MONTANA DEPARTMENT OF FISH AND GAME
FISHERIES DIVISION

JOB PROGRESS REPORT

State Montana

Cooperators U. S. Forest Service (Lolo National Forest)[1/]

Project No. F-12-R-19 Title Western Montana Fishery Investigation

Job No. 1-b Title Fish Management Surveys - Rock Creek Creel Census and Upper Clark Fork Fish Population Study

Period Covered July 1, 1972 through June 30, 1973

ABSTRACT

During the 1972 fishing season on Rock Creek an estimated 7,432 fishermen fished 26,908 hours and caught 12,331 gamefish. Rainbow was the dominant species followed by whitefish and brown trout. The catch rate was 0.45 fish per hour which was less than found during the 1958-1967 census years. The average length of gamefish was compared to previous census years of 1965-1967. Non-residents increased from 22 percent to 45 percent of the total fishermen from 1967 to 1972, yet accounted for only 33 percent of the total gamefish harvest. The actual return rate for 449 tagged wild trout was 22% while the projected capture rate was 25%. Brewster and Ranch Creek were the most heavily fished tributaries.

Brown trout and whitefish were found in the pH shack section on the Clark Fork River near Warm Springs. Previous sampling in 1967 and 1969 had found this area barren of fish. Recommendations are made for more intensive surveillance of the aquatic resources in this area.

ROCK CREEK CREEL CENSUS

BACKGROUND

Rock Creek was the subject of an intensive 10-year study (Spence, 1971) to yield information on the return of planted catchable-size rainbow trout to the

1/ The U. S. Forest Service provided $500.00 toward operation of the Rock Creek creel census station and also provided and maintained traffic counters necessary to document vehicle use in the drainage. The cooperation and assistance provided by Mr. Gordon Haugen, fisheries biologist, Lolo National Forest, was greatly appreciated.

creel and their effect on fishing in a stream containing wild trout populations. Four years have elapsed since the study was terminated in 1967. Since that time, subdivision and campground developments have increased in Rock Creek. This activity coupled with a more mobile public was bound to influence the fishery.

OBJECTIVE

The objective of this study was to evaluate the current trend of fisherman use and harvest on Rock Creek and its tributaries during the 1972 season and compare this information with that gathered during the 10-year census (Spence,1971). A secondary objective was to estimate the harvest rate of wild trout by tagging fish and obtaining tag return data during the census period.

PROCEDURES

Census Schedule

A creel census was designed similar to that operated during the 1966 and 1967 census season (Spence, 1971). During 1966 and 1967, 52% of the days were censused through September 30, and 23% thereafter to November 30. In 1972, 71% of the days were censused through September 30 and 44% thereafter to November 30. The season ran for 194 days from May 21 to November 30, 1972. A single creel station located approximately 0.5 miles up the Rock Creek road was operated. In the previous census years (Spence, 1971) two stations had been in operation but due to the low percentage of fishermen checked through the upper station, it was not operated during this census. Each census day coverage was from 9:00 a.m. to 9:00 p.m. or until it appeared practically all the anglers had left the area in the evening.

Interviews

The interview format followed that outlined for the 1958-1967 census with the exception that fishing license numbers were not requested, all fish were weighed (unless dressed) and measured, and the number of fish released was noted. Fishermen were asked whether or not they had caught tagged fish.

Pressure and Harvest Estimates

Car counters operated by the U. S. Forest Service were used to obtain daily vehicle use in the drainage. Data collected on census days were used to estimate fishing pressure and harvest information for days with no census coverage. Each fisherman contacted daily was considered a new fisherman whether or not he had been contacted on a previous day.

A linear regression analysis similar to that used in 1967 (Spence, 1971) was used in 1972. Estimates were made for the entire section. Days where many campers departed after a weekend of fishing in the drainage were not used to determine the regression lines. These days were May 21, May 29, June 18, June 24, July 5, and September 4. Errors in recalling the number of fish caught, number of hours fished, and days fished were probably introduced from those who had to reflect back over several days to answer interview questions.

Hatchery trout

Five thousand catchable rainbow trout had been planted annually in Rock Creek since 1970. In 1971 and 1972 all hatchery trout were adipose clipped to allow identification at the census station. Nearly all trout were planted above Hogback Creek.

Limits

The limit during the 1972 fishing season was 10 pounds and one fish not to exceed 10 fish for all trout species with the exception of brook trout which had a ten pound limit. Fifteen whitefish per day were also allowed.

FINDINGS

Species Composition

A comparison of the species composition of the catch from 1958 through 1967 and in 1972 is presented in Table 1. Rainbow trout dominated the catch in all years followed by whitefish and brown trout. The greatest variation between the 10-year census and 1972 was the decrease in the percentage of cutthroat and brook trout in the catch. Discontinuing the upstream creel station may have influenced these percentages as more cutthroat are present in the stream population in the upper reaches of Rock Creek.

TABLE 1. Species composition of the anglers catch, in percent, exclusive of the hatchery rainbows, from Rock Creek during the years 1958-67 and 1972

Year	Rb[1/]	Ct	Eb	DV	LL	Wf
1958	52.2	9.9	19.8	6.8	1.7	9.5
1959	51.7	7.6	18.3	6.2	1.8	14.5
1960	45.0	10.8	17.5	6.9	2.5	17.2
1961	46.9	11.8	13.6	7.1	4.3	16.1
1962	53.5	8.6	11.9	5.5	5.0	15.4
1963	48.1	12.0	11.4	6.6	7.3	14.5
1964	51.7	10.2	11.1	5.0	7.1	14.8
1965	51.1	10.9	11.4	5.1	7.1	14.4
1966	47.1	8.7	12.7	7.7	10.4	13.3
1967	46.9	7.9	14.4	7.8	12.3	10.8
1972	54.7	3.7	5.9	6.3	11.8	17.6

1/ Rb - Rainbow trout, Ct - Cutthroat trout, Eb - Brook trout, DV - Dolly Varden, LL - Brown trout, and Wf - Mountain whitefish.

Catch Rate

Trends in catch per hour, catch per angler, and length of fishing trip for the 10-year census and also 1972 are shown in Table 2. There was a decrease in the catch rate and catch per angler in 1972 in comparison to other years. High water flows (1 in 42 year flood stage) hampered fishermen efforts during the early part of the season and undoubtedly made fishing more difficult. The mean daily turbidity readings during the April-June period in 1972 was nearly 20 JTU's (Figure 1). This is higher than generally observed during spring runoff. A road washout from June 3 to August 16th also prohibited fishermen from driving above Eagle Point, 35 miles upstream from the mouth.

TABLE 2. Observed average catch per hour and per angler, and the average length of trip for both stations of Rock Creek, 1958-67 and 1972 (numbers in parentheses were calculated from estimated totals)

Year	Catch per angler	Catch per hour	Combined catch per hour	Average length of trip (hours)
1958	3.3 (3.4)	0.89 (0.90)	Stocked years	3.8 (3.8)
1959	3.0 (3.0)	0.91 (0.92)	0.90	3.3 (3.3)
1960	3.1 (3.1)	0.89 (0.91)		3.4 (3.4)
1961	2.1 (2.2)	0.69 (0.75)	Non-stocked years	3.0 (3.0)
1962	2.0 (2.1)	0.65 (0.72)	0.64	3.0 (2.9)
1963	2.0 (2.0)	0.61 (0.64)		3.2 (3.2)
1964	2.2 (2.3)	0.60 (0.61)		3.7 (3.7)
1965	2.4 (2.4)	0.67 (0.67)	Stocked years	3.6 (3.5)
1966	2.4 (2.4)	0.63 (0.62)		3.8 (3.7)
1967	2.8 (2.9)	0.72 (0.77)	0.67	3.9 (3.8)
1972	1.6 (1.7)	0.45 (0.46)	.45	3.7 (3.6)

Hatchery Trout Returns

Only 25 (<1.0%) of the hatchery trout planted in Rock Creek were checked at the station. The lack of access because of the washout and not operating the upper station would partially account for this extremely low return.

Pressure and Harvest Estimates

Fisherman pressure and harvest estimates show a total of 7,432 fishermen fished 26,908 hours and caught 12,331 gamefish during the 1972 season (Table 3). This

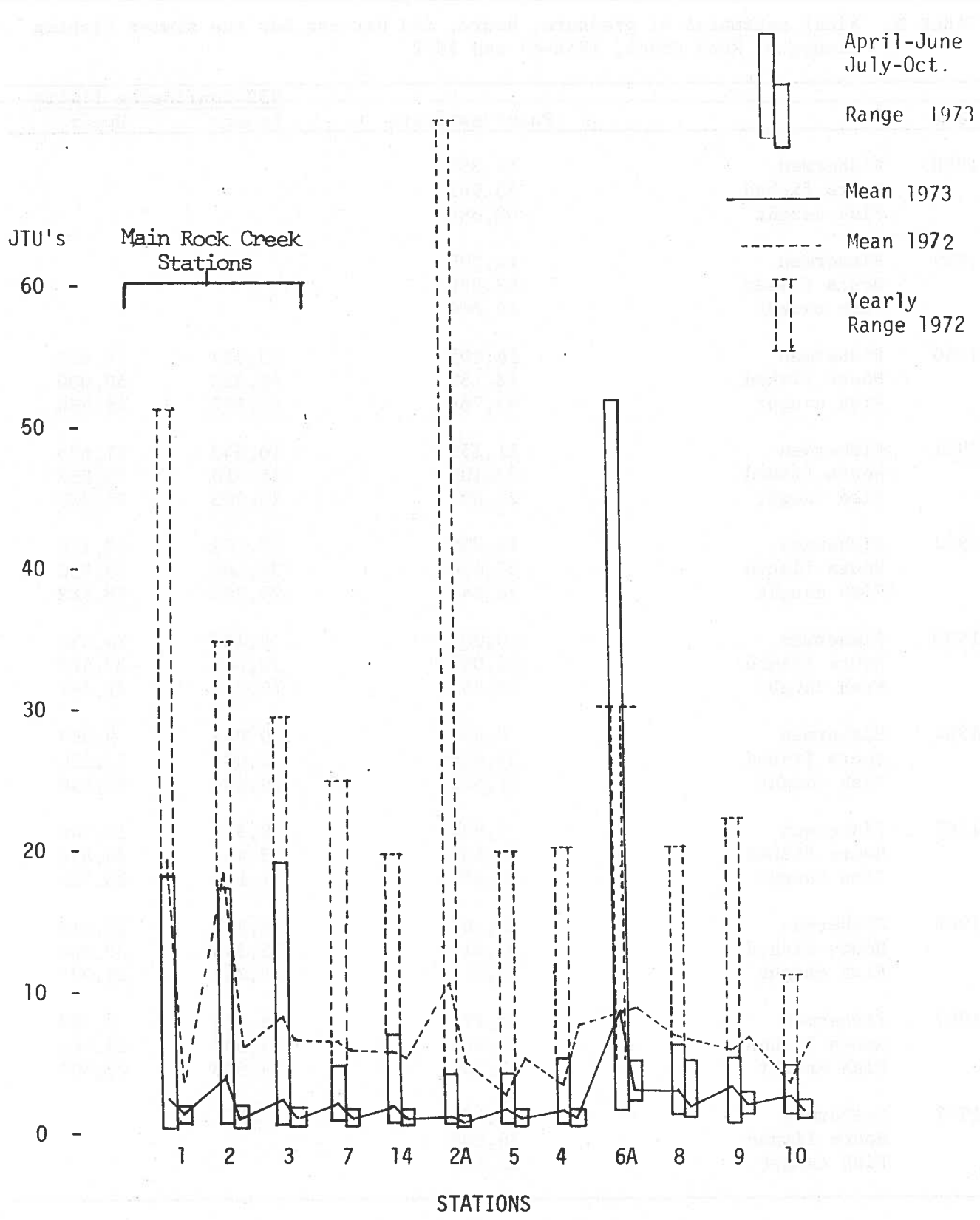

Figure 1. Comparison of turbidity readings in Rock Creek 1972 and 1973 (Prepared by Gordon Haugen, Lolo National Forest)

TABLE 3. Final estimates of pressure, hours, and harvest for the summer fishing season on Rock Creek, 1958–67 and 1972

Year		Point estimate	95% confidence limits Lower	Upper
1958	Fishermen	14,359		
	Hours fished	53,962		
	Fish caught	48,684		
1959	Fishermen	14,590		
	Hours fished	47,876		
	Fish caught	44,044		
1960	Fishermen	14,205	13,727	14,683
	Hours fished	48,159	46,318	50,000
	Fish caught	43,786	41,992	45,580
1961	Fishermen	11,158	10,643	11,673
	Hours fished	33,100	31,318	34,882
	Fish caught	24,891	23,393	26,389
1962	Fishermen	12,709	12,192	13,226
	Hours fished	37,456	35,362	39,550
	Fish caught	26,942	25,296	28,588
1963	Fishermen	10,001	9,486	10,516
	Hours fished	32,054	30,645	33,463
	Fish caught	20,555	19,319	21,791
1964	Fishermen	9,457	9,047	9,867
	Hours fished	35,416	33,682	37,150
	Fish caught	21,622	19,834	23,410
1965	Fishermen	9,936	9,526	10,346
	Hours fished	35,166	33,456	36,876
	Fish caught	23,455	21,185	25,725
1966	Fishermen	10,107	9,595	10,619
	Hours fished	37,615	35,346	39,884
	Fish caught	23,162	21,252	25,072
1967	Fishermen	7,291	6,794	7,788
	Hours fished	27,486	25,507	29,465
	Fish caught	21,205	19,803	22,607
1972	Fishermen	7,432	1/	
	Hours fished	26,908		
	Fish caught	12,331		

1/ Due to the narrow range of confidence limits in the preceding sampling years and a higher sampling intensity in 1972 confidence limits were not computed for 1972.

includes increasing the pressure and harvest estimates derived from the census station figures by 13% to account for use on the reaches of stream formerly covered by a check station near the Gilles bridge. This figure was derived from the average angler contact figure during the 10-year census (Spence, 1971).

The total number of fish reported caught and released (8,329) exceeded the total unexpanded number harvested (8,323) and checked through the station. Many fishermen were catching fish for sport and were not keeping all fish caught.

Individual Harvest Comparisons

Over the period 1960-67 the percent of fishermen catching zero fish averaged 44 percent and ranged from 37-51 percent. In 1972, the percent of fishermen catching zero fish was 57 percent (Table 4), with the majority of successful fishermen catching under three fish. Non-residents were less successful than residents with 67.5 percent catching zero fish.

TABLE 4. Percent of fishermen catching from 0 to 11+ gamefish in the catch for the 1972 census year 1/

	0	1	2	3	4	5	6	7	8	9	10	11+2/
Percent	57	12	9	5	4	3	2	2	2	1	2	1

1/ Obtained from single day completed fisherman trips only.

2/ In some instances people caught whitefish or brook trout in addition to the other trout species.

During the non-stocked years in the previous census, 11 percent (range 10-11) caught over 5 trout while in this census only 6 percent caught over 5 trout.

Size of Fish Caught

Length and weight data from the catch in 1965-67 and 1972 is compared in Table 5. Although sample sizes were small in several instances, the average length of fish in 1972, with the exception of Dolly Varden which decreased, were within the length ranges for 1965-1967.

TABLE 5. Average length of wild fish from Rock Creek, 1965-1967 and 1972 1/

	Species and length (inches)					
Year	Rb2/	Ct	Eb	DV	LL	Wf
1965	11.4 (195)3/	9.0 (38)	9.5 (26)	13.4 (30)	13.7 (44)	11.3 (12)
1966	12.4 (473)	10.8 (34)	10.1 (39)	13.0 (67)	12.8 (122)	12.6 (65)
1967	12.2 (105)	9.5 (07)	8.7 (14)	14.8 (14)	13.9 (64)	12.0 (28)
1972	11.5 (2443)	9.4 (160)	9.2 (234)	12.0 (259)	13.3 (627)	11.6 (503)

1/ Calculated from all fish sampled, whether dressed or undressed.
2/ See Table 1 for meaning of abbreviations.
3/ Sample size in parentheses.

The number of gamefish harvested per inch group in 1972 is shown in Table 6. Few fish over 17 inches were caught during the 1972 season.

TABLE 6. Number of trout and whitefish harvested per inch group during the 1972 fishing season (represents only those checked with head intact and does not represent the total number of fish taken during census)

Inch group	Number (percent in parenthesis)					
	Rb 1/	LL	DV	Eb	Ct	Wf
4.0 - 4.9	1 (Tr)					
5.0 - 5.9	2 (Tr)			2 (0.9)	2 (1.3)	
6.0 - 6.9	23 (0.9)		4 (1.5)	9 (3.8)	9 (5.6)	1 (0.2)
7.0 - 7.9	94 (3.8)	15 (2.4)	6 (2.3)	37 (15.8)	28 (17.5)	1 (0.2)
8.0 - 8.9	195 (8.0)	22 (3.5)	14 (5.4)	58 (24.7)	33 (20.6)	1 (0.2)
9.0 - 9.9	241 (9.9)	41 (6.5)	30 (11.5)	61 (26.1)	35 (21.9)	30 (6.0)
10.0 - 10.9	412 (16.9)	70 (11.2)	36 (13.8)	42 (18.0)	20 (12.5)	123 (24.5)
11.0 - 11.9	447 (18.3)	58 (9.3)	48 (18.5)	15 (6.4)	13 (8.1)	181 (36.0)
12.0 - 12.9	407 (16.7)	75 (12.0)	40 (15.4)	7 (3.0)	15 (9.4)	93 (18.4)
13.0 - 13.9	266 (10.9)	74 (11.8)	28 (10.8)	1 (0.4)	5 (3.1)	34 (6.7)
14.0 - 14.9	174 (7.1)	93 (14.8)	22 (8.5)	1 (0.4)		25 (5.0)
15.0 - 15.9	102 (4.2)	75 (12.0)	9 (3.5)	1 (0.4)		4 (0.8)
16.0 - 16.9	53 (2.2)	44 (7.0)	10 (3.8)			8 (1.6)
17.0 - 17.9	19 (0.8)	29 (4.6)	6 (2.3)			1 (0.2)
18.0 - 18.9	4 (0.2)	14 (2.2)	3 (1.2)			1 (0.2)
19.0 - 19.9	2 (Tr)	9 (1.4)	1 (0.4)			
20.0 - 20.9	1 (Tr)	3 (0.5)	2 (0.8)			
21.0 - 21.9		2 (0.3)	1 (0.4)			
22.0 - 22.9		2 (0.3)				
23.0 - 23.9		1 (0.2)				
Total	2443	627	260	234	160	503

1/ See Table 1 for meaning of abbreviations.

In 1972 there were slight decreases in the average weight of rainbow and whitefish from those found during the years 1965-67, but a slight increase from those found in 1960 (Table 7).

TABLE 7. Average weight of wild fish from Rock Creek in 1960, 1965-67, and 1972 1/

Year	Species and weight (pounds)					
	Rb 2/	Ct	Eb	DV	LL	WF
1960	.63 (988) 3/	.28 (605)	.28 (484)	.71 (158)	1.57 (67)	.37 (303)
1965	.72 (91)	.36 (21)	.30 (22)	.63 (17)	1.06 (20)	1.24 (02)
1966	.82 (229)	.62 (11)	.42 (21)	.85 (30)	.97 (54)	.84 (46)
1967	.67 (83)	.29 (06)	.25 (12)	1.18 (10)	1.10 (54)	.59 (28)
1972	.66 (478)	.32 (56)	.30 (89)	.73 (77)	1.07 (233)	.51 (259)

1/ Calculated from weights of undressed fish only.
2/ See table 1 for meaning of abbreviations.
3/ Sample size in parentheses.

Monthly Harvest

Rainbow trout dominated the catch from May through September with whitefish the primary species caught in October and November (Table 8).

TABLE 8. Percent of reported catch of each gamefish species taken from Rock Creek during each month of the 1972 season

Month	Species					
	Rbl/	Ct	Eb	DV	LL	Wf
May	70.8	2.3	3.8	5.5	5.9	11.7
June	61.8	2.1	6.6	6.4	12.0	11.1
July	56.9	5.1	8.3	9.6	13.3	6.8
August	56.3	4.3	6.7	6.1	13.9	12.7
September	47.3	4.2	3.1	4.6	10.7	30.1
October	21.6	0.9	3.8	2.5	16.3	54.9
November	15.3	5.5	0.0	0.9	9.4	67.7

1/ See Table 1 for meaning of abbreviations.

Residency of Anglers

The residency of anglers contacted at station 1 on Rock Creek from 1960-67 and in 1972 is shown in Table 9. In the 1960-67 census years, non-resident anglers averaged 18% with a high of 27% of the fishermen censused at station 1. In 1972, over 45% of the fishermen were non-residents. Campground services have provided additional opportunity for extended stays by non-residents.

TABLE 9. Residency of anglers contacted on Rock Creek (Station 1) for the years 1960-67 and 1972

Year	Percent Montana residents	Percent nonresidents
1960	91	9
1961	90	10
1962	87	13
1963	82	18
1964	80	20
1965	74	26
1966	79	21
1967	78	22
1972	55	45

Comparison of Fishing Success - Resident vs. Non-resident

Resident anglers were more successful than non-resident anglers as shown by a catch rate of .55 vs .33 fish per hour (Table 10). Residents accounted for nearly 70% of the harvest on Rock Creek, although they made up only 55% of the total anglers.

TABLE 10. Comparison of resident and non-resident fishing use and success on Rock Creek in 1972

	Catch per hour	Hours per fisherman	Percent of total fishermen	Percent of total harvest
Resident	.55	3.7	54.6	67.1
Non-resident	.33	3.6	45.4	32.9

Types of Lures Used

A comparison of lures or bait used shows little change between the combined years of 1958, 1966, and 1967 and those used in 1972. Bait and flies are most commonly used by Rock Creek anglers (Table 11).

TABLE 11. Percent of fishermen using bait, flies, hardware, or a combination thereof during 1958, 1966, and 1967 and in 1972

Type of lure	Percent of Use 1958,1966,1967 Average Range	1972
Bait	43 (40-49)	40
Flies	28 (22-36)	33
Hardware	8 (06-10)	12
Combination	20 (15-30)	15

Tag Returns

A total of 422 trout over 9 inches long captured by electrofishing were tagged in March and April, 1972. The number of each species tagged in the Valley-Moon Section approximately 1 mile above the mouth and the Fish and Game Section about 13 miles above the mouth is shown in Table 12. Both sections where tagging occurred were heavy use areas.

TABLE 12. Number of trout over 9 inches tagged during electrofishing and number returned by fishermen during the 1972 fishing season (percent returned in parentheses)

	Species					
Section	Rb 1/	LL	Ct	Eb	DV	Grand Total
Valley-Moon	75	107	0	1	0	183
Fish and Game	173	11	0	1	54	239
Combined total	248	118	0	2	54	422
Number return	56 (23)	23(19.5)	0	1 (50)	12 (22)	92 (22)

1/ See Table 1 for meaning of abbreviations.

A return rate of 22% was found. Brown trout had the lowest percentage return rate for the number tagged. On the 94 days censused during the 133 days to September 30, 74 tags were returned to the check station for a return rate of .787 ($=\frac{74}{94}$) tags per day. The projected capture rate (multiply the number of days censused by the daily return rate) for the period was 105 tags. The actual return was 91. Of these, 74 were returned at the check station and 17 by various other means (phone call, office return, warden return) for catches on non-census days. For the period October 1 to November 30, (61 days) only 1 tag was returned during the 27 days censused for a daily return rate of .037. The projected return was 2 tags. Comparing the projected return (107) by the actual return (92) for the season, a projected capture rate of 25% of the trout tagged was determined versus the actual return rate of 22%.

The majority of trout were caught in the vicinity where tagged; however, a 16.4 and 11.9 inch rainbow and one 15.8 inch brown trout did move from Rock Creek into the Clark Fork River. The maximum downstream movement was approximately 10 miles, while a Dolly Varden 13.3 inches long moved over 15 miles upstream from the section tagged.

Tributary Streams

Several tributary streams contributed to the fishery. Brewster Creek and Ranch Creek had the heaviest pressure on census days (Table 13).

TABLE 13. Fisherman use and harvest data gathered on census days during the 1972 fishing season

Stream	No. Fishermen	Total Hours	Total Fish	Wild Rb 1/	Ct	Eb	DV	LL	Wf	Species Unknown	Catch per Hour
Alder	3	9	5	0	0	0	0	0	0	5	0.56
Brewster	33	721	130	3	81	23	1	0	0	22	0.18
Cougar	1	3	3	0	0	0	3	0	0	0	1.00
Gilbert	2	6	8	1	0	6	0	1	0	0	1.33
Grizzly	4	6	0	0	0	0	0	0	0	0	0.00
Kitchen	2	3	0	0	0	0	0	0	0	0	0.00
Ranch	37	132	140	35	54	10	2	0	0	39	1.06
Sawmill	1	2	0	0	0	0	0	0	0	0	0.00
Spring	6	9	18	0	0	18	0	0	0	0	2.00
Welcome	1	1	6	1	4	1	0	0	0	0	6.00
Willow	2	2	10	0	0	0	0	0	0	10	5.00
Unknown	3	7	7	0	1	5	1	0	0	0	1.00

1/ See Table 1 for meaning of abbreviations.

RECOMMENDATIONS

Although use remained similar or less than previous censuses, it was obvious that the composition of residents vs. non-residents had changed greatly. Overnight, weekly and monthly vacations in Rock Creek were common and therefore complicated the census procedure as those staying a long time inevitably could not remember all catches made. The census procedure should be modified by providing cards or some other means by which those staying in the drainage can record daily catches and also provide a means (logbooks, etc.) whereby residents can also record theirs. The catch of Rock Creek residents was not recorded in this census.

The census should be scheduled every fourth year, at least for the immediate future, to furnish adequate use, harvest, and other quantitative data for management decisions aimed at retaining the quality of this resource. The 25 percent projected capture rate of tagged wild trout is one of the highest in the state. The monitoring of the annual harvest of the wild trout population by tagging should be continued in future census years. Because of the ease of access and the use Rock Creek receives, consideration should be given to emphasizing quality of the fishery rather than a quantity approach. This stream would be ideal to monitor the effect of regulations selected to accomplish this emphasis.

Electrofishing should be conducted annually to monitor fish populations in at least two sections until adequate data is available to provide for future comparison.

UPPER CLARK FORK FISH POPULATION STUDY

BACKGROUND

Extensive tailings deposition and acid water discharge has occurred in past years from the Anaconda Company's mining operations. For example, on January 2 and March 1, 1972 red water was observed at least to Drummond and Deer Lodge, respectively. Dike breakage at the settling pond at Warm Springs caused these problems. Since the establishment of the closed water system at the Anaconda Company mining complex in Butte in October, 1972 no major spills have been observed or reported. An acid seep below the lowermost settling pond was observed in October, 1972 and was stopped prior to July 1, 1973. In an effort to evaluate fish populations in the Clark Fork River below the Anaconda Company settling ponds at Warm Springs, two electrofishing sections have been established.

OBJECTIVE

The objective is to obtain fish population data on the two sections of the Clark Fork River to evaluate the influence of the Anaconda Company's closed water system.

PROCEDURES

Fish populations were sampled using standard D. C. electrofishing gear operated from a 14-foot boat. Population estimates were attempted utilizing the Petersen mark-and-recapture technique adapted for electrofishing as suggested by Vincent (1971). Population estimates were computed utilizing the Montana Fish and Game Department's manual entitled "Procedures for Using Computer System to Compute Fish Population Statistics." Confidence intervals at the 80% level ($\pm$ 1.282 standard deviations) were determined for each estimate.

FINDINGS

pH Shack Section

This section begins at the county bridge approximately 0.5 miles below the Anaconda Company settling ponds and extends downstream 2.2 miles to the next county bridge. Single electrofishing runs were made in November, 1972 and March, 1973 (Table 14). July, 1967 and 1969 runs and April, 1972 runs (Marcoux, 1973, Spence, 1968 and 1970) are also shown.

TABLE 14. Species and numbers captured in a single electrofishing run from the pH shack section from the summer of 1967 to spring 1973

	Species					
	LL[1/]	wf	DV	Rb	Eb	FSu
Summer - 1967[2/]	0	0	0	0	0	0
Summer - 1969	0	0	0	0	0	0
Spring - 1972	4	3	0	0	0	1
Fall - 1972	35	51	1	1	1	1
Spring - 1973	29	1	0	1	0	16

1/ LL - Brown trout, wf - Mountain whitefish, DV - Dolly Varden, Rb - Rainbow trout, Eb - Brook trout, and FSu - Longnose sucker.

2/ Approximately 1000 feet sampled.

During 1967, a strike caused acid water to flow directly into the Clark Fork River without treatment for several months. Subsequent sampling during the summer of 1967 and 1969 found no fish present in this section. In April 1972 following the spills noted under BACKGROUND, brown trout and whitefish were captured. During the fall of 1972 brown trout and whitefish dominated the fish species captured. Although a comparable number of brown trout were captured during the spring, 1973 sampling, only one whitefish was taken. Apparently water quality or some other factor caused the whitefish to move out of the area prior to spring sampling, or perhaps they are numerous here only during their fall spawning migrations. Future study during these same periods should provide better understanding of this fluctuation.

Although single runs have not provided estimates of the fish populations it is evident that fish, particularly brown trout, are utilizing this area.

Williams - Tavenner Section

Population estimates were computed in November, 1972 and 1973 for whitefish (Table 15) on the 1.1 mile Williams - Tavenner section located approximately 15 miles downstream from the Anaconda Company settling ponds.

Whitefish population estimates for those over 7.0 inches in length were comparable between sampling periods. Whitefish appear to be the dominant game fish inhabiting this section. However, at the current sampling level we were unable to obtain adequate trout population estimates for distinct comparisons.

TABLE 15. Whitefish population estimates (numbers) and 80% confidence intervals from the Williams - Tavenner section on August, 1969, April, 1972, and November, 1972.

Date	Length Range	Point estimate	80% C.I.
August, 1969	7.2 - 16.3	1751	± 895
April, 1972	7.5 - 16.5	2895	± 981
November, 1972	7.0 - 17.3	3732	± 1464

RECOMMENDATIONS

It is obvious from the data obtained that more intensive annual or biannual surveillance is necessary in these two sections. Two marking and two recapture runs are probably the minimum for adequate estimates in the Williams - Tavenner section. Although sample numbers have been low in the pH shack section, a concentrated effort should be made to sample sufficiently to obtain a population estimate. This will provide adequate base data for future comparisons.

Eyed eggs in Vibert boxes should be placed in artificial redds to evaluate whether water quality is adequate for egg survival, particularly in the pH shack area. Intragravel monitoring and streambed mapping should be conducted to further categorize the currently existing conditions.

Data being gathered by the Anaconda Company and other agencies in this area should be reviewed. A cooperative comprehensive study should be initiated whereby water quality, aquatic invertebrates and fish populations are extensively monitored at selected locations to properly evaluate the effect of the closed water system and proposed future developments.

Literature Cited

Marcoux, R. G. 1973. Inventory of waters of the project area. Job Progress Report, Federal Aid in Fish and Wildlife Restoration Acts. Montana Project No. F-12-R-18, Job 1-a, 27 pp.

Spence, L. 1968. Inventory of waters of the project area. Job Progress Report, Federal Aid in Fish and Wildlife Restoration Acts. Montana Project No. F-12-R-14, Job No. 1, 14 pp.

Spence, L. 1970. Inventory of waters of the project area. Job Progress Report, Federal Aid in Fish and Wildlife Restoration Acts. Montana Project No. F-12-R-16, Job No. 1-a, 13 pp.

Spence, L. 1971. Rock Creek Census. Montana Fish and Game Department, Federal Aid in Sport Fish Restoration. Job Final Report, 28 pp.

Vincent, E. R. 1971. River electrofishing and fish population estimates. Prog. Fish Cult. 33 (3): 163-9.

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Waters referred to:

Clark Fork River	06-1140-1
Rock Creek Sec. 1	06-5263-1
Rock Creek Sec. 2	06-5282-1