Existing Works — Modeled Water Management Alternatives

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Study Organization	Water Management Components																					
	UPPER TUOLUMNE SYSTEM (including local SFPUC system)							LOWER TUOLUMNE SYSTEM (including MID/TID)				OUTSIDE / BA Y-DEL TA SYSTEM (Water and Power Options)						OTHER MODELING ASSUMPTIONS				
	O'Shaughnessy (TAF)	Cherry / Eleanor Storage and Recperation (TAF)	New / Enlarged Storage on Tuolumne River (TAF)	San Joaquin Pipeline Capacity (CFS)	Calaveras Reservoir Volume (TAF)	Other New Local Storage	Conservation and Efficiency Measures (TAF)	Don Pedro Intertie Volume (CFS)	Groundwater Storage Volume (TID/MID) (TAF)	Other New / Enlarged Storage	Ag to Urban Water Transfers	Calif. Aqueduct Intertie to SFPUC System	Los Vaqueros Reservoir Enlargement	Shasta Reservoir Enlargement	Other Storage Proposals	Ag to Urban Water Transfers	Power Replacement	Demand (TAF)	Calaveras Reservoir Pump Volume (CFS)	Calaveras Reservoir Output Capacity (CFS)	Sunol Valley Water Treatment Plant Capacity (MGD)	Groundwater Peak Recharge / Extraction Rates (MID/TID) (CFS)
	1A	1B	1C	1D	1E	1F	1G	2A	2B	2C	2D	3A	3B	3C	3D	3E	3F	1	1	1	1	2
ENVIRONMENTAL DEFENSE																						
Water Supply Replacement Alternatives																						
Existing Demand Scenarios																						
Existing Conditions Base	360	300		465	97			0	0									290	0	143	160	0
Surface Storage Replacement	0	300		542	420			407	0									290	200	600	400	0
Groundwater Exchange Replacement	0	300		542	97			407	400									290	0	143	400	200
Transfer Replacement	0	300		542	97			407	0		Yes							290	0	143	400	0
Delta Source Transfer Replacement	0	300		542	97			407	0							Yes		290	0	143	400	0
Future Demand Scenarios																						
Potential Future Conditions Base, CIP	360	300		542	420			407	0									339	200	600	240	0
Transfer Replacement	0	300		542	420			407	0		Yes							339	200	600	400	0
Delta Source Transfer Replacement	0	300		542	420			407	0							Yes		339	200	600	400	0
Groundwater Exchange Replacement	0	300		542	420			407	400									339	200	600	400	200
Groundwater Exchange and Transfer Replacements	0	300		542	420			407	400		Yes							339	200	600	400	200
Don Pedro Intertie & Hetch Hetchy Run-of-River Diversions	0	300		542	97			407	0									339	0	143	400	0
Cherry / Eleanor Intertie & Hetch Hetchy Run-of-River Diversions	0	300		542	97			0	0									339	0	143	400	0
Bay-Delta System Alternatives																						
Existing Demand Scenarios																						
Existing Conditions Base	360	300		465	97													290	0	143	400	
CA Aqueduct Intertie	0	300		465	97							Yes						290	0	143	400	
Future Demand Scenarios																						
Potential Future Conditions Base, CIP	360	300		542	97													339	0	143	400	
CA Aqueduct Intertie, Intermediate Calaveras Expansion	0	300		542	260							Yes						339	200	200	400	
CA Aqueduct Intertie, Full Calaveras Expansion	0	300		542	420							Yes						339	200	200	400	
CA Aqueduct Intertie	0	300		542	97							Yes						339	0	143	400	
UC DAVIS																						
Base	360			465	91													238				
2020 Level Demand Scenarios																						
O'Shaughnessy, with filtration avoidance	360			465	91													238				
O'Shaughnessy, without filtration avoidance	360			465	91													238				
New Don Pedro Intertie, no O'Shaughnessy, without filtration avoidance	0			465	91			Yes										238				
2100 Level Demand Scenarios																						
O'Shaughnessy, without filtration avoidance	360			465	91													259				
New Don Pedro Intertie, no O'Shaughnessy, without filtration avoidance	0			465	91			Yes										259				
Climate Change (O'Shaughnessy, without filtration avoidance)																						
Climate Change (no O'Shaughnessy, without filtration avoidance)								Yes														

Note: Values in this table are modeling assumptions used by ED and UCD. Modeling assumptions were not reviewed for accuracy or acceptability by stakeholders, agencies and the public.

THE HETCH HETCHY SUMMARY

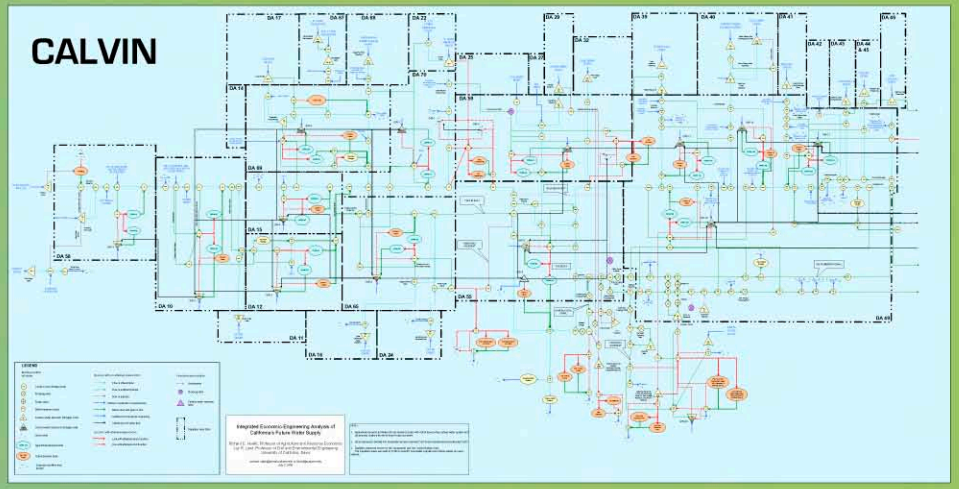
STATE OF CALIFORNIA resources AGENCY

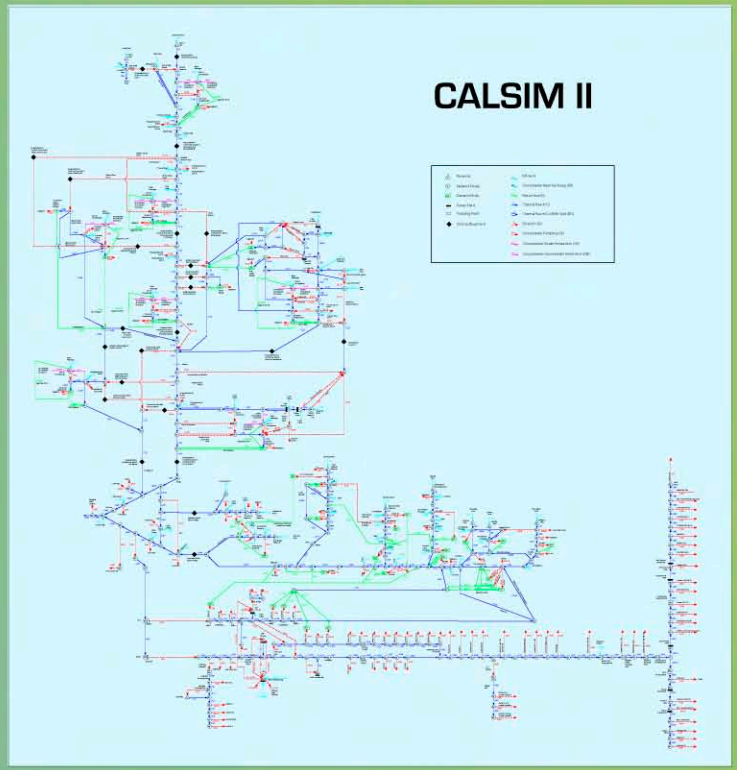
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
DEPARTMENT OF PARKS AND RECREATION

Operations Modeling

HETCH HETCHY RESTORATION STUDY
GENERAL CHARACTERISTICS AND MODEL ASSUMPTIONS FOR PAST OPERATION STUDIES

	U.C. Davis	Environmental Defense
MODEL CHARACTERISTICS		
Model Name/date	CALVIN 2001	TREWSSIM 2004
Technique		
Simulation or Optimization	Optimization	Simulation (based on CALSIM)
Foresight		
Use of foresight	Yes	No
Flow sequence		
Historic flow sequence or forecasted flow	Forecasted flow	Historic flow
Water Allocation Basis		
Economic or water rights	Economic	Water rights
Period of Simulation	1922-1993 (72 years)	1922-1994 (73 years)
Level of Development	2020 Level based on DWR B160-98, 2100 (Landis and Riley, 2002 cited in Pulida-Velasquez and Jenkins, 2002)	2020 Level Based on DWR B160-98
Institutional Constraint	No	Yes
BAY-DELTA SYSTEM ASSUMPTIONS		
Water Quality Standards	1995 Water Quality Control Plan, present and assumed for future (Based on DWRSIM September 1997 Study 514)	1995 Water Quality Control Plan, present and assumed for future.
SWP Banks Pumping Plant	Based on DWRSIM September 1997 Study 514	6,680 cfs
CVP Tracy Pumping Plant	Based on DWRSIM September 1997 Study 514	4,200 cfs plus diversions upstreams of DMC constriction
Trinity River Diversions	Based on DWRSIM September 1997 Study 514	Interm Minimum Flow below Lewiston Dam (369-453 TAF/Yr)
CVPIA Requirements	Pre-CVPIA, no CVPIA actions	CVPIA actions included
American River Diversions	SWRCB D-893	SWRCB D-893 and USFWS discretionary use of CVPIA 3406(b)(2)
EWA	Pre-EWA, no EWA actions	EWA actions included in baseline
Regulatory flows	Environmental flows in the Sacramento-San Joaquin Delta system are simplified. Flows for river reaches are not modeled explicitly but taken from DWRSIM September 1997 Study 514.	"OCAP 2001 with EWA" study used in baseline. Study assumes compliance with regulatory/environmental objectives.
Vernalis Adaptive Management Program	VAMP actions not included	VAMP actions included
Water Transfers	Scarcity driven transfers allocated economically	No water transfers
HETCH HETCHY RELATED ASSUMPTIONS AND FACILITIES		
Existing Facilities	O'Shaughnessy, Hetch Hetchy aqueduct, New Don Pedro, Cherry and Eleanor reservoirs, SWP and CVP systems	O'Shaughnessy, Hetch Hetchy aqueduct, New Don Pedro, Cherry and Eleanor reservoirs, SWP and CVP systems
Alternatives Investigated	**2020 Level** ★ O'Shaughnessy with filtration avoidance ★ O'Shaughnessy without filtration avoidance ★ New Don Pedro Intertie without O'Shaughnessy, without filtration avoidance ★ O'Shaughnessy, Hetch Hetchy aqueduct, New Don Pedro, Cherry and Eleanor reservoirs, SWP and CVP systems **2100 Level** ★ O'Shaughnessy without filtration avoidance ★ New Don Pedro Intertie without O'Shaughnessy, without filtration avoidance ★ Climate Change, O'Shaughnessy without filtration avoidance ★ Climate Change, no O'Shaughnessy, without filtration avoidance	**Water Supply Replacement** **Existing Demand (2004)** ★ Base with O'Shaughnessy ★ Without O'Shaughnessy, Surface storage replacement, Groundwater Exchange, Transfer replacement **Future Demand (2030)** ★ OP with O'Shaughnessy ★ Without O'Shaughnessy, Transfer replacement, Groundwater Exchange, Groundwater and Transfer ★ Don Pedro Intertie and Hetch Hetchy Run-of-River diversion ★ Cherry/Eleanor Intertie and Hetch Hetchy Run-of-River diversion **Bay-Delta System Alternatives** ★ Cal Aqueduct Intertie with and without expanded S.J. Pipeline ★ Cal Aqueduct Intertie with intermediate and full Calaveras Expansion
Assumed Future Facilities	Unlimited desalination facilities, Urban wastewater recycling, Lower Cherry Creek, San Joaquin Pipeline, Don Pedro Intertie	Expanded Calaveras Reservoir, San Joaquin Pipeline, SWP/CVP aqueduct Intertie, Don Pedro Intertie, Cherry Lake Intertie
Demands		
TID/MID	Water Rights	Water Rights
Bay Area		
City of San Francisco and others	(TAF) 2020 2100 SFPUC 238 259 SCV 656 927 CVPM(urban) 545 1773 CVPM(ag) 5259 4509	(TAF) Current 2030 SFPUC 290 339
Operations		
Tuolumne River		
Minimum Flow at Lagrange Bridge	SANJASM	FERC 2299-024, 1995 (Settlement Agreement)
Flow Objective for Power	FERC 2299-024 Settlement Agreement	FERC 2299-024 Settlement Agreement
Change in Power Operations	Kirkwood Plant Eliminated, Holm and Moccasin reduced output	Thermal Plants, Cherry Intertie
Flow objective for Fisheries	FERC 2299-024, 1995 (Settlement Agreement)	FERC 2299-024, 1995 (Settlement Agreement)
Flood Control	No	30 TAF flood space in Don Pedro
TID/MID Water Allocations	Water Rights	Water Rights
CVP Water Users		
Settlement and Exchange	CALVIN Economic Allocations	100% (75% in Critical years)
Refuges	Level 2 Refuge Water Assumed (pre-CVPIA), except 2100 level demand where some Level 4 assumed. (UCD Study, page 20)	100% (75% in Critical years)
Agriculture	CALVIN Economic Allocations	100% - 0% based on supply (Allocations are reduced due to D1640 and 3406(b)(2) allocations related export restrictions)
Municipal & Industrial	CALVIN Economic Allocations	SFPUC California aqueduct link given first priority for South of Delta Deliveries
SWP Water Users		
South of Delta	CALVIN Economic Allocations	Based on supply
City of San Francisco and Other Water Allocations	CALVIN Economic Allocations	SFPUC local storage equals combined capacities for Calaveras, San Antonio, San Andreas, Crystal Springs and Pilarcitos reservoirs.





THE HETCH HETCHY STUDY

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