

MONTANA DEPARTMENT OF FISH AND GAME
FISHERIES DIVISION

JOB PROGRESS REPORT

State Montana
Project No. F-20-R-23 Title South Central Fisheries Investigation
Job No. I-a (Supplement) Title Musselshell River Study
Period Covered April 1, 1978 through March 31, 1979

ABSTRACT

Flow measurements for three reaches of the Musselshell River provided data for instream flow recommendations for the cold water, transitional and warm water zones.

Eleven sites along the river were sampled with electrofishing apparatus to identify fish species, determine relative abundance and establish distribution. Twenty-two species of fish were identified and distribution patterns were roughly determined. Relative abundance of species has yet to be satisfactorily established.

Tagged channel catfish recovered by anglers near the town of Musselshell indicate spawning runs from the Missouri River.

Mean monthly temperatures in the Musselshell River at Martinsdale, Harlowton and Roundup ranged from a high in August of 58° F., 60° F. and 69° F., respectively, and a low during winter of 32° F.

OBJECTIVES

1. Provide instream flow recommendations for three biotic zones in the Musselshell River.
2. Identify all game and nongame fish species present including their distribution and abundance.
3. Obtain instream water temperatures at various locations along the river.
4. Evaluate the status of the smallmouth bass population recently introduced.

PROCEDURES

Details on methods used to provide instream flow recommendations and final evaluation of data may be obtained from the Instream Flow Recommendation, Missouri Level B, Musselshell River Study.

Fish samples were taken from 11 sites along 200 miles of the Musselshell River with each site averaging approximately 2 miles in length (Figure 1). Both a bank shocker and boat shocker were used to collect fish samples. The bank electrofishing unit generated 230 volts of continuous direct current, while the boat electrofishing unit was usually adjusted between 100-250 volts of pulsating direct current at a

pulse width of 50%, 5-10 amps and a frequency of 60-90 pulses per second. Power for this unit was generated by a 3,500-watt (Kohler) generator and regulated by a Variable Voltage Pulsating Unit (Coeffelt VVP-15).

All fish captured were measured for total length and weight, and game fish were tagged with orange Floy anchor tags.

Temperatures were monitored by continuous recording 30-day thermographs placed at three locations along the river. Stations were located near Martinsdale, Harlowton and Roundup (Figure 1). Instantaneous daily water temperatures were recorded by USGS field personnel at Mosby.

Locations where smallmouth bass were planted were sampled by the boat electro-fishing unit described above.

FINDINGS

Consideration of various biological and geographical characteristics of the Musselshell River suggested a natural division of the drainage into three biotic zones or reaches; a cold water, warm water and transitional zone (Figure 1). In these three zones species diversity tended to increase progressively downstream (Tables 2, 3 and 4), with a total of twenty-two species being indentified on the main stem (Table 1). Ten species (6 families) were collected in the cold water zone, twelve species (4 families) in the transitional zone, and seventeen species (5 families) in the warm water zone.

Cold Water Zone

The cold water zone, from the convergence of the South and North Forks to the town of Barber supports a good trout fishery, with brown trout being the most dominant salmonid (Table 2). Isolated pockets of rainbow trout are present due to annual planting and are more numerous than mountain whitefish (Table 2).

Riparian cover along the upper portions of this zone is abundant but is lacking in lower areas where livestock grazing has disrupted natural growth. Car bodies were noted in several areas upstream from Harlowton. Heavy sediment loads are common in this area during spring runoff and summer irrigation runoff.

In spite of several reservoirs on this portion of the Musselshell, 43 years of flow records provided by the USGS indicate significant fluctuations in discharges. The minimum instream flow recommended for this zone is 40 cfs.

Water temperatures recorded at Martinsdale and Harlowton ranged from a high of 65° F. and a low of 32° F.

Transitional Zone

The transitional zone, from Barber downstream to Roundup appears to have very few game species present (Table 3). The area does, however, have numerous rough and forage fish species which could provide sustenance for a game fish population. The apparent absence of game fish species may be the result of a variety of factors, but there are two that are more suspect than others. Diversion dams located at several sites along this reach are the most obvious factor, effectively blocking upstream movement of the warm water game fish species from the warm water zone. Inhospitable water temperatures is another factor which discourages immigration of game fish, especially from the cold water zone where trout are relatively numerous.

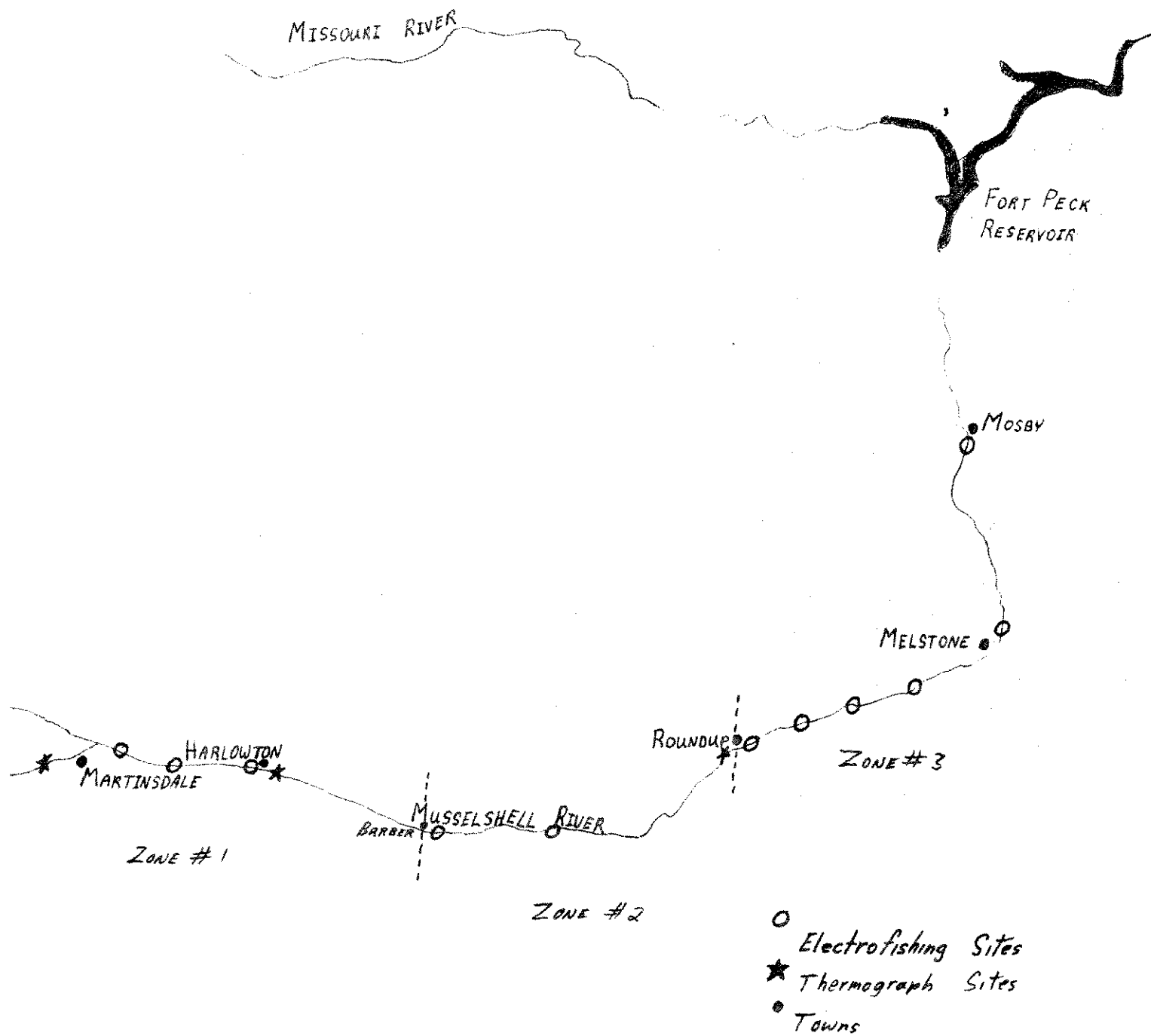


Figure 1. Musselshell Study Area.

Table 1. Fish Species of the Musselshell

Catostomidae

Longnose sucker	<u>Catostomus catostomus</u>
Mountain sucker	<u>Catostomus platyrhynchus</u>
River carpsucker	<u>Carpoides carpio</u>
Shorthead redhorse	<u>Moxostoma macrolepidotum</u>
Smallmouth buffalo	<u>Ictiobus bubalus</u>
White sucker	<u>Catostomus commersoni</u>

Centrarchidae

Black crappie	<u>Pomoxis nigromaculatus</u>
Smallmouth bass	<u>Micropterus dolomieu</u>

Cottidae

Mottled sculpin	<u>Cottus bairdi</u>
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Cyprinidae

Carp	<u>Cyprinus carpio</u>
Fathead minnow	<u>Pimephales promelas</u>
Flathead chub	<u>Hybopsis gracilis</u>
Lake chub	<u>Couesius plumbeus</u>
Longnose dace	<u>Rhinichthys cataractae</u>
Western silvery minnow	<u>Hybognathus nuchalis</u>

Hiodontidae

Goldeye	<u>Hiodon alosoides</u>
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Ictaluridae

Channel catfish	<u>Ictalurus punctatus</u>
Stonecat	<u>Noturus flavus</u>

Salmonidae

Brown trout	<u>Salmo trutta</u>
Mountain whitefish	<u>Prosopium williamsoni</u>
Rainbow trout	<u>Salmo gairdneri</u>

Percidae

Sauger	<u>Stizostedion canadense</u>
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Table 2. Cold water Zone (main stem)

Species	Number Collected	Range	
		Length (in.)	Weight (lbs.)
Longnose dace	357	1.5- 4.1	.01- .04
White sucker	351	2.3-16.6	.01-1.60
Longnose sucker	184	2.3-16.9	.01-1.59
Mountain sucker	149	2.7- 8.0	.01- .23
Brown trout	136	2.7-18.5	.01-2.30
Mottled sculpin	117	1.0- 4.5	.01- .06
Rainbow trout	37	5.5-11.3	.08- .58
Shorthead redhorse	6	15.0-18.2	1.36-2.60
Stonecat	3	6.1- 7.5	.10- .20
Mountain whitefish	2	8.2-13.5	.20- .84

Table 3. Transitional Zone

Species	Number Collected	Range	
		Length (in.)	Weight (lbs.)
White sucker	277	2.8-16.4	.01-1.42
Flathead chub	254	2.7- 7.8	.01- .21
Mountain sucker	104	2.8- 7.5	.01-2.0
Longnose dace	104	1.6- 3.0	.01- .02
Longnose sucker	100	4.3-15.0	.02-1.10
Fathead minnow	60	2.7- 5.5	.01- .08
Lake chub	49	2.5- 4.5	.01- .03
Shorthead redhorse	33	5.8-17.5	.08-1.62
Stonecat	19	1.5- 9.0	.01- .17
Western silvery minnow	15	2.5- 3.4	.01- .04
Carp	11	3.3-17.75	.02-2.44
Brown trout	1	9.8	.40

Table 4. Warm water Zone

Species	Number Collected	Range	
		Length (in.)	Weight (lbs.)
Shorthead redhorse	308	4.0-16.0	.04-1.24
Flathead chub	226	3.0- 7.4	.02- .15
Goldeye	89	11.3-13.8	.45- .82
Carp	73	7.1-22.5	.17-4.75
Mountain sucker	67	2.5- 8.0	.01- .25
Carp sucker	51	3.1-19.5	.04-3.50
Longnose sucker	41	5.1-14.0	.09- .92
Western silvery minnow	39	2.2- 5.0	.01- .08
Sauger	28	11.4-18.8	.40-2.00
White sucker	24	5.2-12.0	.04- .66
Stonecat	12	4.0- 7.0	.02- .12
Channel catfish	9	15.2-28.0	1.31-6.00
Longnose dace	8	2.2- 3.2	.01- .03
Smallmouth bass	6	3.6- 7.2	.01- .02
Fathead minnow	3	3.0- 3.5	.01- .24
Black crappie	1	7.7	.24
Smallmouth buffalo	1	15.6	1.70

Streambanks are stable throughout most of this reach except in areas where livestock are allowed access to the river.

In this reach as in the previous one, river flows fluctuate significantly and turbidity is high in spring and summer. The minimal instream flow recommended for this area is 50 cfs.

A thermograph located near Roundup recorded temperature extremes from 75° F. in August to 32° F. during winter months. Temperatures exceeded 70° F. for 32 days.

Warm Water Zone

The warm water zone of the Musselshell River extends from Roundup to the confluence of the Missouri River. Sauger is the most dominant game fish species followed by channel catfish and black crappie (Table 4). Smallmouth bass introduced in August, 1977 have grown well and range in size from 8.0 inches and .34 pounds to 3.6 inches and .01 pounds.

Tagged channel catfish from the upper Missouri River above Fort Peck Reservoir have been retrieved by anglers near the town of Musselshell, a distance of over 80 miles. The size and precise movement of this population is uncertain, but it is assumed to be rather large and wide ranging at this point.

It is hypothesized that other spawning species of game fish migrate upstream into the Musselshell such as sauger and walleye and nongame species such as shovel-nose sturgeon and possibly paddlefish.

Streambanks are stable in the upper portions of this warm water zone but are very unstable in lower areas. This situation is mainly the result of the more arid climate and poor soil quality intrinsic to the area.

River discharges fluctuate here, as they do elsewhere on the Musselshell River and may drop to zero at times. The minimum recommended instream flow for this zone is 60 cfs.

Instantaneous water temperatures recorded at Mosby ranged from a high of 79° F. in August to a low of 32° F. during winter. Temperatures exceeded 70° F. for 28 days.

RECOMMENDATIONS

1. Obtain more data to further document instream flow recommendations.
 - a. Photographs and instantaneous flow measurements at various flows.
 - b. Document the adverse effects that fluctuating flows have on the resident and migratory fish populations.
2. Continue monitoring water temperatures at the various stations already in operation.
3. Continue monitoring of the smallmouth bass population.
4. Identify other migratory fish populations and determine to what extent they utilize the Musselshell River.

LITERATURE CITED

Montana Fish and Game Commission. 1979. Instream Flow Recommendation, Missouri Level B, Musselshell River. Fish and Game Publication.

Waters referred to:

Musselshell River Section 1, 18-4320; Section 2, 18-4350
Cold Water Zone
Warm Water Zone
Transitional Zone

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