MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana Title: Southwest Montana Fisheries Investigations

Project No.: F-9-R-30 Title: Inventory and Survey of Waters of the

Job No.: I-c Project Area

Period Covered: July 1, 1981 through June 30, 1982

Report Period: July 1, 1981 through June 30, 1982

ABSTRACT

Population estimates of trout populations in the Yellowstone River indicate that wild rainbow and brown trout numbers have increased since stocking of hatchery rainbow trout ceased. Yellowstone cutthroat numbers at Corwin Springs may be suppressed by fishing pressure.

Low summer flows in the Shields River appear to suppress the population of three year and older brown trout. Water quality parameters for four sites on the Shields River are presented.

Walleye in Dailey Lake are growing well, but the size of yellow perch and rainbow trout have declined in the last year.

BACKGROUND

As a result of legislative mandate, the Montana Department of Fish, Wildlife and Parks has obtained water rights or reservations for instream flows in numerous streams in Montana. At this time, the Yellowstone Drainage is the only river system that has gone through the reservation process. As of December 15, 1978 the Montana Department of Fish, Wildlife and Parks and the Montana Department of Health and Environmental Sciences were granted certain instream flows in streams throughout the Yellowstone Drainage. To maintain these rights, the Department must continually update and enhance its justification for receiving instream flows. Therefore, the Department must continue to monitor fish populations and study the correlations between these populations and stream flows. The studies will also identity the effects that fishermen are having on populations in the river.

The Shields River Drainage continues to be plagued by problems including erosion, flooding and dewatering. The effects of these conditions on trout populations in the Shields River will continue to be studied.

The effects of different management plans on Dailey Lake fish populations continue to be monitored.

The Department of Fish, Wildlife and Parks is responsible for protecting and enhancing the fishery resource in Montana. To aid the Department in this endeavor, the Stream Protection Act of 1963 and the Natural Streambed and Land Preservation Act of 1975 were passed by the State Legislature. Under these acts, the Department has input into any streambank or streambed work which is proposed by state, county or city government, and private individuals. These laws have been a valuable aid in protecting the fishery resources of Montana.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To determine fish populations in at least two established study sections of the Yellowstone River, and one established study section of the Shields River. Data from these study sections are included in this report.

2. To determine flow, water temperatures and selected water quality parameters at two established sites on the Shields River. Data included in this report.

3. To monitor water temperatures at three established sites on the Yellowstone River. Data included in this report.

4. To assess Walleye planting success in Dailey Lake. Data included in this report.

5. To mitigate or enhance habitat alterations due to agricultural, residential, mining, and industrial development. Data included in this report.

PROCEDURES

Fish populations were sampled in the Yellowstone River using an 18-foot aluminum boat powered by an 80-hp jet motor. The boat was equipped with a double boom electrode system which was designed according to Novotny and Priegel (1971) as modified by Peterman (1978).

Generally, three mark and three recapture runs were made on each section to obtain a population estimate. In the Shields River, fish populations were sampled with a mobile electrode system. Population estimates were calculated according to Vincent (1971).

Water quality and flows were monitored on the Shields River at approximately weekly intervals during critical flow periods and monthly intervals during the winter. Water temperatures were measured with max/min thermometers while turbidity was measured using a Hach Model 2100 A turbidimeter. Flow measurements were made with a hand-held current meter and stage measurements.

Fish populations in Dailey Lake were sampled using experimental 125-foot (3/4 to 2 in.) gill nets.

FINDINGS

Yellowstone River

Two study sections of the Yellowstone River were sampled during 1981 (Figure 1). The Ninth Street Bridge and Corwin Springs study sections were electrofished during the spring, and the Ninth Street Bridge section was sampled during the fall.

Ninth Street Bridge

This 4.75-mile long section is dominated by rainbow trout with lesser numbers of brown trout and a small population of Yellowstone cutthroat. The overall estimate indicates that approximately 3,000 trout per mile inhabit this section.

Table 1 shows the populations of rainbow and brown trout larger than 6 in. in this section since 1973. Rainbow trout have displayed a general increase in numbers since 1973, while the number of brown trout has fluctuated. Both species appear to have higher populations in 1981 than any other previous year. Figures 2 and 3 illustrate the trends in population estimates for rainbow and brown trout longer than 16 in. in this section since 1973. These larger trout are also present in higher numbers in 1981 than any previous year.

Rainbow and brown trout populations in this section have increased since 1973, a year after stocking of hatchery rainbow trout ceased. Vincent (1972) documented increases in wild trout populations in total numbers after a 20-year catchable rainbow trout program had been discontinued on the Madison River. He also found that the population of trout in O'Dell Creek decreased by 45% in number after stocking of hatchery rainbow trout. It appears that cessation of stocking in the

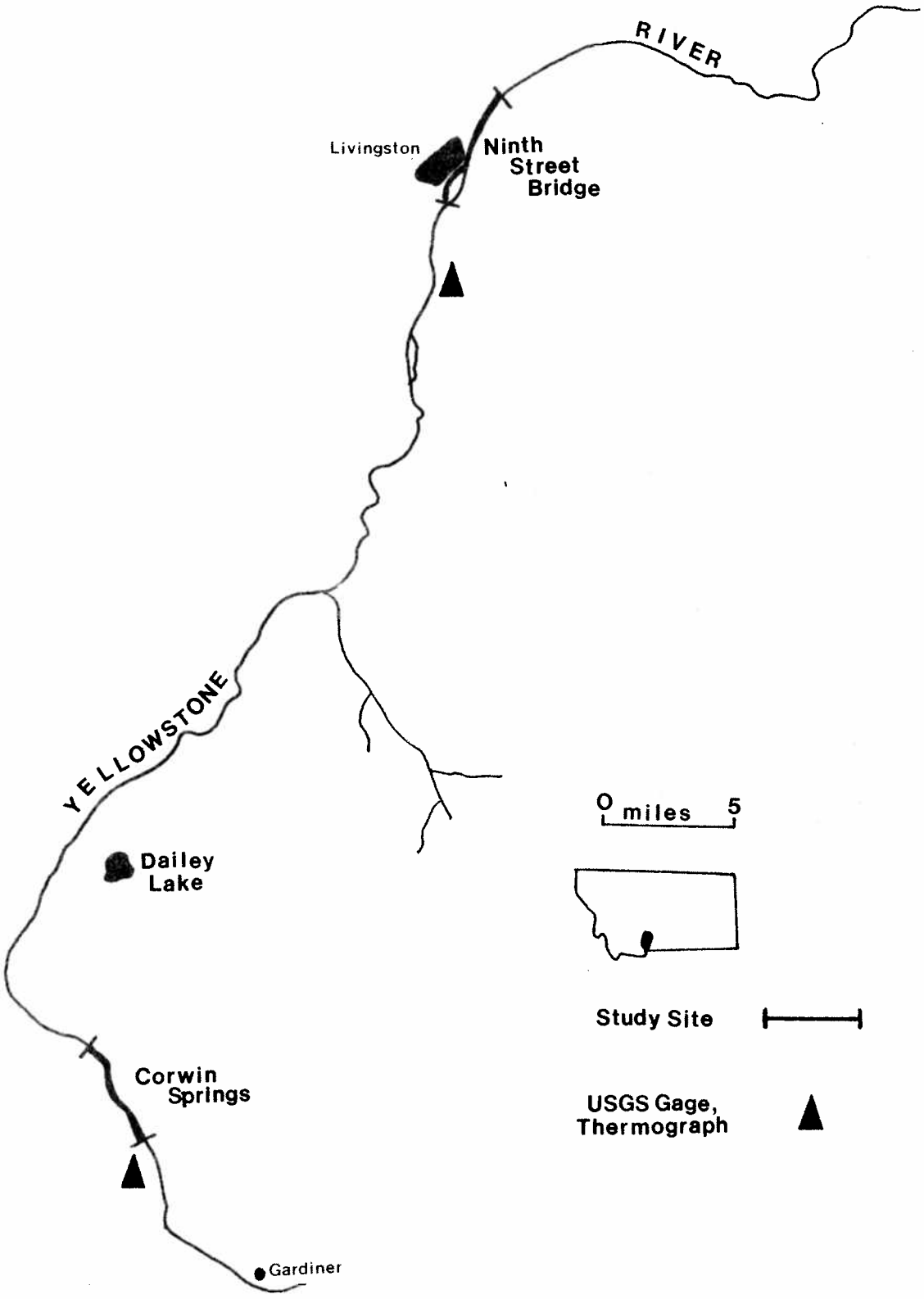


Figure 1. Map of the Upper Yellowstone River.

Yellowstone River has allowed the wild trout population to increase.

Table 1. Population estimates of rainbow and brown trout longer than 6 in. in the Ninth Street Bridge study section during the spring from 1973-1978 and 1981 (80% confidence intervals in parentheses).

Year	Rainbow Trout	Brown Trout
1973	4 637 (± 878)	2 268 (±615)
1974	8 692 (±1358)	2 453 (±372)
1975	--	2 924 (±697)
1976	7 045 (±1014)	1 868 (±444)
1977	8 680 (±1669)	1 501 (±366)
1978	9 359 (±1578)	2 435 (±730)
1981	9 643* (±2105)	4 061 (±1353)**

* This estimate is for trout longer than 10 inches. The figure for trout larger than 6 inches would be higher.

** This estimate is for trout longer than 8.5 inches. The figure for trout longer than 6 inches would be higher.

Corwin Springs

This 5.2-mile long section is dominated by brown trout and lesser numbers of rainbow and Yellowstone cutthroat trout. The overall estimate indicates that approximately 1000 trout per mile inhabit this section.

Table 2 depicts the spring, 1981 population estimates for brown, rainbow and Yellowstone cutthroat trout in this section.

Table 2. Population estimates for brown, rainbow and Yellowstone cutthroat trout in the Corwin Springs section of the Yellowstone River during May, 1981 (80% confidence intervals in parentheses).

Species	Number
Brown trout (> 9.0 in.)	2014 (±391)
Rainbow trout (> 8.5 in.)	745 (±165)
Yellowstone cutthroat (> 10.0 in.)	671 (±174)
Rainbow trout (> 8.5 in.)	745 (±165)
Yellowstone cutthroat (> 10.0 in.)	671 (±174)

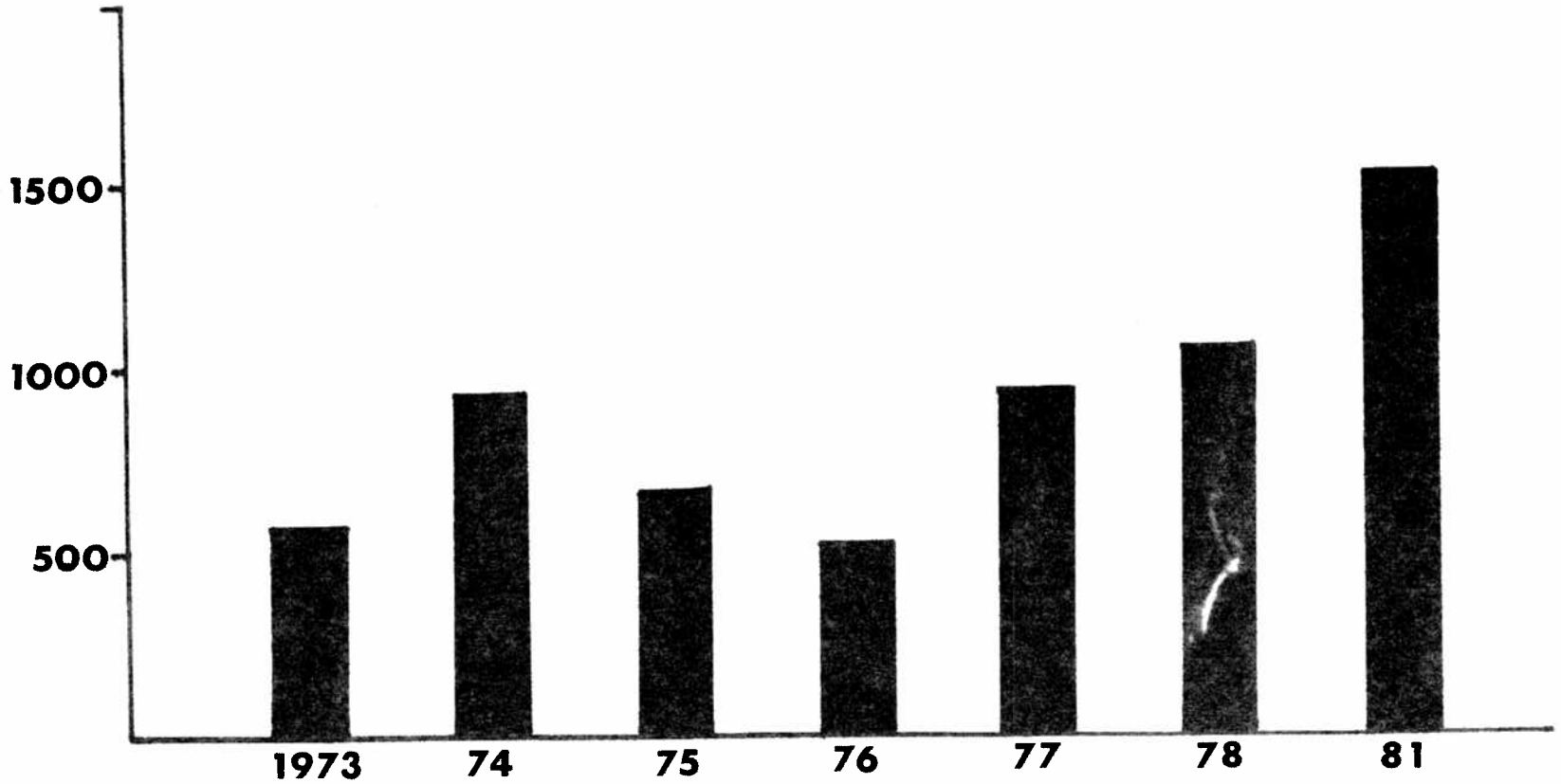


Figure 2. Population estimates of rainbow trout 16 inches and longer in the Ninth Street Bridge study section during the spring of 1973-1978 and 1981.

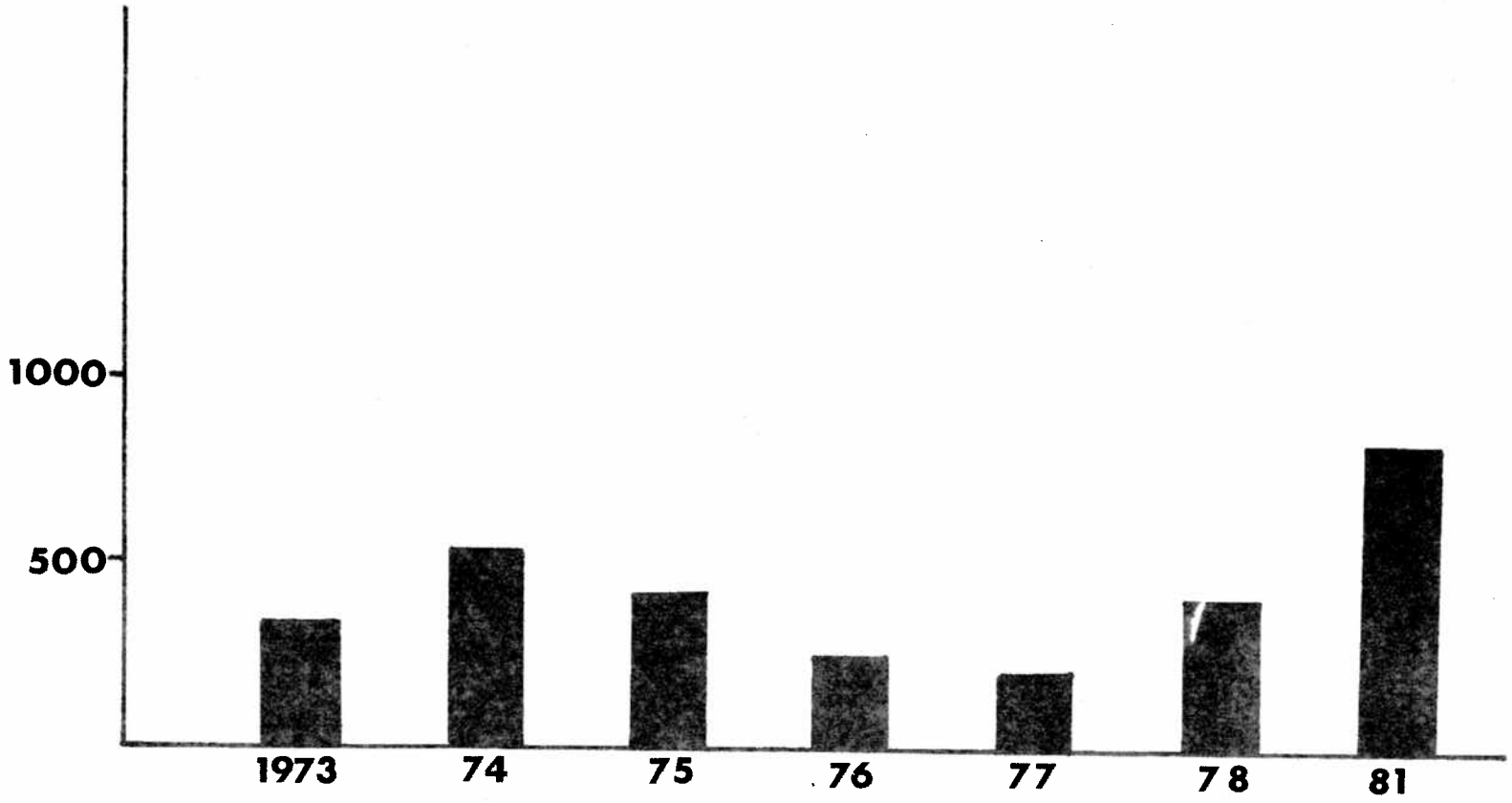


Figure 3. Population estimates of brown trout 16 inches and longer in the Ninth Street Bridge study section during the spring of 1973-1978 and 1981.

The population of brown trout longer than 16 inches during the spring of 1978, 1979 and 1981 is presented in Figure 4. The number of brown trout longer than 16 in. has decreased since 1978. Growth of brown trout in this section appears to be slower than in the Ninth Street Bridge section (Figure 5).

The population of Yellowstone cutthroat trout longer than 14 in. appears to have decreased since 1978 (Figure 6). Harvest by fishermen could be suppressing the cutthroat population. The catch rate in 1978 and 1979 was 0.49 fish per hour (Vincent and Clancy, 1980). This compares to a brown trout harvest of 0.58 fish per hour even though the brown trout population is about three times larger than the cutthroat population. This vulnerability of the Yellowstone cutthroat makes them very succeptible to over fishing.

The number of rainbow trout longer than 14 in. appears to have increased since 1978 (Figure 7).

Shields River

One study section was electrofished on the Shields River during 1981. The Zimmerman section, which is located near Wilsall (Figure 8) was sampled during the spring and fall.

Table 3 depicts the number of brown trout per 1000 feet of stream in this section during 1980 and 1981. The over-winter mortality from 1980 to 1981 was primarily found in one- and two-year old trout. The Age III and older trout remained static during this time period. However, between the spring and fall of 1981, 44% mortality occurred in the Age III and older trout. This could have been a result of extremely low stream flows in this section during 1981.

Table 3. Population estimates of brown trout in the Zimmerman section of the Shields River during the years indicated (expressed as number of trout per 1000 feet).

Time Period	AGE I	II	III (+)*	IV+	Total	80% Confidence Intervals
Sept., 1980	33	40	67		140	19
March, 1981		15	26	71	112	23
Sept., 1981	46	21	54		121	27

* The age of spring fish includes II, III and IV+ fish, while fall aging includes I, II, and III+ fish.

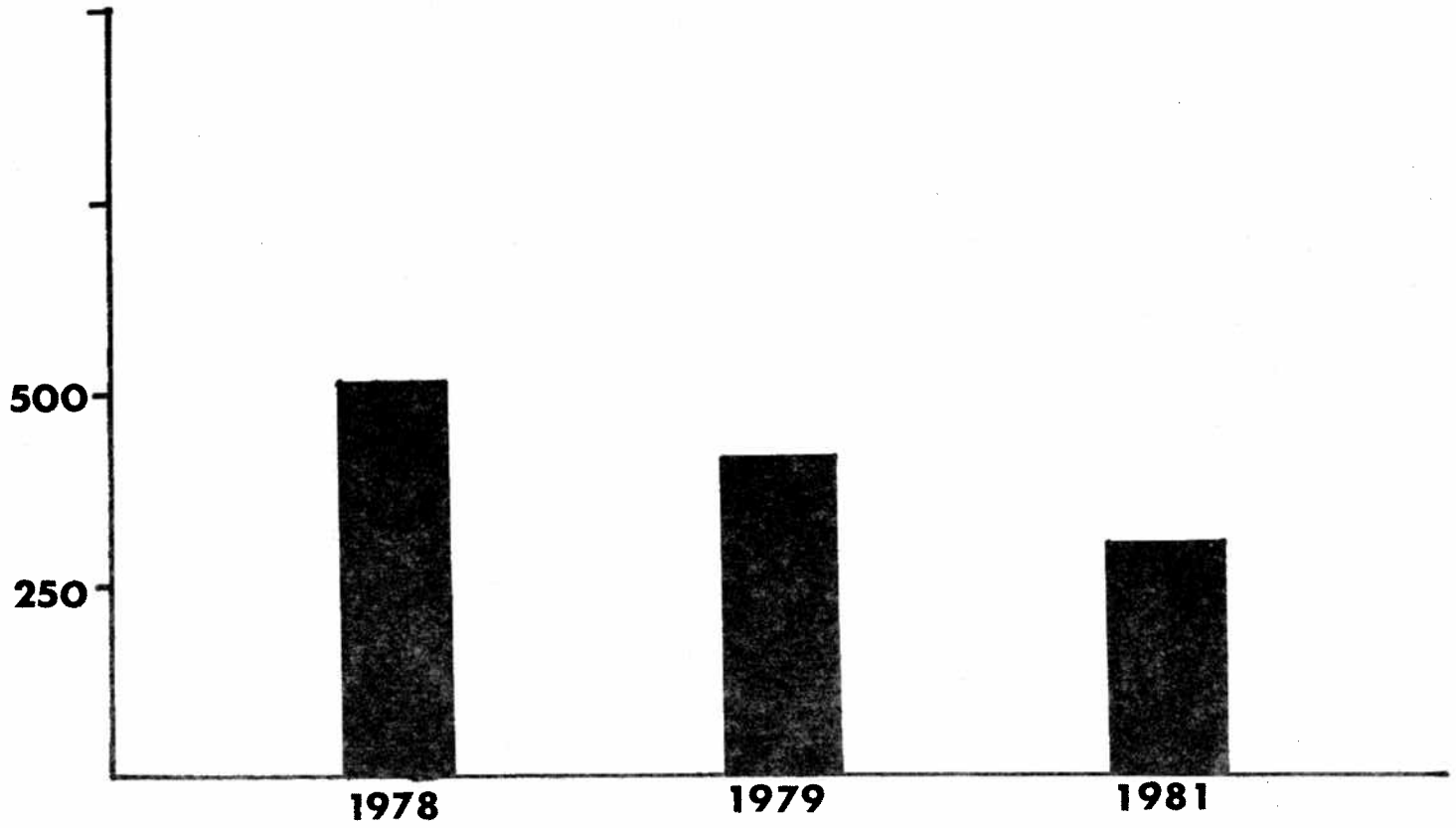


Figure 4. Population estimates of brown trout 16 inches and longer in the Corwin Springs study section during spring of 1978, 1979 and 1981.

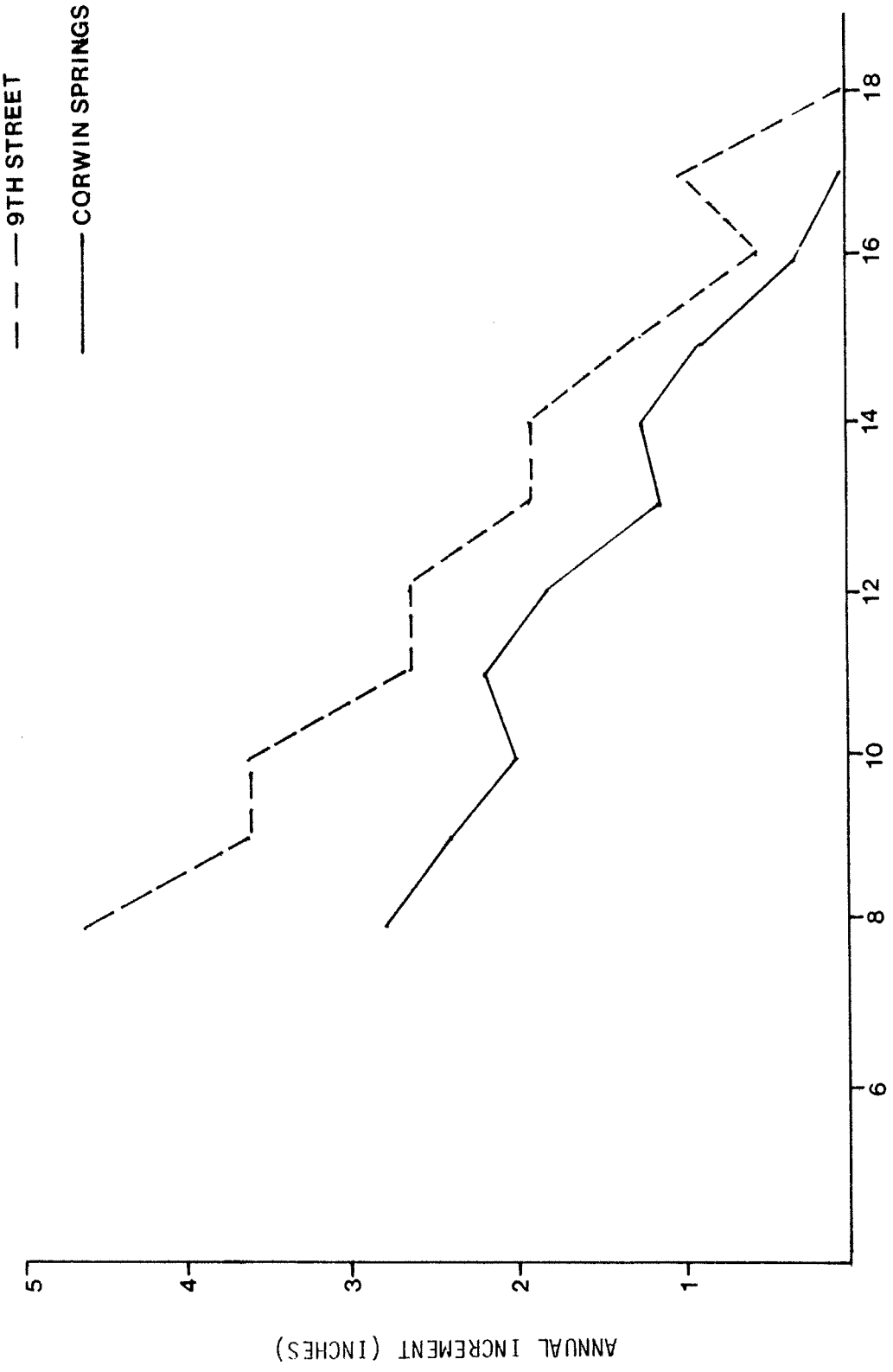


Figure 5. Annual growth of brown trout from the Ninth Street Bridge and Corwin Springs study sections (Ninth Street Bridge data from Stevenson, 1979).

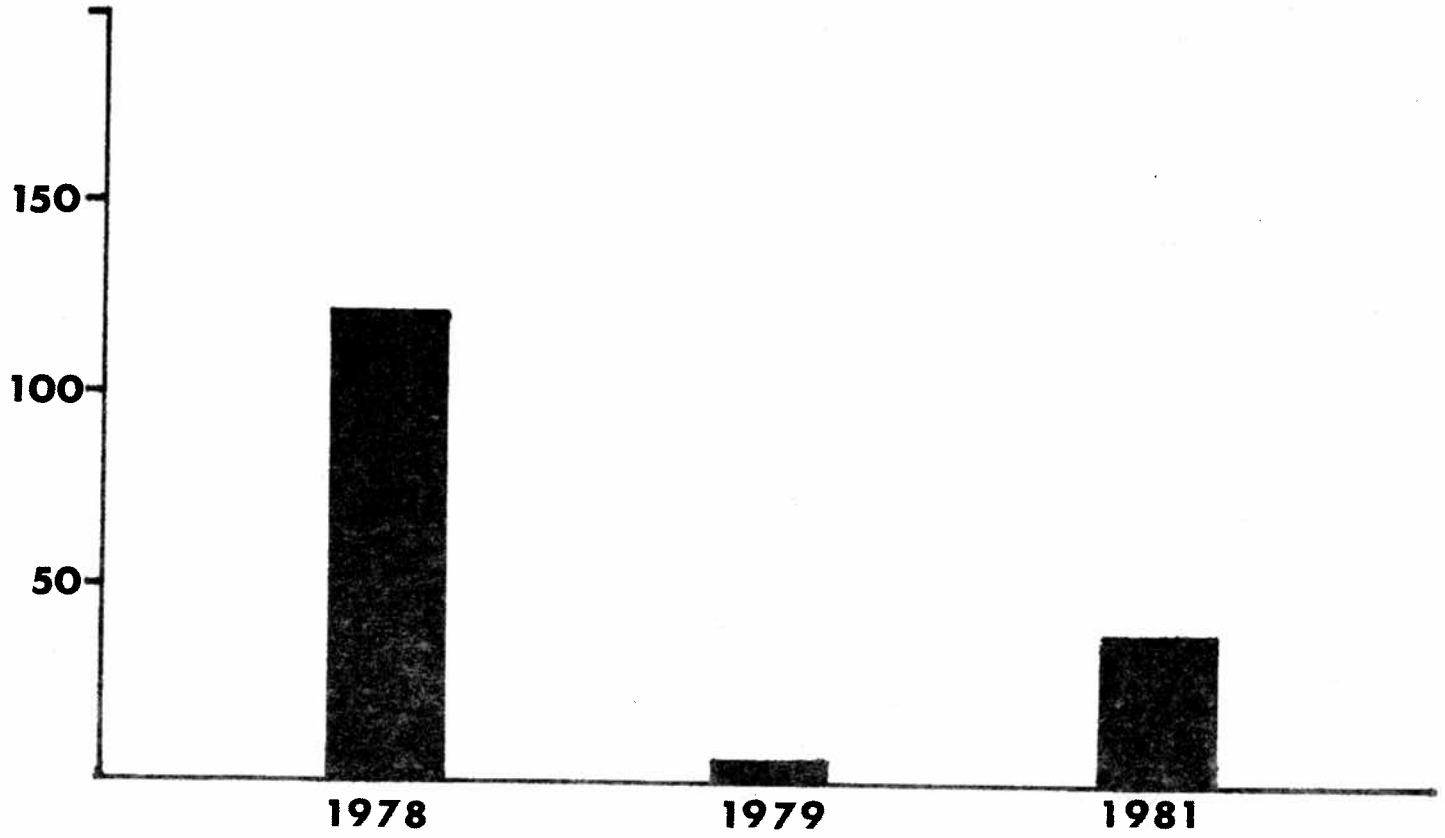


Figure 6. Population estimates of Yellowstone cutthroat trout 14 inches and longer in the Corwin Springs study section during the spring of 1978, 1979 and 1981.

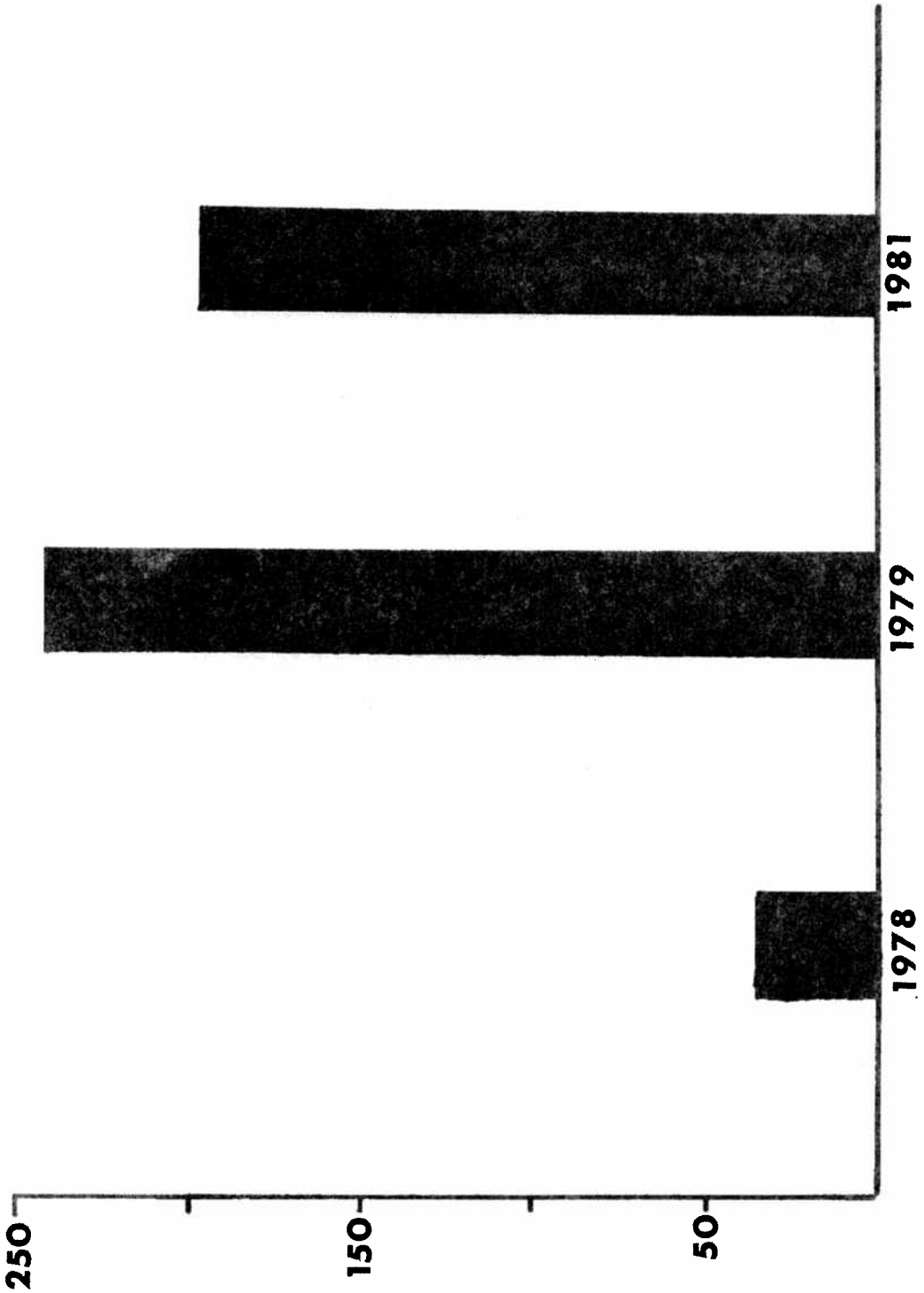


Figure 7. Population estimates of rainbow trout 14 inches and longer in the Corwin Springs study section during the spring of 1978, 1979 and 1981.

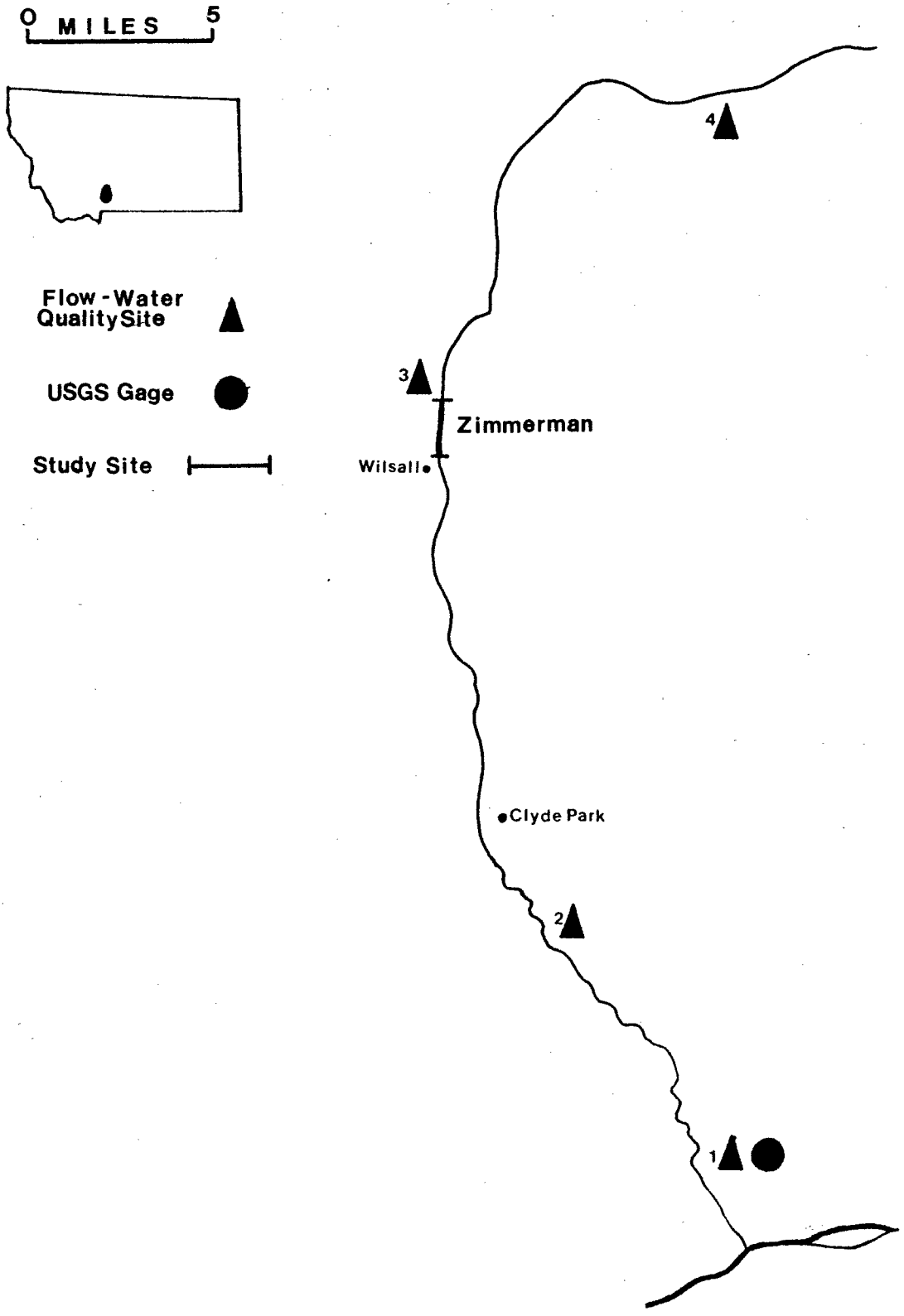


Figure 8. Map of the Shields River.

A relationship between flows and fish populations appears to be occurring in this section. Figure 9 depicts the early October flows and the corresponding number of brown trout longer than 14 in. per 1000 feet in the section. The October flow measurement was chosen because measurements were not taken until October 1978. The low flow period of August and September is probably the limiting factor for the trout population, and the October reading is a reflection of the earlier flows.

Shields River Water Quality

Flows

Flows for the four water quality sites are summarized in Figures 10 and 11. Spring runoff began in late April, as it did in 1980 (Clancy, 1982) and dropped to base levels in late July. Heavy rains in late May caused serious flooding. Fall flows tended to be lower in 1981 than in 1980, probably as a result of low snowpack. It appears that the amount of water during the low flow period is the limiting factor for adult brown trout in the Zimmerman section near Wilsall (Figure 9). The amount of snowpack and the amount of water withdrawls for irrigation are the variables involved with these flows.

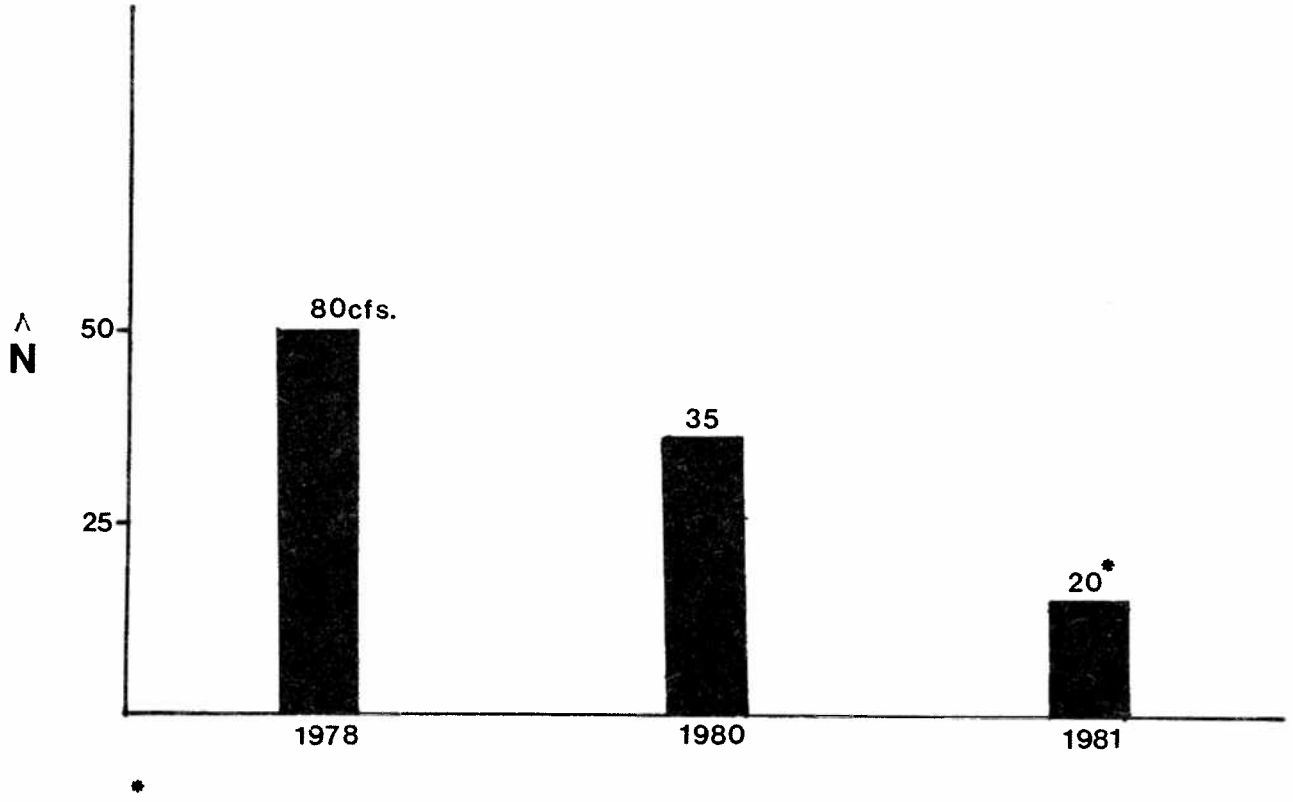
The flows at Site 3 are lower than at Site 4 during the August and September time period. This is probably a result of irrigation withdrawls.

Turbidity

Turbidity increases in a downstream direction (Figures 12 and 13). The highest readings occurred during late May during the flood which was caused by heavy rainfall. Peak turbidities in 1980 occurred during late April when snowmelt began (Clancy, 1982).

Water Temperature

Water temperatures at Sites 1, 3 and 4 during the summer of 1981 are presented in Figure 14. Site 4 was the coolest site, never reaching over 60°F. Site 1 was the warmest site, reaching over 70°F on several occasions.



* This value is an average of two readings: late September and late October (no reading was taken in early October).

Figure 9. Brown trout 14 inches and longer and corresponding early October flows in the Zimmerman section of the Shields River during 1978, 1980 and 1981.

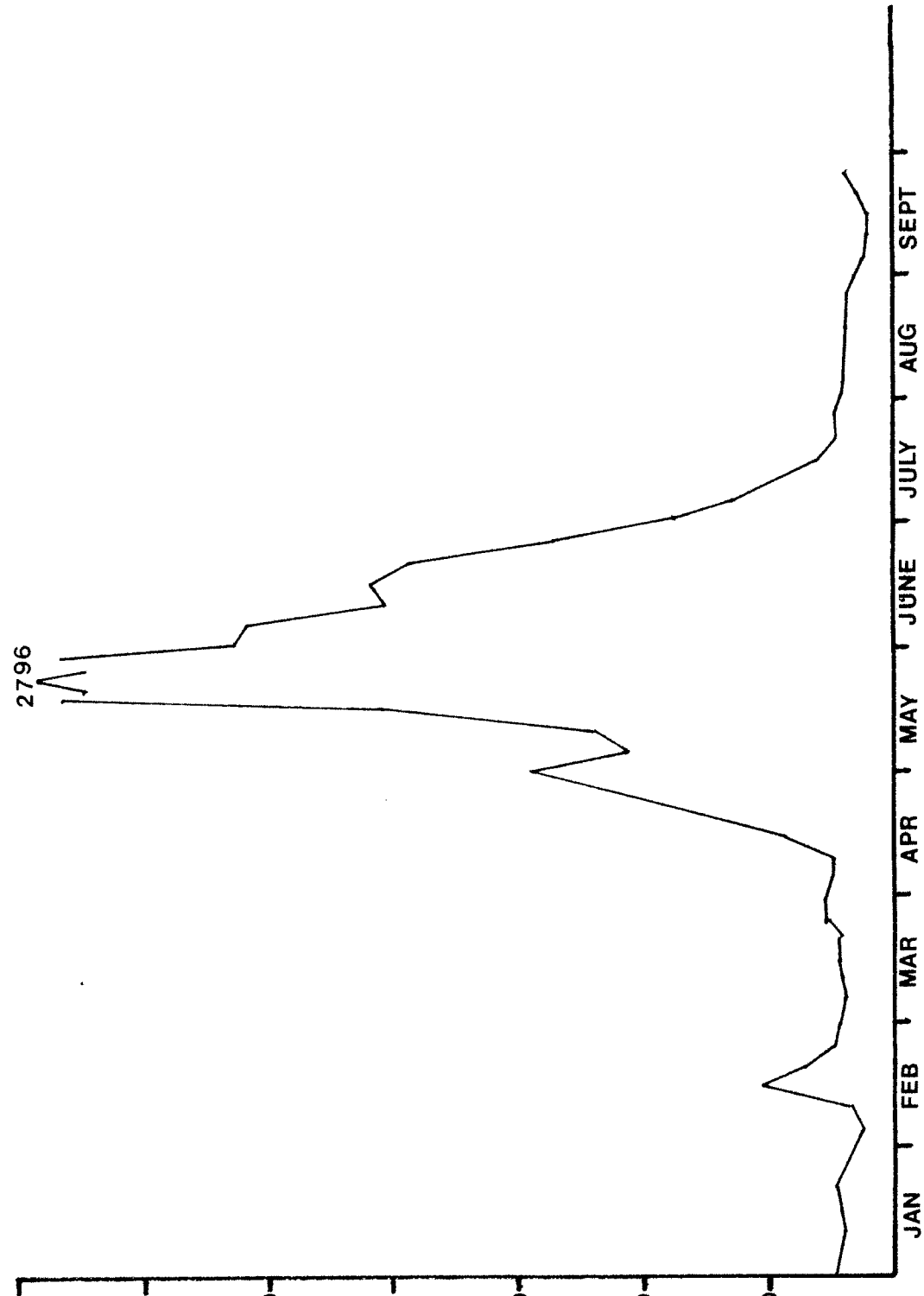


Figure 10. Flow at water quality Site 1 in the Sheilds River during 1981.

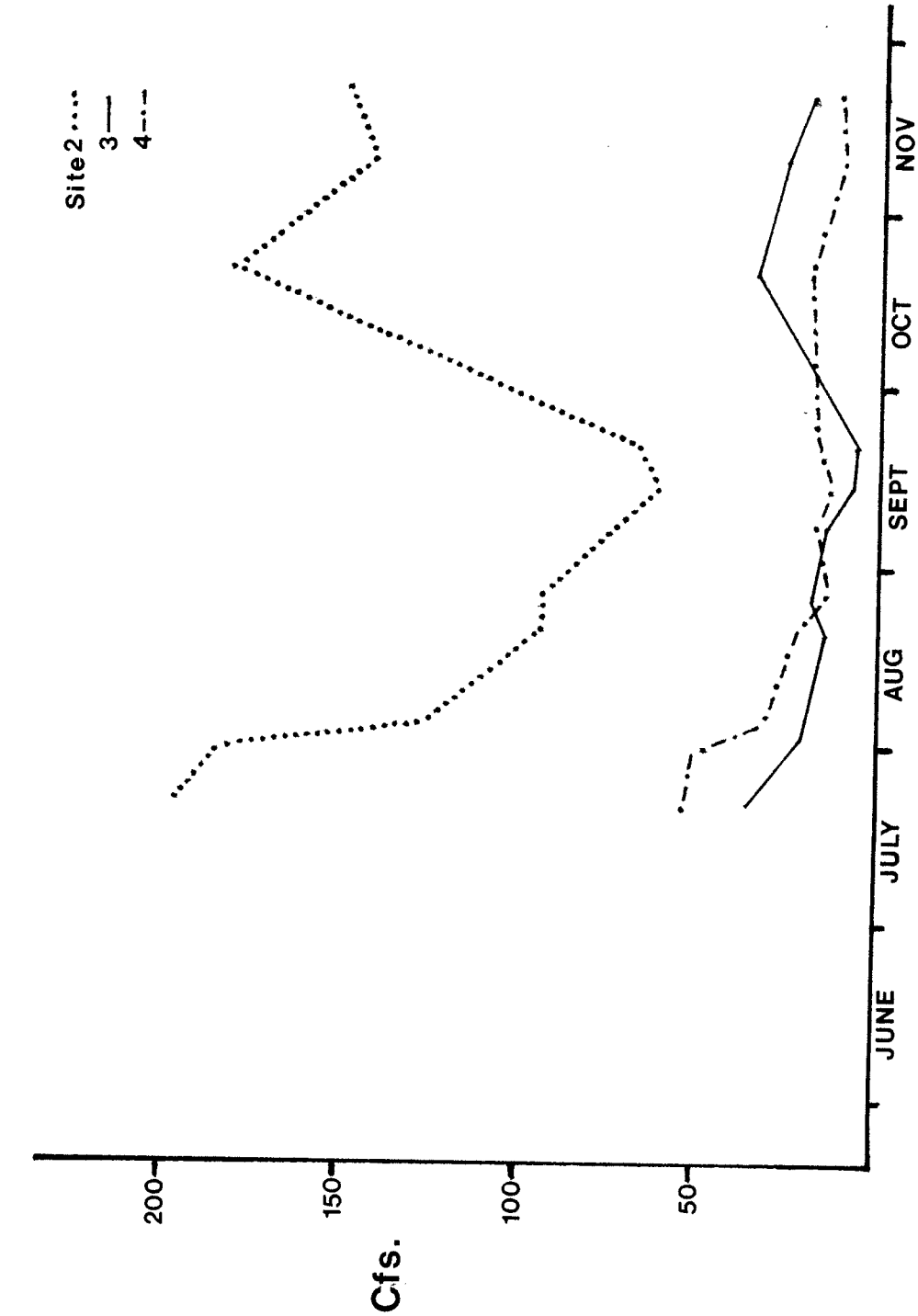


Figure 11. Flows at water quality Sites 2, 3 and 4 in the Shields River during 1981.

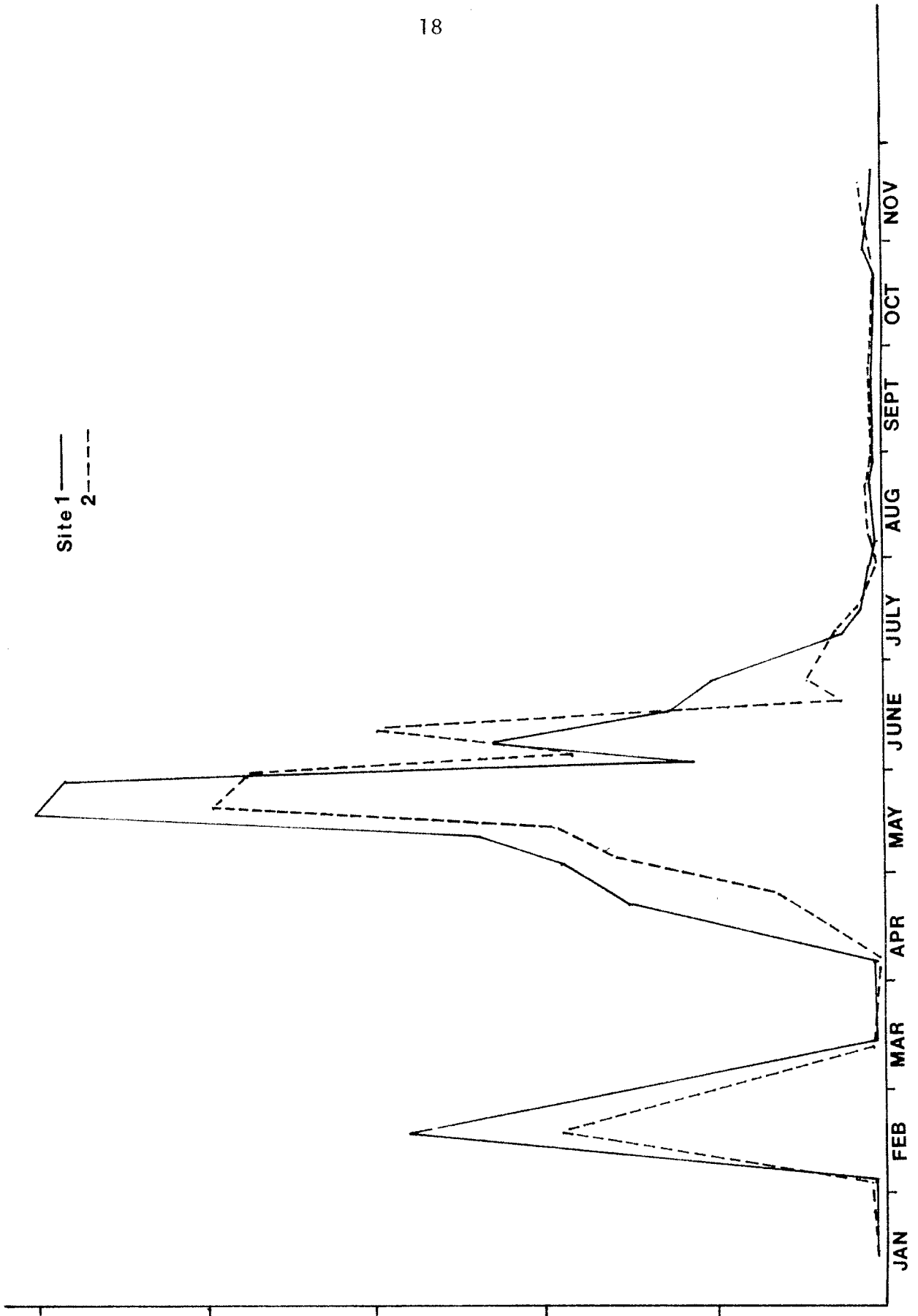


Figure 12. Turbidity at Sites 1 and 2 on the Shields River during 1981.

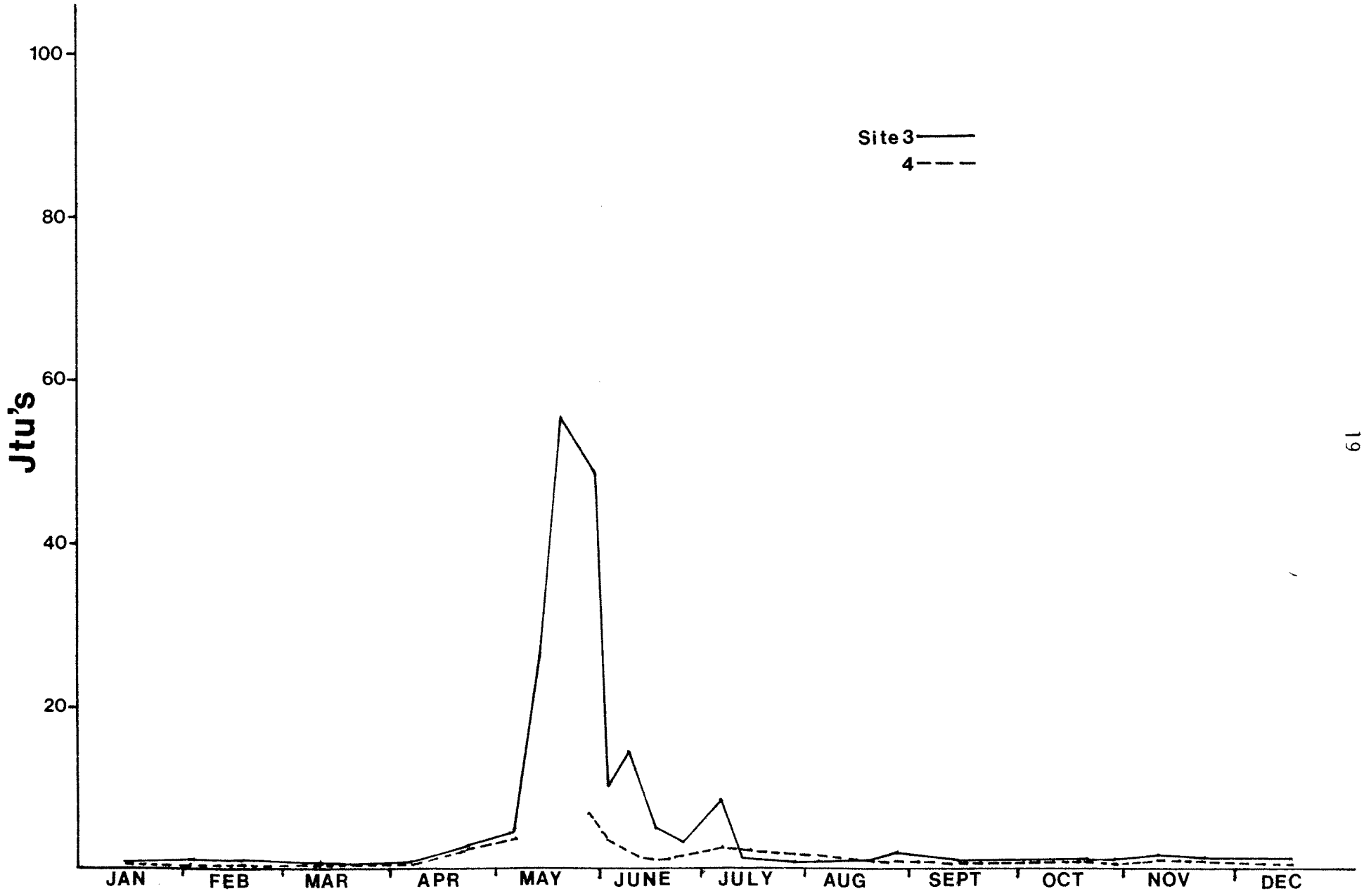


Figure 13. Turbidity at Sites 3 and 4 on the Shields River during 1981.

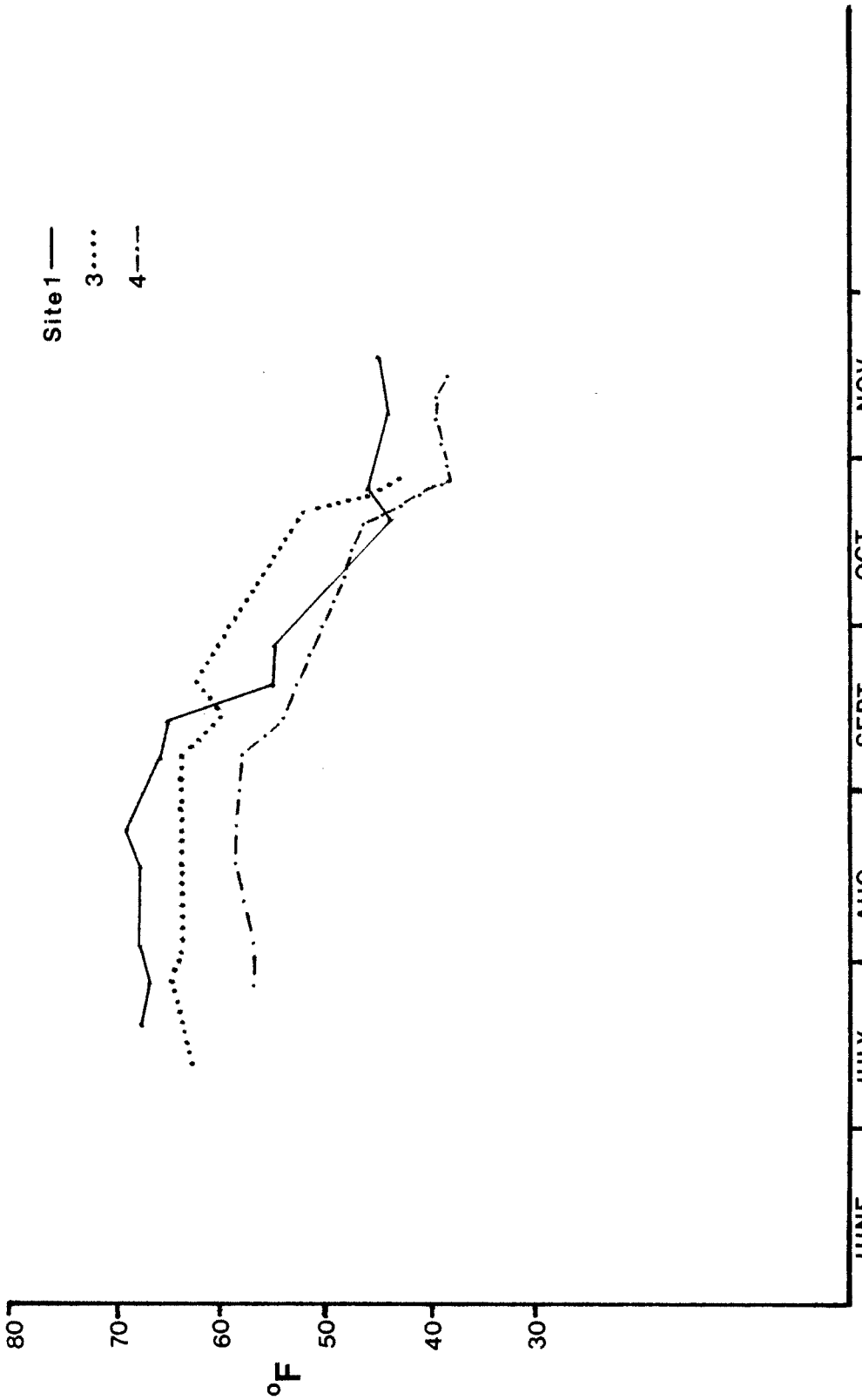


Figure 14. Maximum water temperatures during July-November time period at three water quality sites on the Shields River during 1981.

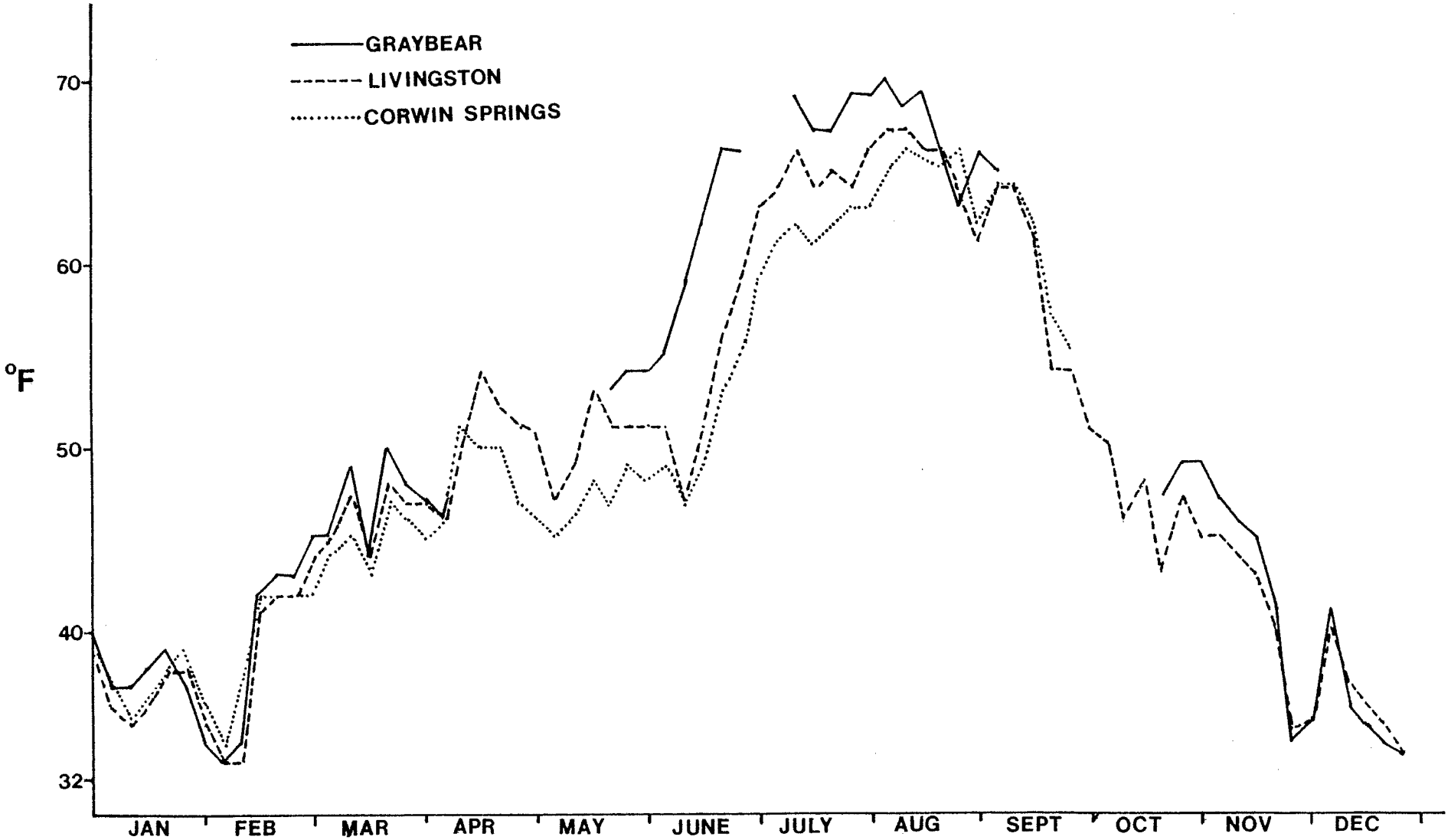


Figure 15. Five-day mean and maximum water temperatures at Graybear, Livingston, and Corwin Springs during 1981.

By 1981, the average size of yellow perch and rainbow trout had decreased (Table 4). Perch were near the original levels before poisoning and rainbow trout sizes had decreased significantly. Walleye averaged 11.3 in. and were exhibiting good growth when compared to other northern latitude lakes (Riggs, 1978).

The success of walleye introductions has been correlated with stocking densities and timing. Carlander, et al. (1960) found that stocking rates of 5,000 fry per acre resulted in significant contributions to the fishing. Stocking rates less than this resulted in poor contributions to the fishery. In Dailey Lake, stocking rates have been 250 and 500 fry per acre. Momot, et al.(1977) found that introductions of walleye fry are most successful when stocking is timed to correlate with forage fish spawning.

The Montana Department of Fish, Wildlife and Parks stocks walleye during May and June. The fish stocked during May tend to be sacfry or swim up, while June fish tend to be larger.

Stream Protection

The need for proper streambank and streambed management cannot be overemphasized when fisheries are evaluated. The Department spends a great deal of time enforcing stream protection laws in the Upper Yellowstone Drainage.

During 1981, the Department inspected 13 projects in Sweetgrass County, and 27 projects in Park County under the provisions of the Natural Streambed and Land Preservation Act of 1975. Also, the Department inspected two projects in Sweetgrass County and seven projects in Park County under the provisions of the Stream Protection Act of 1963.

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Date:	April 5, 1983	
Waters Referred to:	Dailey Lake	3-22-7644-03
	Shields River	3-22-5362-01
	Shields River	3-22-5348-01
	Shields River	3-22-5334-01
	Yellowstone River	5-22-7056-01
	Yellowstone River	3-22-7070-01
	Yellowstone River	3-22-7084-01
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