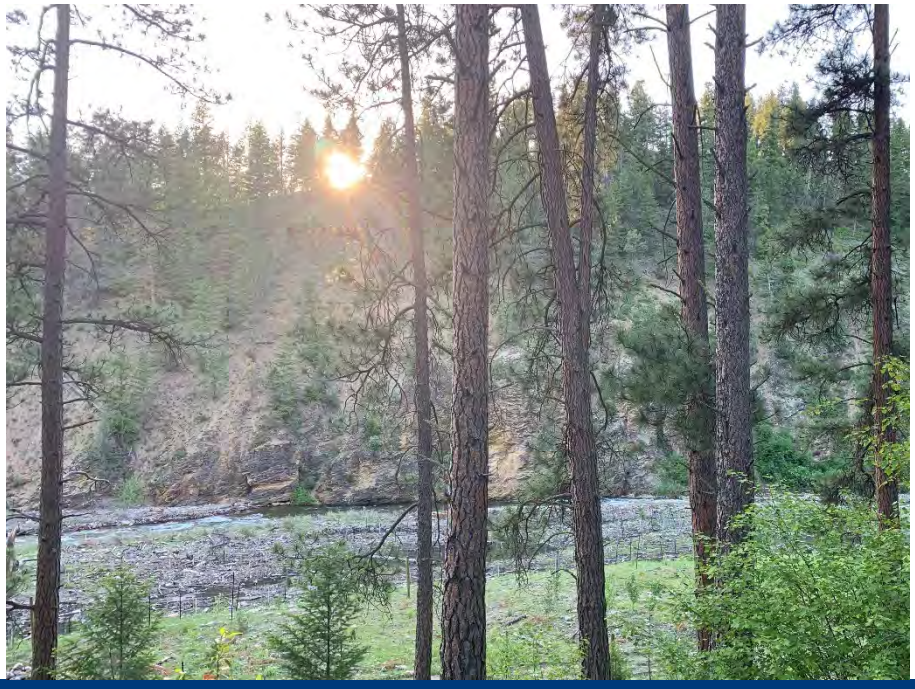

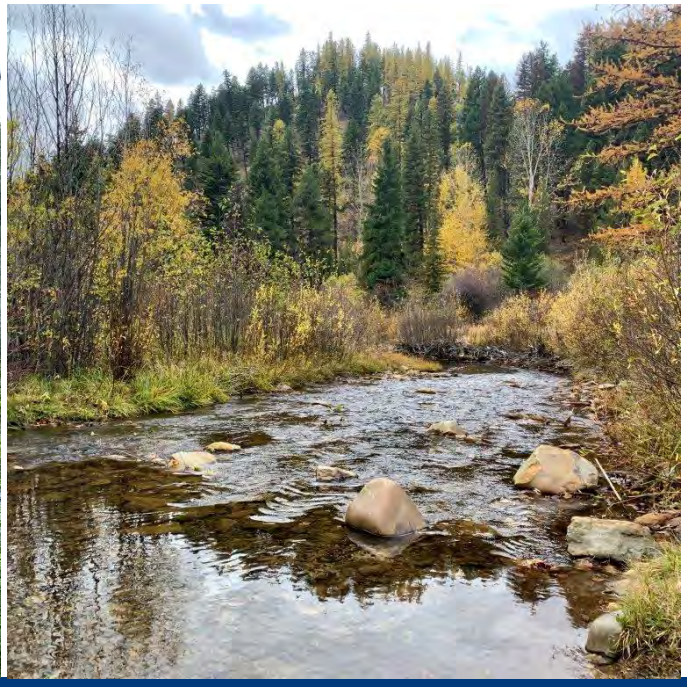

Future Fisheries Improvement Program Interim Report | 2021

Summary of Program activities from November 1, 2020 to December 31, 2021

Montana Fish, Wildlife and Parks
Fish Habitat Bureau
Fisheries Division

January 2022

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PROGRAM INFORMATION

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.

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.

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.

Appropriations & Awards

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).

PROGRAM INFORMATION

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. 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.

FUNDING AWARDS

In 2021, $538,669 in FFIP grants was awarded. Together with matching funds, that resulted in an $5.28 million in restoration projects. Since implementation of the FFIP in 1996, the Commission approved $17.8 million for restoration projects that are ongoing or completed which, in turn, generated over $61 million in available matching funds (Figure 1). In total, ***$81.8 million of habitat restoration has been undertaken in Montana since 1996 in partnership with FFIP.***

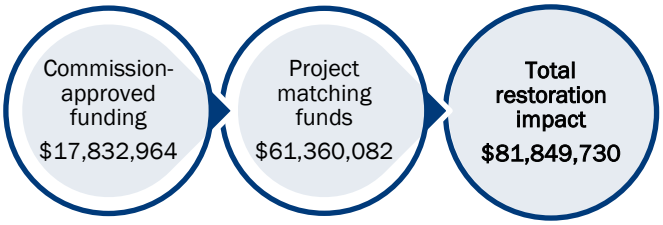

FIGURE 1. APPROVED FUNDING, MATCHING FUNDS, AND TOTAL DOLLARS SPENT ON COMPLETED OR ONGOING FUTURE FISHERIES IMPROVEMENT PROGRAM PROJECTS, SINCE 1996.

2021 FUNDED PROJECTS

Approved and Completed Projects

2021 FUNDED PROJECTS

During the period of this report, the Commission approved funding or partial funding for 21 FFIP restoration projects totaling $538,669 (Table 7). These projects derived an additional $3,241,337 in matching funds and in-kind services from outside sources and had a total value of more than $5.25 million dollars. Of the 21 restoration projects approved, 9 were funded under the FFIP with base license (River Restoration Fund) dollars, and 12 were funded under the NSEP with RIT funding. Narrative descriptions of individual projects can be found in the following section.

TABLE 1. APPROVED PROJECTS LISTED BY NAME AND PROJECT NUMBER (FFIP #); FUNDING CYCLE WINTER 2021 (W21), SUMMER 2021 (S21). RIT = RESOURCE INDEMNITY TRUST FUND, RR = RIVER RESTORATION FUND. PROJECTS IN BOLD WERE COMPLETED IN 2021.

	FFIP #	Cycle	Project Name	**FFIP Grant**	Matching	Total Committed	Source
1	001-2021	W21	**Big Hole 40 Bar streambank restoration**	**$15,000**	$100,337	$115,337	RR
2	002-2021	W21	East Fork Bitterroot River riparian revegetation	**$9,000**	$65,907	$767,384	RR
3	003-2021	W21	Elk Springs Creek restoration phase 2	**$29,550**	$35,000	$64,550	RR
4	004-2021	W21	Lake Elmo fish habitat supplement	**$6,299**	$75,000	$476,600	RR
5	005-2021	W21	Little Gold Creek culvert replacement supplement	**$10,000**	$40,222	$79,697	RR
6	006-2021	W21	**Poorman Creek culvert replacement**	**$31,000**	$273,886	$304,886	RR
7	007-2021	W21	South Fork Lower Willow Creek fish passage	**$20,900**	$37,380	$83,485	RR
8	009-2021	S21	**Andrus Creek fish barrier**	**$18,340**	$11,225	$69,821	RIT
9	010-2021	S21	Beaver Creek restoration phase 2	**$50,000**	$435,938	$498,211	RR
10	011-2021	S21	Big Hole Daniels Ditch fish screen	**$30,000**	$66,545	$96,462	RIT
11	012-2021	S21	Big Hole Spokane Diversion flow improvement	**$33,360**	$61,955	$105,316	RIT
12	013-2021	S21	**Clark Fork River Flynn-Lowney ditch water savings**	**$50,000**	$890,000	$990,000	RIT
13	014-2021	S21	Lake Elmo hab enh supplement 2	**$33,700**	$345,000	$495,506	RR
14	015-2021	S21	Lick Creek culvert replacements	**$50,000**	$159,665	$209,665	RIT
15	016-2021	S21	**Little Park Creek restoration and WCT conservation**	**$20,000**	$18,000	$38,100	RIT
16	017-2021	S21	Mill Creek fish barrier	**$50,000**	$305,000	$437,568	RIT
17	018-2021	S21	**Miller Creek Bear Run stream restoration**	**$15,000**	$95,900	$129,000	RIT
18	019-2021	S21	Placid Lake outlet barrier improvement	**$10,020**	$11,800	$21,820	RIT
19	020-2021	S21	SF Dry Cottonwood Creek road 85 fish passage	**$34,000**	$48,000	$87,636	RIT
20	021-2021	S21	Trail Creek fish passage	**$14,300**	$127,478	$141,778	RIT
21	022-2021	S21	Willow Creek fish passage	**$8,200**	$37,098	$45,298	RIT
TOTAL				**$538,669**	$3,241,337	$5,258,120	

2021 FUNDED PROJECTS

2021 Funded Project Descriptions

Big Hole 40 Bar streambank restoration (001-2021)

The Big Hole River (Beaverhead County) is a tributary to the Jefferson River. The project site is near Jackson in the upper Big Hole Valley and contains populations of westslope cutthroat trout, western pearlshell mussel, and Arctic grayling. This project intends to reestablish a functional riparian corridor to improve stream habitat for Arctic grayling, prevent future infrastructure loss for downstream infrastructure, and serve as a demonstration project for potential future restoration. The proposed restoration is part of a larger effort to restore and enhance native fish (including the Candidate Conservation Agreement with Assurances [CCAA] program). The 40 Bar Ranch is not enrolled in the CCAA and is not eligible for funds, but has some of the lowest riparian vegetation scores. Past land use practices and infrastructure (i.e., grazing, haying, roads, bridges) contributed to the impaired habitat and riparian vegetation. The project would address 1,260 feet of riparian area along three reaches. Streambanks will be regraded with a minimum slope of 2:1, mature willow will be planted at baseflow and bankfull elevations. Cobble will be installed at the toe of the streambanks. Willow stakes and sedge mats will also be transplanted. Disturbed areas will be seeded with native riparian species. Electric fence will be installed around each of the restored streambanks to prevent lateral erosion from livestock grazing and trampling and long term grazing management will incorporate long term maintenance. **COMPLETED; $15,000, BIG HOLE WATERSHED COMMITTEE**

FIGURE 2. THE BIG HOLE 4O BAR PROJECT BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF THE BIG HOLE WATERSHED COMMITTEE.

2021 FUNDED PROJECTS

East Fork Bitterroot River riparian revegetation (002-2021)

The East Fork Bitterroot River (Ravalli County) is a tributary to the Bitterroot River and contains bull trout, westslope cutthroat trout, rainbow trout, brown trout, and mountain whitefish. The project area was affected by riparian grazing and road infrastructure adjacent to the stream and currently has less than 25% vegetative cover. Poor water quality due to high sediment loads, elevated water temperatures, and alterations in streamside vegetation have impaired aquatic life. This project would address these issues by planting riparian vegetation along 1.6 miles of the East Fork and by treating two eroded streambanks near Edwards Road. Riparian fencing and grazing management will be incorporated into the bank treatment plan. The goal is to improve aquatic habitat and water quality in the East Fork. This project builds upon previous restoration work and includes opportunities for education, outreach, and developing partnerships. **ONGOING; $9,000, BITTER ROOT WATER FORUM**

Elk Springs Creek restoration phase 2 (003-2021)

Elk Springs Creek (Beaverhead County) is located in the Centennial Valley and is a tributary to Upper Red Rock Lake. It contains brook trout, white suckers, sculpin, burbot, and Arctic grayling. Historically, it supported one of Montana's most prolific Arctic grayling spawning populations and the location is within the Red Rock Lakes National Wildlife Refuge. In the 1950's, an on-channel pond (MacDonald Pond) was constructed on Elk Springs Creek to increase waterfowl habitat. Elk Springs Creek was subsequently degraded due to sedimentation and the shift from stream to pond habitat. MacDonald Pond was removed in 2009 and in 2016, fifteen hundred feet of the formal stream channel was restored. This project would reconstruct the final 1,750 feet of formerly inundated channel. The channel is currently over widened, shallow, unable to transport the large volumes of lake bed and alluvial deposits that remain, and encourages the growth of macrophytes. The degraded condition holds few resident fish and impedes Arctic grayling from moving upstream. The goal is to complete restoration of Elk Springs Creek by improving stream function and the Arctic grayling population, as part of the Arctic grayling recovery plan in Montana. The previous phase resulted in dramatic increases in salmonid abundances, decreased water temperature, increased and stabilized dissolved oxygen, and improved fish migrations. **ONGOING; $29,550, FWP**

Lake Elmo fish habitat supplement (004-2021)

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 intends to 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. This project received $40,000 in the Summer 2020 cycle for the highest priority habitat structures. **ONGOING; $6,298.84, FWP**

Little Gold culvert replacement supplement (005-2021)

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 could be reconnected to Boulder Creek and then, Flint Creek. The applicant proposes to 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. This project was fully funded in the Summer 2020 cycle for $29,475 but a reduction in match funding led to additional funds needed for project completion. This is a supplemental request. **ONGOING; $10,000, CLARK FORK COALITION**

Poorman Creek culvert replacement (006-2021)

Poorman Creek (Lewis & Clark County) is a tributary to the Blackfoot River and is a critical bull trout habitat stream that supports fluvial bull trout and genetically pure westslope cutthroat trout. Several restoration projects have taken place in Poorman Creek over the last 15 years. This project would replace an undersized culvert stream crossing with a precast concrete bridge. The proposed design would mimic the natural stream channel and establish aquatic connectivity. Fill slopes and streambanks would be restored with sod mats, transplants, and seed mix. The current, undersized culvert has a diameter of 4 feet and the project would establish a bankfull width of 18 feet. The goal of this project is to restore access to the upper three miles of Poorman Creek for populations of fluvial and resident westslope cutthroat trout and bull trout. **COMPLETED; $31,000, BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED**

2021 FUNDED PROJECTS

FIGURE 3. POORMAN CREEK CULVERT REPLACEMENT BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF THE BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED.

South Fork Lower Willow Creek fish passage (007-2021)

South Fork Lower Willow Creek (Granite County) is located in the Flint Creek watershed and eventually drains into Lower Willow Creek Reservoir. The drainage encompasses approximately 25 miles of westslope cutthroat trout habitat, separated from rainbow trout by the reservoir. The project is intended to build upon recently completed conservation efforts in the basin and fully reconnect fish passage in South Fork Lower Willow Creek. The applicant intends to improve the only irrigation diversion in the drainage above the reservoir, which blocks fish passage during periods of low streamflow and diverts 80% of streamflow. The diversion would be upgraded to a rock vane with a Farmers Conservation Alliance (FCA) fish screen. By improving the diversion and installing a fish screen, the water user can maintain their water right and fish would remain in the stream and have unobstructed movement. The project would eliminate entrainment and reconnect 25 stream miles of habitat for native and wild fish. **ONGOING; $20,900, TROUT UNLIMITED**

Andrus Creek fish barrier (009-2021)

Andrus Creek is a tributary to Governor Creek in the Big Hole River watershed, approximately 15 miles southeast of Jackson, MT. It contains a native population of westslope cutthroat trout (WCT) that has been recently invaded by rainbow trout. Over ten years ago, Andrus Creek was home to a non-hybridized population of WCT and to brook trout. Hybridization was detected in 2020, making a barrier more urgent. In the past, a suitable barrier could not be identified. Recently, a private landowner agreed to allow a fish barrier to be built on their property. To protect the population of WCT from hybridization with rainbow trout, the applicant proposes to build a barrier to isolate the WCT population. After the barrier is built, project partners would remove WCT and hold them in a nearby stream in live cages while testing them for hybridization. All remaining fish would be removed

using rotenone, and the non-hybridized WCT would be returned to the stream.* This project would isolate approximately 9 miles of stream, including 3 fish-bearing tributary streams, for WCT conservation. **COMPLETED; $14,314 ($4,026 UNDEREXPENDED), GEORGE GRANT CHAPTER OF TROUT UNLIMITED**

FIGURE 4. ANDRUS CREEK FISH BARRIER, AFTER COMPLETION.

Beaver Creek Restoration Phase 2 (010-2021)

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. Lower Beaver Creek lacked floodplain connectivity, habitat complexity, and a functioning riparian area due to past land use practices. A previous grant (2019) provided $75,000 in funding to Phase 1, which restored 0.5 miles of the channel and connected the stream to the floodplain. The current application is for Phase 2 and will extend the channel and floodplain restoration downstream. The goals are to improve fish habitat and stream function by restoring Beaver Creek within the remainder of the project area (0.7 miles, 6 floodplain acres). The project would improve connectivity with the Missouri River and restore the channel and floodplain to more natural conditions, thereby improving water quality, habitat complexity, and the amount of instream, riparian, and wetland habitat. Restoration strategies include reconnection of abandoned oxbows, construction of riffle-pool complexes, creation of off-channel wetlands, installation of streambank structures, riparian and upland planting, floodplain reconstruction, placement of large wood material, and installation of wildlife snag pods. **ONGOING; $50,000, US FOREST SERVICE**

Big Hole Daniels Ditch fish screen (011-2021)

Daniels Ditch is an irrigation canal on the upper Big Hole River. This project builds on a watershed scale restoration effort for Arctic grayling within the Big Hole River through the Candidate

Conservation Agreement with Assurances (CCAA) Program, which works with private landowners to address threats and implement conservation measures that benefit Arctic grayling and other native species. Young-of-the-year Arctic grayling are being entrained in Daniels Ditch and using it as predator-free rearing habitat, but do not survive because the ditch does not return to the river and is shut off at the end of the irrigation season. Big Hole Arctic grayling spawn in the spring and fry emerge in mid-May. They are weak swimmers and tend to drift with the flow into the irrigation ditches, where they are trapped (entrained). Preventing entrainment has been challenging and largely unsuccessful. This project would install a corrugated water fish screen on Daniels Ditch in a location that maintains the predator-free rearing habitat but also returns the fish back to the river after they enter the fish screen and move through a fish bypass. Fish will also be able to return to the Big Hole River when irrigation flows are reduced or turned off. A new headgate will be installed at the point of diversion to improve the irrigator's ability to accurately divert flow and use their water right. The goal is to reduce mortality of Arctic grayling in the upper Big Hole River watershed. **ONGOING; $30,000, FWP**

Big Hole Spokane Diversion flow improvement (012-2021)

The Spokane Diversion is an irrigation diversion in the Upper Big Hole. It is one of the largest diversions in the upper Big Hole and the most senior water right (300 cubic feet per second; cfs). It is located upstream of some of the most critical Arctic grayling spawning and rearing habitat. Water rights and instream flow targets have been difficult to meet due to a pin-and-plank structure that doesn't allow for small adjustments. The result of this structure has been overshooting the instream flow targets and undershooting the irrigation target, or vice versa. This inefficient method of adjusting flow is expected to result in more fishing day closures due to low flow (<20 cfs) and a reduction in critical spawning and rearing habitat downstream. This project would install a new diversion structure to meet irrigation demand and instream flow targets more accurately, thereby keeping the correct amount of flow going to irrigators and to instream flow, improving habitat for Arctic grayling and other aquatic species. Two screw gates would be installed and will provide real-time management of flow targets. **ONGOING; $33,360.48, FWP**

Clark Fork River Flynn-Lowney ditch water savings (013-2021)

The Flynn-Lowney ditch is an irrigation canal in Missoula near the mouth of Rattlesnake Creek. It has a capacity in excess of 40 cfs and a length of approximately 4.5 miles, and is managed by the Hellgate Valley Irrigation Company. The City of Missoula offered to buy the assets of the irrigation company and allow the irrigation company to use some of the proceeds to provide alternative water sources (e.g., wells) to legal water users in the area and pay other shareholders for giving up their ability to

use water. Once wells are in place, the Flynn-Lowney ditch would be decommissioned. The goals of this project are to meet irrigation demand, eliminate the operation and maintenance burden of the irrigation company, keep additional water in stream, and to eliminate fish entrainment. The Clark Fork River contains westslope cutthroat trout, bull trout, rainbow trout, brown trout, mountain whitefish, largescale sucker, longnose sucker, northern pikeminnow, redside shiners, and more. Fish entrainment has been difficult to quantify but is considered to be substantial. **COMPLETED; $50,000, CITY OF MISSOULA (No photographs available)**

Lake Elmo habitat supplement 2 (014-2021)

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 drawdown, the applicant intends to 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. This project received $40,000 in the Summer 2020 cycle for the highest priority habitat structures and $6,298.84 from the Winter 2021 grant cycle. The Review Panel approved the use of both grants (2020 and 2021) for project design and construction. **ONGOING; $33,700, FWP**

Lick Creek culvert replacements (015-2021)

Lick Creek is a tributary to Moose Creek in the East Fork Bitterroot River drainage. It contains populations of westslope cutthroat trout and bull trout and is an important spawning and rearing tributary. Two culverts currently impede fish movement and fragment the bull trout and westslope cutthroat trout populations in Lick Creek. The culverts are undersized and restrict the bankfull stream width by approximately 50%. The lower culvert is considered a partial barrier due to excessive water velocities during high flow periods and the upper culvert is a complete barrier due to its steep gradient and excessive water velocities. The goal of this project is to restore the stream to its historical condition, where it was available and unobstructed for spawning migratory bull trout and westslope cutthroat trout coming out of the East Fork Bitterroot River via Moose Creek. The project would replace the existing culverts with a larger culvert that is 1.5x wider than the bankfull channel (lower culvert) and a bottomless arch 1.8x wider than the bankfull channel (upper culvert), both able to pass a 100-year flood. **ONGOING; $50,000, US FOREST SERVICE**

2021 FUNDED PROJECTS

Little Park Creek restoration and WCT conservation (016-2021)

Little Park Creek is a tributary to Miller Creek, south of Missoula in the Bitterroot River valley. The Miller Creek watershed is an important area for westslope cutthroat trout (WCT) and rainbow trout, but Miller Creek is listed on the DEQ 303(d) list for temperature and sediment impairments. Little Park Creek is one of two tributaries in the upper Miller Creek drainage that contain genetically pure WCT and is a conservation priority. A perched culvert on the lower end of Little Park Creek has created a fish barrier, protecting the WCT from rainbow trout invasion and hybridization. This culvert barrier is not a permanent barrier and is showing signs of instability. This project would 1) replace the culvert barrier with a concrete barrier and ford, preventing rainbow trout from moving upstream while also accommodating a 100-year flood event, and 2) remove an undersized barrier downstream, near the confluence with Miller Creek to improve fish passage and stream function downstream. The goals of this project are to protect the genetically pure WCT population, improve downstream habitat, improve stream function, and address chronic sediment delivery issues and potential culvert failure.
COMPLETED; $20,000, CLARK FORK COALITION

FIGURE 5. LITTLE PARK CREEK BARRIER BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF THE CLARK FORK COALITION.

Mill Creek fish barrier (017-2021)

Mill Creek is a tributary to the Yellowstone River in Paradise Valley. It contains conservation populations of native Yellowstone cutthroat trout (YCT) and is one of the few remaining areas where gene flow potentially occurs between distinct populations of YCT inhabiting most streams throughout the watershed (i.e., a metapopulation). In 1995, a boulder fish barrier was built at the forest boundary to preclude upstream invasion by nonnative species, but rainbow trout were found upstream of the barrier. In 1999, genetic testing confirmed hybridization of rainbow trout and YCT, and in 2019 testing indicated that hybridization was spreading up the drainage. Brook trout are also a threat to YCT persistence. This project would construct a fish barrier to secure YCT conservation populations in

upper Mill Creek. The barrier would be constructed using cast-in-place concrete with a double drop design and will be designed to accommodate a 100-year flood (750 cfs). Installing a barrier before nonnative invasion expands prevents the need for future nonnative fish removal in Mill Creek. The goals of this project are to maintain the current level of YCT genetic purity and preserve the genetic legacy of this native YCT population. **ONGOING; $50,000, US FOREST SERVICE**

Miller Creek Bear Run stream restoration (018-2021)

Miller Creek is a tributary to the Bitterroot River south of Missoula. It contains populations of westslope cutthroat trout (WCT) and brook trout. The project location is near the confluence of Bear Run and Miller Creek, on the Wustner Ranch, where the channel is confined and deeply incised, with active lateral erosion. There is a lack of connectivity between the channel and floodplain, fine sediment delivery, reduced aquatic habitat diversity, and reduced riparian vegetation and cover. This project would restore the stream channel and realign it away from eroding banks, re-grade and adjust elevation to connect the channel to the floodplain, install large woody debris and other features to improve habitat complexity, plant riparian vegetation, and install fencing. The project goals are to promote riparian recovery, reconnect the stream channel and floodplain areas, and increase habitat complexity. This project is downstream of a past Future Fisheries project on Miller Creek (2019 grant; Spooner Creek Ranch channel restoration) and the Little Park Creek barrier project. **COMPLETED; $15,000, CLARK FORK COALITION**

FIGURE 6. MILLER CREEK BEAR RUN PROJECT BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF THE CLARK FORK COALITION AND FWP.

Placid Lake outlet barrier improvement (019-2021)

Placid Lake is a waterbody in the Blackfoot River drainage that is located between Placid Creek and Owl Creek. It is a highly productive natural glacial lake that supports westslope cutthroat trout, bull trout, kokanee, introduced brown trout and largemouth bass, and several other aquatic species. The

lake has a massive biomass of prey species as well. Invasive species like Northern pike are found below Placid Lake, but the outlet dam served as a barrier until recently. Northern pike are located downstream and have been documented below the Placid Lake outlet and one adult was captured by FWP in Placid Lake above the outlet, likely due to a high flow event that allowed upstream passage. If Northern pike were to become established in Placid Lake, they would undoubtedly explode in number and the current fish assemblage would be decimated. This project would enhance the current fish passage barrier by increasing the vertical height of the barrier, increasing the vertical drop height of the overflow spillway, and enhancing scour protection and stability of the dam. The goal is to protect the quality and integrity of existing fish populations and fisheries, which includes conservation populations of migratory bull trout and westslope cutthroat trout, important sport fisheries (e.g., kokanee), and nongame fish. **ONGOING; $10,020, PLACID LAKE ASSOCIATION**

South Fork Dry Cottonwood Creek Road 85 fish passage (020-2021)

South Fork Dry Cottonwood Creek is a tributary to Dry Cottonwood Creek in the Clark Fork River drainage, near Deer Lodge. It contains a conservation population of westslope cutthroat trout that is 95% pure. The drainage contains no brown trout or brook trout, which are highly competitive with westslope cutthroat trout. About four miles of South Fork Dry Cottonwood Creek is cut off from upstream fish movement due to an undersized culvert on Road 85 that is acting as a fish barrier. This is the third passage barrier culvert in the drainage to be addressed; the upstream two were replaced in 2018 and 2020 (one on South Fork Dry Cottonwood Creek was a 2018 Future Fisheries grant). The project would replace the 36-foot pipe arch culvert with a 12-foot structural arch pipe on a pre-cast concrete foundation, accommodating a natural stream bed and rock weirs to accommodate fish passage. Other improvements in the Dry Cottonwood Creek watershed include irrigation efficiency upgrades, fish screens, road improvements, off-stream water for livestock, and riparian fencing. The Future Fisheries Improvement Program funded some of that work, including a riparian fencing project (2010 grant) and habitat enhancement (2018 grant). **ONGOING; $34,000, CLARK FORK COALITION**

Trail Creek fish passage (021-2021)

Trail Creek is a tributary to Morrell Creek (and the Clearwater River) in the Blackfoot River drainage, near Seeley Lake. The Morrell Creek drainage supports one of the largest adfluvial bull trout populations in the upper Clark Fork Basin and a genetically pure westslope cutthroat trout population in its headwaters. Trail Creek is a high priority tributary that supports adfluvial bull trout as well as migratory and stream resident westslope cutthroat trout populations. This project would address an existing stream crossing above the Morrell/Trail creeks confluence that is undersized and perched. The

existing culverts (three pipes, each 36") create a fish passage barrier during high periods and impair natural stream function. The undersized culverts would be replaced by a bridge that meets stream simulation criteria and allows uninhibited aquatic organism passage and stream function. This crossing is the last known fish passage barrier on Trail Creek, and considers the shifting of the main stream channel to this crossing. The goal is to enhance stream connectivity to improve natural channel function and enhance habitat for wild trout recruitment and survival. Past FFIP projects in the project area include a fish screen (2015 grant) downstream, and a fish screen downstream on Morrell Creek (2008 grant). **ONGOING; $14,300, BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED**

Willow Creek fish passage (022-2021)

Willow Creek is a tributary to the upper Blackfoot River. It supports genetically pure westslope cutthroat trout, brown trout, and brook trout. Willow Creek is a high priority tributary of the Blackfoot River. A culvert near stream mile 6.5 is currently undersized and perched, creating a barrier to fish passage at high flow and impairing natural stream function. This project would replace the undersized culvert with a bridge that will result in a stable stream crossing and a correction of road drainage problems, provide fish passage, and restore natural channel morphology. Improved connectivity is expected to improve habitat for fish, including fluvial westslope cutthroat trout. Downstream, a past FFIP project replaced a culvert with a bridge (2012 grant). **ONGOING; $8,200, BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED**

MONITORING

Implementation Monitoring (Project Completion)

The FFIPC or other FWP staff monitored 20 sites to ensure they were completed as funded (Table 8, Figure 22), called Implementation Monitoring. The projects were completed between November 1, 2018 and December 31, 2021 and were located within Regions 1-5. 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 listed below. All projects were completed successfully.

TABLE 2. PROJECTS MONITORED FOR IMPLEMENTATION (PROJECT COMPLETION) SINCE THE LAST LEGISLATIVE REPORT (NOV 1, 2020 - OCT 31, 2021). * = PROJECT DESCRIPTION IN 'APPROVED AND COMPLETED PROJECTS SECTION' ABOVE.

FFIP #	Project Name	Region	Completed
009-2021	Andrus Creek fish barrier*	3	2021
012-2019	Beaver Creek Missouri Channel Reconstruction	4	2021
001-2021	Big Hole 40 Bar streambank restoration*	3	2021
002-2017	Big Otter Creek riparian protection & improvement	4	2020
013-2021	Clark Fork River Flynn-Lowney ditch water savings*	2	2021
002-2020	Cottonwood Creek fish barrier	3	2020
003-2020	Doolittle Creek fish barrier	3	2020
004-2020	Eagle Creek YCT connectivity	3	2020
014-2020	Flint Creek riparian restoration	2	2021
015-2020	Hall Creek fish barrier removal	2	2021
016-2021	Little Park Creek restoration and WCT conservation*	2	2021
016-2019	Lolo Ditch fish screen	2	2021
019-2020	Lower French Creek riparian restoration	3	2020
018-2021	Miller Creek Bear Run stream restoration*	2	2021
008-2018	Monarch Creek culvert replacement	2	2020
019-2019	Musselshell River McCleary channel restoration	5	2020
012-2017	Ninemile Creek channel restoration	2	2021
006-2021	Poorman Creek culvert replacement*	2	2021
021-2020	Poorman Creek restoration phase 2	2	2021
022-2019	Sevenmile Creek restoration phase 2	4	2021

MONITORING

Beaver Creek Missouri channel reconstruction 012-2019

FIGURE 7. BEAVER CREEK CHANNEL RECONSTRUCTION BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF THE US FOREST SERVICE AND FWP.

Big Otter Creek riparian protection & improvement 002-2017

FIGURE 8. BIG OTTER CREEK AFTER CONSTRUCTION, CULVERT (L) AND FENCE (R) INSTALLED.

Cottonwood Creek fish barrier 002-2020

FIGURE 9. COTTONWOOD FISH BARRIER SITE BEFORE CONSTRUCTION (L) AND AFTER COMPLETION (R). PHOTOS COURTESY OF TROUT UNLIMITED AND FWP.

MONITORING

Doolittle Creek fish barrier 003-2020

FIGURE 10. DOOLITTLE CREEK FISH BARRIER AFTER CONSTRUCTION.

Eagle Creek YCT connectivity 004-2020

FIGURE 11. EAGLE CREEK CULVERT REPLACEMENT BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF THE US FOREST SERVICE AND FWP.

Flint Creek riparian restoration 014-2020

FIGURE 12. FLINT CREEK STREAM RESTORATION BEFORE (L) AND AFTER (R) CONSTRUCTION.

Hall Creek fish barrier 015-2020

FIGURE 13. HALL CREEK FISH BARRIER BEFORE (L) AND AFTER (R) REMOVAL.

Lolo Ditch fish screen 016-2019

FIGURE 14. LOLO DITCH FISH SCREEN AFTER COMPLETION. PHOTO COURTESY OF THE CLARK FORK COALITION.

Lower French Creek riparian restoration 019-2020

FIGURE 15. LOWER FRENCH CREEK RESTORATION BEFORE (L) AND AFTER (R) CONSTRUCTION.

MONITORING

Monarch Creek culvert replacement 008-2018

FIGURE 16. MONARCH CREEK CULVERT REPLACEMENT BEFORE (L) AND AFTER (R). PHOTOS COURTESY OF THE US FOREST SERVICE AND FWP.

Musselshell River McCleary channel restoration 019-2019

FIGURE 17. MUSSELSHELL RIVER MCCLEARY CHANNEL RESTORATION AFTER CONSTRUCTION, WHERE THE AVULSION OCCURED (L) AND CHANNEL PLUG (R).

Ninemile Creek channel restoration 012-2017

FIGURE 18. NINEMILE CREEK AFTER CONSTRUCTION, SHOWING THE FINISHED CHANNEL AND FLOODPLAIN (L) AND THE CONTRAST BETWEEN UPSTREAM COMPLETED AND DOWNSTREAM PROPOSED WORK (R).

MONITORING

Poorman Creek restoration phase 2 021-2020

FIGURE 19. POORMAN CREEK BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED AND FWP.FIGURE 19.

Sevenmile Creek restoration phase 2 022-2019

FIGURE 20. SEVENMILE CREEK BEFORE (L) AND AFTER (R) CONSTRUCTION. PHOTOS COURTESY OF PRICKLY PEAR LAND TRUST.

MONITORING

Effectiveness Monitoring

Effectiveness monitoring addresses the question of how successful a project is, several or many years after completion. In 2021, 30 projects were monitored for long term success (Table 9, detailed information below). Photographs were provided by project applicants or taken by FWP staff.

TABLE 3. PROJECTS MONITORED FOR EFFECTIVENESS IN 2021, TRACKED BY THE FUTURE FISHERIES IMPROVEMENT PROGRAM COORDINATOR (FFIPC). FFIP # = INDIVIDUAL PROJECT NUMBER.

FFIP #	Project Name	Type	Region	MONITORDATE
002-2002	Beaver Creek diversion repair	Routine	4	10-Aug-21
003-2010	Cottonwood Creek fish barrier	Routine	4	06-May-21
007-2002	Cottonwood Creek off-stream livestock watering	Routine	2	28-Jul-21
012-2014	Deadmans Basin Diversion Dam Fishway	Routine	5	04-Oct-21
006-2007	Dick Creek fish screen	Routine	2	28-Jul-21
031-2005	Kleinschmidt Creek channel restoration and grazing management	Long Term	2	28-Jul-21
009-2010	Lincoln Spring Creek culvert replacement	Long Term	2	18-Oct-21
010-2005	Little Blackfoot River bank stabilization	Routine	2	16-Aug-21
021-2016	Marias River Sanford Park fish habitat enhancement	Routine	4	01-Sep-21
012-2015	Musselshell River Egge Diversion Removal	Routine	5	04-Oct-21
010-2013	Pearson Creek channel restoration	Routine	2	28-Jul-21
012-2001	Poorman Creek	Long Term	2	18-Oct-21
014-2018	Poorman Creek mining restoration	Routine	2	10/18/2021
017-2007	Prairie Creek riparian fencing and culvert replacement	Long Term	2	02-Aug-21
015-2018	Prickly Pear Creek Trynan fish passage	Routine	4	05-Feb-21
028-2017	Rattlesnake Creek Cobban fish screen	Routine	2	18-Jun-21
008-2019	Rattlesnake Creek dam removal	Routine	2	19-Jul-21
022-2002	Rattlesnake Creek fish screen	Routine	2	18-Jun-21
022-2002	Rattlesnake Creek fish screen	Routine	2	18-Jun-21
022-2002	Rattlesnake Creek fish screen	Routine	2	18-Jun-21
025-2016	Rattlesnake Creek Williams fish screen	Routine	2	18-Jun-21
023-2013	Redwater River culvert fish passage	Routine	6	15-May-21
026-2016	Shanley Creek fish screen & water conservation	Routine	2	28-Jul-21
014-2015	Shanley Creek Restoration	Routine	2	28-Jul-21
023-1999	Smith River and Thompson Creek fencing and off-stream watering	Long Term	4	21-Sep-21
020-2012	Smith River riparian fencing	Routine	4	21-Sep-21
017-2013	South Woodward Creek bridge repair	Routine	1	24-Aug-21
024-2013	Tenmile Creek diversion repair and fish passage	Routine	4	27-Aug-21
031-2004	Uncle George Creek	Routine	2	10-Aug-21
029-2003	Upper Willow Cr channel restoration	Long Term	2	26-Sep-21

Beaver Creek diversion repair 002-2002

This 2003 project reconnected the bottom end of an irrigation diversion with the Beaver Creek (tributary to the Missouri River) so that water and fish could return to the stream. It was monitored in 2015 and again in 2021. The meeting appears to be functional nearly 20 years later. Water continues

to flow and vegetation is established (Figure 21). This project will expire in 2023 and appears to be a successful long-term project.

FIGURE 21. THE BEAVER CREEK DIVERSION PROJECT AFTER COMPLETION (2003, L) AND IN 2021 (R).

Cottonwood Creek fish barrier 003-2010

The Cottonwood Creek barrier is located near Holter Reservoir and was installed to isolate and protect a genetically pure westslope cutthroat trout population. The original barrier was constructed in 2000 but was at risk for passing brook trout and rainbow trout at high flows. It was replaced in 2010 with a more substantial structure (Figure 22). Since 2010, westslope cutthroat trout have been protected. The barrier was repaired in 2021 and blocks were repositioned. The westslope cutthroat trout population continues to do well and are used as donor fish for another nearby population.

FIGURE 22. THE COTTONWOOD CREEK BARRIER AFTER CONSTRUCTION (2010, L) AND AS IT WAS REPAIRED IN 2021 (R).

Cottonwood Creek off-stream livestock watering 007-2002

This 2003 project eliminated an unscreened irrigation diversion and installed a screened intake pump on Cottonwood Creek (Blackfoot River drainage). The goal was to prevent fish from being lost to the ditch and leave more water instream. The site location was not inspected in 2021, but from the road

the project applicant noted that the water savings had been a success and the infrastructure remain in place. This project will expire in 2023 and appears to have been successful long-term.

Deadman's Basin Diversion Dam fishway 012-2014

This project was built to create fish passage on the Musselshell River at Deadman's Basin Diversion (Figure 23). In 2015, a fishway was constructed to connect 52 miles upstream and 39 miles downstream. The project has been functional since it was completed. In 2021, biologists noted that there is some concern that small-bodied fish may not be able to pass the structure. Future monitoring will investigate this concern, which would provide input on any future structural improvements.

FIGURE 23. DEADMAN'S BASIN DIVERSION DAM BEFORE CONSTRUCTION (L) AND IN 2021 (R).

Dick Creek fish screen 006-2007

This tributary to the North Fork Blackfoot River supports genetically pure cutthroat trout. In 2007, the project installed a headgate and fish screen (in-ditch Coanda screen) on a previously-unregulated irrigation diversion to eliminate entrainment of cutthroat trout and other species (Figure 24). The project was monitored in 2021, and the screen is still working as installed.

FIGURE 24. DICK CREEK FISH SCREEN IN 2011 (L) AND IN 2021 (R).

MONITORING

Kleinschmidt Creek restoration and grazing management 031-2005

Kleinschmidt Creek (Blackfoot River drainage) supports bull trout and westslope cutthroat trout as well as brown trout, rainbow trout, and brook trout. In 2006, this project restored 3,000 feet of stream channel through channel shaping, riparian fencing, revegetation, off-stream water for livestock, and removal of streamside grazing and livestock infrastructure (Figure 25). In 2021, the site was monitored and showed a large improvement over time. The local FWP fisheries biologist collected data at this location over time, and the project is considered successful long term.

FIGURE 25. KLEINSCHMIDT CREEK BEFORE (2005, L) AND AFTER (2021, R) THE PROJECT WAS COMPLETED.

Lincoln Spring Creek culvert replacement 009-2010

Lincoln Spring Creek (Blackfoot River drainage) near Lincoln improved a county road crossing that was acting as a partial fish migration barrier. A larger, structural plate bottomless arch culvert was installed (Figure 26) in 2010. In 2021, the project was monitored and is functioning well. The stream is in good condition downstream of the culvert. This project has been successful long term.

FIGURE 26. LINCOLN SPRING CREEK BEFORE (L) AND AFTER (MIDDLE) CONSTRUCTION, AND IN 2021 (R).

MONITORING

Little Blackfoot River bank stabilization 010-2005

The Little Blackfoot, near the confluence with the Clark Fork River, was the site of a 325 ft bank stabilization project in 2006. Past land management practices led to erosion and loss of riparian vegetation. The treatment included the installation of three log vanes, riparian fencing, and revegetation of the riparian area. In 2021, aerial photography and inspection of the area indicated that the project mostly failed. The stream meandered into the adjacent field and portions of the fence were lost. Some residual wood was observed. The stream is likely unstable at this location due to the adjacent bridges, and it appears that grazing is now occurring adjacent to the stream (in its current position). This project was not successful long term, and there may be limited fishery value to warrant addressing the current configuration.

FIGURE 27. THE LITTLE BLACKFOOT RIVER PROJECT IN 2021 (L) AND ON AN AERIAL MAP (R), SHOWING THE EXPANSION INTO THE FIELD ON THE LOWER RIGHT.

Marias River Sanford Park fish habitat enhancement 021-2016

This project was engineered and installed by FWP staff in partnership with the US Bureau of Reclamation. In 2017, the bank was stabilized and improved using a three-tiered willow soil lift, regrading, and two engineered log jams. The site was visited by FWP staff that designed the project and oversaw construction; that the project is holding up well with an increase in vegetation density.

FIGURE 28. MARIAS RIVER BEFORE CONSTRUCTION (L) AND IN 2021 (R).

MONITORING

Musselshell River Egge Diversion Removal 012-2015

The Egge Diversion was removed in 2017 after the structure was flanked. The water users switched to pump irrigation and the fish passage barrier was removed. Vegetative soil lifts were installed and a continuous 24-mile reach of stream was opened for fish passage. In 2021, the site was highly revegetated and the streambanks were stabilized. It is considered a success both for the landowner/water user and ecologically.

FIGURE 29. THE EGGE DIVERSION BEFORE REMOVAL (L) AND IN 2021 (R).

Pearson Creek channel restoration 010-2013

Located in the Blackfoot River drainage, Pearson Creek supports slightly hybridized populations of westslope cutthroat trout, brook trout, and longnose sucker. In 2013, this project reconstructed 1,244 of straightened channel, replaced an undersized culvert with a larger culvert, transplanted native shrubs, installed willow cuttings, and fenced the riparian corridor. In 2021, the project was in good condition; photopoints were difficult to find with vegetative growth. Vegetation is abundant and the area does not appear to be grazed.

FIGURE 30. PEARSON CREEK AFTER CONSTRUCTION (2013) AND IN 2021. THE PHOTO VANTAGE POINT IS SIMILAR BETWEEN PHOTOS.

MONITORING

Poorman Creek 012-2001

This 2003 project on Poorman Creek (Blackfoot River drainage) continued previous restoration efforts. The focus was irrigation improvements, a fish screen, and vegetative plantings. The irrigation improvements and fish screen installation have been successful, but the plantings were not installed correctly. Non-native species were used. However, the shortcomings of this project led to better management practices concerning vegetation management moving forward. A 2021 project on Poorman Creek complements this work.

Poorman Creek mining restoration 014-2018

A 2019 project on Poorman Creek was completed on US Forest Service property and restored a disturbed reach of the creek impacted by mine tailings. The tailings were removed, a new channel was constructed, large wood was installed, and an undersized stream crossing was upgraded to a bridge. In 2021, the stream channel and flood plain were in great shape and recovering nicely. Fisheries data indicated that the fish populations have also improved.

FIGURE 31. POORMAN CREEK BEFORE CONSTRUCTION (L) AND IN 2021 (R).

Prairie Creek riparian fencing and culvert replacement 017-2007

Prairie and Andrews Creeks (Bitterroot River drainage) support both resident and fluvial westslope cutthroat trout but were impacted by grazing and undersized culverts impeding migration. In 2007, riparian fencing was installed and two culverts were replaced with larger, embedded culverts to improve connectivity. The riparian condition was considered fair in 2013 with high grazing compliance. In 2021, the riparian fence was in disrepair but no indication of recent grazing was observed. Weeds (primarily knapweed) were extensive and a problem in the area. The culvert was in place and appeared functional.

FIGURE 32. ANDREWS CREEK IN 2013 (L) AND IN 2021 (R).

Prickly Pear Creek Tryan fish passage 015-2018

This project, completed in 2018, improved fish passage on Prickly Pear Creek by removing a diversion dam that was acting as a partial fish barrier. The area is used by migratory rainbow trout and brown trout moving out of Lake Helena. Step-pool structures were installed and a bypass channel was installed. 2021 monitoring indicated that the project has been successful and vegetation is increasing.

FIGURE 33. THE PRICKLY PEAR TRYAN FISH PASSAGE PROJECT AT PROJECT COMPLETION (TOP) AND IN 2021 (BOTTOM).

Rattlesnake Creek Cobban fish screen 028-2017

Rattlesnake Creek (Clark Fork River drainage) has been the site of fish screening improvements since 2002. In 2018, the fish screen on the Cobban ditch was upgraded to a vertical plate, paddlewheel-driven fish screen. The goal was to prevent entrainment of fish, including bull trout, westslope

cutthroat trout, rainbow trout, and brown trout. In 2021, the project looked very similar to the condition at install. The project is considered successful thus far, and complements other projects in the drainage.

FIGURE 34. THE RATTLESNAKE COBBAN FISH SCREEN IN 2018 (L) AND 2021 (R).

Rattlesnake Creek dam removal 008-2019

The Rattlesnake Dam was constructed in 1901 as the primary water source for Missoula. The water source was shifted to groundwater wells in the 19080's but the dam remained. A fish ladder was installed in 2003, but the dam was finally removed in 2020. This project removed the last remaining migration barrier on Rattlesnake Creek with the goal of improving habitat and migratory corridors for trout. In 2021, the project site was visited by the Future Fisheries Review Panel. Vegetation was increasing and the stream channel was in great condition.

FIGURE 35. RATTLESNAKE DAM PRIOR TO REMOVAL (L) AND IN 2021 (R).

Rattlesnake Creek fish screen 022-2002

Brencail style fish screens were installed at three irrigation ditches in 2002. Two of the fish screens have been replaced in recent years, but one remains on the Hamilton Day location. The screen was

visited in 2021 and is not functional The Brencail style screen is not an effective design and requires frequent cleaning, which does not occur in this location.

FIGURE 36. THE HAMILTON DAY FISH SCREEN IN 2015 (L) AND IN 2021 (R).

Rattlesnake Creek Williams fish screen 025-2016

The Williams fish screen on Rattlesnake Creek was installed in 2017, and a Coanda-type was used. The project site was visited in 2021 and appeared to be in great condition. The screen is a great improvement to the previous fish screen and has not changed structurally in four years. Adjacent vegetation has increased.

FIGURE 37. RATTLESNAKE CREEK WILLIAMS DITCH FISH SCREEN IN 2017 (L) AND 2021 (R).

Redwater River culvert fish passage 023-2013

In 2016, a series of box culverts replaced four, 24-inch diameter concrete culverts. These improvements at the Nickwall Crossing (near Wolf Point) allowed for stream function and resting areas for slower swimming fish species. The site was visited in 2021. Overall, the project has been successful in allowing the high stream flows and fish to pass. However, high flows led to some erosion around one of the wingwalls. The concrete repair was planned for summer 2021.

FIGURE 38. THE REDWATER RIVER NICKWALL CROSSING AFTER CONSTRUCTION (2016, L) AND IN 2021 (MIDDLE, R). NOTE THE EROSION OF THE WINGWALL TO BE REPAIRED IN 2021 (R).

Shanley Creek fish screen & water conservation 026-2016

In 2016, a vertical flat plate paddlewheel screen was installed on Shanley Creek (Blackfoot River drainage). It replaced a fish screen that was no longer functional and was intended to improve control of diverted streamflow and reduce entrainment of bull trout and pure populations of westslope cutthroat trout. Several other projects were completed on Shanley Creek and this project built upon those successes. In 2021, the project was in good condition and functional. The landowner expressed concern that the grass grows so much it clogs the bypass, but it is a minor issue. Livestock are excluded from the area by an electric fence.

FIGURE 39. SHANLEY CREEK FISH SCREEN AFTER CONSTRUCTION (2016, L) AND IN 2021 (MIDDLE, R).

Shanley Creek restoration 014-2015

This project relocated nearly one mile of road outside of the Shanley Creek floodplain, replaced two undersized culverts with a single crossing (able to pass a 100-year flood), upgraded a ford with a short-span bridge, and removed a third culvert. It was completed in 2015. The goal as to correct the road damage problems, eliminate sources of excessive sediment, provide fish passage, and restore natural

channel morphology at the crossing sites. In 2021, the project was monitored and found to be in good shape. The rock of the abutment had to be grouted as high water was undermining some of the footers, but the problem was fixed and the project is considered successful.

FIGURE 40. SHANLEY CREEK CROSSING BEFORE CONSTRUCTION (L) AND IN 2021 (R).

Smith River and Thompson Creek fencing and off-stream watering 023-1999

In 2001, riparian fencing and off stream water was installed at this property on the Smith River to improve riparian and stream health along 2.5 miles of stream (Smith River and Thompson Creek). In 2004, the riparian condition was considered fair with high grazing. The site was visited in 2021 and found that all of the off-stream water installations were functional and fencing was being used as well. The landowner was positive about the project and its impact. Overall, the riparian buffers could have been larger in some places but the cattle have been kept off the stream and vegetation has expanded. The project is now expired, but the hope is that the willow will continue to expand. The landowner plans to continue using the fence and off-stream water.

FIGURE 41. THE SMITH RIVER PROJECT IN 2002 (L) AND IN 2021 (R).

MONITORING

Smith River riparian fencing 020-2012

This project installed about 4.5 miles of fence associated with six pasture/hay fields along the river and on Sheep Creek. Off stream water and water gaps were also installed. The project was completed in 2015. In 2021, the project was monitored and was found to be in good condition. The landowner is very interested in keeping the stream in a healthy condition. Grazing is considered light to absent and the fencing is in good condition.

FIGURE 42. THE SMITH RIVER ROCKING C PROJECT IN 2015 (L) AND 2021 (R).

South Woodward Creek bridge repair 017-2013

The South Woodward Creek bridge (Swan River drainage) was repaired in 2013 to address failing wingwalls. The location is an important spawning and rearing area for Swan Lake bull trout population. In 2021, the DNRC fisheries biologist noted that the bridge was reevaluated in 2016 and determined that the project was successful at eliminating sediment inputs, retained its structure, and met forestry best management practices.

FIGURE 43. SOUTH WOODWARD BRIDGE REPAIR, DURING CONSTRUCTION (2013).

MONITORING

Tenmile Creek diversion repair and fish passage 024-2013

In 2016, a project was completed on Tenmile Creek (Helena Valley) to improve 1,100 feet of eroding streambank by installing 5,300 feet of riparian fencing and constructing a hardened crossing. Channel improvements, including rock vanes and root wods, were proposed initially but were not completed due to floodplain permitting complications. In 2021, the landowner alerted FWP staff to an issue with the project, as the stream migrated into the field and intercepted the fence. Upon visiting the site, it became clear that the project was noncompliant due to overgrazing and a nonfunctional (cut) riparian fence. FWP staff initiated conversations with the landowner and leasee to bring the project back into compliance. It will be monitored closely for the next several years and FWP will discuss the potential of willow plantings with the conservation district.

FIGURE 44. TENMILE CREEK BEFORE CONSTRUCTION (L), IN 2021 WHEN THE FENCE WAS MOVED (MIDDLE) AND THE CURRENT WATER GAP/BANK CONDITION (R). STREAM AND RIPARIAN CONDITION WILL BE CLOSELY MONITORED IN 2022 AND FUTURE YEARS.

Uncle George Creek 031-2004

Located on the Lewis and Clark National Forest, this project was completed in 2004 and installed 1,320 feet of riparian fencing and one offsite water trough. The stream is small and the benefit to the westslope cutthroat fishery is unknown. The riparian area was fair in 2005 and good by 2016. In 2021, the fence was broken and grazing was occurring in the riparian area. US Forest Service was contacted and repaired the fence before livestock had a significant impact on the stream and riparian area. This project will expire in 2024.

FIGURE 45. UNCLE GEORGE CREEK FENCE AND RIPARIAN AREA IN 2016 (L) AND 2021 (MIDDLE). THE FENCE WAS IN DISREPAIR IN 2021 (R) BUT FIXED BY THE US FOREST SERVICE.

Upper Willow Creek channel restoration 029-2003

Upper Willow Creek (Rock Creek drainage) was the site of a long-term Future Fisheries monitoring effort, in part due to the requirements of a Department of Environmental Quality 319 grant. The project reconstructed 6,500 feet of stream and installed riparian plantings in 2005. Between 2005 and 2021, the project was monitored for fishery response, stream dimensions, substrate, vegetation, and water temperature. The project was successful in improving channel dimension and substrate. Better sediment transport appeared to improve the area suitable for redds. Some channel adjustment occurred, creating a more naturally functioning stream. However, the riparian plantings didn't survive well (planted in the heat of the summer) so grasses dominate. Due to the grasses and failure of woody plantings, the overhead cover is minimal. Water temperature didn't have significant changes due to the project. One of the project goals was to improve suitable habitat for bull trout and westslope cutthroat trout with lower water temperatures, but that goal was not achieved. However, the project area drastically improved due to the work completed and maintained. It will expire in 2025.

FIGURE 46. UPPER WILLOW CREEK AFTER CONSTRUCTION (2005, L) AND IN 2021 (R).

MONITORING

OVERALL CONCLUSIONS

In 2021, monitoring efforts were a combination of opportunistic monitoring (i.e., visiting sites when in a close proximity due to work-related travel), long-term monitoring efforts, and an effort to visit projects that are 5+ years old. In general, monitoring found successful projects. A few projects had problems to be addressed or treatments that were not successful. Unsuccessful treatments were due to installation technique and likely—a bit of bad luck. However, both unsuccessful and successful projects provide 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 Review Panel, and the Commission a constantly improving process.

Overall, project applicants tend to be in compliance with their project agreements. Some project components were addressed for compliance, mostly due to miscommunication, but intent of the project was discussed to bring it into compliance. The success of the FFIP is clear; a substantial positive impact was, and is, made on the waters of Montana and its anglers due to the Program and its partners.