

2015 INTERIM MONITORING REPORT



12/31/2015

FUTURE FISHERIES IMPROVEMENT PROGRAM

This report summarizes the monitoring completed in calendar year 2015. Including implementation and effectiveness monitoring. This information will be used to improve program function and will be included in the 2017 legislative report.

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2015 Interim Monitoring Report

FUTURE FISHERIES IMPROVEMENT PROGRAM

INTRODUCTION

The Future Fisheries Improvement Program (FFIP; MCA 87-1-272, enacted in 1995) provides funds for “*the long term enhancement of streams and stream banks, in-stream flows, water leasing, lease or purchase of stored water, and other voluntary programs that deal with wild fish and aquatic habitats.*” The FFIP was supplemented and amended in 1999 when the legislature enacted the Bull Trout and Cutthroat Trout Enhancement Program (MCA 87-1-283), which “*provides for the enhancement of spawning areas and other habitat for the natural reproduction of bull trout and cutthroat trout.*” This legislation was amended again in 2013 to open the program to **all** native fish species (statute section 87-1-283), now calling for the enhancement of native fish through habitat restoration, natural reproduction, and reductions in species competition by way of the FFIP. Once called the Bull Trout and Cutthroat Trout Enhancement Program, this supplement to the FFIP encompasses all native species and is now termed the Native Species Enhancement Program (NSEP).

This report summarizes monitoring activities during the calendar year 2015. Examples of successfully completed projects funded or partially funded through the FFIP and NSEP are presented. The monitoring discussed in this interim report will contribute to the FFIP 2017 legislative report.

NARRATIVE: ROUTINE MONITORING

Monitoring is a vital part of the FFIP, as it provides a means to track the use of FFIP dollars and to determine the success of various projects and techniques. Monitoring determines if a project was successfully completed (implementation monitoring), and tracks a project over time for its function (effectiveness monitoring). Once a project is completed, implementation monitoring is performed. Subsequently, the project is monitored for effectiveness on 5-year cycles. Five years was chosen as the appropriate period to observe biological, social, and population-level changes. Occasionally projects have an extended or shortened effectiveness monitoring cycle, if the project warrants the change.

In the last five years, monitoring intensity has increased to track a greater number of projects and obtain better information about the program. As of November 1, 2015, there were 498 completed projects in the FFIP. Of those, 96 were considered ‘recent’ and received implementation monitoring within 5 years. Of the remaining 432 projects, 269 have not been monitored for effectiveness within the last five years. In 2015, 49 projects were monitored for effectiveness and 23 were monitored for implementation, representing 71 projects monitored in 2015, or 14.2% of the total projects.

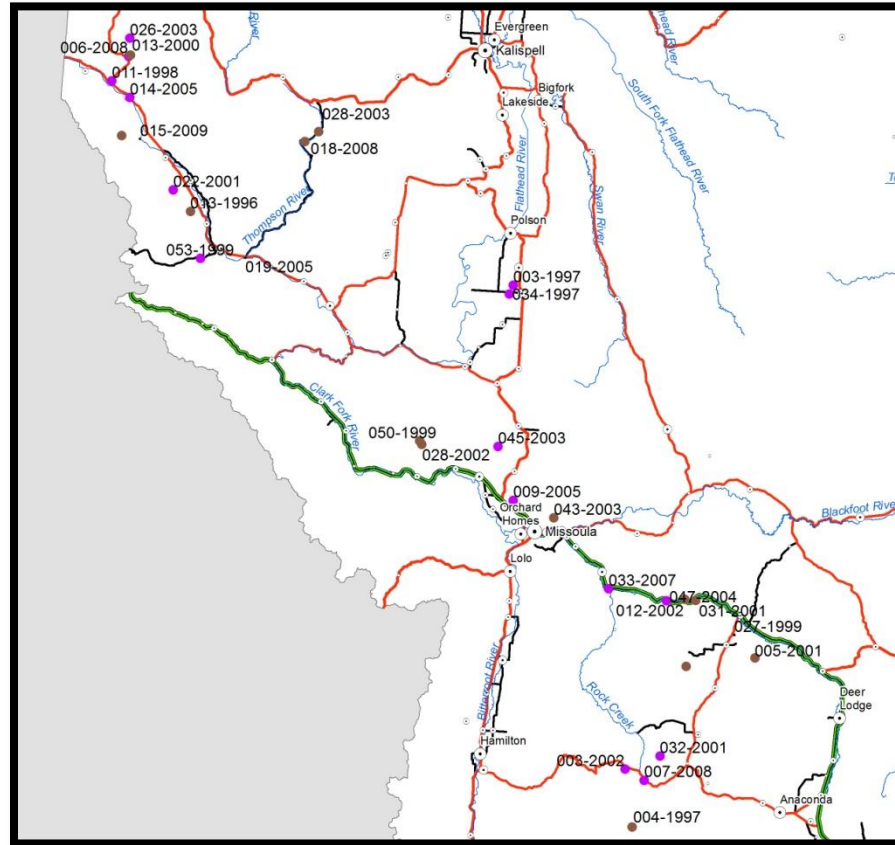
EFFECTIVENESS MONITORING, COMPLETED BY CONSULTANT

In 2015, TerraGraphics Environmental Engineering, Inc. accepted a contract to perform long-term monitoring on 29 sites in western Montana (below). Monitoring sites were chosen based on need and proximity; projects that were over 5 years old were considered priority, and the distance between projects was also considered

to increase efficiency. Unfortunately only 14 of the 29 sites were monitored. The results from this monitoring will be included in a separate report, created by TerraGraphics.

MAP OF CONSULTANT MONITORING SITE LOCATIONS

Sites are labeled with FFI #, corresponding to the table below; colors indicate if the site had 2015 monitoring completed (brown) or not completed (purple).



CONSULTANT MONITORING, BY YEAR PROJECT WAS COMPLETED

FFI #	Region	Water body	Project completed	Monitored?
013-1996	1	Little Beaver Creek	1996	Y
004-1997	2	MF Rock Creek	1997	Y
003-1997	1	Stinger Creek	1997	N
034-1997	1	Mud Creek	1997	N
011-1998	1	EF Bull River	1998	N
053-1999	1	Prospect Creek	1999	N
050-1999	2	Ninemile Creek	1999	Y
027-1999	2	SF Willow Creek	1999	Y
013-2000	1	EF Bull River	2000	Y
022-2001	1	White Pine Creek	2001	N
032-2001	2	Antelope Creek	2001	N
005-2001	2	Dunkelberg Creek	2001	Y
031-2001	2	Antelope Creek	2001	Y

028-2002	2	Ninemile Creek	2002	Y
003-2002	2	Beaver Creek	2002	N
012-2002	2	Harvey Creek	2002	Y
026-2003	1	SF Bull River	2003	N
028-2003	1	Thompson River	2003	Y
045-2003	2	Mill Creek	2003	N
043-2003	2	Marshall Creek	2003	Y
047-2004	2	Tyler Creek	2004	N
014-2005	1	Pilgram Creek	2005	N
019-2005	1	Thompson River	2005	Y
009-2005	2	LaValle Creek	2005	N
033-2007	2	Rock Creek	2007	N
006-2008	1	EF Bull River	2008	N
018-2008	1	Thompson River	2008	Y
007-2008	2	EF Rock Creek	2008	N
015-2009	1	Marten Creek	2009	Y

EFFECTIVENESS MONITORING, COMPLETED BY FWP

The FFIP Officer monitored 36 sites for effectiveness, focusing efforts on key locations as well as proximity to other job and meeting locations. The project sites were within Regions 2, 3, and 4. Some of the projects are nearing the 20-year project maintenance requirement, and others were recently completed. Effectiveness monitoring by the Program Officer facilitated in-depth discussions with biologists, landowners, and project partners regarding long-term successes and failures. The list of projects monitored is below, along with individual photos and descriptions.

FWP MONITORING, BY YEAR PROJECT WAS COMPLETED

FFI #	Region	Water body	Project completed
010-1997	2	Obrien Creek	1997
010-1998	3	Deep Creek	1998
056-1998	3	Staubach Creek	1998
037-1999	4	Cottonwood Creek	1999
051-1999	2	Obrien Creek	1999
057-1999	2	Spring Creek	1999
066-1999	3	Staubach Creek	1999
009-2001	2	Mill Creek	2001
013-2001	2	Rattlesnake Creek	2001
037-2001	3	Boulder River	2001
002-2002	4	Beaver Creek	2002
014-2002	3	Jefferson River	2002
022-2002	2	Rattlesnake Creek	2002
030-2002	3	Creeoklyn Ditch	2002

013-2003	2	Marshall Creek	2003
030-2003	3	Jefferson River	2003
036-2003	2	Clark Fork River	2003
037-2003	3	Deep Creek	2003
043-2003	2	Marshall Creek	2003
020-2004	2	Mill Creek	2004
024-2004	2	Pattee Creek	2004
026-2004	3	Steel Creek	2004
034-2004	3	Willow Springs Creek	2004
041-2004	2	Dry Creek	2004
013-2005	3	Pearsons Slough	2005
002-2006	3	Cottonwood Creek	2006
003-2006	2	Eustache Creek	2006
042-2007	2	Whites Gulch	2007
015-2008	3	Morrell Creek	2008
022-2008	3	Fish Creek	2008
029-2008	2	Whites Gulch	2008
003-2010	4	Cottonwood Creek	2010
004-2010	2	Dry Cottonwood Creek	2010
038-2010	3	Nevada Creek	2010
011-2011	3	McVey Creek	2011
015-2013	3	SF Poorman Creek	2013

EFFECTIVENESS MONITORING: SELECTED PHOTOS AND DESCRIPTIONS

010-1997 & 051-1999 O'Brien Creek (R2)



2000



2015

Project restored pools and riparian areas in O'Brien Creek, Missoula. Habitat structures remain in place and functional. Riparian area has grown in since project. Some erosion is present, but overall project is functional.

010-1998 & 037-2003 Deep Creek (R3)



2001



2015

Project used bioengineering techniques, revegetation, and riparian fencing to stabilize banks, and inserted a gravel plug to reestablish a meander (1998). Additional riparian fencing and off-channel water was added in 2006. Project now appears natural and fully functional.

009-2001 & 020-2004 Mill Creek (R2)



2004



2015

Project replaced an undersized culvert with two embedded arch culverts. Project was scaled back, not installed well, and has led to stream function problems; however, it continues to provide fish passage.

013-2001 Rattlesnake Creek (R2)



2001

2009

2015

This project reconnected a side channel on Rattlesnake Creek and reconstructed the channel, improving spawning habitat, fish habitat, and riparian condition. The project is in good condition. Banks and stream are stable and well vegetated. Rock vanes are in decent to good condition.

002-2002 Beaver Creek (R4)



2004

2015

Project reconnected the bottom end of an irrigation diversion with Beaver Creek, allowing return flows to re-water the stream and prevent fish loss. The diversion remains connected to the creek and the project is in good condition.

022-2002 Rattlesnake Creek (R2)

Pre-project (before 2002)



2015

This project constructed screens on two of the four unscreened diversions on Rattlesnake Creek and made improvements to an existing screened diversion (above). Screens were not functional in 5/2015 (during runoff), but get cleaner during the summer (post-runoff). The screens currently function as barriers and need to be updated in the future.

013-2003 Marshall Creek (R2)

2005



2015

This project upgraded a culvert, which was a barrier to fish passage. A pool-and-weir fish ladder was installed and baffles were added to the inside of the culvert to provide fish passage. It is functioning as intended.

036-2003 Clark Fork River (R2)



2013



2015

This project involved installation of riparian fencing on the river and property boundary. Monitoring done in 2013 indicated a violation, as horse grazing was seen on the riverbank. A follow-up site visit in 2015 found that the fences were mended and the issue was resolved. The riparian area was in good condition.

024-2004 Pattee Creek (R2)



2005



2015



2015

This project, within the town of Missoula, involved channel reconstruction in Elms and Lester Parks. The stream was originally channelized, and is now meandering and vegetated. However, the stream adjacent to the project remains channelized. Project appears to be in good condition, but good opportunity to consider the role of FFIP in these types of projects—including the utility as fish habitat or demonstration project.

034-2004 Willow Springs Creek (R3)

2004



2005



2015

This project involved channel improvements, riparian fencing, and the addition of spawning gravel. The intention was to improve spawning sites for trout. In 2015, the project remains in good condition. Some algae has impacted the spawning gravel, but this project has contributed to an increase in spawning sites, recruitment, and Jefferson River fish populations.

041-2004 Dry Creek (R2)

Pre-2004



2015

This project replaced a wood crib diversion with a series of rock weirs to allow fish passage. The project required maintenance in 2010, but is in good condition and is most likely performing as intended. The impact to the fishery is unknown.

003-2006 Eustache Creek (R2)

2005

2007

2015

This project involved channel and floodplain construction, revegetation, woody debris, and culvert replacement. Approximately 1.3 miles of stream was treated. Project appears to be in place; however, flow was intermittent. The impact on the fishery is unknown, as stream flow did not appear to support fish populations in August 2015. The latest fish sampling was done in 2006. Seasonal benefit is likely; however, condition encourages thought regarding funding of intermittent/low flow streams.

002-2006 Cottonwood Creek (R2)

2006

2007

2015

This project replaced a perched culvert with a bridge, thereby allowing fish passage. In 2015, the bridge was functional and the rock weirs were still in place. This section of Cottonwood Creek was still having fishery benefit, although portions of the stream are intermittent at certain times of the year.

042-2007 & 029-2008 Whites Gulch (R3)



2009



2015

Barrier protects a genetically pure population of westslope cutthroat trout. Project upgraded wooden barrier to concrete structure. It is still functioning as a complete barrier. Some erosion has occurred around the structure.

015-2008 Morrell Creek (R2)



2011



2015

This project replaced two wooden irrigation diversions with rock weirs and new headgates with fish screens and water measuring devices. Project continues to function as intended, but unsure of fishery response.

038-2010 Nevada Creek (R2)

2010



2011



2015

This project involved channel reconstruction, toe wood and log vanes installation, shrub transplants, and riparian fencing. An existing diversion was reconstructed. Project remains intact with only a small amount of erosion occurring. Landowner considers project to be successful; unsure of fishery response.

IMPLEMENTATION MONITORING, COMPLETED BY FWP

The FFIP Officer or FWP representative monitored 23 sites for implementation (completion). All of these projects were completed, with funds expended, in 2015, and were located within Regions 2, 3, and 4. Implementation monitoring by the FFIP Officer facilitated discussions about technique successes and failures with applicants and landowners. The list of projects monitored is below, along with individual photos and descriptions.

IMPLEMENTATION MONITORING SITES

FFI #	Region	Water body
040-2010	3	Poindexter Slough
006-2012	4	Little Otter Creek
007-2012	2	Racetrack Creek
008-2012	3	Ruby River
021-2012	3	Swamp Cr. Siphon
007-2013	2	Lost Horse Creek
011-2013	3	Poindexter Slough
012-2013	2	Sawpit Creek
016-2013	3	SF Sixteenmile
002-2014	3	Cabin Creek
004-2014	2	Gleason Creek
006-2014	2	Keep Cool Creek
013-2014	3	East Gallatin/Story Mill
014-2014	2	Keep Cool Creek
016-2014	2	Liverpool Creek
020-2014	4	Prickly Pear

004-2015	3	Deep Creek
010-2015	3	Moore's Creek
013-2015	3	Ruby Creek
014-2015	2	Shanley Creek
018-2015	2	Theodore Creek
022-2015	2	Yukon Creek
041-2015	3	Van Houten Lake

IMPLEMENTATION MONITORING PHOTOS AND DESCRIPTIONS

040-2010 & 011-2013 Poindexter Slough (R3)



Before

After



Before

After

This project improved the Poindexter Slough by improving the irrigation infrastructure and the channel form and function. This portion represents phases one and two of a three-phase project. Future Fisheries provided \$88,626.04 to this project (total cost \$425,985.25). The intention was to improve fishing by mobilizing fine sediment through adequate flushing flows and channel narrowing. Phase three has not been completed but was funded by FFIP (\$75,000). *Photos by Beaverhead Watershed Committee.*

006-2012 Little Otter Creek (R4)*After (water tank)**(corral)*

This project moved a corral system from the stream corridor to an upland area and revegetated and fenced the disturbed area. The intent was to reduce sedimentation and improve water quality. The project area included 100 to 300 yards of riparian corridor. Future Fisheries contributed \$6,622, including a 10% overrun (total cost \$37,236, including overrun). Applicant was going to request additional funds to upgrade corral gates, but a request has not been received to date. *Photos by FWP.*

007-2012 Racetrack Creek (R2)*Before (diversion)**After*



After (diversion)

After (stock tank)

This project replaced and relocated a riparian fence that had been damaged by past flooding. Additional riparian fence was installed, an offsite well and two winterized stock tanks were built. An irrigation diversion was upgraded to provide fish passage. The intent was to create fish passage and to keep livestock off the stream and riparian corridor. Future Fisheries contributed \$14,735.73 to the project, which came in under budget due to a change in the fish passage structure and a reduction in the scope of the riparian fencing (the furthest downstream landowner dropped out). The total cost was \$25,320. *Photos by the Clark Fork Coalition and FWP.*

008-2012 Ruby River (R3)



Before



During



After



Before



During



After



This project took a straightened channel and reconstructed it; sinuosity and stream length were increased, returning this portion of the Ruby River to its natural state. A feedlot was also moved away from the channel, 7,000 feet of riparian fencing were installed, and a bridge was constructed. FFIP contributed \$40,661 to the project, which had a total cost of \$698,411 (additional match was obtained). *Photos by the Ruby Valley Conservation District.*

021-2012 Swamp Creek (R3)



This project installed a siphon at the crossing of an irrigation canal and Swamp Creek. The intent was to separate canal water from Swamp Creek, increasing stream flow and creating fish passage for an additional 12 miles of stream. A new diversion, watering device, and fish ladder were installed into Swamp Creek at another location. FFIP contributed \$30,000 to the project and the total cost was \$385,556. *Photos by the U.S. Fish and Wildlife Service and FWP.*

007-2013 Lost Horse Creek (R2)





During (siphon pipe)

After (looking across stream)

This project installed a siphon underneath Lost Horse Creek, to convey water diverted from the Bitterroot River down the Ward Canal. The siphon eliminates the need for constructing a seasonal in-channel dam on Lost Horse Creek, which removes a seasonal migration barrier, and reduces a source of fish entrainment. A minimum flow agreement was also made with the irrigation district. FFIP contributed \$98,350 (including 10% overrun) and the total cost was \$487,006, due to an increase in costs. *Photos by the Clark Fork Coalition and FWP.*

012-2013 Sawpit Creek (R2)



Before

After

In this project area, past mining activity led mining deposits in the riparian area (with no vegetation), a dredge pond, and gully area. The project involved excavation of approximately 10,000 cubic yards of mine tailings, re-grading, and creation of a functional floodplain. Approximately 1,000 feet of disturbed channel was reconstructed with rock and log step-pool structures for habitat and grade control. Stream banks were formed and vegetated with soil lifts, willow cuttings, and containerized woody shrubs. The intent was to restore stream and riparian function and to increase available habitat for westslope cutthroat trout. FFIP contributed \$28,200 to the project, which had a total cost of \$156,290. *Photos by Trout Unlimited and FWP.*

016-2013 South Fork Sixteenmile Creek (R3)*Before**During**After*

This project installed a fish migration barrier, intending to protect a native westslope cutthroat trout habitat. A second phase of the project involves removing non-native fishes using a piscicides, and a third phase will restock the stream with genetically pure westslope cutthroat trout. FFIP contributed \$61,681.36 to the project, coming in \$18,070.64 under budget. The total cost was \$174,991.36. *Photos by the U.S. Forest Service.*

002-2014 Cabin Creek (R3)*Before**After*

This project installed a permanent fish migration barrier to preserve genetic purity in a relatively large population of westslope cutthroat trout. A scarp, created from the 1959 Quake Lake earthquake, has slowly eroded and allowed a few rainbow trout to enter the drainage. This barrier will keep rainbow trout separated from westslope cutthroat trout. FFIP contributed \$64,372.65, as the project was completed under budget. The total project cost was \$334,372.65, approximately \$100,000 less than estimated. *Photos by the U.S. Forest Service and FWP.*

004-2014 Gleason Creek (R2)

Before

After

This project replaced an undersized culvert, which acted as a partial fish barrier, with a larger steel pipe that accommodates larger flows and allows year-round fish passage. Rock weirs were added downstream for grade control. FFIP contributed \$10,000 to the project, which had a total cost of \$48,650. *Photos by Big Blackfoot Chapter of Trout Unlimited and FWP.*

006-2014 Keep Cool Creek (R2)

Before

After

After

This project replaced two undersized culverts, which acted as partial fish passage barriers, with a hardened ford and a steel arch pipe. The intent was to improve stream and floodplain function and to provide fish passage. FFIP contributed \$6,000 to this \$16,052 project. *Photos by Big Blackfoot Chapter of Trout Unlimited and FWP.*

013-2014 East Gallatin River / Story Mill (R3)

Before



After



After

This project restored a riparian-wetland complex within Bozeman, intending to improve water quality and provide additional fishing opportunities to the East Gallatin River. Man-made materials were removed, streambanks were revegetated, backwater areas were restored, and floodplain connectivity was improved. This project encompassed 0.5 miles of river. FFIP contributed \$51,953 to the project, and the total cost was \$172,294. *Photos by Respec.*

014-2014 Keep Cool Creek (R2)

Before



After

This project replaced an undersized stream crossing with a timber bridge. The intent was to improve natural channel condition, floodplain function, and fish passage. FFIP contributed \$8,500 to the project, which cost a total of \$28,222. *Photos by Big Blackfoot Chapter of Trout Unlimited.*

016-2014 Liverpool Creek (R2)*Before**After (coanda)**After (coanda)**After (bridge; no before photo)*

This project replaced an undersized stream crossing with a bridge, eliminated an upper diversion, and replaced the lower diversion with a coanda fish screen. A long-term instream flow lease will be pursued in the future. FFIP contributed \$11,255 to the project, which had a total cost of \$44,442. *Photos by Big Blackfoot Chapter of Trout Unlimited and FWP.*

020-2014 Prickly Pear Creek (R4)*Before (spring creek channel)**After (spring creek channel)**After (bridge)*

This project improved pool and riffle habitat in selected meander bends of the spring creek that feeds into Prickly Pear Creek, replaced an undersized culvert with a bridge, and reconnected the spring creek with the original confluence with Prickly Pear Creek. Realignment, revetments, and debris cleanup were components of the adjacent project on Prickly Pear Creek. FFIP contributed \$6,323 to the project and the total cost was \$77,886.55 (including the Prickly Pear Creek component). *Photos by FWP.*

004-2015 Deep Creek (R3)



Before (diversion; looking upstream) After (diversion; looking downstream) After (pumping system to canal)

This project repaired and replaced 1.5 miles of riparian fence, producing a larger riparian buffer than what was completed in a past project. It also eliminated a major irrigation diversion from Deep Creek, changing water use to a pumping system. The FFIP contribution was \$20,000, and the total project cost was \$126,208. Photos by FWP.

010-2015 Moore's Creek (R3)



Before After (fencing; note, different project viewpoints)

This project involved the installation of riparian fencing, hardened crossings, two water gaps, and off-channel water sources for pastures and corrals. A rest-rotation grazing program was also initiated. The intent of the project was to be a demonstration project as well as an opportunity to improve the fishery. FFIP contributed \$10,478 and the total cost was \$51,237.36. Photos by the Madison Conservation District.

013-2015 Ruby Creek (R3)*Before**After*

In this project, the stream channel was relocated away from an eroding, vertical bank. A new stream channel was constructed and a riparian floodplain was developed in the location of the former stream channel. The intent of the project was to establish proper stream form and function, develop a floodplain, and prevent the historic cabin from collapsing into Ruby Creek. FFIP contributed \$2,475 to this project, and the total cost was \$15,075. *Photos by FWP.*

014-2015 Shanley Creek (R2)*Before (ford)**After (bridge)**Before (culvert)**After (culvert removed)*

This project relocated nearly one mile of road out of the Shanley Creek floodplain, replaced two undersized culverts with a single road crossing, removed a third culvert, restored the stream bed and banks at each restored crossing, and replaced an unimproved ford with a short-span bridge. The intent was to correct road damage problems, eliminate a sediment source, provide fish passage, and restore natural channel morphology. FFIP contributed \$13,300 to the project (10% overrun), which had a total cost of \$52,072.81 (adjusted balance). *Photos by Big Blackfoot Chapter of Trout Unlimited and FWP.*

018-2015 Theodore Creek (R2)



Before

After

This project replaced an undersized culvert with a pre-stressed concrete bridge that would create year-round fish passage and restore natural stream function. FFIP contributed \$20,000 to the project, which had a total cost of \$160,738.19. *Photos by Big Blackfoot Chapter of Trout Unlimited and FWP.*

022-2015 Yukon Creek (R2)



Before

After

This project replaced an undersized culvert with a bottomless arch structure that can accommodate a 100-year flood event. The intent was to create a stable stream crossing that corrects road drainage problems and eliminates excessive sediment delivery, provides fish passage, and restores natural stream function. FFIP contributed \$23,400 to the project, which had a total cost of \$169,004.69. *Photos by Big Blackfoot Chapter of Trout Unlimited and FWP.*

041-2015 Van Houten Lake (R3)



Before (barrier location)

After (barrier)

After (barrier)

After (spawning channel)

This project installed a barrier downstream of Van Houten Lake to preclude fish from moving upstream from the outlet stream into the lake. A spawning channel was created between the barrier and the lake. The intent was to treat the lake with a piscicide (which housed non-native fish species), establish a population of arctic grayling and westslope cutthroat trout, and prohibit access by downstream fish species, including non-natives. *Photos by FWP.*