#85584

MONTANA FISH AND GAME DEPARTMENT
ENVIRONMENTAL RESOURCES DIVISION

JOB PROGRESS REPORT

State Montana

Project No. FW-1-R-2 Title Smith River Drainage Inventory and Planning Investigation

Job No. 1 Title Planning Inventory, Fisheries

Period Covered July 1, 1970 to June 30, 1971

ABSTRACT

A field inventory of the fishery resources in the Smith River drainage was continued to form the framework for development of immediate and long-range management plans. Trout populations were estimated in two additional sections of the Smith River. The standing crop of trout in the two sections varied from 26.6 to 40.3 pounds per 1,000 feet of stream. Fish populations were also estimated in 7 sections on 4 tributary streams. Biomass of trout per 1,000 feet of stream varied from 6 to 121 pounds. Survey shocking was conducted on 14 small tributary streams in sections varying in length from 150 to 490 feet. Brook trout were the predominant fish. Physical characteristics were measured on four stream sections where fish population estimates were conducted. A total of 788 miles of streams believed to be permanent in the drainage were measured from aerial photographs. A total of 100 streams were measured and about 70% of the stream miles lie on private land.

A discussion concerning habitat conditions on several streams is presented. A total of 8 reservoirs were gill netted on which public access is allowed. A total of 485 anglers were creel censused during the summer of 1970 and streams yielded 3.7 game fish per angler compared to 1.6 game fish from reservoirs.

BACKGROUND

Fishery resource planning has been and continues to be a phase of each fish manager's work; however, the constant pressure of day-to-day management consumes most of his time. The intensity of individual fishery problems also varies from place to place in a management area. Consequently, managers have not been able to develop complete inventories in a common area. This project will accomplish a complete fishery inventory and probably uncover problems affecting the resource. It will be a total ecological approach that has not been accomplished previously in Montana and will attempt to unify the Department's effort to solve resource management problems.

OBJECTIVES

The objectives of this study are to conduct and evaluate a basic planning procedure of an intensive nature. The problem of planning will be approached from the field level beginning with the collection of basic field inventory data. Once the inventory is complete, the needs of the fishery resource determined, and the areas of land-use conflicts identified, the plans for meeting fishery needs will be proposed. In order to accomplish this, a planning unit was assigned to inventory and develop plans pertaining to the Smith River drainage.

PROCEDURES

Fish populations were inventoried in streams with the aid of electric shocking gear. The shocking gear and collecting equipment was placed in a boat and fish were gathered as the crew and boat moved slowly downstream. Methods involved for population estimates, age structure and confidence intervals largely follow those described by Vincent (1969). Electric shocking gear was also used to inventory fish populations in small tributary streams. The electric power source was placed on the stream bank and fish were collected from stream sections varying from 150 to 490 feet in length. All game fish captured were measured and weighed.

Reservoirs and ponds were surveyed by setting one 125-foot experimental gill net in each body of water. The nets were allowed to fish overnight. All fish gilled were measured and weighed. Scale samples were obtained from wild or unstocked trout from two reservoirs.

A total of 10 staff gages were installed on streams throughout the drainage to aid in monitoring flow regimes and to help determine the quality of habitat available throughout the year. A discharge curve was constructed for each staff gage by periodically measuring the volume of flow with a Gurley current meter. Stream gaging methods and techniques employed are described by Corbett (1962) and Wipperman (1967). A water stage recorder was installed in the United States Geological Survey gage house (Eden Station) on the Smith River near the mouth of Hound Creek.

Limited water chemistry was conducted on streams near the staff gage locations. Water chemistry included pH, conductivity and turbidity. Chemistry was usually done during periods of low water except additional turbidity measurements were taken during high water periods.

Three thermographs were installed on the main stem of the Smith River. One thermograph was installed in the USGS gage house at river mile 26 in the spring of 1970. The other two thermographs were installed in the spring of 1971 at river mile 81 and 116.

Channel morphology and physical habitat was measured in four sections on three streams where fish populations were estimated. The length of each section was measured down the center of the channel. Cross section data was recorded at

25 foot intervals. At each interval, the width of the stream was measured, thalweg depth recorded and shoreline characteristics subsampled by recording features within five feet on each side of the cross section tag line. Streambank and shoreline features were classified into various categories and are described in the previous report (Wipperman, 1971).

Creel census was performed on much of the drainage by project personnel, usually on Sundays. Anglers were also contacted during routine duties during the week. Creel data were also collected by wardens. Data collected included species of fish caught, hours fished, and name of the water. The data is mainly used to determine angler success and use on the various waters in the drainage.

FINDINGS

Fish Populations - Streams

Smith River

Fish populations were sampled with shocking gear in three sections of river; trout population estimates were done in two of these sections. A 4.5 mile section was shocked in March, 1971 from the mouth of Hound Creek to Smith River Hall. This section begins about 23 miles upstream from the mouth of the Smith River. A total of 67 brown trout was captured and they ranged from 8.7 to 25.2 inches in length. Only 8 brown trout or 12% of the sample were under 12 inches in length.

Four rainbow trout were captured and these ranged from 11.2 to 13.1 inches in length. Adverse shocking conditions (cold weather and water temperatures near 32 degrees) hampered the collecting operation. However, very few whitefish were observed, which are quite prone to the electric shock. It was felt too few fish were present in this section of river to collect an adequate sample for population estimates. Very few small trout were present, which indicates poor reproductive success or low overwinter survival. Further attempts to shock this section will be done in the fall of 1971.

Trout population estimates were conducted on about a two-mile section of river on the Fraunhoffer Ranch 40 miles above the mouth. This section is fairly characteristic of the river within the canyon area. Population estimates are presented in Table 1. Rainbow trout comprised about 83% by number and 57% by weight of the total trout population. Other than one cutthroat trout, brown trout made up the remainder of the population. The biomass per 1,000 feet of river is similar to that estimated 37 miles upstream in the Zeig Ranch section in 1969 (Wipperman, 1971). By percent, brown trout comprised about double the population by number and weight compared to that found in the Zeig Ranch section. Considerably more II, III, and IV year old rainbow trout were estimated in the Zeig Ranch section than in the Fraunhoffer section. Both areas of river are accessible through private property and probably receive similar fishing pressure.

Trout populations were also estimated in a 1-1/2 mile section about 109 river miles above the mouth (state section). This portion of river meanders through a wet meadow area with very little woody vegetation along the stream channel. Brown trout comprised 51% by number and 64% by weight of the wild trout population. Rainbow trout comprised 40% and 30% by number and weight respectively, and brook

Table 1. Estimated trout populations from the Fraunhoffer Section of the Smith River, September, 1970. Section length - 11,750 feet. T 16N, R 4E, S 18, 19, 30. (95% confidence limits in parenthesis)

Age	Length Range (inches)	Number	Weight (lbs)
	Rainbow trout		
I	6.1 - 9.6	997	178.56
II	8.7 -12.0	72	29.10
III	10.1 -14.7	60	42.99
IV	12.6 -16.5	20	21.30
		1149 (±492)	271.95
	Brown trout		
I	7.1 -10.4	59	15.53
II	10.8 -15.2	112	92.87
III	13.1 -17.8	45	72.81
IV	18.0 -19.3	9	20.25
		225 (+134)	201.46
Grand total		1374	473.41
Standing crop per 1,000 feet		117	40.3

Table 2. Estimated trout populations from the state section of the Smith River, September, 1970. Section length - 8,050 feet. T 10N, R 5E, S 36. (95% confidence limits in parenthesis)

Age	Length Range (inches)	Number	Weight (lbs)
	Rainbow trout		
I	5.7 - 9.8	37	6.77
II	8.9 -12.8	54	26.76
III - IV	11.5 -16.7	25	23.35
Hatchery	10.4 -13.1	47	24.59
		163 (± 71)	81.47
	Brown trout		
I - II	8.4 -13.8	119	73.01
III - V	14.1 -20.7	31	48.21
		150(± 93)	121.22
	Brook trout		
-	8.7 -12.8	27 (+ 32)	12.00
Grand total		340	214.69
Standing crop per 1,000 feet		42	26.6

trout made up 9% and 7% of the number and weight respectively of the wild trout population. Hatchery rainbow trout are planted a short distance above and below this section and they numbered about 14% of the total trout population (Table 2).

This portion of river is a popular fishing area. Creel census conducted early in the 1970 fishing season revealed brook trout were the predominant fish creeled. The population estimate conducted in mid-September revealed a paucity of brook trout in the area. Either fishermen are greatly exploiting the brook trout during the summer or else the brook trout have largely vacated the river to spawn in the several small spring creeks and drainage ditches within the meadow area. Cursory examination of these spring areas revealed brook trout inhabited some of them.

Young-of-the-year brook trout and rainbow trout were not collected or observed during the shocking operation. Only five young-of-the-year brown trout were collected. These averaged 4.2 inches in length. Mountain whitefish were very abundant in this section of river.

This section of river contains a low-standing crop of trout when compared with other sections of the Smith River in the upper valley. A section of river about two miles downstream was worked in 1969 and about 55 pounds of trout per 1,000 feet were estimated compared to about 27 pounds in the state section. Very little bank cover is present in the state section, and a considerable amount of bank erosion is also evident.

Smith River tributaries

Fish population estimates were conducted in 8 sections on 5 tributary streams. Results of these estimates are presented in Tables 3 through 8. Biomass of trout per 1,000 feet of stream varied from 6 to 121 pounds. Brook trout were found in all the sections worked and were the predominant trout in the North and South Forks of the Smith River. Rainbow trout were present in four streams and were predominant in Rock Creek and the lower half of Sheep Creek.

Brook trout were found in the lower reaches of all five streams. They were the predominant trout in the North Fork of the Smith River near White Sulphur Springs and in the section of Hound Creek, but could not be considered predominant throughout the length of these streams. Scale samples were collected from trout from Hound Creek but were not mounted for reading in time for this report. Only 5 brown trout were collected from the McGuire Section in the South Fork of the Smith River. These were not included in the estimates in Table 5. Upstream movement of fish in the South Fork appears to be inhibited by a permanent irrigation dam located a short distance below the McGuire Section. This is probably the reason brown trout are scarce in the South Fork.

Fish populations were sampled by survey shocking in 14 small tributary streams (Table 9). Brook trout were found in 9 streams, rainbow trout in 5 streams, cutthroat trout in 5 streams, rainbow trout-cutthroat trout hybrids in 5 streams, brown trout and whitefish in one stream each. Mottled sculpins were found in all

Table 3. Estimated trout populations from the Fowlie Ranch Section of the North Fork of the Smith River, July, 1970. T 9N, R 6E, S 13. Section length - 3,885 feet. (95% confidence limits in parenthesis)

Age	Length Range (inches)	Number	Weight (lbs)
	Brown trout		
I	5.7 - 7.7	87	9.92
II	8.7 -13.6	313	132.74
III	11.1 -16.2	78	70.11
IV	14.9 -18.4	32	49.56
V	16.7 -20.6	16	33.27
		526 (±100)	295.60
	Rainbow trout		
I - II	5.9 -11.1	35	9.69
III - V	10.9 -15.5	28	23.22
		63 (± 27)	32.91
	Hatchery Rainbow trout		
-	9.9 -14.5	55 (± 25)	35.66
	Brook trout		
-	5.0 - 6.9	64	7.28
-	7.0 - 8.9	173	35.89
-	9.0 -10.9	106	40.75
-	11.0 -13.5	35	22.97
		378 (+ 76)	106.89
Grand Total		1,022	471.06
Standing crop per 1,000 feet		263	121.25
Standing crop per acre		415	191.49

Table 4. Estimated trout populations from the North Fork of the Smith River, July, 1970. Section length - 1,540 feet. (Dunkel Ranch Section, T 11N, R 8E, S 27) (95% confidence limits in parenthesis)

Brook trout			Rainbow trout		
Length Range	Number	Weight (lbs)	Length Range	Number	Weight (lbs)
3.8 - 5.9	262	10.52	3.1 - 4.9	156	3.08
6.0 - 6.9	132	13.57	5.0 - 6.9	41	3.26
7.0 - 8.9	78	14.09	7.0 - 9.9	22	4.64
9.0 -13.1	24	11.85	10.0 -14.6	23	16.63
Totals	496 (±90)	50.03		242 (±76)	27.61

Standing crop/1,000 ft (all trout).....479 trout and 50.4 pounds
Standing crop/acre (all trout).....1,346 trout and 141.7 pounds

Table 5. Estimated Brook trout populations from the South Fork of the Smith River, June, 1970. (95% confidence limits in parenthesis)

	State Section (11,630 ft)[1]		McGuire Section (2,600 ft)[2]	
Length Range (inches)	Number	Weight (lbs)	Number	Weight (lbs)
3.9 - 5.9	378	16.01	347	19.62
6.0 - 7.9	192	25.55	669	69.95
8.0 - 9.9	71	17.10	127	30.84
10.0 -14.1	26	14.34	18	7.77
Totals	667 (±170)	73.00	1161 (± 92)	128.18
Standing crop/1,000 ft	57	6.28	446	49.30
Standing crop/acre	-	-	1296	143.20

1/ T 8N, R 7E, S 30

2/ T 9N, R 6E, S 27

Table 6. Estimated fish populations from Rock Creek near Lingshire, July, 1970. T 13N, R 3E, S 28 & 33. Section length - 5,600 ft. (95% confidence limits in parenthesis)

Age	Length Range (inches)	Number	Weight (lbs)
	Rainbow trout		
I	2.6 - 7.3	721	32.50
II	6.8 -10.3	79	15.25
III	9.3 -11.8	38	14.88
IV	10.5 -12.5	11	4.82
		849 (±244)	67.45
	Brown trout		
I	5.2 - 6.5	27	2.20
II	8.6 -12.7	30	12.49
III - V	12.8 -21.5	10	18.20
		67 (± 32)	33.89
	Brook trout		
-	4.9 -10.2	20 (+ 15)	5.04
Grand total (trout)		936	106.38
Standing crop per 1,000 ft		167	19.00
Standing crop per acre		354	42.60
	Whitefish		
-	5.2 - 9.9	88	20.87
-	10.0 -11.9	243	110.32
-	12.0 -16.7	104	80.17
Total		435 (± 76)	211.36
Standing crop per 1,000 ft		77	37.70
Standing crop per acre		174	84.50

Table 7. Estimated trout populations from two sections of Sheep Creek, August, 1970. (95% confidence limits in parenthesis)

Moose Creek Section, (T 12N, R 6E, S 13)
Section length - 4,300 ft

Age	Length Range (inches)	Number	Weight (lbs)
	Rainbow trout		
I	4.1 - 7.2	557	31.71
II	6.3 -10.1	117	29.21
III	8.3 -11.6	63	18.86
IV	11.9 -13.7	11	8.40
V	14.3 -15.2	2	2.30
		750 (±194)	90.48
	Brook trout		
-	4.8 -13.3	53 (+ 32)	13.28
Grand Total		803	103.76
Standing crop per 1,000 ft		187	24.1

Hanson Ranch Section, (T 12N, R 5E, S 18)
Section length - 4,400 ft

Age	Length Range (inches)	Number	Weight (lbs)
	Rainbow trout		
I	4.3 - 7.2	828	48.46
II	6.9 - 9.0	109	19.64
III	8.7 -11.5	48	15.40
IV	10.9 -13.0	14	7.42
V	13.2 -16.8	6	6.41
		1005 (±262)	97.33
	Brown trout		
I - III	5.6 -14.6	7	4.96
IV - V	16.2 -21.3	8	23.84
		15 (± 6)	28.80
	Brook trout		
-	6.1 -11.8	27 (+ 19)	8.04
Grand total		1047	134.17
Standing crop per 1,000 ft		238	30.5

Table 8. Estimated trout populations from the McKammey Ranch Section on Hound Creek, March, 1971. Section length - 9,100 ft. T 17N, R 3E, S 19. (95% confidence limits in parenthesis)

Age	Estimated Length Range (inches)[1/]	Number	Weight (lbs)
	Brown trout		
I	4.1 - 6.0	Too few to estimate	
II	6.7 -12.4	257	101.20
III	12.7 -15.5	130	118.82
IV	15.6 -17.8	61	92.84
V & Older	18.4 -23.3	27	71.96
		475 (±184)	384.82
	Rainbow trout		
I	-	Too few to estimate	
II	6.7 -10.3	343	83.09
III	10.5 -14.9	41	23.82
		384 (±178)	106.91
	Brook trout		
I - III	6.1 -11.4	8 (+ 10)	2.33
Grand total		867	494.06
Standing crop per 1,000 ft		95	54.3

1/ Length range of each age group estimated from length frequency.

Table 9. Inventory of 14 Smith River tributary streams.

Stream	Section Length(ft)	Location T. R. S.	Estimated Flow (cfs)	Game Fish Species	Number Caught	Length Range(inches)
Adams Cr.	200	12N,7E,13	4	None		
Butte Cr.	300	12N,6E,26	3	RbXCt hybrid[1]	8(5)[2]	4.8 -10.9
Calf Cr.	450	13N,6E,24	4	Rainbow trout	18(7)	2.6 -10.3
				RbXCt hybrid	4(1)	2.6 - 8.3
Eagle Cr.	400	12N,5E,26	5	Rainbow trout	26(18)	3.4 -12.7
				RbXCt hybrid	4(3)	4.2 - 8.0
				Brook trout	3(2)	5.5 - 9.3
Eightmile Cr.	480	10N,8E,15	3	Rainbow trout	27(0)	1.8 - 5.9
				Brook trout	1(1)	6.4
Freeman Cr.	410	13N,3E,15	3	Rainbow trout	14(10)	5.0 - 9.9
				Brook trout	8(5)	3.1 -10.8
				Brown trout	1(0)	3.6
Jumping Cr.	480	12N,8E,18	2	Cutthroat trout	5(2)	5.5 - 6.7
				Brook trout	2(1)	5.4 - 6.7
Moose Cr.	490	13N,7E,23	5	RbXCt hybrid	2(1)	4.7 - 8.5
				Brook trout	16(3)	3.4 - 8.2
				Whitefish	3(3)	9.2 -12.8
North Fork Freeman Cr.	450	13N,2E,2	2	Rainbow trout	14(13)	5.6 -15.7
				RbXCt hybrid	7(6)	5.2 -10.6
				Cutthroat trout	1(1)	12.8
				Brook trout	1(1)	10.9
Spring Cr.	490	10N,5E,13	2	Brook trout	43(32)	4.3 -10.1
Sheep Cr.	410	12N,8E,15	5	Cutthroat trout	7(2)	3.1 - 8.9
				Brook trout	11(0)	2.9 - 5.3
South Fork Deadman Cr.	275	12N,8E,24	2	None		
Whitetail Cr.	400	11N,5E, 9	3	Brook trout	57(52)	1.8 -10.4
	200	11N,5E,12	2	Brook trout	45(14)	2.0 - 8.3
				Cutthroat trout	1(0)	4.9
Wolsey Cr. (Daniels)	150	12N,7E,14	2	Cutthroat trout	4(2)	5.1 - 8.4

[1] RbXCt hybrid - Rainbow trout-Cutthroat trout hybrid

[2] Figure in parenthesis is number of fish caught over 6 inches in total length.

the stream sections worked except for the South Fork of Deadman Creek. One lake chub (Hybopsis plumbea) was collected from Eightmile Creek along with dozens of white and longnose suckers. The suckers were part of a spawning run from Lake Sutherlin.

Trout habitat was greatly altered by logging operations on Jumping Creek and Wolsey Creek. Large portions of these streams had been included in clearcut operations and in places they could not be seen because of logging debris. Native cutthroat trout were found in both streams. Ten of the 14 streams surveyed lie on or originate on National Forest land.

Stream Habitat Evaluation

Stream channels

Physical characteristics were measured on four stream sections where fish population estimates were conducted. All the sections were located in meadow zones. A summary of the measurements along with the biomass of trout are compared in Table 10. It appears that cover plays the most important role for trout populations. While brush cover was somewhat scarce on the South Fork of the Smith River, considerable cover (not measured) was present in the form of aquatic vegetation. This was the only stream section measured containing aquatic vegetation. The gradient is only about 20 feet per mile, which together with continual dewatering, accounts for the small amount of bank erosion. In contrast, the gradient on Rock Creek is 57 feet per mile, and with only about 25% of the shoreline protected by woody vegetation, the banks are subjected to severe erosion. The importance of woody vegetation effecting the stability of the stream channel is illustrated on the Dunkel Ranch Section of the North Fork of the Smith River. This stream has a high gradient with about 65% of the shoreline protected by woody vegetation. No bank erosion was found in the section measured.

The data presented points out the importance of cover and channel stability on the trout populations. Without these features, other than water quality, few trout would be found in most streams. The physical habitat will be measured on a few more stream sections for future inventory reference.

The miles of stream habitat believed to be permanent in the drainage were measured from aerial photographs. A total of 788.6 miles of stream were measured. Of this total, the Smith River comprised 121 miles. River miles on the Smith River from the mouth and progressing upstream are presented in Figure 1 at various locations. Only 5 other streams in the drainage contain a length of over 25 miles. A total of 100 streams were measured. Most of these streams will be checked for flow and fish populations in 1971.

The mileage of streams lying on various ownerships was measured. Of the 788.6 miles of stream habitat, 552.9 miles (70.1%) were clocked on privately owned land, 199.7 miles (25.3%) bordered or lie on National Forest land, 25.4 miles (3.2%) on state school land, and 10.6 miles (1.3%) on B.L.M. and Fish and

Table 10. Physical and biological characteristics from sections of three Smith River tributary streams.

Channel Characteristics	N. Fk Smith River (Fowlie Ranch)	N. Fk Smith River (Dunkel Ranch)	S. Fk Smith River (McGuire Ranch	Rock Creek (near Lingshire
Channel length measured (ft)	3,885	1,540	2,600	5,600
Average width (ft)	27.6	15.5	15.0	19.5
Average thalweg depth (ft)	1.5	1.6	1.7	1.5
Volume of flow (cubic ft/second)	15	12	6	17
Sinuosity	1.88	1.33	1.85	1.79
Gradient (feet/mile)	45	69	20	57
Shoreline Characteristics				
Brush (percent)	66.4	64.9	22.1	24.1
cover (ft^2/1,000 ft)	3,332	6,964	1,577	1,214
Grass (percent)	22.8	24.5	76.0	49.3
eroding (percent)	2.6	-	1.9	16.8
undercut (ft^2/1,000 ft)	-	121	-	165
Deposition zone (percent)	10.8	10.6	1.9	25.7
Cliff (percent)	-	-	-	0.9
Trout (lbs/1,000 ft)	121.3	50.4	49.3	19.0

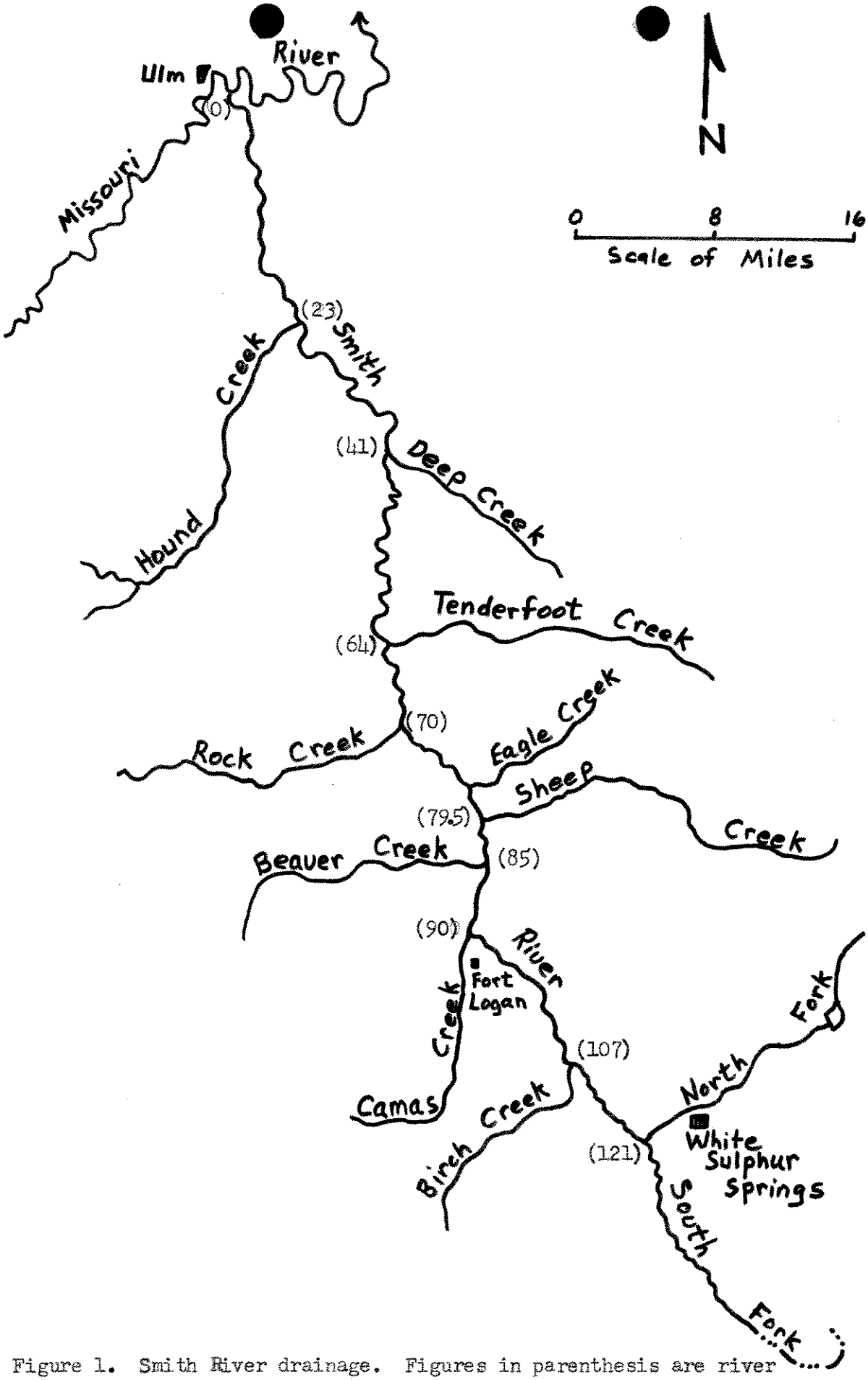

Figure 1. Smith River drainage. Figures in parenthesis are river miles from the mouth near Ulm.

Game land. B.L.M. administered lands amounted to 7.25 miles, but 5.1 miles border the Smith River. All the Fish and Game land lies on two access areas along the Smith River.

Water Quality

Turbidity measurements were taken frequently where stream gaging stations were located. Conductivity and pH values were also measured at most of these locations in the spring and fall. A summary of the water chemistry and discharge is presented in Table 11 for several streams.

Table 11. Chemical characteristics and discharge of the Smith River and several tributaries, 1970.

Stream	pH	Conductivity (micromhos/cm)	Greatest turbidity (JTU)	Discharge (cfs) High	Low
Smith River					
USGS Station	8.2	520	220	3,838	184
Camp Baker	8.3-8.6	430-550	123	815	71
Hound Creek	8.2-8.5	460-500	198	740	23
Rock Creek	8.5	475	960	1,200	12
Eagle Creek	8.4-8.5	425	68	210	3
Sheep Creek	8.3-8.4	275	55	636	20
Beaver Creek	...	...	125	104	3
Camas Creek	7.7-8.3	198-290	45	172	5
Birch Creek	7.7-8.2	210-215	5	85	8
N.Fk. Smith R.	8.5	270-390	88	300	8
S.Fk. Smith R.	8.3-8.4	675-995	230	180	1

A general discussion concerning each of the streams in Table 11 and habitat conditions affecting aquatic resources follows.

Smith River. The drainage area above the USGS gage station is about 1,600 square miles. Flow regime, turbidity and average five-day maximum water temperatures are presented in Figure 2. Peak daily discharge occurred on May 21 at about 3,570 cfs. The minimum discharge occurred on August 31, (Table 11).

Maximum water temperatures of 70 degrees first occurred on July 4 and the last occurred on August 28, 1970. Maximum water temperatures between 70 and 76 degrees occurred on 29 days in July and August. The average 5-day maximum water temperatures presented in Figure 2 reveal temperatures over 70 degrees in four of these periods. The warmest 5-day average was 74 degrees from July 16 to July 20. Each day maximum temperatures over 70 degrees were recorded, the minimum water temperatures varied from 50 to 66 degrees. Minimum water temperatures of 60 degrees or over were recorded on 38 days in July and August. This temperature data is similar to historical data discussed by Wipperman (1971).

A few turbidity readings were taken 22 miles downstream from the USGS station or about 3 miles above the mouth of the river. Turbidities at this location were generally about double those recorded at the USGS station. A high of 500 JTU was

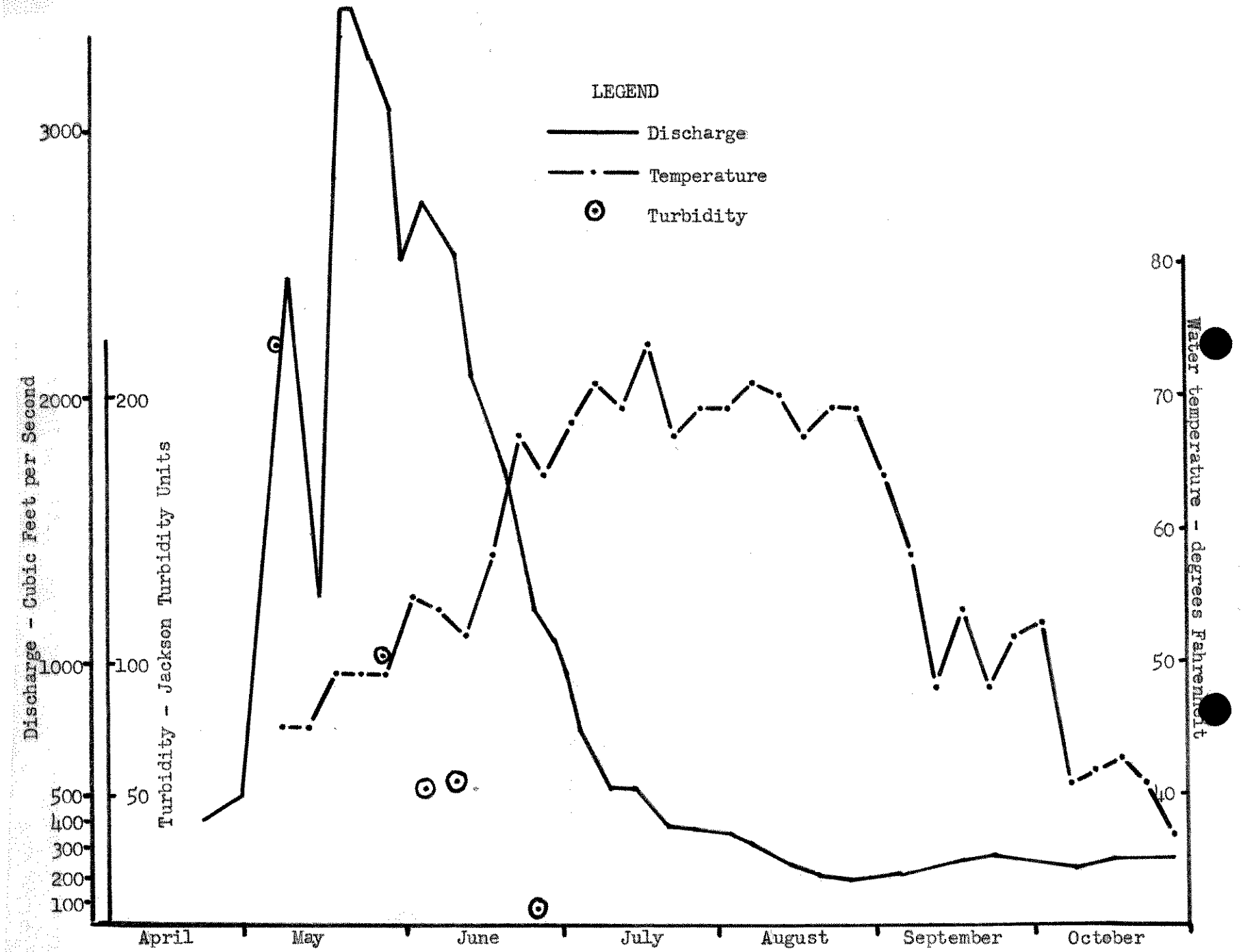

Figure 2. Discharge, average five-day maximum water temperatures and turbidity readings from the Smith River at the USGS gage station. River mile 26.

measured on May 6 when 220 JTU was measured at the USGS station. The lower 20 miles of the river meanders through a relatively narrow valley containing very deep soils. Vertical soil banks up to 30 feet high are common along the river channel throughout the valley. These banks erode almost continually and contribute considerable silt during high water periods.

The Camp Baker staff gage station is located 81 miles above the mouth of the river. The drainage area is about 820 square miles above this station. River discharge peaked at 815 cfs on May 22 and gradually dropped to a low of 71 cfs on August 26 (Figure 3). Maximum turbidities occurred about two weeks before peak runoff. Turbidity gradually decreased to about 30 JTU by the end of May. The river did not clear at this location until about July 1.

Hound Creek. This stream confluences with the Smith at river mile 23. The Hound Creek gage station is located near the mouth of the stream. The drainage area is 230 square miles. The headwaters of Hound Creek originate along the northeast slopes of the Big Belt Mountains. A majority of the drainage is steep rolling grasslands with some cultivated crops along the lower drainage. Nearly the entire drainage is privately owned.

Stream discharge increased from 81 to 740 cfs within a two week period in early May, and then gradually receded to about 100 cfs by July 1. A minimum discharge of 23 cfs was recorded on August 23. A turbidity of 198 JTU was measured on May 7 and gradually tapered to 3 JTU by July 1. Channel relocation, channel clearance and eroding banks have seriously affected trout habitat on the lower three miles of the stream. This area of Hound Creek strongly resembles the lower portion of the Smith River where high vertical eroding banks add considerable silt to the stream and the Smith River. The upper drainage on Hound Creek will be investigated in 1971.

Rock Creek. This stream enters the Smith at river mile 70 and has a drainage of 141 square miles. The drainage lies on the east slopes of the Big Belt Mountains and is chiefly rangeland with timbered zones along the headwater and lower drainage areas. Almost the entire drainage lies in private ownership.

The gage station is located about 7 miles above the mouth of Rock Creek, and the flows recorded represent drainage from 81 square miles. Two flash floods occurred on this stream within one week in mid-May. These floods were caused by a late season snow storm in May, followed by warm weather. An estimated 1,000 cfs discharge was observed on May 13 and 1,200 cfs on May 19 (Figure 4). Turbidities over 100 JTU were measured nearly the entire month of May with a high of 960 JTU during high water. Turbidity dropped to less than 5 JTU by June 18.

The Rock Creek drainage is severely grazed by livestock, which in part contributed to the flash flooding and heavy silt loads. Severe bank erosion and damage to woody vegetation occurred during the flood. Historic heavy use of the watershed by the livestock industry is reflected by the trout population data presented earlier in this report.

Eagle Creek. This stream enters the Smith at river mile 78. Eagle Creek flows westerly from the Little Belt Mountains and the drainage area is 40 square

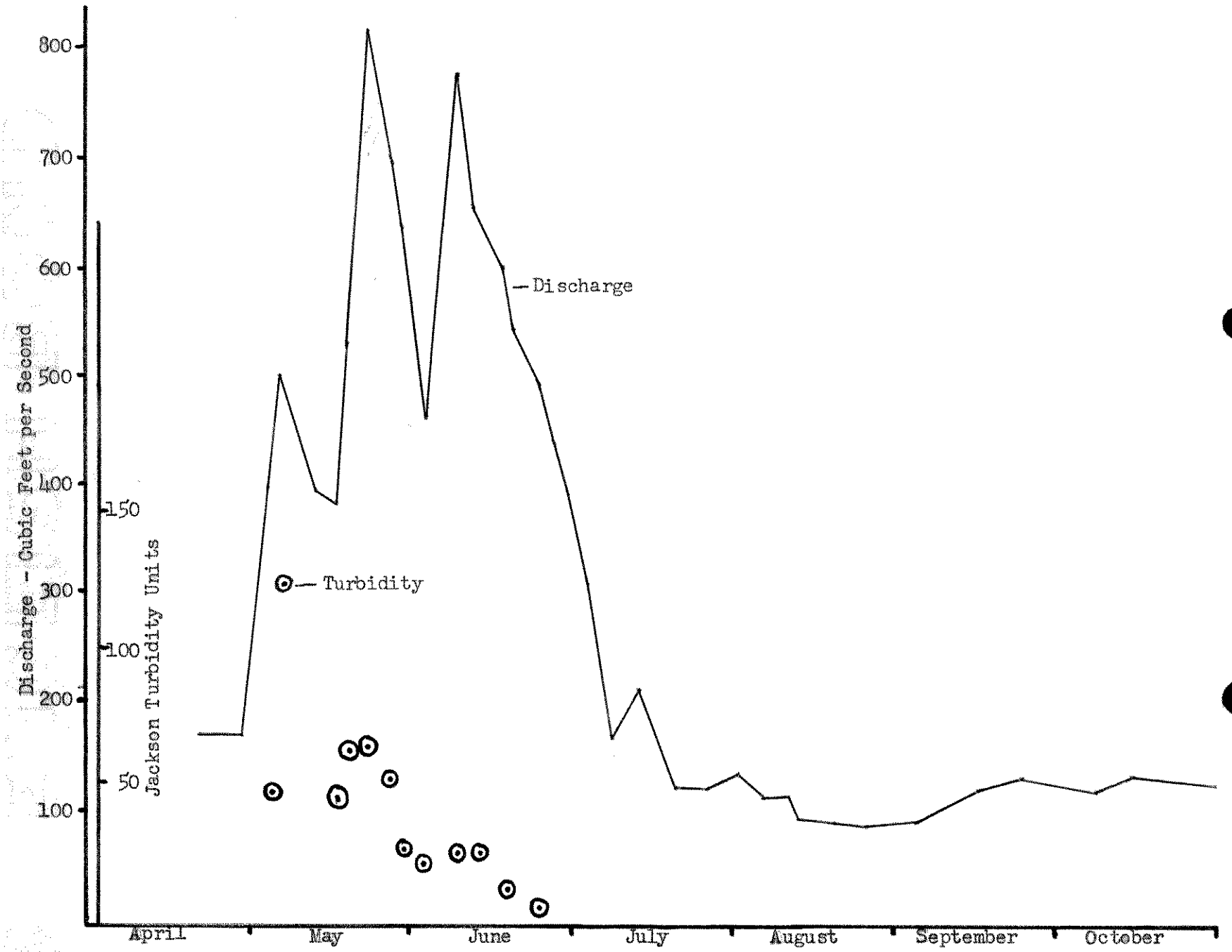

Figure 3. Discharge and turbidity readings from the Smith River at Camp Baker. River mile 81.

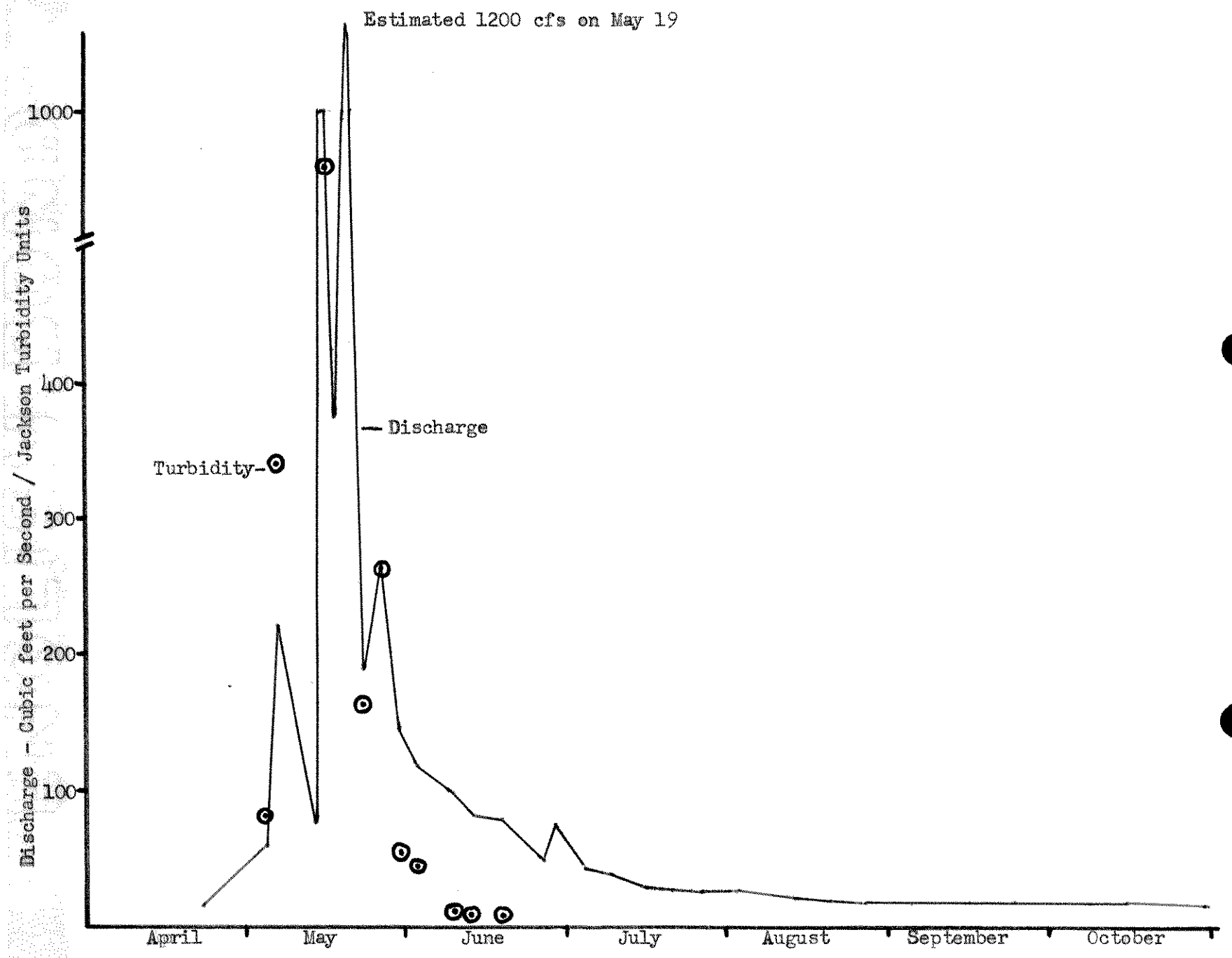

Figure 4. Discharge and turbidity measurements from Rock Creek near Lingshire, 1970.

miles. The headwater area is heavily timbered while grasslands predominate along the lower half of the drainage. About 620 acres of cultivated and wild hay crops are irrigated from Eagle Creek and its tributaries.

Discharge in Eagle Creek gradually increased from 10 cfs on May 1 to a maximum of 210 cfs by May 27. The flow then subsided to 20 cfs by July 4. A minimum flow of 2 cfs was recorded in early September. Turbidity over 30 JTU was observed nearly the entire month of May, with the maximum of 68 JTU measured on May 19. The stream gradually cleared to less than 5 JTU by June 18.

Sheep Creek. This large tributary enters the Smith at river mile 79. The drainage area is 188 square miles and is entirely mountainous. Most of the area is timbered. Considerable cutting of lodgepole pine has occurred along the upper half of the drainage. Sheep Creek supplies water for irrigation of about 3,100 acres. The gaging site was located near the mouth of the stream.

A low flow of 20 cfs was observed on Sheep Creek on April 29 and peak flows of about 640 cfs occurred on May 27 (Figure 5). On two occasions, Sheep Creek contributed a greater discharge to the Smith River than what was recorded in the river above the confluence of the creek. Thoreson (1953) measured about 110 cfs in Sheep Creek on July 21, 1952. At this time, the Smith River above the mouth of Sheep Creek was discharging only 23 cfs.

Turbidities ranged from 20 to 55 JTU the entire month of May and then gradually cleared by July 1. According to Thoreson (personal communication), Sheep Creek ran clear during runoff prior to 1940. Since then, land use and development within the drainage contributing to siltation are extensive clearcut logging, development of a ski run on the headwaters at Kings Hill, and road building. Very turbid flows were observed in upper Sheep Creek after rain storms in late June and July. These turbid flows were originating from the ski course, where portions of the stream had been rechanneled and the floodplain disturbed for further development of a ski lift. Lateral erosion is still cutting the banks where Sheep Creek was rechanneled for highway construction in the early 1960s.

Beaver Creek. This small stream enters the Smith at river mile 85. Beaver Creek flows easterly from the Big Belt Mountains and has a drainage area of 45 square miles. Most of the drainage is rolling rangeland and is heavily utilized by the livestock industry. About six miles of the lower half of the stream goes dry after runoff. Springs freshen the stream immediately above the gaging site.

Discharges of about 100 cfs followed a brief warm period in early April. The flow dropped to 8 cfs in late April, but quickly rose to about 105 cfs on May 7. Flows gradually dropped to 65 cfs by May 27 and then rapidly subsided to 9 cfs within a two week period. Turbidities ranged from 30 to 125 JTU throughout most of May. Stream flow cleared by June 20.

Camas Creek. This stream flows easterly from the Big Belt Mountains and swings north to join with the Smith at river mile 90. The drainage area of Camas Creek is 62 square miles, but the gaging station is located on the upper portion of the stream and involves a drainage area of 22 square miles. The gage site was located here to monitor flows before logging activities invade the upper watershed. The upper drainage area is heavily timbered, while foothill grasslands prevail at lower elevations. The drainage supplies water for irrigation of about 3,000 acres

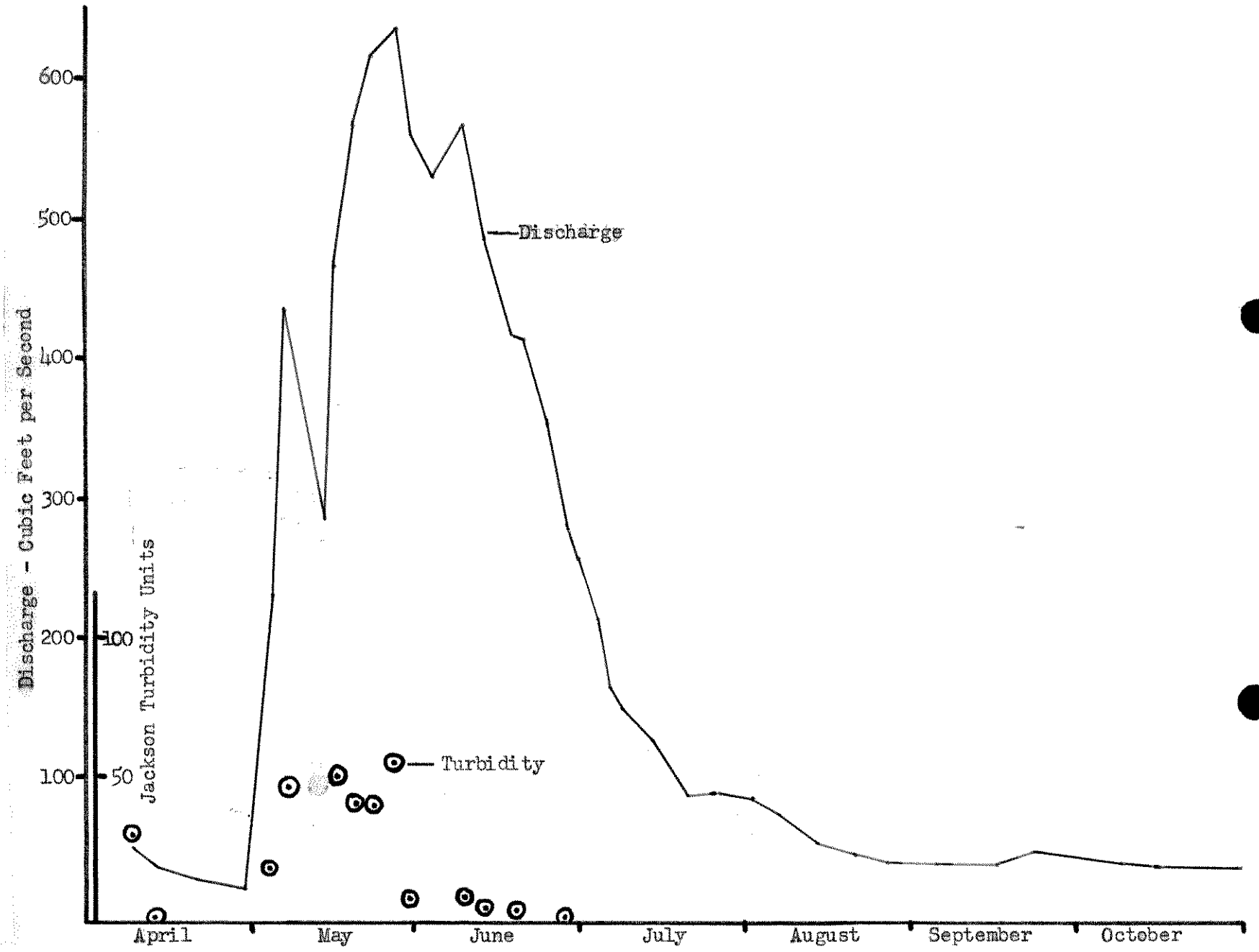

Figure 5. Discharge and turbidity readings from Sheep Creek, 1970.

of forage and grain crops. Over 120 cfs of decreed water rights have been filed on Camas Creek and its tributaries.

Since the chief supply of water originates at high, shaded elevations, peak spring runoff appears to be delayed when compared to other Smith River subdrainages. A peak flow of 170 cfs occurred on June 10 while minimum flows of 5 cfs were observed on occasions in the spring and late summer (Figure 6).

The highest turbidity recorded occurred in mid-May early in the runoff period (45 JTU, Figure 6). On two occasions, the highest turbidities recorded were followed a few days later by clear flows. Examination of the stream upstream from the gaging site revealed a few large beaver dams had washed out which probably accounted for the irregular turbid flows.

North Fork Smith River. The North and South Forks converge to form the Smith River 121 river miles above the mouth. The North Fork drains westerly from the southwest flanks of the Little Belt Mountains. The drainage area is about 180 square miles. An irrigation impoundment, the North Fork Smith River Reservoir, catches the upper third of the North Fork drainage. Over 11,000 acres of forage and grain crops are irrigated from the North Fork and its tributaries.

The gaging site on the North Fork is located near White Sulphur Springs about twelve miles below the reservoir. The site was chosen in conjunction with the section of stream where fish population estimates were conducted. The State Water Board monitors the discharge below the reservoir with the aid of a water stage recorder. The discharge at White Sulphur Springs is compared with that below the North Fork Reservoir in Figure 7. The hydrograph in Figure 7 readily points out the period in mid-May when the North Fork Reservoir is filled and surplus water flows over the spillway. During the nonirrigation season, minimal discharge is released from the reservoir. Springs and tributaries a few miles below the dam provide fishery maintenance flows in the North Fork during the winter. Early season irrigation demands sometimes nearly deplete the North Fork near White Sulphur Springs. A low of 8 cfs was observed on May 13.

Most early season turbidity in the North Fork originates from runoff from a few tributary streams below the reservoir. A maximum turbidity of 88 JTU was recorded on May 4. Generally, the North Fork contains a slight amount of turbidity in late summer that originates from the North Fork Reservoir. Reservoir drawdown exposes the mud-flat shorelines which become vulnerable to wave action. Silt becomes suspended in the impounded waters on windy days and is then flushed into the North Fork.

South Fork Smith River. This stream flows through a relatively wide valley between the Big Belt and Castle Mountains. The drainage area is about 167 square miles and a major portion of the drainage is rolling sagebrush grassland. Most of the cultivated grain crops grown in the upper Smith River valley are found on the benchlands along the South Fork. Over 4,000 acres are irrigated from the South Fork and its tributaries.

The discharge gaging site on the South Fork was located about 16 river miles above the mouth, which represented about half the drainage (87 square miles). The first few warm days in early April brought on flash flooding. An estimated 180 cfs was observed for two days at the gaging site. The hydrograph illustrating the flow

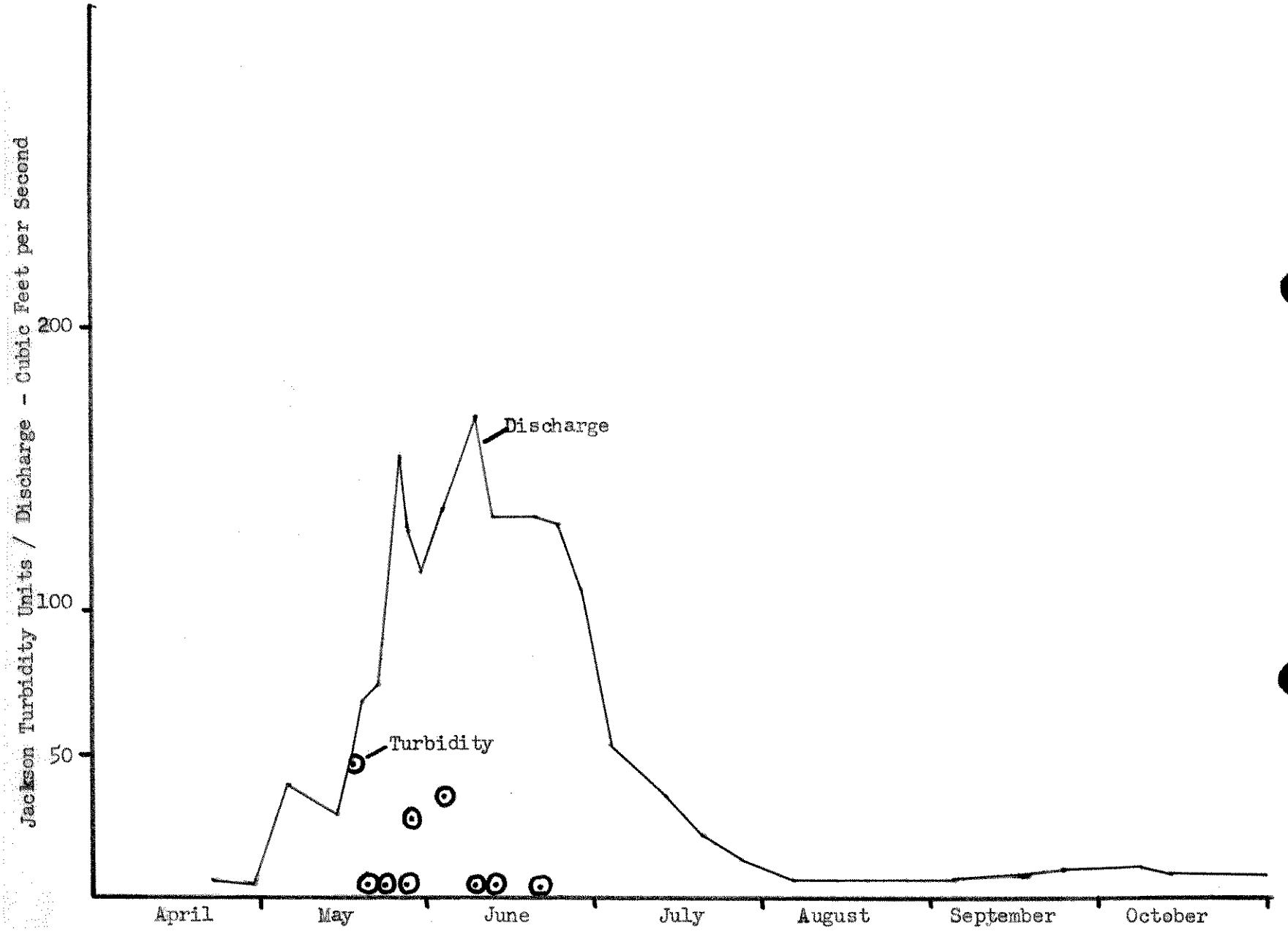

Figure 6. Discharge and turbidity readings from Camas Creek, 1970.

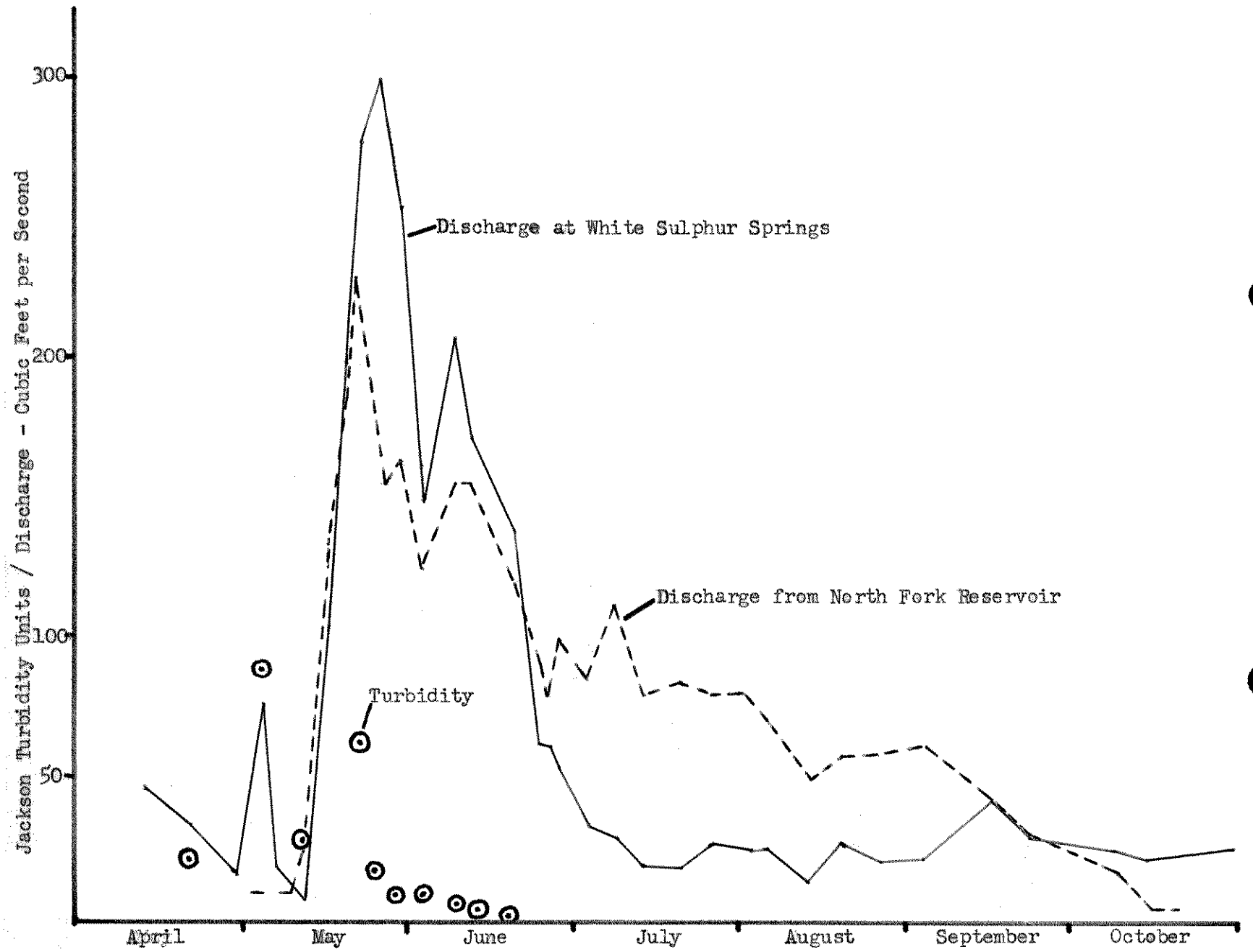

Figure 7. Discharge and turbidity readings from the North Fork of the Smith River, 1970.

regime of the South Fork from April through June is presented in a previous report (Wipperman, 1971). Most of the runoff from high mountain elevations is stored in small irrigation impoundments or diverted for irrigation, which tempers the flow of the South Fork during May and June. A flow of only one cfs was recorded nearly the entire month of August.

Turbidities up to 120 JTU were measured in early April during the flash flooding. The stream did not clear until late June when the discharge dropped to less than 10 cfs.

Reservoirs and Ponds

Fish populations were sampled with gill nets in 8 reservoirs and ponds where public access is available. Only one of the reservoirs lies on public ground. Results of the gill net catches are presented in Table 12.

Trout are stocked in seven of the reservoirs by the Fish and Game Department. Natural reproduction occurs in 4 of the 7 reservoirs. Elk Creek Reservoir was drained to about a half acre puddle for irrigation purposes in 1970. Since draining of this reservoir is almost an annual occurrence, it was recommended that stocking should be discontinued.

Scale samples were obtained from fish from Giles Reservoir (Gipsy Lake) and Keep Cool Reservoir. Age II+ rainbow trout from Giles Reservoir ranged from 7.6 to 9.2 inches total length; and age III+, 10.2 to 12.2 inches total length. Age I+ cutthroat trout from Keep Cool Reservoir ranged from 5.7 to 8.5 inches total length; age II+, 10.1 to 13.5; and one age III+ cutthroat was taken that measured 16.3 inches in length. Both reservoirs were netted in late June, 1970.

Giles Reservoir lies on the Helena National Forest. The water rights revert to the government in 1972, and the United States Forest Service plans to raise the dam and build a campground near the lake. A contour map of the area was studied and recommendations were submitted to the Forest Service for enlarging the lake. Presently, the deepest part of the lake is 6 feet with an average depth of about 3 feet. Raising the shoreline 10 feet would yield a lake of about 24 acres, of which 35% of the area would be at least 10 feet deep and about 69% of the area would be at least 5 feet deep.

Creel Census

A total of 285 anglers were contacted on 15 streams in the Smith River drainage. At the time of contact, 240 anglers or 84% were successful in taking at least one game fish. They caught 1,043 game fish or 4.3 fish per angler (3.7 fish per angler for total sample). Species composition of the catch was as follows: 480 brook trout (46%); 464 rainbow trout (45%); 51 cutthroat trout (5%); 27 whitefish (2%); and 21 brown trout (2%).

A total of 200 anglers were contacted on 7 reservoirs. A total of 111 anglers or 56% were successful in taking at least one game fish at the time of contact. The successful anglers caught 318 game fish or 2.9 fish per angler (1.6 fish per angler for the total sample). Species composition of the catch included: 204 rainbow trout (64%); 113 brook trout (36%); and one cutthroat trout (0.3%). Trout are stocked in 6 of the 7 reservoirs on which angler contacts were made.

Table 12. Gill netting results from eight reservoirs in the Smith River drainage. (Figures in parenthesis represent length range of fish sample in inches)

Reservoir	Location T. R. S.	Area (acres)	Catch (trout) Rainbow	RainbowXCutthroat	Cutthroat	Brook
Elk Creek	11N,4E,33	10	5 (10.3-15.5)	-	-	4 (7.9-10.4)
Giles	9N,4E,34	5.7	17 (7.6-12.2)	2 (7.6- 8.3)	-	-
Jackson	9N,5E,34	19.5	7 (13.4-19.8)	-	-	1 (12.8)
Keep Cool	11N,4E,29	28.0	1 (18.4)	5 (5.7 - 6.5)	15 (6.3-16.3)	-
McGuire	10N,6E, 3	5	5 (11.7-14.2)	1 (11.8)	5 (9.4-12.5)	5 (12.0-14.3)
McGuire #1	13N,6E,32	2	-	-	52 (7.2-13.7)	-
McGuire #2	13N,6E,31	2	-	-	3 (8.3-11.4)	-
Whitetail	11N,5E,10	6	19 (5.5-11.3)	9 (7.3-12.2)	7 (6.9-10.8)	34 (5.8-13.0)

RECOMMENDATIONS

The collection of field data should continue and be completed to form the framework for the fishery planning procedure. The final plans for management of the Smith River drainage will be written in this fiscal year.

Preliminary conclusions based on data and observations reveal land use practices in the Smith River drainage have adversely affected aquatic life. The drainage has a history of heavy grazing by livestock. Clearcut logging has severely damaged natural channels on several small headwater streams. Road building and mining operations have taken a toll on several miles of stream channel. The end result of development and land use is stream channel deterioration, erosion and loss of topsoil which has caused unnecessary silt pollution in several waters.

Improvement in range management on private and public lands has been noted in a few areas in the past two years. Private landowners need considerably more guidance on conservation practices. The United States Forest Service in showing some concern for other resources on forest land other than timber, mining and grazing. Several meetings have been attended with Forest Service personnel to include fish and wildlife needs in land management planning. Additional work is needed to orient the Forest Service along this line.

Recent legislation has improved the methods of coordination and planning with government agencies who propose activities influencing aquatic habitat. Several violations of the Stream Preservation Act have been observed in the Smith River drainage in the past few years. Actions were taken to solve these violations; however, more coordination and planning is needed by subdivisions of state governments to protect aquatic resources. The Fish and Game Department will have to increase their efforts to orient and educate these government agencies to receive full mileage from the Stream Preservation Law.

Several individuals have complained that the 10-pound brook trout limit is depleting the species. Data collected to date does not verify this complaint. Field inventories reveal brook trout are the most abundant game fish in most of the Smith River tributary streams. In only one instance, (on a short section of the Smith River) the liberal brook trout limit may be influencing the numbers present. It is recommended the 10-pound brook trout limit remain unchanged.

The Smith River is the most important fishing stream in the drainage. Floating is a popular means of recreation on this stream. Two major problems concerning floaters are present in the eyes of most landowners. These are littering and cutting or damaging fences that cross the river. Cleanup campaigns conducted by the Forest Service, Fish and Game Department, and sportsmen's groups have alleviated the littering problem somewhat. The carry in-carry out campaign should be strongly stressed to all outdoor users. Experimental work devising cross-stream fencing should be implemented in cooperation with the landowners. Some ideas, patterned after cross-ditch fencing, are presently being developed.

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Prepared by A. H. Wipperman

Date August 8, 1971

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