THE YIELD AND STANDING CROP OF FISH IN DAILEY LAKE, MONTANA

by

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I was born October 15, 1932 in Livingston, Montana and graduated from Park County High School there in 1950. I served with the United States Air Force from April 1952 to April 1956. In 1953 I married Sylvia Spencer and we now have two children.

During the summers of 1958-1961 I was employed by the Montana Fish and Game Department. I entered Montana State College in 1956, receiving a B.S. in Fish and Wildlife Management in 1960.

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ABSTRACT

A creel census was conducted on Dailey Lake during the summers of 1960 and 1961. An estimate of the standing crop of fish was made in 1961 by a mark and recovery method. Fishermen harvested 34.3 pounds per acre of rainbow trout, 4.5 pounds per acre of kokanee and 8.4 pounds per acre of yellow perch in 1960. Fishermen harvested 27.8 pounds per acre of rainbow trout, 4.3 pounds per acre of kokanee, and 11.7 pounds per acre of yellow perch in 1961. The total catch per hour was 0.5 in 1960 and 0.81 in 1961. An estimated 4,394 rainbow trout of the 1961 plant were harvested during the 1961 census period giving a return of 23 percent the first year. The standing crop of fish in Dailey Lake was 86.1 pounds per acre in 1961, of which 35 pounds were rainbow trout, 23.6 pounds yellow perch, 19.8 pounds kokanee, and 7.7 pounds longnose suckers. Natural mortality probably accounts for 50 percent of the stocked rainbow trout.

INTRODUCTION

A considerable number of population studies have been made on warm-water fish, especially in ponds; however, only a few concern trout populations in lakes. These latter include studies of: Grebe Lake in Yellowstone National Park (Kruse, 1959), four lakes in New York (Hatch and Webster, 1961) and six lakes in Wisconsin and Michigan (Johnson and Hasler, 1954). The present study was conducted on Dailey Lake, in Montana, during June through September of 1960 and 1961. The objectives were to determine the standing crop, species composition and angler harvest of fish.

This lake is located in the Yellowstone River drainage approximately 30 miles north of Yellowstone National Park. It lies in the foothills of the Absaroka Mountain Range at an elevation of 5200 feet mean sea level. Dailey Lake (Figure 1) has a surface area of 204 acres and a maximum depth of 24 feet. During the study period the maximum surface water temperature was 71° F and the minimum 41° F. No marked thermal stratification was observed during the investigation. This was probably due to frequent, strong winds which circulate the water during the ice free period (April-October). The lake is fed by a diversion from a nearby stream which usually flows only during the spring and fall, and also by a small spring and by runoff, largely from melting snow. The outlet is small and flows only during periods of high water. Chemical analysis of the lake water showed the following: methyl orange alkalinity, 320-360 p.p.m.; pH, 8.2-8.6; and total dissolved solids, 403 p.p.m. (one sample).

Aquatic vegetation is abundant in Dailey Lake. Extensive stands of

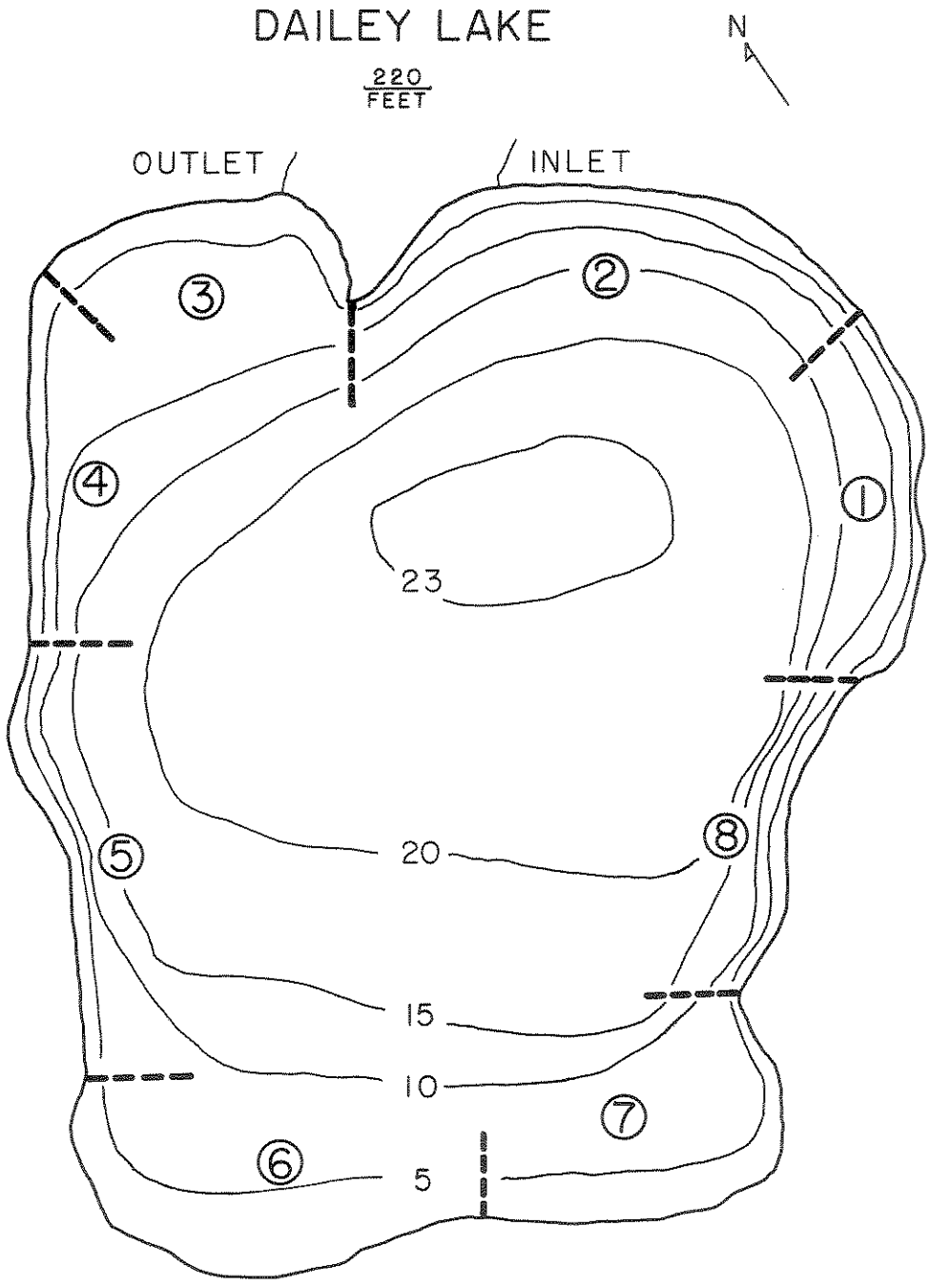

Fig. 1. Dailey Lake, Montana. Circled numbers denote sections used during the marking and recovery study.

bullrush (Scirpus validus) were found in the shallow water along the south end while emergent vegetation was sparse or absent in other parts of the lake. Large Chara beds were found over much of the lake bottom in areas less than 15 feet in depth. Other submerged vegetation was confined to small scattered patches in the shallow areas.

The fish included in the population study in order of decreasing abundance are as follows: yellow perch (Perca flavescens), rainbow trout (Salmo gairdneri), kokanee (Onchorhynchus nerka kennerlyi), and longnose sucker (Catostomus catostomus). Other species present include cutthroat trout (Salmo clarki), brown trout (Salmo trutta), largemouth bass (Micropterus salmoides), black crappie (Pomoxis nigromaculatus), white sucker (Catostomus commersoni), and the lake chub (Hybopsis plumbea). Of these, only the lake chub is abundant.

Yellow perch were probably first introduced in 1944 along with largemouth bass and bluegill (Lepomis macrochirus). Rainbow trout were initially planted in 1947 and since 1951 have been stocked each year. During the study 20,000 of these (total length, 4-12 inches) were planted each year. In 1961 all of the rainbow were marked by removing the right pelvic fin. The longnose sucker was introduced, at an unknown time, probably by bait fishermen. Kokanee have been planted continuously since 1955 at the rate of 50,000 fry annually.

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CREEL CENSUS

Methods

During 1960 and 1961 Dailey Lake was open to angling from the last Sunday in May through November 30. Snagging of kokanee was permitted from October 1 through December 31 in both years. A checking station, located on the main access road to the lake, made it possible to interview 85 percent of the summer fishermen in 1960 and 90 percent in 1961. The following information was recorded for each fisherman: Number of hours fished; number of fish caught; species caught; method of fishing (boat or shore). The type of fisherman (perch or trout) and the number of fin-clipped trout in the catch was also recorded in 1961. Approximately 70 percent of the trout in the creel were examined for missing fins. The ratio of clipped to unclipped fish in the creels examined was applied to those creels not examined to obtain the total number of fin-clipped rainbow taken by fishermen during the 1961 census sample.

To obtain a representative sample, the census periods (May 30-September 30, 1960 and May 31 - October 13, 1961) were divided into three-week intervals. A group of seven days, with each day of the week being repre-

sented once, was then randomly selected from each three week interval to make up a sampling period. In 1961 all holidays were also included in the sample.

For estimating the number of fish, fishermen, and hours, the census period was divided into three strata in 1960: stratum I, opening day; stratum II, weekend days and holidays; stratum III, weekdays (Monday - Friday). The 1961 census period was divided into five strata: stratum I, opening day; stratum II, weekend days and holidays through Labor day; stratum III, weekdays through Labor day; stratum IV, weekend days after Labor day; stratum V, weekdays after Labor day.

Estimates with 95 percent confidence limits were determined by the method outlined by Cochran (1953, pp. 72-73). To obtain total harvest and pressure (Table 1) estimates for strata II-III in 1960 and strata II-V in 1961 were computed to supplement the actual counts of stratum I.

Average total length was determined by measuring a random sample of the catch each year. Average weight was found by comparing the average length of creel caught fish to the weights of fish of the same length taken in gill nets during the 1960 and 1961 season. The pounds of fish harvested were computed by multiplying the estimated number of fish caught by their average weight.

CREEL CENSUS

Results

The estimated fishing pressure and harvest for both census periods is given in Table 1. Although the 1961 census period was two weeks longer

Table 1. Estimated number of fish, fishermen, and hours of fishing for 1960 and 1961 (95 percent confidence limits).

Strata	Rainbow trout			Kokanee			Yellow perch			Fishermen			Hours		
							1960								
I	696	696	696	419	419	419	3	3	3	338	338	338	1716	1716	1716
II-III	7998	9742	10946	348	845	1342	3239	5042	6845	6331	7669	9007	22509	28090	33671
Total	8694	10438	11642	767	1264	1761	3242	5045	6848	6669	8007	9345	24225	29806	35387
							1961								
I	876	876	876	510	510	510	229	229	229	442	442	442	2220	2220	2220
II-V	8356	9417	10478	513	701	889	6725	7972	9219	4776	5329	5882	19490	22163	24836
Total	9232	10293	11354	1023	1211	1399	6954	8201	9448	5218	5771	6324	21710	24383	27056

than in 1960, approximately the same number of rainbow and kokanee were harvested each year. The catch of yellow perch increased by about 60 percent in 1961. While the total number of fish caught in 1961 was greater than in 1960, the total weight harvested (Table 2) decreased by 700 pounds.

Table 2. Average length, weight, pounds harvested, and composition of the catch for the 1960 and 1961 census period.

	Average length		Average weight		Pounds harvested		Pounds per surface acre		Percent of catch	
	1960	1961	1960	1961	1960	1961	1960	1961	1960	1961
Rainbow trout	12.0	11.6	0.67	0.55	6,994	5,661	34.3	27.8	62.4	52.2
Kokanee	12.6	12.7	0.72	0.72	910	872	4.5	4.3	7.5	6.2
Yellow perch	8.4	8.1	0.34	0.29	1,715	2,378	8.4	11.7	30.1	41.6
Total					9,619	8,911	47.2	43.8		

The average weights (Table 2) of rainbow and yellow perch decreased by 0.12 and 0.05 pounds respectively from 1960 to 1961. This decrease in size is also shown by comparing average total lengths of rainbow taken the opening day for four different fishing seasons. These are as follows: 1955 - 15.9 inches; 1957 - 14.7 inches; 1960 - 13.2 inches; 1961 - 12.2 inches.

The number of fishermen decreased in 1961 while the average number of hours fished, the total catch per hour and number of fish per fisherman increased (Table 3).

Table 3. Fishing intensity and rate of catch for the 1960 and 1961 census period.

	Fishermen per acre	Hours per acre	Total catch per hour	Hours per fisherman	Average number fish per fisherman
1960	39.5	146	0.56	3.7	2.1
1961	28.3	120	0.81	4.2	3.4

The catch of kokanee on opening day (strata I) accounted for 33 percent of the total kokanee catch in 1960 and 42 percent in 1961 (Table 1). Excluding opening day, the catch was highest during the last part of the census period. Kokanee made up 8 percent of the combined rainbow and kokanee harvest during the first three weeks of the census; it averaged 3 percent during July, August and most of September and increased to 20 percent during the last three weeks of the census. A similar pattern was shown by Bjornn (1961) in Idaho. He related the higher catch in the early summer and fall to lower water temperatures during these periods.

The fishing success for all trout fishermen (trout and kokanee) in 1961 was 0.47 fish per hour. Excluding the unsuccessful trout fishermen, the catch per hour was 0.63 fish. Thirteen percent of the trout fishermen caught 47.4 percent of the rainbow and kokanee. Percentage composition of the catch is given in Table 2. The combined harvest of salmonids was 38.8 pounds per surface acre in 1960 and 32.1 pounds in 1961. Georgetown Lake, Montana (2,800 acres) had a catch per hour of 0.50 and a harvest of 14.3 pounds per acre of game fish (salmonids) during the summer season of 1958 (Averett and Whitney, 1959). The total harvest of game fish in this lake for the 1958-59 season (including a partial winter fishery) was 29.4 pounds per surface acre.

Yellow perch fishermen, while making up only 5 percent of the total, had a high rate of success. They averaged 11.3 perch per angler and had a catch per hour of 2.23. The total harvest by all fishermen was 11.7 pounds per surface acre.

An estimated 4,394 rainbow of the 1961 plant were harvested during the 1961 census period giving a return of 23 percent. They made up 46.9 percent of the rainbow harvested during this period.

POPULATION ESTIMATES

Methods

Two types of estimates were made. The first was based on fish taken by trap nets, a seine, and sport fishermen from July 26 to September 7. The second was based on fish taken in gill nets from September 11-13.

Two trap nets, similar to the one described by Crowe (1950), were used. These had leads of 125 feet and both the nets and leads were of 0.5 inch bar mesh. They were set facing shore in water ranging from 8 to 12 feet in depth and were fished continuously during the 44 day period. The seine (0.5 inch bar mesh) was 300 feet long, 12 feet deep at the center and tapered to a depth of 7 feet at each end. Seining was usually done on two consecutive nights and then discontinued for three nights depending upon the weather and help available. Only those areas less than 15 feet in depth were fished with the traps and seine. These were divided into eight sections (Figure 1). The north portion, referred to subsequently, includes sections 1 through 4 while the south portion includes sections 5 through 8. An effort was made to mark fish from all sections, however, the greatest amount of effort was applied to sections 2, 3, 6, and 7 where fish were more abundant. Seining was the principal method of capturing fish in the north portion while trapping was the main method in the south. Except for two small areas, seining was practically impossible in

the south portion due to aquatic vegetation and consequently the two available traps were used here.

Fish taken in the traps and the seine were fin clipped with two objectives in mind. The first was to have recognizable fish for population estimates and the second was to determine if there was random mixing of fish between the north and south portions. Rainbow trout stocked in 1961 had the right pelvic fin removed before planting. All fish of this species taken in the traps and seine were marked by removing the left pelvic fin. A hole was punched in the dorsal lobe of the caudal fin for trout taken in the north portion and in the ventral lobe for those taken in the south portion. Kokanee and longnose suckers were marked by removing the right pelvic fin for those captured in the north and the left pelvic for those in the south. The right pectoral fins of perch were removed for those captured in the north and the left pectoral for those in the south. There was no indication that any of the clipped fins had regenerated during the marking and recapturing period. There was evidence of slight regeneration of caudal fin deletions. Fish taken in the traps and seine were taken to the approximate center of the lake, fin clipped and released. The same two persons marked and checked all fish during the estimating period.

Fish were divided into length groups for population estimates. Two groups of trout were recognized; those planted in 1961 (1 year old); and all others (2 years or older). Yellow perch were also separated into two groups; those from 7.2 to 9.2 inches (3 years old), and those over 9.2 inches (4 years old or older). Perch between 5 and 7.1 inches (2 years

old) were too numerous to mark but their numbers were recorded. Only kokanee 11.5 inches or longer and longnose suckers 12.0 inches or longer were included in the population estimate. Very few small kokanee or suckers were taken by traps. No longnose suckers and few small kokanee were known to have been caught by fishermen.

Recruitment into the above classes was considered negligible. Since the rainbow planted in 1961 were all fin clipped before stocking and no successful spawning was observed, there could be no recruitment into either of the trout groups. The two groups of perch could be separated by their length frequency. This was verified by scale reading. Two year old perch were easily distinguished from three year olds but there was some overlap between three and four year old perch. The error in separating these two groups is not considered important. Lengths of the two groups of perch were adjusted every two weeks to allow for recruitment. The lower size limit of three year old perch was 7.2 inches on July 27 and increased to 8.0 inches by September 7. The lower size limit of four year old perch started at 9.3 inches and increased to 10.0 inches by September 7. Longnose suckers taken in traps, gill nets and the seine during the marking and recovery period made up two distinct length groups. The lengths of the two groups were 8.5 inches to 9.5 inches and 12.0 inches to 24 inches. While there was probably some recruitment into the larger group it would not be enough to cause any serious error. Recruitment into the group of kokanee under estimation is thought to be negligible.

Periodic checks were made to determine if there was an increased

mortality of marked over unmarked fish. There was no indication that marked trout or yellow perch suffered any differential mortality, however, five marked kokanee were found dead and this species seemed to suffer a greater mortality from handling than the others.

During the mark and recovery period an effort was made to check the catch of every fisherman leaving the lake. At least 90 percent were checked but at times it was impossible to measure each fish or even check for missing fins. In several cases where there was a large number of perch in the catch only the trout and kokanee were checked. When this happened the ratio of marked to unmarked, and the ratio of three to four year old fish in any week's catch was applied to those fish not checked during the week.

After marking and recapture with the traps and seine had been completed a series of 24 experimental gill nets was set in the lake. These were 125 feet long and 6 feet deep with mesh sizes ranging from 3/4 to 2 inches (bar measure). Six sets were made each day for four days. Twelve nets were set randomly in each end of the lake.

POPULATION ESTIMATES

Results

The population of fish was estimated by the Schnabel and Peterson methods. The Schnabel estimates with 95 percent confidence limits were computed from formulas 3.13 and 3.14 given by Ricker (1958). The Peterson estimates with 95 percent confidence limits were computed using formulas 2, 3 and 5 of Institute for Fisheries Research (1960).

The assumptions that must be met to give valid estimates by the above methods are listed by Ricker (1958). After inspection of the factors involved, it was felt that; unequal vulnerability of marked fish, loss of marks, failure to recognize or report marked fish, and recruitment into established classes could be disregarded as causing serious errors in the Schnabel estimates.

Ricker (1958) states, "To make a marking experiment representative, it is necessary that either the marked fish or the total fishing effort be randomly distributed over the population being sampled". Since fishing effort (traps and seine) was not randomly distributed, it was expected that fish released, at a central point would distribute themselves randomly around the lake. Of 189 one year old trout recaptured in the traps and seine (149 of these were originally marked in the north portion and 40 in the south), 163 were recovered in the same portion where marked while 26 were recovered in the opposite portion. This tendency to return to the same portion of the lake where originally marked, was also exhibited by trout two years old or older. The assumption of random distribution is not met; therefore, an estimate based on the combination of both north and south recaptures would be low. The combined Schnabel estimate was 6,746 for one year old trout and 2,685 for trout two years old or older. Separating the lake into north and south portions and estimating the population in each separately, as was done by Lagler and Ricker (1942), the Schnabel estimate was 11,090 for one year old trout and 3,699 for trout two years or older. Freiden (1950) suggests that different methods be

used to capture fish so that selectivity of each type of gear is minimized. Waters (1960) found that by using mixed procedures (trap and recapture by angling, or angling and recapture by trap) more accurate estimates were obtained. The assumption that fishing effort be proportional to the number of fish present in different parts of the water, is best met in this study by the trap, and recapture by angling method. This estimate, computed by the Schnabel method, is given in Table 4.

Table 4. Comparison of estimates made on trout and yellow perch by the Schnabel and Peterson method (95 percent confidence limits). The first method is based on fish recaptured by angling and the second on fish recaptured in gill nets.

		Lower	$\hat{P}$	Upper
Rainbow One year old	Schnabel	11,005	13,130	16,268
	Peterson	12,339	15,461	21,830
Rainbow Two years old or older	Schnabel	3,975	4,932	6,495
	Peterson	5,764	8,024	15,920
Yellow Perch Three years old	Schnabel	7,968	9,064	11,743
	Peterson	7,489	9,381	13,221
Yellow Perch Four years old or older	Schnabel	2,414	3,018	4,024
	Peterson	5,492	6,662	12,554

During the mark and recapture period, yellow perch were concentrated in the south sections of the lake, particularly in sections 6 and 7. Relatively few perch were taken by seining in the north portion of the lake. Traps were set for several days in the north portion to determine if seining was an ineffective method of capturing perch or if perch moved out of the seining areas at night. Few perch were caught by traps or hook and

line in this portion, but they were readily caught in the south portion. The estimated number of three year old perch based on recaptures in the trap and seine was 8,973 with confidence intervals of 6,475 - 14,611. This is in close agreement with the other two estimates of three year old perch (Table 4). The estimated number of perch, four years old or older, by the above method was 3,715 with confidence intervals of 2,903 - 6,100. This is higher than the Schnabel estimate based on perch recaptured in the creel (Table 4).

Population estimates of kokanee and longnose suckers are not considered to be as reliable as the other estimates. Samples were smaller (Table 5), and their distribution was difficult to determine. Differential mortality between marked and unmarked kokanee is a source of error. There is no way to determine how much this affected the estimate, but it is reasonable to assume differential mortality existed since as many marked as unmarked kokanee were found dead. Estimates based on the small number of recaptures (Table 5) taken by anglers and by gill nets are unreliable. Kokanee also showed a tendency to return to that portion of the lake in which they were originally marked. A combined Schnabel estimate of the population based on kokanee recaptured in the traps and seine was 4,089. When estimates were made separately for north and south portions and then combined, the estimate was 5,066. Most longnose suckers were captured by traps in the south portion. A combined Schnabel estimate based on suckers recaptured in the traps and seine is 627 fish.

Population estimates of trout and perch made by the Schnabel and

Table 5. Summary of fish handled, marked and recaptured during the population study.

		Handled	Marked	Recaptures
Rainbow	Traps and seine	1,823	1,480	198
One year old	Creel	1,618		109
	Gill nets	522		47
Rainbow	Traps and seine	771	639	89
Two years old	Creel	920		70
or older	Gill nets	256		17
Yellow perch	Traps and seine	2,416	2,092	273
Three years	Creel	1,687		215
old	Gill nets	216		42
Yellow perch	Traps and seine	675	617	52
Four years old	Creel	554		65
or older	Gill nets	79		6
Kokanee	Traps and seine	544	479	29
	Creel	58		3
	Gill nets	64		3
Longnose	Traps and seine	146	119	15
sucker	Gill nets	188		9

Peterson methods are given in Table 4. The Schnabel estimates are based on fish captured in the traps and seine and recaptured by fishermen. The Peterson estimates are based on fish captured by the same methods and recaptured by gill nets. The Peterson estimates are higher than the Schnabel in every case. The Schnabel estimates were selected as the most reliable upon which to base standing crop estimates.

Several things could be responsible for the higher estimates obtained by the Peterson method, such as: (1) the relatively small samples taken; (2) natural mortality biasing both estimates upward but having a greater influence on the Peterson estimate because of the time element involved;

(3) the marked fish removed by fishermen missed during creel census, and not subtracted from the marked fish at large, again biasing both estimates upward but having a greater influence on the Peterson estimate.

The standing crop for the groups of fish estimated during this study is given in Table 6. Based on these groups, the total standing crop is

Table 6. Estimated number, average length and weight, and standing crop of fish for 1961.

	Estimated number	Average length	Average weight	Total pounds	Pounds per acre	Fish per acre
Trout						
One year old	13,130	9.5	0.30	3,939	19.3	64.3
Two years old or older	4,932	12.6	0.65	3,206	15.7	24.1
Yellow perch						
Three years old	9,064	8.6	0.36	3,263	15.9	44.4
Four years old or older	3,018	9.8	0.51	1,571	7.7	14.7
Kokanee	5,066	13.5	0.80	4,052	19.8	24.8
Longnose sucker	627	18.3	2.51	1,573	7.7	3.0
Total	35,837			17,604	86.1	175.3

86.1 pounds per acre, but if two year old perch and the smaller kokanee and suckers are included, the total would be something over 100 pounds per acre. Approximately 20,000 two year old perch were captured in the traps and seine. These averaged 0.11 pounds each and would contribute approximately 10 pounds or more per acre to the total standing crop. Game fish (trout and kokanee) had a standing crop of 35 pounds per acre and non-game fish (perch and suckers) 23.6 pounds per acre. Rainbow trout and yellow perch three years old or older had a standing crop of 35 and 23.6

pounds per acre respectively.

Carlander (1955) states, that an average standing crop for trout lakes is something less than 50 pounds per acre. Johnson and Hasler (1954) give a range of 9-92 pounds per acre. Kruse (1959) estimated the standing crop of Grebe Lake to be about 78 pounds per acre (grayling and trout). Mueller and Rokett (1962) estimate about 100 pounds per acre of trout in lake De Smet, Wyoming.

DISCUSSION

When trout and perch are found in the same waters, growth of one or both species may be poor. Eschmeyer (1937) found that survival and growth of trout was good in lakes without perch populations but poor in those that had perch populations. Hays and Livingston (1955) considered perch to be on the same trophic level as trout and found that by partial poisoning of perch and other species the yield of trout was increased. Echo (1955) suggests partial poisoning as a means of reducing the perch population so perch would attain a more useful size and make conditions more favorable for salmonids.

The average length of Dailey Lake trout has decreased, as shown earlier, over the last few years while the average length of perch has increased. Graham (1959) aged Dailey Lake perch collected in the fall of 1958. Average lengths for two, three and four year old perch were as follows: 4.7, 7.1 and 8.8 inches respectively. Two, three and four year old perch collected during the mark and recapture study had an average length of 6.4, 9.0 and 10.2 inches respectively. The large die off of

perch which occurred in Dailey Lake in 1959 (Ross et al., 1960) reduced the numbers and consequently could be the cause for this increased growth rate. The decrease in the growth rate of trout may have resulted from over stocking, competition between trout and perch or a combination of these and/or other factors.

Rainbow trout were stocked at the rate of 20,000 fish per year and approximately 10,000 were taken each year by fishermen during the study period. Natural mortality probably accounts for approximately 50 percent of the stocked rainbow. Data from the population estimates and creel census show that by fall about 16,000 rainbow trout were left in the lake, 12,000 of which were planted that year and the rest were fish two years old or older.

SUMMARY

1. A creel census was conducted on Dailey Lake during the summers of 1960 and 1961. An estimate of the standing crop of fish was made during late summer in 1961 by the Schnabel and Peterson method.

2. The estimated catch during 1960 was 10,438 rainbow trout (34.3 pounds per acre), 1,264 kokanee (4.5 pounds per acre) and 5,045 yellow perch (8.4 pounds per acre). The estimated catch during 1961 was 10,293 rainbow trout (27.8 pounds per acre), 1,211 kokanee (4.3 pounds per acre), and 8,201 yellow perch (11.7 pounds per acre).

3. An estimated 8,007 anglers fishing 29,806 hours harvested 9,619 pounds of fish in 1960 and 5,771 anglers fishing 24,383 hours harvested 8,911 pounds of fish in 1961.

4. Anglers averaged 2.1 fish per fisherman at a rate of 0.5 fish per hour in 1960 and averaged 3.4 fish per fisherman at a rate of 0.81 fish per hour in 1961.

5. All trout fishermen (trout and kokanee) had a catch per hour of 0.47 and successful trout fishermen had a catch per hour of 0.63 during 1961. Thirteen percent of the trout fishermen caught 47.4 percent of the rainbow and kokanee. Perch fishermen averaged 11.3 perch and had a catch per hour of 2.2.

6. The catch of kokanee on opening day made up 33 percent of the total catch in 1960 and 42 percent in 1961.

7. An estimated 4,394 rainbow trout of the 1961 plant were harvested during the 1961 census period giving a return of 23 percent the first year.

8. The standing crop of fish in Dailey Lake was 86.1 pounds per acre of which 35 pounds were rainbow trout, 23.6 pounds yellow perch, 3 years old or older, 19.8 pounds kokanee 11.5 inches or longer and 7.7 pounds longnose suckers 12.0 inches or longer.

9. The average length of trout has decreased over the past several years while the average length of perch has increased. The increased perch growth may be attributed to a large die off of perch in 1959.

10. Natural mortality probably accounts for approximately 50 percent of the stocked rainbow trout.

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