Fisheries Division
Federal Aid Job Progress Report

Montana Statewide Fisheries Management

Federal Aid Project Number: F-113-R-6

July 1, 2019 – June 30, 2020

Project Title: Montana Statewide Fisheries Management

Job Title: Havre Area Coldwater Fisheries Management

Abstract:

The coldwater fisheries in Hill, Blaine, and Phillips Counties maintained good to excellent water levels in 2018/2019. Substantial rain events occurred in Phillips County during June and netting conducted in July suggests entrainment downstream from several reservoirs may have occurred. Rainbow trout growth in Beaver Creek Reservoir has been above average the past few years and correlates with lower trout densities, likely due to predation by walleye and pike shortly after stocking. Rainbow trout densities and growth in Bearpaw Lake have been stable but white sucker densities continue to increase. Beaver Creek, Beaver Creek Reservoir, Bearpaw Lake and select ponds and reservoirs in Hill, Blaine, and Phillips Counties were monitored in 2019 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: (5) 310 and (5) 124 projects were reviewed along with one campground/cabin development review with local agencies; attended three walleye unlimited meetings and helped with six school programs and fishing events related to the "Hooked on Fishing" program.

METHODS

Sampling conducted in Beaver Creek were multi-pass 500ft/run within sections 1 through 3 using a backpack mounted electrofishing unit (Smith-Root LR 24). The electrofishing unit was set to a standard pulse waveform, with output voltage of 300 to 325 volts, and a cycle frequency of 30 Hz. Block nets were placed at the start and finish of each section. Two-pass depletion (K-Pass depletion) estimates were conducted at each site.

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 ½" mesh were set 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 (lbs.).

RESULTS AND DISCUSSION

Beaver Creek (Hill County)

Beaver Creek flows 43.1 miles from its headwaters on the Rocky Boy Indian Reservation to its confluence with the Milk River west of Havre. Beaver Creek has three impoundments, East Fork Reservoir on the Rocky Boy Indian Reservation, Bear Paw Lake, and Beaver Creek Reservoir.

Beaver Creek is divided up into four sections based on impoundment divisions and land ownership. Section 01 of Beaver Creek flows 21.8 miles from Beaver Creek Reservoir to the confluence with the Milk River. Section 02 flows 7.8 miles from Bear Paw Lake to Beaver Creek Reservoir. Section 03 flows 7.8 miles from the Rocky Boy Indian Reservation to Bear Paw Lake. Section 04 is a 3.6-mile section on the Rocky Boy Indian Reservation. The fishery in Beaver Creek was established in 1928 with the stocking of cutthroat trout in Section 02. Since that time, rainbow trout, brook trout, brown trout, and smallmouth bass have been introduced in Sections 01, 02 and 04. Section 01 and 02 are currently maintained through natural reproduction, entrained trout from Bear Paw Lake and Beaver Creek Reservoir, and annual plants of 2,000 2-4-inch brown trout. Section 03 is not stocked, however contains a natural reproducing population of brook trout.

Section 01- Beaver Creek Reservoir to confluence with Milk River

Section 01 of Beaver Creek is a lower gradient stream (approximately 2,952 feet to 2,296 feet elevation) consisting of lower trout abundance levels than upstream sections. As the creek progresses to the confluence with the Milk River, water temperatures increase due to distance from Beaver Creek Reservoir and the fish assemblage becomes dominated by native non-game species. This section, especially immediately below Beaver Creek Reservoir, receives a high amount of angling pressure. In 2013/2014, this section ranked 12th in the region for angling pressure receiving 3,243 (± 1,321) angler days (MTFWP Fisheries Bureau 2014).

Within this section one depletion estimate was conducted, (see methods section above). The site was located approximately 1.15 river miles downstream of Beaver Creek Reservoir.

A total of five species were observed (rainbow trout, brown trout, longnose dace, mottled sculpin, and white sucker). One rainbow trout (TL=17.4 in.) and two brown trout ranging from 15 to 17.5 in. ($\bar{x}$ =16.3 in.) were collected. Estimated rainbow trout/500 ft. at this site was 1 (±0) and estimated brown trout/500 ft. was 2 (±0), respectably (Figure 1).

Section 02: Bearpaw Lake Dam to Beaver Creek Reservoir

Section 02 is a higher gradient stream (4,002 feet to 2,952 feet elevation change) consisting of populations of native non-game species and non-native rainbow and brown trout fisheries. The Bearpaw Dam regulates water conditions within this section and efforts are to mimic the natural hydrograph by allowing water to flow over the spillway. This section receives a high amount of angling pressure, in 2013/2014, this section ranked 9th in the region for angling pressure receiving 4,757 (± 1,660) angler days (MTFWP Fisheries Bureau 2014).

Within this section, three sites were sampled for fish species composition and to estimate trout abundance (trout/500 ft.). The first site (between bridge and weir) was located approximately 6 stream miles downstream of Bearpaw Dam, the second site (Eagle Rock) was located approximately 3.4 river miles downstream of Bearpaw Dam and the third site (Rotary Falls) was located approximately 0.3 miles downstream of Bearpaw Dam. At site one a total of two species were collected. One rainbow trout (TL=7.6 in.) and three brown trout ($\bar{x}$ TL=9.8 in.) were collected at this site. Estimated rainbow trout/500 ft. at this site was 1 (±0) and estimated brown trout/500 ft. was 3 (±3), respectably (Figure 1).

Seven species were observed at site 2 (rainbow trout, brown trout, white sucker, longnose dace, mottled sculpin, longnose sucker and mountain sucker). Captured rainbow trout ranged from 7.8 to 11.9 in. ($\bar{x}$ =10.1 in.) and brown trout ranged from 5.5 to 16.2 in. ($\bar{x}$ =9.2 in.). Estimated rainbow trout/500 ft. at this site was 4 (±1) and brown trout/500 ft. was 26 (±2), respectably (Figure 1).

Five species were observed at site 3 (rainbow trout, brook trout, white sucker, longnose dace and mottled sculpin). Captured rainbow trout ranged from 6.7 to 14.2 in. ($\bar{x}$ =10.9 in.) and one brook trout was 9.8 inches. Estimated rainbow trout/500 ft. at this site was 37 (±11) and brook trout/500 ft. was 1 (±0), respectably (Figure 1).

Section 03: Rocky Boy Indian Reservation Boundary to Bear Paw Lake

Section 03 is a higher gradient stream (4,593 feet to 4,002 feet elevation change) with lower flows than the other sections. This section has been highly impacted by major rain and runoff events (2008, 2011 and 2013) and has been altered by human activities in attempt to re-establish the existing stream function prior to the historic water events. This section receives a high amount of angling pressure due to numerous campsite locations along the creek and abundant brook trout population. In 2013/2014, this section ranked 15th in the region for angling pressure receiving 2,620 (± 1,242) angler days (MTFWP Fisheries Bureau 2014).

Within this section, five sites were sampled for fish species composition and to estimate trout abundance (trout/500 ft.). Site one was located at the Rocky Boy Indian Reservation Boundary located approximately 8.65 river miles upstream of Bearpaw Lake, site two (Lions Camp) was located approximately 6.4 miles upstream of Bearpaw Lake, site three (JC Camp) was located approximately 4 miles upstream of Bearpaw Lake, site four (downstream of Rotary Pond) is located approximately 3.6 miles upstream of Bearpaw Lake, and site five (Boy Scout Camp) is located approximately 0.5 miles upstream Bearpaw Lake.

Three species were observed at site 1 (brook trout, rainbow trout and mottled sculpin). Brook trout collected ranged in length from 4.0 to 9.7 in. ($\bar{x}$ =6.1 in.) and one rainbow trout was 8.7 in. Estimated rainbow trout/500 ft. at this site was 1 and brook trout/500 ft. was 45 (±27), respectably (Figure 1).

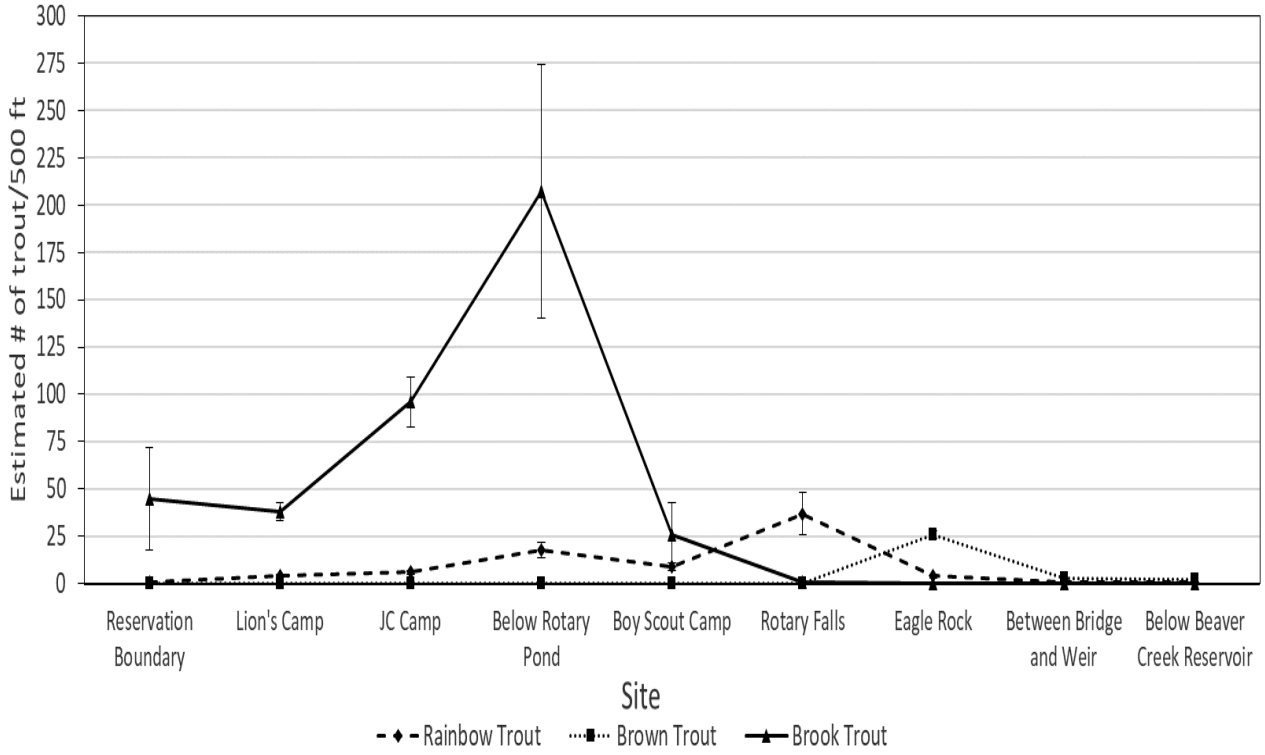
Three species were observed at site 2 (brook trout, rainbow trout and mottled sculpin). Brook trout collected ranged in length from 4.7 to 11.7 in. ($\bar{x}$ =7.6 in.) and rainbow from 6.2 to 8 in. ($\bar{x}$ =7.1 in.). Estimated brook trout/500 ft. at this site was 38 (±5) and rainbow trout/500 ft. was 4 (±1), respectably (Figure 1).

Four species were observed at site 3 (brook trout, rainbow trout, mountain sucker and mottled sculpin). Brook trout captured ranged in length from 3.8 to 12.3 in. ($\bar{x}$ =6.1 in.) and rainbow trout from 6.8 to 12.2 in. ($\bar{x}$ =9.6 in.). Estimated brook trout/500 ft. at this site was 96 (±13) and rainbow trout/500 ft. was 6 (±1), respectably (Figure 1).

Five species were observed at site 4 (brook trout, rainbow trout, white sucker, mountain sucker and mottled sculpin). Brook trout collected ranged from 3.4 to 12.0 in. ($\bar{x}$ =6.3 in.) and rainbow trout from 6.0 to 11.1 in. ($\bar{x}$ =8.9 in.). Estimated brook trout/500 ft. at this site was 207 (±67) and rainbow trout/500 ft. was 18 (±4), respectably (Figure 1).

Five species were observed at site 5 (brook trout, rainbow trout, white sucker, mountain sucker and mottled sculpin). Brook trout collected ranged from 4.5 to 11.5 in. ($\bar{x}$ =6.6 in.) and rainbow trout from 5.5 to 14.7 in. ($\bar{x}$ =8.9 in.). Estimated brook trout/500 ft. at this site was 26 (±17) and rainbow trout/500 ft. was 9 (±2), respectably (Figure 1).

Figure 1. Estimated rainbow, brown and brook trout/500 ft. at nine sites located on Beaver Creek.



Beaver Creek Reservoir

Beaver Creek Reservoir, located south of Havre, is a 185-acre reservoir with a maximum depth of 80 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 2017/2018 indicated it received 2,602 (± 1,017) angler days (MTFWP Fisheries Bureau 2018). The decrease in pressure observed in 2017 was due to extreme drought conditions that reduced water levels in the reservoir by more than 15 feet, making both shore and boat access difficult.

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 white suckers and enhance the fishing opportunity within the reservoir. Currently this reservoir receives annual plants of 50,000 catchable size Eagle Lake/Erwin and Arlee rainbow trout, as well as 10,000 fingerling and 5,000 advanced fingerling walleye.

Population Status of Adult Fishes

Water levels in September 2019 were down approximately 8 feet during our sampling effort. 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

Historically, rainbow trout densities have exhibited high annual variation. This variability can be attributed to rainbow trout stocking densities, predation by northern pike and walleye, and entrainment during high water events.

In 2006, stocking densities of rainbow trout reflected historical densities (70,000 RB/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 in 2009, 2010, 2011 and 2013 (Table 1), major flood events occurred in three of the four years. In 2014, rainbow trout relative abundance increased to its highest level in 11 years (14 fish/net) and dropped slightly in 2015 to 11.83 fish/net ($\bar{x}$ length=12.78), remaining 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). In 2017 and 2019, sampling took place at the same time as the fall rainbow trout plant. This was unintentional and resulted in inflated rainbow trout relative abundance and reduced average length (Table 1). Rainbow relative abundance observed in 2018 was the lowest ever documented at 0.67 trout/net (Table 1). In 2019, no age 1+ rainbow trout were observed during our netting surveys. Since 2008, rainbow trout stocking densities into Beaver Creek Reservoir have significantly decreased due to budget cuts and hatchery space (Table 2). Walleye densities have doubled their historic abundance averages and could be increasing the predation of stocked rainbow trout as well (Table 1).

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, 1974-2019.

			Rainbow Trout			Yellow Perch			Northern Pike			Smallmouth bass			Walleye			Longnose sucker		White sucker	
Date		Nets	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel Wt	Rel. Ab (fish/net)	Ave TL (in.)	Rel. Ab (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
Sep-17	2017	4	23.25	9.21	110.26	7.50	7.64	92.54	1.50	24.62	100.71	--	--	--	8.50	14.04	87.75	0.00	--	1.00	16.60
Sep-18	2018	6	0.67	17.45	107.56	4.67	7.87	98.67	1.67	24.65	103.82	0.33	11.50	105.35	8.67	14.01	89.26	0.00	--	1.67	17.64
Sep-19	2019	6	13.17	8.09	106.75	20.67	5.95	94.81	2.17	21.95	103.71	0.17	14.60	99.95	13.17	14.68	85.71	0.00	--	0.67	18.80

Table 2. Rainbow trout historic stocking rates as it relates to densities stocked, strain, length and month on Beaver Creek Reservoir, 1997-2019. 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
2017	41,424	A, R	7.0-8.5	April/September
2018	24,020	A, R	7.1	May/September
2019	22,483	A, R	7.5	April/September

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 (Leslie 2007). 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. In 2006, a supplemental plant of 5,000 advanced fingerlings occurred to replenish the aging walleye population. Following a chemical rehabilitation of Bearpaw Lake conducted in 1983, a manual sucker control program was initiated in 1989 to reduce food competition between trout and white suckers and improve growth and survival of rainbow trout. From 2016-2019, no removal effort of white suckers was conducted, and their abundance has increased (Table 3).

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 one sinking experimental gill net and two floating experimental gill nets. 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 ½" 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 from 2016-2019 to remove adult white suckers.

Rainbow Trout

Rainbow trout have been stocked in Bearpaw Lake since the 1960s and have been stocked at a rate of 20,000 catchables annually (Table 4). Stocking densities were reduced in 2018 and 2019 due to reduced hatchery budgets (Table 4).

The relative abundance of rainbow trout has varied 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 by 60% to 22.3 rainbow trout/net in 2016 and fell to their lowest level since 2009 in 2019 (11.67 fish/net; Table 3).

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 2; Table 3).

White Sucker

The white sucker population has been significantly reduced since control efforts were initiated in 1984 (Figure 2; 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 reduced spawning adult abundance.

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). Results from 2017-2019 show the white sucker population continues to increase (> 60 white sucker/net; Table 3). Removal efforts may have been able to slightly reduce the adult population of suckers from 2016-2019; however, in recent years (2008-2012), when significant declines in white sucker relative abundance occurred (Table 3), significant outflows from Bearpaw Lake were recorded. 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. Anglers continue to 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 and are likely extirpated from Bearpaw Lake (no walleye captured during last six fall surveys; Table 3).

Figure 2. - Comparison of white sucker relative abundance during fall gill netting surveys and average length of rainbow trout sampled in Bearpaw Lake (1984-2019).

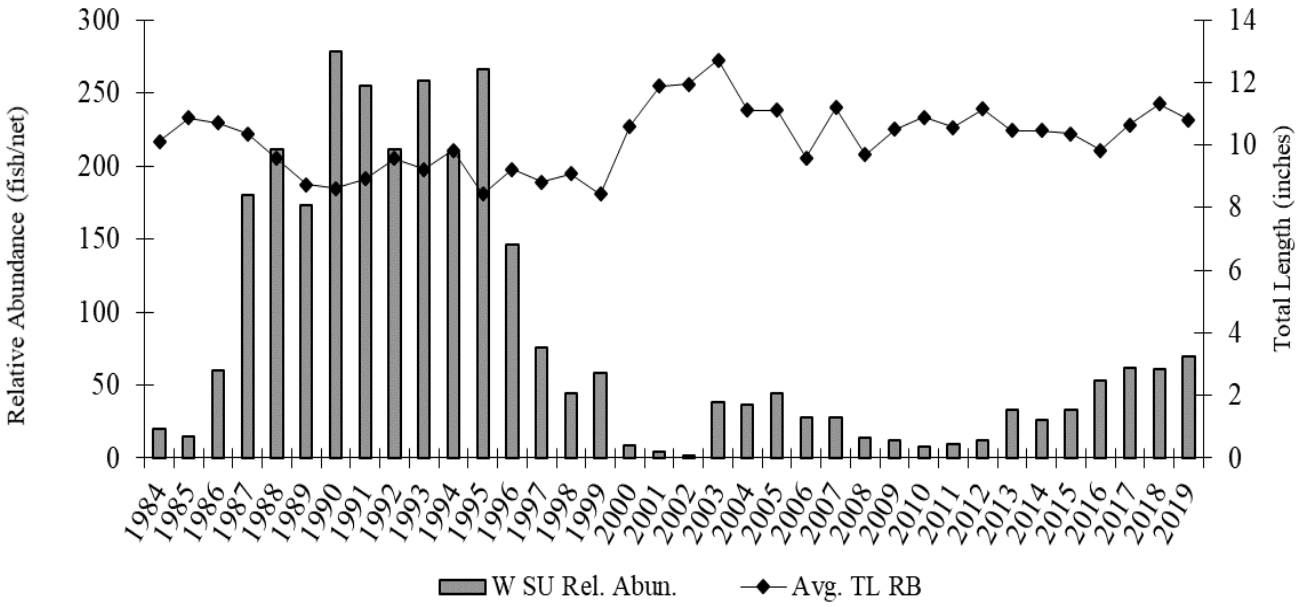


Table 3.- Summary of relative abundance (catch per unit effort (CPUE)), total length (TL), and relative weights of fishes collected in fall gillnetting surveys in Bear Paw Lake since chemical rehabilitation in 1983.

			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	--	--
Sep-17	2017	3	27.00	10.64	93.51	0.00	--	--	0.00	--	--	61.70	14.43	97.30	2.33	10.77	95.77	0.00	--	--
Sep-18	2018	3	28.00	11.31	88.00	0.33	10.30	82.45	0.00	--	--	60.70	11.97	93.55	2.67	14.49	108.22	0.00	--	--
Sep-19	2019	3	11.67	10.82	93.93	0.00	--	--	0.00	--	--	69.70	11.97	89.95	0.33	8.40	92.02	0.00	--	--

Table 4. Stocking summary of rainbow trout, Yellowstone cutthroat trout, smallmouth bass, and walleye in Bearpaw Lake, 1984-2019. 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	Size (inches)	# 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.	6.9	19,248	M	April/Sept.	--	--	--	--
1988	8,018	I	Sept.	5.2	28,904	M	April/Sept.	--	--	--	--
1989	500		May	6	6,000	M	May	--	--	--	--
1990	--	--	--	--	5,025	M	May	--	--	--	--
1991	9,965	A	Sept.	6.8	7,574	M	May	--	--	--	--
1992	6,879	A	Sept.	8.8	8,023	M	May	25,000	Aug.	--	--
1993	11,040	A	Sept.	7.1	5,058	M	May	41,250	July/Aug.	--	--
1994	9,394	A	Sept.	7.4	5,040	M	May	23,995	July/Aug.	--	--
1995	--	--	--	--	10,064	M	May	--	--	5,000	June
1996	11,398	A	Sept.	7.2	9,997	M	May	20,000	July	4,000	June
1997	13,448	A	Sept.	6.8	8,924	M	May	5,000	Aug.	6,000	June
1998	13,904	A	Sept.	6.8	5,047	M	May	5,000	July	--	--
1999	17,160	A	June	5	4,048	M	May	--	--	--	--
2000	4,995	A	Sept.	6.5	3,973	M	May	--	--	--	--
2001	10,000	A	Sept.	6.4	3,991	M	May	--	--	--	--
2002	10,700	A	Sept.	7.3	4,320	M	May	--	--	--	--
2003	15,215	A	Sept.	6.5	4,200	M	May	--	--	--	--
2004	12,549	A	Sept.	6.5	4,384	M	May	--	--	--	--
2005	14,520	A	Sept.	7.7	5,600	M	May	--	--	--	--
2006	12,628	A	Sept.	6.7	6,214	M	April/May	--	--	5,112	Sept.
2007	20,000	A and I	Sept.	6	8,127	M	May	--	--	--	--
2008	15,000	A	Sept.	7.3	7,293	G	May	--	--	--	--
2009	15,000	A	Sept.	8	5,024	G	May	--	--	--	--
2010	5,000	I	June	7.6	--	--	--	--	--	--	--
2011	5,104	I	June	7.7	--	--	--	--	--	--	--
2012	15,828	A	Sept./Nov.	8.7	--	--	--	--	--	--	--
2013	20,000	A	Sept./Nov.	6.9	--	--	--	--	--	--	--
2014	20,536	A	June/Sept.	6.7	--	--	--	--	--	--	--
2015	20,328	A and I	May/Sept.	7.5	--	--	--	--	--	--	--
2016	19,777	A and I	May/Sept.	6.4	--	--	--	--	--	--	--
2017	17,725	A and I	Sept./Oct.	8	--	--	--	--	--	--	--
2018	12,757	A and I	Sept./Oct.	7	--	--	--	--	--	--	--
2019	12,715	A and I	Sept./Oct.	7.3	--	--	--	--	--	--	--

Table 5. - Number of white suckers removed from Bearpaw Lake by trap netting and fall gill netting, 1989-2019.

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
2017	--	185	185	263.00
2018	--	182	182	263.00
2019	--	209	209	192.00
Totals	142,753	7,676	150,429	72,546

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.

Brookie Pond

Brookie Pond is a privately-owned reservoir that had been managed as a brook trout fishery by Montana Fish, Wildlife & Parks since 2003. In 2005, Brookie Pond was entered into a five-year contract under the Private Lands Fishing Access Program and was renewed in October 2010 for another five years. This pond has a windmill aeration system and from 2004 to 2007 the pond was managed with annual plants of 3,000 fingerling brook trout. From 2007 to 2015 the pond was stocked with alternate year plants of 1,500 fingerling brook trout. Since 2017 this pond has been stocked annually with 1,000 Arlee rainbow trout.

In 2008, 22 brook trout were collected ranging in length from 8.2 to 17.1 inches ($\bar{x}$ =11.4 inches) and in weight from 0.52 to 2.94 pounds ($\bar{x}$ =0.96 pounds). Brookie Pond winterkilled in 2010 due to extremely low water levels during the summer 2009 and throughout the winter 2009/2010. One gill and trap net were set overnight to assess the severity of the winterkill. The gill net contained no fish and the trap net contained two fathead minnows. High runoff during the spring of 2011 filled Brookie Pond to full capacity and Brook trout were planted in May 2011. In 2014, no brook trout were captured in the gill or trap net set overnight, the trap net did contain 5,000 fathead minnows. In 2019 one rainbow trout was collected in our gill net and one rainbow trout and 237 fathead minnows were collected in our trap net. The rainbow trout averaged 15.7" and weighed over two pounds.

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.

Current Reservoir

Current Reservoir is a 10-acre pond located on BLM land in south Phillips County. This reservoir has been popular since the 1970s because of its ability to produce quality trout. Water levels have been good with the reservoir spilling in 2004, 2005, 2011, 2013 and 2019. In addition to fishing pressure, this reservoir also receives a fair amount of grazing pressure, which has been blamed in recent years for a reduction in the aquatic vegetation and the riparian quality surrounding the reservoir.

This reservoir has only been monitored periodically since the 1970s, however the relative abundance and size of fish present had been consistent (Table 6). Severe drought reduced reservoir elevations from 2006-2008 and netting surveys suggest the reservoir may have winter-killed in 2007 and 2010 (based on average lengths; Table 6)

In 2013, rainbow trout relative abundance remained low but at least three different age classes were sampled, which suggests reservoir pools levels had stabilized enough for the rainbow trout to overwinter and grow to desirable sizes (Table 6). One trap net was also set overnight and contained 10 rainbow trout, 24 sand shiners, and 1 fathead minnow. No rainbow trout were observed in 2019 and it's unknown if a winterkill occurred in 2018/2019, entrainment occurred during high rain events in June 2019, or if recent stocking cohorts were unable to survive and grow shortly after being planted into the reservoir. The trap net captured 250 fathead minnows.

Table 6. Relative abundance, average length, and average weight of rainbow trout collected during periodic gill net surveys on Current Reservoir from 1982-2019.

	Rainbow Trout		
Date	Rel. Abun.	Avg. Length	Avg. Weight
8/18/1982	14	13.71	1.57
8/25/1999	58	16.00	1.25
7/20/2005	11	15.81	1.80
7/9/2008	8	6.32	0.14
7/11/2013	7	12.7	0.86
7/17/2019	0	--	--

Plutz Reservoir

Plutz is located on BLM land in south Phillips County and has been managed as a fishery since 1994. This reservoir receives annual plants of 1,000 fingerling rainbow trout and brown trout plants occurred in 2000 and 2001. There is currently no plan to continue stocking brown trout.

Rainbow trout and brown trout have exhibited good growth and survival within Plutz, however not as high as some of the neighboring ponds. In 2011, approximately 1,700 adult fathead minnows were trapped from Compton Reservoir and transferred to Plutz to establish an alternate forage base to increase trout growth. In 2013, one gill net and one trap net were set overnight. The gill net contained one rainbow trout (Table 7). The trap net contained one rainbow trout (18.3 inches) and 534 fathead minnows. The presence of fathead minnows confirms the introduction of this species was successful. Furthermore, the size of the two rainbow trout captured surpassed any lengths previously observed in this reservoir and suggests the alternate forage base is contributing to the current increase in trout lengths (Table 7). In 2017 and 2019, no rainbow trout were observed in either the gill or trap nets. Fathead minnows are still being observed and both white suckers and western silvery minnows were captured in the trap net in 2019, suggesting these fish were somehow planted and have established within the reservoir.

In 2017, water levels were down approximately two feet and the water conditions suggested a recent algal bloom had occurred, greenish water and faint smell. It is possible that Plutz had a summer kill occur to the rainbow trout population in 2017. Significant rain events occurred in June 2019 and it's possible a significant amount of rainbow trout stocked in 2019 were entrained downstream.

Table 7. Relative abundance, average length, and average weight of rainbow and brown trout sampled during periodic gill net surveys in Plutz Reservoir from 2002-2019.

	Rainbow Trout			Brown Trout	
Date	CPUE	Avg. Length	Avg. Weight	CPUE	Avg. Length
4/18/2002	5	8.5	0.25	3	9.6
7/19/2005	17	9.70	0.41	7	13.40
7/22/2009	49	7.10	0.17	0	0.00
7/16/2013	1	17.70	2.48	0	0.00
7/6/2017	--	--	--	--	--
7/17/2019	--	--	--	--	--

Rebate Reservoir

Rebate is BLM reservoir located in a deep coulee off Rock Creek and is surrounded by pine trees. This reservoir has been managed as a rainbow trout fishery since 1996. The fishery was maintained from 1996 to 2001 with annual plants of 1,000 fingerling rainbow trout. In 2002, one stocking of brown trout occurred and the plants of rainbow trout were reduced to occur every three years. In 2004, an additional 1,000 rainbow trout were stocked in the fall. Currently, 250 fingerling rainbow trout are stocked annually.

Water levels have remained good to excellent since 2010. In 2010, gill netting surveys indicated good survival and growth of stocked rainbow trout (relative abundance 6 fish/net; $\bar{x}$ TL=16.2 in.; $\bar{x}$ WT=1.65 lbs.). The trap net contained one rainbow trout (TL=5.1; WT=.06). In 2015, rainbow trout relative abundance increased to 18 rainbow trout ($\bar{x}$ TL=11.8 in.; $\bar{x}$ WT=0.58 lbs.) and the trap contained two rainbow trout. In 2019, no rainbow trout were captured in the gill net and the trap net captured two rainbow trout ($\bar{x}$ TL=5.7 in.) and 26 fathead minnows.

Rotator Cup Reservoir

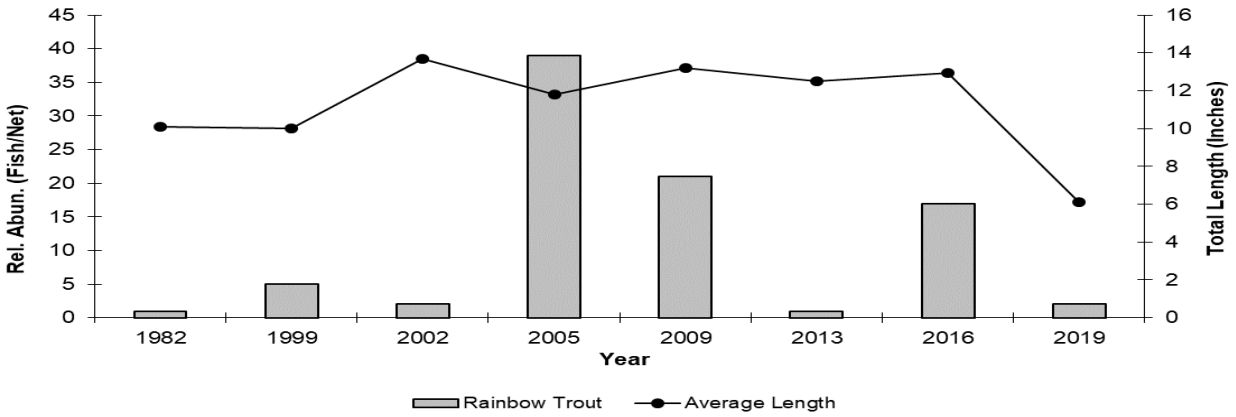
Rotator Cup is a BLM pond that has been managed as a rainbow trout fishery since 1996, maintained with biennial plants of 1,000 fingerling rainbow trout. Water levels have been maintained by summer rains and have remained good. In 2010, rainbow trout relative abundance was 9 fish/gill net ($\bar{x}$ TL=16.3 in.; $\bar{x}$ WT=1.70) and the trap net contained one rainbow trout (TL=15.3; WT=1.74). In 2015 and 2019 no fish were collected during our netting surveys.

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 3). Rainbow trout relative abundance decreased to 2 trout/net in 2019 ($\bar{x}$ TL=6.2, $\bar{x}$ Wt. = 0.10 lbs.; Figure 3). The trap net captured 11 rainbow trout and 109 fathead minnows. Two size classes of rainbow trout were observed, 2019 plants and older age 4 fish that exceeded 20 inches. It was also evident that a significant amount of water flowed through the reservoir and out the spillway. It's possible a high densities of rainbow trout were entrained downstream during this rain event.

Figure 3. - Relative abundance and average total length of rainbow trout in Sentinel reservoir based on gill netting surveys from 1982 to 2019.



Shallow Reservoir

Shallow reservoir is located on BLM land and has been managed as a rainbow trout fishery since 1994. The fishery is currently maintained with annual plants of 250 fingerling rainbow trout. Presence and survival of rainbow trout has been fair and may be due to fluctuations in water levels (winterkill or entrainment during high water events). In 2005, the relative abundance of rainbow trout was 3 fish/net ($\bar{x}$ TL=10.3 inches). In 2009 relative abundance increased to 17 fish/net ($\bar{x}$ TL=8.9 inches). One trap net set overnight captured four rainbow trout ($\bar{x}$ TL=10.2 inches) and 270 fathead minnows. In 2015 rainbow trout relative abundance decreased to 11 fish/net ($\bar{x}$ TL=13.7 inches) and one trap net contained one rainbow trout $\bar{x}$ TL=4.3 inches) and 450 fathead minnows. In 2019 no rainbow trout were captured in either the gill or trap net, the trap net did capture 14 fathead minnows.

Spanky Reservoir

Spanky Reservoir is a BLM pond that has been managed as a rainbow trout fishery since 1996. Currently, Spanky is maintained with annual plants of 250 fingerling rainbow trout.

Water levels have been good/excellent since 2010. In 2010, rainbow trout relative abundance was 3 fish/gill net ($\bar{x}$ TL=9.3 inches.; $\bar{x}$ WT=0.30 lbs.) and the trap net contained one rainbow trout (TL=9.8 inches; WT=0.32 lbs.). In 2014, rainbow trout relative abundance increased to 11 rainbow trout/net ($\bar{x}$ TL=12.54 inches; $\bar{x}$ WT=0.97 lbs.). No fish were captured in the trap net. In 2019 no fish were captured in either the gill or trap net.

RECOMMENDATIONS

Beaver Creek Reservoir: Continue annual stocking of up to 30,000 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 10,000 catchable size Arlee and 5,000 Eagle Lake rainbow trout. 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. Include pond updates in periodic Region 6 Pond Fishing Guide.

Waters Codes:

154560	Bearpaw Lake
150340	Beaver Creek
154570	Beaver Creek Reservoir
154719	Brookie Pond
164870	Current Reservoir
167662	Plutz Reservoir
167750	Rebate Reservoir
167979	Rotator Cup Reservoir
168220	Sentinel Reservoir
168255	Shallow Reservoir
168354	Spanky Reservoir

Key Words or Fish Species:

Region 6; ponds; Hill County; Blaine County; Phillips County; Havre; Chinook; Malta; Arlee; Eagle Lake; Erwin; rainbow 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; Beaver Creek Reservoir; Bearpaw Lake

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Appendix 1. Arlee rainbow trout stocking from 2001-2019 on select ponds and reservoirs in Blaine and Phillips Counties. Table highlights year and month, as well as number and size of fish stocked. Note-Brookie Pond did receive several brook trout (EB) plants during the period of reference.

YEAR	Brookie Pond	Current Reservoir	Plutz Reservoir	Rebate Reservoir	Rotator Cup Reservoir	Sentinel Reservoir	Shallow Reservoir	Spanky Reservoir
2001 (April)	--	2,415 (2.8")	1,610 (2.8")	805 (2.8")	--	5,175 (2.8")	--	805 (2.8")
2002 (April)	--	3,000 (3")	1,004 (3")	--	1,000 (4")	5,000 (3")	--	--
2003 (April)	--	2,971 (3.1")	--	--	--	6,022 (3.1")	1,003 (3.1")	1,000 (3.1")
2004 (April)	--	3,045 (2.6")	2,030 (2.6")	1,015 (2.6")	1,015 (2.6")	6,090 (2.6")	--	--
2005 (April)	--	3,035 (2.9")	--	--	--	6,016 (2.9")	1,030 (2.9)	1,030 (2.9")
2006 (April)	--	3,300 (3.1")	2,200 (3.1")	--	1,100 (3.1")	6,601 (3.1")	--	--
2007 (April)	EB-3,000 (4")	3,020 (3.2")	--	982 (3.2")	--	6,040 (3.2")	982 (3.2")	982 (3.2")
2008 (April)	EB-2,000 (4.7")	3,047 (3.3")	--	--	--	6,022 (3.3")	--	--
2009 (May)	--	2,993 (4")	2,010 (4")	--	--	5,986 (4")	1,026 (4")	1,026 (4")
2010 (May)	--	3,000 (3.6")	--	--	--	6,000 (3.6")	--	--
2011 (June)	EB-1,500 (3.9")	3,000 (3.6")	2,000 (3.6")	--	--	6,000 (3.6")	1,000 (3.6")	1,000 (3.6")
2012 (May)	EB-1,500 (4.3")	3,000 (2.7")	--	--	--	6,000 (2.7")	--	--
2013 (June)	EB-1,500 (4.5")	3,000 (3.2")	2,000 (3.4")	1,000 (3.4")	--	6,000 (3.2")	1,000 (3.4")	1,000 (3.4")
2014 (April)	--	3,000 (2.1")	--	--	--	6,000 (2.1")	--	--
2015 (April)	EB-1,500 (4.9")	3,000 (1.9")	2,000 (1.9")	--	--	6,000 (1.9")	1,000 (1.9")	1,000 (1.9")
2016 (April)	--	3,000 (2.1")	--	1,000 (2.1")	1,000 (2.6")	6,000 (2.1")	--	--
2017 (April)	1,000 (2")	3,000 (2")	2,000 (2")	--	--	6,000 (2.6")	1,000 (2")	1,000 (2")
2018 (June)	1,000 (2.5")	3,000 (3.1")	1,000 (1.9")	1,000 (1.9")	1,000 (1.9")	6,000 (2.5")	1,000 (1.9")	--
2019 (May)	1,000 (2.7")	3,000 (2.7")	2,000 (2.7")	1,000 (2.7")	--	6,000 (2.7")	1,000 (2.7")	1,000 (2.7")