MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION

STATE: MONTANA

FEDERAL AID PROJECT NUMBER: F-113-R1
F-113-R2
F-113-R3

PROJECT TITLE: STATEWIDE FISHERIES MANAGEMENT

JOB TITLE: HAUSER AND HOLTER DRAINAGE FISHERIES MANAGEMENT

2001 ANNUAL REPORT

Abstract:

Hauser Reservoir

Angling pressure on Hauser Reservoir in 2001 fell to 33,803 angler days placing it 16th in the state pressure rankings. Since the decline of kokanee and the failure of rainbow trout plants to establish a quality fishery, Hauser angling pressure remains in decline. Catch rates in the summer and winter creels are reflective of poor fishing. Catch rates for walleye remained good and average size of walleye in the creel has been increasing since 1999. Yellow perch catch rates remain disturbingly low and beach seining in 2002 provided little hope of a turn-around in the near future. Oddly, carp were extremely successful spawning in 2002 as record numbers were collected in 2002 beach seining with reports from anglers of "clouds" of carp along the shoreline in the Causeway common throughout the summer/fall of 2002. Walleye are the only species in Hauser where management plan targets are being met. Rainbow, kokanee and yellow perch were all below established targets for angler catch rates and gillnet targets.

Holter Reservoir

Angling pressure on Holter Reservoir fell in 2001 to an estimated 53,000 angler days (winter and summer). The long-term average (1989-2001) has been 70,000 angler days with winter pressure contributing 17,000 angler days. Winter angling pressure in 2001 was down 40% from this long-term average. Poor perch survival combined with below average rainbow survival have contributed to this reduction. In addition, the nearly nonexistent kokanee salmon population in Hauser has limited flushing of kokanee into Holter, which provided a significant component of the sport fishery in the early 1990's. Walleye populations remain above the long-term average in both spring and fall netting. Age structure of the population has shifted such that 89% of fish caught in the fall were age five or younger. Proportion of walleye in the current slot limit (20-28 inches) remained low at 8% of the spring catch but increased to 15% in fall gillnets. This proportion should increase as the strong 1997-year class recruits to the slot. Evaluation of rainbow strain and size at stocking continued in 2001. Since 1996, age 1+ Eagle Lakes have demonstrated an approximate 4 fold higher rate of return over the age 0+ Eagle Lake plants (planting date constant). Simply looking at returns from 2000-year-stocked rainbow (two years of return), the age 1+ Eagle Lake plants have shown between an 8.3 and 9.2 fold return advantage over the age 0+ Eagle Lake and fall release Arlee plants. Hatchery costs to raise and plant show that the larger fish are seven times more expensive than the smaller fingerling trout.

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INTRODUCTION

Fisheries data were gathered on Hauser and Holter reservoirs to provide information needed to: 1) manage the fishery of the two reservoirs; 2) evaluate impacts of reservoir operations on the sport fishery; 3) evaluate the success of the hatchery stocking program and; 4) discuss protection, mitigation and enhancement projects implemented under the 2188 relicencing agreement with PPL Montana. This report summarizes data collected during the 2001 field season.

Throughout this report, species management goals are presented. These goals/targets were developed during the Canyon Ferry, Hauser, Holter Fisheries Management workgroup that took place in 1999 and are presented in detail in the document, "Upper Missouri River Reservoir Fisheries Management Plan; 2001-2009". This management plan set the direction of fisheries management for the period 2001-2009.

PROCEDURES

The study area has been previously described by Rada (1974), Berg and Lere (1983) and MFWP (1985). A map of the two reservoirs is presented in Figure 1. Vertical and horizontal gillnetting (timing, net size and net locations) continued in 2001 based on procedures established in Lere (1986). Single-lead trap nets (4 x 6 foot frame with either 1" or ½" mesh) were used to sample walleye on Holter Reservoir in spring 2001. The partial creel census continued on Hauser and Holter reservoirs from May through October and again during ice-covered months (January through March) as described in Lere (1987). Zooplankton and water quality samples were collected during ice-free months at three established locations on Hauser and Holter Reservoirs according to methods established in Lere (1987). No hydroacoustic sampling was completed in 2001.

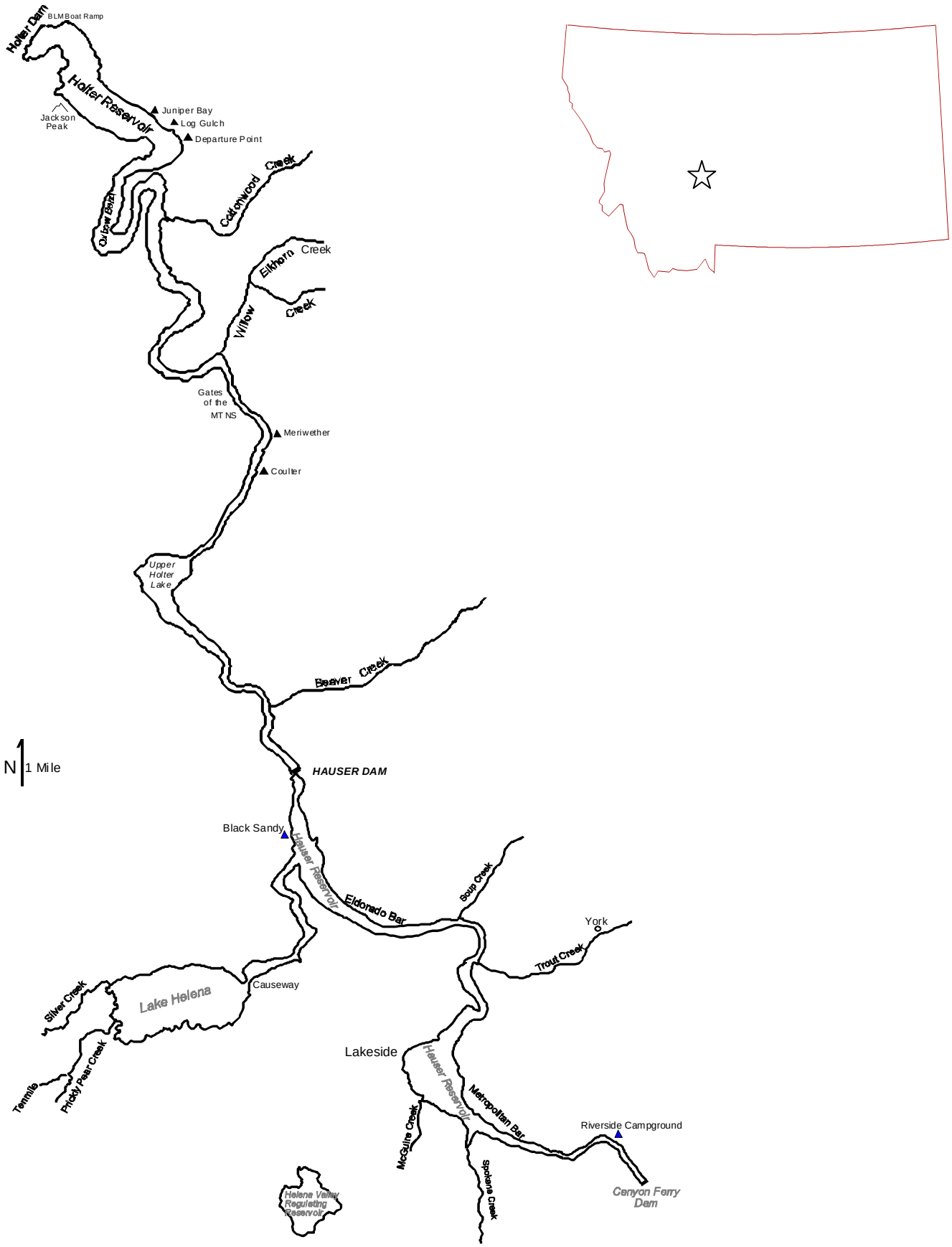


Figure 1. Map of Hauser, Holter and the Helena Valley Regulating Reservoirs.

Hauser Reservoir

Creel Surveys

Summer Creel

A total of 1359 anglers for a total of 5510 angling hours were interviewed during the 2001 summer creel on Hauser Reservoir. Total numbers of creeled fish include; 267 rainbow trout, 77 yellow perch, 1 kokanee, 274 walleye and 26 brown trout. Statistics generated from the weekend creel indicate the average completed shore trip was 3.6 hours and 5.8 hours for a boat-based trip. Walleye and rainbow trout boasted the highest average catch rates at 0.05 fish/hour (Table 1). Catch rates for brown trout and kokanee salmon were less than 0.01 fish per hour. Yellow perch catch rates were 0.01 per hour averaged over the 2001 summer season.

By month, rainbow catch rates reached highs in May (0.16 per hour) and October (0.23 per hour). Walleye catch rates were relatively consistent throughout the summer with 0.07 per hour in May, followed by 0.05, 0.06, and 0.06 per hour in June, July and August respectively. A high percentage of fish caught were kept; rainbow (78%), walleye (80%) and perch (70%).

Catch rates by anglers targeting individual species or groups of similar species were higher than for the general angler. Anglers targeting yellow perch recorded a catch rate of 0.34 per hour while those fishing for "any fish" caught perch at the rate of 0.006 per hour. The same trend held true for walleye and rainbow trout. Anglers specifically fishing for walleye, who comprised 33.8% of anglers, caught walleye at the rate of 0.14 per hour while general anglers, who comprised 27.7%, caught walleye at the rate of only 0.01 per hour. Anglers who specifically fished for rainbow trout comprised 26% of all respondents and caught 0.12 rainbows per hour while general anglers caught only 0.02 per hour.

The majority of anglers interviewed (77.6%) had not caught a fish. Anglers who caught fish were asked if they were satisfied with the size of the fish they had caught. Of the 22.4% that had caught fish, the majority (90.5%) responded that they were satisfied or very satisfied with the size of their fish. A small percentage (9.2% responded that they were dissatisfied with the size of their fish.

A total of 185 walleyes were measured during the 2001 summer angling season. These fish averaged 16.2 inches (range = 11.9-29.5 inches) and weighed an average of 1.5 pounds (range= 0.5-9.3 pounds). The majority of these fish were 1997 year class (age 4) that has dominated the

Hauser fishery since first entering the creel in 1998. Rainbow trout averaged 16.5 inches (range= 12.4-23.4 inches) and weighed 2.1 pounds (range = 1.1-4.95 pounds).

Winter Creel

A total of 306 anglers were interviewed during the 2001 ice-fishing season (January through March) for a total of 913 angler hours. Rainbow catch rate was 0.17 per hour, which was an improvement over the previous year (0.11 per hour; Table 3). The average size of creeled rainbow remained excellent at 17.9 inches. Rainbow catch rates reached 0.41 per hour for anglers fishing open water during the winter below Canyon Ferry at the Riverside access. Anglers fishing at the Causeway recorded an average catch rate for rainbow of 0.23 per hour. Reservoir-wide, only 18 yellow perch were recorded for a total winter catch rate of 0.02 per hour, remaining substantially below the long-term average of 0.34 perch per hour. Average size of perch in the creel remained high at 9.9 inches (range = 5.7-12.6 inches). Walleye catch rates fell from 2000 levels (0.04 per hour) to 0.01 in 2001 with an average size of 15.8 inches (range = 14.7-16.6 inches). In addition, nine brown trout and one kokanee salmon were recorded in the winter creel. Anglers using the Black Sandy State Park access site caught all walleye recorded during the winter creel.

The majority of anglers interviewed during the winter reported that they were fishing for rainbow trout (42.2%) while 36.3% were fishing for “any fish”. A total of 4.2% of anglers stated that they were fishing for walleye and 4.9% were fishing for yellow perch.

Table 1. Summer catch rates, mean size, and harvest estimates of selected species in Hauser Reservoir. Harvest estimates include ice fishing statistics collected during the winter 2001-2002 season.

	RAINBOW			KOKANEE			YELLOW PERCH			WALLEYE		
Year	Catch rate (fish/hr)	Mean Size (inches)	Harvest (X 1000)	Catch rate (fish/hr)	Mean Size (inches)	Harvest (X 1000)	Catch rate (fish/hr)	Mean Size (inches)	Harvest (X 1000)	Catch rate (fish/hr)	Mean Size (inches)	Harvest (X 1000)
1986	0.25	13.5	-	0.10	16.6	-	0.13	8.6	-	0.00	N/A	-
1987	0.24	14.2	-	0.13	15.6	-	0.12	9.7	-	0.00	N/A	-
1988	0.24	15.8	-	0.24	16.3	-	0.06	9.6	-	0.00	N/A	-
1989	0.12	13.7	25.5	0.42	14.6	101.4	0.10	7.7	27.2	0.00	N/A	N/A
1990	0.10	14.9	27.8	0.22	15.7	60.9	0.17	8.9	38.9	0.00	N/A	N/A
1991	0.02	15.3	7.8	0.46	14.7	141.3	0.08	8.1	36.8	0.0001	N/A	0.03
1992	0.05	15.1	13.0	0.22	15.8	78.4	0.16	9.0	55.4	0.0005	*	0.08
1993	0.05	16.3	16.5	0.22	16.0	89.3	0.05	9.0	49.4	0.0001	N/A	0.03
1994	0.02	16.6	4.2	0.15	14.8	37.1	0.15	10.6	38.2	0.0004	N/A	0
1995	0.05	17.5	11.5	0.11	17.0	29.1	0.16	8.9	23.2	0.002	*	0.08
1996	0.05	17.5	12.4	0.10	14.1	18.6	0.31	9.4	37.2	0.002	*	0.09
1997	0.08	16.9	11.0	0.03	16.8	5.8	0.07	8.4	16.1	0.001	*	0.09
1998	0.08	16.4	10.6	0.01	16.3	1.5	0.12	9.8	28.9	0.04	16.4	3.9
1999	0.12	17.4	21.4	0.01	19.1	1.8	0.06	9.2	12.9	0.14	13.6	7.9
2000	0.06	20.5	15.0	0.00	N/A	0.06	0.01	10.1	6.8	0.02	14.2	4.9
2001	0.05	16.5	11.8	0.0002	N/A	0.04	0.01	11.2	2.0	0.05	16.2	7.6
Mean	0.10	16.1	14.5	0.15	16.0	43.5	0.11	9.3	28.7	0.02	15.1	2.2

Harvest estimates for 1986 - 88 were not estimated because creel surveys were not completed during winter months. * Insufficient sample size.

Species Trends and Relative Abundance (Creel and Gillnetting);

Rainbow Trout

Creel

Rainbow catch rates during the 2001 summer season averaged 0.05 per hour, with fish averaging 16.5 inches (range= 12.4-23.4 inches) and weighing 2.1 pounds (range = 1.1-4.9 pounds) (Table 1).

The 2000 plant of 189,232 rainbow trout demonstrated good survival and recruitment to the summer creel. This 2000 group of fish dominated angler catch throughout the summer with the highest number caught in May and October. A total of 209 rainbows were caught during these months and approximately 75% were products of the 2000 plant. Angler catch rates fell dramatically for the months of June through September; however, the 2000 plant continued to comprise the majority of the rainbows caught. [FERC Article 414.1B]

- The Management Plan goal specifies a three-year running average angler catch rate of 0.15 to 0.20 rainbow/hour.
- The current three-year running average through 2001 is 0.08 fish/hour which is below the management target.

Floating Gillnets

The number of rainbow collected in spring floating gillnets (2.6 per net) jumped dramatically from 2000 (0.8 per net; Figure 3a). These levels are slightly below the 16-year average of 3.0 per net but are significantly above levels from the previous three-year period (1998 through 2000). Recruitment of age 1 fish in 2001 improved with 71% of the 28 fish caught being products of the 2000 plant.

Rainbow trout collected in fall floating gillnets fell from 2000 levels (2.8 per net) to 1.3 per net and remained well below the long-term average of 4.7 per net. Only two trout from the 2001 summer plants were collected in fall floating gillnets.

- The Management Plan goal specifies a three-year running average of five rainbows per fall floating gill net.
- The three-year running average through 2001 is 2.1 rainbow trout/fall floating gillnet, which is below the management plan target.

Discussion of Rainbow Trout Status

Efforts continued in 2001 to achieve management plan targets for rainbow trout. A goal of stocking 200,000 hatchery rainbow trout was established in the management plan. In 2001, 211,843 Arlee rainbow trout (4.6-6.0 inches) were raised by Giant Springs state fish hatchery (SFH). These fish were planted in Hauser between June 25 and July 3, 2001. All fish were marked with a single tetracycline mark.

Higher than average water retention times in Hauser reservoir in 2001 combined with the third consecutive decline in walleye catch rates (fall sinkers; Figure 2d) should have contributed to good rainbow trout survival. Annual average water retention time since 1986 has been 12.14 days. Retention time for 2001 was 16.74 days, representing the highest retention time since 1986. Retention time during the summer months of June, July and August were well above long-term averages at 16.89, 16.41 and 16.5 days, respectively.

Evaluation of survival of various strains of rainbow was initiated in 2001. Arlee rainbow have been the only strain of rainbow planted in recent history. The only exception was in 1999 when 30,184 Eagle Lake rainbows were planted in addition to the 144,075 Arlees (Appendix A). Beginning in 2002 roughly half of the 200,000 Arlees will be planted in early October at approximately eight inches in length. Stocking larger rainbow in the fall has been effective in Wyoming reservoirs where walleye predation in rainbow trout fingerlings was a problem (Yule et al. 2001).

Fall floating gillnets are the principal tool used to evaluate rainbow trout survival (Appendix A). General trends since 1996 indicate that approximately 50% of the fall gillnet catch is typically comprised of that years plant; 1999 was an exception when only 13% of the fall catch was from the 1999 plant. The 2001 plant of 211,843 rainbows matched the 1999 low accounting for only 13% of the total rainbow catch. Additionally, the 15 rainbow trout collected in fall 2001 gillnets (floaters and sinkers) represents the lowest number in the period of record (1986-2001). Of the 15 fish collected, 33% were from the 1999 year class, 27% were from the 1998 and 20% were from the 2000 year class. Only one unmarked (wild?) rainbow accounting for 7% of the catch was caught. This compares with seven of 31 (22.6%) unmarked rainbow collected in 2000.

Evaluation of rainbow stockings that have had four years to return to fall gillnets (1996-1998) shows relative consistent cumulative return rates to fall gillnets; 35 in 1996 for a return index of 37.1. The 1997 stocking of 98,700 Arlee had a return index of 32.4 while the 1998 stocking of 98,200 Arlee demonstrated a return index of 36.7 (Appendix A). Despite the near doubling of the size of plant in 1999, the number of fish collected continues to indicate a near failure of survival. To date only 13 of the 174,259 stocked in 1999 have been collected for a three-year return index of 0.7. Based on record low catch rates of the 2001 YOY, it is likely that this year class is a failure as well (Table 2).

Longevity of Arlee rainbow trout stocked into Hauser Reservoir from 1996 through 1998 is 3-4 years. Ninety-seven percent of the 1996 stocking was collected after three years. Returns from the 1997 and 1998 stockings were similar after three years at 94% and 84% respectively (Table 2). Longevity of Eagle Lake rainbow stocked into Holter Reservoir during this same period is 4-5 years. In general, Eagle Lake are in the system one more year than Arlee rainbow (Table 7).

To date, the increase in rainbow stocking densities in Hauser Reservoir have not resulted in increased recruitment to fall floating gillnets (Figure 2). Conversely, survival and recruitment has been in decline since 1998 while rainbow-stocking density has increased each year [1998 (98,154), 1999 (174,259), 2000 (189,232) and 2001 (211,843)]. Size and season of stocking of rainbow planted remains a concern, as predation losses are likely high on four to six inch rainbow planted in July (Yule et al 2001).

Approximately 70% of the 2001 summer harvest consisted of age 1 fish from the 2000 plant. Wild (unmarked) rainbow comprised approximately 11% of the catch with the remaining 19% being age two and older fish. Few of the 2001 rainbow plant were caught in the 2001 winter creel (January through March). The majority of the rainbows caught during this creel period were products of the 2000 plant.

Table 2. Longevity and relative rate of annual return of hatchery rainbow to fall horizontal gillnets (sinking and floating) in Hauser Reservoir (1996-2001). Strain; A=Arlee, EL=Eagle Lake

			Number Caught in Nets (cumulative % in parenthesis)						
Year Stocked	Strain	Age @ Release	1996	1997	1998	1999	2000	2001	Total
1996	A	0	21(60%)	8(83%)	5(97%)	1(100%)			35
1997	A	0		13(41%)	9(69%)	8(94%)	2(100%)		32
1998	A	0			21(58%)	9(83%)	2(89%)	4(100%)	36
1999	A;EL	0				3(23%)	4(54%)	6(100%)	13
2000	A	0					16(80%)	4(100%)	20
2001	A	0						1(100%)	1

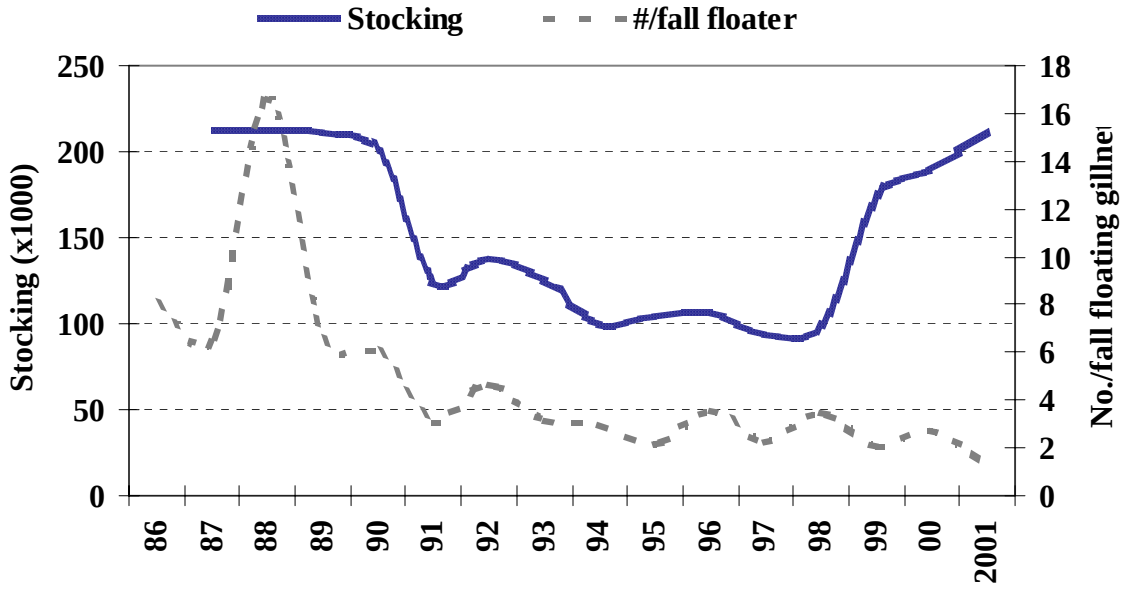


Figure 2. Number of total rainbow trout stocked versus number of rainbow trout (all age classes) collected in fall floating gillnets on Hauser Reservoir. Stocking records are offset one year (e.g. 1986 plant are represented in 1987)

Kokanee

Creel

Only two kokanee were recorded during the summer and winter creel. A total of 19 anglers stated they were specifically targeting kokanee during the summer creel accounting for only 1.4% of the summer angling pressure. [FERC Article 414.1B]

- The Management Plan specifies a three-year running average angler catch rate (during summer angling season) of 0.10 kokanee per hour.
- The current rate is 0.003 fish per hour, which is below the management goal.

Summer Vertical Gillnets

Only one kokanee was collected during the summer vertical gillnetting series (Figure 3b). This series is inclusive to the four vertical net panels (1 inch through 1 3/4 inch mesh) fished in July, August and September. A total of 11 kokanee salmon (all hatchery fish) were caught in ½ inch mesh nets that are not included in the standardized series vertical gillnets. The majority of these were products of the 2001 plant. Only one age-2 kokanee was collected throughout the 2001 vertical netting effort and this was in October. [FERC Article 414.1B]

- The Management Plan specifies a three-year running average of 20 kokanee salmon in the standardized summer vertical gillnet series (July through September).
- The current three-year running average catch is 1 fish, which is below the management goal.

Discussion of Kokanee Salmon Status

In spite of stocking 788,059 (1.1-3.0 inch) kokanee in 2000 and 1,006,447 (1.0-4.3 inch) kokanee in 2001, kokanee catch rates on Hauser Reservoir remained near zero throughout the 2001-angling season.

Additionally, in 2001, approximately, 250,000 kokanee eggs were incubated and hatched using remote site incubators (RSI's) on private land on Spokane Creek. Eggs from Somers State Fish Hatchery were placed into 10 RSI's on December 28, 2000. Eggs were checked daily for hatching, sufficient flow through RSI's and cleaned of dead eggs. Water temperatures varied little throughout the incubation period, ranging from 37°F to 42°F. The majority of hatching occurred within 20-30 days and all fry were released on February 7th, 2001 into Spokane Creek. Eggs hatched in Spokane Creek were not marked for future identification. . [FERC Article 414.3A]

Problems encountered in operating the RSI's included; 1) insufficient flow rates through RSI's to sustain the densities of fry following hatching, 2) fungus growth, at times, was substantial without formalin treatment and 3) debris buildup on intake screens and in RSI's due to livestock use upstream of RSI's.

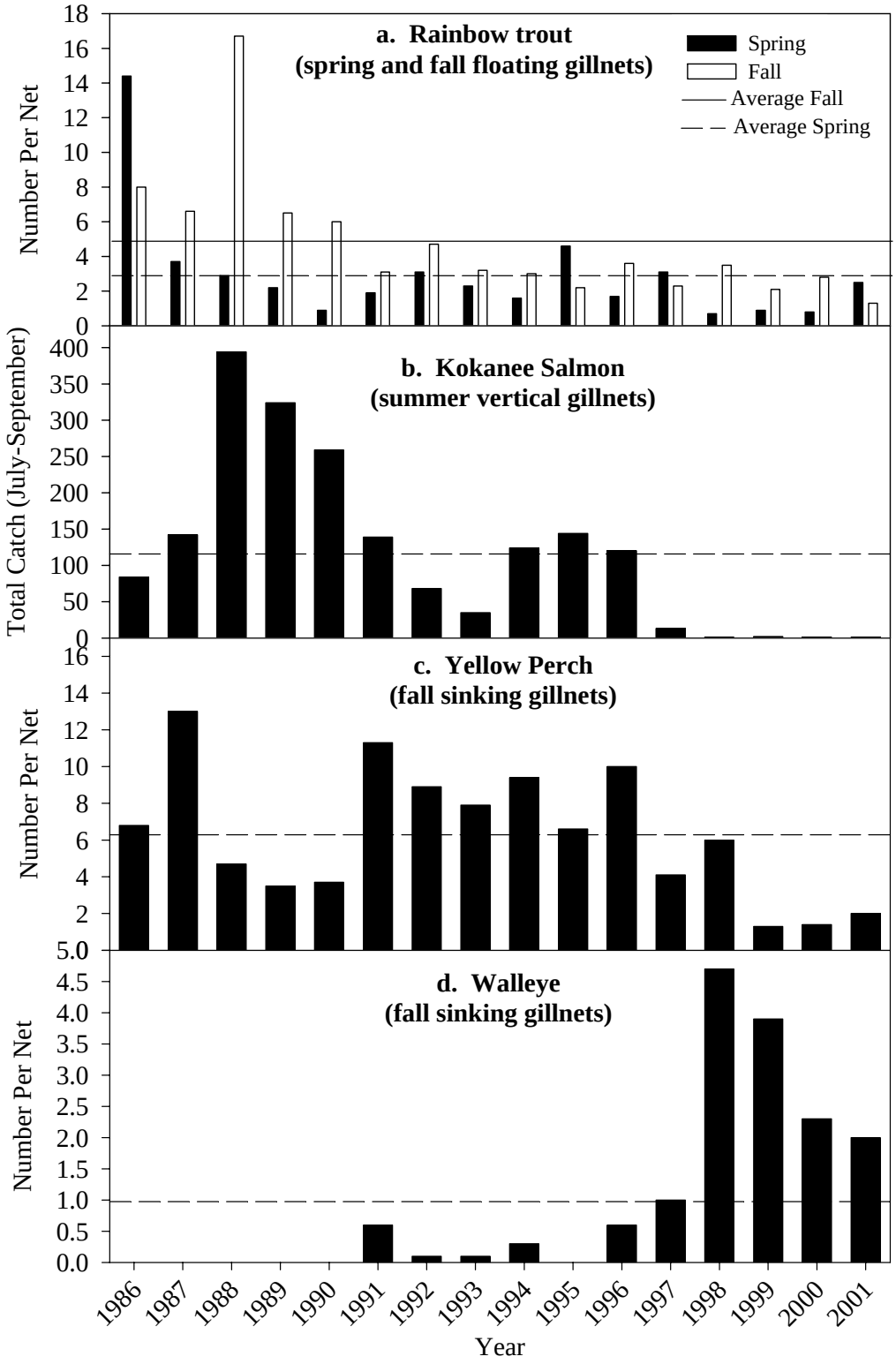


Figure 3. Hauser Reservoir gillnetting trends for the principal game species. Species trends are for the period 1986 through 2001. Dashed lines represent average catch rate for the period 1986 through 2001.

Table 3. Total catch, number of interviews and angler catch rates for the principal game species from **winter creel** surveys on Hauser Reservoir.

			Catch Rates (fish per hour)				
Year	**# of Interviews**	**Total Fish**	**Rainbow**	**Brown**	**Kokanee**	**Perch**	**Walleye**
1989	573	882	0.18	0.01	0.23	0.2	0.00
1990	300	337	0.11	<0.01	0.18	0.2	0.00
1991	451	723	0.08	0.01	0.18	0.6	0.00
1992	566	1177	0.02	<0.01	0.30	0.45	0.00
1993	635	2234	0.04	0.01	0.47	0.88	0.00
1994	197	457	0.01	0.02	0.03	0.76	0.00
1995	323	624	0.04	<0.01	0.06	0.45	0.00
1996	247	141	0.04	<0.01	<0.01	0.15	0.00
1997	297	281	0.08	0.00	0.01	0.34	0.00
1998	197	115	0.05	0.00	0.00	0.21	0.00
1999	255	207	0.17	<0.01	<0.01	0.13	0.02
2000	266	188	0.11	0.00	<0.01	0.11	0.04
2001	306	192	0.17	0.01	<0.01	0.02	0.01
Mean	354.8	581.4	0.08	0.01	0.16	0.35	0.01

Yellow Perch

Creel

A total of 77 yellow perch were caught during the summer creel for a catch rate of 0.01 (Table 1). Approximately 70% were kept and average size remained excellent at 11.2 inches (range 9-14.6 inches). Winter creel results were equally as poor with only 18 fish creeled for a catch rate of 0.02 perch per hour (Table 3). Additionally, only 4.9% of anglers were specifically targeting yellow perch while another 9.7% targeted perch in conjunction with trout and/or walleye. . [FERC Article 414.1B]

- The Management Plan targets specifies a three-year running average angler catch rate (during summer angling season) of 0.10 – 0.15 perch per hour and 0.30 – 0.40 perch per hour during the winter creel.
- The current three year running average angler catch rate is 0.03 perch per hour (summer) and 0.09 perch per hour (winter), which are both below the management goal.

Sinking Gillnets

Yellow Perch caught in fall sinking gillnets improved slightly from 2000 (1.4 per net) to 2.0 per net in 2001 (Figure 3c). This catch rates remains well below the long-term average of 6.3 per net and well below the management plan target of seven per net.

Only five perch were caught in spring sinking gillnets for a catch rate of 0.8 per net while 14 were collected in fall sinkers. Average length of spring perch was 6.6 inches while fall perch averaged 10.2 inches. [FERC Article 414.8A]

- The Management Plan calls for a three-year running average of 7 perch per sinking fall gillnet.
- The current three year running average is 1.6 yellow perch per fall sinking gillnet which is below the management goal.

Discussion of Yellow Perch Status

Habitat enhancement remains the primary focus for yellow perch population recovery. Christmas tree reefs were constructed and deployed at locations in and around the Causeway during the pre-spawn period of 2001. A total of 1832 trees were bundled into 349 bundles and deployed at 25 sites. Target depth of deployment was 20 feet of water in bays where perch spawning was likely. [FERC Article 414.9]

Beach seining in 2001 collected the third highest number of yellow perch (primarily YOY) since 1990 at 371.8 perch per haul. The second highest number of perch recorded in beach seining occurred in 1998 when 670.4 per haul were collected (Table 4). These fish should have started to recruit to creel and gillnets in 2001 as age three perch. This did not occur, and only 3 of 14 perch were age 3 in fall 2001 sinking gillnets and the overall catch of yellow perch in fall nets was well below the long-term average.

Walleye

Creel

Walleye anglers were the most prevalent species-specific angling group on Hauser during the 2001 summer season accounting for 33.8% of the angling pressure. Walleye catch rates remained good at 0.05 walleye per hour (an increase from 2000 of 0.02 per hour) for the general angler. Average size of walleye in the summer creel also improved to 16.2 inches (up from 14.2 inches in 2000). Anglers specifically targeting walleye recorded a catch rate

of 0.14 per hour. Shore anglers fishing for walleye continued to do well, primarily fishing at the Causeway. Shore anglers fishing specifically for walleye recorded a total of 76 walleye caught during the summer creel. This resulted in a catch rate of 0.11 walleye per hour. [FERC Article 414.1B]

Sinking Gillnets

Walleye catch rates in fall sinking gillnets declined for the third straight year after reaching a record high of 4.7 per net in 1998 (Table 3d). Catch rates in the October 2000 sinkers were 2.0 per net, twice the long-term average of 1.0 per net. The majority of walleye caught were age-4 walleye which continues the trend followed since 1998 of limited walleye recruitment in Hauser since the record 1997-year class was flushed from Canyon Ferry in 1997.

- The Management Plan calls for a three-year running average of 2-3 walleye per sinking fall gillnet
- The current three-year running average is 2.7 per sinking gillnet, which meets the management goal.

Walleye Food Habits

Walleye stomachs were collected from all fish collected throughout the 2001 sampling season. Stomachs collected during the spring of 2001 (n=14) indicate that walleye were feeding nearly exclusively on invertebrates (91.5%) with a small portion of sculpins (8.5%). Average size of these 14 fish was 15.1 inches. Only one walleye was collected during the summer vertical period (August). This stomach contained 100% kokanee. Fall walleye stomachs (n=26), collected during October gillnetting, showed a greater diversity of food contents than either spring or summer. By comparison to spring, only 6.7% of the diet was composed of invertebrates while 35.2% was kokanee. Rounding out the diet was 21.1% yellow perch, 13.8% sculpins, 14.3% suckers and 9.2% carp.

Discussion of Walleye Status

With the decline in walleye catch rates and no significant recruitment since 1997-1998, walleye relative weights showed an increase from 1998 to 2000 for the three relative weight categories (Stock-Quality [10.0-14.9 inches], Quality-Preferred [15.0-19.9 inches] and Preferred-Memorable [20.0-24.9 inches]) (Wege and Anderson 1978; Liao et al. 1995). In 2000, relative weights peaked at 99.7 (S-Q) and 93.1 (Q-P). In 2001, only two walleyes were collected in the S-Q group and 13 in the Q-P group. Average W_r for the Q-P group was 91.0, a decrease from 2000.

The decline in W_r in the Q-P and the consistently low W_r compared to Canyon Ferry walleye indicate a continued lack of available forage in Hauser. By comparison, Canyon Ferry walleye W_r in the Q-P group have been over 100 since 1996 and were 105.4 in 2000 and 105.1 in 2001.

Beach Seine

Beach seining in the fall 2002 collected a record number of young of the year (YOY) carp throughout the reservoir. Walleye YOY declined in 2002 while remaining slightly above the long-term average of 0.7 per seine. Suckers increased to nearly twice the long-term average. Disappointingly, yellow perch YOY declined by approximately 75% from 2001 levels despite the implementation of habitat projects in 2001 and 2002, which are targeted at enhancing perch production.

Table 4. Number of fish per beach seine haul in Hauser Reservoir 1990-2002.

		Number per Tow			
Year	**Number of Tows**	**Yellow Perch**	**Suckers**	**Walleye**	**Carp**
1990	2	15.5	---	0.0	*
1991	20	36.6	---	0.0	*
1992	20	1153.1	107.6	0.0	*
1993	20	145.0	1105.9	0.0	*
1994	20	52.8	729.6	0.0	7.4
1995	20	47.0	187.5	0.1	3.1
1996	19	232.0	573.6	0.0	49.5
1997	20	58.0	81.5	2.7	0.1
1998	19	670.4	361.1	3.3	28.6
1999	20	191.1	63.5	1.3	3.1
2001	20	371.8	720.0	0.4	201.5
2002	20	118.7	939.5	1.0	1132.6
Mean		257.7	487.0	0.7	178.2

* Carp not counted until 1994.

Holter Reservoir

Creel Surveys

Summer Creel

A total of 1468 anglers were interviewed during the 2001 summer creel on Holter Reservoir representing 8132 hours of fishing. These anglers caught 464 rainbow trout, 596 yellow perch, 5 kokanee, and 507 walleye. Catch rates were similar as those recorded in 200 except walleye catch rate declined by half. Summer catch rates (number/hour) were 0.06 for rainbow, 0.06 for walleye and 0.07 for perch. Rainbow catch rates peaked in May at 0.12 then declined through the summer and rebounded to 0.11 in September. Walleye catch rates peaked in June at 0.11 and ranged from 0.03 to 0.08 throughout the summer. Yellow perch catch rates were 0.11 in July, 0.13 in August, and 0.11 in September (Table 5).

A total of 469 (31.9%) of the respondents were fishing specifically for rainbow. These anglers recorded an average catch rate for rainbows of 0.14 per hour which was more than double the rainbow catch rate for all anglers combined. The same trend was observed for the 491 (33.4%) anglers targeting walleye. These anglers recorded an average catch rate for walleyes of 0.15 per hour, which was also more than double the catch rate for walleye by all anglers combined. Percent of walleye kept was nearly identical for general anglers (52%) as for anglers specifically targeting walleye (53.2%). Anglers specifically targeting yellow perch recorded a catch rate of 0.52 per hour compared to general anglers at 0.07 per hour. Anglers responding that they were fishing for "anything that bites" caught 0.02 rainbow per hour, 0.001 kokanee per hour, 0.02 walleye per and 0.09 perch per hour throughout the summer.

The majority of anglers (56%) responded that they were dissatisfied with the number of fish caught while 37.5% responded that they were satisfied with the number of fish caught. Noncommittal anglers answering that they had no strong opinion either way accounted for 4.1%. Of the 30.2% of the total number of anglers that had caught fish, 70.5% stated they were "satisfied" with the size of fish while 19.1% answered they were dissatisfied with the size of fish.

A total of 213 walleyes were measured during the 2001 summer angling season. These fish averaged 15.1 inches (range = 8.5-19.9 inches) and weighed an average 1.2 pounds (range= 0.2-2.96 pounds). The majority of walleye harvested were from the 1997 year class (age 4 in 2001) that has dominated the Holter fishery since first entering the creel in 1998. The average length of the 156 rainbow trout measured during the 2001 summer creel was 17.1 inches (range= 8.0-23.7 inches) and weight averaged 2.1 pounds (range = 0.2-4.5 pounds). A total of 177 yellow perch

were measured with an average length of 8.7 inches (range = 6.2-12.8 inches) and average weight of 0.36 pounds (range = 0.1-0.9 pounds).

Winter Creel

A total of 243 anglers, accounting for 993.7 angling hours, were interviewed during the 2001 ice-fishing season (January through March). Winter catch included; 63 rainbow trout and 500 yellow perch accounting for catch rates of 0.06 per hour and 0.50 per hour respectively (Table 6). Catch rates for both rainbow and perch were lower than 2000 levels and below the long-term averages recorded since 1989 (0.17 per hour for rainbow and 2.34 per hour for perch).

Average length of rainbow trout in the winter creel was 17.1 inches (range = 11.2-25.1 inches) while perch averaged 8.4 inches (range = 5.0-11.8 inches). Anglers kept 97% of rainbows and perch caught. The majority of anglers (36.2%) reported they were fishing for yellow perch while 21.8% were fishing for "any fish" and 20.2% were fishing for rainbow trout.

Table 5. Summer catch rates, mean size, and harvest of selected species in Holter Reservoir. Harvest estimates include winter ice fishing.

	RAINBOW TROUT			KOKANEE SALMON			YELLOW PERCH			WALLEYE		
Year	Catch rate (fish/hr.)	Mean Size (in)	Harvest (x1000)	Catch rate (fish/hr.)	Mean Size (in)	Harvest (x1000)	Catch rate (fish/hr.)	Mean Size (in)	Harvest (x1000)	Catch rate (fish/hr.)	Mean Size (in)	Harvest (x1000)
1986	0.34	13.9	---	0.01	16.9	---	0.16	---	---	0.002	15.0	---
1987	0.37	13.8	---	0.01	16.7	---	0.39	8.8	---	0.02	16.1	---
1988	0.32	13.7	---	0.01	16.8	---	0.37	---	---	0.01	17.4	---
1989	0.27	14.5	57.1	0.01	16.1	2.1	0.85	9.0	330.0	0.004	20.3	0.9
1990	0.26	14.2	59.2	0.11	16.1	24.3	0.53	9.2	297.2	0.004	17.9	0.3
1991	0.27	12.6	62.3	0.10	15.2	22.4	0.40	8.6	237.7	0.003	16.4	0.5
1992	0.22	14.1	53.2	0.09	16.6	20.4	0.52	8.9	492.9	0.005	20.4	0.6
1993	0.14	15.9	33.7	0.06	16.1	12.0	0.22	9.1	313.2	0.001	18.6	0.1
1994	0.03	14.7	10.4	0.06	16.2	13.4	0.34	9.5	336.9	0.01	19.5	1.3
1995	0.16	14.1	20.1	0.03	15.7	4.3	0.08	9.5	108.6	0.003	*	0**
1996	0.21	13.8	49.3	0.16	14.1	34.0	0.04	9.5	49.3	0.02	13.2	1.9
1997	0.11	15.5	32.3	0.02	16.9	4.0	0.07	7.8	29.3	0.01	17.7	1.1
1998	0.10	15.5	15.4	0.01	16.8	1.9	0.10	9.7	82.4	0.04	15.5	4.6
1999	0.14	18.0	41.3	0.002	15.6	0.4	0.23	8.3	75.7	0.05	14.1	5.6
2000	0.05	19.6	16.0	0.001	*	0.09	0.08	7.9	139.9	0.13	14.8	24.3
2001	0.06	17.1	14.1	0.001	16.1	0.3	0.07	8.7	35.2	0.06	15.1	8.3
Mean	0.19	15.1	35.7	0.04	16.1	10.7	0.28	8.9	194.5	0.02	16.8	4.1

Harvest estimates for 1986 - 88 were not estimated because creel surveys were not completed during winter months. *Insufficient sample size **All fish were released.

Table 6. Anglers catch rates on Holter Reservoir during the ice-fishing season; 1989 through 2001. Catch rates for walleye and brown trout were less than 0.01 for all years.

			Catch Rates (fish per hour)		
Year	**# of Interviews**	**Total Catch**	**Rainbow**	**Kokanee**	**Perch**
1989	493	4708	0.23	<0.01	2.95
1990	346	3597	0.24	<0.01	3.05
1991	547	6162	0.27	0.02	3.57
1992	166	2930	0.23	<0.01	5.60
1993	486	4487	0.09	<0.01	2.73
1994	349	4519	0.07	<0.01	3.79
1995	121	624	0.06	0.00	1.69
1996	160	403	0.25	0.00	0.65
1997	283	476	0.24	0.00	0.38
1998	139	630	0.11	<0.01	1.31
1999	136	547	0.29	0.00	0.95
2000	88	958	0.11	0.00	3.22
2001	243	564	0.06	0.00	0.50
Mean	273.6	2354	0.17	<0.01	2.34

Species Trends and Relative Abundance (Creel and Gillnetting);

Rainbow Trout

Creel

Rainbow catch rates measured during the 2001 summer creel averaged 0.06 per hour, with fish averaging 17.1 inches and 2.1 pounds (Table 5). Catch rates remained below the long-term average of 0.19 fish per hour and average size of catch declined by two inches from 2000. Additionally, harvest rates declined slightly from 2000 levels (16,000) to 14,100 and remained well below the long-term average harvest of 35,700 (average 1989-2001).

Monthly rainbow catch rates peaked in May at 0.12 fish per hour and again in September at 0.11 fish per hour. By area, the highest catch rate was at the BLM (Holter) ramp by shore anglers (0.21 fish per hour). Anglers fishing on and around the boat ramp recorded high catch rates for large Eagle Lake rainbow that were cruising the shorelines in the springtime, attempting to locate a spawning area. Angler creel data was not collected until May and some of the good early spring rainbow fishing occurring in April was missed. Regardless, 67% of all fish creeled during the 2001 season were recorded during the May/June period. Only 3.8% of creeled fish were of non-hatchery origin. [FERC Article 416.1B]

- The Management Plan target specifies a three-year running average angler catch rate of 0.25 fish/hour during the summer season.

- The current three-year running average angler catch rate for rainbow trout is 0.08 fish/hour, which is below the management plan target.

Floating gillnets

Spring and fall floating gillnet catch rates improved slightly over 2000 levels. Spring netting collected 2.4 rainbows per net; up from 1.9 per net (2000) while fall nets increased to 5.9 per net up from 5.7 collected in 2000 (Figure 5a). These catch rates remain below the long-term average since 1986 of 5.5 per net for spring and 7.2 in fall floaters.

Scale aging of rainbow trout collected in spring horizontal gillnets (May 2001) resulted in the following length at age distribution; age one (11.1”-14.3”), age two (13.3”-16.0”), age three (17.3”) and, age four (21.4”-22.5”; Figure 4). Aging of rainbow trout caught in fall horizontal gillnets (October 2001) resulted in the following length at age distribution; age zero (8.4”-12.6”), age one (11.5”-17.7”), age two (15.4”-20.8”), age three (20.2”), age four (21.3”-22”) and age five (21.4”; Figure 4).

- The Management Plan specifies a three-year running average of eight rainbows per fall floating gill net
- The current three-year running average is 5.2, which is below the management plan target.

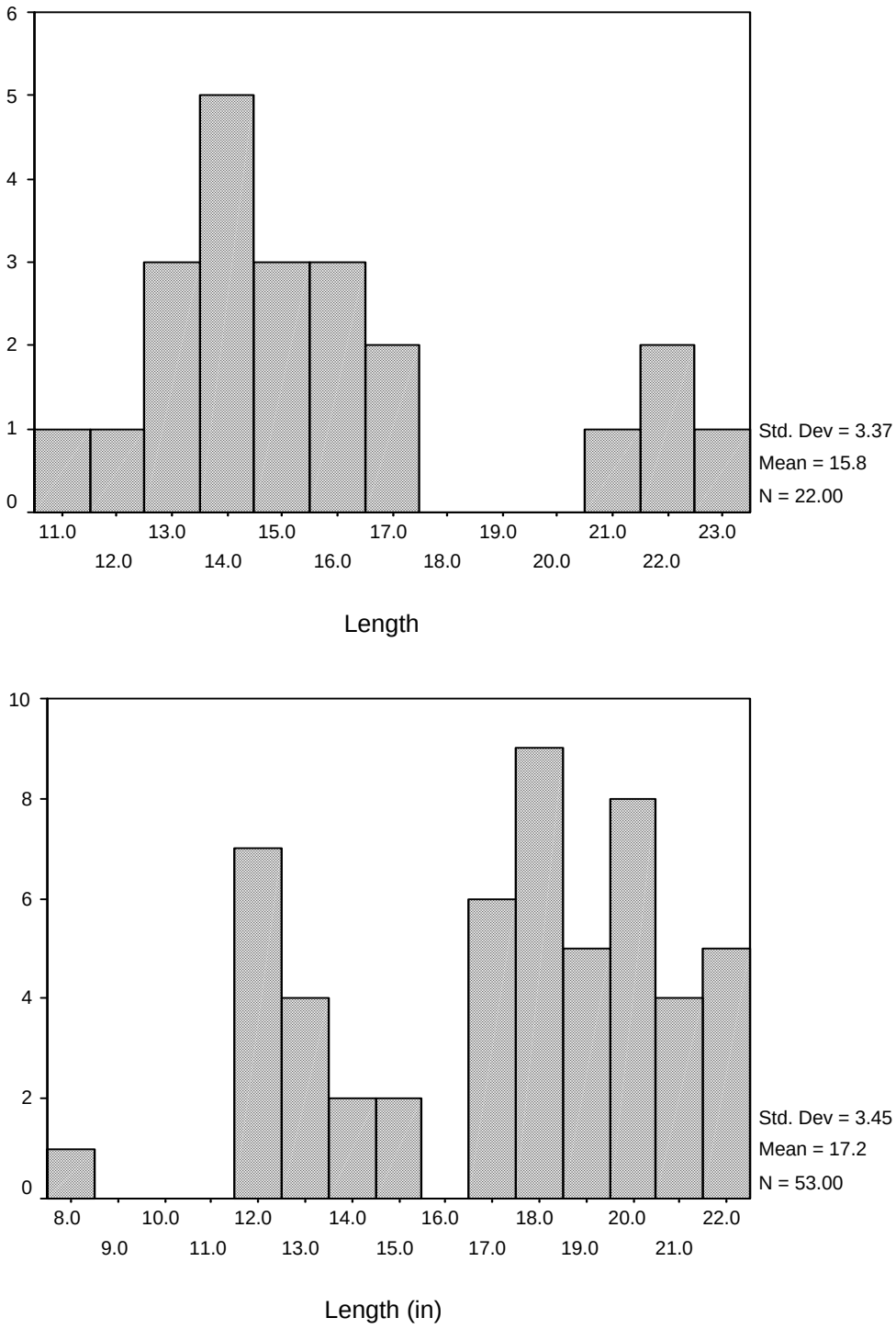


Figure 4. Length frequency histogram of rainbow trout collected in the 2001 spring horizontal gillnets (top chart) and fall floating horizontal gillnets (lower chart) in Holter Reservoir.

Discussion of Rainbow Trout Strain/Time and Size of Release Evaluation

Rainbow trout were stocked in 2001 to test survival differences between; strain (Eagle Lake versus Arlee), size/age (age 0 versus age 1) at plant, and season of plant (July versus September/October). A total of 77,512 age 1 Eagle Lake rainbow (6.6"-7.0") were planted in early July from Big Springs State Hatchery (BSSH). A total of approximately 264,000 Age 0 Eagle Lake rainbow were planted in July (230,575 @ 3.6" from BSSH and 33,264 @ 4.1" in late July from the Giant Springs State Hatchery). Finally, 120,000 @ 6.8" age 0 Arlee rainbow were planted in late September. (Appendix A)

Return to Fall Horizontal Gillnets

The survival of various strains and sizes of rainbow trout stocked since 1996 has been monitored by use of floating and sinking gillnets set in the fall (Appendix A). A total of nine combinations of age and strain have been collected in fall gillnets. The largest contribution to the fall 2001 gillnet catch came from the 2000 plant of age 1+ Eagle Lake (29%) followed by the 2001 age 1+ plant (17%). In contrast, no fish from the 2000 plant of fall released Arlee rainbow were captured in fall 2001 nets and only 3% of the catch was from the 2001 plant age 0+ Arlee.

Since 1996, age 1+ Eagle Lakes have consistently demonstrated substantially higher rates of return over the age 0+ Eagle Lake plants (planting date constant). Tracking of cumulative returns to fall gillnets indicates most fish remain at large for three years or less in the reservoir. For instance, 81% of all the 1997 plant of age 0's and 99% of all the 1998 plant of yearlings netted were caught by fall of 1999 (Table 7). With at least four years to return (99%-100% return), the 1996 plant of age 1+ Eagle Lake has shown a four-fold return over the 1997 plant of age 0+ Eagle Lake rainbow. Through the first three years in the system, the 1998 age 1+ Eagle Lake plant out-returned the 1999 age 0+ plant by a factor of 3.6. Interestingly, between three and four times more age 0+ Eagle Lakes were planted than the age 1+ during these years. For rainbows stocked in 2000, the age 1+ Eagle Lake plants have shown between an 8.3 and 9.2 fold return advantage over the age 0+ Eagle Lake and fall release Arlee plants.

On a per-fish basis, it cost 1.8 cents to raise a 4.2-inch rainbow versus 12.8 cents to raise an 8.25-inch rainbow or a seven-fold difference (personal comm. Jack Boyce, Manager, Big Springs State Fish Hatchery). The survival of the 8.25-inch fish is four times greater

than the 4.2-inch fish, but the cost to raise these larger fish is seven times greater. Therefore, the most cost effective approach would be to dramatically increase numbers of 4.2-inch rainbow planted. However, this assumes that survival is linear based on numbers stocked, which is probably not the case. Results from Seminole Reservoir on the North Platte Reservoir System in Wyoming indicated roughly 500,000-fingerling rainbow were consumed within three weeks post-stocking by the abundant walleye population (McMillan 1984). In numerous examples, fingerling rainbow have been shown to be highly vulnerable to predation, regardless of numbers planted (Yule et al 2001). Season of planting (Summer versus Fall or Winter) could be manipulated to determine if planting fingerlings at periods when predation is lower would enhance survival of the fingerling plants. For example, the 1999 plant of age 0+ Eagle Lake was split between 66% plant in early July and 33% in October. Fall 1999 gillnets failed to collects any of the July plant, however, the following fall, 15 of 55 rainbows (27%) were products of one of these plants. The October fish did not possess a tetracycline mark and therefore were difficult to distinguish from wild fish.

Conclusive evidence that fall planted, catchable (approximately 9") rainbow trout outperform summer stocked subcatchables (approximately 7") in the presence of walleye was shown in the Wyoming North Platte study (Yule et al. 2001). Over the course of this investigation, returns of fall-stocked rainbow were nearly twice those of spring-stocked rainbow. Walleye predation was stated as the primary factor in the survival differences with larger rainbow trout being less vulnerable to predation. Additionally, walleye predation declines in the fall-winter period resulting in fewer rainbows consumed.

Return to Creel

A total of 217 rainbow trout were recorded during the summer (156) and winter (61) creel periods. During the summer creel, only 10 (6.4%) were from the September releases of "fall Arlees" with nine from the 2000 plant and one was from the fall 2001 plant. No Arlee from the 2000 or 2001 plants were recorded during the winter creel. The majority (45%) of creeled fish during the 2001 summer period were from the 2000 age 0+ Eagle Lake plant. The remaining fish were age 2+ and 4+ from the Eagle lake plants made since 1997. However, vertebrae were not collected during the creel period for tetracycline mark examination, making it impossible to determine if the fish were originally stocked as yearlings or age 0.

Table 7. Longevity and relative rate of annual return of hatchery rainbow to fall horizontal gillnets (sinking and floating) in Holter Reservoir (1996-2001). Strain; A=Arlee, EL=Eagle Lake

			Number Caught in Nets (cumulative % in parenthesis)						
Year Stocked	Strain	Age @ Release	1996	1997	1998	1999	2000	2001	Total
1996	EL	1	53(64%)	18(85%)	5(92%)	6(99%)	1(100%)		83
1997	EL	0		18(23%)	31(62%)	15(81%)	14(99%)	1(100%)	79
1998	EL	1			29(62%)	8(79%)	8(96%)	2(100%)	47
1999	EL	0				0(0%)	15(65%)	8(100%)	23
2000	EL	1					12(41%)	17(100%)	29
2000	EL	0					2(25%)	6(100%)	8
2000	A	0					3(100%)	0(100%)	3
2001	EL	1						10(100%)	10
2001	EL	0						4(100%)	4
2001	A	0						2(100%)	2

Initial results indicate that Eagle Lake planted as age 1+ have a survival advantage over the age 0+ Eagle Lake and fall release Arlee. Although early in the program, returns from the fall Arlee rainbow plants have been disappointing both in fall gillnets and angler creel.

Continued monitoring, including improved data collection during creeling and better marking schemes will be required to determine survival advantages of the various rainbow plants in Holter Reservoir. More specifically, Coded Wire Tagging (CWT) should be implemented to allow for exact identification of size and season of plant of the Eagle Lake strain. Furthermore, increased sampling efforts should occur to allow for a larger sample size. This could be accomplished through increased gillnetting and more intensive creel sampling.

Kokanee

Creel

A total of five kokanee were recorded during the summer 2001 creel survey while no kokanee were creeled during the 2001 winter creel survey on Holter reservoir. Few anglers were specifically targeting kokanee with only eight respondents (0.5%) answering that they were seeking kokanee. An additional 12 anglers (0.8%) stated that they were fishing for kokanee/rainbow trout. [FERC Article 416.1B]

- The Management Plan states that the Holter kokanee fishery is reliant on the success/failure of the Hauser kokanee fishery and hence there are no specific targets for kokanee management in Holter Reservoir.

Vertical Gillnets

Only four kokanee were collected during the summer vertical gillnetting series and all were yearlings (Figure 5b). These fish were not marked which could indicate they were wild fish or products of a 2000 plant of 413,838 kokanee that did not receive a tetracycline mark. This catch of four fish is a decline from the 2000 catch of 11 kokanee. [FERC Article 416.1B]

Discussion of Kokanee Salmon Status

Unlike results from 2000 where the majority of fish caught were of hatchery origin, kokanee collected in Holter in 2001 were classified as wild or products of the aforementioned 2000-year plant. Fall gillnet results from 2000 collected only two kokanee of which only one was a spawning age fish, leaving questions about the origin of these fish. The lack of hatchery fish collected during 2001 netting suggests that few fish were flushed from Hauser. Even with a record 1,006,447 million fry/fingerling and 252,000 kokanee eggs planted in Hauser in 2001, the record high water retention times that occurred in Hauser during 2001 apparently limited flushing losses. Unfortunately, vertical netting results in Hauser do not support this, leaving significant questions about the fate of those fish.

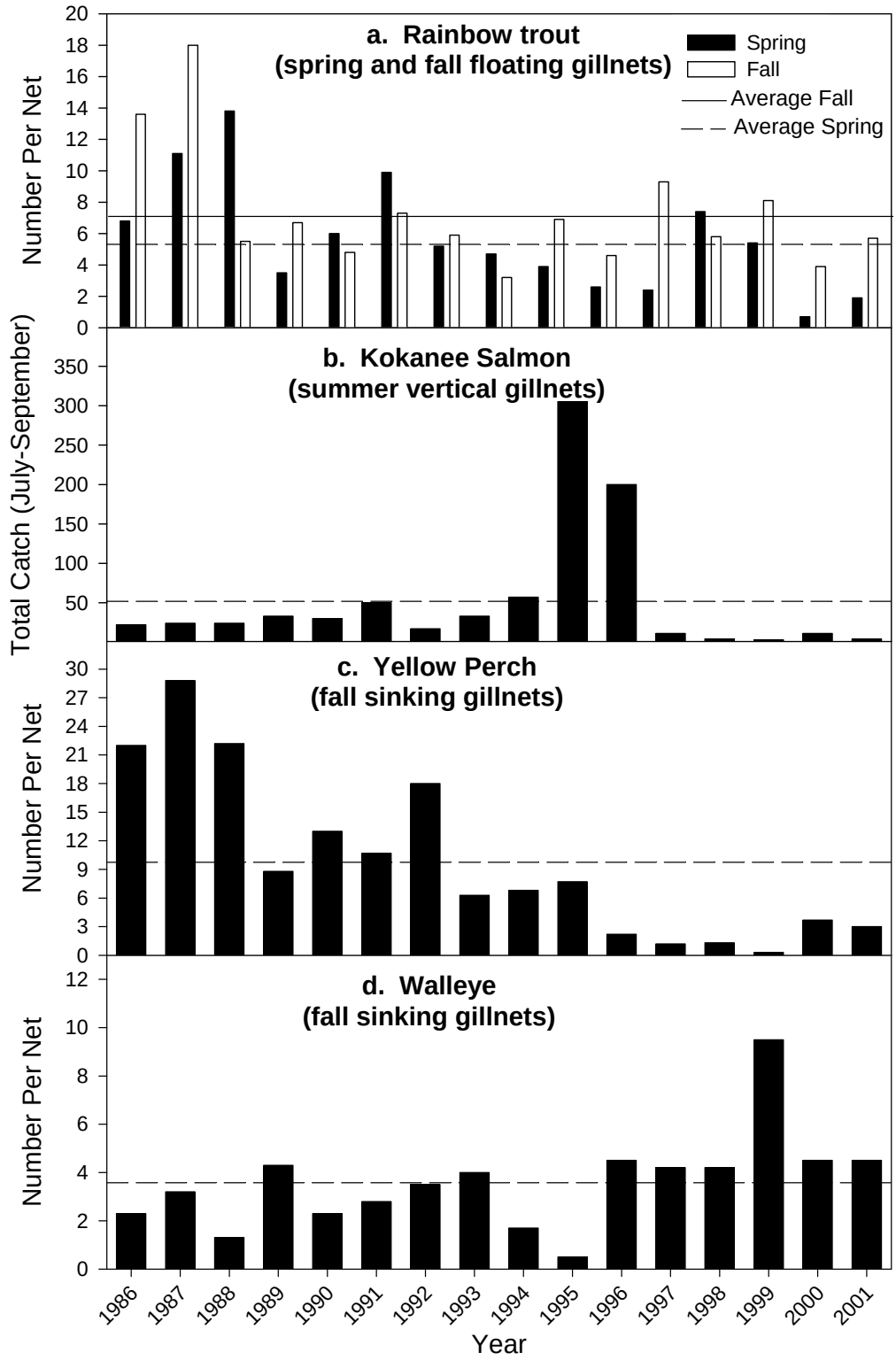


Figure 6. Holter Reservoir gillnetting trends for the principal game species. Species trends are for the period 1986 through 2001. Dashed lines represent average catch rate for the period 1986 through 2001.

Yellow Perch

Creel

Angler catch rates for yellow perch during the summer 2001 creel survey on Holter Reservoir were 0.7 per hour, which is well below the long-term average (0.30; at 0.07 perch per hour Table 5). A total of 596 perch were recorded with only 50% being kept. Catch rates peaked in August at 0.13 perch per hour. Catch rates in July and September were 0.11 perch per hour. The catch rate for anglers specifically targeting perch was 0.52 per hour, which was slightly better than the average angler. Angler who specifically targeted perch represented 5.3% of the total number interviewed. Yellow perch caught in the summer averaged 8.7 inches and ranged from 6.2 to 12.8 inches.

The winter catch rate for perch was 0.50 perch per hour, which was better than the summer rate but still well below the long-term average of 2.34 (Table 6). Average size of perch in the winter creel was 8.4 inches (range 5”-11.8”). Approximately 35,000 perch were harvested for the year in 2001, compared to 139,000 the previous year and a long-term average of 194,000 (Table 5). [FERC Article 416.1B]

- The Management Plan specifies a three-year running average angler catch rate (during summer angling season) of 0.2-0.4 yellow perch per hour and 1.0 – 2.0 yellow perch per hour during the winter creel.
- As of 2001, the three-year running averages were 0.13 per hour for summer and 1.6 for the winter. The winter catch rate is within the management goal range while the summer catch rate is below the management goal.

New angling regulations were adopted in 2001 regarding yellow perch harvest. A limit of 50 perch and no possession limit was implemented in an effort to reduce harvest in light of population declines. Results from the 2001-angling season indicate a small percentage of anglers catch more than 10 perch (Table 8). No anglers creeled during summer possessed more than 10 perch while 6.6% of winter anglers possessed more than 10 perch. No anglers during the winter or summer creel recorded keeping a limit of 50 perch and only 0.4 percent of winter anglers kept between 41-45 perch.

Table 8. Number and percentage of anglers catching and keeping perch per trip during the summer and winter 2001 creel on Holter Reservoir. All anglers were included in analysis.

Number of perch kept	Summer (1468 total interviews)	Winter (243 total interviews)
0	1367 (93.1%)	189 (77.8%)
1-5	84 (5.7%)	28 (11.5%)
6-10	17 (1.2%)	9 (3.7%)(
11-15	0	6 (2.5%)
16-20	0	6 (2.5%)
21-25	0	1 (0.4%)
26-30	0	0
31-35	0	1 (0.4%)
36-40	0	2 (0.8%)
41-45	0	1 (0.4%)
46-50	0	0

Sinking Gillnets

Perch catch rates in 2001 sinking gillnets (3.7 per net) were somewhat lower than the previous year (3.0 per net; Fig 5c). The catch in 2001 spring sinking nets (4.4 per net) was slightly higher than the previous year (3.3 per net) and well below the long-term average of 32.1 per net. Spring fish averaged 7.8 inches (range 5.7-9.9 inches) while fall perch averaged 7.9 inches (range 5.0-11.8 inches). Of the 18 fish caught in the fall, 50% were less than 8 inches while spring perch catch was comprised of 63% fish less than eight inches. [FERC Article 416.6A]

- The Management Plan calls for a three-year running average of 10 yellow perch per sinking fall gillnet.
- The current three-year running average of 2.3 per net is below the management goal.

Discussion of Yellow Perch Status

Holter yellow perch populations have undergone an age structure shift, as older perch are lost from the system, younger perch are increasingly represented. As demonstrated in the creel and gillnetting, average size of perch declined from 2000 to 2001. Creel data in 2001 (summer) showed that only 51% of perch were kept; increasing to 97% during the winter creel. Summer creel results indicate that average size of creeled fish actually increased, however, this represents only fish that were kept. Therefore the 49% of fish that were released were likely of substandard size. Perch length in spring nets decreased from 9.7

inches in 2000 to 7.8 inches in 2001 while the length of fall gillnetted perch stayed about the same.

Perch have failed to rebound following the significant decline in catch between 1995 and 1996 (Figure 5c). Historic data indicates that perch were at consistently higher densities during the 1980's than at present. Angler catch rates and harvest support the premise that a significant decline occurred during the 1994 to 1996 timeframe.

Walleye

Creel

Walleye catch rates for all anglers during summer angling season declined from the record high of 0.13 per hour in 2000 to 0.06 per hour in 2001 (Table 5). However, catch rate for anglers specifically targeting walleyes in 2001 remained good at 0.15 walleye per hour. Seasonally, walleye catch rates peaked in June at 0.11 per hour, and decreased throughout the summer and fall. A total of 213 walleye were measured, averaging 15.1 inches and 1.2 pounds (Figure 6). Of the 213 walleyes, 48% fell into the Stock-Quality relative weight category (10.0-14.9 inches) while 51% fell into the Quality-Preferred category (15.0-19.9 inches). Only one walleye in the creel survey was less than 10 inches. However, 47.1% of walleyes caught were released, suggesting that substantial numbers of smaller walleye were caught and released. [FERC Article 416.1B]

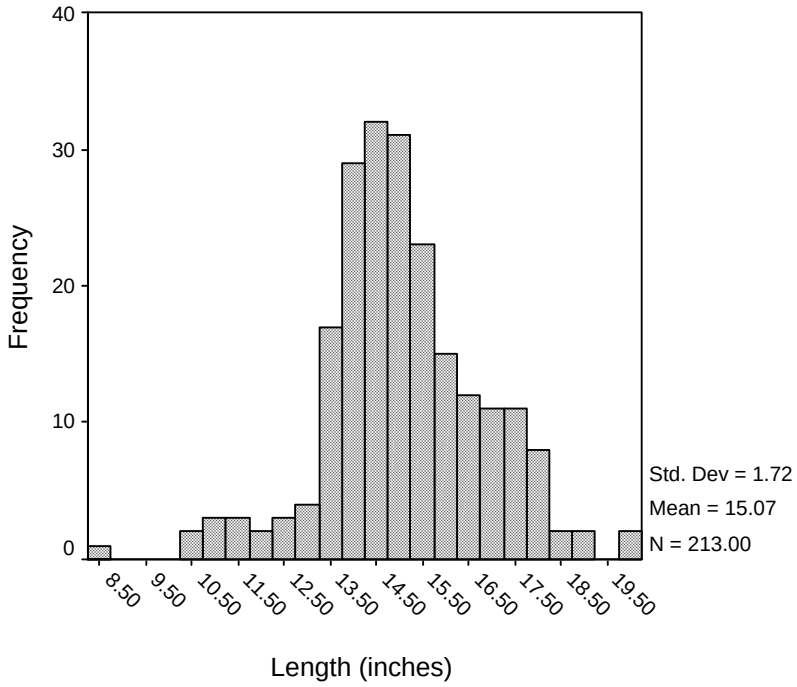


Figure 6. Length frequency histogram of walleye measured during 2001 Holter Reservoir summer creel.

The bag limit of 6 fish daily, five under 20 inches and one greater than 28 inches (fish between 20-28 inches must be released) remained in effect for walleye during the 2001 season on Holter Reservoir. This liberalized bag limit was implemented to reduce walleye densities in an effort to improve remaining walleye growth rates combined with reducing predation pressure. The previous slot limit (1996 through 2001) allowed a daily bag limit of three walleye less than 18 inches and one greater than 28 inches.

- The Management Plan calls for a three-year running average angler catch rate of 0.10 walleye per hour for anglers specifically targeting walleye.
- The current three-year running average is 0.24 per hour, which is above the management target.

Sinking Gillnets

Walleye collected in 2001 spring sinking gill nets remained above the long-term average (3.3/net) at 4.3 per net (Figure 5d). Fall gillnets were also above long-term averages (3.6/net) at 4.5 per net, remaining unchanged from 2000 fall catch rates. Spring fish averaged 15.4 inches (range = 10.2-27.3 inches) while average size of fall walleye improved from 14.9 inches in 2000 to 17.0 inches in 2001 (range = 9.6-25.9 inches). Spring catch was dominated by four-year-old walleye, which comprised 50% of the catch. Age two and three walleye represented 41% of the catch while only three fish, age 7, 8 and 13 were collected. Distribution of age in fall nets was more diverse with the majority (64.7%) being age two and three. Only six fish (17.6%) were age four and five (Figure 7). [FERC Article 416.6A]

Slot limit sized walleye (20-28 inches) comprised 23.5% of the fall sinking gillnet catch representing a two-fold increase over 2000 levels (11%). Future years should see this proportion increase as the strong 1997 and 1998-year classes recruit to the slot.

- The Management Plan calls for a three-year running average of 3 walleye per sinking fall gillnet.
- The current three-year running average is 6.2/net, which is above the management plan goal.
- The Management Plan calls for a three-year running average of at least 30% of the population between 20 and 28 inches in fall sinking gillnets.
- The current three-year running average is 15% of the walleye caught in fall sinking gillnets were between 20 and 28 inches which is below the management plan goal.

Walleye Food Habits

In 2001, Holter walleyes relied heavily on invertebrates in the spring (87% by weight) with yellow perch comprising the remaining 13% (Figure 8). Yellow perch remained an important food item throughout the year comprising 46% of the fall diet. Since 1997, perch have comprised approximately 50% of walleye diets. Perch consumption peaked in 1999 at 63% but fell to 46% in 2000. Salmonid consumption increased in fall stomachs to 25% of the diet, an increase over 2000 levels (16%). Suckers and sculpins comprised 10% and 19% of stomach contents in the fall, respectively. No invertebrates were found in the fall walleye diet. [FERC Article 416.6A]

Discussion of Walleye Status

Walleye catch rates in fall gillnets remained the same as 2000 (4.5 per net) following the record high catch in 1999 (9.5 per net; Figure 5d). Population size structure continued to increase following the record high recruitment of age two and three in 1999 (Figure 7). Since 1999, the proportion of fish in the 14-20 inch category (primarily age 3) has increased while recruitment of age 1 walleye has declined since 1998. The proportion of walleyes recruiting to the 20-28 inch slot limit doubled from 2000 levels (11% to 23.5%), halting a four-year decline.

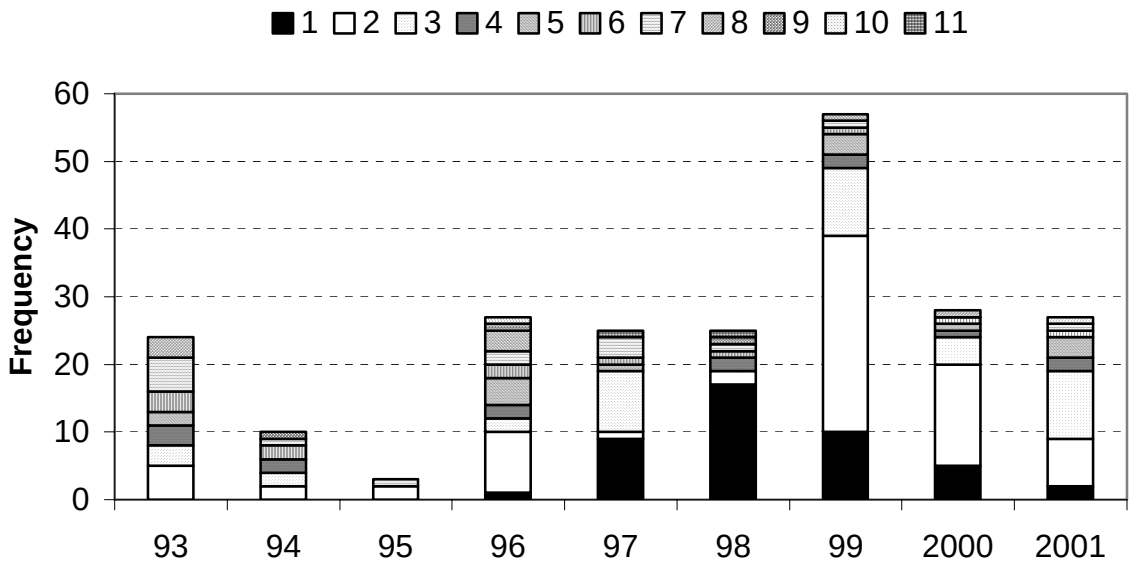
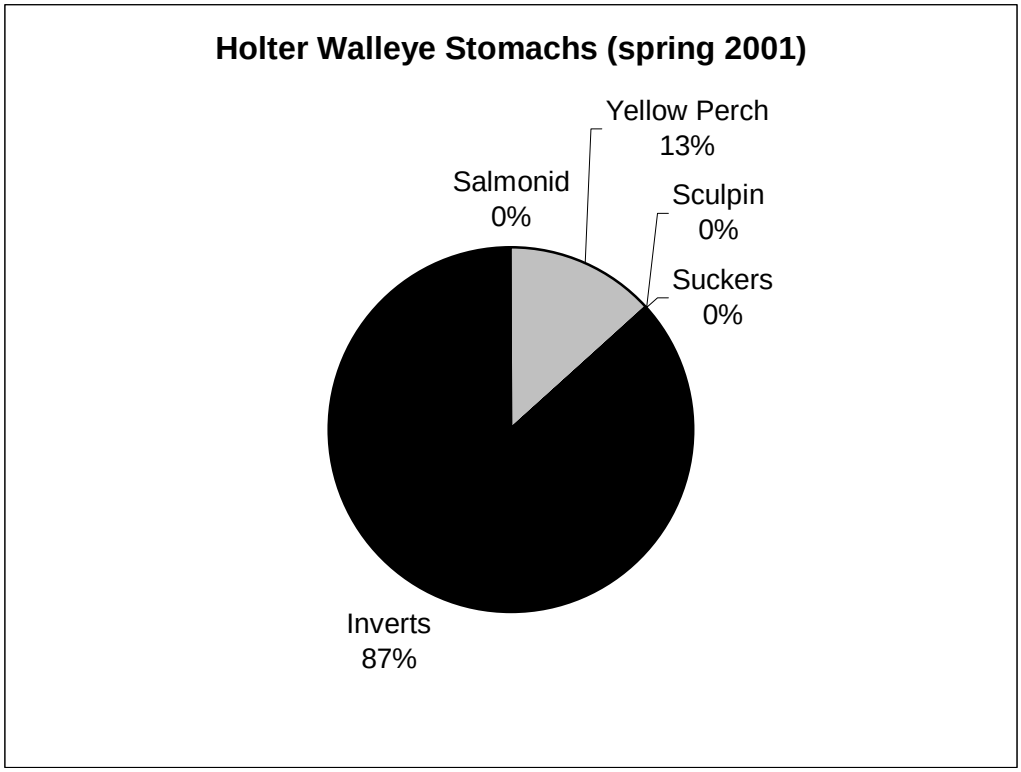


Figure 7. Age composition of Holter Reservoir walleye collected in fall sinking horizontal gillnets; 1993 through 2001.



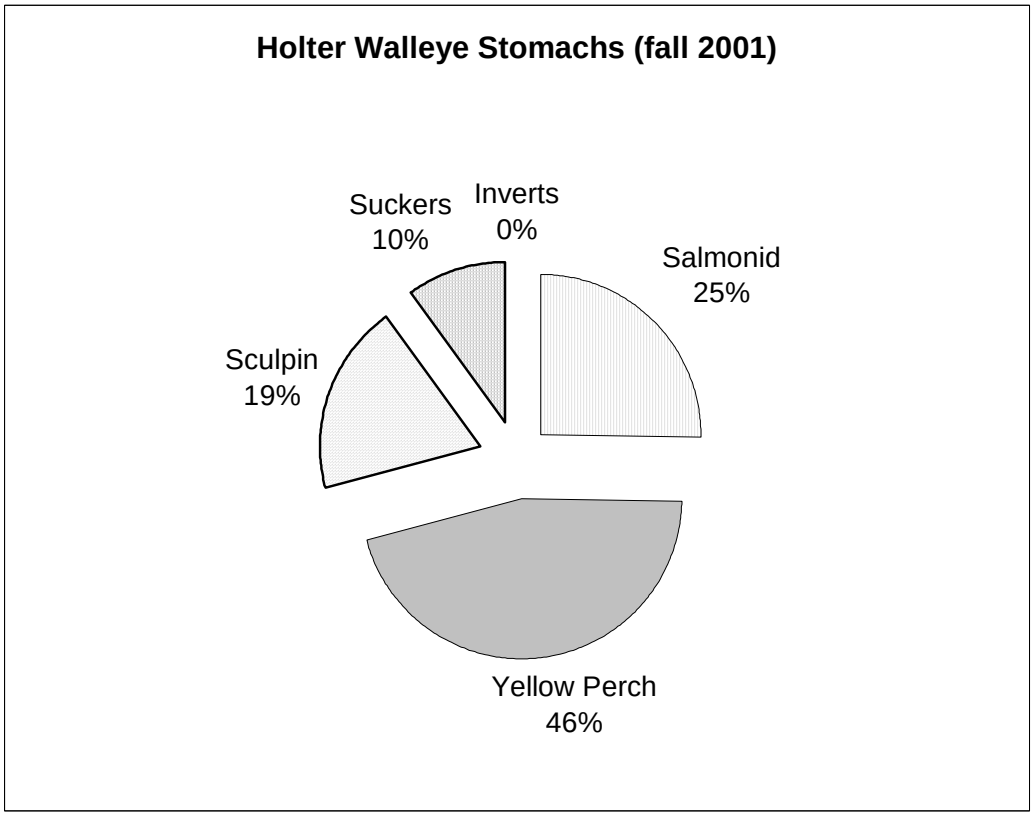


Figure 9. Holter Reservoir walleye diet (% by weight) in spring (top) and fall (bottom) 2001. All fish were sampled using horizontal or vertical gillnets.

Beach Seine

Beach seining conducted during August of 2002 collected 1,029 yellow perch, 61 suckers and 0.4 walleye per seine haul (Table 9). Perch collected per haul remained above the long-term average (759) however; this is a fraction of the record 1998 and 1999 levels (2906 and 3006 perch per haul). Sucker numbers continue to decline and remain a fraction of the long-term average (306). Additionally, 0.4 walleye were collected per haul, which was below the long-term average (1.6 per haul).

Table 9. Beach seine results (number of fish per haul) in Holter Reservoir (1990-2001).

		Number per Tow		
Year	**Number of Tows**	**Yellow Perch**	**Suckers**	**Walleye**
1990	7	125.1	---	0.0
1991	20	274.2	---	2.5
1992	20	622.2	147.2	0.0
1993	20	38.0	52.5	<0.1
1994	19	169.7	288.6	0.0
1995	16	80.3	120.9	1.0
1996	19	32.4	385.5	0.6
1997	20	32.0	327.4	0.6
1998	20	2906.2	962.3	4.2
1999	19	3005.7	616.5	4.4
2001	20	792.3	100.3	4.8
2002	20	1028.7	61.2	0.4
Mean	18.3	758.9	306.2	1.6

Trap Netting

Trap net results are shown in Table 10. Nets were fished from April 30 to May 10, 2002 to tag walleyes to determine angler exploitation and to the age composition of spawning walleye in Holter. A total of 84 male, 26 female and 4 immature walleye were netted in 53 net nights. Average length of spawning age male walleye was 18.5 inches (unchanged from 2001) and females were 24.7 inches (down from 25.8 in 2001).

Total walleye catch in spring trap nets has declined dramatically since 1995, falling from a record high in 1995 of 309 walleyes in 52 net nights to 110 walleyes in 53 net nights in 2002. In addition, size of spawning walleye, both males and females has decreased during this same time while average age has increased (females) indicating a decrease in growth. Comparisons of age 4 through 10 female walleye collected in trap nets prior to 2000 show markedly better growth than those collected in 2000 through 2002. Age 3 through 10 male walleye also show dramatic reductions in growth compared to pre-2000 growth rates. Age three though nine walleye show the greatest growth reductions.

Table 10. Numbers and species of fish captured in trap nets in Holter Reservoir.

			WALLEYE				PERCH		RAINBOW
			Total Catch		Mean Length (in)				
Year	Dates	Nets	Γ	E	Γ	E	Total	# of Clips	Total
1995	4/26-5/12	52	250	59	22.4	26.6	3,281	1,251	84
1996	4/25-5/17	69	181	60	22.9	26.0	1,558	1,100	350
1997	4/29-5/13	45	66	29	22.3	25.5	2,025	1,638	247
1998	4/28-5/8	52	32	11	19.2	26.3	1,890	1,478	124
1999	5/4-5/7	24	59	13	21.4	27.0	1,007	0	159
2000	5/2-5/5	28	66	17	18.9	26.0	291	0	50
2001	5/8-5/11	25	82	24	18.5	25.8	50	0	143
2002	4/30-5/10	53	84	26	18.5	24.7	457	0	194
AVE		43.5	102.5	29.9	20.5	26.0	1307.4	N/A	165.5

Walleye collected in traps in the 20-28 inch range (current slot range) was 23% (males) and 72% (females), which was a slight decrease from 2001 levels for males while females increased from 48% in 2001 (Table 11). The long-term average (since 1995) is 58% for males and 73% for females. The proportion of males in this category is largely influenced by strength of recruitment of age 3 males to the spawning population. Females generally recruit to the spawning population at age 5 and therefore are susceptible to two more years of harvest pressure. The fact that the proportion of females recruiting to the 20”-28” slot has fallen since 1995 (48 in 1995 compared to 18 in 2002) may indicate that harvest pressure on immature females is impacting recruitment. In addition, female walleye have ranged in age from 7.6 (1995) to 9.2 (1999 and 2001) averaging 8.2 years old since 1995 (Table 11). Although, female walleye collected in 2002 were on average younger than the previous two years, average age has been trending upward since 1995 indicating potential recruitment issues.

Number of walleyes greater than 28 inches has declined from the high in 1996 (13) to 4 in 2002. This proportion is generally low and has averaged 6% of the catch since 1996. Conversely, the proportion of walleyes less than 16 inches (primarily males at the lower threshold for jaw tagging) has increased since 1995 when only 1% was found. This proportion peaked in 2001 when 35.4% of the walleye caught were smaller than 16 inches. In 2002, this fell to 19.3% but remains above the long-term average of 15%

Table 11. Walleye caught in spring trap nets; sorted by size categories, sex, percentage in slot (20”-28”) and average age on Holter Reservoir (1999 through 2002). The current walleye fishing regulation is all walleye between 20 to 28 inches must be released.

	Less than 20”		20”-28”		Greater than 28”		% in slot		Average Age	
Year	Γ	E	Γ	E	Γ	E	Γ	E	Γ	E
1995	64	0	184	48	2	9	74	84	5.6	7.6
1996	22	0	153	45	1	12	87	79	6.0	6.8
1997	14	0	52	23	0	5	79	82	7.0	7.9
1998*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1999	19	0	39	9	0	4	67	69	6.9	9.2
2000	40	0	28	13	0	4	41	76	5.4	8.5
2001	54	3	28	11	0	9	34	48	6.0	9.2
2002	65	3	19	18	0	4	23	72	5.2	8.1
AVE	39.7	0.9	71.9	23.9	0.4	6.7	58	73	6.0	8.2

*1998 trap nets were fished primarily for yellow perch.

Walleye Tagging

In an effort to estimate angler harvest, walleye caught in trend and trap net operations have been tagged with dangler and more recently monel (jaw tags). From 1988 through 2002 a total of 200 of 1473 tags (14%) implanted into Holter reservoir walleye have been returned (Appendix D). First-year tag return percentages have ranged from 0% in 1993 and 1994 to 10.1% in 2000. First year tag return rate for 2001 was 5% remaining above the long-term average of 3.9%. Cumulative rates of return for walleye that have had at least 10 years to be recovered (1988 through 1991) have ranged from 17% to 36%.

First year rate of return of walleyes in Bynum, Frances and Tiber Reservoirs generally fall within the same range as those in Holter Reservoir. During the period 1995 through 2000, Bynum ranged from 0.8% to 7.5%, Frances ranged from 1.4% to 6.4% and Tiber ranged from 6.9% to 12.6%. Cumulative return rates (1995 through 2000) in these three Northcentral reservoirs ranged from 4% to 17% in Bynum, 15% to 19% in Frances and 11% to 20% in Tiber (Hill et al. 2000). Holter cumulative return rates during the years 1995 through 1997 (five to seven years of return) ranged from 5% to 12% which is comparable to Bynum but lower than Frances and Tiber.

Since 1988, anglers in the Missouri River below Holter Dam have recovered 20% of walleye tagged in Holter Reservoir (Appendix D). A high was reached in 1995 when 78% (7 of 9) were

returned from the river. This trend continued through 1998 as above average runoff defined the years 1995 through 1997. Lower than average runoff has been the trend in recent years (1999 through 2001) which has resulted in a river tag recovery rate of 13% in 1999, 0% in 2000 and 0% in 2001.

APPENDICES

Appendix A. Recruitment of hatchery rainbow trout to fall horizontal gillnets (sinking and floating) in Hauser and Holter Reservoirs (1996-2001)
A=Arlee; EL=Eagle Lake

HAUSER RESERVOIR

					Number in Fall Horizontal Gillnets (percent of total)						
Year	**Stocking (X1000)**	**Strain**	**Age @ Release**	**Release Date**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**Return Index***
1996	94.2	A	0	Summer	21/42 (50%)	8/28 (29%)	5/38 (13%)	1/23 (4%)			37.1
1997	98.7	A	0	Summer		13/28 (46%)	9/38 (24%)	8/23 (35%)	2/31 (6%)		32.4
1998	98.2	A	0	Summer			21/38 (55%)	9/23 (39%)	2/31 (6%)	4/15(27%)	36.7
1999	174.3	A; EL	0	Summer				3/23 (13%)	4/31 (13%)	6/15(40%)	0.7
2000	189.2	A	0	Summer					16/31 (52%)	4/15(27%)	1.1
2001	211.8	A	0	Summer						1/15(7%)	0.4

HOLTER RESERVOIR

					Number in Fall Horizontal Gillnets (percent of total)						
Year	**Stocking (X1000)**	**Strain**	**Age @ Release**	**Release Date**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	
1996	106.2	EL	1	Summer	53/92 (58%)	18/62 (29%)	5/76 (7%)	6/37 (16%)	1/55 (2%)		78.1
1997	371.4	EL	0	Summer		18/62 (29%)	31/76 (41%)	15/37 (41%)	14/55 (25%)	1/59(2%)	19.7
1998	141.5	EL	1	Summer			29/76 (38%)	8/37 (22%)	8/55 (15%)	2/59(3%)	33.2
1999	400.7	EL	0	Sum/Fall				0/37 (0%)	15/55 (27%)	8/59(14%)	8.8
2000	75.3	EL	1	Summer					12/55 (22%)	17/59(29%)	38.5
	191.6	EL	0	Summer					2/55 (4%)	6/59(10%)	4.1
	65.0	A	0	Fall					3/55 (5%)	0/59(0%)	4.6
2001	77.5	EL	1	Summer						10/59(17%)	12.9
	263.9	EL	0	Summer						4/59(7%)	1.5
	120.0	A	0	Fall						2/59(3%)	1.6

***Return Index. Calculated as the total number of fish recaptured in nets, divided by the number of fish stocked, then multiplied by 100,000.**

Appendix B. Stocking records, creel survey results, harvest and gillnet trends for **rainbow trout** in Hauser Reservoir.

Year	Stocking (X1000)	Summer Catch Rates (fish/hr.)	Winter Catch Rates (fish/hr.)	Ave. size (inches) Summer Creel	Harvest (X1000)	Spring Floaters (fish/net)	Fall Floaters (fish/net)	% wild from Floaters
1986	212.6	0.25	N/A	13.5	N/A	14	8	
1987	212.8	0.24	N/A	14.2	N/A	4	7	
1988	211.8	0.24	N/A	15.8	N/A	3	17	4
1989	244.5	0.12	0.18	13.7	25.5	2	7	7
1990	154.0	0.10	0.11	14.9	27.8	1	6	4
1991	138.1	0.02	0.08	15.3	7.8	2	3	11
1992	126.4	0.05	0.02	15.1	13.0	3	5	11
1993	118.6	0.05	0.04	16.3	16.5	2	3	16
1994	105.1	0.02	0.01	16.6	4.2	2	3	
1995	106.7	0.05	0.04	17.5	11.5	5	2	
1996	94.2	0.05	0.04	17.5	12.4	2	4	
1997	98.7	0.08	0.08	16.9	11.0	3	2	15
1998	98.1	0.08	0.05	16.4	10.6	1	3	11
1999	174.3	0.12	0.17	17.4	21.4	1	2	9
2000	189.2	0.06	0.11	20.5	15.0	1	3	23
2001	211.8	0.05	0.17	16.5	11.8	3	1	5
Mean	**156.1**	**0.10**	**0.08**	**16.1**	**14.5**	**3**	**5**	**11**

% wild in 1986-87 were not estimated because hatchery fish were not marked before 1986.
% wild in 1994-96 were not estimated because hatchery fish were not marked in 1994.

Appendix C. Stocking records, catch rates, harvest and gillnet trends for **rainbow trout** in Holter Reservoir

Year	Stocking (X1000)	Summer Catch Rates (fish/hr.)	Winter Catch Rates (fish/hr.)	Ave. size (inches) Summer Creel	Harvest (X1000)	Spring Floaters (fish/net)	Fall Floaters (fish/net)	% wild from Floaters
1986	357.3	0.34	N/A	13.9	N/A	7	14	
1987	323.0	0.37	N/A	13.8	N/A	11	18	
1988	322.9	0.32	N/A	13.7	N/A	14	6	44
1989	366.8	0.27	0.23	14.5	57.2	4	7	37
1990	347.3	0.26	0.24	14.2	59.2	6	5	27
1991	420.1	0.27	0.27	12.6	62.3	10	7	37
1992	382.8	0.22	0.23	14.1	53.2	5	6	33
1993	361.0	0.14	0.09	15.9	33.7	5	3	42
1994	290.5	0.03	0.07	14.7	10.4	4	7	66
1995	317.5	0.16	0.06	14.1	20.1	3	5	52
1996	106.2	0.21	0.25	13.8	49.3	2	9	20
1997	371.4	0.11	0.24	15.5	32.3	7	6	29
1998	141.5	0.10	0.11	15.5	15.4	5	8	12
1999	400.**7**	0.14	0.29	18.0	41.3	1	4	25
2000	331.9	0.05	0.11	19.6	16.0	2	6	7
2001	461.4	0.06	0.06	17.1	14.1	2	6	11
Mean	**322.7**	**0.20**	**0.18**	**14.9**	**37.5**	**6**	**7**	**33**

% wild in 1986-87 were not estimated because hatchery fish were not marked before 1986.

Appendix D. Holter walleye tagging summary. Dangler tags used between 1988 and 1995; 1996 most walleye were tagged with both jaw and dangler tags; 1997-2001 all walleye tagged with jaw tags. Numbers in parenthesis represent walleye tagged in Holter Reservoir and recaptured by anglers in the Missouri River below Holter Dam.

		NUMBER OF TAG RETURNS BY ANGLERS																
Year	# Tagged	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Total	1st Yr Return	Cumulative Return
1988	100	6	2	1	6(1)	4	5(2)	1	1	0	0	1	0	0	0	**27(3)**	**6.0%**	**27%**
1989	30		2	2	0	0	0	0	1	0	0	0	0	0	0	**5(0)**	**6.7%**	**17%**
1990	121			3	10	16	7(1)	3(1)	2(3)	1(1)	0	1	0	0	0	**43(6)**	**2.5%**	**36%**
1991	63				1(1)	4	4	1	0	0	0	0	0	1	0	**11(1)**	**1.6%**	**17%**
1992	42					2	1	1	0	0	1	1(1)	0	0	0	**6(1)**	**4.8%**	**14%**
1993	18						0	5	0	0	0	0	0	0	0	**5(0)**	**0.0%**	**28%**
1994	19							0	0	1(1)	0	0	1	0	0	**2(1)**	**0.0%**	**11%**
1995	284								5(4)	10(9)	4	5	7(1)	2	0	**33(14)**	**1.8%**	**12%**
1996	212									7(1)	5(2)	11(3)	5(2)	1	0	**29(8)**	**3.3%**	**14%**
1997	230										4(1)	4(3)	2	0	1	**11(4)**	**1.7%**	**5%**
1998	54											2(1)	3	0	0	**5(1)**	**3.7%**	**9%**
1999	69												5	3	1	**9(0)**	**7.2%**	**13%**
2000	89													9	2	**11(0)**	**10.1%**	**12%**
2001	60														3	**3(0)**	**5.0%**	**5%**
	Totals	**6(0)**	**4(0)**	**6(0)**	**17(2)**	**26(0)**	**17(3)**	**11(1)**	**9(7)**	**19(12)**	**14(3)**	**25(8)**	**23(3)**	**16(0)**	**7(0)**	**200(39)**	**Ave=3.9%**	

150 of the 230 walleye tagged in 1997 were from fish relocated from Canyon Ferry

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Prepared by: Steve Dalbey and Troy Humphrey
Date: March, 2003
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