FUTURE FISHERIES IMPROVEMENT PROGRAM
REPORT TO 1997 LEGISLATURE
and
FISH, WILDLIFE AND PARKS COMMISSION

July 1, 1995 to December 4, 1996

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MONTANA FISH WILDLIFE AND PARKS
Fisheries Division

Future Fisheries Improvement Program
Summary 1995-96

The Future Fisheries Improvement Program (HB 349) was enacted by the 1995 Legislature. The purpose of the program is to "provide for the protection and enhancement of Montana fisheries through voluntary enhancement of spawning streams and other habitats for the natural reproduction of fish and growth of populations of wild fish." This report summarizes program activities between July 1, 1995 and December 1, 1996.

PRE-PLANNING: Meetings were held during July and August, 1995 with the fisheries staff in each of our seven administrative regions and with leaders of local angler groups to discuss the new program and to develop a preliminary list of potential fish habitat improvement projects (APPENDIX A). This was not intended to be a complete list nor was it intended that all of the projects on this list would be good projects or even doable projects. However, these meetings served the purpose of getting people thinking about the program.

RULES: The Fish, Wildlife and Parks Commission approved public release of draft administrative rules to implement the program on September 28,1995. After a public involvement process, final Future Fisheries Program Rules (APPENDIX B) were approved by the commission; certified by the Secretary of State on January 2, 1996; and published in final form (ARM 12.7.1201 through 12.7.1208) on March 31,1996.

REVIEW PANEL: The law authorized the Governor (or Governor's designee) to appoint a citizen group known as the Future Fisheries Review Panel to help guide the program and specified the make-up of the panel. Nominations were sought from the public (by way of public notice) and review panel members were selected by Director Pat Graham on August 1, 1995.

Review panel members include: **Mike Volesky,** Executive Director, Montana Association of Conservation Districts, Helena; **Tom Melesnick,** commercial rancher, Belgrade; **Dave Cochran,** commercial rancher and irrigator, Ovando; **Buddy Drake,** Drake and Associates, Aquatic Habitat Consultants, Bozeman; **Steve McGuire,** licensed angler, Kalispell; **Shirley Cleary,** licensed angler, Helena; **Jesse Bloom,** student, Corvallis High School, Hamilton; **Senator Al Bishop,** Billings; **Representative Doug Wagner,** Hungry Horse; **Glenn Marx,** Governor's Office, Natural Resource Policy Advisor, Helena.

The Future Fisheries Review Panel met twice during 1995 (October 26 and November 30) to complete the ground work necessary to begin receiving proposals. They developed review panel guidelines (APPENDIX C) describing the application, review, and approval process. They also helped develop a program application form (APPENDIX D), program fact sheet (APPENDIX E), project ranking criteria (APPENDIX F), and a program brochure.

The review panel established February 1, 1996 as the first deadline for project applications to the program. The second deadline was established as July 1, 1996. Subsequent application deadlines will fall on July 1 and January 1 of each year (the winter deadline was changed to accommodate applicants who hope to complete projects prior to spring runoff).

STAFFING: Program staffing is being phased in to give FWP time to evaluate program needs. The first program staff person, Bruce Rehwinkel, was hired in January, 1996. This coincided with the first program funding cycle. Bruce is responsible for working with landowners and other citizens who need help developing project proposals, coordinating with consultants and contractors who design and perform restoration projects, reviewing project applications, visiting the sites of proposed projects, communicating with the Future Fisheries Review Panel, and completing MEPA requirements. Bruce also helped develop program monitoring guidelines (APPENDIX G).

A second program staff person, Brad Shepard (0.5 FTE biologist), was hired in June 1996. Brad is exclusively responsible for project monitoring. To date, Brad has helped develop monitoring guidelines (APPENDIX G), initiated field monitoring of several projects, and is developing and maintaining a database to track monitoring efforts of restoration projects (regardless of the funding source or the person doing the monitoring). Brad works out of the Biology Department at MSU-Bozeman and is able to use graduate students to help with monitoring efforts. A very preliminary report of his monitoring efforts is attached (APPENDIX H).

A third staff person, Eric Reiland (0.5 FTE biologist), will be added this winter. Eric will be responsible for developing and supervising restoration projects at priority locations east of the Continental Divide. Eric will also work with landowners who need help developing proposals and will monitor the success of projects in his area.

Finally, Chief of the Habitat Protection Bureau, Glenn Phillips, allocates approximately 30-40% of his time to Future Fisheries Program administration. His time is not charged against the operating budget for the program.

OPERATING BUDGET: Operating expenses during the first biennium were considerably below the $100,000 per year that was budgeted (Table 1). This occurred because of the time lag in coming up to full staffing. We also realized operating budget savings in the services category by incorporating project design services into the capital program budget for individual projects. We anticipate however, that at full staffing during the next biennium we will require an operating budget of $100,000 per year.

Table 1. Future Fisheries Improvement Program operating expenses July 1, 1995-November 30, 1996.

Expense Category	FY 96	FY 97	Total
Salaries & Benefits	26,865	24,114	50,979
Operating Expenses			
Services	3,159	183	3,342
Supplies & Material	410	490	900
Communication	477	169	646
Travel	2,482	2,705	5,187
Education & Training	559	920	1,479
Grand Total			62,533

ANTICIPATED EXPENSES: House Bill 349 requires us to report "anticipated expenses for the ensuing 10 years' implementation of the program." This is difficult to do because at the time this report was written we had only completed two funding cycles. We will, however, have received applications for the third and last funding cycle of the first biennium of the program as of January 1, 1997. If we receive applications for and approve $500,000 worth of projects during this last funding cycle of the biennium, we will have spent about $1.3 million on projects. This will leave $0.5 million to carry forward into the next biennium which will be added to the $1.0 million in the Governor's budget. Based on our limited experience with the program, we anticipate spending $7.5 million on projects over the next 10 years or about $1.5 million per biennium.

PROJECTS: During the first two funding cycles Fish, Wildlife and Parks (FWP) and the Future Fisheries Review Panel received 58 applications for program funding; 48 of these were recommended for funding by FWP and the review panel. The FWP Commission subsequently approved all 48 projects. Total program dollars committed to these projects was $830,176; program dollars were matched by $1,782,222 from outside sources (Table 2).

Contract work has been completed on all 48 projects. Requirements of the Montana Environmental Policy Act have also been fulfilled including preparation of Environmental Assessments on many projects. As of December 1, 1996 a total of 15 projects have been completed. We anticipate that the remaining project will be completed during 1997 and 1998 (Table 2).

Approved projects originated from a variety of sources including: private-19, state government-15, federal government-5, non-profit organizations-5, and conservation districts-4. Projects that have been approved include seven that will improve fish habitat in lakes and reservoirs and 41 that will improve habitat in rivers and streams.

All of the lake and reservoir projects are designed to improve spawning or rearing habitat. The river and stream projects include (several projects are included in more than one category): channel reconstruction to restore stream function and improve fish habitat-13; riparian fencing to improve streamside vegetation and bank stability-13; revegetation and stabilization of stream banks including incorporation of root wads or other habitat features into the banks-9; screens to prevent fish from being lost down irrigation diversions-6; improvements in irrigation efficiency or development of off-stream water sources to enhance stream flow-5; removal of barriers or installation of ladders to improve fish passage-4; removal of a streamside feedlot to improve bank stability and water quality-1; and survey work to determine needed restoration measures-1.

When all of these projects are completed, over 50 miles of stream and hundreds of acres of lakes and reservoirs will have been directly treated. Additionally, fish screens, stream flow enhancements, and improvements in fish passage will have benefited many more miles of stream. Photographs depicting typical projects are shown later in this report.

Table 2. Future Fisheries Improvement Program project funding and status (Program funds spent as of December 5, 1996).

Project Number and Name	Program Funds Committed ($)	Matching Funds ($)	Total Funds ($)	Program Funds Spent ($)	Expected Year of Completion
1 Cress Spring Creek Fence	$5,328	$12,172[c]	$17,500	$5,328	Complete
2 Dunham Creek Fish Screen	15,915	12,500[ab,c,d,e]	28,415	7,000	1997
3 O'Brien Creek Restoration	8,500	13,000[b,c,f,g]	21,500	4,191	1997
4 Gold Creek Pool Development	25,652	29,000[a,f]	54,652	23,050	Complete
5 Rock Creek Restoration	12,450	9,758[c]	22,208	12,450	Complete
6 Steel Creek Restoration	10,000	19,325[a,c,e,h]	29,325	0	1997
7 Cottonwood Creek-Dreyer Diversion	16,070	30,309[a,f,i,j,k]	46,379	16,070	Complete
8 Meadow Creek Fence	2,000	2,000[b]	4,000	0	Complete
9 Sweathouse Creek Enhancement	13,305	1,500[b,c,l]	11,109	9,609	Complete
10 Little Beaver Creek Riparian Fence	1,966	1,200[c]	2,803	1,603	Complete
11 Upper Big Hole River Flow Enhancement	20,000	45,000[a]	62,347	17,348	Complete
12 Whites Gulch Riparian Fence & Revegetation	19,500	12,500[b]	25,338	12,838	Complete
13 Deep Creek Channel Restoration	65,000	280,000[c,l,m]	345,000	0	1997
14 Lake Frances Shoreline Stabilization	2,500	13,017[c,l,n]	15,517	0	

Table 2. Continued

Project Number and Name	Program Funds Committed ($)	Matching Funds ($)	Total Funds ($)	Program Funds Spent ($)	Expected Year of Completion
15 Dick Creek Restoration	6,800	0	6,800	6,520	Complete
16 Mol Heron Creek Flow Enhancement	124,000	52,525[c]	176,525	3,369	1998
17 Fort Peck Breakwater - Spawning Reef	12,500	920,000[q]	932,500	12,000	1998
18 Nelson Reservoir Spawning Vegetation	2,100	0	2,100	0	1998
19 Nelson Reservoir Spawning Reef	5,750	1,000[c]	6,750	0	1997
20 Fresno Reservoir Spawning Vegetation	2,400	1,000[c]	3,400	70	1998
21 Bear Paw Reservoir Spawning Enhancement	1,200	0	1,200	0	1997
22 Slemmons Pond Dam Removal	5,000	10,000[k]	15,000	2,401	Complete
23 Big Hole River Channel Restoration	62,500	7,500[c]	64,730	57,230	Complete
24 Ruby River Bank Stabilization	16,340	7,000[a,c]	23,340	16,340	Complete
25 Elk Creek Restoration	18,075	15,000[n]	33,075	0	1997
26 Dry Creek Rehabilitation & N. Fork Blackfoot	76,250	2,000[c]	78,250	56,009	1997
27 Madison Spring Creek Rehabilitation	15,000	17,000[c]	32,000	15,000	Complete
28 Elk Creek Rehabilitation	8,000	23,000[a]	31,000	8,000	Complete

Table 2. Continued

Project Number and Name	Program Funds Committed ($)	Matching Funds ($)	Total Funds ($)	Program Funds Spent ($)	Expected Year of Completion
29 Locke Creek Flow Enhancement	2,500	1,500[c]	4,000	0	1997
30 NCAT - Agrimet Flow Enhancement	90,000	90,000	180,000	0	1998
31 Prickly Pear Creek Fence & Bank Stabilization	2,000	500[c]	2,500	0	1997
32 St. Regis River Channel Restoration	27,500	27,500[c]	55,000	0	1997
33 Little Sheep Creek Channel Restoration	10,729	20,620[b]	31,349	6,382	1998
34 Cottonwood Creek	18,200	0	18,200	4,100	1997
35 North Fork Fish Screens	10,500	22,500[c]	33,000	6,000	1997
36 Blackfoot River Bank Stabilization	1,500	6,350[c]	7,850	0	1997
37 Sun River Bank Stabilization	10,800	19,200[c]	30,000	0	1997
38 Blanchard Creek Riparian Fence	8,000	0	8,000	0	1997
39 Elk Creek Restoration	7,300	1,000[c]	8,300	644	1997
40 Beaverhead, Van Camp & Rattlesnake Slough	22,923	9,500[c]	32,423	0	1998
41 Bitterroot River Fence	4,922	3,244[c]	8,166	0	1997
42 Blanchard Creek Feedlot Removal	9,143	10,742[c]	19,885	0	1997

Table 2. Continued

Project Number and Name	Program Funds Committed ($)	Matching Funds ($)	Total Funds ($)	Program Funds Spent ($)	Expected Year of Completion
43 Echo Lake Bass Rearing Habitat	1,414	1,200[q]	2,614	0	1997
44 Magpie Creek Fish Passage	5,000	5,000[c]	10,000	0	1997
45 Teton River Bank Stabilization	4,300	14,300[p]	18,600	0	1997
46 Canyon Creek Bank Stabilization	2,500	2,116[c]	4,616	0	1997
47 Missouri River Bank Stabilization	15,000	7,800[c]	22,800	0	1997
48 Meadow Creek Riparian Fence	1,844	1,844[c]	3,688	0	1997
TOTALS	**830,176**	**1,782,222**	**2,593,754**	**303,552**	

[a] US Fish & Wildlife Service
[b] US Forest Service
[c] Private Landowner
[d] Blackfoot Challenge
[e] Trout Unlimited
[f] Timber Companies
[g] Milltown Mitigation
[h] Big Hole River Foundation
[i] Bureau of Land Management
[j] University of Montana
[k] Montana Department of Natural Resources & Conservation
[l] Conservation District
[m] "319" Grants
[n] Federal Aid (USFWS)
[o] Counties
[p] Nature Conservancy
[q] US Corps of Engineers

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Photo illustration 1. Ronan Spring Creek (located near Ronan) before and after restoration.The channel was narrowed and deepened to restore natural channel geometry, the corridor was fenced and a water gap was constructed to limit cattle access to the stream, and wetlands were constructed adjacent to the stream.

Photo illustration 2. Madison Spring Creek, which enter the Madison River near the Wade lake cut-off, before and immediately after restoration. The stream has been narrowed and deepened to increase current velocity, facilitate sediment transport, and create cover for fish.

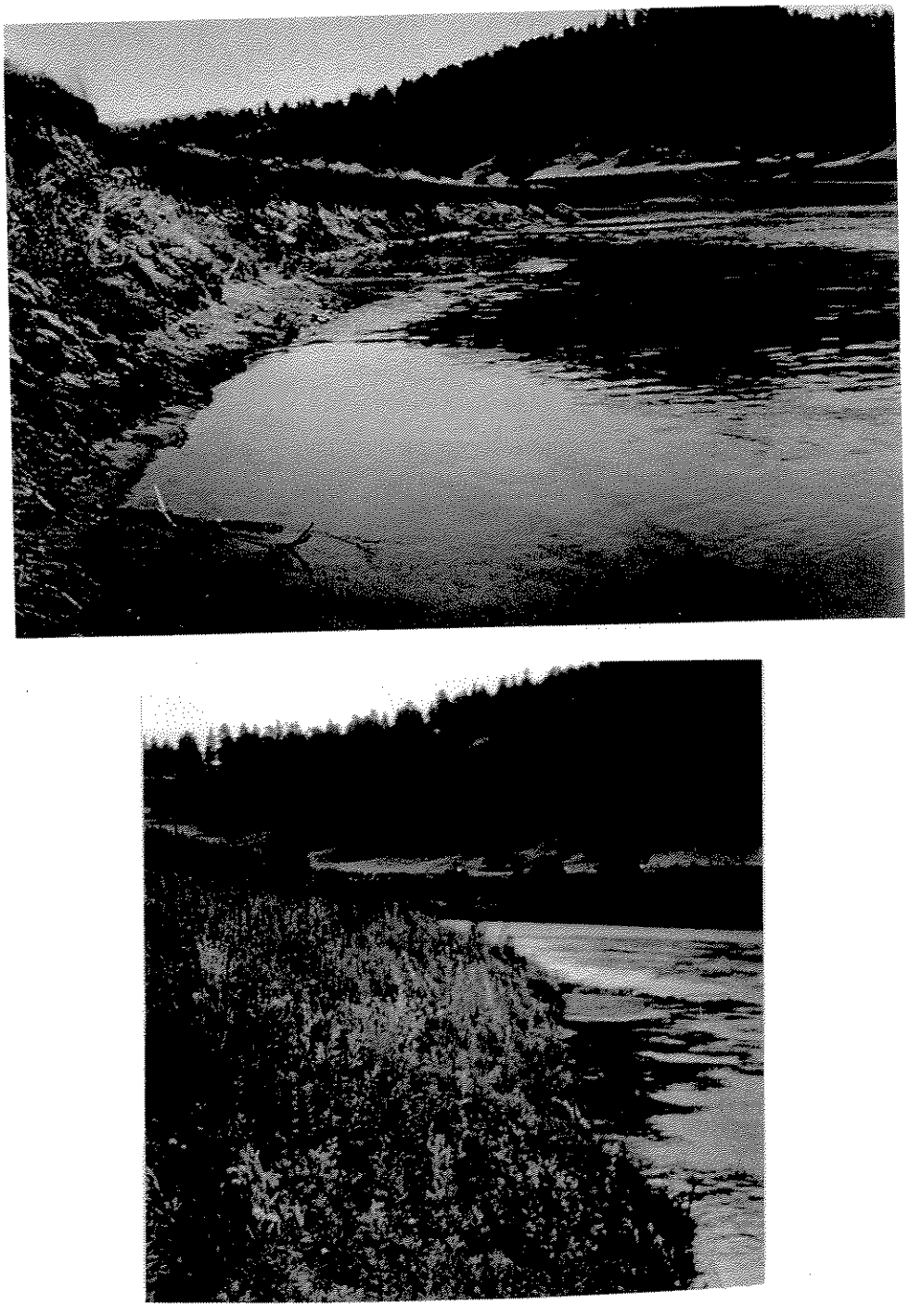

Photo illustration 3. The Missouri River near Craig before and after restoration of an eroding stream bank. Treatment included back sloping the bank, installing a biodegradable erosion control fabric, seeding the area, and planting willows.

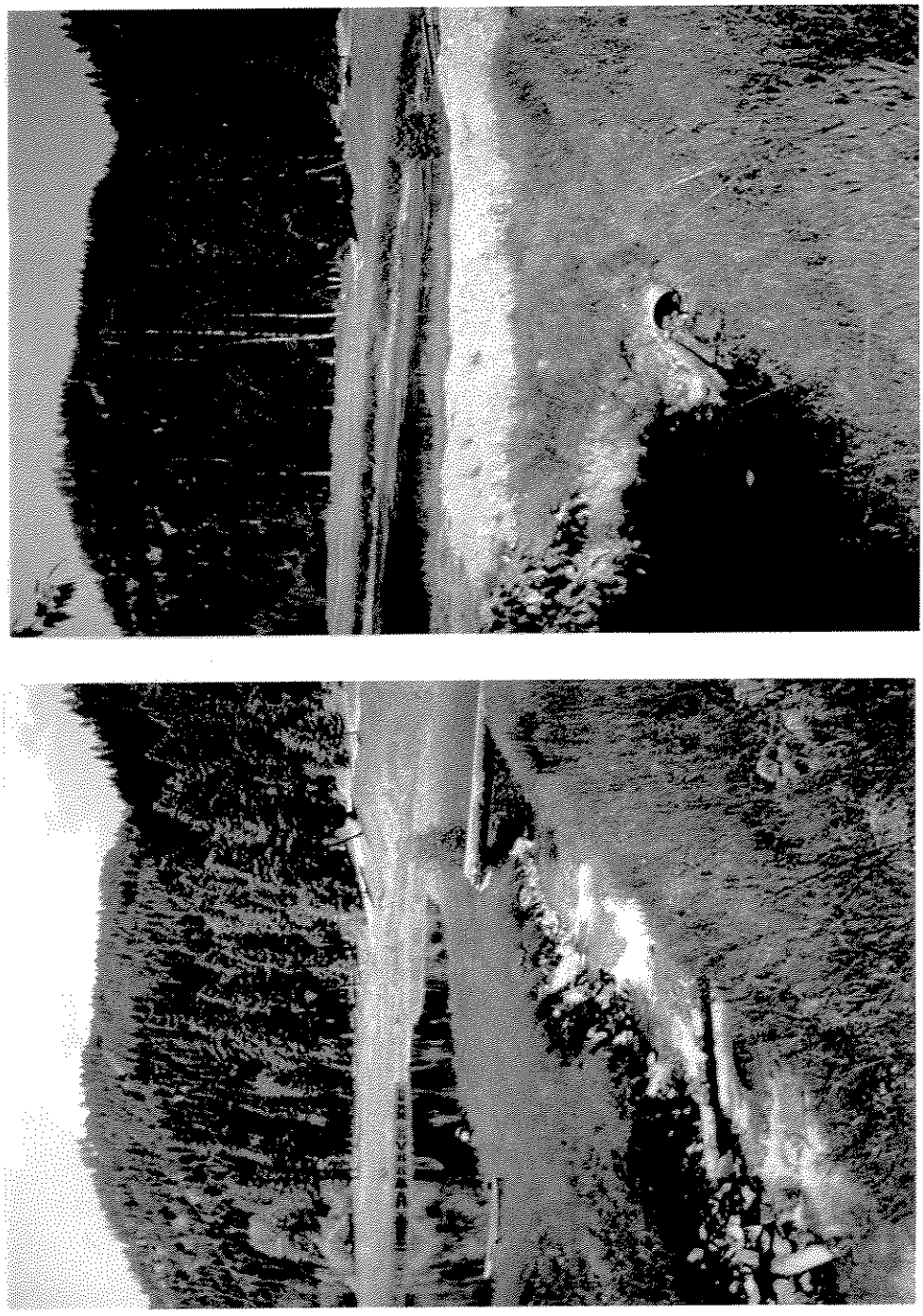

Photo illustration 4: Gilbert Creek (a tributary to Rock Creek located east of Missoula) before and after a fish ladder was constructed to restore fish passage to its upper reaches.

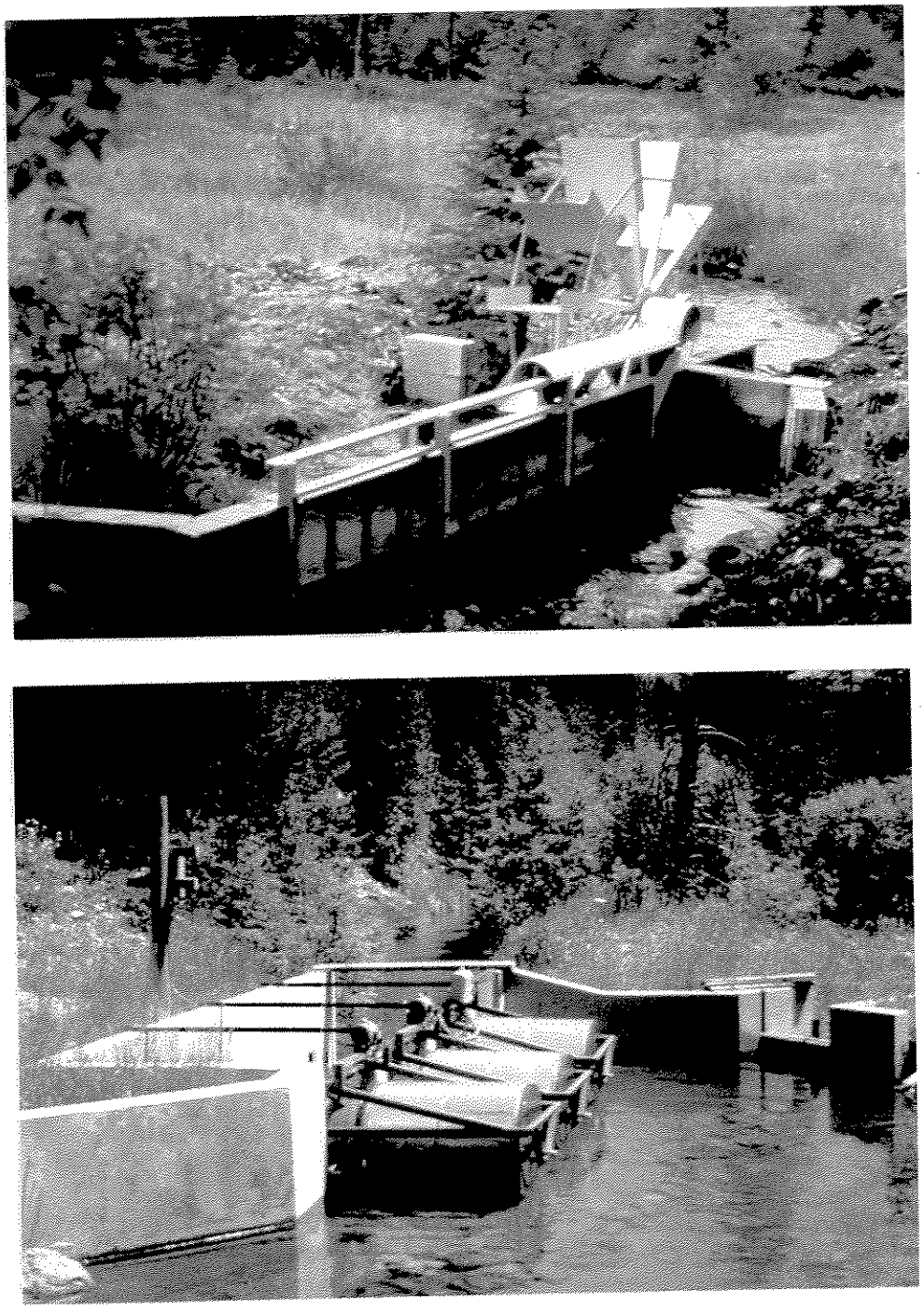

Photo illustration 5. Fish screens installed on irrigation diversions to prevent fish from being lost down the diversions. Both screens are on ditches diverting water from tributaries to the upper Blackfoot River.

Project Descriptions

1. **Cress Spring Creek Riparian Fence:** Cress Spring Creek is located on private property and is a tributary to the Gallatin River near Three Forks. The spring creek has potential as a spawning stream for Gallatin River fish. The applicant had already spent considerable dollars restoring the stream which had been damaged by grazing. Additional dollars were sought for riparian fencing to protect the restoration. Approximately 1.75 miles of stream was treated. **Completed.**

2. **Dunham Creek Fish Screen:** Dunham Creek is a tributary to Monture Creek which is an important tributary to the Blackfoot River. Dunham Creek has potential as a spawning stream for cutthroat and bull trout. This project will prevent loss of juvenile and adult fish into the diversion.

3. **O'Brian Creek Restoration:** O'Brian Creek has potential to provide spawning habitat for migrating cutthroat and rainbow trout from the Bitterroot River. This project includes replacement of culverts that are barriers to migration, removal of an abandoned irrigation diversion, and improved riparian management. This project will influence approximately 4 miles of stream.

4. **Gold Creek Pool Development:** Gold Creek is one of only three core spawning streams for bull trout in the Blackfoot River drainage. Pool habitat has been lost because of over logging and subsequent loss of woody debris recruitment to the stream. This project created 134 pools in the lower six miles of the stream using woody debris and rocks. **Completed**.

5. **Rock Spring Creek Restoration:** Rock Spring Creek enters the North Fork of the Blackfoot River near Ovando and is used for spawning by rainbow and cutthroat trout. The stream had become overly widened and shallow due to past grazing practices. The project involved dredging sediment out of the pools, narrowing the stream, re-vegetation of stream side areas, and riparian fencing. Approximately 1800 ft of stream was treated. **Completed**.

6. **Steel Creek Restoration:** Steel Creek is an important spawning stream for fluvial arctic grayling from the Big Hole River. The lower reaches of the stream have been channelized and damaged by grazing. This project involves restoring the streams natural configuration and improving riparian vegetation. Approximately 1.7 miles of stream will be treated.

7. **Cottonwood Creek -- Dreyer Diversion Lining:** Cottonwood Creek is an important spawning stream for cutthroat trout from the Blackfoot River. Funds were used to line the Dreyer Ditch thereby improving water use efficiency and leaving more water for in-stream purposes. We estimate that this project saved 8 cfs during low flow periods. **Completed.**

8. **Meadow Creek Riparian Fence:** Meadow Creek is located on the Bitterroot Forest and is used by cutthroat and bull trout. The stream has been damaged by grazing practices. This

riparian fencing project will allow the stream to recover. Approximately, 0.5 miles of stream was treated. **Completed.**

9. **Sweathouse Creek Riparian Fence:** Sweathouse Creek supports brook and brown trout and may have potential for cutthroat and bull trout. The stream has been damaged by past grazing practices. This project includes fencing the riparian area along approximately 1.5 miles of stream and re-vegetating stream-side areas with willows. **Completed.**

10. **Little Beaver Creek Riparian Fence:** Little Beaver Creek is a tributary to the lower Clark Fork and supports a population of brook trout. Beaver activity has slowed the stream and increased water temperatures and grazing practices have caused excessive erosion of stream banks. This project involved fencing the riparian area along one mile of stream. **Completed.**

11. **Upper Big Hole Flow Enhancement:** Reaches of the upper Big Hole River that support fluvial arctic grayling suffer from dewatering during late summer. This project involved providing off-stream water development that will eliminate the need to divert water during the summer. Water saved will remain in-stream. **Completed.**

12. **White's Gulch Riparian Fence and Re-vegetation:** White's Gulch is a tributary to Canyon Ferry Reservoir that was damaged by placer mining. The upper reaches support a genetically pure population of cutthroat trout. A large project to restore the stream channel was previously completed. This project consisted of constructing 1.2 miles of riparian fence to protect the newly constructed channel. **Completed.**

13. **Deep Creek Channel Restoration:** Deep Creek is a tributary to the Missouri River upstream of Canyon Ferry Reservoir that supports spawning runs of rainbow and brown trout. However, recruitment is believed to be limited by heavy siltation caused by channel shortening and grazing practices. This project involves stabilizing eroding banks, regaining stream length, and riparian fencing. This project will influence a 20 mile reach of stream.

14. **Lake Frances Shoreline Stabilization:** Lake Frances is experiencing severe shoreline erosion due to reservoir management and wave action. A campground that is a major fishing access point is receiving severe erosion. This project involves building a bulkhead to stabilize eroding shores.

15. **Dick Creek Restoration:** Dick Creek is a tributary to Monture Creek and has potential as a native fish spawning stream. This project involved putting the finishing touches on a channel reconstruction project. Approximately 450 ft of stream was treated. **Completed.**

16. **Mol Heron Creek Flow Enhancement:** Mol Heron Creek is a tributary to the Yellowstone River and is an important spawning stream for Yellowstone Cutthroat Trout.

However, the stream suffers from dewatering and an existing diversion is a barrier to migration of spawning fish. This project involves modifying the diversion so that it is no longer a barrier, installing a more efficient irrigation system, and leasing water saved for in-stream flow.

17. **Fort Peck Reservoir--Breakwater, Spawning Reef:** Fort Peck is an important warm water fishery but reservoir fluctuations sometimes limit reproduction. This project involves modifying a breakwater design to provide a deep water spawning reef.

18. **Nelson Reservoir Spawning and Rearing Vegetation:** Nelson Reservoir lacks suitable spawning and rearing habitat for yellow perch. This project involves seeding shoreline areas with vegetation during the low water season to provide spawning and rearing habitat the following year.

19. **Nelson Reservoir Spawning Reef:** Reservoir fluctuations in Nelson Reservoir sometimes limit walleye reproduction. This project involves placing rocks on the ice during the winter to establish a spawning reef.

20. **Fresno Reservoir Spawning and Rearing Vegetation:** Fresno Reservoir lacks suitable spawning and rearing habitat for yellow perch. This project involves seeding shoreline areas with vegetation during the low water season to provide spawning and rearing habitat the following year.

21. **Bear Paw Reservoir Shoreline Habitat Enhancement:** Bear Paw Reservoir supports smallmouth bass but the population is limited by a lack of spawning and rearing habitat. This project involves placing rocks along the shoreline to serve as spawning and rearing areas.

22. **Slemmons Pond Dam Removal:** Slemmons Pond is located on a small unnamed tributary to Ninemile Creek. The dam acted as a migration barrier for spawners from the lower Clark Fork. This project involved removing the dam to provide fish with access to the stream. **Completed.**

23. **Big Hole River--Restore Old Channel:** Formation of a large gravel bar in the Big Hole River near Glen caused the river to breach a dike and to begin forming a new channel behind the dike. Three miles of some of the best habitat in the lower Big Hole was lost; additionally, the new channel was not navigable. This project involved placing the river back in its' old channel and stabilizing the area to prevent a similar occurrence in the future. **Completed.**

24. **Ruby River Bank Stabilization:** One of the few segments of the Ruby River where public access is allowed suffers from a severely eroding bank. This project involved construction of bank barbs, root wads, rock keys, and a low head rock weir to prevent erosion and create fish habitat. Approximately 400 ft of stream was treated. **Completed.**

25. **Elk Creek Restoration:** Elk Creek is an important spawning stream for brown and rainbow trout from the Blackfoot River. The stream has been degraded by past grazing practices. The project involves riparian fencing to protect the stream and off site-water development to eliminate to need for cattle to use the stream for watering. Approximately 6600 ft of stream will be treated.

26. **Dry Creek Rehabilitation and North Fork Blackfoot Fish Screens:** Dry Creek is a tributary to the North Fork of the Blackfoot River that has been degraded by grazing. Additionally, a fish migration barrier exists in its lower reaches. This project involves channel rehabilitation work, riparian fencing, removal of a migration barrier, and installation of a fish ladder. Approximately 2100 ft of stream will be treated. The North Fork of the Blackfoot River is a major bull trout spawning stream. Several large irrigation diversions capture adult and juvenile fish during their migrations. This project includes installation of fish screens on two of the major diversions.

27. **Madison Spring Creek Rehabilitation:** Madison Spring Creek is a tributary to the upper Madison River that has been degraded by past grazing practices. The stream has the potential to provide spawning habitat for Madison River fish. This project involved reconstructing the stream channel and fencing the riparian area. Approximately 2500 ft of stream was treated. **Completed.**

28. **Elk Creek Restoration:** Elk Creek is a tributary to the Sun River near Augusta. The channel was damaged by irrigation diversion practices in the area. This project involved narrowing the channel, installing a vortex rock weir to stabilize the grade at the point of diversion, and re-vegetating and stabilizing the banks using root wads and willows. Approximately 800 ft of stream was treated. **Completed.**

29. **Locke Creek Flow Enhancement:** Locke Creek is a tributary to the Yellowstone River that provides spawning habitat for Yellowstone Cutthroat Trout. However, the stream suffers from dewatering due to irrigation withdrawals. This project involves renovating an irrigation system on private property that will allow more water to be left in-stream.

30. **NCAT Agrimet Proposal:** Agrimet is a method of fine tuning water needs for sprinkler irrigated systems using soil moisture probes, weather stations, and more efficient sprinkler heads. Water savings of 30-60% have been realized in locations where this technology has been employed. Additionally, farmers realize large savings in electrical costs. The applicant proposes to use Agrimet technology to apply water more efficiently on irrigated crop lands and to use the water that is saved for in-stream purposes. The applicant will work with the Department to choose locations where fisheries will benefit from enhanced stream flow. Funding is contingent upon the applicant obtaining equivalent matching dollars.

31. **Prickly Pear Creek Riparian Fence and Bank Stabilization:** Prickly Pear Creek is a tributary to Lake Helena and supports populations of brown and rainbow trout. Portions of the

stream have been damaged by grazing and agriculture. This project involves stabilizing 610 ft of stream banks and riparian fencing.

32. **St. Regis River Restoration:** The St. Regis River near Haugan supports cutthroat, brown, rainbow, and brown trout. Channel alterations caused by highway construction and other projects caused the river to become braided. This project involves returning the river to a single channel which is its original natural state. Approximately 2500 ft of stream will be treated.

33. **Little Sheep Creek Channel Reconstruction:** Little Sheep Creek, located southwest of Dell, supports a nearly pure strain of cutthroat trout. The channel has been overgrazed in the past and has experienced severe down-cutting. This project includes reconstructing 1.5 miles of new meandering channel that has access the floodplain, re-vegetating stream side areas with willow clumps, and installation of a migration barrier to protect the genetic integrity of the population.

34. **Cottonwood Creek Fish Screen Improvements:** Cottonwood Creek is a tributary to the Blackfoot River which supports a significant population of bull trout. Two ditches on Cottonwood Creek had previously been fitted with fish screens to prevent fish from being lost down the ditches. This project involves retrofitting these screens with self cleaning brushes to greatly reduce maintenance. These improvements are a practical necessity of the screens are to remain functional.

35. **North Fork Blackfoot Fish Screen:** The North Fork is a major spawning stream for bull and cutthroat trout from the Blackfoot River. Several irrigation diversions on the North Fork capture a high percentage of the juvenile fish migrating downstream. This project involves installing a rotating drum fish screen on the Smith-Weaver Diversion to prevent fish from being captured in the ditch.

36. **Blackfoot River Bank Restoration:** The Blackfoot River in the Lincoln area supports a trout fishery that is locally popular. The 1996 floods damaged a section of bank near Lincoln and threatened to capture a spring creek that is used for spawning. This project involves using logs and root wads to stabilize 325 ft of the river bank.

37. **Sun River Bank Stabilization:** The Sun River near the town of Sun River supports a population of brown trout. Channel alterations near the project area have caused serious bank erosion problems. This project involves using bank barbs, root wads, back sloping, erosion control fabric and re-vegetation to stabilize approximately 2500 ft of eroding bank and improve fish habitat.

38. **Blanchard Creek Riparian Fence:** Blanchard Creek is a tributary to the Clearwater River. The stream supports a good population of cutthroat trout and provides spawning habitat for bull trout. This project involves riparian fencing along approximately 4000 ft of stream to

allow the stream to recover from damage caused by grazing.

39. **Elk Creek Restoration:** Elk Creek is a tributary to the Lower Clark Fork River near Heron. Numerous reaches of Elk Creek have been damaged by flooding and adjacent land use practices. Local citizens have formed a watershed group to develop a plan for restoring the stream. This project involved providing the watershed group with professional help to conduct a watershed assessment and to help them develop a restoration plan that will provide the basis for a future application to the program. **Completed.**

40. **Rattlesnake Slough, Van Camp Slough, and Beaverhead River Restoration:** Rattlesnake Slough and Van Camp Slough are spring creeks that enter the Beaverhead River near Dillon. The Beaverhead River and these two spring creeks located on private property have been degraded by past grazing practices and water management. This project includes riparian fencing to control grazing, improved water management to enhance fish passage into the spring creek system, bank stabilization along the Beaverhead River, and installation of a grade control to prevent a meander cut-off. Approximately 3 miles of stream and spring creek will be treated.

41. **Bitterroot River Fence:** The Bitterroot River near Lolo is one of Montana's best known trout streams. This riparian fencing project will eliminate cattle from riparian areas and allow stream-side vegetation to recover. Approximately, 1.2 miles of stream will be treated.

42. **Blanchard Creek Feedlot Removal:** Blanchard Creek is a tributary to the Clearwater River that supports a good population of cutthroat trout and a spawning run of bull trout. This project involves moving a calving shed and feedlot away from the banks of the stream to allow the riparian area to recover.

43. **Echo Lake Bass Rearing Habitat:** Echo Lake, located near Bigfork, supports a popular bass fishery but rearing habitat is believed to be limiting the population. This project involves installation of 144 bass rearing structures in the lake. We are hopeful that bass populations will increase as a result of this project.

44. **Magpie Creek Fish Passage:** Magpie Creek is a tributary to Canyon Ferry reservoir that supports a significant run of rainbow trout. However, two barriers located a short distance upstream from the mouth prevent fish from gaining access to the upper reaches. This project involves installation of fish ladders to provide trout with access to the upper reaches of the creek for spawning.

45. **Teton River Bank Stabilization:** Bank erosion on the Teton River near the Bynum Diversion is causing the Teton River to move towards McDonald Creek. If McDonald Creek captures the Teton River, McDonald Creek will experience severe erosion and degradation of fish habitat; further, Bynum Reservoir will be severely impacted. This project involves

stabilizing stream banks upstream of the Bynum Diversion and incorporating fish habitat improvement measures. Approximately 700 ft of stream will be treated.

46. **Canyon Creek Bank Stabilization:** Canyon Creek, located north of Helena, is a tributary to Little Prickly Pear Creek and supports a rainbow and brown trout fishery. This project includes back-sloping to stabilize the stream bank, keying the toe with rock, and re-vegetation. Approximately 500 ft of bank will be treated.

47. **Missouri River Bank Stabilization:** A side channel of the Missouri River near Townsend is heavily used for spawning by brown and rainbow trout from Canyon Ferry Reservoir. Portions of the side channel are experiencing severe erosion due to past grazing practices. This project involves riparian fencing, back-sloping the banks, keying the toe of the slope with rock, and re-vegetation with sod and willows. Approximately 700 ft of bank will be treated.

48. **Meadow Creek Riparian Fence:** Meadow Creek is located on the Beaverhead Forest and supports a population of pure strain cutthroat trout. Grazing practices have damaged riparian areas. This project involves fencing riparian areas to exclude cattle. Approximately 0.6 miles of stream will be treated.

APPENDIX A

List of Potential Project Sites

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Flathead	Herrig Creek (Tributary to Little Bitterroot Lake	Passage barrier caused by a culvert and unstable channel due to overgrazing	Replace culvert with a bridge
	Logan Creek (Tributary to Tally Lake)	Spawning habitat naturally limiting	Develop spawning channel
	Ashley Lake Tributaries	Unstable banks due to overgrazing	Riparian fencing
	Warmwater lakes throughout regions	Poor spawning and rearing habitat	Habitat structures
	Hubbard Reservoir	Low drawdown	Water lease and establish minimum pool
	Evergreen Spring Creek	Unstable banks and channel due to overgrazing, dewatering and migration barriers due to irrigation	Riparian fencing, off site watering, fish ladder, water lease, new diversion from Flathead
	Whitefish River (below lake)	Poor rearing and spawning success due to dewatering and high water temperatures	Tributary enhancement
	Goodrich Bayou	Poor rearing and spawning success due to habitat degradation and dewatering	Channel reconstruction and flow enhancement
	Lake Mary Ronan	Low drawdown and loss of fish at outlet	Water lease and establish minimum pool, install fish screen at outlet
	Upper Stillwater River	Blocked fish passage due to beaver dams and dewatering	Remove beaver dams, channel reconstruction to restore armoring
Middle Fork Flathead	Stanton, Tunnel, and Paola Creeks	Barriers to fish passage caused by railroad and highways	Remove barriers
	Bear Creek	Channelization caused by highway and railroad	Channel reconstruction

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Clark Fork	Thompson River	Habitat altered due to roads, grazing and riparian clearing	Stream reconstruction, move road away from stream, riparian fencing, off-site water development
	Lynch, Weeksville and Swamp Creeks	High silt and low flows due to agricultural practices and other land management activities	Riparian fencing and revegetation
	Swamp Creek (tributary to Noxon Reservoir)	Dewatering due to irrigation and habitat deterioration due to land use	Water leasing, riparian fencing and revegetation, bank stabilization
	Graves Creek (falls to mouth)	Habitat deterioration and intermittent flows caused by 1964 flood and 1965 earthquake	Channel reconstruction and seal
	East Fork Elk Creek	Dewatered due to 1910 fire and logging	Channel reconstruction and seal
	Elk Creek (downstream of confluence of E. and W. Forks)	Intermittent flows and degraded habitat due to 1910 fire and land use	Channel reconstruction and seal
	Trout Creek (lower 10 miles)	Habitat degradation and intermittent flows caused by 1910 fire	Channel reconstruction and seal
Kootenai	Grave Creek (tributary to Lake Koocanusa)	Dewatering and loss of fish into irrigation ditches	Water lease, line ditch, fish screen
	Libby Creek	Channel overwidened and shallow due to flood damage. Flood destroyed armoring causing water loss.	Reconstruct channel and possibly experimental sealing
	Quartz Creek	Blocked fish passage caused by beaver dams and bank erosion due to poor land management	Remove beaver dams and improve bank stability by sloping and revegetating

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
	Bobtail Creek	Spawning habitat degraded due to timber harvest, roading, and subdivision	Riparian fencing, remove roads or improve drainage, stabilize banks
	O'Brian Creek	Blocked fish passage caused by beaver dams; no access to a spring creek due to a natural barrier	Remove beaver dams, provide a fish ladder to the spring creek
	Lake Creek	Migration barrier caused by Lake Creek dam	Provide a fish ladder

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Lower Clark Fork	Tamarack Creek (near confluence)	Fish passage barrier caused by highway and railroad culverts	Mitigate fish passage
	Nemote Creek (lower few miles)	Dewatering in late summer caused by overharvest of timber	Work with USFS and Plum Creek to reclaim
	Lolo Creek (lower 10 miles)	Bank erosion and poor channel diversity due to channelization from highway construction. Dewatering and fish passage barriers caused by irrigation	Rehabilitate banks and channel, possible water leases, facilitate fish passage
	Six Mile Creek (entire drainage)	Streambank erosion due to overgrazing and fish migration barrier due to perched culvert	Provide fish passage through culvert, riparian fencing
	Mill Creek (lower few miles)	Fish passage barrier caused by a dam on a waterfowl pond	Provide fish passage
	Rattlesnake Creek (lower few miles)	Fish passage barrier caused by a Montana Power Dam	Provide fish passage
	Dry Creek near Superior (lower few miles)	Fish passage barrier and dewatering caused by irrigation practices	Provide fish passage, water lease

DRAINAGE	WATER BODY	PROBLEMS AND CAUSE	POSSIBLE SOLUTION
Upper Clark Fork	Warm Springs Creek	Dewatering due to irrigation and Anaconda diversion	Water leases; rehabilitation of the Twin Lake, Storm Lake, Silver Lake water system securing saved water for instream flows
	Harvey Creek	Riparian degradation caused by overgrazing	Riparian fencing, revegetation
	Little Blackfoot and tributaries	Low channel diversity and erosion caused by channelization, riparian degradation due to overgrazing, dewatering caused by irrigation	Riparian fencing, channel reconstruction, water leases

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Blackfoot	Nevada Spring Creek	Over-widened channel and poor riparian vegetation caused by overgrazing	Channel restoration, riparian fencing, revegetation of riparian areas.
	Cottonwood, Rock, Pearson, Chamberlain creeks, North Fork Blackfoot	Reduced streamflow and loss of fish into ditches due to irrigation. Poor channel diversity caused by channelization and overgrazing	Water leases, fish screens at diversions, channel restoration, riparian fencing
	Rosses Fork Willow Creek	Degraded riparian vegetation caused by overgrazing	Riparian fencing and revegetation

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Bitterroot	Painted Rocks Reservoir	Dewatered due to withdrawals	Develop a reservoir management plan with a minimum pool
	Little Tincup Creek	Loss of fish into an irrigation diversion	Installation of a siphon or a fish screen
	Gold Creek (tributary)	Channel degradation due to grazing	Riparian fencing and revegetation
	East Fork Bitterroot River	Poor channel diversity and riparian degradation caused by grazing	Riparian fencing, revegetation, and possibly channel rehabilitation
	Skalkaho Creek and Sleeping Child Creek	Migration barriers caused by irrigation diversion	Modify barriers to provide fish passage
	Willow Creek and Gird Creek	Bank damage caused by grazing and channelization	Riparian fencing and revegetation, and possibly channel rehabilitation
	Lolo, Bear, Kootenai, Blodgett and Sheafmen creeks	Dewatering and loss of fish into irrigation ditches and erosion caused by overgrazing	Water leases, fish screens, riparian fencing and rehabilitation
	West Fork Bitterroot	Poor channel diversity and lack of pools	Channel rehabilitation
	Hughes Creek	Channel damage caused by placer mining	Channel rehabilitation
	Camp Creek	Channelization caused by highway construction	Put stream in old channel and rehabilitate
	Meadow Creek	Trampled streambanks caused by grazing	Riparian fencing and revegetation
	Fred Burr, Burnt Fork, and Sweathouse creeks	Dewatered due to irrigation, erosion due to grazing	Water leases, riparian fencing and rehabilitation
	Mill Creek	Trampled streambanks caused by grazing	Riparian fencing and revegetation

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Madison	Jack Creek	Riparian degradation due to overlogging and over grazing	Riparian fencing and revegetation
	North Meadow Creek	Channel degradation due to over grazing	Riparian fencing and revegetation, channel reconstruction
	Soap Creek	A natural barrier that is protecting a population of pure cutthroat may fail	Reinforce barrier to protect the population
	Lake Creek (trib to W. Fork Madison)	Channel degradation due to over grazing	Riparian fencing and revegetation, channel reconstruction
	Spring Creek (enters Madison near Wade Lake)	A headcut has resulted in a barrier to spawning fish; habitat degradation due to grazing	Reconstruct to provide fish passage, riparian fencing; enhance spawning habitat
	Denny Creek (enters South Fork Madison)	Unstable streambanks and limited spawning habitat due to overgrazing	Riparian fencing and revegetation, bank stabilization
	Madison River (below McAtee Bridge)	Controlled flows out of Hebgen Lake have resulted in limited rearing habitat for brown trout	Diversify stream bank cover to enhance rearing habitat

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Beaverhead, Red Rock, Ruby	Grasshopper Creek (Bannack to mouth)	Entrenchment and bank erosion caused by past mining and overgrazing. Mine tailings in the drainage	Bank and channel stabilization riparian fencing, tailings control
	Red Rock River (Lima to Dell)	Entrenchment, sedimentation, and overwidening caused by removal of vegetation and high irrigation flows	Riparian fencing, bank stabilization and revegetation, in-channel structures
	Beaverhead River (Anderson Lane to mouth)	Vegetation removal caused by overgrazing and variable irrigation flows have resulted in entrenchment, erosion, and dewatering	Riparian fencing, revegetation, and bank stabilization
	Blacktail Deer Creek (Headwaters to mouth)	Vegetation removal caused by overgrazing, channelization and natural slumping have caused bank erosion, entrenchment and dewatering	Riparian fencing and revegetation, re-establish a floodplain, in-channel structures
	Big Sheep Creek (Muddy Creek to mouth)	Overgrazing and willow removal have caused entrenchment, erosion of streambanks and dewatering	Riparian fencing and revegetation, bank stabilization, in-channel structures
	Various Westslope Cutthroat Streams	Grazing, logging, and mining practices and beaver activity have caused habitat degradation; pure strain population are not protected from exotics	Riparian fencing and revegetation, bank stabilization, in-channel structures, remove beaver dams, install barriers to migration
	Ruby River (Canyon to reservoir, reservoir to mouth)	Over-grazing, willow removal, irrigation and extreme floods have caused entrenchment, bank erosion, and sedimentation	Riparian fencing and revegetation, bank stabilization, in-channel structures

	Ruby River	Fluvial Arctic grayling are no longer present in their historic range due to habitat degradation and competition from exotic species	Construct a migration barrier, remove exotics, re-introduce grayling

DRAINAGE	WATER BODY	PROBLEM AND SOLUTION	POSSIBLE SOLUTION
Yellowstone	Mol Heron Creek	Dewatering due to irrigation and loss of fish in irrigation diversions	Install sprinkler system and us salvaged water to enhance streamflow; install fish screens on diversions
	Mill Creek	Upper reaches support a population of pure strain cutthroat. A barrier has been constructed but possible negative impacts have not been evaluated	Conduct a long-term study of impacts of barriers
	Yellowstone River (upstream of Livingston)	Barbs have been used as an alternative to rip-rap but criteria have not been developed for their placement and construction	Develop criteria for when use of barbs is appropriate. Develop criteria for placement and construction

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Big Hole	Big Hole between Jackson and Pintlar creeks	Channelization, over grazing, and willow removal have degraded habitat and caused braiding	Riparian fencing, willow planting, channel stabilization, return to a single channel
	Big Hole between Jackson and Swamp Creek	Late summer dewatering due to diversion for stock watering; bank trampling by livestock	Off-site water development and water lease; riparian fencing and enhanced grazing management
	Steel Creek (Hwy 43 bridge to Wisdom cemetery)	Willow removal and over grazing have caused riparian degradation	Riparian fencing and willow planting
	Big Hole River (Jackson to North Fork Big Hole	Entrainment of YOY grayling into irrigation diversions	Install fish screens
	N. Fork McVey Creek and McVey Creek	Eastern brook trout are competing with native cutthroat	Install a barrier, remove brook trout, re-establish native cutthroat

DRAINAGE	WATER BODY	PROBLEM AND SOLUTION	POSSIBLE SOLUTION
Jefferson	North Boulder and Cold Springs	The existing spring has limited spawning and rearing habitat; fish are lost in to irrigation diversions downstream	Develop a new channel for the spring; install fish screens on the diversions
	Parrot Ditch	The existing ditch leaks resulting in inefficient use of water and dewatering; fish are lost into ditches	Enlarge the upper canal, install a more efficient system; deliver water for spawning and rearing during low flow years; install a fish screen
	Muskrat Creek	Pure strain cutthroat trout are unprotected and subject to competition from brook trout	Install a migration barrier to isolate the cutthroat and remove brook trout to reduce competition

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Judith River	Big Spring Creek (Brewery Flats)	Channelization caused by road and railroad	Rebuild a meandering channel
	Big Spring Creek below Lewistown	Eroding banks caused by overgrazing	Riparian fencing, off-site water development, tree revetments
	Ackley Lake and Martinsdale Reservoir	Poor spawning habitat	Provide a fish ladder on the ditches that enter the lakes and develop spawning habitat
	Dry Wolf Creek	Over widened channel caused by over grazing, poor structures installed	Riparian fencing and development of riparian fencing, remove old structures
	Lost and Middle Forks of the Judith	Pure strain cutthroat that are unprotected	Construct a barrier
	Warm Springs Creek	Loss of fish into irrigation diversions	Fish screen
	Entire Judith watershed	Channelization and erosion of banks caused by over grazing	Riparian fencing, riparian vegetation enhancement, channel reconstruction in some reaches and other watershed enhancement measures
	Big Spring Creek (Tresh property)	Bank erosion	Bank stabilization, riparian vegetation development
	Petrolia Reservoir	Poor habitat for forage fish spawning	Install brush piles

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Sun-Teton-Marias	Several streams	Support pure Westslope cutthroat that are unprotected	Construct barriers
	Tiber, Bynum, and Lake Francis	Spawning sites for perch and other forage species limited	Brush piles or other structures enhance spawning habitat
	Teton River	Eroding banks, channel braiding and deterioration caused by Bynum Diversion, gravel dikes for irrigation diversions	Return to one channel, rehabilitation the Bynum Diversion, Cottonwood tree revetments, root wad habitat structures, develop fish friendly diversions
	Marias River below Tiber Dam	Eroding banks, poor spawning habitat, lack of cover	Bank stabilization measures, develop a spawning channel, brush piles
	Sun River	Dewatered due to irrigation practices	Water leases
	Wood Lake	Low water levels	Work with USFS to raise water levels

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Smith River	Sheep Creek	Dewatering caused by irrigation, channel erosion caused by grazing, channelization	Water leases, riparian fencing, channel restoration
	Newlan Creek	Dewatering caused by irrigation	Water lease
	Elk Creek	Channelized	Channel restoration
	Boundary Lake	Low water depth caused by low dam	Raise water level by increasing dam height
	North Fork Smith	Dewatered due to irrigation	Water leases
	Lower Smith	Bank erosion caused partially by agricultural practices and grazing	Riparian fencing, enhance riparian vegetation

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Missouri River	Big Springs near Toston	Limited access to existing spring and irrigation water lost due to seepage	Reduce seepage loss and use salvaged water to develop a natural spring creek
	Deep Creek near Townsend	Past channelization and poor riparian management have caused unstable banks and erosion	Stabilize banks, improve riparian management, restore channel lengths
	Beaver Creek near Winston	Irrigation practices result in severe dewatering	Install a pipeline and use salvaged water to enhance streamflows

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Mid-Missouri	Little Prickly Pear Creek	Channelization caused by highway and railroad and dewatering caused by irrigation	Channel reconstruction, water leases
	Dearborn River	Dewatering and loss of fish into irrigation ditches	Water leases, fish screens on diversion
	Bean Lake	Lake level too low during some years due to evaporation	Water leases to supplement lake levels
	Trout Creek (tributary to Hauser Lake)	Barriers to fish passage caused by beaver dams and a culvert, poor recruitment	Replace culvert with bridge, remove beaver dams, reduce sediment, improve spawning habitat
	Ten Mile Creek	Dewatered due to irrigation and fish lost into diversions	Water leases, fish screens on diversions
	Prickly Pear Creek	Dewatered due to irrigation and fish lost into diversions. Erosion of streambanks and channelization	Water leases, fish screens on diversions, riparian fencing and other erosion control measures
	Silver Creek near Lake Helena	Excessive sediment and poor habitat diversity caused by channelization	Rebuild channel, develop spawning habitat
	Various ditches entering Lake Helena	Used for spawning, but potential may not be realized	Possibly enhance spawning conditions
	Spokane Creek (tributary to Hauser Lake)	Spawning success appears poor and recruitment is limited	Evaluate and possibly enhance spawning habitat
	Elkhorn Creek (tributary to Holter Lake)	Possibly supports pure strain cutthroat that are unprotected	Constant barrier

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Yellowstone	Yellowstone River (downstream of Clarks Fork)	Fish passage barriers at Cartersville and Huntley block spawning migrations.	Install fish passage structures at diversions.
	Yellowstone River (Big Timber to Huntley)	Lack of trout recruitment due to lack of spawning habitat, tributary dewatering and sediment loading from Clark Fork.	Improve tributary spawning conditions, develop spawning channels, and water leases.
	Yellowstone River (downstream of Huntley)	Limited smallmouth recruitment due to lack of adequate spawning habitat.	Improve spawning habitat in the mainstem and tributaries.
	Milligan Slough Spring Creek	Siltation and bank trampling caused by livestock grazing.	Fence riparian area, narrow and deepen the stream, develop riparian vegetation.
	Spring Creek adjacent to upper Deer Creek	Siltation and bank trampling caused by livestock grazing, dewatering due to irrigation, migration barrier near mouth.	Fence riparian area, narrow and deepen the channel, water leases, install fish passage structure.
	Clark Fork Yellowstone and Pryor Creek	High sediment loads due to land management practices and natural sources.	Conduct watershed analysis to identify sources and control sediment through riparian fencing and other appropriate practices.
Stillwater	Trout Creek	Unstable channel, siltation and dewatering caused by grazing, irrigation and beaver dams.	Stabilize channel, riparian fencing, water leases, develop riparian vegetation, remove beaver dams.
	Midnight Canyon Ranch Spring Creek	Dewatering near mouth due to irrigation, riparian degradation due to grazing.	Water leasing, riparian fencing.
	Bushy Fork Willow Creek	Riparian degradation due to overgrazing.	Riparian fencing.

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Yellowstone	Yellowstone near Cartersville, and Huntley Diversions.	These diversion dams are a barrier to migrations of sauger and sturgeon and limit numbers above the dam.	Install fish passage at the diversion.
	South Sandstone Reservoir	Heavy summer weed growth interferes with fishing.	Treat the reservoir with "Sonar" in alternate years.
	Castle Rock Reservoir	Reproduction may become limiting because the reservoir is treated annually with copper sulfate to prevent fouling of screens and filters in the power plant.	Develop biological controls to prevent the need for chemical treatment.
	Tongue River near T&Y Diversion	Stream flow in April, May and June is inadequate for sauger and sturgeon spawning.	Lease or purchase water originating from the Tongue River Dam.
	Tongue River	Fish are lost into irrigation diversions at several locations.	Install fish screens to prevent loss into diversions.
Lower Missouri	Missouri downstream of Fort Peck Reservoir	A spawning channel that was built several years ago is filling in with silt due to bank erosion and flows are insufficient to flush silt.	Stabilize river banks that are eroding, restore spawning channel, divert additional river flow into the channel.
	Nelson Reservoir and Milk River	Fish are lost over the dam and into irrigation canals.	Fish screens or acoustic block.
	Fresno and Nelson Reservoirs	Shorelines and shallow bays are overgrazed when water is low reducing suitable spawning areas for yellow perch.	Build exclosures at selected sites and plant with crops that will provide a good spawning substrate when the water comes up.
	Bear Paw Lake	Reservoir drawdown during previous years has caused bank sloughing in several areas. Additionally, cover for smallmouth is lacking.	Fill in the sloughed areas with shale and stone to slow erosion and provide smallmouth cover.

DRAINAGE	WATER BODY	PROBLEM AND CAUSE	POSSIBLE SOLUTION
Bighorn	Bighorn River below Yellowtail Dam	Loss of side channels due to natural downcutting below a dam, low flows.	Develop techniques to maintain side channels, lease water to enhance flows.
	Bighorn River downstream of Two Leggins and Manning diversions.	Fish passage blocked is limiting access to spawning areas.	Install fish passage structures at these diversions.
	Soap Creek	Major sediment source due to land management practices, loss of fish into irrigation diversions, barriers to fish passage.	Develop sediment control plan, install fish passage at barriers, install screens on irrigation diversions.
Musselshell	Musselshell River (downstream of Lavina)	Lack of recruitment of warmwater species due to irrigation barriers at diversion dams and dewatering.	Install fish passage at diversions, water leases.
	Musselshell River (Headwaters to Deadman Diversion)	Dewatering and lack of flushing flows caused by irrigation.	Water leases.
	Musselshell River (Deadmans Diversion to Mouth)	Riparian and channel degradation caused by land management practices, dewatering caused by irrigation.	Improve riparian management, water leases.
	Careless Creek	Habitat degradation caused by too much water released into channel from Deadman's Basin Reservoir.	Restore stream channel, riparian fencing, better flow management.
Misc.	Existing and potential ponds on public lands.	Some ponds are too shallow to over-winter fish. Some good sites have not been developed.	Rebuild existing dams, develop new pond sites.

APPENDIX B

Administrative Rules

Sub-Chapter 12

Future Fisheries Program

12.7.1201 PURPOSE (1) The purpose of these rules is to adopt procedures to implement the functions of the commission and the department in the future fisheries improvement program established in 87-1-272, MCA. The purpose of the program is to restore essential habitats for the growth and propagation of wild fish populations in lakes, rivers, and streams through voluntary means. Funds may be used for long-term enhancement of streams and stream banks, instream flows, water leasing, lease or purchase of stored water or other voluntary programs to enhance wild fish and their habitats. (History: Sec. 87-1-201, 87-1-301 MCA; IMP, Sec. 87-1-272, 87-1-273 MCA; NEW, 1996 MAR p. 153, Eff. 1/12/96.)

12.7.1202 DEFINITIONS As used in these rules, the following definitions apply:

(1) "Commission" means the fish, wildlife and parks commission.

(2) "Department" means the department of fish, wildlife and parks.

(3) "Native fish" means fish species that were present in a given water body prior to the influence of European man.

(4) "Program" means the future fisheries improvement program provided for in 87-1-272, MCA, and as implemented in these rules.

(5) "Restoration" means to restore to a natural or near natural condition.

(6) "Review panel" means the future fisheries improvement review panel.

(7) "Wild fish" means fish populations that sustain themselves through natural reproduction in lakes, reservoirs, rivers, or streams. (History: Sec. 87-1-201, 87-1-301 MCA; IMP, Sec. 87-1-272, 87-1-273 MCA; NEW, 1996 MAR p. 153, Eff. 1/12/96.)

12.7.1203 PROJECT RANKING AND APPROVAL (1) Eligible projects that have been approved by the review panel will be reviewed, evaluated and ranked by a committee that includes at least two department personnel with a background in fishery biology and an understanding of the habitat requirements of fish and one member of the review panel.

(2) The department will submit a list of recommended projects to the commission for consideration at public hearings conducted as part of regularly scheduled commission meetings. The commission will grant final approval for project funding.

(3) The department and the commission will use the following criteria to evaluate and prioritize projects:

(4) Additional funding may be available to complete or repair a project if a natural catastrophic event damages or destroys the project while the project is under construction. requests for additional funding will be evaluated by the department. (History: 87-1-201, 87-1-301, MCA; IMP, 87-1-272, 87-1-273, MCA; NEW, 1996 MAR p. 153, Eff. 1/12/96.)

12.7.1206 PROJECT MAINTENANCE (1) Projects funded under the program such as fences, bridges, fish screens, or other channel restoration measures will become the property of the landowner. Fish habitat improvement projects such as spawning channel development, fish barrier removal, fish screens, and riparian enhancements must be maintained for the useful life of the project by the applicant.

(2) Projects with demonstrated benefits to public fisheries and conservation of rivers may be eligible for maintenance funding under this program. Maintenance costs of up to 10% of total project costs can be approved by the department. (History: 87-1-201, 87-1-301, MCA; IMP, 87-1-272, 87-1-273, MCA; NEW, 1996 MAR p. 153, Eff. 1/12/96.)

12.7.1207 PROJECT MONITORING (1) Restoration projects shall be evaluated by either the applicant or the department according to terms stipulated in the project agreement. Monitoring will be conducted on each completed project at times agreeable to the landowner. The type and frequency of monitoring will be established by the department. (History: 87-1-201, 87-1-301, MCA; IMP, 87-1-272, 87-1-273, MCA; NEW, 1996 MAR p. 153, Eff. 1/12/96.)

12.7.1208 EFFECT OF RULE VIOLATIONS (1) Any person or organization falsifying financial statements or using program funds for purposes other than the intended project will be disqualified from further participation in the program and will be required to reimburse the department for any compensation received. (History: 87-1-201, 87-1-301, MCA; IMP, 87-1-272, 87-1-273, MCA; NEW, 1996 MAR p. 153, Eff. 1/12/96.)

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(a) the degree to which the project optimizes public benefits to wild fisheries;

(b) whether the project benefits a native fish species with emphasis on species of special concern;

(c) the importance of the river or stream (determined from the Montana interagency database -- a ranking of the habitat and species value of stream reaches);

(d) the expected benefits of the project relative to cost;

(e) the long-term effectiveness of the restoration;

(f) the level of in-kind services or cost-sharing from other sources.

(4) All applicants will receive written notification of action taken on their project proposals after the commission has made a final decision.

(5) Projects will be approved for funding only if account money is available as requested to complete the projects. Each approved project sponsor must enter into a written agreement with the department on a form prepared by the department.

(6) When deemed necessary, the department will solicit outside technical design review of projects.

(7) No project completed under this program may restrict or interfere with any water rights or property rights of landowners adjacent to projects.

(8) Funds from this account may not be used to acquire any interest in land. (History: Sec. 87-1-201, 87-1-301 MCA; IMP, Sec. 87-1-272, 87-1-273 MCA; NEW, 1996 MAR p. 153, Eff. 1/12/96.)

12.7.1204 PERMITS (1) The project applicant is responsible for obtaining all necessary permits required to complete the project. Permits must be obtained prior to project initiation to qualify for payment of funds. (History: Sec. 87-1-201, 87-1-301 MCA; IMP, Sec. 87-1-272, 87-1-273 MCA; NEW, 1996 MAR p. 153, Eff. 1/12/96.)

12.7.1205 INSPECTION AND PAYMENT BY DEPARTMENT (1) Funds granted from the account shall be used only for purposes described in the final project agreement. Itemized invoices of expenses and receipts approved by the applicant must be submitted to the department for payment.

(2) Payment may be made in installments for completed work as the project progresses. Upon completion of a project, a final inspection and payment will be made within 45 days by the department. If the department determines after inspection that the project is not complete, final payment shall be withheld pending completion and reinspection.

(3) Unanticipated expenses of up to 10% of total project costs can be approved by the department.

APPENDIX C

Review Panel Guidelines

Review Panel Guidelines

PROGRAM FUNDING (1) Program funding may be provided to any person or entity for costs of design, planning, administration, construction, maintenance and monitoring of projects which will restore, protect or enhance fish habitat. Preference will be given to projects that restore, protect or enhance habitat for native fishes. Projects must eliminate or significantly reduce the cause of the habitat degradation rather than dealing with symptoms. Potential projects must accomplish one or more of the following:

(a) improve or maintain fish passage;
(b) restore or protect naturally functioning stream channels or stream banks;
(c) restore or protect naturally functioning riparian areas;
(d) prevent loss of fish into irrigation diversion;
(e) restore or protect essential habitats for spawning, rearing, overwintering or avoidance of predators;
(f) enhance stream flow in a dewatered reach to improve fisheries;
(g) restore or protect genetically pure native fish populations;
(h) improve wild fish populations in a lake or reservoir;
(i) other projects that enhance wild fish populations.

PROJECT APPLICATION (1) An application for program funding must be submitted on forms supplied by the Future Fisheries Review Panel. One copy of the completed application must be submitted to the Fisheries Division at the Department Headquarters located in Helena.

(2) Plans, photographs, detailed sketches, maps, evidence of landowner consent or public support and/or other information necessary to evaluate the merits of the project must accompany the application. Applications without adequate information will be returned to the applicant with a description of the information needed to make the application complete.

(3) Applicants proposing more than one project must submit a separate application for each proposal.

(4) Applicants proposing projects on lands other than their own must include written consent to the landowner and their own must include written consent to the landowner and any lessee for the project, including an agreement for any maintenance and evaluation activities that may be necessary.

PROJECT SELECTION CRITERIA (1) Project applications will be evaluated by the review panel at least every six months. To be eligible the applicant must demonstrate that the project will:

(a) accomplish one or more of the objectives listed under PROGRAM FUNDING;

(b) be conducted with approval of the landowner on whose property the project is being completed;
(c) not interfere with water or property rights of adjacent landowners;
(d) other appropriate criteria as determined by the review panel.

(2) A list of eligible projects will be sent to the department at least every six months.

APPENDIX D

Program Application Form

FUTURE FISHERIES IMPROVEMENT PROGRAM
GRANT APPLICATION

I. APPLICANT INFORMATION

A. Applicant Name _____

B. Mailing Address _____ City or Town _____
C. State _____ Zip _____ Telephone _____

D. Contact Person _____
Address if different from Applicant _____

Telephone _____

E. Landowner and/or lessee name, address, telephone (if other than applicant). _____

_____

II. PROJECT INFORMATION*

A. Project Name _____ River, stream, or lake _____

Location: Township ____ Range ____ Section ____ County _____

B. Purpose of Project _____

C. Brief Project Description _____

D. Length of stream or size of lake that will be treated _____

E. Project Budget
Grant Request (Dollars) _____

Contribution by Applicant (Dollars or In-kind) _____

Contribution from other Sources (Dollars) _____
(attach verification)

Total Project Cost _____

F. Plans, sketches, photographs, maps, evidence of landowner consent, evidence of public support and/or other information necessary to evaluate the merits of the project must accompany the application.

III. PROJECT BENEFITS*

A. What species of fish will benefit from this project?

_____

B. How will the project protect or enhance wild fish habitat? _____

_____

C. Will the project improve fish populations and/or fishing? To what extent? _____

_____

D. Will the project increase public fishing opportunity for wild fish and, if so, how?

_____

E. If the project requires maintenance, what is your time commitment to this project?

_____

F. What was the cause of habitat degradation in the area of this project and how will the project correct the cause? _____

G. What public benefits will be realized from this project? _____

_____

H. Will the project interfere with water or property rights of adjacent landowners (explain)? _____

_____

Each approved project sponsor must enter into a written agreement with the Department specifying terms and duration of the project.

IV. AUTHORIZING STATEMENT

I (we) hereby declare that the information, and all statements to this application are true, complete, and accurate to the best of my (our) knowledge and that the project or activity complies with rules of the Future Fisheries Improvement Program.

Applicant Signature _____ Date _____

Sponsor (if applicable) _____

***Use extra paper, if necessary.**

Mail To: Montana Fish, Wildlife & Parks
Habitat Protection Bureau
P.O. Box 200701
Helena, MT 59620-0701

APPENDIX E

Program Fact Sheet

FUTURE FISHERIES IMPROVEMENT PROGRAM
FACT SHEET

Purpose

The 1995 Montana Legislature passed the Future Fisheries Improvement Program to restore essential habitats for the growth and propagation of wild fish populations in lakes, rivers and streams.

Funding

Funds used to implement the Future Fisheries Improvement Program originate from the sale of Montana fishing licenses. Nearly a million dollars per year are presently allocated to the program.

Who Is Eligible

Good projects originating from virtually any source will be considered for funding.

Use of Funds

Program funding may be provided for costs of design, planning, administration, construction, maintenance and monitoring of projects which restore or enhance habitat for wild fishes. Preference will be given to projects that restore habitats for native fishes.

How To Apply and When

Applications must be made on forms available from Fish, Wildlife & Parks (FWP) regional offices located in Kalispell, Missoula, Bozeman, Great Falls, Billings, Glasgow and Miles City or from the Fisheries Division Office in Helena. Contact the Fisheries Division in Helena (444-2449) if you need help filling out the application form or developing a project proposal.

Projects are reviewed in the field by a FWP representative prior to being considered for funding. Contact the FWP office in Helena (444-2449) to schedule a site visit.

Applications may be submitted at any time but are reviewed and scored twice each year. Applications must be received before January 1 and July 1 of each year to be considered for the subsequent funding period. Applications must be sent to Montana Fish, Wildlife & Parks , Habitat Protection Bureau, Fisheries Division, P.O. Box 200701, Helena, MT 59620-0701.

Types of Projects That Are Funded

In addition to restoring habitat, projects must eliminate or significantly reduce the original

cause of the habitat degradation. For example, if a stream is damaged by a specific land management practice, restoring the channel does little good without changing the management practice.

Potential projects must accomplish one or more of the following:

(1) Improve or maintain fish passage;
(2) restore or protect naturally functioning stream channels or banks;
(3) restore or protect naturally functioning riparian areas;
(4) prevent loss of fish into diversions;
(5) restore or protect essential habitats for spawning;
(6) enhance streamflow in a dewatered reach to improve fisheries;
(7) restore or protect genetically pure native fish populations;
(8) improve fishing in a lake or reservoir;
(9) other projects that restore or protect habitat for wild fish populations.

Project Eligibility

Project proposals will be screened for eligibility by a citizen review panel. To be eligible, the applicant must demonstrate that the project:

(1) will accomplish one or more of the items listed above;
(2) will be conducted with approval of the landowner on whose property the project is being completed;
(3) will not interfere with water or property rights of adjacent landowners;
(4) is most appropriately funded through this program.

Project Selection

Eligible projects will be evaluated by a citizen review panel. The following criteria will be used to evaluate projects:

(1) public benefits to wild fisheries;
(2) long-term effectiveness;
(3) benefits to native fish species;
(4) expected benefits relative to cost;
(5) in-kind services or cost-sharing;
(6) importance of the lake or stream.

The review panel and FWP will submit a list of recommended projects to the FWP Commission for consideration at public hearings conducted as part of their regularly scheduled Commission meetings. Final project approval is the responsibility of the Commission.

Project Administration

Each approved project sponsor must enter into a written agreement with FWP. Funds granted for projects must be used only for purposes described in the final project

agreement. Itemized invoices of expenses and receipts approved by the applicant must be submitted to FWP for payment.

Evaluating Project Success

Each completed project will be monitored to evaluate the public benefits of the project to wild fisheries. FWP is in the process of developing guidelines for monitoring restoration projects.

APPENDIX F

Project Ranking Criteria

FUTURE FISHERIES IMPROVEMENT PROGRAM
RANKING CRITERIA

BENEFITS A NATIVE FISH SPECIES (15 point maximum)

Project protects or enhances habitat for a native fish species with emphasis on species of special concern.

OPTIMIZES PUBLIC BENEFITS TO WILD FISHERIES (25 point maximum)

1. Project will protect or enhance wild fish habitat by:

   a. Restoration of river bed or lake bottom cover.

   b. Restoration of river banks or lake shore.

   c. Improving spawning or rearing habitat.

   d. Improving fish passage.

   e. Increasing bank, channel, or shoreline cover.

2. Project is expected to improve wild fish populations and fishing:

   a. Greatly. Project is expected to measurably increase angler opportunity or angler success over a wide area (>2.0 mi) of stream or in a large (>500 acres) lake or reservoir.

   b. Moderately. Project is expected to measurably increase angler opportunity or angler success over a moderate area (>0.5-2.0 mi) of stream or in a moderate sized (>200-500 acres) lake or reservoir.

   c. Somewhat. Project is expected to increase angler opportunity or angler success over a small area (<0.5 mi) of stream or in a small (<200 acres) lake or reservoir. (or) Project is expected to increase angler opportunity or angler success but the benefits are unlikely to be measurable.

   d. No increase.

3. Project will increase public fishing opportunity for wild fish.

   a. Public fishing allowed adjacent to the project.

   b. Public fishing not allowed but project will benefit a fishery that the public has access to.

c. Public fishing not allowed and the public will not benefit from the project.

IMPORTANCE OF THE RIVER OR STREAM (5 point maximum)

1. Class I (highest value).
2. Class II (high priority).
3. Class III (substantial fishery).
4. Class IV (moderate fishery).
5. Class V (limited fishery).
6. Not listed but limited fishery.

LONG TERM EFFECTIVENESS (25 point maximum)

1. Project corrects cause of the original problem.
2. Project partially corrects cause of the original problem.
3. Project does not deal with the cause of the problem (project ineligible).

EXPECTED BENEFITS RELATIVE TO COST (15 point maximum)

1. Project benefits high relative to cost.
2. Project benefits about equal to cost.
3. Project costs exceed benefits (project ineligible).

COST SHARING OR IN-KIND SERVICES (15 point maximum)

Percent of the project that will be funded from other revenue sources and/or in-kind services.

1. 50% or greater.
2. 25-49%
3. Up to 24%
4. Project will rely entirely on Future Fisheries Improvement Program funding.

APPENDIX G

Monitoring Recommendations

Monitoring Recommendations

Reasons for Monitoring: Needless to say, all of the habitat restoration projects that we undertake are done so with the belief that the changes that are implemented will result in more fish and ultimately greater angler opportunity. However, there are risks associated with doing habitat restoration work.

Most fish populations are limited by some critical factor, often an element of habitat, that is essential for the population to continue to expand. Examples of habitat elements that could become limiting in an aquatic system include spawning habitat (or access to spawning habitat), rearing habitat, over-wintering habitat, security cover, food production, water quality, and stream flow.

If the habitat feature that is improved by a given restoration project is not the limiting factor, the project may not improve fish numbers -- even if the habitat appears better. For example, a stream limited by a shortage of deep pools necessary for security and over-wintering will not likely benefit from an increase in available spawning and rearing areas. Similarly, an increase in over-wintering habitat and security cover will not result in improved fish numbers if spawning habitat is limiting the population.

Survey and inventory work conducted by biologists has greatly increased our understanding of factors limiting fish populations. Unfortunately, our knowledge is far from complete. Consequently, it is very likely that we will conduct some restoration projects that will result in very little benefit to fish populations or to anglers. Given the high expense of fish habitat restoration work, it is essential that we monitor a cross section of our projects so that we understand the types of projects that are working (or not working) and also the types of projects that result in greatest benefits relative to costs.

Finally, fish habitat restoration experts in other parts of the country have shown that it often takes 3-5 years for fish populations to respond to improvements in habitat. Consequently, it is essential that monitoring be a long term commitment.

With the above in mind, we have the following general and specific recommendations for monitoring projects completed with Future Fisheries Improvement Program funds.

General Recommendations: For all projects we should examine all existing information that is pertinent to the project including:

* channel profile and type
* stream flow characteristics
* riparian condition
* fish species composition and population sizes
* limiting factors

Specific Recommendations: At a minimum, all projects should be monitored to determine that the work was completed as proposed. Additionally, some projects in each category should be monitored to evaluate how effective the project was at improving fish populations. For those projects that are monitored, the basic minimum monitoring requirements are referred to as tier 1. More intensive monitoring to provide even greater information on project effectiveness is referred to as tier two monitoring. Tier one monitoring is denoted by (1) and tier two by (2):

Stream flow enhancement projects

* stream flow and stage recordings during critical periods before and after (1)
* photographs before and after (1)
* catch-per-unit-effort shocking before and after (2)
* redd counts to document spawning use before and after (2)
* fry trapping before and after (2)

Spawning enhancement projects

* determine substrate size in the spawning area before and after (pebble counts) (2)
* count redds before and after (1)
* monitor fry out-migrations before and after (2)
* juvenile catch-per-unit-effort shocking before and after (2)
* determine species using the area for spawning and timing of spawning before and after (1)
* monitor fish populations in the area believed to be benefitting from the added recruitment before and several years after (2)

Grade stabilization projects

* photographs before and after (1)
* channel profile above and below and before and after (2)
* documentation of the negative impacts of the head cut on the channel (1)

Bank stabilization projects using barbs

* photographs of the bank before and after (1)
* documentation of erosion rates before and after (2)
* evaluation of downstream impacts (2)
* evaluation of barb use by fish (2)
* evaluation of land use practices before and after (1)

Fish passage enhancement projects

* redd counts before and after (1)
* documentation that a real barrier exists before (1)

* fish populations above and below and before and after (2)
* recruitment before and after (fry and juvenile trapping) (2)
* species present before and after barrier removal (1)
* disease status before and after barrier removal (1)

Barrier installation to protect populations of native fishes

* movement of fish species of interest before and after barrier installation (1)
* design flow of the barrier should be established before installation (1)
* channel profile should be measured before and after barrier installation above and below the barrier (2)
* fish species present above the barrier should be monitored periodically after barrier installation to establish whether the barrier is working (1)

Channel rehabilitation projects

* determine what is limiting the system e.g. sediment effects on spawning habitat, cover, etc. before (1)
* before and after ground and, if possible, aerial photographs (1)
* before and after channel geometry (2)
* before and after fish population estimates (1)
* if possible treatment and control areas should be established and fish populations monitored before and after (2)
* effects of the project on channel stability both upstream and downstream from the project after (2)

Stream bank stabilization projects using natural materials

* Photographs of the treatment area before and after (1)
* channel geometry before and after (2)
* effects of the project on upstream and downstream areas after (2)
* fish population response to habitat structures such as root wads (2)
* documentation of erosion rates before and after (1)

Riparian fencing projects and other riparian enhancements

* photographs before and after and at frequent intervals throughout the expected life of the project (1)
* channel geometry before and after (2)
* management plan required (before) if riparian grazing allowed; compliance with the grazing plan after (1)

Fish screens

* Clearly establish that a screen is needed before installing one (screens should not be used if the stream experiences seasonal dewatering) (1)
* Fish numbers in the screened ditch before and after (shutdown is a good time to monitor) (1)
* Fish numbers in the river before and after installation of the screen (2)
* Alternatives to screening should be explored (before) such as the possibility of providing an alternative water source (1)
* impingement on the screen after (2)

Lake and reservoir projects

* limiting factors should be evaluated before (1)
* success of artificial substrates for spawning or rearing areas should be determined after (1)
* various indices of fish harvest or fish numbers should be used to help evaluate project success after (2)

APPENDIX H

Monitoring Summary

Future Fisheries Improvement Program
Monitoring Report - 1997

by

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Montana Fish, Wildlife and Parks
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This report summarizes monitoring efforts of fish habitat restoration projects funded by either the River Restoration Program (RRP) or the Future Fisheries Improvement Program (FFI). Evaluation of projects is separated into two classes: implementation monitoring and evaluation monitoring.

Implementation Monitoring

Implementation monitoring is intended to ensure that projects are completed as planned and usually includes a qualitative assessment that the project is functioning as designed and a photographic record showing site conditions prior to initiation of the project and after project completion. Implementation monitoring is completed by either FWP or the project sponsor and is done for all projects. All completed FFI projects are inspected by FWP representatives upon completion. We are presently compiling a reference list of photo availability and photo locations for each project.

Evaluation Monitoring

Evaluation monitoring is intended to determine if the project positively affects the target fish populations. Due to the more intensive data collection required, evaluation monitoring is not done for all projects. Evaluation monitoring is completed by FWP Fisheries Biologists or contracted personnel. FWP recommended monitoring procedures for the various types of projects (Appendix G). Evaluation monitoring has been initiated on about half of the RRP and FFI projects. Since this monitoring program is relatively new, few definitive results showing the effects these projects have had on target fish populations are available. FWP is in the process of compiling all fisheries information collected for evaluating these projects. In addition to projects where state funds have been used, FWP has contributed technical assistance to numerous other projects which were funded from other sources. Monitoring data from these projects will also be

compiled to evaluate the effectiveness of these projects. The remainder of this report presents brief summaries of evaluation monitoring results for selected projects by project name and cites reference which contains, or will contain, detailed results. In many cases detailed reports are in preparation. In general, our present information suggests that most of these projects are improving fish populations.

Rock Creek Habitat Improvements #1 and #2

Relative abundance of rainbow and brown trout were assessed in five sections of Rock Creek, tributary to the North Fork Blackfoot River, prior to construction of habitat improvement projects (1989) and following construction (1994) to assess the effects of the habitat improvement projects on trout abundance (Peters and Pierce, in prep.). Relative abundance was assessed as the catch of trout in one electrofishing pass standardized to the number caught per 100 feet of stream length. Catch rates for both species increased from three to five times between 1989 and 1994 in the lower three sections where the two habitat improvement projects were located (Peters and Pierce, in prep.; Figures 1 and 2).

Blackfoot River Monture Creek Riparian

Annual counts of bull trout redd numbers in Monture Creek and the North Fork Blackfoot River serve as a measure of relative impacts of numerous restoration efforts on bull trout in the drainage (Peters and Pierce, in prep.; Figures 3). A specific project in Monture Creek was undertaken in 1992 to exclude livestock by fencing a portion of the stream where bull trout were known to spawn. The numbers of redds have risen consistently from 1989 to 1996. These data suggest that restoration efforts have been successful in increasing the numbers of adult bull trout in the Blackfoot River population and that restoration efforts in Monture Creek are obviously contributing to this increase.

Belmont Creek Culvert Replacement

A culvert crossing in Belmont Creek was replaced with a bridge to provide improved fish passage. The populations of rainbow, brown, and bull trout were estimated in 1989, prior to culvert replacement, and in 1994, two years after culvert replacement, in a sample section of Belmont Creek immediately above the old culveert location (Peters and Pierce, in prep.; Figure 4). Densities of rainbow and brown trout increased, while densities of bull trout decreased slightly.

Cottonwood Creek Irrigation Diversion

Modifications were made to an irrigation diversion on Cottonwood Creek, a tributary to the Blackfoot River, to reduce the impacts of annual reconstruction of this diversion and to reduce the number of fish lost into the irrigation diversion. Relative abundance of four trout species was assessed immediately below the diversion within Cottonwood Creek prior to the project in 1992

(Peters and Pierce, in prep.; Figure 5). Relative fish abundance will again be assessed to document changes in fish abundance which might be related to the modification of this diversion. Additional projects have, or will be undertaken, to improve fish passage, increase instream flows, and screen the ditch intake.

Fleshman Creek Channel Improvement

The Joe Brooks Chapter of Trout Unlimited, the Park County Conservation District, the USDA Soil Conservation Service (now the NRCS), and FWP cooperatively rehabilitated the lower portion of the Fleshman Creek channel of the Yellowstone River in 1992 to improve access and spawning and rearing habitat for trout from the Yellowstone River, particularly Yellowstone cutthroat trout. Prior to initiating the project a level survey of the entire stream was completed and the NRCS has these data stored in a CAD format.

In 1995 FWP evaluated incubation success in the newly rehabilitated portion of the stream channel by placing 20,000 eyed Yellowstone cutthroat trout embryos in artificial redds constructed in the new rehabilitated spawning habitats (Tohtz 1996). Hatching success was about 75% which translated to about 14,500 cutthroat fry produced from this egg plant.

Gilbert Creek Habitat Restoration

Habitat restoration which increased the habitat complexity by creating pools and other habitat types occurred in a middle portion of Gilbert Creek during spring 1996. Estimated densities of brook, westslope cutthroat, rainbow, and brown trout 6.0 inches and longer all increased dramatically from 1995 to 1996 in the restored portion of creek (Peters and Pierce, in prep.; Figures 6 and 7).

Warren Creek Restoration

Relative fish abundance for three trout species, mountain whitefish, and longnose sucker was assessed in three sections of Warren Creek prior to habitat restoration (Peters and Pierce in prep.; Figure 8). Following restoration these sample sections can be re-sampled to assess the effect of restoration on the relative abundance of the above species.

Blanchard Creek Fish Passage

Fish passage into Blanchard Creek, a Blackfoot River tributary, was improved to increase reproduction by Blackfoot River salmonids. The species composition of fishes in lower Blanchard Creek was documented in 1990, prior to the project, and in 1994, following completion of the project (Peters and Pierce, in prep.). Cutthroat trout, brown trout, mountain whitefish, and dace all comprised a greater proportion of the sampled fish community following the passage project (Peters and Pierce, in prep.; Figure 9). In addition, the relative abundance of rainbow trout and cutthroat trout increased following the passage project (Peters and Pierce, in

prep.; Figure 10). A water lease was also negotiated for Blanchard Creek which maintained flows in the creek during low flow periods. This lease also contributed to changes in fish composition and increased densities.

Stone Creek Rehabilitation

The Left Fork of Stone Creek is a tributary to Stone Creek which is a Beaverhead River tributary which enters the river north of Dillon. The Left Fork supports a genetically pure population of westslope cutthroat trout. This stream has been impacted in the past by mining activity and a road which was located immediately adjacent to the stream. A RRP project in cooperation with a Barrett's Minerals Inc and the Ruby Valley Conservation District along with other assistance from the U.S. Fish and Wildlife Service/Malesich Ranch Inc Partnerships for Wildlife and the BLM rehabilitated a large portion of the stream channel, relocated the road, and reclaimed the previous roadbed during 1996.

The entire population of westslope cutthroat trout (3 inches and longer) in the 1.6 mile portion of the Left Fork which supported westslope cutthroat trout was estimated to be 134 (SE: 10) in 1994 (Shepard et al., in prep.)(Figure 11). In 1995 a 2,230 feet sample section was again sampled and the density of westslope cutthroat trout was 3 fish per 1,000 feet versus 15.9 in 1994 (Shepard et al., in prep.). Fish population estimates were also made in two sections in the Middle Fork of Stone Creek during both 1994 and 1995. Densities of westslope cutthroat trout (3 inches and longer) in these two Middle Fork sections were about 7 fish per 1,000 feet of stream in 1994 and 4 fish per 1,000 feet for the lower section in 1995 and 9 fish per 1,000 feet in the upper section in 1995. These sections will serve as a control for the Left Fork. The RRP project will be evaluated by repeating estimates in the Left and Middle forks during future years and comparing pre- and post project densities using the control to account for non-project effects.

Mill Creek Fish Passage Barrier

A barrier to prevent the upstream movement of non-native trout into upper Mill Creek, a tributary to the Yellowstone River south of Livingston, was constructed in 1995. This barrier was installed to protect a genetically pure population of Yellowstone cutthroat trout which inhabit the upper Mill Creek draiange. This barrier replaced an old irrigation diversion structure which was removed in the mid-1980's. The irrigation diversion had been a barrier to upstream fish movement and had prevented non-native trout from invading upper Mill Creek.

The extremely high stream flows experienced during the spring of 1996 (estimated to be at least a 100 year flood event for the Yellowstone River) damaged the barrier structure. However, the Forest Service repaired the barrier during the summer of 1996. Several fish population monitoring sections have been sampled in the upper Mill Creek drainage prior to 1995, when the barrier initially was constructed (Clancy 1987, Shepard 1992, Tohtz 1996 and in prep.). Genetic

analyses have shown the Yellowstone cutthroat trout in upper Mill Creek to be pure (FWP files, Livingston). Repeated sampling of these fish population monitoring sections and re-testing of the genetic status of Yellowstone cutthroat trout above the barrier over time will determine the effectiveness of this barrier.

North Fork Blackfoot Fish Screens

Several projects have been initiated in the North Fork Blackfoot River to screen irrigation five divisersions to reduce the number of juvenile bull and westslope cutthroat trout lost into irrigation ditches. Fish sampling data for one of these screens, on the Lund/Jorgensen Canal, shows that the screens were 100% effective in preventing juvenile trout from entering the canal (Peters and Pierce, in prep.; Figure 12). FWP has collected fish abundance data in all five irrigation diversions prior to any screening efforts and this information will be used to evaluate the effectiveness of screening efforts.

White's Gulch Restoration

Upper White's Creek supports a genetically pure remnant population of westslope cutthroat trout. Approximately 2 miles of White's Creek which had been heavily impacted by past mining activity was totally restored. Restoration included reconstruction of the stream channel, rebuilding the valley floor and floodplain, and construction of barrier to prevent movement of non-native brook trout into upper White's Creek. In addition, brook trout were removed from the restored segment during channel restoration and from 1.8 miles of stream above the restored segment. The goal of the restoration project was to improve the channel to a naturally functioning condition. The goal of the non-native brook trout removal was to preserve and enhance the westslope cutthroat trout population.

The channel/valley restoration was completed in the fall of 1995. Preliminary results indicate that westslope cutthroat trout had begun to move into this restored portion of the creek by the summer of 1996 (Shepard and Spoon, in prep.). Many of the westslope cutthroat trout observed and captured in the restored area were young fish.

Electrofishing to remove non-native brook trout was extremely effective above the restoration project. Sampling in 1996 confirmed that very few brook trout remained in this segment of stream. Very few brook trout were also captured in the restored channel segment, indicating their removal during construction was very effective. Electrofishing removal below the channel restoration area, but above the fish barrier, was less effective. However, only one removal effort occurred here and this portion of the channel was much more complex with beaver ponds, springs, side channels, and abundant cover. Additional brook trout were removed during 1996 sampling which appeared to be more effective than removals made in 1995. The westslope cutthroat trout population appears to be responding positively to the removal of brook trout. Higher densities of westslope cutthroat trout, particularly younger age classes, were sampled during 1996, one to three years following brook trout removal efforts.

Gold Creek Pool Development

Pool habitats were created in Gold Creek, a tributary to the Blackfoot River, in 1996. A survey of pool habitats completed in 1990, prior to the pool construction, in three sections of Gold Creek found less than 2 pools per 2,000 feet of stream (Peters and Pierce, in prep.; Figure 13). Following pool construction over 14,000 feet of stream pool frequencies increased to from 4 to 12 pools per 2,000 feet of stream length (Peters and Pierce, in prep.). FWP has also collected fish abundance information in three sample sections within Gold Creek prior to the construction of pools (Peters and Pierce, in prep.). These estimates will be repeated to document the effects of the pool development on fish abundance.

Sweathouse Creek Enhancement

The riparian portions of two areas (Dayton and Groff properties) on Sweathouse Creek were fenced to prevent livestock from accessing and potentially damaging the stream channel and to enhance growth of riparian vegetation. Fish population estimates were made in an 800 feet long sample section within both these areas in 1996 prior to fencing (Clancy in prep.). The Dayton sample site contained an estimated 35 (SD: 17) westslope cutthroat trout 3 inches and longer, 153 (SD: 47) brown trout 3.5 to 8.0 inches long, and 138 (SD: 16) brook trout 4.0 to 10.0 inches. The Groff sample site contained 259 (SD: 64) brown trout 3.0 to 14.0 inches long and 86 (SD: 15) brook trout 4.0 to 12.0 inches. The estimates for brown trout in both sections were probably biased due to movement of brown trout. These sections will be re-sampled in future years to evaluate changes in fish populations resulting from the FFI project.

Mol Heron Creek Flow Enhancement

Mol Heron Creek, a tributary to the Yellowstone River located below Gardiner, provides spawning habitat for Yellowstone cutthroat trout and other fish from the Yellowstone River. A proposed FFI project will enhance passage over an irrigation diversion and improve stream flows in lower Mol Heron Creek to allow fish from the Yellowstone River to gain access to more spawning areas in Mol Heron Creek.

A graduate study was inititated to quantify stream flows, spawning use, and the number of Yellowstone cutthroat trout fry moving out of Mol Heron Creek to the Yellowstone River. This study is also evaluating the proportion of trout fry lost into two irrigation ditches in lower Mol Heron Creek. Preliminary results from this study and previous FWP monitoring indicate Mol Heron Creek is important for recruitment of Yellowstone cutthroat trout to the Yellowstone River (Clancy 1985 and 1987, Shepard 1992, Hennessey, in prep.).

Preliminary results suggest that from 15 to 30% of the trout fry moving down Mol Heron Creek to the Yellowstone River may be lost into the two irrigation ditches (Hennessey, in prep.). This study should also improve techniques for efficiently estimating the number of young fish which move out of spawning tributaries to mainstem rivers. These techniques will be incorporated into

future monitoring efforts for assessing recruitment of fish to mainstem populations from tributary streams.

Dry Creek Rehabilitation

Relative abundance of trout was sampled in four sections of Dry Creek in 1996, prior to rehabilitation, by assessing the relative catch of each of four trout species in one electrofishing pass standardized to number caught per 100 feet of stream length (Peters and Pierce, in prep.; Figure 14). Following rehabilitation sampling will be repeated in the section within the rehabilitated stream segment (treatment at stream mile 6.6) and sections outside the treatment area (control) to assess the effect of the rehabilitation on fish abundance and species composition.

Madison River Spring Creek Enhancement

An unnamed spring creek to the Madison River located below Quake Lake was rehabilitated during 1996. It is anticipated that this spring creek will provide spawning habitat for trout from the Madison River. Counts of spawning fish and fish spawning sites, redds, will be made during spring and fall months of 1997 to assess use of this rehabilitated spring creek by Madison River rainbow and brown trout.

Locke Creek Flow Enhancement

Locke Creek, a tributary to the Yellowstone River located below Livingston, provides spawning habitat for Yellowstone cutthroat trout from the Yellowstone River (Clancy 1985 and 1987, Shepard 1992, Hennessey, in prep.). A FFI project will enhance flows in lower Locke Creek, where all Yellowstone cutthroat trout spawning occurs, by improving the delivery efficiency of irrigation water above the spawning areas.

A study has been initiated to quantify stream flows, spawning use, and the number of Yellowstone cutthroat trout fry subsequently migrating to the Yellowstone River from Locke Creek. Preliminary results from this study and previous FWP monitoring indicate Locke Creek is important for recruitment of Yellowstone cutthroat trout to the Yellowstone River (Henessey, in prep.). This study is being conducted in conjunction with the Mol Heron Creek project evaluation.

References

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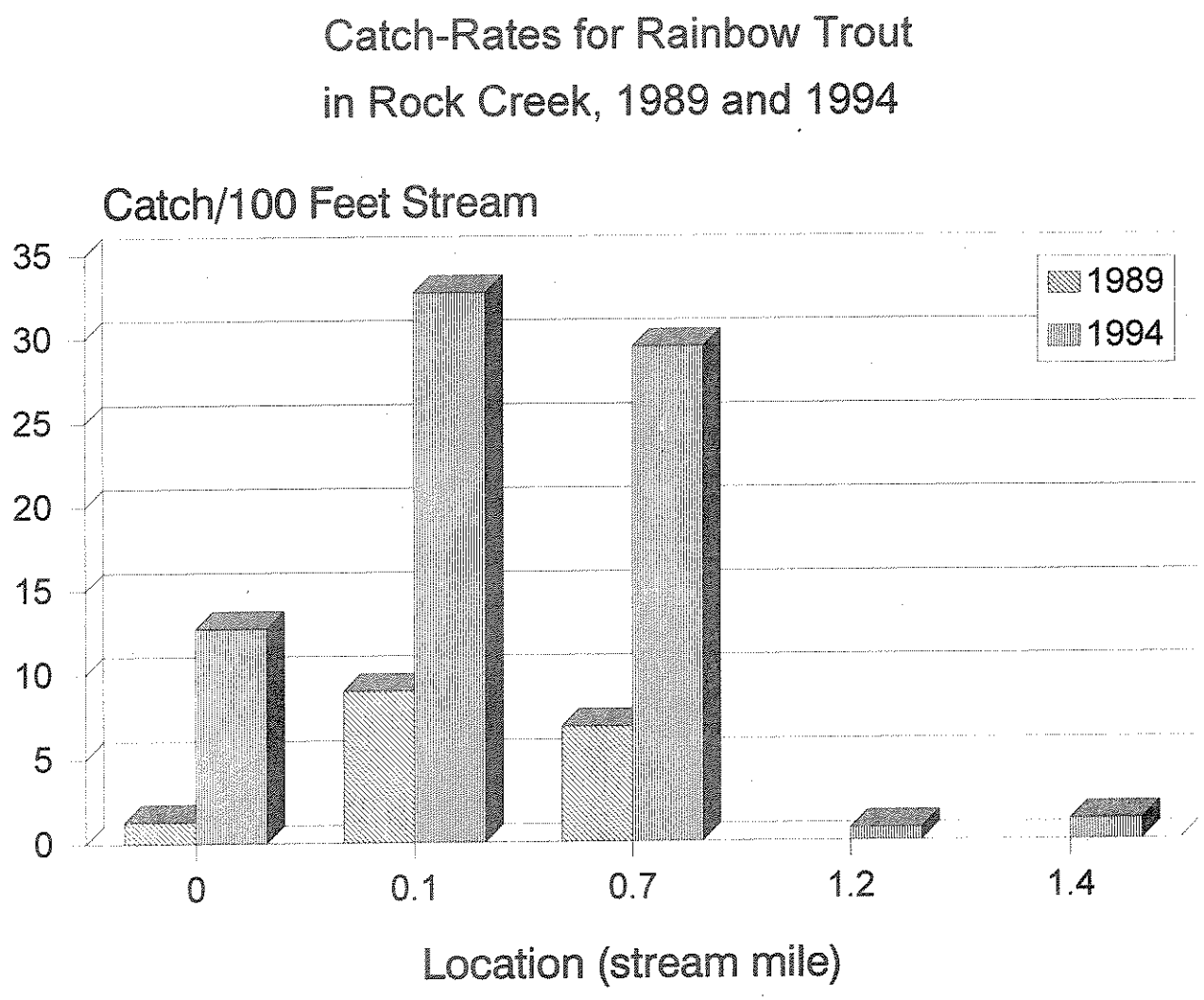

Figure 1. Number of rainbow trout captured in one electrofishing pass, standardized to catch per 100 feet of stream length, in five sample sections within Rock Creek, a tributary to the North Fork Blackfoot River, in 1989 (pre-treatment) and 1994 (post-treatment). Treatment was habitat restoration in the lower mile of stream.

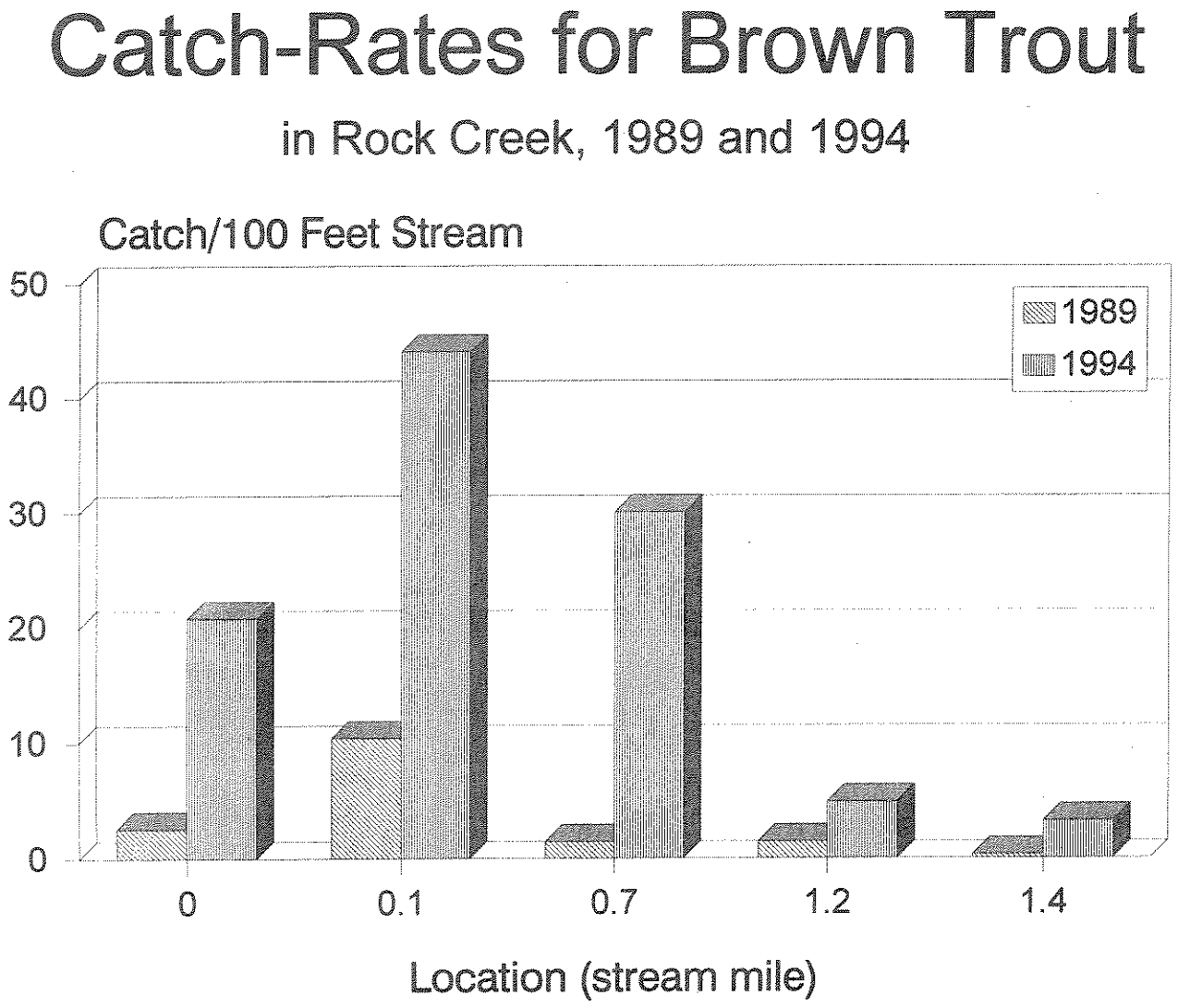

Figure 2. Number of brown trout captured in one electrofishing pass, standardized to catch per 100 feet of stream length, in five sample sections within Rock Creek, a tributary to the North Fork Blackfoot River, in 1989 (pre-treatment) and 1994 (post-treatment). Treatment was habitat restoration in the lower mile of stream.

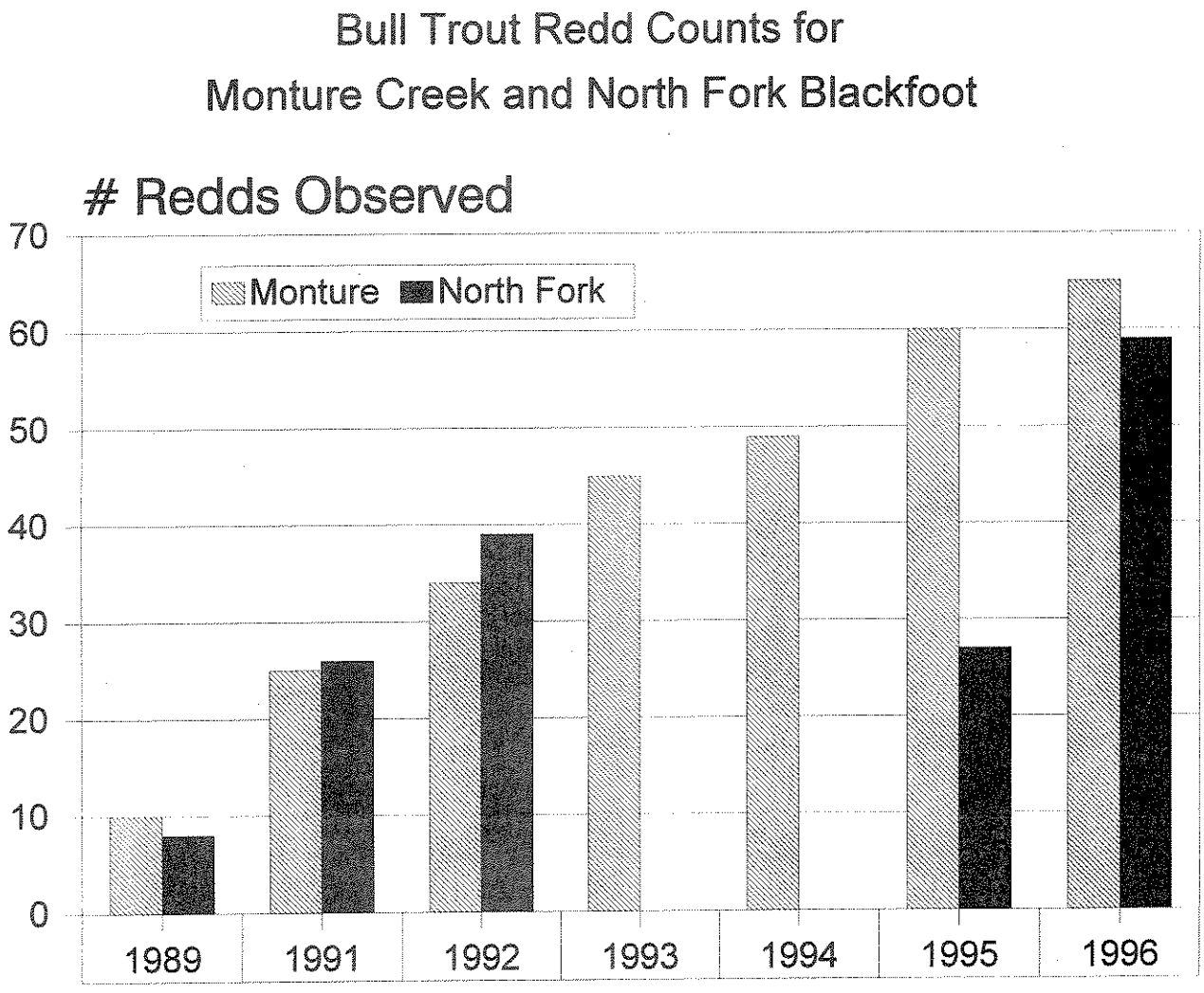

Figure 3. Number of bull trout redds (spawning sites) observed in the North Fork Blackfoot River (North Fork) and in Monture Creek from 1989 to 1996.

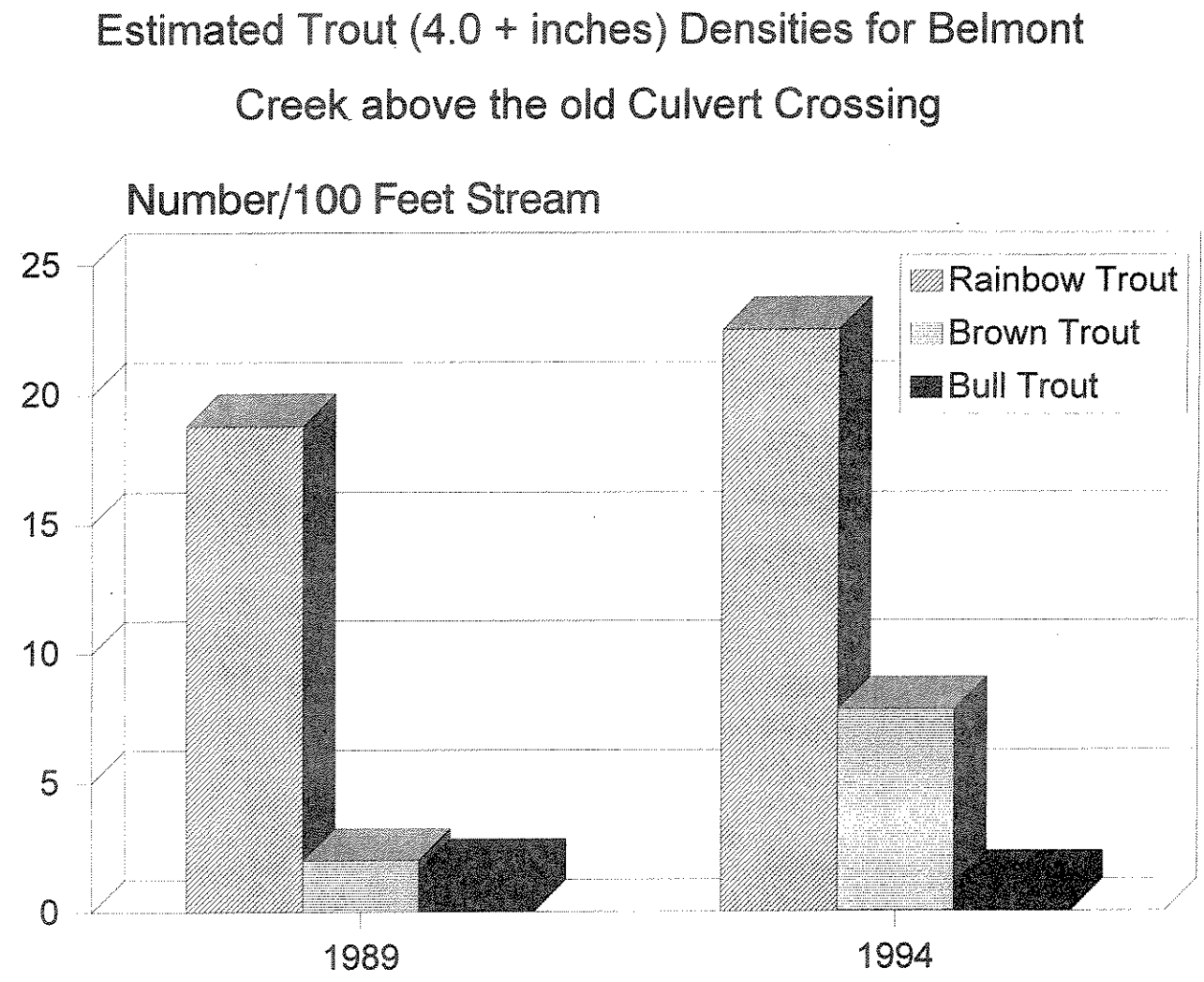

Figure 4. Estimated densities of rainbow, brown, and bull trout in 1989 (prior to culvert replacement) and 1994 (two years following culvert replacement) within a sample section of Belmont Creek located above the site where a culvert was replaced with a bridge in 1992.

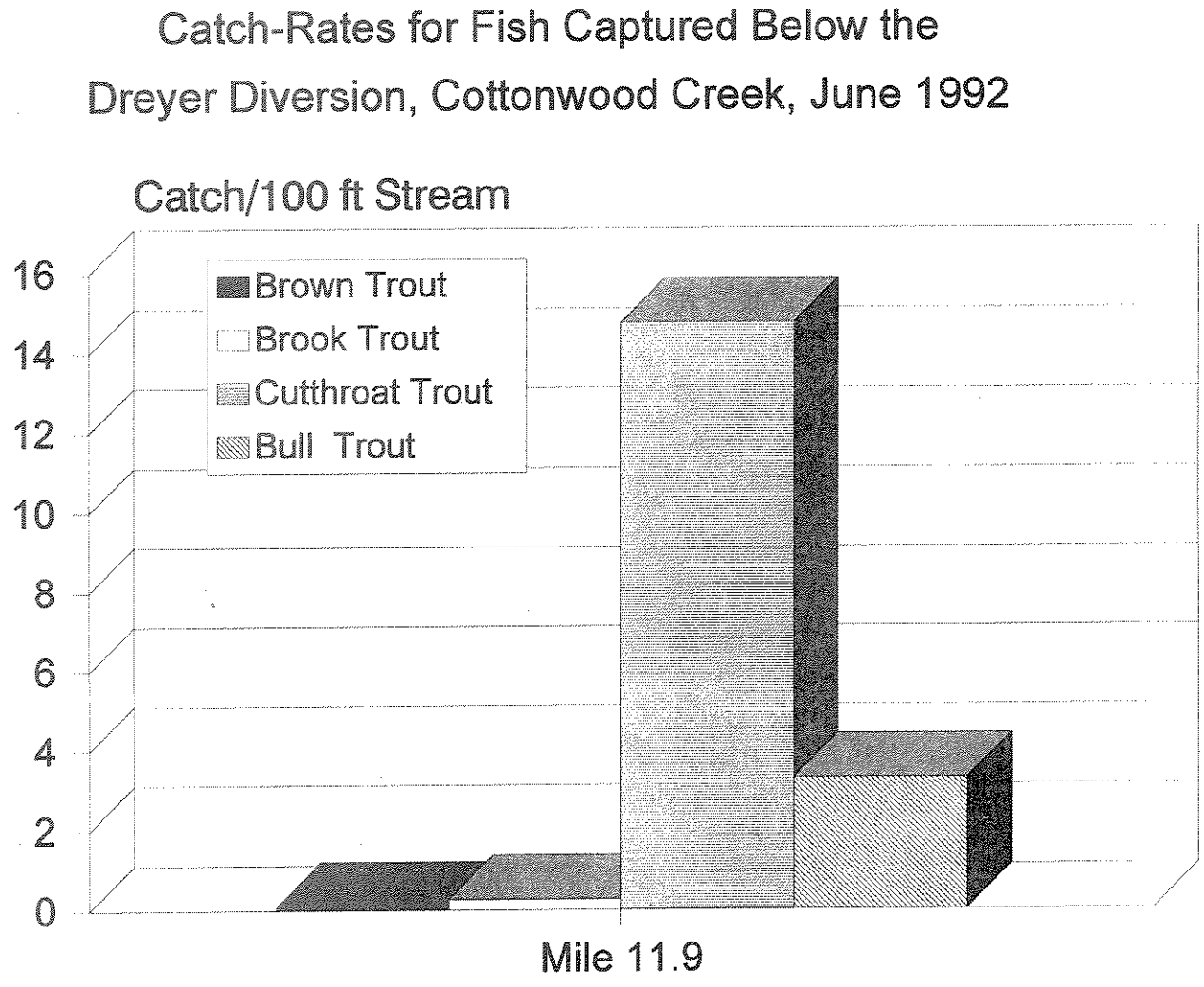

Figure 5. Number of brown, brook, westslope cutthroat, and bull trout captured in one electrofishing pass, standardized to catch per 100 feet of stream length, in a sample section of Cottonwood Creek located immediately below the Dreyer Diversion in 1992 (pre-treatment).

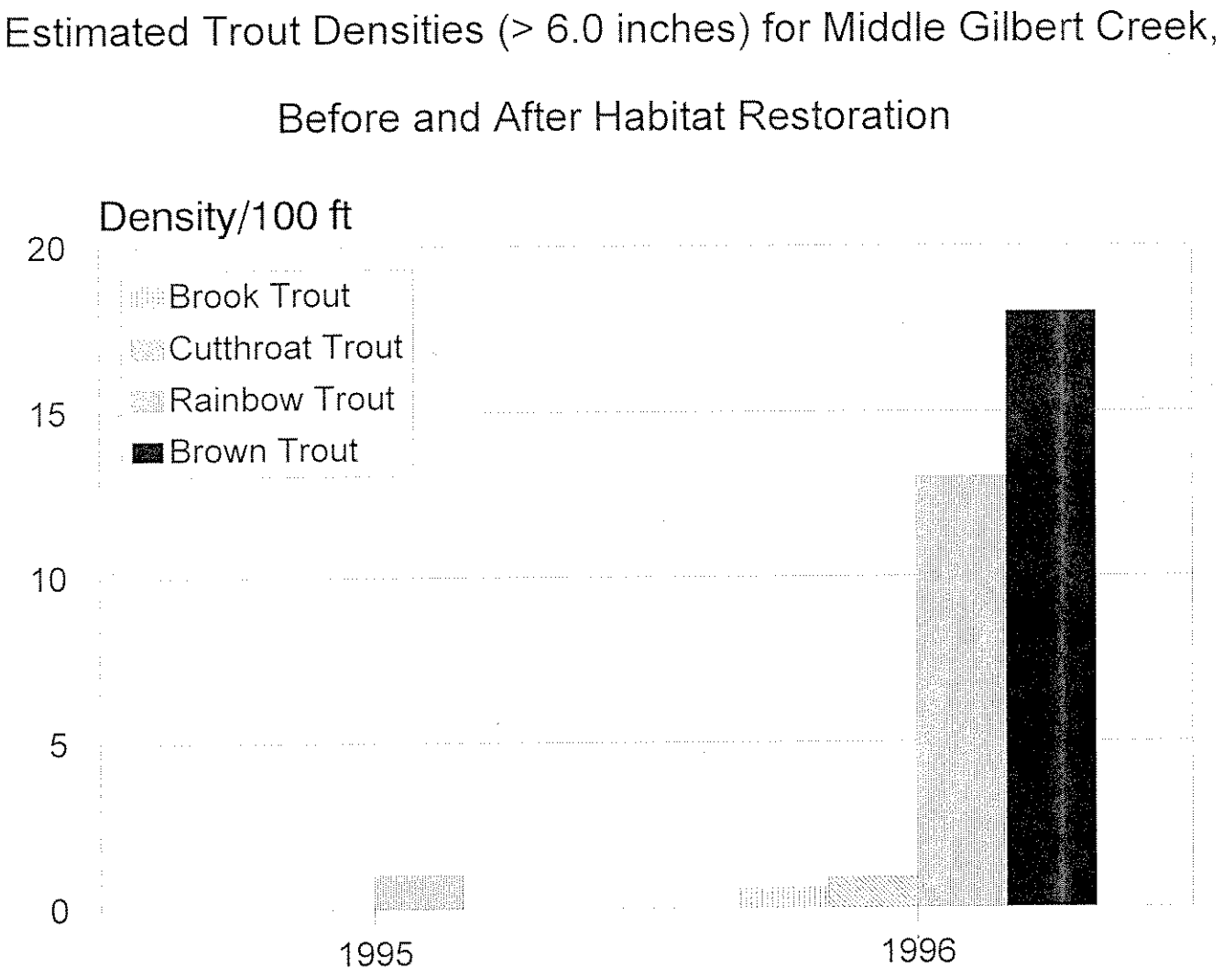

Figure 6. Estimated densities of brook, westslope cutthroat, rainbow, and brown trout in 1995 (prior to habitat restoration) and 1996 (following habitat restoration) within a sample section of Gilbert Creek located within the restored section of stream.

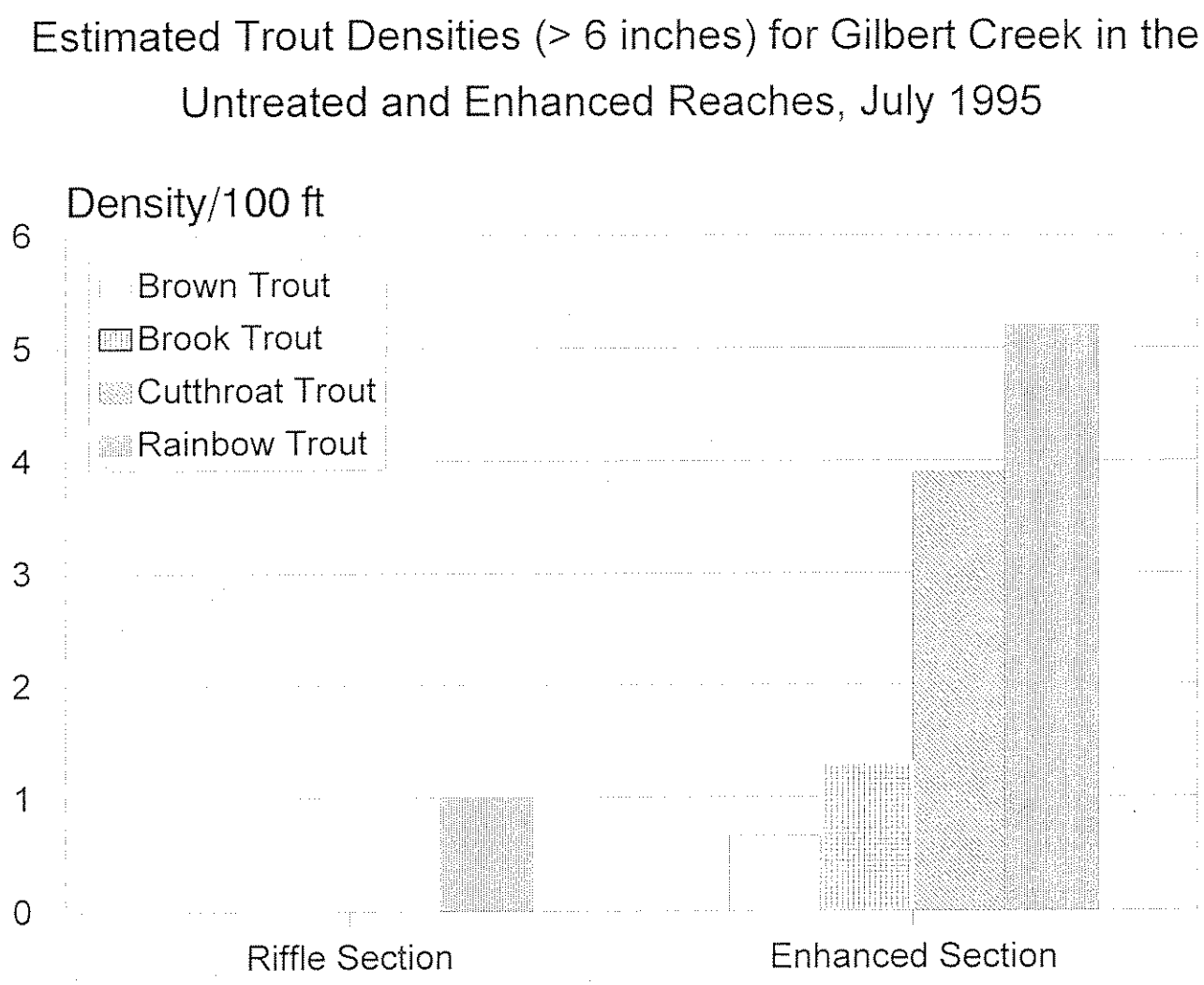

Figure 7. Estimated densities of brown, brook, westslope cutthroat, and rainbow trout in the restored portion (Enhanced Section) and a control portion (Riffle Section) of Gilbert Creek in 1995 (immediately following restoration).

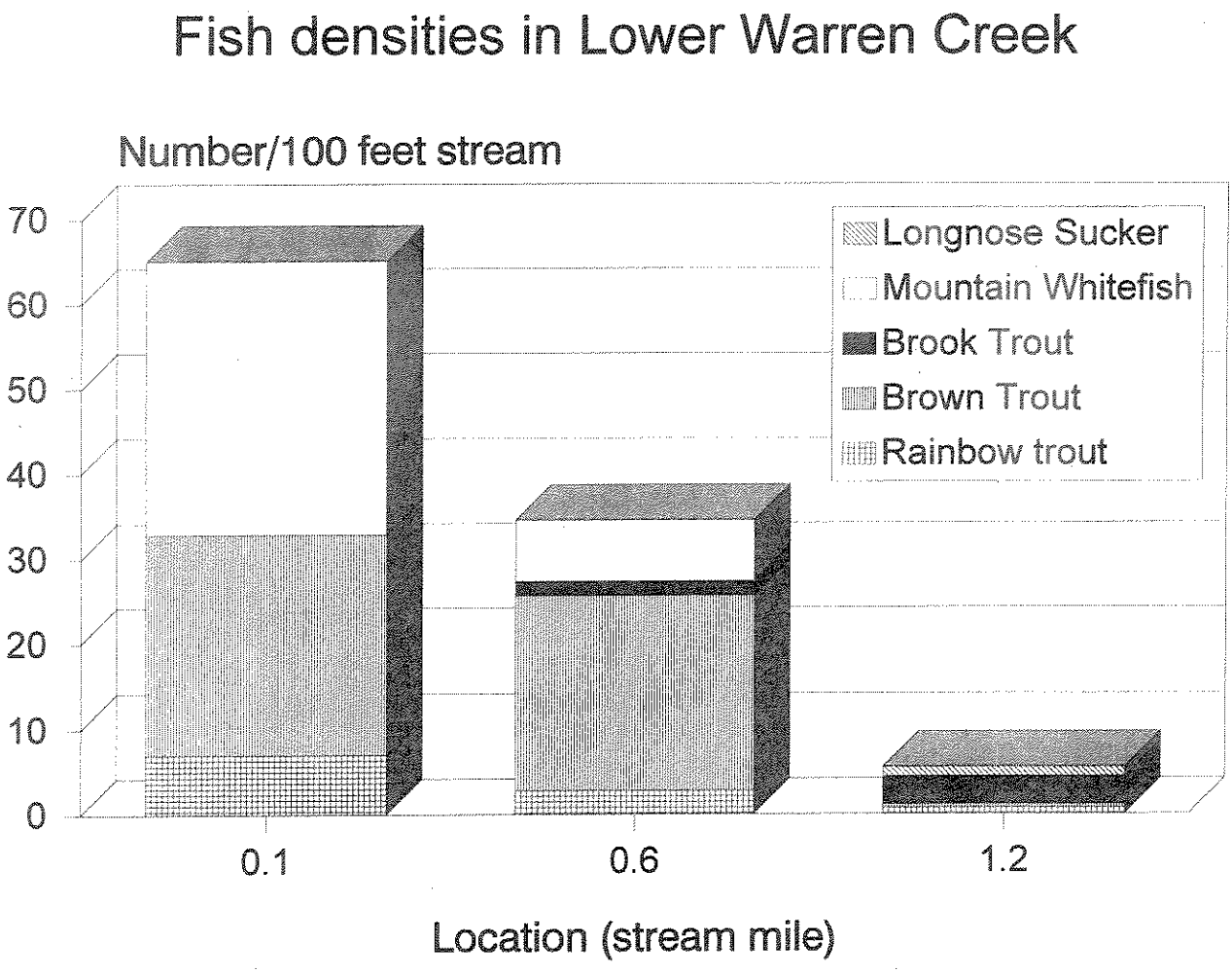

Figure 8. Estimated densities of longnose sucker, mountain whitefish, and brook, brown, and rainbow trout in three sample sections of lower Warren Creek prior to habitat restoration.

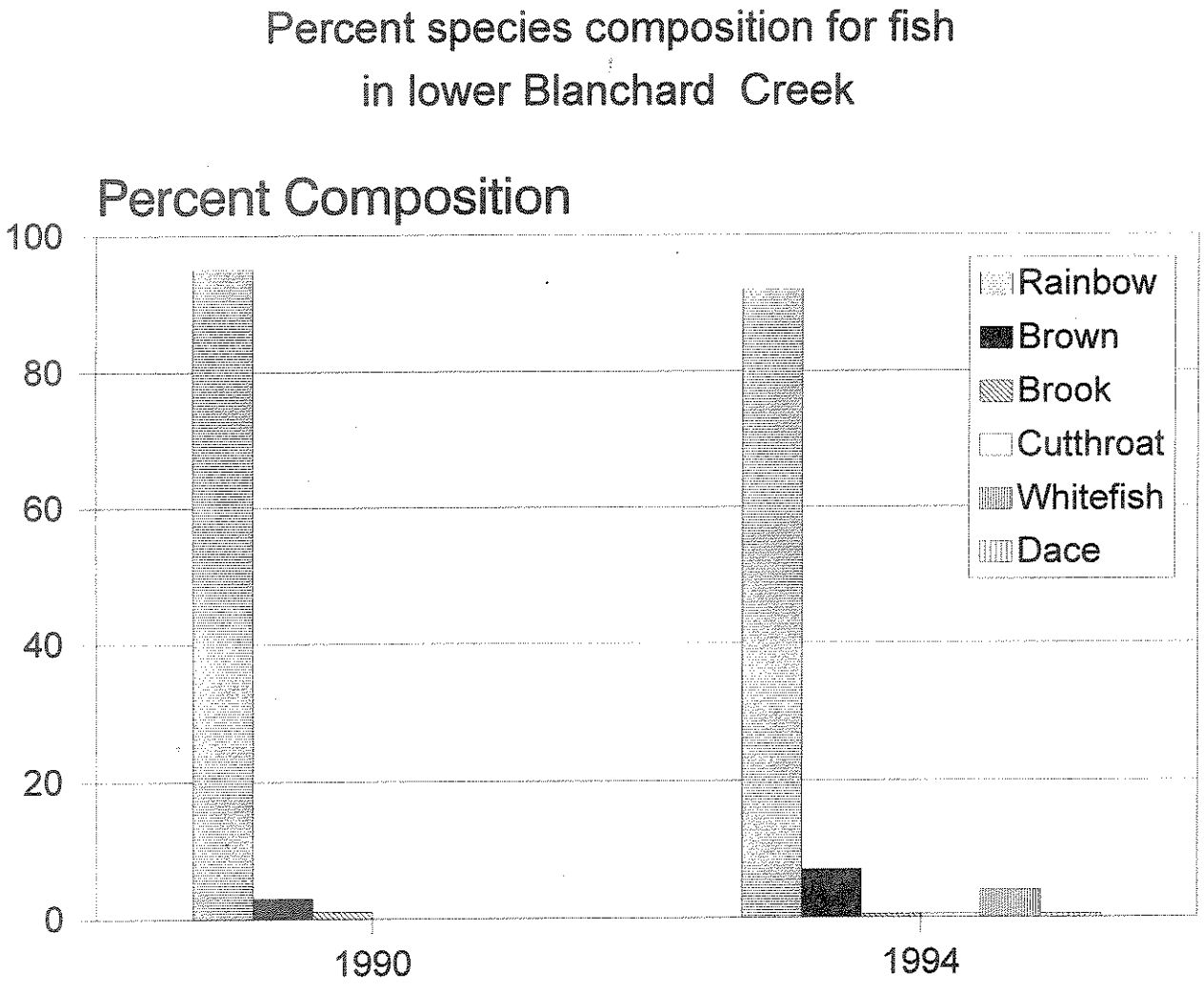

Figure 9. Species composition based on electrofishing sampling of lower Blanchard Creek in 1990 (prior to fish passage enhancement) and 1994 (following fish passage enhancement).

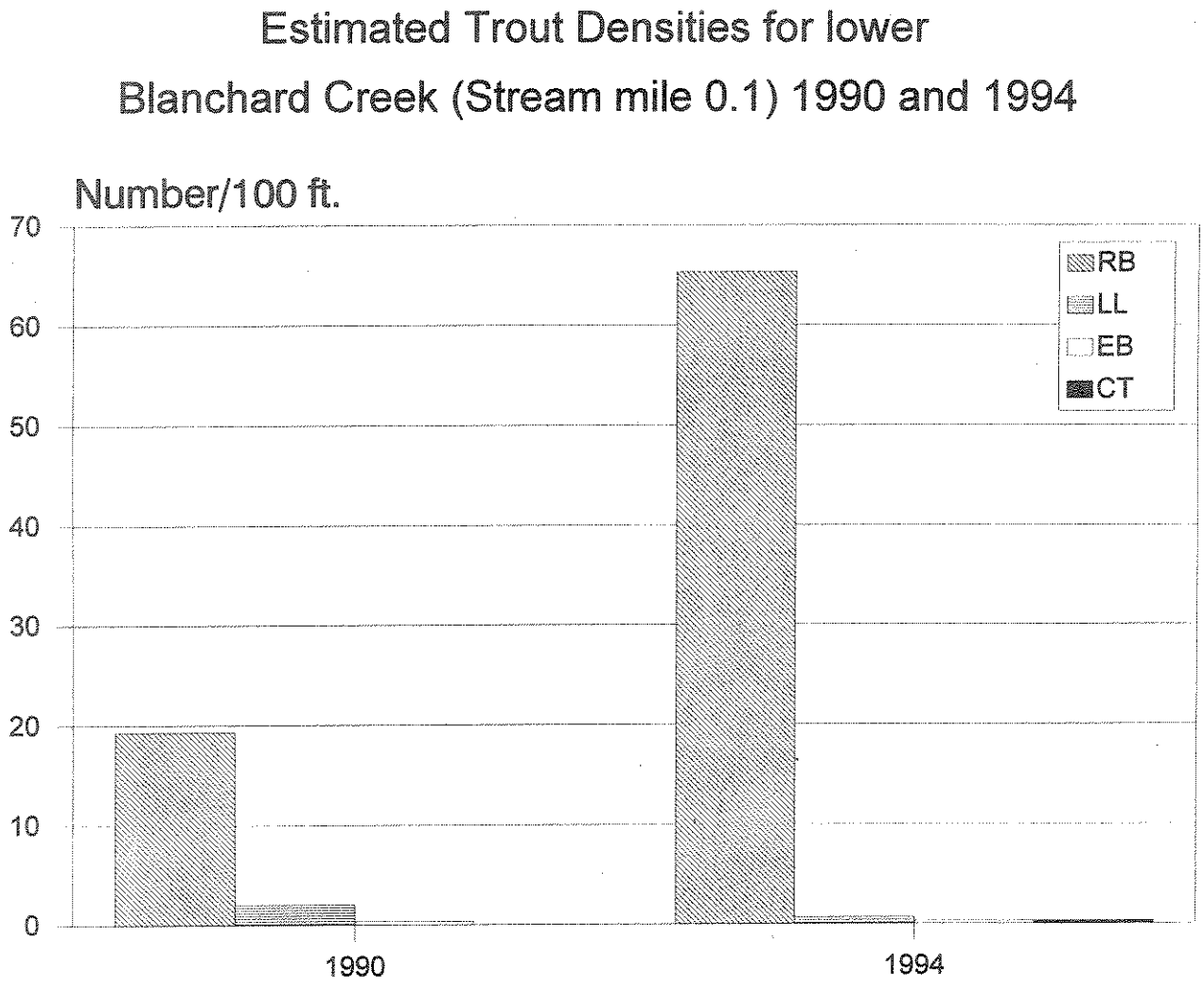

Figure 10. Estimated densities of rainbow (RB), brown (LL), brook (EB), and westslope cutthroat (CT) trout in 1990 (prior to fish passage enhancement) and 1994 (following fish passage enhancement) in lower Blanchard Creek.

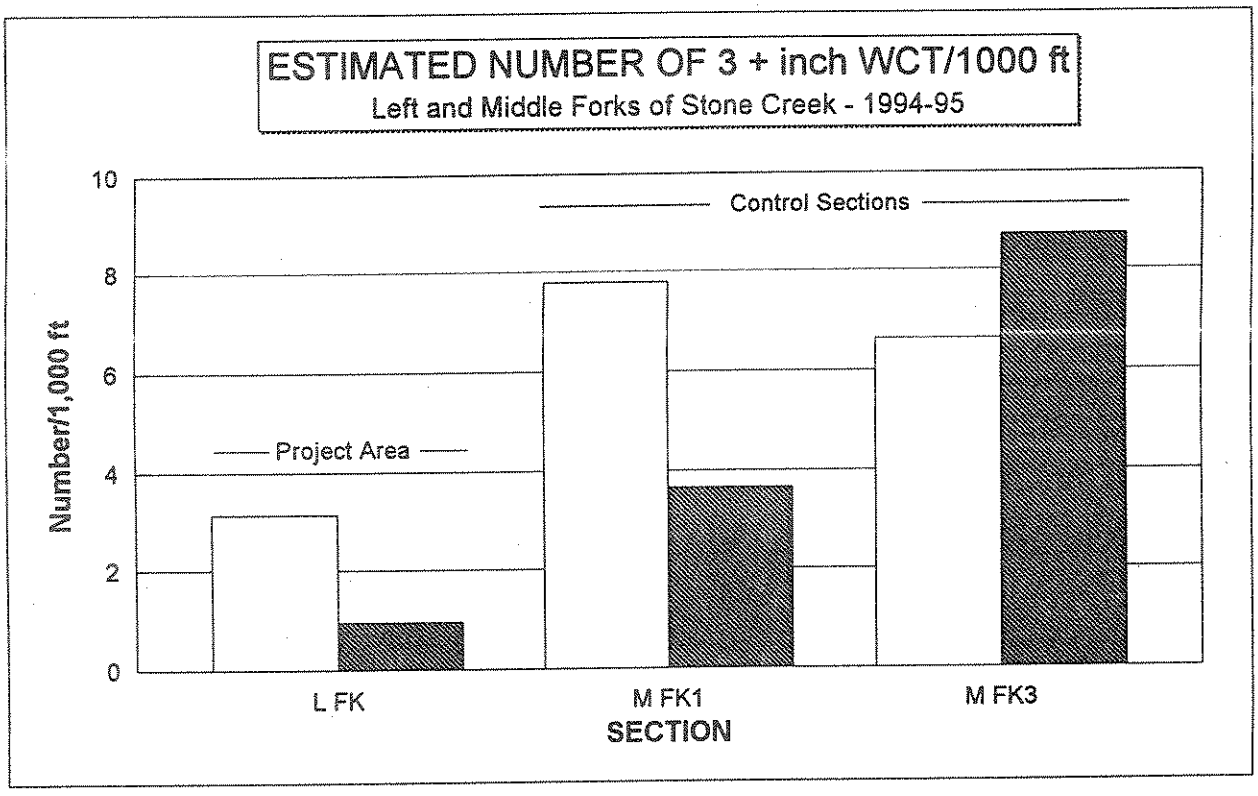

Figure 11. Population estimates of westslope cutthroat trout in Left Fork Stone Creek (Project Area) and two sections of Middle Fork Stone Creek (Control Sections) for 1994 and 1995, prior to channel restoration in the Left Fork.

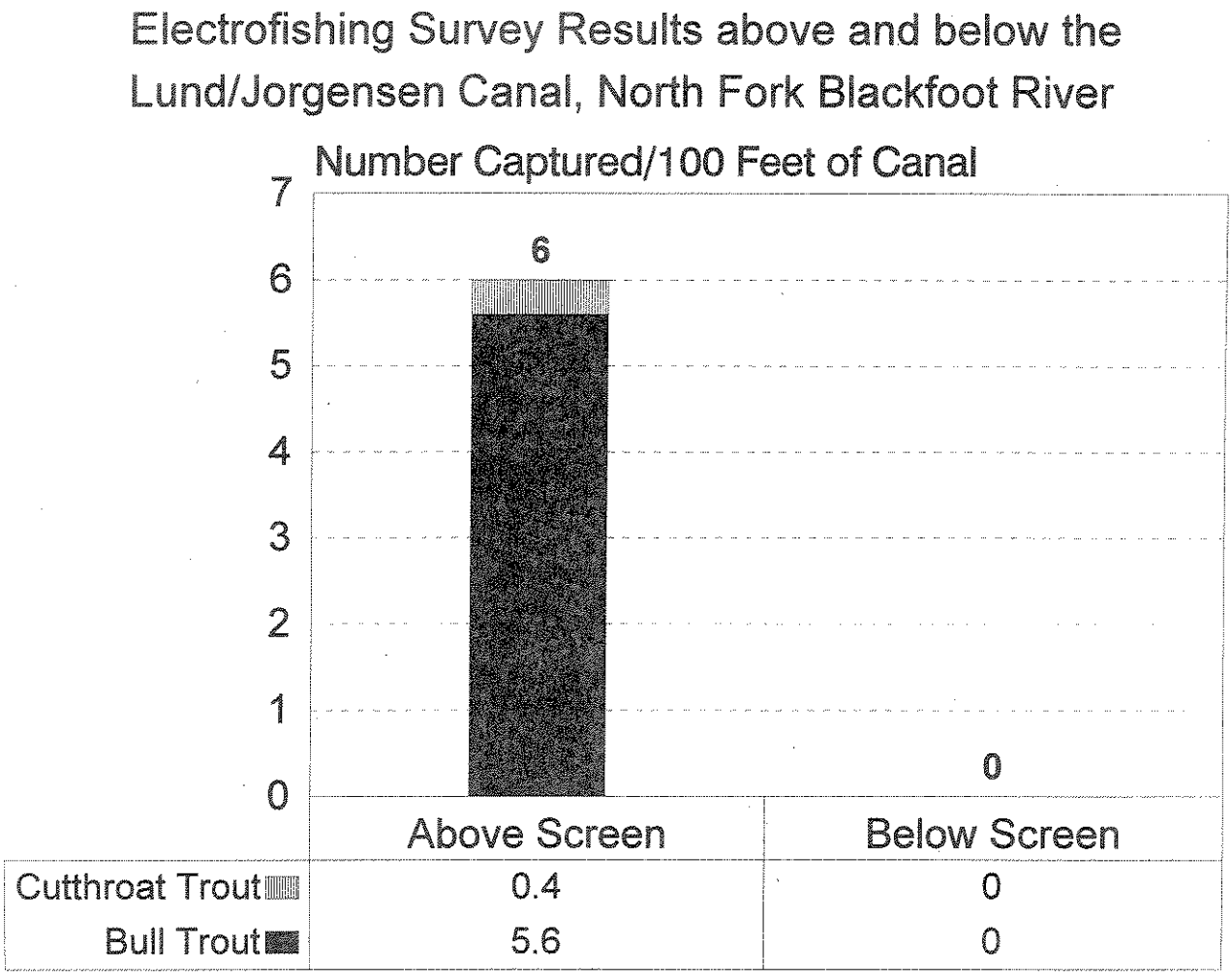

Figure 12. Number of westslope cutthroat and bull trout captured in one electrofishing pass, standardized to catch per 100 feet of stream length, in sample sections within the Lund/Jorgense Canal (North Fork Blackfoot River) above and below the fish screening device in 1996.

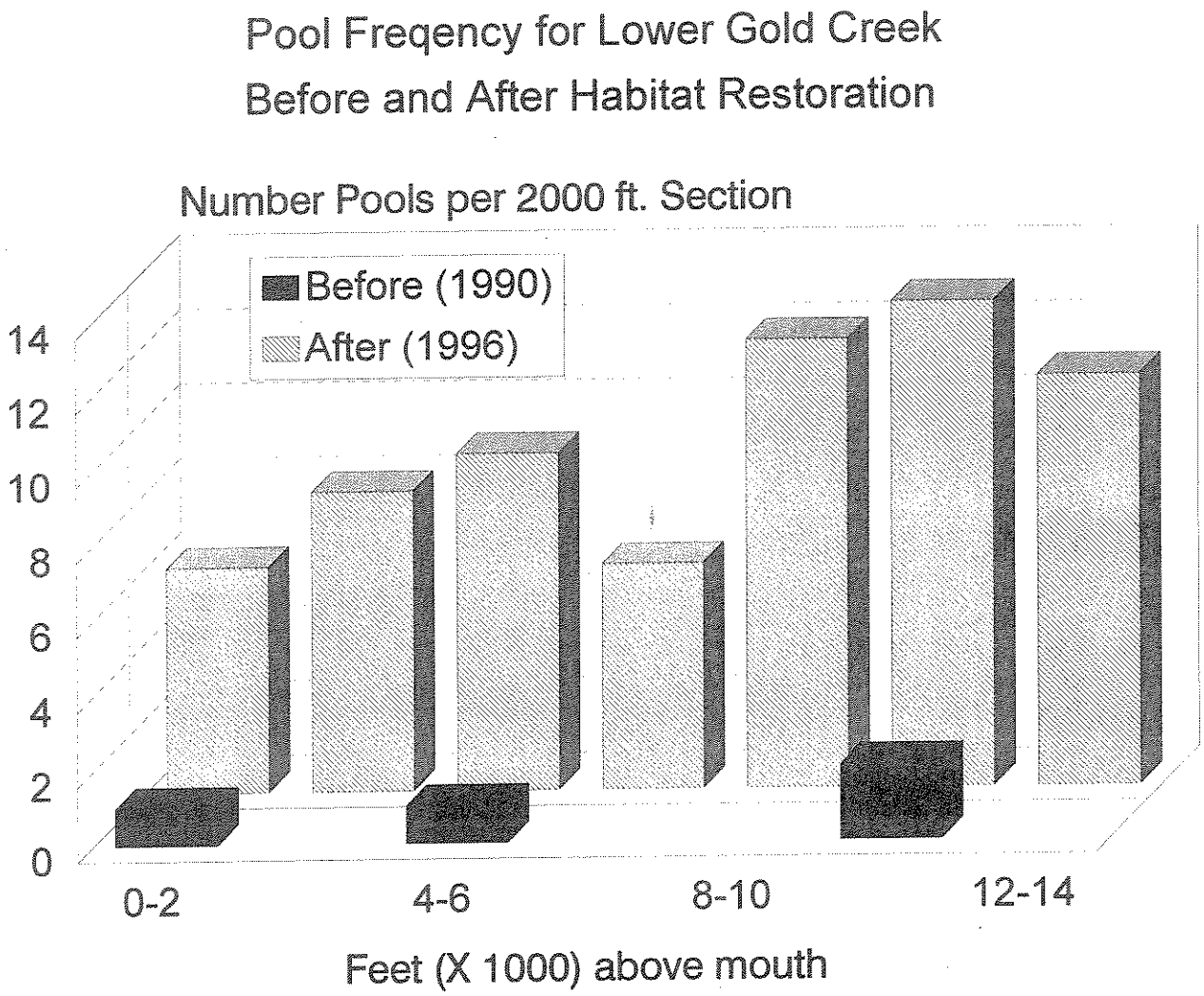

Figure 13. Frequency of pool habitats (number per 2,000 linear feet of stream) in lower Gold Creek before and after habitat restoration.

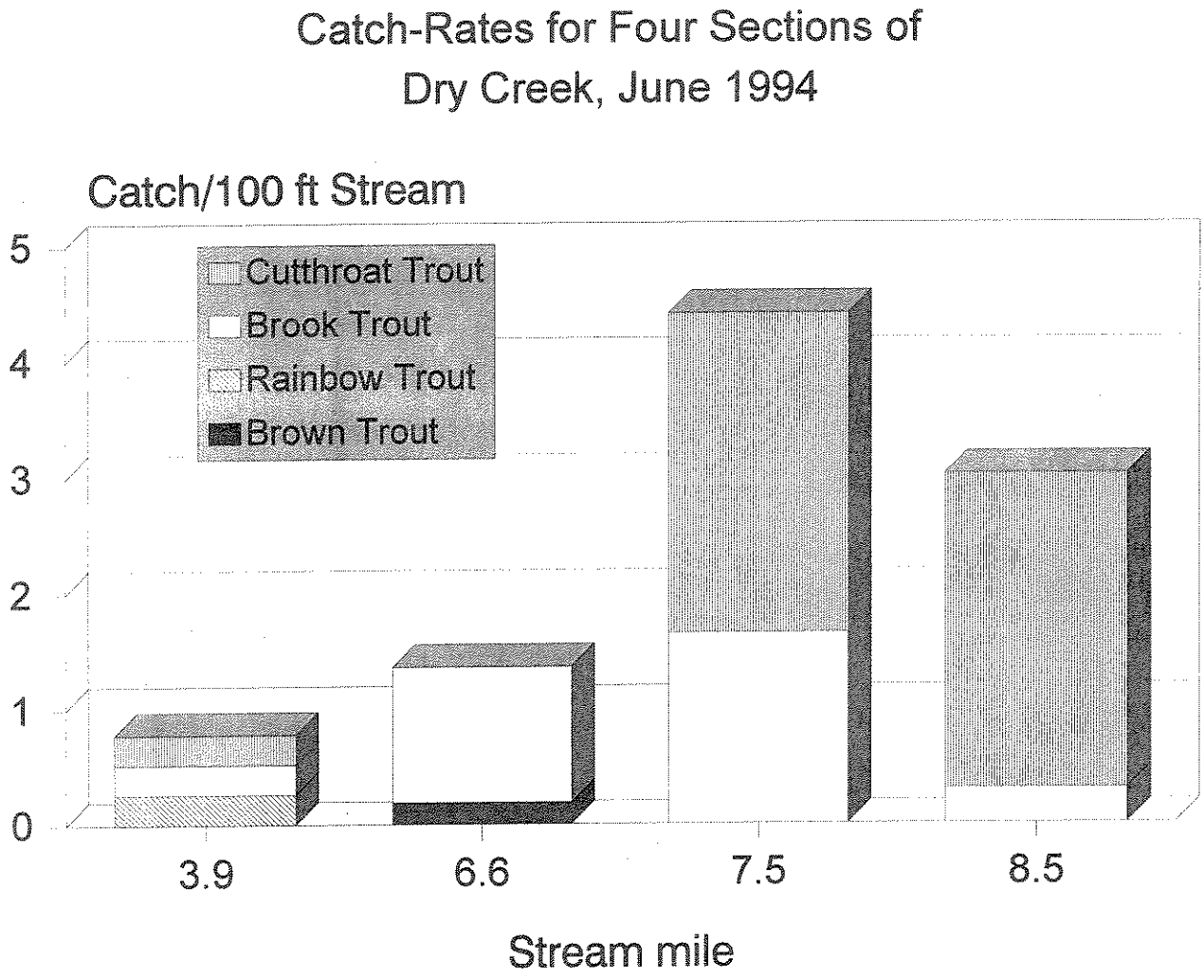

Figure 14. Number of westslope cutthroat, brook, rainbow, and brown trout captured in one electrofishing pass, standardized to catch per 100 feet of stream length, in four sample sections of Dry Creek in 1994 (prior to habitat restoration of the stream at stream mile 6.6).

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