Section 1
Management Plan Area

The Upper Missouri River Reservoir Management Plan area is comprised of a portion of the Missouri River from Toston Dam, approximately 18 miles south of Townsend, to Holter Dam, approximately 30 miles north of Helena (Figure 1). Three reservoirs are included in the management area: Canyon Ferry, Hauser, and Holter. Two river sections are included in the area: from Toston to Canyon Ferry Reservoir and the Hauser Tailrace from Hauser Dam downstream 4.6 miles to Holter Reservoir. A variety of important fish species are present within the management area. Rainbow trout, kokanee salmon, yellow perch, brown trout, burbot (ling), and walleye are among the species of greatest interest to the public. Canyon Ferry Reservoir is the first major storage impoundment on the Missouri River. Hauser and Holter reservoirs lie about 3 and 30 miles downstream from Canyon Ferry, respectively. Downstream movement of hatchery rainbow trout from Canyon Ferry to Hauser and Holter reservoirs has been documented during periods of high surface water releases (Skaar and Humphrey 1996) and flushing of walleye out of Canyon Ferry has heavily influenced species composition in the downstream reservoirs.

Combined, the upper Missouri River reservoir system accounted for 7.7% of the fishing pressure in Montana in 2007. Fishing pressure on these reservoirs is high relative to other bodies of water in Montana. These reservoirs traditionally are in the top 5 most heavily fished waters in Montana with Canyon Ferry averaging 92,527 angler days (1989-2007), Hauser averaging 58,487 angler days (1989-2007) and Holter averaging 60,657 angler days (1989-2007). This level of pressure equates to an average 15.4 angler days per acre on Hauser, 12.6 days per acre on Holter, and 2.6 angler days per acre on Canyon Ferry. In 2007, Canyon Ferry was the third most heavily fished water in the state, and was the number one flatwater fishery in Montana (Figure 2). Hauser Reservoir was the most heavily fished body of water in the state in 1991 (Figure 2). This was attributable to a booming kokanee salmon population that resulted in a record 141,000 kokanee harvested in 1991. Since 1999 total angler pressure in the reservoir system has declined 31.5%, with Canyon Ferry pressure declining 30.5% and Holter declining 46% between 1999 and 2007 (Figure 2). Angler use in Hauser declined through the early 2000s, however pressure has increased 2.5% from 1999 to 2007 (Figure 2). Statewide angling pressure has also declined over that time, decreasing 25.4% from 1999 to 2007.

Canyon Ferry Reservoir and Missouri River (Toston Dam to Canyon Ferry Reservoir)

The Toston Dam to Canyon Ferry Reservoir reach of the Missouri River has been managed for wild trout since 1973, although hatchery stocking of Canyon Ferry Reservoir has resulted in significant seasonal movement of hatchery fish into this reach of the Missouri River. The sport fishery is primarily comprised of brown trout and rainbow trout. Although this reach of river is located downstream from Toston Dam, it does not have characteristics of tailwater fisheries similar to reaches of the Missouri River below Canyon Ferry, Hauser and Holter dams because the low head structure (26 feet) does not disrupt natural temperature extremes. Toston Dam is located 23 miles above Canyon Ferry Reservoir and is a barrier to upstream migrating fish. The 23-mile reach of the river upstream of Canyon Ferry Reservoir represents a transition area of the upper Missouri where cold-water species of fish and invertebrates thrive during average precipitation years or cool/wet years. During dry/warmer summers, this reach of the Missouri River becomes unsuitable for cold-water species of fish and invertebrates. Since the Canyon

Ferry/Missouri River fishery is linked by seasonal migrations, the reservoir and the river must be managed as a system.

Canyon Ferry Dam and Reservoir is operated by the BOR for power production, flood control, irrigation, recreation, and as a municipal water source. Canyon Ferry has been in full operation for the past 54 years. At full pool, Canyon Ferry has a surface area of 35,200 acres and a volume of nearly 2 million acre-feet. It is about 25 miles long and 1 to 4.5 miles wide. Canyon Ferry is a moderately deep reservoir, with an average depth of 58 feet and maximum depth near the dam of 160 feet (Table 4). The upper, southern half of the reservoir is characterized by low relief, relatively shallow depth (less than 50 feet), and gently sloping shorelines. It is frequently subject to strong winds, especially during the spring months. The lower, northern half is more protected and is characterized by cliffs and steeply sloping, rocky shorelines, particularly on the western shore. Depths tend to increase rapidly to greater than 60 feet a short distance from the shoreline. Submerged or emergent aquatic vegetation is almost totally absent in the reservoir (McMahon 1992).

The shoreline length of Canyon Ferry at full pool is 76 miles. The shoreline development factor, an index of the irregularity of the shore, is 2.9 (Rada 1974), reflecting a relatively uniform shoreline (1.0 is a circle) punctuated by a number of small coves and bays located near the mouths of tributary streams. Land immediately surrounding the reservoir is principally owned by the BOR with some private land. BOR manages recreational areas, including campgrounds, boat ramps, and day-use areas around the reservoir. Major tributaries to the reservoir include Duck Creek, Confederate Gulch, Hellgate Creek, Avalanche Creek, Magpie Creek, and Beaver Creek (Figure 3).

Reservoir Operation

Rapid filling of the reservoir begins in early May with peak storage occurring in late June to early July, followed by a steady decrease (about 2 feet per month) during the summer period of high irrigation use (July-September). Decreases in reservoir volume continue throughout the fall and winter in preparation for storage of spring run-off. The retention time of water in the reservoir averages 135 days, but ranges from 50-200 days depending on reservoir elevation and inflow-outflow regimes (Horn and Boehmke 1998). The storage ratio (reservoir water volume divided by average annual water release) averages 0.53. The annual water level fluctuation (drawdown) averages about 12 feet (McMahon 1992).

Canyon Ferry Reservoir is typically drawn down to its minimum level in March, and then is refilled during the March to June period. A reservoir operations steering committee comprised of Fish, Wildlife & Parks (FWP), PPL Montana, Bureau of Reclamation (BOR), irrigators and sportsmen have formulated operational guidelines for Canyon Ferry Reservoir to balance recreational values and minimize impacts to fish and wildlife. This committee meets annually to review operational guidelines.

Discharge from Canyon Ferry Dam occurs at various outlets: the radial gates near the top of the spillway (30 feet deep); power penstocks (94 feet); irrigation outlet (110 feet); and the river outlet (147 feet). The power penstocks are usually the main release point, except in spring and summer when additional releases are made from the spillway, irrigation, and river outlets (Rada 1974). Releases from the radial gates typically occur during June and July following peak river run-off. Radial gate spills occur in roughly two out of every three years, with an average duration of 30-45 days (McMahon 1992). Canyon Ferry has a generating capacity of 50-megawatts.

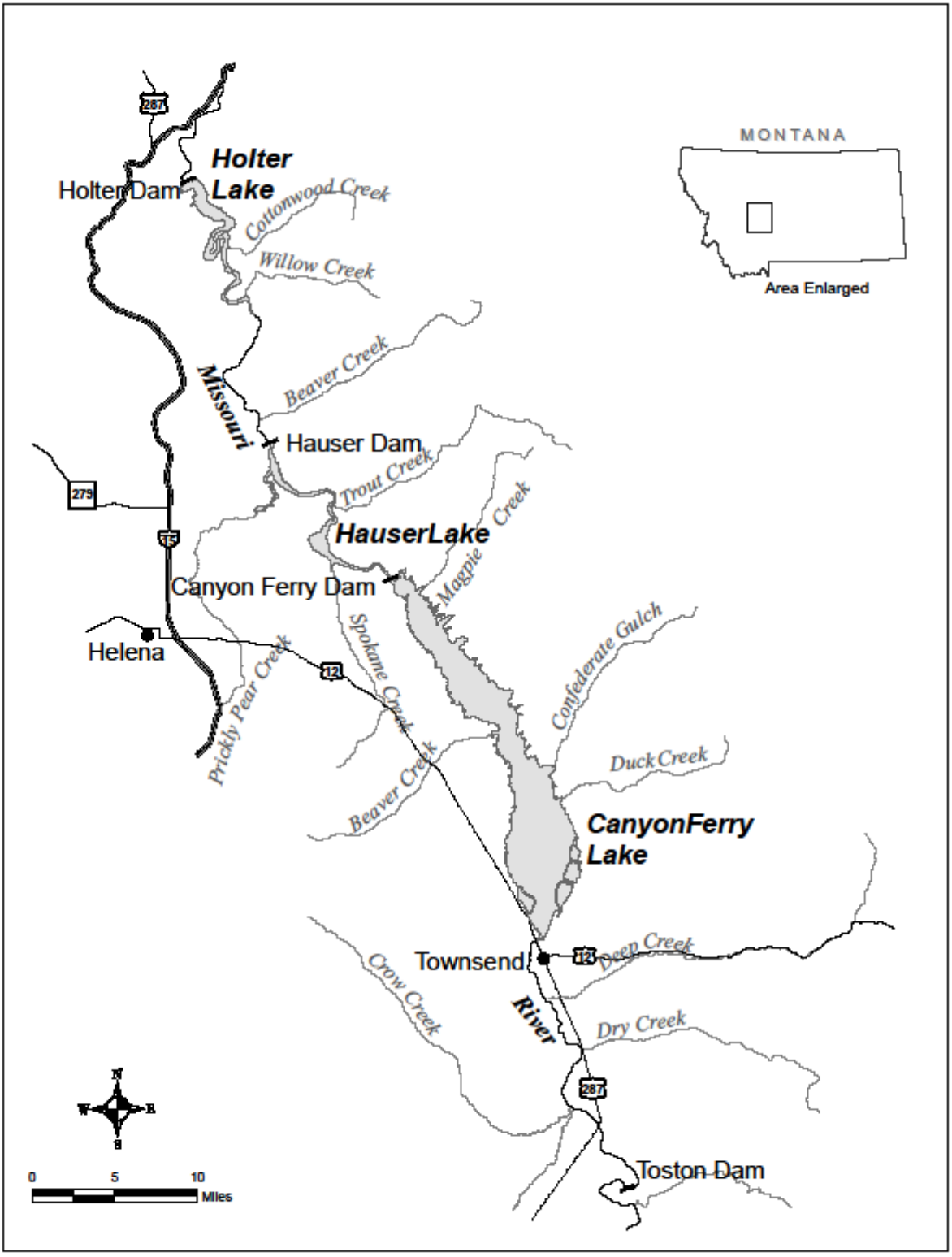

Figure 1. Upper Missouri River Reservoir Management Area.

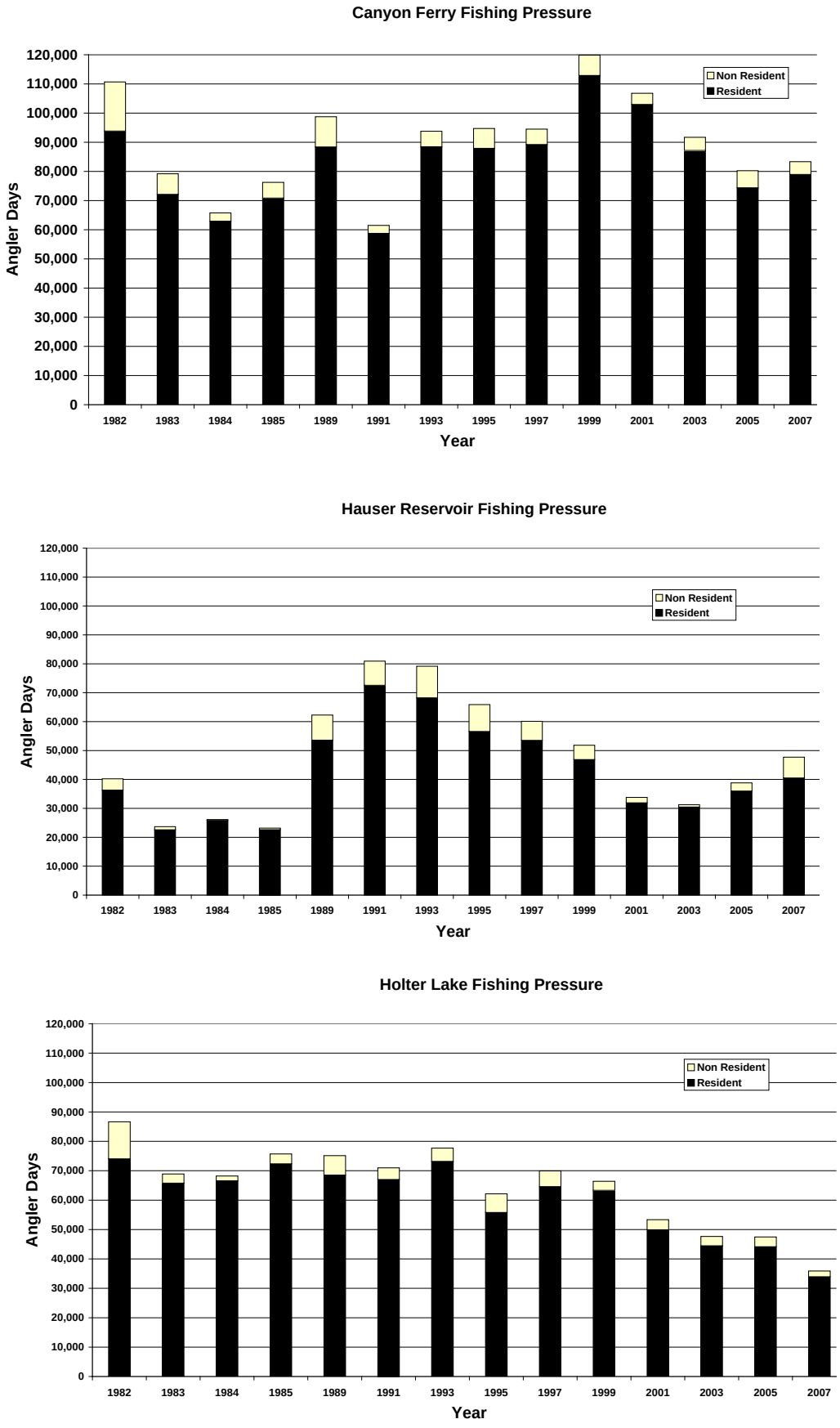

Figure 2. Resident and Non-Resident Angler Days on Canyon Ferry, Hauser, and Holter Reservoirs, 1982-2007.

Fisheries and Water Quality

Canyon Ferry Reservoir

The sport fishery of the Canyon Ferry Reservoir/Missouri River system is primarily comprised of rainbow trout, brown trout, yellow perch, burbot (ling), and walleye. Other game fish species in the system are not abundant enough to provide significant sport fishing opportunities, including smallmouth bass, largemouth bass, bluegill, and northern pike. Non-game species in this system are abundant, but not particularly diverse. The three primary nongame species include common carp, longnose sucker, and white sucker. Anglers at Canyon Ferry Reservoir have historically sought rainbow trout and yellow perch during ice free months of the year, and the development of a walleye population in the late-1990s has become a significant component of the summer fishery. Yellow perch were particularly popular during the winter ice-fishing season, however recent declines in perch abundance have been detrimental to the sport fishery. Burbot (ling) are also a popular sport fish during the winter and early spring season and remain an important component of the winter fishery. Walleye, yellow perch, and burbot sustain populations entirely through natural reproduction. Rainbow trout in Canyon Ferry Reservoir are primarily sustained through hatchery plants. Natural reproduction accounts for less than 10% of the total population of rainbow trout.

Brown trout populations are typically sustained by natural reproduction, and supplemental imprint stocking of brown trout that occurred in the Missouri River in the mid-1990s proved unsuccessful at increasing brown trout numbers in the river or the reservoir. Brown trout have provided an important trophy component to the fishery in the past, but low numbers of brown trout have resulted in low catch rates in Canyon Ferry Reservoir and the Missouri River upstream to Toston Dam since the mid-1990s.

Walleye have become a significant component of the Canyon Ferry fishery, especially during the summer fishing season. This population has expanded rapidly since the late 1990s and is now one of the most sought after species in the reservoir. Prior to 1996, no walleye were observed in the standard roving creel census and reports of walleye caught by anglers were uncommon. In summer 2008, 28.4% of anglers were fishing for walleye exclusively and 43.6% were targeting walleye in combination with some other species, such as trout.

Angling pressure at Canyon Ferry typically ranks near the top of the statewide angling pressure survey, averaging about 92,527 angler days from 1989-2007 (Figure 2). Angling pressure peaked at 119,886 angler days in 1999 and has averaged 96,083 angler days from 1997-2007. Approximately one third of the angling pressure at Canyon Ferry (35, 000 angler days) occurs during the relatively short ice-fishing season of January, February, and early March. Overall angler pressure on Canyon Ferry has decreased 30.5% from 1999 to 2007 (Figure 2).

Results from an angler satisfaction survey completed during the 2007 license year indicate a general lack of satisfaction with the current fishery in Canyon Ferry reservoir (FWP 2008). On a scale of 1 to 5 where 1 = poor and 5 = excellent, 33.2% rated 1 (poor), 26.7% rated 2, 27% rated 3, 8.2% rated 4, and 4.7% rated 5 (excellent).

Water transparency (Secchi disc depth) averages about 10 feet. Transparency varies by a factor of two to three from the upper to the lower reservoir, averaging 6, 10, and 15 feet in the upper (Silos), mid (White Earth), and lower (Cemetery) sections during the summer. A detailed limnological analysis of the reservoir in the early 1970s classified Canyon Ferry as mesotrophic or of intermediate fertility on the scale between shallow, nutrient-rich, often turbid eutrophic waters and clear, deep, nutrient-poor

oligotrophic waters (Rada 1974). More recent studies have found little change in nutrient levels and trophic status of the reservoir (Horn and Boehmke 1998). Dissolved oxygen (DO) levels recorded for Canyon Ferry surface waters are excellent, with minimum values typically exceeding 7 mg/l (Priscu 1986, Thomas 1992). However, Rada (1974) reported that DO levels fell below 5 mg/l during summer at depths below the thermocline (60 feet) near the dam. Low DO levels may affect some cold water fish species and can create a low DO plume in Hauser Reservoir. The pH levels in Canyon Ferry vary between 7 and 8.5 (Rada 1974).

Surface temperatures typically warm to 55^{o}F by late May, peak near 70^{o}F in early August, and cool to below 50^{o}F by late October. The combination of wind action and a deep reservoir outlet (94 feet at power penstock) results in a deep, weakly developed thermocline in Canyon Ferry. Water in the upper reservoir tends to remain mixed throughout the ice-free season (April-December) because of shallow depths and frequent winds. In the middle and lower reservoir, a weak thermocline is present from June through August at a depth near 60 feet (McMahon 1992).

Missouri River (Toston Dam to Canyon Ferry Reservoir)

Drought conditions in the early 2000s have had detrimental effects to the Missouri River fishery between Toston Dam and Canyon Ferry. Catch per unit effort (CPUE) electrofishing surveys conducted annually in the fall indicate that mountain whitefish and rainbow trout abundance has declined drastically, while brown trout abundance remains at low levels. The rainbow fishery in this section is highly dependent upon stocking in Canyon Ferry, and rainbow CPUE in the river has increased slightly in recent years. This is likely due to improved water flows and modifications to the stocking regime in the reservoir.

Abundance of brown trout in the river has changed little over the past ten years. Brown trout have always comprised a small component of the Canyon Ferry fishery, and have been historically present in low to moderate numbers in the river. Spawning habitat and dewatering of spawning tributaries—factors that have been further enhanced due to the recent drought—have typically limited brown trout abundance in the river. It appears that two distinct populations have developed in this portion of the Missouri River/Canyon Ferry system. One population completes their entire life cycle within the Missouri River and its tributaries, while the other population depends on the Missouri River and its tributaries for reproduction, spending the remainder of their life cycle in Canyon Ferry Reservoir. Brown trout rearing in the reservoir become larger than those that reside in the Missouri River. Both populations appear to be limited by their ability to recruit and are declining.

CPUE electrofishing surveys in this reach of the Missouri River during 2008 indicate that mountain whitefish are the most abundant fish species in the river, followed by suckers, rainbow trout, carp, and brown trout. Use of the river by walleyes appears limited, as most walleye captured during electrofishing surveys are captured in the first two miles upstream of the reservoir. Recent increase in abundance of northern pike in the Toston Dam area are cause for concern in regards to fish management in the system, as northern pike would be an additional predator in an already prey-depleted system.

Table 4. Physical Characteristics of Canyon Ferry, Hauser, and Holter Reservoirs.

Characteristic	Reservoir		
	Canyon Ferry	**Hauser**	**Holter**
Impounded River	Missouri River	Missouri River	Missouri River
Surface Area (acres)	35,200	3,800	4,800
Mean Depth (feet)	58	26	50
Maximum Depth (feet)	164	70	121
Shoreline Length (miles)	76 miles	31 miles	50 miles
Age (years)	54 years	98	105
Drainage Area (square miles)	15,904	16,876	17,149
Avg. water retention time (days)	135	8	21
Discharge Type Spill gates a) Bottom b) Mid-depth c) Surface Turbines d) Bottom e) Mid-depth f) Surface	River Outlet Gates: 138 feet Surface to 31 feet Turbine outlet 91 feet	Spill gates – surface (0-14 feet) Turbines – 16-32 feet	Spill cap (0-6 feet) Spill gates (6-16 feet) “Exciter Unit” – 25-29 feet Turbines – 24-32feet
Surface elevation at full pool (feet above sea level)	3797 feet	3650 feet	3578 feet
Average annual pool height fluctuation (avg pool ht – avg drawdown height) (feet)	12 feet	2 feet	2 feet

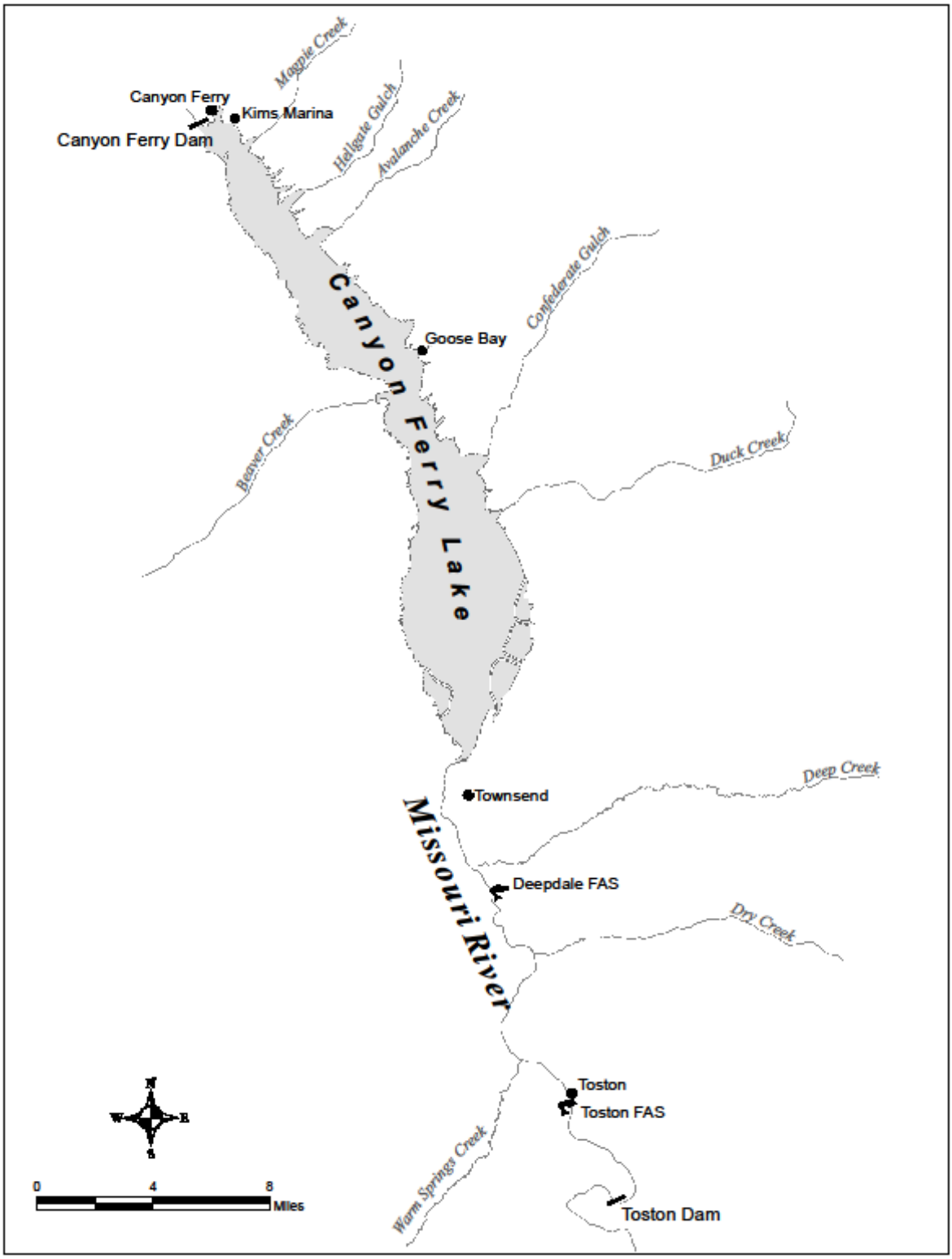

Figure 3. Canyon Ferry Reservoir and the Missouri River from Toston Dam to Canyon Ferry.

Hauser Reservoir, Holter Reservoir, and Missouri River (Hauser Tailwater)

Hauser and Holter are the second and third reservoirs below Canyon Ferry (Figure 4). These two upper Missouri River reservoirs differ significantly from Canyon Ferry Reservoir in that they are "run-of-the-river" facilities. This means that approximately the same volume of water flowing into the reservoirs is released. Hauser and Holter dams were constructed in 1911 and 1904 for the purpose of generating electric power and both reservoirs have limited storage capacity. The dams were historically owned and operated by the Montana Power Company; however the dams were purchased by Pennsylvania Power and Light Montana, now known as PPL Montana, in 1999. A 4.6-mile reach of the Missouri River is located between Hauser Dam and Holter Reservoir. This unique segment of river flows through a narrow, high-walled gorge for most of its length prior to entering upper Holter Reservoir.

Hauser Reservoir has a surface area of about 3,800 acres and stores approximately 98,000 acre-feet of water at full pool (Table 4). The Reservoir is about 15.5 miles in length and is relatively narrow, ranging from about 0.1 to 1.1 miles in width. The average depth of the reservoir is 26 feet, with a maximum depth of 70 feet. Important tributaries to Hauser Reservoir include Prickly Pear, Silver, Trout, Spokane and McGuire creeks (Figure 4).

A biologically important feature of Hauser is Lake Helena, which is a large, shallow water body connected to the Causeway Arm by a narrow channel. This impoundment was created when Hauser Dam inundated the lower reach of Prickly Pear Creek. Lake Helena connects to Hauser Reservoir through the Causeway Arm, which enters the reservoir about 1.5 miles upstream from Hauser Dam. The Causeway Arm is 3.9 miles in length from its Hauser Reservoir outlet to the Lake Helena Causeway bridge. The outlet works of the Lake Helena Causeway consist of a narrow rectangular concrete bridge through which water flows from Lake Helena into the Causeway Arm of Hauser Reservoir. Lake Helena has a surface area of 2,100 acres, average depth of five feet, and a maximum depth of 10 feet. Because of the shallow average depth, Lake Helena develops dense mats of aquatic vegetation and is an important waterfowl production area. FWP has a Wildlife Management Area (WMA) on the north shore. Most fish species probably move in from Hauser Reservoir seasonally, especially to take advantage of the early spring water temperatures and productivity.

The free flowing segment of the Missouri River, located between Hauser Dam and Holter Reservoir, is about 4.6 miles in length. This segment of river flows through a narrow, high-walled gorge for most of its length prior to entering into upper Holter Lake. Impounded water from Holter Dam greatly influences the lower 1.5 miles of river. Productivity in this river segment is affected by the two upstream reservoirs (Canyon Ferry and Hauser). Deep-water releases from Canyon Ferry Dam and associated releases from Hauser Dam create tailrace conditions where water temperatures are moderated and the water is enriched with nutrients.

Holter Reservoir has a surface area of about 4,800 acres, stores 243,000 acre-feet of water at full pool and is 25 miles long with widths ranging from 0.1 to 1.1 miles (Table 4). The average depth of the reservoir is 50 feet, with a maximum depth of approximately 121 feet. The 4.6 mile segment of free flowing river located upstream of Holter Reservoir provides very important spawning habitat to migrant salmonids. Beaver Creek, a tributary to this river segment, is the principal spawning stream for reservoir fish, especially in the spring. Cottonwood and Willow creeks are also important tributaries that empty directly into Holter Reservoir (Figure 4).

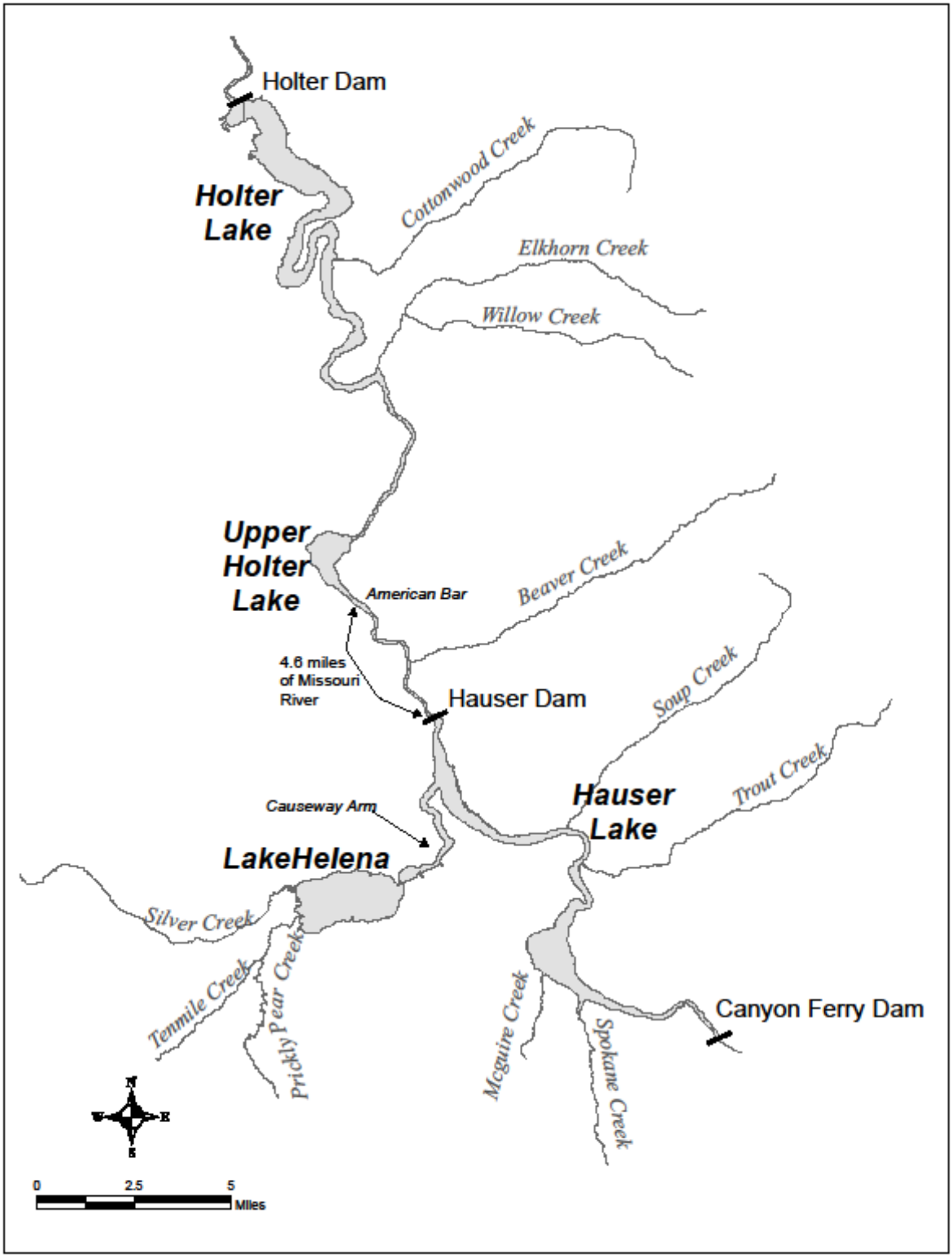

Figure 4. Hauser and Holter Reservoirs.

Reservoir Operation

Hauser Dam is a straight concrete gravity structure that is 700 feet long and 80 feet above the riverbed. The structure consists of an overflow spillway, a non-overflow section, a forebay intake section and two abutment sections. The spillway is 493 feet long with slide gates and removable flashboards for flow control. Hauser Dam has the lowest powerhouse capacity of the three dams (19-megawatts) and therefore spills the most water. Turbine water enters a 32-foot deep intake channel on the east side of the dam. The six-penstock intakes draw from this channel with the openings from 16 to 30 feet below full pool. Water is spilled from five hydraulic gates and 17 manually operated gates. Water that is spilled is drawn from 0-14 feet below full pool. Even on a dry water year such as 1986, water was spilled through much of January, February, and March and again in May. In a wet water year such as 1997, water is spilled every day of the year.

Holter Dam is a straight concrete gravity structure that is 1,364 feet long and 124 feet above the riverbed. The top of the dam is at elevation 3,568 feet. The structure consists of an overflow spillway section, a powerhouse/intake section, a left non-overflow section and a right non-overflow section. Holter has a generating capacity of 50-megawatts. It has a usable storage of approximately 81,920-acre feet between elevations 3,543 and 3,564 feet. Penstocks are between 24-32 feet below full pool. In addition, an "exciter" unit is always operating which has penstock opening from 25-29 feet below full pool. Water is spilled from a depth of 6-16 feet. In very high water conditions a "cap" can be removed from the spill gates allowing the top six feet of water to be spilled. In a dry year (1992) water was spilled only one day. Wet water years result in spilling throughout most of the year.

Operation of Holter Dam has a significant impact on the fishery, wildlife and recreational resources of the reservoir and downstream (as experienced in 1986 when flows were shut down). As part of the re-licensing process, a draft Environmental Impact Statement (EIS) released in 1997 outlined proposed operational modifications for Holter Reservoir. These guidelines direct PPL Montana to operate Holter as a run-of-the-river project with pool elevations maintained within one foot between 3,543 and 3,564 feet msl (Federal Energy and Regulatory Commission (FERC), 1997). Previously, a steering committee comprised of FWP, Montana Power Company, BOR, U.S. Forest Service (FS), irrigators, and sportsmen formulated operational guidelines for Holter Dam to optimize recreational values and to minimize impacts to fish and wildlife (FWP 1985). Steering committee recommendations for the operation of Holter Dam included: 1) provide a stable reservoir level, 2) no large spills (10,000 cfs, total turbine and spill) in August or September; and 3) facility maintenance drawdowns should be accomplished in March or during September (after Labor Day) through October 15.

Fisheries and Water Quality

Hauser Reservoir

Angling pressure on Hauser Reservoir has varied considerably and has been closely linked to the abundance of kokanee. In 1991, Hauser Reservoir was the most heavily fished water body in the state at 80,938 angler days (Figure 2). Angler use has fluctuated in recent years, averaging 37,897 angler days from 2001-2007 (Figure 2). Angler demographics historically shifted in response to the status of the kokanee fishery. The percentage of anglers from Lewis and Clark County decreased to 32% during the kokanee boom years (1988 through 1993) while the proportion of nonresidents and Montana anglers traveling more than 150 miles increased. Nonresident angling pressure peaked in 1988 at 19%. In 2008, 77.1% of anglers were from Lewis & Clark County and only 2.7% were from out of state. An average fishing trip on Hauser Reservoir in 2008 was 2.3 hours for shore anglers and 4.1 hours for boat anglers.

Kokanee salmon and rainbow trout dominated the angler creel through the early 1990's surpassing the 1989-1994 management goal of a combined harvest of 80,000 fish (1989 through 1993). Following high runoff in 1993, kokanee harvest declined 58.5% from 89,269 (1993) to 37,064 (1994). Angler harvest of kokanee declined drastically following the high water year of 1997 and kokanee currently contribute little to the Hauser sport fishery. In 2007, only 94 kokanee were harvested from the reservoir. Rainbow trout are currently the most sought after species in the reservoir, with 67.5% summer anglers and 96.7% winter anglers targeting rainbows in 2008. The majority of the rainbow trout caught in the reservoir continue to be of hatchery origin (average less than 10% wild fish caught).

Hauser Reservoir historically supported a small population of walleye, with the first walleye stocked by FWP in Lake Helena in 1951 and additional supplemental stocking in the early 1990s. Presently walleye abundance is highly influenced by flushing of walleye from Canyon Ferry. Walleye densities have remained at record levels for the past three years (2006-2008). Angler catch rates were high in 2008 (0.25 fish per hour), however only 26.3% of the catch was harvested due to poor growth rates. Walleye remain a popular component of the summer fishery, with 32.4% of anglers targeting specifically walleye or a combination of walleye and another species (trout). In 2007, 4,558 walleye were harvested from Hauser.

Yellow perch abundance has remained at low levels over the past 10 years, hitting record lows in 2008. Declines in perch abundance are largely attributable to flushing large numbers of walleye into the reservoir from Canyon Ferry. Angler perch harvest has averaged 3,720 since 2000, compared to an average harvest of 33,114 annually from 1989-1999. Few anglers target perch specifically, with 0.1% and 2.3% anglers targeting only perch in the 2008 summer and winter creel.

Brown trout numbers have remained low with long-term gillnet catches averaging 0.4 and 0.2 fish per net in spring and fall sinking gillnets from 2000-2008. Numbers are so low that long-term population trend evaluation is difficult. However, trophy sized brown trout are occasionally taken in the reservoir, especially during the fall when spawners concentrate around the mouths of the tributaries and the Canyon Ferry tailrace area. Largemouth and smallmouth bass are not commonly caught in Hauser Reservoir, with most bass fishing generally confined to the Causeway Arm and Lake Helena.

Results from an angler satisfaction survey conducted during the 2007 license year indicate a general lack of satisfaction with the current fishery in Hauser Reservoir (FWP 2008). On a scale of 1 to 5 where 1 = poor and 5 = excellent, 25.5% rated 1 (poor), 22.8% rated 2, 22.8% rated 3, 15.4% rated 4, and 13.5% rated 5 (excellent).

Water quality in Hauser is heavily influenced by Canyon Ferry Dam, especially in areas upstream of Spokane Creek. Short water retention times can lead to riverine-like conditions throughout Hauser, which can limit in-reservoir productivity. Weak layers of thermal stratification occur late in the summer in the lower reservoir. Deep-water releases from Canyon Ferry Dam can form a low DO plume during late summer, which is below the state water quality standard of 6.5 mg/L in flowing water. When stratification breaks up in Canyon Ferry in the fall, Hauser DO increases to saturation. This low DO plume may be a limiting factor in fish movement and habitat use in Hauser (Horn 2004). The BOR has installed an air injection unit on one power turbine with positive results, however more work is necessary to increase the efficiency and reliability of the system.

Missouri River - Hauser Tailwater (Hauser Dam to Holter Reservoir)

Angler use is very high on this short segment of the Missouri River, averaging about 21,000 angler days per year (1991-2007). This is reflective of the fact that this is the closest river fishery to the greater

Helena area. Fishing pressure peaked at nearly 30,000 angler days in 2001 and was at a record low of 6,000 angler days in 2007. Low pressure in 2007 was largely due to forest fires in the area that limited downstream access. No recent creel survey information has been collected; however, creel surveys in 1983 revealed that a majority of anglers fishing the river were from Lewis and Clark County (79%), while about 9% of the anglers were from out of state. A majority of anglers interviewed on the river during 1983 were bait fishermen. Rainbow trout and mountain whitefish were the most readily caught species in 1983, comprising 63 and 18% of the catch, respectively. Rainbow trout averaged 13.2 inches in the creel. An estimated 6,000 rainbow trout and 15,000 mountain whitefish were harvested from the river segment in 1983.

Recent fall electrofishing population estimates found rainbow trout numbers comparable to fall estimates in the 1980s. In 2007, the average rainbow captured during fall estimates was 17.6-inches long, and 35% were hatchery fish that migrated upstream from Holter Reservoir. Brown trout abundance is currently lower than in the 1980s, averaging 130 brown trout per mile 2003-2007, verses 391 in the 1980s. Trophy brown trout are a significant component of this river section, which is reflected in electrofishing estimates. In 2007 the average size brown trout was 21.0-inches. Walleye also provide a seasonal element to the fishery, with trophy walleye often caught early in the spring and fall.

Migrant kokanee from Holter Reservoir historically contributed to the river fishery during the fall. This fishery has fluctuated through the years and has reached record lows with the collapse of the Hauser Reservoir kokanee fishery. The remaining game fish species, including largemouth bass, cutthroat trout and brook trout, are not commonly caught in the river.

Holter Reservoir

Holter Reservoir has historically been one of the most diverse and productive multi-species fisheries in the state. In some years, Holter provides good to excellent fishing for rainbow trout, kokanee salmon, walleye, and yellow perch simultaneously. Angling pressure on Holter Reservoir has averaged 60,657 angler days annually from 1989-2007, however angling pressure has declined in recent years, averaging 46,079 between 2001-2007 (Figure 2). Because of Holter's proximity to Great Falls, most anglers fishing on the reservoir are from Cascade County (61.9% from Cascade County in 2008) while 14.7% of the reservoir users were from Lewis and Clark County and only 1.6% traveled from out of state. Most anglers fishing Holter Reservoir target rainbow trout (74%) while anglers fishing for walleye specifically comprise 18.5% of the fishing pressure. Effort and harvest rates for kokanee are far below historic averages, with only 0.2% anglers targeting kokanee in 2008 and only 296 harvested in 2007.

Yellow perch harvest has declined drastically in recent years, averaging 39,940 perch harvested annually from 2001-2007, well below the long-term average of 151,479 perch (1989-2007). Perch declines are largely attributable to flushing loss and increased predation due to the larger numbers of walleyes in the system.

Rainbow trout are generally the most sought after species with an average harvest of 34,173 fish since 1989. Rainbow harvest has fluctuated in recent years as the rainbow stocking regime has been modified. Average harvest from 2000-2007 has been 25,810 rainbow per year. Average size of creeled rainbow trout has remained high with an average rainbow in 2008 measuring 17.6-inches. Historically, wild trout comprised a significant component of the rainbow fishery (between 20-66%), but in recent years wild fish make up a much smaller component of the fishery, ranging between 4.7-12% of the catch in fall floating gillnets from 2004-2008.

Like in Hauser, kokanee harvest has declined drastically since 1998. From 1986-1998, Holter kokanee harvest averaged 13,897 fish. From 1999-2007, annual harvest has averaged only 577 fish and only 296 kokanee were harvested in 2007. There is a remnant kokanee fishery in Holter that is sustained by stocking of surplus hatchery fish. Recruitment of these fish to the sport fishery is highly variable and kokanee are expected to maintain a low-level population in Holter as long as surplus fish are available.

Brown trout are seldom caught in Holter Reservoir and contribute very little to the reservoir fishery. Very few anglers target brown trout due to low population densities. During summer creels since 1986, only 51 brown trout have been creeled, averaging 2.3 fish per year.

Walleye harvest in Holter has increased significantly following development of the Canyon Ferry walleye fishery. From 1986-1997 angler harvest averaged 744 walleye annually. From 1998-2007 angler harvest increased to an average of 9,300 walleye annually. Average size of walleye harvested has decreased in recent years due in part to the slot limit (no fish can be harvested between 20" and 28") but also from an increase in the number of young of the year fish thought to be flushed from Canyon Ferry when water is spilled from the surface spill gates. Walleye growth rates have declined as a function of increased walleye population densities.

Results from an angler satisfaction survey completed during the 2007 license year indicate a general lack of satisfaction with the current fishery in Holter reservoir (FWP 2008). On a scale of 1 to 5 where 1 = poor and 5 = excellent, 23.7% rated 1 (poor), 13.7% rated 2, 31.3% rated 3, 20.5% rated 4, and 10.8% rated 5 (excellent). Although satisfaction ratings of 3-5 (which indicate better fishing) are similar to Hauser Reservoir, they are greater than those reported for Canyon Ferry.

Canyon Ferry Dam normally controls flow patterns in Holter Reservoir. Annual discharge from Holter Dam averages about 3.7 million acre-feet (1929 through 1988). The intake capacity for water into the generators within the dam is approximately 7,000 cfs with all remaining water being spilled. Spilling surplus water over Holter Dam is a common occurrence, especially during the spring. Because of a relatively small storage capacity, Holter Reservoir has a short retention time with water in the lake being replaced about every 21 days. During spring runoff, retention time can be significantly less than 21 days. Holter Reservoir can be considered slightly productive when compared to other impoundments. Blooms of algae occasionally develop during the summer. Water temperatures tend to be similar to those in Hauser Reservoir and weak thermal layering has been found to occur during the mid-summer period.