# Future Fisheries Improvement Program | Report to the 2025 Montana State Legislature

Summary of Program Activities from
April 1, 2022 to March 31, 2024

Montana Fish, Wildlife & Parks
Habitat Bureau
Fisheries Division
September 2024

# Future Fisheries Improvement Program

FY 2023/2024 Accomplishments

## $2.2M in grants and 45 fish habitat projects

were awarded during the period of this report (April 2022-March 2024). These projects will use an additional $11.3 million in matching funds and in-kind services from outside sources for a total value of approximately $13.5 million restoration dollars.

## Completed Project Highlights

### Middle Fork Judith River

**Road decommissioning & rehabilitation**

Improved fish habitat and water quality by decommissioning 2.5 mi. of riparian roads and many fords that added sediment to the river. Improved fish habitat while also establishing sustainable ATV and trail routes.

### East Fork Lolo Creek

**Instream habitat**

Installed large, stream-spanning log jams to create spawning habitat and pools, trap sediment, and return the stream to a natural condition after impacts from grazing and wood removal.

### Big Hole Fish Barriers

**Browns, Buffalo, & Painter creeks**

Installed or improved fish barriers in three streams to protect at-risk, conservation populations of westslope cutthroat trout. Resulted in securing 17.6 miles of stream.

### Prickly Pear Creek

**Fish screen**

Stopped rainbow and brown trout from getting stuck in an irrigation ditch by using a fish screen to separate the fish from irrigation water, keeping fish in the stream.

## Local Dollars and Community Support

Most, if not all, of the funding from this program stays in Montana, supporting local contractors and communities. Projects are developed from partnerships between people from many backgrounds, including landowners, state and federal agencies, watershed groups, non-profits, angler groups, and conservation districts. Oftentimes engineers or consultants are hired, and local contractors do the work. Even when materials are purchased, they typically come from local companies or sources.

**Thank you for supporting the Future Fisheries Improvement Program**

For nearly 30 years, the FFIP has provided biannual funding for habitat improvements across Montana (MCA 87-1-272). Find the full report at: *https://fwp.mt.gov/legislature*

# Contents

# Background and Overview

This report provides updates on Future Fisheries Improvement Program (FFIP) activities and expenses, project schedules, and anticipated expenses for the next 10 years.

## Legislation

The FFIP was enacted in 1995 (MCA 87-1-272) to provide funding for the long-term enhancement of streams, rivers, and lakes. It replaced the River Restoration Program (authorized in 1989) and expanded opportunities to restore wild fish habitats. The FFIP was supplemented and amended in 1999 when the legislature enacted the Bull Trout and Cutthroat Trout Enhancement Program (MCA 87-1-283), which emphasized the enhancement of habitat for the natural reproduction of bull trout and cutthroat trout. In 2013, the emphasis on native species was amended and expanded to all native fish species. This expansion of the FFIP, which encompassed all native species (hereinafter referred to as Native Species Enhancement Program; NSEP), is a component of FFIP, separated by financials and project eligibility.

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

## Program Status and Impact

Since the FFIP began, 729 projects have been completed across Montana (Figure 1), with significant contributions to fish habitat improvements (Table 1). Since 1996, with the help of Future Fisheries, almost 250 miles of riparian fence was installed (equivalent to the distance between Whitefish and Bozeman), and 145 miles of stream channel was restored (Great Falls to Kalispell).

**TABLE 1. IMPACT OF COMMON PROJECT TYPES, SINCE PROGRAM INCEPTION (1996).**

| PROJECT TYPE | |
|---|---|
| **Riparian fence** installed | 249 Miles |
| **Stream channel** restored | 145 Miles |
| **Fish screens** installed | 63 Screens |
| **Fish passage** structures installed, or barriers removed | 281 Structures |
| **Spawning structures** placed in a lake or reservoir | 13,964 Structures |
| **Instream flow** added | 373 cubic feet per second |

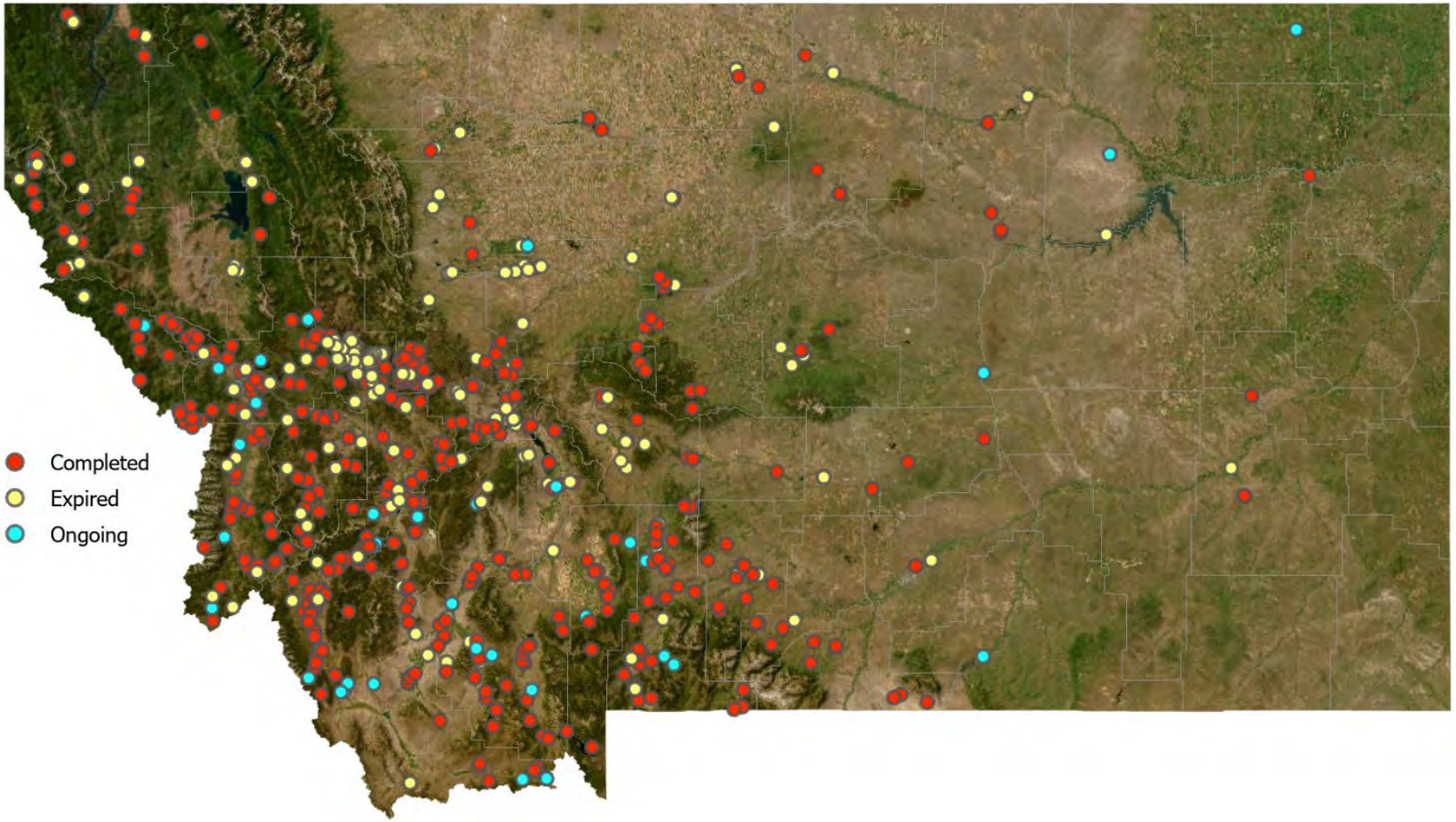


**FIGURE 1. FUTURE FISHERIES IMPROVEMENT PROGRAM PROJECT LOCATIONS, SINCE 1996, DENOTED BY PROJECTS THAT ARE EXPIRED, COMPLETED BUT ACTIVE, AND ONGOING (NOT YET COMPLETED).**

Since implementation of the FFIP in 1996, the commission approved $22.4 million for restoration projects that are ongoing or completed which, in turn, generated approximately $79.3 million in available matching funds (Figure 2). 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. **Nearly $102 million of habitat restoration work has been undertaken in Montana since 1996, with help from the FFIP.**

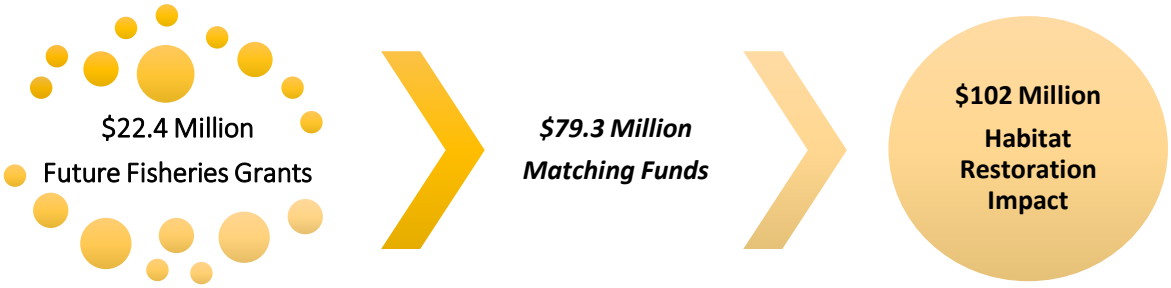


**FIGURE 2. APPROVED FUNDING, MATCHING FUNDS, AND TOTAL DOLLARS SPENT ON COMPLETED OR ONGOING FISH HABITAT RESTORATION PROJECTS, SINCE 1996.**

## Program Goals and Funding Priorities

The overall goal of the FFIP (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 additional project guidance, requiring 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 was added to the FFIP, additional priority was put on projects that restore, protect, or enhance habitat for native fishes, including those involving mineral reclamation. This expanded projects into eastern Montana, an area with fewer projects completed. During the review process, the Panel considers the guidance and goals of the FFIP as well as other criteria 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, including pre/post-treatment monitoring
- Landowner approval and participation

## Funding Process and Public Participation

Any entity proposing a habitat project to benefit Montana's wild fish can be considered for funding. Project applications can be submitted to FWP twice each year, due prior to November 15 (winter cycle), and May 15 (summer cycle).

Since the last biennial report, the Panel met to review project proposals four times: June 2022, December 2022, June 2023, and December 2023. 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 (EAs) are prepared for all projects approved for funding and include a public comment period, except for projects that fall under categorical exclusion (ARM Rule 12.2.454) or other review. 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.

## 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 recommend funding. The 14-person Panel meets twice a year (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
- One ex-officio member from the Montana Department of Transportation with experience in highway impact mitigation

An additional appointee was added 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 (2022-2024). *REAPPOINTMENT IN 2023.**

| CATEGORY | NAME, LOCATION | TERM START | TERM END |
|---|---|---|---|
| Conservation District (CHAIR) | Clint Peck, Billings | Reappointed | 7/1/2025 |
| Commercial Agriculture | Bill Mytton, Absarokee | Reappointed | 7/1/2024 |

| CATEGORY | NAME, LOCATION | TERM START | TERM END |
|---|---|---|---|
| Irrigated Agriculture | Bob Schroeder, Missoula | Reappointed | 7/1/2024 |
| Restoration Professional | Ron Pierce, Missoula | 7/1/2021* | 7/1/2025 |
| Licensed Angler (1 of 2) | Michael Johns, Bozeman | 7/1/2021* | 7/1/2025 |
| Licensed Angler (2 of 2) | David Cope, Ennis | 7/1/2021* | 7/1/2025 |
| Silviculture/Forestry | Richard Lane, Missoula<br>Zachary Bashoor, Missoula | 7/1/2021<br>1/25/2024 | 7/1/2023<br>7/1/2025 |
| High School Student | John Goodwin, Helena<br>Gabrielle Thorsen, Bigfork | 7/1/2021<br>1/25/2024 | 7/1/2023<br>7/1/2026 |
| Mine Reclamation | Nancy Winslow, Missoula | Reappointed | 7/1/2024 |
| Fisheries | Mike Newton, Glendive | 7/1/2021* | 7/1/2025 |
| MDT ex-officio | Bill Semmens, Helena | Reappointed | 7/1/2025 |
| Hydrologist | Karin Boyd, Bozeman<br>Peter Skidmore, Bozeman | 7/1/2021<br>1/1/2024 | 7/1/2023<br>7/1/2025 |
| House of Representatives | Rep. Brian Putnam, Kalispell<br>Rep. Wayne Rusk, Corvallis | 1/1/2021<br>1/1/2023 | 1/1/2023<br>1/1/2025 |
| Senate | Vacant<br>Sen. Tom McGillvray, Billings | 1/1/2021<br>1/1/2023 | 1/1/2023<br>1/1/2025 |

## FWP Employees

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 transitioned to base license dollars to fund the positions (FTEs) and their operations, allowing more Program funds to be used for on-the-ground restoration. There is one FFIP staff member, Michelle McGree, who has been the future fisheries coordinator (FFC) since 2014. The FFC is responsible for compiling and distributing project applications, acting as FWP staff liaison for the Panel, communicating with the Panel, developing project agreements, processing and approving payments for completed work, monitoring project implementation, effectiveness, and compliance, and maintaining a comprehensive FFIP database. The FFIP also helps develop projects by coordinating with consultants and contractors, works with landowners and other citizens that need help developing project proposals, and assisting 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.” The NSEP operational funding covers only costs to support the Panel meetings and supplemental monitoring activities related to NSEP-funded projects. Operations expenditures associated with the NSEP over this report period equaled $28,745.77 and included four Panel meetings and contracted monitoring (see Current Expenditures). The use of base license dollars to support employees allows maximum Program dollars to be used for restoration.

# Authority, Funding, & Expenditures

## Program Authority

Authority is allocated by the Montana State Legislature in House Bill 5 (Table 3). Since inception of the FFIP, authority averaged $1.43 million per biennium with a cumulative total of over $21.3 million. In the 2023 legislative session, approved authority for the biennium was $2 million.

**TABLE 3. LEGISLATIVE AUTHORITY, BY LEGISLATIVE SESSION. RIT = RESOURCE INDEMINITY TRUST FUND.**

| FISCAL YEARS | DESCRIPTION, FUND, AND SUBCLASS | AMOUNT |
|---|---|---|
| FY 1996, 1997 | General License, 26306, E125 (earmarked) | $510,000 |
| | River Restoration, 26301 | $290,000 |
| | General License, 02409, ET30 | $220,000 |
| | General License, 02409, ET2 | $1,250,000 |
| FY 1998, 1999 | River Restoration, 02149, 28466 | $70,000 |
| | General License, 02409, E131 | $1,310,000 |
| FY 2000, 2001 | River Restoration, 02149, E190 | $300,000 |
| | General License, 02409, E131 | $1,170,000 |
| | General License, 02409, 38011 | $750,000 |
| FY 2002, 2003 (RIT – bull, cutthroat trout funding begins) | River Restoration, 02149, EI115 | $260,000 |
| | General License, 02409, EI115 | $750,000 |
| | RIT, 02022, EI115 | $850,000 |
| FY 2004, 2005 | River Restoration, 02149, EI131 | $210,000 |
| | RIT, 02022, EI131 | $700,000 |
| FY 2006, 2007 | River Restoration, 02149, EI150 | $190,000 |
| | RIT, 02022, EI150 | $1,000,000 |
| FY 2008, 2009 | River Restoration, 02149, EI170 | $314,000 |
| | RIT, 02022, EI170 | $1,000,000 |
| FY 2010, 2011 | River Restoration, 02149, EI109 | $150,000 |
| | RIT, 02022, EI109 | $1,000,000 |
| FY 2012, 2013 | River Restoration, 02149, EI001 | $274,000 |
| | RIT, 02022, EI001 | $1,000,000 |
| FY 2014, 2015 (expansion to all native species begins) | River Restoration, 02149, EI003 | $190,000 |
| | RIT, 02022, EI003 | $600,000 |
| FY 2016, 2017 | River Restoration, 02149, EI005 | $277,000 |
| | RIT, 02022, EI005 | $1,000,000 |
| FY 2018, 2019 | River Restoration, 02149, EI007 | $250,000 |
| | RIT, 02022, EI007 | $927,000 |
| FY 2020, 2021 | River Restoration, 02149, EI009 | $250,000 |
| | RIT, 02022, EI009 | $1,000,000 |
| FY 2022, 2023 | River Restoration, 02149, EI301 | $320,000 |
| | RIT, 02022, EI301 | $1,000,000 |
| FY 2024, 2025 | River Restoration, 02149, EI303 | $350,000 |
| | RIT, 02022, EI303 | $1,650,000 |
| CUMULATIVE TOTALS | FFIP (License + River Restoration) | $8,905,000 |
| | NSEP (RIT + BT/CT) | $12,477,000 |
| | TOTAL AUTHORITY | $21,382,000 |
| AVERAGE AUTHORITY PER BIENNIA | | $1,425,466.67 |

## Program Funding

The FFIP is funded using base license dollars and River Restoration funds (MCA 87-1-257-258), which are derived from a $0.50 earmark on resident fishing licenses and a $1 earmark on nonresident fishing licenses. The NSEP was historically funded with Resource Indemnity Trust (RIT) funds (MCA 15-38-202). However, due to sustained declines in the RIT fund, FWP base license dollars were used to backfill the Program. Additionally, the 2021 legislature passed HB637 to supplement the Program using fees from nonresident big game license preference points. These approaches ensure that the FFIP has funding to match the authority approved by the Legislature.

## Current Expenditures

Table 4 lists all the FFIP projects that expended funds during the report period. A total of $1.32 million was expended on 48 restoration projects and program operations. The operations expenditures were used for project monitoring and to facilitate Panel meetings. Most operations expenditures are absorbed by the FWP budget, allowing funding to be available for on-the-ground projects.

In the period of this report, nearly $2.2 million in grants was awarded through the FFIP over four grant cycles (Table 5). Together with matching funds, that will result in $10.2 million in restoration projects. On average, projects take two to three years from award to invoicing and completion, which creates a delay between grant award and expenditure. Program expenditures during the period of this report are typically for projects awarded between 2018 and 2022.

**TABLE 4. PROGRAM EXPENDITURES FROM 4-01-2022 TO 03-31-2024, SEPARATED BY PROGRAM (02022, NATIVE SPECIES ENHANCEMENT, NSEP; AND 02149, RIVER RESTORATION / FUTURE FISHERIES IMPROVEMENT) AND SPENDING AUTHORITY SUBCLASS (EI007-EI301).**

| PROJECT NUMBER | PROJECT NAME | STATUS | SUBCLASS | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|
| | | | 02022 Native MT Fish Species Enhance | | 02149 River Restoration Account | | | |
| | | | EI009 | EI301 | EI007 | EI009 | EI301 | |
| 73643 | Bull/Cut Trout Statewide Ops | N/A | $21,814.28 | $6,931.49 | | | | $28,745.77 |
| FFI0022018 | Deep Creek Instream Flow | Ongoing | | | $1,649.18 | $3,046.40 | | $4,695.58 |
| FFI0022021 | East Fork Bitterroot River | Completed | | | $9,000.00 | | | $9,000.00 |
| FFI0052019 | Hells Canyon Creek instream flow | Ongoing | | | | $5,000.00 | | $5,000.00 |
| FFI0052021 | Little Gold Creek culvert | Completed | | | | $10,000.00 | | $10,000.00 |
| FFI0052023 | Little Boulder River restoration | Ongoing | | | $1,915.59 | | $9,559.41 | $11,475.00 |
| FFI0072021 | South Fork Lower Willow Creek | Completed | | | | $20,900.00 | | $20,900.00 |
| FFI0102020 | Reser Reservoir dam reconstruction | Completed | | | | $40,000.00 | | $40,000.00 |
| FFI0102021 | Beaver Creek restoration | Completed | | | $13,167.25 | $36,832.75 | | $50,000.00 |
| FFI0142021 | Lake Elmo habitat enhancement supplement | Completed | | | | $4,059.06 | $8,853.33 | $12,912.39 |
| FFI0142022 | Bighorn River side channel reactivation | Ongoing | | | | $35,657.79 | $17,974.56 | $53,632.35 |
| FFI0162020 | Lake Elmo fish habitat enhancement | Completed | | | $11,330.41 | $10,254.00 | | $21,584.41 |
| FFI0162022 | Buer Pond Fencing | Completed | | | | $6,650.00 | | $6,650.00 |
| FFI0172022 | Middle Fork Judith road decommissioning | Completed | | | | $40,000.00 | | $40,000.00 |
| RIT0012019 | Big Creek instream flow | Ongoing | $10,465.10 | $40,684.90 | | | | $51,150.00 |
| RIT0012022 | Blackfoot River fish screen | Completed | $8,900.00 | | | | | $8,900.00 |
| RIT0022022 | Browns Gulch fish screen | Completed | $2,050.00 | $20,500.00 | | | | $22,550.00 |
| RIT0022023 | Bull River riparian function | Ongoing | | $12,951.76 | | | | $12,951.76 |
| RIT0032016 | Carpenter Creek fish barrier | Completed | $44,078.25 | | | | | $44,078.25 |
| RIT0032022 | East Fork Lolo & Lost Park Creek | Completed | $33,000.00 | | | | | $33,000.00 |
| RIT0032023 | Flint Creek riparian restoration | Completed | | $42,900.00 | | | | $42,900.00 |
| RIT0042022 | Flint Creek riparian restore phase 2 | Completed | | $41,250.00 | | | | $41,250.00 |
| RIT0042023 | Granite Creek fish passage | Completed | $17,410.71 | $67,589.29 | | | | $85,000.00 |
| RIT0062022 | Johnson Creek fish screen | Completed | $8,500.00 | | | | | $8,500.00 |
| RIT0072023 | Nevada Creek restoration phase 6 | Completed | $103,000.00 | | | | | $103,000.00 |
| RIT0082022 | Murphy Spring Creek instream flow | Completed | | $15,000.00 | | | | $15,000.00 |
| RIT0092022 | Nevada Creek restoration phase 5 | Completed | $35,000.00 | | | | | $35,000.00 |
| RIT0092023 | O'Brien Creek Meadows restoration | Ongoing | | $39,088.00 | | | | $39,088.00 |
| RIT0102023 | Prickly Pear Creek Simmental | Completed | $3,360.15 | $33,606.50 | | | | $36,966.65 |
| RIT0112020 | Wall Creek fish barrier supplement | Completed | $3,790.18 | | | | | $3,790.18 |

| PROJECT NUMBER | PROJECT NAME | STATUS | SUBCLASS | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|
| | | | 02022 Native MT Fish Species Enhance | | 02149 River Restoration Account | | | |
| | | | EI009 | EI301 | EI007 | EI009 | EI301 | |
| RIT0112023 | Spring Coulee Creek culvert replacement | Ongoing | | $30,569.88 | | | | $30,569.88 |
| RIT0122020 | Wheelbarrow Creek Threemile | Completed | $18,920.00 | | | | | $18,920.00 |
| RIT0122021 | Big Hole Spokane diversion | Completed | $31,298.55 | | | | | $31,298.55 |
| RIT0132020 | Big Hole Divide fish barrier | Completed | $10,420.00 | | | | | $10,420.00 |
| RIT0132022 | Upper Ruby River restore phase 2 | Completed | $46,308.90 | | | | | $46,308.90 |
| RIT0132023 | Browns Gulch fish screens | Ongoing | $29,014.00 | | | | | $29,014.00 |
| RIT0152021 | Lick Creek culvert replacement | Completed | | $50,000.00 | | | | $50,000.00 |
| RIT0152022 | Bryant Creek fish barrier | Completed | $15,000.00 | | | | | $15,000.00 |
| RIT0172020 | Little Gold Creek fish passage | Completed | $31,507.64 | | | | | $31,507.64 |
| RIT0192022 | Miller Creek restoration MPG | Completed | $20,700.00 | | | | | $20,700.00 |
| RIT0202021 | SF Dry Cottonwood Creek road 85 fish passage | Completed | $34,000.00 | | | | | $34,000.00 |
| RIT0212017 | Deer Creek road decommissioning | Completed | $7,813.75 | | | | | $7,813.75 |
| RIT0212021 | Trail Creek fish passage | Completed | $2,300.00 | | | | | $2,300.00 |
| RIT0222021 | Willow Creek fish passage | Completed | $1,000.00 | $7,200.00 | | | | $8,200.00 |
| RIT0272018 | Musselshell River Meathouse | Completed | $44,000.00 | | | | | $44,000.00 |
| RIT0302018 | Wall Creek fish barrier | Completed | $18,685.06 | | | | | $18,685.06 |
| RIT0392006 | Skalkaho Creek/Hedge Supplement | Completed | $6,600.00 | | | | | $6,600.00 |
| RIT0402006 | Skalkaho Creek/Republican | Completed | $9,485.82 | | | | | $9,485.82 |
| RIT0482002 | Skalkaho Creek | Completed | $11,775.00 | | | | | $11,775.00 |
| Grand Total | | | $630,197.39 | $408,271.82 | $37,062.43 | $212,400.00 | $36,387.30 | $1,324,318.94 |

## Anticipated Expenses

Total program expenditures during the report period were similar to previous biennia: approximately $1.32 million (Table 5). Total grant awards were increased when compared to previous years due to a focused effort to spend authority that previously didn't have identified funding (i.e., see Program Funding). The winter 2024 grant cycle saw a large influx of applications (21) and requests ($1.34 million), demonstrating a funding need.

**TABLE 5. GRANT AWARDS AND EXPENDITURES OF THE CURRENT AND PREVIOUS REPORTS. EXPENDITURES ARE TYPICALLY ASSOCIATED WITH PREVIOUS BIENNIUM AWARDS. *REPORT TIMING SHIFTED PERIOD TO SHORTER TIMEFRAME.**

| REPORT PERIOD | 11/1/2016 – 10/31/2018 | 11/1/2018 – 10/31/2020 | 11/1/2020 – 3/31/2022* | 4/1/2022 – 3/31/2024 |
|---|---|---|---|---|
| AWARDS | $1.19 million | $1.34 million | $878,875 | $2.2 million |
| EXPENDITURES | $1.58 million | $1.32 million | $841,552.75 | $1.32 million |

Awarded funds are often less than requested funds due to the competitive grant process and limited funding. Program authority and funding increased in 2023, which helped address the increased cost of restoration, but project costs continue to outpace the funding available – even when projects use a variety of matching sources. Project prioritization (ARM 12.7.1203) can be used to identify the top priority projects and cap spending to meet the limit of authority or funding. Using this method, the lowest-ranking applications are denied, even though they are recommended for funding by the Panel.

If funding was not limited the FFIP could spend, at a minimum, an amount comparable to what was awarded in this report period ($2.2 million), which is estimated to be $11 million in a 10-year period. Competition for funds is high, and project costs have increased rapidly due to inflation on materials and contractor estimates. With a 6:1 match (typical), the restoration impact of $11 million in 10 years would generate matching funds of $66 million and an overall expenditure of $77 million. These are valuable dollars for fisheries restoration, but also for Montana's recreation economy and the local contractors that complete the projects.

## Approved, Ongoing & Completed Projects

Since 1996 the FFIP approved 898 restoration projects (Table 6). Of these projects, 729 are completed or expired, 46 are ongoing, and 123 were cancelled. If a project is cancelled, funding is reallocated to future projects. The reasons for cancellations vary, but include:

- A project agreement was not signed. Funding contracts are required to ensure protection for the investment in restoration (typically 20 years).
- The applicant was unable to secure matching funds to complete the project.
- The project scope changed significantly, requiring a new application or new sources of funding.

**TABLE 6. STATUS OF FUTURE FISHERIES IMPROVEMENT PROGRAM FUNDED PROJECTS, BY YEAR, THROUGH MARCH 31, 2024. EXPIRED PROJECTS ARE COMPLETED PROJECTS THAT HAVE EXCEEDED THEIR 20-YEAR MAINTENANCE CONTRACT.**

| YEAR | CANCELLED | COMPLETE | ONGOING | *EXPIRED* | TOTAL |
|---|---|---|---|---|---|
| 1996 | 6 | | | *42* | 48 |
| 1997 | 6 | | | *39* | 45 |
| 1998 | 10 | | | *39* | 49 |
| 1999 | 7 | | | *43* | 50 |
| 2000 | 8 | 2 | | *34* | 44 |
| 2001 | 8 | 2 | | *25* | 35 |
| 2002 | 7 | 3 | | *31* | 41 |
| 2003 | 9 | 13 | | *19* | 41 |
| 2004 | 7 | 15 | | *17* | 39 |
| 2005 | 4 | 27 | | | 31 |
| 2006 | 13 | 27 | | | 40 |
| 2007 | 2 | 34 | | | 36 |
| 2008 | 9 | 17 | | *1* | 27 |
| 2009 | 3 | 27 | | *1* | 31 |
| 2010 | 3 | 28 | | *2* | 33 |
| 2011 | 8 | 22 | | | 30 |
| 2012 | 1 | 17 | | | 18 |
| 2013 | | 18 | | *1* | 19 |
| 2014 | 2 | 17 | | | 19 |
| 2015 | 2 | 33 | | | 35 |
| 2016 | 4 | 19 | 1 | | 24 |
| 2017 | 3 | 20 | | | 23 |
| 2018 | | 25 | 1 | | 26 |
| 2019 | | 16 | 2 | | 18 |
| 2020 | 1 | 18 | | | 19 |
| 2021 | | 19 | 2 | | 21 |
| 2022 | | 12 | 7 | | 19 |
| 2023 | | 4 | 14 | | 18 |
| 2024 | | | 19 | | 19 |
| Total | 123 | 435 | 46 | *294* | 898 |

### Program Project Types, Since Inception

Program funds were used to complete many types of habitat enhancement. Riparian fencing and channel restoration were the most common treatments funded through FFIP and make up 17 percent and 15 percent of all completed projects (Figure 3). Additional restoration activities include fish passage improvement, riparian restoration, streambank stabilization, irrigation efficiency or instream

flow, diversion modification, fish screens, barrier construction (native fish protection), instream habitat, lake spawning habitat, and spawning enhancement.

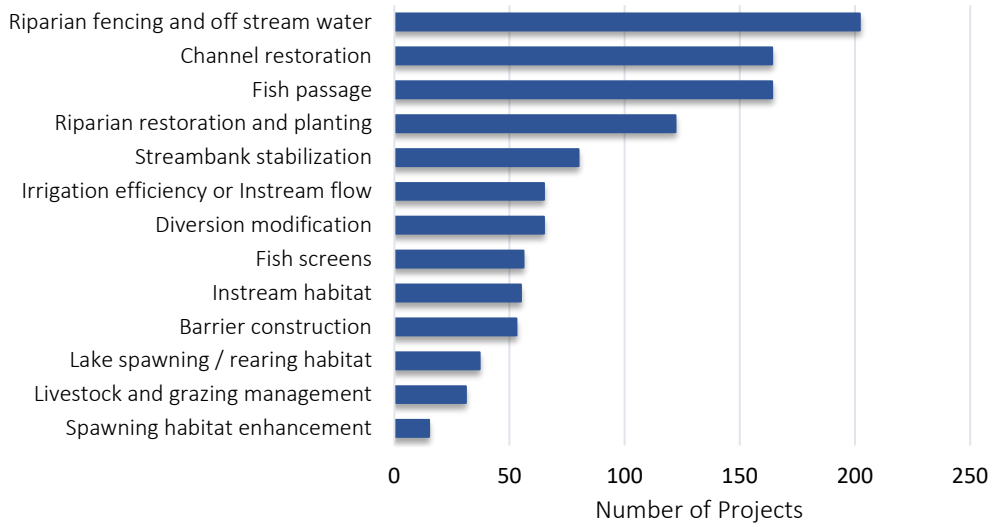


**FIGURE 3. PROJECT TYPES, 1996-2024.**

# Project Status Updates

## Approved & Funded Projects

During the period of this report, the commission approved funding or partial funding for 45 FFIP grant applications totaling $2.2 million (Table 7). These projects will use an additional $11.3 million in matching funds and in-kind services from outside sources and had a total value of approximately $13.5 million dollars. Narrative descriptions of individual projects can be found in Appendix 1: Newly Approved Project Descriptions.

Most of the approved projects involved channel restoration, fish passage, riparian restoration and planting, or fish screens (Figure 4). Other common project activities included fish barriers, streambank stabilization, and livestock and grazing management.

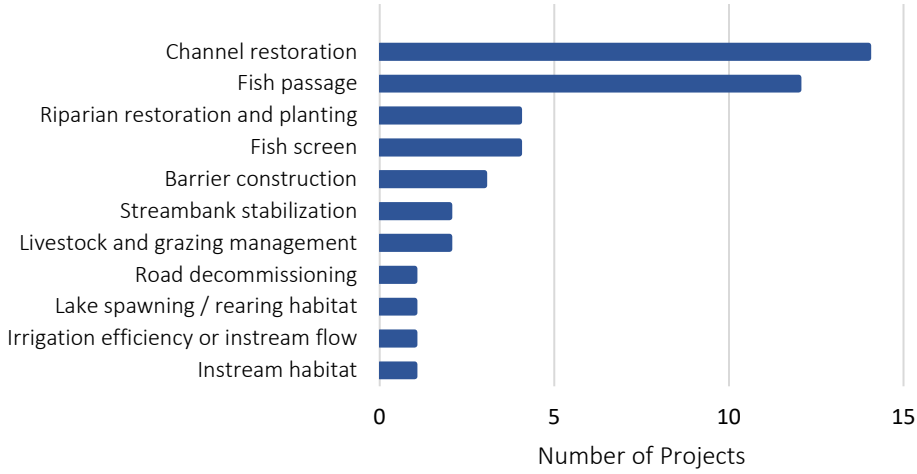


**FIGURE 4. PRIMARY TREATMENT TYPE FOR PROJECTS FUNDED WITHIN THE REPORT PERIOD (LAST 4 GRANT CYCLES).**

**TABLE 7. APPROVED PROJECTS, BY NAME AND PROJECT NUMBER, FOR THE REPORT PERIOD (FUNDING CYCLES SUMMER 2022 [S2022]; WINTER 2023 [W2023]; SUMMER 2023 [S2023]; AND WINTER 2024 [W2024]).**

| # | PROJECT NUMBER | CYCLE | PROJECT NAME | FFIP GRANT | MATCHING FUNDS | TOTAL COMMITTED |
|---|---|---|---|---|---|---|
| 1 | 014-2022 | S2022 | Bighorn River side channel reactivation | $66,000.00 | $110,663.00 | $170,663.00 |
| 2 | 015-2022 | S2022 | Bryant Creek Barrier construction | $15,000.00 | $21,000.00 | $35,000.00 |
| 3 | 016-2022 | S2022 | Buer Pond fencing | $6,650.00 | $2,850.00 | $9,500.00 |
| 4 | 017-2022 | S2022 | Middle Fork Judith road decommission and rehab | $40,000.00 | $67,482.00 | $113,832.00 |
| 5 | 018-2022 | S2022 | Mill Creek Barrier construction supplement | $50,000.00 | $435,834.08 | $576,153.46 |
| 6 | 019-2022 | S2022 | Miller Creek restoration MPG | $20,700.00 | $98,146.00 | $118,846.00 |
| 7 | 020-2022 | S2022 | North Boulder Fish passage | $41,000.00 | $183,200.00 | $224,200.00 |
| 8 | 022-2022 | S2022 | Wilson Creek stream and floodplain restoration | $5,460.00 | $31,560.00 | $31,560.00 |
| 9 | 002-2023 | W2023 | Bull River Riparian Function Restoration | $30,000.00 | $204,634.00 | $234,634.00 |
| 10 | 003-2023 | W2023 | Flint Creek riparian restoration phase 2B | $42,900.00 | $90,675.00 | $129,675.00 |
| 11 | 004-2023 | W2023 | Granite Creek Fish passage | $85,000.00 | $180,000.00 | $265,000.00 |
| 12 | 005-2023 | W2023 | Little Boulder River restoration | $28,737.50 | $278,591.25 | $229,461.25 |
| 13 | 006-2023 | W2023 | McKinley Lake dam removal | $30,000.00 | $285,650.00 | $315,650.00 |
| 14 | 007-2023 | W2023 | Nevada Creek restoration phase 6 | $103,000.00 | $1,070,303.00 | $1,173,303.00 |
| 15 | 008-2023 | W2023 | North Burnt Fork Creek Fish passage reconnection | $39,970.00 | $187,009.50 | $226,979.50 |
| 16 | 009-2023 | W2023 | O'Brien Creek Meadows stream restoration | $43,888.00 | $125,287.00 | $169,175.00 |
| 17 | 010-2023 | W2023 | Prickly Pear Creek Simmental fish screen | $36,966.65 | $55,000.00 | $98,000.00 |
| 18 | 011-2023 | W2023 | Spring Coulee Creek culvert replacement | $40,830.00 | $34,336.00 | $75,166.00 |
| 19 | 012-2023 | S2023 | Brackett Creek streambank restoration | $85,115.00 | $91,396.00 | $176,511.00 |
| 20 | 013-2023 | S2023 | Browns Gulch fish screens | $49,929.00 | $116,126.00 | $154,016.00 |
| 21 | 014-2023 | S2023 | Chicken Creek fish screen | $25,965.00 | $44,974.00 | $70,724.00 |
| 22 | 015-2023 | S2023 | Grasshopper Creek mine tailings stabilization | $27,765.00 | $424,180.00 | $429,180.00 |
| 23 | 016-2023 | S2023 | Middle Fork Rock Creek Fish passage reconnection | $50,000.00 | $333,530.00 | $383,530.00 |
| 24 | 017-2023 | S2023 | Mount Haggin culvert removal and replacement | $29,788.50 | $50,786.00 | $75,286.00 |
| 25 | 018-2023 | S2023 | Musselshell River Rowton bank restoration | $118,461.00 | $115,095.00 | $165,095.00 |
| 26 | 019-2023 | S2023 | SF NF Divide Creek Fish passage | $45,000.00 | $80,000.00 | $115,000.00 |
| 27 | 001-2024 | W2024 | Albert Creek culvert replacement | $45,300.00 | $200,000.00 | $244,297.90 |
| 28 | 002-2024 | W2024 | Benedict Creek Fish passage | $11,400.00 | $26,309.05 | $37,709.05 |
| 29 | 003-2024 | W2024 | Blind Canyon Creek barrier construction | $20,000.00 | $21,258.00 | $41,258.00 |
| 30 | 004-2024 | W2024 | Cattail Creek spawning enhancement | $105,558.00 | $124,908.00 | $232,266.00 |
| 31 | 005-2024 | W2024 | Fifer Gulch stream restoration | $143,730.00 | $132,250.00 | $286,980.00 |
| 32 | 006-2024 | W2024 | First Chance Gulch habitat improvements | $24,000.00 | $1,083.60 | $25,083.60 |
| 33 | 007-2024 | W2024 | Flat Creek tailings removal and restoration | $53,310.00 | $759,748.73 | $763,706.40 |
| 34 | 008-2024 | W2024 | Flathead Creek streambank restoration | $100,375.00 | $140,560.00 | $240,936.00 |
| 35 | 009-2024 | W2024 | Governor Creek streambank restoration | $16,400.00 | $23,500.00 | $39,900.00 |
| 36 | 010-2024 | W2024 | Granite Creek Upper Alder restoration | $100,000.00 | $3,660,681.30 | $3,760,681.30 |
| 37 | 011-2024 | W2024 | Hellroaring Creek streambank restoration | $10,400.00 | $15,600.00 | $26,000.00 |
| 38 | 012-2024 | W2024 | Little Casino Creek fish passage | $32,625.00 | $33,699.08 | $66,324.08 |
| 39 | 013-2024 | W2024 | Marshall Creek riparian fencing | $2,000.00 | $4,000.00 | $6,000.00 |
| 40 | 014-2024 | W2024 | Miller Creek restoration Leik property | $69,790.00 | $127,650.00 | $197,440.00 |
| 41 | 016-2024 | W2024 | Nevada Creek restoration phase 7 | $150,000.00 | $628,238.00 | $903,238.40 |
| 42 | 017-2024 | W2024 | North Burnt Fork Creek fish passage supplement | $55,190.00 | $347,288.75 | $422,478.75 |
| 43 | 018-2024 | W2024 | Parsons Slough Willow Springs water lease | $50,000.00 | $200,000.00 | $250,000.00 |
| 44 | 019-2024 | W2024 | Paulo Reservoir storage and habitat | $33,181.00 | $84,495.00 | $117,676.00 |
| 45 | 020-2024 | W2024 | Tin Cup Creek fish screen update | $18,200.00 | $44,252.00 | $62,452.00 |
| TOTAL | | | | $2,199,585 | $11,293,829 | $13,490,568 |

## Completed Projects

Within the report period, 38 projects were completed and inspected by FWP staff (typically the FFC and/or local fisheries staff) to ensure they were completed as approved (Table 8). This *Implementation Monitoring* facilitated discussions about successes and lessons learned with applicants and landowners. Some projects were approved and completed during this report period (*). All projects were completed successfully. Project details are in Appendix 2: Newly Completed Project Descriptions.

**TABLE 8. PROJECTS COMPLETED WITHIN THE REPORT PERIOD (APRIL 1, 2022 – MARCH 31, 2024) AND MONITORED FOR IMPLEMENTATION. *PROJECTS APPROVED AND COMPLETED WITHIN THE REPORT PERIOD.**

| PROJECT NUMBER | PROJECT NAME | REGION | COMPLETED |
|---|---|---|---|
| 001-2022 | Blackfoot River fish screen | 2 | 2023 |
| 021-2017 | Deer Creek road decommissioning | 2 | 2022 |
| 002-2021 | East Fork Bitterroot River riparian revegetation | 2 | 2023 |
| 003-2022 | East Fork Lolo and Lost Park Creeks instream habitat enhancement | 2 | 2022 |
| 004-2022 | Flint Creek riparian restoration phase 2 | 2 | 2024 |
| 003-2023 | Flint Creek riparian restoration phase 2B* | 2 | 2024 |
| 004-2023 | Granite Creek fish passage* | 2 | 2023 |
| 006-2022 | Johnson Creek fish screen | 2 | 2022 |
| 015-2021 | Lick Creek culvert replacements | 2 | 2023 |
| 005-2021 | Little Gold Creek culvert replacement supplement | 2 | 2022 |
| 017-2020 | Little Gold Creek fish passage | 2 | 2022 |
| 019-2022 | Miller Creek restoration MPG* | 2 | 2023 |
| 007-2023 | Nevada Creek restoration phase 6* | 2 | 2023 |
| 009-2022 | Nevada Creek restoration project phase 5 | 2 | 2022 |
| 019-2021 | Placid Lake outlet barrier improvement | 2 | 2022 |
| 020-2021 | SF Dry Cottonwood Creek road 85 fish passage | 2 | 2023 |
| 007-2021 | South Fork Lower Willow Creek fish passage | 2 | 2022 |
| 021-2021 | Trail Creek fish passage | 2 | 2022 |
| 012-2020 | Wheelbarrow Creek Threemile fish passage | 2 | 2023 |
| 022-2021 | Willow Creek fish passage | 2 | 2022 |
| 013-2020 | Big Hole Divide fish barriers | 3 | 2022 |
| 012-2021 | Big Hole Spokane Diversion flow improvement | 3 | 2022 |
| 002-2022 | Browns Gulch fish screen | 3 | 2023 |
| 015-2022 | Bryant Creek fish barrier* | 3 | 2022 |
| 003-2021 | Elk Springs Creek restoration phase 2 | 3 | 2022 |
| 018-2020 | Long Creek aquatic habitat enhancement | 3 | 2022 |
| 013-2022 | Upper Ruby River restoration project phase 2 | 3 | 2023 |
| 030-2018 | Wall Creek fish barrier | 3 | 2022 |
| 011-2020 | Wall Creek fish barrier supplement | 3 | 2022 |
| 010-2021 | Beaver Creek restoration phase 2 | 4 | 2022 |
| 003-2016 | Carpenter Creek fish barrier | 4 | 2023 |
| 017-2022 | Middle Fork Judith road decommission and rehab* | 4 | 2023 |
| 010-2023 | Prickly Pear Creek Simmental fish screen* | 4 | 2024 |
| 016-2020 | Lake Elmo fish habitat enhancement | 5 | 2022 |
| 014-2021 | Lake Elmo habitat enhancement supplement 2 | 5 | 2022 |
| 027-2018 | Musselshell River Meathouse restoration | 5 | 2022 |
| 016-2022 | Buer Pond fencing* | 6 | 2023 |
| 010-2020 | Reser Reservoir dam reconstruction and fish habitat improvement | 6 | 2022 |

## Long Term Effectiveness Monitoring

Effectiveness monitoring addresses the success of each project after completion and through its contractual life. In the period of this report, 55 projects were monitored for long-term success (Table 9). In some cases, one project number covered multiple monitoring sites. The FFC performed effectiveness monitoring, and the Big Hole Watershed Committee was hired to complete monitoring in the Big Hole watershed. Detailed monitoring information is in Appendix 3: Effectiveness Monitoring.

**TABLE 9. PROJECTS MONITORED FOR EFFECTIVENESS BETWEEN APRIL 1, 2022, AND MARCH 31, 2024. *PROJECT MONITORING COMPLETED BY BIG HOLE WATERSHED COMMITTEE.**

| PROJECT NUMBER | PROJECT NAME | REGION | MONITOR DATE |
|---|---|---|---|
| 041-2000 | Big Creek fish screen | 2 | 26-Sep-23 |
| 035-2002 | Blanchard Creek riparian fence | 2 | 16-Aug-23 |
| 001-2020 | Boles Creek fish screening and passage | 2 | 15-Jun-22 |
| 002-2010 | Braziel Creek channel restoration* | 2 | 15-Jun-22 |
| 026-2009 | Chamberlain/Bear creeks road deconstruction | 2 | 16-Aug-23 |
| 004-2010 | Dry Cottonwood Creek riparian fencing | 2 | 23-Aug-22 |
| 004-2018 | Elliston Creek riparian fence | 2 | 04-Oct-22 |
| 005-2018 | Granite Creek culvert removal and fish passage | 2 | 25-Jul-22 |
| 005-2020 | Lee and West Fork Lolo creeks fish passage improvement and decommissioning | 2 | 25-Jul-22 |
| 009-2016 | Little Blackfoot and Ontario Creek road relocation / floodplain restoration | 2 | 04-Oct-22 |
| 014-2007 | Lolo Creek tributary culvert replacements | 2 | 25-Jul-22 |
| 016-2019 | Lolo Ditch fish screen | 2 | 31-Aug-22 |
| 008-2018 | Monarch Creek culvert replacement | 2 | 04-Oct-22 |
| 015-2008 | Morrell Creek fish passage and fish screens | 2 | 09-Sep-22 |
| 038-2010 | Nevada Creek channel restoration | 2 | 15-Jun-22 |
| 020-2019 | Nevada Creek phase 3B restoration | 2 | 15-Jun-22 |
| 011-2016 | North Fork Dry Cottonwood Creek culvert replacement | 2 | 03-Aug-22 |
| 011-2018 | North Fork Dry Cottonwood Creek habitat enhancement | 2 | 23-Aug-22 |
| 014-2017 | Racetrack Creek Johnson diversion replacement | 2 | 23-Aug-22 |
| 036-2009 | Racetrack Creek riparian fence | 2 | 23-Sep-22 |
| 007-2012 | Racetrack Creek riparian fencing and fish passage | 2 | 23-Aug-22 |
| 015-2006 | Rock Creek riparian restoration | 2 | 16-Aug-23 |
| 017-2018 | South Fork Dry Cottonwood Creek culvert replacement | 2 | 23-Aug-22 |
| 038-2015 | Stonewall Creek fish screen | 2 | 04-Oct-22 |
| 019-2015 | Upper Lolo Creek sediment reduction | 2 | 25-Jul-22 |
| 040-2015 | Upper Lolo Creek sediment reduction | 2 | 25-Jul-22 |
| 002-2007 | Big Hole River Ralston riparian enhancement* | 3 | 16-Aug-23 |
| 028-2007 | Big Hole River riparian fencing Christiansen Reach* | 3 | 22-Aug-23 |
| 003-2011 | Big Hole River riparian fencing* | 3 | 08-Aug-23 |
| 001-2010 | Big Hole River stock water and water salvage* | 3 | 22-Aug-23 |
| 005-2011 | Cherry Creek fish barrier | 3 | 11-Jul-22 |
| 037-2003 | Deep Creek* | 3 | 16-Aug-23 |
| 013-2014 | East Gallatin restoration at Story Mill | 3 | 30-Aug-23 |
| 014-2019 | French Creek Channel Reconstruction | 3 | 15-Jun-23 |
| 003-2014 | French Creek fish barrier | 3 | 11-Oct-22 |
| 006-2015 | French Gulch channel relocation | 3 | 11-Oct-22 |
| 028-2015 | French Gulch channel restoration | 3 | 15-Jun-23 |

| PROJECT NUMBER | PROJECT NAME | REGION | MONITOR DATE |
|---|---|---|---|
| 040-2002 | German Gulch | 3 | 22-Aug-23 |
| 008-2007 | Governor Creek culvert to bridge conversion* | 3 | 22-Aug-23 |
| 006-2017 | Jack Creek riparian restoration | 3 | 03-Oct-23 |
| 011-2009 | Lake Creek fish passage enhancement | 3 | 03-Oct-23 |
| 008-2005 | LaMarche Creek pool enhancement* | 3 | 17-Aug-23 |
| 019-2020 | Lower French Creek riparian restoration | 3 | 15-Jun-22 |
| 016-2002 | Mathew Bird Creek | 3 | 30-Aug-23 |
| 010-2017 | Moore's Creek channel and riparian restoration | 3 | 03-Oct-23 |
| 008-2014 | Shields River fish barrier | 3 | 06-Oct-23 |
| 027-2016 | Shields River watershed YCT passage | 3 | 21-Sep-23 |
| 019-2012 | Sixmile Creek fish barrier | 3 | 29-Jun-23 |
| 016-2013 | South Fork Sixteenmile Creek fish barrier | 3 | 31-Dec-22 |
| 037-2007 | Swamp Creek riparian fencing* | 3 | 11-Sep-23 |
| 029-2017 | Turkey Creek fish passage | 3 | 22-Sep-23 |
| 003-2007 | Upper Big Hole River stock water wells* | 3 | 22-Aug-23 |
| 041-2015 | Van Houten Lake fish barrier and spawning channel | 3 | 11-Jul-22 |
| 019-2008 | York Gulch riparian fencing* | 3 | 29-Aug-23 |
| 028-2011 | Boulder River Dry Creek canal restoration | 5 | 27-Jul-22 |

## Expired Projects

Project agreements are developed with an anticipated project life of 20 years. There can be exceptions, however, such as 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 after 2016. Each year there are more projects that reach the end of their contractual life. Projects that expired within the report period are listed in Appendix 4. Expired Projects. Once a project is expired, the status is updated in the FFIP database, and the project file is kept for an additional five years. After five years has passed, the files are uploaded electronically, and the hard copy paperwork is destroyed, ensuring historical projects are archived.

## Appendix 1: Newly Approved Project Descriptions

**014-2022 Bighorn River side channel reactivation**
The Bighorn River (Bighorn County) is one of Montana's premier trout fisheries. The river supports populations of warmwater species (longnose and white suckers, longnose dace, channel catfish) but trout are the focus of this project (brown trout, rainbow trout). The Bighorn was dammed in 1966 (Yellowtail Dam built at Fort Smith), which affected sediment transport and reduced side channel habitat due to sediment deposition at channel heads and vegetative encroachment. This builds on a pilot side channel reconnection project by completing 12 side channel reconnections with the intention of achieving stream function at the lower flows produced by the dam. Habitat complexity will also be improved in areas with oversimplified bedform features. The goals are to improve stream and ecological function, enhance habitat, and increase angling opportunities by improving trout populations. **Status: Ongoing.**

**015-2022 Bryant Creek Barrier construction**
Bryant Creek (Beaverhead County) is a tributary to the Big Hole River, 9 miles northwest of Wise River. In its uppermost 1 mile of stream, 100 percent pure westslope cutthroat trout are separated from downstream brook trout by a natural cascade fish barrier. This project installed a treated wood fish barrier approximately 1.5 miles above the confluence with the Big Hole River. Following this project, the brook trout will be removed with rotenone and the stream will be restocked with westslope cutthroat trout, increasing available habitat from 1 mile to 11 miles. The goal is to conserve westslope cutthroat trout both in Bryant Creek and east of the Continental Divide in the Upper Missouri drainage. The fish removal portion of the project was approved by the Fish and Wildlife Commission in December 2021. **Status: Completed.**

**016-2022 Buer Pond fencing**
Buer Pond (Daniels County) is a 1-acre waterbody located 7 miles east of Scobey. It contains self-sustaining populations of largemouth bass and yellow perch and serves as a donation source to populate other waterbodies. It is on private land but is managed as a public fishery. Cattle have been able to access the pond, leading to reduced and trampled vegetation. This project fenced the pond area, excluding it from cattle grazing. The goal is to improve riparian and near-shore emergent vegetation, which is expected to enhance critical spawning and rearing habitat for fish. **Status: Completed.**

### 017-2022 Middle Fork Judith road decommission and rehab

The Middle Fork Judith River (Judith Basin County) is a tributary to the Judith River southwest of Hobson that contains populations of westslope cutthroat trout / rainbow trout hybrids, brook trout, rocky mountain whitefish, sculpin, and other cool- and warmwater species. In the project location, extensive and increasing use of a forest road led to river fords in 17 locations with 49 discrete entrances impacting the river. The road network affected the river by causing erosion and sediment deposition, which reduced water quality and available fish habitat. This project decommissioned 2.5 miles of riparian road and rehabilitated damaged streambanks with locally available materials. The goal was to return the stream to a naturally functional state, which will promote healthy sediment transport and improve habitat for invertebrates and fish species. This phase is number 5, following four previous phases of work in this area. **Status: Completed** (photos before [left] and after construction).

### 018-2022 Mill Creek Barrier construction supplement

Mill Creek (Park County) 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 application requested supplemental funding for a project that will construct a fish barrier to secure YCT conservation populations in upper Mill Creek. The barrier will 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 non-native invasion expands will prevent the need for future non-native fish removal in Mill Creek. The goals of this project were to maintain the current level of YCT genetic purity and preserve the genetic legacy of this native YCT population. **Status: Ongoing.**

### 019-2022 Miller Creek restoration MPG

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 on the 2016 Clean Water Act 303(d) list for temperature and sediment impairments and also has high conservation value for native cutthroat trout. Historically, Miller Creek was moved and straightened, causing bank incision and erosion, reduced

riparian vegetation, and reduced habitat quality. The project applicant and landowner intend to improve stream function, floodplain connectivity, riparian vegetation, and instream habitat by installing large instream wood structures, beaver mimicry structures, and woody debris matrix streambank treatments, by lowering the streambanks, planting vegetation, and activating or adjusting the current or old channels. The goals are to improve fish and riparian habitat while also improving temperature and sediment impairments. **Status: Completed.**

**020-2022 North Boulder fish passage**
The North Boulder River (Jefferson County) is a tributary to the Boulder River, near Whitehall. It contains brown trout, rainbow trout, mountain whitefish, and other species including sculpin and crayfish. In the project area, three irrigation diversions entrain fish and one diversion restricts seasonal fish movement. This project will focus on the removal of the diversion restricting fish passage (Shaw Diversion) and the restoration of the project site. Other, related projects will address the remaining diversions and water rights. The goal is to attain unobstructed movement for aquatic organisms in the North Boulder River and to improve natural stream function. This is expected to translate to improved brown trout populations. **Status: Ongoing.**

**022-2022 Wilson Creek stream and floodplain restoration**
Wilson Creek (Gallatin County) is a tributary to the Gallatin River. It contains populations of rainbow trout, brown trout, and Rocky Mountain sculpin. At the project location, south of Gallatin Gateway, Wilson Creek was ditched for agriculture, creating a straightened, widened channel. It was also impacted by dewatering during peak irrigation season and a loss of vegetation. This created poor habitat for salmonid reproduction or rearing and reduced the overall health of the stream. The project will restore the incised stream channel and connect it to the floodplain, create in-stream habitat complexity, and partially relocate the stream channel. The goals are to enhance spawning and rearing habitat for resident and migratory salmonids and to recontour the stream channel to increase floodplain connectivity and increase the potential for water storage that can contribute to late season flows in Wilson Creek and the Gallatin River. **Status: Ongoing.**

**002-2023 Bull River riparian function restoration**
The Bull River and East Bull River (Sanders County) are tributaries to the Clark Fork River near Heron that currently support native bull trout, westslope cutthroat trout, and mountain whitefish. The applicant will expand previous restoration and continue a long-term program of planting native woody riparian vegetation to stabilize banks that have been eroding and depositing sediment in the rivers. The primary cause of degradation is the monoculture of reed canarygrass, introduced in the valley as hay grass and a species that outcompeted native plants. This project will involve planting species that will grow roots and help bind the soil and reduce sloughing of banks that is a common occurrence in areas dominated by reed canarygrass. Excessive streambank and elevated sediment levels have negatively impacted fish habitat and water quality. The proposed techniques used have been improved over time and the project has expanded. The overall goal is to restore the ecological integrity, fish habitat, and

health of the Bull River and East Bull River through restoration of native riparian vegetation and suppression of non-native canarygrass. **Status: Ongoing.**

**003-2023 Flint Creek riparian restoration phase 2B**

Flint Creek (Granite County) is a tributary to the Clark Fork River near Hall that supports populations of 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 and is directly downstream of previous restoration. This project addressed 0.5 mile of stream that was impaired by past land use practices. A grazing management exclusion is being used to protect and improve riparian and floodplain vegetation and wildlife habitat. A revegetation plan was used to plant woody plants in fenced wildlife exclusion units and to seed areas. Eroding streambanks were treated where necessary to restore functioning channel geometry and improve fisheries habitat complexity. The goal was to improve habitat on an impaired 0.5-mile reach of Flint Creek in an area that has been damaged past land use practices, which is expected to improve fish populations in Flint Creek and recruitment to the Clark Fork River. **Status: Completed.**

**004-2023 Granite Creek fish passage**

Granite Creek (Missoula County) is a tributary to Lolo Creek west of Lolo that supports westslope cutthroat trout, bull trout, brook trout, brown trout, and other nongame species. Lolo Creek and its tributaries historically supported a coldwater fishery and portions of the watershed are designated as bull trout critical habitat. Road building activities disconnected several fish-bearing tributaries and contributed a large amount of sediment to the streams. Recent, nearby projects have decommissioned roads and removed many culverts. Since 2006, 130 miles of forest roads have been treated, many culverts and stream crossings have been addressed, and habitat structures have been installed. For this project, the applicant upsized eight culverts on Granite Creek tributaries that were seasonal or complete fish barriers. Most of the culverts were upsized from 24-inch corrugated culverts to 72-inch roughened bottom culverts and one will be upsized to a 5-foot culvert. The goal was to provide year-round connectivity for aquatic organisms and increase hydrologic capacity. **Status: Completed.**

**005-2023 Little Boulder River restoration**
The Little Boulder River (Jefferson County) is a tributary to the Boulder River near Boulder that supports populations of brown trout and rainbow trout. Westslope cutthroat trout are located upstream, separated from downstream waters by a fish barrier. The applicant intends to increase trout numbers in the Little Boulder River by improving fish passage, reconnecting the stream to its floodplain, and enhancing aquatic and terrestrial habitats. Treatments include grade control and aggradation riffles, rootwad/soil/gravel matrix bank treatments, wet sod lifts, riffles with log keyways, and log vanes. **Status: Ongoing.**

**006-2023 McKinley Lake dam removal**
McKinley Lake (Missoula County) is a headwater storage lake in the Rattlesnake Wilderness Area outside of Missoula. It is connected to Rattlesnake Creek, a tributary to the Clark Fork River and a high-priority fisheries area due to the presence of native fish (westslope cutthroat trout, bull trout, mountain whitefish). The project will remove the obsolete dam and outlet infrastructure, construct additional stream channel that will connect to the existing outlet channel, and revegetate the newly exposed littoral zone to support riparian and wetland vegetation. The goal is to eliminate a significant hazard that has the potential to cause nonrecoverable environmental damage downstream. Specifically, this project will eliminate an imminent threat to downstream native fisheries (sediment from erosion) and a source of non-native fish in the Rattlesnake Creek watershed (rainbow trout) while enhancing the stream and riparian and wetland areas. **Status: Ongoing.**

**007-2023 Nevada Creek restoration phase 6**

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 had past channel manipulations, overgrazing, and vegetation removal that led to bank erosion issues. In 2010 and 2017-2022, nearby channel restoration projects addressed over 5 miles of instream and riparian habitat and resulted in reduced sediment, increased stream complexity, improved riparian condition, and increased trout abundance. This project was phase 6 and continued the restoration downstream; it intends to restore natural stream and riparian function by reducing sediment loading and improving trout habitat with channel restoration, bank treatments, floodplain connectivity, and aquatic habitat complexity. It also addressed irrigation infrastructure (Douglas Canal) that is at risk of being undermined by Nevada Creek. The stream was shifted to historical meanders away from the canal. **Status: Completed.**

**008-2023 North Burnt Fork Creek fish passage reconnection**
North Burnt Fork Creek (Ravalli County) is a tributary to the Bitterroot River near Stevensville that currently supports bull trout, westslope cutthroat trout, brown trout, rainbow trout, brook trout, and

other nongame species. It was once a major spawning tributary to the Bitterroot River, but a relic water control structure has been a fish barrier for over 50 years. This applicant intends to replace the barrier with a bridge, opening fish passage, and retaining connection to the trail on the Lee Metcalf National Wildlife Refuge. The goals are to fully reconnect fish passage between the Bitterroot River and 2.5 miles of spawning habitat in North Burnt Fork Creek and to improve 0.5 mile of riparian habitat. Outreach and education will also be a component of this project. **Status: Ongoing.**

**009-2023 O'Brien Creek Meadows stream restoration**

O'Brien Creek (Missoula County) is a tributary to the Bitterroot River near Missoula that currently supports westslope cutthroat trout, rainbow trout, brown trout, brook trout, and mountain whitefish. O'Brien Creek is considered critical bull trout habitat although the species hasn't been found there recently. In this section of O'Brien Creek, habitat was degraded by historical removal of wood from the stream, straightening of the creek due to road construction, and an undersized culvert. This applicant will address all of these issues by adding large woody debris habitat structures, restoring the creek to a new channel and floodplain, installing riparian plantings, and adding two 36-inch relief culverts to the road crossing. The overall goal is to increase wild and native trout populations in the O'Brien Creek and Bitterroot River watersheds. **Status: Ongoing.**

**010-2023 Prickly Pear Creek Simmental fish screen**

Prickly Pear Creek (Lewis and Clark County) is a tributary to the Missouri River via Lake Helena. The project site is near East Helena and supports rainbow trout and brown trout, as well as sculpin, longnose dace, and white suckers. Entrainment data were collected by the local fisheries biologist and the landowner reported that young fish have been clogging pivot heads. Entrainment was estimated at over 2,000 fish annually. A fish screen was installed on an irrigation canal to prevent fish entrainment and to install an instream rock ramp at the concrete diversion headwall to increase fish passage and protect the fish screen. A corrugated water screen and a 5 percent grade rock ramp was constructed and installed. The overall goals were to eliminate fish entrainment losses, increase fish passage, and improve irrigation efficiencies for the landowner. This project is one of many improvements in Prickly Pear Creek and the trout population has improved 170 percent from 2010 to 2022. **Status: Completed.**

**011-2023 Spring Coulee Creek culvert replacement**

Spring Coulee Creek (Teton County) is a tributary to Muddy Creek and the Sun River near Power that currently supports brown trout, brook trout, rainbow trout, Rocky Mountain sculpin, white sucker, longnose dace, longnose sucker, brook stickleback, and lake chub. In the project area a channel-spanning bridge was lost in the 2018 flood and the road crossing was repaired with undersized culverts that were improperly installed (i.e., perched). The undersized culverts led to a partial fish barrier and

downstream habitat degradation. The project will replace the two perched, undersized culverts with a box culvert to reestablish connectivity for aquatic species. The goal is to restore fish passage, improve stream function, and prevent erosion. **Status: Ongoing.**

**012-2023 Brackett Creek streambank restoration**
Brackett Creek (Park County) is a tributary to the Shields River near Clyde Park that currently supports a population of Yellowstone cutthroat trout. Water leases in the stream are secured or ongoing, but channel instability remains. The project area was affected by channelization, land management practices, and an undersized bridge; these activities led to channel instability and streambanks that are vulnerable to erosion as well as limited deep pool habitat. This applicant will remove the bridge causing channel instability, increase riparian vegetation along eroding banks, and re-slope the banks as needed. The overall goals are to increase watershed resilience and floodplain connection and protect and improve wild and native fish habitat by stabilizing eroding banks using stable channel geometry, native vegetation, and the use of soft techniques. **Status: Ongoing.**

**013-2023 Browns Gulch fish screens**
Browns Gulch (Silver Bow County) is a tributary to Silver Bow Creek and contains populations of brook trout and genetically pure cutthroat trout. Westslope cutthroat trout are present throughout the drainage but most prevalent in the upper reaches. Expansion of westslope cutthroat trout is a goal in Browns Gulch, and this project builds upon previous work in the drainage that includes improving fish passage, restoring the stream channel, and improving riparian areas. The current project will rebuild four rustic diversions and install fish screens. The largest ditch (diversion 5) was funded with a 2022 FFIP grant. For this project, the applicant will address three upper diversions and install three small, corrugated water fish screens (diversions 6, 7, and 8). The goal is to provide upstream fish passage and prevent entrainment of trout. Within the watershed, the goal is to improve the westslope cutthroat trout fishery in Browns Gulch and downstream in Silver Bow Creek. **Status: Ongoing.**

**014-2023 Chicken Creek fish screen**
Chicken Creek (Ravalli County) is a tributary to West Fork Bitterroot River, above Painted Rocks reservoir in the Bitterroot Watershed. The project location is the Hawkes Ditch, which diverts water from high-quality bull trout and westslope cutthroat trout habitat. This area is one of the highest conservation priorities in the Bitterroot because it is predicted to have long-term cold water refugia and quality habitat. It is an important spawning tributary for bull trout, westslope cutthroat trout, longnose sucker and sculpin. This project will install a passive, self-cleaning corrugated water fish screen and reconnect 4.2 miles of stream. A former window-style passive screen was not entirely effective and was a maintenance burden. The goal of the project, alongside a future fish screen project, is to eliminate entrainment in the entire waterbody and protect quality habitat for native fish species. **Status: Ongoing.**

**015-2023 Grasshopper Creek mine tailings streambank stabilization**
Grasshopper Creek (Beaverhead County) is a tributary to the Beaverhead River that runs through Bannack State Park. The area is affected by mining; contaminated mine tailings were historically deposited adjacent to Grasshopper Creek. A 1977 project to stabilize the mine tailings is aging and failing; it is at risk of catastrophic failure with a major runoff event. Grasshopper Creek is a major source of sediment to the Beaverhead River, which is listed by Montana DEQ as impaired for several reasons, including sedimentation/siltation. The creek contains brown trout and brook trout, but it is connected to the Beaverhead River and this project is primarily directed at potential impacts to the Beaverhead River fishery. This project will re-armor the tailings along the streambank, while removing

tailings from the opposite side of the stream to allow for stream movement. Failing mine tailings will be addressed to prevent a massive failure. The goal is to reduce current sediment and waste inputs from the failing tailings pile and to prevent a massive failure event that will release sediment and toxic mine waste. The benefits are to reduce current sediment inputs and improve current fish habitat while protecting the fishery in Grasshopper Creek and the Beaverhead River. **Status: Ongoing.**

### 016-2023 Middle Fork Rock Creek fish passage reconnection

Middle Fork Rock Creek (Granite County) is a tributary to Rock Creek in the Upper Clark Fork River watershed. It contains bull trout, genetically nonhybridized westslope cutthroat trout, brown trout, and rainbow trout. Past agricultural practices and channel alteration led to habitat degradation in the project area, including increased erosion and sediment loading into the stream, an over-widened stream channel, and decreased pool frequency and depths. This project will enhance streamflows and reconnect 25 miles of fish passage by upgrading irrigation infrastructure and eliminating two fish passage barriers that have been entraining fish (including bull trout). Irrigation infrastructure improvements will combine water withdrawals from two irrigation diversions into one and eliminate 1.5 miles of leaky ditch. A fish screen will be installed at the combined irrigation diversion (screen type has not been chosen). The goal is to fully reconnect fish passage in Middle Fork Rock Creek and improve connectivity in Rock Creek. **Status: Ongoing.**

### 017-2023 Mount Haggin culvert removal and replacement

Within the Mount Haggin Wildlife Management Unit (Deer Lodge County), Sixmile Creek, Little California Creek, and Julius Gulch are tributaries to California Creek and the French Creek watershed. This area has been affected by 19th-century mining activities and has been the focus of large-scale restoration of French Creek and French Gulch (including past FFIP projects) and the reintroduction of Arctic grayling and westslope cutthroat trout. The project will address four undersized, perched culverts that restrict upstream movement by native fish. Two culverts will be removed (Little California Creek 1 and Julius Gulch) and two culverts will be replaced (Sixmile Creek and Little California Creek) to facilitate fish passage and stream connectivity to 8.4 miles of upstream habitat. The goal is to continue to restore native fish habitat in an area that contains one of the largest interconnected populations of westslope cutthroat trout in the upper Missouri River drainage and the only population of fluvial Arctic grayling in the absence of non-native species. With this project, occupied stream length will increase to nearly 48.4 miles. **Status: Ongoing.**

### 018-2023 Musselshell River Rowton bank restoration

The Musselshell River (Petroleum County) is a tributary to the Missouri River and contains many native fish, including blue sucker, sauger, Northern redbelly dace, sicklefin chub, and sturgeon chub. All of these species are Species of Greatest Conservation Need or Species of Concern. In the project area (Rowton property), historic flood events and extreme drought affected past land-use practices and led to alteration of the river and its riparian areas. High rates of erosion occurred. This project will use a soft bank erosion approach to limit future erosion issues and spark habitat enhancement. Approximately 1,050 feet of streambank will be restored, and 10 acres of riparian habitat will be enhanced by installing a brush matrix along the riverbank. The project is expected to increase local habitat complexity and benefit aquatic species and also to prevent additional erosion that negatively affects the landowner's infrastructure and agricultural property. The goal is to improve river function and fish habitat for important native fish species, potentially increasing woody vegetation, shade (and decreasing temperatures), and reducing sedimentation. The needs of the private landowner will also be addressed. **Status: Ongoing.**

**019-2023 SF NF Divide Creek fish passage**
South Fork North Fork Divide Creek (Silverbow County) becomes the South Fork Reservoir, south of Butte, a part of the Butte municipal drinking water supply. It contains a native, nonhybridized population of westslope cutthroat trout. Brook trout were removed from the stream and reservoir, and a dam forms the downstream fish barrier. South Fork Reservoir and much of its infrastructure was constructed in the early 1900s, and the route of water entering the reservoir has been modified several times over the years. A fish passage structure was constructed in 2016 but the channel collapsed after the grout cracked, causing the stream to undercut the boulders in the channel. This project will install a new fish passage structure while allowing the county to continue using the settling pond upstream of the reservoir. Spawning gravels will be added to the stream channel entering the settling pond to improve spawning habitat for reservoir fish. The goal is to improve the long-term conservation and viability of westslope cutthroat trout in the area, as the project could greatly improve the population size by connecting the reservoir and stream. **Status: Ongoing.**

**001-2024 Albert Creek culvert replacement**
Albert Creek is a tributary to the Middle Clark Fork River near Frenchtown that primarily supports a resident bull trout population as well as westslope cutthroat trout. Two culvert barriers exist on roads in the lower 2 miles of Albert Creek, which are considered partial barriers to adult, fluvial fish and full barriers to smaller fish. By increasing fish passage, this stream could potentially support more fluvial fish. The project will replace the upper barrier with a 12-foot-wide bottomless arch culvert. The second barrier, located 2 miles downstream of the project, ensures that non-native species do not migrate up Albert Creek from the Clark Fork River. **Status: Ongoing.**

**002-2024 Benedict Creek fish passage**
Benedict Creek is a tributary to the Clearwater River near Seeley Lake that primarily supports populations of westslope cutthroat trout. An existing irrigation diversion is impacting the stream by restricting upstream fish passage, limiting channel function, and potentially entraining trout and aquatic species. The project will upgrade an existing irrigation diversion with a headgate, valve, and a Zinvent fish screen. An 80-foot pipeline will also be installed to transport diverted flows into the existing water storage tank. Diversion infrastructure will be replaced by a channel step-pool with wood and rock. The goal is to upgrade the diversion point with a fish screen and step-pool to improve fish passage, prevent entrainment, and to better regulate flows. **Status: Ongoing.**

**003-2024 Blind Canyon Creek Barrier construction**
Blind Canyon Creek is a tributary to the Big Hole River south of Jackson that supports a population of aboriginal, genetically unaltered westslope cutthroat trout. This project is intended to support the FWP goal of increasing secured westslope cutthroat trout habitat to 20 percent across its native range in the Upper Missouri watershed. A perched culvert and periodic drying of the streambed has prevented brook trout expansion upstream of Skinner Meadows Road. The culvert is deteriorating, is undersized, and only has a 2-foot drop (not the 6-foot drop recommended to protect a population from invasion). This project will replace the culvert with a larger, squash pipe culvert that will have a 6-foot drop and a splash pad to prevent a jump pool from forming below the culvert. No fish removal (i.e., rotenone treatment) is needed as part of this project. The goal is to prevent brook trout invasion in upper Blind Canyon Creek and maintain a conservation population of westslope cutthroat trout. **Status: Ongoing.**

**004-2024 Cattail Creek spawning enhancement**
Cattail Creek is a tributary to the Ruby River near Alder that is predominantly composed of brown trout. The project area has an artificial stream channel and pond system that was created in the 1990s. Over

time, the existing system became over-widened, shallower, and slower, which resulted in fine sediment accumulation and degraded fish habitat. This project will retire the existing channel-and-pond system and create a new channel to increase spawning and rearing habitat. Activities include removal of three existing fish barriers, channel restoration, and the addition of spawning substrate and instream habitat. This is intended to improve recruitment and abundance in the Ruby River. The new channel will create 2,475 feet of enhanced spawning and rearing habitat that will be connected to the Ruby River. The goal is to improve habitat and enhance the brown trout population, as well as other aquatic species. Public access is granted through a managed access program at the Woodson Ranch. **Status: Ongoing.**

### 005-2024 Fifer Gulch stream restoration

Fifer Gulch is a tributary to Warm Springs Creek near Anaconda. It primarily contains populations of brown trout, but also includes westslope cutthroat and brook trout. Bull trout have been found in Warm Springs Creek. In the project area, the Fifer Gulch stream has been channelized and is incised. A nearby spring creek has been ditched into nearby Warm Springs Creek as well. This project will connect and re-naturalize these channelized and incised streams, adding over 1,000 feet of meandering stream, spawning habitat, physical fish habitat, and wetland areas. Additionally, this project will establish a youth fishing opportunity at the project site. The goals of the project are to enhance fish habitat and support robust populations of wild fish while also providing angling opportunities to the Anaconda community. **Status: Ongoing.**

### 006-2024 First Chance Gulch habitat improvements

First Chance Gulch is a placer-mined stream within the French Creek watershed and the Mount Haggin Wildlife Management Area. It is a tributary to French Creek and contains Arctic grayling and westslope cutthroat trout, as part of the larger French Creek restoration effort. The area was extensively placer mined during the period of 1864-1911 and the stream was straightened and became severely incised. Current conditions are a channelized and homogenous stream system with very little instream habitat (including pools and suitable spawning substrate). This project will construct 50-80 simple log structures within a 1.5-mile reach. The goal is to improve tributary habitat for native species in an important conservation area. This watershed includes a critical population of Arctic grayling. **Status: Ongoing.**

### 007-2024 Flat Creek tailings removal and restoration

Flat Creek is a tributary to the Clark Fork River near Superior that contains westslope cutthroat trout and brook trout. The project area has been affected by extensive mining, which led to heavy metal contamination, tailings piles, and loss of stream/floodplain function. In 2022 and 2023, work was done to remove tailings and rehabilitate the floodplain. However, the volume of tailings discovered exceeded estimates and additional work is needed to complete the restoration. The proposed work includes additional repository cell construction, tailings removal, floodplain grading and restoration, and revegetation. The goal of the project is to enhance fish habitat through floodplain creation and revegetation. Recruitment of spawning gravels is expected to increase due to floodplain creation and a functional stream. **Status: Ongoing.**

### 008-2024 Flathead Creek streambank restoration

Flathead Creek is a tributary to the Shields River west of Wilsall that supports a population of Yellowstone cutthroat trout with high conservation value. It also contains brown trout, longnose suckers, mountain suckers, mountain whitefish, white suckers, and brook trout. In the project area, the stream was degraded due to past grazing activities and encroachment of agricultural activities. The

stream became channelized and incised, the riparian area was diminished, channel length was reduced, and banks were instable and erosive with excess sediment entering the stream. The proposed project will install composite-wood treatments, construct bankfull benches, and revegetate to increase stability and natural stream and floodplain function. The landowner will fund fencing setbacks to limit livestock access to the creek. The goals are to increase stream-floodplain connectivity, increase overhanging cover, increase instream habitat complexity, and improve water quality. **Status: Ongoing.**

**009-2024 Governor Creek streambank restoration**

Governor Creek is a tributary to the Big Hole River near Jackson that supports Arctic grayling, within the Big Hole Candidate Conservation Agreements with Assurances (CCAA). In the project area, high flow events and grazing-related vegetation disturbances caused five outside streambanks to become unstable with a high risk of channel avulsion. Instream habitat was also negatively affected, and the channel became over-widened. This project will repair five unstable streambanks along Governor Creek and install willow stakes and sod mats. The goals are to improve bank stability, reconnect the floodplain to the stream, improve cover with deep rooting vegetation, and improve water quality and temperature. A functional stream and floodplain will promote natural function and needed habitat in an area that has been the focus of a watershed scale restoration effort for Arctic grayling. **Status: Ongoing.**

**010-2024 Granite Creek Upper Alder restoration**

Granite Creek is a tributary to Alder Gulch, which flows into the Ruby River between Alder and Virginia City. It is home to westslope cutthroat trout, brown trout, brook trout, rainbow trout, cutbow hybrids, and mountain whitefish. Historically, the Alder Gulch watershed was extensively dredged to mine for placer gold deposits. Dredging left acres of cobble and boulder piles, some of which created impoundments that affected the streamflow of Granite Creek through a defined channel into Alder Gulch. The Granite Creek bridge on Highway 287 was affected, as was the stream, riparian, and floodplain function. MDT reconstructed the highway in the area, replaced the bridge, and restored the Granite Creek channel through the right of way. A separate project will focus on the riparian conditions above the highway down to Alder Gulch. This project will focus on restoring Alder Gulch and will complete restoration on 900 feet of stream and the adjacent riparian and floodplain areas. Fascine and course wood materials will be used to restore the streambanks and vegetation will be planted in the riparian areas. The goals are to improve degraded, disconnected, and nonfunctional aquatic habitat in Alder Gulch. The project should benefit the fishery by improving aquatic habitat, including proper stream function, spawning gravels, and overhead cover. A soils analysis was completed and also informed the proposed restoration. **Status: Ongoing.**

**011-2024 Hellroaring Creek streambank restoration**

Hellroaring Creek is a tributary to Red Rock Creek, within the Arctic Grayling Centennial Valley Candidate Conservation Agreements with Assurances (CCAA), that contains Arctic grayling. In the project area, historical livestock and wildlife overgrazing contributed to reduced deep-rooted vegetation. This caused poor streambank stability and high risk for a channel avulsion. Healthy riparian areas enhance grayling habitat by increasing cover and reducing sediment inputs into the stream, which helps to maintain cold water habitat and contribute to cleaner, colder water and productive spawning areas. The purpose of this project is to increase healthy riparian habitat along Hellroaring Creek by stabilizing two outside streambanks through bank sloping, planting of mature Salix and Carex sod mats, and transplanting willows. The goal is to improve Arctic grayling habitat by improving bank stability, reconnecting the floodplain to the stream, maintaining and improving overhead cover and riparian vegetation, and improving water quality and temperature. **Status: Ongoing.**

### 012-2024 Little Casino Creek fish passage

Little Casino Creek is a tributary to Big Spring Creek within the City of Lewistown that contains brook trout, rainbow trout, and brown trout as well as numerous native and nonnative nongame species. In the project area, the creek was heavily manipulated and confined to accommodate urban development; there are five road crossings in the lower 1,000 feet of creek. Despite these issues, the creek provides important habitat and recreational value and is used as a spawning tributary for both rainbow and brown trout. This project focuses on the lowest road crossing (3rd Avenue bridge) that is failing due to age. The bridge crossing is to be replaced with a concrete box culvert that is designed to pass 100-year flow events, accommodate natural streambed materials, and maintain aquatic organism passage and connected habitats. The goal is to maintain aquatic habitat benefits. **Status: Ongoing.**

### 013-2024 Marshall Creek riparian fencing

Marshall Creek is a tributary to the Clark Fork River, east of Missoula, that contains westslope cutthroat trout with over 90percent genetic purity in the upper reaches. It also provides trout recruitment to the Clark Fork. The project area, which is the location of a former Future Fisheries fencing project that met its 20-year maintenance obligation, has experienced normal wear and tear on the riparian fence and water gaps. The Future Fisheries project was considered a success, with vegetation and stream habitat improved during the project life. The landowner intends to repair the fence and water gaps and continue protecting the stream and riparian area along 2,500 feet of Marshall Creek. The goal is to maintain quality stream habitat and riparian habitat in an important stream. **Status: Ongoing.**

### 014-2024 Miller Creek restoration Leik property

Miller Creek is a tributary to the Bitterroot River near Lolo that contains brook trout and hybridized westslope cutthroat trout, with conservation populations of westslope cutthroat trout in an adjacent tributary. In the project area, past land management and channel manipulation are believed to have resulted in a modified stream and riparian environment that resulted in reduced trout densities, simplified habitat, increased sediment loads, and elevated stream temperatures. Changes in land management resulted in opportunities to improve stream and riparian conditions. This project will build upon 2 miles of stream restoration in Miller Creek and diversify the channel plan form and realign it away from eroding banks, add grade and elevation controls to increase floodplain connectivity, use large wood/debris matrix structures to increase instream habitat complexity, and employ large scale riparian planting to facilitate recovery of the riparian community. The goals are to reduce sediment delivery to the stream, promote riparian recovery, increase floodplain connectivity, and increase habitat complexity to improve fish habitat. **Status: Ongoing.**

### 016-2024 Nevada Creek restoration phase 7

Nevada Creek is a tributary to the middle Blackfoot River near Helmville that supports populations of westslope cutthroat trout, rainbow trout, and brown trout. The project area had past channel manipulations and streamside vegetation removal that led to bank erosion issues. In 2010 and 2017-2023, channel restoration projects addressed extensive instream and riparian habitat and resulted in reduced sediment, increased stream complexity, improved riparian condition, and increased trout abundance. This project is phase 7 and will continue the restoration downstream; it intends to restore natural stream and riparian function by reducing sediment loading and improving trout habitat with channel restoration, bank treatments, floodplain connectivity, wetland restoration, and aquatic habitat complexity. Specifically, the project will incorporate side channel and meander activation, bank treatments to address eroding banks, and floodplain grading. The goal is to improve instream, riparian, and upland habitat within a working landscape to benefit aquatic species. **Status: Ongoing.**

### 017-2024 North Burnt Fork Creek fish passage supplement

North Burnt Fork Creek is a tributary to the Bitterroot River near Stevensville that currently supports bull trout, westslope cutthroat trout, brown trout, rainbow trout, brook trout, and other nongame species. It was once a major spawning tributary to the Bitterroot River, but a relic water control structure has been a fish barrier for over 50 years. This applicant is seeking supplemental funding for a project that was approved in Winter 2023, which will open fish passage and retain connection to the trail on the Lee Metcalf National Wildlife Refuge. In addition to some minor design changes, contractor and material expenses exceeded original budget estimates. The current project will replace the barrier with a 32-foot span, prefabricated aluminum box culvert that will allow full conveyance of bankfull flows. The project goals are to fully reconnect fish passage between the Bitterroot River and 2.5 miles of spawning habitat in North Burnt Fork Creek and to improve 0.5 mile of riparian habitat. Outreach and education will also be a component of this project. **Status: Ongoing.**

### 018-2024 Parsons Slough Willow Springs water lease

Parsons Slough and Willow Springs are tributaries to the Jefferson River south of Whitehall that contain brown trout, rainbow trout, and mountain whitefish. Water from Parsons Slough and Willow Springs has been legally appropriated to croplands through a ditch diversion and two pump sites. This infrastructure and water diversion reduced streamflow in these high-quality creeks, led to fish loss in an irrigation canal, and restricted fish passage. This project intends to relocate the diversion water sources to 1) a pump site on the Jefferson, leaving colder water in the spring creeks and eliminating the fish passage and entrainment issues or 2) instream flow. Specifically, the two pump sites on the spring creeks will be removed, shifting a pump site to the Jefferson River and reducing irrigation use (shifting the water to instream flow). The result will be improved streamflow in Parsons Slough and Willow Springs (estimated to be 9.45 cfs in Parsons Slough and 2.05 cfs in Willow Springs), two streams with colder water and habitat for juvenile rearing. This colder water will then be available to the Jefferson River and irrigation needs will be met using (warmer) Jefferson River water. **Status: Ongoing.**

### 019-2024 Paulo Reservoir storage and habitat

Paulo Reservoir is located near Glasgow and contains self-sustaining populations of largemouth bass and bluegill. Common carp, black bullhead, channel catfish, and yellow perch are also present at low abundances. Drought-induced reductions in maximum water depth and storage capacity resulted in significant winterkills and desiccation of spawning habitat. To recover the fishery, the applicant proposes to increase the maximum depth and storage capacity of the reservoir by raising the dam and spillway elevation to increase the reservoir's depth and allow the recreational fishery to persist. Part of this project will also to be install two fishing docks, incorporating handicap-accessible amenities. **Status: Ongoing.**

### 020-2024 Tin Cup Creek fish screen update

Tin Cup Creek is a tributary to the Bitterroot River west of Darby that contains bull trout and westslope cutthroat trout. In the project area, fish entrainment was a problem, and a fish screen was installed in 2012. The screen operated well for 11 years but is need of repair to keep it functioning. The project will replace the needed parts and plan for maintenance over the next 20 years. The goal is to maintain fish passage in Tin Cup Creek for aquatic species, especially for native trout. **Status: Ongoing.**

## Appendix 2: Newly Completed Project Descriptions

*Photos provided by FWP staff or project applicants. Projects also listed in Appendix 1 are denoted by*.*

### 001-2022 Blackfoot River fish screen

The Blackfoot River (Powell County) is one of the most popular rivers in Montana and is home to native bull trout and westslope cutthroat trout. It is designated as critical habitat for these species and is also a popular fishery for rainbow trout and brown trout. The project area is located within an important migration corridor for native fish. Near river-mile 46, an unscreened diversion (pump) was entraining fish. This project site was upgraded with a river screen to eliminate fish entrainment, support irrigation, and protect the migratory corridor.

**Status:** The site was visited in June 2022. The screen was in place, and it was reported that the installation went well.

**FIGURE 5. FISH SCREEN AND PUMPHOUSE ALONG THE BLACKFOOT RIVER.**

### 021-2017 Deer Creek road decommissioning

Deer Creek is a tributary to Seeley Lake and is within the Marshall Creek Wildlife Management Area. It currently supports populations of native bull trout and westslope cutthroat trout. The property was purchased in 2010 and contain hundreds of miles of old logging roads. The larger project worked to restore the integrity of headwater basins adjacent to and upstream of known spawning and rearing areas for native trout. The specific Future Fisheries project component removed numerous undersized culverts, decommissioned roads, reconstructed stream crossings, and undertook large-scale revegetation (Figure 6). The goal was to protect and enhance native bull trout and westslope cutthroat trout populations.

**Status:** The project was inspected by the local fisheries biologist. The project was completed successfully, and more culverts may be removed in the future on newly acquired property. The completed work included rehab of approximately 0.6 mile of road paralleling and directly adjacent to the mainstem riparian corridor, removal of 10 culverts, ripping of road surface, installation of more than 40 water bars, and installation of a user trail for access. The original project proposed complete removal of road prism but was modified to maintain a snowmobile route. After project completion, bull trout juveniles were common in both long term Deer Creek fish sampling sections located below project reach 4 and adfluvial bull trout redds were counted in an index section below the project site. Stream temperature regime and instream flows continue to gradually improve as riparian shrubs and canopy recover from decades of logging. Overall, these results indicate a very successful project.

**FIGURE 6. REMOVAL AND REHAB OF ROADS.**

### 002-2021 East Fork Bitterroot River riparian revegetation

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 had less than 25 percent vegetative cover. Poor water quality due to high sediment loads, elevated water temperatures, and alterations in streamside vegetation impaired aquatic life. This project addressed these issues by planting riparian vegetation along 1.6 miles of the East Fork and treating two eroded streambanks near Edwards Road. Riparian fencing and grazing management were incorporated into the bank treatment plan. The goal was to improve aquatic habitat and water quality in the East Fork. This project built upon previous restoration work and included opportunities for education, outreach, and developing partnerships.

**Status:** The completed project was heavily modified from the original plan and was significantly scaled back; bank treatments were no longer recommended by the engineering team. As a result, the project managers maintained or expanded the revegetation component of the project (Figure 7). The work

completed was sufficient and functional from a fish passage and stream function perspective. Future monitoring will focus on assessing county bridge protection and revegetation success.

**FIGURE 7. EAST FORK BITTERROOT RIVER REVEGETATION, INCLUDING WILLOW PLANTINGS.**

### 003-2022 East Fork Lolo and Lost Park creeks instream habitat enhancement

Description: East Fork Lolo and Lost Park creeks (Missoula County) are tributaries to Lolo Creek that include designated bull trout habitat. They support high densities of westslope cutthroat trout and remnant bull trout populations. The project area was impacted by channelization, stream-side roads, past intensive grazing, and large wood removal. Low habitat complexity and roughness contributed to reduced fish habitat and population sizes. This project continued previous restoration efforts in the Lolo Creek watershed that improved fish passage and reduced sediment loading through culvert removal and road decommissioning. Large stream-spanning log jams were installed into East Fork Lolo and Lost Park creeks to dissipate stream energy, trap sediment, and create aquatic habitat diversity such as spawning beds and pools (Figure 8). Smaller jams were installed to reduce energy adjacent to road fill. Old channels and floodplains were activated. The overall goal was to increase native fish populations in the Upper Lolo watershed.

**Status:** At project completion, there was a lot of wood in the project, and it looked very good. It is very visible from the main road. There were some adjustments made to get more contact between the wood and the stream.

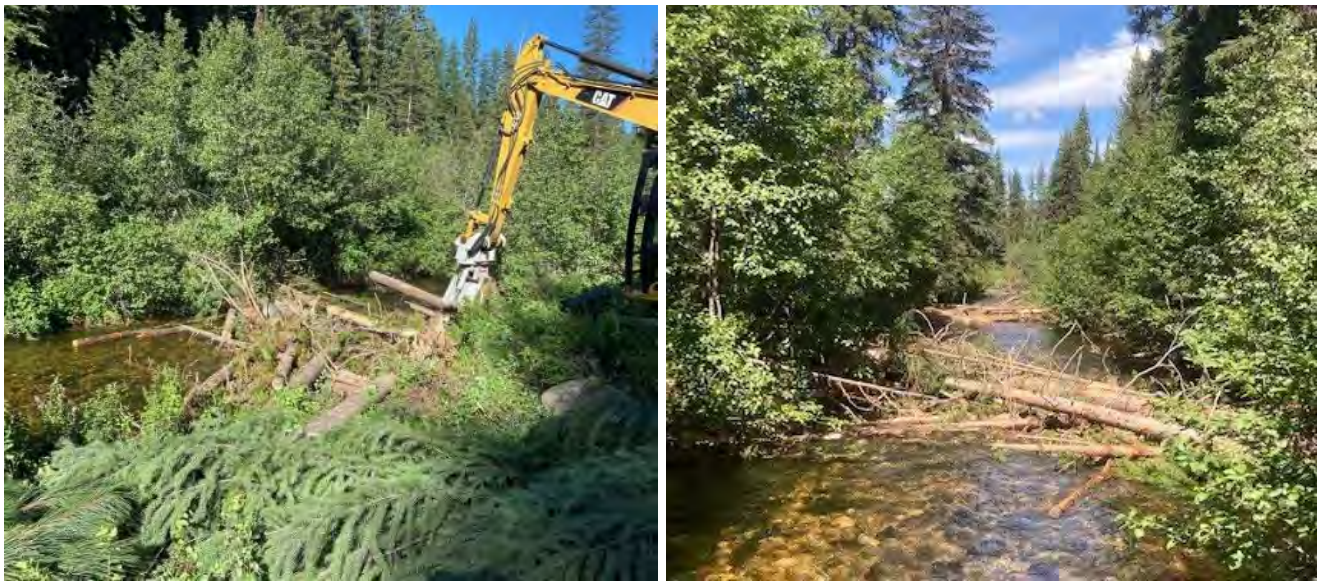


**FIGURE 8. INSTALLING WOOD JAMS IN EAST FORK LOLO CREEK (DURING AND AFTER).**

### 004-2022 Flint Creek riparian restoration phase 2

Flint Creek (Granite County) is a tributary to the Clark Fork River near Hall. Species include brown trout, bull trout, westslope cutthroat trout, rainbow trout, and mountain whitefish. The project area is a high priority foraging, overwinter habitat, and migration corridor for westslope cutthroat trout and bull trout. This project addressed 0.5 mile of stream that was impaired by past land use practices. The project built upon a previous phase and improved grazing management, completed revegetation, and restored 1,200 feet of streambanks using techniques to improve functional channel morphology and improve fish habitat complexity. The goals were to improve and protect riparian and instream habitat and improve fish populations in Flint Creek and the Clark Fork River.

**Status:** The site was visited when the project was nearly complete, showing various areas that were completed while also allowing partners to see streambanks during construction (Figure 9). Successes of previous phases were discussed, and future phases were observed and assessed for project development. Overall, the restoration has been effective and successful.

**FIGURE 9. CONSTRUCTION OF FLINT CREEK RESTORATION, SHOWING PLACEMENT OF BANK STRUCTURES.**

### 003-2023 Flint Creek riparian restoration phase 2B*
Described in Appendix 1: Newly Approved Project Descriptions

### 004-2023 Granite Creek fish passage*
Described in Appendix 1: Newly Approved Project Descriptions

### 006-2022 Johnson Creek fish screen
Johnson Creek is a tributary to the lower Blackfoot River and contains pure westslope cutthroat trout, rainbow trout, and brown trout. It serves as a thermal refugia to the mainstem Blackfoot. Previous studies indicated that Johnson Creek is an important tributary for migrations as far as the Clark Fork River near Thompson Falls. Past work in the drainage included culvert upgrades, and this project was completed to improve the last remaining impact to the creek. An unscreened diversion near the mouth entrained trout, and this project installed a headgate and Zinvent fish screen and upgraded the diversion (Figure 10). The goal was to improve fish passage, prevent entrainment, and regulate flow for conservation benefits.

**Status:** The project was successfully completed, and the landowner was very pleased with the project thus far. Installation looked good. The screen itself had some debris, and it was unclear how often/easy it would be to clean as it sits in a pool. In its first year, the project was noted as being very successful; maintenance needs will be monitored over time.


**FIGURE 10. BEFORE THE PROJECT (LEFT) SHOWING THE DITCH COMING OFF OF JOHNSON CREEK, AND (RIGHT) THE COMPLETED PROJECT, WITH THE FISH SCREEN IN THE POOL.**

### 015-2021 Lick Creek culvert replacements
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 impeded fish movement and fragmented the bull trout and westslope cutthroat trout populations in Lick Creek. The culverts were undersized and restricted the bankfull stream width by approximately 50 percent. The lower culvert was considered a partial barrier due to excessive water velocities during high-flow periods and the upper culvert was a complete barrier due to its steep gradient and excessive water velocities. The goal of this project was to restore the stream to its historical condition, where it was unobstructed for spawning migratory bull trout and westslope

cutthroat trout coming out of the East Fork Bitterroot River via Moose Creek. The project replaced the existing culverts with a larger culvert that is 1.5 times wider than the bankfull channel (lower culvert) and a bottomless arch 1.8 times wider than the bankfull channel (upper culvert), both able to pass a 100-year flood.

**Status:** The project was visited by the FWP biologist. Everything was complete, and the crossings looked good.

**FIGURE 11. LICK CREEK CULVERT INSTALLATION, AT PROJECT COMPLETION.**

### 017-2020 Little Gold Creek fish passage & 005-2021 Little Gold Creek culvert replacement supplement

Little Gold Creek (Granite County) is a tributary to Boulder Creek (and Flint Creek) northeast of Philipsburg. It supports populations of westslope cutthroat trout and bull trout. In the project area, an undersized culvert was 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, 2 miles of stream could be reconnected to Boulder Creek and then Flint Creek. The applicant replaced the undersized culvert with an Aquatic Organism Passage (AOP) culvert that installed a natural stream channel within the culvert and can pass a 100-year flow event of 123 cubic feet per second. The goal was to reconnect Little Gold Creek, improve habitat quantity and connectivity, and maintain additional coldwater refugia.

**Status:** The project was visited in 2023; the final inspection included concern over step pool installation and the ability of fish to pass the structure, so the contractor returned to correct the issues and lower some boulders. Once the adjustments were made, the project met its objectives of fish passage improvement.

**FIGURE 12. LITTLE GOLD CREEK CULVERT INSTALLATION, AT PROJECT COMPLETION (AFTER CORRECTION).**

### 019-2022 Miller Creek restoration MPG*

Described in Appendix 1: Newly Approved Project Descriptions

### 007-2023 Nevada Creek restoration phase 6*

Described in Appendix 1: Newly Approved Project Descriptions

### 009-2022 Nevada Creek restoration project phase 5

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 nonfunctional riparian area caused the channel to erode and downcut. In 2010 and 2017-2020, nearby channel restoration projects improved 24,400 feet of instream and riparian habitat. These projects reduced sediment (>50 percent reduction), increased stream complexity, improved riparian condition, and created fish habitat that resulted in increased trout abundance (100 percent increase in abundance). This project was considered phase 5 and continued the restoration downstream. This project focused on reducing sediment loading through stream bank treatments, floodplain connectivity, aquatic habitat complexity, and stream function on 9,100 feet of Nevada Creek. Unlike previous phases, planform modifications were not proposed, instead habitat was improved strategically. The goal was to increase habitat capacity for trout and reduce sediment loading through healthy riparian areas, functional streams, and floodplain connection. The location was in a highly visible reach of Nevada Creek and the previous projects had important demonstration value.

**Status:** In 2023, the project was visited with staff from the Big Blackfoot Chapter of Trout Unlimited. The restoration looked great overall. The willows were doing really well in some places, marginal in others. It was not understood why there was a difference in growth, but the site will be monitored over time to see how the stream adjusts and the vegetation grows.

**FIGURE 13. NEVADA CREEK BEFORE THE PROJECT (LEFT) AND AFTER PROJECT COMPLETION (RIGHT). NOTE THE BANK TREATMENT AND STREAM WIDTH.**

### 019-2021 Placid Lake outlet barrier improvement

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 enhanced 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 was 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.

**Status:** The project was completed and was about double the cost, requiring additional fundraising. Some revegetation, planting, and seeding was done in spring 2022. The project has been successful protecting against northern pike invasion and the homeowners are invested in its success.

### 020-2021 SF Dry Cottonwood Creek road 85 fish passage

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 95percent pure. The drainage contains no brown trout or brook trout, which are highly competitive with westslope cutthroat trout. About 4 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 replaced 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 included irrigation efficiency upgrades, fish screens, road improvements, off-stream water for livestock, and riparian fencing.

**Status:** Visited the site with staff from the Clark Fork Coalition. The project was completed successfully. The stream immediately downstream of the culvert is wide and the project manager will track the channel adjustment over time. There was a lot of streamflow in the stream (unusual for fall), so deposition/vegetation may occur in the future. Overall, there were no problems with the project.

**FIGURE 14. SOUTH FORK DRY COTTONWOOD CREEK CULVERT INSTALLATION, AT PROJECT COMPLETION.**

### 007-2021 South Fork Lower Willow Creek fish passage

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 project improved the only irrigation diversion in the drainage above the reservoir, which blocked fish passage during periods of low streamflow and diverted 80 percent of streamflow. The diversion was 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 will remain in the stream and have unobstructed movement. The project eliminated risk of entrainment and reconnected 25 stream miles of habitat for native and wild fish.

**Status:** The project site was visited with staff from Trout Unlimited (TU). The improvements are in place and working well. The irrigator is pleased. A headgate was not installed (using boards), which may be challenging in the future but for now the project will be monitored by the landowner and TU. The project resulted in significant fish passage improvement at the site.

**FIGURE 15. SOUTH FORK LOWER WILLOW CREEK FARMERS FISH SCREEN (LEFT) AND ROCK STEP POOL GRADE CONTROL FOR THE DIVERSION (RIGHT), AT PROJECT COMPLETION.**

### 021-2021 Trail Creek fish passage

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 addressed an existing stream crossing above the Morrell/Trail creeks confluence that was undersized and perched. The existing culverts (three pipes, each 36 inches) created a fish passage barrier during high periods and impaired natural stream function. The undersized culverts were replaced by a bridge that meets stream simulation criteria and allows uninhibited aquatic organism passage and stream function. This crossing was the last known fish passage barrier on Trail Creek. The goal was to enhance stream connectivity and natural channel function and enhance habitat for wild trout recruitment and survival.

**Status:** The site was visited with staff from Big Blackfoot Chapter of Trout Unlimited. The project was well done, and the before/after photos are very striking. The project had some differences in opinion over the initial design but the final product is supported and considered successful. It is located at a very accessible site and is meeting its objectives of fish passage and natural stream function.


**FIGURE 16. TRAIL CREEK BEFORE CONSTRUCTION (LEFT) AND AFTER PROJECT COMPLETION (RIGHT), WHERE A BRIDGE REPLACED UNDERSIZED CULVERTS.**

### 012-2020 Wheelbarrow Creek Threemile fish passage

Wheelbarrow Creek (Ravalli County) is located near the Threemile Wildlife Management Area, 9 miles east of Florence. It supports westslope cutthroat trout (likely pure strain). This project removed an undersized culvert and replaced it with a bridge, restoring fish passage and natural stream function. Grade controls were constructed to accommodate the change in slope. The existing culvert was likely a fish passage barrier at most flows. The goal of the project was to restore a natural stream channel, reduce erosion, and facilitate fish passage.

**Status:** The completed project was inspected by the local FWP fisheries biologist. The project was done, with the exception of some riprap that needed to be placed under the bridge. The construction was delayed and the stringers were smaller than expected, making the banks steeper. The riprap should help protect the steeper banks. The project is successful in meeting fish passage objectives.


**FIGURE 17. WHEELBARROW CREEK BRIDGE, INSTALLED FOR FISH PASSAGE.**

### 022-2021 Willow Creek fish passage

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 was undersized and perched, creating a barrier to fish passage at high flow and impairing natural stream function. This project replaced the undersized culvert with a bridge that resulted in a stable stream crossing and a correction of road drainage problems, fish passage, and restoration of natural channel morphology. Improved connectivity is expected to improve habitat for fish, including fluvial westslope cutthroat trout.

**Status:** Visited site with staff from the Big Blackfoot Chapter of Trout Unlimited. The project was completed well and the landowner was helpful and happy with the end result. Costs were higher than expected. It is considered a successful project.

**FIGURE 18. WILLOW CREEK BEFORE CONSTRUCTION (LEFT) AND AFTER COMPLETION (RIGHT), WHERE UNDERSIZED CULVERTS WERE REPLACED WITH A BRIDGE.**

### 013-2020 Big Hole Divide fish barriers

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 was intended to meet the highest priority WCT conservation need. Collectively, these barriers secured 17.6 miles of stream containing >90 percent pure WCT. These populations were threatened by hybridization and competition with non-native fish; there were no barriers or protections to isolate these species, which are some of the last pure isolated WCT in the Upper Missouri Basin. This project installed 6-foot wooden drop structures on Browns and Buffalo creeks. A hardened splashpad was to be installed at Painter Creek to secure the barrier site.

**Status:** The project was completed successfully and secured two genetically unaltered populations and a mixed conservation population. In total, the project secured 6.5, 5.6, and 5.5 miles of habitat in Browns, Buffalo, and Painter Creeks. It was completed on time and within budget.

**FIGURE 19. BROWNS GULCH (UPPER LEFT), BUFFALO CREEK (UPPER RIGHT), AND PAINTER CREEK (BOTTOM) PROJECTS, INSTALLING FISH BARRIERS OR A PERCHED CULVERT TO PROTECT NATIVE SPECIES HABITAT.**

### 012-2021 Big Hole Spokane Diversion flow improvement

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 didn't allow for small adjustments. The result of this structure was overshooting the instream flow targets and undershooting the irrigation target, or vice versa. This inefficient method of adjusting flow was 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 installed a new diversion structure to more accurately meet irrigation demand and instream flow targets, thereby keeping the correct amount of flow going to irrigators and to instream flow, improving habitat for Arctic grayling and other aquatic species. Two screwgates were installed and will provide real-time management of flow targets.

**Status:** Inspected by FWP staff that managed the project. Overall, the project installation was smooth. The contracted work was very well done. In addition to the Spokane Diversion, the contractor was able to include some additional work on the Spokane return flow structure and improve fish passage along the Strow Bridge Diversion on the Big Hole River. This project is expected to make a great improvement in flow management on the Big Hole River and the overall effort to conserve Arctic grayling in the Big Hole.

**FIGURE 20. BIG HOLE SPOKANE DIVERSION BEFORE (LEFT) AND AFTER (RIGHT) CONSTRUCTION.**

### 002-2022 Browns Gulch fish screen

Browns Gulch (Silver Bow County) is a tributary to Silver Bow Creek and contains populations of brook trout and genetically pure cutthroat trout. Westslope cutthroat trout are present throughout the drainage but most prevalent in the upper reaches. This project builds upon previous work in the drainage that includes improving fish passage (irrigation diversions and culverts), channel restoration, and riparian improvements. This project addressed one of the remaining fish habitat priorities, to remove an irrigation barrier and source of entrainment. The applicant rebuilt the irrigation diversion at Costin Ditch and installed a small, corrugated water screen. The diversion was rebuilt with four rock weirs in a step pool design. The goal was to reduce entrainment and improve connectivity of upper Browns Gulch, which will protect and improve habitat for genetically pure westslope cutthroat trout.

**Status:** A corrugated water screen was installed, and the site was visited with staff from the Clark Fork Coalition. The screen uses a new design, which uses horizontal slots instead of circular holes that were getting pine needles trapped in the screen. This is an experimental new design that will be important to evaluate over time. The fabricator for the welded box was hired locally. There were complications with construction oversight, but overall, it was installed well. The rock weirs used for the diversion appear to be installed well and should provide fish passage.

**FIGURE 21. BROWNS GULCH CORRUGATED WATER SCREEN (LEFT) AND STEP POOL GRADE CONTROL FOR THE DIVERSION (RIGHT), AT PROJECT COMPLETION.**

### 015-2022 Bryant Creek fish barrier*

Described in Appendix 1: Newly Approved Project Descriptions

### 003-2021 Elk Springs Creek restoration phase 2

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 1950s, 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 shifted from stream to pond habitat. MacDonald Pond was removed in 2009 and in 2016, 1,500 feet of the formal stream channel was restored. This project reconstructed the final 1,750 feet of formerly inundated channel. The channel was over-widened, shallow, unable to transport the large volumes of lake bed and alluvial deposits that remained, and encouraged the growth of macrophytes. The degraded condition held few resident fish and impeded Arctic grayling from moving upstream. The goal was 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.

**Status:** The project was completed by FWP staff. The newly constructed channel is deeper and wider than the original channel and allows access for migratory fish. The old channel was left as an overflow channel. This restoration improved access for migratory grayling by tightening the channel, resulting in a stream with deeper, cooler water and vegetated banks. It is considered a successful project.

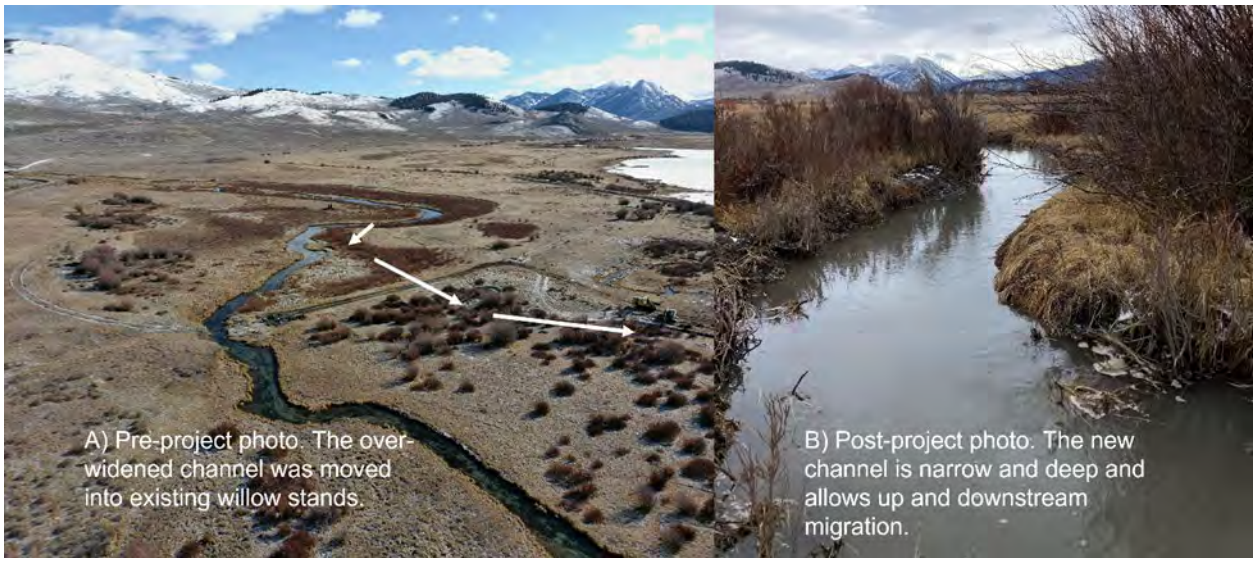


**FIGURE 22. ELK SPRINGS CREEK BEFORE CONSTRUCTION (LEFT) AND AFTER (RIGHT), WHEN THE CHANNEL WAS MOVED TO AN AREA WITH EXISTING WILLOWS AND THE STREAM WAS NARROWED AND DEEPENED.**

### 018-2020 Long Creek aquatic habitat enhancement

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 have been 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 moved part of the degraded stream channel into a historic channel with a stronger riparian vegetation community, which was expected to have more immediate positive impacts to Arctic grayling conservation. The property is protected by a U.S. Fish and Wildlife Service conservation easement.

**Status:** The Project successfully enhanced aquatic and riparian habitat for Arctic grayling on The Nature Conservancy's lower section of Long Creek. The completed work is expected to enhance the extent of suitable spawning habitats and the number of pools specifically for grayling life history needs. Channel realignment and bank treatments will reduce thermal loading during low-flow periods.

**FIGURE 23. LONG CREEK AFTER CONSTRUCTION, WHERE A SIDE CHANNEL WAS CONSTRUCTED.**

### 013-2022 Upper Ruby River restoration project phase 2

The Ruby River (Madison County) is a tributary to the Beaverhead River and supports populations of brown trout, rainbow trout, Arctic grayling, and whitefish. In the project area, the river was a single-thread channel that was actively downcutting and abandoning the floodplain. Removal of beaver and land management led to degradation, loss of vegetation, downcutting, and erosion. The applicants built upon previous work and restored 1.7 miles of the river by installing brush matrix treatments, adding channel length, and improving riparian and aquatic habitat. Bank treatments were combined with riparian fencing and grazing management to reduce erosion, increase instream habitat diversity, and promote establishment of woody vegetation. Channel length was added by moving the channel into abandoned meanders. Bed aggradation structures were installed to elevate the water surface elevation and encourage aggradation. The project was expected to increase floodplain connectivity, leading to groundwater infiltration and water storage for late season streamflow. Fish should benefit from increased spawning gravel, pool refugia, and slack water.

**Status:** The project was visited as part of a tour and looked good overall. Some areas of the previous year's construction showed erosion and some outside banks had minimal vegetation established. Project managers will want to track over time to see how the stream and vegetation respond over time.

**FIGURE 24. UPPER RUBY RESTORATION AFTER CONSTRUCTION, WHERE THE STREAM WAS NARROWED AND STRUCTURES WERE ADDED TO THE OUTSIDE BEND TO PREVENT EXCESSIVE EROSION.**

### 030-2018 Wall Creek fish barrier & 011-2020 Wall Creek fish barrier supplement

Wall Creek (Madison County) is a tributary to the Madison River and supports populations of 95 percent pure westslope cutthroat trout. Before the project, rainbow trout were allowed access to Wall Creek and could hybridize with westslope cutthroat trout. To prevent further dilution of genetic purity and risk losing westslope cutthroat trout conservation status, the applicant intends to install a fish barrier that will isolate the conservation population. The barrier would protect nearly 8 miles of headwater streams and contribute to the restoration goal for westslope cutthroat trout east of the Continental Divide.

**Status:** The project was completed and is protecting westslope cutthroat trout.

**FIGURE 25. WALL CREEK FISH BARRIER AT PROJECT COMPLETION.**

### 010-2021 Beaver Creek restoration phase 2

Beaver Creek (Lewis and Clark County) is a tributary to the Missouri River below Hauser Reservoir near

Helena that 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 provided funding to phase 1, which restored 0.5 miles of the channel and connected the stream to the floodplain. This project was phase 2 and extended the channel and floodplain restoration downstream. The goals were to improve fish habitat and stream function by restoring Beaver Creek within the rest of the project area (0.7 mile, 6 floodplain acres). The project improved connectivity with the Missouri River and restored the channel and floodplain to more natural conditions, thereby improving water quality, habitat complexity, and the amount of instream, riparian, and wetland habitat. Restoration included 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.

**Status:** The project was completed in December 2022. The construction was successful, but water went subsurface for a period of time. Once the fines settled and the water table adjusted, streamflow returned. FWP staff doing redd count surveys saw marked improvements in spawning after the project.

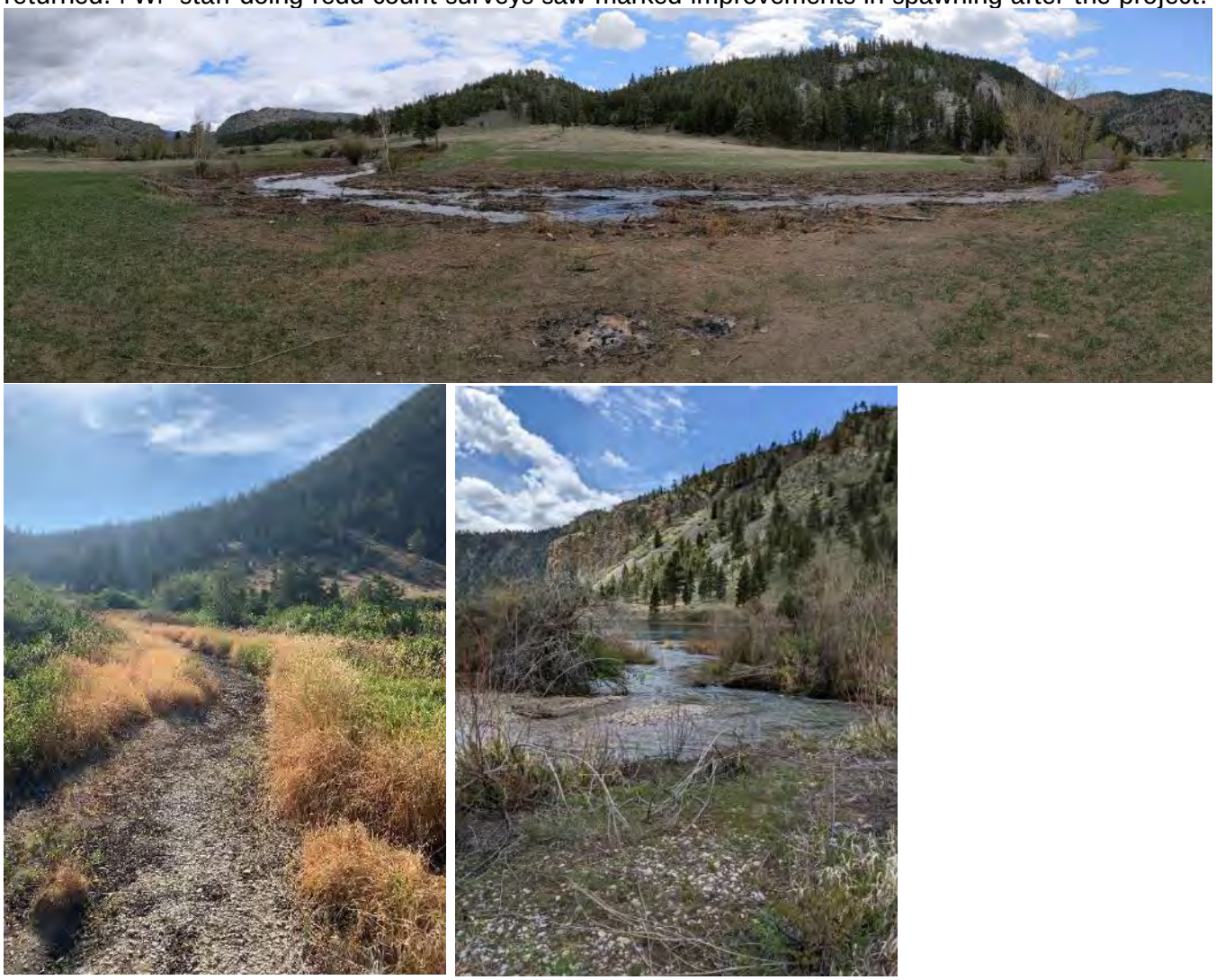

**FIGURE 26. BEAVER CREEK CHANNEL RESTORATION AFTER PROJECT COMPLETION, SHOWING HABITAT STRUCTURES AND FLOODPLAIN RECONNECTION (TOP), AS WELL AS THE STREAMFLOW CHANGES AFTER RESTORATION (BELOW).**

### 003-2016 Carpenter Creek fish barrier

Carpenter Creek (Cascade County) is a tributary to Belt Creek near the town of Neihart that supports two nonhybridized populations of westslope cutthroat trout. These genetically distinct populations were isolated from Belt Creek over 60 years ago when mining activities produced a stream reach with poor enough water quality that fish did not survive. The cutthroat trout have persisted above the chemical barrier, and non-native fish have been restricted to Belt Creek. Current and future efforts to clean up the mine removed the chemical barrier, eliminating the separation of the cutthroat trout from non-native fish in Belt Creek. Monitoring efforts found rainbow trout in lower Carpenter Creek where they had not been observed from 2011 to 2013. The applicant built a concrete barrier to maintain isolation of the nonhybridized populations of westslope cutthroat trout. It also expanded habitat to the area once devoid of fish due to poor water quality.

**Status:** After several delays, the project was completed in 2023. The project is considered successful and it is protecting westslope cutthroat trout.

**FIGURE 27. CARPENTER CREEK FISH BARRIER AT CONSTRUCTION**.

### 017-2022 Middle Fork Judith road decommission and rehab*

Described in Appendix 1: Newly Approved Project Descriptions

### 010-2023 Prickly Pear Creek Simmental fish screen*

Described in Appendix 1: Newly Approved Project Descriptions

### 016-2020 & 014-2021 Lake Elmo fish habitat enhancement

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 project involved creating 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 were based on successful installations in other warmwater lakes. The goal was 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.

**Status:** While the lake was drained, improvements were made to the state park's trails, headgate, angler access, and fish habitat. Two earthen fishing jetties were constructed on the south and west ends of Lake Elmo to spread out shoreline anglers and increase access to greater depths. With the help of a Boy Scout troop, catfish condos were constructed and placed strategically throughout the lake. Catfish condos provide cover for all fish and encourage cavity-nesting catfish to spawn. Project partners also built and placed over 20 Georgia Cubes, which are structures that provide habitat and cover for both sport and baitfish. Georgia Cubes attract fish and, subsequently, anglers. To add habitat and provide more spawning substrate for minnows and panfish, brushy piles (made of felled Russian olive trees) were scattered throughout the lake and three gravel beds were added. Additionally, several trenches were excavated along the east side of the lake to increase depth and lakebed complexity. The trail on the east side of the lake, paralleling Lake Elmo Drive, was moved away from the road, widened, and paved to increase park user safety.

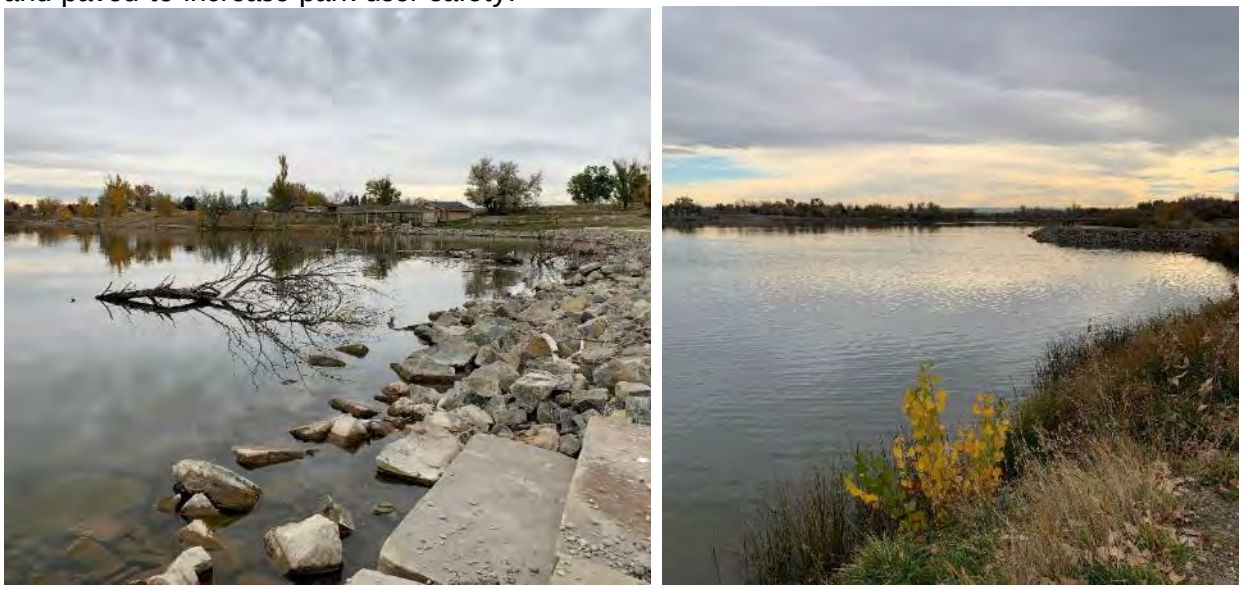

**FIGURE 28. LAKE ELMO HABITAT ENHANCEMENT AFTER CONSTRUCTION, SHOWING THE HABITAT AND FISHING ACCESS (LEFT) AS WELL AS THE ROCK PIERS (RIGHT).**

### 027-2018 Musselshell River Meathouse restoration

The Musselshell River (Musselshell County) is a tributary to the Missouri River and supports populations of sauger, channel catfish, smallmouth bass, and native minnows. In the area near Roundup, a project was developed to restore the floodplain and riparian area on a newly purchased property near an abandoned mine that experiences flooding. This project excavated and removed waste coal from the area, removed berms, and created a floodplain that could accommodate a more natural flow pattern. Installation of habitat in the riparian area was planned, but not completed. The goals were to mitigate flooding events, improve the fishery and riparian habitat, improve recreational access, and reclaim a mine site.

**Status:** Upon inspection, it was noted that a portion of the work was not completed (i.e., the soil lifts), but floodplain access was created. As such, partial payment was made and the project was closed out with notes on the adjustment in scope.

**FIGURE 29. MUSSELSHELL MEATHOUSE RESTORATION BEFORE (LEFT) AND AFTER (RIGHT), SHOWING THE REMOVAL OF BUILDINGS AND RESTORATION OF THE SITE TO ALLOW FLOODPLAIN ACCESS.**

### 016-2022 Buer Pond fencing*

Described in Appendix 1: Newly Approved Project Descriptions

### 010-2020 Reser Reservoir dam reconstruction and fish habitat improvement

Reser Reservoir (Blaine County) is a 25-surface acre reservoir located on 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 was drawn down approximately 20 feet. The BLM repaired the dam in 2020, and the project managers used this opportunity to enhance habitat prior to filling. Using equipment that was onsite during dam reconstruction, the applicant created several large spawning beds at various locations to improve spawning and rearing habitat for largemouth bass, black crappie, and bluegill. Deep structure was installed for larger adult fish. The goal was to enhance natural reproduction and habitat at Reser Reservoir, which is expected to translate to improved wild fish and forage production.

**Status:** The habitat portions of the project were completed, and more structures are likely to be added. The spawning beds were placed in low slope areas away from any channels carrying high water/sediment loads at a depth somewhat susceptible to light wave action (cleaning). The panfish species building beds will be washing and cleaning the bed of any fines that accumulate over time. The big piles of rock were stripped from the dam were sorted and sifted before being placed back into the reservoir for piles/veins and structure. At last report, the reservoir refill was the next action.

**FIGURE 30. RESER RESERVOIR ROCK PLACEMENT FOR HABITAT, PRIOR TO FILLING.**

## Appendix 3: Effectiveness Monitoring

Effectiveness monitoring addresses the success of each project after completion. The future fisheries coordinator (FFC) performed effectiveness monitoring, and the Big Hole Watershed Committee (BHWC) was hired to complete monitoring in the Big Hole watershed (denoted by *). Detailed monitoring information is below. For projects monitored by BHWC (*), excerpts are included here, and additional information can be found in a separate monitoring report, available upon request.

- 001-2010 Big Hole River stock water and water salvage*
- 001-2020 Boles Creek fish screening and passage
- 002-2007 Big Hole River Ralston riparian enhancement*
- 002-2010 Braziel Creek channel restoration
- 003-2007 Upper Big Hole River stock water wells*
- 003-2011 Big Hole River riparian fencing*
- 003-2014 French Creek fish barrier
- 004-2010 Dry Cottonwood Creek riparian fencing
- 004-2018 Elliston Creek riparian fence
- 005-2011 Cherry Creek fish barrier
- 005-2018 Granite Creek culvert removal and fish passage
- 005-2020 Lee and West Fork Lolo creeks fish passage improvement and decommissioning
- 006-2015 French Gulch channel relocation
- 006-2017 Jack Creek riparian restoration
- 007-2012 Racetrack Creek riparian fencing and fish passage
- 008-2005 LaMarche Creek pool enhancement*
- 008-2007 Governor Creek culvert to bridge conversion*
- 008-2014 Shields River fish barrier
- 008-2018 Monarch Creek culvert replacement
- 009-2016 Little Blackfoot and Ontario Creek road relocation / floodplain restoration
- 010-2017 Moore's Creek channel and riparian restoration
- 011-2009 Lake Creek fish passage enhancement
- 011-2016 North Fork Dry Cottonwood Creek culvert replacement
- 011-2018 North Fork Dry Cottonwood Creek habitat enhancement
- 013-2014 East Gallatin Restoration at Story Mill
- 014-2007 Lolo Creek tributary culvert replacements
- 014-2017 Racetrack Creek Johnson diversion replacement
- 014-2019 French Creek channel reconstruction
- 015-2006 Rock Creek riparian restoration
- 015-2008 Morrell Creek fish passage and fish screens
- 016-2002 Mathew Bird Creek
- 016-2013 South Fork Sixteenmile Creek fish barrier
- 016-2019 Lolo Ditch fish screen
- 017-2018 South Fork Dry Cottonwood Creek culvert replacement
- 019-2008 York Gulch riparian fencing*
- 019-2012 Sixmile Creek fish barrier
- 019-2015 Upper Lolo Creek sediment reduction
- 019-2020 Lower French Creek riparian restoration
- 020-2019 Nevada Creek phase 3B restoration
- 026-2009 Chamberlain/Bear creeks road deconstruction
- 027-2016 Shields River watershed YCT passage
- 028-2007 Big Hole River riparian fencing Christiansen Reach*
- 028-2011 Boulder River Dry Creek canal restoration
- 028-2015 French Gulch channel restoration

- 029-2017 Turkey Creek fish passage
- 035-2002 Blanchard Creek riparian fence
- 036-2009 Racetrack Creek riparian fence
- 037-2003 Deep Creek*
- 037-2007 Swamp Creek riparian fencing*
- 038-2010 Nevada Creek channel restoration
- 038-2015 Stonewall Creek fish screen
- 040-2002 German Gulch
- 040-2015 Upper Lolo Creek sediment reduction
- 041-2000 Big Creek fish screen
- 041-2015 Van Houten Lake fish barrier and spawning channel

### 001-2010 Big Hole River stock water and water salvage*

In 2011, the United States Fish and Wildlife Service's (USFWS) Montana Partners for Fish and Wildlife Program installed two stock water systems on the Jackson Ranch outside of Jackson, Montana. The project's purpose was to provide the landowner with an alternative watering source for seasonal use other than the mainstem Big Hole River. Traditionally, the Lapham Ditch was left on after the irrigation season to provide stock water, resulting in significant water loss to the river late in the season. The stock water tanks now provide off-stream watering capability and allow the landowner to completely turn off a large mainstem diversion after irrigation season, thus increasing instream flow to the mainstem river.

**Status:** The two stock water tanks were inspected on Aug. 22, 2023. At the time of inspection, the tanks were in use and in good functioning order (Figure 31Figure 75). The ditch was turned off, and cows were using the western pasture/stock tank. The landowner informed BHWC that the original solar panel that was installed was not delivering enough power to keep both tanks full and keeping up with the cattle's demand. In 2020, FWP paid for the installation of an additional solar panel to generate enough power to keep up with demand and keep the tanks full during peak use. The new system produces 8,000 gallons per day. The landowner plans to continue to use the stock water system well into the future. Overall, this project has been successful at conserving instream flows to the mainstem Big Hole and, therefore, improving late-season habitat conditions for native fish, most notably the Arctic grayling.

**FIGURE 31. MARTIN JACKSON STOCK WATER PROJECT CONDITIONS IN 2023. UPDATED SOLAR PANEL (LEFT), WEST PASTURE WATER TANK (MIDDLE), AND EAST PASTURE WATER TANK (RIGHT).**

### 001-2020 Boles Creek fish screening and passage

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 has been designated critical bull trout habitat. This project upgraded an existing irrigation diversion near stream mile 1.5, with the goal of eliminating entrainment of native trout and improving migration corridors and channel integrity. Sampling in 2019 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. A fish screen was installed to accommodate both ditches of the existing diversion.

**Status:** The project was visited at completion (2020) and in 2022 during a site tour and looked great. The streamside vegetation was growing and the fish screen was functional. The landowner was happy with the project.

**FIGURE 32. BOLES CREEK FISH SCREEN AT COMPLETION (2020, LEFT) AND IN 2022 (RIGHT).**

### 002-2007 Big Hole River Ralston riparian enhancement*

In 2007, the USFWS Montana Partners for Fish and Wildlife Program installed 2.7 miles of riparian fence along the mainstem Big Hole River and 0.5 mile along Bryant Creek. The project also included the installation of two water measuring devices (one Ramp flume and one Cutthroat flume) in mainstem irrigation diversions and the construction of an off-stream stock water well. Lastly, a wildlife exclusion fence, paid for by the Montana Fish and Wildlife Division, was built to protect haystacks from wildlife damage. The purpose of the project was to enhance riparian vegetative communities that would stabilize stream banks, reduce sedimentation, provide cover, decrease water temperatures, and develop habitats that benefit Arctic grayling and other native and sportfish species.

**Status:** The Ralston Ranch Riparian Enhancement Project was inspected on Aug. 16, 2023. The landowner informed the BHWC that he no longer owns cattle but leases his land for grazing in the spring and summer months. The entirety of the riparian fence was in working order and effectively improving riparian vegetation (Figure 33). No signs of grazing beyond the fence line were observed. Natural recovery trends along the river/stream banks are abundantly clear. Healthy willow communities are recolonizing the streambanks, and decadent/formally browsed willow clumps are shooting out suckers. Sedge and rush communities are abundant near the water's edge. In some areas along the fence line, willows are encroaching into the grazed pasture, a clear sign of the fencing success. The stock water tank is in good working order and is only used during the spring months. The haystack wildlife exclusion fence/stack yard is no longer used due to the landowner's decreased operations. During the time of inspection, it was noted to the BHWC that the cutthroat flume on the south side of the river was not functioning properly. The landowner noted that the flume recently seemed to have

heaved up approximately 4 inches and is now backing water up all the way back to his POD. Because of this increased head behind the flume, he is not receiving adequate irrigation water to his south pasture. The flume is still in good shape; the landowner just thinks he needs to reset the flume to its original depth. The ramp flume on the north side of the river (along HWY 43) still appeared to be in functioning order. Overall, this project has met its objectives to enhance riparian health and grayling habitat. The decreased operations of the ranch have seemed to aid in the longevity of the project, specifically the fencing and stock water tanks. It is recommended that the landowner repair the cutthroat flume to realize the project's full objectives.

**FIGURE 33. RALSTON RANCH PROJECT CONDITIONS IN 2023: HEALTHY RIPARIAN VEGETATION BEHIND FENCING (LEFT), OPERATIONAL STOCK WATER TANK (MIDDLE) AND DYSFUNCTIONING CUTTHROAT FLUME (RIGHT).**

### 002-2010 Braziel Creek channel restoration

Braziel Creek (Powell County), a tributary to Nevada Creek located downstream of Nevada Creek Reservoir, supports a westslope cutthroat trout population that is slightly hybridized with rainbow trout. A portion of the stream on the Stitt and Johnson ranches was degraded in the past through channelization and over-grazing by livestock. This project reconstructed about 1,500 feet of the stream with a step-pool design, replaced an undersized culvert, installed a fish screen on an irrigation diversion, installed riparian fencing and implemented a riparian grazing management plan.

**Status:** The project was visited with the project manager and the landowner on a project tour. The culvert replacement and screen are functioning well, and the channel restoration is in place and functional as well. Riparian conditions have improved since 2011.

**FIGURE 34. BRAZIEL CREEK BEFORE CONSTRUCTION (2011, LEFT) AND IN 2022 (RIGHT).**

### 003-2007 Upper Big Hole River stock water wells*

In 2007, the USFWS Montana Partners for Fish and Wildlife Program installed four off-stream stock water systems on four individual land ownerships impacting three waterbodies: Fishtrap Creek, Berry Creek, and Deep Creek. The project aimed to decrease the use of late-season open ditch stock water diversions, therefore increasing late-season flow in each correlating tributary. Each stock water system was complimentary to previous/existing USFWS projects to improve riparian health and habitat conditions, such as upgraded stream crossings, riparian fencing, and riparian revegetation. Most importantly, the tanks have eliminated the need to send water down four open irrigation ditches late in the season when flows are critically low.

**Status:** Each project site and tank were inspected throughout the summer of 2023 (Figure 35). The Deep Creek stock water tanks were installed close to (in an adjacent pasture) the Ralston Ranch Riparian Enhancement Project tank. The tank is in good working order and is only used during the spring and summer months (Ralston Ranch ownership). Due to the landowner's decreased operations, this tank is not heavily used and is functional. The two Fish Trap stock water systems are all functioning and in good order. The landowner noted that the most upstream stock water tanks don't drain properly but have been that way since the initial installation, and it is not an issue. Other than the draining issue, both tanks are functioning well and look good. The landowner plans to use all tanks well into the future. The Berry Creek stock tanks look great, and the landowner has no issues. Overall, the

investments made by FFIP in these ownerships have proven successful and have provided late-season water conservation, thereby improving stressful conditions for native fish, most notably temperature.

**FIGURE 35. UPPER BIG HOLE STOCK WATER WELL PROJECT CONDITIONS IN 2023. DEEP CREEK (UPPER LEFT), BERRY CREEK (UPPER RIGHT), ALL TANKS ARE FUNCTIONING PROPERLY AND ALL LANDOWNERS ARE HAPPY.**

### 003-2011 Big Hole River riparian fencing*

In 2011, the Big Hole River Foundation installed 1 mile of riparian fencing along the mainstem Big Hole River outside of Melrose. In conjunction with installing the wildlife-friendly riparian fence, a grazing management plan was developed for the landowner to fully maximize forage while maintaining an upward trend in riparian vegetation health and river geomorphology. The purpose of the project was to reduce intense grazing pressure along this section of the riverbank that would, in turn, promote bank stabilization, maintenance of healthy channel geometry, reduced sedimentation, and enhanced riparian vegetation benefitting wild fish habitat.

**Status:** The project was inspected on Aug. 8, 2023. The entirety of the riparian fence was in working order, effectively improving riparian vegetation. No signs of grazing beyond the fenceline were observed. Natural recovery trends along the river/stream banks are abundantly clear (Figure 36). Healthy willow communities are recolonizing the streambanks, and decadent/formally browsed willow clumps are shooting out suckers. Multiple stages of willow growth were observed. Sedge and rush communities are abundant near the water's edge. The landowner noted that he has abandoned the project's grazing management plan and has, instead, precluded grazing behind the fence altogether, leaving the entirety of the acreage behind the fence ungrazed. The response to the riparian vegetation and streambanks clearly shows the results of this management shift. Overall, this project has proven to be successful. The landowner is happy with how well the fence has held up over the years. The bankside vegetation is robust, and natural recovery is on an upward trend.

**FIGURE 36. BIG HOLE RIPARIAN FENCING PROJECT CONDITIONS IN 2023: NEW/ROBUST WILLOW GROWTH ALONG A SECTION OF BIG HOLE BEHIND RIPARIAN FENCE (LEFT), NATURAL VEGATION RECOVERY BEHIND FENCE (MIDDLE), HEALTHY WILLOW CLUMP SHOOTING OUT NEW GROWTH BEHIND EXLUSION FENCE.**

### 003-2014 French Creek fish barrier

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 FWP. The stream supports 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 near the mouth of the stream. The barrier consisted of a concrete dam structure with an accompanying 140-foot-long earthen berm installed across the floodplain. After installation, the non-native fish were removed using a piscicide, and westslope cutthroat trout and Arctic grayling were reintroduced.

**Status:** After some financial challenges, the project was completed and is considered well done and functioning. The pond behind the dam is somewhat large but should fill in over time and does not appear to be increasing stream temperature (may actually buffer the high and low temperatures). The upstream fish removal and restocking was going well. This project, and related projects on French Gulch, are a significant success in Arctic grayling and westslope cutthroat trout restoration.

**FIGURE 37. FRENCH CREEK BARRIER COMPLETION AT CONSTRUCTION (LEFT, 2019) AND 2022 (RIGHT).**

### 004-2010 Dry Cottonwood Creek riparian fencing, 011-2018 North Fork Dry Cottonwood Creek habitat enhancement

Dry Cottonwood Creek (Deer Lodge County), a tributary to the Clark Fork River located near Deer Lodge, supports a westslope cutthroat trout population that is slightly hybridized with rainbow trout. The stream, as it flows through a series of five different landowners (including the U.S. Forest Service and Montana school trust), was degraded from overgrazing by livestock, dewatering, and fine sediment input from roads. This project installed riparian fencing along 6 miles of the stream and created a series of new riparian pastures. The project also implemented changes in riparian grazing management.

**Status:** The fencing has been in place and functioning well, with riparian condition being monitored by the Clark Fork Coalition. The riparian condition was considered to be improving. The project is considered a success. The stream suffers from low streamflows late in the season, and 2022 was dramatic. The upper area of the drainage was dry, but there are some beaver ponds in the area that likely provide some refuge.

**FIGURE 38. DRY COTTONWOOD CREEK RIPARIAN FENCING AT PROJECT COMPLETION (LEFT, 2011) AND IN 2022.**

### 004-2018 Elliston Creek riparian fence

Elliston Creek is a tributary to the Little Blackfoot River and supports populations of genetically pure westslope cutthroat trout and brown trout (Powell County). This project created a riparian pasture by separating Elliston Creek from the uplands. The timing of cattle grazing, the amount of forage plants utilized, and the amount of time plants are allowed to recover are controlled along the riparian area. This project installed 1.5 miles of wildlife-friendly fence and restricted riparian cattle grazing to 7 to 15 days. The goal was to create a permanent solution that benefits riparian, stream, and fish habitat. Elliston Creek and the Little Blackfoot River are 303(d) listed for sedimentation impairments and alteration to streamside vegetative cover in part due to grazing.

**Status:** The project was completed as proposed. The fence appears to be in good condition, and maintenance is assumed by the lessee. The fence has been working to control cattle use along Elliston Creek, and the permittees are liking it. Riparian conditions have improved overall.

**FIGURE 39. ELLISTON CREEK RIPARIAN FENCE AT COMPLETION (LEFT, 2018) AND IN 2022 (RIGHT).**

### 005-2011 Cherry Creek fish barrier

Cherry Creek (Beaverhead County) is a tributary located near the community of Melrose that supports a hybridized population of cutthroat trout, as well as a population of brook trout. The stream flows through a mix of ownership, including the U.S. Forest Service, Bureau of Land Management and four private landowners. The project installed a fish migration barrier approximately 1.5 miles upstream from the mouth, removed hybridized fish and non-native fish, and re-established the drainage with genetically pure westslope cutthroat trout.

**Status:** The barrier is installed and doing great. Some maintenance was performed approximately 12 years after project completion, but it continues to protect westslope cutthroat trout.

**FIGURE 40. CHERRY CREEK FISH BARRIER AT COMPLETION (2011).**

### 005-2018 Granite Creek culvert removal and fish passage

Granite Creek is a tributary to West Fork Lolo Creek and supports populations of westslope cutthroat trout, bull trout, mountain whitefish, brook trout, and brown trout (Missoula County). Located on the Lolo National Forest, this project addressed lands that were formerly under Plumb Creek Timber Company ownership. The road network is extensive and there are many failing culverts. Since 2006, over 113 roads have been decommissioned, 51 major culverts were removed, and 10 culverts were upgraded. This project addressed 15 miles of stream and public access was retained. Granite Creek is listed as a sediment impaired stream by Montana DEQ. The goal was to improve watershed health, connectivity, and habitat for salmonids in the lower Bitterroot and Clark Fork rivers.

**Status:** The project was completed as proposed in 2018. The costs were increased due to large fills removed at culvert removal sites and restoration of large landings. The site was revisited in 2022 and long term monitoring showed that the site looks good and native vegetation is filling in. Weed management is ongoing. Overall, the project manager was happy with the project and its progress.

**FIGURE 41. THE GRANITE CREEK CULVERT REMOVAL PROJECT AT COMPLETION (LEFT, 2018) AND IN 2022.**

### 005-2020 Lee and West Fork Lolo Creeks fish passage improvement and decommissioning

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 was a continuation of other work done in the Lolo Creek watershed, addressing forest lands that were

formerly under Plum Creek 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. Twenty-five culverts, 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.

**Status:** The decommissioning was completed in 2020 and was done very well (level 4). In total, 30 culverts were removed. Overall, the project was very well done. A repeat visit in 2022 showed good cover in place, vegetation growth, and reduced weeds.

**FIGURE 42. LEE AND WEST FORK LOLO CREEKS ROAD DECOMMISSIONING PROJECT, COMPLETION (LEFT, 2020) AND IN 2022.**

### 006-2015 French Gulch channel relocation

French Gulch (Deer Lodge County) is a tributary to French Creek, which flows into Deep Creek and the Big Hole River. Placer mining activities occurred in the French Gulch drainage from the mid-19th century to the early 1990s, resulting in stream habitat that was degraded by stream channel straightening, the presence of large dredge spoils, increased stream gradient, reduced riparian area width, and isolation of the stream from its floodplain. The purpose of this project was to restore habitat impacted by placer mining. Restoration activities included reconstruction of the floodplain and stream channel, redirection of the streamflow, and plugging the old channel. The new channel is vegetated with transplanted material or bioengineering techniques. The goal was to increase the number of westslope cutthroat trout and Arctic grayling in French Gulch by addressing the habitat limitations and potentially opening habitat to fluvial fish from French Creek. This project is located upstream of the French Creek fish barrier.

**Status:** The site was visited in 2022, six years after completion. Overall, it looked great and continues to improve. Overall vegetation is coming back well and the stream functions as intended. Some structures failed (water going went around rock grade controls) but others are still in place. The failed structures don't appear to be significantly affecting the stream. The drainage as a whole is much improved and native fish are being reintroduced.

**FIGURE 43. FRENCH CREEK CHANNEL RELOCATION AT PROJECT COMPLETION (LEFT, 2016) AND IN 2022.**

### 006-2017 Jack Creek riparian restoration

Lower Jack Creek (Madison County), near the confluence with the Madison River, supports populations of brown trout and rainbow trout and has been the site of active channel migration and heavy erosion. This location was historically dynamic and experienced alterations such as channel straightening, placement of carbody bank armor, and unfavorable management practices. This project took place on three private property holdings and 1,200 feet of stream. Four actively eroding banksites were restored with bankfull benches, sloping, and native plantings.

**Status:** The site was inspected, and the construction was done well, holding up to a big flow post-construction. Some channel adjustment was made but not to the detriment of the project. Five years later, FWP staff and landowners visited the site (2023). The erosion was reduced, but the willow treatments failed, and the woody vegetation failed to establish, even with fencing (still in place). It is unclear why the vegetation didn't establish in some places. Pasture grass is now established, and it will be difficult for woody plantings to take hold. Lessons learned were to focus more on incorporating fish habitat in the design, including more instream complexity. The landowner is considering some additional plantings to increase overhead cover (considering the challenges of planting amongst reed canarygrass).

**FIGURE 44. JACK CREEK RIPARIAN RESTORATION AT PROJECT COMPLETION (LEFT, 2018) AND IN 2023 (RIGHT).**

**007-2012 Racetrack Creek riparian fencing and fish passage**

Racetrack Creek (Powell County), as it flows near the community of Galen, has been degraded in the past by removal of riparian vegetation and trampling of stream banks by livestock. Also, an irrigation diversion created a partial fish migration barrier. Lower Racetrack Creek primarily supports brook trout and brown trout. Fencing was addressed on three properties and included replacement of an existing riparian fence damaged by past flooding with 2,000 feet of new fence, set back between 100 and 150 feet from the stream. In another location, approximately 600 feet of old riparian fence was removed and replaced with 400 feet of new fence installed on an adjacent terrace. An off-site well was drilled, and two winterized stock tanks were installed. An existing rustic irrigation diversion was rebuilt with a new pin-and-plank structure and a denil-style fish ladder to provide for upstream fish migration.

**Status:** The project was completed under budget, due to a change in fish passage structure configuration and one landowner dropping out of the riparian fencing portion. The fish passage structure delivers water to a pump but can be adjusted in fall to allow winter flows. After visiting the site in 2022, FWP staff noted that off-stream water tanks are in place, functional, and keeping livestock off the creek. The diversion is in place and working well. The structures are believed to be benefiting the brown trout fishery that is critical to lower Racetrack Creek.

**FIGURE 45. RACETRACK CREEK RIPARIAN RESTORATION AND FISH PASSGE PROJECT AT COMPLETION (LEFT, 2015) AND IN 2022 (RIGHT).**

**008-2005 LaMarche Creek pool enhancement***

In 2005, FWP completed the LaMarche Creek pool and riparian enhancement project. The project consisted of excavating/creating 16 pools and restoring 200 feet of stream banks in LaMarche Creek. The project also installed 1.25 miles of riparian fencing along the stream corridor. The project's objectives were to enhance Arctic grayling and other native and sportfish species abundance by enhancing pool habitat in a stream reach that was straightened and high-quality pools were limited. Additionally, the project sought to enhance riparian vegetation and stream bank stability by fencing the stream corridor and restoring the 200 feet of stream banks.

The project was inspected on Aug. 17, 2023. The BHWC identified 12 pools that were originally excavated in 2005. Out of the 16 pools, four pools were not easily identifiable. Changes in the river morphology, beaver dams, and run off events have resulted in changes to some of the pool depths and locations. The pools that were not identified are thought to have been filled in with stream-bed alluvium. The pools that are still there are in good shape and are providing quality habitat for fish (Figure 46). During the site visit and pool assessment, the BHWC saw a handful of 12- to 16-inch fish in the pools, indicating high quality pool habitat. Adjacent vegetation is robust, providing shade and cover. The most downstream restored stream bank has failed and is again bare and erosive. The majority of the bank exhibited a nearly 90-degree angle of repose and lacked vegetation with deep roots to hold the bank together. The upstream restored stream bank has held and is stable, growing healthy vegetation on it.

The existing fence has a slightly different orientation. The east side fence was on top of the ridge instead of lower down on a bench near the stream. Additionally, the east side fence is four-strand barbed wire, whereas the proposal shows three-strand barbed wire. The landowner thinks the east side fence was installed a few years ago. The west side fence is also four-strand barbed wire, whereas the proposal shows three-strand barbed wire. The landowner thought the fence was much older than 2005. The current landowner is new to the property (2012) and, admittedly, does not know the history of the project. Jim Magee, the wildlife biologist for USFWS, confirmed that the riparian fence installed was indeed a four-strand take-down fence. Due to snow accumulation and abundant wildlife crossing through the drainage, the landowner and partnering agencies agreed to install a takedown fence. As mentioned above, the property switched owners in 2012 and changed grazing strategies. After talking with Jim Magee, it was made clear that in 2016, the USFWS Partners for Wildlife program funded an additional fence to create an additional pasture on the east side of LaMarche Creek. The new pasture used some of the original fence on the east side of LaMarche but also added a new fence on the east bench. The new pasture was created as part of the ranch grazing management plan for the CCAA. Additional fence was also installed in 2022 on the lower west side of LaMarche Creek and the adjacent upstream reach of Big Hole River to improve riparian health and grazing management.

Regardless of orientation and installation dates, there is robust riparian fence infrastructure in place and functioning. The project fencing and grazing strategy is working and LaMarche Creek Riparian and stream channel have continually scored high and sustainable since 2006. LaMarche stream temps are some of the coldest in the Big Hole watershed. The hardened crossings and water gaps were in good shape and in functioning order. Cows were in the riparian area during BHWC's site visit. The landowner stated that he holds cows in the riparian area every three years. The landowner is maintaining the fence and stated no issues.

**Status:** Overall, this project has proven to be successful, save for the most downstream eroding bank. There were four excavated pools that were not identified; however, 18 years after this project was

completed, there are still 12 deep and functioning pools, demonstrating that the project will continue to be long-lasting. Vegetation within the riparian and stream corridor was robust, aiding in enhanced stream health. The BHWC recommends taking a fresh look at the downstream stream bank and talking with the landowner about potential future repair options.


**FIGURE 46. PROJECT CONDITIONS IN 2023: BEFORE PHOTO OF STRAIGHTENED POOL ALIGNMENT PRIOR TO POOL ENHANCEMENTS (TOP LEFT), AFTER PHOTO (SAME LOCATION IN 2023, LOOKING NE, TOP RIGHT), FAILED LOWER STREAM BANK (LOWER LEFT), SUCCESSFUL BANK RESTORATION (LOWER RIGHT).**

### 008-2007 Governor Creek culvert to bridge conversion*

In 2007, the USFWS Montana Partners for Fish and Wildlife Program, in partnership with Beaverhead County, replaced two deteriorating and undersized, 6-foot culverts under Skinner Meadows Road (Governor Creek) with a 64-foot concrete bridge. The dilapidated double culverts were inhibiting fish movement during high flow events and during spring runoff as the flows through the culverts were presenting a velocity barrier. Furthermore, the placement of the twin culverts (relative to the stream channel) directed energy of the stream against an unprotected downstream bank, resulting in an over-widened, actively eroding stream channel. The purpose of the project was to replace the culverts with a properly sized bridge to eliminate a partial fish passage barrier, reduce sedimentation, and restore natural stream function.

**Status:** The project was inspected on Aug. 22, 2023. The bridge is in great shape with no apparent issues. The eroding bank downstream has revegetated with grasses and willow, although rip-rap seems to have been used to stabilize it (Figure 47). Before photos show severe erosion issues and an over-widened stream. The current conditions of the downstream bank display a huge improvement toward vegetation recovery and overall stream function. The banks upstream have also vegetated nicely and now hold willows on both sides closer to the bridge. The creek itself looked to have a natural width-to-depth ratio and was flowing nicely under the bridge during BHWC's site visit. This project has clearly met its objectives to eliminate fish passage barriers, reduce sedimentation, and improve overall stream function. All fish passage issues have been addressed at this site.

**FIGURE 47. GOVERNOR CREEK CULVERT REPLACEMENT PROJECT CONDITIONS IN 2023: UPSTREAM CONDITIONS (LEFT), GOVERNOR CREEK FLOWING UNDER THE 2007 BRIDGE (MIDDLE), DOWNSTREAM CONDITIONS (RIGHT).**

### 008-2014 Shields River fish barrier

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 USFS 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. A 130-foot-long berm was installed along the west side of the channel to protect the existing road. Bypass pipes were installed within the berm and in the existing road to allow for drainage during flows that exceed bankfull. As part of the project, non-native brook trout were removed from upstream waters by electro-fishing and by the use of piscicides. Salvaged Yellowstone cutthroat trout were returned to reclaimed waters. A design component of this project allowed for the new barrier to be removable with relative ease should the opportunity to expand Yellowstone cutthroat trout conservation efforts to downstream waters arise.

**Status:** Since construction, the project has been monitored several times and is doing well. The barrier continues to be intact and functional, and the overflow area appears to be in good condition. Looking back at the project, the USFS would have liked to see the overflow culverts perched higher (and adjusted the bank/inlet to reduce groundwater inflows). The project managers advised against pre-cast concrete in future projects unless it is necessary. Pre-cast structures have more leaking than cast-in-place, at least in this drainage. In terms of vegetation, around 5,000 willow cuttings were planted using a variety of methods. and the survival was around 50 percent, likely due to the time between harvest and planting. However, even though survival was relatively poor, the large number of cuttings that survived was probably sufficient to establish riparian vegetation that outcompetes weeds and stabilizes banks. Sedges were also transplanted and had high survival.

**FIGURE 48. THE SHIELDS RIVER BARRIER IN 2017 (TOP LEFT), 2018 (TOP RIGHT), AND 2023 (BOTTOM).**

### 008-2018 Monarch Creek culvert replacement

Monarch Creek is a tributary to Ontario Creek (and subsequently the Little Blackfoot River) and supports populations of genetically pure westslope cutthroat trout, sculpin, mountain whitefish, and brook trout (Powell County). Bull trout have been detected using eDNA in Ontario Creek (downstream). This project replaced a culvert that is a partial fish barrier (at high flows) with a larger pipe-arch culvert. The goal was to improve spawning and rearing habitat for native salmonids and improve connectivity. Together with other passage improvements, approximately 5 miles of habitat could be connected.

**Status:** FWP and the USFS visited the completed project. The culvert was installed well, and the floodplain was already seeing water accumulation. In 2022, the project was visited again, and the culvert was intact and functional with no observable issues or structural concerns. Fish passage is no longer a concern. The area has filled in quite a bit with some great wetland areas downstream of the culvert. Despite some channel movement, grade appears to be maintained.

**FIGURE 49. MONARCH CREEK CULVERT REPLACEMENT AT COMPLETION (LEFT; 2020) AND IN 2022 (RIGHT).**

### 009-2016 Little Blackfoot and Ontario Creek road relocation / floodplain restoration

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 segment of road that includes 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 FSR 4100 over a bridge, created a section of road that would connect FSR 123 (also known as Ontario Creek Road) to FSR 4100 outside of the Ontario Creek and Little Blackfoot River floodplains, and removed the old segment of FSR 123 that impacted the channels and floodplains. The stream channel and floodplain areas were restored. The overall goal of the project was to reduce sediment delivery and restore floodplain function to this section of the Little Blackfoot River.

**Status:** The site was visited upon completion. The project had some channel shifting that eroded and widened the stream in some areas. The USFS will monitor it over time. In subsequent monitoring visits, no new erosion was observed and there was some vegetation growth on the riparian area. In 2020, the road decommissioning looked very good, and the new recreational roads are holding up and used.

There is a nice educational sign on site. The stream restoration work looked pretty similar to the last site visits, with some minor adjustment. A 2022 visit indicated that the stream looks functional overall; the eroded area was still present but likely not a significant source of sediment.

**FIGURE 50. LITTLE BLACKFOOT CREEK AND ONTARIO CREEK ROAD RELOCATION AT COMPLETION (LEFT, 2019) AND IN 2022 (RIGHT).**

### 010-2017 Moore Creek channel and riparian restoration

Moore Creek (Madison County) is a tributary to the Madison River immediately west of Ennis. The stream is assumed to support rainbow, brown, and/or brook trout. The stream and riparian areas were highly degraded because of past management practices and channel manipulations; water quality was impacted by E. coli and sediment. This project restored the stream channel to the proper dimensions and improved riparian areas and water quality through fencing, riparian plantings, livestock management, and irrigation improvement.

**Status:** The project was visited in 2018 at completion; the landowner was present and very enthusiastic about the work. A site visit in 2023 indicated that the project was generally in good shape. Vegetation has been growing and no grazing is occurring on the property. The landowner mows to the stream edge in some places, but the stream does not appear to be affected. The vegetation is dominated by pasture grasses. It is not a cutthroat stream, and there are potentially some dewatering issues, so it is not a hugely impactful project. However, there are likely water quality benefits that translate to downstream areas.

**FIGURE 51. MOORE'S CREEK CHANNEL AND RIPARIAN RESTORATION, AT COMPLETION (LEFT, 2018) AND IN 2023.**

### 011-2009 Lake Creek fish passage enhancement

Lake Creek (Madison County), a tributary to the West Fork Madison River, supports a brown trout fishery. A small earthen dam, constructed in 1979 to provide hydraulic head for a stock water system, created a partial fish passage barrier for upstream migrating fish. This project called for removal of makeshift materials at the dam to provide for fish passage and the installation of a well and pipeline to provide an alternative water source for a nearby grazing allotment.

**Status:** In 2023, the site was visited for effectiveness. After nearly 20 years, the fish ladder was still in place and functional. However, there are multiple areas to pass fish aside from the ladder (the diversion is historical and still in place). Even in the fall, passage does not appear to be a problem (with sufficient water). The project is considered successful with fish passage achieved; there is a low risk of anything changing at this location.

**FIGURE 52. LAKE CREEK FISH PASSAGE ENHANCEMENT PROJECT, IN 2023.**

### 011-2016 North Fork Dry Cottonwood Creek culvert replacement

North Fork Dry Cottonwood Creek (Deer Lodge County) is a tributary to Dry Cottonwood Creek and the Clark Fork River near Racetrack that supports westslope cutthroat trout (92-97 percent pure). The applicant replaced an undersized culvert with a larger arch culvert (sized to include a bankfull-width channel inside the structure). The project reconnected 4 miles of habitat to 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.

**Status:** The project was completed successfully. Some of the rock placed in the culvert was higher than specification and future monitoring will track how it settles with high flows. A 2021 site visit indicated that the project continued to function, although significant grazing in the drainage was noted. The stream suffers from low stream flows late in the season, and 2022 was dramatic. The upper area of the drainage was dry, including this site. Beaver ponds in the area likely provide some refuge lower in the drainage.

**FIGURE 53. NORTH FORK DRY COTTONWOOD CULVERT REPLACEMENT, 2020.**

### 013-2014 East Gallatin Restoration at Story Mill

This project restored of the largest remaining riparian-wetland complex within Bozeman's urban core, improving water quality and providing additional fishing access to the East Gallatin River. The intent of the project was to remove man-made materials and revegetate stream banks as well as restore backwater areas and floodplain connectivity. This project allowed the stream channel to adjust to a more natural state and provide habitat for wild fish. This project took place along 0.5 mile of the East Gallatin River streambed and its streambanks. Along 180 feet of the east bank of the river, native riparian species were planted. The creek was reconnected to its floodplain and a bio-engineered solution to bank instability was used to replace riprap, reduce erosion and sedimentation, enhance detrital input to support aquatic macroinvertebrates, and provide overhead cover for fish through willow plantings. Along the west 250 feet of the East Gallatin River, native willows were planted and native wetlands were seeded. Where present, invasive plant species were controlled or removed. The restoration of a backwater channel on Bozeman Creek created rare rearing habitat for juvenile fish in the channelized reach.

**Status:** The project was completed in 2015. A 2016 visit indicated that the soil lifts appeared to be successful with substantial vegetative growth. It was hard to see the project with vegetation in place. A 2023 visit indicated that the banks were doing fairly well; some root wads remain. It appeared that the woody vegetation didn't establish well, although the banks are holding together, likely due to the root wads in place. Overall, the project is considered successful. Floodplain areas could have been expanded but may not be possible given its location within Bozeman.

FIGURE 54. EAST GALLATIN RESTORATION AT STORY MILL, AT CONSTRUCTION (LEFT) AND IN 2023 (RIGHT).

### 014-2007 Lolo Creek tributary culvert replacements

Lolo Creek (Missoula County) tributary culverts. Lolo Creek supports a mixed salmonid assemblage, including bull trout and cutthroat trout. Movement into spawning tributaries is impaired by several undersized culverts. This project involved replacement of five culverts that were identified as among the most important barriers to remove. The locations are on Granite Creek, North Fork Granite Creek, Lost Park Creek, and East Fork Lolo Creek.

**Status:** In 2022, two sites were visited with the Clark Fork Coalition. The culverts were in good condition and functioning as intended. The Granite Creek bridge was in good condition, the banks were vegetated, and grade control was still in place.


FIGURE 55. LOLO CREEK TRIBUTARY PASSAGE, PRE-PROJECT (2002, TOP LEFT), 2009 (TOP RIGHT), AND 2022 (BOTTOM).

**014-2017 Racetrack Creek Johnson diversion replacement**

Racetrack Creek (Powell County) is a tributary to the Clark Fork River that supports populations of brown trout, mountain whitefish, westslope cutthroat trout, longnose sucker, and slimy sculpin. The area was limited by mid or late summer dewatering and high temperatures. Other complementary projects focused on improving instream flows; this project intended to build on those efforts by providing fish passage to habitat features upstream to the Berg diversion (1.6 miles) and downstream to the lower, cold-water (groundwater) area of the creek. This project replaced an irrigation diversion that blocked upstream fish passage and entrained fish with a rock weir diversion that enhanced passage. The goal was to enhance fish passage and eliminate entrainment in a high-priority watershed.

**Status:** The project involved installation of three drop structures, a headgate, and constructed banks. The first drop structure can be used with a check board. The lowermost drop structure is monitored for low water passage (slightly higher). In 2002, FWP and the Clark Fork Coalition visited the site. At the time of monitoring, the project site was dry. Some rocks were wet indicating it had recently become dry. Late season flow is a challenge in this portion of Racetrack Creek. It is believed that the project is beneficial for brown trout in general, particularly at certain times of the year. The structure installed was easy to inspect. The smooth nature of the concrete is not ideal, but the rock weir may provide sufficient crevices for easier passage. Fish passage has not been studied to fully understand how passage works around this unique structure. For context, the structure is generally a hybrid between a pin-and-plank type of structure with a rock weir; backwatering to the bridge was a concern, as was the ability to reliably obtain the water right. It would be good to see the structure closer to spring or early summer to assess flow pathways.

**FIGURE 56. RACETRACK CREEK JOHNSON DIVERSION AT INSTALLATION (TOP, 2017) AND IN 2022 (BOTTOM).**

**014-2019 French Creek Channel Reconstruction**

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. 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 confined the stream channel and led to significant erosion and sediment deposition. Reference stream conditions were used to construct an unconfined stream channel in the floodplain away from the hillslope (4,000 feet of channel). 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 impacted spawning substrate and water quality.

**Status:** FWP and the Big Hole Watershed Committee visited the site. The project was successful overall. Some of the willow did not survive (installed incorrectly) but a lot of the willow is surviving and doing well. The project generally kept its shape and is functioning as intended (staying away from the vertical bank). There is some lateral migration happening, which is acceptable to the project managers. The project was monitored in 2022 and 2023 and was working well.

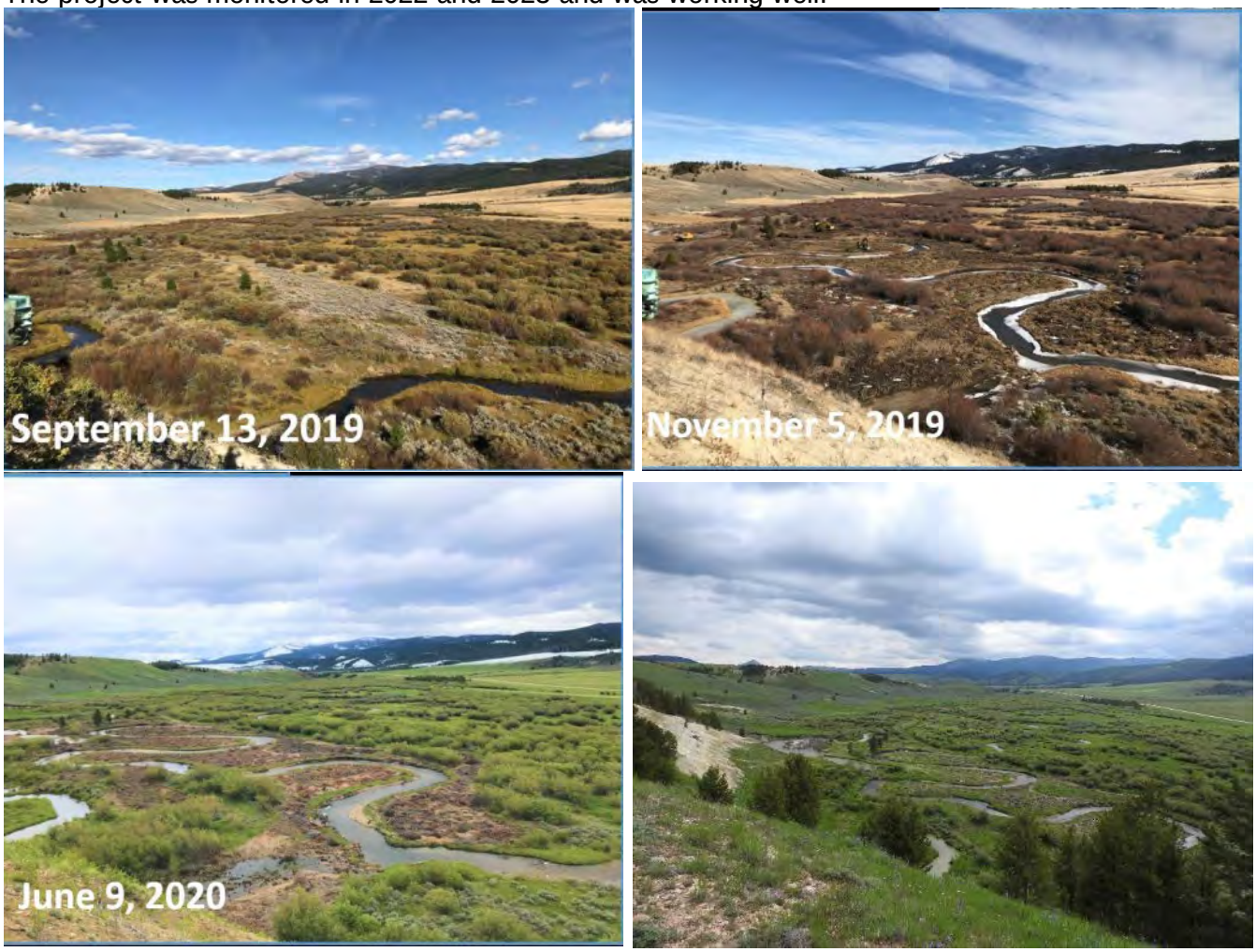


**FIGURE 57. FRENCH CREEK BEFORE CONSTRUCTION (TOP LEFT) AND AFTER CONSTRUCTION (TOP RIGHT) IN 2019. PROJECT SITE IN 2020 (BOTTOM LEFT) AND 2023 (BOTTOM RIGHT).**

### 015-2006 Rock Creek riparian restoration

Salmon, Dry, and Rock creeks (Powell County) previously received restoration attention but efforts to re-establish riparian vegetation were mostly unsuccessful due to browsing by wildlife. This project involved planting riparian shrubs and other plants along 14,500 feet of stream bank, using cages to prevent wildlife damage.

**Status:** The project was visited in 2023. The stream looked to be in good condition, and vegetation looked great. It was obvious from previous photos that vegetation has grown over time. This is a location where it would be hard to know restoration took place, based on the recovery. Due to the success, future monitoring should not be a priority unless land ownership or land use changes.

**FIGURE 58. THE ROCK CREEK PROJECT AFTER CONSTRUCTION (LEFT) AND IN 2023 (RIGHT).**

### 015-2008 Morrell Creek fish passage and fish screens

Morrell Creek (Missoula County) is one of the most important bull trout spawning streams in the Clearwater River drainage. Two major irrigation diversions located near the mouth were partial barriers to fish migration and potentially entrained bull trout. This project involved replacing two old wooden irrigation diversion with rock weirs, and installation of new head gates equipped with fish screens and water-measuring devices that allow more careful flow management.

**Status:** In 2022, the site was visited with Big Blackfoot Chapter of Trout Unlimited staff. The diversion was constructed so that water can only reach the diversion through July, in line with the water right. The water user does not use much water and is responsible for maintenance. At inspection, there was a thick layer of sediment in the screen forebay. The water users will have to remove the sediment for it to be functional and complete that maintenance before water is diverted. The fishery response from this project is unclear.

### 016-2002 Mathew Bird Creek

Mathew Bird Creek (Gallatin County) is an urban stream that flows through Langohr Park in Bozeman. The stream supports populations of brook, brown, and rainbow trout. Stream banks were eroding vertically, presumably due to previous removal of riparian vegetation. This project restored about 300 feet of stream. Treatments included back sloping, placement of erosion control fabric, and revegetation.

**Status:** The project has been successful, and the stream and streambanks have held together well. In 2023, the site was visited and photos were taken to compare to 2016. Overall, the stream was in good

shape. However, the park mowing does come too close to the stream in places. Overall, it's considered a successful project.

**FIGURE 59. MATTHEW BIRD CREEK BEFORE CONSTRUCTION (TOP LEFT), IN 2016 (TOP RIGHT), AND IN 2023 (BOTTOM).**

### 016-2013 South Fork Sixteenmile Creek fish barrier

South Fork Sixteenmile Creek (Gallatin County), located in the north Bridger Range east of the community of Maudlow, supported a mixed salmonid fishery. A reach of the South Fork was identified as a potential site for restoring a native westslope cutthroat trout population. This project installed a fish migration barrier that resulted in about 6.5 miles of restored westslope cutthroat trout habitat. A second phase of the project involved removing the existing non-native fishes using piscicide, followed by a third phase involving restocking with genetically pure westslope cutthroat trout.

**Status:** After the barrier was installed, rotenone treatment was completed from 2018 to 2021. In 2022, eDNA sampling confirmed the absence of rainbow trout hybrids, and Dutchman Creek cutthroat trout were "replicated" by introducing 47 fish during October 2022.

**FIGURE 60. CONSTRUCTED BARRIER ON SOUTH FORK OF SIXTEENMILE CREEK.**

### 016-2019 Lolo Ditch fish screen

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 was the largest irrigation diversion on Lolo Creek and could divert up to 75 percent of flow in low-flow periods. The fish that enter the ditch became entrained and could not return to Lolo Creek. This project installed a fish screen on the Lolo Ditch to keep fish within the Lolo Creek and the Clark Fork drainage. Maintenance is the responsibility of the Clark Fork Coalition and its partners, in coordination with the water users. The goal was to improve fish populations and enhance fishing opportunities through improved survival.

**Status:** The project was visited in 2022. Overall, the project is working great. The project applicant learned some things about the function of corrugated water screens, particularly in this drainage. Algae growth led to some innovative ways to keep the screen clean. Surveys of the ditch show that the screen is likely preventing entrainment. This project is considered very successful.

**FIGURE 61. LOLO DITCH FISH SCREEN AFTER CONSTRUCTION (LEFT) AND IN 2022 (RIGHT), WITH A PROJECT TOUR.**

### 017-2018 South Fork Dry Cottonwood Creek culvert replacement

South Fork Dry Cottonwood Creek is a tributary to Dry Cottonwood Creek and the Clark Fork River and

supports conservation populations of 95 to 98 percent pure westslope cutthroat trout (Deer Lodge County). In the 23-square-mile Dry Cottonwood drainage, two culverts were major fish barriers, and this project addressed one of them. The design was a steel pipe-arch stream simulation culvert with a streambed constructed inside (and will accommodate a 10-year flood). Because the project site was altered by historic placer mining, the location of the culvert was slightly different because of the existing grades, and the existing culvert remains in place as an overflow channel. The goal was to reconnect 3 miles of native trout habitat through improved upstream passage.

**Status:** The site was visited in 2021, 2022, and 2023 and the culvert was in place as described. A lot of rock was used in the construction due to concern about pressure on the outside bend. The additional rock wasn't part of the design, so it would have been preferred if a different configuration could have been used to solve the problem. Overall, the rock has not caused additional problems, but the vegetation has not grown much, and the channel was dry when inspected. Because the goal was to pass fish, the project is considered successful.

**FIGURE 62. SOUTH FORK DRY COTTONWOOD CREEK PROJECT IN 2021 (TOP LEFT), 2022 (TOP RIGHT), AND 2023 (BOTTOM).**

### 019-2008 York Gulch riparian fencing*

In 2008, the USFWS Montana Partners for Fish and Wildlife Program implemented the York Gulch Riparian Fence Project. The project consisted of constructing 3.5 miles of electric riparian fencing, installing three hardened crossings, and installing five new headgates with measuring devices. The points of diversion (POD) were associated with water right numbers 41D 100021 00 and 41D 100023

00. Fish ladders were installed in four new diversion structures but omitted from one to create a fish barrier for westslope cutthroat trout conservation. The project's primary purpose was to protect the riparian corridor along York Gulch and facilitate a grazing management plan. The secondary objective was to improve irrigation efficiency and instream flows throughout York Gulch, benefiting one of the last remaining genetically pure populations of westslope cutthroat trout in the Big Hole.

**Status:** This project was inspected once before in June of 2012. During that inspection, the fence was still up and in working order. At the time of BHWC's 2023 inspection, the fence was no longer up, and no fence infrastructure remained. A new landowner purchased this property in 2015. When talking to the new landowner, he expressed that the fencing was indeed put up before he bought the land and thought it was installed in the 1990s. The landowner said he took out the fence because it was falling apart, and the posts had rotted and were heaving out of the ground. The new landowner also has a different grazing strategy. The riparian area consisted of sedges and rushes adjacent to the stream channel, with pasture grasses dominating outside of the stream corridor (Figure 63). Some willows and riparian shrubs are present but sparse. All of the headgates, fish ladders, and hardened crossings were in working order.

This project is partially successful due the functioning state of the irrigation infrastructure and hardened crossings; however, the original objective of protecting the riparian corridor has not been met due the fact the fence is no longer there. This property is still enrolled in the Candidate Conservation Agreement with Assurances (CCAA) and still has its own specific site plan. BHWC recommends that the USFWS and FWP broach this subject with the new landowners to see if there are any opportunities for a new riparian fence that fits their operation and needs.

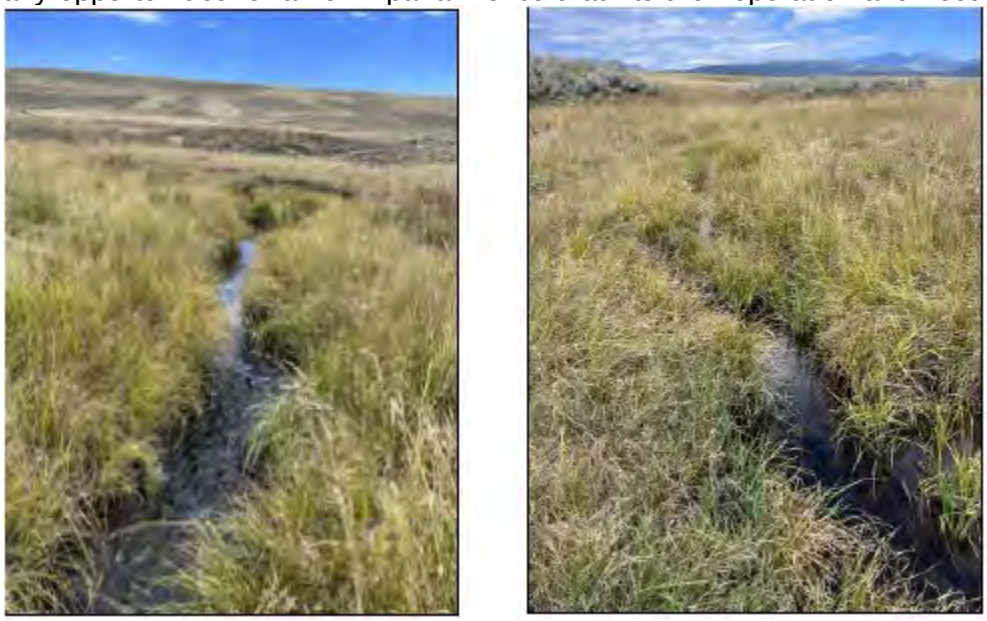

**FIGURE 63. YORK GULCH RIPARIAN FENCE PROJECT CONDITIONS IN 2023: YORK GULCH CONDITIONS IN 2023 WITHOUT THE RIPARIAN FENCE. ALL IRRIGATION INFRASTRUCTURE AND WATER GAPS ARE IN FUNCTIONING ORDER.**

### 019-2012 Sixmile Creek fish barrier

Sixmile Creek (Deer Lodge County) is a stream located in the Big Hole drainage on the Mount Haggin Wildlife Management Area that historically harbored westslope cutthroat trout. Surveys indicated that westslope cutthroat trout were no longer present in the stream. Only brook trout and rainbow trout were found to be present. A natural waterfall located in a bedrock canyon approximately 2 miles

upstream from the mouth had the potential to be modified into a barrier to upstream fish migration. There were approximately 3 miles of excellent fish habitat upstream of this potential barrier. This project modified the waterfall by blasting away material from the bedrock cascade located just downstream to increase the jump height from about 3 feet to approximately 6 to 8 feet. Once the barrier was created, the existing brook trout population was removed using piscicide. Following the removal of brook trout, westslope cutthroat trout were re-introduced into this reach of stream using salvaged fish from the stream and fish obtained from other streams located in the Big Hole drainage.

**Status:** The project was completed successfully. However, because Sixmile is within the French Creek drainage, FWP decided to no longer try to maintain it as a barrier; having some genetic exchange from below will be a good thing through time. There are no plans to remove it, but just let nature take its course.


**FIGURE 64. THE SIXMILE CREEK FISH BARRIER (2018).**

### 019-2015 and 040-2015 Upper Lolo Creek sediment reduction

The Upper Lolo Creek watershed (Missoula County) is significantly impacted by sediment generated by forest roads and failing culverts. This area is considered important habitat for bull trout, and the project is part of a long-term restoration effort to remove culverts that are fish barriers and reclaim excess forest roads that add sediment to the Upper Lolo Creek system. The project re-contoured 12 to 14 miles of forest roads and removed at least eight culverts, reducing sediment and improving fish passage in the drainage.

**Status:** At project completion, it was noted that the decommissioning used a level 5 obliteration and was very well done. Some hiking trails were retained. The project was visited in 2016 and 2022 and appeared to be in good shape; the road is still decommissioned, and vegetation has grown in significantly.


**FIGURE 65. UPPER LOLO CREEK ROAD DECOMMISSIONING AT COMPLETION (2016, LEFT), AND IN 2022 (RIGHT).**

### 019-2020 Lower French Creek riparian restoration

French Creek (Deer Lodge County) is a tributary to Deep Creek west of Wise River. French Creek was 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 took place on the Mount Haggin Wildlife Management Area and USFS property and restored over 3,600 feet of streambank that was degraded due to non-native vegetation and overgrazing. The project graded and re-sloped the perched streambanks with a minimum 3:1 ratio, and mature willows were transplanted to create stream-bank stabilization. Old beaver dam side channels were activated to accommodate high flows and to provide greater flooding and connection with the floodplain. The goal was to enhance riparian function and improve instream habitat for Arctic grayling and westslope cutthroat trout in French Creek. The applicants restored high priority degraded stream banks and side channel reactivation before moving to the moderate and low priority eroded banks, due to funding limitations.

**Status:** The project was visited in 2023, three years after completion. The area was very wet and vegetation was coming in well. The project looked great and is very successful, according to project managers. A monitoring report is available, which describes a successful outcome for woody species and riparian vegetation establishment. The vegetation will continue to be monitored, but the project is likely to achieve its goals of returning a natural stream and riparian area and creating instream habitat for Arctic grayling and westslope cutthroat trout.

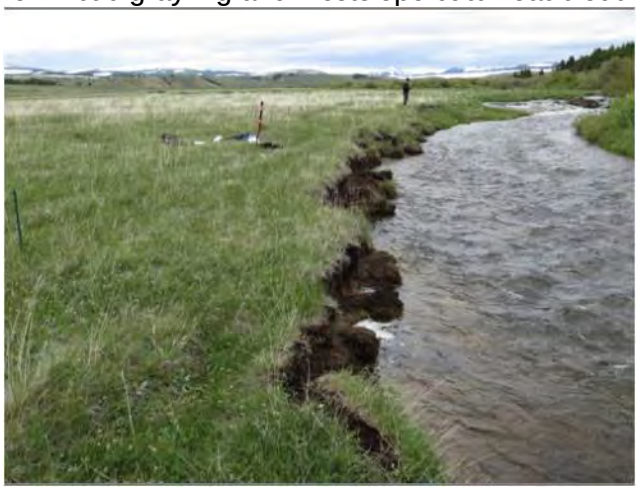


**FIGURE 66. LOWER FRENCH CREEK BEFORE CONSTRUCTION (LEFT) AND AFTER CONSTRUCTION (RIGHT, 2023).**

### 020-2019 Nevada Creek phase 3B restoration

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 nonfunctional 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 was 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.

**Status:** In 2022, the project was visited with staff from the Big Blackfoot Chapter of Trout Unlimited and the landowner, who spoke about the value of work to their operation. Overall, the project has done very well and is a good example of agricultural and fisheries interests working together.

**FIGURE 67. NEVADA CREEK RESTORATION PHASE 3B BEFORE CONSTRUCTION (LEFT, 2019) AND IN 2022 (RIGHT).**

### 026-2009 Chamberlain/Bear creeks road deconstruction

Chamberlain and Bear creeks (Powell County), tributaries in the Blackfoot drainage located near Clearwater Junction, support nearly genetically pure fluvial westslope cutthroat trout populations. These drainages and several others will enter into public ownership with the aid of the USFWS Native Fish Habitat Conservation Plan, where Montana DNRC will become the ultimate owner with FWP holding a conservation easement. An existing road system encroached on about 5.5 miles of the two streams, contributing to over-simplified aquatic habitat, sediment delivery, and a corresponding reduction in spawning and rearing habitat quality. This project involved the deconstruction of about 5.5 miles of existing road located within the riparian corridor, reconstruction of 2.3 miles of existing sub-standard upland road and construction of 2.8 miles of new upland road.

**Status:** In 2023, the site was visited for effectiveness. It was hard to assess the change, since the old road is gone. Ariel photos may be useful for additional monitoring. The stream in the adjacent area appeared to be in good condition. A dispersed campsite is now at the head of the old road.


**FIGURE 68. CHAMBERLAIN AND BEAR CREEK DECOMMISSIONING AT CONSTRUCTION (LEFT) AND IN 2023 (RIGHT). DUE TO THE PROJECT ACTIVITIES AND VEGETATIVE RECOVERY, IT IS DIFFICULT TO LOCATE THE ORIGINAL PROJECT LOCATION.**

### 027-2016 Shields River watershed YCT passage

This project took place in the Upper Shields River watershed, specifically Buck Creek and Lodgepole Creek (Park County) above Crandall Creek. This area was rated as the highest priority for Yellowstone cutthroat trout (YCT) habitat because rainbow trout were not yet present, it is publicly owned land, habitat is in good condition, and the threat of brook trout could be eliminated. This project tied into other work in the area, including installation of a fish barrier to isolate YCT habitat. This project constructed two bottomless pipe arches, on Buck Creek and Lodgepole Creek, to restore full passage for aquatic organisms. The goal was to improve fish passage and, in combination with other projects, reconnect 28 stream miles above the Shields River fish barrier for YCT conservation.

**Status:** The project sites were visited in 2023, and the culverts appeared to be in good condition and functioning. Fish passage has been maintained.


**FIGURE 69. SHIELDS RIVER CULVERTS IN 2023.**

### 028-2007 Big Hole River riparian fencing Christiansen Reach*

In 2007, FWP completed the Christiansen riparian project. The project consisted of installing 1.25 miles of five-strand barbed-wire riparian/pasture fence that created a riparian and upland pasture and 1.7 miles of three-strand high-tensile temporary electric fence to protect the mainstem banks from livestock impacts. Additionally, a solar stock watering system was developed to provide water to

livestock while in the northernmost pasture. The project aimed to enhance riparian vegetative communities that stabilize banks, reduce sedimentation, provide cover, decrease temperatures, and develop habitat for Arctic grayling and other native and sportfish species.

**Status:** The project was inspected on Aug. 22, 2023 (Figure 70). The entire four-strand permanent fence was still up and in good working order; however, the only remaining section of temporary electric fence that was still up was along the northern bank. The southern bank section of electric fence was gone. During BHWCs site visit, cows were grazing along the river's edge where the fence was originally installed. The stock-water tank was not installed in the original proposal, but along Toomey Creek on the south side of the river. That tank is present and in good working order. The riparian area consisted of sedges and rushes adjacent to the stream channel, with pasture grasses dominating outside of the stream corridor. Hoof shear was present in isolated locations.

This project is partially successful due the functioning state of the permanent fence and partial electric fence that was installed. This property is still enrolled in the CCAA and still has its own specific site management plan. BHWC recommends that the USFWS and FWP broach this subject with the new landowners to see if there are any opportunities for a new riparian fence that fits their operation and needs.

**FIGURE 70. CHRISTIANSEN RIPARIAN FENCE PROJECT CONDITIONS IN 2023: PERMANENT FENCE INFRASTRUCTURE (LEFT) AND (MIDDLE), REMAINING NORTH SIDE ELECTRIC FENCE (RIGHT).**

### 028-2011 Boulder River Dry Creek canal restoration

The Boulder River (Sweet Grass County) supports a popular recreational fishery for rainbow trout, Yellowstone cutthroat trout, brown trout and mountain whitefish. The Dry Creek Canal was one of the largest diversions in the Boulder Drainage, diverting up to 100 cubic feet per second during the irrigation season. The Dry Creek diversion was documented to entrain thousands of fish during the irrigation season, and FWP personnel periodically visited the ditch each fall to rescue fish and return them to the river. The diversion headgate was located about 8 miles upstream from the mouth of the river, with the canal paralleling the river for a distance of about 2,000 feet before heading out to lands in the Dry Creek valley. This project installed a new waste-way gate 2,000 feet downstream of the headgate and constructed a return channel to the Boulder River. Approximately 10 cubic feet per second of streamflow is maintained year-round in this 2,000-foot canal reach, preserving existing high-quality spawning habitat found there. Without this guaranteed canal flow and new wasteway structure, brown trout redds would be completely dewatered once the headgate was closed, and fish entrained into the canal would be lost. FWP video on youtube: https://www.youtube.com/watch?v=V3OnQp4x0t4

**Status**: In 2022, FWP staff learned from the landowner that the project is still functional. The offshoot channel looks different now and is less of a channel than a collection of boulders. This causes more flooding, especially in the cottonwood gallery. The project has been an astounding success; big brown trout spawning was observed recently (fall 2021). Everyone is happy with the project, including the canal company. An upstream screen never worked, but incremental reductions in flow has been working.

### 028-2015 French Gulch channel restoration

French Gulch (Deerlodge County) is a tributary to French Creek, which flows into Deep Creek and the Big Hole River. Placer mining activities occurred in the French Gulch drainage from the mid-19th century to the early 1890s, resulting in stream habitat that was degraded by stream channel straightening, the presence of large dredge spoils, increased stream gradient, reduced riparian area width, and isolation of the stream from its floodplain. The purpose of this project was to restore habitat impacted by placer mining. Restoration activities included reconstructing of the floodplain and stream channel, redirecting the streamflow, and plugging the old channel. The new channel was vegetated with transplanted material or bioengineering techniques. The goal was to increase the number of westslope cutthroat trout and Arctic grayling in French Gulch by addressing the habitat limitations and potentially opening habitat to fluvial fish from French Creek. This project is upstream of the French Creek fish barrier project (003-2014).

**Status:** In 2023, the site was visited with the Big Hole Watershed Committee. Overall, the French Gulch restoration is doing very well and was very successful. The native fish reintroduction is in progress.

### 029-2017 Turkey Creek fish passage

Turkey Creek and an unnamed stream are tributaries to the Shields River. They support native Yellowstone cutthroat trout (YCT). These streams provide habitat for YCT that is 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 and opened critical habitat. The goal was to conserve and protect YCT and reduce sediment loading to streams. There is a mainstem barrier that was installed downstream (that included Future Fisheries funds) that will eventually (along with a brook trout removal project) provide 27 miles of stream habitat for YCT.

**Status:** The site was visited with project managers and was completed successfully. In 2023, the site was revisited, and the culverts appeared to be in good condition and functioning. No erosion or aggradation was present.

**FIGURE 71. THE TURKEY CREEK CULVERT (2023).**

### 035-2002 Blanchard Creek riparian fence

Blanchard Creek (Powell County) is an important spawning stream for cutthroat trout from the Blackfoot River. The project area suffered damage due to cattle grazing. This project involved riparian fencing on both sides of the stream and creation of a riparian pasture. Approximately 3 miles of fencing were constructed to protect approximately 1 mile of stream.

**Status:** Riparian condition was considered fair but improving in 2004. Grazing compliance was high. However, in 2023, the project was monitored and although fencing was visible, cattle were within the riparian area and many areas appeared overgrazed with erosive streambanks. The applicant was contacted, and the grazing concerns were rectified quickly. The problem was noted as being an isolated incident.

**FIGURE 72. BLANCHARD CREEK AFTER PROJECT COMPLETION (LEFT, 2004), AND IN 2023 (RIGHT).**

### 036-2009 Racetrack Creek riparian fence

Racetrack Creek (Powell County), a tributary to the Clark Fork River located near Deer Lodge, supports a mixed salmonid fishery. The stream, as it flows through the Five Rockin Angus Ranch, was degraded in the past from dewatering and livestock use. This project installed about 3.1 miles of riparian fencing, creating a 300-acre riparian pasture. Two hardened livestock crossings were constructed. The proposal called for two years of excluding livestock followed by a grazing plan involving one month of late summer grazing by 50 cow-calf pairs.

**Status:** In 2011, after project completion, riparian condition was fair and grazing compliance was medium. When the site was visited in 2022, it was noted that there is still an electric fence on both sides of Racetrack Creek for almost 2 miles. Part of it is on DNRC-leased grazing land, and part on Five Rocking MS Angus Ranch. The three-strand high-tensile electric fence and charger were up and functional (though not turned on since no cattle are in those pastures) in Section 16. In Section 17/20 most of the fence is in place, but the wires are not tightened, and a few fiberglass posts were tipped or even down on the ground. However, there was no evidence of recent cattle grazing on the site (either side of the fence). The landowner noted that the area was not being grazed but the fence would be improved when grazing did occur. They do not repair the fence during the season they are not grazing, due to extremely heavy elk traffic in the area. They make sure the fence is tight and functional before they put the cattle into those pastures every year.

**FIGURE 73. RACETRACK CREEK FENCING UPON COMPLETION (LEFT, 2004) AND IN 2022 (RIGHT).**

### 037-2003 Deep Creek*

In 2003, FWP completed the Deep Creek riparian enhancement project. The project involved installing 0.5 mile of riparian fencing and a stock-water system to provide off-stream water to livestock. The project aimed to improve riparian health on Deep Creek by protecting the riparian corridor and streambanks from livestock use (fencing) and using a new off-channel livestock watering well. A grazing management plan was established in which grazing was to occur only during the winter months when the stream banks were frozen. This project was a continuation of a 1998 project in which the landowner and FWP installed riparian fencing along Deep Creek. This project tied into that 1998 fence and extended the fencing further upstream. FWP monitored the project in June 2015. During that monitoring visit, the livestock were using the stock tanks for water and were off stream. The fencing was up and functioning. The landowner was happy with the project.

**Status:** BHWC inspected the Deep Creek riparian enhancement project on Aug. 16, 2023 (Figure 74). The landowner informed the BHWC that he no longer owns cattle but leases his land for grazing in the spring and summer months. The landowner also mentioned that elk use this portion of land more than anything now, indicating low levels of ranch use. The entirety of the riparian fence was in working order and effectively improving riparian vegetation. No signs of heavy grazing beyond the fence line were observed. Natural recovery trends along the river/stream banks are abundantly clear. Healthy willow communities are recolonizing the streambanks, and decadent/formally browsed willow clumps are shooting out suckers. Sedge and rush communities are abundant near the water's edge. The stock-water tank is in good working order and is only used during the spring months. Overall, this project has

met its objectives to enhance riparian health and grayling habitat. The decreased operations of the ranch  seem to have aided the project's longevity, specifically the fencing and stock water tanks. The landowner has no concerns about the fence or the stock water tank.

**FIGURE 74. DEEP CREEK RIPARIAN ENHANCEMENT CONDITIONS 2023: STOCK WATER TANK IN WORKING ORDER (LEFT) AND FENCE PROTECTING THE RIPARIAN ZONE AND STREAMBANKS FROM OVERUSE AND BROWSE (RIGHT). NOTE THE ROBUST WILLOW COMMUNITIES ON THE RIPARIAN SIDE OF FENCE (RIGHT).**

### 037-2007 Swamp Creek riparian fencing*

In 2007, FWP completed the Swamp Creek riparian fence project. The project involved installing 12.5 miles of riparian fencing (6.25 miles of stream on both sides) along Swamp Creek and the installation of two stock-water systems to provide off-stream water to livestock. The project was a collaborative effort with three landowners and includes a section of state land. The purpose of the riparian fence was to enhance native vegetation that would result in improved fish habitat, bank stability, channel morphology, and floodplain function. The fence split the properties into multiple pastures and was in conjunction with a grazing management plan developed by the landowners for the CCAA program. The stock-water tanks were developed to enable the landowners to utilize alternative pastures outside of the riparian corridor. FWP monitored the project  in June 2012. During that monitoring visit, it was noted that a portion of the fence was nonfunctional and was going to be replaced.

**Status:** This project was inspected in June of 2012. During that inspection, a portion of the fence was nonfunctional but scheduled for repair. Cattle were in the excluded area during the 2012 inspection but were quickly removed before damage could be done. BHWC inspected the Swamp Creek Riparian Fence Project on Sept. 11, 2023 (Figure 75). The fence is still up and in good working order. The riparian area within the fence looked healthy and when comparing pre-project photos to 2023, it is evident that there has been an ecological uplift and vegetation recovery. There was a lone cattle within one reach of the fence, and BHWC notified the landowner. Both stock tanks were present and in good working order. Overall, this project has proven to be successful. The landowners are happy with how well the fence has held up over the years. The bankside vegetation is robust, and natural recovery is on an upward trend.


**FIGURE 75. SWAMP CREEK RIPARIAN FENCE PROJECT 2023 CONDITIONS: SWAMP CREEK BEFORE FENCE INSTALL (TOP LEFT), SAME LOCATION IN 2012, LOOKING NE (TOP RIGHT), AFTER PHOTO OF THE SAME LOCATION (2023, LOWER LEFT), AVERAGE SWAMP CREEK FENCE CONDITION (2023, LOWER RIGHT).**

### 038-2010 Nevada Creek channel restoration

Nevada Creek (Powell County) is a tributary to the middle Blackfoot River that supports a mixed salmonid fishery. The stream, located immediately downstream of Nevada Creek Reservoir on property owned by the DNRC and by the Stitts, was over-widened, suffered from bank erosion, and was deficient of suitable woody riparian vegetation. This project involved restoring the dimension, pattern and profile on approximately 4,400 feet of stream channel. The work involved constructing a meandering channel with well-defined pools and a low width-to-depth ratio. Stream bank stability was enhanced with the placement of toe wood and log vanes and the transplanting of woody riparian shrubs. An existing diversion was reconstructed, and a fish screen was installed. Grazing management was improved with the installation of riparian fencing.

**Status:** The project has been considered to have fair or good riparian condition since 2012, with high grazing compliance. In 2022, the project was revisited. It is evident from the 2022 photo vs. older photos that more woody vegetation has continued to establish. Overall, the fishery data are very good, and the project is considered successful.


**FIGURE 76. NEVADA CREEK PHASE 1 RESTORATION, IN 2011 (LEFT) AND 2022 (RIGHT).**

### 038-2015 Stonewall Creek fish screen

Stonewall Creek (Lewis & Clark County) is a tributary to Keep Cool Creek located near Lincoln that contains westslope cutthroat trout. Near stream-mile 5, an unscreened irrigation diversion was causing channel impairments and entrainment of cutthroat trout. This project upgraded the existing diversion with a fish screen and instream cross vane. These upgrades were expected to permit fish passage, bedload movement, and stop fish from entering the ditch. A flat-plate fish screen with a paddlewheel was installed.

**Status:** The project was visited in 2022 after the fish screen was shut down for the season. However, the project appeared to be in good condition aside from a lot of debris in the forebay. Overall, it is considered successful.

**FIGURE 77. STONEWALL CREEK FISH SCREEN, AFTER CONSTRUCTION.**

### 040-2002 German Gulch

German Gulch (Silver Bow County) supports a unique population of westslope cutthroat trout. Unfortunately, logging, grazing, and historic placer mining all contributed to degradation of habitat in the watershed. This project was intended to improve approximately 4.8 miles of stream. The scope of the project was significantly downsized, but habitat was improved, and complexity increased by adding woody debris and boulders to the stream, widening the floodplain, and improving bank stability with vegetative treatments. Grade controls were installed at key locations to prevent head-cuts.

**Status:** The riparian condition was considered fair but improving in 2009. Grazing compliance was high, but weeds were excessive. It appeared that the stream probably adjusted slightly since construction. It appears that some of the wood moved to the margins of stream or was abandoned. Although this project was meant to be a demonstration project, it is unclear what projects were developed as a result of the work. In 2023, it was noted that the riparian area and vegetative growth was improved since 2016. There was considerably more riparian vegetation. Weeds were still very abundant in parts (especially knapweed), but the project appears to be much more successful. Cows were in the area but not seen in the riparian area.

**FIGURE 78. GERMAN GULCH STREAM CHANNEL IN 2016 (LEFT) AND 2023 (RIGHT)**

### 041-2000 Big Creek fish screen

Big Creek (Ravalli County), a tributary to the Bitterroot River near Stevensville, supports a mixed assemblage of trout including spawning runs from the Bitterroot. The ditch trapped migrating fish. The Big Creek Ditch Company was in the process of reconstructing the headgate and diversion, so this project retrofitted the new diversion structure with a self-cleaning fish screen.

**Status:** FWP worked with the ranch manager to operate this fish screen since installation. It continues to operate given the importance of native species in the area. In 2023, the screen was replaced (including panels, brushes, and drives). These improvements were necessary to increase function after 20 years of operation and ensure its continued use. The ranch manager continues to maintain the screen and ensure fish are not entrained during the irrigation season.

**FIGURE 79. THE BIG CREEK FISH SCREEN AFTER REPAIRS IN 2023.**

### 041-2015 Van Houten Lake fish barrier and spawning channel

Van Houten Lake (Beaverhead County) is located on the Beaverhead Deerlodge National Forest near the town of Jackson in the Big Hole valley. The lake is 12.1 acres in size with a maximum depth of 9 feet. Two spring-fed inlet streams are located on the west and north sides of the lake. The outlet flows to the east and feeds into the Big Hole River approximately 0.5 mile downstream of the lake. Van Houten Lake currently supports a brook trout fishery, but white and longnose suckers were abundant and have contributed to slow growth of fish. The fishery was poor, and an introduction of burbot did not control the sucker population. The goals of this project were to expand the range of Arctic grayling into Van Houten Lake, to establish a lake brood source for westslope cutthroat trout, and to improve the fishery. To complete these goals, the applicant installed a fish barrier in the outlet stream to preclude fish passage and keep non-natives out of the lake. An outlet spawning channel was constructed above the barrier near the current lake outlet.

**Status:** FWP staff reported that the barrier is doing great and is functioning as intended.

# Appendix 4. Expired Projects

**TABLE 10. PROJECTS THAT EXPIRED IN 2023 OR 2024.**

| PROJECT NUMBER | PROJECT NAME | APPLICATION YEAR | COMPLETED | EXPIRED |
|---|---|---|---|---|
| 030-1999 | Bad Canyon Creek | 1999 | 2003 | 2023 |
| 003-2002 | Beaver Creek | 2002 | 2003 | 2023 |
| 002-2002 | Beaver Creek diversion repair | 2002 | 2003 | 2023 |
| 004-2002 | Big Timber Creek | 2002 | 2003 | 2023 |
| 042-2000 | Bitterroot River | 2000 | 2003 | 2023 |
| 033-2002 | Bitterroot River | 2002 | 2003 | 2023 |
| 034-2002 | Blackfoot River water salvage | 2002 | 2003 | 2023 |
| 035-2002 | Blanchard Creek riparian fence | 2002 | 2003 | 2023 |
| 037-2001 | Boulder River fish ladder | 2001 | 2003 | 2023 |
| 002-2003 | Brackett Creek | 2003 | 2003 | 2023 |
| 043-2000 | Butler Creek fish passage | 2000 | 2003 | 2023 |
| 003-2003 | Canyon Ferry Lake | 2003 | 2003 | 2023 |
| 036-2002 | Cedar Creek | 2002 | 2003 | 2023 |
| 006-2002 | Chicken Creek | 2002 | 2003 | 2023 |
| 004-2003 | Cottonwood Creek | 2003 | 2003 | 2023 |
| 007-2002 | Cottonwood Creek off-stream livestock watering | 2002 | 2003 | 2023 |
| 045-2000 | Dempsey Creek corral relocation | 2000 | 2003 | 2023 |
| 007-2003 | Dupuyer Creek | 2003 | 2003 | 2023 |
| 039-2002 | East Gallatin River | 2002 | 2003 | 2023 |
| 009-2002 | Elk Creek spring corral bypass | 2002 | 2003 | 2023 |
| 008-2003 | Elkhorn Tributary Non-native Removal | 2003 | 2003 | 2023 |
| 012-2002 | Harvey Creek | 2002 | 2003 | 2023 |
| 009-2003 | Hauser Reservoir | 2003 | 2003 | 2023 |
| 030-2003 | Jefferson River | 2003 | 2003 | 2023 |
| 010-2003 | Laird Creek | 2003 | 2003 | 2023 |
| 012-2003 | Lost Creek | 2003 | 2003 | 2023 |
| 042-2002 | Marias River | 2002 | 2003 | 2023 |
| 043-2003 | Marshall Creek | 2003 | 2003 | 2023 |
| 016-2002 | Mathew Bird Creek | 2002 | 2003 | 2023 |
| 042-2001 | Nevada Spring Creek | 2001 | 2003 | 2023 |
| 019-2003 | Nevada Spring Creek | 2003 | 2003 | 2023 |
| 012-2001 | Poorman Creek | 2001 | 2003 | 2023 |
| 020-2003 | Poorman Creek | 2003 | 2003 | 2023 |
| 047-2002 | Poorman Creek water salvage and riparian improvements | 2002 | 2003 | 2023 |
| 050-2002 | R-6 ponds | 2002 | 2003 | 2023 |
| 021-2002 | Rattlesnake Creek fish ladder | 2002 | 2003 | 2023 |
| 049-2001 | Region 6 Pond Aerators | 2001 | 2003 | 2023 |
| 026-2003 | South Fork Bull River | 2003 | 2003 | 2023 |
| 032-2003 | SUN RIVER DRAINAGE | 2003 | 2003 | 2023 |
| 032-2000 | Sweathouse Creek | 2000 | 2003 | 2023 |
| 028-2003 | Thompson River | 2003 | 2003 | 2023 |
| 037-2000 | West Fork Wilson Creek | 2000 | 2003 | 2023 |
| 001-2002 | Alderman Spring Creek | 2002 | 2004 | 2024 |
| 032-2001 | Antelope Creek riparian fence and off site water | 2001 | 2004 | 2024 |

| PROJECT NUMBER | PROJECT NAME | APPLICATION YEAR | COMPLETED | EXPIRED |
|---|---|---|---|---|
| 038-2004 | Blackfoot River | 2004 | 2004 | 2024 |
| 003-2004 | Canyon Ferry Lake | 2004 | 2004 | 2024 |
| 004-2004 | Chicken Creek | 2004 | 2004 | 2024 |
| 036-2003 | Clark Fork River | 2003 | 2004 | 2024 |
| 006-2004 | Deep Creek | 2004 | 2004 | 2024 |
| 041-2004 | Dry Creek | 2004 | 2004 | 2024 |
| 009-2004 | Emigrant Spring Creek | 2004 | 2004 | 2024 |
| 010-2004 | Fishtrap Creek | 2004 | 2004 | 2024 |
| 014-2002 | Jefferson River fish entrainment | 2002 | 2004 | 2024 |
| 013-2004 | Little Prickly Pear Creek | 2004 | 2004 | 2024 |
| 016-2003 | Middle Fork Rock Creek | 2003 | 2004 | 2024 |
| 017-2003 | Mill Creek | 2003 | 2004 | 2024 |
| 045-2003 | Mill Creek | 2003 | 2004 | 2024 |
| 020-2004 | Mill Creek | 2004 | 2004 | 2024 |
| 009-2001 | Mill Creek culvert replacement | 2001 | 2004 | 2024 |
| 021-2004 | Missouri River | 2004 | 2004 | 2024 |
| 045-2002 | Missouri River Sec 10 | 2002 | 2004 | 2024 |
| 033-1998 | Nevada Creek, Douglas and Helmville fish ladders | 1998 | 2004 | 2024 |
| 023-2004 | Otie Reservoir | 2004 | 2004 | 2024 |
| 026-2004 | Steel Creek | 2004 | 2004 | 2024 |
| 046-2004 | Therriault Creek | 2004 | 2004 | 2024 |
| 028-2004 | Tiber Reservoir | 2004 | 2004 | 2024 |
| 029-2004 | Tiber Reservoir | 2004 | 2004 | 2024 |
| 047-2004 | Tyler Creek | 2004 | 2004 | 2024 |
| 031-2004 | Uncle George Creek | 2004 | 2004 | 2024 |
| 026-1999 | Warren Creek | 1999 | 2004 | 2024 |