

Memorandum

To: Tracy McReynolds
Staff Environmental Scientist

Date: August 31, 2011

From: Clint Garman -Associate Fisheries Biologist
Department of Fish and Game – North Central Region - Chico

Subject: 2011 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 August 10-16, 2011. The standard swimming snorkel methodology which has been employed since about 1988, was used again this year, and covered Centerville Head Dam to the Oro-Chico Highway Bridge (OCHB). The three reaches from Quartz Bowl to the Covered Bridge were surveyed on consecutive days and the reach from Centerville Covered Bridge to the Oro-Chico Highway (Figure 1) was surveyed on August 15-16, 2011. A snorkel survey from Centerville Head Dam to Quartz Bowl was conducted on August 30, 2011 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 2011 adult escapement is 2130 salmon.** Following is the range and average number of adult spring-run Chinook salmon observed in each reach:

Date	Reach	Range	Average	% of Total
8/10	Quartz Bowl Pool to Whiskey Flat	45	45	2%
8/11	Whiskey Flat to Centerville Powerhouse	427-543	481	23%
8/12	Centerville Powerhouse to Covered Bridge	948-1143	1034	49%
8/15	Centerville Covered Bridge to Parrott-Phelan Diversion Dam	384-404	394	18%
8/16	Parrott-Phelan Diversion Dam to Oro-Chico Highway	168-183	176	8%
8/30	Centerville Head Dam to Quartz Bowl Pool	0	0	0%
	Totals	1972-2318	2130	100%

To include all returning adults in the escapement estimate, the survey was scheduled to be performed in July to avoid pre-spawning mortalities that would be excluded from the traditional August survey. This year's survey was postponed several times due to high flows within the holding habitat of Butte Creek from Quartz Bowl Pool downstream to the Centerville Covered Bridge and the survey was once again conducted in August. The aforementioned high flows and mild summer air temperatures made environmental conditions for holding adults amicable in the valley portion of Butte Creek. During mid-August, Butte Creek water temperatures from Parrott-Phelan Diversion Dam to the Oro-Chico Highway Bridge (OCHB) are typically lethal to holding SRCS within this historical migration corridor with water temperatures frequently exceeding day time highs of 75° F. However, this year adult SRCS were observed lower in the system and the snorkel survey was extended to the OCHB. It should be noted that from the Highway 99 Bridge to OCHB (8/16/11) several hundred yearling SRCS were also observed. Prior to the snorkel survey, three pre-spawn mortalities have been 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 eleventh 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).

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

cc: Kathy Hill, DFG, North Central Region
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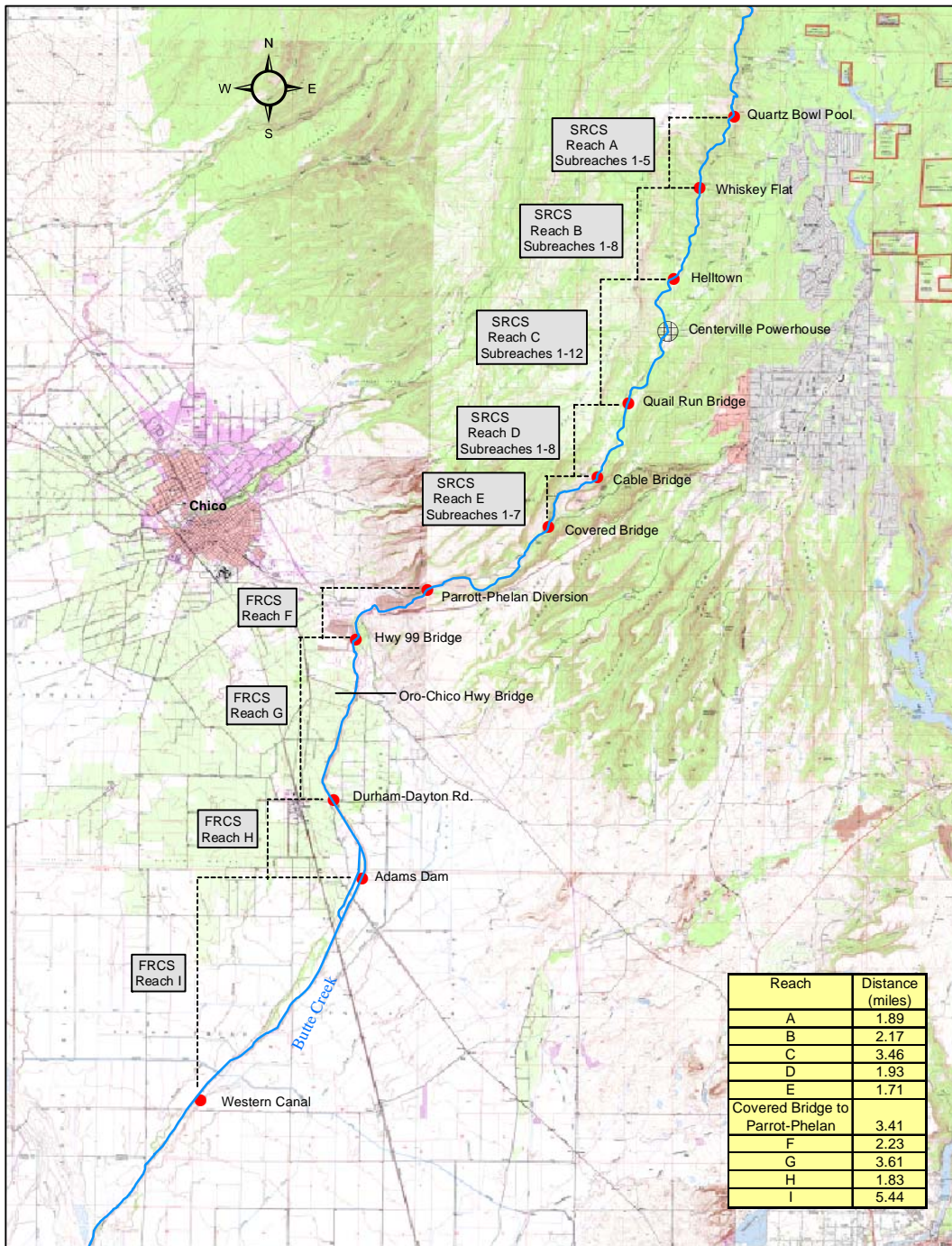


Figure 1. Map showing reaches and major physical features for both SRCS and FRCS spawning and holding areas on Butte Creek.

Butte Creek (SRCS) Escapement Estimates 2001-2011

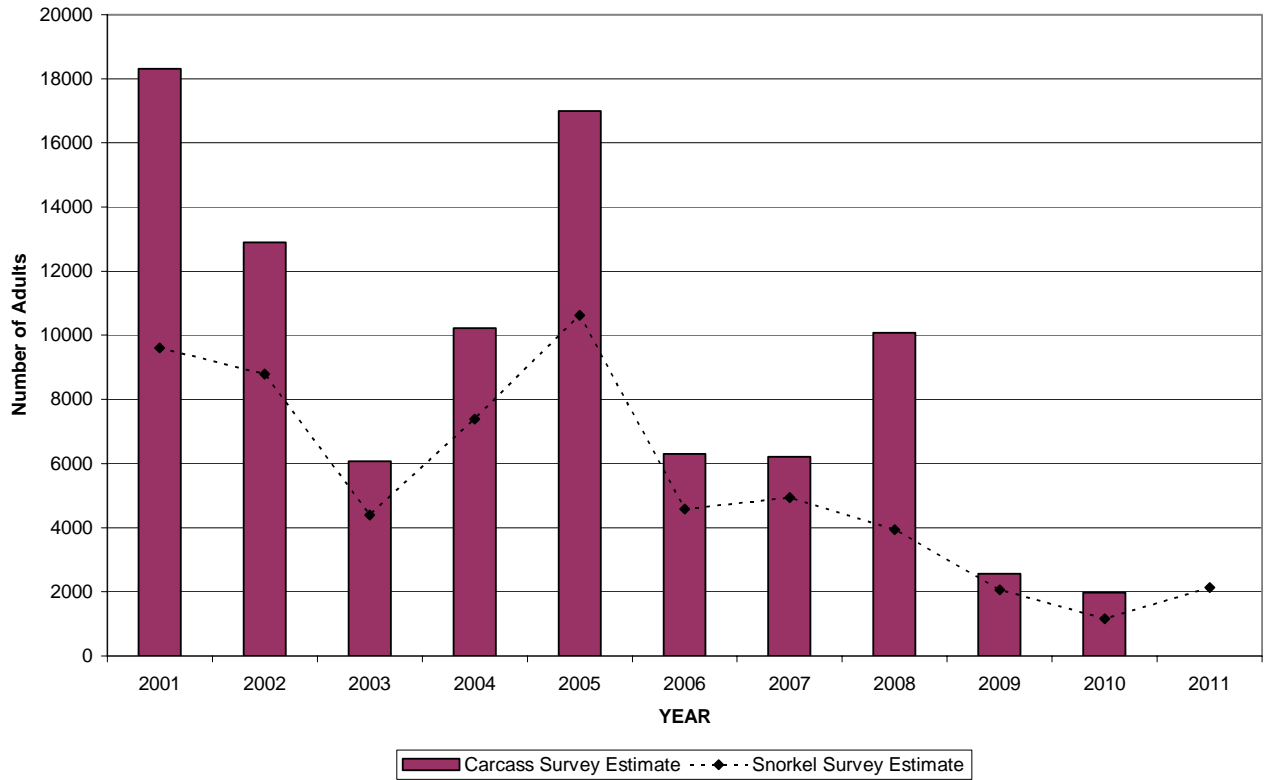


Figure 2. Butte Creek escapement estimates comparing carcass survey versus snorkel survey from 2001-2011.