Montana Fish, Wildlife & Parks

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Great Falls Management Area Fisheries Progress Report


2004 Annual Report

by

Travis B. Horton and Paul D. Hamlin

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

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ABSTRACT

A new section of Belt Creek was sampled in 2004, within Sluice Boxes State Park. The estimated number of rainbow trout 8 inches and longer per mile was 356. Brown trout and mountain whitefish were sampled, but population estimates were not calculated due to low sample sizes and poor recapture efficiencies. The Eagle Creek and Deep Creek sections of the Smith River were sampled in 2004. The estimated number of 8 inch and longer rainbow trout and brown trout in the Eagle Creek section was 365 and 273 per mile, respectively. In the Deep Creek section, the estimated number of 8 inch and longer rainbow trout and brown trout was 115 and 413 per mile, respectively. Water temperature was monitored throughout the Smith River basin in 2004. Mean water temperatures were the highest in July, and gradually increased downstream. In 2004, rainbow trout numbers declined again (to 88% of the long-term average) in the Craig section of the Missouri River. The number of large (17 inches and longer) rainbow trout has been declining since 2001; however, the estimate is still at 115% of the long-term average. Recruitment of age-1 rainbow trout to the Craig section was below the long-term average for the 6th year in a row. Rainbow trout declines in the Craig section are likely due to the effects of drought and whirling disease. The 2004 estimated number of 10 inch and longer brown trout in the Craig section was 118% of the long-term average. Mountain whitefish were sampled in the upper 1.75 miles of the Craig section in 2004, but a population estimate was not calculated due to poor recapture efficiencies and low sample size. The average number of mountain whitefish sampled was 102.6 per pass, and large individuals dominated the sample. Rainbow trout and brown trout population trends were similar in the Pelican Point section of the Missouri River. In general, rainbow trout populations continued to decline, and the brown trout population increased slightly. The estimated number of rainbow trout and brown trout was 132% and 157% of the long-term average, respectively. In August 2004, sampling was conducted in the Missouri River to document species composition and the relative abundance of macroinvertebrates in light of the recent introduction of New Zealand mudsnails *Potamopyrgus antipodarum* in the upper river. Water temperature was monitored throughout the Missouri River and its tributaries.

In April 2004, trap nets were fished in Pelican Point Pond #1. Yellow perch were the most abundant of the 5 species sampled. White suckers were sampled for the first time in 2004. Nighttime electrofishing was conducted on two dates in June. Pumpkinseed sunfish, yellow perch, and largemouth bass were the most commonly sampled species. Yellow perch and largemouth bass sampled by trap netting and electrofishing were transferred to the two neighboring Hendrickson Ponds. Stock density indices calculated for fish sampled in Pelican Point Pond #1 indicated that size structure in the largemouth bass, yellow perch, and pumpkinseed sunfish populations is poor. Trap netting conducted in April on Wadsworth Pond indicated that the density of white suckers had been reduced during the 2003 sucker removal experiment. Catch rates of white suckers were down, but yellow perch increased to an all-time high. Overall, the size of sampled white suckers and yellow perch increased from 2003 to 2004. Seven fish species were sampled with seines on Wadsworth Pond in June 2004. The average catch rate of walleye and common carp increased in 2004 (compared to 2002), but the catch rates of pumpkinseed sunfish and yellow perch declined.

Gill net and angling surveys were conducted on Upper Baldy Lake and Edith Lake (Big Belt Mountains, Smith River Drainage) in 2004. Westslope cutthroat trout and Yellowstone cutthroat trout were sampled in both lakes. Rainbow trout catch rates in Newlan Creek Reservoir gill nets were similar in 2004 compared to 2003, but the average size of sampled rainbow trout increased. Five species of fish were sampled in Newlan Creek Reservoir in 2004, and longnose suckers were the most commonly sampled species. Rainbow trout catch rates in Smith River Reservoir gill nets declined in 2004 to 40% of the long-term average, but average length was similar to the 2003 sample. Burbot catch rates were 288% of the long-term average, and burbot were the second most commonly sampled fish species. Catch rates of longnose suckers and white suckers were below the long-term average. Sampling was conducted in Lanning Reservoir and Phantom Coulee Reservoir in 2004, to evaluate stocking of rainbow trout in 2003. No fish were sampled in Lanning Reservoir, but 43 rainbow trout were sampled in Phantom Coulee Reservoir.

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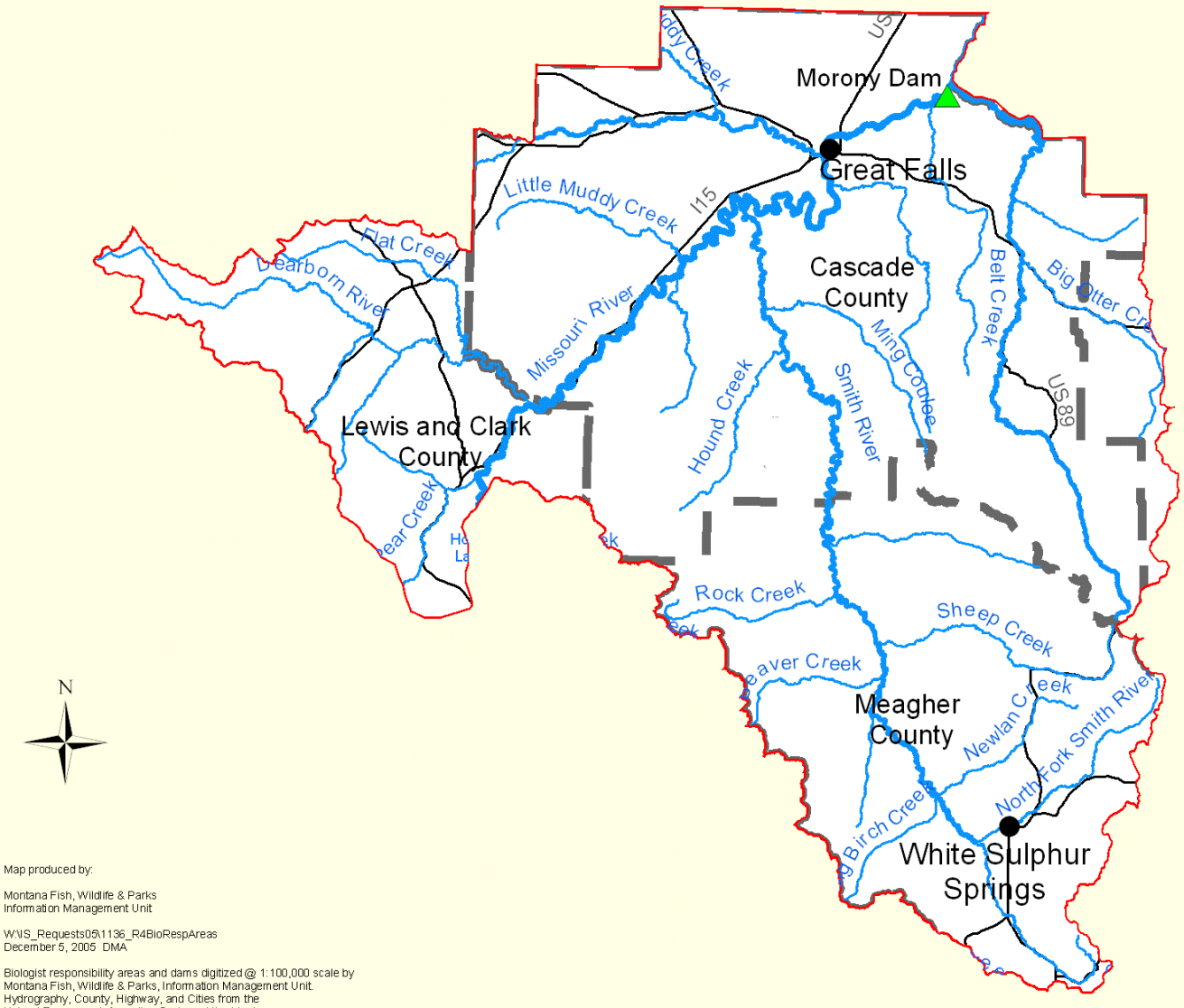

Biologist Responsibility Area
County
Stream
Lake
City
Highway
Dams

Map produced by:

Montana Fish, Wildlife & Parks
Information Management Unit

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December 5, 2005 DMA

Biologist responsibility areas and dams digitized @ 1:100,000 scale by Montana Fish, Wildlife & Parks, Information Management Unit.
Hydrography, County, Highway, and Cities from the Natural Resources Information System at the Montana State Library, Helena, Montana; digitized at 1:100,000 scale.
Biologist responsibility areas last reviewed by Montana Fish, Wildlife & Parks Fisheries Managers in 2004.

OBJECTIVES

The purpose of this project is to implement the Fisheries Program in the Great Falls Management Area in Northcentral Montana. Major watersheds include the Missouri, Little Prickly Pear, Dearborn, Smith, and Belt Creek drainages.

The mission of the Fisheries Division of the Montana 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

Coldwater Stream Ecosystems

In 2004, a new section was electrofished within Sluice Boxes State Park on Belt Creek. The electrofishing boat was launched from private land, just upstream from the Logging Creek Bridge. The section started approximately 0.5-miles downstream (start NAD83 coordinates N47.14207 W110.94443) from the Logging Creek Bridge and continued for 1.5 miles (end NAD83 coordinates N47.15688 W110.95657). Equipment was taken out through private land, and the boat was loaded over the bank just downstream from the end of the electrofishing section (take out NAD83 coordinates N47.15813 W110.95520). Fish populations in the Eagle Creek and Deep Creek sections of the Smith River and on Belt Creek were sampled using a drift boat equipped with a mobile electrode and a Coffelt VVP-15 or Mark XXII-M to rectify AC to straight DC. In 2004, two sections of the Missouri River downstream from Holter Dam [Craig section (rm 2.5 to 8.1) and the Pelican Point section (rm 24.2 to 28.3)] were electrofished at night using aluminum jet boats. 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 pulsed or straight DC using Coffelt rectifying units. Population estimates for brown trout and mountain whitefish (mountain whitefish were only sampled in the first 1.75 miles of the Craig section) were conducted during the spring (April and May), and rainbow trout estimates were conducted in the fall (September and October). On 2 July 2004, fish were sampled by daytime electrofishing in the Missouri River near Great Falls. The section encompassed 2.5 miles of the Missouri River, ending at the mouth of Sand Coulee Creek. Only part of the area was electrofished. The objective of this sampling was to determine species composition in the area. Electrofishing was conducted with an aluminum jet boat equipped with fixed booms and stainless steel droppers suspended in front of the bow. Electricity from a 240-volt portable generator was converted to pulsed or straight DC using Coffelt rectifying units. Initially, straight DC (100 volts 5 – 7 amps) was used, but most (78%) of the sampling was conducted with pulsed DC (200 volts and 25-30 amps) due to improved efficiency. Total shocking time was 3,226 seconds. All population estimates were calculated using the log-likelihood method (FA+ Program; MFWP 2004), which generates recapture efficiency curves for discrete length groups. All sampled fish 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 length 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.

On 20 August 2004, sampling was conducted in the Missouri River to document species composition and the relative abundance of macroinvertebrates in light of the recent introduction of New Zealand mudsnails *Potamopyrgus antipodarum* in the upper river. Two sites were selected, one in the Craig section and one in the Pelican Point section of the Missouri River. A modified kick-net procedure described by Hauer et al. (1991) was used to obtain 5 samples per site. To better characterize the benthic fauna, sampling effort was partitioned among wade-able habitats at each site. Four samples were stratified by depth (shallow/deep) and water velocity (slow/fast). The fifth sample was taken from the most abundant (average) habitat type at the site.

Water depth and velocity were measured and substrate composition was estimated at each sampling location. A sampling grid (delineating 0.25 m^2) was randomly placed on the stream bed in the selected habitat. A large rectangular net (50 cm wide by 20 cm tall; mesh 800 x 900 microns) was held immediately downstream from the grid. Cobbles were hand scrubbed and smaller sediments were mechanically agitated. The contents of the net (macroinvertebrates, vegetation, sediment and debris) were preserved in 90% ETOH.

Invertebrate sampling on the Missouri River near the Wolf Creek Fishing Access Site

Initially in the laboratory, a subsample consisting of approximately 300 organisms was obtained using Rapid Bioassessment Protocol (RBP) III techniques (Plafkin et al. 1989). The sample was placed in a US. Standard #30 sieve and rinsed with water. For small samples (< 0.5 liters), the entire sample was evenly distributed in a gridded enamel pan. Depending on sample volume, pan size was either 9 x 12 inches or 14 x 20 inches. All macroinvertebrates in a randomly selected grid square were counted and placed in a vial for later identification. This process was repeated until 270 to 330 macroinvertebrates had been picked. The total number of organisms in the sample was estimated from the percentage of sample used to obtain the subsample (i.e., the proportion of grids counted). For larger samples, a small portion (30 to 50 ml) of the sample was placed in the gridded pan. All macroinvertebrates in two randomly selected grids were counted and placed in a vial for later identification. This procedure was repeated until the entire sample had been processed; however, only the first ~300 organisms removed comprised the subsample used to calculate

metrics. A qualitative examination of the entire sample was then conducted to find any unique or un-represented taxa; however, these organisms were retained in a separate vial. These organisms were identified and included on the site taxa list and in the estimated taxa richness for the entire sample. All New Zealand mudsnails in the sample were counted. Macroinvertebrates were identified to taxonomic levels specified by Bukantis (1996) and enumerated. Dan McGuire (a ecological consultant) conducted all laboratory invertebrate work and assisted with invertebrate field sampling.

Warmwater Lake Ecosystems

On 7, 8, and 9 April 2004, two 1-inch mesh trap nets were fished overnight on Pelican Point Pond #1 (the big pond to the south). On 10 and 17 June 2004, nighttime electrofishing was conducted on Pelican Point Pond #1 using an aluminum jet boat. The boat was equipped with headlights and fixed booms with stainless steel droppers suspended in front of the bow. Electricity from 240-volt portable generator was converted to pulsed or straight DC using a Coffelt rectifying unit. On 20, 21, and 22 April 2004, one 3/8-inch mesh and three 1-inch mesh trap nets were fished overnight on Wadsworth Pond. On 30 June 2004, Wadsworth Pond was sampled using a 100- x 10-foot beach seine with 0.25-inch mesh. Sampled fish were identified, measured to the nearest 0.1 inch, and weighed to the nearest 0.01 pound. Relative weight equations were obtained from Blackwell (2000). Proportional stock density (PSD) and relative stock density (RSD-P) values for preferred size fish (Anderson and Newman 1996) were calculated for largemouth bass, pumpkinseed, and yellow perch based on length categories proposed by Gablehouse (1984).

Seining Wadsworth Pond

Coldwater Lake Ecosystems

On 4 Aug 2004 and 5 Aug 2004, one 125-foot monofilament experimental sinking gill net was fished overnight in Upper Baldy and Edith lakes, in the upper Smith River Basin, respectively. Nets were set using a float tube. Standardized angling was also conducted at Upper Baldy and Edith lakes using artificial lures and flies. All sampled fish were identified, counted, measured to the nearest mm (later lengths were converted to the nearest 0.1 inch). On 3 November 2004, two (one floating and one sinking) 125-foot multifilament experimental gill nets were fished overnight on Newlan Creek and Smith River reservoirs. On 17 May 2004 and 20 May 2004, one multifilament experimental gill net was fishbvged overnight on Lanning and Phantom Coulee reservoirs, respectively. All sampled fish were identified, counted, measured to the nearest 0.1 inch, and weighed to the nearest 0.01 pound.

Setting a gill net on Grace Lake

RESULTS AND DISCUSSION

Coldwater Stream Ecosystems

Belt Creek

Overall 290 rainbow trout were sampled in the Sluice Boxes section of Belt Creek. The mean length of sampled rainbow trout was 10.3-inches long (varying from 6- to 16.9-inches long). The mean weight of sampled rainbow trout was 0.58 pounds, and mean relative weight was 94. The estimated number of rainbow trout 8 inches and longer per mile was 356. A total of 101 mountain whitefish were sampled varying from 7.4- to 18.1-inches long (mean length = 14.9 inches). The heaviest mountain whitefish sampled was 2.34 pounds (mean weight = 1.32 pounds), and mean relative weight was 106. Only 61 brown trout were sampled. The mean length of sampled brown trout was 15.5-inches long (varying from 7.2- to 22.4-inches long). The heaviest brown trout sampled weighed 4.12 pounds, and mean relative weight was 99.4. Population estimates were not calculated for mountain whitefish or brown trout due to low sample sizes and poor recapture efficiencies.

Smith River

The 2004 estimated number of rainbow trout 8 inches and longer per mile was 365 in the Eagle Creek section (Figure 1). The number of rainbow trout per mile decreased steadily from 1999 through 2003, but began to recover in 2004. Although the rainbow trout estimate is higher compared to the record lows experienced over the past two years (Horton and Tews 2005), the estimate is only 65% of the long-term average. The increased number of rainbow trout was primarily due to the strong 2003 cohort. Overall, 491 rainbow trout were sampled in the Eagle Creek section varying from 6.1- to 16.5-inches long (mean length = 10.0 inches). The heaviest rainbow trout sampled weighed 1.58 pounds (mean weight was 0.55 pounds), and mean relative weight was 98.1. The estimated number of brown trout in the Eagle Creek section decreased from 2003 to 2004 (Figure 1). The 2004 brown trout estimate was 273, 8 inch and longer brown trout per mile, which is 73% of the long-term average. The mean length was 13.3-inches long (varying from 6.7-to 20.9-inches long). The heaviest brown trout sampled was 3.62 pounds, and mean weight was 1.02 pounds. The relative weight of sampled brown trout was 95.7. In the Deep Creek section, the rainbow trout estimate was 115, 8 inches and longer per mile, which was only 68% of the long-term average (Figure 2). Mean length of sampled rainbow trout was 11.3-inches long (varying from 6.2- to 17.1-inches long). The heaviest rainbow trout was 1.87 pounds (mean weight = 0.63 pounds), and relative weight was 97.3.

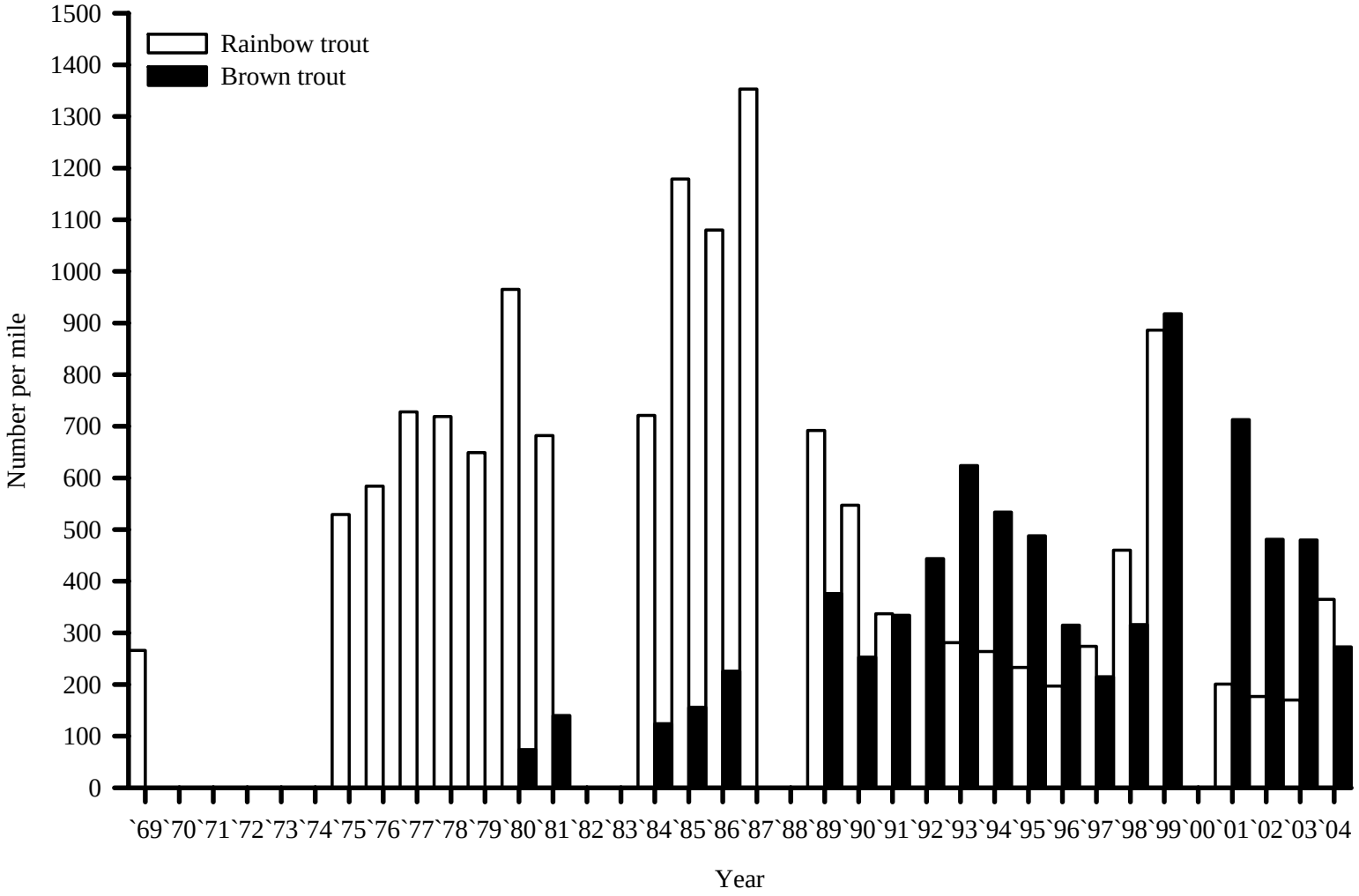

Figure 1. Number of rainbow trout and brown trout 8 inches and longer per mile, in the Eagle Creek section of the Smith River, from 1969 to 2004.

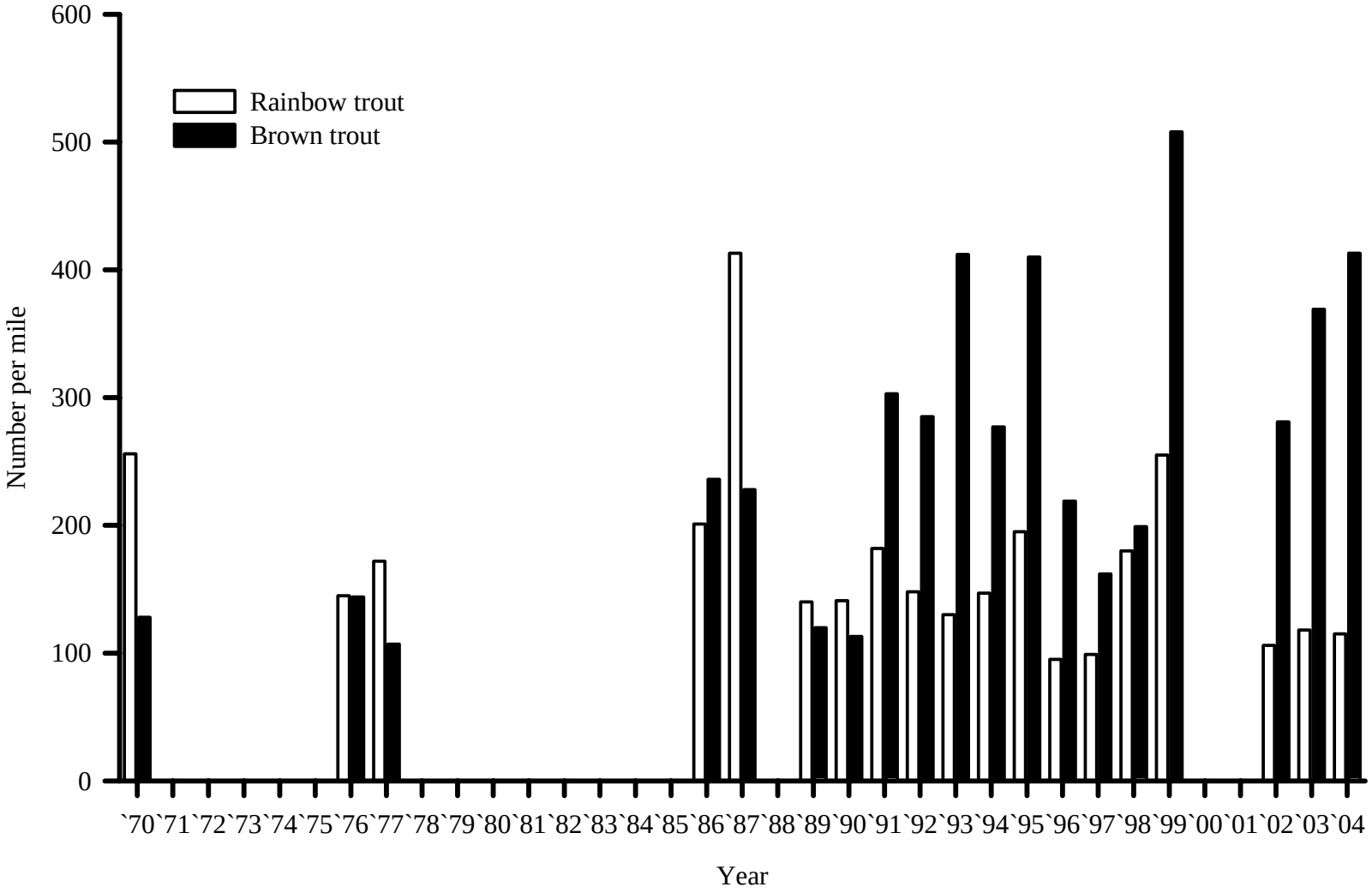

Figure 2. Number of rainbow trout and brown trout 8 inches and longer per mile, in the Deep Creek section of the Smith River, from 1970 to 2004.

The estimated number of 8 inch and longer brown trout in the Deep Creek section was 413 per mile in 2004 (160 % of the long-term average; Figure 2). The mean length of sampled brown trout was 12.3-inches long and varied from 6.6- to 20.2-inches long. The heaviest brown trout sampled in the Deep Creek section in 2004 weighed 3.04 pounds (mean weight was 0.81 pounds), and relative weight was 93.8.

Water temperature was monitored throughout the mainstem Smith River and in several tributaries during 2004. Mean monthly water temperatures were highest during July, and gradually increased downstream (Table 1).

Missouri River

In the Craig section of the Missouri River, rainbow trout 10 inches and longer declined to 2,569 per mile in 2004 (Figure 3). This estimate is 88% of the long-term average for rainbow trout. Declines in the rainbow trout population are likely due to the extended drought and the effects of whirling disease. Overall, 3,885 rainbow trout were sampled varying from 6- to 22.1-inches long (mean 15.9-inches long). The heaviest rainbow trout weighed 3.52 pounds (mean weight was 1.14 pounds), and mean relative weight was 93.8. The size structure of rainbow trout in the Craig section continues to change. In 2001, the number of rainbow trout 17 inches and longer per mile reached an all-time-high of 2,497 per mile. In the past three years the number of 17 inches and longer rainbow trout has declined each year. In 2004, there were 908 rainbow trout 17 inches and longer per mile in the Craig section. Despite the precipitous decline in large fish over the past 3 years, the 2004 estimate of this size group is 115% of the long-term average. The number of age-1 rainbow trout in the Craig section of the Missouri River was below the long-term average for the 6th year in a row in 2004 (Figure 4). The past six years of low rainbow trout recruitment in the Craig section of the Missouri River is likely related to drought conditions and the effects of whirling disease in Little Prickly Pear Creek. The 2004 estimate for brown trout 10 inches and longer per mile was 651 (Figure 3). This estimate is 118% of the long-term average for brown trout in the Craig section. Over the past 20 years, the brown trout population has been slowly increasing. This trend is likely due to mild winters, which improve survival of incubating brown trout eggs in stream substrates, and changes in harvest regulations. During the 2004 estimate, 1,589 brown trout were sampled varying from 6- to 23.9-inches long (mean length was 15.2-inches long). The heaviest brown trout sampled was 4.38 pounds (mean weight was 1.44 pounds), and relative weight of sampled brown trout averaged 89.8. Although mountain whitefish were sampled during the spring of 2004, calculation of a reliable population estimate was not possible using the log-likelihood estimator, due to low sample sizes and poor recapture efficiencies. Therefore only catch per unit effort (CPUE) will be reported. Mountain whitefish were sampled during a total of 8 (1.75-mile long) passes (4 on each bank). Overall, 821 mountain whitefish were sampled (mean CPUE = 102.6 (SE 18.9) per pass) varying from 6.5- to 20.3-inches long (mean length = 16.3-inches long). The mountain whitefish sample was skewed toward larger fish. For example, 95.6% of sampled mountain whitefish were 14-inches long or longer. The heaviest mountain whitefish weighed 2.8 pounds, and mean weight of all sampled mountain whitefish was 1.52 pounds. Mean relative weight of the sampled mountain whitefish was 99.7, indicating good body condition.

Table 1. Sampling dates, mean, standard deviation, minimum, and maximum water temperatures recorded, by site and month on the Smith River in 2004.

Section	Dates		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
North Fork Smith										
	20 Apr–27 Sep	Mean	49.9	51.4	56.5	63.4	59.7	52.1		
		SE	0.94	0.88	1.00	0.63	0.65	0.62		
		Min	36.4	35.3	45.4	52.1	50.4	43.4		
		Max	65.3	68.2	72.4	80.5	73.3	61.9		
Near Newlan Cr.										
	20 Apr–27 Sep	Mean	48.4	49.5	54.1	62.4	61.3	52.3		
		SE	0.91	0.81	0.73	0.68	0.75	0.71		
		Min	35.2	34.1	43.1	49.0	49.2	40.9		
		Max	62.7	65.3	68.5	79.5	74.5	65.0		
Near Camp Baker										
	20 Apr–28 Sep	Mean	50.7	52.5	58.4	65.9	62.2	53.8		
		SE	0.74	0.84	0.86	0.58	0.76	0.69		
		Min	40.5	38.8	48.3	54.4	50.2	43.3		
		Max	61.4	65.2	71.0	79.0	73.4	65.2		
Sheep Creek										
	20 Apr–27 Sep	Mean	43.0	44.7	51.1	61.7	59.0	50.0		
		SE	0.63	0.54	0.80	0.56	0.76	0.71		
		Min	35.2	36.0	40.8	49.7	46.9	38.6		
		Max	50.9	53.1	65.0	74.4	71.1	63.2		
Mid Canyon										
	24 June–9 Nov	Mean			62.0	66.1	62.7	54.1	44.1	37.9
		SE			0.95	0.58	0.79	0.72	0.86	0.73
		Min			56.2	54.9	50.4	43.2	34.2	32.7
		Max			68.8	77.1	73.2	66.9	53.6	43.2
Near Deep Cr.										
	5 May–31 Jul	Mean		49.1	56.3	66.8				
		SE		0.72	0.89	0.55				
		Min		39.1	46.4	55.3				
		Max		57.8	71.6	79.4				
Eden Bridge										
	6 May–23 Nov	Mean		50.7	57.7	68.6	65.3	56.3	45.8	37.3
		SE		0.81	0.94	0.61	0.86	0.71	1.02	0.68
		Min		38.7	48.7	56.5	52.4	43.7	34.7	31.8
		Max		61.3	74.5	82.1	78.0	70.9	57.4	46.0

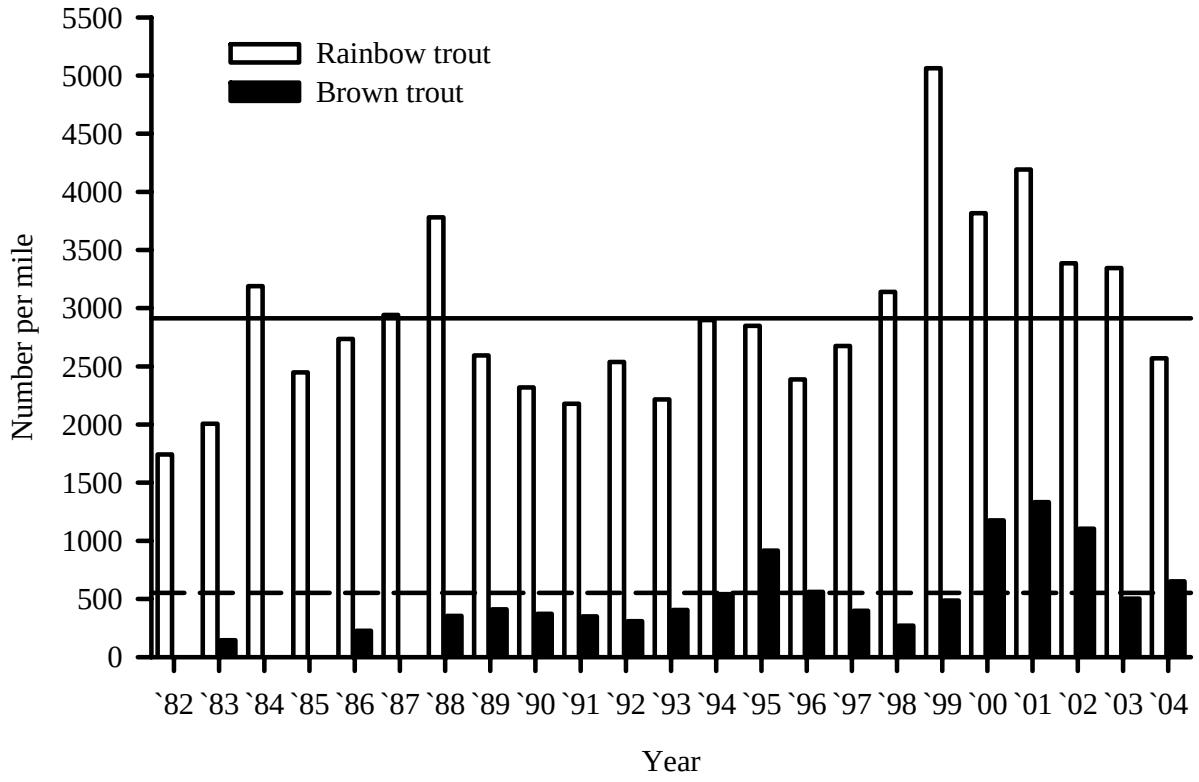

Figure 3. Number of rainbow trout and brown trout 10 inches and longer per mile in the Craig section of the Missouri River, from 1982 to 2004. The solid horizontal line and the dashed horizontal line represent the 1982-2004 average for rainbow trout and brown trout, respectively.

Rainbow trout and brown trout population trends were similar in the Pelican Point section compared to the Craig section (Figures 3 and 5) during 2004. The 2004 estimated number of rainbow trout 10 inches and longer per mile was 1,911 (132% of the long-term average) in the Pelican Point section. During the 2004 rainbow trout estimate in the Pelican Point section, 2,790 rainbow trout were sampled varying from 6- to 21.0-inches long. The heaviest rainbow trout sampled was 3.2 pounds (the mean weight was 0.99 pounds), and the mean relative weight was 89.5. The estimated number of age-1 rainbow trout was above average, despite drought conditions (Figure 6). The 2004 estimated number of brown trout 10 inches and longer per mile was 468 (157% of the long-term average) in the Pelican Point section. During the 2004 estimate, 585 brown trout were sampled varying from 6- to 23.6-inches long (mean length was 14.7-inches long). The heaviest brown trout sampled weighted 4.79 pounds (mean weight was 1.34 pounds), and relative weight was 90.5.

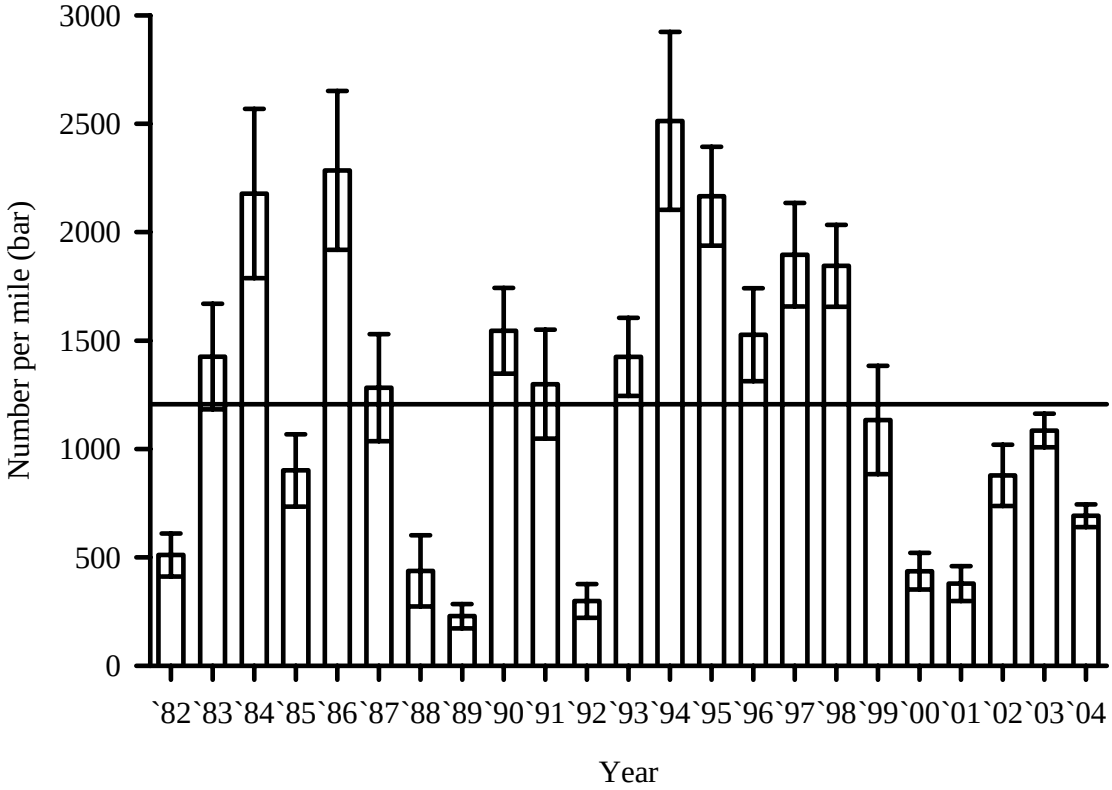

Figure 4. Number of age-1 rainbow trout per mile in the Craig section of the Missouri River, from 1982 to 2004. Horizontal line represents the long-term average. Error bars represent one standard deviation.

Water temperature was recorded throughout the Missouri River and its major tributaries during 2004. These data are summarized in Table 2.

Macroinvertebrate samples taken in August 2004 were used to document species composition and relative abundance of macroinvertebrates in the upper (Craig section) and lower (Pelican Point section) Missouri River. These data have become increasingly important due to the established (first documented in 2002) population of New Zealand mudsnails (NZMS) near the Wolf Creek Bridge Fishing Access Site. These data will be used in the future to help understand the impact of NZMS in the Missouri River. Differences in invertebrate species composition were evident when comparing the two sections (Appendix 1 & 2). In the Craig section, the samples were represented more by Dipterans and Crustaceans compared to samples from the Pelican Point section (Appendix 1 & 2). Conversely in the Pelican Point section, samples contained more Ephemeropterans, Trichopterans, and Plecopterans, than in the Craig section. New Zealand mudsnails were sampled in the Craig section, but not in the Pelican Point section.

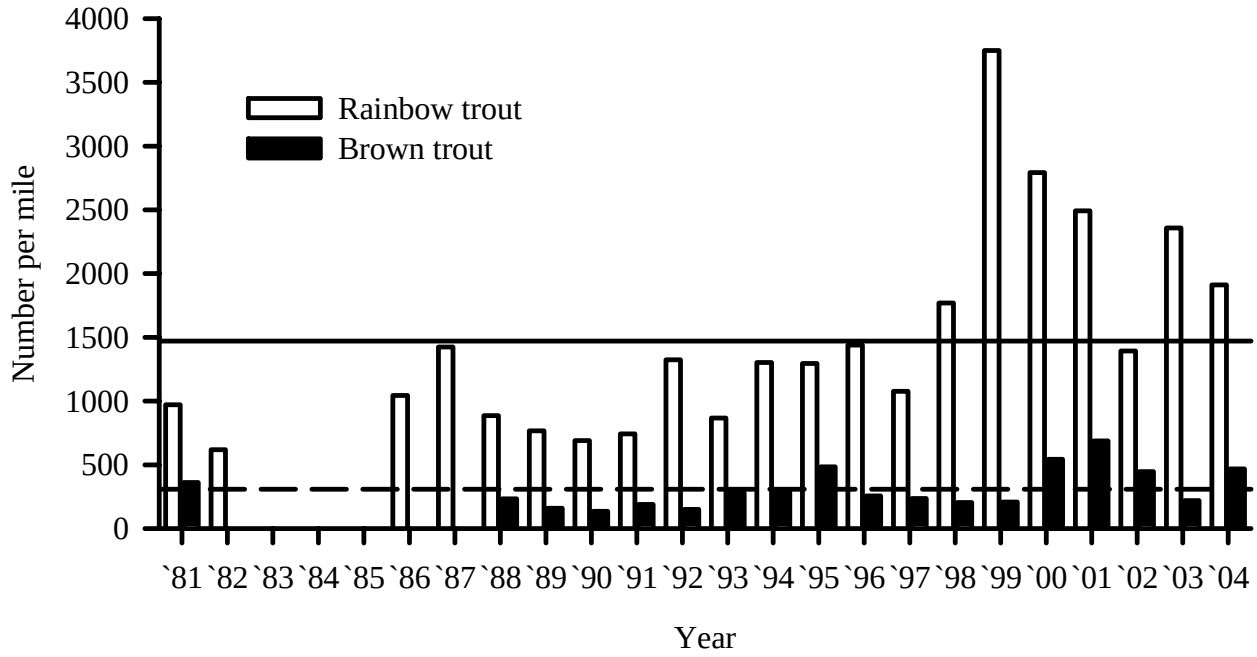

Figure 5. Number of rainbow trout and brown trout 10 inches and longer per mile in the Pelican Point section of the Missouri River, from 1981 to 2004. The solid horizontal line and the dashed horizontal line represent the 1981-2004 average for rainbow trout and brown trout, respectively.

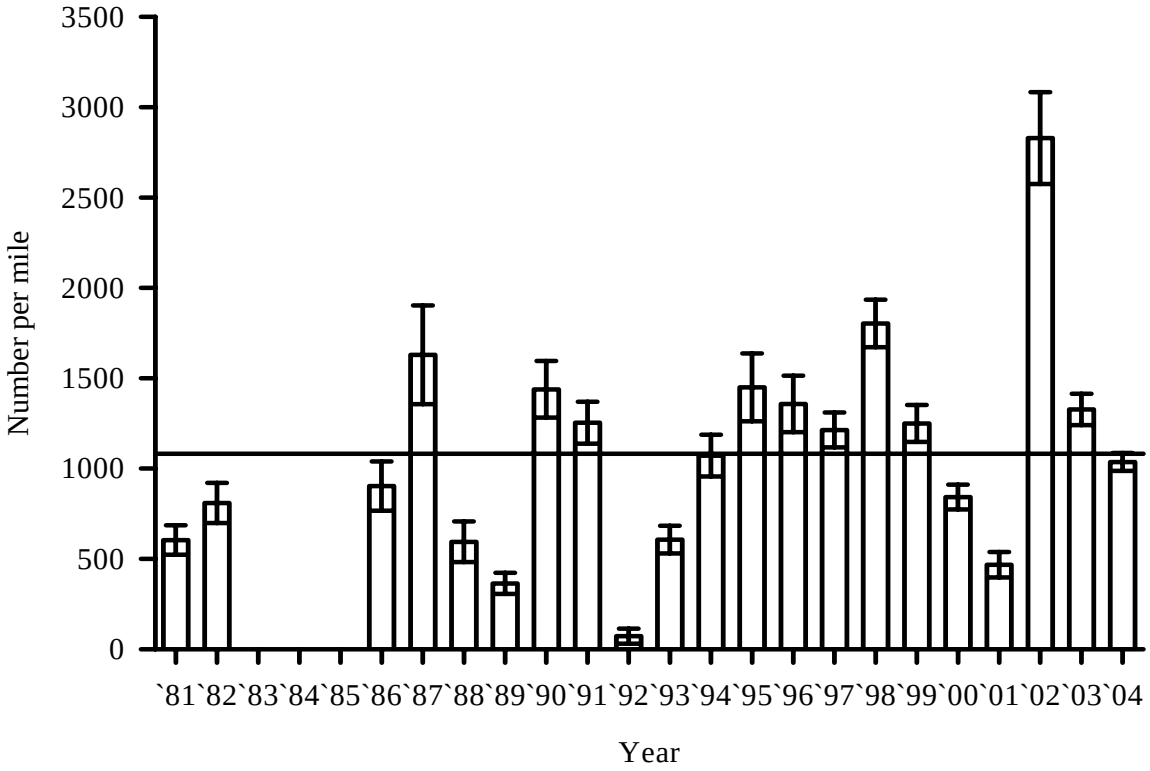

Figure 6. Number of age-1 rainbow trout per mile in the Pelican Point section of the Missouri River, from 1981 to 2004. The horizontal line represents the long-term average. Error bars represent one standard deviation.

Table 2. Mean, standard error, maximum, and minimum water temperatures recorded in 2004 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 (5 Apr – 27 Jul)												
Mean				44.5	49.7	55.4	63.5					
SE				0.42	0.26	0.37	0.31					
Min				40.2	45.3	50.8	59.2					
Max				50.6	53.3	62.9	69.0					
Craig (1 Jan – 28 Jul)												
Mean	33.6	34.5	37.5	44.7	50.2	56.2	64.6					
SE	0.13	0.15	0.28	0.47	0.28	0.46	0.33					
Min	32.1	32.4	33.5	38.1	45.1	51.0	58.5					
Max	35.6	37.8	44.0	52.1	55.2	66.6	71.9					
Mid Cannon (1 Jan – 7 Apr and 27 Jul – 22 Nov)												
Mean	33.5	34.5	37.9	41.8			66.7	65.2	59.6	52.7	45.3	
SE	0.15	0.19	0.33	0.67			0.19	0.29	0.37	0.52	0.37	
Min	32.1	32.1	32.7	38.1			61.6	59.9	54.6	46.8	41.2	
Max	35.5	38.1	45.4	47.4			70.4	70.7	66.0	58.5	48.7	
Pelican Point (7 Apr – 22 Nov)												
Mean				47.0	51.3	57.5	66.2	65.4	59.5	52.4	45.0	
SE				0.46	0.40	0.58	0.37	0.35	0.40	0.57	0.39	
Min				40.4	43.2	50.7	59.4	60.2	53.8	46.0	40.1	
Max				53.2	56.0	66.0	71.3	70.1	66.3	57.9	48.2	

Table 2. Cont.

Site	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lyons Creek (7 Apr – 27 Oct)												
Mean				43.4	46.3	50.4	56.2	55.0	50.7	45.8		
SE				0.41	0.50	0.46	0.36	0.30	0.34	0.52		
Min				34.3	36.3	42.2	46.4	48.3	44.2	38.6		
Max				56.4	57.6	62.4	66.7	65.0	60.7	52.8		
Wolf Creek (5 Apr – 27 Oct)												
Mean				45.1	47.1	51.3	57.1	55.8	52.4	47.9		
SE				0.40	0.48	0.47	0.33	0.28	0.31	0.46		
Min				36.2	38.8	43.8	47.7	49.7	46.6	41.6		
Max				57.8	58.9	63.2	66.7	64.1	61.2	54.7		
Little Prickly Pear Creek (All data were corrupted)												
Mean												
SE												
Min												
Max												
Dearborn River (16 Apr – 27 Oct)												
Mean				48.1	48.8	54.5	64.5	63.1	55.2	46.6		
SE				0.76	0.59	0.76	0.66	0.66	0.59	0.91		
Min				35.7	37.4	44.9	50.8	51.6	43.5	34.2		
Max				60.8	60.5	69.8	79.1	76.5	69.8	58.5		
Sheep Creek (16 Apr – 27 Oct)												
Mean				47.8	47.5	53.3	61.0	60.7	53.3	46.4		
SE				0.61	0.50	0.58	0.54	0.55	0.58	0.72		
Min				37.2	38.3	44.8	50.3	51.7	43.9	36.9		
Max				60.1	59.5	67.8	73.5	73.2	67.0	55.9		

On 2 July 2004, 12 species of fish were sampled in the Missouri River by selectively electrofishing a 2.5-mile long section upstream from the mouth of Sand Coulee Creek (Table 3). The section was sampled to determine species composition in this section of the Missouri River. White suckers were the most commonly sampled species, followed by yellow perch, lake chubs, and common carp. Common carp were the largest fish sampled; the heaviest carp weighed 7.8 pounds. Only two trout (one rainbow trout and one brown trout) were sampled.

Table 3. Summary [sample size (n), mean, minimum (min), and maximum (max)] of length, weight, and relative weight for fish species sampled on 2 July 2004 in the lower Missouri River, near Great Falls.

	Length				Weight				Relative Weight	
Species	n	mean	min	max	n	mean	min	max	n	mean
Common carp	13	19.3	6.9	25.5	13	4.1	0.21	7.8	12	100.8
Lake chub	14	4.3	2.9	6.1	4	0.04	0.01	0.08	-	-
Fathead minnow	1	2.4	-	-	-	-	-	-	-	-
Longnose sucker	2	4.7	3.5	5.8	-	-	-	-	-	-
White sucker	46	5.4	2.8	15.7	26	0.24	0.01	1.74	18	95.3
Black bullhead	1	6	-	-	1	0.12	-	-	1	94.5
Rainbow trout	1	5.8	-	-	1	0.08	-	-	1	106.3
Brown trout	1	13.8	-	-	1	1.06	-	-	1	104.1
Burbot	1	1	8.8	-	-	0.15	-	-	1	78.2
Sculpin	3	3.7	3.3	4.1	1	0.03	-	-	-	-
Pumpkinseed	4	3.4	1.9	4.8	1	0.04	-	-	1	134.9
Yellow perch	19	4.8	1.8	8.8	15	0.08	0.02	0.30	12	101.3

Warmwater Lake Ecosystems

Pelican Point Pond #1

Trap nets fished on Pelican Point Pond #1 sampled five species of fish on 7-9 April 2004 (Table 4). Yellow perch were the most commonly sampled species [catch per unit effort (CPUE) = 84.0 per net, (SD = 63.0)], followed by pumpkinseed sunfish (CPUE = 11.3 per net, SD = 8.7), black crappie (CPUE = 0.5 per net, SD = 0.8), white sucker (CPUE = 0.2 per net, SD = 0.4) and largemouth bass (CPUE = 0.2 per net, SD = 0.4).

Table 4. Catch per unit effort (CPUE) (SD), mean (n=sample size), minimum (min), and maximum (max) length, weight, and relative weight by gear type and pond during 2004 in the Great Falls management area, Montana.

					Length			Weight			Relative Weight		
Water	Gear	Effort (date)	Species	CPUE (SD)	Mean (n)	Min	Max	Mean (n)	Min	Max	Mean (n)	Min	Max
Pelican Point Pond #1													
	Trap net (1-inch mesh)												
		2 nets for 3 overnight sets each (all fish combined; length and weight was not recorded from all fish)											
		(7-9 April 2004)	Pump	11.3 (8.7)	4.7 (68)	3.8	5.7	0.08 (25)	0.03	0.14	90.7 (25)	69.3	109.6
			LMB	0.2 (0.4)	6.6 (1)	-	-	0.11 (1)	-	-	88.3 (1)	-	-
			YP	84.0 (63.0)	6.6 (502)	5.0	11.5	0.15 (112)	0.06	0.78	80.8 (112)	64.5	120.6
			BlCr	0.5 (0.8)	10.1 (3)	10.0	10.2	0.65 (3)	0.60	0.67	105.2 (3)	102.1	106.7
			WSu	0.5 (0.4)	14.0 (1)	-		1.17 (1)	-	-	95.6 (1)	-	-
	Electrofishing												
		1 shoreline pass	Pump	121.5 (19.1)	4.1 (108)	2.6	5.5	-	-	-	-	-	
		(10 and 17 June	LMB	22 (4.2)	10.2 (44)	1.6	17.7	1.1 (36)	0.1	3.5	109.5 (26)	89.8	157.7
		2004)	YP	76 (35.4)	5.0 (152)	3.8	11.2	-	-	-	82.5 (1)	-	-
			BlCr	1 (1.4)	8.1 (2)	5.4	10.8	0.5 (2)	0.1	0.9	118.1 (2)	115.8	120.3
			WSu	0.5 (0.7)	14.2 (1)	-	-	-	-	-	-	-	
Wadsworth Pond													
	Trap net (1-inch mesh)												
		3 nets for 2 overnight sets each (all fish combined; length and weight was not recorded from all fish)											
		(21-22 April 2004)	LnSu	0.2 (0.4)	15.1 (1)	-	-	1.25 (1)	-	-	-	-	-
			WSu	68.0	13.9 (85)	11.7	16.8	1.16 (85)	0.68	1.89	95.2 (8.5)	80.3	124.7
			BBh	0.8 (1.2)	8.7 (5)	8.5	9.0	0.32 (5)	0.30	0.36	79.9 (5)	75.1	84.0
			Pump	0.3 (0.8)	4.1 (2)	4.0	4.3	0.05 (2)	0.04	0.05	87.1 (2)	86.6	87.5
			Carp	0.3 (0.5)	12.9 (2)	12.7	13.0	1.04 (2)	0.99	1.08	93.5 (2)	92.6	94.3
			NP	0.3 (0.8)	31.9(2)	29.0	34.7	-	-	-	132.4 (1)	-	-
			YP	25.7 (28.6)	7.0(154)	6.0	9.0	0.14(120)	0.08	0.43	82.5 (120)	60.7	117.6
			WE	1.5 (1.6)	11.6(9)	7.3	20.9	0.83(9)	0.10	3.95	93.4 (9)	78.8	109.8

Table 4. Cont.

Water	Gear	Effort (date)	Species	CPUE (SD)	Length Mean (n)	Length Min	Length Max	Weight Mean (n)	Weight Min	Weight Max	Relative weight Mean (n)	Relative weight Min	Relative weight Max
Wadsworth Pond Cont.													
	Trap net	(3/8-inch mesh)											
		1 net for 2 overnight sets each (all fish combined; length and weight was not recorded from all fish)											
		(22-23 April 2004)	Carp	0.5 (0.7)	4.3 (1)		-	0.04 (1)	-	-	-	-	-
			WSu	89.5 (85.6)	13.7 (179)	11.7	16.3	1.15 (150)	0.68	1.89	95.5 (150)	81.2	120.5
			YP	4.0 (0.0)	7.1 (8)	6.3	8.3	0.16 (8)	0.11	0.26	89.2 (8)	72.4	117.6
	Seine												
		7 seine hauls	Carp	8.7 (6.2)	14.2 (61)	6.0	23.4	1.83 (59)	0.14	5.02	105.6 (59)	83.2	159.2
		100’ x 10’x ¼”	WSu	1.7 (2.5)	2.6 (12)	1.1	15.0	0.30 (2)	0.05	1.68	126.5 (2)	112.1	140.8
		beach seine	BBh	0.4 (0.8)	7.3 (3)	6.7	8.2	0.26 (3)	0.20	0.31	109.0 (3)	93.2	121.9
		(30 June 2004)	Pump	1.7 (1.1)	3.9 (12)	1.9	4.6	0.07 (12)	0.05	0.09	99.0	82.1	136.7
			YP	1.1 (1.1)	6.2 (8)	1.1	8.2	0.24 (7)	0.17	0.28	96.6	84.9	109.5
			WAE	7.7 (5.1)	4.0 (54)	1.5	16.7	0.17 (27)	0.06	1.62	95.8	75.5	139.6
			RB	0.3 (0.8)	7.9 (2)	7.6	8.1	0.21 (2)	0.18	0.21	103.6	101.6	105.6

Previous to this sampling event, white suckers had not been sampled in the pond. Five species of fish were sampled during the two nighttime electrofishing passes conducted on the Pelican Point Pond #1. Pumpkinseed sunfish were the most abundant species sampled (CPUE = 121.5), followed by yellow perch (CPUE 76), largemouth bass (CPUE 22), black crappie (CPUE 0.5), and white sucker (CPUE 0.5). All largemouth bass (n=45) and yellow perch (n=656) from the trap nets and the two nights electrofishing were transferred to Hendrickson Pond #1 and Pond #2 located just north of Pelican Point Pond #1. The average length, weight and relative weight for each species and gear type are reported in Table 4. Proportional stock density (PSD) values and relative stock density—preferred length (RSD-P) values were calculated for largemouth bass, yellow perch, and pumpkinseed sunfish sampled in Pelican Point pond #1. The PSD value for largemouth bass sampled by late spring nighttime electrofishing was 63 compared to PSD of 43 in 2003 (Yerk et al 2006). The RSD-P (15 inches) value was 16 in 2004 compared to RSD-P of 21 in 2003. Largemouth bass spring electrofishing samples have been shown to overestimate the number of large fish in the population (Carline et al. 1984). Due to spawning behavior of largemouth bass, the fish are in shallow water during the spring, which makes them more vulnerable to electrofishing equipment. PSD values calculated for pumpkinseed sunfish were 0 for both trap net and electrofishing samples. Yellow perch PSD values were 5 for trap net samples (PSD=9 in 2003; Yerk et al. 2006), and 4 for electrofishing samples (PSD=5 in 2003; Yerk et al. 2006). RSD-P values were 0 for pumpkinseed sunfish with both sampling methods. Yellow perch RSD-P was 2 for electrofishing samples and 1 in the trap net samples. PSD and RSD-P values for largemouth bass, pumpkinseed sunfish, and yellow perch are low indicating that not many large fish exist in the respective populations.

Wadsworth Pond

Eight species of fish were sampled during the annual spring trap net survey conducted on 21 and 22 April 2004 (Table 4). The white sucker sample was pooled on the second day for the three 1-inch mesh trap nets preventing variance calculations for individual traps. The mean white sucker CPUE of 68 accounted for 70% of all fish sampled in the 1-inch trap nets, a decline from the high CPUE of 192.8 (98% of all fish sampled) in 2003 (Yerk et al 2006). The one 3/8-inch trap net sampled 179 white suckers (CPUE = 89.5 per net, SD=85.6) comprising 95% of the total fish sample. The overall (3/8-inch and 1-inch combined) CPUE for white suckers was 73.5 per net, a 75% decline from the all time high sample (CPUE=287.7) in 2003. In an experiment to reduce sucker numbers, 2,541 white and longnose suckers were removed from Wadsworth Pond in 2003 (Yerk et al 2006). Lower water temperatures of 52°F and 54°F in 2004 (compared to 66°F and 58°F in 2003) along with the removal of suckers in 2003 was likely the cause for the reduced catch rate of suckers in 2004. On the last day of netting in 2004, 323 white suckers were removed. The overall sample of yellow perch increased from 17 in 2003 to an all time high of 162 in 2004. Walleye (CPUE = 1.1), black bullhead (CPUE = 0.6), common carp (CPUE = 0.4), northern pike (CPUE = 0.3) and pumpkinseed sunfish (CPUE = 0.3) longnose sucker (CPUE = 0.1) were sampled in low numbers similar to 2003 catch rates. Largemouth bass and rainbow trout were not sampled in 2004.

Mean length (TL) of white suckers has increased each year from 9.3 inches in 1996 to 13.9 inches in 2004. Mean relative weight (Wr) has also increased from a low of 80.5 in 1996 to 95.2 in 2004. Yellow perch mean length has improved from a 4.5-inch average in 2002, to 7.0 inches in 2004. The sucker removal experiment, annual stocking of predator species (walleye since 1996, largemouth bass since 1997) and the illegal introduction of northern pike are likely influencing the size structure and density of white suckers, yellow perch, black bullheads and pumpkinseed sunfish.

Seven species of fish were sampled during 7 - 100' x 10' x ¼" beach seine hauls pulled on 30 June 2004 (Table 4). Walleye catch rate (CPUE) increased from 2.4 per haul in 2002 to 7.7 (SD=5.1) per haul in 2004. Five thousand 1.5-inch long fry were stocked prior to seining both years. In 2002, fry stocking preceded seining by one day, and in 2004 stocking preceded 6 days to seining. Common carp catch rate increased from 1.4 per haul in 2002 to 8.7 (SD=6.2) in 2004. The pumpkinseed sunfish catch rate declined from 24.2 per haul in 2002 to 1.7 (SD=1.1) per haul in 2004. The CPUE of yellow perch also decline from 9.0 per seine haul in 2002 to 1.1 (SD=1.07) per haul in 2004. No largemouth bass were seined in 2004.

Pumpkinseed sunfish seined in Wadsworth Pond in July 2004

Coldwater Lake Ecosystems

Upper Baldy Lake

Upper Baldy Lake was first surveyed on 9 September 1968 using a 125-foot monofilament experimental gill net set overnight (Holton 1970). Only one 13.5-inch rainbow trout was sampled. Based on this survey, Holton (1970) recommended stocking the lake with Yellowstone cutthroat trout (YCT). From 1969 to 1999, YCT (1,000 to 1,200 YCT) were stocked approximately every other year. On 31 July 1971, Upper Baldy Lake was sampled again using a 125-foot experimental monofilament gillnet fished overnight (MFWP unpublished data). Twenty-six YCT were sampled varying from 8.7- to 10.2-inches long; mean length was 9.7 inches. On 25 July 1973, a 4-hour gillnet set caught 2 YCT (MFWP unpublished data). Beginning in 2003, stocking was changed to 1,000 Westslope cutthroat trout (WCT) every other year. On 4 August 2004, a 125-foot sinking monofilament gillnet was fished overnight. One 14.8-inch YCT and 4 WCT were sampled (Table 5). The WCT varied from 5.7- to 7.7-inches long (mean = 6.7). Three anglers fished for a total of 7.5 hours using fly fishing equipment. Overall, 17 WCT (mean length = 6.2 inches) and 2 YCT (mean length = 18.7 inches) were caught resulting in catch rates of 2.3 WCT and 0.3 YCT per hour (Table 5). Based on stocking records, all sampled YCT were at least 5 years old.

Upper Baldy Lake, August 2004

Table 5. Number sampled (n), mean, minimum (min), and maximum (max) length, weight, and relative weight by species, sampling gear, and Northcentral Montana coldwater lake sampled during 2004.

					Length			Weight			Relative Weight		
Water	Gear	Effort	Species	n	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Upper Baldy Lake													
	Gill net[1]	20.4h/overnight set	WCT	4	6.7	5.7	7.7	0.15	0.10	0.20	138.4	121.1	154.4
			YCT	1	14.8			1.00			79.9		
	Angling	3 anglers, 7.5 total h	WCT	17	6.2	4.5	7.5	0.10	0.06	0.17	98.2	93.4	107.5
			YCT	2	18.7	18.0	19.3	3.15	3.00	3.30	123.6	116.2	131.0
Edith Lake													
	Gill net[1]	18.2h/overnight set	WCT	3	7.4	7.2	7.7	0.10	0.10	0.10	68.1	60.6	73.7
			YCT	3	15.3	14.4	16.6	0.93	0.80	1.20	66.6	63.9	68.8
	Angling	3 anglers, 4.5 total h	WCT	7	4.5	3.9	5.0						
Newlan Creek Reservoir													
	Gill net[2]	18.2h/overnight set	RB	7	12.0	9.3	14.9	0.63	0.31	1.03	81.5	72.3	89.0
			YCT	3	10.8	10.5	11.1	0.40	0.37	0.44	85.9	85.3	87.0
			LnSu	1	15.2			1.09					
	Gill net[3]	18.5h/overnight set	RB	3	13.5	12.6	14.2	0.75	0.65	0.90	70.9	64.5	75.3
			YCT	4	10.3	9.2	10.9	0.36	0.26	0.41	87.5	84.2	90.7
			LL	1	9.9			0.37					
			LnSu	68	14.1	7.0	17.1	1.08	0.13	1.91			
			Burbot	7	22.0	18.2	27.6	2.28	1.09	4.24	75.3	62.4	91.0
Smith River Reservoir													
	Gill net[2]	16.3h/overnight set	Rb	5	15.2	13.9	16.5	1.24	1.04	1.66	82.5	72.8	96.7
			WSu	1	18.1			2.36			90.6		
			LnSu	2	18.7	17.5	19.8	2.73	2.38	3.07			
	Gill net[3]	16.3h/overnight set	Rb	5	13.3	8.6	16.3	0.94	0.25	1.5	82.2	73.0	90.7

Table 5. Cont.

Water	Gear	Effort	Species	n	Length			Weight			Relative weight		
					Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Smith River Reservoir (Cont.)													
	Gill net[3]		WSu	8	9.3	6.6	11.4	0.35	0.10	0.57	83.5	74.6	99.5
			LnSu	28	17.0	7.3	19.5	2.06	0.12	3.01			
			Burbot	15	16.5	10.3	26.4	0.99	0.18	2.81	73.3	58.3	92.3
Lanning Reservoir													
	Gill net[3]	19.8h/overnight set	No fish sampled										
Englandt Reservoir													
	Gill net[3]	19.7h/overnight set	RB	43	11.9	8.4	14.0	0.7	0.2	1.1	93.3	76.1	116.5

[1] 125-foot experimental monofilament sinking gill net
[2] 125-foot experimental multifilament floating gill net
[3] 125-foot experimental multifilament sinking gill net

Edith Lake

Edith Lake was stocked between 1940 and 1964 with cutthroat (subspecies not specified) trout. In addition, Arctic grayling were stocked in 1953. Beginning in 1967, YCT were stocked every other year until 1999. Then in 2003, stocking was changed to 1,000 WCT every other year. Edith Lake was sampled in 1966 using a 125-foot multifilament experimental gill net fished for a 41-hour period (MFWP unpublished data). In total, 8 cutthroat trout were sampled varying from 7.7- to 11.6-inches long (mean length was 10 inches). On 5 August 2004, one 125-foot monofilament experimental gill net was fished overnight. Three WCT and 3 YCT were sampled (Table 5). The mean length of WCT and YCT sampled in the gill net was 7.4 and 15.3 inches, respectively. Based on stocking records, the YCT were at least 5 years old. Three anglers fished (using fly fishing equipment) for a total of 4.5 hours. Overall, 7 WCT were caught varying from 3.9- to 5.0-inches long (mean 4.5 inches; Table 5); thus, the average angling catch rate was 1.6 WCT per hour.

Edith Lake, August 2004

Newlan Creek Reservoir

Five species of fish were sampled in Newlan Creek Reservoir in 2004 (Table 5). Longnose suckers were the most abundant, followed by rainbow trout, Yellowstone cutthroat trout, burbot, and brown trout. The mean catch rate of rainbow trout was 5.0 per net (sinking and floating gillnets pooled), which is similar to the long-term average. Average size of rainbow trout has increased since 2002 (Tews et al. 2004, Tews et al. 2005). For example, the average size of sampled rainbow trout was 9.6-, 11.8-, and 12.5-inches long in 2002, 2003, and 2004, respectively. In 2004, weight of sampled rainbow trout varied from 0.31 to 0.90 pounds (mean = 0.67 pounds), and mean relative weight was 78.3. In 2004, the average size of sampled longnose sucker and Yellowstone cutthroat trout was similar to 2002 and 2003. Only one brown trout (9.9-inches long) was sampled in 2004. Finally, the average length of burbot sampled in Newlan Creek Reservoir was 22.0-inches long.

Smith River Reservoir

Four species of fish were sampled in Smith River Reservoir (Sutherlin Reservoir) in 2004 (Table 5). Similar to Newlan Creek Reservoir, longnose suckers were the most abundant species sampled. Burbot were the next most sampled species, followed by rainbow trout, and white suckers. Rainbow trout catch rates were 40% of the long-term average (mean =5 per net, sinking and floating gill nets pooled; Table 5). The average length (14.2-inches long) of sampled rainbow trout was similar to the 2003 sample (14.3-inches long; Tews et al. 2005). Burbot catch rates were 288% of the long-term average, and the average size of sampled burbot has increased in recent years. For example, the average length of sampled burbot was 13.4-, 14.2-, and 16.5-inches long in 2002 (Tews et al. 2004), 2003 (Tews et al. 2005), 2004, respectively. Catch rates of longnose suckers and white suckers were 60% and 36% of the long-term average, respectively.

Lanning Reservoir

Rainbow trout and brook trout were stocked in Lanning Reservoir in the early 1990's without success. The landowner thought there might be water quality problems associated with land use practices in the drainage because historically it produced nice trout. The land surrounding the reservoir was recently converted from farming use to pasture. In 2003, 1,000 Arlee strain rainbow trout were stocked into Lanning Reservoir. One multifilament sinking gill net set overnight (19.7 hours) on 17 May 2004, but sampled no fish (Table 5). One thousand Eagle Lake strain rainbow trout were stocked in 2004; future sampling will be conducted to monitor their survival.

Phantom Coulee Reservoir (Englandt Res.)

Phantom Coulee Reservoir went dry in 2002 eliminating the abundant population of small black bullheads. In 2003, the reservoir refilled to a sufficient level, allowing 2,500 Arlee strain rainbow trout, and 2,500 Eagle Lake strain rainbow trout to be stocked. One multifilament experimental sinking gill net was set overnight (19.7 hours) on 20 May 2004. Forty-three

rainbow trout were sampled with a mean length of 11.9 inches, mean weight of 0.69 pounds, and mean relative weight at 93.3 (Table 5).

HABITAT PROTECTION

During the reporting period in the Great Falls area, 50 Natural Streambed and Land Preservation Act (310) and 11 Stream Protection Act (124) permits were processed.

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PRINCIPAL FISH SPECIES INVOLVED

Family Common name genus species	Abbreviation
Cyprinidae	
Common carp *Cyprinus carpio*	Carp
Lake chub *Couesius plumbeus*	
Fathead minnow *Pimephales promelas*	
Catostomidae	
Longnose sucker *Catostomus catostomus*	LnSu
White sucker *Catostomus commersonii*	WSu
Ictaluridae	
Black bullhead *Ameiurus melas*	BBh
Esocidae	
Northern pike *Esox lucius*	NP
Salmonidae	
Rainbow trout *Oncorhynchus mykiss*	RB
Westslope cutthroat trout *Oncorhynchus clarkii lewisi,*	WCT
Yellowstone cutthroat trout *Oncorhynchus clarkii bouvieri*	YCT
Brown trout *Salmo trutta*	LL
Eastern brook trout *Salvelinus fontinalis*	
Mountain whitefish *Prosopium williamsoni*	MWF
Arctic grayling *Thymallus arcticus*	
Gadidae	
Burbot *Lota lota*	
Cottidae	
Sculpin *Cottus spp.*	
Centrarchidae	
Pumpkinseed sunfish *Lepomis gibbosus*	Pump
Largemouth bass *Micropterus salmoides*	LMB
Black crappie *Pomoxis nigromaculatus*	BlCr
Percidae	
Yellow perch *Perca flavescens*	YP
Walleye *Sander vitreum*	WAE

CODE NUMBERS OF WATERS REFERRED TO IN THIS REPORT

16-1870	Lanning Reservoir
16-5070	(Phantom Coulee Reservoir (Englandt Reservoir)
17-0544	Belt Creek
17-4896	Missouri River from Cascade, MT bridge to Holter Dam
17-6832	Smith River from Hound Creek to Camp Baker
17-8912	Edith Lake
17-9080	Hendrickson Pond #1
17-9081	Hendrickson Pond #2
17-9330	Newlan Creek Reservoir
17-9393	Pelican Point Pond #1
17-9616	Smith River Reservoir (Sutherlin Reservoir)
17-9735	Upper Baldy Lake
20-8470	Wadsworth Pond

Appendix 1. Number per sample (Sample), mean count (mean), standard deviation, and mean percent represented in sample (Mean % in sample) of macroinvertebrates by taxonomic group and section of the Missouri River.

Taxa		Sample 1	2	3	4	5	Mean	S.D.	Mean % in sample
Craig section									
COLEOPTERA		**5**	**9**	**19**	**10**	**14**	**11.0**	**5.3**	**4.0**
	Optioservus spp.	5	6	19	10	14	10.8	5.8	3.4
	Haliplus sp.	0	2	0	0	0	0.4	0.9	0.1
	Hydrophilidae	0	1	0	0	0	0.2	0.4	0.1
DIPTERA		**101**	**29**	**229**	**65**	**72**	**99.0**	**77.0**	**32.0**
	Thienemannimyia gp.	7	4	4	1	1	3.4	2.5	1.1
	*Potthastia sp. **								
	Cricotopus spp.	1	1	4	1	1	1.6	1.3	0.5
	Orthocladius spp.	5	0	0	1	1	1.4	2.1	0.4
	Parametriocnemus sp.	1	1	0	0	0	0.4	0.5	0.1
	*Tvetenia sp. **								
	*Cryptochironomus sp. **								
	Dicrotendipes sp.	0	0	0	1	1	0.4	0.5	0.1
	Microtendipes sp.	1	4	2	2	13	4.4	4.9	1.4
	*Parachironomus sp. **								
	*Phaenopsectra sp. **								
	Polypedilum spp.	0	0	1	0	0	0.2	0.4	0.1
	Simulium spp.	86	16	218	59	55	86.8	77.5	27.7
	Hemerodromia sp.	0	1	0	0	0	0.2	0.4	0.1
	Stratiomyiidae	0	2	0	0	0	0.4	0.9	0.1

Appendix 1. Cont.

Taxa		Sample 1	2	3	4	5	Mean	S.D.	Mean % in sample
EPHEMEROPTERA		**11**	**28**	**18**	**89**	**71**	**43.0**	**34.5**	**14.0**
	Baetis tricaudatus	3	0	10	40	12	13.0	15.9	4.2
	Ephemerella inermis *								
	Tricorythodes minutus	8	28	8	49	59	30.4	23.3	9.7
HEMIPTERA *									
	I								
LEPIDOPTERA *									
	Petrophila sp. *								
	Synclita sp. *								
TRICHOPTERA		**20**	**33**	**23**	**22**	**25**	**25.0**	**5.0**	**8.0**
	Cheumatopsyche spp.	0	0	0	0	3	0.6	1.3	0.2
	Hydropsyche occidentalis	1	0	2	17	6	5.2	7.0	1.7
	Lepidostoma sp. *								
	Hydroptila spp.	7	5	6	0	1	3.8	3.1	1.2
	Oecetis sp.	12	28	15	5	15	15.0	8.3	4.8
ANNELIDA		**1**	**6**	**3**	**3**	**3**	**3.0**	**1.8**	**1.0**
	Lumbricidae *								
	Lumbriculidae	0	4	3	3	2	2.4	1.5	0.8
	Naididae *								
	Tubificidae	1	0	0	0	0	0.2	0.4	0.1
	Erpobdellidae	0	2	0	0	1	0.6	0.9	0.2
	Glossophonia complanata *								

Appendix 1. Cont.

Taxa		Sample 1	2	3	4	5	Mean	S.D.	Mean % in sample
CRUSTACEA		**111**	**105**	**77**	**71**	**77**	**88.0**	**42.5**	**28.0**
	Hyalella azteca	21	60	1	1	6	17.8	25.0	5.7
	Gammarus sp.	1	2	17	9	14	8.6	7.1	2.7
	Caecidotea sp.	89	43	59	61	57	61.8	16.8	19.7
MOLLUSCA		**14**	**29**	**18**	**0**	**11**	**14.0**	**10.5**	**5.0**
	Physella sp.	14	22	17	0	11	12.8	8.2	4.1
	Gyraulus sp.	0	1	0	0	0	0.2	0.4	0.1
	*Fossaria sp. **								
	Potamopyrgus antipodarum	0	6	1	0	0	1.4	2.6	0.4
	*Pisidium sp. **								
TURBELLARIA		**20**	**38**	**14**	**49**	**22**	**28.6**	**14.4**	**9.1**
HYDRACARINA		**0**	**0**	**0**	**1**	**0**	**0.2**	**0.4**	**0.1**
Pelican Point section									
COLEOPTERA		**120**	**122**	**83**	**42**	**28**	**79.0**	**43.3**	**28.0**
	Optioservus spp.	118	122	79	42	28	77.8	42.8	27.2
	Zaitzevia sp.	0	0	1	0	0	0.2	0.4	0.1
	Microcylloepus sp.	2	0	3	0	0	1.0	1.4	0.3
	*Dubriaphia minima **								

Appendix 1. Cont.

Taxa		Sample 1	2	3	4	5	Mean	S.D.	Mean % in sample
DIPTERA		**19**	**30**	**21**	**41**	**20**	**26.2**	**9.4**	**9.0**
	Thienemannimyai gp.	4	2	0	5	2	2.6	1.9	0.9
	Potthastia sp.	1	0	0	0	0	0.2	0.4	0.1
	Cricotopus spp.	1	3	0	2	1	1.4	1.1	0.5
	Cricotopus nostococladius	1	2	0	0	0	0.6	0.9	0.2
	Orthocladius spp.	0	1	2	1	0	0.8	0.8	0.3
	Thienemanniella sp.	1	0	0	0	0	0.2	0.4	0.1
	*Tvetenia sp. **								
	Cryptochironomus sp.	0	0	0	0	1	0.2	0.4	0.1
	Dicrotendipes sp.	0	1	0	0	1	0.4	0.5	0.1
	Microtendipes sp.	1	14	0	23	3	8.2	10	2.9
	Paralaterborniella sp.	0	1	0	0	0	0.2	0.4	0.1
	*Phaenopsectra sp. **								
	Polypedilum spp.	4	0	2	3	3	2.4	1.5	0.8
	Pseudochironomus sp.	0	2	0	0	0	0.4	0.9	0.1
	Paratanytarsus sp.	1	0	0	0	0	0.2	0.4	0.1
	Tanytarsus sp.	0	1	0	0	0	0.2	0.4	0.1
	Ceratopogonidae	0	2	0	0	0	0.4	0.9	0.1
	Simulium spp.	0	0	16	1	9	5.2	7.1	1.8
	Chelifera sp.	5	1	0	0	0	1.2	2.2	0.4
	Hemerodromia sp.	0	0	1	6	0	1.4	2.6	0.5
EPHEMEROPTERA		**90**	**53**	**67**	**83**	**109**	**80.4**	**21.5**	**28.0**
	Acentrella sp.	1	0	0	0	0	0.2	0.4	0.1
	Acerpenna pygmacus	5	6	8	0	38	11.4	15.2	4.0
	Baetis tricaudatus	65	31	45	77	56	54.8	17.8	19.1
	Plauditus punctiventris	15	3	6	1	12	7.4	5.9	2.6

Appendix 1. Cont.

Taxa		Sample 1	2	3	4	5	Mean	S.D.	Mean % in sample
EPHEMEROPTERA									
	*Centroptilum sp. **								
	Diphetor hageni	0	0	1	0	1	0.4	0.5	0.1
	Attenella margarita	1	0	1	1	0	0.6	0.5	0.2
	*Rhithrogena sp. **								
	Stenonema sp.	1	0	0	0	0	0.2	0.4	0.1
	*Choroterpes sp. **								
	Tricorythodes minutus	2	13	6	4	2	5.4	4.6	1.9
LEPIDOPTERA		**0**	**1**	**1**	**11**	**0**	**2.6**	**4.7**	**0.9**
	Petrophila sp.	0	1	1	11	0	2.6	4.7	0.9
	*Syncilita sp. **								
PLECOPTERA		**1**	**0**	**0**	**1**	**0**	**0.4**	**0.5**	**0.1**
	Skwala sp.	1	0	0	1	0	0.4	0.5	0.1
TRICHOPTERA		**19**	**43**	**56**	**45**	**62**	**45.0**	**16.5**	**16.0**
	Cheumatopsyche spp.	4	2	7	6	17	7.2	5.8	2.5
	Hydropsyche occidentalis	1	6	16	5	26	10.8	10.1	3.8
	Ceratopsyche spp.	1	0	3	4	1	1.8	1.6	0.6
	Dicosmoecus sp.	1	0	0	0	0	0.2	0.4	0.1
	*Limnephilus sp. **								
	Hydroptila spp.	0	2	1	6	0	1.8	2.5	0.6
	Ceraclea sp.	0	0	0	5	0	1.0	2.2	0.3
	Oecetis sp.	1	4	0	4	0	1.8	2.0	0.6
	Brachycentrus occidentalis	9	19	27	8	18	16.2	7.9	5.7
	Helicopsyche borealis	0	9	1	0	0	2.0	3.9	0.7

Appendix 1. Cont.

Taxa		Sample 1	2	3	4	5	Mean	S.D.	Mean % in sample
TRICHOPTERA	*Protoptila sp.*	2	1	1	1	0	1.0	0.7	0.3
	Glossosoma sp.	0	0	0	6	0	1.2	2.7	0.4
ANNELIDA		**16**	**8**	**11**	**11**	**4**	**10.0**	**4.4**	**3**
	Lumbicidae	15	4	8	6	4	7.4	4.6	2.6
	Naididae	0	0	0	4	0	0.8	1.8	0.3
	Tubificidae	1	4	3	1	0	1.8	1.6	0.6
CRUSTACEA		**5**	**19**	**12**	**30**	**51**	**23.4**	**18.0**	**8**
	Orconectes sp.	0	0	1	0	0	0.2	0.4	0.1
	Hyalella azteca	3	18	9	17	51	19.6	18.6	6.8
	Gammarus sp.	0	0	0	4	0	0.8	1.8	0.3
	Caecidotea sp.	2	1	2	9	0	2.8	3.6	1.0
MOLLUSCA		**7**	**8**	**18**	**19**	**4**	**11.2**	**6.8**	**4**
	Physella sp.	5	8	17	18	0	9.6	7.8	3.4
	Ferrissia sp. *								
	Gyraulus sp.	0	0	1	1	0	0.4	0.5	0.1
	Pisidium sp.	0	0	0	0	1	0.2	0.4	0.1
	Sphaerium sp.	2	0	0	0	3	1.0	1.4	0.3
TURBELLARIA		**1**	**22**	**14**	**3**	**0**	**8.0**	**9.6**	**2.8**

* Organism found during qualitative inspection, not during subsampling process.

Appendix 2. Mean and standard deviation of various macroinvertebrate descriptive groups, indices, and summary statistics, by section of the Missouri River.

	Craig section		Pelican Pt. section	
Descriptive groups, indices, and summary statistics	Mean	S.D.	Mean	S.D.
Total Organisms-subsample	313.0	51.0	286.0	12.0
Taxa Richness	19.0	2.0	29.0	4.7
EPT Richness	4.6	1.1	12.4	2.4
Shannon Diversity Index (log2)	3.0	0.4	3.5	0.34
Biotic Index	6.0	0.6	5.0	0.18
% EPT	22.0	12.0	44.0	11.0
% Chironomidae	4.0	2.0	6.2	4.0
Amphipoda/ (Amph+-Isopoda)	0.3	0.2	0.8	0.17
Baetidae/Ephemeroptera	0.3	0.2	0.9	0.1
Hydropsychinae/Trichoptera	0.3	0.3	0.4	0.2
% R.A. Dominant	29.0	15.0	31.5	9.0
Shannon-Weaver Index (loge)	2.1	0.3	2.4	0.2
Metals Tolerance	4.2	0.3	4.1	0.2
Ordinal Relative Abundance (%)				
Ephemeroptera	14.0	11.0	28.0	8.0
Plecoptera	0.0	0.0	0.1	0.0
Trichoptera	8.0	2.0	15.7	6.0
Coleoptera	3.0	1.0	27.4	15.0
Diptera	30.0	18.0	9.1	3.0
Non-insect	44.0	14.0	18.3	5.0
Functional Feeding Group Relative Abundance (%)				
Scrapers/Grazers	6.0	5.0	7.0	6.0
Shredders	3.0	2.0	1.0	1.0
Filter Feeders	28.0	18.0	15.0	10.0
Collector-Gatherer	48.0	12.0	72.0	9.0
Predators	16.0	7.0	6.0	3.0
Estimated total organisms	2,895	868	1,269	962
Estimated Taxa richness	25.6	3.8	34.8	4.5
Estimated EPT richness	5.4	1.1	14.4	2.7
Estimated Potamopyrgus	7.6	12.0	0	0