Appendix A

FUTURE FISHERIES IMPROVEMENT PROGRAM

LONG-TERM PHOTO POINT MONITORING REPORT

DECEMBER 2012

Prepared By:

Mark Lere
Fisheries Bureau
Montana Fish, Wildlife and Parks

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FUTURE FISHERIES IMPROVEMENT PROGRAM
December 2012
LONG-TERM PHOTO POINT MONITORING

INTRODUCTION

The Future Fisheries Program has committed over $13.8 million towards 638 restoration projects in Montana since its inception in 1995. Associated matching funds and in-kind services have exceeded $36.9 million. By nature, restoration projects typically should be viewed as experimental since outcomes cannot be readily predicted. Without monitoring, one simply cannot determine whether a project is effective and worthwhile. Although not consistent or comprehensive, the types of monitoring undertaken by the Future Fisheries Improvement Program have included implementation (was project completed as proposed?), effectiveness (did the project meet objectives?) and compliance (are land use activities in compliance with project agreements?). The establishment of long-term photo points is one technique that provides a visual reference for riparian conditions and maintenance of channel function. This visual reference can help assess the long-term effectiveness of restoration projects, as well as compliance with land management agreements. This paper summarizes the Program's monitoring effort using long-term photo-points for a selected series of completed restoration projects. Long-term photo monitoring calls for re-visiting selected sites approximately every 5 years to take follow-up photographs in order to monitor change over time. Additionally, the plan calls for adding new projects to the long-term photo monitoring effort as time passes and as projects are completed. This long-term photo monitoring effort represents only a small subset of a myriad of monitoring activities that have been, and are continuing to be, undertaken for the Program.

METHODS

Long-term photo points for a selected series of completed Future Fisheries projects were initially established in 2009. Projects were selected using a random numbers generator from a list of completed restoration projects that were at least four years old (completed prior to 2009) and also had either pre and/or post photographs on file. Additionally, project lists were further broken into a series of project types including riparian fencing, channel restoration, bank stabilization, fish passage at road crossings, in-stream flow enhancement and fish passage barriers. Several projects that were randomly selected for long term photo monitoring involved more than one type of restoration, and were categorized as separate restoration types (for example, a project could involve riparian fencing and channel restoration or some other combination). Due to staff and time limitations, and the desire to provide a relatively even distribution of projects by type, the number of photo points established in 2009 were limited to 10 riparian fencing projects, 10 channel restoration projects, 6 bank stabilization projects, 2 fish passage at road crossing projects, 1 in-stream flow enhancement project and 1 fish passage barrier project (Table 1). Appendix Table 1 provides a list of the projects selected for long-term photo monitoring.

Table 1. The number of Future Fisheries projects, by type, selected for long-term photo point monitoring. Total number of projects and selections were from 2009. Total number of projects monitored to date is through August 2012.

PROJECT TYPE	TOTAL NUMBER OF PROJECTS COMPLETED (AT LEAST 4 YEARS OLD AND WITH PHOTOS ON FILE) AS OF 2009	TOTAL NUMBER OF PROJECTS SELECTED FOR LONG-TERM PHOTO MONITORING	% OF PROJECTS SELECTED	TOTAL NUMBER OF PROJECTS MONITORED TO DATE
Riparian fencing	62	10	16.1	8
Channel restoration	64	10	15.6	9
Bank stabilization	28	6	21.4	6
Fish passage @ road crossings	15	2	13.3	2
In-stream flow	7	1	14.3	1
Fish passage barrier	6	1	16.7	1

RESULTS

Since August 2012, 27 of the 30 projects selected for long-term photo point monitoring were surveyed. Surveyed projects by project type included 8 of 10 riparian fencing projects, 9 of 10 channel restoration projects, 6 of 6 bank stabilization projects, 2 of 2 fish passage at road crossings projects, 1 of 1 in-stream flow projects and 1 of 1 fish passage barrier projects. A summary of monitoring results is presented in Table 2. Descriptions and observations of individual projects follow the discussion section (photos presented side-by-side were taken from similar vantage points).

Table 2. A summary of monitoring results obtained from long-term photo-point monitoring.

Project Type	**Project Name and Number**	**Region**	**Project Completion Date**	**Date Last Visited**	**Riparian Function**	**Channel Function**	**Fish Habitat**
Riparian Fencing							
	Little Beaver Creek FFI-013-1996	1	10/1997	10/2009	Improved	Neutral	Neutral
	Stinger Creek FFI-003-1997	1	6/1997	Needs visit			
	Smith River FFI-023-1999	4	10/2000	Needs visit			
	Dupuyer Creek FFI-012-2000	4	10/2000	10/2009	Neutral	Neutral	Neutral

Project Type	Project Name and Number	Region	Project Completion Date	Date Last Visited	Riparian Function	Channel Function	Fish Habitat
	Prickly Pear Creek FFI-023-2000	4	6/2001	9/2009	Improved	Improved	Improved
	Rock Creek FFI-014-2001	2	7/2001	8/2012	Improved	Improved	Improved
	Harvey Creek FFI-012-2002	2	4/2003	9/2009	Improved	Improved	Neutral
	Madison Spring Cr. FFI-015-2002	3	7/2002	8/2009	Improved	Neutral	Neutral
	Tyler Creek FFI-047-2004	2	10/2004	9/2009	Neutral	Neutral	Neutral
	McKee Spring Creek FFI-018-2003	3	2/2008	8/2012	Improved	Improved	Nuetral
Channel Restoration							
	Stinger Creek FFI-003-1997	1	6/1997	Needs visit			
	Big Spring Creek FFI-024-1997	4	Fall/2001	10/2009	Improved	Improved	Improved
	Prospect Creek FFI-053-1999	1	10/2000	10/2009	Neutral	Neutral	Neutral
	Poorman Creek FFI-052-2000	2	Summer 2001	9/2009	Neutral	Improved	Unknown
	Rattlesnake Creek FFI-13-2001	2	11/2001	9/2009	Improved	Improved	Improved
	White Pine Creek FFI-022-2001	1	12/2002	10/2009	Neutral	Neutral	Neutral
	Nevada Spring Cr. FFI-042-2001	2	2/2003	8/2012	Improved	Improved	Improved
	German Gulch FFI-040-2002	2	9/2007	9/2009	Neutral	Neutral	Neutral
	Upper Willow Cr. FFI-005-2006	2	5/2006	8/2011	Improved	Improved	Improved
	Willow Springs Cr. FFI-034-2004	3	5/2005	7/2001	Improved	Improved	Improved
Bank Stabilization							
	Deep Creek FFI-017-1996	3	Winter 1998	9/2009	Improved	Improved	Improved
	Missouri River FFI-057-1996	3	11/1997	9/2009	Neutral	Neutral	Neutral
	Cottonwood Creek FFI-008-1999	4	4/2000	10/2009	Improved	Neutral	Unknown
	Shields River FFI-059-1999	3	Summer 2000	8/2010	Neutral	Neutral	Neutral
	Shields River FFI-060-1999	3	Fall 2001	8/2010	Neutral	Neutral	Neutral
	Silver Butte Creek FFI-053-2000	1	9/2001	10/2009	Neutral	Neutral	Neutral
Fish Passage Road x-ings							
	Cottonwood Creek FFI-037-1997	2	1999	9/2009	NA	Improved	Improved

Project Type	Project Name and Number	Region	Project Completion Date	Date Last Visited	Riparian Function	Channel Function	Fish Habitat
	Duck Creek FFI-008-2004	3	2005	8/2009	NA	Neutral	Improved
In-stream Flow							
	McCabe Creek FFI-018-2000	2	2000	9/2009	NA	Neutral	Improved
Fish Barrier							
	Big Coulee Creek FFI-033-1999	4	10/2002	10/2009	NA	Neutral	Improved

DISCUSSION

Riparian Fencing Projects

Six of the 8 riparian fencing projects that were monitored for this report were found to be effective in improving riparian function. Two projects, Dupuyer and Tyler creeks, showed no improvement in riparian function. Fencing on Dupuyer Creek was in disrepair when visited and, although there was no recent evidence of livestock use, farming practices that had been undertaken to the edge of the active channel eliminated the chance for riparian recovery in affected areas. For Tyler Creek, fencing was effectively excluding an old oxbow of the Clark Fork River from livestock use, but was providing no benefits to the stream itself. The intent of the Tyler Creek project did not appear to be directed at the stream.

Benefits to fish habitat and fish populations associated with these riparian fencing projects appeared to be much less direct. Only two of the eight monitored projects appeared to show significant improvements to fish habitat, but both of these projects (Prickly Pear and Rock creeks) also involved stream channel restoration and enhancement of in-stream flow. Habitat benefits were likely due to a combination of all of these restoration activities, and not just the installation of riparian fencing. The remaining six projects did not appear to substantially improve fish habitat. Inadequate in-stream flow, poor in-channel habitat conditions and excessive recruitment of fine sediment from upstream reaches were some of the factors that appeared to limit fish habitat on these six projects, despite improved riparian function.

Riparian function, for the six successful riparian fencing projects, is expected to further improve as long as land use activities in the riparian corridor continue to be properly managed. However, overall fish habitat may not show improvement due to the presence of other limiting factors.

Channel Restoration Projects

Six of the 9 channel restoration projects that were monitored for this report were shown to be effective in improving channel function. The three projects that did not appear to be effective were alluvial-type channels that have the tendency to meander. Hardened, in-channel structures (vanes, weirs, j-hooks) placed in alluvial streams, such as those installed into Prospect, White Pine and German Gulch creeks, typically either fail or the stream channel migrates away from them to another position within the active floodplain. The only exception

for this report was the restoration of a side channel on Rattlesnake Creek, involving the placement of some in-channel structure. This reach of Rattlesnake Creek is an alluvial channel. However, the success of the Rattlesnake project likely hinged on the fact that it was located on a side channel where flows and bed load were controlled by an in-take structure. Successful efforts to restore stream channels likely need to reflect the context of the channel type. Alluvial channels typically do not harbor hardened structures, and if they do, their presence and function are commonly only temporary in nature.

Five of the 9 channel restoration projects showing improvements to channel function also appeared to improve fish habitat and fish populations. The Poorman project, as an exception, lacked data on the fishery to make a determination. All five of the projects that were successful in improving fish habitat also showed improvements in riparian function. Riparian improvements were associated with the removal of livestock from the riparian corridors.

Bank Stabilization Projects

Of the six bank stabilization projects monitored for this report, only the Deep Creek project showed improvement in channel function and fish habitat. The Deep Creek project was part a large scale attempt to reduce sediment loading on 20 miles of stream in association with a Total Maximum Daily Load Plan for the drainage. The remaining five projects were small in scale and appeared to focus more on property protection than on channel function or fish habitat. In general, bank stabilization projects showed no measureable benefits to channel function or fish populations due to the typical small scale at which bank erosion was addressed. Bank erosion is part of the natural progression of channel evolution, as well as a common process on alluvial channels. Attempting to stabilize banks under these circumstances often conflicts with natural channel forming processes where fish have evolved to thrive. Two of the bank stabilization projects, Deep and Cottonwood creeks, showed improvement in riparian function. Both involved the installation of riparian fencing and the exclusion of livestock.

Fish Passage at Road Crossing Projects

The Cottonwood Creek and Duck Creek passage projects monitored for this report were successful in improving fish habitat. The Cottonwood Creek drainage has been the subject of numerous restoration efforts over the years and, although the Cottonwood passage project monitored for this report is only a small part of the overall restoration effort in the drainage, it has undoubtedly contributed to improved fish habitat by providing unfettered upstream fish passage at a county road crossing. The Duck Creek project involved channel modifications to improve fish passage at an existing perched highway culvert. The modifications have been shown to be partially successful in enhancing upstream fish passage, but flow velocities in the culvert continue to be high. As a result, the culvert likely will continue to inhibit or slow at least some upstream fish passage until a new bridge or larger embedded culvert is installed at this highway crossing in a manner that would restore full channel function.

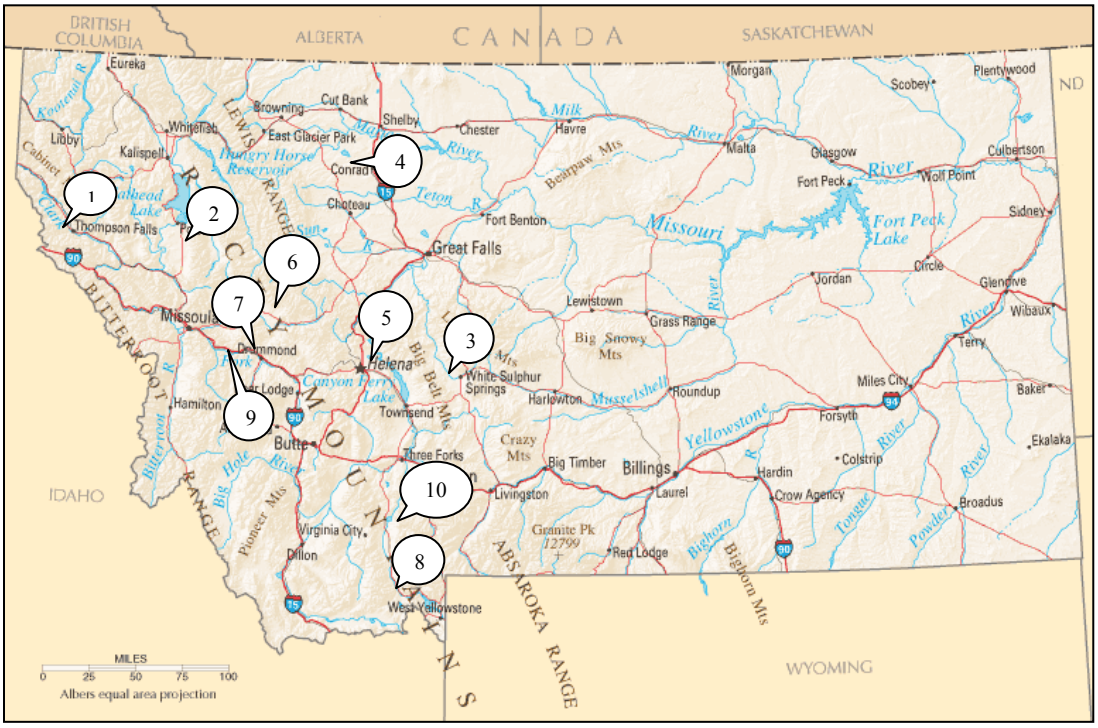
In-stream Flow Project

Only one in-stream flow project was monitored for this report. The McCabe Creek project has been successful in enhancing in-stream flow. Approximately 5 cubic feet per second of water was salvaged for in-stream purposes by consolidating a series of ditches and placing the diversion into a pipe. The amount of water that can be diverted from the stream is regulated by the capacity of the pipe. The remainder that once was diverted by the old series of ditches now remains in-stream. In-stream flow enhancement on McCabe Creek was just one of many restoration efforts that have been undertaken on the stream. A combination of restoration efforts on the stream completed over the years has been shown to benefited the fishery.

Fish Barrier Project

The Big Coulee Creek fish barrier has proven successful in isolating a population of genetically pure westslope cutthroat trout. This cutthroat population was further enhanced by the physical removal of non-native brook trout. The Big Coulee Creek barrier has required a series of modifications over the years to ensure its full function as a fish passage barrier. Once modifications were completed, however, the barrier has remained stable and acts as a complete barrier to upstream fish passage.

RIPARIAN FENCING PROJECTS:



Map showing project locations for long term photo monitoring of riparian fencing projects. Numbers on the map correspond to the project numbers shown in the text.

#1.
PROJECT NAME: Little Beaver Creek riparian fencing
REGION: 1
T; R; SEC: 22N; 30W; Sec 5
FFI FUNDING: $2,125.00
DATE OF COMPLETION: 10/1997
COMMENTS: 10/15/09 – The riparian fencing remains intact in most places. However, broken wires and laid down fence were observed in several locations. Low stocking rates and/or pasture management appears to be adequate to protect the riparian corridor even with the breaks in the fencing. Vegetation within the riparian corridor appears to be thriving. Reed canary grass dominates the stream banks. The physical characteristics of the stream channel do not appear to have changed since project completion. Fine sediment accumulations continue to dominate the channel substrate. The landowner claims sediment accumulations are due to upstream beaver activity. Weeds do not appear to be an issue.

Little Beaver Creek after (10/1997)

Little Beaver Creek after (10/2009)

Little Beaver Creek after (10/1997)

Little Beaver Creek after (10/2009)

MONITORING CONCLUSIONS: Fencing the stream-side corridor, in association with livestock grazing compliance, improved the riparian vegetative community. However, the channel morphology does not appear to have changed; with the channel remaining somewhat

over-wide and shallow and laden with fine sediment. Overall, fisheries benefits appear to be minimal, at best.

#2
PROJECT NAME: Stinger Creek channel restoration
PROJECT TYPE: Riparian fencing
REGION: 1
T; R; SEC: 21N; 20W; Sec 27 & 34
FFI FUNDING: $39,945.00
DATE OF COMPLETION: 6/1997

Not monitored to date for this report.

#3
PROJECT NAME: Smith River riparian enhancement
PROJECT TYPE: Riparian fencing
REGION: 4
T; R; SEC: 10N; 5E; Sec 9, 10, 15, 16
FFI FUNDING: $12,500.00
DATE OF COMPLETION: 10/2000

Not monitored to date for this report.

#4
PROJECT NAME: Dupuyer Creek channel restoration
PROJECT TYPE: Riparian fencing
REGION: 4
T; R; SEC: 28N; 7W; Sec 11
FFI FUNDING: $9,802.00
DATE OF COMPLETION: 10/2000
COMMENTS: 10/2/09 – The project fencing is in disrepair in a number of places. However, there was no recent evidence of livestock grazing within the project area. Farming activities were being undertaken to the edge of the active channel on one reach of the project area. Riparian shrubs and sedges have not re-colonized the denuded areas along the riparian corridor. Invasive weeds do not appear to be a problem in the project area. A large beaver dam has caused the channel to avulse to the left, resulting in some actively eroding stream banks. There also was a high eroding bank at the lower end of the project area where the old channel had been plugged.

Dupuyer Creek during (10/2000)

Dupuyer Creek after (10/2009)

Dupuyer Creek during (10/2000)

Dupuyer Creek after (10/2009)

Dupuyer Creek during (10/2000)

Dupuyer Creek after (10/2009)

MONITORING CONCLUSIONS: The purpose of this project was to repair a meander cutoff and stabilize the channel. The meander cutoff has remained repaired (stable). Other portions of adjacent channel exhibit bank erosion and the streamside fencing has done little to improve the riparian vegetative community. Overall, fisheries benefits appear minimal.

#5
PROJECT NAME: Prickly Pear Creek channel and riparian restoration
PROJECT TYPE: Riparian fencing
REGION: 4
T; R; SEC: 10N; 3W; Sec15
FFI FUNDING: $10,753.00
DATE OF COMPLETION: 6/1/2001
COMMENTS: 9/9/09 – This project involved both channel and riparian restoration. It appears that all livestock grazing has been excluded since inception of project. Grasses were chest high. Some thistle patches were observed but weeds are not overwhelming. Willow transplants all appear to be dead, with the likely cause due to past severe stream dewatering, not to transplant methodologies. Native shrubs are showing some re-establishment. Browsing by wildlife was observed on the riparian shrubs (probably from the abundant deer population). Some channel changes have occurred over time, but overall channel function appears to be stable.

Prickly Pear Creek before (4/2001)

Prickly Pear Creek after (6/2001)

Prickly Pear Creek after (9/2009)

MONITORING CONCLUSIONS: This project involved both riparian fencing and channel restoration. The riparian vegetation has recovered significantly since completion of the project and the channel morphology has remained relatively stable. A major limiting factor on this reach of the stream has been severe dewatering. However, additional in-stream flow has been made available over the past 3 years, resulting in further recovery of the riparian vegetation. With the additional in-stream flow and with the associated channel restoration, this project has contributed toward benefiting the resident fishery (primarily brown trout).

#6
PROJECT NAME: Rock Creek channel and riparian restoration
PROJECT TYPE: Riparian fencing
REGION: 2
T; R; SEC: 15N; 11W; Sec35
FFI FUNDING: $34,486.00
DATE OF COMPLETION: 7/2001
COMMENTS: 8/22/2012 – This project involved both channel and riparian restoration and was part of a drainage-wide restoration effort, involving improvements to in-stream flow, channel function and riparian condition. The fencing associated with this project created a

larger riparian pasture. It did not appear the pasture had been grazed in the recent past. No sign of livestock use was observed. Riparian condition has substantially improved and the restored channel has remained stable. No weeds were observed on the project site.

Rock Creek before (9/1996)

Rock Creek after (8-22-2012)

MONITORING CONCLUSIONS: This project has substantially restored the health and function of the stream, especially in context with the many other past restoration projects completed in the drainage. Adequate flow remained in-stream even in the face of the 2012 drought conditions. Riparian condition looks good and will continue to improve if land use activities continue to be managed as they have been in the recent past. Monitoring of fish populations in a lower reach of Rock Creek has shown increases in the number of trout in the stream. The project provides benefits to the resident fishery, and likely benefits fluvial westslope cutthroat trout as well.

#7
PROJECT NAME: Harvey Creek channel restoration
PROJECT TYPE: Riparian fencing
REGION: 2
T; R; SEC: 11N; 14W; Sec 16 & 21
FFI FUNDING: $63,616.00
DATE OF COMPLETION: 4/2003
COMMENTS: 9/17/09 –The riparian corridor appears relatively healthy and the fencing remains in place. There are some signs of past cattle use (cow pies, tracking). Riparian shrub establishment appears to be slowly taking place. Weed infestations are extensive on the drier upland sites (knapweed and leafy spurge). The channel work appears to be successful, with the restored channel remaining stable. Unfortunately, the overall project is likely unsuccessful due to a diversion dam located at the bottom of the restored reach and near the confluence with the Clark Fork River (approximately 20 yards upstream from the mouth). This diversion appears to be a nearly complete barrier to upstream fish migration in low flow conditions and was taking ALL of the stream flow at the date of observation (see last photo).

Harvey Creek before (2002)

Harvey Creek after (9/2003)

Harvey Creek after (9/2009)

Harvey Creek before (2002)

Harvey Creek after (9/2003)

Harvey Creek after (9/2009)

Harvey Creek after (9/2009)

MONITORING CONCLUSIONS: This project involved both riparian fencing and channel restoration. The intent of the project was to enhance recruitment of fish to the Clark Fork River. Although contrary to reports received in previous years, where observers claimed the site was extensively overgrazed (state lands section), the riparian vegetation has shown substantial recovery and the channel morphology has remained stable. However, the project likely has not provided recruitment benefits to the Clark Fork River due to the irrigation diversion located near the mouth of the stream. This diversion acts as a partial fish migration barrier and severely dewaters the channel during the irrigation season.

#8
PROJECT NAME: Madison Spring Creek restoration
PROJECT TYPE: Riparian fencing

REGION: 3
T; R; SEC: 11S; 2E; Sec 31
FFI FUNDING: $9,300.00
DATE OF COMPLETION: 7/2002
COMMENTS: 8/20/09 – The riparian fencing remains intact and fully functional. There were no signs of livestock grazing within the riparian corridor. Weeds do not appear to be an issue. Riparian grasses and sedges are thriving. It does not appear that riparian shrubs are recruiting to the corridor. The low energy of this small stream, in association with the large alluvial cobble that it runs through, appears incapable of adjusting channel width and depth in response to encroaching vegetation. It is unlikely that this upper portion of Madison Spring Creek has much potential to recruit juvenile fish to the Madison River due to shallow stream depths and the large cobble substrate that comprises most of the stream channel bottom.

Madison Spring Creek before (2002)

Madison Spring Creek after (6/2003)

Madison Spring Creek after (6/2003)

Madison Spring Creek after (8/2009)

Madison Spring Creek after (6/2003) Madison Spring Creek after (8/2009)

MONITORING CONCLUSIONS: The installed riparian fencing and associated livestock grazing compliance has improved the riparian sedge and grass community. Riparian shrubs have not shown re-colonization. Based on the channel substrate being composed of large cobble, it is unlikely that this project has improved recruitment of fish to the Madison River. The project may have benefited the resident fishery (likely smaller brown trout and rainbow trout). Public benefits appear to be very marginal.

#9
PROJECT NAME: Tyler Creek riparian fence
PROJECT TYPE: Riparian fencing
REGION: 2
T; R; SEC: 11N; 15W; Sec 23
FFI FUNDING: $780.00
DATE OF COMPLETION: 10/2004
COMMENTS: 9/17/09 –This project appears to have been primarily directed at protecting some existing wetlands (existing river oxbow). The riparian vegetation at the site of the fencing appears healthy and there are no signs of livestock use. However, when looking down Tyler Creek from the private drive, a good portion of the stream (from fence line to confluence with the Clark Fork River) appears to be extensively overgrazed, with little or no remaining vegetation in the pasture (see fence line contrast shown in last photo). This project did not benefit the fishery in Tyler Creek.

Tyler Creek after (10/2004) Tyler Creek after (9/2009)

Tyler Creek after (10/2004)

Tyler Creek after (9/2009)

Tyler Creek after (9/2009)

MONITORING CONCLUSIONS: This was a very small riparian fencing project, monetarily, for Future Fisheries. The project appeared to be solely associated with protecting a wetland complex (old river oxbow). The lower portion of Tyler Creek continues to be heavily over-grazed by horses. The project appeared to provide no benefits to the Tyler Creek fishery and the riparian corridor remains degraded.

#10
PROJECT NAME: McKee Spring Creek channel restoration
PROJECT TYPE: Riparian fencing
REGION: 3
T; R; SEC: 5S; 1W; Sec 26
FFI FUNDING: $25,000.00
DATE OF COMPLETION: 1/2008
COMMENTS: 8/16/12 – This project, designed by a private consulting firm, was part of a larger wetland mitigation project with Montana Department of Transportation. The channel

of the stream was narrowed and deepened, some spawning gravel was imported for riffle construction and fencing was installed to exclude livestock from the riparian corridor. The constructed channel has remained stable, but the low gradient and slow flow velocities have not maintained clean spawning gravel. The stream channel substrate is primarily composed of mud. The riparian fencing has remained functional and no livestock have been allowed into the fenced corridor. Pasture and wetland grasses are thriving in the riparian corridor. However, riparian shrubs have not recruited and remain virtually absent. All three photos were taken from the same vantage point.

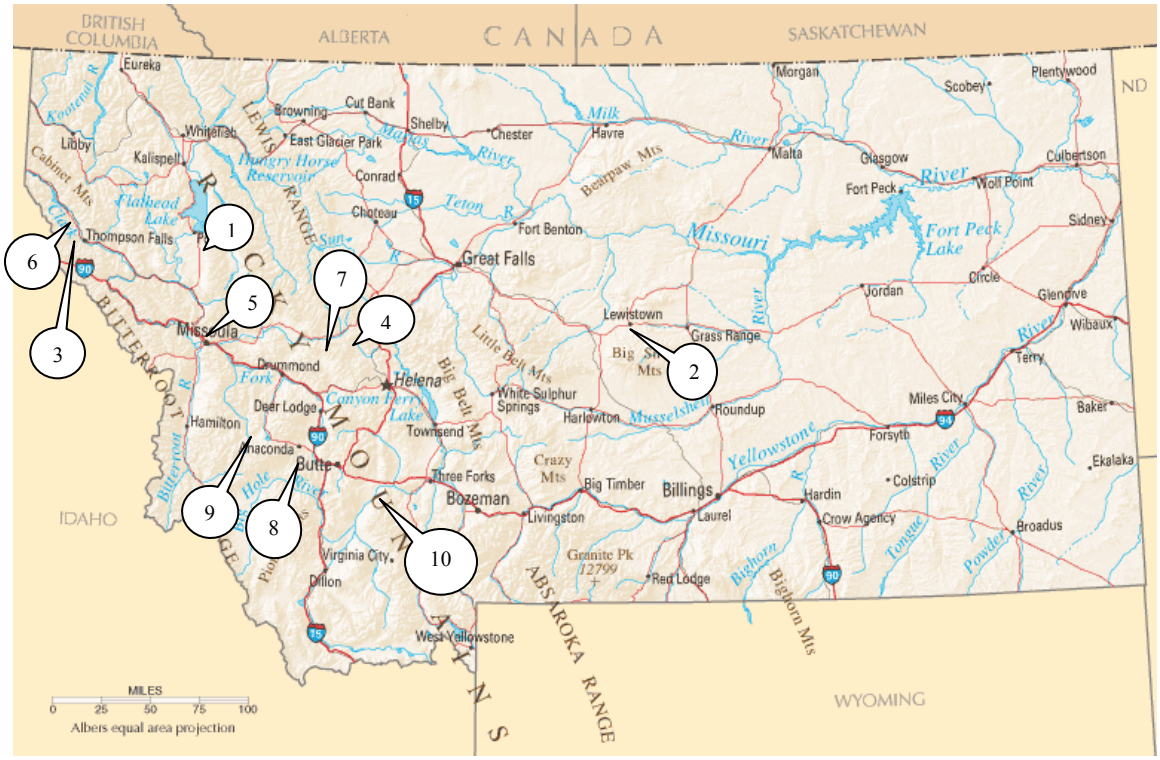
McKee Spring Creek before (2003)

McKee Spring Creek after (2/2008)

McKee Spring Creek after (8/2012)

MONITORING CONCLUSIONS: Monitoring by FWP has not documented any fluvial trout utilizing this spring creek to date. The new stream channel has not been able to maintain gravel substrate and, as a result, spawning habitat appears to be nearly non-existent. It is doubtful that fish from the Madison River will utilize this spring creek due to lack of spawning habitat.

CHANNEL RESTORATION PROJECTS:



Map showing project locations for long term photo monitoring of channel restoration projects. Numbers on the map correspond to the project numbers shown in the text.

#1
PROJECT NAME: Stinger Creek channel restoration
PROJECT TYPE: Channel restoration
REGION: 1
T; R; SEC: 21N; 20W; Sec 27 & 34
FFI FUNDING: $39,945.00
DATE OF COMPLETION: 6/1997

Not monitored to date as part of this monitoring effort.

#2
PROJECT NAME: Big Spring Creek channel restoration
PROJECT TYPE: Channel restoration
REGION: 4
T; R; SEC: 15N; 18E; Sec 23
FFI FUNDING: $35,000.00
DATE OF COMPLETION: Fall/2001
COMMENTS: 10/21/09 –The channel pattern has remained stable since project completion, however, the channel has widened over time. The newly constructed channel appeared to be undersized. A couple of outside meander bends are exhibiting some bank erosion. The riparian

area is lush, with significant wetland areas developing throughout the corridor. Vegetation is so lush that some of the viewing benches installed along the trail following project completion are now nearly surrounded by willow (and not providing much of a view). Few weeds were observed. The Parks division is mowing the access site close to water edge. Numerous willow sprigs from the original project were observed to be dead and under water. Much of the sprigging appeared to be installed at the wrong elevation along the bank line (either too high or too low). Sprigging was completed before water was turned down the new channel, making it difficult to determine the appropriate elevation for installation. Natural regeneration of willow certainly has outpaced the significant sprigging effort.

Big Spring Creek before (9/1998)

Big Spring Creek after (10/2009)

Big Spring Creek during (9/1998)

Big Spring Creek after (6/2002)

Big Spring Cr after (10/2009)

MONITORING CONCLUSIONS: This project is located on a FWP fishing access site. The site has become extremely popular with the community of Lewistown following the restoration. The channel morphology has remained relatively stable and the riparian and wetland communities have dramatically recovered. MDT received substantial wetland credits for this project. This project substantially benefited the resident fishery in this reach of the stream (rainbow trout and brown trout).

#3
PROJECT NAME: Prospect Creek channel restoration
PROJECT TYPE: Channel restoration
REGION: 1
T; R; SEC: 21N; 30W; Sec 13, 22, 23 and 24

FFI FUNDING: $34,000.00
DATE OF COMPLETION: 10/2000
COMMENTS: 10/15/09 – This project involved channel stabilization over a significant reach of stream. Most of the stabilization structures have been lost or the stream has moved away from treated reaches. GPS'd photos are of a stabilization site where the stream has moved approximately 100 yards to the north of (away from) the treated bank. All transplanted alder at project completion appear to have died, but natural recruitment has been significant - significant enough to block viewpoints for matching photos. Root wads appear to have remained fully intact but are non-functional since the stream course is now about 100 yards away. Weeds do not appear to be an issue and livestock are not found in the area. Brush bundles installed on the floodplain bench appear to be intact but do not appear to have contributed to fine sediment accumulation or re-vegetation. Bank stabilization work appeared to be more directed at property protection than restoring channel function.

Prospect Creek after (7/2001)

Prospect Creek after (10/09)

Prospect Creek after (7/2001)

Prospect Creek after (10/09)

MONITORING CONCLUSIONS: The project appeared to be more associated with property protection than with channel restoration, at least on the stream reach that was observed for this monitoring effort. Some of the bank stabilization efforts have remained in place over time, but the active channel has migrated away from the protected banks at a

number of the treated reaches. The project appears to provide minimal benefit, at most, to the fisheries.

#4
PROJECT NAME: Poorman Creek channel restoration
PROJECT TYPE: Channel restoration
REGION: 2
T; R; SEC: 13N; 7W; Sec 18 & 19
CONTACT: Jim Robinson (landowner) @ 449-3335
FFI FUNDING: $4,165.00
DATE OF COMPLETION: Summer 2001
COMMENTS: 9/17/09 – The restored channel has remained stable and the riparian vegetation appears to be thriving. Weeds do not appear to be an issue. Riparian woody shrubs are re-establishing along the stream banks (appears to be through a combination of clump transplants, sprig or rootstock planting and natural recruitment). The old buildings located on the site have been torn down. The landowner has located his summer cabin and outbuildings in a similar location, between the South Fork of Poorman Creek and the main stem. Some of this development has encroached upon the riparian corridor, including a garage/bridge constructed over the active channel.

Poorman Creek before (7/2000) Poorman Creek after (8/2001) Poorman Creek after (9/2009)

MONITORING CONCLUSIONS: This channel restoration project is located on a site that has been developed as a seasonal home site. The restoration work has remained stable and it appears to have created improved habitat for the resident fishery. Public benefits likely are minimal since the restoration work is located adjacent to a private cabin and associated outbuildings.

#5
PROJECT NAME: Rattlesnake Creek side channel restoration
PROJECT TYPE: Channel restoration
REGION: 2
T; R; SEC: 13N; 19W; Sec 22
FFI FUNDING: $21,500.00
DATE OF COMPLETION: 11/2001

COMMENTS: 9/17/09 –This project is located in Missoula's Greenough Park. The original protective fencing (used to protect from wildlife browsing and from trampling by people) has been removed. The riparian vegetation at this project site has flourished, with riparian shrubs now heavily lining both banks. Weeds do not appear to be a significant issue. The channel restoration work has remained stable and the rock weir grade controls remain intact. Most of the relatively small woody debris initially placed in the channel has washed away. The plastic erosion control meshed used to line a good portion of the restored channel has remained intact and shows no sign of degrading after 8 years (see last photo). This plastic mesh is now an eyesore and likely ensnares wildlife and fish.

Rattlesnake before (Fall/2001)

Rattlesnake after (Fall/2002)

Rattlesnake after (9/2009)

Rattlesnake Cr. after (Fall/2001)

Rattlesnake Cr. after (9/2009)

Rattlesnake Cr. Photo showing plastic mesh

MONITORING CONCLUSIONS: This restoration project occurred on a side channel of Rattlesnake Creek located in Geenough Park. The project has remained stable over time and the riparian vegetative community has dramatically recovered. The vegetation recovery is probably the most dramatic response that I've ever seen. The project appears to have benefitted the resident fishery and may be providing improved recruitment of fish to the Clark Fork River

#6
PROJECT NAME: White Pine Creek channel restoration
PROJECT TYPE: Channel restoration
REGION: 1
T; R; SEC: 23N; 31W; Sec 14 and 15
FFI FUNDING: $20,000.00
DATE OF COMPLETION: 12/2002
COMMENTS: 10/15/09 – The project has not maintained a "stable" channel (as designed) since about 2004. Most of the in-channel structures originally installed have been washed away or buried under gravel. These structures included log cross vanes and log and rock j-hook vanes. Repair work, apparently to no avail, was conducted in 2004 and in several additional efforts thereafter. Two engineered log jams have remained in place, although portions of each have been lost. The upper log jam had been installed to armor a site where an avulsion was starting to take place. This log jam has prevented further channel movement. The original designer pointed at shortcomings associated with the channel geometry during construction as the cause for the channel failures and has called for additional channel re-adjustments, bank wraps and more structures. The existing channel, however, appears to be relatively stable and appears to provide decent pools and overhead cover for fish habitat. A significant portion of the overhead cover appears to be from large woody debris produced from the installed in-channel structures that had been washed away. As a result of past channel adjustments, some j-hooks are now found on the inside of meander bends and appear to be non-functional.

White Pine Creek after (12/2002)

White Pine Creek after (10/2009)

White Pine Creek after (12/2002)

White Pine Creek after (10/2009)

MONITORING CONCLUSIONS: This project appeared to be more associated with protecting a landowner's private pond from a channel avulsion than restoring channel function. The blow-out of the installed channel structures may actually have created better fish habitat from the resultant jumble of logs than the original installations. This project appeared to provide minimal benefits, at most, to the fishery.

#7
PROJECT NAME: Nevada Spring Creek channel restoration
PROJECT TYPE: Channel restoration
REGION: 2
T; R; SEC: 13N; 11W; Sec 10, 11
FFI FUNDING: $35,000.00
DATE OF COMPLETION: 2/2003
COMMENTS: This project restored approximately the upper one third of the stream. Due to the very flat gradient of the valley and to the presence of a substantial number of acres of wetland ponds created by the abandonment of the over-widened historic channel, the restored channel has had to be substantially modified at least twice following initial completion to prevent the new channel from capturing created ponds. The latest work was completed in the spring of 2012 when a low earthen berm was constructed along a portion of the north side of the new channel. Livestock have been fully excluded from the riparian corridor and weed infestations appear to be minimal. No woody shrub colonization was observed.

Summer 2000

8/30/12

Spring 1999

8/30/12

MONITORING CONCLUSIONS: The restored channel is relatively stable, with classic narrow and deep dimensions exhibited by "E" type channels. However, at least one meander bend was observed flowing into a wetland pond. Likely, there will need to be additional work done to prevent portions of the new channel from further capturing wetland ponds. Westslope cutthroat trout were observed in the stream, but no viable spawning habitat was observed. Channel substrate lacked gravel and was composed of silt/mud. Monitoring has documented westslope cutthroat trout migrating through Nevada Spring Creek (now nearly fully restored) to spawn in Wassan Creek, a headwater tributary. The restored spring creek is providing a migratory corridor and resident habitat for adult fish.

#8
PROJECT NAME: German Gulch channel restoration demonstration
PROJECT TYPE: Channel restoration
REGION: 2
T; R; SEC: **3**N; 10W; Sec 34
FFI FUNDING: $15,000.00
DATE OF COMPLETION: 9//2007
COMMENTS: 9/17/09 – This work was done on a short section of stream as a demonstration project. The riparian area appears relatively healthy and the livestock exclosure fence remains fully functional. The seeding of the placer mined floodplain shows good survival. Riparian shrub establishment appears minimal. Weed infestations are minimal. The channel work