Montana Fish, Wildlife & Parks

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Great Falls Management Area Fisheries Progress Report

2005 Annual Report

by

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ABSTRACT

In 2005, the estimated number of 8 inch and longer rainbow trout and brown trout was 303 and 682 per mile, respectively in the Eagle Creek section of the Smith River. The rainbow trout estimate was only 55% of the long-term average due to extended drought conditions in the Smith River. Due to access problems, population sampling was not conducted in the Deep Creek section of the Smith River in 2005. Water temperature generally peaked in July, and water temperature gradually increased in the Smith River in a downstream direction. Fish populations have been sampled at various sites on the Sun River below Gibson Dam since the late 1980s. Trout estimates in the long-term populations monitoring sections on the Sun River are low in comparison to other trout rivers in Northcentral Montana. For example, 2005 population estimates for 8 inch and longer trout (brown trout and rainbow trout combined) were 116, 43, and 90 per mile for the Augusta/287, Simms, and Sun River sections, respectively. Over-appropriated surface waters coupled with drought conditions have caused the low trout densities in the Sun River. Since fish sampling began in 1987, over 15 fish species have been sampled in the Sun River. In 2005, the brown trout estimate in the Craig section, of the Missouri River was 80% of the long-term average. The average catch rate for mountain whitefish in the Craig section was 91.6 fish per pass. For the first time in 4 years, the estimated number of 10 inch and longer rainbow trout per mile increased, and the estimate was 98% of the long-term average. The number of large (17-inch long) rainbow trout increased in 2005, halting a decline that started in 2001. Brown trout in the Pelican Point section were up from 2004 (to 670, fish 10 inch and longer per mile), but high flows and turbid water during the sampling period in the lower river likely caused the estimates to be inflated. Similar to the Craig sections, rainbow trout densities were 98% of the long-term average in the Pelican Point section. In spring 2005, pumpkinseed sunfish, yellow perch, and black crappie were sampled in trap nets in Pelican Point Pond #1. Catch rates of pumpkinseed sunfish were similar to the 2004 sample, but yellow perch catch rates were much lower compared to 2004. Pumpkinseed sunfish, largemouth bass, and yellow perch were sampled by nighttime electrofishing in Pelican Point Pond #1. Largemouth bass catch rates were higher in 2005 than in 2004, but the average size of largemouth bass decreased by over three inches. Size structure indices suggest that not many large pumpkinseed sunfish, yellow perch, or largemouth bass exist in the pond. In order to improve size structure, FWP plans to stock largemouth bass in 2006. Many fish community and habitat changes have taken place over the past several years in Wadsworth Pond. These changes have caused changes in the size structure and composition of the fish community in the pond.

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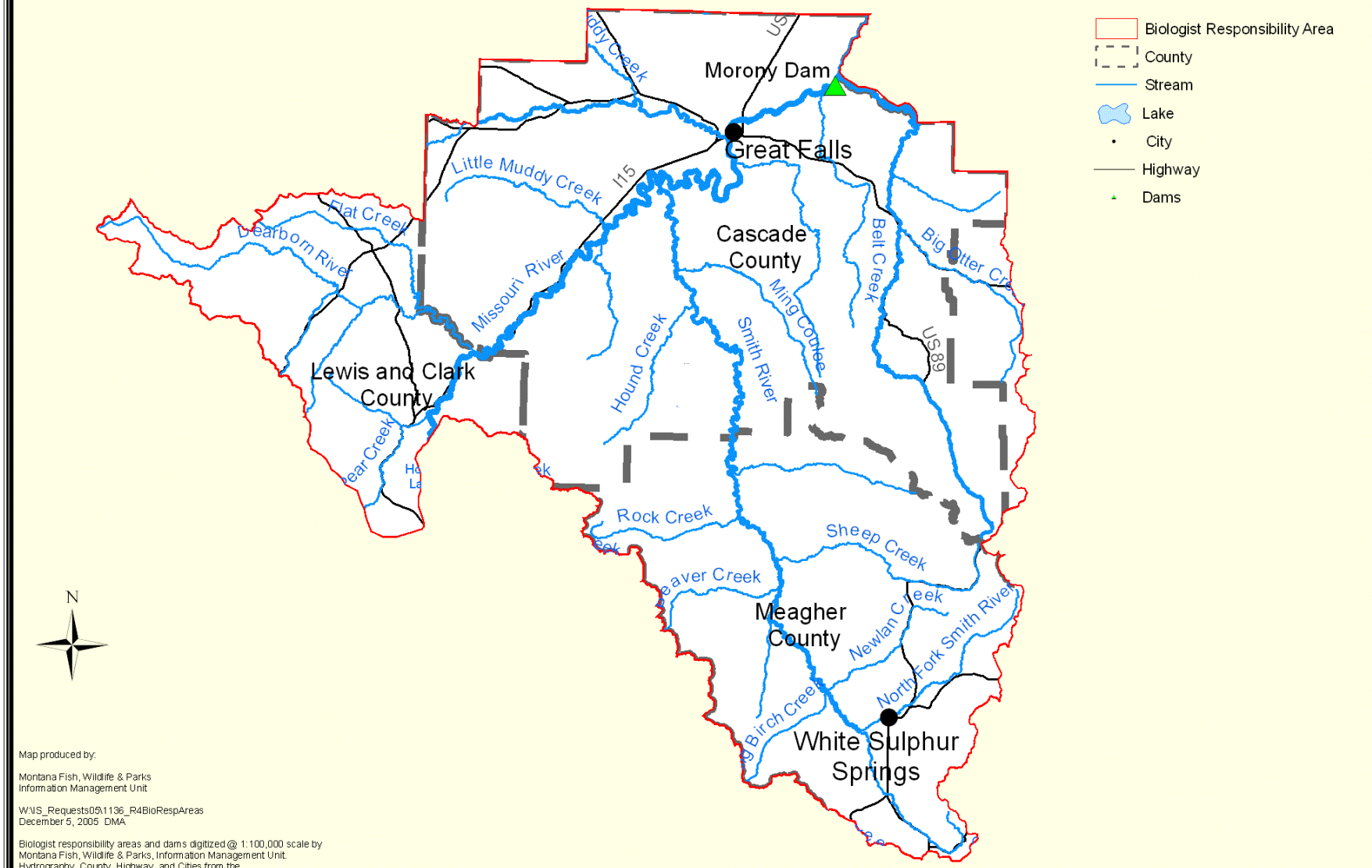

Map produced by:

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 Montana Fish, Wildlife & Parks (MFWP) Fisheries Division 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.

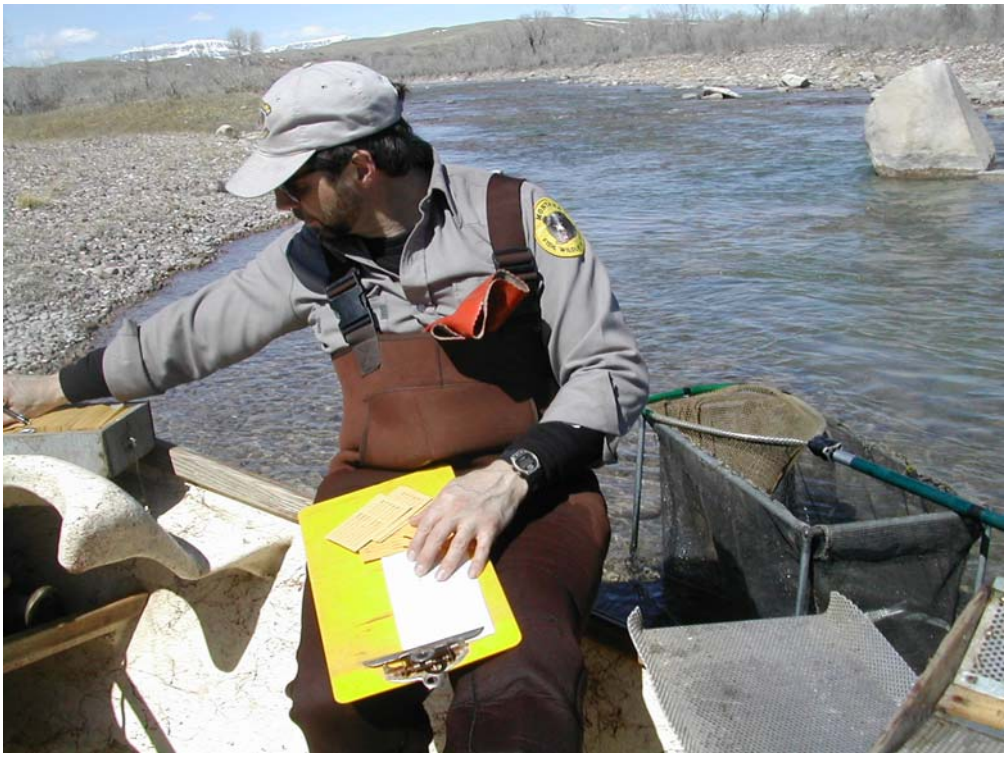
The **Aquatic Education** element of the fisheries program has 11 objectives and the following desired outcomes:

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 2005, fish populations were sampled in the Eagle Creek section of the Smith River using a drift boat equipped with a mobile electrode, a 240-volt portable generator, and a Coffelt VVP-15 or Mark XXII-M to rectify AC to straight DC. Fish sampling was not conducted during 2005 in the Deep Creek section of the Smith River because access to the river was not permitted to MFWP through private land. Since the late 1980s, fish sampling has been conducted in several reaches of the Sun River downstream from Gibson Dam (Table 1). In 1997, sampling was initiated in three long-term fish population-monitoring sections on the Sun River (Augusta-287, Simms, and Sun River sections; Table 1, Figure 1). Sampling was conducted again in all three sections in 2000. Extreme drought conditions in 2001 prohibited sampling in any section, and in 2002 only the Augusta/287 section was sampled. Since 2003, all three sections have been sampled annually. Section lengths on the Augusta/287 and Simms sections have remained consistent at 2.6- and 5.0-miles long, respectively (Table 1). From 1997 through 2003, the Sun River section was 5.3-miles long. The section was shortened to 3.25-miles long in 2004, and then increased to 3.5-miles long in 2005 (Table 1). Fish sampling on the Sun River is similar to the methodology listed for the Smith River, using a drift boat equipped with a mobile electrode, a 240-volt portable generator, and a Coffelt VVP-15 or Mark XXII-M to rectify AC to straight DC. In 2005, 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.



Collecting data on the Sun River

Table 1. Beginning and ending latitude and longitude, section length, and year initiated of fish sampling sections on the Sun River. Sections with multiple years indicate changes in section boundaries. Sections with asterisks indicate the current long-term sampling sections.

		Begin		End		Section
Section	Year	Latitude	Longitude	Latitude	Longitude	Length
Gibson Dam	1988	N47.602730	W112.758572	N47.616118	W112.734186	1.85
Diversion	1987	N47.620926	W112.693166	N47.616239	W112.680593	0.95
Alakali Flats	1988	N47.633550	W112.625811	N47.634148	W112.606868	0.97
Augusta-287 section*	1997	N47.559157	W112.406080	N47.547454	W112.365271	2.60
Augusta Bridge	1987	N47.546945	W112.378063	N47.550168	W112.353987	1.20
Simms section*	1997	N47.512376	W112.008027	N47.502670	W111.932910	5.00
Simms Bridge	1987	N47.506002	W111.945241	N47.501582	W111.931326	0.80
Fort Shaw Bridge	1988	N47.513355	W111.815547	N47.520838	W111.795549	1.50
Sun River section*	1997	N47.527780	W111.710833	N47.537780	W111.630278	4.75
	2000	N47.535120	W111.717760	N47.539191	W111.6365266	5.30
	2004	N47.526649	W111.711370	N47.533703	W111.657622	3.25
	2005	N47.526768	W111.711564	N47.536684	W111.656738	3.50

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). Smith and Missouri River population estimates were calculated using the log-likelihood method (FA+ Program; MFWP 2004), which generates recapture efficiency curves for discrete length groups. Sun River population estimates were calculated using Chapman's modification of the Peterson Method (Ricker 1975). All sampled fish were measured to the nearest 0.1-inch and weights (to the nearest 0.01 pound) were obtained on a minimum 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 determination. 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.

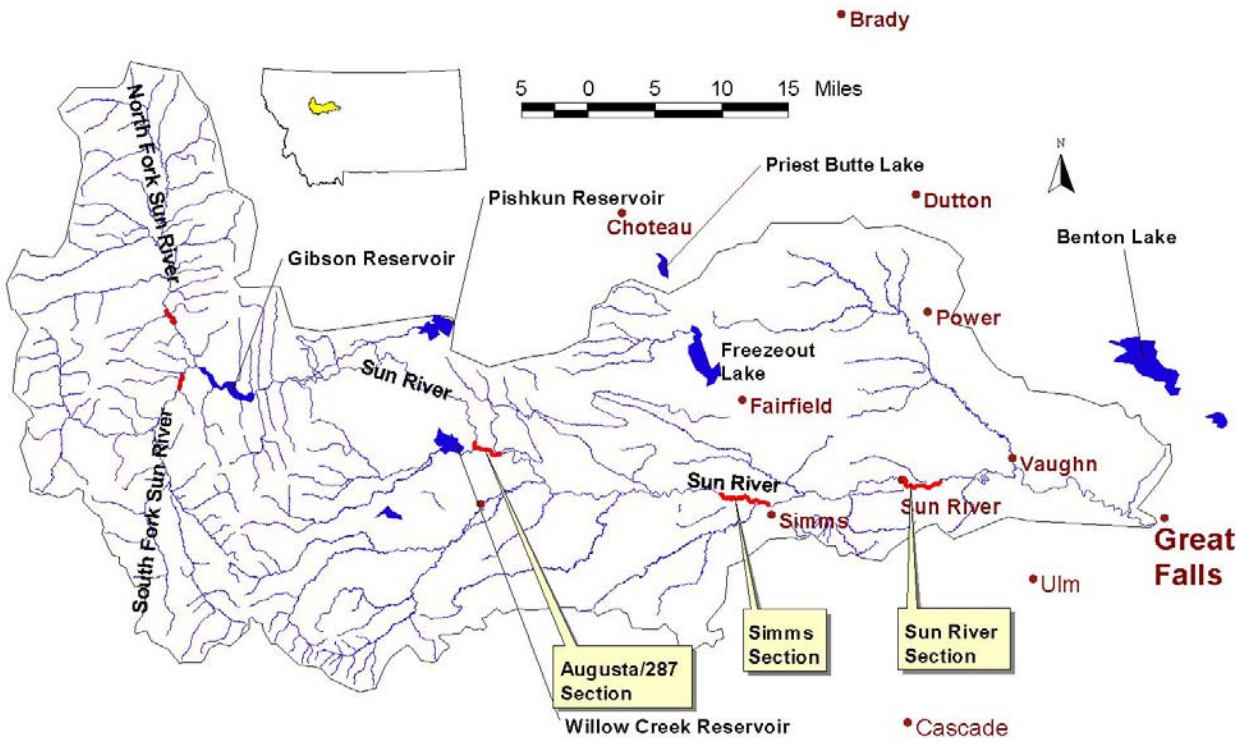


Figure 1. Map illustrating the locations of the Augusta/287, Simms, and Sun River long-term fish population monitoring sections in the Sun River Basin, Montana.

Warmwater Lake Ecosystems

On 20 and 21 April 2005, two 1-inch mesh trap nets and one 3/8-inch mesh trap net were fished overnight on Pelican Point Pond #1 (the big pond to the south). On 13 July 2005, 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 17 and 18 April 2005, one 3/8-inch mesh and three 1-inch mesh trap nets were fished overnight on Wadsworth Pond. On 17 July 2005, 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 Size Structure (PSS) values for quality and preferred size fish (PSS_Q and PSS_P, respectively; Anderson and Newman 1996, Guy et al. 2006) were calculated for largemouth bass, pumpkinseed, and yellow perch based on length categories proposed by Gablehouse (1984).

Coldwater Lake Ecosystems

On 3 Aug 2005, one 125-foot monofilament experimental sinking gill net was fished overnight on Camas Lake, in the upper Smith River Basin. The net was set using a float tube. Standardized angling was also conducted at Camas Lake using artificial flies. All sampled fish were identified and measured to the nearest mm (later lengths were converted to the nearest 0.1 inch). On 3 November 2005, one floating and one sinking 125-foot multifilament experimental gill nets were fished overnight on Newlan Creek Reservoir and Smith River Reservoir. All sampled fish were identified, counted, measured to the nearest 0.1 inch, and weighed to the nearest 0.01 pound.

Camas Lake August 2005

RESULTS AND DISCUSSION

Coldwater Stream Ecosystems

Smith River

The estimated number of 8 inch and longer rainbow trout in the Eagle Creek section of the Smith River was 303 per mile in 2005 (Figure 2). This estimate is only 55% of the long-term average. Extended drought—causing low flows and high water temperatures in late summer—has negatively affected the rainbow trout population over the past six years. Overall, 500 rainbow trout were sampled varying from 6- to 17.7-inches long (mean length was 10.1 inches). The average weight of sampled rainbow trout was 0.44 pounds, and the heaviest rainbow trout sampled weighed 1.96 pounds. Average relative weight of sampled rainbow trout was 94. The estimated number of 8 inch and longer brown trout in the Eagle Creek section of the Smith River was 682 per mile in 2005 (Figure 2). This estimate is 175% of the long-term average. Brown trout densities have been increasing over the past 30 years in the Smith River. These increases may be due to mild winters (increasing the over winter survival of incubating brown trout eggs), harvest regulation changes, and declines in the rainbow trout population. In 2005, 543 brown trout were sampled varying from 6.4- to 21.0-inches long (mean length was 11.0 inches). The heaviest brown trout sampled weighed 3.6 pounds, mean weight was 0.66 pounds, and mean relative weight was 94. Water temperature was recorded throughout the Smith River basin in 2005 (Table 2). Monthly average water temperatures were generally highest in July and increased gradually in a downstream direction. In addition, water temperatures were cooler in the tributaries (North Fork of the Smith and Sheep Creek) than in the mainstem river.

Sun River

Fish have been sampled at various sites in the Sun River since the late 1980s (Table 1). Many of these sampling events only took place in one or two years, and the purpose of the sampling varied. Thus, beginning in 1997, long-term fish population monitoring was initiated on the Sun River in three sections: Augusta/287, Simms, and the Sun River sections (Figure 1). For each Sun River monitoring section, rainbow trout and brown trout data were pooled to calculate population estimates, due to the overall low numbers of trout in the lower Sun River Basin (Figure 3). On average, the Augusta/287 section has the highest trout densities of the three long-term sections (Figure 3). Overall, trout densities are extremely low in the Sun River when compared to other trout rivers in Northcentral Montana. The long-term average trout densities are 116, 43, and 90 rainbow trout and brown trout 8 inches and longer per mile in the Augusta/287, Simms, and Sun River sections, respectively. In comparison, the long-term average density of rainbow trout and brown trout combined in the Smith River is 887 and 429, 8 inches and longer per mile in the Eagle Creek and Deep Creek sections, respectively. Low trout densities are caused by year around chronic de-watering of the Sun River Basin, resulting from large-scale irrigation withdrawals. This is especially true in the Simms section area, where the river typically ceases to flow during the summer, and is reduced to a series of disconnected pools. Despite drought conditions, trout densities have been relatively stable—at the low levels—in all three sections through the period of record. Since 1987, 15 species of fish have been sampled in the Sun River (Appendix 1). Rainbow trout, brown trout, and mountain whitefish are generally the most commonly sampled species. Other species regularly sampled include: mottled sculpin, longnose dace, longnose suckers, white suckers, and mountain suckers.

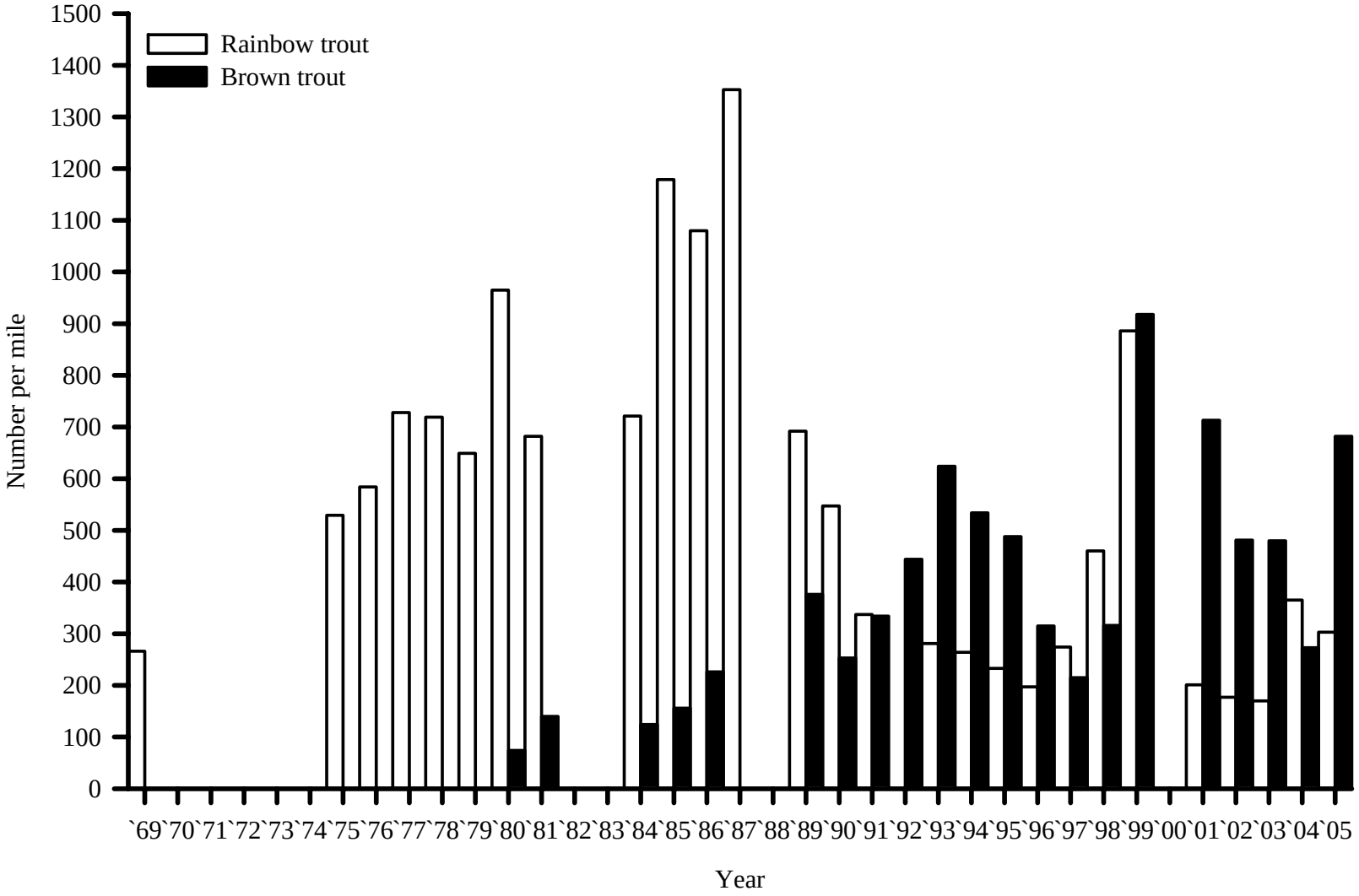


Figure 2. Number of rainbow trout and brown trout 8 inches and longer per mile, in the Eagle Creek section of the Smith River, from 1969 to 2005.

Table 2. Sampling dates, mean, standard deviation, minimum, and maximum water temperature recorded, by section and month on the Smith River in 2005.

Section	Dates		Jul	Aug	Sep	Oct	Nov
North Fork Smith							
	1Jul–29 Sep	Mean	60.1	60.7	52.4		
		SE	0.28	0.56	0.69		
		Min	52.4	49.3	43.5		
		Max	66.8	70.0	63.3		
Near Newlan Cr.							
	1Jul–29 Sep	Mean	62.5	60.6	52.1		
		SE	0.54	0.61	0.78		
		Min	50.9	47.6	41.4		
		Max	72.1	72.1	64.5		
Near Camp Baker							
	1Jul–29 Sep	Mean	65.1	62.3	53.3		
		SE	0.51	0.71	0.76		
		Min	53.9	48.6	43.8		
		Max	74.3	74.0	65.5		
Sheep Creek							
	1Jul–29 Sep	Mean	60.5	58.5	49.5		
		SE	0.51	0.70	0.79		
		Min	49.8	46.5	40.0		
		Max	70.0	70.9	61.3		
Mid Canyon							
	12 Jul–8 Nov	Mean	65.9	62.4	53.0	45.4	37.8
		SE	0.56	0.70	0.80	0.60	0.81
		Min	53.6	51.1	42.5	35.6	33.4
		Max	73.2	72.6	64.4	57.5	43.2
Eden Bridge							
	12 Jul–8 Nov	Mean	68.4	65.4	56.0	48.4	39.5
		SE	0.55	0.68	0.87	0.57	1.00
		Min	56.2	53.2	44.3	38.1	35.3
		Max	77.6	77.0	68.8	59.3	46.5

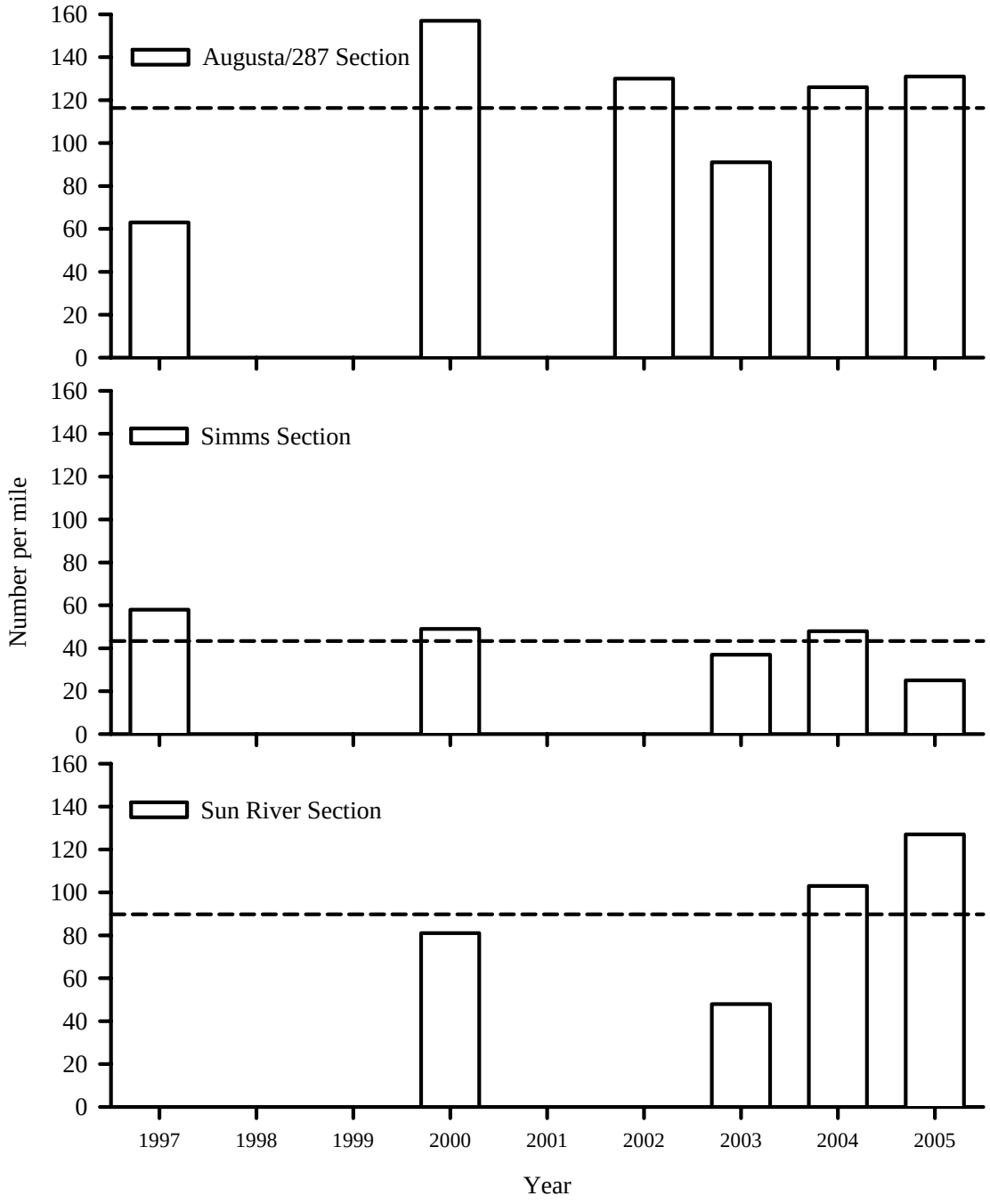


Figure 3. Number of 8 inch and longer rainbow trout and brown trout (combined) by section of the Sun River from 1997 through 2005. Dashed line represents the long-term average.

Infrequently sampled species include: brook trout, common carp, northern pike, burbot, lake chubs, brassy minnow, and stonecats. Early sampling events on the Sun River did not allow for estimates of population size, only relative abundance through CPUE. Two sections in the upper river (Augusta Bridge and Augusta/287 section) and two sections near Simms, MT (Simms Bridge and Simms section) overlap, allowing for comparison of relative abundance over a longer time period (Table 3). Changes in CPUE are evident for mountain whitefish, rainbow trout, and brown trout in the Augusta and Simms areas, however, the reasons for the differences are unknown and may include: different habitat being sampled, differences in season when the sample was taken, changes in irrigation water management, drought, etc. In any case, a dramatic drop in CPUE has been observed for brown trout in the Simms area from 29.2 per pass in 1987 to 3.4 per pass in 2005.

Table 3. Mean catch per unit effort (mobile-probe electrofishing; catch per mile) of mountain whitefish (MWF), rainbow trout (RB), and brown trout 6 inches long and longer (LL) from each section of the Sun River by year and month. The coordinates delineating the starting and ending point for each section can be found in Table 1.

Site	Year	Month	MWF	RB	LL
Augusta Bridge	1987	November	-	2.7	8
Augusta/287 section	1997	April	-	3.5	9.2
	2000	April	7.9	6.5	15.4
	2002	April	2.5	8.7	15.6
	2003	April	12.4	8.6	8.2
	2004	April	9.4	7.9	11.7
	2005	March	1.1	8.4	9.1
Simms Bridge	1987	November	5.8	4.2	29.2
	1988	September	4.1	1.8	19.5
Simms section	1997	April	-	2.1	7.4
	2000	April	17.8	2.0	8.8
	2003	April	7.4	2.6	3.4
	2004	March	3.4	4.0	8.1
	2005	March	2.5	2.8	3.4

Missouri River

In 2005, the estimated number of 10 inch and longer brown trout was 438 per mile in the Craig section of the Missouri River (Figure 4). This estimate is 80% of the long-term (1982-2005) average, and is a slight decrease from the 2004 estimate (Horton and Hamlin 2006). Overall, 1,112 brown trout were sampled varying from 6- to 24.1-inches long. The average length of sampled brown trout was 15.2-inchs long, which was identical to the average length in 2004 (Horton and Hamlin 2006). The heaviest brown trout sampled weighed 4.07 pounds (average weight was 1.44 pounds), and mean relative weight was 91. The mountain whitefish population was surveyed again in the upper 1.75 miles of the Craig section, in the fall of 2005. Similar to 2004, recapture efficiencies were too low to calculate a reliable population estimate, so catch per unit effort (CPUE) was used to monitor relative abundance of mountain whitefish in the section.

The average CPUE of mountain whitefish was 91.6 (SD = 11.3) per pass, which was similar to the 2004 CPUE of 102.6 per pass. The size of sampled mountain whitefish was similar to those sampled in 2004 (Horton and Hamlin 2006). For example, the average length of mountain whitefish in 2004 was 16.4-inches long, compared to 16.3-inches long in 2005. Overall, 733 mountain whitefish were sampled varying from 6.3- to 19.5-inches long. The average weight of sampled mountain whitefish was 1.63 pounds, and average relative weight was 101. For the first time in 4 years, the estimated number of 10 inches and longer rainbow trout per mile increased in the Craig section (Figure 4). The 2005 estimate for 10 inch and longer rainbow trout was 2,860 per mile, which is 98% of the long-term (1982-2005) average. In addition, the number of large (17 inch and longer) rainbow trout increased in 2005 (Figure 5), halting a precipitous decline, which started in 2002. Overall, 4,165 rainbow trout were sampled varying from 6- to 22-inches long. The average length of sampled rainbow trout was 15.6-inches long, and was similar to the average length of sampled rainbow trout in 2004 (Horton and Hamlin 2006). The heaviest rainbow trout sampled weighted 4.49 pounds, and average weight was 1.27 pounds. Finally, average relative weight of sampled rainbow trout was 98 in 2005, which indicates good body condition.

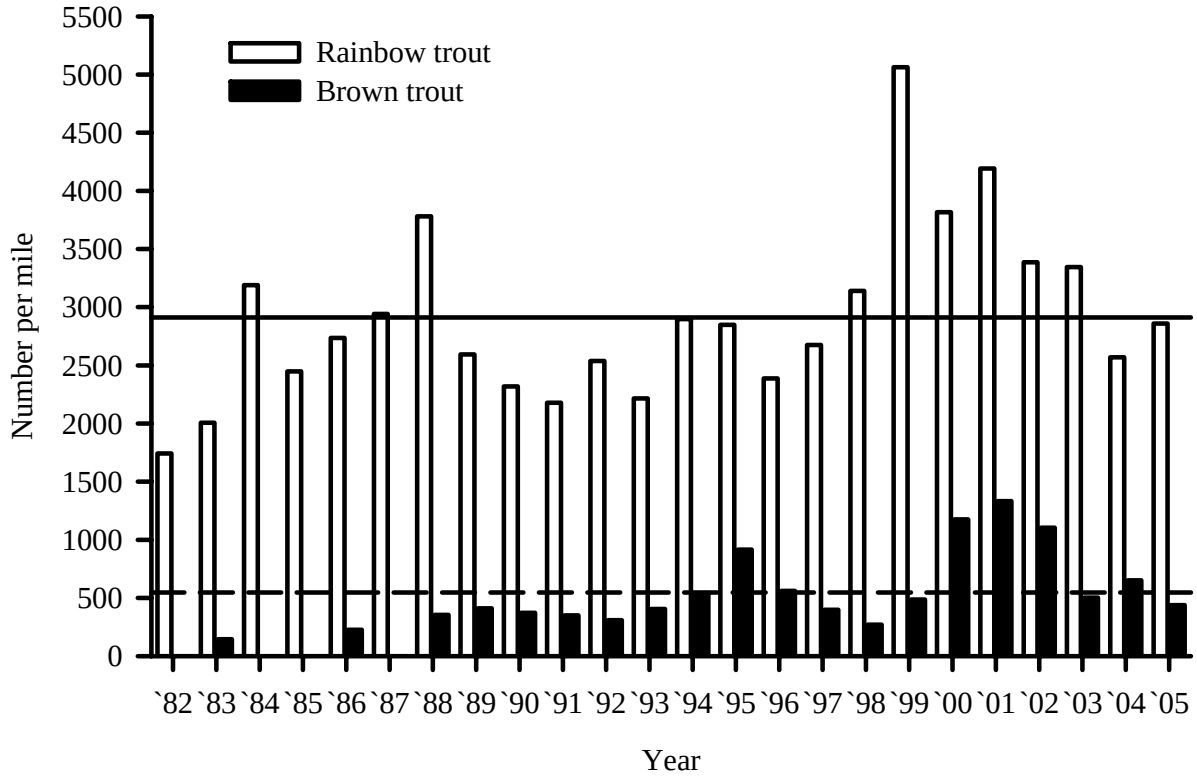


Figure 4. Number of rainbow trout and brown trout 10 inches and longer per mile in the Craig section of the Missouri River, from 1982 to 2005. The solid horizontal line and the dashed horizontal line represent the 1982-2005 average for rainbow trout and brown trout, respectively.

The 2005 estimate for 10 inch and longer brown trout in the Pelican Point section was 670 per mile (Figure 6)—which was 205% of the long-term average—however; the estimate was influenced by poor sampling conditions (high and turbid water) during the recapture sampling

runs. Floods in Little Prickly Pear Creek and the Dearborn River created the sampling conditions experienced. For example, flows in the Pelican Point section of the Missouri River during the mark runs were approximately 3,800 cfs. Flows increased to approximately 7,150 during the recapture runs. These flow conditions decreased sampling efficiency, which likely resulted in an increased estimate of brown trout.

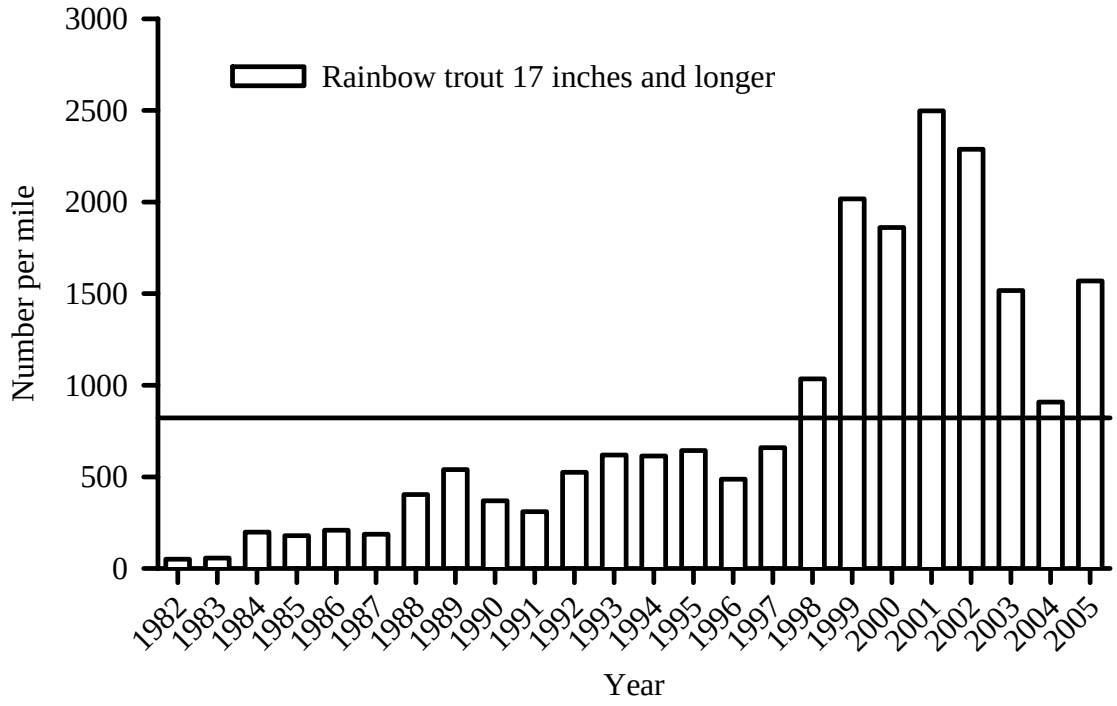


Figure 5. Number of rainbow trout 17 inches and longer per mile in the Craig section of the Missouri River, from 1982 to 2005. Horizontal line represents the 1982-2005 average.

Overall, 529 brown trout were sampled in the Pelican Point section in 2005. The average length of sampled brown trout was 15.1 inches (length varied from 6.0- to 23-inches long). The heaviest brown trout sampled weighed 4.26 pounds (mean length was 1.37 pounds), and relative weight was 90. The estimated number of 10 inch and longer rainbow trout in the Pelican Point section was 1,445 per mile in 2005 (Figure 6). The estimate was 98% of the long-term (1981-2005) average. Overall, 2,537 rainbow trout were sampled varying from 6.1- to 20.9-inches long (average length was 13.0 inches). The average weight of sampled rainbow trout was 0.98 pounds (varying from 0.07 to 3.31 pounds), and average relative weight was 94.

Water temperature was monitored throughout the Missouri River Basin, including major spawning tributaries in 2005. These data are summarized in Table 4.

Warmwater Lake Ecosystems

Pelican Point Ponds

Trap nets sampled three species of fish in Pelican Point Pond #1 in 2005 (Table 5). Pumpkinseed sunfish were the most commonly sampled species in 1-inch mesh trap nets (CPUE = 12.7 per overnight set), but were second to yellow perch in the 3/8-inch mesh trap nets (CPUE

= 6.5 per overnight set, compared to 12.0 for yellow perch). On average, the 3/8-inch mesh trap net selected for smaller pumpkinseed sunfish and yellow perch, compared to the 1-inch mesh trap nets. Average catch rates for the 1-inch nets were similar to the 2004 sample for pumpkinseed sunfish (CPUE = 11.3 in 2004; Horton and Hamlin 2006), but were much lower for yellow perch (CPUE = 84 in 2004; Horton and Hamlin 2006).

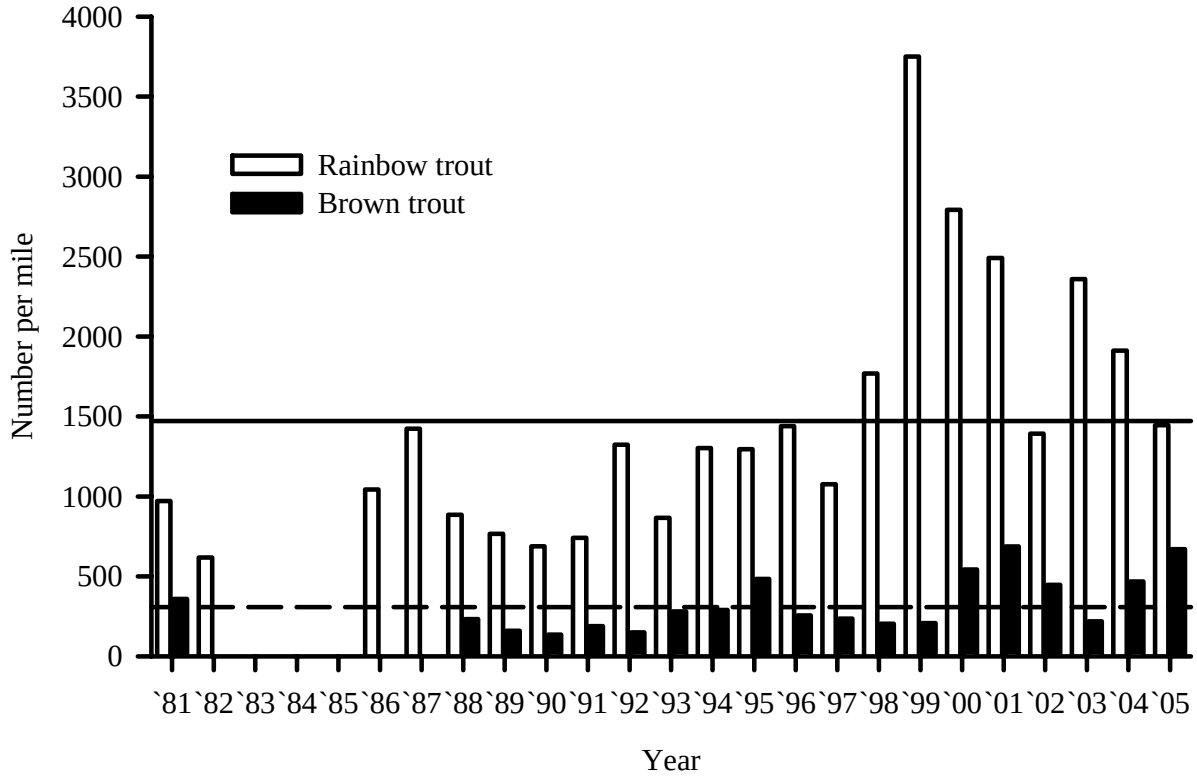


Figure 6. Number of rainbow trout and brown trout 10 inches and longer per mile in the Pelican Point section of the Missouri River, from 1981 to 2005. The solid horizontal line and the dashed horizontal line represent the 1981-2005 average for rainbow trout and brown trout, respectively.

Electrofishing in early summer 2005 sampled three species of fish in Pelican Point Pond #1 (Table 5). Similar to 2004, pumpkinseed sunfish were the most commonly sampled species, followed by yellow perch, and largemouth bass. On average, electrofishing samples selected for smaller pumpkinseed sunfish and yellow perch, compared to either 1-inch mesh or 3/8-inch mesh samples. Although the catch rate of largemouth bass was higher in the 2005 (CPUE = 90) sample compared to the 2004 (CPUE = 22) sample, the average size of sampled largemouth bass was over three-inches shorter. In 2004, over 650 yellow perch were removed from Pelican Point Pond #1 and transferred to the two Hendrickson Ponds, but no improvement was observed in size structure of the remaining yellow perch in 2005. In fact, the average size of sampled yellow perch was 0.2-inches shorter in 2005, than in 2004 (Horton and Hamlin 2006). Furthermore, proportional size structure (PSS) values for quality length (PSS_Q) and preferred length (PSS_P) yellow perch decreased to 4 and 1 in 2005, respectively. PSS_Q and PSS_P values for pumpkinseed sunfish remained at 0 for both size groups in 2005.

Table 4. 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	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Holter (3 May – 14 July)								
Mean	49.7	56.8	59.9					
SE	0.52	0.28	0.32					
Min	44.7	53.6	55.9					
Max	57.5	62.6	63.5					
Craig (1 Jun – 31 Dec)								
Mean		57.1	62.2	64.0	60.0	53.2	45.7	35.2
SE		0.35	0.34	0.23	0.44	0.21	0.52	0.29
Min		52.6	55.1	59.6	54.3	49.6	39.2	32.4
Max		64.2	68.6	70.3	66.5	58.2	52.6	39.8
Mid Cannon (27 Jun – 31 Dec)								
Mean		60.6	63.0	64.4	59.9	53.1	45.4	34.7
SE		0.44	0.33	0.26	0.46	0.23	0.53	0.29
Min		57.7	54.9	59.1	54.0	49.3	38.9	31.8
Max		64.8	69.5	70.4	66.3	57.4	52.4	39.2
Pelican Point (3 May –2 Nov)								
Mean	51.4	57.7	63.5	64.6	59.7	52.9	50.1	
SE	0.62	0.47	0.34	0.30	0.49	0.25	0.43	
Min	43.2	52.1	55.2	59.6	53.5	48.5	48.5	
Max	58.2	65.1	68.9	69.2	65.1	58.2	51.6	
Lyons Creek (3 May – 2 Nov)								
Mean	45.8	49.1	54.7	54.7	50.7	46.6	44.5	
SE	0.29	0.44	0.25	0.30	0.34	0.27	0.48	
Min	39.7	42.5	46.7	48.3	44.7	41.9	42.8	
Max	54.5	61.0	63.3	62.4	57.6	53.1	46.7	
Wolf Creek (3 May – 2 Nov)								
Mean	46.5	51.0	55.9	55.4	52.3	49.1	47.2	
SE	0.40	0.47	0.21	0.24	0.30	0.25	0.82	
Min	40.5	44.4	48.3	49.4	46.3	44.7	45.2	
Max	54.7	62.3	63.5	62.9	58.9	54.7	49.7	

Table 4. Cont.

Site	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				Month				
Little Prickly Pear Creek (2 Nov – 31 Dec)								
Mean							39.0	33.7
SE							0.48	0.31
Min							31.9	31.9
Max							45.0	38.5
Dearborn River (3 May – 2 Nov)								
Mean	48.0	54.6	65.1	64.3	55.8	47.9	42.8	
SE	0.56	0.87	0.45	0.59	0.83	0.48	1.12	
Min	39.9	44.9	53.3	51.0	42.7	38.5	39.3	
Max	58.5	70.1	77.7	77.7	70.4	57.4	49.1	
Sheep Creek (3 May – 14 July)								
Mean	48.5	52.8	61.4					
SE	0.54	0.73	0.56					
Min	40.6	45.0	52.0					
Max	61.5	67.6	73.5					

Largemouth bass PSS_Q decreased from 63 in 2004 (Horton and Hamlin 2006) to 45 in 2005, and PSS_P decreased from 16 in 2004 (Horton and Hamlin 2006) to 9 in 2005. PSS_Q and PSS_P values for largemouth bass, pumpkinseed sunfish, and yellow perch are low indicating that not many large fish exist in the respective populations. In 2006, MFWP plans to stock largemouth bass into Pelican Point Pond #1 to increase predation on the panfish community.

Wadsworth Pond

Many habitat and fish community changes have taken place in Wadsworth Pond over the past several years. Largemouth bass were first stocked in Wadsworth Pond in 1991, but were not stocked again until 1997. Walleye stocking started in 1996. Both walleye and largemouth bass have been stocked annually from 1997 to 2005, when largemouth bass were discontinued due to the occurrence of natural reproduction. In spring of 2003 and 2004, white suckers were removed from Wadsworth Pond in order to reduce their dominance in the fish community (Yerk et al. 2006, Horton and Hamlin 2006). In 2003 white suckers represented 98% and 99% of all sampled fish in 1-inch mesh and 3/8-inch mesh trap nets, respectively. Finally, a dredging project was completed in Wadsworth Pond in late fall 2004. The objective of the dredging was to reduce habitat complexity and to make the pond easier for anglers to fish. The project focused on the southwestern and western edges of the pond—where angler access is easiest and where the pond is the shallowest. In combination, these factors have all influenced the fish community as indicated by spring 2005 netting results(Table 5). The average CPUE for white suckers has declined annually since 2003 (Figure 7), and the average length of sampled white suckers has been increasing since sampling began in 1996. In 2005, white suckers only represented 29% of all species sampled in the 1-inch mesh trap nets. Catch rates of yellow perch increased abruptly in 2004 (Figure 7), likely due to their growth-related increased vulnerability to trap nets. In other words previous to 2004, yellow perch in Wadsworth Pond were not effectively sampled by trap

nets due to their small size, and by 2004 they had grown large (due to fish community manipulations) enough to be sampled effectively. Yellow perch catch rates declined in 2005, but are still higher than the early sampling years. The average length of sampled yellow perch has been increasing since 2001, and in 2005 the average length of sampled yellow perch was over 8-inches long. Walleye catch rates have been increasing since 2002 (Figure 7). Relative weight for sampled walleye has decreased in recent years. Mean walleye relative weight was the highest in 2002 at 109.8, and then declined to 97.7 in 2003, 93.4 in 2004, and 83.7 in 2005. The long-term change in walleye body condition is indicative of higher walleye densities and lower forage fish densities (Figure 7).

A walleye sampled in Wadsworth Pond

Table 5. Catch per unit effort (CPUE) (SD), mean (n=sample size), minimum (min), and maximum (max) length, weight, and relative weight by gear type during 2005 in the Great Falls management area ponds.

Water	Gear	Effort (date)	Species	CPUE (SD)	Length			Weight			Relative Weight		
					Mean (n)	Min	Max	Mean (n)	Min	Max	Mean (n)	Min	Max
Pelican Point Pond #1													
	Trap net (1-inch mesh)												
		2 nets for 2 overnight sets each (all fish combined; length and weight was not recorded from all fish)											
		(20-22 April 2005)	Pump	12.7 (9.29)	4.6 (51)	3.7	5.8	0.02 (22)	0.04	0.12	91.8 (22)	64.3	113.5
			BlCr	0.3 (0.50)	7.2 (1)	-	-	0.22 (1)	-	-	112.4 (1)	-	-
			YP	9.7 (9.00)	6.4 (39)	5.1	8.9	0.11 (39)	0.06	0.29	90.6 (39)	50.4	132.9
	Trap net (3/8-inch mesh)												
		1 net for 2 overnight sets (all fish combined; length and weight was not recorded from all fish)											
			Pump	6.5 (0.71)	4.2 (13)	3.3	4.9	0.05 (13)	0.02	0.10	97.7 (13)	74.8	149.5
			YP	12.0 (4.24)	5.7 (24)	4.1	10.6	0.09 (24)	0.02	0.42	86.8 (24)	49.8	159.4
	Electrofishing												
		1 shoreline pass	Pump	159	3.9 (159)	2.8	5.8	0.05 (47)	0.01	0.12	95.2 (47)	34.6	155.0
		(13 July 2005)	LMB	90	7.0 (90)	3.4	17.0	0.31 (90)	0.02	3.15	118.3 (46)	87.3	151.8
			YP	143	5.6 (143)	3.0	8.0	0.09 (57)	0.02	0.29	91.4 (57)	33.2	168.1
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)											
		(17-19 April 2005)											
			Carp	0.3 (0.52)	11.0 (2)	10.4	11.6	0.84 (2)	0.72	0.96	118.8 (2)	117.0	120.7
			WSu	6.5 (5.82)	14.6 (39)	12.6	16.6	1.44 (39)	0.93	2.05	102.7 (39)	90.8	118.8
			Rb	1.3 (1.86)	17.1 (8)	11.5	19.3	1.86 (8)	0.62	2.30	83.8 (8)	71.4	108.4
			YP	12.2 (10.61)	8.2 (69)	7.0	10.0	0.27 (69)	0.13	0.60	91.7 (69)	62.2	194.1
			WE	1.8 (2.64)	16.8 (11)	8.6	24.3	1.97 (11)	0.20	5.40	83.7 (11)	73.7	101.7
	Trap net (3/8-inch mesh)												
		1 net for 2 overnight sets (all fish combined; length and weight was not recorded from all fish)											
		(17-19 April 2005)	WSu	2.5 (3.54)	14.3 (5)	12.5	16.5	1.32 (5)	0.85	2.00	97.8 (5)	92.5	100.8
			Pump	0.5 (0.71)	4.4 (1)	-	-	0.06 (1)	-	-	96.5 (1)	-	-

Table 5. Cont.

Water	Gear	Effort (date)	Species	CPUE (SD)	Length			Weight			Relative weight		
					Mean (n)	Min	Max	Mean (n)	Min	Max	Mean (n)	Min	Max
Wadsworth Pond Cont.													
	Beach seine (100’ x 10’x ¼”)												
		6 seine hauls (all fish combined; length and weight was not recorded from all fish)											
		(13 July 2005)	Carp	3.3 (2.07)	4.6 (27)	1.0	17.9	2.12 (6)	1.60	2.61	89.3 (6)	88.1	92.4
			LMB	1.7 (2.88)	1.3 (15)	1.2	1.4	-	-	-	-	-	-
			YP	0.8 (1.60)	6.4 (5)	1.9	9.8	0.29 (4)	0.06	2.46	96.9 (4)	78.1	110.6
			WE	5.0 (4.24)	3.7 (30)	2.7	9.5	0.18 (4)	0.11	0.22	86.7 (1)	-	-

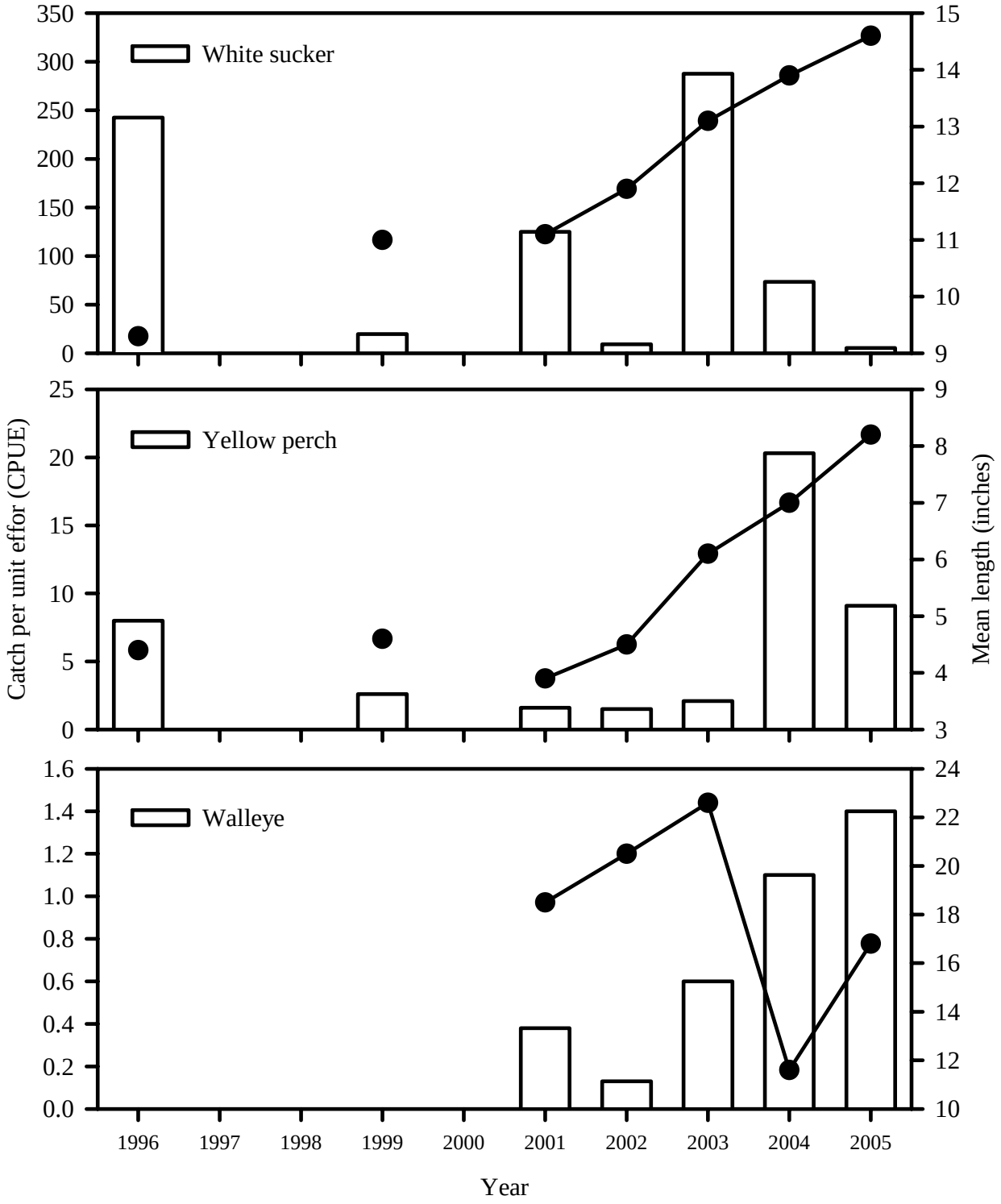


Figure 7. Catch per unit effort (Bars; 1 inch and 3/8 inch trap nets combined) and mean length (line and circles) of white suckers, yellow perch, and walleye sampled in Wadsworth Pond from 1996 through 2005.

Beach seining on 13 July 2005 sampled four species of fish (Table 5). Walleye were the most commonly sampled species (CPUE = 5.0 per seine haul), followed by common carp (CPUE = 3.3), largemouth bass (CPUE = 1.7), and yellow perch (CPUE = 0.8). Since the average length of sampled largemouth bass was 1.3-inches long, it was evident that the fish were newly hatched. Hatchery stocking had not taken place prior to the seining so the sampled largemouth bass were the result of natural reproduction in the pond. Based on seining data, it appears that pumpkinseed sunfish densities have been reduced in Wadsworth Pond. For example, the CPUE decreased from 24.2 pumpkinseed sunfish per seine haul in 2002 (Yerk et al. 2005), to 1.7 per haul in 2004 (Horton and Hamlin 2006), to 0 per haul in 2005.

Based on catch rate and body condition data, it appears that walleye may be overabundant in Wadsworth Pond. In addition, the density of walleye appears to be influencing the fish community overall, causing reductions in density and changes in size structure of prey species. Based on these conclusions, MFWP changed the stocking regime for walleye from 5,000 every year to 5,000 every other year, beginning in 2005. Despite all of the recent changes in the habitat and the fish community in Wadsworth Pond, anecdotal reports by anglers indicate that fishing is poor. Hopefully, the fish community changes will result in a better fishery in future years.

Coldwater Lake Ecosystems

Camas Lake

Camas Lake, in the Big Belt Mountains, Meagher County, was stocked with Yellowstone cutthroat trout (YCT) in 1938 and 1940. Subsequent to the initial stocking, natural reproduction has sustained the fish population. On 26 September 1966, one 125-foot monofilament experimental gill net was fished overnight on Camas Lake (MFWP unpublished data). Twenty-nine YCT were sampled during the overnight set, varying from 5.8- to 15.7-inches long (mean length = 9.5 inches). The heaviest fish sampled weighted 1.53 pounds, and the average weight of sampled YCT was 0.39 pounds. On 5 August 1971, one 125-foot monofilament experimental gill net was fished overnight on Camas Lake (MFWP unpublished data). Thirty YCT were sampled, varying from 6.1- to 14.3-inches long (mean length = 8.7 inches). No weights were recorded on the fish sampled in 1971. In 2005, one 125-foot monofilament experimental gill net was fished overnight on Camas Lake, and standardized angling was conducted (Table 6). Although, the gill net catch rate of YCT was lower than those from 1966 and 1971, the average size of sampled fish was similar. For example, a total of 18 YCT were sampled in the gill net varying from 5.7- to 11.5-inches long, with a mean length of 9.7 inches. Angling proved to be an effective method to sample YCT in Camas Lake. Overall, 39 YCT were caught using fly-fishing equipment in 7 hours of fishing. Thus, the average angling catch rate was 5.6 YCT per hour. The average length of angled YCT (7.9-inches long) was smaller than those sampled in the gill net. In terms of size structure and relative abundance, the self-sustaining YCT population in Camas Lake appears to be temporally stable.

Newlan Creek Reservoir

In 2005, Westslope cutthroat trout were stocked into Newlan Creek Reservoir instead of YCT. Gill nets sampled five species of fish, including WCT (Table 6).

Table 6. 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 2005.

					Length			Weight			Relative Weight		
Water	Gear	Effort	Species	n	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Camas Lake													
	Gill net[1]	18.7h/overnight set	YCT	18	10.6	8.8	11.5						
	Angling	2 anglers 14 h total	YCT	34	7.8	4.7	9.2						
Newlan Creek Reservoir													
	Gill net[2]	18.2h/overnight set	burbot	1	22.5			2.40			82.3		
			LnSu	1	13.5								
			RB	7	12.0	9.5	15.1	0.67	0.33	1.16	83.4	74.8	88.9
			WCT	1	12.2			0.68			98.6		
	Gill net[3]	18.5h/overnight set	burbot	9	16.9	11.2	24.8	1.30	0.33	3.37	85.9	64.3	98.8
			LnSu	56	14.7	8.3	17.5	1.26	0.15	1.98			
			RB	2	15.9	14.8	17.0	1.20	0.95	1.44	68.1	68.0	68.1
			YCT	1	13.6			0.89			92.3		
Smith River Reservoir													
	Gill net[2]	16.3h/overnight set	LnSu	6	18.1	15.9	19.2	2.46	1.70	3.03			
			MWF	2	14.3	12.5	16.1	1.12	0.67	1.56	97.9	94.2	101.7
			RB	2	16.3	16.0	16.6	1.50	1.39	1.61	80.3	78.8	81.8
	Gill net[3]	16.3h/overnight set	burbot	18	15.8	12.3	20.5	0.88	0.40	1.92	80.8	60.2	95.5
			LnSu	21	16.8	6.8	19.7	2.01	0.14	3.41			
			MWF	1	17.0			1.85			102.2		
			RB	7	14.2	7.2	17.1	1.19	0.12	1.70	83.2	71.3	98.2
			WSu	3	14.6	12.1	18.6	1.45	0.76	2.73	98.7	91.5	108.1

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

Brown trout were stocked in 2003, but were not stocked in 2004 or 2005 due to PCB contamination related production changes at the Big Springs Fish Hatchery in Lewistown Montana. Longnose suckers were the most commonly sampled fish species in 2005 [CPUE = 28.5 per net (sinking and floating gill nets pooled)], followed by rainbow trout (CPUE = 4.5 per net), burbot (CPUE = 4.5 per net), YCT (CPUE 0.5 per net) and WCT (CPUE 0.5 per net). Since 2002, rainbow trout, YCT, and longnose sucker catch rates have been decreasing, and burbot catch rates have been increasing (Figure 8). However, water temperature at the time of sampling may be influencing catch rates of individual species. The average size of sampled rainbow trout increased for a third year in a row to 12.9-inches long in 2005. The weight of sampled rainbow trout varied from 0.33 to 1.44 pounds, and the average relative weight was 80, which was similar to the 2004 sample (Horton and Hamlin 2006). The average length of burbot sampled in 2005 was 17.5 inches, average weight was 1.41 pounds, and average relative weight was 85.5.

Smith River Reservoir

In 2005, gill nets sampled five species of fish in Smith River Reservoir (Table 6). Longnose suckers were the most commonly sampled species (CPUE = 13.5), followed by burbot (CPUE = 9), rainbow trout (CPUE = 4.5), mountain whitefish (CPUE = 1.5), and white sucker (CPUE = 1.5). Similar to Newlan Creek Reservoir, the catch rates of rainbow trout, longnose suckers, and white suckers have been decreasing over recent years, but catch rates of burbot have been increasing (Figure 9). In fact, the 2005 catch rate for burbot was 3 times higher than the long-term average. This pattern was also observed in 2004, and may be due to cooler water temperatures at the time of sampling. The average length of longnose suckers was 17.1 inches in 2005. On average, longnose suckers sampled in 2005 were 2.3 inches longer in Smith River Reservoir, compared to those sampled in Newlan Creek Reservoir. In addition, rainbow trout sampled in Smith River Reservoir were larger than the rainbow trout sampled in Newlan Creek Reservoir. For example, the average length of rainbow trout sampled in Smith River Reservoir was 14.7-inches long (varying from 7.2- to 17.1-inches long), and the average length of rainbow trout sampled in Newlan Creek Reservoir was 12.9-inches long (varying from 9.5- to 17.0-inches long).

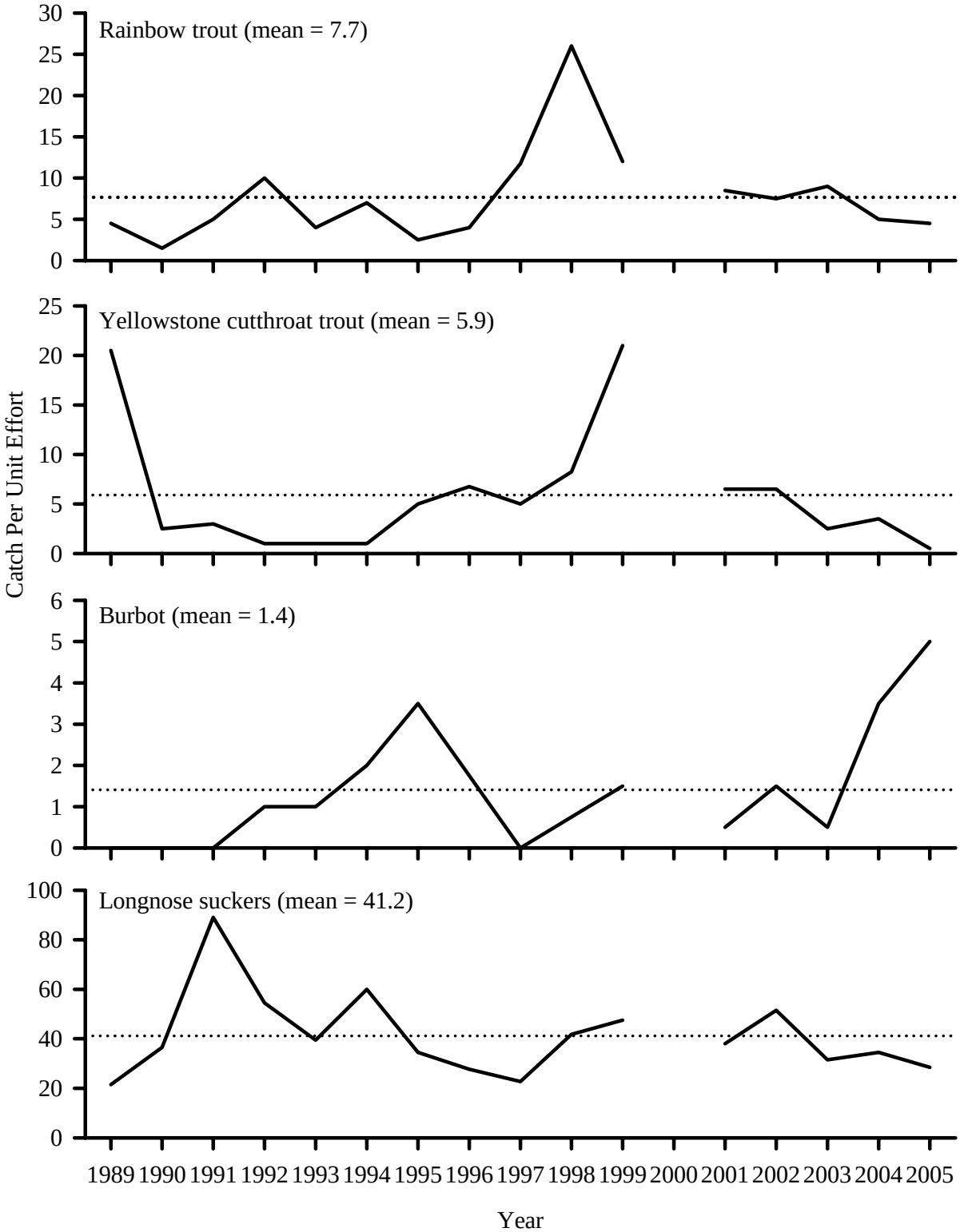


Figure 8. Mean (floating and sinking nets were pooled) catch per unit effort for gill nets on Newlan Creek Reservoir, by species. The dotted line represents the long-term mean.

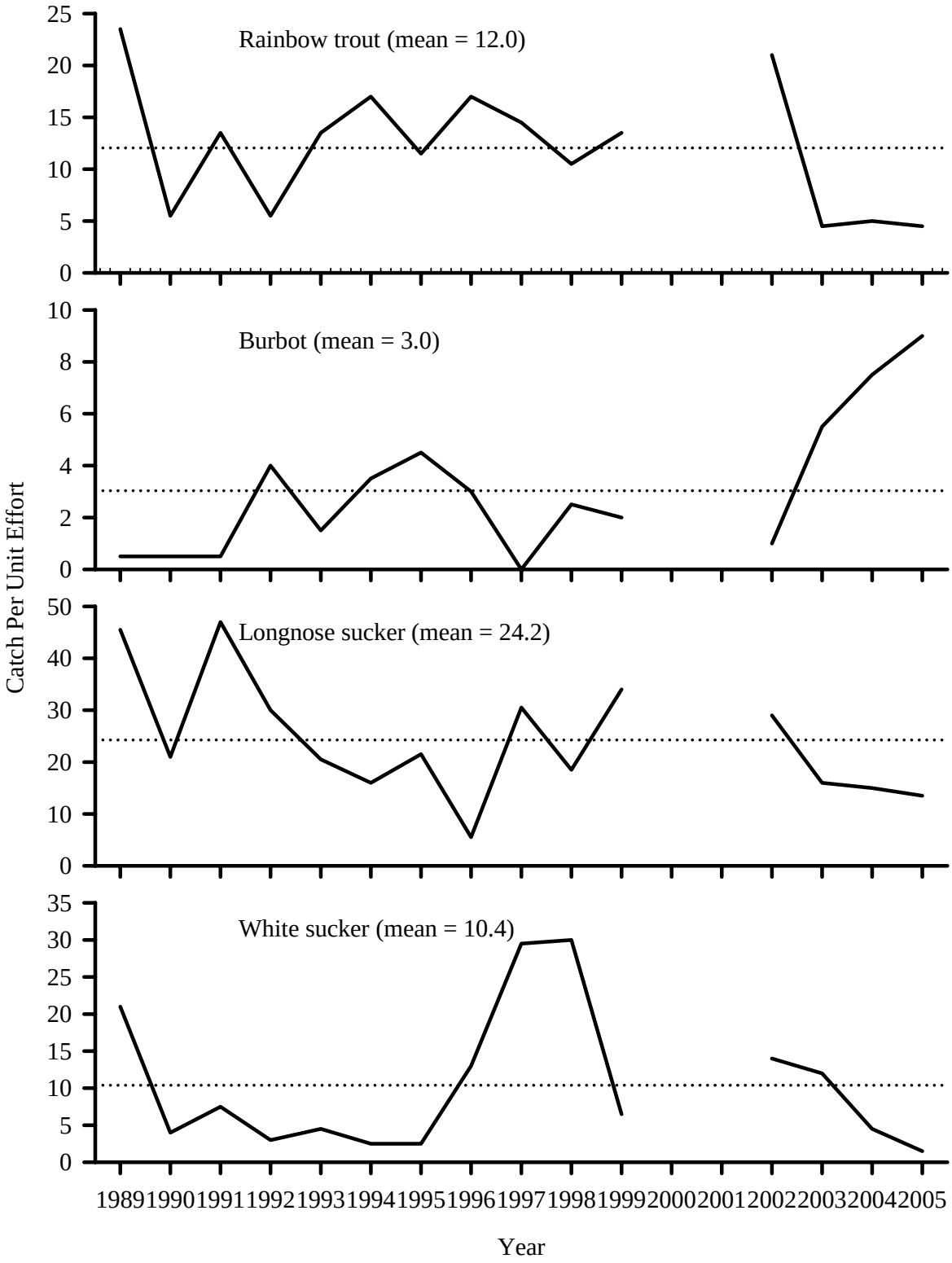


Figure 9. Mean (floating and sinking nets were pooled) catch per unit effort for gill nets on Smith River Reservoir, by species. The dotted line represents the long-term mean.

HABITAT PROTECTION

During the reporting period in the Great Falls area, 100 Natural Streambed and Land Preservation Act (310) and 13 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*	
Longnose dace *Rhinichthys cataractae*	
Brassy minnow *Hybognathus hankinsoni*	
Catostomidae	
Longnose sucker *Catostomus catostomus*	LnSu
White sucker *Catostomus commersonii*	WSu
Mountain sucker *Catostomus platyrhynchus*	MtnSu
Ictaluridae	
Stonecat *Noturus flavus*	
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
Gadidae	
Burbot *Lota lota*	
Cottidae	
Mottled sculpin Cottus bairdi	
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

17-4896	Missouri River from Cascade, MT bridge to Holter Dam
17-6832	Smith River from Hound Creek to Camp Baker
17-8784	Camas Lake
17-9330	Newlan Creek Reservoir
17-9393	Pelican Point Pond #1
17-9616	Smith River Reservoir (Sutherlin Reservoir)
20-6100	Sun River from Gibson Dam to Muddy Creek
20-8470	Wadsworth Pond

Appendix 1. Number sampled (n), mean, minimum (min), and maximum (max) of length, weight, and relative weight by section, species and year for fish sampled in the Sun River, Montana.

		Length				Weight				Relative weight			
Species	Year	n	Mean	Min	Max	n	Mean	Min	Max	n	Mean	Min	Max
Gibson section													
Rainbow trout	1988	18	8.2	2.9	14.4	12	0.38	0.10	1.16	12	83.6	63.6	103.0
Brook trout	1988	2	8.5	7.3	9.7	2	0.22	0.10	0.34	2	84.1	69.2	99.0
Mottled sculpin	1988	*	-	-	-	-	-	-	-	-	-	-	-
Diversion section													
Longnose sucker	1987	4	11.7	5.0	15.0	3	1.10	0.97	1.27	-	-	-	-
Mountain sucker	1987	1	5.7	-	-	1	0.10	-	-	-	-	-	
Rainbow trout	1987	22	7.2	4.6	13.8	20	0.20	0.03	0.80	20	93.0	58.8	124.8
Brook trout	1987	1	6.1	-	-	1	0.06	-	-	1	71.7	-	-
Brown trout	1987	1	12.6	-	-	1	0.69	-	-	1	88.7	-	-
Mountain whitefish	1987	4	5.1	3.5	6.2	2	0.08	0.07	0.08	2	106.7	94.5	118.9
Mottled sculpin	1987	*	-	-	-	-	-	-	-	-	-	-	-
Alakali Flats section													
Rainbow trout	1988	40	5.1	2.6	16.6	16	0.20	0.04	1.58	11	85.1	68.4	104.7
	1997	11	8.3	5.2	16.6	11	0.37	0.04	1.64	16	97.3	59.1	118.4
Brown trout	1988	14	14.2	3.9	23.0	13	1.33	0.24	3.40	25	82.9	53.1	105.0
	1997	30	13.7	3.5	20.7	30	1.29	0.02	3.45	13	87.8	73.6	99.4

Appendix 1. Cont.

		Length				Weight				Relative Weight			
Species	Year	n	Mean	Min	Max	n	Mean	Min	Max	n	Mean	Min	Max
Alakali Flats section													
Mountain whitefish	1988	40	10.6	3.6	18.0	35	0.50	0.08	1.66	35	86.1	71.4	102.7
Augusta/287 section													
Longnose dace	2000	10	4.0	2.9	5.0	5	0.03	0.01	0.04	-	-	-	-
	2002	6	3.7	2.9	5.1	6	0.03	0.01	0.06	-	-	-	-
	2003	31	3.4	2.0	4.4	20	0.02	0.01	0.05	-	-	-	-
	2004	11	3.5	2.2	4.2	7	0.03	0.02	0.04	-	-	-	-
	2005	3	4.5	4.3	4.8	1	0.03	-	-	-	-	-	-
Longnose sucker	2000	4	5.1	4.3	6.0	1	0.1	-	-	-	-	-	-
	2002	2	4.5	3.5	5.5	2	0.05	0.02	0.08	-	-	-	-
	2003	7	6.4	3.8	16.0	7	0.26	0.02	1.51	-	-	-	-
	2004	6	5.4	4.6	6.7	6	0.08	0.05	0.13	-	-	-	-
	2005	2	5.1	4.6	5.5	2	0.07	0.06	0.08	-	-	-	-
White sucker	2000	3	14.6	7.6	18.3	3	2.30	0.19	3.40	3	117.1	93.6	134.9
	2003	1	3.8	-	-	1	0.03	-	-	-	-	-	-
	2004	1	7.6	-	-	1	0.20	-	-	1	98.5	-	-
	2005	3	9.4	5.4	12.1	3	0.42	0.06	0.73	3	84.3	80.6	91.6
Mountain sucker	2000	6	5.7	5.0	6.7	6	0.08	0.05	0.11	-	-	-	-
	2002	2	4.6	4.5	4.6	2	0.09	0.08	0.10	-	-	-	-
	2003	10	5.3	4.5	6.6	10	0.07	0.04	0.12	-	-	-	-
	2004	12	5.6	4.3	6.6	12	0.07	0.04	0.11	-	-	-	-
	2005	5	5.9	4.5	7.1	4	0.08	0.03	0.13	-	-	-	-

Appendix 1. Cont.

		Length				Weight				Relative weight			
Species	Year	n	Mean	Min	Max	n	Mean	Min	Max	n	Mean	Min	Max
Rainbow trout	1997	19	13.3	3.5	21.7	19	1.22	0.02	4.02	18	92.9	71.2	138.4
	2000	87	10.0	3.2	20.3	84	0.67	0.02	2.77	66	86.7	56.0	122.4
	2002	114	9.8	2.9	20.6	114	0.62	0.01	3.01	91	92.6	41.6	250.9
	2003	125	7.7	.0	19.4	120	0.34	0.01	2.29	89	90.1	62.1	156.8
	2004	109	10.0	3.3	23.0	108	0.70	0.01	4.02	89	92.3	58.8	154.0
	2005	136	10.8	3.2	22.2	136	0.86	0.01	3.56	100	88.9	60.2	200.8
Brook trout	2003	1	6.2	-	-	-	0.08	-	-	1	91.0	-	-
Brown trout	1997	49	15.1	3.7	23.9	49	1.53	0.03	5.00	44	87.7	73.8	115.5
	2000	151	14.0	3.7	23.6	151	1.15	0.03	4.89	140	88.0	66.3	111.8
	2002	142	14.8	5.0	22.5	142	1.24	0.04	3.20	136	85.0	59.7	138.6
	2003	114	11.7	3.4	23.3	102	1.09	0.01	3.54	78	84.5	59.8	122.2
	2004	145	10.6	3.4	21.6	145	0.74	0.01	3.04	111	85.3	55.2	149.5
	2005	92	13.5	3.8	21.1	91	1.12	0.02	3.18	81	82.4	46.2	103.3
Mountain whitefish	2000	122	9.1	4.3	20.5	122	0.44	0.02	2.77	84	91.0	59.9	127.0
	2002	27	11.9	3.9	19.8	27	0.94	0.02	2.28	20	88.3	65.4	152.5
	2003	177	8.5	4.0	20.2	169	0.34	0.01	2.33	113	92.8	72.4	121.0
	2004	110	10.5	4.1	20.2	110	0.56	0.02	2.33	87	91.1	45.9	158.5
	2005	35	8.2	4.3	20.5	26	0.55	0.02	2.42	13	85.2	73.6	102.0
Mottled sculpin	2000	*	-	-	-	-	-	-	-	-	-	-	-
	2003	21	2.8	1.5	4.2	2	0.02	0.02	0.02	-	-	-	-
	2004	5	2.9	2.5	3.4	3	0.03	0.02	0.03	-	-	-	-
Augusta Bridge section													
Longnose dace	1987	*	-	-	-	-	-	-	-	-	-	-	-

Appendix 1. Cont.

		Length				Weight				Relative weight			
Species	Year	n	Mean	Min	Max	n	Mean	Min	Max	n	Mean	Min	Max
Augusta Bridge Sections													
Lake chub	1987	*	-	-	-	-	-	-	-	-	-	-	-
Longnose sucker	1987	*	-	-	-	-	-	-	-	-	-	-	-
Mountain sucker	1987	6	5.7	5.1	6.3	1	0.10	-	-	-	-	-	-
Rainbow trout	1987	4	12.0	6.5	17.9	4	0.90	0.11	2.06	4	95.8	86.3	103.5
Brown trout	1987	14	8.5	3.9	16.5	12	0.35	0.04	1.47	12	91.3	59.8	111.6
Mountain whitefish	1987	2	14.1	13.3	14.9	2	0.92	0.86	0.98	2	90.5	80.8	100.1
Mottled sculpin	1987	*	-	-	-	-	-	-	-	-	-	-	-
Simms section													
Longnose dace	2000	15	3.5	2.7	4.5	5	0.03	0.02	0.04	-	-	-	-
	2003	45	3.0	2.1	4.2	2	0.02	0.01	0.02	-	-	-	-
	2004	9	3.2	2.3	4.6	1	0.03	-	-	-	-	-	-
	2005	19	3.1	2.2	4.3	15	0.04	0.01	0.10	-	-	-	-
Longnose sucker	2000	13	5.9	3.5	17.5	3	0.75	0.07	2.08	-	-	-	-
	2003	19	7.1	3.1	15.8	19	0.37	0.02	1.72	-	-	-	-
	2004	7	6.3	3.8	15.0	4	0.45	0.06	1.56	-	-	-	-
White sucker	2000	15	10.9	4.2	17.4	14	0.96	0.05	2.58	14	96.0	44.0	130.1
	2003	53	10.5	3.8	18.2	52	0.99	0.02	2.54	51	92.6	39.3	124.4
	2004	21	8.3	4.2	16.9	18	0.57	0.03	2.80	18	97.2	75.2	131.6
	2005	10	6.6	3.3	15.4	10	0.30	0.04	1.86	9	91.0	60.1	114.9

Appendix 1. Cont.

		Length				Weight				Relative weight			
Species	Year	n	Mean	Min	Max	n	Mean	Min	Max	n	Mean	Min	Max
Simms section													
Mountain sucker	2000	2	5.5	5.5	5.5	2	0.06	0.06	0.06	-	-	-	-
	2003	17	4.3	3.3	6.7	17	0.06	0.04	0.13	-	-	-	-
	2004	13	4.3	2.9	5.6	7	0.06	0.04	0.13	-	-	-	-
	2005	4	4.1	3.8	4.5	4	0.04	0.02	0.06	-	-	-	-
Rainbow trout	1997	18	15.3	12.0	21.3	18	1.40	0.64	3.35	18	92.3	80.3	109.1
	2000	27	10.4	3.4	20.2	27	0.72	0.02	2.73	21	89.2	67.7	103.1
	2003	25	13.1	6.1	21.6	25	1.09	0.08	3.10	25	89.0	74.5	125.7
	2004	30	9.1	3.4	20.1	25	0.60	0.02	2.58	21	89.7	57.4	125.5
	2005	46	11.0	3.5	21.5	46	0.86	0.02	3.30	34	86.9	34.9	129.7
Brown trout	1997	71	16.2	4.5	22.5	71	1.61	0.05	3.77	70	89.5	71.5	161.0
	2000	113	11.8	3.6	21.5	113	0.89	0.02	3.32	82	85.3	48.6	188.7
	2003	33	15.6	6.0	21.0	33	1.47	0.06	2.68	33	80.9	69.3	96.2
	2004	106	11.7	3.6	23.2	96	1.01	0.02	3.72	79	83.9	56.7	126.3
	2005	40	11.3	4.2	21.2	40	0.86	0.03	2.98	31	89.0	71.3	114.0
Mountain whitefish	2000	204	11.2	4.0	18.3	185	0.67	0.02	2.04	166	90.0	50.2	126.4
	2003	71	10.2	6.0	19.3	71	0.44	0.06	1.98	71	97.3	64.8	121.6
	2004	47	9.0	4.0	16.9	47	0.41	0.02	1.72	34	99.5	70.4	130.8
	2005	59	7.3	3.7	17.6	59	0.25	0.02	1.76	27	91.5	61.0	116.9
Burbot	2003	2	20.2	20.0	20.4	2	1.53	1.5	1.54	2	71.8	70.2	73.4
Mottled sculpin	2003	1	2.3	-	-	-	-	-	-	-	-	-	-
	2004	*	-	-	-	-	-	-	-	-	-	-	-
	2005	0	2.6	2.3	2.9	2	0.03	0.02	0.03	-	-	-	-

Appendix 1. Cont.

		Length				Weight				Relative weight			
Species	Year	n	Mean	Min	Max	n	Mean	Min	Max	n	Mean	Min	Max
Simms Bridge													
Longnose dace	1987	*	-	-	-	-	-	-	-	-	-	-	-
Lake chub	1987	*	-	-	-	-	-	-	-	-	-	-	-
Longnose sucker	1987	*	-	-	-	-	-	-	-	-	-	-	-
Mountain sucker	1987	6	5.7	6.3	1	0.10	-	-	-	-	-	-	-
Rainbow trout	1987	5	10.4	7.6	13.5	5	0.47	0.18	0.85	5	98.2	86.5	105.6
	1988	5	11.2	4.7	17.2	4	1.09	0.25	2.30	4	108.7	94.2	115.0
Brown trout	1987	65	9.6	3.3	22.5	39	1.21	0.24	3.54	38	90.6	59.8	195.4
	1988	56	12.4	3.1	23.1	40	1.72	0.16	4.32	40	93.4	67.6	113.1
Mountain whitefish	1987	2	14.1	13.3	14.9	2	0.92	0.86	0.98	2	90.5	80.8	100.1
Burbot	1988	2	13.3	13.0	13.5	2	0.57	0.52	0.62	2	90.5	87.5	93.5
Mottled sculpin	1987	*	-	-	-	-	-	-	-	-	-	-	-
Ft. Shaw Bridge													
Longnose sucker	1988	6	4.6	3.4	7.0	1	0.10	-	-	-	-	-	-
White sucker	1988	8	8.3	5.4	15.2	6	0.40	0.09	1.30	6	86	73.8	102.5
Mountain sucker	1988	4	4.9	4.5	5.6	-	-	-	-	-	-	-	-

Appendix 1. Cont.

		Length				Weight				Relative weight			
Species	Year	n	Mean	Min	Max	n	Mean	Min	Max	n	Mean	Min	Max
Ft. Shaw Bridge													
Rainbow trout	1988	3	12.2	10.2	14.5	3	0.74	0.53	1.05	3	104.8	87.3	127.7
Brown trout	1988	16	11.5	3.2	20.2	15	0.88	0.03	2.90	14	90.4	77.6	103.8
Mountain Whitefish	1988	40	10.2	4.0	16.6	37	0.46	0.06	1.54	37	86.8	68.4	142.8
Mottled sculpin	1988	*	-	-	-	-	-	-	-	-	-	-	-
Sun River													
Common carp	2000	*	-	-	-	-	-	-	-	-	-	-	-
	2003	1	25.6	-	-	1	11.6	-	-	-	-	-	-
	2004	1	11.2	-	-	1	0.86	-	-	1	116.1	-	-
Sun River													
Longnose dace	2000	2	3.1	2.7	3.5	1	0.01	-	-	-	-	-	-
	2003	25	2.9	2.6	3.4	-	-	-	-	-	-	-	-
	2004	1	2.3	-	-	-	-	-	-	-	-	-	-
	2005	4	3.6	3.4	3.9	2	0.03	0.02	0.04	-	-	-	-
Brassy minnow	1	2.2	-	-	-	-	-	-	-	-	-	-	-
Lake chub	2004	1	4.0	-	-	1	0.02	-	-	-	-	-	-

Appendix 1. Cont.

		Length				Weight				Relative weight			
Species	Year	n	Mean	Min	Max	n	Mean	Min	Max	n	Mean	Min	Max
Sun River													
Longnose sucker	2000	4	13.3	5.6	16.4	4	1.28	0.10	1.90	-	-	-	-
	2003	12	9.5	4.7	16.7	12	0.62	0.03	2.00	-	-	-	-
	2004	2	16.0	15.7	16.3	2	1.58	1.52	1.64	-	-	-	-
	2005	2	11.2	6.5	15.8	2	0.88	0.16	1.60	-	-	-	-
White sucker	2000	60	14.1	6.1	20.4	60	1.51	0.10	3.67	-	-	-	-
	2003	137	11.0	4.0	18.0	130	0.99	0.02	2.98	-	-	-	-
	2004	39	13.2	4.8	18.3	39	1.42	0.04	3.36	39	107.7	76.1	129.2
	2005	59	13.7	5.0	18.5	59	1.52	0.01	3.18	59	104.7	55.4	129.5
Mountain sucker	2000	4	5.4	4.7	6.3	4	0.06	0.04	0.10	-	-	-	-
	2003	3	5.7	4.9	6.3	2	0.09	0.08	0.10	-	-	-	-
Stonecat	2005	1	7.3	-	-	1	0.14	-	-	-	-	-	-
Northern pike	2005	1	17.7	-	-	1	1.40	-	-	1	106.5	-	-
Rainbow trout	1997	5	14.0	12.6	15.3	5	1.03	0.73	1.43	-	-	-	-
	2000	22	11.2	9.1	15.4	22	0.52	0.22	1.22	22	87.3	74.9	99.6
	2003	26	11.2	5.8	15.1	26	0.54	0.26	1.29	25	92.5	77.3	102.3
	2004	33	11.2	4.6	15.9	33	0.57	0.04	1.45	32	91.9	70.2	115.7
	2005	67	11.6	5.4	20.2	67	0.64	0.05	2.80	83	88.5	52.8	182.5
Brown trout	1997	28	13.2	4.5	19.5	27	1.05	0.05	2.73	-	-	-	-
	2000	82	12.4	4.3	20.9	82	0.85	0.03	2.90	75	87.4	62.9	149.5
	2003	40	10.3	4.4	21.1	40	0.71	0.02	3.42	32	93.1	70.0	133.4
	2004	75	10.3	4.0	23.3	75	0.64	0.02	4.36	66	85.6	53.1	123.5
	2005	96	11.9	4.6	21.5	83	0.89	0.08	3.20	83	88.5	52.8	182.5

Appendix 1. Cont.

		Length				Weight				Relative weight			
Species	Year	n	Mean	Min	Max	n	Mean	Min	Max	n	Mean	Min	Max
Sun River													
Mountain whitefish	2000	627	10.9	4.5	16.7	627	0.54	0.03	1.69	587	99.6	64.4	140.9
	2003	696	9.6	2.9	17.2	694	0.43	0.01	1.92	648	105.4	65.2	155.0
	2004	636	9.7	4.4	16.3	571	0.40	0.02	1.27	545	106.6	28.9	151.0
	2005	315	10.3	4.8	17.2	288	0.52	0.05	1.96	288	100.8	37.9	182.7
Burbot	1997	1	17.1	-	-	1	0.99	-	-	-	-	-	-
	2000	2	26.1	24.6	27.5	2	3.84	3.15	4.53	-	-	-	-
Mottled sculpin	2000	*	-	-	-	-	-	-	-	-	-	-	-
	2003	4	3.2	2.9	3.4	2	0.02	0.02	0.02	-	-	-	-
	2004	1	2.7	-	-	-	-	-	-	-	-	-	-

*Species was sampled but no length or weight was recorded.