SURFACE STORAGE

CALFED BAY-DELTA PROGRAM SURFACE STORAGE INVESTIGATIONS PROGRESS REPORT UPDATE MAY 2006

PREPARED FOR THE CALFED BAY-DELTA PROGRAM BY

CALIFORNIA DEPARTMENT OF WATER RESOURCES

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SURFACE STORAGE PROGRESS REPORT

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FOREWORD

California's population is growing by about 600,000 people a year, and forecasts indicate the State's population could increase from about 36 million to roughly 48 million by 2030[1]. As competition for limited water supplies intensifies, conflicts over how to allocate those supplies will worsen unless we change the way we manage our statewide water supply system. The CALFED Bay-Delta Program lays out the means for making fundamental improvement in the way we manage the system. These changes will allow for long-term water supply reliability, improvements in water quality, restoration of ecosystem and fishery resources, and levee stability.

In one of the most ambitious integrated water management plans in the nation, the CALFED Bay-Delta Program set forth objectives and actions to protect water quality and at-risk species, restore habitat in the San Francisco Bay-Sacramento-San Joaquin River Delta (Delta) and continue to meet the water needs of farms and cities. The CALFED Bay-Delta Program recognized early on that its plan must include the means for more fully integrating California's water supply system to provide more reliable water supplies and to meet competing needs. Specific potential storage projects are being carefully evaluated by the CALFED Bay-Delta program as one of the tools in California water resources management portfolio to help meet those needs.

We are now proceeding through the sixth year of implementation of the CALFED Bay-Delta Program, and the surface storage investigations have reached a critical milestone. With input from stakeholders and assistance from local agencies, the studies of the five surface storage projects identified in the CALFED Record of Decision (ROD) have advanced. The U.S. Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) have completed preliminary environmental impact studies and conceptual modeling scenarios based on general operational objectives. Now the studies must move toward a specific set of operational objectives to formulate detailed alternatives that can be used in decision-making processes.

Future efforts now hinge on the willingness of interested parties and stakeholders to participate and shape the alternative formulations that will be used to make decisions on these projects. A key Guiding Principle adopted by CALFED is to follow a benefits-based approach in developing cost allocations. The fundamental philosophy from the ROD is that costs, "to the extent possible, be paid by the beneficiaries of the program actions." [ROD, page 34] Evaluations to date demonstrate that the surface storage projects have the potential to provide both broad public benefits and local/regional benefits. The next steps in the planning process will include identifying the specific public benefits that will be evaluated in more detailed studies and working directly with potential participants to assess their needs and interests in specific surface storage projects.

1. State of California, Department of Finance, *Population Projections by Race/Ethnicity, Gender and Age for California and Its Counties* 2000-2050, Sacramento, California, May 2004.

INTRODUCTION

This report update, the third in a series of updates on the latest activities of the CALFED Storage Program, presents an overview of the major findings and status of each of the five storage studies. In addition, the report includes a comparable set of results from recent water supply reliability and water quality modeling. This modeling, except where noted, was performed using common model code and analysis protocols developed through the efforts of the Common Assumptions process. (For more about this process, see the *Developing Common Assumptions* section under *Common Considerations*.) The appendix contains brief descriptions of each of the studies, and a summary of accomplishments and analyses completed since the April 2004 storage progress report. Next steps for each of the studies are also described.

The intent of this third update is to:

- Provide information that will help potential project partners assess their interest in participating in the next steps of the storage investigations.
- Assist responsible agencies with decisions about future steps in the planning investigations for these projects.

MAJOR FINDINGS SINCE APRIL 2004

Following are the major findings of the five surface storage investigations since the first progress report, released in April 2004. *Table 1, Potential Primary Benefits of Surface Storage Projects,* summarizes potential benefits of each project modeled to date. More detail of potential benefits are included in the summaries of findings for each project. A comprehensive set of results is included in the *Interim Common Model Package, Modeling Protocol and Assumptions Technical Memorandum* (available online at: www.storage.water.ca.gov/public_docs.cfm). These findings are general in nature, since the modeling scenarios are based on simplified operational objectives and assumptions. To define more specific operational objectives Reclamation and DWR will work with interested parties to develop quantitative information about the timing and magnitude of deliveries or releases — along with other details — that would meet their water quality, fishery, ecosystem, and water supply needs. *Table 2, Preliminary Capital Cost Estimates for The Surface Storage Projects,* gives ranges of cost estimates for different project configurations.

TABLE 1. POTENTIAL PRIMARY BENEFITS OF SURFACE STORAGE PROJECTS

Potential Benefits		Shasta Lake Water Resources Investigation	North-of-the-Delta Offstream Storage	In-Delta Storage	Los Vaqueros Reservoir Expansion	Upper San Joaquin River Basin Storage Investigation[5]
		(difference from base condition)				
(SWP/CVP) Water Supply	Long-term average (TAF/year)[1]	40–85	90–260	50–77	0–13	24-183[6]
	Driest periods average (TAF/year)[2]	60–160	200–390	50–64	0–25	Not available
EWA Water Supply	Long-term average (TAF/year)	DNM[4]	0–124	14–28	117–143	DNM
	Driest periods average (TAF/year)	(EWA to be considered as a project objective in future studies)	0–147 (EWA water supply delivered to Delta inflow)	0 (EWA water supply delivered to San Luis Reservoir)	42–65 (Water provided by reducing pumping at Banks P.P. while maintaining SBA deliveries through LVE releases)	DNM
Releases for Improving Delta Water Quality	Long-term average (TAF/year)	DNM	20–210	35	DNM	DNM
	Driest periods average (TAF/year)	DNM	0–137	0	DNM	DNM
Water Quality Improvements		Did not conduct chloride analysis	+4% to -27% (Change in average Cl loading to Banks P.P. for Jul–Oct (1976–1991) period)	Did not conduct chloride analysis	-50% to -58% (Change in Sep–Nov long-term average Cl delivered to SBA contractors)	Did not evaluate water quality improvements
Water Supply for Rice Straw Decomposition & Level 4 Refuges in Sacramento Valley	Long-term average (TAF/year)	DNM	70–81	DNM	DNM	DNM
	Driest periods average (TAF/year)	DNM	0–37	DNM	DNM	DNM
Percent of Time Sacramento River at Bend Bridge exceeds 56° Fahrenheit (Apr–Sep)	Long-term	-3% to -7%	DNM	DNM	DNM	DNM
Early Life Stage Winter-run Salmon Mortality in Sacramento River	Dry & Critical Periods	-0.3% to -1.4%	DNM	DNM	DNM	DNM
Early Life Stage Spring-run Salmon Mortality in Sacramento River	Dry & Critical Periods	-1% to -9%	DNM	DNM	DNM	DNM
Net Change in Power Generation	Long-term average (GWh/year)	10 to 40	Did not conduct energy production modeling	Did not conduct energy production modeling	Did not conduct energy production modeling	0 to -216[6]
Reduction in Sacramento River Diversions (Apr–Aug)	Long-term average (TAF/year)	DNM	170–230	DNM	DNM	DNM
	Driest periods average (TAF/year)	DNM	115–235	DNM	DNM	DNM
Provide Spring Flows for Cottonwood Establishment (Provided by Shasta through Coordinated Operations)	8-year average TAF/year (8 years out of 73 years)	DNM	0–460	DNM	DNM	DNM
Provide Fall Stability Flows below Keswick Dam (Provided by Shasta through Coordinated Operations)	Long-term average (TAF/year)	DNM	0–120	DNM	DNM	DNM

1. Long-term average is the average quantity for the period of Oct 1922–Sep 1994.
2. Driest periods average is the average quantity for the combination of periods of May 1928–Oct 1934, Oct 1975–Sep 1977, and Jun 1986–Sep 1992.
3. The range of benefits for each project reflects the various operational scenarios and storage options being investigated.
4. DNM — Did Not Model as a primary project objective.
5. Did not model with the Common Assumptions Progress Report Common Model Package.
6. Long-term average is the average quantity for the period of October 1922–September 1999.

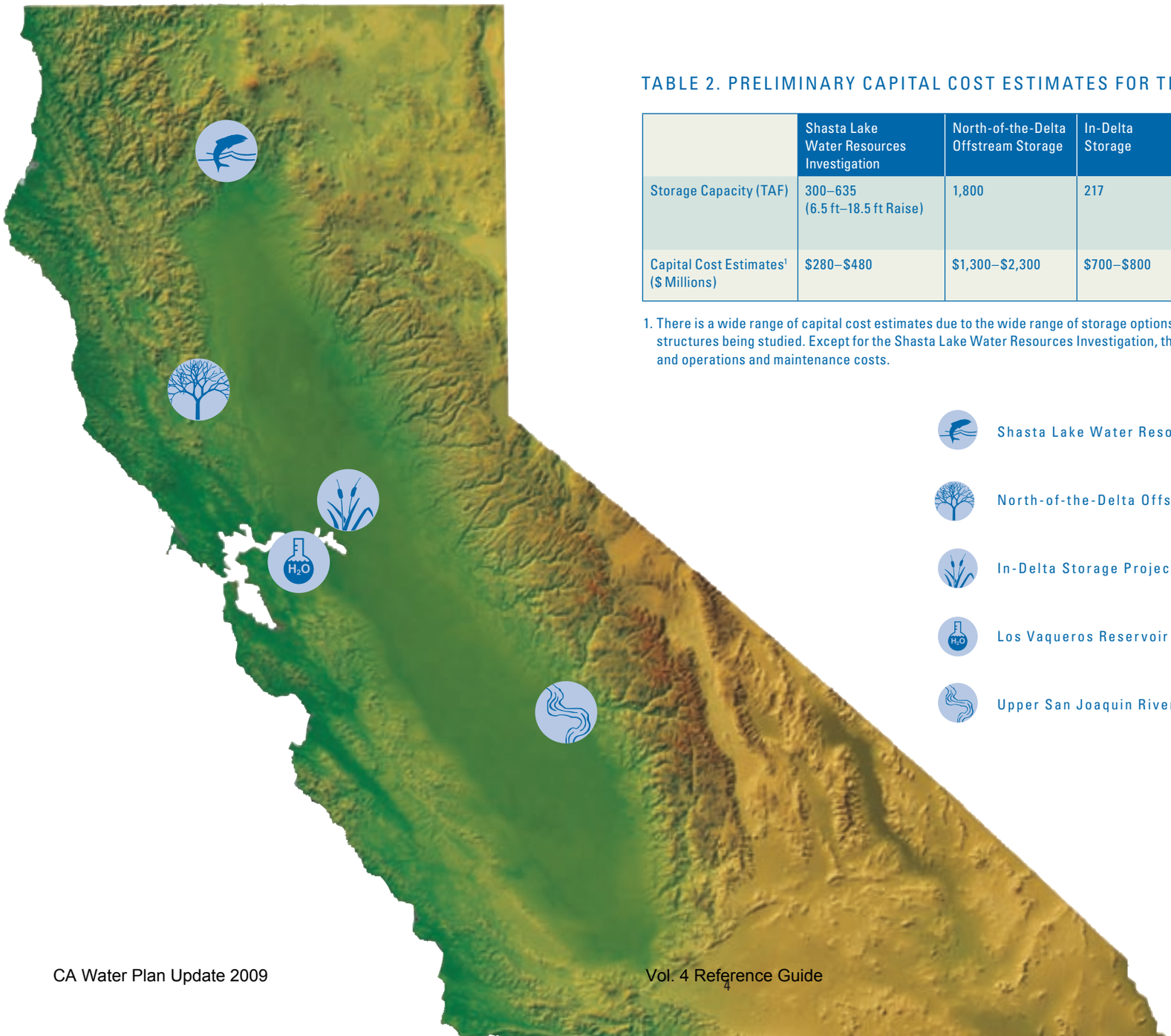


TABLE 2. PRELIMINARY CAPITAL COST ESTIMATES FOR THE SURFACE STORAGE PROJECTS

	Shasta Lake Water Resources Investigation	North-of-the-Delta Offstream Storage	In-Delta Storage	Los Vaqueros Reservoir Expansion	Upper San Joaquin River Basin Storage Investigation
Storage Capacity (TAF)	300–635 (6.5 ft–18.5 ft Raise)	1,800	217	200–400 (Range of expansion)	130–1,310 (Range of storage options)
Capital Cost Estimates[1] ($ Millions)	$280–$480	$1,300–$2,300	$700–$800	$870–$1,500	$220–$1,000

1. There is a wide range of capital cost estimates due to the wide range of storage options, conveyance facilities, and appurtenant structures being studied. Except for the Shasta Lake Water Resources Investigation, the cost estimates do not include pumping and operations and maintenance costs.

- Shasta Lake Water Resources Investigation
- North-of-the-Delta Offstream Storage
- In-Delta Storage Project
- Los Vaqueros Reservoir Expansion
- Upper San Joaquin River Basin Storage Investigation

SHASTA LAKE WATER RESOURCES INVESTIGATION

Expanding storage in Shasta Lake can increase the cold water available to maintain lower Sacramento River temperature and improve water supply reliability for other beneficial uses.

Raising Shasta Dam 6.5 feet would enlarge Shasta Reservoir by 290 thousand acre-feet (TAF) and could improve the average annual water supply reliability by about 40 TAF/yr long-term[2] and 60 TAF/yr during the driest periods.[3]

Raising Shasta Dam by 18.5 feet would provide about 630 TAF of additional storage and could improve the average annual water supply reliability by about 85 TAF/yr long-term and 160 TAF/yr during the driest periods.

Model runs of three scenarios showed that raising Shasta Dam by 6.5 feet and 18.5 feet could also decrease the amount of time the river temperatures at Bend Bridge exceed 56 degrees between the April to September timeframe by approximately 3 and 7 percent, respectively. The 6.5 foot and 18.5 foot raises can also decrease mortality during the early life stage of spring run salmon in the upper Sacramento River during dry and critical periods by 1 percent and 9 percent respectively, and for winter run salmon by 0.3 to 1 percent, respectively.

TABLE 3. POTENTIAL PRIMARY BENEFITS OF SHASTA ENLARGEMENT

		Scenario 1 (6.5 ft Raise) (Water Supply)	Scenario 2 (18.5 ft Raise) (Water Supply)	Scenario 3 (18.5 ft Raise) (Water Supply and anadromous fish)
		(difference from base condition)		
Total water supply (CVP/SWP)	Long-term average (TAF/year)	40	69	85
	Driest periods average (TAF/year)	60	127	160
Percent of time Sacramento River temperature at Bend Bridge exceeds 56° Fahrenheit (Apr–Sep)	Long-term	-3.0%	-6.7%	-6.9%
Early life stage salmon mortality in Sacramento River (winter run)	Dry & critical	-0.3%	-1.4%	-0.4%
Early life stage salmon mortality in Sacramento River (spring run)	Dry & critical	-1.0%	-9.0%	-6.2%
Net increase in CVP energy production (GWh/year)	Long-term average	10	40	30

Raising Shasta Dam by 6.5 feet could increase the long-term net CVP energy production by up to 10 gigawatt hours/year. Raising Shasta Dam by 18.5 feet could increase the long-term net CVP energy production by up to 40 gigawatt hours/year.

2. Long-term is the average for the period from October 1922–September 1994.
3. Driest periods are the average for the periods of May 1928–October 1934, October 1975–September 1977, and June 1986–September 1992.

NORTH-OF-THE-DELTA OFFSTREAM STORAGE

Results of the CALSIM II and DSM2 runs demonstrated that North-of-the-Delta Offstream Storage (NODOS) could provide improved water supply reliability for Sacramento Valley water users as well as SWP and CVP contractors; provide Level 4 water supply for Sacramento Valley wildlife refuges; provide water for rice straw decomposition in the Sacramento Valley; improve Delta water quality; reduce diversions from the Sacramento River during critical fish migration periods; contribute to Sacramento River ecosystem restoration objectives; and provide water and storage for the Environmental Water Account (EWA).

Modeling runs of four example scenarios showed that NODOS could provide an average annual total water supply benefit of 310 TAF to 470 TAF/yr long-term and 315 TAF to 440 TAF/yr during the driest periods. The total water supply benefits include water for the EWA. An average annual water supply of 124 TAF/yr long-term and 147 TAF/yr during the driest periods can be provided for the EWA. The quantity of water supply provided for EWA is limited by EWA's north of Delta purchase goals.

The average chloride loading at Banks Pumping Plant for July to October (1976–1991) varied between an increase of up to 4 percent and a decrease by as much as 27 percent, depending on the operational scenario.

With operational flexibility created by NODOS, diversions from the Sacramento River at Glenn-Colusa Irrigation District and Tehama-Colusa Canal intakes could be reduced during April through August by 170 TAF to 230 TAF/yr long-term and 115 TAF to 235 TAF/yr during the driest periods to protect fish migration.

Through coordinated operations of Sites and Shasta Reservoir, an average annual release of 120 TAF/yr long-term and during the driest periods could be provided from Shasta to maintain fall stability flows in the upper Sacramento River, and an average annual release of 460 TAF/yr could be provided in the spring of wet years to help improve cottonwood establishment in 8 years out of the 73-year simulation period.

TABLE 4. POTENTIAL PRIMARY BENEFITS OF NORTH-OF-THE-DELTA OFFSTREAM STORAGE

	(TAF/year)	Scenario 1 (Water Supply)	Scenario 2 (Water Quality)	Scenario 3 (Environmental)	Scenario 4 (Environmental and EWA)
		(difference from base condition)			
Water supply (CVP/SWP)	Long-term average	259	177	220	87
	Driest periods average	392	294	314	203
EWA water supply delivered to Delta inflow	Long-term average	DNM	DNM	DNM	124
	Driest periods average	DNM	DNM	DNM	147
Water supply for rice straw decomposition & Level 4 refuges	Long-term average	80	81	69	75
	Driest periods average	29	12	0	37
Release for improving Delta water quality	Long-term average	39	213	19	32
	Driest periods average	14	137	0	9
Total Water Supply Benefits	Long-term average	378	471	308	318
	Driest periods average	435	443	314	396
Change in average chloride loading to California Aqueduct for Jul-Oct (1976–91)		3%	-27%	4%	1%
Spring flows for cottonwood establishment (provided by Shasta through coordinated operations)	Long-term average	DNM	DNM	460 (provided in 8 out of 73 years)	460 (provided in 8 out of 73 years)
Provide fall stability flows below Keswick for Oct–Dec (provided by Shasta through coordinated operations)	Long-term average	DNM	DNM	120	120
Reduction in Sacramento River diversions (Apr–Aug)	Long-term average	175	234	173	189
	Driest periods average	184	235	121	116

DNM — Did Not Model as an objective in the scenario.

IN-DELTA STORAGE PROJECT

The In-Delta Storage Project (IDSP) could provide water supply reliability, operational flexibility, conjunctive use opportunities, water quality improvements, wildlife and habitat improvements and seismic stability. Based on the Common Assumptions modeling criteria and the additional State Water Resources Control Board (SWRCB) Decision 1643 (D1643) requirements, average annual water supply benefits for the four operational scenarios vary from 77 TAF to 112 TAF/yr for the long-term and from 50 TAF to 64 TAF/yr during the driest periods. Other storage projects being studied for the CALFED Bay-Delta Program have not yet been assigned their own operational requirements similar to D1643 for IDSP. While final operational requirements would be unique to any particular storage proposal, it is interesting to note that the IDSP could deliver about 100 TAF/year additional average annual water supply benefits if it was not required to operate under the D1643 constraints.

Recent court decisions have put into question the water right permits issued by the SWRCB under water right Decision 1643. These conditions may change as a new water right decision is sought by the project proponent.

TABLE 5. POTENTIAL PRIMARY BENEFITS OF IN-DELTA STORAGE

	(TAF/year)	Scenario 1 (Water Supply)	Scenario 2 (Water Quality and EWA)	Scenario 3 (Water Supply, EWA, and ERP)	Scenario 4 (Water Supply, EWA and Water Quality)
		(difference from base condition)			
Water supply (CVP/SWP)	Long-term average	77	73	52	63
	Driest periods average	64	61	51	49
EWA water supply delivered to San Luis Reservoir	Long-term average	DNM	26	28	14
	Driest periods average	DNM	0	0	0
Water supply for ERP actions	Long-term average	DNM	DNM	19	DNM
	Driest periods average	DNM	DNM	0	DNM
Release for improving Delta water quality	Long-term average	DNM	DNM	DNM	35
	Driest periods average	DNM	DNM	DNM	0
Total Water Supply Benefits	Long-term average	77	99	99	112
	Driest periods average	64	61	51	49

DNM—Did Not Model as an objective in the scenario.

The water quality data collected during the 2004 Upper and Lower Jones Tract flood indicates that the increase in organic carbon at Banks, Tracy, and Contra Costa intakes due to organic carbon contribution from Jones Tract is within the acceptable drinking water quality standards.

LOS VAQUEROS RESERVOIR EXPANSION

Completed operational studies show that the Los Vaqueros Expansion (LVE) project with 500 TAF of total storage could contribute to meeting the CALFED Bay-Delta Program's water quality, water supply reliability and ecosystem restoration objectives while meeting the Contra Costa Water District (CCWD) participation principles. LVE could also meet the drought supply needs of agencies served by the South Bay Aqueduct (SBA).

A multi-purpose reservoir would provide maximum benefits if operated to provide water supply reliability benefits in very dry years, and provide EWA benefits in all years with the greatest quantities available in wetter years.

Through a combination of increased pumping from the Delta during periods of excess flow and a reduction in the need to blend in many years, an additional 189 to 249 TAF can be delivered, on average, during the 1928–34 and the 1986–92 droughts.

An average annual of 120 TAF/yr long-term, 47 TAF/yr during the driest periods, and 180 TAF/yr in wet years could be provided for the EWA by reducing pumping at Banks Pumping Plant while maintaining SWP deliveries to the SBA through releases from an expanded Los Vaqueros Reservoir.

LVE could allow better quality water (28 percent improvement in chloride concentration) to be delivered to the SBA in critical years during the winter and early summer months.

LVE could improve the delivered water quality to the SBA (by 60 percent in chloride concentration) in all water year types during late summer and early fall months.

TABLE 6. POTENTIAL PRIMARY BENEFITS OF LOS VAQUEROS RESERVOIR EXPANSION

	(TAF/year)	Scenario 2 (Environmental Water/ SBA Water Quality)	Scenario 3 (SBA Water supply Reliability/Environmental Water/SBA Water Quality)	Scenario 4 (SBA & CCWD Water Supply Reliability/ Environmental Water/ SBA Water Quality)
		(difference from base condition)		
Total water supply (CVP/SWP)	Long-term average	0	8	13
	Driest periods average	0	17	25
EWA water supply (TAF/year)	Long-term average	143	123	117
	Driest periods average	65	49	42
Total Water Supply Benefits	Long-term average	143	131	130
	Driest periods average	65	66	67
Improvement to water quality (chloride) delivered to the SBA SWP Contractors during the Sep thru Nov period long-term		-58%	-52%	-50%
Additional total water supply for Bay Area users during a six-year drought (TAF)		0	189	249

UPPER SAN JOAQUIN RIVER BASIN STORAGE INVESTIGATION

Unlike the other four storage projects, the Upper San Joaquin River Basin Storage Investigation (USJRBSI) is not formulated for Delta exports.

The primary objectives for the USJRBSI are to develop and manage water supplies to:

- Contribute to restoration of the San Joaquin River
- Improve water quality of the San Joaquin River
- Facilitate additional conjunctive management and water exchanges that improve the quality of water deliveries to urban communities

Water supply developed by new storage in the Upper San Joaquin River Basin could be used for various combinations of the primary objectives.

Table 7 shows the potential primary benefits of USJRBSI that was evaluated in the *USJRBSI Initial Alternatives Information Report (June 2005)*. These new water supply estimates are based on single-purpose analyses designed to estimate the availability of new water supplies for river uses (restoration or water quality) and water supply for canal uses. The analyses were performed using a screening model (spreadsheet simulation model that represents the operations of Friant Dam and Mendota Pool) developed specifically for the initial alternatives evaluation. When the Plan Formulation Report Common Model Package is completed and the CALSIM II model will have dynamic representations of Friant operations, the USJRBSI will evaluate multiple-purpose operational scenarios using CALSIM II and analyze the water supply benefits and CVP/SWP system-wide operational responses.

The following is a description of the USJRBSI's major findings since the publication of the first Progress Report:

- Southern California Edison (SCE) and Pacific Gas & Electric (PG&E) provided several options upstream of Redinger Lake to avoid impacts to their existing hydropower facilities. The study team has been evaluating these options. The options may provide a significant hydropower benefit, but appear to provide minimal water supply benefits.
- Estimating power generation and loss based on potential impacts and development of replacement power options to mitigate impacts has been a focus of recent studies. While no new net energy could be developed, one option may provide full replacement power.

TABLE 7. POTENTIAL PRIMARY BENEFITS OF UPPER SAN JOAQUIN RIVER BASIN STORAGE INVESTIGATION[1]

Reservoir Site	Gross Pool Elevation (feet above msl)	New Storage Capacity (TAF)	Average New Water Supply[2] (TAF/year)[3]
Raise Friant Dam 25 ft	603	130	24 – 29
Fine Gold Reservoir	1,020	400	65 – 78
	1,110	800	113 – 136
Temperance Flat RM 274	985	1,310	165 – 183
Temperance Flat RM 279	900	450	86 – 103
	985	725	122 – 146

1. The potential new water supply was evaluated in the USJRBSI Initial Alternatives Information Report (June 2005). The evaluations did not use the Common Assumptions Progress Report Common Model Package. They were performed using a screening model developed specifically for the initial alternatives evaluations.
2. Based on single-purpose analysis for water supply reliability or contribute to San Joaquin River restoration or water quality improvements.
3. Based on long-term average for the period from October 1922–September 1999.

CONSIDERATIONS AND NEXT STEPS

Most of the potential benefits for each storage project have been explored and described. Much of the work over the next year for the surface storage investigations will focus on defining more specific project alternatives, and conducting more refined analyses of the likely results under each alternative formulation. Three important considerations will be addressed as the work continues:

- Optimize the use of available and expected funding.
- Maintain consistent assumptions and comparable analytical methods between each project investigation to allow reasonable comparisons by decision makers.
- Define specific project formulations that best describe the potential local, State and Federal interest in these projects.

Common Considerations

Funding

As one might expect in California's current economic climate, there is some uncertainty as to the amount and timing of future funding for completing the surface storage investigations. This fact requires the surface storage investigation study teams to continue to monitor progress of the investigations and periodically reevaluate how to proceed given the expected availability of funds over the next several years. There is ample funding for the work scheduled for this year, but there are not sufficient dedicated funds to successfully complete all desired studies for all five projects.

California's Proposition 50 provided State funding for surface storage investigations. In October 2004, the President signed the Water Supply Reliability and Environmental Improvement Act, Public Law 108-361, reauthorizing the CALFED Bay-Delta Program. PL108-361 reaffirms Federal feasibility study authorization for four of the five storage investigations (Shasta Lake Water Resources Investigation (SLWRI), NODOS, LVE, and USJRBSI).

TABLE 8. SURFACE STORAGE FUNDING TARGETS AND UNMET NEEDS

Project	Funding Targets[1]	Available Funding Sources ($ in Millions)			Unmet Needs
		State[2]	Federal[3]	Total Available Funds	
North-of-the-Delta Offstream Storage	$ 11.40	$ 7.40	$ 1.80	$9.20	$ 2.20
Shasta Lake Water Resources Investigation	$ 9.20	$ 0.00	$ 8.00	$ 8.00	$ 1.20
In-Delta Storage[4]	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Los Vaqueros Reservoir Expansion	$ 13.90	$ 5.10	$ 5.20	$ 10.30	$ 3.60
Upper San Joaquin River Basin Storage Investigation	$ 13.00	$ 3.00	$ 6.50	$ 9.50	$ 3.50
TOTAL	$ 47.50	$ 15.50	$ 21.50	$ 37.00	$ 10.50

1. Total remaining funding needed over the 10-year Plan.
2. Remaining Prop 50 funds available in Fiscal Year 2006 and beyond.
3. Included Fiscal year 2006 appropriations and the President's FY 2007 budget.
4. State Legislature did not provide funding for IDSP in FY 2006 and is not expected to in future years. As a result, study on IDSP has been suspended.

In December 2004, the California Bay-Delta Authority (Authority) approved a Finance Plan that includes funding and cost-sharing targets for each of the CALFED Bay-Delta Program's elements.[5] The Finance Plan spans ten years — 2005 through 2014. Table 8, updated from the Final Finance Plan (January 2005), shows the funding targets for completing four of the five surface storage investigations, the current proposed division of available funding by project, and the unmet needs.

An estimated $15.5 million remains available from Proposition 50 bond proceeds to support surface storage investigations in the current fiscal year and beyond. The Federal budget for this fiscal year and the President's proposed budget for next year amount to approximately $21.5 million, leaving an unmet need of $10.5 million. Any future Federal appropriations will reduce this need further.

Other efforts are underway to address uncertainties around future funding. DWR has prioritized its work efforts to focus resources on identifying the most viable projects and project tasks. DWR and Reclamation will work cooperatively to evaluate projects using information in the Federal Initial Alternatives Information Reports (IAIRs) and the other feasibility or environmental studies and reports. The Common Assumptions effort is developing information that will allow the projects' performance, costs, and benefits to be compared using a consistent approach, and will inform decisions about ongoing project priorities.

In addition, DWR and Reclamation are working with stakeholders to identify which projects currently attract the greatest local interest along with a potential willingness to pay for some of the project costs. Based on the local interest expressed, the CALFED Storage Program plans to develop partnerships with stakeholders to define a set of specific plan formulations that show the most promise. If there are no willing partners for a particular project (demonstrating lack of interest in advancing a project) when technical studies are completed and/or the results of technical and economic studies indicate any of the five projects are not feasible in the near future, the State may decide to defer future studies of specific projects. If additional funds are not available in the future, one or more of the studies will likely be delayed or ceased to insure that complete analyses can be done on the most promising projects.

Delta Conveyance (South Delta Improvements Program)

The objectives of South Delta Improvements Program (SDIP) are to improve water supply for south Delta agriculture, improve fish protection, and increase the amount and reliability of water supply for the State Water Project and Central Valley Project. The SDIP has two major components: a physical/structural component and an operational component. The physical/structural component includes the construction and operation of permanent operable gates at up to four locations in south Delta channels to protect fish and meet the water level and water quality needs for local irrigation diversions. The operational component considers increasing the permitted pumping capacity at Banks Pumping Plant from 6,680 cfs to 8,500 cfs during certain periods.

The surface storage projects will evaluate the effects of the operational component of SDIP on the operations of the storage projects in the Plan Formulation Report and Feasibility Study phases through the Common Assumptions effort and individual project assessments.

5. With respect to Federal funding for the entire CALFED Bay-Delta Program, Reclamation in a letter dated January 25, 2005, to The Authority, stated their concerns over "the proposed cost allocations for projects identified in the [Finance] Plan not being consistent with current Federal law, and which may not be consistent with allocation proposed by Reclamation in the future." Also, "…the estimates in the Plan far surpass the ceiling for new Federal appropriations authorized by the Act." Reclamation stated it's committed to continue working with the Authority and the other CALFED agencies and stakeholders as we work through the difficult task of financing the Program.

Developing Common Assumptions

DWR, Reclamation, and the Authority initiated the Common Assumptions process to develop consistency and improve efficiency among the surface storage investigations. While each of the investigations addresses a unique purpose to meet different combinations of water supply and water quality needs, all of the surface storage investigations share some common requirements including completing planning reports and feasibility studies and the associated alternatives analyses to comply with the California Environmental Quality Act (CEQA), NEPA, and Clean Water Act Section 404 requirements. To complete the planning, environmental documentation and permitting process each project team through the Common Assumptions effort must:

- Define the CEQA (existing) and NEPA (future no-action) conditions
- Characterize likely impacts of the proposed project and alternatives
- Define and assess the cumulative impacts of the proposed projects when combined with other expected projects

The Common Assumptions teams have been developing a set of common tools and consistency protocols among the surface storage investigations. To date, the accomplishments of the Common Assumptions effort include:

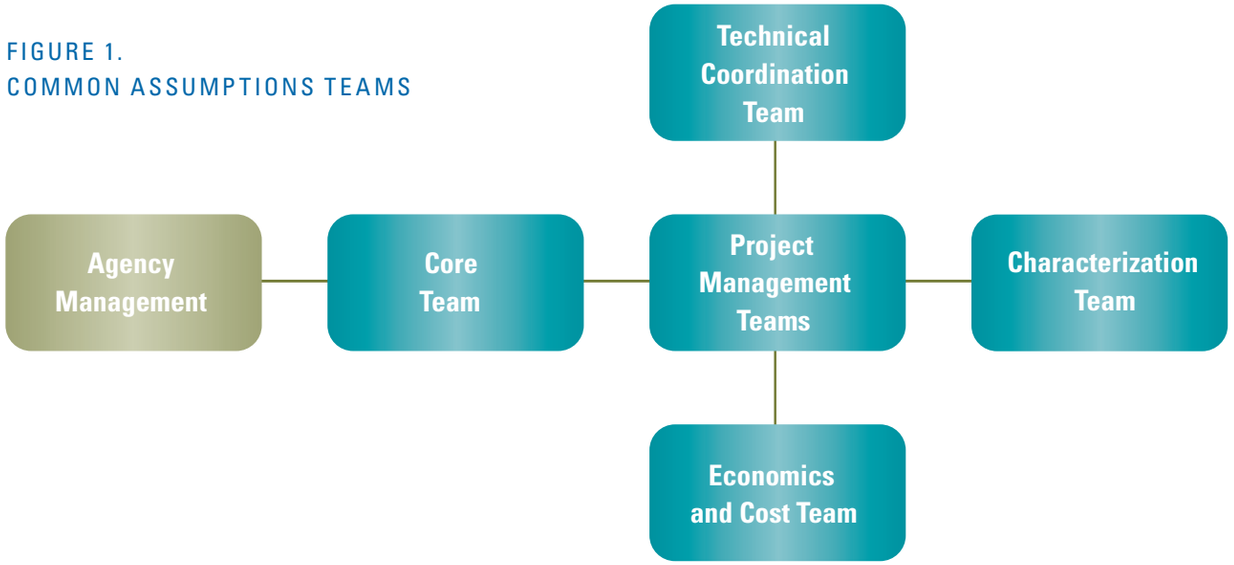
- Developed CALSIM II and DSM2 (Progress Report Common Model Package) common baseline runs for use by the surface storage investigations to support this Progress Report. This is the first time that a common model package (including common tools, inputs, and assumptions) has been developed for use by the surface storage investigations. Prior to the Common Model Package, projects used different baseline runs and assumptions. For example, some projects assumed 8,500 cubic feet per second (cfs) capacity at Banks Pumping Plant while others assumed 6,680 cfs. For this report, all the investigations assumed 8,500 cfs capacity at Banks Pumping Plant.
- Developed consistent model structure and simulation steps that CALSIM II utilizes to analyze and apply the SWCRB D1485, D1641, Joint-Point-of-Diversion (JPOD), and the Central Valley Project Improvement Act (CVPIA) (b)(2) programs.
- Identified and resolved numerous technical and policy issues related to CALSIM II and DSM2 runs of project scenarios for supporting this Progress Report.
- Developed common reporting metrics for reporting CALSIM II and DSM2 model results. The common reporting metrics provide a basis for comparing or contrasting the performance of the storage projects.
- Initiated characterization of conservation, local supply projects, recycling, transfers, desalination, and conjunctive use for inclusion in future common model packages.
- Initiated review and upgrade of the Least Cost Planning Simulation Model (LCPSIM), an economics optimization model for urban water management options and the Central Valley Production Model (CVPM) and California Agricultural Production Model (CALAG), both agricultural economic models. The Economics and Cost Estimation Team will determine if these models should be used as the common economic models for the surface storage investigations.

- Completed review of project cost estimation procedures and guidelines of DWR and Reclamation. The Economics and Cost Estimation Team will compile and compare cost estimation guidelines from DWR, Reclamation, and U.S. Army Corps of Engineers.
- Developed common reporting metrics for agricultural economics, municipal and industrial (M&I) water supply and water quality, flood damage, recreation, ecosystem, hydropower, and regional economics.

The Common Assumptions effort has established a number of teams to address different areas required to develop consistency among the individual storage studies. Attaining consistency in modeling assumptions and analytical approach will allow the surface storage projects' performance, costs, and benefits to be compared and will inform decisions about project prioritization. The Common Assumptions process also makes more efficient use of limited technical resources. The Common Assumptions teams provide:

- Coordination to facilitate the resolution of study issues
- Coordination with other ongoing activities such as the California Water Plan Update and CALFED's Water Use Efficiency Program

FIGURE 1.
COMMON ASSUMPTIONS TEAMS



- Development of technical tools and coordination of the use among the surface storage investigation study teams
- Briefings to the Bay-Delta Public Advisory Committee's Water Supply Subcommittee (WSS) and its technical representatives

Following is an overview of the Common Assumptions teams:

The Core Team comprises management representatives from DWR, Reclamation, and the Authority. This team provides overall direction to the common assumptions process.

The Technical Coordination Team is working on the refinement and development of common systems operations models including CALSIM II and DSM2. This team is focusing on the following areas:

- Consistent application of operations models
- Development of common systems operations reporting metrics
- Consistency in use of models and validation of consistency of modeling results
- Development of work plans and schedules for future common model packages

The Economics and Cost Team is working on the refinement and development of common economics models and cost estimation methodology. This team is currently focusing on the following areas:

- Review and refinement of the LCPSIM structure and assumptions; LCPSIM is an economics optimization model for urban water management options
- Review and refinement of other models if appropriate
- Compilation and comparison of engineering cost estimation guidelines from Reclamation, DWR, U.S. Army Corps of Engineers
- Consistent application of LCPSIM and CVPM, two agricultural production economic models
- Development of common economics and costs reporting metrics
- Review and update CVPM and CALAG

The Characterization Team is working on characterization and quantification of transfers, conservation, recycling, conjunctive use, and other local supply projects. This team is currently focusing on the following areas:

- Gathering information from agencies and water districts
- Translating information for incorporation into system operations and economics models
- Developing a broadly supported methodology for quantifying future conditions including future demands that represent potential changes in groundwater use, water transfers, and water use efficiency actions

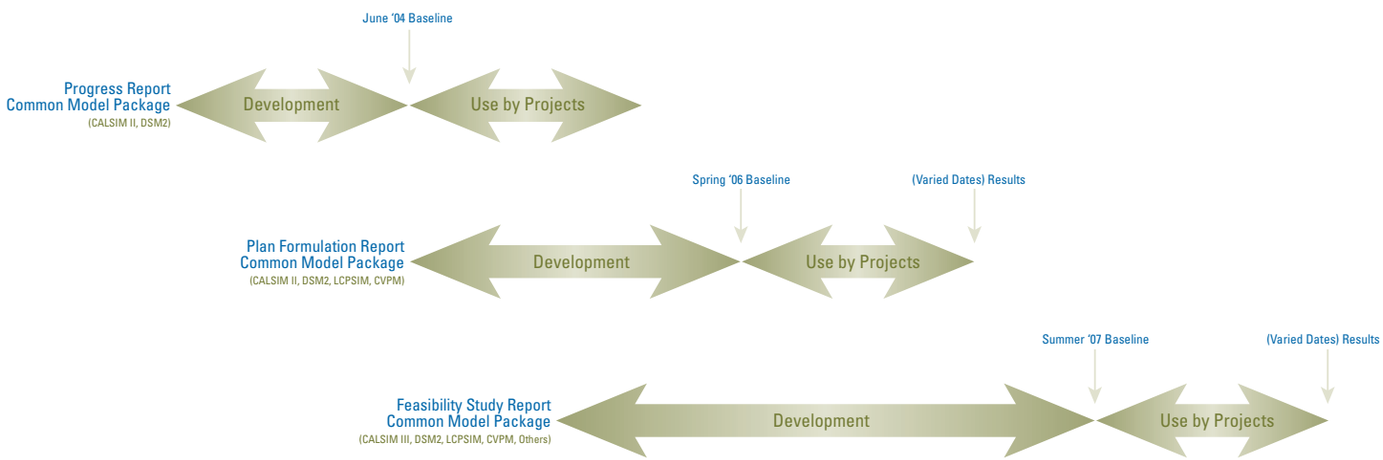
The Project Management Teams apply common tools, methodology, and assumptions to analyses of individual projects.

The recommended strategy for the remainder of Stage 1 implementation is to continue the development of common assumptions by:

- Refining models in a series of logical steps consistent with the surface storage investigation planning timelines (see Figure 2)
- Maintaining buy-in of project management teams
- Staging work to maintain study schedules for each of the individual storage projects
- Obtaining stakeholder review and input and seeking broad-based support for the technical approach, methods, and data

Three common model packages will be developed by the Common Assumptions effort to support different phases of the storage investigation. Each model package will consist of a set of analytical tools representing the future no-action condition. The Progress Report Common Model Package has been used for this report (see Figure 2). This package includes CALSIM II and DSM2. The next package, which is planned to be completed in Spring 2006, will be the Plan Formulation Report Common Model Package (PFRCMP). It will include CALSIM II, DSM2, LCPSIM, CVPM and a method for linking them. In the PFRCMP, CALSIM II will incorporate operations rules and mathematical algorithms of the Friant Dam and Mendota Pool from the screening model developed for use in the USJRBSI *Initial Alternatives Information Report* to allow for comprehensive analysis of storage alternatives of the USJRBSI and identify system-wide effects of changed operations of the Upper San Joaquin River system during the plan formulation stage. The final package, planned to be completed in Summer 2007, is the Feasibility Study Report Common Model Package. It will be used for the feasibility analysis and NEPA/CEQA environmental documentation and include the models identified above, and possibly others.

FIGURE 2.
COMMON ASSUMPTIONS COMMON MODEL PACKAGE DEVELOPMENT TIMELINE



Defining Specific Project Alternatives

One of the next key steps in the surface storage planning process is to define specific project alternatives that meet the requirements of Federal, State, and local participants. Formal project alternative definitions require identifying and solving specific problems and needs. To date, Reclamation and DWR have developed an array of informative modeling scenarios for the five surface storage investigations. To develop project alternatives, additional detail will be needed to describe the specific goals of potential Federal, State, and local participants.

The CALFED Storage Program is refining project alternatives and evaluating the level of potential participants' interests. The Federal planning process is being used to determine if a Federal interest exists for a specific project. (Federal interest is defined as whether a commitment of Federal resources will contribute to the overall benefit of the Nation.) This process includes preparing up to three reports (the Initial Alternatives Information Report, Plan Formulation Report, and Federal

Feasibility Study Report). Each subsequent report increases in detail and specificity to determine if a workable solution to identified problems and needs can be developed and implemented. The Federal Feasibility Study includes an iterative planning and decision making process that documents decisions and recommends a specific plan to Congress for implementation[6]. The Federal Feasibility Study includes technical studies, a benefit and cost analysis, cost allocation estimates, non-Federal sponsor commitments, and preparation of a planning report and appropriate environmental compliance documentation.

Reclamation and DWR have completed the IAIR for the SLWRI, LVE, and USJRBSI and expect completion of the NODOS IAIR by Spring 2006. DWR has also completed a Draft State Feasibility Study for IDSP. To complete feasibility analyses for each project, alternatives that include the interests of all participants must be evaluated.

Results from initial investigations strongly suggest that additional surface storage can contribute to broad public benefits in several ways. More specific descriptions of these public objectives and benefits will be explored with other State and Federal resource agencies during the coming year.

In addition, Reclamation and DWR are working directly with potential participants by performing studies requested by potential participants and are providing information to potential participants as they perform their own evaluations to determine if the surface storage projects can contribute to meeting their specific water resource needs. This Progress Report is intended to serve as a guide to help potential participants learn more about how the five projects might serve their specific urban, agricultural, environmental water supply and water quality needs.

Reclamation and DWR have begun environmental documentation on three of the projects (NODOS, Shasta Lake Enlargement, and USJRBSI). Reclamation is working with CCWD (CEQA lead) on the environmental documentation for LVE. Work on IDSP has been suspended. These documents are being prepared concurrently with the Federal planning process. However, until specific alternatives are defined, detailed impact analyses cannot be completed. The next steps in the planning process will include identifying each surface storage project's broad public benefits and working directly with potential participants to assess their needs and interests in specific surface storage projects. As progress is made in these two areas, more detailed impact analyses will proceed.

6. By Executive Order 12322, dated September 17, 1981, Reclamation must follow the guidelines set forth in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, commonly referred to as the P&Gs. Once a final Feasibility report and appropriate environmental document(s) are completed, they are forwarded to Congress through the Office of Management and Budget for authorization of construction and appropriation.

PROJECT SPECIFIC CONSIDERATIONS

Shasta Lake Water Resources Investigation

A critical issue for the SLWRI is the potential for additional impacts to the McCloud River. Current State law, Public Resources Code 5093.542 (c), allows DWR to conduct technical and economic studies of the McCloud River basin; however, no other State agency can participate in a project that has "an adverse effect on the free flowing condition of the McCloud River" upstream of the McCloud River Bridge or "its wild trout fishery." Shasta Lake, when full, already inundates the river upstream of the McCloud River Bridge. Preliminary estimates show that a 6.5-foot raise of Shasta Dam would inundate the McCloud River an additional 1,400 feet.

Reclamation will evaluate further the potential environmental effects on the McCloud River associated with a Shasta Dam raise and will document the findings in the feasibility report and environmental compliance documents. DWR will continue to participate in the SLWRI to the extent allowed by the Public Resources Code.

Sites of cultural significance exist in and around Shasta Lake, many related to historic activities of indigenous peoples. Both Native American and non-Native American burials from known burial sites and cemeteries were re-interred to cemeteries during the construction of Shasta Dam. This was done with permission of the descendants and they determined where the remains were to be re-interred. The Winnemen band of the Wintu Indians have expressed concern relating to sites of significance to the Winnemen that are within the existing gross pool of Shasta Lake and several possible sites would be impacted by raising the dam. The Winnemen have alluded to approximately 20 sites being within the 18.5 feet raise. Although the Winnemen band of the Wintu Indians are currently not a federally recognized tribe, identifying these sites and developing appropriate mitigation measures will be a major focus in the feasibility study.

North-of-the-Delta Offstream Storage

There is considerable stakeholder interest to evaluate the flow regime of the Sacramento River and potential relationship to NODOS, where flow regime includes the magnitude, duration, timing and subsequent effects of flows in the river. The possibility of modifying flows to improve water supply reliability, water quality and simultaneously benefit the environment will be evaluated. Topics that will be considered related to potential high flow diversions associated with NODOS include Sacramento River geomorphology, meander migration and ecosystem development.

The NODOS project management team requested that a Sacramento River flow regime technical advisory group (to include local, State, and Federal resources agencies as well as university scientists and environmental advocates and scientists) be formed to consider the flow regime of the upper Sacramento River. The Sacramento River Technical Advisory Group (TAG) was formed in early 2002 and was tasked to help identify potential NODOS flow regime impacts and benefits, as well as improve the general understanding of the flow regime of the upper Sacramento River and related ecosystem processes. Meetings of the Flow Regime TAG began in 2002. An administrative draft *Sacramento River Flow Regime Technical Advisory Group Summary Report and Evaluation* was prepared for review by the TAG and NODOS project management team in May 2004. The report documents discussions of the TAG meetings and summarizes the findings of recently completed and ongoing studies to improve the ecosystem along the Sacramento River between Keswick and Colusa. The report also describes historic changes in the flow regime of the Sacramento River and concepts that may improve the ecosystem habitat both with and without NODOS. Finally, the report documents the need for additional studies related to flow regime and ecosystem processes.

The NODOS team is currently incorporating comments from the TAG and NODOS project management team to finalize the *Sacramento River Flow Regime Summary Report and Evaluation*. Findings in the report will assist in the evaluation of the project alternatives and operational plans. (Information from the report will help evaluate the potential benefits and adverse impacts to the upper Sacramento River system.) A flow regime work plan that includes a list of proposed analytical tools to address flow regime issues related to the diversion of flows into NODOS is being developed. The work plan and the *Sacramento River Flow Regime Summary Report and Evaluation* report will be submitted to a CALFED Science Panel for review.

In-Delta Storage Project

Resolution of the water quality issue related to the effect of organic carbon (OC) on drinking water quality is the main challenge of the IDSP. The potential sources of nutrients influencing Delta water quality are peat, algae, aquatic plants, seawater intrusion and seepage returns. Also, salinity, in particular bromide, a constituent of seawater, affects urban water agencies' ability to meet U.S. Environmental Protection Agency's safe drinking water regulations. Impact of releases on water temperatures and dissolved oxygen (DO) in Delta channels adjacent to the proposed outlets is of concern related to the fisheries habitat.

The Protest Dismissal Agreements (PDAs) executed by Delta Wetlands Properties with California Urban Water Agencies (CUWA), CCWD, and East Bay Municipal Utility District (EBMUD) include a Water Quality Management Plan which prevents the release of IDSP water that will degrade the water quality and beneficial uses of Delta water. The PDA with CCWD protects Delta water quality by restricting diversions and discharges from the proposed reservoirs. The terms and conditions of these PDAs have been incorporated into the State Water Resources SWRCB D1643, but the PDAs themselves are independent agreements that apply to Delta Wetlands Properties and its successors. Measures to avoid and mitigate operational impacts must be developed in consultation with CUWA, CCWD, and EBMUD as operational plans are developed. Circulating fresh water through the reservoirs could resolve the OC, DO, and temperature related issues. New water treatment technology using oxidization is under development. This technology may eliminate the OC concerns if the technology becomes available.

The 2001 and 2002 Bay-Delta CALFED In-Delta Storage Science Panel Reviews emphasized the need for field experiments to study the OC, DO and temperature variations under simulated natural processes. With a recent levee breach on Upper Jones Tract, two islands neighboring Bacon Island (Upper and Lower Jones Tract) were flooded. DWR has monitored water-quality of the flooded islands and at the Banks, Tracy, and CCWD's Old River Rock Slough and Los Vaqueros intakes. The next stage of work is to use the data resulting from the monitoring as input to the CALSIM II and DSM2 models and to analyze impacts of releases from the Bacon Island and Webb Tract proposed reservoirs on drinking water quality.

On March 16, 2001, the Central Delta Water Agency challenged the SWRCB and the water right permit issued to Delta Wetlands. The Appellate Court found the SWRCB decision and water right permit were not prepared in accordance with law and therefore voided the permit (Central Delta Water Agency V. State Water Resources Control Board, (Case No. C041749) November 19, 2004). The California Supreme Court denied review of the Appellate Court decision. Delta Wetlands would need to file a petition to the SWRCB to change the water right application to address the issues raised by the Appellate Court in vacating the permit. The major issue raised by the court was failure to identify the buyers of the water and where it will be used. Other issues include ensuring that the CEQA analysis covered the effects of the use of project water and that the permit assures that protection of water quality is addressed. The SWRCB petition process would include the opportunity for interested parties to file protests, and a hearing to address any unresolved protests. Delta Wetlands would need to supplement its environmental documentation to add information on where the water will be used and any effects, such as growth inducing impacts.

Los Vaqueros Reservoir Expansion

In March 2004 a ballot measure was passed by Contra Costa Water District ratepayers directing Contra Costa Water District to work with public water agencies to expand Los Vaqueros Reservoir, at no cost to District ratepayers, to: (1) increase water supplies for drought protection; (2) improve drinking water quality; and (3) protect endangered fish in the delta, on condition that: (a) CCWD water rates will not increase; (b) no water will be exported to Southern California or a peripheral canal; and (c) CCWD will still operate the expanded Reservoir.

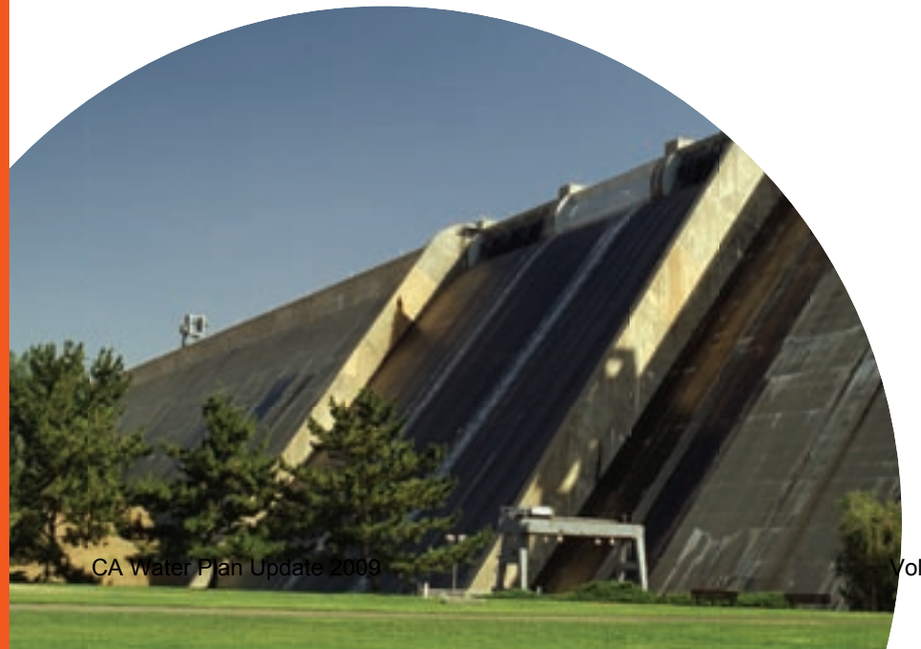
If a viable project cannot be formulated to meet these and other conditions set by the CCWD Board, subsequent CCWD voter approval will be necessary.

Upper San Joaquin River Basin Storage Investigation

In August 2004, the U.S. District Court found that Friant Dam has been operated in violation of California Fish and Game Code Section 5937, which requires that water be released from the dam to maintain a river's historic fishery. The ruling specified that a remedy to the violation be determined at a later date. While a future remedy ruling may influence the downstream use of water supply, it is recognized that a remedy to the violation is very complex and may take several years of study. Therefore, it would be speculative to consider the implications of any potential downstream releases at this point in the USJRBSI. The U. S. District Court – Eastern District of California has issued an order that states the court's intentions to complete a decision on this issue including the remedy phase by May 1, 2006.

The study team will continue, cognizant of the ongoing litigation, and will proceed based on the current Friant Dam operating criteria and the ROD objectives. The study team will continue evaluating storage options to contribute to restoration of and improve water quality for the San Joaquin River and facilitate conjunctive water management and water exchanges that improve the quality of water deliveries to urban communities.

DWR and Reclamation are continuing to work with local water agencies, environmental groups, and local stakeholders to advance the development of a scientifically-based restoration plan that is balanced with water supply needs. In addition, several agencies and interest groups are also developing restoration plans. Consensus on a feasible and acceptable plan has not been reached and will not likely be reached for several years. For the purpose of describing the expected ecosystem benefits of the USJRBSI, several alternative restoration plans may need to be evaluated and the benefits described for each.



Summary

The work done to date has described the broad array of potential benefits that each storage project can provide. The next steps require each project team to get more specific about which of the possible project benefits are most needed from a Federal, State, and local perspective. Then the refined project formulations will be evaluated to describe the physical benefits that can be produced. Once the physical benefits are described, the next step will be to compare the expected benefits to the cost of building and operating the project.

Appendix

CALFED STORAGE PROGRAM STATUS OF THE FIVE SURFACE STORAGE INVESTIGATIONS

Shasta Lake Water Resources Investigation

Study Description

Reclamation re-initiated a feasibility investigation in 2000 to evaluate the potential to enlarge Shasta Dam primarily for increased water supply reliability and water quality improvements for anadromous fish survival, with the potential to consider limited hydropower generation and flood damage reduction. This investigation is being conducted under the general authority of Public Law 96-375 (1980).

The ROD provided further guidance for the feasibility investigation by identifying the potential for expansion of Shasta Reservoir to increase the pool of cold water available to maintain Sacramento River water temperatures for anadromous fish and provide other water management benefits such as water supply reliability.

Accomplishments

- Completed Initial Alternatives Information Report in June 2004
- Conducted Public Workshop in August 2004
- Continued with ongoing public, tribal and stakeholder outreach
- Conducted scoping meetings in Fall 2005
- Completed and released Scoping Report in Spring 2006

Analyses Completed

Technical studies of initial alternatives are continuing. Studies include systems modeling, fisheries studies, environmental surveys, engineering, and economics.

Next Steps

The schedule for planning documents is as follows:

- Fall 2006 — Complete *Plan Formulation Report*
- Winter 2007 — Complete *Draft Feasibility Study Report* and *EIS*
- Fall 2008 — Complete *Final Feasibility Study Report* and *EIS*

North-of-the-Delta Offstream Storage

Study Description

As directed by the ROD, DWR and Reclamation formed a partnership (in November 2000) with local water interests and other State and Federal agencies to investigate offstream storage north of the Delta. Under the NODOS investigation, DWR and Reclamation, in coordination with the partnership, are formulating a range of alternatives, including Sites Reservoir and Newville Reservoir and associated source and conveyance options.

The objectives identified in the ROD include enhancing water management flexibility in the Sacramento Valley while reducing water diversions from the Sacramento River during critical fish migration periods; increasing reliability of supplies for a significant portion of the Sacramento Valley; and providing storage and operational benefits for other CALFED programs including Delta water quality and the EWA.

Accomplishments

- Completed and distributed the administrative draft *Sacramento River Flow Regime Summary Report* and *Evaluation* report to the Flow Regime TAG and NODOS Project Management Team for review
- Completed biological and cultural resources field studies
- Completed draft descriptions of the affected environment for the *Environmental Impact Report/Environmental Impact Statement (EIS/EIR)*
- Completed feasibility engineering study on reverse flow facilities for releasing water back to the river
- Completed feasibility engineering studies on dams and appurtenant structures, conveyance facilities, and road relocations
- Completed a probable maximum flood analysis and a dam break analysis

Analyses Completed

Since the April 2004 Progress Report, the Common Assumptions Progress Report Common Model Package was used to provide updated CALSIM II and DSM2 modeling output for the four NODOS operational scenarios. These scenarios are preliminary options and are not considered alternatives.

Next Steps

The NODOS team is working on establishing partnerships with potential project participants to define potential project formulations and operations. Defining the project formulations will require development of a purpose and need statement that meets statutory requirements and encompasses potential project participants' interests. Once the project purpose has been defined, alternatives can be formulated to meet that purpose and serve the specific needs. With the development of project alternatives, the NODOS team will complete the evaluation of project benefits and environmental impacts. The schedule for NODOS planning documents follows:

- Spring 2006 — Complete *Initial Alternatives Information Report*
- Fall 2007 — Complete *Plan Formulation Report*
- Spring 2008 — Complete *Draft Feasibility Study Report* and *EIS/EIR*
- Winter 2008 — Complete *Final Feasibility Study Report* and *EIS/EIR*

In-Delta Storage Project

Study Description

The IDSP would provide capacity to store approximately 217 TAF of water in the south Delta for a wide array of water supply, water quality and ecosystem benefits. The project would include two storage islands (Webb Tract and Bacon Island) and two habitat islands (Holland Tract and Bouldin Island), similar to that proposed by Delta Wetlands over a decade ago, but would also include:

- New embankment design
- Consolidated inlet and outlet structures
- New project operations
- Revised Habitat Management Plans

DWR completed the *Draft State Feasibility Study* and released the *Draft Executive Summary Report* for the IDSP for stakeholder and public reviews in February 2004. These reviews indicated the need for further analysis of the water quality, risk of failure, operations and economic viability of the project.

The IDSP could provide a variety of benefits and contribute to meeting each of the CALFED Bay-Delta Program's four objectives for water supply reliability, water quality, ecosystem restoration, and levee system integrity. The project could meet the water supply and operational flexibility needs of the State Water Project and the Central Valley Project.

The IDSP's strategic location within the Delta provides enhanced operational flexibility of the CVP and SWP in responding to short-term operational needs for water quality and fisheries benefits. This added flexibility and more immediate response would result in greater environmental protection and more reliable water supplies. The IDSP could

help reduce salinity intrusion by making releases of fresh water into the Delta. It could improve export water quality by storing water when Delta inflow quality is good and salinity is low. The IDSP could provide water needed to support the EWA, enhancing EWA's ability to respond to real-time fisheries needs. Releases from the IDSP could help provide spring pulse flows proposed in the Ecosystem Restoration Program (ERP). The IDSP could also provide additional water quality and aquatic habitat improvements by strategically releasing carryover water saved in island storage. The IDSP could provide water for supplies (in addition to Level 2 refuge supply) to meet CVPIA Level 4 refuge demand. Meeting this demand more reliably would benefit fish, wildlife, and associated habitats in the Central Valley. Wildlife habitats would be improved and protected by developing terrestrial, aquatic, and wildlife-friendly agricultural habitats on Holland Tract and Bouldin Island.

The embankments would withstand higher magnitude earthquakes compared to existing levees, reducing the chance of embankment failure and associated saltwater inflow from the Bay. In case of a seismic failure of adjoining islands, the reservoirs could release fresh water to repel salt water.

There is a need to enhance public recreation within the Delta. The proposed reservoir and habitat islands could provide more public recreation in the Delta. Recreational opportunities could include hunting, fishing, hiking, biking, and interpretative experiences and have a positive effect on local economy.

Accomplishments

- Completed and released the *State Draft Feasibility Study* and the *Draft Executive Summary*, along with supporting study reports in February 2004
- Conducted two public workshops. Stakeholder comments were received during the 45-day public review period and highlighted the need for further investigations of the water quality, risk, operations and economics issues
- Continued with technical studies of risk, design, operations, water quality, environmental impacts, benefits, and costs by following the common assumptions process to assure that the analyses use a consistent basis for comparison, and that the planning assumptions are based on the most current rules, regulations, and operations
- Completed *Draft State Supplemental Feasibility Report (March 2006)*

The *Draft State Supplemental Feasibility Report* was prepared in response to comments received during the public review of the *2004 Draft In-Delta Storage Program State Feasibility Study Report*. The report describes new studies on a broad array of issues, including water supply and quality, project design, risk analysis, environmental evaluations, and construction costs. New information gathered by DWR during the response to the June 2004 Middle River levee breach and flooding of Jones Tract is incorporated in these studies. This report includes revised project cost estimates, refined project operations, revised risk analysis, and additional information on specific technical issues, such as the impact to project operations from organic carbon absorbed in water stored on Delta islands with peat soils.

Recommendations

The Department of Water Resources, acting as the State implementing agency for the CALFED Bay-Delta Program surface storage projects, has refined the In-Delta Storage project proposal and developed a substantial body of information to facilitate its evaluation and consideration. Additional work to add to the existing body of information and further reduce uncertainty regarding the In-Delta Storage project proposal would require significant new investment in field testing, data collection and modeling to better understand the effects of DOC, DO, temperature, and taste and odor on project operations and potential water supply benefits.

DWR believes that sufficient technical information is now available for potential project participants to evaluate their interest in the In-Delta Storage Project. To date, DWR has not received any expression of interest from potential project participants willing to use water developed by the project and share in project costs. DWR acknowledges that some potential project participants may be reluctant to express an interest in any CALFED surface storage proposal until equivalent, comparable information is available for other CALFED surface storage proposals.

DWR recommends that further detailed study of the In-Delta Storage project be suspended until adequate technical information is available for other CALFED surface storage projects. DWR further recommends that limited economic study and operations modeling of the In-Delta Storage project proposal continue through the CALFED Surface Storage Program Common Assumptions effort. This information will allow DWR and potential project participants to continue to compare the In-Delta Storage project proposal to other CALFED surface storage proposals as work on those proposals advances.

Los Vaqueros Reservoir Expansion

Study Description

The existing Los Vaqueros Project was completed in 1998 to provide 100 TAF of offstream water storage to improve water quality and provide emergency storage for CCWD customers. Water is diverted from the Delta at the existing Old River pump station when Delta water quality is good and impact to Delta fisheries is low and pumped to the Los Vaqueros Reservoir for storage.

The LVE could provide up to 500 TAF of offstream storage to CCWD and other Bay Area water agencies. New Delta intakes, pumps, and pipelines would be required to fill the new reservoir capacity, and water deliveries would be made from the expanded reservoir to Bay Area beneficiaries through new conveyance facilities.

There are three planning objectives for the LVE:

- Improve Bay Area water supply reliability
- Provide a lower-cost environmental water supply to the long-term EWA or equivalent program, and
- While meeting the first two objectives, improve the quality of water delivered to Bay Area water users.

Accomplishments

- Continued to work with Bay Area potential partners on assessing dry-year needs for imported water and potential shortfalls
- Completed the CALSIM II integration of the expanded facility to provide a tool to evaluate the dynamic interaction between LVE and the Federal and State water systems and other proposed CALFED storage projects
- Completed *Initial Alternatives Information Report (Fall 2005)*
- Issued a Notice of Preparation/Notice of Intent (NOP/NOI) for environmental documentation (Winter 2005)
- Conducted scoping meetings in January 2006

Analyses Completed

Preliminary hydrologic and water quality modeling has been completed using the new common assumptions baseline for three of the projects potential operating scenarios.

Next Steps

At this time no separate Plan Formulation Report will be completed. In an attempt to keep to the draft and final Feasibility Report schedule, the plan formulation activities will be done as a part of the Feasibility study. Reclamation, working in coordination with DWR and CCWD, has begun the development of a Draft Feasibility Study Report needed to further formulate and analyze the alternatives to address planning objectives established for the LVE study. The document will identify a range of alternatives that address the Federal, State, and local water resources and environmental needs. The schedule for these studies follows:

- Winter 2006 — Complete *Draft Feasibility Study Report* and *EIS/EIR*
- Winter 2007 — Complete *Final Feasibility Study Report* and *EIS/EIR*

Upper San Joaquin River Basin Storage Investigation

Study Description

The ROD recommended evaluating increasing water storage in the upper San Joaquin River basin at Millerton Lake by raising Friant Dam or developing a functionally equivalent storage program. The new water supply developed with additional storage could contribute to restoration of and improved water quality for the San Joaquin River and to facilitate additional conjunctive management and exchanges that improve the quality of water deliveries to urban areas. Other benefits could include hydropower production and flood control. In 2003, Reclamation received authority to undertake a feasibility study of Upper San Joaquin River storage projects.

Friant Dam is currently operated to supply water to agricultural and urban areas in the eastern San Joaquin Valley and to provide flood protection to downstream areas. Millerton Lake, the largest reservoir in the upper San Joaquin River basin, has a storage capacity of 520.5 TAF. Because the minimum storage for canal diversion is about 130 TAF, the maximum active conservation storage is about 390.5 TAF.

Accomplishments

- Completed the NEPA scoping process. A Scoping Report summarizing the major issues and comments received was released to the public in December 2004
- Continued with public, tribal, and stakeholder outreach including a July 2004 Public Workshop
- Established Cooperating Agency groups, developed a Memorandum of Agreement (MOA) and invited sixteen agencies as Cooperating Agencies for participation on technical teams
- Completed *Initial Alternatives Information Report (Summer 2005)*

Analyses Completed

The USJRBSI has continued with technical studies including hydropower, engineering, water operations, flood benefits, and costs of potential options that will be documented in the IAIR and appendices. Screening criteria are also being developed and will be used to select surface storage options that would serve as a basis for the formulation of storage alternatives. The USJRBSI is also considering groundwater storage options. Stakeholder interviews were conducted to receive input on conjunctive management opportunities and issues in the region.

Next Steps

The next major milestones in the USJRBSI planning process are to complete the alternatives development and screening, perform detailed evaluation of the alternatives, and select a preferred alternative. As with all the surface storage projects, meeting the following schedule depends on the availability and timeliness of State and Federal funding:

- Summer 2007 — Complete *Plan Formulation Report*
- Summer 2008 — Complete *Draft Feasibility Study Report* and *EIS/EIR*
- Summer 2009 — Complete *Final Feasibility Study Report* and *EIS/EIR*

List of Abbreviations

Authority	California Bay-Delta Authority
Bay-Delta	San Francisco Bay-Sacramento-San Joaquin River Delta
CALAG	California Agricultural Production Model
CALFED	A collaborative effort of over 20 State and Federal agencies to develop and implement a long-term comprehensive plan to restore the ecological health and improve water management for beneficial uses of the Bay-Delta system
CALSIM II	Generalized water resources simulation model for simulating the operations of the State Water Project/Central Valley Project system
CCWD	Contra Costa Water District
CEQA	California Environmental Quality Act
cfs	Cubic feet per second
CUWA	California Urban Water Agencies
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVPM	Central Valley Production Model
Delta	Sacramento River-San Joaquin River Delta
DO	Dissolved Oxygen
DSM2	A river, estuary, and land modeling system of the Delta that can simulate stages, flows, velocities, mass transport processes, and water quality constituents
DWR	State of California, Department of Water Resources
EBMUD	East Bay Municipal Utility District
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ERP	Ecosystem Restoration Program
EWA	Environmental Water Account
IAIR	Initial Alternatives Information Report
IDSP	In-Delta Storage Project
JPA	Joint Powers Authority
JPOD	Joint-Point-of-Diversion
LCPSIM	Least-Cost Planning Simulation Model
LVE	Los Vaqueros Reservoir Expansion
M & I	Municipal and Industrial
MOA	Memorandum of Agreement
NED	National Economic Development
NEPA	National Environmental Policy Act
NODOS	North-of-the-Delta Offstream Storage
NOP/NOI	Notice of Preparation/ Notice of Intent
OC	Organic Carbon
PDA	Protest Dismissal Agreements
PG&E	Pacific Gas and Electric Company
Reclamation	US Department of Interior, Bureau of Reclamation
ROD	CALFED Record of Decision
SBA	South Bay Aqueduct
SCE	Southern California Edison
SLWRI	Shasta Lake Water Resources Investigation
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	Thousand acre-feet
TAF/yr	Thousand acre-feet per year
TAG	Technical Advisory Group
USJRBSI	Upper San Joaquin River Basin Storage Investigation
WSS	Water Supply Subcommittee