SWAN LAKE ANGLER CREEL SURVEY - 1995

FINAL REPORT

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Catch rates were the highest for pike during April after ice-off with 0.13 fish per hour caught. Catch rates during the remaining period ranged from 0.0-0.11 fish per hour. The mean annual catch rate was 0.04 fish per hour (Table 7). Anglers generally kept 66 percent of the pike they caught.

Bull Trout

Bull trout harvest from Swan Lake ranks third in order of relative abundance. Anglers kept an estimated 482 fish with more than 99 percent coming from southern lake Sections 1 and 2. Twenty percent of the total bull trout harvest occurred during ice cover in Sections 1 and 2 during January and February. The majority of bull trout were harvested between April and October in the southern half of the lake with the peak occurring in June (Figure 8, Appendix C). Weekend anglers harvested 60 percent of the bull trout, and 57 percent of these fish were caught by boat anglers. Bull trout catch rates were the highest in October , November, and December, and averaged 0.5 fish per hour during this period. Ice anglers experienced the next best catch rates averaging about 0.2 fish per hour followed by summer boat anglers whose catch rates dropped to less than 0.1 fish per hour. The mean annual catch rate for bull trout was 0.07 fish per hour. Bull trout anglers tend to keep fewer fish and release an average of 86 percent of their catch annually (Table 8).

Thirty-two valid scale samples were collected from the 51 angler-harvested bull trout during the creel period. These fish were between three- and six-years-old based on scale verification. Examination of ovary and testis development in bull trout from previous work (Leathe 1985, Rumsey, MFWP file data) indicate that an 18 inch threshold is appropriate to separate juvenile and adult fish. Using this criteria, we estimated that 53 percent of the angler-harvested bull trout were adult fish.

Fish collection work (MFWP, Kalispell unpublished file data) documented the presence of bull trout x brook trout F_1 hybrids in tributaries to the Swan River upstream from Swan Lake. Electrophoretic analysis of 40 bull trout collected during the creel concluded that only alleles characteristic of pure bull trout were detected in the sample (R. Leary, University of Montana Genetics Laboratory, pers. comm. 1996). Leary also concluded, "assuming the fish represented a random sample, the hybrids of the two are infrequent in Swan Lake. With a sample of 40 we would have a 95 percent chance of having at least one hybrid in the sample if they constituted 10 percent or more of the population. If hybrids are in Swan Lake, therefore, they probably represent less than 10 percent of the char population."

Rainbow and Westslope Cutthroat Trout

Rainbow and westslope cutthroat trout had nearly identical harvest estimates of 204 and 205, respectively. With cutthroat, all fish were caught from June to September by boat anglers in Section 2. Eighty-three percent of the rainbow trout were harvested from May through October in Section 2, with the remainder caught in Section 1 during the same time frame. Harvest of

Figure 8. Swan Lake monthly bull trout harvest estimates by lake section, 1995.

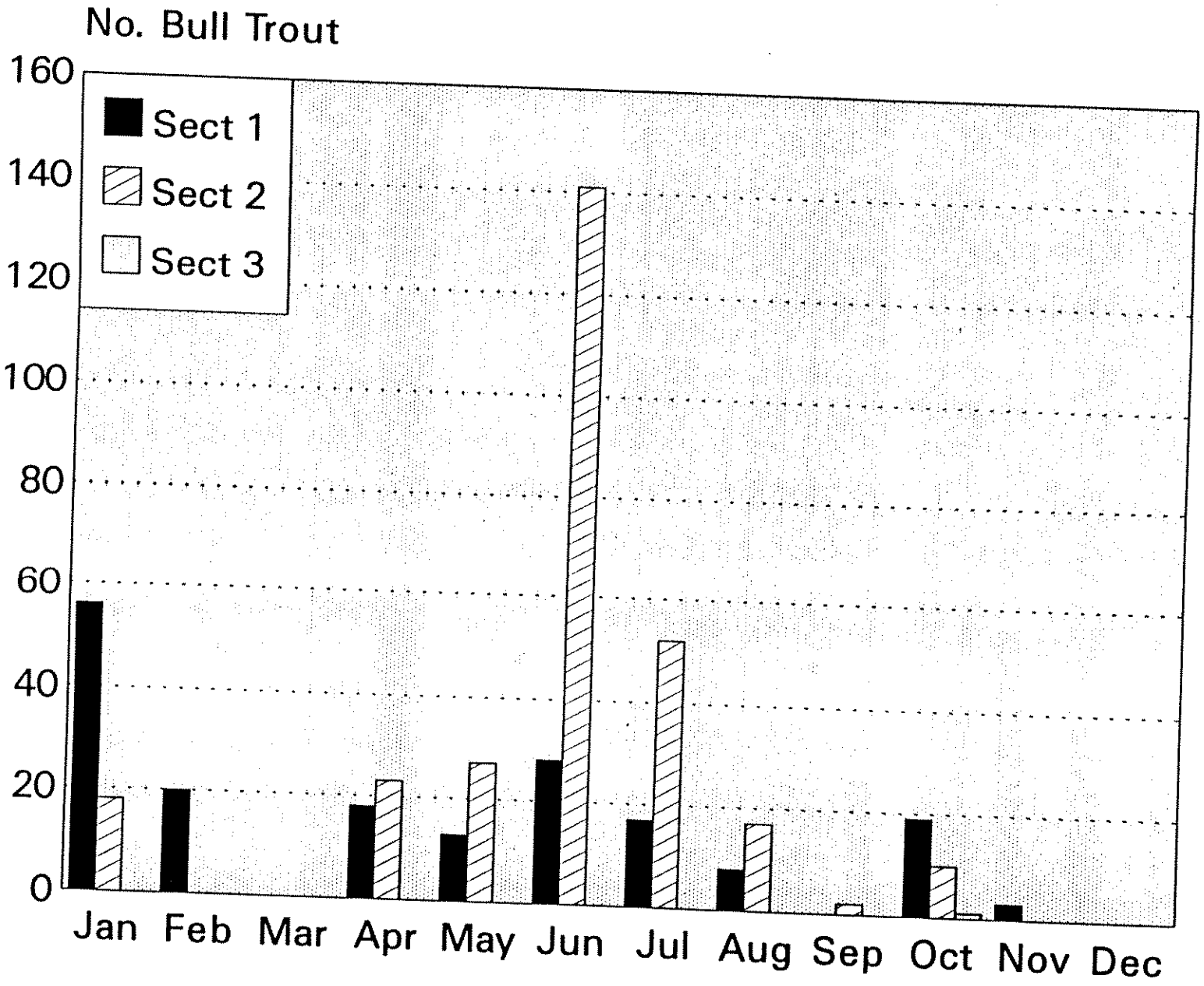

Table 8. Mean monthly catch and harvest rates for bull trout in Swan Lake, 1995.

Month	Bull Trout Caught/Hour	Bull Trout Harvested/Hour	Percent Kept
January	0.16	0.05	35
February	0.15	0.10	71
March	0.24	0.00	0
April	0.05	0.02	32
May	0.06	0.01	23
June	0.03	0.02	45
July	0.02	0.01	50
August	0.02	0.01	55
September	0.01	0.01	8
October	0.74	0.05	7
November	0.21	0.02	27
December	0.50	0.00	0
Annual Mean	0.07	0.01	

Pressure

During the 1983-84 creel (Leathe and Enk 1985), anglers expended an estimated 21,734 hours (±2,540 hours; 95 percent C.I.) of fishing effort on Swan Lake compared to 38,819 hours (±2,425 hours; 95 percent C.I.) in 1995. This represents a 44 percent increase in pressure over the 11-year period, averaging a 4 percent increase per year. Anglers tended to fish longer per day in 1995 averaging 4.39 hours per completed trip versus 3.17 hours in 1983-84. Angler-day estimates on these values were 7,093 in 1983-84, and 8,833 during 1995, suggesting only a 20 percent increase in angler-day pressure from 1984 to 1995. The seasonal distribution of pressure by angler types and lake areas fished was very similar during both creels.

McFarland (1996) estimated 9,315 angler days of pressure on Swan Lake through the Statewide Mail Survey for the March 1995 through February 1996 fishing season. A mail survey during the 1985 license year estimated a pressure of 7,621 angler days which suggests an 18 percent increase over the period (McFarland 1989).

Harvest

A 44 percent increase in pressure between 1984 and 1995 did not yield a higher harvest rate in 1995. In fact, we estimate 39 percent less gamefish were harvested in 1995 versus 1984 (Table 16).

Additional tables within Leathe and Enk (1985) and this report allow comparison on the following subjects: monthly catch rates by species, summary of bait types, fishing party origins, and target species preference.

Swan Lake Bull Trout Status

As mentioned previously, a major objective of this creel was to determine the present harvest level of bull trout in Swan Lake. We also evaluated redd count data, adult population levels, and other changes occurring between the 1983-84 and 1995 creel survey periods that pertain to the present status of bull trout in the Swan Drainage.

The overall annual estimated harvest of bull trout declined from 738 in 1983-84 to 482 during 1995, representing a reduction of 35 percent for the period. The ratio of juvenile to adult fish in the harvest was very similar during both creel periods where 50 percent were juveniles in 1983-84 and 47 percent were juveniles in 1995.

To determine if harvest was negatively impacting the entire population, we incorporated redd count data to estimate the total number of bull trout in Swan Lake for the fall of 1996. A basin-wide survey covering all bull trout spawning streams yielded a total of 748 redds. Based on trapping data and spawner counts in Flathead tributaries (Fraley and Shepard 1989), we then multiplied the total redd count by 3.2 fish to represent the total number of adult fish per

Table 16. Annual harvest estimates of gamefish species from 1983-84 and 1995 Swan Lake creel surveys (95% confidence interval in parenthesis) and the percent decrease. The estimated harvest of bull trout for 1983-84 includes both Swan Lake and Swan River harvest.

Species	1983-84	1995	% Decrease
Kokanee	14,430 (±3,392)	8,791 (±1,410)	-39
Northern Pike	1,238 (±461)	932 (±235)	-25
Bull Trout (Lake)	739 (±263)	482 (±114)	-35
(River)	564 (±264)		
(Total)	1,303		
Rainbow Trout	284 (±182)	205 (±109)	-28
Cutthroat Trout	238 (±147)	204 (±78)	-14
Total	17,493	10,670	-39

completed redd or 2,394 adult fish. In Swan Lake we also assume alternate year spawning which doubles this value resulting in 4,787 total adult fish after spawning in 1996, or 1.8 bull trout per surface acre. In 1995, it is estimated that 482 bull trout were harvested of which 53 percent were adults (256). Therefore, only 5 percent of the adult population was harvested having no appreciable impact on the population.

During the 1983-84 creel period, anglers harvested an estimated 738 bull trout from Swan Lake and 564 from the Swan River and tributaries, totaling 1,302 fish. In the lake and river, 50 and 44 percent of the harvest were adult bull trout, respectively. During 1995, a total of only 482 bull trout were harvested, representing a reduction of 63 percent for the period. The ratio of juvenile to adult fish in the harvest was similar, where 53 percent were adults in 1995.

Bull trout redd counts for the Swan Drainage have been annually conducted on monitoring streams since 1982 (Table 17). These monitoring streams currently represent 70 percent of the total drainage tributary spawning based on entire basin surveys, conducted during selected years (MFWP unpublished file data). Redd count data indicate that adult bull trout numbers are increasing significantly and record high counts occurred in 1996 (Table 19).

To determine if harvest is negatively impacting the population, and to allow comparison between creel surveys, we incorporated redd count data to estimate total numbers of adult bull trout in Swan Lake during the two creel periods.

During 1995, 501 bull trout redds were counted in the four Swan Drainage monitoring streams which represent approximately 70 percent of the spawning from basin-wide counts, covering all spawning streams. Therefore, we estimate 715 redds were constructed throughout the drainage and from experience and profession judgement we further expanded this count by 25 percent to account for unsurveyed areas, missed redds, or superimposition. This assumption increases the counts to 894 redds throughout the Swan Drainage. We then multiplied the redd count total by factors which account for the number of adults per redd, alternate year spawning, and harvested adults during 1995. We also assume from trapping and redd count comparisons (Fraley and Shepard 1989) that the average number of adult fish per redd equals 3.2 fish. To account for alternate year spawning (Fraley and Shepard 1989, Leathe and Enk 1985) we multiplied this value by two. To represent the total adult bull trout population for Swan Lake in 1995, we also added the adult harvest that occurred throughout the year (53 percent of 482, or 256), yielding a total lake population estimate of 5,977 adult fish, or 2.2 per surface acre. Therefore, anglers harvested only an estimated 4 percent of the adult population from Swan Lake in 1995. If we make the same interpretations during 1984 and assume similar harvests for June through December as in 1983 (Leathe and Enk 1985), then the total lake population estimate for 1984 was 3,983 adult bull trout or 1.5 per surface acre. Harvest during this period was much higher since this represented 33 percent of the adult population.

Table 17. Summary of Swan Drainage bull trout redd counts from 1982-1996 in stream sections monitored annually.

Stream	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Elk	56	91	93	19	53	162	201	186	136	140	143	139	195	150	176
Goat	33	39	31	40	56	31	46	34	27	31	17	64	66	32	52
Squeezer	41	57	83	24	55	64	9[a/]	67	42	101	115	106	91	149	117
Lion	63	49	88	26	46	33	65	84	58	94	100	123	141	170	180
TOTAL	193	236	295	109[a/]	210	290	321[a/]	371	263	366	375	432	493	501	526

[a/] High flows may have obliterated some redds.

Since 1984, daily stream limits have been progressively reduced from 1 bull trout, 18" minimum, to closure of all Swan streams to fishing for bull trout in 1993. In 1982, one major spawning stream (Elk Creek) was closed to fishing and in 1985, the three remaining major spawning streams (Lion, Goat, and Squeezer creeks) were also closed to fishing to protect bull trout. In Swan Lake, the daily limit was reduced in 1985 from 10 pounds and 1 fish, 18" minimum, to the present limit of one bull trout daily.

To summarize, the adult bull trout population in the Swan Drainage has increased from an estimated 3,983 fish in 1984 to 5,977 fish in 1995. Angler pressure during the same period increased 44 percent from 21,734 hours to an estimated 38,819 hours. Harvest decreased over the period for a number of reasons: more restrictive regulations and stream closures; only 13 percent of the anglers were selecting for bull trout in 1995 versus 30 percent in 1983-84; mean annual harvest rates dropped from 0.09 per hour to 0.01 in 1995; and anglers kept 35 percent of the bull trout caught in 1983-84 versus 14 percent in 1995.

A petition to list bull trout as a threatened or endangered species throughout their range was also submitted in 1992. This focused attention on the species and Swan Lake is presently the only state water allowing harvest of bull trout. Consequently, anglers are likely more aware of the situation facing the species, which is reflected by the reduction in harvest. In conclusion, we feel the bull trout fishery in Swan Lake is sustainable at the present and possibly a higher harvest level. Present regulations are protecting the species and maintaining a healthy population, while providing a sport fishery.