Future Fisheries Improvement Program Legislative Report | 2019-2020

Summary of Program activities from November 1, 2018 to October 31, 2020.

Fish Management Bureau
Fisheries Division
November 15, 2020

FUTURE FISHERIES IMPROVEMENT PROGRAM

2019 / 2020 ACCOMPLISHMENTS

The Future Fisheries Improvement Program (FFIP) was enacted in 1995 to provide funding for the improvement of wild fish and aquatic habitats. For over 20 years, the FFIP has provided biannual funding for habitat improvements. It is funded by FWP license dollars and the Resource Indemnity Trust (RIT) Fund.

In the last biennium, fish habitat improvements include:

37
Projects approved

Over $1.3 million was granted for restoration. Combined with matching funds, the impact was Projects approved over $8.6 million.

100 spawning structures were installed in reservoirs

Fish passage was improved at **24 locations**

14 cubic feet per second of instream flow was protected

Road removal

Unused roads were decommissioned and failing culverts were removed on Lee and West Fork Lolo Creeks to reduce sediment input and improve fish passage.

Irrigation Upgrade

An irrigation diversion was upgraded on Boles Creek, near Seeley Lake, to improve migratory corridors for westslope cutthroat and bulltrout, while providing water to the landowner.

Barrier Trifecta

Three barriers will be installed on Browns, Buffalo, and Painter Creeks near Dillon. These structures will secure over 17 miles of stream for >90% pure westslope cutthroat trout.

Spillway Repair

Haughian Bass Reservoir is on private property in the R7 Pond Fishing Program. Funds repaired the spillway to retain the high quality fishery and reduce risk of a winterkill.

More Water

A pipeline was installed on Reese Creek, near Gardiner, to increase irrigation efficiency and decrease volume of diverted water, keeping additional flow in the creek.

These projects were completed by FWP staff and many other critical partners, including private landowners, Big Blackfoot Chapter of Trout Unlimited, Big Hole Watershed Committee, Clark Fork Coalition, Lower Clark Fork Watershed Group, Trout Unlimited, and the U.S. Forest Service.

MONTANA FISH, WILDLIFE & PARKS

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Background and Overview

LEGISLATION

The Future Fisheries Improvement Program (FFIP) was enacted in 1995 (MCA 87-1-272) to provide funding for the long-term enhancement of streams and stream banks, in-stream flows, water leasing, lease or purchase of stored water, and other programs that improve wild fish and aquatic habitats. It replaced the River Restoration Program (authorized in 1989) and expanded opportunities to restore wild fish habitats, funded through a portion of fishing license sales.

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 emphasized the enhancement of habitat for the natural reproduction of bull trout and cutthroat trout. This component of the FFIP was established with funding from the Resource Indemnity Trust (RIT) fund. In 2013, the emphasis on native species was amended and expanded to all native fish species, not exclusively bull and cutthroat trout (MCA 87-1-283). This legislation called for the enhancement of native fish through habitat restoration, natural reproduction, and reductions in species competition. This supplement to the FFIP encompassed all native species and became the Native Species Enhancement Program (NSEP).

Legislative statute outlines the procedures and requirements of the FFIP, including approval of project funding. The Citizen Review Panel (Panel), appointed by the Governor and legislative body, assesses proposed projects independently and makes recommendations for funding. The Fish & Wildlife Commission (Commission) is responsible for final funding approval.

Since the FFIP began, over 660 projects have been completed, which directly translates to a significant positive impact on fish habitat in Montana. Table 1 shows the impact of common project types.

There has been enough riparian fence installed to stretch from Helena to Billings, and enough stream channel restored to stretch from Billings to Bozeman.

TABLE 1. IMPACT OF COMMON PROJECT TYPES, SINCE 1996.

Project Type	Value
Miles of **riparian fence** installed	245
Miles of **channel restored**	142
Number of **fish screens** installed	57
Number of **fish passage** structures installed, or **barriers removed**	249
Number of **spawning structures** placed in a lake or reservoir	13,386
Instream flow added (cubic feet per second)	269

PROGRAM INFORMATION

As part of the enabling legislation for the FFIP, Montana Fish, Wildlife & Parks (FWP) must present a detailed report to each regular session of the legislature on the progress of the FFIP. This report includes Program activities and expenses since the last report, the project schedules, and the anticipated expenses for the ensuing 10 years' implementation of the FFIP.

PROGRAM GOALS AND FUNDING PRIORITIES

The overall goal of the FFIP, identified in the enabling legislation (MCA 87-1-272), is to provide for the protection and enhancement of Montana fisheries through voluntary enhancement of spawning streams and other habitats, and to improve natural reproduction and growth of wild fish populations.

The Panel developed specific guidance in 1995, stating that potential projects must accomplish one or more of the following goals to be considered for funding: 1) improve or maintain fish passage; 2) restore or protect naturally functioning stream channels or banks; 3) restore or protect naturally functioning riparian areas; 4) prevent loss of fish into water diversions; 5) restore or protect essential habitats for spawning; 6) enhance stream flow in dewatered stream reaches to improve fisheries; 7) improve or protect genetically pure native fish populations; or 8) improve fishing in a lake or reservoir.

When the NSEP (and RIT funding) was added to the FFIP, preference shifted to projects that restore, protect, or enhance habitat for native fishes, including those involving mineral reclamation. In 2013, FFIP funding preference expanded into Eastern Montana after all native species became eligible for funding and it was recognized that there were fewer projects completed in Eastern Montana.

Currently, the Panel considers the guidance and goals of the FFIP and considers other criteria during the review process, including:

- Evaluation of the cause of degradation and resolution (if possible), including a watershed approach
- Benefit to the public, anglers, and/or native species
- Cost share, public participation, and demonstration value
- Planning and design that includes geomorphic, hydrologic, and biologic principles that promote natural function
- Magnitude of benefit to wild fisheries
- Landowner approval and participation

FUNDING PROCESS & PUBLIC PARTICIPATION

Any entity that proposes a habitat project benefiting wild fish in Montana can be considered for funding under the FFIP. Project applications can be submitted to FWP twice each year and are

considered for the subsequent funding period; winter funding cycle applications are due prior to December 1, and summer funding cycle applications are due prior to June 1.

Since the last biennial report, the Panel met to review project proposals four times: December 2018, June 2019, December 2019, and June 2020. After each meeting, funding recommendations formulated by the Panel were forwarded to the Commission for final action during their regularly scheduled public meetings held in February and August for the winter and summer funding cycles, respectively.

For each individual funding cycle, there are several avenues for public comment prior to final approval by the Commission. All submitted project applications are posted on the FWP website to provide opportunity for public review and comment. Additionally, environmental assessments (EA's) are prepared for all projects approved for funding by the Panel and include a public comment period, except for projects that fall under categorical exclusion (ARM Rule 12.2.454). If the project is a sub-segment of a larger proposed action, or if the project takes place on federal lands, EA's are completed externally through the Montana Environmental Policy Act (MEPA) or National Environmental Policy Act (NEPA). Additional opportunities for public involvement and comment include attending public meetings of the Panel and the Commission. Press releases announce each upcoming grant cycle as well as the projects approved by the Commission.

PROGRAM UPDATES

Recent changes to the program include increased social media and reporting. Storytelling is a focus within the Program, and social media stories are used as an interactive way to display case studies and success stories in a way that resonates with the public. An updated program brochure is in production, which will be used as a handout to provide Program information to the public.

Other projects in development include the merging of the FFIP database with the FWP Fisheries Information System (FIS), which will improve efficiency in reporting and allow restoration and fisheries data to be linked. Once the databases are updated, FFIP data will be more interactive and available to the public.

The Covid-19 pandemic affected the FFIP primarily through travel restrictions. Non-mandatory travel reduced the number of sites that could be monitored in 2020. It also required the cancellation of the Review Panel project tour and a shift to virtual meetings. This reduced the interaction and education of Panel Members, staff, and applicants.

Staffing and Membership

FUTURE FISHERIES CITIZEN REVIEW PANEL

The Panel is a critical component of the FFIP, serving as an independent body to review applications and make recommendations for funding. The 14-person Panel meets twice a year in mid-December and mid-June to discuss proposed projects and is available throughout the year to provide Program guidance.

The enabling legislation (MCA 87-1-272, MCA 87-1-283) called for the establishment of the Panel and identified specific categories of representation, including but not limited to the following:

- One member who is a representative of conservation districts;
- One member with expertise in commercial agriculture;
- One member with expertise in irrigated agriculture;
- One member from the private sector who is a fisheries restoration professional;
- Two members who are licensed Montana anglers;
- One member of the House of Representatives, chosen by the Speaker of the House;
- One member of the Senate, chosen by the Committee on Committees;
- One member with expertise in silviculture;
- One member who is a Montana high school student;
- One member with an expertise in mine reclamation techniques;
- One member with expertise in fisheries; and
- One ex-officio member from the Montana Department of Transportation with experience in highway impact mitigation.

An additional appointee was added by FWP to include a member with expertise in hydrology / geomorphology. Except for legislative appointments, Panel members are selected by the Governor or a Governor's designee. Members serve a voluntary, two-year term and may be re-appointed for additional terms. Members of the Panel serving during the period of this report are in Table 2.

TABLE 2. REVIEW PANEL MEMBERSHIP (2018-2020).

CATEGORY	NAME, LOCATION	TERM START	TERM END
Conservation District	Clint Peck, Billings	Reappointed	7/1/2021
Commercial Agriculture	Bill Mytton, Absarokee	7/1/2018	7/1/2022
Irrigated Agriculture	Jim Stone, Ovando Bob Schroeder, Missoula	Reappointed 7/1/2020	7/1/2020 7/1/2022

PROGRAM INFORMATION

CATEGORY	NAME, LOCATION	TERM START	TERM END
Restoration Professional	Karin Boyd, Bozeman	Reappointed	7/1/2021
Licensed Angler (1 of 2)	Joseph Willauer, Butte Bruce Farling, Missoula	Reappointed 7/1/2019	7/1/2019 7/1/2021
Licensed Angler (2 of 2)	Michael Johns, Bozeman Tony Cate, Missoula	3/2016 7/1/2019	7/1/2019 7/1/2021
Silviculture/Forestry	Terry Chute, Helena	Reappointed	7/1/2021
High School Student	Dylan Yonce, Missoula Ivan Kloberdanz, Helena Luca Welle, Kalispell	7/1/2018 7/1/2019 7/1/2020	7/01/2019 7/1/2020 7/1/2021
Mine Reclamation	Nancy Winslow, Missoula	Reappointed	7/1/2020
Fisheries	William (Bill) Wichers, Hamilton	Reappointed	7/1/2021
MDT ex-officio	Bill Semmens, Helena	Reappointed	7/1/2021
Hydrologist	Chuck Dalby, Helena	Reappointed	7/1/2021
House of Representatives	Rep. Matt Regier, Kalispell	1/1/2017	12/31/2020
Senate	Sen. Jedediah Hinkle, Belgrade Sen. Jason Ellsworth, Hamilton	1/1/2017 1/1/2019	12/31/2018 12/31/2020

FWP EMPLOYEES

Future Fisheries Improvement Program Funding

The enabling legislation for the FFIP (MCA 81-1-272) authorized the use of program funds for up to two additional full-time employees. FWP initially allocated two full time equivalents (FTE's) to the FFIP, but then transitioned to base license dollars to fund the two FTE's and their operations. Using base license dollars rather than funds allocated to the FFIP allows more Program funds to be used for on-the-ground restoration.

Michelle McGree was employed as FWP staff during the report period. Michelle has been the Future Fisheries Improvement Program Coordinator (FFIPC) since 2014. The FFIPC is responsible for compiling and distributing project applications, visiting the sites of proposed projects, acting as FWP staff liaison for the Panel, developing and communicating FWP recommendations to the Panel, developing project agreements, processing and approving payments associated with completed restoration work, monitoring project implementation, effectiveness, and compliance, and maintaining a comprehensive FFIP database. Michelle also develops projects, coordinates with consultants and contractors who

design and perform restoration projects, works with landowners and other citizens that need help developing project proposals, and assists with fish screening and fish passage project review.

Native Species Enhancement Program Funding

MCA 87-1-283 states, "In order to implement (the program), the department may expend revenue from the Bull Trout and Cutthroat Trout Enhancement Program for one additional FTE and one contractor to assist the review panel." In the past, the FTE was split among three individuals who were required to organize, complete, or maintain projects that were eligible for funding under the NSEP. Base license dollars were then used to fund this split FTE. Currently, the NSEP covers only operations costs to support the Panel meetings and supplemental monitoring activities related to NSEP-funded projects. Operations expenditures associated with the NSEP since the last report period (November 1, 2018 to October 31, 2020) equaled $18,146.46 and included four Panel meetings and one monitoring contract (see Expenditures). The use of base license dollars to support employees for both the NSEP and FFIP allows maximum program dollars to be used for restoration.

Appropriations, Awards, & Expenditures

PROGRAM APPROPRIATIONS

The FFIP has been funded using base license dollars (River Restoration funds), while the NSEP has been funded primarily with Resource Indemnity Trust (RIT) funds and a small amount of base license dollars. River Restoration funds (MCA 87-1-257-258) are derived from a $0.50 earmark on resident fishing licenses and a $1.00 earmark on non-resident fishing licenses. NSEP funds (formerly the Bull Trout and Cutthroat Trout Enhancement Program) are derived from appropriations to the RIT fund (MCA 15-38-202). Past appropriations included $510,000 specifically earmarked by the 1995 legislature (26306, EI25) to construct a fish screen on the T&Y Diversion located on the Tongue River to prevent the loss of fish down the irrigation canal.

In recent years, the available funding from the RIT has been less than the approved authority. The RIT allocations are based on interest earnings and are managed by the Montana Board of Investments. This led to reductions in FFIP funding available within the NSEP.

Since the inception of each program, FFIP authority averaged $663,461.54 per biennium (over 13 biennia) and $893,363.64 per biennium (over 11 biennia), for the FFIP and NSEP funding sources, respectively (Table 3). For the duration of the Program, the average amount of authority granted per biennia is approximately $1.4 million, and the cumulative total of authority is just over $18 million.

PROGRAM FINANCIALS

TABLE 3. LEGISLATIVE AUTHORITY

LEGISLATIVE SESSION	FUND AND SUBCLASS	AMOUNT
1995	General License, 26306, E125 (earmarked)	$510,000.00
	River Restoration, 26301	$290,000.00
	General License, 02409, ET30	$220,000.00
	General License, 02409, ET2	$1,250,000.00
1997	River Restoration, 02149, 28466	$70,000.00
	General License, 02409, E131	$1,310,000.00
1999	River Restoration, 02149, E190	$300,000.00
	General License, 02409, E131	$1,170,000.00
	General License, 02409, 38011 (BT/CT)	$750,000.00
2001	River Restoration, 02149, EI115	$260,000.00
	General License, 02409, EI115	$750,000.00
	RIT, 02022, EI115 (BT/CT)	$850,000.00
2003	River Restoration, 02149, EI131	$210,000.00
	RIT, 02022, EI131 (BT/CT)	$700,000.00
2005	River Restoration, 02149, EI150	$190,000.00
	RIT, 02022, EI150 (BT/CT)	$1,000,000.00
2007	River Restoration, 02149, EI170	$314,000.00
	RIT, 02022, EI170 (BT/CT)	$1,000,000.00
2009	River Restoration, 02149, EI109	$150,000.00
	RIT, 02022, EI109 (BT/CT)	$1,000,000.00
2011	River Restoration, 02149, EI001	$274,000.00
	RIT, 02022, EI001 (BT/CT)	$1,000,000.00
2013	River Restoration, 02149, EI003	$190,000.00
	RIT, 02022, EI003	$600,000.00
2015	River Restoration, 02149, EI005	$277,000.00
	RIT, 02022, EI005	$1,000,000.00
2017	River Restoration, 02149, EI007	$250,000.00
	RIT, 02022, EI007	$927,000.00
2019	River Restoration, 02149, EI009	$250,000.00
	RIT, 02022, EI009	$1,000,000.00
TOTALS	FFIP (License + River Restoration)	$8,235,000.00
	NSEP (RIT + BT/CT funds)	$9,827,000.00
		$18,062,000.00
AVERAGE PER BIENNIUM	FFIP (License + River Restoration)	$633,461.54
	NSEP (RIT + BT/CT funds)	$893,363.64
		$1,389,384.62

PROGRAM FINANCIALS

FUNDING AWARDS

Since implementation of the FFIP in 1996, the Commission approved $17.2 million for restoration projects that are ongoing or completed which, in turn, generated approximately $58 million in available matching funds (Figure 1). Matching funds come from a wide array of sources, including federal agencies, state agencies, sportsman's groups, conservation groups, watershed groups, private foundations, private companies, and landowners. ***With FFIP and match combined, $76.5 million of habitat restoration work has been undertaken in Montana since 1996 because of the FFIP.***

The Panel and Commission have approved funding requests (full or partial) for 821 restoration projects (Table 4). Of these projects, 666 have been completed, 38 are ongoing, and 117 have been cancelled. All program funds previously committed to cancelled projects were subsequently reallocated to fund new habitat projects. The reasons for cancellations vary, but include:

- The applicant used other funding sources to complete the project
- The landowner was unwilling to sign a project agreement. These project agreements apply to all funded projects and are put in place to ensure that there is protection for the investment in restoration (typically 20 years)
- The applicant was unable to secure the matching funds that were identified in the application
- The landowner was not fully on board with the proposed project and backed out after funds were approved
- The scope of the project significantly changed after funding was secured, requiring the applicant to re-apply to the FFIP or seek other sources of funding

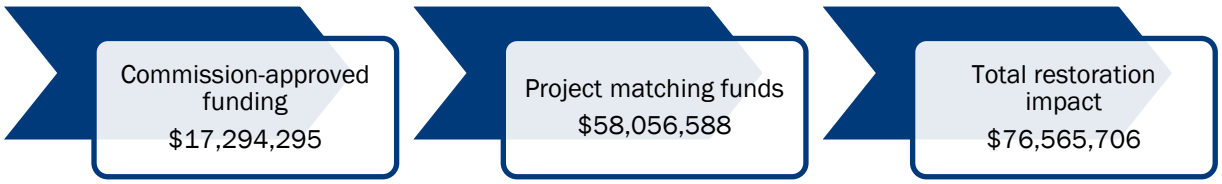

FIGURE 1. APPROVED FUNDING, MATCHING FUNDS, AND TOTAL DOLLARS SPENT ON COMPLETED OR ONGOING FUTURE FISHERIES IMPROVEMENT PROGRAM PROJECTS, SINCE 1996.

PROGRAM FINANCIALS

TABLE 4. STATUS OF FUTURE FISHERIES IMPROVEMENT PROGRAM FUNDED PROJECTS, BY YEAR, THROUGH OCTOBER 31, 2020.

FUNDED PROJECTS PER YEAR					
Year	Ongoing	Cancelled	Complete	Ongoing maintenance	Total
1996		6	42		48
1997		6	39		45
1998		9	40		49
1999		7	43		50
2000		8	36		44
2001		8	27		35
2002		7	32	2	41
2003		8	33		41
2004		7	32		39
2005		3	28		31
2006		13	25	2	40
2007		2	34		36
2008		9	18		27
2009		3	28		31
2010		3	30		33
2011		8	22		30
2012		1	17		18
2013			19		19
2014		2	17		19
2015		2	33		35
2016	1	4	19		24
2017	5	1	17		23
2018	5		21		26
2019	8		10		18
2020	15		4		19
Total	34	117	666	4	821

Projects have been completed statewide since 1996 (Figure 2). However, fewer projects have been completed in eastern Montana. Because the NSEP funding originally targeted cutthroat trout and bull trout projects, those funds were limited to western Montana. In 2013, NSEP funding was expanded to include all native fish, creating opportunities for funding in additional areas. Increasing habitat enhancement in eastern Montana is a Program priority.

PROGRAM FINANCIALS

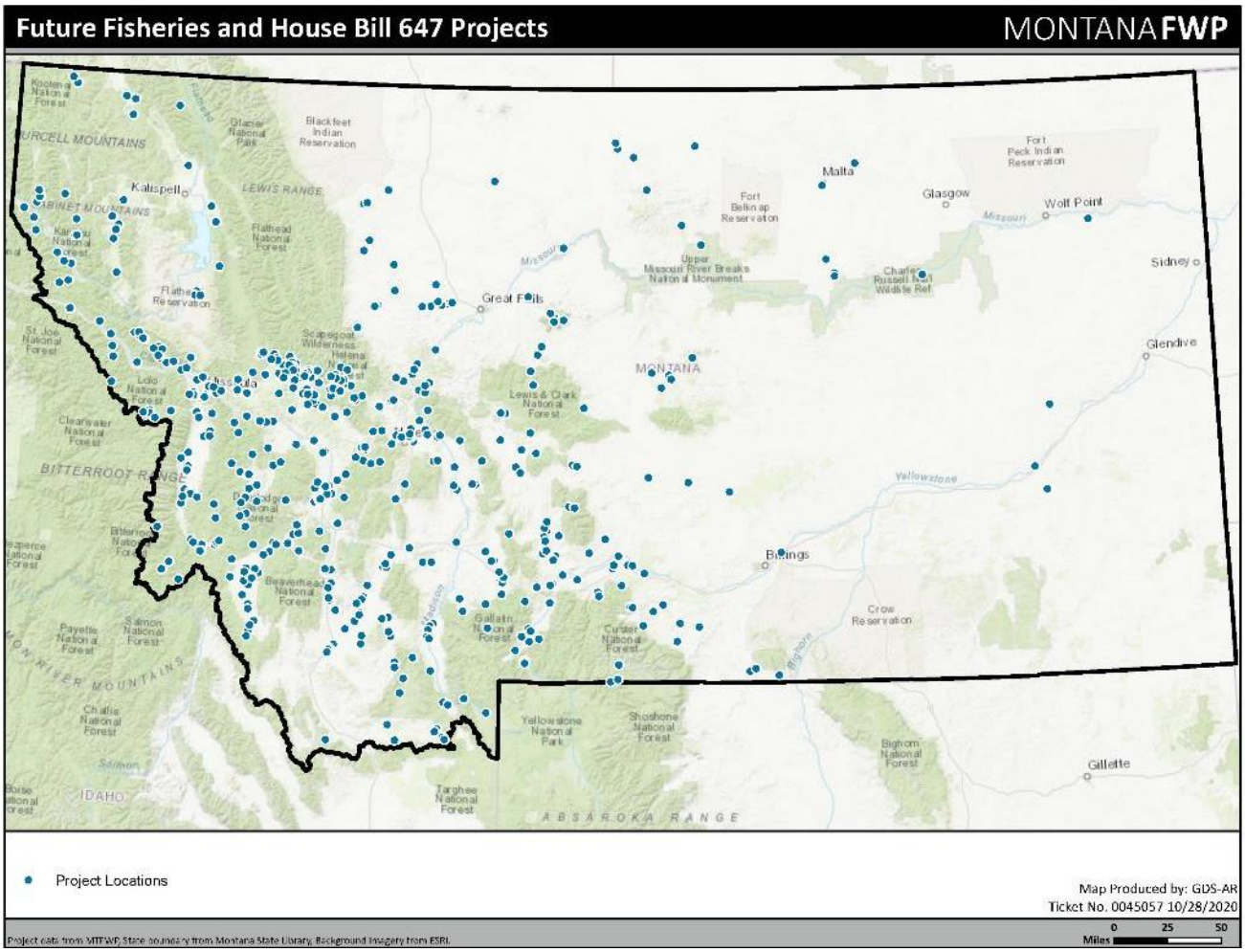

FIGURE 2. COMPLETED FUTURE FISHERIES IMPROVEMENT PROGRAM PROJECTS, 1996-2020.

EXPENDITURES

Table 5 lists all the FFIP projects that expended funds during the report period (November 1, 2018 to October 31, 2020). A total of $1,320,281.30 was expended on 53 restoration projects. Of these projects, 3 addressed long-term maintenance, 6 were granted funding prior to 2017, 26 were funded between 2017 and 2018, and 18 were funded in 2019 and 2020. Additionally, $18,146.46 was expended on program operations during this period. The operations expenditures were used to hire an intern for project monitoring and to facilitate Panel meetings. Most operations expenditures are absorbed by the FWP budget, which allows maximum FFIP funding to be available for on-the-ground projects.

PROGRAM FINANCIALS

TABLE 5. PROGRAM EXPENDITURES FROM 11-1-2018 TO 10-31-2020, SEPARATED BY PROGRAM (02022, NATIVE SPECIES ENHANCEMENT; 02149, RIVER RESTORATION /FUTURE FISHERIES IMPROVEMENT) AND SPENDING AUTHORITY SUBCLASS (EI001-EI007).

Project Detail			Program / Subclass							Expenditures
			02022 Native Species Enhancement Program				02149 River Restoration (FFIP)			
FFIP #	Project Name	Status	EI005	EI007	EI009	EI067	EI005	EI007	EI009	Grand Total
73643	Program Operations	N/A	$7,136.03	$11,010.43						$18,146.46
012-2019	Beaver Creek Upper Missouri channel reconstruction	Ongoing							$6,000.00	$6,000.00
002-2017	Big Otter Creek riparian protection & improvement	Ongoing					$559.25	$988.00		$1,547.25
001-2020	Boles Creek fish screening and passage	Complete			$25,625.00					$25,625.00
018-2018	Brewster Creek fish passage	Complete	$16,000.00							$16,000.00
019-2018	Cedar Creek large woody debris	Complete		$28,660.00						$28,660.00
021-2018	Copper Creek decommissioning	Complete		$20,046.35						$20,046.35
022-2018	Cottonwood / NF Cottonwood passage & decommissioning	Complete	$27,554.00							$27,554.00
003-2019	Crow Creek phase 2 stream restoration	Complete		$17,897.89						$17,897.89
002-2018	Deep Creek instream flow	Ongoing					$2,399.98	$1,070.48		$3,470.46
021-2017	Deer Creek road decommissioning	Ongoing	$7,140.00	-$7,140.00						$0.00
022-2017	Dry Creek channel restoration	Complete					$9,258.00	-$4,308.78		$4,949.22
003-2018	Dry Creek fish passage	Complete	$48,521.00							$48,521.00
004-2020	Eagle Creek YCT connectivity	Complete			$43,780.00					$43,780.00
004-2018	Elliston Creek riparian fence	Complete	$11,880.00	-$11,880.00						$0.00
014-2019	French Creek channel reconstruction	Complete		$40,000.00						$40,000.00
003-2014	French Creek fish barrier	Complete	$100,203.96	$44,401.44						$144,605.40
004-2017	Fresno Reservoir Habitat enhancement	Complete					$312.55	$1,387.30		$1,699.85
006-2018	Green Canyon Creek fish passage	Complete	$15,086.48							$15,086.48
015-2019	Haughian Bass Reservoir spillway repair	Complete						$2,659.41		$2,659.41

PROGRAM FINANCIALS

Project Detail			Program / Subclass							Expenditures
			02022 Native Species Enhancement Program				02149 River Restoration (FFIP)			
008-2016	Hells Canyon Creek instream flow	Complete					$2,013.65			$2,013.65
005-2020	Lee and West Fork Lolo Creeks fish passage improvement and decommissioning	Complete			$27,450.00					$27,450.00
007-2018	Lincoln Spring Creek restoration	Complete	$10,000.00	-$9,000.00						$1,000.00
009-2016	Little Blackfoot and Ontario Creek road relocation / floodplain restoration	Complete		$2,440.00						$2,440.00
025-2018	Loneman Creek riparian fencing	Complete	$2,000.00	$0.00						$2,000.00
009-2017	Mill Creek fish ladder	Complete					$9,435.50			$9,435.50
017-2019	Miller Creek restoration & sediment reduction	Complete		$28,400.00						$28,400.00
018-2019	Morrell Creek decommissioning & revegetation	Complete		$50,000.00	$32,208.00					$82,208.00
026-2018	Mulherin Creek instream flow lease renewal	Complete	$38,175.00	$0.00						$38,175.00
007-2019	Nevada Creek Phase 3A reconstruction	Complete	$42,000.00	$11,900.00						$53,900.00
020-2019	Nevada Creek phase 3B restoration	Complete		$68,200.00	$0.00					$68,200.00
008-2020	Nevada Creek phase 4 stream restoration	Complete		$60,000.00	$25,200.00					$85,200.00
011-2018	NF Dry Cottonwood Creek habitat enhancement	Complete	$6,000.00	$0.00						$6,000.00
012-2018	NF Keep Cool Creek fish passage	Complete		$24,640.00						$24,640.00
028-2018	NF Spanish Creek barrier supplement	Complete	$27,500.00	-$27,500.00						$0.00
013-2017	North Fork Cottonwood Creek fish passage	Complete		$36,710.00						$36,710.00
011-2016	North Fork Dry Cottonwood Creek culvert replacement	Complete		$12,626.00						$12,626.00
014-2018	Poorman Creek mining restoration	Complete	$20,000.00	$5,000.00						$25,000.00
021-2020	Poorman Creek restoration phase 2	Ongoing			$52,200.00					$52,200.00
015-2018	Prickly Pear Cr Trynan fish passage	Complete					$27,000.00			$27,000.00
029-2018	Ramshorn Creek fish barrier	Complete	$10,000.00	$0.00						$10,000.00
008-2019	Rattlesnake Creek dam removal	Complete		$10,000.00						$10,000.00

PROGRAM FINANCIALS

Project Detail			Program / Subclass							Expenditures
			02022 Native Species Enhancement Program				02149 River Restoration (FFIP)			
035-2015	Reese Creek instream flow enhancement	Complete		$55,000.00						$55,000.00
021-2019	Reese Creek instream flow supplement	Complete		$20,000.00						$20,000.00
016-2018	Rock Creek realignment	Complete	$11,725.00	$0.00						$11,725.00
009-2019	Ross Fork Rock Creek fish passage	Complete		$21,400.00						$21,400.00
010-2019	Selway Creek fish barrier	Complete		$2,509.74		$22,587.64				$25,097.38
017-2018	SF Dry Cottonwood Creek culvert replacement	Ongoing	$24,957.00	$0.00						$24,957.00
027-2016	Shields River watershed YCT passage	Complete		$1,340.00						$1,340.00
039-2006	Skalkaho Creek / Hedge Supplement	Complete	$3,300.00	$3,300.00						$6,600.00
040-2006	Skalkaho Creek / Republican	Complete	$3,300.00	$3,300.00						$6,600.00
048-2002	Skalkaho Creek fish screens	Complete	$5,500.00	$5,000.00						$10,500.00
029-2017	Turkey Creek fish passage	Complete	$9,647.77	$51,442.23						$61,090.00
023-2019	West Fork Bitterroot Wilson Ditch fish screen	Complete		$5,125.00						$5,125.00
TOTAL:			**$447,626.24**	**$584,829.08**	**$206,463.00**	**$22,587.64**	**$50,978.93**	**$1,796.41**	**$6,000.00**	**$1,320,281.30**

PROGRAM FINANCIALS

ANTICIPATED EXPENSES

Since inception of the FFIP, the legislature approved an average of $1.39 million of authority per biennium ($694,692 per year) to habitat enhancement projects (Table 3). Combined project expenditures for the last three biennia have ranged from $916,406 and $1.58 million (Table 6). In the last two years, Program expenditures were approximately $1.32 million.

TABLE 6. EXPENDITURES AND APPROPRIATIONS FROM THE LAST FOUR BIENNIA, BY LEGISLATIVE REPORT PERIOD (NOV 1 – OCT 31). EXPENDITURES ARE TYPICALLY ASSOCIATED WITH PREVIOUS BIENNIUM AUTHORITY.

	November 1, 2012 - October 31, 2014	November 1, 2014 - October 31, 2016	November 1, 2016 - October 31, 2018	November 1, 2018 - October 31, 2020
Expenditures	$916,406	$1.40 million	$1.58 million	$1.32 million
Authority (Fiscal Year)	$790,000 2014 - 2015	$1.27 million 2016 - 2017	$1.18 million 2018 - 2019	$1.25 million 2020 - 2021

The amount of authority has been less than the amount expended for several biennia, due to unexpended carry-over from appropriations prior to 2007. The amount expended compared to the authority became increasingly equivalent in the last biennium as the carry-over decreased. However, expenditure and authority reporting is staggered, as expenditures typically correspond with authority from the previous several biennia. Projects are typically completed, with funds expended, between one and three years after the grant is awarded.

Currently, awarded funds are less than requested funds due to the competitive grant process but also because of reduced allocations from the RIT fund. While authority has stayed relatively constant, awarded funding awarded has generally decreased since 2009 (Figure 3).

As the cost for restoration continues to increase, it is likely that the FFIP funding level and funding sources will need to be evaluated. In both of the last two biennia, the funding process was required to use the prioritization procedure to deny the lowest-ranking applications, even though they were recommended for funding by the Panel. These projects were beneficial and likely would have received funding if it were available. The prioritization procedure had not been used to influence funding recommendations prior to 2016. As funding levels decrease and project requests increase, restoration potential will continue to be limited.

PROGRAM FINANCIALS

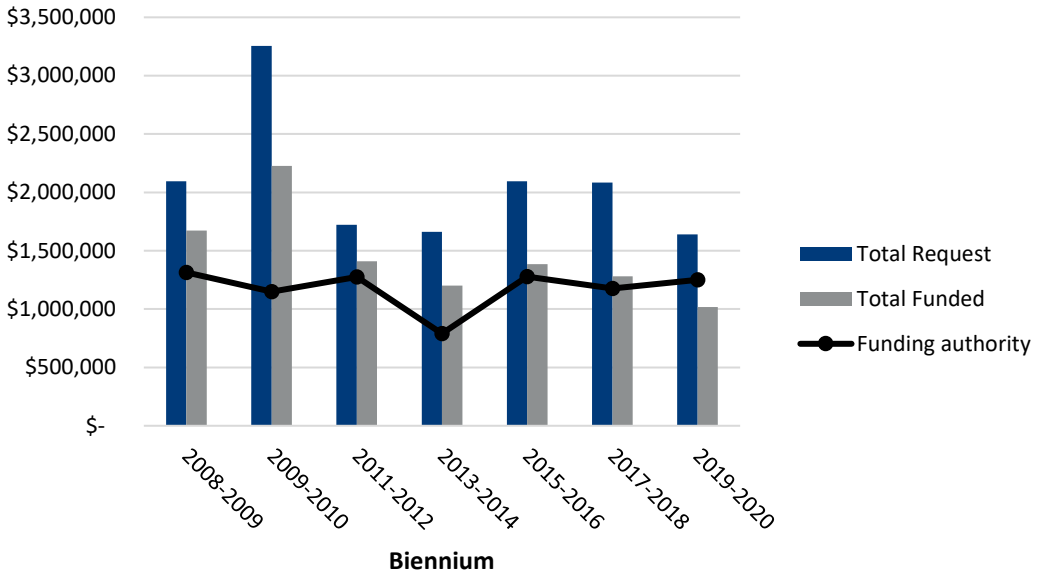

FIGURE 3. FUTURE FISHERIES IMPROVEMENT PROGRAM FUNDING REQUESTS, AMOUNT FUNDED, AND FUNDING AUTHORITY OVER TIME, BY BIENNIUM. FUNDING FOR THE DECEMBER 2020 GRANT DEADLINE HAS NOT YET BEEN AWARDED, BUT WILL BE LIMITED TO APPROXIMATELY $100,000 IN REMAINING FUNDS.

If funding was not limited, the Program would be expected to spend, at a minimum, an amount comparable to what was expended previously, which is estimated to be $6.5 million in a 10-year period or $1.3 million per biennium. However, this estimate exceeds the funding and authority currently available.

With a 5:1 match (the average of the last two funding cycles), the restoration impact of $6.5 million in 10 years would generate matching funds of $32.5 million and an overall expenditure of $39 million. These are valuable dollars for fisheries restoration, but also for Montana's recreation economy and the local contractors that complete the project installation.

Approved and Completed Projects

PROGRAM PROJECT TYPES, SINCE INCEPTION

Program funds have been used to complete many types of lake and stream habitat enhancements. Riparian fencing and channel restoration have been the most common treatments funded through FFIP and make up 19% and 15% of all completed projects, respectively (Figure 4). Additional prevalent restoration activities include fish passage improvement, riparian restoration, bank stabilization, irrigation efficiency or instream flow, diversion modification, fish screens, barrier construction (native fish protection), instream habitat, lake spawning habitat installation, and spawning enhancement.

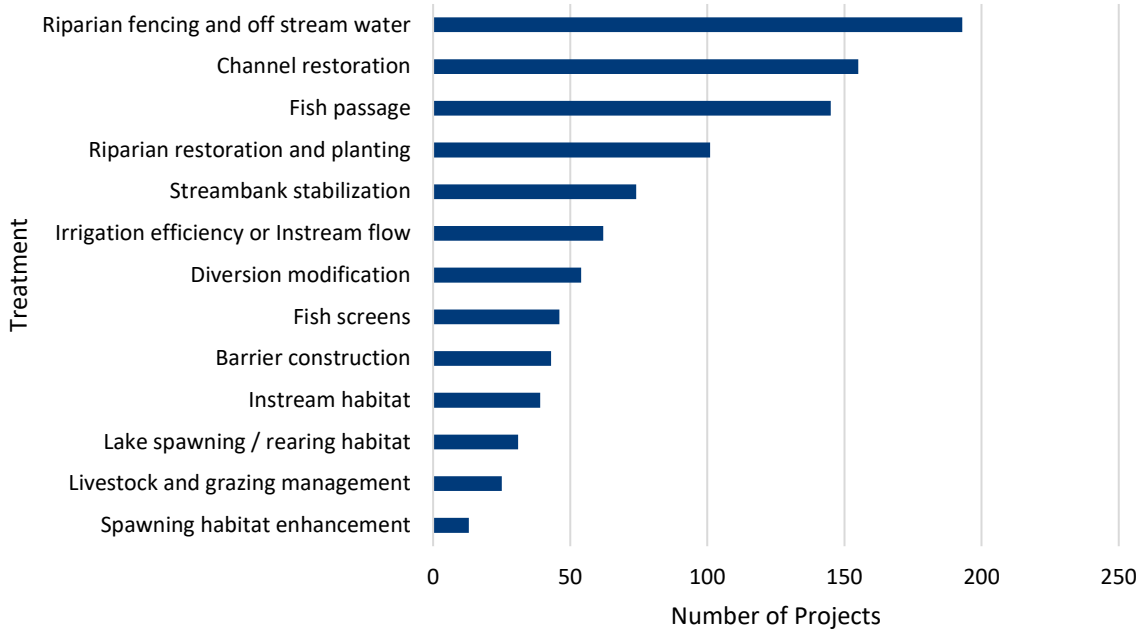

FIGURE 4. PROJECT TYPES, 1996–2020. MANY PROJECTS INCORPORATED MULTIPLE TREATMENTS.

2019-2020 PROJECT TYPES

In 2019 and 2020, most of the approved projects involved channel reconstruction and riparian restoration, followed by fish passage and riparian fencing (Figure 5). Other common project activities included instream habitat, fish barriers, instream flow, fish screens, lake habitat improvements, road decommissioning, and riparian restoration.

APPROVED AND COMPLETED PROJECTS

Channel restoration projects often improve stream function and habitat by adding sinuosity (bends) to straight reaches or moving a stream back to its original location. Riparian restoration is often a component of channel restoration projects where banks are held together by various forms of vegetation. Fish passage projects remove barriers to fish movement and reconnect them with important habitats to live or reproduce. Fencing projects typically create exclosures around the stream and riparian areas or establish a riparian pasture to better control grazing and encourage vegetation growth around the stream. Instream flow projects usually involve leases that keep water in the stream to benefit the fishery, particularly at times with low flow.

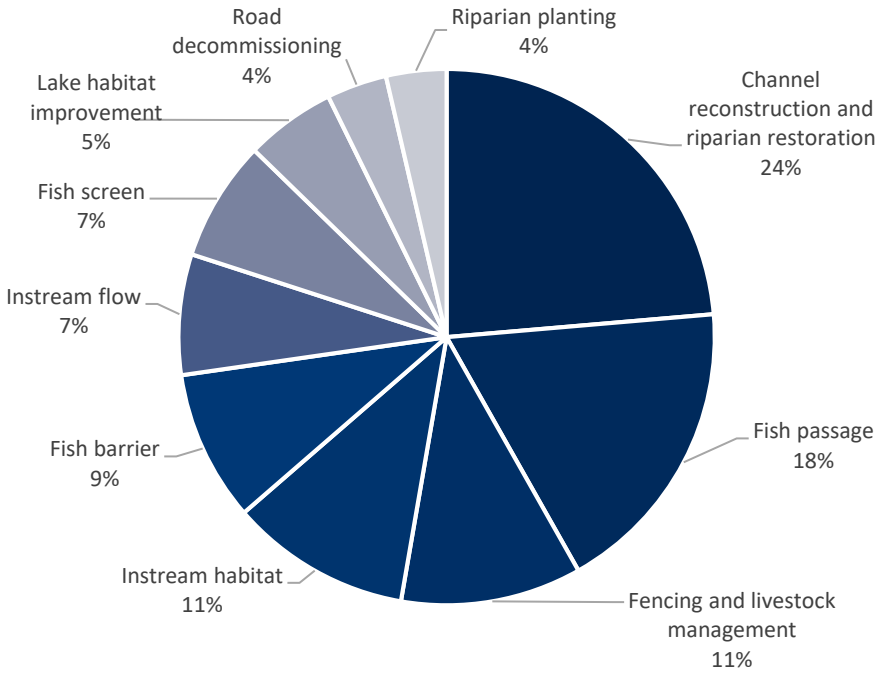

FIGURE 5. PERCENT OF EACH TREATMENT TYPE FOR PROJECTS FUNDED IN 2019 AND 2020. MANY PROJECTS INCLUDED SEVERAL TREATMENTS.

2019-2020 FUNDED PROJECTS

During the period of this report, the Commission approved funding or partial funding for 37 FFIP restoration projects totaling $1,349,744 (Table 7). These projects derived an additional $6,610,287 in matching funds and in-kind services from outside sources and had a total value of more than $8.6 million dollars. Of the 37 restoration projects approved, 6 were funded under the FFIP with base license (River Restoration Fund) dollars, and 31 were funded under the NSEP with RIT funding. Narrative descriptions of individual projects can be found in the following section.

APPROVED AND COMPLETED PROJECTS

TABLE 7. APPROVED PROJECTS BY NAME AND PROJECT NUMBER (FFIP #); FUNDING CYCLE WINTER 2019 (W19), SUMMER 2019 (S19), WINTER 2020 (W20) AND SUMMER 2020 (S20). RIT = RESOURCE INDEMNITY TRUST FUND; RR = RIVER RESTORATION FUND

	FFIP #	Cycle	Project Name	FFIP Grant $	Matching $	Total Committed $	Source
1	001-2019	W19	Big Creek instream flow lease	51,150	51,150	102,300	RIT
2	003-2019	W19	Crow Creek phase 2 stream restoration	23,000	81,134	104,134	RIT
3	005-2019	W19	Hells Canyon Creek instream flow renewal	47,500	2,500	50,000	RR
4	007-2019	W19	Nevada Creek Phase 3A reconstruction	53,900	178,235	227,235	RIT
5	008-2019	W19	Rattlesnake Creek dam removal	50,000	855,029	905,029	RIT
6	009-2019	W19	Ross Fork Rock Creek fish passage	21,400	21,420	42,820	RIT
7	010-2019	W19	Selway Creek fish barrier	80,000	329,845	409,845	RIT
8	012-2019	S19	Beaver Creek Upper Missouri channel reconstruction	75,000	271,860	346,860	RR
9	014-2019	S19	French Creek channel reconstruction	40,000	490,680	586,662	RIT
10	015-2019	S19	Haughian Bass Reservoir spillway repair	4,100	483	4,583	RR
11	016-2019	S19	Lolo Ditch fish screen	70,000	148,280	218,280	RIT
12	017-2019	S19	Miller Creek restoration & sediment reduction	28,400	113,950	142,350	RIT
13	018-2019	S19	Morrell Creek decommissioning & revegetation	60,095	278,735	338,830	RIT
14	019-2019	S19	Musselshell River McCleary channel restoration	70,000	127,755	207,755	RIT
15	020-2019	S19	Nevada Creek phase 3B restoration	68,200	265,060	327,060	RIT
16	021-2019	S19	Reese Creek instream flow supplement	20,000	216,733	361,733	RIT
17	022-2019	S19	Sevenmile Creek restoration phase 2	50,000	274,431	343,431	RR
18	023-2019	S19	West Fork Bitterroot Wilson Ditch fish screen	30,630	31,113	61,743	RIT
19	001-2020	W20	Boles Creek fish screening and passage	25,625	71,145	96,770	RIT
20	002-2020	W20	Cottonwood Creek fish barrier	7,500	24,102	31,602	RIT
21	003-2020	W20	Doolittle Creek fish barrier	10,000	15,000	25,000	RIT
22	004-2020	W20	Eagle Creek YCT connectivity	43,780	87,790	175,350	RIT
23	005-2020	W20	Lee & West Fork Lolo Cr fish psg imprvmnt & decommissioning	30,500	146,294	176,294	RIT
24	008-2020	W20	Nevada Creek phase 4 stream restoration	66,000	484,712	550,712	RIT
25	009-2020	W20	O'Neill Creek culvert replacement	15,250	19,620	34,870	RIT
26	010-2020	W20	Reser Reservoir dam reconstruction & fish habitat improvement	40,000	1,101,049	1,141,049	RR
27	011-2020	W20	Wall Creek fish barrier supplement	20,000	139,488	254,125	RIT
28	012-2020	W20	Wheelbarrow Creek Threemile fish passage	18,920	62,828	82,248	RIT
29	013-2020	S20	Big Hole Divide fish barriers	10,420	74,643	85,063	RIT
30	014-2020	S20	Flint Creek riparian restoration	29,100	33,300	262,835	RIT
31	015-2020	S20	Hall Creek fish barrier removal	8,500	3,000	12,000	RIT
32	016-2020	S20	Lake Elmo fish habitat enhancement	40,000	40,000	202,600	RR
33	017-2020	S20	Little Gold Creek fish passage	29,475	48,534	78,709	RIT
34	018-2020	S20	Long Creek aquatic habitat enhancement	27,750	41,820	69,570	RIT
35	019-2020	S20	Lower French Creek riparian restoration	10,000	75,920	85,920	RIT
36	020-2020	S20	Madison River Storey Ditch riparian restoration	15,549	58,670	95,212	RIT
37	021-2020	S20	Poorman Creek restoration phase 2	58,000	343,979	401,979	RIT
TOTAL				1,349,744	6,610,287	8,642,558	

APPROVED AND COMPLETED PROJECTS

Funded Project Descriptions

2019 APPROVED PROJECTS

Big Creek instream flow lease (001-2019)

Big Creek (Park County) is a tributary to the upper Yellowstone River and supports substantial recruitment of Yellowstone cutthroat trout to the river. Big Creek is considered critical Yellowstone cutthroat trout spawning habitat within the upper Yellowstone River drainage. Lower Big Creek was dewatered often during the irrigation season prior to a significant water conservation project and several associated water leases. The current instream flow leases have been in place for 20 years and expired prior to the 2019 irrigation season. The total instream flow lease is 10 cubic feet per second (cfs), with the water split between two ownerships:

a. John L. Lake, Jr. and Yellowstone State Stop Estates Water User's and Homeowners Association; 2.8 cfs. [renewal for 10 years]
b. Mountain Sky Guest Ranch; 7.2 cfs. [renewal up to 5 years, 1 year for this grant due to anticipated changes to its irrigation rights]. Providing in-kind water lease value.

The lease with Montana Land Reliance for 1-16 cfs is also being renewed for 10 years, not funded through this proposal. This project is expected to continue providing water for 95% of the redds in Big Creek, allowing for successful emergence and outmigration to the Yellowstone River. The goal is to preserve the streamflow obtained from the leases and continue achieving successful recruitment of Yellowstone cutthroat trout. **ONGOING; $51,150, FWP.**

Crow Creek phase 2 stream restoration (003-2017)

Crow Creek (Sanders County) is a tributary to upper Prospect Creek on the Lolo National Forest and supports populations of bull trout, westslope cutthroat trout, and cedar sculpin. Historically, the Crow Creek valley was affected by two major powerline corridors that resulted in loss of old growth riparian conifers along 1/3 of a mile of forest. This left the stream over-widened, shallow, braided, and lacking pools, shade, and complexity. In 2007, a channel restoration project was completed just upstream of the proposed project area and was considered phase 1. This project was successful in improving the habitat complexity, stream function, and fish population size and biomass.

This project, phase 2, continued stream restoration and enhancement by reconfiguring the stream alignment to provide grade control, habitat complexity, and floodplain connectivity (Figure 6). Meanders, pools, and shade were increased. Grade control structures were installed using large woody debris and rock, and vegetation was planted to provide shade and increase bank stability. The

goal was to restore a degraded segment of stream and floodplain and improve native fish habitat. Improved habitat is intended to improve the carrying capacity of native salmonids in this portion of Crow Creek, similar to phase 1. **COMPLETED; $23,000 (EXPENDED $17,898), LOWER CLARK FORK WATERSHED GROUP.**

FIGURE 6. CROW CREEK BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF LOWER CLARK FORK WATERSHED GROUP AND RIVER DESIGN GROUP. NOTE HABITAT STRUCTURE ADDED TO THE RIGHT SIDE OF THE AFTER PHOTO.

Hells Canyon Creek instream flow renewal (005-2019)

Hells Canyon Creek (Madison County) is a tributary to Jefferson River near Twin Bridges that supports populations of rainbow trout, rainbow/cutthroat trout hybrids, brown trout, and several non-game species. In 1995, three landowners converted open ditches into a single gravity pipeline system. FWP and the Natural Resources and Conservation Service (NRCS) provided cost share, and FWP has been leasing the water for 20 years. In 2016, FWP negotiated a 3-year extension while a long-term lease was being negotiated. As part of the negotiated lease, a pivot was to be installed to save water for instream flow. The pivot system was installed in 2017, sooner than expected. This project will renew the instream flow lease for an additional 10 years. Hells Canyon Creek has demonstrated value for trout rearing and spawning and provides important recruitment to the Jefferson River. Since the instream flow has been in place, the stream has not been dewatered. **ONGOING; $47,500, FWP.**

Nevada Creek phase 3A restoration (007-2019)

Nevada Creek (Powell County) is a tributary to the middle Blackfoot River and supports populations of westslope cutthroat trout, rainbow trout, and brown trout. The project area was historically straightened, and a non-functional riparian area caused the channel to erode and downcut. In 2010

and 2017, adjacent channel restoration projects reduced sediment, increased stream complexity, improved riparian condition, and created fish habitat that resulted in increased trout abundance.

This project was considered phase 3A and continued the restoration downstream. Approximately 4,700 feet of Nevada Creek was tied into phase 2 and the channel was restored to proper dimensions. Habitat was improved by increasing overhead and in-stream cover, sediment inputs are expected to be reduced, floodplain connectivity should improve, vegetation growth should increase, and a grazing management system will be implemented. The location is in a highly visible reach of Nevada Creek and the previous projects had important demonstration value. **COMPLETED; $49,000 ($53,900 EXPENDED WITH 10% OVERAGE), BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED (BBCTU).**

FIGURE 7. NEVADA CREEK BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED. THE RED ARROW IS FOR REFERENCE POINT IN BOTH PHOTOS.

Rattlesnake Creek dam removal (008-2019)

Rattlesnake Creek (Missoula County) is a tributary to Clark Fork River and supports populations of bull trout, westslope cutthroat trout, and rainbow trout. Rattlesnake Creek Dam was constructed in 1901 to be the primary water source for Missoula. In the early 1980s, contamination with giardia led to a change in water supply and Missoula's water source was transferred to groundwater wells. Since then, the dam had no storage or water delivery purpose, but has remained in place. A fish ladder, partially funded by Future Fisheries, was installed in 2003. Several ditches on Rattlesnake were also screened.

The applicant removed all infrastructure on the dam site and tied into existing Rattlesnake Creek, which included 2,000 feet of stream channel reconstruction and bank treatments and 14,000 cubic yards of fill to raise the channel to floodplain level. This project removed the last remaining migration barrier on Rattlesnake Creek. Rattlesnake Creek is the primary rearing and spawning habitat for trout in the Missoula Clark Fork River area and supports the only viable bull trout population in the area.

The goal was to improve habitat and migratory corridors for trout. **COMPLETED; $50,000, TROUT UNLIMITED.**

FIGURE 8. RATTLESNAKE CREEK BEFORE (L) AND AFTER (R) DAM REMOVAL. THE FORMER DAM SITE IS IN THE BOTTOM LEFT AREA OF THE AFTER PHOTO. AFTER PHOTO COURTESY OF MONTANA TROUT UNLIMITED.

Ross Fork Rock Creek fish passage (009-2019)

Ross Fork Rock Creek (Granite County) is a tributary to Rock Creek and supports populations of westslope cutthroat trout and bull trout and is considered critical bull trout habitat. An inventory of instream structures identified this project as the only major upstream fish passage barrier on Ross Fork. This project removed two undersized, 5’ wide culverts that were located 0.5 miles downstream of the U.S. Forest Service boundary (Figure 9). The culverts were undersized and a velocity barrier at critical times of the year. The undersized culverts were replaced with a farm bridge made from a railcar and eco-blocks. Two rock weirs were constructed to maintain streambed stability. The goal was to reconnect an additional 15 miles of spawning and rearing habitat and refugia in Ross Fork. This project is expected to benefit both resident and fluvial populations of bull and westslope cutthroat trout. **COMPLETED; $21,400, TROUT UNLIMITED.**

FIGURE 9. ROSS FORK ROCK CREEK BEFORE (L) AND AFTER (R) THE PROJECT; REPLACING UNDERSIZED CULVERTS WITH A RAIL CAR FARM BRIDGE. PHOTOS COURTESY OF TROUT UNLIMITED.

Selway Creek fish barrier (010-2019)

Selway Creek (Beaverhead County) is a tributary to Bloody Dick and Horse Prairie creeks upstream of Clark Canyon Reservoir and supports populations of non-native trout and native western pearlshell mussels. This project installed a fish barrier to re-establish a genetically pure westslope cutthroat trout population in 48 miles of stream (Figure 10). In the next phase, non-native fish will be removed and westslope cutthroat trout will be reestablished, which would make the Selway watershed among the strongest cutthroat trout strongholds in the upper Missouri River basin. The goal was to conserve and protect native westslope cutthroat trout. **COMPLETED; $80,000, FWP.**

FIGURE 10. SELWAY CREEK BARRIER AFTER CONSTRUCTION.

APPROVED AND COMPLETED PROJECTS

Beaver Creek Upper Missouri channel reconstruction (012-2019)

Beaver Creek (Lewis & Clark County) is a tributary to the Missouri River below Hauser Reservoir near Helena and primarily supports populations of brown trout and rainbow trout. Historically, Beaver Creek served as a primary spawning tributary for adfluvial trout. Currently, lower Beaver Creek currently lacks floodplain connectivity, habitat complexity, and a functioning riparian area due to past land use practices. A phased restoration approach is proposed, and this project is Phase I of II. Phase I will restore 0.3 miles of the channel (total size 1.2 miles). Improvements include raising the elevation of Beaver Creek to connect to the floodplain, reconnecting abandoned oxbows, constructing a new channel, converting old channel to wetlands, installing habitat structures, planting riparian vegetation, reconstructing the floodplain surface, and improving camping sites. The goals are to restore hydrologic processes, reconstruct the channel and riparian area to reference conditions, improve water quality, and increase habitat complexity to improve spawning and rearing habitat. **ONGOING; $75,000, PAT BARNES CHAPTER OF TROUT UNLIMITED & U.S. FOREST SERVICE.**

French Creek channel reconstruction (014-2019)

French Creek (Deer Lodge County) is a tributary to Deep Creek, which flows into the Big Hole River. It is part of the Mount Haggin Wildlife Management Area and within the proposed Artic grayling and westslope cutthroat trout recovery area. Past projects in the watershed funded by Future Fisheries include French Gulch channel restoration, French Creek riparian fencing, and the French Creek fish barrier. The goal of restoration in the upper French Creek drainage is to restore mining-related damage and establish an interconnected stream system (over 40 miles of stream) for Artic grayling and westslope cutthroat trout.

This project addressed mining-related damages due to an unnatural dike that has been confining the stream channel and leading to significant erosion and sediment deposition. Reference stream conditions were used to construct 4,000 feet of unconfined stream channel in the floodplain away from the hillslope (Figure 11). Native sods and willows were used to construct the banks of the new channel and bioengineering techniques were used at meander bends. The goal was to enhance fish habitat by reducing a major sediment source that impacts spawning substrate and water quality. **COMPLETED; $40,000, BIG HOLE WATERSHED COMMITTEE.**

APPROVED AND COMPLETED PROJECTS

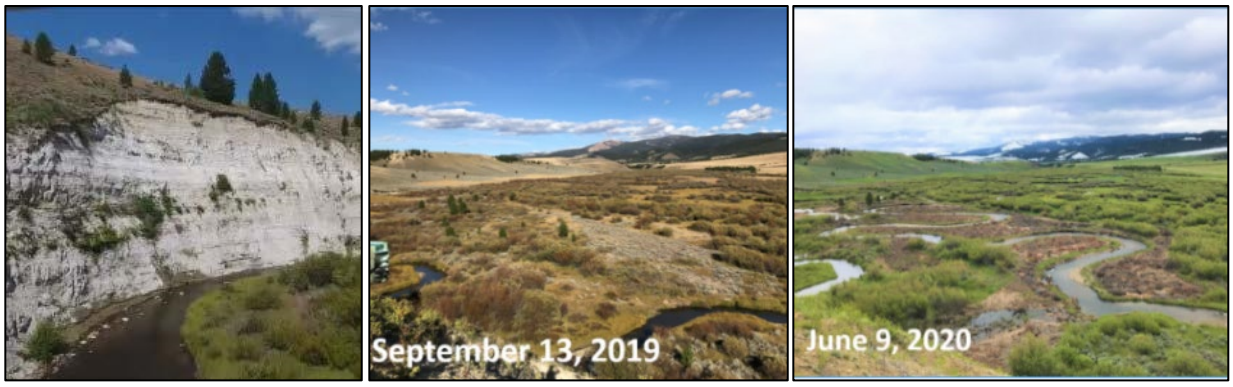

FIGURE 11. FRENCH CREEK CHANNEL RECONSTRUCTION BEFORE (L AND CENTER) AND AFTER (R). THE STREAM CHANNEL WAS MOVED AWAY FROM THE HIGHLY EROSIVE HILLSIDE (L PICTURE). PHOTOS COURTESY OF BIG HOLE WATERSHED COMMITTEE.

Haughian Bass Reservoir spillway repair (015-2019)

Haughian Bass Reservoir is a 45-acre impoundment on private property in northern Custer County in the Cheery Creek drainage. It is managed within the Region 7 Pond Fishing Program, open to public access through landowner permission since 1975. This reservoir is larger than most ponds in the area and supports an above average quality fishery with largemouth bass, smallmouth bass, yellow perch, and northern pike. Many fish species naturally reproduce but there is some stocking. The existing spillway and concrete foundation were damaged due to shifting ice, and sandbags were placed around the damaged pipe to reduce water loss and minimize additional damage. Failure to repair the pipe could have compromised the spillway and reduced water depth by 3-4 feet, putting the reservoir in risk of winter kill. A head cut also threatened the integrity of the dam. The spillway pipe was excavated and repaired and the headcut was filled (Figure 12). The goal was to retain the high quality fishery and reduce the risk of a winter kill. **COMPLETE; $4,583.20 ($2,659 EXPENDED), LANDOWNER.**

FIGURE 12. HAUGHIAN RESERVOIR SPILLWAY PIPE BEFORE (L) AND AFTER (R) CONSTRUCTION. BEFORE PHOTO COURTESY OF PAT HAUGHIAN.

APPROVED AND COMPLETED PROJECTS

Lolo Ditch fish screen (016-2019)

Lolo Creek (Missoula County) is the third largest drainage in the Bitterroot watershed and its upper tributaries are strongholds for bull trout and westslope cutthroat trout. Brown trout, rainbow trout, and mountain whitefish are also present. The stream is impacted by dewatering and high water temperatures in the lower reaches, and entrainment, sediment, and fish passage are issues in the higher reaches. The Lolo Ditch is the largest irrigation diversion on Lolo Creek and can divert up to 75% of flow in low flow periods. The fish that enter the ditch become entrained and cannot return to Lolo Creek. This project will install a fish screen on the Lolo Ditch to keep fish within the Lolo Creek and Clark Fork drainages. Maintenance will be the responsibility of the Clark Fork Coalition and its partners, in coordination with the water users. The goal is to improve fish populations and enhance fishing opportunities through improved survival. **ONGOING; $70,000, CLARK FORK COALITION.**

Miller Creek restoration & sediment reduction (017-2019)

Miller Creek (Missoula County) is a tributary to the Bitterroot River near Lolo that supports populations of westslope cutthroat trout and brook trout. It is considered a stronghold for native fish in the lower Bitterroot and several of its tributaries contain pure strain westslope cutthroat trout. These important tributaries enter Miller Creek within a six mile area, and this project addressed one of those six miles of stream. The project area was degraded due to past logging and agricultural practices and was actively eroding. The floodplain was disconnected, fine sediment was entering the stream, habitat diversity was reduced, and there was little riparian cover. This project addressed these problems and returned the project area to its natural function (Figure 13). In this one mile reach, the applicant designated a woody riparian vegetation expansion corridor and installed bed aggradation structures (with cobble, large wood, vegetation, or beaver dam analogs), channel shaping / realignment, riparian planting, habitat structures, and floodplain wetlands. The goals were to reduce water temperatures and sediment while enhancing aquatic and terrestrial habitat, thereby increasing wild fish populations. The stream is listed for temperature and sediment impairments (Clean Water Act section 303(d) list) and property is under a conservation easement and will not be grazed. This project has landowner support and value as a demonstration project. **COMPLETED; $28,400, CLARK FORK COALITION.**

FIGURE 13. MILLER CREEK BEFORE (L) AND AFTER (R) CHANNEL RECONSTRUCTION AND REVEGETATION. BEFORE PHOTO COURTESY OF CLARK FORK COALITION.

Morrell Creek decommissioning & revegetation (018-2019)

Morrell Creek (Powell County) is a tributary to the Clearwater River and supports populations of bull trout and westslope cutthroat trout. This area is considered a high priority conservation area, is critical bull trout habitat and supports both adfluvial bull trout and genetically pure westslope cutthroat trout. The project area was impacted by 1.6 miles of road that was located within the 300 ft buffer of Morrell Creek and its floodplain. The road negatively impacted the stream by reducing wood recruitment and riparian cover, increasing sedimentation, and supporting the use of riprap. Sediment was identified as a limiting factor for bull trout populations. This project decommissioned 1.6 miles of road and moved the road to an upland area where it would not impact the stream. The decommissioned and loosened road surface now has a trail and is expected to support vegetation growth and wood recruitment as well as eliminate a significant source of sediment. The goal was to improve floodplain function, water quality, and habitat conditions for native fish in Morrell Creek. **COMPLETED; $60,095 (EXPENDED $66,104 WITH 10% OVERAGE); BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.**

FIGURE 14. MORELL CREEK ROAD BEFORE (L) AND AFTER (R) DECOMMISSIONING. BEFORE PHOTO COURTESY OF BIG BLACKFOOT CHAPTER TROUT UNLIMITED. RED ARROWS DENOTE THE SAME TREES IN EACH PHOTO.

Musselshell River McCleary channel restoration (019-2019)

The Musselshell River (Musselshell County) is a tributary to the Missouri River. The Musselshell has experienced extensive flooding and channel adjustments in recent years. In the project area, the channel experienced an avulsion in 2018, resulting in a limited ability to access water for irrigation and domestic use. The applicant and landowner intend to restore full connectivity and increase habitat for fish while maintaining a pump site and point of withdrawal for water use. The goal is to improve ecological function and stream health rather than just return irrigation access. The project area supports a variety of native fish including sauger, catfish, sucker, emerald shiner, burbot, and western silvery minnow. Non-native gamefish are also present, as well as turtle and native mussels. **ONGOING; $70,000, LANDOWNER.**

Nevada Creek phase 3B restoration (020-2019)

Nevada Creek (Powell County) is a tributary to the middle Blackfoot River and supports populations of westslope cutthroat trout, rainbow trout, and brown trout. The project area was historically straightened, and a non-functional riparian area caused the channel to erode and downcut. In 2010, 2017, and 2018 adjacent channel restoration projects reduced sediment, increased stream complexity, improved riparian condition, and created fish habitat that resulted in increased trout abundance. This project is considered phase 3B and continued the restoration downstream. Approximately 4,600 feet of Nevada Creek was tied into phase 3A and the channel was restored to proper dimensions. Habitat was improved by increasing overhead and in-stream cover, sediment inputs were reduced, floodplain connectivity was improved, vegetation growth was encouraged, and a grazing management system was implemented. The location is in a highly visible reach of Nevada Creek and the previous projects

have had important demonstration value. **COMPLETED; $62,000 ($68,200 EXPENDED WITH 10% OVERAGE), BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.**

FIGURE 15. NEVADA CREEK BEFORE (L) AND AFTER (R) RESTORATION. NOTE THE REDUCTION IN CHANNEL WIDTH AND THE FLOODPLAIN AREA DEVELOPED. BEFORE PHOTO COURTESY OF BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.

Reese Creek instream flow supplement (021-2019)

Reese Creek (Park County) is a tributary to the Yellowstone River near the northern boundary of Yellowstone National Park that supports both a resident population of Yellowstone cutthroat trout at its headwaters and a migratory spawning population that originates in the mainstem Yellowstone River. This project improved the headgate, incorporated a fish screen, and installed a pipeline between the existing diversion and intake pond, decreasing the necessary diverted flow volume and salvage seepage losses, providing additional instream flow to Reese Creek. Between 1.3 and 3.84 cfs will be saved from seepage, for 4.3 cfs (spawning) or 1.6 cfs (remainder of the year) of flow (Figure 16). The goal of this project is to ensure minimum instream flows are available in Reese Creek year-round, which should increase survival of Yellowstone cutthroat trout fry and increase recruitment to the Yellowstone River. **COMPLETED; $20,000 (TOTAL INVESTMENT $75,000 INCLUDING A PREVIOUS GRANT), TROUT UNLIMITED.**

FIGURE 16. REESE CREEK DIVERSION BEFORE (L) AND AFTER (R) RESTORATION. THE PROJECT INCLUDED INSTALLATION OF A FISH SCREEN AND PIPELINE (DENOTED BY STAR). BEFORE PHOTO COURTESY OF TROUT UNLIMITED.

Sevenmile Creek restoration phase 2 (022-2019)

Sevenmile Creek (Lewis & Clark County) is a tributary to Tenmile Creek that supports populations of brown trout and brook trout. In 2017, the Prickly Pear Land Trust acquired a 350-acre parcel of land in the Helena Valley that included approximately 2.2 miles of Sevenmile Creek. The stream has been heavily impacted by riparian clearing, intensive grazing, flow, diversion, and channelization. An initial phase was completed in 2018 that improved fish passage and removed a diversion. This project will address the final 0.6 miles of restoration to complete 2.2 miles of restoration in Sevenmile Creek by constructing a permanent fish passage structure, reconstructing 2,800 feet of channel to its historical elevation, and constructing an inset floodplain along the lower 200 feet of incised channel. The goal is to enhance wild fish habitat by reducing fine sediment inputs, improving habitat complexity, and improve function of the riparian corridor and floodplain. **ONGOING; $50,000, PRICKLY PEAR LAND TRUST.**

West Fork Bitterroot Wilson Ditch fish screen (023-2019)

Wilson Ditch is located on the upper West Fork Bitterroot River (Ravalli County), above Painted Rocks Reservoir. The West Fork Bitterroot supports populations of bull trout, westslope cutthroat trout, and brook trout. The Wilson Ditch was silted in after fires in the upper watershed, but water users decided to reactivate the ditch, which is located in an important area for bull trout spawning. This project screened the Wilson Ditch, the highest diversion on the West Fork Bitterroot, and updated the diversion (Figure 17). The screen can accommodate 1.7 cfs, approximately 15% of baseflow. A

Corrugated Water Screen was used, which is a relatively new fish screen type in Montana that is known for having a relatively low cost and maintenance requirement. This project prevents native trout entrainment in the ditch, which is top priority for bull trout conservation in the Bitterroot. The irrigator assumed primary maintenance responsibilities, but Trout Unlimited and the U.S. Forest Service will contribute. **COMPLETED; $30,630, TROUT UNLIMITED.**

FIGURE 17. WILSON DITCH BEFORE (L) AND AFTER (CENTER) AFTER DIVERSION UPGRADE. PHOTOS COURTESY OF TROUT UNLIMITED. A CORRUGATED WATER FISH SCREEN WAS INSTALLED IN THE DITCH (R).

2020 APPROVED PROJECTS

Boles Creek fish screening and passage (001-2020)

Boles Creek (Missoula County) is a tributary to Placid Lake near Seeley Lake that supports adfluvial and fluvial bull trout populations, with genetically pure westslope cutthroat trout populations in the headwaters. The stream is designated critical bull trout habitat. This project upgraded an existing irrigation diversion near stream mile 1.5 to eliminate entrainment of native trout and improve migration corridors and channel integrity. Recent sampling indicated that bull trout were entrained in existing ditches. The applicant replaced the existing wooden dam used to divert water with a rock cross-vane set at elevation to allow fish passage, stream channel function, and bedload movement (Figure 18). A fish screen was installed to keep fish out of both ditches of the existing diversion. **COMPLETED; $25,625, BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.**

APPROVED AND COMPLETED PROJECTS

FIGURE 18. BOLES CREEK DIVERSION BEFORE CONSTRUCTION (L) AND AFTER CONSTRUCTION (R), USING A ROCK CROSS-VANE TO DIVERT WATER AND MAINTAIN FISH PASSAGE. BEFORE PHOTO COURTESY OF BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.

Cottonwood Creek fish barrier (002-2020)

Cottonwood creek (Beaverhead County) is a tributary to Blacktail Deer Creek in the Beaverhead River drainage near Dillon. It contains pure westslope cutthroat trout (WCT) 0.6 miles above a natural barrier in Cottonwood Creek. This population is one of five remaining genetically unaltered populations of WCT in the Beaverhead drainage. This project will install a fish barrier lower in Cottonwood creek, adding 4.5 miles of habitat for WCT. The goal is to secure additional habitat for native WCT and expand the population from approximately 600 fish to 2,500. **ONGOING; $7,500, TROUT UNLIMITED.**

Doolittle Creek fish barrier (003-2020)

Doolittle Creek (Beaverhead County) is a tributary to the Big Hole River, located 9 miles northeast of Wisdom. It is home to a native, 100% pure population of westslope cutthroat trout (WCT) in the upper reaches of the stream, South Fork of Doolittle Creek. Brook trout are currently present in the Doolittle Creek and have eliminated the native WCT in the rest of the drainage. This project will install a barrier on the mainstem of Doolittle Creek, remove the non-native brook trout upstream, and expand the population of WCT from 1 mile of habitat to 11 miles. The goal of this project is to contribute to the overall goal of restoring 400 miles of stream for WCT in the Big Hole and conserve WCT before they are displaced by brook trout. **ONGOING; $10,000, FWP.**

Eagle Creek YCT connectivity (004-2020)

Eagle Creek (Park County) is a tributary to the Yellowstone River near Gardiner. An in-channel pond and five road culverts excluded nonnative species and also fragmented Yellowstone cutthroat trout (YCT) along its 6.6 stream miles. The applicant replaced two upstream perched culverts with larger, sunken culverts that can pass aquatic species, increasing secure YCT habitat by an additional 2.8 stream miles (Figure 19). A lower barrier was maintained, with the goal of securing additional habitat for YCT while protecting them from non-native species. **COMPLETED; $43,780, U.S. FOREST SERVICE.**

FIGURE 19. EAGLE CREEK UNDERSIZED CULVERT BEFORE CONSTRUCTION (L) AND LARGER ARCH CULVERT (R) AFTER CONSTRUCTION. BEFORE PHOTO COURTESY OF THE U.S. FOREST SERVICE.

Lee and West Fork Lolo creeks fish passage improvement and decommissioning (005-2020)

Lee and West Fork Lolo creeks (Missoula County) are located within the West Fork Lolo Creek drainage of Lolo Creek. Lolo Creek is a tributary to the Bitterroot River located near Lolo. This project is a continuation of other work done in the Lolo Creek watershed, addressing forest lands that were formerly under Plum Creek Timber Co. ownership that have a large network of roads and failing culverts. Westslope cutthroat trout, brown trout, and brook trout are present in the project area. Low densities of bull trout may be present in the drainage. The project decommissioned roads and removed passage barriers (Figure 20). Twenty-five culverts, including five that are partial fish passage barriers, were removed in 2020. The goal was to remove sediment inputs, improve natural stream function, and improve fish passage. **COMPLETED; $30,500, CLARK FORK COALITION.**

FIGURE 20. WEST FORK OF LOLO CREEK AND LEE CREEK BEFORE RESTORATION (L) AND AFTER (R) ROADS WERE DECOMMISSIONED. BEFORE PHOTO COURTESY OF CLARK FORK COALITION.

Nevada Creek phase 4 stream restoration (008-2020)

Nevada Creek (Powell County) is a tributary to the middle Blackfoot River and supports populations of westslope cutthroat trout, rainbow trout, and brown trout. The project area was historically straightened, and a non-functional riparian area caused the channel to erode and downcut. In recent years, nearby channel restoration projects reduced sediment, increased stream complexity, improved riparian condition, and created fish habitat that resulted in increased trout abundance. This project is considered phase 4 even though the restoration was completed upstream of the reservoir. Approximately 7,100 feet of Nevada Creek channel was restored to proper dimensions (Figure 21). Habitat was improved by increasing overhead and in-stream cover, sediment inputs were reduced, floodplain connectivity was improved, vegetation growth was encouraged, and a grazing management system will be implemented. Western pearlshell mussels were also found in the project area. **COMPLETED; $66,000 (EXPENDED $72,600 WITH 10% OVERAGE), BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.**

APPROVED AND COMPLETED PROJECTS

FIGURE 21. NEVADA CREEK PHASE 4 BEFORE (L) AND AFTER RESTORATION (R). BEFORE PHOTO COURTESY OF BIG BLACKFOOT CHAPTER TROUT UNLIMITED.

O'Neill Creek culvert replacement (009-2020)

O'Neill Creek (Powell County) is a tributary to the Clark Fork River downstream of Deer Lodge that supports a population of genetically pure westslope cutthroat trout. The project is located on the Spotted Dog Wildlife Management area, where an undersized culvert has been a partial or complete fish barrier and creates stream impairments. The applicant will replace the culvert with a bridge using cast-in-place concrete abutments and recycled bridge stringers. The purpose is to improve fish passage long term and allow genetically pure westslope cutthroat trout and fluvial cutthroat trout from the Clark Fork River to access habitat above the crossing. **ONGOING; $15,250, MONTANA NATURAL RESOURCE DAMAGE PROGRAM.**

Reser Reservoir dam reconstruction and fish habitat improvement (010-2020)

Reser Reservoir (Blaine County) is a 25-surface acre reservoir located on Bureau of Land Management (BLM) lands. It has been a public fishery since 1982 and the primary fish species include rainbow trout, bluegill, black crappie, yellow perch, channel catfish, and largemouth bass. In 2018, the dam failed due to excessive runoff, and has been drawn down approximately 20 feet. The BLM intends to repair the dam and the applicant will use the opportunity to enhance habitat prior to filling. Using equipment that will be onsite during dam reconstruction, the applicant will create several large spawning beds at various locations to improve spawning and rearing habitat for largemouth bass, black crappie, and bluegill. Deep structures will be installed for larger adult fish. The goal is to enhance natural reproduction and habitat at Reser Reservoir, which is expected to translate to improved wild fish and forage production. **ONGOING; $40,000, FWP.**

APPROVED AND COMPLETED PROJECTS

Wall Creek fish barrier supplement (011-2020)

Wall Creek (Madison County) is a tributary to the Madison River and supports populations of 95% pure westslope cutthroat trout. Currently, rainbow trout are allowed access to Wall Creek and can hybridize with westslope cutthroat trout. To prevent further dilution of genetic purity and risk losing westslope cutthroat trout conservation status, the applicant will install a fish barrier that will isolate the conservation population. The barrier will protect nearly 8 miles of headwater streams and contribute to the restoration goal for westslope cutthroat trout east of the Continental Divide. **ONGOING; $20,000, FWP.**

Wheelbarrow Creek Threemile fish passage (012-2020)

Wheelbarrow Creek (Ravalli County) is located near the Threemile Wildlife Management Area, nine miles east of Florence. It supports westslope cutthroat trout (likely pure strain). This project will remove an undersized culvert and replace it with a bridge, restoring fish passage and natural stream function. Grade controls or a hardened riffle will be constructed to accommodate the change in grade. The existing culvert is likely a fish passage barrier at most flows. The goal of the project is to restore a natural stream channel, reduce erosion, and facilitate fish passage. **ONGOING; $18,920, BITTER ROOT WATER FORUM.**

Big Hole Divide fish barriers (013-2020).

Browns Creek, Buffalo Creek, and Painter Creek (Beaverhead County) are streams in the Beaverhead and Red Rock River sub-basins. The project sites are located west and southwest of Dillon. The streams currently contain conservation populations of westslope cutthroat trout (WCT) that are considered at-risk and need to be secured. This project is intended to meet the highest priority WCT conservation need. Collectively, these barriers will secure 17.6 miles of stream containing >90% pure WCT. These populations are currently threatened by hybridization and competition with non-native fish; there are currently no barriers or protections to isolate these species, which are some of the last pure isolated WCT in the Upper Missouri Basin. This project will install six-foot wooden drop structures on Browns and Buffalo creeks. A hardened splashpad will be installed at Painter Creek to secure the barrier site. **ONGOING; $10,420, TROUT UNLIMITED.**

Flint Creek riparian restoration (014-2020)

Flint Creek (Granite County) is a tributary to the Clark Fork River near Hall. Species present include brown trout, bull trout, westslope cutthroat trout, rainbow trout, and mountain whitefish. The project

area is a high priority migration corridor for westslope cutthroat trout and bull trout. This project will address one mile of stream that has been impaired by past land use practices. The applicant intends to implement grazing management recommendations that will incorporate fencing for rotational grazing, stock watering, and riparian/wetland buffers. Some streambanks will be passively restored and revegetated using containerized native, woody plants, exclusion fencing, and seeding. Other streambanks will be restored with active streambank restoration. The goals are to repair the damaged caused by cattle grazing and to improve fish habitat through shade and overhead cover, pool depth, complexity, and reduction of sediment. **ONGOING; $29,100, TROUT UNLIMITED.**

Hall Creek fish barrier removal (015-2020)

Hall Creek (Lake County) is a tributary to Swan Lake near the town of Swan Lake. In 1989, a fish barrier was constructed to conserve westslope cutthroat trout and isolate a 2.3-mile reach from brook and rainbow trout invasion. Rotenone was used to remove fish from the stream and cutthroat trout were restocked. The project was unsuccessful and over time the conservation value has continued to decrease. The applicant will remove the nonfunctional barrier and reconnect aquatic passage between Hall Creek and Swan Lake. The concrete barrier will be removed, the streambanks will be restored, and rock will be placed for grade control. The goal is to remove an old, nonfunctional barrier and support natural stream function and aquatic movement throughout the stream. **ONGOING; $8,500, U.S. FOREST SERVICE.**

Lake Elmo fish habitat enhancement (016-2020)

Lake Elmo (Yellowstone County) is part of Lake Elmo State Park in Billings. In 2019, Asian clams were found at Lake Elmo, leading to a decision for a partial and complete draw-down in 2020 and 2021. During draw-down, the applicant will create complex fish habitat using rock, gravel, and artificial reefs (Christmas trees or other large woody debris) to encourage self-sustaining populations of channel catfish, crappie, bluegill, yellow perch, and bass. Habitat structures will be based on successful installations in other warmwater lakes. The goal is to enhance wild fish populations and angler opportunities at Lake Elmo State Park while capitalizing on a unique opportunity to add habitat during a draw-down. The lake has very high angler use. **ONGOING; $40,000, FWP.**

Little Gold Creek fish passage (017-2020)

Little Gold Creek (Granite County) is a tributary to Boulder Creek (and Flint Creek) northeast of Phillipsburg. It supports populations of westslope cutthroat trout and bull trout. In the project area, an undersized culvert is blocking fish passage at a forest road. The Boulder Creek drainage is the only

location within the Flint Creek drainage with viable populations of both bull trout and westslope cutthroat trout. By opening fish passage on Little Gold Creek, two miles of stream will be reconnected to Boulder Creek and then, Flint Creek. The applicant will replace the undersized culvert with an Aquatic Organism Passage (AOP) culvert that installs a natural stream channel within the culvert and can pass a 100-year flow event of 123 cubic feet per second. The goal is to reconnect Little Gold Creek, improve habitat quantity and connectivity, and maintain additional coldwater refugia. **ONGOING; $29,475, CLARK FORK COALITION.**

Long Creek aquatic habitat enhancement (018-2020)

Long Creek (Beaverhead County) is a tributary to the Red Rock River near Lima Reservoir. It is the only tributary below upper Red Rock Lake with a viable population of Arctic grayling. The population is small and geographically distanced from other populations. Past land use practices led to degraded aquatic habitat in Long Creek, including loss of beaver, altered flows, and decreased riparian vegetation. Arctic grayling are confined to a short reach upstream where there is higher quality habitat. Past restoration on Long Creek has included willow planting, barrier removal, irrigation infrastructure improvements, instream flow leases, and floodplain reconnection. More work is needed; therefore, the applicant will move part of the degraded stream channel into a historic channel with a stronger riparian vegetation community, which should have more immediate positive impacts to Arctic grayling conservation. The property is protected by a U.S. Fish and Wildlife Service conservation easement. **ONGOING; $54,700, FWP.**

Lower French Creek riparian restoration (019-2020)

French Creek (Deer Lodge County) is a tributary to Deep Creek west of Wise River. French Creek has been the focus of many past restoration efforts for Arctic grayling and westslope cutthroat, as well as other native species like western pearlshell mussel. This project will take place on the Mount Haggin Wildlife Management Area and U.S. Forest Service property and would restore over 3,600 feet of streambank that has been degraded due to nonnative vegetation and overgrazing. The project will grade and re-slope the perched streambanks, and mature willows would be transplanted to create streambank stabilization. Additionally, old beaver dam side channels will be activated to accommodate high flows and to provide greater flooding and connection with the floodplain. The goal is to enhance riparian function and improve instream habitat for Arctic grayling and westslope cutthroat trout in French Creek. The applicant will restore high priority degraded stream banks and side channel reactivation before moving to the moderate and low priority eroded banks. **ONGOING; $10,000, FWP.**

APPROVED AND COMPLETED PROJECTS

Madison River Storey Ditch riparian restoration (020-2020)

The Storey Ditch restoration project (Madison County) is located on the east bank of the Madison River upstream of the Storey Ditch boat launch, approximately 16 miles south of Ennis. The Madison River supports populations of rainbow trout, brown trout, cutthroat trout, and mountain whitefish. The project site (1,105 feet of stream) contains little to no woody vegetation due to the altered flow regime of Hebgen dam, which disconnected the stream and riparian areas, and wildlife browsing. The applicant will reshape the bank and lower the bankfull height, which is expected to reconnect the vegetation community, add live willows and brush to the banks and dissipate stream energy and provide additional habitat, and incorporate containerized plants that will be protected with browse protectors. Wildlife fence will be installed until vegetation is mature enough to be browse resistant. The goals of the project are to increase the riparian corridor and woody vegetation cover, create floodplains that support natural vegetation recruitment, increase habitat complexity for fish, support the food web, and encourage long term ecosystem resilience. **ONGOING; $15,548.62, MADISON RIVER FOUNDATION.**

Poorman Creek restoration phase 2 (021-2020)

Poorman Creek (Lewis & Clark County) is a tributary to the Blackfoot River and supports populations of bull trout, pure westslope cutthroat trout, and brown trout. The stream is listed as critical bull trout habitat. Poorman Creek has been the focus of several previous restoration projects funded through FFIP, including fish passage, fish screening, stream restoration, and water conservation. This project addresses Poorman Creek near its confluence with the Blackfoot River. The applicant will address impairments caused by land use disturbances, which include entrenchment, lack of instream and riparian habitat, channel aggradation, and bank erosion. An estimated 409 tons of sediment is contributed to Poorman Creek per year from streambank erosion. Approximately 8,400 feet of channel will be restored with channel reconstruction or shaping, the creation of step pools, and the use of vegetated wood matrix and woody debris structures. A grazing management plan will be incorporated, and a water lease will protect instream flow within the project reach. The overall goal of this project is to restore a high-priority native trout tributary through channel stability, riparian health, and improved aquatic habitat, which should improve the overall recruitment to the Blackfoot River. The objectives include reestablishing floodplain connectivity and function, improve existing trout habitat, correct chronic bank erosion, and restore a self-maintaining natural stream system. **ONGOING; $58,000, FWP.**

Implementation Monitoring (Project Completion)

The FFIPC or an FWP representative monitored 40 sites to ensure they were completed as funded (Table 8, Figure 22), called Implementation Monitoring. The projects were completed between November 1, 2018 and October 31, 2020 were located within all Regions except Region 5. Implementation monitoring by the FFIPC or FWP staff facilitated discussions about technique successes and failures with applicants and landowners. Some of these projects are discussed above in *Approved and Completed Projects* (denoted by asterisks in Table 8). Remaining projects are described below.

TABLE 8. PROJECTS MONITORED FOR IMPLEMENTATION (PROJECT COMPLETION) SINCE THE LAST BIENNIUM (NOV 1, 2018 - OCT 31, 2020). * = PROJECT DESCRIPTION IN 'APPROVED AND COMPLETED PROJECTS SECTION' ABOVE.

FFIP #	Region	Project Name	Waterbody	Completed
001-2020*	2	Boles Creek fish screening and passage	Boles Creek	2020
018-2018	2	Brewster Creek fish passage	Brewster Creek	2019
019-2018	2	Cedar Creek large woody debris	Cedar Creek	2019
021-2018	2	Copper Creek decommissioning	Copper Creek	2019
022-2018	2	Cottonwood/NF Cottonwood passage & decommissioning	Cottonwood Creek and North Fork Cottonwood Creek	2019
003-2019*	1	Crow Creek phase 2 restoration	Crow Creek	2020
022-2017	3	Dry Creek channel restoration	Dry Creek	2019
003-2018	3	Dry Creek fish passage	Dry Creek	2019
004-2020*	3	Eagle Creek YCT connectivity	Eagle Creek	2023
014-2019*	3	French Creek Channel Reconstruction	French Creek	2019
003-2014	3	French Creek fish barrier	French Creek	2019
004-2017	6	Fresno Reservoir habitat enhancement	Fresno Reservoir	2020
006-2018	2	Green Canyon Creek fish passage	Green Canyon Creek	2019
015-2019*	7	Haughian Bass Reservoir spillway repair	Haughian Bass Reservoir	2019
005-2020*	2	Lee and West Fork Lolo Creeks fish passage improvement and decommissioning	Lee and West Fork Lolo Creeks	2020
007-2018	2	Lincoln Spring Creek restoration	Lincoln Spring Creek	2019
009-2016	2	Little Blackfoot and Ontario Creek road relocation / floodplain restoration	Ontario Creek	2019
025-2018	1	Loneman Creek riparian fencing	Loneman Creek	2019
009-2017	2	Mill Creek fish ladder	Mill Creek	2019
017-2019*	2	Miller Creek restoration & sediment reduction	Miller Creek	2019

IMPLEMENTATION MONITORING

FFIP #	Region	Project Name	Waterbody	Completed
018-2019*	2	Morrell Creek decommissioning & revegetation	Morrell Creek	2020
010-2018	2	Nevada Creek fish screening	Nevada Creek	2019
007-2019*	2	Nevada Creek phase 3A reconstruction	Nevada Creek	2019
020-2019*	2	Nevada Creek phase 3B restoration	Nevada Creek	2019
008-2020*	2	Nevada Creek phase 4 stream restoration	Nevada Creek	2020
013-2017	2	North Fork Cottonwood Creek fish passage	North Fork Dry Cottonwood Creek	2020
011-2016	2	North Fork Dry Cottonwood Creek culvert replacement	North Fork Dry Cottonwood Creek	2020
011-2018	2	North Fork Dry Cottonwood Creek habitat enhancement	North Fork Dry Cottonwood Creek	2020
012-2018	2	North Fork Keep Cool Creek fish passage	North Fork Keep Cool Creek	2020
014-2018	2	Poorman Creek mining restoration	Poorman Creek	2019
029-2018	3	Ramshorn Creek fish barrier	Ramshorn Creek	2019
008-2019*	2	Rattlesnake Creek dam removal	Rattlesnake Creek	2020
035-2015*	3	Reese Creek instream flow enhancement	Reese Creek	2020
021-2019*	3	Reese Creek Instream Flow Supplement	Reese Creek	2020
009-2019*	2	Ross Fork Rock Creek fish passage	Ross Fork Rock Creek	2019
015-2017	2	Sauerkraut Creek instream flow lease	Sauerkraut Creek	2020
010-2019*	3	Selway Creek fish barrier	Selway Creek	2020
029-2017	3	Turkey Creek fish passage	Turkey Creek	2019
023-2019*	2	West Fork Bitterroot Wilson Ditch fish screen	West Fork Bitterroot River	2020
018-2017	4	Williams Creek riparian fencing	Williams Creek	2018

IMPLEMENTATION MONITORING

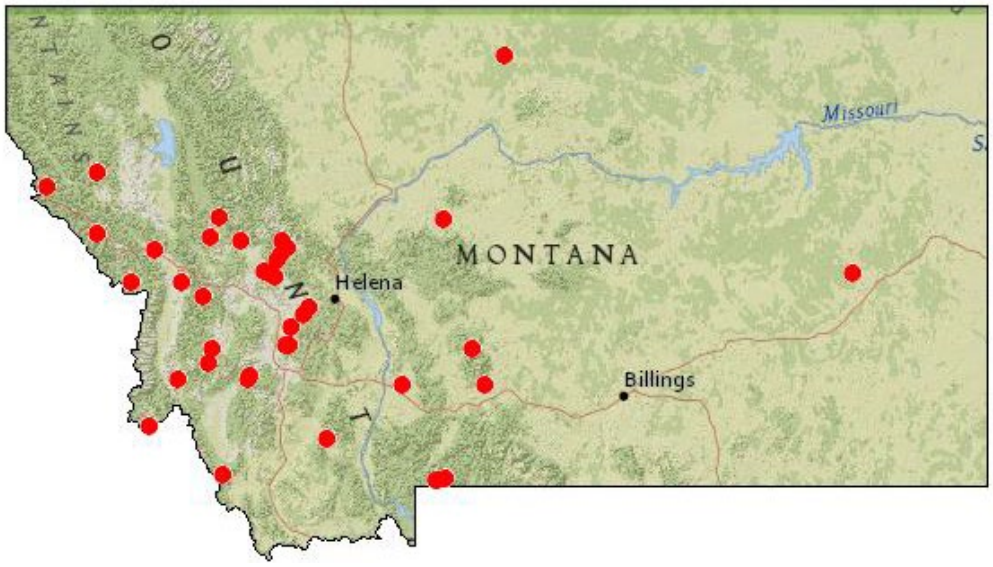

FIGURE 22. PROJECTS COMPLETED BETWEEN 11/1/2018 AND 10/31/2020, REPRESENTED AS RED DOTS.

Brewster Creek fish passage (018-2018)

Brewster Creek (Granite County) is a tributary to Rock Creek and supports populations of westslope cutthroat trout and bull trout. Brewster Creek is a spawning tributary for lower Rock Creek and contains resident and migratory westslope cutthroat trout, bull trout (low levels), and other trout and non-game fish. This project removed a culvert that was the only major fish passage on lower Brewster Creek and was located 400 feet upstream of the confluence with Rock Creek. A farm bridge was installed so Brewster Creek could be reconnected to Rock Creek (Figure 23). The goal was to reconnect habitat for bull trout, westslope cutthroat trout, and other aquatic species.

FIGURE 23. BREWSTER CREEK BEFORE (L) AND AFTER (R) RESTORATION. AN UNDERSIZED CULVERT WAS REPLACED WITH A FARM BRIDGE. PHOTOS COURTESY OF TROUT UNLIMITED.

Cedar Creek large woody debris (019-2018)

Cedar Creek (Mineral County) is a tributary to the middle Clark Fork River and supports populations of westslope cutthroat trout, bull trout, and mountain whitefish. It is listed as a priority bull trout watershed and core bull trout habitat. Within the project area, Cedar Creek was impacted by placer mining, leaving much of the riparian corridor disturbed. Railroad and road systems also contributed to confinement of the stream channel. This proposal was phase three of a larger project and relocated the road, created a floodplain, and installed large wood structures in one mile of stream to encourage instream habitat development (Figure 23). The goal was to improve overwintering, spawning, and rearing habitat for bull trout, westslope cutthroat trout, and other aquatic species through reduced erosion, cooler water temperatures, and increased habitat.

When visiting the site, it was noted that the floodplain and wood are in good condition with fish visible in the project reach. Beaver have recolonized the area due to similar work completed in previous restoration phases.

FIGURE 24. CEDAR CREEK BEFORE RESTORATION (L), WITH RIP RAP ALONG THE CREEK. AFTER (R) RESTORATION, WITH THE ROAD RELOCATED AND INSREAM FISH HABITAT ADDED. BEFORE PHOTO BY TROUT UNLIMITED.

Copper Creek decommissioning (021-2018)

Copper Creek (Lewis & Clark County) is a third-order tributary to the Landers Fork, which feeds the upper Blackfoot River and flows 14 miles entirely through United States Forest Service land. It contains populations of bull trout and pure westslope cutthroat trout and is listed as critical bull trout habitat. Telemetry studies have traced bull trout originating from Copper Creek as far as 100 miles downstream. In the project area, the stream recently accessed old channels and part of the road

eroded into the stream. Sediment was identified as a limiting factor for bull trout habitat and therefore this project, which involved eliminating a chronic source of sediment to Copper Creek, was a priority for restoration. This project decommissioned approximately one mile of road adjacent to Copper Creek (Figure 25). The goal was to re-establish floodplain connectivity and function, restore the riparian corridor, and eliminate a chronic source of sediment while maintaining public access. At inspection, the road was functioning well and kept the floodplain intact.

FIGURE 25. COPPER CREEK BEFORE RESTORATION (L), WITH THE STREAM ERODING THE ROAD. THE ROAD WAS MOVED TO THE SIDESLOPE AND OUT OF THE FLOODPLAIN (R). RED ARROWS DENOTE COMMON FEATURES. BEFORE PHOTO COURTESY OF BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.

Cottonwood/NF Cottonwood passage & decommissioning (022-2018)

North Fork Cottonwood Creek is a tributary to Cottonwood Creek (Powell County), which flows into the middle Blackfoot River. It supports populations of bull trout and westslope cutthroat trout. Cottonwood Creek is a high priority tributary and is listed as critical bull trout habitat and a bull trout core area stream. At the North Fork Cottonwood Creek crossing there was an undersized culvert that inhibited fish passage. This project decommissioned a road to reestablish the historic floodplain and replaced the undersized culvert with a bottomless arch structure that can accommodate flood capacity, fish passage, and bedload transport. The goal was to improve fish passage, reestablish floodplain connectivity and function, restore the riparian corridor, eliminate a chronic source of sediment, and retain public access. Future Fisheries funding has helped complete several other projects in the drainage.

FIGURE 26. COTTONWOOD CREEK AND NORTH FORK COTTONWOOD CREEK. BEFORE RESTORATION, AN UNDERSIZED CULVERT IMPEDED FISH PASSAGE (L). THE ROAD WAS DECOMMISSIONED AND REROUTED (CENTER), AND A NEW CULVERT WAS INSTALLED (R). PHOTOS COURTESY OF BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.

Dry Creek channel restoration (022-2017)

Dry Creek is a tributary to the East Gallatin River. It supports populations of brown trout, mountain whitefish, and rainbow trout. The Dry Creek drainage has experienced channelization, sedimentation, irrigation withdrawals, and fish passage problems. As part of a watershed effort, projects to improve water quality, habitat, and stream function have been initiated. This project improved stream habitat in the lower section of Dry Creek, downstream of the fish passage project. Spawning, rearing, and resident trout habitat are expected to improve by re-naturalizing the channelized section downstream of the diversion upgrade. This included the establishment of more pools and improved riparian habitat. Willow, aspen, and chokecherry were planted to establish cover along the stream corridor. Large woody debris were placed in the channel to form scour pools and provide overhead cover (Figure 27). The goal was to increase spawning, rearing, and resting habitat.

Upon completion it was noted that wood structures added habitat complexity in certain areas, but the channel had not yet adjusted. There was still considerable grass and entrenchment, and it will be important to watch plantings for establishment and competition with the grasses.

FIGURE 27. DRY CREEK BEFORE RESTORATION (L) WITH LITTLE STRUCTURE AND FLOODPLAIN ACCESS. AFTER RESTORATION (R), HABITAT STRUCTURE AND PLANTINGS WERE IN PLACE TO ADD DIVERSITY TO THE HABITAT. BEFORE PHOTO COURTESY OF TROUT UNLIMITED.

Dry Creek fish passage (003-2018)

Dry Creek is a tributary to the East Gallatin River and supports populations of brown trout, mountain whitefish, and rainbow trout (Gallatin County). Dry Creek was seasonally disconnected from the East Gallatin for decades, as the stream captured by a large canal during irrigation season. Upstream fish migrations were blocked by the canal and downstream migrations were intercepted by the canal. This project installed a fish bypass that directed Dry Creek under the canal crossing (Figure 28). The goal was to reconnect the lower reaches of Dry Creek with the upper reaches and expand habitat access to a tributary stream that may be important spawning and rearing habitat and summer refugia.

FIGURE 28. DRY CREEK FISH PASSAGE BEFORE RESTORATION (L), WHERE THE CREEK WAS INTERCEPTED BY THE DITCH. THE PROJECT INSTALLED NEW IRRIGATION INFRASTRUCTURE (MIDDLE) AND BUILT A CULVERT TO ROUTE THE STREAM UNDERNEATH THE DITCH (R). BEFORE PHOTO COURTESY OF TROUT UNLIMITED.

French Creek fish barrier (003-2014)

French Creek (Deer Lodge County) is a tributary to Deep Creek, and ultimately the Big Hole River, that drains a portion of the Mount Haggin Wildlife Management area owned by Montana Fish, Wildlife and Parks. The stream supported non-native brook trout and rainbow trout, as well as native mountain whitefish, longnose dace and mottled sculpin. This project installed a permanent fish migration barrier located near the mouth of the stream, which is a concrete dam structure with a 140-foot long earthen berm installed across the floodplain (Figure 29). The project will involve removal all of the non-native fish using a piscicide, followed by the reintroduction of westslope cutthroat trout and arctic grayling.

FIGURE 29. FRENCH CREEK BARRIER IN CONSTRUCTION (L) AND AFTER COMPLETION (R). THE NEXT PHASE OF THIS PROJECT WILL BE TO REMOVE NON-NATIVE FISH AND REINTRODUCE ARCTIC GRAYLING AND WESTSLOPE CUTTHROAT TROUT.

Fresno Reservoir habitat enhancement (004-2017)

Fresno Reservoir (Hill County) was the second most fished waterbody in FWP Region 6 in 2015 and contains sportfish populations of yellow perch, walleye, northern pike, and black crappie. Fish abundance and condition were limited by prey availability and habitat. This project installed Christmas tree habitat structures at critical points in the reservoir (Figure 30), which should improve spawning and rearing habitat for yellow perch, thereby improving sportfishing opportunities for perch and their predators. After completion, yellow perch reproduction was observed.

FIGURE 30. FRESNO RESERVOIR HABITAT STRUCTURES PLACED ON THE ICE (L) SO THEY WILL SINK AT ICE OFF. YELLOW PERCH REPRODUCTION A YEAR AFTER INSTALLATION (R; RED ARROW DENOTES EGG SKEINS).

Green Canyon Creek fish passage (006-2018)

Green Canyon Creek, a tributary to Copper Creek in the Rock Creek watershed near Phillipsburg (Granite County), supports populations of bull trout, westslope cutthroat trout, and mountain whitefish. This project replaced an undersized culvert at a road crossing that was perched and a partial fish barrier, which was at risk of failure from post-fire debris loading (Myers Fire). Environmental DNA (eDNA) sampling found bull trout below this undersized culvert but not above, indicating that the project could open additional habitat to bull trout. Approximately three miles of Green Canyon Creek were reconnected with this project. The undersized culvert was replaced with an 84” pipe and rock grade control structures and natural bed material to provide year-round passage while also preventing potential catastrophic impacts of a road washout associated with post-fire debris (Figure 31).

FIGURE 31. AN UNDERSIZED CULVERT IMPAIRED FISH PASSAGE ON GREEN CANYON CREEK (L) AND WAS REPLACED WITH A LARGER CULVERT (R). BEFORE PHOTO BY TROUT UNLIMITED.

Lincoln Spring Creek restoration (007-2018)

Lincoln Spring Creek is a tributary to Keep Cool Creek in the Blackfoot River drainage that supports westslope cutthroat trout, brown trout, and brook trout (Lewis & Clark County). This project is located one mile west of Lincoln and built upon a stream restoration project implemented in 2008 where 9,000 feet of channel were restored. In the project location, past land use activities degraded the channel and encouraged fine sediment deposition that has been detrimental to macroinvertebrate production and salmonid spawning. Cover and woody riparian habitat were also sparse. This project restored 4,400 feet of Lincoln Spring Creek and 0.47 acres of emergent wetlands by restoring proper pattern, profile, and dimensions of the stream, improving sediment transport ability, installing root mimicry structures to provide refugia, cover, and stability, and narrow the stream channel with finger bars. The goal was to restore the instream, riparian, and wetland functions of Lincoln Spring Creek to improve rearing, spawning, and overall habitat for native and non-native trout.

FIGURE 32. LINCOLN SPRING CREEK BEFORE RESTORATION WAS CHANNELIZED, WIDE AND UNABLE TO PROPERLY TRANSPORT SEDIMENT (L). THE PROJECT RESTORED THE STREAM CHANNEL TO A NATURAL WIDTH (R), IMPROVED STREAM COMPLEXITY, AND CREATED ADDITIONAL FLOODPLAIN ACCESS. BEFORE PHOTO BY BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.

Little Blackfoot and Ontario creeks road relocation and floodplain restoration (009-2016)

Ontario Creek (Powell County) is a tributary to the Little Blackfoot River south of Elliston. The Little Blackfoot River is a tributary to the Clark Fork River. Within the project area, near the confluence of Ontario Creek and the Little Blackfoot River, the primary target species include westslope cutthroat trout and bull trout. Other species present include brook trout, brown trout, and slimy sculpin. An inadequate ford and road that included three inadequate crossing structures contributed fine

sediment, impaired floodplain function, and affected connectivity and natural channel function. Fish habitat was degraded through sedimentation and vehicles crossing the stream. This project eliminated the ford on Forest Service Road (FSR) 4100, re-routed it over a bridge, created a section of road that would connect it to Ontario Creek Road outside of the floodplain, and remove the old segment of road that impacted the channels and floodplains (Figure 33). The stream channel and floodplain areas were restored. The overall goal of the project was to reduce sediment delivery and restore floodplain function.

FIGURE 33. ONTARIO CREEK WAS AFFECTED BY MANY ROADS WITHIN THE FLOODPLAIN (L). THIS PROJECT DECOMMISSIONED THE UNAUTHORIZED ROADS AND MOVED THE MAIN ROAD OUT OF THE FLOODPLAINS. PHOTOS COURTESY OF THE U.S. FOREST SERVICE.

Loneman Creek riparian fencing (025-2018)

Loneman Creek (Sanders County) is a tributary to the Little Thompson River and contains westslope cutthroat trout. The Little Thompson River was impacted by sediment, nutrients, and water temperature. The project area was negatively impacted by cattle, which had unrestricted access to the creek. This project installed exclusion fencing to allow the stream to recover and improve habitat, shade, and reduce temperatures, nutrients, and sediment (Figure 34). The goal was to encourage recovery of the stream and riparian areas, improve water quality, and enhance aquatic habitat.

FIGURE 34. LONEMAN CREEK BEFORE (L) AND AFTER (R) RIPARIAN FENCING WAS INSTALLED. PHOTOS COURTESY OF THE LOWER CLARK FORK WATERSHED GROUP.

Mill Creek fish ladder (009-2017)

Mill Creek (Missoula County) is a tributary to the Clark Fork and supports populations of rainbow trout, rainbow x cutthroat trout hybrids, brown trout, and mountain whitefish. In 2005, a fish ladder was installed to allow fish passage on the recruitment-limited and heavily fished stream. The ladder functioned for a decade but needed replacement. This project replaced the fish ladder with a larger, more operational unit to provide year-round fish passage on Mill Creek (Figure 35).

FIGURE 35. MILL CREEK FISH LADDER BEFORE (L) AND AFTER IT WAS REPLACED FOR FUNCTIONALITY (R). AFTER PHOTO COURTESY OF TROUT UNLIMITED.

Nevada Creek fish screening (010-2018)

Nevada Creek is a tributary to the Blackfoot River and supports populations of westslope cutthroat trout, rainbow trout, brown trout, and other non-game species (Powell County). Many projects have been completed in the Nevada Creek drainage and this project continued the momentum to improve populations of native species. In the project area, the diversion was previously a debris dam with logs, tarps, sandbags, and other materials that created a fish barrier during most flows. The diversion created a backwater effect that altered Nevada Creek. This project eliminated entrainment of trout with the fish screen installation, installed a headgate and sluice gate, provided bed and bank stability, and restored fish passage (Figure 36). A grade control weir was installed to allow diversion of water. The goal was to eliminate entrainment of trout down an irrigation diversion while providing fish passage and bed and bank stability within the stream channel.

FIGURE 36. NEVADA CREEK DIVERSION BEFORE (TOP L) CONSTRUCTION. THE IRRIGATION DIVERSION WAS UPGRADED (TOP R) AND A FISH SCREEN WAS INSTALLED (BOTTOM) BEHIND THE HEADGATE. BEFORE PHOTO COURTESY OF BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.

North Fork Cottonwood Creek fish passage (013-2017)

North Fork Cottonwood Creek (Powell County) is a tributary to Cottonwood Creek in the Clark Fork River drainage and supports populations of westslope cutthroat trout and brook trout. An undersized culvert was a partial barrier to fish passage on the Beaverhead Deer Lodge National Forest. This project replaced the culvert with a larger culvert specifically designed to enhance fish passage for native trout (Figure 37). The goal was to maintain a single, connected population of cutthroat trout throughout the three forks of Cottonwood Creek and enhance the long-term viability of a large conservation population of pure westslope cutthroat trout.

FIGURE 37. NORTH FORK COTTONWOOD CREEK HAD AN UNDERSIZED CULVERT (L) THAT WAS REPLACED WITH A LARGER CULVERT (R), WHICH ENHANCED FISH PASSAGE AND STREAM FUNCTION. BEFORE PHOTO COURTESY OF CLARK FORK COALITION.

North Fork Dry Cottonwood Creek culvert replacement (011-2016)

North Fork Dry Cottonwood Creek (Deer Lodge County) is a tributary to Dry Cottonwood Creek and the Clark Fork River near Racetrack that currently supports westslope cutthroat trout (92-97% pure). This project replaced an undersized culvert with a larger, arch culvert with a bankfull-width channel inside the structure (Figure 38). The project reconnected four miles of fish habitat to the mainstem Dry Cottonwood Creek, and potentially to the upper Clark Fork River. The overall goal was to improve fish passage and habitat connectivity for westslope cutthroat trout in the upper Clark Fork River watershed.

FIGURE 38. AN UNDERSIZED CULVERT ON NORTH FORK DRY COTTONWOOD CREEK (L) WAS REPLACED WITH A LARGER ARCH CULVERT FOR FISH PASSAGE (R). BEFORE PHOTO COURTESY OF CLARK FORK COALITION.

North Fork Dry Cottonwood Creek habitat enhancement (011-2018)

North Fork Dry Cottonwood Creek is a tributary to Dry Cottonwood Creek and the Clark Fork River near Deer Lodge and supports populations of 95% pure westslope cutthroat trout (Deer Lodge County). This project addressed excessive riparian and aquatic habitat damage from summer grazing on a U.S. Forest Service allotment. Off-stream water was developed, livestock presence near the stream was reduced, and shrub growth along the channel was encouraged (Figure 39). Riparian tree felling was completed on approximately two miles of riparian area to impede livestock access to the stream banks. The goal was to enhance westslope cutthroat trout spawning and rearing habitat along three miles of stream by reducing livestock impact.

FIGURE 39. NORTH FORK DRY COTTONWOOD CREEK BEFORE THE PROJECT (L), WITH RIPARIAN DAMAGE. THE PROJECT INVOLVED TREE FELLING AND OFF STREAM WATER (RIGHT) TO DISCOURAGE CATTLE FROM USING THE STREAM. PHOTOS COURTESY OF CLARK FORK COALITION.

North Fork Keep Cool Creek fish passage (012-2018)

North Fork Keep Cool Creek is a tributary to Keep Cool Creek and the Blackfoot River and supports fluvial, genetically pure westslope cutthroat trout (Lewis & Clark County). This project addressed the stream crossing near stream mile 10.1 on U.S. Forest Service property that was undersized, a barrier at most flows, and created impairments to the stream channel. A bottomless steel plate pipe arch was installed with grade control step pools, which allows uninhibited aquatic organism passage and replicated the streambed throughout the crossing (Figure 40). The goal of this project was to improve connectivity and support migratory life histories of native species. The stream crossing promotes natural morphology, correct road drainage problems, and eliminates a source of sediment. The culvert accommodates bankfull stream width and an appropriate floodplain, including a 100-year flood event.

FIGURE 40. THIS PROJECT, ON NORTH FORK KEEP COOL CREEK, REPLACED AN UNDERSIZED CULVERT THAT WAS A BARRIER AT MOST FLOWS (L) WITH A LARGER CULVERT THAT IMPROVES FISH PASSAGE AND CONNECTIVITY (R). BEFORE PHOTO COURTESY OF BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.

Poorman Creek mining restoration (014-2018)

Poorman Creek is a tributary to the Blackfoot River and supports populations of pure westslope cutthroat trout and bull trout (Lewis & Clark County). Poorman Creek is a high priority stream and is considered critical bull trout habitat. This project took place on U.S. Forest Service property where the stream and riparian area was highly modified by past mining activities. The stream was channelized, large wood and pools were lacking, and waste rock deposits eliminated a floodplain, restricted floodplain area, and confined the channel. This project restored the disturbed reach of Poorman Creek and its floodplain. Tailings were removed, a new channel was constructed, large wood was incorporated to improve habitat quality, and an undersized stream crossing was upgraded (Figure 41).

The goal was to restore a reach of Poorman Creek impacted by mining activities, improving floodplain connectivity, instream habitat quality, riparian areas, and fish passage.

FIGURE 41. POORMAN CREEK BEFORE (L) AND AFTER (R) RESTORATION. THE ARROWS NOTE THE TREE SIMILAR TO BOTH PHOTOS. MINE TAILINGS WERE REMOVED AND THE STREAM CHANNEL AND FLOODPLAIN WERE RESTORED. PHOTOS COURTESY OF BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.

Ramshorn Creek fish barrier (029-2018)

Ramshorn Creek (Madison County) is a tributary to the Ruby River. After completion of this project, the area would eventually support populations of westslope cutthroat trout and Rocky Mountain sculpin above the barrier and brook trout, brown trout, and rainbow trout below the barrier. The fish passage barrier was installed in conjunction with an irrigation delivery structure that ensures delivery of water and reduces maintenance and avoid channel manipulation. This project is in the Ruby watershed and is an essential component in implementing native fish restoration in Ramshorn Creek and its tributaries. The goal was to conserve an important population of westslope cutthroat trout in the Ruby watershed.

FIGURE 42. THE RAMSHORN CREEK FISH BARRIER DURING CONSTRUCTION (L) AND AFTER COMPLETION (R).

Turkey Creek fish passage (029-2017)

Turkey Creek and an unnamed stream are tributaries to the Shields River that support native Yellowstone Cutthroat Trout (YCT). These streams provide habitat for YCT secure from brook trout competition, due to a temporary perched culvert barrier and a natural bedrock barrier downstream. This project replaced culverts that were fragmenting populations within the protected stream reaches with aquatic organism passage (AOP) culverts to open critical habitat (Figure 43). The goal was to conserve and protect Yellowstone Cutthroat Trout and reduce sediment loading to streams. There is a mainstem barrier that was installed downstream, so after a brook trout removal project there will be 27 miles of stream habitat for YCT.

FIGURE 43. THIS PROJECT ON TURKEY CREEK REPLACED AN UNDERSIZED CULVERT (L) WITH A LARGER CULVERT THAT PROVIDES CONNECTIVITY AND FISH PASSAGE (R). BEFORE PHOTO COURTESY OF THE U.S. FOREST SERVICE.

Williams Creek riparian fencing (018-2017)

Williams Creek (Judith Basin County) is a tributary to Big Otter Creek near Raynesford. It supports populations of brown trout, brook trout, and rainbow trout. Cattle accessed the stream and this project installed riparian fencing to control livestock access, constructed a water gap, and developed a spring for off-stream water (Figure 44). The goals were to improve fish habitat through riparian growth, reduced sedimentation, and overall stream health.

FIGURE 44. WILLIAMS CREEK AFTER RESTORATION. FENCING WAS INSTALLED TO KEEP LIVESTOCK FROM ACCESSING THE STREAM.

Effectiveness Monitoring

Effectiveness monitoring addresses the question of how successful a project is, several or many years after completion. In 2019 and 2020, project effectiveness monitoring was reduced due to Covid-19 travel restrictions. Nonetheless, 42 projects were monitored for long term success in 2019 and 2020 (Figure 45, Table 9, detailed information below).

A Yellowstone cutthroat trout intern (YCT-I) was hired in 2020 to work with Yellowstone cutthroat trout restoration biologist Carol Endicott and perform monitoring in Park, Gallatin, Judith Basin, Meagher, and Sweet Grass counties. The YCT-I, Carl Young, monitored 5 sites, listed in Table 9. In 2019 and 2020, Michelle McGree (FFIPC) collected monitoring information from FWP staff or examined projects for compliance and effectiveness at 37 sites. These projects were monitored as part of a strategy to investigate effectiveness of older projects.

TABLE 9. PROJECTS MONITORED FOR EFFECTIVENESS IN 2019-2020, BY THE YELLOWSTONE CUTTHROAT TROUT RESTORATION INTERN (YCT-I) OR TRACKED BY THE FUTURE FISHERIES IMPROVEMENT PROGRAM COORDINATOR (FFIPC). FFIP # = INDIVIDUAL PROJECT NUMBER.

FFIP #	Project Name	Monitor
011-2007	Lake Creek fish barrier	YCT-I
011-2010	Lower Deer Creek barrier	YCT-I
012-2010	Mandeville Creek channel and riparian restoration	YCT-I
027-2003	South Fork Judith River fish barrier	YCT-I
038-2000	Yellowstone River riparian restoration	YCT-I
024-2005	Arrastra Creek culvert replacement	FFIPC
033-1999	Big Coulee	FFIPC
003-2009	Cameron Creek channel restoration	FFIPC
007-1997	Camp Creek	FFIPC
006-1999	Camp Creek restoration	FFIPC
007-1999	Coal Creek fencing	FFIPC
026-2005	Darnutzer Slough channel restoration	FFIPC
030-2011	Darnutzer Slough spawning habitat enhancement	FFIPC
027-2015	Devil's Dip Spring Creek channel restoration	FFIPC
004-2014	Gleason Creek fish passage	FFIPC
005-2014	Johnson Creek riparian fencing	FFIPC
005-2013	Klondike Creek culvert to bridge	FFIPC
010-2003	Laird Creek	FFIPC
009-2011	Little Boulder Creek culvert fish passage	FFIPC
015-2002	Madison Spring Creek restoration	FFIPC
008-2013	McVey Creek riparian fence and bridge	FFIPC
019-2003	Nevada Spring Creek	FFIPC
042-2001	Nevada Spring Creek	FFIPC
033-2005	Piney Creek pool enhancement	FFIPC

EFFECTIVENESS MONITORING

FFIP #	Project Name	Monitor
011-2013	Poindexter Slough channel restoration	FFIPC
033-2015	Poindexter Slough Channel Restoration	FFIPC
040-2010	Poindexter Slough restoration	FFIPC
016-2007	Poorman Creek culvert replacement	FFIPC
023-2000	Prickly Pear Creek	FFIPC
017-2008	Prickly Pear Creek instream flow enhancement	FFIPC
013-2001	Rattlesnake Creek	FFIPC
021-2002	Rattlesnake Creek fish ladder	FFIPC
034-2015	Rattlesnake Creek fish screen	FFIPC
014-2001	Rock Creek channel restoration	FFIPC
034-2007	Rock Creek ford to culvert conversion	FFIPC
008-2012	Ruby River channel stabilization	FFIPC
008-2014	Shields River fish barrier	FFIPC
053-2000	Silver Butte Fisher River bank stabilization	FFIPC
015-2013	South Fork Poorman Creek road relocation	FFIPC
018-2015	Theodore Creek Fish Passage Improvement	FFIPC
040-2009	Warm Springs Creek culvert to bridge	FFIPC
034-2004	Willow Springs Creek	FFIPC
022-2015	Yukon Creek Fish Passage Improvement	FFIPC

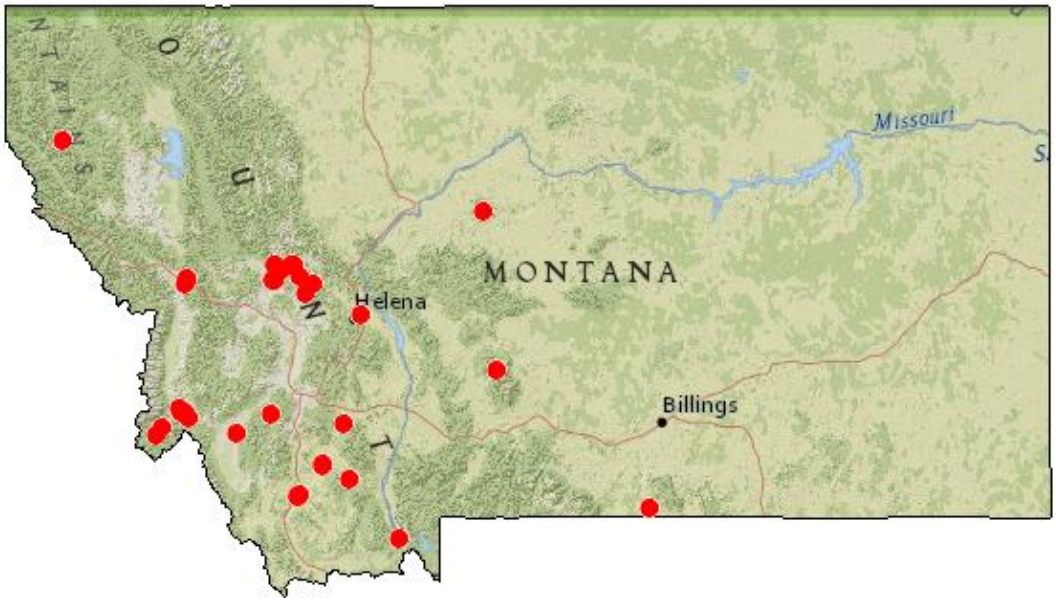

FIGURE 45. MAP OF PROJECTS MONITORED FOR EFFECTIVENESS IN 2019 AND 2020.

EFFECTIVENESS MONITORING

PROCEDURES AND PRIORITIES

The goal of this effort was to document the condition of projects that received funding from the FFIP (Table 9, Figure 45). When available, background information was compiled for each project. Sources included FWP's FFIP database and the local biologists' internal files. Information obtained included pre-project photos, fish survey data, and project designs. This information often provided a baseline of pre-project conditions that allowed evaluation of the success of the specific project. Some projects could not be evaluated due to difficulties in contacting landowners, or failure to get permission to access the sites.

One or more field observers visited each site and assessed the project conditions at the project site, compared the status to project implementation, and verified that the project met the terms of the agreement. Photos provided primary documentation of site conditions, and the coordinates of the locations of the photos were obtained with a handheld GPS unit or with automatic camera waypoints.

Following field data collection, the field observer or observers prepared a narrative that described the project area and compared baseline conditions to current conditions. Other components of the narrative were compliance with the terms in the agreement, an assessment of whether the project was successful in meeting project goals, and recommendations for improvements. Mapping locations of photo points on aerial photos linked field conditions to a recent aerial view of the project area.

Synthesis of pre-project information and field observations allowed assessment of the success of the project. Evaluation of projects also documented shortcomings and failures and provided recommendations for improvements or future study. Individual results and photographs are described below.

The projects monitored by the YCT-I included those benefiting native, species of concern, including Yellowstone cutthroat trout and westslope cutthroat trout. Monitoring completed by the Future Fisheries Improvement Program Coordinator (FFIPC) was done to follow the long-term monitoring program and to monitor projects in conjunction with other fieldwork. Because the duties of FFIPC are varied, monitoring was restricted to a few weeks a year and to opportunities combined with required meeting travel or implementation monitoring.

In 2019 and 2020, the FFIPC focused on updating and implementing the 5-year photo monitoring sites. The goal of FFIPC monitoring was not focused on species, but rather on sites that are representative of the more than 500 active and completed projects. Projects with land-use components were a focus, as those types of projects tend to have more compliance questions than project types that require little maintenance (e.g. barriers or bridges).

EFFECTIVENESS MONITORING

Overall, the FFIPC was able to monitor 37 sites for effectiveness. In the next biennium, the photo monitoring sites will continue to be updated to reflect active and expired projects, and the FFIPC will continue to focus on the 5-year monitoring sites.

YELLOWSTONE CUTTHROAT TROUT INTERN MONITORING

The goal of this effort was to document the condition of five projects that received funding from the FFIP (Figure 46). Other projects were slated for evaluation; however, difficulties in contacting landowners, or failure to get permission to access the sites, limited the number projects visited.

Projects evaluated included those benefiting native, species of concern, including Yellowstone cutthroat trout and westslope cutthroat trout. Of course, other native species benefit from improvements in habitat and water quality, and these include mountain whitefish, Rocky Mountain spotted sculpin, and several species in the sucker and minnow families. Nonnative, but economically and recreationally important species including brown trout, rainbow trout, and brook trout also benefit. These popular game fishes attract anglers worldwide, and investments in improving habitat for these species bring considerable benefit to local communities.

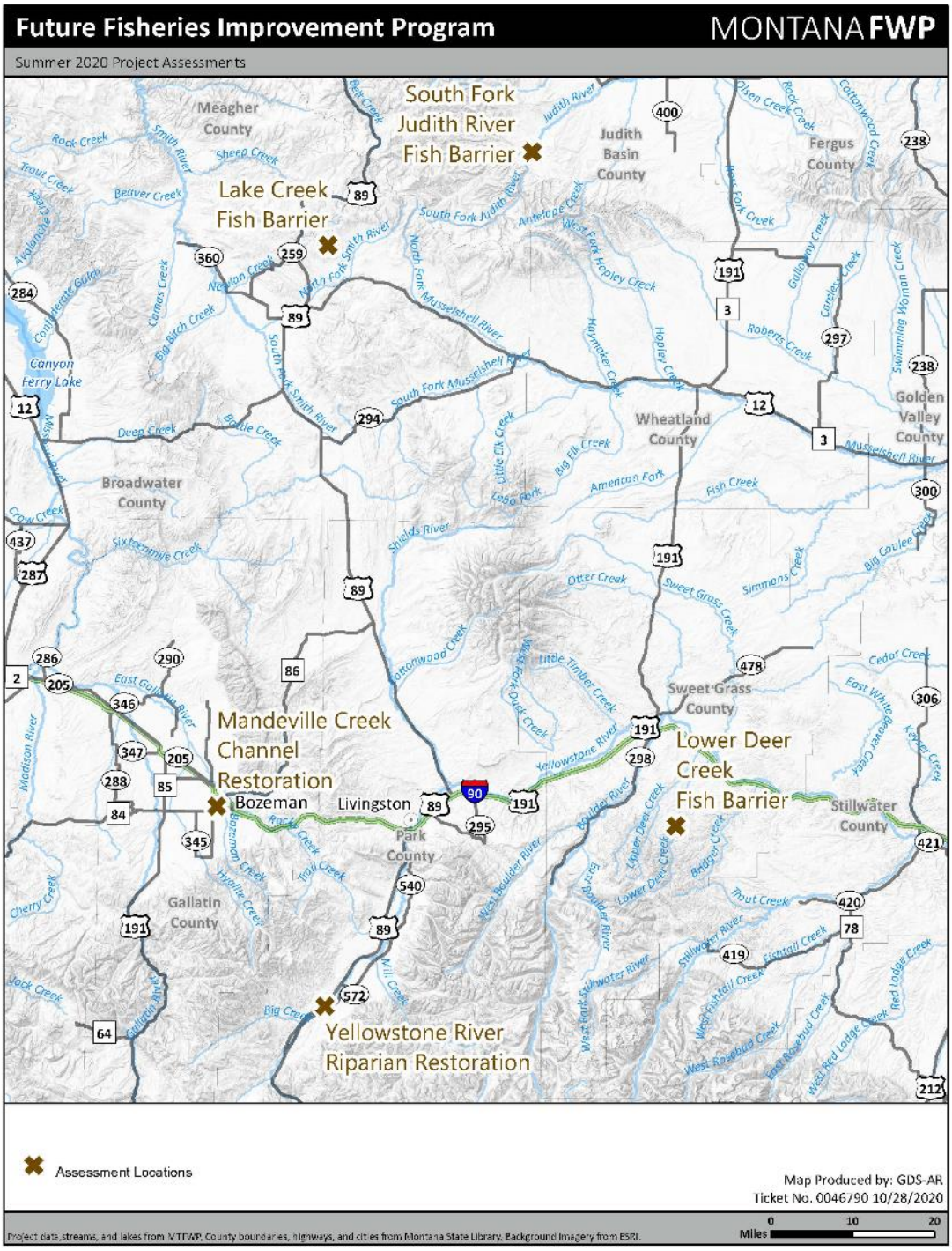

FIGURE 46. MAP OF FFIP PROJECTS ASSESSED BY THE YELLOWSTONE CUTTHROAT TROUT INTERN IN 2020.

Lake Creek Fish Barrier (011-2007)

Introduction

Lake Creek is a tributary of the North Fork Smith River located near White Sulphur Springs. Westslope cutthroat trout have diminished drastically in distribution and abundance in their historical habitat east of the Continental Divide in the Missouri River headwaters. At the time of this project, populations of westslope cutthroat trout known or suspected to be genetically unaltered occupied about 4% of their historically occupied habitat of historically occupied waters (Shepard et al. 2003). Westslope cutthroat trout were even rarer in the Smith River watershed, with about 2% of historically occupied stream habitat in this watershed still supporting genetically unaltered populations (Shepard et al. 2003). This drastically reduced distribution of westslope cutthroat trout makes restoring westslope cutthroat trout in suitable habitat among the highest conservation objectives (MCTSC 2007).

The barrier is gabion structure fortified with concrete and has a concrete apron to prevent scour of a pool (Figure 47). It was built in 2010, and in 2011, the rainbow trout fishery upstream of the barrier was eradicated with rotenone. Approximately 1,000 embryos obtained from an existing population of westslope cutthroat trout in the Smith River watershed were raised in remote site incubators placed in Lake Creek annually from 2012 to 2014. Monitoring in 2017 found a self-reproducing population of westslope cutthroat trout upstream of the barrier.

FIGURE 47. LAKE CREEK FISH BARRIER ONE YEAR AFTER CONSTRUCTION.

Site Inspection

On June 6, 2020, Carl Young visited the fish barrier. He noted some wear of concrete; however, the apron was intact and did not provide a vantage for fish to leap (Figure 48). A substantial amount of

large woody debris had accumulated along the upstream face of the barrier (Figure 49). The jam of logs upstream of the barrier posed a potential threat during high flows. Logs washed over the barrier could become stuck on the apron and provide enough complexity for fish to breach the barrier, or to cause damage to the barrier. He returned within a few days with equipment to clear out the accumulated wood.

While working at the site, Carl observed a family fishing and catching westslope cutthroat trout. Establishing recreational opportunities for catching native westslope cutthroat trout was among the rationale included in the application, and this observation indicates some level of appreciative angling.

FIGURE 48. THE LAKE CREEK FISH BARRIER ON JUNE 6, 2020.

FIGURE 49. TOP OF LAKE CREEK FISH BARRIER SHOW WEAR AND ACCUMULATIONS OF WOODY DEBRIS.

FIGURE 50. LAKE CREEK BARRIER AFTER REMOVAL OF WOODY DEBRIS.

Conclusions

This project has been apparently successful in restoring westslope cutthroat trout to Lake Creek and protecting the population from nonnatives. The amount of habitat secured is about 1.5 miles of stream, which is a relatively small amount for a population protected by a barrier (Hilderbrand and Kershner 2000). Nevertheless, as westslope cutthroat trout have been nearly eliminated from the Smith River watershed, this project is a small but significant step towards securing westslope cutthroat trout in their native habitat in this part of Montana. As this isolated population is at risk of inbreeding and eradication from catastrophic events, periodic monitoring is needed to evaluate the population and its genetic status. Likewise, the barrier requires periodic maintenance. Its effectiveness in blocking passage of rainbow trout given the hydraulics associated with a flat-fronted barrier should be evaluated.

Lower Deer Creek Barrier (011-2010)

Introduction

Lower Deer Creek is a tributary of the Yellowstone River that flows north out of the foothills of the Beartooth Mountains. Periodic genetic analyses had found only genetically unaltered Yellowstone cutthroat trout until 2005, which hybrids were found downstream of the U. S. Forest Service boundary. Sampling in subsequent years found obvious hybrids were ascending higher in the watershed posing a dire threat to Lower Deer Creek's Yellowstone cutthroat trout population. FWP teamed with the Custer Gallatin National Forest to build a barrier on state land (Figure 51). FFIP was among several contributors to this project, which was completed in early winter of 2010.

FIGURE 51. LOWER DEER CREEK AFTER CONSTRUCTION AS WATER WAS FILLING BEHIND THE STRUCTURE.

The design of this barrier was innovative as it eliminated the hydraulics that occur with the flat-fronted weirs, which were the most commonly constructed barriers at the time. With a flat-fronted barrier, water piles up behind the jet of water flowing over the structure. Fish can use these turbulent hydraulics to breach barriers. The Lower Deer Creek design called for a curved, or ogee, front (Figure 52). Water clings to the curve of the ogee and the velocity of the flow is faster than the fish can swim. The ogee leaves no space for water to pile up behind the water flowing over the structure. The concrete apron is another velocity barrier, and its shallow, rapid flow does not leave a pool for fish to use to leap. Finally, they hydraulic jump, the increase of water elevation downstream of the ogee, is farther away from the front of the structure at higher flows. This design results in a convergence of features that make the barrier a velocity and leap barrier across a range of flows.

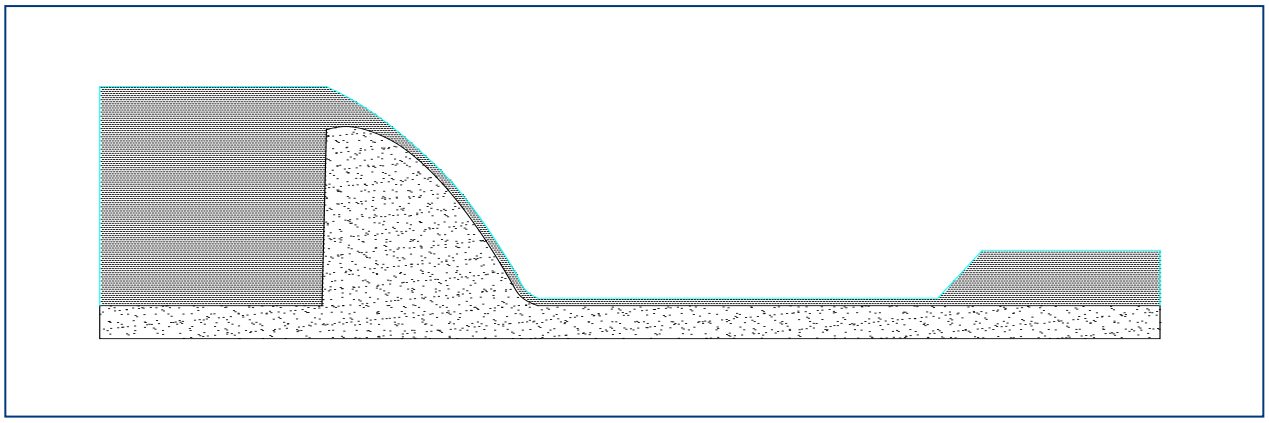

FIGURE 52. CONCEPTUAL DESIGN OF AN OGEE-FACED BARRIER.

Brown trout were also present in Lower Deer Creek, and their numbers had been increasing relative to Yellowstone cutthroat trout in recent years. As brown trout posed a secondary threat to Yellowstone cutthroat trout in Lower Deer Creek, FWP and the Custer Gallatin National Forest collaborated on a

rotenone project in early fall of 2011. Yellowstone cutthroat trout were salvaged before treatment and held in live cars outside the area of treatment (Figure 53). The Backcountry Horsemen of Billings provided invaluable assistance in transporting fish and gear throughout the project area. Yellowstone cutthroat trout were returned to Lower Deer Creek the day after rotenone treatment was completed.

Rocky Mountain spotted sculpin were also present in Lower Deer Creek near the barrier, although absent within the forest. Following rotenone treatment, fieldworkers captured about 100 sculpin from downstream of the barrier and moved them upstream. The goal was to reestablish a self-supporting population of Rocky Mountain spotted sculpin upstream of the barrier.

FIGURE 53. YELLOWSTONE CUTTHROAT TROUT HELD IN LIVE CARS DURING ROTENONE TREATMENT IN LOWER DEER CREEK.

FIGURE 54. HORSE SUPPORT PROVIDED BY THE BACKCOUNTRY HORSEMEN FROM BILLINGS.

Site Visit

On August 19, 2020, an FWP field crew visited the Lower Deer Creek site to inspect the barrier and perform any needed maintenance. In addition, they electrofished a long-term sampling reach to evaluate species composition, size, and abundance.

The barrier was in excellent condition, with no evidence of wear (Figure 55 and Figure 56). No maintenance was required, and the apron was free of woody debris. Slight scour was apparent at the downstream end of the concrete apron, but this was minor and did not provide sufficient depth to promote leaping or threaten the structure.

FIGURE 55. VIEW OF THE LOWER DEER CREEK BARRIER FROM TOP OF CANYON.

FIGURE 56**. LOWER DEER CREEK BARRIER FRONT VIEW. LOGS WERE DEPOSITED ON WINGWALLS DURING FLOODING IN 2011.**

Electrofishing upstream of the structure confirmed Yellowstone cutthroat trout had repopulated this portion of the stream, and that the barrier and rotenone treatment had likely eliminated brown trout from this stronghold for Yellowstone cutthroat trout. Yellowstone cutthroat trout were abundant, a

range of age classes were present, and several of the fish were of considerable size (Figure 57). These sampling results were in stark contrast to electrofishing efforts at this site in previous years. In 1985 and 2005, brown trout were the only trout captured in this reach. In 2007, Yellowstone cutthroat trout comprised 12% of the trout captured in this reach and were greatly outnumbered by brown trout. The absence of brown trout and health of the Yellowstone cutthroat trout population are clear indicators of success.

FIGURE 57. YELLOWSTONE CUTTHROAT TROUT CAPTURED IN LOWER DEER CREEK UPSTREAM OF THE BARRIER ON AUGUST 19, 2020.

Electrofishing also indicated the transfer of Rocky Mountain spotted sculpin upstream of the barrier was successful in restoring this native fish to the project area. Several size classes of sculpin were present, and some sculpin reached considerable size for a small fish.

Conclusions

This project is an unequivocal success and appropriate use of FFIP funds. Electrofishing data suggest that rotenone was successful in eradicating brown trout, the barrier has prevented their reinvasion, and Yellowstone cutthroat trout thrive in the 11 protected miles of stream. Angler reports augment sampling data with many anglers reporting lively fishing and substantial numbers of large Yellowstone cutthroat trout. This stream provides a rare opportunity to catch large Yellowstone cutthroat trout in a small stream and beautiful, secluded setting. The Lower Deer Creek project has been successful from a conservation perspective, as partnering agencies protected a genetically unaltered population of Yellowstone cutthroat trout from hybridization and competition, which is the highest conservation priority (MCTSC 2007). FFIP funds were instrumental in achieving conservation goals and providing a high quality recreational fishery for native trout.

Mandeville Creek Channel and Riparian Restoration (012-2010)

Introduction

Mandeville Creek is a small stream that originates as a spring south of Bozeman and flows through the Montana State University campus and the City of Bozeman before its confluence with the East Gallatin River. Urbanization and to a lesser extent livestock grazing have substantially altered the biological, physical, and chemical integrity of the creek. An assessment in the early 2000s found profound modifications to the stream channel and riparian area, including piping the stream into the sewer system for several blocks. Aquatic macroinvertebrates and the algal assemblage scored within the range of severely impaired, with nutrient enrichment, fine sediment, fecal coliform bacteria, and toxic chemicals likely contributing to impairment (Confluence Consulting, Inc. unpublished data). Lawns, connectivity with the sewer system, and stormwater runoff were the likely sources of pollutants.

The student sub-chapter of the Montana Chapter of the American Fisheries Society seized the opportunity to work locally to benefit this tortured stream and worked with Montana State University and the Bozeman schools to formulate an approach. Other partners in the restoration of Mandeville Creek included Gallatin County, the Gallatin Conservation District, Montana Water Course, and private consulting companies. Channel restoration, riparian plantings, and managing stormwater runoff from roads and parking lots are among the actions implemented to restore health to this stream.

A now retired teacher led efforts through the Bozeman High School to turn the reach of Mandeville Creek into an outside classroom, capitalizing on concurrent upgrades to the school property. Photos from the FFIP application illustrate the channelized reach adjacent to the school, its calving banks vegetated with Kentucky bluegrass, and the locations where upgrades to the school building would encroach nearer the stream (Figure 58 and Figure 59).

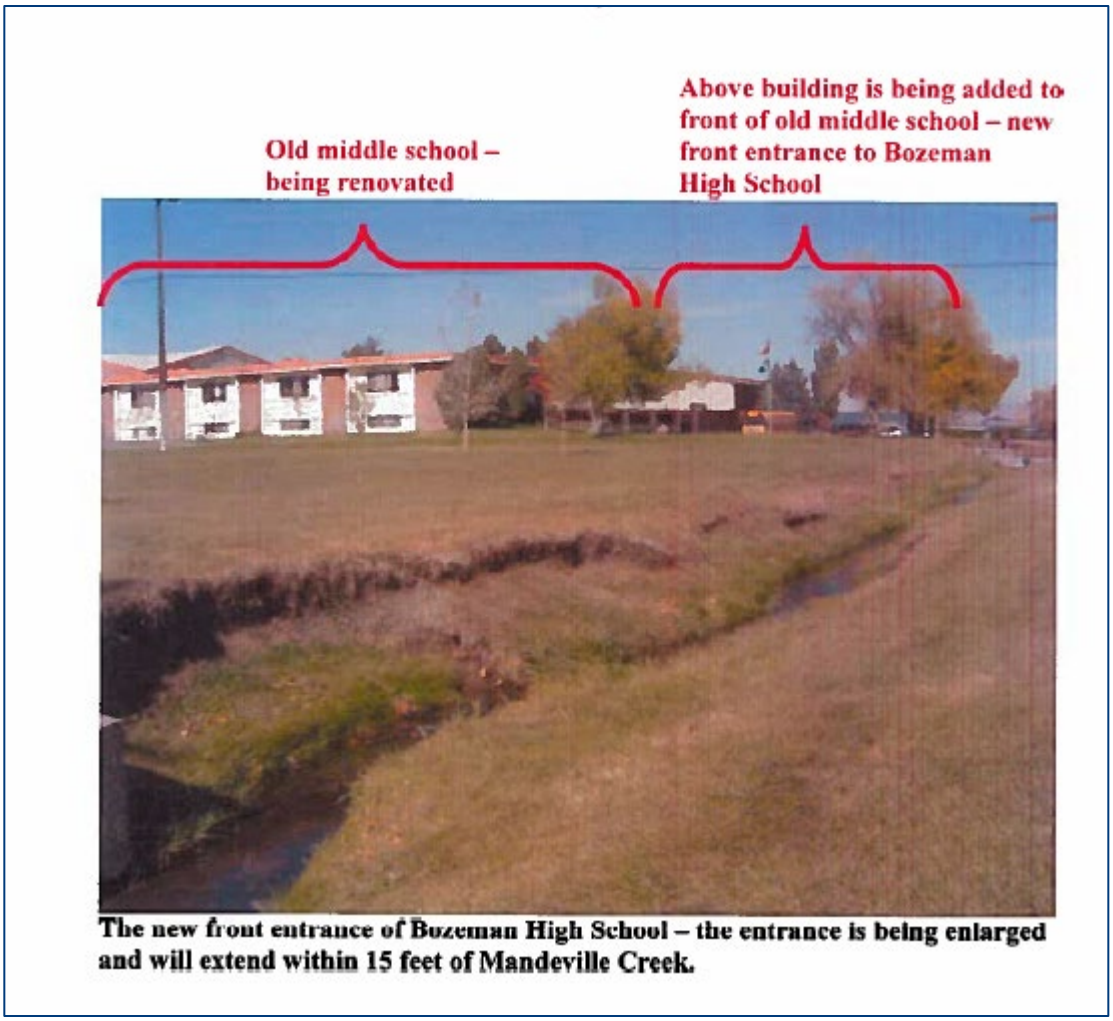

FIGURE 58. MANDEVILLE CREEK AT CULVERT WHERE THE STREAM RESURFACES AT THE BOZEMAN HIGH SCHOOL CAMPUS. PLANNED RENOVATIONS WOULD ENCROACH CLOSER TO THE STREAM REQUIRING DESIGN TO MITIGATE FURTHER

Mandeville Creek just north of the new Bozeman High School front entrance. The new front entrance will reach to the edge of the parking lot (left side of photo) and close to 11th Avenue (right side of this photo).

FIGURE 59. VIEW OF MANDEVILLE CREEK LOOKING DOWNSTREAM FROM MAIN STREET SHOWING NEAR-CHANNEL SOURCES OF STORMWATER RUNOFF, CLOSELY CROPPED KENTUCKY BLUEGRASS LAWN, EROSION, AND CHANNELIZATION.

The conceptual approach to restoration was to create a meandering channel and plant native riparian plants adjacent to the stream (Figure 60 and Figure 61). The restored channel would provide higher quality habitat for aquatic organisms. The riparian plantings would filter pollutants contributed from adjacent lawns, roads, and parking lots.

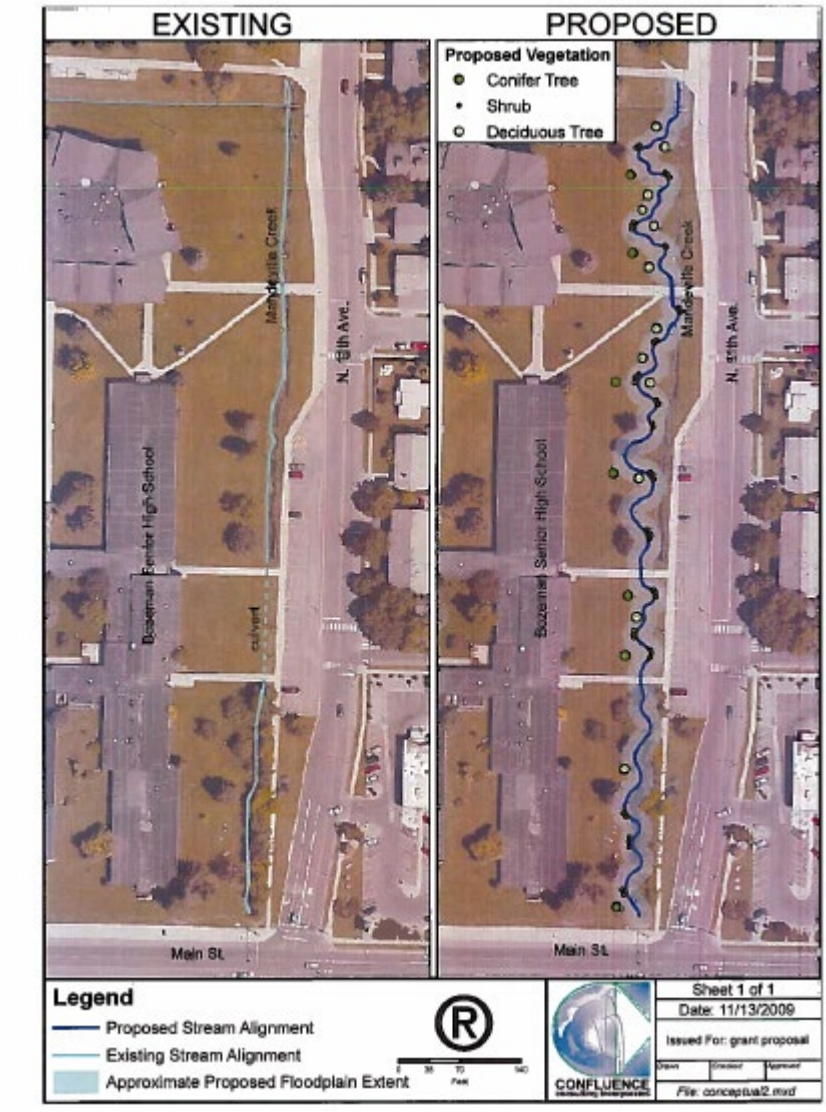

FIGURE 60. PLAN VIEW OF THE CONCEPTUAL APPROACH TO RESTORING PHYSICAL, CHEMICAL, AND BIOLOGICAL INTEGRITY TO MANDEVILLE CREEK THROUGH THE BOZEMAN HIGH SCHOOL CAMPUS FROM THE FFIP APPLICATION.

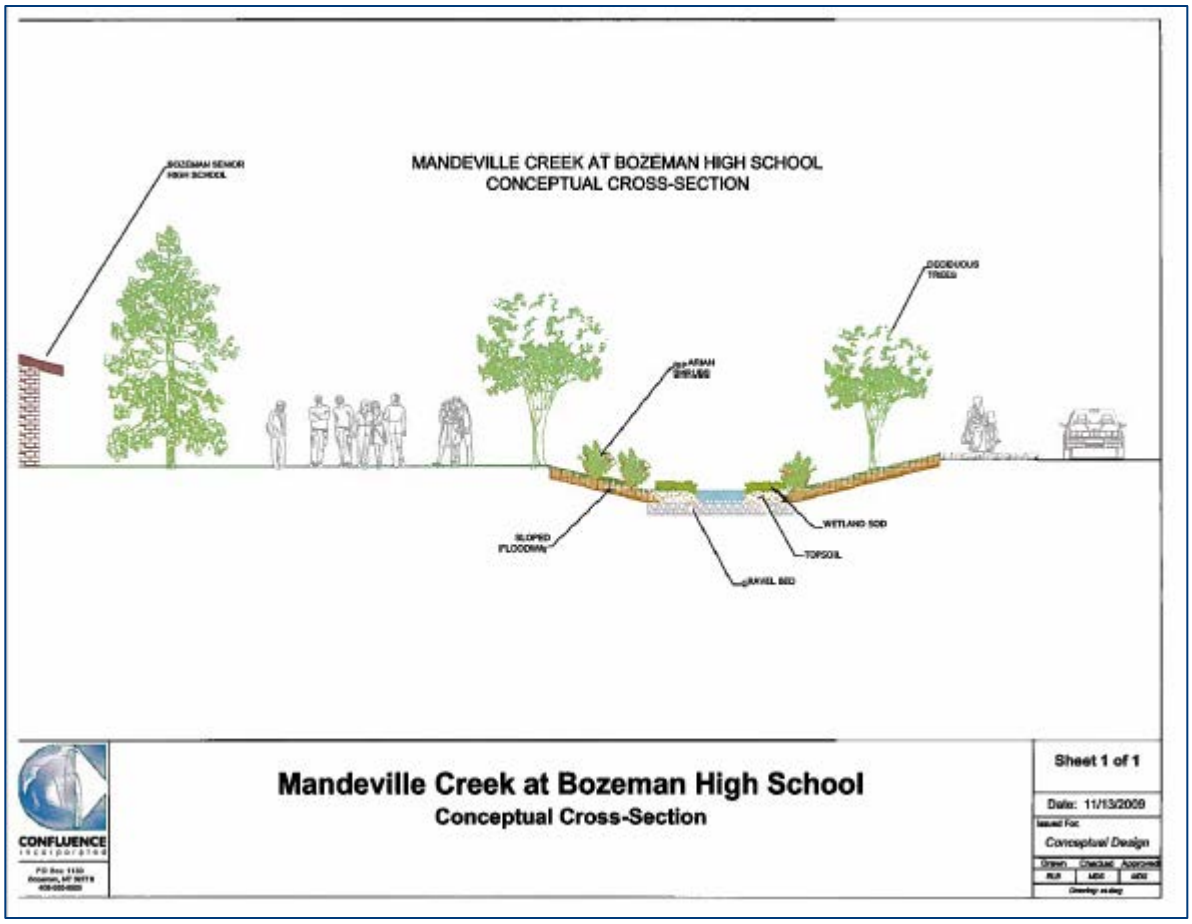

FIGURE 61. REPRESENTATIVE CROSS-SECTION OF THE CONCEPTUAL APPROACH TO RESTORE MANDEVILLE CREEK THROUGH THE BOZEMAN HIGH SCHOOL CAMPUS SHOWING RESTORED CHANNEL GEOMETRY AND RIPARIAN PLANTINGS.

Featured prominently in the application and support letters was the value of having the opportunities to instill a conservation ethic and interest in the outdoors in students growing up in the age of cell phones, video games, and other indoor pursuits. The project would provide an outside classroom where students could have hands on experience learning about stream ecology. A variety of partners wrote letters of support for the project that also pledged assistance with the curriculum.

The project has been high profile, with more partners joining the effort and an active Facebook page updating the community as restoration has been continuing through 2019, a decade after the project was initiated (BHS Mandeville Creek Facebook page), and more is left to do. The posts on the Facebook page show a healthy riparian corridor, a diversity of wildlife using this strip of wildness flowing through Bozeman, and students participating in restoration or recreating in the urban oasis.

Ducks and ducklings fledged from the restored habitat occasionally stroll through the school's corridors, as has a black bear. The Mandeville Creek restoration is a point of local pride.

Site Visit

On June 24, 2020, Carl Young evaluated the Mandeville Creek restoration project. The stream and riparian had improved markedly from the degraded ditch that Mandeville Creek occupied thanks to urbanization and under-valuation of small streams. Much of the stream had a substantial riparian buffer with trees, shrubs, and sedges being well-established (Figure 62).

FIGURE 62. VIEW OF MANDEVILLE CREEK SHOWING RIPARIAN BUFFER AND RESTORED CHANNEL.

An added aesthetic was installation of attractive footbridges that allowed pedestrians to cross Mandeville Creek (Figure 63). Near the bridge, the channel profile of a natural riffle/pool sequence was evident and a significant improvement from the uniform ditch the stream formerly occupied.

FIGURE 63. FOOTBRIDGE OVER A RESTORED SECTION OF MANDEVILLE CREEK SHOWING A RIFFLE/POOL SEQUENCE.

The upgrades to the school and restoration of Mandeville Creek is occurring in phases and is not yet complete. The final photos show silt fence installed between the stream and stockpiled soil and the remaining stretches of channelized stream (Figure 64 and Figure 65). The uniform, silt-dominated streambed is evident in the unrestored reaches and a marked contrast to most of the stream, which has been restored.

FIGURE 64. LOWER, UNRESTORED REACH OF MANDEVILLE CREEK SHOWING SILT FENCE TO PREVENT SEDIMENT LOADING INTO THE STREAM.

FIGURE 65. LOWER, UNRESTORED REACH OF MANDEVILLE CREEK ON THE BOZEMAN HIGH SCHOOL CAMPUS.

Conclusions

The Mandeville Creek channel restoration project has resulted in substantial improvement in stream form and function, water quality, and aesthetics. The project's high profile has generated considerable pride in the stream and provided students and the community a hands-on opportunity for stream restoration. The extent to which student's monitored invertebrates, water quality, and other aspects

of the biological, chemical, and physical integrity of the stream is unknown. Several phone calls to the science department at the school were not returned.

In reviewing this project, the FFIP panel weighed the apparently negligible benefit to fisheries in deciding the merits of funding a project, with the educational opportunities driving the decision to fund despite the low potential for a fishery. Mandeville Creek is not listed in FWP's fisheries database, and presumably, no fisheries data are available. The incidental observation of a brook trout in the early 1990s is the only evidence of relatively recent presence of fish. Fish passage may be restricted by downstream culverts and other barriers.

Despite the lack of measurable benefit to fisheries, the project was successful in drawing attention to the condition of the stream and the plight of urbanized streams in general. Interested parties should view the project's Facebook page (BHS Mandeville Creek Facebook page) and read the numerous newspaper articles that documented its progress. In 2019, the project was awarded The Beautification of Bozeman Award.

In Montana, agriculture is the most spatially extensive land use with potential to harm streams when not managed in a compatible manner, and it receives the lion's share of the focus. Although agriculture has potential to affect many more miles of stream, the extent to which this small stream has been degraded and polluted from urbanization is a reminder that building a town on a stream can be highly detrimental to its health, and sometimes result in far greater and more difficult to reverse impairment than agricultural uses. Not all small urban streams support a fishery, but all drain to a larger waters that do, and the pollutants picked up from lawns, roads, and parking lots end up downstream in fish-bearing waters.

The FFIP may receive requests in the future for highly degraded streams where restoration will provide limited benefit to fisheries, and the panel will likely decide funding these on a case-by-case basis. This project suggests tangible and lasting benefit given the number of lives touched by the project. The only recommendation is to have a clearly defined monitoring and reporting plan that demonstrates students are learning about the various pollutants that affect urban streams and evaluating how invertebrate populations respond to restoration.

South Fork Judith River Fish Barrier (027-03)

Introduction

The South Fork Judith River watershed supports westslope cutthroat trout with varying levels of hybridization with rainbow trout and to a lesser degree, Yellowstone cutthroat trout. Westslope

cutthroat trout have been nearly extirpated from the Judith River watershed, with an estimated 1% of the historically occupied waters still supporting genetically unaltered fish (Shepard et al. 2003). In 2007, a barrier was constructed that would provide over 20 miles of protected habitat from nonnative fishes (Figure 66).

FIGURE 66. SOUTH FORK JUDITH RIVER BARRIER.
The barrier is a flat-fronted weir, with a notch intended to provide for transport of large wood and bedload. The photo at relatively high flows shows the standing wave behind the jet of water that had allowed passage of rainbow trout at another barrier. The ability of rainbow trout or other nonnative trout to breach this barrier is currently unknown.

Initially, application of rotenone was the planned approach to eradicate hybrids and nonnative westslope cutthroat trout from upstream of the barrier. Instead, an intensive program of yearly swamping began in 2007 and has continued through 2018. Westslope cutthroat trout planted in the project area are from FWP's M012 brood stock, which have been shown to be effective in establishing populations of westslope cutthroat trout in large-scale projects, and these fish have outperformed brood stock collected from neighboring streams (Andrews et al. 2016). Genetic analyses are planned in the near future to evaluate the effectiveness of genetic swamping in the South Fork Judith River watershed.

Site Visit

On July 23, 2020, Carl Young visited the barrier. He found it to be in good condition with little evidence of wear (Figure 67). He cleared what little debris was present, but overall, the barrier appeared to be stable with no obvious features that would allow for fish passage. The rock armoring featured in Figure 66 appears to be replaced with a wing wall on the left bank and bed rock is present on the right bank. This apparent retrofit has likely eliminated roughness that trout could use to breach the barrier.

FIGURE 67. SOUTH FORK JUDITH RIVER FISH BARRIER ON JULY 23, 2020.

Conclusions

The South Fork Judith westslope cutthroat trout restoration project has been ongoing, with genetic swamping being the means of reducing nonnative genes upstream of the barrier. This approach is time-consuming and has not yet been verified as an effective approach; however, it avoids the potential for controversy associated with rotenone projects. Future monitoring will determine if genetic swamping is sufficient to achieve conservation goals of an acceptable level of hybridization in the project area. Sampling to evaluate genetic status of the fish in the project area is slated to begin soon.

The potential for rainbow trout to breach the barrier is another factor that could result in continued introgression of rainbow trout genes into the project area. Although rainbow trout have been able to gain access over a barrier in a different watershed, this barrier may be effective at blocking passage. Biologists with management responsibility for flat-fronted barriers should be consider the potential for these barriers to pass fish in their monitoring activities.

Yellowstone River Riparian Restoration (038-2000)

Introduction

Channel migration on large, uncontrolled rivers like the Yellowstone River poses challenges to landowners, highway departments, railroads, and irrigation companies as floods result in loss of land and pose threats to infrastructure like bridges, homes, irrigation diversions and rail lines. Large floods in 1996 and 1997 caused considerable erosion along the Yellowstone River. The resulting push to riprap banks came under fire due to concern over the cumulative effects of widescale bank armoring. Riprap alters fluvial geomorphic processes, habitat for fish, and sediment transport regimes. The

resulting controversy resulted in the filing of a lawsuit against the Army Corps of Engineers, the formation of a task force to study a variety of social, biological, and geomorphic aspects of the upper Yellowstone River, and ultimately changed practices to address erosion along the river.

This project was intended as a showcase for a softer, bioengineered approach that could be applied along the Yellowstone riparian corridor as an alternative to riprap. Home construction, roads, channel manipulation, and hard armoring of a reach of bank were the identified causes of impairment in the reach. The FFIP application proposed to stabilize 0.6 miles of stream bank and restore riparian function with plantings of cottonwoods, willows, dogwood and alder. The planting efforts were described as “emulating natural processes of plant colonization” with staggering the plantings over 3 years and planting mixed stands. Over the 3 year planting effort, 75 cottonwoods measuring 5 to 6 feet and 36 dogwoods were installed. Bundles of dormant willow and alder stems were installed in trenches excavated in the bank with 1,650 stems planted. The estimated success rate for riparian plantings was 50 to 70% within 2 years.

No pre-project photos are available, but descriptions in the FFIP application provide some information on site characteristics. Survey data indicated a trapezoidal channel through the reach (Figure 68). A portion of the project area was covered in riprap.

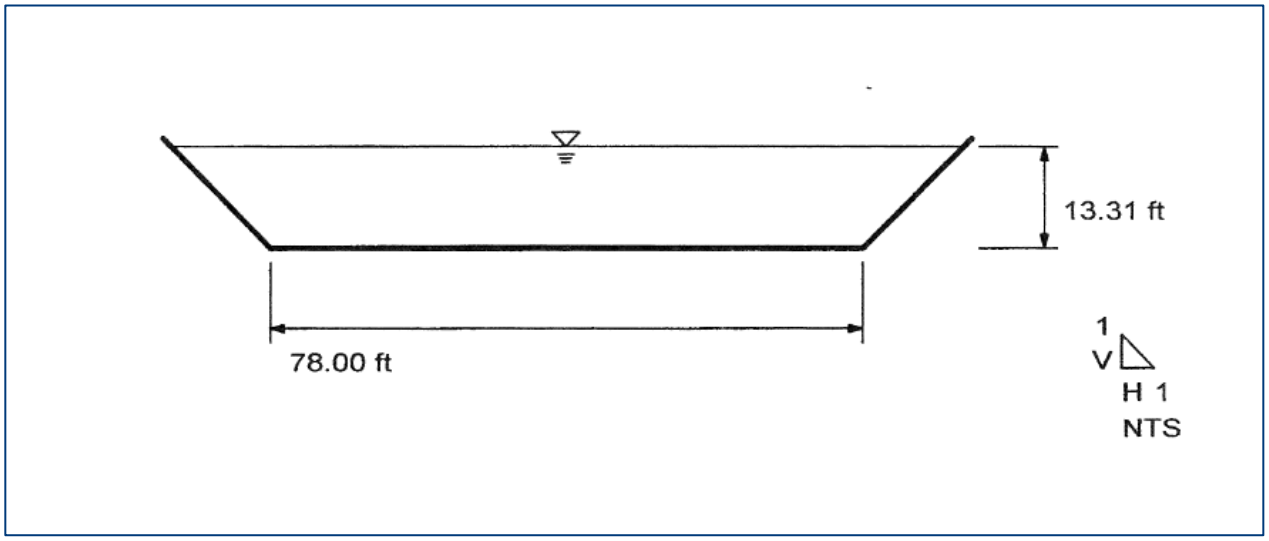

FIGURE 68. CROSS-SECTION OF CHANNEL IN PROJECT AREA FROM THE FFIP PROPOSAL.

The application provided diagrams of the conceptual approach to riparian planting along with bulleted narratives of the approach and benefits (Figure 69 and Figure 70). The images show sloped banks with live stakes tamped into soil, and fascines or bundles of willow and alder poles placed in shallow

trenches. The image conceptual approach for the riprapped reach shows trees tamped into spaces among rocks.

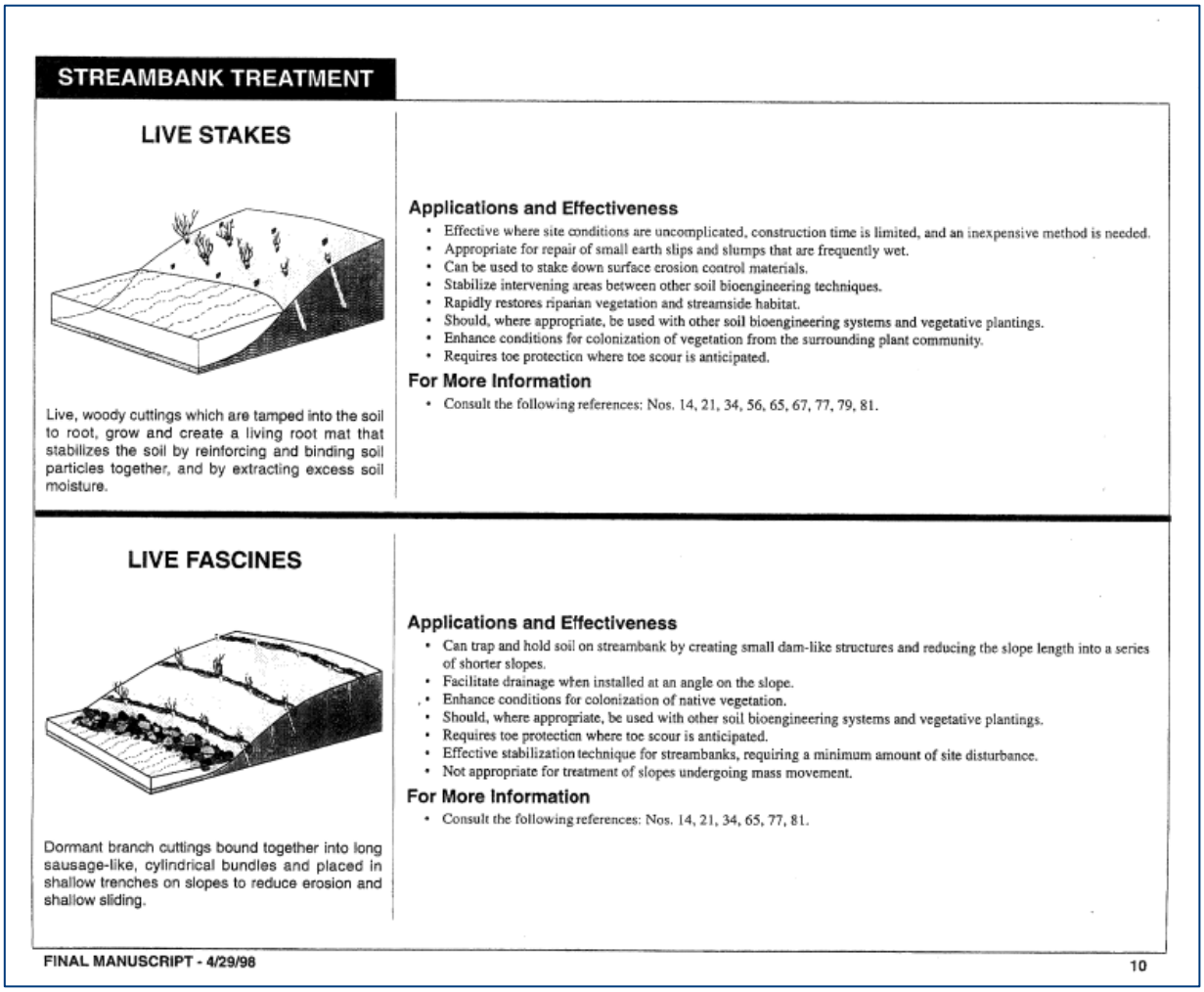

FIGURE 69. CONCEPTUAL APPROACH TO PLANTINGS OF COTTONWOOD AND DOGWOOD STAKES, AND FASCINES OF WILLOWS AND ALDERS ON UNSTABLE BANK OF THE YELLOWSTONE RIVER.

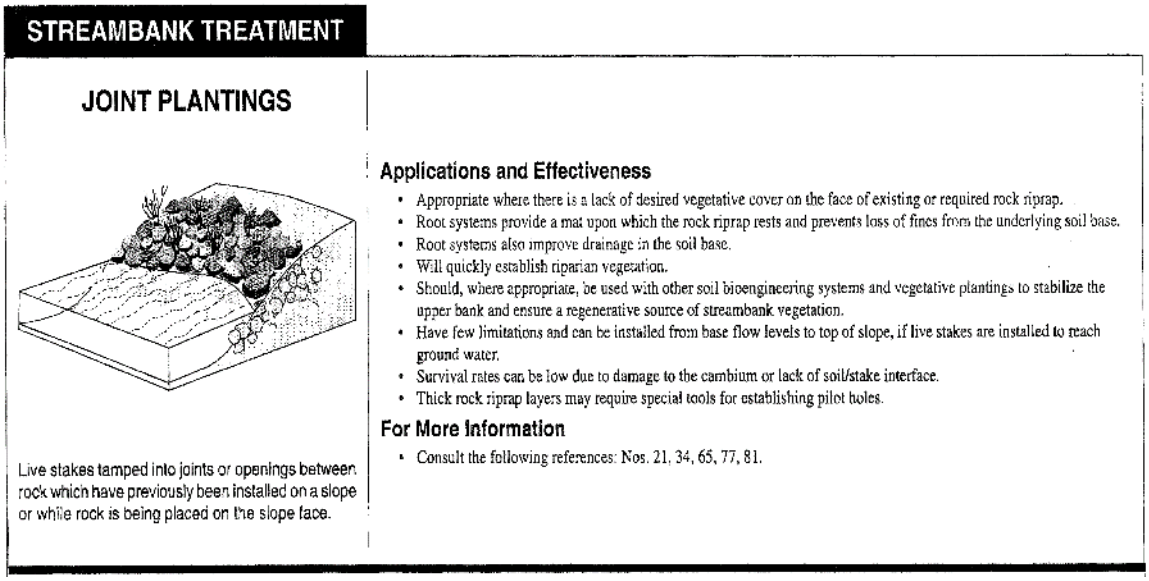

FIGURE 70. CONCEPTUAL APPROACH TO RIPARIAN PLANTINGS WITHIN RIPRAPPED REACH OF PROJECT AREA.

Site Visit and Interviews

On May 22, 2020, Carl Young and Carol Endicott visited the site and spoke with several of the landowners along the reach. We examined the project area while referencing the FFIP proposal. The landowners provided background on the project implementation, ongoing channel manipulations, and relatively recent changes in river morphology relating to flooding and channel migration. Scott Opitz, the area fisheries biologist, provided additional background information on changes in channel morphology and associated permitting to ensure delivery of water to the canal.

Notable features of the first half of the project reach were its trapezoidal channel geometry and cobble-dominated banks that were nearly devoid of vegetation (Figure 71). The landowners reported that in previous years, the channel was regularly dredged to ensure delivery of water to the Park Canal diversion located about 1 mile downstream of the project area (Figure 72). Placement of Jersey barriers to form a cofferdam across the channel to prevent deposition of cobble and gravel in this side channel failed after a few years, and the Jersey barriers were abandoned on the bar on the opposite side of the project area. Dredging has not occurred in recent years, as channel movement in the channel migration zone has increased delivery of water to the head gate. None of the cottonwood and dogwood stakes or willow/alder bundles survived in this reach.

FIGURE 71. TRAPEZOIDAL CHANNEL GEOMETRY, COBBLE BANKS, AND JERSEY BARRIERS ABANDONED ON THE UPSTREAM END OF MID-CHANNEL BAR.

The project area is along a low terrace adjacent to a wide reach of active channel mapped as a channel migration zone (Thatcher et al. 2009). The channel is highly braided in this reach (Figure 72), and the capacity of braids to carry water changes considerably as the river reworks the channel during spring runoff. The channel through the project area had been the primary supply of water to the irrigation diversion, but in recent years, new and naturally augmented braids have increased the proportion of flow delivered to the head gate.

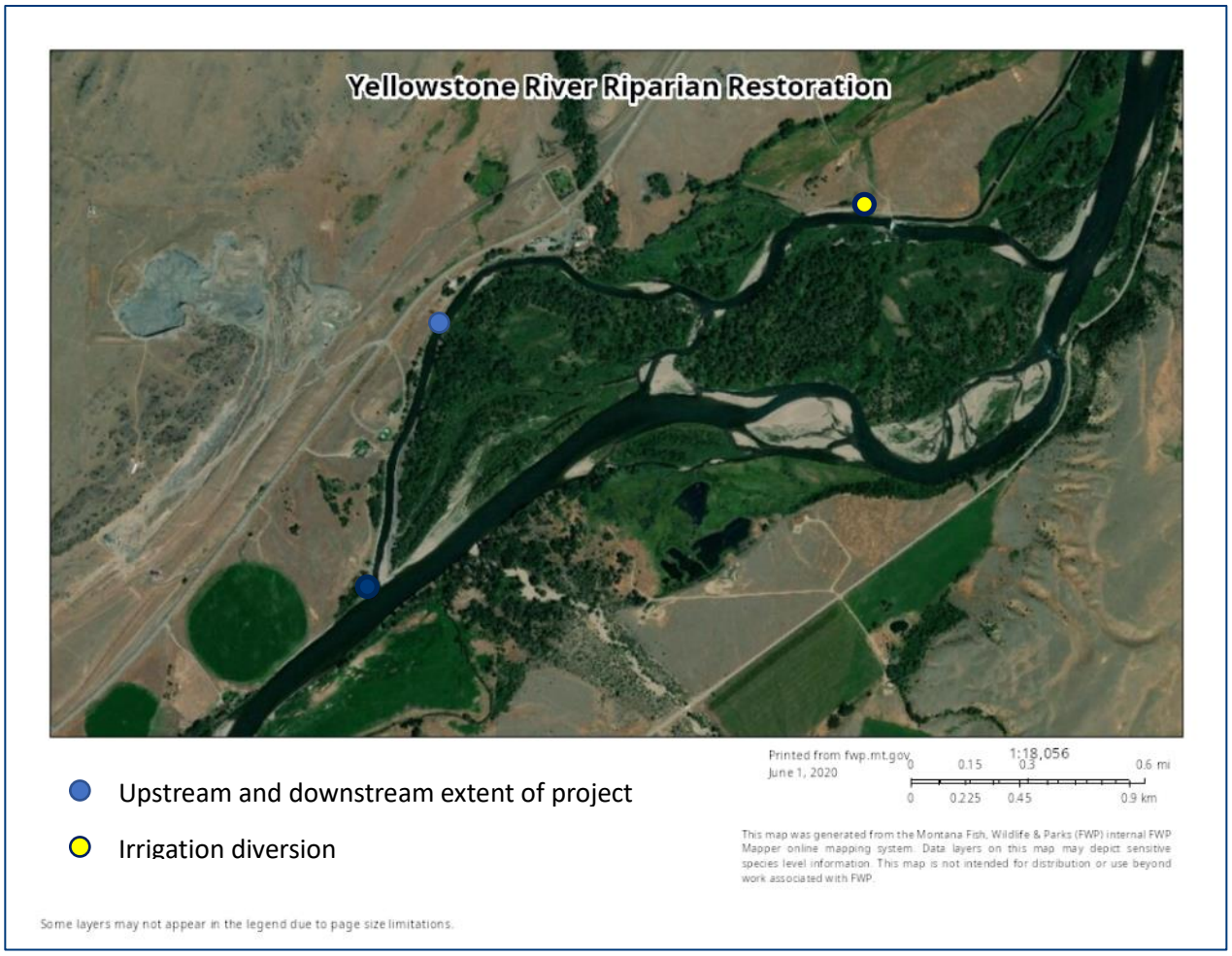

FIGURE 72. AERIAL VIEW OF THE PROJECT AREA, NEWLY CUT CHANNEL, AND CANAL DIVERSION.

Aggradation of bedload in the project reach had been among the factors requiring channel modifications to deliver water to the canal. Dredging to ensure enough water was conveyed to the canal diversion produced substantial amounts of cobble and gravel, and these spoils were applied to roads on the adjacent properties (Figure 73). These road grades are at considerably higher elevation than typical ranch roads, reflecting the need to dispose of the continued supply of cobble and gravel from the channel in the project area. The dynamic nature of the channel through this active reach of river has decreased the tendency for aggradation within the channel in its current configuration, so dredging has not altered the channel in the project area over the past few years.

FIGURE 73. ELEVATED ROADBED MADE FROM SPOILS FROM YEARS OF DREDGING IN THE PROJECT AREA.

The second half of the project reach began at an area of slight channel inflection, and this reach was covered in riprap (Figure 74). The landowners reported they had the riprap installed in the 1990s after flooding eroded 8 feet into their property. They owned the property when the planting project occurred and watered the cottonwood trees and willow/alder bundles. Only 3 cottonwoods survived despite substantial effort to irrigate all plantings. Rebar in the bank remained as evidence of where willow/alder bundles were planted but did not survive (Figure 75).

FIGURE 74. BANK ARMORING IN THE PROJECT AREA.

FIGURE 75. REBAR USED TO ANCHOR WILLOW/ALDER BUNDLES INTO BANKS.

Peak flows the first week of June 2020 provided an opportunity to see the conditions planting would experience during high water. On June 2, 2020, Carl Young photographed the project area again when flows were approaching flood stage. The river was several feet higher than it was in May, and the areas that had been planted were under water. Plantings on these 45 ° banks would need to be able to withstand sheer stress and inundation during high flows.

FIGURE 76. PROJECT REACH ON JUNE 2, 2020 DURING HIGH FLOWS

Conclusions

This project was unsuccessful and did not meet its intended goals. Survival of plantings was negligible, with only 3 of the 75 cottonwoods still present and no establishment of willows, dogwoods, or alders. Several factors contributed to failure of plantings to survive and reproduce. Notably, the project did not emulate natural processes of plant colonization as claimed in the application.

These plants likely died from inundation during high flows and insufficient water during summer months. The application included models of sheer stress at the bank margins and asserted plantings would survive this force; however, the low water availability once peak flows had passed would not promote extensive root growth. As a result, plantings may not have been secure from the existing amount of scour at higher flows than an established riparian stand with extensive root system and dense shrub and tree cover.

Cottonwoods and sandbar willow are disturbance driven species and recruit naturally from seed on recent alluvial bar deposits as illustrated in Figure 77. Along the Missouri River, cottonwoods established following floods of recurrence intervals of 10 years, which deposited alluvial bars at low enough elevation to remain moist enough to provide for establishment of seeds, but were high enough to allow cottonwoods to survive floods and ice jams in subsequent years (Scott et al. 1997). Cottonwood and willow seeds are light and windborne, and have few reserves for growth, so landing on the recently flooded alluvial bars and racing the declining limb of the hydrograph with root development is how they survive. Once established, these plants build floodplains by trapping sediment during high flows. By slowing flood flows, they allow for deposition of more alluvial bar habitat, and natural stands of cottonwoods and willows are often present in arcuate bands, with the older trees and shrubs at higher elevations.

FIGURE 77. EXAMPLE OF NATURAL RECRUITMENT OF COTTONWOOD AND WILLOWS ON A RECENT ALLUVIAL BAR HABITAT ON THE YELLOWSTONE RIVER.

The site characteristics were unsuitable for establishment of cottonwoods, willows, dogwood, or alders. As the project area is a low terrace (Thatcher et al. 2009) and not a recent alluvial bar, the setting is too high for natural colonization of cottonwood or sandbar willow. The proposed intent of the application was to emulate natural colonization; however, the plants were placed at varying elevations on a sloped, comparatively high bank in a relatively straight reach, as compared to low

elevations on a point bars on the inside of a channel meander. Trees and shrubs planted higher on the bank would need to grow roots that reached the alluvial aquifer in one season or be irrigated until their roots reached groundwater, as the cobble-dominated stream banks are well-drained once above the water line. Even with supplemental irrigation provided by the adjacent landowners, survival of plantings was negligible. Establishing roots into the water table the first year is critical for recruitment of cottonwoods and willows.

The highly altered nature of this reach also likely contributed to failure of the plantings to take hold. Repeated dredging resulted in a trapezoidal channel, which is atypical of natural channels on the Yellowstone River. This high energy reach differs substantially from low lying point bars where willows and cottonwoods recruit naturally.

The selection of alders for planting in bundles was an inappropriate choice. Alders are not among the riparian shrubs commonly encountered on the Yellowstone River (Merigliano and Polzin 2003), although they are common on smaller streams in the region. Alders are intolerant of inundation (Kaelke and Dawson 2003), so plants placed below the bank-full margin would be unlikely to survive. Using early colonizing species, like cottonwoods and sandbar willow, is a better choice to jumpstart recovery of a riparian corridor. Alders and dogwoods are later successional species and will likely colonize on their own at suitable sites.

Considering the tremendous amount of high quality habitat within this reach of the Yellowstone River, the fisheries benefit, had it worked, would likely have been minor. Protecting land and infrastructure along this uncontrolled, wild river will continue to be a challenge to landowners, ditch companies, and road departments. Actions to protect land and infrastructure is subject to permitting through the Army Corps of Engineers, the Park Conservation District, and FWP. Parties seeking land protection should work with these entities on developing a site-specific approach. Land protection with isolated and likely biologically insignificant benefits to fisheries is not an effective use of limited FFIP funds.

YELLOWSTONE CUTTHROAT TROUT MONITORING CONCLUSIONS

This report covers evaluation of 3 fish barriers and 2 stream or riparian restoration projects funded at least in part with FFIP funds. All barriers have remained in the streams for at least a decade with a minimum of wear. Site visits found debris removal to be warranted on one occasion. Continued monitoring of fish populations will determine if actions to establish conservation populations of native cutthroat trout have been successful. The flat-fronted barriers have hydraulics that may allow fish to breach the structures, so monitoring should evaluate whether the barriers block all fish.

The Mandeville Creek restoration was highly successful in replacing a straight, polluted ditch with a channel with natural morphology and a functioning and attractive riparian area. The fisheries benefits may be limited, but the cumulative efforts along the stream may have improved water and habitat quality to a point that the stream can support fish. Electrofishing as a demonstration project with high school students, along with electrofishing other restored streams in Bozeman would enhance the educational value of the project.

The effort to stabilize a reach of the Yellowstone River with riparian plantings was unsuccessful. Plantings along are insufficient on a large, uncontrolled river like the Yellowstone River. Furthermore, the setting and species selected for transplant were not suitable for establishment of a riparian forest.

FUTURE FISHERIES IMPROVEMENT PROGRAM COORDINATOR EFFECTIVENESS MONITORING

Arrastra Creek culvert replacement (024-2005)

Arrastra Creek (Lewis and Clark County), a tributary to the upper Blackfoot River, supports spawning runs of bull trout and genetically pure westslope cutthroat trout. Other salmonids present include brown and brook trout. Twin culverts associated with a road crossing located approximately 3.3 miles upstream from the mouth were a barrier to fish movement. This project replaced the existing culverts with a full span bridge, and was completed in 2005 (Figure 78). In 2019, the bridge remained functional and intact. There was more riprap than desired and some downstream erosion, but fish passage was maintained.

FIGURE 78. ARRASTRA CREEK BEFORE (TOP LEFT), AFTER (TOP RIGHT), AND IN 2019 (BOTTOM).

Big Coulee (033-1999)

Big Coulee Creek (Choteau County) supports a remnant, pure population of westslope cutthroat trout. This project created a migration barrier from a natural waterfall to protect the genetic integrity of this population and prevent invasion by non-native brook trout (Figure 79). The waterfall barrier was enhanced in 2002 and 2004, and nonnative brook trout were mechanically removed by electrofishing from 1997 to 2008. Brook trout were found above the barrier in 2015, and intensive annual electrofishing for removal of brook trout has been completed from 2015 to 2020. Since 2015, annual barrier checks have been performed to reduce the plunge pool below the falls and clear out debris from the stream immediately downstream of the falls. Total annual catch of brook trout is declining over the last several years; only 8 individuals were captured in 2019. In 2020, the barrier appeared to be functioning under the current flow conditions.

FIGURE 79. BIG COULEE CREEK BEFORE (L) AND AFTER RESTORATION (R; 2020).

Cameron Creek channel restoration (003-2009)

Cameron Creek (Ravalli County), a tributary to the East Fork Bitterroot River, supports a mixed salmonid fishery, including documentation of fluvial bull trout. A 450-foot reach of the stream was channelized and flowed in a ditch paralleling the highway. This project moved the ditched channel away from the highway and reconstructing an appropriate dimension, pattern and profile, and it was completed in 2010 (Figure 80).

In 2020, most of the channel appeared to be functional. The riparian area was primarily composed of grasses. A livestock crossing was present, but there appears to be some level of grazing throughout. Overall the project appears to be successful, but additional willow colonization is desirable. The impact of wildlife browse is not known.

FIGURE 80. CAMERON CREEK AFTER RESTORATION WAS COMPLETED (L; 2010) AND IN 2020 (R).

Camp Creek (007-1997) (006-1999)

Camp Creek (Ravalli County) was channelized due to highway construction. The stream supports populations of westslope cutthroat and brook trout. This project involved reconstructing the stream and returning the stream to the old channel. The project restored approximately 1.75 miles of stream and was completed in 1999 (Figure 81). In 2020, the riparian condition looked decent around the culvert sites, but the riparian area was overgrazed upstream of the project site. Overall the riparian has a good number of trees and vegetation. However, the multiple culvert installation is not functioning as installed. From aerial imaging, it appears the channel has shifted slightly and is now moving through the culverts at an angle (occured after 2005), likely causing instability and erosion.

FIGURE 81. CAMP CREEK AFTER CONSTRUCTION (L; 1999) AND IN 2020 (R).

Coal Creek fencing (007-1999)

Coal Creek (Ravalli County), a tributary to the West Fork of the Bitterroot River, supports populations of both bull and westslope cutthroat trout. The stream was damaged by grazing, and the project involved construction of approximately 1 mile of jackleg fence to exclude cattle from approximately 0.5 miles of stream. The project was completed in 1999. In 2013 the site was monitored and found to have a mildly incised channel but stable and vegetated streambanks. In 2020 it was very similar to 2013 conditions and the riparian was in good condition (Figure 82).

FIGURE 82. COAL CREEK IN 2013 (L) AND IN 2020 (R).

Darnutzer Slough channel restoration (026-2005)

Darnutzer Slough (Madison County) is a spring creek that enters the Beaverhead River between Twin Bridges and Dillon. The spring creek has been degraded due to previous land management and grazing practices. This project involved installation of riparian fencing to more carefully manage riparian grazing, installation of water gaps, reconstruction of the channel to narrow and deepen the stream, and addition of some woody debris to the channel to improve habitat complexity (Figure 81). Approximately 13,200 feet of stream was treated. A restored spring creek was expected to provide a source of recruitment to the Beaverhead River in a reach where recruitment is severely limited. It was completed in 2006.

When monitored in 2019, the stream had adjusted over time and became wider. It doesn't transport sediment as desired and the channel is now oversized for the streamflow. The channel width is too wide to transport sediment and maintain the stream channel. A lesson learned is ensuring proper stream width for the typical streamflows. Grazing management has been successful.

FIGURE 83. DARNUTZER SLOUGH CHANNEL RESTORATION PROJECT AFTER CONSTRUCTION (L) AND IN 2019 (R). IT HAS WIDENED SINCE CONSRUCTION.

Darnutzer Slough spawning habitat enhancement (030-2011)

Darnutzer Slough (Madison County), a spring-creek tributary to the Beaverhead River that flows though the Osborne ranch, had the potential of providing spawning and rearing habitat to fish residing in the river. In 2006, 18,000 feet of the stream channel was restored in an effort to enhance recruitment of fish to the Beaverhead River, but the lower portion of the restored stream filled in with sediment due to channel conveyance issues and the management of an adjacent irrigation system (project 026-2005). Spawning and rearing habitat within the lower 4,500 feet of channel was degraded as a result. The issues with the irrigation system contributing excessive sediment were addressed in 2010 by converting the system to a center pivot sprinkler. This project resized the lower 4,500 feet of the channel to enhance conveyance of fine sediment, placing additional spawning gravel and installing 160 mature willow transplants (Figure 84). It was completed in 2012.

When monitored in 2019, it was noted that the stream has adjusted over time to be wide and doesn't transport sediment as desired; this is because the channel oversized for flow. However, the ranch is fixing some of the channel and making it narrower. This may improve sediment transport and stream function.

FIGURE 84. DARNUTZER SLOUGH BEFORE CONSTRUCTION (L) AND IN 2019 (R). THE STREAM WIDENED AFTER CONSTRUCTION BUT IS BEING REPAIRED BY THE LANDOWNER.

Devil's Dip Spring Creek channel restoration (027-2015)

Devils Dip Spring Creek (Powell County) is a tributary to Nevada Spring Creek near Helmville. The Nevada Creek drainage was the focus of restoration projects that resulted in improved habitat, decreased water temperature, and westslope cutthroat trout population enhancement. However, Devils Dip Spring Creek remained isolated from Nevada Spring Creek. In this project, the Devils Dip Spring Creek stream channel was restored, the adjacent pond and wetlands areas were isolated, fish passage was improved, and the stream was reconnected to Nevada Spring Creek. The goals of this project were to restore the spring creek, reconnect it to Nevada Spring Creek, and provide uninhibited fish passage through the restored reach. In 2019, the site was monitored for effectiveness and determined to be functioning as intended.

Johnson Creek riparian fencing (005-2014)

Johnson Creek (Silver Bow County) is a tributary to the Big Hole River located near Wise River that supports a slightly hybridized westslope cutthroat trout population, as well as a brook trout population. Cattle trespassing led to trampled stream banks and over-widening of the stream channel. This project installed riparian fencing that tied into existing fencing to eliminate the cattle trespass problem. Approximately 2,200 feet of wire fence and 150 of jack-leg fence was installed (Figure 85). A cattle guard was installed at an access road leading to private property. Livestock are excluded from the riparian corridor. It was completed in 2014.

In 2020, the project site looked very similar. The fencing continues to protect the stream and the riparian area looks highly vegetated and functional. The fencing is in good condition.

FIGURE 85. JOHNSON CREEK FENCE AFTER CONSTRUCTION (L; 2014) AND IN 2020 (R). THE FENCE AND RIPARIAN AREA REMAINS INTACT.

Gleason Creek fish passage (004-2014)

Gleason Creek (Powell County) is a tributary to Nevada Creek located on U.S. Forest Service property near the community of Finn. The stream supports a slightly hybridized population of westslope cutthroat and possibly some limited bull trout use. An existing U.S. Forest Service road culvert on the stream acted as a partial upstream barrier to migrating fish. This project replaced the existing 48-inch culvert with a 137-inch span by 87-inch rise corrugated steel arch pipe (Figure 86). A series of 4 rock weirs were installed inside the new pipe to maintain the stream grade. It was completed in 2014.

In 2020, the site was monitored and noted to be in excellent condition. It has remained intact and is visually similar to its 2014 completion photographs. It continues to maintain unobstructed fish passage.

FIGURE 86. GLEASON CREEK FISH PASSAGE PROJECT BEFORE (TOP LEFT), AFTER (TOP RIGHT; 2014), AND IN 2020 (BOTTOM).

Klondike Creek culvert to bridge (005-2013)

Klondike Creek (Lewis and Clark County) is a tributary to Beaver Creek and ultimately the Blackfoot River located near the town of Lincoln that supports genetically pure westslope cutthroat trout. An existing road culvert on the stream was undersized, acted as a seasonal upstream migration barrier, and caused impairments to the stream channel. This project replaced the existing undersized culvert with a concrete bridge set on concrete footings (Figure 87). It was completed in 2013. In 2019, the project appeared functional, even after a recent fire that impacted the surrounding area.

FIGURE 87. KLONDIKE CREEK CULVERT TO BRIDGE PROJECT BEFORE (TOP LEFT), AFTER (TOP RIGHT; 2013), AND IN 2019 (BOTTOM).

Laird Creek (010-2003)

Laird Creek (Ravalli County) supports a mixed salmonid fishery. Fires in 2000, followed by thunderstorms, caused changes to the stream channel that reduced fish habitat. This project returned the channel to the low point in the valley and stabilized it with a series of rock and log grade controls (Figure 88). It was completed in 2003. In 2010, the riparian condition looked good with medium grazing compliance. In 2020, the riparian area was so vegetated it was difficult to find the photopoints or assess the condition of the stream. It is clear that the project is functioning from a vegetation standpoint. Fish data were not collected as part of this monitoring.

FIGURE 88. LAIRD CREEK AFTER CONSTRUCTION (L; 2003) AND IN 2020 (R).

Little Boulder Creek culvert fish passage (009-2011)

Little Boulder Creek (Ravalli County) is a tributary to Painted Rocks Reservoir that supports bull trout and westslope cutthroat trout. An existing U.S. Forest Service road culvert was determined to be, at least, a partial barrier for upstream fish passage. This project replaced the existing undersized culvert with an open bottom arch bridge that spans the bankfull channel width (Figure 89). It was completed in 2013. In 2020, the culvert looked similar to the installation; the structure is functional, grade control structures are intact, and fish passage is unrestricted.

FIGURE 89. LITTLE BOULDER CREEK AFTER CONSTRUCTION (L; 2013) AND IN 2020 (R).

Madison Spring Creek restoration (015-2002)

Madison Spring Creek (Madison County), which enters the Madison River near the Three Dollar Bridge, supports spawning runs of brown and rainbow trout. The stream was degraded by previous grazing practices. However, a conservation easement was put in place. This project reconstructed the channel to former dimensions, installed riparian fencing to exclude livestock, and improved culverts to facilitate fish passage (Figure 90). Approximately one mile of stream was treated, and the project was completed in 2002.

In 2020, monitoring by FWP staff noted that the upper reach was in much better condition than the lower. The stream is a defined channel and is narrowed to what appears to be appropriate dimensions. The lower section is still wide with some channel braiding and large cobble. Fish passage at the culvert should not be a problem as there was plenty of depth and adequate flow. It does not appear that these areas have been or are being grazed, and there was no shoreline pugging from cattle. The cross braces for the fence at the culvert have been removed, possibly due to lack of grazing. Overall, project compliance is good.

FIGURE 90. MADISON SPRING CREEK IN 2009 (L) AND 2020 (R). THE STREAM HAS ADJUSTED BUT THE RIPARIAN AREA IS IN GOOD CONDITION.

McVey Creek riparian fence and bridge (008-2013)

McVey Creek (Beaverhead County) is a tributary to the Big Hole River located near Wisdom that was the site of a recent effort to re-establish a genetically pure population of westslope cutthroat trout. Grazing management on private and state land properties was improving riparian conditions along the stream, with the exception of several reaches where recovery was slow. This project installed about 0.5 miles of riparian fencing on a reach located on state land where there was a lack of willow cover

(Figure 91). Additionally, the project installed a hardened water gap and replaced an existing road ford with a bridge. It was completed in 2014.

In 2020, FWP staff noted that juvenile willows in the grazing exclosure are popping up and not getting grazed off each year. This photo below is the location of the former ford across the creek that the bridge replaced.

FIGURE 91. MCVEY CREEK AFTER CONSTRUCTION (L; 2014) AND IN 2019. THE RIPARIAN AREA HAS IMPROVED OVER TIME.

Nevada Spring Creek (019-2003) (042-2001)

Nevada Spring Creek (Powell County) was a highly degraded spring creek that enters the Blackfoot River north of Helmville. The stream was previously channelized and became wide and shallow with very little fish habitat, especially for spawning. This project restored over 9,000 ft of Nevada Spring Creek (2001) and then extended the restoration downstream for an additional 10,240 ft (2003). The restored channel was narrower and deeper and was managed as a riparian grazing exclosure (Figure 92).

In 2019, the stream remained functional, with the exception of most of the woody species. It had widened in some places. Willows and woody vegetation had not been established. Overall, the project has been successful but additional woody vegetation and woody recruitment is desired.

FIGURE 92. NEVADA CREEK BEFORE (TOP LEFT [2013]; BOTTOM LEFT [2001]) AND AFTER (TOP AND BOTTOM RIGHT; 2019).

Piney Creek pool enhancement (033-2005)

Piney Creek (Carbon County), which is fed by a spring creek located at the base of the Pryor Mountains, supports an isolated population of Yellowstone cutthroat trout. However, over-wintering habitat was a limiting factor; some pools completely froze. This project excavated and deepened pools with hand tools to provide additional over-wintering habitat. It was completed in 2005.

Genetic analysis from 2019 indicated that they Piney Creek fish are distinct from other populations of Yellowstone cutthroat trout and other brood sources. Once believed to have been a product of bucket biology (intentional fish transfer) associated with a nearby stagecoach stop, it is now believed that the historical landowner did not allow fish stockings, making the Piney Creek fish aboriginal and this population very unique.

Poindexter Slough channel restoration (040-2010) (011-2013) (033-2015)

Poindexter Slough (Beaverhead County) is 4.7-mile-long channel of the Beaverhead River, located near Dillon, fed by a combination of groundwater and water diverted from the river. The project area supports a very popular fishery for rainbow trout and brown trout. FWP surveys on this slough documented a steady decline in trout numbers over the last 12 years. This decline was attributed to impaired riparian conditions and the loss of instream habitat, primarily as a result of stream flow management restricted high spring flushing flows. The slough was traditionally fed by groundwater returning from flood irrigation. As landowners converted from flood to sprinkler irrigation, groundwater inputs decreased, and the slough was supplemented with more water from the Beaverhead River to meet water rights. The diverted water deposited sediment into the slough, which filled pools and inundated riffle habitat. To effectively mobilize and transport these fine sediment deposits, a larger head gate at the top of the slough was installed. Appropriately sized channel dimensions were achieved, and backwatered reaches were eliminated in most of the project area (Figure 93). The project was completed in 2016.

The project was visited in 2019 with FWP staff. Fisheries biologist Matt Jaeger is controlling the headgate and flushing flows. Although the project is successful overall, the channel was built slightly too wide and sediment has accumulated in places. The lesson learned was to build the channel slightly narrower than expected. Poindexter Slough remains a popular, public fishery near Dillon.

FIGURE 93. POINDEXTER SLOUGH AFTER CONSTRUCTION (L; 2016) AND IN 2019 (R).

Poorman Creek culvert replacement (016-2007)

Poorman Creek (Lewis and Clark County) is a highly important tributary located in the upper Blackfoot River watershed. Poorman Creek is a bull trout spawning stream and also supports genetically pure westslope cutthroat trout. Culverts on a road crossing located about 2.8 miles upstream from the mouth acted as a barrier to fish migration. This project replaced these culverts with a full span bridge (Figure 94). The project was completed in 2009. In 2019, the bridge was functional and fish passage remained unobstructed.

FIGURE 94. POORMAN CREEK BEFORE (TOP LEFT) AND AFTER CONSTRUCTION (TOP RIGHT; 2009). THE BRIDGE WAS IN GOOD CONDITION IN 2020 (BOTTOM).

Prickly Pear Creek (023-2000) (017-2008)

Prickly Pear Creek (Lewis and Clark County) located in the Helena valley supports a mixed trout fishery. The reach that flows through the Burnham Ranch suffered from a variety of problems caused by adjacent land management practices. In 2001, a restoration project was completed on the Burnham section. The owner entered into a Conservation Reserve Program (CRP) agreement with the Natural Resources Conservation Service (NRCS) that resulted in cattle being excluded from streamside areas for a minimum of 10 years to allow riparian areas to recover. This project installed riparian fencing and native material revetments, revegetated selected areas with willow clumps, and re-aligned and narrowed of portions of the channel to facilitate sediment transport and improve fish habitat (Figure 95). Approximately 2,100 ft of stream was treated.

In 2008, a project to enhance instream flow was completed. This project shut down an irrigation system that used approximately 30 cfs of Prickly Pear Creek water and replaced it with Canyon Ferry Water purchased from the Bureau of Reclamation. This project helped maintain a wetted perimeter in Prickly Pear Creek during critical late summer and early fall periods.

In 2020, FWP staff electrofished the reach as part of routine sampling. Surveys since 2010 in the Burnham section indicate the sustained presence of a highly migratory population of rainbow trout in the spring and a well-established and increasing population of brown trout (Figure 96). Rainbow trout catch per unit effort has decreased since 2010 while brown trout catch per unit effort has increased. The effects of whirling disease have become more established, which is likely affecting the abundance of rainbow trout. In 2018, a fish barrier was removed downstream of this site.

FIGURE 95. PRICKLY PEAR CREEK AFTER COMPLETION (L; 2001) AND AFTER CONSTRUCTION (R; 2020).

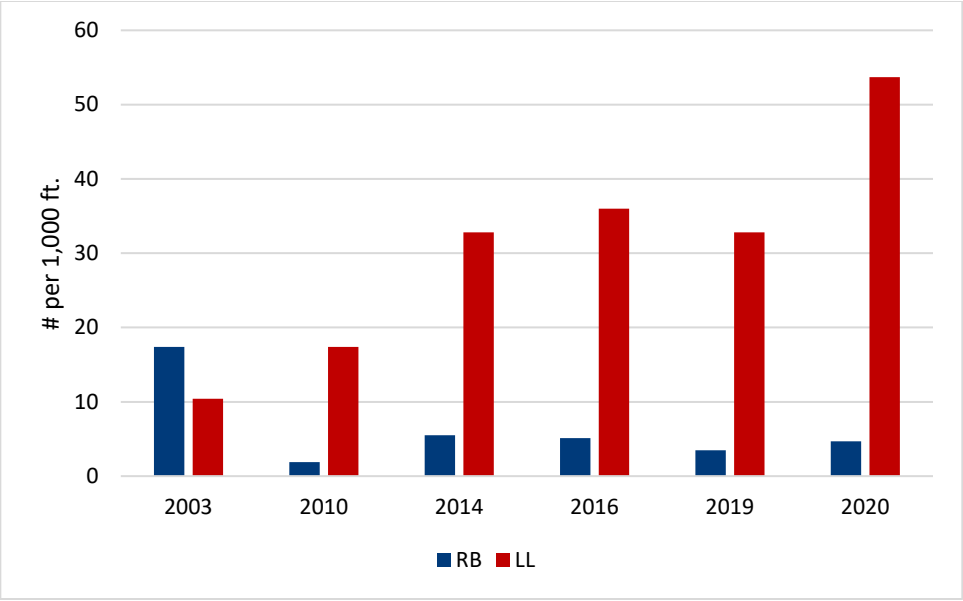

FIGURE 96. POPULATION SURVEY (CATCH PER UNIT EFFORT; FISH PER 1,000 FT.) FOR RAINBOW (RB) AND BROWN (LL) AT THE BURNHAM RANCH SECTION ON PRICKLY PEAR CREEK, 2020. DATA COURTESY OF ADAM STRAINER, FWP.

Rattlesnake Creek (013-2001)

Rattlesnake Creek (Missoula County) is a tributary to the Clark Fork River near Missoula. Over the years the lower reaches were channelized to accommodate urban development. Although heavily impacted, portions of the urban channel continued to be used for spawning by Clark Fork River fishes particularly one side channel. This project used a variety of techniques to maintain spawning habitat in side channels, improve fish passage, and reduce urban flooding. It was completed in 2002.

This project was visited in 2020 and looked very similar to monitoring completed in 2015 (Figure 97). There is high riparian stability and established vegetation. There is significant woody debris present in the main channel and accumulating in the side channel.

FIGURE 97. RATTLESNAKE CREEK CHANNEL RESTORATION BEFORE CONSTRUCTION (TOP LEFT), AFTER CONSTRUCTION (TOP RIGHT; 2009), 2015 (BOTTOM LEFT), AND IN 2020 (BOTTOM RIGHT).

Rattlesnake Creek fish ladder (021-2002)

Rattlesnake Creek (Missoula County) supports important spawning runs of both bull and westslope cutthroat trout from the Clark Fork River. A ten-foot-high diversion dam that supplied water for the city of Missoula prevented migrant fish from gaining access to the upper 15 miles of Rattlesnake Creek. This project constructed a fish ladder that allowed migrant spawners to move upstream (Figure 98). The project was completed in 2003; FWP staff have monitored passage periodically.

In 2020, the project site was visited in preparation for dam removal (008-2019). Because removal of the dam will provide unrestricted fish passage, this project will be removed and considered obsolete (expired).

FIGURE 98. RATTLESNAKE CREEK FISH LADDER AFTER CONSTRUCTION (TOP LEFT; 2003), IN 2014 (TOP RIGHT) AND IN 2020 (BOTTOM). THE FISH LADDER WAS REMOVED IN 2020 WITH THE REMOVAL OF RATTLESNAKE DAM.

Rattlesnake Creek fish screen (034-2015)

Rattlesnake Creek (Missoula County) is a tributary to the Clark Fork River and contains bull trout, westslope cutthroat trout, rainbow trout, brook trout, brown trout, and mountain whitefish. Within Rattlesnake Creek, several irrigation diversions are active, and most of them are screened. This project addressed the Hughes-Fredline diversion, which was unscreened and entrained many salmonids. This project installed a coanda fish screen on the side channel upstream of the ditch to prevent fish entrainment (Figure 99). Additionally, the culvert was replaced and a formal headgate was installed, allowing water levels to be controlled. The bank was graded and revegetated. The project was completed in 2015.

The site was monitored in 2020 and the screen appeared to be in good condition and functional. Vegetation at the site has been established and there are several enclosures for woody plants. The headgate inlet still has some bank erosion but overall the project appears to be successful.

FIGURE 99. RATTLESNAKE CREEK FISH SCREEN AFTER CONSTRUCTION (L; 2015) AND IN 2020 (R).

Rock Creek channel restoration (014-2001)

Rock Creek (Powell County), a tributary to the North Fork Blackfoot River, is an important spawning stream for bull trout and westslope cutthroat trout as well as supporting brown and rainbow trout. Much of the stream was previously restored. This project restored about 1.1 miles of stream located several miles upstream from the mouth. Treatments included fencing, off-stream water development, revegetation, channel reconstruction, irrigation diversion upgrades, and installation of a more efficient irrigation system (Figure 100). The project was completed in 2001.

The project site was monitored in 2019 and had limited woody recruitment and some erosion. Big Blackfoot Chapter of Trout Unlimited intends to address this project and improve woody habitat with a future project. It has been successful relative to the pre-project conditions, but there is significant room for improvement.

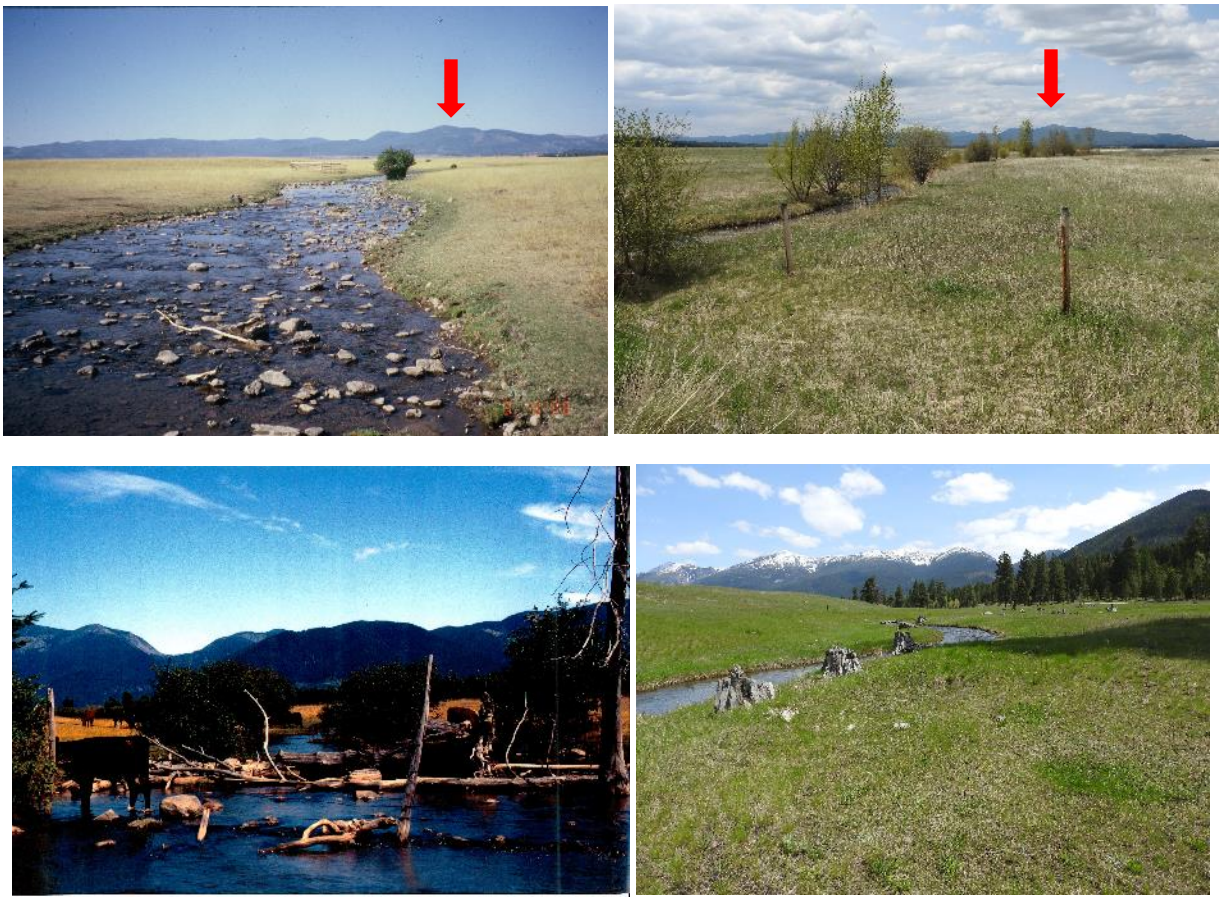

FIGURE 100. ROCK CREEK BEFORE (TOP LEFT; BOTTOM LEFT) AND AFTER RESTORATION (TOP RIGHT; BOTTOM RIGHT, TAKEN IN 2019). RED ARROWS INDICATE THE SAME MOUNTAIN RANGE / PERSPECTIVE.

Rock Creek ford to culvert conversion (034-2007)

One of the most important tributaries to the North Fork of the Blackfoot River supports a mixed salmonid fishery that includes bull and westslope cutthroat trout. A stream ford located about four miles upstream from the mouth was unstable and a significant source of sediment to the stream. This project replaced the ford with a pipe arch culvert (Figure 101). The project was completed in 2008.

The project site was visited in 2019, in conjunction with 014-2001. The culvert remains in place and is functional. There is some downstream erosion present.

FIGURE 101. ROCK CREEK CULVERT IN 2013 (L) AND 2019 (R). THE CULVERT IS INTACT BUT THERE IS SOME DOWNSTREAM EROSION.

Ruby River channel stabilization (008-2012)

The Ruby River (Madison County) located downstream from Ruby Reservoir, supports a mixed trout fishery. Portions of the river located on the Miller Ranch historically were straightened and the riparian vegetation removed to make more room for farming. This project reconstructed the straightened channel to increase sinuosity from 1.2 to 1.8 by lengthening the channel from approximately 2,000 feet to 3,500 feet. The project also relocated an existing feedlot away from the river channel, installed about 7,000 feet of riparian fencing and constructed a bridge (Figure 102). It was completed in 2015.

In 2019, the project site was visited as part of the FFIP project tour. The site was in good condition and functional. The riparian area has been maintained and livestock management has been successful.

FIGURE 102. RUBY RIVER CHANNEL BEFORE CONSTRUCTION (TOP LEFT), AFTER CONSTRUCTION (TOP RIGHT; 2015), AND IN 2019 (BOTTOM).

Shields River fish barrier (008-2014)

The Shields River (Meagher County) is one of the few remaining strongholds for native Yellowstone cutthroat trout. However, expanding brook trout populations were threatening the persistence of these native fish, especially in the headwaters. This project constructed a fish migration barrier at an existing U.S. Forest Service road crossing located within the Shields River headwaters, just downstream from the confluence of Crandall Creek. The barrier structure is a precast box culvert that replaced an existing bridge and created a 4.2-foot drop from the end of the apron (Figure 103). A 130-foot long berm was installed along the west side of the channel to protect the existing road. By-pass pipes were installed within the berm and in the existing road to allow for drainage during flows that exceed bank full. Non-native brook trout will be removed from upstream waters by electro-fishing and by the use of piscicides and replaced with Yellowstone cutthroat trout. The barrier was designed to be

removable should there be an opportunity to expand Yellowstone cutthroat trout conservation efforts to downstream waters. The project was completed in 2017 but additional plantings and maintenance continued into 2020. The spillway had to be sealed to ensure it is only accessible during flood conditions and a berm at the south east side of the campground was installed to prevent a spring from flowing through the campground to an unnamed tributary and allowing fish to circumvent the barrier. The barrier has required some maintenance but has been successful overall.

FIGURE 103. SHIELDS RIVER BARRIER BEING INSTALLED (L) AND AFTER CONSTRUCTION (R; 2019).

Silver Butte Fisher River bank stabilization (053-2000)

Silver Butte/Fisher River (Lincoln County) supports cutthroat trout and some bull trout. The stream was unstable in the project area due to past grazing and land use. This project stabilized the bank using rock vanes, J-hook weirs, and rootwads. Riparian fencing was also installed (Figure 104). The project was completed in 2001.

In 2020, FWP staff visited the site and spoke with the landowner's son, visiting the project on the east side of Silver Butte Creek. The lower two-thirds of the project is in good shape with the installed root-wads intact and some natural alder becoming established. Some of the installed root-wads in the upper third of the project area have been undercut and are perched above the water surface. The landowner's son said a tree fell at the upper end of the project site this spring, which ended up somewhat protecting the upper end of the site. There is some concern about the upper 1/3 of the project site, but currently it does not look like there is significant erosion. For a project that is 19 years old, it has been successful overall.

FIGURE 104. SILVER BUTTE/FISHER RIVER BEFORE CONSTRUCTION (TOP LEFT), AFTER CONSTRUCTION (TOP RIGHT; 2001), AND IN 2020 (BOTTOM). MOST OF THE PROJECT REMAINS INTACT BUT THERE IS SOME EROSION.

South Fork Poorman Creek road relocation (015-2013)

South Fork Poorman Creek (Lewis and Clark County), a tributary to Poorman Creek located in the upper Blackfoot River drainage, supports populations of genetically pure westslope cutthroat trout and bull trout. Aquatic habitat on the South Fork was negatively affected by existing road locations and undersized culvert crossings, creating excessive sediment delivery to the stream and hindering upstream fish migration. This project relocated 2,400 feet of road out of the South Fork Poorman Creek floodplain. The new location eliminated five stream crossings (four fords and one undersized culvert) and replaced them with a single stream crossing located on the West Fork of the South Fork Poorman Creek (Figure 105). The bed and banks, located at each of the existing stream crossings that were abandoned, were restored. The project was completed in 2014.

In 2020, the site was functional and recovering. There were some weeds in the area but overall the project is functioning as intended. The new road is intact and old road has vegetation established.

FIGURE 105. SOUTH FORK POORMAN CREEK AFTER CONSTRUCTION (L; 2014) AND IN 2020 (R).

Theodore Creek Fish Passage Improvement (018-2015)

Theodore Creek (Lewis and Clark County) is a tributary to Beaver Creek and supports fluvial, genetically pure westslope cutthroat trout. Bull trout were also historically found in the system. This project replaced an undersized culvert that impeded fish passage during high flows with a pre-stressed concrete bridge structure that created year-round connectivity and natural stream conditions (Figure 106). This project was completed in 2015.

In 2019, this project appeared to be functional and having no sign of erosion. The stream profile has been maintained and the grade control is intact. Fish passage is unobstructed.

FIGURE 106. THEODORE CREEK BEFORE THE BRIDGE WAS INSTALLED (TOP LEFT), AFTER CONSTRUCTION (TOP RIGHT; 2015) AND 2019 (BOTTOM).

Warm Springs Creek culvert to bridge (040-2009)

Warm Springs Creek (Ravalli County), a tributary to the East Fork Bitterroot River near Sula, supports westslope cutthroat trout and bull trout populations. The cutthroat trout are hybridized with rainbow trout in the lower reaches of the stream and are genetically pure in the upper reaches. A U.S. Forest Service culvert located about one mile upstream from the mouth acted, at least, as a partial migration barrier to the upstream movement of juvenile trout and adult bull trout. This project replaced the existing undersized and perched culvert with a 50-foot bridge (Figure 107). It was completed in 2011.

In 2020, the site was monitored. The bridge is in good condition and stream is functional. Vegetation is established immediately upstream and downstream and there was no visible erosion. Fish passage is unobstructed.

FIGURE 107. WARM SPRINGS BRIDGE AFTER CONSTRUCTION (L; 2011) AND IN 2020 (R).

Willow Springs Creek (034-2004)

Willow Spring Creek (Jefferson County), located on the Joe Adams property, is an important spawning stream for Jefferson River rainbow trout. A lack of suitable spawning sites was limiting the fishery. Spawning habitat was improved by importing gravel into the spring creek as well as into several smaller tributaries. The project also included channel improvements and riparian fencing. About 4,500 ft of channel was treated (Figure 108). It was completed in 2005.

In 2020, the site was visited with FWP biologist Ron Spoon, who has been collecting redd data on this stream and population data on the Jefferson river. Overall the project is in great condition with a healthy riparian area. The fencing is intact, and vegetation is healthy. There are some invasive weeds in and out of the riparian area. There has been some predation by pelicans, so flagging has been used to dissuade them from taking spawning fish.

FIGURE 108. WILLOW SPRINGS CREEK BEFORE (TOP LEFT), AFTER CONSTRUCTION (TOP RIGHT; 2005) AND IN 2020 (BOTTOM). RED ARROWS DENOTE COMMON FEATURES.

Yukon Creek Fish Passage Improvement (022-2015)

Yukon Creek (Lewis and Clark County) is a tributary to Beaver Creek and supports fluvial, genetically pure westslope cutthroat trout. This project addressed an existing stream crossing that was undersized, impeded fish passage during high flows, and impaired the channel. The existing 60-inch culvert was replaced with a bottomless arch structure large enough to pass 100-year flood events. The goals of this project were to develop a stable stream crossing that would correct road drainage problems, eliminate delivery of excessive sediment, provide fish passage, and restore natural channel morphology to the site (Figure 109). It was completed in 2015.

In 2019, the site was monitored. The project was intact and functional. Fish passage continues to be unobstructed, grade control structures are in place, and the stream looks similar to site completion.

FIGURE 109. YUKON CREEK FISH PASSAGE BEFORE CONSTRUCTION (TOP LEFT), AFTER CONSTRUCTION (TOP RIGHT; 2015), AND IN 2019 (BOTTOM).

OVERALL CONCLUSIONS

Monitoring completed by the YCT-I, FFIPC or FWP staff found generally successful projects. A few projects, however, were not successful or had unsuccessful components, typically related to treatments that did not work effectively in the particular location they were used. Projects that did not consider the watershed, surrounding stream, or the behavior of the stream in question had a higher rate of failure.

Many of the projects reviewed as part of this report provided valuable information to the FFIP and will help guide future funding decisions. The greatest benefit from effectiveness and implementation monitoring is to learn what works, what doesn't, and why. Much has been learned from the FFIP since 1996, making project review by FWP staff, the Panel, and the Commission a constantly improving process.

EFFECTIVENESS MONITORING

Overall, project applicants tend to be in compliance with their project agreements. Some project components have shifted or changed, often due to the needs of the landowner, but the intent of the project remains intact in most cases. The success of the FFIP has been overwhelming, and a significant positive impact has been made to the waters of Montana due to the Program and its partners.

EXPIRED PROJECTS

Expired Projects

Project agreements are developed with an anticipated project life of 20 years. There can be exceptions, however, as is the case for certain types of projects like instream flow leases or lake habitat enhancement (e.g. Christmas trees begin to degrade upon installation). Unless a shorter duration agreement is approved, projects are expected to be maintained for 20 years and the applicant or landowner must agree to those terms to receive funding.

The first FFIP projects were initiated in 1996; therefore, certain projects began to reach their 20-year commitment in 2016. The 20-year commitment begins when a project is completed. Each year there are more projects that will reach the end of their contractual life. The projects that expired in 2019 and 2020 are listed below (Table 10).

Once a project is expired, the status is updated in the database and the project file is kept for an additional five years. After five years has passed, the file will be uploaded electronically, and the paperwork will be moved to record storage for an additional five years.

TABLE 10. FFIP PROJECTS THAT EXPIRED IN 2019 OR 2020.

PROJID	Project Name	Application Year	Completed
001-1997	Elk Creek	1996	1999
017-1996	Deep Creek Channel Restoration	1996	1999
021-1996	Mulherin Creek Flow Enhancement	1996	1999
023-1997	Elk Creek	1996	1999
024-1997	Big Spring Creek	1996	2000
025-1996	Nelson Reservoir	1996	1999
050-1996	Beaverhead River	1996	1999
007-1998	Canyon Ferry Lake Perch Spawning Structures	1997	1999
012-1998	Highwood Creek restoration	1997	1999
018-1997	Mulherin Creek infiltration gallery	1997	1999
026-1997	Richardson Creek	1997	2000
037-1997	Cottonwood Creek barrier removal	1997	1999
045-1997	Mill Coulee Creek restoration	1997	2000
051-1997	Boulder River migration barrier	1997	1999
18a-1998	Spring Creek Diversion	1997	1999
18c-1998	North Fork Blackfoot River channel restoration	1997	1999
001-1999	Big Hole River flow enhancement.	1998	1999
004-1999	Butler Creek riparian enhancement	1998	1999
005-1999	Bynum Reservoir spawning structures	1998	1999
008-1999	Cottonwood Creek bank stabilization	1998	1999
018-1999	Prickly Pear Creek restoration	1998	1999
020-1999	Rock Creek	1998	1999
024-1999	Sun River bank stabilization	1998	1999

EXPIRED PROJECTS

PROJID	Project Name	Application Year	Completed
026-1998	Spring Coulee Creek	1998	2000
027-1998	Big Creek Flow Enhancement	1998	2000
027-1999	Lower Willow Creek	1998	1999
029-1998	Blackfoot River off stream watering	1998	1999
030-1998	Cottonwood Creek	1998	1999
031-1998	McCabe Creek large woody debris	1998	1999
036-1998	Spring Creek - Nevada Spring Creek bridge	1998	1999
037-1998	Rock Creek	1998	1999
038-1998	Shanley Creek fencing	1998	1999
039-1998	Wasson Creek fish friendly diversion	1998	1999
042-1998	Careless Creek	1998	1999
045-1998	ESP/Chambers Spring Creek	1998	1999
051-1998	Ross Fork fish ladder	1998	1999
052-1998	Saddle Brook Pond	1998	1999
053-1998	Shields River and Elk Creek fencing	1998	1999
055-1998	Spokane Creek	1998	1999
056-1996	Canyon Creek Bank Stabilization	1998	1999
056-1998	Staubach Creek fish barrier	1998	2000
057-1998	Sweet Grass Creek fencing	1998	1999
005-2000	Bitterroot River Riparian Fence	1999	2000
006-1999	Camp Creek restoration	1999	1999
007-1999	Coal Creek fencing	1999	1999
012-1999	Elk Creek restoration	1999	1999
021-1999	Ruby River feed lot relocation	1999	1999
025-1999	Tenmile Creek revegetation	1999	1999
028-1999	Yellowstone River	1999	1999
031-1999	Beaverhead River	1999	2000
035-1999	Canyon Ferry Lake spawning structures	1999	2000
039-1999	Daisy Dean Creek off stream watering and fencing	1999	2000
041-1999	Elk Creek restoration	1999	2000
045-1999	Little Prickly Pear Creek	1999	2000
049-1999	Monture Creek	1999	2000
051-1999	O'Brien Creek	1999	2000
052-1999	Pearson Creek	1999	2000
054-1999	Racetrack Creek riparian fence	1999	2000
057-1999	Spring Creek	1999	2000
058-1999	Salmo Reservoir	1999	2000
059-1999	Shields River	1999	2000
066-1999	Staubach Creek	1999	2000
007-2000	Bynum Reservoir spawning habitat	2000	2000
008-2000	Canyon Creek	2000	2000
012-2000	Dupuyer Creek channel restoration	2000	2000
027-2000	Ruby Creek flow enhancement	2000	2000

EXPIRED PROJECTS

PROJID	Project Name	Application Year	Completed
030-2000	Stillwater River side-channel restoration.	2000	2000
033-2000	Tenmile Creek riparian restoration	2000	2000
059-2000	Region 6 ponds	2000	2000

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