BIENNIAL PROGRESS REPORT
- FWP WATER LEASING STUDY -
2006 & 2007

Submitted to:

Montana Environmental Quality Council
Montana Department of Natural Resources and Conservation
And
Montana Fish, Wildlife & Parks Commission

Submitted by:

Montana Fish, Wildlife and Parks
Fisheries Division

Index

Part A – LEASING ACTIVITY REPORT

I. Executive Summary

Reporting requirements for Montana Fish, Wildlife and Parks (FWP) were modified by the 2007 legislative session. New requirements set a biennial reporting schedule with the report due at the end of "odd numbered calendar years". Prior reporting was done annually. The 2006 calendar year report was completed and submitted in December 2006. This first biennial report will reference that report but includes only a brief summary of 2006 activities. The full 2006 monitoring report will not be replicated. Therefore this 2007 report and the previously submitted 2006 report should be considered together.

During the 2006 and 2007 calendar year Montana Fish, Wildlife and Park's (FWP), Water Program

- developed a new water right lease on Lazyman Cr. a tributary to the Ruby River, (The Application of Change of Appropriation Water Right has been submitted to Montana Dept. of Natural Resources and Conservation (DNRC).)
- renewed two leases in the Big Blackfoot Drainage on Chamberlain Creek and Pearson Cr. (DNRC did publicly noticed and approved those lease extensions.),
- renewed the Cedar Creek lease in the upper Yellowstone basin in 2006,
- monitored stream and ditch flows on Trail Creek in the Big Blackfoot drainage during both 2006 and 2007 to determine if adequate infrastructure could be developed and instream flows improved,
- conducted a "flushing / fish passage" flow release test on Mill Creek in the Yellowstone River Basin in 2006,
- investigated a potential restoration and leasing project Hardy Creek in the Missouri River basin during 2006 that included a "short term" diversion reduction agreement.
- commenced worked with Montana Dept. of Justices Natural Resource Damage Program and Atlantic Richfield in transfer of water rights for instream flow in the Upper Clark Fork drainage as part of the super fund clean-up and damages settlement,
- responded to and perform preliminary due diligence review related to water leasing inquires from water right holders.
- provided technical assistance and review of leasing projects being evaluated by other entities.

Water leasing was not a program priority during both 2006 and 2007. Once again Montanan's worked through another year of drought -- the sixth and seventh consecutive drought years for western Montana. FWP's primary water program priority were again, focused upon protection and management of current water rights and stream flows.

II. Water Rights And In-Stream Flow Protection

Water leasing and the "Change of Use" process is only one tool or mechanism that can provide water for instream flow. It is a tool that provides specific benefits and

opportunities. As discussed in the 2005 annual report the leasing program also has limitation and risks.

Fortunately, Montana's water law currently provides several mechanisms to protect instream flows or water levels. These provisions were added relatively late in Montana's water allocation history but include:

1. Water Right created by statutory directive or authorization (These are pre-1873 water rights an include "Murphy Rights" and "public recreational claims".),
2. Purchase or contract from new or existing water storage,
3. State based "Water Reservations",
4. Water Leasing, and the,
5. Designation of "Closed Basin" watersheds.

Water rights created by statutory directive or authorization are derived to from two specific actions. The1969 legislature directed FWP to establish water rights in a specified set of rivers in streams known as "blue ribbon" streams. In the statute creating Montana's general stream adjudication, the legislature also directed FWP to file "Statements of Existing Water Right Claims" for public recreational uses (85-2-222 MCA [2005]). This legislative requirement has been further explored by the Montana Supreme Court in a series of cases commonly referred to a "Bean Lake". Their most recent holding also recognized that there could be other judicially recognized pre-1973 instream water rights. Through, the adjudication proceedings those claims are being reviewed and decided accordingly.

The designation of a basin as "closed" to certain new appropriations of water does not create any new water rights or specifically protect an instream flow level. The designation does however, began to place a cap on additional depletions of water from the system thus protecting existing water rights and maintaining the "status quo".

III. FWP Water Leasing Program & Reporting

Statutory provisions found in 85-2-4436 MCA (2007) providing FWP the authorization to change appropriation rights to instream flow. This statute was amended during the 2007 legislative session. Several changes were made to that statute. The most significant was the addition of a new subsection 6 that allows the agency to permanently change water rights held in fee simple to instream flow.

The water leasing report requirements found in section 85-2-436 (4) MCA [2007] were also amended. New biennial report rather than annual report is to be prepared in odd number years. Copies are to be submitted to the Department of Natural Resources and Conservation (DNRC), the Fish and Wildlife Commission (Commission), and the Environmental Quality Council (EQC).

The report must include a summary of all appropriations rights changes to an instream flow purposes developed in the preceding 2 years, stream reaches approved by DNRC for study (pursuant to 85-2-437, MCA [2005]), and a summary of leasing activity on all

designated streams. The report must include specific information for each new lease including:

(i) the length of the stream reach and how it is determined;
(ii) streamflow or volume needed to enhance or preserve fisheries;
(iii) the amount of water available for instream flows as a result of the change in appropriation rights;
(iv) contractual parameters, conditions, and other steps taken to ensure that each in appropriation right does not harm other appropriators, particularly if the stream is one that experiences natural dewatering; and
(v) methods and technical means used to monitor use of water under each lease.

IV New And Current Leases

Working in partnerships with the Ruby Conservation District, Ruby Watershed Council, and private watershed council FWP assisted in stream restoration and water conservation activities on Lazyman Creek, a tributary to the Ruby River located about the Ruby Reservoir. A lease agreement was signed in October 2007. The conservation and restoration improvements have been developed and installed. An Application for Change in Appropriation Water Right has been submitted to DNRC but not yet publicly noticed.

FWP has ten active leases and one conversion to instream flow on nine streams that have approved "Change of Use Authorizations" issued by DNRC. Current leases with DNRC authorization are developed on the following streams;

1. Big Cr., Yellowstone basin
2. Cedar Cr., Yellowstone basin
3. Mol Heron Cr., Yellowstone basin
4. Locke Cr., Yellowstone basin
5. Hells Canyon Cr., tributary to the Jefferson R. in the Upper Missouri R.
6. Cottonwood Cr., tributaries to Blackfoot R. in Clark Fork Basin
7. Chamberlain Cr., tributaries to Blackfoot R. in Clark Fork Basin
8. Pearson Cr, tributaries to the Blackfoot R. in Clark Fork Basin.
9. Rock Cr. a tributary the upper Clark Fork River.

As noted in previous annual reports FWP, Double Arrow Enterprises, and Double Arrow Ranch Landowners Association have, since 2004, been exploring an instream water lease related to a water conservation project in Trail Creek tributary to the Clearwater River in Western Montana. This project contemplated construction of screens, pipelines, measuring devices and alterations to existing diversion structures. During 2006 and 2007 flows in both the ditch and creek were measured and evaluated. Agreements related to the diversion and screen capacity still need to be finalized.

DNRC has completed examination of the underlying claims according to the Supreme Court rules. This is being done in preparation for the issuance of the Montana Water Court's decree in the statewide general stream adjudication. This examination process has raised additional question related to the size and ownership of affected rights. These factors continue to complicate this project and impede progress. It is unlikely that this lease or Change in Appropriation Water Right will be submitted in the near future.

Figure 1 is a table displaying all of the leases (active, terminated, transferred) that FWP has been associated with over the life of the water leasing project. Three of the leases displayed on this table were not renewed by FWP. A fourth lease, Tin Cup Creek, could not be renewed a second time by FWP under the statutory provision in place at that time. However, the Montana Water Trust was able to acquire and maintain this water lease.

A more detailed discussion of each lease and its monitoring is provided in part B of this report.

PART B
FWP WATER LEASE MONITORING INFORMATION, 2007

I. Yellowstone River Basin

1. Big Creek

Background: Big Creek, a tributary to Yellowstone River near Emigrant, is used by native Yellowstone cutthroat trout from the Yellowstone River for spawning and rearing. Historically, irrigation diversion completely dewatered the lower 1.4 miles of Big Creek. Tributary dewatering is an important, if not the major factor regulating numbers of adult cutthroat trout in the Yellowstone River. Because of shrinking distribution and declining numbers, the Yellowstone cutthroat trout is classified as a "Fish of Special Concern" in Montana and had been petitioned for listing under the federal Endangered Species Act (ESA).

Restoration Objectives: Maintain stream flow in the lower 1.4 miles of Big Creek to improve Yellowstone cutthroat trout recruitment to the Yellowstone River. 11 cfs was determined to maintain 97% of the redds in lower Big Creek. (Byorth, 1989)

Project Summary: FWP finalized two leases on Big Creek in 1999. The first lease, DNRC Authorization to Change No. 43B 19526500, leases 10.0 cfs of the oldest 12.5 cfs water right on Big Creek from May 1 to November 1 of each year. This lease expires May 1, 2009. The installation of a sprinkler system paid for by the water right owner created the water savings to make the 10.0 cfs available for lease. The annual payment to the water right owner is $8,000.

The second lease, DNRC Authorization to Change No. 43B 19062800, leases a total of 16.0 cfs under 5 water rights including the 4th most senior water right from Big Creek from April 15 to October 15 of each year. Of the 16.0 cfs leased, the lease warranties only 1.0 cfs that is enforced against other water users. This lease expires April 15, 2020. The installation of a gravity fed pipeline and sprinkler system funded through the Future Fisheries Improvement Program created the water savings to make the water available for lease. There is no annual payment associated with this lease.

Figure 1. FWP Instream Flow Leasing History, as of December 2007

SOURCE	LESSOR	LEASE TERM/EXP.	PRIORITY OF RIGHT	QUANTITY LEASED	PERIOD OF USE
Mill Creek	Mill Creek Water and Sewer District	Terminated	95 rights with various priorities	41.4 cfs	48-60 hours in Aug. Diversion shut off after 10-day notice from FWP
Mill Creek	Individual	Terminated	June 30, 1880; June 1, 1903	2.0 cfs (1880) and 4.13 cfs (1903) (salvaged water)	May 1 -October 4
Blanchard Creek	Individual	Contract Rescinded 3/5/2004	May 11, 1913 (first right on stream)	3.0 cfs	April 15 -October 15
Tin Cup Creek	Six individuals	Met statutory limit on renewal. 5-year renewal March 28, 2005	August 1, 1883 (first right on stream)	2.28 cfs April 1-April 14 4.32 cfs April 15-April 30 4.72 cfs May 1-October 19	April 1- November 4
Cedar Creek	US Forest Service	10 years Lease Renewed Sep. 20, 2015	April 1, 1890; April 1, 1893; April 1898; April 1, 1904; April 7, 1972 (high water rights only)	6.77 cfs May 1-July 15[2] 6.39 cfs July 16-July 31 9.64 cfs August 1-August 31 6.39 cfs Sept 1 - October 15	May 1-October 15
Hells Canyon Creek	Three individuals	20 years Apr. 1, 2016	December 31, 1884 (1st right on stream), August 23, 1889; August 29, 1912	1.12 cfs (salvaged water)	April 1- November 4
Mill Creek	Individual	Terminated	June 1, 1891	2.64 cfs (salvaged water)	May 1-October 19
Chamberlain Creek	Individual	10 years Apr. 1, 2017	October 10, 1911	½ the flow up to 25 cfs	April 1 - October 31
Pearson Creek	Individual	10 years Apr. 1, 2017	October 10, 1911	Up to 8 cfs	April 1 - October 31
Cottonwood Creek	FWP[3]	20 years Oct. 2016	May 1, 1884	14 cfs April, 37 cfs May 1-June 30, 32 cfs July, 9 cfs August, 6 cfs Sept., 9 cfs Oct. 8 cfs November (Salvaged water)	April 1- November 4

SOURCE	LESSOR	LEASE TERM/EXP.	PRIORITY OF RIGHT	QUANTITY LEASED	PERIOD OF USE
Mol Heron Creek	Private ranch	20 years Dec. 31, 2018	July 15, 1884; May 7, 1885; June 15, 1893; January 1, 1900; March 2, 1903; June 5, 1905; August 5, 1920; April 15, 1967	5.0 cfs to 27.0 cfs	April 15 - October 19
Big Creek	Two private ranches[4]	20 years April 15, 2020	March 12, 1883; June 30, 1901; May 31, 1909; May 15, 1910; May 15, 1910	1.0 – 16.0 cfs (rights dedicated to a land trust in perpetuity)	April 15 - October 15
Big Creek	Private ranch	10 years May 1, 2009	June 30, 1873 (1st right on stream)	10.0 cfs	May 1 - November 1
Rock Creek	Private ranch	20 years	March 23, 1881; May 15, 1881; June 1, 1892; May 1, 1898; September 29, 1904; May 10, 1907	5.0 - 27.22 cfs	April 15 - October 31
Locke Creek	Private ranch	30 years; December 14, 2031	March 6, 1915	7.5 cfs	April 20 – October 24
Cedar Creek	Private ranch	30 years: June 9, 2033	May 29, 1894 (4th right on stream; other high-priority rights already leased by FWP); June 11, 1971 (high water right); April 7, 1972 (high water right)	3.25 cfs 3.76 cfs (high water)	April 1 – November 4
Trail Creek	Resort (and) Homeowners Association	30 years: June 3, 2034	April 10, 1905 January 10, 1911	1.06 cfs 2.37 cfs plus an additional 0.5 cfs during periods of low flow	Both have periods of use: April 1 to October 31.

Flow Monitoring: FWP monitors flows in Big Creek at the Kendall Bridge located about 0.2 miles downstream of the last major irrigation diversions. Again in 2007 FWP used an Aqua rod® at this location to electronically and continuously record stream stage or elevation of the water in Big Creek. This stage information is used in conjunction with a mathematical stream rating function determined by actual stream flow measurements to calculate the instantaneous flow in Big Creek every 30 minutes. The Aqua rod® was installed April 5th and removed on November 1st to prevent possible damage from freezing.

Figure 2. 2007 Big Creek discharge

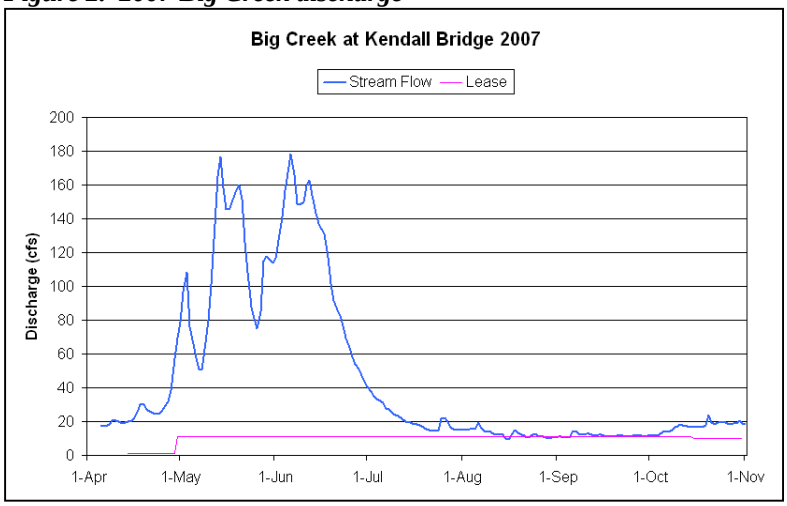
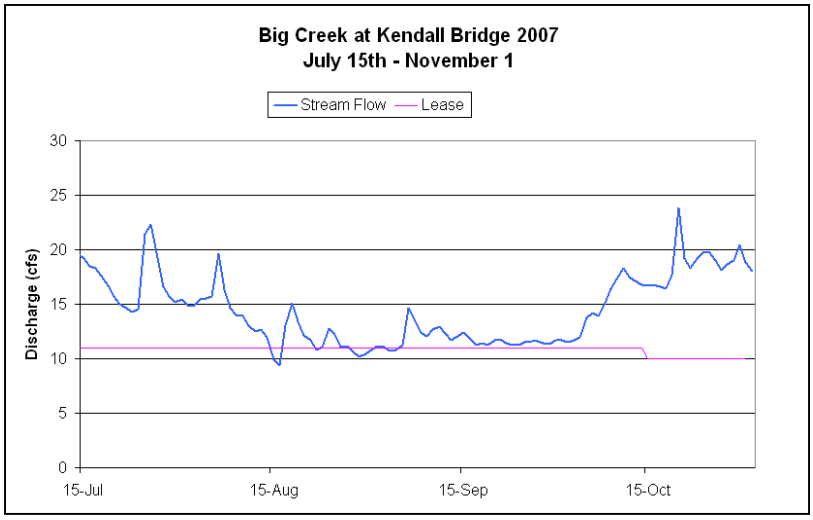


Figure 2 shows the hydrograph for Big Creek at the Kendall Bridge below the main irrigation diversions as well as the leased flow rates. Figure 3 displays the same information, but focuses on the low-flow period of the year from July 15th through November 1st.

Figure3.



Similar to 2006 low flow conditions were encountered in 2007 about two weeks earlier than in 2005. Peak flows were substantially lower in 2007 than in 2006 reflecting the much lower snow-pack conditions.

Without reductions in irrigation diversions, flows would have dropped much more significantly in August and September. The irrigators monitor the flow in Big Creek by reading the staff gauge attached to the Kendall Bridge. As the water is not completely still at this location, readings of the staff gauge are less than exact. For example, during low flows a difference of ½ inch in reading the staff gauge equates to a difference of about 1 cfs. This variability makes it difficult to exactly manage irrigation diversions to maintain the leased flow levels and contributes to the number of days when average flows

are slightly below the leased levels. The hydrograph in Figure 3 indicates that the irrigators made appropriate adjustments in diversions to maintain the leased flow rates.

In 2007, the Big Creek leases continued to keep the lower 1.4 miles of Big Creek sufficiently watered to meet the objectives of the leases.

2. Cedar Creek

Background: Cedar Creek, a tributary to Yellowstone River near Corwin Springs, historically has been an important spawning stream for Yellowstone cutthroat trout. However, during times of drought irrigation diversions threatened to limit the flow in the lower 2700 feet of the stream, potentially limiting fry production and migration into the Yellowstone River.

Restoration Objectives: Maintain stream flow in the lower 2700 feet of Cedar Creek to continue Yellowstone cutthroat trout recruitment to the Yellowstone River. Historically irrigation diversions never completely dewatered the stream. The nature of the diversion dams allowed for some water to bypass the diversions and remain instream. The leases provide the legal basis for the bypass of this water and serve to greatly reduce competition for water.

The lease total of 3 cfs equals the inflection point derived using the wetted perimeter method providing an indicator of the most desirable minimum flow. Review of velocity and depth data indicates that 3 cfs or more is likely necessary for successful spawning. However, 1.3 cfs is sufficient to cover nearly all the redds in lower Cedar Creek and maintain connection with the Yellowstone River for fry migration.

Lease Summary: Two in-stream leases are currently in place on Cedar Creek. The first lease, DNRC Authorization to Change No. 43B 12253900, approved in 1995 and implemented in 1996 leases 7 irrigation water rights on Cedar Creek and its tributaries with a combined flow rate of up to 9.61 cfs in August from the U.S. Forest Service including the 2nd oldest priority right in the Cedar Creek drainage. These water rights were associated with the historic OTO Ranch, which the Forest Service gained title to provide for winter range for the Northern Yellowstone Elk Herd. The lease protects a flow of 1.3 cfs in the lower 2700 feet of Cedar Creek from May 1 to October 15 of each year. 1.3 cfs is the minimum flow necessary to prevent fry loss due to redd dewatering. This lease expired September 20, 2005 and was re-authorized by DNRC in 2006 for an additional 10 years. Under the renewal agreement, there is no monetary compensation to the U.S. Forest Service.

The second lease, DNRC Authorization to Change No. 43B 30005084, approved and implemented in 2004 leases 3 irrigation water rights on Cedar Creek with a combined flow rate of 7.01 cfs including the 3rd oldest priority right. The lease protects an additional flow of 1.7 cfs in the lower reach of Cedar Creek from April 1 to November 4 of each year. This additional lease provides a total protected flow of 3.0 cfs. Based on stream cross-sectional work by FWP, this flow is the minimum necessary to maximize spawning/incubation habitat. This lease expires February 20, 2034. The installation of a

reservoir with a gravity fed pipeline and sprinkler system in an adjacent drainage funded in part through the Future Fisheries Improvement Program made the water available for lease. There is no annual payment associated with this lease.

Flow Monitoring: FWP has three flow monitoring locations on Cedar; one at stream mile 2.0 above the OTO Ranch buildings, a second above the lower diversions at stream mile 0.55 and a third location near the mouth below all the diversions. The lowermost monitoring location is the most important as it measures the stream flow in the reach historically dewatered.

Again in 2007 FWP used an Aqua rod® at the lower monitoring location to electronically and continuously record stream stage near the mouth of Cedar Creek. This stage information is used in conjunction with a mathematical stream rating function determined by actual stream flow measurements to calculate the instantaneous flow in Cedar Creek every 30 minutes. Figure 4 shows the hydrograph for Cedar Creek near the mouth below the irrigation diversions as well as the leased flow rates. Data was not collected after August 15th because of technical difficulties. A staff gauge reading corresponding to a flow of 1.61 cfs on August 29th indicates the lease functioning correctly through the critical fry out-migration period that ends about September 1st. A single flow measurement on September 27th shows flows dropped to 0.92 cfs, but this should have had no impact as fry out-migration was completed. The Aqua rod® was installed on April 5th and removed on November 1st to prevent possible damage from freezing.

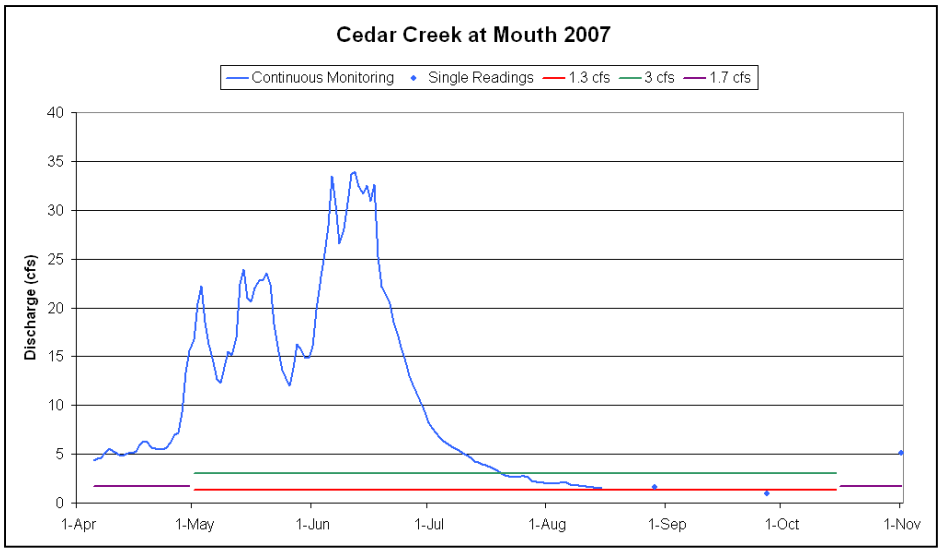


Figure 4. 2007 Cedar Creek discharge near mouth in comparison to leased flow rates.

The final order of the DNRC for Authorization to Change No. 43B 12253900 required the two upstream monitoring sites. The objective of this additional monitoring is to determine the amount of water the stream gained between the points of diversion for the Forest Service rights being leased and the lower diversion points, a distance of about 1.5 miles. FWP measured the flow differences in this reach once on August 8, 2005. Flow of 9.55 cfs was measured above the OTO Ranch buildings with a flow of 8.91 cfs measured above the lower diversions for a loss of 0.64 cfs or 6.7%. The fact that Cedar Creek lost water instead of gained is likely due to the Forest Service not irrigating with its remaining water rights during June and early July, 2005. As Cedar Creek seems to lose water as opposed to gaining and the Forest Service did not irrigate again in 2007 no

measurement comparisons between the two upper monitoring sites were made in 2007. Fire danger on the OTO Ranch made unnecessary trips into this restricted access area undesirable.

Comparison of flows at the monitoring gauge upstream of the lower diversions and the gauge near the mouth were made again in 2007 to assess how much water was being diverted by water users with the senior water rights. As in previous years, the water users made appropriate adjustments to their diversion as streamflow decreased.

3. Mol Heron Creek

Background: Mol Heron Creek, a tributary to the Yellowstone River near Corwin Springs, historically has been an important spawning stream for Yellowstone cutthroat trout. However, during times of low stream flow irrigation diversions dewatered the lower 0.5 miles of the stream, limiting fry production and migration into the Yellowstone River.

Restoration Objective: Maintain stream flow in the lower 0.5 miles of Mol Heron Creek to improve Yellowstone cutthroat trout recruitment to the Yellowstone River. Wetted perimeter data indicates that 6 cfs would be the minimum desirable flow in lower Mol Heron Creek. However the leased flow 5 cfs was a negotiated value and still provided some level of protection for redds and adequately maintains connection with the Yellowstone River to provide for fry migration.

Lease Summary: One lease is currently in place on Mol Heron Creek. The lease, DNRC Authorization to Change No. 43B 18577200 approved and implemented in 1998, leases 27.0 cfs under 8 Mol Heron Creek water rights from April 15 to October 19 of each year. Of the 27.0 cfs leased, the lease 5.0 cfs to be left instream below the lowest diversion on Mol Heron Creek at all times. This lease expires December 31, 2018. The Future Fisheries Improvement Program funded the lease. The installation of sprinkler irrigation system created the water savings to make the water available for lease. There is no annual payment associated with this lease.

Flow Monitoring: The flow monitoring for the Mol Heron Creek lease occurs approximately 200 ft. upstream of the confluence with the Yellowstone River. FWP installed an Aqua rod® at the monitoring location to electronically and continuously record stream stage or elevation. It recorded data from April 5th through November 1st. This stage information is used in conjunction with a mathematical stream rating function determined by actual stream flow measurements to calculate the instantaneous flow in Mol Heron Creek every 30 minutes. Figure 5 shows the hydrograph for Mol Heron Creek as well as the leased flow rates.

Stream flow in Mol Heron Creek was substantially lower in 2007 than 2006. Flow dropped below 10 cfs nearly 1 month earlier. Despite lower flows earlier in the summer the Mol Heron Creek lease continued to successfully keep the lower 0.5 miles of Mol Heron Creek sufficiently watered to meet the objective of the lease.

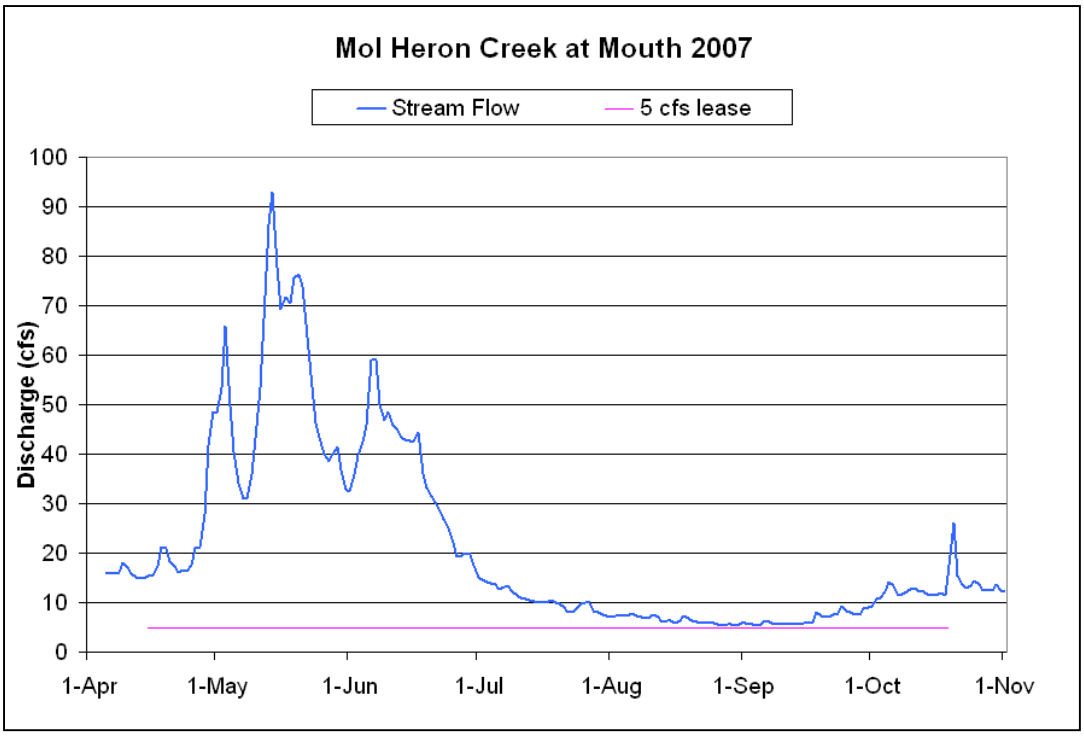


Figure 5. 2007 Mol Heron Creek discharge near mouth.

4. Locke Creek

Background: Locke Creek, a tributary to the Yellowstone River near Springdale, historically has been an important spawning stream for Yellowstone cutthroat trout. However, during times of low stream flow irrigation diversions dewatered the lower 0.15 miles of the stream, limiting fry production and migration into the Yellowstone River. This diversion also limited access to approximately 0.35 miles of potential spawning and rearing habitat.

Restoration Objectives: To maintain stream flow in the lower 0.15 miles of Locke Creek and provide access to an additional 0.35 miles to improve Yellowstone cutthroat trout recruitment to the Yellowstone River.

Lease Summary: One lease with the sole irrigation diverter on Locke Creek is currently in place. The lease, DNRC Authorization to Change No. 43B 30001336 approved and implemented in 2004 leases one irrigation water right with a flow rate of 7.5 cfs from April 20 to October 24 of each year. A second irrigation right has not been changed to instream flow. However, under the terms of the lease agreement the lessor cannot use this water right during the lease period. This lease expires June 4, 2032. From about 1975 on the irrigation right was exercised via diversion and pump diverting about 1.5 cfs located at stream mile 0.15 supplying a sprinkler system. The water right owner replaced the Locke Creek diversion with a well that is not hydrologically connected to Locke Creek. This change from surface to ground water created the water savings leased by FWP. FWP made a one-time payment to the lessor from the Future Fisheries Improvement Program. There is no annual payment associated with this lease.

Flow Monitoring: FWP monitors the flow in Locke Creek just above the creek's mouth. An Aqua rod® located at the monitoring location electronically and continuously recorded stream stage in Locke Creek. This stage information is used in conjunction with a mathematical stream rating function determined by actual stream flow measurements to calculate the instantaneous flow in Locke Creek every 30 minutes.

Figure 6 displays the hydrograph for Locke Creek near the mouth. The Aqua rod® was installed on April 5th and removed on November 1st to prevent possible damage from freezing. Average daily flows peaked at the beginning of May and again in mid June. Both peak flows and base flows were substantially higher than in 2006. Without the lease the historic diversion of up to 1.5 cfs would have completely dewatered the stream beginning on about July 28th as, as compared to June 1st in 2006 and July 10th in 2005.

In 2007, the Locke Creek lease continued to successfully keep the lower 0.15 miles of the creek sufficiently watered to meet the objective of the lease.

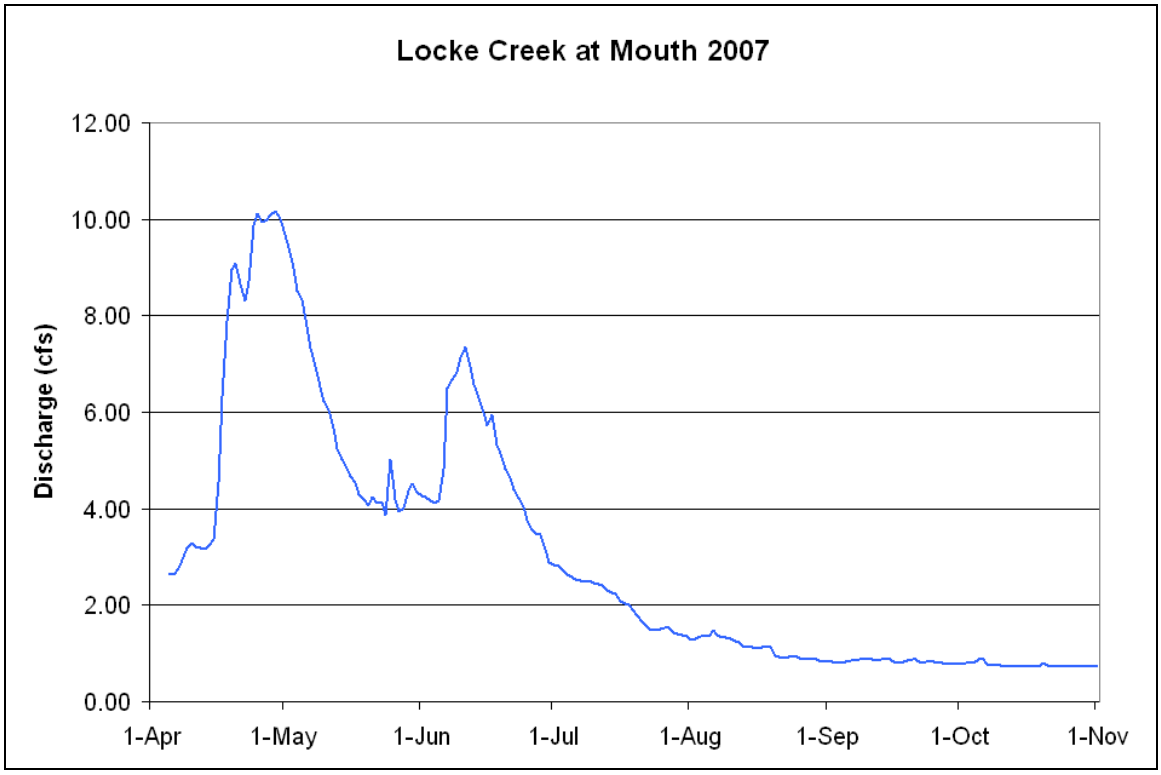


Figure6. 2007 Locke Creek discharge near mouth.

Biological Monitoring

FWP operated an adult fish trap to capture spawning fish from the Yellowstone River. Adult trapping began on May 15th, 2007 and went on for a total of 38 days ending on June 25th, 2007. A total of 1 Yellowstone Cutthroat, 5 Rainbows and 3 Brown trout were captured.

FWP operated fry traps near the mouth of Locke Creek from July 24th to August 12th. During this time frame captured no trout fry exiting Locke Creek to the Yellowstone River. This indicates very little or no production of trout fry in lower Locke Creek due to an apparent lack of a spawning run by adult fish.

Fish Access Issues: During the recent years of extend drought there has been concern as to whether or not the spawning run of Yellowstone cutthroat trout from the Yellowstone River into Locke Creek has endured. The connection between Locke Creek and the Yellowstone River is somewhat tenuous. Locke Creek flows into a side channel of the Yellowstone River that may not provide an adequate connection to the Yellowstone except at quite high flows.

As previously noted fish passage impairments through the box culvert under the railroad at the mouth of Locke Creek may also be limiting fish access to Locke Creek. This is suspected to be a greater impediment that the lack of connection with the side channel described above. The shallow, laminar flow may be too difficult for most fish to move through into Locke Creek.
FWP is presently working with a consultant to develop a design to facilitate fish passage up to and through the railroad culvert. This project will consist of a structure near the mouth that will allow FWP staff to regulate the structure to prevent passage of rainbow trout, while allowing Yellowstone cutthroat trout to move into Locke Creek. A series of boulder formed step pools will provide access to the culvert, and backwater flows through the culvert, thereby increasing water depths.

If an adequate design can be developed and funding secured the project may be implemented before the next spawning season. More likely the project will be completed after spawning in the late summer or the fall of 2008.

II. Missouri River Basin

5. Lazyman Creek – New Lease in 2007

Background: Lazyman Creek is a small tributary to the Ruby River located in the Gravelly Range of the Beaverhead-Deerlodge National Forest approximately 40 miles south of Sheridan. Lazyman Creek flows through both Forest Service and private land in holdings. Presently Lazyman Creek is dewatered later in the summer and into the fall due to a single irrigation diversion. This water lease would provide at least 1 cubic foot per second (cfs) of stream flow in lower Lazyman Creek below the irrigation diversion.

Restoration Objectives: The Lazyman Creek has been identified as a stream suitable to incubation and rearing of fluvial arctic grayling. This water lease would provide sufficient flow in the lower Lazyman Creek for FWP personnel to incubate grayling and to allow for the rearing of grayling in the stream. Once the channel and stream flow is restored adult grayling reared in Lazyman Creek should return to the stream to naturally reproduce.

Lease Summary: FWP has prepared and submitted an application to submit to DNRC to temporarily change a portion of the landowner's water right to instream flow to provide a minimum of 1 cfs of flow in lower Lazyman Creek.

The Lazyman Creek Instream Flow Water Right Lease Agreement was signed in October 2007. It leases a portion of a private landowner's irrigation water right to maintain and enhance stream flow in the lower reach of Lazyman Creek.

The period of the lease is 20 years, the same period as the NRCS and Future Fisheries contracts. The water leasing statute allows water conservation projects such as the Lazyman Creek Project to have a lease period equal to the expected life of the project not to exceed 30 years. After 20 years the water right owner and FWP can renew the lease if both parties desire to do so.

Implementation: The work to be done as part of the Lazyman Creek Project includes stream restoration as well as improvements to the landowner's irrigation system that reduce the amount of water needed to effectively irrigate. The project will improve stream habitat, reduce sediment in both Lazyman Creek and the Ruby River and provide instream flow in lower Lazyman Creek, all which are necessary to establish natural reproduction of grayling. The stream restoration was completed in the Fall of 2007 with the irrigation improvements scheduled to be completed in the Spring of 2008.

The Lazyman Creek project is sponsored by the Ruby Watershed Council. The Council has already secured funds for the project from the Future Fisheries Improvement Program and the Natural Resource and Conservation Service (NRCS). The NRCS funds are contingent on approval of this lease agreement. The stream restoration and improvement to the irrigation system constitute the payment for the water lease. No additional payment to the Lessors would be required.

6. Hell's Canyon Creek

Background Hell's Canyon Creek is tributary to the Jefferson River. The small stream originates in the Highland Mountains flows to the southeast and joins the Jefferson River on its west bank upstream of Silver Star, Montana. The lease was developed and perfected between 1992 and 1996. The lease incorporated the construction of a new diversion, fish screen, gravity pipeline, and sprinkler system. Water use efficiency was improved, water demand reduced and water salvaged for instream flow. The salvage portions of three water rights are leased under this agreement.

Restoration Objectives: FWP's goal was to enhance and preserved a valuable rainbow trout spawning stream. The guaranteed minimum flows for Hell's Canyon Creek established in the lease agreement were:

TIME PERIOD	MINIMUM FLOW (CFS)	PURPOSE
April 1 – July 15	1.60 cfs	maintain rainbow trout egg incubation
July 16 – Nov. 4	0.25 cfs	provide fry migration to avoid stranding

Flow Monitoring: The Hell's Canyon Creek water lease was monitored during 2007 to determine effectiveness and compliance of the lease agreement with landowners operating the Hell's Canyon Creek Gravity Pipeline. The pipeline was installed and the water lease implemented in 1996. Monitoring of pipeline withdrawal and stream flow from 1996 through 2007 did not observe problems with meeting guaranteed minimum flows in Hell's Canyon Creek. Stream flow monitoring in 2007 involved site visits during 15 days during the irrigation season, and 4 flow measurements were obtained to establish a stage discharge relationship (Figure 7). Stream flow was never observed below 1.60 cfs during the April 1 to July 15 period, and did not fall below 0.25 cfs during the July 16 to November 4 time period. Thus, the lease agreement was satisfied in 2007.

Figure7. Flow monitoring site
24 July 2007 1.3 cfs

Hell's Canyon Creek flows are monitored by taking a) periodic stream discharge readings, b) staff gage readings and c) mentoring water levels (stage) via a data logger. Figure 8 summarizes the manually recorded staff gage and discharge measurements collected over the irrigation period.

Figure 8. Hells Canyon Creek Flow Monitoring – 2007

Date	Gage Ht.	Measured Q	Time	Temp.	Comments
4-23-07	1.91				
6/21/07	2.08	10.58	1645		Aqua Rod installed
6/28/07	1.99	8.24	1728		
7-11-07	1.74		1700		Wheel Lines Operating
7-16-07	1.82	2.60 cfs	1800	68 F	
7-24-07	1.70		1600	65 F	RB fry Common
7-25-07	1.80	1.84 cfs	1100	65 F	Rain last night
7-31-07	1.65	0.54 cfs	1400		
8/1/07	1.64		1500		Talked to Ty Sandru and Dustin's to cut one wheel line
8-10-07	1.75		1300		
8-13-07	1.73	1.30 cfs	1300		
8-16-07	1.66		1100		RB Fry Common
8-20-07	1.78		1400		Showers
8-26-07	1.71		0900		
8-31-07	1.75		1000		
9-4-07	1.75				
9-9-07	1.81		1200		Flow Continued to improve through the fall

Simple Regression Equation: Flow = -17.503 + 10.899*GH (Based on 4 Measured Q's)

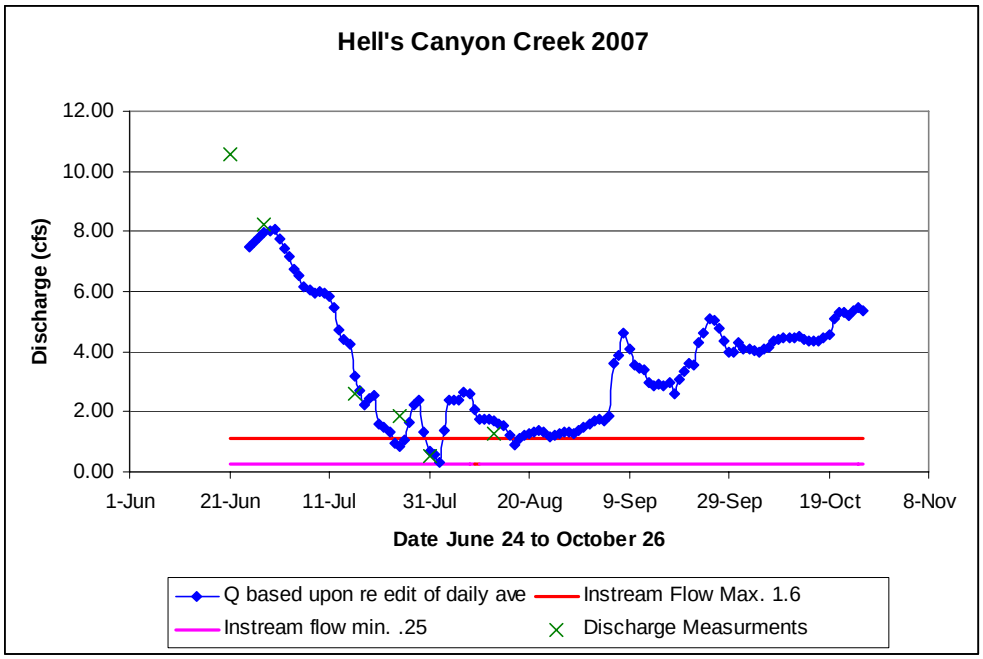


Figure 9

The data logger was installed on a bridge abutment near the monitoring site. The data logger provides a continuous measurement of water level (stage). From this a calculated record of discharge (flow) can be derived. Figure 9 is a graph displaying this calculated flow as well as the manually collected record of measured flows and the minimum and maximum instream flow targets.

The severe drought of recent years has created very low stream flows in Hell's Canyon Creek, and the extremely hot and dry conditions continued during the 2007 irrigation season. On 31 July, flow decreased to 0.54 cfs. FWP contacted the two water users operation the gravity pipeline to inform them that the flow was at a critical stage. After this date, water users began using 2 wheel lines instead of 3. Stream flows stabilized and improved through the remainder of the summer.

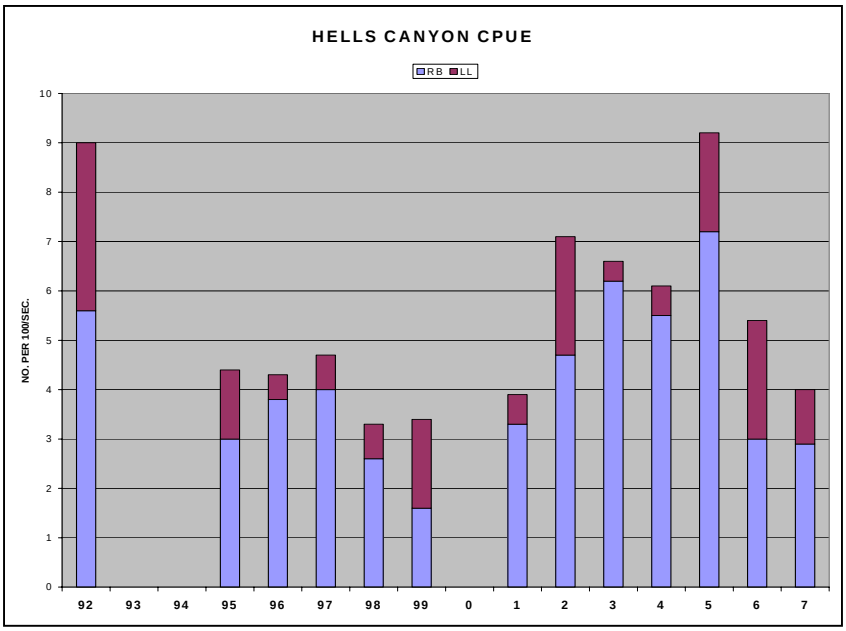
During the extremely dry conditions experienced during August and September from 2000 to 2007, the stream flow of Hell's Canyon Creek was low throughout the summer irrigation season. Although the terms of the water lease were met during each of these years, the low flows resulted in marginal conditions in the lower 2 miles of stream below the pipeline system.

Biological Monitoring: Trout fry were not sampled at the fish screen bypass in 2006. This sampling is done once every two or three years to determine the effectiveness of the fish screen placed at the intake of the gravity pipeline system. Typically, this sampling estimates that several thousand trout fry are screened from the irrigation system during the July and August period of fry migration to the Jefferson River.

An electro fishing survey of juvenile trout was conducted near the mouth of Hell's Canyon Creek during 2007 using similar methods employed at this stream beginning in

1992. In 2007, we captured 1.1 brown trout fry per 100 seconds of sampling, which was slightly less abundant than the long-term average of 1.4 brown trout captured per 100 seconds of electro fishing from 1992 to 2006. We captured 2.9 rainbow trout fry per 100 seconds of sampling in 2006, which is slightly less than the long-term average of 4.2 per 100seconds.

Figure 10



This sampling is conducted during November and it confirms that adequate flow is available for trout fry to survive and rear in lower Hell's Canyon Creek throughout the summer and fall (Figure 10). This figures displays the abundance of juvenile rainbow and brown trout near the mouth of Hells Canyon Creek during fall electrofishing surveys using Catch-Per-Unit-Effort (CPUE) techniques from 1992 through 2007.

Although abundance of juvenile trout rearing in Hells Canyon Creek was slightly below average during 2007, the stream would likely have been dewatered during 2007 and other dry years since 2000 without the efficient operation of the gravity pipeline systems and the associated water lease. Summer rearing of juvenile trout would not have been possible using the previous system of a long open ditch.

The quantity of water leased at Hells Canyon Creek is relatively low, but provides adequate flow for rearing and migration of trout fry. Flow on 24 July 2007 was approximately 1.3 cfs, and rearing habitat for trout fry appeared to remain suitable (Figure 11). The importance of rearing habitat in tributaries has increased in recent drought years due to the extremely low flow conditions of the Jefferson River (Figure 3).

Figure 11. Mouth of Hells Canyon Creek 24 July 2007 flow 1.3 cfs

III. COLUMBIA RIVER BASIN

7. Cottonwood Creek

Background: Cottonwood Creek, a large tributary to the middle Blackfoot River originating near Cottonwood Lakes. The stream flows 16-miles to its junction with the Blackfoot River at river mile 43. Cottonwood Creek supports bull trout, west slope cutthroat trout (WSCT), rainbow trout, brown trout and brook trout.

FWP acquired the water rights along with lands purchased for the Blackfoot Clearwater game range**.** There are numerous water rights associated with these purchased lands. Three of these water rights, the three most senior rights on the stream, are being used for both instream flow enhancement and irrigation. In water short years the emphasis is place on instream flows. Prior to the conversion this "Dreyer Diversion" completely dewatered a portion of Cottonwood Creek during the late irrigation season.

Restoration Objectives: Improve degraded habitat; eliminate fish losses to irrigation ditches; and restore migration corridors for native fish. Completed restoration measures involve water conservation and water leasing, upgrading irrigation diversions with fish ladders, fish screens at large diversions, and implementation of riparian grazing changes.

Project Summary: Cottonwood Creek is not a lease, but a conversion allowed under the statutorily developed Upper Clark Fork River Basin In-stream Flow Pilot Program (85-2-439 [1997]). Current This lease/conversion is included in this report as an example of FWP's other instream flow-related activities. The conversion was initiated in 1997.

Only a portion of this Water Right was converted to instream flow. When there are adequate water supplies water is used for both instream flow and irrigation. To accomplish this mix of benefits considerable work was done on water use infrastructure.

A new diversion, headgate and fish screen was installed. The ditch was realigned and line from the diversion to the field headgate. Measurements of ditch flows after installation of a mechanical liner were unable to discern any losses. Since ditch lining salvaged considerable water and allows for continued irrigation with far less water demand.

Flow Monitoring: Blackfoot Clearwater Game Range agriculture personnel administer water withdrawals at the Dreyer Diversion and monitor flows in Cottonwood Creek. Since only portions of the water rights were converted to instream flow, spot checks have revealed a proper balance of water has been found between diverted and instream water. With the extreme low flows resulting from low snow pack and continued drought diversion of irrigation waters from the Dreyer diversion ceased by mid July 2007.

A comprehensive flow-monitoring program for Cottonwood Creek is not essential because there are no diversions within the approximate 2-mile-long reach where FWP protects its salvaged water. (Protected reach begins in SE ¼ section 24, T16N, R14W., carries through section 25, and ends in section 30 of T16N, R13 W.

Currently the benefits of the lease effectively extend to Cottonwood Creeks confluence with the Blackfoot River. The "Bandy Ranch" irrigation diversion located just downstream of the protected reach has been moved and converted from a ditch / flood system to a pumped center pivot. Dramatically reducing demand. The next 3 diversions are water right held by FWP and in time of extreme shortage the agency can elect not to divert. The next and last diversion is currently not in use. As a result of these other water management and use patterns "salvaged" and converted water are extending benefits approximately another 5.5 miles.

Biological Monitoring WSCT and bull trout dominate the headwaters. Genetic testing of WSCT in Cottonwood Creek in 2003 showed no introgression. Rainbow trout inhabit the lower mile of stream while brook trout and brown trout dominate middle stream reaches.

In 2006 and 2007, FWP's continued to monitor fish populations in upper Cottonwood Creek (mile 12.0) where enhanced flow, irrigation ditch screening and diversion upgrades were made. Prior to 1997 this section was completely dewatered during late summer and fall by irrigation. Also resurveyed in 2007 were middle Cottonwood Creek (mile 7.5) as well as three nearby spring creeks on FWP lands. These middle Cottonwood Creek and nearby spring creek monitoring sites were originally established in 1991 prior to the current level of riparian degradation (Pierce et al. 1997).

At the upper Cottonwood Creek monitoring site (mile 12.0), age 1 and older WSCT have remained stable in recent years, following an initial increase in the late 1990s. Bull trout densities have remained static at low densities (Figure 10). By contrast, fisheries at the middle Cottonwood Creek (mile 7.5) monitoring site show community-level decline in the area of livestock over-use (Figure 12). Likewise, sampling on three adjoining spring creeks (entering middle Cottonwood Creek as miles 6.4, 6.7 and 7.5) show declines in species richness and abundance. In 1991, brown trout were identified throughout the spring creeks, and WSCT were present in two of three spring creeks. However, in replicate 2007 surveys, all trout species were identified in reduced densities

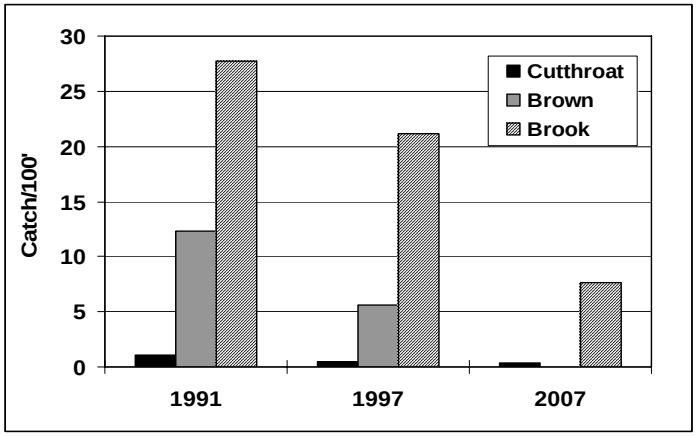


Figure 12. CPUE for salmonids in Cottonwood Creek at mile 7.5 in 1991, 1997 and 2007.

in areas where riparian conditions have deteriorated. Brown trout were found in low densities in only one spring creek, and WSCT were absent from all spring creek samples. Brook trout have also expressed declines compared to 1991 (Pierce et al 1997)

Water temperature monitoring in lower Cottonwood Creek shows continued warming since 2001. Sentinel exposures near the mouth (mile 1.1) from 2006 and 2007 show a continuous high severity of whirling disease (mean grades of 3.96 and 4.25, respectively).

8. Chamberlain Creek

Background: Chamberlain Creek is a tributary the Blackfoot River. This small tributary arise in the Garnet Mountain and enters the middle Blackfoot River, at river mile 43.9. Base stream flows are ~2-3 cfs. Chamberlain Creek flows into the Blackfoot's south bank and joins the river below Monture Creek and above the Clearwater drainage. Pearson Creek, the next described lease, is just upstream. The same water right owner holds the underlying rights of both Chamberlain and Pearson Creek

The initial water lease on Chamberlain Creek was to expire the spring of 2007. The water right owner was interested in extending the lease. A lease renewal was developed. DNRC noticed the extension of time. No water users or water right holders raised any objections or concerns or noted any harm related to past project operations or its renewal. Therefore on May 29th DNRC issued a renewed Authorization to Temporarily Change the underlying water right to instream flow until April 1, 2017.

Restoration Objectives: Improve access to spawning areas; improve rearing conditions for WSCT; improve recruitment of WSCT to the river; provide thermal refuge and rearing opportunities for fluvial bull trout.

Project Summary: Sections of lower Chamberlain Creek were severely altered, leading to historic declines in WSCT densities. Adverse changes to stream habitat included channelization, loss of instream wood, dewatering, excessive riparian livestock access, road encroachment, and elevated instream sediment from road drainage. Other problems included fish losses to irrigation ditches, impaired fish passage, and more recently the escalation of whirling disease in lower reaches.

Since 1990, Chamberlain Creek has been the focus of a comprehensive fisheries restoration effort. Projects include road drainage repairs, riparian livestock management changes, fish habitat restoration, irrigation upgrades (consolidated ditches, water conservation, elimination of fish entrainment, and a fish ladder installation on a diversion), and improved stream flows through water leasing. Restoration occurred throughout the drainage but focused mostly on the lower mile of stream.

Biological Monitoring: Chamberlain Creek is dominated by WSCT over its entire length, with low densities of rainbow and brown trout in lower reaches. Radio telemetry identified Chamberlain Creek as a primary spawning stream for fluvial WSCT from the Blackfoot River (Schmetterling 2001).

In 2006-07, FWP's continued to monitor fish population densities, water temperature and whirling disease in the restoration area near the mouth. Fish population surveys at mile 0.1 identify >10 years of stable densities of age 1 and older WSCT (Figure 12).

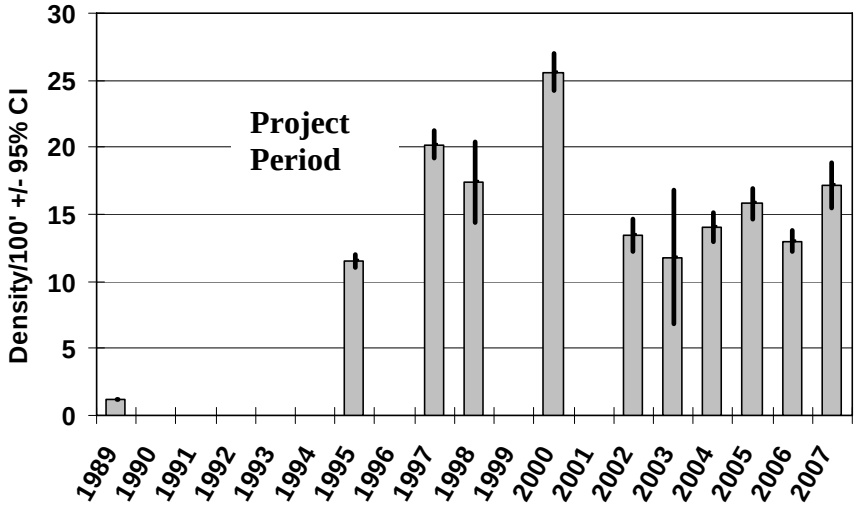


Figure 12. *Densities of age 1 and older WSCT in Chamberlain Creek at mile 0.1, 1989-2007.*

Fluvial spawning occurs throughout the mainstem and extends into Pearson Creek and the East Fork of Chamberlain Creek. Beginning in 1997, we found low numbers of bull trout using the stream in areas affected by restoration. In 2006, we continued to monitor fish populations at mile 0.1 in a reach of stream influenced by the water lease. Densities remain much higher than before the project. Recent density declines (2002-04) are likely related to continuing drought.

Flow Monitoring: Chamberlain Creek has only two water users. One user has leased all his water to FWP. The second diverts half the water into a pond, and then returns all but the evaporated water to Chamberlain Creek.

FWP primarily relies on the lessor to monitor instream flows. FWP personnel periodically check the gauge and measure flows to ensure an even flow distribution between the two water users. In past years spot checks revealed an equal distribution of water diverted and left instream. Under an agreement with FWP the United States Geologic Survey (USGS), is to measured flows on four occasions during the irrigation season. Unfortunately, with USGS personal changes in 2007 water measurement were missed in 200 is unavailable.

9. Pearson Creek

Background: Pearson Creek a tributary the Blackfoot River. This stream is a small Garnet Mountain tributary to the middle Blackfoot River, entering at river mile 43.9 with a base flow of ~2-3 cfs. Pearson Creek flows into the Blackfoot's south bank and joins the river below Monture Creek and above the Clearwater drainage. Chamberlain Creek, the previously described lease, is just upstream. The same water right owner holds the underlying rights of both Chamberlain and Pearson Creek

Pearson Creek initial lease was to expire this past spring. The water right owner was interested in extending the lease. A lease renewal was developed. DNRC noticed the extension of time. No objections or concerns were raised by any water user. Therefore on May 29th DNRC issued a renewed Authorization to Temporarily Change the underlying water right to instream flow until April 1, 2017.

Restoration Objectives: Restore the stream to its original channel; improve stream flows through, condition of, and access to a historic fluvial WSCT spawning site.

Project Summary: Pearson Creek is a small tributary to Chamberlain Creek with a base-flow of approximately one cfs. Pearson Creek has a history of channel alterations, and adverse irrigation and riparian land management practices the lower two-miles of its channel. The Pearson Creek restoration effort includes conservation easements, water leasing, channel reconstruction, riparian habitat restoration and improved riparian grazing management. Beginning in 1994, Pearson Creek has been the focus of a holistic restoration project involving channel reconstruction and instream habitat work, instream flow enhancement (water leasing), conservation easements and riparian grazing changes. Additional riparian grazing improvements completed in 2006 included riparian corridor fencing for the lower two miles of stream, off-stream water developments and armoring a road crossing.

Biological Monitoring: Pearson Creek is a fluvial WSCT spawning stream connected to the Chamberlain Creek WSCT population. In 2006 and 2007, we continued fish population monitoring at two sites in lower Pearson Creek. The upstream site (mile 1.1) was established in 1999 prior to instream restoration activities. Following an initial increase between 1999 and 2000, age 1 and older WSCT have remained static at higher densities. In 2005, we established the downstream site (mile 0.5) following the degradation of stream banks by cattle. Fish population sampling results for both sites are summarized in Figure 13.

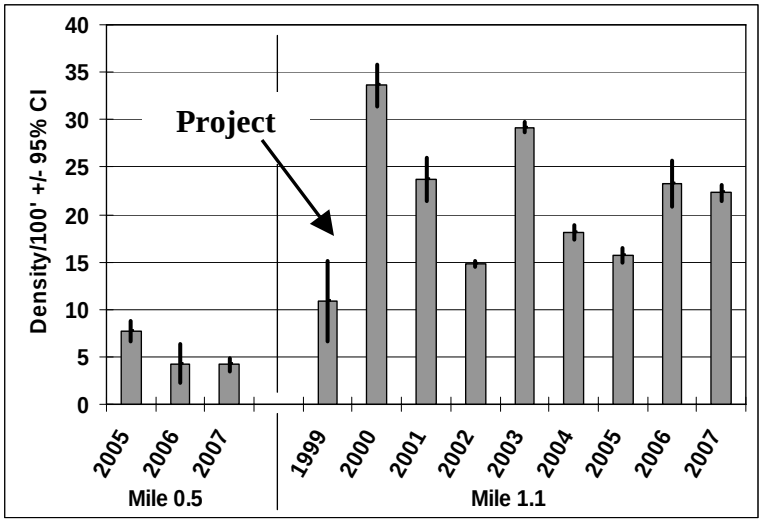


Figure 13. Densities of age 1 and older WSCT in Pearson Creek at miles 0.5 and 1.1, 1999-2007.

Flow Monitoring: Lessor was the only consumptive water user on Pearson Creek. FWP spot checks flow in Pearson Creek to ensure that all water remains in stream. In past years lessor has left all the water in Pearson Creek. In 2007 spot checks revealed that no water was diverted. The creek had all of its natural flow.

10. Rock Creek

Background: Rock Creek is a tributary to the Clark Fork River whose confluence is in the upper basin near Garrison, Montana. This stream was historically dewatered, over-grazed, unstable and contained virtually no pool habitat within the lower 2.5 miles, reducing its potential as a spawning tributary and contributing excessive nutrients and sediment to the Clark Fork River.

Restoration Objectives: Improve fish and wildlife habitat through instream flow, nutrient and sediment reduction, habitat improvement, channel stabilization, and removal of fish passage barriers and assist with riparian management.

Project Summary: The project has improved fisheries and wildlife habitat in both Rock Creek and the Clark Fork River. Leased and salvaged water has also provided spawning, rearing and over wintering salmonid habitat, increasing wild trout recruitment to the Clark Fork River. The Rock Creek project improved fish and wildlife habitat, while maintaining historical ranching traditions and building positive partnerships between landowners, government agencies and conservation groups.

The lower 2.5 miles of Rock Creek had been annually dewatered for 35 years. The project converted the ranch's flood irrigated pastures to sprinkler irrigation and dedicated all salvaged water to instream flow (5-27 cfs). Since the lease took affect in 1999 instream flows have not dropped below 7 cfs, even in drought years. Although dewatering was the most significant cause of habitat loss in lower Rock Creek, the channel still lacked pool habitats. Less than one pool per 300 feet was suitable for over wintering habitat in the lower 7,820 feet of channel. Above this reach pool densities increase to approximately 3-7 pools per 300 feet. The project restored four meanders (bank stabilization and channel reconstruction), created 46 new pools and 16 new overhead cover areas. The habitat improvements, along with the instream flow water lease, generated new spawning opportunities for Clark Fork River trout and created excellent habitat for resident salmonids.

Biological Monitoring: Due to biologist position vacancies in the area, FWP did not monitor fish populations in Rock Creek in 2006 or 2007. Past fisheries investigations for the Rock Creek (Garrison) Instream Flow and Habitat Improvement Project included redd counts and electro fishing population estimates.

In fall 2000, 2001 and 2002, brown trout redds were counted for the lower 2.5 miles of Rock Creek. Redds were counted three times with at least one week between counts. In 2000, the surveys found 4 definite redds, 9 probable redds and 4 test digs. In fall 2001, the number of redds increased to 16 definite and 4 probable. In fall 2002, the number of redds increased to 28 definite, 8 probable and 3 test digs.

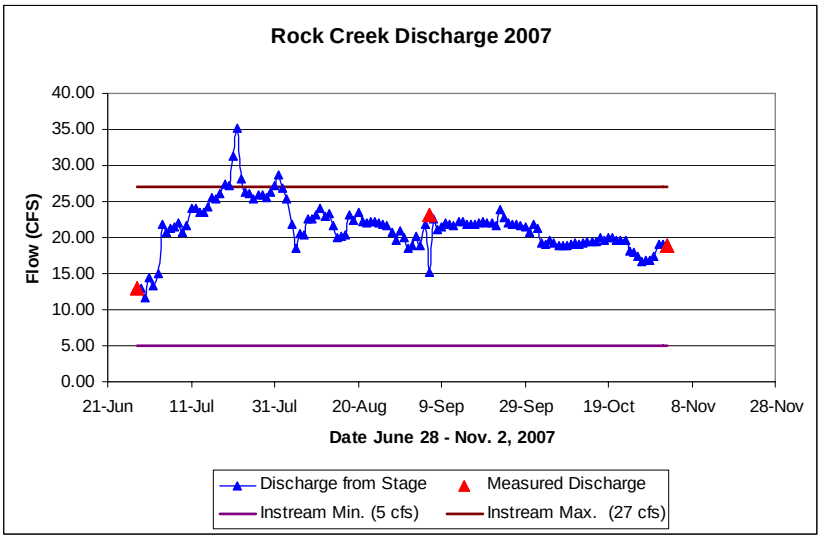
In fall of 2003 and 2004, brown trout redds were counted for the lower 2.5 miles of Rock Creek, but only once each year, during the first week of November. In 2003, the surveys found 4 definite redds, 9 probable redds and 4 test digs. In 2004, the number of redds

increased to 5 definite and 4 probable. The redd counts indicate that brown trout are using the restored reaches of Rock Creek.

Electro fishing estimates were conducted in fall 2001 and 2002. In 2001, the lower channel (historically dewatered reach), the survey found 29 brown trout per 100 yards and 46 brown trout per 100 yards in the upper project area (9 fish > 10" and 15 fish > 10", respectively). In 2002, the lower channel (historically dewatered reach), the survey found 30 brown trout per 100 yards and 71 brown trout per 100 yards in the upper project area (18 fish > 10" and 25 fish > 10", respectively).

The number of adult brown trout has almost doubled since the 2001 sampling, many of which may be spawning adults from the Clark Fork River. Westslope cutthroat trout were also sampled in the upper reach, indicating that they may be pioneering the area of restored habitat. Prior to project completion, the channel had been dewatered for the previous 35 years. The redd counts and population estimates indicate that brown trout and westslope cutthroat trout are using the restored reaches of Rock Creek.

Figure 14



Flow Monitoring: FWP monitored stream flows in Rock Creek during the 2006 and 2007 irrigation seasons. Instantaneous measurements were recorded on Rock Creek using a velocity meter and an Aqua rod continuous stage recorder installed. Discharge was recorded below the return flow (fish bypass) pipe.

The graph (figure 14) displays stream flow developed using stage recorded by the Aqua Rod as well as measured discharges and expected water lease flows. The table below (figure 15) shows that the flow objective of a minimum of 5 cfs below the headgate was exceeded during the entire irrigation season.

Figure 15 2007 Rock Creek Measured Flow Data

Dates	Number of Operating pivots	Discharge (cfs) Below headgate
June 28	2	12.9
September 6	0	23.2 cfs
November 2	0	18. 8 cfs