State of California **The Resources Agency**

M e m o r a n d u m

To: Colin Purdy
Senior Environmental Scientist

Date: August 14, 2017

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

Subject: **2017** Butte Creek Spring-run Chinook Salmon Snorkel Escapement Survey

The annual Butte Creek spring-run Chinook salmon (*Oncoryhnchus tshawystcha*) (SRCS) spawning escapement survey was conducted July 11 - 13, 2017. 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.

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 2017 adult escapement is 982 salmon.** Below is the range and average number of adult spring-run Chinook salmon observed in each reach:

Date	Reach	Range	Average	% of Total
7/11	Quartz Bowl Pool to Whiskey Flat	322-339	330	33.6%
7/12	Whiskey Flat to Centerville Powerhouse	558-717	637	64.9%
7/13	Centerville Powerhouse to Covered Bridge	15	15	1.5%
-	Centerville Head Dam to Quartz Bowl Pool	0	0	0
	Totals		**982**	100%

This year, a comparison of returning adult salmon using the Vaki RiverWatcher (Vaki) at Durham Mutual Fish Ladder did not occur. During high flow events on Butte Creek during the 2016-2017 winter period, excessive amounts of sand, gravel and cobble mobilized and deposited at the site. The entire fish ladder and fish screen structures at Durham Mutual was buried under several feet of debris and fish passage was blocked throughout the majority of the adult salmon migration period. The Vaki unit, which is housed in the upper end of the fish ladder was buried under several feet of debris and damaged in the process. Therefore, an alternative escapement estimate utilizing the Vaki was not

generated for the 2017 SRCS migration period. However, during clean up at the site, several dozen adult salmon were observed ascending the apron of the irrigation dam and making it up and over the dam.

A mark-recapture carcass survey (Cormack Jolly-Seber model) is scheduled to start in mid-September and will be used to generate an escapement estimate that is used to define the size of the spawning population. This will be the seventeenth 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, Hideki Kubo, Matt Johnson, Jason Julienne, and Marc Beccio. Also assisting with the survey was Pacific States Marine Fisheries Commission employee Ryan Revnek and National Marine Fisheries Service employee Johnava Dureya. Please address any questions regarding this survey to me at (530) 895-5110.

cc: Kevin Thomas, DFW, North Central Region

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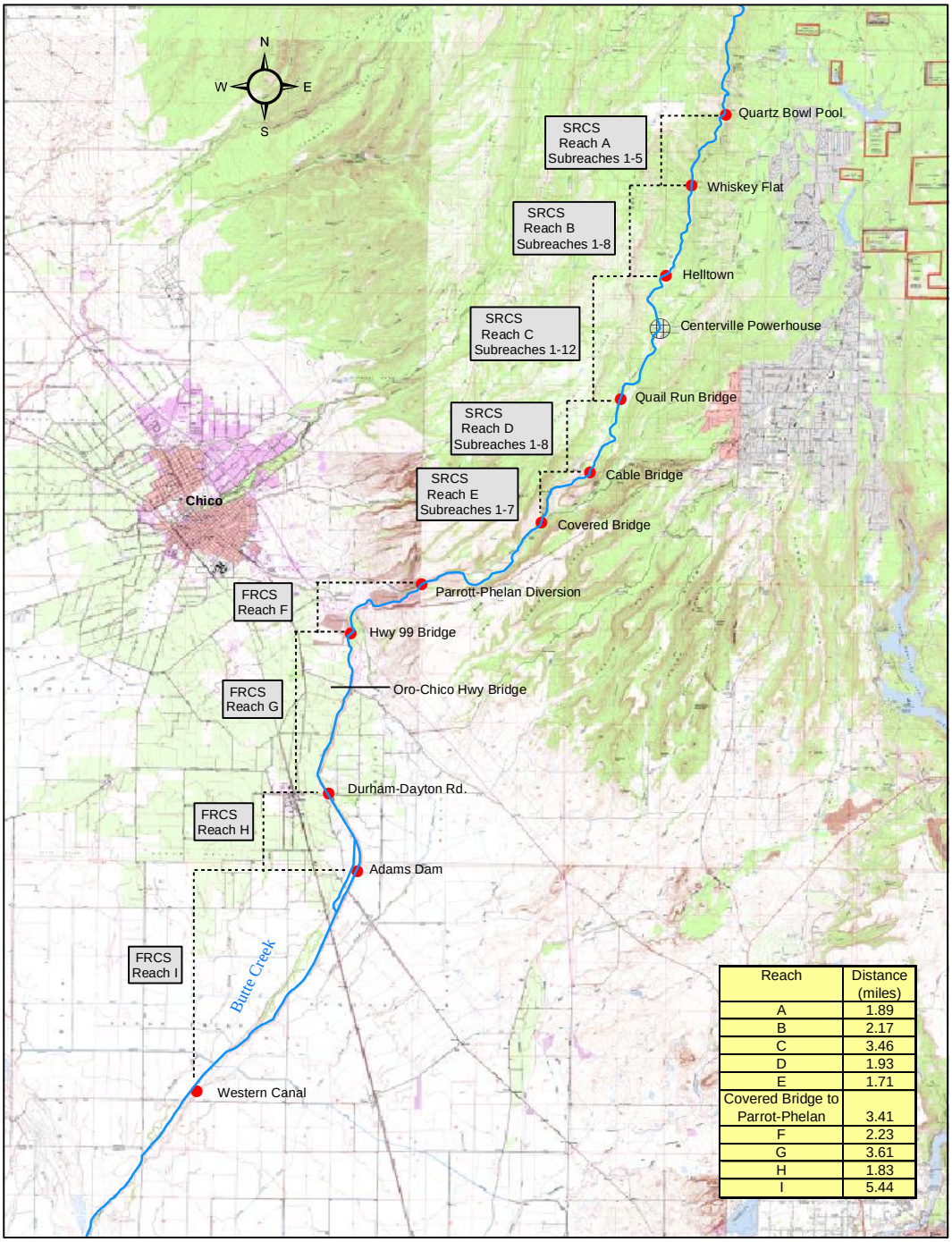

Figure 1. Map showing reaches and major physical features for both SRCS and FRCS spawning and holding areas on Butte Creek.

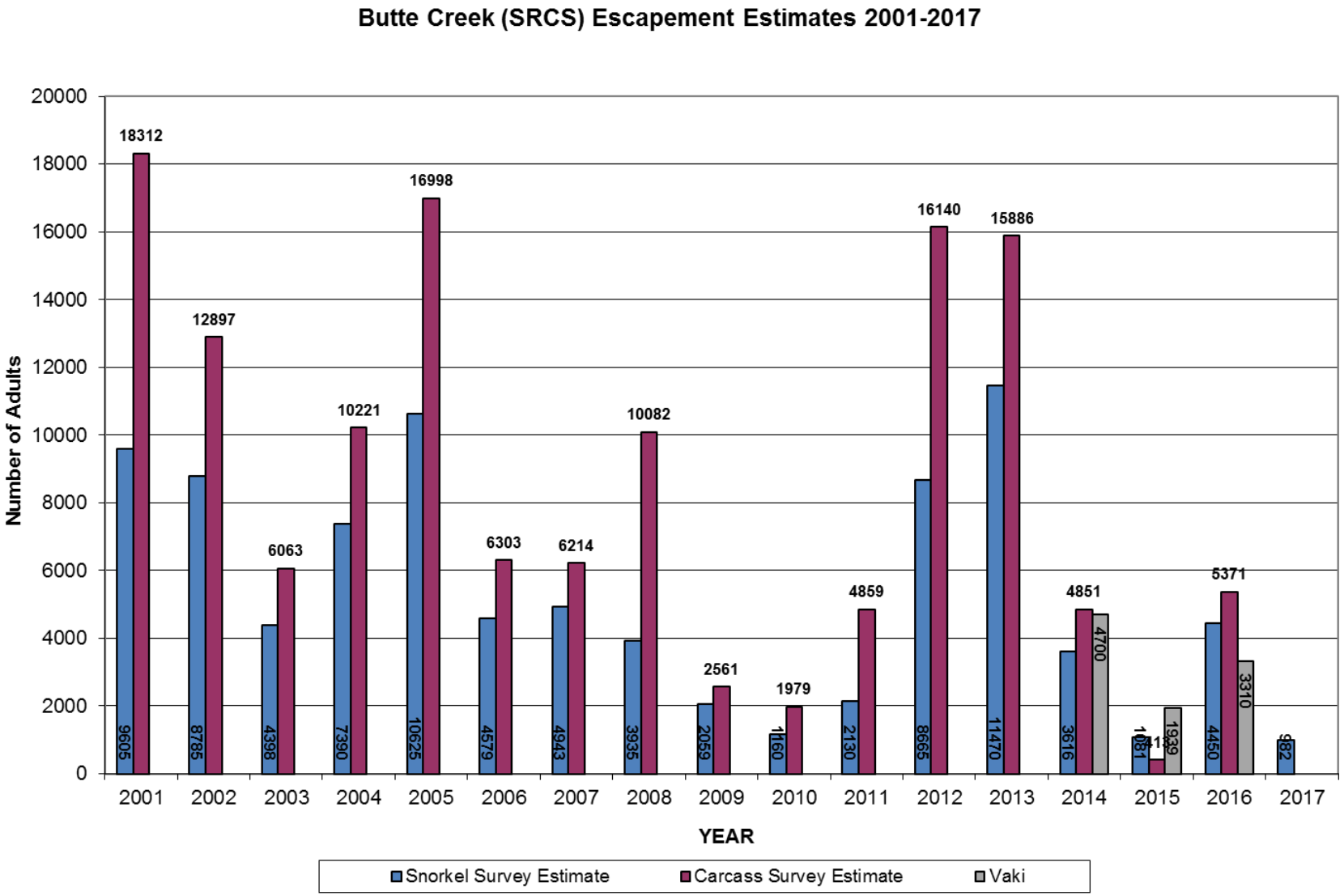

Figure 2. Butte Creek escapement estimates: carcass survey vs. snorkel survey vs. Vaki from 2001-2017.