Fisheries Division
Federal Aid Job Progress Report

Montana Statewide Fisheries Management

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Project Title: Montana Statewide Fisheries Management

Job Title: Havre Area Coldwater Fisheries Management

Abstract:

The coldwater fisheries in Hill, Blaine, and Phillips Counties continue to exhibit excellent growth of hatchery stocked rainbow trout following the historic spring run-off in 2011 that re-filled many ponds and reservoirs that were previously chronically dewatered. Excellent water conditions have remained throughout the area and many water bodies remain full and stable.

Rainbow trout growth and survival in Beaver Creek Reservoir has been above average the past few years. Rainbow trout densities and growth in Bearpaw Lake have decreased with the sudden increase in white sucker densities. Fishing pressure had increased in response to the increased size of trout within Bearpaw Lake, based on statewide creel surveys conducted in 2015/2016. Growth and condition of rainbow trout in Anderson, Grasshopper, Jensen, and Sentinel remains good. Ponds in Hill, Blaine, and Phillips Counties were monitored in 2016 and results and management recommendations for all these waters are presented.

OBJECTIVES AND DEGREE OF ATTAINMENT

Survey and Inventory: Objective is to survey and monitor the characteristics and trends of fish populations, angler harvest and preference, and to assess habitat conditions in selected waters. Objective accomplished, data presented.

Fish Population Management: Objective is to implement fish stocking programs and/or fish eradication actions to maintain fish populations at levels consistent with habitat conditions and other limiting factors. Objective accomplished, data presented.

Technical Guidance: To review projects by federal, state and local government agencies and private parties that has the potential to affect fisheries resources, and to provide technical advice or decisions to mitigate impacts on these resources. Provide landowners and other private parties with technical advice and information to sustain and enhance fisheries resources. Objective accomplished: (6) 310 and (13) 124 projects were reviewed along with one waste water improvement review with local agencies; attended six walleye unlimited meetings and helped with four school programs and fishing events related to the "Hooked on Fishing" program.

METHODS

Floating and sinking multi-filament experimental gill nets 125 feet in length and 6 feet deep consisting of 25-foot panels of ¾", 1", 1 ¼", 1 ½", and 2" mesh were fished to acquire information on adult fish populations in ponds and reservoirs. Whenever possible, fish were measured for total length (TL: inches (in.)) and weighed to the nearest 0.01 pound (lb).

RESULTS AND DISCUSSION

Beaver Creek Reservoir

Beaver Creek Reservoir, located south of Havre, is a 185-acre reservoir with a maximum depth of 90 feet. Its proximity to the city of Havre makes this reservoir a valuable local resource and it has been managed intensively for a variety of species. The statewide fishing pressure survey for 2015/2016 indicated it received 5,104 (± 2,078) angler days (MTFWP Fisheries Bureau 2016). The continued increase in pressure is likely due to stable weather conditions, no major flooding events, and re-established fish populations.

This reservoir was initially managed as a rainbow trout fishery in the 1970's. However, the illegal introductions of northern pike (1980s) and yellow perch (1980s) created a variable rainbow trout fishery. As a result, the fisheries management plan was expanded to include other warm water species, which were legally introduced to control undesirable species and enhance the fishing opportunity within the reservoir. Currently this reservoir receives annual plants of 30,000 catchable size Eagle Lake/Erwin and Arlee rainbow trout, as well as 10,000 fingerling and 5,000 advanced fingerling walleye.

In an effort to maintain the balance between the rainbow trout fishery and the warm water fishery, the use of live minnows for bait has been allowed since March of 2000. The regulation was intended to increase harvest of northern pike, and perhaps open up a winter fishery for walleye. Though fishermen use live minnows regularly, a winter fishery for walleye has not developed as expected.

Population Status of Adult Fishes

Water levels in September were down approximately one foot during our sampling effort, the highest pool elevations observed during these surveys in several years. Gill netting was conducted overnight with three sinking and three floating experimental gill nets. Prior to 1986, adult fish populations were monitored, however sampling was neither uniform, nor consistent enough to develop useful trend data on sport fish population size or composition. As a result this data was excluded from analysis and is only included within the tables for reference to the illegal introduction of northern pike and yellow perch.

Rainbow Trout

In 2003 and 2004, 84,443 and 61,459 Arlee and Eagle Lake rainbow trout were stocked and the relative abundance of rainbow trout rose above 12 trout/net, respectively (Tables 1 and 2). Rainbow trout relative abundance fell below 6 trout/net in 2005 and 2006, however they increased to 9 fish/net in 2007 (Table 1). In 2005, 41,416 rainbow trout were stocked which may account for the decreased relative abundance (relative abundance=5.5 fish/net; Table 2). Decreased stocking levels in 2005 due to PCB cleanup at Big Springs Fish hatchery, combined with increased competition and predation were likely causes for the decreased abundance of rainbow trout in 2005/2006.

In 2006, stocking densities of rainbow trout reflected historical densities (70,000 RBT / year) and relative abundance increased to target levels (10 trout/net) in 2007 and 2008 (Tables 1 and 2). Rainbow trout relative abundance fell below target levels again in 2009, 2010, 2011 and 2013 (Table 1). In 2014, rainbow trout relative abundance increased to its highest level in 11 years (14 fish/net). Relative abundance dropped slightly in 2015 to 11.83 fish/net ($\bar{x}$ length=12.78) and remained above historic abundances (Table 1). Rainbow trout relative abundances dropped to 4.33 trout/net in 2016, the lowest abundance observed since 2011(Table 1). Average length of rainbow trout captured in 2016 was the highest observed since 2005 (Table 1). There are a number of variables influencing rainbow trout densities in Beaver Creek Reservoir: high spring flow increases entrainment, variability in stocking rates, and predation by walleye and northern pike.

Table 1. Summary of relative abundance (catch per unit effort (CPUE)), average total length, and relative weights of fishes collected in fall gillnetting surveys in Beaver Creek Reservoir, 1974-2016.

			Rainbow Trout			Yellow Perch			Northern Pike			Smallmouth bass			Walleye			Longnose sucker		White sucker	
Date		Nets	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	CPUE (fish/net)	Ave TL (in.)
Sep-74	1974	3	24.00	10.91	111.26	--	--	--	--	--	--	--	--	--	--	--	--	7.33	10.49	82.33	10.23
Nov-77	1977	3	35.00	10.05	86.31	--	--	--	--	--	--	--	--	--	--	--	--	2.33	9.66	113.00	9.75
Sep-80	1980	3	23.33	10.12	81.04	--	--	--	--	--	--	--	--	--	--	--	--	1.33	6.33	156.00	8.86
Sep-81	1981	3	7.33	10.88	82.77	--	--	--	--	--	--	--	--	--	--	--	--	6.67	8.78	165.33	8.70
Oct-82	1982	3	8.33	11.78	99.67	--	--	--	2.33	15.79	109.67	--	--	--	--	--	--	3.33	9.66	109.67	9.69
Oct-83	1983	3	3.33	11.79	94.66	--	--	--	3.67	25.10	117.07	--	--	--	--	--	--	1.33	--	98.33	--
Sep-84	1984	3	3.00	11.26	95.43	--	--	--	3.67	26.64	111.21	--	--	--	--	--	--	0.67	11.00	58.33	10.50
Sep-86	1986	6	15.00	11.50	98.90	--	--	--	4.17	16.68	109.86	--	--	--	--	--	--	0.00	--	42.00	--
Sep-87	1987	6	11.33	13.61	92.06	0.33	6.30	--	5.17	22.43	91.71	--	--	--	0.00	--	--	0.00	--	18.00	--
Sep-88	1988	6	9.67	14.74	90.40	8.17	5.93	105.50	3.00	27.55	123.61	--	--	--	0.67	10.58	86.48	4.00	--	14.00	--
Sep-89	1989	6	10.67	13.15	93.45	9.17	7.59	96.04	1.17	30.31	94.56	--	--	--	0.00	--	--	2.50	--	14.33	4.13
Sep-90	1990	6	18.50	11.96	88.66	4.00	8.51	95.13	0.67	20.95	100.49	--	--	--	2.67	13.69	81.72	9.17	8.04	9.67	14.12
Sep-91	1991	6	15.50	12.78	93.26	12.00	7.39	103.98	2.33	16.57	95.37	--	--	--	5.67	13.98	90.24	2.83	--	8.17	--
Sep-92	1992	6	13.67	13.74	93.42	6.00	6.37	91.54	3.33	25.64	113.39	--	--	--	2.33	17.84	94.80	1.33	--	7.67	--
Sep-93	1993	6	3.17	16.43	94.48	12.33	7.20	109.06	2.00	27.49	100.01	--	--	--	3.33	16.75	95.36	0.00	--	8.67	--
Sep-94	1994	6	27.67	11.73	99.87	23.83	7.65	101.80	2.83	25.52	114.54	--	--	--	1.67	17.39	103.33	0.00	--	6.00	--
Sep-95	1995	6	20.17	13.42	96.73	20.00	7.71	102.97	3.50	21.66	96.62	--	--	--	2.50	17.96	90.90	0.00	--	12.83	--
Sep-96	1996	6	7.83	12.56	96.59	38.00	7.58	105.79	2.83	24.86	103.02	0.17	10.10	119.26	3.33	16.68	96.53	0.00	--	11.00	3.75
Sep-97	1997	6	6.83	13.00	91.31	39.50	7.22	94.54	4.17	21.70	99.11	0.00	--	--	2.17	17.65	96.90	0.00	--	6.17	--
Sep-98	1998	6	4.50	15.53	86.75	47.17	7.55	93.84	4.83	24.43	94.79	0.33	11.65	114.91	4.33	18.04	96.05	0.00	--	10.17	13.74
Sep-99	1999	5	4.20	12.26	104.04	40.60	8.39	93.18	2.20	24.17	105.00	0.80	8.95	119.90	4.40	15.24	95.74	0.20	17.30	4.60	13.39
Sep-00	2000	6	1.00	15.07	93.40	25.00	7.52	96.67	2.50	25.33	99.20	0.50	7.80	104.56	4.67	16.66	96.31	0.00	--	4.17	0.00
Sep-01	2001	6	14.50	12.09	92.76	30.67	7.39	100.86	1.00	27.73	96.81	0.17	10.40	108.60	4.50	13.93	93.62	0.17	17.10	8.67	14.72
Sep-02	2002	6	3.33	11.98	96.85	21.67	7.98	100.11	1.17	25.76	96.31	0.50	9.43	99.04	7.67	14.90	89.57	0.17	--	5.33	--
Sep-03	2003	5	15.80	11.46	102.26	12.20	7.94	125.10	2.00	13.90	108.18	0.20	10.40	96.53	3.60	14.74	101.16	0.00	--	2.60	--
Sep-04	2004	6	12.83	11.62	93.09	16.17	8.34	99.43	0.67	23.90	103.89	0.33	8.20	103.42	2.50	15.32	68.68	0.17	19.20	5.17	15.99
Sep-05	2005	6	5.50	13.63	97.00	12.33	8.35	102.88	0.50	29.23	104.05	0.00	--	--	3.33	15.29	96.82	0.00	--	6.00	16.57
Sep-06	2006	6	3.00	13.38	143.90	23.00	7.71	101.30	1.50	26.94	97.10	0.00	--	--	3.00	15.08	98.10	0.00	--	3.00	16.89
Sep-07	2007	6	9.00	11.80	95.70	29.33	7.90	107.00	1.67	27.50	101.50	0.17	9.20	107.20	5.17	12.80	103.80	0.00	--	17.00	17.20
Sep-08	2008	6	10.00	12.05	104.30	26.50	8.01	102.48	1.00	28.10	97.53	0.17	14.00	113.20	2.67	19.80	94.20	0.00	--	1.83	16.89
Sep-09	2009	6	4.00	11.80	100.90	20.00	8.20	100.40	2.33	26.40	95.16	0.17	15.70	124.59	3.67	18.26	104.72	0.00	--	0.83	16.90
Sep-10	2010	6	3.67	12.12	110.10	19.20	7.35	106.30	0.83	24.32	92.23	0.17	10.20	113.73	1.33	14.48	87.10	0.00	--	1.17	16.59
Aug-11	2011	4	3.75	12.93	98.08	26.50	7.76	92.06	1.75	18.10	83.31	0.25	8.20	76.40	0.75	13.63	81.05	0.00	--	6.00	16.07
Sep-12	2012	6	12.33	11.75	105.68	36.33	8.53	157.05	1.00	24.07	106.95	0.33	9.40	111.89	3.83	11.76	99.32	0.00	--	3.20	15.14
Sep-13	2013	6	5.33	11.56	104.79	26.00	8.81	104.64	0.33	22.05	92.04	--	--	-- --	2.50	10.18	87.06	0.00	--	5.33	16.28
Sep-14	2014	6	14.00	12.22	98.22	8.50	8.34	92.12	1.50	25.46	100.97	0.33	13.50	104.83 --	1.83	15.25	83.76	0.00	--	2.66	16.31
Sep-15	2015	6	11.83	12.78	96.40	12.33	8.79	95.82	2.00	24.95	101.28	0.66	11.75	108.10	4.66	12.72	94.03	0.00	--	1.83	16.84
Sep-16	2016	6	4.33	13.57	95.91	5.00	8.24	98.79	1.16	23.23	95.79	0.83	13.50	103.27	8.33	13.82	89.11	0.00	--	2.50	17.64

Table 2. Rainbow trout historic stocking rates as it relates to densities stocked, strain, length and month on Beaver Creek Reservoir, 1997-2016. Strains include A-Arlee I- Eagle Lake T- Erwin N- Arlee x Eagle Lake R- Arlee x Erwin.

Year	# Stocked	Strain	Length (Inches)	Month Stocked
1997	19,990	T	6.7-7.3	April
1997	52,722	A	3.6	May
1997	19,219	I	5.9	June
1998	11,358	T	6.8	April
1998	5,200	T	7.3	May
1998	40,086	A	4.0	June
1998	19,992	I	5.6	June
1999	17,010	T	7.0	April
1999	10,413	A	6.8	April
1999	4,858	T	8.7	June
1999	18,691	A	5.8	July
1999	6,975	I	3.0	August
2000	10,557	A	6.0	April
2000	25,010	T	6.7	April
2000	18,955	I	4.2	July
2000	36,758	A	6.8	September
2001	21,151	T	6.2	April
2001	6,012	N	4.2	June
2001	52,578	A	6.5	September
2001	15,433	I	4.6	September
2002	20,010	T	6.5	April
2002	4,992	A	3.2	April
2002	47,721	A	6.7-7.3	September
2002	2,992	T	9.0	September
2003	20,705	T	6.2	April
2003	48,563	A	5.6-7.2	September
2003	15,175	N	6.4	September
2004	20,040	T	5.9	April
2004	7,000	I	4.1	August
2004	17,149	I	4.4	September
2004	45,663	A	6.3-7.0	September
2004	9,998	I	3.8	October
2005	10,440	T	6.6	April
2005	30,976	A	7.7	September
2006	20,045	T	6.7	April
2006	19,125	A	3.2	May
2006	54,854	A	6.7-7.9	September
2007	19,121	I	8.0	April
2007	52,058	A	6.5-7.6	September
2007	24,823	I	4.3	September
2008	20,168	R	6.9	April
2008	50,222	A	6.1-7.5	September
2009	10,005	R	7.2	April
2009	8,364	I	8.6	May
2009	49,210	A	7.8-8.4	September
2010	19,995	R	6.9	April
2011	10,120	R	6.6	April
2011	24,486	A	7.7	August
2012	30,124	A	8.6	September
2013	20,120	AxI	7.2	April
2013	30,000	A	6.2	September
2014	50,362	A, R	5.9	April/September
2015	36,160	A, R	7-8.2	April/September
2016	20,137	R	6.0-7.0	April

Bearpaw Lake

Bearpaw Lake is a very popular 45 surface-acre reservoir located on Beaver Creek in the Bearpaw Mountains and received 7,550 (± 1,886) angler days in 2015/2016 (MTFWP Fisheries Bureau 2016). Bearpaw Lake has been managed as a trout fishery since 1960 and is currently maintained with annual plants of 20,000 catchable size Arlee rainbow trout. Stocking of cutthroats was discontinued in 2010 due to poor growth rates and overall condition of these fish in Bearpaw Lake. Wild brook trout moving out of Beaver Creek are also found in the reservoir.

Bearpaw Lake and Beaver Creek also sustain a very robust population of white suckers, which negatively impacts the rainbow trout fishery. In an effort to limit white sucker abundance, FWP introduced smallmouth bass and they have been naturally reproducing within the reservoir since 1998. Walleye were illegally introduced in the 1990s and were then utilized as a control measure for white suckers with periodic stockings from 1992 to 1997. Since 2006, a supplemental plant of 5,000 advanced fingerlings has been planted to replenish the ageing walleye population. Following a chemical rehabilitation of Bearpaw Lake conducted in 1983, a manual sucker control program was initiated in 1989 in an effort to reduce food competition between trout and white suckers and improve growth and survival of rainbow trout. In 2016, no removal effort of white suckers was performed.

Population Status of Adult Fishes

Adult fish populations were monitored at three fixed experimental gillnetting sites, established in 1984. Gill netting was conducted over-night utilizing two sinking experimental gill nets and one floating experimental gill net. The sinking and floating experimental gill nets were 125 feet in length and 6 feet deep consisting of 25-foot panels of ¾", 1", 1 ¼", 1 ½", and 2" mesh. Fish were measured for total length (TL: inches) and weighted to the nearest 0.01 pound (lb).

Since 1989, manual control of white suckers has been attempted annually. Control efforts involve setting five or more trap nets for one to two weeks during their peak spawning period (April/May). Traps are checked daily and white suckers are killed and returned to the lake or dumped at a landfill. Due to sampling conflicts, no additional trap netting occurred in 2016 to remove adult white suckers.

Rainbow Trout

Rainbow trout have been stocked in Bearpaw Lake since the 1960s and are currently stocked at a rate of 20,000 catchables annually (Table 4).

The relative abundance of rainbow trout has fluctuated greatly since their introduction (Table 3). The primary reasons for these fluctuations are stocking densities, fishing pressure, stream flows (entrainment) over spillway, and competition with white suckers. In 2015, relative abundance of rainbow trout increased to their highest level since chemical rehabilitation occurred in 1983 (55.7 fish/net), this was the second consecutive year record rainbow trout relative abundance was documented (Table 3). Rainbow trout relative abundance decreased to 22.3 rainbow trout/net in 2016 (Table 3). Rainbow trout relative abundance decreased by 60% and fell below the 10-year average of 28.3 rainbow trout/net.

Rainbow and brook trout have had relatively poor growth rates due to competition with white suckers for food. However, since the initiation of manual control effort of white suckers and the introductions of smallmouth bass (1992) and walleye (legally in 1995; Table 5), the average length of trout has increased from lengths recorded in the late 1990s (Figure 1; Table 3).

White Sucker

The white sucker population has been significantly reduced since control efforts were initiated in 1984 (Figure 1; Table 3). Chemical rehabilitation was attempted in 1983 however white suckers quickly re-populated the lake from upstream sources in Beaver Creek. In 1989, a manual removal program was initiated. In 1992 and 1995 smallmouth bass and walleye were introduced to help control YOY and adult white sucker populations. From 1989 to 2015, 149,853 white suckers have been removed using trap and

gill nets (Table 5). Overall the average size of white suckers has remained high ($\bar{x}$ TL=11.0 inches; Table 3), indicating that control efforts have reduced spawning adult abundance, and walleye and smallmouth bass have been helping control YOY populations.

In 2016, white sucker relative abundance increased by 38% to 53 white sucker/net (Table 3). White suckers accounted for 70% of the total catch during fall surveys and densities have increased since 2011 (Table 3). Removal efforts may have been able to slightly reduce the adult population of suckers in 2016; however, in recent years (2008-2012), when significant declines in white sucker relative abundance occurred (Table 3), significant outflows from Bearpaw Lake were recorded. At this time, it appears entrainment of suckers during high water events has a greater influence on white sucker abundance than manual removal efforts. No significant water events have occurred on Bearpaw Lake since 2013.

Smallmouth Bass

Smallmouth bass were introduced legally in 1992 to assist with the control of YOY white suckers. Since 1998, smallmouth bass have been successfully reproducing and recruiting into the population. In addition to providing control of white suckers, smallmouth bass have become an important addition to the fishery. No smallmouth bass were collected during 2016 surveys. Anglers did report catching many smallmouth bass throughout the reservoir during the summer months.

Walleye

Walleye were illegally introduced into Bearpaw Lake in the early 1990s. They were first documented in the lake in 1992. From 1992 to 1997, walleye fry and fingerlings were stocked to help control adult white sucker populations. Walleye were last stocked in 2006 with 5,000 advanced fingerlings to replenish the ageing walleye population. Since their legal introduction, walleye have exhibited slow growth and their densities continue to decline (no walleye captured during last three fall surveys; Table 3).

Figure 1. - Comparison of white sucker relative abundance during fall gill netting surveys and average length of rainbow trout sampled in Bearpaw Lake (1984-2016).

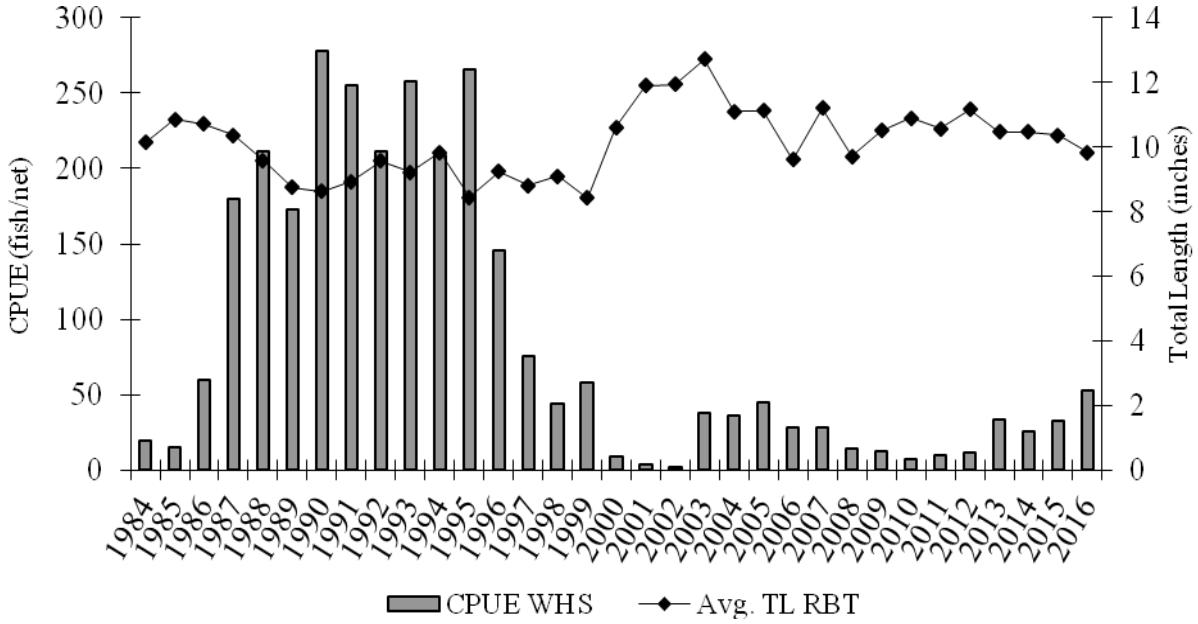


Table 3.- Summary of relative abundance (catch per unit effort (CPUE)), total length (TL), and relative weights of fishes collected in fall gillnetting surveys in Bear Paw Lake since chemical rehabilitation in 1983.

			Rainbow Trout			Brook Trout			Yellowstone Cutthoat Trout			White Sucker			Smallmouth Bass			Walleye		
Date		Nets	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt	CPUE (fish/net)	Ave TL (in.)	Rel Wt
Sep-84	1984	2	0.00	--	--	0.00	--	--	15.50	10.13	86.34	13.50	8.00	--	--	--	--	--	--	--
Sep-85	1985	3	1.33	12.03	97.49	1.00	9.05	109.72	27.33	11.50	86.83	6.33	--	--	--	--	--	--	--	--
Sep-86	1986	3	0.00	--	--	3.33	10.41	106.78	16.67	11.01	86.45	94.33	6.40	--	--	--	--	--	--	--
Sep-87	1987	3	17.00	11.27	93.31	3.00	10.31	103.48	25.67	9.52	86.21	192.67	7.00	--	--	--	--	--	--	--
Aug-88	1988	3	9.33	10.66	83.05	1.33	10.48	100.24	9.00	7.60	90.08	210.33	11.67	93.74	--	--	--	--	--	--
Sep-89	1989	3	15.33	8.64	88.09	0.67	9.50	106.91	19.33	8.08	85.50	173.67	8.00	--	--	--	--	--	--	--
Aug-90	1990	3	9.00	9.95	81.94	0.33	7.20	86.56	22.33	8.71	77.85	277.67	8.00	--	--	--	--	--	--	--
Aug-91	1991	3	4.00	10.23	88.55	0.67	7.45	104.75	15.00	9.12	85.36	255.33	8.00	--	--	--	--	--	--	--
Sep-92	1992	3	17.00	9.83	90.97	0.33	10.10	90.14	58.67	8.79	77.22	212.00	8.00	--	--	--	--	0.33	13.90	97.61
Sep-93	1993	3	0.00	--	--	0.33	9.30	105.94	6.00	9.15	81.65	258.33	8.00	--	0.00	--	--	0.00	--	--
Sep-94	1994	3	6.33	10.59	101.87	0.00	--	--	13.67	9.09	79.87	208.67	8.00	--	0.00	--	--	0.00	--	--
Sep-95	1995	2	21.50	9.07	92.20	0.00	--	--	89.50	7.82	81.30	399.00	8.00	--	1.00	5.80	111.70	0.00	--	--
Sep-96	1996	3	1.67	10.36	102.97	0.33	8.40	90.25	60.67	8.94	85.64	146.00	8.80	--	0.67	6.80	96.44	1.33	8.73	81.46
Sep-97	1997	3	24.67	9.16	93.58	0.00	--	--	26.00	8.47	80.26	76.00	10.00	--	0.67	9.90	103.82	1.00	7.73	72.03
Sep-98	1998	3	10.00	9.34	86.71	0.00	--	--	3.67	8.84	72.68	44.33	12.02	84.89	0.33	6.00	90.19	1.33	8.43	80.59
Sep-99	1999	3	43.33	8.31	97.60	0.00	--	--	19.33	8.54	79.14	57.33	12.00	--	0.00	--	--	1.33	10.43	83.95
Sep-00	2000	2	46.00	11.36	97.54	1.50	9.67	98.77	20.00	10.81	80.53	14.00	12.00	--	6.00	9.76	103.09	3.50	11.30	88.39
Sep-01	2001	2	11.00	13.39	98.99	6.50	11.36	101.16	15.00	10.91	81.14	6.00	8.00	--	2.00	10.83	102.66	0.00	--	--
Sep-02	2002	2	19.50	12.58	98.57	0.00	--	--	6.50	11.31	83.45	3.00	13.52	99.67	0.00	--	--	2.00	19.50	82.57
Sep-03	2003	3	16.33	12.72	94.32	0.00	--	--	0.00	--	--	37.67	8.00	--	5.67	12.21	112.80	1.00	19.60	101.96
Sep-04	2004	3	13.33	11.11	--	0.00	--	--	0.00	--	--	36.67	12.60	--	0.33	14.50	--	0.67	20.45	--
Sep-05	2005	3	24.67	11.12	92.19	0.00	--	--	0.33	--	--	44.67	13.14	99.05	5.67	9.07	112.75	1.33	20.53	101.17
Sep-06	2006	3	32.00	10.62	98.00	0.00	--	--	0.67	9.35	96.10	28.00	15.31	108.20	9.00	9.84	109.80	0.33	15.40	104.20
Sep-07	2007	3	13.33	11.20	96.30	0.00	--	--	2.33	9.20	80.90	28.00	13.40	102.30	9.00	9.00	115.70	4.33	7.60	96.10
Sep-08	2008	3	30.33	9.73	94.58	0.00	--	--	7.67	9.03	84.95	14.00	14.12	108.86	5.67	10.94	147.97	5.00	8.07	97.96
Sep-09	2009	3	9.66	10.50	73.45	0.33	10.00	100.88	9.00	9.33	62.37	12.33	14.58	95.00	7.66	11.31	104.73	2.66	10.25	80.07
Sep-10	2010	3	14.33	10.90	104.35	0.33	10.00	111.49	0.00	--	--	7.67	13.80	104.10	1.67	8.94	117.20	6.00	10.62	98.00
Aug-11	2011	3	26.33	10.56	98.91	0.33	10.60	106.02	0.00	--	--	10.00	14.28	102.92	0.00	--	--	0.67	12.40	103.88
Sep-12	2012	3	34.67	11.15	99.37	1.33	9.73	99.80	0.00	--	--	12.00	12.26	103.03	0.66	10.80	106.63	1.66	14.90	102.83
Sep-13	2013	3	24.00	10.47	146.81	0.66	8.55	98.05	0.00	--	--	33.33	12.79	106.65	1.66	12.20	104.72	0.33	17.10	109.51
Sep-14	2014	3	52.30	10.46	97.25	4.00	10.05	90.72	0.00	--	--	25.70	13.01	98.94	0.33	12.90	106.22	0.00	--	--
Sep-15	2015	3	55.67	10.36	91.26	0.00	--	--	0.00	--	--	33.00	12.18	94.10	0.33	12.90	107.95	0.00	--	--
Sep-16	2016	3	22.30	9.83	90.11	0.00	--	--	0.00	--	--	53.00	14.00	95.10	0.00	--	--	0.00	--	--

Table 4. Stocking summary of rainbow trout, Yellowstone cutthroat trout, smallmouth bass, and walleye in Bearpaw Lake, 1984-2016. Strains include A-Arlee I- Eagle Lake D- Lake DeSmet M- McBride Lake G- Goose Lake.

	Rainbow Trout			Yellowstone Cutthoat Trout			Smallmouth Bass		Walleye	
Date	# Stocked	Strain	Month	# Stocked	Strain	Month	# Stocked	Month	# Stocked	Month
1984	--	--	--	21,234	M	April/Sept.	--	--	--	--
1985	--	--	--	8,120	M	May/Aug.	--	--	--	--
1986	--	--	--	12,727	M	June/Sept.	--	--	--	--
1987	13,008	D and I	April/Sept.	19,248	M	April/Sept.	--	--	--	--
1988	8,018	I	Sept.	28,904	M	April/Sept.	--	--	--	--
1989	500		May	6,000	M	May	--	--	--	--
1990	--	--	--	5,025	M	May	--	--	--	--
1991	9,965	A	Sept.	7,574	M	May	--	--	--	--
1992	6,879	A	Sept.	8,023	M	May	25,000	Aug.	--	--
1993	11,040	A	Sept.	5,058	M	May	41,250	July/Aug.	--	--
1994	9,394	A	Sept.	5,040	M	May	23,995	July/Aug.	--	--
1995	--	--	--	10,064	M	May	--	--	5,000	June
1996	11,398	A	Sept.	9,997	M	May	20,000	July	4,000	June
1997	13,448	A	Sept.	8,924	M	May	5,000	Aug.	6,000	June
1998	13,904	A	Sept.	5,047	M	May	5,000	July	--	--
1999	17,160	A	June	4,048	M	May	--	--	--	--
2000	4,995	A	Sept.	3,973	M	May	--	--	--	--
2001	10,000	A	Sept.	3,991	M	May	--	--	--	--
2002	10,700	A	Sept.	4,320	M	May	--	--	--	--
2003	15,215	A	Sept.	4,200	M	May	--	--	--	--
2004	12,549	A	Sept.	4,384	M	May	--	--	--	--
2005	14,520	A	Sept.	5,600	M	May	--	--	--	--
2006	12,628	A	Sept.	6,214	M	April/May	--	--	5,112	Sept.
2007	20,000	A and I	Sept.	8,127	M	May	--	--	--	--
2008	15,000	A	Sept.	7,293	G	May	--	--	--	--
2009	15,000	A	Sept.	5,024	G	May	--	--	--	--
2010	5,000	I	June	--	--	--	--	--	--	--
2011	5,104	I	June	--	--	--	--	--	--	--
2012	15,828	A	Sept./Nov.	--	--	--	--	--	--	--
2013	20,000	A	Sept./Nov.	--	--	--	--	--	--	--
2014	20,536	A	June/Sept.	--	--	--	--	--	--	--
2015	20,328	A and I	May/Sept.	--	--	--	--	--	--	--
2016	19,777	A and I	May/Sept.	--	--	--	--	--	--	--

Table 5. - Numbers of white suckers removed from Bearpaw Lake by trap netting and fall gill netting, 1989-2016.

Year	Number Trap Netting	Number Gill netting	Total Number	Total Pounds
1989	12,545	521	13,066	9,359.19
1990	44,622	833	45,455	10,396.52
1991	18,140	766	18,906	4,932.86
1992	4,133	636	4,769	955.42
1993	5,239	775	6,014	1,205.33
1994	6,995	626	7,621	882.49
1995	5,653	798	6,451	2,396.44
1996	1,991	438	2,429	817.39
1997	13,485	228	13,713	8,227.80
1998	6,708	133	6,841	5,309.22
1999	8,239	172	8,411	7,614.72
2000	2,225	28	2,253	2,591.20
2001	331	12	343	562.69
2002	17	6	23	21.65
2003	1,564	113	1,677	2,362.17
2004	222	110	332	418.32
2005	1,895	134	2,029	2,311.74
2006	1,893	84	1,977	2,491.02
2007	1,705	84	1,789	2,111.02
2008	560	42	602	818.72
2009	175	37	212	290.44
2010	104	23	127	173.99
2011	310	30	340	418.20
2012	409	36	445	547.35
2013	641	100	741	911.43
2014	1,560	77	1,637	2,013.51
2015	1,392	99	1,491	1,491.00
2016	--	159	159	196.00
Totals	142,753	7,100	149,853	71,828

Blaine County Ponds

Ponds throughout Blaine County were sampled using gill and trap nets to assess species composition, relative abundance, and size distribution of fish or the voluntary creel boxes were maintained.

Anderson Reservoir

Anderson reservoir is a privately owned reservoir, which has been managed as a rainbow trout fishery since 2003. This reservoir is maintained with annual plants of 2,000 four-inch Arlee rainbow trout. In addition, a creel box was erected during the summer of 2005 but was destroyed by cows.

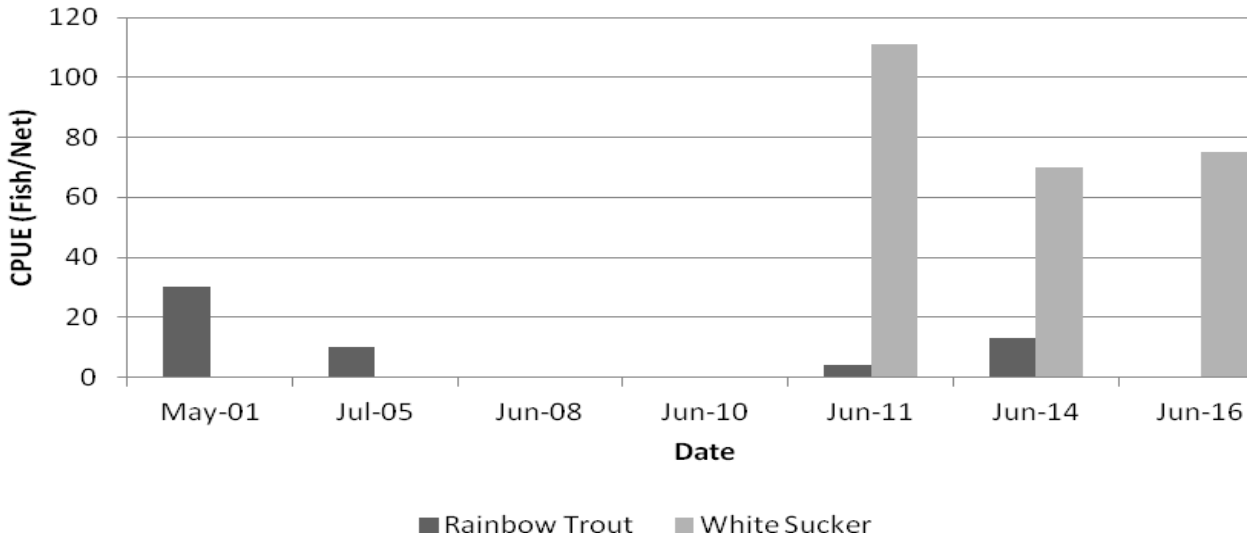
Initially, the trout exhibited excellent growth and survival in Anderson reservoir. However, winterkills occurred in 2008 and 2010, which limited the abundance and size of fish (Figure 2).

In 2011, fish health samples were collected for trap and transport of fathead minnows, one gill net and two trap nets were set overnight and captured 10 rainbow trout, 783 white sucker, 8,500 fathead

minnows, 236 brassy minnow, 3 creek chubs, 3 northern redbelly dace, 1 brook stickleback, and 1 mountain sucker. The rainbow trout stocked in 2010 showed excellent growth and exceeded 15 inches in total length. The high diversity of species found in Anderson Reservoir during the 2011 sampling effort was most likely caused by a high spring runoff event that had many creeks running out of their banks and small dams either breaching or running water over spillways. In 2014, rainbow trout relative abundance increased to 13 rainbow trout/net and averaged 15.5 inches, no rainbow trout were captured in the gill net in 2016 (Figure 2). One trap captured 7 rainbow trout that averaged 14.6 inches.

The reservoir continues to support a high white sucker population (Figure 2) and their presence at current densities is impacting the rainbow trout population.

Figure 2. - Relative abundance of rainbow trout and white suckers in Anderson Reservoir based on gill netting surveys from 2001 to 2016.



Grasshopper Reservoir

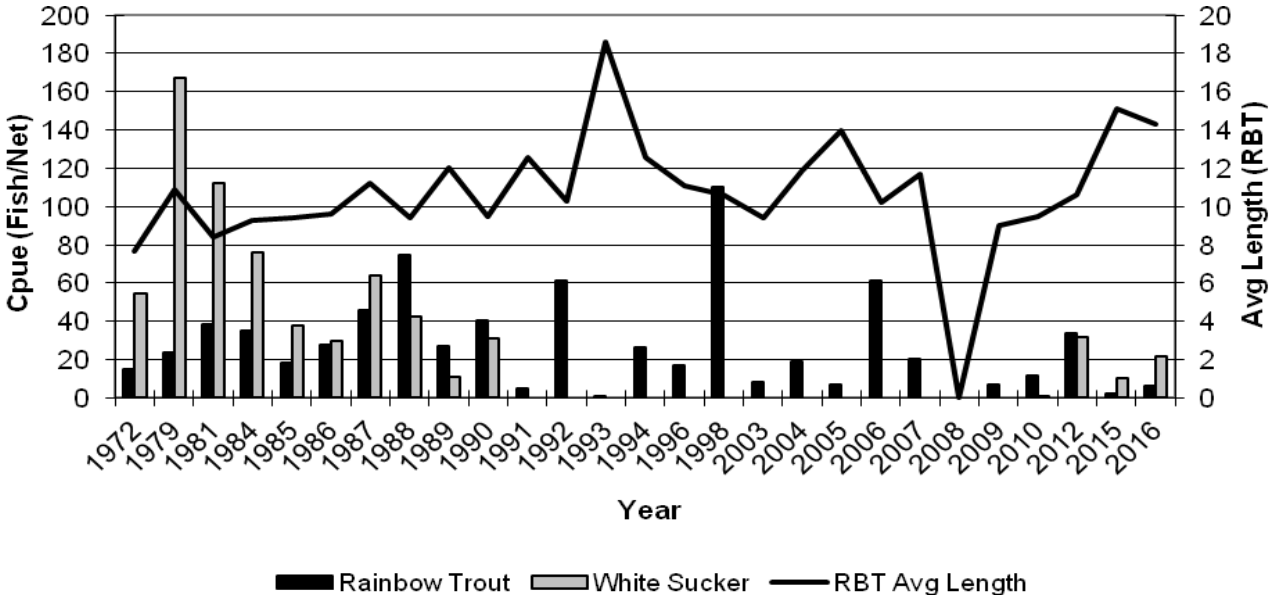
Grasshopper Reservoir is a privately owned 19 surface-acre reservoir located approximately 12 miles south of Chinook and received 523 (± 278) angler days in 2015/2016 (MTFWP Fisheries Bureau 2016). Grasshopper Reservoir was first stocked with rainbow trout in 1947 and trout have exhibited good growth and survival rates in this reservoir. Grasshopper is currently maintained with annual plants of 2,500 fingerling Arlee rainbow trout and biennial plants of 3,000 advanced fingerling Eagle Lake rainbow trout. In 2011, FWP and S Bar B Ranch entered into a 5-year agreement through the Private Lands Public Fishing program to ensure public access to the reservoir remains. In return FWP provided $7,800 to upgrade the access road across the dam.

Grasshopper experienced a winterkill in 2007/2008. Anglers who filled out creel cards reported catching no fish during late ice (n=2) and one reported seeing over 100 dead trout along the east bank. In the spring of 2008 heavy rains raised water levels and the reservoir received a supplemental stocking of 2,500 Arlee rainbow trout.

White suckers were chemically removed in 1991 and were undetected in netting surveys until 2010, when one white sucker (TL=7.4; WT=0.16 lbs.) was captured. White suckers have since established themselves within the reservoir and are successfully reproducing (Figure 3). Tiger muskies were stocked in 2013 as a biological control on the white sucker population, their impact is undetermined at this time and no tiger muskie were observed during our surveys in 2015 or 2016.

In 2012 rainbow trout relative abundance climbed to 33.5 fish/net with an average length of 10.6 inches (Figure 3). Rainbow trout relative abundance dropped to 2 fish/net in 2015 with an average length of 15.13 inches (Figure 3). Rainbow trout relative abundance increased to 6.5 fish/net in 2016 an averaged 14.3 inches.

Figure 3. - Relative abundance of rainbow trout and white suckers and average total length of rainbow trout in Grasshopper reservoir based on gill netting surveys from 1972 to 2016.



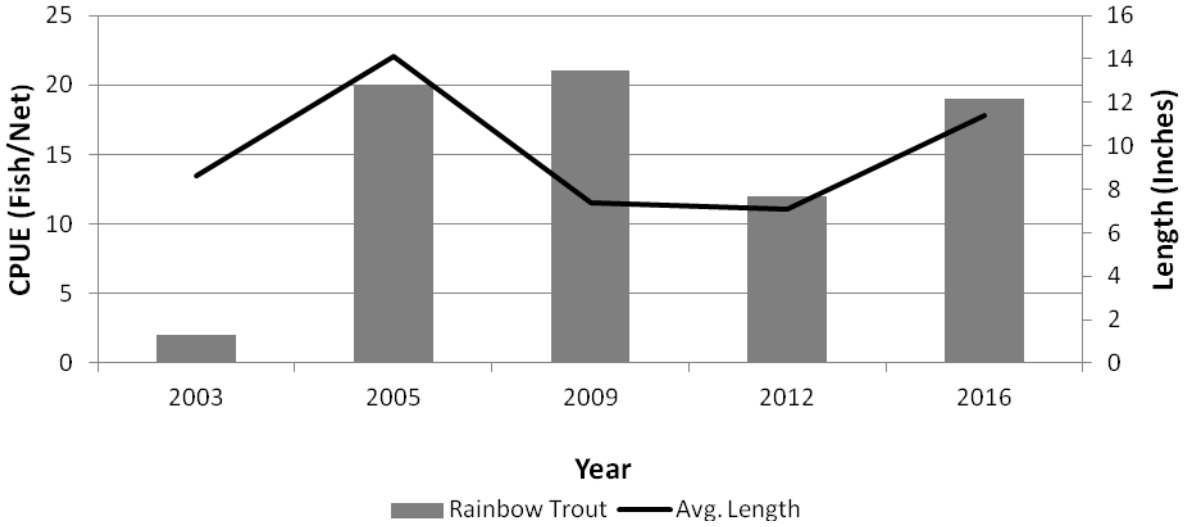
Jensen Reservoir

Jensen reservoir is a privately owned pond which has been open to public fishing since 2003 and received 212 (± 164) angler days in 2013/2014 (MTFWP Fisheries Bureau 2014). A windmill aeration system was installed to assist with over-winter survival and the reservoir is maintained with annual plants of 500 fingerling Arlee rainbow trout.

In 2009, one gill net and one trap net were set overnight. The gill net captured 21 rainbow trout ($\bar{x}$ TL=7.4, $\bar{x}$ Wt. = 0.22 lbs.). The trap net captured one rainbow trout, 4,000 fathead minnows, and 1,520 brassy minnows. In 2012, one gill net captured 12 rainbow trout ($\bar{x}$ TL=7.6, $\bar{x}$ Wt. = 0.35 lbs.; Figure 4). One trap net captured 1,764 brassy minnows and one rainbow trout.

Rainbow trout relative abundance increased to 19 trout/net in 2016 ($\bar{x}$ TL=11.4, $\bar{x}$ Wt. = 1.56 lbs.; Figure 4). Three year-classes were observed, suggesting over-winter survival has occurred during the last few mild winters. Little over-winter habitat remains, even with the windmill aeration system installed. High sediment load occurred during the historic run-off event in the spring of 2011 and reduced the maximum depth of this reservoir from 12 to 8 feet. Annual rainbow trout stocking continued due to the popularity of this fishery, and personal investments made by the landowner. However, winters with significant snow and long periods of cold temperatures will increase winterkill at this reservoir.

Figure 4. Relative abundance and average total length of rainbow trout in Jensen Reservoir based on gill netting surveys from 2003 to 2016.



Phillips County Ponds

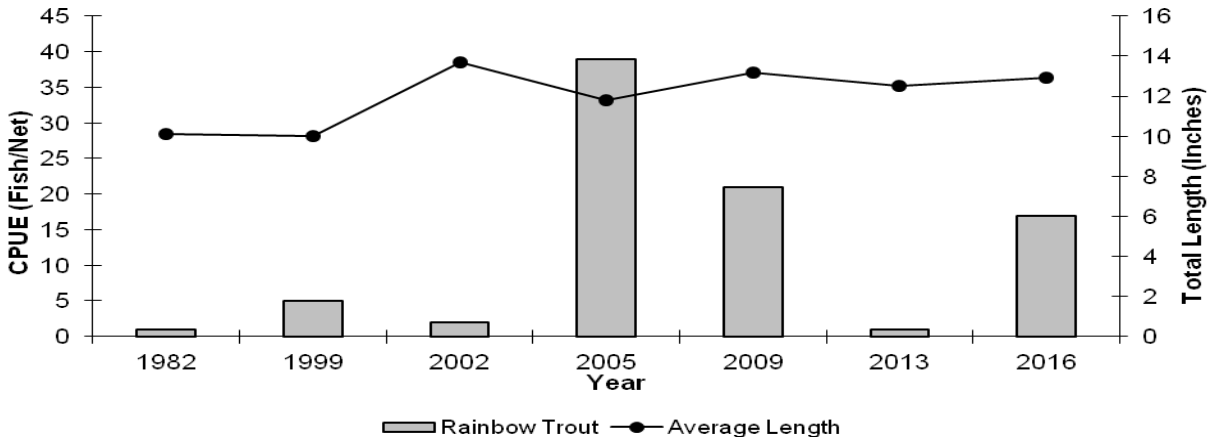
Ponds throughout Phillips County were sampled using gill and trap nets to assess species composition, relative abundance, and size distribution of fish or the voluntary creel boxes were maintained.

Sentinel Reservoir

Sentinel is located on BLM land in south Phillips County and received 473 (± 287) angler days in 2015/2016 (MTFWP Fisheries Bureau 2016). This reservoir has been managed as a rainbow trout fishery since 1970. Sentinel receives annual plants of 6,000 fingerling rainbow trout.

Rainbow trout relative abundance has been variable over the years, with little variability in the average length of rainbow trout collected (Figure 5). Rainbow trout relative abundance increased to 17 trout/net in 2016 ($\bar{x}$ TL=12.9, $\bar{x}$ Wt. = 1.22 lbs.; Figure 5) and contained three year-classes. The trap net captured 458 fathead minnows.

Figure 5. - Relative abundance and average total length of rainbow trout in Sentinel reservoir based on gill netting surveys from 1982 to 2016.



RECOMMENDATIONS

Beaver Creek Reservoir: Continue annual stocking of up to 50,000 catchable size Arlee rainbow trout. Continue to monitor fishery annually with the use of seining and gill netting at fixed sites. Continue to monitor the impacts to the fishery during extreme water years and impacts of entrainment over the spillway.

Bearpaw Lake: Continue annual stocking of 15,000 catchable size Arlee and 5,000 Eagle Lake rainbow trout. Add additional walleye stockings to supplement the population to assist with the control of a high-density white sucker population. Continue manual removal of adult suckers by trapping and/or electrofishing in the spring, and gill netting in the fall. Continue to monitor fishery annually with the use of fall gill netting at fixed stations.

Blaine County Ponds: Monitor ponds every two to three years to assess survival and growth of stocked fish. Continue public education program alerting the public to the problems associated with the use of live bait (where illegal) and illegal dumping of fish into Montana waters. Continue to look for other ponds with suitable habitats to create new fisheries, work with area wardens and landowners to help identify potential ponds.

Phillips County Ponds: Monitor ponds every two to three years to assess survival and growth of stocked fish. Continue to look for other ponds with suitable habitats to create new fisheries, work with area wardens and landowners to help identify potential ponds.

Waters Codes:

154770	Beaver Creek Reservoir
154560	Bearpaw Lake
154515	Anderson Reservoir
155380	Grasshopper Reservoir
155780	Jensen Reservoir
168220	Sentinel Reservoir

Key Words or Fish Species:

Arlee; Eagle Lake; Erwin; rainbow trout, Yellowstone cutthroat trout; brown trout; brook trout; mottled sculpin; longnose dace; mountain sucker; fathead minnow; lake chub; white sucker; white sucker control; smallmouth bass; walleye; northern pike; largemouth bass; yellow perch;

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