REGION 4

FISH POPULATIONS OF HAUSER AND HOLTER RESERVOIRS, MONTANA WITH EMPHASIS ON TRIBUTARY RECRUITMENT

By:

Rodney Berg and Mark Lere
Ecological Services Division
Montana Department of Fish, Wildlife and Parks

Sponsored by:

Bureau of Reclamation
US Department of Interior
Purchase Order No. 2-01-60-02720

March 1983

DESCRIPTION OF STUDY AREA

The study area lies in west central Montana and includes a 67.2 km (41.8 mi) reach of the mainstem of the Missouri River from Canyon Ferry Dam to Holter Dam (Figure 1). Most of the reach is impounded in hydropower reservoirs behind Hauser and Holter dams. Hauser Reservoir, the uppermost impoundment, extends for 24.9 km (15.5 mi) in length from Hauser Dam to Canyon Ferry Dam. The relatively narrow impoundment ranges from about 0.2 to 1.8 km in width. Lake Helena, an oval shaped impoundment, results largely from the impoundment of lower Prickly Pear Creek by Hauser Dam. The size of Lake Helena is increased somewhat by the presence of the Lake Helena Causeway, which raises the water surface elevation of Lake Helena about 1 ft above the elevation of the Causeway Arm of Hauser Reservoir. Lake Helena is about 4.5 km in length and 2 km in width. It is a relatively shallow impoundment compared to Hauser and Holter reservoirs. Lake Helena connects to Hauser Reservoir through the Causeway Arm which enters Hauser Reservoir 2.7 km above Hauser Dam. The Causeway Arm is 6.3 km in length from its Hauser Reservoir outlet to the Lake Helena Causeway. The outlet works of the Lake Helena Causeway consist of a 6.7 m wide rectangular concrete bridge through which water flows from Lake Helena into the Causeway Arm of Hauser Reservoir.

A 5 km free-flowing segment of the Missouri River flows through a gorge-like canyon downstream from Hauser Dam before emptying into Holter Reservoir. The river segment varies slightly in length with changes in the water surface elevation of Holter Reservoir.

Holter Reservoir extends for 37.3 km (23.2 mi) in length from Holter Dam to the free-flowing Missouri River segment located downstream from Hauser Dam. The reservoir varies from about 0.2 to 1.8 km in width.

Fishery surveys were concentrated in the lower reaches of tributaries in the study area. The principal tributaries of Hauser Reservoir are Trout, Spokane, McGuire and Soup creeks. Prickly Pear Creek, Silver Creek and various man-made drainage ditches empty into Lake Helena. Tenmile Creek is a secondary tributary which empties into Prickly Pear Creek 3.7 km upstream from its confluence with Lake Helena. Cottonwood and Willow creeks are the principal tributaries of Holter Reservoir. Beaver Creek is an important tributary which enters the free-flowing segment of the Missouri River below Hauser Dam. A fishery study on this segment of the Missouri River and on lower Beaver Creek is presently being conducted by the Montana Cooperative Fishery Unit, Bozeman. Therefore, this area was not included in our survey.

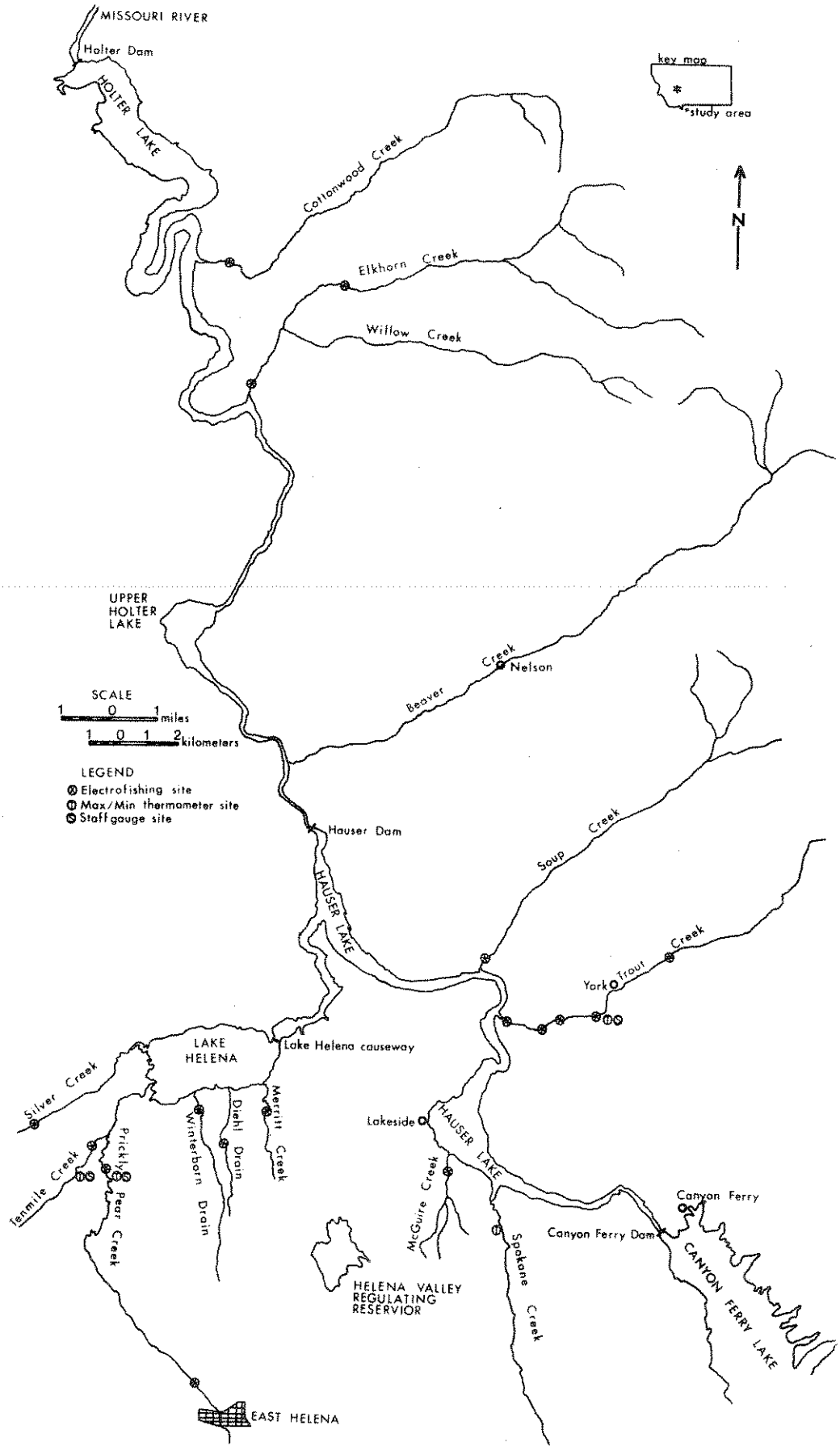

Figure 1. Map of study area showing location of study sites.

PROCEDURES

Fish Population Surveys

Boom-suspended Electrofishing System

A boom-suspended electrofishing system was used to sample fish populations on Hauser and Holter reservoirs and Lake Helena. The electrofishing sysem was adapted from Novotny and Priegel (1974) and is described by Berg (1981). The electrofishing apparatus was mounted on a 4.5 m (14.6 foot) aluminum drift boat powered by a 9.9 horsepower outboard.

Mobile Electrofishing System

A mobile electrofishing system was used to sample fish populations in tributaries. The mobile electrofishing system consisted of a hand-held mobile positive electrode, a stationary negative electrode mounted on a 1.0 m^2 float attached to the boat, and a portable 1350-watt, 115 volt (60 Hz. single phase) alternating current generator. A Coffelt Model VVP-2C rectifying unit was used to change the alternating current to pulsed direct current. Output from the rectifying unit was adjustable from 0 to 300 volts half-wave 60 hz. in 25 and 50 volt increments. The electrofishing system was carried in a 5.8 m (19 foot) aluminum freight canoe. In tributaries where the freight canoe could not be floated, electrofishing with this system was accomplished by bank shocking with 76.2 m (250 feet) of 16/2 electrical cord.

Fish Sample Processing and Tagging

Fish captured by various methods were measured to the nearest mm in total length and weighed to the nearest 10 g. Sex and spawning condition (gravid, ripe or spawned) were recorded for fish captured during their spawning season. Trout larger than 250 mm in total length were marked with individually numbered Floy t-tags to evaluate growth rate, movement, and angler harvest. All fish were released near the capture site.

FINDINGS - PHYSICAL CHARACTERISTICS

Stream Discharge

Flows of Prickly Pear, Tenmile and Trout creeks were monitored from April through early November, 1982. Hydrographs developed for these streams are presented in Figure 2. For Prickly Pear and Tenmile creeks, maximum discharges were recorded during late May and minimum discharges were recorded during mid-August. Snowmelt and sequential runoff in the spring accentuated maximum flows, while dewatering from irrigation during the summer accentuated minimum flows. Maximum and minimum discharges of Trout Creek were recorded in late November and early April, respectively. Spring runoff and summer irrigation were not apparent

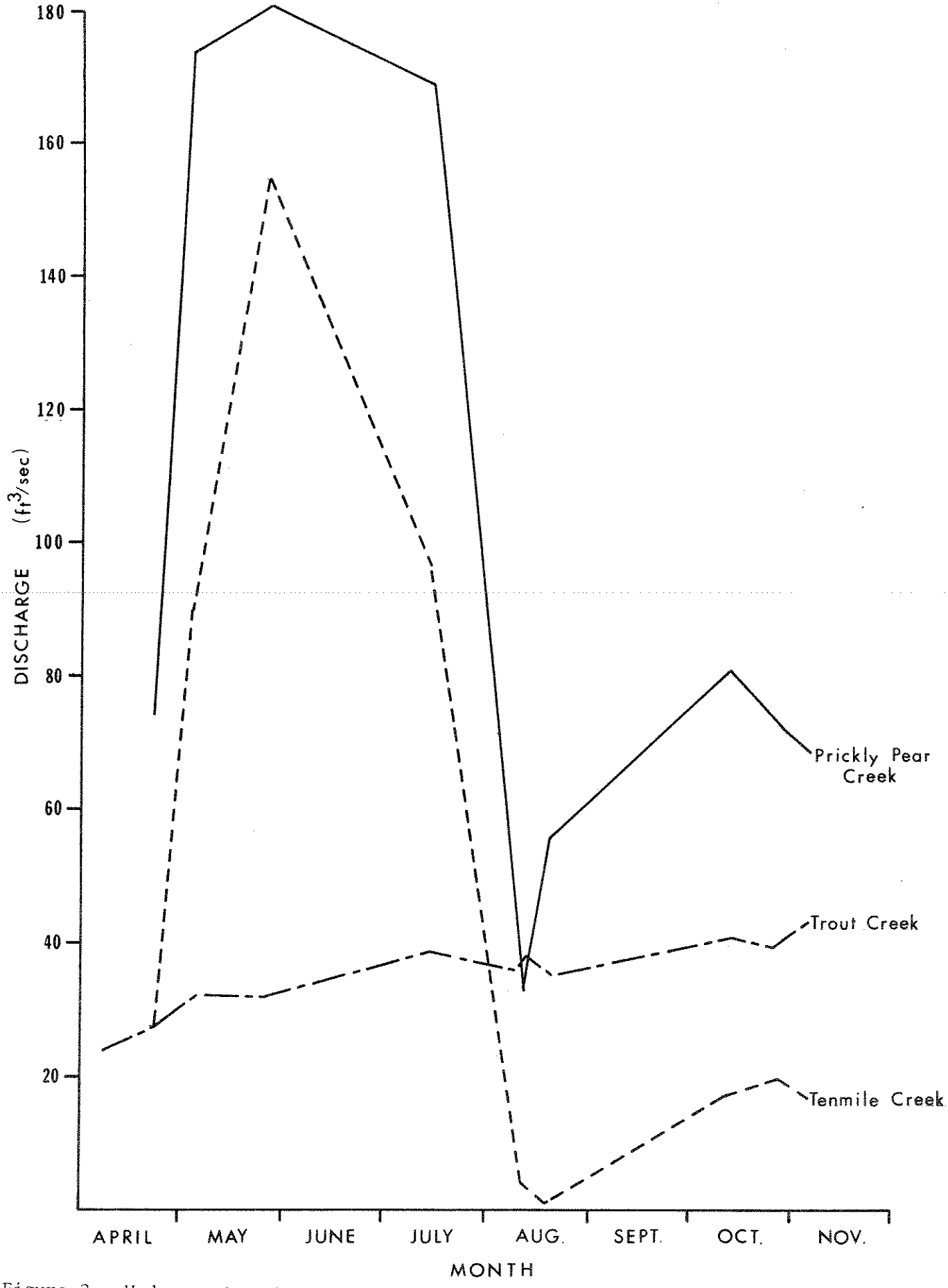

Figure 2. Hydrographs of Prickly Pear, Tenmile and Trout creeks developed during 1982.

factors in forming the shape of the hydrograph for this stream.

Discharges of McGuire and Silver creeks measured on December 2, 1982, were 0.16 m^3/sec (5.6 cfs) and 0.22 m^3/sec (7.6 cfs), respectively. Stream flows of other tributaries and drainage ditches examined during the period of study were not measured. Visually, base flows of each of these streams or drains appeared to be less than 0.28 m^3/sec (10 cfs).

Water Temperature

Water temperatures in Prickly Pear, Tenmile and Trout creeks were monitored from April through early November 1982. Recordings from maximum/minimum thermometers and individual readings are presented in Figure 3. The respective ranges in temperature for Prickly Pear, Tenmile, and Trout creeks were 34-73 (1.1-22.8 C), 33-74 (0.6-23.3 C) and 35-64 F (1.7-17.8 C) during the period of study. Temperature appears to be adequate for trout survival in Prickly Pear and Tenmile creeks, while temperature in Trout Creek is probably optimal.

Temperatures measured in six other tributaries are shown in Figure 4. Maximum readings from these streams never exceeded 68 F (20 C).

FISH POPULATIONS

Salmonid Spawning in Tributaries

In an effort to better understand the relationship between the reservoir complex and its tributary streams, the lower reaches of several tributaries were electrofished during the salmonid spawning seasons to document the possible presence of spawning runs. The tributaries were electrofished prior to or following the spawning runs to determine the size and abundance of resident fish. Fish captured in the tributaries during the spawning season were assumed to be from the reservoir if they were in a ripe spawning condition and obviously oversize or overabundant for the habitat present. Also, some tagged fish moved from the reservoir into a tributary, or vice versa, which confirmed the reservoir origin of the fish.

Holter Reservoir Tributaries

Numbers of adult rainbow trout and brown trout sampled in Cottonwood, Willow and Elkhorn creeks during 1981 and 1982 are shown in Table 1. Migrant rainbow trout were captured only in Cottonwood Creek. A beaver dam located approximately 1500 m upstream from the mouth of this tributary was a probable barrier to migrants, since rainbow trout were not captured beyond this structure. A total of 46 spawners, ranging from 248-562 mm (9.8-22.1 in) in total length and from 190-1780 gm (0.4-3.9 lbs) in weight, were captured on May 14, 1982. Willow Creek was not sampled during the spawning period for rainbow trout; thus the possibility of a spring migration was not assessed.

Table 1. Numbers of adult rainbow and brown trout sampled in tributaries of Holter Reservoir during 1981 and 1982. Average length (mm) in parentheses and average weight {gm} in brackets.

Tributary	Location T	R	S	Section Length (m)	Date	Number of Adult Rainbow Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Cottonwood Creek	14N	3W	35, 36	900	11- 4-81	Walked streambank - none observed						
"	"	"	" "	1500	5-14-82	33 (404.1) {723.3}	0	2 (458.4) {1443.5}	4 (443.8) {822.5}	7 (450.3) {778.6}	0	46 (416.9) {771.7}
"	14N	3W	35	500	7-21-82	0	0	0	0	0	0	0
"	14N	3W	35, 36	700	10-22-82	0	0	0	0	0	0	0
Willow Cr	13N	3W	12	150	11- 4-81	0	0	0	0	0	2 (240.0) {125.0}	2 (240.0) {125.0}
"	"	"	"	"	7-21-82	0	0	0	0	0	0	0
"	"	"	"	200	10-22-82	0	0	0	0	0	0	0
						Number of Adult Brown Trout						
Cottonwood Creek	14N	3W	35, 36	900	11- 4-81	Walked streambank - 2 adults observed						
"	"	"	"	1500	5-14-82	0	0	0	0	0	0	0
"	14N	3W	35	500	7-21-82	0	0	0	0	0	0	0
"	14N	3W	35, 36	700	10-22-82	0	0	0	0	0	0	0
Willow Cr	13N	3W	12	150	11- 4-81	0	0	0	0	0	0	0
"	"	"	"	150	7-21-82	0	0	0	0	0	0	0
"	"	"	"	200	10-22-82	0	0	0	0	0	0	0
Elkhorn Cr	14N	2W	32	200	10-22-82	0	0	0	0	0	0	0

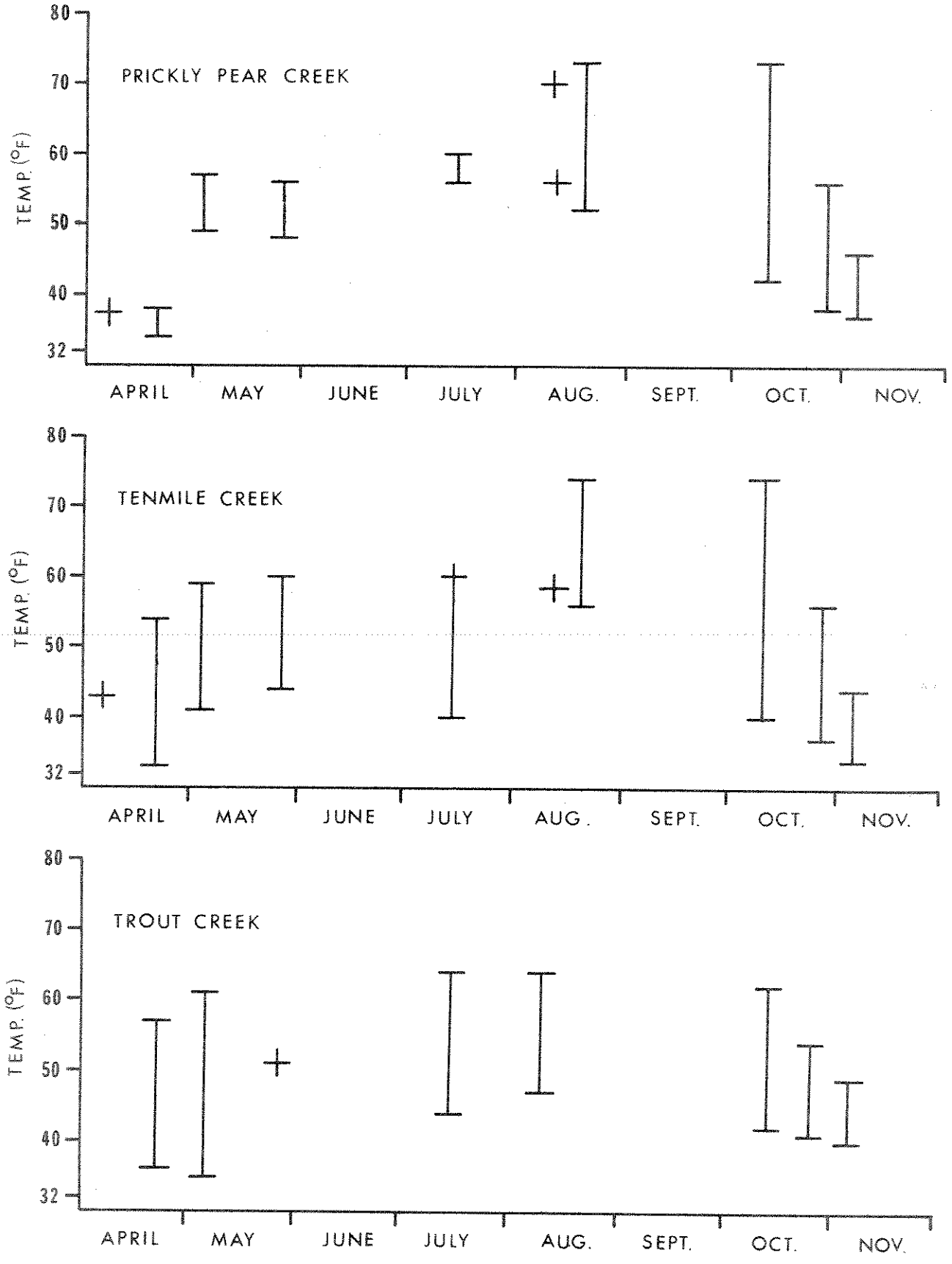

Figure 3. Water temperatures of Prickly Pear, Tenmile and Trout creeks monitored from April 1 through early November 1982. Bars represent maximum/minimum thermometer readings. Plus signs represent individual spot temperature measurements.

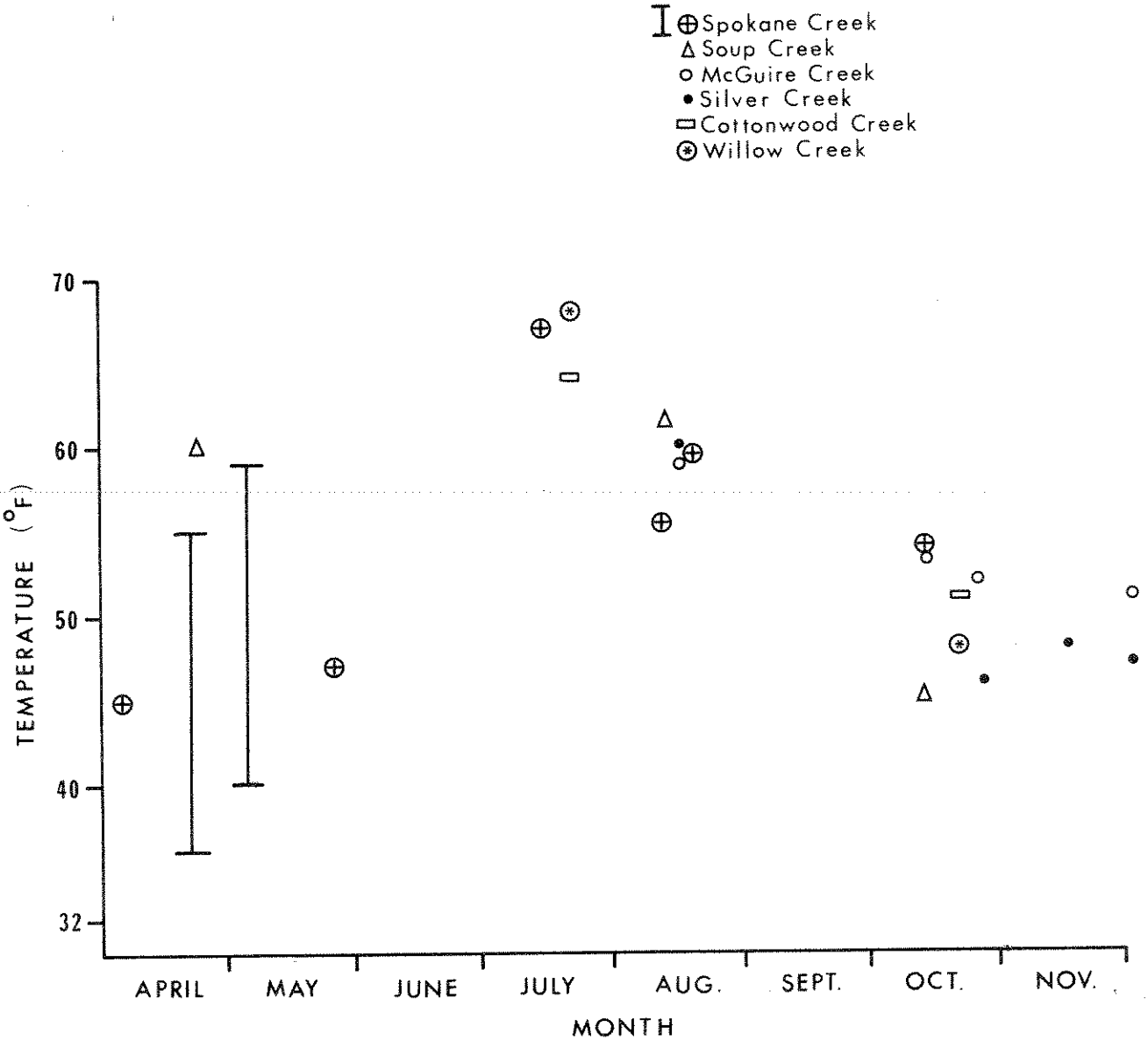

Figure 4. Water temperatures measured in several tributaries of the reservoir complex during 1982. Bars represent maximum/minimum thermometer readings for Spokane Creek.

Migrant brown trout were not captured in the tributaries of Holter Reservoir. However, a pair of migrants were observed in Cottonwood Creek near the confluence with the reservoir on November 4, 1981. Extensive beaver dams located upstream from the mouths of both Cottonwood and Willow creeks undoubtedly hinder the movements of migrant trout. Migration of trout into these streams probably varies seasonally and year-to-year depending upon the extent of dam construction. Beaver activity in these streams has produced excellent habitat for brook trout. Viable populations of brook trout were sampled in all three of the streams examined.

Hauser Reservoir Tributaries

Numbers of adult rainbow trout sampled in Soup, Trout, Spokane and McGuire creeks are presented in Table 2. During the spring sampling period, migrant rainbow trout were captured only in Trout Creek. However, spring surveys in Soup, Spokane and McGuire creeks were limited to visual observations. Limited observations do not adequately determine the utilization of these reservoir tributaries by spawners. A total of 12 spawners, ranging from 173-500 mm (6.8-19.7 in) in total length and from 50-1070 gm (0.1-2.4 lbs) in weight, were captured in Trout Creek during April, 1982. Of these, 10 were considered to be migrants from the reservoir.

In addition, migrant rainbow trout were collected in Trout and McGuire creeks during the fall of 1982. Migrants captured during this period were either ripe males or mature fish not yet in spawning condition.

Sampling in 1981 and 1982 indicated resident populations of rainbow trout inhabit Trout and McGuire creeks. Spokane Creek was not electrofished during the study period; thus the possibility of rainbow trout residing in this stream was not determined.

Numbers of adult brown trout sampled in the tributaries of Hauser Reservoir during 1981 and 1982 are shown in Table 3. Resident populations of brown trout were sampled in Soup, Trout and McGuire creeks. The possibility of resident brown trout inhabiting Spokane Creek was not determined. This stream was not electrofished due to restricted access by the landowner. Migrant spawners were collected or observed in Trout, Spokane and McGuire creeks. Soup Creek did not appear to contain enough flow to maintain a fall spawning run in 1981 and 1982.

A total of 65 migrants was captured in five separate sections of Trout Creek during the fall spawning period. Migrant spawners were sampled as far as 6.8 km upstream from the confluence with Hauser Reservoir. Migrants captured in Trout Creek ranged from 351-723 mm (13.8-28.5 in) in total length and from 390-3820 gm (0.86-8.42 lbs) in weight. Sampling in 1982 indicated the peak of spawning activity for brown trout occurred during the last half of November. Additionally, migrant mountain whitefish were captured in the lower reach of this tributary during the fall of both years.

Table 2. Numbers of adult rainbow trout sampled in tributaries of Hauser Reservoir during 1981 and 1982. Average length (mm) in parentheses and average weight {gm} in brackets.

Tributary	Location T R S	Section Length (m)	Date	Number of Adult Rainbow Trout						
				Male		Female			Not	
				Ripe	Spent	Gravid	Ripe	Spent	Ripe	Total
Soup Cr	11N 2W 11, 12	500	10-29-81	Walked streambank - none observed						
"	" " " "	500	5-23-82	"	"	"	"			
"	11N 2W 11	-	8-12-82	0	0	0	0	0	0	0
"	" " "	-	10-13-82	0	0	0	0	0	0	0
Trout Cr	11N 2W 13	150	10-29-81	0	0	0	0	0	5 (190.2) {76.0}	5 (190.2) {76.0}
"	11N 1W 18	150	10-29-81	0	0	0	0	0	2 (324.0) {370.0}	2 (324.0) {370.0}
"	11N 2W 13	150	11-12-81	0	0	0	0	0	9 (190.6) {78.9}	9 (190.6) {78.9}
"	11N 1W 18	150	11-12-81	0	0	0	0	0	2 (271.0) {205.0}	2 (271.0) {205.0}
"	11N 2W 13 & 11N 1W 18	300	4- 7-82	1 (276.0) {230.0}	0	1 (440.0) {975.0}	0	1 (474.0) {900.0}	3 (218.3) {98.3}	6 (307.5) {400.0}
"	11N 2W 13 & 11N 1W 18	300	4-21-82	4 (377.3) {628.8}	1 (333.0) {330.0}	0	2 (427.0) {707.5}	2 (444.0) {830.0}	3 (275.7) {223.3}	12 (367.6) {549.2}
"	11N 2W 13	150	5- 5-82	0	0	0	0	0	5 (228.6) {150.0}	5 (228.6) {150.0}

Table 2 continued.

Tributary	Location T R S	Section Length (m)	Date	Number of Adult Rainbow Trout						
				Male		Female			Not Ripe	Total
				Ripe	Spent	Gravid	Ripe	Spent		
Trout Cr	11N 2W 13	150	5-26-82	0	0	0	0	0	2 (271.5) {170.0}	2 (271.5) {170.0}
"	11N 2W 13 & 11N 1W 18	300	8- 9-82	0	0	0	0	0	1 (310.0) {260.0}	1 (310.0) {260.0}
"	" " "	300	10-13-82	0	0	0	0	0	3 (244.0) {173.3}	3 (244.0) {173.3}
"	" " "	300	10-25-82	0	0	0	0	0	2 (290.0) {235.0}	2 (290.0) {235.0}
"	" " "	300	11- 5-82	3 (256.3) {223.3}	0	0	0	0	2 (387.0) {740.0}	5 (308.6) {430.0}
"	11N 1W 18	150	11-18-82	0	0	0	0	0	1 (264.0) {190.0}	1 (264.0) {190.0}
"	" " "	150	12- 2-82	1 (542.0) {1670.0}	0	0	0	0	0	1 (542.0) {1670.0}
"	11N 1W 17	150	12- 2-82	1 (383.0) {590.0}	0	0	0	0	0	1 (383.0) {590.0}
Spokane Cr	10N 2W 1	500	10-29-81	Walked streambank - none observed						
"	" " "	500	4- 5-82	Walked streambank - none observed						
"	" " "	500	4-21-82	Walked streambank - none observed						

Table 2 continued.

Tributary	Location T	R	S	Section Length (m)	Date	Number of Adult Rainbow Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
McGuire Cr	11N	2W	35	300	5-25-82	Walked streambank - none observed						
"	"	"	"	150	8-16-82	0	0	0	0	0	0	0
"	"	"	"	300	10-14-82	1 (280.0) {280.0}	0	0	0	0	3 (353.0) {640.0}	4 (334.8) {550.0}
"	"	"	"	450	10-26-82	0	0	0	0	0	1 (355.0) {560.0}	1 (355.0) {560.0}
"	"	"	"	300	11-18-82	4 (347.0) {620.0}	0	0	0	0	1 (302.0) {310.0}	5 (338.0) {558.0}

Table 3. Numbers of adult brown trout sampled in tributaries of Hauser Reservoir during 1981 and 1982. Average length (mm) in parentheses and average weight {gm} in brackets.

Tributary	Location T	R	S	Section Length (m)	Date	Number of Adult Brown Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Soup Cr	11N	2W	11&12	500	10/29/81	Walked streambank - none observed						
	11N	2W	11	-	8/12/82	0	0	0	0	0	3 (185.7) {- }	3 (185.7) {- }
	Same			-	10/13/82	0	0	0	0	0	1 (136.0) {- }	1 (136.0) {- }
Trout Cr	11N	2W	13	150	10/29/81	1 (378.0) {480.0}	0	0	0	1 (545.0) {1315.0}	2 (256.0) {160.0}	4 (358.8) {528.8}
	11N	1W	18	150	10/29/81	6 (304.0) {291.7}	0	1 (256.0) {170.0}	1 (320.0) {280.0}	1 (278.0) {190.0}	4 (245.8) {137.5}	13 (281.6) {226.2}
	11N	2W	13	150	11/12/81	2 (437.5) {1145.0}	0	0	1 (474.0) {1130.0}	1 (543.0) {1300.0}	2 (287.5) {240.0}	6 (411.2) {866.7}
	11N	1W	18	150	11/12/81	3 (347.3) {443.3}					3 (253.7) {146.7}	6 (300.5) {295.0}
	11N 11N	2W 1W	13& 18	300	4/ 7/82	0	0	0	0	0	19 (263.0) {169.5}	19 (263.0) {169.5}
	Same			300	4/21/82	0	0	0	0	0	8 (252.6) {156.9}	8 (252.6) {156.9}
	11N	2W	13	150	5/ 5/82	0	0	0	0	0	0	0
	Same			150	5/26/82	0	0	0	0	0	2 (238.5) {125.0}	2 (238.5) {125.0}

Table 3 continued.

Tributary	Location T	R	S	Section Length (m)	Date	Number of Adult Brown Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Trout Cr	11N	2W	13&	300	8/ 9/82	0	0	0	0	0	8	8
	11N	1W	18								(266.0)	(266.0)
											{202.5}	{202.5}
	Same			300	10/13/82	1	0	0	0	0	6	7
						(228.0)					(269.5)	(263.6)
						{140.0}					{215.0}	{204.3}
	Same			300	10/25/82	4	0	0	3	0	5	12
						(427.5)			(410.7)		(240.6)	(345.4)
						{1292.5}			{580.0}		{136.0}	{632.5}
	11N	1W	17	150	10/25/82	9	0	5	1	0	9	24
						(320.9)		(250.8)	(524.0)		(275.3)	(297.7)
						{416.7}		{148.0}	{1250.0}		{170.0}	{302.9}
	11N	1W	9	150	10/25/82	7	0	2	0	0	5	14
						(297.0)		(265.0)			(237.4)	(271.1)
						{325.7}		{195.0}			{136.0}	{239.3}
	11N	3W	13 &	300	11/ 5/82	7	0	0	1	1	3	12
	11N	1W	18			(454.6)			(363.0)	(525.0)	(242.7)	(399.9)
						{1235.7}			{420.0}	{1470.0}	{166.7}	{920.0}
	11N	1W	18	150	11/18/82	21	1	2	2	2	0	28
						(501.5)	(380.0)	(534.5)	(529.0)	(361.0)		(491.4)
						{1460.2}	{520.0}	{1430.0}	{1670.0}	{445.0}		{1366.9}
	Same			150	12/ 2/82	8	0	0	3	3	3	17
						(532.3)			(568.0)	(529.3)	(256.0)	(489.3)
						{1834.4}			{2066.7}	{1180.0}	{198.3}	{1471.2}
	11N	1W	17	150	12/ 2/82	6	0	0	1	0	16	23
						(426.5)			(258.0)		(229.9)	(282.4)
						{1190.0}			{160.0}		{118.1}	{399.5}
Spokane Cr	10N	2W	1	500	10/29/81	Walked streambank - 41 migrants observed						

Table 3 continued.

Tributary	Location T	R	S	Section Length (m)	Date	Number of Adult Brown Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
McGuire Cr	11N	2W	35	150	8/16/82	0	0	0	0	0	7 (263.6) {- }	7 (263.6) {- }
	Same			300	10/14/82	11 (308.7) {370.9}	0	0	1 (390.0) {680.0}	0	1 (225.0) {140.0}	13 (308.5) {376.9}
	Same			450	10/26/82	16 (317.4) {378.8}	0	1 (325.0) {430.0}	1 (586.0) {1970.0}	3 (518.3) {1090.0}	3 (258.7) {213.3}	24 (346.7) {515.4}
	Same			300	11/18/82	11 (313.9) {349.1}	2 (285.5) {280.0}	1 (389.0) {690.0}	0	2 (428.5) {870.0}	2 (240.0) {155.0}	18 (319.4) {396.7}

Sampling in Spokane Creek was limited to a single visual observation in 1981. A total of 41 brown trout migrants was observed in the lower 500 m of this tributary on October 29. Migrant mountain whitefish also were observed on this date.

A total of 17 brown trout migrants was captured during the 1982 fall spawning period in McGuire Creek. Migrants ranged from 347-597 mm (13.7-23.5 in) in total length and from 440-1970 gm (0.97-4.34 lbs) in weight. The peak of spawning activity in 1982 appeared to occur during the first half of November. Migrant mountain whitefish were not observed in McGuire Creek.

Tag returns provided additional evidence that brown trout from Hauser Reservoir migrate into the tributaries to spawn. Two brown trout tagged in Hauser Reservoir were recaptured in Trout Creek during the spawning period in 1982. A similarly tagged brown trout was recaptured in McGuire Creek during the same time period.

Lake Helena Tributaries

Numbers of adult rainbow trout sampled in the tributaries of Lake Helena are presented in Table 4. All of the tributaries, except Merritt Creek, contained resident populations of rainbow trout. Possible migrant spawners were captured only in Prickly Pear and Tenmile creeks. The migrant status of spawning rainbow collected in these creeks could not be verified, since large-sized resident rainbow inhabit both tributaries.

The scarcity of migrant rainbow trout in the Lake Helena tributaries was probably related to the late initiation of our spring sampling effort in 1982. Sportsmen and landowners have reported large-sized migrant rainbow are found in the Diehl drain, Winterborn drain and Silver Creek. Our sampling effort in 1983 will be initiated earlier, in an attempt to better evaluate rainbow trout spawning values of Lake Helena tributaries.

Numbers of adult brown trout sampled in the tributaries of Lake Helena are shown in Table 5. Resident populations of brown trout were found in Prickly Pear, Tenmile and Silver creeks. Brown trout were not captured or observed in Merritt Creek or the Diehl drain.

Migrant brown trout spawners were difficult to distinguish from large-sized resident spawners in Prickly Pear Creek. Recaptures of tagged brown trout indicated a majority of the spawners in this tributary were probably residents. Spawning brown trout collected in Prickly Pear Creek ranged from 297-598 mm (11.7-23.5 in) in total length and from 270-2830 gm (0.60-6.24 lbs) in weight. At least some migrant brown trout from the reservoir complex probably utilize lower Prickly Pear Creek for spawning. It is likely this can eventually be verified by the recapture of reservoir tagged brown trout in the tributary.

One sexually mature brown trout was captured in Tenmile Creek. This relatively small-sized fish was probably a resident of either Tenmile or Prickly Pear creek. Sampling was limited to the lower 500 m of Tenmile Creek. Thus, the possibility of brown trout migrants utilizing upper reaches of this stream was not determined.

Table 4. Numbers of adult rainbow trout sampled in the tributaries of Lake Helena during 1981 and 1982. Average length (mm) in parentheses and average weight {gm} in brackets.

Tributary	Location T	R	S	Section Length (m)	Date	Number of Adult Rainbow Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Prickly Pear Cr	11N	3W	34	160	10/30/81	0	0	0	0	0	0	0
	11N	3W	33/34	1700	11/12/81	1 (380.0) {610.0}	0	0	0	0	12 (339.5) {493.3}	13 (342.6) {502.3}
	Same			1700	4/ 6/82	0	0	0	0	0	9 (324.8) {435.6}	9 (324.8) {435.6}
	Same			1700	4/20/82	0	0	1 (342.0) {420.0}	0	0	6 (302.7) {300.8}	7 (308.3) {317.8}
	Same			1700	8/10/82	0	0	0	0	0	6 (406.0) {721.7}	6 (406.0) {721.7}
	Same			1700	10/12/82	0	0	0	0	0	1 (300.0) {320.0}	1 (300.0) {320.0}
	Same			1700	10/27/82	0	0	0	0	0	1 (262.0) {210.0}	1 (262.0) {210.0}
	10N	3W	24	250	10/29/82	0	0	0	0	0	1 (253.0) {180.0}	1 (253.0) {180.0}
Tenmile Cr	11N	3W	33	150	10/30/81	0	0	0	0	0	1 (350.0) {470.0}	1 (350.0) {470.0}
	Same			500	4/ 6/82	0	0	2 (423.0) {825.0}	0	0	0	2 (423.0) {825.0}

Table 4 continued.

Tributary	Location T	R	S	Section Length (m)	Date	Number of Adult Rainbow Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Tenmile Cr	11N	3W	33	500	4/20/82	0	0	0	0	0	1 (282.0) {260.0}	1 (282.0) {260.0}
	Same			500	8/10/82	0	0	0	0	0	2 (280.5) {240.0}	2 (280.5) {240.0}
	Same			500	10/12/82	0	0	0	0	0	2 (297.5) {310.0}	2 (297.5) {310.0}
	Same			500	10/27/82	0	0	0	0	0	0	0
Silver Cr	11N	3W	29	85	5/ 5/82	0	0	0	0	0	0	0
	Same			160	8/16/82	0	0	0	0	0	0	0
	Same			500	10/28/82	0	0	0	0	0	3 (287.3) {290.0}	3 (287.3) {290.0}
	Same			500	11/17/82	0	0	0	0	0	5 (227.2) {163.0}	5 (227.2) {163.0}
Merritt Cr	11N	2W	30	300	4/22/82	Walked streambank - none observed						
	Same			500	8/11/82	0	0	0	0	0	0	0
	Same			500	10/14/82	0	0	0	0	0	0	0
Diehl Drain	11N	3W	24	300	4/22/82	Walked streambank - none observed - 4 redds located						
	Same			250	10/14/82	0	0	0	0	0	3 (225.0) {163.3}	3 (225.0) {163.3}
Winterborn Drain	11N	3W	24/25	40	4/22/82	0	0	0	0	0	1 (362.0) {580.0}	1 (362.0) {580.0}
	Same			250	8/11/82	0	0	0	0	0	0	0

Table 5. Numbers of adult brown trout sampled in tributaries of Lake Helena during 1981 and 1982. Average length (mm) in parentheses and average weight {gm} in brackets.

Tributary	Location T R S	Section Length (m)	Date	Number of Adult Brown Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Prickly Pear Cr	11N 3W 34	160	10/30/81	0	0	0	0	0	3 (319.7) {375.0}	3 (319.7) {375.0}
	11N 3W 33/34	1700	11/12/81	5 (415.6) {814.0}	0	7 (391.6) {784.3}	2 (373.5) {550.0}	3 (390.0) {623.3}	36 (328.1) {404.2}	53 (350.0) {511.0}
	Same	1700	4/ 6/82	0	0	0	0	0	85 (367.6) {551.0}	85 (367.6) {551.0}
	Same	1700	4/20/82	0	0	0	0	0	70 (372.4) {593.9}	70 (372.4) {593.9}
	Same	1700	8/10/82	0	0	0	0	0	44 (380.2) {606.4}	44 (380.2) {606.4}
	Same	1700	10/12/82	9 (398.3) {667.8}	0	6 (433.8) {955.0}	0	0	28 (323.9) {395.7}	43 (354.8) {530.7}
	Same	1700	10/27/82	7 (415.3) {761.4}	0	5 (399.4) {714.0}	0	1 (384.0) {460.0}	26 (301.6) {306.2}	39 (336.7) {444.1}
	10N 3W 24	250	10/29/82	5 (421.6) {1030.0}	0	3 (340.3) {460.0}	0	0	12 (260.6) {175.0}	20 (312.8) {431.5}
Tenmile Cr	11N 3W 33	150	10/30/81	0	0	0	0	0	3 (284.0) {260.0}	3 (284.0) {260.0}
	Same	150	4/ 5/82	0	0	0	0	0	1 (317.0) {370.0}	1 (317.0) {370.0}

Table 5 continued.

Tributary	Location T	R	S	Section Length (m)	Date	Number of Adult Brown Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Tenmile Cr	11N	3W	33	500	4/ 6/82	0	0	0	0	0	1 (242.0) {170.0}	1 (242.0) {170.0}
	Same			500	4/20/82	0	0	0	0	0	4 (306.5) {333.8}	4 (306.5) {333.8}
	Same			500	8/10/82	0	0	0	0	0	0	0
	Same			500	10/12/82	0	0	0	0	0	3 (241.3) {153.3}	3 (241.3) {153.3}
	Same			500	10/27/82	1 (272.0) {230.0}	0	0	0	0	1 (228.0) {120.0}	2 (250.0) {175.0}
Silver Cr	11N	3W	29	85	5/5/82	0	0	0	0	0	14	14
	Same			160	8/16/82	0	0	0	0	0	0	0
	Same			500	10/28/82	28 (378.6) {730.7}	0	10 (461.3) {1210.0}	1 (636.0) {3140.0}	0	20 (267.7) {229.0}	59 (359.4) {682.7}
	Same			500	11/17/82	20 (331.4) {501.8}	1 (293.0) {290.0}	2 (375.0) {640.0}	4 (398.5) {696.3}	3 (380.7) {556.7}	18 (262.1) {205.8}	48 (315.1) {411.8}
Merritt Cr	11N	2W	30	500	8/11/82	0	0	0	0	0	0	0
	Same			500	10/14/82	0	0	0	0	0	0	0
Diehl Drain	11N	3W	36	250	10/14/82	0	0	0	0	0	0	0

Table 5 continued.

Tributary	Location T R S	Section Length (m)	Date	Number of Adult Brown Trout						
				Male		Female			Not	
				Ripe	Spent	Gravid	Ripe	Spent	Ripe	Total
Winterborn Drain	11N 3W 24/25	40	4/22/82	0	0	0	0	0	0	0
	Same	250	8/11/82	0	0	0	0	0	0	0
	Same	175	10/29/82	Walked Streambank - None Observed						

A total of 42 brown trout migrants was captured in Silver Creek. Migrants ranged from 343-636 mm (13.5-25.0 in) in total length and from 440-3140 gm (0.97-6.92 lbs) in weight. The peak of spawning activity in 1982 appeared to occur during the first half of November in this tributary. In addition, a total of 46 spawning kokanee salmon was captured in Silver Creek during the fall spawning period. These migrants ranged from 330-526 mm (13.0-20.7 in) in total length and from 430-1610 gm (0.95-3.55 lbs) in weight.

Resident populations of brook trout were found in Silver Creek, Merritt Creek and Winterborn drain.

Salmonid Spawning in the Tailrace of Canyon Ferry Dam

In addition to tributary streams, salmonids in the Hauser Reservoir/Lake Helena complex utilize the tailrace of Canyon Ferry Dam for spawning. Numbers of adult rainbow trout sampled in the tailrace during 1981 and 1982 are shown in Table 6. Since the sampling effort in the tailrace during the spawning period in the spring of 1982 was very limited and since some, if not most, of the rainbow spawning may have occurred prior to the initiation of our sampling, our data probably underestimate utilization of the tailrace area for rainbow spawning. A total of 13 sexually mature rainbow trout was captured in the tailrace during the spring of 1982. These fish ranged from 250-537 mm (9.8-21.1 in) in total length and from 220-1860 gm (0.49-4.10 lbs) in weight. In addition, 6 sexually mature rainbow trout were collected during the fall spawning period in 1982. These spawners ranged from 403-451 mm (15.9-17.8 in) in total length and from 830-1110 gm (1.83-2.45 lbs) in weight. Some of these sexually mature trout appeared to be hatchery brood stock.

Numbers of adult brown trout captured in the tailrace of Canyon Ferry Reservoir during 1981 and 1982 are shown in Table 7. A total of 140 sexually mature brown trout was collected during the fall spawning periods. Increased concentrations of brown trout sampled through the fall of 1982 indicated a majority of the spawners were migrants. Spawners ranged from 322-795 mm (12.7-31.3 in) in total length and from 360-6800+ gm (0.79-15.0 + lbs) in weight. Sampling during 1982 indicated the peak of spawning activity for brown trout occurred during the last half of October.

Additionally, concentrations of kokanee salmon were found in the tailrace area during the fall spawning periods. A total of 220 spawners was captured during 1981 and 1982 (Table 8). These salmon ranged from 281-569 mm(11.1-22.4 in) in total length and from 240-1720 gm (0.53-3.79 lbs) in weight. Sampling during 1982 indicated the peak of spawning activity for kokanee salmon occurred during the end of October or the first of November.

Table 6. Numbers of adult rainbow trout sampled in the tailrace (1500 m section) of Canyon Ferry Reservoir during 1981 and 1982. Average length (mm) in parentheses and average weight{gm} in brackets.

Area	Location T	R	S	Section Length (m)	Date	Number of Adult Rainbow Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Canyon Ferry Tailrace	10N	1W	4	1500	10/29/81	0	0	0	0	0	8 (437.0) {1055.0}	8 (437.0) {1055.0}
					4/20/82	1 (492.0) {1140.0}	0	1 (250.0) {220.0}	0	0	16 (291.2) {325.9}	18 (300.1) {365.2}
					4/22/82	2 (394.0) {682.5}	0	3 (450.7) {1056.7}	0	0	17 (292.6) {350.3}	22 (323.4) {476.8}
					5/ 4/82	0	0	2 (500.0) {1450.0}	1 (457.0) {1080.0}	0	4 (279.3) {265.0}	7 (367.7) {720.0}
					5/24/82	3 (443.0) {803.3}	0	0	0	0	1 (462.0) {965.0}	4 (447.8) {843.7}
					8/11/82	0	0	0	0	0	5 (301.8) {295.0}	5 (301.8) {295.0}
					8/18/82	0	0	0	0	0	2 (511.0) {1755.0}	2 (511.0) {1755.0}
					10/14/82	0	0	0	0	0	6 (380.5) {588.3}	6 (380.5) {588.3}
					10/25/82	0	0	0	1 (403.0) {830.0}	0	7 (433.3) {1055.7}	8 (429.5) {1027.5}

Table 6 continued.

Area	Location T	R	S	Section Length (m)	Date	Number of Adult Rainbow Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Canyon Ferry Tailrace	10N	1W	4	1500	10/28/82	2 (445.5) {905.0}	0	1 (433.0) {980.0}	0	0	3 (320.0) {393.3}	6 (380.7) {661.7}
					11/ 4/82	0	0	0	0	0	1 (445.0) {1050.0}	1 (445.0) {1050.0}
					11/17/82	2 (459.5) {1160.0}	0	0	0	0	2 (324.5) {390.0}	4 (392.0) {775.0}

Table 7. Numbers of adult brown trout sampled in the tailrace (1500 m section) of Canyon Ferry Reservoir during 1981 and 1982. Average length (mm) in parentheses and average weight {gm} in brackets.

Area	Location T	R	S	Section Length (m)	Date	Number of Adult Brown Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Canyon Ferry Tailrace	10N	1W	4	1500	10/29/81	9 (518.8) {1637.8}	0	8 (493.8) {1272.5}	1 (537.0) {1520.0}	0	9 (409.3) {626.7}	27 (475.6) {1188.2}
					4/20/82	0	0	0	0	0	9 (422.4) {742.8}	9 (422.4) {742.8}
					4/22/82	0	0	0	0	0	6 (466.0) {1168.3}	6 (466.0) {1168.3}
					5/ 4/82	0	0	0	0	0	8 (459.1) {981.3}	8 (459.1) {981.3}
					5/24/82	0	0	0	0	0	10 (421.1) {900.0}	10 (421.1) {900.0}
					8/11/82	0	0	0	0	0	15 (431.7) {1022.0}	15 (431.7) {1022.0}
					8/18/82	0	0	0	0	0	12 (478.4) {1228.8}	12 (478.4) {1228.8}
					10/14/82	14 (552.3) {1834.3}	0	21 (516.3) {1698.6}	1 (658.0) {3330.0}	0	42 (424.3) {788.3}	78 (475.0) {1253.7}
					10/25/82	17 (566.2) {2017.6}	0	24 (526.6) {1861.7}	0	1 (427.0) {520.0}	30 (408.3) {667.7}	72 (485.3) {1382.4}

Table 7 continued.

Area	Location T	R	S	Section Length (m)	Date	Number of Adult Brown Trout: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Canyon Ferry Tailrace	10N	1W	4	1500	10/28/82	10	0	11	0	2	29	52
						(587.1)		(516.0)		(474.0)	(403.0)	(465.0)
						{2440.0}		{1686.4}		{865.0}	{674.8}	{1235.6}
					11/ 4/82	4	0	1	0	1	5	11
						(611.0)		(660.0)		(577.0)	(458.6)	(543.1)
						{2460.0}		{3960.0}		{1780.0}	{826.0}	{1791.8}
					11/17/82	5	0	4	4	2	20	35
						(591.4)		(530.3)	(523.5)	(563.5)	(406.8)	(469.6)
						{2180.0}		{1517.5}	{1432.5}	{1850.0}	{655.5}	{1128.9}

Table 8. Numbers of adult kokanee salmon sampled in the tailrace (1500 m section) of Canyon Ferry Reservoir during 1981 and 1982. Average length (mm) in parentheses and average weight {gm} in brackets.

Area	Location T	R	S	Section Length (m)	Date	Number of Adult Kokanee Salmon: Male Ripe	Male Spent	Female Gravid	Female Ripe	Female Spent	Not Ripe	Total
Canyon Ferry Tailrace	10N	1W	4	1500	10/29/81	3 (494.7) {1260.0}	0	1 (523.0) {1460.0}	0	1 (506.0) {1130.0}	0	5 (502.6) {1274.0}
					4/20/82	0	0	0	0	0	0	0
					4/22/82	0	0	0	0	0	0	0
					5/ 4/82	0	0	0	0	0	0	0
					5/24/82	0	0	0	0	0	0	0
					8/11/82	0	0	0	0	0	2 (447.0) {1010.0}	2 (447.0) {1010.0}
					8/18/82	0	0	0	0	0	2 (380.5) {670.0}	2 (380.5) {670.0}
					10/14/82	12 (450.3) {945.8}	0	9 (392.7) {682.2}	0	0	9 (363.9) {503.3}	30 (407.1) {734.0}
					10/25/82	19 (447.5) {970.0}	0	8 (410.8) {801.3}	3 (447.7) {916.7}	0	3 (285.7) {256.7}	33 (423.9) {859.4}
					10/28/82	42 (448.5) {984.5}	0	2 (440.0) {970.0}	22 (449.3) {990.5}	1 (432.0) {620.0}	0	67 (448.3) {980.6}
					11/ 4/82	17 (471.9) {1074.1}	0	1 (451.0) {960.0}	8 (441.5) {893.8}	19 (447.8) {861.6}	0	45 (455.9) {949.8}
					11/17/82	23 (432.6) {863.5}	4 (467.5) {817.5}	0	4 (446.3) {815.0}	21 (431.2) {757.1}	0	52 (435.8) {813.3}

Salmonid Spawning - Discussion

Sampling efforts to evaluate salmonid spawning in tributaries and in the Canyon Ferry Dam tailrace have been limited. Numbers of spawners given in this report represent only a small portion of the total spawners present, since only selected days during the spawning period were sampled, and only one capture run was made on each day sampled. Also, the surveys represent only a small portion of the total spawning area available on most tributaries and in the tailrace. Therefore, in the areas where migrant salmonids were captured, our data document only the presence of migrant spawning fish and do not accurately reflect their abundance. In tributaries where migrant salmonids have not been found, additional sampling is needed to confirm the presence or absence of spawning runs.

Survey data indicate rainbow and brown trout utilize the Canyon Ferry tailrace and many tributaries in the reservoir complex area for spawning. Since brown trout are entirely self-sustaining and dependent upon these areas for spawning, it is essential that the integrity of the spawning areas be maintained so that their use by brown trout can continue undiminished. Brown trout provide a trophy fishery in the reservoir complex area with a good number of fish weighing from 10 to 15 pounds and some exceeding 15 pounds. The tailrace and tributaries also provide vital spawning habitat for rainbow trout and kokanee.

Trout Redd Surveys

The search for rainbow trout redds during the spring spawning period was limited in scope and was hindered by high stream flows and turbid water in some of the tributaries. Of all the tributaries examined within the reservoir complex, rainbow trout redds were located only in Cottonwood Creek and the Diehl drain.

Greater effort was undertaken in the search for brown trout redds during the fall spawning period. Brown trout redds were located in Prickly Pear, Silver, Trout, and McGuire creeks. Greatest redd numbers were found in Silver Creek. Selected physical characteristics measured from redds located in these four tributaries are shown in Table 9.

Trout Rearing in Tributaries

Electrofishing surveys were made on 10 tributaries of the reservoir complex during 1982 to evaluate the importance of these streams as rearing areas for young of the year (YOY) and yearling trout. Preliminary age determination was made by interpretation of length frequencies. Aging may be subject to change when scale collections are analyzed.

Numbers of YOY and yearling trout collected in the reservoir tributaries are presented in Tables 10 and 11, respectively. YOY and yearling rainbow trout were found in a total of eight and nine tributaries, respectively. YOY brown trout were located in a total of nine tributaries, while yearlings were found in only six streams. Composite averages of 0.50 YOY rainbow trout and 0.26 YOY brown trout were collected per electrofishing minute in the tributaries. For yearling trout, composite averages of 0.12 rainbow trout and 0.08 brown trout per minute were sampled.

Table 9. Selected physical characteristics measured from brown trout redds located in four tributaries of the reservoir complex during 1982.

Tributary	Location T R S	Number of Redds	Area (m^2) of Redd		Depth (m) of Redd		Mid-Depth Velocity (m/sec)		Bottom Velocity (m/sec)	
			Mean	Range	Mean	Range	Mean	Range	Mean	Range
Prickly Pear Creek	11N 3W 34	1	1.85	-	0.46	-	1.04	-	0.49	-
Silver Creek	11N 3W 29	14	1.25	0.33-4.44	0.28	0.17-0.37	0.61	0.35-0.87	0.26	0.11-0.62
Trout Creek	11N 1W 17	2	1.50	0.76-2.23	0.26	0.24-0.26	0.56	0.46-0.66	0.30	0.21-0.38
McGuire Creek	11N 2W 35	7	2.26	1.02-3.80	0.26	0.18-0.34	0.77	0.46-1.07	0.32	0.17-0.43

Table 10. Numbers of young of the year (YOY) rainbow trout and brown trout sampled in tributaries of the reservoir complex during 1982.

Tributary	Date Sampled	Minutes Electrofished	Section Length (m)	Rainbow Trout				Brown Trout			
				Number	Length Range	Ave. Length	CPUE [1]	Number	Length Range	Ave. Length	CPUE [1]
Cottonwood Cr	5/14/82	-	1500	3	-	-	-	0	-	-	-
	7/21/82*	31	500	30	25-49	36.0	0.97	1	-	52.0	0.03
	10/22/82	7	700	57	58-103	81.5	8.14	1	-	118.0	0.14
Willow Cr	7/21/82*	12	150	4	33-42	37.3	0.33	Brook & brown trout not seperated			
	10/22/82	7.5	200	9	74-116	98.3	1.20	1	-	114.0	0.13
Trout Cr	4/7/82	60**	300	0	-	-	0	0	-	-	0
	4/21/82	60**	300	0	-	-	0	0	-	-	0
	5/5/82	30**	150	0	-	-	0	0	-	-	0
	5/26/82	30**	150	0	-	-	0	3 [2]	40-43	41.7	0.10
	8/ 9/82*	81	300	45	39-74	54.4	0.56	70	53-103	76.0	0.86
	10/13/82	55	300	10	70-100	83.0	0.18	9	79-115	94.6	0.16
	10/25/82	60**	300	1	-	111.0	0.02	5	86-115	102.5	0.08
	11/ 5/82	60**	300	3	103-121	110.6	0.05	3	103-113	109.0	0.05
	11/18/82	30**	150	0	-	-	0	0	-	-	0
	12/ 2/82	30**	150	0	-	-	0	1	-	105.0	0.03
Soup Cr	8/12/82*	10	-	4	52-76	60.0	0.40	5	66-96	81.2	0.50
	10/13/82	7.5	-	6	66-101	79.2	0.80	6	85-111	97.8	0.80

Table 10 continued.

Tributary	Date Sampled	Minutes Electrofished	Section Length (m)	Rainbow Trout				Brown Trout			
				Number	Length Range	Ave. Length	CPUE	Number	Length Range	Ave. Length	CPUE
McGuire Cr	8/16/82*	32	150	3	109-119	115.7	0.09	14	81-131	113.0	0.44
	10/14/82*	65	300	25	95-173	149.4	0.38	55	98-176	139.3	0.85
	10/26/82	80**	450	18	99-173	148.6	0.23	38	104-175	141.3	0.48
	11/18/82	65**	300	41	88-175	146.3	0.63	36	103-176	141.5	0.55
Prickly Pear Cr	4/ 6/82	160**	1700	0	-	-	0	0	-	-	0
	4/20/82	160**	1700	0	-	-	0	0	-	-	0
	8/10/82*	185	1700	0	-	-	0	1	-	95.0	0.005
	10/12/82	160	1700	0	-	-	0	1	-	95.0	0.006
	10/27/82	160**	1700	1	-	111.0	0.006	0	-	-	0
Tenmile Cr	4/ 6/82	30**	500	0	-	-	0	0	-	-	0
	4/20/82	30**	500	0	-	-	0	0	-	-	0
	8/10/82*	25	500	0	-	-	0	1	-	74.0	0.04
	10/12/82	30**	500	0	-	-	0	1	-	114.0	0.03
	10/27/82	30**	500	0	-	-	0	1	-	108.0	0.03
Silver Cr	5/ 5/82	15**	85	0	-	-	0	0	-	-	0
	8/16/82*	35	160	79	60-129	92.2	2.26	28	81-116	98.8	0.80
	10/28/82*	60**	500	167	98-186	134.4	2.78	182	97-174	140.2	3.03
	11/17/82	60**	500	38	93-177	138.1	0.63	65	78-175	142.0	1.08

Table 10 continued.

Tributary	Date Sampled	Minutes Electrofished	Section Length (m)	Rainbow Trout				Brown Trout			
				Number	Length Range	Ave. Length	CPUE	Number	Length Range	Ave. Length	CPUE
Merritt Cr	8/11/82*	15	500	0	-	-	0	0	-	-	0
	10/14/82*	9	500	0	-	-	0	0	-	-	0
Diehl Drain	7/15/82*	10	50	0	-	-	0	0	-	-	0
	10/14/82*	40	250	13	86-117	103.8	0.33	0	-	-	0
Winterborn Drain	4/22/82	8	40	0	-	-	0	0	-	-	0
	8/11/82	65	250	0	-	-	0	3	71-96	80.0	0.05

1 No. fish sampled per electrofishing minute
2 Observed greater numbers
* Dates spent specifically searching for YOY
** Approximate

Table 11. Numbers of yearling rainbow trout and brown trout sampled in the tributaries of the reservoir complex during 1982.

Tributary	Date Sampled	Minutes Electrofished	Section Length (m)	Rainbow Trout				Brown Trout			
				Number	Length Range	Ave. Length	CPUE [1/]	Number	Length Range	Ave. Length	CPUE [1/]
Cottonwood Cr	5/14/82	-	1500	0	-	-	-	0	-	-	-
	7/21/82*	31	500	17	95-137	114.3	0.55	0	-	-	0
	10/22/82	7	700	7	124-160	137.9	1.00	0	-	-	0
Willow Cr	7/21/82*	12	150	5	91-132	108.6	0.42	0	-	-	0
	10/22/82	7.5	200	10	124-160	136.0	1.33	0	-	-	0
Trout Cr	4/7/82	60**	300	5	105-146	128.0	0.08	5	97-149	126.2	0.08
	4/21/82	60**	300	3	103-160	122.3	0.05	4	97-143	119.0	0.07
	5/5/82	30**	150	1	-	127.0	0.03	0	-	-	0
	5/26/82	30**	150	0	-	-	0	0	-	-	0
	8/9/82*	81	300	3	108-176	138.0	0.04	4	150-178	162.0	0.05
	10/13/82	55	300	2	150-178	158.5	0.04	7	162-201	188.6	0.13
	10/25/82	60**	300	2	146-168	157.0	0.03	7	183-213	200.1	0.12
	11/ 5/82	60**	300	2	186-207	196.5	0.03	4	170-211	197.5	0.07
	11/18/82	30**	150	0	-	-	0	1	-	170.0	0.03
	12/ 2/82	30**	150	0	-	-	0	5	147-216	187.6	0.17
Soup Cr	8/12/82*	10	-	3	99-117	107.0	0.30	0	-	-	0
	10/13/82	7.5	-	1	-	147.0	0.13	1	-	136.0	0.13
McGuire Cr	8/16/82*	32	150	1	-	152.0	0.03	1	-	143.0	0.03
	10/14/82	65	300	0	-	-	0	2	185-201	193.0	0.03
	10/26/82	80**	450	2	184-190	187.0	0.03	3	182-192	185.7	0.04
	11/18/82	65**	300	2	181-183	182.0	0.03	4	182-207	189.0	0.06

Table 11 continued.

Tributary	Date Sampled	Minutes Electrofished	Section Length (m)	Rainbow Trout				Brown Trout			
				Number	Length Range	Ave. Length	CPUE[1/]	Number	Length Range	Ave. Length	CPUE[1/]
Prickly Pear Cr	4/ 6/82	160**	1700	0	-	-	0	13	102-140	122.4	0.08
	4/20/82	160**	1700	0	-	-	0	13	113-165	143.2	0.08
	8/10/82*	185	1700	0	-	-	0	62	146-212	176.9	0.34
	10/12/82	160	1700	0	-	-	0	55	148-231	205.2	0.34
	10/27/82	160**	1700	0	-	-	0	35	175-235	211.3	0.22
Tenmile Cr	4/ 6/82	30**	500	0	-	-	0	3	104-135	118.3	0.10
	4/20/82	30**	500	0	-	-	0	3	120-135	126.7	0.10
	8/10/82*	25	500	0	-	-	0	3	139-204	181.0	0.32
	10/12/82	30**	500	0	-	-	0	1	-	212.0	0.03
	10/27/82	30**	500	0	-	-	0	0	-	-	0
Silver Cr	5/5/82	15**	85	0	-	-	0	0	-	-	0
	8/16/82*	35	160	0	-	-	0	0	-	-	0
	10/28/82*	60**	500	0	-	-	0	2	188-227	207.5	0.03
	11/17/82	60**	500	2	193-205	199.0	0.03	1	-	188.0	0.02
Merritt Cr	8/11/82*	15	500	0	-	-	0	0	-	-	0
	10/14/82*	9	500	2	153-182	167.5	0.22	0	-	-	0
Diehl Drain	7/15/82*	10	50	0	-	-	0	0	-	-	0
	10/14/82*	40	250	9	128-177	151.8	0.23	0	-	-	0
Winterborn Drain	4/22/82	8	40	0	-	-	0	0	-	-	0
	8/11/82*	65	250	2	132-141	136.5	0.03	0	-	-	0

1 No. fish sampled per electrofishing minute
* Dates spent specifically searching for juveniles
** Approximate

Forage Fish in Tributaries

Numbers of forage fish sampled in the tributaries of the reservoir complex during 1982 are shown in Table 12. The most common forage species collected were juvenile white suckers, juvenile longnose suckers, longnose dace and mottled sculpins. In tributaries draining agricultural land, the most common species of forage fish sampled were juvenile white suckers, juvenile longnose suckers and longnose dace. Mottled sculpin was the most common forage species collected in tributaries with spring-like characteristics and in streams located within mountain valleys.

Forage Fish in Reservoirs

Numbers of forage fish collected from seining in Hauser Reservoir and Lake Helena during August, 1982, are shown in Table 13. Juvenile yellow perch and white suckers were the most common forage species collected in Hauser Reservoir. In Lake Helena, the most common forage species collected were juvenile carp and white suckers.

Tag Distribution and Preliminary Estimates of Angler Harvest

A total of 875 individually numbered Floy T-tags was distributed in the reservoir complex during 1982 (Table 14). Tags were placed in 114 rainbow trout and 312 brown trout in Hauser Reservoir. Electrofishing attempts on Lake Helena were ineffective, thus only one trout was tagged. In tributaries of the reservoir complex, tags were placed in 104 rainbow trout and 344 brown trout.

Preliminary information from tags returned by anglers indicates harvest rates in both Hauser Reservoir and the tributaries are greater for rainbow trout than for brown trout. A grand total of 4.59 percent of the rainbow trout tagged in the reservoir complex has been harvested by anglers. In comparison, a grand total of 1.22 percent of the tagged brown trout has been harvested. Since only a percentage of tags are returned by anglers, the percentages reported underestimate actual harvest.

Since large numbers of tagged trout are still at large and additional trout are being tagged in the study area, harvest rates presented in this report are preliminary. Angler harvest rate statistics will be updated in the next report.

Assessment of Hatchery Trout in the Reservoir Complex

Canyon Ferry, Hauser and Holter reservoirs are heavily stocked with fingerling rainbow trout to supplement natural reproduction and maintain the sport fishery. In recent years the average plant has been 200,000 fish per year in Hauser Reservoir and 300,000 fish per year in Holter Reservoir. In Canyon Ferry, 500,000 to 1,000,000 fingerling trout have been planted annually.

Table 12. Numbers of forage fish collected in tributaries of the reservoir complex during 1982.

Tributary	Location T	R	S	Date	ME[1]	SL[2] (m)	Numbers of forage fish (CPUE in parentheses)[3] WS	LS	LD	SC	MW	CP	FM
Cottonwood Cr	14N	3W	35	7/21/82	31	500	0	0	0	Abdt[4]	0	0	0
							-	-	-		-	-	-
Willow Cr	13N	3W	12	7/21/82	12	150	0	0	0	Abdt	0	0	0
							-	-	-		-	-	-
Trout Cr	11N	2W	13 &	8/ 9/82	81	300	0	0	0	18	0	0	0
	11N	1W	18				-	-	-	(0.22)	-	-	-
Soup Cr	11N	2W	11	8/12/82	10	-	0	0	0	8	2	0	0
							-	-	-	(0.80)	(0.20)	-	-
McGuire Cr	11N	2W	35	8/16/82	32	150	0	0	0	32	0	0	0
							-	-	-	(1.00)	-	-	-
Prickly Pr Cr	11N	3W	33, 34	8/10/82	185	1700	28	127	38	C[5]	0	0	2
							(0.15)	(0.69)	(0.21)		-	-	(0.01)
	Same			10/12/82	160	1700	11	26	3	C	0	0	0
							(0.07)	(0.16)	(0.02)		-	-	-
Tenmile Cr	11N	3W	33	8/10/82	25	500	8	51	54	0	0	0	2
							(0.32)	(2.04)	(2.16)	-	-	-	(0.08)
	Same			10/12/82	30	500	18	11	1	0	0	0	0
							(0.60)	(0.37)	(0.03)	-	-	-	-
Silver Cr	11N	3W	29	8/16/82	35	160	0	0	0	5	0	0	0
							-	-	-	(0.14)	-	-	-
Merritt Cr	11N	2W	30	8/11/82	15	500	0	1	4	5	0	0	0
							-	(0.07)	(0.27)	(0.33)	-	-	-
	Same			10/14/82	9	500	104	14	1	C	0	48	3
							(11.6)	(1.60)	(0.11)		-	(5.33)	(0.33)
Diehl Drain	11N	3W	36	10/14/82	40	250	36	4	0	7	0	0	0
							(0.90)	(0.10)	-	(0.18)	-	-	-
Winterborn Drain	11N	3W	24, 25	8/11/82	65	250	8	46	0	1	0	0	0
							(0.12)	(0.71)	-	(0.02)	-	-	-

1 - ME = minutes electrofished
2 - SL = section length
3 - WS = juvenile white sucker, LS=juvenile longnose sucker, LD=longnose dace, SC=mottled sculpin, MW= juvenile mountain whitefish, CP=juvenile carp, FM=fathead minnow, CPUE = No. fish per electrofishing minute
4 - Abdt = abundant
5 - C = Common

Table 13. Number of forage fish collected from seines in Hauser Reservoir and Lake Helena during August 1982.

Reservoir	No. of Hauls	Species	Fish/Haul Mean	Fish/Haul Range	Total Length (mm) Mean	Total Length (mm) Range
Hauser	9	Yellow perch	142.4	2-265	77.0	41-207
	"	White sucker	108.8	4-336	71.0	40-196
	"	Carp	4.8	0- 25	50.8	35- 60
	"	Fathead minnow	2.2	0- 10	61.4	50- 71
	"	Unident. cyprinid	0.4	0- 3	51.0	-
Helena	10	Yellow perch	0.1	0- 1	60.0	-
	"	White sucker	7.3	0- 27	49.8	30-111
	"	Carp	12.6	0- 53	29.3	19- 52
	"	Unident. cyprinid	0.3	0- 2	45.0	-

Table 14. Tag distributions and preliminary estimates of angler harvest as indicated by tag returns during 1982.

Study area	Section/tributary	Rainbow Trout			Brown Trout		
		No. Tagged	No. Harvested	Percent Harvested	No. Tagged	No. Harvested	Percent Harvested
Holter Lake	-	No attempt made			No attempt made		
Hauser Lake	Canyon Ferry tailrace	70	5	7.14	260	4	1.54
	Lakeside	10	0	0	28	0	0
	Causeway Arm	25	2	8.00	21	1	4.76
	Black Sandy	9	0	0	3	0	0
Lake Helena	-	0	-	-	1	0	0
Subtotal		114	7	6.14	313	5	1.60
Tributaries	Cottonwood Cr	45	1	2.22	0	-	-
	Trout Cr	18	0	0	85	0	0
	McGuire Cr	8	0	0	37	0	0
	Prickly Pear Cr	23	1	4.35	145	3	2.07
	Tenmile Cr	5	1	20.00	5	0	0
	Silver Cr	3	0	0	72	0	0
	Lake Helena Drains	2	0	0	0	-	-
Subtotal		104	3	2.88	344	3	0.87
Grand Total		218	10	4.59	657	8	1.22

Since large numbers of hatchery rainbow trout are planted in the reservoir complex, it is essential that they be included in the fishery assessment. Twenty-five percent of the rainbow trout planted in Hauser and Holter reservoirs in 1982 were marked with fin clips. The Canyon Ferry Reservoir plant was marked with tetracycline dye. A plan has been established to collect fish for examination of marks. Information which can eventually be obtained from this effort will include 1) assessment of movement of fish between reservoirs, 2) determination of the growth rate of hatchery fish, 3) evaluation of the extent of spawning by marked hatchery fish in the reservoir complex area, and 4) evaluation of the extent of distribution of hatchery fish in the blue ribbon segment of the Missouri River downstream from Holter Dam. This information will be helpful in making future management decisions.

LITERATURE CITED

Berg, R.K. 1981. Fish populations of the Wild and Scenic Missouri River, Montana. Job Comp. Rept., Fed. Aid to Fish and Wildl. Rest. Proj. No. FW-3-R. Job 1-A. 242 pp.

Novotny, D.W. and G.R. Priegel. 1974. Electrofishing boats - improved designs and operational guidelines to increase the effectiveness of boom shockers. Wisc. Dept. Nat. Resc. Tech. Bull. No. 73. 48 pp.