

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS  
FISHERIES DIVISION

JOB PROGRESS REPORT

State Montana

Project No. F-20-R-25

Title South Central Montana Fisheries Study

Job No. III-a

Title Musselshell River Study

Period Covered April 1, 1980 through March 31, 1981

ABSTRACT

This report contains data from the third year of investigation of species of fish in the Musselshell River. The study was initiated to determine instream flow requirements of selected fish species and evaluate progress of newly introduced smallmouth bass. Information in this report was collected from a small portion of the warm water environment of the lower river.

Water temperatures at the upper reach of the warm water zone ranged from 32° F to 79.5° F. Nineteen days of record exceeded 75° F.

Seventy-five channel catfish (Ictalurus punctatus), 46 sauger (Stizostedion canadense) and 42 smallmouth bass (Micropterus dolomieu) were captured and fitted with streamer tags. Game fish were captured by seining (1), gill netting (20), baited hoop nets (68), electrofishing (50), fixed traps (16), barrel traps (3) and set lines (5). No game species were captured in drift nets.

Sauger lengths and weights ranged from 10 to 24 inches and .27 to 3.72 pounds, respectively. Channel catfish ranged from 9.3 to 30.0 inches and .27 to 12.0 pounds.

Age I smallmouth bass averaged 6.5 inches, Age II were 9.2 inches and Age III fish were 11.6 inches. The largest smallmouth bass was 13.2 inches, 1.30 pounds at a known age of 39 months. Newly introduced smallmouth bass moved 20 $\frac{1}{2}$  miles downstream from stocking sites.

OBJECTIVES

1. To further document instream flow recommendations.
2. To identify species present in the lower 100 miles of river.
3. To monitor success of the introduced smallmouth bass.
4. To monitor instream temperatures.
5. To map migration pattern of channel catfish in lower 100 miles of river.

PROCEDURES

Thirty-one day continuous reading thermographs monitored instream temperatures at three locations on the Musselshell River near Martinsdale, Harlowton and Roundup

shown in Figure 1.

Floating gill nets were used at three locations on the Musselshell River (Fig. 1). Nets were set in backwaters and eddies near irrigation diversions. Nets were checked approximately every  $\frac{1}{2}$  hour to reduce mortality. Fish were weighed, measured and tagged.

Baited hoop nets were placed in two locations in the river in mid-June (Fig. 1). Techniques and procedures were the same as those previously used (Berg, 1978; Wiedenheft, 1980).

Electrofishing from a small boat with a boom mounted positive electrode equipped with a variable voltage pulsating unit (Coffelt VVP-15) provided fish samples from four sections over a 20-mile portion of the Musselshell River (Fig. 1). Mean length of each section was 3.5 miles. Smallmouth bass and sauger were marked with individually numbered yellow streamer tags. Catfish were marked with green cinch-up tags. Lengths and weights were recorded for all game fish.

Barrel traps were constructed using old 15-inch diameter Civil Defense water containers. Small mesh seine netting was used as trap material. These barrel traps were placed in three locations on the river (Fig. 1) using steel fence posts for securing in place.

Three fixed box traps were constructed of 2x2's and chicken wire. They were divided into two compartments with downstream and upstream openings. Leads were placed on each opening to assist in funneling fish into the trap. Cheese was placed in perforated plastic buckets inserted into the traps as bait.

## FINDINGS

### Water Temperatures

Water temperatures at the Galt Ranch near Martinsdale (cold water zone) ranged from 32° F to 62.5° F. Warmest temperatures occurred in July 1980. Water temperatures at Harlowton ranged from 32° F to 71.5° F. Temperatures of 65° F and above were recorded on 48 days. Warmest temperatures were recorded during July.

River temperatures at Roundup ranged from 32° F to 79.5° F. Recorded temperatures were 75° F or higher on 19 days. The month of July was the warmest period of record in 1980. Temperatures in 1980, in most instances, were warmer than in 1978, but cooler than in 1979 (Table 1). The 3-year average temperature of the Musselshell River at Roundup ranged from 32° F to 69° F (Fig. 2).

### Game Fish

During 1980, 163 game fish were captured and tagged in six different areas of the lower river. A total of 42 smallmouth bass, 75 channel catfish and 46 sauger were tagged (Fig. 3).

Sampling with six floating gill nets proved effective for capturing sauger and smallmouth bass, but less effective with channel catfish. A total of six smallmouth bass were sampled using this method. Lengths ranged from 9.5 to 12.3 inches, while weights ranged from 0.44 to 1.18 pounds. Only one channel catfish was captured measuring 20.5 inches and 2.28 pounds. Thirteen sauger were sampled measuring 10.0 to 19.8 inches and weighing 0.27 to 2.82 pounds (Table 2).

Five baited hoop nets captured 21 smallmouth bass, 43 channel catfish and four sauger. Smallmouth bass lengths ranged from 6.0 to 12.0 inches and weights ranged

Table 1. Mean monthly maximum and minimum temperatures for portions of the years, 1978 through 1980

Station	Year	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Galt Ranch	$\bar{X}$ Max. 1978	-	-	-	54.0	55.0	58.0	51.0	46.0	41.0	33
	$\bar{X}$ Max. 1979	37.0	40.0	47.0	54.0	60.0	61.0	57.0	47.0 <sup>1</sup>	35.0	34
	$\bar{X}$ Max. 1980	-	-	-	58.3 <sup>1</sup>	59.4 <sup>1</sup>	-	55.2	44	36	33
	$\bar{X}$ Min. 1978	-	-	-	45.0	52.0	52.0	46.0	42.0	38.0	32
	$\bar{X}$ Min. 1979	34.0	37.0	41.0	47.0	58.0	59.0	53.0	46.0 <sup>1</sup>	34.0	32
	$\bar{X}$ Min. 1980	-	-	-	53.1 <sup>1</sup>	57.5 <sup>1</sup>	-	54.2	42	35	32
Harlowton	$\bar{X}$ Max. 1978	-	-	-	61.0	60.0	60.0	54.0	49.0	35.0	32
	$\bar{X}$ Max. 1979	36.0	46.0	52.0	60.0	67.0 <sup>1</sup>	68.0	62.0	49.0	35.0	33
	$\bar{X}$ Max. 1980	-	-	-	62.6 <sup>1</sup>	69.4 <sup>1</sup>	65.0	58.8	47	37	33
	$\bar{X}$ Min. 1978	-	-	-	52.0	55.0	57.0	49.0	45.0	34.0	32
	$\bar{X}$ Min. 1979	33.0	40.0	47.0	53.0	61.0 <sup>1</sup>	61.0	55.0	45.0	33.0	32
	$\bar{X}$ Min. 1980	-	-	-	57.6 <sup>1</sup>	62.6 <sup>1</sup>	59.2	53.9	43	35	32
Roundup	$\bar{X}$ Max. 1978	-	-	-	65.0	67.0	69.0	59.0	44.0	35.0	34
	$\bar{X}$ Max. 1979	36.0	47.0	59.0	68.0	75.0	72.0	66.0	48.0	35.0	34
	$\bar{X}$ Max. 1980	-	-	-	71.7 <sup>1</sup>	76.3	69.9	62.2	47	39	33
	$\bar{X}$ Min. 1978	-	-	-	59.0	63.0	61.0	52.0	41.0	34.0	32
	$\bar{X}$ Min. 1979	32.0	43.0	53.0	61.0	68.0	67.0	60.0	44.0	34.0	32
	$\bar{X}$ Min. 1980	-	-	-	64.5 <sup>1</sup>	68.2	62.8	54.6	41	35	32

<sup>1</sup>Based on less than 16 days of thermograph operation.

# KEY

- Thermograph sites - - - - - ★
- Electrofishing sites - - - - - ●
- Fixed & barrel trap sites - - - - - □
- Gill net sites - - - - - ▲
- Baited hoop net sites - - - - - ⊗

0 10 20 30 40  
1" = 22 miles

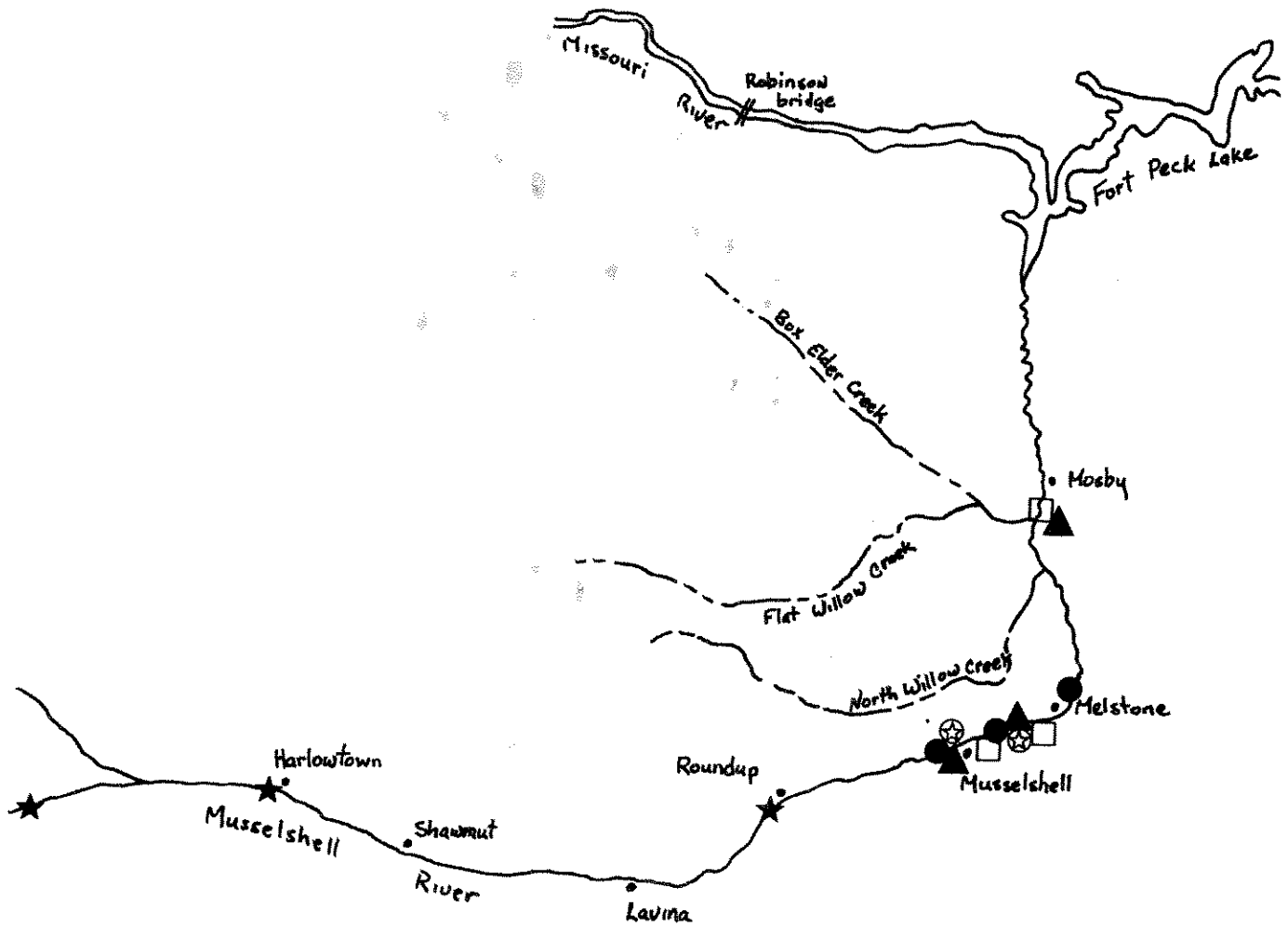
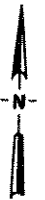


Figure 1. Data collection sites on the lower Musselshell River, 1980.

Table 2. Gill net data for lower Musselshell River, 1980

Species	# of Fish	Length Range (in.)	Weight Range (lbs.)	$\bar{X}$ Length	$\bar{X}$ Weight
Small Mouth Bass	6	9.5 - 12.3	0.44 - 1.18	10.7	0.71
Channel Catfish	1	20.5	2.28	-	-
Sauger	13	10.0 - 19.8	0.27 - 2.82	14.3	0.96

Table 3. Baited hoop net data for lower Musselshell River, 1980

Species	# of Fish	Length Range (in.)	Weight Range (lbs.)	$\bar{X}$ Length	$\bar{X}$ Weight
Small Mouth Bass	21	6.0 - 12.0	0.12 - 0.94	10.2	0.61
Channel Catfish	43	11.0 - 26.5	0.42 - 7.50	16.5	1.84
Sauger	4	12.3 - 21.0	0.48 - 2.90	15.5	1.25

Table 4. Electrofishing data for lower Musselshell River, 1980

Species	# of Fish	Length Range (in.)	Weight Range (lbs.)	$\bar{X}$ Length	$\bar{X}$ Weight
Small Mouth Bass	12	7.0 - 11.3	0.23 - 0.92	8.5	0.42
Channel Catfish	18	9.6 - 30.0	0.24 - 12.0	19.2	3.26
Sauger	20	11.6 - 24.0	0.46 - 3.72	15.1	1.11

Table 5. Fixed trap and barrel trap data for lower Musselshell River, 1980

Species	# of Fish	Length Range (in.)	Weight Range (lbs.)	$\bar{X}$ Length	$\bar{X}$ Weight
Small Mouth Bass	2	10.6 - 10.9	0.72 - 0.74	10.8	0.73
Channel Catfish	8	9.3 - 17.4	0.27 - 1.42	12.3	0.61
Sauger	9	12.8 - 21.5	0.51 - 3.10	16.8	1.42

Table 6. Other methods of capturing fish in the lower Musselshell River, 1980

Method	Species	# of Fish	Length Range (in.)	Weight Range (lbs.)	$\bar{X}$ Length	$\bar{X}$ Weight
Set line	Channel Catfish	5	22.3 - 30.0	3.42 - 8.0	26.1	5.7
Drift net	None Captured	0	-	-	-	-
Seine	Small Mouth Bass	1	5.3	0.08	-	-

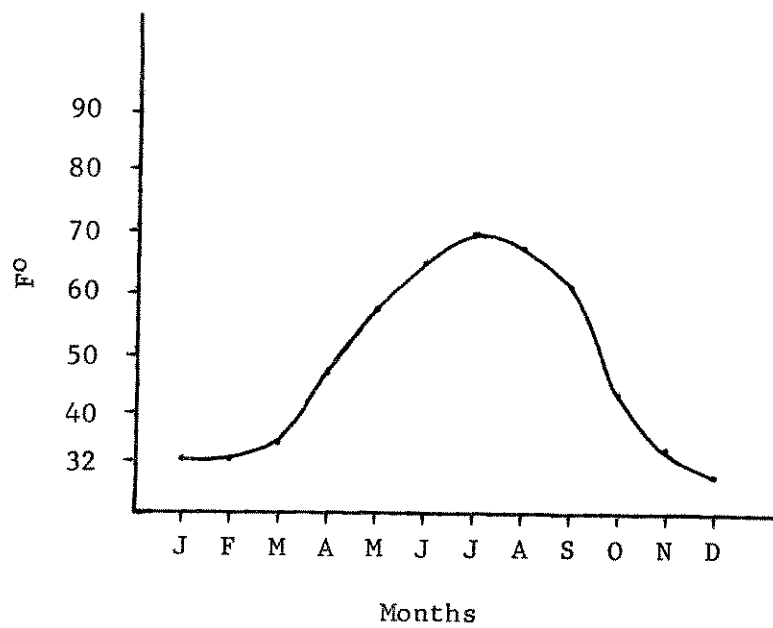


Figure 2. Mean monthly temperature of the Musselshell River at Roundup, Montana.

# KEY

Site	SMB	Catfish	Sauger
1	8	1	0
2	25	57	9
3	5	4	18
4	3	9	9
5	1	4	8
6	0	0	2
Total	42	75	46

SMB = smallmouth bass

0 10 20 30 40  
1" = 22 miles

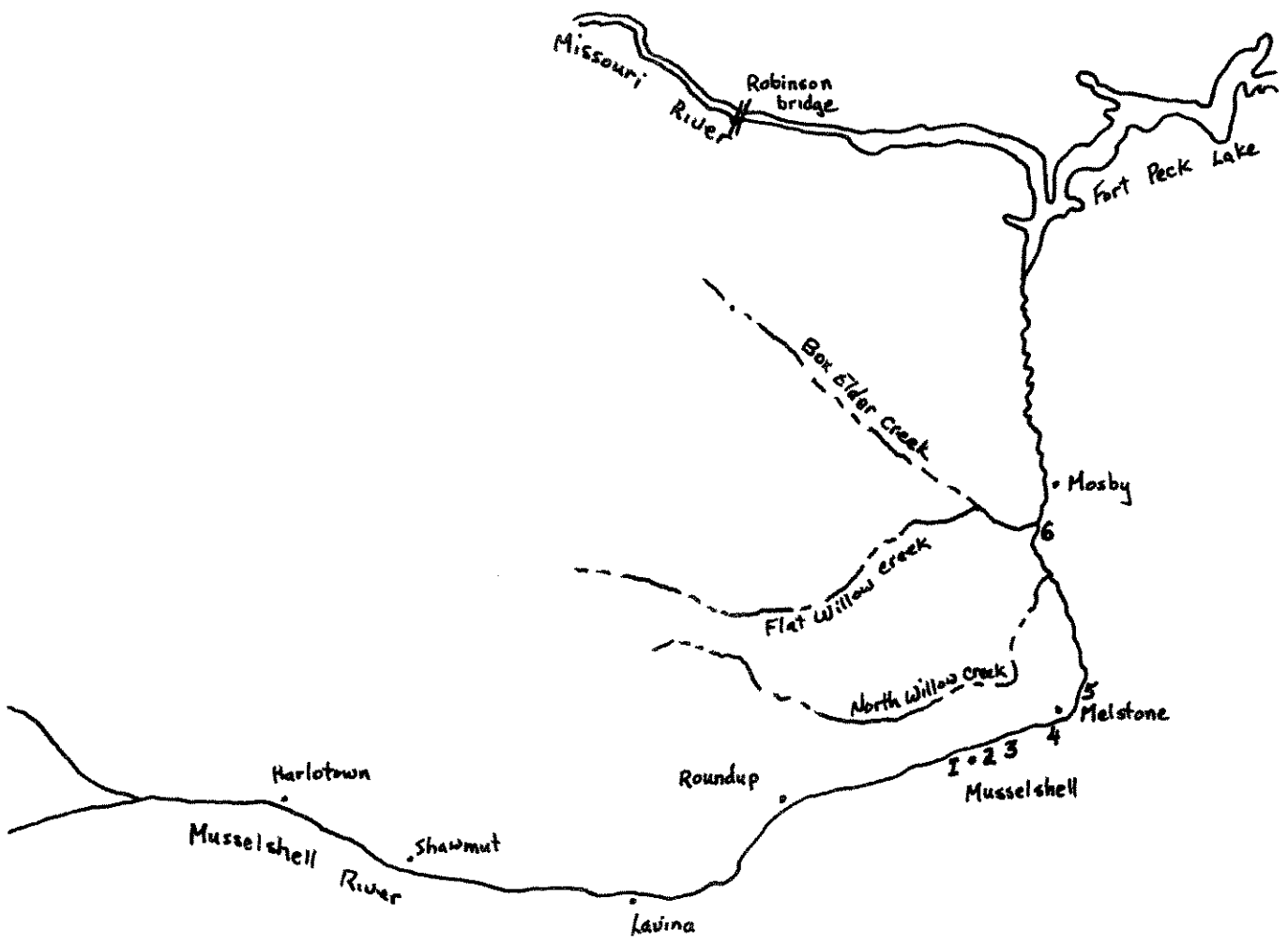
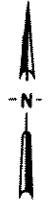


Figure 3. Capture sites of game fish on the lower Musselshell River, 1980.



from 0.12 to 0.94 pounds. Channel catfish lengths and weights ranged from 11.0 to 26.5 inches, 0.42 to 7.5 pounds, respectively. Sauger lengths ranged from 12.3 to 21.0 inches and weights ranged from 0.48 to 2.90 pounds (Table 3).

Sampling by electrofishing at four sites captured 12 smallmouth bass, 18 channel catfish and 20 sauger. The bass ranged from 7.0 to 11.3 inches and from 0.23 to 0.92 pounds. Lengths and weights of channel catfish ranged from 9.6 to 30.0 inches and from 0.24 to 12.0 pounds, respectively. Lengths of sauger ranged from 11.6 to 24.0 inches and weights ranged from 0.46 to 3.72 pounds (Table 4).

Six fixed traps and three barrel traps captured two smallmouth bass, eight channel catfish and nine sauger. Smallmouth bass were 10.6 to 10.9 inches and 0.72 to 0.74 pounds. Channel catfish lengths ranged from 9.3 to 17.4 inches and weights ranged from 0.27 to 1.42 pounds. Sauger lengths ranged from 12.8 to 21.5 inches and weights ranged from 0.51 to 3.10 pounds (Table 5).

Set lines captured five channel catfish ranging from 22.3 to 30.0 inches and 3.42 to 8.0 pounds. One yearling smallmouth bass was captured by seining an irrigation canal near the Town of Musselshell. No game fish were captured using a drift net (Table 6).

Smallmouth bass raised at the Federal Fish Hatchery in Miles City, Montana have been stocked in the Musselshell River from 1977 through 1980. A total of 138,000 2-inch fish were planted between Shawmut and Melstone during these years (Fig. 4). Hatching date of each year class was approximately May 15 and were introduced to the river by mid-June.

Subsequent sampling of the 1977 through 1980 year classes showed the following growth rates: Age 0+ - 3.6 to 4.3 inches, Age I+ - 5.3 to 8.4 inches, Age II+ - 8.6 to 11.5 inches and Age III+ - 11.2 to 13.2 inches. Mean lengths expected on their May birthdate follow: Age I - 6.5 inches, Age II - 9.2 inches and Age III - 11.6 inches (Fig. 5). One yearling smallmouth tagged July 16, 1980 at 6.0 inches and .12 pounds was recaptured 27 days later at 6.9 inches and .20 pounds.

Small numbers of smallmouth bass, 8 of 55, moved downstream from their stocking site. Evidence suggests that fish planted from Lavina, Montana to Roundup in June 1979 emigrated at least 20 miles downstream to an area adjacent to the Town of Musselshell.

A total of 44 smallmouth bass, channel catfish and sauger have been recaptured since initiation of tagging in 1978. Four channel catfish tagged in the Missouri River near Robinson Bridge were recaptured in the Musselshell River. Two were caught upstream from Mosby, one was caught five miles north of Melstone and one was trapped at the Musselshell diversion. These Missouri River catfish traveled 180 to 240 or more river miles to spawn in the Musselshell River. The remaining 27 recaptured catfish were sampled short distances from where they were tagged. Nine smallmouth bass and four sauger were recaptured in the same general areas where they were tagged.

#### RECOMMENDATIONS

1. Initiate a smallmouth bass study to determine growth, reproductive potential and habitat preferences.
2. Determine species composition and distribution in the remaining 70 miles of river from Melstone to its confluence with Fort Peck Reservoir.
3. Document spawning times and sites of channel catfish, sauger and smallmouth bass.

# KEY

## Smallmouth bass plants

Year	Number
1977	20,000
1978	33,000
1979	33,000
1980	52,000

0 10 20 30 40  
1" = 22 miles

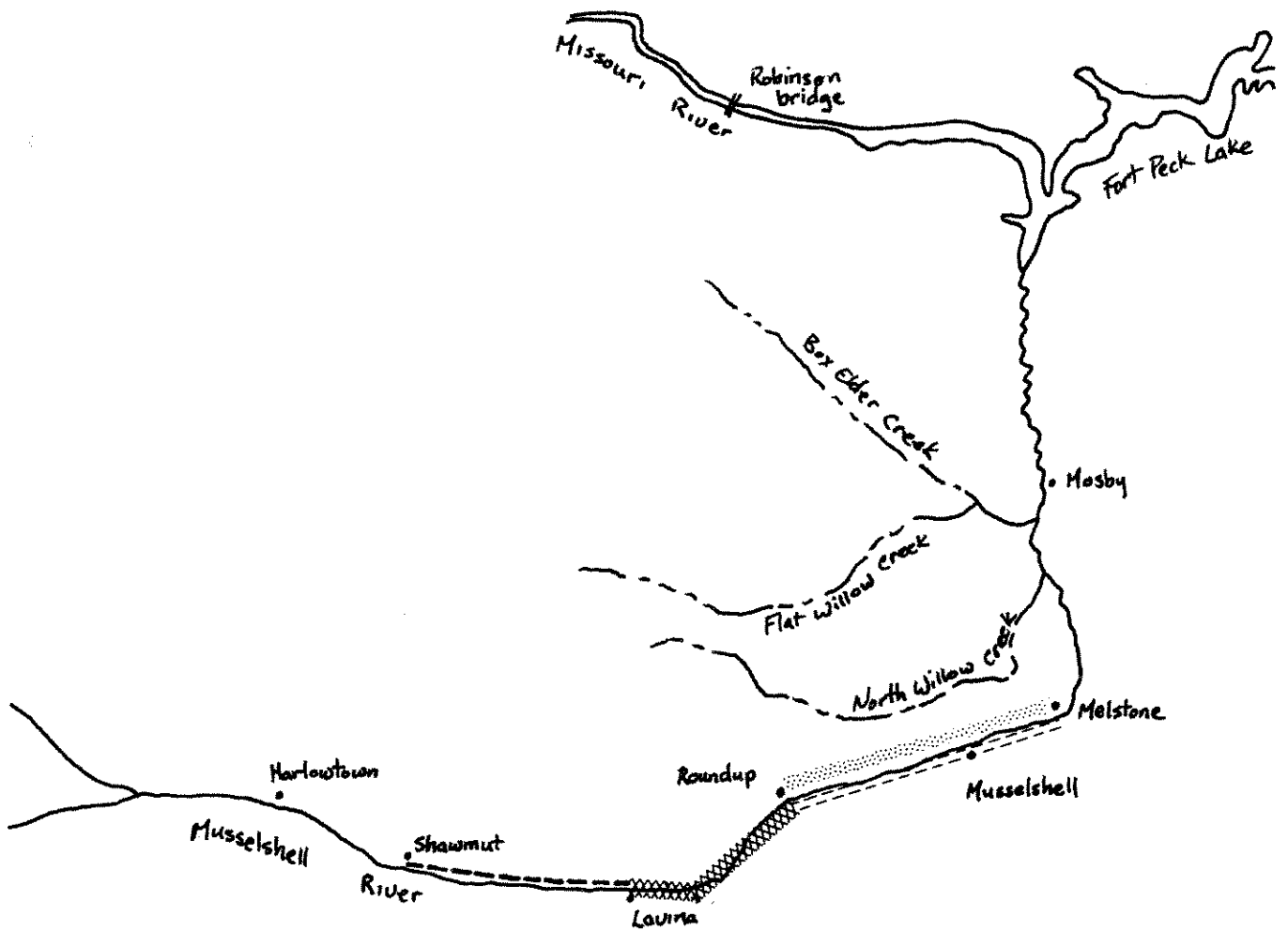
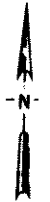


Figure 4. Smallmouth bass stocking areas in the Musselshell River.

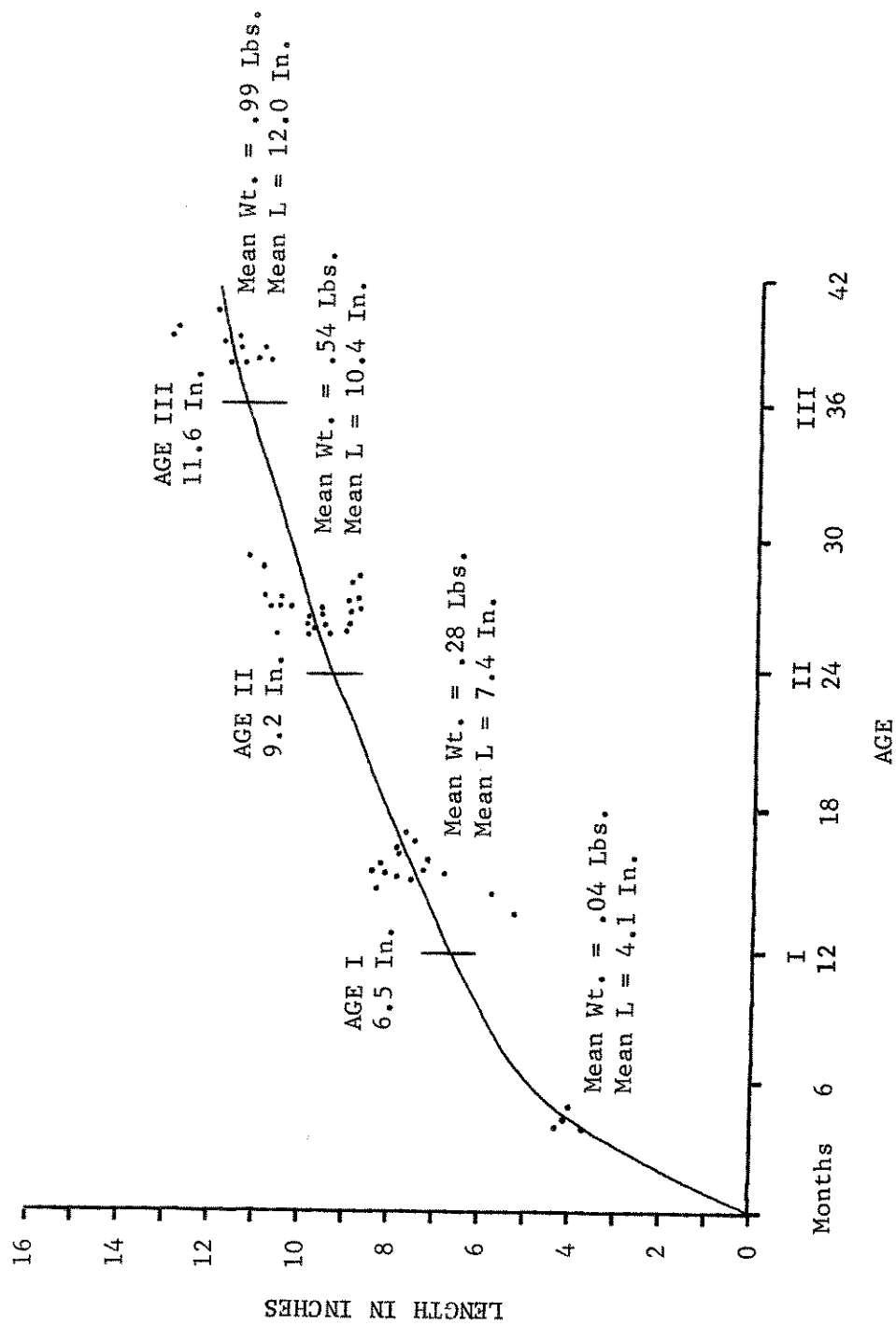


Figure 5. Growth rate of smallmouth bass in the Musselshell River, Montana.

4. Continue to gather information to substantiate instream flow recommendations.

#### LITERATURE REVIEW

Berg, R. K. 1978. Middle Missouri River planning project. Mont. Dept. of Fish, Wildlife and Parks, Job Prog. Rpt., FW-3-R-6, Job 1-a, Fisheries, 53 pp.

Wiedenheft, B. 1980. Musselshell River study. Mont. Dept. of Fish, Wildlife and Parks, Job Prog. Rpt., F-20-R-24, Job III-a, Fisheries, 15 pp.

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Waters referred to:

Musselshell River, Sec. 2      18-4350

Key words:

None needed.