

IDAHO

FISH & GAME DEPARTMENT

Joseph C. Greenley, Director SALMON AND STEELHEAD INVESTIGATIONS Job

Performance Report

Project F-49-R-12



Job No. V-a. Evaluation of Survival of Hatchery Reared
Salmonids

Period Covered: March 1, 1973 to February 28, 1974 by
Ronald L. Lindland
Senior Fishery Research Biologist

May, 1974

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JOB PERFORMANCE REPORT

State of Idaho Name: SALMON AND STEELHEAD INVESTIGATIONS
Project No. F-49-R-12 Title: Evaluation of Survival of Hatchery
Job No. V-a Reared Salmonids
Period Covered: March 1, 1973 to February 28, 1974

ABSTRACT:

Between June 6 and August 28, 1973, fisheries personnel snorkeled a total of 209 transects on 37 different days in the Selway, Lochsa, South Fork of the Clearwater and Middle Fork of the Clearwater rivers, as well as a few selected tributaries. We counted rainbow trout (over 8 in.), juvenile steelhead (less than 8 in.) cutthroat trout, juvenile chinook, adult chinook, Dolly Varden, brook trout, smallmouth bass, whitefish, suckers and squawfish.

Juvenile steelhead were most numerous in the South Fork drainage with an overall average of 42.2 per transect. Streams in the Lochsa and Selway drain-ages averaged 11.2 and 7.6 juvenile steelhead, respectively. Juvenile chinook were most abundant in the Selway, averaging 11.7 per transect. We found white-fish to be numerous in all Clearwater River tributaries, averaging 28.3 per transect in the Selway drainage, 21.8 in the South Fork drainage and 17.2 in the Lochsa drainage. The Selway had the only significant populations of cut-throat trout with an overall average of 2.8 cutthroat per transect.

In early May, 1973, hatchery personnel trucked 1,600 unspawned adult steelhead from Dworshak National Fish Hatchery to the Lochsa drainage and 800 to Lolo Creek. Mortalities incurred were slight; the fish dispersed well and we observed spawning activity above and below all release sites. We noted three instances of hatchery fish spawning with wild fish.

In June, 1973, 1,942 unspawned adult chinook were trucked from Rapid River Hatchery to the South Fork of the Clearwater. Again, mortalities were insignificant and dispersal was rapid.

We conducted aerial spawning ground surveys for steelhead and chinook in the Lochsa and Selway drainages. Steelhead redd counts in the Selway were very low for the second straight year, while those in the Lochsa were about average. Chinook redd counts in both the Lochsa and Selway were the highest they have been in 8 years.

Submitted by:

Ronald L. Lindland
Senior Fishery Research Biologist

RECOMMENDATIONS:

Continue snorkeling the transects which we established in Clearwater River tributaries during 1973 for at least 4 more years, noting any trends which may develop.

Attempt to snorkel transects in the Selway River from White Cap Creek to Moose Creek twice each year (early July and mid-August) and establish more transects in Selway tributaries.

Continue trucking surplus adult steelhead from Dworshak National Fish Hatchery to Lolo Creek and the Lochsa drainage and surplus adult chinook from Rapid River Hatchery to the South Fork of the Clearwater.

Continue the steelhead and chinook spawning ground counts in the Lochsa and Selway drainages.

Establish some steelhead spawning ground count areas in the South Fork of the Clearwater drainage.

OBJECTIVES:

To monitor the distribution, abundance, dispersal and survival of steel-head and chinook smolts and fingerlings planted in Clearwater River tributaries.

To assess factors that limit survival.

To formulate planting programs which will maximize survival.

TECHNIQUES USED:

Snorkel Transects

Between June 6 and August 28, 1973, fisheries personnel snorkeled a total of 209 transects on 37 different days in the Selway, Lochsa, South Fork of the Clearwater, and Middle Fork of the Clearwater rivers as well as a few selected tributaries. We selected our snorkel transects to include a variety of habitat types in the streams. These ranged from deep pools to riffle-run type stretches and varied in length from 25 yards in small tributaries to 300 yards in the Selway River. The starting point for a transect was usually the head of a pool or run and the end point was either the downstream end of the pool or some other easily visible landmark. All transects were located with reference to tributary streams or some other prominent landmark.

We enumerated fish in the transect areas as follows: Two divers counted each transect. Diver #1 positioned himself as far out into the stream as he could and still be able to see the shoreline as he floated along counting fish. Diver #2 waited until Diver #1 had completed the transect, gave the fish time to reestablish their positions, and then floated over the same stretch as Diver #1. The two counts were then averaged. The proportion of the total

fish counted in a pool would depend on the width and depth of the stream at that point.

We counted rainbow trout (over 8 in.), juvenile steelhead (less than 8 in.), cutthroat trout, juvenile chinook, adult chinook, Dolly Varden, brook trout, smallmouth bass, whitefish, suckers, and squawfish. In late August, we counted young-of-the-year steelhead after they had moved from the shallows into mainstream.

The transects established in 1973 will be snorkeled in future years to monitor any changes in the distribution, abundance, dispersion and survival of juvenile salmonids in Clearwater River tributaries. In interpreting 1973 data or comparing it with future years, we must keep in mind that stream flows were much below normal in 1973 and what little spring run-off we had was over by the end of May.

Selway River and Tributaries

We snorkeled a total of 42 different transects in the Selway River from Deep Creek downstream to the mouth (Figure 1). The 38 transects above Race Creek ranged in length from 50 to 300 yards; the four below Race Creek were each approximately 100 yards long. We covered the river in two separate trips, rafting from Moose Creek to Race Creek on July 24-27 and backpacking from White Cap Creek to Moose Creek on August 13-18. We snorkeled 17 transects from Deep Creek to Moose Creek and 21 transects from Moose Creek to Race Creek. We swam one transect each in White Cap, Running, Moose and O'Hara creeks and two transects in Bear Creek. We snorkeled the four transects from Race Creek to the mouth of the Selway on five different dates and the pool just below Moose Creek on July 24 and August 18. All other transects in the Selway drainage were snorkeled on only one date.

Lochsa River and Tributaries

In the Lochsa River, from Papoose Creek to the mouth, we snorkeled seven transects on each of five different dates between June 12 and August 28, 1973 (Figure 2). We swam two transects on four occasions between June 28 and August 28 in Crooked Fork Creek; on July 8 we swam four transects in Crooked Fork. On June 27 and July 13, we snorkeled four transects in Papoose Creek and three each in Squaw and Post Office creeks.

South Fork of the Clearwater and Tributaries

On the South Fork of the Clearwater, we snorkeled seven transects on three occasions and six on another between June 6 and August 29, 1973 (Figure 3). We covered two transects on Red River and one on American River on each of five different days and three transects on four dates in Newsome Creek.

Upper Clearwater, Middle Fork of the Clearwater, and Lolo Creek

We snorkeled three transects in the Upper Clearwater (Orofino to Kooskia) and four in the Middle Fork of the Clearwater on each of five different days between June 29 and August 22, 1973 (Figure 4). On July 12 and August 24, we snorkeled three and four transects, respectively, in Lolo Creek.

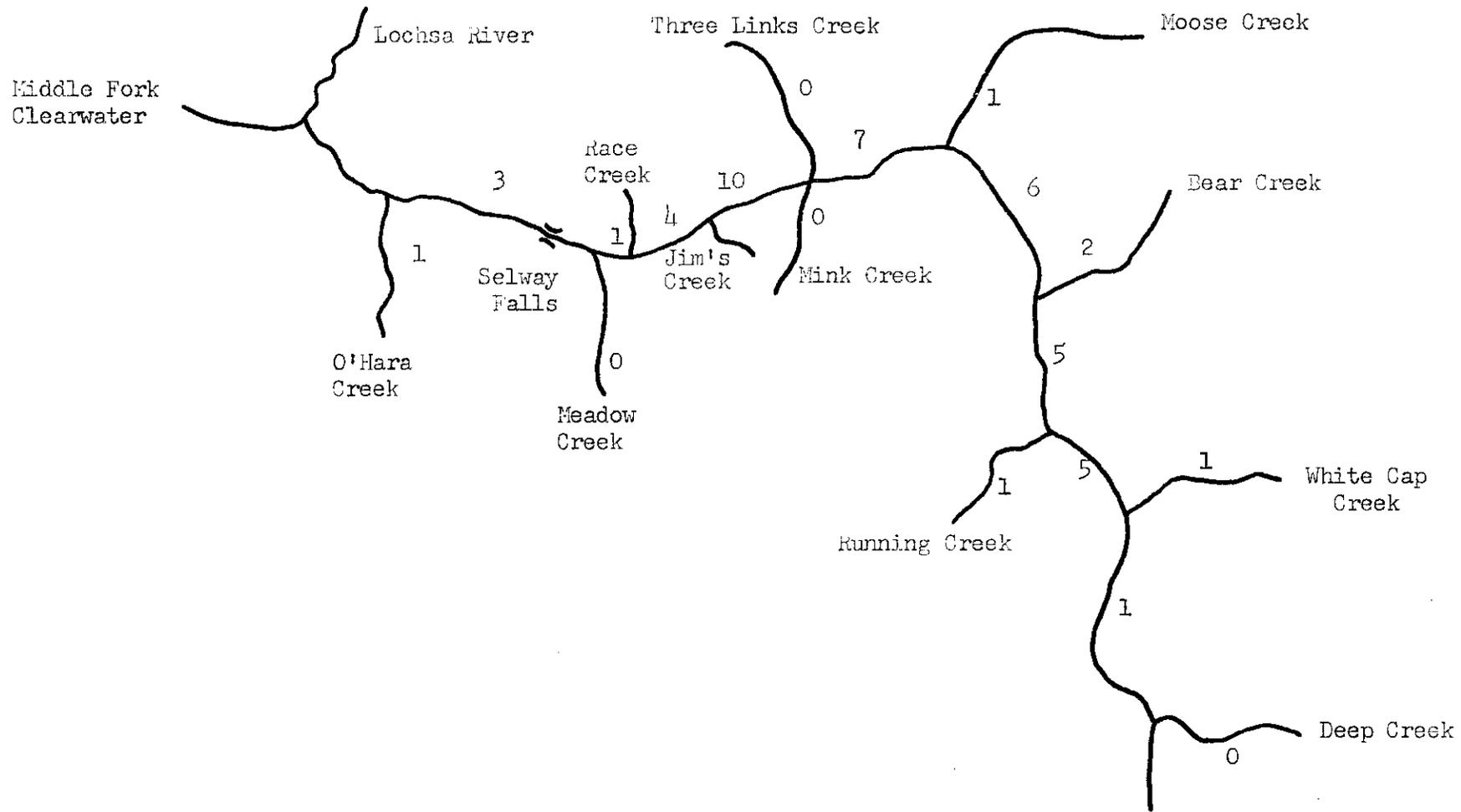


Figure 1. Distribution of snorkel transects in the Selway River drainage, 1973.

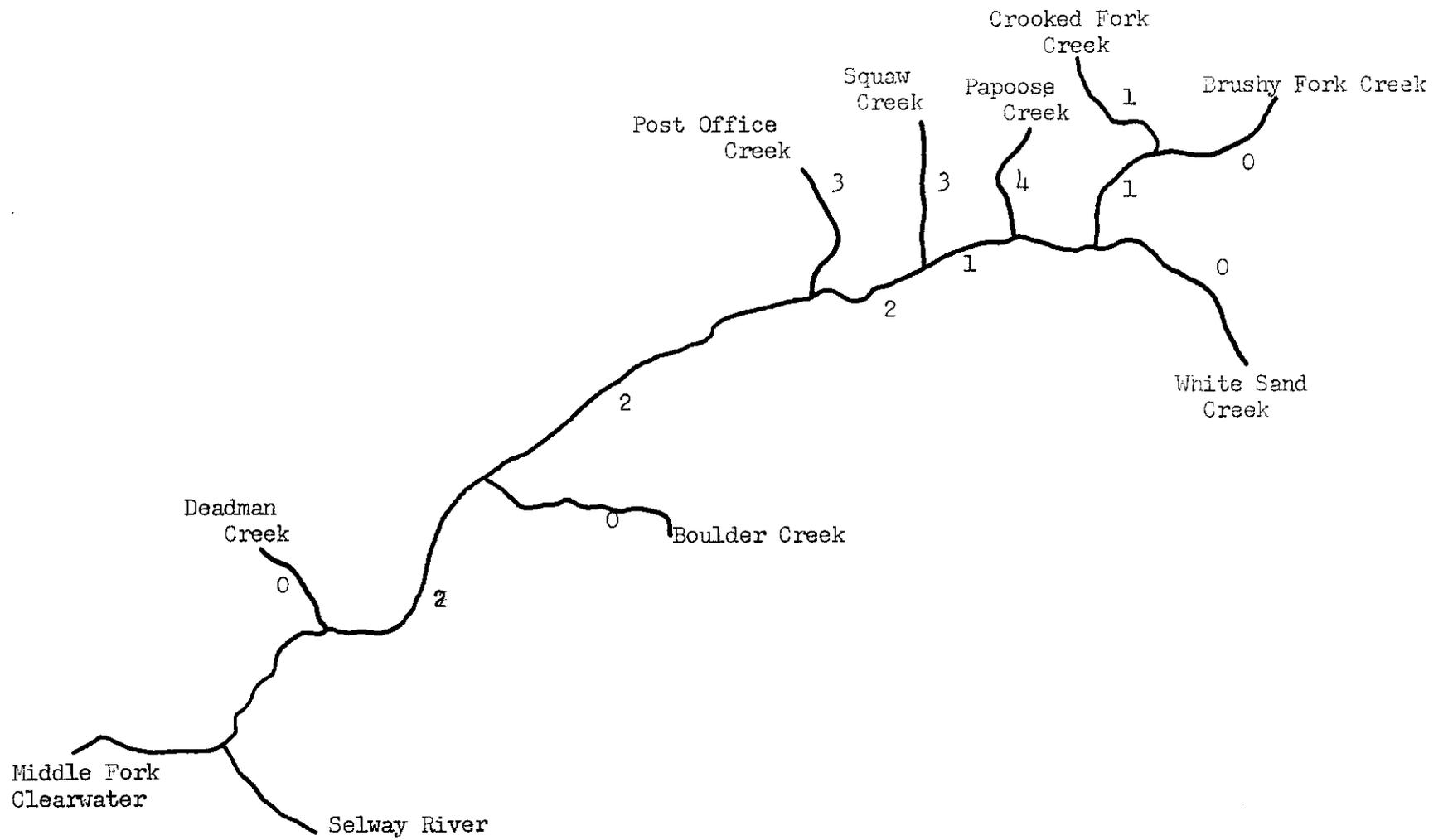


Figure 2. Distribution of snorkel transects in the Lochsa River drainage, 1973.

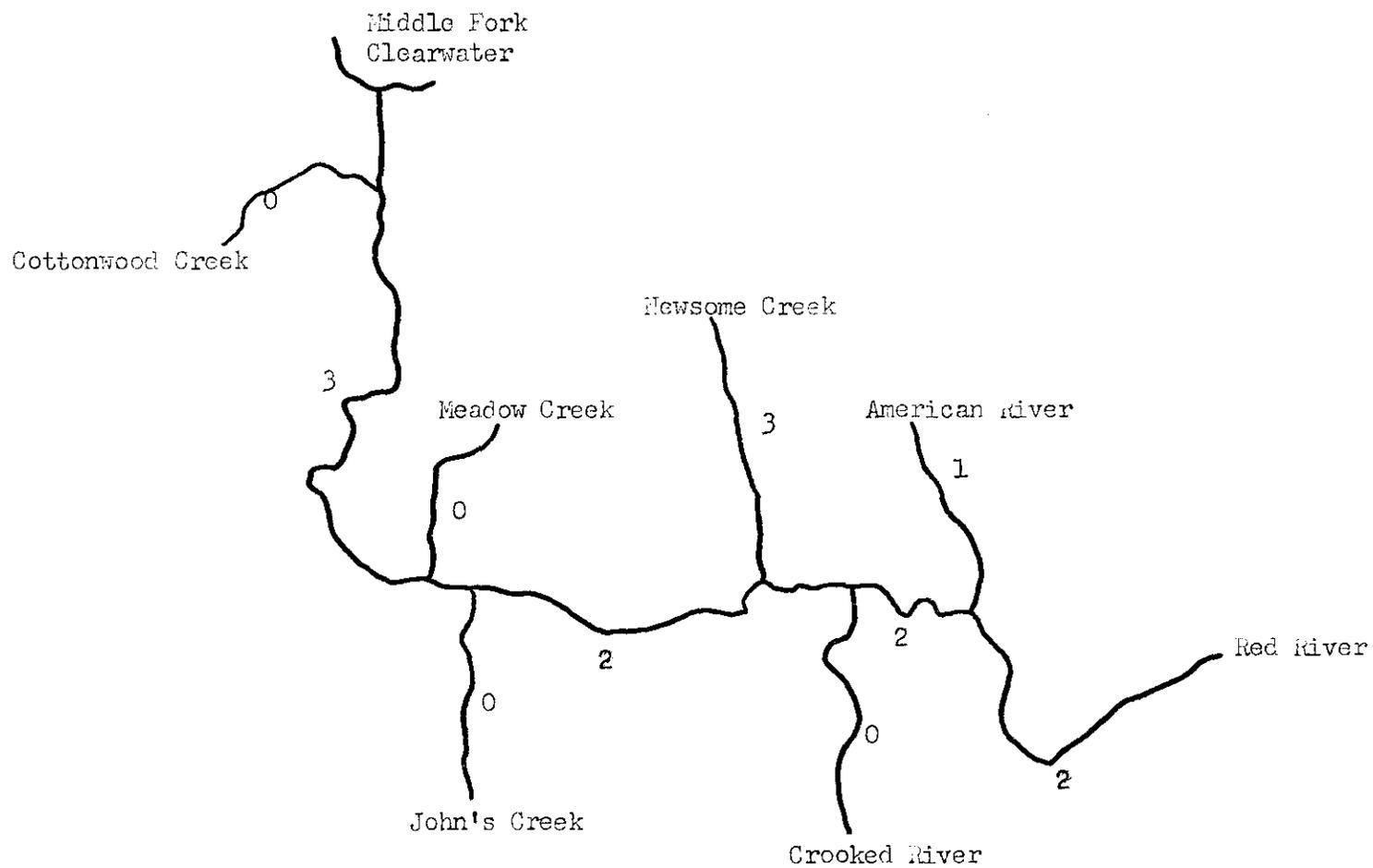


Figure 3. Distribution of snorkel transects in the South Fork of the Clearwater drainage, 1973.

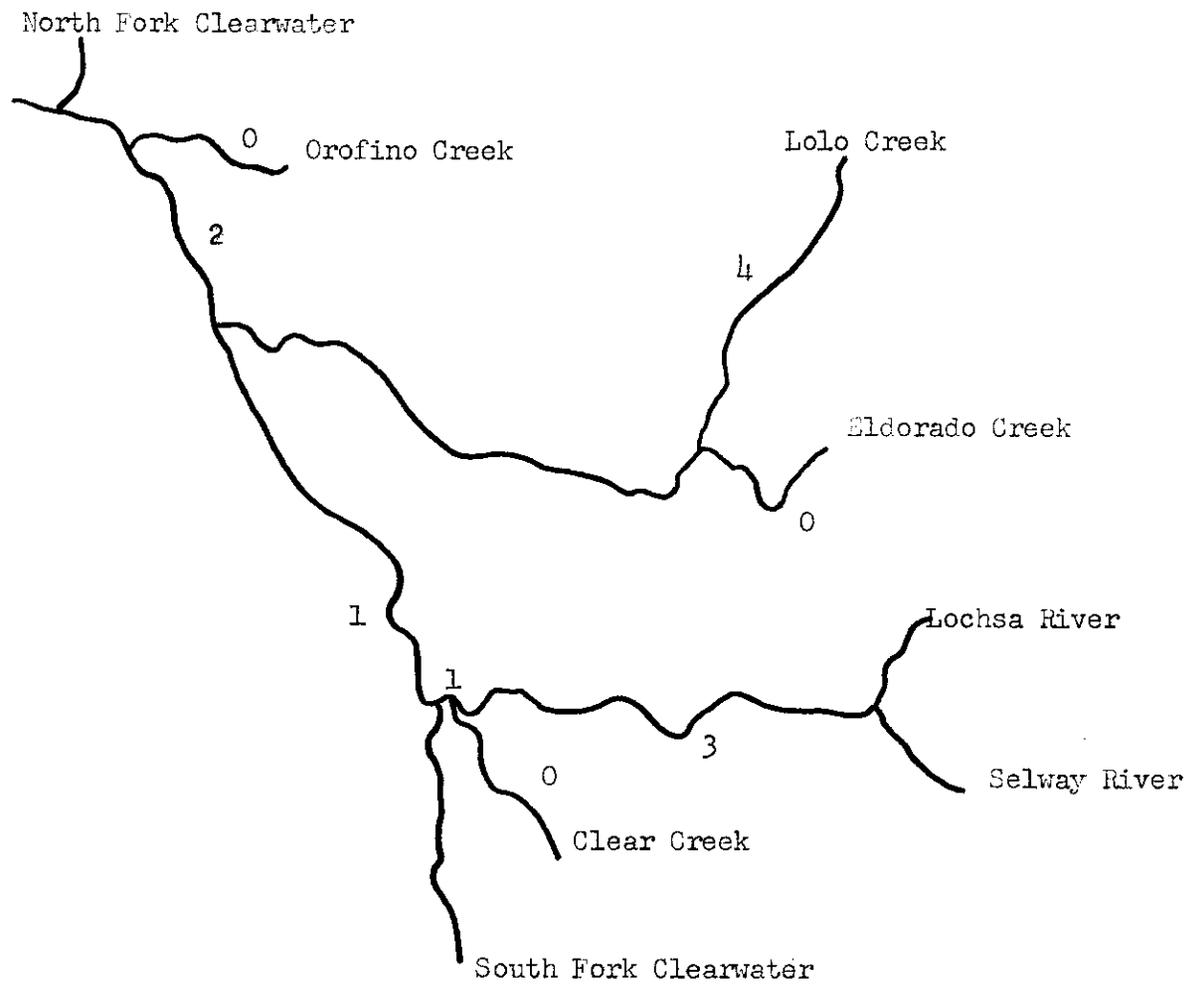


Figure 4. Distribution of snorkel transects in the Middle Fork of the Clearwater drainage, 1973.

Plants of salmonid Eyed Eggs, Fry and Fingerlings

Juvenile steelhead plants in Clearwater River tributaries totaled 4,065,000 in 1973. The South Fork of the Clearwater received 1,365,000 steelhead fingerlings and 2,000,000 steelhead sac fry from April through June. In June, 1973, 748,000 *steelhead* fry were released in the Lochsa drainage at White Sand Creek and Brushy Fork Creek. These steelhead all originated from eggs taken at Dworshak National Fish Hatchery. All other steelhead introductions since 1969 have been as eyed eggs in the South Fork: 700,000 in 1969, 2,007,500 in 1970, and 256,000 in 1971. No hatchery steelhead were released in *Clearwater* River tributaries during 1972, and none have ever been released in the Selway drainage to date.

Table 1 summarizes plants of chinook eyed eggs, fry, fingerlings and smolts in the Selway, South Fork and Lochsa since 1969. Eyed chinook eggs were placed in hatching channels during September and October each year and resultant fry were distributed in the upper Selway and tributaries during May and June of the following year. Smolts and fingerlings were planted in early April and early June, respectively.

Releases of Adult Steelhead and Chinook

From May 9-14, 1973, a total of 1,600 unspawned adult steelhead were trucked from Dworshak National Fish Hatchery to the Lochsa River and tributaries. Distribution was as follows: 200 in the Lochsa River at Boulder Creek, 200 in Squaw Creek, 400 in Crooked Fork Creek, 400 in White Sand Creek and 400 in Brushy Fork Creek. The 200 fish released in Squaw Creek were tagged with white dart tags; the remainder were marked by clipping off a small portion of the top lobe of the caudal fin. On May 8, 1973, 800 unspawned adult steelhead were trucked from Dworshak National Fish Hatchery to Lobo Creek. These fish were marked with an adipose clip.

During mid-June, 1973, 1,942 unspawned adult chinook salmon were trucked from Rapid River Hatchery to the South Fork of the Clearwater River. They were distributed at several release sites from the Mt. Idaho Bridge on the lower South Fork to the Moose Butte Bridge on Red River. These fish were all adipose clipped.

Department personnel frequently checked the areas where adult steelhead and chinook were released noting dispersal, spawning activity and mortalities. We were also able to observe some of the adult chinook while snorkeling.

Steelhead and Chinook Salmon Spawning Ground Surveys

We conducted steelhead spawning ground counts by helicopter on the Lochsa and Selway rivers on April 30, 1973. We counted redds and live fish in the Selway River from Selway Falls to Moose Creek and in Moose Creek from its mouth to Elbows Bend. We surveyed parts of White Sand and Crooked Fork creeks in the Lochsa drainage. The main Lochsa River was not flown because of windy conditions. During April and May, 1973, I made spot checks on foot in Crooked River, Red River and Newsome Creek in the South Fork of the Clearwater drainage.

Table 1. Plants of chinook eyed eggs, fry, fingerlings and smolts in the Selway, South Fork of the Clearwater and Lochsa drainages, 1969-73.

<u>SELWAY DRAINAGE</u>		<u>Eyed eggs</u>		<u>Emergent fry</u>	<u>Major fry distribution sites</u>			
<u>Year</u>	<u>Total</u>	<u>Indian Creek channel</u>	<u>Running Creek channel</u>	<u>Indian Creek channel</u>	<u>Beaver Point (Selway)</u>	<u>Magruder R.S. (Selway)</u>	<u>White Cap Creek</u>	<u>Storm Creek</u>
1969	1,488,816	921,191	242,453	-				
1970	4,339,155	3,287,841	500,714	495,682	29,505	39,480	91,460	76,160
1971	1,623,080	1,623,080	0	830,900	159,618	184,692	216,492	215,280
1972	2,956,179	2,956,179	0	524,710	86,640	59,280	103,740	107,665
1973	2,029,316	2,029,316	0	1,626,550	302,550	245,900	397,350	200,000

<u>SOUTH FORK DRAINAGE</u>		<u>Eyed eggs</u>		<u>Fry, fingerling and smolt distribution sites</u>				
<u>Year</u>	<u>Total</u>	<u>Red River Channel</u>	<u>Crooked River Channel</u>	<u>Ten Mile Creek</u>	<u>Red River</u>	<u>Newsome Creek</u>	<u>American River</u>	<u>Crooked River</u>
1970	3,239,762	1,631,500	1,608,262					
1971	800,900	-	800,000		6,768	33,088		
1972	2,818,723	1,293,592	1,525,131			113,400		
1972 Fingerlings				29,800	402,811	126,360	109,700	
1973	1,482,228	551,628	930,600	No fry distribution from 1972				
1973 Smolts					120,160	33,772	33,772	9,599

<u>LOCHSA DRAINAGE</u>		<u>Distribution Sites</u>							
<u>Year</u>	<u>Boulder Creek Bridge (Lochsa)</u>	<u>White Sand Creek</u>	<u>Post Office Creek</u>	<u>Squaw Creek</u>	<u>Brushy Fork Creek</u>	<u>Papoose Creek</u>	<u>Fish Creek</u>	<u>Wendover Creek</u>	<u>Greens Flat (Lochsa)</u>
1972 Smolts	95,275	91,800	-	-	-	-	-	-	-
1972 Fingerlings			96,945	44,700	59,600	14,900	44,700	122,760	122,760
1973 Smolts		60,000	25,000	30,000	-	-	-	-	-
1973 Fingerlings		-	100,000	-	-	-	-	100,000	56,396

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On August 30, 1973, we made a ground count of chinook redds and live and dead chinook in Crooked Fork Creek from Brushy Fork to the Haskell Creek Bridge. On September 6, we made an aerial count of redds and live chinook in the Selway River from Thompson Flat to Bear Creek and also surveyed portions of White Cap, Running, Bear and Moose creeks. On September 12, we made a ground count on the Selway River from Little Clearwater River to Magruder Crossing.

FINDINGS:

Snorkel Transects

Selway River and Tributaries

Juvenile Steelhead. We found that juvenile steelhead were nearly six times more abundant in the Selway River from Moose Creek to Race Creek than from White Cap Creek to Moose Creek; averaging 15.8 per transect below Moose Creek compared to 2.7 above that point (Table 2 and Figure 5). We snorkeled only one transect above White Cap Creek and saw 15 juvenile steelhead. Water temperatures in the Selway were about 5F higher when we snorkeled the river above Moose Creek than when we snorkeled from Moose Creek to Race Creek. The extent to which juvenile steelhead may have moved into the tributaries as a result of this increased water temperature is unknown. We did snorkel a pool in the Selway at the mouth of Moose Creek on both trips and saw 21 juvenile steelhead on July 24, and only 4 on August 18.

From Race Creek to the mouth of the Selway we saw an average of only 0.6 juvenile steelhead per transect.

Nearly 28% of all fish observed from Moose Creek to Race Creek were juvenile steelhead, while only 5.9% were juvenile steelhead between White Cap Creek and Moose Creek. In the transect above White Cap Creek, 9.7% of the fish were juvenile steelhead. Only 1.7% of the fish seen below Race Creek were juvenile steelhead (Table 2).

Bear Creek and O'Hara Creek each had an average of 20 juvenile steelhead per transect; Moose Creek, 14; White Cap Creek, 10; and Running Creek, 2 (Table 2 and Figure 6). Because of the tremendous numbers of whitefish and juvenile chinook in one of the Bear Creek transects, juvenile steelhead comprised only 4.8% of the fish seen in Bear Creek. In O'Hara Creek, however, juvenile steelhead made up 54.1% of the fish seen.

Juvenile Chinook. We observed the largest concentrations of juvenile chinook in the Selway River above White Cap Creek (125 per transect). Juvenile chinook comprised 80.6% of the fish seen above White Cap Creek and 17.6% of the fish seen from Moose Creek to Race Creek. Very few juvenile chinook were seen in the Selway between White Cap Creek and Moose Creek (0.3 per transect) (Table 3).

On July 9, we counted 32 juvenile chinook in one transect below Race Creek which was 24.8% of the fish seen on that date. We saw no juvenile chinook below Race Creek on any of four other dates.

Table 2. Total numbers counted, average number of fish per transect and percent of total fish for juvenile steelhead in the Selway River and tributaries, June-August, 1973.

Stream section	Date	Total juvenile steelhead counted	Average number of juvenile steelhead per transect	Percent of total fish	Number of transects
Deep Creek to White Cap Creek	8/13/73	15	15.0	9.7	1
White Cap Creek to Running Creek	8/14/73	6	1.2	2.6	5
Running Creek to Bear Creek	8/15/73	11	2.2	4.4	5
Bear Creek to Moose Creek	8/17/73	<u>26</u>	<u>4.3</u>	<u>10.4</u>	<u>6</u>
Subtotals		43			17
Weighted means			2.7	5.9	
Moose Creek to Halfway Creek	7/24/73	110	27.5	23.0	4
Halfway Creek to Dry Bar	7/25/73	98	14.0	30.4	7
Dry Bar to Jim's Creek	7/26/73	116	19.3	33.2	6
Jim's Creek to Race Creek	7/27/73	<u>7</u>	<u>1.8</u>	<u>19.4</u>	<u>4</u>
Subtotals		331			21
Weighted means			15.8	27.9	
Race Creek to mouth	6/11/73	1	0.2	1.0	4
	6/21/73	0	-	-	4
	7/ 9/73	9	2.2	7.0	4
	8/ 2/73	1	0.2	1.1	4
	8/23/73	<u>0</u>	<u>-</u>	<u>-</u>	<u>4</u>
Subtotals		11			20
Weighted means			0.6	1.7	
White Cap Creek	8/13/73	10	10.0	16.1	1
Running Creek	8/14/73	2	2.0	9.1	1
Bear Creek	8/16/73	40	20.0	4.8	2
Moose Creek	8/18/73	14	14.0	23.3	1
O'Hara Creek	6/28/73	20	20.0	54.1	1

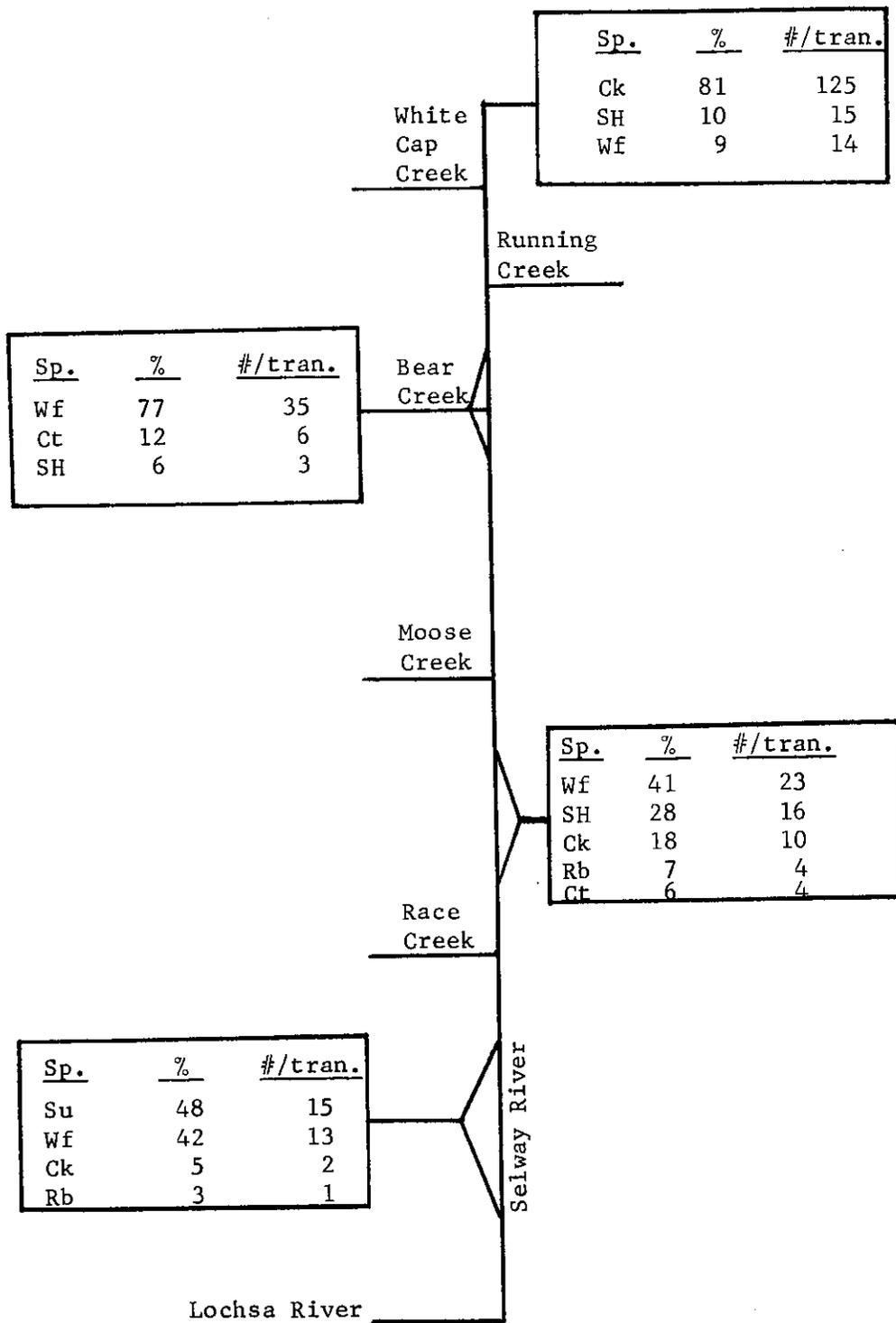


Figure 5. Percent of total fish and average number of fish per snorkel transect for major fish species in the Selway River, 1973.

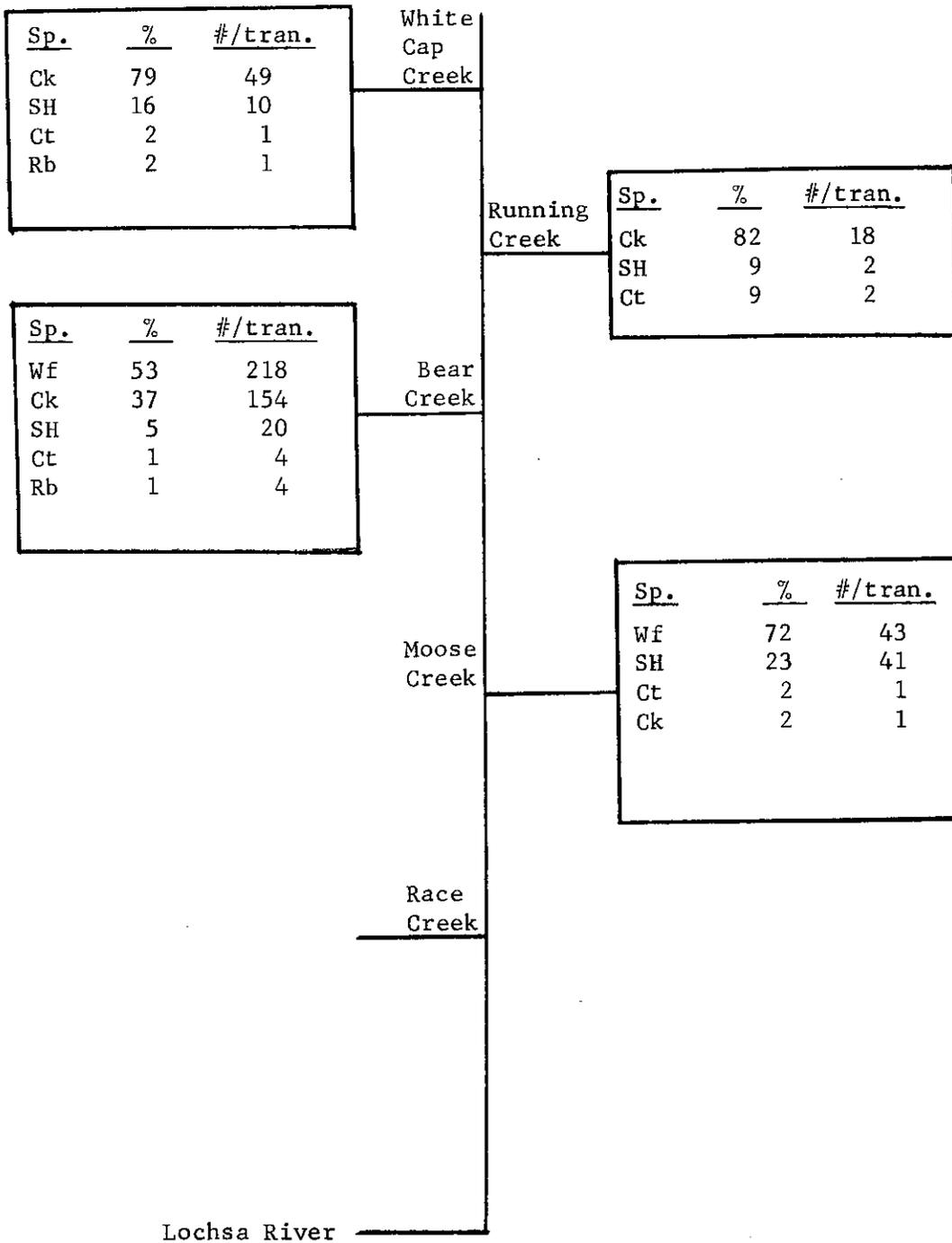


Figure 6. Percent of total fish and average number of fish per snorkel transect for major fish species in the Selway River tributaries, 1973.

Table 3. Total numbers counted, average number of fish per transect and percent of total fish for juvenile chinook in the Selway River and tributaries, June-August, 1973.

Stream Section	Date	Total juvenile chinook counted	Average number of juvenile chinook per transect	Percent of total fish	Number of transects
Deep Creek to White Cap Creek	8/13/73	125	125.0	80.6	1
White Cap Creek to Running Creek	8/14/73	3	0.6	1.3	5
Running Creek to Bear Creek	8/15/73	0	-	-	5
Bear Creek to Moose Creek	8/17/73	<u>2</u>	<u>0.3</u>	<u>0.8</u>	<u>6</u>
Subtotals		130			17
Weighted means			0.3	0.7	
Moose Creek to Halfway Creek	7/24/73	132	33.0	27.6	4
Halfway Creek to Dry Bar	7/25/73	41	5.9	12.7	7
Dry Bar to Jim's Creek	7/26/73	34	5.7	9.7	6
Jim's Creek to Race Creek	7/27/73	<u>2</u>	<u>0.5</u>	<u>5.6</u>	<u>4</u>
Subtotals		209			21
Weighted means			10.0	17.6	
Race Creek to mouth	6/11/73	0	-	-	4
	6/21/73	0	-	-	4
	7/ 9/73	32	8.0	24.8	4
	8/ 2/73	0	-	-	4
	8/23/73	<u>0</u>	<u>-</u>	<u>-</u>	<u>4</u>
Subtotals		32			20
Weighted means			1.6	5.0	
White Cap Creek	8/13/73	49	49.0	79.1	1
Running Creek	8/14/73	18	18.0	81.8	1
Bear Creek	8/16/73	308	154.0	37.1	2
Moose Creek	8/18/73	1	1.0	1.7	1

Juvenile chinook comprised 79.1, 81.8 and 37.1% of the fish seen in White Cap, Running and Bear creek, respectively. Oddly, only 1.7% of the fish seen in the transect in Moose Creek were juvenile chinook (Table 3).

Adult Chinook. We saw 22 adult chinook in the 17 transects above Moose Creek; none were seen in 21 transects from Moose Creek to Race Creek. On June 28, I saw 35 adult chinook in the transect above White Cap Creek.

We counted 25 adult chinook in the "Salmon Hole" in Bear Creek. No adult chinook were seen in snorkel transects in White Cap, Running, Moose or O'Hara creeks, but were present in all of those streams.

Rainbow Trout. We considered any rainbow over 8 inches long to be a resident rainbow. On this basis, no resident rainbow were seen in the Selway River above White Cap Creek. From White Cap Creek to Moose Creek, we saw an average of only 0.6 per transect, and from Moose Creek to Race Creek we saw 4.2 rainbow per transect. Below Race Creek there was 1.0 rainbow per transect. We saw four and five rainbow over 8 inches in the transects in Bear and O'Hara creeks, respectively. White Cap and Moose creeks each had one rainbow trout per transect and Running Creek had none (Table 4).

Cutthroat Trout. Observations on distribution and abundance of cutthroat trout in the Selway drainage are contained in a separate report (F-59-R).

Whitefish. Whitefish made up 9.1% of the total fish seen between Deep Creek and White Cap Creek, 76.8% between White Cap Creek and Moose Creek, 40.8% from Moose Creek to Race Creek and 41.8% from Race Creek to the mouth of the Selway. The transects in Moose, Bear and O'Hara creeks showed 71.6, 52.6 and 16.2% whitefish, respectively (Table 5).

Whitefish numbers increased throughout the summer in the Selway below Race Creek from 6.5 per transect on June 11 to 28.8 per transect on August 23.

Other Species. We counted five Dolly Varden in one transect in Bear Creek and three in the Selway below Running Creek. The largest was about 18-20 inches long.

We saw only seven suckers above Selway Falls, and no squawfish were seen above the Falls. Below Selway Falls, however, 47.5% of the fish seen were suckers. Only three squawfish were seen below the Falls (Table 6).

Lochsa River and Tributaries

Juvenile Steelhead. In 1973, Crooked Fork Creek had the highest concentration of juvenile steelhead of any stream we snorkeled in the Lochsa drainage with an average of 19.5 per transect. Papoose Creek and Squaw Creek had 13.8 and 14.0 juvenile steelhead per transect, while the main Lochsa averaged 8.4. When the lowest numbers of juvenile steelhead were seen in the Lochsa in mid-July, numbers were highest in the tributary streams (Table 7).

Juvenile steelhead made up a smaller percentage of the total fish in the Lochsa River as the summer progressed. On June 12, 61.6% of the fish seen in

Table 4. Total numbers counted, average number of fish per transect and percent of total fish for Rainbow trout over 8 inches in the Selway River and tributaries, June-August, 1973.

Stream Section	Date	Total rainbow trout counted	Average number of rainbow trout per transect	Percent of total fish	Number of transects
Deep Creek to White Cap Creek	8/13/73	0	-	-	1
White Cap Creek to Running Creek	8/14/73	7	1.4	3.1	5
Running Creek to Bear Creek	8/15/73	3	0.6	1.2	5
Bear Creek to Moose Creek	8/17/73	<u>0</u>	<u>-</u>	<u>-</u>	<u>6</u>
Subtotals		10			17
Weighted means			0.6	1.4	
Moose Creek to Halfway Creek	7/24/73	18	4.0	3.8	4
Halfway Creek to Dry Bar	7/25/73	38	5.4	11.8	7
Dry Bar to Jim's Creek	7/26/73	26	4.3	7.4	6
Jim's Creek to Race Creek	7/27/73	<u>6</u>	<u>1.5</u>	<u>16.7</u>	<u>4</u>
Subtotals		88			21
Weighted means			4.2	7.4	
Race Creek to mouth	6/11/73	4	1.0	3.8	4
	6/21/73	7	1.8	6.2	4
	7/ 9/73	8	2.0	6.2	4
	8/ 2/73	0	-	-	4
	8/23/73	<u>2</u>	<u>0.5</u>	<u>1.0</u>	<u>4</u>
Subtotals		21			20
Weighted means			1.0	3.3	
White Cap Creek	8/13/73	1	1.0	1.6	1
Running Creek	8/14/73	0	-	-	1
Bear Creek	8/16/73	8	4.0	1.0	2
Moose Creek	8/18/73	1	1.0	1.7	1
O'Hara Creek	6/28/73	5	5.0	13.5	1

Table 5. Total numbers counted, average number of fish per transect and percent of total fish for whitefish in the Selway River and tributaries, June-August, 1973.

Stream section	Date	Total whitefish counted	Average number of whitefish per transect	Percent of total fish	Number of transects
Deep Creek to White Cap Creek	8/13/73	14	14.0	9.1	1
White Cap Creek to Running Creek	8/14/73	176	35.2	77.6	5
Running Creek to Bear Creek	8/15/73	196	39.2	77.8	5
Bear Creek to Moose Creek	8/17/73	<u>187</u>	<u>31.1</u>	<u>75.1</u>	<u>6</u>
Subtotals		573			17
Weighted means			34.9	76.8	
Moose Creek to Halfway Creek	7/24/72	195	48.8	40.6	4
Halfway Creek to Dry Bar	7/25/73	124	17.7	38.6	7
D Bar to Jim's Creek	7/26/73	143	23.8	41.1	6
Jim's Creek to Race Creek	7/27/73	<u>21</u>	<u>5.2</u>	<u>58.3</u>	<u>4</u>
Subtotals		483			21
Weighted means			23.0	40.8	
Race Creek to mouth	6/11/73	26	6.5	25.0	4
	6/21/73	24	6.0	21.4	4
	7/ 9/73	53	13.2	41.1	4
	8/ 2/73	49	12.2	56.3	4
	8/23/73	<u>115</u>	<u>28.8</u>	<u>55.8</u>	<u>4</u>
Subtotals		267			20
Weighted means			13.4	41.8	
White Cap Creek	8/13/73	1	1.0	1.6	1
Running Creek	8/14/73	0	-	-	1
Bear Creek	8/16/73	437	218.5	52.6	2
Moose Creek	8/18/73	43	43.0	71.6	1
O'Hara Creek	6/28/73	6	6.0	16.2	1

Table 6. Total numbers counted, average number of fish per transect and percent of total fish for suckers and squawfish in the Selway River and tributaries, June-August, 1973.

Stream section	Date	Total counted		Average number per transect		Percent of total fish		Number of transects
		Sk	Sq	Sk	Sq	Sk	Sq	
Deep Creek to White Cap Creek	8/13/73	0	0	-	-	-	-	1
White Cap Creek to Running Creek	8/14/73	0	0	-	-	-	-	5
Running Creek to Bear Creek	8/15/73	0	0	-	-	-	-	5
Bear Creek to Moose Creek	8/17/73	0	0	-	-	-	-	6
Moose Creek to Halfway Creek	7/24/73	0	0	-	-	-	-	4
Halfway Creek to Dry Bar	7/25/73	0	0	-	-	-	-	7
Dry Bar to Jim's Creek	7/26/73	0	0	-	-	-	-	6
Jim's Creek to Race Creek	7/27/73	0	0	-	-	-	-	4
								<u>38</u>
Race Creek to mouth	6/11/73	73	0	18.2	-	70.2	-	4
	6/21/73	80	0	20.0	-	71.5	-	4
	7/ 9/73	27	0	6.8	-	20.9	-	4
	8/ 2/73	37	0	9.2	-	42.6	-	4
	8/23/73	<u>86</u>	<u>3</u>	<u>21.5</u>	<u>0.8</u>	<u>41.7</u>	<u>1.5</u>	<u>4</u>
Subtotals		303	3					20
Weighted means				15.2	0.2	47.5	0.5	
White Cap Creek	8/13/73	0	0	-	-	-	-	1
Running Creek	8/14/73	0	0	-	-	-	-	1
Bear Creek	8/16/73	0	0	-	-	-	-	2
Moose Creek	8/18/73	0	0	-	-	-	-	1
O'Hara Creek	6/28/73	6	0	6.0	-	16.2	-	1

Table 7. Total numbers counted, average number of fish per transect and percent of total fish for juvenile steelhead in the Lochsa River, Crooked Fork Creek, Papoose Creek, Squaw Creek and Post Office Creek, June-August, 1973.

Stream	Date	Total juvenile steelhead counted	Average number of juvenile steelhead per transect	Percent of total fish	Number of transects
Lochsa River	6/12/73	77	12.8	61.6	6
	7/ 5/73	60	8.6	25.5	7
	7/17/73	24	3.4	16.0	7
	8/ 1/73	39	5.6	15.2	7
	8/28/73 (J)*	43	7.2	9.3	6
	8/28/73 (YOY)**	<u>35</u>	<u>5.8</u>	<u>7.6</u>	
Subtotals		278			33
Weighted means			8.4	22.7	
Crooked Fork Creek	6/28/73	15	15.0	60.0	1
	7/ 8/73	53	13.2	15.5	4
	7/17/73	76	38.0	35.2	2
	8/ 1/73	26	13.0	6.9	2
	8/28/73 (J)*	38	19.0	6.9	2
	8/28/73 (YOY)**	<u>7</u>	<u>0.6</u>	<u>0.5</u>	
Subtotals		215			11
Weighted means			19.5	14.2	
Papoose Creek	6/27/73	39	9.8	50.6	4
	7/13/73	<u>30</u>	<u>30.0</u>	<u>88.2</u>	<u>1</u>
Subtotals		69			5
Weighted means			13.8	62.2	
Squaw Creek	6/27/73	39	13.0	86.7	3
	7/13/73	<u>31</u>	<u>15.5</u>	<u>63.3</u>	<u>2</u>
Subtotals		70			5
Weighted means			14.0	74.5	
Post Office Creek	6/27/73	11	3.7	68.8	3
	7/13/73	<u>12</u>	<u>12.0</u>	<u>75.0</u>	<u>1</u>
Subtotals		23			4
Weighted means			5.8	71.9	

* Juveniles

** Young-of-the-year

the Lochsa were juvenile steelhead; by August 28 this percentage was down to 9.3. This was caused mainly by introductions of hatchery trout and increasing numbers of whitefish. Papoose, Squaw and Post Office creeks had 62.2, 74.5 and 71.9% juvenile steelhead, respectively.

Young-of-the-year steelhead showed up in our transects in the Lochsa River on August 28 when they comprised 7.6% of the fish seen. They had been observed in the shallows close to shore earlier in the summer.

Juvenile Chinook. Of the streams snorkeled in the Lochsa drainage, Crooked Fork Creek had the only significant concentrations of juvenile chinook with an average of 46.1 per transect. Only Bear and White Cap creeks on the Selway had a higher average number of juvenile chinook per transect than did Crooked Fork Creek. The numbers of juvenile chinook seen in Crooked Fork transects increased throughout the summer from 23.2 per transect on July 8 to 125.0 per transect on August 28. We saw very few juvenile chinook in the main Lochsa until August 1. Juvenile chinook comprised from 18.5 to 45.8% of the total fish seen in Crooked Fork with an overall average of 33.5% (Table 8 and Figure 7).

Adult Chinook. We saw three adult chinook in a transect above Split Creek on July 17. In Crooked Fork Creek, we saw from one to four adult chinook every time we snorkeled a transect from June 28 to August 28. We saw 15 adult chinook in the deep pool just below Badger Greek on June 28. However, this pool was not an established transect area.

Rainbow Trout. As was the case in the South Fork of the Clearwater, most of the rainbow trout over 8 inches long that we saw in the Lochsa were hatchery catchables. Hatchery catchable rainbow made up as high as 33.6% of the fish seen in the Lochsa and 35.1% in Crooked Fork. The numbers of hatchery rainbow seen in Crooked Fork increased from 3.0 per transect on June 28 to 79.5 per transect on August 28 (Table 9).

Whitefish. Whitefish comprised an average of 51.5% of the total fish seen in the Lochsa River but only 24.1% in Crooked Fork. The average number of whitefish per transect and the percent of total fish increased throughout the summer in the Lochsa River. On June 12, 20.0% of the fish seen in the Lochsa were whitefish and by August 28, 72.8% were whitefish (Table 10).

Other Species. We saw only four cutthroat all summer in our transects in the Lochsa; these were seen only on July 5 below Skookum Creek. We saw only an occasional sucker in the Lochsa above Skookum Creek and only 8 to 12 per transect below Skookum Creek. We saw no squawfish in the Lochsa until August 1, and then only a few below Boulder Creek.

South Fork of the Clearwater River and Tributaries

Juvenile Steelhead. Newsome Creek and American River had the most dense populations of juvenile steelhead in the South Fork drainage, with averages of 95.2 and 67.0 per transect. Red river averaged 23.3 juvenile steelhead per transect, while the South Fork had 21.0 per transect (table 11 and Figure 8).

Young-of-the-year steelhead were first observed in our transects in the South Fork in late August. An average of 8.7 per transect were seen in the South

Table 8. Total numbers counted, average number of fish per transect and percent of total fish for juvenile chinook in the Lochsa River and tributaries, June-August, 1973.

Stream	Date	Total juvenile chinook counted	Average number of juvenile chinook per transect	Percent of total fish	Number of transects
Lochsa River	6/12/73	0	-	-	6
	7/ 5/73	3	0.4	1.3	7
	7/17/73	0	-	-	7
	8/ 1/73	23	3.3	9.0	7
	8/28/73	<u>21</u>	<u>3.5</u>	<u>4.6</u>	<u>6</u>
Subtotals		47			33
Weighted means			1.4	3.8	
Crooked Creek	6/28/73	0	-	-	1
	7/ 8/73	93	23.2	27.3	4
	7/17/73	40	20.0	18.5	2
	8/ 1/73	122	61.0	32.1	2
	8/28/73	<u>252</u>	<u>126.0</u>	<u>45.8</u>	<u>2</u>
Subtotals		507			11
Weighted means			46.1	33.5	
Papoose Creek	6/27/73	0	-	-	4
	7/13/73	<u>0</u>	<u>-</u>	<u>-</u>	<u>1</u>
					5
Squaw Creek	6/27/73	0	-	-	3
	7/13/73	1	0.5	2.0	<u>2</u>
					5
Post Office Creek	6/27/73	0	-	-	3
	7/13/73	0	-	-	<u>1</u>
					4

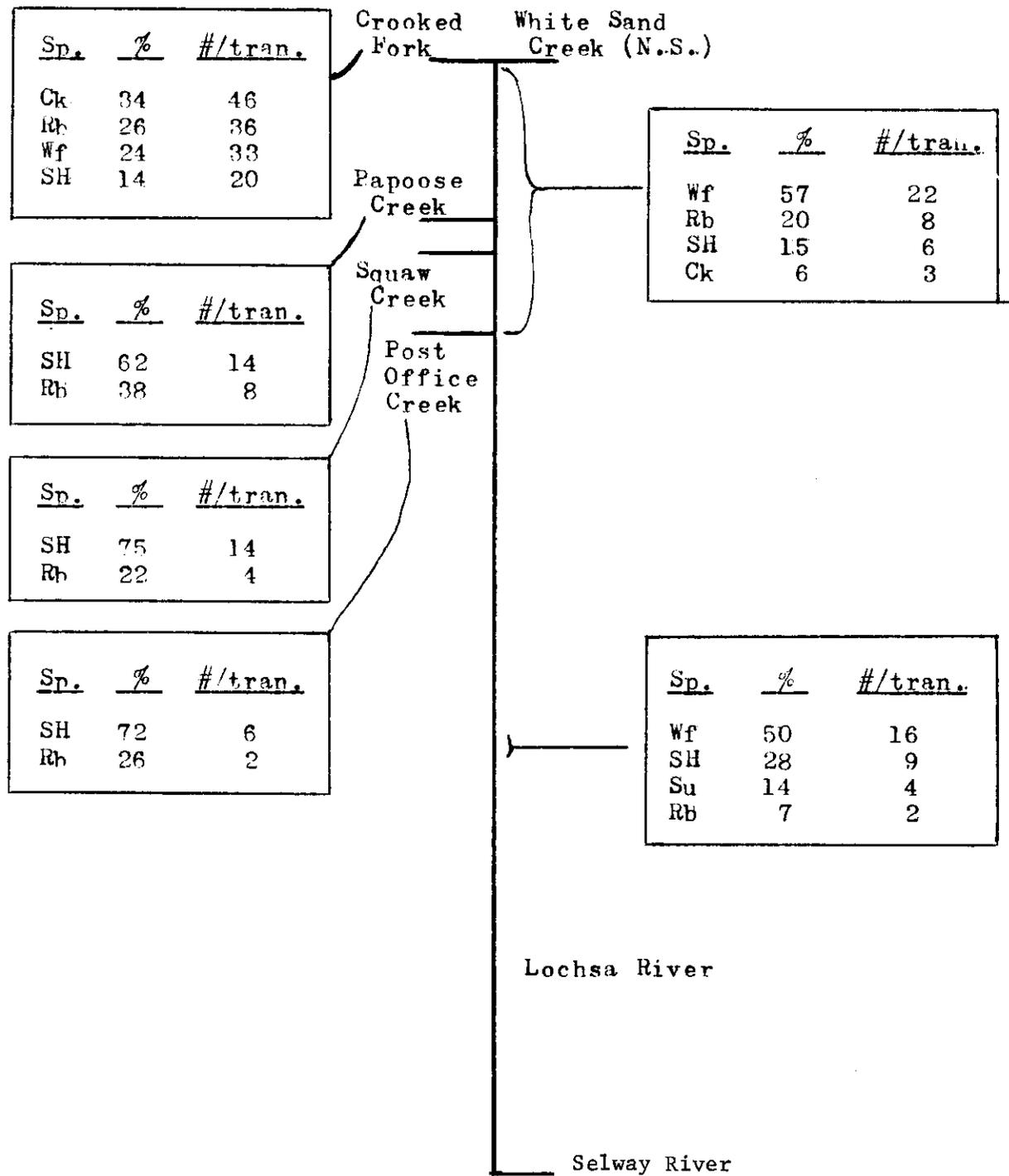


Figure 7. Percent of total fish and average number of fish per snorkel transect for major fish species in the Lochsa River and tributaries, 1973.

Table 9. Total numbers counted, average number of fish per transect and percent of total fish for rainbow trout over 8 inches in the Lochsa River and tributaries, June-August, 1973.

Stream	Date	Total rainbow trout counted	Average number of rainbow trout per transect	Percent of total fish	Number of transects
Lochsa River	6/12/73	6	1.0	4.8	6
	7/ 5/73	79	11.3	33.6	7
	7/17/73	41	5.9	27.3	7
	8/ 1/73	21	3.0	8.2	7
	8/28/73	<u>18</u>	<u>3.0</u>	<u>3.9</u>	<u>6</u>
Subtotals		165			33
Weighted means			5.0	13.5	
Crooked Fork Creek	6/28/73	3	3.0	12.0	1
	7/ 8/73	48	12.0	14.1	4
	7/17/73	52	26.0	24.1	2
	8/ 1/73	133	66.5	35.1	2
	8/28/73	<u>159</u>	<u>79.5</u>	<u>28.9</u>	<u>2</u>
Subtotals		395			11
Weighted means			35.9	26.1	
Papoose Creek	6/27/73	38	9.5	49.4	4
	7/13/73	<u>4</u>	<u>4.0</u>	<u>11.8</u>	<u>1</u>
Subtotals		42			5
Weighted Means			8.4	37.8	
Squaw Creek	6/27/73	6	2.0	13.3	3
	7/13/73	<u>14</u>	<u>7.0</u>	<u>28.6</u>	<u>2</u>
Subtotals		20			5
Weighted means			4.0	22.2	
Post Office Creek	6/27/73	4	1.3	25.0	3
	7/13/73	<u>4</u>	<u>4.0</u>	<u>25.0</u>	<u>1</u>
Subtotals		8			4
Weighted means			2.0	25.8	

Table 10. Total numbers counted, average number of fish per transect and percent of total fish for whitefish in the Lochsa River and tributaries, June-August, 1973.

Stream	Date	Total whitefish counted	Average number of whitefish per transect	Percent of total fish	Number of transects
Lochsa River	6/17/73	25	4.2	20.0	6
	7/ 5/73	56	8.0	23.8	7
	7/17/73	75	10.7	50.0	7
	8/ 1/73	141	20.1	55.1	7
	8/28/73	<u>335</u>	<u>55.8</u>	<u>72.8</u>	<u>6</u>
Subtotals		632			33
Weighted means			19.2	51.5	
Crooked Fork Creek	6/28/73	5	5.0	20.0	1
	7/ 8/73	134	33.5	39.3	4
	7/17/73	42	21.0	19.4	2
	8/ 1/73	92	46.0	24.3	2
	8/28/73	<u>91</u>	<u>45.5</u>	<u>16.5</u>	<u>2</u>
Subtotals		364			11
Weighted means			33.1	24.1	
Papoose Creek	6/27/73	0	-	-	4
	7/13/73	0	-	-	1
Squaw Creek	6/27/73	0	-	-	3
	7/13/73	0	-	-	2
Post Office Creek	6/27/73	0	-	-	3
	7/13/73	0	-	-	1

Table 11. Total numbers counted, average number of fish per transect and percent of total fish for juvenile steelhead in the South Fork of the Clearwater River and tributaries, June-August, 1973.

Stream	Date	Total juvenile steelhead counted	Average number of juvenile steelhead per transect	Percent of total fish	Number of transects
South Fork Clearwater River	6/ 6/73	96	13.7	77.4	7
	7/10/73	82	11.7	18.9	7
	8/ 8/73	104	17.3	35.5	6
	8/29/73(J)*	223	31.9	40.0	7
	8/29/73(YOY)**	<u>61</u>	<u>8.7</u>	<u>4.3</u>	<u> </u>
Subtotals		566			27
Weighted means			21.0	40.2	
Newsome Creek	6/20/73	407	135.7	82.4	3
	7/10/73	236	78.7	63.1	3
	7/18/73	318	106.0	44.0	3
	7/31/73	<u>182</u>	<u>60.7</u>	<u>60.7</u>	<u>3</u>
Subtotals		1,143			12
Weighted means			95.2	58.4	
Red River	6/19/73	65	32.5	85.5	2
	7/ 3/73	31	15.5	19.0	2
	7/18/73	53	26.5	20.9	2
	7/31/73	39	19.5	17.4	2
	8/29/73	<u>45</u>	<u>22.5</u>	<u>10.2</u>	<u>2</u>
Subtotals		233			10
Weighted means			23.3	20.2	
American River	6/19/73	38	38.0	66.1	1
	7/ 3/73	65	65.0	53.7	1
	7/18/73	49	49.0	66.2	1
	7/31/73	46	46.0	43.8	1
	8/29/73(J)*	111	111.0	35.7	1
	8/29/73(YOY)**	<u>26</u>	<u>26.0</u>	<u>3.9</u>	<u> </u>
Subtotals		335			5
Weighted means			67.0	50.1	

* Juvenile

** Young-of-the-year

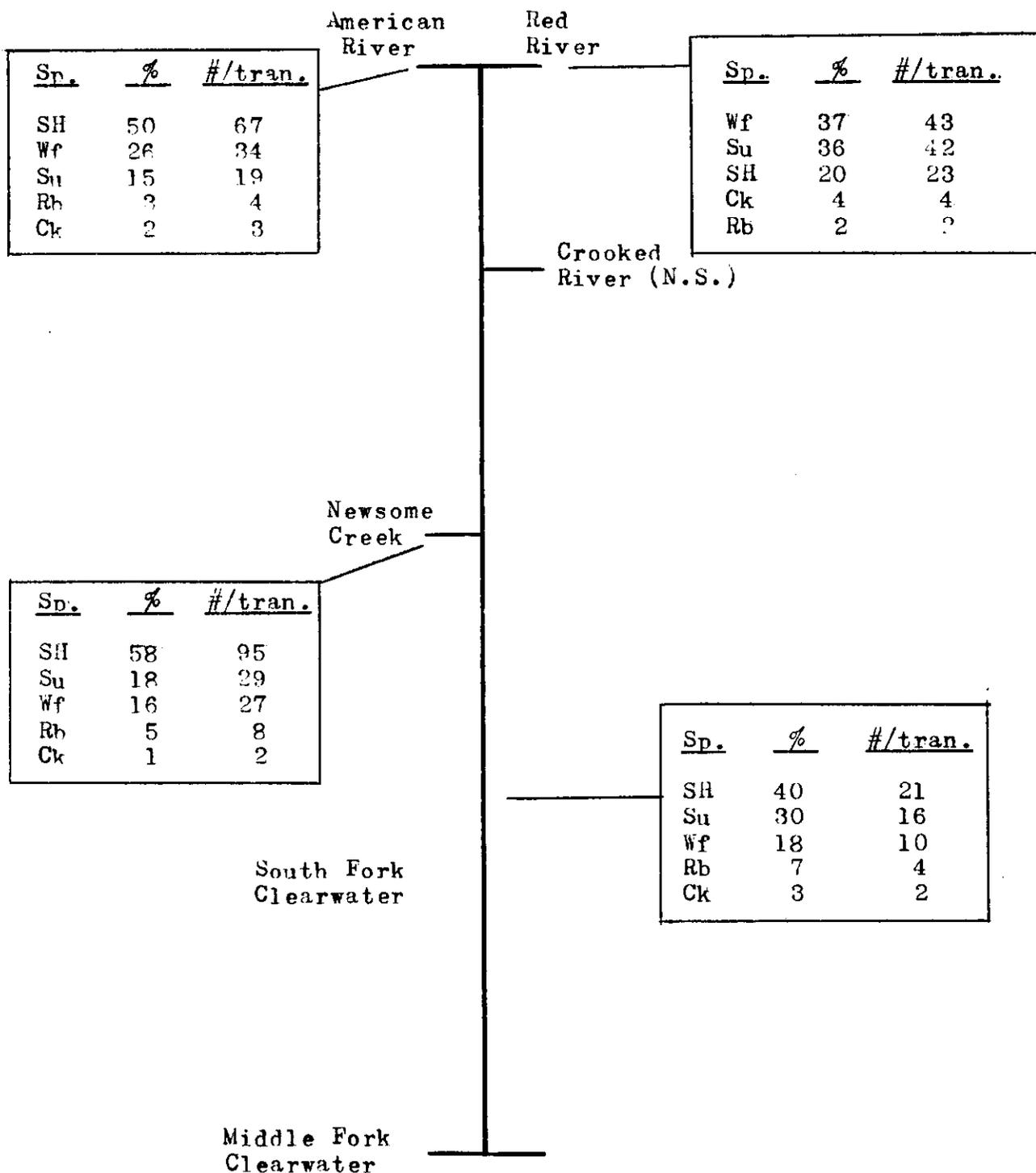


Figure 8. Percent of total fish and average number of fish per snorkel transect for major fish species in the South Fork Clearwater River and tributaries, 1973.

Fork and 26.0 per transect in American River (Table 11). Large numbers of young-of-the-year steelhead were seen in the shallows of Red River, American River and Newsome Creek earlier in the summer but were not enumerated. These fish originated from eggs taken at Dworshak Hatchery and were released as fry.

Juvenile steelhead made up 82.4 and 85.5% of the total fish seen in Newsome Creek and Red River in June. By July 31, 60.7% of the fish seen in Newsome Creek were juvenile steelhead, and on August 29 only 10.2% of the fish in the Red River transects were juvenile steelhead. In the main South Fork, percentages of juvenile steelhead varied from 77.4% in June down to 18.9% in July and back up to 40.0% on August 29 (Table 11).

Juvenile Chinook. Relatively few juvenile chinook were seen in the South Fork drainage. Red River and American River had averages of 4.4 and 3.4 juvenile chinook per transect, respectively. Newsome Creek had an average of only 2.3 juvenile chinook per transect and the main South Fork averaged only 1.5 (Table 12).

Adult Chinook. In June, 1973, hatchery personnel released 1,942 unspawned adult chinook from Rapid River Hatchery at several sites in the South Fork of the Clearwater. They dispersed quite rapidly from the planting sites and were observed in several locations in the South Fork and tributaries. We observed only one adult chinook in an established transect in the South Fork; in Newsome Creek we saw adult chinook in two of our transects. Apparently, all or most of the spawning activity by these fish occurred in tributary streams (Red River, Newsome Creek and John's Creek).

Rainbow Trout. All of the rainbow trout over 8 inches seen in the South Fork were apparently hatchery catchables. Over the summer Newsome Creek had an average of 8.1 rainbow per transect (5.0% of the fish seen). Red River, American River and the main South Fork each averaged from two to four resident rainbow per transect (Table 13).

Whitefish. The greatest concentrations of whitefish were found in Red River, American River and Newsome Creek in that order. Whitefish numbers in Red River, American River and the South Fork increased throughout the summer in our transects. On the average, 37.1% of the fish seen in Red River were whitefish. In American River, 25.6% were whitefish and in Newsome Creek 16.3% (Table 14).

Other Species. We saw only one cutthroat all summer in our transects in the South Fork. We saw totals of five cutthroat in Newsome Creek, four in American River and one in Red River.

Dolly Varden were not numerous anywhere, but were about equally abundant in Newsome Creek, American River and Red River. We never saw more than four in any transect.

Suckers were most numerous in Red River where they comprised an average of 36.0% of the fish seen. In the Main South Fork, 30.3% of the fish seen were suckers. We saw a few squawfish in the main South Fork during August, but none were seen in the upper river or tributaries (Table 15).

Table 12. Total numbers counted, average number of fish per transect and percent of total fish for juvenile chinook in the South Fork of the Clearwater River and tributaries, June-August, 1973.

Stream	Date	Total juvenile chinook counted	Average number of juvenile chinook per transect	Percent of total fish	Number of transects
South Fork of Clearwater River	6/ 6/73	0	-	-	7
	7/10/73	3	0.4	0.7	7
	8/ 8/73	14	2.3	4.8	6
	8/29/73	<u>24</u>	<u>3.4</u>	<u>4.3</u>	<u>7</u>
Subtotals		41			27
Weighted means			1.5	2.9	
Newsome Creek	6/20/73	0	-	-	3
	7/10/73	1	0.3	0.3	3
	7/18/73	9	3.0	1.2	3
	7/31/73	<u>18</u>	<u>6.0</u>	<u>4.9</u>	<u>3</u>
Subtotals		28			12
Weighted means			2.3	1.4	
Red River	6/19/73	0	-	-	2
	7/ 3/73	0	-	-	2
	7/18/73	3	1.5	1.2	2
	7/31/73	26	13.0	11.6	2
	8/29/73	<u>15</u>	<u>7.5</u>	<u>3.4</u>	<u>2</u>
Subtotals		44			10
Weighted means			4.4	3.8	
American River	6/19/73	0	-	-	1
	7/ 3/73	6	6.0	5.0	1
	7/18/73	3	3.0	4.1	1
	7/31/73	0	-	-	1
	8/29/73	<u>8</u>	<u>8.0</u>	<u>2.6</u>	<u>1</u>
Subtotals		17			5
Weighted means			3.4	2.5	

Table 13. Total numbers counted, average number of fish per transect and percent of total fish for Rainbow trout over 8 inches in the South Fork of the Clearwater River and tributaries, June-August, 1973.

Stream	Date	Total rainbow trout counted	Average number of rainbow trout per transect	Percent of total fish	Number of transects
South Fork Clearwater River	6/ 6/73	2	0.3	1.6	7
	7/10/73	25	3.6	5.8	7
	8/ 8/73	32	5.3	10.9	6
	8/29/73	<u>37</u>	<u>5.3</u>	<u>6.6</u>	<u>7</u>
Subtotals		96			27
Weighted means			3.6	6.8	
Newsome Creek	6/20/73	35	11.7	7.1	3
	7/10/73	26	8.7	7.0	3
	7/18/73	19	6.3	2.6	3
	7/31/73	<u>17</u>	<u>5.7</u>	<u>5.7</u>	<u>3</u>
Subtotals		97			12
Weighted means			8.1	5.0	
Red River	6/19/73	0	-	-	2
	7/ 3/73	6	3.0	3.7	2
	7/18/73	7	3.5	2.8	2
	7/31/73	4	2.0	1.8	2
	8/29/73	<u>6</u>	<u>3.0</u>	<u>1.4</u>	<u>2</u>
Subtotals		23			10
Weighted means			2.3	2.0	
American River	6/19/73	8	8.0	14.3	1
	7/ 3/73	0	-	-	1
	7/18/73	5	5.0	6.8	1
	7/31/73	2	2.0	1.9	1
	8/29/73	<u>4</u>	<u>4.0</u>	<u>1.3</u>	<u>1</u>
Subtotals		19			5
Weighted means			3.8	2.8	

Table 14. Total numbers counted, average number of fish per transect and percent of total fish for whitefish in the South Fork of the Clearwater River and tributaries, June-August, 1973.

Stream	Date	Total whitefish counted	Average number of whitefish per transect	Percent of total fish	Number of transects
South Fork Clearwater River	6/ 6/73	17	2.4	13.7	7
	7/10/73	66	9.4	15.2	7
	8/ 8/73	68	11.3	23.2	6
	8/29/73	<u>107</u>	<u>15.3</u>	<u>19.2</u>	<u>7</u>
Subtotals		258			27
Weighted means			9.6	18.3	
Newsome Creek	6/20/73	44	14.7	8.9	3
	7/10/73	54	18.0	14.4	3
	7/18/73	134	44.7	18.6	3
	7/31/73	<u>87</u>	<u>29.0</u>	<u>23.7</u>	<u>3</u>
Subtotals		319			12
Weighted means			26.6	16.3	
Red River	6/19/73	10	5.0	13.2	2
	7/ 3/73	63	31.5	38.6	2
	7/18/73	90	45.0	35.4	2
	7/31/73	80	40.0	35.7	2
	8/29/73	<u>185</u>	<u>92.5</u>	<u>42.2</u>	<u>2</u>
Subtotals		428			10
Weighted means			42.8	37.1	
American River	6/19/73	7	7.0	12.4	1
	7/ 3/73	20	20.0	16.5	1
	7/18/73	15	15.0	20.2	1
	7/31/73	39	39.0	37.1	1
	8/29/73	<u>90</u>	<u>90.0</u>	<u>28.9</u>	<u>1</u>
Subtotals		171			5
Weighted means			34.2	25.6	

Table 15. Total numbers counted, average number of fish per transect and percent of total fish for sucker and squawfish in the South Fork of the Clearwater River and tributaries, June-August, 1973.

Stream	Date	Total counted		Average number per transect		Percent of total fish		Number of transects
		Sk	Sq	Sk	Sq	Sk	Sq	
South Fork Clearwater River	6/ 6/73	8	0	1.1	-	6.5	-	7
	7/10/73	256	0	36.6	-	59.0	-	7
	8/ 8/73	64	11	10.7	1.8	21.8	3.8	6
	8/29/73	<u>98</u>	<u>6</u>	<u>14.0</u>	<u>0.9</u>	<u>17.6</u>	<u>1.1</u>	<u>7</u>
Subtotals		426	17					27
Weighted means				15.8	0.6	30.3	1.3	
Newsome Creek	6/20/73	0	0	-	-	-	-	3
	7/10/73	50	0	16.7	-	13.4	-	3
	7/18/73	240	0	80.0	-	33.3	-	3
	7/31/73	<u>57</u>	<u>0</u>	<u>19.0</u>	<u>-</u>	<u>15.6</u>	<u>-</u>	<u>3</u>
Subtotals		347	0					12
Weighted means				28.9	-	17.7	-	
R River	6/19/73	0	0	-	-	-	-	2
	7/ 3/73	57	0	28.5	-	35.0	-	2
	7/18/73	100	0	50.0	-	39.3	-	2
	7/31/73	75	0	37.5	-	33.5	-	2
	8/29/73	<u>185</u>	<u>0</u>	<u>92.5</u>	<u>-</u>	<u>42.1</u>	<u>-</u>	<u>2</u>
Subtotals		417	0					10
Weighted means				41.7	-	36.0	-	
American River	6/19/73	0	0	-	-	-	-	1
	7/ 3/73	28	0	28.0	-	22.3	-	1
	7/18/73	0	0	-	-	-	-	1
	7/31/73	14	0	14.0	-	13.3	-	1
	8/29/73	<u>55</u>	<u>0</u>	<u>55.0</u>	<u>-</u>	<u>17.7</u>	<u>-</u>	<u>1</u>
Subtotals		97	0					5
Weighted means				19.4	-	14.5	-	

Upper Clearwater, Middle Fork of the Clearwater River and Lolo Creek

Juvenile Steelhead. We saw very few juvenile steelhead in the upper Clearwater or Middle Fork after June 29 and an average of only 3.4 per transect on that date. In Lolo Creek, juvenile steelhead were about twice as numerous in transects below Lolo Falls as above that point on July 12. By August 24, we found juvenile steelhead about 1.5 times more numerous below the falls. However, young-of-the-year steelhead were 1.3 times more abundant above the falls in August. These young-of-the-year steelhead were the progeny of wild adults and possibly some from 800 unspawned adults released in Lolo Creek.

Juvenile Chinook. We observed only one juvenile chinook in an established transect in the Middle Fork. We did, however, observe several in nontransect areas of the stream. No juvenile chinook were seen in Lolo Creek. The falls in Lolo Creek is a barrier to upstream migration by chinook.

Adult Chinook. On June 29, we saw one adult chinook in the Middle Fork just below Clear Creek. On July 11, two adult chinook were observed in the transect just below the Lochsa-Selway confluence. No adult chinook were seen in Lolo Creek.

Rainbow Trout. We saw an average of 2.8 rainbow trout per transect on the Middle Fork on June 29 and 1.6 per transect on July 11. After that, less than one rainbow trout per transect were seen in the Middle Fork. We did not see any rainbow trout over 8 inches in Lolo Creek.

Whitefish. We saw an average of 9.3 whitefish per transect in the Middle Fork and 11.1 per transect in Lolo Creek. On August 9, 53.2% of the fish seen in the Middle Fork were whitefish (Table 16).

Other Species. We noted only two cutthroat in the Middle Fork all summer. These were seen on July 19 below Clear Creek and were 9-10 inches long. We saw three cutthroat above the falls in the Lolo Creek transects on July 12.

We saw an average of 2.6 brook trout per transect in Lolo Creek. Brook trout were seen both above and below the falls. On July 12, we counted 11 brook trout in the transect immediately below Lolo Falls.

In the Middle Fork of the Clearwater, we counted less than one smallmouth bass per transect. On June 9, however, we saw five smallmouth bass in our lower-most transect in the Middle Fork.

Suckers were very numerous in the Middle Fork making up an average of 51.2% of the fish seen. Squawfish comprised another 15.0% of the fish in the Middle Fork (Table 17 and Figure 9).

Releases of Adult Steelhead and Chinook

The 1,600 unspawned adult steelhead which were trucked from Dworshak National Fish Hatchery to the Lochsa drainage dispersed from the planting sites quite rapidly and survival was apparently quite good. Of the 200 adults released into Squaw Creek, we noted six mortalities. We found three mortalities

Table 16. Total numbers counted, average number of fish per transect and percent of total fish for whitefish in the Upper and Middle Fork of the Clearwater Rivers and Lolo Creek, June-August, 1973.

Stream	Date	Total whitefish counted	Average number of whitefish per transect	Percent of total fish	Number of transects
Middle Fork Clearwater River	6/29/73	27	5.4	6.3	5
	7/11/73	53	7.6	20.5	7
	7/19/73	98	16.3	43.2	6
	8/ 9/73	33	8.2	53.2	4
	8/22/73	<u>41</u>	<u>8.2</u>	<u>30.8</u>	<u>5</u>
Subtotals		252			27
Weighted means			9.3	22.7	
Lolo Creek	7/12/73	2	0.7	2.8	3
	8/24/73	<u>76</u>	<u>19.0</u>	<u>27.7</u>	<u>4</u>
Subtotals		78			7
Weighted means			11.1	22.3	

Table 17. Total numbers counted, average number of fish per transect and percent of total fish for suckers and squawfish in the Upper and Middle Fork of the Clearwater River and Lolo Creek, June-August, 1973.

Stream	Date	Total counted		Average number per transect		Percent of total fish		Number of transects
		Sk	Sq	Sk	Sq	Sk	Sq	
Middle Fork Clearwater River	6/29/73	215	155	43.0	31.0	50.0	36.1	5
	7/11/73	170	10	24.3	1.4	65.9	3.8	7
	7/19/73	119	0	19.8	-	52.4	-	6
	8/ 9/73	18	3	4.5	0.8	29.0	4.8	4
	8/22/73	<u>45</u>	<u>43</u>	<u>9.0</u>	<u>8.6</u>	<u>33.8</u>	<u>32.3</u>	<u>5</u>
Subtotals		567	211					27
Weighted means				21.0	7.8	51.2	19.0	
Lolo Creek	7/12/73	0	0	-	-	-	-	3
	8/24/73	<u>0</u>	<u>0</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>4</u>
Subtotals		0	0					7
Weighted means								

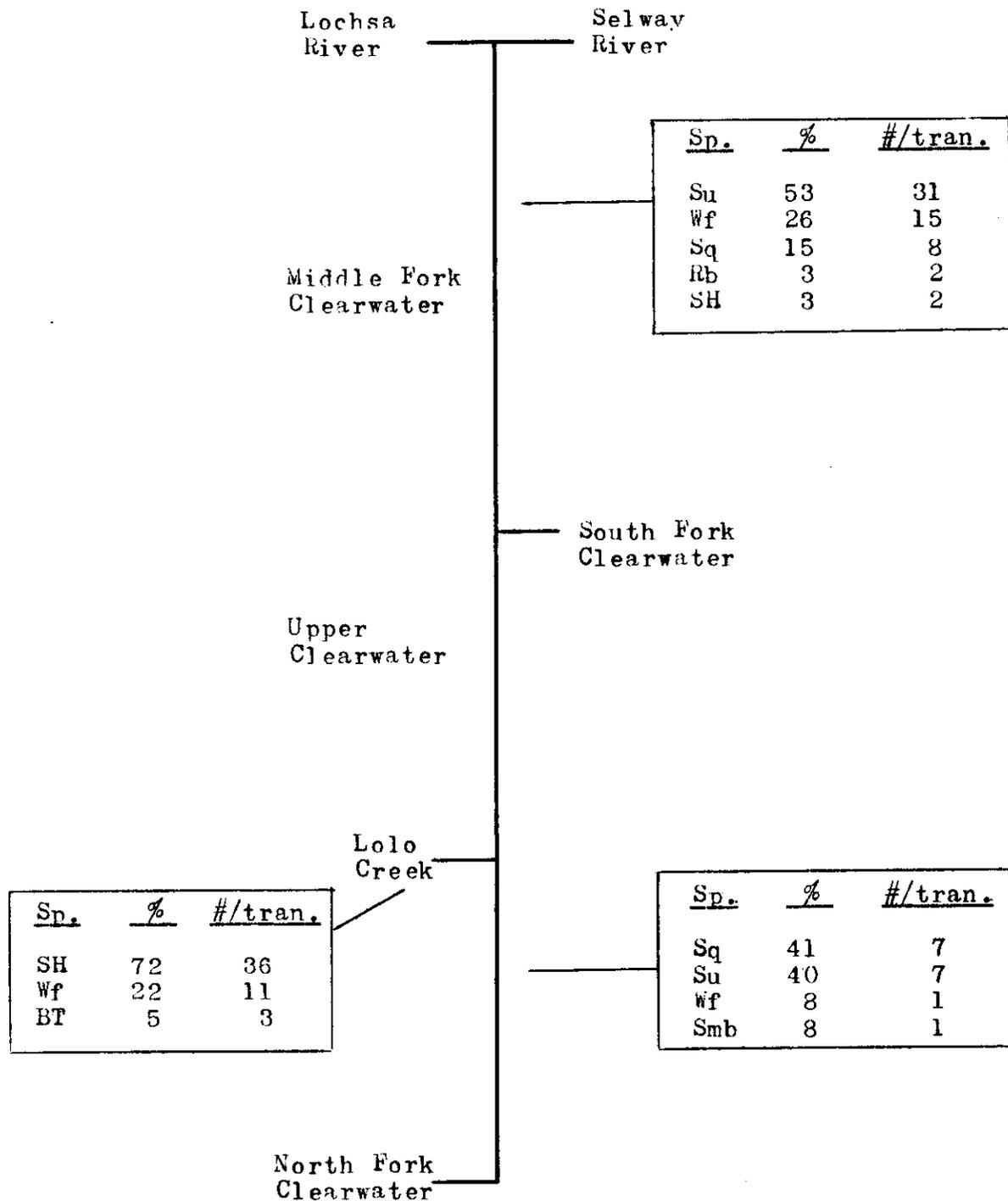


Figure 9. Percent of total fish and average number of fish per snorkel transect for major fish species in the Upper and Middle Fork Clearwater and Lolo Creek, 1973..

out of 200 below the Boulder Creek release site. Concentrations of 15 to 20 "hatchery" steelhead were observed actively spawning above release sites in Crooked Fork Creek and White Sand Creek. Several "hatchery" fish were also seen spawning in Squaw Creek and Papoose Creek. We observed three instances of "hatchery" fish spawning with "wild" fish.

An additional 800 unspawned adult steelhead were trucked to Lolo Creek. We did have a significant mortality below one of the release sites in Lolo Creek, where we counted 42 dead steelhead out of 400 released at that site. Again, the fish dispersed well and spawning activity was observed above and below the release sites in Lobo Creek.

The 1,942 unspawned adult chinook which were trucked from Rapid River Hatchery to the South Fork of the Clearwater experienced similar success. Dispersal was rapid and no mortalities were noted. We observed several of these fish while snorkeling in Newsome Creek and the main South Fork, and had reports of fish as far up as Red River Ranger Station. We did not actually observe any of these fish actively spawning, but received several reports of spawning activity in Red River, Newsome Creek and Johns Creek.

Steelhead and Chinook Salmon Spawning Ground Surveys

Steelhead spawning ground surveys were made by helicopter on April 30, 1973 in the Lochsa and Selway drainages. As was the case in 1972, steelhead redd counts in the Selway were quite low in 1973. Counts in the Selway drainage were as follows: Selway Falls to Moose Creek, 9 redds and 4 fish; Moose Creek from its mouth to Elbows Bend, 19 redds and 13 fish. Lochsa counts were: White Sand Creek, 8 redds and 7 fish; Crooked Fork Creek from its mouth to Fox Creek, 35 redds and 50 fish.

I saw only two spawning steelhead in Crooked River and four in Red River. None were observed in Newsome Creek.

We made chinook spawning ground surveys by helicopter on September 6, 1973 in the Selway drainage. Redd counts and counts of live fish were up in all areas. Table 18 summarizes chinook redd counts in the Selway since 1968.

DISCUSSION:

No hatchery stocks of steelhead have been introduced into the Selway drainage to date. Therefore, any juvenile steelhead enumerated in snorkel transects would be the progeny of wild adults. However, eyed spring chinook eggs have been placed in several hatching channels in the upper Selway River since 1961. These eggs have come from several sources but mainly from Rapid River Hatchery since 1969.

We found that juvenile steelhead were nearly six times as abundant in the Selway River from Moose Creek to Race Creek during the third week in July as they were from White Cap Creek to Moose Creek during the second week in August. The available rearing areas in these two river sections are apparently not significantly different and on this basis, we would not expect such a large difference in numbers of juvenile steelhead. During this time interval, early

Table 18. Helicopter counts of chinook redds and live fish in the Selway River and selected tributaries, 1968-1973

Stream	Section	Redds						Live Fish					
		1968	69	70	71	72	73	1968	69	70	71	72	73
Selway River	Bear Creek- Whitecap Creek	4	26	18	14	37	38	4	21	9	11	13	22
Selway River	Whitecap Creek - Magruder Crossing	10	26	33	34	98	133	6	14	14	15	89	75
Selway River	Magruder Crossing Thompson Flat	2	5	14	7	40	90	1	0	1	4	17	50
Bear Creek	3 miles upstream from mouth of Cub Creek	7	6	19	14	25	26	2	2	0	5	5	7
Running Creek	Mouth - 3 miles upstream	4	21	10	8	11	21	5	17	4	21	12	15
White Cap Creek	Mouth - 12 miles upstream	-	-	4	-	3	7	-	-	-	-	1	3
Moose Creek	Mouth - Elbows Bend	-	-	-	-	13	32	-	-	-	-	2	18
Totals		27	84	98	77	232	347	18	54	28	56	130	190

morning water temperatures in the main Selway at Moose Creek had increased from 56F to 61F and afternoon water temperatures rose from 63F to 70F. Therefore, we might conclude that the juvenile steelhead had moved out of the Selway into the cooler waters of the tributaries by the time we made our August observations. Keating (1958) and Reingold (1964) found that juvenile steelhead moved into tributaries of the North Fork of the Clearwater River during spring and summer and back into the river during fall and winter. They concluded that the movements were due to "climatic conditions".

Even in early June (water temperature 51F), we found very few juvenile steelhead (0.2 per transect) in the Selway River from Race Creek to the mouth. A road parallels this section of the river and it is the only section which receives plants of catchable rainbow trout. The low numbers of juvenile steel-head may be due in part to fishing pressure and/or competition from hatchery trout during the summer months.

Juvenile chinook followed much the same distribution patterns as juvenile steelhead in the main Selway River. Probably the same factors influencing the distribution of juvenile steelhead determined where juvenile chinook were found. In upper Selway tributaries, juvenile chinook outnumbered juvenile steelhead 5 to 1 in White Cap Creek, 9 to 1 in Running Creek and 7 to 1 in Bear Creek. This can be explained by the fact that these streams receive large plants of chinook fry from Indian Creek Hatching Channel and in the past from Running Creek Hatching Channel. We saw no smolt-size chinook in the Selway or its tributaries indicating no residualization of chinook in this drainage.

We saw no adult chinook in any of our transects below Moose Creek. This can be explained by the fact that the chinook run was 3 to 4 weeks earlier than normal in 1973. We counted as many as 35 adult chinook in one transect above White Cap Creek on June 28. The early run was due to very low flows allowing easier passage over down river dams.

The increase in numbers of whitefish in our transects in the Selway below Race Creek as the summer progressed may have been due to forced concentration in deep pools as flows decreased and available habitat decreased (Pettit 1973). We do not have information on the upper Selway during late August so we cannot whether there was a corresponding decrease in whitefish numbers in the upper drainage which would have indicated a downstream movement.

In June, 1973, 748,000 steelhead fry from Dworshak Hatchery were released in the Lochsa drainage at White Sand Creek and Brushy Fork Creek. The Lochsa had received no previous introduction of steelhead. Therefore, the juvenile steel-head seen in our transects during most of the summer of 1973 were the progeny of wild adults. Only during late August did the above mentioned fry along with wild fry begin to show up in mainstream. They had been previously noted in the shallows but were not enumerated. The Lochsa received plants of chinook fingerlings and smolts in 1972 and 1973 from Rapid River and Sandpoint Hatcheries.

As was the case in the Selway, water temperature was a major factor in influencing numbers of juvenile steelhead counted in our transects on the Lochsa. Juvenile steelhead were least abundant in the river and most abundant in the tributaries in mid-July. At this time, water temperature has reached 68F in the Lochsa and was still only 50F in the tributaries.

The continual decrease in percentage of total fish comprised by juvenile steelhead in the Lochsa was caused mainly by releases of hatchery trout and concentration of whitefish in deep pools as flows decreased. Actual numbers of juvenile steelhead did not decline as drastically as the percentages indicate.

We saw no smolt-size chinook in our transects in the Lochsa or tributaries indicating that the smolts released in April had migrated out. We did, however, see a few smolt-size chinook in the Middle Fork and upper Clearwater throughout the summer, and some of these may have originated from plants in the Lochsa or Selway.

We saw no adult chinook in our transects in the Lochsa, due to their early arrival on the spawning grounds in Crooked Fork Creek and other upper Lochsa tributaries. We saw from one to four adult chinook every time we snorkeled a transect in Crooked Fork from June 28 to August 28.

Similarly to what we found in the Selway, whitefish numbers increased in both the main Lochsa and Crooked Fork as the summer progressed. Again, this was probably due to forced concentration as flows decreased (Pettit 1973). The same situation occurred in the South Fork of the Clearwater and its major tributaries.

During 1973, the South Fork of the Clearwater received the greatest numbers of juvenile steelhead of any Clearwater tributary, with releases totaling 1,365,000 fingerings and 2,000,000 fry from Dworshak Hatchery. No steelhead were released in the South Fork during 1972; the progeny of 256,000 eyed eggs entered the system from Red River Hatching Channel in 1971.

Newsome Creek supported the highest densities of juvenile steelhead of any stream we snorkeled averaging 95.2 per transect throughout the summer. In spite of this high density, the fish appeared to remain in good condition and there was no indication that they moved out of the stream. Water temperature reached 71F in Newsome Creek during mid-August but was near 80F in the South Fork at that time.

On August 29, with the water temperature back down to 65F in the South Fork, we noted a two-fold increase in numbers of juvenile steelhead in South Fork transects. However, there was no concurrent drop in numbers of juvenile steelhead in the major tributaries which we snorkeled (Newsome Creek, Red River and American River). These additional steelhead probably came back into the main South Fork from smaller tributary streams which we had not snorkeled.

Juvenile chinook were not nearly as abundant in the South Fork drainage as they were in the Selway or Crooked Fork on the Lochsa. This indicates that chinook fry emerging from Red River and Crooked River hatching channels have probably not survived as well as those from Indian Creek Hatching Channel on the Selway. We saw no hold over smolt-size chinook in the South Fork or tributaries indicating that smolts planted in this drainage in 1973 had moved downstream.

We saw no salmonids in the upper Clearwater or Middle Fork of the Clearwater after July 19. The water temperature had reached 68F in the Middle Fork by this time. From then on, our transects in these streams were dominated by whitefish, suckers and squawfish.

In Lolo Creek, we found juvenile steelhead both above and below the falls. The 800 unspawned adult steelhead from Dworshak Hatchery were all released at sites above the falls, spawn from these fish could have contributed to the young-of-the-year steelhead which we observed above the falls on August 24.

We found no juvenile or adult chinook in Lolo Creek. This is because the falls is impassable to adults and the lower portion of Lolo Creek below the falls is too warm for chinook during the summer months.

Stream flows in all drainages which we snorkeled were much below normal during 1973. We first snorkeled the lower Selway on June 11, 1973 at a flow of 6,200 cfs at Lowell. The previous 5-year-average (1968-1972) flow of the Selway on June 11 was 18,476 cfs. We first snorkeled the Lochsa on June 12, 1973 at a flow of 4,230 cfs at Lowell. The previous 5-year-average flow on this date was 11,544 cfs. We first snorkeled the South Fork of the Clearwater on June 6, 1973 at a flow of 921 cfs at Stites. The previous 5-year-average flow on June 6 was 3,710 cfs. These very low flows in 1973 would no doubt change the migration patterns and distribution of juvenile steelhead and chinook. It will be quite interesting to compare our 1973 findings with those of 1974 (an above normal water year).

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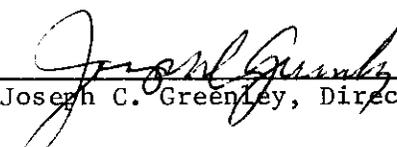
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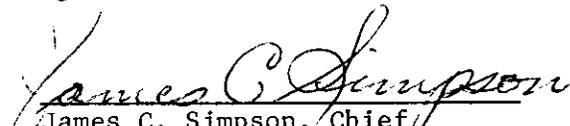
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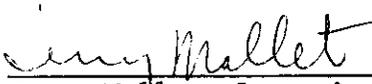
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