MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA
PROJECT NO: F-78-R-1
JOB NO: II-f

TITLE: STATEWIDE FISHERIES INVESTIGATIONS
TITLE: SURVEY AND INVENTORY OF COLDWATER LAKES
TITLE: HAUSER AND HOLTER RESERVOIRS STUDY

PROJECT PERIOD: JULY 1, 1994 THROUGH JULY 1, 1995

ABSTRACT

Fisheries data were gathered on Hauser and Holter reservoirs to provide information needed to: 1) manage the fishery of the two reservoirs; 2) evaluate impacts of existing reservoir operations on the sport fishery; and 3) evaluate the success of the hatchery stocking program. The composition of fish species in the horizontal gill nets in Hauser Reservoir in 1994 was similar to catches in previous years. Kokanee dominated the catch in floating gill nets, while white suckers dominated the sinking gill net catch. Walleye continued to make up less than 1% of the catch in sinking gill nets, in spite of yearly plants of 3,000-5,000 fingerlings since 1989. The number of kokanee in vertical gill nets averaged 41.6/net night in 1994. Only the age 2+ year class of kokanee was considered to be strong. A hydroacoustic survey was conducted in April 1995 in order to estimate the kokanee population. The number of age 1+, 2+ and 3+ fish was estimated to be 1.34, 0.54, and 0.40 million, respectively. A total of 1,407 anglers were interviewed during the summer of 1994 on Hauser Reservoir. Kokanee and yellow perch were equally dominant in the catch, together comprising 93% of the total. Angler catch rates of rainbow trout were 0.02/hr in 1994, while mean length of harvested fish was 16.6 inches. Kokanee catch rates were 0.15/hr, while the mean length of harvested fish was 14.8 inches. Yellow perch dominated the catch in the 1993/94 winter fishery on Hauser Reservoir, composing 91.1% of the catch; kokanee were the second most frequently taken fish, composing 5.8% of the catch.

In Holter Reservoir, rainbow trout and kokanee dominated the catch in both the spring and fall floating gill nets in 1994. Yellow perch, white suckers and longnose suckers dominated the catch in both spring and fall sinking gill nets. Catch rates for walleye in spring sinking gill nets was a record high (4.83 fish/net). In the fall sinking gill nets, walleye catch rates were 1.43/net, almost a record low. The average length of walleye in the spring and fall nets was 20.5 and 21.2 inches, respectively. The catch rates for kokanee in the vertical gill

nets were at record high levels in 1994, with 28.5 fish/net for all age classes. Most of these fish were age 1+, which were caught at a rate of 21.0/net. Trap nets were fished in April and May and captured 311 spawning walleye. A total of 279 walleye were tagged with red dangler tags; the remaining 32 fish had been previously tagged (eight in previous years, 24 in 1995). A total of 1,272 anglers were interviewed during the summer on Holter Reservoir in 1994. Yellow perch dominated the catch made by anglers (77.3%), followed by kokanee and rainbow trout. Catch rates for rainbow trout in 1994 was 0.03, the lowest in nine years of creel surveys. In 1994, about 62% of the rainbow trout harvested were of known hatchery origin, while only 34% of rainbow trout captured in gill nets were of hatchery origin. These numbers support previous work that showed that Arlee rainbow trout stocked into Holter Reservoir are more susceptible to being caught by anglers than naturally reproduced rainbow trout. Yellow perch dominated the composition of the catch during the 1993/94 winter ice fishery on Holter Reservoir. Angler catch rates for yellow perch and rainbow trout were 3.79/hr and 0.07/hr, respectively.

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PROCEDURES

The study area has been previously described by Rada (1974), Berg and Lere (1983) and MDFWP (1985). A map of the two reservoirs is presented in Figure 1.

Reservoir fish were sampled with floating and sinking 6 x 125 foot experimental gill nets (0.75 to 2 inch mesh) set during the spring and fall. Nets were set in each reservoir in similar locations and at similar times of year through the period of survey. Distribution of fish species by depth was determined by using a gang of four vertical gill nets that were 150 feet deep and 12 feet wide (0.75, 1, 1.25 and 1.5 inch mesh). Vertical nets were set monthly from July through October at permanent sampling stations located at the lower end of each reservoir (the Dam station on Hauser Reservoir and the Jackson station on Holter Reservoir). Single-lead trap nets (4 x 6 foot frame, 1/2 and 1 inch mesh) were used to sample spawning walleye on Holter Reservoir in spring 1995.

Hydroacoustics were used to estimate the kokanee population in Hauser Reservoir on the nights of April 6-7, 10-11, 11-12 and 13-14, 1995. Acoustic data were collected along 52 transects, selected randomly from a stratified sampling design, which incorporated the entire main body of the reservoir and the Causeway Arm. Four transects were randomly sampled from each of 14 equally sized sub-areas of the reservoir. Sub-areas were designated with letters A-N, with lettering starting at the Canyon Ferry Dam and ending at the upper end of the Causeway Arm. Sub-area A (Canyon Ferry Dam downstream to Brown's Gulch) was not sampled due to shallow water and to a lack of detectable targets. A BioSonics Model 105 Echosounder (420kHz) was used to transmit and receive signals from a dual-beam system (boat-mounted 6° and 15° circular transducers). Data were collected in digital format on tape, and later processed with a BioSonics Model 281 Echo Signal Processor. Fish densities were then calculated with the BioSonics ESPTS fortran program, or in a spreadsheet format using SPSSPC+ software. The composition of vertical gill net catches were used to partition density values into kokanee and non-kokanee groups. Horizontal gill net catches were used for the same purpose in order to explain near-shore fish densities for transects in the Eldorado Bar area. Based on an evaluation of target strength-frequency plots, it was assumed that targets with strengths from -61 to -47 dB were echoes from age 1+ kokanee, while targets from -47 to -34 dB were echoes from age 2+/3+ kokanee. Densities of age 2+ kokanee and age 3+ kokanee were partitioned on the basis of the relative number of these two age classes in the vertical gill nets.

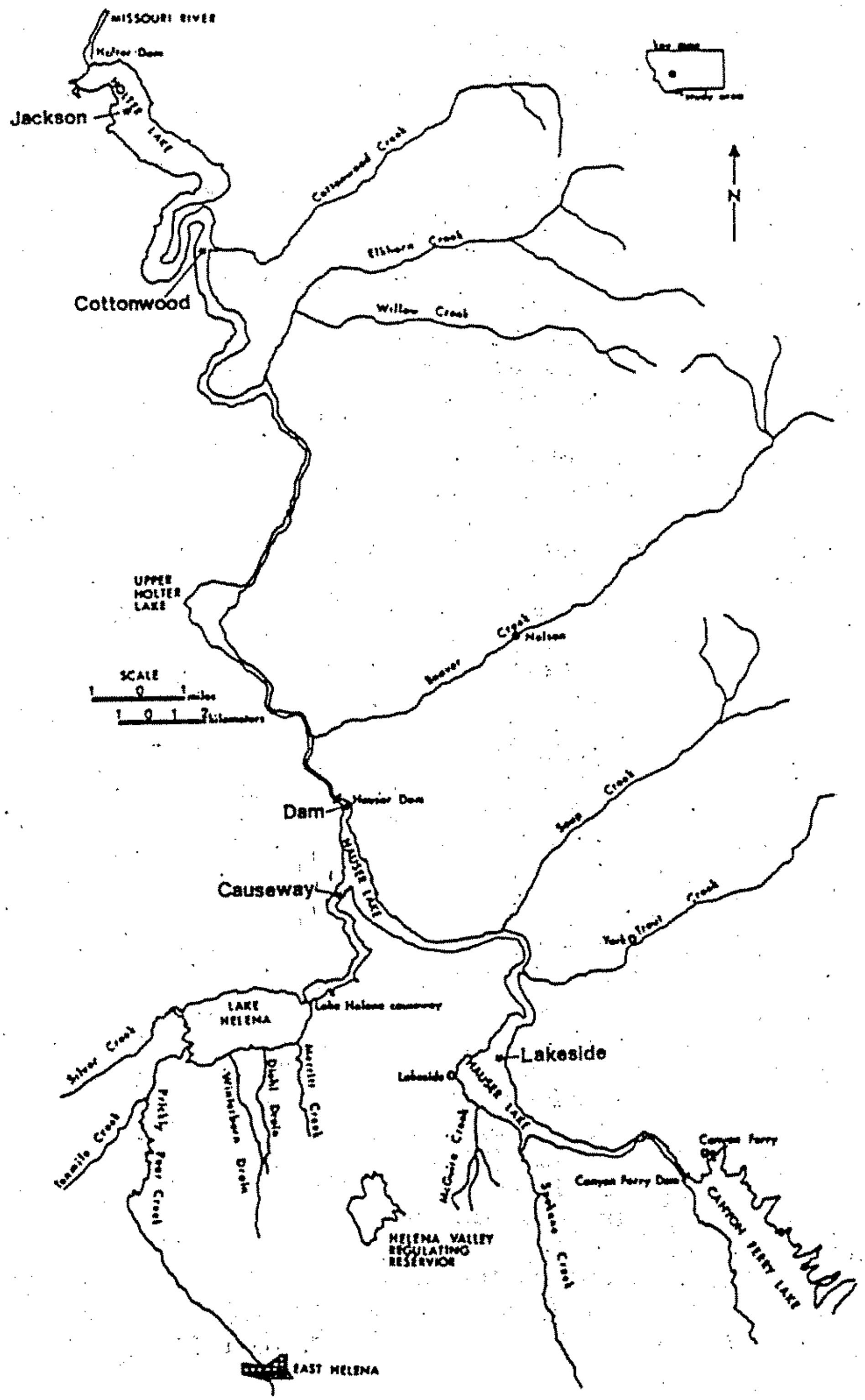

Figure 1. Map of Hauser and Holter reservoirs showing locations of permanent sampling stations. Lakeside, Causeway and Dam stations are on Hauser Reservoir. Cottonwood and Jackson stations are on Holter Reservoir.

A partial creel census was conducted on Hauser and Holter reservoirs from late April through late September. Procedures for this partial creel census are described in Lere (1987). An additional partial creel survey was conducted during the ice fishery on the two reservoirs from mid-January through early March.

RESULTS

Hauser Reservoir

Fish Abundance and Distribution

Floating gill nets. Relative abundance of fish captured in floating gill nets in 1994 is presented in Table 1. The composition of the catch was similar to past years, with kokanee dominating the catch in both spring and fall. Rainbow numbers were relatively low in the spring, but they rebounded to typical catch levels in the fall. Sucker catches in the spring and fall increased markedly from 1993, when the combined catches of both species was 11.5% in the spring and 1.0% in the fall. Sucker catches in spring 1994 increased to 33.6%, while fall catches increased to 60.3%.

Since 1986, rainbow trout catch rates in the spring nets have been fairly stable--if the extremely high catch rate in 1986 is discounted (Figure 2, Appendix Table 1). Catch rates in the fall have shown a slow downward trend (Figure 3). About 48% of rainbow trout collected in gill nets in 1994 were of known hatchery origin. It is important to note that the rainbow trout planted in 1994 were not marked--leading to the unusually low number of fish of known hatchery origin.

Kokanee catch rates were higher in spring 1994 than in any year since 1991 (Figure 4). Fall catch rates were lower than in any year since 1987, and were less than 50% of the fall catch rates from 1989-1992.

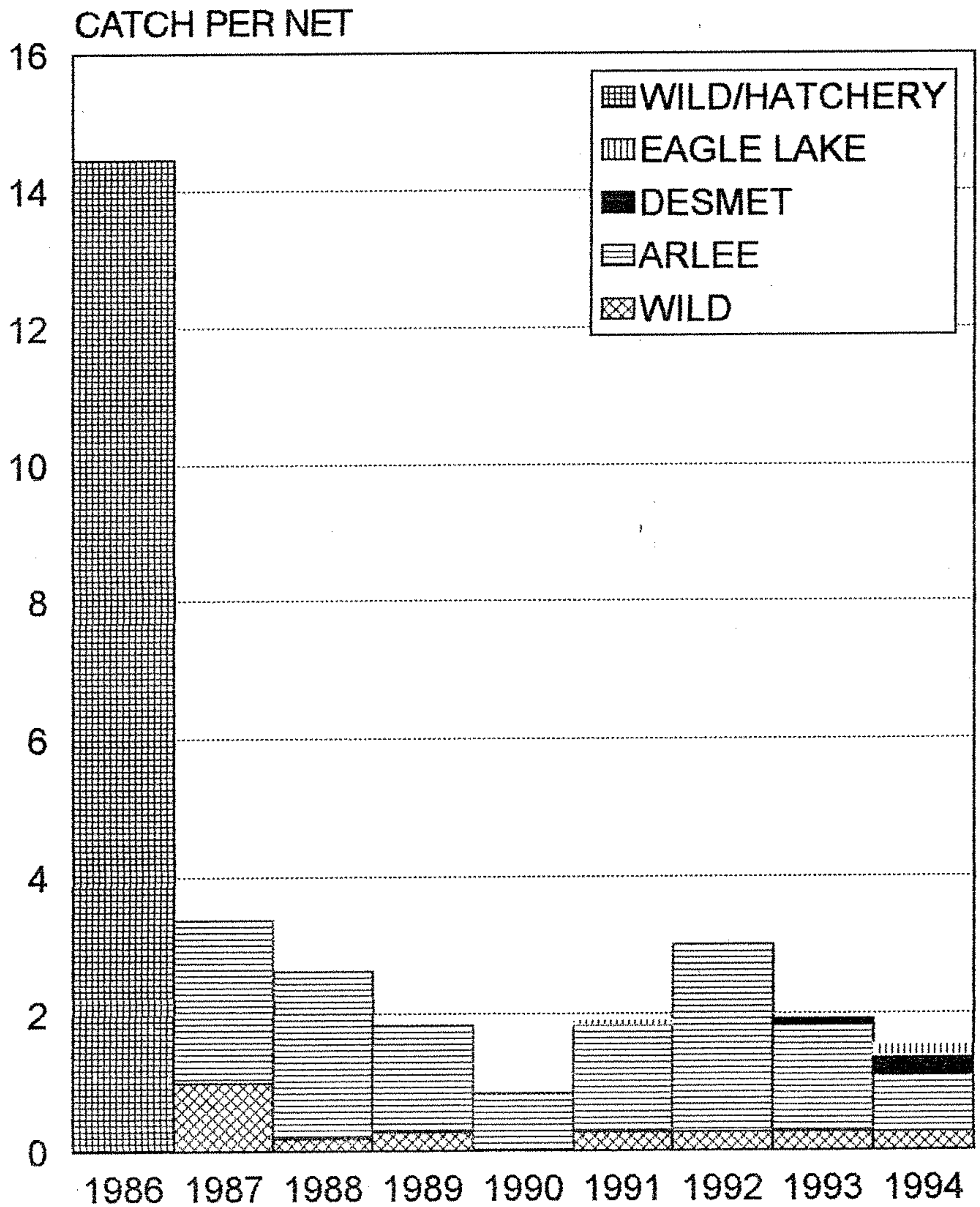

Figure 2. Catch rates for rainbow trout in floating gill nets in Hauser Reservoir, Spring 1986-94

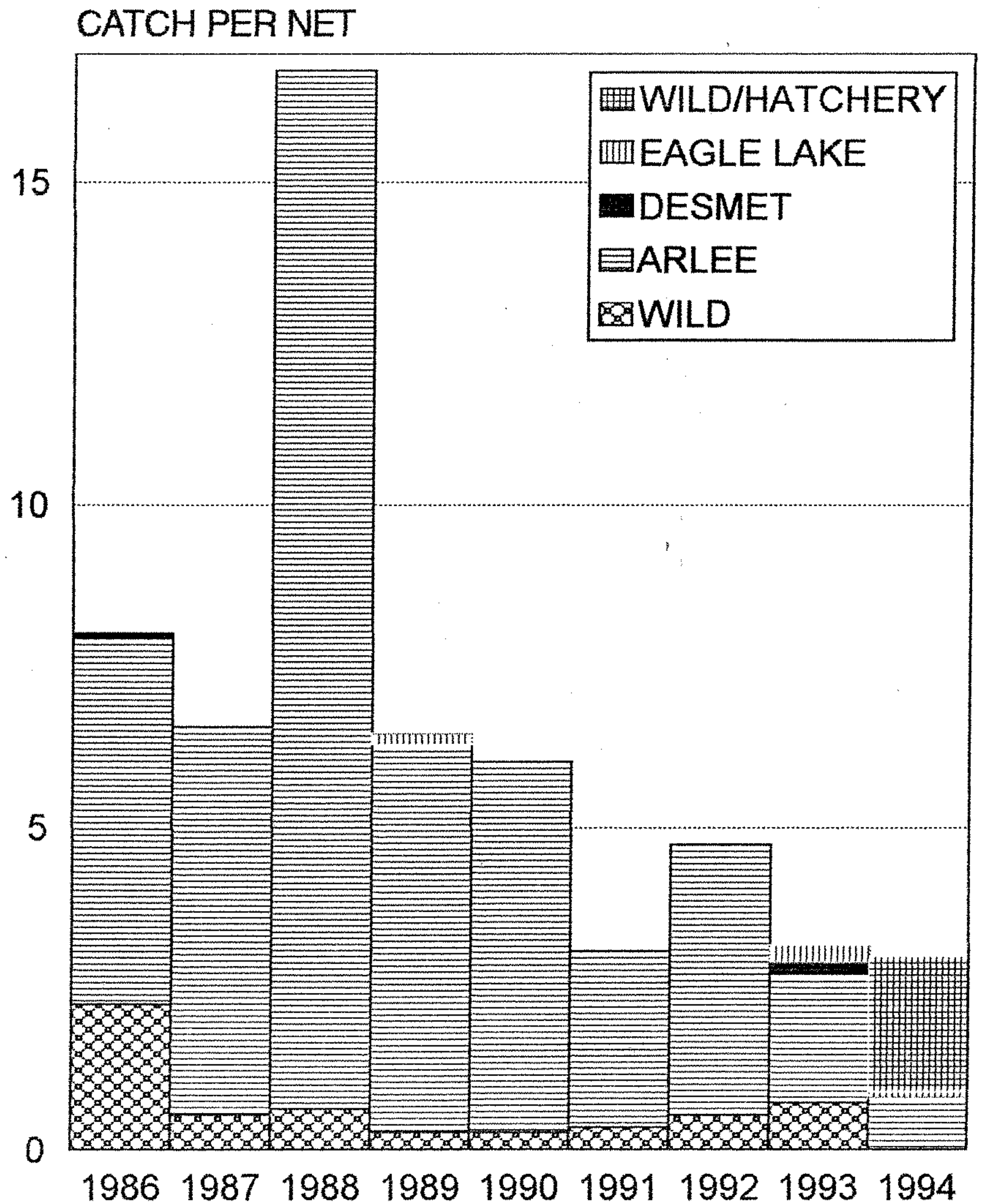

Figure 3. Catch rates for rainbow trout in floating gill nets in Hauser Reservoir, Fall 1986-94

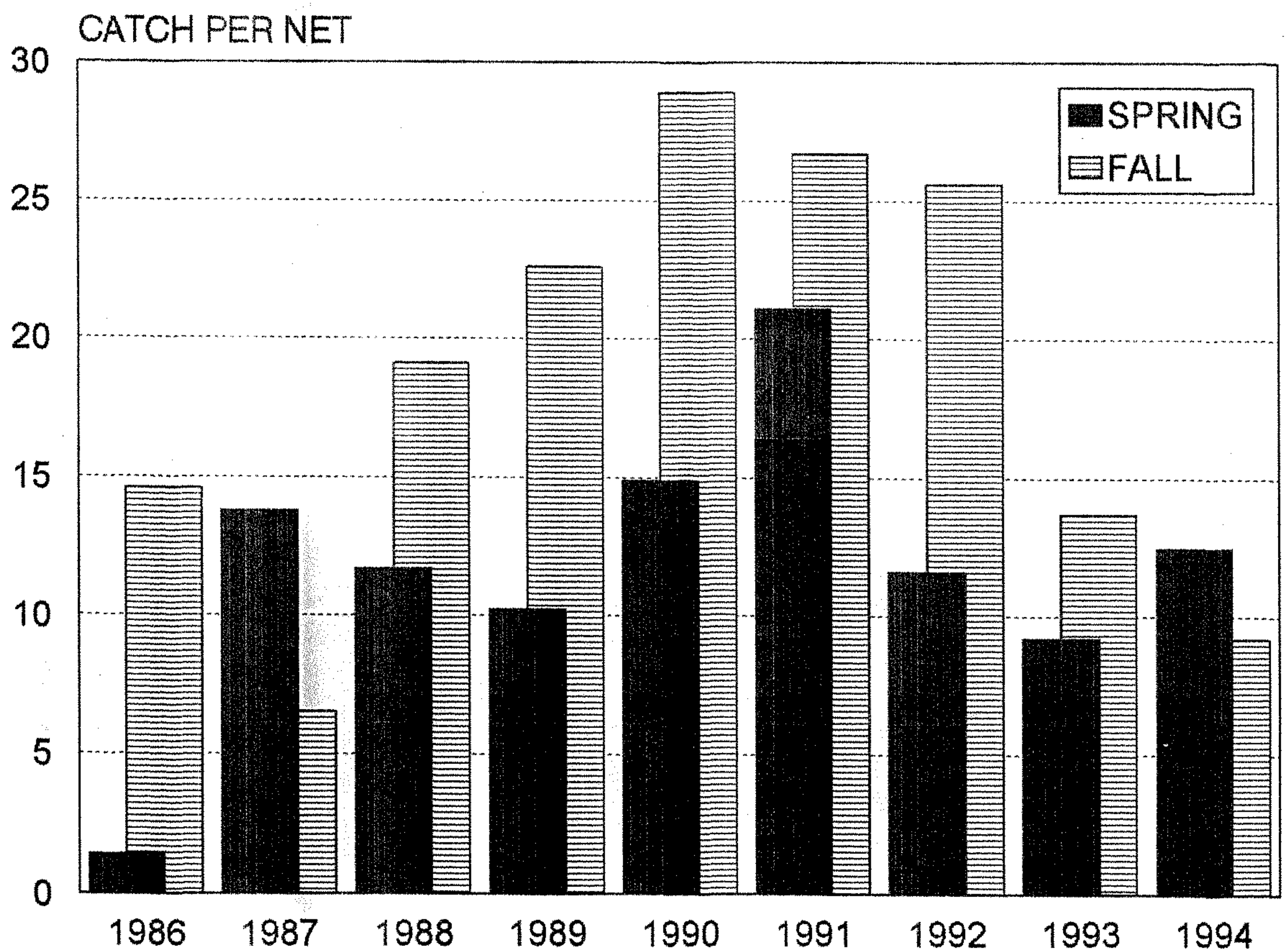

Figure 4. Catch rates for Kokanee in floating gill nets in Hauser Reservoir, 1986-94

Table 1. Percent composition by species and season for gill net catches in Hauser Reservoir in 1994.

	Sinkers		Floaters	
Species	Spring	Fall	Spring	Fall
RB	0.4	0.4	7.0	17.6
LL	3.0	0.9	2.0	1.1
KOK	7.0	4.0	56.1	54.0
MWF	1.5	0.9	0	0.5
WE	0.7	0.2	0.4	0
YP	12.9	7.4	0.4	0
LNSU	31.4	12.0	20.9	14.4
WSU	39.9	45.1	12.7	12.3
CP	0	29.1	0	0
UC	2.6	0.7	0.1	0
BURBOT	0.7	0.2	0	0
Total # Caught	271	902	244	187
Number nets	6	7	11	11

Sinking gill nets. Relative abundance of fish captured in sinking gill nets in 1994 are shown in Table 1. White suckers dominated the catch in both spring and fall. This has been true for every year since 1986 (Appendix Table 2). Yellow perch composed 12.9% of the catch in spring 1994, dropping from 17.1% in 1993 and from the record catch in 1992 (21.5%). Nonetheless, the percentage of the catch in 1994 was still higher than in any year prior to 1990. Walleye continue to make up less than 1% of the catch in sinking nets, in spite of yearly plants of 3,000-5,000 fingerlings since 1989. In 1994 four walleye were captured in sinking nets, and ranged in length from 9.5-22.2 inches. Two of the four fish were of known hatchery origin.

Vertical gill nets. The number of kokanee collected in vertical nets (number per net night) increased to an average of 41.6 in 1994. The increased catch rate comes after a three year period of steady decline in average numbers (Table 2). The age 2+ fish were the strongest of the year classes, averaging 24.8 fish/net night, the highest for this age class since 1989.

Table 2. Mean catch rates (fish per net night) by age class for kokanee collected in vertical nets set at the Dam Station in Hauser Reservoir from 1986 through 1994.

YEAR	NUMBER OF SETS	NUMBER OF KOKANEE PER SET				TOTAL
		AGE 0+	AGE I+	AGE II+	AGE III+	
1986	3	0	21.7	6.3	0	28.0
1987	4	0	32.3	7.5	0.2	40.0
1988	5	0.4	100.6	4.8	3.0	108.8
1989	6	0	36.7	44.0	0.6	81.3
1990	7	0.1	35.7	22.5	3.4	61.7
1991	5	0	4.2	24.4	0.4	29.0
1992	7	0	14.6	10.1	2.0	26.7
1993	6	0	5.7	4.3	0.3	10.3
1994	5	0.2	15.6	24.8	1.0	41.6

Hydroacoustics

Areal target densities generally increased in the downstream direction. Densities in transects above the Devil's Elbow (G sub-area) were frequently less than 0.1 target/m^2, whereas densities were near or above 1.0 target/m^2 from the Eldorado Bar downstream to the dam and also up into the Causeway Arm (Table 3.) This difference between the upper and lower reservoir was even more pronounced when targets thought to represent noise (weaker than -61dB) were removed from the calculation (Table 3).

Target strength-frequency plots for sub-areas I-M displayed a distinct tri-modal distribution (Figure 5). The peak in the -42 to -40 dB range is believed to represent age 2+/3+ kokanee, while the peak around -52 to -50 dB represents age 1+ kokanee, and the peak from -66 to -62 dB represents background electrical noise. Target strength-frequency plots for all other sub-areas did not show the tri-modal distribution, and the targets were assumed to represent species other than kokanee (Figure 6).

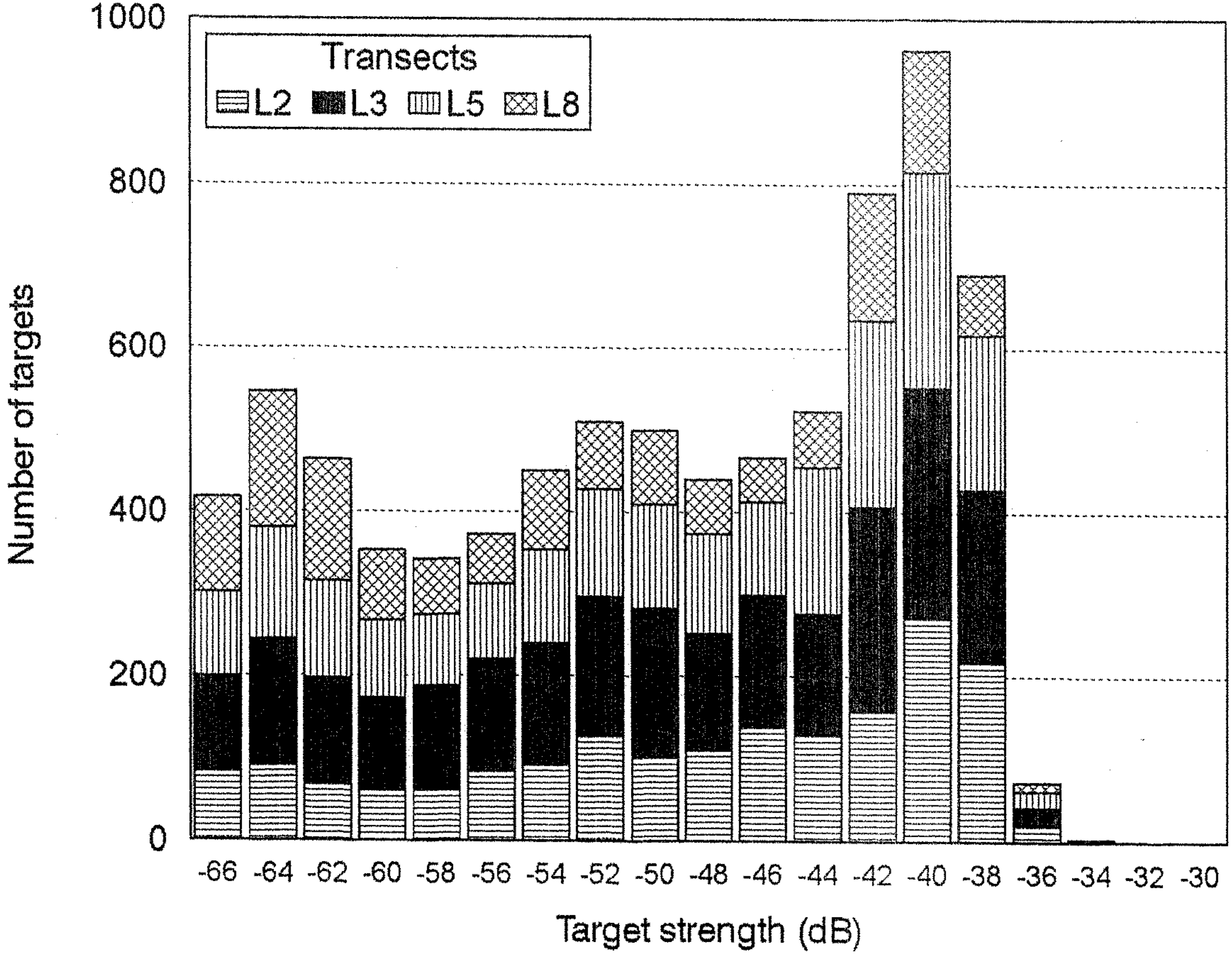

Figure 5. Target strength-frequency plot of sonar targets in the L sub-area, Hauser Reservoir, April 1995.

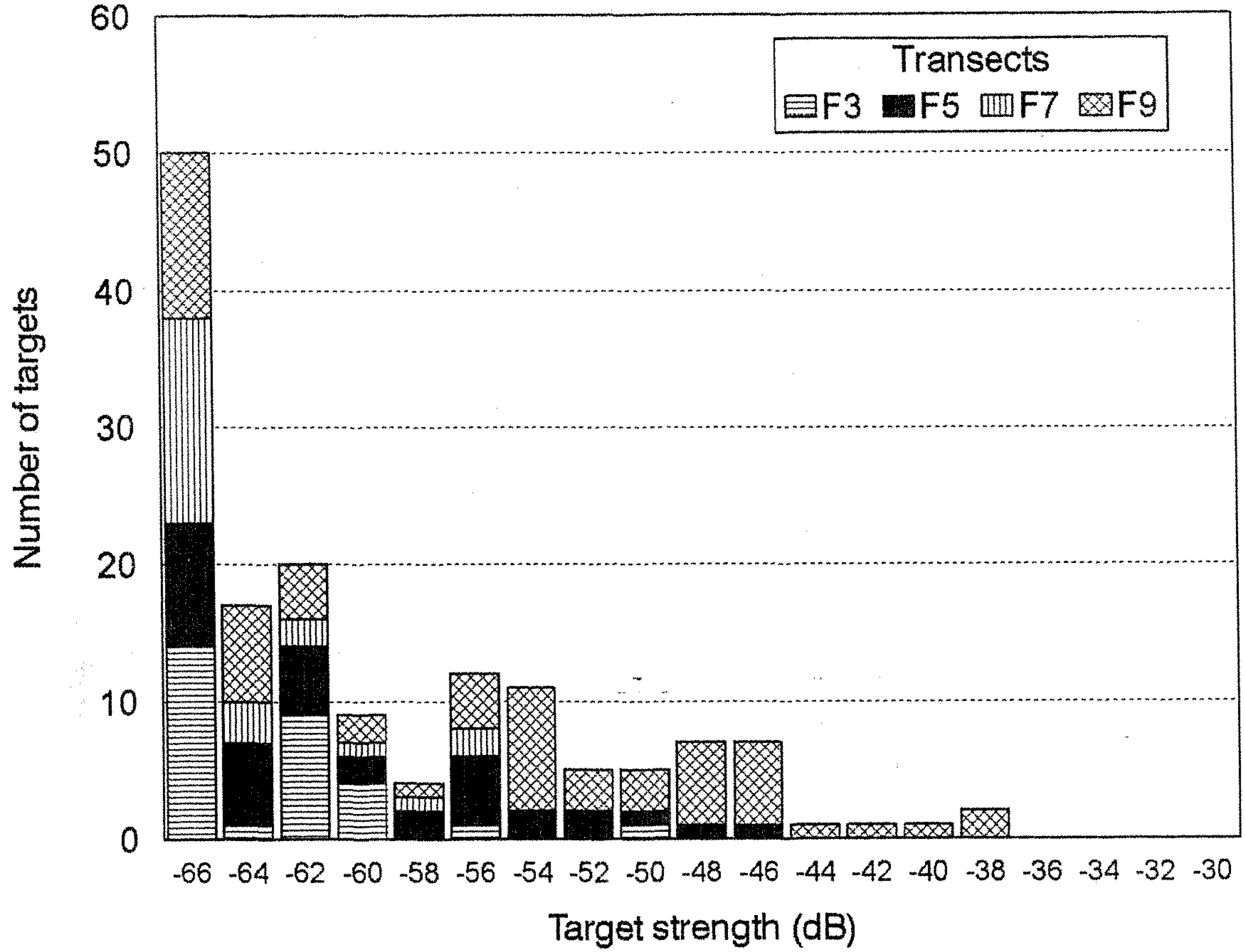

Figure 6. Target strength-frequency plot of sonar targets in the F sub-area, Hauser Reservoir, April 1995.

The 20 transects in sub-areas I-M (Eldorado Bar downstream to the Dam and the lower half of the Causeway Arm) were used to calculate a kokanee population estimate. Targets smaller than -61 dB were assumed to be electrical noise and were not used in the calculations. The densities of targets greater than -61 dB ranged from 0.145 fish/m^2 in transect I-4 to 0.919 fish/m^2 in transect L-8 (Table 4) Targets from -61 to -47 dB were assumed to represent age 1+ kokanee, while targets larger than -47 dB were assumed to be larger fish in the size range of age 2+/3+ kokanee. The grand mean density for all five sub-areas was estimated to be 0.29, 0.098 and 0.086/m^2 for age 1+, 2+ and 3+ kokanee, respectively. These densities corresponded to population estimates of 1,344,933 for age 1+ kokanee, 454,495 for age 2+ kokanee, and 398,842 for age 3+ kokanee.

Several aspects of the population estimation procedure were known sources of error: 1) Only transects in sub-areas I-M were used to calculate an estimate. Some kokanee certainly were present in the other areas, but how many is not known; and 2) The echo analysis procedure was conducted in a way that would provide the most unbiased density estimate for the large fish (2+/3+ kokanee). These same procedures biased the density estimates for the age 1+ fish, and probably resulted in an underestimate of the number in this age class. The procedures referred to include the choice of voltage threshold (100 mV), beam angle (4.4° full angle), and targets that represented noise (<-61 dB).

Table 3. Raw target numbers and target density estimates for acoustic transects on Hauser Reservoir, April 1995.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m^3)	Fish density (> -61dB) (no./m^3)	No. of targets of different target strengths -66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
B1	1-3	1.0000	.351E+00	.702E-01	4	14	10	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.7571	.856E-01	.197E-01	6	5	9	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.2592	.325E-01	.405E-02	0	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				10	24	20	11	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.848E+00	.173E+00																					
B2	1-3	1.0000	.274E+00	.112E+00	4	10	2	5	4	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.8167	.709E-01	.147E-01	11	6	2	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.3232	.158E-01	.158E-01	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				15	16	4	8	6	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.674E+00	.258E+00																					
B5	1-3	1.0000	.438E-01	.109E-01	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.8039	.504E-01	.314E-02	5	8	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.4235	.279E-01	.000E+00	3	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				9	16	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.192E+00	.268E-01																					
B6	1-3	1.0000	.221E+00	.301E-01	5	6	8	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.8519	.602E-01	.172E-01	6	5	4	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.4274	.258E-02	.000E+00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				12	11	12	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.547E+00	.895E-01																					
C1	1-3	1.0000	.158E+00	.724E-01	5	6	2	3	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.8721	.280E-01	.186E-02	5	3	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.4334	.169E-02	.169E-02	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				11	9	8	4	4	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.366E+00	.150E+00																					
C2	1-3	1.0000	.911E-02	.911E-02	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.8462	.138E-01	.275E-02	1	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.3311	.303E-01	.303E-02	5	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.1216	.881E-02	.000E+00	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				8	7	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.638E-01	.249E-01																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m^3)	Fish density (> -61dB) (no./m^3)	No. of targets of different target strengths -66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
C6	1-3	1.0000	.586E-01	.292E-01	3	2	0	0	1	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	3-5	0.9083	.197E-01	.000E+00	7	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.4782	.950E-02	.000E+00	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				16	7	2	0	1	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.162E+00	.584E-01																					
C9	1-3	1.0000	.298E+00	.798E-01	23	26	32	8	2	2	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
	3-5	0.9655	.237E-01	.000E+00	18	8	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.4818	.829E-02	.752E-03	3	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				44	39	40	9	2	2	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.650E+00	.160E+00																					
D2	1-3	1.0000	.207E-01	.777E-02	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9463	.136E-01	.311E-02	8	2	7	3	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.4461	.414E-02	.000E+00	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				11	6	11	4	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.708E-01	.214E-01																					
D4	1-3	1.0000	.860E-02	.430E-02	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9543	.310E-02	.000E+00	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.6833	.133E-02	.333E-03	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				6	4	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.249E-01	.906E-02																					
D6	1-3	1.0000	.561E-01	.368E-01	4	4	2	2	3	7	5	0	0	0	0	0	0	1	1	0	0	0	0	0	0
	3-5	0.9638	.508E-02	.923E-03	2	7	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	5-7	0.6387	.101E-02	.000E+00	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				7	12	3	2	4	7	5	0	0	0	0	0	1	1	1	0	0	0	0	0	0
Areal density (no./m^2)			.123E+00	.754E-01																					
D8	1-3	1.0000	.256E-01	.196E-01	1	0	2	2	2	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9874	.105E-01	.413E-02	7	3	4	5	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.7561	.281E-02	.140E-02	5	0	0	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				13	3	6	8	4	8	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.762E-01	.495E-01																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m^3)	Fish density (> -61dB) (no./m^3)	No. of targets of different target strengths -66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
E1	1-3	1.0000	.729E-02	.365E-02	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9829	.512E-02	.427E-03	8	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.6698	.149E-02	.595E-03	3	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				12	3	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.266E-01	.894E-02																					
E3	1-3	1.0000	.107E-01	.215E-02	1	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9782	.454E-02	.000E+00	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.7525	.305E-03	.305E-03	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				5	7	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.307E-01	.476E-02																					
E5	1-3	1.0000	.103E-01	.000E+00	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9613	.392E-02	.490E-03	1	3	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.7636	.196E-02	.000E+00	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				6	8	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.311E-01	.942E-03																					
E7	1-3	1.0000	.322E-01	.280E-01	1	0	1	2	3	3	2	0	2	0	0	0	0	0	1	0	0	0	0	0	0
	3-5	0.9146	.268E-02	.107E-02	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.6684	.337E-03	.000E+00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				3	2	1	4	3	3	2	0	2	0	0	0	0	0	1	0	0	0	0	0	0
Areal density (no./m^2)			.698E-01	.580E-01																					
F3	1-3	1.0000	.282E-01	.109E-01	2	0	6	3	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9820	.515E-02	.515E-03	8	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.7914	.141E-02	.000E+00	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.2296	.126E-02	.000E+00	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				14	1	9	4	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m^2)			.693E-01	.228E-01																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m³)	Fish density (> -61dB) (no./m³)	No. of targets of different target strengths -66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
F5	1-3	1.0000	.665E-01	.525E-01	1	1	2	1	2	5	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0
	3-5	0.9695	.746E-02	.000E+00	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.8274	.280E-02	.343E-03	3	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.3931	.544E-03	.000E+00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				9	6	5	2	2	5	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0
Areal density (no./m²)			.153E+00	.106E+00																					
F7	1-3	1.0000	.000E+00	.000E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9216	.211E-01	.528E-02	8	3	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.8432	.482E-02	.000E+00	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				15	3	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m²)			.470E-01	.106E-01																					
F9	1-3	1.0000	.405E-01	.254E-01	2	1	0	2	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9806	.714E-02	.119E-02	3	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9416	.235E-01	.173E-01	6	3	3	0	0	2	8	3	3	6	6	1	1	1	2	0	0	0	0	0	0
	7-9	0.4845	.185E-02	.000E+00	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				12	7	4	2	1	4	9	3	3	6	6	1	1	1	2	0	0	0	0	0	0
Areal density (no./m²)			.141E+00	.857E-01																					
G1	1-3	1.0000	.193E-01	.483E-02	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.8728	.163E-01	.502E-02	5	4	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	5-7	0.7456	.245E-01	.135E-01	6	6	6	4	1	1	2	3	3	2	1	1	1	0	3	0	0	0	0	0	0
	7-9	0.3703	.899E-02	.301E-02	0	3	5	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				13	13	12	6	4	2	4	3	3	2	1	2	1	0	3	0	0	0	0	0	0
Areal density (no./m²)			.110E+00	.418E-01																					
G4	1-3	1.0000	.434E-01	.621E-02	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9886	.145E-02	.000E+00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9772	.104E-01	.429E-02	5	4	1	4	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.8991	.368E-02	.184E-02	2	3	0	0	2	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Sum				10	9	3	5	2	4	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Areal density (no./m²)			.117E+00	.241E-01																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m^3)	Fish density (> -61dB) (no./m^3)	No. of targets of different target strengths -66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
G5	1-3	1.0000	.555E-01	.555E-01	0	0	0	1	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0
	3-5	0.9883	.971E-02	.000E+00	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9731	.193E-01	.124E-01	0	2	3	2	0	1	2	1	0	1	1	1	0	0	0	0	0	0	0	0	0
	7-9	0.8004	.567E-02	.472E-02	0	1	0	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	9-11	0.5046	.932E-03	.000E+00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	11-13	0.2815	.116E-02	.000E+00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				2	6	3	3	1	2	2	3	2	2	2	1	0	0	0	0	0	0	0	0	0
	Areal density (no./m^2)		.178E+00	.143E+00																					
G6	1-3	1.0000	.254E+00	.120E+00	1	5	4	7	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9943	.928E-02	.000E+00	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9887	.391E-02	.000E+00	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.7488	.496E-02	.000E+00	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	9-11	0.4768	.934E-02	.000E+00	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	11-13	0.2723	.934E-02	.818E-02	0	0	1	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				11	12	9	10	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Areal density (no./m^2)		.556E+00	.244E+00																					
H3	1-3	1.0000	.000E+00	.000E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9718	.127E-01	.254E-02	3	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9437	.164E-01	.328E-02	5	5	2	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0
	7-9	0.9146	.159E-01	.184E-02	12	5	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	9-11	0.7955	.407E-02	.000E+00	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	11-13	0.3790	.161E-01	.141E-01	1	1	1	1	0	0	1	2	2	6	3	2	1	2	1	0	0	0	0	0	0
	Sum				26	15	10	4	0	0	1	2	2	8	3	3	1	3	1	0	0	0	0	0	0
	Areal density (no./m^2)		.103E+00	.252E-01																					
H4	1-3	1.0000	.000E+00	.000E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9947	.493E-01	.148E-01	1	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9894	.145E-01	.000E+00	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.9841	.136E-01	.341E-02	5	4	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	9-11	0.8175	.131E-01	.000E+00	9	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	11-13	0.6528	.967E-02	.746E-03	6	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13-15	0.4160	.692E-02	.172E-02	2	3	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	15-17	0.2347	.344E-02	.000E+00	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				29	22	8	4	2	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Areal density (no./m^2)		.195E+00	.386E-01																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m³)	Fish density (> -61dB) (no./m³)	No. of targets of different target strengths -66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
H7	1-3	1.0000	.000E+00	.000E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9876	.243E-01	.000E+00	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9755	.350E-01	.124E-01	4	4	3	0	0	0	0	0	0	0	0	0	0	1	4	1	0	0	0	0	0
	7-9	0.9302	.320E-01	.130E-01	8	4	4	0	6	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	9-11	0.6451	.311E-01	.999E-02	7	7	5	4	2	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
	11-13	0.3984	.273E-01	.107E-01	3	5	6	4	1	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0
	13-15	0.2755	.242E-01	.115E-01	2	2	6	1	4	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
	15-17	0.1076	.767E-02	.256E-02	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				24	26	27	10	13	6	2	1	1	1	0	0	1	1	7	2	0	0	0	0	0
Areal density (no./m²)			.252E+00	.767E-01																					
H9	1-3	1.0000	.618E+00	.456E+00	0	2	8	3	5	2	3	2	2	3	1	1	5	1	0	0	0	0	0	0	0
	3-5	0.9932	.113E-01	.000E+00	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9691	.652E-02	.163E-02	2	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.9293	.258E-01	.556E-02	12	7	3	1	0	0	0	0	0	0	0	0	2	0	2	0	1	0	0	0	0
	9-11	0.8823	.403E-01	.134E-01	18	17	9	2	1	4	1	0	0	0	0	0	0	2	6	6	0	0	0	0	0
	11-13	0.7103	.306E-01	.842E-02	14	17	11	8	2	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	13-15	0.2611	.114E-02	.000E+00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				46	44	35	14	8	8	7	2	3	3	1	1	7	3	8	6	1	0	0	0	0
Areal density (no./m²)			.143E+01	.961E+00																					
I3	1-3	1.0000	.322E+00	.190E+00	2	5	9	8	5	7	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0
	3-5	0.9962	.115E-01	.115E-01	0	0	0	0	1	0	0	2	0	1	0	0	0	0	2	0	0	0	0	0	0
	5-7	0.9822	.187E-01	.154E-01	2	1	1	0	0	0	0	2	1	1	3	2	5	2	2	0	1	0	0	0	0
	7-9	0.9183	.266E-01	.248E-01	3	0	1	1	3	5	1	4	4	11	3	7	7	2	1	3	0	0	0	0	0
	9-11	0.8246	.120E-01	.831E-02	4	4	3	3	7	5	3	2	1	1	2	0	1	0	0	0	0	0	0	0	0
	11-13	0.5319	.982E-02	.436E-02	6	4	5	3	1	2	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	13-15	0.2287	.129E-02	.129E-02	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				17	14	19	15	17	20	10	11	8	14	8	9	13	5	5	3	1	0	0	0	0
Areal density (no./m²)			.784E+00	.498E+00																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m³)	Fish density (> -61dB) (no./m³)	No. of targets of different target strengths																				
					-66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
I4	1-3	1.0000	.590E-01	.147E-01	3	1	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9977	.171E-01	.137E-01	2	0	0	0	0	0	0	0	0	0	0	0	1	1	6	0	0	0	0	0	0
	5-7	0.9948	.646E-02	.432E-02	1	2	0	0	1	0	0	1	0	1	2	1	0	0	0	0	0	0	0	0	0
	7-9	0.9563	.180E-01	.167E-01	2	1	0	0	8	1	3	6	3	4	3	4	2	2	2	0	3	0	0	0	0
	9-11	0.8475	.195E-01	.163E-01	2	5	4	6	8	8	5	8	2	3	0	1	3	5	7	0	0	0	0	0	0
	11-13	0.5458	.212E-01	.184E-01	6	1	2	5	7	8	2	2	5	2	5	2	3	9	8	0	0	0	0	0	0
	Sum				16	10	8	11	25	18	10	17	10	10	10	8	9	17	23	0	3	0	0	0	0
Areal density (no./m²)			.256E+00	.145E+00																					
I7	1-3	1.0000	.457E+00	.403E+00	2	2	1	4	8	6	3	1	8	1	4	2	0	0	0	0	0	0	0	0	0
	3-5	0.9938	.252E-01	.758E-02	2	3	2	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9807	.967E-02	.215E-02	1	4	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.9624	.101E-01	.655E-02	4	2	0	0	0	0	0	0	0	0	1	1	2	0	3	3	1	0	0	0	0
	9-11	0.9391	.267E-01	.183E-01	6	10	6	6	2	2	1	3	0	0	2	3	1	12	14	1	1	0	0	0	0
	11-13	0.6809	.202E-01	.134E-01	6	8	4	0	2	1	1	3	9	4	2	3	3	5	3	0	0	0	0	0	0
	13-15	0.3178	.285E-01	.236E-01	2	2	4	5	7	6	7	3	1	2	0	0	0	0	8	0	0	0	0	0	0
	Sum				23	31	19	16	21	16	13	10	18	7	9	9	6	17	28	4	2	0	0	0	0
Areal density (no./m²)			.113E+01	.906E+00																					
I8	1-3	1.0000	.249E+00	.174E+00	2	4	0	4	4	0	1	3	1	0	0	1	0	0	0	0	0	0	0	0	0
	3-5	0.9915	.579E-02	.579E-02	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9594	.504E-02	.000E+00	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.8884	.119E-01	.667E-02	4	2	1	1	0	2	0	0	0	0	4	0	1	0	0	1	0	0	0	0	0
	9-11	0.8325	.246E-01	.202E-01	1	2	6	3	10	1	3	3	3	2	0	0	2	4	7	1	2	0	0	0	0
	11-13	0.7301	.351E-01	.309E-01	2	3	6	8	4	10	6	3	1	8	4	5	5	7	16	2	0	0	0	0	0
	13-15	0.3566	.191E-01	.185E-01	0	0	1	0	1	1	2	2	4	4	2	4	7	3	0	0	0	0	0	0	0
	Sum				12	12	14	16	20	15	12	11	9	14	10	10	15	14	23	4	2	0	0	0	0
Areal density (no./m²)			.646E+00	.463E+00																					
J1	1-3	1.0000	.148E+00	.116E+00	1	0	2	2	2	0	1	2	1	3	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9471	.413E-01	.336E-01	3	0	0	0	0	1	0	0	0	0	1	1	1	4	4	1	0	0	0	0	0
	5-7	0.8717	.469E-01	.398E-01	2	4	0	0	2	1	0	5	2	2	4	0	2	6	8	2	0	0	0	0	0
	7-9	0.7954	.167E-01	.119E-01	5	2	0	0	2	2	0	0	0	0	1	0	2	4	4	2	0	0	0	0	0
	9-11	0.6998	.363E-01	.348E-01	1	1	1	3	4	3	1	3	0	2	2	2	6	21	20	3	0	0	0	0	0
	11-13	0.6115	.928E-01	.837E-01	4	7	12	18	12	30	26	14	8	17	10	22	20	27	10	1	0	0	0	0	0
	13-15	0.4669	.451E-01	.418E-01	1	5	3	8	12	11	9	6	6	13	5	10	12	15	5	0	0	0	0	0	0
	Sum				17	19	18	31	34	48	37	30	17	37	23	35	43	77	51	9	0	0	0	0	0
Areal density (no./m²)			.689E+00	.574E+00																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m³)	Fish density (> -61dB) (no./m³)	No. of targets of different target strengths																				
					-66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
J2	1-3	1.0000	.984E-02	.984E-02	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9750	.301E-01	.116E-01	1	5	2	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9501	.219E-01	.210E-01	1	0	0	1	0	3	2	1	0	1	3	0	3	4	2	1	0	0	0	0	0
	7-9	0.9252	.273E-01	.244E-01	1	2	2	1	0	3	0	2	2	1	10	6	6	7	5	1	0	0	0	0	0
	9-11	0.9003	.573E-01	.498E-01	8	7	6	13	15	15	10	8	7	7	8	4	13	19	16	3	1	0	0	0	0
	11-13	0.7930	.976E-01	.895E-01	8	9	12	23	24	22	26	34	26	18	18	28	40	30	27	0	0	0	0	0	0
	13-15	0.4553	.409E-01	.338E-01	3	7	9	8	4	7	13	12	9	6	4	7	12	7	3	0	0	0	0	0	0
	Sum				22	30	31	48	47	50	51	57	44	33	43	45	74	67	53	5	1	0	0	0	0
Areal density (no./m²)			.466E+00	.390E+00																					
J4	1-3	1.0000	.669E-02	.669E-02	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9953	.186E-01	.171E-01	0	0	1	4	2	0	1	0	0	1	1	0	0	2	0	0	0	0	0	0	0
	5-7	0.9640	.405E-01	.318E-01	6	3	4	0	2	3	4	1	3	4	5	4	5	8	7	1	0	0	0	0	0
	7-9	0.8709	.634E-01	.586E-01	6	4	2	5	2	4	7	14	11	15	10	8	17	26	22	2	0	0	0	0	0
	9-11	0.7752	.497E-01	.451E-01	6	5	5	10	12	16	19	5	7	4	5	6	14	26	29	3	1	1	0	0	0
	11-13	0.6858	.685E-01	.567E-01	15	17	21	23	20	23	17	20	18	15	19	23	21	29	24	2	0	0	0	0	0
	13-15	0.3668	.159E-01	.120E-01	3	2	7	9	5	4	1	2	0	0	1	1	3	3	6	1	1	0	0	0	0
	Sum				36	31	40	51	43	50	50	42	39	39	41	42	60	94	88	9	2	1	0	0	0
Areal density (no./m²)			.422E+00	.367E+00																					
J6	1-3	1.0000	.321E-01	.214E-01	0	0	2	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9878	.563E-01	.500E-01	1	4	0	0	0	1	0	0	0	1	4	2	14	10	6	1	1	0	0	0	0
	5-7	0.9584	.298E-01	.243E-01	8	1	1	1	0	1	1	1	4	8	2	0	7	10	9	1	0	0	0	0	0
	7-9	0.9103	.245E-01	.182E-01	7	6	7	8	9	3	5	5	2	8	6	3	5	1	4	0	0	0	0	0	0
	9-11	0.8529	.652E-01	.581E-01	11	11	12	13	15	20	23	23	25	26	17	28	24	30	28	7	1	0	0	0	0
	11-13	0.7024	.486E-01	.379E-01	17	20	24	23	19	21	22	18	19	23	7	9	22	19	15	0	0	0	0	0	0
	13-15	0.3556	.193E-01	.153E-01	3	3	9	5	13	13	10	2	5	3	2	3	2	0	0	0	0	0	0	0	0
	Sum				47	45	55	51	56	59	62	50	56	69	38	45	74	70	62	9	2	0	0	0	0
Areal density (no./m²)			.470E+00	.385E+00																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m³)	Fish density (> -61dB) (no./m³)	No. of targets of different target strengths -66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
K2	1-3	1.0000	.207E+00	.156E+00	0	3	7	12	6	2	5	0	1	0	0	1	2	0	1	1	0	0	0	0	0
	3-5	0.9752	.572E-01	.489E-01	2	4	1	1	2	2	3	1	1	0	2	1	1	8	10	9	0	0	0	0	0
	5-7	0.9548	.473E-01	.396E-01	6	7	2	2	1	1	2	1	0	2	4	7	8	14	31	5	0	0	0	0	0
	7-9	0.8757	.406E-01	.314E-01	11	9	10	5	3	6	4	10	10	13	3	3	7	19	15	4	0	0	0	0	0
	9-11	0.6931	.672E-01	.544E-01	18	18	17	15	16	15	16	28	18	19	12	10	15	37	25	1	0	0	0	0	0
	11-13	0.5778	.573E-01	.431E-01	19	24	28	12	11	18	22	20	25	7	11	15	23	30	20	1	0	0	0	0	0
	13-15	0.2967	.316E-01	.221E-01	9	11	13	9	4	6	12	11	7	3	4	7	6	8	0	0	0	0	0	0	0
	Sum				65	76	78	56	43	50	64	71	62	44	36	44	62	116	102	21	0	0	0	0	0
	Areal density (no./m²)		.865E+00	.676E+00																					
K3	1-3	1.0000	.994E-01	.521E-01	1	3	3	3	1	1	2	0	0	0	1	1	2	1	2	0	0	0	0	0	0
	3-5	0.9972	.536E-01	.459E-01	2	3	2	1	0	0	2	1	2	5	0	1	4	10	14	1	1	0	0	0	0
	5-7	0.9828	.454E-01	.332E-01	9	10	7	3	4	5	5	3	4	5	1	3	5	9	18	5	0	1	0	0	0
	7-9	0.8422	.203E-01	.161E-01	5	5	4	4	7	1	3	5	2	1	2	1	6	11	4	6	0	0	0	0	0
	9-11	0.7012	.613E-01	.526E-01	13	20	6	8	9	17	13	8	10	17	19	27	31	33	40	4	0	0	0	0	0
	11-13	0.6245	.862E-01	.727E-01	16	28	34	27	36	36	47	28	30	29	40	28	31	59	24	3	0	0	0	0	0
	13-15	0.3375	.366E-01	.278E-01	11	17	10	16	17	14	15	3	10	12	6	9	8	3	2	0	0	0	0	0	0
	Sum				57	86	66	62	74	74	87	48	58	69	69	70	87	126	104	19	1	1	0	0	0
	Areal density (no./m²)		.647E+00	.471E+00																					
K5	1-3	1.0000	.542E-01	.500E-01	1	0	0	2	0	0	0	0	1	1	0	1	4	2	1	0	0	0	0	0	0
	3-5	0.9985	.635E-01	.558E-01	2	1	5	1	2	1	1	1	2	3	5	7	6	9	14	4	2	0	0	0	0
	5-7	0.9711	.310E-01	.264E-01	5	3	3	0	4	0	1	2	2	4	3	10	6	14	16	1	0	0	0	0	0
	7-9	0.8464	.188E-01	.116E-01	14	7	6	4	4	3	3	3	2	0	1	2	3	8	8	3	0	0	0	0	0
	9-11	0.7004	.652E-01	.555E-01	19	15	15	12	16	15	13	16	10	17	6	13	47	54	59	4	0	0	0	0	0
	11-13	0.6793	.693E-01	.562E-01	18	35	42	39	35	43	28	28	27	19	8	22	36	52	66	3	0	0	0	0	0
	13-15	0.4427	.139E-01	.129E-01	1	4	1	2	1	4	4	4	4	3	7	10	11	20	8	0	0	0	0	0	0
	Sum				60	65	72	60	62	66	50	54	48	47	30	65	113	159	172	15	2	0	0	0	0
	Areal density (no./m²)		.525E+00	.448E+00																					
K7	1-3	1.0000	.379E-01	.292E-01	1	2	0	1	2	0	0	1	0	1	1	2	1	1	0	0	0	0	0	0	0
	3-5	0.9831	.397E-01	.295E-01	3	8	4	2	2	2	2	3	1	4	3	1	3	8	9	3	0	0	0	0	0
	5-7	0.9245	.320E-01	.209E-01	16	14	6	8	7	11	10	7	2	1	0	4	4	9	4	0	1	0	0	0	0
	7-9	0.8114	.293E-01	.111E-01	40	32	23	8	4	2	1	1	6	7	10	5	4	4	6	0	0	0	0	0	0
	9-11	0.7069	.458E-01	.233E-01	51	69	46	25	19	17	13	9	11	13	12	17	5	12	14	3	2	0	0	0	0
	11-13	0.6918	.752E-01	.548E-01	70	67	76	53	61	57	53	50	33	24	28	46	38	75	57	6	0	0	0	0	0
	13-15	0.4694	.563E-01	.506E-01	11	17	24	33	33	20	29	29	28	29	37	41	64	78	46	4	0	0	0	0	0
	Sum				192	209	179	130	128	109	108	100	81	79	91	116	119	187	136	16	3	0	0	0	0
	Areal density (no./m²)		.482E+00	.329E+00																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m^3)	Fish density (> -61dB) (no./m^3)	No. of targets of different target strengths -66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
L2	1-3	1.0000	.644E-01	.149E-01	1	3	3	0	0	0	1	0	0	0	0	0	0	2	3	0	0	0	0	0	0
	3-5	0.9504	.454E-01	.298E-01	4	6	3	4	2	2	4	0	4	2	0	1	1	2	2	1	0	0	0	0	0
	5-7	0.8790	.472E-01	.277E-01	17	15	4	2	3	3	6	3	1	3	4	0	3	11	11	1	0	0	0	0	0
	7-9	0.8007	.417E-01	.274E-01	18	20	6	9	4	0	4	6	2	1	3	1	8	21	23	2	1	0	0	0	0
	9-11	0.7111	.499E-01	.380E-01	20	20	12	11	17	17	18	12	9	14	14	13	6	15	16	5	0	0	0	0	0
	11-13	0.6412	.799E-01	.728E-01	10	13	18	15	9	23	16	40	34	30	38	40	38	67	66	7	0	0	0	0	0
	13-15	0.4839	.923E-01	.865E-01	10	10	14	12	18	22	29	50	34	30	37	49	67	92	68	3	0	0	0	0	0
	15-17	0.2759	.706E-01	.673E-01	3	4	8	7	8	17	14	16	17	30	42	24	34	61	28	0	0	0	0	0	0
	Sum				83	91	68	60	61	84	92	127	101	110	138	128	157	271	217	19	1	0	0	0	0
	Areal density (no./m^2)		.667E+00	.447E+00																					
L3	1-3	1.0000	.155E+00	.125E+00	1	2	2	3	7	4	1	0	0	0	1	0	2	1	1	1	0	0	0	0	0
	3-5	0.9948	.582E-01	.416E-01	6	2	4	2	1	3	2	3	3	1	0	0	1	4	9	1	0	0	0	0	0
	5-7	0.9731	.226E-01	.119E-01	5	10	3	1	1	3	0	3	0	2	0	2	3	0	4	1	0	0	0	0	0
	7-9	0.9473	.375E-01	.169E-01	29	26	7	8	4	8	5	7	4	0	1	2	3	5	4	0	0	0	0	0	0
	9-11	0.9297	.546E-01	.305E-01	41	43	30	10	9	10	10	7	2	6	5	10	17	30	26	2	0	0	0	0	0
	11-13	0.9131	.957E-01	.808E-01	21	44	36	32	38	41	47	43	47	27	47	30	60	71	55	9	1	0	0	0	0
	13-15	0.8864	.952E-01	.877E-01	9	22	37	39	42	49	56	88	92	69	65	50	81	84	72	7	0	0	0	0	0
	15-17	0.5009	.772E-01	.744E-01	4	5	9	16	24	17	26	18	34	37	42	54	82	86	39	1	0	0	0	0	0
	Sum				116	154	128	111	126	135	147	169	182	142	161	148	249	281	210	22	1	0	0	0	0
	Areal density (no./m^2)		.106E+01	.822E+00																					
L5	1-3	1.0000	.396E-01	.198E-01	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9642	.311E-01	.287E-01	0	0	1	0	0	1	0	0	0	0	0	0	1	4	5	1	0	0	0	0	0
	5-7	0.8944	.345E-01	.313E-01	2	1	0	0	2	2	1	1	2	0	2	1	1	3	10	4	0	0	0	0	0
	7-9	0.7968	.178E-01	.331E-02	11	7	4	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	9-11	0.7157	.879E-01	.647E-01	19	21	11	4	6	4	10	18	21	8	10	8	12	10	28	2	0	0	0	0	0
	11-13	0.6426	.965E-01	.690E-01	27	32	20	18	17	17	14	19	8	8	5	11	22	30	25	4	0	0	0	0	0
	13-15	0.5777	.126E+00	.969E-01	26	39	39	28	25	9	25	24	22	17	20	29	47	53	42	2	1	0	0	0	0
	15-17	0.4948	.149E+00	.129E+00	16	32	32	24	23	36	40	37	41	45	33	54	60	81	38	3	0	0	0	0	0
	17-19	0.4009	.125E+00	.122E+00	1	3	10	17	14	22	23	32	32	43	43	75	85	82	41	3	0	0	0	0	0
	Sum				102	135	119	96	87	92	114	131	126	121	113	178	228	263	189	19	1	0	0	0	0
	Areal density (no./m^2)		.872E+00	.675E+00																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m³)	Fish density (> -61dB) (no./m³)	No. of targets of different target strengths																				
					-66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
L8	1-3	1.0000	.249E+00	.221E+00	0	1	1	0	1	2	2	1	1	1	1	3	2	1	1	0	0	0	0	0	0
	3-5	0.9965	.384E-01	.224E-01	2	1	2	0	0	0	4	0	0	0	1	0	0	2	0	0	0	0	0	0	0
	5-7	0.9933	.283E-01	.674E-02	6	6	4	1	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0
	7-9	0.9723	.495E-01	.128E-01	22	15	12	0	1	0	0	1	2	4	5	0	2	2	0	0	0	0	0	0	0
	9-11	0.9283	.730E-01	.286E-01	21	44	25	10	4	3	1	3	2	2	2	1	5	11	9	5	0	0	0	0	0
	11-13	0.8639	.602E-01	.257E-01	23	39	33	13	8	5	6	4	7	7	3	2	7	7	2	0	0	0	0	0	0
	13-15	0.7785	.741E-01	.519E-01	20	25	31	21	13	9	23	12	15	11	9	10	21	15	16	1	0	1	0	0	0
	15-17	0.6955	.105E+00	.891E-01	16	23	26	26	24	24	33	30	38	22	12	23	65	45	16	1	0	0	0	0	0
	17-19	0.5169	.799E-01	.727E-01	5	10	12	14	13	18	24	24	19	14	14	24	42	50	15	0	0	0	0	0	0
	19-21	0.1680	.526E-01	.510E-01	0	1	1	0	3	0	3	6	5	4	6	5	11	13	14	3	1	0	0	0	0
	Sum				115	165	147	85	67	61	96	81	89	66	53	68	155	147	74	11	1	1	0	0	0
Areal density (no./m²)			.133E+01	.919E+00																					
M1	1-3	1.0000	.290E-01	.145E-01	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	3-5	0.9510	.133E+00	.119E+00	0	2	2	0	1	1	5	2	4	3	7	2	6	3	0	0	0	0	0	0	0
	5-7	0.9018	.177E+00	.108E+00	3	1	2	5	6	3	3	5	5	1	1	6	4	10	14	7	0	0	0	0	0
	7-9	0.8528	.531E-01	.442E-01	1	3	6	4	7	6	6	3	3	0	1	1	2	5	11	1	0	0	0	0	0
	9-11	0.8092	.443E-01	.343E-01	6	7	4	10	6	6	3	9	2	1	3	4	7	2	4	2	0	0	0	0	0
	11-13	0.7848	.534E-01	.422E-01	7	11	9	16	11	9	21	9	4	3	4	7	4	6	8	1	0	0	0	0	0
	Sum				17	25	23	35	31	25	38	28	18	8	16	20	24	26	37	11	0	0	0	0	0
Areal density (no./m²)			.876E+00	.647E+00																					
M2	1-3	1.0000	.649E-01	.325E-01	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9957	.714E-01	.564E-01	2	1	1	0	2	1	0	3	0	2	1	1	1	3	1	0	0	0	0	0	0
	5-7	0.9770	.823E-01	.645E-01	5	4	2	7	3	0	4	4	2	1	3	6	1	2	6	0	1	0	0	0	0
	7-9	0.9180	.570E-01	.430E-01	6	1	8	4	1	4	4	3	5	3	2	5	2	9	3	1	0	0	0	0	0
	9-11	0.8515	.100E+00	.818E-01	7	7	15	15	8	7	9	7	9	5	7	5	12	17	22	6	1	0	0	0	0
	11-13	0.7735	.723E-01	.624E-01	2	7	10	9	9	14	12	17	6	5	8	14	10	18	9	2	0	0	0	0	0
	Sum				22	20	38	35	23	26	29	34	24	16	21	31	26	49	41	9	2	0	0	0	0
Areal density (no./m²)			.820E+00	.618E+00																					
M5	1-3	1.0000	.349E-01	.349E-01	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	3-5	0.9567	.753E-01	.377E-01	3	4	2	0	0	1	1	0	0	1	2	0	1	1	2	0	0	0	0	0	0
	5-7	0.8364	.939E-01	.286E-01	12	17	3	2	1	0	0	2	0	0	1	3	1	2	1	0	1	0	0	0	0
	7-9	0.7474	.935E-01	.207E-01	19	28	13	1	5	2	1	5	3	0	0	0	0	0	0	0	0	0	0	0	0
	9-11	0.6486	.351E-01	.270E-02	12	18	6	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Sum				46	67	24	6	6	3	2	7	3	2	4	3	2	3	3	0	1	0	0	0	0
Areal density (no./m²)			.556E+00	.224E+00																					

Table 3, continued.

Transect	Depth Stratum (m)	Relative transect length	Fish density (no./m³)	Fish density (> -61dB) (no./m³)	No. of targets of different target strengths																				
					-66	-64	-62	-60	-58	-56	-54	-52	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26
M6	1-3	1.0000	.170E+00	.151E+00	1	0	0	0	0	1	0	0	2	0	0	0	1	4	0	0	0	0	0	0	0
	3-5	0.9777	.494E-01	.000E+00	7	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5-7	0.9323	.130E+00	.138E-01	14	28	17	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7-9	0.8895	.174E+00	.393E-01	32	45	43	14	7	7	2	3	1	1	0	0	0	0	0	0	0	0	0	0	0
	9-11	0.6972	.562E-01	.748E-02	15	21	16	5	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				69	97	77	26	8	8	3	3	4	1	0	0	1	4	0	0	0	0	0	0	0
Areal density (no./m²)			.107E+01	.408E+00																					
N1	1-3	1.0000	.932E-01	.133E-01	5	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.9164	.620E-01	.103E-01	7	6	2	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	5-7	0.5587	.253E-01	.000E+00	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				16	11	3	2	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Areal density (no./m²)			.328E+00	.455E-01																					
N5	1-3	1.0000	.548E+00	.129E+00	4	5	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	3-5	0.6517	.126E+00	.158E-01	3	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				7	8	5	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m²)			.126E+01	.279E+00																					
N7	1-3	1.0000	.103E+01	.389E+00	12	23	24	7	7	6	7	3	3	0	3	0	0	0	0	0	0	0	0	0	0
	Sum				12	23	24	7	7	6	7	3	3	0	3	0	0	0	0	0	0	0	0	0	0
Areal density (no./m²)			.103E+01	.389E+00																					
N8	1-3	1.0000	.224E+00	.640E-01	3	3	4	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Sum				3	3	4	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Areal density (no./m²)			.224E+00	.640E-01																					

Table 4. Density estimates for kokanee in Hauser Reservoir, April 1995.

Transect	(a) Target density (#/m^2)	(b) Percent signals lost	(c) Corrected density (#/m^2)	(d) % of targets categorized as: Age 1+	(e) % of targets categorized as: 2+/3+	(f) % of netted fish as 2+ kokanee	(g) % of netted fish as 3+ kokanee		(h) Age 1+ kokanee density (#/m^2)	(i) Age 2+ kokanee density (#/m^2)	(j) Age 3+ kokanee density (#/m^2)
Calculation			a+[a][b]						[c][d]	[c][e][f]	[c][e][g]
I3	0.498	0.0	0.498	85.8	14.2	43.8	38.0		0.427	0.031	0.027
I4	0.145	0.9	0.146	57.6	42.4	43.8	38.0		0.084	0.027	0.024
I7	0.796	6.9	0.851	80.1	19.9	43.8	38.0		0.682	0.074	0.065
I8	0.439	7.7	0.472	88.6	11.4	43.8	38.0		0.418	0.023	0.021
								Mean:	0.403	0.039	0.034
J1	0.589	4.7	0.617	62.6	37.4	43.8	38.0		0.386	0.101	0.088
J2	0.390	0.0	0.390	54.6	45.4	43.8	38.0		0.213	0.077	0.068
J4	0.367	2.9	0.378	48.8	51.2	43.8	38.0		0.184	0.085	0.074
J6	0.385	3.6	0.399	47.6	52.4	43.8	38.0		0.190	0.091	0.080
								Mean:	0.243	0.089	0.078
K2	0.395	1.5	0.401	59.0	41.0	43.8	38.0		0.237	0.072	0.063
K3	0.471	1.3	0.477	43.5	56.5	43.8	38.0		0.207	0.118	0.103
K5	0.448	12.6	0.504	32.3	67.7	43.8	38.0		0.163	0.149	0.131
K7	0.329	9.1	0.359	49.7	50.3	43.8	38.0		0.178	0.079	0.069
								Mean:	0.196	0.105	0.092
L2	0.447	0.4	0.449	43.3	56.7	43.8	38.0		0.194	0.111	0.098
L3	0.822	0.9	0.829	56.5	43.5	43.8	38.0		0.408	0.158	0.138
L5	0.675	0.0	0.675	44.9	55.1	43.8	38.0		0.303	0.163	0.142
L8	0.919	0.0	0.919	50.3	49.7	43.8	38.0		0.402	0.200	0.175
								Mean:	0.357	0.158	0.138
M1	0.647	0.8	0.652	47.9	52.1	43.8	38.0		0.312	0.149	0.130
M2	0.618	1.1	0.625	56.4	43.6	43.8	38.0		0.353	0.119	0.104
M5	0.224	3.2	0.231	49.3	50.7	43.8	38.0		0.114	0.051	0.045
M6	0.408	3.1	0.421	53.7	46.3	43.8	38.0		0.226	0.085	0.075
								Mean:	0.251	0.101	0.089
								Grand Mean:	0.290	0.098	0.086
								(S.D.)	0.086	0.042	0.037

Population estimates (densities x surface area--4,637,702 m^2): Age 1+ = 1,344,933 +/- 398,842
Age 2+ = 454,495 +/- 194,783
Age 3+ = 398,842 +/- 171,595

Summer Creel Census

A total of 1,407 anglers were interviewed on Hauser Reservoir during the summer period (April through September) in 1994. As opposed to previous years, the interviews were done almost exclusively during the weekends. Distribution of interviews, mean hours per fishing trip and mean number of anglers per fishing party are presented in Table 5.

Table 5. Distribution of interviews by day of week and by method of fishing with mean hours per completed fishing trip and mean party size obtained on Hauser Reservoir during the summers of 1986 through 1994.

	PERCENT OF TOTAL INTERVIEWS					
YEAR	WEEKDAY	WEEKEND	SHORE	BOAT	MEAN HOURS FISHED/TRIP	MEAN # OF ANGLERS/PARTY
1986	38	62	58	42	3.96	2.98
1987	49	51	60	40	3.93	1.87
1988	48	52	48	52	4.18	1.93
1989	61	39	54	46	4.07	1.90
1990	48	52	55	55	4.03	1.85
1991	37	63	25	75	4.63	2.07
1992	53	47	39	61	4.67	2.37
1993	45	55	53	47	5.20	2.32
1994	2	98	39	61	4.40	2.79
OVERALL	42	58	48	52	4.34	2.23

Table 6 presents the composition of the catch made by anglers during the summer fishery in 1994. Kokanee continued to dominate the catch in 1994, followed closely by yellow perch which composed an all-time high percent of the catch in 1994 (46.7%). Rainbow trout catch rates decreased to 5.4%, similar to the low level observed in 1991 (4.3%).

Summer catch rates (fish per angler hour) for rainbow trout and kokanee are presented in Table 7. Total catch rates for rainbow trout decreased from 0.05 in 1993 to 0.02 in 1994. Kokanee catch rates decreased from 0.22 in 1993 to 0.15 in 1994.

The average length, weight, and condition factor for rainbow trout and kokanee harvested from Hauser Reservoir during 1994 are presented in Table 8. Mean length for rainbow trout (16.6 inches) was at an all-time high. Growing conditions appeared to be good for kokanee--based on a condition factor of 41.2. The mean length for kokanee had decreased from the previous year, however.

Table 6. Composition of the catch by anglers on Hauser Reservoir during the summers of 1986 through 1994.

		PERCENT COMPOSITION OF CATCH						
YEAR	NUMBER CAUGHT	RAINBOW TROUT	BROWN TROUT	KOKANEE	YELLOW PERCH	MOUNTAIN WHITEFISH	S.MOUTH BASS	WAL
1986	2,728	49.9	1.4	26.7	21.6	0.3	0.2	0
1987	3,912	47.6	0.4	30.4	20.3	1.2	0.1	0
1988	3,882	45.3	0.3	43.6	10.6	0.2	0	0
1989	3,247	18.1	0.3	65.8	15.5	0.4	0	0
1990	3,870	21.2	0.5	44.2	33.8	0.2	0	0
1991	6,935	4.3	0.2	81.5	13.7	0.3	<0.1	0
1992	3,565	11.9	0.4	49.6	37.9	0.2	0	0.
1993	2,532	16.8	0.6	68.4	14.1	0.1	0	0
1994	1,616	5.4	1.2	46.3	46.7	0.1	0.3	0

Table 7. Catch rates (fish per angler hour) and the percent harvested for rainbow trout and kokanee during the summers of 1986 through 1994 on Hauser Reservoir.

	RAINBOW TROUT				KOKANEE			
	FISH/HOUR				FISH/HOUR			
YEAR	SHORE	BOAT	TOTAL	% KEPT	SHORE	BOAT	TOTAL	% KEPT
1986	0.25	0.26	0.25	88.7	0.01	0.18	0.10	98.6
1987	0.31	0.18	0.24	80.4	0.02	0.24	0.13	92.6
1988	0.38	0.09	0.24	74.8	<0.01	0.38	0.24	93.3
1989	0.21	0.06	0.12	66.2	0.08	0.63	0.42	89.0
1990	0.19	0.05	0.10	89.8	0.02	0.35	0.22	94.0
1991	0.12	0.01	0.02	84.5	0.07	0.53	0.46	94.6
1992	0.12	0.03	0.05	79.5	0.02	0.28	0.22	93.9
1993	0.11	0.02	0.05	91.8	0.02	0.34	0.22	94.6
1994	0.04	0.01	0.02	77.3	<0.01	0.20	0.15	92.4
OVERALL	0.19	0.08	0.12	81.4	0.03	0.35	0.24	93.7

Table 8. Mean length (in), weight (lbs), and condition factors for rainbo trout and kokanee harvested from Hauser Reservoir during the summers of 1986 through 1994. Ranges are in parentheses.

	RAINBOW TROUT			KOKANEE		
YEAR	MEAN LENGTH	MEAN WEIGHT	COND. FACTOR	MEAN LENGTH	MEAN WEIGHT	COND. FACTOR
1986	13.5 (7.0-20.1)	1.06 (0.14-4.06)	40.1	16.6 (8.5-22.2)	1.87 (0.20-3.94)	39.0
1987	14.2 (7.6-23.0)	1.26 (0.15-4.07)	41.2	15.6 (8.6-21.4)	1.52 (0.32-3.31)	38.2
1988	15.8 (7.9-23.9)	1.73 (0.22-6.00)	40.9	16.3 (8.2-21.8)	1.71 (0.28-3.24)	37.9
1989	13.7 (8.3-22.4)	1.17 (0.22-4.90)	39.1	14.6 (9.2-21.1)	1.13 (0.28-3.10)	35.4
1990	14.9 (7.0-23.5)	1.60 (0.30-4.95)	41.4	15.7 (8.6-23.4)	1.57 (0.26-3.97)	38.5
1991	15.3 (7.4-23.4)	1.74 (0.18-4.90)	41.0	14.7 (8.7-21.2)	1.25 (0.28-3.44)	38.3
1992	15.1 (8.5-24.3)	1.71 (0.31-8.00)	43.6	15.8 (9.4-23.1)	1.67 (0.41-3.27)	41.1
1993	16.3 (8.3-25.3)	1.89 (0.30-5.50)	42.3	16.0 (8.9-21.0)	1.72 (0.32-3.20)	41.3
1994	16.6 (10.1-23.5)	2.04 (0.42-4.02)	39.9	14.8 (10.7-24.8)	1.40 (0.48-4.54)	41.2

Winter Creel Census

Yellow perch continued to dominate the catch in the winter ice fishery in 1993/94 (Table 9), while rainbow trout continued to slip in importance. Rainbow trout composed only 1.8% of the catch in 1993/94, less than one-tenth the contribution in 1988/89. Kokanee decreased to 5.8% of the catch, while yellow perch increased to 91.1%.

Table 9. Composition of the catch made by anglers on Hauser Reservoir during the winter ice fishery from 1988/89 through 1993/94.

		PERCENT COMPOSITION OF CATCH				
YEAR	NUMBER CAUGHT	RAINBOW TROUT	BROWN TROUT	KOKANEE	YELLOW PERCH	MOUNTAIN WHITEFISH
1988/89	882	29.1	1.8	37.1	31.9	0.1
1989/90	337	27.2	1.4	37.0	34.3	0.1
1990/91	723	9.4	0.7	20.7	69.2	0
1991/92	1177	2.4	0.2	39.0	58.4	0
1992/93	2234	2.6	0.4	33.8	63.1	0.1
1993/94	224	1.8	1.3	5.8	91.1	0

Holter Reservoir

Fish Abundance and Distribution

Floating gill nets. Relative abundance of fish captured in floating gill nets set in Holter Reservoir in 1994 are presented in Table 10. In the spring, rainbow trout, yellow perch, and kokanee dominated the catch. Perch numbers (14.6% of the catch) were markedly lower than in 1993 (29.8% of catch). In the fall, rainbow trout and kokanee dominated the catch, as they have in every year since 1986 (Appendix Table 3). About 34% of rainbow trout collected in gill nets in 1994 were of hatchery origin.

Catch rates for rainbow trout in floating gill nets have shown similar trends in both spring and fall. Catch rates in spring were over 10/net in 1987 and 1988, and have been between 3-6/net in every year since then (except for 1991). The catch rate in spring 1994 was 3.9/net, slightly lower than in 1993 (4.7/net)(Figure 7). In the fall nets, catch rates were substantially higher in 1986 and 1987 than in subsequent years. Since 1988, the catch rates have remained fairly stable (Figure 8). Catch rates in fall 1994 were 6.9/net, much higher than the 3.2/net in 1993.

Kokanee catch rates in floating nets have shown dramatic changes since 1986 (Figure 9). In the spring nets, catch rates have been very low (0-3 fish/net) in all years except 1991, when the rate was 13.4/net. The catch rate did rebound in 1994 to 3.4/net. In the fall floating nets, catch rates climbed to a peak in 1990, and dropped slightly every year until 1994, when numbers rebounded to 7.6/net.

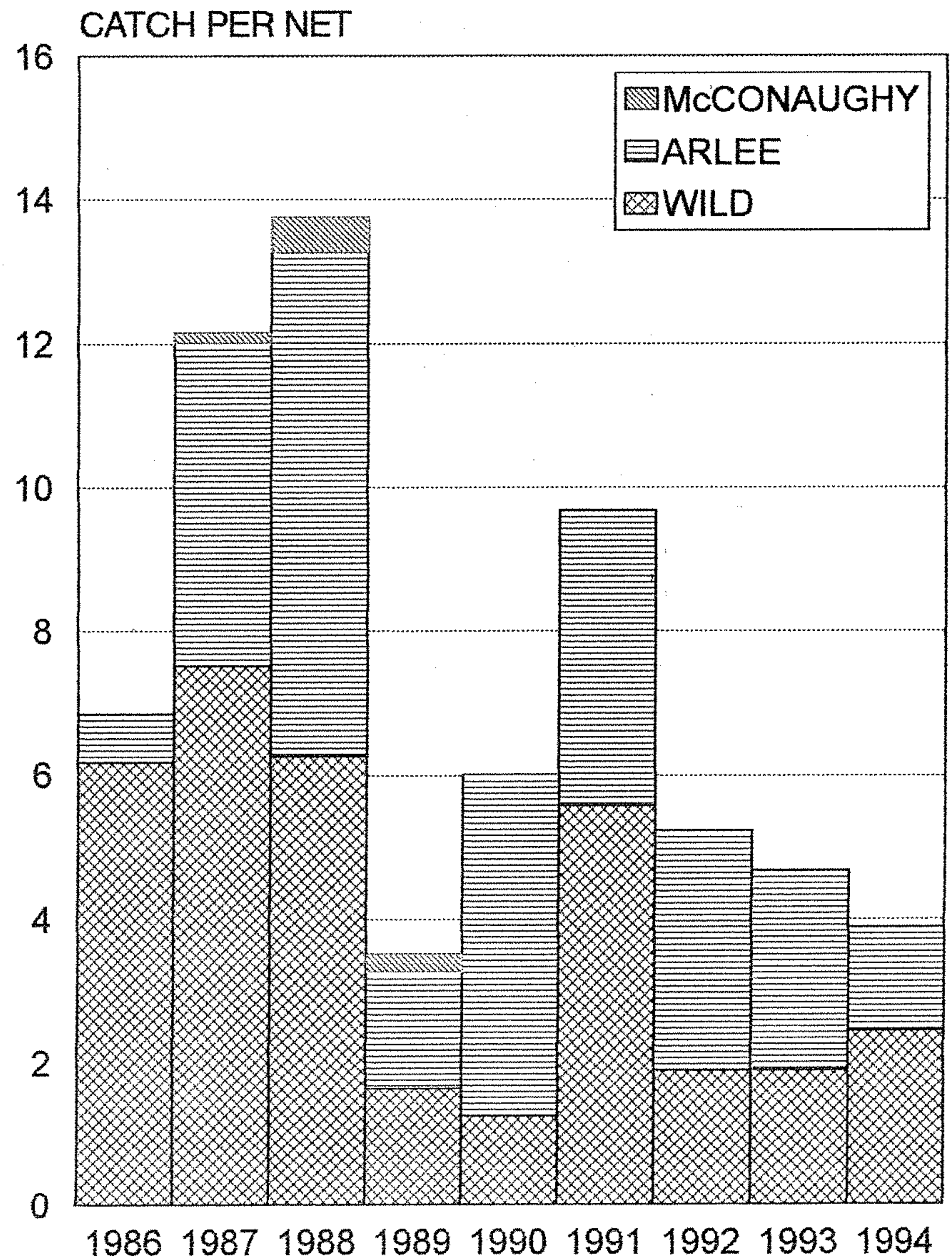

Figure 7. Catch rates for rainbow trout in floating gill nets in Holter Reservoir, Spring 1986-94

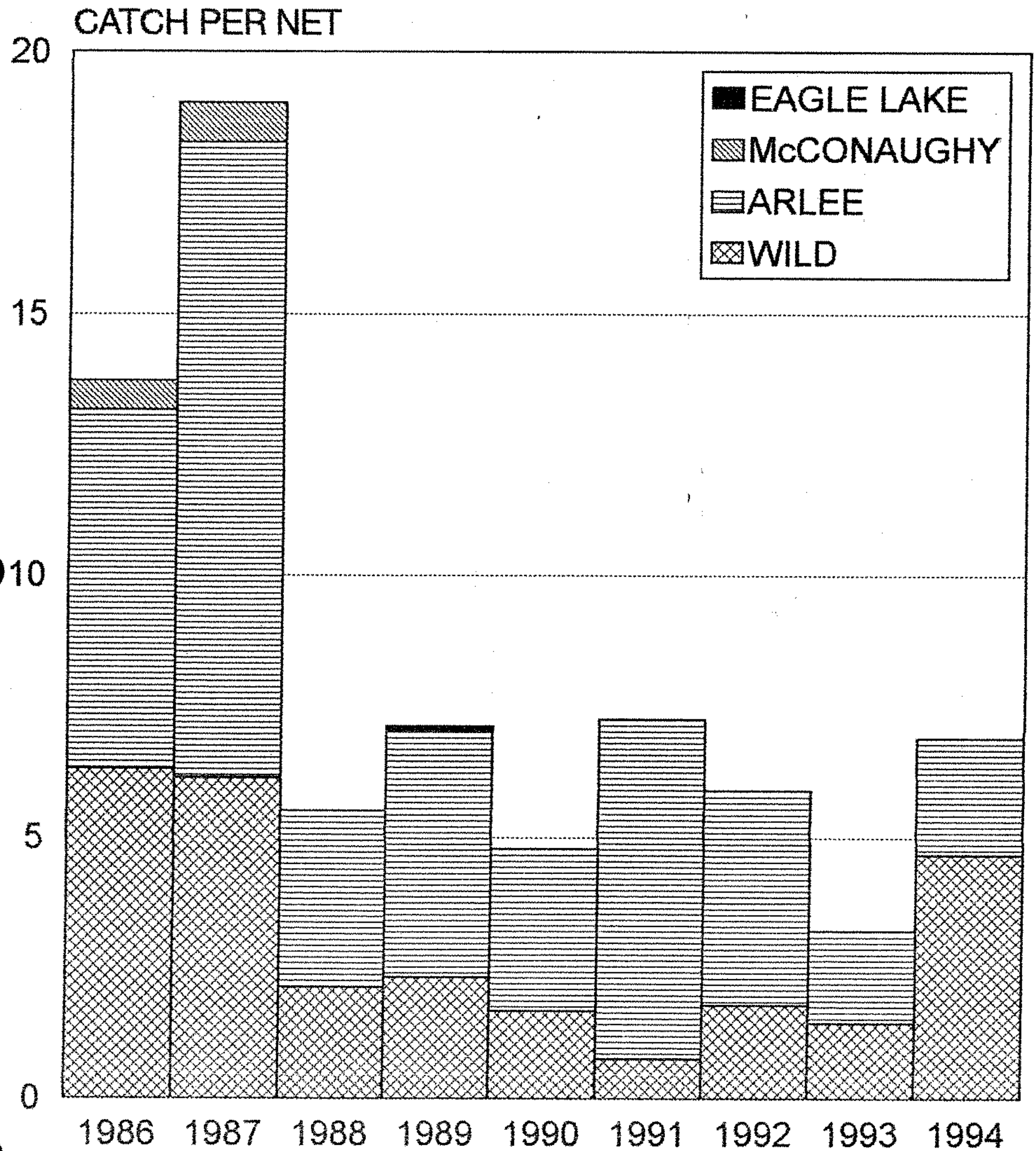

Figure 8. Catch rates for rainbow trout in floating gill nets in Holter Reservoir, Fall 1986-94

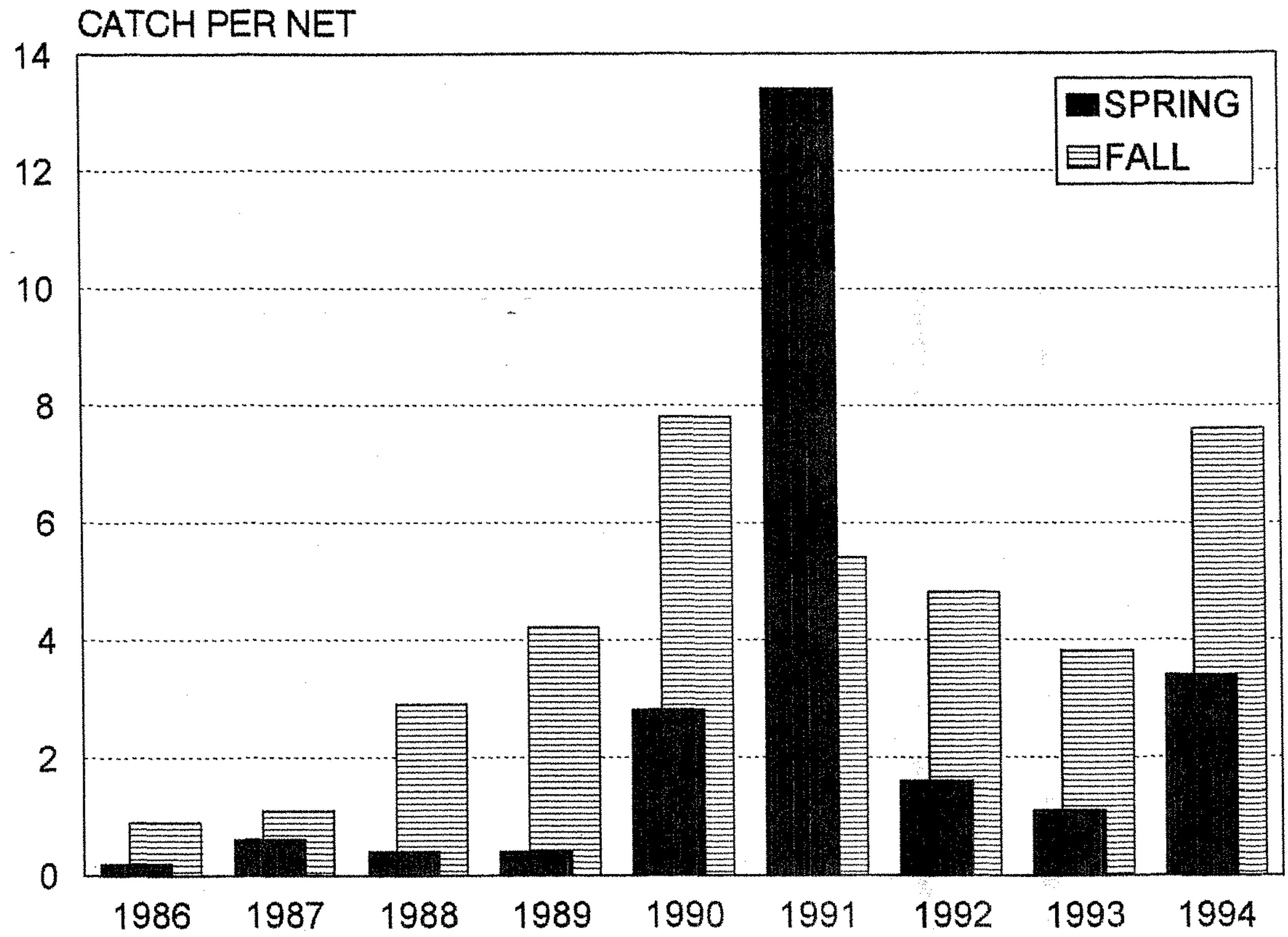

Figure 9. Catch rates for kokanee in floating gill nets in Holter Reservoir, 1986-94

Sinking gill nets. Yellow perch, white suckers, and longnose suckers dominated the catch in sinking gill nets in 1994 (Table 10). Numbers for all three of these species seem to be holding relatively constant since 1986 (Appendix Table 4). However, the percentage of yellow perch in the catch in spring 1994 (28.1) was substantially lower than in 1992 and 1993 (43.4 and 42.3%, respectively).

The number of walleye captured per sinking gill net in the spring in 1994 (4.83) was higher than in any previous year (Table 11). Conversely, the number per net in the fall sinking nets (1.43) was lower than in any year since 1989. The average weight in spring 1994 (3.73 pounds) was a record high (Table 11).

Table 10. Percent composition by species and season for gill net catches in Holter Reservoir in 1994.

	SINKERS		FLOATERS	
Species	Spring	Fall	Spring	Fall
RB	0.5	2.7	34.0	42.5
LL	0	0	0	0.7
KOK	0.2	1.2	30.1	46.6
MWF	2.0	0.2	1.0	1.4
WE	5.3	2.4	5.8	0
YP	28.1	10.0	14.6	0
LNSU	12.8	23.4	7.8	2.7
WSU	51.0	60.0	4.9	6.2
CARP	0.2	0	1.9	0
Total # Caught	549	410	103	146
Number nets	6	7	9	9

Vertical gill nets. The number of kokanee captured in vertical gill nets increased from 19.3 per net set in 1993 to 28.5 in 1994 (Table 12). The catch rates in 1994 were the highest since 1986, and were due primarily to the strength of the age I+ fish (21.0 fish/net set).

Table 11. Number of fish per net night and mean length, weight and condition factors for walleye collected in sinking gill nets set in Holter Reservoir from 1986 through 1994. Ranges are in parentheses.

YEAR	NUMBER PER NET	MEAN LENGTH (IN)	MEAN WEIGHT (LBS)	MEAN CONDITION FACTOR
		SPRING		
1986	--	--	--	--
1987	2.60	12.2 (9.5-16.6)	0.70 (0.22-1.69)	31.3
1988	2.17	19.1 (11.0-27.9)	3.00 (0.40-8.00)	33.8
1989	2.50	19.6 (17.2-27.0)	2.70 (1.55-7.50)	33.1
1990	2.40	19.1 (12.3-24.6)	3.22 (0.55-6.25)	38.6
1991	2.17	15.7 (11.7-26.3)	1.75 (0.51-7.00)	34.5
1992	2.50	20.7 (12.3-30.6)	3.29 (0.66-9.40)	35.5
1993	2.33	19.2 (12.1-28.3)	2.98 (0.58-7.00)	35.6
1994	4.83	20.5 (10.6-28.5)	3.73 (0.38-8.75)	35.7
		FALL		
1986	2.33	20.0 (15.0-30.0)	3.31 (1.12-10.0)	35.8
1987	3.17	16.7 (9.7-26.2)	2.05 (0.26-8.00)	36.7
1988	1.33	19.6 (15.6-25.4)	2.87 (1.52-5.00)	36.7
1989	4.33	20.5 (13.3-29.1)	3.60 (0.78-8.60)	37.9
1990	2.33	21.2 (13.5-27.2)	3.97 (0.84-9.00)	37.5
1991	2.83	20.4 (11.5-26.0)	4.08 (0.44-9.10)	40.7
1992	3.67	22.4 (12.0-27.5)	4.12 (0.66-6.80)	37.3
1993	4.00	22.0 (15.1-27.5)	4.67 (1.30-9.25)	40.3
1994	1.43	21.2 (15.3-27.0)	4.20 (1.19-7.30)	39.3

Table 12. Mean catch rates (fish per net night) by age class for kokanee collected in vertical nets set at the Dam Station in Holter Reservoir from 1986 through 1994.

YEAR	NUMBER OF SETS	NUMBER OF KOKANEE PER SET				TOTAL
		AGE 0+	AGE I+	AGE II+	AGE III+	
1986	3	0	4.0	2.3	1.0	7
1987	4	0	3.0	3.0	0.5	6
1988	6	0	2.8	1.7	0.7	5
1989	5	0	9.2	4.2	0.4	13
1990	6	0	4.0	9.0	0.7	13
1991	5	0	2.2	11.2	2.0	15
1992	7	0	6.3	2.6	2.1	11
1993	6	0.2	15.2	3.3	0.3	19
1994	4	0	21.0	4.0	3.5	28

Trap netting. Trap nets were fished from April 25 to May 11 in order to capture spawning walleye. A total of 311 walleye were captured during 52 net nights of sampling (Table 13). Sampling effort was concentrated in the Oxbow Bend area, and all but two of the fish were captured in three specific sites on the Bend. Thirty-two of the fish had been previously tagged and bore red dangler tags (eight fish had been tagged in previous years and 24 fish had been tagged in 1995). The remaining 279 walleye were tagged and a spine and scale were removed for ageing. Other species of fish caught in the nets, in decreasing order of abundance, were white sucker (6,589), yellow perch (3,279), and rainbow trout (84).

The daily catch rate for walleye showed a general increase through the sampling period, and the peak daily catch for walleye (57) occurred on the last day of sampling, when temperatures were 51-52°F. The first ripe female walleye was not observed until May 1, and the first spent female was captured on May 9. Two spent females were captured on May 11, but this represented only 22% of the females that day. These findings suggest that walleye spawning had not yet peaked when we last sampled on May 11.

The spawning activity for yellow perch began earlier than for walleye. On the first day of sampling (April 25), 33% of females were ripe and 67% were spent. Spawning continued throughout the sampling period, and there was no clear trend toward a greater percentage of spent fish as time progressed. On the last day (May 11), three of four females were still ripe. In spite of these observations, perch spawning activity may have been most intense on April 27 when perch numbers in the nets peaked at 840. Unquantified observations suggested that the number of egg masses along the shorelines and in the nets also peaked at about this time.

Walleye tagging. Walleye have been tagged with dangler tags since 1988 in an effort to estimate angler harvest. Eighteen walleye were tagged in 1994, bringing the total number of tagged fish to 385 (Table 14). None of the fish tagged in 1994 were returned by anglers that year, but four tags were returned from fish tagged in 1990, 1991 and 1993.

Table 13. Numbers and species of fish captured in trap nets in Holter Reservoir, 1995. Temperature ranges are based on water surface measurements taken periodically during the day.

Date of set	Number nets	Temp. Range(°F)	Number of fish: walleye	yellow perch	rainbow trout	white sucker
4/25	5	47	4	464	2	177
4/26	5	48-53	8	496	2	370
4/27	5	48-49	20	840	13	228
5/1	4	47	25	318	11	139
5/2	4	47	8	290	11	208
5/3	4	46-48	24	220	9	300
5/4	4	46-52	45	104	20	497
5/8	5	47	29	135	5	916
5/9	5	48-51	41	120	6	1,354
5/10	5	52-53	50	123	2	1,787
5/11	5	51-52	57	169	3	613
Total			311	3,279	84	6,589

The percentage of tagged fish being caught by anglers in the first 1.5 years after tagging has been quite variable (Table 14). This variability is probably due to the small sample size of tagged fish. Probably the only years when enough fish were tagged to yield reliable estimates of harvest are 1988 and 1990, when 92 and 121 fish were tagged, respectively. In these years, there was an angler harvest rate of 5.4% and 2.5% for fish caught in the first 1.5 years after tagging. Tagging efforts in conjunction with trap netting (as occurred in spring 1995) should provide for larger numbers of tagged fish and yield more accurate harvest estimates.

Summer Creel Census

A total of 1,272 anglers were interviewed on Holter Reservoir during the summer period (April through September) in 1994. As opposed to past years, the interviews were done almost exclusively during the weekends. Distribution of interviews, hours per fishing trip and mean number of anglers per fishing party are presented in Table 15.

Table 14. Number of walleye tagged and caught by anglers on Holter Reservoir, 1988-1994.

		Number (percent) of tagged walleye harvested by anglers							
Year tagged	Number tagged	1988	1989	1990	1991	1992	1993	1994	Cumu- lative
1988	92	4(4.3)	1(1.1)	0(0.0)	0(0.0)	2(2.2)	3(3.3)	0(0.0)	10(10.9)
1989	31		2(6.5)	1(3.2)	0	0	0	0	3 (9.7)
1990	121			1(0.8)	2(1.7)	3(2.5)	2(1.7)	2(1.7)	10 (8.3)
1991	63				0	1(1.6)	1(1.6)	1(1.6)	3 (4.8)
1992	42					2(4.8)	0	0	2 (4.8)
1993	18						0	2(11.1)	2(11.1)
1994	18							0	0 (0.0)

The composition of the catch made by anglers during the summer of 1994 is presented in Table 16. Yellow perch dominated the catch made by anglers (77.3%), up markedly from 1993 when it comprised 52.8% of the catch. The catch for kokanee in 1994 (13.2%) was similar to every other year since 1990, the first year that kokanee comprised over 10% of the catch. Rainbow trout comprised only 7.1% of the catch, the lowest ever, and far below the 32.1% recorded in 1993.

Annual summer catch rates (fish per angler hour) for rainbow trout and yellow perch are presented in Table 17. The catch rates for rainbow trout in 1994 (0.03/hr) were lower than in 1993 (0.14), and much lower than the overall average (0.25). Catch rates for yellow perch increased from 0.22/hr in 1993 to 0.34/hr in 1994. The angler catch rate for kokanee was 0.06/hr in 1993 and remained unchanged at 0.06/hr in 1994. Catch rates for anglers specifically seeking to catch walleye were 0.01/hr in 1993, increasing to 0.11/hr in 1994. The 1994 walleye catch rate was the highest since 1986.

Table 15. Distribution of interviews by day of week and by method of fishing with mean hours per completed fishing trip and mean party size obtained on Holter Reservoir during the summers of 1986 through 1994.

YEAR	PERCENT OF TOTAL INTERVIEWS WEEKDAY	WEEKEND	SHORE	BOAT	MEAN HOURS FISHED/TRIP	MEAN # OF ANGLERS/PARTY
1986	25	75	34	66	3.88	2.43
1987	34	66	41	59	4.02	2.23
1988	44	56	40	60	4.54	2.17
1989	38	62	41	59	4.13	2.10
1990	35	65	40	60	4.08	2.21
1991	42	58	48	52	4.02	2.17
1992	45	55	26	74	4.19	2.50
1993	52	48	39	61	3.83	2.50
1994	1	99	24	76	4.32	2.93
OVERALL	35	65	37	63	4.11	2.36

Table 16. Composition of the catch by anglers on Holter Reservoir during the summers of 1986 through 1994.

YEAR	NUMBER CAUGHT	PERCENT COMPOSITION OF CATCH RAINBOW TROUT	BROWN TROUT	KOKANEE	YELLOW PERCH	MOUNTAIN WHITEFISH	WALLEYE
1986	1,893	67.5	0.3	1.0	30.9	<0.1	0.3
1987	4,339	46.3	0.1	1.8	49.6	<0.1	2.2
1988	2,968	45.0	0.2	1.8	52.2	0	0.8
1989	4,848	23.7	<0.1	0.7	75.2	0	0.4
1990	5,109	28.5	0	12.5	58.5	0	0.5
1991	4,223	34.9	<0.01	12.5	52.0	0.2	0.4
1992	6,823	26.3	<0.1	11.3	61.8	<0.1	0.6
1993	1,828	32.1	0.1	14.8	52.8	<0.1	0.2
1994	2,098	7.1	0.1	13.2	77.3	<0.1	2.3

Table 17. Catch rates (fish per angler hour) and the percent harvested for rainbow trout and yellow perch during the summers of 1986 through 1994 on Holter Reservoir.

	RAINBOW TROUT				YELLOW PERCH			
	FISH/HOUR				FISH/HOUR			
YEAR	SHORE	BOAT	TOTAL	% KEPT	SHORE	BOAT	TOTAL	% KEPT
1986	0.27	0.37	0.34	81.8	0.30	0.10	0.16	91.3
1987	0.24	0.41	0.37	85.9	0.61	0.31	0.39	72.7
1988	0.19	0.38	0.32	81.8	0.70	0.22	0.37	76.2
1989	0.22	0.29	0.27	70.8	0.40	1.06	0.85	83.1
1990	0.27	0.25	0.26	67.8	0.48	0.55	0.53	65.7
1991	0.36	0.19	0.27	78.1	0.31	0.47	0.40	76.3
1992	0.19	0.23	0.22	76.6	0.52	0.52	0.52	76.8
1993	0.21	0.10	0.14	87.7	0.18	0.24	0.22	90.3
1994	0.02	0.03	0.03	88.0	0.41	0.33	0.34	89.9
OVERALL	0.22	0.25	0.25	79.8	0.43	0.42	0.42	80.3

The average length, weight and condition factor for rainbow trout and kokanee harvested from Holter Reservoir during 1994 are presented in Table 18. Rainbow trout harvested in 1994 decreased in length (14.7 in), weight (1.32 lbs) and condition factor (39.9) from the previous year. About 86% of rainbow trout harvested in 1993 and examined for marks were of known hatchery origin. These data are in contrast to gill netting data which indicated 62% of the rainbow trout population in Holter Reservoir was of hatchery origin. This same trend was seen in 1994, where 68% of harvested rainbow trout were of hatchery origin, while only 34% of horizontal and vertical gillnetted fish were of hatchery origin. As in previous years, there is a strong indication that Arlee rainbow trout stocked into Holter Reservoir are more susceptible to being caught by anglers than wild rainbow trout.

Table 18. Mean length (in), weight (lbs), and condition factors for rainbow trout and kokanee harvested from Holter Reservoir during the summers of 1986 through 1994. Ranges are in parentheses.

	RAINBOW TROUT			KOKANEE		
MEAN YEAR	MEAN LENGTH	COND. WEIGHT	MEAN FACTOR	MEAN LENGTH	COND. WEIGHT	FACTOR
1986	13.9 (8.1-20.8)	1.17 (0.2-4. 4)	40.8	16.9 (14.3-20.1)	2.17 (1.4-3.0)	43.4
1987	13.8 (7.5-22.2)	1.11 (0.2-3.7)	41.0	16.7 (10.1-21.0)	2.01 (0.4-3.8)	41.9
1988	13.7 (7.5-20.8)	1.17 (0.2-3.3)	41.6	16.8 (13.0-23.2)	1.96 (0.9-4.0)	42.2
1989	14.5 (8.9-21.3)	1.26 (0.3-2.9)	39.7	16.1 (14.1-19.5)	1.99 (1.3-3.6)	43.8
1990	14.2 (8.0-20.1)	1.17 (0.2-3.7)	39.1	16.1 (11.7-21.0)	1.79 (0.6-3.9)	42.1
1991	12.6 (8.1-24.5)	0.83 (0.3-5.0)	37.9	15.2 (9.7-20.2)	1.63 (0.4-3.1)	44.1
1992	14.1 (8.2-19.8)	1.20 (0.2-3.7)	41.5	16.6 (9.5-23.2)	2.08 (0.4-3.6)	44.4
1993	15.9 (9.0-24.3)	1.76 (0.1-6.0)	41.9	16.1 (12.2-21.9)	1.99 (0.8-3.9)	46.7
1994	14.7 (10.0-21.2)	1.32 (0.5-2.7)	39.9	16.2 (10.5-22.0)	1.93 (0.5-4.2)	44.5

Winter Creel Census

As in previous years, yellow perch dominated the composition of the catch during the winter of 1993/94 (Table 19). Harvested rainbow trout averaged 13.4 inches in length, while yellow perch averaged 9.5 inches. Catch rates for rainbow trout and yellow perch were 0.07/hr and 3.79/hr, respectively. The catch rates for rainbow trout were similar to the winter of 1992/93. The yellow perch catch rates increased from 2.73/hr in 1992/93 to 3.79/hr in 1993/94.

Table 19. Composition of the catch made by anglers on Holter Reservoir during the winter ice fishery from 1988/89 through 1993/94.

		PERCENT COMPOSITION OF CATCH				
YEAR	NUMBER CAUGHT	RAINBOW TROUT	BROWN TROUT	KOKANEE	YELLOW PERCH	MOUNTAIN WHITEFISH
1988/89	4704	7.3	<0.1	0	92.3	0.4
1989/90	3597	7.2	0	<0.1	92.6	0.2
1990/91	6162	6.9	0	0.4	92.4	0.3
1991/92	2930	3.9	0	<0.1	96.0	0
1992/93	4487	3.3	0	<0.1	96.6	0
1993/94	393	17.0	0	0.5	82.4	0

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Montana Department of Fish, Wildlife and Parks. 1985. Upper Missouri River reservoir operating guidelines for fish, wildlife and recreation. 38 pp.

Rada, R.G. 1974. An investigation into the trophic status of Canyon Ferry Reservoir, Montana. PhD Thesis. Montana State University, Bozeman, MT. 126 pp.

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Date: September 15, 1995
Waters referred to:

Hauser Reservoir	17-9056
Holter Reservoir	17-9136

APPENDICES

Appendix Table 1. Percent composition by species and season for floating gill net catches in Hauser Reservoir from 1986 through 1993.

SPECIES	1986 SPRING	1986 FALL	1987 SPRING	1987 FALL	1988 SPRING	1988 FALL	1989 SPRING	1989 FALL
RB	29.0	31.3	9.7	44.2	17.7	42.0	13.2	20.9
LL	0.2	2.5	1.3	1.2	0.6	1.4	2.0	0.9
KOK	2.9	57.3	36.0	25.1	71.3	47.9	74.2	73.2
MWF	0.2	4.3	0	0	1.2	0.9	0	0.3
WE	0	0	0	0	0	0	0	0
YP	0	0.7	0	0	0	0	0	0
LNSU	52.9	1.4	35.8	12.9	6.1	2.5	5.3	0.9
WSU	13.8	1.1	16.4	16.0	3.1	0.5	5.3	0.3
CARP	0.5	0	0	0	0	0	0	0
U.CHUB	0.5	1.4	0.8	0.6	0	4.8	0	3.5
TOTAL # CAUGHT	448	281	383	163	164	438	151	339
NUMBER OF NETS	9	11	10	11	10	11	9	11

SPECIES	1990 SPRING	1990 FALL	1991 SPRING	1991 FALL	1992 SPRING	1992 FALL	1993 SPRING	1993 FALL
RB	5.4	16.5	7.8	8.1	12.7	15.0	17.2	17.7
LL	1.6	0.5	0.7	0.7	3.0	0.3	1.6	0.5
KOK	88.6	79.3	85.6	70.0	47.6	81.5	68.0	76.3
MWF	0	0.7	0.4	0.5	0	0.6	0	0.5
WE	0	0	0	0.5	1.1	0	0.4	0
YP	0	0	0	0	0	0	0.4	0
LNSU	1.6	0.2	1.8	0	10.9	0.3	2.5	0
WSU	2.7	0.2	1.5	0	24.3	0.9	9.0	1.0
CARP	0	0	0	0	0.4	0	0	0
U.CHUB	0	2.5	2.2	20.2	0	1.4	0.8	4.5
TOTAL # CAUGHT	185	401	271	420	267	346	122	198
NUMBER OF NETS	11	11	11	11	11	11	9	11

Appendix Table 2. Percent composition by species and season for sinking gill net catches in Hauser Reservoir from 1986 through 1993.

	1986		1987		1988		1989	
SPECIES	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL
RB		0.7	0.2	1.4	0	0.5	0	1.8
LL		1.0	1.5	0.4	1.2	0.5	0.9	0
KOK		0.4	1.1	4.2	4.2	9.1	1.7	18.3
MWF		3.6	3.8	2.3	5.4	2.6	2.4	0.5
WE		0	0	0	0	0	0.2	0
YP		4.9	4.7	9.3	10.6	4.3	5.8	3.5
LNSU		28.9	23.0	16.1	17.9	24.1	22.3	14.7
WSU		60.5	65.5	66.0	60.0	58.3	66.0	59.4
CARP		0	0	0	0	0	0	0.2
U.CHUB		0	0.2	0.1	0.5	0.1	0.3	1.3
BURBOT		0	0	0.2	0	0.5	0.2	0
S.BUFF.		0	0	0.2	0	0.5	0.2	0
TOTAL # CAUGHT	0	700	473	839	407	648	574	600
NUMBER OF NETS	0	5	5	6	6	6	6	6

	1990		1991		1992		1993	
SPECIES	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL
RB	0	0.3	0	0.7	0	0.7	0	0.2
LL	0.7	0.7	1.2	0.4	0.2	1.0	2.6	1.0
KOK	2.7	11.1	3.1	20.6	0.7	7.7	11.5	6.8
MWF	2.0	2.1	3.0	1.7	1.7	1.2	2.0	1.6
WE	0	0	0	0.6	0.7	0.1	0	0.2
YP	13.5	3.8	13.7	11.2	21.5	8.1	17.1	10.7
LNSU	19.5	16.1	20.9	16.6	19.6	18.3	23.5	18.7
WSU	58.4	63.4	55.7	45.0	53.3	59.3	40.8	57.3
CARP	0	0	0	0	0	1.0	0	0
U.CHUB	3.1	2.3	1.9	1.7	0	1.8	0.8	1.4
BURBOT	0	0.2	0.2	0.4	2.1	0.7	1.8	1.2
S.BUFF	0	0	0.3	1.1	0.2	0	0	1.0
TOTAL # CAUGHT	548	577	635	705	424	765	392	513
NUMBER OF NETS	6	6	6	7	6	7	6	7

Appendix Table 3. Percent composition by species and season for floating gill net catches in Holter Reservoir from 1986 through 1993.

SPECIES	1986 SPRING	1986 FALL	1987 SPRING	1987 FALL	1988 SPRING	1988 FALL	1989 SPRING	1989 FALL
RB	25.5	77.2	47.1	76.6	64.3	41.5	25.0	52.1
LL	0	0.8	1.6	2.2	1.2	1.9	0	0.9
KOK	0.6	4.9	2.6	4.8	1.7	21.7	2.7	33.0
MWF	2.5	3.3	1.6	0	1.2	2.8	0.9	0.9
WE	5.0	9.7	7.4	0.5	4.1	0	1.8	2.6
YP	0	0	20.1	0	18.7	0	8.9	0
LNSU	40.4	3.3	10.1	6.9	4.1	12.3	38.4	7.0
WSU	24.8	0.8	7.9	9.0	3.5	19.8	22.3	2.6
CARP	1.2	0	1.6	0	1.2	0	0	0
U.CHUB	0	0	0	0	0	0	0	0.9
TOTAL # CAUGHT	161	123	189	188	171	106	112	115
NUMBER OF NETS	6	7	8	8	8	8	8	9

SPECIES	1990 SPRING	1990 FALL	1991 SPRING	1991 FALL	1992 SPRING	1992 FALL	1993 SPRING	1993 FALL
RB	61.5	34.7	34.5	53.7	39.2	35.3	26.1	42.0
LL	1.3	0	0	1.9	0	1.3	0	0
KOK	28.2	56.5	46.9	39.8	11.7	28.6	6.2	49.3
MWF	0	1.6	1.2	2.8	3.3	0	0	0
WE	5.1	0	13.9	0	0.8	0.7	3.7	2.9
YP	0	0	0	0	38.3	0	29.8	0
LNSU	1.3	6.5	0.4	0.9	0	20.0	8.1	1.4
WSU	2.6	0.8	2.7	0.9	5.8	14.0	26.1	4.3
CP	0	0	0.4	0	0.8	0	0	0
U.CHUB	0	0	0	0	0	0	0	0
TOTAL # CAUGHT	78	124	258	108	120	150	161	69
NUMBER OF NETS	8	9	9	8	9	9	9	9

Appendix Table 4. Percent composition by species and season for sinking gill net catches in Holter Reservoir from 1986 through 1993.

	1986		1987		1988		1989	
SPECIES	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL
RB		4.3	0.9	2.5	1.4	2.6	1.1	1.8
LL		0.2	0.8	0.3	0.2	0	0.2	0
KOK		0.4	0	0.2	0.3	0.5	0	0.6
MWF		1.8	1.7	2.0	3.6	0.5	5.1	1.8
WE		2.5	1.6	3.1	2.0	1.3	2.8	5.2
YP		24.0	57.2	28.8	34.0	21.8	29.5	10.6
LNSU		24.0	16.5	21.5	17.6	21.9	11.2	20.4
WSU		42.8	21.2	41.6	40.7	51.2	49.7	59.6
CARP		0	0.1	0	0	0.2	0.4	0
U.CHUB		0	0	0	0.2	0	0	0
TOTAL # CAUGHT	0	551	838	601	658	611	545	500
NUMBER OF NETS	0	6	5	6	6	6	6	6

	1990		1991		1992		1993	
SPECIES	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL
RB	1.0	3.1	0.7	4.4	0.2	0.8	0.4	1.5
LL	0.7	0	0.1	0	0.1	0.2	0	0.2
KOK	0	1.9	0.6	1.6	0.1	1.4	0.1	1.5
MWF	4.0	4.3	5.8	1.3	1.8	2.2	1.5	1.5
WE	2.0	2.9	1.4	3.0	1.6	4.2	1.9	6.0
YP	39.2	16.0	50.4	11.3	43.4	21.5	42.3	9.4
LNSU	11.4	15.4	11.9	20.3	5.4	15.5	10.4	17.0
WSU	41.4	56.2	29.1	58.1	46.9	53.8	43.2	62.3
CP	0	0.2	0	0	0.3	0.4	0.1	0.5
U.CHUB	0.3	0	0	0	0	0	0.1	0
TOTAL # CAUGHT	597	486	894	566	921	502	743	401
NUMBER OF NETS	5	6	6	6	6	6	6	6

Reviewed
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R4 Supervisor
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