Rebuilding the Central Valley Fall-Run Chinook Salmon Populations

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This is a series on my proposed salmon recovery plan.

**Note: NCGASA is providing a place for more information on salmon, but all of Cannon's recommendations do not necessarily represent the views of our organization. Salmon management is a complicated issue and NCGASA strives to provide all the information that is presented to share with our membership. We hope to educate everyone with additional data and recommendations so our members can get a full picture of the decline of our fisheries.*

The Central Valley Fall-Run Chinook Salmon populations make up the bulk of commercial and sport salmon fisheries in California. Total fall-run adult spawner returns (escapement) to the Central Valley rivers and hatcheries has ranged from 53,000 in 2009 to 873,000 in 2002 (Figure 1). Low points of 100,000 or less have occurred during or following four multiyear drought periods (87-92, 07-09, 13-15, and 20-22). High points follow multiyear wetter periods (82-86, 95-00, 10-12) when stocks build.

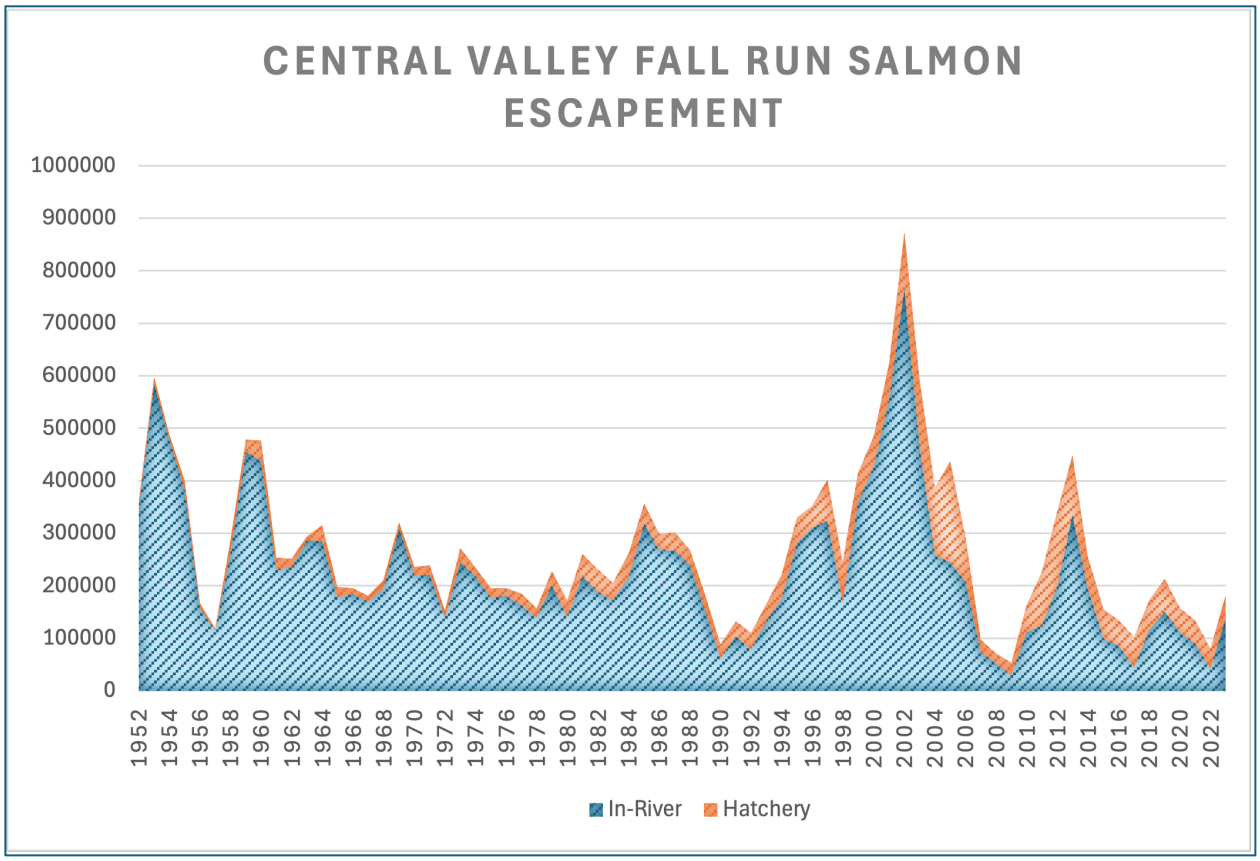

Figure 1. Total annual fall-run salmon escapement in the Central Valley from 1952-2023. Breakdown is by river and hatchery return estimates.

The right strategy for rebuilding the populations is greatly improving recruitment in drier years and maintaining/building recruitment in wetter years. Improving escapement in drought periods is most important otherwise the spawning stocks fall too low and limit future reproduction and fishery harvest opportunities. Recruitment has been low after the 2013-2015 drought and again after the 2020-2022 drought. Fisheries were curtailed from 2008-2010 and again in 2023-2024 as stock levels fell to "over-fished' levels.

Of greatest concern is the decline in the Upper Sacramento River Fall Run natural-spawning population that spawns in the river near Redding. Escapement estimates fell to record lows in 2017 and 2023 (Figure 2) because of record drought years 2015 and 2021 that decimated brood years 2014 and 2020. Central Valley fall-run escapement is now dominated by salmon produced by the Battle Creek, Feather River, American River, and Mokelumne River hatcheries.

Wet years in 2023-2025 provide an opportunity to rebuild escapement levels and hopefully once again allow fishery harvest. Though limited by severely depressed numbers of spawners, brood years 2022-2024 had good winter-spring habitat conditions (mainly good streamflow and water temperatures in rivers and the Bay-Delta) for natural-born and hatchery smolt survival to the ocean. Brood years 2022-2024 further benefit from closed fisheries in 2023 and 2024 (and likely 2025).

The remaining unknown is what awaits brood years 2022-2024 when they return to spawn in 2025-2027. If dry conditions prevail then there is little optimism for brood years 2025-2027, unless dramatic improvements are made to drought year habitat conditions. If luck provides wetter years, then habitat conditions should be optimized to allow full recovery of the populations, enough to sustain reasonable fishery harvests. More on what habitat and management actions are needed will be presented in coming posts.

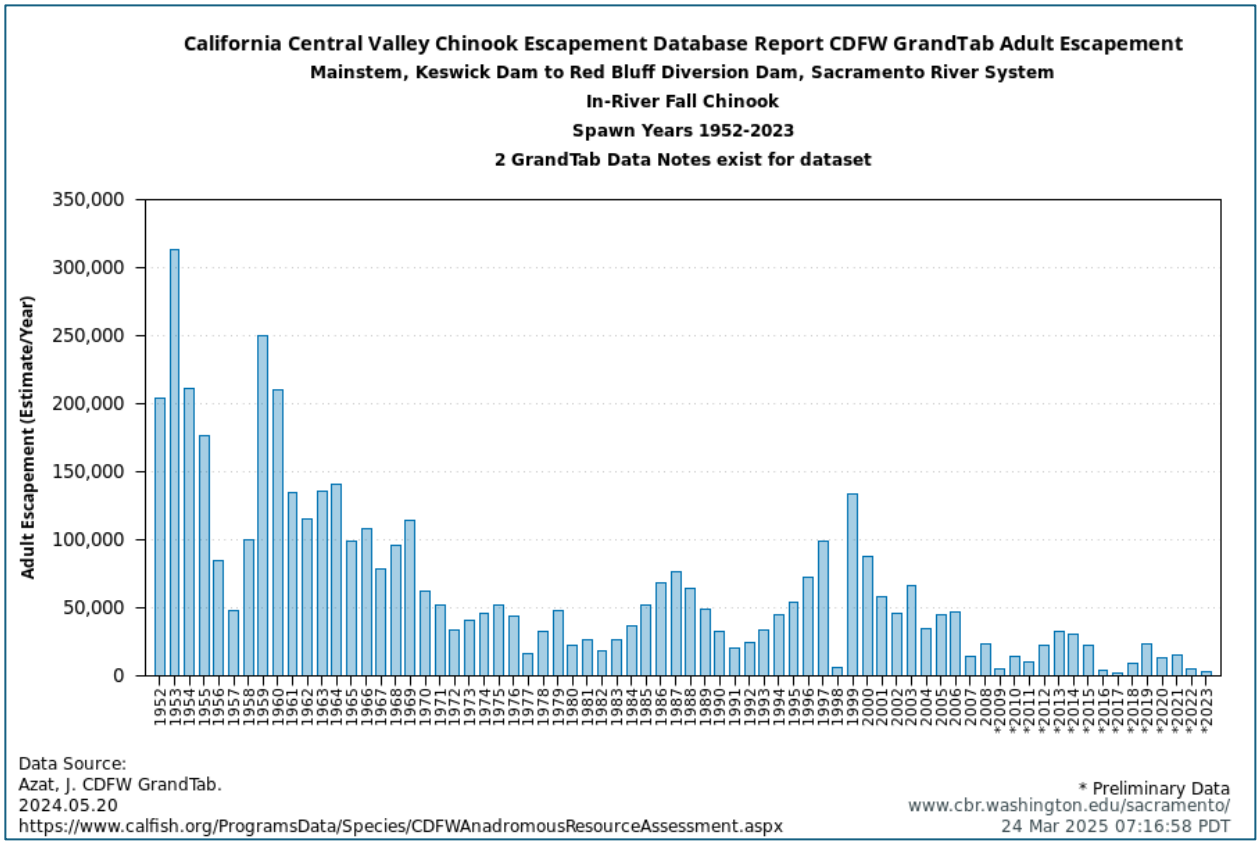

Figure 2. Annual fall-run salmon escapement totals for upper Sacramento River mainstem between Keswick Dam and Red Bluff Diversion Dam from 1952-2023.

Tom Cannon has degrees in fisheries and biostatistics from the University of Michigan. Cannon is an fisheries population ecologist and biostatistician and has been involved in California fishery issues for more than 40 years. Over that period, Cannon has been a consultant to the California Department of Fish and Wildlife, U.S. Bureau of Reclamation, National Marine Fisheries Service, US Fish and Wildlife Service, US Army Corps of Engineers, US Forest Service, State Water Contractors, Metropolitan Water District, CalFed Bay-Delta Program, State Water Resources Control Board, PG&E, California Striped Bass Association, California Water Information Network (C-WIN), Fisheries Foundation of California, Cal Trout, Karuk Tribe, California Sportfishing Protection Alliance, and NCGASA. ***thomascannon0@gmail.com***