2005 FWP ANNUAL PROGRESS REPORT
- WATER LEASING STUDY -

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

December 2005

TABLE OF CONTENTS

List of Figures

Appendices

I. INTRODUCTION

Pursuant to Section 85-2-436(3)(a), MCA, the Montana Department of Fish, Wildlife, and Parks must submit an annual water leasing study progress report 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 specific information for each lease including:

(i) the length of the stream reach and how it is determined;
(ii) technical methods and data used to determine critical streamflow or volume needed to preserve fisheries;
(iii) legal standards and technical data used to determine and substantiate the amount of water available for instream flows through leasing of existing rights;
(iv) contractual parameters, conditions, and other steps taken to ensure that each lease in no way harms 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.

The progress report must also contain a summary of stream reaches approved by DNRC for study (pursuant to 85-2-437, MCA), and a summary of leasing activity on all designated streams. If no new leases have been obtained in the reporting year, FWP must "provide compelling justification for that fact" in the report. The remainder of this report is divided into six sections plus appendices as described below. Please note that Section V has changed from recent years. Historically, this report has simply described leasing program goals for the upcoming year. In this year's report, Section VI goes much further. This year, however, Section V articulates the need to eliminate the limitation on renewal of leases, make FWP's authority to lease water rights for instream flow permanent, and to enable FWP to permanently dedicate water rights it owns in fee simple to instream flow.

Section II—background on the creation of the leasing program,
Section III – our review of the 2004 leasing year, including new lease agreements, and general issues and opportunities noticed or arising in 2004,
Section IV – the statutorily-required reporting on the streams designated, for study and potential leasing under FWP's leasing program; and,
Section V – discussion of 2005 challenges and leasing program needs.
Appendix A lists our leasing objectives, which is what we currently use to evaluate lease offers, and seek additional lease opportunities.
Appendix B provides a sample FWP lease evaluation, showing what information FWP needs and uses to evaluate lease offers under the criteria provided in Appendix A.
Appendix C provides monitoring information for FWP's existing leases/conversions.

II. WATER RIGHTS AND THE FWP WATER LEASING PROGRAM

Montana's water law has traditionally focused on the rights and procedures associated with diverting water from streams and lakes and putting that water to a beneficial use (e.g., irrigation, fish and wildlife, domestic, mining, etc.) away from the source. Persons who appropriate water from a stream must have a right or permit to do so. A right or permit specifies how much water

can be diverted, for what purpose, during what time period, at what point on the stream, the location of the use of the water, and has a priority date assigned to it. The priority date determines who gets the water first; if there isn't enough to go around, the earliest date has the first claim (hence the maxim, "first in time, first in right").

Montana's Water Use Act encourages "*the water resources of the state … be protected and conserved to assure adequate supplies for public recreational purposes and for the conservation of wildlife and aquatic life*" (85-1-1-1(5), MCA). It also seeks to "*provide for the wise utilization, development, and conservation of the waters of the state for the maximum benefit of its people with the least possible degradation of the natural aquatic ecosystems*" 85-2-101(3), MCA. Except in basins that are closed to new appropriation, the DNRC may issue new permits to divert surface water if the applicant can show (among other things) that water is reasonably available for the use proposed and that there is a means to ensure persons with senior rights can get the water to which they are entitled. There is no flow level where new appropriations are no longer granted. If water is physically available (even 1 in 10 years) and legally available (not claimed by senior water users) a permit can be issued. Generally, the system encourages maximum diversion and use of water from Montana's streams.

In the 1960's conservationists began to advocate for legal mechanisms to keep water instream. The 1969 Legislature passed "Murphy's Law" which allowed FWP to file instream flow claims on 12 blue ribbon trout streams. FWP was later authorized to apply for instream "reservations" to support fishery values. FWP pursued the authority to reserve water, and was granted a series of reservations in the Yellowstone basin (1978 priority date), the Missouri River basin above and below Ft. Peck (1985 priority date), and the Little Missouri basin (1989 priority date). Reservations are a valuable management tool, but due to their late priority dates they do not provide much drought relief.

In 1988, much of Montana suffered severe drought conditions. Low natural flows coupled with normal diversion rates exacted severe tolls on sensitive fisheries. Montana newspapers ran front-page photos of fish kills on dewatered streams. These conditions spurred the 1989 Legislature to consider additional tools and incentives for water users to protect fishery values. One highly controversial idea was to allow FWP to temporarily lease consumptive water rights for instream flows. The idea became a law, and since then FWP has pursued attractive leasing opportunities with willing lessors on seriously dewatered streams with high fishery restoration potential. The water leases are now making major contributions to select fisheries.

FWP's leasing statute was originally set to expire in 1999. It required the agency to prepare a final report of the leasing program to be adopted by the FWP Commission and DNRC. The report was then to be submitted to the EQC for completion by December 1, 1998. The EQC's Water Policy Subcommittee recognized its role in evaluating the leasing program. The EQC reviewed the program and related statutes in the 1997-98 Interim. The Subcommittee conducted public review of the progress and acceptance of the program. The EQC eventually proposed legislation that would renew FWP's leasing statutes for 10 years, increase the cap on the number of FWP lease streams, increase the maximum lease period for certain leases, and allow other leasing programs to lease salvaged water. Though the EQC was encouraged to be more aggressive in proposing changes (i.e., making the program permanent, removing the DNRC

study stream approval requirement, etc.), the Council elected to act conservatively to ensure that the whole program wasn't lost. The EQC encouraged others during the 1999 Legislative Session "to use the legislative committee hearing and amendment process to further test the waters on additional changes to the DFWP's water leasing statutes" (EQC, 1998). The bill, as drafted, received overwhelming support in both houses, and was signed by the Governor on March 19, 1999. The EQC deserves credit for its long-term support of this program.

The reauthorized statute also requires FWP to prepare a final report that is to be adopted by the FWP Commission and the DNRC and submit the report to the EQC for completion by December 1, 2008. Though the deadline for submission of the final report is still three years away, Water Program staff feels it is time to begin communicating its long-term assessment of the leasing study to the EQC. Thus, Section V contains an assessment of the leasing study and suggestions for potential improvements. If the EQC is willing to consider supporting improvements to the instream flow leasing legislation there will be adequate time to explore various possibilities prior to the 2009 legislature, when the leasing statute is set to expire.

A summary of FWP's leasing history is provided in Figure 1.

Figure 1. FWP Instream Flow Leasing History, as of December 2005

SOURCE	LESSOR	LEASE TERM/EXP.	PRIORITY OF RIGHT	QUANTITY LEASED	PERIOD OF USE	COST
Mill Creek	Mill Creek Water and Sewer District	10 years Aug. 1, 2003-expired; being considered for renewal	95 rights with various priorities	41.4 cfs	48-60 hours in Aug. Diversion shut off after 10-day notice from FWP	$12, 750 per year[1]
Mill Creek	Individual	10 years April 1, 2003-expired; a portion available (and being considered for) renewal	June 30, 1880; June 1, 1903	2.0 cfs (1880) and 4.13 cfs (1903) (salvaged water)	May 1 -October 4	$7,500 per year
Blanchard Creek	Individual	10-year renewal June 20, 2009	May 11, 1913 (first right on stream)	3.0 cfs	April 15 -October 15	$2,000 per year
Tin Cup Creek	Six individuals	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	$6,260 per year
Cedar Creek	US Forest Service	10 years Sep. 20, 2005	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	$1.00 per year
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	$45,000 - One-time payment
Mill Creek	Individual	10 years May 1, 2006	June 1, 1891	2.64 cfs (salvaged water)	May 1-October 19	$4,200 per year
Chamberlain Creek	Individual	10 years Apr. 1, 2007	October 10, 1911	½ the flow up to 25 cfs	April 1 - October 31	$1.00 per year
Pearson Creek	Individual	10 years Apr. 1, 2007	October 10, 1911	Up to 8 cfs	April 1 - October 31	$1.00 per year
Cottonwood Creek	FWP[3]	9 years June 30, 2005	May 1, 1884	14.0 cfs April , 37.0 cfs May 1-June 30, 32.0 cfs July, 9.0 cfs August, 6.0 cfs Sept., 9.0 cfs Oct., 8.0 cfs November (salvaged water)	April 1- November 4	None
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	$100,000 - one-time payment
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	$228,640 - one-time payment

Figure 1 (cont.). FWP Instream Flow Leasing History, as of December 2005

SOURCE	LESSOR	LEASE TERM/EXP.	PRIORITY OF RIGHT	QUANTITY LEASED	PERIOD OF USE	COST
Big Creek	Private ranch	10 years May 1, 2009	June 30, 1873 (1st right on stream)	10.0 cfs	May 1 - November 1	$8,000 per year
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	$138,346 - one-time payment
Locke Creek	Private ranch	30 years; December 14, 2031	March 6, 1915	7.5 cfs	April 20 – October 24	$45,000 – one-time payment
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	$40,000 – one-time payment
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.	$1 to association for life of lease. $24,372 one-time payment to resort for diversion and conveyance improvements.

[1]Lessor pays for water commissioner and the installation of measuring devices on all on-farm turnouts from the pipeline.
[2]These rights are used to maintain a flow of 1.3 cfs at the mouth of Cedar Creek, eliminating effects on other water users.
[3]FWP converted its own water rights to instream flow under 85-2-439, MCA.
[4]Ranches transferred their rights to the Montana Land Reliance, who is the lessor.

III. A REVIEW OF THE 2005 LEASING YEAR

Drought conditions continued in most of Montana in 2005. Once again, snowpack was below average throughout much of the state. Fortunately, May and June rains brought much-needed relief to agricultural producers in many areas. However, due to the low snow-pack and years of drought, the rain was not enough to prevent late season low flows in all basins. Once again, FWP water program staff spent much of their time responding to drought rather than pursuing additional water leases. These activities include enforcement of instream water rights against junior water users, and participation in the Governor's Drought Advisory Council. As a result, FWP did not complete any new leases in 2005. This does not mean, however, that Water Program staff were not active in the leasing program. Indeed, staff members spent considerable time pursuing leases on which we failed to reach agreement, and other projects that may eventually come to fruition. The following paragraphs describe noteworthy elements, both positive and negative, of the 2005 leasing year.

- **Enhanced monitoring.** As noted in last year's report, FWP monitors all of its leases to ensure that we are getting the water we have paid for. Until 2005, however, FWP's field fisheries biologists have largely been responsible for checking staff gauges and recording flow information as well as performing biological monitoring. These duties are time consuming and often burdensome to our busy field staff. As a result, our stream flow data in the lease streams are often incomplete. In 2005, the Water Program took a far more active role in stream flow data collection. We installed continuous flow stage recorders in most of our lease streams, and collected and examined the data to ensure that the leases are supplying the required water.

- **Working toward completion of a 2004 agreement.** In 2004, FWP signed a lease agreement with two water right holders on Trail Creek, a tributary to the Clearwater River, near Seeley Lake, Montana. One of the parties agreed to replace a leaky ditch with a pipe (funded by the Future Fisheries Program) which will save a significant amount of water, and to further reduce its diversion when flows are very low. FWP has leased the saved water. The second lessor leased FWP all the water it once used for irrigation. Unfortunately, the project has not been completed due to complications with neighboring landowners. Therefore in 2005, Water Program staff monitored the water flow in the diversion and in the creek below the diversion to determine if the project could be modified and still meet instream flow goals.

- **Painted Rocks instream water contract renewal.** Last year, FWP entered a new contract with the DNRC for the annual purchase of water stored in Painted Rocks Reservoir on the West Fork of the Bitterroot River. Once again, a total of 15,000 acre-feet of water was released to the Bitterroot River to help maintain summer instream flow.

- **Supporting leasing/conversion by others.** In the past, FWP has assisted water right holders interested in leasing water to other parties, or converting their rights to instream flow. Such assistance includes potential funding through our Future Fisheries Improvement grant program, technical assistance with project planning, and information on water rights and the conversion process. FWP staff have also assisted applicants and DNRC with documentation

that a conversion will benefit the fishery.

- **FWP leases and water reservations available on the Web.** The Montana Fisheries Information System (MFISH) allows a user to access a variety of information for various streams and rivers; from fish species present to the presence of instream water rights – including leases. This site may be accessed at http://maps2.nris.state.mt.us/scripts/esrimap.dll?name=MFISH&Cmd=INST. The site has proven extremely helpful to our field staff who must answer questions about water rights, as well as the public.

IV. DESIGNATED STUDY STREAMS

Montana statutes require FWP to obtain approval of its commission and DNRC to study a stream for leasing. Figure 3 lists the study streams approved to date, their relevant basins, the status of the approval, and the status of leasing on them. Statutory revisions in 1999 increased the allowed number of study streams from 20 to 40.

Figure 2. Status of Designated Study Streams and Leasing

Study Stream	Basin	Status of Request	Status of Leasing in Reach
1. Swamp Creek	Big Hole River	Final approval 3/5/90	No lease; FWP and right holder could not reach agreement on price for lease
2. Big Creek	Yellowstone River	Final approval 3/5/90	Two leases finalized in 1999
3. Mill Creek	Yellowstone River	Final approval 11/9/90	Three leases; two expired and will likely not be renewed.
4. Cedar Creek	Yellowstone River	Final approval 1/6/92	One lease in place; additional lease agreement finalized in 2003
5. Blanchard Creek	Blackfoot River	Final approval 9/25/92	Lease rescinded.
6. Hells Canyon Creek	Jefferson River	Final approval 9/25/92	Lease
7. Tin Cup Creek	Bitterroot River	Final approval 10/30/92	2004 was last year of lease.
8. Rattlesnake Creek	Clark Fork	Final approval 5/25/95	No lease; negotiations on hold
9. Mol Heron Creek	Yellowstone River	Final approval 11/28/95	Lease
10. Rock Creek	Blackfoot River	Final approval 11/28/95	TU lease negotiations on hold, past FWP negotiation information being used in efforts by Trout Unlimited
11. Chamberlain Creek	Blackfoot River	Final approval 1/3/96	Lease
12. Pearson Creek	Blackfoot River	Final approval 1/3/96	Lease
13. Rock Creek, near Garrison	Clark Fork River	Final approval 7/15/98	Lease
14. Locke Creek	Yellowstone River	Final approval 6/18/02	Lease

15. Trail Creek	Clearwater / Blackfoot River	Final approval 6/18/04	One lease agreement with two lessors.

V. DISCUSSION OF LEASING PROGRAM AND GOALS

A. The year in review and leasing challenges. FWP did not complete any new leases in 2005. FWP is required by statute to provide compelling justification in this report for its failure to obtain a new lease. It would be easy to simply make excuses. Indeed, other matters have occupied the two Water Program staff. The continuing drought caused us to focus our attention in summer on enforcement of our existing instream water rights. Monitoring existing leases is also time consuming. But the real problem is that good leases are hard to find. This is not to say that leasing is not a valuable tool. There is absolutely no doubt that instream flow leases have enhanced spawning and rearing opportunities, resulting in increased fish recruitment in several important streams. These streams attract thousands of anglers every year who help support local economies. Fisheries of the Blackfoot, Bitterroot, Jefferson, Clark Fork and Yellowstone have all benefited from the program. Leases can and do work.

The slow pace of Montana's general water adjudication is resulting in the loss of potential leases. Inflated, unperfected and abandoned claims impede the process. It is difficult to convince potential lessors that they may not have as much water as their claim says they have. This is particularly true with owners who are not the original filer of the claim. An accurate, timely adjudication will help relieve this problem. For example FWP was working with major irrigator on Tongue River to develop a water lease that would have increased flows in a chronically dewatered reach of the river. FWP put extensive effort into drafting a lease agreement and preparing an application to change the water right for submittal to DNRC. However, the water user ultimately decided not to pursue the lease largely because it would have brought significant attention to his water right just prior to the Water Court issuing a preliminary decree for the Tongue River, potentially causing other water users to object to the water right. Such objections could lead to significant costs to the water user. The water user was unwilling to accept this risk. This water right was historically decreed by the District Court and the current General Adjudication should have presented a mere formality. However, the significant delays in the General Adjudication have only served to increase the uncertainty of this already decreed water right.

Hardy Creek is a small tributary to the Missouri River near Cascade. The Missouri below Holter Dam is a nationally renowned trout fishery, but it suffers from a limited number of spawning streams. After a substantial investment in staff time, questions over the place of use and hence the ownership of a water right that should have long ago been settled through the General Adjudication stymied another leasing opportunity. Additionally, water right claims filed in the General Adjudication that were never perfected or long ago abandoned would have potentially solved the issue.

As leases focus on dewatered streams and rivers with already intense competition for water, it is impossible to lease until such time streams are adjudicated. This limits the number of streams where leases can be effective. While this issue will continue to impair leasing opportunities, the increased funding for the General Adjudication approved by the 2005 Legislature will help

alleviate this impairment much sooner than was previously.

Over the years FWP has learned what goes into a good lease. At first there was a general perception that leasing was a simple proposition. If an irrigator is simply willing to stop or reduce his irrigation, it is. But most agricultural producers are not looking to lower production; they are interested in maintaining or increasing their crop production, while contributing to the health of a stream and/or gaining financial support. The support may go to installation of a new irrigation system – which saves labor, replace a dilapidated headgate or other infrastructure improvement. In the early days of leasing, we thought that if you installed a pivot system, with their greater efficiency, you saved water. In some cases this is true: Rock Creek near Garrison is a perfect example. Our investment in lessor's new water conveyance and sprinkler system has greatly increased late season flows in the lower part of the creek and connectivity to the Clark Fork. Elsewhere, widespread conversion from flood to sprinkler irrigation across a basin is increasing flow in the early part of the irrigation season but due to reduced return flows is actually diminishing late season flow. What this means is that we must be very careful before entering a lease that it will be effective. Further, the Department of Natural Resources and Conservation has adopted new rules that require an applicant seeking to change a water right, including a consumptive use to instream flow, to produce a much greater amount of information on historic use than in the past. Quite simply, the bar has been raised, and this means that we have to do our homework; i.e. to carefully evaluate past and present uses of water, so we can determine if there really is water that could be salvaged, and to have enough information to meet the requirements of the change rules.

Nevertheless, FWP is currently evaluating several possible lease opportunities. For purposes of this report, in a year in which we did not complete a lease, it is tempting to say that our goal is sign two new leases in 2006. Rather, our goal is to work toward the completion of leases that ensure that the sporting public that pay for those leases get good projects for their money. We hope that some of these opportunities come to fruition in 2006. Up until now, FWP has found that leases have been most effective for re-watering short stretches of small streams. However, in spite of our disappointment on the Tongue River, we are currently investigating the possibility of leasing water in another major river. There, we monitored flows in the river and throughout the course of a major irrigation ditch to determine if an irrigation district can meet its water delivery objectives while diverting less water through a combination of ditch lining and installation of remote water gauges and controls. Eventually, salvaged water may be leased, but it would be misleading to assert that we will likely complete this lease in 2006. We may need to gather more information and, importantly, we will need to continue to work closely with the ditch company to make them comfortable with the idea of a lease. Our goal for 2006 is simply to continue to work toward good leasing opportunities.

B. Improving water leasing, and new opportunities for water conservation. FWP feels that it has learned a lot about water leasing since the program was started. Water leases are an effective tool for fisheries enhancement. Like any other tool, however, this one is limited. It's perfect for some jobs but not a good fit for others. There are several ways the tool could be improved and other tools added to help solve a greater number of conservation problems.

<u>Limitations of lease renewal.</u> FWP leased water for instream flow from Tin Cup Creek in the

Bitterroot Basin for the ten years. The lease enhanced flows in this important spawning stream. Consequently, Tin Cup Creek has produced healthy numbers of fry for the Bitterroot fishery. Unfortunately, 2004 was the last year that we were able to lease water from Tin Cup Creek. This is not because the lessors were not willing to continue the lease. It is because we are limited by statute to leasing water for ten years (30 years for a water conservation project), and renewing that lease only once, up to ten years. The Tin Cup agreement was originally negotiated as a five-year lease, and was renewed once for five years. Therefore, we could not legally renew the lease a second time. Fisheries in Montana would benefit by our ability to renew leases indefinitely.

Make the Leasing Program Permanent. The leasing program was conceived as a study. Ten years into the program the EQC published a final report on the leasing study. The EQC considered making the program permanent but recommended that the study be continued for another ten years citing the need to take a cautions approach with the legislature rather than risk losing the entire program to a sunset clause. FWP's current authority to lease water will expire in 2009. FWP believes that the study phase of water leasing can be safely drawn to a close. We have proceeded very cautiously with leasing, concentrating our efforts on leases that result in real fisheries benefits and are affordable and administrable but do not harm other water users. Fisheries have benefited and controversy over specific projects has been virtually nonexistent. We urge the EQC to consider recommending that the leasing program be made permanent.

Permanent dedication of water to instream flow. The leasing program, is a valuable tool for the enhancement of fishery resources. However, the time limitations imposed by statute call into question its long-term effectiveness. Other western states including Colorado and Oregon allow water to be permanently dedicated to instream flow. Montana does not. Moreover in Montana, a consumptive water right holder may change the use of that right to any beneficial use other than instream flow so long as certain statutory criteria are met – the most important of which is that the change does not adversely affect any other water user. Because many of Montana's rivers and streams are over allocated and large areas are closed to new surface water appropriations, those seeking new uses of water are increasingly looking to purchase water rights. As a markets for water rights develop and the value of water rights increases, the cost to lease water will increase as well. At this time, however, there are still opportunities to not only lease water, but to purchase or otherwise acquire them permanently. It follows that we need a mechanism to permanently dedicate formerly consumptive water rights to instream flow. Like conservation easements on land, active participation in the marketplace may become an essential conservation tool. Montana fisheries would benefit if consumptive use water rights could be permanently dedicated to instream flow.

In 1998, FWP submitted a Water Leasing Study Final Report to the EQC, which EQC then considered in its Final Report to the 56th Legislature. EQC reiterated FWP's conclusion:

> The DFWP has been very careful in obtaining the leases it currently holds. Although many potential leases have been investigated, only a small number have been pursued to completion. Interest in leasing is more prevalent now than it was during the first few years of the study. Water leasing will not solve all of Montana's stream dewatering problems, because of; (1) the complexity of

> obtaining leases, (2) the small quantities of water that are usually involved, and (3) the potential effects on existing water users. However, because leasing is one tool that can help balance the competing uses of a finite water resource, leases should continue to be cautiously selected and pursued where they will benefit the fisheries resource without adverse effects on existing water users.

These words remain true today. Leasing is a tool. It has limitations but through judicious use it has and can continue to contribute to the health and sustainability of Montana fisheries. The tool can be improved and indeed, more tools can be added to the kit that makes of the Department of Fish Wildlife and Parks' ability to conserve fisheries and the public's opportunity to enjoy them now and in the future.

APPENDICES

FWP Instream Flow Lease Objectives

Maximizing the 4 'A's

- **Advantageous** to the fishery

  Attractive leasing opportunities are those that address a stream flow problem that significantly limits potential fishery values.

- **Actual** water dedicated to instream flows

  Leases must involve valid water rights, and quantities leased should be large enough to benefit the stream.

- **Administrable** by the Department or other appropriate entity

  Leases should involve a reasonable combination of water right seniority and advantageous location so that the instream flow contribution can be ensured and defended through the lease period. Decreed streams and/or an existing water commissioner are an added plus.

- **Affordable**

  Do the benefits to the fishery justify the cost of the lease or the project creating the leasing opportunity?

Contact Montana Fish, Wildlife & Parks' (FWP) Instream Flow Specialists Bill Schenk at 406-444-3364 in Helena, or Andy Brummond in Lewistown at 406-538-4658 ext. 224 for more information.

Appendix B – A Sample Lease Evaluation

Review of Potential Water Lease

Little Prickly Pear Creek -- Lewis and Clark County

Prepared for: [redacted]
December, 1999

The following is a preliminary review of an instream flow lease proposal. It includes 1) a description of the proposal; 2) the results of a cursory review of the associated water rights, their relation to other rights in the watershed, and available information on water flow patterns; 3) a description of the fishery; and 4) a preliminary evaluation of the lease offer according to FWP's informal lease evaluation criteria.

Additional information, insights, and/or corrections to this preliminary review are welcome and can be incorporated into a revised review.

Background on Proposal

According to our recent conversation, the rights you are interested in leasing are the potential salvaged portions of the rights listed below.

Right Number (Diversion Point)	Purpose	Quantified Flow (cfs)/ Acres/ Volume	Priority Date	Relative Priority on Source (of 70)	Claims Senior to Offered Rights
41QJ-W- 097583 NWNENW20T13NR4W	Irrigation	none/ 8 acres/ 32 AF	5/18/1877	28th	100.09 cfs (all upstream)
41QJ-W-097581 NENENE25T13NR5W	Irrigation	12.00 cfs/ 50 acres/ 200 AF	4/1/1882	34th	additional 17.76 cfs
41QJ-W-097582 NWSWNE19T13NR4W	Irrigation	25.00 cfs/ 58 acres/ 232 AF	3/15/1902	61st	additional 110+ cfs
Total		**35+ cfs/ 116 acres/ 464 AF**			

You are proposing to convert from two informal diversions (and associated lengthy ditches for flood irrigation) to one diversion point for a sprinkler system to irrigate close to the same acreage. One diversion point is shared with another right. The diversion point for your most senior right (without quantified flow) appears to be near the access road to your home, near the approximate location of your proposed pump house.

Your estimate of water need under your new system is 2 cfs, leaving the consumed (non-return-flow) portion of the remainder instream under a lease with FWP. The claims associated with these rights

would rank 10th in priority, and your 1902 right would rank 16th in priority for Canyon Creek water. Approximately 9.3 claimed Canyon Creek cfs are senior to your 1882 right and about 32 cfs are senior to your 1902 right. Although making a call for water can be a controversial move, we do consider your ability to do so in evaluating rights being considered for lease. A USGS gauge which operated on Canyon Creek in 1921-23 shows a peak flow of 270 cfs (1922) and a minimum summer flow (1921) around 10 cfs. Water use may have changed a good deal since then, but your rights have a much better seniority situation in Canyon Creek than in upper Little Prickly Pear.

Regarding downstream flows, U.S. Geological Survey (USGS) flow records are available for a 5-year period (from 1962-67) for a site just upstream of Clark Creek confluence. During this period, the minimum recorded flow was 6.2 cfs for four days in August of 1963. (At the gauge discussed below, flows were between 19 and 20 cfs on the same days.) Monthly minimums were not calculated for this review. A variety of miscellaneous flow measurements from this time period (conducted for a study of the effects of Interstate construction) also exist, but were not evaluated for this review.

Currently, there is one operating USGS real-time stream gauge on Little Prickly Pear Creek, located about ½ mile downstream from the confluence of Wolf Creek, just downstream of the I-15 access road bridge. This gauge has operated intermittently; from May 1962 to September 1967, and again from October 1991 to present. Streamflow information for this approximate 15-year period of record is provided below.

	Jan	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Monthly Average (cfs)	46.9	69.4	70.1	150	276	235	95.0	51.6	56.8	57.5	58.3	53.7
Monthly Minimum (cfs)	30.8	29.9	43.9	66.6	35.5	25.5	23.8	17.0	20.4	29.5	31.5	31.2

The lowest flow recorded at this gauge during the period of record is 9.9 cfs on August 13, 1992. In 1997 and 1998, the lowest flows at the gauge were in mid-January, with flows of 22 cfs and 25 cfs respectively. The lowest flow in the 1999 water year was 34 cfs in September (1 cfs lower than the minimum July and August flows for 1999). What this tells us is that, despite the number of claims upstream and the relative seniority of those claims, water is making it downstream, and the lower river (at the gauge) has not gone dry during the period of record, even in low flow years.

There are 10 junior mainstem water right claims (6 owners) downstream of your lowest diversion point. The closest downstream junior claims are two Sieben points of diversion (totaling 11.25 cfs), located just downstream of your access road. After Sieben, the next junior user is roughly 5 miles downstream (two small rights totaling 70 claimed gpm). Beginning roughly another 5 miles downstream of that is a series of two (Robert) Wirth diversions (totaling 13.5 claimed cfs), the town of Wolf Creek, then the of Sentinel/Lahti diversions (totaling 67.5 claimed cfs) just before the mouth.

In dry years, FWP staff have confirmed that a one-mile reach of the Creek (approximate) located immediately downstream of the Sieben diversion becomes severely dewatered. Groundwater inflows on the Sieben Ranch recharge the Creek before it enters the head of Wolf Creek Canyon. If water can be passed by the Sieben diversion, at least a portion of leased rights could provide benefits to this

Evaluation

Montana Fish, Wildlife & Parks uses the following general criteria to organize their evaluations of instream flow lease inquiries – we attempt to "maximize the 4 'A's", as described below. (These criteria continue to be evaluated and improved as more lease inquiries are reviewed – suggestions are welcome!)

1) Advantageous to the Fishery -- Does the leasing opportunity address a stream flow problem that significantly limits potential fishery values?

At this point, FWP Helena staff feel that a potential lease of the above rights would provide a **low to moderate** benefit to the fishery. Streamflow within this reach of Little Prickly Pear Creek does not appear to be a major limiting factor to the fishery. Our conclusions are base on:

- Severe and regular dewatering appears to be limited to the relatively short segment of stream from the Sieben diversion to the head of Wolf Creek canyon.
- Resident fish populations in stream reaches that remain relatively unaltered (with good riparian vegetation and natural meanders) appear healthy.
- Migrant brown trout spawners from the Missouri River likely are limited more by barriers created by beaver dams than low water. Rainbow trout, both residents and migrants, currently are severely limited by the presence of whirling disease. A potential lease would not resolve the impacts created by either beaver activity or whirling disease.

However, a lease potentially would provide water to the reach of stream between your diversion and the head of Wolf Creek Canyon and could supplement flows downstream. The salvage project would also eliminate the need to berm the stream channel to obtain water and eliminate the possible entrainment of fish in at least the middle diversion. The upper ditch likely would remain operational due to the shared water rights associated with the ditch.

2) Actual water dedicated to instream flows

The rate of streamflow potentially generated by the proposed salvage project could be substantial (possibly up to a maximum of 33 cfs, or 1,320 miners inches). However, with the rights as claimed and some rough calculations, the potential volume of salvaged water is relatively small (about 174 acre feet). As a result, the small volume potentially could severely limit the duration that salvaged water could be protected from other appropriators. Unless the claims are amended, we consider this a **significant limitation** associated with this leasing opportunity.

If the volume issue were made less constraining, and depending on the portions of the rights regularly used, this lease would likely add some streamflow to Little Prickly Pear in periods and in a location where dewatering is limiting to fish. The dewatered section of creek is relatively short (less than 2 miles?). Downstream, where complete dewatering is less frequent, added water would provide low-flow "insurance" to both the fishery and other water users, as well as enhance the likelihood that FWP's instream reservation would be regularly met.

We therefore recommend and can support a funding request to the Future Fisheries Program of $15,000. This amount assumes that: the volume restriction would be addressed so as to be less constraining on a potential lease; that additional secured funding sources would be documented in the Future Fisheries application; and that the project would include the lease elements as discussed herein.

Thank you for your interest in the program. Please contact Kathleen Williams, Water Resources Program Manager (406-444-3888), if you have questions or concerns about the information in this review.

Appendix C: FWP Water Lease Monitoring Information, 2005

Cottonwood Creek

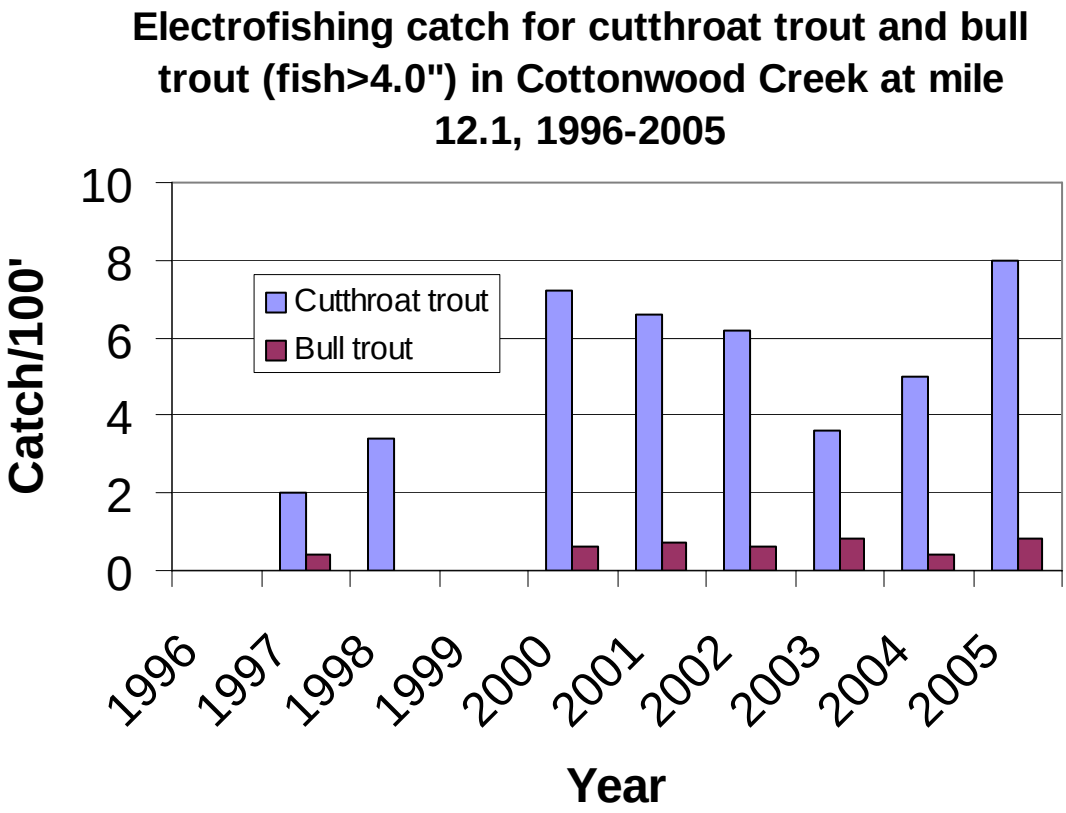
Restoration Objectives: Improve degraded habitat; eliminate fish losses to irrigation ditches; and restore migration corridors for native fish.

Project Summary: Cottonwood Creek is not a lease, but is included in this report as an example of FWP's other instream flow-related activities. FWP acquired the water rights along with lands purchased for the Blackfoot Clearwater game range. The conversion was initiated in 1997, prior to which time a major diversion (Dreyer Diversion) completely dewatered a portion of Cottonwood Creek during the late irrigation season

Cottonwood Creek, a large tributary to the middle Blackfoot River originating near Cottonwood Lakes, 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. 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. 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.

Biological Monitoring: In 2005, FWP continued to monitor fish populations in the upper Cottonwood Creek instream flow conversion area, downstream of the Dreyer Diversion. Fish population monitoring in the conversion area (stream mile 12.1) shows increasing densities of WSCT following increased flows, and generally stable densities of age1+ WSCT during the drought.

Flow Monitoring: Blackfoot Clearwater Game Range agriculture personnel administrative water withdrawals at the Dreyer Diversion and monitor flows in Cottonwood Creek. FWP fisheries personnel periodically measure flows to check the gauge's accuracy. 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. Since portions of the water rights were converted to instream flow, spot checks have revealed the proper proportion of water has been diverted and left in stream. In the unlikely event that new diversions are approved, FWP will then develop a more comprehensive flow monitoring plan for Cottonwood Creek.



Chamberlain Creek

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.

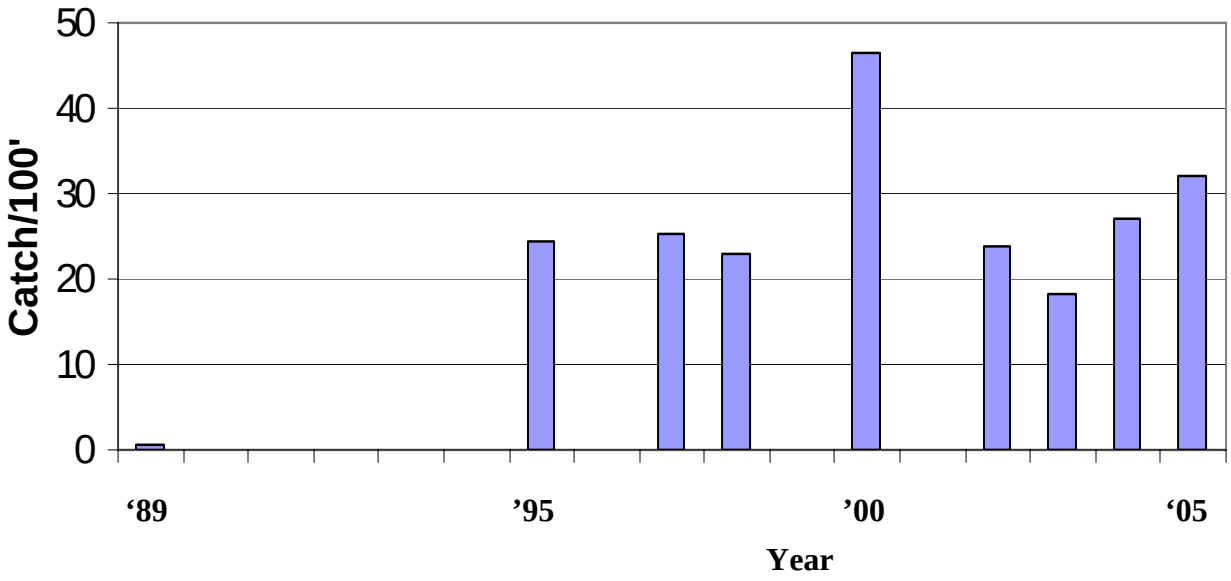
Project Summary: Chamberlain Creek is a small Garnet Mountain tributary to the middle Blackfoot River, entering at river mile 43.9 with a base flow of ~2-3 cfs. Sections of lower Chamberlain Creek were severely altered, leading to historic declines in WSCT densities. Adverse changes to stream habitat 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 (consolidate ditches, water conservation, eliminate fish entrainment, 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 stream over its entire length, with low densities of rainbow and brown trout in lower reaches. Chamberlain Creek also supports a migration of fluvial WSCT from the Blackfoot River. 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 2004, 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 drought and possibly to whirling disease.

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. This year, spot checks confirmed that the lease is working and flows are evenly divided between the users.



Pearson Creek

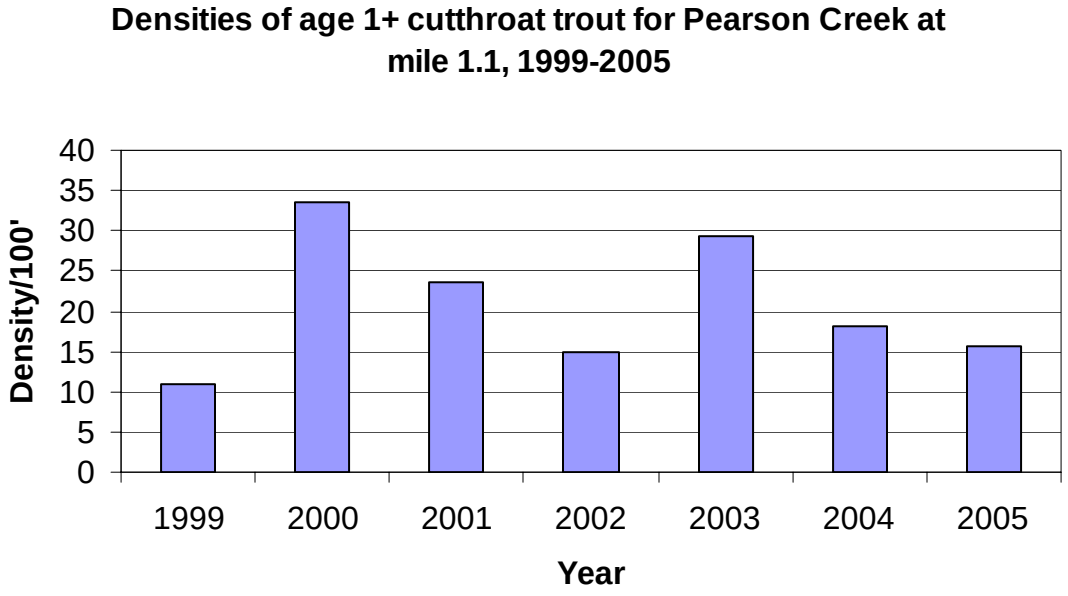
Restoration Objectives: Restore the stream to its original channel; improve stream flows, access to, and the condition of a historically fluvial WSCT spawning site.

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.

Biological Monitoring: In 2005, FWP again sampled cutthroat trout in Lower Pearson Creek (mile 1.1) in a stream reach influenced by a water lease. Annual population surveys show large fluctuation in densities of young-of-the-year but generally stable densities of age 1+ cutthroat trout. During the current drought period (2000-2004), densities of age 1+ fish appear to be generally higher following fencing and habitat work completed in spring 2000.

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 2005 spot checks revealed that no water was diverted. The creek had all of its natural flow.



Rock Creek

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: Rock Creek 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. The project has improved fisheries and wildlife habitat in both Rock Creek and the Clark Fork River. It 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 2005. Fisheries investigations for the Rock Creek (Garrison) Instream Flow and Habitat Improvement Project included redd counts and electrofishing 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 once 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. Electrofishing 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 past 35 years. The redd counts and population estimates indicate that brown trout and westslope cutthroat trout are using the restored reaches of Rock Creek.

Flow Monitoring: FWP monitored stream flows in Rock Creek during the 2005 irrigation season. Instantaneous measurements were recorded on Rock Creek using a Marsh/Mcberny velocity meter and an Aquarod continuous stage recorder installed. Discharge was normally recorded above the headgate and below the return flow (fish bypass) pipe. However, if no pivots were in operation, then flow was recorded only downstream of the headgate. No site visit was conducted before June because we were primarily interested in ensuring that flow objectives were met during the low flow season. The table below shows that the flow objective of a minimum of 5cfs below the headgate was exceeded during the entire irrigation season.

2005 Rock Creek Flow Data

Dates 2005	Number of operating pivots	Discharge (cfs)	
		Above headgate	Below headgate
July 10	2	33.99	31.74
July 15	1	27.51	25.55
July 26	0	---	20.59
August 29	1	31.56	27.8
September 16	2	31.15	31.84
October 21	0	---	22.06

Hells Canyon Creek

Restoration Objectives: Improve fish and wildlife habitat through instream flow enhancement; eliminate entrainment of fish through installation of a fish screen.

Project Summary: Prior to the project, the lessor diverted water from Hells Canyon Creek into a highly inefficient ditch system. In 1996, FWP funded the installation of a pipeline that would convey water more efficiently, and leased the salvaged water for instream flow.

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

Biological Monitoring: FWP typically monitors trout fry migrations at the fish screen bypass to document the effectiveness of the fish screen at the head of the gravity pipeline. This year the bypass pipe was sampled during 21 trap-nights from July 8 through August 17. We captured 3974 young-of-the-year rainbow trout during this trapping effort. It is not possible to sample 100% of the bypass flow, and our subsampling of the bypass typically captured 25 to 45% of the flow and fish traveling through the bypass. Thus, the number of fish effectively screened from entering the irrigation system is much higher than the 3974 fish captured in 2005.

FWP has conducted catch-per-unit-effort (CPUE) sampling on Hells Canyon Creek every year since 1992, except for 2000. The creek was again sampled on October 14, 2005

near the mouth of Hells Canyon Creek by making one pass with a backpack electrofishing unit to determine abundance of juvenile trout. In 2005, we sampled the largest number of juvenile rainbow trout we have seen since 1992. We collected 144 rainbow trout less than 120 mm in total length in 2000 seconds of electrofishing time, which results in 7.2 rainbow trout per 100 seconds. Previous years results ranged from 1.6 to 6.2 rainbow trout (<120 mm) per 100 seconds of electrofishing. There are several variables potentially influencing the abundance of juvenile rainbow trout including whirling disease, size of spawning population, spawning success, and others. The improved flow conditions in 2005 may also be a positive factor resulting in the higher abundance of juvenile trout observed in 2005.

In addition, we observed brown trout spawning activity was in Hells Canyon Creek during October and November of 2005. Improved stream flow during the fall apparently allowed brown trout resident to the Jefferson River to enter the stream for spawning as was generally the case prior to drought conditions beginning in about 2000. In general, brown trout were not able to enter Hells Canyon Creek for spawning from 2000 through 2003 due to low stream flow during the fall.

Table 1. Catch-per-unit-effort electrofishing surveys for juvenile rainbow trout (<120 mm) near the mouth of Hell's Canyon Creek, 1992 – 2004.

Year	Catch per 100 seconds of shocking time
1992	5.6
1995	3.0
1996	3.8
1997	4.0
1998	2.6
1999	1.6
2000	---
2001	3.3
2002	4.7
2003	6.2
2004	5.5
2005	7.2

Flow Monitoring: FWP monitored flows in Hell's Canyon Creek during 2005 and previous years to determine the lease's effectiveness. We have always found the landowners operating the Hell's Canyon Creek gravity pipeline to be in compliance with the lease. As in previous years, discharge of Hell's Canyon Creek exceeded the pre-July

15 minimum flow value of 1.60 cfs. On July 7th, flow was measured at 7.78 cfs. By August 4th, the flow had only dropped to 4.03 cfs. We made no further flow measurements, but Aquarod® data indicate that the flow stayed above the .25 cfs minimum. Summer flows stayed healthy in 2005, but from 2000 through 2003, there is no question that Hell's Canyon Creek would have been completely dewatered downstream of the diversion if the water lease was not in place. Similarly, it is likely that Hell's Canyon Creek would have been dangerously dewatered during 2005 if the water lease were not in place. The water remained relatively cool and hundreds of trout fry could be observed rearing in the leased waters of Hell's Canyon Creek below the diversion.

2005 Hells Canyon Creek Flow Data

Dates of 2005 flow measurement	Discharge (cfs)
May 18	17.93
May 24	16.10
June 13	12.84
July 5	8.36
July 7	7.78
August 4	4.03

Big Creek

Background: Big Creek, a tributary to Yellowstone River near Emigrant, is used by native Yellowstone cutthroat trout ***(YCT)*** 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.

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.

Flow Monitoring: FWP monitors Big Creek flows at the Kendall Bridge located about 0.2 miles below the last major irrigation diversion. On May 20, 2005 FWP installed an Aquarod® (Figures 1 &2) to continuously record stream stage (elevation). 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. Both the Aquarod® and an independent thermograph monitored stream temperature.

Figure 1. Aquarods®

Figure 3 shows the hydrograph for Big Creek at the Kendall Bridge below the main irrigation diversions as well as the leased flow rates. Figure 4 displays the same information, but focuses on the low-flow period of the irrigation season from the beginning of August through the end of October. FWP removed he Aquarod® on October 26 to prevent possible damage from freezing.

Stream flow in Big Creek generally held up well during 2005. The lowest flows occurred in September with the lowest average daily flow of 8.79 cfs recorded on September 5. Flow was below the 11 cfs minimum lease level on 24 days in late August and September as well as below the 10 cfs oldest right lease on 12 days. This assessment does need to be qualified as the flow information contains some error due to instrumentation, limitations of flow measurement methods, and use of a mathematical stage-discharge relationship that does not match every data point perfectly. For this reason an overly strict interpretation of the average daily flow data would lead to incorrect conclusions with regard to the success of maintaining minimum flow levels.

Figure 2. Kendall Bridge October 26, 2005. The Aquarod® is housed in the metal pipe attached to the left bridge abutment.

Without reductions in irrigation diversions, flows would have dropped much more significantly in late 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 below the leased levels.

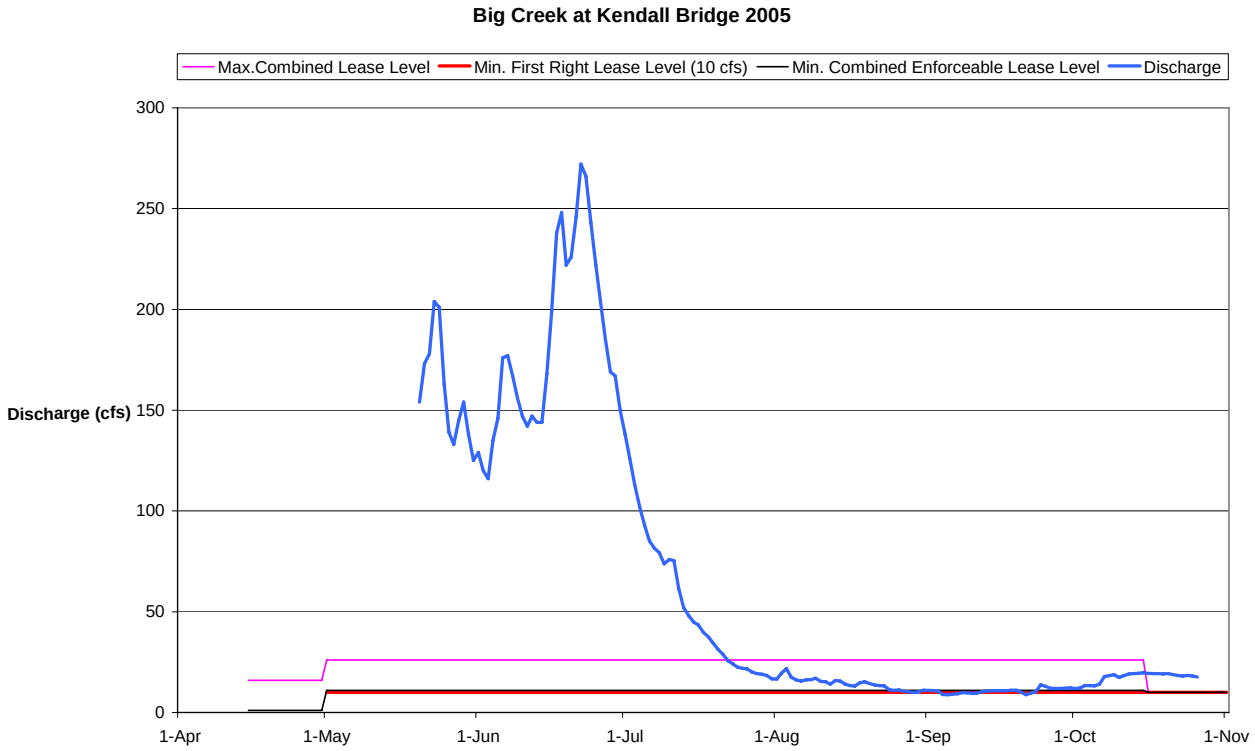


Figure 3. 2005 Big Creek discharge at Kendall Bridge in comparison to leased flow rates.

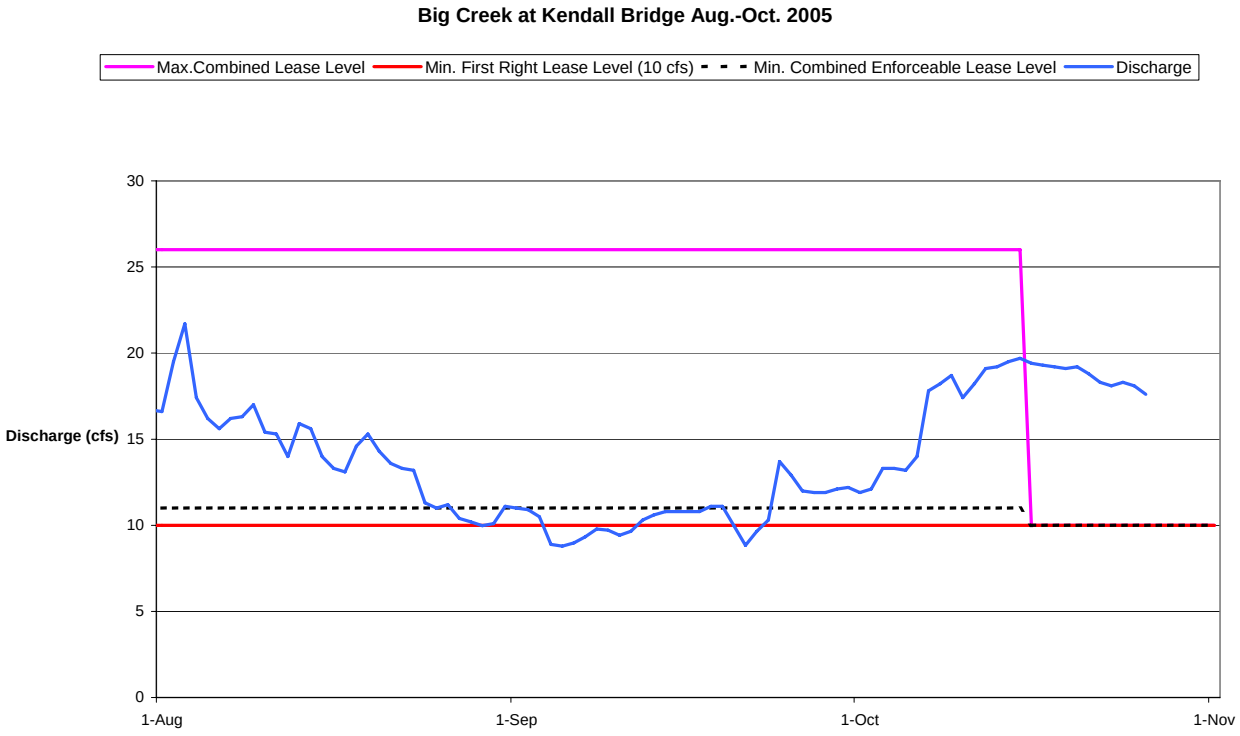


Figure 4. August – October 2005 Big Creek discharge at Kendall Bridge in comparison to leased flow rates.

In recent years, an irrigation diversion below the Kendall Bridge resumed operation. This diversion diverts water under the first and second priority water rights. The diversion does not have a measuring device, but FWP measured the highest observed diversion in 2005 at 0.69 cfs on August 15th. At this time, the flow at the Kendall Bridge was 13.9 cfs. Observed flows from the lower diversion continued to drop from that date, and did not present a significant depletion to stream flow. In the future, a measuring device at this diversion would be helpful to ensure additional water is present at the Kendall Bridge to compensate for this lower diversion.

In 2005, the Big Creek leases continued to keep the lower of 1.4 miles of Big Creek sufficiently watered to meet the objectives of the leases.

Biological Monitoring: During 2004 and 2005, FWP monitored spawning and fry production using redd counts and fry trapping. From pre-leasing conditions, YCT redd counts increased from 27 – 39 in 1988-1989 to 142 in 2004 and 88 in 2005. Estimated fry production improved from 0 in 1988 and 3,429 in 1989 to over 18,000 in 2005. The significant improvement in YCT production in Big Creek is directly attributable to water leases. Entrainment of spawners and fry into the Mutual Ditch should end with the installation of a rotary drum screen in 2006.

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 dewatered the lower 2700 feet of the stream, limiting fry production and migration into the Yellowstone River.

Restoration Objectives: Maintain stream flow in the lower 2700 feet of Cedar Creek to improve Yellowstone cutthroat trout recruitment to the Yellowstone River.

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 August flow rate of up to 9.61 cfs 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 (Byorth, 1990). This lease expired September 20, 2005. A lease renewal agreement between the US Forest Service and Montana Fish, Wildlife and Parks (FWP) for a ten-year extension of the lease has been signed and the renewal of the Change Authorization is currently pending before the Dept. of Natural Resources and Conservation. Under the renewal agreement, there would be no payment 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 through the Future Fisheries Improvement Program made the water available for lease. There is no annual payment associated with this lease.

The water right with the oldest priority date in the Cedar Creek drainage is historically decreed in District Court with a flow rate of 5.5 cfs. Nine timely filed irrigation claims with a combined flow rate of 5.14 cfs and two late filed claims, subordinate to timely filed claims, with a combined flow rate of 0.38 cfs, all based on the 5.5 cfs historically decreed first right currently are included in the current Temporary Preliminary Decree. Under the current Temporary Preliminary Decree up to 5.14 cfs can be diverted without regard to the 3.0 cfs protected by the leases. However, the water distribution on Cedar Creek has typically been done in compliance with the historic District Court decree allowing up to 5.5 cfs diverted under the most senior water rights instead of the 5.14 cfs that makes up the timely file senior water right claims in the Temporary Preliminary Decree. This mode of operation is likely the best until such time the Temporary Preliminary Decree is deemed to be enforceable for Cedar Creek by the Water Court or a Final Decree is issued for the Yellowstone River, above and including Bridger Creek.

Flow Monitoring: FWP monitors flow in Cedar Creek at three locations; 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. On June 17, 2005 FWP installed an Aquarod® (Figure 5) at the lower monitoring location to electronically 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. Stream temperature was monitored both with the Aquarod® and an independent thermograph. Figure 6 shows the hydrograph for Cedar Creek near the mouth below the irrigation diversions as well as the leased flow rates. Figure 7 exhibits the same information, but focuses on the low-flow period of the irrigation season from the middle of July through the end of October. The Aquarod® was removed on October 26 to prevent possible damage from freezing.

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 changes 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 the stream was losing as opposed to gaining, no more measurement comparisons between the two sites were made in 2005.

A comparison of the monitoring gauge upstream of the lower diversions and the gauge near the mouth provides an estimate of irrigation diversions without measuring the actual irrigation diversions. The following table shows this comparison.

Table 2. Diversions from Cedar Creek

Date	Abv Diversion (cfs)	Near Mouth (cfs)	Difference (Diversion) (cfs)	Portion of 1.3 cfs used	Portion of 1.7 cfs used	1st right (cfs)
6/17/2005	42.9	35.5	7.4	1.3	1.7	5.5
7/18/2005	15.2	8.6	6.6	1.3	1.7	5.5
8/8/2005	8.9	3.0	5.9	1.3	1.7	5.5
8/15/2005	8.3	2.7	5.6	1.3	1.4	5.5
8/26/2005	8.0	2.4	5.6	1.3	1.1	5.5
9/7/2005	6.7	2.0	4.7	1.3	0.7	5.5
9/16/2005	6.4	2.0	4.4	1.3	0.7	5.5
10/6/2005	6.4	1.6	4.8	1.3	0.3	5.5

Average daily flows first dipped below 3.0 cfs on August 5 but remained within 10% of this level until August 15. The irrigation diversions as determined by comparison of stream flow on August 8 and 26 may slightly overestimate the actual diversion, as they do not account for natural losses in the stream. Also given the inherent errors in stream measurement, the August irrigation diversions from Cedar Creek were being managed in compliance with the historically decreed flow rate of 5.5 cfs for the first priority water rights. The lowest average daily flow of 1.70 cfs was recorded on October 1, 2005. Without voluntary reductions in irrigation diversions by the oldest water rights, flows would have dropped more significantly in September and early October.

Biological Monitoring: Monitoring YCT spawning runs and fry production in Cedar Creek dates back to the 1980's. Cedar Creek has consistently been an important source of recruitment to the Yellowstone River fishery. Over the years, fry production fluctuated depending on flow conditions. Water leases appear to have stabilized production at levels similar to good moisture levels prior to the leases. In 2005, redd counts and fry production demonstrated stability with 74 redds counted near the peak of spawning and fry production estimated at 11,000. These numbers are above long-term averages.

Figure 5. Cedar Creek near mouth. October 26, 2005. The Aquarod® is housed in the metal pipe attached to the staff gauge.

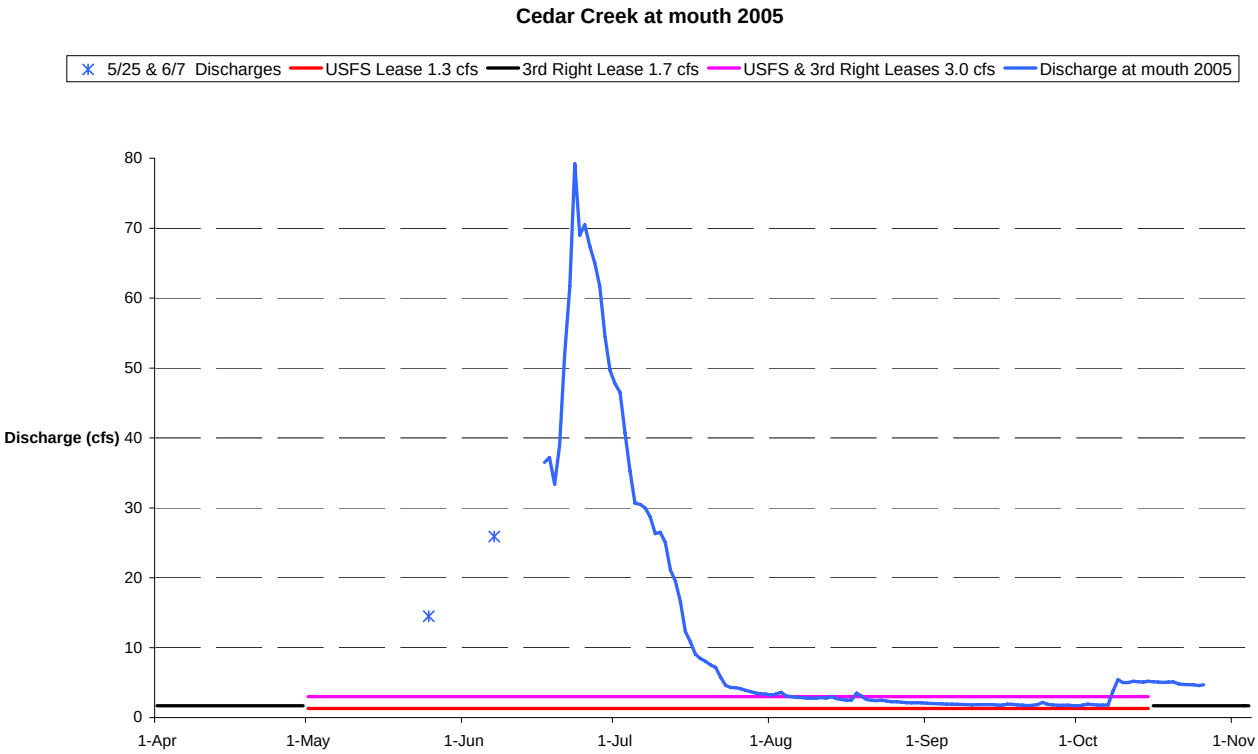


Figure 6. 2005 Cedar Creek discharge near mouth in comparison to leased flow rates.

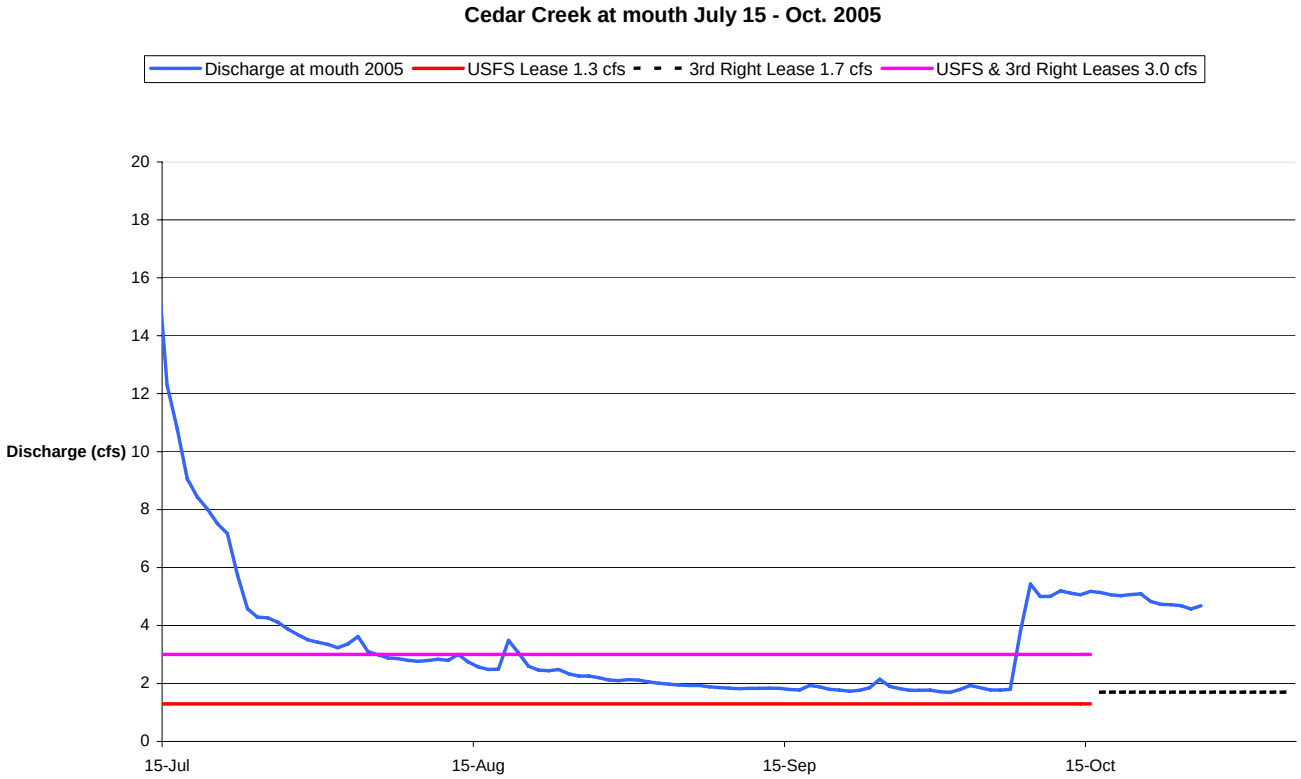


Figure 7. July 15 – October 2005 Cedar Creek discharge near mouth in comparison to leased flow rates.

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.

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. The stage is monitored throughout the summer. 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. The Table 3 contains the measurements from 2005.

***Table 3. Mol Heron Creek discharge above mouth 2005*.**

Date	Time	Stage (feet)	Discharge (cfs)
8/15/05	11:25	1.19	12.1
8/26/05	11:55	1.15	9.0
9/7/05	13.40	1.20	12.7*
9/16/05	10:40	1.18	11.3
10/6/05	13:45	1.22	14.4
10/26/05	12:45	1.22	14.4

*Actual Discharge Measurement

Stream flow in Mol Heron Creek held up relatively well during 2005. The lowest observed flow of 9.0 cfs occurred on August 26, well above the 5.0 cfs lease minimum. In 2005, 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.

Biological Monitoring: Currently, two students and their advisors from Montana State University, (Jesse Patton, Andy Solcz, Joel Cahoon, Tom McMahon, Matt Blank), are conducting an ongoing study assessing Yellowstone cutthroat trout passage through five culverts on Mol Heron Creek. The extent to which culverts affect fish mobility in streams is an increasing concern in Montana. Some studies have been performed on fish passage, but there is still much to be learned about the ability of trout to successfully swim through culverts. This study puts a technology called passive integrated transponder (PIT) tagging to a relatively new use. PIT tags are small capsule-shaped electronic devices that are implanted under the skin of the fish. Then, when a tagged fish passes through a looped antenna, the date, time, and pit tag code are recorded. In this study, ten antennas were installed to monitor all the major culverts in a drainage basin that provides spawning habitat for trout that are resident in the Yellowstone River. At each of five culverts, antennas are placed at both the upstream and downstream end (photo, right) of the culvert. With this arrangement, the number of attempts and successful passes made by each tagged fish is recorded electronically. Ultimately, the study will correlate the passage data with hydraulic and habitat conditions.

The lease has effectively provided stable flows for spawning and rearing YCT, allowing spawners and fry to return to the Yellowstone River. A screen will be installed in 2006 to prevent entrainment into the irrigation system.

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 not hydrologically connected to Locke Creek, which created the leased water savings. 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. On May 20, 2005, FWP installed an Aquarod® (Figure 8) at the monitoring location to electronically continuously record stream stage near the mouth of 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. FWP used both the Aquarod and an independent thermograph to monitor stream temperature.

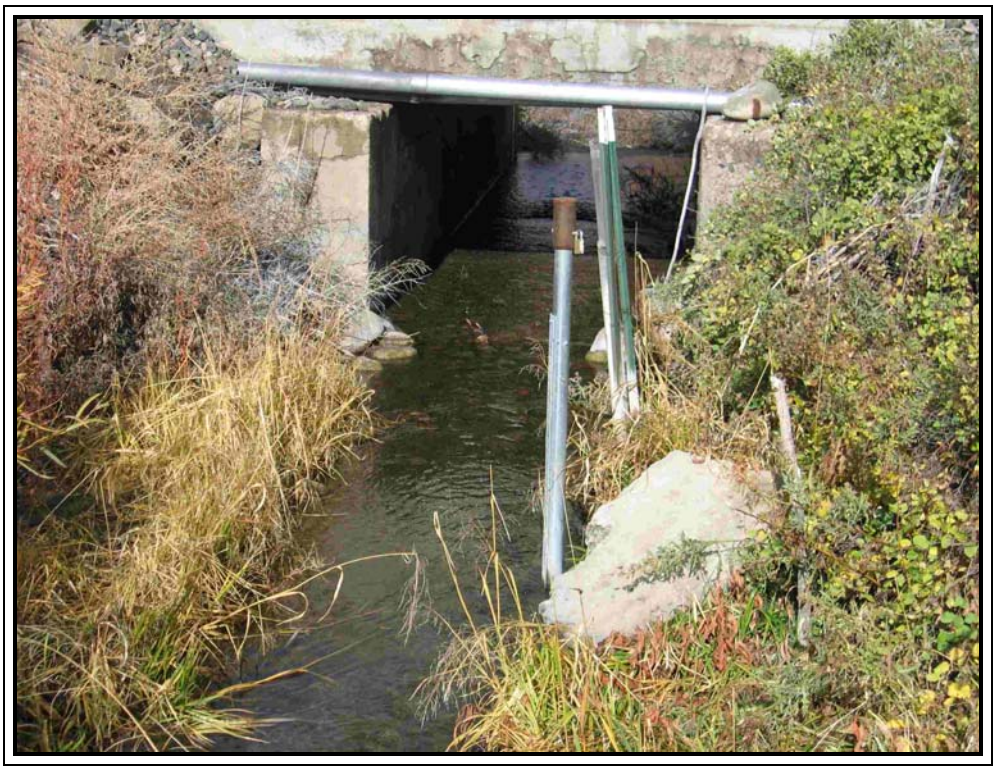


Figure 8. Locke Creek near mouth. October 28, 2005. The Aquarod® is housed in the metal pipe driven into the streambed.

Figure 9 displays the hydrograph for Locke Creek near the mouth. The Aquarod® was removed on October 26 to prevent possible damage from freezing. Average daily flows peaked in mid-May and dropped to a low of 0.47 cfs on September 10. Without the lease the historic diversion of up to 1.5 cfs would have completely dewatered the stream beginning on about July 15 and dewatering in June would likely have been sufficient to reduce or prevent any spawning migration from the Yellowstone River.

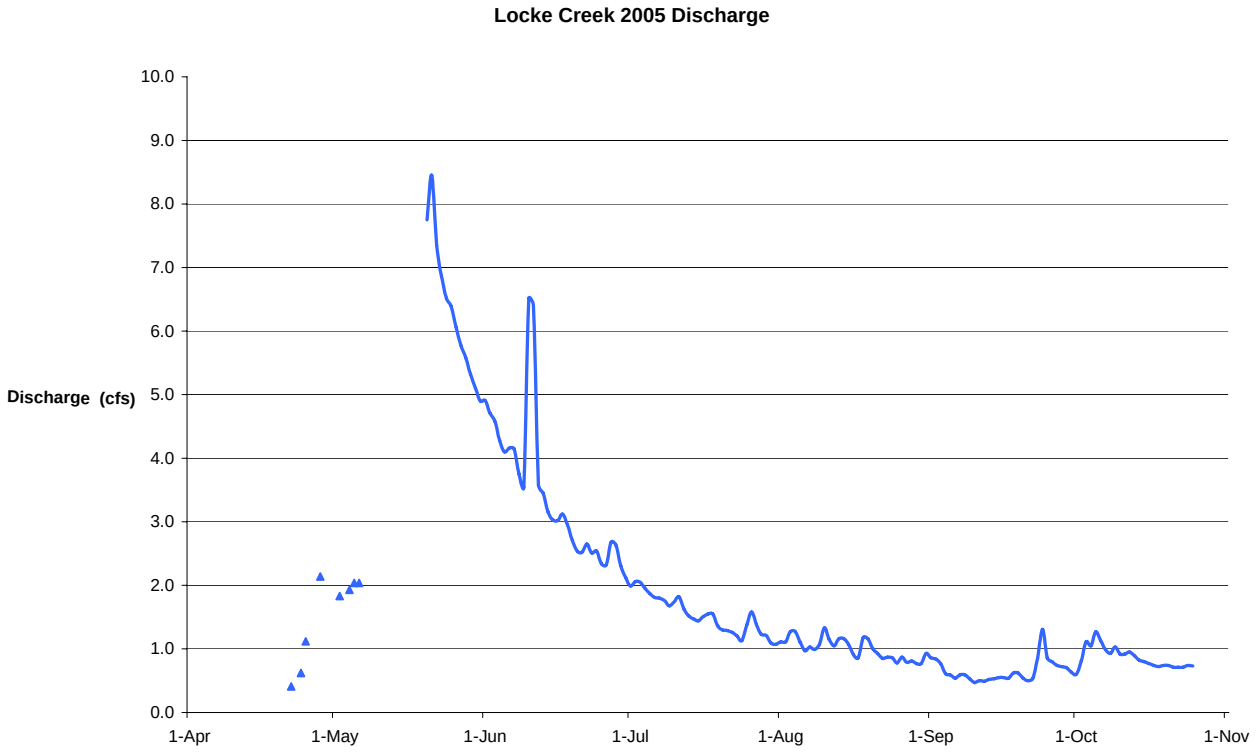


Figure 9. 2005 Locke Creek discharge near mouth.

In 2005, 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.

Biological Monitoring: Spawning monitoring captured only 6 YCT. While FWP detected 16 redds, no fry were captured. It is believed the remnant spawning run may be restored if sufficient flushing flows cleanse gravels of fine sediments and access past the railroad culvert can be improved.

Additional Restoration Issues: During the recent years of extended 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. Figure 10 is an aerial of the photo of this area. The aerial photo indicates a good connection between the side channel and the main channel. The extreme1996 and 1997 flood events likely changed this situation. Now except during quite high water the side channel is perched well above the main channel. Figure 11 shows the side channel looking downstream from the mouth of Locke Creek. Figure 12 is a view of the confluence of the side channel with the main channel of the Yellowstone River. This situation may be limiting the use of Locke Creek for Spawning.

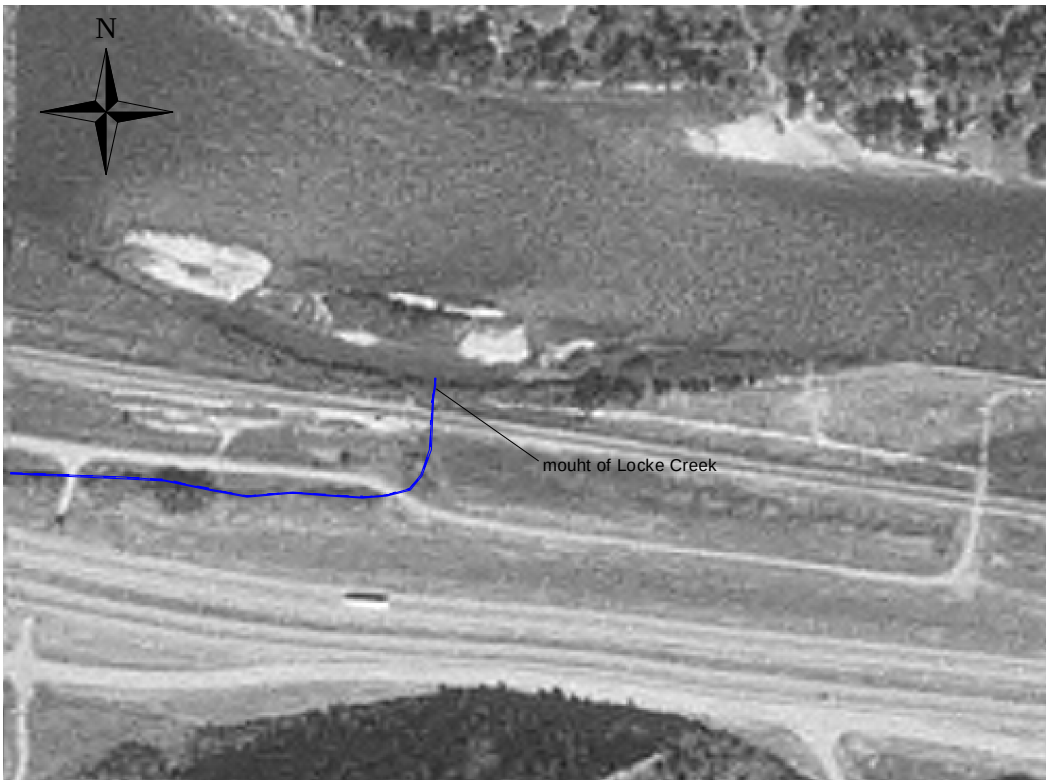


Figure 10. Aerial photograph of area near mouth of Locke Creek.

Figure 11. Side channel looking downstream from the mouth of Locke Creek. The Yellowstone River main channel can be seen in the distance.

Figure 12. Side channel at confluence with the Yellowstone River main channel.

In 2005, FWP documented flow levels necessary to maintain access to Locke Creek during the YCT spawning run. Flows of over 10,000 cfs in the Yellowstone River are necessary to allow fish access into the side channel and past the concrete apron created by the railroad culvert (Figure 8). During the YCT spawning period (May 15 –July 15 annually) flows in the Yellowstone River were sufficient to pass fish for about 30 days. Over the past 11years, flows have been sufficient to pass fish for at least 30 days during 9 years. Most recently, flows were adequate for only 8 days in 2004 and 4 days in 2001. Strategies to improve fish passage into Locke Creek are being investigated.

Beaver dams in the lower reach of Locke Creek are an annual maintenance issue. The beaver dams can prevent spawning migration. The lessor has been very gracious in removing these dams as necessary.

Mill Creek

Background: Mill Creek, a tributary to the Yellowstone River near Pray, historically has been an important spawning stream for Yellowstone cutthroat trout. However, during times of low stream flow, irrigation diversions dewatered the lower 6.4 miles of the stream with the lower 1-mile being dry, limiting fry production and migration into the Yellowstone River.

Restoration Objective: Maintain stream flow in the lower 6.4 miles of Mill Creek to improve Yellowstone cutthroat trout recruitment to the Yellowstone River.

Lease Summary: FWP currently leases one water right from Mill Creek. The lease, DNRC Authorization to Change No. 43B 3920400 approved and implemented in 1996, leases 2.64 cfs under two Mill Creek water rights from May 1 to October 19 of each year. Due to channel loss, FWP attempts to protect only 50% of the lease flow rate or 1.32 cfs at the monitoring site about 0.45 stream miles upstream from the confluence with the Yellowstone River. This lease expires May 1, 2006. A water conservation project by the Mill Creek Water and Sewer District and the USDA Natural Resource and Conservation Service involving the construction of a gravity pipeline irrigation system along with the installation of sprinkler irrigation on 2160 acres of previously flood irrigated land created the water savings to make water available for lease. The annual lease payment is $4200.

FWP administered two additional instream water leases on Mill Creek from 1993-2002. The first lease protected 6.13 cfs for instream flow throughout the irrigation season to provide spawning and rearing habitat throughout the dewatered reach of Mill Creek. The second lease was for a 41.4 cfs flow for 60 hours in August. The purpose of this limited duration high flow was to flush young Yellowstone cutthroats out of Mill Creek to the Yellowstone River. Reducing diversion to the Water and Sewer District pipeline system provided for the 41.4 cfs flush.

FWP chose not to renew these leases after 2002. During the term of these two leases, Mill Creek reportedly went dry in its lower reaches in at least four out of ten years (1994, 1998, 2000 & 2001) and flows fell below the leased level in at least two additional years (1999 & 2002). This occurred despite the District Court appointing a water commissioner to properly apportion water diversions from Mill Creek. While FWP leased sufficiently senior water rights to assure water even in times of drought, the water commissioner had difficulty responding to rapid decreases in stream flow and at times could not prevent water users from illegally increasing irrigation diversions. Maintaining a specific instream flow minimum presents greater difficulty for water commissioners as damage to the fishery due to dewatering below the minimum flow cannot be reversed by again delivering the minimum flow such as is the case with irrigation diversions. A hay crop can survive a day without water, a fish cannot. Because of the significant number of years when the objective of improved fry production in Mill Creek wasn't achieved and the difficulty in administration of water rights, FWP chose not renew the first two leases after 2002.

Flow Monitoring: The flow monitoring for the Mill Creek lease occurs approximately 0.45 miles upstream of the confluence with the Yellowstone River at the East River Road Bridge. The stage is monitored throughout the summer. 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 Mill Creek. Table 4 includes the measurements from 2005.

Table 4. Mill Creek discharge at East River RD Bridge 2005.

Date	Time	Stage (feet)	Discharge (cfs)
5/20/05	15:30	3.02	270
5/25/05	13:54	3.34	312
6/8/05	06:55	3.31	306*
6/17/05	14:57	3.70	410+
7/14/05	10:30	2.31	120
7/18/05	12:50	1.92	73.1
7/19/05	15:10	1.77	57.7*
8/1/05	13:40	0.96	7.8
8/3/05	13:30	1.04	10.3
8/4/05	11:15	1.12	13.3
8/8/05	15:30	0.78	3.5
8/15/05	12:00	0.88	5.7
8/26/05	12:50	Dry	Dry
9/7/05	15:00	Dry	Dry
10/6/05	14:30	No Reading	Flowing
10/20/05	11:10	1.39	24.4*
10/26/05	12:45	1.32	23.1

*Actual Discharge Measurement
+Estimated – stage beyond range of rating table

Again in 2005 Mill Creek dried up in its lower reaches. In fact no flow was present for nearly the entire lower 6.4 miles on September 15, 2005. In 2005, the water users on Mill Creek chose not to petition the District Court for the appointment of a water commissioner. This decision likely resulted in the severe dewatering. FWP considered solely petitioning the court for a water commissioner, but determined that the remaining 2.64 cfs lease alone would provide little if any benefit to Mill Creek in such a severely dewatered state.

For the remaining 2.64 cfs Mill Creek lease, 2005 represented at least the fifth out of the ten-year lease term in which the lower reaches of Mill Creek went dry. As with the previous leases difficulty in administering the lease remained a problem. Additionally, this relatively small lease alone is insufficient to supply the flow needs in lower Mill Creek. FWP has not made a determination as to whether or not to seek of the renewal of this lease. This decision largely depends on the progress of other opportunities to re-water Mill Creek that are currently being explored.

Biological/Habitat Monitoring: In 2005, FWP documented 52 YCT redds in Mill Creek between the mouth and a barrier 8 miles upstream. Apparently, most redds attributable to Yellowstone River spawners were located within 1 mile of the mouth, the most dewatered reach. 122 Yellowstone cutthroat fry were trapped just before the stream was completely dewatered. Apparently, some fry were successful in reaching the Yellowstone River prior to dewatering. Observations of stream flow indicate that a

minimum of 13 cfs at the East River Road Bridge is needed to keep redds wet and allow fry to pass to the river.

Additional Restoration Issues: Efforts are underway to seek additional leases and water conservation measures sufficient to maintain a minimum flow in the severely dewatered reach of Mill Creek. FWP is currently collaborating with the Upper Yellowstone Watershed Basin group to work with the community to solve dewatering problems.