FUTURE FISHERIES IMPROVEMENT PROGRAM

REPORT TO 2007 LEGISLATURE
AND
FISH, WILDLIFE AND PARKS COMMISSION

Montana Fish, Wildlife & Parks

1420 EAST 6TH AVENUE
P.O. BOX 200701
HELENA, MT 59620-0701

Prepared by:
Habitat Protection Bureau
Fisheries Division

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MONTANA FISH, WILDLIFE AND PARKS
Fisheries Division
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Future Fisheries Improvement Program
and
Bull Trout and Cutthroat Trout Enhancement Program
Summary 1995-2006

The Future Fisheries Improvement Program (HB 349) provides funds for: "*the long term enhancement of streams and stream banks, in stream flows, water leasing, lease or purchase of stored water, and other voluntary programs that deal with wild fish and aquatic habitats."* The Future Fisheries Improvement Program was supplemented in 1999 when the legislature enacted the Bull Trout and Cutthroat Trout Enhancement Program (HB 647) which "*provides for the enhancement of Montana bull trout and cutthroat trout populations through voluntary enhancement of spawning areas and other habitats for the natural reproduction of bull trout and cutthroat trout."*

This report summarizes project funding and status of all projects that have been approved since these programs began in 1995 and 1999, respectively, and includes a brief narrative description of all projects approved since the last reporting period and highlights projects that restore habitat for bull and cutthroat trout. Two active projects that restore habitats that were damaged by mining activities are also identified - German Gulch and Eustache Creek. Finally, before and after photographs of several projects are included; and project monitoring results are summarized in Appendix A.

Review Panel: Panel members during this report period included: **Jim Stone,** irrigator and rancher, Ovando; **Amy Miller,** Park Conservation District, Livingston; **Alan Johnstone,** commercial rancher, Wilsall; **Traci Sylte,** stream restoration professional, Missoula; **Dr**. **Tom McMahon**, fishery biologist, Montana State University, Bozeman; **Robert Twiford,** Walleyes Unlimited, Malta; **Chris Strainer,** Trout Unlimited, Helena; **Jake Schrock,** student, Great Falls High School, Helena; Senator **Steve Gallus,** Butte; Representative **George Golie**, Great Falls; **Chuck Dalby,** hydrologist, Department of Natural Resources and Conservation, Helena; **Ron Steiner,** Plum Creek Timber Company, Missoula; **Dr. Marvin Miller (Chairman)**, Bureau of Mines and Geology**,** Butte; and **Bonnie Steg** (ex-officio), Montana Department of Transportation, Helena. The review panel met four times since the last report – January 2005, July 2005, January 2006, and July 2006. Proposal deadlines are January 1 and July 1 of each year.

Staffing: The enabling legislation for both the Future Fisheries Improvement Program and the Bull Trout and Cutthroat Trout Enhancement Program authorized use of program funds for FTE's. HB 349 stated: *In order to implement (the program) the department may expend revenue from the future fisheries improvement program for up to two additional full-time employees.* Subsequently, the Department allocated two FTE's to the program but base license dollars were used to fund these FTE's rather than program dollars. Consequently, more dollars have been

made available for projects. Over the eleven years the program has been in existence, this has amounted to nearly $1.4 million in additional dollars available for projects.

Similarly, HB 647 stated: *In order to implement (the program), the department may expend revenue from the bull trout and cutthroat trout enhancement program for one additional FTE and one contractor to assist the review panel.* In recent years, the Department has used program funds to fill this FTE, which is presently split among three individuals who, as part of their positions, are required to organize and complete projects that are eligible for funding from the Bull Trout and Cutthroat Trout Enhancement Program. A contractor has not been hired. Expenditures for FTE and operations related to the bull and cutthroat trout enhancement program were $74,209 during FY-06 (HB647, 02049, 380I1) and $19,831 through October 31 of FY 07 ($11,169 from HB 647, 02049 380I1 and $8,662 from HB647 02022 EI131).

Mark Lere has been the Program Officer since November of 1997. Mark is responsible for reviewing project applications, visiting the sites of proposed projects, communicating department recommendations to the review panel, completing MEPA requirements, coordinating with consultants and contractors who design and perform restoration projects, developing project proposals, working with landowners and other citizens who need help developing proposals, and maintaining the program data base.

Other program staff include: Biologist George Liknes who is responsible for project monitoring as well as developing and overseeing new projects. George maintains a database to track restoration project monitoring conducted by himself as well as other biologists. His monitoring report is attached as an appendix. Biologist Lee Nelson (0.5 FTE, from HB 647) is responsible for westslope cutthroat restoration efforts in FWP Region-3. Biologist Brad Shepard (0.25 FTE from HB 647) is responsible for statewide cutthroat trout restoration efforts. Biologist Pat Byorth (0.25 FTE from HB 647) was assigned to conduct restoration projects in the Upper and mid-Yellowstone River drainages that benefit Yellowstone cutthroat trout. Pat recently left the agency and his replacement, Carol Endicott, will begin January 2, 2007.

Program goals: In 1995, the review panel determined that potential projects must accomplish one or more of the following goals: (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 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.

Anticipated Expenses: House Bill 349 requires Fish, Wildlife and Parks to report anticipated expenses for the ensuing 10 years implementation of the program. During the first nine years of the program, we have committed, on average, about $0.75 million/yr to projects. Over the next ten years we anticipate spending $1.5 - $2.0 million per biennium or $7.5 - $10 million over the next ten years.

Appropriations and projects: Appropriations to the program since program inception are summarized in Table 1. This includes $510,000 earmarked by the1995 legislature for projects to enhance fisheries in the Tongue River; an additional $275,000 was appropriated towards this purpose by the 1999 legislature but these latter dollars were not Future Fisheries Program funds. All of these funds were used to construct a fish screen on the T&Y Diversion, to prevent the loss of fish down the diversion ditch. The Tongue River Project was jointly administered by the state of Montana, the Northern Cheyenne Tribe, and the United States Bureau of Reclamation. To date the Future Fisheries Review Panel and Fish, Wildlife and Parks Commission have fully or partially approved funding for 463 projects; of these, 71 projects have been cancelled for various reasons.

Table 1. Legislative appropriations to the Future Fisheries program and the Bull Trout and Cutthroat Trout Enhancement Program (BT/CTT).

Session	Fund and Subclass	Amount
1995	General License, 26306, E125	$510,000
	River Restortion, HB5, 26301	290,000
	General License, HB349, 02409, ET30	220,000
	General License, HB349, 02409, ET2	1,250,000
1997	River Restoration, 02149, 28466	70,000
	General License, 02409, E131	1,310,000
1999	River Restoration, 02149,E190	300,000
	General License, 02409, E190	1,170,000
	General License, HB647, 02409, 380I1 (BT/CTT)	750,000[a]
2001	River Restoration, 02149, EI115	260,000
	General License, 02409, EI115	750,000
	RIT, 02002, EI115 (BT/CTT)	850,000
2003	River Restoration, 02149, EI131	210,000
	RIT, 02202, EI131 (BT/CTT)	700,000
2005	River Restoration, 02149, EI150	190,000
	RIT, 02022, EI150 (BT/CTT)	1,000,000

[a] Beginning in FY-2000, this appropriation was used to pay for the one FTE and operating expenses that are eligible for this source of funding. Additionally, $198,465 has been spent on projects.

Accounting changes: Beginning in FY-07, our Finance Division initiated several changes to the program accounting system. These included: (1.) adding organizational numbers in SABHRS that will allow tracking of expenditures for individual projects; and (2.) entry into SABHRS of Commission approved project budgets immediately after projects are approved. For program costs incurred after 1 July 2006, these changes will improve our ability to respond, in a timely manner, to requests for program budget details.

Table 2 summarizes the status of all projects approved by the Fish, Wildlife and Parks Commisison since program inception. Table 3 summarizes all projects that are still active and includes bills paid from various appropriations between July 1, 2004 and October 31, 2006.

TABLE 2. Future Fisheries Improvement Program Project Status as as of October 31, 2006. Cancelled Projects Have Been Removed From This Table. Projects Highlighted in Bold and Italicized were eligible for Funding under House Bill 647.

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
		1996 WINTER FUNDING CYCLE		
001-96	1	Cress Spring Creek Fence	Landowner	Complete
002-96	2	Dunham Creek Fish Screen	FWP/Landowner	Complete
003-96	3	O'Brien Creek Restoration	FWP/Landowner	Complete
004-96	4	Gold Creek Pool Development	FWP/Landowner	Complete
005-96	5	Rock Creek Restoration	Consult/Landowner	Complete
006-96	6	Steel Creek Restoration	FWP/Landowner	Complete
007-96	7	Cottonwood Creek-Dreyer Diversion	FWP/Landowner	Complete
011-96	8	Sweathouse Creek Enhancement	Landowners	Complete
013-96	9	Little Beaver Creek Riparian Fence	Landowner	Complete
014-96	10	Upper Big Hole River Flow Enhancement	USFWS/Landowner	Complete
016-96	11	Whites Gulch Riparian Fence & Revegetation	USFS	Complete
017-96	12	Deep Creek Channel Restoration	FWP/Landowners	Complete
018-96	13	Lake Francis Shoreline Stabilization	Cons. District	Complete
020-96	14	Dick Creek Restoration	USFWS/Landowner	Complete
021-96	15	Mol Heron Creek Flow Enhancement	Landowner	Complete (supplemented by 018-97)
022-96	16	Fort Peck Breakwater - Spawning Reef	ACOE	Complete
024-96	17	Nelson Reservoir Spawning Vegetation	FWP	Complete
025-96	18	Nelson Reservoir Spawning Reef	FWP	Complete
026-96	19	Fresno Reservoir Spawning Vegetation	FWP	Incomplete
027-96	20	Bear Paw Reservoir Spawning Enhancement	FWP	Complete
028-96	21	Slemmons Pond Dam Removal	FWP	Complete
030-96	22	Big Hole River Channel Restoration	TU/Landowner	Complete
031-96	23	Ruby River Bank Stabilization	FWP/Landowner	Complete
033-96	24	Dry Creek Rehab. & N. Fork Blackfoot	TU/Landowner	Complete
036-96	25	Madison Spring Creek Rehabilitation	Consult/Landowner	Complete
037-96	26	Elk Creek Rehabilitation	USFWS/Landowner	Complete
039-96	27	NCAT - Agrimet Flow enhancement	NCAT	Complete
		1996 SUMMER FUNDING CYCLE		
041-96	28	Prickly Pear Creek Fence & Bank Stabilization	Landowner	Complete
042-96	29	St. Regis River Channel Restoration	FWP/Landowner	Complete
043-96	30	Little Sheep Creek Channel Restoration	USFS	Complete
044-96	31	Cottonwood Creek	FWP	Complete
045-96	32	North Fork Fish Screens	FWP/Landowner	Complete
046-96	33	Blackfoot River Bank Stabilization	Consult/Landowner	Complete
048-96	34	Blanchard Creek Riparian Fence	DNRC	Complete
049-96	35	Elk Creek Assessment	Watershed group	Complete
050-96	36	Beaverhead, Van Camp & Rattlesnake Slough	Landowner	Complete
051-96	37	Bitterroot River Fence	Landowner	Complete
053-96	38	Echo Lake Bass Rearing Habitat	Bassmasters	Complete
054-96	39	Magpie Creek Fish Passage	Landowner	Complete
055-96	40	Teton River Bank Stabilization	Cons. District	Complete

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
056-96	41	Canyon Creek Bank Stabilization	Landowner	Complete
057-96	42	Missouri River Bank Stabilization	Landowner	Complete
		1997 WINTER FUNDING CYCLE		
001-97	1	Elk Creek Channel Restoration	Watershed group	Complete
002-97	2	Fisher River Channel Restoration	Cons. District	Complete
003-97	3	Stinger Creek Channel Restoration	Cons. Foundation	Complete
004-97	4	Middle Fork Rock Creek Riparian Fence	USFS	Complete
005-97	5	Clark Fork River Riparian Fence	Landowner	Complete
006-97	6	Grantier Spring Creek Channel Restoration	Landowner	Complete
007-97	7	Camp Creek Restoration	TU/Landowners	Complete (adds to 006-1999)
009-97	8	Chamberlain Creek Diversion	FWP/Landowner	Complete
010-97	9	O"Brien Creek Channel Restoration	FWP/Landowners	Complete
011-97	10	N. F. Blackfoot Hoxworth/Williams Fish Screen	FWP/Landowners	Complete
012-97	11	Monture Creek Fish Habitat Enhancement	FWP/Landowner	Complete
013-97	12	Salmon Creek & Dry Creek Habitat Restoration	FWP/Landowner	Complete
016-97	13	Stone Creek Channel Restoration	FWP/Landowner	Complete
017-97	14	Ruby River Channel Stabilization	FWP/Landowner	Complete
018-97	15	Mol Heron Creek Fish Screen - supplement	Landowner	Complete (adds to 021-96)
020-97	16	Black Butte Creek Riparian Fence & Stabilization	USFS/Landowner	Complete
021-97	17	Missouri River Bank Stabilization	TU/Landowner	Complete
022-97	18	Sun River Bank Stabilization Survey	Consult/Landowner	Complete
023-97	19	Elk Creek Bank Stabilization	Consult/Landowner	Complete
024-97	20	Big Spring Creek Restoration	FWP	Complete
026-97	21	Townsend Ranch Streams Restoration	USFS/Landowner	Complete
027-97	22	Bynum Reservoir Spawning Habitat	WU	Complete
028-97	23	Hauser Reservoir Spawning Habitat	WU	Complete
031-97	24	Fresno Reservoir Spawning Habitat	FWP	Complete
		1997 SUMMER FUNDING CYCLE		
033-97	25	Yellowstone River Bank Stabilization	FWP/Landowner	Complete
034-97	26	Mud Creek Channel Restoration	Cons. Foundation	Complete
036-97	27	Rock Creek Channel Restoration	USFS	Complete
037-97	28	Cottonwood Creek Culvert to Bridge Conversion	FWP/County	Complete
038-97	29	McCabe Creek Culvert to Bridge Conversion	FWP/County	Complete
039-97	30	Johnson Creek Culvert to Bridge Conversion	FWP/Landowners	Complete
040-97	31	Gilbert & Shanley Creeks Project Repair	FWP/Landowners	Complete
045-97	32	Mill Coulee Bank Stabilization	Consult/Landowner	Complete
046-97	33	Sun River Channel Survey	Cons. Dist./Consult	Complete
047-97	34	Sun River Bank Stabilization	Consult/Landowner	Complete
050-97	35	Canyon Creek Channel Restoration	NRCS/Landowner	Complete
051-97	36	Boulder River Channel Stabilization	Consult/Landowner	Complete
052-97	37	Careless Creek Bank Stabilization	NRCS/Landowner	Complete
055-97	38	Muskrat Creek Migration Barrier	FWP/USFS/BLM	Complete
056-97	39	Yellowstone River Bank Stabilization	FWP/Landowner	Complete
		1998 WINTER FUNDING CYCLE		

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
001-98	1	Bear Paw Lake Shoreline Rearing Habitat	FWP	Complete
003-98	2	Beaverhead River Riparian Fencing	USFWS/Landowner	Complete
004-98	3	Big Creek Channel Restoration	Cons. Dist./Consult	Complete
006-98	4	Bynum Reservoir Spawning Habitat	WU	Complete
007-98	5	Canyon Ferry Reservoir Spawning Habitat	WU	Complete
010-98	6	Deep Creek Channel Restoration	FWP/Landowner	Complete
011-98	7	East Fork Bull River Bank Stabilization	FWP/Landowner	Complete
012-98	8	Highwood Creek Bank Stabilization	Consult/Landowner	Complete
013-98	9	Hughes Creek Channel Restoration	USFS	Complete
014-98	10	Kleinschmidt Creek Channel Restoration	Consult/Landowner	Complete
016-98	11	Missouri River Bank Stabilization	TU/Landowner	Complete
018a-98	12	Spring Creek Murphy Diversion Fish Passage	FWP/Landowner	Complete
018b-98	13	North Fork Blackfoot River Haggert Diversion	FWP/Landowner	Complete
018c-98	14	North Fork Blackfoot River Weaver Diversion	FWP/Landowner	Complete
018d-98	15	Blackfoot River Bank Stabilization	FWP/Landowner	Complete
021-98	16	Ruby River Diversion Improvement	CD/Landowners	Incomplete
026-98	17	Spring Coulee Riparian Fence & Stabilization	Consult/Landowners	Complete
		1998 SUMMER FUNDING CYCLE		
027-98	18	Big Creek Flow Enhancement	Landowners	Ongoing
028-98	19	Bear Creek Channel Restoration	TU/Landowner	Complete
029-98	20	Blackfoot River Water Conservation	FWP/Landowner	Complete
030-98	21	Cottonwood & McCabe Cr. Bridges (supplement)	FWP/County	Complete
031-98	22	McCabe Creek Habitat Enhancement	FWP/Landowner	Complete
033-98	23	Nevada Creek Douglas & Helmville Fish Ladders	FWP/Landowner	Complete
034-98	24	Nevada Creek Quigley Fish Ladder	FWP/Landowner	Complete
035-98	25	Nevada Creek Fish Friendly Diversion & Fence	FWP/Landowner	Complete
036-98	26	Nevada Spring Creek Culvert to Bridge Conversion	FWP/Landowner	Complete
037-98	27	Rock Creek Channel Restoration	TU/Landowner	Complete
038-98	28	Shanley Creek Diversion & Riparian Fence	FWP/Landowner	Complete
039-98	29	Wasson Creek Fish Friendly Diversion	FWP/Landowner	Complete
042-98	30	Careless Creek Bridge & Riparian Fence	NRCS/Landowners	Complete
045-98	31	Esp/Chamber Spring Creek Channel Restoration	CD/FWP/Owners	Complete
051-98	32	Ross Fork Rock Creek Fish Ladder	USFS	Complete
052-98	33	Saddle Brook Pond Restoration	WU	Complete
053-98	34	Shields River & Elk Creek Riparian Fence	CD/Watershed Grp.	Complete
054-98	35	Smith Creek Riparian Fence	Landowner	Complete
055-98	36	Spokane Creek Channel Restoration	USFWS/Landowner	Complete
056-98	37	Staubach Creek Fish Barrier	FWP	Complete
057-98	38	Sweetgrass Creek Riparian Fence	Landowner	Complete
059-98	39	Thompson Chain of Lakes Habitat Structures	Bassmasters	Complete
060-98	40	Tiber Reservoir Spawning Habitat	Sportsmen's Club	Complete
		1999 WINTER FUNDING CYCLE		
001-99	1	Big Hole River Stock Water	CD/FWP	Complete
002-99	2	Big Hole River Stock Water	Landowner/FWP	Complete
004-99	3	Butler Creek Fence and Stockwater	Landowner/FWP	Complete
005-99	4	Bynum Reservoir Spawning Habitat	WU	Complete

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
006-99	5	Camp Creek Channel Restoration	Consult/Landowner	Complete (adds to 007-97)
007-99	6	Coal Creek Riparian Fencing	DNRC	Complete
008-99	7	Cottonwood Creek Bank Stabilization	Landowner/CD	Complete
010-99	8	Douglas Creek Fish Passage	FWP	Complete
012-99	9	Elk Creek (Scherrer) Channel Restoration	Landowner/FWS	Complete
014-99	10	Horseshoe Lake Spawning Habitat	Bassmasters	Complete
018-99	11	Prickly Pear Creek Bank Stabilization	Consult/Landowner	Complete
020-99	12	Rock Creek Water Salvage & Channel Restoration	Landowner/FWP	Complete (supplemented by 014-01)
021-99	13	Ruby River Feedlot Relocation	Landowner/NRCS	Complete
023-99	14	Smith River Stock Water	Landowner/CD	Complete
024-99	15	Sun River Bank Stabilization	Consult/CD	Complete
025-99	16	Tenmile Creek Riparian Habitat	Watershed Group	Complete
026-99	17	Warren Creek Channel Restoration	USFWS	Complete
027-99	18	S. Fork Willow Creek Riparian Fence	Landowner/FWP	Complete
028-99	19	Yellowstone River Huntley Fish Passage	Irrigation District	Complete
		1999 SUMMER FUNDING CYCLE		
030-99	***20***	***Bad Canyon Creek Non-native Fish Removal***	***FWP***	***Complete***
031-99	21	Beaverhead/Poindexter Bank Stabilization	Landowner/FWP	Complete
033-99	***22***	***Big Coulee Creek Fish Barrier***	***FWP***	***Complete***
035-99	23	Canyon Ferry Reservoir Spawning Habitat	FWP	Complete
037-99	***24***	***Cottonwood Creek Fish Barrier***	***FWP***	***Complete***
038-99	***25***	***Cottonwood Creek Fish Ladder Repair***	***TU/FWP***	***Complete***
039-99	***26***	***Daisy Dean Creek Off-site Water and Fencing***	***CDWatershed group***	***Complete***
041-99	27	Elk Creek (Artz) Channel Restoration	Landowner/FWS	Complete
042-99	***28***	***Grave Cr Diversion Repair and Fish Screen***	***CD/FWP***	***Complete***
045-99	29	Little Prickly Pear Cr. Fish Screen	FWP/Landowner	Complete
047-99	30	Lost Creek Corral Relocation	Landowner/FWP	Complete
049-99	***31***	***Monture Creek Habitat Restoration***	***TU/Landowner***	***Complete***
050-99	32	Ninemile Creek Bank Stabilization & Fencing	Landowner	Complete
051-99	33	O-Brien Creek Grade Control Repair	FWP	Complete
052-99	***34***	***Pearson Creek Habitat Restoration***	***TU/Landowner***	***Complete***
053-99	***35***	***Prospect Creek Channel Restoration***	***Watershed group***	***Complete***
054-99	36	Racetrack Creek Riparian Fence & Channel Restoration	Landowner/FWP	Complete
057-99	37	Ronan Spring Cr. Channel Restoration	Community Found.	Complete
058-99	38	Salmo Reservoir Lake Aeration	FWP	Complete
059-99	39	Shields River Bank Stabilization	CD	Complete
060-99	40	Shields River Bank Stabilization	CD	Complete
061-99	41	S. Fk. Smith River Off-Site Water & Fence	Landowner/CD	Complete
063-99	***42***	***Spring Creek Fish Barrier***	***FWP/Landowner***	***Complete***
066-99	43	Staubach Creek Native Fish Protection	FWP/Landowner	Complete
		2000 WINTER FUNDING CYCLE		
002-00	1	Basin Creek Culvert Replacement	CT Foundation	Complete
004-00	2	Upper Big Hole River Offstream Water	Big Hole Watershed	Complete
005-00	3	Bitterroot River Riparian Fence	Landowner	Complete

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
007-00	4	Bynum Reservoir Spawning Habitat	Walleye Unlimited	Complete
008-00	5	Canyon Creek Riparian Fence	Landowner	Complete
009-00	6	Cottonwood Creek Channel Restoration	NRCS/Landowner	Complete
010-00	***7***	***Cottonwood Creek Fish Barrier***	***USFS***	***Complete***
012-00	8	Dupuyer Creek Channel Restoration	USFWS/Landowner	Complete
013-00	9	East Fork Bull River Channel Restoration	Landowner	Complete
015-00	10	Flint Creek Off-site Water and Riparian Fencing	FWP/Landowner	Complete
017-00	11	Lost Creek Headgate Repair & Channel Restoration	FWP/Landowner	Complete
018-00	***12***	***McCabe Creek Irrigation Efficiency***	***USFWS***	***Complete***
023-00	13	Prickly Pear Creek Channel Restoration	FWP/Landowner	Complete
024-00	***14***	***Prospect Creek Channel Restoration***	***Watershed group***	***Complete***
027-00	15	Ruby Creek Flow Enhancement	USFWS/Landowner	Complete
028-00	16	S.F. Musselshell River Fish Passage	DNRC	Complete
030-00	17	Stillwater River Side Channel Restoration	Landowner	Complete
031-00	18	Sun River Channel Restoration	Consultant	Complete
032-00	19	Sweathouse Creek Fish Screen	FWP/Landowner	Complete
033-00	20	Tenmile Creek Riparian Restoration	Watershed Group	Complete
035-00	21	Virginia Creek Channel Restoration	Landowner	Complete
036-00	22	Warren Creek Channel Restoration	FWP	Complete
037-00	***23***	***West Fork Wilson Creek Fish Barrier***	***FWP***	***Complete***
038-00	24	Yellowstone River Riparian Restoration	Consultant	Complete
		2000 SUMMER FUNDING CYCLE		
041-00	25	Big Creek Fish Screen	Landowner	Complete
042-00	***26***	***Bitterroot River Fish Screen***	***Ditch Company***	***Complete (adds to 033-2002)***
043-00	***27***	***Butler Creek Fish Passage***	***FWP***	***Complete***
044-00	28	Canyon Ferry Perch Spawning Habitat	FWP	Complete
045-00	***29***	***Dempsey Creek Corral Relocation***	***Cons. District***	***Complete***
046-00	30	Kolb Spring Creek Channel Restoration & Fencing	FWP/Landowner	Complete
051-00	***31***	***O'Brien Creek Riparian Fencing***	***FWP***	***Complete***
052-00	32	Poorman Creek Channel Restoration	Consultant	Complete
053-00	33	Silver Butte Fisher Creek Bank Stabilization	NRCS	Complete
056-00	34	Tongue River Riparian Fencing	FWP/Landowner	Complete
058-00	35	Wolf Creek Fish Passage	FWP	Complete
059-00	36	Region 6 Pond Aeration	FWP	Complete
		2001 WINTER FUNDING CYCLE		
005-01	1	Dunkleberg Creek Habitat Enhancement	Landowner/TU	Complete
006-01	2	Elk Creek Channel Restoration	USFWS/Landowner	Complete
007-01	3	Hauser Reservoir Perch Spawning Habitat	FWP	Complete
008-01	***4***	***Marshall and Deer Creeks Fish Screens***	***FWP***	***Complete***
009-01	***5***	***Mill Creek Culvert Replacement***	***Landowners***	***Complete (adds to 020-04)***
010-01	6	Missouri River Riparian Restoration	Landowner/TU	Complete
011-01	7	Pinltar Creek Flow Enhancement	USFWS	Complete

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
012-01	***8***	***Poorman Creek Flow Enhancement***	***TU/FWP***	***Complete (adds to 047-2002)***
013-01	9	Rattlesnake Creek Side Channel Stabilization	Landowner	Complete
014-01	***10***	***Rock Creek Channel Restoration***	***TU/Landowner***	***Complete***
015-01	11	Rock Creek Supplemental Funding	FWP/Landowner	Complete (adds to 020-99)
016-01	12	Shields River Bank Stabilization	DNRC	Complete
017-01	13	Sixmile Creek Diversion Repair	FWP/Landowners	Complete
020-01	14	Teton River Diversion Stabilization	Watershed group	Complete
022-01	15	White Pine Creek Channel Stabilization	Watershed Group	Complete
023-01	***16***	***Non-native Fish Removal***	***FWP***	***Complete***
		2001 SPECIAL DROUGHT FUNDING CYCLE		
024-01	17	Big Hole River Soil Moisture Meters	Watershed Group	Complete
025-01	18	Blackfoot River Soil Moisture Meters	Watershed Group	Complete
028-01	***19***	***Locke Creek Irrigation Conversion and Lease***	***FWP/Landowner***	***Complete***
		2001 SUMMER FUNDING CYCLE		
031-01	***20***	***Antelope Creek Riparian Fence***	***Landowner/FWP***	***Complete***
032-01	21	Antelope Creek riparian fence and off-site water	Landowner/FWP	Complete
034-01	22	Bitterroot River Riparian Fence	Landowner	Complete
035-01	23	Big Otter Creek Corral Relocation	Landowner	Complete
037-01	24	Boulder River Fish Ladder	Trout Unlimited	Complete
039-01	***25***	***Dunham Creek Channel Restoration***	***FWP***	***Complete***
042-01	26	Nevada Spring Creek Channel Restoration	Landowner/consultant	Complete
049-01	27	Region 6 Pond aeration	FWP	Complete
		2002 WINTER FUNDING CYCLE		
001-02	1	Alderman Spring Creek channel restoration	Landowner/ Consultant	Complete
002-02	2	Beaver Creek diversion repair	FWP	Complete
003-02	***3***	***Beaver Creek channel restoration***	***FWP***	***2006***
004-02	4	Big Timber Creek channel stabilization	Landowner/ Consultant	Complete
005-02	5	Canyon Ferry perch spawning habitat	FWP	Complete
006-02	6	Chicken Creek flume installation	Landowner/FWP	Complete
007-02	***7***	***Cottonwood Creek off-stream livestock water***	***State forest***	***Complete***
008-02	8	East Boulder River off-stream livestock water	Watershed Group	Complete
009-02	9	Elk Creek spring corral bypass	Cons. District/ Landowner	Complete
011-02	10	Esp-Chambers Spring Creek off-stream water repair	FWP	Complete
012-02	***11***	***Harvey Creek channel restoration***	***FWP***	***Complete***
013-02	12	Hauser Reservoir perch spawning habitat	FWP	Complete
014-02	13	Jefferson irrigation overflow fish migration barrier	Trout Unlimited	Complete
015-02	14	Madison Spring Creek channel restoration	Trout Unlimited	Complete
016-02	15	Mathew Bird Creek bank stabilization	Gallatin Land Trust	Complete
021-02	***16***	***Rattlesnake Creek fish ladder***	***Trout Unlimited***	***Complete***
022-02	***17***	***Rattlesnake Creek fish screens***	***FWP***	***Complete***
024-02	18	Sappington Spring Creek spawning channel	Trout Unlimited	Complete

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
027-02	***19***	***Stone Creek channel restoration***	***Cons. District***	***Complete***
028-02	20	Ninemile Creek riparian fencing	Landowner/ Trout Unlimited	Complete
		2002 SPECIAL DROUGHT FUNDING CYCLE		
030-02	21	Jefferson River ditch sealing	Trout Unlimited	Complete
		2002 SUMMER FUNDING CYCLE		
033-02	***22***	***Bitterroot River Republican Ditch fish screen***	***FWP***	***Complete/ ongoing maintenance (supplemented by 042-2000)***
034-02	23	Blackfoot River water salvage - stockwater well	Landowner	Complete
035-02	***24***	***Blanchard Creek riparian fence***	***DNRC***	***Complete***
036-02	***25***	***Cedar Creek water lease***	***Landowner/FWP***	***Complete***
039-02	26	East Gallatin River bank stabilization	FWP	Complete
040-02	***27***	***German Gulch channel restoration***	***TU/FWP***	***2007***
041-02	***28***	***Locke Creek fish passage***	***GYC***	***Complete***
042-02	29	Marias River habitat enhancement	Sportsmen group	Complete
043-02	***30***	***Marshall Creek woody debris recruitment***	***FWP***	***Complete***
045-02	31	Missouri River bank stabilization repair	FWP/Landowner	Ongoing
047-02	***32***	***Poorman Creek water salvage and diversion repair***	***TU***	***Complete (adds to 012-01)***
048-02	***33***	***Skalkaho Creek fish screens***	***FWP***	***Complete/ ongoing maintenance***
050-02	34	R-6 Ponds aeration	FWP	Complete
		2003 WINTER FUNDING CYCLE		
002-03	***1***	***Brackett Creek channel stabilization***	***Landowner/consultant***	***Complete***
003-03	2	Canyon Ferry perch spawning habitat	FWP	Complete
004-03	***3***	***Cottonwood Creek fish passage***	***FWP***	***Complete***
006-03	4	Dry Creek fish passage and irrigation improvement	FWP	Incomplete
007-03	5	Dupuyer Creek channel stabilization	Landowner/FWP	Complete
008-03	***6***	***Elkhorn tributaries non-native fish removal***	***FWP***	***Complete***
009-03	7	Hauser Reservoir perch spawning habitat	FWP	Complete
010-03	***8***	***Laird Creek channel stabilization***	***Landowner***	***Complete***
012-03	***9***	***Lost Creek channel restoration***	***FWP***	***Complete***
013-03	***10***	***Marshall Creek fish passage***	***FWP***	***Complete***
016-03	***11***	***Middle Fork Rock Creek riparian fencing***	***USFS***	***Complete***
017-03	12	Mill Creek channel restoration	Watershed group/NRCS	Complete
018-03	13	McKee Spring Creek channel restoration	Consultant/Landowner	2007
019-03	14	Nevada Spring Creek channel restoration	Consultant/Landowner	Complete
020-03	***15***	***Poorman Creek fish passage***	***Consultant/Landowner***	***Complete***
024-03	***16***	***Skalkaho Creek Hedge canal siphon***	***FWP***	***2008***
025-03	***17***	***Skalkaho Creek Republican canal siphon***	***FWP***	***2008***
026-03	***18***	***South Fork Bull River channel stabilization***	***Watershed group***	***Complete***
027-03	***19***	***South Fork Judith River fish passage barrier***	***FWP***	***2007 (supplemented by 016-06)***
028-03	***20***	***Thompson River riparian restoration***	***Plum Creek Timber***	***Complete***

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
029-03	***21***	***Upper Willow Creek channel restoration***	***FWP***	***Complete***
		2003 SPECIAL DROUGHT FUNDING CYCLE		
030-03	22	Jefferson River ditch sealing	Trout Unlimited	Complete
032-03	23	Sun River ditch sealing	FWP	Complete
		2003 SUMMER FUNDING CYCLE		
034-03	24	Boulder River fish screen	Trout Unlimited/FWP	Incomplete
036-03	25	Clark Fork River riparian fencing	Landowner	Complete
037-03	26	Deep Creek riparian fencing and off site water	FWP/Landowner	Complete
039-03	27	East Fork Yaak River / Solo Joe Creek fish passage and road stabilization	Watershed group	2007
042-03	28	Lost Creek channel restoration	FWP	Complete
043-03	***29***	***Marshall Creek riparian fencing***	***FWP/Landowner***	***Complete***
045-03	30	Mill Creek riparian fencing	Land trust	Complete
046-03	31	Ninemile Creek riparian fencing	Landowner	2007
047-03	***32***	***North Fork Fridley Creek fish passage and water salvage***	***Landowner***	***Complete***
048-03	***33***	***North Fork Horse Creek riparian fencing and off site water***	***Landowner***	***Complete***
051-03	34	Shields River channel stabilization	Conservation district	Complete
053-03	35	Tenmile Creek channel stabilization	County water quality distric	Complete
		2004 WINTER FUNDING CYCLE		
003-04	1	Canyon Ferry Reservoir perch spawning habitat	FWP	Complete
004-04	2	Chicken Creek riparian fencing and offsite water	Landowner/FWP	Complete
005-04	3	Clear Creek culvert fish passage	FWP	Complete (supplemented by 005-05)
006-04	4	Deep Creek bank stabilization repair	Cons. District	Complete
007-04	5	Deep Creek off channel livestock water	FWP	2007
008-04	6	Duck Creek culvert fish passage	FWP	Complete
009-04	***7***	***Emigrant Spring Creek channel restoration***	***FWP/Landowner***	***Complete***
010-04	8	Fishtrap Creek pool habitat enhancement	FWP	Complete
013-04	9	Little Prickly Pear Creek (Sentinel Rock) instream flow enhancement	FWP/Landowner	Complete
014-04	10	Little Prickly Pear Creek (Rocking Z) riparian fencing	FWP/Landowner	2007
020-04	***11***	***Mill Creek culvert fish passage supplement***	***FWP***	***Complete (adds to 09-01)***
021-04	12	Missouri River riparian plantings	FWP	Complete
022-04	***13***	***North Fork Horse Creek fish passage and flow enhancement***	***Landowner***	***Complete***
023-04	***14***	***Otie Reservoir riparian fencing and offsite water***	***FWP***	***Complete***
024-04	15	Pattee Creek channel re-naturalization	Montana Trout	Complete
026-04	16	Steel Creek riparian fencing	FWP	Complete
028-04	17	Tiber Reservoir perch spawning habitat	Local angler	Complete
029-04	18	Tiber Reservoir perch spawning habitat	Great Falls Walleye Unlimit	Complete
030-04	19	Tongue River T&Y diversion fish passage	FWP	2007

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
031-04	20	Uncle George Creek riparian fencing and offsite water	USFS	Complete
033-04	21	Willow Creek riparian restoration	Bitterroot Land Trust	Complete
034-04	22	Willow Springs Creek spawning habitat enhancement	Trout Unlimited	Complete
		2004 SPECIAL DROUGHT FUNDING CYCLE		
035-04	23	Boulder River stock water well	Trout Unlimited	Complete
		2004 SUMMER FUNDING CYCLE		
037-04	***24***	***Blackfoot River drainage fish screen maintenance***	***FWP***	***2009***
038-04	***25***	***Blackfoot/Clearwater rivers irrigation efficiency***	***FWP***	***Complete***
041-04	***26***	***Dry Creek diversion replacement for fish passage***	***FWP***	***Complete***
044-04	27	Missouri River riparian restoration and fencing	Trout Unlimited/FWP	2006
045-04	***28***	***North Fork Horse Creek irrigation efficiency and water salvage***	***Landowner***	***Complete***
046-04	***29***	***Therriault Creek channel restoration***	***Watershed group***	***Complete***
047-04	***30***	***Tyler Creek riparian fencing***	***Land trust***	***Complete***
048-04	***31***	***Soda Butte Creek brook trout removal***	***FWP***	***Complete***
		2005 WINTER FUNDING CYCLE		
001-05	1	Antelope Creek channel restoration	Consultant/Landowner	Complete
002-05	***2***	***Ashby Creek channel restoration***	***Land trust/Landowner***	***Complete***
003-05	***3***	***Bad Canyon Creek barrier repair***	***FWP***	***2007***
004-05	4	Big Hole River fish ladders	FWP	Complete
005-05	5	Clear Creek fish passage supplemental funding	FWP	Complete (Supplemented by 005-04)
006-05	6	Hamilton Slough spawning habitat enhancement	TU/Landowner	Complete
007-05	7	Jack Creek channel restoration	Consultant/Landowner	2007
008-05	8	LaMarche Creek pool enhancement	FWP	Complete
009-05	***9***	***LaValle Creek riparian fencing***	***Landowner***	***2007***
010-05	10	Little Blackfoot River bank stabilization	Landowner	Complete
012-05	11	Nelson/Dana spring creek channel restoration	Landowners	Complete
013-05	12	Parson's slough spawning habitat enhancement	TU	2007
014-05	***13***	***Pilgrim Creek channel restoration***	***Watershed group***	***2007***
016-05	14	Region 1 Lakes bass habitat structures	Bass club	Complete
017-05	15	Region 6 ponds aerator maintenance	FWP	2007
018-05	16	Telegraph Creek riparian and channel restoration	Landowner/Consultant	2007
019-05	17	Thompson River riparian enhancement	Plum Creek Timber	Complete
020-05	***18***	***Threemile Creek channel stabilization***	***Landowner/Consultant***	***Complete***
021-05	19	Tiber Reservoir perch spawning habitat	WU	Complete
022-05	20	Willow Creek channel restoration	Landowner	Complete
023-05	***21***	***Yellowstone tributaries fish screens***	***FWP***	***2007***
		2005 SPECIAL DROUGHT FUNDING CYCLE	**No applications submitted**	
		2005 SUMMER FUNDING CYCLE		
024-05	***22***	***Arrastra Creek culvert replacement***	***TU***	***Complete***

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
025-05	23	Chicken Creek corral removal	Landowner	Complete
026-05	24	Darnutzer Slough channel restoration	Landowner	Complete
028-05	***25***	***Grant Creek culvert replacement***	***City of Missoula***	***2007***
029-05	***26***	***Hound Creek Reservoir non-native removal***	***FWP***	***2007***
030-05	***27***	***Jacobsen Spring Creek channel restoration***	***TU***	***2007***
031-05	***28***	***Kleinschmidt Creek channel and riparian restoration***	***TU***	***2007***
032-05	29	Magpie Creek fish passage	FWP	Complete
033-05	***30***	***Piney Creek pool enhancement***	***FWP***	***Complete***
		2006 WINTER FUNDING CYCLE		
002-06	***1***	***Cottonwood Creek culvert replacement***	***TU***	***2007***
003-06	***2***	***Eustache Creek channel restoration***	***TU***	***2006***
005-06	3	Little Belt Creek riparian fencing	FWP/Landowner	2007
006-06	4	Little Prickly Pear Creek irrigation efficiency	Landowner	Complete
008-06	5	Lolo Creek bank stabilization	Landowner	2006
010-06	6	Missouri River riparian enhancement	FWP	Complete
011-06	***7***	***Murphy Spring Creek fish screen***	***TU***	***2007***
013-06	8	Rock Creek channel restoration	FWP	2007
014-06	***9***	***Sage Creek native fish barrier***	***FWP***	***2007***
015-06	***10***	***Salmon/Rock creeks riparian restoration***	***Land Trust***	***2007***
016-06	***11***	***South Fork Judith River fish passage barrier supplement***	***FWP***	***2007 (supplement to 027-03)***
017-06	12	Teton River bank stablilization	FWP	Complete
019-06	***13***	***Upper Willow Creek riparian fencing***	***Land Trust***	***2007***
020-06	***14***	***Yellowstone tributaries fish screens supplement***	***FWP***	***2007***
021-06	15	Beavertail and Frenchtown ponds woody debris	FWP	2007
022-06	16	Big Hole River - Jackson Reach - channel stabilization and riparian enhancement	FWP	2007
023-06	17	Big Hole River - Little Lake reach - channel stabilization and riparian enhancement	FWP	2007
024-06	18	Big Hole River - Wisdom Reach - channel stabilization and riparian enhancement	FWP	2007
025-06	19	Box Elder Creek channel restoration	Landowner/consultant	2007
026-06	***20***	***Butler Creek riparian fencing***	***Landowner***	***2007***
027-06	***21***	***Crooked Creek fish barrier***	***FWP***	***2008***
028-06	***22***	***Daisy Dean Creek bank stabilization and riparian enhancement***	***Landowner/FWP***	***2007***
029-06	***23***	***Elk Creek bank stabilization and riparian enhancement***	***Landowner/FWP***	***2007***
030-06	24	Fish Creek channel restoration	TU	2007
031-06	25	Fishtail Creek corral relocation	Stock association	2007
032-06	***26***	***Meadow Creek culvert to bridge conversion***	***USFS***	***2008***
033-06	***27***	***Midas Creek culvert replacement***	***Montana Trout***	***2007***
034-06	28	Ninemile Creek fish screen	Landowner/NRCS	2007
035-06	***29***	***North Fork Horse Creek bank stabilization and riparian enhancement***	***Landowner***	***2007***
036-06	***30***	***Poorman Creek culvert to bridge conversion***	***TU***	***2008***

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	EXPECTED YEAR OF COMPLETION
037-06	31	Ruby River/Lazyman Creek bank stabilization and riparian enhancement	Watershed group	2007
039-06	***32***	***Skalkaho Creek Hedge siphon supplement***	***FWP***	***2008***
040-06	***33***	***Skalkaho Creek Republican siphon supplement***	***FWP***	***2008***
041-06	34	Threemile Creek channel and riparian restoration	Watershed group	2007
042-06	***35***	***Trail Creek channel restoration***	***Consultant***	***2007***
043-06	***36***	***Trail Creek fish screen and passage***	***FWP***	***2008***
044-06	37	Tiber Reservoir xmas tree perch habitat	FWP	2007
045-06	38	Wheelbarrow Creek bank stabilization and riparian restoration	Watershed group	2007
046-06	39	Volney Creek corral relocation	Landowner/Stock Assoc.	2007

TABLE 3. Future Fisheries Improvement Program Expenditures and Balances by Project and Funding Source for the Report Period July 1, 2004 Through October 31, 2006. Projects Hilighted in Bold are Projects Eligible for RIT Funding Because They Restore Habitat for Bull Trout and/or Cutthroat Trout.

ProjID	Status	Project Name	1999 Gen Lic (02409 EI90)	1999 RR (02149 EI90)	2001 RIT (02022 EI115)	2003 RIT (02022 EI131)	02409/380I1	TOTAL EXPENDITURES FOR REPORT PERIOD	BALANCE OF COMMITTED FUNDS ($)
027-1998	Ongoing	Big Creek Flow Enhancement	$8,000					$8,000	$40,063
026-1999	Completed	Warren Creek Channel Restoration	$20,000					$20,000	
061-1999	Completed	S. Fk. Smith River Off-Site Water & Fence	$10,973					$10,973	
017-2000	Completed	Lost Creek Headgate Repair & Channel Restoration	$31,561					$31,561	
035-2000	Completed	Virginia Creek Channel Restoration	$2,875					$2,875	
042-2000	Completed	**Bitterroot River Fish Screen**				$284		$284	
009-2001	Completed	**Mill Creek Culvert Replacement**			$11,800			$11,800	
016-2001	Completed	Shields River Bank Stabilization	$1,699					$1,699	
032-2001	Completed	Antelope Creek riparian fence and off-site water	$20,320					$20,320	
035-2001	Completed	Big Otter Creek Corral Relocation	$4,220					$4,220	
003-2002	Pending	**Beaver Creek channel restoration**				$10,042		$10,042	$33,048
024-2002	Completed	Sappington Spring Creek spawning channel	$12,600					$12,600	
033-2002	Ongoing	**Bitterroot River Republican Ditch fish screen**						$0	$12,274
040-2002	Pending	**German Gulch channel restoration**						$0	$103,425
045-2002	Ongoing	Missouri River bank stabilization repair	($9,715)					($9,715)	$7,715
048-2002	Ongoing	**Skalkaho Creek fish screens**			$5,358	$1,187		$6,545	$47,491
013-2003	Completed	**Marshall Creek fish passage**			$20,838	$5,496		$26,334	
016-2003	Completed	**Middle Fork Rock Creek riparian fencing**			$4,572			$4,572	
018-2003	Pending	McKee Spring Creek channel restoration						$0	$25,000
024-2003	Ongoing	**Skalkaho Creek Hedge canal siphon**			$1,843			$1,843	$120,438
025-2003	Ongoing	**Skalkaho Creek Republican canal siphon**			$151	$1,692		$1,843	$104,399
027-2003	Ongoing	**South Fork Judith River fish passage barrier**			$1,734	$54,496		$56,230	
029-2003	Completed	**Upper Willow Creek channel restoration**			$10,412	$83,193		$93,605	
039-2003	Ongoing	East Fork Yaak River / Solo Joe Creek fish passage and road stabilization	$2,712					$2,712	$2,628
042-2003	Completed	Lost Creek channel restoration	$29,263					$29,263	
045-2003	Completed	Mill Creek riparian fencing	$962					$962	
046-2003	Pending	Ninemile Creek riparian fencing						$0	$805
047-2003	Completed	**North Fork Fridley Creek fish passage and water salvage**	$34,578		$1,500			$36,078	
048-2003	Completed	**North Fork Horse Creek riparian fencing and off site water**				$6,093		$6,093	
051-2003	Completed	Shields River channel stabilization	$10,552	$2,648				$13,200	
053-2003	Completed	Tenmile Creek channel stabilization	$9,867					$9,867	
004-2004	Completed	Chicken Creek riparian fencing and offsite water	$9,522					$9,522	
005-2004	Completed	Clear Creek culvert fish passage	$10,000					$10,000	
006-2004	Completed	Deep Creek bank stabilization repair	$7,579					$7,579	
007-2004	Pending	Deep Creek off channel livestock water						$0	$3,750

ProjID	Status	Project Name	1999 Gen Lic (02409 EI90)	1999 RR (02149 EI90)	2001 RIT (02022 EI115)	2003 RIT (02022 EI131)	02409/380I1	TOTAL EXPENDITURES FOR REPORT PERIOD	BALANCE OF COMMITTED FUNDS ($)
008-2004	Completed	Duck Creek culvert fish passage	$5,583					$5,583	
009-2004	Completed	**Emigrant Spring Creek channel restoration**			$20,866			$20,866	
014-2004	Ongoing	Little Prickly Pear Creek (Rocking Z) riparian fencing	$352					$352	$16,397
020-2004	Completed	**Mill Creek culvert fish passage supplement**			$15,185			$15,185	
022-2004	Completed	**North Fork Horse Creek fish passage and flow enhancement**				$9,000		$9,000	
023-2004	Completed	**Otie Reservoir riparian fencing and offsite water**			$2,695			$2,695	
024-2004	Completed	Pattee Creek channel re-naturalization	$4,872					$4,872	
026-2004	Completed	Steel Creek riparian fencing	$8,345					$8,345	
030-2004	Ongoing	Tongue River T&Y diversion fish passage	$78,965					$78,965	
033-2004	Completed	Willow Creek riparian restoration	$8,654	$1,215				$9,869	
034-2004	Completed	Willow Springs Creek spawning habitat enhancement	$35,242					$35,242	
035-2004	Completed	Boulder River stock water well		$32,053				$32,053	
037-2004	Ongoing	**Blackfoot River drainage fish screen maintenance**				$503		$503	$9,497
038-2004	Completed	**Blackfoot/Clearwater rivers irrigation efficiency**			$34,776			$34,776	
041-2004	Completed	**Dry Creek diversion replacement for fish passage**			$2,663	$0		$2,663	
044-2004	Ongoing	Missouri River riparian restoration and fencing	$1,825	$10,722				$12,547	$1,350
045-2004	Completed	**North Fork Horse Creek irrigation efficiency and water salvage**				$30,000		$30,000	
046-2004	Completed	**Therriault Creek channel restoration**			$10,000			$10,000	
047-2004	Completed	**Tyler Creek riparian fencing**			$780			$780	
048-2004	Completed	**Soda Butte Creek brook trout removal**			$1,352	$3,369		$4,721	
001-2005	Completed	Antelope Creek channel restoration	$72,938					$72,938	
002-2005	Completed	**Ashby Creek channel restoration**				$88,000		$88,000	
003-2005	Ongoing	**Bad Canyon Creek barrier repair**				$3,748		$3,748	$1,561
004-2005	Completed	Big Hole River fish ladders	$4,600					$4,600	
005-2005	Completed	Clear Creek fish passage supplemental funding	$5,752					$5,752	
006-2005	Completed	Hamilton Slough spawning habitat enhancement	$4,126					$4,126	
007-2005	Pending	Jack Creek channel restoration						$0	$20,000
008-2005	Completed	LaMarche Creek pool enhancement	$8,109					$8,109	
009-2005	Ongoing	**LaValle Creek riparian fencing**				$6,139		$6,139	$6,176
010-2005	Completed	Little Blackfoot River bank stabilization	$4,855					$4,855	
012-2005	Completed	Nelson/Dana spring creek channel restoration	$42,049					$42,049	
013-2005	Ongoing	Parson's slough spawning habitat enhancement	$1,213					$1,213	$46,691
014-2005	Ongoing	**Pilgrim Creek channel restoration**				$2,579		$2,579	$16,421
016-2005	Completed	Region 1 Lakes bass habitat structures	$2,390					$2,390	
017-2005	Ongoing	Region 6 ponds aerator maintenance	$1,294	$318				$1,612	$942
018-2005	Ongoing	Telegraph Creek riparian and channel restoration	$4,785					$4,785	$10,685
019-2005	Completed	Thompson River riparian enhancement	$3,771					$3,771	
020-2005	Completed	**Threemile Creek channel stabilization**	$1,512			$9,951		$11,463	
021-2005	Completed	Tiber Reservoir perch spawning habitat	$2,358					$2,358	
022-2005	Completed	Willow Creek channel restoration	$22,464					$22,464	

ProjID	Status	Project Name	1999 Gen Lic (02409 EI90)	1999 RR (02149 EI90)	2001 RIT (02022 EI115)	2003 RIT (02022 EI131)	02409/380I1	TOTAL EXPENDITURES FOR REPORT PERIOD	BALANCE OF COMMITTED FUNDS ($)
023-2005	Ongoing	**Yellowstone tributaries fish screens**				$357		$357	$38,080
024-2005	Completed	**Arrastra Creek culvert replacement**				$13,440		$13,440	
025-2005	Completed	Chicken Creek corral removal	$12,789					$12,789	
026-2005	Completed	Darnutzer Slough channel restoration	$67,779					$67,779	
028-2005	Pending	**Grant Creek culvert replacement**						$0	$100,000
029-2005	Ongoing	**Hound Creek Reservoir non-native removal**				$1,375		$1,375	$5,443
030-2005	Ongoing	**Jacobsen Spring Creek channel restoration**				$53,085		$53,085	$12,463
031-2005	Ongoing	**Kleinschmidt Creek channel and riparian restoration**				$5,000		$5,000	$7,976
032-2005	Completed	Magpie Creek fish passage	$6,568					$6,568	
033-2005	Completed	**Piney Creek pool enhancement**				$3,200		$3,200	
002-2006	Pending	**Cottonwood Creek culvert replacement**						$0	$15,000
003-2006	Pending	**Eustache Creek channel restoration**						$0	$10,000
005-2006	Pending	Little Belt Creek riparian fencing						$0	$10,963
006-2006	Completed	Little Prickly Pear Creek irrigation efficiency		$15,000				$15,000	
008-2006	Pending	Lolo Creek bank stabilization						$0	$3,165
010-2006	Completed	Missouri River riparian enhancement		$2,531				$2,531	
011-2006	Pending	**Murphy Spring Creek fish screen**						$0	$9,943
013-2006	Pending	Rock Creek channel restoration						$0	$90,000
014-2006	Pending	**Sage Creek native fish barrier**						$0	$8,000
015-2006	Pending	**Salmon/Rock creeks riparian restoration**						$0	$15,000
016-2006	Pending	**South Fork Judith River fish passage barrier supplement**						$0	$25,445
017-2006	Completed	Teton River bank stablilization		$10,148				$10,148	
019-2006	Pending	**Upper Willow Creek riparian fencing**						$0	$7,000
020-2006	Pending	**Yellowstone tributaries fish screens supplement**						$0	$12,500
021-2006	Pending	Beavertail and Frenchtown ponds woody debris						$0	$3,000
022-2006	Pending	Big Hole River - Jackson Reach - channel stabilization and riparian enhancement						$0	$16,688
023-2006	Pending	Big Hole River - Little Lake reach - channel stabilization and riparian enhancement						$0	$70,514
024-2006	Pending	Big Hole River - Wisdom Reach - channel stabilization and riparian enhancement						$0	$59,204
025-2006	Pending	Box Elder Creek channel restoration						$0	$23,865
026-2006	Pending	**Butler Creek riparian fencing**						$0	$3,694
027-2006	Pending	**Crooked Creek fish barrier**						$0	$85,000
028-2006	Pending	**Daisy Dean Creek bank stabilization and riparian enhancement**						$0	$17,549
029-2006	Pending	**Elk Creek bank stabilization and riparian enhancement**						$0	$27,100
030-2006	Pending	Fish Creek channel restoration						$0	$63,200
031-2006	Pending	Fishtail Creek corral relocation						$0	$2,000
032-2006	Pending	**Meadow Creek culvert to bridge conversion**						$0	$15,000

ProjID	Status	Project Name	1999 Gen Lic (02409 EI90)	1999 RR (02149 EI90)	2001 RIT (02022 EI115)	2003 RIT (02022 EI131)	02409/380I1	TOTAL EXPENDITURES FOR REPORT PERIOD	BALANCE OF COMMITTED FUNDS ($)
033-2006	Pending	**Midas Creek culvert replacement**						$0	$10,166
034-2006	Pending	Ninemile Creek fish screen						$0	$7,908
035-2006	Pending	**North Fork Horse Creek bank stabilization and riparian enhancement**						$0	$3,750
036-2006	Pending	**Poorman Creek culvert to bridge conversion**						$0	$35,000
037-2006	Pending	Ruby River/Lazyman Creek bank stabilization and riparian enhancement						$0	$87,840
039-2006	Pending	**Skalkaho Creek Hedge siphon supplement**						$0	$68,646
040-2006	Pending	**Skalkaho Creek Republican siphon supplement**						$0	$74,022
041-2006	Pending	Threemile Creek channel and riparian restoration						$0	$11,188
042-2006	Pending	**Trail Creek channel restoration**						$0	$73,963
043-2006	Pending	**Trail Creek fish screen and passage**						$0	$8,855
044-2006	Pending	Tiber Reservoir xmas tree perch habitat						$0	$1,950
045-2006	Pending	Wheelbarrow Creek bank stabilization and riparian restoration						$0	$30,922
046-2006	Pending	Volney Creek corral relocation						$0	$19,000
Bul/Cutt Yct Ops (in fy07 only)								$0	
FY07 only -73642							$5,317	$5,317	
FY07 only -73643								$0	
FY07 only -73644							$169	$169	
FY07 only -73645							$3,176	$3,176	
		.						$0	
TOTAL			$630,755	$74,633	$146,524	$392,230	$8,662	$1,252,804	$1,821,758
		adjustments per JV 06BGT90 &06BGT95 in SABHRS	$9,744		$15,662	($16,779)		($7,035)	
			$640,499	$74,633	$162,187	$375,451	$8,662	$1,261,432	

from appropriation reports

FY05	$189,556	$0	$162,186	$22,068		$373,810
FY06	$413,835	$17,500		$145,621		$576,956
FY07 (7/1/06 - 10/31/06)	$37,109	$57,133		$207,762		$302,004
Cat & dog 02409/380I1					$8,662	$8,662
adj						
total	$640,499	$74,633	$162,186	$375,451	$8,662	$1,261,432
diff	($0)	$0	$0	($0)	$0	($0)

Project Descriptions – 2005
(italicized projects receive RIT funding because they restore habitat for bull or cutthroat trout)

1. **Antelope Creek Restoration.** Antelope Creek (Madison/Jefferson Counties) enters the Jefferson River about 2 miles upstream from Sappington Bridge. The Jefferson supports populations of brown and rainbow trout and is judged by fishery biologists to be recruitment limited. This project, located on the KG Ranch, involved restoration of approximately 5,400 ft. of Antelope Creek and occurred immediately upstream from its confluence with the Jefferson River. The project included building approximately 1,000 ft of new meandering channel where the stream had previously been channelized; narrowing and deepening portions of the channel to improve sediment transport and create better habitat; redesign of channel geometry including construction of additional pools and installation of bed control structures to beneficially influence scour; water conservation resulting from replacement of an existing diversion structure with a more efficient center pivot system; and riparian fencing that resulted in a 70-acre riparian pasture. Grazing is now managed to protect the investment in restoration. **Completed.**

2. ***Ashby Creek Restoration.*** Ashby Creek (Missoula County) is a tributary to Camas Creek located in the Blackfoot Valley near Potomac. Ashby Creek, as it flows through the Hayes Ranch, was historically channelized and degraded. In its upper reaches, Ashby Creek supports a genetically pure population of westslope cutthroat trout. The property is in the process of being placed in a perpetual conservation easement and efforts are underway to restore two miles of stream as well as wetlands located on the property. Treatments include reconstructing the stream channel, revegetation of the riparian area, installation of a riparian fence, and construction of a step-pool fish ladder around an existing irrigation diversion. **Completed.**

3. ***Bad Canyon Creek Barrier Repair.*** Bad Canyon Creek (Stillwater County) supports an isolated population of Yellowstone cutthroat trout. The stream was recently treated with rotenone to remove brown trout from a stream reach located upstream of an existing barrier. However, the barrier is in danger of washing out. This project involves restoring the integrity of the barrier to prevent re-invasion of brown trout. **Ongoing.**

4. **Big Hole River Fish Ladders.** Big Hole River (Beaverhead County) supports the last remaining population of fluvial arctic grayling the lower 48 states. Irrigation diversions are common in the upper Big Hole and many are barriers to fish migration. This project involved installation of two Denil-style fish ladders to provide fish passage around existing irrigation diversions. **Completed.**

5. **Clear Creek Fish Passage.** Clear Creek (Carbon County), a tributary to Rock Creek, supports spawning runs of brown and rainbow trout but a perched road culvert limited access to the upper ten miles of the stream. The project involved building a series of step pools to bring the elevation of the stream up to that of the culvert. **Completed.**

6. **Hamilton Slough Spawning Habitat Enhancement.** Hamilton Slough (Madison County) enters the Beaverhead River just upstream from its confluence with the Jefferson River. The Jefferson, which supports both brown and rainbow trout, is partly limited by the scarcity of tributaries that support spawning. The slough is presently managed as a ditch that captures irrigation return flow. This project, located on the Hamilton Ranch, involved removal of a migration barrier, fencing and gates to facilitate grazing management, and various other improvements to enhance spawning. **Completed.**

7. **Jack Creek Channel Restoration.** Jack Creek (Madison County), which enters the Madison River near Ennis, supports a mixed salmonid fishery. The stream, as it flows through the Jack Creek Ranch, was historically channelized and grazing practices have further degraded the channel. This project involves returning approximately 2,200 ft of stream to its historic channel and reconnecting the stream to its historic floodplain. The project also includes riparian re-vegetation and riparian fencing to enhance grazing management. The ranch will be entering into a perpetual conservation easement. **Pending.**

8. **LaMarch Creek Pools.** LaMarche Creek (Deer Lodge County), a tributary to the upper Big Hole, supports a mixed salmonid fishery and is heavily used by fluvial arctic grayling. The lower 0.5 miles of stream were channelized and pool habitat was scarce. This project, located on the Guckenberg Ranch, involved reconstructing the lower 0.5 miles of stream to a natural meandering form and creation of additional pool habitat. The lower 2.5 miles of stream was fenced on both sides and 200 ft of eroding bank was treated. **Completed.**

9. ***LaValle Creek Riparian Fencing.*** LaValle Creek (Missoula County) supports a population of westslope cutthroat trout. This project, located on the Sky Range Ranch involves riparian fencing along 6,600 ft of stream (both sides). The streamside area will be managed as a riparian exclosure. **Ongoing.**

10. **Little Blackfoot River Bank Stabilization.** Little Blackfoot River (Powell County), a tributary to the Clark Fork River, supports a mixed salmonid fishery. A stream bank, located on the Bowe property, is actively eroding as a result of land management practices of a previous owner. This project stabilized approximately 325 ft of riverbank. Treatments included installation of three log spur veins, riparian fencing to manage grazing, and revegetation with willow sprigs and riparian shrubs. **Completed.**

11. **Nelson-Dana Spring Creek Restoration.** Nelson/Dana Spring Creek (Park County) enters the Yellowstone River south of Livingston. The spring complex supports brown, rainbow, and cutthroat trout and is used for spawning by Yellowstone River fish. This project involved consolidating the flows of three smaller springs (approximately 2.5 cfs), which were routed through ditches on the Nelson/Dana Ranches, and reconstructing approximately 4,100 ft of natural channel. The purpose of the project is to enhance spawning habitat. **Completed.**

12. **Parson's Slough Spawning Enhancements.** Lower Parson's Slough (Madison County) enters the Jefferson River near Waterloo. The Jefferson supports a mixed salmonid fishery and spawning is limited due to dewatering and a lack of suitable tributaries. This project involves construction of a 2,000 ft. spawning channel that will receive irrigation return flow from Parson's Slough during the spawning and incubation season for brown trout. **Ongoing.**

13. ***Pilgrim Creek Restoration.*** Pilgrim Creek (Sanders County) enters the Clark Fork River at Cabinet Gorge Reservoir. The stream supports bull and cutthroat trout as well as several non-native salmonids. The stream suffers from channel straightening, floodplain encroachment, clearing of riparian vegetation, and riparian logging. The drainage also has a history of catastrophic fires. This project involves reconstructing approximately 1600 ft of channel, rebuilding the floodplain, and revegetating stream banks. The project is taking place on the Reishus and McDowell properties. **Ongoing.**

14. **Bass Habitat Structures.** Echo, Loon, Horseshoe, and Middle Thompson Lakes (Flathead, Lake and Lincoln Counties) support largemouth bass populations that are limited by the availability of hiding and rearing cover for fry and juveniles. This project involved installation of artificial habitat structures to provide cover. **Completed.**

15. **Pond Aerator Maintenance.** Several ponds located in Blaine, Phillips, and Valley counties are aerated during winter months using windmill aerators. This project is helping pay for maintenance and winterizing costs associated with existing windmills. The windmills were originally purchased using Future Fisheries dollars. **Ongoing.**

16. **Telegraph Creek Restoration.** Telegraph Creek (Phillips County) enters Fourchette Creek just upstream of the UL Bend Wilderness and property surrounding the stream was recently purchased by the American Prairie Foundation. Prairie streams typically quit flowing during the summer but fish often survive in residual pools. The drainage supports a mixed assemblage of native prairie fishes. A number of factors, including land use and water management, are believed to have contributed to the degradation of the stream. Additionally, it is believed that the removal of beaver from the drainage has contributed to down-cutting of the channel and reduced residual pool storage. This project would attempt to restore residual pool volume and riparian vegetation by constructing artificial beaver dams. The goal is to return the system to condition that favors the native fish/ amphibian fauna. **Ongoing.**

17. **Thompson Creek Riparian Enhancement.** Thompson River (Sanders County) supports a mixed salmonid fishery, including bull and cutthroat trout. Unfortunately, reed canary grass has invaded much of the drainage and out-competes native shrubs such as dogwood, snowberry and willow. This has had a negative effect on the stream because reed canary grass provides less shade than native flora resulting in higher water temperatures. This project involved replacing reed canary grass with a native shrub assemblage along approximately 2000 ft of channel. **Completed.**

18. ***Three Mile Creek Channel Stabilization.*** Threemile Creek (Ravalli County) supports a mixed salmonid fishery that includes westslope cutthroat trout. This project, located on the Brown Valley Ranch, is intended to correct several problems related to land management practices. Treatments included reshaping several sections of over-widened channel (112 ft), enhancing riparian areas with shrubs and willows, installation of a rock grade control, and improved fish passage through a culvert. Riparian grazing will be excluded for 2 years followed by implementation of a riparian grazing management plan that will protect the investment in restoration. **Completed.**

19. **Tiber Reservoir Spawning Habitat.** Tiber Reservoir (Liberty County) supports an important cool water fishery that includes walleye and yellow perch. This project involved installation of anchored, Christmas tree reefs to provide spawning habitat for adults and cover for young fish. **Completed.**

20. **Willow Creek Channel Restoration.** Willow Creek (Madison County), located in the upper Ruby River drainage, is one of several streams in the state selected for reintroduction of fluvial arctic grayling. This project involved reconstructing a channelized section of stream and increasing stream length from 1,330 to 6,350 feet. The project improved spawning habitat for grayling. Riparian fencing was installed to enhance grazing management of riparian areas and water management practices were altered to enhance stream flow. **Completed.**

21. ***Yellowstone River Fish Screens.*** Yellowstone River (Park County) is one of the few remaining strongholds for Yellowstone cutthroat trout. Yellowstone cutthroat depend heavily on tributaries for spawning. This project involves installation of improvements to irrigation structures on four important spawning tributaries (South Fork Fridley, Big, Cedar and Mol Heron creeks). These improvements will reduce entrainment of early life stage and adult fishes, thereby increasing recruitment to the Yellowstone. **Ongoing.**

22. ***Arrastra Creek Culvert Replacement.*** Arrastra Creek (Lewis and Clark County) a tributary to the upper Blackfoot River, supports spawning runs of bull and genetically pure west-slope cutthroat trout. Other salmonids present include brown and brook trout. Twin culverts associated with a road crossing located approximately 3.3 miles upstream from the mouth have been identified as barriers to upstream fish movement. This project involves replacement of existing culverts with a full span bridge. **Completed.**

23. **Chicken Creek Corral Removal.** Chicken Creek (Park County**),** a tributary to the Shields River near Clyde Park, supports brown and brook trout and may support a remnant Yellowstone cutthroat population. Under previous ownership, livestock degraded a reach of Chicken Creek located on the Jordon Tubaugh Ranch. This project involved moving corrals and paddocks out of the riparian area, providing off-stream watering via a pipeline, fencing portions of the riparian area to facilitate livestock management, graveling of stream crossings, and narrowing and deepening the channel. **Completed.**

24. **Darnutzer Slough Channel Restoration.** Darnutzer Slough (Madison County) is a spring creek that enters the Beaverhead River between Twin Bridges and Dillon. The spring creek was degraded due to previous land management and grazing practices. This project involved riparian fencing to more carefully manage riparian grazing, installation of water gaps, reconstruction of the channel to narrow and deepen the stream, and addition of some woody debris to the channel to improve habitat complexity. Approximately 13,200 ft of stream was treated. The reach of the Beaverhead near Darnutzer Slough has limited brown trout recruitment for a variety of reasons. This project will provide a source of recruitment where recruitment is severely limited. **Completed.**

25. **Dempsey Creek Corral Removal.** Dempsey Creek (Powell County) supports a local fishery for brown trout. The Creek, as it flows through the Doug Tamcke Ranch, is degraded due to a concentrated livestock holding facility located immediately adjacent to the stream. This project would have involved installation of additional riparian fencing that would have isolated the facility from the stream, and replacement of water gaps with an off-site watering facility. Approximately 750 ft of stream would have been treated. **Cancelled.**

26. ***Grant Creek Culvert Replacement.*** Grant Creek (Missoula County) is largely an urban stream, flowing through the city limits of Missoula. The stream has been severely degraded due to channelization, construction of irrigation features and road crossings that are barriers to fish movement, and riparian land use and development. In spite of these problems, Grant Creek has been identified as a potentially important spawning stream for Clark Fork River fishes, including west-slope cutthroat trout, and the upper reaches support bull trout. Objectives of this project include improved fish passage and enhanced fish habitat. **Pending.**

27. ***Hound Creek Reservoir Non-native Removal*.** Hound Creek Reservoir (Cascade County) located on the Sieben Ranch, is fed by two tributaries – Tyrell and Pole creeks. This project involves removal of all non-native fishes from the drainage using a piscicide and re-stocking the drainage with pure-strain, west-slope cutthroat trout. This project will increase the range of west-slope cutthroat - presently a Montana species of special concern. Approximately 7 miles of stream are involved. **Ongoing.**

28. ***Jacobson Spring Creek Channel Restoration*.** Jacobson Spring Creek (Powell County), a tributary to the North Fork of the Blackfoot River, reportedly received historical use by bull and cutthroat trout. However, the stream is severely degraded due to past grazing practices and presently supports low densities of brown, brook, and rainbow trout. This project will restore about 2 miles of spring creek and includes narrowing and deepening the channel, placing sod mats along the banks, adding woody debris to increase channel complexity, and improving land management practices to protect the investment in restoration**. Ongoing.**

29. ***Kleinschmidt Creek Channel Restoration*.** Kleinschmidt Creek (Powell County) presently supports bull and fluvial west slope cutthroat trout, as well as brown, rainbow

and brook trout. The lower reaches of the stream have been restored and have responded well. This project will extend the restoration effort upstream for an additional 3,000 ft. Treatments include channel shaping to resemble the natural condition; riparian fencing and revegetation; off-site water development; removal of a concentrated livestock holding facility from streamside; and improved grazing management. This project is expected to improve recruitment to both the North Fork and mainstem Blackfoot River. **Ongoing.**

30. **Magpie Creek Fish Passage.** Magpie Creek (Lewis and Clark County) presently supports a spawning run of rainbow trout from Canyon Ferry Reservoir. A perched culvert, associated with a county road crossing and located a short distance upstream from the mouth, was a barrier to fish movement. This project involved installation of a series of rock drop structures below the culvert to bring the level of the stream up to the culvert and allow fish to move through the culvert. **Completed.**

31. ***Piney Creek Pool Enhancement.*** Piney Creek (Carbon County), which is fed by a spring located at the base of the Pryor Mountains, supports an isolated population of Yellowstone cutthroat trout. However, over-wintering habitat was a limiting factor because some pools freeze all the way to the bottom. This project involved excavating and deepening pools with hand tools to provide additional over-wintering habitat. **Completed.**

Project Descriptions – 2006
(Italicized projects receive RIT funding because they restore habitat for bull or cutthroat trout.)

1. ***Bean Creek Restoration.*** Bean Creek (Beaverhead County), a small stream located in the Centennial Valley, supports a population of pure strain, westslope cutthroat trout. This project, located on Scheid and Dennis ranches, improves a reach that was channelized and impacted by grazing. The project included, restoring stream length by activating old meanders, revegetating riparian areas, riparian fencing, and replacing old diversion structures that are presently a barrier to fish migration. About 900 feet of stream would have been treated. **Cancelled.**

2. ***Cottonwood Creek Culvert Replacement.*** Cottonwood Creek (Missoula County), a tributary to the Blackfoot River near Ovando, is within bull trout core area and supports a genetically pure population of westslope cutthroat trout. This project involves replacement of a perched culvert, that is a barrier to fish migration, with an open bottom arch. **Pending.**

3. ***Eustache Creek Channel Restoration.*** Eustache Creek (Missoula County), located west of Missoula on the Lolo National Forest, supports both westslope cutthroat trout and bull trout. **The stream was historically placer mined and the habitat is in poor condition.** This project involves channel and floodplain reconstruction, revegetation of riparian areas, placement of large woody debris in the channel, and removal of a culvert that is a barrier to fish migration. About 1.3 miles of stream will be treated. **Pending.**

4. **Little Belt Creek Riparian Fencing.** Little Belt Creek (Cascade County), as it flows through the Gerhart Ranch, supports a mixed population of salmonids. A high-intensity thunderstorm and poor riparian vegetation caused the channel to down-cut. This project involves riparian fencing, planting of riparian shrubs, and off-stream water development. Approximately 1.1 miles of stream will be treated. **Pending.**

5. **Little Prickly Pear Creek Irrigation Efficiency.** Little Prickly Pear Creek (Lewis and Clark County), which enters the Missouri River near Wolf Creek, supports spawning runs of rainbow and brown trout from the river. Flood irrigation, on the Zach Worth property, removed approximately 3-6 cfs from the stream. This project involved replacing the flood system with a pump and sprinkler that utilizes less water. Salvaged water is now left in-stream and entrainment of fish into the irrigation ditch has been eliminated. **Completed.**

6. **Lolo Creek Bank Stabilization.** Lolo Creek (Missoula County), as it flows through the Zens-Kimerly property, suffers from eroding banks and lack of pools. This project involves installation of root wads, j-hook vanes and sod mats to increase bank stability and to facilitate pool development. About 450 ft of stream will be treated. **Pending.**

7. **Missouri River Riparian Enhancement.** Missouri River (Cascade County) in the Riverside Park area of Great Falls is heavily riprapped. This project involves filling voids in the riprap with soil and planting shrubs, trees, and native grasses along 820 ft. of river. The project will increase riparian cover for trout and other species that inhabit this reach of the Missouri. **Completed.**

8. ***Murphy Spring Creek Fish Screen.*** (Powell County) is a tributary to the North Fork of the Blackfoot River near Ovando. Murphy Spring Creek is important for both bull and cutthroat trout. An irrigation diversion located on the stream presently entrains juvenile trout. This project involves installation of a fish screen that will eliminate the entrainment problem. **Pending.**

9. **Rock Creek Channel Restoration.** Rock Creek (Beaverhead County) is a tributary to the Big Hole River near Wisdom that was historically used by grayling. Unfortunately, the stream is intercepted by an irrigation ditch and no longer reaches the Big Hole. Riparian habitat has also been degraded by past grazing management practices. This project involves reconnecting Rock Creek to the Big Hole and restoring approximately 1.5 miles of stream. Overall, 2.3 miles of stream will be treated. **Pending.**

10. ***Sage Creek Fish Barrier.*** Sage Creek (Carbon County) has been identified as a potential restoration site for Yellowstone cutthroat trout. The stream presently supports a non-native fish assemblage. This project involves removal of non-native fishes and replacement with Yellowstone cutthroat. Screened outlet structures will also be installed on a series of private ponds to prevent brook trout from entering the ponds. This will benefit future native fish management in the drainage. **Pending.**

11. ***Salmon, Dry and Rock Creeks Riparian Restoration.*** Salmon, Dry, and Rock Creeks (Powell County) previously received restoration attention but efforts to re-establish riparian vegetation were unsuccessful due to browsing by wildlife. This project involves planting riparian shrubs and plants along 14,500 ft of bank and using browse protectors to prevent wildlife damage. **Pending.**

12. ***South Fork Judith River Barrier.*** South Fork Judith River (Judith Basin) supports a nearly pure population of west-slope cutthroat trout. A Future Fisheries Project was funded in 2003 to construct a barrier to prevent further hybridization of this population. However, cost estimates for this earlier project were based on preliminary engineering plans. Final cost estimates are about 85% greater than previous estimates. This application supplements a previously funded project. **Pending.**

13. **Teton River Restoration.** Teton River (Teton County), near Choteau, supports an important local fishery for rainbow and brown trout. This project involves restoring eroding stream banks on a section of school trust land that has been over grazed. Treatments include back-sloping, planting willow clumps and sprigs, seeding with native grasses, and installation of electrical fencing and erosion control fabric. Grazing will be managed to protect the investment in restoration. Approximately 900 ft of stream will be treated. **Completed.**

14. ***Upper Willow Creek Riparian Fencing.*** Upper Willow Creek (Granite County) supports a mixed salmonid fishery that includes bull and cutthroat trout. The stream, as it flows through the McGeorge property, has been impacted by grazing. This project involves construction of about 10,000 ft of riparian fencing. **Pending.**

15. ***Yellowstone River Tributary Screening.*** Several Yellowstone River (Park County) tributaries located in Paradise Valley have irrigation diversions that are entraining Yellowstone cutthroat trout. A project to install screens on several diversions was previously funded but the original grant request was based on preliminary engineering estimates of cost. Since that time, the project has been modified based on more recent information. This project supplements the earlier project. **Pending.**

16. **Beavertail Pond and Frenchtown Pond Woody Habitat.** Beavertail Pond and Frenchtown Pond (Missoula County) support natural reproducing populations of yellow perch and pumpkinseed sunfish. Largemouth bass are also transported to the ponds from the Lee Metcalf Wildlife Refuge on an annual basis. Both ponds are located within state parks and are extremely popular with local anglers. Unfortunately, habitat and cover are limited in both ponds. This project involves the addition of woody structures to increase habitat complexity and provide cover. **Pending.**

17. **Big Hole River Habitat Restoration.** Big Hole River (Beaverhead County) supports the last remaining population of fluvial arctic grayling in the lower 48 states. Past management practices on the Jackson Ranch have degraded riparian areas. This project will improve riparian vegetation by planting native grasses, sedges, and willows and protect the riparian area with riparian fencing. A hardened cattle crossing will also be constructed and several pools will be deepened by mechanical means. Approximately 0.2 miles of stream will be treated. **Pending.**

18. **Big Hole River Riparian Enhancements.** (Beaverhead County) near the town of Jackson supports an important fluvial population of arctic grayling. However, a one-mile reach in this section of river suffers from unstable banks, poor riparian vegetation, and limited pool habitat. This project involves planting of streamside willows, riparian fencing, improved grazing management, and bank stabilization using back-sloping, willow clumps, and sod mats. Approximately one mile of stream will be treated. **Pending.**

19. **Big Hole River Pool Creation.** Reaches of the Big Hole River (Beaverhead County) both upstream and downstream of the Wisdom Bridge suffer from poor riparian vegetation, unstable banks, high width-to-depth ratios, and limited pool habitat. This project is similar to the project described above and involves treatment of 1.76 miles of stream. **Pending.**

20. **Box Elder Creek Restoration.** (Phillips County) supports a population of fathead minnows. Telegraph Creek, a downstream tributary, supports a more diverse prairie fish assemblage. Under previous ownership, the stream was diked and the floodplain

converted to alfalfa. This project will remove the dike, restore the channel to a natural pattern and dimensions using an upstream reference reach, re-establish native prairie grasses and streamside woody vegetation, and transplant willow clumps from adjoining areas. Approximately 2,625 ft of stream will be treated. **Pending.**

21. ***Butler Creek Riparian Enhancement.*** Butler Creek (Missoula County) supports a native fish assemblage that includes westslope cutthroat trout. However, past grazing practices on the Griggs property have degraded riparian areas. This project involves fencing approximately 600 ft of stream and managing the riparian area as a grazing exclosure, construction of a cattle crossing, and development of off-stream water. **Pending.**

22. ***Crooked Creek Barrier.*** Crooked Creek (Carbon County) supports one of the eastern most populations of Yellowstone cutthroat trout. A natural barrier that protected the genetic integrity of the population recently washed out during a 100-year rainstorm. This project involves reconstruction of a barrier near a natural bedrock constriction to protect this unique population. **Pending.**

23. ***Daisy Dean Creek Restoration.*** Daisy Dean Creek (Park County), a tributary to the upper Shields River, supports a coldwater fish assemblage that includes Yellowstone cutthroat trout. Channel changes in the lower reaches of the creek have caused incision of the channel and degraded habitat. An old irrigation diversion has prevented the headcut from moving upstream. This project includes sloping and revegetating eroding banks, construction of a riparian fence to better manage grazing, installation of rock grade controls below the headgate to enable fish passage, and development of off-stream watering facilities and winter shelter. Approximately 245 feet of channel will be treated. **Pending.**

24. ***Elk Creek Restoration.*** Elk Creek (Park County), a Shields River tributary, supports a coldwater fishery that includes Yellowstone cutthroat trout. The problem on Elk Creek is similar to that described on Daisy Dean Creek above. This project includes riparian fencing, back-sloping and revegetation of eroding banks, stabilizing an irrigation diversion, and development of off-stream water. Approximately, 1,060 ft of stream bank will be treated. **Pending.**

25. **Fish Creek Restoration**. (Jefferson County) has potential as a rainbow and brown trout spawning tributary for Jefferson River fish. However, irrigation and grazing practices have degraded the channel and eliminated much of the spawning potential. This project involves restoring Fish Creek by removing accumulations of fine sediment, narrowing the channel to increase sediment transport capacity, construction of wildlife friendly riparian fencing, and replacement of two irrigation structures with a single pin and plank structure. Approximately, 7,650 ft. of stream will be treated. **Pending.**

26. **Fishtail Creek Corral Relocation.** Fishtail Creek (Stillwater County) supports coldwater fishes included brown trout. Confined animal operations in close proximity to the creek have degraded the stream and acted as a source of excessive nutrients. This

project involves moving the corral facility away from the creek and providing a source of off-stream water. **Pending.**

27. ***Meadow Creek Bridge.*** (Ravalli County,) located on the Bitterroot National Forest, supports an important population of westslope cutthroat trout. However, an undersized culvert located on a forest road is presently a barrier to fish movement. This project will replace this undersized culvert with a bridge and allow westslope cutthroat to gain access to an additional ten miles of spawning habitat. **Pending.**

28. ***Midas Creek Culvert Replacement.*** Midas Creek (Lincoln County), a tributary to Libby Creek, supports westslope cutthroat trout as well as redband trout. Libby Creek also supports bull trout. A perched culvert located near the mouth of Midas Creek is a barrier to upstream fish movement. This project involves replacing the undersized culvert with a larger culvert that will restore fish passage. **Pending.**

29. **Ninemile Creek Ditch Screening.** Ninemile Creek (Missoula County), an important tributary to the lower Clark Fork River, supports a mixed salmonid fishery. An irrigation diversion located on the Janis Dersham property presently entrains fish from the creek. This project involves installation of a fish screen that will prevent loss of fishes into the diversion. The ditch will also be lined and a flow-measuring device installed to more closely monitor the diversion quantity. **Pending.**

30. ***North Fork Horse Creek Riparian Treatments.*** North Fork Horse Creek (Park County), a tributary to the middle Shields, supports a genetically pure strain of Yellowstone cutthroat trout. Previous, uncontrolled grazing on the Sinnard property has resulted in loss of most of the streamside woody vegetation causing erosion and channel incision. This project involves back-sloping, revegetation of eroding banks, rest from grazing for a period of 5 years, and managed grazing thereafter. Approximately 800 ft of bank will be treated. **Pending.**

31. ***Poorman Creek Bridge.*** Poorman Creek (Lewis and Clark County) supports a mixed salmonid fishery that includes bull trout as well as genetically pure westslope cutthroat trout. A pair of culverts located approximately 3 miles upstream from the mouth, are barriers to fish migration. This project involves replacement of the existing culverts with a bridge. **Pending.**

32. **Ruby River Habitat Enhancement.** Ruby River (Madison County), in the vicinity of a tributary known as Lazyman Creek, is a proposed site for a fluvial arctic grayling re-introduction effort. The hope is that Big Hole River grayling introduced into the Ruby will develop a self-sustaining population. This project involves development of spawning habitat in Lazyman Creek as well as improving pool habitat and riparian conditions in the Ruby. Treatments on the Ruby include back-sloping and revegetation of eroding banks, and creation of pools. Treatments on Lazyman include riparian fencing and creation of small pools and side channels to act as spawning sites. The adjacent landowner has also agreed to change his point of irrigation diversion on Lazyman in order to provide more favorable late season flows for grayling. **Pending.**

33. ***Skalkaho Creek – Hedge Canal Siphon.*** Skalkaho Creek (Ravalli County) is an important spawning stream for westslope cutthroat trout. Irrigation diversions act as migration barriers or entrain juvenile and adult fish attempting to migrate. Several projects have been completed over the last few years to remove or modify these impediments. One of these, a large siphon on the Hedge Canal, previously received Future Fisheries funding. Unfortunately, inflation has rendered the budget insufficient. Additionally, the ditch company will be required to conduct routine maintenance on the siphon. This project supplements the previously funded project. **Pending.**

34. ***Skalkaho Creek – Republican Canal Siphon.*** (Ravalli County), as described above, is an important spawning stream for Bitterroot River cutthroat trout. Similar to the previous project, funding to install a siphon on the Republican Canal received previous funding from Future Fisheries. However, inflation has increased the cost of the project. Additionally, the ditch company will be required to perform routine maintenance on the project, which adds additional costs. This project supplements the previously funded project. **Pending.**

35. **Threemile Creek Restoration.** Threemile Creek (Ravalli County) supports a coldwater fishery that includes westslope cutthroat trout. Past grazing practices have reduced woody riparian vegetation and caused the stream to degrade. This project involves riparian fencing, construction of a hardened water crossing and a grade control upstream of the crossing, installation of a soil lift to stabilize an outside eroding stream bank, and re-vegetation of riparian areas with native stock. Approximately 1,369 ft of stream will be treated. **Pending.**

36. ***Trail Creek Restoration.*** Trail Creek (Gallatin County) supports a population of Yellowstone cutthroat trout. Failure of an on-stream reservoir in 1996, combined with a catastrophic fire in the watershed in 2001, have severely damaged the stream. This project will establish a new stream channel at an elevation that will re-establish access to the flood plain. The primary benefit of the project is conservation of Yellowstone cutthroat trout. **Pending.**

37. ***Trail Creek Screen.*** Trail Creek (Missoula County) supports a mixed coldwater fish assemblage, including bull trout and westslope cutthroat. An irrigation diversion located approximately 1.5 miles upstream from the mouth is a barrier to fish migration. The diversion also entrains fish moving downstream. This project includes replacement of the existing structure with a more fish friendly structure and installation of a screen on the irrigation diversion to prevent entrainment. **Pending.**

38. **Tiber Reservoir Habitat Improvements.** Tiber Reservoir (Liberty County) supports an important warmwater fishery that includes yellow perch. However, spawning and rearing habitat for yellow perch is limiting population size. This project involves installation of Christmas tree reefs in the Willow Creek arm of the reservoir. **Pending.**

39. **Wheelbarrow Creek Restoration.** Wheelbarrow Creek (Ravalli County) supports a mixed coldwater fish assemblage that includes westslope cutthroat trout. Grazing, logging, and railroad construction have all contributed to degradation of the stream. This project will stabilize eroding banks, relocate the stream channel away from unstable areas, restore riparian vegetation, and create additional pool habitat. Treatments include riparian fencing, hardening an existing water gap, channel reconstruction – including soil lifts and coir logs, installation of log grade controls, and planting of riparian shrubs. Approximately 1800 ft of stream will be treated. **Pending.**

40. **Volney Creek Corral Relocation.** Volney Creek, a tributary to Red Lodge Creek (Carbon County) support a mixed coldwater fishery that includes brown and rainbow trout. The drainage suffers from excessive nutrient loading. This project involves relocation of a streamside corral and development of off-stream water. The primary benefit of the project will be improved water quality. **Pending.**

Photo Illustration 1. Upper two photos display a fish passage improvement project on Duck Creek, a tributary to Hebgen Lake. The goal of this project was to improve upstream fish passage, primarily for spawning rainbow trout from Hebgen Lake, through a culvert located on U.S. Highway 191. Photo on left shows perched culvert before project completion. Photo on right shows completion of constructed riffle downstream of culvert. Lower two photos display a fish passage improvement project on Magpie Creek, a tributary to Canyon Ferry Reservoir. The goal of the project was to improve upstream fish passage, primarily for spawning rainbow trout from Canyon Ferry Reservoir, through a culvert located on a U.S. Bureau of Reclamation road. Photo on left shows perched culvert before project completion. Photo on right shows completion of constructed riffle downstream of culvert.

Photo Illustration 2. Fish passage improvement on Clear Creek, a tributary to Rock Creek in Carbon County. The goal of this project was to improve upstream fish passage, primarily for rainbow trout and brown trout, through a box culvert located at a county road near the mouth of the stream. Upper photo shows perched box culvert prior to the project. Lower photo shows the completion of a series of rock stair-step pools downstream from the culvert.

Photo Illustration 3. Restoration of Sappington Spring Creek, a tributary to the Jefferson River in Gallatin County. The project improved aquatic habitat, lengthened the stream channel and restored migratory connectivity to the Jefferson River for primarily rainbow trout and brown trout. The goal of the project was to enhance recruitment of juvenile trout to the Jefferson River. Top photo shows original spring outlet to the Jefferson River. Lower photo shows restored channel connectivity to the Jefferson River.

Photo Illustration 4. Restoration of Upper Willow Creek, a tributary to Rock Creek in Granite County. The goal of the project was to restore aquatic habitat and channel function on a 2-mile reach of the stream to benefit westslope cutthroat trout, rainbow trout, brown trout and bull trout. Top photo shows unstable stream channel prior to restoration. Lower left photo shows restored channel two months following channel construction. Lower right photo shows restored channel one year and three months following channel construction.

Photo Illustration 5. Channel restoration on Willow Springs Creek, a tributary to the Jefferson River near Waterloo in Madison County. The goal of this project was to enhance recruitment of juvenile trout, especially rainbow trout, to the Jefferson River. The upper photo shows the over-widened and shallow channel before restoration. The lower photo shows the restored channel providing excellent spawning and rearing habitat for rainbow trout and brown trout

Photo Illustration 6. Top pair of photos shows a channel restoration project on Nelson-Dana Spring Creek, a tributary to the Yellowstone River near Livingston in Park County. The goal of this project was to create spawning and rearing habitat for trout, especially Yellowstone cutthroat trout, and enhance recruitment to the Yellowstone River. Top left photo shows over-widened channel with poor streamside vegetation. Top right photo shows newly restored channel with riparian corridor fencing. Lower pair of photos shows a channel restoration project on Darnutzer Slough, a tributary to the Beaverhead River located south of Twin Bridges in Madison County. The goal of this project was to enhance spawning and rearing habitat for trout and enhance recruitment to the Beaverhead River. Lower left photo shows slough before restoration and lower right photo shows newly restored channel.

Photo Illustration 7. Upper two photos show a bank stabilization project on the Teton River located near Choteau. The goal of this project was to stabilize an actively eroding stream bank through sloping and re-vegetation and to protect the riparian corridor from livestock over-grazing with fencing. The upper left photo show a portion of the eroding stream bank prior to stabilization. The upper right photo shows the stream bank immediately following treatment. Lower two photos show a bank stabilization project on Tenmile Creek located near Helena. The goal of this project was to stabilize actively eroding stream banks though sloping, rootwads and re-vegetation and to protect the riparian corridor from livestock overgrazing. The lower left photo shows a reach of eroding stream bank prior to treatment. The lower right photo shows the same stream bank after treatment.

Photo Illustration 8. Restoration of Emigrant Spring Creek, a tributary to the Yellowstone River located near the community of Emigrant. The goal of this project was to improve spawning and rearing habitat for trout, primarily Yellowstone cutthroat trout, and enhance recruitment to the Yellowstone River. Upper photo shows the over-widened, stagnant and sediment-laden stream channel prior to restoration. Lower photo shows the restored channel providing high quality habitat for trout.

Photo Illustration 9. Restoration of Jacobsen Spring Creek, a tributary to the North Fork Blackfoot River located near Ovando. The goal of the project was to restore aquatic habitat on an over-widened and shallow spring creek and enhance recruitment of trout, especially westslope cutthroat trout and bull trout, to the North Fork Blackfoot River. The upper photo shows the spring creek before restoration. The lower photo shows the spring creek after restoration providing excellent habitat for trout.

Appendix

Future Fisheries Improvement Program
Fisheries Monitoring Report – 2006

by

George Liknes
Montana Fish, Wildlife and Parks
4600 Giant Springs Road
Great Falls, Montana 59405-0901

November 2006

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Introduction

This report summarizes the results of monitoring conducted from 2004 to 2006 to evaluate the effectiveness of selected habitat restoration projects funded through the Future Fisheries Improvement Program (FFI). Monitoring was conducted to help answer the question; "Did the funded project improve target fish populations?" Monitoring is essential to understand what types of projects provide benefits to fish populations and which do not. However, the data in this report also needs to be viewed in relation to a broader context; in the recent past, stream flows and surface water have been below average for an extended period of time. In a time of prolonged low flows, we would expect substantial declines in fish communities, but sampling on some FFI projects documented fish abundance indices remained stable or increased despite extremely low base flows. These data suggest that for some streams extremely low flows can be partially mitigated by improved habitat or that efforts to mitigate low flow impacts by increasing flows through FFI efforts may be at least partially successful. However, since we do not know if we are recovering from drought conditions, we must continue monitoring efforts now and after near normal flows for several years in order to fully assess the benefits of some projects.

This report presents data collected for numerous projects on 35 different streams from east of Lewistown to the southwestern corner of the state in the Bitterroot. These data, as well as conclusions, are considered preliminary because it often takes five years or more for fish populations to fully respond to habitat improvement treatments (Hunt 1976) and some of these data have not yet been fully analyzed. This report is organized first by the river basin where each project is located and then by the project name.

Boulder River Drainage

Muskrat Creek Fish Barrier and Removal of Non-Natives

WATER NAME: Muskrat Creek (Boulder River)
DATA PROVIDED BY: Lee Nelson, FWP
DETAILED REPORT CITATION: Nelson (2006)
FFI NUMBER: FFI-055-1997, FFI-023-2001, FFI-008-2003

Project goals and attainment of goals: Protect a westslope cutthroat trout population by installing a migration barrier and removing non-native fish by electrofishing. No brook trout have been captured above the barrier since October 2003. The westslope cutthroat trout population is now secure.

Muskrat Creek is a tributary to the Boulder River near Boulder, MT. In 1997, a westslope cutthroat trout restoration effort was initiated in the drainage and included construction of a fish barrier, relocation of westslope cutthroat trout to an upstream fishless reach, and removal of nonnative brook trout from a 1.3-mile project reach. It is estimated that fewer than 100 westslope cutthroat trout occupied the project reach at the initiation of the conservation efforts. The restoration program has used multiple pass electrofishing to remove brook trout since 1997. Between 1997 and 2000 the program included single week-long removal efforts during late summer, and between 2001 and 2003 efforts were expanded to include two or more removal periods each year between mid summer and late autumn. As brook trout densities declined in 2004 and 2005, removal effort was reduced to a single-pass over the entire project reach, or several multiple-pass estimate sections within the project reach. In addition to the brook trout removal efforts, between 1997 and 2001 westslope cutthroat trout were transferred from the project reach to an upstream previously fishless reach (isolated by a waterfall). This transfer served to reduce westslope cutthroat trout exposure to electrofishing and to increase the overall distribution of the population by about four stream miles.

No brook trout were captured in the four estimate sections surveyed in Muskrat Creek in 2006. These sections were spaced throughout the project reach and totaled about 1700 ft (≈ 25% of the project reach). The capture of no brook trout was expected, and confirmed survey results since October 2003 that brook trout have been eradicated from the project reach (Figure 1).

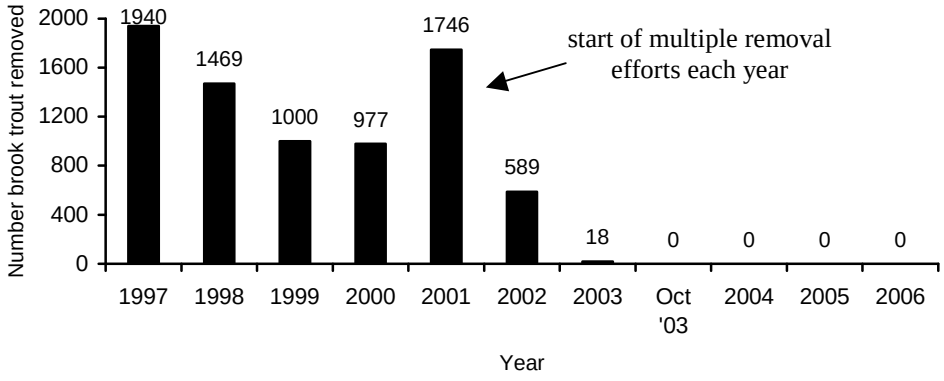

Figure 1. Number of brook trout removed by year in the Muskrat Creek project reach, 1997–2006.

As described above, from 1997-2000, the Muskrat Creek brook trout removal program included one August removal effort each year. This level of effort was not adequate to reduce the brook trout population by more than 50% from initial densities (Figure 1). Thus, starting in 2001, the annual removal effort was increased to include several periods between July and October. The summer efforts removed adults prior to spawning, while the autumn efforts were effective at capturing younger fish as they reached maximum size and as capture efficiency increased because water temperatures declined. The eradication of brook trout from the project reach can be attributed to the multiple efforts in 2001, which effectively removed adults prior to spawning that autumn, then a high efficiency of removing remaining fish in 2002 when no YOY were present. Together, the 2001 and 2002 efforts removed more than 99% of brook trout from the project reach, and the 2003 effort served to remove the remaining 18 fish.

At the initiation of restoration efforts in Muskrat Creek fewer than 100 westslope cutthroat trout (age-1 and older) were estimated to remain in the 1.3-mile project reach. In 2006, the westslope cutthroat trout population was estimated to be between 1000 to 1200 age-1 and older fish in the project reach. This 10 fold increase in population size is considerable taking into account that most westslope cutthroat trout captured in the initial years of the conservation effort were transferred to the upper previously fishless reach of the stream (n= 224, 1997 – 2001). The transferred fish also reproduced exceptional well; it is now estimated that about 2,000 age-1 and older westslope cutthroat trout occupy about 4 miles of stream. With no brook trout competition and high quality habitat, we anticipate that westslope cutthroat trout abundance in both reaches of the stream will continue to increase for several years.

Overall, westslope cutthroat trout now occupy about 5 stream miles in Muskrat Creek, and the population includes about 3,000 fish. These figures indicate this is one of the strongest and most secure populations in the Elkhorn Mountains and the entire Missouri River drainage. The population has become an important source of live fish and gametes for introduction efforts elsewhere in the Elkhorn Mountains, and in 2007 will be used to help establish westslope cutthroat trout in Cherry Creek near Ennis.

Box Elder Creek Drainage

Collar Gulch Pool Enhancement

WATER NAME: Collar Gulch – Big Hole River
DATA PROVIDED BY: Anne Tews, FWP
DETAILED REPORT CITATION: Moser et. al (2005)
FFI NUMBER: application to be submitted in December

Project goals and attainment of goals: Protect a westslope cutthroat trout population that is at risk by relocating the channel to avoid a wooden crib dam and stabilizing a headcut by installing drop structures. The goal is to relocate the channel and install drop structures in 2007.

Collar Gulch contains pure westslope cutthroat trout over about a 2-mile reach of habitat, but the majority of fish are in 1 mile of stream. Sixteen westslope cutthroat trout tested in 1981 and 27

tested in 2001 were genetically pure. There are no known records of stocking (Shepard et al. 1996) but locals have reported that westslope cutthroat trout were stocked in the mid-20th century in Collar Gulch. A population estimate completed on 9 September 2004 found about 54 westslope cutthroat trout greater than 4 inches per 1,000 feet, but there were 181 westslope cutthroat trout exceeding 3 inches per 1,000 feet. Shepard et al. (1996) did an extensive study on Collar Gulch from 1993–1995 and found a large variability in size structure between years, but the number of fish exceeding 3 inches appears to be larger in 2004 than in the mid 1990's. However, there appears to have been higher numbers of larger fish in the mid 1990's. The remnants of previous mining activities in Collar Gulch put this westslope cutthroat trout population at risk. A wood crib dam that contains heavy metals at the upper reach of the best population levels is at risk of failing. Failure of the dam would cause headcutting and bedload transport of sediment that could devastate the westslope cutthroat trout population downstream.

The proposed project on Collar Gulch will relocate the channel around and away from the crib dam and install drop structures to eliminate the potential of headcutting. The project will also reduce fragmentation of habitat that is upstream and downstream of the crib dam. This is a BLM area of critical environmental concern and the easternmost known westslope cutthroat trout population.

Blackfoot River Drainage

Cooperative private and public fisheries restoration efforts, of which FFI program has been one component, have been implemented within Blackfoot River drainage throughout the 1990's and into the 2000's. Cooperators include FWP, US Fish and Wildlife Service, US Bureau of Land Management, US Natural Resource Conservation Service, Montana Department of Transportation, Montana Department of Natural Resources and Conservation, North Powell Conservation District, Big Blackfoot Chapter of Trout Unlimited, private landowners, Chutney Foundation, National Fish and Wildlife Foundation, Northwestern Energy, and Plum Creek Timber Company. Fish evaluations for specific FFI projects often could not be separated from other cooperative projects conducted during the same time and in the same drainages as FFI projects. Consequently, the following evaluations should be viewed as assessments for the total effort, rather than just FFI projects.

Ashby Creek

WATER NAME: Ashby Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-002-2005

Project goals and attainment of goals: Protect the genetic purity of a Westslope cutthroat trout population in the upper Ashby Creek watershed by using an existing wetland as a migration barrier, and improve westslope cutthroat trout habitat by creating a natural channel that provides complexity, increases riffle-pool habitat features and available spawning substrate and increases shade and small diameter wood recruitment to the channel. Improve and re-establish wetland

functionality. On the ground work designed to achieve these restoration goals was planned for 2006.

Ashby Creek, a 2nd order tributary in the Union Creek basin enters Camas Creek at stream mile 0.5. Upper reaches originate in forested areas including Plum Creek and BLM properties before entering private ranch lands near mile 3.0. Below stream mile 3.0, Ashby Creek has been severely altered by agricultural practices. Alterations involve the loss of the historical channel to farming and irrigation, livestock degradation of streambanks, loss of woody plant communities, an inter-basin transfer of water to Arkansas Creek and associated dewatering of the channel and downstream wetlands.

Over the last several years a comprehensive restoration project has been in the development phases, with implementation planned for 2006. The project will involve landscape protection measures (conservation easements), creation of ~17,000' of new stream channel and revegetation, upgrades to a diversion structure, riparian grazing changes, instream flow enhancement and wetland restoration – all within the context of a working agricultural operation.

In 2005, FWP established pre-project control (mile 4.0) and treatment (mile 3.0) fish population monitoring sections in order to measure the influence of the upcoming project (Figure 2). On August 8th, during the peak irrigation season we measured flows at 2.6 cfs above the diversion and 0.9 below the diversion. This 0.9 cfs downstream value in expected to approximate the minimum instream summer flows in the new channel.

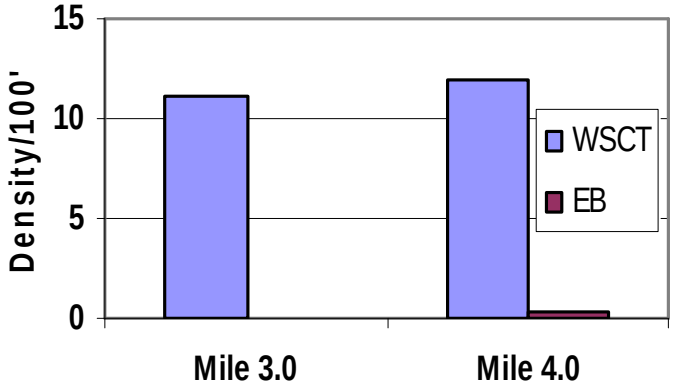

Figure 2. Densities of fish >4.0" at two sites in Ashby Creek, 2005. (WCT= westslope cutthroat trout, EB = brook trout).

Arrastra Creek

WATER NAME: Arrastra Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-024-2005

Project goals and attainment of goals: Restore upstream fish passage for fluvial native fish of the Blackfoot River. Culvert barriers have been replaced with a bridge. Westslope cutthroat trout numbers have increased.

Arrastra Creek, the largest and among the coldest Blackfoot River tributary between Beaver Creek (rm 105.2) and Nevada Creek (rm 67.8), enters the Blackfoot River at river mile 88.8. Arrastra Creek is also the only stream between Poorman Creek (rm 108) and the North Fork (rm 54.1) to support a bull trout population. Arrastra Creek was also identified as the primary spawning tributary for fluvial westslope cutthroat trout in the middle Blackfoot River based on telemetry studies (Pierce et al. 2004). All telemetered westslope cutthroat trout spawned downstream from a set of undersized culverts located at mile 3.2. During the westslope cutthroat trout migration period of 2003, we measured flow velocities through the culverts in excess of 8 ft/second – well above velocities westslope cutthroat trout can navigate. In 2005, these culverts were replaced with a bridge. The bridge allows access to ~6 miles of perennial stream upstream of the crossing.

Arrastra Creek supports bull trout and genetically pure westslope cutthroat trout throughout the mainstem as well as brown trout and brook trout in lower reaches. Fish populations in lower Arrastra Creek have been periodically monitored since 1989 and most recently in 2004. The monitoring shows an increased number of westslope cutthroat trout in the lower 2.4 miles of stream compared to the original 1989 surveys (Figure 3). This increase is thought to result from the increased number of fluvial adult westslope cutthroat trout in the middle Blackfoot River using Arrastra Creek for spawning and concentrated spawning downstream of the culverts.
Other data collections in Arrastra Creek included a geomorphic and substrate survey of the westslope cutthroat trout spawning areas. Arrastra Creek recently tested positive for whirling disease in 2003 with an initial infection 0.34, which then increased to 1.23 in 2004.

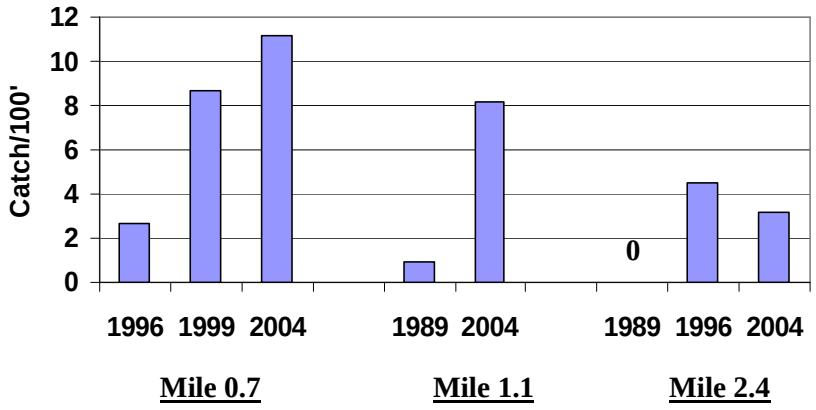

Figure 3. Catch Per Unit Effort (CPUE) for westslope cutthroat trout at three locations in lower Arrastra Creek.

Bear Creek Channel Reconstruction

WATER NAME: Bear Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-028-1998

Project goals and attainment of goals: Restore habitat degraded by historical activities in the channel, restore fish passage and thermal refugia, and improve recruitment of trout to the Blackfoot River. The relative abundance of fish greater than four inches have continued to increase following restoration activities within the Bear Creek drainage. However, not all impairments have been addressed.

Bear Creek, a small 2nd order tributary to the lower Blackfoot River, flows six miles north to its mouth where it enters the Blackfoot River at river mile 12.2 with a base flow of 3-5 cfs. Bear Creek is one of the colder tributaries to the lower Blackfoot River. For August 2002 and 2003, mean daily temperatures (mile 1.0) were in the low 50's with maximum summer temperature ~6^{o} F cooler than the Blackfoot River at the USGS gauging station at river mile 7.9.

Bear Creek has a long history of adverse habitat changes. These include placement of undersized culverts, road drainage and siltation, irrigation, channelization of the stream, excessive riparian grazing and streamside timber harvest (Pierce et al. 1997; Pierce and Schmetterling 1999). At least one road crossing is still considered a barrier to movement. These fisheries impairments contributed to the loss of migration corridors and the simplification and degradation of salmonid habitat. Projects completed included: 1) upgrading culverts and addressing road drainage problems; 2) improving water control structures at irrigation diversions; 3) reconstructing 2,000' of channel; 4) enhancing habitat complexity on an additional 2,000' of stream; 5) shrub plantings; and 6) the development of compatible riparian grazing systems for one mile of stream.

Bear Creek supports populations of rainbow trout, brown trout and brook trout, along with westslope cutthroat trout in the upper basin and very low densities of juvenile bull trout. Bear Creek is an increasingly important spawning and rearing tributary to the lower Blackfoot River sport fishery. In 2004 and 2005, we continued fish population monitoring in a reconstructed section of Bear Creek. Trout densities are shown in Figure 4. These monitoring results show an upward trend in the densities of larger (fish >4.0') fish, primarily rainbow trout.

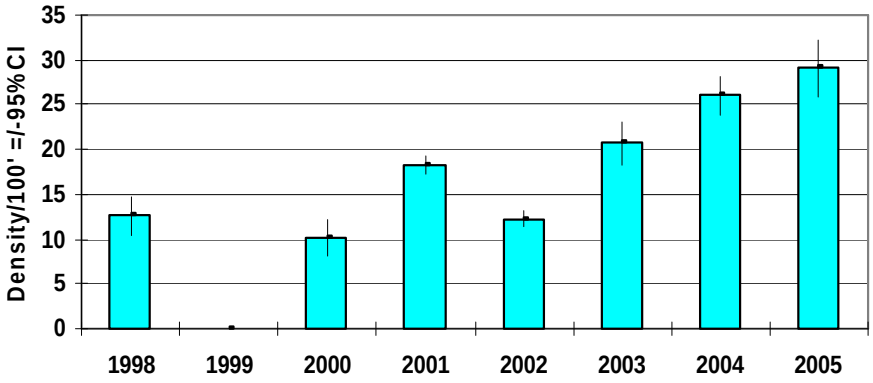

Figure 4. Total trout densities (all trout >4.0") for Bear Creek at mile 1.1, 1998-2005

Chamberlain Creek Fish Passage and Irrigation Diversion

WATER NAME: Chamberlain Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-009-1997

Project goals and attainment of goals: Improve access to spawning areas; improve rearing conditions for westslope cutthroat trout; improve recruitment of westslope cutthroat trout to the river; provide thermal refuge and rearing opportunities for fluvial bull trout. Rehabilitation work has led to increased spawning use of Chamberlain Creek by adult westslope cutthroat trout from the Blackfoot River. However, prolonged drought and whirling disease escalation have minimized the positive response of fish populations.

Chamberlain Creek is a small Garnet Mountain tributary to the middle Blackfoot River, entering at river mile 43.9 with a base flow of ~2-3 cfs. Sections of lower Chamberlain Creek were severely altered, leading to historic declines in westslope cutthroat trout densities. Adverse changes to stream habitat included channelization, loss of instream wood, dewatering, streambank degradation from livestock, road encroachment, and elevated instream sediment from road drainage. Other problems included fish losses to irrigation ditches, impaired fish passage, and more recently the escalation of whirling disease in lower reaches.

Between 1990 and 1996, Chamberlain Creek was the focus of a comprehensive fisheries restoration effort. Projects include: road drainage repairs, riparian livestock management changes, fish habitat restoration, irrigation upgrades (consolidate ditches, water conservation, eliminate fish entrainment, fish ladder installation on a diversion), and improved stream flows through water leasing. Restoration occurred throughout the drainage but focused mostly in the lower mile of stream.

Chamberlain Creek is a westslope cutthroat trout dominated stream over its entire length, with low densities of rainbow and brown trout in lower reaches. Chamberlain Creek supports a significant migration of fluvial westslope cutthroat trout from the Blackfoot River. In 2004 and 2005, we continued to monitor fish populations at mile 0.1 (Figure 5). Recent fish population surveys indicate generally stable westslope cutthroat trout densities in the lower-most portion of Chamberlain Creek. Whirling disease sampling in 2004 recorded the continued escalation of whirling disease in lower Chamberlain Creek. A time-series whirling disease assessment indicates high infections (mean grade range 3.3-4.3) levels during the critical westslope cutthroat trout emergence period.

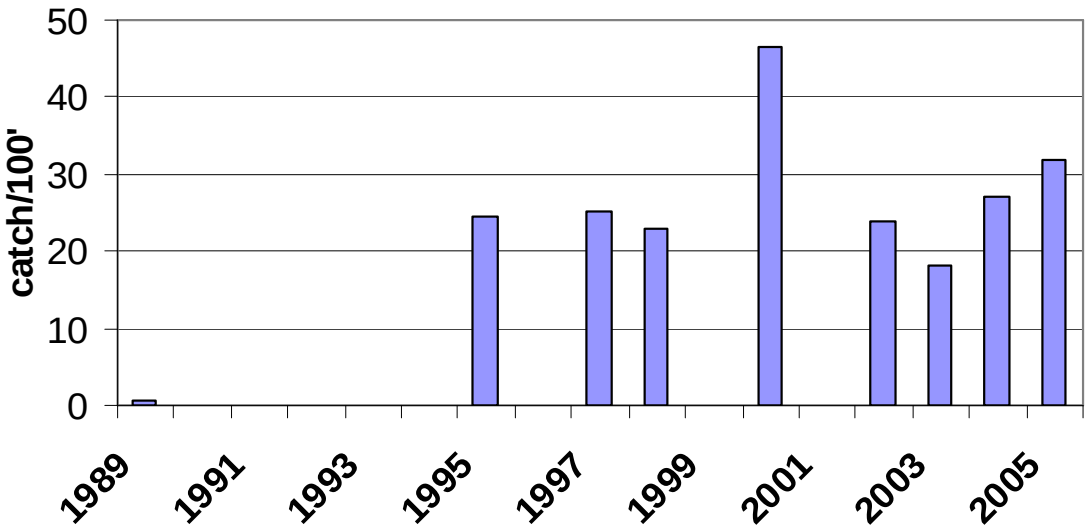

Figure 5. Catch per unit effort for westslope cutthroat trout in Chamberlain Creek at mile 0.1, 1989-2005.

Cottonwood Creek Fish Friendly Diversion, Dreyer Diversion Lining, Culvert Replacement, Fish Ladders, and Fish Screen Improvement

WATER NAME: Cottonwood Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: RRA-56-1994, FFI-7-1996, FFI-44-1996, FFI-37-1997, FFI-30-1998, FFI-38-1999, FFI-7-2002, FFI-4-2003 and FFI-02-2006.

Project goals and attainment of goals: Goals include improvements to degraded habitat; eliminate fish losses to irrigation ditches; restore instream flows and migration corridors for native fish. Westslope cutthroat trout abundance has dramatically increased following improved flows as the result of the water lease in Cottonwood Creek. Although population densities have shown increases, drought conditions have resulted in fluctuations and temporary declines as in 2003.

Cottonwood Creek flows from Cottonwood Lakes 16 miles to its junction with the middle Blackfoot River entering at river mile 43 with a base flow of ~15 cfs. Cottonwood Creek supports bull trout, genetically pure westslope cutthroat trout, rainbow trout, brown trout and brook trout. Westslope cutthroat trout and bull trout dominate the headwaters. Rainbow trout inhabit the lower mile of stream while brook trout and brown trout dominate middle stream reaches.

In 2003, a road-crossing problem related to an undersized culvert at stream mile 15.9 was assessed. This undersized and perched culvert causes severe channel downcutting and high erosion immediately below the culvert, along with aggradation below the incised reach. This instability appears to contribute to the loss of surface flows during base flow periods and isolation of fish between the dewatered section and the perched culvert. We measured a decrease in flows from 0.4 cfs to the complete loss of surface flow over a distance of 765 feet in

September 2003. We further identified road drainage into this portion of Cottonwood Creek. In 2005, we also recently identified grazing-related impacts and the inappropriate use of a diversion on State properties. Corrective measures are now being planned for all of these identified problems beginning in 2006.

In 2004 and 2005, we continued to monitor fish populations in upper Cottonwood Creek in the area of a water lease, downstream of the Dreyer Diversion. The water lease was initiated in 1997, prior to which time a major diversion (Dreyer Diversion) completely dewatered a middle portion of Cottonwood Creek during the late irrigation season. Fish population monitoring in the water lease area (mile 12.1) show higher densities of westslope cutthroat trout following increased flows and the recent recovery of westslope cutthroat trout from a recent drought-related low in 2003 (Figure 6). Whirling disease monitoring continued near the mouth of Cottonwood Creek. The whirling disease results show a continuous severe infection.

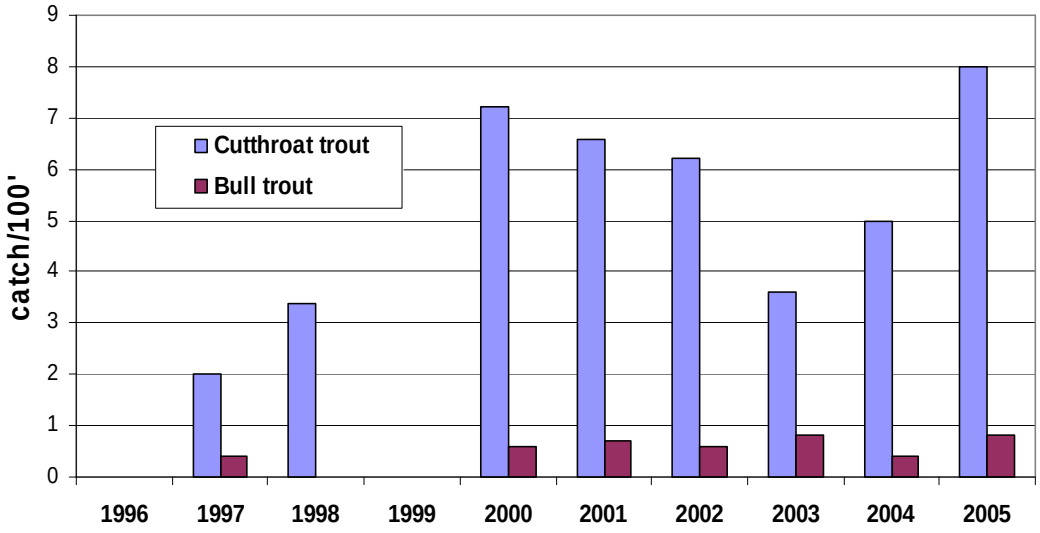

Figure 6. Catch per unit effort for native trout in Cottonwood Creek at mile12.0, 1996-2005.

Dunham Creek Fish Screen and Channel Restoration

WATER NAME: Dunham Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-002-1996 and FFI-039-2001

Project goals and attainment of goals: Projects on Dunham Creek have eliminated the loss of native fish to irrigation canals, the restoration of habitat conditions and migration corridors, and improve recruitment of bull trout and westslope cutthroat trout to the Blackfoot River. Both westslope cutthroat trout and bull trout numbers increased to a peak in 2004, after correcting impairments. Drainage wide declines in bull trout spawning have contributed to lower bull trout recruitment.

Dunham Creek is a spawning stream for fluvial westslope cutthroat trout and bull trout that enters Monture Creeks at mile 11.5. Two types of fisheries impairment – entrainment of native fish to the Dunham canal and an altered channel, were identified in Dunham Creek. The Dunham canal entrainment problem was corrected with a fish-screening project in 1996. The channel alteration was identified in the early 1970's when ~ 1.3 miles of the Dunham riparian area was clear-cut and burned and the stream channelized. This channelized reach had since become vertically and laterally unstable, resulting in downcutting, increased bank erosion, as well as a channel braiding in downstream reaches. The reconstruction and renaturalization of this channelized section was completed in 2000.

The primary objective of the renaturalization project was to stabilize the stream to allow riparian vegetation to encompass the stream over a 10-15 year period, and thus provide long-term stability. Review of the project indicates that surface water is now reestablished to the lower portion of the reconstruction project where the channel was braided and intermittent prior to reconstruction.

Dunham Creek supports populations of genetically pure fluvial westslope cutthroat trout, fluvial bull trout and brook trout. In 2004 and 2005, we completed bull trout redd counts and continued to monitor fish populations at mile 2.3. The mile 2.3 survey site is located 0.6 miles downstream of the naturalization project.

Consistent with adult bull trout-spawning declines in Monture Creek, redds counts have declined in Dunham Creek since 2002. This decline is thought to contribute to declining juvenile densities observed during population monitoring (Figure 7). Active poaching has been observed during 2004 and 2005 at the population monitoring site. Recent bull trout spawning, in both 2004 and 2005, has been identified in the newly constructed channel.

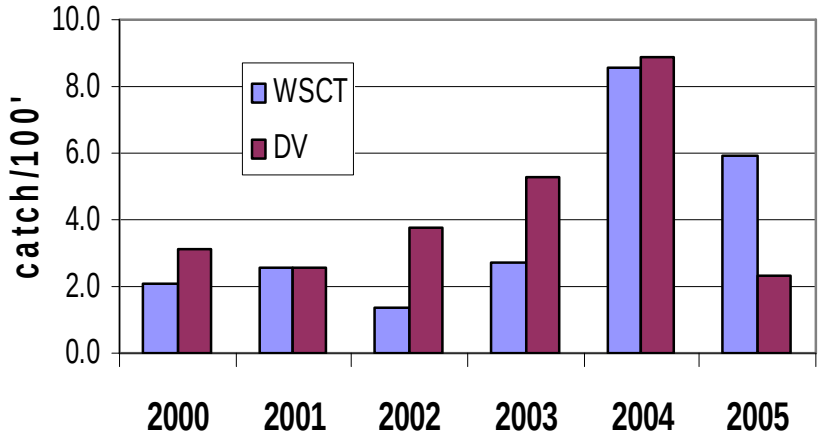

Figure 7. Catch per unit effort (catch per 100 feet) for westslope cutthroat trout (WSCT) and bull trout (DV) in Dunham Creek at mile 2.3, 2000-2005

Jacobsen Spring Creek Channel Restoration and Grazing Management

WATER NAME: Jacobsen Spring Creek – North Fork Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-030-2005

Project goals and attainment of goals: The goal of the project is to restore a high quality spring creek capable of self-maintaining complex habitat suitable to all salmonids in the North Fork Blackfoot River. Work continues to achieve this goal.

Jacobsen Spring Creek(s), a series of two small, inter-connected spring creeks totaling 13,700 feet in length, merge at stream mile 0.7 and enter the North Fork of the Blackfoot River at mile ~4.0 with a base flow of ~4-7 cfs. Based on landowner accounts, the spring creek system was a historical bull trout and westslope cutthroat trout stream. Jacobsen Spring Creek is now highly degraded and currently supports low densities of brown trout, brook trout and rainbow trout based on FWP fish population surveys completed in 2004 and 2005. Currently, the stream maintains low sinuosity and is over-widened approaching maximum widths of ~50 feet (Table 1).

Channel measurements	
Stream channel length	3150
Sinuosity	1.37
Total # Pools	19
# Sampled Pools	10
Pool Frequency	6.0/1000'
# Pools Measured with LWD	9(90%)
Pool Length	37±21(14 -79)
Wetted Pool Surface Area	858±626(224-1859)
Maxim Pool Depth	1.7±0.7(0.9-3.3)
Wetted Pool Width @ Max Depth	20±10(9-44)
Wetted Width @ Riffle Crest	24±12(8-47)
Bankfull Width @ Max Pool Depth	21±10(9-44)
Bankfull Width @ Riffle Crest	24±12 (8-47)
Riffle Crest Depth	0.6±0.2(0.4-0.9)
Residual Pool Depth	1.1±0.7(0.3-2.7)

* all in standard (ft) units

Table 1. Summary of pre-project channel measurements for the lower reach of Jacobsen Spring Creek.

Despite a degraded condition, the spring creek appears to posses the basic habitat components necessary for improved fisheries, including bull trout use. These include cold groundwater input, sufficient base flows, a gravel base and a surrounding spruce forest that will provide shade, complexity and the input of wood to the channel. Current habitat impairments on the spring

creek include areas of livestock-induced channel degradation and suppressed riparian vegetation, which has resulted in channel over-widening, elevated temperatures and excessive sediment input and accumulation. Historical timber harvest contributes to reductions of instream wood, further contributing to the simplification of habitat.

The initial phases of channel restoration, including 5,800 feet of reconstruction, began in 2005 and will continue through 2006. Phase two of this project, slated for 2006, includes another 7,900 feet of channel work. When completed, this project will narrow and deepen the channel, increase stream sinuosity, place instream wood and sod mats and perform other revegetation measures for 2.6 stream miles. The project is to include land management (grazing and timber harvest) plans consistent with project goals and objectives.

During the 2004 and 2005 project development period, we completed fish population surveys, water temperature and discharge measurements, a pre-project habitat inventory and whirling disease sampling. Fish population surveys at four locations revealed very low densities of rainbow trout, brown trout and brook trout (Figure 8). Flow monitoring near the mouth recorded a high of 11.3 cfs in June 2004 and a low of 4.4 cfs in August 2004 during the peak irrigation season. Water temperature studies completed in 2004 recorded maximum summer temperatures near the mouth ranging from 61.5 - 66.3 ^{o}F. The results of pre-construction habitat survey for the lower 3,100' of channel are located in Table 1. Whirling disease testing of the spring creek in summer 2004 showed a mild 0.13 mean grade infection was present.

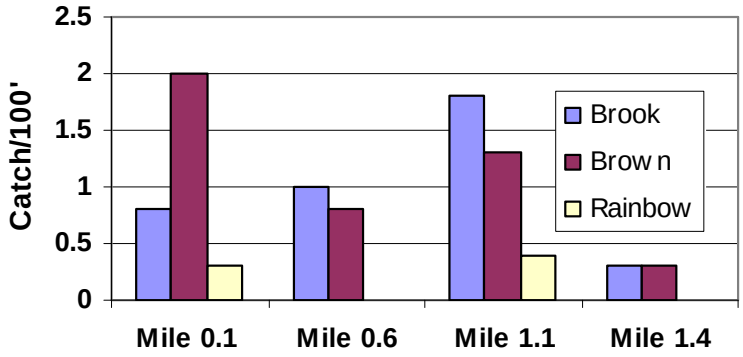

Figure 8. Catch per unit effort for trout at four sites in Jacobsen Spring Creek, 2004.

Kleinschmidt Creek Channel Restoration

WATER NAME: Kleinschmidt Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce (1991); Pierce et al. (1997); Pierce and Schmetterling (1999); Pierce and Podner (2000); Pierce et al. (2002); Pierce et al. (2004) Pierce and Podner (2006)
FFI NUMBER: FFI-014-1998 and FFI- 031-2005

Project goals and attainment of goals: Project goals include reduce whirling disease infection levels, restoration of the stream channel morphology for all life stages of trout, increase recruitment of trout to the Blackfoot River, and restore thermal refugia and rearing areas for

North Fork Blackfoot River bull trout. These goals have been met in that brown trout densities have increased following stream reconstruction, and have significantly higher densities where large woody debris was placed in the channel. Maximum water temperatures showed significant declines following reconstruction of the channel.

Kleinschmidt Creek, a spring creek tributary with a base flow of ~9 cfs, joins with Rock Creek at mile 0.1 before entering the North Fork of the Blackfoot River at mile 6.2. Kleinschmidt Creek has a long history of stream degradation involving livestock over-use and channel alterations related to instream rock dams, undersized culverts and highway channelization (Pierce 1991). Restoration of Kleinschmidt Creek began in 1991, and expanded substantially in 2001 when 6,250 feet of the stream was reconstructed to a longer (8,494 feet), narrower, deeper and more sinuous channel. Restoration continues to expand upstream where grazing changes and limited channel reconstruction are planned for 2006. Summaries of pre-and post-project fisheries and channel measurements are described in Pierce et al. (1997; 2002; and 2004).

During the 2004 and 2005, we monitored fish populations, water temperatures, whirling disease and spawning substrates in Kleinschmidt Creek. Fish populations were resurveyed at two locations (mile 0.5 and 0.8) of lower Kleinschmidt Creek established in 1998 prior to channel reconstruction. These sites were established not only to assess the fisheries responses to restoration, but also to assess restoration techniques involving the placement of large instream wood into E4-type channels. No instream wood was placed in the reconstructed channel at mile 0.5, whereas the rest of the channel, including the mile 0.8 survey site, included instream wood placements.

Both sites show higher densities of age 1+ brown trout compared to the pre-project periods (Figure 9). During the post-project monitoring period (2002-05), densities of age I+ brown trout were 168% higher in the wooded section compared to the woodless section. Unfortunately, livestock access to the mile 0.5 site has confounded early phases of the study, making full interpretation of these results difficult. The survey site at mile 0.8 was not subject to streamside livestock damage.

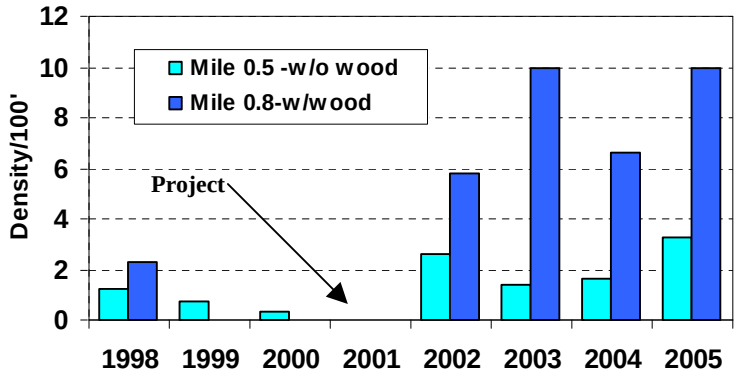

Figure 9. Estimated densities of age 1+ brown trout in two sections of Kleinschmidt Creek, 1998-2005.

In 2005, we also established a new pre-project fish population survey upstream of the groundwater influence area (mile 2.0) in order to assess the influence of planned restoration. This survey revealed very low densities of fish with a total trout catch per unit effort of 1.7 fish/100'. This portion of channel is degraded from livestock over-use and appears to suffer from seasonal dewatering.

The USFWS measured stream discharge at four locations between mile 0.1 and 1.8 in 2004 (Figure 10). The data shows significant groundwater inflows between mile 1.0 and 1.8 and a mid-summer peak in the hydrograph that extends into the fall.

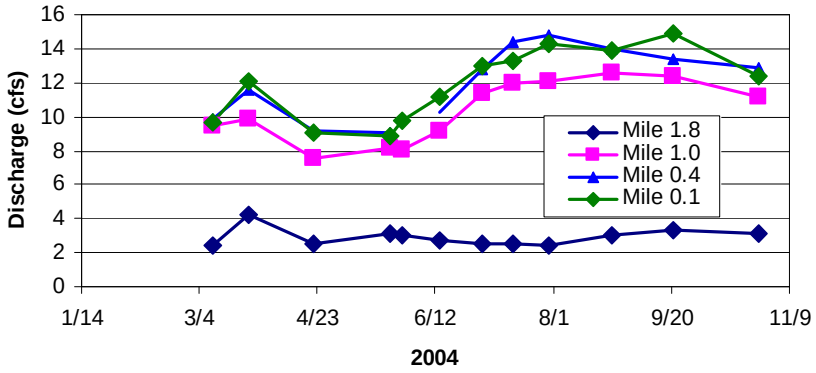

Figure 10. Summary of flow measurements at four locations in Kleinschmidt Creek (data from USFWS, 2004).

Water temperature monitoring has shown substantial reduction in water temperatures in the newly constructed channel, with maximum water temperatures 12 ^{o}F lower in 2004 than the 2001 pre-project temperatures (Figure 11).

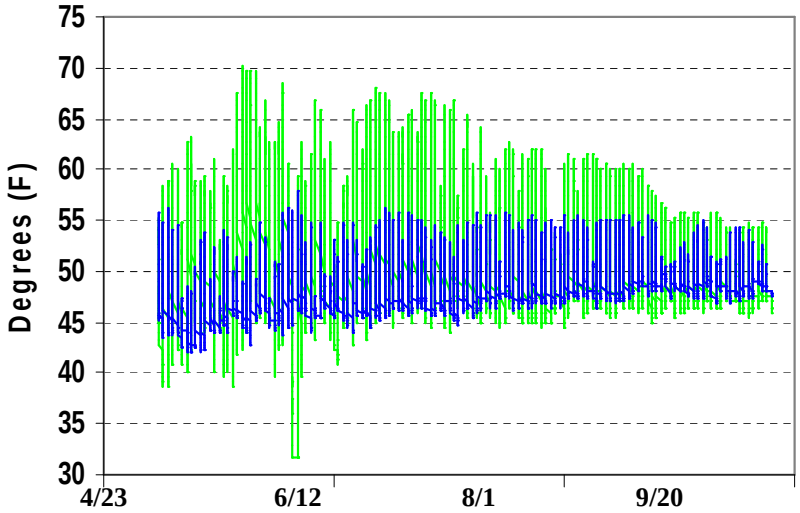

Figure 11. Pre-project (2001-green or light) and post-project (2004-blue or dark) restoration water temperature comparison for Kleinschmidt Creek.

Whirling disease sampling in 2004 recorded a continued severe 4.9 mean grade infection.
We also completed an assessment of spawning areas in Kleinschmidt Creek, which generally show that Kleinschmidt Creek substrates are comprised largely of "fine" textured material (<6.35mm - silt, sand and fine gravel) in high quantities sufficient to inhibit trout reproduction.

McCabe Creek Irrigation Efficiency Conversion, Barrier Removal, Debris Placement, Culvert to Bridge Conversion, Habitat Enhancement
WATER NAME: McCabe Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2000); Pierce et al. (2004); Pierce and Podner (2006)
FFI NUMBER: FFI-038-1997, FFI-031-1998, and FFI-18-2000

Project goals and attainment of goals: Restore instream flows and habitat conditions for bull trout and westslope cutthroat trout. Eliminate entrainment of westslope cutthroat trout to irrigation ditches. Both native and nonnative species have increased after comprehensive restoration in McCabe Creek**.**

McCabe Creek, a cold basin-fed tributary to lower Dick Creek, enters at stream mile 3.8 with a base flow of ~4 cfs. McCabe Creek begins as a steep mountain stream in its headwaters, before entering knob-and-kettle topography in the lower basin. In lower reaches, McCabe Creek passes through a beaver-influenced wetland bog before entering Dick Creek, a lower tributary to Monture Creek. McCabe Creek has a long history of adverse fisheries impacts related to channel alterations and agricultural activities. These include intensive riparian grazing, physical alterations to the channel, poorly designed road crossings, chronic dewatering, and fish losses to irrigation ditches.

A comprehensive restoration project for McCabe Creek began in 1999 and was completed in 2002. This project: 1) consolidated four irrigation ditches into one pipeline and screened the intake; 2) converted flood to sprinkler irrigation; 3) restored habitat conditions including the placement of instream wood and shrub plantings along 1/2 mile of stream; 4) incorporated necessary riparian livestock management changes; and 5) replaced a county road culvert with an open-bottom box culvert. In 2001-02, the project completed the irrigation conversion, developed off-stream livestock watering, and reconstructed ~1/2 mile of stream channel. Additional grazing management measures are planned for the immediate project area in 2006.

Benefits to fish population relate to increasing stream flows, reducing water temperatures in Dick Creek, eliminating westslope cutthroat trout losses to ditches, and restoring habitat complexity to a damaged stream channel. McCabe Creek is a westslope cutthroat trout dominated stream, with brook trout present in lower stream reaches. Due to cool summer temperatures, McCabe Creek likely supported bull trout historically. In 1999, prior to habitat restoration, we established a fish population survey section in a degraded section of stream (mile 2.2), an area of low habitat complexity and chronic low flows. Following the initial surveys, we screened the upper diversion, enhanced stream flows by 3-5 cfs and improved habitat in the survey reach by adding

large woody debris to the channel. We also implemented some grazing changes and developed off-stream livestock water.

In 2004, we continued to monitor fisheries at mile 2.2 (Figure 12). Both westslope cutthroat trout and brook trout (> 4.0") have responded to the project compare to the pre-project (1999) condition. The brook trout increase is less encouraging for attainment of the desired goals.

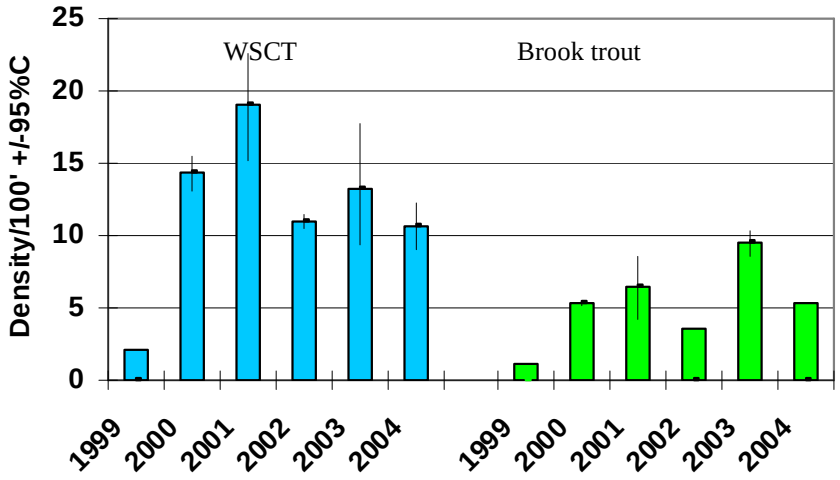

Figure 12. Densities of westslope cutthroat trout (WCT) and brook trout fish > 4.0" in McCabe Creek at mile 2.2, 1999-2004.

Monture Creek Fish Habitat Enhancement and Restoration
WATER NAME: Monture Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-012-1997, FFI-049-1999

Project goals and attainment of goals: Restore habitat for spawning and rearing bull trout and westslope cutthroat trout; improve recruitment of bull trout and westslope cutthroat trout to the Blackfoot River; improve staging areas and thermal refugia for fluvial bull trout. Data suggest that bull trout use and population levels in Monture Creek increased as cooperative restoration projects improved habitat in the drainage and restrictive angling regulations were in place. However, sharp declines in bull trout redds have occurred in 2004 and 2005.

Monture Creek, a large tributary to the middle Blackfoot River, is a primary spawning and rearing tributary for fluvial bull trout and fluvial westslope cutthroat trout. Monture Creek also serves as thermal refugia for fluvial bull trout during periods of Blackfoot River warming. Reproduction of westslope cutthroat trout and bull trout occurs primarily in the mid-to-upper basin. Fluvial rainbow trout and brown trout inhabit the lower portions of the drainage. Brook trout are found throughout the drainage.

Riparian areas in the mid-to-lower reaches of Monture Creek have a long history of riparian timber harvest and improper grazing practices, with resulting adverse impacts to native fish

habitats. All lower tributaries of Monture Creek from Dunham Creek downstream likewise were identified as fisheries-impaired. Many identified problems were corrected through a decade of cooperative restoration activities (Pierce et al. 1997; Pierce et al. 2001), which contributed to improving the health of Monture Creek. Excessive livestock access to Monture Creek however, continues to adversely influence Monture Creek at multiple locations.

Monitoring for 2004 and 2005 period included: 1) bull trout redd counts; 2) assessments of juvenile trout abundance at long-term monitoring stations; 3) water temperature monitoring; 4) continued whirling disease studies; 5) geomorphic and spawning site assessments; and 6) radio telemetry study involving rainbow trout. Bull trout redd counts have been upward trending since restrictive angling regulations in 1990, but also show a sharp recent decline in 2004 and 2005. This downturn is consistent with other drought-related bull trout declines in the Blackfoot watershed. Likewise, assessments of juvenile bull trout abundance at a long-term monitoring station revealed increases through the 1990s, but also a recent decline proportional to declining redds.

Preliminary results from a rainbow trout telemetry study show Monture Creek to be the primary spawning tributary for the Blackfoot River rainbow trout upstream of Clearwater River. Spawning occurred primarily in lower Monture Creek, but extended upstream as far as lower Dunham Creek. Lower Monture Creek tested positive for whirling disease in 2000. The disease has since increased in intensity to a mean grade infection of 4.8 in 2005. Surveys of juvenile rainbow trout in infected waters of lower Monture Creek indicate rainbow declines near the mouth but stable densities at an upstream site (Figure 13). Whirling disease testing at upstream bull trout spawning sites of Monture Creek remained negative when last tested in 2003.

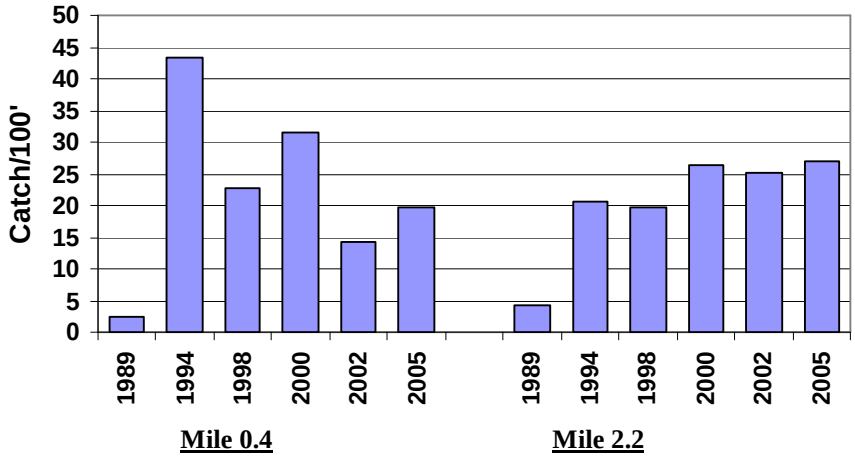

Figure 13. Catch per unit effort for juvenile rainbow trout at two lower Monture Creek sampling locations, 1989-2005.

Murphy Spring Creek Fish Passage, Instream Flow Enhancement

WATER NAME: Murphy Spring Creek – North Fork Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-018-1998

Project goals and attainment of goals: Restore habitat conditions suitable to westslope cutthroat trout and juvenile bull trout; prevent irrigation ditch losses; maintain minimum instream flows and provide rearing and recruitment for fluvial bull trout and cutthroat trout to the North Fork Blackfoot River. Work has continued to address all impairments; instream flows have been improved since 2004.

Murphy Spring Creek, a small westslope cutthroat trout dominated tributary, originates on the north side of Ovando Mountain and flow six miles south to its confluence with the lower North Fork at mile 9.9. Murphy Spring Creek has a history of irrigation impacts and fish passage problems. Irrigation problems involve chronic dewatering and entrainment of westslope cutthroat trout to the Murphy ditch at mile 1.8. Fish passage problems involved an undersized culvert at mile 0.5 and the defunct condition of the Murphy diversion. The culvert reduced the upstream movement of juvenile bull trout from the North Fork, while the diversion reduced downstream movement of westslope cutthroat trout from the headwaters to the North Fork through dewatering and entrainment.

The Murphy Spring Creek restoration project began in 1998 with the installation of a new diversion fitted with a Denil fish ladder. In 2000, we replaced the culvert with a larger baffled culvert designed to allow the upstream movement of young-of-the-year bull trout. In 2004-05, the Blackfoot Cooperators continued to expand on restoration actions by developing an instream flow agreement that granted habitat maintenance flows as well as a 2.2 cfs minimal instream flow in Murphy Spring Creek. The project at the Murphy diversion also seeks to eliminate entrainment of westslope cutthroat trout with the installation of a fish screen planned for 2006.

Figure 14 shows the instream flow monitoring results above and below the Murphy diversion for 2005. The measurements at the culvert crossing (~2 cfs) compare to a measurement of <0.5 cfs in September 2004. Fish population surveys indicate a modest increase in densities in lower Murphy Creek in 2005 compared to 2001 (Figure 15).

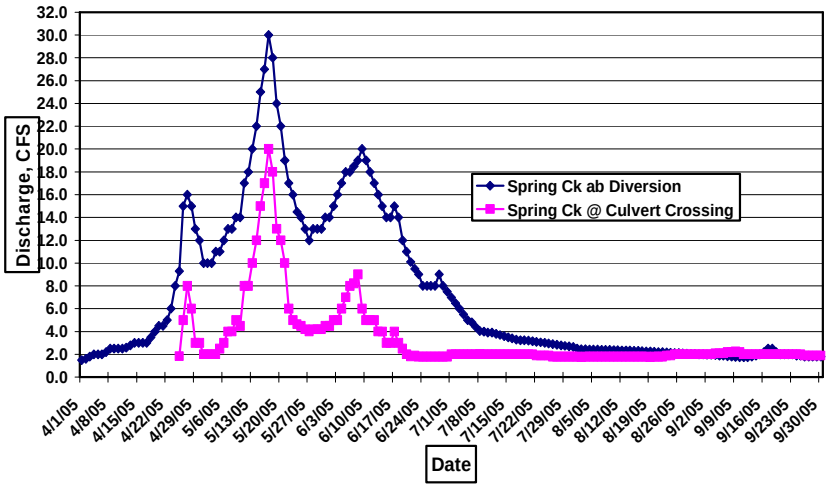

Figure 14. Flow regimes for Murphy Spring Creek at two sites, April-September of 2005 (*data* from Ron Sheilds, 2005).

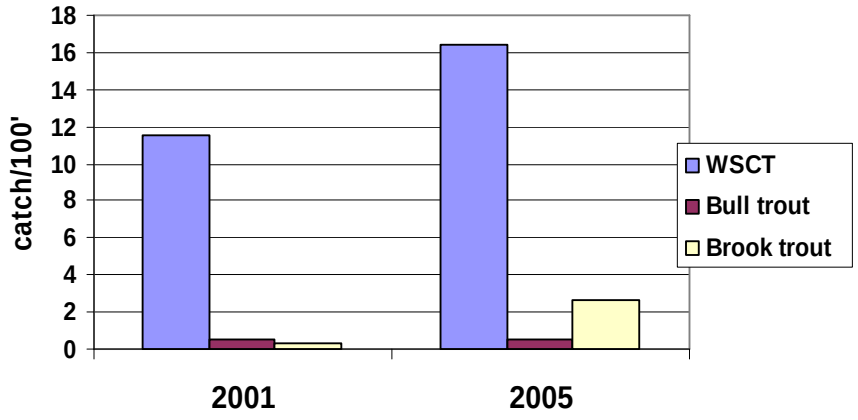

Figure 15. Catch per unit effort for westslope cutthroat trout (WSCT), bull trout, and brook trout in Murphy Spring Creek at mile 0.6, 2001 and 2005.

Nevada Spring Creek Habitat and Water Quality Enhancement and Restoration
WATER NAME: Nevada Spring Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-036-1998, FFI-048-2000, FFI-042-2001, and FFI-019-2003

Project goals and attainment of goals: Restore habitat suitable for cold-water trout, improve downstream water quality, and reduce thermal stress in Nevada Creek and the Blackfoot River. Data suggests that channel reconstruction decreased water temperatures, increased brown trout densities, resulted in westslope cutthroat trout and bull trout use and provided spawning habitat.

Nevada Spring Creek, a tributary of lower Nevada Creek, originates from an artesian spring and flows through agricultural lands to its junction with Nevada Creek at mile 6.2. The spring source produces between six and nine cfs. Nevada Spring Creek is joined at the source by Wasson Creek, a small, basin-fed tributary that brings and additional base flow of approximately two cfs during the non-irrigation season. Water temperatures at the artesian source are a constant year-around 44.1^{o}F.

A comprehensive habitat restoration project for the upper 4.2 miles of Nevada Spring Creek was completed between 2001 and 2004. The project entailed the complete reconstruction of Nevada Spring Creek, riparian grazing changes, instream flow enhancement, wetland restoration and shrub plantings. Prior to restoration, summer water temperatures in the lower portion of Nevada Spring Creek exceeded >75^{o}F due to the over-widened condition of the channel (Pierce et al. 2002). This warming and agricultural runoff from adjacent lands contributed to water quality degradation, and created unsuitable habitat conditions for coldwater salmonids in the lower portion of Nevada Spring Creek and contributed to impaired water quality in lower Nevada Creek (Pierce et al. 2002).

Prior to channel restoration, Nevada Spring Creek supported low densities of brown trout in upper reaches and non-game species (redside shiners, northern pikeminnow, and largescale sucker) in lower reaches (Pierce et al 2002). Westslope cutthroat trout thought to originate in Wasson Creek, also inhabited Nevada Spring Creek in very low densities, where historically they were abundant (Frank Potts, personal communication).

In 2004 and 2005, restoration monitoring occurred on several fronts. We completed measurements of the new channel, monitored water temperatures at several locations, surveyed fish populations in upper and lower reaches of the spring creek, and documented the introduction and rapid escalation of whirling disease into the spring creek system.

The post-project habitat survey completed between 2002 and 2004 measured channel bedforms (pools, riffles) and channel pattern. Objectives for the Nevada Spring Creek habitat survey were to characterize the new channel consistent with a pre-project habitat survey (Pierce and Peters 1990). The post-project survey began from a randomly selected pool (1-4) near the spring source and proceeded downstream, measuring every fourth pool and preceding downstream riffle. Pool measurements included total pool length, maximum pool depth and wetted width at max pool depth. Riffle measurements included riffle crest depth and wetted widths at the riffle crest. Residual pool depth was calculated by subtracting maximum pool depth from riffle crest depth. Aerial photographs were used to calculate sinuosity. Summary results of the pre-and post project comparison are outlined in Table 2.

	Before	After	Percent Change
Stream length (ft)	18,811	22,563	20
Sinuosity	1.65	1.98	20
Surface Area (acres)	22.8	6.6	-71
Mean wetted width (range) (ft)	47(14-98)	10.1(6.7-16.6)	-79
Pool Frequency	0.8/1000	13.5/1000	1587
Mean pool depth (ft)	2.5	3.45	38
W/D Ratio	23.5	2.9	-88

Table 2. Comparison of channel morphometrics in Nevada Spring Creek before and after reconstruction.

Water temperature monitoring was completed at four locations in the spring creek, including near the mouth. Survey results from this site show a 5-10^{o}F cooling influence during the summer period compared to the pre-project condition (Figure 16).

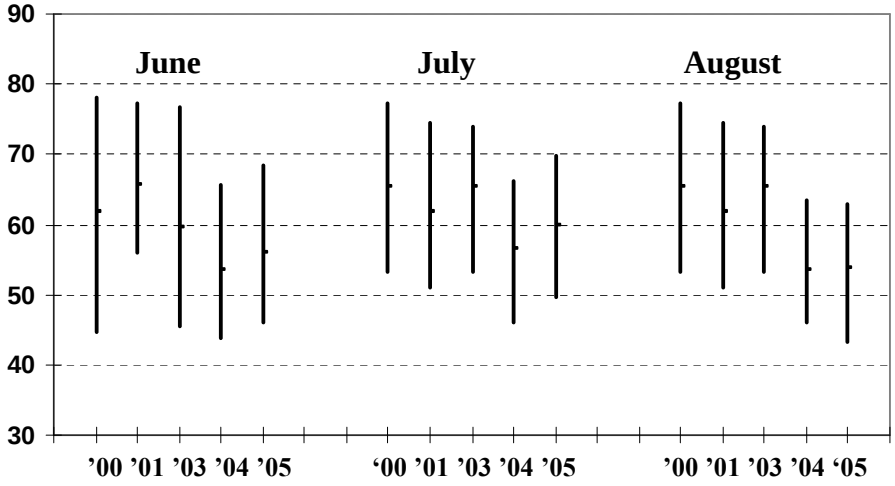

Figure 16. Comparison of summer water temperatures three years pre-project (2000-03) and two years post-project (2004-05) for Nevada Spring Creek near the mouth.

In 2004 and 2005, we continued monitoring fish populations near the source and near the mouth. Near the source, densities of brown trout >4.0" increased 1,030 % from mean pre-project (2000 and 2001) densities of 1.3 to 14.5 fish/100' in 2005 (Figure 17). Total biomass of brown trout (fish >4.0") have increased from 1.4 lbs/1000' to 46.7 lbs/1000' between 2001 and 2005, a 3,242 % increase.

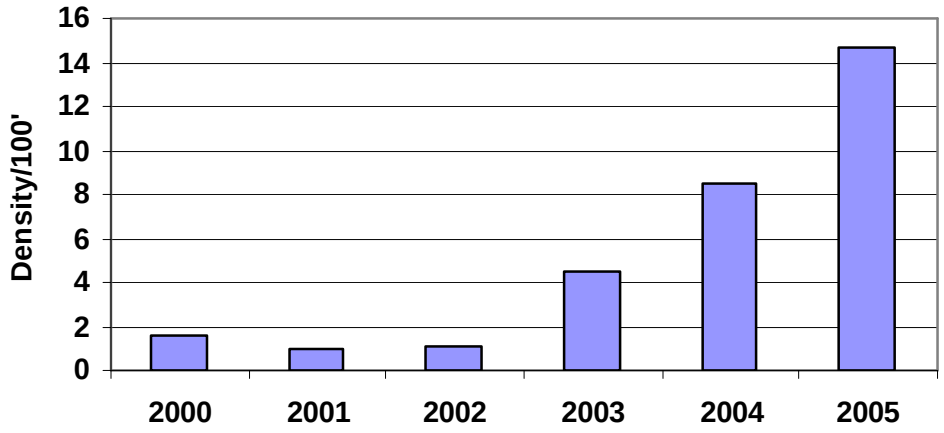

Figure 17. Brown trout densities (fish >4.0") in upper Nevada Spring Creek, 2000-05.

Sampling near the mouth in 2004-05 revealed a community-level shift from non-salmonids (northern pikeminnow, largescale sucker and redside shiner) to a salmonid community (Figure 18). The salmonid community currently includes low densities of brown trout, cutthroat trout, and mountain whitefish. In 2004 a single bull trout was also found in the sample. Westslope cutthroat trout are now present throughout the spring creek in low densities ranging from a CPUE of 0.2 near the source to 1.2 near the mouth.

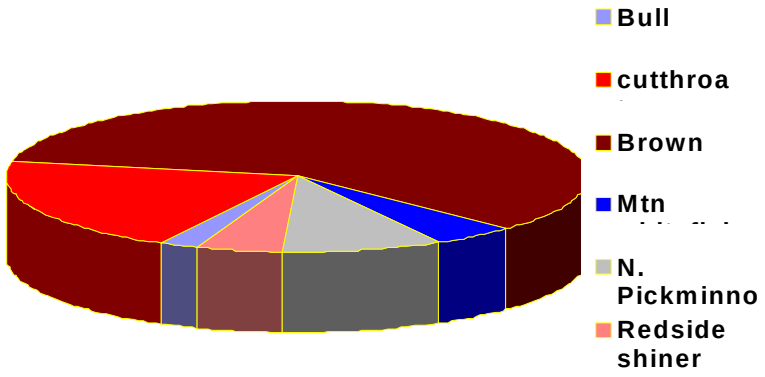

Figure 18. Combined species composition for lower Nevada Spring Creek, 2004 and 2005

Nevada Creek Habitat and Water Quality Enhancement and Restoration
WATER NAME: Nevada Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-033-1998, FFI-034-1998, and FFI-035-1998

Project goals and attainment of goals: Restore water quality and fish habitat to levels suitable for trout. Water temperatures have declined and the fish community has shifted towards salmonids.

Nevada Creek is a major tributary to the Blackfoot River entering at rm 67.8. It flows through a wide valley converted from a historical beaver wetland to hay and grazing meadows. Nevada Creek contributes a significant amount of water to the overall flow of the Blackfoot River. Unfortunately, impaired water quality in Nevada Creek originating from non-point runoff, including high temperatures, high nutrient loading and high levels of sediment degrades water quality in the Blackfoot River. It has long been held that Nevada Spring Creek in a restored state could moderate water temperatures, improve water quality and provide a source of trout recruitment to Nevada Creek (Pierce and Peters 1990; Pierce et al. 1997).

Fish population surveys in lower Nevada Creek in the 1990s downstream of mile 4.0 recorded a community of long nose sucker, large scale suckers, reside shiners and northern pikeminnow along with low numbers of sculpins. Extremely low numbers of trout were identified when in April 1990 a drift boat electrofishing survey found a single brown trout in the lower 3.8 miles of Nevada Creek (Pierce et al. 1997).

Following the reconstruction of Nevada Spring Creek, we monitored summer water temperatures up- and downstream of the Nevada Spring Creek confluence during both 2004 and 2005. To ensure mixing of the Nevada and Nevada Spring Creek waters, we placed the downstream sensor 6300' below of the new Nevada Spring Creek confluence. The upstream sensor recorded peak summer temperatures in Nevada Creek >80 ^{o}F but >4 ^{o}F lower downstream of the spring creek confluence. The 2005 monitoring found comparable maximum July temperatures but notably lower August temperatures (Figure 19). These temperatures although still elevated are now within the tolerance limits for most trout species. This is a result of two main factors: the cooler water now exiting Nevada Spring Creek and the low stream flows in Nevada Creek.

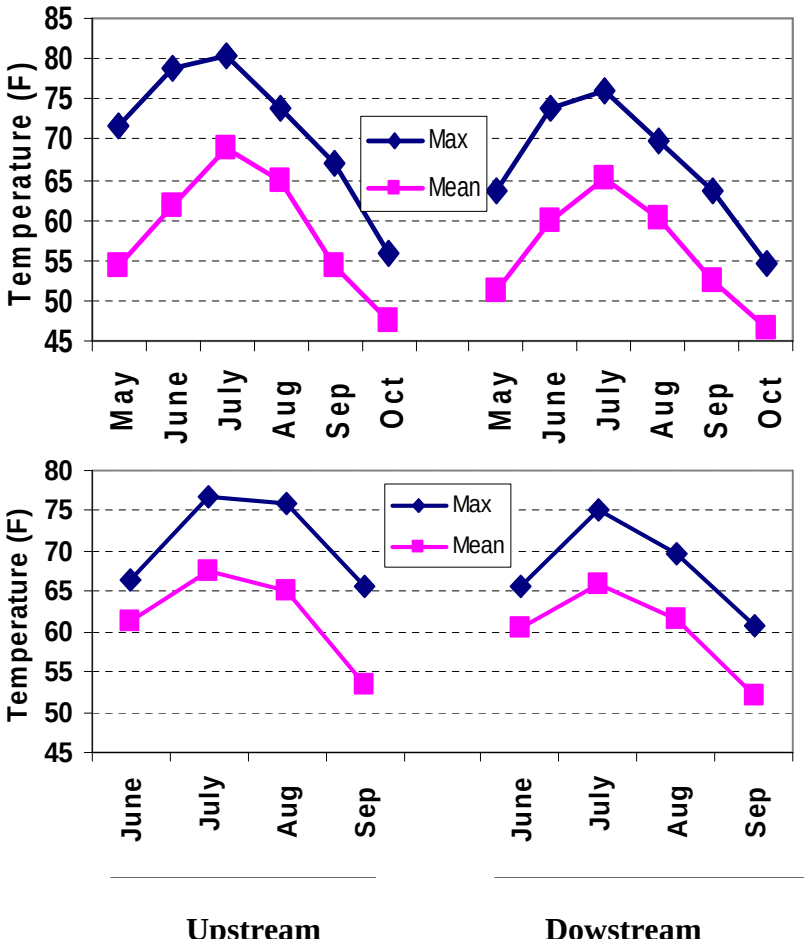

Figure 19. Comparison of water temperatures in Nevada Creek up-and downstream of Nevada Spring Creek, 2004 (top) and 2005 (bottom).

Using a drift boat electrofishing unit, in September 2005 we established a new fish population survey section (mile 4.5-5.7) in Nevada Creek immediately downstream of the Nevada Spring Creek confluence. Consistent with community-shift to salmonids in lower Nevada Spring Creek after restoration, we found four trout species and mountain whitefish present in Nevada Creek downstream of Nevada Spring Creek. Densities are however still very low, but notably higher compared to the 1990 survey (Figure 20).

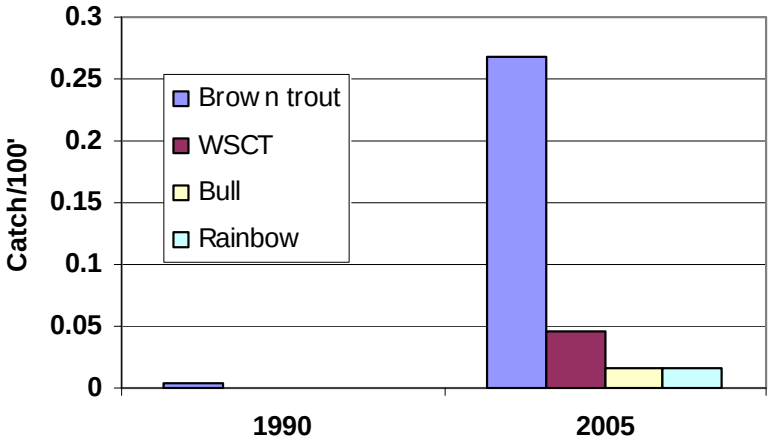

Figure 20. Catch per unit effort for trout in lower Nevada Creek, 1990 and 2005.

North Fork Blackfoot River Diversions and Fish Screens

WATER NAME: North Fork Blackfoot River – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-68-1995, FFI-45-1996, FFI-11-1997, and FFI-018-1998

Project goals and attainment of goals: Eliminate the loss of bull trout and westslope cutthroat trout to irrigation canals, manage the riparian areas to protect habitat for native fish, and improve recruitment of native fish to the Blackfoot River. Additional work still needs to occur to reduce entrainment of bull trout in canals. Drought conditions have contributed to declines in bull trout numbers and redds.

The North Fork of the Blackfoot is the largest tributary to the Blackfoot River, with headwaters draining the Scapegoat Wilderness. Upon exiting the mountains near mile 12, the North Fork enters Kleinschmidt Flat, a large glacial outwash plain before entering the middle Blackfoot River at river mile 54. Five irrigation canals, located on the Flat between mile 8.8 and 15.3, divert an estimated 40-60 cfs from the North Fork. In addition, this reach of the North Fork naturally loses water to glacial alluvium. The combined influences of this dewatering periodically traps native fish including large numbers of the adult bull trout spawners in intermittent pools downstream of the irrigation diversions during the late summer and early fall.

The North Fork is one of three primary fluvial bull trout-spawning streams for the Blackfoot River. Bull trout recovery and related "core area" fisheries conservation projects involve developing compatible riparian grazing systems and eliminating fish entrainment on five canals. More recently, the North Fork restoration project evolved to a more holistic watershed approach, enrolling landowners in conservation easement programs, incorporating water conservation measures in leaky ditches, and restoring habitat conditions to six impaired tributaries (Murphy Spring Creek, Jacobsen Spring Creek, Rock Creek, Kleinschmidt Creek, Dry Creek and Salmon Creeks). In 2004 and 2005, the Blackfoot Cooperators continued to work closely with landowners on a wide range of conservation measures involving instream flow enhancement, riparian grazing changes, and channel re-naturalization on North Fork and its tributaries.

The North Fork of the Blackfoot River supports fluvial bull trout and fluvial westslope cutthroat trout, as well as rainbow trout, brown trout and brook trout in the lower basin. Fisheries-related monitoring for 2004 and 2005 included: 1) bull trout redd surveys; 2) assessments of juvenile fish abundance; 3) assessments of ditch screening projects; 4) whirling disease studies in tributaries; and 5) water temperature recordings.

Bull trout redds declined from a high of 123 in 2000 to lows ranging from 41 to 43 during the 2003-2005 monitoring period. Recent juvenile bull trout abundances in four long-term monitoring sections of the North Fork are showing similar declines. In 2005, we surveyed four irrigation canals (mile 8.7, 10.4, 11.6 and 15.5) downstream of fish screens and found bull trout at the mile 11.6 and 15.5 canals. Screens at these two sites should be evaluated.

Temperature monitoring in the lower North Fork Blackfoot River (mile 2.3) recorded a maximum summer temperature of 63.1^{o}F in August, 12.7^{o}F cooler than the 75.8^{o}F detected in the Blackfoot River at Raymond Bridge (mile 60.2).

Whirling disease infection levels remain low in the lower North Fork upstream of its spring creek tributaries (Kleinschmidt Creek and Rock Creek and Jacobsen Spring Creek). The disease remains absent from upstream bull trout spawning sites in the North Fork.

Pearson Creek Channel Reconstruction, Woody Debris Placement and Grazing Management

WATER NAME: Pearson Creek – Blackfoot River
DETAILED REPORT CITATION: Pierce and Podner (2000); Schmetterling (2000); Pierce et al. (2004); Pierce and Podner (2006)
FFI NUMBER: FFI-052-1999

Project goals and attainment of goals: Restore the stream to its original channel; improve stream flows, access to, and the condition of a historical fluvial westslope cutthroat trout spawning site. Westslope cutthroat trout recruitment has remained higher than before channel reconstruction. Modifications of grazing strategies will continue to improve habitat conditions.

Pearson Creek is a small tributary to Chamberlain Creek with a base-flow of approximately one cfs. Pearson Creek has a history of channel alterations, and adverse irrigation and riparian land management (grazing and timber harvest) practices in its lower two-miles of channel. Beginning in 1994, Pearson Creek has been the focus of a holistic restoration project involving channel reconstruction and instream habitat work, instream flow enhancement (water leasing), conservation easements and riparian grazing changes. Additional riparian grazing improvements are planned for lower Pearson Creek for 2006.

Pearson Creek is a fluvial westslope cutthroat trout spawning stream. In 2004 and 2005, we continued fish population surveys at the site (mile 1.1) established in 1999 prior to a 2000 habitat restoration project (Figure 21). We also established in 2005 a new pre-project fish population survey section at mile 0.5. The new site recorded a westslope cutthroat trout catch of 6.0/100' compared to 29.4/100' at mile 1.1. This site was totally dewatered prior to 1996 water lease; it will be used to measure the future influence of grazing changes to westslope cutthroat trout.

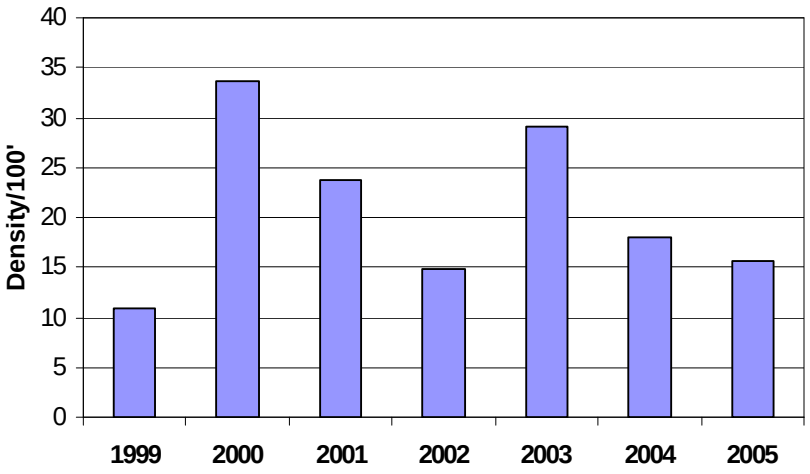

Figure 21. Density of age 1+ westslope cutthroat trout in Pearson Creek at mile 1.1, 1999-2005.

Poorman Creek Diversions, Fish Screens, Channel Restoration & Flow Enhancement
WATER NAME: Poorman Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-52-2000, FFI-012-2001, FFI-047-2002, FFI-20-2003

Project goals and attainment of goals: Improve riparian habitat conditions and enhance instream flows; eliminate fish losses to irrigation ditches; restore migration corridors; improve recruitment of native fish to the Blackfoot River. Drought, channel instability and past grazing practices have prevented anticipated populations responses.

Poorman Creek is one of the larger tributaries entering the Blackfoot River from the Garnet Mountains, entering at river mile 108.0. Poorman Creek is an impaired stream adversely influenced by hard rock and placer mining, channel alterations, poorly designed road crossings, excessive livestock grazing and irrigation dewatering. Poorman Creek also supports a naturally intermittent section of stream near the mouth. In 1999, we assessed fish populations and habitat conditions on lower Poorman Creek. These surveys identified irrigation dewatering, fish losses to ditches, channel instability and excessive riparian grazing pressure in the lower two miles of stream. The problems these surveys identified helped set the stage for a comprehensive restoration project for lower Poorman Creek beginning in 2002. Restoration projects involve the conversion of flood to pivot irrigation (consolidation of two ditches to a single pipe), screening of the intake, instream flow enhancement, the replacement of two culverts with bridges and riparian grazing changes. Grazing changes involve corridor fencing (FSA *continuous conservation reserve* program), off-stream water developments and shrub plantings – all of which continued in 2005. Upstream culvert replacements were also completed on the Stemple Pass road through the combined assistance of the Blackfoot Cooperators.

Poorman Creek supports genetically pure westslope cutthroat trout, brown trout and brook trout, and is one of only two known Garnet Mountain streams to support bull trout reproduction. Native fish densities increase in the upstream direction while non-native fish occupy lower Poorman Creek. In 2001, we established fish population monitoring sites in lower Poorman

Creek immediately up-and downstream of the irrigation project. In 2004-05, we repeated these surveys. Survey results through 2005 have not recorded a noticeable population response below the diversions (Figure 22), despite increasing flows in lower Poorman Creek. Continued drought, channel instability and past grazing impacts appear to be factors limiting population response at this early recovery phase.

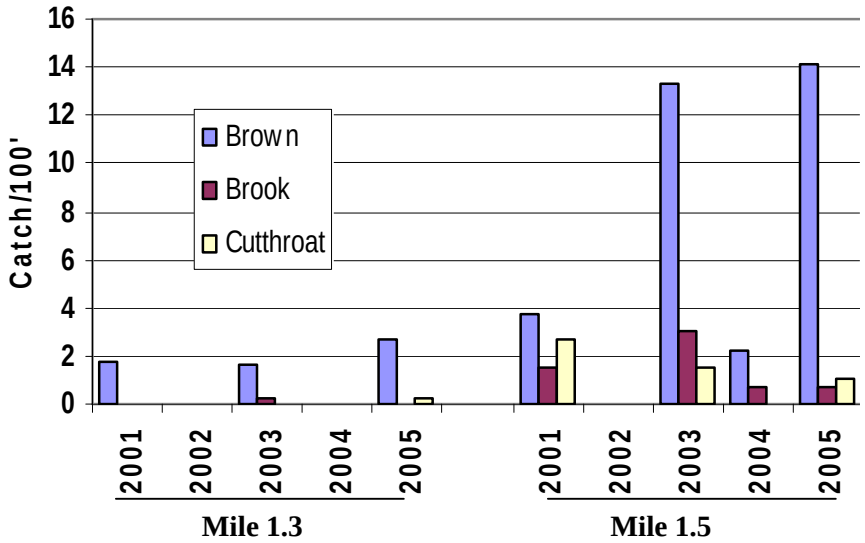

Figure 22. Catch per unit effort for fish in Poorman Creek at two locations, 2001-2005.

Monitoring of instream flows below the diversions found less diverted resulting in better connectivity to downstream waters (Mike Roberts, personal communication; Table 3).

	2001	2005
Channel seepage	40-50%	40-50%
Diversion (flow)	4-8 cfs	<3 cfs
Diversion (frequency)	nearly continuous	periodic
Connectivity	thru mid-July	thru early September
Average August flows at mouth	<0.5 cfs	2.1 cfs

Table 3. Comparison of flows in lower Poorman Creek, 2001 and 2005 (data from Mike Roberts, DNRC hydrologist).

Rock Creek Restoration

WATER NAME: Rock Creek – North Fork Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Peters (1990), Pierce (1991); Pierce et al. (1997); Koopal (1998); Pierce and Schmetterling (1999); Pierce and Podner (2000); Pierce et al. (2004); Pierce and Podner (2006)
FFI NUMBER: FFI-005-1996, FFI-033-1996, FFI-018-1998, FFI-37-1998, and FFI-14-2001

Project goals and attainment of goals: Restore migration corridors for native fish; restore natural stream morphology to improve spawning and rearing conditions for all fish using the system. Habitat restoration in Rock Creek has restored migration corridors and increased trout densities, especially brown trout.

Rock Creek, a basin-fed stream over most of its length, receives significant groundwater inflows between mile 1.2 and 1.6. Rock Creek is the largest tributary to the lower North Fork of the Blackfoot River, but has been degraded over most of its 8.2-mile length due to a wide range of past channel alterations and riparian management activities (Pierce 1990; Pierce et al. 1997). Rock Creek has also been the focus of continued restoration since 1990.

In 2004-05, the Blackfoot Cooperators reconstructed ~3,000' of the South Fork of Rock Creek, a spring creek tributary entering Rock Creek at mile 1.7. This spring generates the majority of flow to lower Rock Creek during base flow periods. Additional projects included constructed floodplain for an adjacent ~3,000' in an over-widened stream between mile three and four. These projects also employed shrub plantings and grazing changes with fencing and off-stream water developments. Active restoration is now completed over the entire 8.2-mile length of Rock Creek and its primary tributary, the South Fork of Rock Creek. Recovery of riparian areas, including plant communities, is expected to take several years.

Rock Creek supports spawning migrations of brown trout and rainbow trout in lower reaches, and brook trout throughout the length of the stream. Middle reaches provide bull trout rearing and fluvial migration corridors to small headwater populations of westslope cutthroat trout. In 2002, we continued to survey fish populations in a section (mile 1.6) of stream reconstructed in 1999. Survey results show a continued increase in trout densities and a community dominated by brown trout (Figure 23). Prior to restoration this section of Rock Creek was brook trout dominated. Bull trout and rainbow trout also periodically utilize this portion of Rock Creek in low abundance.

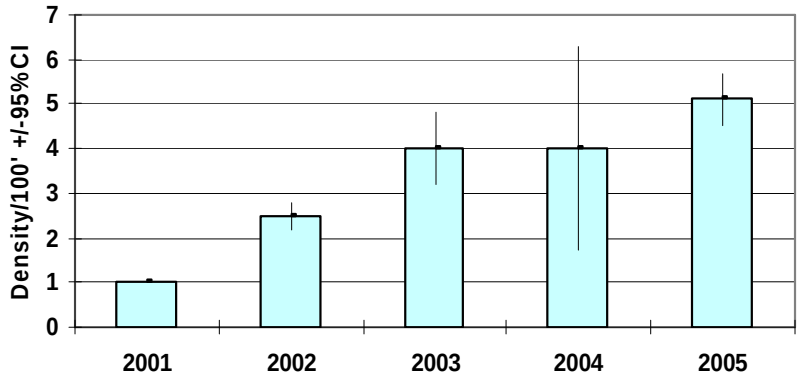

Figure 23. Densities of age 1+ brown trout in Rock Creek at mile 1.6, 2001-2005

Warren Creek Channel Restoration

WATER NAME: Warren Creek– Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: RRA-031-1993, FFI-026-1999 and FFI-036-2000

Project goals and attainment of goals: Restore riparian vegetation and stream habitat for all life stages of trout; improve spawning and rearing conditions; increase recruitment of trout to the middle Blackfoot River; moderate whirling disease. Fish densities have increased only in the upper reaches.

Warren Creek, a small tributary to the middle Blackfoot River, originates on Ovando Mountain, flows 12 miles southwest through knob-and-kettle topography until its junction with the Blackfoot River at river mile 50, with a base flow of ~3-4 cfs. Warren Creek water is used for irrigated hay production and livestock watering. Irrigation causes the middle section of Warren Creek to dewater, although the lower section gains inflow from springs and maintains perennial base-flows of 3-5 cfs. Some riparian areas in mid-to-lower Warren Creek were cleared, heavily grazed, dredged and straightened in some cases using dynamite (Don McNally, personal communication). These actions all contribute to extensive degradation of salmonid habitat over most of Warren Creek.

Since 1995, Warren Creek has been the focus of extensive restoration actions. The actions involve removal of several streamside corrals, implementation of grazing plans, shrub plantings, several miles of channel reconstruction, instream flow enhancement near the mouth, wetland restoration and the enrollment of private landowners in conservation easement programs. In 2004-2005, the Blackfoot Cooperators continued to work with private landowners on riparian grazing plans, irrigation diversions and reconstruction of channelized stream. The reconstruction project, between stream mile 5.1 and 6.8, increased stream length 96%, from 4,750’ to 9,300’. The new channel contains ~5,400’ of E-type and ~3,900’ of C-type channel and a combined mean frequency of 17 pools/1000.

In 2004 and 2005, FWP continued to monitor fish populations at five locations (miles 1.1, 2.1, 3.6, 6.8 and 8.2), all in areas of previous restoration actions. Population survey results are outlined in Figure 24. The three downstream monitoring sites (mile 1.1, 2.1 and 3.6) are in an area of channel reconstruction and grazing exclosures completed in 2000. Fisheries at these sites have not responded as anticipated, although densities of fish have increased in 2005. Drought, whirling disease, low summer flows and warm summer temperatures are suspected contributors to this static trend.

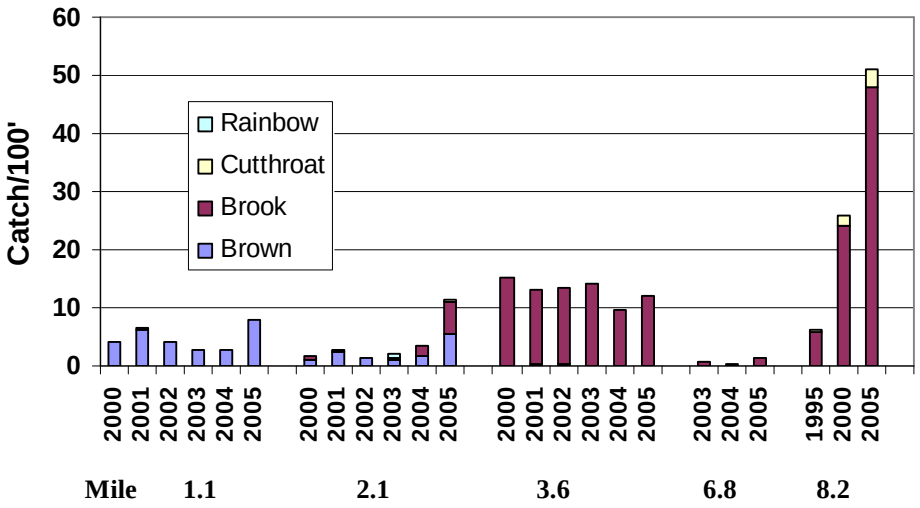

Figure 24. Catch per unit effort for trout at five sites in Warren Creek, 2000-2005.

Fish population surveys at mile 6.8 show two years (2003 and 2004) of pre-restoration monitoring and one year (2005) of post-restoration monitoring. These surveys reveal very low densities of fish. This reach is subject to chronic dewatering, fish passage barriers and livestock degradation of the stream. Other monitoring of this project involves a post-project habitat survey (Table 4). During the survey, we identified an incision over a 4000' segment of the new "E" channel. The incision is related to a faulty design, compounded by insufficient grade control. A reentry into the project in spring 2006 elevated the new channel to its proper elevation within the floodplain.

Channel and habitat type	Total Habitat Units	# Sampled Units	Bankfull Width	Bankfull Depth	Wetted Depth	Residual Pool Depth	Riffle Crest Depth	BNKFL W/D Ratio
C-type pools	70	24	11.1+1.8(8.3-14.4)	2.6+0.6(1.6-3.9)	1.2+ 0.3(0.5-1.8)	1.0+0.3(0.3-1.6)		
C-type riffles	70	24	10.9+2.0(6.3-15.2)	1.6+0.3(1.0-2.2)	0.3+0.1(0.2-0.5)		0.3± 0.1(0.2-0.4)	6.8
E-type pools	51	16	9.3+ 0.9(6.7-10.4)	2.9+0.4(2.2-3.6)	1.1+0.3(0.6-1.5)	0.8+0.3(0.4-1.3)		
E-type riffles	51	16	9.0+ 0.7(7.6-10.0)	2.4+0.3(1.9-2.9)	0.4+0.1(0.2-0.5)		0.3± 0.1(0.2-0.4)	3.8

* all measurements in feet (tenths) with mean, SD and range

Table 4. Summary of channel measurements for the Warren Creek channel reconstruction. project.

The mile 8.2 monitoring site dates to 1995 when it was established to monitor fish population response to upcoming riparian grazing project. Here, survey results show a significant increase in the densities of brook trout and westslope cutthroat trout. During this period of recovery brought on by grazing exclusion, the stream has evolved from an F-type channel to a more stable E-type channel. We continue to observe suspected clinical signs of whirling disease (opercular deformities) in a high percentage of sampled brook trout throughout Warren Creek. FWP measured the post-restoration discharge (mile 6.7, Murphy ranch) on Warren Creek in September and recorded above the diversion a flow of 2.06 cfs and below the diversion 1.24 cfs.

Wasson Creek Fish Friendly Diversion

WATER NAME: Wasson Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce and Podner (2006)
FFI NUMBER: FFI-039-1998

Project goals and attainment of goals: Restore channel maintenance flows; restore migration corridors in lower Wasson Creek in order to provide significant downstream recruitment; restore channel conditions to support spawning and rearing conditions in lower Wasson Creek; prevent fish losses to irrigation ditches; prevent the introduction of unwanted fish into the drainage; provide periodic flushing flows to Nevada Spring Creek Although these goals are being addressed, irrigation diversions still appear to be having a major detrimental effect on westslope cutthroat trout populations.

Wasson Creek is a small 2nd order basin-fed tributary to Nevada Spring Creek. Wasson Creek begins on the Helena National Forest, before entering private ranchland at stream mile 3.8. Wasson Creek enters Nevada Spring Creek ~100' below the spring source, bringing a base flow of ~one cfs during the non-irrigation season. Wasson Creek has a long history of fisheries problems that include fish passage barriers throughout the system, irrigation dewatering and entrainment of fish to ditches, excessive livestock damage to streambanks, channel straightening and water quality impairments from agricultural runoff.

The goal of the project is to ensure that Wasson Creek will be a significant source of westslope cutthroat trout recruitment to Nevada Spring Creek, Nevada Creek and the Blackfoot River, and provide sufficient forage production for economic sustainability to ranchlands, while demonstrating a successful collaborative effort.

Fisheries elements of the project include: 1) grazing management over the length of the project area; 2) irrigation changes to accommodate instream flows (low flows and channel maintenance) and fish passage, while preventing fish losses to ditches; 3) reconstruction of 3,625' of new stream in a channelized reach to increase sinuosity from 1.2 to 1.4; and 4) floodplain containment measures on ~2000' of stream to prevent losses of high flows and improve water conveyance to Nevada Spring Creek. Preventing unwanted fish species into the drainage is also to be considered in the future if needed. The Blackfoot Cooperators began implementation of the Wasson Creek restoration project in 2005 and completion is expected in 2006.

Instream flow targets (habitat maintenance and minimum flows) relate to channel "bankfull" cross-sectional area below the lower irrigation diversion, which is ~3.0 sq. ft or ~ 60% lower than the ~7.5 sq. ft upstream of the diversions. Based on these cross-section differences, we measured bankfull flows at 6.75 cfs above the upper diversion and 3.05 cfs at bankfull below the lower diversion. This 3.05 cfs value represents the flow target for channel maintenance. Likewise, minimal instream flows are also reduced proportional to the channel cross-section from ~2.0 cfs (derived from the Montana Method instream flow model) to ~0.75 cfs, maintained as such during base-flow periods. These flows ranging from a high of 3.05 cfs to minimal base flows of 0.75 cfs are to emulate the natural Wasson Creek hydrograph, which has been modeled from USGS flow data in the Nevada Creek Watershed. Flows above these targets are available for irrigation.

FWP sampled fish populations at four locations (miles 0.1, 1.0, 2.4 and 2.6), measured water temperatures at two sites (mile 0.1 and 1.3), instream flows at 3 locations in 2004 and 2005 and initiated whirling disease monitoring in lower Wasson Creek at mile 1.5. Fish population surveys show substantially lower westslope cutthroat trout densities below the upper diversion at mile 2.6, but increasing densities in the downstream direction (mile 1.0 and 2.4) during 2005 (Figure 25). Near the mouth of Wasson Creek (mile 0.1), we also found westslope cutthroat trout densities in low densities (1.3/100') and low densities of brown trout near the mouth of Wasson Creek, in addition to longnose and largescale suckers and redside shiners.

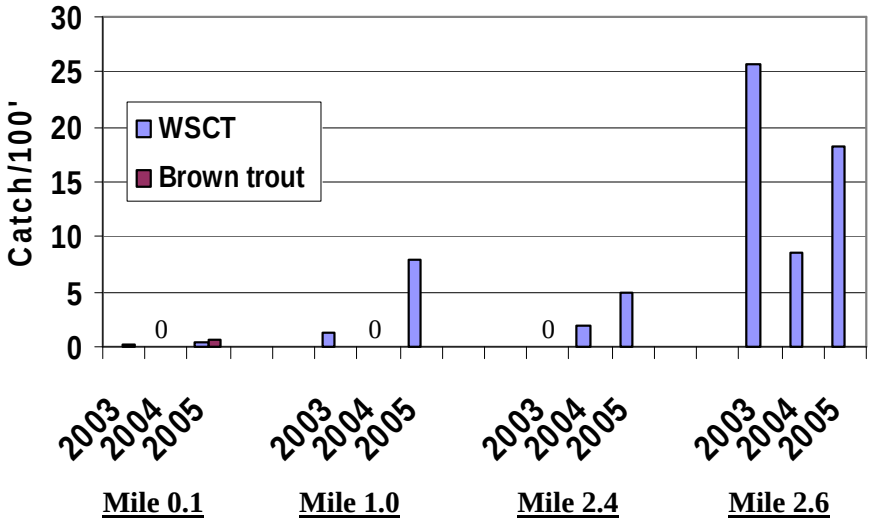

Figure 25. Catch per unit effort for westslope cutthroat trout (WSCT) and brown trout in four sections of Wasson Creek, 2003-2005.

Flow monitoring results in 2005 for Wasson Creek above and below the irrigation diversion are displayed in Figure 26. We also calculated bankfull flows from staff gauges located at stable channel cross sections in order to develop both channel maintenance (3.05 cfs) and minimal instream flow (0.75 cfs) values.

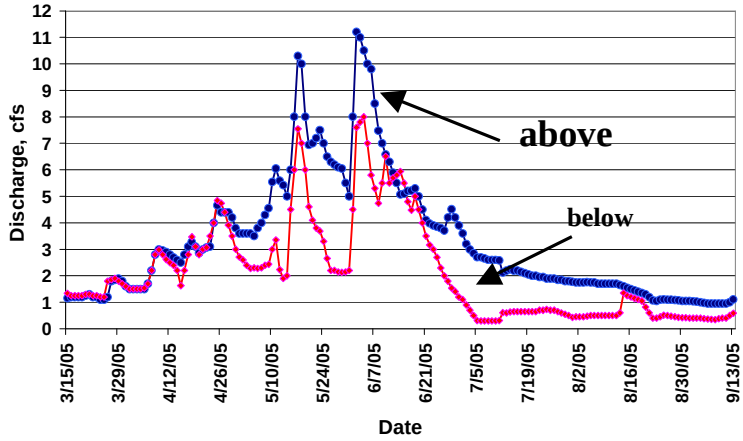

Figure 26. Flow measurements above and below the Wasson Creek diversions in 2005 (data by R. Sheilds).

Water temperatures for summer 2005 were consistently lower (range 4-9 ^{o}F) near the mouth (mile 0.1) compared to 2004, while temperatures at mile 1.3 showed no change (Figure 27). This cooling is likely the result of restoration measures including the early recovery of streamside plant communities.

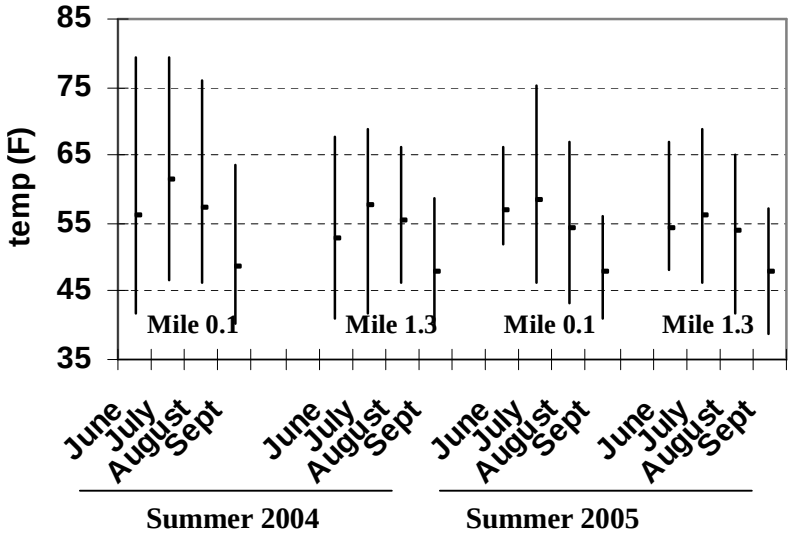

Figure 27. Monthly maximum, mean and minimum water temperatures for two sections of Wasson Creek, 2004 and 2005 (data from Don Peters).

A spawning site (McNeil core) survey was also conducted in 2005 on Wasson Creek upstream of the diversions (mile 2.6). The results show high levels of "fine" sediments in spawning riffles. This survey provides a baseline for monitoring in spawning areas under alternative grazing methods.

Bitterroot River Drainage

Camp Creek Channel Restoration

WATER NAME: Camp Creek – Bitterroot River
DATA PROVIDED BY: Chris Clancy, FWP
DETAILED REPORT CITATION: FWP files, Hamilton
FFI NUMBER: FFI-006-1999

Project goals and attainment of goals: The Camp Creek project was designed to relocate approximately 10,000 feet of the stream, which included a channelized reach along Highway 93, to its historic channel and floodplain. Also, landowners committed to the implementation of a grazing management plan to aid in revegetation efforts to allow woody species to recover and to protect the riparian area. Since trout densities remained the same, but the total length of the reach has roughly doubled, the total number of trout have increased in the reach.

Pre-project (1999) and post-project (2003-2005) trout population data for westslope cutthroat trout and hybrids as well as brook trout were obtained by electrofishing 1,000 feet sections in the same general vicinity since the old channel was filled in and a new one created. Densities in

2005 are about the same per 1000' of stream as in 1999 (Figure 28). Brook trout numbers were consistently low in 1999 when compared to westslope cutthroat /hybrid levels. Riparian wetlands have not developed well because of downcutting of the new channel

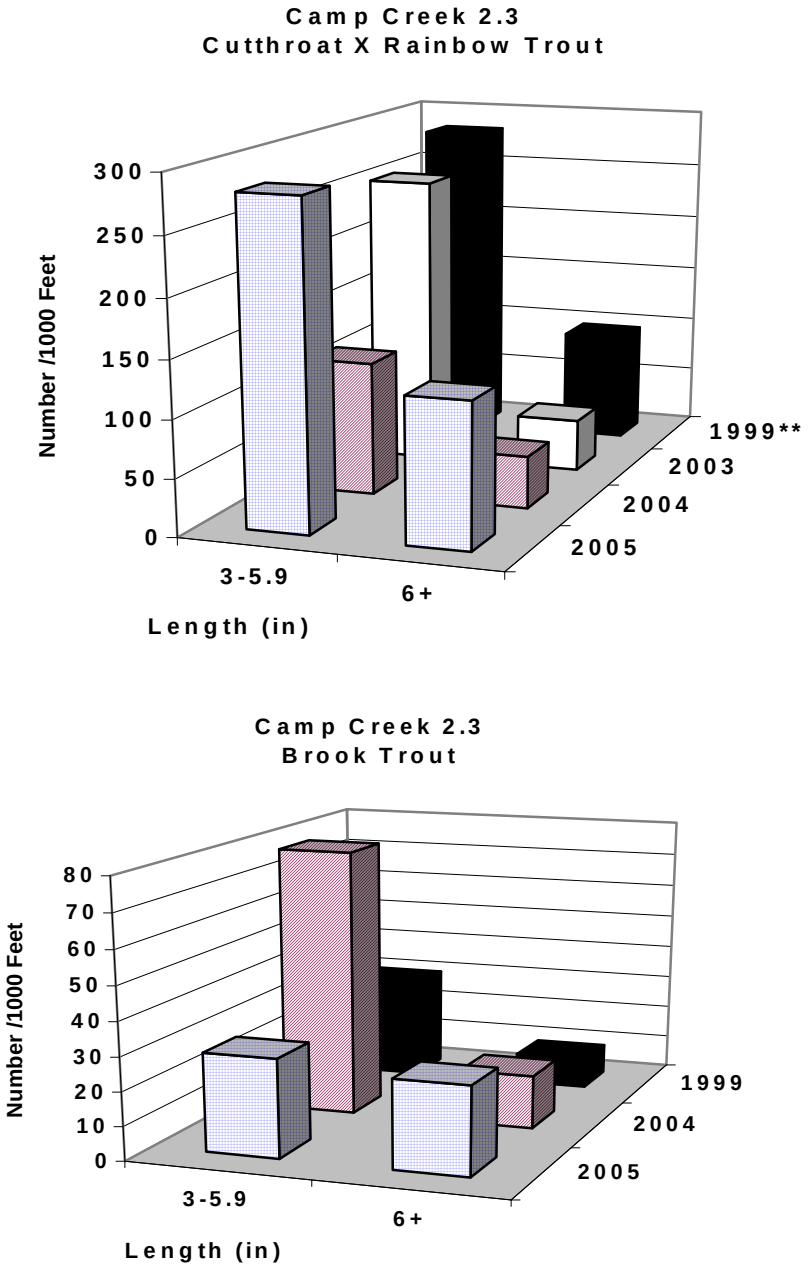

Figure 28. Westslope cutthroat trout and hybrids (top) and brook trout (bottom) densities by size groups in Camp Creek, Montana in 1999 (pre-project) and 2003 –2005 (post-project).

Clark Fork River Drainage

Rock Creek (Garrison) Instream Flow and Habitat Improvement Project

WATER NAME: Rock Creek – Clark Fork River
DATE PROVIDED BY: FWP Region 2
DETAILED REPORT CITATION: FWP files, Region 2
FFI NUMBER: FFI-020-1999

Project goals and attainment of goals: This project included the design and installation of an irrigation system to provide instream flows, provide for improved habitat, stabilization of channel reaches, and assistance with riparian management. Redd counts and population estimates indicate that brown trout and westslope cutthroat trout are using the restored reaches of Rock Creek and flow objectives are being exceeded.

The Rock Creek (Garrison) Instream Flow and Habitat Improvement project was designed to improve fish and wildlife habitat and assist with riparian management on a degraded reach of Rock Creek. Rock Creek was dewatered, over-grazed, channelized, unstable and contained virtually no pool habitat within the lower 2.5 miles. This degraded condition eliminated its potential as a spawning tributary and resulted in it contributing excessive nutrients and sediment to the Clark Fork River. This project improved fisheries and wildlife habitat in both Rock Creek and the Clark Fork River through enhanced instream flow, nutrient and sediment reduction, habitat improvement, channel stabilization, and removal of fish passage barriers. It also provided spawning, rearing and overwintering salmonid habitat, increasing wild trout recruitment to the Clark Fork River. The Rock Creek project improved fish and wildlife habitat, while maintaining historical ranching traditions and building positive partnerships between landowners, government agencies and conservation groups.

The Rock Creek (Garrison) Instream Flow and Habitat Improvement project designed and installed an irrigation system to provide instream flows, as well as improved habitat, stabilized channel reaches and assisted with riparian management. The Project converted the ranch's flood irrigated pastures to a sprinkler irrigation system. All salvaged water was donated for instream flow (5-27 cfs). The lower 2.5 miles of Rock Creek had been annually dewatered for the past 35 years. In 2 years of monitoring, instream flows were never recorded below 7 cfs, even through the drought years of 2000 and 2001. Although dewatering was the most significant cause of habitat loss in lower Rock Creek, the channel still lacked pool habitat. Less than one pool per 300 feet was suitable for overwintering habitat in the lower 7,820 feet of channel. Above this reach, pool densities increase to approximately 3-7 pools per 300 feet. Channelization and removal of large woody debris have created insufficient habitat complexity. The project restored four meanders (bank stabilization and channel reconstruction), created 46 new pools and 16 new overhead cover areas. The habitat improvements, along with the instream flow water lease, generated new spawning opportunities for Clark Fork River trout and created excellent habitat for resident salmonids.

Fisheries investigations for the Rock Creek (Garrison) Instream Flow and Habitat Improvement Project included redd counts and electrofishing population estimates. In fall 2000, 2001 and

2002, brown trout redds were counted for the lower 2.5 miles of Rock Creek. Redds were counted three times with at least one week between counts. In 2000, the surveys found 4 definite redds, 9 probable redds and 4 test digs. In fall 2001, the number of redds increased to 16 definite and 4 probable. In fall 2002, the number of redds increased to 28 definite, 8 probable and 3 test digs. In fall of 2003 and 2004, brown trout redds were counted for the lower 2.5 miles of Rock Creek, but only once each year, during the first week of November. In 2003, the surveys found 4 definite redds, 9 probable redds and 4 test digs. In 2004, the number of redds increased to 5 definite and 4 probable. The redd counts indicate that brown trout are using the restored reaches of Rock Creek.

No additional electrofishing estimates have been conducted since fall 2001 and 2002 that were reported in the 2003 report. The redd counts and population estimates indicate that brown trout and westslope cutthroat trout are using the restored reaches of Rock Creek. However, FWP monitored stream flows in Rock Creek during the 2005 irrigation season. Instantaneous measurements were recorded on Rock Creek using a Marsh/Mcbirny velocity meter and an Aquarod continuous stage recorder was installed. Discharge was normally recorded above the headgate and below the return flow (fish bypass) pipe. However, if no pivots were in operation, then flow was recorded only downstream of the headgate. No site visit was conducted before June because we were primarily interested in ensuring that flow objectives were met during the low flow season. The flow objective of a minimum of 5cfs below the headgate was exceeded during the entire irrigation season; for six measurements made between 10 July and 21 October, flows below the headgate averaged 26.6 cfs and varied form 20.59-31.84 cfs. During 2 measurements, two pivots were operating.

Upper Willow Creek Channel Restoration

WATER NAME: Upper Willow Creek – Rock Creek
DATA PROVIDED BY: George Liknes, FWP
DETAILED REPORT CITATION: FWP files, Great Falls
FFI NUMBER: FFI-029-2003

Project goals and attainment of goals: Restoration of over a two-mile reach of degraded stream, protect the restored reach from poor land use activities for at least 20 years, and enhance native fish populations. Channel restoration has been completed. It is too soon since completion of the channel work to judge the improvement of fish populations.

Upper Willow Creek in Granite County is reportedly the most important cutthroat spawning stream in the upper Rock Creek drainage. The stream was severely degraded and incised due to previous agricultural practices. This project included restoration of the dimension, pattern and profile of 9,500 feet of the altered reach to a length of approximately 12,700 ft of stream, which increased channel length by approximately 34% and reconnected the channel to the floodplain. Restoration includes reconstruction of the channel, installation of natural habitat features, rebuilding of stream crossings and irrigation structures to a more fish friendly design, and comprehensive revegetation of riparian areas. It was completed in May 2006.

Fish population estimates for brown and a composite estimate of rainbow, westslope cutthroat, and rainbow X westslope cutthroat trout hybrids should be considered baseline data for post-restoration population levels since adjustments to the habitat changes occur over several years. The estimates were made in June 2006. Brown trout population levels were higher in the control section while the rainbow, westslope cutthroat trout, and rainbow X westslope cutthroat trout hybrids were more numerous in the restored reach (Figure 29). Mountain whitefish densities were similar in both the control and restored reach (Figure 30); mottled sculpin point estimates showed higher numbers in the control section but confidence intervals showed no difference between the two sections (Figure 30).

Redd counts of fall spawning fish were made along the entire length of the restored reach in October of 2005 and 2006. Seven redds were recorded in fall 2005 while 24 redds were counted in 2006. Most redds were small enough that they were judged to be brown trout, although some may have been dug by bull trout. Redd counts for spring spawning fish have not been determined because poor visibility associated high and turbid water precluded accurate surveys.

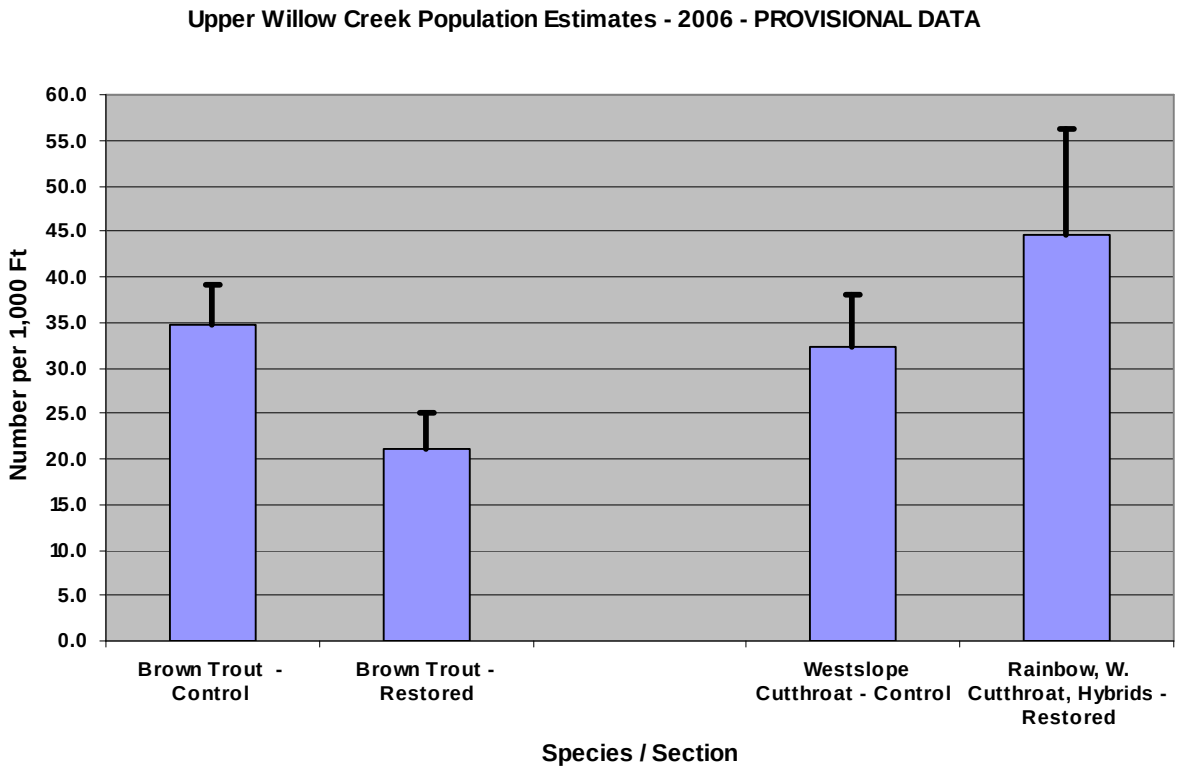

Figure 29. Brown trout and rainbow, westslope cutthroat, and rainbow X westslope cutthroat trout hybrid >75 mm densities in Upper Willow Creek, Montana in June 2006 (immediate post-project).

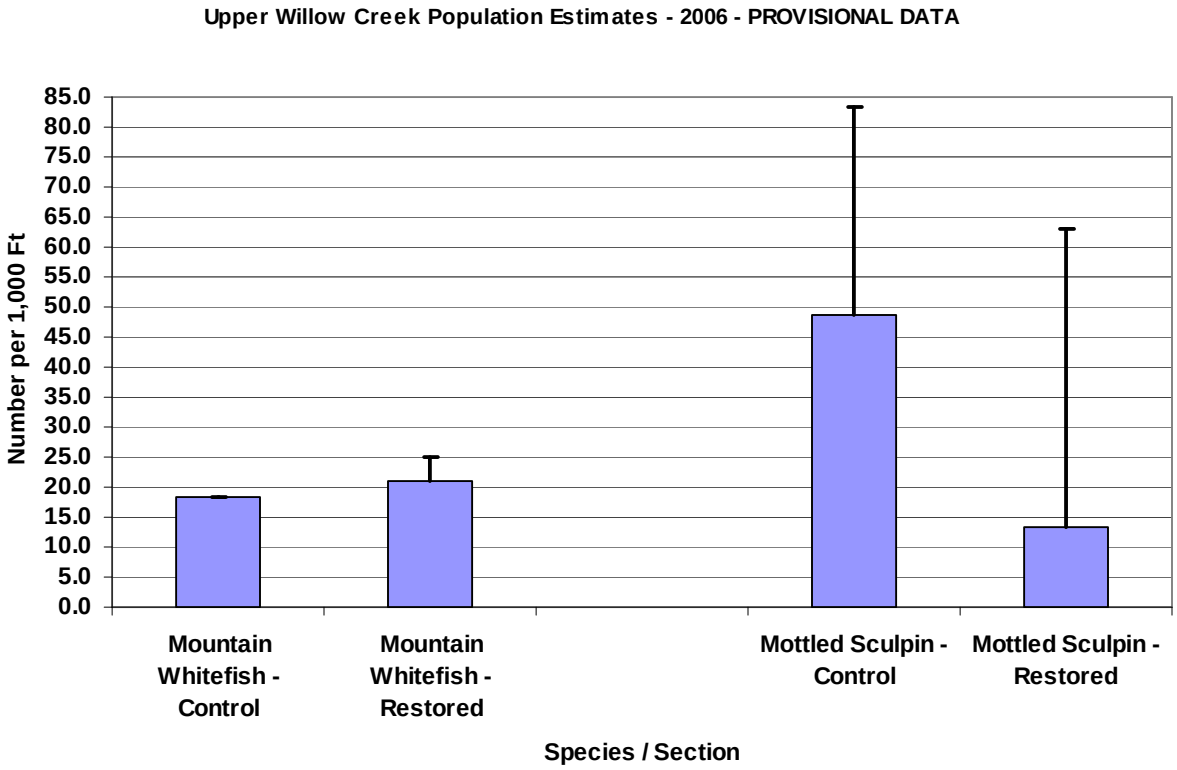

Figure 30. Mountain whitefish > 125 mm and mottled sculpin > 25mm densities in Upper Willow Creek, Montana in June 2006 (immediate post-project).

Jefferson River Drainage

Antelope Creek Habitat Restoration and Water Conservation

WATER NAME: Antelope Creek – Jefferson River
DATA PROVIDED BY: Ron Spoon, FWP
DETAILED REPORT CITATION: FWP files, Townsend
FFI NUMBER: FFI-001-2005

Project goals and attainment of goals: Habitat restoration and water conservation to improve the tributary to provide spawning habitat to increase recruitment in the Jefferson River. The project was completed in fall/winter 2005. Baseline data has been obtained. We hope to see increased spawning and rearing occur as the project develops.

Antelope Creek is a tributary that enters the Jefferson River about 2 miles upstream from Sappington Bridge. The Jefferson supports populations of brown and rainbow trout and is thought to be recruitment limited. This project involved restoration of approximately 5,400 ft. of Antelope Creek and would occur immediately upstream from its confluence with the Jefferson River. The project included building approximately 1,000 ft of new meandering channel where the stream had previously been channelized. Work also included narrowing and deepening

portions of the channel to improve sediment transport and create better habitat, redesign of channel geometry including construction of additional pools and installation of bed control structures to beneficially influence scour, water conservation resulting from replacement of an existing diversion structure and canal with a more efficient center pivot system, and riparian fencing that will result in a 70-acre riparian pasture. Grazing will be managed to protect the investment in restoration. Elimination of the irrigation canal and habitat enhancement were completed in fall/winter of 2005. Five brown trout redds were observed in the project area in 2006. Catch per unit effort survey results from before (2004) and after the project was completed (2006) showed similar numbers of brown and rainbow trout.

Hells Canyon Creek Water Lease, Fish Screens, and Diversion Improvement

WATER NAME: Hells Canyon Creek – Jefferson River
DATA PROVIDED BY: Ron Spoon, FWP
DETAILED REPORT CITATION: FWP files, Townsend
FFI NUMBER: RRA-038-1993

Project goals and attainment of goals: Improve fisheries by instream flow enhancement and eliminate entrainment of fish by installation of a fish screen. The water lease requirements have been met since this project was implemented in 1996 and flows are often exceeding those levels; without the lease in place, Hells Canyon Creek would have been dewatered downstream of the diversion from 2000-2003. Rainbow trout recruitment increased to the highest levels ever observed in 2005.

Before implementation of this project, water was diverted from Hells Canyon Creek into a highly inefficient ditch system. In 1996 a pipeline that would convey water more efficiently was constructed using River Restoration funds and the salvaged water was leased for instream flow. The leased flows are 1.60 cfs from April 1 – July 15 for rainbow trout incubation and 0.25 cfs from July 16–November 4 for fry migration and to prevent stranding.

Trout fry monitoring at the fish screen bypass documented the effectiveness of the fish screen at the head of the gravity pipeline. In 2005, the bypass pipe was sampled during 21 trap-nights from July 8 through August 17. A total of 3,974 young-of-the-year rainbow trout were captured. This represents subsampling of 25 to 45% of the flow and fish traveling through the bypass, which means the number of fish effectively screened from entering the irrigation system is much higher than the 3,974 fish captured in 2005.

Catch-per-unit-effort (CPUE) sampling has been done on Hells Canyon Creek every year since 1992, except for 2000. The creek was again sampled in 2005 and 2006 near the mouth of Hells Canyon Creek by making one pass with a backpack electrofishing unit to determine abundance of juvenile trout. In 2005, we sampled the largest number of juvenile rainbow trout we have seen since 1992. A total of 144 rainbow trout less than 120 mm in total length in 2000 seconds of electrofishing time, or 7.2 rainbow trout per 100 seconds. Previous years results ranged from 1.6 to 6.2 rainbow trout (<120 mm) per 100 seconds of electrofishing. In 2006, the number of juvenile rainbows decreased to 3.0 per 100 seconds. There are several variables potentially

influencing the abundance of juvenile rainbow trout including whirling disease, size of spawning population, spawning success, and others. The improved flow conditions in 2005 may also be a positive factor resulting in the higher abundance of juvenile trout observed in 2005 (Figure 31).

In addition, we observed brown trout spawning activity was in Hells Canyon Creek during October and November of 2005. Improved stream flow during the fall apparently allowed brown trout residents of the Jefferson River to enter the stream for spawning, which generally occurred prior to drought conditions beginning in about 2000. Brown trout were not able to enter Hells Canyon Creek for spawning from 2000 through 2003 due to low stream flow during the fall.

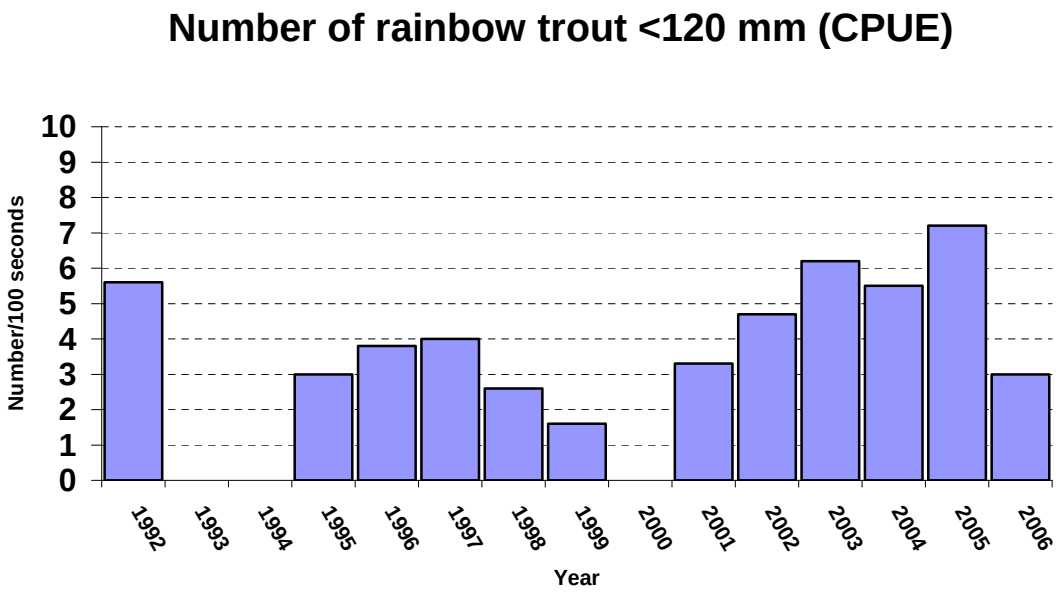

Figure 31. Catch-per-unit-effort (CPUE) of juvenile rainbow trout from electrofishing surveys in Hells Canyon Creek, Montana, a spawning tributary of the Jefferson River, 1992-2005. The CPUE values represent the number of rainbow trout (<120 mm) captured per 100 seconds of electrofishing.

Monitoring of flows has occurred in Hell's Canyon Creek to determine the lease's effectiveness. We have always found the landowners operating the Hell's Canyon Creek gravity pipeline to be in compliance with the lease. In 2005, as in previous years, discharge of Hell's Canyon Creek exceeded the pre-July 15 minimum flow value of 1.60 cfs. On July 7th, flow was measured at 7.78 cfs and by August 4th, the flow had only dropped to 4.03 cfs. Aquarod® data indicated that the flow stayed above the 0.25 cfs minimum. Summer flows stayed healthy in 2005, but from 2000 through 2003, there is no question that Hell's Canyon Creek would have been completely

dewatered downstream of the diversion if the water lease was not in place. Similarly, it is likely that Hell's Canyon Creek would have been dangerously dewatered during 2005 if the water lease were not in place.

Sappington Spring Creek Spawning Channel

WATER NAME: Sappington Spring Creek – Jefferson River
DATA PROVIDED BY: Ron Spoon, FWP
DETAILED REPORT CITATION: FWP files, Townsend
FFI NUMBER: FFI-024-2002

Project goals and attainment of goals: Connect Sappington Spring Creek to the Jefferson River to provide spawning habitat and recruitment of rainbow and brown trout. Access for fish to the Spring Creek was accomplished in 2005 and spawning use has been documented. Imprinting of rainbow trout has been initiated and spawning use should increase in future years.

Sappington Spring Creek a tributary of the Jefferson River, has great potential to provide spawning habitat for Jefferson River rainbow and brown trout but the outlet was perched about 4 feet above the river. This project involved improving habitat within the spring creek, lengthening the channel by about 1,200 ft, and re-connecting the spring creek with the river to allow Jefferson River fish to enter the spring. Construction occurred in fall 2005 on this small (<5 cfs) spring. One brown trout redd was observed soon after construction in 2005 and 5 redds have been observed in 2006 (spawning season still ongoing). No rainbow trout redds were observed in spring 2006. Rainbow trout eggs from Willow Springs Creek were imprinted in 2006, and moderate abundance of juvenile (<120 mm) brown trout (3.1 per 100 seconds electrofished) and rainbow trout (2.4 per 100 seconds electrofished) was observed in the fall 2006 survey.

Willow Springs Habitat Improvement

WATER NAME: Willow Springs Creek – Jefferson River
DATA PROVIDED BY: Ron Spoon, FWP
DETAILED REPORT CITATION: FWP files, Townsend
FFI NUMBER: RRA-004-1991, FFI-034-2004

Project goals and attainment of goals: Improve spawning areas on Willow Springs Creek to increase rainbow trout production and recruitment to the Jefferson River. A positive response was observed in rainbow trout fry production and spawning and an increase in rainbow trout numbers in the Jefferson River attributed to the habitat improvement.

Willow Springs Creek is an important spawning stream for Jefferson River rainbow trout. A scarcity of suitable spawning sites was limiting the fishery. Spawning habitat has been improved by importing gravel into the spring creek as well as into several smaller tributaries. Projects have included channel improvements and riparian fencing. No rainbow trout were observed in this tributary in the mid-1980's, and the first spawning took place in 1991, three years after imprinting rainbow trout from Hell's Canyon Creek. Fry production after habitat improvement and imprinting was significantly improved by the initial project (Figure 32) and an increase in

the number of rainbow trout residing in the Jefferson River near Willow Springs Creek was observed. The abundance of age 0 rainbow trout frequently exceeds 3.0 fish per 100 seconds, which is among the highest density of all tributaries surveyed and is considered significant spawning and rearing success. A population estimate section was established near Willow Springs in 2000, and the number of rainbow trout in this section has increased in recent years as a result of increases in spawning habitat despite severe drought conditions. Redd count data for rainbow trout spawning in Willow Springs has also been collected (Figure 33). Since 2000, redd counts have averaged 134 in Willow Springs Creek.

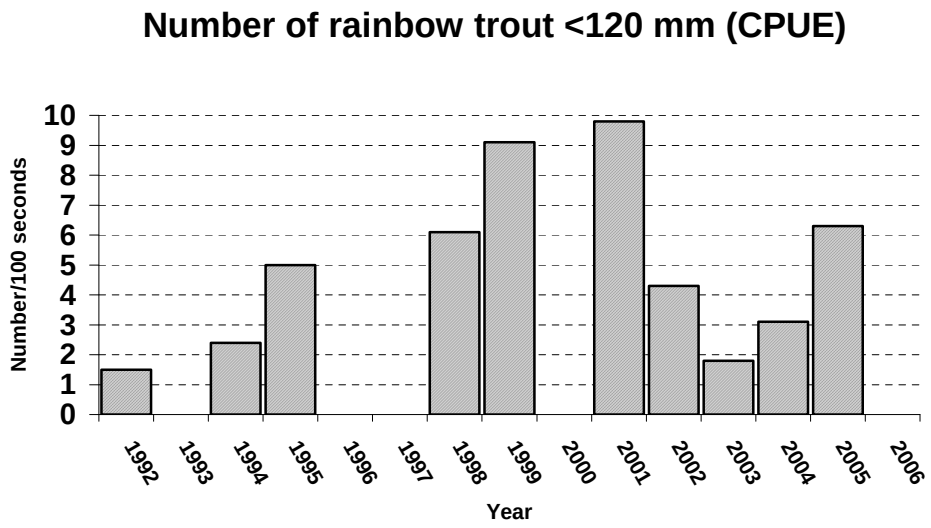

Figure 32. Catch-per-unit-effort (CPUE) of juvenile rainbow trout from electrofishing surveys in Willow Springs Creek, Montana, a spawning tributary of the Jefferson River, 1992-2006. The CPUE values represent the number of rainbow trout (<120 mm) captured per 100 seconds of electrofishing.

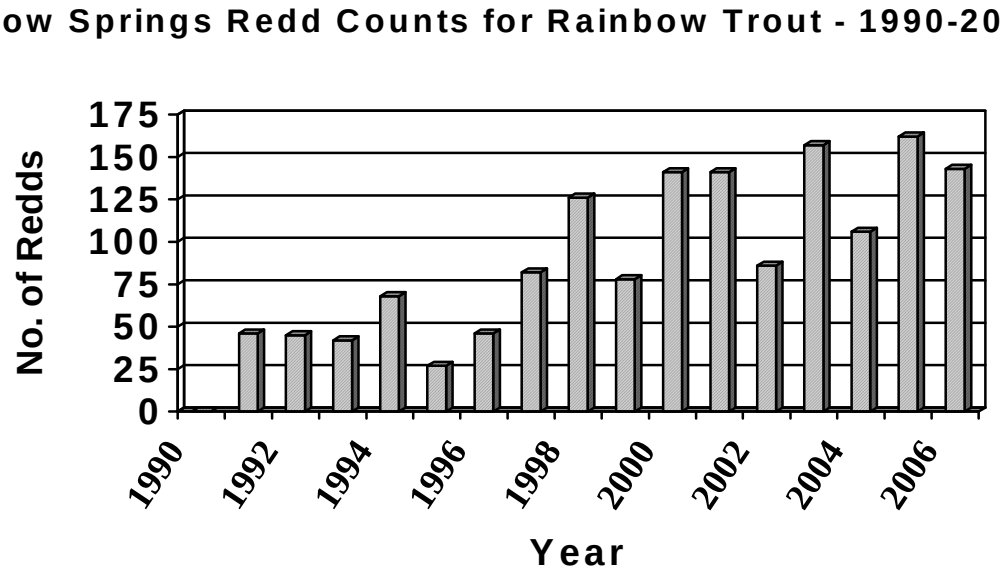

Figure 33. Rainbow trout redd counts in Willow Springs Creek, Montana, a spawning tributary of the Jefferson River, 1990-2006.

Judith River Drainage

Big Springs Creek Brewery Flats Channel Restoration

WATER NAME: Big Springs Creek – Judith River
DATA PROVIDED BY: Anne Tews, FWP
DETAILED REPORT CITATION: FWP files, Lewistown
FFI NUMBER: FFI-024-1997

Project goals and attainment of goals: Reconstruction of a straightened channelized reach to a meandering channel with access to the floodplain and enhanced fish populations. Long-term data have been collected to evaluate the FFI project for the Brewery Flats channel restoration. The increased channel length created by this project has resulted in higher overall numbers and catchable sized rainbow and brown trout (>10 inches) have also increased on a per mile basis from pre-project averages.

Big Springs Creek in the Brewery Flats area consisted primarily of a straight, rock-lined channel with high velocities due to channelization that occurred around 1910. Future Fisheries Improvement Program funds were used to restore a more natural meandering channel-type by lengthening this section of channel from 2500 feet to 3900 feet. On the ground work started in 1998; water was placed in the new channel in after electrofishing was completed in September 2000.

Mark recapture data for trout populations were collected in August or September from three sections of Big Spring Creek. Sites included the Burleigh (5860 feet) and Brewery Flats sections

above Lewistown and the 4394 feet Carroll Trail (Tresch) section below town. The Brewery Flats Section changed from 3704 feet (1995-2000) to 5104 feet in length thereafter. In 2000, a section only 3740 feet in length was electrofished at Carroll Trail. We have been electrofishing the entire Brewery Flats Fishing Access Site since 1995. Most of the section underwent restoration. However, reaches above and below the restored reach (total=1200 feet) are also included in the estimates. The restored reach comprises 3900 of the 5104 feet length. The Carroll Trail (Tresch) and Burleigh sections have somewhat natural meander pattern and are considered control sections for this project.

The Brewery Flats project increased the length of stream in the sampling section and we have noted a corresponding increase in the total number of trout in the section especially since 2003, even with population fluctuations (Figure 34). We have also observed an improvement in trout production in the Brewery Flats section since reconstruction; the average number of trout per mile in the section 10 inches and larger has increased 259 fish from a pre-project average of 618 to a post-project average of 877 per mile (Figure 35). Rainbow trout numbers for fish 10 inches and longer in the Brewery Flats Section have remained substantially higher since 2000 than for pre-2000 population levels (Figure 36). Brown trout numbers for fish 10 inches and longer in the Brewery Flats Section have also increased much more greatly than in other sections since 2000 (Figure 37). Estimates of larger (>10 inches) brown trout in 2006 are the highest ever observed in the section. Drought and other factors apparently have taken a toll on rainbow recruitment in the Brewery Flats section from 2001-2004, but in 2005 and 2006, the numbers of rainbow trout less than 10 inches long has returned to more typical levels (Figure 38). The Carroll Trail section showed low levels in 2002 while the Burleigh section remained below average for the numbers of small rainbow trout in most recent years.

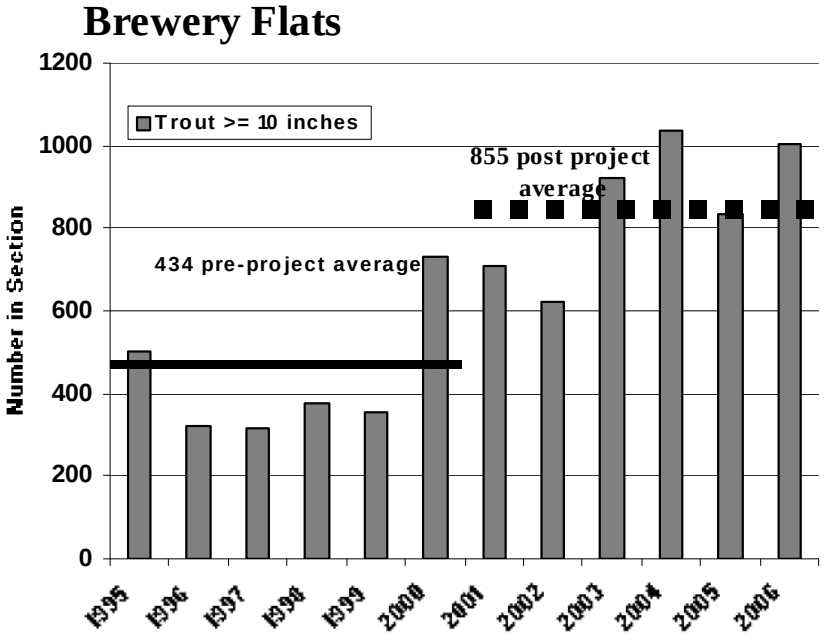

Figure 34. Estimated total number of trout 10 inches and longer in the Brewery Flats Section of Big Springs Creek, 1995 to 2006. PROVISIONAL DATA.

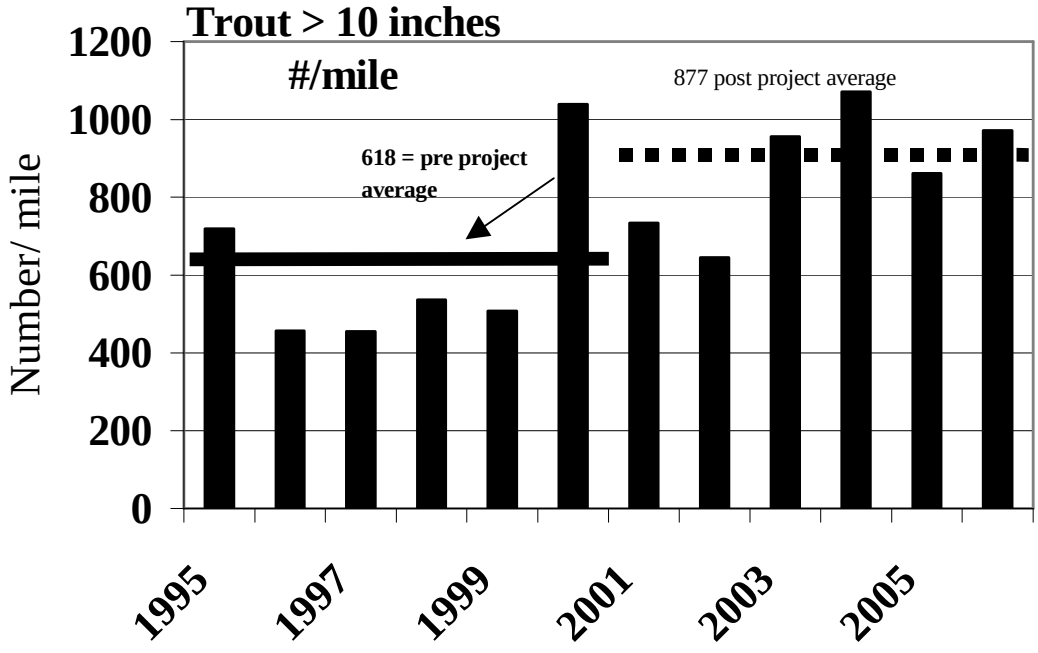

Figure 35. Estimates of the number of trout per mile longer than 10 inches in the Brewery Flats Section of Big Springs Creek from 1995 to 2006. PROVISIONAL DATA.

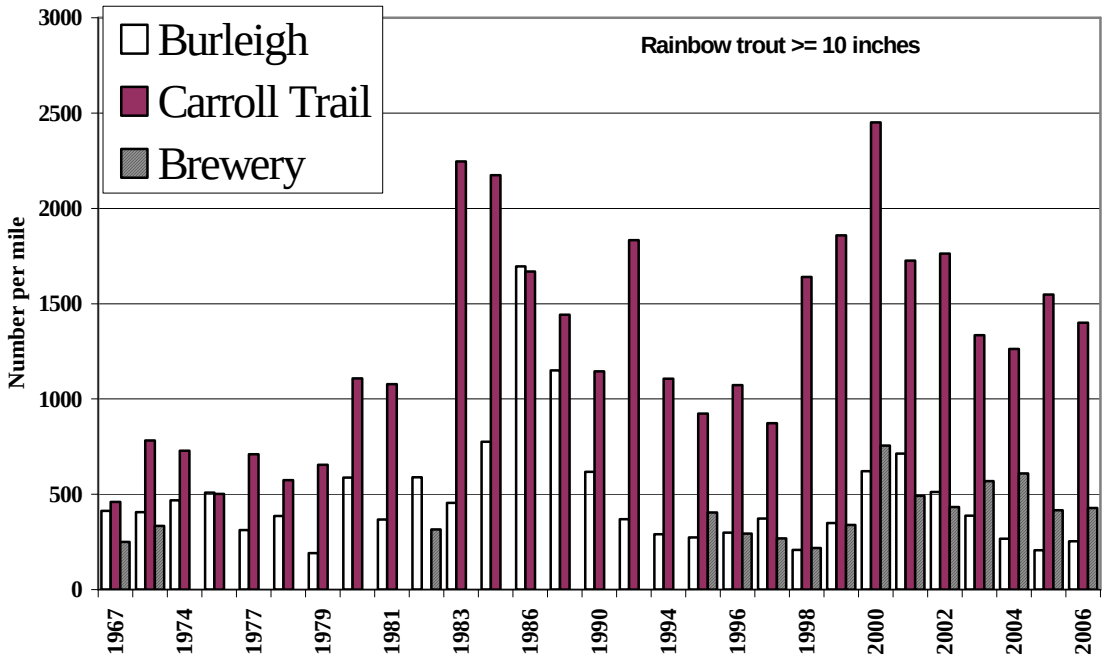

Figure 36. Estimated number of rainbow trout 10 inches and longer per mile in three sections of Big Springs Creek from 1967 to 2006. PROVISIONAL DATA.

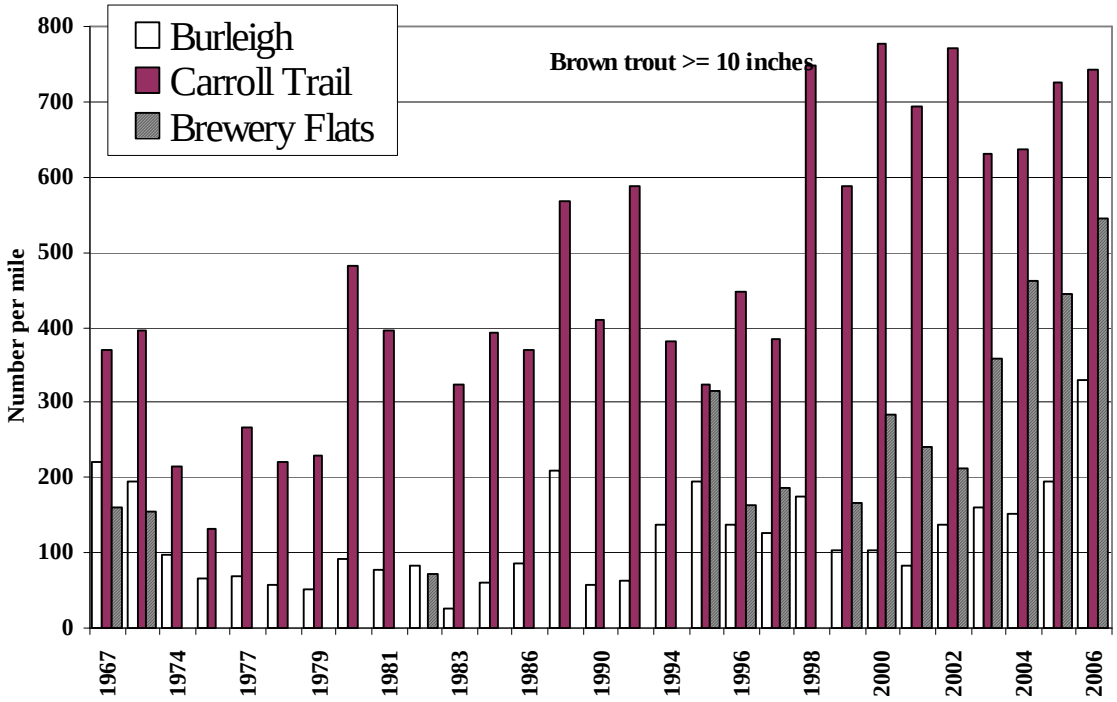

Figure 37. Estimated number of brown trout 10 inches and longer per mile in three sections of Big Springs Creek, 1967 to 2006. PROVSIONAL DATA.

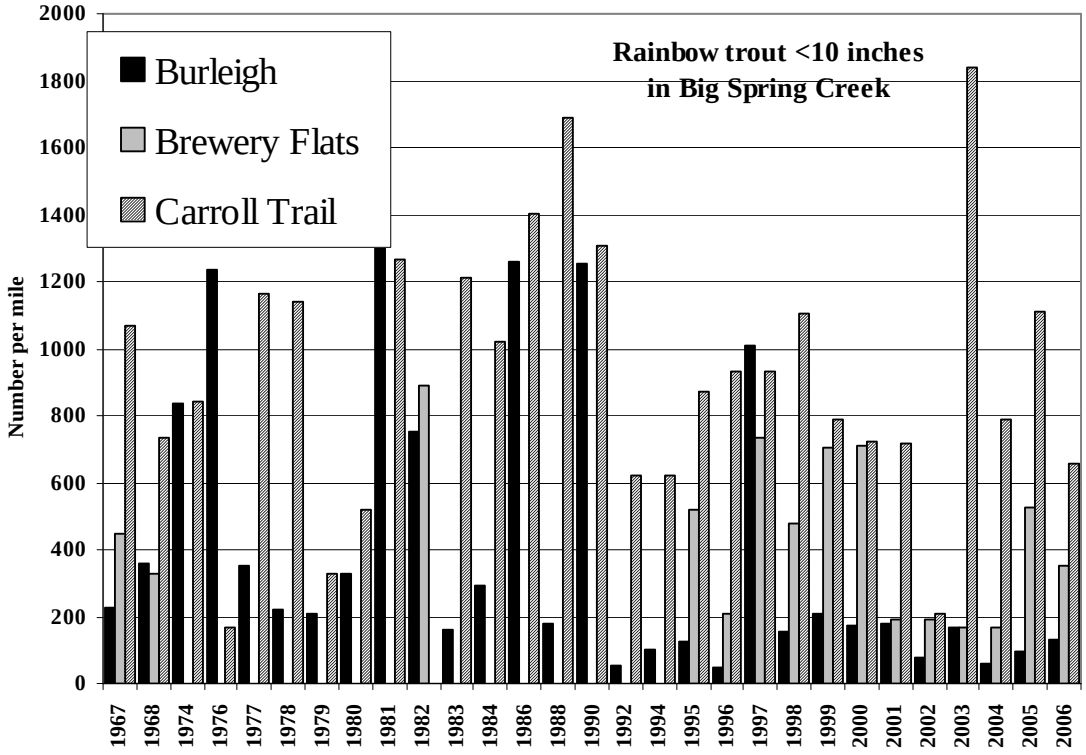

Figure 38. Estimated number of rainbow trout per mile less than 10 inches in length from three sections of Big Springs Creek, 1967 to 2006. PROVSIONAL DATA.

Cottonwood Creek Channel Restoration

WATER NAME: Cottonwood Creek – Judith River
DATA PROVIDED BY: Anne Tews, FWP
DETAILED REPORT CITATION: FWP files, Lewistown
FFI NUMBER: FFI-009-2000

Project goals and attainment of goals: Restore and relocate 2,700 feet of floodplain and stream channel with pools and riffles in a pattern profile and dimension that is typical of Cottonwood Creek in other reaches and provide increased fish habitat. Improvement in drought conditions may help provide an observable population response.

Cottonwood Creek is an important trout stream located about 8 miles southwest of Lewistown. A reach of Cottonwood Creek located on the Floyd Maxwell ranch is severely incised, gully channel and suffers from steep, raw, eroding banks. This project involved creating 2,700 ft of newly restored channel, moving the stream to the new channel, and allowing it to regain access to its floodplain.

Baseline fisheries data from 2000 was compared to the restored section electrofished in June 2006 (Figure 39). No significant increase in population densities was observed between 2000 and 2006. However, a westslope cutthroat trout was sampled in the rehabilitated reach in 2006. Damage in the restored reach from high water and drought conditions contributed to the lack of a population response.

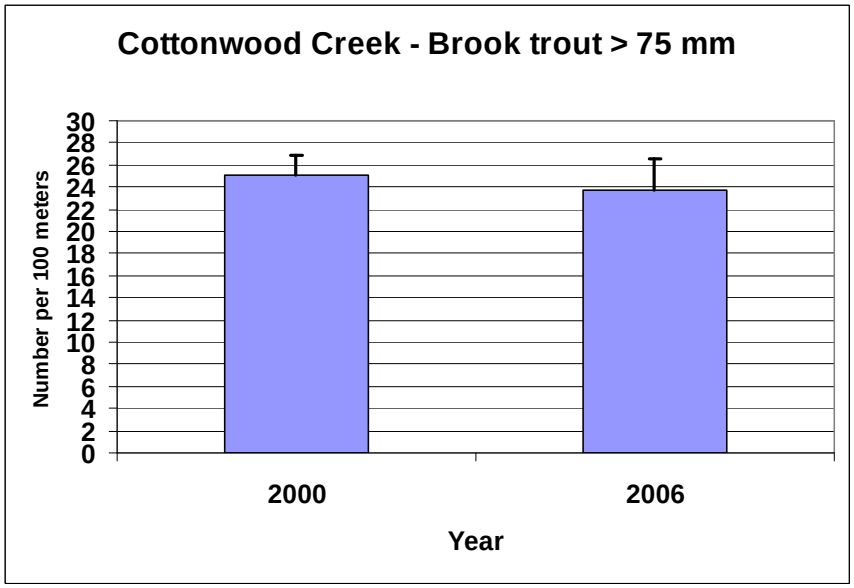

Figure 39. Estimated number of brook trout per 100 meters 75 mm and longer in the habitat restoration section in Cottonwood Creek in 2000 and 2006 on the Maxwell Ranch.

South Fork Judith River Barrier

WATER NAME: South For Judith River – Judith River
DATA PROVIDED BY: David Moser, FWP
DETAILED REPORT CITATION: FWP files, Great Falls
FFI NUMBER: FFI-027-2003, FFI-016-2006

Project goals and attainment of goals: Develop a barrier on the mainstem of the South Fork Judith to provide a secure refuge for a westslope cutthroat trout population. A barrier has been installed and removal of non-native brook trout and hybrids has been initiated. After removal, empty reaches of stream will re-colonize naturally from genetically purer upstream sources of westslope cutthroat trout with levels of hybridization less than 5 percent.

The South Fork Judith River in its upper reaches supports a nearly genetically pure population of westslope cutthroat trout. Highly hybridized fish and rainbow trout dominate most of the South Fork Judith River downstream of its confluence with Deadhorse Creek. To maintain this area as a westslope cutthroat trout stronghold, this project was developed, which involves construction of a relatively large barrier that will protect westslope cutthroat trout from continued hybridization and upstream colonization by non-native fishes in the upper 28 miles of the drainage. A design for a fish barrier to be constructed near Bluff Mountain Creek was developed in 2002; the barrier was built below Bluff Mountain Creek in summer 2006.

Additional testing and understanding of the genetics of these populations has been ongoing and is important because of backpack electrofishing equipment removals of nonnative fish and highly hybridized fish are being performed before chemical treatment takes place. In September and October 2006, non-native fish removals in the South Fork Judith River Drainage included removals in the South Fork Judith River drainage over a total of 7,350 meters. A total of 17 shocker days representing 28 hours of shocking time resulted in 4,107 hybrids and 406 brook trout removed from above the barrier. After highly hybridized fishes are removed, empty reaches of stream will re-colonize naturally from genetically purer upstream sources of westslope cutthroat trout. The overall goal is to maintain a westslope cutthroat trout fishery in the upper reaches of the South Fork Judith River with levels of hybridization less than 5 percent.

Missouri River Drainage

Deep Creek Channel Restoration

WATER NAME: Deep Creek - Missouri River above Townsend
DATA PROVIDED BY: Ron Spoon, FWP
DETAILED REPORT CITATION: FWP files, Townsend, MT
FFI NUMBER: FFI-017-1996, FFI-006-2004

Project goals and attainment of goals: Watershed problems were addressed by stabilizing eroding banks at select locations, regaining stream length, and riparian fencing over a 20-mile reach of influence on the stream. The goal was to benefit spawning runs of rainbow and brown trout since recruitment appeared to be limited by siltation. Brown trout redd counts increased to peak levels shortly after work was completed and remained at higher levels than in the pre-project survey.

In 1996, a plan was formulated and implemented to address watershed problems in the Deep Creek drainage upstream from Canyon Ferry Reservoir near Townsend, Montana. Restoration activities that included watershed restoration, stream stabilization and habitat enhancement to address water quality and fisheries concerns were completed between 1996-1999. Areas of failure were retreated in 2004.

Brown trout redd counts were completed during the fall in an upper reach (Clopton Lane to Highway 12 Bridge) in 1991 (pre-project) and post-project in 1999, 2001, 2004, and 2005. Beaver dams in the reach were also counted in most years to provide trend information. The number of brown trout redds observed in the reach increased dramatically between 1991 and 1999 but then slowly declined from 2001-2005 (Figure 40). However, the number of redds observed in 2005 was still 1.2 times that of pre-project levels.

Beaver activity and dams has also greatly increased from 1991-2001 and have remained high (Figure 40). In 1991, all dams were located in the lowest sections of the redd count reach; today, they are distributed throughout the reach. Although this created impassable barriers and inundated spawning sites, it also created rearing, adult holding and winter habitat, which may have increased brown trout population levels in the reach. The increased number of resident brown trout could also be at least partially attributable to the habitat and stabilization work. Many of the revetments that stabilized eroding banks have been inundated. Data indicates brown trout redd counts increased and remained at higher levels than in the pre-project survey. An increase in the number of beaver dams and restoration work likely stimulated an increase in brown trout numbers in the reach.

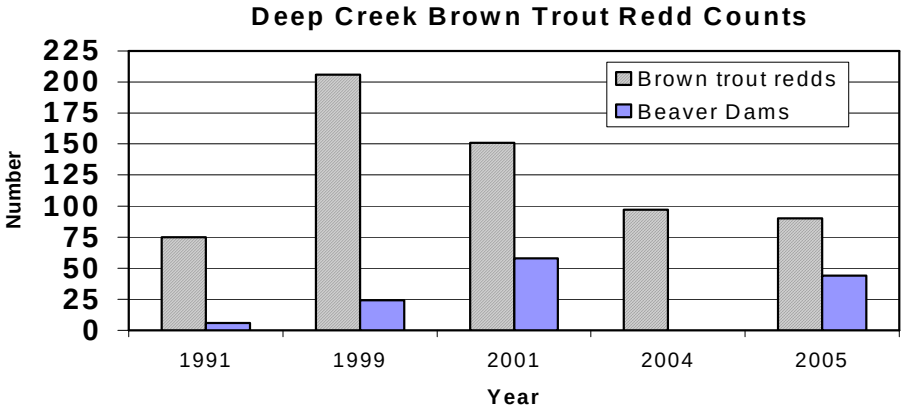

Figure 40. Brown trout redd counts and beaver dam numbers in Deep Creek, Montana 1991-2005.

Magpie Creek Fish Barrier,

WATER NAME: Staubach Creek - Canyon Ferry/Missouri River drainage
DATA PROVIDED BY: Ron Spoon, FWP
DETAILED REPORT CITATION: FWP files, Townsend
FFI NUMBER: FFI-054-1996, FFI-032-2005

Project goals and attainment of goals: Provide fish passage at barriers to increase wild recruitment of rainbow trout into Canyon Ferry Reservoir. Barriers have been removed and in 2006, high densities of rainbow trout juveniles were sampled in Magpie Creek.

Magpie Creek supports a spawning run of rainbow trout from Canyon Ferry Reservoir. However, barriers located a short distance upstream from the mouth prevented fish from gaining access to the upper reaches. The first project involved installation of a fish ladder to provide trout with access to the upper reaches of the creek for spawning. The second project involved installation of a manufactured riffle below the culvert that will bring the level of the stream up to the culvert and allow fish to move through the culvert. The perched culvert was associated with a county road crossing.

Abundance of juvenile rainbow trout above the ladder was much reduced from 2002-2005 when compared to levels observed in the mid-1990's and no rainbow trout were observed in 2005 (Figure 41). However, an extremely high number of juvenile rainbow trout were observed above the fish ladder in 2006, indicating favorable fish passage and high spawning success (Figure 41).

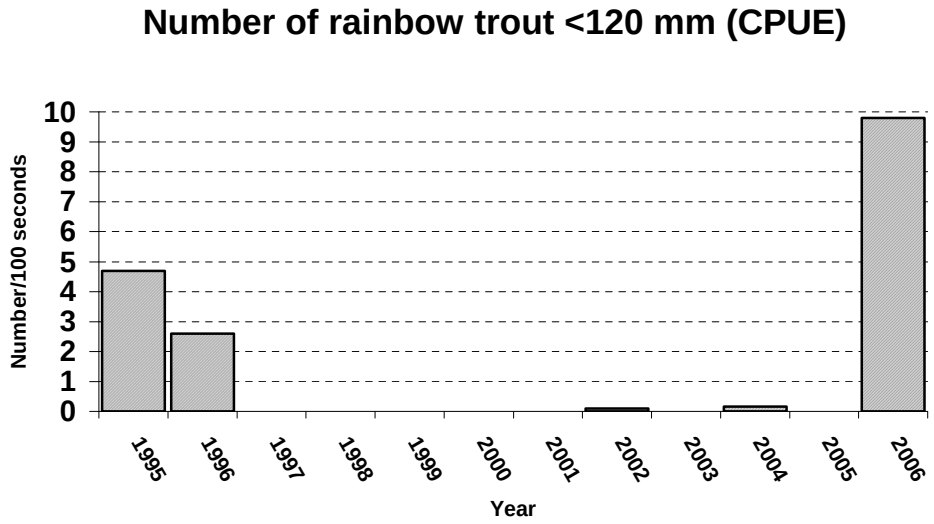

Figure 41. Catch-per-unit-effort (CPUE) of juvenile rainbow trout from electrofishing surveys in Magpie Creek, Montana, a spawning tributary of Canyon Ferry Reservoir, 1995-2006. The CPUE values represent the number of rainbow trout (<120 mm) captured per 100 seconds of electrofishing.

Staubach Creek Fish Barrier, Irrigation Improvements, and Non-native Fish Removal

WATER NAME: Staubach Creek - Canyon Ferry/Missouri River drainage
DATA PROVIDED BY: Lee Nelson, FWP
DETAILED REPORT CITATION: Nelson (2006)
FFI NUMBER: FFI-056-1998, FFI-066-1999, FFI-023-2001

Project goals and attainment of goals: Protect a westslope cutthroat trout population by installing a migration barrier and removing non-native fish by electrofishing. No brook trout have been captured in 2005 or 2006. Westslope cutthroat trout numbers and age class distributions have improved. What appeared to be a doomed population is now much more secure.

Staubach Creek is a small tributary to Beaver Creek near Winston, MT. A brook trout removal effort was initiated in the headwaters of Staubach Creek in 2000 based on information indicating much reduced westslope cutthroat trout abundance and increasing distribution and abundance of brook trout. The Staubach Creek westslope cutthroat trout population was estimated to be less than 60 fish at the initiation of the removal program, and with no isolation from brook trout the population was believed to have only a very small chance of long-term persistence. The 1.6-mile project reach is isolated by a culvert barrier to upstream moving fish, and includes both Forest Service and private lands. Between 2000 and 2003 removal efforts included intensive multiple pass electrofishing during several periods each year, summer to late autumn. As brook trout densities declined in 2004 and 2005, removal effort was reduced to a single-pass over the entire project reach, or stream sections just above the culvert barrier.

No brook trout were captured in a complete survey of the Staubach Creek project reach (1.6 miles) in 2006 (Figure 42). These results support findings from 2004 and 2005 that the brook trout population in the project reach has likely been eradicated.

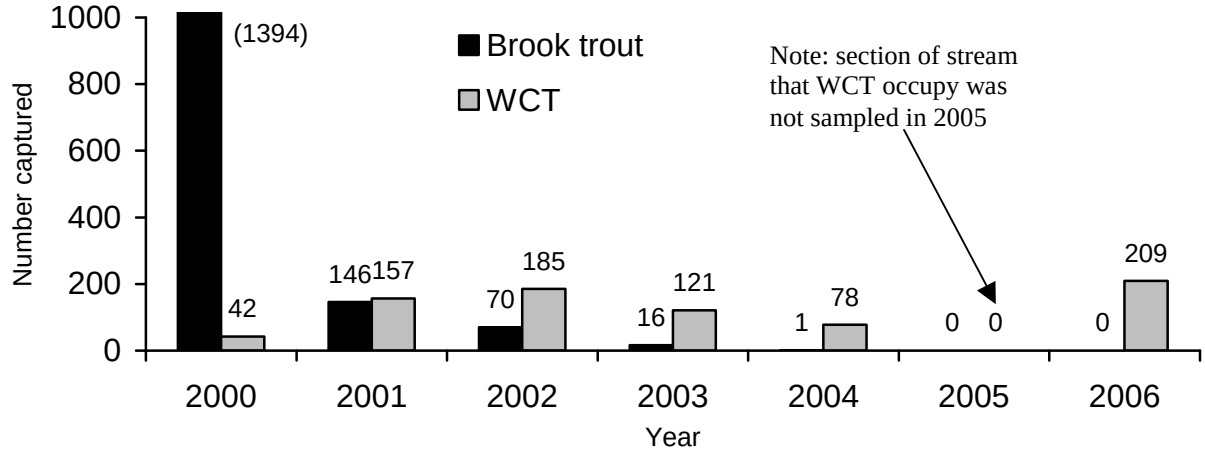

Figure 42. Number of brook trout removed and westslope cutthroat trout captured in Staubach Creek, 2000–2006.

Between 2000 and 2003 more than 1,600 brook trout were removed from the Staubach Creek project reach, including 1,394 in 2000 (Figure 42). Like the Muskrat Creek project, the removal program in Staubach Creek was successful due to both total effort expended (approximately 20-25 electrofishing passes over 5 years), and timing of efforts that removed adults prior to spawning (summer removals) and YOY as they reached vulnerable size (autumn removals). While brook trout were reduced to relatively inconsequential densities with the first two years of effort, they continued to persist into 2004 due to an abundance of woody debris in numerous areas. Brook trout eradication in the project reach would have been very possible in the first three years of effort if large woody debris had been cleared in several areas to increase removal efficiencies.

Two hundred and nine westslope cutthroat trout were captured in Staubach Creek in 2006, and the estimated total population size was 240 (age-1 and older). The abundance of westslope cutthroat trout in 2006 was the highest observed in Staubach Creek since conservation efforts were initiated, and was a five-fold increase from the 42 captured in the first year of effort (Figure 42). The population numbers were up significantly from just two years ago, when only 78 westslope cutthroat trout were captured. Age structure of the westslope cutthroat trout population also improved from previous years when typically only one year class was dominant (Figure 43). Strong age classes of yearlings (< 100 mm), sub-adult (< 150 mm), and adult fish (> 150 mm) were observed in 2006. With this improved age class distribution, and better stream flow conditions in 2006, we anticipate the westslope cutthroat trout population to continue increasing in stream distribution and abundance for the next several years.

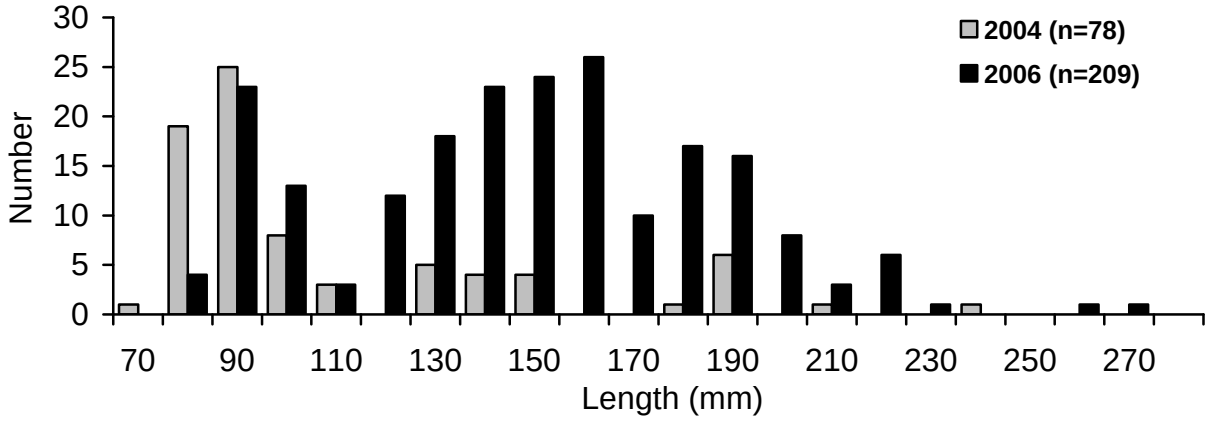

Figure 43. Length distribution of westslope cutthroat trout captured in Staubach Creek, 2004 and 2006.

Sun River Drainage

Sun River Inventory and Design - Simms to Fort Shaw; Bank Stabilization

WATER NAME: Sun River – Missouri River
DATA PROVIDED BY: Brad Shepard, Bill Hill, George Liknes and Steve Leathe, FWP
DETAILED REPORT CITATION: FWP files, Great Falls
FFI NUMBER: FFI-022-1997, FFI-046-1997, FFI-047-1997, FFI-024-1999, FFI-031-2000

Project goals and attainment of goals: Determine population densities of trout in reaches of the Sun River and address limiting factors of the populations. Although we have sampled the Sun River effectively and ascertained population information, we continue to work on improving flow conditions and habitat in the watershed.

A pilot study was done in 1997 to determine the effort needed to estimate fish populations in several sections of the Sun River (Shepard 1998). A limited effort has been continued since that time. In 2000, sections were sampled near the towns of Augusta (287 section), Simms (Simms section), and Sun River (SR section). In 2002, estimates were again obtained near Augusta. In 2003 through 2006, we were able to sample all three sections. Both rainbow and brown trout were combined to enable poor quality population estimates to be calculated (Figure 44). These data consistently suggest that the Sun River supports low population densities of rainbow and brown trout; population levels appear to have reached a low point in 2003 in all sections. Point estimates in the Simms section were consistently the lowest, and ranged from 25-58 trout eight inches and longer (combined rainbow and brown trout) per mile. The principal factor limiting trout populations are low flows year around and extreme flow fluctuations during times of low flow. Available data indicate very low fish densities reside in the Sun River, although the river supports some large brown trout and rainbow trout. Low flows that can occur anytime of year combined with major flow fluctuations are likely limiting trout populations at the present time.

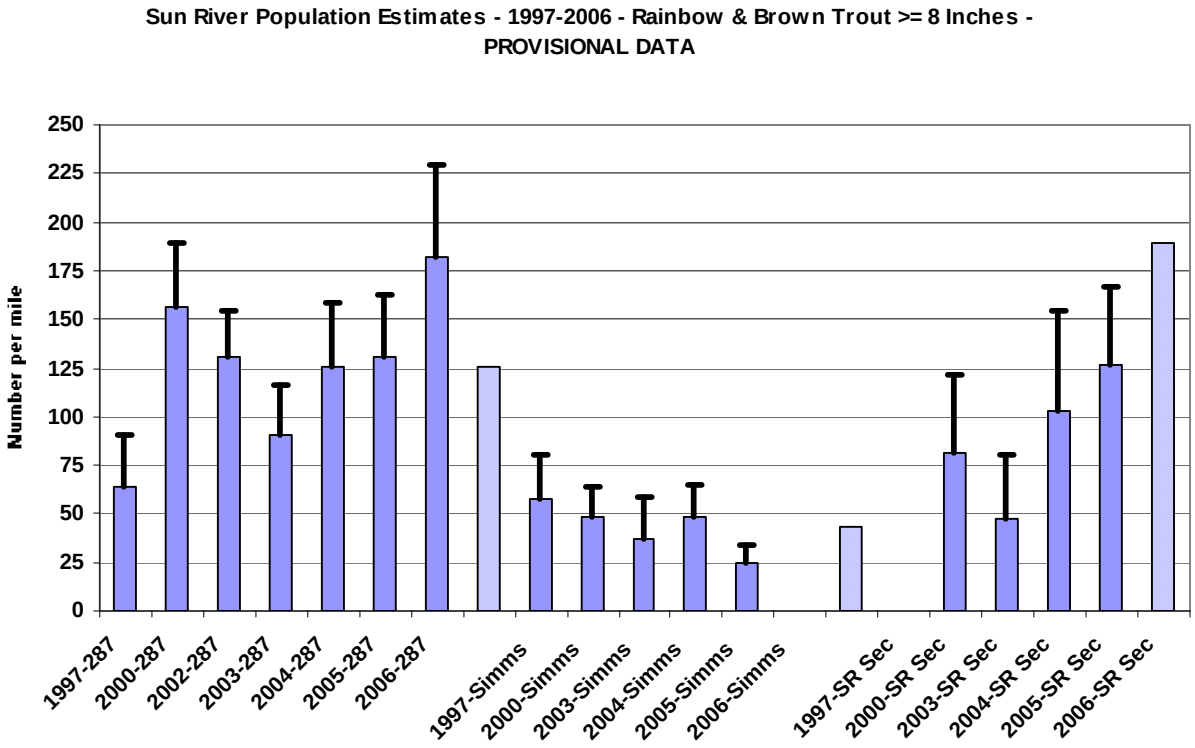

Figure 44. Population estimates (number/mile) for rainbow and brown trout eight inches and longer from three monitoring sections on the Sun River, 1997-2006. Cross-hatched bars at end of each section represent the mean number of trout per mile for the period of record. No estimates were obtained in 2006 in the Simms section and in 1997 in the Sun River (SR) section.

Yellowstone River Drainage

Big Creek Irrigation Efficiency

WATER NAME: Big Creek – Yellowstone River
DATA PROVIDED BY: Scott Opitz, FWP
DETAILED REPORT CITATION: FWP Files, Livingston
FFI NUMBER: FFI-027-1998

Project goals and attainment of goals: Maintain stream flow in the lower 1.4 miles of Big Creek to improve Yellowstone cutthroat trout recruitment to the Yellowstone River. The significant improvement in Yellowstone cutthroat trout production in Big Creek is directly attributable to water leases. Additional work is ongoing to reduce entrainment into ditches.

Big Creek, a tributary to Yellowstone River near Emigrant, is used by native Yellowstone cutthroat trout from the Yellowstone River for spawning and rearing. Historically, irrigation diversions completely dewatered the lower 1.4 miles of Big Creek. Tributary dewatering is an important, if not the major factor regulating numbers of adult cutthroat trout in the Yellowstone River.

Two water leases linked to improving irrigation efficiency in the lower Big Creek drainage were finalized in 1999. These leases provide water to lower Big Creek to improve the success of spawning Yellowstone cutthroat trout. Fry production has been greatly enhanced (Figure 45). Estimated fry production was 0 in 1988 and 3,429 in 1989. Fry trapping to monitor this lease began in Big Creek in 1999. About 3,500 Yellowstone cutthroat trout fry were captured in 1999 during 35 days of trapping, over 11,000 fry were trapped in 2000 during 44 days of trapping, and in 2001, nearly 4,250 were sampled in only eighteen days. Estimated fry production improved to over 18,000 in 2005. Yellowstone cutthroat trout redd counts increased from 27–39 in 1988-1989 to 142 in 2004 and 88 in 2005. In 2005, the Big Creek leases continued to keep the lower of 1.4 miles of Big Creek sufficiently watered to meet the objectives of the leases. Without reductions in irrigation diversions, flows would have dropped much more significantly in late August and September. The significant improvement in Yellowstone cutthroat trout production in Big Creek is directly attributable to water leases. We expect higher Yellowstone cutthroat trout recruitment to the Yellowstone River as a result**.**

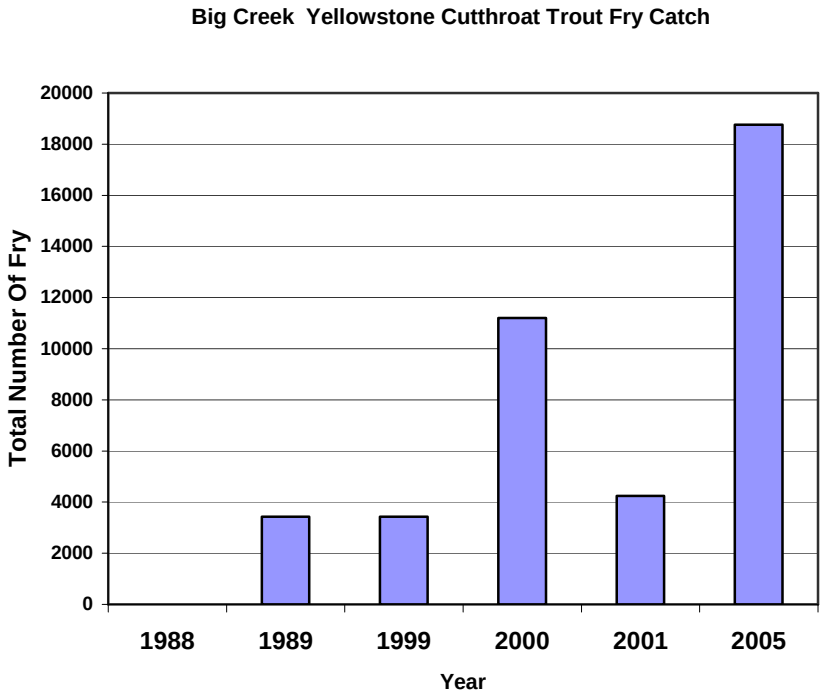

Figure 45. Total number of Yellowstone cutthroat trout fry captured in fry traps while emigrating from Big Creek from 1988 to 2005.

Cedar Creek Flow Enhancement

WATER NAME: Cedar Creek – Yellowstone River
DATA PROVIDED BY: Scott Opitz, FWP
DETAILED REPORT CITATION: FWP Files, Livingston
FFI NUMBER: FFI-036-2002

Project goals and attainment of goals: Maintain stream flow in the lower 2,700 feet of Cedar Creek to improve Yellowstone cutthroat trout recruitment to the Yellowstone River. Instream

flow improvements have helped to stabilize recruitment of Yellowstone cutthroat trout fry at higher levels than before the leases.

Cedar Creek, a tributary to Yellowstone River near Corwin Springs, historically has been an important spawning stream for Yellowstone cutthroat trout. However, during times of drought irrigation diversions dewatered the lower 2,700 feet of the stream, limiting fry production and migration into the Yellowstone River. Two in-stream flow leases are currently in place on Cedar Creek. The first lease protects a flow of 1.3 cfs in the lower 2,700 feet of Cedar Creek from May 1 to October 15 of each year. Fortunately, 1.3 cfs is the minimum flow necessary to prevent fry loss due to redd dewatering. (Byorth, 1990). The second lease protects an additional flow of 1.7 cfs in the lower reach of Cedar Creek from April 1 to November 4 of each year. This second lease provides a total protected flow of 3.0 cfs. Based on stream cross-sectional work, this flow is the minimum necessary to maximize spawning/incubation habitat.

Monitoring Yellowstone cutthroat trout spawning runs and fry production in Cedar Creek dates back to the 1980's. Cedar Creek has been a consistently important source of recruitment to the Yellowstone River fishery. Over the years, fry production fluctuated depending on flow conditions (Figure 46). Water leases appear to have stabilized production at levels similar to good moisture years prior to the leases. In 2005, redd counts and fry production demonstrated stability with 74 redds counted near the peak of spawning and fry production estimated at 11,000.

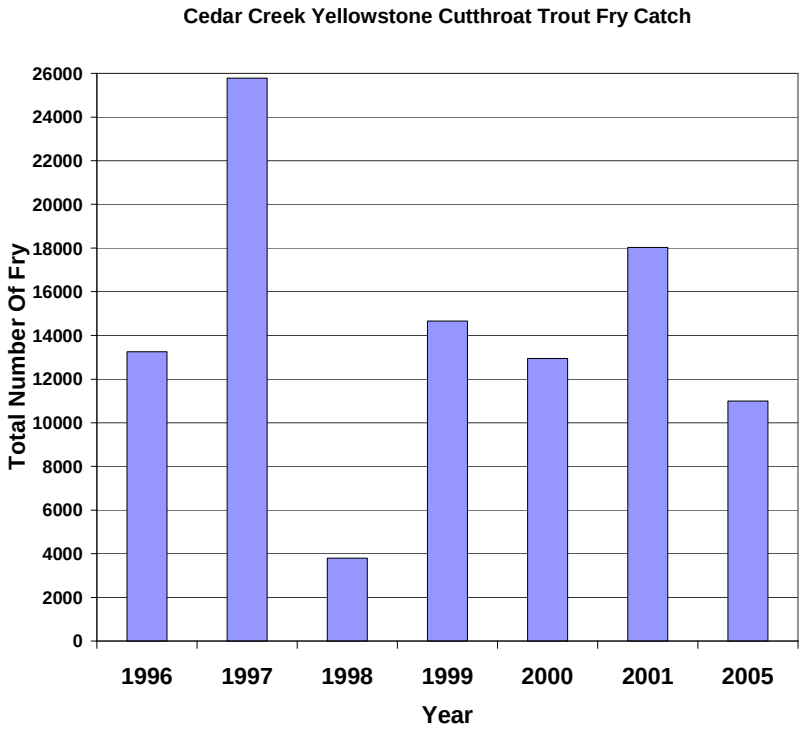

Figure 46. Total number of Yellowstone cutthroat trout fry captured in fry traps while emigrating from Cedar Creek from 1996 to 2005.

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