MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

JOB PROGRESS REPORT

State Montana

Project No. F-20-R-29 Title South Central Montana Fisheries Study

Job No. I-a Title Inventory of Waters of the Project Area

Period Covered April 1, 1984 through March 31, 1985

ABSTRACT

Walleye were successfully introduced in Cooney Reservoir in May, 1984. Gill nets set in October, 1984 caught an average of seven walleye with a mean length of 7.3 inches. The rainbow trout fishery in Cooney was slightly poorer in winter 1985 than in 1984, due to reduced numbers of fish planted.

Arlee strain rainbow trout planted in Deadman's Basin Reservoir failed to produce an acceptable fishery in 3 out of 4 years. McConaughy strain rainbow trout and kokanee were introduced in 1984, but have not yet contributed to the fishery. McConaughy rainbows were also introduced in Willow Creek Lake.

Three subalpine and 11 alpine lakes were sampled to evaluate management strategies. Changes in management direction are recommended for the subalpine lakes.

Net sampling of Lake Elmo indicated yellow perch and nongame species continue to dominate the fishery. Channel catfish were introduced in September, 1984. Emphasis on addition of fish habitat structures to the lake is recommended.

Baseline population surveys were conducted in three streams. A transplant of fluvial grayling in Picket Pin Creek appeared to be successful. Several streams that had previously been planted with catchable rainbow trout were sampled. Termination of stream stocking is recommended.

OBJECTIVES AND DEGREE OF ATTAINMENT

1) To take necessary actions to protect the stream fish habitat. Objective accomplished; projects that would affect stream habitat were dealt with through the Montana Stream Protection Act of 1963 and the Montana Natural Streambed and Land Preservation Act of 1975.

2) To sample lakes and reservoirs which show fishery potential and make management recommendations. Objective accomplished, data and management recommendations are presented.

3) To inventory new ponds and reservoirs capable of supporting warmwater fisheries. Objective partially accomplished; inventory was begun and will be reported in next annual progress report.

4) To follow management recommendations on high mountain lakes as presented in management plans. Objective accomplished. Fourteen mountain lakes were sampled in 1984. Adjustments to management plans are recommended.

5) To monitor fisheries in the region to keep abreast of changes and to apply management measures as needed. Objective accomplished; data and management recommendations are presented.

PROCEDURES

One or more experimental gill nets (6 x 125 ft) were fished overnight in lakes or reservoirs accessible by vehicle. Lakes in the Absaroka-Beartooth Wilderness were sampled with a 5 x 125 ft. monofilament gill net. Streams were sampled with various types of electrofishing gear, ranging from a backpack unit to a bank shocking unit with a 500-foot cord to a boat mounted, mobile anode unit.

Fish were measured and weighed, and scale samples were taken from game fish. Fish were aged from acetate impressions of scales using a microfiche reader at 43x.

FINDINGS

Cooney Reservoir

Arlee rainbow stocked in Cooney Reservoir continued to show poor second-year growth performance and poor longevity, but good survival from stocking. Fish stocked in 1983 at an average length of 4 inches were an average of 11.5 inches 13 months after stocking (June, 1984) and 12.5 inches 17 months after stocking. Fish stocked in 1984 averaged 9.4 inches 5 months after stocking which was equivalent to previous years, despite a stocking density only one-fourth as high as past years. Both plants survived well and contributed heavily to the fishery. The fall gillnetting sample was composed of 57% for 1984 planters, 40% for 1983 stock and less than 4% from 1982. Brown trout continue to show higher than historic numbers. June, 1984 net sampling provided the largest brown trout catch ever recorded in this reservoir (Table 1).

Rainbow trout plants were scaled back in 1984 and a new walleye stocking program was initiated in an attempt to diversify the fishery. Initial stocking of 1 million walleye fry occurred on May 14, 1984. Fall net sampling indicated excellent first-year growth and survival with an average length of 7.3 inches for 28 walleye captured 5 months after stocking. Stomachs of those fish contained four rainbow trout, four unidentifiable fish and five invertebrates (chironomids and mayfly nymphs). Condition factors (c) of the young walleye averaged 33.8 and examination showed high amounts of visceral fat, indicating generally favorable growing conditions.

Several creel surveys were conducted on Cooney Reservoir during the winters of 1983-1984 and 1984-1985 to assess the ice fishery. About 85% of the anglers were from Billings with most of the rest from the local area.

Table 1. Species composition of fish gillnetted in four reservoirs during spring and fall, 1984. Numbers presented are catch per net night in sinking gill nets.

Reservoir	Date	No. of Nets	Fish Species								
			Rainbow Trout	Brown Trout	Cutthroat Trout	Kokanee	Mountain Whitefish	Walleye	White Sucker	Longnose Sucker	Lake Chub
Cooney	6/11/84	4	7.0	10.5					69.8	15.3	
	10/9/84	4	38.8	1.3				7.0	69.0	8.0	0.3
Deadman's Basin	3/20/84	4	8.8	1.8					13.3	5.3	
	10/24/84	4	24.0	2.3		1.5			23.3	4.0	
Willow Creek	6/13/84	4	1.3	13.8			1.0		36.0	0.3	
	11/1/84	4	8.5	8.5	6.0				36.8		
Lebo Lake	3/28/84	4	10.5	1.3					39.7		

Catch rates were higher in January, 1984 than in January-February, 1985 (Table 2). However, on the 1984 sample date, the average length of fish kept was 10.7 inches, and 82% of the catch was made up of rainbow from the 1983 plant. In 1985, the average length of fish kept was 12.2 inches and only 39% of the catch was from the previous 1984 plant. While realizing that such small sample sizes are not conclusive, it does appear that reduced stocking rates in 1984 resulted in an ice fishery the following winter that produced lower catch rates, but larger fish owing to the dominance of the previous 1983 plant. Stocking of 50,000 rainbow trout per year probably will not sustain the fishery at the desired level.

Table 2. Results of ice fisherman creel surveys on Cooney Reservoir during 1984 and 1985.

Date	Number of Anglers Contacted	Total Hours Fished	Trout Caught Per Hour	Trout Caught per Angler
1/7/84	62	216	0.57	1.98
1/5/85	107	382	0.21	0.75
1/12/85	50	161	0.29	0.92
2/23/85	25	46	0.07	0.12

Deadman's Basin

Arlee rainbow stocked in May, 1983 at 5 inches averaged 8.5 inches in October, 1983; 10.7 inches in March, 1984 and 13.9 inches in October, 1984. Stocking of 153,000 3-inch McConaughy rainbow in early June produced excellent survival with those fish, averaging 8.6 inches in length in October, 1984. A plant of 100,000 4-inch Arlee fish stocked April 30, 1984 appeared to have been a failure once again. These fish were marked with tetracycline and examination of 80 fish from October, 1984 net samples did not produce any marked fish.

Total failures of Arlee rainbow plants occurred during 3 of the past 4 years. McConaughy rainbow were stocked at a smaller size (3 inches) later in the year than previous Arlee plants, and still produced the same size fish by October. These characteristics make the McConaughy fish look promising for future stocking in Deadman's Basin. Pooled stomach samples from 50 McConaughy rainbow taken in the October net samples contained 13,900 Daphnia spp., 2 corn kernels and 1 mayfly nymph.

Kokanee, introduced as 2-inch fish in mid-May, 1984, had reached an average length of 6.7 inches by late October (Table 3), exceeding growth rates in Flathead Lake where between 1972 and 1983 kokanee averaged 3.2-4.1 inches

Table 3. Mean lengths and length ranges (inches) of game fish gillnetted in four reservoirs during 1984.

Water	Species	No.	Average Length	Range
Cooney	Rainbow trout	183	10.8	5.9-14.0
	Brown trout	47	11.6	6.8-17.4
	Walleye	28	7.3	6.9- 8.3
Deadman's Basin	Rainbow trout	131	10.1	6.9-16.2
	Brown trout	16	13.1	8.8-21.3
	Kokanee	6	6.7	6.4- 6.8
Willow Creek	Rainbow trout	59	9.4	6.2-17.5
	Cutthroat trout	24	15.0	14.0-16.5
	Brown trout	89	15.1	10.6-21.7
	Mountain whitefish	4	11.2	7.0-12.7
Lebo Lake	Rainbow trout	42	13.1	12.0-16.0
	Brown trout	5	18.0	13.4-25.0

at the first annulus (Hanzel 1985). Survival rates from stocking and first-year population levels are unquantified, but growth rates of kokanee to date are excellent.

Crayfish collected from Deadman's Basin were verified by Horton Hobbs of the Smithsonian Institution as being Orconectes virilis. This species has been found all over Montana, and is the predominant species in the state.

Limited creel survey was conducted on Deadman's Basin during 1984-85. Interviews with 106 anglers who fished 383 hours between April 13 and May 28, 1984 found a catch rate of 0.58 trout per hour composed of 99% rainbow and 1% brown trout. Winter creel survey on January 26 and February 23, 1985 of ice fishermen found a catch rate of 0.35 fish per hour for 52 anglers surveyed. Average length of fish caught by ice fishermen was 14.5 inches. None of the 53 rainbow examined were from the 1984 stocking, indicating the McConaughy fish have not yet entered the fishery. Overall, the Deadman's Basin fishery has rebounded from the low quality experienced in 1983 (Fredenberg and Swedberg 1984).

Willow Creek Lake

Gill net sampling of Willow Creek Lake during 1984 produced catches comparable to past years (Table 1). During mid-June, 1984, a plant of 15,000 4-inch McConaughy rainbow occurred. Forty-eight rainbow trout from that plant (positively identified by tetracycline marks) averaged 8.2 inches by November 1. Snake River cutthroat stocked by the U. S. Fish and Wildlife Service in July, 1983 appeared to have done well. These fish were 11 inches when stocked, and a sample of 24 fish collected November 1, 1984 averaged 15.0 inches (Table 3).

Analysis of pooled stomach samples from the November, 1984 gill net samples showed a heavy reliance by all trout species on the crayfish and minnow forage base in this reservoir (Table 4). Failure of McConaughy rainbow to utilize crayfish may be a function of size, since the largest McConaughy was only 9.2 inches. A sample of crayfish from Willow Creek Lake was also sent to the Smithsonian and verified as Orconectes immunis, a species common to Wyoming, but previously unreported in Montana. Crayfish appear to be the most important forage item in Willow Creek Lake.

Lebo Lake

Lebo Lake is a oligotrophic prairie reservoir of 314 acres and is located near the Town of Twodot in Wheatland County. It has a maximum depth of 17 feet (Fredenberg and Swedberg 1984), is used for irrigation and is very turbid. From 1978 through 1982, the lake received about 30,000 rainbow trout annually. It was not stocked in 1983, but in May, 1984 it was planted with 920 white crappie averaging 7 inches in length.

Lebo was gillnetted in March 1984 (Table 1). White suckers dominated the catch at 39.7/net and this compares favorably with the catch of suckers taken in the gill nets in October, 1983 (39.0/net).

Scales were taken for age analysis from rainbow trout gillnetted in March, 1984. There were 20 rainbow from the 1981 plant. They ranged in

Table 4. Analysis of 112 trout stomachs collected from gill nets set in Willow Creek Lake November 1, 1984. Number of organisms with volume (ml) is in parentheses.

Fish Species	Number	Size Range (Inches)	Pooled Stomach Contents			
			Crayfish	Hybognathus spp.	White Sucker	Daphnia spp.
McConaughy Rainbow	48	6.2- 9.2	-	35 (20.0)	-	1,678 (2.0)
Unspecified strain rainbow	6	14.8-17.5	14 (76.2)	-	-	-
Brown trout	34	13.2-20.7	7 (22.2)	55 (49.0)	1 (5.1)	-
Snake River Cutthroat	24	14.0-16.5	28 (123.2)	33 (23.5)	3 (22.0)	-

length from 12.0-14.3 inches and averaged 12.8 inches. Sixteen fish were from the 1980 plant. They ranged in length from 12.5-14.0 inches and averaged 13.1 inches. One fish was 16.0 inches in length and was planted in 1979.

Management of Lebo is presently directed towards establishing a warmwater fishery consisting of white crappie and largemouth bass. The high incidence of tapeworms in the sucker population could be an indication that the crappie and bass could become affected, too.

High Mountain Lakes

East Rosebud Lake

This is a natural 112-acre lake located on East Rosebud Creek in Carbon County. The lake has a maximum depth of 20 feet, is considered to be mesotrophic and has a low population of aquatic invertebrates. Situated at 6,208 feet elevation and at the mouth of a steep canyon, the lake receives a heavy blanket of snow atop the ice cover during most winters. The lake also receives a heavy silt load during spring runoff. In past years, fish plants of rainbow, brown and Yellowstone cutthroat trout have not produced a good fishery in the lake (Fredenberg and Swedberg 1984). The last fish stocked in the lake were 10,800 3-inch rainbow planted in September, 1981. Their survival could not be expected to be high due to the late planting date.

From five gill nets set overnight at East Rosebud in October, 1984 (Table 5), four rainbow were taken and three of the rainbow were from the plant of September, 1981. These three fish averaged 11.8 inches at 3 years of age, and the fourth rainbow was Age 4 at 15.3 inches. A total of 25 brown trout were captured in the gill nets, and seven of the brown trout were from a plant of 44,100 4-inch fish made in spring, 1981. These Age 3 brown trout averaged 10.9 inches. Mountain whitefish and longnose suckers dominated the gill net catch, averaging 8.6 and 10.8/net, respectively. The trout:sucker ratio was 1:1.8.

Emerald Lake

Emerald is a shallow (maximum depth 6.9 feet), mesotrophic lake of about 28 acres and is situated at an elevation of 6,310 feet. It is located southwest of Fishtail, Montana on West Rosebud Creek. Stocking records indicate that Emerald has been stocked with rainbow trout almost yearly since 1945. Fishing pressure on Emerald Lake for 1982-83 was estimated at 3,884 man-days. The total plant of catchable rainbow in 1982 was 8,160 fish, or 2.1 fish per fisherman day.

Prior to 1984, the last gill nets were set at Emerald Lake in July and December, and the catch consisted of rainbow and brown trout, mountain whitefish and unidentified suckers. No brook trout or cutthroat trout have been recorded since netting began in 1948; however, Marcuson (1980) lists these two species as occurring in the lake. Two nets set in October, 1984 indicate that brown trout were the most abundant trout species, averaging 16.5/net (Table 5). Brown trout averaged 11.6 inches in length vs. 10.4 and 9,4 inches for rainbow and brook trout, respectively (Table 6). All rainbow netted were of Age 2 and were probably from a total of 7,920 rainbow (average length 7-9 inches) planted in April, June and August, 1984. The scarcity in

Table 5. Species composition of fish gillnetted in three mountain lakes during 1984 (catch per net night in parentheses).

Water	Date	Nets	Fish Species						Total Fish
			Rainbow Trout	Brown Trout	Brook Trout	Mountain Whitefish	White Sucker	Longnose Sucker	
East Rosebud Lake	10/10/84	5	4 (0.8)	25 (5.0)	1 (0.2)	43 (8.6)	- -	54 (10.8)	127
Emerald Lake	10/11/84	2	7 (3.5)	33 (16.5)	13 (6.5)	17 (8.5)	- -	11 (5.5)	81
West Rosebud Lake	10/11/84	3	9 (3.0)	46 (15.3)	1 (0.3)	17 (5.6)	-	20 (6.6)	93

Table 6. Mean lengths and length ranges of trout gillnetted in three lakes during 1984.

Water	Rainbow Trout			Brown Trout			Brook Trout		
	No.	$\bar{x}$ Length (Inches)	Range	No.	$\bar{x}$ Length (Inches)	Range	No.	$\bar{x}$ Length (Inches)	Range
East Rosebud Lake	4	12.6	10.2-15.3	25	14.0	8.0-15.4	1	6.6	-
Emerald Lake	7	10.4	9.0-11.2	33	11.6	8.5-15.5	13	9.4	6.0-13.2
West Rosebud	9	10.3	8.2-11.4	46	11.9	6.3-16.2	-	-	-

numbers of rainbow trout in the net-catch vs. the numbers of brown and brook trout is not understood, especially since the last rainbow plant was in August. Apparently, the sucker population has not taken over in this lake for the netting results show a trout:sucker ratio of 4.8:1.

West Rosebud Lake

West Rosebud Lake (elevation 6,386 feet) is about 50 acres in size. It is located on West Rosebud Creek 3.1 miles below Mystic Lake dam and about 1/2 mile above Emerald Lake. The lake is mesotrophic, has a maximum depth of 15.1 feet and is considered to be low in productivity. A survey for 1982-83 lists the lake as having 1,111 man-days of fishing pressure per year. In 1982, 6,085 catchable and 10,192 fingerling rainbow were planted, or 14.7 fish were stocked/fisherman day. Stocking records indicate that catchable rainbow have been planted yearly since 1955.

Records indicate that West Rosebud was last gillnetted in July and December, 1958 and the catch included rainbow, brown and brook trout, mountain whitefish and unidentified suckers. Silver salmon were also listed as being taken in the July, 1958 netting, but planting records do not indicate that silver salmon were ever stocked in the lake. Marcuson (1980) lists rainbow, brown, brook and cuttroat trout as occurring in the lake. Gill nets set in October, 1984 (Table 5) took no cutthroat trout and brown trout were the most numerous trout species taken, averaging 15.3/net. Of nine rainbow taken in gill nets, one was Age 1 at 8.2 inches and six were Age 2 at an average length of 10.3 inches. These seven rainbow were probably from a May, 1984 plant of 10,080 fish (average 4-6 inches in length) and from plants in April, June and August, 1984 (average length 7-9 inches). Two 11-inch rainbow were of Age III and were carryover from plants made in 1983. Gill net data indicate a trout:sucker ratio of 2.8:1, mainly bolstered by the numbers of brown trout in the lake.

Absaroka Beartooth Wilderness Lakes

Eleven lakes in the Absaroka-Beartooth Wilderness were sampled in August, 1984 to evaluate management strategies. Results are summaryized in Table 7. The 1982 plant of golden trout in Desolation and Big Butte lakes were successful with fish averaging 8.9 and 8.2 inches, respectively. One golden trout was netted in Anchor Lake, indicating some downstream drift of golden trout was occurring as planned. No fish were caught in Widowed Lake, the lowest of the Desolation chain lakes. No changes in existing management plans were recommended, based on 1984 alpine lake samples.

Small Reservoirs and Ponds

Lake Elmo

Lake Elmo is a 64-acre irrigation storage reservoir located on the outskirts of Billings. Land surrounding the reservoir was purchased by the DFWP in 1983. Proximity of Lake Elmo to Billings and guaranteed access give the lake a high potential for fisheries recreation.

Initial surveys identified 10 species of fish in Lake Elmo (Fredenberg and Swedberg 1984). An additional species, channel catfish, was introduced in

Table 7. Summary of data collected by gill net and hook and line in alpine lakes in the Absaroka-Beartooth Wilderness, August, 1984.

Lake Name	Drainage	File Code	Date Sampled	Sp.	No.	Length Range	Mean Length	Comments
Anchor	Clarks Fork	124	8/25/84	GT	1	-	8.5	GT from 1982 plant in Big Butte Lake entering lake as hoped
Arch	E. Rosebud	42	8/14/84	MCt	38	8.4-12.5	10.4	1980 plant, larger fish mature, maintain present management
Big Butte	Clarks Fork	125	8/24/84	GT	40	6.2-10.0	8.2	GT from 1982 plant
Desolation	Clarks Fork	127	8/24/84	GT	37	7.5-12.3	8.9	GT from 1982 plant
Glacier	Rock Creek	9	8/9/84	MCt Eb	25 5	6.5-16.0 7.4-11.0	10.0 8.0	MCt replanted 1985
Jorden	Clarks Fork	121	8/23/84	MCt	7	11.6-13.2	12.2	Hook and line sample, self-sustaining population
Lower Arch	E. Rosebud	41	8/14/84	MCt	10	7.5-12.9	9.6	Self-sustaining population
Mountain Goat	Rock Creek	11	8/10/84	MCt	28	6.2-17.2	8.1	27 fish from 1982 plant, average length 7.8 inches
N. Picket Pin	Stillwater	105	8/29/84	MCt	8	6.9-8.8	8.3	1983 plant
Triangle	Rock Creek	10	8/10/84	MCt	1	-	13.0	Replanted in 1985
Widowed	Clarks Fork	123	8/24/84	-	-	-	-	Lowest lake in Desolation chain, no evidence of GT drift yet

1984. The population is dominated by yellow perch and nongame species. Largemouth bass, black crappie, yellow perch and channel catfish offer the most opportunities for management.

Yellow perch reproduce successfully in Lake Elmo, and good populations of perch up to 2 years old are found. Few older perch are found, however. Perch caught in fall, 1984 averaged 3.3 inches at Age 0, 6.3 inches at Age 1 and 7.8 inches at Age 2. Management efforts for perch should be directed towards improving habitat for mature fish.

Spawning of centrachid species is limited by weekly fluctuations of up to three vertical feet. Largemouth bass up to 5 pounds and crappie as large as 2 pounds have been caught in Lake Elmo. Substantial numbers of crappie in the half-pound range are found in Lake Elmo. These are 8- and 9-year-old fish. Few younger crappie are found. Periodic stocking will be needed to maintain fishable populations of centrachid species.

Success of the fall, 1984 channel catfish plant should be monitored beginning in 1986. If the plant is successful, it may be possible to place spawning structures for catfish in the lake. Increased effort should be directed toward involving local sportsmen groups in habitat improvement projects. Addition of several more artificial reefs in Lake Elmo would improve habitat for larger fish and serve to concentrate perch and crappie in areas where anglers could be more effective.

Stream Surveys

Several small streams were surveyed in 1984 and 1985 to gather base-line data. Two-catch population estimates (Seber 1973) were conducted on some streams (Table 8). Each stream is discussed individually.

West Fork Rock Creek

A two-catch estimate near the lower end of this stream showed a good population of 4-11-inch rainbow and 4-9-inch brook trout. This stream section was closed prior to 1954 to protect the Red Lodge city water supply, and was reopened to fishing May 1, 1984. A stream survey in 1950 showed about the same type of populations and size of fish as the present survey. Length ranges by age class of rainbow trout during October were Age 1 = 3.0-4.1 inches, Age 2 = 4.7-5.8 inches, Age 3 = 6.2-8.7 inches, Age 4 = 8.4-10.0 inches and Age 5 = 9.4-11.7 inches. This stream should be considered a high-quality small stream fishery.

West Red Lodge Creek

This stream received experimental plants of 1-inch McBride cutthroat in 1980 (1,500 fish) and 1982 (3,300 fish) in the reach between the Forest boundary and Luther about 3 miles downstream. Electrofishing survey on either end of this reach in 1984 showed good populations of brook trout in both sections up to 10.5 inches long (Table 8). The lower end near Luther contained 193 brown trout per 1,000 feet, which ranged up to 13.2 inches long. Length ranges of brown trout by age class were Age 2 = 4.7-6.0 inches, Age 3 = 6.2-9.3 inches, Age 4 = 8.7-11.9 inches and Age 5 = 11.2-13.2 inches. Five cutthroat were captured in the upper section at the Forest boundary. They

Table 8. Estimated trout populations (fish/1,000 feet) on streams surveyed during 1984. Two-catch population estimate technique was used to estimate numbers of trout 4 inches and longer (95% confidence interval in parentheses).

Stream	Location	Date	Number/1,000 Feet			
			Rainbow Trout	Brown Trout	Brook Trout	Cutthroat Trout
West Fork Rock Creek	T08S,R20E,S.05	10/9/84	200 (±12)	0	80 (±13)	
West Red Lodge Creek	T06S,R19E,S.30	4/13/84		193 (±33)	168 (±41)	
West Red Lodge Creek	T06S,R18E,S.36	4/10/84	Present in low numbers	7 (±1)	164 (±40)	Present in low numbers

ranged from 4.5-11.1 inches. It is possible the two larger fish (9.7 and 11.1 inches) could be from the 1980 stocking, but age analysis was uncertain. Five rainbow trout were also captured in this upper reach.

Electrofishing surveys in 1957 (unpublished data) in the same reach showed populations of 4-9-inch brook and brown trout. It is doubtful that cutthroat will successfully compete with well-established populations of these two species, and further stocking is not warranted.

Rock Creek

McBride cutthroat were also stocked in a reach of upper Rock Creek during 1980 (1,824 1-inch fish) and 1982 (7,586 2-inch fish). Electrofishing of a 540-foot section below M K Campground in July, 1985 turned up 11 brook trout, 7 rainbow trout and 1 cutthroat 7.8 inches long. The cutthroat was aged from scale samples at 3 years and could have been from the 1982 stocking. Again, it is doubtful that cutthroat will successfully out-compete resident brook trout and rainbow, and no further stocking is recommended.

Picket Pin Creek

On November 9, 1983, a total of 409 8-10-inch fluvial arctic grayling were transplanted into Picket Pin Creek in the Stilwwater River drainage (T05S, R14E, Sec. 03). The fish were collected from a diversion structure near Fairfield, Montana on a drainage ditch that originates in Pishkun Reservoir. The site was selected as a good site to perpetuate the fluvial strain of graying, since it appeared to be barren of other fish species and contained numerous deep pools and undercut banks with heavy willow cover.

Sampling with electrofishing gear on August 29, 1984 produced a 12.4-inch cutthroat and six grayling averaging 10.3 inches long (range 10.0-10.7 inches). The initial transplant was a success, and future monitoring should occur to assess whether reproduction takes place.

Hatchery Trout in Streams

Ten streams were electrofished during 1983 and 1984 to determine the survival of planted trout. Results of the surveys are presented in Table 9. Additional information about Meatrack Creek and data obtained using the two-pass fish population estimate on Willow Creek and Fourmile Creek is described below. Future management plans regarding fish plants are provided in the recommendation section.

All of the stream sections investigated were previously planted with catchable rainbow trout, except Meatrack Creek. This stream received 2,250 2-inch rainbow trout in July, 1952, and apparently the progeny from this plant are still present. The intent of the survey in August, 1984 was to evaluate a 2-inch fingerling plant of McBride cutthroat trout planted in July, 1979. Fish scales read for rainbow trout showed that one Age 2 fish was 7.7 inches, 14 Age 3 fish averaged 8.6 inches and one Age 4 fish was 12.2 inches in length. Fish scales read for McBride cutthroat showed that 37 Age 3 fish ranged in length from 9.6-13.2 inches and averaged 11.4 inches. Three were Age 4 fish and range in length from 11.7-12.0 inches. Their average length was 11.9 inches. Meatrack Creek could be subjected to a U. S. Forest Service

Table 9. Summary of streams electrofished in 1983 and 1984 to determine survival of stocked trout. Additional data included information about other species of trout captured in each section.

Stream and Section Description	T	R	S	Length of Stream Section (Feet)	Fish Planting Data	Electrofishing Data: Species Taken	No.	L. Range Inches	Date Sampled	Comments
Sage Creek USFS Campground	7S	26E	23	1,000	Catchable - Rb planted 1954-1983	Rb[a] Eb	11 70	4.1-10.9 2.0- 9.0	7/19/84	No hatchery Rb
East Rosebud Creek Outlet of E. Rosebud Lake - downstream below USFS bridge	7S	17E	21	1,000	Catchable - Rb planted 1954-1981	Rb LL Eb	80 35 1	1.9-14.9 2.8-11.7 3.4	4/17/84	(1) hatchery Rb
600 feet above USFS bridge, 1 mile above Jimmie Joe campground	7S	17E	15	1,000	Catchable - Rb planted 1954-1981	Rb LL	111 10	2.6-10.3 5.6-20.3	4/16/84	(1) hatchery Rb
West Rosebud Creek .2 miles below outlet of Emerald Lake	7S	17E	06	1,000	Catchable - Rb planted 1954-1982	LL LL	52 55	3.2-19.7 4.4-12.2	10/18/83 4/5/84	No hatchery RB No hatchery Rb
Pine Grove campground	6S	17E	28	1,000	Catchable - Rb planted 1954-1982	Rb LL	1 13	6.8 4.5-15.1	10/28/83	No hatchery Rb
Stillwater River, Sec. 02 Buffalo Jump FAS	4S	16E	31	1,000	Catchable - Rb planted 1954-1982	Rb LL	24 85	2.4-16.9 2.9-15.9	4/12/84	No hatchery Rb
Willow Creek Strobbs Ranch .1 mile below county bridge	5S	20E	27	1,000	Catchable - Rb planted 1966-1983	Rb LL	1 32	13.2 6.2-12.5	4/11/84	(1) hatchery Rb
Red Lodge Creek Wold Ranch .2 mile above county bridge	5S	19E	24	500	Catchable - Rb planted 1964-1983	Rb LL Eb	1 13 3	11.4 4.1-12.7 4.7- 8.9	4/18/84	(1) hatchery Rb
Meatrack Creek (tributary of Fourmile Creek) .6 mile above its mouth	6S	11E	15 &22	1,500	Fingerling - CT planted 1979	MCt Rb	54 17	2.3-13.2 7.7-12.2	8-30-84	Natural reproduction - MCt
Fourmile Creek USFS bridge above Fourmile Guard Station	6S	12E	04	960	Catchable - Rb planted	Rb MCt	134 80	3.6-11.6 2.7-11.4	4-19-84	(125) hatchery Rb
Boulder River, Sec. 02 Chippy Park Campground at mouth of W. Chippy Creek	4S	12E	36	1,000	Catchable - Rb planted 1974-1983	Rb YCt	61 1	2.7-14.4 6.1	4-24-84	(4) hatchery Rb
Sweetgrass Creek Morris Tronrud Ranch	5N	13E	32	1,300	Catchable - Rb planted 1955-1979	LL Eb	27 2	4.3-15.3 6.1-6.8	9-16-83	No hatchery Rb

[a]Species of trout are Rb = rainbow, LL = brown trout, Eb = brook trout, MCt = McBride cutthroat trout, YCt = Yellowstone cutthrout trout and Rb x MCt = rainbow-cutthroat trout hybrid.

proposed sheep grazing allotment. If this should come about, the stream could have reduced ability to produce fish - due to accelerated silt deposition in the stream.

A two-pass estimate was made for brown trout in a 1,000-foot section of Willow Creek at the Strobb Ranch in April, 1984. There was an estimated 33+ three brown trout in the 1,000-foot section. Scales were read and 16 Age 2 fish ranged from 6.2-8.2 inches in length. Their average length was 7.8 inches. Fifteen Age III fish ranged in length from 8.6-12.5 inches. Their average length was 10.6 inches.

Fourmile Creek was the only section surveyed that showed a sufficient carryover of planted rainbow trout. Two-pass estimates were made in April, 1984 for hatchery rainbow and wild McBride strain cutthroat trout. The 960-foot section was divided by a USFS bridge over Fourmile Creek, 460 feet above the bridge and 500 feet below. The estimate for hatchery rainbow showed that 150± 16 fish were present in the section. McBride cutthroat were estimated at 82± 5 fish per section.

Fish scales read for rainbow showed that three Age 1 fish ranged in length from 5.4-6.0 inches and averaged 5.6 inches. Twenty-seven Age 2 fish ranged from 6.2-7.9 inches and averaged 7.0 inches in length. There were nine Age 3 fish, ranging in length from 7.8-10.8 inches and they averaged 9.4 inches in length.

Fish scales from McBride cutthroat were read, three Age 0 fish ranged in length from 3.0-3.7 inches and averaged 3.4 inches. The length range for 18 Age 1 fish was 4.0-5.7 inches and averaged 4.9 inches. Eighteen Age 2 fish ranged from 6.0-8.6 inches and averaged 7.1 inches. Seven Age 3 cutthroat ranged in length from 8.0-9.7 inches and averaged 9.2 inches. One Age 4 fish was 11.2 inches in length.

Age analysis comparisons for rainbow and McBride cutthroat trout from Meatrack Creek vs. Fourmile Creek indicated that in most instances the growth rate for both species of trout was better in Meatrack Creek.

MANAGEMENT RECOMMENDATIONS

1. Cooney Reservoir - continue stocking 1 million walleye fry through 1986. Rainbow trout should be stocked at the rate of 150,000 per year.

2. Deadman's Basin - continue stocking kokanee until return and growth rates can be evaluated. Stock and evaluate McConaughy rainbow for 3 years and terminate planting of Arlee rainbow in this reservoir - due to inconsistent performance.

3. Willow Creek Lake - continue evaluation of McConaughy and Red Band rainbow trout in side-by-side comparison.

4. East Rosebud Lake - monitor 1986 McBride cutthroat trout plants to see if this trout can provide a fishery based on natural propagation.

5. Emerald Lake and West Rosebud Lake - monitor McBride cutthroat plants.

6. Lebo Lake - continue present management plan, stocking with white crappie and largemouth bass.

7. Lake Elmo - monitor success of channel catfish plant. Stock 10,000 largemouth bass fry per year for 3 years. Work with local sportsmen clubs to develop artificial reefs.

8. Sage Creek, East Rosebud Creek, West Rosebud Creek, Stillwater River Section 02, Willow Creek, Red Lodge Creek, Sweet Grass Creek, Fourmile Creek and Boulder River Section 02 - all these streams contain natural reproducing trout species. Little carryover of hatchery plants of catchable rainbow trout occurs. Discontinue plants in favor of a wild trout program.

9. Meatrack Creek - continue to monitor the fish population, to safeguard against loss of stream's reproductive capacity, due to proposed grazing allotment.

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Prepared by: Wade A. Fredenberg

Steve E. Swedberg

Steve L. McMullin

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Waters referred to:

Anchor Lake	5-22-7148-03
Arch Lake	5-22-9622-03
Big Butte Lake	5-22-7249-03
Boulder River, Sec. 2	5-22-0756-01
Cooney Reservoir	5-22-7518-05
Deadman's Basin Reservoir	5-18-7540-05

Waters referred to: (cont.)

Desolation Lake	5-22-1736-03
East Rosebud Creek	5-22-2254-01
East Rosebud Lake	5-22-7714-03
Emerald Lake	5-22-7812-03
Fourmile Creek	5-22-2618-01
Glacier Lake	5-22-7980-03
Jorden Lake	5-22-8204-03
Lake Elmo	5-22-7777-07
Lebo Lake	5-18-8230-05
Tower Arch Lake	5-22-8530-03
Meatrack Creek	5-22-3962-01
Mountain Goat Lake	5-22-8739-03
North Picket Pin Lake	5-22-8880-03
Picket Pin Creek	5-22-4648-01
Red Lodge Creek	5-22-4886-01
Rock Creek, Sec. 03	5-22-4956-01
Sage Creek	5-22-5110-01
Stillwater River, Sec. 02	5-22-6118-01
Sweet Grass Creek	5-22-6230-01
Triangle Lake	5-22-9489-03
West Fork Rock Creek	5-22-6650-01
West Red Lodge Creek	5-22-6790-01
West Rosebud Creek	5-22-6804-01
West Rosebud Lake	5-22-9744-03
Widowed Lake	5-22-9759-03
Willow Creek	5-22-6916-01
Willow Creek Lake	5-22-9786-05