

# Memorandum

To: Colin Purdy  
Senior Environmental Scientist

Date: September 7, 2016

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

Subject: **2016** 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 12 - 14, 2016. A standard swimming snorkel methodology was used and covered Centerville Head Dam (CHD) to Centerville Covered Bridge (CCB) (Figure 1). The three reaches from Quartz Bowl Pool to the CCB were surveyed on three consecutive days and a snorkel survey from Centerville Head Dam to Quartz Bowl was conducted on August 22, 2016 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 the pool 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 2016 adult escapement is 4450 salmon.** Below is the range and average number of adult spring-run Chinook salmon observed in each reach:

| Date | Reach                                    | Range     | Average     | % of Total |
|------|--|-----------|-------------|------------|
| 7/12 | Quartz Bowl Pool to Whiskey Flat         | 848-1119  | 973         | 22%        |
| 7/13 | Whiskey Flat to Centerville Powerhouse   | 2020-2904 | 2440        | 55%        |
| 7/14 | Centerville Powerhouse to Covered Bridge | 856-1219  | 1037        | 23%        |
| 8/22 | Centerville Head Dam to Quartz Bowl Pool | 0         | 0           | 0%         |
|      | Totals                                   | 3724-5242 | <b>4450</b> | 100%       |

For comparison to the numbers of adults entering the systems, the Vaki RiverWatcher (Vaki) at Durham Mutual Fish Ladder detected a preliminary count of 4,115 “big” fish passing through the camera. Software programming measures the total length of known fish passage and records fish size based on three separate categories; “small” (0-30cm), “medium” (30-60cm) and “big” (60-160cm).

Technical difficulties with the software and camera hampered identification of all recorded video images on the Vaki and silhouette images are currently being analyzed to refine the passage estimate.

A mark-recapture carcass survey (Cormack Jolly-Seber model) will be used to generate an escapement estimate that is used to define the size of the spawning population. This will be the sixteenth year in which a mark re-capture carcass survey estimate can be used to compare escapement estimates against the traditional swimming snorkel methodology. Long term data suggests snorkel survey methodology likely underestimates the number of adults in Butte Creek when there are large populations (Figure 2). The snorkel survey is used to provide long term trends in populations.

This year's participants were Department employees, Mike Healey, Colin Purdy, Matt Johnson, Jason Julienne, Chris McKibbin, Marc Beccio and Drew Honeycutt. Also assisting with the survey was PG&E employee Craig Geldard. Please address any questions regarding this survey to me at (530) 895-5110.

cc: Kevin Thomas, DFW, North Central Region

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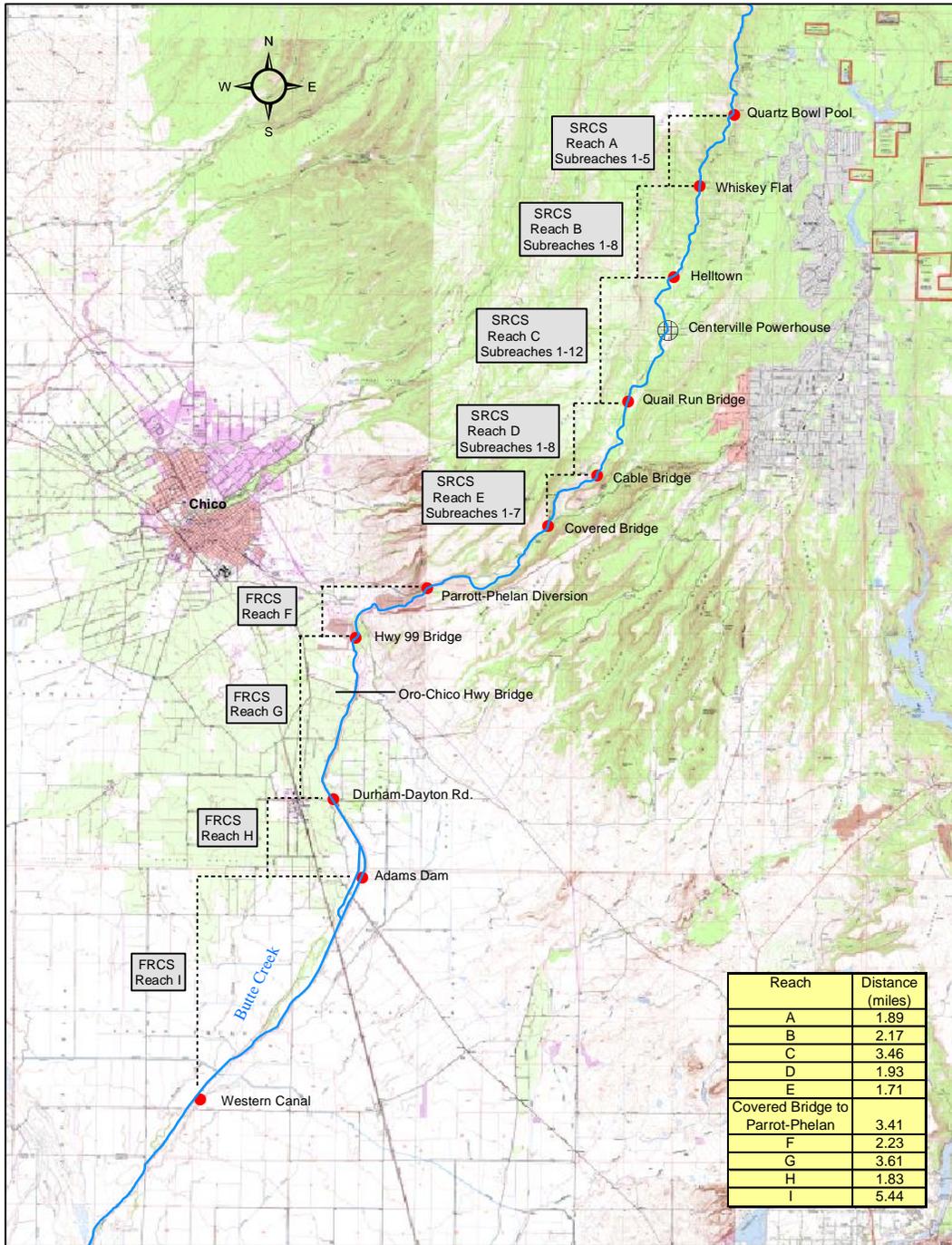


Figure 1. Map showing reaches and major physical features for both SRCS and FRCS spawning and holding areas on Butte Creek.

## Butte Creek (SRCS) Escapement Estimates 2001-2016

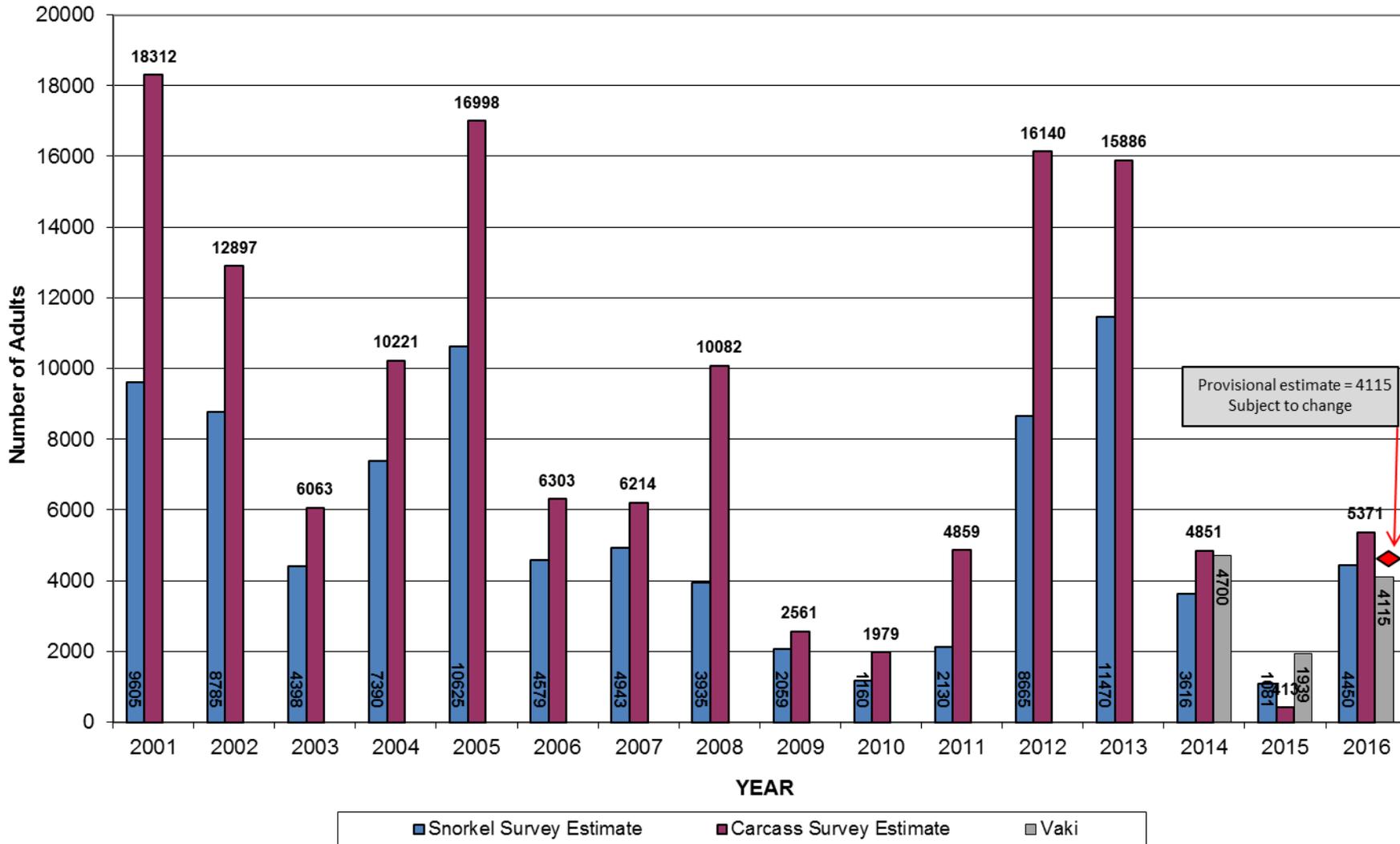


Figure 2. Butte Creek escapement estimates: carcass survey vs. snorkel survey vs. Vaki from 2001-2016.