

**M e m o r a n d u m**

To: Colin Purdy  
Environmental Program Manager

Date August 27, 2020

From: Jessica Nichols – Environmental Scientist  
**Department of Fish and Wildlife – North Central Region – Chico**

Subject: **2020** Butte Creek Spring-run Chinook Salmon Snorkel Escapement Survey

The annual Butte Creek spring-run Chinook salmon (*Oncorhynchus tshawytscha*) spawning escapement survey was conducted August 4-7, 2020. A standard swimming snorkel methodology was used and covered Centerville Head Dam (CHD) to Parrot-Phelan Diversion Dam (PPDD) (Figure 1). The four reaches from Quartz Bowl Pool to PPDD were surveyed on four consecutive days. The CHD to Quartz Bowl Pool reach was conducted on August 12, 2020.

Since 2001, survey data collection and analysis has been standardized.<sup>1</sup> The survey protocol requires each pool to be observed only once by each crew member (either swimming the pool or observed from above the pool), with each of the individual estimates recorded separately. Upon analysis, outliers are excluded, and the total for each pool is subsequently calculated as the average of the individual estimates. The total annual snorkel survey escapement estimate is calculated by summing the averages for each pool. **The estimate for the 2020 adult snorkel survey is 1,559 salmon.** Below is the range and average number of adult spring-run Chinook salmon observed within each reach:

Date	Reach	Range	Average	% of Total
8/4	Quartz Bowl Pool to Whiskey Flat	561 - 660	611	39.2%
8/5	Whiskey Flat to Centerville Powerhouse	863 – 998	941	60.4%
8/6	Centerville Powerhouse to Covered Bridge	6 – 8	7	0.400%
8/7	Covered Bridge to Parrot-Phelan Diversion Dam	0	0	0
8/12	Centerville Head Dam to Quartz Bowl Pool	0	0	0
	Totals	1430 – 1666	<b>1559</b>	100%

For the 2020 migration season, the Vaki RiverWatcher (Vaki) at Durham Mutual Fish Ladder was operational and detected a preliminary count of 2,991 salmon traveling upstream through the ladder and migrating into the summer holding habitat. Historical data trends demonstrate variability with Vaki estimates when compared to snorkel and carcass survey estimates (Figure 2). Water flow during the

<sup>1</sup> 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.

migration season may be a contributing factor to this variation. Flows within Butte Creek this season remained low enough to suggest that most salmon traveled through the fish ladder and therefore through the Vaki providing a reliable estimation of upstream passage counts. Additionally, there were no observations this season of salmon ascending over the Durham Mutual Dam located adjacent to the fish ladder. In comparison, it has been observed during high flow years (e.g. 2019) that salmon have bypassed the fish ladder and ascended over the Dam thereby affecting upstream passage counts. (Figure 2).

A mark-recapture carcass survey (Cormack Jolly-Seber model) is scheduled to begin in mid-September to generate an escapement estimate that is used to define the size of the spawning population. This will be the twentieth year in which a mark re-capture carcass survey estimate can be used to compare escapement estimates against the traditional swimming snorkel methodology and Vaki estimates. Long term data suggests snorkel survey methodology likely underestimates the number of adults in Butte Creek compared to carcass survey estimates when there are large populations (Figure 2). However, additional data collected during summer snorkel surveys provide important information such as real time monitoring of critical water temperatures within Butte Creek that contribute to water operations and pre-spawn morality assessment over the holding period. Overall, snorkel survey estimates provide valuable data used to assess long term trends in spring-run Chinook salmon populations.

This year's participants were Department employees: Jessica Nichols, Andrew Huneycutt, Donovan Whitworth, and Mike Healey. Please address any questions regarding this survey to Jessica Nichols at (530) 333-7748.

cc: Kevin Thomas, DFW, North Central Region  
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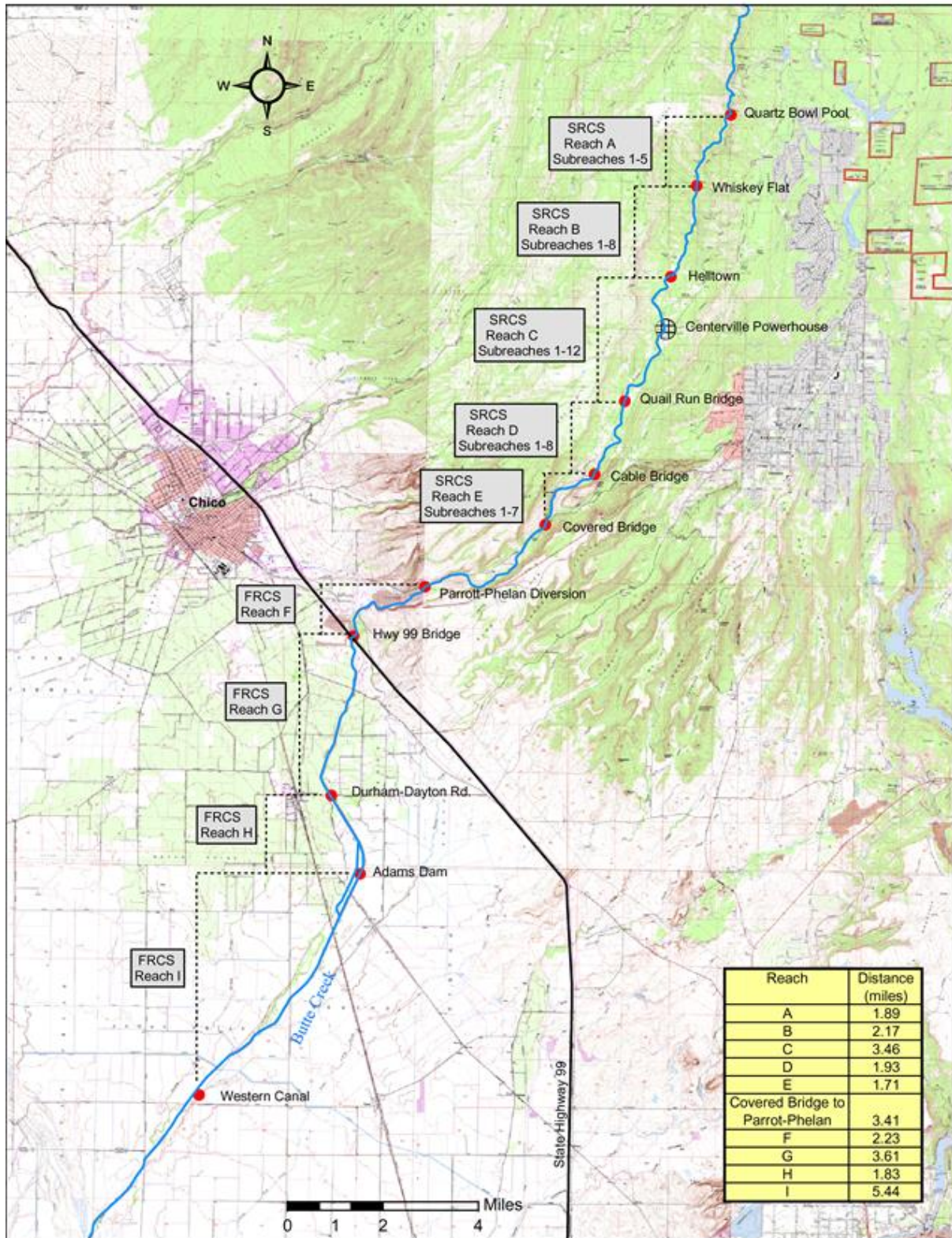


Figure 1. Map showing reaches and major physical features for both Spring Run Chinook Salmon and Fall Run Chinook Salmon spawning and holding areas on Butte Creek.

## Butte Creek Spring Run Chinook Salmon Escapement Estimates 2001-2020

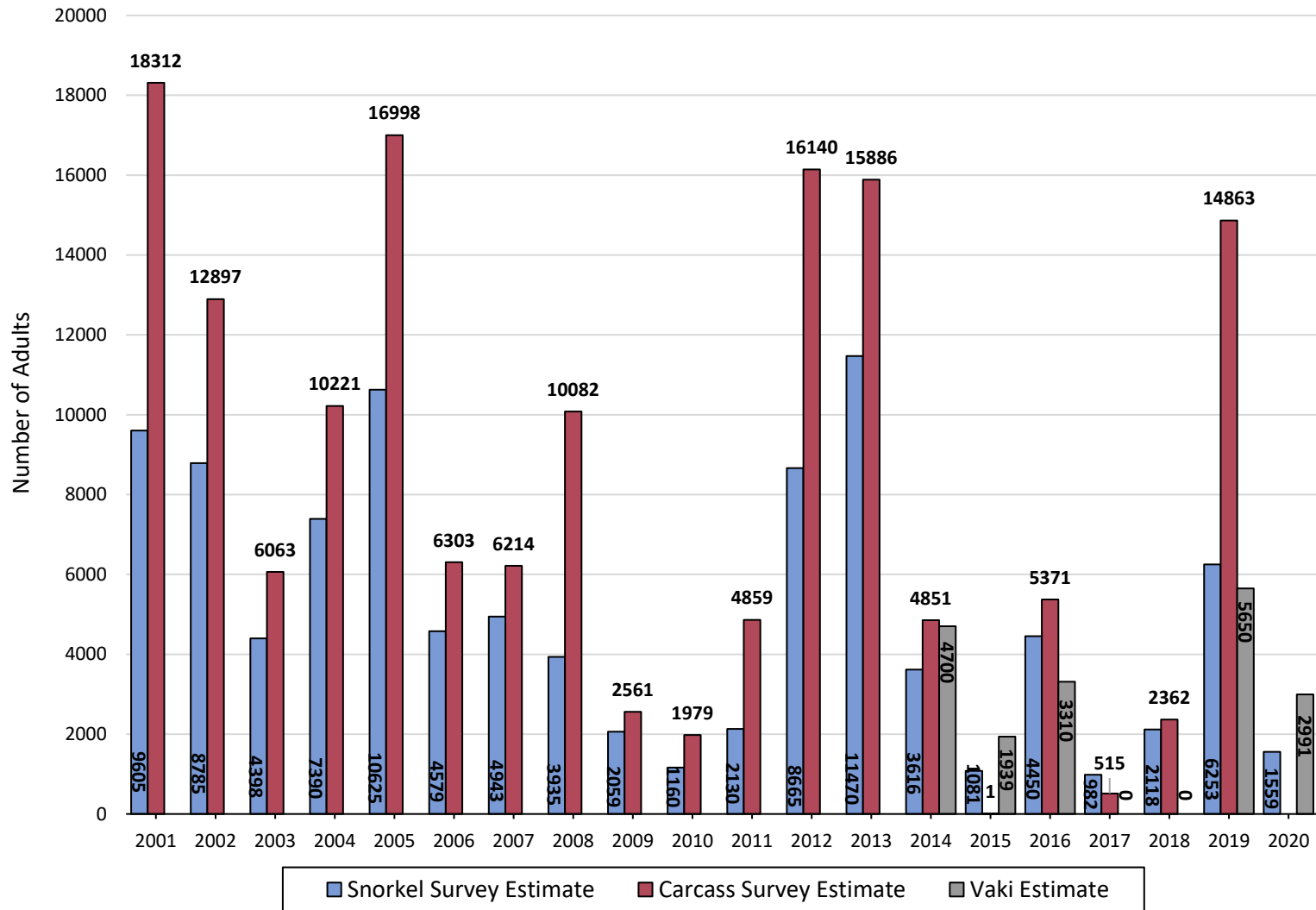


Figure 2. Butte Creek escapement estimates from 2001-2020: snorkel survey (blue); carcass survey (red); and Vaki estimates (gray).