MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana Title: Southwest Montana Fisheries Study

Project No.: F-9-R-31 Title: Inventory and Survey of the Waters

Job No.: 1-d of the Jefferson and Missouri River Drainages

Project Period: July 1, 1982 through June 30, 1983

Report Period: July 1, 1982 through June 30, 1983

ABSTRACT

Trout population estimates were calculated for the Toston Section of the Missouri River; the 1982 estimate is 143 brown trout per mile (Age III and older). The annual mortality rate from 1981 to 1982 was 34% for Age III+ to IV+ brown trout.

Brown trout estimates from the Jefferson River indicate a population of 390 fish per mile (Age III and older). Annual mortality rate from 1981 to 1982 in the Willow Creek-Three Forks Section was 56% for Age III+ to IV+ fish.

Discharge and water temperatures were monitored in both rivers. Throughout the summer the Missouri River was above average in discharge (minimum, 2790 cfs). The Missouri water temperature peaked on August 1st (72.7°F). The Jefferson River discharge was exceptional all summer, with the low flow occurring on August 29th (1100 cfs). The maximum water temperature in the Jefferson was 78.5°F (recorded on July 30th). Another temperature site was added in the upper Jefferson River near Twin Bridges; this site indicated cooler water.

BACKGROUND

The upper Missouri River in Montana is famous for producing trophy trout. This stream was given "Blue Ribbon" status in 1959 by the Montana Department of Fish and Game. Fishing pressure on the reach between Canyon Ferry Reservoir and Three Forks totaled 7705 fishermen days annually in 1975. Canyon Ferry Reservoir supports a trout fishery (both rainbow and brown) as well as a yellow perch fishery. The 1975 pressure survey showed Canyon Ferry Reservoir to be the most heavily fished body of water in the state. A brown trout spawning out-migration occurs in the reservoir in the fall and rainbow have run in both the spring and fall with the most noticeable concentrations occurring in the fall season.

The river is used as a source of irrigation water for agriculture. Although never totally dewatered, it suffers from indirect thermal addition resulting from dewatering upstream and Madison River temperature increases below Ennis Dam. At present, a power generation facility is being considered as an addition to the existing Toston irrigation dam.

In contrast, the Jefferson River suffers periodic total dewatering (in some reaches) and severe temperature problems. Despite these problems, the Jefferson supports a good brown trout population which provided 26,374 days of angling in 1975.

Data is needed to establish base information from which to determine fisheries management direction on these rivers.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To determine trout populations in sections of the Missouri and Jefferson rivers. Data is presented.

2. To monitor daily flow and summer water temperatures in these study sections. Data is presented for the Missouri and Jefferson rivers.

3. To relate salmonid growth rates to the respective temperature situations. Data is not included due to thermograph malfunction.

4. To mitigate or enhance habitat alterations due to agricultural, residential, mining and industrial development. Data is presented.

PROCEDURES

Trout populations in the Missouri and Jefferson rivers were censused using a fixed-positive boat-mounted electrofishing system. Population and biomass estimates were calculated using methods described by Vincent (1971 and 1974) and adapted for computer analysis.

Discharge data was gathered by the USGS at gauge stations located at Three Forks on the Jefferson River, and at Toston on the Missouri River. Water temperature data was collected by the USGS at Toston and by the Montana Department of Fish, Wildlife and Parks at Three Forks and Twin Bridges.

FINDINGS

Missouri River

Resident Fish Populations

Toston-Deepdale Section - Brown trout population estimates are presented in Table 1 for the 7.3-mile section of the Missouri River (Figure 1). Table 1 depicts the population estimate for the spring of 1982.

Table 1. Estimated numbers and biomass by age groups for brown trout in the Toston-Deepdale study section (7.3 miles), spring 1982 (80% confidence limits in parentheses).

Age	Average Length (In.)	Number	Biomass (Lbs)	Number Per Mile
III	13.8	387 (±136)	380.2	53
IV	15.8	307 (±106)	449.5	42
V+	18.8	354 (±112)	854.8	48
		1048 (±296)	1684.5	143

Table 2 depicts the annual mortality rate of brown trout Age III and IV and older in the spring of 1982. This annual mortality rate (34%) is considerably lower than previously encountered and may reflect the high summer flows of 1981. Movement between Canyon Ferry Reservior and this study section may also be confounding evaluations of the trout population.

Table 2. Annual mortality rates of brown trout by age group in the Toston-Deepdale study section from spring 1981 to spring 1982.

Age	Spring 1981 Population Estimate	Spring 1982 Population Estimate	Annual Mortality (%)
III+ to IV+	995	661	34

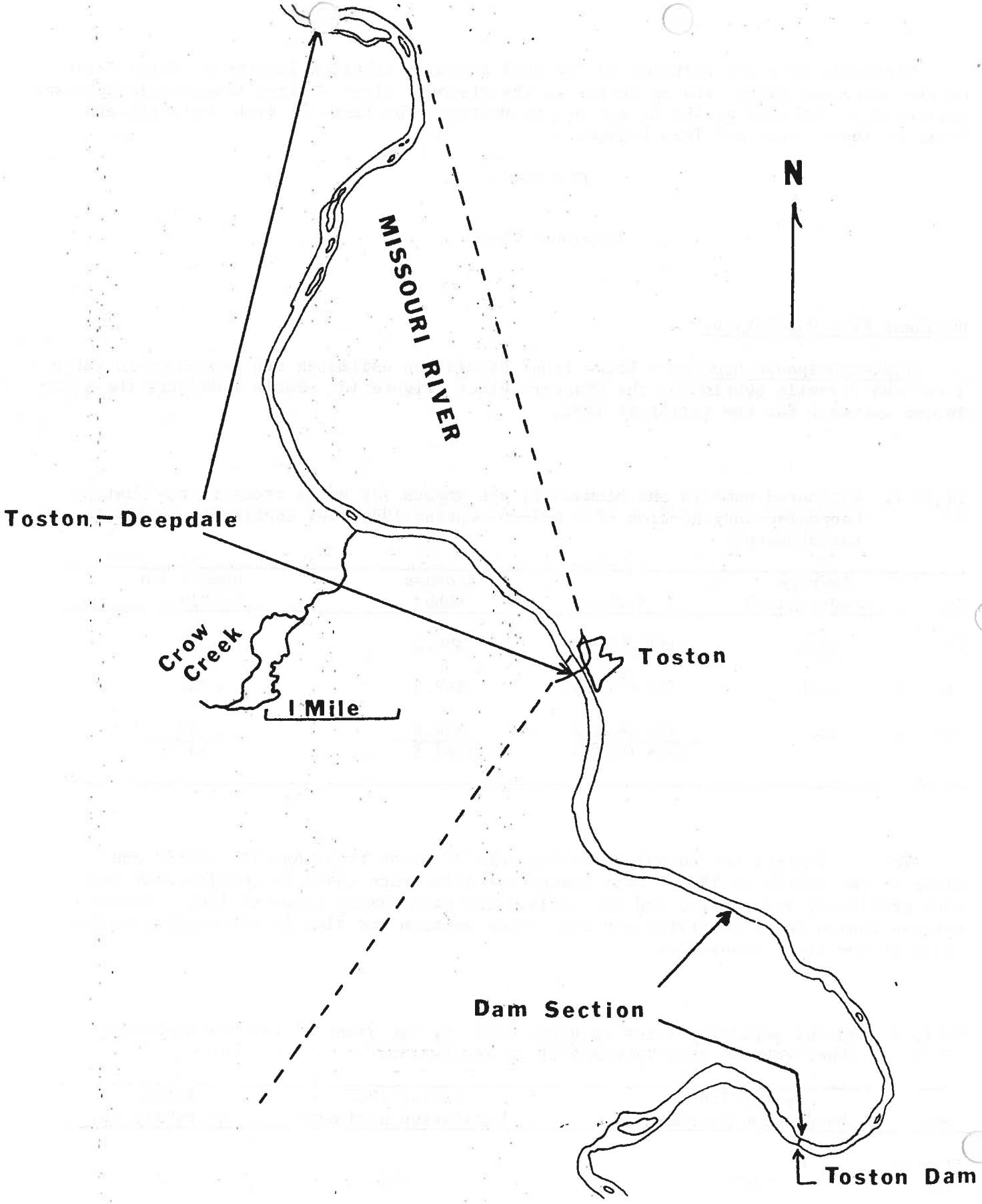

Figure 1. Map of the Missouri River study sections (Toston-Deepdale and Toston Dam).

Migrant Fish Populations

This work, limited to the fall period, and was done in four sections between Canyon Ferry Reservoir and Toston Dam: Canyon Ferry-Townsend, Townsend-Deepdale, Toston-Deepdale, and Toston Dam section (Figures 1 and 2).

In 1978 and 1979, Fredenberg (1980) documented a substantial fall rainbow trout run and associated fishery. He suggested a relationship between magnitude of the run and river discharge. This run was monitored in subsequent years, as time permitted. In 1982, fishermen began complaining about an absence of fall running rainbow. Table 3 shows results of the 1982 sampling in numbers of brown and rainbow trout tagged. Table 4 depicts the catch-per-unit effort data on the Canyon Ferry-Townsend Section with respect to rainbow trout for 1978, 1980 and 1982. This data suggests the rainbow run declined markedly from 1978 to 1982. Discharge in the Missouri River during the fall of 1982 was even greater than in 1978, which suggests flow is not the limiting factor to this fall run of rainbows.

Table 3. Effort and sampling success of fall 1982 electrofishing in four sections of the Missouri River.

Study Section	No. Days Sampled	No. of LL (16.0 In.+) Tagged	No. of Rb (13.0 In.+) Tagged
Canyon Ferry-Townsend	8	37	191
Townsend-Deepdale	5	53	109
Toston-Deepdale	2	114	59
Toston Dam	7	355	230
TOTAL	22	559	589

Table 4. Average number of rainbow sampled per run in the Canyon Ferry-Townsend Section by year.

Year	Fall 1978	Fall 1980	Fall 1982
No. of rainbow trout over 13.0 In.+	94	52	24

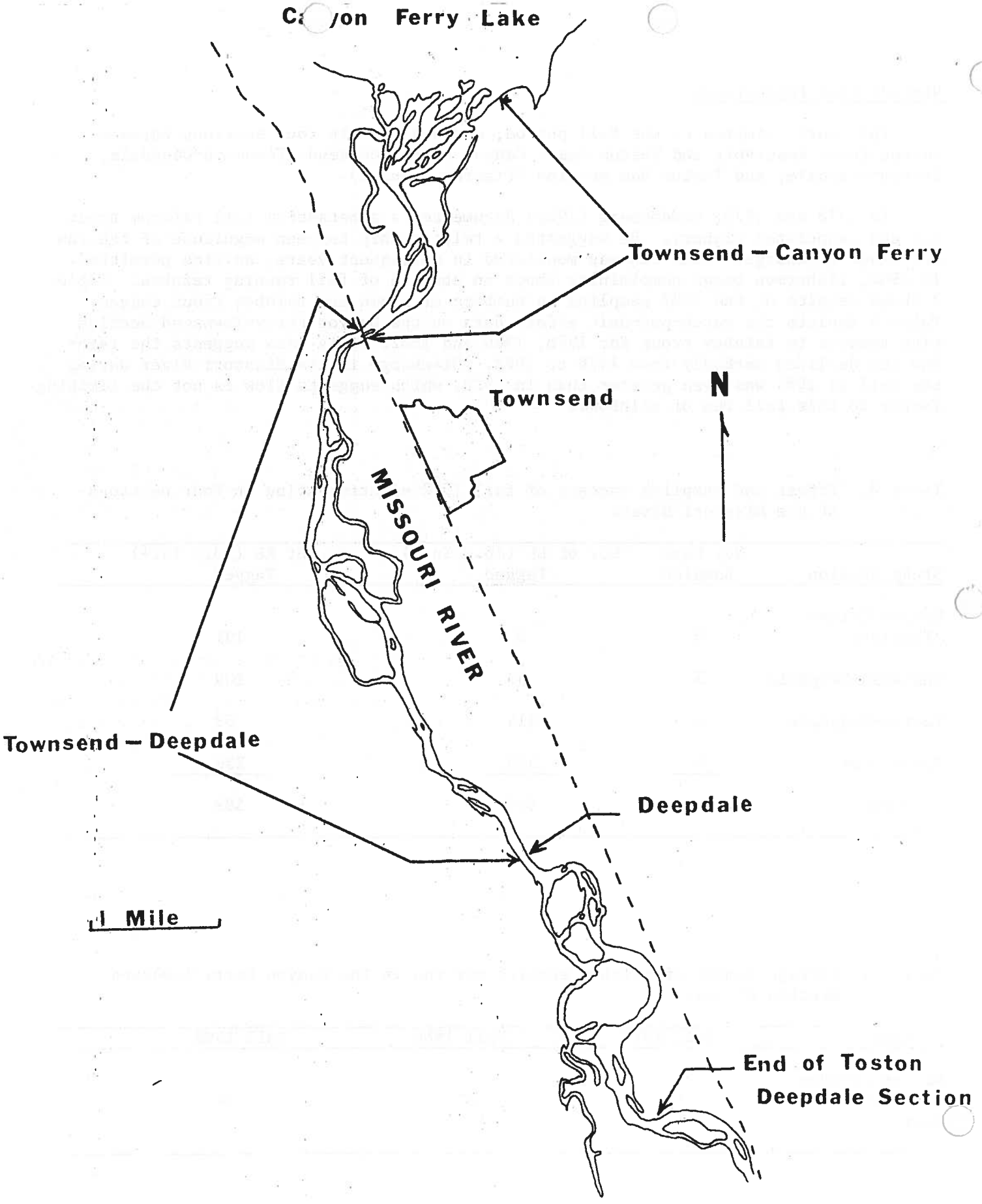

Figure 2. Map of the Missouri River study sections (Townsend-Canyon Ferry and Townsend-Deepdale).

A spot creel census was run on the Canyon Ferry-Townsend Section for five separate days in October, 1982. Very few fishermen were encountered and the result of 80 contacts revealed a catch rate of 0.154 rainbows per hour. This compares to Fredenberg's stratum 7 and 8 where he showed 6381.5 hours of pressure in this 28-day period (228 hours per day) during 1978. The harvest taken in those four weeks of 1978 was approximately 4600 trout with catch rates averaging 0.72 fish per hour.

The fall run of rainbow trout into the Missouri River from Canyon Ferry Reservoir has deteriorated substantially and coincides with a collapse of the reservoir rainbow fishery.

Flow

Late spring and summer flows of the Missouri River at Toston during 1982 were higher than those of 1981. The mean monthly discharges for the May-September period were all above average. Mean monthly discharges were 10,230 and 3349 for July and August, respectively (USGS, 1982). Mean daily discharges are given in Appendix Table 1. The low flow for 1982 occurred on August 14th (2790 cfs). This value is well above the minimum recommended instream flow of 1500 cfs for the low flow summer period.

Temperature

Summer water temperatures of the Missouri River at Toston are commonly above those recommended for salmonid growth (Vincent, 1979). The maximum summer water temperature in 1982 was recorded on August 1st (72.7°F). During 1982, the maximum daily water temperature of the Missouri equaled or exceeded 70.0°F on 17 days, while the daily mean temperature equaled or exceeded the 70.0°F level on 6 days (Appendix Table 2).

Salmonid Growth Related to Water Temperature

Although temperature data was collected and brown trout scale samples were aged, cursory review indicated insufficient scale sample sizes for this analysis. The location for this work is further confounded by large runs of reservoir fish which appear to be impacting the population.

Jefferson River

Resident Fish Populations

Willow Creek-Three Forks Section - This section begins at Meridian Bridge and runs 7.0 miles to the Three Forks Highway No. 10 Bridge (Figure 3). During the non-

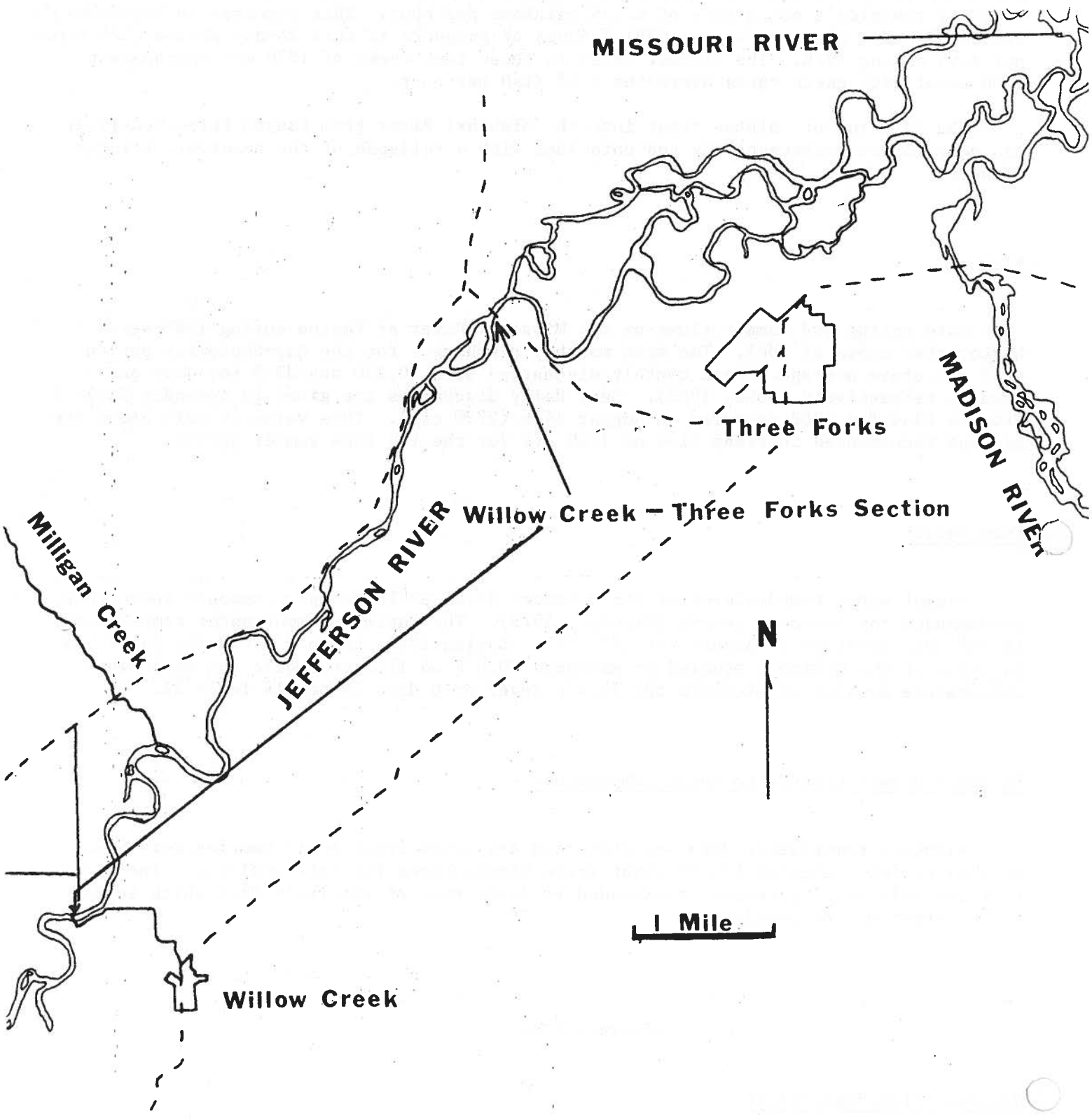

Figure 3. Map of the Jefferson River study sections (Willow Creek-Three Forks, 7.0 miles).

runoff period there are no significant tributaries entering this reach. The river in this area is mainly confined to a single large channel, although several small side channels are present. Man has impacted this section with rock rip-rap, highway construction, some denuded streambanks, and sediment discharge.

Brown trout constitute over 90% of the trout population in this section of the river.

Population estimates for the spring of 1982 are given in Table 5. Brown trout mortality rates are given in Table 6.

Table 5. Brown trout population estimates for the Willow Creek-Three Forks study section (7.0 miles), spring 1982 (80% confidence limits in parentheses).

Age	Average Length (In.)	Number	Biomass (Lbs)	No. Per Mile
III	12.3	1958 (±470)	1293.5	280
IV	14.7	542 (±175)	610.8	77
V+	17.4	232 (± 79)	425.9	33
TOTAL		2732 (±722)	3623.7	390

Table 6. Mortality rates for brown trout from spring 1981 to spring 1982 in the Willow Creek-Three Forks Section of the Jefferson River.

Age Group	Number Spring 1981	Number Spring 1982	Annual Mortality (%)
III+ to IV+	1773	774	56

The brown trout population experienced an annual mortality rate of 56% from Age III to IV. This year's mortality rate was lower than previously documented and is an acceptable loss. The minimum summer discharge during this period of mortality was 555 cfs (August 17, 1981), while the maximum water temperature was 74.7°F (August 16, 1981). Flows during this report period were the highest since 1978.

Hell's Canyon Section - This section is 3.1 miles long and is located in the upper reaches of the Jefferson River (Figure 4). This section was added when cursory investigation revealed generally cooler water temperatures (unpublished data) and better in-

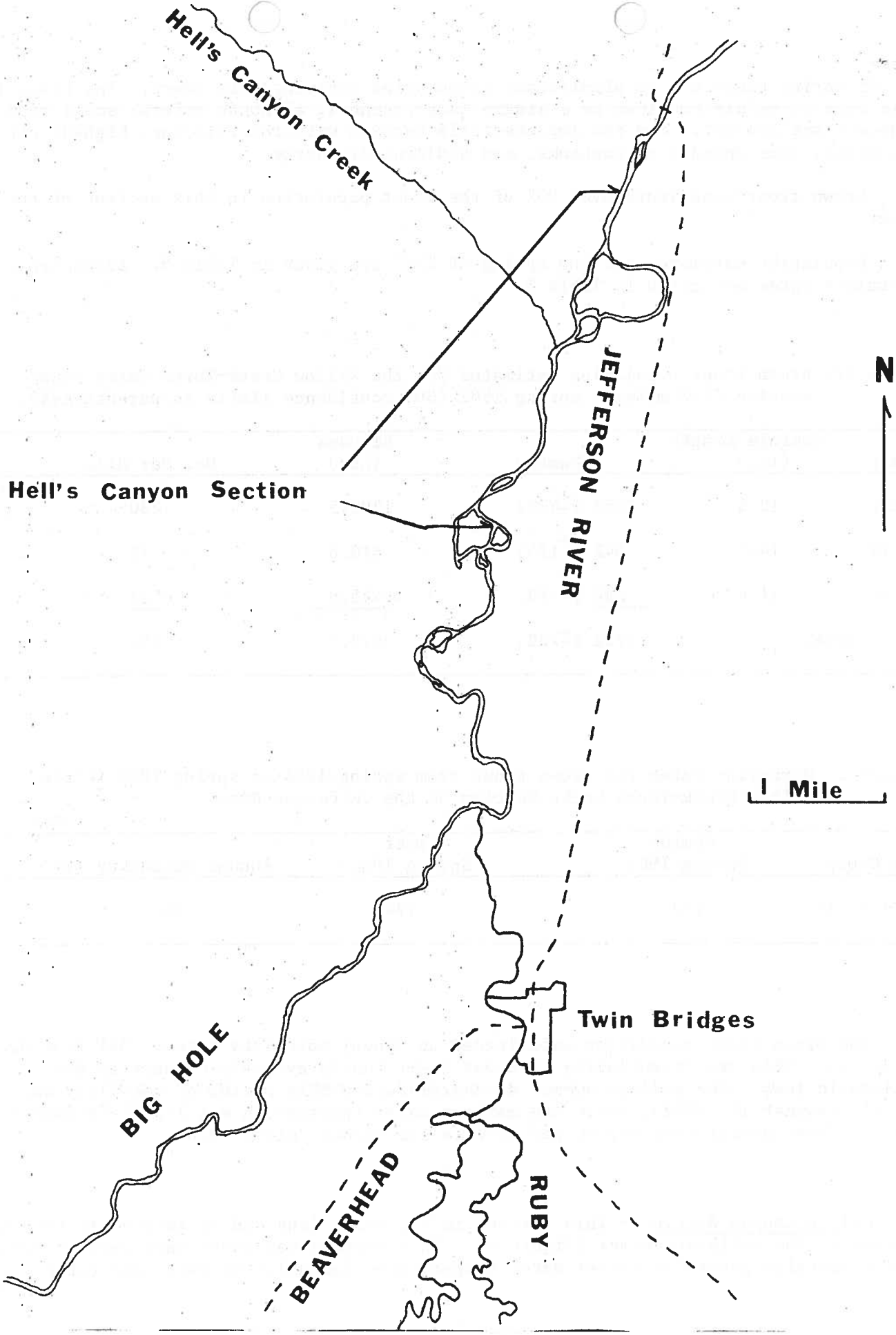

Figure 4. Map of the Jefferson River study sections (Hell's Canyon, 3.1 miles).

stream flows (located above all major Jefferson River diversions).

During the spring of 1982, one day of electrofishing was completed on this section. A total of 201 brown and 33 rainbows were captured. Future work will include enumerating these trout populations.

Migrant Populations

Boulder River - Initial tagging of this fall brown trout concentration was done in the falls of 1977 and 1978. Tag return information indicated these fish came largely from the lower half of the Jefferson River. Smaller numbers were caught in the lower Madison River, Willow Creek, and the upper Missouri River.

During the fall of 1982, two electrofishing runs were made in the lower Boulder River. A total of 196 brown trout (13.0 inches and larger) were tagged with the largest individual being 4.4 pounds.

Ruby River - Results from initial tagging done in the fall of 1981 suggested most of these brown trout were from the Jefferson River. Tagging was intensified in an attempt to better understand this life phase of Jefferson River brown trout.

A total of four electrofishing runs were conducted during October, 1982; 314 brown trout were tagged (16.0 inches and greater). The largest individual was 10.5 pounds.

Flow

Spring and summer discharges of the Jefferson River at Three Forks during 1982 were the highest since work began in 1978. Mean monthly discharges were 6269, 9117, 4834, 1277, and 1722 for May, June, July, August and December, respectively (USGS, 1982). Mean daily discharges are given in Appendix Table 3. The low flow for 1982 occurred on August 29th (1100 cfs); flow during 1982 did not drop below the recommended instream flow of 1000 cfs.

Temperature

Summer water temperatures of the Jefferson River are commonly above those recommended for salmonid growth (Vincent, 1979). Since dewatering is recognized, another site was added above all major irrigation diversions (near Twin Bridges location). The maximum water temperature at the Three Forks site in 1982 was recorded on July 30th (78.5°F); the maximum water teperature at the Twin Bridges location in 1982 was recorded on July 31st (74.0°F). During 1982 the Jefferson River at Three Forks had daily maximums in excess of 70°F on 26 days, while the Twin Bridges site exceeded 70°F on 23 days.

Salmonid Growth Related to Water Temperature

Temperature data collection has been plagued by equipment failures, making analysis impossible. Until reliable equipment can be obtained it is recommended this objective be omitted.

Mitigation of Habitat Alterations

This objective falls under the responsibility of the Natural Streambed and Land Preservation Act of 1975. These responsibilities are handled in conjunction with local Soil Conservation Districts. In the area adjacent to the Missouri and Jefferson rivers there are three conservation districts: Broadwater, Jefferson Valley, and Mile High.

During 1982, a total of 44 alteration projects were reviewed and eventually approved. Table 7 summarizes the types of projects mitigated in the three conservation districts.

Table 7. Summary of habitat alteration projects by conservation district.

	Type of Project					
District	Agriculture	Residential	Mining	Industrial*	Roads	Total
Mile High			3			3
Broadwater	12	1	3		1	17
Jefferson Valley	10	2	9	2	1	24

* Includes logging.

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Jefferson River 3-10-3840-01

Key Words: Trout Numbers
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Mortality Rates
Brown Trout
Water Temperature
Discharge
Rainbow Trout

APPENDIX

Appendix Table 1. Missouri River mean daily discharge (cfs), May through September, 1982 (USGS gauge at Toston).

Day	May	June	July	August	September
1	8 720	16 600	22 000	4 350	3 520
2	8 930	14 500	20 700	4 130	3 620
3	9 960	13 200	18 500	3 680	3 600
4	11 600	12 300	17 600	3 960	3 620
5	12 100	12 400	16 700	3 820	3 450
6	11 300	12 800	15 700	3 530	3 440
7	10 100	13 500	14 000	3 030	3 500
8	9 520	13 800	12 600	3 090	3 600
9	9 740	14 000	12 000	3 070	3 660
10	9 500	13 300	12 300	3 090	3 630
11	8 930	12 500	12 100	3 100	3 890
12	8 050	12 200	11 500	3 100	4 170
13	7 670	12 500	10 600	2 950	4 400
14	7 430	14 400	10 100	2 790*	4 990
15	7 520	17 100	9 990	2 850	5 720
16	8 120	18 500	9 810	2 970	5 750
17	8 970	20 100	9 290	3 360	5 610
18	9 880	22 500	8 820	3 290	5 560
19	12 200	22 900	7 730	3 230	5 520
20	12 700	22 500	7 130	3 220	5 540
21	12 300	21 900	6 560	3 490	5 590
22	11 800	21 500	6 230	3 350	5 590
23	12 100	21 500	5 580	3 420	5 560
24	12 600	22 000	5 610	3 560	5 440
25	13 200	22 100	5 550	3 460	5 350
26	13 700	22 200	5 510	3 300	5 260
27	14 900	22 000	5 180	3 150	5 780
28	17 500	22 500	4 660	3 230	6 740
29	20 100	23 000	4 390	3 300	6 740
30	19 600	23 100	4 310	3 410	6 830
31	18 100	—	4 390	3 540	—
Mean	11 580	17 780	10 230	3 349	4 856

* Low summer discharge.

Appendix Table 2. Water temperature (°F) of the Missouri River at Toston, Montana 1982 (USGS).

Day	July			August			September		
	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean
1	65.8	62.6	63.5	72.7*	70.9	71.8			
2	62.4	59.4	61.0	70.5	67.8	69.1			
3	62.4	59.7	61.2	68.0	66.7	67.5			
4	61.7	58.6	59.5	67.1	65.5	66.4			
5	59.0	56.1	57.4	68.9	66.9	67.8			
6	60.3	55.6	57.4	70.7	68.7	69.8			
7	60.4	58.5	59.5	72.0	69.6	70.5			
8	62.8	59.4	60.6	71.2	68.7	70.0			
9	63.0	60.6	61.3	69.6	67.6	68.4	65.1	63.1	64.2
10	64.0	59.9	61.3	71.2	68.9	70.0	64.6	59.5	62.4
11	64.8	62.1	63.5	71.8	68.7	70.3	59.2	56.8	57.6
12	66.0	62.8	64.0	69.4	66.0	67.8	58.6	56.5	57.7
13	66.4	64.8	65.7	68.5	66.4	67.1	56.1	50.0	53.6
14	66.9	64.6	65.8	69.1	66.9	67.9	49.6	47.1	47.8
15	66.9	63.3	64.8	67.8	65.1	66.6	49.6	46.8	48.0
16	64.9	61.7	62.8	66.9	64.6	65.8	52.0	49.8	50.9
17	63.5	60.8	62.1	69.4	66.7	67.8	53.6	52.0	52.9
18	65.1	63.0	63.9	68.0	66.0	66.9	54.5	53.6	54.1
19	66.6	64.2	65.3	68.5	66.0	67.3	55.6	54.5	54.9
20	68.4	66.7	67.3	70.5	68.4	69.4	56.7	55.8	56.1
21	69.3	67.5	68.4	71.4	69.4	70.3	56.7	56.3	56.5
22	69.8	68.7	69.3	72.1	70.2	70.9	57.0	56.1	56.7
23	69.8	68.7	69.3	70.5	68.0	69.3	56.8	56.1	56.5
24	68.7	67.8	68.2	68.0	65.7	66.6	59.4	56.8	58.3
25	69.4	68.0	68.5	68.4	66.2	67.1	59.4	56.3	58.3
26	70.2	69.3	69.8	67.8	65.7	66.7	56.1	51.6	53.6
27	71.1	70.0	70.5	66.9	64.4	65.7	51.4	49.6	50.5
28	71.6	70.3	71.1	67.8	65.8	66.6	49.5	47.3	48.0
29	70.3	70.0	70.2	68.4	65.7	66.7	47.3	45.9	46.6
30	70.5	69.6	70.2				46.8	46.4	46.6
31	71.6	70.3	70.9						

* Maximum temperature recorded during summer, 1982.

Appendix Table 3. Jefferson River mean daily discharge (cfs), May through September, 1982 (USGS gauge near Three Forks).

Day	May	June	July	August	September
1	4 760	9 610	10 900	1 700	1 260
2	4 890	8 370	10 200	1 680	1 280
3	5 260	7 220	9 180	1 600	1 280
4	6 130	6 550	8 640	1 510	1 270
5	6 910	6 590	7 910	1 450	1 330
6	6 450	6 840	7 330	1 350	1 360
7	5 390	6 820	6 790	1 240	1 400
8	5 020	6 720	6 300	1 130	1 360
9	5 040	6 600	6 060	1 170	1 320
10	4 880	6 290	6 010	1 270	1 250
11	4 590	5 860	5 860	1 340	1 260
12	4 350	5 670	5 530	1 310	1 240
13	4 130	5 690	5 100	1 270	1 380
14	3 950	6 300	4 850	1 250	1 640
15	4 000	7 970	4 850	1 230	1 890
16	4 380	9 720	4 740	1 220	2 090
17	4 860	10 900	4 420	1 230	2 030
18	5 340	11 700	4 080	1 220	2 010
19	6 060	12 200	3 690	1 240	1 990
20	6 560	12 000	3 270	1 240	1 990
21	6 570	11 400	3 000	1 220	1 970
22	6 390	11 300	2 720	1 210	1 940
23	6 430	11 000	2 500	1 240	1 910
24	6 790	11 200	2 300	1 240	1 830
25	7 120	11 500	2 230	1 200	1 770
26	7 390	11 500	2 200	1 180	1 730
27	8 010	11 400	2 090	1 120	1 980
28	9 680	11 600	1 910	1 110	2 320
29	10 900	11 600	1 800	1 100*	2 680
30	11 300	11 400	1 720	1 130	2 900
31	10 800	—	1 680	1 200	—
Mean	6 269	9 117	4 834	1 277	1 722

* Low summer discharge.

Appendix Table 4. Water temperatures (°F) of the Jefferson River at Three Forks, Montana, 1982 (MDFWP).

Day	July Max.	July Min.	July Mean	August Max.	August Min.	August Mean	September Max.	September Min.	September Mean
1	67.0	61.0	64.0	74.0	65.5	69.8	67.5	62.0	64.8
2	69.0	60.5	65.8	72.0	63.5	67.8	66.5	60.0	63.3
3	68.5	60.5	64.5	70.0	62.5	66.3	69.0	60.0	63.5
4	61.5	59.0	60.3	70.0	63.0	66.5	69.0	64.0	66.5
5		"		71.5	65.0	68.3	68.0	61.5	64.8
6		"		72.5	66.0	69.3	67.0	60.0	63.5
7		"		73.0	65.5	69.3	67.0	59.5	63.3
8		"		69.5	65.0	67.3	66.5	59.5	63.0
9	Temperature Range			70.5	64.5	67.5	66.5	59.5	63.0
10	to			72.5	65.0	68.8	61.0	54.5	57.8
11	55.0° to 69.0°F			71.5	63.0	67.3	64.5	54.5	59.5
12		"		69.0	62.0	65.3	58.0	50.0	54.0
13		"		69.0	63.0	66.0	50.0	45.0	47.5
14		"		67.5	61.5	64.5	45.5	43.5	44.5
15		"		66.5	61.0	63.8	54.0	44.0	49.0
16	68.5	59.5	64.5	69.5	63.0	66.3	58.0	52.0	55.0
17	68.0	57.5	62.8	68.0	62.0	65.0	55.5	49.5	52.5
18	65.0	59.0	62.0	69.0	63.0	66.0	57.0	52.0	54.5
19	66.0	60.0	63.0	71.5	64.5	68.0	52.0	51.5	51.8
20	68.0	62.5	65.3	72.0	65.5	68.8	58.0	53.0	55.5
21	71.0	65.5	68.3	73.0	67.0	70.0	60.0	53.0	56.6
22	71.5	67.0	69.3	72.5	64.0	68.3	59.5	55.0	57.3
23	71.5	66.5	69.0	71.0	64.0	67.5	60.0	55.0	57.5
24	69.5	65.0	67.3	70.0	62.5	66.3	59.0	54.5	56.8
25	70.5	66.0	68.3	69.5	62.0	65.8	61.5	56.0	58.8
26	74.0	68.0	71.0	68.0	62.0	65.0	58.5	56.0	57.3
27	74.0	67.0	70.5	68.5	62.0	65.3	57.0	50.5	53.8
28	74.0	66.5	70.3	68.5	63.0	65.8	51.0	48.0	49.5
29	78.0	65.0	71.5	68.0	63.0	65.5	49.0	45.5	47.3
30	78.5*	65.0	71.8	68.0	63.0	65.5	47.0	44.0	45.5
31	75.0	67.0	71.0	67.5	62.0	64.8			

* Maximum temperature recorded during summer, 1982.

Appendix Table 5. Water temperature (°F) of the Jefferson River near Twin Bridges, Montana, 1982 (MDFWP).

Day	July			August			September		
	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean
1	64.0	59.0	61.5	70.0	65.0	67.5	59.0	56.0	57.5
2	64.0	57.0	60.5	70.0	60.0	65.0	64.0	55.0	59.5
3	64.0	57.0	60.5	70.0	60.0	65.0	65.0	56.0	60.5
4	62.0	57.5	59.8	69.0	60.0	64.5	65.0	57.0	61.0
5	58.0	54.5	56.3	71.0	60.0	65.5	67.0	60.0	63.5
6	61.0	52.0	56.5	73.0	61.5	67.3	64.0	56.0	60.0
7	61.0	55.5	58.3	73.5	63.0	68.3	63.0	55.0	59.0
8	62.0	55.0	58.5	69.0	64.0	66.5	64.0	55.0	59.5
9	60.0	57.0	58.5	72.0	62.0	67.0	63.0	55.0	59.0
10	62.0	56.0	59.0	73.0	63.0	68.0	64.0	56.0	60.0
11	66.0	59.5	62.5	71.0	63.0	67.0	58.0	52.0	55.0
12	67.0	59.0	63.0	68.5	59.5	64.0	56.0	50.0	53.0
13	68.0	60.0	64.0	69.5	59.0	64.3	53.0	50.0	51.5
14	66.0	60.0	63.0	69.0	61.0	65.0	48.0	42.0	45.0
15	68.0	60.0	64.0	66.5	59.5	63.0	45.0	40.0	42.5
16	67.0	58.0	62.5	70.0	59.5	64.8	46.0	42.0	44.0
17	65.0	57.0	61.0	70.0	61.0	65.5	50.0	42.0	46.0
18	66.0	58.5	62.3	69.0	61.0	65.0	54.0	46.0	50.0
19	67.0	60.0	63.5	71.0	61.0	66.0	55.0	48.0	51.5
20	69.0	62.0	65.5	71.5	62.0	66.8	54.0	50.0	52.0
21	69.0	62.0	65.5	72.0	63.5	67.8	59.0	49.0	54.0
22	71.0	63.0	67.0	71.0	63.0	67.0	60.0	53.0	56.5
23	71.5	63.0	67.3	68.0	60.0	64.0	58.0	53.0	55.5
24	70.0	62.0	66.0	68.0	58.0	63.0	59.0	52.0	55.5
25	68.5	61.0	64.8	67.0	58.0	62.5	57.0	52.0	54.5
26	71.5	63.0	67.3	66.0	57.0	61.5	60.0	53.0	56.5
27	73.5	64.0	68.8	66.0	57.0	61.5	59.0	54.0	56.5
28	69.0	64.5	66.3	67.0	59.0	63.0	54.0	50.0	52.0
29	72.0	62.0	67.0	65.0	58.0	61.5	51.0	48.0	49.5
30	73.0	63.0	68.0	65.0	58.0	61.5	47.0	43.0	45.0
31	74.0*	65.0	69.5	64.0	58.0	61.0			

* Maximum temperature recorded during summer, 1982.