State of California
Department of Fish and Wildlife

M e m o r a n d u m

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Cc: North Central Region Fish Files

Subject: Fish Relocation Efforts on the Yuba River

Date occurred: October 26, 2015

California Department of Fish and Wildlife (Department) personnel involved: environmental scientists Chris McKibbin and Marc Beccio, senior environmental scientist specialist Anna Ewing and scientific aides Kevin Moncrief, Drew Huneycutt, Alyssa Caldwell and Daniel Thompson.

Results:
Numbers of adult Chinook salmon (*Oncorhynchus tshawytscha*) were trapped in an isolated scour pool, adjacent to the Yuba River mainstream channel, below Englebright Reservoir. Two adult salmon were captured by Department staff from the scour pool and relocated to the Yuba River. Another six salmon carcasses (dead salmon) were observed onshore nearby the scour pool. Tissues for genetic analysis were collected from the two living salmon and two of the dead salmon. Genetic analysis of the tissues determined that the fish were spring-run Chinook salmon.

Summary:
The Department was notified on October 25, 2015, of a fish stranding event below Englebright Reservoir in the Yuba River. The dam that creates Englebright Reservoir is an 85-meter-tall concrete arch on the Yuba River located on the border of Yuba and Nevada counties, California. The reservoir blocks anadromy to historic spawning grounds for steelhead trout (*O. mykiss*) and races of spring and fall Chinook salmon (Yoshiyama et al. 2001).

Department staff convened at the stranding site, below Englebright Reservoir at 1100 hours on October 26, to evaluate the stranding pool (Figure 1), enumerate stranded salmon, and develop a capture and relocation strategy. Staff observed two living salmon in the stranding pool as well as several salmon carcasses in the vicinity of the stranding pool. Approximately 40 living adult salmon were also observed in the main stem of the river, approximately three meters downstream of the stranding pool.

Maximum depth of the stranding pool was estimated to be three meters in the center. Water clarity was greater than three meters and the bottom substrate of the stranding pool was clearly visible in all areas. Flow velocities in the stranding pool were evaluated at two locations using a Global Water Flow Probe FP101; flow velocity at the head and tail of the stranding pool measured zero feet per second. Water temperature in the stranding pool was measured to be 55 degrees Fahrenheit (12.8 degrees Celsius) using a handheld H-B USA standard liquid thermometer.

At approximately 1200 hours, Department staff wearing wet suits entered the stranding pool to gather the two live salmon using a beach seine (methods described by Hahn 2007). Once the adult salmon were corralled with the seine, they were placed into a specially designed salmon cradle which helped calm the fish. Staff collected information from each salmon including fork length, spawning condition, and notations of external markings. Staff then removed a piece of tissue from the upper caudal fin (methods described by Crawford 2007) for genetic analysis and Chinook race designation (Table 1). The salmon were then externally marked with two uniquely numbered, grey in color, "t-bar" anchor tags (methods described by Guy 1996) for identification if encountered during other studies. All data was recorded on waterproof datasheets. The two salmon were released in good condition to the Yuba River at 1230 hours.

Staff assessed the condition of the salmon carcasses along the shoreline of the stranding pool. Two salmon carcasses were found in fair condition and were evaluated for sex, length, and spawning condition; staff took a small tissue sample for genetic analysis (Table 1). Another four salmon carcasses were found near the stranding pool but were too deteriorated to be evaluated. Staff observed thousands of unfertilized salmon eggs that were on dry land, strewn amongst the rocks on the north side of the stranding pool. Staff also noticed and enumerated 40 adult salmon, in the main stem of the river, three meters downstream of the stranding pool.

The tissues that were taken from salmon were sent to a laboratory for genetic analysis. All four of the tissues were identified to have come from spring-run Chinook salmon.

Male/ Female	Fork Length (cm)	Spawn Status	Adipose Fin Status	Condition	Genetic Identification
Male	83	Spawned	Adipose fin intact	Alive, released to the river	Spring-run Chinook
Male	86	Spawned	Adipose fin intact	Alive, released to the river	Spring-run Chinook
Male	90	Unknown	Adipose fin intact	Carcass	Spring-run Chinook
Male	81	Not Spawned	Adipose fin intact	Carcass	Spring-run Chinook

Table 1. Number and status of salmon captured from the scour pool below Englebright Reservoir and relocated to the main stem Yuba River.

Discussion:

There is no way to ascertain exactly how many salmon may have been lost to poaching, predation or the effects of stress from being stranded in the scour pool below Englebright Reservoir. Habitat in the pool was poor for spawning salmon because there was no river flow; river flows are necessary for redd construction and egg incubation. Habitat in the main river channel below the reservoir was lacking spawning gravels, so the two salmon that were recovered by staff may have had the opportunity to spawn if they moved downstream.

Englebright Reservoir blocks access for salmonids to historical habitat occurring at higher elevations (Yoshiyama et al. 2001), so for many salmonids in the Yuba River, upstream migration ends directly below the reservoir. It should be assumed that adult migrants will attempt to enter any of the wetted areas below Englebright Reservoir as they instinctually try to navigate upstream. To reduce chances of migrant stranding in the future, it may be helpful to physically remediate the stranding areas; rocky features that create stranding areas may be modified to ensure fish have free passage to the main river channel and access to spawning areas occurring downstream.

The salmon observed in the stranding area below Englebright Reservoir are significant because the Central Valley spring-run Chinook salmon evolutionarily significant unit (ESU) is listed as threatened under both the state and federal endangered species acts. The National Marine Fisheries Service designated the Yuba River from its confluence with the Feather River upstream to Englebright Reservoir as critical habitat for spring-run Chinook salmon (NMFS 2014). It is crucial that adult Central Valley spring-run Chinook salmon in the Yuba River get the opportunity to spawn and contribute to the recovery of their population. It is unknown if the stranding problem was influenced by water releases from the reservoir or by the drought conditions which began in 2011. To better understand this problem for spring-run Chinook salmon, Department staff should monitor the Yuba River below Englebright Reservoir for stranded adults during the spring-run migration season which occurs annually from August to October.

Figure 1: Image of the scour pool and salmon stranding area below Englebright Reservoir.

References:

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