

# Memorandum

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To : ... Don Weidlein

Date: June 6, 1973

*RES 40426*

From : Department of Fish and Game Siskiyou Fisheries Management Unit/ Siskiyou Stream Improvement Headquarters

Subject: Annual Aerial King Salmon Spawning Counts ( Years 1971, and 1972)

A. The 1972 spawning survey was composed of two flights. On October 20 R. Caddell and G. Stumpf made the flight. The November 2 flight was postponed due to weather and was made on November 20 with J. Humphrey observing and recording.

The October flight included the Shasta, Scott, Salmon, and Klamath Rivers. The November flight surveyed the Scott and Salmon Rivers. The results are summarized in the following tables:

Table 1. Scott River - October 20, 1972

<u>Area</u>	<u>Redds</u>	<u>Fish</u>
Callahan to Farmer's Diversion	0	0
Farmer's Diversion to Scott Valley Screen	4	3
Scott Valley Screen to Fort Jones	2	5
Fort Jones to Heamber Bridge	160	120
Heamber Bridge to Spring Flat	123	88
Spring Flat to Mouth	38	13
Totals	327	229

Table 2. Scott River - November 20, 1972

<u>Area</u>	<u>Redds</u>	<u>Fish</u>
Callahan to Farmer's Diversion	2	3
Farmer's to Scott Valley Screen	37	6
Scott Valley Screen to Fort Jones	102	17
Fort Jones to Heamber Bridge	328	65
Heamber Bridge to Mouth	16	0
Totals	485	127

Table 3. Salmon River - October 20, 1972

<u>Area</u>	<u>Redds</u>	<u>Fish</u>
Finley Camp to Little North Fork	66	32
Little North Fork to Forks of Salmon	54	19
Cecilville to Forks of Salmon	138	73
Forks of Salmon to Mouth	<u>47</u>	<u>3</u>
Totals	305	127

Table 4. Salmon River\* - November 20, 1972

<u>Area</u>	<u>Redds</u>	<u>Fish</u>
Finley Camp to Sawyers Bar	0	0
Sawyers Bar to Forks of Salmon	17	2
Cecilville to Forks of Salmon	94	1
Forks of Salmon to Mouth	<u>7</u>	<u>1</u>
Totals	118	4

\*Water turbid, L. North Fork to Mouth

Table 5. Additional Rivers Counted - October 20, 1972

<u>Area</u>	<u>Redds</u>	<u>Fish</u>
Shasta River (Big Springs to Mouth)	270	51
Klanath River		
Iron Gate to Horse Creek	36	5
Horse Creek to Happy Camp	5	0

B. The 1971 spawning survey consisted of three flights. The Scott and Salmon Rivers were flown on Oct. 28, 1971 with D. Hoopaugh and R. Caddell observing. The Shasta and Scott Rivers were flown by R. Caddell and D. Hoopaugh on Nov. 12, 1971. Inclement weather prevented a flight over the Salmon River. The Salmon River flight was rescheduled and flown on Dec. 12, 1971 with D. Ahrenholz and R. Caddell observing. The results are summarized in the following tables:

Table 6. Salmon and Scott Rivers - October 28, 1971

<u>Area</u>	<u>Redds</u>	<u>Fish</u>
Salmon River		
North Fork to Forks	87	19
South Fork to Forks	102	34
Forks to Mouth	<u>72</u>	<u>42</u>
	261	95
Scott River	650	306

Table 7. The November and December Flights, 1971

<u>Date</u>	<u>Area</u>	<u>Redds</u>	<u>Fish</u>
11/12	Shasta River	409	4
11/12	Scott River	642	44
12/16	Salmon River	0	0
12/16	Shasta River	Visible, not counted	0

C. Estimation of Spawning Escapement

The actual numbers of female spawners has in the past been estimated by assuming that each female constructs an average of two redds. The number of males has been estimated from the number of estimated females by using the mean sex ratio observed for that given year at Iron Gate Hatchery and at the Shasta River Racks.

Utilizing this estimation technique with no modifications, the number of spawners in the Shasta River was estimated as follows:

<u>Year</u>	<u>Date</u>	<u>Redds</u>	<u>Run Composition (Includes grisle)*</u>	<u>Spawners Est.</u>	<u>Spawners Act.**</u>
1971	11/12	409	45% Females	456	6,619
1972	10/20	270	38% Females	355	3,641

\*From Shasta Rack Counts

If compensation is made in the above calculations for spawning which would occur after Oct. 20 for 1972, the relative error between the 1971 estimates (Nov. 12) and the 1972 estimates would be even greater. The values obtained for the two years from flights do not reflect the almost 50% decrease in the actual number of spawners for 1972.

There are many sources for this error observed, discounting variance in the altitude of flight or observers. A large amount of superimposition could be occurring, or more alarming, a very low rate of spawning success. The redd/female ratios for 1971 and 1972 on the Shasta River are .13 and .19 respectively. If one assumes two redds for each successfully spawned female, the spawning success would be one half of the figures given earlier, i.e. 7-10%. We do not have any data to substantiate the source of error, or to ascertain whether the spawning success is as low as the aerial flights indicate.

It is also difficult to extrapolate to the other rivers from the Shasta River data. A major problem is "redd life". The redds on the Salmon River are not visible from the plane early in November as contrast is lost between surface gravels and subsurface gravels relatively early, compared with the Scott or Shasta River. The Scott River redds seem to disappear slower than those of the salmon river, but more rapidly than Shasta River redds. While Salmon and Scott River redds disappear due to algal die off, the Shasta redds become less visible due to algal growth.

D. The relative value of these aerial surveys

The earlier discussion demonstrated that aerial surveys are of little value when used to enumerate spawning escapement. The best managerial use of these flights would be to map spawning areas of high use, as these areas should be closely checked for alteration by gravel removal operations and other altering projects.

It is suggested (R. Caddell) that the relative insensitivity of the aerial redd counts to spawner numbers observed in the Shasta River may be due to the use by spawners of particular areas, and when runs are high increased superimposition of redds decreases the actual redd count. There has not been a method of evaluating the sensitivity of redd counts from the other rivers.

The flights should be continued, and time should be expended on improving the techniques for more sensitive enumeration, if in fact, the enumerated counts have any value as a management tool. In the future, additional spawning area maps should be constructed during flights.

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