

Appendix B

California Department of Fish and Game Pulse Flow Monitoring Study Plan

EBMUD and DFG will cooperatively develop a monitoring program to evaluate reduction of Mokelumne River fall-run Chinook salmon straying and cooperate with Reclamation to further refine water quality modeling utilized for managing DCC closures for Mokelumne River fall-run Chinook salmon escapement. EBMUD and DFG will conduct an analysis of the fish migration response based on fish passage at Woodbridge Dam, detection histories of acoustically tagged fall-run Chinook salmon, and coded wire tag data from inland recoveries. Daily passage is recorded on digital video camera in the Woodbridge Dam fish ladder. The number of adipose fin clipped fish will also be recorded, but biological samples will not be collected at Woodbridge.

DFG will implement an acoustic tagging study. DFG will tag up to 30 adult Chinook salmon of hatchery origin (adipose fin clipped) with Vemco V13 acoustic transmitters and Floy-anchor tags in the Forks of the Mokelumne River downstream of the DCC facility. Capture in this reach will provide a higher likelihood that they are on Mokelumne River hatchery origin. Salmon will be captured using a drifted commercial gill net (200 feet x 12 feet, 5-7 inch stretch nylon mesh) or a trammel net (200 feet x 10 feet, 6 inch stretch nylon mesh). Once captured, salmon will be removed from the net, brought aboard a boat and placed in an aerated 150 gallon holding tank filled with ambient river water. Injured fish or fish that exhibit extensive stress from handling will not be tagged, but allowed to recover in the holding tank prior to release. Prior to tagging, fish will be inspected for the presence/absence of an adipose fin to ascertain if it is a hatchery origin or “wild” fish. If an adipose fin is present, fish will be immediately released back into the river. If adipose fin is missing, which indicated it should have a CWT, the salmon will be scanned with a portable “tag wand” to verify presence of a CWT and tagged. If an adipose fin clipped fish does not have a verified CWT, it will be released.

Tagged salmon will receive both an internal ultrasonic transmitter and an external Floy-anchor tag. The ultrasonic transmitter will be placed via the esophagus and into the gastric cavity using a pill dispenser device, commonly used on livestock. External Floy-tags will be sequentially numbered and have contact information to gather information from fish taken by anglers and recovered at hatcheries. CWT information from tagged fish will be recovered at hatcheries. Successfully tagged fish will be released in the same location they are captured. Movement of tagged salmon will be monitored through stationary Vemco VR2-W receivers located upstream and downstream of the DCC gates as well as in the Mokelumne River. As part of the telemetry study, travel times in the Mokelumne River’s tidal and nontidal sections will be compared during periods when the DCC is open and closed and when the pulse flow is occurring and river flows are at their baseline. Storm events, specifically drops in barometric pressure, could also be a factor

influencing the pattern of upstream migration. Telemetric data may be used to see if there is a delay in adults' movement due to weather.

Monitoring will evaluate the multiple factors that can influence straying, including but not limited to, tributary flow operations, Delta water management operations (including operation of the Delta Cross Channel), temperature, and planting practices for hatchery fingerlings and smolts. Straying rates will be determined by the recovery of CWT in Central Valley river carcass surveys and hatchery returns. In addition to increased CWT tagging rates through the Constant Fractional Marking Program (CFM), EBMUD and DFG increased tagging rates of brood year (BY) 2008 and 2009 Chinook salmon production from the Mokelumne River Hatchery to 100%. Through tagging 100% of the production the amount of return data will be increased fourfold and allow for improved accuracy of all CWT recovery based indices, including straying percentages. The recovery data will include three brood years (two, three and four-year-old fish) of CWT Chinook salmon released at various locations from the Mokelumne River Fish Hatchery. These data will be used to focus the straying rate analysis to only evaluate straying rates of Mokelumne origin fall-run Chinook salmon to other Central Valley rivers and hatcheries. Annual results of the DCC closure, Mokelumne River pulse flow, and stray rates will be summarized in annual investigation reports within 18 months of the DCC closure