State of California
Department of Fish and Wildlife

M e m o r a n d u m

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Subject: 2025 Butte Creek Adult Spring-run Chinook Salmon Holding Snorkel Survey

The annual Butte Creek adult spring-run Chinook salmon (*Oncoryhnchus tshawytscha*; spring-run) holding snorkel survey was conducted July 8-11, 2025. The survey was conducted using a standard swimming snorkel methodology within four reaches from Quartz Bowl Pool to Parrott-Phelan Diversion Dam (PPDD) (Figure 1, Table 1). This survey is used to estimate the number of adult spring-run Chinook salmon holding over summer and their distribution in Butte Creek prior to spawning in the fall.

Data collection and analyses have been standardized for this survey since 2001.[1] The survey protocol requires each pool to be surveyed once by each crew member (either swimming the pool or observing from above the pool), and each crew member records a count separately for each pool. To increase accuracy of the count, snorkel surveys are conducted in an upstream to downstream direction, and the number of snorkelers entering a pool at a time is dictated by the width of the pool. This approach utilizes the swimming direction of the adult salmon to minimize double counting within a pool and prevents groups of fish from swimming around individual crewmembers and avoiding detection. Upon analysis of individual pool specific counts, uncertain or obvious outliers are excluded, and the estimated number of fish observed for an individual pool is calculated by averaging individual crewmember counts. The total estimate of holding salmon is calculated by summing the averages for

[1] Prior to 2001, each crew member developed an independent estimate for each holding pool, and before proceeding, a single estimate was made by group consensus and recorded in the field.

each pool.

The estimate of adult spring-run Chinook salmon holding in Butte Creek during the 2025 snorkel survey was 5,387 salmon. The 2025 snorkel survey estimate was the highest estimate of adult spring-run holding in Butte Creek since 2021 and is above the average of 4,816 since standardized survey methodologies were established in 2001 (see [1]; Figure 2). During the 2025 survey, the majority (81%) of adult spring-run Chinook salmon were observed holding in the two reaches between Quartz Bowl Pool and Centerville Powerhouse (Table 1). The remaining adult spring-run Chinook salmon were observed below the Centerville Powerhouse with 18% between the Centerville Powerhouse and Honey Run Covered Bridge and 1% below the Honey Run Covered Bridge. The range, average number, and percent total of adult spring-run Chinook salmon observed holding within each of the four survey reaches in Butte Creek in 2025 can be found in Table 1.

Table 1. Range, average number, and percent total of adult spring-run Chinook salmon observed in Butte Creek within each surveyed reach from Quartz Bowl to Parrot-Phelan Diversion Dam during the 2025 Butte Creek adult spring-run Chinook salmon holding snorkel survey.

Date	Reach	Range	Average	% Total
7/8	Quartz Bowl Pool to Whisky Flat	2,023-2,613	2,287	43%
7/9	Whiskey Flat to Centerville Powerhouse	1,636-2,595	2,066	38%
7/10	Centerville Powerhouse to Honey Run Covered Bridge	746-1,241	974	18%
7/11	Honey Run Covered Bridge to Parrott-Phelan Diversion Dam	55-64	60	1%
	Total	4,460-6,513	**5,387**	100%

A Vaki RiverWatcher Fish Counter (Vaki) has been installed in Butte Creek at Durham Mutual Fish Ladder since 2014 to monitor passage of adult salmon and steelhead returning to Butte Creek. The Vaki is utilized to estimate the number of adult spring-run entering holding and spawning reaches of Butte Creek. This is particularly important data for spring-run Chinook salmon in Butte Creek as the number of adults entering the creek is often greater than the estimate of adult spawners due to prespawn mortality during the summer holding period. Additionally, due to regularly occurring prespawn mortality during the summer, passage counts, along with snorkel estimates, may be a better indicator of overall escapement as well as relative smolt to adult return rates for a given cohort. The first adult spring-run documented to pass through the Vaki for the 2025 migration season occurred on March

12; the last adult spring-run passed through on July 15. Historical Vaki data on Butte Creek demonstrates adult spring-run passage into upper Butte Creek can take place from February through June depending on the water year and flow. When compared to previous years, the first and last salmon observed passing through the Vaki in 2025 were later than average. This may have been associated with the wet winter and resulting high flows in the system. The Vaki was operational for the entire adult spring-run migration season and documented a total of 6,340 adult spring-run traveling upstream through the ladder and migrating into the summer holding habitat. It is important to note that salmon can ascend over the Durham Mutual Dam during high flow events, bypassing the Vaki, which was observed twice during the 2025 season. With several high flow events occurring during the 2025 migration period, 6,340 salmon may be a minimum estimate. Historical data trends demonstrate variability with Vaki estimates when compared to snorkel and carcass survey estimates (Figure 2).

A prespawn mortality survey is conducted annually from June through mid-September to assess the number of adult spring-run that did not survive to spawn over the summer holding period. Prior to the snorkel survey, a total of four prespawn mortalities had been documented. A final number of prespawn moralities will be available in the fall when fish transition from holding to spawning. Once the first sign of spawning is observed, usually in mid-September, a mark-recapture post-spawn carcass survey (Cormack Jolly-Seber model) is conducted through October to estimate the number of adult spring-run that survived to spawn during the fall. The estimated number of prespawn mortalities along with the estimate of spawning adults are combined to produce the official escapement estimate for Butte Creek. This number is reported annually to Grand Tab, the California Central Valley Chinook Escapement Database Report (see https://wildlife.ca.gov/Conservation/Fishes/Chinook-Salmon/Anadromous-Assessment). This will be the twenty-fifth year in which a mark re-capture carcass survey estimate will be used to compare escapement estimates against the traditional swimming snorkel methodology in Butte Creek. Long-term data suggests snorkel survey methodology likely underestimates the number of spring-run adults in Butte Creek when there are large populations (Figure 2); however, adult holding estimates can provide valuable data to assess long-term population trends and holding patterns.

This year's participants of the holding snorkel survey included Department of Fish and Wildlife employees: Anna Allison, Drew Huneycutt, Corey Fernandez and Grant Henley. Please address any questions regarding the 2025 Butte Creek adult spring-run Chinook salmon holding snorkel survey to Grant Henley at (916) 272-4152.

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Figure 1. Map of Butte Creek showing survey reaches from Quartz Bowl Pool to Parrott-Phelan Diversion Dam (PPDD) for spring-run Chinook salmon holding and spawning surveys.

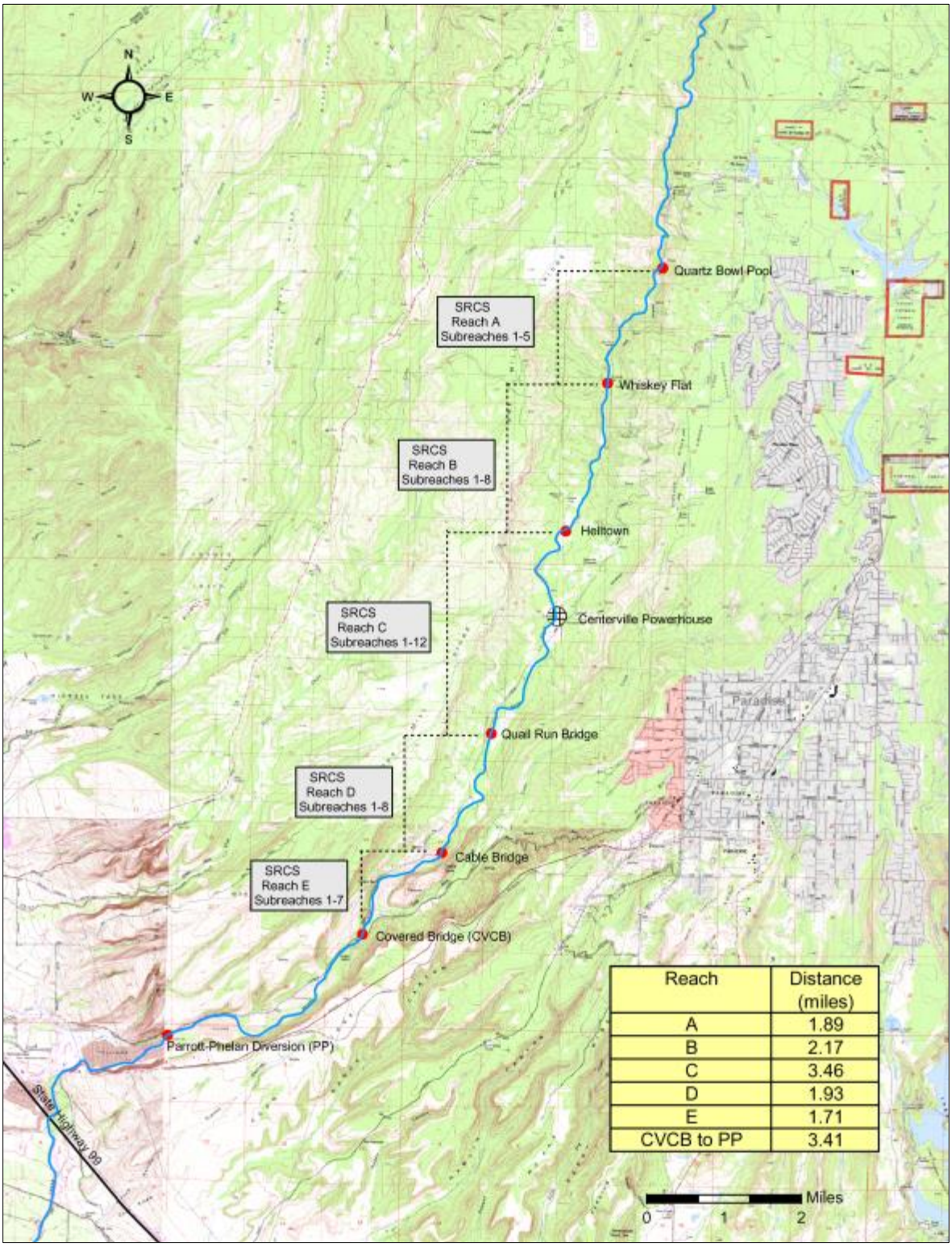

Figure 2. Butte Creek adult spring-run Chinook salmon escapement estimates (red bars) from 2001-2024, holding snorkel survey estimates (blue bars) from 2001-2025, and Vaki estimates (gray bars) from 2014-2016, and 2019-2025. An escapement estimate is not currently available for 2025.