Interim Update of the

CALFED Bay-Delta Program Surface Storage Investigations

Interim Common Model Package, Modeling Protocol and Assumptions

Technical Memorandum

Prepared for

CALFED Bay-Delta Program

May 4, 2005

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SECTION 1.0

Introduction

This document describes the common model package, assumptions and protocols for the interim update of the CALFED Bay-Delta Program Surface Storage Investigations, specifically in regard to the: 1) Shasta Lake Water Resources Investigation (SLWRI), 2) North-of-the-Delta Offstream Storage (NODOS), 3) In-Delta Storage (IDSP), and 4) Los Vaqueros Reservoir Expansion (LVE) projects.

This update is performed to support the CALFED Bay-Delta Program Surface Storage Investigations Progress Report for release in May of 2005. The Upper San Joaquin River Storage Investigation (USJRBSI) will be included in the progress report, but all necessary information in regard to this project was previously developed. Therefore, the Upper San Joaquin River Storage Investigation is not specifically referenced in this document since no new work was performed in the interim update process.

The common model package for this update only includes the CALSIM II and the DSM2 models. Other models may be used to support the interim update of some storage project investigations. This document only addresses the assumptions and protocols applied to maintain consistency in application of the common model package.

Please refer to the Table of Contents for a listing of the document sections.

This document served as the Common Assumptions teams' tool to maintain consistency throughout the update process and to appropriately interpret the results of the analyses. Based on this document the following tasks were performed:

1. Revision/Development of the interim CALSIM baseline(s) (monthly and daily versions)
2. Development of the interim DSM2 baseline(s) (monthly and daily versions)
3. Project- specific scenario simulation development (CALSIM and DSM2)
4. Coordination and application of consistency checks protocol
5. Finalization of project-specific scenario simulations
6. Development of the record of the technical coordination for the Common Assumptions progress report update

SECTION 2.0

CALSIM II Inputs for Interim Common Assumptions Baseline

Three baseline conditions have been defined for the Common Assumptions process: 1) Existing Condition; 2) 2020 Future No-Action Condition; and 3) Supplemental 2020 Future No-Action Condition. For the interim update only the 2020 Future No-Action Condition is used.

The 2020 Future No-Action Condition, is defined to include the 1) 400 cfs DMC/CA Intertie, 2) SDIP, and 3) proposed Integrated Operations. Due to the time and resource constraints, integrated EWA operations are not included in the interim update. The assumptions listed in Table 2-1 are for the purpose of defining the interim baseline (Future No-Action Condition) for the CALFED Bay-Delta Program Surface Storage Investigations.

TABLE 2-1
CALSIM II Inputs
Interim Common Assumptions Baseline

	Future No-Action Condition
Period of Simulation	73 years (1922-1994)
HYDROLOGY	
Level of Development (Land Use)	2020 Level, DWR Bulletin 160-98
Demands	
North of Delta (exc American R)	
CVP (non-settlement)	Land Use based, limited by Full Contract
(Settlement)	Land Use based, historical
CVP Refuges	Firm Level 2[a]
SWP (FRSA)	Land Use based, limited by Full Contract
Non-Project	Land Use based
American River Basin	
Water rights	2020[b], Sacramento Water Forum
CVP	2020[b], Sacramento Water Forum (modified, PCWA 35 TAF CVP contract supply diverted at the new American River PCWA Pump Station)
San Joaquin River Basin	
Friant Unit	Regression of historical
Lower Basin	Fixed annual demands
Stanislaus River Basin	New Melones Interim Operations Plan
South of Delta	
CVP	Full Contract
CVP Refuges	Firm Level 2[a]
CCWD	195 TAF/YR
SWP (w/ North Bay Aqueduct)	3.9-4.1 MAF/YR (MWD demand at Table A)

TABLE 2-1
CALSIM II Inputs
Interim Common Assumptions Baseline

	Future No-Action Condition
SWP Article 21 Demand	MWDSC up to 100 TAF/month, Dec-Mar, others up to 84 TAF/month
FACILITIES	
System-wide	Existing plus other as noted
Upper American River	PCWA pumps[c]
Freeport Regional Water Project	Included (includes modified EBMUD operations on the Mokelumne River)
Delta Export Conveyance	
SWP Banks Pumping Plant	8,500 cfs year round (500 cfs reserved for EWA Jul, Aug, Sep)
CVP Tracy Pumping Plant	4,600 cfs (allowed by the DMC/CA Intertie)
REGULATORY STANDARDS	
Trinity River	
Minimum Flow below Lewiston Dam	Trinity EIS Preferred Alternative (369-815 TAF/YR)
Trinity Reservoir End-of-September Minimum Storage	Trinity EIS Preferred Alternative (600 TAF as able)
Clear Creek	
Minimum Flow below Whiskeytown Dam	Downstream water rights, 1963 USBR Proposal to USFWS and NPS, and USFWS discretionary use of CVPIA 3406(b)(2)
Upper Sacramento River	
Shasta Lake End-of-September Minimum Storage	SWRCB WR 1993 Winter-run Biological Opinion (1900 TAF)
Minimum Flow below Keswick Dam	Flows for SWRCB WR 90-5 and 1993 Winter-run Biological Opinion temperature control, and USFWS discretionary use of CVPIA 3406(b)(2)
Feather River	
Minimum Flow below Thermalito Diversion Dam	1983 DWR, DFG Agreement (600 CFS)
Minimum Flow below Thermalito Afterbay outlet	1983 DWR, DFG Agreement (750 – 1700 CFS)
Yuba River	
Minimum Flow below Daguerre Point Dam	Existing instream flow requirement[d]
American River	
Minimum Flow below Nimbus Dam	SWRCB D-893 (see accompanying Operations Criteria), and USFWS discretionary use of CVPIA 3406(b)(2)
Minimum Flow at H Street Bridge	SWRCB D-893
Lower Sacramento River	
Minimum Flow near Rio Vista	SWRCB D-1641
Mokelumne River	
Minimum Flow below Camanche Dam	FERC 2916-029, 1996 (Joint Settlement Agreement) (100 – 325 CFS)
Minimum Flow below Woodbridge Diversion Dam	FERC 2916-029, 1996 (Joint Settlement Agreement) (25 – 300 CFS)
Stanislaus River	
Minimum Flow below Goodwin Dam	1987 USBR, DFG agreement, and USFWS discretionary use of CVPIA 3406(b)(2)

TABLE 2-1
CALSIM II Inputs
Interim Common Assumptions Baseline

	Future No-Action Condition
Minimum Dissolved Oxygen	SWRCB D-1422
Merced River	
Minimum Flow below Crocker-Huffman Diversion Dam	Davis-Grunsky (180 – 220 CFS, Nov – Mar), Cowell Agreement, and FERC 2179 (25 – 100 CFS)
Tuolumne River	
Minimum Flow at Lagrange Bridge	FERC 2299-024, 1995 (Settlement Agreement) (94 – 301 TAF/YR)
San Joaquin River	
Maximum Salinity near Vernalis	SWRCB D-1641
Minimum Flow near Vernalis	SWRCB D-1641, and Vernalis Adaptive Management Plan per San Joaquin River Agreement
Sacramento River-San Joaquin River Delta	
Delta Outflow Index (Flow and Salinity)	SWRCB D-1641
Delta Cross Channel Gate Operation	SWRCB D-1641
Delta Exports	SWRCB D-1641, USFWS discretionary use of CVPIA 3406(b)(2)
OPERATIONS CRITERIA	
Subsystem	
Upper Sacramento River	
Flow Objective for Navigation (Wilkins Slough)	Discretionary 3,500 – 5,000 CFS based on CVP water supply condition
American River	
Folsom Dam Flood Control	Variable 400/670 flood control diagram (without outlet modifications)
Flow below Nimbus Dam	Discretionary operations criteria corresponding to SWRCB D-893 required minimum flow
Sacramento Water Forum Mitigation Water	Sacramento Water Forum (up to 47 taf/yr in dry years)[e]
Stanislaus River	
Flow below Goodwin Dam	1997 New Melones Interim Operations Plan
System-wide	
CVP Water Allocation	
CVP Settlement and Exchange	100% (75% in Shasta Critical years)
CVP Refuges	100% (75% in Shasta Critical years)
CVP Agriculture	100% - 0% based on supply (SOD allocations are reduced due to D1641 and 3406(b)(2) allocation related export restrictions)
CVP Municipal & Industrial	100% - 50% based on supply (SOD allocations are reduced due to D1641 and 3406(b)(2) allocation related export restrictions)
SWP Water Allocation	
North of Delta (FRSA)	Contract specific
South of Delta (including North Bay Aqueduct)	Based on supply; Equal prioritization between Ag and M&I based on Monterey Agreement

TABLE 2-1
CALSIM II Inputs
Interim Common Assumptions Baseline

	Future No-Action Condition
CVP/SWP Coordinated Operations	
Sharing of Responsibility for In-Basin-Use	1986 Coordinated Operations Agreement (FRWP EBMUD and 2/3 of the North Bay Aqueduct diversions are considered as Delta Export, 1/3 of the North Bay Aqueduct diversion is considered as In-Basin-Use)
Sharing of Surplus Flows	1986 Coordinated Operations Agreement
Sharing of Restricted Export Capacity for Project Specific Priority Pumping	Equal sharing of export capacity under SWRCB D-1641; use of CVPIA 3406(b)(2) only restricts CVP exports
Dedicated CVP Conveyance at Banks	SWP to convey 100,000 af/year of Level 2 refuge water at Banks P.P. (Jul & Aug)
North of Delta Accounting Adjustments	CVP to provide the SWP a maximum of 75,000 af of water to meet in-basin requirements through adjustments in COA accounting (released from Shasta)
Sharing of Export Capacity for Lesser Priority and Wheeling Related Pumping	Cross Valley Canal wheeling (max of 128 TAF/Yr), CALFED ROD defined Joint-Point-of-Diversion
San Luis Low Point	San Luis Reservoir is allowed to operate to a minimum storage of 100 TAF
Transfers	Not included at this time
CVPIA 3406(b)(2)	Per May 2003 Dept of Interior Decision:
Allocation	800 taf/yr, 700 taf/yr in 40-30-30 dry years, and 600 taf/year in 40-30-30 critical years
Actions	1995 WQCP, Fish flow objectives (Oct-Jan), VAMP (Apr 15- May 15) CVP export restriction, 3000 CFS CVP export limit in May and June (D1485 Striped Bass cont.), Post (May 16-31) VAMP CVP export restriction, Ramping of CVP export (Jun), Upstream Releases (Feb-Sep)
Accounting Adjustments	Per May 2003 Interior Decision, no limit on responsibility for non-discretionary D1641 requirements with 500 taf target, no Reset with the Storage metric and no Offset with the Release and Export metrics, 200 taf target on costs from Oct-Jan
CALFED Environmental Water Account	No EWA operations are included at this time; dedicated export capacity of 500 cfs is reserved in Banks PP in the months of July, August and September (Banks pumping of SWP and CVP water limited to 8,000 cfs in these months.)

Notes:

[a] It is assumed that Level 4 supplies are obtained through water transfers and are not part of the basic operating demands in CALSIM.

[b] Sacramento Water Forum 2025 Level Demands defined in Sacramento Water Forum's EIR

[c] The Placer County Water Agency pumping facility upstream of Folsom Lake is just about to begin construction

[d] D1644 in some form will be modeled in the future when SWRCB and YCWA resolve the Decision.

[e] This is implemented only in the PCWA Middle Fork Project releases used in defining the CALSIM II inflows into Folsom Lake

SECTION 3.0

DSM2 Inputs for Interim Common Assumptions Baseline

The assumptions listed in Table 3-1 are for the purpose of defining the interim baseline (Future No-Action Condition) for the CALFED Bay-Delta Program Surface Storage Investigations.

TABLE 3-1
DSM2 Inputs
Interim Common Assumptions Baseline

	Future No-Action Condition
Period of Simulation	16 years (1976-1991)
	Boundary Conditions
Boundary flows	CALSIM II output *(alternatives provide different flows and exports)*[a]
Boundary Stage	15-minute adjusted astronomical tide
Ag flows (DICU[b])	2020 Level, DWR Bulletin 160-98
Martinez EC	CALSIM II Net Delta Outflow & G-model[c]
Tributary Boundary EC	CALSIM II output[d]
Ag Return EC	MWQI data
	Facilities Operations
Delta Cross Channel (DCC)	CALSIM II output
South Delta barriers	Permanent barriers, operation based on CALSIM II SJR river flow

Notes:

[a] Although monthly CALSIM output was used as the HYDRO input, the Sacramento and San Joaquin rivers were interpolated to daily values in order to smooth the transition from high to low and low to high flows

[b] The Delta Island Consumptive Use (DICU) model is used to calculate diversions and return flows for all Delta islands based on the level of development assumed

[c] Net Delta Outflow based on the CALSIM II flows was used with an updated G-model to calculate Martinez EC

[d] CALSIM II calculates monthly EC for the San Joaquin river, which was then converted to daily EC using the monthly EC and flow for the San Joaquin River. Fixed concentrations of 150, 175, and 125 μmhos/cm were assumed for the Sacramento River, Yolo Bypass, and eastside streams respectively

Eventhough monthly CALSIM input are used as the flow boundary conditions, the Sacramento and SJR flows are interpolated into daily values. DSM2 then uses the daily flow values along with a 15-minute adjusted astronomical tide, to simulate effect of the spring and neap tides.

SECTION 4.0

Common Assumptions Baseline Revisions

Sections 2.0 and 3.0 present the 2020 Future No-Action condition assumptions that correspond to the two components of the interim common model package: CALSIM II and DSM2. This section discusses the specific implementation of the CALSIM II and DSM2 baseline simulations that correspond to the assumptions identified in sections 2.0 and 3.0.

CALSIM

In February 2004, a series of CALSIM II model simulations were released by Reclamation in support of the CVP Operations Criteria and Plan process (OCAP). The OCAP model, corresponding to a future level of development, is used as the foundation for the CALSIM II component of the interim common model package.

Due to the specific need for a daily simulation framework for assessing the In-Delta Storage project, two baselines, a monthly and a daily, consistent in assumptions, but different in simulation time-step, were developed. Measures have been employed to make these two baseline simulations as consistent as possible in the application of the assumptions. The monthly and daily baselines were developed as follows:

For the development of the CALSIM II monthly baseline model, the following OCAP study and additional modifications were used:

OCAP model study name: OCAP_2020D09D_FutureEWA_012104

Modifications added:

1. Modifications for consistency of interim analyses:
    a) EWA step and related adjustments removed (dedicated export capacity of 500 cfs is reserved in Banks PP in the months of July, August and September).
    b) MWD Demand levels revised to full Table A values
2. Modifications for pre-project representations of potential beneficiaries:
    c) Included Los Vaqueros Reservoir Expansion Scenario 1B (developed by the Los Vaqueros project team as part of their updated modeling) operation of the CCWD Rock Slough pumping plant and the existing Los Vaqueros pumping plant to reflect consistent existing Los Vaqueros Reservoir operations
    d) Added time-series demand as a surrogate for GW recharge in Kern County - under base conditions, this is only met by conveying Delta excess, when Banks PP capacity is available and Article 21 deliveries have been satisfied to the maximum extent possible.

3. Modifications to include corrections and other updates that are known at this time

    e) American River CVP/WR delivery reporting cleanup.

The daily version of the CALSIM II baseline model has been documented in previous In-Delta Storage technical reports. In order to implement a consistent set of assumptions, a new version of the daily operations model (DOM) was developed that incorporated the new features of the monthly CALSIM II baseline model. These features included:

1. 400 cfs Delta Mendota Canal/California Aqueduct Intertie
2. South Delta Improvements Program
3. Proposed Integrated Operations: a) up to 100 TAF/Yr CVP Dedicated use of Banks for Level 2 Refuges; b) Shasta Lake releases for up to 75 TAF/Yr SWP COA obligations
4. Implementation of Freeport Regional Water Project
5. Joint-Point-of-Diversion (JPOD) capabilities
6. Predetermined additional flow/export restrictions as surrogate for the B2 program actions

The monthly version of the CALSIM II baseline is used for evaluating: 1) Shasta Lake Water Resources Investigation, 2) North-of-the-Delta Offstream Storage, and 3) Los Vaqueros Reservoir Expansion projects. The daily version of the CALSIM II baseline is used for evaluating the In-Delta Storage project.

DSM2

DSM2 runs using DWR's current standard simulation package are produced for each baseline, monthly and daily. These runs include astronomical tide and SDIP related improvements (permanent barrier operations) at a 2020 level of development.

DSM2 relies directly on the results of CALSIM II for characterizing inflows into the Delta and exports and other operations in the Delta. In the case of the monthly application, inputs that are used as the flow boundary conditions, the Sacramento and SJR flows, are interpolated into daily values. DSM2 then uses the daily flow values along with a 15-minute adjusted astronomical tide, to simulate effect of the spring and neap tides.

In the case of the daily application, DSM2 uses the daily values directly from CALSIM II. Therefore the DSM2 daily results can be reported at a higher resolution than just monthly values.

SECTION 5.0

Project-Specific Analytical Process—Interim Update

This section visually describes the multiple simulation steps that CALSIM II utilizes to analyze and apply the SWRCB D1485, D1641, Joint-Point-of-Diversion (JPOD), and the CVPIA B2 programs.

Due to the specific need for a daily simulation framework for assessing the In-Delta Storage project, two baselines, consistent in assumptions, but different in simulation time-step, are used for project-specific analyses. The daily operations model (DOM) is not presently capable of dynamic B2 accounting (no D1485 step is available). As such, a single SDIP step with pre-processed b2 actions is run for the IDS base and project simulations. For monthly analyses, due to project specific operational specifications, additional simulation steps are also used (i.e. A Delta water quality enhancement for NODOS scenarios, and a Sacramento River fisheries enhancement for Shasta Lake Enlargement scenarios).

By using two different time interval baseline simulations, that also employ different analytical processes, there are variations between the In-Delta Storage project analyses and other project analyses.

Figures 5-1 and 5-2 describe the CALSIM model structure for the interim baseline simulations. Figures 5-3 through 5-6 describe the CALSIM model structure for various project scenario simulations. For comparative analysis, monthly project analyses reference the monthly version of the baseline; daily project analyses reference the daily version of the baseline.

MONTHLY VERSION

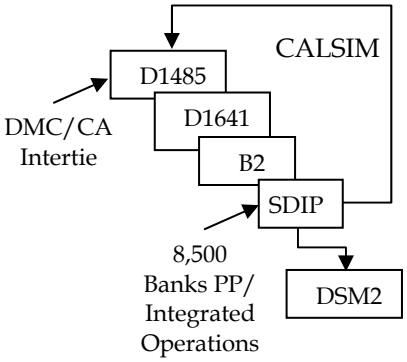

FIGURE 5-1
Interim CA Baseline Simulation
(Interim CA Future No Action),
(Monthly, 4 step)

DAILY VERSION

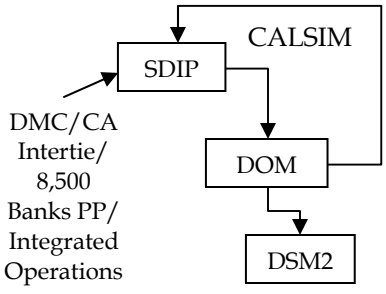

FIGURE 5-2
Interim CA Baseline Simulation
(Interim CA Future No Action),
(Monthly, 1 step/Daily, 1 step)

Notes:

- All CALSIM simulations use the full 73-year period of record
- CALSIM Daily Version includes JPOD, a surrogate for B2, and SDIP, DMC/CA Intertie, and Integrated Operations features
- Unless noted, all DSM2 simulations use the astronomical tide and a 16-year simulation period (1976-1991)

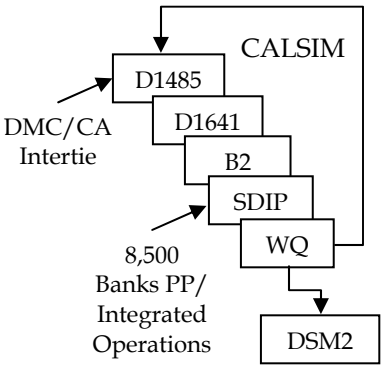

FIGURE 5-3
North-of-the-Delta Offstream Storage Analysis
(Monthly, 5 Step)

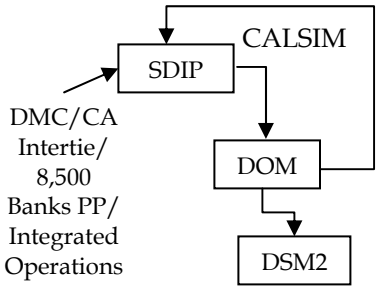

FIGURE 5-4
In-Delta Storage Analysis
(Monthly, 1 Step/Daily, 1 Step)

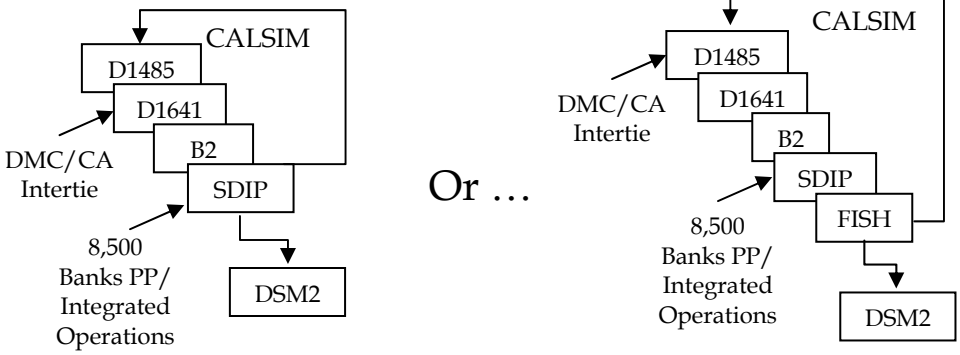

FIGURE 5-5
Shasta Lake Enlargement Analysis
(Monthly, 4 or 5 Step)

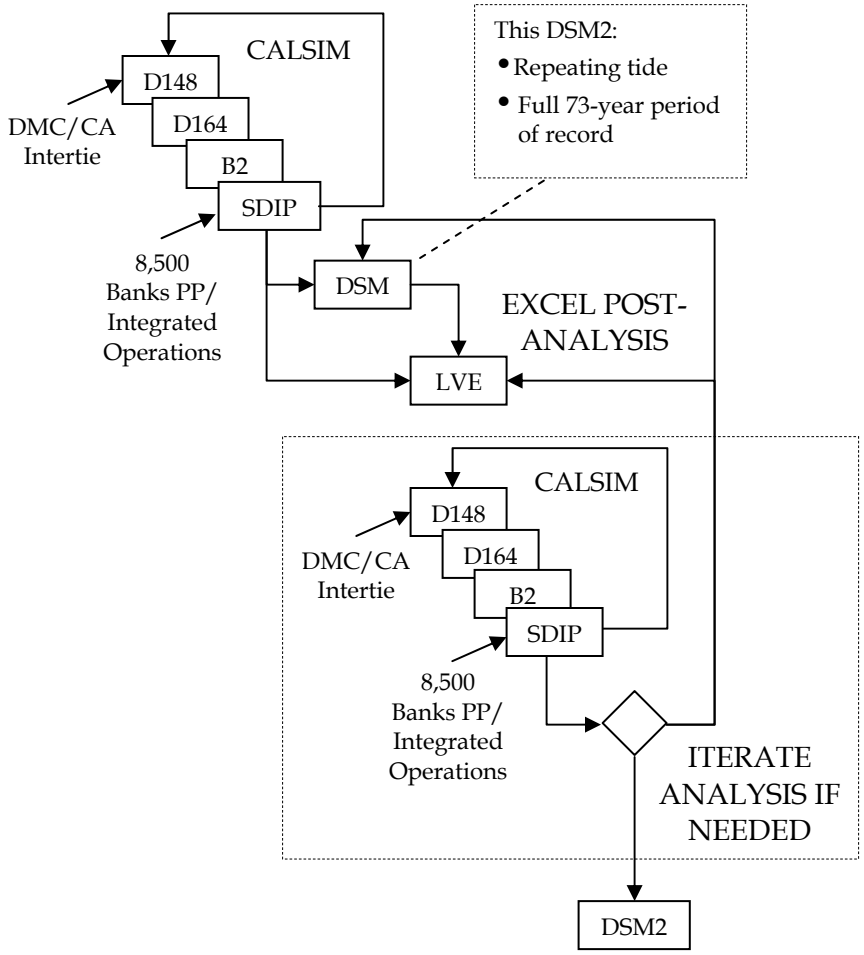

FIGURE 5-6
Los Vaqueros Reservoir Expansion Analysis
(Monthly, 4 Step with DSM2/ Spreadsheet post-analysis and iteration w/ CALSIM as needed)

SECTION 6.0

Project-Specific Potential Benefits Definitions—Interim Update

Throughout the analyses, each project addresses a variety of potential benefits and priorities of operations. Table 6-1 provides an overview of how the definitions of potential benefits vary from one project to another. In some cases these are consistent and directly comparable. In other cases, the unique aspects of the project have provided for a unique opportunity and potential benefits have been so defined.

This matrix does not include all potential benefits that may be identified for each project, and makes no assumptions about specific scenario priorities. Each storage investigation is at a different level of refinement in regard to what scenarios are being considered. The table presents only those that are specifically operated for in the CALSIM II/DSM2 modeling for the purpose of the interim update. This matrix ties in directly with project-specific reporting metrics that are defined in Section 8.0.

TABLE 6-1
Comparison of Proposed Project Specific Potential Benefit Definitions
Interim Common Assumptions Model Runs

Potential Benefits[a,b]	Shasta Lake Water Resources Investigation	North-of-the-Delta Offstream Storage	In-Delta Storage	Los Vaqueros Reservoir Expansion
Water Supply Reliability for Local Water Users	Modification of TCCA Diversion schedule to mimic effect of NOD Conjunctive Use program (used if CU included as component of the project) (Supplemental)	Deliver water to TCCA CVP Ag Service contractors, up to a total of local and CVP supply of 100% of CVP contract in normal years, and 75% of CVP contract in Shasta critical years (offsets assumed GW pumping in baseline)	—-	Deliver water to South Bay Aqueduct SWP contractors and CCWD, a CVP contractor, in drought years (Supplemental)
Water Supply Reliability for CVP	Increase CVP Deliveries	Increase CVP Deliveries	Increase CVP Deliveries	—-
Water Supply Reliability for SWP	—-	Increase SWP SOD Deliveries	Increase SWP SOD Deliveries	—-
Water Supply for SOD groundwater banking	—-	Meet timeseries based annual diversion amounts (above what is met from Delta excesses)	Meet timeseries based annual diversion amounts (above what is met from Delta excesses)	—-
Water Supply for the Environmental Water Account	—-	Deliver 260 TAF/Yr in Dry and Critical years, 145 TAF/Yr in Below Normal years, and 75 TAF/Yr in Wet and Above Normal years (Jul - Sep) (Offset of NOD purchases - "virtual" - no returns)	Delivered to Banks PP for Export according to available EWA Capacity (limited only by supply available) (Supplemental)	Deliver water to South Bay Aqueduct for EWA Credit (to offset impact of EWA export actions or other actions that reduce SWP and/or CVP water supplies, limited by South Bay Aqueduct conveyance and demand) (Supplemental)
Water Supply for Level 4 Refuge	—-	Deliver Level 4 Refuge Supplies to Sacramento, Colusa, and Delevan Refuges in all years (Supplemental)	Deliver Level 4 Refuge Supplies to SOD Refuges (Supplemental)	Deliver to South Bay Aqueduct for Level 4 Refuge Supply Credit (limited by South Bay Aqueduct conveyance and demand) (Supplemental)
Water Supply for Rice Straw Decomposition	—-	Deliver 100 TAF/Yr (Oct-Jan) to Colusa Basin in all years (Supplemental)	—-	—-

TABLE 6-1
Comparison of Proposed Project Specific Potential Benefit Definitions
Interim Common Assumptions Model Runs

Potential Benefits[a,b]	Shasta Lake Water Resources Investigation	North-of-the-Delta Offstream Storage	In-Delta Storage	Los Vaqueros Reservoir Expansion
Water Quality	—-	Augment Delta Outflow by 1,500 CFS in Jul-Aug (not allowed to reduce CVP/SWP Delta outflow obligations or increase CVP/SWP Delta exports) (Supplemental)	Augment Delta Outflow by 1,500 CFS in Jul-Aug (not allowed to reduce CVP/SWP Delta outflow obligations or increase CVP/SWP Delta exports) (Supplemental)	Deliver to South Bay Aqueduct and CCWD to Improve WQ
Environmental Flows	Increase flows below Keswick (Oct - Apr) (Supplemental)	Fall Flow Stability below Keswick (Oct-Nov), Cottonwood/Willow establishment in Sac. R. (Mar-Apr), Reduction of TCCA/GCID diversions from the Sac. R. (Apr-Aug), Augmentation of Yolo Bypass flows (Mar, Apr) (Supplemental)	ERP Delta outflow targets based on year type (10 days in Mar and 10 days in Apr) (Supplemental)	—-

Notes:

[a] Incidental Benefits are not included in this presentation

[b] Potential Benefits not already included in the baseline simulation are noted as "Supplemental"

SECTION 7.0

Scenarios for Interim Common Assumptions Model Runs

The scenarios for Interim Common Assumptions Model Runs combine various potential benefits definitions with specific priorities to define alternate ways in which each project could be operated. Tables 7-1 through 7-4 provide a descriptive overview of each scenario being considered by the project teams for use in preparing results for the interim update.

TABLE 7-1
Shasta Lake Water Resources Investigation
Scenarios for Interim Common Assumptions Model Runs

Scenario 1 - Water Supply, 6.5' Raise	Scenario 2 - Water Supply, 18.5' Raise	Scenario 3 - Water Supply and Anadromous Fish, 18.5' Raise
The objective of this scenario is to address the two primary study objectives for the Shasta Lake Water Resources Investigation (SLWRI) of (1) increasing water supply reliability and (2) increasing anadromous fish survival in the Sacramento River through raising Shasta Dam by 6.5 feet. Through the increased 290,000 acre-feet of storage in Shasta Reservoir, this scenario (WSR-1 in Initial Alternatives Information Report – IAIR) would increase drought year yield of the CVP/SWP and reduce salmon mortality through reduced water temperature in the upper Sacramento River. The scenario would also provide a net increase in system hydropower generation. Although small, the scenario could also contribute to flood damage reduction benefits in the upper Sacramento River and Delta water quality. Although not formulated to address EWA, through the added system storage, the scenario could contribute to implementation of the program.	The objective of this scenario is similar to Scenario 1 except it includes raising Shasta Dam by 18.5 feet. This magnitude of dam raise is believed the largest without the requirement for major relocations of the Pit River Bridge and other infrastructure related to Interstate 5 and the Union Pacific Railroad. Through the increased 640,000 acre-feet of storage in Shasta Reservoir, this scenario (WSR-2 in IAIR) would increase drought year yield of the CVP/SWP and result in a significant reduction in salmon mortality through reduced water temperature in the upper Sacramento River. The scenario would also provide a net increase in system hydropower generation. Although modest, the scenario could also contribute to flood damage reduction benefits in the upper Sacramento River and Delta water quality. Similar to Scenario 1, through the added system storage, the scenario could contribute implementation of EWA.	The primary objective of this scenario is similar to Scenarios 1 and 2. The scenario includes raising Shasta Dam by 18.5 feet. The scenario also focuses on increasing benefits to anadromous fish survival through creation of additional spawning areas in the upper Sacramento River and to ecosystem restoration through riparian and wetland creation along the upper river and riverine habitat around Shasta Lake. The scenario also includes a conjunctive water management component in the Sacramento River basin to help increase drought period yield. Through the increased 640,000 acre-feet of storage in Shasta Reservoir, this scenario (CO-5 in IAIR) would increase drought year yield of the CVP/SWP and result in a significant reduction in salmon mortality through reduced water temperature in the upper Sacramento River. The scenario would add about 150 acres of increased spawning habitat and about 550 acres of wetland, riverine, and related habitat. This scenario would also provide a net increase in system hydropower generation. Although modest, the scenario could also contribute to flood damage reduction benefits in the upper Sacramento River and Delta water quality. Similar to Scenarios 1 and 2, through the added system storage, the scenario could contribute to implementation of EWA.

TABLE 7-2
North-of-the-Delta Offstream Storage
Scenarios for Interim Common Assumptions Model Runs

Scenario 1 – Water Supply	Scenario 2 – Water Quality	Scenario 3 – Environmental	Scenario 4 – EWA
The following are common objectives in the Sacramento Valley that are met by all scenarios. The priorities of meeting the objectives are indicated by the numbers: 1. Increase local water supply reliability (Tehama-Colusa Canal Authority water users) by increasing their allocation to 100% of the contract amount in normal years and 75% in Shasta critical years. 2. Provide Level 4 refuge supply to the Sacramento Valley wildlife refuges. 3. Provide up to 100 taf/yr of water for rice straw decomposition in the Sacramento Valley. In addition to the common benefits, the main objective of this scenario is to increase the water supply reliabilities of the SWP and CVP contractors' deliveries. The project could provide water supply to urban and agricultural water users (modeled as SWP/CVP, but could be any urban or agricultural water user). Secondary objectives of this scenario are to reduce diversions on the Sacramento River at the Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal intakes during critical fish migration periods (Apr-Aug) and improve Delta water quality as described in Scenario 2.	In addition to the common objectives, the main objective of this scenario is to improve Delta water quality. During July and August, a supplemental release of 1,500 cfs from NODOS is used to augment Delta outflow. This supplemental release is not to be exported at Banks and Tracy and is not to be used to replace SWP/CVP Delta outflow obligations. Secondary objectives of this scenario are to reduce diversions on the Sacramento River at the Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal intakes during critical fish migration periods (Apr-Aug) and improve water supply reliability for CVP contractors.	In addition to the common objectives, the main objective of this scenario is to provide environmental flows for ecosystem restoration in the upper Sacramento River. The environmental flow objectives to be provided include: – Provide stability flows below Keswick in Oct & Nov – Provide spring flows in Mar-Apr for cottonwood/willow trees establishment in Sac. R. – Provide supplemental flows for Yolo Bypass in Mar and Apr for splittail Some of these flow objectives are achieved through coordinated operations with Shasta. Secondary objectives of this scenario are to reduce diversions on the Sacramento River at the Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal intakes during critical fish migration periods (Apr-Aug, high emphasis is placed on reducing diversions during Apr & May.) and improve water supply reliability for the SWP contractors.	In addition to the common objectives, the main objective of this scenario is to provide water supply for the Environmental Water Account. Water is provided to the EWA in accordance with its recent north of Delta purchase goals (260 taf/yr in dry and critical years, 145 taf/yr in below normal years, and 75 taf/yr in wet and above normal years). Secondary objectives of this scenario are to reduce diversions on the Sacramento River at the Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal intakes during critical fish migration periods (Apr-Aug, high emphasis is placed on reducing diversions in Apr & May) and provide environmental flows for ecosystem restoration in the upper Sacramento River as described in Scenario 3.

TABLE 7-3
In-Delta Storage
Scenarios for Interim Common Assumptions Model Runs

Scenario 1 - Water Supply	Scenario 2 - Water Supply and EWA	Scenario 3 - Water Supply, EWA and ERP	Scenario 4 - Water Supply, EWA and Water Quality
The objective of this scenario is to help meet the future demands of CVP/SWP water contractors when supplies are short. The project could produce additional water deliveries to urban and agricultural water users (modeled as SWP/CVP, but could be any urban or agricultural water user). SWP and CVP allocated deliveries as of May 1 were given the first priority to be met by direct supplies to SWP and CVP users as in the Base study. Additional objectives of this scenario are to provide Level 4 refuge supplies to south of the Delta wildlife refuges and to provide additional water supplies for San Joaquin Valley groundwater banking. The additional refuge supply and conjunctive use supply were made available only when export capacity was available. These additional objectives were modeled in all four scenarios.	The objective of this scenario is twofold: to help meet the future demands of CVP/SWP water contractors and to provide operational flexibility for the Environmental Water Account (EWA). Scenario 2 builds upon Scenario 1 by adding EWA as another buyer of In-Delta water. The EWA gives fishery agencies and state water managers increased flexibility to alter pumping and delivery schedules to protect fish without affecting water supply reliability. In this study, no EWA actions (cuts in exports) are modeled. It is assumed the EWA takes fish protection actions, and, therefore, the EWA will have demand for In-Delta water when it and Banks export capacity are available. EWA buys the water to pay the projects back for the assumed fish protection actions. It was assumed that any water that was not needed by SWP and CVP as of May 1 could be purchased for EWA. EWA is given a lower priority to the water than the Level 4 refuge supply and San Joaquin Valley groundwater conjunctive use, but from July through September Banks permitted capacity is increased from 8,000 cfs to 8,500 cfs with the extra 500 cfs dedicated to moving In-Delta water for the EWA. This guarantees that, while low in priority, the EWA can purchase a significant share of the unwanted In-Delta water because it can move water that the refuges and groundwater recharge are otherwise unable to.	The objective of this scenario is threefold: to help meet the future demands of CVP/SWP water contractors, to provide operational flexibility for the EWA, and to provide additional water to help meet the Ecosystem Restoration Program (ERP) goals. The ERP demand for increased Delta outflow in March, April and May is added to Scenario 2 to create Scenario 3. In this scenario, the ERP Delta outflow targets are 20,000, 30,000 and 40,000 cfs for an additional 10 days in March and 10 days in April/May for Dry, Below Normal and Above Normal water year types, respectively. The water year types are based on the Sacramento Valley Water Year Hydrologic Classification. The order of priority given is: SWP, CVP, refuge, groundwater conjunctive use, EWA, and ERP demand for In-Delta water. The ERP was established to accomplish strategic program goals through habitat creation and management and the EWA was created to reach these goals through flow manipulations. Some of the implementing agencies for the EWA (USFWS, NOAA Fisheries and CDFG) are also the ERP implementing agencies. These agencies are responsible for exercising biological judgment to determine SWP/CVP operational changes to protect and enhance at-risk fish species dependent on the Delta. All of the at-risk fish species that are targeted for enhancement and recovery by the EWA are also targeted for recovery by the ERP, so there is a direct linkage between the goals of these two programs.	The objective of this scenario is threefold: to help meet the future demands of CVP/SWP water contractors, to provide operational flexibility for the EWA, and to improve Delta water quality. This scenario builds on Scenario 2 by adding a demand to improve Delta water quality. During July, August, and September, a supplemental release of 1,500 cfs from In-Delta is used to augment Delta outflow. This supplemental release is not to be exported at Banks and Tracy and is not to be used to replace SWP/CVP Delta outflow obligations. Note: There is no ERP demand in this scenario.

TABLE 7-4
Los Vaqueros Reservoir Expansion
Scenarios for Interim Common Assumptions Model Runs

Scenario 2 - Environmental Water and SBA Water Quality	Scenario 3 - SBA Water Supply Reliability, Environmental Water, and SBA Water Quality	Scenario 4 - SBA plus CCWD Water Supply Reliability, Environmental Water and SBA Water Quality
Under this scenario, the CALFED entity that controls the EWA, or the successor to the EWA (e.g., USFWS, CDFG, or NOAA Fisheries), would have a portion of the water developed by an expanded Los Vaqueros Reservoir. It would provide that water to the South Bay Aqueduct (SBA) for delivery to Bay Area water agencies to repay the SWP and/or the CVP for export reductions called for by the EWA to protect and restore the Delta fisheries. Therefore, water that would have been delivered to SBA contractors by the SWP no longer must be delivered because that water supply requirement would be met by an expanded reservoir. This water would become EWA water by an amount equal to the annual total of expanded Los Vaqueros Reservoir water delivered to the SBA; this water could then be used to curtail pumping at the SWP facilities during periods determined (by the managing entity or entities) to best protect fish, such as delta smelt and winter- and spring-run chinook salmon, from impacts. No net increase in pumping from the Delta would occur. Improving delivered water quality is also part of this scenario – including improving the quality of water delivered to the SBA contractors and meeting or improving CCWD's internal salinity water quality target, as well as lowering the concentration of other constituents in water delivered to the SBA and CCWD.	This operating scenario is designed to illustrate the extent to which an expanded reservoir could meet the SBA water contractors respective water needs during droughts while also providing benefits to the EWA and improving delivered water quality to the Bay Area. As a first operational priority, an expanded Los Vaqueros Reservoir could provide high-quality, dry-year reliability supplies to the SBA contractors as an alternative to short-term water transfers and/or rationing. The amount of water potentially needed by each contractor has been developed by those contractors. As a second priority, water would be managed for the EWA, similar to Scenario #2. Improving delivered water quality is also part of this scenario – including improving the quality of water delivered to the SBA contractors and meeting or improving CCWD's internal salinity water quality target, and lowering the concentration of other constituents in water delivered to the SBA and CCWD.	This operating scenario differs from Scenario #3 in its inclusion of specific drought reliability benefits for CCWD. During dry periods (assumed to be all dry and critical years), when CCWD is experiencing shortages in its CVP supplies, the expanded reservoir would provide to CCWD up to 10,000 AF each year during an extended drought while also meeting all of the drought reliability needs of the SBA contractors. The water quality benefits to CCWD achieved in the base condition (Scenario #1) were preserved and the drought reliability benefits from Scenario #3 retained. Additional water that could be delivered for environmental purposes was then determined, similar to Scenario #3. The CCWD reliability needs were added to Scenario #3 to show the impact of increasing the CCWD demand from an expanded reservoir on the project's ability to develop environmental water and provide water quality benefits to the SBA contractors.

See Chapter 2 of the CALFED Los Vaqueros Reservoir Expansion Studies Planning Report, April 2004 for more information on the scenarios.

SECTION 8.0

Interim Reporting Metrics

A common set of reporting metrics was prepared to aid the consistent reporting of the interim Common Assumptions project specific analyses. Table 8-1 shows the common reporting metrics.

Figure 8-1 details the specific Delta stations corresponding to the Delta related metrics of EC, Bromide, DOC, Scour and Stage (see DSM2 setup memo attachment for further details)

Each project also prepared additional reporting metrics when necessary to present unique aspects of the specific scenarios. .

The following should be noted regarding the definition of reporting metrics in Table 8-1:

- Long Term is defined as the average quantity for the period of Oct 1922 - Sep 1994.
- Driest Periods is defined as the average quantity for the combination of periods of May 1928 - Oct 1934, Oct 1975 - Sep 1977, and Jun 1986 - Sep 1992.
- Water Quality and Other Delta related metrics are based upon the limited period of Oct 1975 - Sep 1991 (Driest Periods in these cases only cover the combined period of Oct 1975 - Sep 1977 and Jun 1986 - Sep 1992).
- Percentile is defined as the quantity at which a certain percentage of values is equal to or less than the value shown by the metric; differences are not shown for percentile information (i.e. the value associated with a 90th percentile is greater than 90% of the values in the period of record of the simulation)
- Minimum and Maximum are defined as the minimum and maximum for the period of record of the simulation

TABLE 8-1
Common Reporting Metrics for Interim Common Assumptions Model Runs

Water Supply Reliability			
	Sacramento Valley		
		CVP Ag (not including Settlement contracts)	Long Term Average and Driest Periods Contract Delivery (TAF/year)
		CVP M&I	Long Term Average and Driest Periods Contract Delivery (TAF/year)
	Bay Area		
		CVP Ag	Long Term Average and Driest Periods Contract Delivery (TAF/year)
		CVP M&I	Long Term Average and Driest Periods Contract Delivery (TAF/year)
		SWP M&I (including Article 21)	Long Term Average and Driest Periods Contract Delivery (TAF/year)
	San Joaquin Valley (not including San Joaquin River and its tributary's water users)		
		CVP Ag (including Cross Valley Canal, not including Exchange contracts)	Long Term Average and Driest Periods Contract Delivery (TAF/year)
		CVP M&I	Long Term Average and Driest Periods Contract Delivery (TAF/year)
		SWP Ag (including Article 21)	Long Term Average and Driest Periods Contract Delivery (TAF/year)
		Groundwater Banking	Long Term Average and Driest Periods Contract Delivery (TAF/year)
	South Coast		
		SWP M&I (Including Article 21)	Long Term Average and Driest Periods Contract Delivery (TAF/year)
	Total for All Regions		
		Ag, M&I, and Groundwater Banking	Long Term Average and Driest Periods Contract Delivery (TAF/year)
Ecosystem			
	Shasta Lake		Percentage of period that End-of-Sept Storage is less than 1.9 MAF
	Delta		

		X2 Location	February thru June Long Term Average and Driest Periods X2 Location (km from Golden Gate)
		Qwest	February thru June Long Term Average and Driest Periods Qwest flow (cfs)
		Delta Outflow	February thru June Long Term Average and Driest Periods Delta outflow (cfs)
	EWA		
		NOD	Long Term Average and Driest Periods Quantity Delivered to Delta Inflow (TAF/year)
		SOD	Long Term Average and Driest Periods Quantity Delivered to San Luis Reservoir (TAF/year)
	Environmental Programs (non-EWA)		Long Term Average and Driest Periods Quantity Used for Environmental Flows/Actions (TAF/year)
	Delta Water Quality		Long Term Average and Driest Periods Quantity Delivered to Delta for Outflow Augmentation (TAF/year)
	Level 4 Refuge		
		NOD	Long Term Average and Driest Periods Delivery to Refuges (TAF/year)
		SOD	Long Term Average and Driest Periods Delivery to Refuges (TAF/year)
Water Quality			
	San Joaquin River		
		Vernalis	Long Term Average, Driest Periods, and 90th Percentile Monthly EC (umhos/cm)
	Delta		
		Emmaton	Long Term Average, Driest Periods, and 90th Percentile Monthly EC (umhos/cm), and DOC (mg/L)
		Jersey Point	Long Term Average, Driest Periods, and 90th Percentile Monthly EC (umhos/cm), and DOC (mg/L)
	Bay Area		
		Old River at Rock Slough	Long Term Average, Driest Periods, and 90th Percentile Monthly EC (umhos/cm), Bromide (mg/l) and DOC (mg/L)
		Los Vaqueros Old River Intake	Long Term Average, Driest Periods, and 90th Percentile Monthly EC (umhos/cm), Bromide (mg/l) and DOC (mg/L)
		Los Vaqueros Middle River Intake (proposed)	Long Term Average, Driest Periods, and 90th Percentile Monthly EC (umhos/cm), Bromide (mg/l) and DOC (mg/L)
	Delta Export		

		Tracy PP	Long Term Average, Driest Periods, and 90th Percentile Monthly EC (umhos/cm), Bromide (mg/l) and DOC (mg/L)
		Banks PP	Long Term Average, Driest Periods, and 90th Percentile Monthly EC (umhos/cm), Bromide (mg/l) and DOC (mg/L)
Other			
	Delta Stage		
		Old River Head Barrier – Upstream	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		Old River Head Barrier – Downstream	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		Middle River at Mowry	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		Middle River Barrier – Upstream	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		Middle River Barrier – Downstream	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		Old River at Tracy Rd Bridge	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		Old River Barrier – Upstream	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		Old River Barrier – Downstream	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		GLC East Barrier – Upstream	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		GLC West Barrier – Upstream	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
		GLC West Barrier – Downstream	Minimum, 10th Percentile and Maximum Change in Monthly Minimum Stage (ft NGVD)
	Delta Scouring		
		Clifton Court Forebay Intake	Maximum and 90th Percentile Monthly Maximum Velocity (ft/s)
		Los Vaqueros Old River Intake	Maximum and 90th Percentile Monthly Maximum Velocity (ft/s)
		Los Vaqueros Middle River Intake (proposed)	Maximum and 90th Percentile Monthly Maximum Velocity (ft/s)

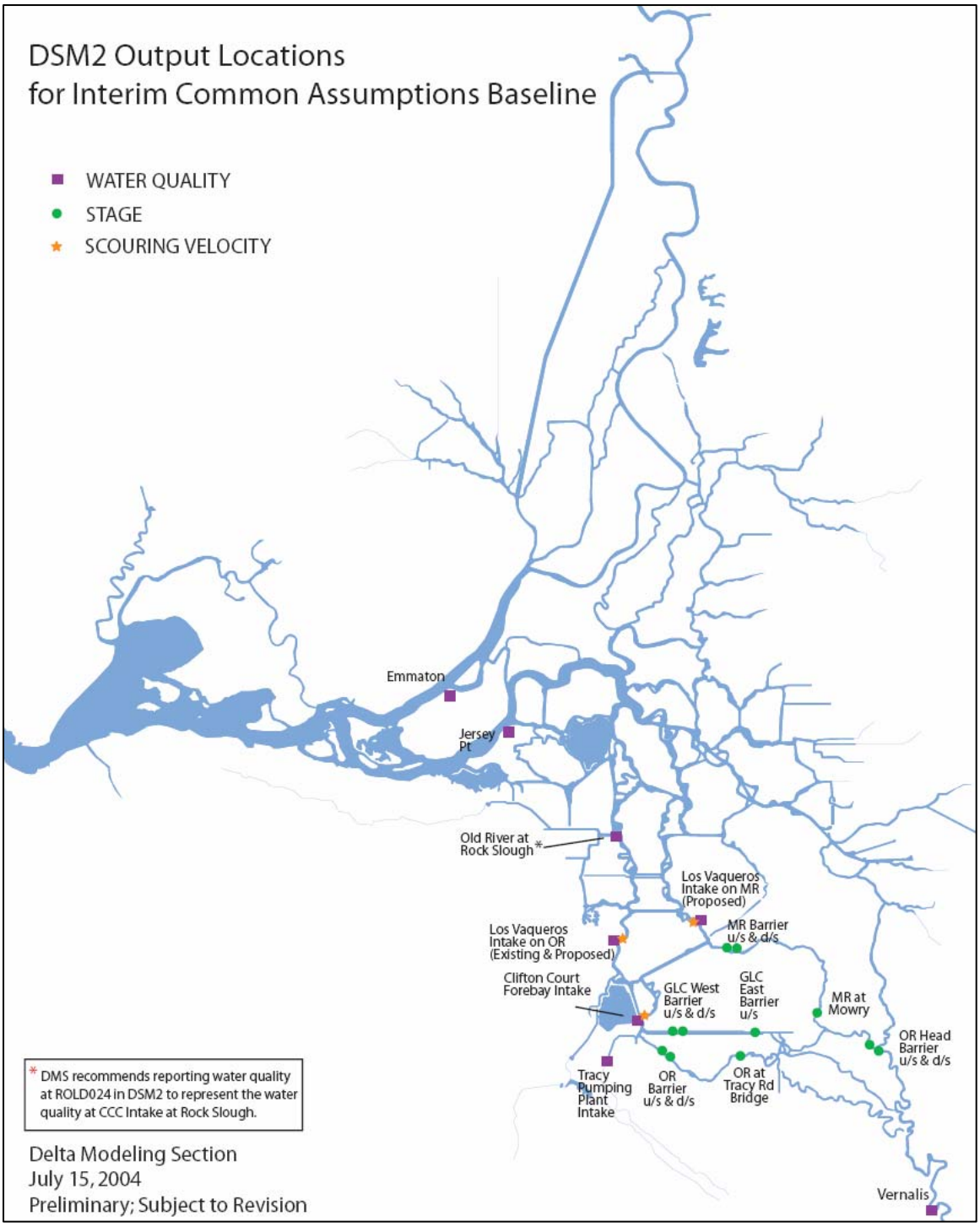

FIGURE 8-1
Locations for DSM2 Based Delta Reporting Metrics

SECTION 9.0

Consistency Checks Protocol/Process

Five technical teams were involved in the interim update of the CALFED Bay-Delta Program Water Supply Investigations. There is a project technical team as part of each project team, and then there is the Common Assumptions technical team. Each project technical team, four in all, was responsible for developing their own project specific analyses (CALSIM II and DSM2).

In order to establish consistency between these analyses, the project teams coordinated the definition of a common model package, common assumptions, common analytical processes (to the extent possible), common characterization of potential benefits of the projects (to the extent possible), and common reporting metrics. The Common Assumptions technical team coordinated with each project technical team as well as all the management teams to define these common products. They are presented in sections 2.0, 3.0, 5.0, 6.0 and 8.0 (table 8.1 and figure 8.1 specifically).

Defining packages, assumptions, analytical processes and outputs is only the first step in establishing consistency and comparability across the project analyses. In addition, the products need to be correctly implemented, verified and reported in order to insure that consistency and comparability have been truly achieved. In the case of this interim update, there were some limits in both definition and implementation of these common packages. These limits arose primarily out of limitations on time and resources, but also to differences in approaches that could not be resolved without further management and policy guidance. These issues are identified and discussed in this section.

The Common Assumptions technical team developed the CALSIM II and DSM2 baseline model runs. To insure that these baselines were adequate for use in the interim project scenario model runs, the baselines were provided to and reviewed by the project technical teams. Information relevant to the development of the CALSIM II and DSM2 baselines is documented in section 4.0.

As the project technical teams developed the project scenario model runs, all technical teams continued to meet on a weekly basis to identify, discuss and resolve issues as they arose. The Common Assumptions technical team organized and facilitated the coordination process. The coordination process occurred in three phases: 1) each project technical team presented the details of its assumptions, scenarios, and analyses; 2) each project technical team presented products of its interim analysis and reported on specific issues as they were resolved; 3) each project technical team developed reporting metric results and worked to resolve issues or clarifications as appropriate.

Each project team was responsible for its own technical work. Issues specific to a project or verification of the results of a project's analysis were not addressed by the Common Assumptions technical team and are not addressed in this document. This document is limited to just those issues specific to the technical coordination effort and the reporting of results in the interim update progress report.

The following table (Table 9-1) lists the issues identified in the Consistency Checks Process. The table briefly describes each issue, to what analysis it pertained to and how it was addressed. Following the table, according to the organization of this table, a more detailed description is provided.

TABLE 9-1
Issues List for Interim Common Assumptions Model Runs

Item #	Regarding	Issue	Resolution
1.	Common	Definition of Interim Common Model Package assumptions, models, analytical procedures and protocols	Interim common model documentation prepared and agreed on by project teams 6/7/2004
2.	Common	Implementation and review of CALSIM II and DSM2 interim baselines (monthly)	Completed by CA team, CALSIM release 6/30/2004, DSM2 release 7/20/2004
3.	LVE	Consistency of LVE study 1B results and CALSIM II and DSM2 interim baselines	LVE study 1B results adopted in baseline (CCWD/Los Vaqueros reservoir diversion time-series)
4.	Shasta	Shasta Lake Enlargement study scenarios handle unused Federal share (as defined under 1986 COA) differently than other project analyses (other projects are constrained to not impact SWP Delta/Article 21 operations)	The CA team met with Shasta and NODOS teams to review issues – no resolution in interim modeling
5.	Common	Level of refinement of analyses varies from project to project	No resolution in interim modeling – reporting metrics not detailed enough to reveal weaknesses in studies
6.	Common	Definition of process for QA/QC of CALSIM II project specific analyses	No formal CALSIM II QA/QC process/checklist established in interim, only cursory review and discussion of analyses and results performed, reliance on project team internal QA/QC process
7.	Common	Definition of process for QA/QC of DSM2 project specific analyses	DSM2 QA/QC process/checklist established, implemented in project team internal QA/QC process
8.	Common	Determination and Implementation of B2 operations not reviewed/accepted by Reclamation, USFWS	No resolution in interim modeling – NODOS and Shasta models interact with B2 operations/accounting
9.	Common	Use of conveyance for water transfers, EWA and appropriate JPOD priority within hierarchy of priorities	No resolution in interim modeling – CVP and SWP export increases may be greater than if these uses were modeled in analyses
10.	In-Delta	In-Delta requires daily operations analysis for the Delta, therefore a daily CALSIM II and DSM2 interim baseline was developed	In-Delta team completed CALSIM II daily baseline 9/22/04, (resolution still in progress) CA team coordinated with In-Delta team to implement consistent B2, SDIP, Intertie, JPOD operations in daily model

TABLE 9-1
Issues List for Interim Common Assumptions Model Runs

Item #	Regarding	Issue	Resolution
11.	In-Delta	Inconsistencies in monthly and daily modeling need to be identified and addressed in reporting of results	In-Delta and CA team drafting a document to describe the difference between modeling approaches
12.	LVE	Los Vaqueros Reservoir analysis dependent on full period (73-yr) Delta water quality simulation to define Chloride concentrations for LVE operations logic	Common model package uses 16-yr DSM2 (with adjusted astronomical tide) – LVE uses 73-yr (with repeating tide) – no resolution in interim modeling. 16-year DSM2 is used to determine LVE Delta affects.
13.	LVE	Los Vaqueros Reservoir analysis was conducted with a full period (73-yr) repeating tide version of DSM2 - common model package uses 16-yr DSM2 with adjusted astronomical tide	No resolution in interim modeling - DWR DMS drafting document to describe difference between modeling approaches/potential difference in results
14.	LVE	Past Los Vaqueros Reservoir analyses were conducted with a DSM2 repeating tide version that used temporary barriers – common model package uses permanent barrier operations	LVE team implemented a consistent permanent barrier operation into repeating tide version of DSM2 – DWR DMS reviewed and concurred on implementation
15.	LVE	Los Vaqueros Reservoir analysis used project specific Chloride conversion equations to convert DSM2 EC data for use in the LVE analysis – common reporting metrics do not report Chloride	Chloride conversion equations being reviewed by DWR DMS - need for resolution uncertain - no resolution at this time – DWR DMS working with LVE team to document
16.	LVE	Los Vaqueros Reservoir analysis used western end of Rock Slough for defining intake quality at CCWD Rock Slough intake – DWR DMS does not report Rock Slough quality at this location, but at the location of Old River and Rock Slough	Need for resolution uncertain - No resolution at this time – DWR DMS working with LVE team to document. If needed the LVE team currently plans to switch to the DWR station.
17.	Common	Some projects have unique components which are not represented explicitly in CALSIM – In these cases reporting metrics calculations need to be adjusted so that metrics are consistent between analyses	Issues resolved – refer to footnotes on reporting metrics for more information
18.	Common	Reporting metrics for EWA are unique for each project	No resolution at this time – results will be footnoted to denote context
19.	Common	Initial conditions for reservoir storage volume is subjectively set	Individual projects use their own discretion
20.	Common	Number of projects apply supplemental demands as part of their definition of potential benefits; there is concern regarding the influence of this on the comparability of results between projects	No resolution at this time
21.	LVE	Los Vaqueros Reservoir analyses were conducted with a DSM2 repeating tide version – upon review by DWR DMS, differences in Delta Cross Channel operations (between the DSM2 versions) were identified	LVE team implemented a consistent Delta Cross Channel operation into repeating tide version of DSM2 – DWR DMS reviewed and concurred on implementation – differences are being reviewed and documented

TABLE 9-1
Issues List for Interim Common Assumptions Model Runs

Item #	Regarding	Issue	Resolution
22.	Common/ LVE	Without integrated analysis of EWA operations, export changes associated with supplying EWA with new water supplies are not assessed in the analyses – this has a significant potential effect of CALSIM and DSM2 modeling	No resolution at this time – metrics that could change significantly, if EWA was included in the analysis, will be footnoted
23.	LVE	Los Vaqueros Reservoir scenarios assume that impacts to CVP/SWP SOD deliveries, due to unintended storage impacts, would be addressed through use of Los Vaqueros supplies through the South Bay Aqueduct; CALSIM does not recognize this operation and therefore shows potential impacts to CVP and SWP SOD deliveries	No resolution at this time – the Common Assumptions and Los Vaqueros teams investigated a number of methods for addressing the issue – The Los Vaqueros team decided to report results showing impacts to CVP and SWP SOD deliveries and provide interpretation in the supporting document clarifying how the impacts would be eliminated in operation of Los Vaqueros

Following the order of the previous table (Table 9-1), a more detailed description of each issue is provided here:

1. Definition of Interim Common Model Package assumptions, models, analytical procedures and protocols. Interim common model documentation was prepared and agreed on by project teams (early draft of this document, dated June 7th, 2004). This document is an updated version of the June 7th document. The Common Assumptions process relied on communication between the technical teams involved, to insure consistency and disclosure of issues. This document served to establish the specifics of coordinating the technical analyses and reporting the outcome of the coordination process. All issues discussed in the technical coordination process are presented in this document.

2. Implementation and review of CALSIM II and DSM2 interim baselines (monthly). This was completed by the CA team. Initial versions of the baseline modeling were reviewed through the technical teams involved and revisions were made based upon this review – one such change is documented in item #3. The CALSIM release occurred on June 30th, 2004; the DSM2 release occurred on July 20th, 2004.

3. Consistency of LVE study 1B results and CALSIM II and DSM2 interim baselines. Based upon a preliminary version of the CALSIM baseline, the Los Vaqueros team established a baseline operation (study 1B) for the existing Los Vaqueros Reservoir. It was decided to revise the interim Common Assumptions baseline to agree with the Los Vaqueros baseline to insure that the reporting metrics for CALSIM II and DSM2 results would be consistent. This change is noted in section 4.0. The Los Vaqueros team then did additional work to iterate and verify the operation of their baseline operation (study 1B) before doing project scenarios. In future modeling,

Los Vaqueros Reservoir will be dynamically modeled in CALSIM II. Therefore, in subsequent baselines, the Los Vaqueros Reservoir operation will be included in CALSIM II and reiteration will not be required.

4. Shasta Lake Enlargement study scenarios handle unused Federal share (as defined under 1986 COA) differently than other project analyses (other projects are constrained to not impact SWP Delta/Article 21 operations). In the briefing discussions of the Shasta Lake Enlargement project, it was identified that the filling of the new storage capacity with Delta excess flows was prioritized differently in the Shasta analysis than in other projects' analyses. For example, in the NODOS analysis, Delta excess was defined as the excess flow above the desired flow at the Navigational Control Point (NCP) and the excess flow above the required Delta salinity and flow standards, that could not be pumped for delivery to CVP or SWP or storage in San Luis by either Tracy PP and Banks PP, and could not be pumped for SWP Article 21 delivery by Banks PP. For the Shasta Lake analysis, the enlarged component of Shasta Lake was assumed to be able to store any water that was not required by CVP regulatory or delivery obligations and required or desired as Tracy PP pumping. In response to this concern, the Common Assumptions team met with the Shasta and NODOS teams to review issues – an adequate resolution was not reached. In the subsequent results of the Shasta analysis, impacts to SWP deliveries are evident (even though they are not large). In future modeling, further efforts will be made to clarify the rational and nature of the difference or resolve the difference through changes in the analyses.

5. Level of refinement of analyses varies from project to project. In the interim update process, due to limited time and resources, each project team agreed to do limited updates of existing project analyses. This included updating the version of CALSIM II used (all), in some cases updating two projects to consistent assumptions (Shasta Lake Enlargement and Los Vaqueros Reservoir Enlargement), and in one case significant modifications of the analysis (In-Delta Storage). No consistent level of refinement was targeted for any of the project analyses. Therefore, the level of refinement of some analyses (such as Los Vaqueros Reservoir Enlargement) is substantially better than others. In the interim progress report, the level of detail presented in the reporting metrics does not merit significant refinement in the analysis. Upon review, where there is concern in the presentation of results, the progress report will be footnoted. In future modeling, it is expected that measures will be taken to insure consistent level of refinement in the analyses, so that detailed reporting will not be limited.

6. Definition of process for QA/QC of CALSIM II project specific analyses. In order to accomplish consistency of results (as noted in #5), one requirement is a standard QA/QC protocol. No formal CALSIM II QA/QC process/checklist was established for the interim modeling. Only cursory review and discussion of analyses and results was performed. The Common Assumptions team relied on each project team's internal QA/QC process. Each project team was responsible for its own

technical work. Issues specific to a project or verification of the results of a project's analysis were not addressed by the Common Assumptions technical team and are not addressed in this document. In the case of CALSIM II, developing a standard QA/QC process/protocol is an extensive effort, given that development and interpretation of CALSIM II simulations is specific to each project, and is often conducted by subjective means. In future modeling activities, specific QA/QC guidelines and procedures will be prepared and implemented to insure the verification and testing of each project analyses results.

7. Definition of process for QA/QC of DSM2 project specific analyses. In order to accomplish consistency of results (as noted in #5), one requirement is a standard QA/QC protocol. In the interim update process, a DSM2 QA/QC process/checklist was established and implemented in each project team's internal QA/QC process.

8. Determination and Implementation of B2 operations not reviewed/accepted by Reclamation, USFWS. All projects, but most significantly, NODOS and Shasta Lake Enlargement may interact significantly with B2 operations/accounting. In the interim modeling, impacts to the CVPIA B2 operations from the effects of new storage projects were allowed. Reclamation's Central Valley Operations (CVO) Office and Fish and Wildlife Service have not reviewed the results of these analyses. There has been no resolution of this issue in the interim modeling. Issues regarding the interaction between new storage projects and CVPIA B2 operations are being discussed with Reclamation and USFWS and will be resolved in future modeling. Any future change in this regard will have the greatest impact on the analysis of North-of-the-Delta Offstream Storage and Shasta Lake Enlargement projects.

9. Use of conveyance for water transfers, EWA and appropriate JPOD priority within hierarchy of priorities. In the interim analyses, the use of Tracy PP and Banks PP Delta conveyance by entities that are pursuing long term water transfers has not been considered. However, the dedicated 500 cfs Banks PP capacity dedicated for EWA from July through September has been reserved. The related changes in available capacity and impacts on the supplies under present and future water transfer agreements have not been addressed. There is no resolution of this issue in the interim modeling. Water transfers will be characterized and implemented in future Common Assumptions modeling. This change will have the greatest impact on the analysis of increased SWP, CVP and EWA water supplies.

10. In-Delta Storage requires daily operations analysis for the Delta, therefore a daily CALSIM II and DSM2 interim baseline was developed. As documented in Section 4.0 and 5.0, the In-Delta Storage analysis required a daily version of the CALSIM II and DSM2 baseline. The In-Delta Storage project analysis required daily Delta operations in the implementation of constraints on the project. The level of effort required to convert all other analyses to a daily model was significantly more than the time allowed for this update. Every effort was made to achieve a consistent set

of assumptions and implementation of assumptions between the daily and monthly modeling. Changes were required for the daily operations model (DOM) to address inconsistencies with the monthly model. The most significant change was the use of predetermined CVPIA B2 operations. Others include revisions to the CVP and SWP delivery logic and implementation of the South Delta Improvements Program (SDIP), the Delta Mendota Canal/California Aqueduct Intertie and joint-point-of-diversion (JPOD) operations. These changes were implemented into the DOM. The In-Delta Storage team completed a CALSIM II daily baseline (initial 9/22/04, QA/QC resolution still in progress).

11. Inconsistencies in monthly and daily modeling need to be identified and addressed in reporting of results. Even with the resolution of significant inconsistencies between daily and monthly analyses (as noted in item #10), there remain issues of inconsistency between these two modeling approaches specifically because one is daily and the other is monthly timestep based. For the interim modeling, the In-Delta Storage and Common Assumptions teams are drafting a document explaining and contrasting the daily and monthly approaches. This document will be used to support consistent interpretation of results between these two types of analyses. For future modeling, the Common Assumptions team is investigating solutions both in regard to consistency in the analyses as well as reporting metrics between daily and monthly analyses.

12. Los Vaqueros Reservoir analysis dependent on full period (73-yr) Delta water quality simulation to define Chloride concentrations for LVE operations logic. The Los Vaqueros Reservoir Enlargement team requires full period (73-years) Delta water quality data (Chloride concentrations at Los Vaqueros Reservoir and CCWD intake locations) for their analysis. The standard DWR Delta Modeling Section DSM2 package, (adopted by Common Assumptions as the interim model DSM2 model) is an adjusted astronomical tidal operation for a 16-year simulation period (1976-1991). The adjusted astronomical tide version of DSM2 is not yet available for more than 16 years. This difference in time period requirements was recognized at the beginning of the interim update process. As shown in figure 5-6, the Los Vaqueros uses the older repeating tide version of DSM2 with a 73-year period of record in the analysis. In future modeling, the Common Assumptions team will select a version of DSM2 that can use the full period (73-years) for analysis.

13. Los Vaqueros Reservoir analysis was conducted with a full period (73-yr) repeating tide version of DSM2 - common model package uses 16-yr DSM2 with adjusted astronomical tide. As noted in figure 5-6 and described in item #12, the Los Vaqueros Reservoir Enlargement team used an older repeating tide version of DSM2 with a 73-year period of record in its analyses. In addition, the Los Vaqueros team, in order to report DSM2 results consistently, with all other projects' analyses, has done additional CALSIM II and DSM2 (16-7r adjusted astronomical version) modeling that conforms to the Common Assumptions baseline models. For the interim, depending on the reporting metric the Los Vaqueros team will present both types of DSM2 results with footnotes identifying the source. To support this

reporting, the Common Assumptions team, with the DWR DMS, is drafting a document to describe difference between DSM2 modeling approaches and the potential impact on Los Vaqueros Reservoir Enlargement results. In future modeling, the Common Assumptions team will investigate the feasibility of extending the adjusted astronomical tide version of DSM2 to the full 73-year period for use in the common baselines and throughout project specific modeling.

14. Past Los Vaqueros Reservoir analyses were conducted with a DSM2 repeating tide version that used temporary barriers – common model package uses permanent barrier operations Previous Los Vaqueros team's analyses used "temporary" south Delta barrier operations as part of the older repeating tide version of DSM2. The Common Assumptions Future No Action assumption is for permanent South Delta barriers (in conjunction with SDIP assumptions) as currently modeled by DWR Delta Modeling Section. The Los Vaqueros team modified its DSM2 version to use consistent permanent barrier operations. The DWR Delta Modeling Section reviewed and concurred with the permanent barrier operations and their consistency to the Common Model Package.

15. Los Vaqueros Reservoir analysis used project specific Chloride conversion equations to convert DSM2 EC data for use in the LVE analysis – common reporting metrics do not report Chloride. DSM2 water quality results are outputted as electrical conductivity values (EC). The Los Vaqueros team has used project specific salinity conversion equations for the CCWD and Los Vaqueros intake points to convert from EC to Chloride concentrations. These Chloride conversion equations are different from what DWR has been using. For the Common Reporting metrics, Chloride values are not required. In the interim, in project specific reporting metrics, Los Vaqueros will report values based on its customized Chloride conversion equations. In the interim, any areas of concern regarding these Chloride conversion equations will be documented. In future modeling DWR and the Los Vaqueros team will discuss further the use of various conversion equations and decide upon a consistent conversion process.

16. Los Vaqueros Reservoir analysis used western end of Rock Slough for defining intake quality at CCWD Rock Slough intake – DWR DMS does not report Rock Slough quality at this location, but at the location of Old River and Rock Slough. This issue is related to item #15. The need for resolution is uncertain. In the interim, any areas of concern regarding the use of DSM2 results for these locations will be documented. In future modeling DWR and the Los Vaqueros team will discuss further the use of these locations and decide upon validity of locations for use in specific analyses and reporting of results. The LVE team is willing to move the location of the Rock Slough DSM2 quality measurement.

17. Some projects have unique components which are not represented explicitly in CALSIM – In these cases reporting metrics calculations need to be adjusted so that metrics are consistent between analyses. All issues have been resolved, reporting

metrics reports are footnoted to identify when adjustments have been applied to CALSIM results.

18.Reporting metrics for EWA are unique for each project. The reporting of EWA benefits was discussed at many points in the technical coordination process. North-of-the Delta Offstream Storage, Los Vaqueros Reservoir Expansion, and In-Delta Storage may provide benefits to EWA, but each at different locations. No acceptable means of converting these benefits to one metric was determined. For the interim, values will be footnoted to distinguish the differences that exist in the reporting metrics. In future modeling, EWA operations will be part of the CALSIM II model and the various contributions of the projects impacts on uniform EWA metrics can be reported instead.

19.Initial conditions for reservoir storage volume is subjectively set. Individual projects use their own discretion. Need for resolution/agreement on this is uncertain. No resolution at this time.

20. Number of projects apply supplemental demands as part of their definition of potential benefits; there is concern regarding the influence of this on the comparability of results between projects. The potential benefits defined in Section 6.0 for Level 4 Refuges (LVE, IDS, NODOS), Rice Decomposition Water (NODOS), Groundwater Recharge (IDS, NODOS) are examples of supplemental demands. In the coordination process, issues were raised regarding the Kern GW Recharge assumptions made by the NODOS and In-Delta Storage teams. Concern over whether or not the levels of recharge were appropriate and whether facilities were available were raised. Subsequently, documentation has been provided, to the Common Assumptions team, detailing the basis of these assumptions. While the assumptions used to constrain each of these supplemental operations may be appropriate, the use of supplemental demands may diminish the comparability results between individual projects. In the interim, these potential benefits will be footnoted as "supplemental" when they are of significant value in the reporting metrics. In future modeling, these supplemental demands will be redefined so that they are consistently recognized in "pre-project" and "with-project" conditions.

21. Los Vaqueros Reservoir analyses were conducted with a DSM2 repeating tide version – upon review by DWR DMS, differences in Delta Cross Channel operations (between the DSM2 versions) were identified. LVE team implemented a consistent Delta Cross Channel operation into repeating tide version of DSM2 – DWR DMS reviewed and concurred on implementation – differences are being reviewed and documented.

22. Without integrated analysis of EWA operations, export changes associated with supplying EWA with new water supplies are not assessed in the analyses – this has a significant potential effect of CALSIM and DSM2 modeling. No resolution at this

time – metrics that could change significantly, if EWA was included in the analysis, will be footnoted.

23. Los Vaqueros Reservoir scenarios assume that impacts to CVP/SWP SOD deliveries, due to unintended storage impacts, would be addressed through use of Los Vaqueros supplies through the South Bay Aqueduct; CALSIM does not recognize this operation and therefore shows potential impacts to CVP and SWP SOD deliveries. No resolution at this time – the Common Assumptions and Los Vaqueros teams investigated a number of methods for addressing the issue – The Los Vaqueros team decided to report results showing impacts to CVP and SWP SOD deliveries and provide interpretation in the supporting document clarifying how the impacts would be addressed in operation of Los Vaqueros.