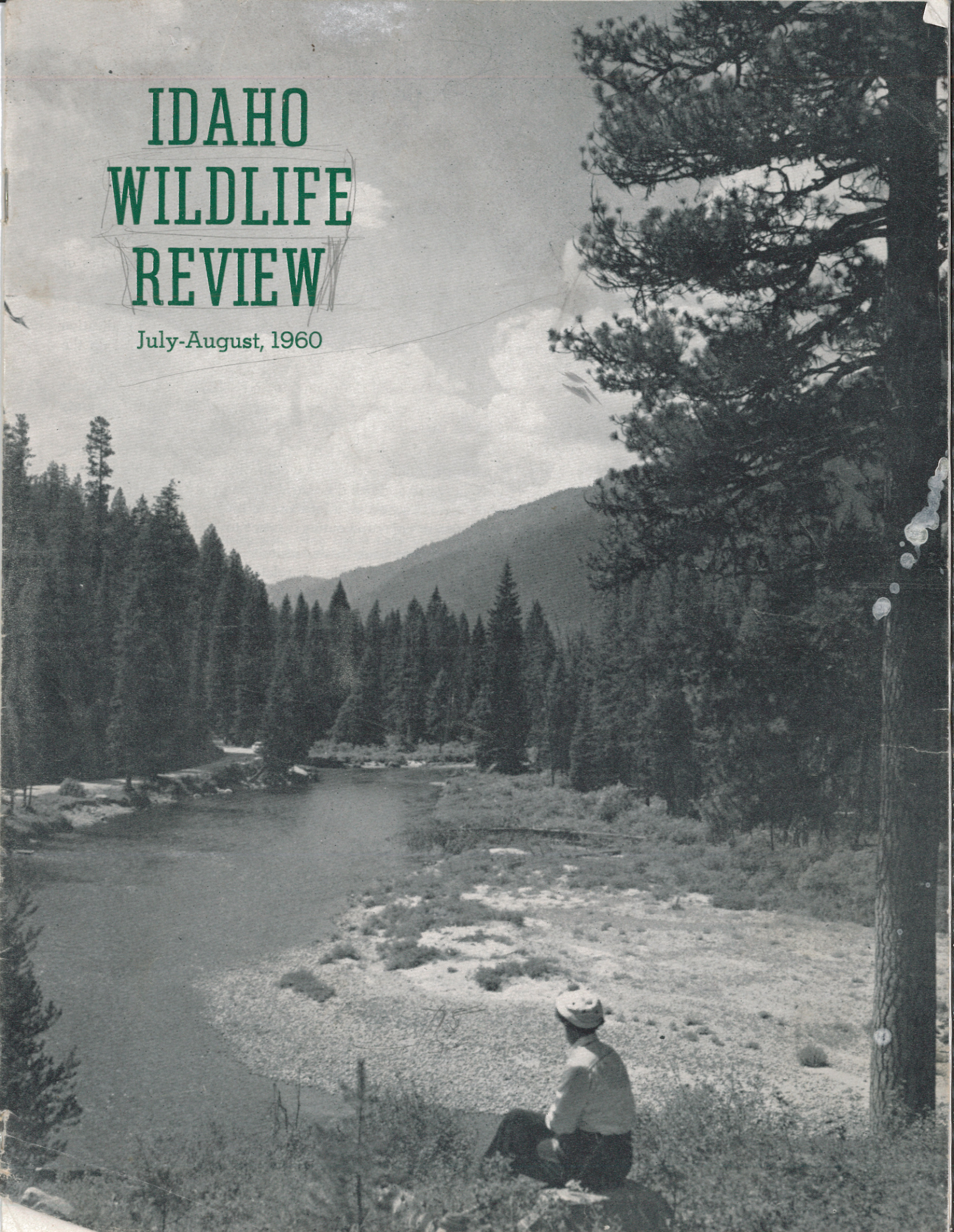
IDAHO WILDLIFE REVIEW

July-August, 1960



The headwaters of the main Salmon River with the Sawtooth Mountains in the background. This area is the objective of many salmon and steelhead after their long migration from the Pacific Ocean.

Salmon and Steelhead In Idaho

by Ted C. Bjornn
(Fisheries Biologist)

Salmon and steelhead that enter Idaho provide sport fishing in the ocean, lower Columbia River, and Idaho in addition to the annual commercial harvest. One out of every seven anglers in Idaho fished for chinook salmon and/or steelhead trout during 1958. Idaho sport fishermen spent approximately 105,000 days fishing for chinook salmon and 173,000 days for steelhead in 1958.

Two of the five species of Pacific salmon enter Idaho streams after spending part of their life in the ocean. The chinook salmon, of which there are three races (spring, summer, and fall), is present in the Snake River below Swan Falls Dam, the Salmon River, and in limited numbers in the Clearwater River.

The sockeye salmon, once abundant in the Payette and Salmon River systems, is now present in relatively small numbers and spawns in Redfish Lake at the headwaters of the Salmon River.

In addition to the two species of salmon, a large run of steelhead trout also enters Idaho streams each year.

A review of the commercial and sport fishery regulations, history and status of the stocks entering Idaho follows:

Commercial Fishery Regulations

The commercial fishery for salmon and steelhead that enter the Columbia River began in the mid-1800's. Fishing gear in use during early operations included traps, haul seines, fish wheels, dip nets, purse seines, and gill nets.

Legislation by the States of Oregon and Washington has eliminated all but drift gill nets, dip nets, and sports gear from the Columbia River salmon fishery.

Prior to 1957, commercial fishing was allowed from the mouth of the Columbia River to the mouth of the Deschutes River, a distance of almost 200 miles. In 1957, commercial fishing above Bonneville Dam was eliminated and The Dalles Dam flooded Celilo Falls, the site of an extensive Indian fishery.

Commercial fishing regulations for the Columbia River are identical in most instances for both Washington and Oregon. One exception is that by law the steelhead is a sport fish in Washington and a commercial species in Oregon.

There has been a gradual decline in the number of days in which commercial fishing was permitted. In 1938, commercial fishing was allowed on 272 days while in 1959 the season has been reduced to 97 days (Figure 1).

The present commercial season allows fishing for a two-week period in February on downriver chinook salmon and steelhead; a three-week season with week-end closures during May for upriver spring chinook salmon; a four-week season with week-end closures during late June and

Statistics and graphs presented with this article are from "A Biological Report For Columbia River Commercial Fisheries" prepared for a Columbia River regulation Hearing January, 1960. The report was prepared jointly by the Oregon Fish Commission and the Washington Department of Fisheries.

early July for spring and summer chinook salmon and steelhead; a four-week season with week-end closures in August for fall-run salmon and summer steelhead, and a four-week season with weekly four-day closures in September and October for fall-run salmon.

The 1959 commercial fishing seasons with the period of migration of the upriver races of salmon and steelhead through the fishing area is presented diagramatically in Figure 2,

Sport Fishery Regulations

Significant numbers of upriver chinook salmon and steelhead trout are taken by sport fishermen from the Columbia and lower Snake Rivers. Sport fishing in these downriver areas is permitted in most areas and at most times that fish are available.

Regulations governing the harvest of salmon and steelhead in Idaho vary with the species involved. Regulations for the steelhead fishery are few and simple while regulations for the chinook salmon fishery are many and complex. Sockeye salmon are protected in Redfish Lake Creek thereby preventing, for all practical purposes, any harvest of this species since it is taken but rarely on hook and line.

High water levels usually provide the protection necessary for spawning steelhead. Chinook salmon spawning on the other hand occurs during the late summer and fall in headwater streams and the fish are quite susceptible to capture.

Over the years, salmon fishing regulations in Idaho have been revised so as to ensure a spawning escapement of about 50 per cent of the run entering Idaho. In 1945, spearing, snagging, or taking salmon by any means other than with hook and line became unlawful.

As fishing pressure increased, closures on the streams where salmon spawning takes place were put into effect. The objects of the regulations are to distribute the allowable harvest among the fishermen and maintain a good spawning escapement.

Chinook Salmon in Idaho

The three races of chinook salmon are separated on the basis of: 1) date of entry into the Columbia River, 2) length of time spent in fresh water before migrating to the ocean, and 3) date of spawning.

Spring Chinook Salmon

There are two groups of spring-run chinook salmon that enter the Columbia River. One group, referred to as the **downriver** spring chinook salmon, enters the river in February and March and spawns principally in tributaries below Bonneville Dam. The other group known as the **upriver** spring run, enters the Columbia River in late March, April, and May. A large portion of these upriver fish are destined for the Salmon River.

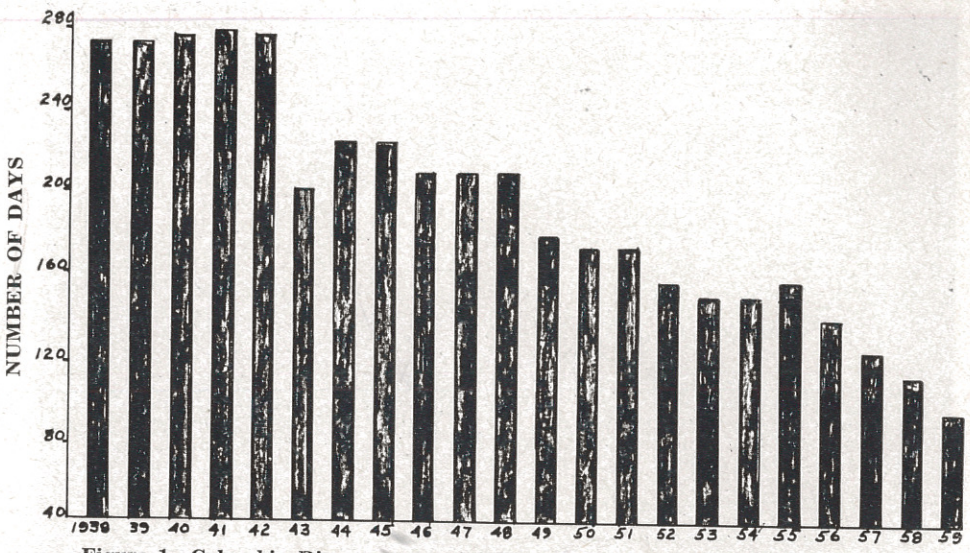


Figure 1. Columbia River commercial fishing seasons below Bonneville Dam, 1938-1959.

Spring chinook salmon spawn in the Salmon River during August and early September. Eggs that are deposited in the gravel in September usually hatch during December. The one-inch fry remain in the gravel nest until the yolk sac attached to the abdomen is absorbed in February or March of the following year.

There is some downstream movement of newly emerged fry during the high water following emergence. However, it appears that most of the spring and summer chinook salmon remain in the streams where they were spawned until fall or the following spring.

Most of the young spring and summer chinook salmon migrate to the ocean during their **second year of life** at a length of 4 to 5 inches.

The spring chinook salmon run is one of the races of salmon entering the Columbia River that has shown

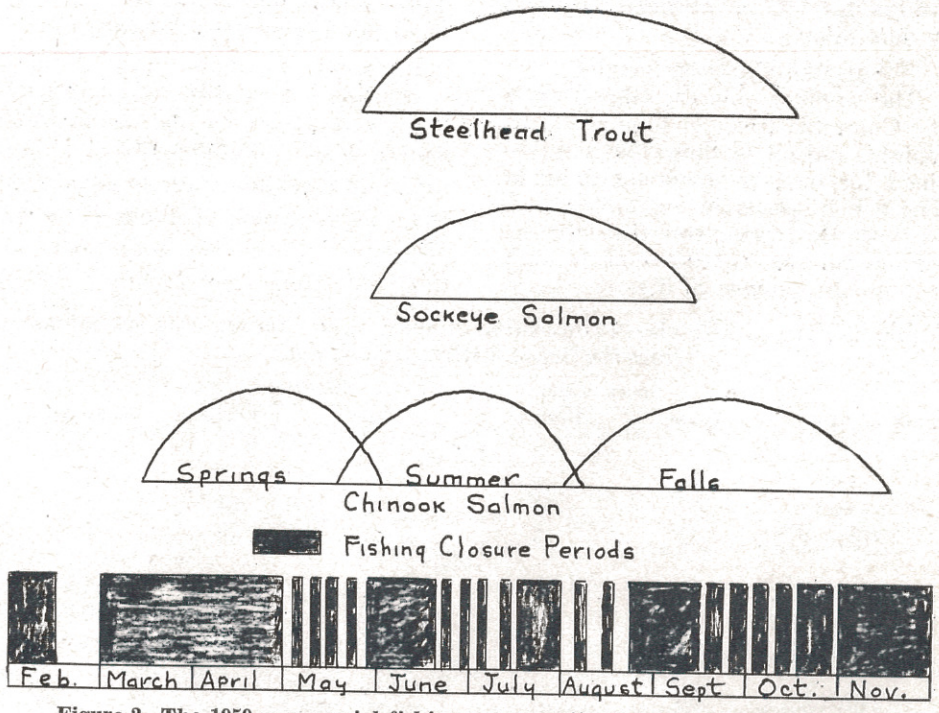
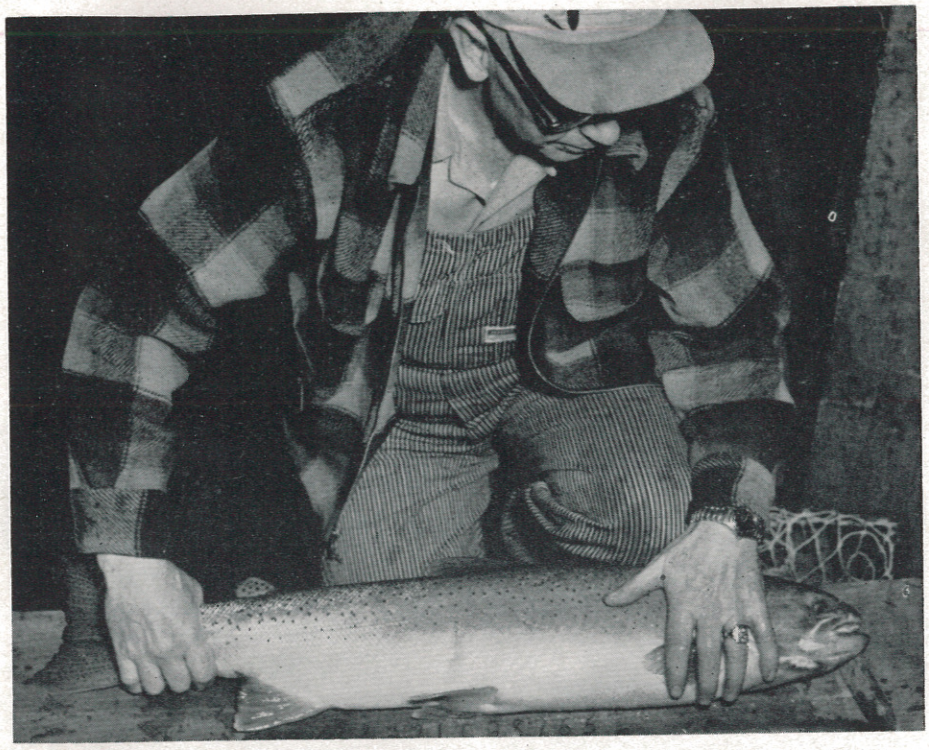


Figure 2. The 1959 commercial fishing seasons with the period of migration of the upriver races of salmon and steelhead through the fishing area below Bonneville Dam.



Steelhead trout being measured at the Lewiston Dam on the Clearwater River. Since 1957, the steelhead run has increased up the Clearwater River.

an upward trend during the last decade. The Columbia River commercial fishery has harvested an average of 60 per cent of the Columbia River run over the past 10 years.

Closure of the commercial fishery above Bonneville Dam will probably help increase the upriver escapement of this run. The commercial take of fish from runs destined for Idaho waters has not, as yet, been accurately determined.

Summer Chinook Salmon

The summer chinook salmon enter the Columbia River in June and July, mainly, and all of these fish are destined for upriver spawning grounds. These fish spawn in September and, as with the spring-run fish, the juveniles migrate to the ocean mainly in their second year of life.

The summer run of chinook salmon has also shown an increase in numbers after a period of relatively small runs in the mid-1940's. Commercial fishing has harvested about 42 per cent of the Columbia River runs for the past 10-year period as compared to 68 per cent for the 10-year period 1940-1949. The commercial catch above Bonneville Dam was normally quite small and comprised only a small portion of the total catch.

The summer chinook run has rapidly improved since 1942 when restrictions were placed on the commercial fishery in the Columbia River.

Chinook salmon migrate upstream at an average rate of about 12 miles per day. Salmon have been taken in the Snake River near Lewiston about the first of May and at the mouth of the Lemhi River near Salmon about the first of June.

During a normal water year, fishermen begin to catch chinook salmon from the upper portion of the Salmon River drainage during the latter part of June.

At an average rate of migration, it would take a salmon about 32 days to reach the mouth of the Middle Fork from McNary Dam, 41 days to Challis, and 50 days to Redfish Lake.

During the years of 1951-1959, aerial counts of spring and summer chinook salmon spawning nests or redds were made throughout the Salmon River drainage. The average distribution of the nests counted is presented in Table 1 and is probably a good indicator of the distribution of fish through the drainage.

The runs of spring and summer chinook salmon are composed of fish in their third, fourth, fifth, and possibly sixth years of life. The abundance of the various age classes may vary from year to year, thereby making it difficult to forecast the size of runs in the future or analyze the productivity of past runs.

Based on length-frequency data collected from fish on the spawning grounds and in the sport catch during 1954-1956, the following age class groupings were made to obtain some measure of the relative abundance of the various age groups.

Year of life	Range in length (inches)
Third	up to 25
Fourth	25 - 34
Fifth and over	35 and over

Table 2. Per cent age class composition of spring and summer chinook salmon from the Salmon River, 1954-1956.

Year of life	Sport catch		Spawners		
	Male	Female	Male	Female	Combined
1954					
Third	71	0	57	1	37
Fourth	27	52	32	64	44
Fifth	2	48	11	35	19
1955					
Third	49	2	33	4	23
Fourth	42	73	60	76	64
Fifth	9	25	7	20	13
1956					
Third	34	3	28	0	20
Fourth	57	58	60	55	58
Fifth	9	39	12	45	22

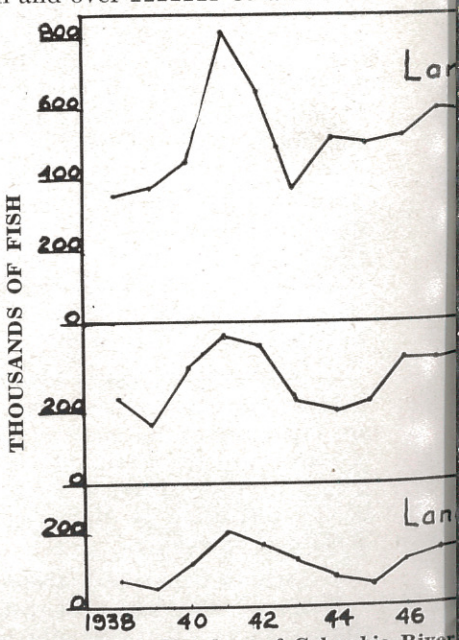


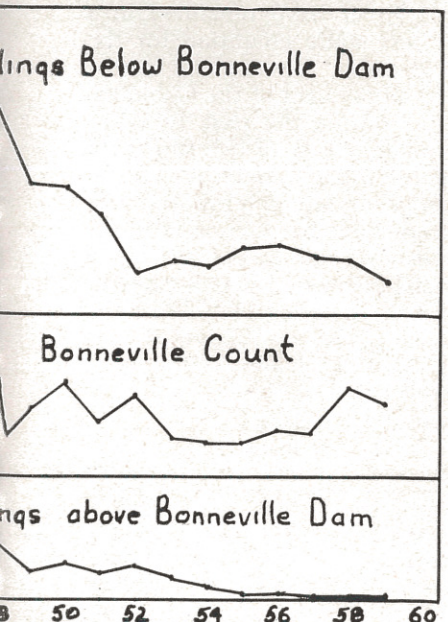
Figure 3. Numbers of Columbia River ville Dam counts, August-D

Table 1. The average distribution of redds in the Salmon River drainage, 1951-1959

Salmon River drainage above Middle Fork	
Panther Creek	1%
North Fork	1
Lemhi River	6
Pahsimeroi River	3
East Fork	7
Yankee Fork	1
Valley Creek	3
Salmon River	19
Middle Fork drainage	
Big Creek	6
Camas Creek	2
Loon Creek	3
Sulphur Creek	3
Marsh Creek drainage	4
Bear Valley Creek	6
Elk Creek	5
Chamberlain Creek	1
Middle Fork	2
South Fork drainage	
Lake Creek and Secesh River	3
Johnson Creek	3
South Fork	21
Totals	100%

From the data available, it appears that chinook salmon up to about 25 inches in length are in their third year of life and have spent one year in the ocean. Fish 25 to 34 inches in length appear to be in their fourth year of life and have spent two years in the ocean. Fish over 35 inches in length are probably in their fifth year of life or more and have spent at least three years in the ocean.

Using the above information, the spring and summer runs that entered Idaho in 1954, 1955, and 1956 have been divided into age groups to illustrate the fluctuations in age class abundance that occur from year to year (Table 2).



ll season chinook landed, and Bonne-
ember, 1938-1959.


A mature sockeye salmon being released at the counting weir below the entrance of Redfish Lake. The only remnant of once big sockeye runs appears at this lake in late summer.

From the information presented in Table 2, it can be seen that fish in their third year of life, usually referred to as "jacks," make up a sizeable portion of the run each year and that nearly all of these younger fish are males. It is also evident that the older age groups contain a higher percentage of females than do the fish in their third and fourth years.

Males outnumber females in the chinook salmon runs by more than 1.5 to 1 most years. During the years 1954-1956, approximately 15 per cent of the spring and summer chinook salmon runs were less than 21 inches in length and only one per cent of these smaller fish were females.

The counts of chinook salmon past McNary Dam during April through August are used as a basis for estimating the size of the spring and summer runs entering Idaho and the Salmon River.

Enumeration studies conducted in 1954-1959 indicate that about 63 per cent of the spring and summer chinook salmon passing McNary Dam were destined for the Salmon River in Idaho (Table 3). The annual escapement of spring and summer chinook salmon to Idaho has ranged from 62,000 to 142,000 during the past six years.

The sport catch in Idaho, as estimated with the Statewide Fishing Harvest Survey, has averaged 45,000 fish since 1954 or slightly more than 50 per cent of the run entering Idaho. There seems to be a tendency for the per cent of the run harvested to be inversely related to the size of the run.

Table 3. Statistics on the spring and summer chinook salmon that entered the Salmon River 1954-1959.

Year	McNary Dam count	Escapement to Idaho	Sport catch		Spawning escapement		Redd count	Per cent unspawned females
			Number	Per cent	Total number	Number females		
1954	117,000	74,000	30,000	41	44,000	16,000	6,242	9.6
1955	98,000	62,000	37,000	60	25,000	11,000	9,394	4.5
1956	106,000	67,000	41,000	61	26,000	11,000	8,608	5.6
1957	225,000	142,000	78,000	55	64,000	26,000	13,689	--
1958	135,000	85,000	49,000	58	36,000	14,000	6,805	--
1959	126,000	79,000					5,818	--

Table 4. The estimated number of summer steelhead entering the Columbia River, McNary Dam counts, Rock Island Dam counts, Lewiston Dam counts, and Idaho sport catch, 1950-1959.

Year	Run entering Columbia	McNary* Dam count	Rock Island Dam count	Lewiston* Dam count	Idaho sport catch
1950	179,000		2,000	4,000	
1951	244,000		2,000	6,000	
1952	383,000		3,000	11,000	
1953	361,000		3,000	7,000	
1954	290,000	73,000	4,000	14,000	25,000
1955	299,000	84,000	5,000	8,000	26,000
1956	201,000	41,000	4,000	4,000	16,000
1957	229,000	105,000	2,000	20,000	40,000
1958	211,000	87,000	4,000	33,000	60,000
1959	239,000	108,000**	6,000	12,000**	

* Fish year, July through June
** To November 1, 1959

The number of days spent fishing for salmon in Idaho is influenced by the fishing success which is in turn influenced by the size of the run entering Idaho. For example, the spring and summer chinook run into the Salmon River in 1957 was larger than the 1958 run by about 50,000 fish and the number of days fished for salmon in 1957 exceeded that in 1958 by more than 50,000 days.

Fall Chinook Salmon

Fall chinook salmon enter the Columbia River in August, September, and early October. The fall-run fish that enter Idaho, spawn in the Snake River below Swan Falls Dam in late October and November. Most juvenile fall chinook salmon migrate to the ocean during their first year of life.

The fall chinook salmon runs that enter the Columbia River and Idaho have experienced a general decline in numbers (Figure 3). Elimination of the commercial fishery above Bonneville Dam has increased the upriver escapement. However, water resource development, including dam construction, has reduced the amount of spawning area in the Snake River in Idaho to only 25 per cent of its former abundance.

The sport fishery for fall chinook salmon in Idaho is rather limited at the present time. However, since the construction of dams in the middle Snake River area, increased interest has been shown in fishing for fall-run fish.

Jack salmon, or fish less than 24 inches in length, comprise a large portion of the fall chinook run in some years, such as 1959 when 50 per cent were jacks. Since most of these smaller fish are males, the ratio of males to females in the run is high some years.

The number of unsuccessful spawners in the fall-run fish that pass the middle Snake River dams has apparently increased since the beginning of dam construction indicating that upstream fish passage facilities have not been completely successful.

The numbers of fall chinook salmon counted past Brownlee and Oxbow Dams have been: 14,952 in 1957, 14,078 in 1958, and 11,830 in 1959. The upriver escapements during these three years are four to nine times as great as the estimated escapements in the previous three years and are probably a result of the elimination of the Indian fishery at Celilo Falls and closure of the commercial fishery above Bonneville Dam.

Steelhead Trout

There are two groups of steelhead trout that enter the Columbia River. The so-called *winter* steelhead enter the river from November through May and spawn primarily in the lower tributaries of the Columbia. The *summer* steelhead pass through the lower Columbia River from June through October and spawn in upriver tributaries.

These summer-run steelhead are the fish that enter the Clearwater, Salmon, and upper Snake Rivers in Idaho. Summer-run steelhead average about nine pounds in weight.

Steelhead fishing is a major sport in Idaho. The catch was estimated at sixty thousand in 1958.

Summer steelhead entering the Columbia River have remained in a more or less static condition for the last four decades. Commercial fishery harvested 49 per cent of the Columbia River runs during the past 10 years. The commercial take of fish from runs destined for Idaho waters has not, as yet, been accurately determined. Upriver escapement has increased in the last three years due to the closure of commercial fishing above Bonneville Dam and the flooding of Celilo Falls.

Table 5. Sockeye salmon counts at McNary Dam, Rock Island Dam, and Redfish Lake, 1954-1959.

Year	McNary Dam count	Rock Island Dam Count		Redfish Lake count	Unknown
		Number	Per cent of McNary count		
1954	108,000	91,000	84	998	16,000
1955	174,000	156,000	90	4,361	14,000
1956	102,000	92,000	90	1,381	9,000
1957	85,000	71,000	84	571	12,500
1958	101,000	98,000	97	55	3,000
1959	84,000	72,000	86	290	12,000

Many of the steelhead trout destined to enter the Clearwater, Salmon, and upper Snake Rivers do so in the fall of the year while a portion of the runs destined for these streams lie over the winter in the lower Snake River and in the Columbia River in the vicinity of McNary Dam.

Steelhead that are caught in the Idaho sport fisheries during the fall are so-called "**fresh**" fish that have migrated into Idaho without any delay. The fish that are caught during the winter in such areas as the upper Salmon River are fish which apparently enter the river in the fall and lie over in the big holes.

Once the spring thaw begins, steelhead which have lain over in the lower Snake River during the winter resume their upstream migration. These provide spring steelhead fishing in Idaho.

The spawning season for steelhead in Idaho appears to be rather extended and may last from late March into June. Steelhead trout, unlike the species of Pacific salmon, do not necessarily die after spawning. How ever, as with all the trout species, the rigors of migration and spawning are causes of a high mortality.

Young steelhead emerge from the gravel in late summer and remain in fresh water one to three years before migrating to the ocean. In certain areas of the Clearwater and Salmon River drainages, many of the 4 to 7-inch rainbow trout caught by fishermen are actually young steelhead that have not yet migrated to the ocean.

From available estimates, it appears that a large per cent of the steelhead counted over McNary Dam are destined for Idaho streams. Since 1957, the run into the Clearwater River has increased from a maximum of about 15,000 fish during the 1954-1955 fish year (July 1954 through June 1955) to a new high of about 40,000 fish during the 1958-59 fish year.

On the basis of catch estimates, it appears that the run of steelhead into the Salmon River may be as large as the Clearwater run, if not larger.

Table 7. The average annual number of salmon and steelhead entering the Columbia River and the estimated number that originated from Idaho streams, 1954-1959.

	Entered Columbia River		Originated in Idaho	
	Number	Per cent of total	Number	Per cent of race
Chinook salmon—				
Spring and summer run	443,000	31	197,000	45
Fall run	350,000	24	30,000	9
Sockeye salmon	227,000	16	3,000	1
Steelhead trout—				
Summer run	245,000	29	184,000	75
Winter run	175,000			
Totals	1,440,000	100	414,000	29

Estimated number of summer steelhead entering the Columbia River, counts at the various dams, and the Idaho sport catch are presented in Table 4.

Sockeye Salmon

As mentioned previously, sockeye or blueback salmon runs that enter Idaho are much reduced from numbers that entered prior to the 20th Century. Sockeye which formerly entered the Payette River system were blocked by construction of a dam in 1924. Runs that entered the Salmon River were blocked by Sunbeam Dam until about 1934 when a portion of the dam was removed. A small run has reestablished itself in Redfish Lake.

The majority of the sockeye salmon produced in the Columbia River drainage come from the Wenatchee and Okanogan drainages in Washington. Runs entering the Columbia River experienced a decline from about 1900 to 1945, after which a slight upward trend has occurred. Since the sockeye salmon do not enter the sport fisheries in significant numbers in either Idaho or Washington, the commercial fishery harvests a large per cent of the run.

Sockeye salmon enter the Columbia River from May through August and reach Redfish Lake from July through September. Each year since 1954, upstream and downstream migrant sockeye salmon have been counted at Redfish Lake.

The runs that spawn in Washington must pass Rock Island Dam where they are also counted and it has been found that each year a substantial number of sockeye salmon are unaccounted for. (Table 5).

An explanation for the loss of these fish each year is not available, however, it is known that **Columnaris** disease does cause mortality to the sockeye and chinook salmon as they migrate upstream.

From production studies being conducted at Redfish Lake, it was found that juvenile sockeye salmon migrating from the lake represented from 0.5 to 2 per cent of the eggs deposited (Table 6).

Idaho Contribution to Columbia River Salmon and Steelhead Stocks

As the water resources of the Columbia River drainage have been developed, the importance of salmon and steelhead originating from Idaho streams has been recognized.

For the period 1954-1959, nearly a **million and a half salmon** and steelhead entered the Columbia River each year. From the catch and escapement figures available, it appears that Idaho streams are the destination of almost **one-third of these fish.**

The estimated size of the various runs entering the Columbia River and the estimated number of fish that originated from Idaho streams are presented in Table 7. Silver and chum salmon also enter the Columbia River but estimates of their numbers are not available.

It is obvious that management of the salmon and steelhead resource cannot be confined to any one area. A coordinated management program, embracing the ocean, the Columbia River, the lower Snake River and Idaho streams must be maintained.

Only by such a program can the perpetuation and increase of the Columbia River salmon and steelhead runs as a whole, and of the Idaho stocks which are integral and vital parts of the Columbia River runs, be insured. ▲▲▲

Table 6. Production of sockeye salmon at Redfish Lake.

Year	Number of spawners	Number of downstream migrants			
		Total	Second year	Third year	Migrants as per cent of eggs deposited
1954	998	38,000	14,000	24,000	2.2
1955	4,361	82,000	36,000	46,000	1.0
1956	1,381	12,000	1,000	11,000	0.5
1957	571		3,000		
1958	55				
1959	290				