Surface Storage — CALFED

A Resource Management Strategy of the California Water Plan

California Department of Water Resources

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Acronyms and Abbreviations

BDCP	Bay Delta Conservation Plan
CVP	Central Valley Project
CWP	California Water Plan
DHCCP	Delta Habitat Conservation and Conveyance Program
DWR	California Department of Water Resources
EIR	environmental impact report
EIS	environmental impact statement
GHG	greenhouse gas
IDSP	In-Delta Storage Project
IRWM	integrated regional water management
LVE	Los Vaqueros Reservoir Expansion
maf	million acre-feet
NODOS	North-of-the-Delta Offstream Storage
SLWRI	Shasta Lake Water Resources Investigation
SWP	State Water Project
taf	thousand acre-feet
USBR	U.S. Bureau of Reclamation

Surface Storage —CALFED

Surface Storage in California

California remains significantly dependent upon surface water. A review of the California Water Balance Summary, 2001-2010 (*California Water Plan Update 2013*, Volume 1, Chapter 3, Table 3-2), indicates that in an average year like 2010, about 65 maf (million acre-feet) (more than 80 percent) of 80 maf total dedicated and developed water supply is associated with surface water. Surface storage is an essential element of managing the state's surface water resources.

The naturally arid conditions found in much of California, coupled with seasonal variations of too much or too little water prompted water planners of the past to implement conveyance and storage projects to support land development, population, and economic growth. After construction, these dams captured seasonal runoff and stored it for beneficial uses during drier times. Today, these projects facilitate a larger set of water management objectives including reliable water supplies, water quality and ecosystem maintenance, flood management, and hydropower generation. In many areas of the state, surface water and groundwater are used conjunctively. Coordinated surface water and groundwater management can be either formal or informal. For example, a managed groundwater recharge program where surface water is infiltrated to an aquifer for later use is formal; excess applied surface water in agricultural areas during wetter years that increases the availability of groundwater in drier years is often more informal.

Dams and surface water storage continue to be a critical tool for providing water management flexibility in California. The amount of surface water in California, as noted above, often make it a foundational integration element of more diverse local and regional water management portfolios. In addition to storing water for use by residents, businesses, and industries, these facilities provide vital supplies during warm and dry periods for growing crops and maintaining the state's managed wildlife refuges.

CALFED Surface Storage in California

The CALFED Record of Decision (2000) identified five potential surface storage reservoirs that are being investigated by the California Department of Water Resources (DWR), U.S. Bureau of Reclamation (USBR), and local water interests:

- Shasta Lake Water Resources Investigation (SLWRI) — Draft Feasibility Report released February 2012/Draft Environmental Impact Statement (EIS) released June 2013.
- North-of-the-Delta Offstream Storage (NODOS) — administrative draft feasibility report and Administrative Draft Environmental Impact Report (EIR) released May 2014.
- In-Delta Storage Project (IDSP) — Delta Wetlands Project — Draft EIR 4/2010.
- Los Vaqueros Reservoir Expansion (LVE).
- Upper San Joaquin River Basin Storage Investigation (USJRBSI) — Draft Feasibility Report released January 2014; Draft EIS released August 2014.

These five investigations were recommended after the CALFED Program evaluated and considered 52 sites. An initial screening identified and eliminated those reservoir sites that were clearly impracticable for the CALFED Program. The following summary provides a snapshot of the current status of the five CALFED Surface Storage Investigations. Additional information is at http://www.water.ca.gov/storage/index.cfm. The general locations of the initial alternatives reflected in

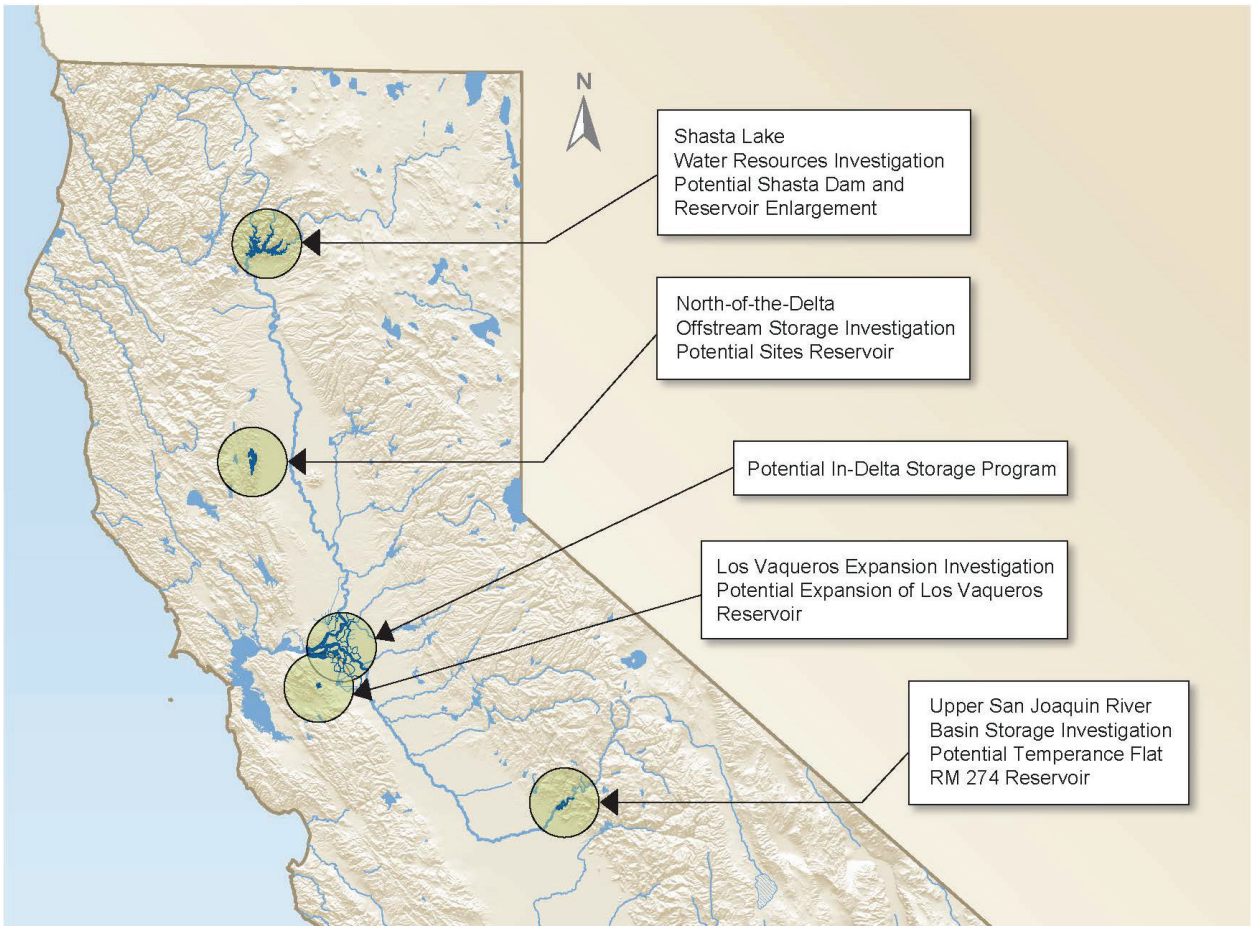
the summary below are shown in Figure 1, "General Location of CALFED Surface Storage Initial Alternatives."

The proposed water bond, "Funding for Water Quality, Supply, Treatment, and Storage Projects," if approved by voters, would provide $2.7 billion for new water storage. CALFED surface storage is one type of eligible storage. This public money would be used to invest in public benefits including ecosystem restoration, flood management, water quality, emergency response, and recreation. According to the bond proposal, water supply reliability benefits for urban or agricultural users would be paid for by those beneficiaries. The California Water Commission, consistent with direction in this legislation, has begun developing methods for the quantification and management of these potential public benefits.

Water resources planning has changed significantly over the past several decades. New approaches to planning for CALFED surface storage has resulted in a new era of project formulations designed to address a new era of water resources needs. The State and federal governments have funded the five surface storage investigations, which were explicitly conceived to support at least three of CALFED's program objectives: water supply reliability, water quality, and ecosystem restoration. From the outset, investigation planners acknowledged that the dam building model of the past (i.e., onstream reservoirs built primarily for agricultural and urban users and flood protection) would not be helpful in solving California's current water challenges. In fact, these approaches would likely exacerbate many of the state's water resources problems, especially perceptions about winning and losing in California's water battles. Consequently, CALFED considered new onstream storage untenable. However, offstream storage or expansion of existing onstream reservoirs were considered to be consistent with CALFED solution principles. For example, of the initial investigation formulations described in this status summary, Los Vaqueros, Sites Reservoir (North-of-the-Delta Offstream Storage), and In-Delta Storage are considered offstream; Shasta Lake enlargement and Temperance Flat (Upper San Joaquin River Basin Storage) are considered expansions of existing onstream reservoirs. In addition, formulations would emphasize effective mitigation of impacts and would not limit consideration of environmental effects to mitigation, but instead would be designed to improve environmental conditions. Project purposes emphasize multi-objective storage, combining newer objectives associated with ecosystem restoration and water quality with more traditional purposes of water supply reliability, hydropower, and flood control. More specifically, these new projects would support aquatic ecosystem restoration focused on the Delta and its tributaries, improved drinking and habitat water quality, and water supply reliability improvements that ultimately support California's growing population and diverse economy.

The CALFED surface storage project formulations have dedicated significant project resources to public benefits including ecosystem restoration, water quality, and water supply reliability for environmental uses (e.g., refuge water supply) (see Table 1, "CALFED Surface Storage 2010 Progress Report Benefits Summary") that would be paid for by the State and/or federal governments. Contributions to a reliable water supply are also explicitly included. Urban and agricultural water supply reliability is considered a non-public benefit that would be paid for by water users. In addition, tribes could be potential beneficiaries of the projects. Note that this summary includes information from the 2010 Progress Report and does not reflect changes now included in the more recent environmental and feasibility documents.

Figure 1 General Location of CALFED Surface Storage Initial Alternatives



California's water resources future has become increasingly uncertain. Consequently, these projects will need to perform well under a number of potential future conditions including climate change, alternative Delta conveyance and management, and disaster/emergency response. The investigations should consider a project's effectiveness as precipitation and runoff patterns change and sea level rises, with either existing or new Delta conveyance and management and potential implementation of multiple storage facilities. Storage should also support adaptively managed restoration approaches based on new or improved science, changes in the viability of species, and modified restoration priorities. While flexibility may be challenging to value, a robust response to various future scenarios will help ensure that projects would remain "no- regrets" investments.

The continuing CALFED Surface Storage Investigations are in their final phase of planning. Funding for In-Delta Storage ended in 2005; the four remaining investigations are ongoing. State funding for State agencies to participate in the Shasta Lake investigation also ended in 2005. DWR and the USBR are coordinating planning assumptions and documents with the Bay Delta Conservation Plan (BDCP) and Delta Habitat Conservation and Conveyance Program (DHCCP) so that potential future changes to Delta conveyance can be considered in surface storage planning. DWR and USBR plan significant outreach and

Table 1 CALFED Surface Storage 2010 Progress Report Benefit Summary

Investigation (Reservoir Initial Formulation Shown) [a]	New Storage Capacity (taf)	Average Annual Yield (taf/year)	Drought Yield [b]	Yield Estimate Includes	Benefits Not Included in Yield Estimate
Los Vaqueros Expansion	115	13 147	3 86	Water supply [c] Ecosystem (diversion through new fish screens)	Emergency Water Supply Water Quality
North-of-the-Delta Offstream Storage (Sites Reservoir)	1,800	560 183 197 180	387 209 112 66	Total Water supply Water Quality Ecosystem Restoration	Flexible Hydropower Generation Recreation Flood Damage Reduction
Shasta Lake Water Resources	634	74	71	Total to be distributed to water supply, ecosystem restoration, and water quality	Dedicated storage for anadromous fish Hydropower Recreation
Upper San Joaquin River Basin Storage (Temperance Flat RM 274)	1,260	140	86	Total to be distributed to water supply, ecosystem restoration, and water quality	Flood Damage Reduction Hydropower Recreation Ecosystem Restoration Water Quality Emergency Water Supply
In-Delta Storage [d]	217	107 30 18 13 2 44		Total Urban + Ag Groundwater Banking Ecosystem Restoration Refuge Water Quality	Ecosystem Restoration (non flow-related)

Notes:

taf = thousand acre-feet

[a] Initial Investigation Formulations are from the 2010 CALFED Surface Storage Investigations Progress Report, unless noted, and are not feasibility or environmental document alternatives.

[b] Drought yield is the average annual yield associated with the driest periods, which include 1928-1934, 1976-1977, and 1986-1992.

[c] Water supply may include municipal and industrial, agricultural, and refuge water supply reliability improvements.

[d] In-Delta Storage information was compiled from the 2004 Draft – State Feasibility Study and 2006 Supplemental Report of the In-Delta Storage Project.

Table 2 Primary Environmental Permits/Compliance Issues

State
Department of Fish and Wildlife Code Sections:
5937-Water Diversions and Fish
3511-Fully Protected Birds
4700-Fully Protected Mammals
3503-Specified Birds
3505-Eggs and Nests
3503.5-Birds of Prey
Department of Fish and Wildlife Streambed Alteration Agreement
California Environmental Quality Act
California Endangered Species Act
California Water Rights
Executive Order 12898-Environmental Justice
Executive Order 11990-Wetlands Protection
Natural Community Conservation Planning Act
Native Plant Protection Act
Regional Water Quality Control Board Storm-water Permit
Federal
1899 Rivers and Harbors Act
Energy Regulatory Commission License
Fish and Wildlife Coordination Act
Migratory Bird Treaty Act
National Environmental Policy Act
Clean Water Act Sections 404 and 401
Other
Local Permits and Compliances
Public Trust Doctrine

stakeholder input throughout this final phase, especially during the comment period of the environmental documents. Planning requirements for large surface storage projects are extensive. A more comprehensive listing of regulatory permits and compliances that would likely be required, as compiled by one of the investigations is shown in Tables 2 and 3.

Potential Benefits

The size and location of these surface storage projects facilitates accomplishing water resources benefits in two distinct ways. First, many benefits are achieved directly by releases from new storage. Second, additional storage can provide significant system flexibility such that other facilities' operations can be modified without reducing current benefits to support additional benefits within the system. Additional water in storage can be used either to improve ecosystem functions and conditions for targeted species, or to improve water quality or supply reliability for water users. Another important characteristic of these proposals is the geographic location of the benefits. A number of the environmental benefits occur within the Sacramento-San Joaquin Delta. Other environmental benefits are targeted at the Delta's tributaries including the Sacramento River and the San Joaquin River and other rivers downstream of existing

Table 3 Primary Cultural Resource Permits/Compliance Issues

Federal
American Indian Religious Freedom Act of 1978 (42 USC 1996)
Archaeological and Historic Preservation Act of 1974 (16 USC 469)
Archaeological Resource Protection Act of 1979 (16 USC. 470)
Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48 CFR 44716)
Determination of Eligibility for Inclusions in the National Register of Historic Places (36 CFR Part 63)
National Historic Preservation Act of 1966(16 USC 470, Section 106)
National Register of Historic Places (36 CFR Part 60)
Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001)
Protection of Archaeological Resources: Uniform Regulations (43 CFR 7)
Protection of Cultural and Historic Properties (36 CFR Part 800)
Reclamation Cultural Resources Directives and Standards LND 02-01
Reclamation Cultural Resources Management Policy LND-P01
State
California Environmental Quality Act (Public Resources Code Sections 21083.2 and 21084.1, and Section 15064.5 of the CEQA Guidelines)
California Health and Safety Code (Section 7070.5(b))

reservoirs, recognizing the direct connections between tributary and estuarine health. Water supply reliability improvements are generally for State Water Project (SWP) and Central Valley Project (CVP) contractors or environmental uses (i.e., refuges). However, these reliability improvements could be directed to other beneficiaries, including other users such as local and regional water suppliers, tribes, or contractors of other systems if those entities become project participants.

Performance of the CALFED surface storage projects is measured using an operations simulation of the CVP and SWP systems, using the historic hydrologic sequence 1922-2003 run through a simulation model of the water projects (CALSIM II). CALSIM II provides detailed information related to operations of the system under with and without project conditions. Results are often reported with both average annual values and driest periods average annual values, reflecting the importance of performance under dry and drought conditions. Drought performance has become increasingly important, as water managers and decision-makers acknowledge challenges California will face with future drought conditions. This type of comprehensive analysis allows investigators to determine how much water from a proposed project will be used to meet needs that would not be met without the project. In addition, DWR and USBR have developed a suite of analytical tools that are used in a coordinated manner with the operations simulation to assess other important characteristics including Delta water quality, Sacramento River temperature, water quality, fishery effects, river meander, sediment transport, riparian success, and water resources economics. DWR, USBR, and other agencies have developed a Common Assumptions process that establishes a common set of analytical tools, operations, planning assumptions, and reporting metrics so that projects are evaluated with a common foundation.

In 2010, DWR, in coordination with Reclamation and Contra Costa Water District, published the CALFED Surface Storage Investigations Progress Report. Some detail associated with specific benefits is shown in Table 1, "CALFED Surface Storage 2010 Progress Report Benefits Summary." An initial

alternative from each investigation is described here and in Table 4, "CALFED Surface Storage 2010 Progress Report Cost Summary." These initial alternatives are not feasibility or environmental documentation alternatives and are not necessarily the preferred alternative. However, the initial alternatives described here are being and have been used to inform the formulation of alternatives for feasibility and environmental documents that are now in development. The Progress Report did not evaluate an In-Delta Storage initial formulation.

Consequently, a 2004 DWR State feasibility study report for the In-Delta Storage Program and a 2006 draft supplemental report is used for In-Delta information shown in the tables. No additional State or federal funding for the program has been received since 2006. Consequently, study results are not consistent with the Common Assumptions being used by the other CALFED Surface Storage Investigations. The In-Delta storage reports are available at http://www.water.ca.gov/storage/indelta/index.cfm.

Potential Costs

Costs have been estimated for an initial alternative for each of the CALFED Surface Storage Investigations. The costs shown in Table 4 reflect the same initial formulation as described in the Potential Benefits section above so that benefits and costs can be considered together. As noted previously, the initial formulations shown here are not necessarily the preferred alternative, but will be used to inform the alternatives that will be selected and analyzed in the environmental and feasibility planning documents. The investigations are also considering several cost-saving measures that have been identified in value engineering studies that may be incorporated into final formulations that are included in the feasibility and environmental documents. Costs and benefits are shown as they are reported in the 2010 Progress Report or the In-Delta reports.

The older In-Delta studies have not been updated to reflect same date comparisons of the four investigations reported on in the Progress Report. Table 4 shows the storage capacity and capital cost. Costs of the initial formulations shown range from $789 million to $3.6 billion. Costs would be allocated to benefits based upon the amount of project resources necessary to support each benefit type and the value of the benefits. Benefits provided to the public would be paid for by federal and/or State funding sources. The remaining portion of the cost of each project would then need to be paid for by local and regional water interests. In these initial formulations, the local and regional water interests are primarily considered to be the contractors of the CVP and SWP.

Major Implementation Issues

Climate Change

Climate models project that average temperatures are expected to continue to rise by the end of this century. With warmer temperatures, it is anticipated that a higher percentage of precipitation will fall as rain as snow levels rise, and snowpack is reduced. In the past few years, there has been a gradual shift in snowpack and runoff timing in California; runoff is now occurring earlier in the year than it has historically.

Table 4 CALFED Surface Storage 2010 Progress Report[a] Cost Summary

Investigation[a](Reservoir Initial Formulation Shown Here)	New Storage Capacity of Initial Project Formulation (taf)	Cost ($ million)
Los Vaqueros Expansion	115	N/A[b]
North-of-the-Delta Offstream Storage (Sites Reservoir)	1,800	$3,620
Shasta Lake Water Resources	634	$942
Upper San Joaquin Basin Storage (Temperance Flat RM 274)	1,260	$3,360
In-Delta Storage[c]	217	$789

Notes:

taf = thousand acre-feet

[a] Initial Investigation Formulations are from the 2010 CALFED Surface Storage Investigations Progress Report, unless noted, and are not feasibility or environmental document alternatives.

[b] Not available.

[c] In-Delta Storage information was compiled from 2004 Draft – State Feasibility Study and 2006 Supplemental Report of the In-Delta Storage Project.

Climate temperature models have a higher degree of certainty than precipitation models. Climate precipitation models project little change in precipitation in California before 2050 and projections past 2050 suggest even more uncertainty with either more or less precipitation. SWP and CVP operations are sensitive to precipitation changes and sea level rise, with projected effects to reservoir carryover storage levels, in-basin reliability for water management purposes, and Delta exports. Existing system vulnerabilities intensified by a changing climate will potentially reduce water management flexibility, supply, and delivery capability, including reduced Delta exports.

Adaptation

Much of the state's infrastructure was built to capture relatively slow spring runoff and deliver water during the summer and fall months. With anticipated changes to the snowpack, runoff timing, and sea level rise, increased surface storage would improve management flexibility by capturing more runoff as it occurs. Stored runoff would supplement existing storage by providing a buffer to meet water demand under drier or wetter future climate conditions. While surface storage has the potential to immediately address vulnerabilities such as water quality, ecosystem health, and supply reliability, additional surface storage will also allow the system to respond to future climate scenarios such as extreme drought periods and sea level rise. While uncertainties of the state's hydrologic future exist in current climate science, the current framework of understanding demonstrates the need for adaptive capacity and to address system vulnerabilities with additional surface storage.

Mitigation

Energy intensity of surface storage could be different depending on net energy input or energy used for construction and maintenance. Surface storage projects could also have some climate change impacts on watershed ecosystems and water quality related to greenhouse gas (GHG) emissions; however, these impacts are not well defined due to project-related uncertainty. Energy use and generation should be defined to evaluate energy benefit with hydropower and net energy production.

Management strategies discussed in this resource management strategy report can be used to avoid and minimize adverse impacts on climate change related to energy use and GHG emissions:

1. CALFED surface storage projects have the potential to reduce GHG emissions by maximizing the use of renewable energy sources and displacing the least efficient/highest emissions power plants. This can be done by using intermittent renewable energy sources (e.g., wind and solar) to pump water into storage when excess renewable energy is available and releasing stored water to generate electricity when renewable generation drops (e.g., night, calm wind conditions) or when energy demands peak.
2. Prioritizing future surface storage by assessing energy use and GHG emissions in the feasibility and environmental studies for three CALFED Surface Storage Investigations (NODOS, LVE, 10 and USJRBSI).
3. Evaluating potential project effects and related alternatives (upgrading existing projects or developing new projects) by using climate change mitigation and reducing GHG emissions as one of the project option selection criteria.
4. Identifying public benefits in surface storage for the State and federal investment in ecosystem service including carbon offset from riparian and wetland environments could have mitigation potential related to GHG emissions reduction.
5. Performing integrated planning with the Delta Plan, the California Water Plan (CWP) updates, and the BDCP as well as integrated regional water management (IRWM) with watershed management could provide long- term public benefits with water quality control, vegetation improvement, and ecosystem service, which could have mitigation potential related to carbon sequestration and reducing energy use and GHG emissions.
6. Planning project operations to achieve primary purposes of ecosystem restoration could provide potential benefits related to carbon sequestration and reducing energy use and GHG emissions.
7. Evaluating energy efficiency and GHG emissions with other water management options such as water use efficiency, water transfers, conjunctive management, desalination, and recycling could provide opportunities for climate change mitigation.

Effects

Implementation of new CALFED surface storage would affect environmental and human conditions, including economic effects to surrounding communities, as well as flow upstream and downstream of diversions and throughout California's water resources system. Some potential effects will be positive and some will be negative. Regulatory and permitting requirements, as listed previously, will require surface storage investigations to consider, for example, potential effects to streamflow regimes, water quality, stream geomorphology, fish and wildlife habitat, and risk of failure during seismic and operational events. In addition, agencies are developing analytical methodologies to determine GHG emissions and their contribution to climate change associated with project construction and operations. Mitigation of significant effects is required under State and federal environmental laws and is accomplished through implementation strategies that avoid, minimize, rectify, reduce over time, or compensate for negative effects.

Significant input from tribes, the public, and agencies have already been received by DWR and USBR related to effects associated with potential implementation. Additional input is anticipated as feasibility and National Environmental Policy Act/California Environmental Quality Act alternatives are developed and evaluated during the final phase of the investigations.

State and Federal Interests

A continuing essential task is the identification of State and federal interests in each of the investigations. DWR will identify public benefits (consistent with the description in the bond proposal) that warrant investment by the State. Similarly, USBR will continue to determine federal interest in projects as the federal feasibility studies are developed. In addition, DWR and USBR are working with stakeholders to identify which projects have the greatest local interest and possible willingness to pay for project costs. The CALFED Surface Storage Investigations will then use results of all these evaluations to develop federal-State-local partnerships with local and regional interests to continue refining alternatives development and plan formulations. Local and regional water entities have indicated a preference that the State and federal governments express some commitment to potential State and federal investments in the projects prior to their commitment. If partnerships are not formed (demonstrating lack of interest in advancing a project) and/or the outcome of technical and economic studies indicate any of the five projects are not feasible, then the State and/or federal governments may decide to defer future studies of specific projects.

Financing

Implementation of one or more CALFED surface storage projects would likely require multiple types of financing. The Safe, Clean, and Reliable Drinking Water Supply Act, scheduled for vote in 2014, could provide general obligation bonds to pay for the public benefits portion of CALFED surface storage projects. Repayment bonds could facilitate contractor (i.e., local agencies) participation in benefits to specific water users, as has been provided in the past. Local agencies may also develop their own financing. Federal participation in the projects would potentially make them much more effective. State and federal investment in developed water supplies dedicated to the restoration of the Delta and tributary ecosystems would give fish and wildlife managers new tools to revitalize these ecosystems proactively. Managers could then use these environmental water supplies to support water-required actions that would improve conditions for aquatic ecosystems and species that depend on them. These dedicated restoration supplies may prove an essential element in recovery of the Delta, its tributaries, and dependent species. State and federal fish and wildlife management agencies would have the task to manage restoration water supply assets proactively and adaptively. DWR and USBR understand that these agencies and the public will want assurances that projects will be operated in a manner to protect these potential public investments. The federal government may also invest in refuge water supplies or make a capital investment in water supplies for CVP contractors.

Recommendations to Facilitate CALFED Surface Storage Decision-Making

1. CALFED signatories and stakeholders should continue to prioritize work efforts to complete the feasibility and environmental studies of the surface storage investigations.
   A. As indicated in the funding discussion above, DWR is prioritizing future surface storage work to complete environmental documentation and feasibility analyses for three CALFED Surface Storage Investigations (NODOS, LVE, and USJRBSI). USBR is prioritizing work on four investigations (SLWRI, NODOS, LVE, and USJRBSI). Prioritization criteria include reviewing conclusions and recommendations from ongoing State and federal planning studies; determining federal, State, and local interest including willingness to pay;

evaluating benefits in light of the bond proposal; and assessing legal and logistical issues related to specific projects.

B. Engage more stakeholders and potential project participants in the process. The investigations should continue to work with tribes, the public, and agencies in identifying, evaluating, and quantifying potential project effects (i.e., both beneficial and negative effects).
C. Develop information on costs, effects, and how the projects could be operated for a variety of purposes.
D. Consider uncertain potential futures including alternative Delta conveyance and operations and climate change effects that allow potential participants to assess their interest in specific projects more fully.
E. Develop mechanisms to provide assurances that these projects should be operated in a manner consistent with the objectives.
F. Assess tribal, federal, State, and local interest in the investigations, including opportunities for State and federal investment in public benefits.
G. The investigations should coordinate with IRWM efforts.

2. DWR, USBR, other State and federal agencies, and local interests should continue coordination with related planning efforts including Delta Vision, the CWP Update, and the BDCP.
3. DWR and USBR should continue their development of conceptual finance plans that include descriptions of relevant State and federal financial policies and a determination of the potential for State and federal investment in benefits to the general public. The scenarios and finance plans may help facilitate potential investment discussions and then decisions by the public as well as local, regional, State and federal decision-makers.

Linkages to Other Strategies

The CALFED Surface Storage Investigations are inclusive of a number of other strategies in their formulations. As stated previously, ecosystem restoration and water quality are explicitly included as primary purposes of several investigations. Accomplishments related to ecosystem restoration and water quality are achieved by dedication of developed water to these purposes. Other strategies are included as secondary purposes of the surface storage investigations such as flood management and water-dependent recreation. A major conceptual component of these investigations is related to how these new facilities would be integrated into the existing water resources systems, especially the CVP and SWP systems. In each investigation, new storage integrated into these systems provides unique opportunities to provide benefits associated with system re-operation. In many cases, the existing facilities can be operated in a more efficient manner with additional storage. These re-operative approaches are described in greater detail in each investigation's most recent planning documents.

The CALFED Surface Storage Investigations are also incorporating many other strategies into their planning. For example, a cooperative and collaborative Common Assumptions process has led to agreed-upon assumptions associated with future strategy implementations including agricultural and urban water use efficiency, Delta conveyance, water transfers, conjunctive management, desalination, and recycled municipal water. The CALFED Surface Storage Investigations is one of just a few strategies that assume increased implementation of other strategies in its planning estimates shown in CWP. For example, the common assumptions include increased water use efficiency, water transfers, conjunctive management, desalination, and recycling. All of these strategies are assumed to be implemented in an integrated manner

with the potential CALFED surface storage projects. The Common Assumptions process and assumptions are described in each investigation's current planning documents.

California Water Plan Update 2005 and *California Water Plan Update 2009* provided a planning roadmap with two initiatives for achieving sustainable and reliable water supplies for California through 2030. The CALFED Surface Storage Investigations fall naturally in the Improve Statewide Water Management Systems initiative since the investigations seek to integrate with the CVP and the SWP, California's largest water systems. The second initiative, implementation of IRWM, is also essential to the future of California's water resources. Many purposes of the surface storage investigations need to be integrated with local and regional planning efforts. Ecosystem restoration, water quality, and improved regional and local supplies all need to be incorporated into local and regional planning. The new era approach by the CALFED Surface Storage Investigations is very similar to the approach now being promoted through IRWM.

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