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**STATEMENT FOR THE CALIFORNIA JOINT COMMITTEE  
ON FISHERIES AND AQUACULTURE  
(October 19, 2022)**

**How Allowed High Water Temperatures in the  
Central Valley are Killing Salmon**

**Submitted by**

**George Bradshaw, President  
Pacific Coast Federation of Fishermen's Associations (PCFFA)**

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One of the most dramatic natural resource tragedies of our times, and one that has directly affected our commercial salmon fishing industry by destroying thousands of fishing jobs coastwide, has been the thoughtless and sometimes deliberate destruction of the west coast's once abundant salmon runs. Everywhere on the west coast (both U.S. and Canada) these once abundant wild salmon runs are in steep decline, with many of them already extinct.

The steady decline of west coast salmon runs was an unacknowledged disaster until the prestigious American Fisheries Society (AFS) published a peer-reviewed, comprehensive scientific survey of the problem in "Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington," (Nehlsen, *et al.*, *Fisheries*, Vol 16, No. 2, pp. 4-21 (March-April, 1991)). That first-ever rigorous survey of all west coast salmonid stocks found that of the 214 separate stocks still existing, 101 were at high risk of extinction, 58 at moderate risk of

extinction, 54 of special concern, and one (California Central Valley winter-run Chinook) already by that time classed as threatened with extinction under the federal Endangered Species Act (ESA) and as endangered under California's separate ESA statute. *It also found from historical records that at least 106 to more than 200 other distinct stocks of salmonids had already by that time been extirpated from their native habitat.*

Human actions driving salmon declines are many: thoughtlessly over-engineered rivers with too many dams that block migratory salmon and destroy downstream water quality; massive dewatering of key salmon-producing rivers, some of which – like the once great San Joaquin River in California – were totally dewatered for decades; poorly thought out logging and agricultural practices that drive sediment loads up to fatal levels for fish, and fill our rivers with toxic, fish-killing pesticides; widespread land-use, urbanization and water diversion policies that ignore natural river processes and fish needs, and which destroy key salmon spawning and rearing habitat from estuaries to far inland. Widespread and accelerating climate change (also driven by human-generated greenhouse gases) just exacerbates all these problems.

These impacts have combined in many west coast watersheds to create higher average water temperatures that are fatal to cold-water loving salmon, which start to die as adults *en mass* when daily average water temperature are routinely over about 68 degrees F. (20.0 degrees C.). Salmon eggs are even more temperature sensitive, with egg mortalities escalating rapidly upwards at daily average water temperatures above 53.6 degrees F. (12.0 degrees C.). California is a prime example of shortsighted water allocation and temperature control policies that are killing valuable salmon runs.

Peer-reviewed science studies of California's water over-appropriation problems have concluded that California has over-appropriated its river systems by about 5 time over. In other words, if you stack all the legal California "water rights" together, *they amount to diversions about five times more water than exists in all of California's rivers combined!* California still has not designated minimum instream flows to protect fish in any of its rivers, despite legislative mandates to do so. Thus, in California there is currently no effective upper limit on how much water can be withdrawn from its rivers, up to complete dewatering.

Until recently, California Agribusiness has gotten away with massive water over-appropriation by using groundwater to substitute for missing stream flows. But alone of all the 50 states, California is the only state that still cannot legally regulate its own groundwater at the state level, instead leaving that task up to each individual county, each of which thus has great incentive to "race to the bottom" to suck out as much groundwater as possible before neighboring counties sharing the same aquifers can do the same.

Sucking up too much California groundwater has already resulted in massive ground subsidence (sinking has been up to 40 feet in some areas) as well as dewatering nearby salmon-bearing rivers that would otherwise be fed by underground aquifers.<sup>1</sup>

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<sup>1</sup> The recently passed Sustainable Groundwater Management Act (SGMA) legislation did not shift groundwater management from its currently local county to state control, and is only a minimal attempt to create systematic

Unfortunately, humans are not very good at responding to crises that creep up on us over decades or lifetimes. Many slow but steady environmental crises like this one get ignored until their impacts become too obvious to be denied, which is often too late to reverse them. The abundance of wild salmon in California has been deteriorating almost since European settlement, starting with massive sluice mining operations during the 1850's Gold Rush in which whole hillsides were washed away for their gold.

California's era of large dam building added to these injuries afterwards, followed by the construction of massive irrigation water delivery systems like California's Central Valley Project (CVP) that sucked more and more water out of salmon-bearing rivers to line the pockets of California AgriBusiness. NEPA did not exist then, so most of the environmental impacts of these projects were never analyzed beforehand. But we are all living with those impacts today – especially the salmon.

### **How CVP Operations Have Failed to Protect Salmon**

Of the three key California Central Valley salmon runs that once supported fisheries, the winter-run and spring-run Chinook runs have been so damaged by decades of habitat and water losses that both are now ESA-listed and thus off-limits to any directed harvest. Only Central Valley fall-run Chinook, with is largely supported by hatchery production, is still open to commercial ocean harvest.

Ocean commercial salmon fisheries are managed by the Pacific Fishery Management Council (PFMC). However, the west coast ocean commercial salmon fishery is also managed by the PFMC (as required by law) in accordance with “weak stock management” principles. Thus, any actions that increase water diversions from, or increase water temperatures within, the Sacramento/San Joaquin River systems are very likely to exacerbate an already dire situation for these severely depressed ESA-listed winter-run and spring-run Chinook salmon stocks, and this will in turn further limit fishing opportunities on the intermingling fall-run Chinook that coastal fishing communities depend upon for their livelihoods. Avoiding additional constraints on Council-managed ocean salmon fisheries by avoiding, minimizing, or otherwise offsetting adverse effects to California Central Valley “weak stock” salmon runs is thus of paramount importance to the PFMC and our industry.

In PFMC letters in 2015 and 2016, the Council raised serious concerns with the Bureau of Reclamation (which manages the CVP irrigation system) regarding its loss of temperature control at Lake Shasta and the Sacramento River downstream of CVP facilities there, control losses which resulted in extremely high temperatures, triggering very high levels of both winter-run and spring-run Chinook salmon egg mortality in those years. Major losses of fall-run Chinook salmon egg

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groundwater use planning mechanisms at the county level, not a water reallocation mechanism. It remains to be seen if it will be effective is reversing massive groundwater overdrafts, or just shift over-appropriation problems back to over-drafting instream flows.

for those fish in the wild also occurred, all three impacts seriously depressing those fisheries in later years. The PFMC requested a number of management reforms from Reclamation in those letters to better protect Central Valley salmon runs.

But then, former Westlands Water District lobbyist and Attorney David Bernhardt was appointed Secretary of Interior (the agency which controls the Bureau of Reclamation), in spite of clear conflicts of interest. The PFMC's many elevated water temperature concerns were ignored in the creation of a new 2019 CVP Biological Opinion (BiOp).

Secretary Bernhardt's instructions to the federal agencies in creating the 2019 BiOp were to "maximize irrigation deliveries," but in greatly over-appropriated water systems like California's, this could only be done by taking even more water from the salmon, resulting in even higher average temperatures and egg mortality rates. This is exactly what happened with the adoption of the 2019 CVP BiOp, a result that was foreseen by objecting NMFS biologists, but the science was apparently over-ridden and ignored by political appointees.

As a result, under the daily average water temperature targets of the 2019 BiOp, winter-run Chinook salmon experienced very low freshwater survival rates in 2020, and catastrophically low survival rates in 2021. Survival from the egg life stage to the fry life stage (egg-to-fry survival) was estimated to be only 11.46 percent in 2020, the third lowest level in the previous sixteen years, and approximately one-half of the average survival rate over that same sixteen-year period.

Conditions were even worse in 2021, when winter-run Chinook salmon again experienced extraordinarily poor spawning and incubation conditions, with a major factor being the high average river temperatures that were under Reclamation's control and that resulted in an egg-to-fry survival rate that year of only 2.6 percent. These were potential extinction level impacts, with survival rates for 2022 also projected to be very low for the third year in a row for a species with only a three-year lifecycle!

PCFFA has challenged the legality of that 2019 CVP BiOp in *Pacific Coast Federation of Fishermen's Associations (PCFFA), et al. vs. Raimondo*, US Dist. Court of CA, Eastern District, Case No. 1:20-cv-00431, and the State of California joined that challenge in *California Natural Resources Agency (CNRA) vs. Raimondo*, US Dist. Court of CA, Eastern District, Case No. 1:20-cv-00426, as a related case. But unfortunately, that seriously flawed 2019 BiOp will remain in place until these Court challenges are resolved. In the meantime the CVP is being run based on annual Interim Operations Plans (IOPs) while the old, flawed 2019 BiOp undergoes reconsultation by the new Administration.

### **Salmon Egg Mortality Temperature Thresholds Set Too High**

Previously, in salmon egg mortality analysis work done only in laboratories, under highly controlled (but non-natural) conditions, it was found – in studies now more than 12 years out of date – that the seven-day average of daily maximum water temperatures necessary to prevent Chinook salmon egg mortality could be as high as 56.0 degrees F. This is also the water temperature threshold currently included as a water quality standard in the Central Valley Basin

Plan and currently also included as a term and condition in Reclamation's water rights by the California State Water Resources Control Board (SWRCB) in its water rights Order 90-5, which was adopted in 1990 – *a decision now nearly 32 years old.*

However, since the SWRCB Order 90-5 standards were established, scientists with NMFS have concluded that 56.0 degrees F. is simply *not protective enough* of winter-run Chinook eggs in the field, and peer-reviewed scientific studies have instead concluded that 53.6 degrees F. is the point at which temperature-dependent mortalities begin, and from which they rapidly escalate upwards as temperatures increase. The key point is that these new studies assumed conditions that typically occur in-river (i.e., in the wild), including additional factors such as oxygen saturation (which also varies by temperature) and stream velocity, to ascertain how salmon eggs, laid together in their "redds," would actually respond within the river.

In other words, the best available science now confirms that winter-run Chinook salmon egg temperature-dependent mortalities increase very rapidly at daily average water temperatures above 53.6 degrees F. (12 degrees C.). The current practice of allowing average water temperatures in the Sacramento to get as high as or higher than 56.0 degrees F., which also means daily high temperature "spikes" much higher, is essentially cooking those salmon eggs to death!

The only way to avoid high water temperatures that kill salmon eggs in the Sacramento River is to leave more cold water in-river when eggs are present – which means reserving more of that water through the year in the cold-water pool at Shasta Reservoir by reducing irrigation deliveries. "Maximizing irrigation deliveries" as mandated in Secretary Bernhardt's illegal 2019 CVP BiOp would *eventually mean the extinction of salmon throughout most of the California Central Valley, and potentially the end of all ocean salmon fisheries over much of the west coast!* Foolish and politically biased water allocation decisions in the past have brought us all too close to such an extinction event already, with climate change-driven drought moving us even closer.

With all that in mind, the PFMC sent a strong letter dated September 12, 2022, to the Bureau of Reclamation, NMFS and the State Water Board noting all the above and stating:

"This is why (as noted below) in future IOPs, and in the eventually adopted salmonid BiOp now under reconsultation, it is our strong recommendation that water temperature standards that are necessary to protect these key Central Valley salmon runs from extinction should be both required, and based on the best available science – which at the present time clearly supports the use of 53.5° F. as an appropriate daily average temperature standard for protecting winter-run Chinook salmon egg incubation at the CCR temperature control point in the California Central Valley."

That PFMC letter, which also contains a number of recommended actions to bring Sacramento River water temperature standards back into alignment with best available science, can be found on the PFMC's Habitat Committee website at: <https://www.pcouncil.org/navigating-the-council/membership-groups-and-staff/advisory-groups/habitat-committee/>. PCFFA will continue working to get the PFMC's recommendations implemented.

PCFFA (Bradshaw) Statement  
Jt. Fisheries & Aquaculture Comm.  
Oct. 19, 2022

That PFMC letter, in full, has also been submitted to the Committee for the convenience of the Committee members, and we ask that this statement and the PFMC letter both be included in the formal Record of this hearing. Thanks for the opportunity to testify on this important issue.

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PCFFA Statement on Salmon (Bradshaw) (10-19-22)