



RISKS AHEAD

Flows and the Delta:

The Consequences of Using a One-Dimensional Approach to Address a Complex Problem

In August 2010, the State Water Resources Control Board issued a report on new flow criteria for the Delta ecosystem that calls for increased flows into and through the Delta. In its executive summary, the State Board cautioned readers about the limitations of any flow criteria and made it clear the report had “no regulatory or adjudicatory effect.” The State Board emphasized that because the criteria were developed in an accelerated process required by law, the Board focused only on aquatic resources in the Delta and did not consider other public trust resources. The State Board stated clearly that a more comprehensive review and consideration of a broad range of public trust resources would be required before setting flow objectives with regulatory effect.

Despite these cautions, some interest groups have assigned greater weight to the flow criteria than they deserve. With the State Board set to begin the process of developing actual flow objectives for the Delta, it is critical to understand the limitations of the flow criteria and the broader consequences of trying to resolve the Delta’s ecosystem problems through a one-dimensional, natural flow regime.

To help bring these issues into focus, a coalition of public water and power agencies has completed an analysis of the potential impacts the proposed flow criteria would have on water, energy, the environment and recreation if they were to be adopted as flow objectives. The analysis illustrates the severe consequences under a flow-centric approach, and underscores why a more comprehensive planning effort is needed.

Impacts of a One-Dimensional, Flows-Only Approach

- Reservoir levels critically reduced.
- Loss of available water supplies for cities, farms, businesses and species.
- Harm to fish / habitat due to warmer, slower-moving water.
- Significant reduction in hydropower generation and the potential for increased carbon emissions from replacement energy sources.

To achieve the coequal goals of improved ecosystem health and water supply reliability, California must address all aspects of the challenge, not just flows. The coalition believes that due consideration of all the public interests will lead to sound future policy decisions.

Current Coalition:

- Association of California Water Agencies
- California Municipal Utilities Association
- City of Redding; Department of Public Works
- Northern California Water Association
- Northern California Power Agency
- Placer County Water Agency
- Redding Electric Utility
- Sacramento Municipal Utility District
- San Luis and Delta-Mendota Water Authority
- State Water Contractors
- Westlands Water District
- Yuba County Water Agency



Delta Water Flows: A Careful Balancing Act

The Delta: A Water Hub and Treasured Estuary

The snowmelt and rainfall flowing from the vast Sierra Nevada watershed are vital to virtually every corner of California. The hub of this critical water system lies in the Sacramento-San Joaquin Delta. This system is managed by the federal Central Valley Project, California's State Water Project and many local projects.

By design, the water flows are managed by an intricate system of reservoirs, levees and weirs that serve many equally important purposes:

- Generating clean hydropower to help keep California's energy grid humming.
- Ensuring plants, fish and wildlife have proper water flows and temperatures.
- Distributing fresh water to cities, industries and farms.
- Protecting communities from flooding.

What the State Water Resources Control Board Was Directed to Do

In 2009, the Legislature directed the State Board to develop new, non-binding flow criteria for the Delta. The purpose was to help inform two major planning processes under way — the Delta Stewardship Council's Delta Plan and the Bay Delta Conservation Plan. These two plans seek to create a more reliable water supply while restoring the ecosystem.

What the Flow Criteria Could Do

The State Board accepted a report identifying flow criteria that called for increased reservoir releases to flow into the Delta and eventually out to the Pacific Ocean. The criteria proposed to:

- Increase flows from the Sacramento and San Joaquin rivers into the Delta by approximately 25 percent overall in an average weather year.
- Require increased reservoir releases in winter and spring months.
- Reduce water available as a public water supply.

The State Board stated that a more comprehensive review and consideration of a broad range of public trust resources would be required before setting flow objectives. Such a process would consider:

- Impacts on other public trust resources, including cold water pool in upstream reservoirs.
- Impacts on fish habitat.
- Impacts on navigation, commerce and recreation on upstream rivers.
- Impacts on beneficial uses of water, including municipal, industrial, agricultural and other environmental uses.
- Impacts on power production.
- Economic impacts.
- Effects of flow measures on non-aquatic resources, such as habitat for terrestrial species.

Public water and power agencies are committed to working with the State Board to advance an approach to flows that truly supports the coequal goals.

"The (State Water Resources Control Board) shall, pursuant to its public trust obligations, develop new flow criteria for the Delta ecosystem necessary to protect public trust resources."

— *Delta Reform Act, November 2009*

"In this forum, the State Water Board has not considered.... any balancing between potentially competing public trust resources (such as potential adverse effects of increased Delta outflow on the maintenance of coldwater resources for salmonids in upstream areas)."

— *Delta Flow Criteria, State Water Resources Control Board, August 2010*



Environmental Impacts: Distress for Spawning Grounds, Flyways and Refuges; Loss of Clean Power

Forcing larger flows into the Delta from January through June would have serious consequences upstream. In the fall, spawning salmon and steelhead need cold water, not warm, for their eggs and baby fry to survive. Currently, water and fisheries managers are already struggling to maintain adequate cold water temperatures below dams during spawning and rearing seasons. The impacts of climate change would cause additional challenges for maintaining colder temperatures. California's efforts to address climate change by increasing renewable power generation (AB 32) may be set back by the loss of clean summer hydropower.

Double Whammy: Warmer Waters, Lower Flows

If reservoirs reach low levels or "dead pool" status, healthy water conditions would diminish.

- Water releases would be warmer and less suitable for spawning fish.
- Low summer flows would be more susceptible to warm ambient air temperatures, pushing water temperatures even higher.
- Lower flows and slower moving water in summer months would mean less dilution of pollutants and wastewater releases, worsening their harmful effects.

Shasta Dam

Low and "dead pool" levels at Shasta Lake reservoir would cause temperature objectives for fish survival to be exceeded in 90 percent of years below the dam, threatening the survival of salmonid eggs and fry. This will impact:

- Fall-run and winter-run Chinook salmon
- Steelhead

Folsom Reservoir

Low water levels at Folsom Lake reservoir and subsequent higher water temperatures similarly jeopardize important salmon and steelhead populations along the lower American River as well as operations at the Nimbus Fish Hatchery.

Pacific Flyway

Reduced water supplies to farmers north of the Delta would result in the loss of rice fields, with the domino effect of reducing food availability for waterfowl to support the Pacific Flyway, especially in the fall.

Loss of Clean Hydropower

California would lose a significant portion of a clean, renewable energy resource at a time when the state is seeking to reduce carbon emissions.



Water Supply Impacts: Empty Reservoirs, Fallowed Fields, Failed Water Standards

The Water Board's 2010 Delta flow criteria — if imposed — would greatly increase reservoir releases in winter and spring months. An additional 4.6 million acre-feet of water a year on average would flow out to the ocean and be unavailable as a public water supply. In some years, these additional reservoir releases would redirect as much as 6 million acre-feet as new outflow. This would be on top of the 18 million acre-feet of water on average that already follows this course.

Increased reservoir releases in winter and spring translate into decreased water supplies for the California economy. Here is a look at the impacts:

Overall

Freshwater exports from the Delta — which in average rain years now constitute 17 percent of all the water that flows into the estuary — would be cut in half.

On average, 2.8 million acre-feet of water supply per year would be lost to communities and farms in the Bay Area, Central and Southern California.

Urban and Industrial

- Communities would lose 1.1 million acre-feet of water supply.
- The lost urban supply is roughly equivalent to the entire water supply of the greater San Francisco Bay urban area.

Agriculture

The cost to California's \$36 billion agricultural economy would be severe.

- Farmers would lose 2.4 million acre-feet of water supply.
- Groundwater supplies are limited and cannot sustain the water losses.
- In farming regions north of the Delta, 700,000 acres would be fallowed.
- In farming regions south of the Delta, 1 million acres would be fallowed.

Preparing for Droughts

The state frequently would be unable to store water for times of drought, magnifying the adverse social, economic and environmental impacts of these inevitable dry cycles.

Meeting Water Standards

The Water Board's own existing requirements for freshwater flows and salinity standards in the Delta would no longer be met in many years and months due to the lack of available reservoir supply.

Reservoir Impacts:

A California Landscape of “Dead Pools”

In reservoir operations, “dead pool” refers to the condition when the water level falls to the very bottom of the lowest outlets on the face of a dam. Once a reservoir is at dead pool, no storage can be released. No hydropower can be generated. This condition is now a rarity for most reservoirs in Northern California.

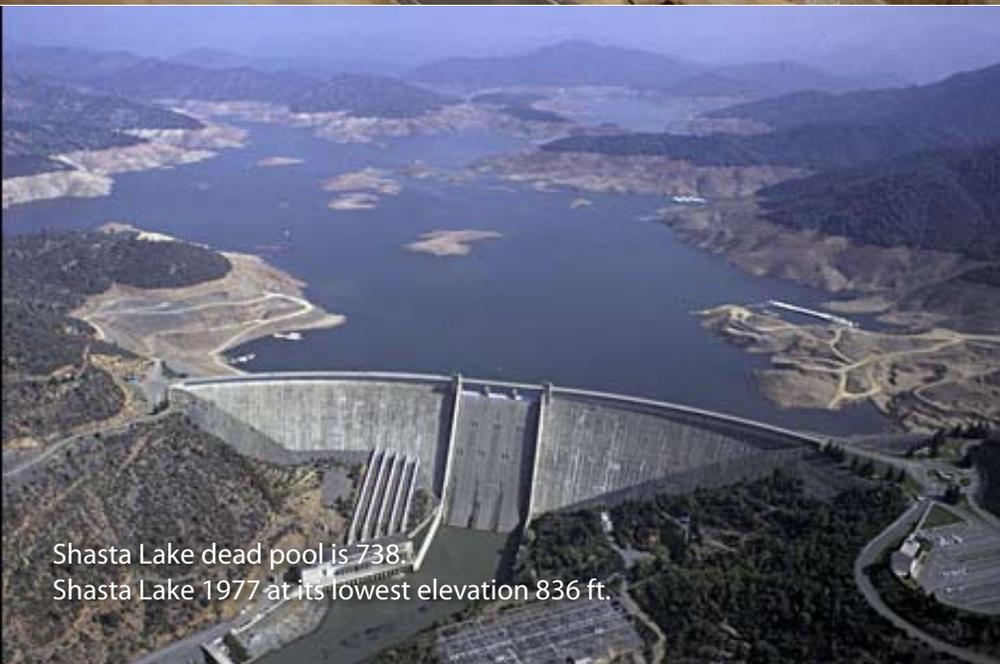
Under the Water Board’s flow criteria, “dead pool” would become a common occurrence.

Notably, San Luis Reservoir, which lies south of the Delta and is largely fed by exported water from the Delta, not river flows, would be at dead pool **98 percent of all years**.

Reservoir	Location	Capacity	Likely Years at Dead Pool
Trinity	Trinity County	2.5 million ac-ft	Nearly half of all years
Shasta	Shasta County	4.5 million ac-ft	More than half of all years
Oroville	Butte County	3.5 million ac-ft	More than half of all years
Folsom	Placer County	1 million ac-ft	Nearly half of all years
San Luis	Merced County	2 million ac-ft	98 percent of all years



Folsom dead pool is 206 ft.
Folsom Lake 2008 at 366 ft.



Shasta Lake dead pool is 738 ft.
Shasta Lake 1977 at its lowest elevation 836 ft.



Oroville dead pool is 640 ft.
Oroville 2009 at 667 ft.



Hydropower Impacts: The Backbone of California's Power Supply

Hydroelectricity is a power source that's often taken for granted and overlooked. It's not flashy like solar or eye-catching like wind farms. Most hydro facilities have been there for decades. Yet, it's the never-failing reliability of hydropower that makes it the backbone of California's power supply. A few indisputable facts:

- California has nearly 400 hydropower plants, and the majority are located in the Sacramento and San Joaquin river watersheds.
- The 400 hydro plants have a combined capacity of 14,000 MW, which produces 28 million megawatt hours of electricity each year.
- Nearly 14 percent of all the power generated in California comes from hydro.
- More than 52 percent of California's renewable power resources are hydro.
- Hydropower can meet up to 45 percent of Northern California's summer peak load.
- Using California's hydropower avoids over 29 million metric tons of carbon pollution each year – equal to the output of over 5.5 million passenger cars.

Devastating Impacts to California's Power Supply

Hydropower is a simple, yet effective concept: Reservoirs capture a significant amount of winter and spring river runoff. The stored water is then released through turbines throughout the year, with the largest releases occurring in the summer to meet the state's high energy demands.

Dramatically increasing winter and spring river flows on the Sacramento and San Joaquin watersheds would leave reservoirs severely depleted and too often near-empty, reducing hydroelectric generation up to 50 percent in the summertime. How important is hydropower to the families, businesses and farms of California? Consider this:

- The recommended river flows would mean an overall power loss that's equivalent to the needs of a city the size of San Francisco.
- Hydropower is instantaneous—throw a lever and clean power pulses immediately through the system, keeping the lights on. During California's long, hot summers, hydropower plays a vital role in keeping the power flowing and the state's power grid stable.
- Hydropower's flexibility is crucial for the development of renewable energy sources. It can be ramped up or down on short notice to help smooth out the intermittency of other renewable sources such as solar and wind.
- Hydropower is the most economical source of power available. If the ability to generate low-cost hydropower is reduced when demand is highest, electricity costs would significantly increase.
- Hydropower is clean power. Carbon-emitting resources may be the only alternative power available.
- Reducing hydropower would be a step backwards from a cleaner, greener power supply and the state's effort to reduce carbon emissions.



Recreational and Economic Impacts: Dry Docks, Lost Tourism Dollars

The reservoirs that help sustain the state and federal water projects also serve as economic engines for nearby communities. These beautiful bodies of water provide important recreational opportunities to the public, including boating, swimming, fishing, sailing, picnicking, houseboating, kayaking, camping, rowing events, food services and wildlife viewing. If reservoir levels fall to “dead pool” levels on a recurring basis, tourism, sales tax income, local jobs, aesthetics and public enjoyment will be diminished. California’s past droughts have shown what low lake levels can do to the recreational and economic picture for communities:

- Waters replaced by cracked earth.
- Docked boats ordered out of the water.
- Boat ramps surrounded by dry land.
- Holiday disruptions.
- Local marinas, restaurants and tackle shops struggling for business.
- Declines in local property values.

Here is a look at some of the major reservoirs that would feel the impacts:

Shasta Reservoir

- Dubbed “Houseboating Capital of the West”.
- Recreation is Shasta County’s fourth-largest industry sector for employment.
- 21.9 percent of Shasta County local tax receipts were visitor-generated in 2009.
- \$107.6 million in Shasta County earnings from travel-generated employment in 2009, and this was a drought year.

Folsom Reservoir

- Folsom Lake State Recreation Area: 1.3 million visitors in 2009-’10.
- 75 miles of coastline, third-largest lake in the California State Parks system.
- Peak season: Memorial Day through Labor Day.
- 13 concessionaires operating at the lake. Among them:
 - Folsom Lake Marina with 500 boat slips and gross annual receipts of more than \$1 million.
 - 12 other lake-based businesses with collective gross receipts of \$500,000 a year.

Oroville Reservoir

- Second-largest reservoir in California, largest in the State Water Project, with more than 150 miles of shoreline.
- Salmon, trout, bass, catfish, sturgeon, mackinaw, crappie and blue gill fishing.
- 800 boat moorings and other enterprises at Bidwell Marina; 2009-’10 gross sales in excess of \$1.4 million.
- 300 boat moorings at Lime Saddle Marina; gross receipts just over \$1 million a year.

What's Needed:

A Broader Look at the Delta, Water and Power

The Water Board's flow criteria exemplify a one-dimensional look at a multi-dimensional resource problem. Lasting solutions for the Delta ecosystem and California's water and power needs will have to take into account all aspects of the challenge, not just one. The Water Board has initiated proceedings to review flow objectives on the San Joaquin River. It has recently announced it intends to review flow objectives throughout Northern California. Now is a critical time to establish a more comprehensive, broad approach to balancing California's many water needs.

Understanding the Real-World Impacts of Proposals

- Any proposal to change the operations of California's major reservoirs has many consequences.
- Impacts on habitat and ecosystems, both upstream and downstream, must be understood.
- Public trust values must be identified and properly balanced.
- Water supply impacts must be analyzed for upstream and downstream users in all year types.
- Hydropower impacts must be identified and taken into full account.

Taking Advantage of Existing Efforts

- The Bay Delta Conservation Plan is an example of an ongoing effort to establish a habitat conservation plan that combines Delta water system improvements with ecosystem enhancements.
- Establishing future flow needs in the Delta, as part of a process that balances public trust and public interests, should happen **AFTER** the completion of habitat plans, not **BEFORE**.
- Understanding impacts should happen **BEFORE**, not **AFTER**, proposals are advanced.

Adopting a More Holistic Approach to Healing the Delta Ecosystem

- The Delta has lost 95 percent of its natural wetlands since settlements began in the 1850s.
- Invasive species now comprise more than 90 percent of the overall population of the ecosystem.
- A comprehensive approach to promoting ecosystem health, rather than a focus on reservoir releases, will be more effective and avoid unintended, negative consequences to the environment and economy.

For more information, contact California Municipal Utilities Association at 916.326.5800 or State Water Contractors at 916.447.7357.

Source: *Hydrologic Modeling Results and Estimated Potential Hydropower Effects Due to the Implementation of the Sacramento Water Resources Control Board Delta Flow Criteria*, December 2011, http://www.sfcwa.org/category/programs/delta_governance_water_management/.

