MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: Montana PROJECT NO. F-46-R-3
PROJECT TITLE: Statewide Fisheries Investigations JOB NO. II-e
STUDY TITLE: Survey and Inventory of Coldwater Lakes
JOB TITLE: Northcentral Montana Coldwater Lakes Investigations

PERIOD COVERED: July 1, 1989 through June 30, 1990

ABSTRACT

Fisheries surveys were conducted on 43 ponds and reservoirs waters. Evaluations of rainbow trout strains continued in several waters. Arlee and AXE rainbow trout had good survival in Bean Lake but both strains had very poor survival in Eureka Reservoir. Arlee showed fair survival in Nilan Reservoir. Arlee had poor survival in Willow Creek Reservoir while AXE survival was good. Survival of both Arlee and Eagle Lake rainbow stocked in Ackley Reservoir during 1989 was fair. Catch rates in Ackley were highest during winter months and Arlee appear to enter the fishery the year planted while Eagle Lake enter the year after at a larger size. Netting of Pishkun Reservoir produced low numbers of kokanee salmon. Information is presented for lake trout in Tiber Reservoir. Growth and survival of Yellowstone cutthroat and rainbow trout planted during 1989 in Bair Reservoir were good. Growth of brown and rainbow trout in East Fork Spring Creek Reservoir continued to be poor. We resumed a strain evaluation on Smith River Reservoir and despite extremely low water levels, some rainbows from the 1987 plants survived. Survival of trout in both Martinsdale and Newlan Creek Reservoirs was good. Rainbow trout survival in Yellow Water Reservoir was poor, but low densities produced exceptional growth. Numerous small ponds were surveyed and several farm ponds were stocked with rainbow trout after these waters went through a series of drought years. Warden creel surveys from 1987-1989 involving 27 waters in the Lewistown area are summarized.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To recommend acceptable water levels in irrigation reservoirs, within hydrologic constraints, for maintaining fishery values of last 10 years. **(State funded).**

2. To establish a self-sustaining trout fishery in Smith River Reservoir that will support 5,000 angler days annually with a catch rate of 0.4 fish per hour.

3. To provide longer-lived, larger trout with adequate growth rates in Willow Creek, Bair, Ackley, East Fork Dam and Newlan Creek Reservoirs for 50,000 angler days annually.

4. To provide 10,000 angler days fishing in Bean Lake for 1 to 3 pound rainbow trout.

5. To provide 28,000 angler days per year for 11 to 20 inch trout in Martinsdale and Eureka Reservoirs and Fitzpatrick Lake.

6. To reduce rough fish populations for maintenance of 11 to 20 inch trout in 5 lakes and ponds. **(State funded).**

7. To maintain (within hydrologic constraints) viable trout fisheries in 60 ponds and small reservoirs. **(Partly State funded).**

8. To improve the kokanee fishery in Pishkun Reservoir to satisfy 5,000 angler days annually.

9. To provide 1,000 angler days of fishing for mature salmon in the Helena Valley Regulating Reservoir.

10. To maintain current level of fishing opportunity on Bean, Ackley and Fitzpatrick Lakes and Newlan Creek Reservoir. **(State funded).**

Progress was made on all federally funded objectives and data are included in this report. Data for some state objectives are included in this report to provide current information for regional lakes.

PROCEDURES

Netting surveys were conducted using standard 6 by 125 feet experimental gill nets (nylon and monofilament) or a 25 feet, 6 feet high, 1/4 inch mesh seine. Rainbow trout were marked with fin clips and tetracycline to differentiate between various strains. Kokanee salmon were stocked by boat in Pishkun Reservoir to obtain better distribution. A Humminbird 4x6 LCR was used to locate lake trout in Lake Elwell prior to setting nets.

FINDINGS

Rainbow Trout Strain Evaluations

Rainbow trout strain evaluations were continued on several waters in the region. Rainbow trout strains being evaluated include Eagle Lake, DeSmet, AXE (Arlee x Eagle Lake hybrid), and Arlee. Results

in each water are discussed separately.

Eagle Lake rainbows are currently being evaluated in Ackley, Bair and East Fork Spring Creek reservoirs. This strain is apparently well suited to productive waters where it typically grows to a large size, displays good catchability, and will feed on chubs. All three Region 4 reservoirs have dense sucker populations and it was hoped that Eagle Lake rainbows would utilize this potential food source.

DeSmet rainbow were planted in Smith River Reservoir (Lake Sutherlin) in 1986, 1987, and 1989. We made these plants in an attempt to establish a naturally reproducing population in the reservoir that would use two available spawning streams. The DeSmet is a wild strain that reproduces well in some areas, has relatively slow growth and good longevity, fair catchability, and feeds on zooplankton and macroinvertebrates.

A hybrid cross between Arlee and Eagle Lake rainbow trout strains, which will be referred to in this report by the term AXE, has been planted in Willow Creek Reservoir annually since 1984. AXE rainbow were stocked in Bean Lake in 1988 and in Eureka Reservoir in 1989. This hybrid reportedly displays similar or better growth and catchability than the Arlee strain and better ability to overwinter successfully.

BEAN LAKE

AXE and Arlee rainbow trout were stocked in equal numbers (20,000 each) in Bean Lake during 1989 for the second consecutive year. Gill nets fished in October 1989 indicate better survival for AXE rainbow for fish planted in both 1988 and 1989 (Table 1). Sixty percent (37 fish) of the trout sampled from 1989 plantings were AXE and 40 percent (25 fish) were Arlee. Survival for both strains was considered good (Table 2). Similar, but more pronounced, results were reported previously for 1988 plants where AXE outnumbered Arlee three to one (Hill et al. 1989). The 1989 netting also showed better carry-over of AXE from the 1988 plant. Growth of Arlee is better than AXE, but may be attributed to the earlier planting date (May 11) and larger size (4.8 inches) at planting as compared to June 20 and 4.1 inches for AXE.

EUREKA RESERVOIR

Rainbow trout survival in Eureka Reservoir has been very poor since 1980; this trend continued in 1989 (Table 1). Poor survival has been attributed to low water levels and predation by brown trout. The 1989 plant included equal numbers of Arlee and AXE (40,000 each) to see if AXE might survive better. However, little difference in survival was observed between the two strains (Table

Table 1. Overnight gill netting results in coldwater lakes and reservoirs in Region Four during 1989.

Water name (Date surveyed)	Surface acres	No. of[1] nets	Mean hours fished/net	Species, strain[2] & year planted	No. of fish	Length(in) Range	Length(in) Mean	Weight(pounds) Range	Weight(pounds) Mean	Condition Factor Range	Condition Factor Mean
Ackley Res. (10/24/89)	240	1F,1S	15.2	Rb-A-1989	9	10.0-11.9	(10.7)	0.46-0.64	(0.54)	38.0-50.7	(44.8)
				Rb-A-1988	10	13.0-14.6	(13.8)	0.80-1.20	(1.02)	34.1-41.4	(38.2)
				Rb-A-1987	3	16.9-18.4	(17.7)	1.78-2.10	(1.95)	33.7-36.9	(35.2)
				Rb-I-1989	10	8.3-9.4	(9.0)	0.26-0.37	(0.31)	39.8-49.0	(43.6)
				Rb-I-1988	20	13.1-14.5	(13.9)	0.87-1.16	(1.01)	33.8-40.5	(37.9)
				Rb-I-1987	12	13.2-16.9	(15.4)	1.06-2.10	(1.48)	34.1-66.5	(41.2)
				LnSu	42	6.3-16.8	(12.1)	0.12-2.28	(0.95)	39.6-48.7	(44.6)
				WSu	40	6.4-14.9	(10.8)	0.11-1.59	(0.72)	37.9-54.3	(46.7)
Bair Reservoir (10/23/89)	272	1F,1S	18.25	YCt	53	9.5-12.6	(11.4)	0.35-0.78	(0.54)	32.4-47.1	(36.9)
				Rb-I-1989	68	7.6-11.1	(9.3)	0.21-0.62	(0.35)	36.1-54.7	(43.7)
				BT	1	-	(10.3)	-	(0.39)	-	(35.7)
				WSu	3	10.2-13.7	(11.5)	0.52-1.13	(0.73)	43.9-49.0	(45.8)
Bean Lake (10/4/89)	200	2S	21.0	Rb-AXE-1989	37	8.7-10.9	(9.9)	0.27-0.55	(0.40)	-	-
				Rb-A-1989	25	10.5-12.1	(11.3)	0.51-0.67	(0.59)	-	-
				Rb-AXE-1988	6	13.9-15.2	(14.6)	0.90-1.32	(1.17)	-	-
				Rb-A-1988	1	-	(13.7)	-	(1.07)	-	-
East Fk Spring Creek Res. (11/6/89)	100	1F,1S	20.0	Rb-I-1987	6	10.7-11.6	(11.2)	0.40-0.50	(0.45)	30.1-33.3	(31.5)
				LL-1988	4	8.9-11.2	(10.4)	0.28-0.50	(0.40)	31.0-39.7	(34.9)
				LnSu	32	8.9-11.9	(10.6)	0.25-0.56	(0.40)	29.9-36.7	(33.7)
				WSu	41	6.6-10.4	(8.7)	0.10-0.47	(0.25)	32.1-42.3	(36.7)
Smith River Res. (10/4/89)	327	1F,1S	16.25	Rb-A-1989	22	8.1-11.3	(10.2)	0.25-0.68	(0.51)	42.1-54.9	(47.8)
				Rb-A-1987	7	12.2-14.2	(13.5)	0.71-1.12	(0.95)	34.2-45.5	(38.8)
				Rb-D-1987	18	13.2-14.9	(14.1)	0.89-1.24	(1.07)	33.3-41.7	(37.8)
				LnSu	91	6.2-16.6	(13.9)	0.09-1.94	(1.10)	9.2-46.3	(39.3)
				W Su	42	6.2-16.7	(13.8)	0.11-1.87	(1.21)	38.9-51.3	(44.1)
				Burbot	1	-	(22.3)	-		-	-
Willow Creek Res. (10/6/89)	1400	2F	23.0	Rb-AXE-1989	25	8.6-10.4	(9.3)	0.23-0.40	(0.30)	-	-
				Rb-AXE-1988	12	12.8-14.1	(13.6)	0.76-0.97	(0.86)	-	-
				Rb-AXE-1987	3	14.4-14.8	(14.6)	1.02-1.17	(1.09)	-	-
Eureka Reservior (10/19/89)	350	3F	21.0	Rb-AXE-1989	3	9.7-12.1	(10.9)	0.32-0.62	(0.45)	-	-
				Rb	1	-	(17.2)	-	(2.24)	-	-
				WSu	1	-	(15.2)	-	-	-	-
(11/3/89)		2S	20.0	Rb-AXE-1989	1	-	(10.8)	-	(0.42)	-	-
				LL	3	15.8-19.2	(18.0)	1.52-2.53	(2.15)	-	-
				WSu	77	8.9-17.7	(13.3)	-	-	-	-
				LnSu	2	12.0-16.1	(14.1)	-	-	-	-
Holter Reservoir	Not netted										
Martinsdale Res. (10/23/89)	1000	1F,1S	18.0	Rb-A-1989	17	10.4-11.9	(11.1)	0.59-0.85	(0.72)	46.9-58.2	(52.7)
				Rb-A-1988	3	13.5-14.7	(14.1)	1.14-1.55	(1.34)	46.3-48.8	(47.6)
				YCt	14	10.6-12.4	(11.6)	0.52-0.84	(0.66)	39.1-46.0	(42.7)
				LL	1	-	(24.0)	-	(5.00)	-	(36.2)
				WSu	99	5.6-17.8	(12.0)	0.24-2.44	(0.86)	-	-
				LnSu	1	-	(12.8)	-	(0.78)	-	-
Nilan Reservior (10/18/89)	500	2F	20.0	Rb-A-1989	13	10.2-11.0	(10.6)	0.42-0.51	(0.46)	-	-
				Rb-A-1988	4	12.9-14.5	(13.4)	0.72-1.16	(0.89)	-	-
Newlan Creek Res. (10/4/89)	280	1F,1S	18.5	YCt	41	7.7-15.9	(13.2)	0.15-1.37	(0.86)	32.8-39.1	(35.6)
				Rb	9	9.4-15.5	(13.8)	0.34-1.50	(1.07)	36.5-40.9	(39.3)
				LnSu	43	6.2-17.2	(12.7)	0.10-1.96	(0.91)	36.4-44.6	(39.7)
Pishkun Reservior (6/29/89)	1400	4S	23.0	KOK	1	-	(10.8)	-	(0.50)	-	-
				Rb	1	-	(12.8)	-	(0.72)	-	-
				NP	10	13.9-29.0	-	0.84-7.00	-	-	-
				YP	12	5.7-7.8	(6.9)	0.08-0.20	(0.15)	-	-
				WSu	11	9.6-18.9	(15.0)	0.38-3.00	(1.99)	-	-

1-Standard experimental gill nets (nylon and monofilament); F=Floating; S=Sinking

2-Species abbreviations: Rb=Rainbow trout; LL=Brown trout; YCt=Yellowstone cutthroat trout; BT= Brook trout; KOK=Kokanee salmon; NP=Northern pike; YP=Yellow perch; WSu=White sucker; LuSu=Longnose sucker
Strain abbreviations: A=Arlee; AXE=Arlee x Eagle Lake Hybrid; D=DeSmet; I=Eagle Lake

Table 1. (continued).

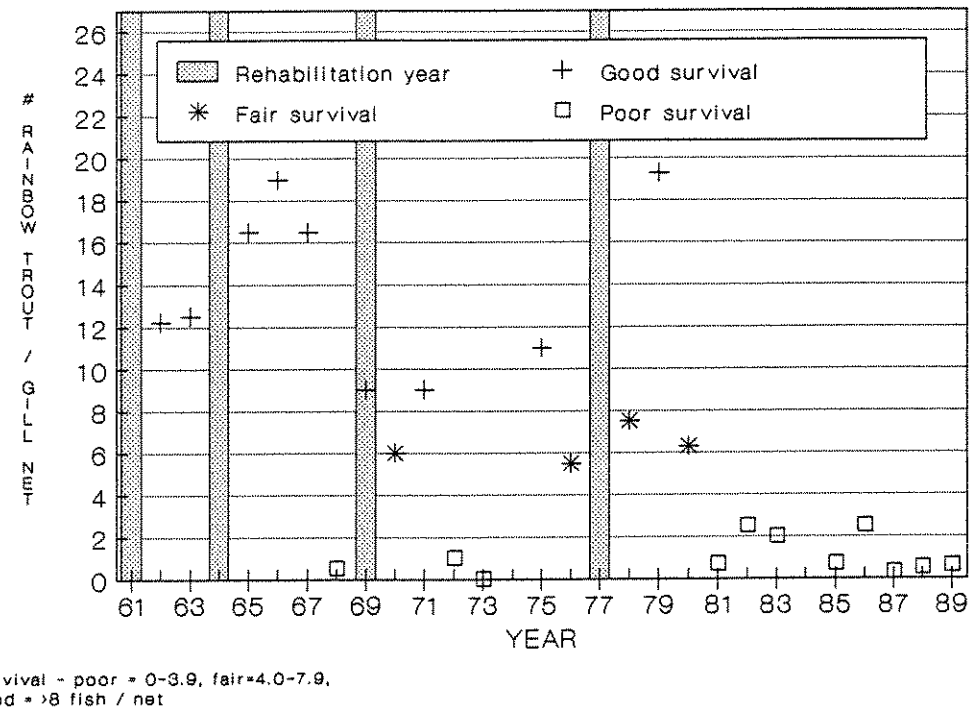
Water name (Date surveyed)	Surface acres	No. of[1] nets	Mean hours fished/net	Species, strain[2] & year planted	No. of fish	Length(in) Range	Length(in) Mean	Weight(pounds) Range	Weight(pounds) Mean	Condition Factor Range	Condition Factor Mean
Yellow Water Reservoir (10/25/89)	193	1F,1S	16.0	Rb-A-1989	3	7.8-11.3	(10.1)	0.24-0.85	(0.61)	45.3-60.3	(52.7)
				Rb-A-1988	5	16.1-20.6	(19.0)	1.89-5.27	(3.75)	45.3-60.3	(52.7)
				Rb-A-All	8	7.8-20.6	(15.7)	0.24-5.27	(2.57)	45.3-60.3	(53.1)
				WSu	3	9.4-10.5	(9.9)	0.36-0.49	(0.41)	40.2-43.3	(42.0)

1-Standard experimental gill nets (nylon and monofilament); F=Floating; S=Sinking
2-Species abbreviations: Rb=Rainbow trout; LL=Brown trout; YCt=Yellowstone cutthroat trout; BT= Brook trout; KOK=Kokanee salmon; NP=Northern pike; YP=Yellow perch; WSu=White sucker; LuSu=Longnose sucker
Strain abbreviations: A=Arlee; AXE=Arlee x Eagle Lake Hybrid; D=DeSmet; I=Eagle Lake

Table 2. Survival comparisons of 1989 plants of two rainbow trout strains in four waters of Region 4.

Water	No. of nets	No.Fish/Net Arlee	No.Fish/Net AXE	Survival Rating* Arlee	Survival Rating* AXE
Bean Lk	2	12.5	18.5	good	good
Eureka Res.	5	0.0	.8	poor	poor
Nilan Res.	2	6.5	N/A	fair	N/A
Willow Ck Res.	2	0.0	12.5	poor	good

*Survival Rating: Good- >8.0 Fish/Net
Fair- 4.0-7.9 Fish/Net
Poor- 0.0-3.9 Fish/Net



Survival - poor = 0-3.9, fair=4.0-7.9, good = >8 fish / net

Figure 1. Rainbow trout survival following chemical rehabilitation in Eureka Reservoir, 1961-1989.

2). This reservoir was gill netted on October 19 with floating nets and on November 3 with sinking nets. A total of four rainbow trout from the 1989 plant were collected and all were AXE.

In addition to low water levels and predation, poor survival of rainbow trout in Eureka Reservoir may be attributed to competition with suckers for food and space. Throughout the years, the reservoir has been chemically rehabilitated several times, resulting in fair to good trout survival for the next two to three years (Figure 1). Sucker populations then become abundant and appear to limit trout survival. The last rehab was carried out in 1977 and as mentioned previously, trout survival has been poor since 1981.

NILAN AND WILLOW CREEK RESERVOIRS

Survival of Arlee rainbow trout stocked in Nilan Reservoir in 1989 was rated fair as 13 fish were collected in two gill nets (Tables 1 and 2). The Arlee strain has provided a good fishery throughout the years but they are short-lived.

A total of 40,000 Arlee and 35,000 AXE rainbow trout were stocked in Willow Creek Reservoir in 1989. Gill netting conducted in October indicates no survival of Arlee and good survival of AXE (Tables 1 and 2). An additional 12 AXE rainbow from the 1988 plant and 3 AXE from the 1987 plant were collected in gill nets (Table 1).

ACKLEY LAKE

In each year since 1986, equal numbers (approximately 20,000 of each strain) of Arlee and Eagle Lake strain rainbow trout have been planted in Ackley Lake. From 1986-87, Arlee rainbow trout were planted in mid-late April, while in 1988-89, plants occurred in mid-May or later. The average length of fish in the April plants varied from 3.9-4.0 inches; the mean length increased to 5.0-5.1 inches for May plants. The first Eagle Lake plant in 1986 was made in late July. All other plants have been earlier, either during the last week of June or the first week of July. Although Eagle Lake rainbow were planted later in 1986, the average length was the smallest (3.0 inches) of any plant. In all later plants the average length was 3.4-3.5 inches.

The gill netting survey in October 1989 provided survival information for both strains on all plants dating back to 1987 (Table 1). Survival was similar among both strains for the 1989 plant. The difference in mean length between strains from the 1989 plant was 1.7 inches, the same difference in length as at the time of stocking. The average length of both strains in the 1988 plant was similar, 13.8-13.9 inches. Although the mean weight of Arlee was greater for all plants, the difference was minimal for the 1988 plant. Netting results indicate that survival of Eagle Lake fish was two and four times better than Arlee for the 1988 and 1987 plants. Relative survival between the two strains planted in 1988 was substantially different in the 1988 and 1989 gill netting results. In the fall 1988 gill net survey, Arlees outnumbered Eagle Lake by about 2:1 (Hill et al. 1989). However, in fall 1989, the reverse was true. The principle item found in stomachs of both strains was plankton; remains of a fish were observed in an Arlee.

Creel survey information gathered in February 1989 by Mark Ernhart, who was the MDFWP warden stationed in Stanford, indicated a high catch rate of 0.97 fish/hr among 28 ice fishermen. The Arlee strain comprised just over half (53.6%) of the rainbow trout kept while Eagle Lake rainbow made up the remaining 46.4%. Most (76.9%) of the Eagle Lake strain kept by anglers represented fish from the 1987 plant while 5.1% and 17.9% were from the 1988 and 1986 plants, respectively. In contrast, 91.1% of the Arlee strain creeled were 1988 plants, with only 2.2% and 6.7% of the Arlee's originating from the 1987 and 1986 plants, respectively.

Other warden creel survey information was gathered for Ackley Lake in 1987. This information is tabulated along with other creel survey work by wardens in the Lewistown area later in this report. During the summer months (May-September), the 49 anglers checked had averaged 0.30 fish/hour. From October-April, a catch rate of 0.59 fish/hour was found among 35 anglers.

OTHER LARGE RESERVOIRS

PISHKUN RESERVOIR

Sinking gill nets were fished in Pishkun Reservoir in late June to sample kokanee salmon. Only one kokanee was taken (Table 1). Ten additional gill nets (sinking, floating, suspended) fished in mid-May and mid-July failed to catch any kokanee. The kokanee fishery has been near non-existent since 1983. Predation by northern pike probably does occur but is not felt to be a major factor. Food contents of 18 northern pike stomachs revealed yellow perch, crayfish, leeches, and unidentified fish remains. Kokanee survival has been greatest when yellow perch numbers are low and also when salmon were stocked from the Somers Hatchery.

TIBER RESERVOIR

Attempts were made to sample lake trout in Tiber Reservoir (Lake Elwell) during 1989. Four bottom sets were fished in July at depths of 140 feet near the dam, at 120 feet approximately four miles from the dam and at 75 feet in the Willow Creek Arm. Three lake trout ranging from 2.5-5.25 pounds were taken near the dam. Three additional gill nets were fished on a suspected spawning point in the Bootlegger Trail area on October 25. A total of ten lake trout (2.5-8.5 pounds) were collected at depths of 15-35 feet. Stomach analysis indicated that fish in spawning condition fed on aquatic insects and spottail shiner.

BAIR RESERVOIR

Water levels were so low in Bair Reservoir during 1988 that all scheduled plants were canceled. By spring 1989, however, water levels had increased sufficiently to warrant resumption of the stocking program. In order to reestablish a fishery as soon as possible, 10,000 catchable Yellowstone cutthroat trout (mean length = 6.8 inches) were planted on 19 May. An additional plant of 20,057 Eagle Lake rainbow trout, which averaged 3.4 inches in length, was made on 21 June. Gill netting results showed good growth among both cutthroat and rainbow trout (Table 1). The average growth of the 1989 Eagle Lake plant was 0.3 inches greater than in Ackley Lake; better growth may have resulted from an

abundance of food since the reservoir had been essentially fishless since being refilled. Survival appeared greater for cutthroat trout since the ratio of cutthroat/rainbow trout at planting (1:2) had increased to 0.8:1 by October.

EAST FORK SPRING CREEK RESERVOIR

Survival and growth of both Eagle Lake rainbow and brown trout was poor in East Fork Spring Creek Reservoir (Table 1). The stunted populations of longnose and white suckers may have reduced the growth rate of trout from the 1987 and 1988 plants. Fish were found in the stomachs of two Eagle Lake rainbow trout. Hopefully survival and growth of the brown trout will be sufficient to allow them to utilize a portion of the available forage base of stunted suckers.

SMITH RIVER RESERVOIR

Although no plants of rainbow trout were made in 1988, water levels in Smith River Reservoir increased enough in 1989 to justify resumption of plants. We continued to plant approximately 12,000 each of Arlee and Desmet rainbow trout. The Arlee plant was made on 6 June and the mean length was 4.2 inches; the DeSmet plant was made much later and the mean size of the fish planted was only 2.6 inches. Survey work in October found good survival from the 1989 Arlee plant but the mean length was less than for other Arlee plants in Region 4 reservoirs (Table 1). No fish from the DeSmet plant were sampled, which should be attributed to their small size. The overwintering of both Arlee and DeSmet rainbow trout from the 1987 plants was unexpected. The good survival of DeSmet rainbow was especially encouraging, since this suggests that even during years where severe drawdowns occur, overwintering of sexually mature fish to maintain a naturally reproducing population may be possible. As we should expect, the growth of both strains from the 1987 plant was relatively poor.

MARTINSDALE RESERVOIR

Although the catch of Arlee rainbow trout planted in 1989 could be considered good (Table 1), it was substantially lower than survival of the 1987 Arlee plant. The number of Arlee from the 1988 plant was low but growth from both year's plants was good. The number of Yellowstone cutthroat found in the gill nets was slightly less than for the Arlee rainbow, indicating fair survival. Although the cutthroat's average length was greater than for rainbow planted in 1989, the mean weight was greater among the rainbow, resulting in higher condition factors. Only one brown trout and one longnose sucker were caught, but more white sucker were netted than in any other large lake or reservoir in Region four.

NEWLAN CREEK RESERVOIR

The number of Yellowstone cutthroat trout sampled in two gill nets continued to be good at Newlan Creek Reservoir (Table 1). The 41 cutthroat trout captured represented more than one age class, with lengths ranging from 7.7-15.9 inches. The number of naturally reproducing rainbow trout in the gill nets returned to near the level observed in 1987 after increasing to 21 in 1988. The rainbow trout captured tended to be longer and weigh more than the cutthroat planted in Newlan Creek Reservoir.

YELLOW WATER RESERVOIR

Water levels in Yellow Water Reservoir in recent years were low enough that overwinter survival was questionable. During fall survey work, we sampled five Arlee rainbow from the 1988 plant that had overwintered (Table 1). Although survival from the 1988 plant of 25,458 was low the fish showed exceptional growth and high condition factors. The growth pattern of these fish shows that Yellow Water Reservoir has the capability to provide a trophy fishery. Since the water level remained low and we believed all trout had winterkilled, the 1989 plant was reduced to approximately 5,000 Arlee. Growth of the three fish we captured from the 1989 plant was less than expected. Stomach contents from the rainbow showed utilization of corixids, amphipods, damselflies, and coeleoptera.

HELENA VALLEY REGULATING RESERVOIR

Three gill nets set in Helena Valley Regulating Reservoir on 17 October 1988 captured a total of 235 kokanee salmon. Mean length of the kokanee was 16.5 inches with lengths ranging from 10.6-20.7 inches; these fish represented at least three age classes and plants dating back to 1984. The only triploid kokanee captured was also the largest fish (20.7 inches, 2.53 pounds); the only plant of triploids in the Regulating Reservoir occurred in 1984. Of the 235 kokanee, 91.1% were sexually mature; males outnumbered females by a 2.3:1 ratio. The number of kokanee planted has varied from about 26-40,000 in recent years.

Small Ponds, Lakes and Reservoirs

Choteau Area Waters

Elevations of 12 waters were checked in early spring of 1989 to determine suitability for stocking with rainbow trout. Most of

these waters were not stocked in previous years due to drought conditions. Moisture conditions improved water levels in several ponds and they were recommended to be planted. These include Myrvold, Stewart, and Henry Ponds, Loch Ponds #1 and #2, Lake Shel-Oole, and Cameron and Ostle Reservoirs. A new water, Forseth Pond, was also planted. Ponds still influenced by drought and not stocked include Stephens' and Furnell Ponds and Fitzpatrick Lake.

Lewistown Area Waters

Gill netting suggested poor survival of rainbow trout planted in Box Elder and Buffalo Wallow Reservoir while Lower Carter Reservoir had good survival (Table 3). No rainbow trout were sampled in Buffalo Wallow Reservoir, but 11 yellow perch, the result of an illegal introduction, were captured. The yellow perch had a larger average size than the three caught in 1988. All rainbow from Box Elder Reservoir appeared to be from the 1989 plant; those in Lower Carter appeared to include at least two years plants. In April 1990, we caught 69 longnose suckers in two gill nets set in Big Casino Creek Reservoir. No fish were captured in Crossover Reservoir, which is also known as Missouri Breaks Pond, but a small fish was observed surfacing in the upper part of the pond on 19 July. Although hatchery records do not list any plants in Missouri Breaks Pond, yellow perch and northern pike were sampled in the pond in the late 1970's and early 1980's. The yellow perch were probably introduced in 1975.

Geyser and Geraldine Area Waters

In August 1989 four of the Kolar Reservoirs in the Geyser area were surveyed (Table 3). Large numbers of white suckers were found Kolar #1 and #2. Good numbers of rainbow trout were also found in Kolar #1 and #4. Seine hauls in Kolar #1 and #2 found minnows present. The samples of rainbow trout in both Kolar #1 and #4 appeared to include fish from more than one age group. It was unexpected that survival of trout would be lowest in Kolar Reservoir #2, which has the highest stocking rate of any pond that was sampled using overnight gill net sets. The stocking rates in Kolar Reservoirs #1, 2, 4, 5, and 6 were 145, 227, 137, 142, and 242 per acre, respectively. All plants were made on the same day with the same sized fish. The sampling of Kolar #5, where no rainbow trout were captured, was not directly comparable since it did not involve an overnight set. Kolar Reservoir # 6 was not

Table 3. Results from overnight gill netting and seine hauls in cold water ponds and reservoirs in the eastern portion of Region four during 1989 and 1990.

Water (Date)	Surface acres	Type of[1] nets	Mean hrs fished/net	Species[2]	No. of fish	Length (in) Avg.	Length (in) Range	Weight(pounds) Avg.	Weight(pounds) Range	Maximum Depth (ft)	Secchi disk (ft)
Lewistown area											
Box Elder Reservoir (7/89)	22.0	1S	20.75	Rb	6	7.8	7.2-8.1	0.22	0.18-0.26	18.0	2.2
				BGill	5	3.6	3.4-3.8	0.05	0.04-0.06		
		2 Seine	-	FHM	4	2.9	2.3-3.3	-	-		
				Rb	1	8.0	-	-	-		
Buffalo Wallow (7/89)	8.0	1S	26.0	YP	11	12.1	10.2-13.8	0.72	0.44-1.06	16.0	3.5
		2 Seine	-	-	0	-	-	-	-		
Casino Creek Reservoir (4/90)	17.5	1F,1S	20.5	LnSu	69	8.5	6.1-13.7	0.27	0.08-1.04	15.0	1.5
Crossover Reservoir (7/89)	-	1S	17.0	-	0	-	-	-	-	10.0	9.5
Lower Carter Reservoir (7/89)	6.5	1S	15.0	Rb	31	14.4	9.3-17.6	1.51	0.39-2.37	15.0	15.0
Geyser/Geraldine area											
Kolar #1 Reservoir (8/89)	13.8	1S	19.0	Rb	40	8.6	6.6-13.2	0.32	0.13-0.96	16.0	2.0
				WSu	172	10.2	6.4-14.1	0.48	0.12-1.05		
		2 Seine	-	BM	1	-	-	-	-		
Kolar #2 Reservoir (8/89)	6.6	1S	19.0	Rb	1	5.9	-	0.11	-	15.0	2.2
				WSu	129	9.0	7.0-15.3	0.32	0.14-1.41		
		2 Seine	-	BM	42	-	0.8-3.0	-	-		
				WSu	3	3.7	2.5-4.5	-	-		
Kolar #4 Reservoir (8/89)	3.7	1S	17.5	Rb	34	9.0	6.6-18.9	0.45	0.14-2.52	10.0	10.0
				WSu	4	14.8	14.1-15.3	1.40	1.22-1.68		
		3 Seine	-	-	0	-	-	-	-		
Kolar #5 Reservoir (8/89)	1.7	1S	3.0	WSu	10	12.0	7.1-16.6	0.91	0.16-1.97	10.0	9.0
		3 Seine	-	-	0	-	-	-	-		

1-Standard experimental gill nets (nylon and monofilament); F=Floating; S=Sinking
2-Species abbreviations: Rb=Rainbow trout; YP=Yellow perch; BGill=Bluegill; FHM=Fathead minnow; LuSu=Longnose sucker; WSu=White sucker; BBh=Black bullhead; BM=Brassy minnow

Table 3. (continued).

Water (Date)	Surface acres	Type of[1] nets	Mean hrs fished/net	Species[2]	No. of fish	Length (in) Avg.	Length (in) Range	Weight(pounds) Avg.	Weight(pounds) Range	Maximum Depth (ft)	Secchi disk (ft)
Englandt Reservoir (5/89)	28.25	1S	24.0	BBh	77	7.0	4.9-8.2	0.21	0.08-0.36	16.0	0.7
		3 Seine	-	BBh	1	7.6	-	0.29	-		
				PM	1	-	-	-	-		
White Sulphur Springs area											
Keep Cool Reservoir (8/89)	28.2	1S	17.0	YCt	20	12.6	8.1-19.7	0.98	0.19-3.20	25.0	20.0
				Rb	1	18.4	-	3.28	-		
		2 Seine	-	-	0	-	-	-	-		
Elk Creek Reservoir (Dogget) (8/89)	9.9	1S	22.0	Rb	6	12.8	9.1-16.6	0.97	0.35-2.09	37.0	10.5
				BT	13	9.4	7.8-11.2	0.40	0.23-0.66		
				Cot	1	5.1	-	0.08	-		
Whitetail Reservoir (8/89)	6.9	1S	16.0	Rb	5	12.2	11.7-12.8	0.69	0.61-0.83	28.0	24.0
				BT	13	9.4	7.8-11.2	0.40	0.23-0.66		
				Cot	1	5.1	-	0.08	-		
		2 Seine	-	-	0						
Gipsy Lake (8/89)	5.9	1S	17.5	Rb	12	10.9	9.8-13.8	0.54	0.39-0.92	7.0	7.0
				BT	3	8.5	8.2-8.7	0.27	0.25-0.29		
				Cot	1	5.0	-	-	-		
		3 Seine	-	Rb	2	2.3	2.1-2.4	-	-		
				Cot	1	3.1					
Cook #2 Reservoir (lower) (8/89)	5.0	1S	16.0	Rb	89	10.1	7.8-15.4	0.48	0.24-1.37	25.0	5.25
				YCt	1	12.3	-	0.67	-		
				BT	1	12.7	-	1.03	-		
		4 Seine	-	-	0	-	-	-	-		
Schafer Reservoir (Badger Cr) (8/89)	4.0	1S	18.5	Rb	30	13.1	8.6-16.7	0.97	0.28-1.87	13.5	4.75
				WSu	60	12.5	6.3-18.5	1.13	0.14-2.44		
Schendle Reservoir (Battle Cr) (8/89)	12.0	1S	20.0	Rb	1	7.2	-	0.17	-	22.0	1.0
				BT	2	9.1	8.7-9.5	0.28	0.26-0.30		
				WSu	247	10.4	7.4-14.0	0.47	0.14-1.05		
		2 Seine	-	WSu	1	3.0	-	-	-		

1-Standard experimental gill nets (nylon and monofilament); S=Sinking
2-Species abbreviations: Rb=Rainbow trout; YCt=Yellowstone cutthroat trout; BT= Brook trout; BGill=Bluegill; BBh=Black bullhead; Cot=Mottled sculpin; PM=Plains minnow; WSu=White sucker

netted.

Englandt Reservoir, located in Phantom Coulee near Geraldine, was surveyed in May 1989. High numbers of small black bullheads were caught in the single sinking net (Table 3). About 88-142 Arlee Rainbow trout per acre have been planted annually since 1978.

White Sulphur Springs Area Waters

The catch of Yellowstone cutthroat trout in Keep Cool Reservoir was good and good survival of Arlee rainbow trout was observed in Gipsy Lake, Cook #2, and Schafer Reservoir (Table 3). The number of rainbow captured in Elk Creek and Whitetail Reservoir was considered fair while in Schendle it was poor. Extremely high numbers of white suckers were caught in Schendle Reservoir. Schafer Reservoir was the only other pond where high sucker numbers were found. Gipsy Lake, which often winterkills since it is shallow, is planted with catchables at a rate of 89 fish per acre. Keep Cool was stocked with Yellowstone cutthroat at a rate of 97 per acre. Stocking densities in Elk Creek, Whitetail, and Schendle Reservoirs were similar at 76, 75, and 89 fish per acre. Schafer Reservoir was stocked at a much higher rate of 374 Arlee per acre which may explain the high survival despite numerous suckers. Cook Reservoir #2 was stocked at 204 Arlee per acre.

Warden Creel Survey - Lewistown Area Waters

Creel surveys at a total of 23 waters were conducted during the summer months, May - September by wardens in the Lewistown area from 1987-1989 (Table 4). As we might expect, the greatest summer use occurred on the larger bodies of water which included Ackley, Box Elder Reservoir, Lower and Upper Carter Reservoirs, Crystal Lake, E. Fork, and Hanson Reservoirs. Many of the smaller ponds had no anglers present when checked. The greatest number of anglers checked per visit occurred at Ackley Lake; Box Elder Reservoir, Crystal Lake, and Hanson Reservoir also had a relatively high number of anglers checked each visit in at least one of the years of the survey. Harvest rates on the waters where fish had been creeled varied from 0.08 fish per hr on Crystal Lake in 1989 to 2.00 fish per hr on Rindel Pond in 1988. The warden checks included 12 waters where no fish were reported harvested. At nine of these waters, no anglers were present. The average number of fish caught and kept per hour on waters where anglers were checked was 0.32 fish per hour.

During the rest of the year (October-April), most anglers were checked at Ackley Lake, Lower Carter, Deerfield, E. Fork, and Hanson Reservoir. Harvest rates where anglers had caught fish tended to be higher than during the summer, varying from 0.19 fish per hour on Peterson Pond in 1989 to 2.5 fish per hour at Deerfield

Table 4. Results of warden creel surveys on coldwater ponds and reservoirs in the Lewistown area from May-September in 1987, 1988, and 1989.

Water	Year	Number of visits	Number of anglers checked	Total hours fished	Number of fish caught	Harvest rate	
						Species	Fish/hr
Ackley Lake	1987	4	49	131	39	Rb	0.30
Barta Pond	1987	6	0	-	0	-	-
	1988	6	3	5	0	-	0
	1989	3	0	-	0	-	-
Box Elder Reservoir	1987	13	62	108	47	Rb	0.44
	1988	15	49	188	42	Rb	0.22
	1989	1	3	8.5	0	-	0
Brewington Pond	1987	2	2	4	1	Rb	0.25
	1988	2	6	34	17	Rb	0.50
Buffalo Wallow	1988	3	0	-	0	-	-
Lower Carter Res.	1987	30	23	40	5	Rb	0.13
	1988	38	5	9	5	Rb	0.56
	1989	17	29	42	12	Rb	0.29
Upper Carter Res.	1987	30	19	32	29	Rb	0.91
	1988	38	0	-	0	-	0
	1989	13	2	1	0	-	0
C-1	1988	2	0	-	0	-	-
Crooked Crk. Res.	1988	3	0	-	0	-	-
Crystal Lake	1987	13	33	42.5	6	Rb	0.14
	1988	8	10	18	14	Rb	0.78
	1989	5	13	26	2	Rb	0.08
Deerfield Res.	1987	6	4	6	0	-	0
	1988	5	3	3	6	Rb	0.78
	1989	2	0	-	0	-	-
E. Fork Res.	1987	18	34	53	8	Rb	0.15
	1988	21	24	46	10	Rb	0.22
	1989	2	0	-	0	-	-
Hanson Res.	1987	29	45	133	52	Rb	0.39
	1988	23	65	120	48	Rb	0.40
	1989	8	4	4	0	-	0
Hassler Res.	1987	10	0	-	0	-	-
Kovacich Pond	1987	2	0	-	0	-	-
	1988	12	0	-	0	-	-

Table 4. (continued).

Water	Year	Number of visits	Number of anglers checked	Total hours fished	Number of fish caught	Harvest rate Species	Fish/hr
Manuel Res.	1987	3	0	-	0	-	-
	1989	1	0	-	0	-	-
Olsen Pond	1987	3	0	-	0	-	-
Peterson Pond	1987	1	5	15	2	Rb	0.13
	1988	4	8	23	5	Rb	0.22
	1989	4	2	3	1	Rb	0.33
Rindel Pond	1987	1	0	-	0	-	-
	1988	5	2	1	2	Rb	2.00
Satter-fields Pond	1987	2	0	-	0	-	-
	1988	2	0	-	0	-	-
	1989	1	0	-	0	-	-
Styer Pond	1987	2	0	-	0	-	-
Urs Pond	1987	1	2	4	0	-	0
Yellow Water	1987	1	0	-	0	-	-
	1988	4	0	-	0	-	-
	1989	1	1	3	0	-	0

Table 5. Results of warden creel surveys on coldwater ponds and reservoirs in the Lewistown area from October -April in 1987,1988, and 1989.

Water	Year	Number of visits	Number of anglers checked	Total hours fished	Number of fish caught	Harvest rate	
						Species	Fish/hr
Ackley	1987	7	35	51	30	Rb	0.59
Lake	1988	1	0	-	0	-	-
Barta	1987	3	1	2	0	-	0
Pond	1988	3	0	-	0	-	-
	1989	1	0	-	0	-	-
Box Elder	1987	5	6	18	15	Rb	0.83
Reservoir	1988	10	6	21	7	Rb	0.33
	1989	7	6	10	7	Rb	0.70
Brewington	1987	1	0	-	0	-	-
Pond	1989	2	0	-	0	-	-
Buffalo	1987	3	5	16	5	Rb	0.31
Wallow	1988	2	0	-	0	-	-
Upper	1987	20	6	6	5	Rb	0.83
Carter	1988	26	0	-	0	-	-
Res.	1989	27	6	7	0	-	0
Lower	1987	18	2	1	0	-	0
Carter	1988	26	15	17	27	Rb	1.59
Res.	1989	24	1	2	1	Rb	0.50
C-1	1987	2	0	-	0	-	-
Crossover	1987	1	0	-	0	-	-
Pond	1988	2	0	-	0	-	-
Deerfield	1987	6	0	-	0	-	-
Res.	1988	6	10	10	4	Rb	0.40
	1989	6	2	4	10	Rb	2.50
E. Fork	1987	5	2	2	0	-	0
Res.	1988	20	25	82	25	Rb	0.30
	1989	17	6	3	2	Rb	0.67
Giltedge	1987	1	0	-	0	-	-
Hanson	1987	28	29	33	22	Rb	0.67
Res.	1988	54	65	134	46	Rb	0.34
	1989	26	36	66	11	Rb	0.17
Hassler	1987	4	0	-	0	-	-
Res.	1988	14	1	2	0	-	0
	1989	3	0	-	0	-	-
Kovacich	1987	2	0	-	0	-	-
Pond	1988	3	0	-	0	-	-
	1989	1	0	-	0	-	-

Table 5. (continued).

Water	Year	Number of visits	Number of anglers checked	Total hours fished	Number of fish caught	Harvest rate Species	Fish/hr
Manuel Res.	1988	1	0	-	0	-	-
Olsen Pond	1988	1	0	-	0	-	-
	1989	1	0	-	0	-	-
Peck Pond	1987	1	0	-	0	-	-
Peterson Pond	1987	3	2	2	0	-	0
	1988	3	0	-	0	-	-
	1989	5	4	16	3	Rb	0.19
Rindel Pond	1987	1	4	2	1	Rb	0.50
	1988	2	2	6	0	-	-
	1989	3	3	6	14	Rb	2.33
Satter-fields Pond	1987	1	2	3	1	Rb	0.50
Surprise Crk Res	1987	1	0	-	0	-	-
Yellow Water Res.	1988	1	0	-	0	-	-
	1989	3	0	-	0	-	-

Reservoir also in 1989. The overall harvest rate from October-April was 0.45 fish per hour.

DISCUSSION AND RECOMMENDATIONS

Strain evaluations of rainbow trout were conducted in several lakes. Arlee in Nilan Reservoir continue to provide fair to good survival, growth and catchability. Bean Lake, Eureka Reservoir and Willow Creek Reservoir all received plants of equal numbers of Arlee and AXE. Arlee showed good survival in Bean Lake but none survived in Eureka or Willow Creek Reservoirs. AXE survival was good in Bean and Willow but poor in Eureka. Where they survive, Arlee show better growth than AXE but longevity is poor with both strains, with few to no fish making it into the third summer following stocking. It is recommended to continue managing Nilan Reservoir with Arlee. The Arlee/AXE combination in Bean and Willow Creek should continue for three additional years. A decision can then be made as to which strain to use in each respective water.

Eureka Reservoir has not provided a significant fishery since 1980.

Various strains of rainbow trout have been tried, including Arlee, Eagle Lake, and AXE, but all have had poor survival. Planting dates, water temperatures at time of planting and hatchery source were compared and none of these appears to be a limiting factor. A review of the management of Eureka Reservoir over the past 30 years shows that a fair to good trout fishery develops for two to three years following chemical eradication of suckers (Figure 1). Rehabilitation is not recommended at this time due to prohibitive costs. Chemical alone would cost around $5000 now as compared to $300 in 1969 and $800 in 1977. To be effective, suckers would have to be eradicated every three to four years. It is recommended to stock hold over DeSmet Rainbow following ice out in the spring for a three-year period at the rate of 20 fish/acre. These recommendations are based on personal communication with Dick Vincent(1990). Harrison Reservoir in Region 3 has an excellent fishery for DeSmet strain rainbow trout. Harrison Reservoir is comparable to Eureka Reservoir in surface acres, drawdown, presence of brown trout and a dense sucker population. It is also possible that DeSmet rainbow trout will utilize the inlet of Eureka for spawning.

In 1989, Pishkun Reservoir was in the second year of a four-year program of stocking 300,000 kokanee salmon in an effort to re-establish the good kokanee fishery that existed in the late 1970's and early 1980's. Predation on salmon by northern pike is minimal. However, it appears that large numbers of yellow perch may depress the kokanee population by competing for the same food. Kokanee survival has also been best when fish were reared and stocked from the Somers Hatchery (from 1970 to 1980). It is recommended to stock kokanee from this hatchery in 1990 and 1991.

The survival of Arlee strain rainbow trout in Ackley Lake has improved substantially since the planting date was delayed until mid-May. Limited creel survey during February 1989 indicated a high catch rate where both Arlee and Eagle Lake strains contributed substantially to the catch. Most of the Arlee caught were from the most recent plant while Eagle Lake fish were primarily from the previous years plant. This difference in the year each strain would be harvested may be influencing our gill-net survival data. We recommend continuing planting both strains. Stocking both strains may provide a greater stabilization of fishing opportunities since the effects of low survival in one plant would be dampened by successful plants of the other strain in a different year. An on-going weekend creel survey through the summer will provide additional harvest information for both strains in Ackley Lake. Since best survival of Arlee plants has occurred when stocked in mid-May or later and when their mean length was 5.0 inches or greater, both these criteria should be met druing future Arlee plants.

We should continue to evaluate plants of picivorous species in East Fork Reservoir that may utilize the large sucker forage base.

Brown trout plants should be continued for several additional years to allow them to reach an adequate size to become effective piscivores before switching to another predator. Other potential predators that should be considered if brown trout do not affect the sucker numbers include male northern pike and tiger muskies. An alternative or additional measure that should be considered includes draining the reservoir and chemically removing the sucker population.

Smith River Reservoir should continue to be planted with both the Arlee and DeSmet strains of rainbow trout for at least another two or three years. During this time we will attempt to monitor the DeSmet population's use of tributaries for spawning. The 1987 DeSmet plants were made in May using fish averaging 7.6 inches in length. We need to closely monitor survival from the 1989 plant since survival of small fish released late in the growing season may be poor. If survival is low, we should consider increasing the number of fish planted and/or the average size of the fish when released. During the next reporting period we plan on examining the frequency of excessive drawdowns that cause winterkill to estimate how often supplemental plants would be needed if a naturally reproducing rainbow population establishes.

No difference was obvious in the number or the timing of the Arlee rainbow trout plants in Martinsdale Reservoir which may have contributed to the variation in survival seen from 1987-1989. In all years, approximately 103,000-107,000 Arlee were planted from Big Springs Hatchery sometime from 12 May - 6 June, when the mean length of the fish were 4.7-5.5 inches. The 20,604 Yellowstone cutthroat planted at a larger size (6.8-7.3 inches) on 22 May and 28 June 1989 showed exceptionally good survival.

In future years, we should attempt to increase the potential for natural reproduction in Newlan Creek Reservoir by completely or partially removing any barriers in Newlan Creek. This should be undertaken at the same time that we trap the inlet of the reservoir to quantify the spawning run of rainbow and determine if cutthroat trout have also begun to reproduce. During 1989, we also initiated tetracycline marking of all Yellowstone cutthroat trout planted in Newlan Creek Reservoir to help determine if the high catch rate is from only the planting program.

The planting program for Yellow Water Reservoir should be modified so a portion of the plant, which consists of catchables, is made early in the year if water is 6-10 ft deep. If water levels are higher, an additional, larger plant of fingerlings should also be made. Planting catchables early in the season will allow these fish to enter the fishery the same year and provide a more consistent fishing opportunity even in low water years.

We should not have expected the density of rainbow trout in Box Elder and Buffalo Wallow Reservoirs to be as high as in Lower

Carter Reservoir since the stocking rates were substantially lower. Both Box Elder and Buffalo Wallow Reservoir were planted in May 1989 with 4.7" Arlee rainbow at a density of 226 and 124 per acre, respectively. Lower Carter, however, was stocked at a rate of 471 Arlee (4.2") per acre. In the future, we will attempt to review stocking rates in many of the regions small ponds and reservoirs. The outlet control gate on Box Elder Reservoir is damaged and currently allows a continuous discharge from the reservoir. The dam is located on private land, but much of the reservoir is on BLM land. We hope to contact the BLM and private landowners in the next reporting period to determine if a cooperative effort could be made to rectify the problem and stabilize water levels in the reservoir. Plants in Box Elder Reservoir may be canceled if water levels drop too low.

We will continue to monitor Buffalo Wallow Reservoir. As a short term measure to restore the trout fishery, an additional 3,648 Arlee averaging 7.3 inches in length were planted in September 1989, which increased stocking densities to 580 per acre. Other long term measures we will consider in response to the introduction of yellow perch will include converting the pond to a cool/warm water fishery or lowering the water level and chemically rehabilitating the reservoir.

Big Casino Creek Reservoir will be drained and possibly chemically rehabilitated during 1990 to remove the stunted sucker population. As soon as possible we plan on planting catchable rainbow trout, followed by fingerling plants in subsequent years.

Missouri Breaks Pond has a maximum depth of approximately 10-10.5 ft. This fairly shallow depth, along with the considerable growth of vegetation may make this pond prone to winterkill. Future management should emphasize additional transplants of yellow perch or small plants of catchable Arlee rainbow trout early in the season.

The large black bullhead population in Englandt Reservoir may be depressing trout survival and growth. We increased the stocking rate of Arlee rainbow trout substantially in 1989 to 461 per acre. Although we have not yet renetted the reservoir, the landowner reported that growth appeared poor. We transplanted 141 male northern pike in April 1990 in an attempt to introduce a predator that may control the bullhead population. Northern pike transplants will continue for the next several years. During this time all rainbow trout plants will be canceled. Other cool/warm water species that may prey upon young bullheads should be evaluated and considered for introduction.

Keep Cool Reservoir plants were recently switched from Yellowstone cutthroat back to rainbow trout at the request of the landowner. From 1984-85, the mean size of cutthroat trout at planting was 3.0 in while from 1986-88, the length dropped and varied from 2.0-2.5

in. Although this may have affected survival, the high gill net catch suggests this was not an important factor. We hope to evaluate potential methods to control sucker populations in Schafer and Schendle Reservoirs. In the next few years, we will attempt to standardize stocking densities in all the smaller waters in the White Sulphur Springs area. Also, we hope to establish a regular sampling schedule where all ponds will be surveyed every two to three years. Some of the reservoirs in this area may be potential candidates for stocking with westslope cutthroat or DeSmet or Eagle Lake rainbow trout in hopes of establishing a naturally reproducing population. The Forest Service has proposed building a dam to increase the depth of Gipsy Lake, which would allow overwintering of trout. A naturally reproducing salmonid population could possibly be developed if the dam is constructed.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the assistance of several individuals in completing field and office work on this project. Ken Sinay and Paul Hamlin assisted in all aspects of data collection and analysis. Bob Hughes, Jose Serrano-Piche, Emerald Asmus, Wayne Gollehon, Jim Sturdivant, Rich Kummer and Steve Giannini helped in gill netting operations. Jim Peterson assisted through the collection and analysis of vertebra for tetracycline marks and Wardens Jim Connor, Bob Barber, and Mark Ernhart gathered creel survey data on many waters.

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Date: August, 1990

Principal Fish Species Involved:

Rainbow trout, brown trout, lake trout, kokanee salmon, white sucker.

Code Numbers of Waters Referred To In Report:

14-7120	Cameron Reservoir
14-7320	Eureka Reservoir
14-7370	Fitzpatrick Lake
14-7450	Furnell Pond
14-7620	Henry Pond
14-8060	Loch Pond #1 and #2
14-8250	Myrvold Pond
14-8420	Ostle Reservoir
14-8935	Lake Shel-oole
14-9091	Stewart Pond
14-9081	Stephens Pond
14-9240	Lake Elwell
16-4300	Ackley Lake
16-4400	Barta's Pond
16-4590	C-1 Reservoir
16-4620	Lower Carter Reservoir
16-4620	Upper Carter Reservoir
16-4628	Big Casino Creek Reservoir
16-4840	Crystal Lake
16-4888	Deerfield Reservoir
16-4950	East Fork Spring Creek Reservoir
16-5070	Englandt Reservoir
16-5535	Hanson's Reservoir
16-5720	Hasslers Reservoir
16-6340	Kolar #1
16-6360	Kolar #2
16-6381	Kolar #4
16-6382	Kolar #5
16-7050	Crossover Reservoir (Missouri Breaks Pond)
16-7359	Olsen's Pond
16-7642	Peterson's Pond
16-8450	Surprise Creek Reservoir
16-8660	Urs Pond
17-8720	Bean Lake
17-8928	Elk Creek Reservoir
17-8960	Gipsy Reservoir
17-9075	Helena Valley Regulating Reservoir
17-9136	Holter Reservoir
17-9184	Keep Cool Reservoir
17-9330	Newlan Creek Reservoir
17-9506	Schendle Reservoir
17-9507	Schafer Reservoir
17-9616	Smith River Reservoir
17-9840	Whitetail Reservoir
17-	Cook Reservoir #2
18-7220	Box Elder Reservoir

18-7230 Brewington Pond
18-7340 Buffalo Wallow
18-7750 Bair Reservoir
18-8110 Kovacich Pond
18-8340 Manuel Reservoir
18-8380 Martinsdale Reservoir
18-8840 Rindel Pond
18-9240 or 9241 Styer Pond
18- Crooked Creek Reservoir
18- Giltedge
18- Satterfield's Reservoir
20-7270 Forseth Pond
20-7900 Nilan Reservoir
20-7950 Pishkun Reservoir
20-8500 Willow Creek Reservoir