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

STATE: Montana PROJECT NO. F-46-R-5
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, 1991 through June 30, 1992

ABSTRACT

Evaluation of rainbow trout strains continued in several regional waters. Poor survival of Arlee rainbow was documented in Nilan Reservoir for the second consecutive year. Poor survival of Arlee was also noted for Eureka and Willow Creek reservoirs while Bean Lake was rated as fair. AXE rainbow stocked in 1991 had good survival in Bean Lake and fair in Eureka and Willow Creek reservoirs. AXE show slightly better longevity. Growth rates of the two strains are nearly equal by the end of the second summer. Gill nets in Pishkun Reservoir produced limited numbers of kokanee salmon. Lake trout in Tiber Reservoir continue to increase in numbers. The Eagle Lake strain showed high survival from three years of plants, while Arlee rainbow trout showed good survival from the 1991 plant. Good survival was found among Eagle Lake planted in Bair Reservoir. Big Casino Creek Reservoir had good survival of rainbow trout but a low growth rate. Brown trout survival in East Fork Spring Creek Reservoir improved from the last reporting period. Survival was extremely high among the 1991 the plant of rainbow trout in Martinsdale Reservoir. Gill net catches of rainbow trout was higher than for Yellowstone cutthroat trout in Newlan Creek Reservoir. Yellow Water Reservoir had good survival of rainbow trout. Survival of rainbow trout was documented in several small ponds.

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 1-3 pound rainbow trout.

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

6. To reduce rough fish populations for maintenance of 11-20 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 to provide current information for regional waters.

PROCEDURES

Netting surveys were conducted using standard 125 x 6 foot experimental gill nets with 25 foot sections of 0.75, 1.0, 1.25, 1.5 and 2.0 inch square mesh and 300 x 8 foot gill nets with 100 foot sections of 2.5, 3.0 and 3.5 inch square mesh. Twine type included nylon or monofilament and nets were either fished sinking or floating. Fish were measured to the nearest tenth of an inch and weighed to the nearest hundredth of a pound. Various rainbow trout strains were marked with tetracycline and fin clips. Kokanee salmon stocked in Pishkun Reservoir were distributed by boat.

FINDINGS

Rainbow Trout Strain Evaluations

Evaluation of various rainbow trout strains continued on several regional waters. Strains being evaluated include DeSmet, Arlee, Eagle Lake and AXE (Arlee x Eagle Lake hybrid).

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.

Three irrigation reservoirs and one natural lake in the Choteau/Augusta area have historically been managed with Arlee rainbow trout. These waters include Eureka, Nilan and Willow Creek Reservoirs and Bean Lake. The Arlee strain has exhibited average growth, poor longevity, and survival varies from poor to good. AXE rainbow trout (Arlee x Eagle Lake hybrids) were stocked in three of these waters in recent years to improve overall survival and longevity. Strains planted, objectives, and various other parameters for these waters are listed in Table 1. Trout survival in the irrigation reservoirs is possibly influenced by fluctuating water levels and abundant white sucker populations.

Nilan Reservoir generally has had fair or good survival with Arlee rainbow over a twenty-one year period (Figure 1), however poor survival was experienced in the last two years. No other strain is being evaluated in Nilan Reservoir. Although few fish from 1991 and 1990 were sampled in the October netting, the 1989 year class was fairly well represented (Table 2). Arlee seldom carry-over into the third summer. Growth rates are considered good.

Arlee survival in Eureka Reservoir has been very poor since 1980. Good or fair survival was experienced in earlier years for which comparable netting data is available. Examination of twenty-six years of netting data (Figure 1) indicates survival was poor for thirteen of these years, fair for four years and good for nine years. Equal numbers of Arlee and AXE were stocked beginning in 1989 to evaluate survival and longevity. Both strains have shown poor survival with the exception of the 1991 AXE which is rated as fair survival (Figure 2 and Table 2). Angler caught trout from winter and early spring show a similar pattern. Of 23 fish observed during this time period, all were AXE except one Arlee. Fishing was excellent following ice-out. Longevity determinations have not been possible due to poor survival. Growth of 1991 AXE is considered average.

Bean Lake has seldom had poor survival of Arlee but fish rarely made it to the third summer. Starting in 1988, equal numbers of Arlee and AXE were stocked to compare longevity as well as survival. Good numbers of trout were sampled in the 1991 October netting (Table 2). Both rainbow strains have shown good first summer survival since 1988. Although both strains are stocked in equal numbers, AXE account for 60-75% of the trout sampled in any given year. (Figure 2). Longevity is comparable with few to no

Table 1. Various parameters of rainbow strain evaluation lakes in the Choteau-Augusta area.

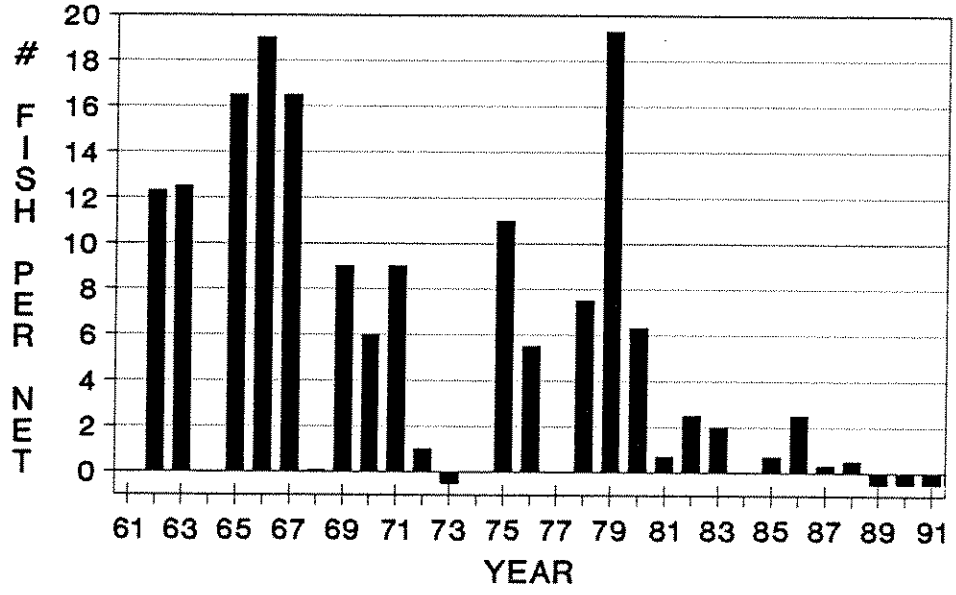
	Eureka Res.	Nilan Res.	Willow Ck.Res.	Bean Lake
Surface Acres	405	540	1500	210
Maximum depth (ft)	28	55	50	24
Fluctuation (ft)	8-10	4-6	6-8	N/A
Type of Water	Reservoir	Reservoir	Reservoir	Natural
Strain(s)	50% Arlee 50% AXE	Arlee -	50% Arlee 50% AXE	50% Arlee 50% AXE
Objective	Survival Longevity -	- - -	Growth Survival Longevity	Survival Longevity -
Stocking size (inches)	4-5	4-5	4-5	4-5
Number planted per Acre by strain	100	150	25	100

fish appearing in the third summer. The 1988 AXE did carry some fish into the third year. Arlee grow slightly better than AXE in the first summer but mean lengths are comparable at the end of the second summer. First-year growth differential is undoubtedly related to Arlee being stocked six to eight weeks earlier than AXE.

Willow Creek Reservoir was managed with Arlee rainbow during a thirteen-year period from 1971-1983. Survival was good for nine of these years but longevity was poor. In 1984, AXE were introduced in attempts to prolong trout longevity. This strain showed good initial survival along with fair numbers making it to the third summer. Growth was comparable to the earlier years with Arlee. In 1989, equal numbers of Arlee and AXE were stocked to evaluate various parameters. As noted for Bean Lake and Eureka Reservoir, AXE survival is better than Arlee in Willow Creek Reservoir (Figure 2). Poor survival was noted for Arlee for all three years and for AXE in 1990. AXE continue to survive into the third summer but Arlee don't. Arlee show slightly better growth which again can be attributed to being stocked at least eight weeks earlier than AXE.

Eagle Lake rainbows are currently being planted in Ackley and Bair 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. Both waters have dense

EUREKA RESERVOIR



NILAN RESERVOIR

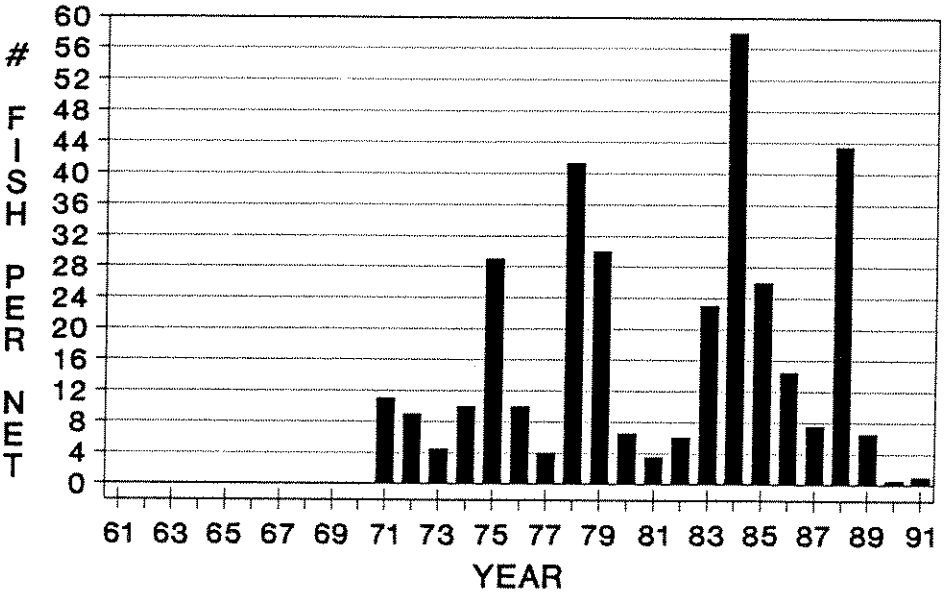


Figure 1. Historical first-summer survival of Arlee rainbow trout in Eureka and Nilan Reservoirs. (Survival ratings: Good,>8.0 fish/net; fair, 4.0-7.9 fish/net; poor, 0.0-3.9 fish/net).

ible 2. Overnight gill netting results in coldwater lakes and reservoirs in Region Four during 1991.

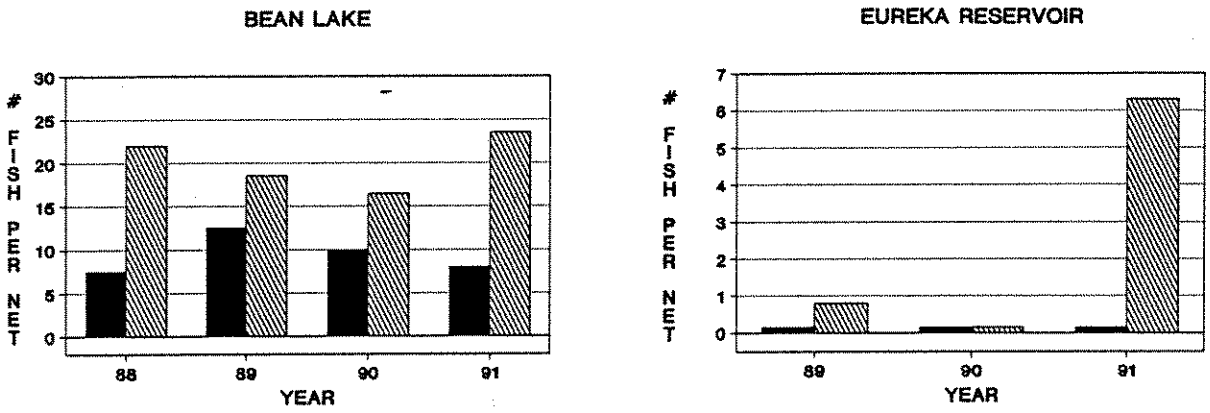
later name ate surveyed)	Surface acres	No. of[1] nets	Mean hours fished/net	Species, strain[2] & year planted	No. of fish	Length(in) Range	Length(in) Mean	Weight(pounds) Range	Weight(pounds) Mean	Condition Factor Range	Condition Factor Mean
kley Res. 0/21/91)	240	1F,1S	17.25	Rb-A-1991	12	8.4-11.0	(9.9)	0.24-0.57	(0.44)	40.5-46.2	(43.9)
				Rb-A-1990	2	16.7-16.9	(16.8)	1.45-1.73	(1.59)	31.1-35.8	(33.5)
				Rb-I-1991	17	8.4-10.4	(9.6)	0.21-0.47	(0.36)	34.9-48.9	(39.8)
				Rb-I-1990	14	12.9-14.9	(14.1)	0.77-1.20	(1.01)	34.9-37.3	(36.0)
				Rb-I-1989	15	15.3-17.0	(16.2)	1.28-1.69	(1.51)	30.3-39.6	(35.7)
				LL	3	17.0-19.1	(18.3)	1.88-2.51	(2.30)	36.0-38.3	(37.5)
				MW	3	15.2-15.5	(15.4)	1.48-1.66	(1.58)	42.1-45.5	(43.5)
				LnSu	16	12.1-17.0	(14.3)	0.71-1.96	(1.21)	34.1-46.4	(40.3)
				WSu	53	6.0-16.8	(13.3)	0.09-2.19	(1.15)	36.0-50.9	(43.4)
ir Reservoir 0/2/91)	272	1F,1S	19.3	Rb-I-1991	44	7.2-8.6	(7.8)	0.14-0.24	(0.17)	31.2-42.0	(36.6)
				Rb-I-1990	22	10.2-12.1	(11.1)	0.36-0.57	(0.45)	29.7-34.9	(32.7)
				Rb-I-1989	9	13.7-15.4	(14.4)	0.72-1.18	(0.89)	25.7-33.6	(29.7)
				EB	11	6.9-12.2	(9.4)	0.12-0.55	(0.29)	27.6-39.1	(33.2)
				YCT	1	-	(17.7)	-	(2.17)		
				WSu	111	6.3-17.2	(10.6)	0.11-2.04	(0.50)	34.9-53.3	(39.4)
an Lake 0/18/91)	200	2S	24.5	Rb-A-1991	16	6.9-12.7	(11.7)	0.14-0.82	(0.66)	-	-
				Rb-A-1990	1		(17.1)		(1.95)	-	-
				Rb-AXE-1991	47	6.5-10.3	(9.3)	0.10-0.47	(0.33)	-	-
				Rb-AXE-1990	2	16.5-16.8	(16.7)	1.81-1.82	(1.82)	-	-
g Casino Creek servoir 0/22/91)	17.5	1F,1S	16.5	Rb-A-1991	49	9.1-12.3	(11.2)	0.33-0.73	(0.55)	35.0-43.8	(39.3)
				WSu	112	7.3-17.2	(11.7)	0.16-2.01	(0.78)	35.8-51.1	(42.0)
st Fk Spring eek Res. 2/91)	100	1F,1S	18.3	LL	17	10.6-18.8	(13.0)	0.45-2.96	(0.96)	35.0-45.3	(38.8)
				NP	5	22.6-24.5	(23.6)	3.09-3.96	(3.47)	24.7-27.6	(26.3)
				YP	5	6.4-13.8	(9.5)	0.13-1.36	(0.56)	47.2-56.1	(50.7)
				WSu	65	6.7-12.7	(9.4)	0.10-0.86	(0.32)	32.7-42.0	(37.3)
				LnSu	3	9.5-11.7	(10.5)	0.27-0.56	(0.39)	31.5-35.0	(33.2)
ith River Res. 0/1/91)	327	1F,1S	16.0	Rb-A-1991	19	8.0-10.4	(9.7)	0.22-0.48	(0.37)	34.0-43.0	(39.8)
				Rb-A-1990	7	12.8-14.4	(13.9)	0.82-1.02	(0.94)	32.5-39.1	(35.3)
				Rb-D-1989	1	-	(15.9)	-	(1.18)	-	(29.4)
				LnSu	94	6.4-17.6	(14.7)	0.09-1.83	(1.15)	30.1-41.3	(35.1)
				WSu	15	9.6-15.6	(14.1)	0.34-1.74	(1.14)	36.8-45.8	(39.2)
				Burbot	1	-	(15.0)	-	(0.66)	-	-
reka Reservoir 0/18/91)	350	2F,1S	23.0	Rb-AXE-1991	19	9.2-11.0	(10.1)	0.27-0.47	(0.37)	-	-
				LL	4	17.4-26.0	(21.4)	2.20-7.50	(4.32)	-	-
				LnSu	1	-		-		-	-
				WSu	73	-		-		-	-
lter Reservoir - netted by Region 8 personnel											
rtinsdale Res. 0/2/91)	1000	1F,1S	16.2	Rb-A-1991	76	7.4-11.2	(9.9)	0.16-0.51	(0.40)	34.9-47.2	(41.3)
				Rb-A-1990	3	14.8-15.6	(15.1)	1.33-1.42	(1.38)	36.4-43.8	(40.1)
				Rb-A-1989	6	16.1-18.4	(17.2)	1.82-2.12	(1.94)	31.3-43.6	(38.4)
				YCt-90	1	-	(15.0)	-	(1.18)	-	(35.0)
				YCt-89	2	17.6-18.1	(17.9)	2.02-2.19	(2.10)	36.9-37.1	(37.0)
				LL	2	13.7-16.7	(15.2)	1.00-1.88	(1.44)	38.9-40.4	(39.6)
				MW	4	10.4-16.0	(13.0)	0.41-1.60	(0.92)	34.7-40.0	(37.5)
				WSu	129	6.0-17.4	(13.5)	0.10-2.33	(1.14)	31.6-49.6	(42.2)
				LnSu	7	8.7-15.6	(14.1)	0.23-1.52	(1.21)	34.9-50.2	(39.7)

Standard 125 foot experimental gill nets (nylon and monofilament); F=Floating; S=Sinking
Species abbreviations: Rb=Rainbow trout; LL=Brown trout; YCt=Yellowstone cutthroat trout; EB= Brook trout; KOK=Kokanee salmon; LT=Lake Trout; NP=Northern pike; YP=Yellow perch; WSu=White sucker; LnSu=Longnose sucker; MW=Mountain Whitefish
Strain abbreviations: A=Arlee; AXE=Arlee x Eagle Lake Hybrid; D=DeSmet; I=Eagle Lake

able 2 (continued).

ater name ate 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
rony Reservoir 11/14/91)		3S	19.1	WE	5	9.6-20.1	(13.0)	0.29-3.00	(0.98)	31.2-36.9	(33.9)
				Rb	2	14.7-15.7	(15.2)	1.01-1.36	(1.19)	31.8-35.1	(33.5)
				LL	1	-	(18.9)	-	(2.14)	-	
				YP	2	5.7-8.0	(6.9)	0.10-0.25	(0.18)	48.8-54.0	(51.4)
				Ling	1	-	(13.0)		(0.59)		
				WSu	97	6.3-16.6	(13.1)	0.11-2.33	(1.09)	36.1-57.1	(44.4)
				LnSu	12	8.2-14.8	(11.0)	0.23-1.32	(0.61)	39.6-50.3	(42.7)
lan Reservoir 0/17/91)	400	2F	44.0[3]	Rb-A-1991	2	12.1-12.7	(12.4)	0.73-0.83	(0.78)	-	-
				Rb-A-1990	1		(16.2)		(1.67)	-	-
				Rb-A-1989	10	16.7-19.5	(17.5)	1.98-3.60	(2.39)	-	-
				LL	3	19.3-23.3	(20.9)	2.58-5.33	(3.74)	-	-
wlan Creek Res. 0/1/91)	280	1F,1S	16.6	YCt-91	5	8.2-10.3	(9.0)	0.19-0.34	(0.25)	31.1-38.5	(33.9)
				YCt-90	1	-	(16.9)	-	(1.58)		
				Rb	10	9.9-18.0	(12.5)	0.39-1.86	(0.79)	31.9-40.6	(37.8)
				LnSu	178	6.4-17.1	(9.7)	0.10-1.86	(0.39)	29.3-53.4	(35.0)
shkun Reservoir /24/91)	1300	4S,2F	19.0	KOK	12	7.1-8.2	(7.8)	0.12-0.18	(0.14)	-	-
				KOK	1	-	(12.2)	-	(0.60)	-	-
				KOK	1	-	(17.5)	-	(2.00)	-	-
				YP	15	5.5-8.6	(6.9)	0.08-0.35	(0.18)	-	-
				YP	4	9.3-10.7	(10.0)	0.40-0.62	(0.51)	-	-
				WSu	2	6.9-8.8	(7.9)	0.15-0.34	(0.25)	-	-
ber Reservoir 1/8/91)	14700	2S, 1S(300)	21.0	LT	73	20.2-32.1	(25.0)	2.88-9.13	(5.44)	-	-
				WE	2	-		-		-	-
				MW	1	-		-		-	-
				Carp	1	-		-		-	-
llow Creek servoir 0/16/91)	1400	2F	22.5	Rb-A-1991	2	10.7-11.5	(11.1)	0.51-0.61	(0.56)	-	-
				Rb-AXE-1991	15	8.8-10.0	(9.2)	0.25-0.39	(0.30)	-	-
				Rb-AXE-1989	3	16.5-16.6	(16.6)	1.56-1.72	(1.68)	-	-
llow Water servoir 0/23/91)	193	1F,1S	16.0	Rb-A-1991	28	7.9-13.3	(12.2)	0.18-1.12	(0.83)	36.5-49.3	(44.0)
				Rb-A-1990	16	13.4-14.6	(14.1)	1.12-1.43	(1.28)	41.4-49.2	(45.5)
				WSu	5	9.3-15.5	(13.5)	0.31-1.52	(1.03)	37.4-40.8	(38.9)

Standard 125 foot experimental gill nets (nylon and monofilament) unless otherwise noted; F=Floating; S=Sinking
Species abbreviations: Rb=Rainbow trout; LL=Brown trout; YCt=Yellowstone cutthroat trout; EB= Brook trout; KOK=Kokanee salmon; NP=Northern pike; YP=Yellow perch; WSu=White sucker; LnSu=Longnose sucker; MW=Mountain whitefish; WE=Walleye.
Strain abbreviations: A=Arlee; AXE=Arlee x Eagle Lake Hybrid; D=DeSmet; I=Eagle Lake
Nets left two days due to adverse winds. Nets not fishing effectively.



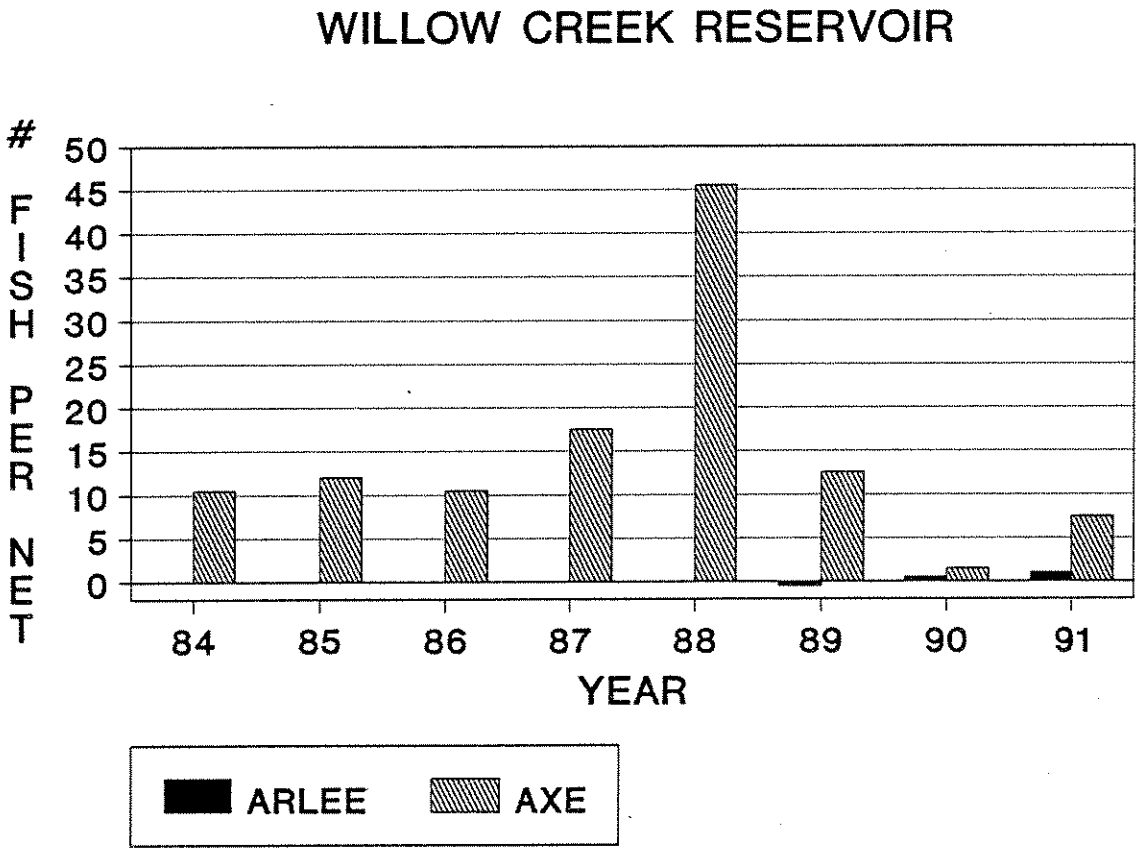


Figure 2. First-summer survival comparisons of Arlee and AXE rainbow trout in Bean Lake, Eureka and Willow Creek reservoirs. (Survival ratings: Good,>8.0 fish/net; fair, 4.0-7.9 fish/net; poor, 0.0-3.9 fish/net).

sucker populations and it was hoped that Eagle Lake rainbows would utilize this potential food source.

ACKLEY LAKE

Equal numbers (approximately 20,000 of each strain) of Arlee and Eagle Lake strain rainbow trout have been planted in Ackley Lake since 1986. The gill netting survey in October 1991 provided survival information for the Arlee strain for the last 2 years and for Eagle Lake rainbow trout on plants dating back to 1989 (Table 2). Survival was good for both strains from the 1991 plant. Gill net catches were substantially higher for the Eagle Lake strain than for the Arlee strain for the 1990 plant. The number of Eagle Lake rainbow trout captured in gill nets was similar for all years from 1989-91.

OTHER LARGE RESERVOIRS

PISHKUN RESERVOIR

Gill nets fished in late July collected 14 kokanee salmon (Table 2). Twelve of these represent yearling fish from the 1990 year class. A total of 15 gill nets fished in May and June captured only 5 kokanee (2 yearlings, 2 two-year olds and 1 age III+). A fair number of yearling kokanee were sampled in 1990 but apparently have disappeared from the population.

TIBER RESERVOIR

Gill nets set for lake trout in mid-August at four different locations throughout the reservoir caught no fish. Netting surveys in early November collected a total of 73 lake trout (Table 2). Nets were set over suspected spawning areas in the Bootlegger Trail area. As noted earlier (Liknes et al. 1990), the lake trout population appears to be increasing. The November 1991 survey captured 53 males and 20 females, with 90% of the females either ripe or spent. The majority of the fish sampled ranged from 23-26 inches. A total of 53 lake trout (37 males, 16 females) were tagged and released to assist in harvest determinations. Three fish tagged in 1990 were also caught and released. They showed growth increments of 0.6, 1.5 and 2.2 inches.

FITZPATRICK LAKE

Fitzpatrick Lake in northwestern Toole County has not been stocked since 1987 due to low water levels arising from several drought years along with irrigation withdrawal. This natural lake previously supported an excellent rainbow trout fishery. The lake

lies within private land and the landowners have canceled their agreement allowing public access to the lake due to liability concerns.

BAIR RESERVOIR

Gill netting results showed extremely good survival among both the 1991 and 1990 Eagle Lake rainbow trout plants (Table 2). Survival of the 1990 plant was rated as good. Substantial numbers of white suckers were also captured. Sampling also demonstrated the continued survival of at least small numbers of Yellowstone cutthroat trout.

BIG CASINO CREEK RESERVOIR

Big Casino Creek Reservoir was drained during 1990 to remove the stunted sucker population. Gill netting in October 1990 and 1991 verified the high number of white suckers present. In June 1991, 3,000 Arlee rainbow trout averaging 8.6 inches in length were planted; in following years, we will utilize fingerling plants. Survival of rainbow trout was very high (Table 2), but growth was less than expected.

EAST FORK SPRING CREEK RESERVOIR

The brown trout catch was greater than in 1990 (Table 2). We continued to find substantial large numbers of stunted white suckers. A yellow perch was captured in the gill nets. Largemouth bass have been reported caught by an angler.

SMITH RIVER RESERVOIR

DeSmet rainbow have been planted in Smith River Reservoir (Lake Sutherlin) in 1986-87 and 1989-91. 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.

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. Survey work in October 1991 found good survival from the 1991 Arlee plant and fair survival from the 1990 Arlee plant (Table 2). The only DeSmet strain rainbow trout netted was planted in 1989.

MARTINSDALE RESERVOIR

The catch of Arlee rainbow trout planted in 1991 was extremely high (Table 2). Also, survival of Yellowstone cutthroat trout appeared to be poor. Two brown trout, seven longnose suckers, and substantial numbers of white suckers were netted.

NEWLAN CREEK RESERVOIR

The number of Yellowstone cutthroat trout sampled at Newlan Creek Reservoir in two gill nets from the 1991 plant was rated as fair (Table 2). The number of naturally reproducing rainbow trout in the gill nets was higher than the Yellowstone cutthroat catch (Table 2). Large numbers of longnose suckers were captured.

YELLOW WATER RESERVOIR

Water levels in Yellow Water Reservoir have continued to be low but overwinter survival has occurred. Survival was good from both the 1990 and 1991 plants (Table 2).

Small Ponds, Lakes and Reservoirs

Great Falls - Lewistown Area Waters

Data from sampling eleven waters in the eastern portion of Region 4 showed catches as high as 83 rainbow per net (Table 3).

Table 3. Results from overnight gill netting in cold water ponds and reservoirs in the eastern portion of Region four, 1990-91.

Water (Date)	Surface acres	Type of[1] nets	Mean hrs fished per net	Species[2]	No. of fish	Length (in) Range (Average)	Weight(pounds) Range (Average)	Maximum Depth (ft)	Secchi disk (ft)	Conductivity uohms/cm
Lewistown Area										
Buffalo Wallow (8/31/90)	8.0	1S	overnight	Rb	11	6.0- 8.3 (6.9)	-			
				YP	29	5.2-14.5 (6.2)	-			
				LC	6	6.0- 6.5 (6.2)	-			
Hanson Creek (7/17/90)		1S	16.2	Rb	9	8.7-18.7 (13.3)	0.37-2.80 (1.29)	24.5	8.5	
Hassler (7/16/90)		1S	19.5	Rb	83	7.1-17.8 (10.1)	0.17-3.00 (0.61)	9	9.0	
Peterson (7/11/91)		1S	14.2	Rb-91	2	8.9- 9.3 (9.1)	0.34-0.37 (0.36)	19	8.0	1350
				Rb-90	4	12.3-14.7 (13.8)	0.80-1.40 (1.17)			
				Rb-89	3	15.9-17.6 (16.5)	1.76-2.08 (1.87)			
Upper Carter (7/16/90)		1S	15.8	Rb	56	7.0-17.3 (9.5)	0.16-2.96 (0.53)	16	14	-
Fort Benton, Geyser, and Geraldine Area										
Briggs (8/9/90)		1S	1.0	No Fish		-	-	13	5.0	-
Courtnage #1 (8/9/90)		1S	17.5	Rb	14	5.7-18.2 (12.9)	0.08-2.62 (1.31)	8	8.0	-
Englandt (Phantom Coulee) (7/10/91)		1F,1S	17.8	Rb-89	4	14.1-15.2 (14.7)	1.12-1.65 (1.33)	?	1.2	4100
				NP	17	19.2-26.1 (23.1)	2.16-4.64 (3.41)			
				BBH	47	4.4- 9.8 (6.6)	0.05-0.60 (0.21)			
Ridgeway (7/11/91)		1S	21.2	No Fish (observed RB-91 jumping)				5.5	5.5	1050
Urs (7/10/91)		1S	19.5	Rb-91	37	7.1- 9.5 (8.5)	0.18-0.45 (0.34)	10.0	9.5	3600
				Rb-90	15	14.3-16.3 (15.4)	1.45-1.98 (1.74)			
				Rb-89	1	- (17.7)	- (2.20)			
Cascade Area										
Hound Creek Res.		1S	17.0	Rb	40	6.3-14.3 (10.7)	0.12-1.12 (0.56)	33	6.2	
				WSu	25	6.2- 8.1 (7.0)	0.11-0.27 (0.17)			

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;LC=Lake Chub

DISCUSSION AND RECOMMENDATIONS

Arlee and AXE rainbow trout strain evaluations continued in three irrigation storage reservoirs and one natural lake in the Choteau/Augusta area. It is recommended to continue plants of Arlee in Nilan Reservoir even though poor survival was experienced for the past two years. This strain has performed well throughout the years providing a good to excellent fishery. However, few Arlee make it to the third summer. It is recommended to stock an additional strain into Nilan Reservoir in 1993 to ensure a fishery should the Arlee plant fail. Equal plants of Arlee and AXE in Bean Lake, Eureka and Willow Creek Reservoirs indicate that AXE have much higher survival. Arlee survive better in Bean Lake than in the other waters. Arlee grow better in all waters but AXE "catch up" in the second summer in Bean Lake. AXE show better longevity with some fish making it to the third summer. Better survival of AXE may in part be a result of stocking at a later date than Arlee. Earlier studies showed that Arlee also had better survival when stocked late as compared to an early date (Hill and Wipperman 1979). It is recommended for 1992 to stock equal numbers of Arlee and AXE in Bean Lake, Eureka and Willow Creek Reservoirs. Following completion of the 1992 evaluation, a recommendation will be made as to what strain(s) will be planted as well as preferred stocking dates. In addition, DeSmet rainbow will be stocked in Eureka Reservoir in 1992 to measure survival, growth and longevity.

Kokanee salmon have not provided much of a fishery in Pishkun Reservoir in recent years. Fairly good numbers of yearling salmon taken in 1990 failed to show up as two-year olds during 1991 surveys. Several yearling fish were again sampled in 1991. Due to difficulties in obtaining adequate egg supplies in the state and poor survival of stocked salmon, kokanee will not be planted in Pishkun in 1992. Attempts will be made to produce a salmonid fishery in this reservoir in 1992. A five-year study will be undertaken with three and-nine inch Eagle Lake rainbow along with four and eight-inch Arlee rainbow. Survival of equal plants of small Eagle Lake and small Arlee will be compared as will equal plants of larger-sized fish of both strains. In addition, northern pike predation on stocked trout will be assessed through netting surveys and periodic creel checks. Pishkun Reservoir contains a self-sustaining northern pike population. Previous attempts at co-management with trout (1977-1984) showed predation on trout increased as pike populations increased (Hill and Wipperman 1985). Northern pike populations will also be estimated during the five-year trout study. If predation on trout is significant, stocking should be discontinued.

Lake trout continue to increase in Tiber Reservoir. Populations will be monitored during spawning and at other periods as time permits.

Management recommendations for other waters in Region 4 will be made during the next reporting period.

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Principal Fish Species Involved:
Rainbow trout, brown trout, lake trout, kokanee salmon, Yellowstone cutthroat trout.

Code Numbers of Waters Referred To In Report:

14-7001	Briggs Reservoir
14-7320	Eureka Reservoir
14-7370	Fitzpatrick Lake
14-9240	Tiber Reservoir
16-4300	Ackley Lake
16-4620	Upper Carter Reservoir
16-4628	Big Casino Creek Reservoir
16-4785	Courtnage Reservoir #1
16-4950	East Fork Spring Creek Reservoir
16-5070	Englandt Reservoir
16-5535	Hanson's Reservoir
16-5720	Hasslers Reservoir
16-7642	Peterson's Pond
16-7949	Ridgeway Pond
16-8660	Urs Pond
17-8720	Bean Lake
17-9136	Holter Reservoir
17-9140	Hound Creek Reservoir
17-9330	Newlan Creek Reservoir
17-9616	Smith River Reservoir
18-7340	Buffalo Wallow Reservoir
18-7750	Bair Reservoir
18-8380	Martinsdale Reservoir
18-9500	Yellow Water Lake
20-7900	Nilan Reservoir
20-7950	Pishkun Reservoir
20-8400	Tunnel Lake
20-8500	Willow Creek Reservoir