

# Memorandum

To: Joe Johnson  
Senior Environmental Scientist

Date: July 23, 2013

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

Subject: **2013** 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 9-11, 2013. The standard swimming snorkel methodology which has been employed since about 1988, was used again this year, and covered Centerville Head Dam (CHD) to Centerville Covered Bridge (CCB) (Figure1). The three reaches from Quartz Bowl Pool to the CCB were surveyed on consecutive days and a snorkel survey from Centerville Head Dam to Quartz Bowl was conducted on July 23, 2013 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 2013 adult escapement is 11,470 salmon.** Following is the range and average number of adult spring-run Chinook salmon observed in each reach:

Date	Reach	Range	Average	% of Total
7/9	Quartz Bowl Pool to Whiskey Flat	4,212-6,556	5,330	46.5%
7/10	Whiskey Flat to Centerville Powerhouse	4,033-5,713	4,892	42.7%
7/11	Centerville Powerhouse to Covered Bridge	1,003-1,623	1,248	10.8%
7/23	Centerville Head Dam to Quartz Bowl Pool	0	0	0.0%
	Totals	9,248-13,892	<b>11,470</b>	100.0%

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 45 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 in mid-September.

A mark-recapture carcass survey (Cormack Jolly-Seber model) will be used to generate an alternative escapement estimates. This will be the thirteenth year in which a 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/Cormack Jolly-Seber model carcass estimates (Figure 2).

This year's participants were Department employees, Clint Garman, Colin Purdy, Mike Healey, Jay Rowan and Ben Ewing. Also assisting with the survey were PG&E aquatic biologists Craig Geldard and Catalina Reyes 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  
Tracy McReynolds, DFG, North Central Region  
Trevia Porter, DFG, North Central Region  
Mary Dunne, DFG, North Central Region

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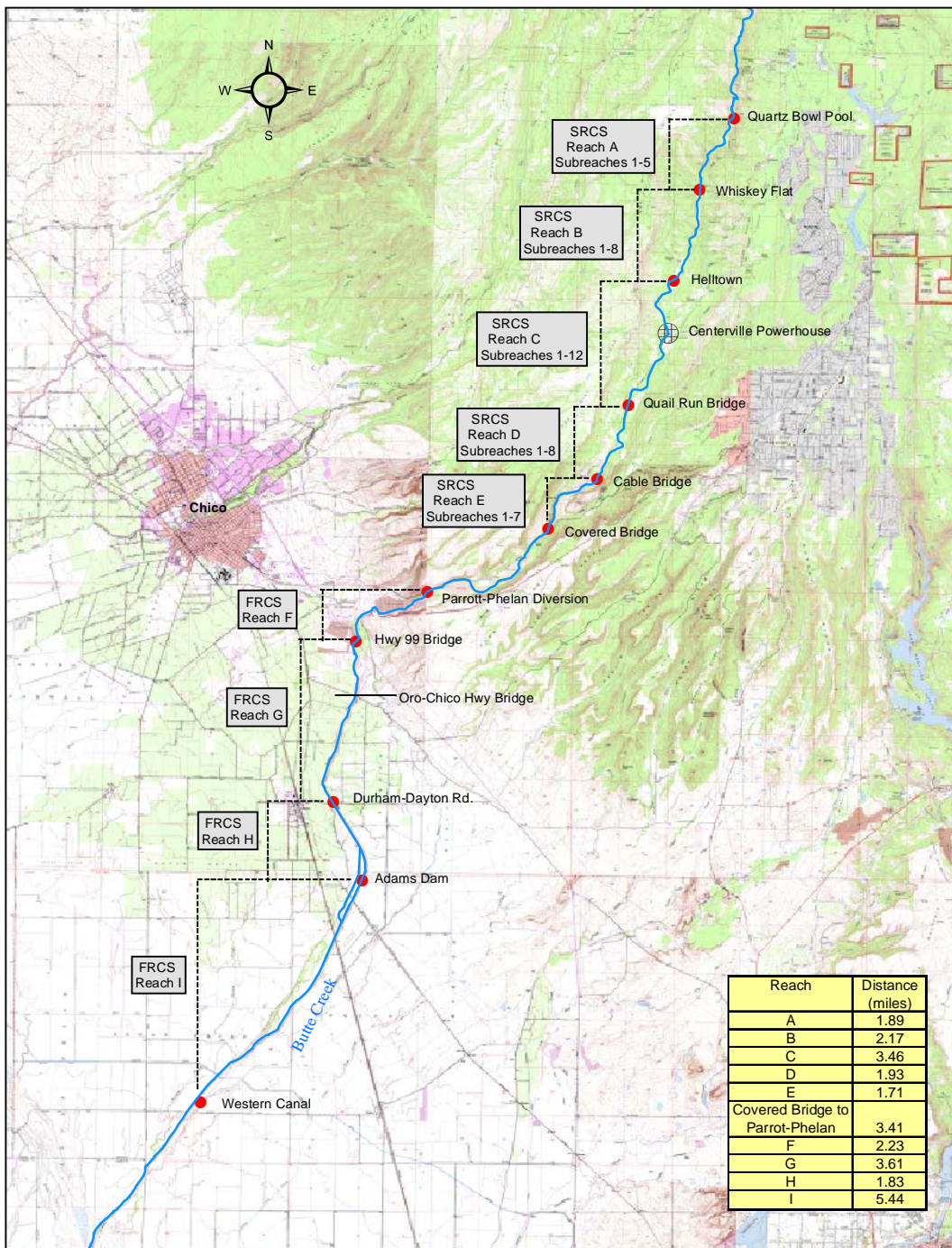


Figure 1. Map showing reaches and major physical features for both SRCS and FRCS spawning and holding areas on Butte Creek.

### Butte Creek (SRCS) Escapement Estimates 2001-2013

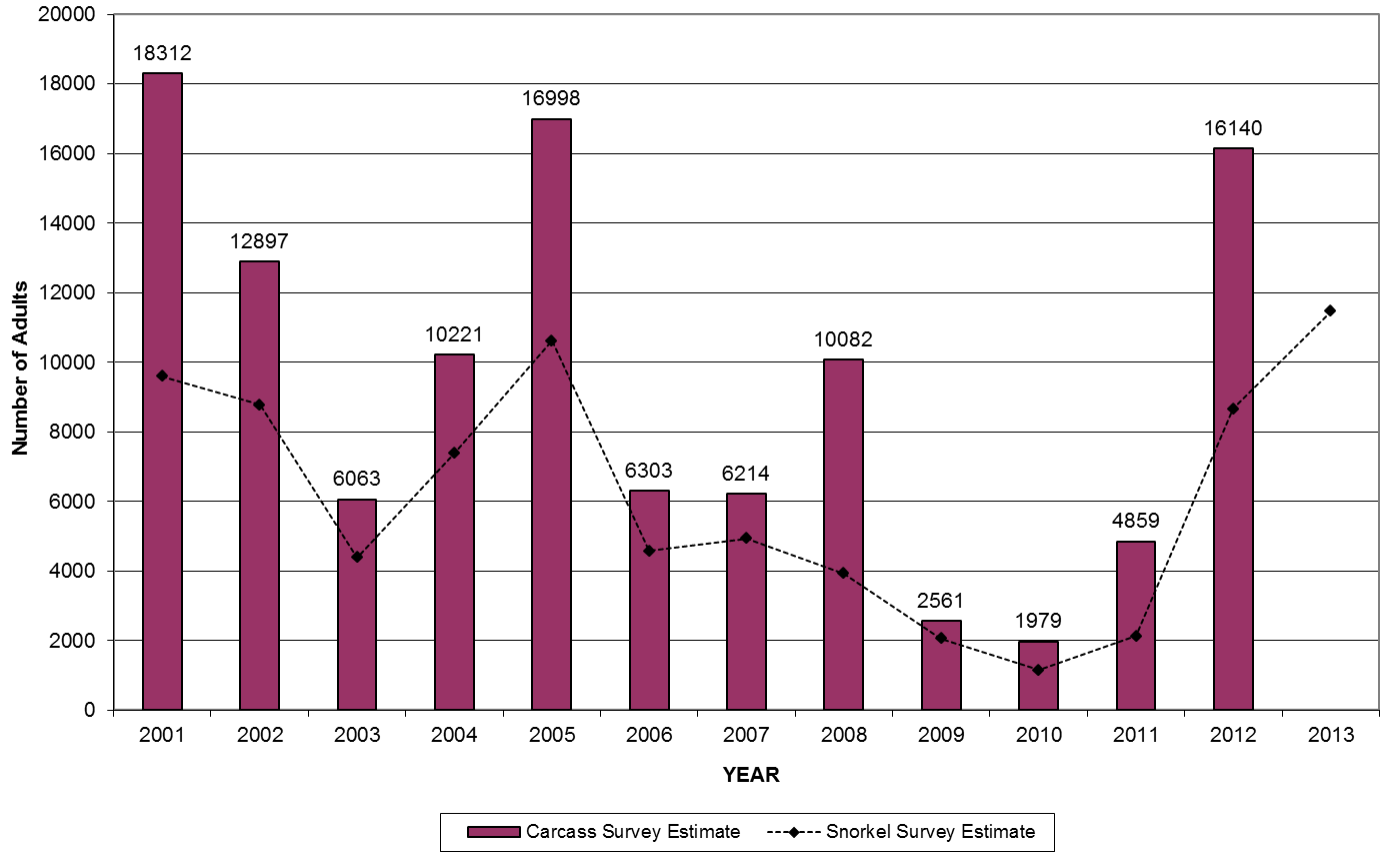


Figure 2. Butte Creek escapement estimates comparing carcass survey versus snorkel survey from 2001-2013.