

## Tuolumne River Chinook Salmon Redd Enumeration 1998 and 1999

### Background

Carcass surveys performed by California Department of Fish and Game (CDFG) since 1953 have documented the spawning escapements in the tributaries of the San Joaquin River. These numbers have allowed the CDFG to separate successful fish production years from unsuccessful years but do not allow a complete assessment of biotic and abiotic factors that contribute to that success or failure. Counts of redds and live fish during the carcass surveys allow further assessment of where and when spawning is occurring.

Recently, efforts have been made to estimate the number of juveniles outmigrating from the river. This additional data should allow the separation of the impact to recruitment of factors in the natal stream versus factors beyond the natal stream (Delta pumping, ocean mortality). There is interest in further parsing the natal stream factors to evaluate spawn success and survival to emergence, such that affects of spawning habitat quantity and quality can be separated from those of rearing habitat. This will require large amounts of information.

A beginning for this information collection can be to evaluate spawning success. This can be defined simply as the number of redds produced in the river divided by the number of females in the adult escapement. Currently, some data is collected on the number of redds in the river. This data consists of number of redds counted by the carcass survey crew in each spawning area (riffle).

The CDFG in 1998 and 1999 performed an evaluation of the number of redds (determined by intensive foot survey) in a stratified random sample of the spawning areas compared to the carcass survey crew counts of redds in those same riffles. (CDFG 1999).

### Procedures

Carcass surveys were performed as described in numerous CDFG reports (2002). These crews tagged and recovered carcasses and counted the number of live fish and redds that they see as they float through each riffle. The riffle referred to is a shallow area in the river where the salmon tend to congregate for spawning. These surveys are performed each week throughout the entire area of the river where spawning is occurring. Since the crews float in a boat through the riffles, the counts of live and redds are approximate as the crews are moving rather quickly.

During three weeks of the spawning season, a second crew surveyed specific riffles chosen in a stratified random pattern that accommodated the size and intensity of use at each riffle. The survey was conducted on foot at each of the chosen riffles. The intensive survey involved passing through the riffle in a boat and then recovering it on foot. Redds were mapped onto riffle maps which were then used to count the number of redds in each riffle. The counts from this second crew were used to determine how the number of redds counted intensively on a riffle compares to the counts of redds obtained by the carcass survey.

The counts at each riffle were tallied in the following two tables. The intensive counts are referred to as calibration counts and the carcass survey counts are called crew counts. Crew counts were taken from the database based on the carcass survey date on a riffle that most closely matched the date of the intensive surveys. These were always within a week of each other. This will allow calibration of the carcass survey crew counts to obtain a more accurate estimate of redds in the river in a season. This should give a much better estimate of spawning success.



**1998 Calibration Data**

Survey#	Calibration Count			Crew Count		
	1	2	3	1	2	3
Start Date	11/3/1998	11/17/1998	12/1/1998	11/2/1998	11/16/1998	11/30/1998
End Date	11/4/1998	11/24/1998	12/3/1998	11/6/1998	11/25/1998	12/3/1998
Riffle						
1A		91	110	34	25	8
3B	54	82	96	32	21	16
4A	42	78	89	32	25	13
4B	31	44	64	37	33	20
5A	16	16		12	5	2
8		3	8	1	3	7
13		14	16	2	1	8
16	6	18	13	2	2	6
19	9	18	9	2	3	7
23A	6	8	6	1	4	4
23C	5	8	7	1	0	3
23D	7	12	12	1	4	5
33	0		4	2		3
35B	0		0	1		0
41	3		2	3		2
60			0	0		1
64			4	0		1

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**1999 Calibration Data**

Survey#	Calibration Count			Crew Count		
	1	2	3	1	2	3
Start Date	11/21/1998	11/16/1998	12/2/1998	11/2/1998	11/16/1998	11/30/1998
End Date	11/8/1998	11/19/1998	12/9/1998	11/8/1998	11/19/1998	12/9/1998
Riffle						
1A	33	120	129	23	41	27
3B		117		20	48	17
4A		114		0	45	9
4B		77	128	43	20	15
5A		41	50	4	11	3
8	7		12	8	3	9
13	16		11	11	15	5
16	7		0	3	12	0
19	3		3	1	0	3
23A	3		8	3	2	6
23C			6	2	2	4
23D			0	2	2	6
33	1	1		1	2	0
35B	0	0		0	0	0
41	1	2	1	0	0	2
60		2	1	0	0	1
64		0	0	0	0	0

