MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: Montana PROJECT TITLE: Statewide Fisheries Investigations

PROJECT NO: F-46-R-1 STUDY TITLE: Survey and Inventory of Coldwater Streams

JOB NO: I-C JOB TITLE: Upper Clark Fork River Study

PROJECT PERIOD: July 1, 1988 Through June 30, 1989

ABSTRACT

Trout population densities were estimated during the spring of 1987 throughout the reach of the Clark Fork from its origin near Warm springs to Milltown Reservoir, approximately 135 river miles. Thirty-one estimate sections averaging 4.35 miles in length were established for data analyses. Population densities varied from a high of 1959 brown trout >7.6 inches total length per mile near Warm Springs to a low of 25 per mile between Drummond and Bearmouth. Population densities were highest in the uppermost sections (about 1500/mile), declined to less than 500/mile within a distance of less than 5 miles, declined slowly over the succeeding 70+ miles (from just over 300/mile to less than 150/mile), dropped precipitously for 30 miles (fewer than 50/mile), and recovered somewhat in the remaining 30 miles (about 300/mile). Numbers of 0+ and 1+ brown trout were not reliably estimated but generally followed the density pattern of older fish. Factors responsible for determining population densities are complex. While other influences are no doubt operable, water quality factors, both chronic and acute, appear to be the major determinant.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. Maintain instream flows at present conditions.

   Progress towards achievement of this objective was determined by the pursuit of the instream flow reservation process.

2. Determine why trout numbers are low and why the juvenile segment is absent from the trout population.

   Determining influences in trout abundance are complex and include riparian habitat conditions, water volume, forage abundance, instream habitat quality, recruitment and mortality, and water quality. While all these factors are no doubt operable recruitment and mortality are most likely the most significant elements. Mortalities ascribable to date seem to be the result of water quality deficiencies resulting from high metal concentrations. Juvenile densities are probably negatively affected by water quality but are also the result of inadequate reproductive sites.

3. Use data collected in fish population studies and studies by other agencies to direct clean up efforts for maximum benefits to the river fishery.

   This objective is being satisfactorily met. Information gathered has resulted in accelerated efforts to halt fish kills in the Warm Springs area. This work will entail removal of metals contaminated sediments from the Mill-Willow bypass channel and temporary berming of tailings deposits in the Warm Springs vicinity to prevent thunderstorm caused sheet flooding from washing metals into the river. Permanent solutions to these problems are scheduled to be addressed by EPA and MT DHES within a few months.

4. Work with other agencies to see that data are collected which will supplement fisheries data.

   Extensive data on Upper Clark Fork fisheries are being collected in a cooperative effort with an Arco consultant. These studies are currently underway and will probably continue into 1990. Expanded studies within FWP include additional fry survival work, fish health examinations on brown trout from diverse river segments, and analysis of brown trout tissue samples for metals content. Progress in this objective has been satisfactory.

5. Develop citizen participation in river clean up.

   Attainment of this objective has been furthered by speaking opportunities to citizen's environmental groups, civic organizations, and youth classes. Meetings and informal information exchange with the public and elected officials have also contributed to this objective's fulfillment.

PROCEDURES

Fish were sampled for mark recapture estimates with a boat-mounted electroshocker equipped with a 3500 watt generator and a Coffelt Model VVP-15 rectifying unit. The cathodes were suspended from booms from the bow of the boat, and the aluminum boat served as the anode surface. all captured trout were identified to species, measured to the nearest 1.0 mm (total length), and weighed to the nearest 10 g.

Forty-two days of sampling from 30 March through 18 June 1987 were required to complete both mark and recapture runs. Capture efficiency (R/C) was sufficient (range: 12 to 42% for fish longer than 7.6 in.) to allow one mark and one recapture sampling run. Fish were marked with partial fin clips and/or insertion of T-bar anchor tags behind the dorsal fin.

Selection of population estimate sections was made after completion of field sampling by identifying fish processing stops on aerial photographs (scale: 1:6000). Eighty fish processing stops were identified; average section length was 1.7 mi. After combining several sections to provide larger sample sizes to calculate population estimates, 31 segments of the upper Clark Fork River were selected to estimate trout population densities; average section length was 4.35 mi. River mile midpoints of the 31 sections were used to identify location of each sampling site (Table 1).

Population estimates were calculated using Chapman's modification of Peterson's mark and recapture formula (Ricker 1975). Population estimate variance was estimated using Seber's formula for variance (Seber 1983). Fish population data were analyzed using MRSYS, a computer program developed by MDFWP.

Although age class estimates provide the most consistent basis for comparisons of densities between river segments, accurate age data were not available due to difficulties in aging trout in this river system. Therefore, brown trout population densities for three general size groups were selected to evaluate population trends. Based on length frequency, brown trout from 3 to 7.5 in. were considered age I+. No estimates were calculated for this size group due to poor capture efficiencies, and low densities in some reaches of river. The remaining brown trout (age II+ and older) were divided in two size groups to compare trends in the subadult population (7.6 to 11.9 in.) to those of the adult population (12 in. and larger). Estimates for a size class were not presented if the number of recaptured fish in the capture sample was less than four.

Table 1. Section number, river mile midpoint, and general boundary descriptions of 31 electrofishing sections of the Clark Fork River sampled during the spring, 1987.

Section Number	River Mile Midpoint of Section	General Section Description
1	501	Pond 2 outlet to 0.85 miles downstream
2	500	End section 1 to Warm Springs Bridge
3	499	End section 2 to 0.50 miles downstream
4	498	End section 3 to 1.40 miles downstream
5	497	End section 4 to Perkins Lane Bridge
6	494	End section 5 to Galen Bridge
7	488	End section 6 to Racetrack Bridge
8	484	End section 7 to 3.61 miles downstream
9	480	End section 8 to Sager Lane Bridge
10	476	End section 9 to 3.75 miles downstream
11	471	End section 10 to Deer Lodge
12	466	End section 11 to sewage pond outlet
13	462	End section 12 to veterinary clinic
14	458	End section 13 to Kohrs Bend FAS
15	453	End section 14 to Little Blackfoot River
16	447	End section 15 to Phosphate Bridge
17	442	End section 16 to mouth of Gold Creek
18	438	End section 17 to Little's diversion
19	434	End section 18 to 3.96 miles downstream
20	429	End section 19 to 4.41 miles downstream
21	425	End section 20 to 3.76 miles downstream
22	421	End section 21 to Drummond fairgrounds
23	417	End section 22 to 4.08 miles downstream
24	412	End section 23 to 5.34 miles downstream
25	407	End section 24 to Bear Creek Bridge
26	401	End section 25 to Bearmouth Chalet
27	393	End section 26 to Beavertail FAS
28	386	End section 27 to mouth of Rock Creek
29	381	End section 28 to Schwartz Creek Bridge
30	375	End section 29 to Turah FAS
31	368	End section 30 to slackwaters of Milltown

RESULTS AND DISCUSSION

Trends in trout population levels observed in the upper Clark Fork River during 1987 were similar to trends observed during previous work at established electrofishing sections. The results of the 1987 survey allow more precise determination of the areas of abrupt changes in trout abundance.

For brown trout age II and older (> 7.5 inches in length) the highest densities were observed within one to two miles of the treatment pond discharge (Figure 1). Brown trout densities decreased abruptly in the following 10 miles from a high of nearly 2,000 brown trout per mile near Warm Springs Creek to 331 per mile near the Racetrack Bridge. Densities remained similar for the subsequent 60 miles of river from Racetrack Bridge to near Drummond, ranging from 240 to 352 brown trout per mile of stream. Densities declined further between river mile 429 (near Drummond) and river mile 407 (near the mouth of Bear Creek). From Bear Creek to the mouth of Rock Creek, brown trout densities were extremely low, ranging from 25 to 44 per mile. Brown trout densities increased downstream from the mouth of Rock Creek.

Brown trout population estimates were calculated for a variety of size groups. Although the ability to estimate densities of brown trout in small size classes was limited due to poor capture efficiencies, each of the size groups exhibited similar trends in densities throughout the river (Table 2).

Rainbow trout densities were too low to estimate from the treatment pond discharge (river mile 501) to approximately Bear Creek (river mile 407) during spring, 1987. From the mouth of Bear Creek to the mouth of Rock Creek, rainbow trout densities ranged from 28 to 41 per mile. Downstream from Rock Creek, rainbow trout densities ranged from 170 to 175 per mile (Figure 1).

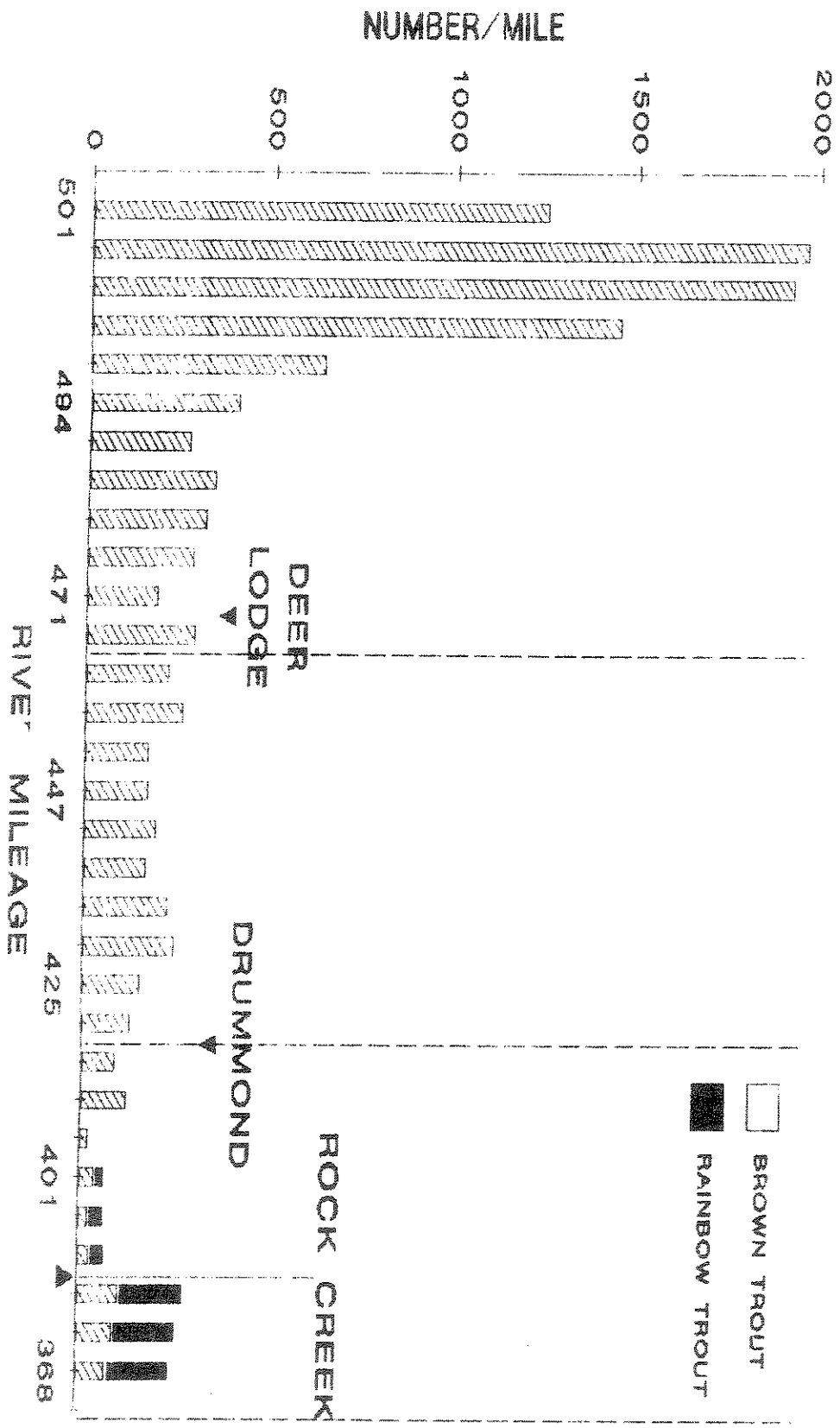
UPPER CLARK FORK RIVER
TOTAL TROUT NUMBER/MILE IN 31 RIVER SEGMENTS
(SPRING 1987)
NUMBER/MILE
0
500
1000
1500
2000
501
494
471
447
425
401
368
RIVER MILEAGE
DEER LODGE
DRUMMOND
ROCK CREEK
BROWN TROUT
RAINBOW TROUT

Figure 1.

Table 2. Brown trout population statistics of 31 electrofishing sections of the Clark Fork River sampled during the spring, 1987.

Section	Number Captured Per Mile * (3 - 7.5")	Estimated Number of Brown Trout Per Mile for Three Size Groups** (7.6 - 11.9")	(12.0 - 23.9")	(Total >7.5")
1	21	689	685	1374
2	36	572	1387	1959
3	28	964	966	1930
4	26	672	801	1473
5	9	447	382	829
6	18	505	126	631
7	8	221	110	331
8	10	130	209	339
9	12	182	170	352
10	9	114	168	282
11	6	95	112	207
12	8	-	134	-297
13	2	-	134	-229
14	5	103	160	263
15	3	-	112	-192
16	4	81	102	183
17	2	67	118	185
18	2	-	109	-174
19	1	-	147	-233
20	2	54	186	240
21	1	-	115	-162
22	<1	-	113	-134
23	<1	-	68	- 94
24	<1	-	86	-126
25	<1	-	19	- 25
26	<1	-	29	- 44
27	2	-	20	- 31
28	2	-	20	- 32
29	3	-	77	-117
30	4	-	75	-101
31	4	-	62	- 84

* Capture efficiency too low to calculate population estimates for this size group in all sections.

** Estimated numbers not presented for the 7.6-11.9" size group when less than four recaptures were recovered. Estimated numbers for the 7.6 - 23.9" size group were approximated when too few recaptures were recovered in the 7.6 - 11.9" size group.

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Waters Referred to: Clark Fork River

Keywords or Fish Species: Brown Trout, Rainbow Trout

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