



## Testimony on San Joaquin River Flows - March 8, 2017

My name is Chuck Knutson. I was a fisheries biologist in California for 34 years and retired as a senior fisheries biologist 10 years ago. I am representing myself.

Based on my field experience conducting and coordinating salmon population estimates during the 1970s and 1980s, and statistical analysis of salmon production and freshwater flows on the San Joaquin River (SJR), I found a strong positive correlation between freshwater flows on San Joaquin tributaries from February through June and returns of adult salmon spawners 2.5 years later. The reasons were that higher spring flows increased freshwater habitat for salmon juveniles, prevented lethal high water temperatures from forming in the lower tributaries and the main stem SJR, improved safe passage of juvenile salmon down the tributaries and through the Delta and into SF Bay, and increased planktonic food production for salmon in the freshwater/saltwater mixing zone of the estuary.

Besides salmon, freshwater flows were also highly beneficial to other estuarine species that depend on the estuary for food supply and/or reproduction. Examples are dungeness crab larvae, white and green sturgeon, steelhead, California halibut, sharks and rays, and forage species, such as threadfin shad, Pacific herring, northern anchovy, and various species of smelt and shrimp. Many fish eating birds, such as kingfishers, herons, grebes, terns, pelicans, sea gulls, and mergansers, feed on these forage fish. Adult fish are also important as food for humans and mammals that depend on them, such as river otters, sea lions, and the occasional Orca. It is critically important that this food web and nursery area be protected and improved upon with increased freshwater flows, as estuaries are one of the most productive ecological systems in the world.

Without significant improvements to instream flows, implementation of non-flow measures, while beneficial, will not meet the salmon doubling objectives alone, as required by law, or adequately protect fish and wildlife beneficial uses. Best available science demonstrates that current flows are insufficient to protect public trust resources and uses within the SJR basin or the Bay Delta. Ecosystem functions can only be achieved with increased flows and a flow regime that mimics the natural hydrograph.

Substantial scientific evidence demonstrates that approximately 50% - 60% of unimpaired flow is the minimum necessary to reestablish and sustain fish and wildlife beneficial uses. 50% is insufficient because it is the lower end of a minimum flow; therefore, 60% of the unimpaired freshwater flows is needed to pass down the Stanislaus, Tuolumne, and Merced rivers to the Delta to protect and improve a reasonable level of our public trust resources. The Board has a public trust responsibility in the planning and allocation of water resources, and to protect public trust resources whenever feasible.

To maximize zooplankton habitat and maintain high biological production in the Estuary to support the food web, it is very important that the entrainment zone, which is the section of the salinity gradient where fresh and salt water initially mix and surface salinities are 1.2 - 6.0 parts per thousand, be positioned over the shallows of Suisun Bay during the summer months. Keeping the zone in this area would be accomplished by regulating water releases from upstream dams and water exports from the pumping plants in the South Delta.

In addition to reductions in biological production caused by water diversions upstream from the Estuary, reduced freshwater flows allow pollutants to accumulate to dangerous levels and encourages blooms of toxic algae, reduces sediment supply to Bay Area wetlands and beaches, and makes it easier for undesirable non-native species to successfully invade and remain viable in the Bay Estuary. Increasing freshwater flows through the Estuary would at least partially mitigate these negative impacts. All entities who divert water destined for the Bay should be required to contribute their fair share of fresh water to support benefits enjoyed by all Californians. Investments in local water supplies around the state, including conservation and recycling, can generate millions of acre-feet of water and reduce reliance on water diverted from the Estuary and its watershed.

The root causes of our current water resource problems are unsustainable human population growth approaching 40 million in California and overconsumption of a finite natural resource, i.e. water. Continued population growth (consumers) should be discouraged and reduced per capita and overall water consumption rates should be encouraged whenever possible.