

Integrated Storage Investigation

The CALFED Bay-Delta Program is committed to developing a balanced, integrated water management strategy. The water management strategy assures that all available water resources management tools, including water use efficiency, water transfers, conveyance facilities, and groundwater and surface storage opportunities, will be used to achieve CALFED's water supply reliability goals (as illustrated in Figure 1). The proper role of storage in the context of this water management framework will be evaluated in a comprehensive fashion as part of the Integrated Storage Investigation (ISI). The ISI is an effort to coordinate existing storage investigations being conducted by CALFED agencies, CALFED-initiated storage evaluations and broader water management strategies and analysis to provide a comprehensive assessment of alternative storage options and their utility to overall water management.

Specifically, the ISI will evaluate surface storage, groundwater storage, power facility reoperation and the potential for conjunctive operation of these different types of storage. Additionally, the nature of these investigations will provide an important opportunity to prepare a comprehensive assessment and prioritization of critical fish migration barriers for modification or removal (see Figure 2).

The investigation will evaluate these elements both on a Bay-Delta system using currently available system modeling tools such as DWRSIM and PROSIM and on a local scale with more detailed modeling tools. It must assure that proposals for system changes take into consideration regional, as well as statewide water management objectives. For example, reoperation of power generation facilities if done conjunctively with downstream water supply reservoirs, as well as groundwater banking, may avoid impacts or in fact enhance overall benefits. Therefore, the development of regional strategies for water resources management will be an important work effort linking the study elements, which will require more detailed evaluation of local hydrologic conditions and interactions than can be provided by the large scale models.

The study elements within the Integrated Storage Investigation include:

- Overall Storage Strategy
- Surface Storage Investigations
 - Surface Storage Facilities Screening
 - North of Delta Off-Stream Storage Study
 - In-Delta Storage Studies
 - On-Stream Storage Enlargement Studies: Shasta and Friant
- Groundwater/Conjunctive Use Studies
- Power Facilities Re-operation Evaluation
- Fish Migration Barrier Removal Prioritization and Evaluations

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The program elements are designed to achieve the following individual objectives:

Overall Storage Strategy: Determine the proper mix of surface and groundwater storage and the general operational strategy necessary to meet CALFED objectives, based on policy assumptions agreed to by the CALFED Policy Group, technical assumptions developed with assistance from CALFED agencies and stakeholders, and linked economic and hydrologic modeling. The modeling will take into account the effect of water transfers, water use efficiency measures, alternative water supplies, impacts of unmet demands, system storage, and the effects of all these measures on the price of water. Additionally, the assessment of the time value of water and geofluvial processes will be coordinated with the ERP science panel review.

The regulatory presumption under the Section 404 Guidelines is that there is a less environmentally damaging practicable alternative to constructing new facilities which may impact Waters of the United States, including streams, wetlands, and special aquatic sites. The overall storage strategy will describe whether or not all practicable alternatives to storage facilities have been implemented to the extent feasible and whether there is still an unmet need for additional storage facilities when beneficiaries pay the full cost of new facilities. This effort will be coordinated with the overall CALFED 404 process.

Surface Storage Investigations: Depending on their locations and operating criteria, surface storage facilities can provide a wide range of water management functions. CALFED and its cooperating agencies have conducted a preliminary screening of potential surface storage locations and project configurations, then selected a smaller number for more detailed evaluation. The screening process, although it has already provided preliminary guidance for more detailed investigations, continues to be refined to assure consistency with current planning conditions and available environmental data. DWR is conducting more detailed feasibility investigations for north of Delta off-stream surface storage under separate authority, while USBR is investigating enlargement of Shasta Reservoir. In-Delta storage has been proposed by Delta Wetlands, a private venture, and this evaluation is nearing the end of the environmental documentation and review process. CALFED may evaluate the in-Delta concept further. There has been considerable interest in a potential expansion of upper San Joaquin River storage; this alternative may be evaluated further if the combined benefits of increased flood control and other water management opportunities warrant it. These study elements will be integrated through system hydrologic modeling, economic analysis, and regional evaluations.

Surface Storage Facilities Screening: Narrow the range of candidate surface storage sites based on engineering, economic, and environmental considerations. The initial list included 52 potential sites; during the Program implementation phase it is anticipated that only a handful will be given serious consideration. One objective of the screening study is to limit the scope of expensive and time consuming environmental and feasibility investigations required to comply with the required 404 alternatives analysis.

North of Delta Off-Stream Storage Investigation: This study was initially authorized under the Safe, Clean, Reliable Water Supply Act of 1996 and is continuing under augmented funding provided through the State budget process. Its scope was developed in close coordination with the CALFED Bay-Delta Program, and includes four potential reservoir projects on the west side of the Sacramento Valley. The proposed projects would rely on a mix of local runoff and/or diversions from the Sacramento River to develop additional water supply reliability.

In-Delta Storage Studies: In-Delta storage could provide significant operational flexibility to enhance both water supply reliability and ecosystem benefits. Two approaches have been considered. In the Delta Wetlands proposal, water would be pumped from Delta channels when conditions allow, and pumped back into Delta channels in times when there is a demand for the water. An alternative explored by CALFED would connect in-Delta storage to the export facilities in the south Delta, thus eliminating a second screening cycle for export water supplies. The Delta Wetlands Project review process is nearing completion, whereas the CALFED approach has been explored at a level sufficient for the programmatic EIR/EIS documentation process. Completion of the Delta Wetlands Project review process and a feasibility level evaluation of the CALFED approach to in-Delta storage are both recommended by CALFED staff.

On-Stream Storage Enlargement Studies: USBR has completed an initial assessment of potential Shasta Lake enlargement alternatives. Raising the dam elevation by about 6 feet may prove to be a cost-effective option for expanding capacity by about 290,000 acre-feet. The primary impact concerns would include additional inundation of streams entering the lake, loss of terrestrial habitat, and impacts on recreation facilities on the existing shoreline. More detailed study may be warranted and is recommended by CALFED staff. There has also been considerable interest in exploring an enlargement of Millerton Reservoir by raising Friant Dam for potential improvements in flood control, water supply reliability, and ecosystem restoration. Given the potential for multiple sources of funding for such an enlargement, further feasibility study of this proposal is recommended.

Groundwater/Conjunctive Use Programs: CALFED has developed a framework for evaluation and development of additional groundwater and conjunctive use opportunities, based on voluntary participation by local water management entities. The proposed framework would provide opportunities for intensified groundwater monitoring, modeling, and evaluation of local and regional opportunities as well as potential impacts and mitigation requirements. It calls for use of pilot studies to methodically assess opportunities and impacts before full implementation. In addition, DWR and USBR are working with local agencies to explore specific groundwater banking and conjunctive use opportunities. DWR's North of Delta Off-Stream Storage Study also includes evaluation

of opportunities for exchanges and groundwater management in conjunction with new surface storage to maximize water supply utility.

Power Facilities Reoperation Evaluation: AB1890 requires that California utilities facilitate deregulation of their electric power operations by appraising and separately managing their transmission and generating facilities. PG&E is currently engaged in this process. It plans to consolidate its hydroelectric generation facilities under a new subsidiary, U.S. Generation. A wide range of federal, state, and local entities are working with PG&E to assure that potential impacts of the restructuring process are addressed. PG&E owns thousands of acres of land in association with its hydroelectric generation facilities and reservoirs. These agencies participate in a Utility Land Working Group, which meets regularly with PG&E as this process moves forward.

Some local entities have expressed interest in acquiring PG&E facilities, which might then be re-operated to meet a range of local needs, including water supply, power, recreation, and environmental enhancement.

CALFED's participation in this process will be important to assure that local, regional, and state planning goals for PG&E's hydroelectric facilities are properly balanced and meet the overall objectives of the Program.

Fish Migration Barrier Removal Evaluations: As part of CALFED's Ecosystem Restoration Program, some obstructions to fish passage (such as small dams) are being considered for modification or removal in order to restore anadromous fish access to critical spawning habitat. There is a need for a more systematic approach to identifying and prioritizing barriers for future action. The scope of ISI provides an opportunity for such a comprehensive assessment. The evaluation will consider the potential ecosystem benefits and alternative ways to address potential water supply reliability, flood control, and power impacts associated with facility removal. Interested stakeholders will participate in the evaluation of each candidate facility in an open evaluation and decision process.

Integrated Water Management Strategy											
Water Management Objectives	Water Management Tools										
	Transfers		Conservation			Recycling	Storage		Watershed Management	Water Quality Control	Monitoring and Real-Time Diversion Management
	Long-Term	Short-Term	Agricultural	Urban	Wetlands		Groundwater	Surface			
Reduce Diversion Conflicts											
Decrease Drought Impacts - Environmental Flows - Ag/Urban supply											
Increase Supply Availability - Drought - Average											
Increase Operational Flexibility											
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Integrated Storage Investigations

Groundwater Storage	Surface Storage	Power Facility Reoperation	Fish Barrier Assessment
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