

Temperance Flat

Frequently Asked Questions *September 2007*

Department of Water Resources

California's water management system depends on surface storage, not only for water supply, but flood control, hydropower generation, and recreation. Existing surface storage is used to maintain water quality in the Delta, is operated in conjunction with groundwater storage to leverage enhanced water supply reliability, and provides an ability to respond to a variety of disasters. As California's population grows and the effects of climate change continue, new storage facilities must be built.

Governor Schwarzenegger has proposed a multi-billion dollar investment in new reservoirs that will increase our water supply, support ecosystem restoration, improve flood protection, improve water quality, and give more flexibility in dealing with climate change.

How much does it cost?

Estimated costs were last published in the Initial Alternatives Information Report, in June 2005. Estimates were included for two alternative Temperance Flat dam sites with total capital costs ranging from \$1.0 to \$1.4 billion. Alternative plans, designs, and costs are currently being revised by the Reclamation/DWR planning team. Costs are expected to increase substantially and perhaps double from previously published costs. Primary reasons for these expected cost increases include addition of temperature control devices, mitigation for hydropower facility relocations, and the substantial increase in material costs since 2005. For the purposes of calculating costs of project water supplies, DWR is currently using a total capital cost estimate of \$ 2 billion. Refined and updated cost estimates will be presented in the Plan Formulation Report later this year and the Draft Feasibility Report/EIS-EIR in 2008.

What are the identified benefits?

Benefits could include enhancing restoration goals on the San Joaquin River from Friant Dam to the Merced River, improving San Joaquin River water quality, providing increased operational flexibility that would increase the certainty of water supply allocations and allow development of additional conjunctive management projects that would reduce impacts



Proposed Temperance Flat Reservoir. Temperance Flat is one of the alternatives in the Upper San Joaquin River Basin Storage Investigation

from groundwater overdraft in the region. Urban water quality could be improved through an exchange program between the Friant Water Users Authority and the Metropolitan Water District of Southern California. In addition, there are opportunities to provide increased control of flood flows at Friant

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Dam and reduce downstream damages, improve hydropower generating flexibility, and improve recreation experiences.

Are Sites and Temperance Flat reservoirs the best locations for new surface storage and Los Vaqueros Reservoir the best location for expansion?

Sites Reservoir and Temperance Flat are among the best locations for new multi-objective surface storage in California. Since the late 1990s, state and federal agencies have investigated 5 promising surface storage projects. Each project is capable of producing multiple benefits. Sites Reservoir and Temperance Flat are the largest projects and thus could produce the broadest array of statewide and national benefits, based on the following facts.

- State and federal agencies initially screened 52 potential surface storage sites, with many eliminated due to high costs and environmental impacts
- Five surface storage sites were selected for further study in the CALFED Programmatic EIS/EIR: Shasta Lake Enlargement, NODOS (Sites Reservoir), In-Delta Storage, Los Vaqueros Reservoir Expansion, Upper San Joaquin Basin (Millerton Lake Enlargement or equivalent)
- Sites and Temperance Flat Reservoirs would likely provide the most storage and broadest benefits (water supply, water quality, ecosystem restoration, and flood management)
- Sites Reservoir, Temperance Flat Reservoir, and Los Vaqueros Reservoir Expansion have significant local and regional support

Los Vaqueros Reservoir Expansion involves raising an existing dam. DWR, Reclamation and CCWD have recognized the Kellogg creek area in the western Delta as an ideal location for a reservoir for decades. In the early 1990's CCWD acted by buying 23,000 acres of watershed and constructing a dam and 100,000 acre foot reservoir facility to

serve CCWD's water quality needs. LV's proximity to the Delta and the State and Federal water projects offers unique opportunities to provide additional Delta conveyance and south of Delta storage to California's water systems that serve the Bay Area. As recommended in the recent PPIC report, expanding Los Vaqueros Reservoir's seasonal Delta export operations would allow Delta salinity fluctuation providing significant ecological value, could operate with or without an improved Delta conveyance, and is not affected by restrictions in the recent Judge Wanger decision making it a perfect "no regrets" action to help fix the Delta.

How quickly can new surface storage be brought on line?

Assuming Congress and the State approve the projects, authorize and appropriate construction funds immediately following completion of the Feasibility Report/EIS-EIRs, project construction could begin by about 2012 and be completed in 5 to 7 years. Final engineering design, preparation of construction documents, acquisition of lands and rights, and construction permitting would precede construction. Project operation could begin by 2017 to 2019.

What is the impact on the environment?

The NEPA/CEQA process is underway to identify potential environmental impacts and mitigation measures with draft and final EIS/EIR due in July 2008 and July 2009 respectively. All significant adverse impacts will be avoided or mitigated where feasible.

How could surface storage assist in "saving" the Delta?

Surface storage is one component of a broad array of water management tools that includes conveyance improvements, water conservation and recycling measures, conjunctive management and groundwater storage, reoperation of existing reservoirs, water transfers, and other actions needed to build a solution to save the Delta.

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Additional surface storage will provide flexibility to the state's constrained water management system, which can be operated to contribute to the long-term sustainability of the Delta ecosystem, maintain water quality and supply reliability, and prevent and plan for catastrophic failure of the Delta system. Flexibility created within the water management system will likely prove to be essential in developing solutions to Delta ecosystem challenges. With additional capacity and integrated operations, water diversion and deliveries can also be timed in ways that will allow for better response to the effects of earthquakes, floods and climate change.

Added flexibility from storage can also improve the viability and effectiveness of water exchanges and transfers. Storage will be dedicated to enhancing restoration goals on the San Joaquin River. The health of the Delta partially depends on the health of its tributaries. Improving conditions on the San Joaquin River, the Delta's second largest tributary, should not be ignored when considering Delta improvement measures.

What is the cost of the water?

Previous estimates were given at \$350/acre-foot for the larger size alternative based on an assumed escalated capital cost of \$2 billion and 183,000 acre-feet of average annual yield reported in the Initial Alternatives Information Report in June 2005. However, recent events such as the Friant/NRDC Settlement have caused the Investigation Team to reevaluate planning assumptions, objectives, formulation and evaluation. Thus, these numbers are likely to change.

If surface storage is part of the overall solution to California's water supply needs, what are the priorities among all of the options available? How important are conservation and recycling for example?

As California faces mounting water management challenges, including population growth, climate change and water quality degradation, it must

invest in a diversified portfolio of water management options, as described in the 2005 California Water Plan Update. Options that will help deal with these challenges include conservation, recycling, desalination, water transfers, reoperation of existing reservoirs, groundwater management, and new surface storage. No single water management action can meet all of California's future water management challenges.

Preliminary studies indicate that new surface storage can improve water supply reliability at a lower total cost than the highest cost water recycling and water conservation options that would be needed for the most economically efficient future urban water management portfolio.

If other cost effective alternatives exist, why is the state looking at Surface Storage?

California needs to implement a full array of different water management actions. Each contributes in different ways to the overall reliability of the water management system. Water conservation, water recycling, watershed management, conveyance, desalination, water transfers, groundwater storage and surface storage are all needed in a diversified management portfolio. Water conservation, one of the most cost effective actions needs to be aggressively pursued in conjunction with surface storage and other actions. Surface storage provides a degree of operational flexibility that cannot be provided by other management actions. Surface storage is particularly useful in providing drought protection, releasing water at specific times for water quality and environmental benefits, contributing to flood management, mitigating for lost snowpack due to climate change, and in responding to other unforeseen circumstances.

How can decisions on surface storage be made without final studies that better define project costs and benefits?

Existing surface storage studies already provide a wealth of information that can be used as the basis of implementation decisions on locating new

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storage. Since the late 1990s, state and federal agencies have performed detailed studies that have focused on five promising surface storage projects. This information has been published in a series of documents that can be found on the DWR and Reclamation project websites. The studies have determined estimated project costs and have shown that each potential surface storage project can be operated in a variety of ways to achieve a range of different benefits depending on the objectives of the project partners. The studies have also identified potential environmental impact, including biological and cultural resources that may be affected. Impact analyses and mitigation will be included in the environmental documents and permits.

Reports and summaries of these studies provide potential partners, including the state and federal governments, sufficient information to evaluate their level of interest in each project. Feasibility study reports and environmental impact reports/ environmental impact statements will be completed for Sites Reservoir by the end of 2008 and for Temperance Flat in 2009. The final studies should include input from project partners so final costs and benefits can be determined.

Final decisions on project implementation will be made after the studies are completed and the projects are deemed feasible.

Why are project partners not stepping up to pay for the water supply benefits from the storage projects?

While potential project partners have been engaged in the storage investigations, none have yet committed to investing in the projects. Both Sites Reservoir and Temperance Flat are likely too large for any one agency or entity to pursue on its own. Partnerships that include state and federal participation to pay for broad public benefits will be necessary to allow groups of entities to share in project costs and benefits.

The ongoing feasibility studies will help define the cost sharing by state and federal agencies, but more is needed to provide assurances for other potential

partners. A framework for investment, similar to that included in the Governor's proposal, would define the state's cost share in the Sites Reservoir and Temperance Flat projects and demonstrate to potential partners that the state government is serious about substantially participating in the projects. Based on this initial framework, cost sharing for these public benefits may pay up to one-half of the project costs, leaving the remainder to be paid by other project beneficiaries.

In addition, until now, there has been no framework for a fix for the Delta, which potential project participants may find critical to assuring that they could realize benefits from surface storage. The Governor's Delta Vision initiative, the Bay Delta Conservation Plan, the Delta Risk Management Strategy and other initiatives including provisions of the Governor's proposal demonstrate that the state is serious about fixing the Delta. Surface storage needs to be developed in light of a Delta solution and as part of a comprehensive plan for securing statewide water reliability.

What is the estimated yield of the project?

The estimated average annual yield for the Temperance Flat RM 274 alternative, reported in the June 2005 Initial Alternatives Information Report, varies between 165,000 and 183,000 acre-feet per year, depending on the benefit emphasis of the project.

Will Temperance Flat Reservoir impede salmon migration?

A new Temperance Flat Reservoir would be located above Friant Dam. Friant Dam completely blocks salmonid migration, so Temperance Flat would not cause any additional impediment. The San Joaquin Settlement stipulates water flow releases from Friant Dam to the San Joaquin River for restoring and maintaining salmon and other fish species. A Temperance Flat project could improve the capability, reliability and flexibility to release water at suitable temperatures for anadromous fish downstream of Friant Dam.

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How many years of hydrologic data are being used for the analyses?

The operations studies use 82 years (1922 to 2003) of hydrologic record. In addition, the investigation includes sensitivity analyses that vary these historic flow conditions to test the possible effects of climate change, such as more winter precipitation falling as rain and less as snow.

How is evaporation being taken into account?

Evaporation rates for these surface storage reservoirs are comparable to losses associated with typical groundwater storage projects. Evaporation for all reservoirs, including Temperance Flat, is accounted for in the operations studies. Evaporation rates are directly related to the exposed surface area of a reservoir and wind and temperature conditions.

Won't Temperance Flat Reservoir flood recreation sites and a replica Native American village?

A replica native-American village does exist within the footprint of the proposed Temperance Flat Reservoir. However, this is a replica village that can be relocated, and is not an archeological site. Existing public recreation sites will also need to be relocated, but since the new reservoir will create additional water-based recreation opportunities, the relocated sites will be replaced and expanded upon to the extent possible.

Based on our current survey information, the replica native-American village is at or slightly above the gross pool elevation of either Temperance Flat reservoir alternative. It is not clear at this time if relocation would be required or if the existing site would become a feature along the shoreline of a new reservoir.

The San Joaquin River Settlement Agreement does not call for Temperance Dam. Why is Temperance Flat still under consideration?

While the Settlement does not call for new storage, water temperature and flow conditions on the San

Joaquin River could be enhanced through new storage to support the Settlement's fishery restoration goals. In addition, many of the same objectives, such as water quality in the San Joaquin River, increased supply reliability for Friant Division water user, increased flood management and the facilitation of transfers to urban water users, still apply.

Isn't Temperance Flat Reservoir a net consumer of energy?

There are two alternative reservoir sites under consideration on the San Joaquin River. Construction of a reservoir at either RM 274 or RM 279 would inundate two PG&E power plants at the Kerckhoff Project. At RM 279, an extension of the Kerckhoff power tunnel would result in net power generation. At RM 274, power facilities would be included at the base of the new structure, but there would be a net loss of energy generation. However, with the use of Millerton Lake as a forebay/afterbay these projects can be used as pumped storage facilities. During the summer periods, water can be pumped from Millerton at night (daily off-peak) when relatively inexpensive wind energy is available from southern California and released back into Millerton during the day (on-peak) when the hydropower is needed the most. This process is called wind-shaping.

Will there be a net decrease in stream flow as a result of global warming? If so, how will new reservoirs fill?

Climate change projections for altered total annual precipitation in California through the end of this century vary. While models predicting smaller increases in temperature tend to predict moderate increases in precipitation, models predicting the greatest amount of warming also predicted moderate decreases in precipitation. All models, however, projected changes in runoff and timing, amount of precipitation, and runoff. In addition, most temperature projections indicate that higher temperatures will result in higher snow elevations, and more precipitation will fall in the form of rain rather than snow which will increase winter inflows to existing reservoirs. Therefore, more annual runoff

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will likely be passed through the existing reservoirs in the winter. New reservoirs would improve our ability to capture this modified winter runoff and mitigate the loss of snowpack storage.

While new dams alone are not the total solution to global warming, increased surface storage, along with increased and improved water use efficiency, recycling, groundwater management, water quality protection, and other actions would provide California with a comprehensive, sustainable approach to managing the effects of climate change.

Recent studies indicate that building large reservoirs may actually increase the greenhouse gases that cause global warming. Will Temperance Flat Reservoir increase the CO₂ and methane released to the atmosphere?

Once built, Temperance Flat reservoir would create methane and carbon dioxide emissions, but the amount is expected to be relatively small. For example, Lake Oroville, which is approximately two to three times the size of proposed Temperance Flat reservoir, annually emits the same amount of carbon dioxide as one-half day of all passenger cars commuting in the Los Angeles basin. Habitat in the Temperance Flat reservoir area includes grasslands, woodlands, scrub, and exposed granite outcroppings common in steep canyons of the Sierra Nevada. Reservoir lands would be cleared prior to construction to prevent unwanted debris in the completed reservoir. This will reduce the amount of organic decomposition that can cause greenhouse gas emissions. In some cases, cleared vegetation can be used to create underwater habitat for the benefit of reservoir fish.

Does the Water Plan Update say California will use less water in 2030 than today through available conservation measures? If so, why do we need additional water storage?

The Water Plan presents three future scenarios. These scenarios are “plausible futures, not forecasts.” The scenarios are instead intended to describe a new methodology approach to future water Update

comparisons of both supply and demand. The scenarios show a net change in statewide demand that varies from a slight decrease to an increase of about 4 MAF per year between now and 2030. However, these estimates do not account for a continued overdraft of about 2 MAF per year from groundwater basins. If correction for groundwater overdraft is considered, the net demand increases from about 2 to 6 MAF per year by 2030.

The Water Plan Update states, “the biggest challenge for California water management remains making sure that water is in the right places at the right time. This challenge is at its greatest during dry years.” Surface storage is a measure that provides the flexibility to place water in the right place at the right time by optimizing the timing of releases to maximize water supply benefits. Both water demand and shortages occur in specific places at specific times. Multi-year droughts present the greatest challenge for water managers, because water in storage is diminished during each successive dry year. Looking at the total change in water demand for the State, while informative, is less essential than understanding a water system’s ability to reliably deliver water supplies to a service area during these kind of drought conditions.
