FUTURE FISHERIES IMPROVEMENT PROGRAM

REPORT TO 2005 LEGISLATURE
AND
FISH, WILDLIFE AND PARKS COMMISSION

Montana Fish, Wildlife & Parks

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December 2004

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MONTANA FISH, WILDLIFE AND PARKS
Fisheries Division
Habitat Protection Bureau
Future Fisheries Improvement Program
and
Bull Trout and Cutthroat Trout Enhancement Program
Summary 1995-2004

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. The report also includes a brief narrative description of all projects approved since the last reporting period. Results of project monitoring are summarized in Appendix A.

Review Panel: Panel members during this report period included: **Jim Stone,** irrigator and rancher, Ovando; **Bill Naegeli,** Green Mountain Conservation District, Trout Creek; **Doug Parrott,** commercial rancher, Roundup; **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; **Jeff Wilson,** student, Capital High School, Helena; Senator **Mike Taylor,** Proctor; Representative **George Everett,** Kalispell; **Dr. Steve Custer,** hydrologist, Montana State University, Bozeman; **Ron Steiner,** Plum Creek Timber Company, Missoula; **Dr. Marvin Miller,** 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 2003, July 2003, January 2004, and July 2004. Project proposal deadlines are January 1 and July 1 of each year. Additionally, conference calls were held in April of each year to consider proposals specifically designed to help mitigate pending droughts.

Staffing: 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. Mark also manages the Fisheries Restoration and Irrigation Mitigation Act (FRIMA) – a federal program that provides

funding for fish passage and fish screening associated with irrigation projects located west of the continental divide. This program nicely compliments the Future Fisheries Program for certain projects.

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 reports are attached (Appendices A and B). Biologist Lee Nelson (0.5 FTE, from HB 647) is responsible for cutthroat restoration efforts in the Elkhorn Mountains. 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) is assigned to conduct restoration projects in the Upper and mid-Yellowstone River drainages that will benefit Yellowstone Cutthroat Trout. Glenn Phillips, Chief of the Habitat Protection Bureau, continues to be responsible for overall program administration.

Operating Budget: Operating expenses during FY-03, FY-04, and FY-05 are summarized in Table 1.

Table 1. Future Fisheries Improvement Program (HB 349) operating expenses July 1, 2002-September 15, 2004.

Expense category	**FY-03**	**FY-04**	**FY-05**
Salaries and Benefits	102,460	119,735	21,850
Operating Expenses			
Supplies & Materials	2,898	3,611	513
Communications	1,016	503	-
Travel	7,918	8,692	1,559
Rent	1,363	654	-
Repair & Maintenance	-	45	-
Education and Training	-	540	-
Miscellaneous	272	136	-
Total	115,927	133,916	23,922

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 $0.7 million/yr to projects. Over the next ten years we anticipate continuing to spend approximately $1.5 million per biennium or about $7.5 million over the next ten years.

Projects and appropriations: To date the Future Fisheries Review Panel and Fish, Wildlife and Parks Commission have fully or partial funded 392 projects. Additionally, both the review panel and the commission approved funding for the Tongue River project. The 1995 legislature earmarked $510,000 for projects to enhance fisheries in the Tongue River; an additional $275,000 was appropriated towards this purpose by the 1999 legislature. 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.

Legislative appropriations to the Future Fisheries program include: FY-96, $2,270,000; FY-98, $1,380,000; FY-00, 1,470,000; FY-02, $1,010,000; FY-04, $210,000; Total-$6,345,000. Additionally, the 1999 legislature appropriated $750,000 from our general license account and $500,000/yr (beginning in FY-02) from the Resource Indemnity Trust (RIT) Account to the Bull Trout and Cutthroat Trout Enhancement Program. During the 2002 special session, the legislature reduced the RIT contribution to $350,000/yr for FY's 03, 04, and 05. The full amount is scheduled to be restored during FY-06.

Table 2. Summary of projects approved, program dollars committed, and matching dollars committed during each funding cycle.

Funding Cycle	Projects Approved	Program $ Committed	Matching $ Committed
Winter 96	30	$666,601	$1,722,289
Summer 96	18	164,278	172,416
Tongue River (96&99)	1	785,000	115,000
Winter 97	27	435,807	767,052
Summer 97	18	266,617	1,677,408
Winter 98	23	320,520	712,300
Summer 98	26	483,397	410,187
Winter 99	20	360,860	571,981
Summer 99	30	379,114	937,735
Winter 00	30	285,847	1,049,606
Summer 00	14	206,298	200,847
Winter 01	22	288,128	444,927
Summer 01	13	190,243	541,902
Winter 02	24	348,639	534,995
Summer 02	17	539,881	1,408,107
Winter 03	25	801,359	3,335,897
Summer 03	16	316,914	460,321
Winter 04	29	496,132	1,319,494
Summer 04	10	143,828	544,456
Total	**393**	**$7,479,463**	**$16,926,920**

Table 3 summarizes the budget and status of projects that have been approved to date. Bull trout and cutthroat trout projects funded through HB 647 are highlighted in bold. Photos illustrate examples of completed projects.

Table 3. Future Fisheries Improvement Program project funding and status (Program funds allocated and spent as of November 15, 2004). Projects highlighted in **bold** were funded under House Bill 647.

FFI#		PROJECT NUMBER, NAME & YEAR	APPLICANT	PROGRAM FUNDS COMMITTED ($)	MATCHING FUNDS ($)	TOTAL FUNDS COMMITTED ($)	PROGRAM FUNDS SPENT ($)	EXPECTED YEAR OF COMPLETION
		1996 WINTER FUNDING CYCLE						
001-96	1	Cress Spring Creek Fence	Landowner	$5,328	$12,172[a,p]	$17,500	$5,328	Complete
002-96	2	Dunham Creek Fish Screen	FWP/Landowner	15,915	12,500[a,r]	28,415	14,800	Complete
003-96	3	O'Brien Creek Restoration	FWP/Landowner	8,500	13,000[a,l]	21,500	8,329	Complete
004-96	4	Gold Creek Pool Development	FWP/Landowner	25,652	29,000[o,r]	54,652	25,652	Complete
005-96	5	Rock Creek Restoration	Consult/Landowner	12,450	9,758[a]	22,208	12,450	Complete
006-96	6	Steel Creek Restoration	FWP/Landowner	10,000	19,325[s]	29,325	9,415	Complete
007-96	7	Cottonwood Creek-Dreyer Diversion	FWP/Landowner	16,070	30,309[a,r]	46,379	16,180	Complete
008-96	8	Meadow Creek Fence	USFS	2,000	2,000[s]	4,000	0	Cancelled
011-96	9	Sweathouse Creek Enhancement	Landowners	13,305	1,500[a,e]	14,805	9,609	Complete
013-96	10	Little Beaver Creek Riparian Fence	Landowner	1,966	1,200[a]	3,166	2,125	Complete
014-96	11	Upper Big Hole River Flow Enhancement	USFWS/Landowner	20,000	45,000[a,r]	65,000	20,001	Complete
016-96	12	Whites Gulch Riparian Fence & Revegetation	USFS	19,500	12,500[e,s]	32,000	12,838	Complete
017-96	13	Deep Creek Channel Restoration	FWP/Landowners	65,000	280,000[a,e,g]	345,000	70,000	Complete
018-96	14	Lake Francis Shoreline Stabilization	Cons. District	2,500	107,500[a,e,i]	110,000	2,500	Complete
020-96	15	Dick Creek Restoration	USFWS/Landowner	6,800	0	6,800	6,520	Complete
021-96	16	Mol Heron Creek Flow Enhancement	Landowner	124,000	52,525[a]	176,525	103,369	Complete
022-96	17	Fort Peck Breakwater - Spawning Reef	ACOE	12,500	920,000[i,q]	932,500	12,000	Complete
024-96	18	Nelson Reservoir Spawning Vegetation	FWP	2,100	0	2,100	1,182	Complete
025-96	19	Nelson Reservoir Spawning Reef	FWP	5,750	1,000[t]	6,750	5,817	Complete
026-96	20	Fresno Reservoir Spawning Vegetation	FWP	2,400	0	2,400	863	Cancelled

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027-96	21	Bear Paw Reservoir Spawning Enhancement	FWP	1,200	0	1,200	1,200	Complete
028-96	22	Slemmons Pond Dam Removal	FWP	5,000	10,000[m]	15,000	2,401	Complete
030-96	23	Big Hole River Channel Restoration	TU/Landowner	62,500	7,500[a,k,p]	70,000	57,230	Complete
031-96	24	Ruby River Bank Stabilization	FWP/Landowner	16,340	7,000[a,r]	23,340	16,340	Complete
032-96	25	Elk Creek Restoration	TU/Landowner	18,075	15,000[a,k]	33,075	0	Cancelled
033-96	26	Dry Creek Rehab. & N. Fork Blackfoot	TU/Landowner	76,250	2,000[a]	78,250	74,343	Complete
036-96	27	Madison Spring Creek Rehabilitation	Consult/Landowner	15,000	17,000[a]	32,000	15,000	Complete
037-96	28	Elk Creek Rehabilitation	USFWS/Landowner	8,000	23,000[a,b,j,n,r]	31,000	8,000	Complete
038-96	29	Locke Creek flow enhancement	TU/Landowner	2,500	1,500[a,p]	4,000	0	Cancelled
039-96	30	NCAT - Agrimet Flow enhancement	NCAT	90,000	90,000[k,x]	180,000	90,000	Complete
		SUBTOTAL 1996 winter funding cycle		**$666,601.00**	**1,722,289.00**	**$2,388,890.00**	**$603,492.00**	
		1996 SUMMER FUNDING CYCLE						
041-96	31	Prickly Pear Creek Fence & Bank Stabilization	Landowner	2,000	500[a]	2,500	2,637	Complete
042-96	32	St. Regis River Channel Restoration	FWP/Landowner	27,500	26,500[e,f]	54,000	26,622	Complete
043-96	33	Little Sheep Creek Channel Restoration	USFS	10,729	20,620[s]	31,349	6,979	Complete
044-96	34	Cottonwood Creek	FWP	18,200	22,500[r]	40,700	16,500	Complete
045-96	35	North Fork Fish Screens	FWP/Landowner	10,500	20,000[a,r]	30,500	10,500	Complete
046-96	36	Blackfoot River Bank Stabilization	Consult/Landowner	1,500	6,350[a]	7,850	1,500	Complete
047-96	37	Sun River Bank Stabilization	FWP/Landowner	10,800	19,200[a]	30,000	0	Cancelled
048-96	38	Blanchard Creek Riparian Fence	DNRC	8,000	0	8,000	8,144	Complete
049-96	39	Elk Creek Assessment	Watershed group	7,300	1,000[a]	8,300	8,745	Complete
050-96	40	Beaverhead, Van Camp & Rattlesnake Slough	Landowner	22,923	9,500[a]	32,423	22,923	Complete
051-96	41	Bitterroot River Fence	Landowner	5,625	3,244[a]	8,869	2,892	Complete

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052-96	42	Blanchard Creek Feedlot Removal	Landowner	9,143	10,742[a]	19,885	0	Cancelled
053-96	43	Echo Lake Bass Rearing Habitat	Bassmasters	1,414	1,200[c]	2,614	2,387	Complete
054-96	44	Magpie Creek Fish Passage	Landowner	5,000	5,000[a]	10,000	5,000	Complete
055-96	45	Teton River Bank Stabilization	Cons. District	4,300	14,300[a,e,n]	18,600	1,700	Complete
056-96	46	Canyon Creek Bank Stabilization	Landowner	2,500	2,116[a]	4,616	2,500	Complete
057-96	47	Missouri River Bank Stabilization	Landowner	15,000	7,800[a]	22,800	15,000	Complete
058-96	48	Meadow Creek Riparian Fence	USFS	1,844	1,844[s]	3,688	0	Cancelled
		SUBTOTAL 1996 summer funding cycle		**$164,278.00**	**$172,416.00**	**$336,694.00**	**$134,029.00**	
		1997 WINTER FUNDING CYCLE						
001-97	1	Elk Creek Channel Restoration	Watershed group	55,800	84,500[a,g]	140,300	55,796	Complete
002-97	2	Fisher River Channel Restoration	Cons. District	3,300	4,000[e,x]	7,300	2,288	Complete
003-97	3	Stinger Creek Channel Restoration	Cons. Foundation	40,000	32,000[a,k,r]	72,000	39,945	Complete
004-97	4	Middle Fork Rock Creek Riparian Fence	USFS	26,000	26,000[a,s]	52,000	26,000	Complete
005-97	5	Clark Fork River Riparian Fence	Landowner	1,600	1,062[a]	2,662	1,668	Complete
006-97	6	Grantier Spring Creek Channel Restoration	Landowner	2,260	5,060[a]	7,320	2,260	Complete
007-97	7	Camp Creek Restoration	TU/Landowners	39,300	65,000[a,u]	104,300	39,300	Complete (adds to 006-1999)
009-97	8	Chamberlain Creek Diversion	FWP/Landowner	10,442	18,178[a,r]	28,620	10,442	Complete
010-97	9	O"Brien Creek Channel Restoration	FWP/Landowners	11,600	34,000[a,m,r,s]	45,600	12,708	Complete
011-97	10	N. F. Blackfoot Hoxworth/Williams Fish Screen	FWP/Landowners	14,500	24,000[a,p,r]	38,500	14,306	Complete
012-97	11	Monture Creek Fish Habitat Enhancement	FWP/Landowner	9,000	22,500[a,p,r]	31,500	8,921	Complete
013-97	12	Salmon Creek & Dry Creek Habitat Restoration	FWP/Landowner	37,384	63,000[a,k,p,r]	100,384	37,384	Complete
014-97	13	Mill Creek Channel Restoration	Consult/Landowner	38,246	32,000[a]	70,246	0	Cancelled
016-97	14	Stone Creek Channel Restoration	FWP/Landowner	8,910	5,700[a,d,e]	14,610	8,909	Complete

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017-97	15	Ruby River Channel Stabilization	FWP/Landowner	3,660	14,610[a]	18,270	3,660	Complete
018-97	16	Mol Heron Creek Fish Screen – supplement	Landowner	21,000	0	21,000	46,601	Complete
020-97	17	Black Butte Creek Riparian Fence & Stabilization	USFS/Landowner	4,500	7,500[a,n,s,x]	12,000	2,305	Complete
021-97	18	Missouri River Bank Stabilization	TU/Landowner	20,430	18,842[a,j,k,p,r,x]	39,272	20,434	Complete
022-97	19	Sun River Bank Stabilization Survey	Consult/Landowner	6,000	6,000[a]	12,000	5,044	Complete
023-97	20	Elk Creek Bank Stabilization	Consult/Landowner	11,000	27,700[a,r]	38,700	11,000	Complete
024-97	21	Big Spring Creek Restoration	FWP	35,000	235,000[f,i,m,x]	270,000	35,338	Complete
025-97	22	Dearborn River Chanel Stabilization	Landowner	4,000	5,000[a,r]	9,000	0	Cancelled
026-97	23	Townsend Ranch Streams Restoration	USFS/Landowner	10,000	28,500[a,n,s,x]	38,500	9,148	Complete
027-97	24	Bynum Reservoir Spawning Habitat	WU	9,900	3,400[t,x]	13,300	9,415	Complete
028-97	25	Hauser Reservoir Spawning Habitat	WU	4,400	500[t]	4,900	4,400	Complete
029-97	26	Dearborn River Bank Stabilization	Landowner	3,800	2,000[a]	5,800	0	Cancelled
031-97	27	Fresno Reservoir Spawning Habitat	FWP	3,775	1,000[t,x]	4,775	3,735	Complete
		SUBTOTAL 1997 winter funding cycle		**$435,807.00**	**$767,052.00**	**$1,202,859.00**	**$411,007.00**	
		1997 SUMMER FUNDING CYCLE						
033-97	28	Yellowstone River Bank Stabilization	FWP/Landowner	20,000	20,000[a,k]	40,000	20,000	Complete
034-97	29	Mud Creek Channel Restoration	Cons. Foundation	15,000	20,000[a,k,r,v]	35,000	14,950	Complete
035-97	30	Bitterroot River Riparian Fencing	Landowner	991	991[a]	1,982	0	Cancelled
036-97	31	Rock Creek Channel Restoration	USFS	20,000	625,000[s]	645,000	8,100	Complete
037-97	32	Cottonwood Creek Culvert to Bridge Conversion	FWP/County	10,000	15,000[f,p,r]	25,000	10,000	Complete
038-97	33	McCabe Creek Culvert to Bridge Conversion	FWP/County	13,000	12,000[f,p,r]	25,000	13,000	Complete
039-97	34	Johnson Creek Culvert to Bridge Conversion	FWP/Landowners	4,000	6,500[m,p,r]	10,500	4,000	Complete
040-97	35	Gilbert & Shanley Creeks Project Repair	FWP/Landowners	5,560	8,000[a,r]	13,560	5,612	Complete

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045-97	36	Mill Coulee Bank Stabilization	Consult/Landowner	13,603	33,000[a,e,n]	46,603	14,898	Complete
046-97	37	Sun River Channel Survey	Cons. Dist./Consult	5,000	0	5,000	5,500	Complete
047-97	38	Sun River Bank Stabilization	Consult/Landowner	11,963	13,034[a,d,e,n,r]	24,997	11,608	Complete
050-97	39	Canyon Creek Channel Restoration	NRCS/Landowner	12,000	17,000[a,e,n,r]	29,000	13,200	Complete
051-97	40	Boulder River Channel Stabilization	Consult/Landowner	10,000	65,438[a]	75,438	10,000	Complete
052-97	41	Careless Creek Bank Stabilization	NRCS/Landowner	2,000	435,700[a,h,n,x]	437,700	995	Complete
053-97	42	Cottonwood Creek Migration Barrier	USFS	3,000	1,270[s]	4,270	0	Superseded with 010-00
054-97	43	Union Creek Riparian Fence & Offsite Water	DNRC	10,500	29,250[a,h]	39,750	0	Cancelled
055-97	44	Muskrat Creek Migration Barrier	FWP/USFS/BLM	10,000	25,225[k,s]	35,225	6,509	Complete
056-97	45	Yellowstone River Bank Stabilization	FWP/Landowner	100,000	350,000[a,x]	450,000	100,000	Complete
		SUBTOTAL 1997 summer funding cycle		**$266,617.00**	**$1,677,408.00**	**$1,944,025.00**	**$238,372.00**	
		1998 WINTER FUNDING CYCLE						
001-98	1	Bear Paw Lake Shoreline Rearing Habitat	FWP	4,750	0	4,750	4,810	Complete
003-98	2	Beaverhead River Riparian Fencing	USFWS/Landowner	15,000	20,000[a,r]	35,000	15,000	Complete
004-98	3	Big Creek Channel Restoration	Cons. Dist./Consult	19,600	23,000[a,e,s]	42,600	19,600	Complete
006-98	4	Bynum Reservoir Spawning Habitat	WU	3,500	1,500[t,x]	5,000	3,500	Complete
007-98	5	Canyon Ferry Reservoir Spawning Habitat	WU	1,000	7,000[t]	8,000	1,100	Complete
009-98	6	Cottonwood Creek Barrier - supplement	USFS	6,000	6,000[s]	12,000	0	Superseded with 010-00
010-98	7	Deep Creek Channel Restoration	FWP/Landowner	10,400	22,000[a,d,r]	32,400	10,304	Complete
011-98	8	East Fork Bull River Bank Stabilization	FWP/Landowner	5,325	1,775[a,r]	7,100	5,728	Complete
012-98	9	Highwood Creek Bank Stabilization	Consult/Landowner	31,920	24,150[a,e,r]	56,070	24,000	Complete
013-98	10	Hughes Creek Channel Restoration	USFS	5,000	125,000[k,s,x]	130,000	5,000	Complete

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014-98	11	Kleinschmidt Creek Channel Restoration	Consult/Landowner	25,500	10,000[a]	35,500	25,500	Completed
015-98	12	Mill Creek Channel Restoration	Consult/Landowner	30,000	60,500 [a,n,r]	90,500	0	Cancelled
016-98	13	Missouri River Bank Stabilization	TU/Landowner	34,629	19,600[a,j,k,p,r]	54,229	34,629	Complete
017-98	14	Mud Creek Channel Restoration	Cons. Foundation	20,000	24,000[a,r,v,x]	44,000	0	Cancelled
018a-98	15	Spring Creek Murphy Diversion Fish Passage	FWP/Landowner	5,546	12,979[n,r]	18,525	5,546	Complete
018b-98	16	North Fork Blackfoot River Haggert Diversion	FWP/Landowner	13,300	21,300[a,r]	34,600	13,301	Complete
018c-98	17	North Fork Blackfoot River Weaver Diversion	FWP/Landowner	4,500	6,500[a,r]	11,000	3,213	Complete
018d-98	18	Blackfoot River Bank Stabilization	FWP/Landowner	6,750	11,750[a,r]	18,500	5,853	Complete
021-98	19	Ruby River Diversion Improvement	CD/Landowners	25,000	154,031[a,e,g,n,r]	179,031	8,740	Cancelled
022-98	20	Smith Pond Development	FWP/Landowner	30,000	65,000[r,u,x]	95,000	0	Cancelled
023-98	21	South Fork Dupuyer Creek Habitat Enhancement	USFS	2,800	2,000[s]	4,800	0	Cancelled
024-98	22	Sweathouse Creek Bank Stabilization	Consult/Landowners	10,000	82,575[a,r]	92,575	0	Cancelled
026-98	23	Spring Coulee Riparian Fence & Stabilization	Consult/Landowners	10,000	11,640[a,n]	21,640	10,000	Complete
		SUBTOTAL 1998 winter funding cycle		**$320,520.00**	**$712,300.00**	**$1,032,820.00**	**$195,824.00**	
		1998 SUMMER FUNDING CYCLE						
027-98	24	Big Creek Flow Enhancement	Landowners	325,000	144,000[a,r]	469,000	276,937	Ongoing
028-98	25	Bear Creek Channel Restoration	TU/Landowner	15,000	48,200[a,h,m,o,r]	63,200	16,500	Complete
029-98	26	Blackfoot River Water Conservation	FWP/Landowner	3,050	9,175[a,e,n,r]	12,225	1,560	Complete
030-98	27	Cottonwood & McCabe Cr. Bridges (supplement)	FWP/County	8,625	10,675[f,p,r]	19,300	11,787	Complete
031-98	28	McCabe Creek Habitat Enhancement	FWP/Landowner	5,000	14,000[a,p,r]	19,000	6,213	Complete
033-98	29	Nevada Creek Douglas & Helmville Fish Ladders	FWP/Landowner	3,000	5,400 [e,n,r]	8,400	3,000	Complete
034-98	30	Nevada Creek Quigley Fish Ladder	FWP/Landowner	2,980	12,980[a,e,n,r]	15,960	2,981	Complete
035-98	31	Nevada Creek Fish Friendly Diversion & Fence	FWP/Landowner	2,590	15,370[a,e,n,r]	17,960	2,590	Complete

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036-98	32	Nevada Spring Creek Culvert to Bridge Conversion	FWP/Landowner	4,000	8,000[e,r]	12,000	4,400	Complete
037-98	33	Rock Creek Channel Restoration	TU/Landowner	27,660	35,540[a,k]	63,200	30,426	Complete
038-98	34	Shanley Creek Diversion & Riparian Fence	FWP/Landowner	2,800	6,800[a,r]	9,600	2,307	Complete
039-98	35	Wasson Creek Fish Friendly Diversion	FWP/Landowner	1,250	2,400[a,e,f,r]	3,650	272	Complete
042-98	36	Careless Creek Bridge & Riparian Fence	NRCS/Landowners	10,150	4,150[a,h,n]	14,300	10,621	Complete
044-98	37	Cottonwood Creek Diversion	CD/Landowner	2,000	3,500 [a,e,n]	5,500	0	Cancelled
045-98	38	Esp/Chamber Spring Creek Channel Restoration	CD/FWP/Owners	11,600	18,400[n,r]	30,000	12,472	Complete
048-98	39	Prickly Pear Riparian Fence	Consult/Landowner	5,000	5,000[a]	10,000	0	Cancelled
050-98	40	Red Lodge Creek Riparian Fence	NRCS/Landowner	4,050	1,350[a,n]	5,400	0	Cancelled
051-98	41	Ross Fork Rock Creek Fish Ladder	USFS	2,000	4,000[s]	6,000	1,891	Complete
052-98	42	Saddle Brook Pond Restoration	WU	12,000	3,340[a,t]	15,340	13,218	Complete
053-98	43	Shields River & Elk Creek Riparian Fence	CD/Watershed Grp.	20,000	41,537[a,n]	61,537	19,139	Complete
054-98	44	Smith Creek Riparian Fence	Landowner	2,595	1,670[a,n]	4,265	2,855	Complete
055-98	45	Spokane Creek Channel Restoration	USFWS/Landowner	4,000	5,100[a,r,x]	9,100	4,000	Complete
056-98	46	Staubach Creek Fish Barrier	FWP	3,000	3,500[e,k]	6,500	3,000	Complete
057-98	47	Sweetgrass Creek Riparian Fence	Landowner	2,500	2,500[a]	5,000	2,500	Complete
059-98	48	Thompson Chain of Lakes Habitat Structures	Bassmasters	1,060	1,600[c]	2,660	898	Complete
060-98	49	Tiber Reservoir Spawning Habitat	Sportsmen's Club	2,487	2,000[a]	4,487	1,417	2005
		SUBTOTAL 1998 summer funding cycle		**$483,397.00**	**$410,187.00**	**$893,584.00**	**$430,984.00**	
		1999 WINTER FUNDING CYCLE						
001-99	1	Big Hole River Stock Water	CD/FWP	7,035	1,200[a,r]	8,235	7,035	Complete
002-99	2	Big Hole River Stock Water	Landowner/FWP	10,000	4,300[a,n,r]	14,300	7,330	Complete
004-99	3	Butler Creek Fence and Stockwater	Landowner/FWP	2,906	1,300[a]	4,206	2,881	Complete

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005-99	4	Bynum Reservoir Spawning Habitat	WU	4,000	2,500[t]	6,500	3,900	Complete
006-99	5	Camp Creek Channel Restoration	Consult/Landowner	12,000	54,950[a,k,r,u]	66,950	11,997	Complete (adds to 007-97)
007-99	6	Coal Creek Riparian Fencing	DNRC	2,400	6,600 [h]	9,000	1,886	Complete
008-99	7	Cottonwood Creek Bank Stabilization	Landowner/CD	3,150	5,718[a,e,g]	8,868	3,150	Complete
010-99	8	Douglas Creek Fish Passage	FWP	25,000	18,000[a,r]	43,000	25,000	Complete
012-99	9	Elk Creek (Scherrer) Channel Restoration	Landowner/FWS	5,000	11,500[a,b,r]	16,500	5,000	Complete
013-99	10	Flatwillow Creek Bank Stabilization	Consult/Landowner	30,525	17,250[a,k]	47,775	0	Cancelled
014-99	11	Horseshoe Lake Spawning Habitat	Bassmasters	1,000	1,150[a]	2,150	950	Complete
018-99	12	Prickly Pear Creek Bank Stabilization	Consult/Landowner	28,775	28,775[a,r]	57,550	23,775	Complete
020-99	13	Rock Creek Water Salvage & Channel Restoration	Landowner/FWP	138,346	231,283[a,n,p,r,x]	369,629	152,181	Complete
021-99	14	Ruby River Feedlot Relocation	Landowner/NRCS	18,100	60,000[a,n,r]	78,100	11,000	Complete
023-99	15	Smith River Stock Water	Landowner/CD	12,500	12,500[a,n]	25,000	12,500	Complete
024-99	16	Sun River Bank Stabilization	Consult/CD	13,712	21,500[a,e,x]	35,212	13,032	Complete
025-99	17	Tenmile Creek Riparian Habitat	Watershed Group	4,501	1,000[a]	5,501	4,401	Complete
026-99	18	Warren Creek Channel Restoration	USFWS	20,000	50,625[a,n,r]	70,625	0	2005
027-99	19	S. Fork Willow Creek Riparian Fence	Landowner/FWP	7,000	34,630[a,x]	41,630	7,200	Complete
028-99	20	Yellowstone River Huntley Fish Passage	Irrigation District	14,910	7,200[a,x]	22,110	16,400	Complete
		SUBTOTAL 1999 winter funding cycle		**$360,860.00**	**$571,981.00**	**$932,841.00**	**$309,618.00**	
		1999 SUMMER FUNDING CYCLE						
030-99	**21**	**Bad Canyon Creek Non-native Fish Removal**	FWP	6,500	0	6,500	5,529	Complete
031-99	22	Beaverhead/Poindexter Bank Stabilization	Landowner/FWP	3,117	8,112[a,r,x]	11,229	3,117	Complete
033-99	**23**	**Big Coulee Creek Fish Barrier**	FWP	1,560	1,000[s]	2,560	1,000	Complete
035-99	24	Canyon Ferry Reservoir Spawning Habitat	FWP	11,000	8,544[t,x]	19,544	10,310	Complete

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036-99	25	Clark Fork River Riparian Fence and Bank Stabilization	Landowner/FWP	1,334	1,335[a]	2,669	0	Cancelled
037-99	**26**	**Cottonwood Creek Fish Barrier**	FWP	9,550	1,600[a,r]	11,150	6,113	Complete
038-99	**27**	**Cottonwood Creek Fish Ladder Repair**	TU/FWP	4,000	7,000[a,r,x]	11,000	4,145	Complete
039-99	**28**	**Daisy Dean Creek Off-site Water and Fencing**	CDWatershed group	9,500	4,746[a,e,n]	14,246	8,870	Complete
041-99	29	Elk Creek (Artz) Channel Restoration	Landowner/FWS	7,500	10,500[a,g,k,r]	18,000	6,570	Complete
042-99	**30**	**Grave Cr Diversion Repair and Fish Screen**	CD/FWP	38,000	121,050[a,k,s,x]	159,050	38,000	Complete
044-99	31	Kleinschmidt/Rock Cr. Water Lease	TU	6,000	9,000[a,p]	15,000	0	Cancelled
045-99	32	Little Prickly Pear Cr. Fish Screen	FWP/Landowner	14,000	10,000[r]	24,000	14,500	Complete
046-99	33	Little Prickly Pear Cr. Off-Site Water & Fence	FWP/Landowner	7,225	7,425[a,r]	14,650	0	Complete
047-99	34	Lost Creek Corral Relocation	Landowner/FWP	29,832	92,250[a,r,x]	122,082	27,703	Complete
048-99	**35**	**Middle Fork Rock Cr. Riparian Fence**	USFS	5,500	5,900[s]	11,400	0	Cancelled
049-99	**36**	**Monture Creek Habitat Restoration**	TU/Landowner	5,000	10,000[p,r]	15,000	4,567	Complete
050-99	37	Ninemile Creek Bank Stabilization & Fencing	Landowner	5,000	14,325[a]	19,325	5,000	Complete
051-99	38	O-Brien Creek Grade Control Repair	FWP	2,400	1,300[m,r]	3,700	2,568	Complete
052-99	**39**	**Pearson Creek Habitat Restoration**	TU/Landowner	5,000	12,000[a,d,r]	17,000	4,875	Complete
053-99	**40**	**Prospect Creek Channel Restoration**	Watershed group	34,000	121,174[a,g]	155,174	34,000	Complete
054-99	41	Racetrack Creek Riparian Fence & Channel Restoration	Landowner/FWP	1,750	36,680[a,x]	38,430	1,750	Complete
057-99	42	Ronan Spring Cr. Channel Restoration	Community Found.	10,000	2,500[x,v]	12,500	10,000	Complete
058-99	43	Salmo Reservoir Lake Aeration	FWP	950	300[a,d]	1,250	700	Complete
059-99	44	Shields River Bank Stabilization	CD	7,000	18,838[a,h]	25,838	7,000	Complete
060-99	45	Shields River Bank Stabilization	CD	14,569	18,996[a,e]	33,565	15,336	Complete
061-99	46	S. Fk. Smith River Off-Site Water & Fence	Landowner/CD	9,975	9,975[a]	19,950	5,640	2005

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063-99	**47**	**Spring Creek Fish Barrier**	FWP/Landowner	6,000	1,000[r]	7,000	6,000	Complete
064-99	48	Spring Creek Channel Restoration	Consult/Landowner	25,000	35,310[a]	60,310	0	Cancelled
066-99	**49**	**Staubach Creek Native Fish Protection**	FWP/Landowner	3,157	3,000[a]	6,157	3,157	Complete
069-99	50	Trout Creek Channel Restoration	FWP	94,695	363,875[a,g,n,p,x]	458,570	0	Cancelled
		SUBTOTAL 1999 summer funding cycle		**$379,114.00**	**$937,735.00**	**$1,316,849.00**	**$226,450.00**	
		2000 WINTER FUNDING CYCLE						
002-00	1	Basin Creek Culvert Replacement	CT Foundation	3,900	1,950[a,s]	5,850	5,627	Complete
004-00	2	Upper Big Hole River Offstream Water	Big Hole Watershed	6,450	3,965[x]	10,415	3,155	Complete
005-00	3	Bitterroot River Riparian Fence	Landowner	4,336	4,546[a]	8,882	3,734	Complete
007-00	4	Bynum Reservoir Spawning Habitat	Walleye Unlimited	3,160	3,000[t]	6,160	2,896	Complete
008-00	5	Canyon Creek Riparian Fence	Landowner	1,485	1,650[a]	3,135	1,081	Complete
009-00	6	Cottonwood Creek Channel Restoration	NRCS/Landowner	16,681	12,094[a,g]	28,775	14,906	Complete
010-00	**7**	**Cottonwood Creek Fish Barrier**	USFS	10,000	13,075[k,s]	23,075	10,000	Complete
011-00	8	Dry Creek Riparian Fencing	FWP/Landowner	6,000	3,897[a]	9,897	0	Cancelled
012-00	9	Dupuyer Creek Channel Restoration	USFWS/Landowner	9,800	14,200[a,r]	24,000	9,802	Complete
013-00	**10**	**East Fork Bull River Channel Restoration**	Landowner	14,150	20,273[a,x]	34,423	15,565	Complete
014-00	11	Flatwillow Creek Riparian Fencing	Landowner	2,850	2,400[a]	5,250	0	Cancelled
015-00	12	Flint Creek Off-site Water and Riparian Fencing	FWP/Landowner	16,500	47,920[a,n]	64,420	14,197	Complete
017-00	13	Lost Creek Headgate Repair & Channel Restoration	FWP/Landowner	31,860	163,020[a,g,h,p,x]	194,880	0	2005
018-00	**14**	**McCabe Creek Irrigation Efficiency**	USFWS	15,084	85,000[a,p,r]	100,084	15,084	Complete
022-00	15	N. Burnt Fork Cr. Riparian Fencing	Landowner/Consul.	8,700	15,880[a]	24,580	0	Cancelled
023-00	16	Prickly Pear Creek Channel Restoration	FWP/Landowner	15,555	14,560[a,g,r]	30,115	10,753	Complete
024-00	**17**	**Prospect Creek Channel Restoration**	Watershed group	12,150	391,278[g,k,x]	403,428	12,150	Complete

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025-00	18	Racetrack Creek Off-site water & Riparian Fencing	Landowner/FWP	4,500	13,300[a,n,x]	17,800	0	Cancelled
027-00	19	Ruby Creek Flow Enhancement	USFWS/Landowner	3,000	3,000[a,r]	6,000	3,235	Complete
028-00	20	S.F. Musselshell River Fish Passage	DNRC	3,146	2,979[a]	6,125	2,696	Complete
029-00	21	S. Willow Creek Bank Stabilization & Riparian Fencing	Landowner	12,000	12,106[a,n]	24,106	0	2005
030-00	22	Stillwater River Side Channel Restoration	Landowner	10,400	14,020[a,n]	24,420	10,400	Complete
031-00	23	Sun River Channel Restoration	Consultant	5,000	73,025[a,n,x]	78,025	5,000	Complete
032-00	24	Sweathouse Creek Fish Screen	FWP/Landowner	3,000	3,000[n]	6,000	3,300	Complete
033-00	25	Tenmile Creek Riparian Restoration	Watershed Group	3,549	3,536[a,x]	7,085	3,549	Complete
034-00	26	Trail Creek Fish Ladder and Screen	Landowner	1,880	9,670[a]	11,550	0	Cancelled
035-00	27	Virginia Creek Channel Restoration	Landowner	2,875	2,875[a]	5,750	0	Cancelled
036-00	28	Warren Creek Channel Restoration	FWP	35,000	88,541[a,r,x]	123,541	34,809	Complete
037-00	**29**	**West Fork Wilson Creek Fish Barrier**	FWP	12,500	7,500[s,x]	20,000	13,750	Complete
038-00	30	Yellowstone River Riparian Restoration	Consultant	10,336	17,346[a]	27,682	11,369	Complete
		SUBTOTAL 2000 winter funding cycle		**$285,847.00**	**$1,049,606.00**	**$1,335,453.00**	**$207,058.00**	
		2000 SUMMER FUNDING CYCLE						
041-00	31	Big Creek Fish Screen	Landowner	57,500	14,700[a]	72,200	63,464	Complete
042-00	32	Bitterroot River Fish Screen	Ditch Company	42,000	50,000[a,k]	92,000	42,000	Complete (adds to 033-2002)
043-00	**33**	**Butler Creek Fish Passage**	FWP	6,400	480[a]	6,880	4,672	Complete
044-00	34	Canyon Ferry Perch Spawning Habitat	FWP	4,770	18,722[t,x]	23,492	4,770	Complete
045-00	**35**	**Dempsey Creek Corral Relocation**	Cons. District	11,608	13,580[a,n,x]	25,188	8,824	Complete
046-00	36	Kolb Spring Creek Channel Restoration & Fencing	FWP/Landowner	55,530	36,275[a]	91,805	56,484	Complete
049-00	37	Newlan Creek Riparian Fencing and Stockwater	Cons. District	1,290	10,760[a]	12,050	0	Cancelled
051-00	**38**	**O'Brien Creek Riparian Fencing**	FWP	940	715[a]	1,655	940	Complete

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052-00	39	Poorman Creek Channel Restoration	Consultant	4,165	18,015[a]	22,180	4,165	Complete
053-00	**40**	**Silver Butte Fisher Creek Bank Stabilization**	NRCS	3,350	17,650[a,n]	21,000	3,350	Complete
056-00	41	Tongue River Riparian Fencing	FWP/Landowner	3,920	2,250[a]	6,170	2,611	Complete
057-00	42	Trout Creek Fish Ladder	FWP	4,100	4,100[m]	8,200	0	Cancelled
058-00	43	Wolf Creek Fish Passage	FWP	2,425	4,000[m,k]	6,425	2,091	Complete
059-00	44	Region 6 Pond Aeration	FWP	8,300	9,600[d]	17,900	8,515	Complete
		SUBTOTAL 2000 summer funding cycle		**$206,298.00**	**$200,847.00**	**$407,145.00**	**$201,886.00**	
		2001 WINTER FUNDING CYCLE						
002-01	1	Camp Creek Bank Stabilization	Landowner	5,000	3,632 [a,n]	8,632	0	Cancelled
005-01	**2**	**Dunkleberg Creek Habitat Enhancement**	Landowner/TU	1,000	1,000 [a,x]	2,000	250	Complete
006-01	3	Elk Creek Channel Restoration	USFWS/Landowner	7,000	19,500 [a,e,g,r]	26,500	3,500	Complete
007-01	4	Hauser Reservoir Perch Spawning Habitat	FWP	5,000	19,428 [m,t,x]	24,428	4,119	Complete
008-01	**5**	**Marshall and Deer Creeks Fish Screens**	FWP	13,100	4,400 [m]	17,500	1,377	Complete
009-01	6	Mill Creek Culvert Replacement	Landowners	11,800	27,277 [a]	39,077	11,800	Complete (adds to 020-04)
010-01	7	Missouri River Riparian Restoration	Landowner/TU	13,000	39,800 [j,p,r,m,g]	52,800	8,043	Complete
011-01	8	Pinltar Creek Flow Enhancement	USFWS	9,000	11,300 [a,r]	20,300	8,996	Complete
012-01	**9**	**Poorman Creek Flow Enhancement**	TU/FWP	35,000	39,022 [a,g,r]	74,022	35,000	Complete (adds to 047-2002)
013-01	10	Rattlesnake Creek Side Channel Stabilization	Landowner	21,500	38,000 [a,x]	59,500	21,500	Complete
014-01	**11**	**Rock Creek Channel Restoration**	TU/Landowner	41,341	64,591 [a,m,p,r]	105,932	34,486	Complete
015-01	12	Rock Creek Supplemental Funding	FWP/Landowner	10,000	0	10,000	10,000	Complete (adds to 020-99)
016-01	13	Shields River Bank Stabilization	DNRC	4,000	4,000 [a]	8,000	1,899	2005
017-01	14	Sixmile Creek Diversion Repair	FWP/Landowners	4,000	20,035 [a]	24,035	3,739	Complete
019-01	**15**	**S.F. Warm Springs Creek Fish Barrier**	FWP	3,500	3,675 [a,d]	7,175	0	Cancelled

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020-01	16	Teton River Diversion Stabilization	Watershed group	8,980	17,600 [a,r,x]	26,580	8,678	Complete
022-01	17	White Pine Creek Channel Stabilization	Watershed Group	20,000	31,000 [a,g,x]	51,000	20,000	Complete
023-01	**18**	**Non-native Fish Removal**	FWP	17,400	57,600 [d,p,s]	75,000	15,256	Complete
		SUBTOTAL 2001 WINTER FUNDING CYCLE		**$230,621.00**	**$401,860.00**	**$632,481.00**	**$188,643.00**	
		2001 SPECIAL DROUGHT FUNDING CYCLE						
024-01	19	Big Hole River Soil Moisture Meters	Watershed Group	1,358	3,917 [e,r,x]	5,275	1,358	Complete
025-01	20	Blackfoot River Soil Moisture Meters	Watershed Group	4,849	4,850 [x]	9,699	4,849	Complete
027-01	21	Jefferson River Soil Moisture Meters	NCAT	6,300	6,300 [g,x]	12,600	0	Cancelled
028-01	**22**	**Locke Creek Irrigation Conversion and Lease**	FWP/Landowner	45,000	28,000 [a,p]	73,000	45,000	Complete
		SUBTOTAL DROUGHT FUNDING CYCLE		**$57,507.00**	**$43,067.00**	**$100,574.00**	**$51,207.00**	
		2001 SUMMER FUNDING CYCLE						
031-01	**23**	**Antelope Creek Riparian Fence**	Landowner/FWP	$30,000	$42,252 [a,n,x]	$72,252	$18,625	2005
032-01	**24**	**Antelope Creek riparian fence and off-site water**	Landowner/FWP	$20,320	$33,855 [a,m,x]	$54,175	$0	2005
034-01	25	Bitterroot River Riparian Fence	Landowner	$3,933	$6,226 [a]	$10,159	$3,641	Complete
035-01	26	Big Otter Creek Corral Relocation	Landowner	$4,220	$4,220 [a]	$8,440	$0	2005
036-01	27	Bitterroot River Bank Stabilization	Landowner/ Consultant	$6,050	$37,875 [a,x]	$43,925	$0	Cancelled
037-01	28	Boulder River Fish Ladder	Trout Unlimited	$8,000	$4,000 [x]	$12,000	$11,015	Complete
039-01	**29**	**Dunham Creek Channel Restoration**	FWP	$34,000	$190,000 [p,r,x]	$224,000	$37,400	Complete
041-01	30	Little Sleeping Child Creek Fish Ladder	Landowner/ consultant	$10,400	$29,025 [a]	$39,425	$0	Cancelled
042-01	31	Nevada Spring Creek Channel Restoration	Landowner/ consultant	$35,000	$108,204 [a,e,p,r,x]	$143,204	$35,000	Complete

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043-01	32	Painted Robe Creek Off-site Water Development	NRCS/ Landowner	$2,000	$44,492 [a,g,h,n]	$46,492	$0	Cancelled
046-01	33	Sullivan Creek riparian fence	Landowner/NRCS	$1,460	$3,479 [a]	$4,939	$0	Cancelled
047-01	34	Sullivan Park Pond Construction	Glasgow WU/ FWP	$30,600	$37,074 [x]	$67,674	$0	Cancelled
049-01	35	Region 6 Pond aeration	FWP	$4,260	$1,200 [d]	$5,460	$4,512	Complete
		SUBTOTAL 2001 summer funding cycle		**$190,243.00**	**$541,902.00**	**$732,145.00**	**$110,193.00**	
		2002 WINTER FUNDING CYCLE						
001-02	1	Alderman Spring Creek channel restoration	Landowner/ Consultant	$10,000	$61,000 [a,n]	$71,000	$10,005	Complete
002-02	2	Beaver Creek diversion repair	FWP	$2,000	$1,096 [s]	$3,096	$1,497	Complete
003-02	**3**	**Beaver Creek channel restoration**	FWP	$43,090	$45,800 [h,m,x]	$88,890	$0	2005
004-02	4	Big Timber Creek channel stabilization	Landowner/ Consultant	$22,500	$95,873 [a]	$118,373	$22,500	Complete
005-02	5	Canyon Ferry perch spawning habitat	FWP	$7,500	$9,604 [t,x]	$17,104	$7,047	Complete
006-02	**6**	**Chicken Creek flume installation**	Landowner/FWP	$3,900	$6,100 [n]	$10,000	$3,900	Complete
007-02	**7**	**Cottonwood Creek off-stream livestock water**	State forest	$15,000	$8,608 [a,r]	$23,608	$15,367	Complete
008-02	8	East Boulder River off-stream livestock water	Watershed Group	$1,500	$9,781 [a,x]	$11,281	$1,500	Complete
009-02	9	Elk Creek spring corral bypass	Cons. District/ Landowner	$1,000	$4,834 [a,e]	$5,834	$1,000	Complete
010-02	10	Elk Creek riparian fence & off-stream water	Cons. District/ Landowner	$2,000	$30,481 [a,e]	$32,481	$0	2005
011-02	11	Esp-Chambers Spring Creek off-stream water repair	FWP	$2,111	$2,110 [n]	$4,221	$1,463	Complete
012-02	**12**	**Harvey Creek channel restoration**	FWP	$63,616	$25,500 [a,m,x]	$89,116	$63,616	Complete
013-02	13	Hauser Reservoir perch spawning habitat	FWP	$5,500	$17,548 [m,t,x]	$23,048	$5,500	Complete

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014-02	14	Jefferson irrigation overflow fish migration barrier	Trout Unlimited	$8,000	$3,750 [p]	$11,750	$8,375	Complete
015-02	15	Madison Spring Creek channel restoration	Trout Unlimited	$9,300	$18,407 [m,p]	$27,707	$9,300	Complete
016-02	16	Mathew Bird Creek bank stabilization	Gallatin Land Trust	$2,250	$13,623 [a,x]	$15,873	$2,250	Complete
021-02	**17**	**Rattlesnake Creek fish ladder**	Trout Unlimited	$67,800	$67,000 [p,x]	$134,800	$45,938	Complete
022-02	**18**	**Rattlesnake Creek fish screens**	FWP	$14,750	$7,500 [m]	$22,250	$8,900	Complete
023-02	19	Rock Creek riparian fencing	Landowner/ Trout Unlimited	$2,000	$4,000 [a,p]	$6,000	$0	Cancelled
024-02	20	Sappington Spring Creek spawning channel	Trout Unlimited	$12,600	$5,500 [p]	$18,100	$0	Cancelled
027-02	**21**	**Stone Creek channel restoration**	Cons. District	$18,000	$82,000 [g]	$100,000	$18,000	Complete
028-02	22	Ninemile Creek riparian fencing	Landowner/ Trout Unlimited	$2,000	$2,000 [a]	$4,000	$2,000	Complete
		SUBTOTAL 2002 WINTER FUNDING CYCLE		**$316,417.00**	**$522,115.00**	**$838,532.00**	**$228,158.00**	
		2002 SPECIAL DROUGHT FUNDING CYCLE						
030-02	23	Jefferson River ditch sealing	Trout Unlimited	$7,850	$3,000 [p]	$10,850	$7,150	Complete
031-02	**24**	**Trail Creek irrigation efficiency**	Landowners	$24,372	$9,880 [a]	$34,252	$0	2005
		SUBTOTAL DROUGHT FUNDING CYCLE		**$32,222.00**	**$12,880.00**	**$45,102.00**	**$7,150.00**	
		2002 SUMMER FUNDING CYCLE						
032-02	**25**	**Mount Creek riparian restoration and fencing**	Watershed group	$24,600	$247,688 [g,k,x]	$271,688	$0	2005
033-02	26	Bitterroot River Republican Ditch fish screen	FWP	$61,000	$227,796 [x]	$288,796	$47,083	Complete/ ongoing maintenance
034-02	27	Blackfoot River water salvage – stockwater well	Landowner	$5,000	$0	$5,000	$5,201	Complete
035-02	28	Blanchard Creek riparian fence	DNRC	$21,305	$14,518 [h]	$35,823	$18,762	Complete

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036-02	**29**	**Cedar Creek water lease**	Landowner/FWP	$40,000	$9,000 [a]	$49,000	$40,000	Complete
037-02	30	Chimney Creek corral relocation and fencing	CD/NRCS	$17,489	$30,152 [a,e,n,r]	$47,641	$0	Cancelled
038-02	31	Dearborn River water salvage project	FWP	$50,000	$105,900 [a,g,m,p,r]	$155,900	$0	Cancelled
039-02	32	East Gallatin River bank stabilization	FWP	$15,165	$17,970 [r]	$33,135	$15,165	Complete
040-02	**33**	**German Gulch channel restoration**	TU/FWP	$103,425	$432,834 [p,m,n,x]	$536,259	$0	2005
041-02	**34**	**Locke Creek fish passage**	GYC	$3,262	$10,897 [a,x]	$14,159	$3,262	Complete
042-02	35	Marias River habitat enhancement	Sportsmen group	$1,471	$0	$1,471	$1,401	Complete
043-02	**36**	**Marshall Creek woody debris recruitment**	FWP	$8,350	$8,500 [m,o]	$16,850	$6,823	Complete
045-02	37	Missouri River bank stabilization repair	FWP/Landowner	$11,653	$2,730 [a,j,p]	$14,383	$11,995	Complete
046-02	38	Ninemile Creek water salvage	Landowner	$24,000	$62,760 [a]	$86,760	$0	Cancelled
047-02	**39**	**Poorman Creek water salvage and diversion repair**	TU	$21,770	$75,368 [a,p,n,r,x]	$97,138	$21,770	Complete (adds to 012-01)
048-02	**40**	**Skalkaho Creek fish screens**	FWP	$128,431	$157,994 [x]	$286,425	$72,470	Complete/ ongoing maintenance
050-02	41	R-6 Ponds aeration	FWP	$2,960	$4,000 [d]	$6,960	$3,668	Complete
		SUBTOTAL 2002 SUMMER FUNDING CYCLE		**$539,881.00**	**$1,408,107.00**	**$1,947,388.00**	**$247,600.00**	
		2003 WINTER FUNDING CYCLE						
002-03	1	Brackett Creek channel stabilization	Landowner/ consultant	$20,000	$705,398 [a,n,r]	$725,398	$20,000	Complete
003-03	2	Canyon Ferry perch spawning habitat	FWP	$7,500	$9,704 [t,x]	$17,204	$8,400	Complete
004-03	**3**	**Cottonwood Creek fish passage**	FWP	$7,616	$13,979 [l,y]	$21,595	$5,363	Complete
006-03	4	Dry Creek fish passage and irrigation improvement	FWP	$12,000	$85,096 [n]	$97,096	$558	2005

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007-03	5	Dupuyer Creek channel stabilization	Landowner/FWP	$10,990	$2,000 [n,r]	$12,990	$10,959	Complete
008-03	**6**	**Elkhorn tributaries non-native fish removal**	FWP	$5,000	$28,080 [d,p,s]	$33,080	$5,000	Complete
009-03	7	Hauser Reservoir perch spawning habitat	FWP	$5,000	$8,000 [t,w]	$13,000	$4,921	Complete
010-03	**8**	**Laird Creek channel stabilization**	Landowner	$12,000	$19,046 [a]	$31,046	$9,739	Complete
011-03	**9**	**Lost Creek fish passage**	FWP	$6,688	$19,119	$25,807	$0	Cancelled
012-03	**10**	**Lost Creek channel restoration**	FWP	$29,979	$22,198 [g,zz]	$52,177	$29,979	Complete
013-03	11	Marshall Creek fish passage	FWP	$30,090	$20,000 [l,x]	$50,090	$9,590	2005
016-03	12	Middle Fork Rock Creek riparian fencing	USFS	$7,400	$7,400 [s]	$14,800	$4,572	Complete
017-03	13	Mill Creek channel restoration	Watershed group/NRCS	$93,738	$376,834 [a,n]	$470,572	$92,801	2005
018-03	14	McKee Spring Creek channel restoration	Consultant/ Landowner	$25,000	$940,000 [a,u]	$965,000	$0	2005
019-03	15	Nevada Spring Creek channel restoration	Consultant/ Landowner	$25,000	$236,745 [a,k,p]	$261,745	$19,153	Complete
020-03	**16**	**Poorman Creek fish passage**	Consultant/ Landowner	$11,680	$23,805 [a,f,r,s]	$35,485	$11,680	Complete
022-03	**17**	**Sentimental Creek fish passage**	USFS	$7,000	$12,000 [f,s]	$19,000	$0	2005
024-03	**18**	**Skalkaho Creek Hedge canal siphon**	FWP	$122,585	$271,139 [y]	$393,724	$304	2005
025-03	**19**	**Skalkaho Creek Republican canal siphon**	FWP	$106,547	$235,668 [y]	$342,215	$305	2005
026-03	**20**	**South Fork Bull River channel stabilization**	Watershed group	$15,739	$31,358 [k,s,x]	$47,097	$15,739	Complete
027-03	**21**	**South Fork Judith River fish passage barrier**	FWP	$49,313	$28,223 [x]	$77,536	$1,734	2005
028-03	**22**	**Thompson River riparian restoration**	Plum Creek Timber	$21,160	$54,767 [o]	$75,927	$21,160	Complete
029-03	**23**	**Upper Willow Creek channel restoration**	FWP	$160,000	175,040 [d,g,l,n,r,zz]	$335,040	$74,197	2005

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		SUBTOTAL 2003 WINTER FUNDING CYCLE		**$792,025.00**	**$3,325,599.00**	**$4,117,624.00**	**$346,154.00**	
		2003 SPECIAL DROUGHT FUNDING CYCLE						
030-03	24	Jefferson River ditch sealing	Trout Unlimited	$4,934	$4,602 [p]	$9,536	$4,641	Complete
032-03	25	Sun River ditch sealing	FWP	$4,400	$5,696 [x]	$10,096	$4,300	Complete
		SUBTOTAL DROUGHT FUNDING CYCLE		**$9,334.00**	**$10,298.00**	**$19,632.00**	**$8,941.00**	
		2003 SUMMER FUNDING CYCLE						
033-03	26	Blackfoot River off-site water and fencing	Landowner	$3,000	$9,250 [a]	$12,250	$0	2005
034-03	27	Boulder River fish screen	Trout Unlimited/FWP	$58,000	$11,600 [p,z]	$69,600	$40,000	2005
036-03	28	Clark Fork River riparian fencing	Landowner	$1,923	$10,151 [a]	$12,074	$1,923	Complete
037-03	29	Deep Creek riparian fencing and off site water	FWP/Landowner	$3,000	$3,500 [a,r]	$6,500	$0	2005
039-03	30	East Fork Yaak River / Solo Joe Creek fish passage and road stabilization	Watershed group	$5,340	$0	$5,340	$0	2005
040-03	31	Fleshman Creek channel restoration	Trout Unlimited	$5,000	$57,257 [p,x]	$62,257	$0	2005
041-03	**32**	**Lolo Creek fish screen**	FWP	$39,200	$72,800 [y]	$112,000	$0	2005
042-03	33	Lost Creek channel restoration	FWP	$65,761	$169,276 [g,l,zz]	$235,037	$36,229	2005
043-03	**34**	**Marshall Creek riparian fencing**	FWP/Landowner	$1,660	$1,840 [x]	$3,500	$1,606	Complete
044-03	35	Merritt Spring Creek channel restoration	FWP	$12,000	$12,000 [r,w]	$24,000	$0	2005
045-03	36	Mill Creek riparian fencing	Land trust	$1,132	$1,250 [a,x]	$2,382	$962	Complete
046-03	37	Ninemile Creek riparian fencing	Landowner	$805	$3,854 [a]	$4,659	$0	2005
047-03	**38**	**North Fork Fridley Creek fish passage and water salvage**	Landowner	$92,000	$25,021 [a,n,p]	$117,021	$91,070	2005

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048-03	**39**	**North Fork Horse Creek riparian fencing and off site water**	Landowner	$6,093	$29,022 [a]	$35,115	$0	2005
051-03	40	Shields River channel stabilization	Conservation district	$12,000	$47,000 [a,g,r]	$59,000	$846	2005
053-03	41	Tenmile Creek channel stabilization	County water quality district	$10,000	$6,500 [g,w]	$16,500	$605	2005
		SUBTOTOL 2003 summer funding cycle		**$316,914.00**	**$460,321.00**	**$777,235.00**	**$173,241.00**	
		2004 WINTER FUNDING CYCLE						
001-04	**1**	**Blacktail Creek woody debris enhancement**	USFS	$10,000	$42,766 [s]	$52,766	$0	Cancelled
003-04	2	Canyon Ferry Reservoir perch spawning habitat	FWP	$8,400	$10,680 [t,x]	$19,080	$8,400	Complete
004-04	**3**	**Chicken Creek riparian fencing and offsite water**	Landowner/FWP	$9,522	$7,695 [a,g]	$17,217	$4,139	2005
005-04	4	Clear Creek culvert fish passage	FWP	$10,000	$32,212 [j,f,r]	$42,212	$0	2005
006-04	5	Deep Creek bank stabilization repair	Cons. District	$12,000	$21,687 [a,g,x]	$33,687	$12,000	Complete
007-04	6	Deep Creek off channel livestock water	FWP	$3,750	$46,131 [g]	$49,881	$0	2005
008-04	7	Duck Creek culvert fish passage	FWP	$5,075	$9,858 [s,u,w]	$14,933	$0	2005
009-04	**8**	**Emigrant Spring Creek channel restoration**	FWP/Landowner	$18,969	$91,583 [a,f,n]	$110,552	$13,000	2005
010-04	9	Fishtrap Creek pool habitat enhancement	FWP	$2,850	$6,748 [r,z]	$9,598	$769	Complete
012-04	**10**	**Jack Creek westslope cutthroat trout connectivity**	FWP	$10,000	$27,000 [s]	$37,000	$0	2005
013-04	11	Little Prickly Pear Creek (Sentinel Rock) instream flow enhancement	FWP/Landowner	$59,843	$170,842 [a,j,p,r,w]	$230,685	$59,843	Complete
014-04	12	Little Prickly Pear Creek (Rocking Z) riparian fencing	FWP/Landowner	$16,749	$31,133 [a,w]	$47,882	$0	2005
015-04	13	Little Prickly Pear Creek (Rocking Z) instream flow enhancement	FWP/Landowner	$26,454	$129,153 [a,n,w]	$155,607	$0	2005
019-04	**14**	**Meadow Creek riparian fencing**	USFS	$2,000	$5,000 [s]	$7,000	$0	2005

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020-04	**15**	**Mill Creek culvert fish passage supplement**	FWP	$15,185	$49,960 [a,l]	$65,145	$15,095	Complete (adds to 09-01)
021-04	16	Missouri River riparian plantings	FWP	$3,039	$3,439 [j,p,w]	$6,478	$3,126	Complete
022-04	**17**	**North Fork Horse Creek fish passage and flow enhancement**	Landowner	$8,000	$204,597 [a,e,n,r]	$212,597	$0	2005
023-04	**18**	**Otie Reservoir riparian fencing and offsite water**	FWP	$2,476	$2,476 [k]	$4,952	$1,016	2005
024-04	19	Pattee Creek channel re-naturalization	Montana Trout	$4,872	$6,729 [k]	$11,601	$0	2005
026-04	20	Steel Creek riparian fencing	FWP	$10,742	$23,200 [f,s,z]	$33,942	$8,708	Complete
027-04	21	Thompson Creek channel restoration	Watershed group/consultant	$90,000	$140,668 [a,g,k,n,x]	$230,668	$0	2005
028-04	22	Tiber Reservoir perch spawning habitat	Local angler	$693	$1,408 [x]	$2,101	$650	Complete
029-04	23	Tiber Reservoir perch spawning habitat	Great Falls Walleye Unlimited	$825	$4,518 [t]	$5,343	$516	Complete
030-04	24	Tongue River T&Y diversion fish passage	FWP	$75,000	$195,000 [n,r,x]	$270,000	$0	2005
031-04	**25**	**Uncle George Creek riparian fencing and offsite water**	USFS	$1,250	$3,986 [s]	$5,236	$1,200	Complete
033-04	26	Willow Creek riparian restoration	Bitterroot Land Trust	$12,000	$22,784 [x]	$34,784	$5,936	2005
034-04	27	Willow Springs Creek spawning habitat enhancement	Trout Unlimited	$35,061	$15,600 [p,x]	$50,661	$0	2005
		SUBTOTAL 2004 winter funding cycle		**$454,755.00**	**$1,306,853.00**	**$1,761,608.00**	**$134,398.00**	
		2004 SPECIAL DROUGHT FUNDING CYCLE						
035-04	28	Boulder River stock water well	Trout Unlimited	$31,266	$8,600 [a,p]	$39,866	$0	2005
036-04	29	Jefferson River canal sealing	Trout Unlimited	$10,111	$4,041 [p]	$14,152	$0	Cancelled
		SUBTOTAL DROUGHT FUNDING CYCLE		**$41,377.00**	**$12,641.00**	**$54,018.00**	**$ 0.00**	
		2004 SUMMER FUNDING CYCLE						

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037-04	**30**	**Blackfoot River drainage fish screen maintenance**	FWP	$10,000	$10,000 [p]	$20,000	$0	2009
038-04	31	Blackfoot/Clearwater rivers irrigation efficiency	FWP	$34,717	$59,280 [a,p,r]	$93,997	$34,776	Complete
040-04	32	Clearwater River ditch fish screen	FWP	$27,050	$50,235 [y]	$77,285	$0	2005
041-04	**33**	**Dry Creek diversion replacement for fish passage**	FWP	$4,000	$11,000 [l,p,s]	$15,000	$2,663	Complete
042-04	34	**Flathead Creek fish ladder**	Consultant	$7,558	$5,000 [a]	$12,558	$0	2005
044-04	35	Missouri River riparian restoration and fencing	Trout Unlimited/FWP	$13,896	$14,406 [p,w]	$28,302	$0	2005
045-04	**36**	**North Fork Horse Creek irrigation efficiency and water salvage**	Landowner	$31,000	$190,640 [a,e,n,r]	$221,640	$0	2006
046-04	**37**	**Therriault Creek channel restoration**	Watershed group	$10,000	$15,000 [r]	$25,000	$0	2005
047-04	**38**	**Tyler Creek riparian fencing**	Land trust	$797	$1,075 [a,z]	$1,872	$780	Complete
048-04	**39**	**Soda Butte Creek brook trout removal**	FWP	$4,810	$5,020 [s,x]	$9,930	$1,351	Complete
		SUBTOTAL 2004 summer funding cycle		**$143,828.00**	**$361,656.00**	**$505,584.00**	**$39,570.00**	

a Applicant/private landowner
b Audubon
c Bassmasters
d BLM
e Conservation Districts
f Counties
g DEQ 319 grant
h DNRC
i Federal Aid (USFWS)
j Federation of Fly Fishers
k Foundation grants
l Milltown mitigation
m MPC
n NRCS
o Timber companies
p Trout Unlimited
q US Corp of Engineers
r USFWS
s USFS
t Walleye Unlimited
u MDOT
v Confederated Salish/Kootenai Tribe
w PP&L 2188 mitigation
x Other
y FRIMA
z Watershed group
zz NRDP

Photo Illustration 1. Restoration of a 2,650-foot reach of Harvey Creek, a tributary to the Clark Fork River located 12 miles west of the town of Drummond. The project called for removal of wood planking that lined the channel, increasing channel sinuosity, stabilizing eroding banks and improving management of the riparian corridor. The goal of the project was to improve recruitment of westslope cutthroat trout and bull trout to the Clark Fork River. Upper photo shows stream reach prior to restoration. Lower photo shows stream reach immediately following restoration.

Photo Illustration 2. Replacement of an under-sized and perched culvert on Mill Creek, a tributary to the Clark Fork River near Frenchtown. The goal of this project was to enhance upstream passage for westslope cutthroat trout and bull trout. Upper photo shows the old culvert creating a passage barrier for upstream migrating fish. Lower photo shows the new open-bottom arch culverts that provide for fish passage under all flow conditions.

Photo Illustration 3. Construction of a fish ladder on Rattlesnake Creek, a tributary to the Clark Fork River located near Missoula, to provide upstream passage for westslope cutthroat trout and bull trout. Upper photo shows the water supply dam on Rattlesnake Creek creating a passage barrier for upstream migrating fish. Lower photo shows the fish ladder in operation.

Photo Illustration 4. Restoration of the North Fork of Fridley Creek, a tributary to the Yellowstone River located near Emigrant. Prior to restoration, this stream was captured by a large irrigation canal, which prevented it from flowing into the Yellowstone River. The project called for restoring connectivity between the stream and river by installing a culvert underneath the canal. The project also involved restoring the riparian corridor and creating salvaged water for in-stream flow. The goal of the project was to enhance recruitment of Yellowstone cutthroat trout and other species of fish to the Yellowstone River. Upper photo shows channel before restoration. Middle photo shows channel after restoration. Lower photo shows culvert placed underneath irrigation canal.

Photo Illustration 5. Restoration of a 5,500-foot reach of Kolb Spring Creek, a tributary to the Bitterroot River located near Lolo. This project called for the restoration of the dimension, pattern and profile of a channelized stream reach to create spawning and rearing habitat and enhance recruitment of salmonids to the lower Bitterroot River. The upper photo shows the channelized spring creek prior to restoration. The lower photo shows the meandering restored channel with the abandoned ditched channel converted to a wetland pond complex.

Photo Illustration 6. Restoration of two miles of Camp Creek, a tributary to the East Fork of the Bitterroot River located near Sula. The project relocated an existing straightened channel away from U.S. Highway 93 and returned it to the historic meandering channel. Upper photo shows the ditched channel next to the highway prior to restoration. Lower photo shows the relocated and restored channel. Photos taken by Paul Callahan, Land and Water Consulting, Inc.

Photo Illustration 7. Upper two photos show fish screens installed into two irrigation diversions located on Skalkaho Creek, a tributary to the Bitterroot River near Hamilton. The goal of these fish screens was to restore connectivity between the stream and the Bitterroot River for downstream migrating fish, especially westslope cutthroat trout. The lower two photos show the reconstruction of an irrigation diversion on Cottonwood Creek, a tributary to the Blackfoot River near Ovando. The goal of this reconstruction was to restore passage for upstream migrating fish (photo on left shows diversion acting as passage barrier and photo on right shows diversion after reconstruction).

Project Descriptions-2003

1. **Brackett Creek Restoration.** Brackett Creek (Park County), which enters the Shields River near the town of Clyde Park, supports brown trout as well as Yellowstone cutthroat. Just upstream from the mouth, on the Lazy S Ranch, the stream was severely degraded due to removal of riparian vegetation and channelization that occurred under previous ownership. This project involved restoration of about 4 miles of channel as well as removal of irrigation diversions that are barriers to fish passage. **Completed.**

2. **Canyon Ferry Spawning Reefs.** Canyon Ferry Reservoir (Lewis and Clark/Broadwater counties) supports a popular fishery for yellow perch. This proposal was a continuation of earlier efforts to enhance spawning habitat and cover for yellow perch by submerging artificial reefs constructed of Christmas trees. **Completed.**

3. **Cottonwood Creek Fish Passage.** Cottonwood Creek (Powell County) is a bull trout core area as well as a spawning stream for westslope cutthroat from the Blackfoot River. This project involved replacing an existing irrigation diversion structure with a step-pool fish ladder that improved fish passage and minimized deposition of sediment upstream of the diversion. **Completed.**

4. **Dry Creek Fish Passage.** Dry Creek (Broadwater County) supports a spawning run of rainbow trout from the Missouri River. However, two irrigation diversions limit spawning access to the lower 0.5 miles of stream. This project involves removal of two diversions, thereby opening an additional 0.3 miles of stream to spawning.

5. **Dupuyer Creek Restoration.** Dupuyer Creek (Pondera County) supports a mixed salmonid fishery that includes both rainbow and brook trout. Stream banks were degraded due to management practices of a previous owner. This project involved riparian fencing, back sloping, channel shaping, and bank stabilization using erosion control fabric and vegetation. Approximately 0.75 miles of stream was treated – including 400 to 600 ft of stream bank. **Completed.**

6. **Native Trout Restoration – Elkhorn Mountains.** Elkhorn Mountains (Broadwater county) contain several streams that support genetically pure populations of west-slope cutthroat trout. Competition with non-native salmonids and potential hybridization are threats to the viability of these remaining populations. This project involved removal of non-natives and hybrids using multiple pass electro-shocking. **Completed.**

7. **Hauser Reservoir Spawning Reefs.** Hauser Reservoir (Lewis and Clark County) supports a popular yellow perch fishery. However, the numbers of perch that reach catchable sizes have greatly decreased as the walleye population has expanded. This project involved installation of Christmas tree reefs to enhance hiding cover and spawning habitat. **Completed.**

8. **Laird Creek Restoration.** Laird Creek (Ravalli County) supports a mixed salmonid fishery. Mass wasting resulting from thunderstorms following the 2000 Bitterroot fires caused channel changes that reduced fish habitat. This project involved returning the channel to the low point in the valley and stabilizing the channel with a series of rock and log grade controls. **Completed.**

9. **Lost Creek Fish Passage.** Lost Creek (Deer Lodge County) supports a mixed salmonid fishery that includes west-slope cutthroat trout. A diversion dam located on the Ueland Ranch is acting as a barrier to upstream movement. This project involved installing a Denil fish ladder at the diversion site to restore migration.

10. **Lost Creek Restoration.** Lost Creek (Deer Lodge County) supports a mixed salmonid fishery, including west-slope cutthroat trout. Much of the stream on the Ueland Ranch has been damaged by grazing and, to some extent, channelization. This project involved restoring the stream using a variety of techniques including channel reconstruction, back-sloping, floodplain restoration, and revegetation. Approximately 2,400 feet of channel was restored. **Completed.**

11. **Marshall Creek Fish Passage.** Marshall Creek (Missoula County) supports an important population of west-slope cutthroat trout. The culvert under the road crossing near the mouth of Marshall Creek has become perched and is a barrier to fish passage. Additionally, velocities within the culvert may further impede fish movement. This project involves installation of a pool and weir fish ladder to get fish to the culvert and a series of baffles within the culvert to provide resting areas and facilitate movement through the culvert.

12. **Middle Fork Rock Creek Riparian Management.** Middle Fork Rock Creek (Granite County) supports a mixed salmonid fishery, including bull trout. The stream in the project area has become degraded due to grazing practices. This project, located on the Beaverhead-Deerlodge National Forest, included riparian fencing and off-stream water development. The project protects about 8 miles of stream. **Completed.**

13. **Mill Creek Restoration.** Mill Creek (Ravalli County) supports a mixed salmonid fishery and is a spawning stream for Bitterroot River trout. The lower reaches of the stream are severely degraded due to past agricultural practices. This project involves reconstructing and restoring approximately 7,500 ft of channel. Techniques include channel shaping, riparian revegetation, and riparian fencing.

14. **McKee Spring Creek Restoration.** McKee Spring Creek (Madison County) enters Jack Creek near its confluence with the Madison River. The creek has the potential to provide spawning habitat for Madison River fish provided that the restored creek has a gravel bottom. The creek was historically channelized to create hay meadow. This project involves restoring the stream to a more natural condition. Approximately 13,600 feet of creek will be created. This project is part of a much larger project to restore wetlands on the property.

15. **Nevada Spring Creek Restoration.** Nevada Spring Creek (Powell County) is a highly degraded spring creek that enters the Blackfoot River north of Helmville. The stream was previously channelized and has become wide and shallow with very little fish habitat. We previously provided partial funding to restore over 9,000 ft of Nevada Spring Creek that is located upstream of this project. This project extended the restoration downstream for an additional 10,240 ft. The restored channel is narrower and deeper and is being managed as a riparian grazing exclosure. **Completed.**

16. **Poorman Creek Fish Passage.** The North and South Forks of Poorman Creek (Powell County) enter the mainstem of Poorman Creek south of Lincoln. Poorman Creek supports a remnant population of bull trout. This project involved replacement of three culverts with full span bridges to enhance fish passage. **Completed.**

17. **Sentimental Creek Fish Passage.** Sentimental Creek (Ravalli County), a tributary to the Bitterroot River located on the Bitterroot Forest, supports spawning runs of both bull and cutthroat trout. Unfortunately, a Forest Service culvert, located about 0.5 miles upstream from the mouth was a barrier to fish migration. This project involved replacing the existing culvert with a larger culvert that provides fish passage and access to an additional 1.5 miles of spawning area. **Completed.**

18. **Skalkaho Creek-Hedge Canal Siphon.** Skalkaho Creek (Ravalli County) is an important spawning stream for west-slope cutthroat trout from the Bitterroot River. The Hedge Canal, a large ditch that intersects Skalkaho Creek, entrains fish from the stream. This project involves construction of a siphon that will completely separate the canal from the creek and eliminate entrainment.

19. **Skalkaho Creek-Republican Canal Siphon.** Skalkaho Creek (Ravalli County) is an important spawning stream for west-slope cutthroat trout from the Bitterroot River. The Republican Canal is a second large ditch that intersects Skalkaho Creek and entrains fish from the stream. This project involves construction of a siphon to separate the canal from the creek and eliminate entrainment of fish down the canal.

20. **South Fork Bull River Restoration.** South Fork Bull River (Sanders County) supports a mixed salmonid fishery that includes bull and cutthroat trout. A large landslide that occurred in the early 1990's caused braiding and relocation of the channel; a head cut was moving through the landslide area. This project involved reconstructing and reconnecting about 1,400 ft of channel and revegetation of riparian areas. **Completed.**

21. **South Fork Judith River Barrier.** South Fork Judith River (Judith Basin County), particularly in its upper reaches, supports a nearly genetically pure population of west-slope cutthroat trout. Major causes for the decline of cutthroat populations throughout the west include hybridization with rainbow trout and competition from other non-natives such as brook trout. This project involves construction of a relatively large barrier that will protect cutthroat in the upper 25 miles of the drainage.

22. **Thompson River Riparian Enhancement.** Thompson River (Sanders County) supports a mixed trout assemblage and is a popular recreational stream for northwest Montana anglers. Water temperatures in the Thompson are elevated because of deficient riparian vegetation resulting from clearing for agriculture and riparian logging. This project involved planting willow, dogwood, snowberry, and engelmann spruce in riparian areas and control of reed canary-grass. Approximately 2.6 miles of stream was treated. **Completed.**

23. **Upper Willow Creek Restoration.** Upper Willow Creek (Granite County) is reportedly the most important cutthroat spawning streams in the upper Rock Creek drainage. The stream is severely degraded and incised due to previous agricultural practices. This project, includes restoring about 6500 ft of stream. 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.

24. **Jefferson River Ditch Sealing**. Jefferson River (Jefferson County) supports a mixed salmonid fishery but suffers from chronic dewatering. This project involved sealing irrigation ditches with a synthetic sealant to reduce canal leakage. Salvaged water was left in-stream. **Completed.**

25. **Sun River Canals Ditch Sealing**. Sun River (Teton County) supports a mixed salmonid fishery but suffers from chronic dewatering due to irrigation. This project involved treating portions of a major diversion canal with a synthetic sealant to determine if water savings were realized. The project was conducted for demonstration purposes. **Completed.**

26. **Blackfoot River Flow Enhancement.** Blackfoot River (Powell County) in the Helmville area suffers from a variety of problems including elevated temperatures, nutrients and dewatering. This project involved replacing a pumping system with a well for fall livestock watering and installing about 0.5 miles of riparian fence. The project eliminates the need to divert water from the Blackfoot River during the fall. **Completed.**

27. **Boulder River Fish Screen.** Boulder River (Sweet Grass County) supports important brown and rainbow trout fisheries. A large irrigation diversion on the KT Ranch, LLC entrains large numbers of fish each year. This project involves installation of a McKay flat panel fish screen near the head of the diversion.

28. **Clark Fork River Fencing.** The Clark Fork River in the St Regis area (Mineral County) supports a popular fishery. According to the applicant, land management practices on the Loge Ranch damaged riverbanks on the property. This project involved installation of riparian fencing on about 2,900 ft of the river as well as fencing around the property boundary. **Completed.**

29. **Deep Creek Riparian Enhancements.** Deep Creek (Deerlodge County), a tributary to the Big Hole River east of the town of Wise River, is an important spawning stream for

fluvial Arctic grayling as well as several salmonids. Woody riparian vegetation on the Ralston Ranch has suffered from present riparian management. This project involves off-channel watering and construction of about 0.5 miles of riparian fencing.

30. **Yaak River Sediment control.** East Fork Yaak River (Lincoln County) is an important drainage for native redband rainbow trout. The headwaters area contains the strongest remaining population of genetically pure redbands. This proposed project, located on the Three Rivers Ranger District of the Kootenai National Forest, involves sediment abatement measures on Solo Creek. Treatments include removing a culvert, retiring and stabilizing about 0.65 miles of road, and stabilizing a cut-slope and roadside ditch with rocks.

31. **Fleshman Creek Fish Passage.** Fleshman Creek (Park County) is a small stream that flows through the community of Livingston. A large, abandoned beaver dam is presently impounding a large portion of the stream and supposedly acts as a barrier to fish migration. This project involves removing the dam and reconstructing the portion of the stream that is presently impounded.

32. **Lolo Creek Fish Screen.** Lolo Creek (Missoula County) supports a mixed salmonid population including native bull trout. A large irrigation diversion, operated by the Lolo-Maclay Ditch Water Users, entrains large numbers of fish. This project involves installation of a self-cleaning rotating drum fish screen to eliminate entrainment.

33. **Lost Creek Restoration.** Lost Creek (Deer Lodge County), located on the Ueland Ranch, suffers from a variety of problems caused by previous land management practices. This project is part of a larger phased project, and involves returning straightened sections of stream to their historic locations, riparian re-vegetation and management, and back-sloping and stabilizing vertical banks using natural materials.

34. **Marshall Creek Fencing.** Marshall Creek (Missoula County) supports an important run of native west-slope cutthroat trout from the Clark Fork River. Several previous or on-going restoration projects have enhanced fish passage, prevented loss of fish into diversions, and improved habitat by adding woody debris to the channel. This project involved construction of about 2,500 ft of streamside fencing to improve riparian management and facilitate woody vegetation recovery. **Completed.**

35. **Merrit Spring Creek Restoration.** Merrit Spring Creek (Lewis and Clark County), a tributary to Lake Helena in the Helena Valley, has the potential to support spawning runs of both brown and rainbow trout. The stream was historically channelized and subject to land management activities that further degraded the channel. This project involves reconstructing approximately 6,200 ft of channel. Treatments include narrowing and deepening the channel, adding gravel to the substrate, constructing riparian fencing, and re-vegetating streamside areas with woody vegetation and shrubs.

36. **Mill Creek Fencing.** Mill Creek (Missoula County), supports a mixed population of salmonids. Recent land management practices prevented woody riparian vegetation from reaching its potential. This project involved installation of 2,200 ft of riparian fencing along 1,100 ft of stream. The owners are in the process of donating a perpetual conservation easement. **Completed.**

37. **Ninemile Creek Fencing.** Ninemile Creek (Missoula County, located near Huson, supports mixed salmonid populations that includes west-slope cutthroat trout. To improve riparian management, approximately 1,210 ft of riparian fencing will be installed.

38. **North Fork Fridley Creek Reconnection.** North Fork Fridley Creek (Park County) has been disconnected from the Yellowstone River since the 1930's when the Park Branch Canal was built. The stream is also dewatered in its lower reaches due to irrigation withdrawal. In its upper reaches, the stream presently supports a resident population of Yellowstone cutthroat trout. This project involves reconnecting Fridley Creek with the Yellowstone River by building a culvert under the Park Branch Canal and enhancing stream flow by replacing a surface diversion with a well. This will enhance streamflow by an additional 1.88 cfs during the summer.

39. **North Fork Horse Creek Riparian Enhancement.** North Fork Horse Creek (Park County), as it flows through the Anson Crutcher Ranch, is in poor condition due to management practices under a previous owner. The stream supports a pure population of Yellowstone Cutthroat Trout. This project involves off-site water development, and riparian fencing to improve riparian health. Approximately one mile of stream will be protected.

40. **Shields River Restoration.** Shields River (Park County) supports a mixed salmonid fishery. The stream, as it flows through the Freeman Ranch, suffers from channelization and degradation from grazing practices. This project involves restoring stream length, improving pools using rock vanes, providing bank stability with root wads, and installing riparian fencing.

41. **Ten Mile Creek Restoration.** Ten Mile Creek (Lewis and Clark County) suffers from damage caused by grazing practices and previous flooding. The stream supports a mixed salmonid fishery that is locally popular. This project involves increasing channel length by re-activating an old oxbow, stabilizing banks using natural materials, and creating additional pool habitat. Approximately 1,000 ft of channel will be treated.

Project Descriptions - 2004

1. **Blacktail Creek.** Blacktail Creek (Silver Bow County) is primarily a brook trout fishery. Riparian logging and firewood cutting have minimized recruitment of woody debris to the stream. This project would have involved placing logs in the stream to add channel diversity and improve channel scouring. Approximately 5 miles of stream would have been treated. **Cancelled.**

2. **Canyon Ferry Reefs.** Canyon Ferry Reservoir (Lewis and Clark/Broadwater counties) supports a popular and important yellow perch fishery – particularly in the winter. Perch are also an important forage fish in the reservoir. This project involved placement of Christmas tree reefs to enhance spawning substrate and cover. **Completed.**

3. **Chicken Creek Enhancements.** Chicken Creek (Park County) is a tributary to the Yellowstone River that supports Yellowstone cutthroat trout as well as other salmonids. This project, located on the Milkovich Ranch, involves isolating fencing of heavily used corrals and pastures, development of off-site water, and replacement of a culvert that is presently acting as a barrier to fish movement. This project will improve access to Chicken Creek for spawning fish as well as improve habitat for resident species.

4. **Clear Creek Fish Passage.** Clear Creek (Carbon County), a tributary to Rock Creek near Red Lodge, has the potential to be an important spawning stream for rainbow and brown trout as well as a refuge when Rock Creek is dewatered. However, a perched culvert, located approximately 400 ft upstream from the confluence, is presently a barrier to fish migration. This project involves constructing a series of step pools below the culvert to gradually bring the grade of the stream up to the elevation of the culvert.

5. **Deep Creek Repairs.** Deep Creek (Broadwater County) was the sight of a large Future Fisheries funded restoration project several years ago. This project involves repair of selected sites that have failed. Treatments included backsloping, revegetation, and juniper revetments. **Completed.**

6. **Deep Creek Enhancements.** Portions of Deep Creek (Broadwater County) located on the Hahn Ranch suffer from riparian degradation caused by grazing and loss of fish into an irrigation diversion. This project involves irrigation improvements that will eliminate the diversion and off-stream watering that will improve the distribution of cattle and reduce riparian grazing. Approximately one mile of stream will benefit.

7. **Duck Creek Fish Passage.** Duck Creek (Gallatin County), which flows into Hebgen Lake near West Yellowstone, supports important spawning runs of both rainbow and brown trout. However, the culvert that crosses under U.S. Highway 191 has become perched and is a partial barrier to fish movement, particularly during high flows. This project involves building a series of step pools to gradually bring the elevation of the stream up to the culvert.

8. **Emigrant Spring Creek Restoration.** Emigrant Spring Creek (Park County), located on the Richard Kinkie property, is a tributary to the Yellowstone River. The lower reaches of the stream support spawning trout from the Yellowstone but the 2,500 ft located on the Kinkie property were channelized in the 1950's. Land management practices have also contributed to the degradation. This project involved reconstructing the stream to a more natural meandering pattern, off-stream watering, and fencing. **Completed.**

9. **Fishtrap Creek Restoration.** Fishtrap Creek (Deer Lodge County), located in the Jim and Lynn Katzoff property, is a tributary to the Big Hole River and is an important spawning and rearing stream for fluvial Arctic grayling. The stream was channelized in the 1940's and pool habitat is limiting. This project involved reconstructing approximately 0.5 miles of stream and using vegetation on outside bends to facilitate scouring and pool development. **Completed.**

10. **Jack Creek Enhancements.** Jack Creek (Jefferson County) is a tributary to Basin Creek in the Boulder River drainage that suffers from severe acid mine drainage. The Acid mine waste in Jack Creek originates in Jill Creek, which enters Jack Creek near another tributary (un-named) that supports westslope cutthroat trout. This project, located on Forest Service land, involves putting Jill Creek in a new channel that will move its confluence with Jack Creek downstream approximately 1000 ft. This will allow cutthroat from the un-named tributary to inhabit the upper reaches of Jack Creek.

11. **Little Prickly Pear Creek Flow Enhancements and Screening.** Little Prickly Pear Creek (Lewis and Clark County) is an essential spawning stream for Missouri River rainbow and brown trout. However, dewatering due to irrigation limits recruitment. An irrigation ditch located on the Ox Bow Ranch previously entrained fish. This project involved installing a more efficient irrigation system and dedicating the salvaged water to in-stream use. The new irrigation intake is screened. Approximately 17 cfs of water have been salvaged for in-stream use and are benefitting the lower two miles of stream. **Completed.**

12. **Little Prickly Pear Creek Improvements.** Riparian vegetation along Little Prickly Pear Creek (Lewis and Clark County) on the Zachary Wirth Ranch is in poor condition due to previous grazing practices. This project includes installation of 21,800 ft of riparian fencing along Little Prickly Pear and Sheep creeks as well as removal or covering of existing riprap with topsoil. Exposed soil will be revegetated. Additionally, a berm will also be removed, log revetments installed, and water gaps for cattle developed. Approximately 3 miles of streams would benefit.

13. **Little Prickly Pear Creek Flow Enhancements.** Portions of Little Prickly Pear Creek and Sheep Creek (Lewis and Clark County) located upstream of Wolf Creek Canyon suffer from seasonal dewatering. This project, located on the Zachery Wirth Ranch, involves installation of a more efficient irrigation system and dedication of the salvaged water to in-stream use. Approximately 11.5 cfs of water will be salvaged and about 18 miles of stream will benefit. The new system will greatly limit entrainment of fish into diversions.

14. **Meadow Creek Fencing.** Portions of Meadow Creek (Ravalli County) located on the Bitterroot National Forest suffer from riparian damage due to unrestricted grazing. This project will create a riparian exclosure and involves construction of approximately 4,500 ft of fencing along 1800 ft of stream.

15. **Mill Creek Fish Passage Supplement.** Mill Creek (Missoula County) is an important tributary to the Clark Fork River near Missoula. An undersized and perched culvert, located about 2.5 miles upstream from the mouth, was previously a barrier to fish migration. This project involved installion of a new culvert that is large enough to pass fish. **Completed.**

16. **Missouri River Revegetation.** The Missouri River (Lewis and Clark County) in the Craig area is a blue ribbon trout stream but some stream banks are eroding and would benefit from a concerted revegetation effort. This project, located on the Range, Blackman, and Odegard properties, involved revegetation of about 4,500 ft of stream bank using bare root shrubs and willow sprigs. **Completed.**

17. **North Fork Horse Creek Fish Screen.** North Fork Horse Creek (Park County) is a tributary to the upper Shields River that supports a resident population of Yellowstone cutthroat trout. Horse Creek on the Crutcher property suffers from seasonal dewatering. The existing diversion structure is old and cannot be shut off. Consequently, even during non-irrigation season, water is lost to the ditch. The ditch is also known to entrain fish. This project involves replacing the irrigation diversion and installing a turbulent fountain fish screen to prevent loss of fish into the diversion.

18. **Spring Creek Resoration.** Otie Reservoir (Stillwater County) is a nine-acre impoundment that is fed by a small un-named spring creek that is approximately 0.24 miles long. The reservoir and creek presently support a population of rainbow trout. This project involves renovating the reservoir with fish toxicants, restoring the spring creek, and re-introducing native Yellowstone cutthroat trout.

19. **Pattee Creek Restoration.** Pattee Creek (Missoula County) is a small stream that flows through the city of Missoula. As with many urban streams, the creek was channelized to accommodate development. This project involves restoring about 370 ft of Pattee Creek as it flows through two city parks.

20. **Steel Creek Riparian Enhancements.** Steel Creek (Beaverhead County) is a tributary to the upper Big Hole River that is an important spawning stream for fluvial Arctic grayling. Land management practices have resulted in riparian degradation of this 1.5-mile reach of stream located on the Hirschy Ranch. This project involved riparian fencing, willow transplants and seeding. **Completed.**

21. **Thompson Spring Creek Restoration.** Thompson Spring Creek (Gallatin County) enters the East Gallatin River north of Belgrade. Land management practices have degraded the spring creek over the years and the stream is presently a large sediment source to the East

Gallatin. A restored spring creek will reduce sediment load to the East Gallatin as well as provide important spawning habitat and recruitment. This project involves narrowing the stream, stabilizing eroding banks, constructing hardened livestock crossings, riparian fencing and re-vegetation. Nearly 5 miles of stream will be treated.

22. **Tiber Reservoir Reefs**. Tiber Reservoir (Toole County) supports an important fishery for walleye, yellow perch and other cool water species. This project involved placement of submerged Christmas tree reefs to enhance spawning and rearing habitat for yellow perch and other forage species. Reefs were placed near the Devon Fishing Access Site. **Completed.**

23. **Tiber Reservoir Reefs.** Tiber Reservoir (Toole County). This project is identical to the one described above except that Christmas tree reefs were placed in the Willow Creek Arm of Tiber Reservoir. **Completed.**

24. **Tongue River Fish Passage.** Tongue River (Custer County), a tributary to the Yellowstone River near Miles City, supports a rich assemblage of native warm water fishes. The T&Y Diversion Dam, located about 20 miles upstream from the confluence with the Yellowstone, is a barrier to fish passage and blocks spawning runs of fish from the Yellowstone. This project involves construction of a fish passageway around the diversion.

25. **Uncle George Creek Fencing.** Uncle George Creek (Lewis and Clark County), located on the Lewis and Clark National Forest, is a tributary to Dog Creek in the Little Blackfoot River drainage. Uncle George Creek supports native west-slope cutthroat trout. Browsing and trampling have degraded the riparian area. This project involved riparian fencing of about ¼ mile of stream and off-site water development. **Completed.**

26. **Willow Creek Riparian Enhancements.** Willow Creek (Ravalli County), located on the Jean James property, is a small brook trout stream located in the Bitterroot Valley. Grazing practices have resulted in deteriorated riparian areas and an over widened channel. This project will restore 1/3 mile of Willow Creek. Treatments include riparian fencing, revegetation, and a hardened livestock crossing.

27. **Willow Spring Creek Spawning Enhancements.** Willow Spring Creek (Jefferson County), located on the Joe Adams property, is an important spawning stream for Jefferson River rainbow trout. A scarcity of suitable spawning sites is presently limiting the fishery. Spawning habitat will be improved by importing gravel into the spring creek as well as into several smaller tributaries. The project also includes channel improvements and riparian fencing. About 4,500 ft of channel will be treated.

28. **Boulder River Water Salvage**. Boulder River (Sweet Grass County) supports an important mixed salmonid fishery. The Lamp-Nelson Ditch diverts 10-20 cfs from mid-October through mid-December solely for stock use. This project involves development of a stock water well that will eliminate the need for the diversion. In exchange, the landowners involved have agreed to close the ditch headgate on October 1 of each year, thereby leaving the water in the River.

29. **Jefferson River Ditch Treatment**. Dewatering of the Jefferson River Madison and Jefferson counties) is a major limiting factor for rainbow and brown trout. This project involved using a synthetic sealant to treat the Creeklyn Ditch on the Jefferson Canal to reduce ditch loss and expands on work completed the previous year. Saved water remained in-stream.

30. **Blackfoot River Fish Screen Maintenance.** Blackfoot River drainage (Powell and Missoula Counties) is one of the premier rivers in western Montana, supporting important populations of native bull and cutthroat trout as well as numerous other sport fishes. The drainage is the target of a large ongoing restoration effort that has included, among other things, the installation of five fish ladders and 11 fish screens. Ladders and screens have proven to be good fishery enhancement tools but can be damaged or rendered inoperable by floating debris and other natural occurrences. This project involves hiring a contractor to maintain these structures for a period of 5 years to be sure that they continue to function properly.

31. **Blackfoot and Clearwater Rivers Flow Enhancement.** Blackfoot and Clearwater Rivers (Powell and Missoula Counties) are subject to low flow conditions that negatively affect fisheries. This project involved conversion of a wheel line to a pivot. Subsequent water savings will improve flows in the Blackfoot and Clearwater Rivers by 12-24 cfs during low flow conditions. **Completed.**

32. **Clearwater River Fish Screen.** The Clearwater River (Missoula County), a major tributary to the Blackfoot River, supports a native fish assemblage that includes bull and cutthroat trout. The Clearwater diversion, located 3.5 miles upstream from the Clearwater's confluence with the Blackfoot, entrains at least 9 species of fish, including native west slope cutthroat trout. This project involves installation of a self-cleaning fish screen on the ditch that will prevent future entrainment.

33. **Dry Creek Fish Passage.** Dry Creek (Mineral County), a tributary to the Clark Fork River near Superior, supports a variety of fishes, including bull and west slope cutthroat trout. However, an irrigation diversion dam was previously a barrier to fish movement and prevented access to the upper 5 miles of Dry Creek. This project involved replacing the existing wood crib diversion with a series of rock weirs that allow fish passage around the diversion. **Completed.**

34. **Flathead Creek Fish Passage.** Flathead Creek (Park County) is a tributary to the Shields River near Wilsall. The stream supports a mixed trout population that includes Yellowstone Cutthroat and brown trout. An existing irrigation dam located on the Judy Rasmusson property, blocks access of Shields River fish to the uppermost 25 miles of Flathead Creek. This project involves installation of two rock weirs and a Denil fish ladder to allow migrating fish to move past the diversion.

35. **Missouri River Riparian Improvements.** Missouri River (Lewis and Clark County) downstream of Holter Dam supports one of the premier trout fisheries in Montana. Stream banks on the Harold Juedeman property and adjacent BLM lands located just upstream from the confluence with the Dearborn River, have been heavily damaged from grazing. This

project involves restoration of approximately 3,000 ft of stream bank. Treatments include back-sloping, installing erosion control fabric, seeding, planting trees and shrubs, off-stream livestock watering and fencing.

36. **North Fork Horse Creek Flow Enhancement.** North Fork Horse Creek (Park County) is a small tributary to the upper Shields River that supports a substantial resident population of Yellowstone cutthroat trout. Horse Creek on the Crutcher property suffers from seasonal dewatering. This project involves replacing a flood irrigation system with a center pivot and dedicating saved water to in-stream flow. The system will be managed so that flows in the North Fork will never drop below 1.0 cfs. Although this seems like a small flow, it is near the natural base flow.

37. **Therriault Creek Restoration.** Therriault Creek (Lincoln County) is a tributary to the Tobacco River in northwestern Montana. Therriault Creek is an important bull trout stream and supports a population of westslope cutthroat trout as well. Channelization of reaches that flow through private agricultural lands have severely degraded the stream. This project involves reconstruction of approximately 9,300 ft of channel.

38. **Tyler Creek Fencing.** Tyler Creek (Granite County), a tributary to the Clark Fork River, supports a mixed trout population that includes genetically pure west slope cutthroat trout. This project, located on the Gene Tripp property, involved fencing of approximately 1,720 ft of riparian area. **Completed.**

39. **Soda Butte Creek Native Fish Restoration.** Soda Butte Creek (Park County) which flows into Yellowstone Park near Cook City, supports an important population of Yellowstone cutthroat trout. However, a small un-named tributary near the headwaters supports an abundant brook trout population that threatens the cutthroat. This project involved treating the un-named tributary with the piscicide antimycin to control brook trout numbers. **Completed.**

Appendix A

Future Fisheries Improvement Program
Grazing Compliance Monitoring Report – 2004

by

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November 2004

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Introduction

This portion of the 2004 report summarizes tours and visual evaluations of select projects visited in 2004 to evaluate the effectiveness of grazing plans or exclosures on Future Fisheries Improvement Program (FFI) projects. The monitoring was conducted to help determine if various projects and subsequent management resulted in improvements to the riparian health and function, as well as plant vigor, especially for woody plants. As general rule of thumb, we looked for utilization of riparian shrubs not to exceed 50-60% of the current years growth and if there were signs of instability or poor channel function that related back to inadequate vegetative cover. This type of monitoring is essential to ensure that projects funded provide benefits to fish populations and riparian areas. We planned on evaluating 15 projects during 2004. To date, we have visited at least portions of all but one of the projects; consequently, this report presents observations only on those 14 projects. The report is organized first by the river basin where each project is located, then by the Future Fisheries Improvement Program (FFI) project number. All of the evaluations would be assigned a Data Quality Rating of "Judgement Only" since no actual measurements were taken.

We found high compliance with riparian grazing management strategies identified in project agreements or separate grazing management plans on nine of the 14 projects (64%) we rated. Two of these projects were only partially observed. Two projects were judged as demonstrating moderate compliance and another three were determined to have low compliance. Ten of the fourteen (71%) projects showed at least some positive effects from the grazing management currently being utilized.

After visiting different projects over the course of this evaluation, it became clear that guidelines or plans for managing livestock grazing in riparian areas must be site-specific for each project that is developed. Most every project has unique conditions that are the key to ultimately improving fish habitat and to encourage recovery of vegetation, improvement of riparian and channel function, and protection of water quality.

Table 1. Summary of Future Fisheries Projects inspected to determine grazing compliance in 2004.

Drainage	Project name	Water name	Future Fisheries Improvement Program number	Riparian grazing compliance rating	Project effect
Beaverhead	Beaverhead River Riparian Improvement	Beaverhead River	FFI-050-1996	Low	Neutral
Beaverhead	Beaverhead River Riparian Fencing	Beaverhead River	FFI-003-1998	Moderate	Neutral
Blackfoot/ Clearwater	Blanchard Creek Riparian Fencing	Blanchard Creek	FFI-035-2002	High	Positive
Clark Fork	Rock Creek (Garrison) Instream Flow and Habitat Improvement	Rock Creek	FFI-020-1999	Low	Neutral for riparian zone
Clark Fork	Dempsey Creek Corral Relocation	Dempsey Creek	FFI-045-2000	High	Positive
Clark Fork	Ninemile Creek Riparian Fence	Ninemile Creek	FFI-028-2002	High	Positive
Gallatin	Alderman Spring Creek Channel Restoration	Alderman Spring Creek	FFI-001-2002	High(Partially evaluated)	Positive, neutral
Madison	Madison Spring Creek Rehabilitation	Madison Spring Creek	FFI-036-1996	High	Positive
Madison	$3 Bridge Spring Creek Rehabilitation	Madison Spring Creek	FFI-015-2002	High	Positive
Missouri	Prickly Pear Creek Fencing & Bank Stabilization	Prickly Pear Creek	FFI-041-1996	Moderate	Positive, neutral
Missouri	Prickly Pear Creek Channel Restoration	Prickly Pear Creek	FFI-018-1999	Low	Neutral
Missouri	Canyon Creek Riparian Fence	Canyon Creek	FFI-008-2000	High	Positive
Yellowstone	Stillwater River Spawning Channel	Stillwater River	FFI-030-2000	High	Positive
Yellowstone	Cloud Ranch Channel Restoration	Big Timber Creek	FFI-004-2002	High(Partially evaluated)	Positive
Yellowstone	East Boulder River	East Boulder River	FFI-008-2002	Not evaluated	---

Beaverhead River Drainage

Beaverhead River Riparian Improvement: Bank Stabilization and Grazing Management

WATER NAME: Beaverhead River
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-050-1996
MONITORING: Project monitoring has been ongoing. Substantial photo-documentation has been obtained.
STATUS: Ongoing with preliminary results. Although fencing and bank stabilization work was completed, riparian areas on the project show signs of prolonged grazing and little residual riparian vegetation. There has not been a positive response by the riparian vegetation as would have been anticipated if an effective grazing management plan had been implemented and followed. The utilization of riparian woody vegetation typically exceeded 50-60% of the current years growth and there are signs of bank instability that related back to inadequate vegetative cover. Most transplanted willow clumps have failed and herbaceous vegetation has been clipped at levels that result in reduced vigor. The recovery potential for vegetation likely would be quite high if grazing strategies were altered. An on-site meeting with the landowner was held and changes in grazing management were agreed upon.
PROJECT EFFECT: Neutral. Possibly negative in riparian grazing management to promote the regeneration and survival of woody plant species.

Beaverhead River Riparian Fencing

WATER NAME: Beaverhead River
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-003-1998
MONITORING: Project monitoring has been initiated; we established three permanent photo points.
STATUS: Ongoing with preliminary results. One area of the project showed signs of improved riparian management where herbaceous and woody plants appeared to not be subjected to excessive grazing. Other areas showed signs of grazing and no positive response by the riparian vegetation. However, the potential appeared quite high for a response to occur if grazing strategies were altered. Both sheep and cattle are grazed in the pastures. For effective grazing management, additional fencing materials may be needed for sheep containment. The development and implementation of a customized grazing plan could markedly improve forage availability and overall riparian conditions. A large population of whitetail deer was observed, which likely reduces the potential for recruitment of younger stands of woody vegetation.
PROJECT EFFECT: Neutral

Blackfoot/Clearwater River Drainage

Blanchard Creek Riparian Fencing

WATER NAME: Blanchard Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-035-2002
MONITORING: We established six permanent photo points.
STATUS: Ongoing with preliminary results. The project area showed no signs of recent grazing and the grazing management plan calls for at least three more years of rest to allow vegetation recovery and bank stability. Little recruitment of woody plants was observed.
PROJECT EFFECT: Positive.

Clark Fork River Drainage

Rock Creek (Garrison) Instream Flow and Habitat Improvement Project

WATER NAME: Rock Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-020-1999
MONITORING: Photos after.
STATUS: Ongoing with initial/preliminary results. A tour of the project this summer showed that the riparian grazing management strategy currently being used was not achieving the desired stated project goal of regeneration and survival of woody riparian species.
PROJECT EFFECT: Positive for instream flows, but neutral in riparian grazing management to promote the regeneration and survival of woody plant species.

Dempsey Creek Corral Relocation

WATER NAME: Dempsey Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-045-2000
MONITORING: NRCS has pre-project photos, which we will try to obtain. Photos after. Three permanent photo points have been established.
STATUS: Ongoing with preliminary results. The area has been rested since fencing has created a riparian pasture and stream-work significantly narrowed the channel. The majority of the project area showed good survival of shrubs and trees and stands of grasses. Another area on the left bank upstream of the old barn had a heavy kochia stand that may require reseeding and mowing. Upland areas had been mowed to reduce the fire hazard around the buildings, but a buffer was always left along the stream channels. Pool development is anticipated over time.
PROJECT EFFECT: Positive effect.

Ninemile Creek Riparian Fence

WATER NAME: Ninemile Rock Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-028-2002
MONITORING: Photos after. Two permanent photo points have been established.
STATUS: Ongoing with preliminary results. Shrub and tree recruitment was apparent in the exclosure area and an uneven age stand of woody vegetation appears to have the potential to develop. Some smaller cottonwoods had been browsed, but not more than 50% of the current year's growth. Herbaceous growth may effectively compete with woody plant recruitment. No evidence of horse or cattle use was observed.
PROJECT EFFECT: Positive with woody plant recruitment**.**

Gallatin River Drainage

Alderman Spring Creek Channel Restoration

WATER NAME: Alderman Spring Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-001-2002
MONITORING: Photos during construction/after. Two photo points have been established with GPS coordinates.
STATUS: This project has not yet been fully evaluated because landowner permission had not been obtained due to old contact information. Caution was taken to avoid trespass since the entire property area was heavily posted and a large sign discouraged river recreation. We hope to visit this site again and examine the project in its entirety. The project area near the mouth of the spring creek where it enters the East Gallatin River was observed. Channel relocation work appeared recent; bare ground was widespread except on the immediate banks of the new channel where sods had been placed. Trees had been planted and wrapped with wire for protection. No substantial herbaceous riparian vegetative community has yet developed on the project area that we observed. Riparian areas of the property along the East Gallatin River were very healthy and small numbers of whitetail deer were observed. We saw no signs of any livestock grazing. The project area appears to have great potential for development into a very healthy riparian area.
PROJECT EFFECT: Neutral in area observed because additional recovery time is required.

Madison River Drainage

Madison Spring Creek Rehabilitation

WATER NAME: Madison Spring Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-036-1996
MONITORING: Photos after. Three permanent photo points have been established.

STATUS: The area is being managed as an exclosure. The entire riparian area looked healthy and stable with some herbaceous residual growth noted. No sign of woody plant recruitment was observed and appears to be extremely difficult to establish at this site. Rough fescue was observed ungrazed. Landowner compliance within the grazing exclosure area was judged to be good. Near the upstream end of the pond, an area of the riparian area appeared to have been mowed with a small buffer strip near the steam channel.
PROJECT EFFECT: Positive effect.

$3 Bridge Spring Creek Rehabilitation

WATER NAME: Madison Spring Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-015-2002
MONITORING: Photos after. Three permanent photo points have been established.
STATUS: The area is being managed as a grazing exclosure and compliance was judged to be good. The riparian area had substantial herbaceous residual growth and was stable. No sign of woody plant recruitment was observed. The stream channel is still very over-widened in this project area.
PROJECT EFFECT: Positive effect

Missouri River Drainage

Prickly Pear Creek Fencing & Bank Stabilization

WATER NAME: Prickly Pear Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-041-1996
MONITORING: Photos shortly after work completed and after in 2004. Five photo points were established in October 2004 by obtaining GPS locations. Four photo points recreate photos taken in 1997.
STATUS: Although the project agreement specifies the project will exclude livestock from the riparian area for the 20-year life of the project, the project simply fenced areas of the bank after sloping them in locations of high rates of active erosion. Although substantial vegetative cover was observed compared to 1997 photos, there was no evidence of woody regeneration on the immediate banks, which was one of the original goals of the project. Herbaceous vegetation appears to be providing increased bank stability in many areas and is substantially improved over pre-project conditions. However, in several areas (i.e., a point bar), the horses present had heavily grazed to the waters edge. In some areas, livestock had access behind the fences on the bank/stream side of the fence, but did not heavily graze these areas. The fences were installed too close to the active migrating channel and posts have failed because of channel migration. Riprap in some areas is preventing appropriate channel function and form.
PROJECT EFFECT: Positive trend in fenced areas, but neutral in other areas.

Prickly Pear Creek Channel Restoration

WATER NAME: Prickly Pear Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-018-1999
MONITORING: Photos taken in 1999, 2001, and 2004. Nineteen photo points were established in 1999.
STATUS: Since this project was completed, a large infestation of leafy spurge has become established. Also, the landowners where this project took place were killed in separate auto accidents in 2001. Since then, the riparian area fence has not been maintained and cattle have trampled the leafy spurge and caused bank damage. Also, since little other herbaceous or woody riparian vegetation has developed, bank erosion of the sandy soils has continued at an accelerated rate, which is allowing the project to slowly revert to pre-project conditions. The stream channel function in the project area appears to be at risk. Effective weed control steps need to be initiated and the riparian fencing needs to be reinstalled to protect the riparian area.
PROJECT EFFECT: Neutral

Canyon Creek Riparian Fence

WATER NAME: Canyon Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-008-2000
MONITORING: Photos immediately after fencing completed and photos after. Seven photo points were established, three of which match up with photos originally taken just after fencing was installed.
STATUS: Ongoing with preliminary results. The project area has been fenced and appears to be managed as an exclosure. No sign of livestock use was noted. Woody vegetation in the riparian area is a mature and diverse stand; limited recruitment of younger age shrubs was noted because of complete coverage by older aged trees and shrubs. The stream channel in the project area appeared to be functioning properly.
PROJECT EFFECT: Positive effect.

Yellowstone River Drainage

Stillwater River Spawning Channel

WATER NAME: Stillwater River
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-030-2000
MONITORING: Photos before/after. Five permanent photo points have been established with GPS locations. Photo series at the permanent photo points include construction photos (pre-project), and 2004 (post-project).

STATUS: Ongoing with preliminary results. The area shows significant development of riparian vegetation. The area is still being managed as an exclosure, and recruitment of cottonwoods is excellent. On 2 November 2004, 13 redds were observed in the upper and lower portions of the spawning channel.
PROJECT EFFECT: Positive effect.

Cloud Ranch Channel Restoration

WATER NAME: Big Timber Creek
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-004-2002
MONITORING: Photos before/after. A permanent photo point has been established with a GPS location. Additional photo points will be established in the future after landowner permission is obtained to access the entire project.
STATUS: Ongoing with additional monitoring planned. The area showed no signs of livestock grazing on the lower portion of the project. Both herbaceous and woody vegetation appeared healthy; multiple age stands of woody plants were observed. The floodplain area near the buildings had been mowed but a buffer strip near the stream remained. A substantial deer herd was observed in the riparian area.
PROJECT EFFECT: Positive.

East Boulder River Off Stream Livestock Watering

WATER NAME: East Boulder River
DATA LOCATION: Great Falls files
FFI NUMBER: FFI-008-2002
MONITORING: This project has not yet been evaluated. We hope to visit this site in before the end of the year.
STATUS: Unknown.
PROJECT EFFECT: Unknown.

Appendix B

Future Fisheries Improvement Program
Fisheries Monitoring Report – 2004

by

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November 2004

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Introduction

This report summarizes the results of monitoring conducted from 2002 to 2004 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 45 different streams from near Columbus 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.

Big Hole River Drainage

Fishtrap Creek Pool Enhancement

WATER NAME: Fishtrap Creek – Big Hole River
DATA PROVIDED BY: Jim Magee, FWP
DETAILED REPORT CITATION: FWP files, Dillon
FFI NUMBER: FFI-010-2004

This project, which was completed in April 2004, was proposed to enhance pool habitat in a straightened channel. The project reach was 800 feet in which no high quality pools were present. Seven pools were constructed with maximum depths of 3-4 feet. Visual, snorkel, and electrofishing surveys observed and documented use of constructed pools by multiple fish species immediately after construction through fall months. Figure 1 shows numbers of fish by species captured in MFWP electrofishing surveys in 2003 (pre) and 2004 (post) project. Numbers of all species (Arctic grayling, rainbow trout, brook trout and burbot) increased in fall 2004**. A comparison of pre-project baseline data to post-project data shows that all species sampled responded to pool development in the project area.**

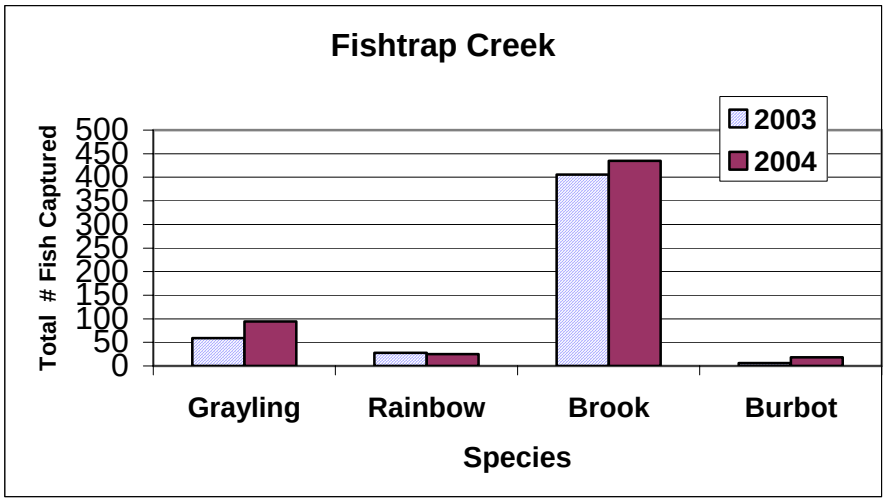

Figure 1. Total number of fish captured before (2003) and after (2004) pool enhancement in Fishtrap Creek, Montana.

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, Montana Power Company, 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.

Bear Creek Channel Reconstruction

WATER NAME: Bear Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce et al. (2004)
FFI NUMBER: FFI-028-1998

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). These activities, implemented without fisheries considerations, contributed to the loss of migration corridors, and the simplification and degradation of salmonid habitat. Restoration of Bear Creek began in 1995, continued through 2000 and involved: 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 the development of compatible riparian grazing systems for one mile of stream; and 6) off-stream water development.

Bear Creek supports populations of rainbow trout, brown trout and brook trout, along with low densities of westslope cutthroat trout in the upper basin and very low densities of juvenile bull trout. Bear Creek provides recruitment to the lower Blackfoot River sport fishery. In 2002 and 2003, we continued fish population monitoring in a reconstructed section of Bear Creek. Total catch per unit effort (CPUE) for all salmonids (> 4.0") is showing an overall positive trend increasing from 7.7 in 2000, to 14.7 fish/100' in 2003 (Figure 2). Increased densities (> 4.0") were noted for all species in the sample. Total CPUE for fish <4.0" decreased from 18.6 fish/100' in 2000 to 14.1 fish/100' in 2003. **The relative abundance of fish greater than four inches have continued to increase following restoration activities within the Bear Creek drainage.**

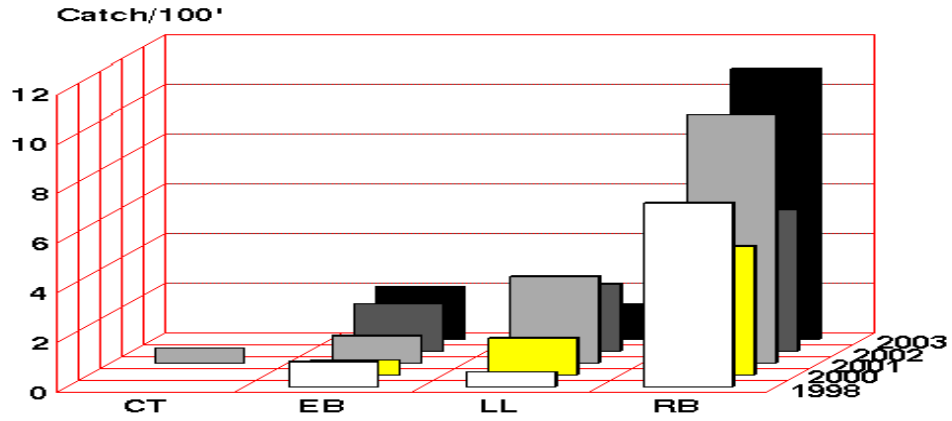

Figure 2. Catch per unit effort (CPUE) for salmonids (fish >4.0") in lower Bear Creek, (mile 1.1), Montana, 1998-2003.

Blanchard Creek Fish Passage, Riparian Fencing, and Feedlot Removal

WATER NAME: Blanchard Creek –Clearwater River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce et al. (2004)
FFI NUMBER: RRA-045-1994, FFI-048-1996, FFI-052-1996, and FFI-035-2002

Blanchard Creek, a small 2nd order tributary to the lower Clearwater River entering at mile 2.9, has a long history of adverse land management activities, and riparian and fish habitat degradation. These include changes to the hydrograph (12% above natural) related to timber harvest (DNRC unpublished data), side-casting of road grade material to the channel by Missoula County road maintenance crews, excessive livestock access to riparian areas, and dewatering through irrigation.

Chronic dewatering in the lower one mile of the stream from irrigation resulted in large fish population declines. In 1991, the irrigator began increasing flows, and then entered into a water lease between 1993 and 2000 for three-cfs instream flow during the irrigation season. In 2001 with the onset of the drought, irrigation needs increased. During this time, the water right holder began to exercise a lease option to increase irrigation, thereby dewatering the stream during low flow periods of 2001-03. In spring 2004, continued drought, competing water use and declining population trends led to a decision to terminate the water lease. In 2002, the DNRC completed a needed riparian grazing project for a 2.7 mile reach (mile 1.1 to 3.8) to manage grazing on State land.

Blanchard Creek is a spawning tributary for rainbow and westslope cutthroat trout, and supports low densities of brown trout and brook trout. During the early years of the water lease, Blanchard Creek supported high rainbow trout densities. However, since the early 1990's population monitoring recorded a downward trend in rainbow trout (> 4.0") densities (Figure 3). The trend coincides with a period of more intensive riparian grazing in lower Blanchard Creek.

With increased irrigation (between 2001-03), the monitoring site (mile 0.1) was dry in 2001 and 2003. Improved grazing practice on public land upstream of the dewatered reach should help offset habitat loss in lower Blanchard Creek**. Dewatering of lower Blanchard Creek in 2001 and 2003 combined with intensive riparian grazing has eliminated fish populations in the monitoring section.**

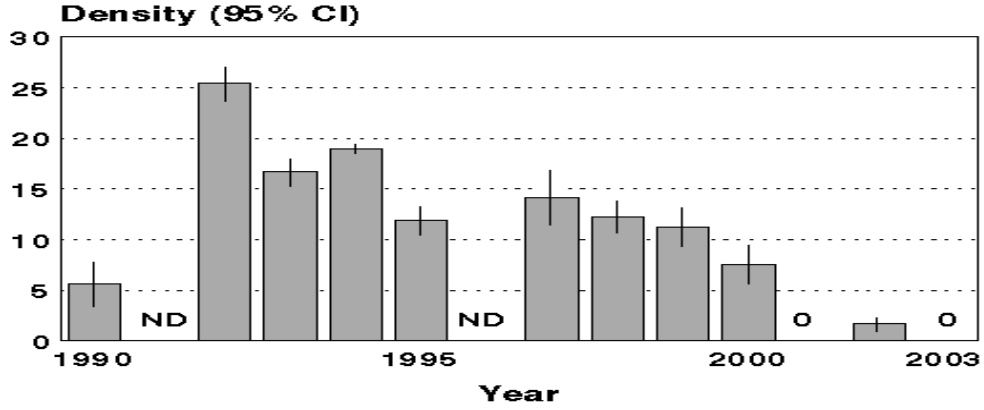

Figure 3. Estimated rainbow trout (fish >4.0") for Blanchard Creek, Montana at mile 0.1, 1990-2003.

Chamberlain Creek Fish Passage and Irrigation Diversion

WATER NAME: Chamberlain Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce et al. (2004)
FFI NUMBER: FFI-009-1997

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, excessive riparian livestock access, 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. Since 1990, Chamberlain Creek has been 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 migration of fluvial westslope cutthroat trout from the Blackfoot River. Fluvial spawning occurs throughout the mainstem and extends into Pearson Creek and the East Fork of Chamberlain Creek. Beginning in 1997, we found low numbers of bull trout using the stream in areas affected

by restoration. In 2002 and 2003, we continued to monitor fish populations at mile 0.1 and 0.5. These surveys show recent declines in WSCT densities in the lower-most portion of Chamberlain (Figure 4). A time-series whirling disease assessment indicates high infection levels during the westslope cutthroat trout emergence period**. Although rehabilitation work led to increased spawning use of Chamberlain Creek by adult westslope cutthroat trout from the Blackfoot River, prolonged drought and whirling disease escalation are likely contributors to recent westslope cutthroat declines.**

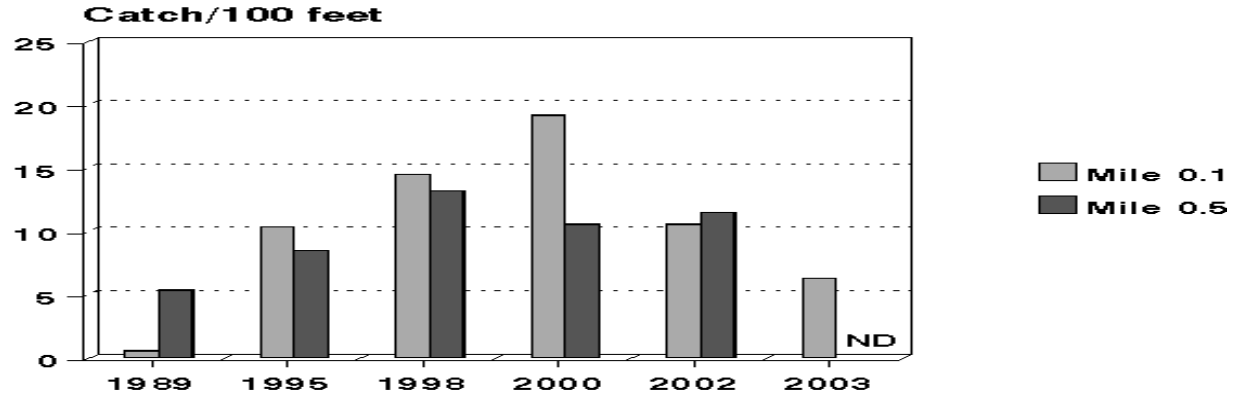

Figure 4. Catch per unit effort for Westslope cutthroat trout (fish>4.0") in two sections of lower Chamberlain Creek, Montana, 1989-2003.

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 et al. (2004)
FFI NUMBER: RRA-56-1994, FFI-7-1996, FFI-44-1996, FFI-37-1997, FFI-30-1998, FFI-38-1999, FFI-7-2002, and FFI-4-2003.

Cottonwood Creek, a large tributary to the middle Blackfoot River originating near Cottonwood Lakes, flows 16-miles to its junction with the Blackfoot River at river mile 43. Cottonwood Creek supports bull trout, westslope cutthroat trout, rainbow trout, brown trout and brook trout. Westslope cutthroat and bull trout dominate the headwaters. Genetic testing of westslope cutthroat trout in Cottonwood Creek in 2003 showed no introgression. Rainbow trout inhabit the lower mile of stream while brook trout and brown trout dominate middle stream reaches.

Impacts to fish populations and their habitats were present throughout the Cottonwood Creek drainage, although most of the identified private land problems were corrected during the 1990s. Completed restoration measures involve water conservation and water leasing, upgrading irrigation diversions with fish ladders, fish screens at large diversions, and implementation of riparian grazing changes. In 2002, the last open irrigation ditch was closed during a flood-to-sprinkler irrigation conversion. In 2003, diversion deficiencies were corrected at the Dreyer

Diversion by replacing the existing diversion with a cross-vane diversion. We also assessed a road-crossing problem related to an undersized culvert at stream mile 15.9. This undersized and perched culvert causes severe channel downcutting and high erosion immediately below the culvert, along with aggradation below the incised reach (Dave Rosgen, personal communication). 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' in September 2003. Cottonwood Creek also supports a high-grade whirling disease infection in the lower stream reaches. The upper stream reaches have remained negative for the presence of WD. Both reaches have been monitored between 1998 and 2003.

In 2002 and 2003, 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 portion of Cottonwood Creek during the late irrigation season.

Fish population monitoring in the water lease area (stream mile 12.1) show increasing densities of westslope cutthroat trout following increased flows. The 2003 fish population data show densities of WSCT (> 4.0") have declined since the 2001estimates, likely the result of extended drought (Figure 5). At stream mile 16, near the upper culvert problem, we recorded a catch per unit effort for westslope cutthroat trout of 2.4 fish/100' above the culvert compared with 4.6 below the culvert. All fish captured below the culvert were concentrated near the culvert. We found very low numbers of bull trout below the culvert (CPUE = 0.2) and no bull trout upstream of the culvert.

Densities of westslope cutthroat trout increased following increased flows in the water lease area of Cottonwood Creek, but 2003 fish population data showed drought largely responsible for declines in westslope cutthroat trout.

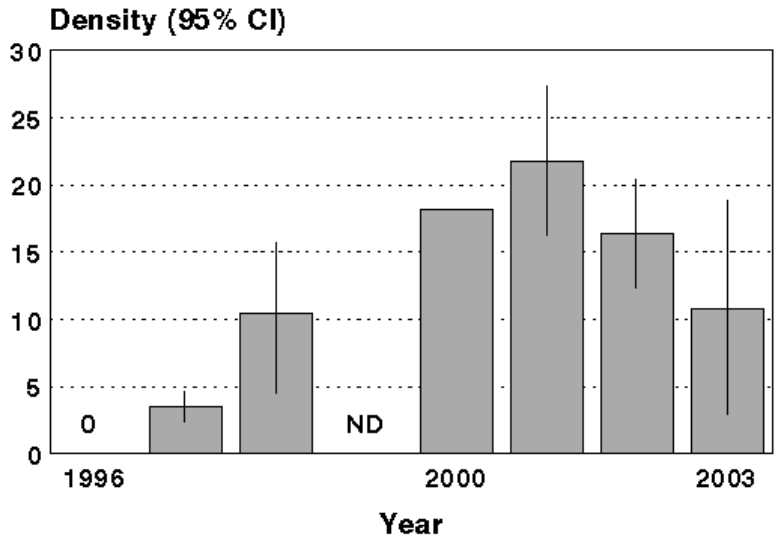

Figure 5. Estimated densities of westslope cutthroat trout (fish > 4.0") in Cottonwood Creek, Montana at mile 12.1, 1996-2003.

Dunham Creek Fish Screen and Channel Restoration

WATER NAME: Dunham Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce et al. (2004)
FFI NUMBER: FFI-002-1996 and FFI-039-2001

Dunham Creek, the largest tributary to Monture Creek, is an impaired spawning stream for fluvial Westslope cutthroat trout and bull trout. In the early 1970's, ~ 1.3 miles of the Dunham riparian area was clear-cut and burned and the stream channelized. This channelized stream has since become both vertically and laterally unstable, resulting in significant increases in bank and bed erosion, as well as a channel braiding in downstream reaches.

Two fisheries restoration projects were recently completed on Dunham Creek: 1) the screening of the Dunham ditch in 1996 and diversion upgrades in 2002, and 2) the reconstruction of 1.3 miles of channelized stream in 2000. Before the reconstruction project, mean bankfull width in the degraded project reach was 62.2', compared with mean stable reference bankfull width of 37.1'. The width/depth ratio of the reference reach was 22.4 compared with 59.1 in the project reach. Sediment deliveries in the project area were ~25-times natural levels and increased significantly following high flow events of the late 1990s (USFS 2001). This influx of unnaturally high levels of sediment entered the channel immediately upstream of the Dunham Creek bull trout spawning area.

The re-naturalization project focused on channel reconstruction, with emphasis on natural channel morphology, habitat complexity and included an aggressive revegetation of disturbed banks. The primary objective of the 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. Our 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 2002 and 2003, we completed bull trout redd counts and continued to monitor fish populations at mile 2.3. The 2.3-mile survey is located 0.6 miles downstream of the project. Sixteen bull trout redds were counted during the 2002 redd surveys in Dunham Creek, of which six were located in the newly constructed channel. The 2003 surveys counted 6 redds in Dunham Creek, with none in the project areas. Early fish population monitoring at mile 2.3 shows an initial positive bull trout response to the project (Figure 6). **Post-project sampling suggests higher bull trout numbers (CPUE) in Dunham Creek.**

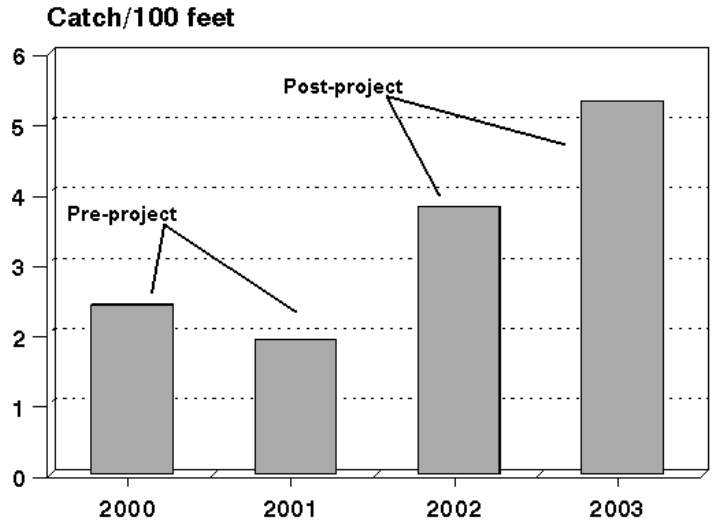

Figure 6. Catch per unit effort for bull trout in Dunham Creek (mile 2.3), Montana, 2000-2003.

Elk Creek Channel Restoration and Grazing Management

WATER NAME: Elk Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce et al. (2004)
FFI NUMBER: FFI-032-1996

Elk Creek originates in the Garnet Mountains and enters the Blackfoot River at river mile 28.0 with a base flow of ~2-3 cfs. Elk Creek, an "impaired" stream on the DEQ 303(d) list, has a long history of adverse land management activities (placer mining, channelization, road construction and improper maintenance practices, undersized culverts, road drainage problems and concentrated riparian livestock grazing) with well-documented negative influences to fish populations (Pierce et al. 1997; Pierce et al. 2004).

To begin improving water quality in lower Elk Creek, a major erosion control project was undertaken in a channelized section of lower Elk Creek (mile 1.3-2.9) in 1994. This project included the reconstruction of 8,600' of new channel as well as some livestock management changes. Although this necessary project addressed a major sediment problem, subsequent monitoring of water temperature, fish populations, and suspended sediment all confirm Elk Creek failed to meet intended project benefits. Objectives were not met, as grazing prescriptions were not adhered to. Other grazing plans on adjacent riparian pastures were not implemented.

In 2003, landowners approached FWP requesting an evaluation of Elk Creek, and the development of a restoration plan. In order to begin the process of developing a restoration project, we resurveyed long-term fish population survey sections, and collected water temperatures at three sites. We also enlisted the assistance of: 1) a range conservationist to evaluate current and alternative riparian grazing strategies, and 2) David Rosgen (hydrologist) to help assess channel stability and methods of correcting channel incision.

Although lower Elk Creek tested negative for whirling disease between 1999 and 2002, samples that are more recent indicate a rapid escalation as infection levels were detected at a mean grade of 2.86 in 2003. To assess the current condition of habitat and its fish population, we collected water temperature data at three long-term monitoring sites and conducted fish population surveys at four long-term monitoring locations. Dave Rosgen performed geomorphic assessments at two locations on lower Elk Creek. Elevated water temperatures on lower Elk Creek are also considered a primary limiting factor adversely affecting fish populations. Our assessments show a large (~14.0 ^{o} F) temperature increase between stream mile 5.6 and 1.0 where maximum summer water temperatures approached 80^{o} F in 2003. Water temperatures at mile 5.6 are well within the thermal tolerances for trout. Conversely, water temperatures near 1.0 are above the stress (> 73^{o} F) levels for salmonids. The incremental loss of shrubs and shade, over-widened stream banks, and the exposure of the channel to direct sunlight are likely contributors to elevated water temperatures.

Fish population data collected in 2003 show similar trends to early surveys at long-term monitoring locations on lower Elk Creek, including significant reduction in trout densities in the lower Elk Creek, compared with upstream monitoring sites. Fish populations are also showing a declining trend in densities over the last decade on portions of lower Elk Creek (Figure 7). Our 2003 surveys marked the first time trout were not collected from a long-term fish population monitoring section at mile 1.1. Photo monitoring shows the incremental loss of riparian shrubs at this site. Dave Rosgen's evaluations also indicated channel incision currently occurring in the immediate area of our fisheries sample location. An initial review with Dave Rosgen indicates active incision in some areas due to grazing practices, and in others due to poor floodplain drainage through undersized culverts. **In order to address identified problems, Dave Rosgen has recommended: 1) correcting the grazing problems, 2) widening floodplains where entrenched and actively sloughing; and 3) restoring riffle elevations so the stream can access its floodplain at normal bankfull (i.e. 1.5 years) flows.**

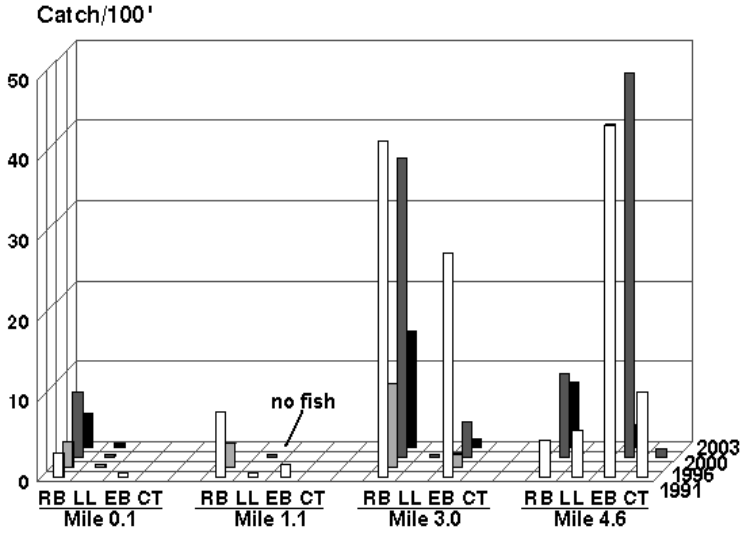

Figure 7. Catch per unit effort for salmonids captured at four locations of lower Elk Creek, Montana in 1991, 1996, 2000 and 2003.

Gold Creek Pool Development

WATER NAME: Gold Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION : Pierce et al. (1997); Schmetterling and Pierce (1999); Swanberg (1996); Swanberg (1997); Pierce and Podner (2000); Schmetterling (2000); Pierce et al. (2004)
FFI NUMBER: FFI-004-1996

Gold Creek is the largest tributary to the lower Blackfoot River, entering at river mile 13.5. Discharge at the mouth of Gold Creek was 19-cfs in August 2000 (Pierce et al 2001). Over 90% of the Gold Creek watershed is industrial forest. Past harvest of riparian conifers combined with the actual removal of large woody debris from the channel, has reduced habitat complexity in the lower three miles of Gold Creek. Before 1996, pools accounted for less than 1% of the wetted surface area in this section of stream (Pierce 1990). Low densities of age 1+ fish resulted from this habitat simplification. In 1996, we installed 66 habitat structures made of native material (rock and wood) that resulted in 61 new pools in the three-mile section (Schmetterling and Pierce 1999). Gold creek has consistently tested positive for whirling disease in recent years, but at very low infection levels. Whirling disease was not detected in Gold Creek in 2003.

Gold Creek is a spawning tributary to the lower Blackfoot River for bull trout, westslope cutthroat trout, rainbow trout, and brown trout. Resident brook trout also inhabit the drainage. The Gold Creek mainstem and confluence area provides thermal refugia for Blackfoot River bull trout during periods of river warming. In 2002 and 2003, we continued to monitor fish populations in the project area, counted bull trout redds, and monitored water temperatures. Fish population surveys, undertaken on an annual basis since 1996, indicate positive increases for rainbow and brown trout in the section (Figure 8), but no clear trend for native fish. Bull trout redd counts show a small run of bull trout reproducing in Gold Creek, with four redds counted in 2003, down from six a year earlier. Gold Creek exerts a cooling influence on the lower Blackfoot River, and appears to offer the highest quality thermal refugia (based on stream size and channel complexity) for bull trout in the lower Blackfoot River downstream of Monture Creek. In 2002 and 2003, stream temperature monitoring near the mouth recorded maximum temperatures of 67^{o} F, approximately 4^{o} F cooler than the Blackfoot River near Belmont Creek at mile 21.9.

Population monitoring data shows that brown and rainbow trout numbers have increased in lower Gold Creek following development of pools and habitat complexity. Adult bull and westslope cutthroat trout from the Blackfoot River continue to use Gold Creek as a thermal refuge and for spawning.

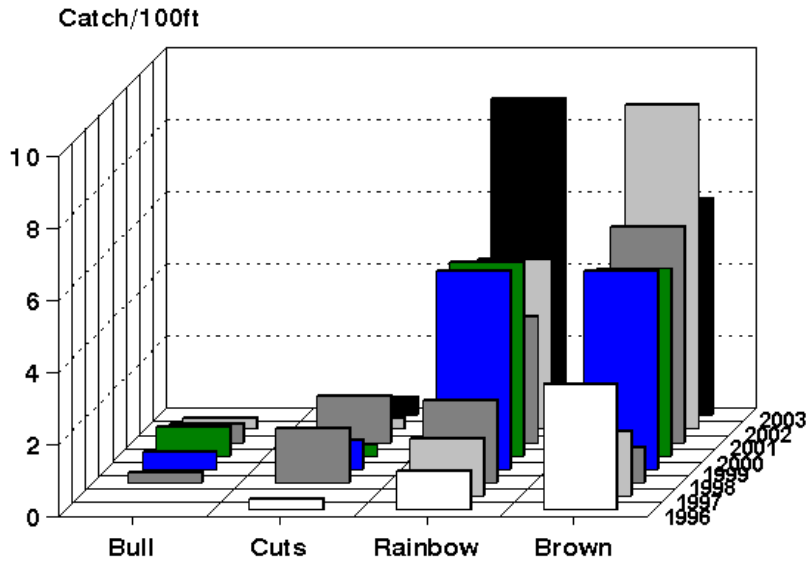

Figure 8. Catch per unit effort for salmonids (> 4.0") in lower Gold Creek (mile 1.9), Montana, 1996-2003.

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)
FFI NUMBER: FFI-014-1998

Kleinschmidt Creek, located on the southern margin of Kleinschmidt Flat, is a spring creek tributary to the North Fork of the Blackfoot River, entering at mile 6.1 with a base flow of 11.4 cfs in September 2001. Kleinschmidt Creek currently supports low numbers of brown trout and brook trout, along with very low densities of bull trout, rainbow trout and westslope cutthroat trout. Kleinschmidt has a long history of intensive riparian grazing, with very little regard for riparian health and channel stability. In addition to livestock over-use, placement of rock dams, undersized culverts and highway channelization further degraded and over-widened Kleinschmidt Creek (Pierce 1991). In 2000-01, the Blackfoot Cooperators reconstructed 6,250' of degraded and over-widened stream to C and E-type channels. A summary of pre-and post-project channel parameters was described by Pierce et al. 2002.

In 2002 and 2003, we monitored fish populations, water temperatures and whirling disease infection levels. Fish population surveys were completed at two locations of lower Kleinschmidt Creek (mile 0.5 and 0.8) at sections established in 1998. To assess the influence of Large Woody Debris (LWD) in newly constructed E4-type channels, we placed no LWD in the mile 0.5 survey section during reconstruction, whereas the rest of the stream included LWD placement, including the mile 0.8 survey section. The 2002 estimate for age 1+ brown trout showed substantial increases at the 0.5-mile section one year post-project, compared with pre-project densities (Figure 9). Our surveys also showed significantly higher densities of age 1+ brown trout where

LWD was incorporated in the channel (mile 0.8) compared with where it was not. In 2003, population densities continued to increase in the section with wood but declined in the section without wood. We attribute this decline in the woodless section to excessive livestock access into the project area during the very sensitive early recovery period, and damage (hoof-shear) to stream banks. Livestock have since been fenced from the riparian area. The survey site at mile 0.8 was not subject to streamside livestock damage.

Water temperature monitoring shows moderately significant declines (Paired t-test; P = 0.08) following reconstruction with maximum water temperatures ~15^{o} F cooler post-project compared with pre-project. Whirling disease sampling shows continued high infection.

Electrofishing showed an increase in brown trout densities following stream reconstruction, and significantly higher densities where large woody debris was placed in the channel. Water temperatures showed moderately significant declines following reconstruction of the channel.

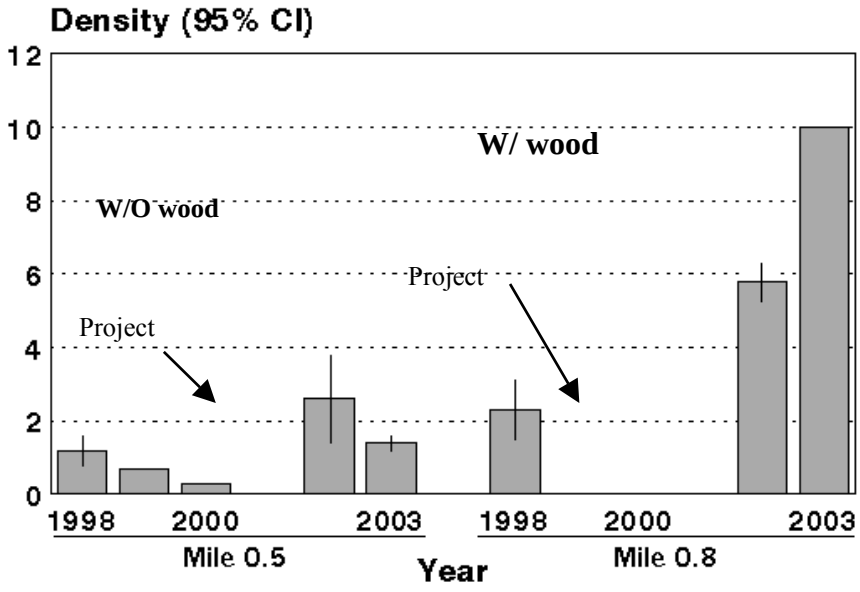

Figure 9. Estimated densities of age 1+ brown trout in two locations of Kleinschmidt Creek, Montana, 1998-2003.

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)
FFI NUMBER: FFI-038-1997, FFI-031-1998, and FFI-18-2000

McCabe Creek, a cold basin-fed tributary to lower Dick Creek entering at stream mile 3.8, is located in the Monture Creek bull trout recovery area. McCabe Creek begins as a steep mountain stream in its headwaters, before entering knob-and-kettle topography in the lower

reaches, McCabe Creek passes through a beaver-influenced wetland bog before entering Dick Creek, a lower tributary to Monture Creek, entering at stream mile 3.8.

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. Post-project monitoring has identified excessive livestock access, damaging portions of the newly constructed stream.

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 decreased densities of brook trout 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 LWD to the channel. We also implemented grazing changes and developed off-stream livestock water.

In 2003, westslope cutthroat trout > 4.0" continued to show a positive response three years post-project (Figure 10). Less encouraging, our monitoring is also showing a proportional increase in brook trout at the monitoring site. **Both native and nonnative species have increased after comprehensive restoration in McCabe Creek.**

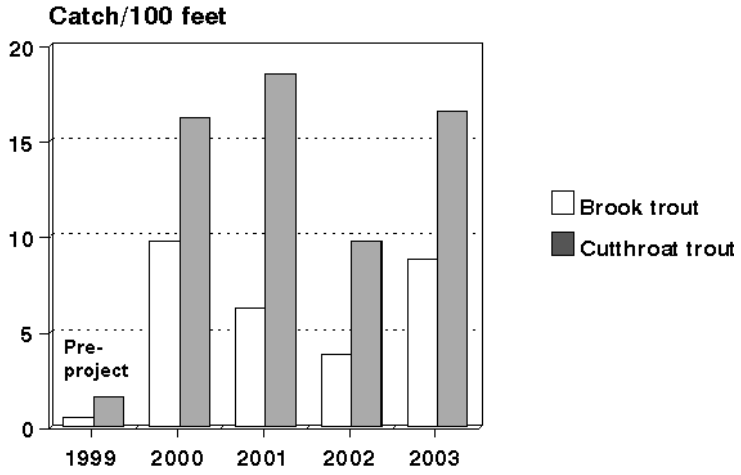

Figure 10. Catch per unit effort for all salmonids sampled in McCabe Creek, Montana, at mile 2.3, 1999-2003.

Monture Creek Fish Habitat Enhancement and Restoration

WATER NAME: Monture Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce et al. (2004)
FFI NUMBER: FFI-012-1997, FFI-049-1999

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 habitat. Furthermore, all lower tributaries, from Dunham Creek downstream, were likewise 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.

Monitoring for 2002 and 2003 period included: 1) bull trout redd counts; 2) assessments of juvenile abundance at long-term monitoring stations; 3) water temperature monitoring; and 4) continued whirling disease studies. Bull trout redd counts have been upward trending since restrictive angling regulations were enacted in 1990. In 2002 and 2003 bull trout redd counts began to level out and in 2003 declined 14% from 101 redds in 2002 to 83 in 2003. The 2003 declines are consistent with other spawning sites in the Blackfoot during the fourth year of the drought. Assessments of juvenile bull trout abundance at long-term monitoring stations showed an upward trend through the 1990s and generally stable between 2000 and 2002 (Figure 11).

In 1998, lower Monture Creek tested negative for whirling disease, but tested positive in July 2000 with a 1.7 mean grade infection, which increased to a 3.2 mean grade infection in 2002. Upstream bull trout spawning sites of Monture Creek tested negative for whirling disease in 2003.

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, the fourth year of drought in the Blackfoot drainage likely is responsible for stable or slightly declining trends in populations and redd counts, respectively.

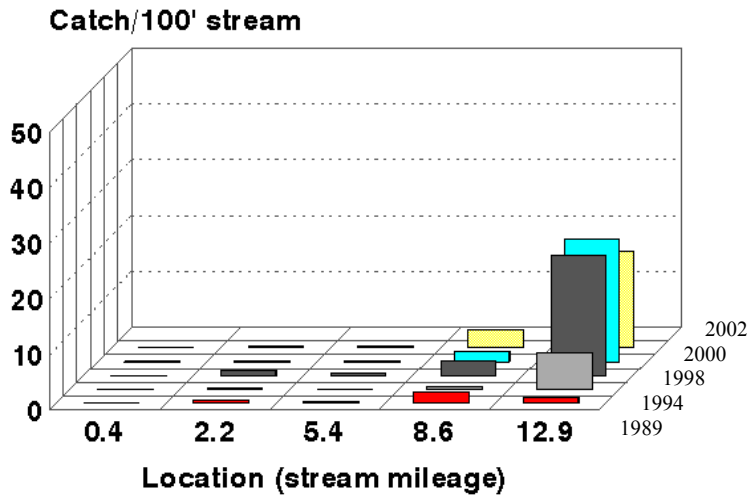

Figure 11. Catch per unit effort for bull trout captured at five locations on Monture Creek, Montana, in 1989, 1994, 1998, 2000 and 2002.

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 et al. (2004)
FFI NUMBER: FFI-036-1998, FFI-048-2000, FFI-042-2001, and FFI-019-2003

Nevada Spring Creek, a tributary of lower Nevada Creek, originates from an artesian spring and flows 3.2 miles to its junction with Nevada Creek at stream mile 6.2. The spring produces between six and nine cfs. Wasson Creek, a small, basin-fed tributary to Nevada Spring Creek enters near the spring source with a base flow of ~2 cfs during the non-irrigation season. Water temperatures at the spring source are a constant year-around 44-47^{o} F. However, summer water temperatures increase to >70^{o} F within 1.6 miles of the source due to the over-widened condition of the channel (Pierce et al. 2002). In addition to warm water, Nevada Spring Creek contributes elevated levels of nitrate and phosphate to lower Nevada Creek (Pierce and Peters 1990).

A comprehensive habitat restoration project for the upper 1.6 miles of Nevada Spring Creek was completed in 2001-02. The project entailed the complete reconstruction of Nevada Spring Creek and riparian grazing changes. In fall 2003, the lower 1.6 miles of Nevada Spring Creek was also reconstructed to a deep, narrow E-type channel.

Nevada Spring Creek supports a brown trout dominated community 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 inhabit Nevada Spring Creek in low densities, although according to historical accounts were once abundant (Frank Potts, personal communication).

In 2002 and 2003, we monitored channel changes (Table 1), water temperature (Figure 12), substrate composition (Figure 13), fish populations, and whirling disease levels in Nevada Spring

Creek. The habitat survey on Nevada Spring Creek focused on measuring pools, riffles, and substrate composition on the restored sections of the spring creek. The survey began at the spring source (mile 3.2) and proceeded downstream to mile 2.0, randomly selecting a pool (1-4) and measuring every fourth pool and preceding downstream riffle. Pool measurements include: total pool length, maximum pool depth, riffle crest depth, and wetted widths at the pools maximum depth and the riffle crest. The difference between maximum pool depth and riffle crest depth was used to calculate residual pool depth. Sinuosity, valley slope and channel slope were measured with GIS using USGS digital orthophotos. Two modified Wolman pebble counts were implemented (miles 3.0 and 2.0) to determine substrate composition. Pool parameter data was summarized based on mean dimensions.

Table 1. Pre-and-post project channel measurements for Nevada Spring Creek from stream mile 1.6 to 3.2.

Measurement	Pre-project*	Post-project	%change
Stream length (ft)	8,700	11,050	+27%
Sinuosity	1.4	1.8	+27%
Wetted surface area (acres)	9.8	3.0	-69%
Wetted width (ft)	49 (14-98)	11.8(6.7-16.6)	-76%
W/D ratio	22	3.2	-85%
Pool Frequency (#/1000 ft)	5.6	17.7	+127%
Mean pool depth (ft)	**2.4**	**3.7**	**+54%**

* *from* Pierce 1990.

The objectives of the Nevada Spring Creek habitat survey were to provide an assessment of quality of post-restoration pools and substrate composition, and to provide a baseline for future monitoring efforts. Water temperature monitoring in the upper 1.6 miles of reconstructed channel recorded large temperature declines at two monitoring locations (mile 2.6 and 1.6) below the spring source (Figure 12). Maximum summer temperatures (June through September) declined 9.6 ^{o} F (62.8-53.2) at mile 2.5 and 16.5 ^{o} F (78.7-62.2) at mile 1.6. Water temperatures near the mouth of Nevada Spring Creek continued to record elevated temperatures in 2003 similar to 2001, but should begin to cool in 2004 following the reconstruction of lower Nevada Spring Creek. Fish population surveys at upper Nevada Spring Creek (mile 3.0) in 2003, one-year post channel reconstruction, recorded a increase in brown trout densities compared with previous samples (Figure 14). The survey revealed higher densities of all year classes, particularly YOY indicating successful reproduction in the new channel. We also captured one westslope cutthroat trout young-of-the-year (YOY) in the sample. Whirling disease monitoring (2002 and 2003) has not yet detected the parasite *Myxobolus cerebralis* in Nevada Spring Creek. **Data suggests that channel reconstruction decreased water temperatures, increased brown trout densities and provided spawning habitat.**

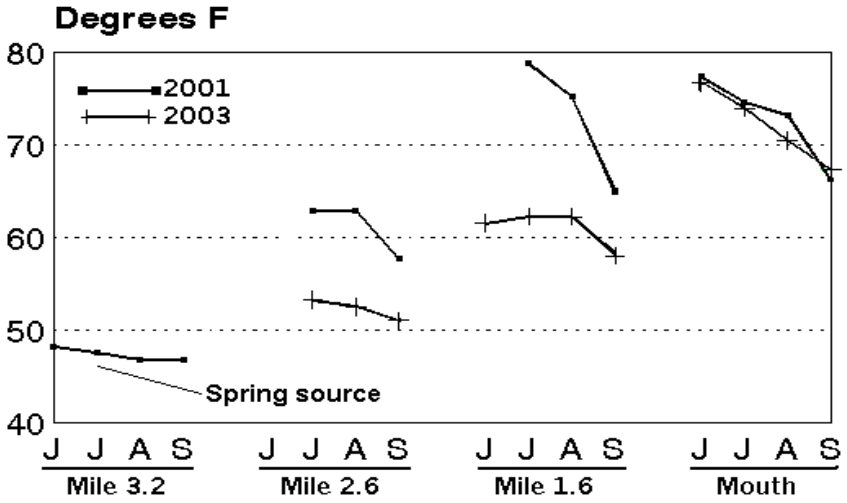

Figure 12. Maximum monthly summer water temperatures before (2001) and after (2003) 1.6 miles of channel reconstruction on Nevada Spring Creek, Montana.

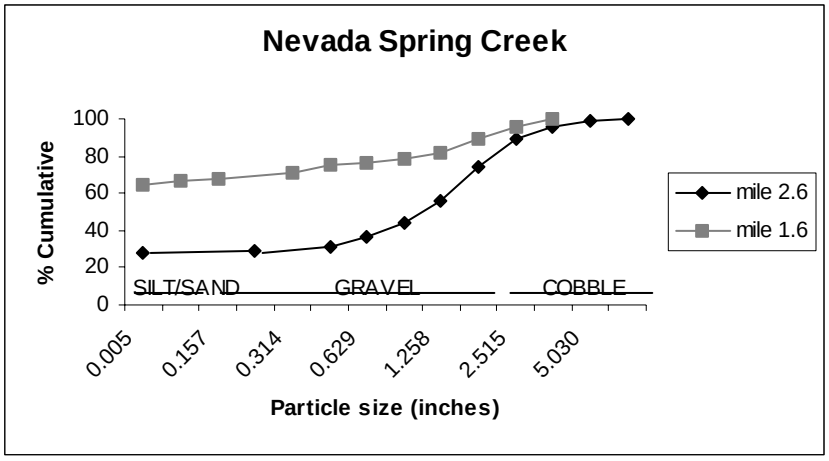

Figure 13. Summary of pebble count surveys at two locations of Nevada Spring Creek, Montana during summer 2003.

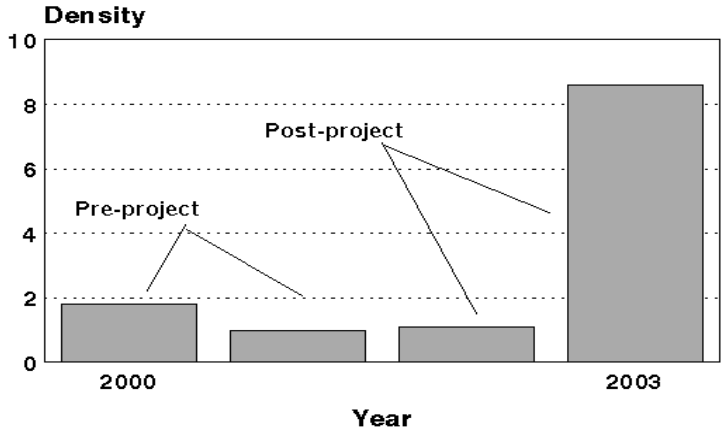

Figure 14. Estimated total brown trout densities for Nevada Spring Creek, Montana at mile 3.0, 2000-2003.

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 et al. (2004)
FFI NUMBER: FFI-68-1995, FFI-45-1996, FFI-11-1997, and FFI-018-1998

The North Fork of the Blackfoot, named the *Salmontrout Fork of the Blackfoot River* by early settlers, is the largest tributary to the Blackfoot River, with headwaters draining the Scapegoat Wilderness. Upon exiting the mountains near river 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 river mile 8.8 and 15.3, divert an estimated 40-60 cfs from the North Fork. In addition, this reach of the North Fork loses water to natural seepage.

The North Fork is a primary fluvial bull trout-spawning stream 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 into a more holistic approach, enrolling landowners in conservation easement programs, incorporating water conservation measures in leaky ditches, and restoring habitat conditions to five impaired tributaries (Spring, Rock, Kleinschmidt, Dry and Salmon Creeks). In 2002 and 2003, 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 tributaries.

The North Fork of the Blackfoot River is a primary spawning tributary for fluvial bull trout and fluvial WSCT to headwater areas, and supports rainbow trout, brown trout and brook trout in the lower basin. Fisheries-related monitoring for 2002 and 2003 included: 1) bull trout redd surveys; 2) assessments of juvenile fish abundance; 3) whirling disease sentinel cage studies; and 4) water temperature monitoring.

Bull trout redd counts in 2002 and 2003, show declining numbers of adult spawners for the third consecutive year, declining from a high of 123 in 2000, to 41 in 2003 in the long-term monitoring reach. Monitoring of juvenile bull trout abundance in four long-term monitoring sections of the North Fork, also show a sharp decline during the drought (Figure 15). For the first time in 2002, we recorded no YOY bull trout at the uppermost survey section at mile 17.2.

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 is present the lower North Fork, and its two primary lower tributaries, Kleinschmidt Creek and Rock Creek. The disease is currently absent from upstream bull trout spawning sites in the North Fork.

The most recent sampling on North Fork Blackfoot River showed that during drought conditions, bull trout numbers and redds have declined. Longer term monitoring with better flow regimes will allow an accurate evaluation of these projects.

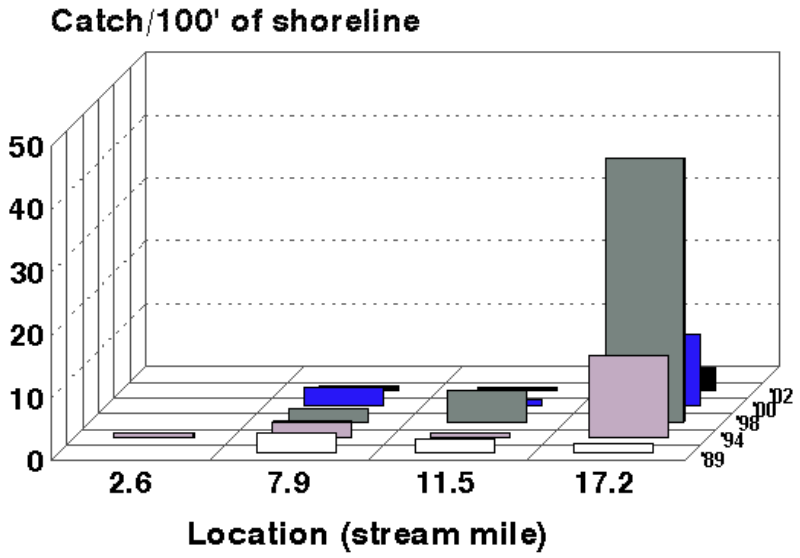

Figure 15. Catch per unit effort for juvenile bull trout in four long-term sampling sites on the North Fork Blackfoot River, Montana, 1989-2002.

Pearson Creek 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)
FFI NUMBER: FFI-052-1999

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 practices in its lower two-miles of channel. The Pearson Creek restoration effort involved conservation easements, water leasing, channel reconstruction, riparian habitat restoration and improved riparian grazing management.

In September 2002 and 2003, we re-sampled westslope cutthroat trout in lower Pearson Creek (mile 1.1) in a stream reach influenced by a water lease and related riparian improvements (riparian fencing and habitat restoration). Between these sampling periods, we found a large increase in westslope cutthroat trout densities following changes to a more sensitive riparian grazing method (Figure 16). **Population declines of westslope cutthroat trout appear to have reversed after modifications of grazing strategies.**

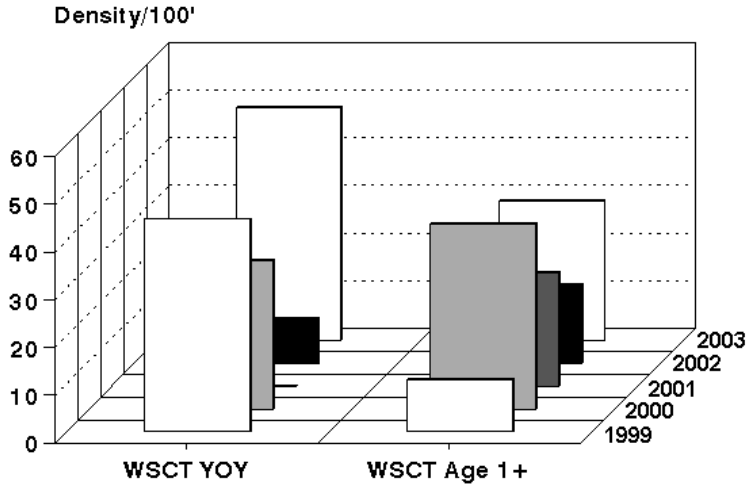

Figure 16. Estimated densities of westslope cutthroat trout in Pearson Creek, Montana at mile 1.1, 1999-2003.

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 et al. (2004)
FFI NUMBER: FFI-52-2000, FFI-012-2001, FFI-047-2002, FFI-20-2003

Poorman Creek is one of the larger tributaries entering the Blackfoot River from the Garnet Mountains, entering at river mile 108.0. In 1999, we assessed fish populations and habitat conditions on lower Poorman Creek. These surveys identified fish loss to ditches, and extensive habitat problems in the lower two miles of stream. These initial surveys help set the stage for a comprehensive restoration project. This project involves the conversion of flood to pivot irrigation (consolidation of two ditches to a single pipe), screening of the intake, instream flow enhancement and riparian grazing changes. Grazing changes involve corridor fencing (FSA *continuous conservation reserve* program), off-stream water developments, shrub planting, the removal of two culverts, and the construction of three bridges. This combined project should be completed in 2004.

Poorman Creek supports populations of westslope cutthroat trout, brown trout, and brook trout, and is one of only two known Garnet Mountains stream to support bull trout reproduction. In 2001, we established fish population monitoring sites immediately upstream and downstream of the irrigation project. In 2003, we repeated the surveys in order to develop a better pre-project baseline for the irrigation project. Findings in 2003 were similar to 2001, with large declines in trout densities below the lower diversion compared with above the upper diversion (Figure 17).

Baseline data that has been obtained that will be compared to future post-project data. Two years of data suggest substantial fish losses to the irrigation system.

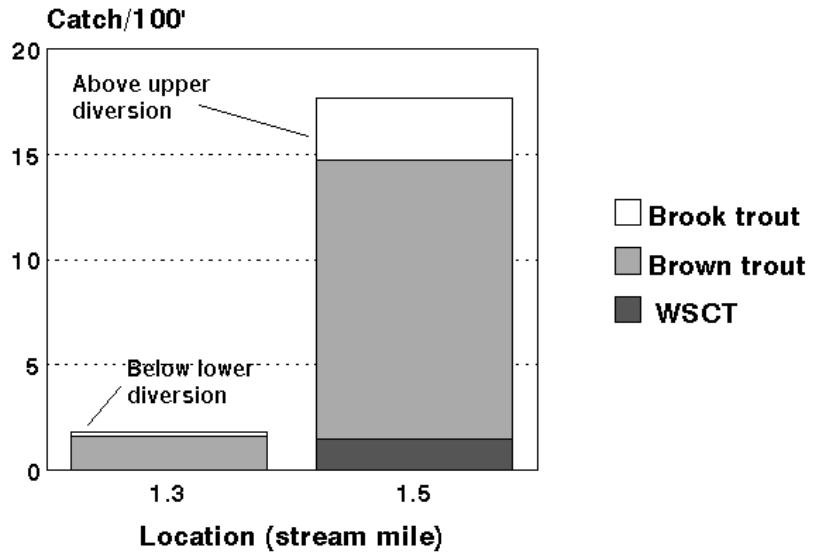

Figure 17. Catch per unit effort for salmonids above and below two diversions on Poorman Creek, Montana, in August 2003.

Rock Creek Restoration

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

Rock Creek, the largest tributary to the lower North Fork of the Blackfoot River, has been the focus of restoration since 1990. Rock Creek, a basin-fed stream over most of its length, receives significant groundwater inflows between mile 1.2 and 1.6. Rock Creek was 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).

In 2001, we reconstructed 5,800' of degraded and over-widened stream (mile 3.8-5.0 pre-project length) to an E4 channel type. This project reduced mean bankfull width from 23.0' to 7.9', increased mean bankfull depth from 0.4' to 1.3' and increased total stream length from 5,800' to 8,130'. The restoration project also incorporated instream woody debris and shrub plantings, along with fencing, offstream water and the removal of a streamside corral, which brings the total amount of restored stream to ~6.8 miles. In 2002, the Blackfoot cooperators reconstructed ~3,000' of floodplain in an over-widened section of stream between mile 3.0 and 3.8. This project focused on importing sod-mats and included shrub plantings, along with fencing and off-stream water developments. To date, this brings the total amount of restored stream to ~7.2 miles.

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. In 2002, we continued to survey fish populations in a section (mile 1.6) of stream reconstructed in 1999. Our surveys show an increase in densities (Figure 18) and a shift from a brook trout to a more brown trout dominated community. Bull trout and rainbow trout also periodically utilize this portion of Rock Creek in lower abundance. **Preliminary data suggest that habitat restoration in Rock Creek may have influenced population shifts and increased fish densities.**

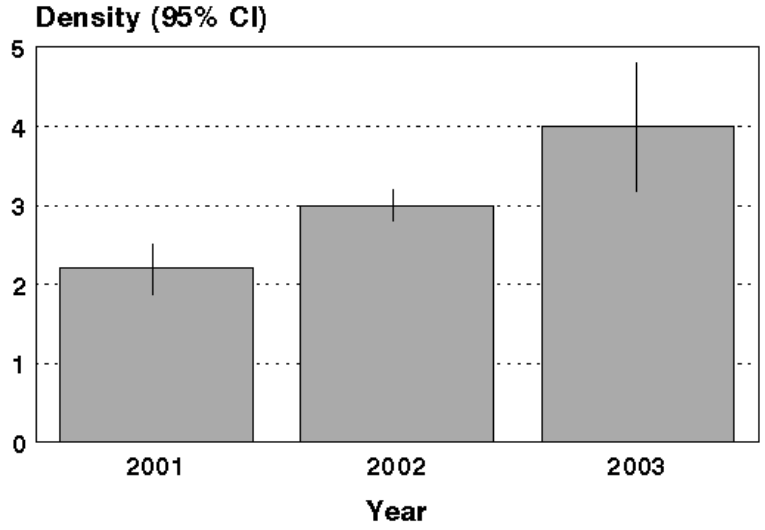

Figure 18. Total trout densities (fish > 4.0") for Rock Creek, Montana at mile 1.6, 2001-03.

Warren Creek Channel Restoration

WATER NAME: Warren Creek– Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce et al. (2004)
FFI NUMBER: RRA-031-1993, FFI-026-1999 and FFI-036-2000

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 of the riparian areas in the mid-to-lower portion of the stream were cleared, heavily grazed, dredged and straightened, all contributing to the degradation of salmonid habitat over most of the length of Warren Creek. Whirling disease had escalated in Warren Creek from mean grade of 0.21 in 1998 to a high of 2.1 in 1999. The 2003 monitoring recorded a decline in infection levels (mean grade 0.06).

In 2001, we completed the restoration of lower Warren Creek on 3.4 miles (mile 0.6 and 4.0) of stream, with emphasis on channel reconstruction in areas of historic channel dredging. Grazing management changes, riparian shrub plantings and restoration of two drained wetlands were also incorporated. This project increased stream length by 46% (6,080' to 8,870') in a straightened

section. The Blackfoot cooperators are currently in the developmental phases of a similar upstream restoration project.

In 2002 and 2003, we continued fish population and temperature monitoring in the project reach. In 2003, we observed a decline in brown trout densities in lower Warren Creek. Lower Warren appears to be prone to elevated sediment levels and drought stressors, including low flows and elevated water temperatures. We also observed the clinical signs of whirling disease (cranial deformities) in a high percentage of sampled brook trout. We established a new fish population survey section in 2003 (mile 6.7) in order to collect baseline fisheries information in an upcoming project area. Fish collected in this survey section, located in an area with extensive habitat problems (channelization, excessive grazing and dewatering), were limited to very low densities of brook trout (Figure 19).

Fish densities in lower Warren Creek have declined in response to drought and an increase in the intensity of the whirling disease infection since habitat restoration was completed.

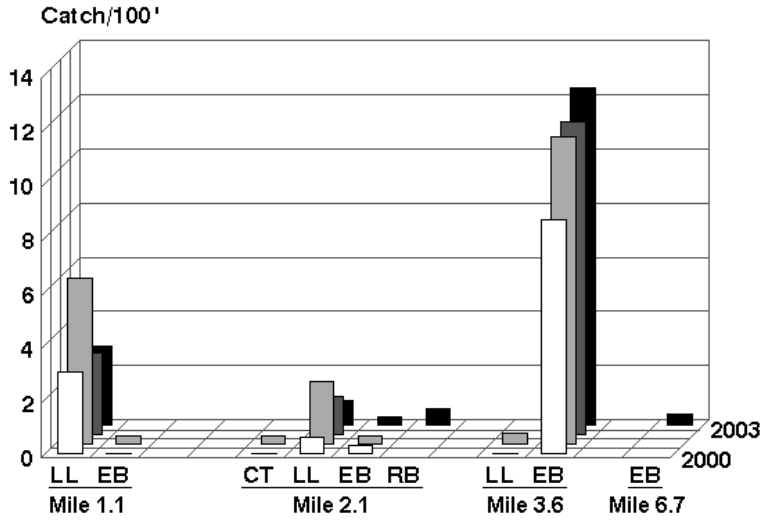

Figure 19. Catch per unit effort for salmonids (fish >4.0") in four sections of Warren Creek, Montana.

Wasson Creek Fish Friendly Diversion

WATER NAME: Wasson Creek – Blackfoot River
DATA PROVIDED BY: Ron Pierce, FWP
DETAILED REPORT CITATION: Pierce et al. (2004)
FFI NUMBER: FFI-039-1998

Wasson Creek is a small basin-fed tributary to Nevada Spring Creek. Wasson Creek begins on the Helena National Forest, then enters private ranchland, before entering Nevada Spring Creek immediately below the spring source with a base flow of ~2 cfs during the non-irrigation season. In 2003 we began to evaluate Wasson Creek from a fisheries restoration perspective. This involved fish population sampling upstream and downstream of major diversions, as well as near the mouth. In addition, a consultant to the landowners monitored water temperatures, assessed

stream channel conditions, measured stream discharge and evaluated riparian grazing practices. These studies all indicate high potential for fisheries improvement if corrective measures are implemented.

We sampled fish populations at four locations (miles 0.1, 1.0, 2.4 and 2.6) of Wasson Creek. The upper surveys show a large decline in westslope cutthroat trout densities below the diversions with a catch per unit effort declining from 25.7 fish/100' above the diversions to zero fish /100' (Figure 20). In lower Wasson Creek, we also found westslope cutthroat trout in very low densities (1.3/100' at mile 1.0) and extremely low densities of brown trout near the mouth of Wasson Creek, in addition to longnose and largescale suckers and redside shiners.

Interestingly, we also found one yellow perch and one largescale sucker in the upper-most sample. The two species likely entered Wasson Creek from the North Helmville Canal, which periodically delivers water (and apparently unwanted fish species) to Wasson Creek and perhaps to other adjacent drainages. Introductions of unwanted fish from Nevada Creek near the reservoir have the potential to compromise the westslope cutthroat trout population of Wasson Creek depending on the species introduced. Preventing the movement of unwanted fish to from the canal to Wasson Creek should be a necessary component to restoration planning.

Irrigation diversions on Wasson Creek appear to be having a major detrimental effect on westslope cutthroat trout populations.

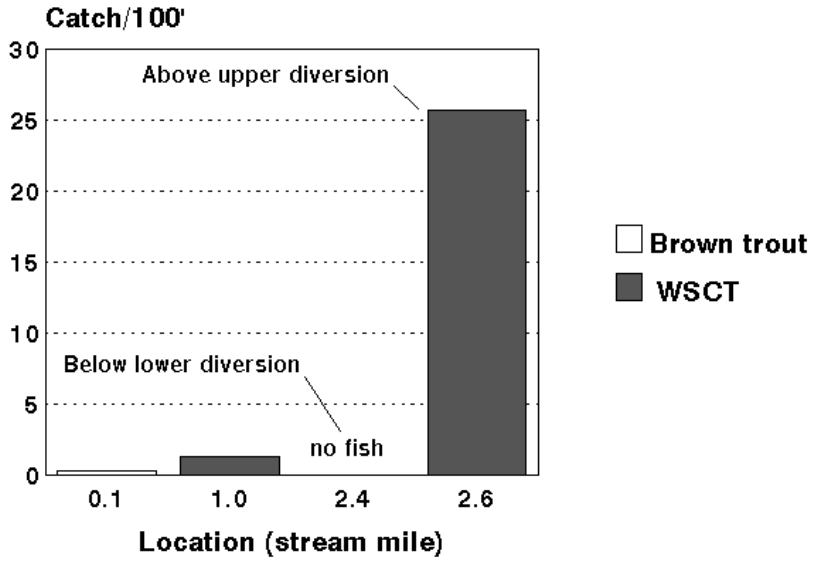

Figure 20. Catch per unit effort for salmonids at four locations in Wasson Creek, Montana in August 2003.

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

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 revegetaion efforts to allow woody species to recover and to protect the riparian area.

Pre- and post-project trout population data (1999 and 2003, respectively) 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. Although westslope cutthroat trout densities were similar in both sections, the post-project cutthroat densities were less for both size groups (Figure 21). Brook trout numbers were low in 1999 when compared to westslope cutthroat levels; in 2003, we attempted to obtain a brook trout estimate, but sampling resulted in an insufficient number of recaptures. An additional population estimate was collected in 2004, but is not available for inclusion in this report. **Westslope cutthroat trout densities decreased slightly from pre-project levels. Brook trout numbers remained low and may also have decreased. Additional future sampling may show a positive response as the stream channel and riparian zone develop.**

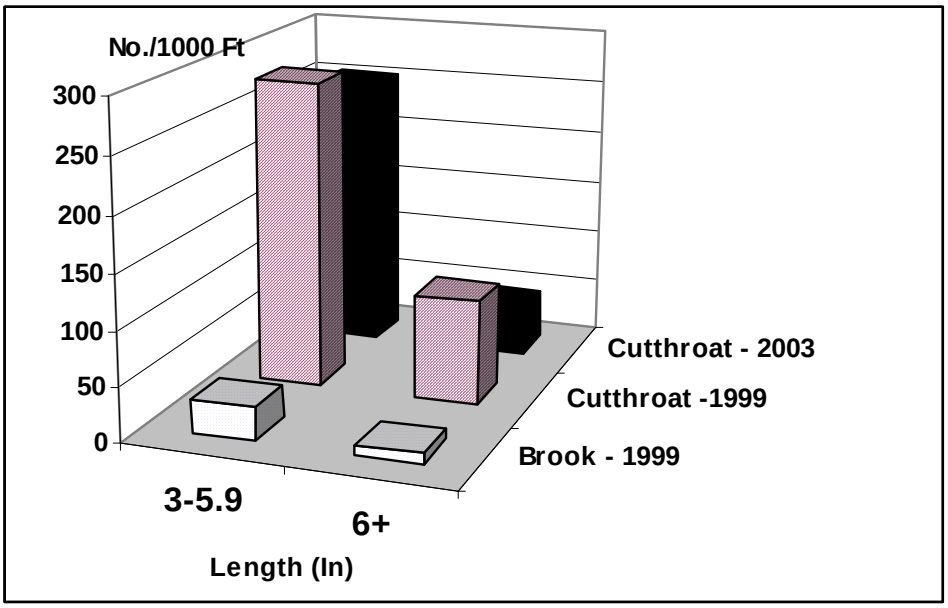

Figure 21. Cutthroat and brook trout densities by size groups in Camp Creek, Montana in 1999 (pre-project) and 2003 (post-project).

Skalkaho Creek Fish Screens and Irrigation Canal Siphons

WATER NAME: Skalkaho Creek – Bitterroot River
DATA PROVIDED BY: **Steve B. Gale, Montana Cooperative Fishery Research Unit MSU-Bozeman**
DETAILED REPORT CITATION: Montana Water Center Wild Fish Habitat Initiative Semi-Annual Report (2004)
FFI NUMBER: FFI-048-2002, FFI-024-2003, FFI-025-2003

Several irrigation canal siphons and fish screens have been installed in the Skalkaho Creek drainage. At the same time, work has been underway to evaluate entrainment losses of westslope cutthroat trout at private irrigation diversions to determine the risk and to provide information to project managers regarding the effectiveness of fish screens and the prevention of fish loss due to irrigation diversions.

Skalkaho Creek is a 25-mile long tributary of the Bitterroot River in southwest Montana. The Bitterroot flows 83 miles through irrigated farm and ranch land to its confluence with the Clark Fork River near Missoula, Montana. Five major diversions and numerous smaller canals remove water from the river during irrigation season. Many tributaries of the Bitterroot River are also diverted for irrigation during the summer months and contribute little streamflow to the river during that time. Both the mainstem of the Bitterroot River and its tributaries are chronically dewatered during the irrigation season.

Skalkaho Creek supports a healthy population of westslope cutthroat trout (Oncorhynchus clarki lewisi), along with brook trout, brown trout, bull trout, mountain whitefish, redside shiner, and slimy sculpin. This study is examining seven lowhead dams on lower Skalkaho Creek that are believed to divert downstream migrant westslope cutthroat trout into irrigation canals. Both post-spawn adults migrating back to the Bitterroot River and juveniles emigrating downstream from nursery reaches of Skalkaho Creek and its tributaries are likely entrained and become trapped and die in the irrigation canal system, resulting in a net loss to the population. Private landowners and irrigators in the drainage expressed concern over this possible loss, and three fish screens were installed in the beginning of 2004 to preclude any such losses. Research was conducted in 2003 to assess the magnitude and effects of entrainment by the diversions on the westslope cutthroat trout population prior to the installation of fish screens and work continues in 2004 to assess entrainment as well as evaluate the efficiency of the screens after installation.

To assess entrainment rates of adult, juvenile, and age-0 westslope cutthroat trout at the seven irrigation ditches, 30 adult and 50 juvenile fish were radio-tagged and followed throughout their migrations during the 2003 field season. Stationary trap nets were used in ditches to estimate entrainment rates of age-0 fish. No entrainment of tagged adults occurred during the 2003 field season, perhaps because they moved little; 80 percent of the radio-tagged adults were likely resident, non-migratory fish. The largest losses of tagged juveniles and age-0 westslope cutthroat trout during 2003 occurred at the Highline Ditch, the furthest upstream ditch. The Highline Diversion Dam diverts a large percentage of Skalkaho Creek to the Highline Ditch during peak irrigation season, which corresponded to the peak emergence and downstream movement of age-0 westslope cutthroat trout.

Three fish screens were installed in the spring of 2004 before the start of the irrigation season at the Hughes, Ward, and Highline Ditches. As with any new equipment or technology, some

problems were encountered early on with the screens. At the Highline Fish Screen, the vertical, stainless steel mesh panels had to be removed for two weeks in May because they were not self-cleaning properly. This was due in part to the high debris flow associated with spring runoff and also due to the fact that the screens on Skalkaho Creek were not designed to handle the higher flows diverted during high water. High-water rights, which allow the Daly Ditch Company to divert more than average flows down each ditch, were not taken into account in the design of these screens. Near the end of May, the high runoff subsided and the screens have been self-cleaning efficiently since. The paddlewheel, which powers the cleaning brushes on the screen, stopped working on the Ward Fish Screen in June. It was discovered that the gears had not been greased properly upon installation. All three paddlewheels have since been re-greased and have been running smoothly. A major incident occurred on May 22, 2004 when a local boy who lives on Skalkaho Road was caught in the paddlewheel of the Highline Ditch and pinned under water. Larry Trexler, ranch manager for Skalkaho Ranch, was able to free the boy from the wheel. Since this incident, contractors have been hired to install guards over each paddlewheel and fencing around each screen to prevent further accidents.

As of June 25, 43 adult fish have been radio-tagged in 2004 with over half of these being possible fluvial fish from the Bitterroot River. Twenty fish tagged last year still have active tags, for a total of 63 fish. This provides us with a larger sample size than last year with which we can track fish migration and estimate adult entrainment rates in Skalkaho Creek. As in 2003, it appears that during the spawning season most, but not all, fluvial adults were able to migrate upstream past the seven diversion dams as well as migrate back downstream over the diversion dams. As of July 7, 2004, nine radio-tagged adult westslope cutthroat trout have been entrained (21 percent of those tagged in 2004). Three fish were entrained in the Republican Ditch and one was entrained in the Hedge Ditch. Five fish were entrained in the Ward Ditch and all five were successfully bypassed back to Skalkaho Creek by the fish screen. Their bypass was detected by the Passive Integrated Transponder (PIT) antenna attached to the bypass pipe. It detects PITtags implanted in the cheeks of each radio-tagged fish. A screw trap has been in operation in Skalkaho Creek since mid-April. Fish collected therein will help estimate when downstream migrations of all sizes of westslope cutthroat trout and other species, such as bull trout, are occurring.

Although problems still exist with the operation and maintenance of fish screens, the improvements have been successfully bypassing entrained fish back to Skalkaho Creek.

Clark Fork River Drainage

Marshall Creek Barrier Removal, Riparian Fencing, Fish Screen and Woody Debris Placement

WATER NAME: Marshall Creek – Clark Fork River
DATA PROVIDED BY: Ladd Knotek, FWP
DETAILED REPORT CITATION: FWP files, Missoula
FFI NUMBER: FFI-008-2001, FFI-43-2002, FFI-013-2003, FFI-14-2003, FFI-43-2003

The monitoring of several reaches on Marshall Creek, a tributary of the Clark Fork River, provided a good comparison between different treatment prescriptions for riparian management

and placement of woody debris (Figure 22). One site served as a control, where no improvements have been made. Another site (RLWD) was a section where large woody debris (LWD) was randomly laid in the stream in 2002 and not anchored; this treatment provided little instream habitat or complexity. The other two sites both had large woody debris placed and anchored in the stream in 2002 to enhance instream cover and habitat complexity (CLWD). In addition, one site had the riparian area fenced in 2003, which allowed better vegetative management. Population levels of westslope cutthroat trout showed that greatest response in sections where large woody debris was placed and anchored in specific locations to enhance instream cover and habitat complexity (CLWD). The CLWD area that was protected by riparian fencing showed the largest population increase in 2004 (Figure 22).

In 2001, a Brencail manual cleaning screen was installed in an irrigation ditch diverting water from Marshall Creek where only westslope cutthroat trout have been sampled. Three sites near the diversion were sampled in 2000; the highest densities (~300/1,000 feet) of westslope cutthroat trout, ranging in size from 30-130 mm, were observed near the headgate. No fish were captured in the ditch during follow-up sampling in 2002 and 2003.

A section where large woody debris was placed and riparian fencing was installed to manage livestock grazing showed the greatest increase in westslope cutthroat trout.

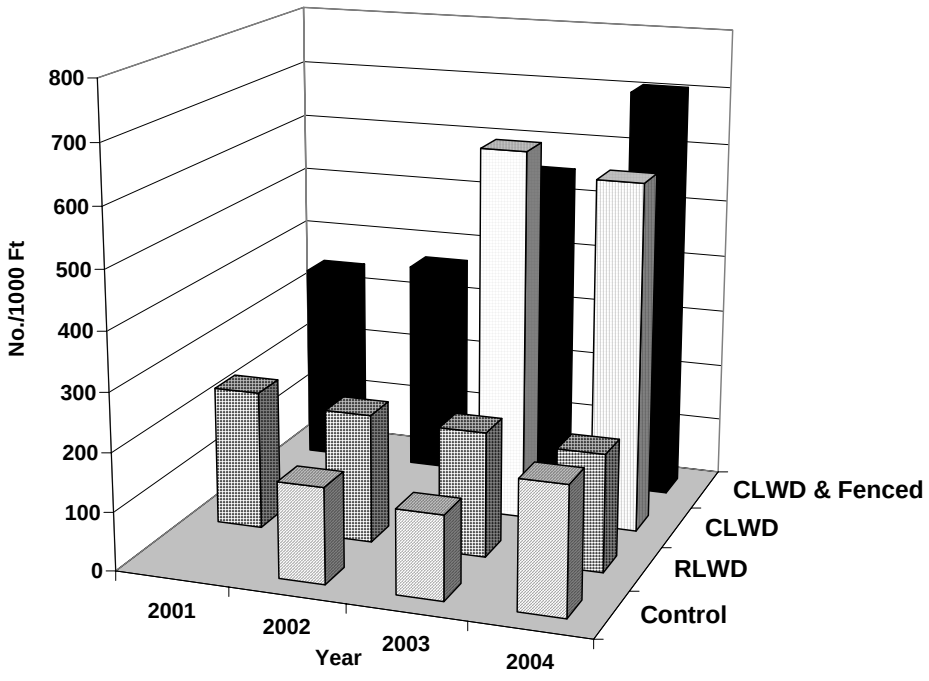

Figure 22. Number of age 1+ westslope cutthroat trout estimated per 1,000 feet of channel length in a control and three treatments sections of woody debris placement in Marshall Creek, Montana, 2001-2004. (RLWD =randomly laid large woody debris, CLWD = large woody debris placed to enhance cover and habitat complexity, CLWD & Fenced = large woody debris placed to enhance cover and habitat complexity and riparian fencing.)

Rattlesnake Creek Fish Ladder

WATER NAME: Rattlesnake Creek – Clark Fork River
DATA PROVIDED BY: Ladd Knotek, FWP
DETAILED REPORT CITATION: Knotek et al. (2004)
FFI NUMBER: FFI-21-2002

The Mountain Water Company Dam was constructed in 1905 approximately four miles upstream of the mouth of Rattlesnake Creek. The dam crest is approximately 10 ft high (without flashboards installed) and likely has completely impeded upstream fish passage past this point since construction. The dam likely affects all fish species in Rattlesnake Creek. Many fluvial species are unable to reach natal spawning areas and stream-resident fish are unable to complete seasonal upstream movements within the drainage; this has been reported at the dam repeatedly in the past century (MFWP, unpublished data). Adult fluvial bull trout have been documented at the base of the dam during the spawning migration period each year since 1996 and fluvial westslope cutthroat trout are present in large numbers each spring during their spawning period (MFWP, unpublished data). Adult fluvial rainbow trout congregate in March - May, but this species spawns primarily in lower reaches of Rattlesnake Creek (downstream of the dam). Although brown trout, brook trout and mountain whitefish are abundant in the lower four miles of Rattlesnake Creek, we have not observed congregations of these species (adults) in the dam tailrace area during their fall migration and spawning periods.

Upstream fish passage at Mountain Water Company Dam was recognized as the most important fisheries enhancement objective on Rattlesnake Creek. Consequently, information related to potential disease, genetic and species contamination resulting from passing fish and other organisms upstream of a long-term barrier was investigated. In fall 2000, the Montana Fish Health Committee reviewed the evaluation of risks and recommended implementation of fish passage improvements at the dam.

In 2001-2003, MFWP and several project partners iteratively developed upstream fish passage upgrades at MWC Dam. The overall goal of the project was to enhance fluvial westslope cutthroat trout and bull trout populations by affording migrating adults access to upstream spawning areas in Rattlesnake Creek. In conjunction with facility improvements, we incorporated radio telemetry, fish tagging and various other sampling efforts to improve and evaluate the project. In 2001, snorkel surveys visually estimated fish abundance below the dam; fish were captured by angling and gill nets. In 2002, a test ladder, which consisted of a 16 ft section of Denil fish ladder that carried 2-3 cfs of water siphoned from the sedimentation reservoir upstream of the dam, was installed. Fish that ascended the ladder were collected in a holding tank controlled with a one-way entrance gate. The test ladder was used to directly evaluate the efficacy of the proposed permanent ladder site over a range of river flow conditions. The apparatus also provided a more efficient method of capturing fish congregated at the dam, monitoring timing of migration, etc. The attractiveness of the test ladder was limited by low flow volume (~4 cfs) and a small, un-natural setting; based on these perceived limitations, we modified the final fish passage design to include greater flow volume for attraction, a more natural, rock step-pool fish ladder entrance, and a more functional staging area that included a deep pool with cover near the entrance. This involved using rock weirs (grade controls) that spanned the channel and incorporated large trees.

Installation of permanent fish passage facilities was completed in early April 2003 and operation began on April 18. The total abundance of westslope cutthroat trout and rainbow trout congregated at the dam was similar to 2001 and 2002. We estimated that the fish ladder successfully passed 80-90% of these fish based on weekly snorkel surveys. Unlike 2001 and 2002, delays appeared minimal when the ladder was in operation.

The primary goal of fish passage upgrades at the Mountain Water Company Dam was enhancement of fluvial westslope cutthroat trout and bull trout populations. Bull trout and westslope cutthroat trout captured in 2001 and 2002 as well as those that ascended the permanent ladder in 2003 were released in the stream above the dam. Bull trout redds counts above the dam show a positive response to providing fish passage (Figure 23). The number of westslope cutthroat trout that have been released above the dam has been relatively constant from 2001-2003, ranging from 58-63.

While there are no recognized detrimental aspects of passing of fluvial bull trout, there are significant considerations for westslope cutthroat trout. So, only fish that appeared to be genetically pure westslope cutthroat trout or those with obvious westslope cutthroat trout characteristics (cutthroat x rainbow hybrids) were released in Rattlesnake Creek upstream of the trap and dam. Rainbow trout, brown trout and brook trout have not been placed in the stream upstream of the dam; they were released downstream of the dam. Fall spawning species including mountain whitefish, brook trout and brown trout were present during the survey period, but were not abundant and surveys at the dam in fall 2001 and 2002 indicate that these species do not congregate in large numbers at the dam during spawning periods. Additional work continues to determine what strategies will be implemented to provide passage for westslope cutthroat trout while minimizing the potential access for rainbow trout above the dam. **This project has improved fish passage for native bull trout and westslope cutthroat trout in Rattlesnake Creek**.

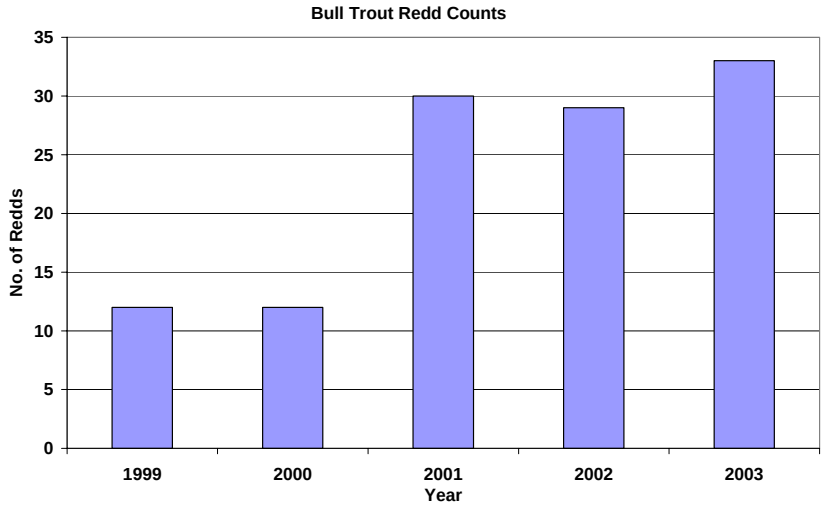

Figure 23. Number of bull trout redds counted in two sections of Rattlesnake Creek, Montana upstream of the Mountain Water Company Dam before (1999 & 2000), during evaluations (2001 & 2002) and after (2003) providing permanent upstream fish passage.

Rattlesnake Creek Fish Screens

WATER NAME: Rattlesnake Creek – Clark Fork River
DATA PROVIDED BY: Ladd Knotek, FWP
DETAILED REPORT CITATION: Knotek et al. (2004)
FFI NUMBER: FFI-022-2002

Monitoring fish entrainment on six active irrigation ditches on the lower five miles of Rattlesnake Creek was initiated in 2001 and continued through 2004. Sampling was typically concentrated in August-September each year when fish densities tend to be high in irrigation canals. Sampling showed that trout were abundant in all unscreened diversion canals (Figure 24). Bull trout relative abundance was much higher in some canals than would be expected when to densities in the stream. Two canals that were screened before monitoring was initiated, the Williams and Quast canals, showed that both Brencail manual cleaning and McKay flat plate, self cleaning fish screens can be effective in reducing fish entrainment (Figure 24). The two canals where Brencail screens were installed after entrainment monitoring was initiated, the Coban and Hamilton-Day canals, showed substantial reductions even though effectiveness was not as high as would be expected. This was due to installation and operational problems, which are being addressed as shown by the 2004 data from the Coban canal.

Fish entrainment in irrigation diversions can be a major factor in juvenile and adult salmonid mortality. Depending on the installation site, both the McKay flat plate, self cleaning fish screen and the Brencail manual cleaning screen can be effective in reducing fish entrainment and preventing fish loss from a stream.

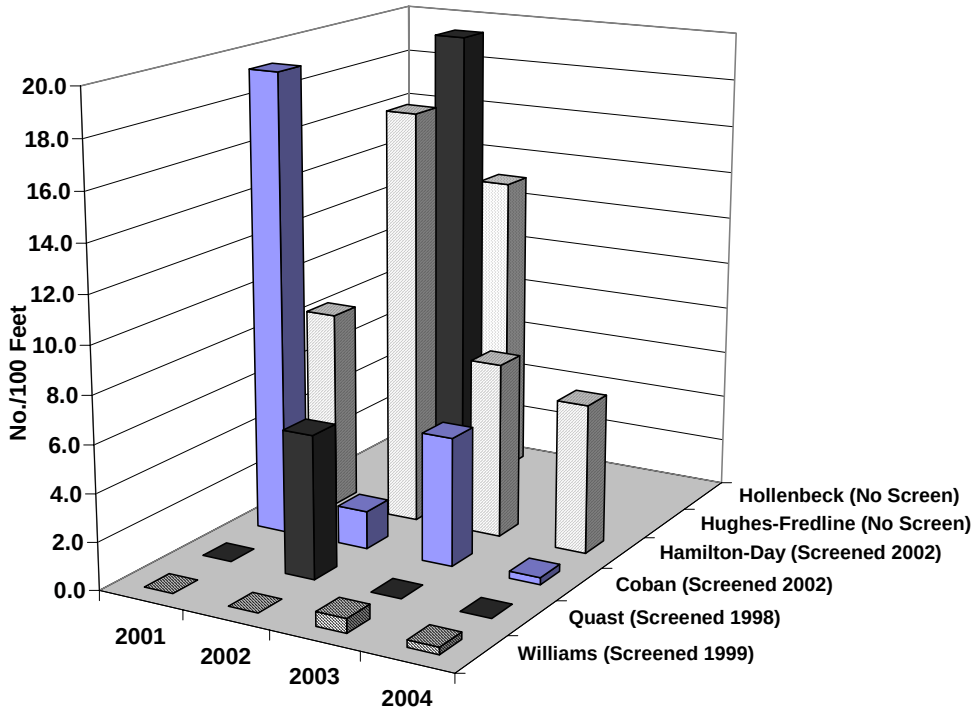

Figure 24. Number of salmonids captured per 100 feet in six irrigation ditches on lower Rattlesnake Creek, Montana, 2001-2004, during evaluations to determine fish entrainment before and after screening.

Jefferson River Drainage

Creeklyn Ditch / Jefferson Canal Irrigation Efficiency

WATER NAME: Jefferson River – Jefferson River
DATA PROVIDED BY: Ron Spoon, FWP
DETAILED REPORT CITATION: FWP files, Townsend
FFI NUMBER: FFI-030-2003, FFI-036-2004

Canal-Seal was applied in both canals during 2003 and 2004 using FFIP funds. Numerous synoptic flow measurements were taken; it appeared that about 6 cfs in Jefferson Canal was conserved in 2003 during mid-summer totaling about 1000 AF of water savings. Creeklyn Ditch had a canal malfunction due to highway construction and funds were returned to FWP. In 2004, improved application of Canal-Seal in Jefferson Canal resulted in a water savings of about 9cfs. Synoptic flow measurements in Creeklyn Ditch showed no quantifiable water savings in 2004. **The application of Canal-Seal conserved 6-9 cfs of water in one canal, while in another canal no water savings was noted.**

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: FFI-038-1993

The water lease requirements have been met since this project was implemented in 1996. Flow information has been collected for Hells Canyon Creek. Rainbow trout fry numbers have maintained a level near the long-term average despite whirling disease and the severe drought of 2000-2004 (Figure 25). **Rainbow trout recruitment has been steady despite factors that would be expected to cause declines.**

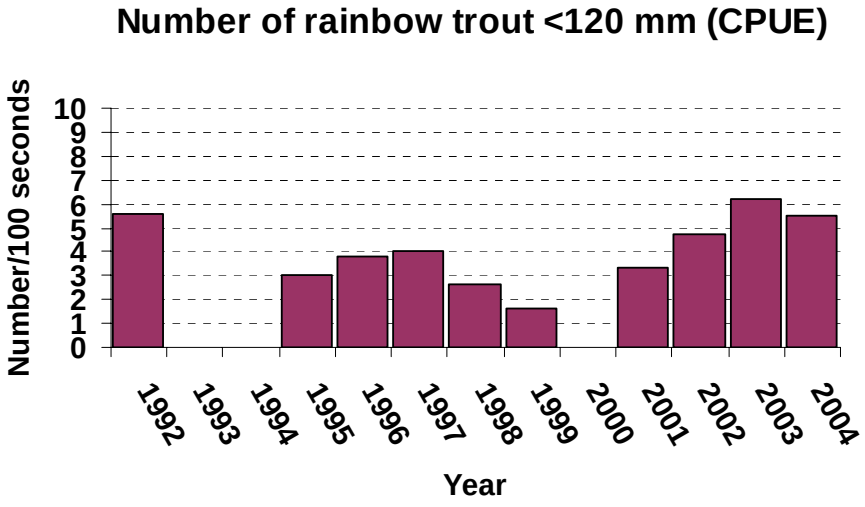

Figure 25. Catch-per-unit-effort (CPUE) of juvenile rainbow trout from electrofishing surveys in Hells Canyon Creek, Montana, a spawning tributary of the Jefferson River, 1992-2004. The CPUE values represent the number of rainbow trout (<120 mm) captured per 100 seconds of electrofishing.

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: FFI-004-1991, FFI-034-2004

No rainbow trout spawning occurred in the area prior to 1990. Fry production after habitat improvement and imprinting was significantly improved by the initial project (Figure 26) and an increase in the number of rainbow trout residing in the Jefferson River near Willow Springs Creek was observed. Redd count data for rainbow trout spawning in Willow Springs has also been collected. **A positive response was observed in rainbow trout fry production and spawning from habitat improvement.**

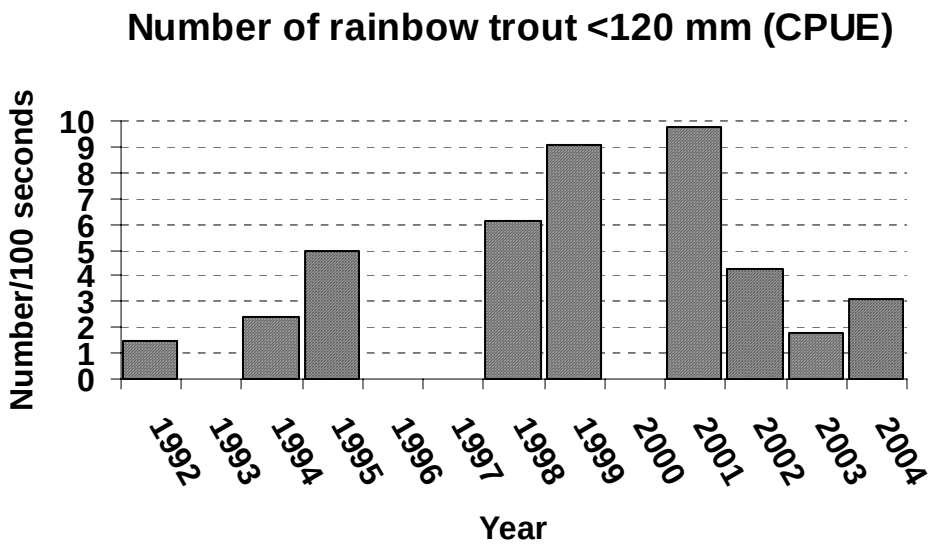

Figure 26. Catch-per-unit-effort (CPUE) of juvenile rainbow trout from electrofishing surveys in Willow Springs Creek, Montana, a spawning tributary of the Jefferson River, 1992-2004. The CPUE values represent the number of rainbow trout (<120 mm) captured per 100 seconds of electrofishing.

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

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 four sections of Big Spring Creek. Sites included the Hatchery, 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. Little data has been collected for the Hatchery section; prior to 2004, the last time that section was sampled was in 1968.

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 since 2000 (Figure 27). 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 207 fish from a pre-project average of 636 to a post-project average of 843 per mile (Figure 28). Rainbow and brown trout numbers for fish 10 inches and longer in the Brewery Flats Section have both increased since 2002 (Figures 29 and 30), in contrast to other sections where numbers have been stagnant or declining. Estimates of larger (>10 inches) rainbow and brown trout in 2004 are amongst the highest ever observed in the section. Drought or other factors apparently have taken a toll on rainbow recruitment in the Brewery Flats section; the numbers of rainbow trout less than 10 inches long has been at essentially record low numbers since the project was completed (Figure 31). However, the Burleigh section also has had low numbers of small rainbow trout in most recent years.

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. However, small rainbow trout numbers have not responded to the habitat enhancement. Additional time and sampling will allow us to assess if population dynamics, drought or simply additional time is required to allow the channel to adjust and function naturally and for woody vegetation, rearing and spawning habitat to further develop.

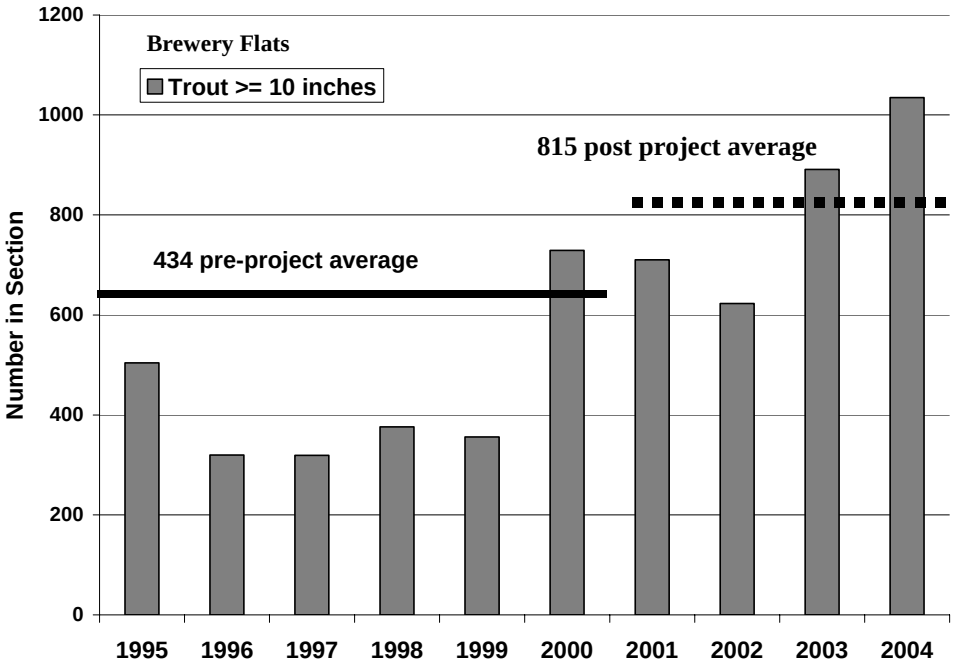

Figure 27. Estimated total number of trout 10 inches and longer in the Brewery Flats Section of Big Springs Creek, 1995 to 2004). PROVISIONAL DATA.

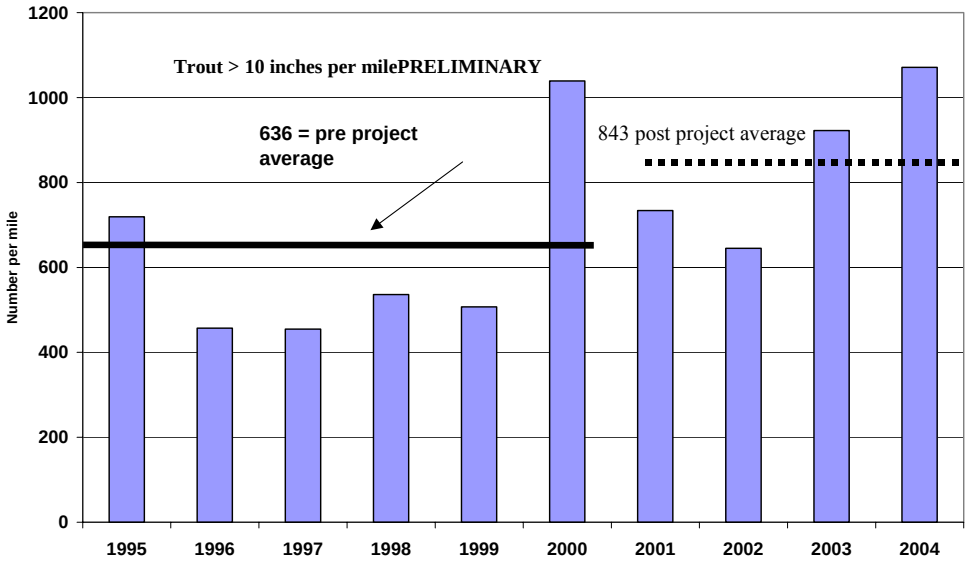

Figure 28. Estimates of the number of trout per mile longer than 10 inches in the Brewery Flats Section of Big Springs Creek from 1995 to 2004. PROVISIONAL DATA.

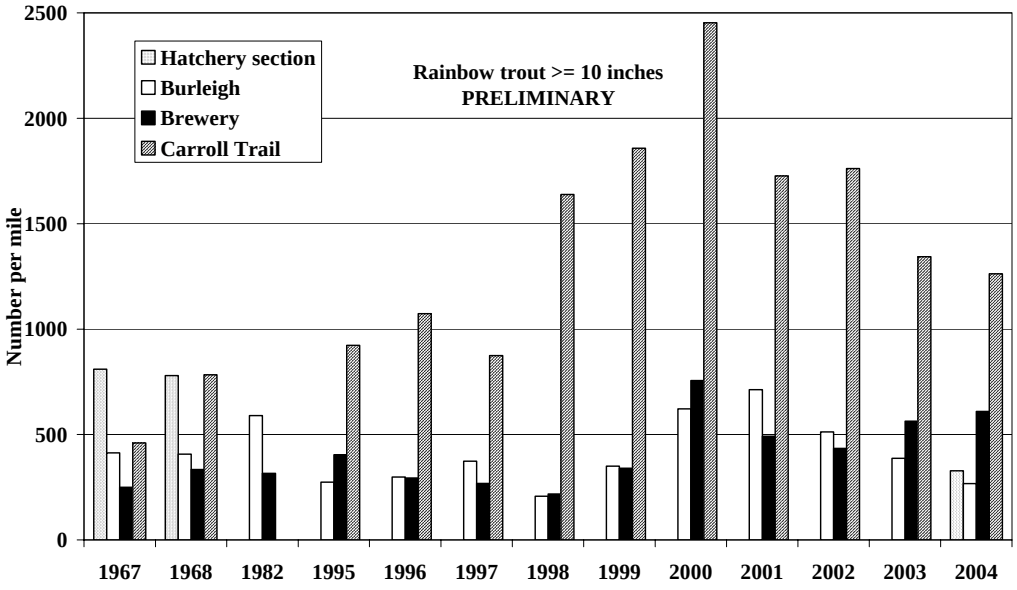

Figure 29. Estimated number of rainbow trout 10 inches and longer per mile in four sections of Big Springs Creek from 1967 to 2004. PROVISIONAL DATA.

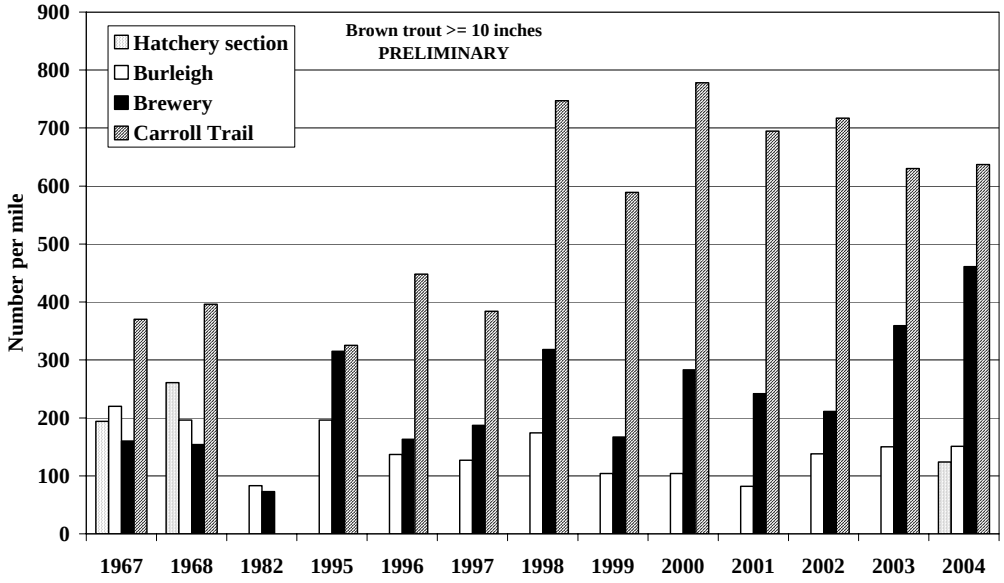

Figure 30. Estimated number of brown trout 10 inches and longer per mile in four sections of Big Springs Creek, 1967 to 2004. PROVSIONAL DATA.

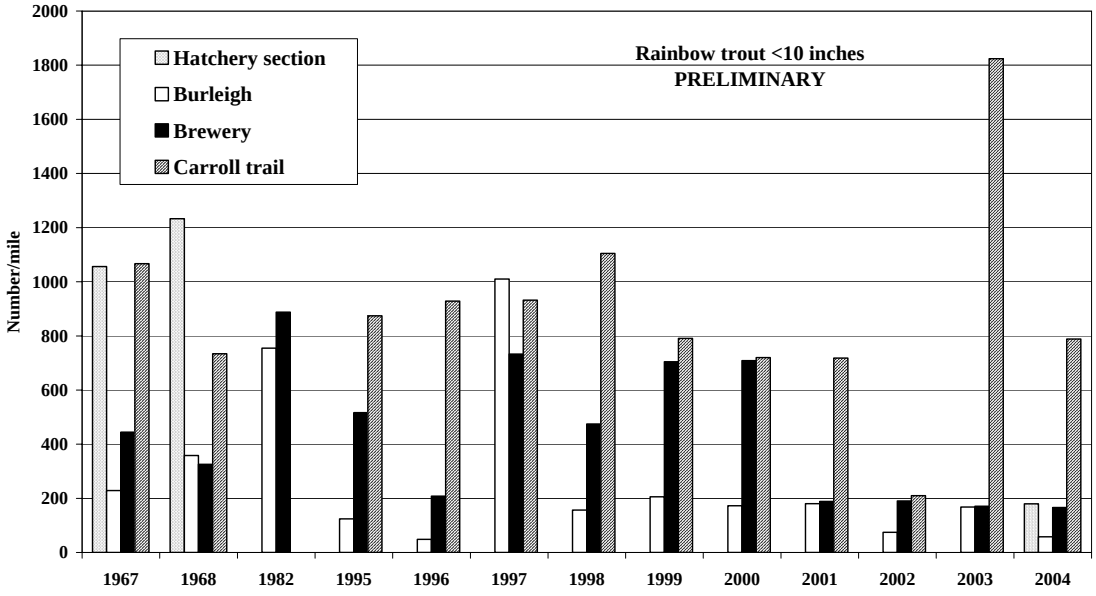

Figure 31. Estimated number of rainbow trout per mile less than 10 inches in length from four sections of Big Springs Creek, 1967 to 2004. PROVSIONAL DATA.

Madison River Drainage

Madison Spring Creek Rehabilitation

WATER NAME: Madison Spring Creek, - downstream of $3 Bridge – Madison River
DATE PROVIDED BY: George Liknes, FWP
DETAILED REPORT CITATION: FWP files, Great Falls, MT
MFWP CODE: FFI-036-1996, FFI-015-2002

In 1996, the Madison River Ranch Association initiated a rehabilitation project on the lower portion (≈2500 feet) of a spring creek that enters the Madison River approximately 1.1 miles downstream of the $3 Bridge from the west. Another less intensive project was initiated on this same spring creek in 2002 on the property immediately upstream from the first project. We sampled two 500 feet-long sections of this spring creek in 1997, 1998, and 2004. One section was entirely within the rehabilitated portion of the creek from the 1996 project. The other section was an untreated section located between the rehabilitated section and the Wade Lake road crossing in the area where the 2002 project had occurred. We made population estimates in the rehabilitated sample section in both 1997 and 1998 while we completed a single electrofishing pass in the untreated sample section in both 1997 and 1998. We obtained population estimates in the both the control and treated sections in 2004 for all species sampled.

In 1997 and 1998, only young brown trout were found in the sample sections. In 2004, the most common salmonid found was brown trout, but rainbow trout, mountain whitefish and sculpins were also captured. In 1997 we estimated that the rehabilitated sample section supported 184 age 0 and 7 age 1 brown trout, in 1998 this section supported an estimated 592 age 0, 8 age 1, and 1

age 2+ brown trout, and in 2004 it supported 10 age 0, 101 age 1, and 13 age 2+brown trout. In 2004, in addition to the brown trout, we also estimated 27 rainbow trout, 19 mountain whitefish, and 375 mottled sculpin /1,000 feet in the rehabilitated section. In 2004, the control section (upstream) section supported 14 age 0, 142 age 1, and 0 age 2+brown trout for a total of 156 per 1000 feet. In 2004, in addition to the brown trout, we also estimated 8 rainbow trout, 9 mountain whitefish, and 667 mottled sculpin /1,000 feet in the control section.

Catches of brown trout in one electrofishing pass were compared between the two sections (Figure 32). In 1998 the rehabilitated section supported more brown trout less than 3 inches per 1,000 feet of stream length than did the section above; however, the upper section still supported higher catches of fish over 3 inches. Lower numbers of brown trout were captured in both sections in 2004 than in previous sampling. Electrofishing occurred during late July in 1997, late June in 1998, and mid-October in 2004. Young of the year fish may have migrated out of the spring creek prior to 2004 sampling. The rehabilitated section averaged only 6 feet wide while the untreated section still averaged 20 feet wide. T**he channel rehabilitation successfully allowed access to the spring creek by brown trout, rainbow trout and mountain whitefish from the Madison River and providing important spawning and rearing habitat for young salmonids. Diversity of species had increased substantially when compared to previous years.**

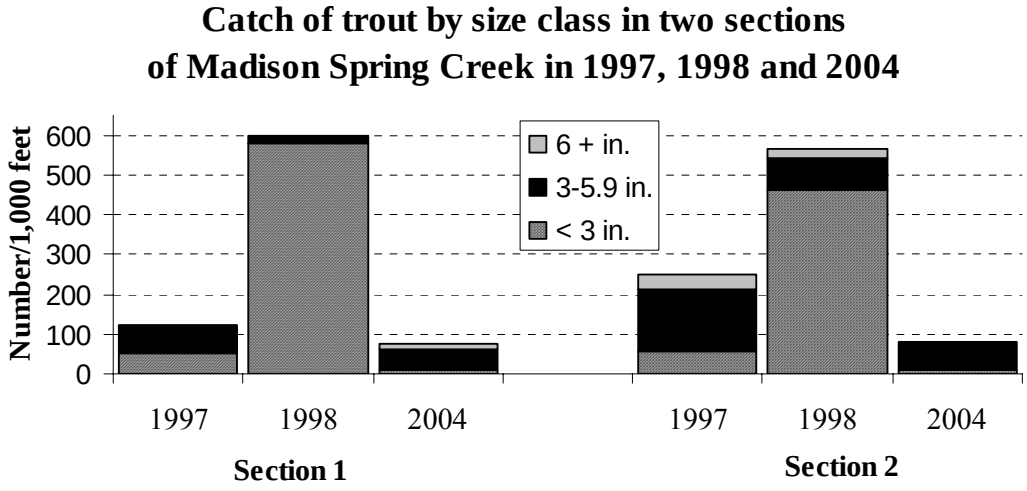

Figure 32. Catch of brown trout by size class in a single electrofishing pass in two sections of a spring creek entering the Madison River below $3 Bridge. Section 1 was rehabilitated to allow passage of adult fish from the Madison River and to improve channel habitat. Section 2 was immediately above the rehabilitated section, but was still an overwidened channel.

Jack Creek Ranch Channel and Riparian Restoration

WATER NAME: McKee Spring Creek, - Madison River
DATE PROVIDED BY: George Liknes, FWP
DETAILED REPORT CITATION: FWP files, Great Falls, MT
MFWP CODE: FFI-018-2003

McKee Spring Creek had been significantly altered in the past by excavations and relocations of the channel, which included the construction of 15 on-channel ponds and a history of prolonged riparian grazing. This led to an over-widened channel, sediment transport problems, and low quality fish habitat and stream function. Numerous ditches were also constructed to drain wetlands.

The lower portion of McKee Spring Creek's channel has been rebuilt into a narrow, deep channel that has vertical and numerous undercut banks. The typical desired cross section would be referred to as an E5 channel under Rosgen's classification system. The new channel also incorporated backwater, pond like areas into the new channel. We examined the project area from the lower end and found that all but the upper reach of the restored channel would be very difficult to sample effectively to obtain any fish population information. Consequently, we established a 512 feet section at the upper end of the new channel and obtained a 3-pass depletion estimate. This section is not representative of habitat in the lower portion of the project. We also made a single electrofishing pass on the proposed future channel restoration reach. This section included an area both inside and outside the exclosure area; it was 988 feet in length. This reach has significantly lower flows than the restored reach.

Brown trout were the most numerous game fish observed in the restored reach section (Figure 33), most of which were 3-5.9 inches in length. The largest brown trout captured was 10.5 inches. The brown trout point estimate was 311 brown trout per 1,000 feet. Low numbers of rainbow trout, brook trout, and mountain whitefish (8, 16, and 4 per 1,000 feet, respectively) were also estimated. A relatively large population of mottled sculpin estimated at 180 per 1,000 feet was sampled.

The single electrofishing pass through the proposed future channel restoration area showed very low fish densities (Figure 34). Sculpin were the most common species, followed by brown trout, longnose dace, and brook trout. The lower portion of this reach was very difficult to sample because of the substantial residual herbaceous vegetation in the channel; the upper portion appeared to be grazed season long and was impacted by livestock. This reach had very low flows and would support fish populations only if flows were redirected back into this channel. The area would also require a grazing management plan if Future Fishery dollars were used for channel restoration.

Population estimates obtained on McKee Spring Creek in 2004 provide a baseline for comparing future population levels in the upper portion of the restored reach and demonstrating the low population levels in the proposed restoration reach.

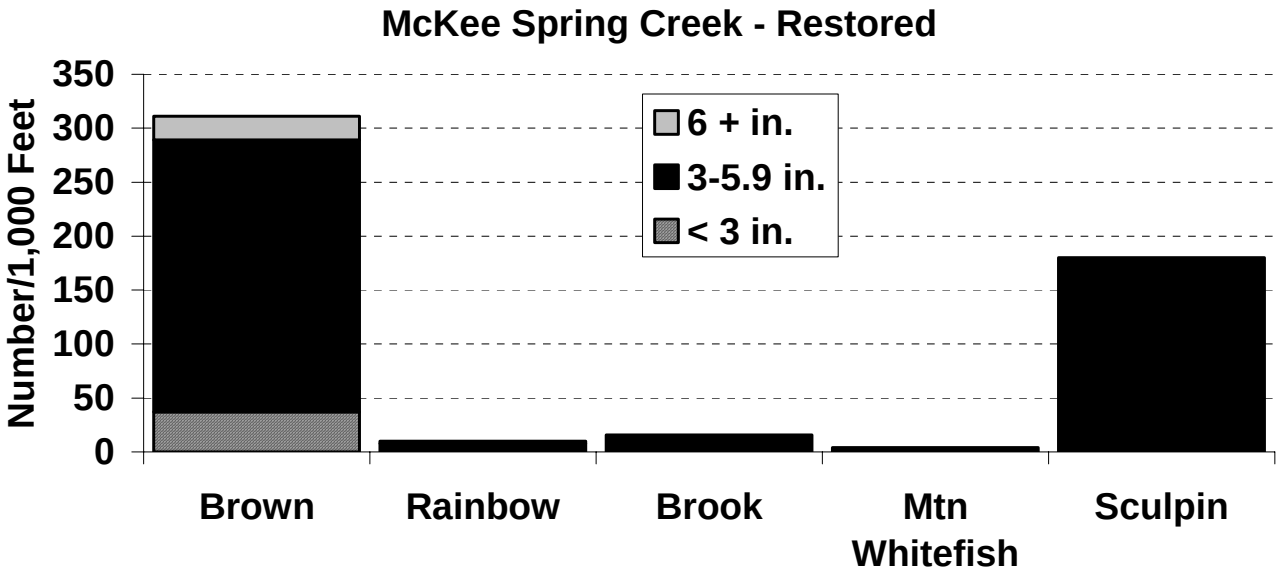

Figure 33. Estimates of brown trout, rainbow trout, brook trout, mountain whitefish, and sculpin densities per 1,000 feet by size class in a restored section of McKee Spring Creek, Montana in 2004.

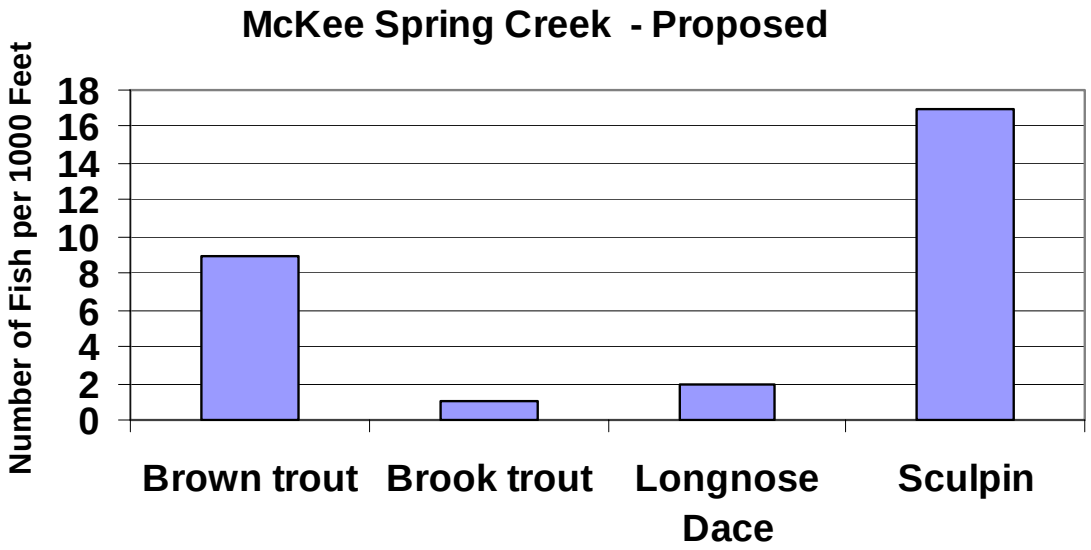

Figure 34. Relative abundance of brown trout, brook trout, longnose dace, and sculpin per 1,000 feet in a section of McKee Spring Creek, Montana proposed for future channel restoration, during October 2004.

Marias River Drainage

Newkirk's Stream Restoration Project

WATER NAME: Dupuyer Creek – Marias River
DATE PROVIDED BY: George Liknes, FWP
DETAILED REPORT CITATION: FWP files, Great Falls, MT
MFWP CODE: FFI-007-2003

A watershed group recently formed in the Dupuyer Creek drainage to address stream impairments. This project just upstream of the town of Dupuyer was designed to restore the riparian corridor and allow the stream to return to a functional channel by fencing, livestock grazing management, removing car bodies, and in-channel work to restore appropriate channel dimensions using bioengineering techniques over a 0.75 mile reach.

We electrofished a 0.51 mile reach of the project area where the proposed restoration work will occur and a 1.77 mile long control section located on school trust land immediately upstream in June 2003. Although the upstream control reach is entrenched, it had a much healthier riparian area. The estimated combined trout population (rainbow trout, rainbow x cutthroat trout hybrids, and brook trout) in the proposed project reach was 58% of that in the upstream control section (Figure 35). **Stream work has completed, so the fisheries data collected in 2003 will provide baseline information to determine population changes in the future.**

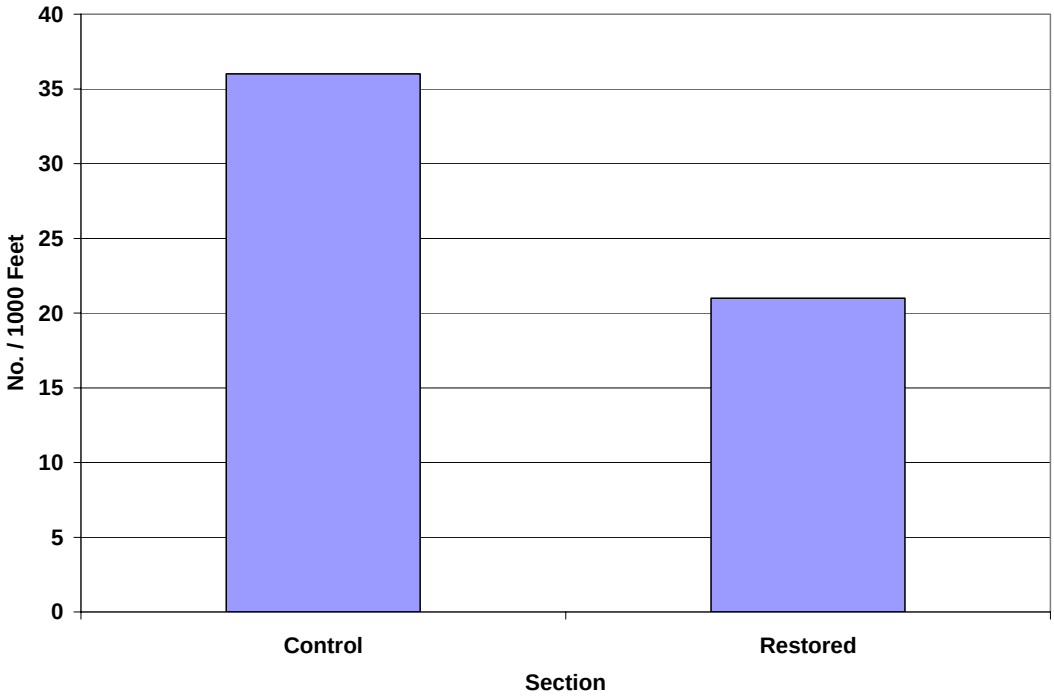

Figure 35. The estimated number of rainbow trout, rainbow x cutthroat trout hybrids, and brook trout in an upstream control section and the proposed restoration reach on Dupuyer Creek, Montana in June 2003.

Missouri River Drainage

Conservation of Westslope Cutthroat Trout by Removal of Brook Trout Using Electrofishing

WATER NAME: Cottonwood Creek (Arrow Creek drainage in Missouri drainage below Fort Benton), Craver (Clark Canyon/Beaverhead River drainage), Muskrat Creek (Boulder River), Spring Creek (Beaverhead River drainage), Staubach Creek (Canyon Ferry/Missouri River drainage, Tyrell and Pole creeks (Hound Creek/Smith River drainage), and Whiterock Creek (Two Medicine River drainage)
DATA PROVIDED BY: Brad Shepard, FWP
DETAILED REPORT CITATION: Shepard and Nelson (2004)
FFI NUMBER: FFI-023-2001

Future Fisheries Improvement Program funding, in collaboration with Forest Service, BLM, Montana State University, and FWP Fisheries support, was used to remove and relocate nonnative brook trout, *Salvelinus fontinalis*, from approximately 14 km of total stream length in Cottonwood, Craver, Muskrat, Spring, Staubach, and Whiterock creeks to conserve sympatric populations of native westslope cutthroat trout, *Oncorhynchus clarki lewisi*. In addition, we assisted FWP biologists to help remove brook trout from two tributaries to upper Hound Creek, a tributary to the Smith River. From 2001 to 2003 we successfully eliminated brook trout from treatment reaches covering almost 8 km of stream in Cottonwood, Muskrat, and Staubach creeks. Electrofishing removal treatments in Muskrat and Staubach creeks began earlier than 2001. In Spring and Craver creeks we suppressed brook trout, but dense riparian vegetation, beaver dams, and abundant woody debris in the channels prevented us from eradicating brook trout using electrofishing. We believe brook trout can be eradicated from the treatment reach in Spring Creek using electrofishing as long as enough riparian vegetation and in-channel woody debris are removed to allow electrofishing crews access to the stream. However, we do not believe it will be possible to remove brook trout from Craver Creek via electrofishing due to the extensive portion of the drainage inundated by beaver dams. Brook trout had not invaded the portion of Whiterock Creek where most westslope cutthroat trout were located, so no removal was necessary. We estimated that electrofishing eradication of nonnative brook trout cost about $3,000 to $4,000 ($US in 2002 using Montana state rates) per kilometer where no riparian vegetation or woody debris clearing was necessary, but cost about $8,000 to $9,000 per kilometer where clearing was needed. These costs did not include costs to install barriers at the lower boundary of treatment areas or to prepare environmental assessments. Cost per kilometer that required no channel clearing was similar to estimated costs of two antimycin piscicide treatments, but slightly more than estimated costs for two rotenone treatments. However, electrofishing eradication would be preferred in locations where native fish are in sympatry with nonnative fish because more native fish can be saved during removal efforts. We found that it took at least six removal treatments of two to three passes per treatment to effectively eliminate brook trout from most treatment reaches. We recommend the following strategies for conducting more efficient electrofishing removals: 1) concentrate removal treatments within two to three years by conducting several removal treatments each year; 2) initially conduct at least one, and preferably two, removal treatments prior to the first spawning by nonnative fish and concentrate on removing mature adults during these initial removal efforts; 3) make at least one removal

treatment during spawning and focus on eliminating mature adults and trampling nonnative fish redds during this treatment; 4) conduct some removal treatments in the late fall or early winter to take advantage of winter concentrations of nonnative fish in pools and better electrofishing efficiency associated with cold water temperatures; 5) remove nonnative fish from sections that are long enough that crews can cover one section with one pass each day and conduct repeat removals on subsequent days; and 6) realize that smaller, younger nonnative fish (age-0 and age-1) will be more difficult to capture and plan on eradicating these fish after adults have been eliminated, so no additional recruitment occurs, and these smaller fish have had time to grow to a size where they are more vulnerable to electrofishing, but are still immature. Our data, and other studies, have shown that native cutthroat trout populations will respond positively to removal of nonnative brook trout. This response may take two to three years and appears related to elimination of competition and/or predation that occurs when cutthroat trout are age-0 to age-1.

In streams where brook trout need to be suppressed to restore and conserve populations of native westslope cutthroat trout, electrofishing is a potential tool providing that dense riparian vegetation, beaver dams, and abundant woody debris in the channels are not present. Cost per kilometer that required no channel clearing was similar to estimated costs of two antimycin piscicide treatments, but slightly more than estimated costs for two rotenone treatments.

Merrit Spring Creek Channel Restoration

WATER NAME: Merrit Spring Creek
DATA PROVIDED BY: George Liknes, FWP
DETAILED REPORT CITATION: FWP files, Great Falls, MT
FFI NUMBER: FFI-015-2003, FFI-44-2003

Merrit Spring Creek, a tributary of Lake Helena/Hauser Resevoir, was nearly completely diverted and channelized into a drain ditch system when the US Bureau of Reclamation was developing Canyon Ferry Dam and the Helena Valley Irrigation Project. The area was drain tiled and area streams were diverted into deeply incised ditches to create irrigatable hay ground. Fish from Hauser Reservoir ascend the ditch to spawn, but no habitat exists in the drain ditch which results in no reproduction and substantial predation loss of spawning fish.

The Merrit Spring Creek project will restore approximately 6,200 feet of the steam channel to a form characteristic of the historic channel, and will enhance and fence riparian vegetation. In order to create baseline fishery data, a single electrofishing pass was made on two sections of Merrit Spring Creek in April 2003 (Figures 36 and 37). Both the upstream reach, which has the correct geometry and needs nothing more than riparian fencing and livestock management, and the lower channelized section contained low numbers of brown trout, fathead minnow, mottled sculpin, and longnose dace (Figure 36). Both sections contained significant numbers of white suckers (Figure 37). We identified longnose suckers in the catch only in the downstream reach. (Figure 36). **Fisheries data has been collected on Merrit Spring Creek that can be used as baseline information to compare to population estimates in the future.**

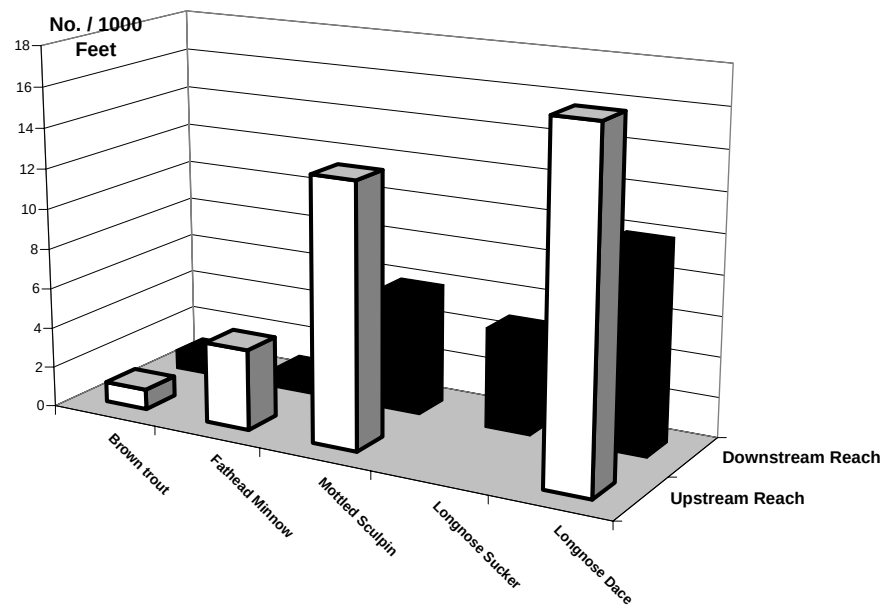

Figure 36. Catch of brown trout, fathead minnow, mottled sculpin, longnose sucker, and longnose dace, per 1,000 feet in a single electrofishing pass in two sections of Merrit Spring Creek, Montana in 2003.

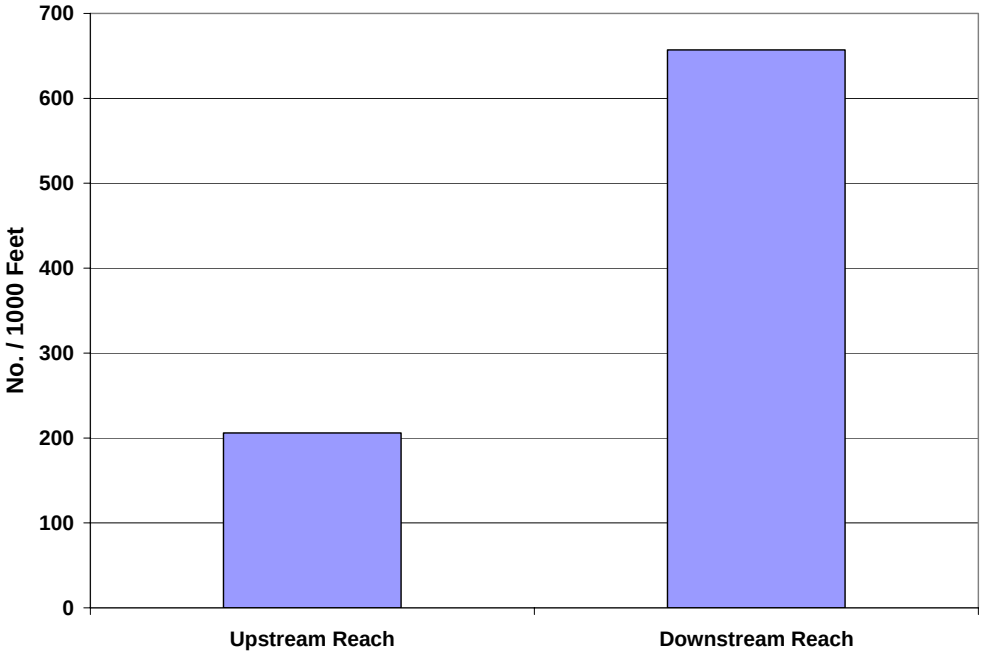

Figure 37. Catch of white sucker per 1,000 feet in a single electrofishing pass in two sections of Merrit Spring Creek, Montana in 2003

Prickly Pear Creek Bank Stabilization \ Channel Restoration

WATER NAME: Prickly Pear Creek - below Sierra Road (Anders)
DATA PROVIDED BY: George Liknes, FWP
DETAILED REPORT CITATION: Shepard (2000), FWP files, Great Falls, MT
FFI NUMBER: FFI- 018-1999

A channel restoration project on Prickly Pear Creek within the Anders' property was evaluated on April 15, 1999, prior to its construction, and again on April 9, 2003 by conducting a mark-recapture population estimate for both brown and rainbow trout in an approximately 1.9 mile long section of Prickly Pear Creek from the Police Academy down to Anders' private bridge. This sample section was segregated into two subsections with the lower subsection (2) lying totally within the proposed project area (Table 2). A mobile electrode system was used to sample the stream and modified Peterson's population estimates were made.

Table 2. Description and lengths (ft) of subsections within the sample section of Prickley Pear Creek below Sierra Road (Anders).

Subsection	Length (ft)	Upper Boundary	Lower Boundary
1	6150	Police Academy bridge	Fence at top of Anders
2	3900	Fence at top of Anders	Anders' bridge

The combined rainbow and brown trout population levels increased in both the control and the restoration reach from 1999 to 2003 (Figure 38). However, the number of fish in the restored reach increased from a level lower than in the control section in 1999 to a higher number than in the control section in 2003. Although both species increased in the restored reach, the proportion of rainbow trout increased from 67% of the population in 1999 to about 75% in 2003.

Monitoring of the subsections post-construction of the FFI project suggests that the project improved fish populations within the treated portion of the stream channel, even though populations in all sections have increased. Problems associated with the treated portion of the section suggest that improvements may be short lived if conditions are not corrected. We plan to re-sample the section in future years to assess post-treatment conditions.

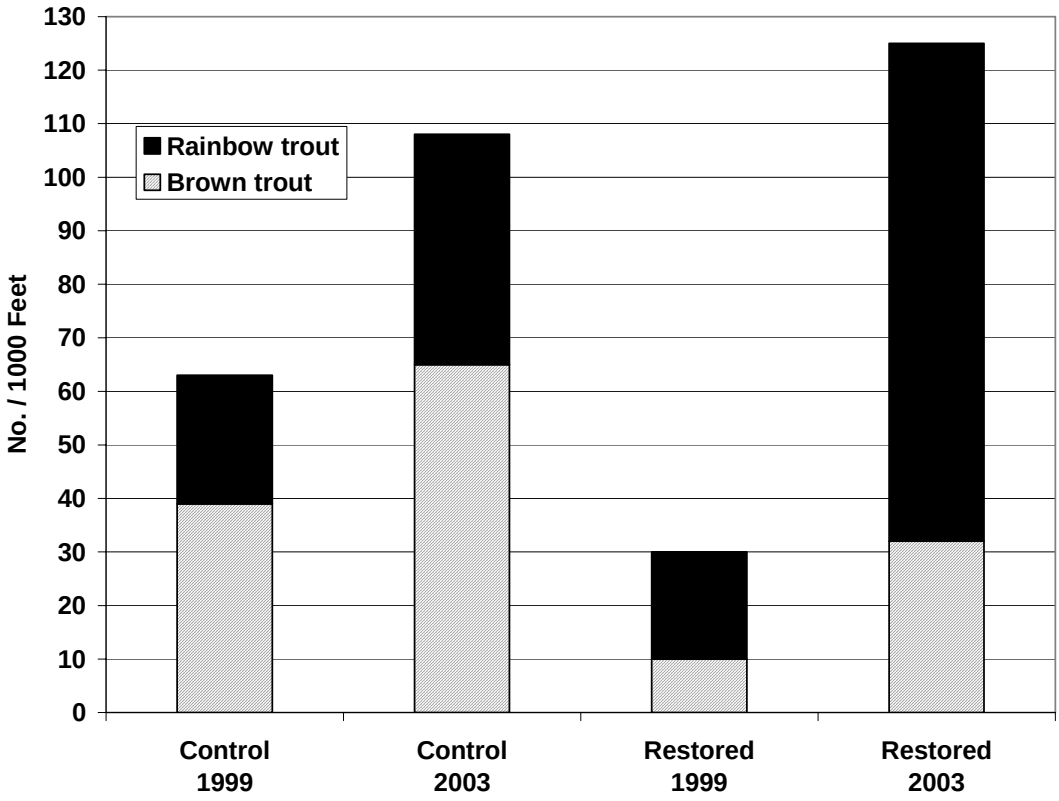

Figure 38. Population estimates of brown and rainbow trout 5 inches and longer in an upstream control (subsection 1) and in the channel restoration reach (subsection2) of Prickly Pear Creek, Montana, below the Sierra Road, April 1999 and April 2003.

Prickly Pear Creek Channel Restoration

WATER NAME: Prickly Pear Creek (Burnham)
DATA PROVIDED BY: George Liknes, FWP
DETAILED REPORT CITATION: FWP files, Great Falls, MT
FFI NUMBER: FFI-023-2000

The FFIP project on the Burnham Ranch near the Helena Airport was not evaluated in 2000, prior to its construction in 2001, because drought conditions led to the total dewatering of this portion of the creek as early as June 1, 2000 by irrigators (personal communication, Mark Lere, Montana FWP, Helena). However, in 2003, we electrofished a 0.67 mile reach of Prickly Pear Creek that encompassed this project with a mobile electrode system. The upper 0.38 miles of the electrofishing section served as a control while the lower 0.29 miles of the section was the restored channel. Modified Peterson's population estimates were made for rainbow and brown trout in both the control and restored reach. The brown trout estimate was slightly higher in the

restored reach, but the rainbow trout population estimate was higher in the control section (Figure 39). Rainbow trout densities were elevated because spawning fish over 20 inches in length that were know to be of hatchery origin and likely migrated out of the reservoir were captured in both reaches. **Dewatering of the channel in the project area is the most important limiting factor affecting trout densities in this reach of Prickly Pear Creek. Thus little difference in population levels was observed between the control and the rehabilitated section.**

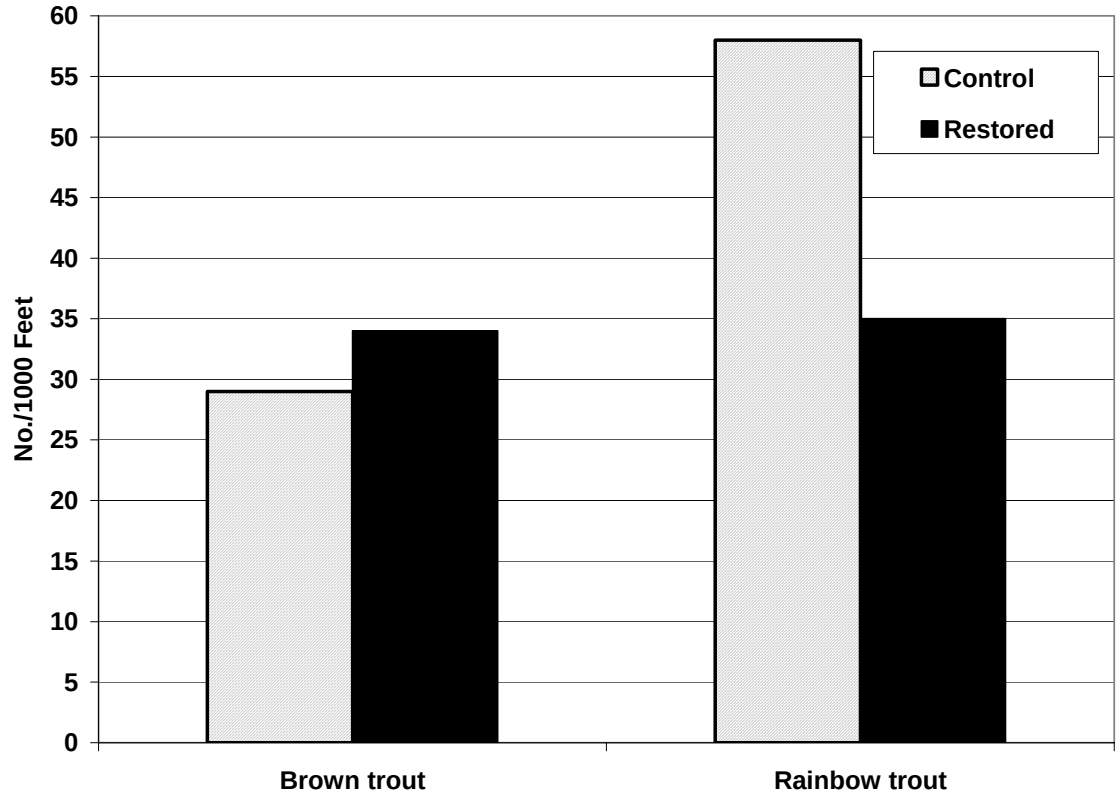

Figure 39. Population estimates of brown and rainbow trout 6 inches and longer in a control and restored reach of Prickly Pear Creek on the Burnham Ranch in April 2003.

White's Gulch Cutthroat Trout Restoration

WATER NAME: White Creek – Canyon Ferry/Missouri River
DATA PROVIDED BY: Brad Shepard and Ron Spoon, FWP
DETAILED REPORT CITATION: Shepard (2003)
FFI NUMBER: FFI-016-1996

The westslope cutthroat trout (*Oncorhynchus clarki lewisi*) population within upper White's Creek, a tributary that enters Canyon Ferry Reservoir on the Missouri River from the east, has been monitored since 1993. The cutthroat trout population increased dramatically in response to brook trout removals and reclamation of about one kilometer of the stream's channel and valley bottom from past dredge and placer mining impacts from 1993 to 2000. However, a recent decline in the population from 2,000-6,000 fish/hectare in 1999-2000 to less than 1,000

fish/hectare currently was documented. Since brook trout were totally eliminated from this sampled portion of White's Creek, the declines were attributed to a combination of drought conditions, experienced in the region since 1999, and degradation of the stream's habitat. The loss of streamside vegetation and bank shearing and sloughing along portions of the stream's banks was observed that was attributed primarily to poor livestock grazing management. Livestock should be excluded from the riparian area adjacent to White's Creek along a reach from the fish barrier upstream to above Spring Gulch until woody vegetation has become re-established and stream banks recover to provide undercut habitats. Also recommended is the planting of woody species along the stream channel where livestock and culvert replacement construction activities have removed woody species. Habitat surveys in three sections of White's Creek that were conducted in 1996 will be repeated to further document changes in stream habitats in these sections. **Although positive responses to habitat improvement can be dramatic as was the case in White's Creek, both drought or the management of the riparian area after enhancement has occurred can eliminate increased population densities.**

Sun River Drainage

Elk Creek Bank Stabilization \ Channel Restoration (Artz/Goff)

WATER NAME: Elk Creek – Sun River
DATA PROVIDED BY: Bill Hill, George Liknes, FWP, Sue McNeal, USFWS
DETAILED REPORT CITATION: Shepard (1998), FWP files, Great Falls
FFI NUMBER: FFI-37-1996, FFI-041-1999

A reach that had been electrofished in 1997 and 1998 was resampled in September 2002. This section was approximately 1.75 miles long. Several projects occurred in the section but much of the area also was unaltered habitat. Densities of brown trout were similar, but slightly less than those calculated in 1998 (Figure 40).

Lower Elk Creek has maintained similar brown trout population levels between 1998 and 2002 in this upper section, despite drought conditions and low flows. The may suggest a response to the projects in this reach.

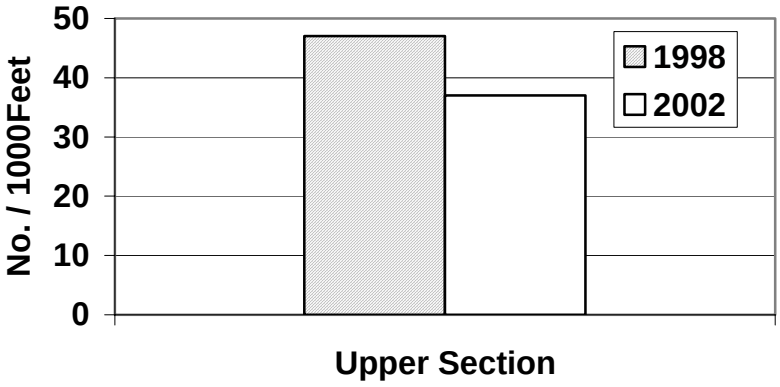

Figure 40. Population estimates (number per 1,000 feet) of brown trout 6 inches and longer from 1998 and 2002 in the upper section, (section 1) on lower Elk Creek below Augusta, Montana.

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

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 (S R section). In 2002, estimates were again obtained near Augusta. In 2003 and 2004, 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 41). These data consistently suggest that the Sun River supports low population densities of rainbow and brown trout and 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 37-58 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.**

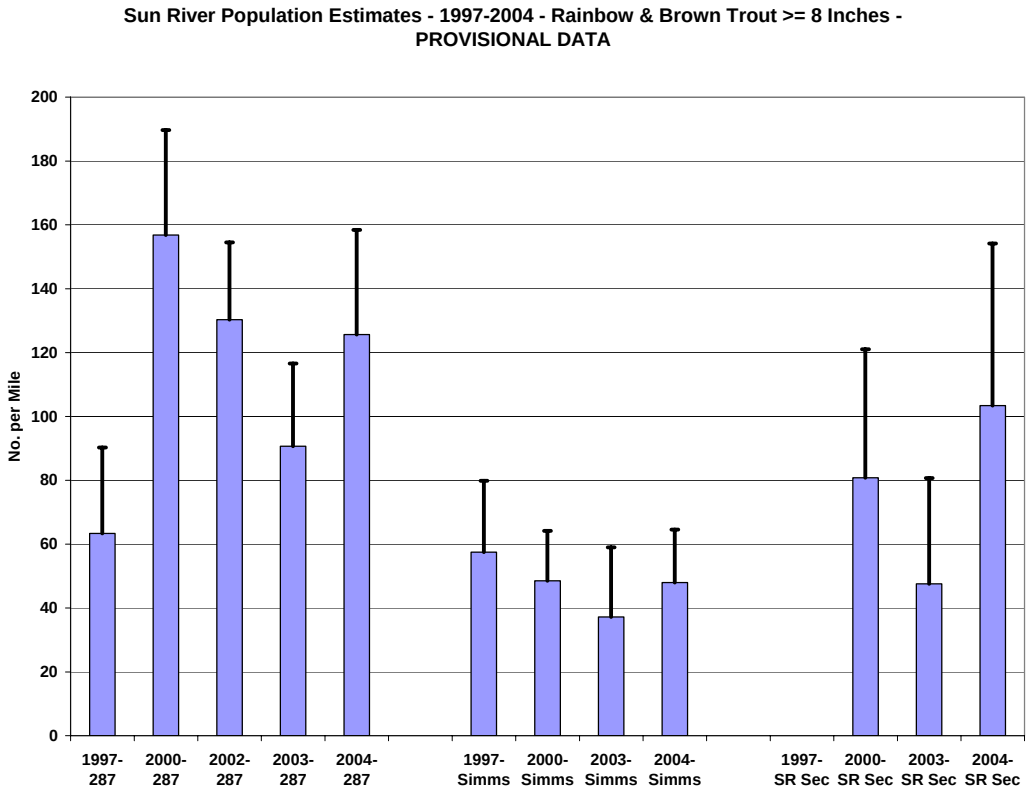

Figure 41. Population estimates (number/mile) for rainbow and brown trout eight inches and longer from three monitoring sections on the Sun River, 1997-2004. PROVISIONAL DATA.

Sun River Slope Canal Sealing – Water Conservation Demonstration Project

WATER NAME: Sun River – Missouri River
DATA PROVIDED BY: George Liknes, FWP
DETAILED REPORT CITATION: FWP files, Great Falls
FFI NUMBER: FFI-032-2003

The Sun River is one of Montana's chronically dewatered rivers. A large irrigation system constructed by the Bureau of Reclamation diverts the majority of Sun River flows into a large canal system that includes the Pishkun Supply Canal and the Sun River Slope Canal. These canals supply water to the Fairfield Bench and are managed by the Greenfields Irrigation District. Seepage and evaporative losses over the 13-mile length of the Pishkun Supply Canal are estimated at 100 cfs, while in the 27 mile Sun River Slope Canal, losses are estimated at 300 cfs. In May 2003, one mile of the Sun River Slope Canal was treated with Canal Seal to determine if it could reduce seepage and result in water conservation, which in turn could allow increased instream base flows in the Sun River below Gibson and Diversion dams. No application of canal Seal was made in 2004.

We monitored the treatment site in the Sun River Slope Canal in 2003 and 2004 by establishing photo points, measuring discharge from drain pipes and springs as well as measuring water elevations in sandpoint wells located below the Canal. The 2004 discharge measurements were the same or less than measurements in July and August 2003 (Figure 42). Also, the 2004 water depth in wells were lower in both a control section and the Canal Seal treatment section than those measured in 2003. However, much of the difference observed may be a direct result of major variations in the Sun River Slope Canal discharge when measurements were made. The Sun River Slope Canal flow was approximately 774 cfs at the site on 10 August 2004, or 705 and 372 cfs less than on days measurements were made in July and August 2003, respectively. We will continue to make measurements during the next irrigation season, but will attempt to duplicate canal flows rather than time of year when making the measurements.

Discharge measurements and sandpoint well elevations have not demonstrated any evidence of water conservation from the Canal Seal Treatment in the 1-mile reach. This reach may not be as suited to the use of polyacrylates as other areas with different soil types.

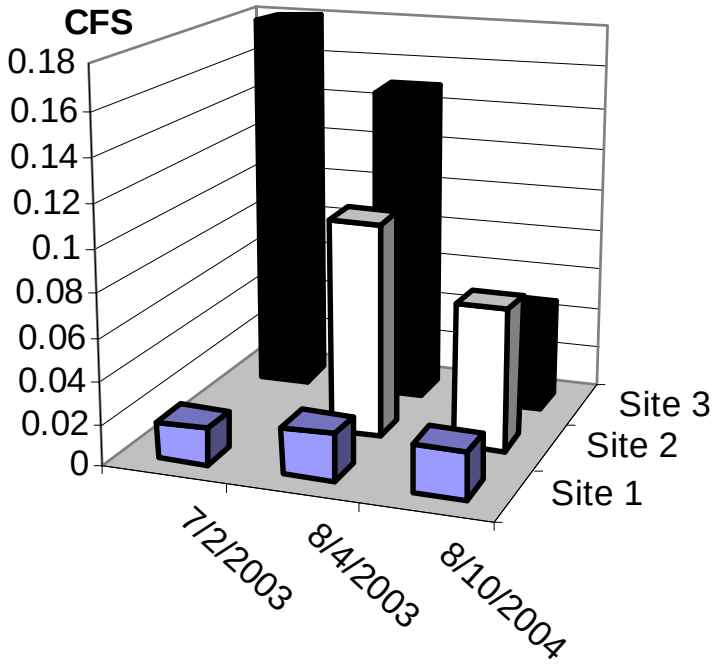

Figure 42. Discharge measurements at three sites within the Canal Seal treatment reach on the Sun River Slope Canal, 2003-2004.

Yellowstone River Drainage

Bad Canyon Creek Barrier/Cutthroat Trout Restoration Project

WATER NAME: Brackett Creek – Shields River
DATA PROVIDED BY: Jim Olsen, FWP
DETAILED REPORT CITATION: FWP files, Absarokee
FFI NUMBER: FFI-030-1999

The rehabilitation of Bad Canyon Creek was completed in September of 2002 by treating the upper 3 miles of the stream and its tributaries with rotenone. Bioassays were performed in Smith Coulee (a tributary to Bad Canyon Creek), first with the pesticide antimycin and then with rotenone to determine the proper concentration of each chemical to use and the proper spacing of application stations along the stream. Also, the stream demand for potassium permanganate ($KMnO_4$) was determined. This was done to find out the appropriate concentration of $KMnO_4$ to effectively detoxify each pesticide. Rotenone was selected as the toxicant of choice because bioassay results indicated that the chemical antimycin did not remain effectively toxic for a sufficient time to make the project feasible and cost effective. Therefore, the decision was made to use rotenone, which breaks down slower and remains toxic to fish longer than antimycin. The treatment of Bad Canyon Creek occurred the week of September 9th. Twenty-one cutthroat trout were removed from the creek prior to treatment and stored in Trail Draw above the barrier

waterfall during the treatment. It took 5 days to ferry equipment in and out using the helicopter, and to treat the entire reach of stream and its tributaries.

On July 12, 2003, the area above the barrier was electrofished to assess the effectiveness of the treatment. The entire stream from Smith Coulee to Boundary Draw (0.75 mile) just upstream of the barrier falls, was electrofished. Four 4 cutthroat trout were captured, three of which were hatchery fish from a live carr experiment the previous fall, as indicated by fin erosion, and the other was one that was rescued from Bad Canyon Creek prior to treatment. Electrofishing was also performed in Bad Canyon Creek from approximately 0.5 mi below Tepee Creek (0.75 mile) to the headwaters and no fish were captured or seen. Therefore, it was concluded that a complete kill had been accomplished and restocking could proceed. That same day, 3,000 age-1 LeHardy Rapids Yellowstone cutthroat trout were transported from Wyoming and flown into the creek via helicopter.

On August 23, 2004, the stream immediately upstream of the barrier falls to Boundary Draw was electrofished to ensure the barrier was still functioning and to assess the success of the previous years plant. Only cutthroat trout were captured from the creek upstream of the barrier. Both brown trout and cutthroat trout were present in the pool immediately downstream of the barrier. Some erosion has occurred at the barrier and future work will be necessary to ensure that it remains impassible to brown trout. Further electrofishing was done upstream of the barrier in the vicinity of Trail Draw. At this location, 15 age-1 wild cutthroat trout were captured in approximately 200 ft of stream, indicating that natural reproduction of the 21 fish saved prior to chemical treatment had occurred. One wild 8-in fish and 4 LeHardy Rapids fish were also captured. The fish plant the previous fall appeared to be successful and the fish had dispersed from their stocking locations to occupy the entire creek that was treated.

A second stocking of age-0 LeHardy Rapids fish was made on November 9, 2004. One thousand fish were stocked into the creek with 2/3 of the fish being planted at Tepee Creek and 1/3 being planted at Smith Coulee. While stocking the fish at Tepee Creek, wild young of the year cutthroat were observed in Bad Canyon Creek indicating that a second spawn of fish was successful from the 21 fish saved from the creek.

Rehabilitation of Bad Canyon Creek above the barrier has been successful and pure Yellowstone cutthroat trout are naturally reproducing. No exotic salmonids have been found above the barrier.

Brackett Creek Yellowstone Cutthroat Trout Restoration Project

WATER NAME: Brackett Creek – Shields River
DATA PROVIDED BY: Confluence Consulting, Inc.
DETAILED REPORT CITATION: Confluence Consulting (2002)
FFI NUMBER: FFI-002-2003

Brackett Creek is a mid-size, meandering stream approximately 19.8 miles long; it is a tributary of the Shields River in the Yellowstone River drainage. In the project area, a substantial portion of the stream has been mechanically altered and channelized and is consistent with Rosgen's B

channel type, which has low sinuosity and moderate entrenchment. Historically the channel had a much higher sinuosity and could easily access its floodplain. The stream restoration project will include bank stabilization, instream habitat enhancement, riparian restoration, and channel relocation.

Low fish populations in the project area in Brackett Creek have been attributed to three factors, 1) the presence of a diversion, which is currently functioning as a partial fish passage barrier, 2) the channelization of the upstream reach, and 3) a low forage base. To provide fisheries information two 1,000 feet sections were electrofished in 2002 and three pass depletion estimates were calculated. One section was in the channelized section upstream of the barrier in reach 2 and one downstream in reach 4. In the upstream reach, an estimate of 37 fish representing 4 different species was obtained (Figure 43), while in the downstream section, 191 fish of 7 species were estimated. Brown trout was the most abundant species in both reaches; Yellowstone cutthroat trout were only captured in the upstream reach. Yellowstone cutthroat trout and Yellowstone cutthroat – rainbow trout hybrids represented 11% of the catch in the upper section; however, no rainbow trout were captured. Mountain whitefish were the second most abundant species in both sections. Other species captured included mottled sculpin, longnose and white suckers, and longnose dace.

Population estimates obtained on two reaches of Brackett Creek in 2002 will provide a baseline to compare responses of Yellowstone cutthroat trout and brown trout to habitat restoration activities.

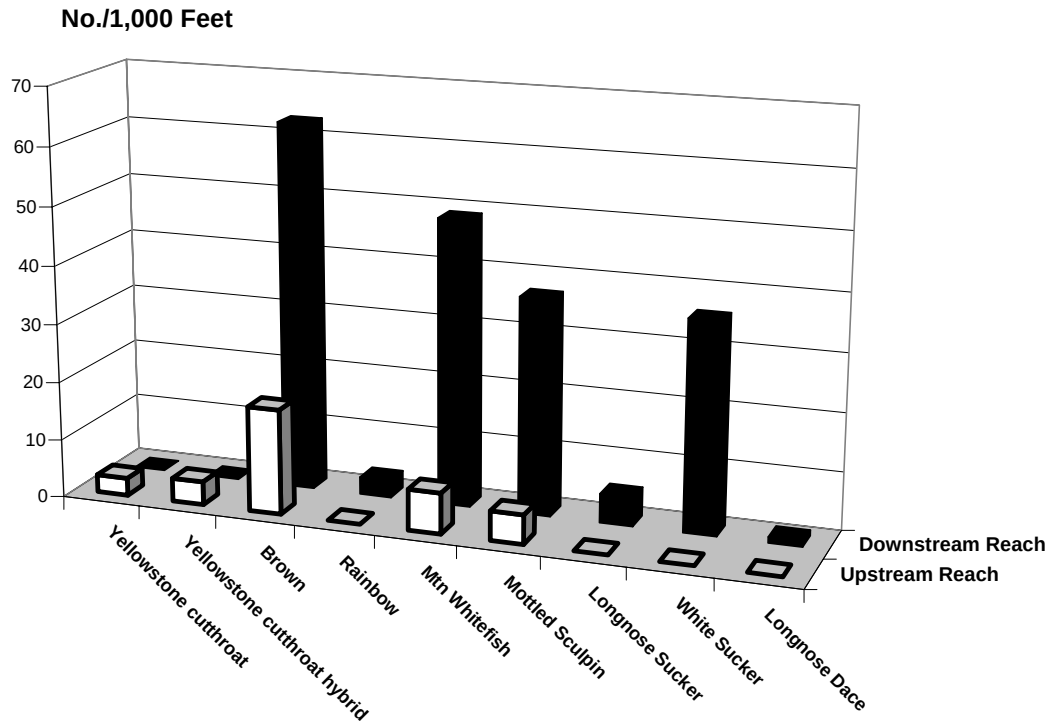

Figure 43. Estimates of Yellowstone cutthroat trout, Yellowstone cutthroat trout hybrids, brown trout, rainbow trout, mountain whitefish, mottled sculpin, longnose and white sucker, and longnose dace densities per 1,000 feet in two sections of Brackett Creek, Montana in 2002.

Stillwater River Spawning Channel

WATER NAME: Stillwater River – Yellowstone River

DATA PROVIDED BY: Jim Olsen, George Liknes, FWP
DETAILED REPORT CITATION: FWP files, Absarokee and Great Falls
FFI NUMBER: FFI-030-2000

Redd counts were performed in the fall of 2003 and 2004 and the spring of 2004 in the spawning channel that was developed on the Bill Hart ranch located approximately 3 miles upstream of Absarokee on the Stillwater River. A spawning channel was created with gravels to create an area suitable for trout spawning. The length of the channel is approximately 150-200 yards and contains several areas that have substrate and other habitat factors common in trout spawning areas. Brown trout spawning counts performed in the fall of 2003 indicated that the area was used for spawning, but was not extensively used. One redd was counted at the confluence of the channel with the main river, and a second redd was counted approximately 50 feet upstream from the outlet. In November 2004, 13 redds were counted in the upper and lower portions of the spawning channel. One of these may have been a false redd. Redd counts in the spring suggest that rainbows do not use the channel for spawning; however, the spawning count was conducted on April 29th ,2004 and spawning was not complete. Rainbow trout may have used the channel after that survey. Beaver dams also have blocked access to the channel. **In the past, both spring and fall spawning salmonids have made minimal use of the spawning channel. Use appears to have increased in fall 2004.**

Acknowledgements

Numerous biologists and field technicians from various agencies contributed immeasurably to this report. I would especially like to thank Montana FWP biologists Chris Clancy, Ladd Knotek, Jim Magee, Jim Olsen, Scott Optiz, Dick Oswald, Ron Pierce, Ron Spoon, Anne Tews, and Brad Shepard. Rob Clark, Steve Dalbey, Paul Hamlin, Troy Humphrey, Travis Lohrentz, Kelly Smith, and Dave Yerk assisted with fieldwork. Also, Steve Gale, MCFRU, and Sue McNeal, USFWS, were gracious in supplying information and help.

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