FISH POPULATION INVESTIGATIONS FOR THE TONGUE RIVER, 1993

BY

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ABSTRACT

Fish were sampled by electrofishing three sections of the Tongue River near Ashland, Montana, to make population estimates for smallmouth bass (Micropterus dolomieui) and channel catfish (Ictalurus punctatus) and to obtain size and relative abundance information for other species. This data will be used to make future fish population comparisons after reconstruction of the Tongue River Dam and spillway.

INTRODUCTION AND OBJECTIVES

This study was conducted to obtain pre-construction fisheries data on the Tongue River below Tongue River Dam, a state water project which will be rehabilitated by the State of Montana and Bureau of Reclamation as part of the Northern Cheyenne Indian Reserved Water Rights Settlement Act of 1992 (Public Law 102-374, 106 Stat. 1186). Reconstruction will probably begin in 1995 or 1996. This work will require partial draining of the reservoir and may result in exceptionally low river flows in late summer and early fall. Fish populations could suffer as a result.

With the exception of Clancy's (1980) work, data on fish populations in the Tongue River below the reservoir is minimal. Thus, the objective was to collect data on all fish species present, with primary emphasis on smallmouth bass and channel catfish. Catch rates and population estimates would then be calculated for these two species. Lengths and weights were measured from a subsample of all other fish species.

STUDY AREA DESCRIPTION

The Tongue River originates in the Big Horn Mountains of Wyoming, passes through southeastern Montana and converges with the Yellowstone River at Miles City, Montana (Figure 1). The study area was centered around Ashland, Montana, located approximately 115 river miles upstream from the confluence of the Tongue and Yellowstone rivers. Three different river sections were established for the study. The first section was located upstream from Ashland, the second at Ashland and the third downstream from Ashland. Legal description and length (miles) for each section are found in Table 1.

All three sections were physically similar with few differences. The river substrate was mostly a mixture of small gravel and sand except for riffle areas of washed gravel and larger rock. River banks were typically high and steep with dense growths of willows. Erosion of these banks during high water has yielded numerous areas where shrubs, trees and roots are partially or totally submerged. Under cut banks are common. The river characteristically has a 50/50 mixture of run and pool areas separated by shallow riffles. Another characteristic common to all areas was the low occurrence of side channels. Stagnant pools at tributary mouths were mostly absent. Section 1 had a higher frequency of areas with larger rocks while Section 2 was deeper overall. Section 3 had a few small islands and a high frequency of areas with submerged vegetation and log jams, thus giving this section the greatest physical diversity.

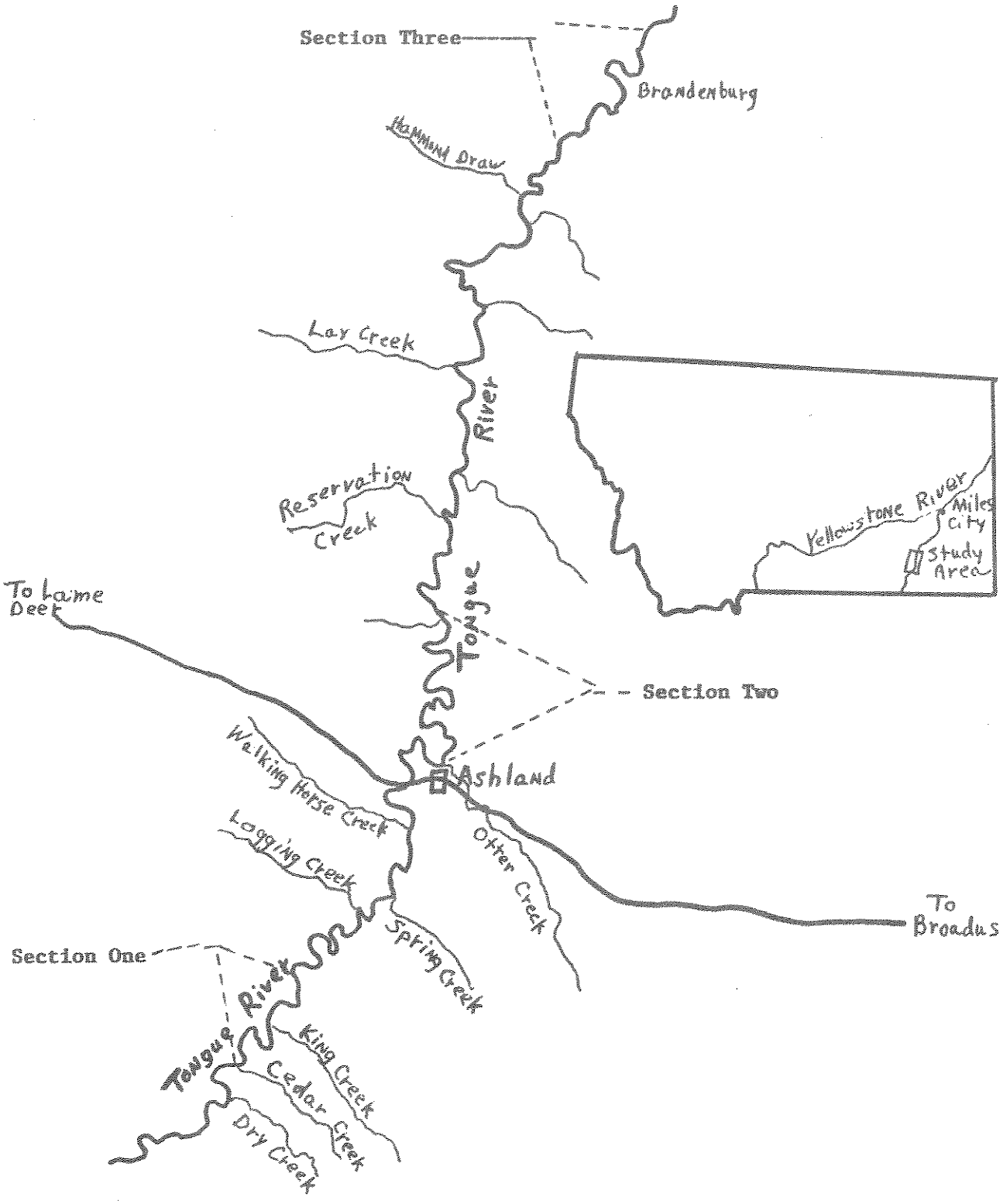

Figure 1. Map of Study Area

METHODS

Field work was conducted from September 9 through October 21, 1993. The sole collecting method was electrofishing with a 14-foot boat, powered by a 15 horsepower outboard motor and equipped with a Coffelt model VVP-15 electrofisher. Electrofishing was conducted while drifting downstream, with initial efforts to cover the bulk of the river by zig-zagging between both river banks. After a few runs through a section, certain areas obviously held more fish so more time was spent in these areas. All fish species were dip netted, placed into a holding tank to allow lengths and weights to be recorded, and then released. Smallmouth bass and channel catfish were fin clipped for future recognition. Length and weight were recorded for at least 100 fish of each species, if possible.

Electrofishing sections were long enough to require a full day to electrofish each section. A fin clip was used to mark and identify previously captured fish. Sections were shocked on consecutive days until catch rates of both marked and unmarked fish decreased. Sections were then left undisturbed for a few days before electrofishing was resumed. Attempts were made to obtain a minimum of seven recaptured fish per species and river section to minimize bias. Population estimates were calculated by the Schumacher method (Ricker 1975). In this method there are no separate marking and recapture electrofishing runs. Rather, fish are marked and recaptured during each pass through the section.

RESULTS

Twenty one different fish species were collected (from September 9 - October 21, 1993) with Catostomids (suckers) being most abundant in all three river sections. Clancy (1980) found six fish species not collected in the present study. These were yellow perch, northern pike, lake chub, fathead minnow, golden shiner and pumpkinseed. Clancy (1980) did not report the plains minnow found in the present study. Tables 4-6 summarize species caught, number weighed and measured, total number of each species collected, and maximum, minimum and mean length and weight found in each river section. A similar number of fish species was found in each section. Catch rates were the highest in Section 1 for smallmouth bass and in Section 2 for channel catfish (Table 2).

Section 1 was shocked nine days with a five day rest period. Smallmouth bass were the dominant game fish based on fifteen recaptures of 77 marked fish. Forty-six catfish were fin clipped but none were recaught (Table 3). Of special interest was the high number of rock bass found in Sections 1 and 3 (Tables 4 and 6). This species is absent in Montana with the exception of the Tongue River drainage. It has apparently become abundant here.

Smallmouth bass seemed to prefer habitats with moderate to slow current associated with large rocks and boulders. Submerged vegetation was a second area where bass were located but not with the frequency of the previously described habitat. Catfish were found in locations of slow current with adequate depth (3 to 6 feet), however, dead current areas seemed to be avoided by catfish even if deep water was present. Large objects, such as rocks or submerged logs, in addition to favored depths and current seemed to be highly attractive to catfish. Rock bass were prevalent in areas of submerged vegetation and undercut banks. These physical descriptions seemed to describe habitats for fish species throughout all three river sections.

Twelve days were spent on Section 3 with two rest periods of approximately 11 days each. Two rest periods were allowed for this section as fish capture drastically diminished to the point where even nongame species were captured infrequently. Channel catfish numbers were adequate to establish a population estimate but only one smallmouth bass was recaptured (Table 3).

Only five days were spent on Section 2 as time and threatened water flow restrictions terminated field work. Due to the few days worked and the low number of recaptures, population estimates were biased, so estimates were not reported (Table 3). Numerous catfish were found in one particular location on the last two days of this section. This location was similar in physical characteristics preferred by catfish in other sections but one thing that stood out was the width of the river. This location had slow current, deep water (four to six feet), scattered submerged logs, and most importantly a narrow river channel. When we realized this fact, it became clear that catfish commonly occupied habitats with narrow river channels in the other river sections.

Clancy's (1980) Section 3 is contained in Section 1 of the present study. Clancy reported a smallmouth bass density in his Section 3 of 98 fish per kilometer. This figure is much larger than the 18 smallmouth bass per kilometer found in Section 1. The 18 fish per kilometer figure is obtained by dividing the smallmouth bass estimate for Section 1 (Table 3) by the section length in kilometers. Clancy (1980) found young of the year smallmouth bass, but no fish of this size were collected in 1993. Clancy sampled these fish by seining, which was not repeated in 1993.

DISCUSSION

Establishing river electrofishing sections was time consuming because permission from landowners had to be obtained with no certainty that suitable locations for launching or pulling out a boat existed. As mentioned before, the majority of the stream banks are characterized by high, steep drop offs covered with dense willow stands. These factors determined the exact location and length of each river section to be worked.

The efficiency of fish collection was low. Fish were commonly seen running around the boat. This was attributed to the clarity of the water which allowed fish to detect the boat and maneuver their way around it. Repeated shocking, over a period of time, also reduced efficiency as fewer fish were observed on a daily basis. This may be due to fish moving out of the section or learning to avoid the boat after repeated exposure to its effects. Rest periods did help as numbers of fish collected would increase but never were as high as obtained in the initial electrofishing run.

Clancy's (1980) work developed a hypothesis that smallmouth bass from upstream areas migrated into an area around Ashland to winter, hence the use of Section 2 of this study. Clancy received phone calls in the fall about his tagged fish being caught by local fisherman in this area. For this reason Section 1 was done first to allow marked fish to travel downstream into Section 2. Section 3 was worked after Section 1 to give marked fish from Section 1 the time to migrate. We did not recover any marked fish in Section 2 from upstream, but conceivably this section could be a wintering location as depth is adequate. This hypothesis could certainly be evaluated in future studies.

Of special interest was a high concentration of catfish found in one area of Section 2. Of 140 catfish captured, 91 (65%) were caught in this one location. All but four of these channel catfish were caught on the last two days this section was worked, thus causing the overall catch rate to be highly misleading. Increasing the number of days worked might have corrected this problem. Some factor caused these fish to be highly attracted to this spot. No physical characteristics, beyond the narrow river channel, stood out as unique to this location compared to several other areas in this section. It would be intriguing to further study this situation to determine what factor caused this concentration to occur. For future work this area is located in the SE1/4 of S34 of T2S, R44E.

Rock bass were abundant in all three sections. Uniquely, it is the only population existing in Montana. An interesting fact about this population is the rarity of the red iris in the eye that is a pronounced characteristic in most field guide descriptions. Rock bass were usually near submerged vegetation and undercut banks.

RECOMMENDATIONS

1. Future work should determine wintering potential and the factor(s) concentrating channel catfish in Section 2.

2. For future work electrofishing sections should be no longer than seven miles so that the full section can be electrofished in a day. Section 2 of this study was longer than seven miles to maximize the likelihood of finding wintering fish concentrations.

Literature Cited

Clancy, C. 1980. Vital Statistics and Instream Flow Requirement of fish in the Montco Mine Area of the Tongue River, Montana. Montana Dept. of Fish, Wildlife and Parks. 55 pp.

Ricker, W. E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Bulletin 191. Fisheries Research Board of Canada. Ottawa, Canada. 382 pp.

Table 1. Legal description of river sections.

Section	Section Length (miles)	Launch Site (upstream end)	Site (downstream end)
1	5.75	SW1/4 of S18 R44E T4S	NE1/4 of S5 R44E T4S
2	7.75	SE1/4 of S3 R44E T3S	SW1/4 of S22 R44E T2S
3	5.50	SE1/4 of S33 R44E T1N	NW1/4 of S23 R44E T1N

Table 2. Catch rate (number of fish per day) for smallmouth bass and channel catfish.

Section	Number of Days Worked	Smallmouth bass Number Caught	Smallmouth bass Catch Rate	Channel catfish Number Caught	Channel catfish Catch Rate
1	9	77	8.6	46	5.1
2	5	27	5.4	140	28.0
3	12	11	0.9	86	7.2

Table 3. Population estimates by species and river section.

Species	River Section	Number Marked (M)	Number Recaptured (R)	Population Estimate (N)	Confidence Interval 80%	90%	95%
Smallmouth bass	1	77	15	164	110-324	99-479	90-889
Channel catfish	1	46	0	*			
Smallmouth bass	2	27	3	*			
Channel catfish	2	140	6	*			
Smallmouth bass	3	11	1	*			
Channel catfish	3	82	10	346	245-587	224-755	208-1028

* = Data considered insufficient to estimate population size.

Table 4. Maximum, minimum, and mean length and weight for fish collected in section 1.

Species	Total Length (mm)			Weight (g)			Number Measured	Total Number Collected
	Max.	Min.	Mean	Max.	Min.	Mean		
Black crappie	191	164	180	90	50	71	7	7
Carp	661	207	502	3730	120	1694	120	160
Channel catfish	656	187	402	3420	20	834	46	46
Flathead chub	230	140	179	140	20	60	6	6
Green sunfish	150	150	150	165	165	165	1	1
Longnose dace	242	45	87	160	5	15	29	29
Longnose sucker	430	120	331	730	10	429	88	88
Plains minnow	115	115	115	5	5	5	1	1
River carpsucker	479	262	356	1400	220	526	77	77
Rock bass	213	131	174	250	40	116	138	138
Sauger	436	436	436	568	568	568	1	1
Shorthead redhorse	419	132	321	720	40	343	168	585
Smallmouth bass	431	150	248	1180	20	243	77	77
Stonecat	216	102	181	110	13	63	19	19
White crappie	204	172	192	120	70	92	9	9
White sucker	395	45	275	720	10	334	117	179
Yellow bullhead	299	140	194	260	10	96	85	85
Total							989	1508

Table 5. Maximum, minimum, and mean length and weight for all fish collected in Section 2.

Species	Total Length (mm)			Weight (g)			Sample Size	Total Number Collected
	Max.	Min.	Mean	Max.	Min.	Mean		
Black crappie	194	175	181	130	70	103	3	3
Carp	636	294	481	3980	120	1498	81	81
Channel catfish	755	180	526	4380	40	1372	140	140
Green sunfish	68	68	68	75	75	75	1	1
Longnose sucker	393	207	322	640	100	389	29	29
River carpsucker	386	165	338	740	65	482	26	26
Rock bass	194	152	173	180	70	120	20	20
Sauger	407	407	407	540	540	540	1	1
Shorthead redhorse	387	112	290	580	25	257	101	149
Smallmouth bass	353	132	237	605	30	223	27	27
Stonecat	191	174	183	90	30	60	2	2
Walleye	200	175	188	60	40	50	2	2
White crappie	201	201	201	120	120	120	1	1
White sucker	376	141	272	650	20	307	45	45
Yellow bullhead	225	157	196	170	30	96	10	10
Total							489	537

Table 6. Maximum, minimum, and mean length and weight for all fish collected in Section 3.

Species	Total Length (mm)			Weight (g)			Sample Size	Total Number Collected
	Max.	Min.	Mean	Max.	Min.	Mean		
Black bullhead	250	250	250	240	240	240	1	1
Black crappie	187	162	176	110	50	77	23	23
Carp	603	183	466	3340	100	1536	108	183
Channel catfish	787	105	295	5300	5	647	86	86
Flathead chub	194	100	144	70	5	25	84	91
Green sunfish	118	96	107	100	80	90	3	3
Longnose dace	115	43	82	30	5	18	77	101
Longnose sucker	381	90	223	550	5	151	130	133
Mountain sucker	181	65	128	60	5	27	5	6
River carpsucker	346	94	285	510	15	292	93	100
Rock bass	218	99	183	240	70	141	66	66
Shorthead redhorse	358	122	285	410	20	234	200	440
Smallmouth bass	442	147	257	1410	50	379	11	11
Stonecat	221	77	164	100	5	50	50	54
Walleye	201	194	197	70	50	60	3	3
White crappie	212	153	194	120	50	93	10	10
White sucker	376	61	229	650	5	204	114	297
Yellow bullhead	234	98	184	180	20	87	113	117
Total							1177	1725