# Montana Fish, Wildlife & Parks

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# Northcentral Montana Coldwater Stream Ecosystems

2003 Annual Report

by

Travis B. Horton and Anne E. Tews

Montana Fish, Wildlife & Parks
Region 4 Headquarters
4600 Giant Springs Road
Great Falls, MT 59405

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## ABSTRACT

Big Spring Creek and several smaller streams in the Lewistown vicinity were sampled during 2003. In Big Spring Creek, numbers of rainbow trout *Oncorhynchus mykiss* ≥ 10 inches total length declined in the Burleigh and Carroll Trail sections and increased in the Brewery Flats section. Point estimates of 10-inch and longer brown trout *Salmo trutta*, increased in both sections upstream of Lewistown but declined in the Carroll Trail section. Small rainbow trout were at record high densities in Carroll Trail section but were at record lows at Brewery Flats section. Big Spring Creek was restored to a meandering channel at Brewery Flats late in 2000. In 2003, trout numbers (≥ 10 inches) in the restored section were higher than the long-term pre-project average. Brown trout redds were counted on four sections of Big Spring Creek, during 2003. Numbers decreased in the Burleigh and Hruska sections compared to 2002, but were similar in the Brewery Flats section. A summer-season creel census completed on 6.5 miles of Upper Big Spring Creek found 98% of rainbow trout and 96% of brown trout were released after they were caught. Each trout was caught about 1.4 times on average. There were approximately 333-angler days/mile, which is much higher than 178-angler days/mile estimated in 1996. Almost everyone was fly-fishing. About 50% of the anglers were not from Montana. A large flow event of 600 cfs (about 6 times the base flow) was measured at the Ash Street Bridge in March. The restoration project at Brewery Flats successfully withstood this event. Due to high levels of PCBs in trout, a catch and release regulation was implemented in December 2003 upstream of the Highway 191 Bridge in Lewistown. Brook trout *Salvelinus fontinalis* numbers have declined since the late 1980's in Spring Creek, a tributary to North Fork Musselshell. In the Lewistown area, electronic thermographs were placed on nine different sites on five different streams. Population estimates conducted in the Smith River basin during 2003 indicate a continued decline in rainbow trout density and a stable or increasing trend in brown trout density. Water temperature was monitored throughout the Smith River Basin in 2003. Brown trout estimates conducted during 2003 in the Missouri River were below average in the Craig and Pelican Point sections. Rainbow trout density in the Craig section of the Missouri River declined slightly, and a major shift in size structure of the population was evident. In 2003, fewer rainbow trout were over 17-inches long and there were more rainbow trout between 14- and 17-inches long. The estimated number of rainbow trout in the Pelican Point section increased in 2003. This increase is due to the 2001 cohort produced in the Dearborn River. Water temperature was monitored throughout the Missouri River Basin.

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## OBJECTIVES

The purpose of this project is to implement the Fisheries Program on warmwater and coolwater ecosystems in the Missouri River drainage in northcentral Montana. Major watersheds include the Missouri, Teton, Marias, Judith, and Musselshell drainages.

The mission of the Fisheries Division of the Montana Department of Fish, Wildlife & Parks (MFWP) is to preserve and enhance aquatic species and their ecosystems to meet the public's demand for recreational opportunities while assuring stewardship of aquatic life. The Fisheries Program is divided into four major elements, with objectives and outcomes as follows:

The **Fisheries Management** element of the fisheries program has 21 objectives and the following desired outcomes:

1. A healthy aquatic resource, including native-species fisheries and sport fisheries.
2. Public satisfaction with available angling opportunities.
3. Public support for ongoing efforts to restore, maintain, and protect the state's aquatic resources.

The **Habitat** element of the fisheries program has 15 objectives and the following desired outcomes:

1. Diverse, high-quality aquatic ecosystems that support healthy fish populations and provide fishing opportunities.
2. Public participation in efforts (MFWP's as well as other state and federal agencies) to conserve and improve fish habitat through formation of watershed protection groups and partnerships for the protection and restoration of habitat.

The **Fishing Access** element of the fisheries program has 16 objectives and the following desired outcomes:

1. Provide a diversity of fishing opportunities throughout the state that might otherwise be unavailable.
2. Provide the public with a variety of incidental, non-angling recreational activities by maintaining access to Montana's waters through the fishing access site program.

The **Aquatic Education** element of the fisheries program has 11 objectives and the following desired outcomes:

1. Opportunities for the public, youth and adults, to learn about the state's aquatic ecosystems and their importance.
2. Fishing and water-safety skills for program participants.
3. Enhanced public understanding of Montana's natural and cultural resources.
3. An educated public able to make informed decisions about using and preserving Montana's aquatic resources.

## PROCEDURES

### Lewistown Management Area

Trout populations on Big Spring Creek were surveyed using a fiberglass drift boat equipped with a mobile electrode and a Coffelt VVP15 to rectify AC to DC. Power was obtained from a 240-volt generator. Fish populations in small streams and young of the year (YOY) trout in Big Spring Creek were sampled with a Smith Root Model 12-B battery powered backpack electrofishing unit using a 12B 24-volt battery. All sampled fish were measured (total length) to the nearest 0.1 inch or 1 mm. Population estimates on small streams followed the methods of Leathe (1983). When the probability of capture during the second pass was less than 0.7, additional passes were usually made to reduce underestimates of trout populations as described by Riley and Fausch (1992). Small streams were electrofished in either an upstream direction or downstream direction with a block net at the downstream end. Big Spring Creek mark-recapture estimates from 2003 were analyzed with the FA+ program (MFWP 2004). Historical mark-recapture estimates utilized the MR-4 program (MFWP 1994). Most estimates were completed using partial log-likelihood statistics. Modified Peterson estimates were used when data did not fit the partial log-likelihood model. Depletion estimates were calculated using the Microfish program (Van Deventer and Platts 1985). Temperature was recorded on several streams with various models of Onset® continuous recording data loggers. Flow measurements were taken with a Price AA® Current meter or a Marsh McBirney Flowmate® model 2000. Continuous flow near the Ash Street Bridge, Big Spring Creek, was measured with a Stevens Recorder®. Redd surveys were completed on Big Spring Creek by walking the stream once in early winter, during clear-water conditions.

Creel Survey - A fishing pressure estimate for Upper Big Spring Creek was obtained from total angler counts completed on two weekend days and four weekdays per month from May 1 – September 30, 2004, henceforth referred to as the “summer” season. The percentage of weekend to weekday counts was assumed to be representative of the total number of weekdays and weekend days per month. Angler counts were completed from the highway that runs adjacent to the creek. Most of the stream easily accessible to the public could be viewed from the road, but only about 50% of the entire creek could be seen. Only people actively fishing were counted. Count dates for each two-week interval were randomly selected without replacement. The time of the first count on each census day was randomly selected on a half-hour basis from 6:00 AM to 4:00 PM (less during shorter daylight hours). Two counts were made on each count day at a 4-hour interval. Counts were considered instantaneous since a count took less than 30 minutes to complete (Neuhold and Lu 1957). Pressure and harvest estimates were derived using the MFWP creel census program (McFarland and Roche 1987). Catch rates, catch composition, fishing techniques, angler and trip characteristics were determined from direct angler interviews. Interviews were conducted between counts on census days and on days when counts were not completed. Additional interviews were conducted in March, April, October and November.

### Great Falls Management Area

In 2003, two sections [Craig section (rm 2.5 to 8.1) and the Pelican Point section (rm 24.2 to 28.3)] of the Missouri River were electrofished at night using aluminum jet boats. Population

estimates were conducted in both sections duing late April and early May for brown trout *Salmo trutta*, and in late September and early October for rainbow trout *Oncorhynchus mykiss.* Jet boats were equipped with headlights and fixed booms with stainless steel droppers suspended in front of the bow. Electricity from 240-volt portable generators was converted to straight DC using Coffelt rectifying units. In 2003, trout populations in the Eagle Creek and Deep Creek sections of the Smith River were sampled using a drift boat or a small plastic boat equipped with a mobile electrode and a Coffelt VVP-15 or Mark XXII-M to rectify AC to straight DC. Power was obtained from a 240-volt generator. Rainbow trout and brown trout populations from the Smith and the Missouri rivers were estimated using the log-likelihood method (FA+ program), which generates recapture efficiency curves for the estimate production (MFWP 2004). All sampled rainbow trout and brown trout were measured to the nearest 0.1 inch and weights (to the nearest 0.01 pound) were obtained on a maximum of 15 fish from each ½ inch group. A maximum of ten scale samples were collected from rainbow trout and brown trout from each ½ inch group for age analyses. Water temperature was monitored throughout the Missouri and Smith River basins using Optic StowAway® temperature loggers. Temperature loggers recorded water temperature every 0.5 h. Temperature monitoring varied from year-round to summer only.

## RESULTS AND DISCUSSION

### Lewistown Management Area

Big Spring Creek

In 2003, mark-recapture estimates were completed on three sections of Big Spring Creek, the Burleigh and Brewery Flats sections upstream from Lewistown, and the Carroll Trail section downstream of town. Results are presented in Table 1. Fish population trends are summarized in Figures 1 and 2. Despite extended drought, small rainbow trout were at record high numbers in the Carroll Trail section. Small rainbow trout remained at record low numbers in the Brewery Flats section and increased to near the long-term average in the Burleigh section. Rainbow trout (≥10 inches) declined to the lowest numbers since 1997 downstream from town at Carroll Trail. Brown trout numbers were lower than seen since 1999 at Carroll Trail. Numbers were still higher than they were in the early 1990's (Figures 1 and 2). In the Burleigh section, rainbow trout ≥10 inches continued the downward trend that began in 2001, but at Brewery Flats rainbow trout ≥10 inches increased to the second highest estimate ever reported. Brown trout numbers increased in both sections upstream of Lewistown. At Brewery Flats, the estimate for trout ≥10 inches per mile was the second highest on record and was higher than the average number prior to completion of a restoration project in 2000 (Figure 3). The per mile increase in trout ≥10 inches at Brewery Flats is especially impressive since there has been a 1,400-foot increase in stream length. In the entire Brewery Flats section there were an average of 434 trout ≥10 inches before the project compared with 823 after the project was completed. Age analysis for 2003 estimates will be reported in a future report.

Young of the year trout were sampled with one-pass electrofishing at two locations in Big Spring Creek in July 2003 (Appendix 2). Catch per effort in the new reach at Brewery Flats was 35 YOY/1,000 feet compared with from 15/1,000 feet in 2001 to 117/1,000 feet in 2002. Brown trout redds were counted on four sections of Big Spring Creek. Numbers decreased on the

Burleigh and Hruska sections compared to 2002, but were similar on the Brewery Flats section (Table 2).

Table 1. Number of fish marked in mark runs (M), number of fish captured in recapture runs (C), number of fish recaptured in recapture runs (R), pooled p-value (Pooled P), number of fish per mile 6 to 10 inches long (#/mile 6 – 10 inches), number of fish per mile 10 inches and longer (#/mile ≥ 10 inches), number per mile 6 inches and longer (#/mile ≥ 6 inches), and pounds of fish per mile (biomass per mile), by section and species for population estimates conducted on Big Spring Creek during 2003. Number in parentheses is standard deviation.

| Section | Date marked | # M | # C | # R | Pooled (P) | #/mile 6-10 inches | #/mile ≥10 inches | #/mile ≥6 inches | Biomass/ mile (lbs.) |
|---|---|---|---|---|---|---|---|---|---|
| **Rainbow trout** | | | | | | | | | |
| Burleigh* | 8/18 | 146 | 155 | 36 | 0.262 | 168 | 387 | 555 (55) | 354 (63) |
| Brewery Flats | 8/20 | 246 | 317 | 110 | 0.002** | 169 | 569 | 738 (45) | 441 (56) |
| Carroll Trail | 8/19 | 451 | 641 | 133 | 0.112 | 1,841 | 1,334 | 3,175 (223) | 1,800 (172) |
| **Brown trout** | | | | | | | | | |
| Burleigh | 8/18 | 43 | 54 | 13 | *** | 0 | 162 | 162 (37) | 265 (85) |
| Brewery Flats | 8/20 | 163 | 169 | 70 | 0.051 | 60 | 359 | 413 (18) | 355 (22) |
| Carroll Trail | 8/19 | 185 | 265 | 70 | 0.124 | 272 | 630 | 894 (72) | 674 (69) |

* Poor estimate quality; **Log likelihood model does not fit, used Modified Peterson method;
*** Model not appropriate for pooled P

Table 2. Brown trout redd counts on Big Spring Creek in 2003.

| **Section** | **Date** | **Number of redds** | **Section length (ft)** | **Number/1,000 ft** | |
|---|---|---|---|---|---|
| | | | | **2002** | **2003** |
| Brewery Flats | 12/3/2003 | 70 | 5,104 | 12 | 14 |
| Burleigh | 12/22-12/30/2003 | 237 | 5,860 | 59 | 40 |
| Lazy KB | 12/22/2003 | 14 | 900 | | 16 |
| Hruska | 1/3/2004 | 116 | 1,425 | 109 | 81 |

We monitored Big Spring Creek flows with a Stevens Recorder near the Ash Street Bridge (immediately downstream from the mouth of Big Casino Creek at river mile 24). High flows of nearly 600 cfs were recorded in mid March. Flows reached a low of 88 cfs in August and were below the MFWP Murphy right of 110 cfs after mid-June (Figure 4).

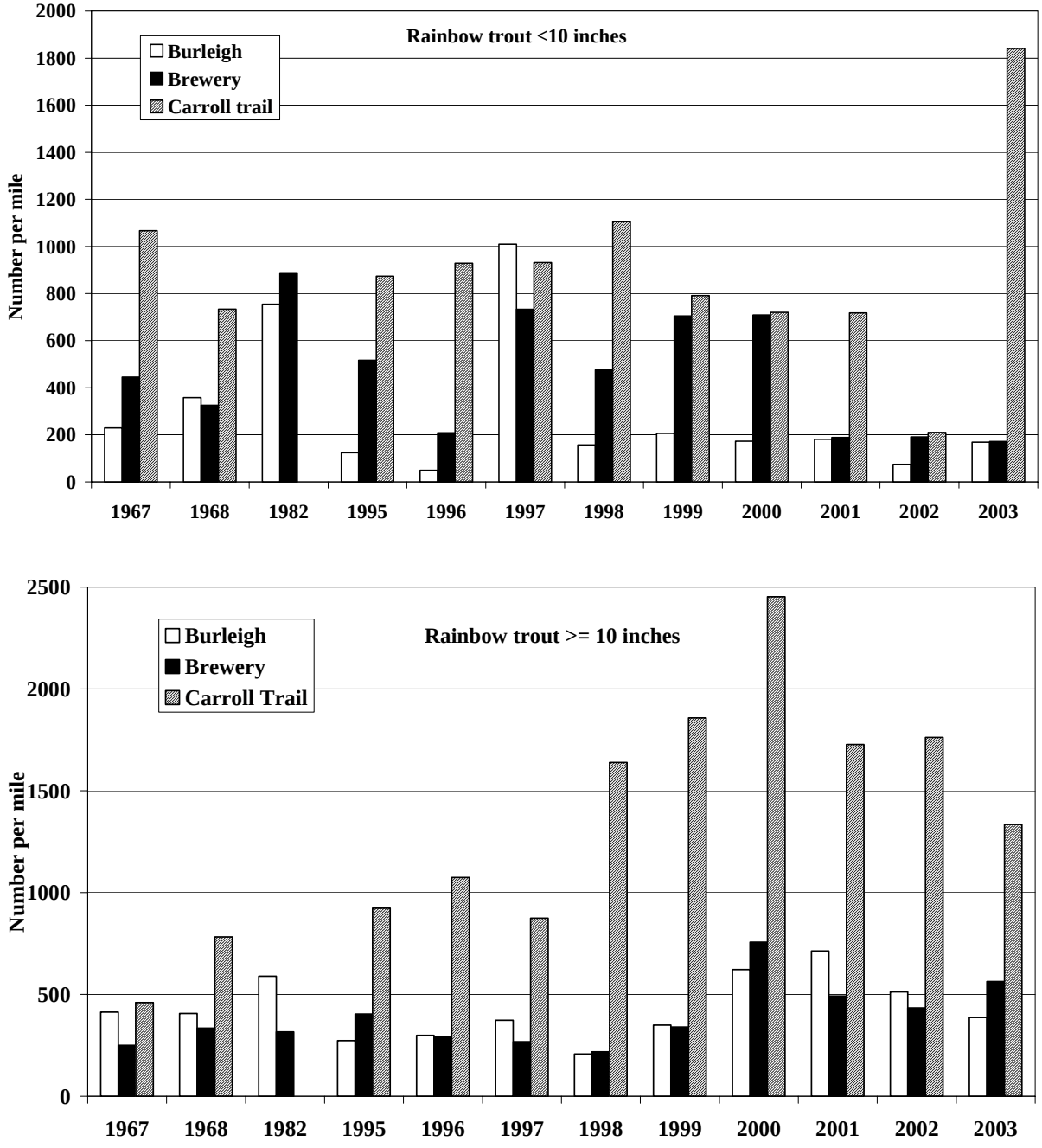


Figure 1. Rainbow trout population trends on three sections of Big Spring Creek, Lewistown, MT.

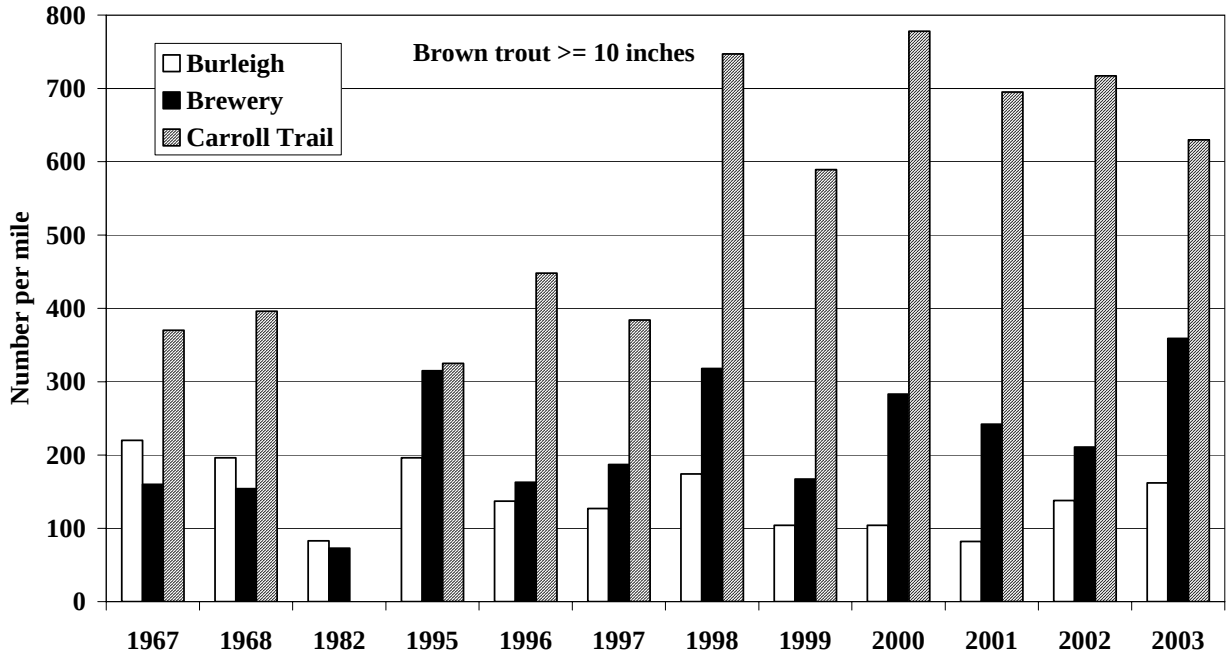


Figure 2. Brown trout (>10 inches) population trends for three sections of Big Spring Creek, Lewistown, MT.

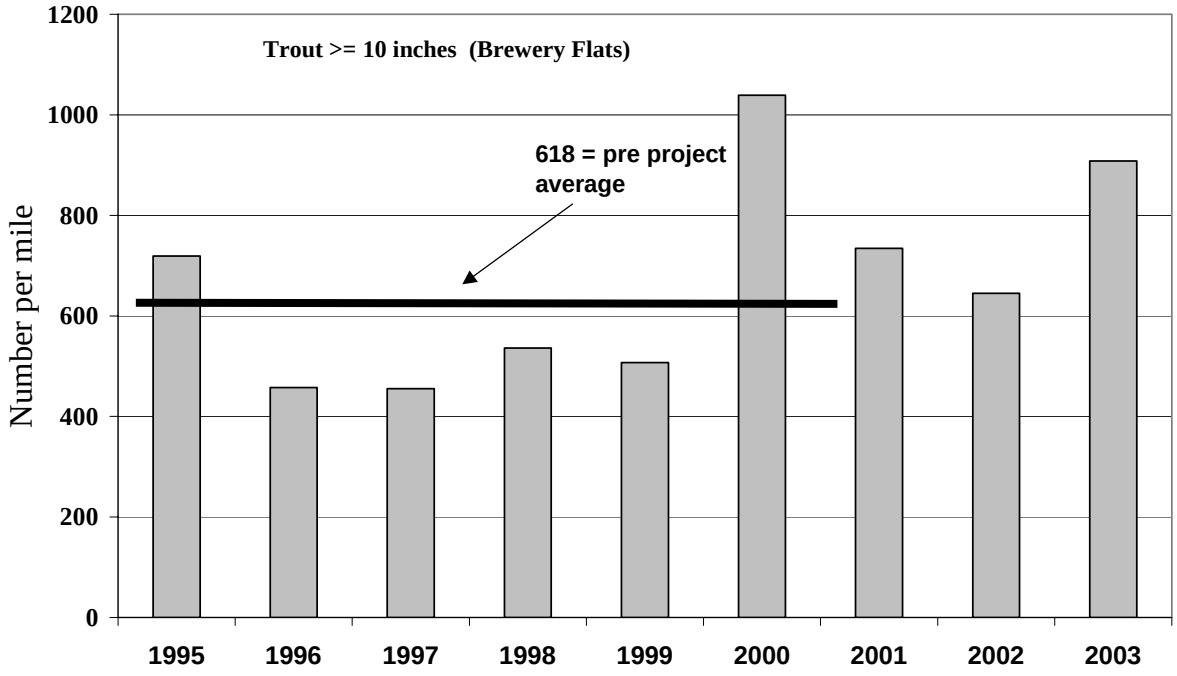


Figure 3. Point estimates of trout (>10 inches) in the Brewery Flats section of Big Spring Creek. Estimates from 1995 – 2000 were prior to construction on the new meandering Brewery Flats channel.

In March 2003, flows appeared to be much higher than 600 cfs downstream of Lewistown. On March 13, flow at Reed and Bowles increased from 167.5 cfs to 330 cfs between 10:00 AM and 1:30 PM. Stage height rapidly increased after 1:30 PM and the AquaRod station that was recently installed at the Reed and Bowles Fishing Access site (T15N R18E S5 NE, river mile 18.8) washed out. A new station will be established in 2004. Summer base flow at the Reed and Bowles site, located downstream of three major irrigation diversions was low in 2003, but was not continuously monitored. On August 7, flow was only 65.8 cfs. In 2003, during late summer, mean water temperatures exceeded 65° F on Lower Spring Creek (Appendix 1).

The high flow event in March provided an opportunity to evaluate the success of the recently constructed flood plain at Brewery Flats. The flood plain successfully passed the flood flow and returned to its restored banks when the flow receded (Figure 5).

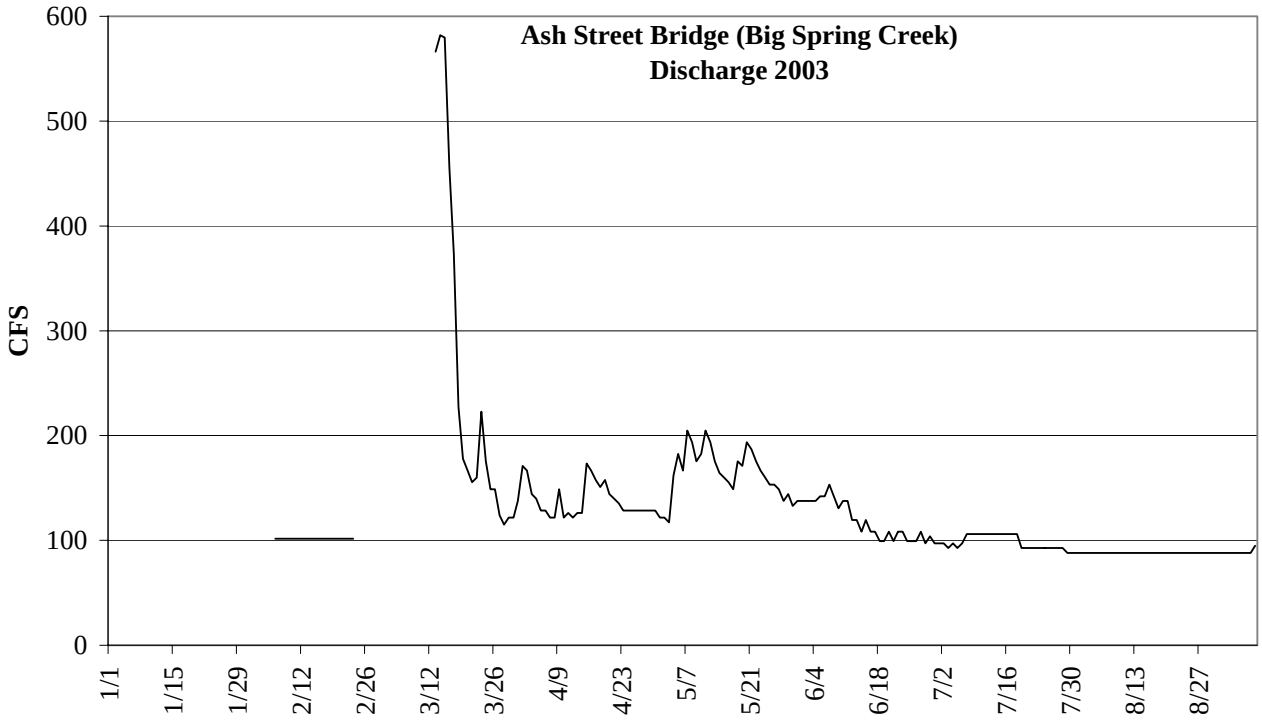


Figure 4. Big Spring Creek flow at Ash Street Bridge (river mile 24) 2003.

Figure 5. High flows in March 2003 on Big Spring Creek through Brewery Flats restoration project (upper picture) and channel shown in fall 2003 (lower picture).

Big Spring Creek Creel Census

A total of 60 counts and 30 interviews were completed during the summer season creel census on upper Big Spring Creek. This census was conducted on a 6.5-mile section of Big Spring Creek starting at the bridge downstream from the MFWP hatchery and proceeding downstream to the Ash Street Bridge (Figure 6). The census estimated 5,049 angler hours (SE = 696) from 1 May – 30 September on the 6.5-mile reach of creek. This is likely an underestimate since some of the stream could not be seen from the road. In 1996, 3,710 angler hours (SE = 809) were estimated (Hill et al. 1997). There were a total of 2,163 angling days in 2003 (333 days/mile), an increase from 1996 (178/mile) but less than found in the 1960's (Table 3). The biannual Montana statewide angling pressure survey estimate for May through September 2003 was 7,292 angler days or 356 angler days per mile for the 20.5 miles of Big Spring Creek upstream from Cottonwood Creek (McFarland and Meredith 2004). On a per-mile basis, the 2003 ground survey and statewide mail survey results were similar.

Nearly all of the fish reported caught during the Big Spring Creek creel census were released. Of the 72 trout caught during summer creel interviews, only one rainbow trout and one brown trout were harvested. The creel program estimated 116 trout of each species were harvested during the summer season (Table 4). In 2003, approximately 3% of the trout caught were harvested compared to 5% in 1996 and 73% in 1969 (Table 3). On average, all rainbow trout 6 inches and longer were caught 1.3 times by anglers, and all brown trout 6 inches and longer were caught 1.4 times by anglers (Table 4). Catch rates were higher than previously reported and averaged 1.7 trout per hour during the summer (Table 3). In 2003, 97% of anglers used flies during the summer season. One angler used bait. Of the 10 additional anglers interviewed in early spring and fall one used a combination of gear and the rest used flies. Use of flies increased compared to 1996 when 68.6% of anglers used flies, 18.6% used lures and 12.8% used bait or a combination (Hill et al. 1997). Non-resident use appears to have increased on Big Spring Creek. The 2003 summer creel census estimated 50% of the anglers were non-residents compared with 27% non-resident anglers in 1996 (Table 3). The statewide mail angler survey also indicates that use by non-resident anglers has increased (McFarland and Meredith 2004).

Big Spring Creek is open to fishing year round, but the vast majority of angling occurs during the summer season. Only 7.6% or 604 angling days (284 non-resident) were reported from the winter season during the 2003 statewide mail survey (McFarland and Meredith 2004). Therefore, the summer season census should reflect most of the anglers on upper Big Spring Creek. The percent of local residents (Fergus County) was slightly higher during the non-summer months (Table 3). In December 2003, after this survey was completed, a catch and release only regulation was instituted on this reach of Big Spring Creek due to high PCB levels in fish. Prior to December 2003, this reach of stream was under a one meal per month health advisory.

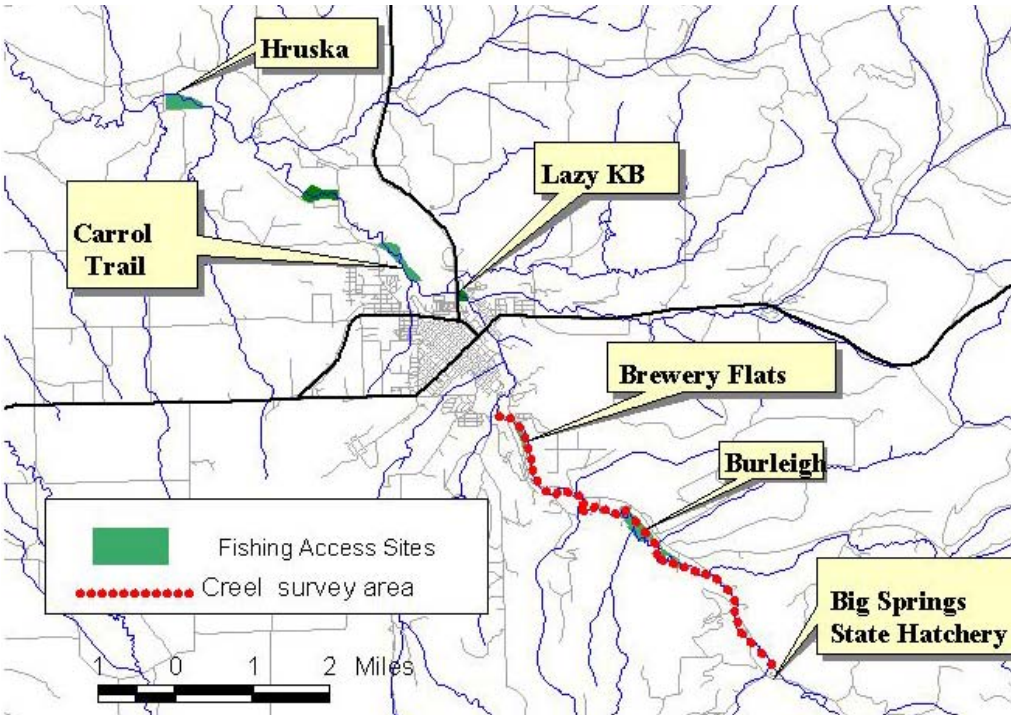


Figure 6. Map showing the creel survey area on Big Spring Creek in 2003. Lewistown, MT is in the map center.

Table 3. Comparison of angler statistics on Upper Big Spring Creek for 2003, 1996, 1969 and 1968.

| Year | 2003 | 2003 | 1996[1] | 1969[2] | 1968[2] |
|---|---|---|---|---|---|
| Season | May-Sept | March - November | May-Sept | May-Sept | May-Sept |
| Angler days/mile | 333 | - | 178 | 534 | 635 |
| % Kept | 3 | 2 | 5 | 73 | - |
| % Local Anglers | 23 | 32 | 36 | 52 | 62 |
| % Other Montana | 27 | 25 | 31 | | |
| % Non resident | 50 | 42 | 27 | | |
| Catch rate/hr (from interviews) | | | | | |
| Wild rainbow | 1.10 | 1.33 | 0.93 | 0.32 | 0.24 |
| Hatchery rainbow | 0.00 | 0.00 | 0.00 | 0.33 | 0.65 |
| Brown trout | 0.55 | 0.51 | 0.16 | 0.04 | 0.03 |
| Total trout | 1.66 | 1.85 | 1.08 | 0.69 | 0.92 |

1 from Hill et al. 1997; 2 from Peterson 1970.

Table 4. Comparison of trout harvest and catch statistics on upper Big Spring Creek in 2003 and 1996.

| **Year** | **2003** | | **1996[1]** | |
|---|---|---|---|---|
| Species | Rainbow trout | Brown trout | Rainbow trout | Brown trout |
| Released | 5,453 | 2,669 | 3,325 | 499 |
| Harvested | 116 | 116 | 111 | 83 |
| # in section[2] ≥ 6 inches | 4,202 | 1,901 | 2,259 | 975 |
| (Turnover)[3] | (1.3) | (1.4) | (1.5) | |
| # in section[2] ≥10 inches | 3,107 | 1,703 | 1,924 | 975 |
| (Turnover)[3] | (1.8) | (1.6) | (1.7) | (0.5) |
| Release mortality (3.8%)[4] | 207 | 65 | 133 | 20 |
| % of population ≥ 10 inches harvested[5] | 3.7% | 6.8% | 5.8% | 8.5% |
| Total mortality | 8 – 10% | 10 – 11% | 11 – 13% | 10% |

1 from Hill et al. 1997; 2 Calculated by averaging number per mile from 2003 population estimates on Brewery Flats and Burleigh section multiplied by 6.5 (number of miles in section); 3 Number of times each fish captured; 4 from Taylor and White 1992; 5 assuming fish harvested ≥ 10 inches.

**Other Streams -** Most streams sampled in 2003 were part of the westslope cutthroat trout recovery effort. Data collected from those streams are included in a companion report (Moser et al. 2003). Statistics from four streams where sampling focused on other species are listed in Appendix B. Sampling highlights are discussed below.

Spring Creek (Musselshell)- A 600 foot section of Spring Creek was electrofished immediately downstream of the confluence with Whitetail Creek. Brook trout *Salvelinus fontinalis* were the only game fish sampled with an estimate of 158 per 1,000 feet (Table 5). In 1987, both rainbow trout and brook trout were sampled (MFWP 1989). In October 1987, population estimates found more than twice as many trout in this stream with 296 brook trout and 44 rainbow trout ≥4 inches per 1000 feet. Brook trout were common and rainbow trout rare in this reach of stream when sampled in 1970 (MFWP unpublished data). When this area of Spring Creek was sampled in 1974 only brook trout were found, but brown trout and rainbow trout were sampled several miles downstream (Poore 1975). The field notes (MFWP unpublished data) state that mottled sculpin *Cottus bairdi* were not present in 1974, one mile downstream of Whitetail Creek; however, they were very common in 2003.

Table 5. Depletion/removal population estimates for fish ≥4 inches from Spring Creek (T10N R11E S21NE) in 2003.

| Date | Species | #/1,000 ft | Average total length (inches) | Probability of capture |
|---|---|---|---|---|
| 9/11/03 | Brook trout | 158 | 5.2 | 0.81 |

Judith River – In late summer 2002, an AquaRod® was installed to measure flows on the Judith River about 4 miles upstream from the confluence of Ross Fork Creek. Results are summarized in a companion report (Yerk et al. 2005). Data collected from the South Fork Judith River are summarized in a companion report (Moser et al. 2003).

Little Casino Creek – White suckers *Catostomus commersoni* were the most common fish species sampled in this stream in Robson Park, located upstream from the Frog Ponds. No game fish were sampled. Other species sampled included fathead minnow *Pimephales promelas*, northern redbelly dace *Phoxinus eos* and longnose dace *Rhinichthys cataractae*. In Little Casino Creek downstream from the Frog Ponds, water temperatures were lower in 2003 than in 2002. In 2003, mean water temperature downstream from the lower pond only briefly exceeded 70˚ F (Appendix 1), while in 2002 mean water temperature was usually above 70˚ F from late June until late July (Horton et al. 2004).

Continuous recording StowAway® temperature loggers were placed on several streams in the Lewistown area (Table 6). Temperatures were recorded every 1 – 2 hours. Data are on file at the Lewistown area office. Temperatures from the South Fork Judith are summarized in Moser et al. (2003). Big Spring Creek temperatures were similar to those seen in past years. Maximum water temperatures on Cottonwood Creek downstream of Beaver Creek occasionally exceeded 80˚ F (Appendix 1), which is close to the 84˚ F critical thermal maxima for wild trout (Carline and Machung 2001).

Table 6. Location of thermographs deployed in the Lewistown vicinity 2003.

| Stream | Location | Dates |
|---|---|---|
| Big Spring Cr. | Burleigh FAS | Yearlong |
| Big Spring Cr. | Hruska FAS | Yearlong |
| Cottonwood Cr. | Below Beaver Cr. | 7/22/2003 –9/23/2003 |
| Judith R., S. Fk. | Below Big Hill Cr. | 6/5/2003-9/16/2003 |
| Judith R., S. Fk. | Below Bluff Mountain Cr. | 6/5/2003-8/18/2003 |
| Judith R., S. Fk. | Below Dry Pole | 6/5/2003 – 9/18/2003 |
| Little Casino Cr. | (Below ponds) | 4/15/2003-10/22/2003 |
| Warm Spring Cr. | State bridge | Yearlong |

**Great Falls Management Area**

Smith River

Population estimates, conducted during the fall of 2003, indicate a continued decline in rainbow trout density in the Smith River and a stable or increasing trend in brown trout density (Figures 7 and 8). In the Eagle Creek section, the 2003 estimate of 170 rainbow trout 8 inches and longer per mile is the second consecutive year of all-time low estimates (since 1969 when monitoring began; Figure 7). Moreover, the estimate is 30% of the long-term average. The 2003 estimated number of 8 inch and longer brown trout in the Eagle Creek section of the Smith River was 480 per mile. This estimate is higher than the long-term average of 380 per mile. In the Deep Creek section of the Smith River, the 2003 rainbow trout estimate (98 rainbow trout 8 inches and longer per mile) was the second lowest recorded since 1970, and was 57% of the long-term average. In 2003, the estimated number of brown trout 8 inches and longer in the Deep Creek section of the Smith River was 396 per mile, or 157% of the long-term average. Stream dewatering and drought conditions have caused the record low numbers of rainbow trout in the Smith River basin. The recent increase in brown trout densities may be related to mild winters.

Water temperature data were collected throughout the Smith River Basin in 2003. Table 7 contains a summary of the data.

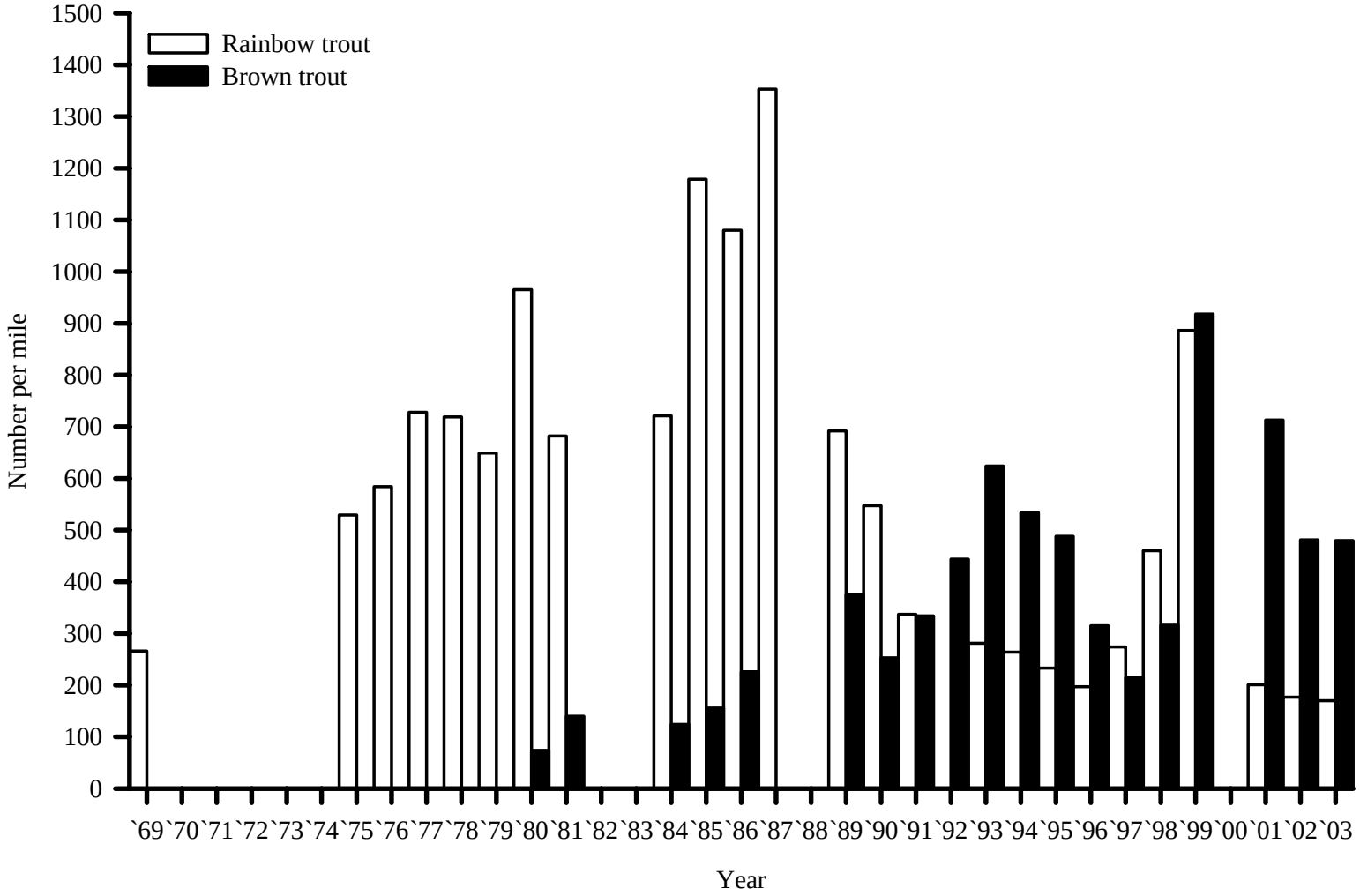


Figure 7. Number of rainbow trout and brown trout 8 inches and longer per mile, in the Eagle Creek section of the Smith River, from 1969 to 2003.

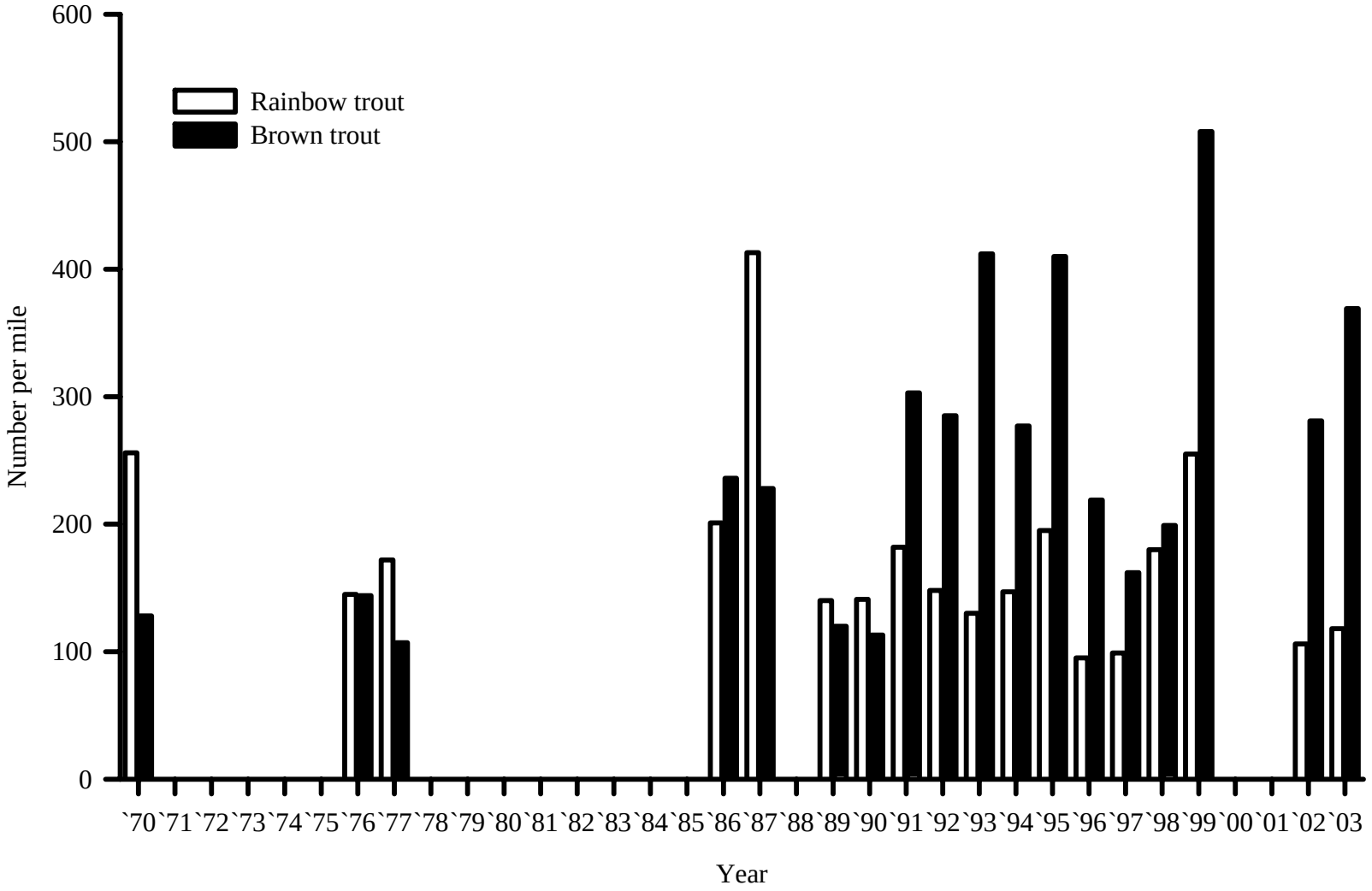


Figure 8. Number of rainbow trout and brown trout 8 inches and longer per mile in the Deep Creek section of the Smith River, from 1970 to 2003.

Table 7. Sampling dates, mean, standard deviation, min, and max temperature recorded by section and month on the Smith River in 2003.

| Section | Dates | | May | Jun | Jul | Aug | Sep | Oct |
|---|---|---|---|---|---|---|---|---|
| North Fork Smith | | | | | | | | |
| | 5 May–24 Sep | Mean | 52.8 | 57.2 | 65.8 | 64.8 | 53.1 | |
| | | SE | 1.02 | 0.87 | 0.48 | 0.47 | 0.95 | |
| | | Min | 40.9 | 47.3 | 54.0 | 53.2 | 41.7 | |
| | | Max | 68.5 | 75.8 | 78.9 | 76.4 | 64.8 | |
| Near Newlan Cr. | | | | | | | | |
| | 5 May–24 Sep | Mean | 51.6 | 55.9 | 66.5 | 65.4 | 53.7 | |
| | | SE | 0.97 | 0.77 | 0.44 | 0.46 | 1.01 | |
| | | Min | 38.3 | 44.2 | 54.0 | 53.1 | 40.6 | |
| | | Max | 69.4 | 75.1 | 77.0 | 77.3 | 67.9 | |
| Near Camp Baker | | | | | | | | |
| | 5 May–24 Sep | Mean | 54.3 | 59.5 | 68.2 | 66.0 | 54.8 | |
| | | SE | 1.11 | 0.82 | 0.46 | 0.42 | 0.97 | |
| | | Min | 41.9 | 48.6 | 54.5 | 55.2 | 43.0 | |
| | | Max | 68.7 | 74.0 | 79.0 | 77.1 | 66.3 | |
| Sheep Creek | | | | | | | | |
| | 5 May–24 Sep | Mean | 45.4 | 52.8 | 67.9 | 64.8 | 51.5 | |
| | | SE | 0.86 | 0.86 | 0.58 | 0.56 | 1.15 | |
| | | Min | 35.7 | 43.9 | 58.7 | 50.0 | 38.8 | |
| | | Max | 57.3 | 57.3 | 76.6 | 76.6 | 67.0 | |
| Mid Canyon | | | | | | | | |
| | 17 June–28 Oct | Mean | | 62.0 | 68.9 | 57.5 | 54.7 | 46.7 |
| | | SE | | 1.42 | 0.53 | 0.48 | 0.96 | 0.65 |
| | | Min | | 49.8 | 57.5 | 56.2 | 41.8 | 35.6 |
| | | Max | | 73.9 | 79.6 | 77.1 | 67.6 | 55.6 |
| Near Deep Cr. | | | | | | | | |
| | 5 May–23 Sep | Mean | 51.7 | 60.4 | 69.3 | 67.8 | 56.1 | |
| | | SE | 1.02 | 0.97 | 0.50 | 0.44 | 1.23 | |
| | | Min | 41.1 | 49.7 | 57.5 | 55.3 | 41.6 | |
| | | Max | 65.2 | 79.0 | 81.6 | 79.7 | 71.6 | |
| Eden Bridge | | | | | | | | |
| | 8 May–28 Oct | Mean | 53.6 | 62.1 | 70.7 | 68.4 | 57.4 | 50.4 |
| | | SE | 1.17 | 1.02 | 0.51 | 0.42 | 0.98 | 0.76 |
| | | Min | 41.5 | 49.3 | 58.8 | 58.5 | 42.1 | 38.1 |
| | | Max | 65.6 | 78.3 | 81.5 | 78.3 | 71.2 | 59.6 |

Missouri River

Brown trout population estimates, conducted in late April and early May, in the Craig section indicated a continued decline in brown trout density (Figure 9). The estimated number of 10 inch and longer brown trout was 503 per mile. Despite the downward trend in brown trout density, the 2003 estimate is 92% of the long-term (1982-2003) average (547 per mile). Overall, 1,661 brown trout were sampled varying from 6- to 23.7-inches long, and the heaviest brown trout sampled was 4.74 pounds. The average length of sampled brown trout was 15.4-inches long, down from 16.7 in 2002 (Horton et al. 2004). Similarly, the average weight of sampled brown trout was 1.25 pounds in 2003 compared to 1.64 pounds in 2002; however, overall relative weight improved from 87.0 in 2002 to 89.5 in 2003, indicating better body condition. The fall 2003 rainbow trout population estimate in the Craig section indicated a continued decline (Figure 9). The estimated number of 10 inch and longer rainbow trout in the Craig section was 3,345 per mile, down from 3,385 in 2002 (Horton et al. 2004); however, the 2003 estimate was 114% of the long-term average. Although there was only a slight decline in density of rainbow trout in the Craig section, a notable change in population size structure was evident. The number of rainbow trout 17 inches and longer was 1,516 per mile, down 35% from the 2002 estimate (Horton et al. 2004). Conversely, the number of rainbow trout 10 to 14 inches long increased from 196 per mile in 2002 to 791 per mile in 2003.

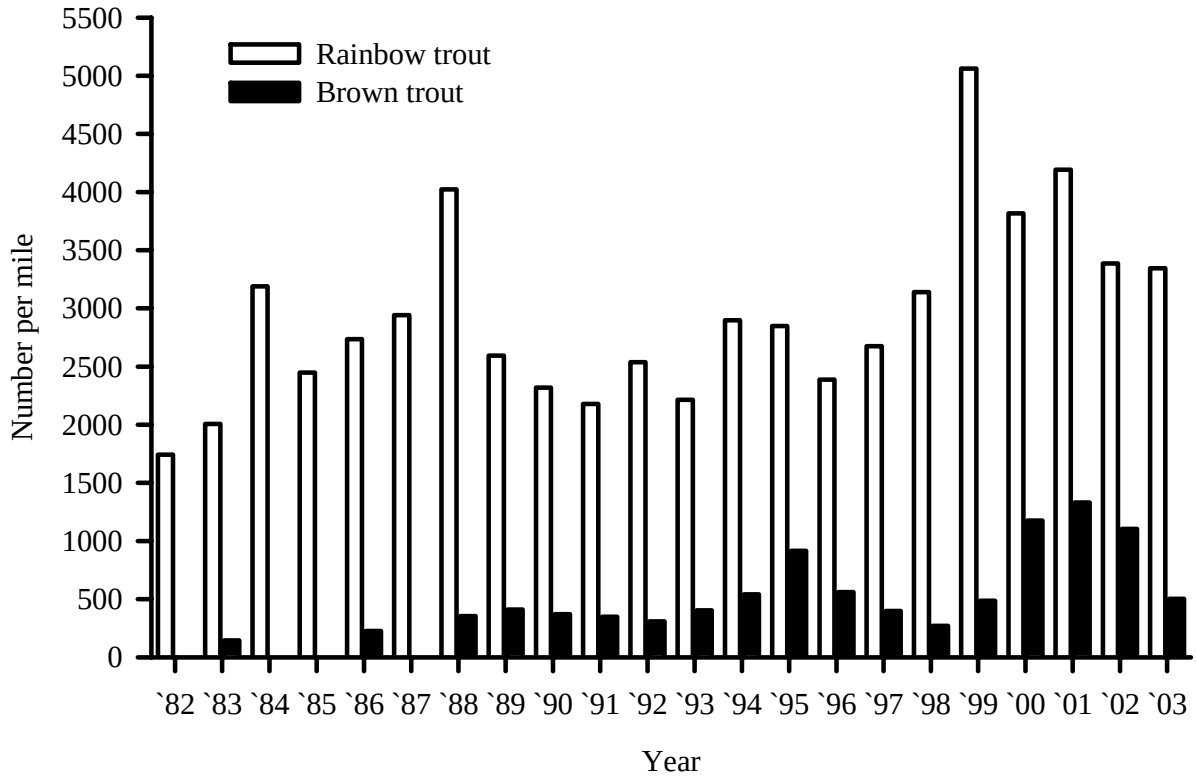


Figure 9. Number of rainbow trout and brown trout 10 inches and longer per mile in the Craig section of the Missouri River, from 1982 to 2003.

The number of age-1 rainbow trout in the Craig section of the Missouri River was below the long-term average for the 5th year in a row (Figure 10). The past five years of low rainbow trout recruitment in the Craig section of the Missouri River is likely related to drought conditions and whirling disease in Little Prickly Pear Creek.

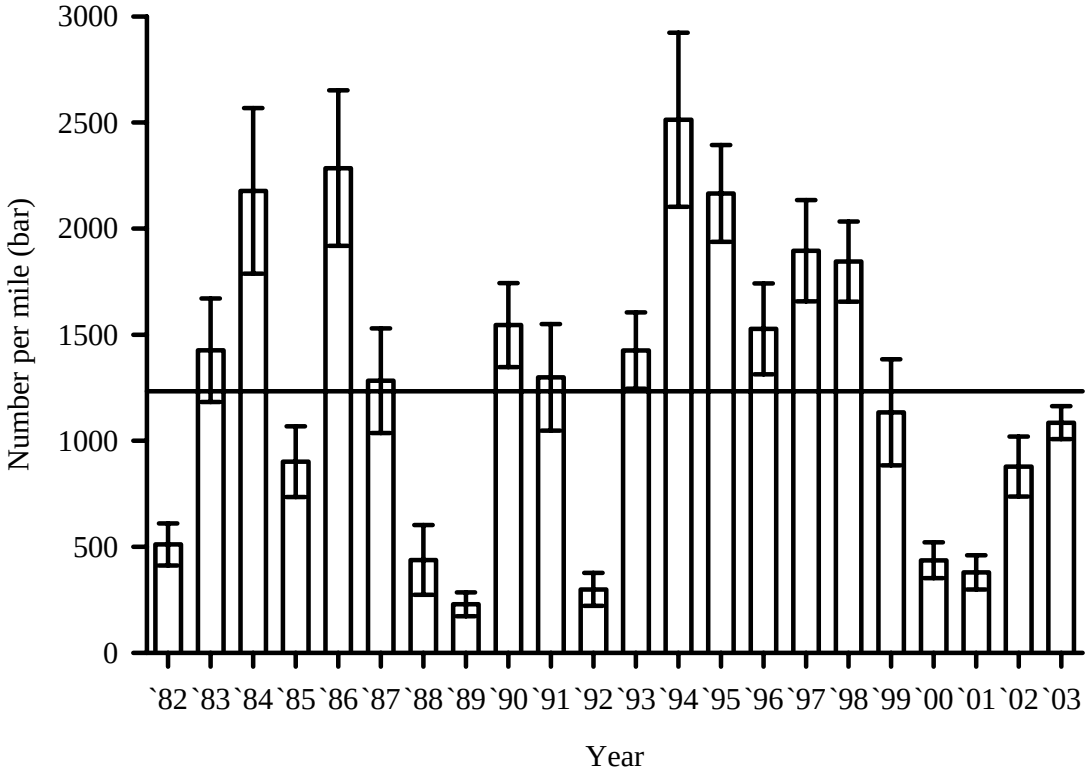


Figure 10. Number of age-1 rainbow trout per mile in the Craig section of the Missouri River, from 1982 to 2003. Horizontal line represents the long-term average. Error bars represent one standard deviation.

Similar to the Craig section, spring brown trout population estimates in the Pelican Point section indicate a continued decline (Figure 11). The 2003 estimate was 73% of the long-term average (299 per mile) in the Pelican Point section. Overall, 447 brown trout were sampled in 2003, varying in length from 6- to 24.3-inches long (average length = 15.4 inches). The heaviest brown trout sampled in 2003 was 4.45 pounds (average weight was 1.36 pounds), and the average relative weight of sampled brown trout was 86.4. Average length in 2003 was 1.2-inches shorter and average weight was 0.27 pounds lighter than in 2002, but relative weight was similar to 2002 (Horton et al. 2004). In 2003, the estimated number of 10 inch and longer rainbow trout was 2,358 per mile (163% of the long-term average; Figure 11). This increase in population density is attributed to the high recruitment of age-1 rainbow trout in 2002 (Figure 12). Historically, recruitment of age-1 rainbow trout has followed similar trends in the upper and lower river, but in 2002 the high recruitment observed in the Pelican Point section was not observed in the Craig section.

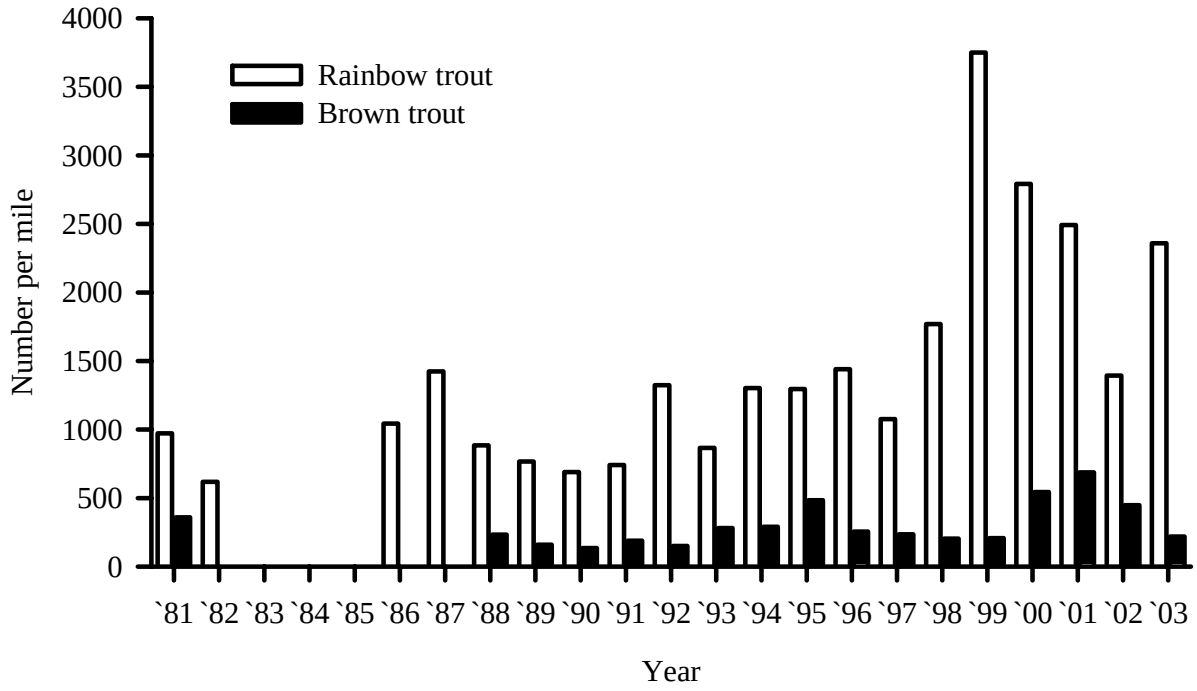


Figure 11. Number of rainbow trout and brown trout 10 inches and longer per mile in the Pelican Point section of the Missouri River, from 1981 to 2003.

Since drought conditions were similar in the upper and lower river tributaries in 2002, the observed difference in recruitment may be due to the effects of whirling disease in the upper river. Overall, 2,263 rainbow trout were sampled in 2003. The average length of sampled rainbow trout was 12.4-inches long (varying from 6.2- to 21.2-inches long) and the average weight was 0.89 pounds (varying from 0.07 to 3.41 pounds). The average length of sampled rainbow trout increased 1.9 inches from 2002 to 2003, but average weigh remained similar (Horton et al. 2004). The average relative weight in 2003 was 93, which was similar to the 2002 sample.

Water temperature was monitored throughout the mainstem river from Holter Dam to the Pelican Point FAS, and in tributaries of the Missouri River. These data area summarized in Table 8.

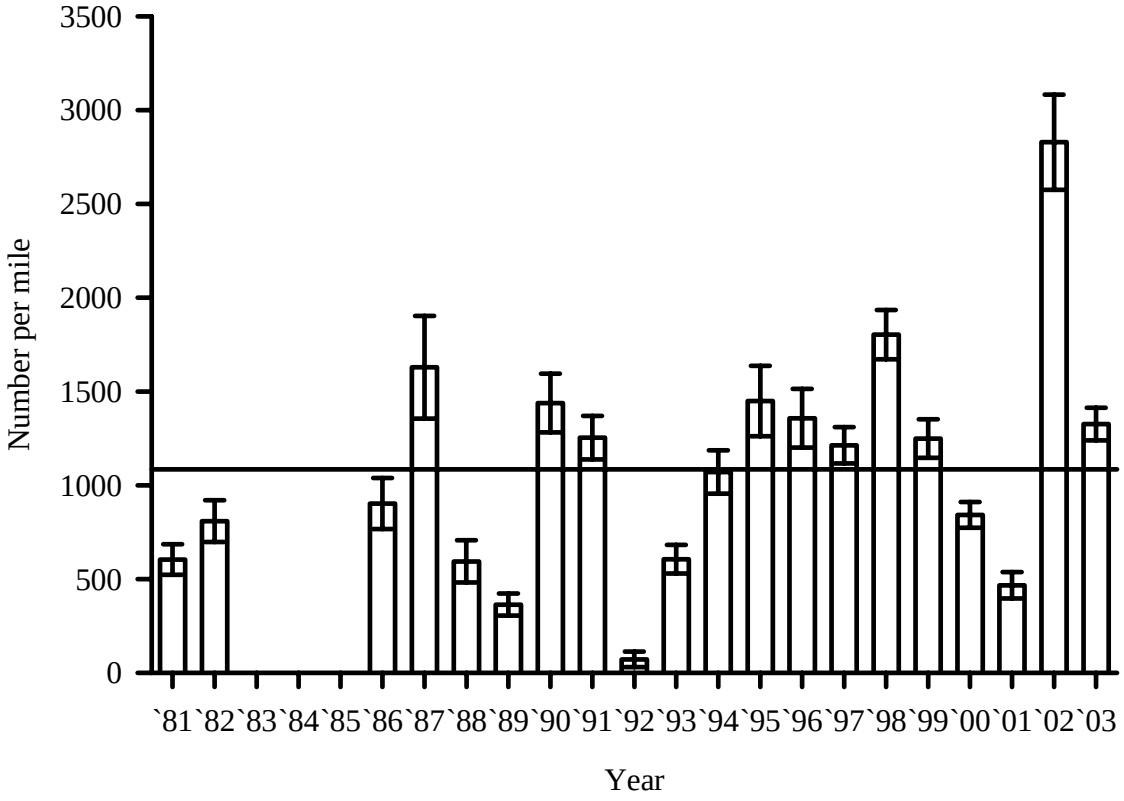


Figure 12. Number of age-1 rainbow trout per mile in the Pelican Point section of the Missouri River, from 1981 to 2003. The horizontal line represents the long-term average. Error bars represent one standard deviation.

Table 8. Mean, standard error, maximum, and minimum water temperatures recorded in 2003 on the Missouri River and tributaries to the Missouri River, by site (sampling time period) and month.

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| **Holter** (30 Apr - 27 Oct) | | | | | | | | | | | | |
| Mean | | | | 45.8 | 49.2 | 56.2 | 61.8 | 65.1 | 61.2 | 55.6 | | |
| SE | | | | - | 0.40 | 0.34 | 0.37 | 0.12 | 0.52 | 0.28 | | |
| Max | | | | 46.1 | 55.9 | 61.2 | 67.0 | 68.2 | 66.4 | 58.1 | | |
| Min | | | | 45.5 | 45.3 | 51.1 | 55.6 | 62.6 | 56.4 | 53.1 | | |
| **Craig** (1 Jan – 31 Dec) | | | | | | | | | | | | |
| Mean | 35.2 | 35.1 | 35.7 | 43.5 | 49.7 | 57.0 | 63.2 | 65.9 | 60.9 | 54.3 | 41.9 | 35.6 |
| SE | 0.1 | 0.1 | 0.27 | 0.63 | 0.46 | 0.38 | 0.41 | 0.13 | 0.56 | 0.48 | 0.52 | 0.27 |
| Max | 36.4 | 36.1 | 41.8 | 52.1 | 57.4 | 64.2 | 71.3 | 71.6 | 69.5 | 60.8 | 48.2 | 39.8 |
| Min | 34.1 | 33.8 | 32.1 | 36.4 | 44.9 | 51.3 | 55.7 | 60.8 | 54.3 | 46.0 | 36.4 | 32.4 |
| **Mid Cannon** (1 Jan – 31 Dec) | | | | | | | | | | | | |
| Mean | 34.1 | 33.9 | 35.9 | 44.3 | 50.4 | 57.8 | 64.1 | 66.4 | 60.9 | 54.1 | 41.4 | 35.2 |
| SE | 0.18 | 0.15 | 0.37 | 0.66 | 0.51 | .042 | 0.41 | 0.16 | 0.59 | 0.52 | 0.54 | 0.29 |
| Max | 37.5 | 36.7 | 42.6 | 53.5 | 58.8 | 65.1 | 71.6 | 70.7 | 68.3 | 59.6 | 47.1 | 39.2 |
| Min | 32.1 | 32.1 | 32.1 | 35.8 | 44.6 | 51.0 | 55.7 | 60.2 | 53.5 | 44.8 | 35.5 | 32.1 |
| **Pelican Point** (30 Apr - 27 Oct) | | | | | | | | | | | | |
| Mean | | | | 47.1 | 50.6 | 58.0 | 64.7 | 66.8 | 60.4 | 54.4 | | |
| SE | | | | - | 0.54 | 0.44 | 0.43 | 0.20 | 0.63 | 0.41 | | |
| Max | | | | 47.1 | 59.1 | 64.8 | 71.0 | 71.0 | 68.0 | 58.5 | | |
| Min | | | | 46.8 | 44.3 | 50.7 | 56.3 | 61.4 | 53.5 | 48.5 | | |

Table 8. Cont.

| Site | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| **Lyons Creek** (30 April – 27 October) | | | | | | | | | | | | |
| Mean | | | | 44.3 | 45.9 | 51.7 | 57.3 | 57.6 | 52.0 | 47.5 | | |
| SE | | | | - | 0.63 | 0.48 | 0.30 | 0.24 | 0.47 | 0.39 | | |
| Max | | | | 45.6 | 60.4 | 64.4 | 67.6 | 66.4 | 61.8 | 55.1 | | |
| Min | | | | 42.8 | 37.7 | 42.2 | 48.3 | 48.9 | 44.2 | 39.1 | | |
| **Wolf Creek** (30 April – 27 October) | | | | | | | | | | | | |
| Mean | | | | 44.1 | 46.4 | 53.1 | 57.6 | 57.9 | 53.4 | 49.9 | | |
| SE | | | | - | 0.70 | 0.46 | 0.24 | 0.19 | 0.41 | 0.37 | | |
| Max | | | | 45.0 | 61.2 | 64.9 | 65.5 | 65.5 | 61.2 | 56.1 | | |
| Min | | | | 43.0 | 38.2 | 44.1 | 49.1 | 49.7 | 15.8 | 42.1 | | |
| **Little Prickly Pear Creek** (1 Jan – 31 Dec) | | | | | | | | | | | | |
| Mean | 34.6 | 34.3 | 36.8 | 45.2 | 50.2 | 57.4 | 61.7 | 61.6 | 54.5 | 48.3 | 36.1 | 34.9 |
| SE | 0.32 | 0.31 | 0.71 | 0.68 | 0.86 | 0.58 | 0.33 | 0.29 | 0.60 | 0.80 | 0.44 | 0.33 |
| Max | 41.9 | 40.8 | 51.4 | 56.4 | 66.1 | 70.8 | 73.5 | 73.5 | 66.4 | 58.0 | 43.3 | 41.3 |
| Min | 32.0 | 32.0 | 32.0 | 33.7 | 41.3 | 47.5 | 53.3 | 51.1 | 44.1 | 32.8 | 32.0 | 32.0 |
| **Dearborn River** (4 May – 27 Oct) | | | | | | | | | | | | |
| Mean | | | | | 48.8 | 57.3 | 67.7 | 66.5 | 55.8 | 48.9 | | |
| SE | | | | | 0.77 | 0.87 | 0.55 | 0.50 | 0.87 | 0.69 | | |
| Max | | | | | 65.7 | 74.3 | 81.6 | 82.2 | 71.9 | 59.7 | | |
| Min | | | | | 38.6 | 45.1 | 54.3 | 52.1 | 41.4 | 35.2 | | |
| **Sheep Creek** (6 May – 27 Oct) | | | | | | | | | | | | |
| Mean | | | | | 50.1 | 58.4 | 65.8 | 65.8 | 56.5 | 50.3 | | |
| SE | | | | | 1.2 | 0.69 | 0.42 | 0.35 | 0.75 | 0.49 | | |
| Max | | | | | 68.1 | 74.1 | 76.2 | 75.6 | 68.1 | 59.4 | | |
| Min | | | | | 39.5 | 46.7 | 55.0 | 55.0 | 46.1 | 40.9 | | |

## HABITAT PROTECTION

In the Lewistown area in 2003, 27 Natural Streambed and Land Preservation Act (310) permits and 4 Stream Protection Act (124) permits were processed. During the reporting period in the Great Falls area, over 50 Natural Streambed and Land Preservation Act (310) and 19 Stream Protection Act (124) permits were processed.

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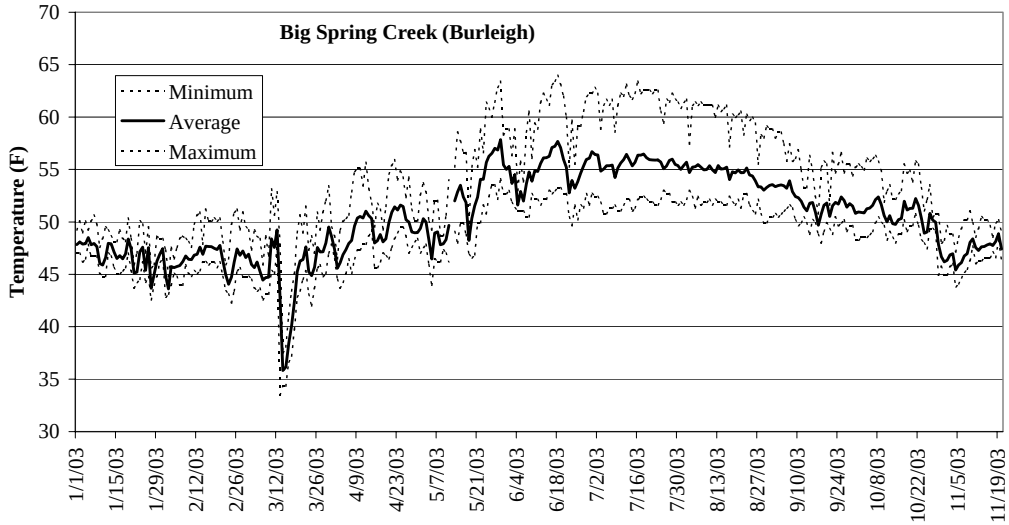
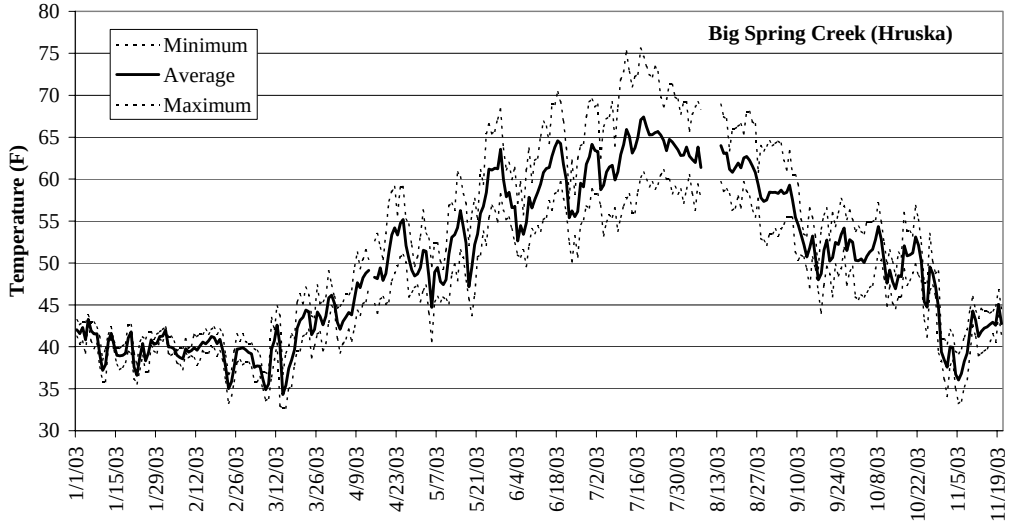
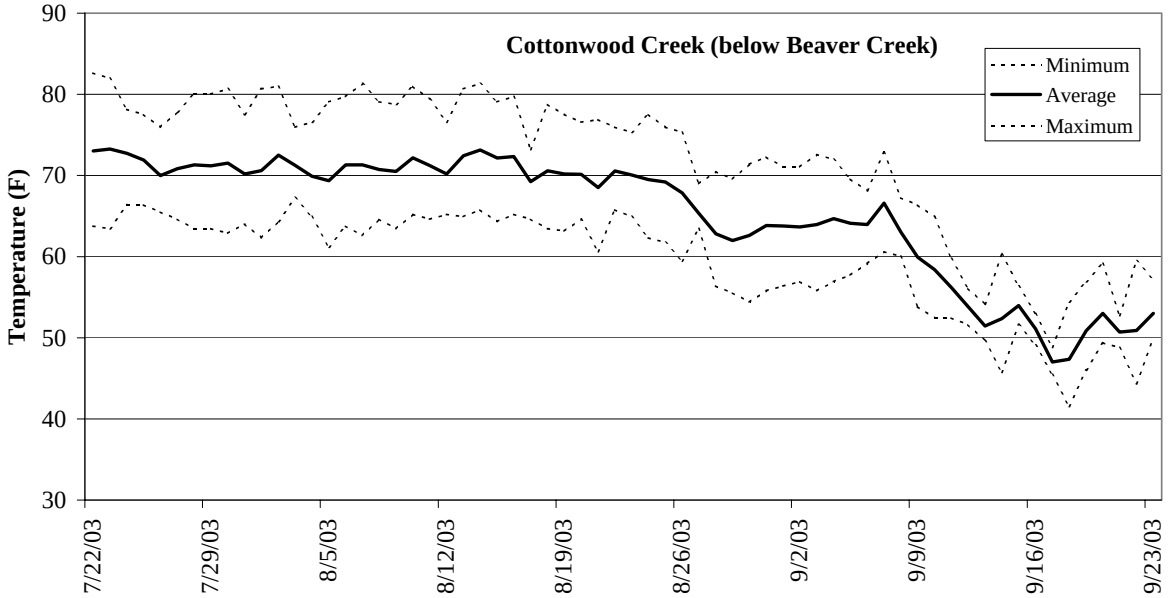
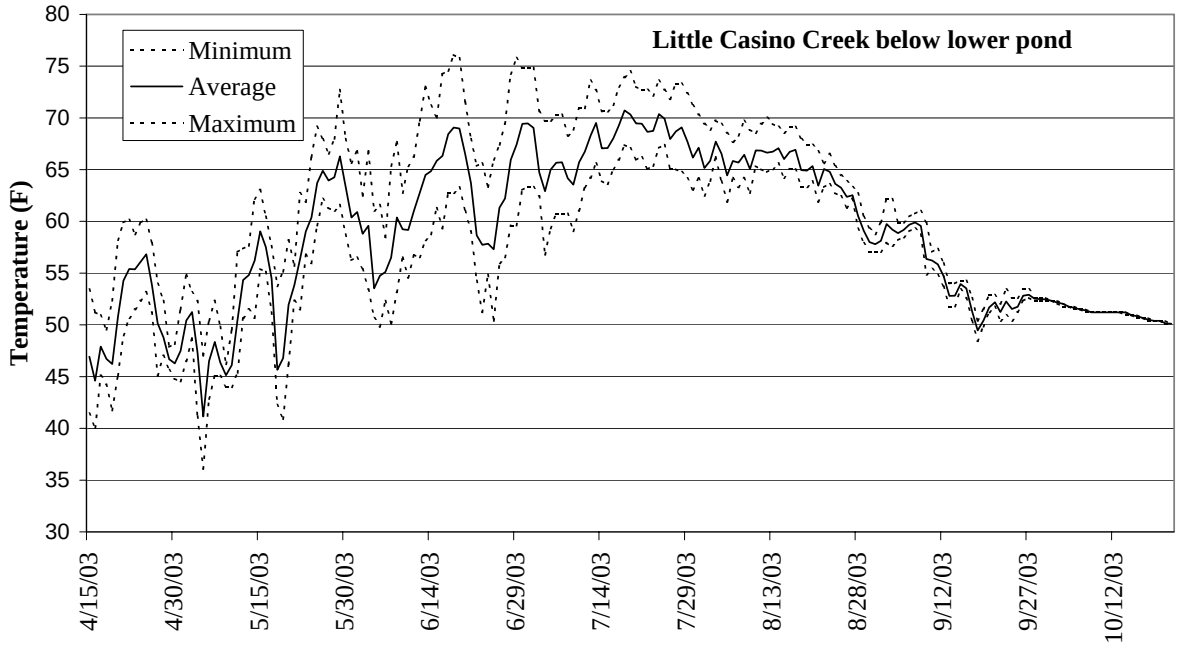
Appendix 1. Temperature measurements taken from Big Spring Creek and two tributaries to Big Spring Creek in 2003.



Appendix 1. Continued.



Appendix 2. Statistics of fish sampled by backpack electrofishing in 2003.

| Water Date (length) | Legal (location) | Species | n | Total length (inches) Min | Max | Avg. |
|---|---|---|---|---|---|---|
| Big Spring Cr. 7/08/03 (1,077 feet) | T15N R18E Sec.23W (Brewery Flats- new section) | Brown trout | 12 | 2.4 | 4.3 | 3.2 |
| | | Longnose dace | 1 | | | 2.0 |
| | | Rainbow trout | 26 | 1.1 | 6.2 | 2.3 |
| | | Yellow perch | 1 | | | 5.9 |
| Big Spring Cr. 7/08/03 (875 feet) | T15N R18E Sec.9 NE (Carroll Trail) | Brown trout | 17 | 2.5 | 3.5 | 3.0 |
| | | Rainbow trout | 3 | 2.1 | 4.1 | 3.0 |
| | | Northern redbelly dace | 1 | | | 2.4 |
| | | Longnose dace | 1 | | | |
| | | Longnose sucker | 2 | 3.4 | 3.5 | 3.4 |
| | | White sucker | 6 | 3.1 | 4.6 | 3.9 |
| Little Casino Cr 6/3/03 (690 feet) | T15N R18E S22NW Robson Park | Fathead minnow* | 32 | 1.0 | 2.3 | 1.7 |
| | | Longnose dace | 10 | 2.8 | 4.0 | 3.2 |
| | | Northern redbelly dace | 3 | 2.0 | 2.2 | 2.1 |
| | | White sucker* | 168 | 2.0 | 11.4 | 5.9 |
| Spring Creek 9/11/03 (600 feet) (Musselshell) | T10N R10E S21NE Below Whitetail Creek | Brook trout | 208 | 2.3 | 8.5 | 3.9 |
| | | Sculpin* | 32 | 1.4 | 5.0 | 3.7 |

*Sub-sample measured

## Principal Fish Species Involved

Longnose sucker *Catostomus catostomus*
White sucker *Catostomus commersoni*
Mountain sucker Catostomus *platyrhynchus*
Northern redbelly dace *Phoxinus eos*
Longnose dace Rhinichthys *cataractae*
Northern redbelly x finescale dace hybrid Phoxinus *eos x P. neogaeus*
Rainbow trout Oncorhynchus mykiss
Westslope cutthroat trout *Oncorhynchus clarki lewisi*,
Brown trout *Salmo trutta*,
Eastern brook trout *Salvelinus fontinalis*
Mountain whitefish *Prosopium williamsoni*
Mottled sculpin *Cottus bairdi*.

## Code Numbers of Waters Referred to in this Report

Code numbers of Waters Referred to in Report

| | |
|---|---|
| 16-0310 | Big Spring Creek, Sec 2 |
| 16-900 | Cottonwood Creek |
| 16-1820 | Judith River, section 2 |
| 16-1965 | Little Casino Creek |
| 16-3520 | South Fork Judith |
| 16-3920 | Warm Spring Creek |
| 18-5820 | Spring Creek |
| 17-4896 | Missouri River from Cascade, MT bridge to Holter Dam |
| 17-5200 | Newlan Creek |
| 17-6832 | Smith River from Hound Creek to Camp Baker |