

# Memorandum

To: Joe Johnson  
Senior Environmental Scientist

Date: December 11, 2012

From: Clint Garman –Environmental Scientist  
**Department of Fish and Game – North Central Region - Chico**

Subject: **Amended**-2012 Butte Creek Spring-run Chinook Salmon Snorkel Escapement Survey

The annual Butte Creek spring-run Chinook salmon (*Oncorhynchus tshawytscha*) (SRCS) spawning escapement survey was conducted July 10-13, 2012. The standard swimming snorkel methodology which has been employed since about 1988, was used again this year, and covered Centerville Head Dam to Parrott-Phelan Diversion Dam (PPDD) (Figure1). The four reaches from Quartz Bowl to the PPDD were surveyed on consecutive days and a snorkel survey from Centerville Head Dam to Quartz Bowl was conducted on July 25, 2012 to assess salmon passage upstream of the Quartz Bowl Pool.

Since 2001, survey data collection and analysis has been standardized. Prior to the 2001 survey, each crew member developed an independent estimate for each holding pool, and before proceeding, a single group consensus estimate was agreed upon and recorded in the field. The survey protocol, established in 2001 and currently in use, requires each pool to be observed only once by each crew member, with each of the individual estimates recorded separately for each pool. The total for each pool is subsequently calculated as the average of the individual estimates. The total annual escapement estimate is then calculated by summing the averages for each pool. As with past surveys, some pools were observed from above where pool size and depth made in-water observations questionable. In some cases, individual observations were recorded but not used in the average where an individual felt the observation was materially in question. **The estimate for the 2012 adult escapement is 8615 salmon.** Following is the range and average number of adult spring-run Chinook salmon observed in each reach:

Date	Reach	Range	Average	% of Total
7/10	Quartz Bowl Pool to Whiskey Flat	1065-1646	1373	15.9%
7/11	Whiskey Flat to Centerville Powerhouse	2789-3778	3255	37.8%
7/12	Centerville Powerhouse to Covered Bridge	2981-4538	3833	44.5%
7/13	Centerville Covered Bridge to Parrott-Phelan Diversion Dam	154	154	1.8%
7/25	Centerville Head Dam to Quartz Bowl Pool	0	0	0%
	Totals	6989-10116	<b>8615</b>	100%

To include all returning adults in the escapement estimate, the survey was conducted in July to avoid pre-spawning mortalities that would be excluded from the traditional August survey. Prior to the snorkel survey, six pre-spawn mortalities were observed. The ongoing PG&E funded pre-spawning mortality survey will continue to monitor the salmon population until the onset of spawning.

A mark-recapture carcass survey (Schaefer model and potentially a Cormack-Jolly Seber model) will be used to generate alternative escapement estimates. This will be the twelfth year in which a Schaefer model mark re-capture carcass survey estimate can be used to compare escapement estimates against the traditional swimming snorkel methodology. Findings continue to suggest that the snorkel survey estimates continue to underestimate the returning adults in Butte Creek when compared to the Schaefer-model carcass estimates (Figure 2).

It should be noted a fairly robust proportion of yearlings were observed from the Chimney Rock area downstream to the Centerville Powerhouse (CVPH). In particular the sub-reaches A1 – C1 (Quartz Bowl Pool to Helltown) held a large number of juveniles. Below CVPH to the Covered Bridge also held significant numbers of juvenile salmon. This past winter's low precipitation and non-flushing flows precluded mass emigration of YOY salmon. Subsequently, these salmon will hold over summer and emigrate as yearlings in the fall of 2012. Observations of juvenile salmon in moderate numbers have also been noted in 2001, 2005 and 2007.

This year's participants were Department employees, Clint Garman, Colin Purdy, Mike Healey, and Sam Plemons. Also assisting with the survey were PG&E aquatic biologists Craig Geldard, Catalina Reyes and Jon Walsh and NMFS fishery staff Gretchen Umlauf. Please address any questions regarding this survey to me at (530) 895-5110.

cc: Kathy Hill, DFG, North Central Region  
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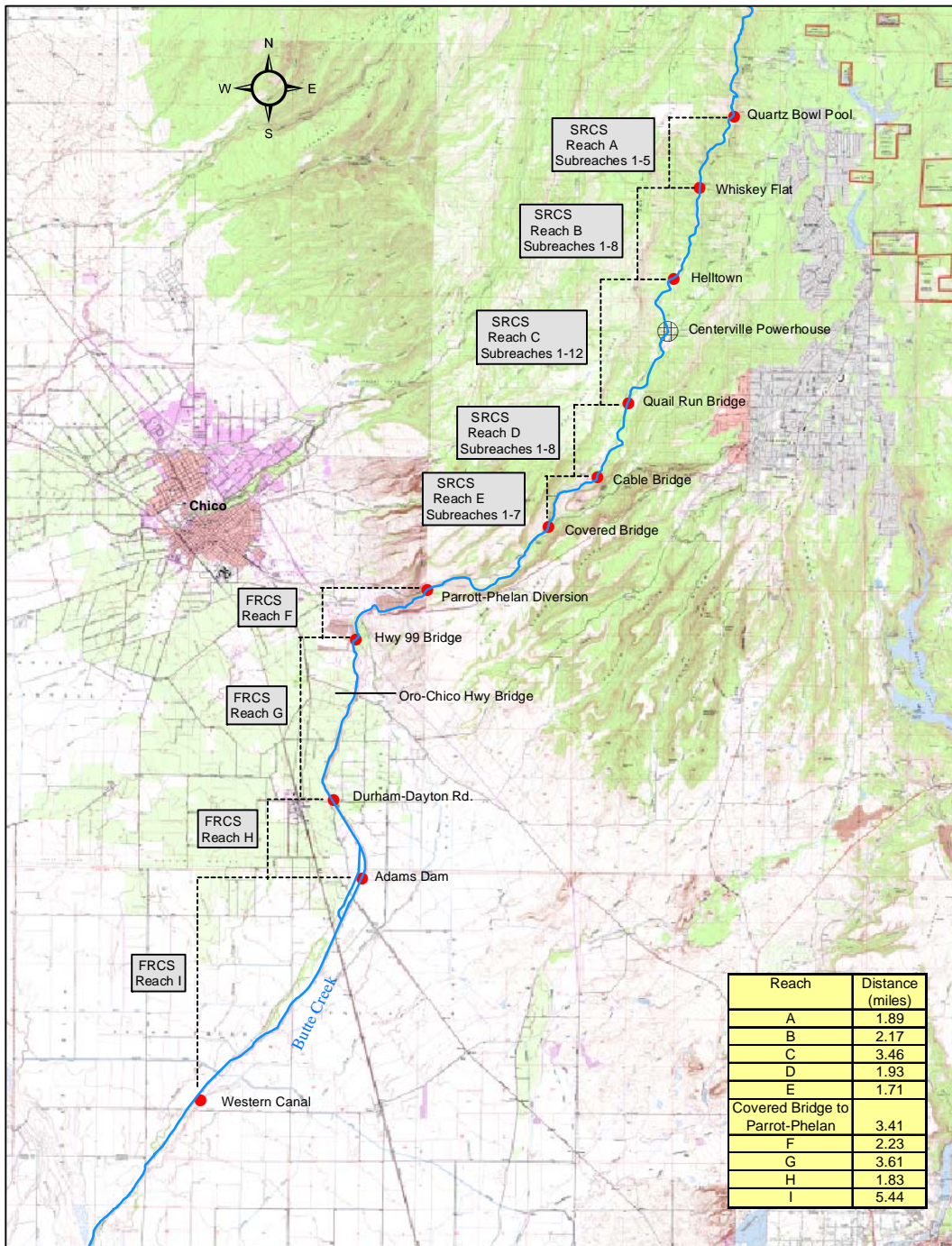


Figure 1. Map showing reaches and major physical features for both SRCS and FRCS spawning and holding areas on Butte Creek.

### Butte Creek (SRCS) Escapement Estimates 2001-2012

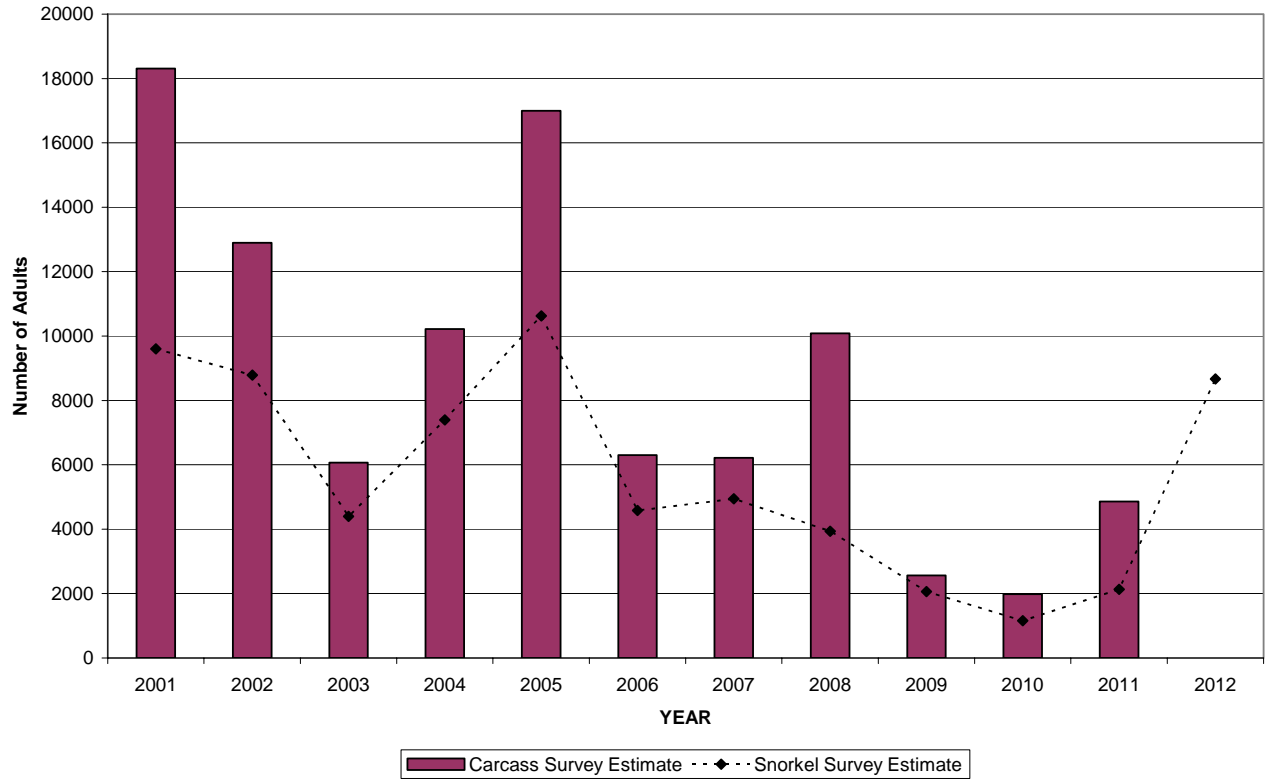


Figure 2. Butte Creek escapement estimates comparing carcass survey versus snorkel survey from 2001-2012.