

State of California
The Resources Agency

DEPARTMENT OF WATER RESOURCES
Division of Operations and Maintenance

STATE WATER PROJECT ANNUAL REPORT OF OPERATIONS 2009



January 2016

Edmund G. Brown Jr.
Governor
State of California

John Laird
Secretary for Resources
The Resources Agency

Mark Cowin
Director
Department of Water Resources

This Annual Report of Operations for the State Water Project (SWP) has been published since 1974. The SWP Annual Reports have been made available on the Internet at www.water.ca.gov/swp. It provides the State Water Service Contractors, public agencies, consultants, and others with the daily and monthly status of the Project's water and power operations.

Printed copies of these reports may be available for a fee.:
For details, please contact:

State of California
DEPARTMENT OF WATER RESOURCES
P.O. Box 942836
Sacramento, CA 94236-0001

Or call DWR Publications Desk at (916) 653-1097.

Please direct questions and comments regarding the contents of this report to the Regulatory Compliance and Reporting Branch, Reporting Section at (916) 574-2677.

State of California
EDMUND G. BROWN JR., Governor

The Resources Agency
JOHN LAIRD, Secretary for Resources

Department of Water Resources
MARK COWIN, Director

**WILLIAM
CROYLE**
Deputy Director

**GARY
BARDINI**
Deputy Director

**CARL
TORGERSEN**
Deputy Director

**JOHN
PACHECO**
Deputy Director

**KATHIE
KISHABA**
Deputy Director

DIVISION OF OPERATIONS AND MAINTENANCE

David Duval..... Chief, Division of Operations and Maintenance

This report was prepared under the direction of

David Roose..... Chief, Operations Control Office

John Leahigh..... Principal Engineer, Water Operations Office

Tracy Hinojosa Supervising Engineer, Regulatory Compliance and Reporting Branch

Guy Masier..... Senior Engineer, Data Management Section

By the Reporting Section

Michael Nolasco Section Chief, Reporting Section

Mary Valdez Water Resources Engineering Associate (Specialist)

Clay Thomas..... Water Resources Engineering Associate (Specialist)

Edna Smith Water Resources Engineering Associate (Specialist)

The organization shown above represents staff and positions relevant to this report as of month of publication, January 2016. It is the Department's policy to not show staff in "Acting" or "Temporary" positions.

Foreword

This is the thirty-sixth in a series of annual reports summarizing the water and energy operation of the California State Water Project. Although the reports in this series are published considerably after the reference year, they document the official record of operations and provide an important source of historical data. This report summarizes the operation of Project facilities during 2009 and includes any revisions to data previously published in the more timely monthly "State Water Project, Operations Data" reports.

Table Of Contents

<i>Section</i>	<i>Page</i>
Organization Page	iii
Foreword	iv
Table of Contents	v, vi, vii
Conversion Factors	vii
Abbreviations and Units	viii
Introduction	1
Highlights of 2009 Operation	1
Project Status in 2009	4
Project Facilities.....	4
Outages and Limitations.....	6
Water Supply Conditions	8
Precipitation and Snowpack.....	8
Runoff and Storage.....	8
Water Operations	9
Reservoir Operations.....	9
Water Deliveries and Aqueduct Operations.....	9
Significant Operational Activities.....	12
Energy Operations	15
Energy Resources.....	15
Energy Loads.....	15
Sacramento-San Joaquin Delta Operations	23
Net Delta Outflow Index.....	23
Project Operations by Field Division	31
Oroville Field Division.....	31
Water Storage.....	31
Water Deliveries.....	31
Delta Field Division.....	40
Water Storage.....	40
Water Deliveries.....	40
Pumping Plants.....	40
San Luis Field Division.....	44
Water Storage.....	44
Pumping and Generating Plants.....	44
Water Deliveries.....	44
San Joaquin Field Division.....	49
Water Deliveries.....	49
Pumping Plants.....	49
Southern Field Division.....	49
Water Storage.....	49
Water Deliveries.....	49
Pumping and Generating Plants.....	49

Tables

<i>No.</i>		<i>Page</i>
1	Project Pumping by Plant, 2009	3
2	Five-Year Water Delivery Summary, 2005-2009.....	5
3	Total Energy Resources, 2009	19
4	Total Energy Loads, 2009.....	20
5	Net Delta Outflow Index, 2009.....	25
6	Sacramento Basin and Sacramento-San Joaquin Delta Operations, 2009	26
7	Upper Feather Area Lakes Monthly Operation, 2009.....	32
8	Lake Oroville Monthly Operation, 2009	33
9	Thermalito Forebay Monthly Operation, 2009	38
10	Thermalito Afterbay Monthly Operation, 2009.....	39
11	Lake Del Valle Monthly Operation, 2009	41
12	Clifton Court Forebay Monthly Operation, 2009	43
13	San Luis Reservoir Monthly Operation, 2009.....	45
14	O'Neill Forebay Monthly Operation, 2009.....	47
15	State-Federal San Luis Joint-Use Facilities Operation, 2009.....	48
16	Pyramid Lake Monthly Operation, 2009	50
17	Elderberry Forebay Monthly Operation, 2009	52
18	Castaic Lake Monthly Operation, 2009.....	53
19	Castaic Lagoon Monthly Operation, 2009	55
20	Silverwood Lake Monthly Operation, 2009.....	56
21	Lake Perris Monthly Operation, 2009	58
22	Summary of Governor Edmund G. Brown California Aqueduct Operations.....	60 - 67

Figures

<i>No.</i>		<i>Page</i>
1	Total Deliveries from SWP Facilities, Annual Totals	11
2	Combined Operation of Hyatt-Thermalito Powerplants	16
3	SWP Energy Resources, 2009	17
4	Total Energy Resources, 2009	18
5	SWP Energy Loads, 2009	21
6	Total Energy Loads, 2009.....	22
7	Delta Tide, Inflow, and Net Delta Outflow Index, 2009.....	27
8	Coordinated Delta Operations, 2009	28
9	Coordinated Delta Operations, Lagged Storage Withdrawals, 2009.....	29
10	Coordinated Delta Operations, Delta Exports, 2009	30
11	Oroville-Thermalito Complex, Inflow, Releases, and Diversions, 2009.....	34
12	10-Year Summary Lake Oroville Operation.....	35
13	Operation of Lake Oroville for Flood Control, 2009	36
14	Lake Oroville Temperatures, 2009	37
15	10-Year Summary Lake Del Valle Operation	42
16	10-Year Summary San Luis Reservoir Operation	46
17	10-Year Summary Pyramid Lake Operation	51

18	10-Year Summary Castaic Lake Operation.....	54
19	10-Year Summary Silverwood Lake Operation	57
20	10-Year Summary Lake Perris Operation	59

Maps

<i>No.</i>		<i>Page</i>
1	Project Facilities.....	ix
2	Field Division Boundaries	2
3	Water Deliveries.....	10

Glossary	68 - 71
-----------------------	---------

Conversion Factors

Quantity	Multiply	By	To obtain
Area	acre	43,560	square feet
Volume	cubic foot	7.481	gallons
	cubic foot	62.4	pounds of water
	gallon	0.13368	cubic feet
	acre-foot	325,900	gallons
	acre-foot	43,560	cubic feet
	million gallons	3.07	acre-feet
Flow	cubic foot/second (cfs)	450	gallons/minute (gpm)
	gallons/minute	0.002228	cubic feet/second (cfs)
	million gallons/day	1.5472	cubic feet/second (cfs)
	cubic foot/second (cfs)	646,320	gallons a day
	cubic foot/second (cfs)	1.98	acre-feet a day
	million gallons/day (mgd)	1,120	acre-feet a year
Pressure	feet head of water	.433	pounds/square inch (psi)
Power	kilowatts (kW)	1.3405	horsepower (hp)

Abbreviations and Units

The following abbreviations are commonly used throughout this report.

AF	acre-feet
Banks	Harvey O. Banks Delta Pumping Plant
California Aqueduct	Governor Edmund G. Brown California Aqueduct
CEA	Capacity Exchange Agreement
cfs	cubic feet per second
CVP	Central Valley Project
D-1485	Water Rights Decision 1485
DFG	Department of Fish and Game
DO	dissolved oxygen
DOI	Delta Outflow Index
DPR	Department of Parks and Recreation
DWB	2009 Drought Water Bank
DWR	Department of Water Resources
EC	electrical conductivity
FRSA	Feather River Service Area
ft	feet
KCWA	Kern County Water Agency
KWB	Kern Water Bank
kv	kilovolt
kW	kilowatt
kWh	kilowatt-hour
LADWP	Los Angeles Department of Water and Power
MAF	million acre-feet
MW	megawatt
MWh	megawatthour
MWDSC	Metropolitan Water District of Southern California
NDOI	Net Delta Outflow Index
PG&E	Pacific Gas and Electric Company
SCE	Southern California Edison
SDWA	South Delta Water Agency
SRI	Sacramento River Index
SWP	State Water Project
SWRCB	State Water Resources Control Board
USBR	United States Bureau of Reclamation

Map 1 Project Facilities, Pumping Plants, and Powerplants

Oroville FD

1. Hyatt Pumping-Generating Plant
2. Thermalito Diversion Dam Powerplant
3. Thermalito Pumping-Generating Plant

Delta FD

4. Barker Slough Pumping Plant
5. Cordelia Pumping Plant
6. Banks Pumping Plant
7. South Bay Pumping Plant
8. Del Valle Pumping Plant

San Luis FD

9. Gianelli Pumping-Generating Plant
10. Dos Amigos Pumping Plant

San Joaquin FD

11. Las Perillas Pumping Plant
12. Badger Hill Pumping Plant
13. Devil's Den Pumping Plant
14. Bluestone Pumping Plant
15. Polonio Pass Pumping Plant
16. Buena Vista Pumping Plant
17. Teerink Pumping Plant
18. Chrisman Pumping Plant
19. Edmonston Pumping Plant

Southern FD

20. Alamo Powerplant
21. Pearblossom Pumping Plant
22. Mojave Siphon Powerplant
23. Devil Canyon Powerplant
24. Oso Pumping Plant
25. Warne Powerplant
26. Castaic Powerplant
27. Greenspot Pumping Station
28. Crafton Hills Pumping Station
29. Cherry Valley Pumping Station



This page left blank intentionally.

Introduction

The 2009 Annual Report of Operations for the State Water Project (SWP) is divided into seven parts. The first two parts, "Highlights of 2009 Operation" and "Project Status in 2009," cover conditions and events of statewide significance. The following three sections cover water conditions, water operations, and energy operations in 2009. The sixth part, "Sacramento-San Joaquin Delta Operations," gives special emphasis to Delta operations, a key aspect of the SWP. The last part, "Project Operations by Field Division," provides details on activities by field division as outlined on Map 2.

Highlights of 2009 Operation

Managing available water supplies during the 1987-1992 drought required activities designed to make the most beneficial use of water available to the SWP. The Department of Water Resources (DWR) initially structured its plan of operations according to the concept of a firm yield. Firm yield is the quantity of water that can be made available on a firm annual basis to water contractors during a drought period. In 1991, after years of discussion, DWR changed its method of determining delivery amounts and replaced the concept of firm yield with the concept of variable yield. Operating on the basis of a variable yield makes efficient use of available water supplies during a drought. Annual Table A represents the total amount of project water that a SWP contractor may request each year, according to that contractor's long-term water supply contracts. Approved Table A (previously called entitlement) represents the amount of annual Table A requested by the contractors and approved for delivery by the Department, based on hydrologic conditions, current reservoir storage, and total requests by the SWP water contractors. DWR also developed programs to compensate for the lack of storage facilities. These programs include water transfers, exchanges, loans, storage, purchases, and carry-over entitlement for delivery at a later date.

The Sacramento and San Joaquin river watersheds were both classified as "dry" in 2009. As a result, DWR approved only 40 percent of the SWP contractors' Table A allocation requests totaling 1,666,550 acre-feet (AF).

California experienced less than average rainfall and mountain snowpack during water year 2008-2009 (covering October 2008 through September 2009). The State received precipitation at 81 percent of average in water year 2008-2009, compared to 78 percent of average in 2007-2008. Though a below average year, the Northern Sierra 8-station Precipitation Index recorded its fourteenth wettest May in 115 years. Approximately 25 percent of the year in the Northern Sierra 8-station Precipitation Index was due to two storms in February. The statewide snowpack peaked at 88 percent of its April 1 average in late March.

The Sacramento Valley Water Year Hydrologic Classification (Sacramento Valley 40-30-30 Index) and the San Joaquin Valley Water Year Hydrologic Classification (San Joaquin Valley 60-20-20 Index) were dry and below normal, respectively, based on observed data for water year 2008-2009.

On June 12, 2008, the Governor proclaimed a state of emergency for nine Central Valley counties due to the drought. In 2009, with California in its third consecutive year of drought, the Governor proclaimed a state of emergency on February 27, 2009, for the entire State as the severe drought conditions continued, and the impacts were felt well beyond the Central Valley.

The DWR-USBR Coordinated Operations Agreement (COA) monitors the daily difference between each agency's releases from storage and Delta exports. "Balanced" conditions are declared when releases are in danger of not meeting Delta outflow requirements. "Excess" conditions are declared when releases exceed Delta outflow requirements. DWR and USBR declared balanced Delta water conditions from Jan 1-Feb 17, Apr 6-Apr 30 and May 31-Dec 31.

The SWP depends on a complex system of dams, reservoirs, power plants, pumping plants, canals, and aqueducts to deliver water. Although initial transportation facilities were essentially completed in 1973, other facilities have been constructed since then and still others are under construction or are scheduled to be built as needed. The SWP facilities include 30 dams, 20 reservoirs, 29 pumping and generating plants, and approximately 700 miles of aqueducts in total.

In 2009, work to enhance, expand, repair, and protect SWP facilities continued. Significant projects included South Bay Aqueduct enlargement, South Bay Pumping Plant expansion, and feasibility studies for the East Branch Extension Phase I improvements and Phase II projects. In 2009, DWR continued to pay bondholders as scheduled. The SWP was financially viable and was indirectly paid for by the approximately 25 million water users served by the project. Direct payment was through the 29 long-term water contractors. In 2009, the SWP handled

Map 2 Field Division Boundaries, Dams, and Reservoirs



- Oroville FD
 1. Frenchman Lake
 2. Lake Davis
 3. Antelope Lake
 4. Lake Oroville
 5. Thermalito Diversion Dam
 6. Thermalito Fish Barrier Dam
 7. Thermalito Forebay
 8. Thermalito Afterbay
- Delta FD
 9. Clifton Court Forebay
 10. Bethany Reservoir
 11. Lake Del Valle
 12. Cordelia Forebay
 13. Napa Turnout Reservoir
- San Luis FD
 14. O'Neill Forebay
 15. San Luis Reservoir
 16. Los Banos Reservoir
 17. Little Panoche Reservoir
- Southern FD
 18. Tehachapi Afterbay
 19. Tehachapi East Afterbay
 20. Silverwood Lake
 21. Devil Canyon 1 Afterbay
 22. Devil Canyon 2 Afterbay
 23. Quail Lake
 24. Pyramid Lake
 25. Elderberry Forebay
 26. Castaic Lake
 27. Castaic Lagoon
 28. Lake Perris

Table 1. Project Pumping by Plant

2009
(in acre-feet)

Pumping Plants	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hyatt	0	0	0	0	0	20	0	0	0	0	0	0	20
Thermalito	0	0	9,485	408	0	0	0	0	0	0	0	0	9,893
Barker Slough	3,235	1,979	96	1,390	5,504	5,585	5,264	5,140	4,368	3,914	4,305	1,611	42,391
Cordelia	1,978	1,254	97	1,070	3,674	3,302	3,158	3,330	2,937	2,439	2,635	976	26,850
Banks													
State	147,252	109,855	172,415	78,803	60,624	29,463	355,991	175,332	120,535	119,414	89,598	205,733	1,665,015
Federal	0	0	0	0	0	0	26,291	60,157	24,750	4,161	0	0	115,359
Other 4/	0	0	0	0	0	0	0	13,216	0	0	0	0	13,216
Total	147,252	109,855	172,415	78,803	60,624	29,463	382,282	248,705	145,285	123,575	89,598	205,733	1,793,590
South Bay	3,379	6,606	6,544	10,433	13,886	14,587	13,606	17,529	14,423	14,184	6,801	0	121,978
Del Valle	2	0	0	315	1,067	670	1,061	0	0	0	0	0	3,115
Gianelli 1/													
State	145,331	89,154	126,596	21,675	0	0	50,834	21,280	4,322	37,793	52,010	162,253	711,248
Federal	111,290	39,722	69,840	11,052	0	0	20,919	36,601	56,924	88,386	69,424	125,616	629,774
Total	256,621	128,876	196,436	32,727	0	0	71,753	57,881	61,246	126,179	121,434	287,869	1,341,022
O'Neill 2/													
State	105,900	59,762	101,659	32,100	0	0	51,968	112,452	106,906	169,889	140,628	129,625	1,010,889
Federal	1	1	1	0	0	0	0	0	0	0	1	1	5
Total	105,901	59,763	101,660	32,100	0	0	51,968	112,452	106,906	169,889	140,629	129,626	1,010,894
Dos Amigos 1/													
State	11,641	18,690	45,824	60,259	129,183	194,500	266,432	227,458	152,180	132,835	73,162	40,452	1,352,615
Federal	9,882	11,042	28,692	44,623	67,985	73,422	77,215	50,417	35,414	29,435	19,972	10,929	459,028
Other 4/	0	0	0	0	0	0	0	1,283	0	0	0	0	1,283
Total	21,523	29,732	74,516	104,882	197,168	267,922	343,647	279,158	187,594	162,270	93,134	51,381	1,812,926
Las Perillas	1,190	2,682	3,992	8,238	13,977	17,160	19,876	16,657	10,795	8,191	837	1,156	104,751
Badger Hill	1,337	2,814	4,209	8,493	13,123	15,704	18,325	14,525	10,705	0	896	1,320	91,451
Devil's Den	1,003	887	1,116	1,495	2,221	2,382	2,344	2,201	2,131	0	522	989	17,291
Bluestone	932	806	1,022	1,364	2,029	2,171	2,143	1,980	1,944	0	474	883	15,748
Polonio Pass	1,036	942	1,175	1,552	2,257	2,422	2,389	2,208	2,145	0	528	1,003	17,657
Buena Vista	41,438	39,983	64,224	63,201	108,165	131,001	158,800	150,427	121,039	145,461	123,917	69,339	1,216,995
Teerink	52,761	49,650	66,282	57,166	97,160	123,453	147,265	141,934	123,723	152,259	135,491	77,157	1,224,299
Chrisman	50,376	47,701	62,772	52,755	90,077	113,036	135,474	132,875	117,044	145,845	132,879	74,902	1,155,735
Edmonston	51,087	47,573	62,190	52,003	90,057	111,902	133,273	131,566	116,619	146,786	131,464	76,124	1,150,644
Oso	41,082	44,080	48,347	29,277	61,014	52,061	56,655	49,267	42,323	50,626	59,563	61,089	595,384
Castaic 3/	28,704	21,664	14,844	0	25,134	14,227	42,417	26,986	31,714	15,078	6,114	11,948	238,830
Pearblossom	6,678	1,935	11,804	17,227	21,176	51,122	68,943	69,064	61,932	84,872	64,220	10,925	469,898

3

1/ Joint State-Federal facility.

2/ O'Neill Pumping Plant is a Federal facility.

3/ Pumping at Castaic Pumping Plant is for the City of Los Angeles.

4/ Pumping at Banks for Cross Valley Canal water delivered to Westlands Water District.

approximately \$826 million in revenues and \$826 million in expenses. The 2009 Income Statement for the SWP sidebar presents a summary of the year's revenues and expenses.

Energy resources totaled 7,619,588 MWh including generation of 4,626,837 MWh from SWP energy sources, 2,942,339 MWh of purchases, and 50,382 MWh in Power Exchange (see Figure 4).

Energy loads of 7,619,558 MWh include sales of 1,530,402 MWh, 5,443,924 MWh used to deliver water to SWP contractors, and deviation (system losses and imbalances) of 645,232 MWh (see Figure 6).

Project Status in 2009

Project Facilities

The SWP conserves water for distribution to much of California's population and to irrigate agriculture. It also provides flood control, water quality control, electrical power generation, new recreational opportunities, and enhancement of sport fisheries and wildlife habitat.

The SWP begins with three small lakes on the Feather River tributaries: Lake Davis, Frenchman Lake, and Antelope Lake. The branches and forks of the Feather River flow into Lake Oroville, the SWP's principal reservoir with a capacity of about 3.5 MAF. From Oroville, water flows through a complex system of pumping-generating plants and power plants, then down the Feather River into the Sacramento River before reaching the Delta. From the northern Delta, water is supplied to Napa and Solano counties through the North Bay Aqueduct.

Near Byron, in the southern Delta, the SWP diverts water into Clifton Court Forebay for delivery south of the Delta. The Harvey O. Banks Pumping Plant (Banks Pumping Plant) lifts water into Bethany Reservoir. The South Bay Pumping Plant then lifts it into the South Bay Aqueduct. Through the South Bay Aqueduct water is supplied to Alameda and Santa Clara Counties. Most of the water from the Bethany Reservoir, however, flows into the Governor Edmund G. Brown California Aqueduct. At O'Neill Forebay, part of the water is pumped through the William R. Gianelli Pumping-Generating Plant (Gianelli Pumping-Generating Plant) for storage in B.F. Sisk San Luis Dam and San Luis Reservoir (San Luis Reservoir) until needed. DWR's share of storage in the reservoir is 1,062,183 AF.

Water not stored in San Luis Reservoir continues its flow south and is raised 1,069 ft by four pumping plants: Dos Amigos, Buena Vista, John R. Teerink Wheeler Ridge (Teerink), and Ira J. Chrisman Wind Gap (Chrisman). In the southern San Joaquin Valley, the Coastal Branch Aqueduct serves agricultural

SWP facilities delivered 3,585,597 AF of water to 53 agencies, including 29 long-term water contractors, in 2009 as shown on Table 2. This amount is 764,003 AF more than the total State and Federal water deliveries from the SWP in 2008. In 2009, state contractor deliveries were 1,780,674 AF; including 1,227,297 AF of Table A water and 553,377 AF of other water; excluding Joint Facilities of 558,990 AF, prior water right deliveries of 1,127,902 AF, Federal Contract water of 478 AF, and Flexible Storage Withdrawals of 117,553 AF. See the "*Water Deliveries and Aqueduct Operations*" section for more details on water deliveries.

areas west of the California Aqueduct. At the Tehachapi Mountains, A.D. Edmonston Pumping Plant (Edmonston Pumping Plant) raises the water 1,926 ft and the water enters 8.5 miles of tunnels and siphons. Once the water has crossed the Tehachapi Mountains, it flows through the California Aqueduct into the Antelope Valley.

The California Aqueduct then divides into two branches, the East Branch and West Branch. The East Branch carries water through the Antelope Valley into Silverwood Lake. From Silverwood Lake, the water enters the San Bernardino Tunnel and drops 1,418 ft into Devil Canyon Powerplant, then to Lake Perris, SWP's southernmost reservoir. Work continued on the East Branch Extension of the California Aqueduct. Construction began in 1999. It is being constructed to convey 8,650 acre-feet of SWP water annually to the San Bernardino Valley Municipal Water District and the San Geronio Pass Water Agency service area. Completion of this contract was scheduled for December 2003, but was extended to March 2006 due to a change order for additional pump units and related components for Greenspot and Crafton Hills pump stations. The added units are complete except for acceptance testing, and contract acceptance is expected in April 2010.

Water in the West Branch flows through William E. Warne Powerplant (Warne Powerplant) into Pyramid Lake. From Pyramid Lake the water flows through the Angeles Tunnel and Castaic Powerplant into Castaic Lake, terminus of the West Branch. For the location of facilities cited here, see Map 1.

Lake Oroville and San Luis Reservoir are the primary conservation facilities of the SWP's 30 dams and reservoirs. The remaining 28 dams and reservoirs are used principally to regulate the conserved supply into water delivery patterns designed to fit local needs. Of those 28, the five largest are Lake Del Valle located in Alameda County; Pyramid Lake, Castaic Lake, Silverwood Lake, and Lake Perris, in

Table 2. Five-Year Water Delivery Summary 2005-2009

(in acre-feet)

Agency	2005	2006	2007	2008	2009	TOTALS
Oroville Field Division						
Last Chance Creek W.D. (Local Supply)	8,195				7,332	15,527
Plumas Co. F.C. & W.C.D.*	6,449				200	6,649
County of Butte*	530				585	1,115
Thermalito I.D.	2,355				2,036	4,391
Prior Water Rights Deliveries 1/	1,059,026				1,118,534	2,177,560
Yuba City*	1,894				2,114	4,008
Delta Field Division						
Napa Co. FC & WCD *	8,009				10,904	18,913
Alameda Co. W.D.*	25,151				24,190	49,341
Alameda Co. FC&WCD, Zone 7*	52,673				41,652	94,325
Santa Clara Valley W.D.*	52,364				66,364	118,728
Oak Flat W.D.*	4,194				1,993	6,187
Parks & Recreation/ Fish and Wildlife	154				133	287
Western Hills Water District	1,046				1,169	2,215
San Joaquin Valley National Cemetery (State)	0	0	0	0	27	27
USBR	621				478	1,099
Solano Co. F.C.W.C.D.*	37,479				30,950	68,429
San Luis Field Division						
Dept. Parks & Rec. (STATE & FEDERAL)	96				17	113
Dept. Fish & Wildlife (STATE & FEDERAL)	1,142				1,189	2,331
Federal Customers (Joint-Use)	1,302,628				539,414	1,842,042
Federal Customers (Miscellaneous)	292				324	616
State Customers (Miscellaneous)	25,870				8,246	34,116
San Joaquin Field Division						
Tulare Lake Basin Water Storage District*	134,725				32,646	167,371
Empire West Side Irrigation District*	3,834				164	3,998
County Of Kings*	5,948				1,612	7,560
Kern County Water Agency*	1,437,283				541,457	1,978,740
Dudley Ridge Water District*	58,051				19,837	77,888
USBR (Cross Valley Canal contractors)	22,947				1,280	24,227
USBR (Others)	576				18,990	19,566
Westlands Water District	11,561				0	11,561
Castaic Lake Water Agency*	2,709				1	2,710
Santa Clara Valley WD	21,941				0	21,941
San Luis Obispo County	4,251				3,801	8,052
Santa Barbara County FC & WCD*	23,344				15,452	38,796
Southern Field Division						
Antelope Valley-East Kern Water Agency*	60,847				45,670	106,517
Metropolitan Water District of Southern Calif*	1,431,259				842,978	2,274,237
Littlerock Creek Irrigation District*	0				42	42
Mojave Water Agency*	32,545				21,559	54,104
Desert Water Agency*	49,089				18,263	67,352
Coachella Valley Water District*	42,519				46,022	88,541
Crestline-Lake Arrowhead Water Agency*	977				1,405	2,382
San Gabriel Valley Municipal Water District*	13,984				11,520	25,504
San Bernardino Valley M.W.D.*	11,543				39,346	50,889
San Geronio Pass Water Agency*	692				6,397	7,089
Dept. Parks & Rec. (STATE & FEDERAL)	831				710	1,541
Dept. Fish & Wildlife (STATE & FEDERAL)	0				580	580
Castaic Lake Water Agency*	36,747				38,784	75,531
Palmdale Water District*	11,712				15,339	27,051
Ventura County Watershed Protection District*	1,665				3,891	5,556
Totals	6,011,748	0	0	0	3,585,597	9,597,345

* Long-term contractors

1/ Includes Thermalito Afterbay, Palermo Canal, Upper Feather lakes deliveries.

Southern California. Lake Del Valle is approximately four miles from the city of Livermore. The four southern reservoirs--Pyramid Lake, Castaic Lake, Silverwood Lake, and Lake Perris--are near the metropolitan areas of southern California, where water supplies are mainly imported. Information about these reservoirs, including amounts of unimpaired runoff to Lake Oroville and storage levels for SWP's conservation, and other storage facilities are summarized in this report.

Outages and Limitations

Major outages, construction, and operating limitations of SWP facilities during 2009 were:

January

- Edward Hyatt Powerplant (Hyatt Powerplant) Unit 4 was out of service from January 14 to March 17 for turbine repair, Unit 6 was out of service from January 16 to March 3 to repair turbine wicket gate.
- Thermalito Pumping-Generating Plant Unit 1 was out of service from January 19 to February 4 for condition assessment inspection.
- Dos Amigos Pumping Plant Unit 3 was out of service from January 12 to March 18 for conditional assessment inspection.
- Edmonston Pumping Plant Unit 2 went out of service on January 12 with expected completion date in 2010 to replace pump.
- Teerink Pumping Plant Unit 8 was out of service from January 15 to October 17 to investigate discharge valve.
- Mojave Siphon Powerplant Unit 1 was out of service from January 12 to February 17 for annual maintenance.
- Pine Flat Powerplant Units 1 through 3 were out of service from January 15 to January 30 for gas breaker maintenance.

February

- Banks Pumping Plant Unit 2 was out of service from February 23 to March 19 for condition assessment inspection.
- Gianelli Pumping-Generating Plant Units 1 and 2 went out of service on February 23 with expected completion date in 2010 for work on penstock.

March

- Hyatt Powerplant Unit 1 was out of service from March 10 to June 5 for relay replacement and maintenance.

- Dos Amigos Pumping Plant Unit 5 was out of service from March 23 to April 8 for condition assessment inspection.
- Teerink Pumping Plant Unit 4 was out of service from March 4 to September 25 to investigate field ground failure. Units 1 through 3 were out of service from March 19 to April 14 for discharge line No. 1 maintenance.
- Oso Pumping Plant Unit 4 was out of service from March 19 to October 30 to remove water from hydraulic oil pump and repair discharge valve. Unit 3 went out of service on March 23 with expected completion date in 2010 to resolve seat O-ring leak.
- Mojave Siphon Powerplant Unit 2 was out of service from March 16 to April 8 for condition assessment inspection.

April

- Gianelli Pumping-Generating Plant Unit 5 went out of service on April 16 with expected completion date in 2010 for butterfly valve leak.
- Dos Amigos Pumping Plant Unit 2 was out of service from April 13 to May 20 for maintenance inspection.

May

- Hyatt Powerplant Unit 4 went out of service on May 6 with expected completion date in 2010 to investigate high thrust bearing loading.
- Devil's Den Pumping Plant Unit 3 was out of service from May 17 to June 10 to replace bearings. The Plant was out of service from May 6 to May 29 for condition assessment inspection.
- Pearblossom Pumping Plant Unit 8 was out of service from May 4 to May 22 for condition assessment inspection.
- Warne Powerplant Unit 1 went out of service on May 2 with expected completion date in 2010 to repair oil leak, refurbish needle valves and electrical maintenance. Unit 1 was out of service from May 6 to June 18 to refurbish turbine needle.

June

- Hyatt Powerplant Unit 5 was out of service from June 2 to June 30 to inspect and de-gas transformer K5A. Unit 6 was out of service from June 8 to June 23 to check generator/turbine alignment.
- South Bay Pumping Plant Unit 4 was out of service from June 4 to July 9 to replace defective RTD.

July

- Banks Pumping Plant Units 1 and 2 were out of service from July 13 to August 12 to dewater discharge line No.1.
- Gianelli Pumping-Generating Plant Unit 7 was out of service from July 19 to September 10 to investigate automatic voltage regulator trip.

August

- Mojave Siphon Powerplant Units 1 through 3 were out of service from August 18 to September 2 to investigate ground fault on 13.8 kV bus.

September

- Hyatt Powerplant Unit 2 went out of service on September 18 with expected completion date in 2010 to inspect turbine for defect in impeller plate cover.
- Thermalito Pumping-Generating Plant Unit 1 was out of service from September 8 to October 5 to replace cooling water piping system.
- Pearblossom Pumping Plant Unit 7 was out of service from September 21 to October 16 to replace pump mechanical seal.
- Pine Flat Powerplant Unit 3 was out of service from September 23 to December 15 to recoat penstock and annual maintenance.

October

- South Bay Pumping Plant Units 1 through 9 were out of service from October 19 to November 25 for switchyard work and preventative maintenance.
- Edmonston Pumping Plant Unit 4 went out of service on October 1 with expected completion date in 2010 to replace pump.
- Buena Vista Pumping Plant Unit 3 was out of service from October 13 to October 24 to balance unit.
- Badger Hill Pumping Plant Units 5 and 6 were out of service from October 28 to November 21 for maintenance of discharge line No. 2 headworks and for pools 3 to 6 silt removal and preventative maintenance.
- Pearblossom Pumping Plant Unit 6 went out of service on October 19 with expected completion date in 2010 for motor rotor refurbishment inspection.

November

- Hyatt Powerplant Unit 6 went out of service on November 29 with expected completion date in 2010 to address governor control issues.

- Thermalito Pumping-Generating Plant Unit 1 was out of service from November 30 to December 17 to repair servo and calibrate flow and pressure devices.
- Banks Pumping Plant Unit 10 was out of service from November 11 to November 23 for discharge valve No. 5 preventative maintenance.
- South Bay Pumping Plant Unit 2 and Units 5 through 9 went out of service on November 17 with expected completion date in 2010 for preventative maintenance. Units 1, 3, and 4 went out of service on November 25 with expected completion date in 2010 for preventative maintenance.
- Badger Hill Pumping Plant Units 1 through 4 were out of service from November 2 to November 21 for pools 3 through 6 silt removal and preventative maintenance.
- Las Perillas Pumping Plant Units 1 through 3 and Units 5 and 6 were out of service from November 2 to November 21 for preventative maintenance. Units 5 and 6 went out of service on November 30 with expected completion date in 2010 to drain and repair discharge line No. 2.
- Devil's Den Pumping Plant Units 1 through 6 were out of service from November 2 to November 21 for pools 3 to 6 silt removal, transformer KYB leak repair, and preventative maintenance. Unit 4 was out of service from November 2 to December 3 for condition assessment inspection.
- Oso Pumping Plant Unit 3 went out of service on November 4 with expected completion date in 2011 for discharge valve. Unit 7 was out of service from November 30 to December 29 for condition assessment inspection.

December

- Del Valle Pumping Plant Units 1 through 4 went out of service on December 22 with expected completion date in 2010 for a leak in pipeline near discharge valve surge tank.
- Barker Slough Pumping Plant Unit 2 was out of service from December 14 to December 29 to investigate failure to start.
- Bluestone Pumping Plant Unit 1 was out of service from December 3 to December 23 to inspect and adjust excitation equipment.
- Oso Pumping Plant Unit 6 went out of service on December 31 with expected completion date in 2010 to drain water from the discharge valve hydraulic power sump and replace seat O-ring.

Water Supply Conditions

The SWP meets its contractual obligations by monitoring precipitation and calculating runoff to coordinate the operation of the complex system of dams and reservoirs. Information on those activities is based on the water supply conditions of the 2009 calendar year and the 2008-09 water year.

Precipitation and Snowpack

California experienced less than average rainfall and mountain snowpack during water year 2008–2009. The State received precipitation at 81 percent of average in 2008–2009, compared to 78 percent of average in 2007–2008. The Northern Sierra 8-Station Precipitation Index finished the water year with 46.85 inches of precipitation, which was 93 percent of average. The statewide average snow water equivalent, based on snow sensors, reported for April 1 was 23.7 inches, or 82 percent of average. The 2008–2009 water year snow accumulation peaked at 25.2 inches on March 25.

In general, the two wettest months were February and March. San Francisco Weather Bureau Airport reached 241 percent of average precipitation (7.92 inches) in the month of February. Mount Shasta City in far northern California peaked at 205 percent of average precipitation (9.0 inches) in the month of March. For the water year, Mount Shasta City received a total of 38.73 inches of precipitation, which is 107 percent of average. Yosemite Headquarters received a total of 7.4 inches of precipitation in May, which is 525 percent of average for the month.

Precipitation for the water year totaled 46.85 inches, which is 94 percent of average. Monthly precipitation totals for October, February, March, May, and June were above average at 104, 149, 120, 262, and 130 percent, respectively. The two wettest months were February and March with 11.9 and 8.3 inches of precipitation, respectively. January and July, conversely, registered as the sixteenth and sixth driest months on record, respectively, for the index.

Approximately 25 percent of the water year total precipitation was recorded in February, during which precipitation was observed on 22 days. Two Pacific storms came ashore bringing widespread rain in the first 2 weeks of the month. The south coast and south central coast saw the heaviest precipitation from these events. During the second week, the storminess continued with a slow moving system bringing valley rain and mountain snow to the northern part of the state.

Snow water equivalents were obtained from daily snow sensor reports corresponding to the first day of each month. On April 1, the snowpack stood at 23.7 inches of snow water content (April 1 is typically the average annual date of peak snow accumulation); it was 82 percent of the April 1 average. This water year, the snowpack peaked on March 25 at 25.2 inches

Runoff and Storage

Statewide river runoff totaled 65 percent of average in the 2008–2009 water year. The Sacramento River Region, the San Joaquin River Region, the Tulare Lake Region, and the Feather River Region water year run off totals were 70, 83, 71, and 68 percent of average, respectively.

From a water supply perspective, the most closely monitored period is April through July. April concluded with 66, 99, and 87 percent of normal runoff for the Sacramento River, San Joaquin River, and Tulare Lake regions, respectively. By the end of July, the April–July runoff was 81, 88, and 76 percent of average for the three respective regions.

The Sacramento Valley Water Year Hydrologic Classification (Sacramento Valley 40-30-30 Index) and the San Joaquin Valley Water Year Hydrologic Classification (San Joaquin Valley 60-20-20 Index) were “dry” and “below normal,” respectively, based on observed data for water year 2008–2009.

During water year 2008–2009, statewide reservoir storage reached its peak of 87 percent of average at the end of May following the wet months of February and March. The water year began at only 70 percent of average reservoir storage because of the dry 2007–2008 water year. The percent of average storage decreased through January, then rose until its peak in May, then declined to 79 percent of average in August and September. End-of-water-year storage in the major Sierra reservoirs ranged from 167 percent of average in Millerton Lake on the San Joaquin River to 41 percent of average in Success Lake on the Tule River. Additional and more specific information is available via the Internet at:

<http://cdec.water.ca.gov/snow-rain.html>.

Water Operations

Reservoir Operations

Lake Oroville and San Luis Reservoir are the two main conservation facilities for SWP water supplies. Tables 8 and 13 summarize the operations of these reservoirs during the 2009 calendar year.

Lake Oroville began 2009 with 979,688 AF of storage, 247,445 AF less than it held at the start of 2008. Storage in Lake Oroville peaked on May 24, 2009 at 2,287,479 AF (65 percent of normal maximum operating capacity of 3,537,577 AF) and ended the year at 29 percent of normal capacity or 1,029,534 AF. Total inflow into Lake Oroville during the 2009 calendar year was 2,801,323 AF. The net effect of operations and water conditions at Lake Oroville resulted in an increase in storage of 49,846 AF. See Table 8 for a complete summary of Lake Oroville operations.

At the beginning of 2009, Lake Del Valle held 30,155 AF (39 percent of normal maximum operating capacity of 77,110 AF). Highest end-of-month storage was in April at 38,911 AF (50 percent of normal maximum operating capacity). At year's end Lake Del Valle held 28,273 AF (37 percent of normal maximum operating capacity).

At the start of 2009, San Luis Reservoir held 489,912 AF, 24 percent of its normal maximum operating capacity (2,027,835 AF); the SWP held 262,709 AF, 25 percent of its maximum operating capacity (1,062,183 AF). SWP storage at the end of 2009 decreased to 343,218 AF. End-of-year Federal storage was 530,464 AF, for a year-end total of 873,682 AF.

SWP southern reservoirs (Pyramid, Castaic, Silverwood, and Perris) have a combined maximum operating storage capacity of 701,320 AF. The total combined storage of 570,653 AF at the beginning of 2009 decreased to 498,007 AF by the end of the year.

The following tabulation compares normal operating capacity in the principal SWP reservoirs with end-of-year storage for 2008 and 2009:

Reservoir	Normal Maximum Operating Capacity	End-of-year Storage 2008	End-of-year Storage 2009
Lake Oroville	3,537,580	981,102	1,029,534
Lake Del Valle	77,110	30,314	28,273
San Luis Reservoir (State Share)	1,062,183	258,136	343,218
Pyramid Lake	171,200	167,639	163,338
Silverwood Lake	74,970	70,195	70,176
Lake Perris	131,450	69,527	63,927
Castaic Lake	323,700	246,316	258,160
Totals	5,341,083	1,823,229	1,956,626

Water Deliveries and Aqueduct Operations

Generally, water diverted from the Sacramento-San Joaquin Delta is delivered to SWP storage facilities and to contractors through Banks Pumping Plant and Barker Slough Pumping Plant for a variety of beneficial uses. In addition to delivering Table A water to long-term water supply contractors, SWP transports water to other public agencies through exchanges or purchases; provides water for wildlife and recreational uses; and conveys water to meet local water rights agreements. A five-year water delivery summary about water deliveries made to long-term contractors and other agencies through 2009 has been organized in Table 2.

Pursuant to Article 56 of the Monterey Amendments, contractors can elect to store project water outside of their service area for later use within their service area. Qualified contractors can request carryover Table A amounts for delivery in the following year to the extent that such deliveries do not adversely affect current or future project operations. Factors that influence how much extended carryover water can be delivered include operational constraints of project facilities, filling of SWP conservation storage facilities, flood control releases, and water quality restrictions. If storage request exceed the available storage capacity, the amount available is allocated among the contractors requesting storage in proportion to their annual Table A amounts for that year. Eighteen SWP water contractors took delivery of 179,016 AF of approved 2008 Article 56C water carried over into 2009, as extended carryover.

The Monterey Agreement grew out of water allocation concerns that intensified during the 1987-1992 droughts. Rather than negotiate only water allocation issues, the Department and water contractors decided on a major revision to SWP long-term contracts and their administration. The Monterey Agreement was released to the public December 16, 1994, in the form of 14 principles. *Bulletin 132-95, Chapter 1*, explains the Monterey Agreement in detail.

During 2009, Article 21 water was only available to SWP contractors north of the Delta due to water conditions and storage amounts in San Luis Reservoir. A total of 6,032 AF of Article 21 water was made available, including Napa County receiving 1,588 AF and Solano County receiving 4,444 AF.

Substantial areas of California continued to experience wide-ranging effects due to the third consecutive year of dry conditions. To assist agencies

Map 3 2009 Water Deliveries (in acre-feet)

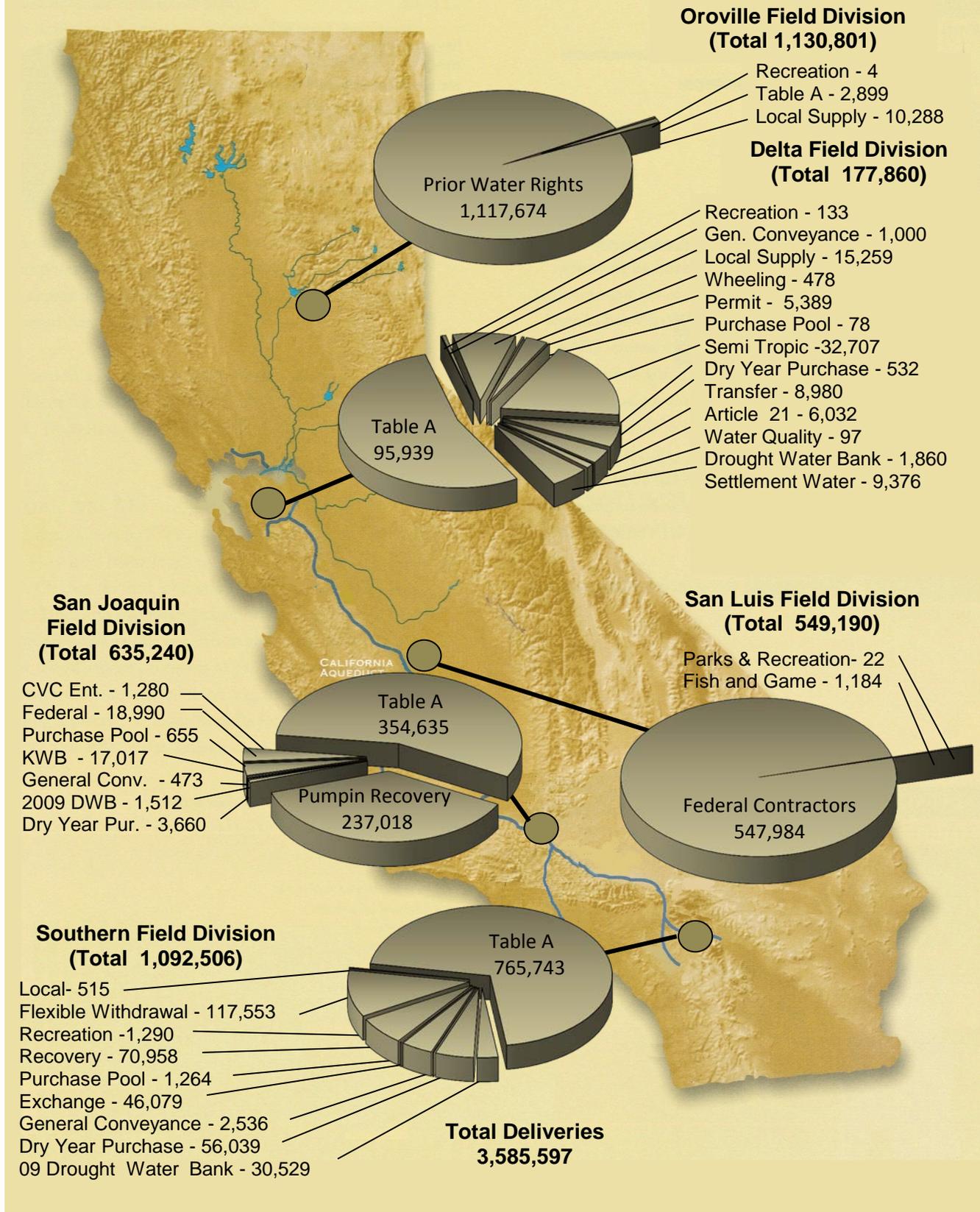
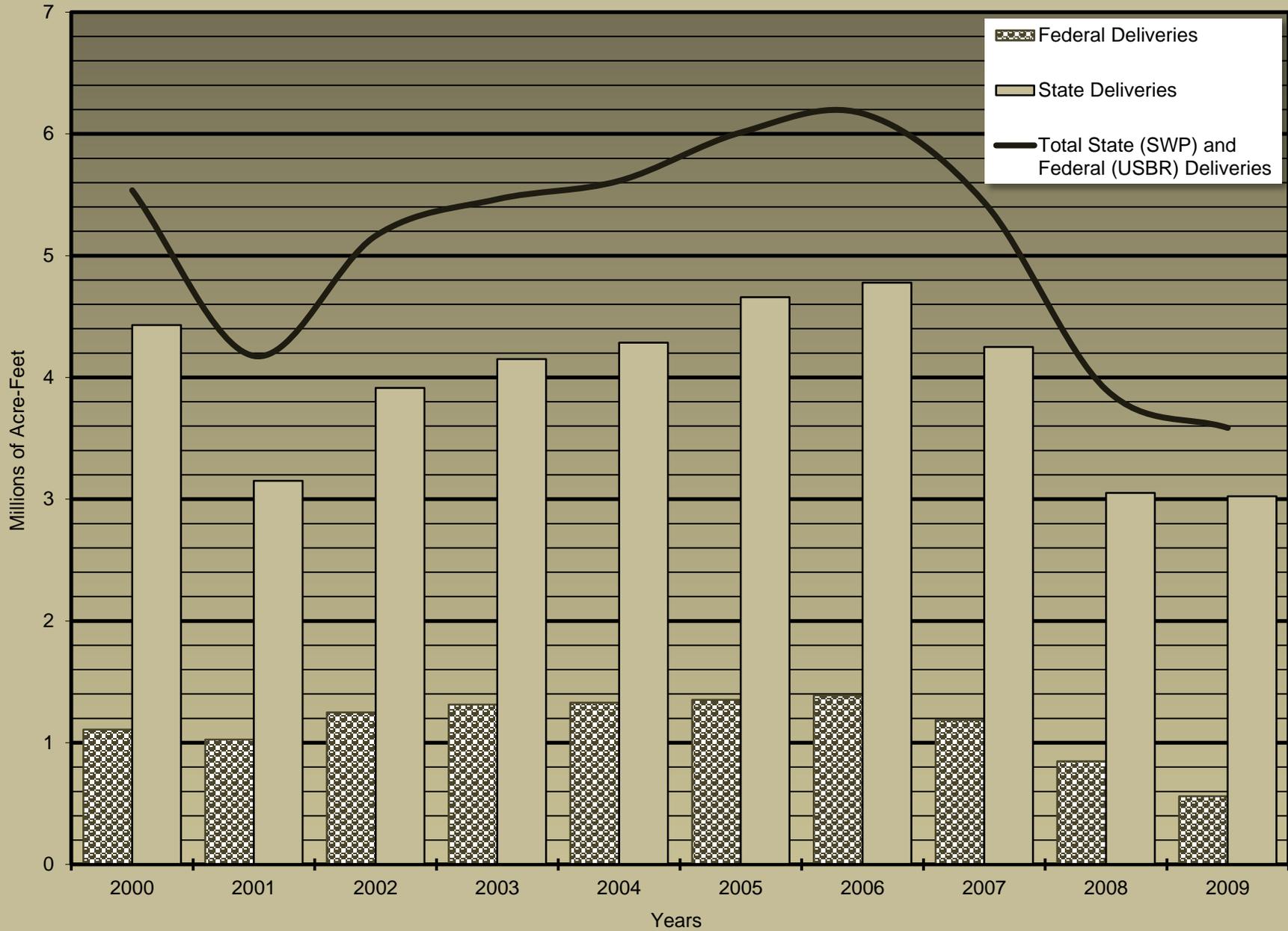


Figure 1. 10-year Summary of Deliveries from SWP Facilities



experiencing potential water supply shortages, DWR established a 2009 Drought Water Bank (DWB). DWR executed 21 agreements with 19 agencies for the sale of water to the 2009 DWB, and 12 agencies executed agreements to purchase water from the 2009 DWB.

The State Water Contractor’s original request for delivery of Table A Entitlement water in 2009 was 4.17 MAF. Based on projected water supply and hydrology, the final approved amount was 1.67 MAF.

Total Project (State and Federal) deliveries for 2009 totaled 3,585,597AF. This total includes Table A and other deliveries of 1,780,674 AF, Federal deliveries of 559,468 AF, 1,127,902 AF of SWP Prior Water Rights and Local Supply and 117,553 AF of Flexible Storage Withdrawal. Of the total Table A and other deliveries, 1,227,297 AF was Table A and 553,377 AF was other water. A graph showing the 10 – year Summary of deliveries from SWP facilities is shown in Figure 1.

Amounts of 2009 water deliveries are shown by field division on Map 2, and include Table A water, permit water, local supply, recreation, purchases, wheeling, and water transfers. Totals by agency are shown in Table 2.

The following table is a summary of Table A and other deliveries in 2009:

Table A Water		Other Water	
TABLE A	1,009,126	Purchase Pool A	750
TBLAOTH	5,660	Purchase Pool B	1,250
TBLATLAN	26,628	CVC Wheeling	1,280
TBLAXEA	480	General Conv.	30,178
TBLAXCH	6,387	SWP Recreation	860
Article 56C	179,016	Permit	5,389
		Article 21	6,032
		Dry Year Purchase	60,382
		Local	15,774
		Pumpin Recovery	280,663
		KWB Rec.	17,017
		DWB	33,901
		Settlement Water	9,376
		Water Quality	97
		Rec. Semi Tropic	80,254
		State Fish & Game	1,187
		SWP Construction	7
		Transfer	8,980
Total	1,227,297	Total	553,377
Total Table A and Other Deliveries		1,780,674	

Significant Operational Activities

January

- SWP water deliveries to date through January 2009 were about 85 TAF. Water deliveries are a combination of project, transfer, and exchange classifications. Total deliveries through this same period in 2008 were 115 TAF.
- On January 21, 2009, DWR received notification that the North Bay Aqueduct was leaking near private property. On January 22, O&M Division Chief issued a report that a contractor had been mobilized to begin encasement of the North Bay Pipeline at the leak site. On January 25, Cordelia-Napa Units 1, 2, 3, & 4 and North Bay Pipeline became available and repairs were complete.

February

- On February 18, by mutual agreement between the USBR and DWR, “Excess” Conditions were declared in the Delta in accordance with Article 6(h) of the COA. “Excess” conditions remained throughout the end of the month, with restrictions due to fish concerns. Excess conditions exist when upstream reservoir releases plus unregulated natural flow exceed Sacramento Valley in-basin uses, plus exports.
- On February 10, Southern Field Division reported LA County Sheriff’s Department was on scene at Aqueduct pool 50 to recover a floating vehicle. Sheriff’s diver reported no occupants in the vehicle and that the vehicle had been in the water for a long period of time. On February 25, the Fish Facility reported gates 3A and 3B had been closed for unknown reasons. This caused Banks Forebay surface elevation to drop to -4.7 feet. Banks Pumping Plant was off schedule for 20 minutes until the gates were re-opened.
- SWP water deliveries to date through February 2009 were about 150 TAF. Total deliveries through this same period in 2008 were 240 TAF.

March

- Conditions in the Delta remained in “Excess” with restrictions due to fish concerns throughout the month of March.
- On March 1, KCWA notified DWR that a turnout had washed into the aqueduct. Flooding occurred in the turnout compound near the pumps. Flooding also occurred in the right of way into the aqueduct about 100 feet down from the turnout at mile post 224.07. A check valve broke in half causing the 13 mile long 20

inch pipeline to Palomar Plant to dewater into the right of way. The water traveled downstream to lowest point and then entered the aqueduct. There was erosion near the intake structure and downstream but no panel damage was visible.

- SWP water deliveries to date through March 2009 were about 256 TAF. Total deliveries through this same period in 2008 were 468 TAF.

April

- SWP water deliveries to date through April 2009 were about 435 TAF. Total deliveries through this same period in 2008 were 733 TAF.
- On April 6, by mutual agreement between the USBR and DWR, conditions in the Delta changed from “Excess” to “Balanced” in accordance with Article 6(h) of the COA. Conditions remained “Balanced” throughout the end of the month. Balanced conditions exist when the DWR and USBR agree that releases from upstream reservoirs plus unregulated flow approximately equal the water supply needed to meet Sacramento Valley in-basin uses, plus exports.
- On April 16, units 4, 5, and 6 at Badger Hill Pumping Plant and units 5 and 6 at Las Perrillas Pumping Plant were forced out of service due to pond weed problems. All units were returned to service by 2100 hours. On April 18, there was a small leak from a 72-inch pipeline from South Bay Pumping Plant near mile post 30.00. Water Operators were sent to the site. A small amount of soil erosion was observed near the leak. South Bay Pumping Plant was shut down and a clearance was placed on the pipeline.

May

- On May 1, by mutual agreement, the USBR and DWR declared “Excess” Conditions in the Delta in accordance with Article 6(h) of the COA. “Excess” conditions remained through May 30 with restrictions due to fish concerns. On May 31, conditions in the Delta changed from “Excess” to “Balanced” and remained “Balanced” throughout the end of calendar year 2009.
- The Gorman Creek Improvement Canal was in and out of service several times during May due to minor damage at patched concrete locations.
- SWP water deliveries to date through May 2009 were about 693 TAF. Total deliveries through this same period in 2008 were 1.045 MAF.

June

- On June 18, Oroville Field Division reported removal of one shutter from Hyatt Intake #1 for temperature control. This action brought Intake #1 down to 6 shutters; while Intake #2 remained at 7 shutters.
- SWP water deliveries to date through June 2009 were about 1.02 MAF. Total deliveries through this same period in 2008 were 1.43 MAF.
- On May 31, by mutual agreement between the USBR and DWR in accordance with Article 6(h) of the COA, “Balanced” conditions were declared in the Delta and remained “Balanced” throughout the end of calendar year 2009.

July

- On July 22, at 0752 hours, Oroville Field Division reported that during the River Outlet Valve testing, the Chamber bulkhead blew out. Five injured DWR employees were transported to the hospital. Hyatt Pumping-Generating Plant was forced out of service. The chamber sump spilled waste sump oil into the Feather River. By 1700 hours, all pre-accident units were back online. Oil clean-up was completed by 1800 hours on July 25.
- SWP water deliveries to date through July 2009 were about 1.43 MAF. Total deliveries through this same period in 2008 were 1.84 MAF.

August

- On August 18, Mojave Pumping Plant was forced out of service when a main bus experienced a solid ground condition. Mojave Bypass flows were increased to 1600 cfs to maintain pumping schedule while main bus was corrected. All units at the plant remained out of service and bypass flows continued through the end of the month.
- SWP water deliveries to date through August 2009 were about 1.77 MAF. Total deliveries through this same period in 2008 were 2.17 MAF.

September

- SWP water deliveries to date through September 2009 were about 2.01 MAF. Total deliveries through this same period in 2008 were 2.41 MAF.
- On September 2, units at Mojave Pumping Plant became available after being out of service since August 18. Los Angeles Department of Water and Power declared September 22 and 23 as “Restricted Maintenance” days, Affecting Generation,

Receiving Stations, Switching Stations, and Converter Stations.

October

- SWP water deliveries to date through October 2009 were about 2.23 MAF. Total deliveries through this same period in 2008 were 2.61 MAF.
- Fish hatchery temperatures broke the 56 degree maximum on the 16th and 17th of October, requiring changes in Hyatt operating schedule. Flows through the plant were reduced from 5,000 AF to 2,000 AF on the 17th and 18th.

November

- SWP water deliveries to date through November 2009 were about 2.38 MAF. Total deliveries through this same period in 2008 were 2.73 MAF.
- Feather River Outlet gate inspections continued into November as flows remained below 2,000 AF for the first five days of the month.
- On November 28, Pool 28 elevation limitations were placed for installation of new pumps to allow Central Valley Project water into the California Aqueduct.

December

- Banks Pumping Plant pumping was curtailed between December 3 and 12 due to the loss of the Skinner Fish Facility new building crane hoist. Maintenance personnel were called out to assess repairs. Banks schedule was changed due to the loss of this equipment. Normal operations resumed on December 13. On December 22, the Delta Field Division reported a leak in the South Bay Aqueduct system 60" pipe between Del Valle Pumping Plant and the Aqueduct. At 1615 hours Del Valle units 1 thru 4 were forced out of service and the Del Valle release was secured.
- SWP water deliveries to date through December 2009 were about 2.45 MAF. Total deliveries through this same period in 2008 were 2.82 MAF.
- On May 31, by mutual agreement between the USBR and DWR in accordance with Article 6(h) of the COA, "Balanced" conditions were declared in the Delta and remained "Balanced" throughout the end of calendar year 2009.

Energy Operations

Significant Events

On April 1, 2009, California Independent System Operator (CAISO) implemented its Market Redesign and Technology Upgrade (MRTU), a new market structure that fundamentally changed the way SWP supplies energy for its pump load and markets its energy surplus.

The most significant features of MRTU were Locational Marginal Pricing and an Integrated Forward Market (IFM).

Locational Marginal Pricing resulted in generation and load being exposed to congestion costs due to being paid and charged, respectively, at nodal levels rather than zonal levels.

The IFM relieved the SWP of the longstanding requirement to “balance” each hourly pump load with equal supplies of SWP generation or purchased energy. Under IFM, DWR has the flexibility to purchase energy for SWP pumping load from CAISO’s IFM; when the energy purchased exceeds SWP pumping energy requirements, DWR can independently sell the excess energy back to CAISO’s IFM. These market purchases and sales are executed independently, and the magnitude of the purchases and sales need not be equal. MRTU also eliminates the risks related to DWR having to buy energy in advance of need and then having to sell the energy once the actual size of loads are known and determined to be less than originally forecast.

Energy Resources

The SWP received energy from ten plants in 2009 including generation from SWP’s eight hydroelectric plants (Hyatt, Thermalito, Gianelli, Warne, Castaic, Alamo, Mojave, and Devil Canyon) totaling 4,626,837 MWh, as illustrated in Figure 3.

DWR purchased 3.22 million MWh of energy at a cost of \$96 million. Other SWP-related costs, including transmission, operation, maintenance, and CAISO charges totaled \$114.66 million. This amount includes \$4.94 million for debt service and \$3.97 million for operations and maintenance, both associated with Pine Flat Powerplant. It also includes \$2.09 million for transmission at Reid Gardner Unit 4 and \$57.55 million for operations, maintenance, fuel, insurance, and property taxes at Reid Gardner Unit 4.

Since July 1983, DWR has received energy from Reid Gardner Power plant, a coal-fired facility near Las Vegas, Nevada. Reid Gardner consists of four units. DWR owns 67.8 percent of Unit 4 (169.5 MW based on nameplate capacity of 250 MW), while Nevada Power Company (NPC) owns the remainder of Unit 4, as well as all of units 1, 2, and 3. The SWP share of energy generated during 2009 totaled 1.22 million MWh of energy.

Total energy resources, including SWP power plant total of 4,626,837 MWh, purchases of 2,850.258 MWh, and net power exchange of 50,382 MWh in 2009 for a total of 7,527,477 MWh, as shown in Figure 4.

Energy Loads

Energy load data (total energy used by the SWP) is summarized in Table 4, and Figures 5 and 6. For the purpose of balancing energy resources and loads, this report itemizes amounts meeting SWP supplies and demands separately from amounts meeting total DWR supplies and demands. Besides SWP energy loads of 5,443,924 MWh, total DWR energy loads include Federal loads of 175,729 MWh, sales of 1,438,326 MWh, and deviation adjustment of 645,231 MWh, for a total of 7,703,206 MWh. A breakdown of energy loads by agency and by plant is summarized in Table 4 and Figure 6.

The San Joaquin Field Division normally accounts for over half of total project energy loads. In 2009, total energy loads included 3,969,441 MWh used in the San Joaquin Field Division, 73 percent of the state-wide total.

In 2009, DWR sold 1.53 million MWh of energy to 7 utilities and 19 Western Systems Power Pool power marketers for total revenue of \$62.27 million. DWR also received \$55.33 million in revenues for capacity and other energy-related services, including \$53.52 million for transactions made through CAISO. See Figure 6 for a breakdown of sales by agency.

The source of energy data contained in this report is the State Water Project Analysis Office, Bulletin 132-10. No CAISO transaction data was used.

Figure 2. Monthly and 10-Year Power Summary at Hyatt and Thermalito Powerplants

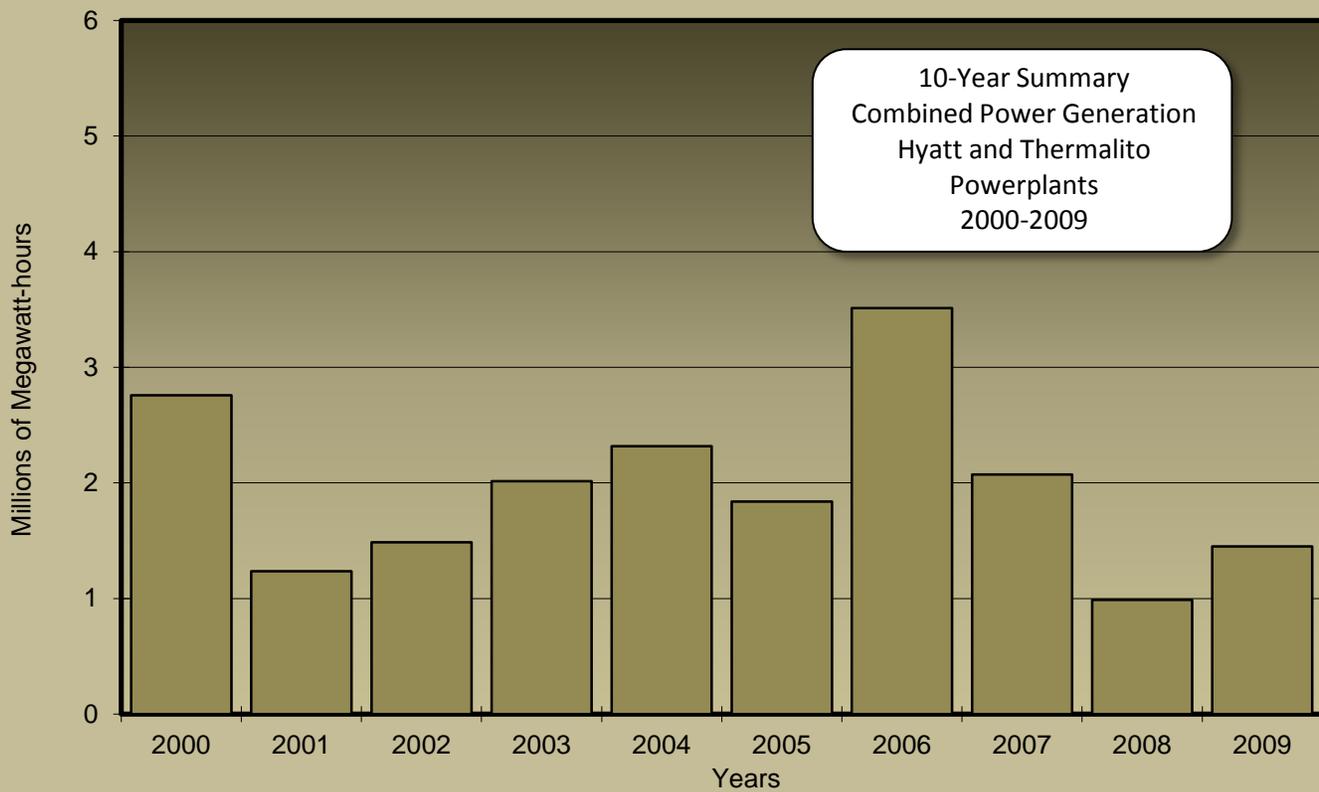
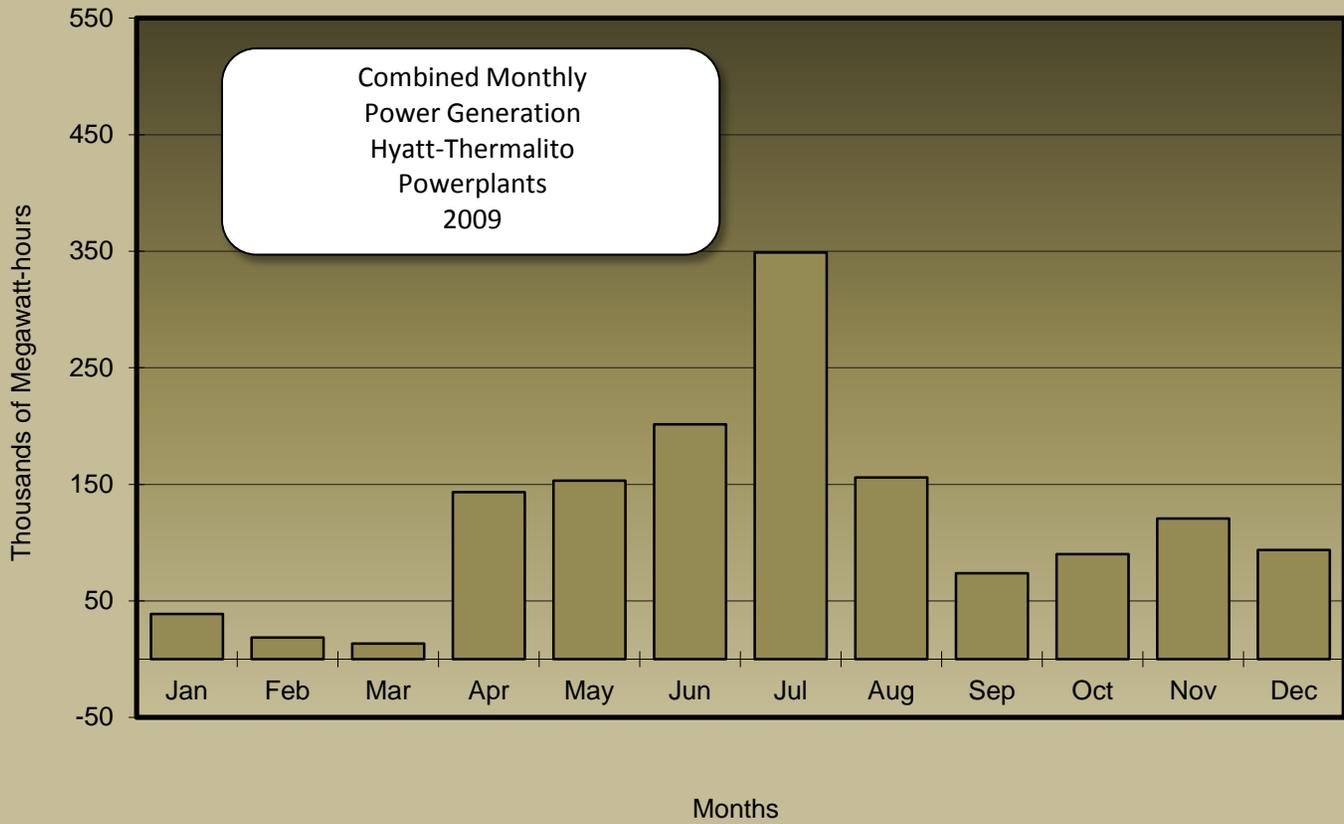
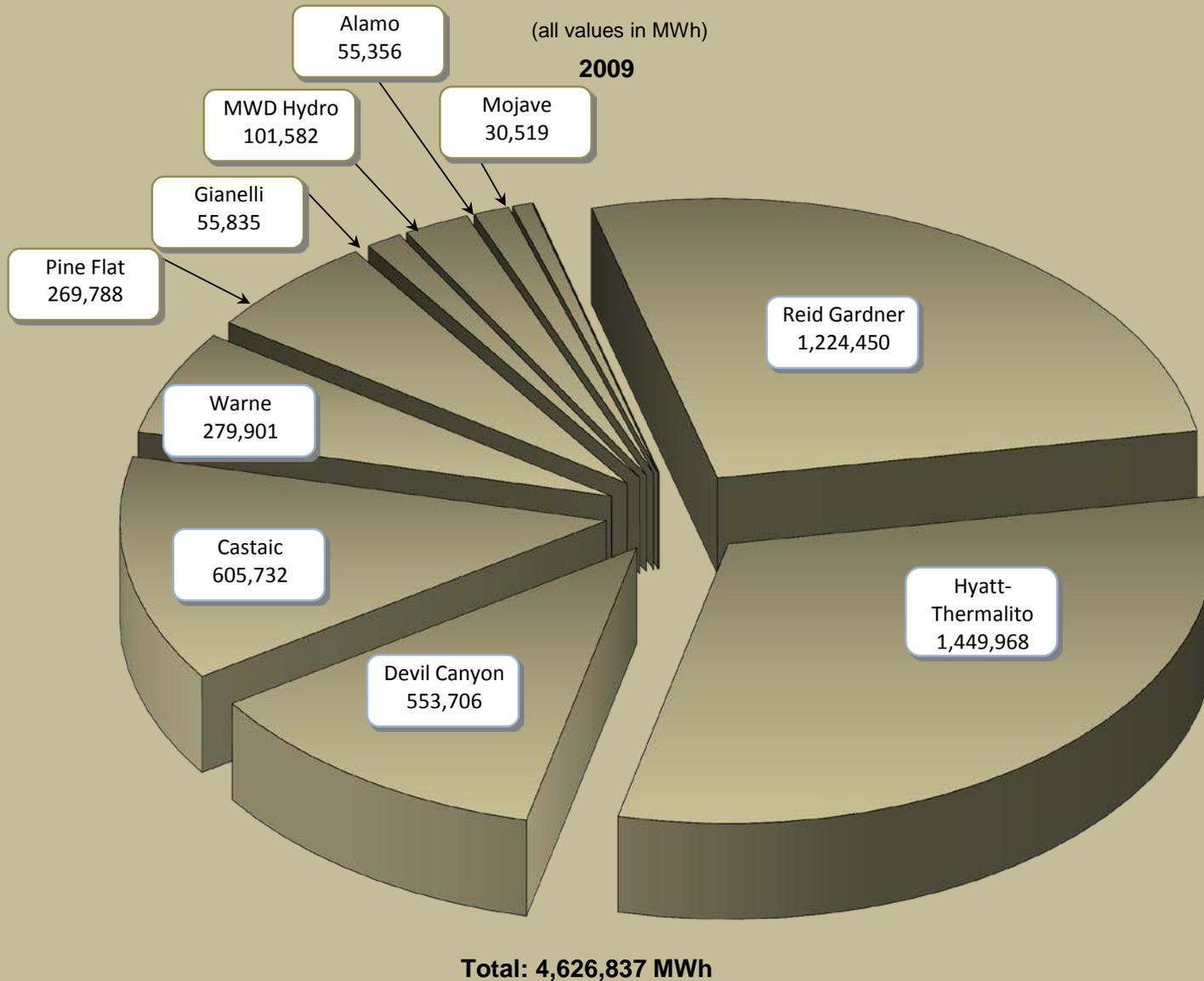


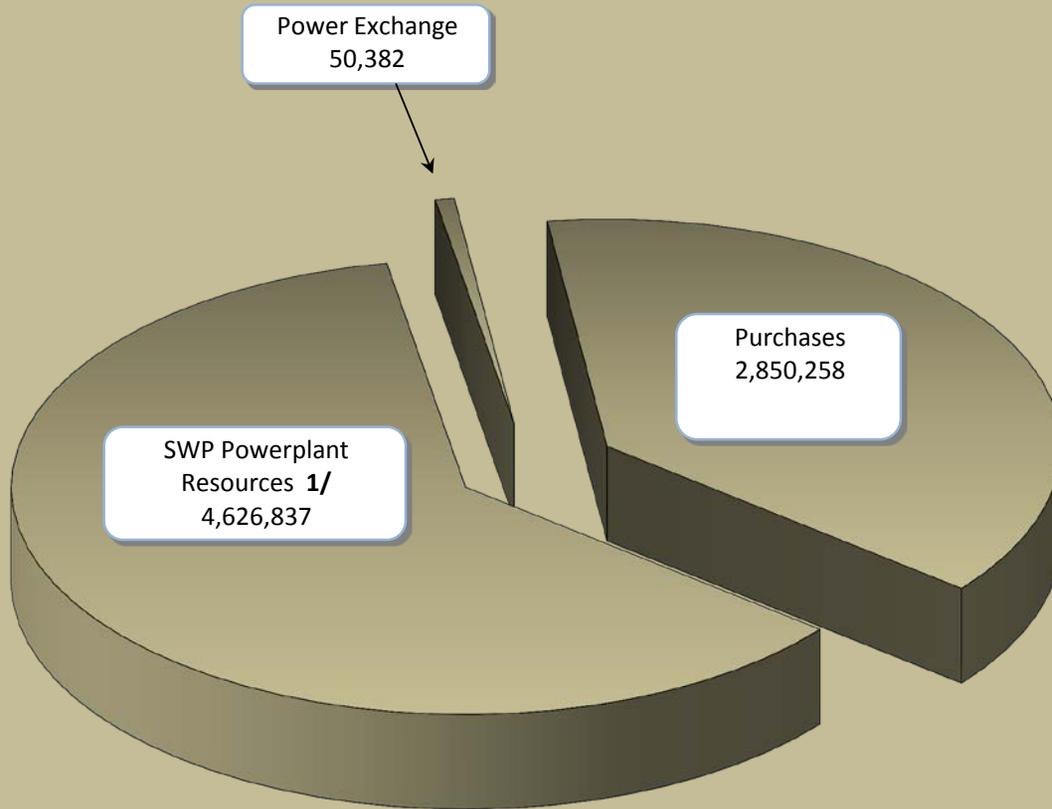
Figure 3. SWP Powerplant Energy Resources



Note: Purchases, Power Exchanges, and System Imbalances are not shown here. All values are metered readings at plants and are not adjusted for transmission losses.

Figure 4. Total State Energy Resources

(all values in MWh)
2009



Total: 7,527,477 MWh

1/ See Figure 3 for a breakdown of SWP Energy Resources.

SWP Powerplant Resources	4,626,837
Purchases	
BP Energy Company	114,325
Calpine Energy Services	406
Cargill Power Marketing	91,375
San Francisco Public Utilities Commission	26,800
Citigroup Energy Inc	207,275
Conoco Philips Company	9,555
Credit Suisse Energy	48,800
Dynegy Power Marketing	1,695
Fortis	128,800
PPM Energy (Pacificcorp)	27,874
JP Morgan Ventures Energy	320
Macquarie Cook Power	2,400
Morgan Stanley Capitol Group	1,246,484
MWD-WSP	8,800
MWD-DVL	61
Occidental Power Services Inc.	1,234
PG&E	305
PacifiCorp-Merchant	600
Pacific Summit Energy LLC	16,800
Powerex	1,150
City of Redding	50
SCE	36,132
SDGE	2,504
Sempra Energy Salution	6,400
Sempra Energy Trading	627,115
Shell (CRLP)	241,305
Sacramento Municipal Utility District	530
Transalta Energy Marketing	1,163
Sub-total	2,850,258
Power Exchange	
Power Exchange Received From Other Entities	133,182
Power Exchange Delivered To Other Entities	(82,800)
Sub-total	50,382
Total	7,527,477

Table 3. Total Energy Resources

2009

(in megawatt-hours)

Resource	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hyatt-Thermalito 1/	38,595	18,381	12,176	143,239	153,241	201,494	348,917	155,959	73,744	90,013	120,601	93,608	1,449,968
Gianelli Total	0	757	480	14,522	43,197	52,513	2,093	2,210	3,219	3,478	0	0	122,469
State	0	217	480	4,794	17,211	22,613	1,613	2,210	3,219	3,478	0	0	55,835
Federal	0	540	0	9,728	25,986	29,900	480	0	0	0	0	0	66,634
Warne 2/	22,610	25,626	27,033	17,825	28,517	27,935	28,973	28,974	17,607	15,241	19,655	19,905	279,901
Castaic	38,926	42,690	43,228	40,646	70,781	51,770	55,692	44,925	42,857	52,861	59,460	61,896	605,732
Mojave	309	25	662	1,028	1,387	3,576	4,952	2,729	4,056	6,365	4,791	639	30,519
Alamo	757	216	1,418	2,375	3,116	6,712	8,674	8,507	7,658	8,042	6,496	1,385	55,356
Devil Canyon	7,154	3,171	14,893	18,212	24,526	59,138	80,789	79,408	71,972	102,884	76,685	14,874	553,706
MWD Hydro	7,494	5,528	7,308	9,223	9,984	10,240	9,648	10,033	8,530	9,517	7,963	6,114	101,582
Reid Gardner	134,264	97,555	122,566	78,756	99,433	84,739	83,824	83,235	94,805	97,899	115,044	132,330	1,224,450
Pine Flat	0	0	4,469	18,123	27,507	99,062	92,488	28,139	0	0	0	0	269,788
SWP Sub-total	250,109	193,409	234,233	334,221	435,703	567,279	715,570	444,119	324,448	386,300	410,695	330,751	4,626,837
Firm Energy Purchases	146,295	130,299	155,789	158,800	154,800	243,200	278,800	295,000	334,800	411,600	294,875	246,000	2,850,258
Power Exchange Total 3/	27,342	24,696	27,216	0	0	-27,000	-27,900	-27,900	0	27,342	26,586	0	50,382
Total Energy Resources	423,746	348,404	417,238	493,021	590,503	783,479	966,470	711,219	659,248	825,242	732,156	576,751	7,527,477
Total Federal Resources	0	540	0	9,728	25,986	29,900	480	0	0	0	0	0	66,634

1/ Includes Table Mountain and Hyatt out adjusted to Tesla.

Total Energy Resources (Total SWP Provided+Federal): 7,594,111

2/ Includes Station-Service energy.

3/ Amounts show actual energy available for SWP use and include transmission losses.

Table 4. Total Energy Loads

2009

(in megawatt hours)

Plant	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hyatt-Thermalito 1/	75	167	1,104	101	24	9	0	0	1	0	1	4	1,486
Cordelia	785	494	57	465	1,312	1,217	1,271	1,358	1,211	905	779	511	10,365
Barker Slough	577	347	26	247	1,571	1,127	1,037	987	819	720	800	285	8,543
South Bay	2,906	5,078	5,073	8,289	11,760	12,261	11,449	14,699	12,113	11,665	5,590	66	100,949
Del Valle	30	27	29	40	81	49	111	13	13	15	23	129	560
Banks Total	42,446	31,763	49,161	22,622	17,597	9,369	108,230	71,210	41,886	35,886	25,902	59,102	515,174
State	42,446	31,763	49,161	22,622	17,597	9,369	100,422	49,416	34,536	34,650	25,902	59,102	476,986
CVP and CVC	0	0	0	0	0	0	7,808	21,794	7,350	1,236	0	0	38,188
Gianelli Total	31,903	24,924	35,756	16,401	26,178	29,914	9,965	4,419	1,010	6,844	11,203	42,146	240,663
State	31,903	24,384	35,756	6,673	192	14	9,485	4,419	1,010	6,844	11,203	42,146	174,029
CVP and CVC	0	540	0	9,728	25,986	29,900	480	0	0	0	0	0	66,634
Dos Amigos Total	3,373	4,477	10,535	14,692	29,380	40,535	51,206	41,323	25,349	21,991	12,729	7,297	262,887
State	1,581	1,749	5,845	9,348	19,508	24,111	39,750	32,978	24,525	19,895	6,881	5,809	191,980
CVP and CVC	1,792	2,728	4,690	5,344	9,872	16,424	11,456	8,345	824	2,096	5,848	1,488	70,907
Pine Flat 2/	231	119	107	0	0	0	0	5	211	225	226	265	1,389
Las Perillas	114	219	320	652	1,091	1,352	1,592	1,314	878	633	73	112	8,350
Badger Hill	254	544	795	1,645	2,745	3,353	3,809	3,224	2,199	1,635	166	259	20,628
Devil's Den	736	656	816	1,081	1,573	1,686	1,661	1,557	1,522	1,252	419	729	13,688
Bluestone	684	608	757	998	1,465	1,568	1,543	1,444	1,412	1,149	390	677	12,695
Polonio	751	676	834	1,091	1,587	1,705	1,680	1,554	1,515	1,233	405	726	13,757
Buena Vista	9,690	9,805	15,639	15,691	26,443	32,389	39,962	36,579	29,366	35,102	29,977	16,779	297,422
Teerink	13,406	13,076	17,394	15,103	26,151	32,470	39,615	37,143	32,263	39,918	35,271	20,149	321,959
Chrisman	29,768	28,961	38,014	32,188	55,483	68,813	85,000	80,924	71,085	88,792	78,975	45,383	703,386
Edmonston	110,130	106,501	139,182	115,595	201,211	249,887	308,538	294,563	260,203	327,850	294,417	169,479	2,577,556
Oso	10,957	11,787	12,706	7,819	16,056	13,762	15,138	12,995	11,237	13,426	15,694	16,184	157,761
Mojave 2/	77	76	74	47	47	22	14	10	5	3	22	70	467
Pearblossom	4,955	1,814	8,606	12,130	14,812	35,182	46,621	46,813	41,663	57,332	42,902	7,846	320,676
Warne 2/	290	172	162	150	2	1	0	0	68	30	0	4	879
Alamo 2/	52	58	52	28	27	5	1	7	3	8	15	49	305
Devil Canyon 2/	197	208	139	140	102	22	0	6	0	2	1	102	919
Greenspot Pump Station	374	502	628	777	878	1,022	1,309	1,334	1,732	1,635	1,557	1,326	13,074
Crafton Hills Pump Station	441	660	757	839	994	1,194	1,350	1,475	1,765	1,771	1,501	1,000	13,747
Cherry Valley Pump Station	15	14	17	12	26	38	44	44	56	34	31	33	364
SWP Sub-Total	263,425	240,465	334,050	253,771	402,738	492,628	711,402	624,861	531,411	646,724	553,221	389,224	5,443,920
Actual Deviation	-1,655	-416	2,118	163,299	93,310	94,331	33,579	-46,575	34,414	105,916	99,783	67,127	645,231
Sales	161,976	108,355	81,070	75,951	94,455	196,520	221,489	132,933	93,423	72,602	79,152	120,400	1,438,326
Total Energy Loads	423,746	348,404	417,238	493,021	590,503	783,479	966,470	711,219	659,248	825,242	732,156	576,751	7,527,477

1/ Pumpback and Station Service

2/ Station Service only.

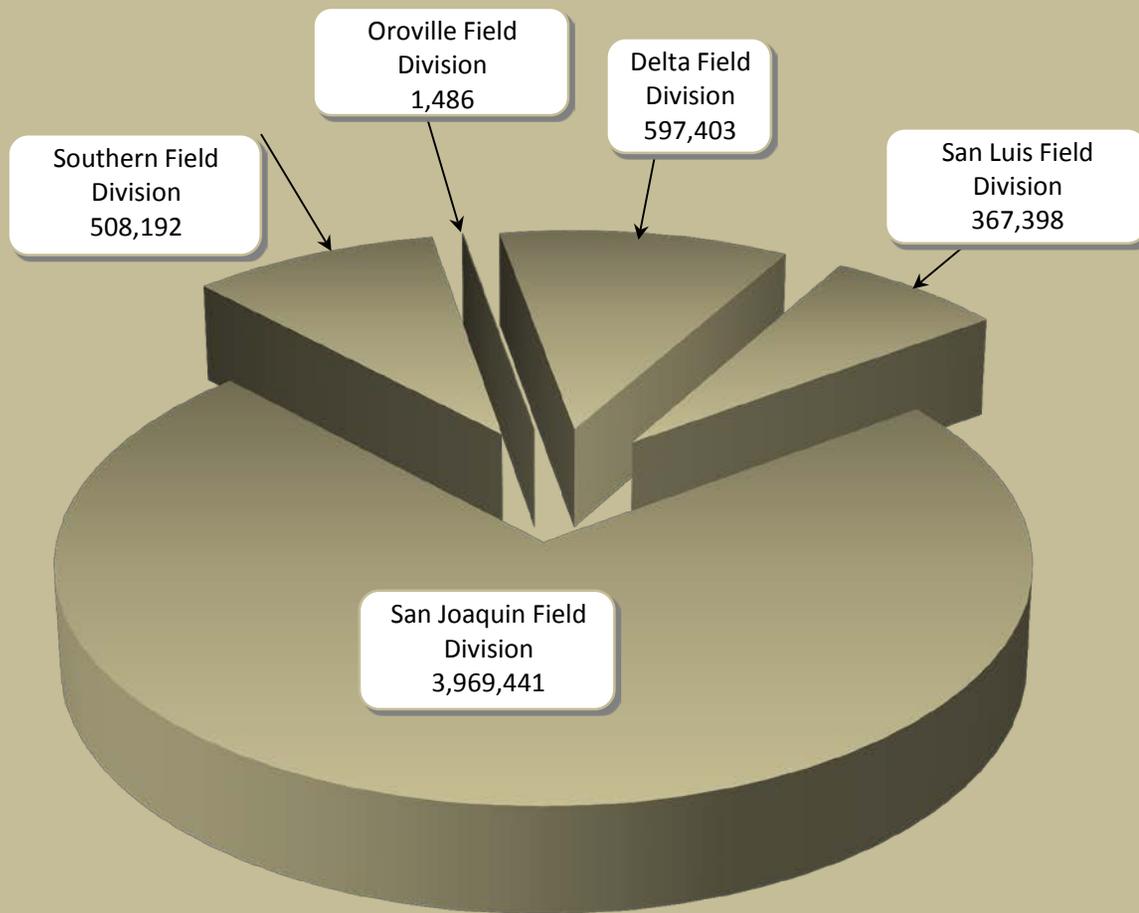
SWP Energy Loads: 7,527,477

Total Federal Loads 175,729

Total Energy Loads: 7,703,206

Figure 5. SWP Energy Loads

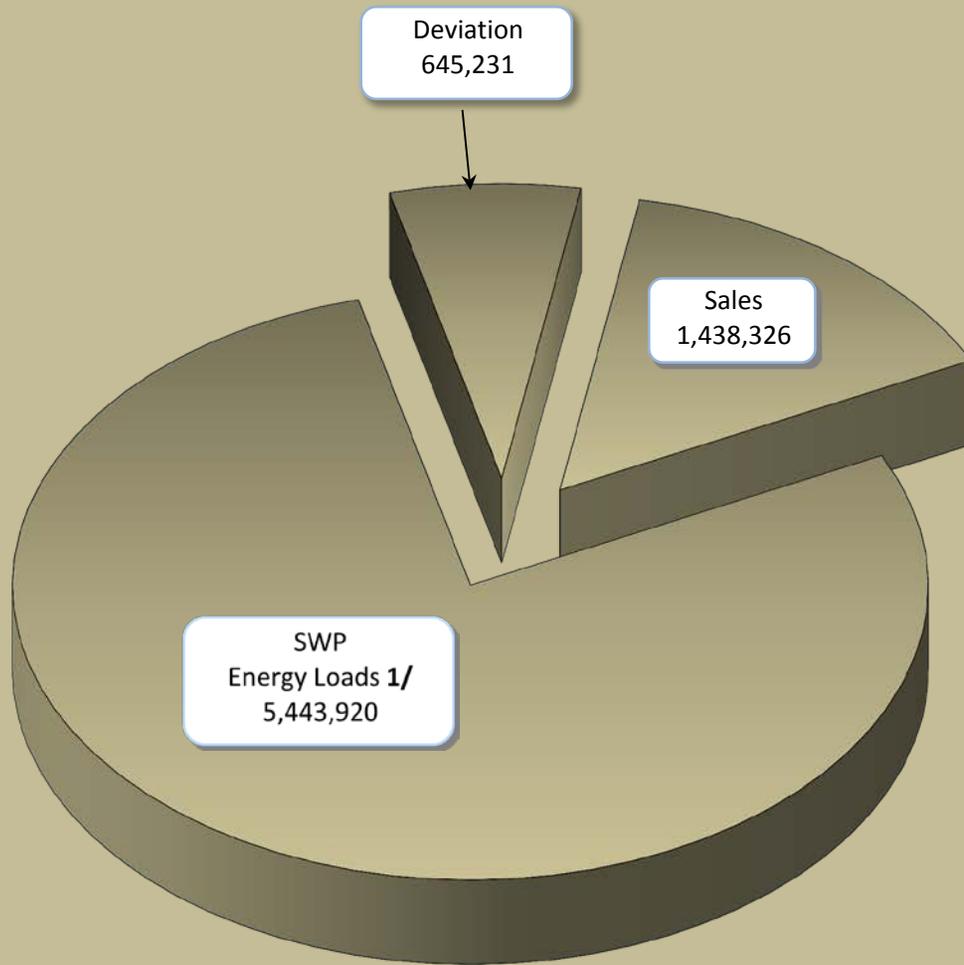
2009
(all values in MWh)



Total: 5,443,920 MWh

<u>Oroville Field Division</u>	
Hyatt-Thermalito Complex	1,486
<u>Delta Field Division</u>	
North Bay	18,908
South Bay	100,949
Del Valle	560
Banks	476,986
Sub-total	597,403
<u>San Luis Field Division</u>	
Gianelli	174,029
Dos Amigos	191,980
Pine Flat (Station Service)	1,389
Sub-total	367,398
<u>San Joaquin Field Division</u>	
Las Perillas	8,350
Badger Hill	20,628
Devil's Den	13,688
Bluestone	12,695
Polonio	13,757
Buena Vista	297,422
Teerink	321,959
Chrisman	703,386
Edmonston	2,577,556
Sub-total	3,969,441
<u>Southern Field Division</u>	
Oso	157,761
Mojave	467
Pearblossom	320,676
Warne (Station Service)	879
Alamo (Station Service)	305
Devil Canyon (Station Service)	919
Greenspot (Station Service)	13,074
Crafton Hills (Station Service)	13,747
Cherry Valley (Station Service)	364
Sub-total	508,192
<hr/>	
5,443,920	

**Figure 6. Total State Energy Loads
2009**
(all values in MWh)



Sales	1,438,326
Deviation	645,231
SWP Energy Loads	5,443,920
Total State Energy Loads 1/	7,527,477

Total: 7,527,477 MWh

1/ See Figure 5 for breakdown of SWP Energy Loads.

Sacramento - San Joaquin Delta Operations

Delta Resources and Environmental Issues

The SWP and CVP obtained take authorization for Endangered Species Act and California Endangered Species Act listed species for coordinated operations in the Delta through a Department of Fish and Wildlife incidental take permit for longfin smelt in February 2009, and a National Marine Fisheries Service biological opinion for salmon, steelhead, and green sturgeon in June 2009.

In November 2009, Senate Bill X7 1 enacted the Sacramento-San Joaquin Delta Reform Act of 2009. Programs authorized by the act were designed according to the recommendations in the *Delta Vision Strategic Plan*. Due to a 2008 court order to protect delta smelt, installation of the 2009 spring Head of Old River physical rock barrier was prohibited. In lieu of a rock barrier, DWR installed a nonphysical barrier comprised of sound projectors, strobe lights, and perforated pipe (to create an air bubble curtain).

CALFED Bay-Delta Program

In June 1994, a Framework Agreement between Federal and State governments was established which defined a joint Federal-State cooperative process for developing a long-term solution to water supply, water quality, and ecosystem problems of the Delta. Hence, the CALFED Bay-Delta Program came into being with the goal of developing a long-term Delta solution. It put into place an extensive public outreach and input program as an important element of its planning methods.

In 2009, Surface storage investigations are developing environmental documentation and feasibility studies for four of the five surface storage projects identified for further study in the CALFED record of decision.

The In-Delta Storage Program may provide capacity to store approximately 217,000 AF 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).

In 2007, further study of the In-Delta Storage Program was suspended, and no further work was done on the project in 2009.

Net Delta Outflow Index

Delta outflow cannot be measured directly due to the tidal influence in the Delta. Instead, an approximation of Delta outflow is calculated using measured inflows, exports, and estimated Delta water use. NDOI, introduced in the 1995 Bay-Delta Plan, now part of D-1641, guided operations in 2009. It provides a more accurate method for calculating Delta outflow by including inflows of the Sacramento River, Yolo Bypass system, the eastside stream system (consisting of the Mokelumne, Cosumnes, and Calaveras Rivers), the Sacramento Regional Treatment Plant, and a measurement of San Joaquin River flow at Vernalis. The NDOI calculated flows cannot be directly compared to the Delta Outflow Index (DOI) used prior to 1995, because DOI does not include all of the above-listed flows. The calculation of in-Delta consumptive use is also different in NDOI. Table 5 shows the computed daily NDOI for 2009.

The NDOI calculated flows cannot be directly compared to the prior DOI, as the Sacramento River bypass flows and several eastside stream flows were not included in the earlier DOI calculations. Those flows can be quite substantial during high flow periods. The Sacramento River flows contributed 85 percent of total Delta inflow, San Joaquin River 9 percent, Yolo Bypass flows 3 percent, East Side Streams 2 percent, and Sacramento Treatment Plant only contributed 1 percent of total Delta inflow of 15.49 MAF. A comparison of Delta Inflow and NDOI is plotted on Figure 7. The NDOI, Delta exports, and Delta Consumptive Use are plotted on Figure 8.

The 2009 daily NDOI averaged 9,044 cfs for the year. The greatest mean monthly NDOI occurred in February at 20,983 cfs and the greatest mean daily was 51,861 cfs on March 6. The lowest daily average NDOI for the month occurred in September 3,332 cfs and the year's lowest daily NDOI was on September 10 with 1,257 cfs.

The term Sacramento River accretions/depletions refers to the difference between the amounts of water released to the Sacramento and its tributaries by the CVP and SWP, and the amount which flows past Sacramento and into the Delta. Depending on the time of year and hydrologic conditions, this amount may represent a net gain (accretion) or a net loss (depletion). Accretions/Depletions are forecasted for both short-term and long-term operations planning purposes. Short-term forecasts, up to about seven days in the future are used to estimate inflows to the Delta, at key points on the Sacramento River, and to provide guidance to project operators on predicting

release requirement 5-7 days in advance (the maximum travel time from Keswick Dam to the Delta). Such short-term predictions of accretions/depletions may make use of real time flow data, temperature and weather forecasts, travel time, non-project reservoir releases, existing trends in accretions and depletions, and on advice and input from some of the major districts using water on the Sacramento. Accretions/Depletions, total Delta exports, and total lagged storage withdrawals are plotted on Figure 9. Figure 10 shows total exports plotted to show both SWP and CVP shares.

Longer-range forecasts of accretions and depletions are made for purposes of planning operations on a seasonal or monthly basis. For this purpose, accretion/depletions are treated as monthly quantities and are customarily forecasted or estimated for 12 months into the future. This discussion will focus on the long-range forecasts of accretions/depletions.

Annually, the net accretions/depletions have ranged from about 1.0 MAF (in 1977) to over 20 MAF (1983). The range of this quantity, in addition to the scope and complexity of the processes within the Sacramento Valley add to the problems of forecasting accretions/depletions accurately. Fortunately, certain predictable tendencies help to characterize the accretions/depletions. Furthermore,

operational considerations limit the range of accretions which have any practical effect on project operations to periods of Delta balanced conditions. When Excess conditions exist, the projects are storing and exporting as much water as possible. Thus the accuracy of the estimate of accretions/depletions is significant to project operations only within the range that is associated with the projects capability to respond operationally.

Forecasts of Delta requirements are perhaps the most difficult to make. There are so many factors that can influence conditions in the Delta that it is unlikely that any forecast will succeed in correctly identifying them all. For example, there are four major water export locations in the Delta, but literally hundreds of minor exporters. There are forecasted tide tables, but no long-term forecasts of barometric pressure, which can affect the magnitude of the tide; and there are no long-term forecasts of daily meteorological events. Despite the inaccuracies, forecasts of Delta requirements are necessary. Without them, planning for upstream reservoir operations and south of the Delta water deliveries would be impossible and the reliability of the projects would be compromised. Table 6 includes monthly totals for the Sacramento River accretion/depletions.

**Table 5. Net Delta Outflow Index
2009**

(in cfs-days except as noted)

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	4,583	8,913	30,325	5,678	11,050	10,417	4,535	6,657	3,330	3,708	4,393	3,488
2	4,493	8,603	27,511	5,944	13,884	10,561	4,305	6,635	4,244	3,989	4,340	3,637
3	4,180	8,066	29,699	6,288	16,078	10,459	3,986	6,531	3,655	4,325	4,282	5,017
4	4,938	7,399	41,330	6,649	17,358	10,511	4,151	6,104	3,627	3,626	4,382	4,959
5	4,757	7,417	51,241	6,714	19,808	10,096	4,446	5,421	3,840	4,138	3,870	4,164
6	4,752	8,369	51,861	9,626	24,276	10,400	5,408	3,750	3,708	4,036	4,298	3,722
7	4,607	10,524	49,118	10,493	28,719	10,489	5,698	3,225	3,284	3,735	3,711	3,433
8	3,727	10,427	43,548	11,349	28,336	10,734	5,519	3,840	2,985	3,945	4,176	6,210
9	4,043	10,233	35,000	11,706	26,382	11,192	5,279	3,557	2,238	4,332	3,794	6,879
10	5,093	10,854	27,284	11,931	22,545	10,922	5,380	3,478	1,257	5,079	4,249	6,396
11	4,898	9,516	22,585	11,610	19,895	10,415	5,435	4,088	2,004	4,728	4,360	6,115
12	4,605	8,910	18,602	11,533	17,095	9,227	5,740	3,382	1,830	4,691	3,974	6,574
13	4,572	9,785	15,160	11,217	15,517	8,199	5,959	3,351	2,183	5,520	3,923	7,423
14	4,863	14,004	12,797	11,318	13,534	7,493	5,987	2,302	3,293	18,195	4,011	12,343
15	4,338	15,681	9,569	11,334	12,354	7,198	7,611	2,464	5,847	19,841	4,350	12,703
16	4,279	16,298	8,386	11,319	11,350	6,462	6,467	2,371	5,259	18,835	4,542	11,883
17	4,516	17,999	7,472	12,207	10,855	5,877	5,947	2,349	4,837	16,488	4,672	10,630
18	4,226	33,181	6,810	11,840	10,775	5,061	4,202	2,657	5,022	16,052	3,799	8,466
19	4,082	39,008	6,922	11,293	11,174	4,893	3,933	2,730	4,555	4,305	5,206	5,711
20	3,703	40,092	9,571	10,886	11,141	4,649	3,889	2,937	3,000	3,327	5,579	6,666
21	4,397	40,834	9,405	10,307	11,588	5,359	3,979	3,055	2,719	4,147	5,687	6,315
22	3,297	36,206	8,126	10,420	11,297	5,930	4,393	3,696	3,028	3,668	7,489	5,620
23	10,201	27,539	9,058	9,680	10,439	5,648	3,354	3,123	3,390	4,303	7,297	6,056
24	11,869	29,007	9,619	9,250	10,140	5,321	5,516	3,294	3,624	3,314	6,408	5,240
25	12,420	37,826	8,920	9,460	10,451	6,476	3,214	3,553	3,046	3,182	3,796	5,937
26	13,033	41,495	8,434	10,305	10,482	7,363	4,816	2,391	3,084	3,186	3,465	5,561
27	14,066	42,456	8,048	11,396	10,648	8,015	5,912	2,389	3,832	3,188	3,554	4,330
28	11,430	36,892	7,374	11,314	11,690	7,762	5,126	2,749	2,545	3,443	3,455	4,347
29	9,273		6,072	11,730	10,498	6,760	3,260	3,089	1,797	2,667	4,842	4,938
30	9,704		6,138	11,639	10,116	7,576	3,988	3,252	2,911	3,114	3,750	5,926
31	9,710		6,090		10,866		6,865	3,001		3,239		6,639
Total	198,655	587,534	592,075	306,436	460,341	241,465	154,300	111,421	99,974	190,346	135,654	197,328
Ave.	6,408	20,983	19,099	10,215	14,850	8,049	4,977	3,594	3,332	6,140	4,522	6,365
Max.	14,066	42,456	51,861	12,207	28,719	11,192	7,611	6,657	5,847	19,841	7,489	12,703
Min.	3,297	7,399	6,072	5,678	10,116	4,649	3,214	2,302	1,257	2,667	3,455	3,433
Total In AF	394,032	1,165,374	1,174,381	606,948	913,086	478,946	306,054	221,004	198,298	377,815	269,070	391,400

Annual Total = 6,496,407 acre-feet

**Table 6. Sacramento Basin and Sacramento-San Joaquin Delta Operations
2009**

(in thousands of acre-feet except as noted)

Month	Upstream Reservoir Releases to River			Sacramento River Accretions or Depletions ^{2/}	Delta Inflow				Net Delta Consumptive Use	Delta Exports					Net Delta Outflow Index
	Keswick ^{1/}	Oroville ^{1/}	Nimbus		Sacramento River at Sacramento ^{3/}	Miscellaneous Inflows ^{4/}	San Joaquin River at Vernalis	Total Inflow		Clifton Court Forebay Intake ^{5/}	Barker Slough Pumping Plant	Tracy Pumping Plant	Contra Costa Pumping Plant	Total Exports	
Jan	206	58	51	264	579	23	71	673	-3	146	3	130	4	282	394
Feb	168	53	40	813	1,074	55	83	1,212	-176	110	2	106	4	222	1,165
Mar	200	51	70	1,041	1,361	101	91	1,553	22	171	0	176	10	357	1,174
Apr	313	165	194	41	719	51	90	860	89	78	1	84	1	164	607
May	529	135	234	69	963	73	135	1,171	116	62	6	64	10	141	913
Jun	609	148	168	-228	704	54	78	835	221	33	6	78	20	136	479
Jul	786	422	306	-384	1,132	44	45	1,221	268	379	5	240	22	647	306
Aug	697	177	212	-159	918	17	36	972	233	251	5	253	9	518	221
Sep	453	95	116	14	676	10	52	738	139	145	4	244	8	401	198
Oct	363	121	119	6	611	27	109	747	-12	126	4	243	8	381	378
Nov	304	116	107	19	546	8	82	636	96	90	4	169	9	272	269
Dec	197	103	106	266	671	13	81	765	28	203	2	133	8	346	391
Total	4,825	1,644	1,723	1,762	9,953	476	953	11,383	1,021	1,792	42	1,919	113	3,866	6,496

1/ Time lagged values (Keswick: 5 days; Oroville: 3 days).

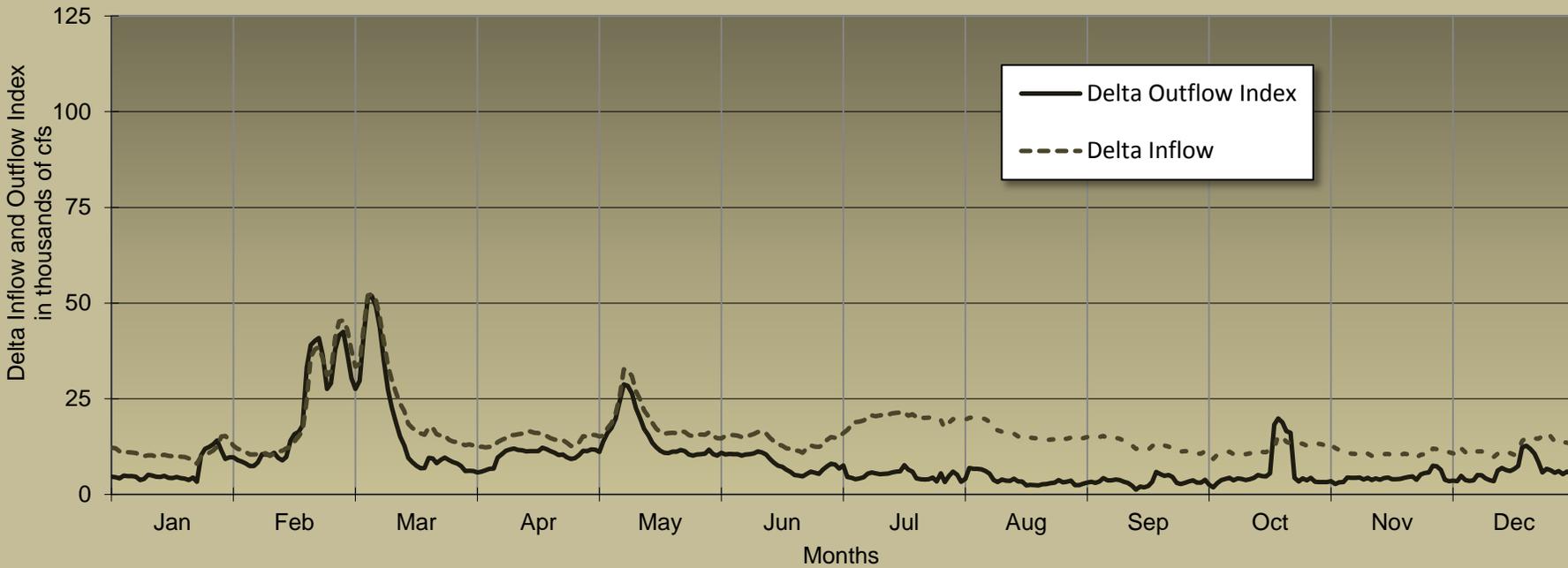
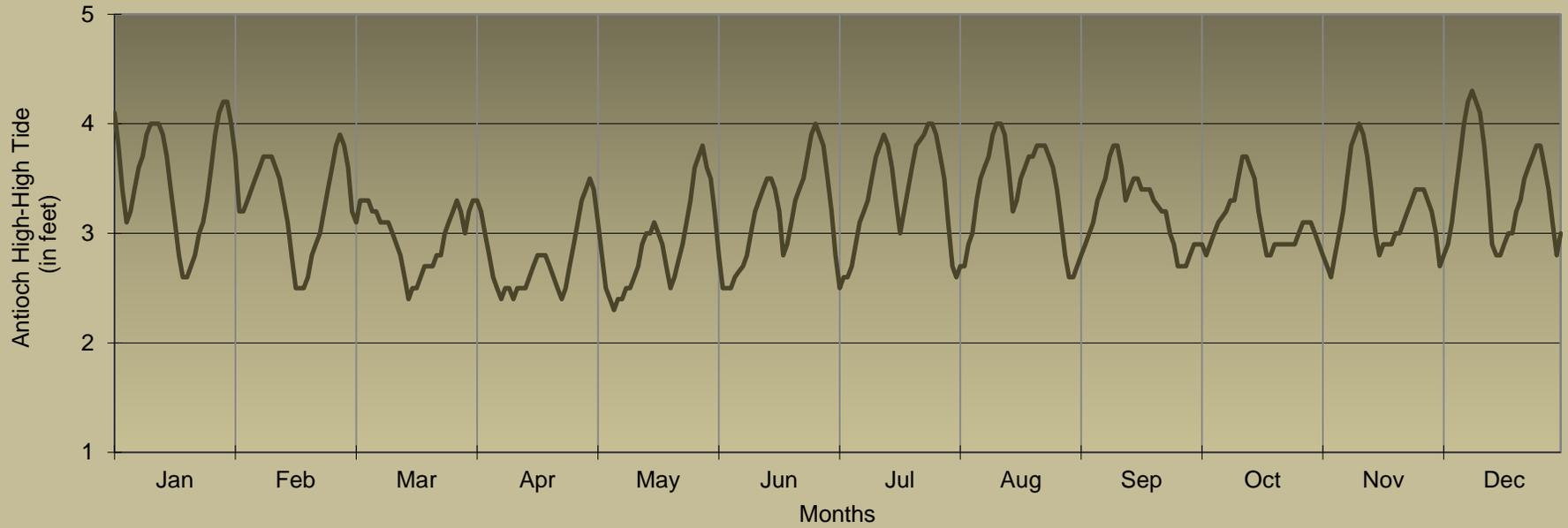
2/ Positive values are accretions; negative values are depletions.

3/ These values are based on a measured daily average taken from the Sacramento River at Freeport and include Sacramento County Regional Waste Treatment Plant.

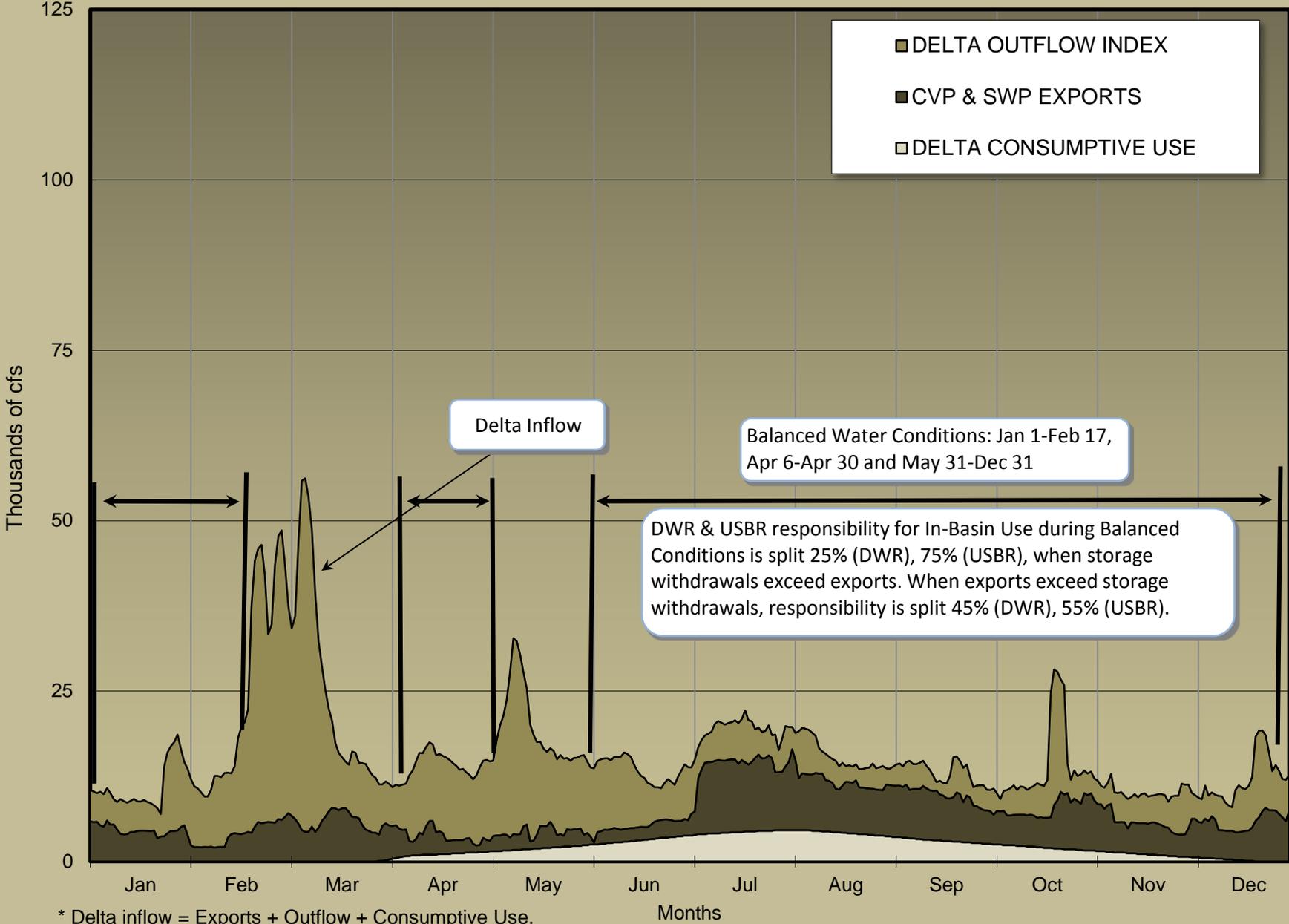
4/ Includes Yolo Bypass, Eastside Streams, and Miscellaneous Inflows.

5/ Includes Byron Bethany Diversion Canal.

Figure 7. Delta Tide, Inflow, and Outflow Index
2009



**Figure 8. Coordinated Delta Operations
2009**



**Figure 9. Coordinated Delta Operations
Lagged Storage Withdrawals
2009**

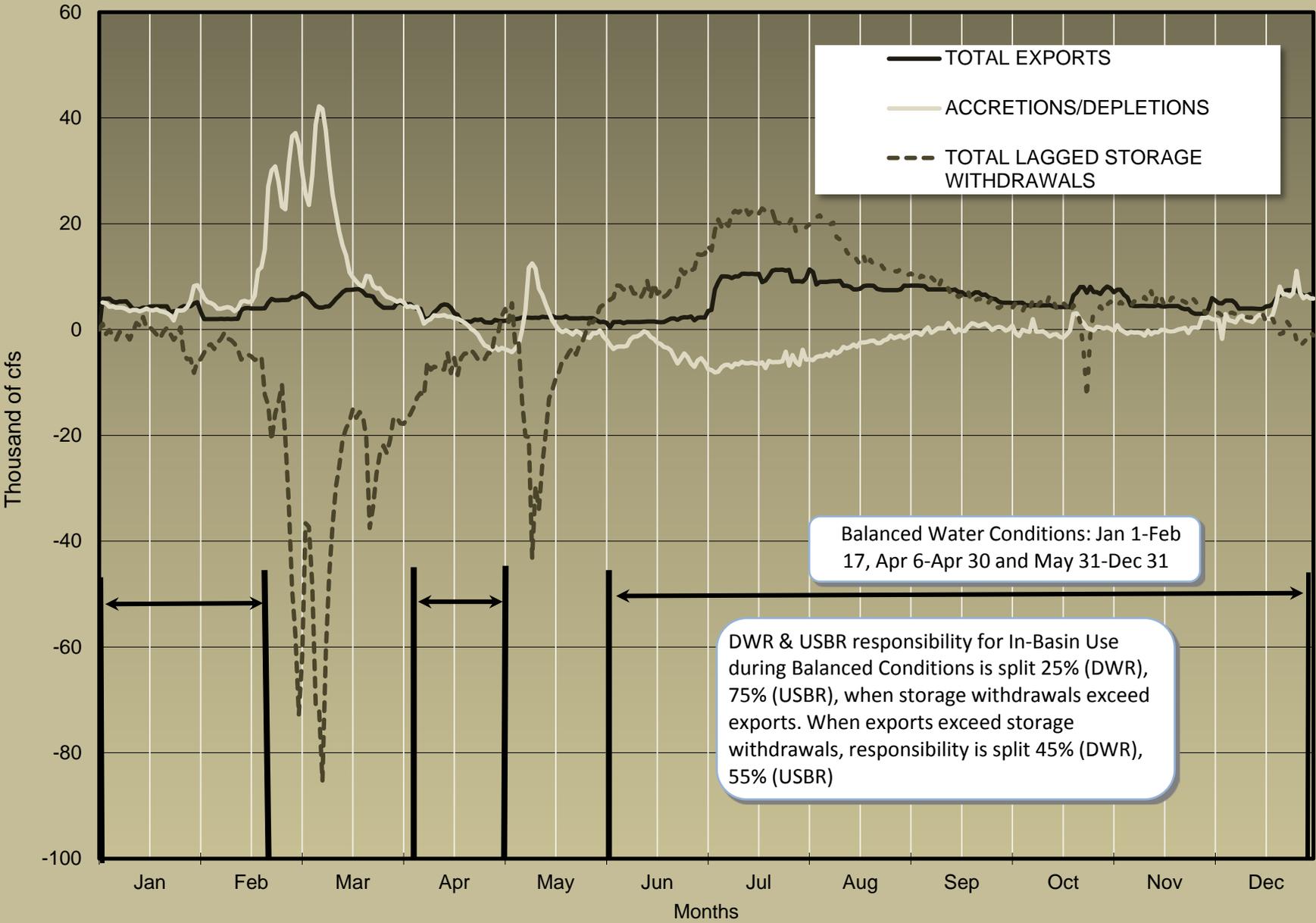
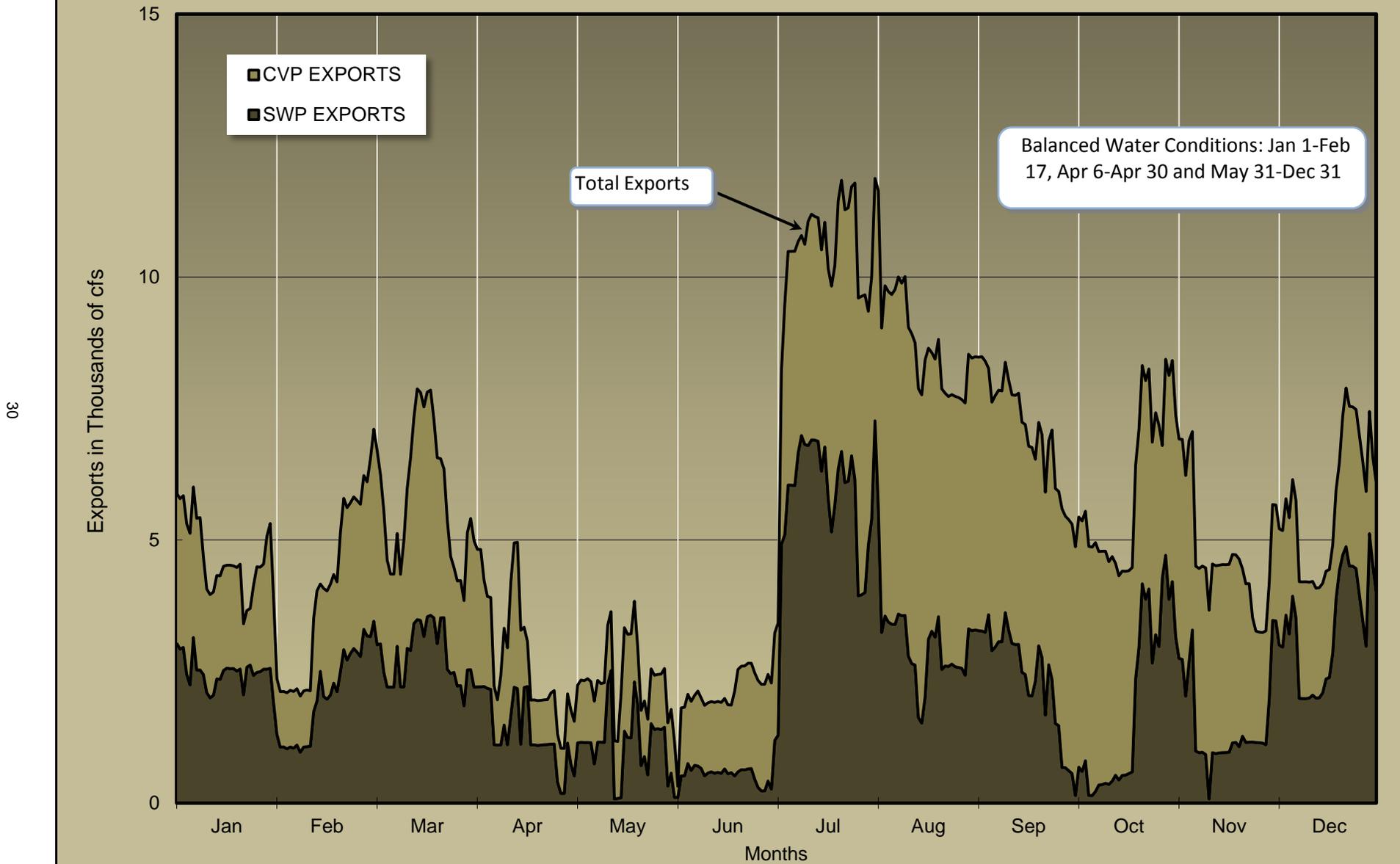


Figure 10. Coordinated Delta Operations
SWP and CVP Exports
2009



Project Operations by Field Division

Oroville Field Division

Water Storage

SWP water storage facilities in the Oroville Field Division include Lake Oroville, Thermalito Forebay and Afterbay (Oroville-Thermalito Complex) and upper Feather River reservoirs consisting of Lake Davis, Frenchman Lake, and Antelope Lake. Lake Oroville operations store winter and spring runoff for later SWP use for power generation, flood control, recreation, fish and wildlife enhancement, in addition to water supply.

The Upper Feather River Reservoirs have a combined capacity of 162,000 AF. Monthly operations for the three Upper Feather River reservoirs are presented in Table 7. The table below compares storage capacity with the largest end-of-month storage for each reservoir for the last five years:

Year	Reservoir		
	Antelope (Capacity: 22,566)	Frenchman (Capacity: 55,477)	Davis (Capacity: 84,371)
2009	(Apr) 23,238	(Apr) 29,826	(May) 50,850
2008	(May) 19,242	(Apr) 36,200	(Mar) 49,197
2007	(Apr) 23,078	(Apr) 45,779	(Mar) 52,256
2006	(Apr) 24,769	(Apr) 58,367	(Apr) 74,669
2005	(Dec) 23,704	(May) 33,261	(May) 59,735

The total amount of unimpaired runoff to Lake Oroville for the 2008-09 water year totaled about 2.80 MAF, (66 percent of average). Lake Oroville storage at the beginning of 2009 was 979,688 AF (28 percent of normal maximum operating capacity). Storage peaked on May 24, 2009 at 2,287,478 AF, (65 percent of normal maximum operating capacity). Lowest storage in Lake Oroville in 2009 was 969,447 (27 percent of normal maximum operating capacity) on January 9.

Lake Oroville's computed inflow is tabulated in Table 8 and plotted along with releases, diversions, and storage withdrawals on Figure 11. A ten-year historical summary of Lake Oroville's storage and inflow is illustrated on Figure 12.

Water temperatures on and below the lake's surface are monitored very closely throughout the year at various locations around the lake. Two intakes to the power plant have shutters that control the depth from which water enters the plant. The temperature of water entering the fish hatchery can then be controlled by adding or removing shutters as necessary. A complete illustration of water temperature and intake operation is shown on Figure 14.

Water Deliveries

Project water stored in the Upper Feather Area Lakes flows into Lake Oroville through the North and Middle Forks of the Feather River. Prior water rights deliveries from Frenchman Lake totaled 7,332 AF local supply to Last Chance Creek WD and 1,060 AF were made out of Lake Davis (Non-project).

Water stored in Lake Oroville is released into the Thermalito Diversion Dam Pool, from which specified quantities are released into both the Feather River and the Thermalito Power Canal. The power canal supplies water first to the Thermalito Forebay and then to Thermalito Afterbay. From the Thermalito Afterbay, additional water is released to the Feather River and several local distribution systems used to deliver water to prior water right holders. These deliveries are collectively called the Feather River Service Area (FRSA) diversions. FRSA diversions are not considered SWP benefits, as they predate the SWP construction, and would have occurred in the absence of the SWP to the limit of available natural river flows.

Total deliveries in the Oroville Field Division were 1,130,801 AF in 2009. Included in this amount were deliveries of Local Supply to Thermalito Irrigation District (2,036 AF), Last Chance WD (7,332 AF), Table A water to Plumas County Flood Control and Water Conservation District (PCFC&WCD) (200 AF), Yuba City (2,114 AF), County of Butte (581 AF), Recreation water to County of Butte (4 AF), Upper Feather Prior Water Rights (860 AF), and FRSA diversions totaling 1,117,674 AF. All FRSA diversions are detailed below:

Sutter Butte Canal	591,120
Richvale Canal	147,241
Sunset Pumps	5,272
Western Canal Lateral	3,061
Western Canal	331,710
Tudor Mutual	1,308
Garden Highway	14,932
Plumas Mutual	13,244
Oswald Water District	1,623
Dana Brothers	2,754
Palermo Canal	5,409
Total in AF	1,117,674

Table 2 shows a breakdown of total deliveries by agency, Map 3 shows a breakdown by water type.

Table 7. Upper Feather Area Lakes Monthly Operation

2009

(in acre-feet except as noted)

Month	Lake Storage			Outflow						Inflow	
	Water Surface Elevation (in feet)	End of Month Storage	Storage Change	Regulated Release			Total Regulated Release	Spill	Estimated Evaporation and Seepage	Total Outflow	Computed Inflow
				Stream-Flow Maint.	Prior Water Rights						
				Local Supply	Non-Project						
Antelope Lake Capacity 22,566 acre-feet											
Jan	4991.76	14,181	253	615	0	0	615	0	49	664	917
Feb	4994.24	16,000	1,819	284	0	0	284	0	57	341	2,160
Mar	5001.00	21,647	5,647	307	0	0	307	0	100	407	6,054
Apr	5002.72	23,238	1,591	298	0	0	298	4,465	185	4,947	6,538
May	5002.24	22,788	-450	411	0	0	411	4,596	301	5,307	4,857
Jun	5001.70	22,287	-501	1,190	0	0	1,190	511	448	2,149	1,648
Jul	5000.03	20,779	-1,508	1,230	0	0	1,230	0	784	2,014	506
Aug	4998.21	19,191	-1,588	1,230	0	0	1,230	0	573	1,803	215
Sep	4996.05	17,412	-1,779	1,190	0	0	1,190	0	750	1,940	161
Oct	4994.79	16,421	-991	1,230	0	0	1,230	0	220	1,450	459
Nov	4993.75	15,630	-791	1,077	0	0	1,077	0	122	1,199	408
Dec	4992.65	14,818	-812	1,230	0	0	1,230	0	82	1,312	500
Total	---	---	890	10,290	0	0	10,290	9,571	3,671	23,533	24,423
Frenchman Lake Capacity 55,477 acre-feet											
Jan	5564.60	25,753	235	123	0	0	123	0	68	191	426
Feb	5565.15	26,295	542	111	0	0	111	0	69	180	722
Mar	5567.44	28,622	2,327	123	0	0	123	0	1,219	1,342	3,669
Apr	5568.58	29,826	1,204	119	32	0	151	0	211	362	1,566
May	5566.34	27,490	-2,336	60	2,634	0	2,694	0	344	3,038	702
Jun	5564.87	26,018	-1,472	85	1,262	0	1,347	0	619	1,966	494
Jul	5562.40	23,648	-2,370	85	1,573	0	1,658	0	861	2,519	149
Aug	5560.15	21,604	-2,044	105	1,581	0	1,686	0	441	2,127	83
Sep	5559.28	20,843	-761	107	135	0	242	0	609	851	90
Oct	5559.00	20,601	-242	123	0	0	123	0	241	364	122
Nov	5558.61	20,268	-333	119	113	0	232	0	137	369	36
Dec	5558.73	20,370	102	182	2	0	184	0	94	278	380
Total	---	---	-5,148	1,343	7,331	0	8,674	0	4,913	13,587	8,439
Lake Davis Capacity 84,371 acre-feet											
Jan	5761.35	39,091	-157	603	12	0	615	0	182	797	640
Feb	5761.91	40,565	1,474	544	11	0	555	0	184	739	2,213
Mar	5764.19	46,903	6,338	603	12	0	615	0	334	949	7,287
Apr	5765.15	49,736	2,833	583	12	0	595	0	591	1,186	4,019
May	5765.52	50,850	1,114	606	12	0	618	0	992	1,610	2,724
Jun	5765.03	49,378	-1,472	417	178	48	643	0	1,403	2,046	574
Jul	5764.17	46,845	-2,533	449	167	55	671	0	1,901	2,572	39
Aug	5763.27	44,279	-2,566	345	270	55	670	0	1,958	2,628	62
Sep	5762.58	42,370	-1,909	446	149	42	637	0	1,332	1,969	60
Oct	5762.20	41,340	-1,030	589	12	0	601	0	759	1,360	330
Nov	5762.07	40,991	-349	583	12	0	595	0	429	1,024	675
Dec	5762.17	41,260	269	603	12	0	615	0	295	910	1,179
Total	---	---	2,012	6,370	860	200	7,431	0	10,360	17,791	19,803

**Table 8. Lake Oroville Monthly Operation
2009**

(in acre-feet except as noted)

Capacity 3,537,577 acre-feet

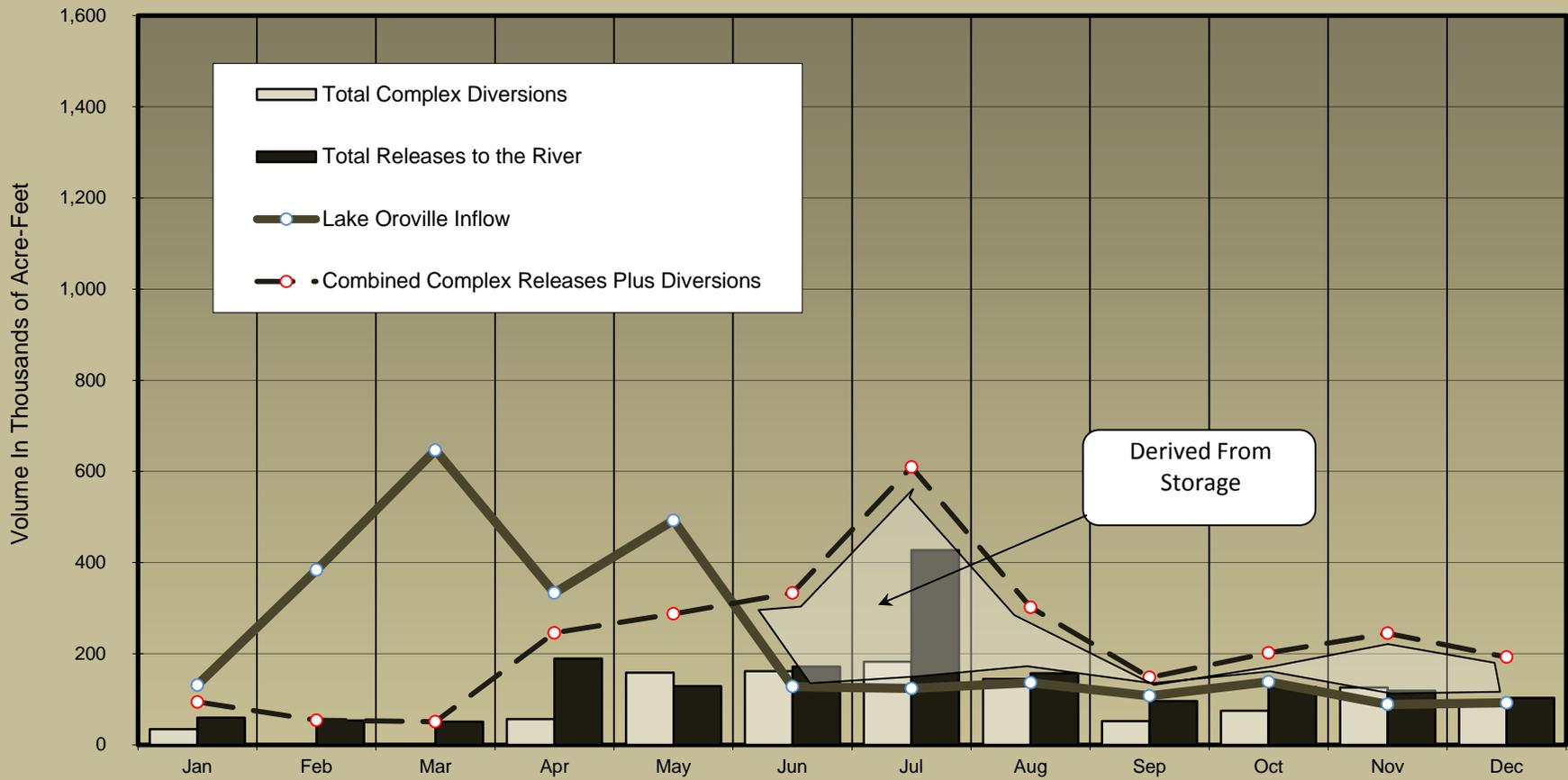
Month	Water Surface Elevation (in feet)	Storage	Storage Change	Outflow						Hyatt Pumpback	Computed Inflow 3/
				Hyatt Generation 1/	Palermo Canal	Deliveries 2/	Evaporation	Spill	Total Outflow		
Jan	667.03	1,020,262	39,160	90,966	122	2	834	0	91,924	0	131,084
Feb	713.49	1,360,493	340,231	42,772	38	1	703	0	43,514	0	383,745
Mar	780.33	1,977,699	617,206	27,095	24	3	2,271	0	29,393	0	646,599
Apr	787.63	2,055,311	77,612	251,270	327	4	3,929	0	255,530	0	333,142
May	807.88	2,281,904	226,593	259,415	644	5	5,754	0	265,818	0	492,411
Jun	787.83	2,057,468	-224,436	344,599	839	5	6,604	0	352,047	20	127,591
Jul	736.40	1,554,036	-503,432	618,340	1,010	3	7,780	0	627,133	0	123,701
Aug	716.36	1,383,772	-170,264	299,172	944	5	6,334	0	306,455	0	136,191
Sep	710.55	1,336,924	-46,848	148,391	893	7	5,141	0	154,432	0	107,584
Oct	704.64	1,290,390	-46,534	181,777	306	4	2,757	0	184,844	0	138,310
Nov	684.12	1,137,487	-152,903	240,163	143	2	1,275	0	241,583	0	88,680
Dec	668.43	1,029,534	-107,953	199,671	119	0	448	0	200,238	0	92,285
Total	---	---	48,432	2,703,631	5,409	41	43,830	0	2,752,911	20	2,801,323

1/ Includes bypass flows.

2/ Includes Lime Saddle Marina and Butte County Del Oro.

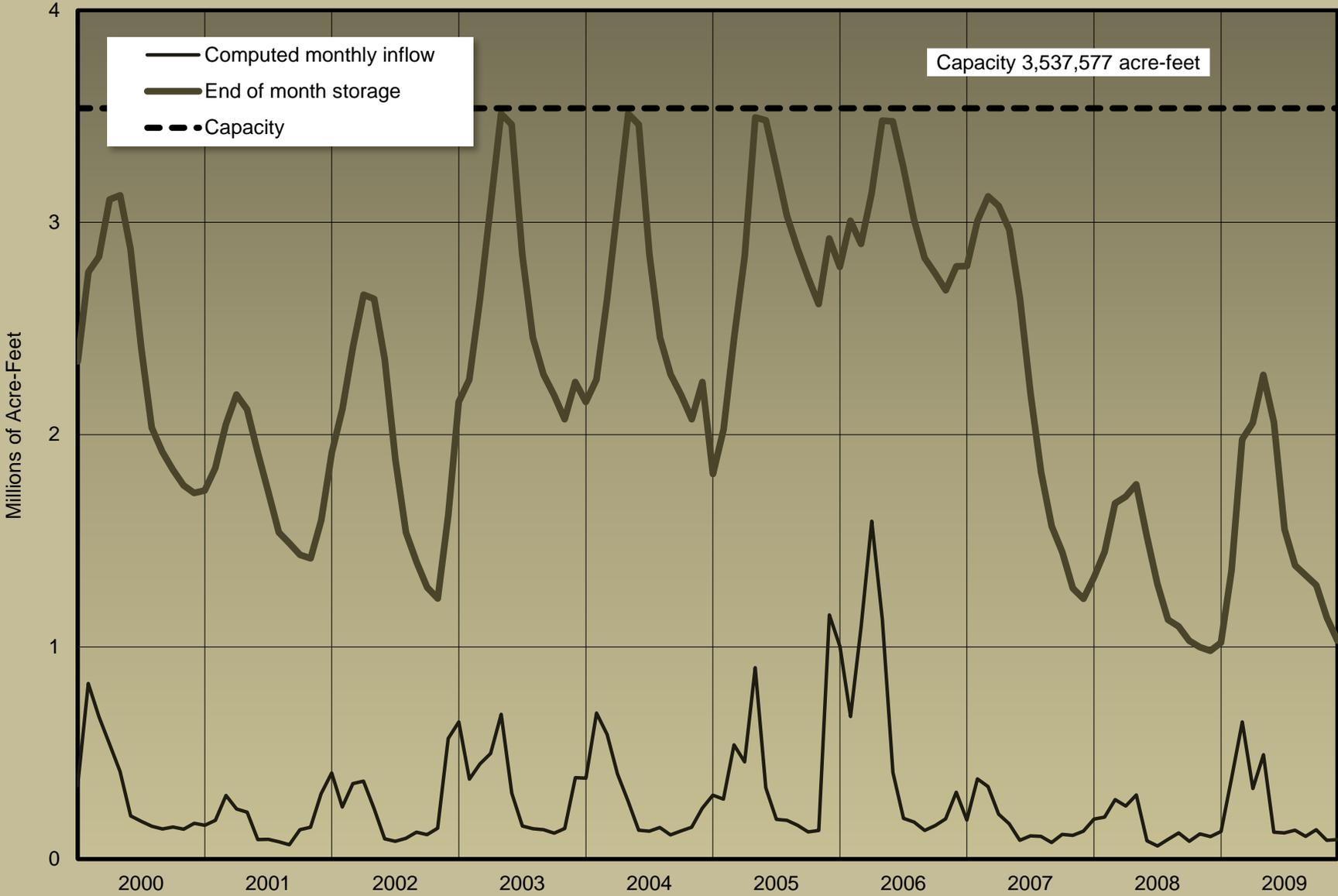
3/ Does not include pumpback.

Figure 11. Oroville-Thermalito Complex
 Inflow, Releases, and Diversions
2009



Note: Releases include flows at fish barrier dam, fish hatchery, and afterbay river outlet. Diversions include Butte County, Thermalito Irrigation District, Sutter Butte Canal, Western Lateral, Richvale Canal, Sunset Pumps, and Western Canal. The area between the plotted lines above the Inflow line represents amounts derived from storage.

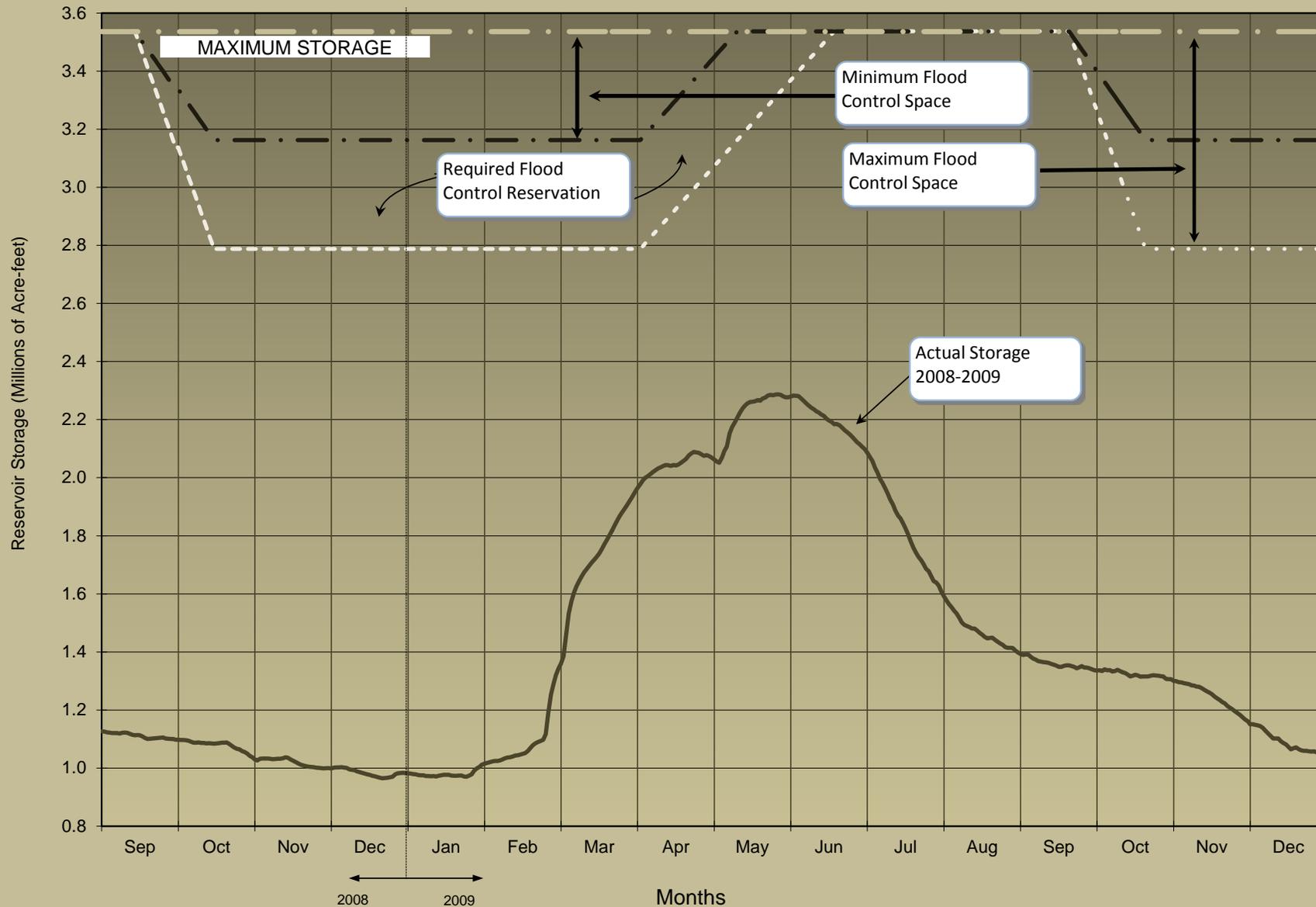
Figure 12. 10-Year Summary of Lake Oroville Operation



* Excludes pumpback.

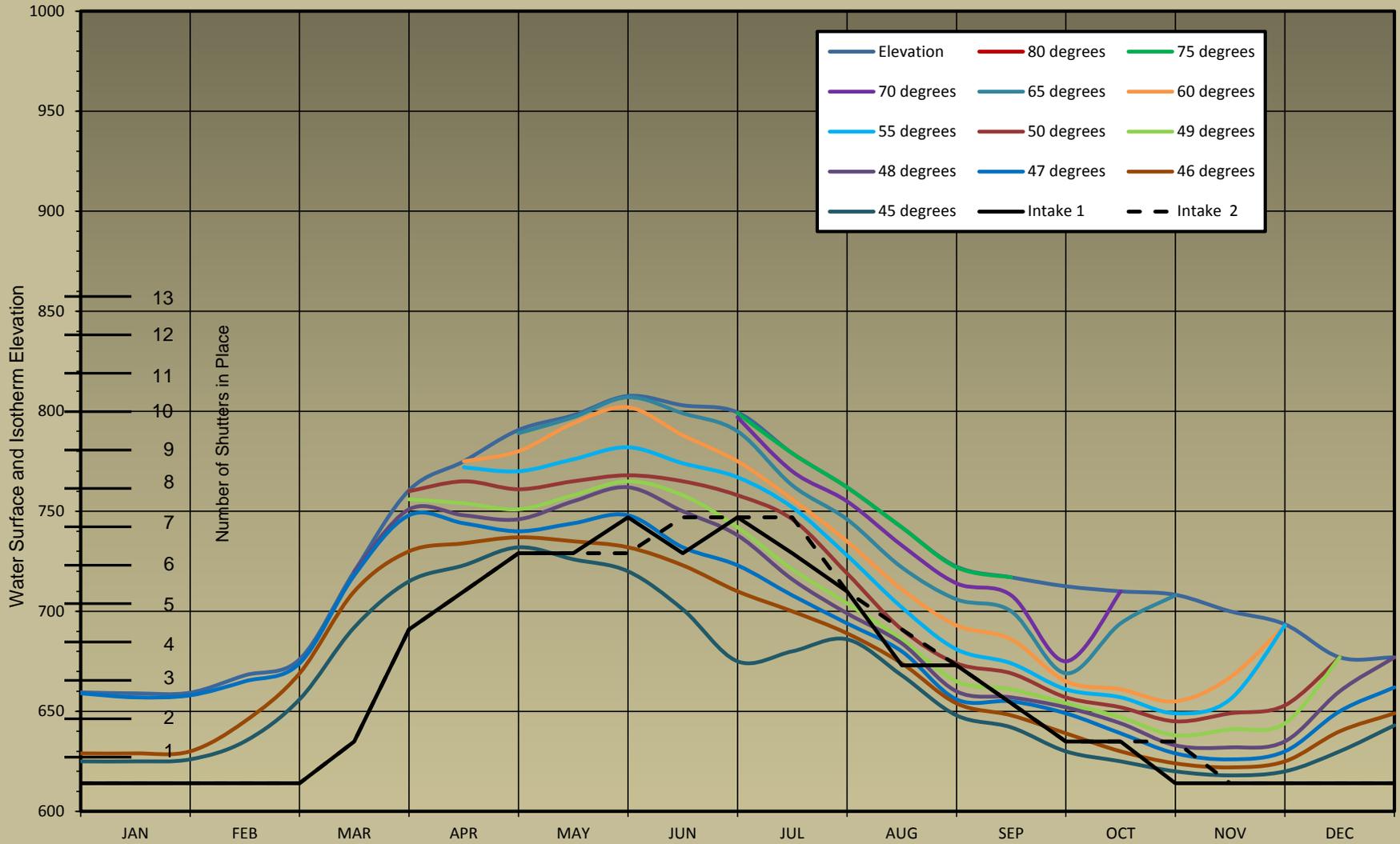
Figure 13. Operation of Lake Oroville for Flood Control

2008-2009



**Figure 14. Lake Oroville Temperatures
2009**

(isotherms in degrees Farenheit)



Note: Temperature data taken once per month and averaged for the rest of the year.

**Table 9. Thermalito Forebay Monthly Operation
2009**

Including Diversion Pool and Power Canal
(end of month storage in acre-feet)

Month	Storage 2/	Storage Change	Inflow			Outflow					Losses (-) And Gains (+)
			Lake Oroville Releases 2/	Kelly Ridge Generation	Thermalito Pumpback	Thermalito Generation 3/	Butte County	Thermalito Irrigation District	Releases To River 4/	Hyatt Powerplant Pumpback	
Jan	24,520	1,322	90,966	6,635	0	65,268	0	96	38,948	0	8,033
Feb	22,684	-1,836	42,772	9,929	0	30,056	0	76	34,997	0	10,592
Mar	22,433	-251	27,095	14,029	9,485	18,196	0	101	39,204	0	6,641
Apr	23,419	986	251,270	14,020	408	226,403	0	150	37,943	0	-216
May	23,832	413	259,415	14,296	0	234,004	0	193	39,775	0	674
Jun	23,688	-144	344,599	10,825	0	308,915	8	257	45,491	20	-877
Jul	23,674	-14	618,340	14,106	0	587,101	111	294	45,264	0	310
Aug	24,030	356	299,172	14,508	0	277,945	80	292	41,903	0	6,896
Sep	24,153	123	148,391	7,331	0	128,283	91	217	39,890	0	12,882
Oct	23,795	-358	181,777	9,424	0	156,678	65	153	41,680	0	7,017
Nov	24,162	367	240,163	14,493	0	217,619	83	105	49,194	0	12,712
Dec	24,074	-88	199,671	12,081	0	177,375	104	102	41,033	0	6,774
Total	- - -	876	2,703,631	141,677	9,893	2,427,843	542	2,036	495,322	20	71,438

1/ Sum of Thermalito Forebay and Diversion Pool.

2/ Sum of releases from Lake Oroville through Hyatt plant, spill, and spillway leakage.

3/ Includes bypass flows.

4/ Sum of Diversion Dam generation plus Hatchery.

**Table 10. Thermalito Afterbay Monthly Operation
2009**

(end of month storage in acre-feet)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow	Outflow						Losses (-) And Gains (+)
				Thermalito Generation 1/	Sutter Butte Canal	Western Canal Lateral	Richvale Canal	Western Canal	River Outlet	Thermalito Pumpback	
Jan	131.49	37,282	1,167	65,268	20,710	27	3,700	10,080	20,415	0	-9,169
Feb	133.25	43,797	6,515	30,056	0	0	0	0	18,582	0	-4,959
Mar	130.46	33,697	-10,100	18,196	0	0	0	0	11,379	9,485	-7,432
Apr	133.85	46,129	12,432	226,403	34,880	104	7,570	11,720	151,210	408	-8,079
May	127.93	25,621	-20,508	234,004	88,150	581	17,370	50,720	89,223	0	-8,468
Jun	130.78	34,793	9,172	308,915	85,270	501	22,231	53,470	125,910	0	-12,361
Jul	133.19	43,567	8,774	587,101	89,830	738	25,100	64,690	382,121	0	-15,848
Aug	133.70	45,541	1,974	277,945	81,130	443	18,550	44,020	115,080	0	-16,748
Sep	133.79	45,893	352	128,283	39,030	15	2,980	9,700	55,911	0	-20,295
Oct	128.85	28,437	-17,456	156,678	31,440	44	13,700	29,510	85,428	0	-14,012
Nov	129.82	31,556	3,119	217,619	64,120	408	20,480	40,720	69,594	0	-19,178
Dec	133.76	45,776	14,220	177,375	56,560	200	15,560	17,080	61,728	0	-12,027
Totals			9,661	2,427,843	591,120	3,060	147,241	331,710	1,186,581	9,893	-148,577

1/ Includes bypass flows.

Delta Field Division

Water Storage

The Delta Field Division consists of the North Bay Aqueduct, the South Bay Aqueduct, and the California Aqueduct from Clifton Court Forebay to Check 12. Along these waterways, water storage operations take place at Clifton Court Forebay, Bethany Reservoir, Travis Tank, Napa Terminal Tank, the California Aqueduct, and Lake Del Valle. Water storage data at the South Bay Aqueduct are not reported; storage changes are assumed to be zero for operational purposes.

Lake Del Valle, located off the South Bay Aqueduct, functions primarily as a storage facility for water delivery into Santa Clara and Alameda counties. At the beginning of the water year, Lake Del Valle held 38,170 AF, which was about 49 percent of its maximum capacity of 77,106 AF. Its highest storage during the 2008–2009 water year occurred on May 11, 2009, at 39,351 AF. Its lowest storage occurred on January 10, 2009, at 29,325 AF.

Project water flows from the Delta into Clifton Court Forebay through the Clifton Court control gates. A schedule of daily gate operation is published in the *SWP Monthly Report of Operations*. In 2009, 1,814,671 AF flowed into Clifton Court Forebay. Monthly inflows to Clifton Court Forebay along with corresponding storage changes are shown in Table 12.

Water Deliveries

The North Bay Aqueduct system, completed in May 1988, begins in the North Delta at the Barker Slough Facilities. Sacramento River water is conveyed to the Barker Slough Pumping Plant. From the pumping plant, water is conveyed by pipe for 24 miles to contractors in Napa and Solano Counties and to the Cordelia Pumping Plant. Deliveries are made to Solano County water users via turnouts along the pipe's length. From the Cordelia Pumping Plant, the North Bay Aqueduct terminates at the Napa Terminal Tank. The Aqueduct supplied 41,854 AF to Napa and Solano counties.

The South Bay Aqueduct system, 43 miles long, begins at South Bay Pumping Plant and terminates at the Santa Clara Terminal Reservoir. South Bay Pumping Plant exports project water flowing through Bethany reservoir. In 2009, this system supplied 132,206 AF of deliveries to Zone 7, Alameda Co. WD., and Santa Clara WD.

The California Aqueduct, beginning at Banks through Check 12, delivered 3,667 AF of Project and CVP water in the Delta Field Division to Oak Flat, Western Hills, Musco Olive, VA Cemetery, and Tracy Golf.

Total deliveries in the Delta Field Division were 177,860 AF in 2009. Included were 95,939 AF to SWP Table A contractors, 15,259 AF of Local Water to Alameda Co. FC&WCD, Zone 7, and to Alameda County WD, 478 AF of Federal Wheeling to Musco Olive, Tracy Golf Course, and the V. A. Cemetery, 133 AF of Recreation water, 1,000 AF of General Conveyance, 5,389 AF of Permit water, 78 AF of Purchase Pool, 32,707 AF of Semi Tropic 532 AF of Dry Year Purchase, 8,980 AF of Transfer, 6,032 AF of Article 21, 97 AF of Water Quality, 1,860 AF of Drought Water Bank, and 9,346 AF of Settlement Water. These and other deliveries are summarized in Table 2.

Pumping Plants

Delta Field Division pumping plants include Barker Slough Pumping Plant and Cordelia Pumping Plant on the North Bay Aqueduct, Banks on the California Aqueduct, and South Bay and Del Valle Pumping Plants on the South Bay Aqueduct. Monthly pumping data is summarized for the year in Table 1.

Banks Pumping Plant was originally built to accommodate 11 units. Initially, seven pumps were constructed for a total pumping capacity of 6,400 cfs. Construction of the final four pumps was completed in 1990, each with a design capacity of 1,067 cfs and a new total capacity of 10,500 cfs. Export pumping rates are increased on weekends to take advantage of less costly off-peak electricity. This produces sharp peaks in the export rate at about 7-day intervals.

In 2009, the SWP diverted 1,793,590 AF of water at Banks Pumping Plant, including 115,359 AF of CVP water and 13,216 AF of CVC water wheeled by the Department. Below is a five-year summary of Federal, State, and total pumping at Banks:

Banks Pumping Plant			
Year	Federal And Other	State	Total
2009	128,575	1,665,015	1,793,590
2008	0	1,175,776	1,175,776
2007	133,497	2,264,017	2,397,514
2006	0	3,501,080	3,501,080
2005	5,091	4,042,851	4,047,942

Table 11. Lake Del Valle Monthly Operation

2009

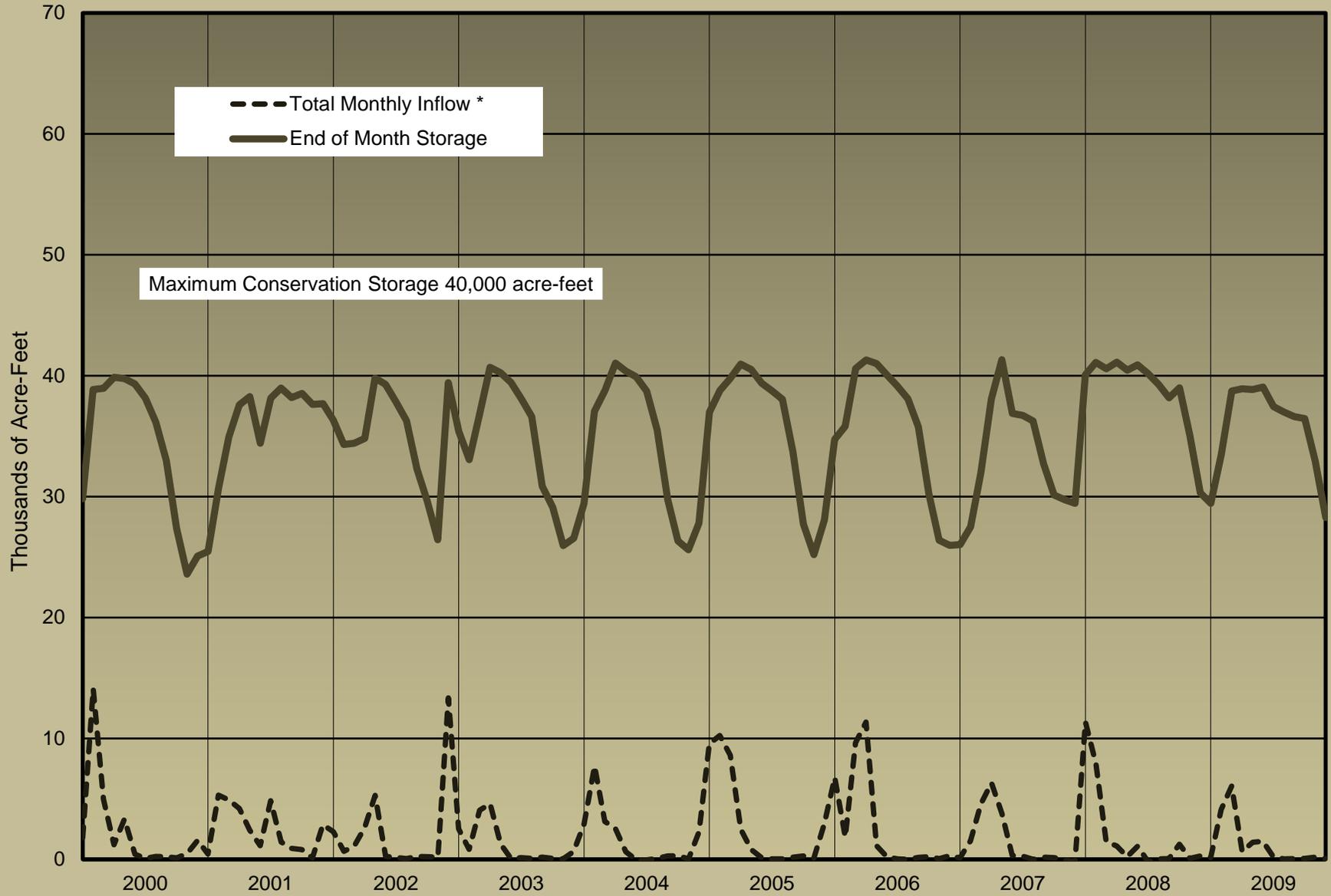
(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow		Outflow					Precipitation (inches)
				Natural 1/	From South Bay Aqueduct	Arroyo Valle	South Bay Aqueduct	Recreation Deliveries 2/	Evaporation	Total	
Jan	686.72	29,446	-868	141	2	0	937	2	72	1,011	1.66
Feb	693.41	33,488	4,042	4,111	0	0	0	3	66	69	3.24
Mar	701.33	38,744	5,256	6,062	0	0	654	6	146	806	3.27
Apr	701.57	38,911	167	336	315	0	240	12	232	484	0.30
May	701.50	38,862	-49	346	1,067	0	1,123	13	326	1,462	0.43
Jun	701.78	39,057	195	824	670	0	919	16	364	1,299	0.28
Jul	699.43	37,438	-1,619	-860	1,061	0	1,338	25	457	1,820	0.00
Aug	698.79	37,005	-433	29	0	0	0	22	440	462	0.04
Sep	698.22	36,621	-384	56	0	0	25	23	392	440	0.32
Oct	697.97	36,454	-167	82	0	0	10	7	232	249	2.21
Nov	692.50	32,917	-3,537	182	0	0	3,571	2	146	3,719	0.18
Dec	684.65	28,273	-4,644	45	0	0	4,636	2	51	4,689	2.16
Total	---	---	-2,041	11,354	3,115	0	13,453	133	2,924	16,510	14.09

1/ Total inflow from stream gaging station above Lang Canyon and accretions/depletions.

2/ To East Bay Regional Park District.

Figure 15. 10-Year Summary Lake Del Valle Operation



* Natural and pumped inflows.

**Table 12. Clifton Court Forebay Monthly Operation
2009**

Month	End-of-Month Water Surface Elevation (in feet)	End-of-Month Storage (in acre-feet)	Total Monthly Storage Change (in acre-feet)	Total Monthly Inflow (in acre-feet)
Jan	-0.99	16,133	-1,377	145,875
Feb	-1.01	16,090	-43	109,812
Mar	-1.43	15,188	-902	172,083
Apr	-1.86	14,265	-923	81,199
May	-1.25	15,575	1,310	66,362
Jun	0.23	18,759	3,184	36,868
Jul	-1.30	15,467	-3,292	382,492
Aug	-0.31	17,596	2,129	253,584
Sep	-0.62	16,929	-667	146,557
Oct	0.48	19,297	2,368	126,598
Nov	0.50	19,340	43	89,951
Dec	-0.87	16,391	-2,949	203,290
Total	---	---	-1,119	1,814,671

San Luis Field Division

Water Storage

San Luis Reservoir reached its maximum end-of-month storage for 2009, 1,006,276 AF (50 percent of maximum operating storage), at the end of March. Maximum operating storage capacity in San Luis is 2,027,835 AF. Minimum end-of-month storage for the year of 350,801 AF (17 percent of maximum operating storage) occurred in June. The State's share of San Luis Reservoir end-of-month storage reached the maximum of 597,348 AF in March (56 percent of State's maximum operating storage), and the minimum of 175,599 AF (17 percent of State's maximum operating storage) was reached in October. Table 13 and Figure 16 show San Luis Reservoir operations during 2009. Table 14 shows the monthly operation of O'Neill Forebay during 2009.

There are two accounting procedures for calculating storage shares in O'Neill Forebay. One calculates storage shares using actual SWP/USBR deliveries. The other method calculates storage shares in O'Neill using amounts pumped at Dos Amigos Pumping Plant for each agency derived from scheduled energy. There is always a mis-match between actual Federal deliveries and scheduled amounts pumped with USBR energy to meet Federal deliveries. The differences are accumulated and carried over into subsequent months. These mismatches are used to "underschedule" or "overschedule" USBR energy and pumping at Dos Amigos to bring the mismatch back into alignment or closer to zero. The end-of-year mismatch at Dos Amigos was 1,712 AF over-pumped for 2009

Pumping and Generating Plants

Total pumping in 2009 at Gianelli Pumping-Generating Plant was 1,341,022 AF. Water released from San Luis Reservoir to O'Neill Forebay for generation was 750,302 AF. Total pumping at Dos Amigos Pumping Plant in 2009 was 1,812,926 AF, about 320,579 AF less than was pumped in 2008. The total water pumped at Dos Amigos Pumping Plant includes 1,283 AF of CVC water wheeled by SWP for Cross Valley Canal exchanges and transfers, 459,028 AF for the USBR, and 1,352,615 for the SWP. Table 15 summarizes joint-use plant activity on a monthly basis.

Water Deliveries

Water deliveries in the San Luis Field Division during 2009 totaled 549,190 AF which included 1,184 AF of State and Federal deliveries to the DFG and 22 AF to the Department of Parks and Recreation (DPR) from the O'Neill Forebay and San Luis Reservoir (Reach 3a, 3 and 5). The following tabulation details the components of these recreation deliveries:

San Luis Reservoir (Reach 3a)			
	DPR	DFG	Total
State	3	0	3
Federal	2	0	2
Sub-total	5	0	5
O'Neill Forebay (Reach 3)			
	DPR	DFG	Total
State	10	536	545
Federal	7	437	445
Sub-total	17	973	990
Reach 5			
	DPR	DFG	Total
State	0	73	73
Federal	0	138	138
Sub-total	0	211	211

Also included are other deliveries from the joint-use facilities of 539,414 AF Joint -Use, 8,426 AF State Customers miscellaneous, and 324 AF Recovery of Pump-in.

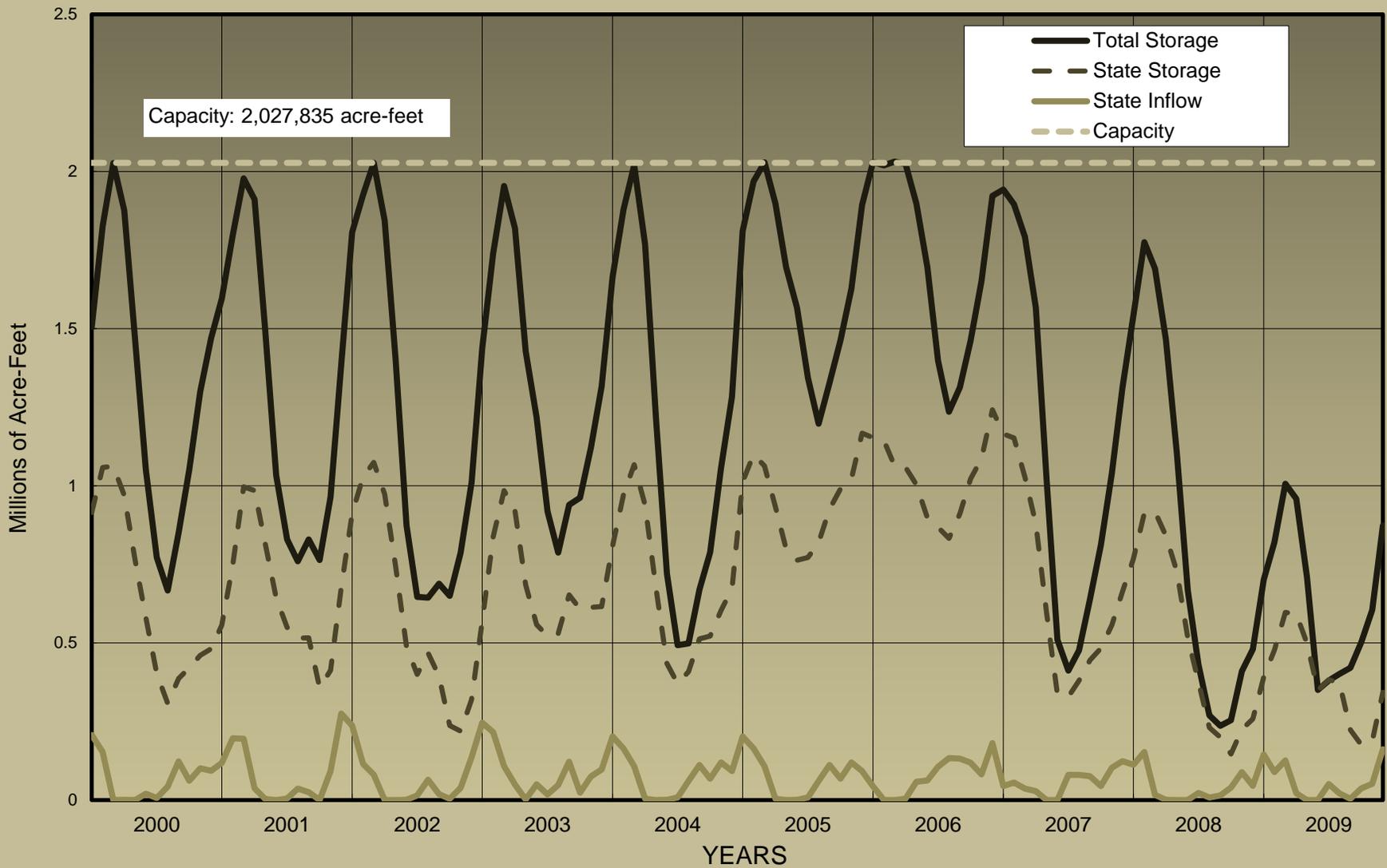
Table 13. San Luis Reservoir Monthly Operation

2009

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow	Outflow			Gain (+) And Loss (-)
				Gianelli P-G Plant Pumping	Gianelli P-G Plant Generation	Pacheco Tunnel	Parks and Rec. Del	
Jan	421.26	701,877	221,860	256,621	0	12,787	0	-21,974
Feb	434.29	820,771	118,894	128,876	4,457	2,976	1	-2,548
Mar	453.41	1,006,276	185,505	196,436	2,459	0	1	-8,471
Apr	448.68	959,210	-47,066	32,727	74,267	1,580	0	-3,946
May	422.24	710,595	-248,615	0	236,846	14,850	0	3,081
Jun	376.79	350,801	-359,794	0	349,333	13,409	1	2,949
Jul	381.05	380,491	29,690	71,753	16,828	15,795	1	-9,439
Aug	384.00	401,559	21,068	57,881	16,485	11,946	1	-8,381
Sep	386.70	421,203	19,644	61,246	23,235	10,724	0	-7,643
Oct	397.38	502,230	81,027	126,179	26,392	6,039	0	-12,721
Nov	410.06	605,139	102,909	121,434	0	4,254	0	-14,271
Dec	439.88	873,682	268,543	287,869	0	6,274	0	-13,052
Total	---	---	393,665	1,341,022	750,302	100,634	5	-96,416

Figure 16. 10-Year Summary San Luis Reservoir Operation



Note: In July 2009, DWR storage exceeded total storage as a result of USBR withdrawals exceeding USBR shares.

Table 14. O'Neill Forebay Monthly Operation

2009

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow				Outflow				Gain (+) And Losses (-)
				Pump In 1/	O'Neill P-G Plant Pumping	Gianelli P-G Plant Generation	California Aqueduct Check 12	O'Neill P-G Plant Generation	Gianelli P-G Plant Pumping	Dos Amigos Pumping	Deliveries	
Jan	219.60	42,119	-12,147	0	105,901	0	142,403	0	256,621	21,523	160	17,853.00
Feb	222.83	50,593	8,474	0	59,763	4,457	100,962	0	128,876	29,732	528	2,428.00
Mar	219.38	41,554	-9,039	0	101,660	2,459	163,966	0	196,436	74,516	222	-5,950.00
Apr	220.74	45,080	3,526	0	32,100	74,267	65,748	27,821	32,727	104,882	701	-2,457.95
May	220.51	44,479	-601	0	0	236,846	43,359	75,737	0	197,168	865	-7,036.00
Jun	221.70	47,598	3,119	0	0	349,333	12,722	86,703	0	267,922	1,154	-3,157.50
Jul	223.31	51,875	4,277	0	51,968	16,828	357,918	1,513	71,753	343,647	1,262	-4,262.30
Aug	223.56	52,544	669	77	112,452	16,485	225,236	212	57,881	279,158	612	-15,718.00
Sep	222.88	50,726	-1,818	0	106,906	23,235	126,939	0	61,246	187,594	372	-9,686.00
Oct	223.12	51,367	641	157	169,889	26,392	107,581	0	126,179	162,270	344	-14,585.00
Nov	223.43	52,196	829	76	140,629	0	82,641	0	121,434	93,134	184	-7,765.00
Dec	221.41	46,836	-5,360	21	129,626	0	204,870	0	287,869	51,381	169	-457.90
Total	---	---	-7,430	331	1,010,894	750,302	1,634,345	191,986	1,341,022	1,812,926	6,573	-50,795

1/ Pump-in located at Mile 79.67R.

**Table 15. Monthly Operations Summary, State-Federal San Luis Joint-Use Facilities
2009**

(In acre-feet except as noted)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Check 12													
State	142,403	100,962	163,966	65,748	43,359	12,722	331,627	165,079	102,189	103,420	82,641	204,870	1,518,986
Federal 1/	0	0	0	0	0	0	26,291	60,157	24,750	4,161	0	0	115,359
Total	142,403	100,962	163,966	65,748	43,359	12,722	357,918	225,236	126,939	107,581	82,641	204,870	1,634,345
O'Neill P-G Plant													
Amount Pumped													
State	105,900	59,762	101,659	32,100	0	0	51,968	112,452	106,906	169,889	140,628	129,625	1,010,889
Federal	1	1	1	0	0	0	0	0	0	0	1	1	5
Total	105,901	59,763	101,660	32,100	0	0	51,968	112,452	106,906	169,889	140,629	129,626	1,010,894
Generation													
Federal	0	0	0	27,821	75,737	86,703	1,513	212	0	0	0	0	191,986
O'Neill Forebay													
End-of-Month Storage													
State 2/	25,724	21,350	12,081	18,963	23,585	-8,665	16,241	-51,898	32,877	35,874	21,026	22,870	---
Federal 2/	16,395	29,243	29,473	26,117	20,894	56,263	35,634	104,442	17,849	15,493	31,170	23,966	---
Total	42,119	50,593	41,554	45,080	44,479	47,598	51,875	52,544	50,726	51,367	52,196	46,836	---
San Luis Reservoir													
End-of-Month Storage													
State	391,392	477,871	597,348	592,433	499,756	350,049	382,727	373,912	223,495	175,999	188,160	343,234	---
Federal	310,485	342,900	408,928	366,777	210,839	752	-2,236	27,647	197,708	326,231	416,979	530,448	---
Total	701,877	820,771	1,006,276	959,210	710,595	350,801	380,491	401,559	421,203	502,230	605,139	873,682	---
Gianelli P-G Plant													
Amount Pumped													
State	145,331	89,154	126,596	21,675	0	0	50,834	21,280	4,322	37,793	52,010	162,253	711,248
Federal	111,290	39,722	69,840	11,052	0	0	20,919	36,601	56,924	88,386	69,424	125,616	629,774
Total	256,621	128,876	196,436	32,727	0	0	71,753	57,881	61,246	126,179	121,434	287,869	1,341,022
Generation													
State	0	1,274	2,459	24,420	94,372	151,329	12,965	16,485	23,235	26,392	0	0	352,931
Federal	0	3,183	0	49,847	142,474	198,004	3,863	0	0	0	0	0	397,371
Total	0	4,457	2,459	74,267	236,846	349,333	16,828	16,485	23,235	26,392	0	0	750,302
Pacheco Tunnel													
Federal	12,787	2,976	0	1,580	14,850	13,409	15,795	11,946	10,724	6,039	4,254	6,274	100,634
Dos Amigos P.P.													
State 3/	11,641	18,690	45,824	60,259	129,183	194,500	266,432	227,458	152,180	132,835	73,162	40,452	1,352,615
Federal 3/	9,882	11,042	28,692	44,623	67,985	73,422	77,215	50,417	35,414	29,435	19,972	10,929	459,028
Other	0	0	0	0	0	0	0	1,283	0	0	0	0	1,283
Total	21,523	29,732	74,516	104,882	197,168	267,922	343,647	279,158	187,594	162,270	93,134	51,381	1,812,926

1/ Check 12 flows are calculated and used in balancing shares of storage in O'Neill Forebay. Negative values indicate a deficit at Banks PP in supplying demands at the Delta Mendota Canal.

2/ Storage shares are calculated. Negative values indicate withdrawals have exceeded shares available. Shares larger than capacity are used to balance splits in storage.

3/ Splits in pumping are calculated based on actual downstream demands and do not reflect volumes associated with energy scheduled.

San Joaquin Field Division

Water Deliveries

A total of 635,240 AF of deliveries were made in the San Joaquin Field Division in 2009. Water types include 284,606 AF of Table A water, 82,924 AF of Pumpin Recovery, 1,280 AF of CVC to Arvin Edison and 247,440 AF of other water. Kern County Water Agency (KCWA) represented 85 percent of the total SWP water delivered within the Division.

In addition to SWP deliveries, 18,990 AF of Federal water was wheeled through SWP facilities for delivery to the Kern National Wildlife Refuge.

The San Joaquin Field Division is the only field division in the SWP where there are no water storage facilities. All deliveries made from the Aqueduct are summarized in Table 22, and are totaled by agency on Table 2 and by water type on Map 3.

Pumping Plants

Pumping plants in the San Joaquin Field Division include Las Perillas and Badger Hill on the Coastal Aqueduct, and Buena Vista, Teerink, Chrisman, and Edmonston on the California Aqueduct. A complete monthly summary of amounts pumped at all of these plants is shown on Table 1. A summary of energy used to pump at each plant is shown on Table 4.

During 2009, 1,335,743 AF of State water and 20,270 AF of Federal water flowed past Check 21 into the San Joaquin Field Division. The total water pumped at Edmonston PP in 2009 was 1,150,644 AF compared to 1,255,828 AF in 2008.

Southern Field Division

Water Storage

There are four storage reservoirs in the Southern Field Division (Pyramid, Castaic, Silverwood, and Perris) with a combined storage capacity of 701,320 AF. Combined storage at the beginning of the year was 552,127 AF. End-of-year combined storage was 555,601 AF. Complete monthly operations for all four reservoirs plus Elderberry Forebay and Castaic Lagoon, is summarized in Tables 16 through 21. Historical inflows and storage data for the last ten years, is summarized in Figures 17 through 20.

Water Deliveries

SWP deliveries in the Southern Field Division totaled 1,092,506 AF. Fifteen agencies received the water, which included Table A, Water Bank recovery, Article 21 interruptible, extended carryover, flexible storage withdrawal, dry year purchase, Purchase Pool A, Purchase Pool B, local, recreation, and Federal water.

In the Southern Field Division 636 AF of local runoff from Huston Creek watershed was stored in Silverwood Lake, of that runoff, 520 AF was delivered to Crestline Lake Arrowhead Water Agency (CLAWA) under water rights held by DWR on Houston Creek. The authorized place of use is limited to CLAWA. As shown in Table 20.

Pumping and Generating Plants

Pumping plants in the Southern Field Division include Oso and Castaic on the West Branch, Pearblossom on the East Branch, and Cherry Valley, Green Spot, and Crafton Hills on the East Branch extension. A complete monthly summary of amounts pumped is shown on Table 1. A summary of energy used to pump and station service energy at each plant is shown on Table 4.

Generating plants in the Southern Field Division include Warne and Castaic on the West Branch, and Alamo, Mojave Siphon, and Devil Canyon on the East Branch. Energy available from each generating plant is summarized in Table 3. Combined generation at all five plants in 2009 totaled 1,525,214 MWh compared to 1,245,042 MWh in 2008.

**Table 16. Pyramid Lake Monthly Operation
2009**

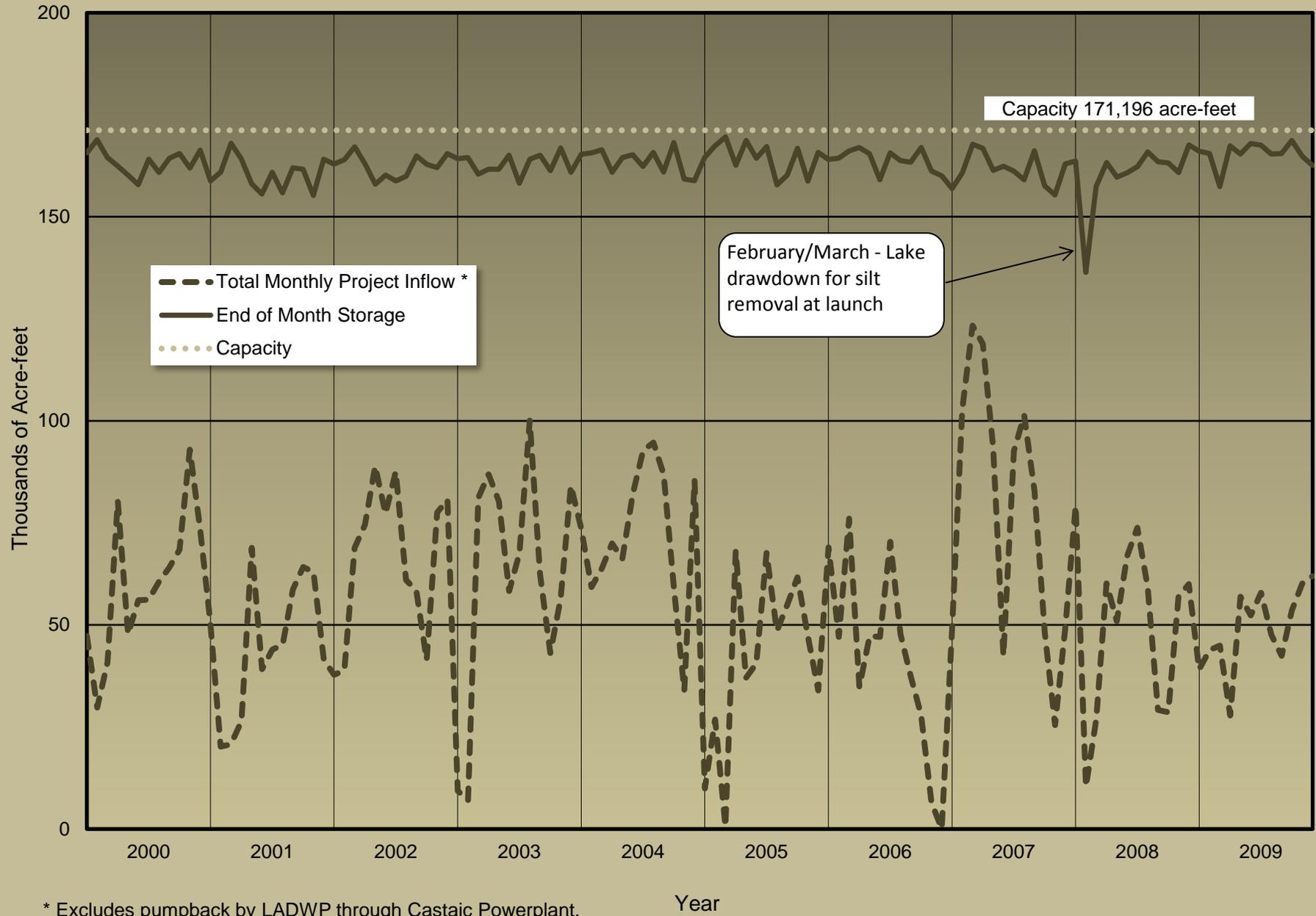
(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Natural Inflow Storage Shares	Storage Change	Inflow				Outflow				Computed Losses (-) Ans Gains (+)
					Project			Natural Stream Flow	Project		Natural To Piru Creek 2/	United Water Agency	
					Castaic Powerplant Pumpback 1/	GCIC	Warne Powerplant		Castaic Powerplant Generation	Recreation Deliveries			
Jan	2575.01	166,070	-362	-1,569	28,704	21	39,092	1,282	68,687	1	1,379	0	-601
Feb	2574.56	165,498	-565	-572	21,664	0	43,838	2,864	64,909	1	3,067	0	-961
Mar	2576.30	167,716	468	2,218	14,844	0	44,964	3,671	57,913	2	2,638	0	-708
Apr	2576.32	167,741	334	25	0	0	27,786	1,313	27,735	2	1,447	0	110
May	2577.13	168,780	63	1,039	25,134	11,071	45,841	730	79,736	3	1,001	0	-997
Jun	2575.37	166,528	0	-2,252	14,227	6,579	45,758	519	65,716	3	598	0	-3,018
Jul	2575.04	166,108	-250	-420	42,417	10,248	47,623	199	97,222	4	449	0	-3,232
Aug	2575.43	166,604	-315	496	26,986	0	47,563	134	72,504	4	199	0	-1,480
Sep	2574.90	165,930	-306	-674	31,714	13,410	29,025	174	71,590	3	149	0	-3,255
Oct	2576.64	168,151	-155	2,221	15,078	28,835	24,739	361	62,314	3	210	0	-4,265
Nov	2574.53	165,460	0	-2,691	6,114	28,329	31,827	436	63,294	4	281	1,230	-4,588
Dec	2572.85	163,338	614	-2,122	11,948	29,562	32,421	1,763	70,516	1	1,149	1,920	-4,230
Total	---	---	---	-4,301	238,830	128,055	460,477	13,446	802,136	31	12,567	3,150	-27,225

1/ Pumpback by Los Angeles Department of Water and Power (LADWP) from Elderberry Forebay through Castaic Powerplant.

2/ Portions of these amounts are used to satisfy fishery enhancement agreement.

Figure 17. 10-Year Summary Pyramid Lake Operation



* Excludes pumpback by LADWP through Castaic Powerplant.

**Table 17. Elderberry Forebay Monthly Operation
2009**

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage 23326	Storage Change	Inflow		Outflow			Computed Losses (-) And Gains (+)
				Castaic Powerplant Generation	Natural Stream Flow	Castaic Powerplant Pumpback 1/	To Castaic Lake		
							Natural	Project	
Jan	1508.66	18,672	-4,654	68,687	18	28,704	18	44,050	-587
Feb	1513.47	20,544	1,872	64,909	1,052	21,664	1,052	42,276	903
Mar	1512.74	20,254	-290	57,913	335	14,844	335	42,970	-389
Apr	1507.43	18,209	-2,045	27,735	104	0	104	29,473	-307
May	1506.80	17,973	-236	79,736	7	25,134	7	54,530	-308
Jun	1513.81	20,680	2,707	65,716	0	14,227	0	48,574	-208
Jul	1513.85	20,696	16	97,222	0	42,417	0	54,597	-192
Aug	1516.66	21,839	1,143	72,504	0	26,986	0	43,911	-464
Sep	1506.61	17,903	-3,936	71,590	0	31,714	0	43,661	-151
Oct	1506.12	17,721	-182	62,314	0	15,078	0	47,523	105
Nov	1516.14	21,625	3,904	63,294	0	6,114	0	52,879	-397
Dec	1510.54	19,393	-2,232	70,516	12	11,948	12	61,309	509
Total	---	---	-3,933	802,136	1,528	238,830	1,528	565,753	-1,486

1/ Pumpback by Los Angeles Department of Water and Power (LADWP) through Castaic Powerplant.

**Table 18. Castaic Lake Monthly Operation
2009**

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Natural Inflow Storage Shares	Storage Change	Inflow			Outflow		Computed Losses (-) Gains (+)
					From Elderberry Forebay		Natural	Deliveries	Released To Castaic Lagoon 1/	
					Natural	Project				
Jan	1,481.18	253,180	0	8,147	18	44,050	144	37,436	313	1,684
Feb	1,492.25	275,177	1,425	21,997	1,052	42,276	1,113	22,128	779	463
Mar	1,494.81	280,406	1,022	5,229	335	42,970	475	37,306	1,478	233
Apr	1,482.17	255,107	155	-25,299	104	29,473	163	54,840	1,218	1,019
May	1,482.74	256,221	99	1,114	7	54,530	40	53,725	220	482
Jun	1,480.58	252,006	0	-4,215	0	48,574	23	53,279	230	697
Jul	1,472.97	237,503	0	-14,503	0	54,597	0	68,973	189	62
Aug	1,460.46	214,626	0	-22,877	0	43,911	0	66,179	169	-440
Sep	1,451.89	199,640	0	-14,986	0	43,661	0	58,883	158	394
Oct	1,456.74	208,050	0	8,410	0	47,523	0	39,012	89	-12
Nov	1,465.18	223,123	0	15,073	0	52,879	15	37,228	59	-534
Dec	1,483.73	258,160	0	35,037	12	61,309	601	25,392	595	-898
Total	---	---	---	13,127	1,528	565,753	2,574	554,381	5,497	3,150

1/ Includes 4,009 AF of natural inflow and 1,488 AF of recreation water.

Figure 18. 10-Year Summary Castaic Lake Operation

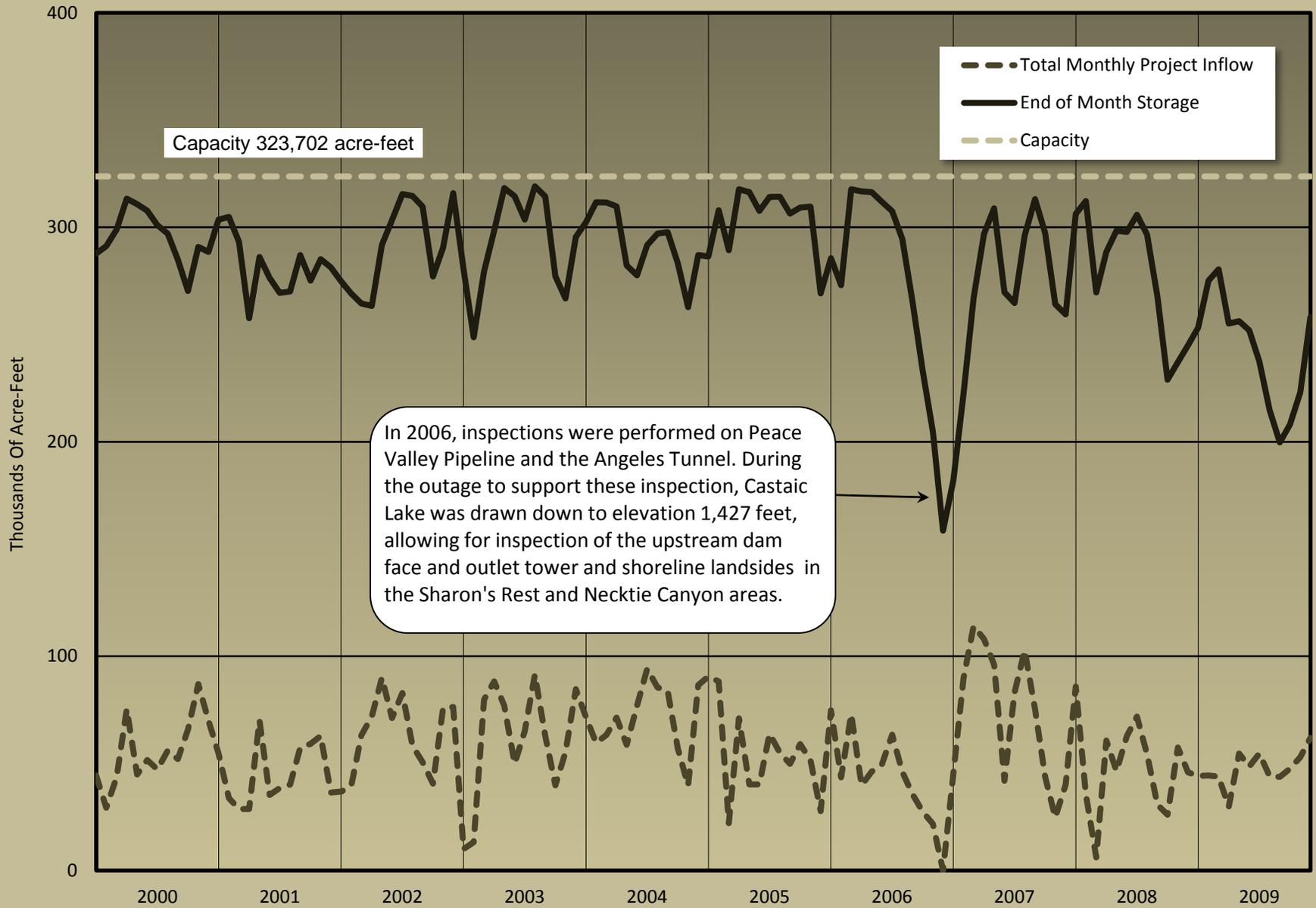


Table 19. Castaic Afterbay Monthly Operation

2009

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow	Natural Outflow		Computed Losses (-) And Gains (+)
					Release From Castaic Lagoon		
					Surface	Sub-Surface	
Jan	1135.80	5,623	-27	313	0	186	-154
Feb	1136.20	5,701	78	779	572	168	39
Mar	1136.26	5,713	12	1,478	1,027	186	-253
Apr	1135.68	5,597	-116	1,218	954	180	-200
May	1135.45	5,554	-43	220	0	186	-77
Jun	1135.59	5,581	27	230	0	180	-23
Jul	1134.86	5,459	-122	189	0	186	-125
Aug	1134.23	5,317	-142	169	0	186	-125
Sep	1133.36	5,151	-166	158	0	180	-144
Oct	1132.82	5,048	-103	89	0	186	-6
Nov	1132.02	4,898	-150	59	0	180	-29
Dec	1134.33	5,337	439	595	0	186	30
Total			-313	5,497	2,553	2,190	-1,067

Table 20. Silverwood Lake Monthly Operation

2009

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow			Outflow				Computed Losses (-) And Gains (+)	Total Natural Inflow Released 1/	Inflow Crestline Lakearrow W.A., Houston Creek appropriation
				Mojave Siphon Powerplant	Mojave Bypass Flume	Natural 2/	Project			Natural Inflow to Mojave River			
							Delivered to CLAWA 3/	Recreation	San Bernardino Tunnel				
Dec	3,350.02	70,195											
Jan	3,349.83	70,016	-179	6,087	0	387	122	2	6,405	10	-114	190	0
Feb	3,351.37	71,473	1,457	2,015	0	3,178	88	2	3,186	1,214	754	1,524	556
Mar	3,350.42	70,572	-901	10,679	0	1,314	93	3	13,572	11	785	566	75
Apr	3,351.43	71,530	958	15,703	66	406	86	7	15,055	133	64	660	0
May	3,350.92	71,045	-485	20,067	50	147	114	8	19,951	10	-666	549	0
Jun	3,351.88	71,958	913	48,315	909	37	109	10	48,584	9	364	490	0
Jul	3,350.53	70,676	-1,282	65,230	0	0	180	13	65,460	9	-850	474	0
Aug	3,350.39	70,544	-132	36,455	29,465	0	193	10	64,291	8	-1,550	278	0
Sep	3,349.86	70,045	-499	53,615	4,122	0	179	9	58,423	8	383	128	0
Oct	3,350.87	70,998	953	82,371	3,075	0	155	6	83,941	9	-382	102	0
Nov	3,351.40	71,501	503	63,929	0	6	116	3	63,387	8	82	100	0
Dec	3,350.00	70,176	-1,325	10,608	0	582	119	2	12,814	225	645	230	5
Total	---	---	-19	415,074	37,687	6,057	1,554	75	455,069	1,654	-485	5,291	636

56

1/ Total releases made from Mojave Siphon to Las Flores Ranch Co., in exchange for natural inflow stored in lake, and from Silverwood Lake to Mojave River from outlet for Mojave W.A. The difference between this total column and the natural inflow released to Mojave River equals the Las Flores Ranch.

2/ Includes 636 AF of Huston Creek appropriation.

3/ Includes 520 AF of Huston Creek appropriation.

Figure 19. 10-Year Summary Silverwood Lake Operation

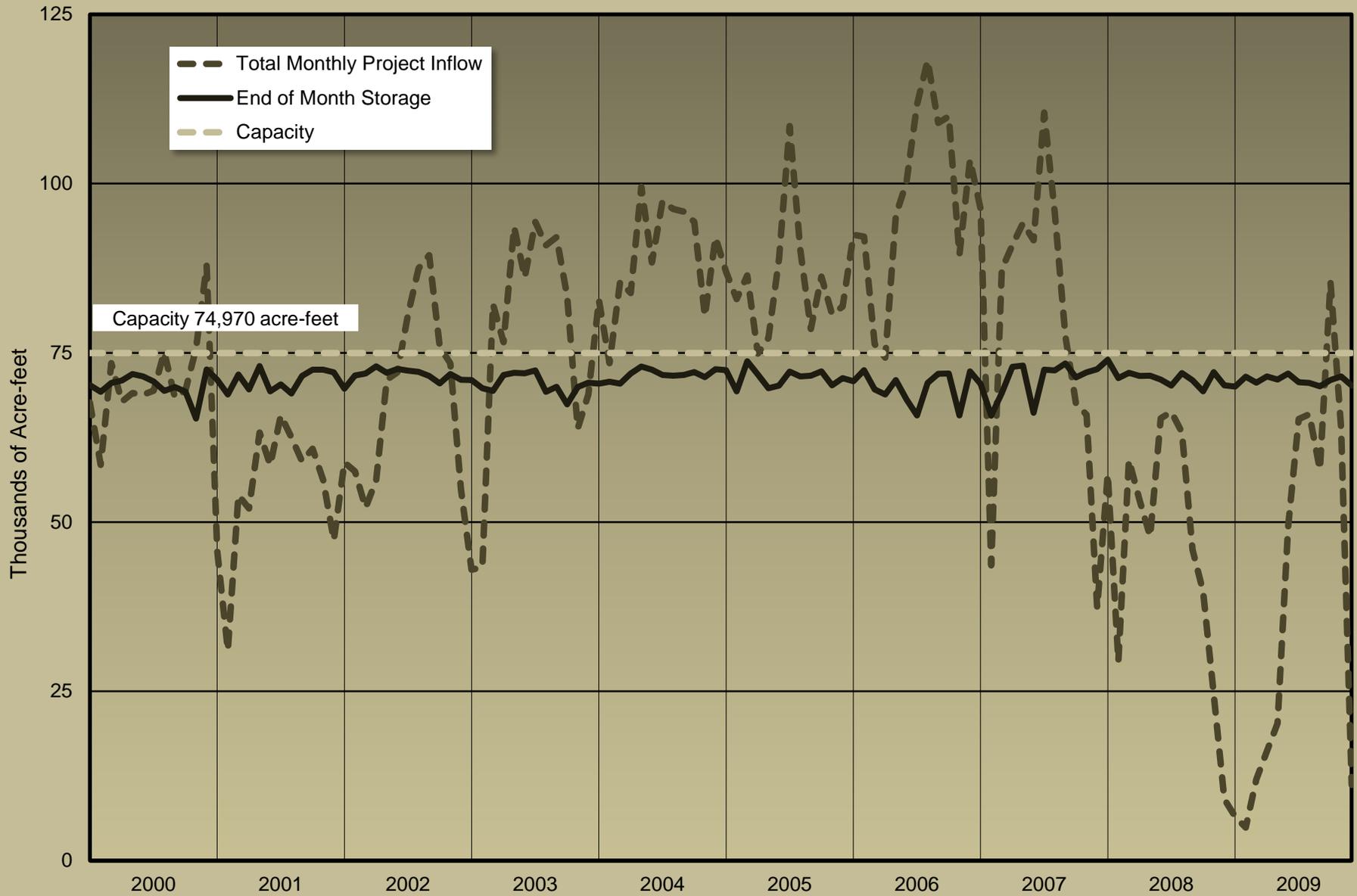


Table 21. Lake Perris Monthly Operation

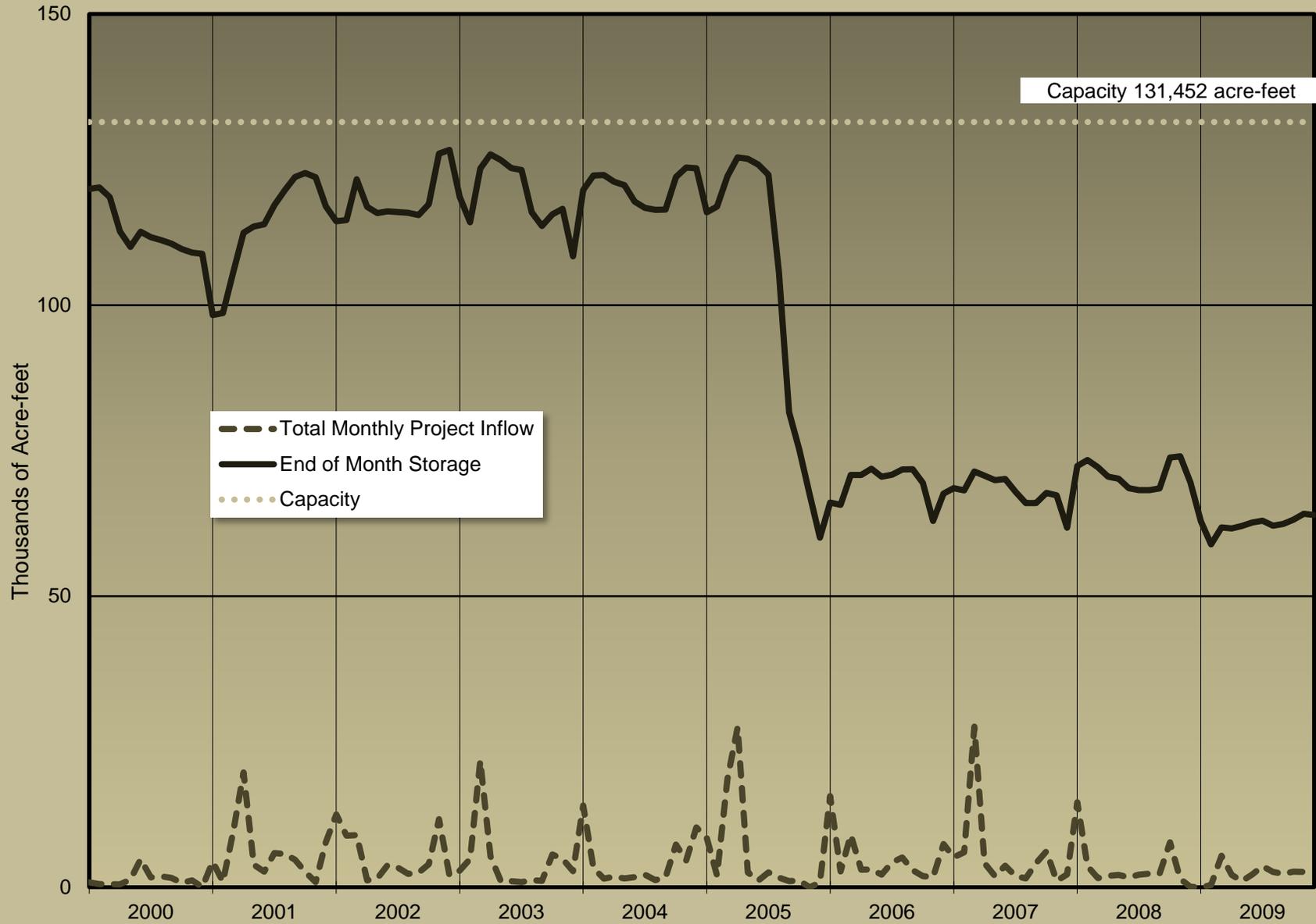
2009

(in acre-feet except as noted)

Month	Water Surface Elevation (in feet)	Storage	Storage Change	Inflow 1/	Outflow	Computed Losses (-) And Gains (+)
Dec	1560.33	69,527				
Jan	1556.59	62,861	-6,666	0	5,955	-711
Feb	1554.29	58,914	-3,947	370	4,305	-12
Mar	1555.99	61,820	2,906	5,415	1,092	-1,417
Apr	1555.88	61,630	-190	2,138	1,077	-1,251
May	1556.13	62,062	432	1,059	290	-337
Jun	1556.48	62,670	608	2,216	350	-1,258
Jul	1556.65	62,965	295	3,618	1,225	-2,098
Aug	1556.15	62,097	-868	2,640	1,767	-1,741
Sep	1556.32	62,392	295	2,285	616	-1,374
Oct	1556.76	63,144	752	2,698	717	-1,229
Nov	1557.34	64,173	1,029	2,658	242	-1,387
Dec	1557.20	63,927	-246	2,039	1,530	-755
Total			-5,600	27,136	19,166	-13,570

1. Inflow calculated

Figure 20. 10-Year Summary Lake Perris Operation



**Table 22. Summary of California Aqueduct Operation
2009**

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun
DELTA FIELD DIVISION						
Note: North Bay Aqueduct, South Bay Aqueduct, and Lake Del Valle they are shown here						
North Bay Aqueduct						
Pumped at Barker Slough Pumping Plant	3,235	1,979	96	1,390	5,504	5,585
Deliveries (Travis & Fairfield/Vacaville)	1,180	669	0	306	1,724	2,311
Pumped at Cordellia Pumping Plant	1,978	1,254	97	1,070	3,674	3,302
Deliveries (Benicia, Vallejo, A.C. 1&2, & Napa)	1,978	1,254	97	1,070	3,674	3,302
Computed Losses (-), Gains (+)	-77	-56	1	-14	-106	28
Cordellia Spillway	0	0	0	0	0	0
California Aqueduct						
Pumped at Banks Pumping Plant	147,252	109,855	172,415	78,803	60,624	29,463
Pumped at South Bay Pumping Plant	3,379	6,606	6,544	10,433	13,886	14,587
Deliveries to Federal Agencies	25	23	50	51	59	53
Deliveries to State Agencies	19	18	106	229	497	628
Change in Storage	-943	514	-404	214	380	410
Outflow at Check 12	142,403	100,962	163,966	65,748	43,359	12,722
Computed Losses (-), Gains (+)	-2,369	-1,732	-2,153	-2,128	-2,443	-1,063
South Bay Aqueduct						
Pumped at South Bay Pumping Plant	3,379	6,606	6,544	10,433	13,886	14,587
Inflow from Lake Del Valle Stored	0	0	0	0	0	0
Inflow from Lake Del Valle Project	937	0	654	240	1,123	919
Outflow to Lake Del Valle Natural	0	0	0	0	0	0
Outflow to Lake Del Valle	2	0	0	315	1,067	670
Outflow, Deliveries to SWP Contractors	4,304	6,596	7,188	10,348	13,932	14,826
Computed Losses (-), Gains (+)	-10	-10	-10	-10	-10	-10
Lake Del Valle Operation:						
Inflow from South Bay Aqueduct	2	0	0	315	1,067	670
Natural inflow	141	4,111	6,062	336	346	824
Releases to South Bay Aqueduct	937	0	654	240	1,123	919
Releases to Arroyo Valle	0	0	0	0	0	0
Deliveries to EBRP District	2	3	6	12	13	16
End-of-Month Storage	29,446	33,438	38,744	38,911	38,862	39,057
Change in Storage	-868	4,042	5,256	167	-49	195
Computed Losses (-), Gains (+)	-72	-66	-146	-232	-326	-364
SAN LUIS FIELD DIVISION						
O'Neill Forebay Operation						
End-of-Month Storage	42,119	50,593	41,554	45,080	44,479	47,598
Inflow, California Aqueduct (Incl. Pump-in)	142,403	100,962	163,966	65,748	43,359	12,722
Inflow, O'Neill P.- G. Plant	105,901	59,763	101,660	32,100	0	0
Inflow, Gianelli P.- G. Plant	0	4,457	2,459	74,267	236,846	349,333
Deliv. to DPR (Cattle Program) State + Fed.	1	1	1	0	0	0
Deliveries to Dept. of Fish and Game (State)	62	0	1	0	55	65
Deliveries to Dept. of Fish and Game (Fed.)	50	0	0	0	45	53
Deliveries to Dept. of Parks & Rec. (State)	1	0	1	0	1	1
Deliveries to Dept. of Parks & Rec. (Fed.)	0	1	0	0	1	0
Deliveries to Fed. Customers	46	526	219	701	763	1,035
Deliveries (Pump-in recovery, State)	0	0	0	0	0	0
Outflow, O'Neill P.- G. Plant	0	0	0	27,821	75,737	86,703
Outflow, Gianelli P.- G. Plant	256,621	128,876	196,436	32,727	0	0
Outflow, Dos Amigos P.P.	21,523	29,732	74,516	104,882	197,168	267,922
Change in Storage	-12,147	8,474	-9,039	3,526	-601	3,119
Computed Losses (-), Gains (+)	17,853	2,428	-5,950	-2,458	-7,036	-3,158
San Luis Reservoir Operation						
State End-of-Month Storage	391,392	477,871	597,348	592,433	499,756	350,049
Total End-of-Month Storage	701,877	820,771	1,006,276	959,210	710,595	350,801
Inflow, Gianelli P.- G. Plant	256,621	128,876	196,436	32,727	0	0
Outflow, Gianelli P.- G. Plant	0	4,457	2,459	74,267	236,846	349,333
Deliveries to Dept. of Parks & Rec. (Fed.)	0	0	0	0	0	1
Deliveries to Dept. of Parks & Rec. (State)	0	1	1	0	0	0
Deliveries to San Felipe (Fed.)	12,787	2,976	0	1,580	14,850	13,409
Change in Storage (Total)	221,860	118,894	185,505	-47,066	-248,615	-359,794
Computed Losses (-), Gains (+)	-21,974	-2,548	-8,471	-3,946	3,081	2,949

Table 22. Summary of California Aqueduct Operations

2009

(in acre-feet)

Jul	Aug	Sep	Oct	Nov	Dec	Total	Description
are not within the Edmond G. Brown California Aqueduct, for completeness.							
5,264	5,140	4,368	3,914	4,305	1,611	42,391	DELTA FIELD DIVISION
2,063	1,748	1,353	1,398	1,596	656	15,004	North Bay Aqueduct
3,158	3,330	2,937	2,439	2,635	976	26,850	Pumped at Barker Slough Pumping Plant
3,158	3,330	2,937	2,439	2,635	976	26,850	Deliveries (Travis & Fairfield/Vacaville)
-43	-62	-78	-77	-74	21	-537	Pumped at Cordellia Pumping Plant
0	0	0	0	0	0	0	Deliveries (Benicia, Vallejo, A.C. 1&2, & Napa)
							Computed Losses (-), Gains (+)
							Cordellia Spillway
							California Aqueduct
382,282	248,705	145,285	123,575	89,598	205,733	1,793,590	Pumped at Banks Pumping Plant
13,606	17,529	14,423	14,184	6,801	0	121,978	Pumped at South Bay Pumping Plant
38	22	19	64	47	27	478	Deliveries to Federal Agencies
638	418	375	97	113	51	3,189	Deliveries to State Agencies
-411	87	72	227	-1,955	282	-1,527	Change in Storage
357,918	225,236	126,939	107,581	82,641	204,870	1,634,345	Outflow at Check 12
-10,493	-5,413	-3,457	-1,422	-1,951	-503	-35,127	Computed Losses (-), Gains (+)
							South Bay Aqueduct
13,606	17,529	14,423	14,184	6,801	0	121,978	Pumped at South Bay Pumping Plant
0	0	0	0	0	0	0	Inflow from Lake Del Valle Stored
1,338	0	25	10	3,571	4,636	13,453	Inflow from Lake Del Valle Project
0	0	0	0	0	0	0	Outflow to Lake Del Valle Natural
1,061	0	0	0	0	0	3,115	Outflow to Lake Del Valle
13,873	17,519	14,438	14,184	10,362	4,636	132,206	Outflow, Deliveries to SWP Contractors
-10	-10	-10	-10	-10	0	-110	Computed Losses (-), Gains (+)
							Lake Del Valle Operation:
1,061	0	0	0	0	0	3,115	Inflow from South Bay Aqueduct
47	29	56	82	182	45	12,261	Natural inflow
1,338	0	25	10	3,571	4,636	13,453	Releases to South Bay Aqueduct
0	0	0	0	0	0	0	Releases to Arroyo Valle
25	22	23	7	2	2	133	Deliveries to EBRP District
37,438	37,005	36,621	36,454	32,917	28,273	---	End-of-Month Storage
-712	-433	-384	-167	-3,537	-4,644	-1,134	Change in Storage
-457	-440	-392	-232	-146	-51	-2,924	Computed Losses (-), Gains (+)
							SAN LUIS FIELD DIVISION
							O'Neill Forebay Operation
51,875	52,544	50,726	51,367	52,196	46,836	---	End-of-Month Storage
357,918	225,313	126,939	107,738	82,717	204,891	1,634,676	Inflow, California Aqueduct (Incl. Pump-in)
51,968	112,452	106,906	169,889	140,629	129,626	1,010,894	Inflow, O'Neill P.- G. Plant
16,828	16,485	23,235	26,392	0	0	750,302	Inflow, Gianelli P.- G. Plant
0	0	0	0	1	1	5	Deliv. to DPR (Cattle Program) State + Fed.
76	38	57	67	45	70	536	Deliveries to Dept. of Fish and Game (State)
62	32	47	54	37	57	437	Deliveries to Dept. of Fish and Game (Fed.)
1	0	0	1	1	0	7	Deliveries to Dept. of Parks & Rec. (State)
0	1	0	1	1	0	5	Deliveries to Dept. of Parks & Rec. (Fed.)
1,123	466	268	67	24	21	5,259	Deliveries to Fed. Customers
0	75	0	154	75	20	324	Deliveries (Pump-in recovery, State)
1,513	212	0	0	0	0	191,986	Outflow, O'Neill P.- G. Plant
71,753	57,881	61,246	126,179	121,434	287,869	1,341,022	Outflow, Gianelli P.- G. Plant
343,647	279,158	187,594	162,270	93,134	51,381	1,812,926	Outflow, Dos Amigos P.P.
4,277	669	-1,818	641	829	-5,360	-7,430	Change in Storage
-4,262	-15,718	-9,686	-14,585	-7,765	-458	-50,795	Computed Losses (-), Gains (+)
							San Luis Reservoir Operation
382,727	373,912	223,495	175,999	188,160	343,234	---	State End-of-Month Storage
380,491	401,559	421,203	502,230	605,139	873,682	---	Total End-of-Month Storage
71,753	57,881	61,246	126,179	121,434	287,869	1,341,022	Inflow, Gianelli P.- G. Plant
16,828	16,485	23,235	26,392	0	0	750,302	Outflow, Gianelli P.- G. Plant
1	0	0	0	0	0	2	Deliveries to Dept. of Parks & Rec. (Fed.)
0	1	0	0	0	0	3	Deliveries to Dept. of Parks & Rec. (State)
15,795	11,946	10,724	6,039	4,254	6,274	100,634	Deliveries to San Felipe (Fed.)
29,690	21,068	19,644	81,027	102,909	268,543	393,665	Change in Storage (Total)
-9,439	-8,381	-7,643	-12,721	-14,271	-13,052	-96,416	Computed Losses (-), Gains (+)

Table 22. Summary of California Aqueduct Operation

2009

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun
SAN LUIS FIELD DIVISION (Cont.)						
California Aqueduct (Pools 14 thru 21)						
Inflow, Dos Amigos P.P.(State)	11,641	18,690	45,824	60,259	129,183	194,500
Inflow, Dos Amigos P.P.(Fed. and Other)	9,882	11,042	28,692	44,623	67,985	73,422
Total Inflow, Dos Amigos P.P.	21,523	29,732	74,516	104,882	197,168	267,922
Flow into Aqueduct	0	0	0	0	0	0
Deliveries to Dept. of Fish and Game (State)	0	0	13	48	10	0
Deliveries to Dept. of Fish and Game (Fed.)	0	0	11	40	9	0
Miscellaneous Outflow	0	0	0	0	0	0
Deliveries, SWP Transfer (State)	0	0	10	600	2,430	2,321
Deliveries to Fed. Customers	8,153	8,957	27,356	43,036	69,856	74,844
Outflow, Check 21 (State)	10,808	17,359	42,613	58,552	129,377	193,804
Outflow, Check 21 (Fed.)	1,125	885	0	0	315	0
Change in Storage	93	-142	1,596	-725	71	112
Computed Losses (-), Gains (+)	-1,344	-2,673	-2,917	-3,331	4,900	3,160
SAN JOAQUIN FIELD DIVISION						
California Aqueduct, Check 21 to Buena Vista Pumping Plant						
Inflow, Check 21 (State)	10,808	17,359	42,613	58,552	129,377	193,804
Inflow, Check 21 (Fed.)	1,125	885	0	0	315	0
Total Inflow, Check 21	11,933	18,244	42,613	58,552	129,692	193,804
Kern River Intertie (Inflow)	0	0	0	0	0	0
Kern River Intertie (Outflow)	0	0	0	0	0	0
Deliveries to Contracting State Agencies	1,962	7,088	9,493	22,875	35,861	67,660
Deliveries to Fed. Customers (incl. CVC)	1,125	885	0	0	315	0
Miscellaneous Pump In	-32,532	-34,825	-37,616	-39,761	-35,605	-29,258
Outflow, Buena Vista P.P.	41,438	39,983	64,224	63,201	108,165	131,001
Coastal Br. Diversion (Las Perrillas PP)	1,190	2,682	3,992	8,238	13,977	17,160
Change in Storage	-634	288	441	-378	74	-648
Computed Losses (-), Gains (+)	616	-2,144	-2,080	-4,376	-6,905	-7,890
California Aqueduct, Buena Vista P.P. to Teerink Pumping Plant						
Inflow, Buena Vista P.P.	41,438	39,983	64,224	63,201	108,165	131,001
Deliveries to Contracting State Agencies	763	1,417	5,480	11,024	15,359	16,793
Inflow, Pump in and Payback	-9,594	-8,644	-4,530	-1,866	-1,341	-1,965
Outflow, Teerink Pumping Plant	52,761	49,650	66,282	57,166	97,160	123,453
Change in Storage	294	-65	-153	141	65	-352
Computed Losses (-), Gains (+)	2,786	2,375	2,855	3,264	3,077	6,928
California Aqueduct, Teerink Pumping Plant to Chrisman Pumping Plant						
Inflow, Teerink Pumping Plant	52,761	49,650	66,282	57,166	97,160	123,453
Inflow, Payback	-127	-519	-161	-127	-73	0
Deliveries to Contracting State Agencies	83	245	891	2,200	3,716	5,200
Outflow, Chrisman Pumping Plant	50,376	47,701	62,772	52,755	90,077	113,036
Change in Storage	67	3	-14	-35	37	-66
Computed Losses (-), Gains (+)	-2,363	-2,220	-2,794	-2,374	-3,403	-5,283
California Aqueduct, Chrisman Pumping Plant to Edmonston Pumping Plant						
Inflow, Chrisman Pumping Plant	50,376	47,701	62,772	52,755	90,077	113,036
Deliveries to Contracting State Agencies	173	454	1,250	1,913	2,342	2,916
Outflow, Edmonston Pumping Plant	51,087	47,573	62,190	52,003	90,057	111,902
Change in Storage	49	-40	-25	-30	24	-19
Computed Losses (-), Gains (+)	934	286	644	1,131	2,346	1,763
Coastal Branch, California Aqueduct						
Inflow, Las Perillas P.P.	1,190	2,682	3,992	8,238	13,977	17,160
B.M.W.S.D. Pumpback	0	0	0	0	0	0
Deliveries to Contracting State Agencies	1,169	2,651	4,193	8,441	13,571	16,410
Deliveries to Fed. Customers	0	0	0	0	0	0
Change in Storage	-20	19	4	0	-10	-25
Computed Losses (-), Gains (+)	-41	-11	205	203	-415	-775

Table 22. Summary of California Aqueduct Operations

2009

(in acre-feet)

Jul	Aug	Sep	Oct	Nov	Dec	Total	Description
							SAN LUIS FIELD DIVISION (Cont.)
							California Aqueduct (Pools 14 thru 21)
266,432	227,458	152,180	132,835	73,162	40,452	1,352,615	Inflow, Dos Amigos P.P.(State)
77,215	51,700	35,414	29,435	19,972	10,929	460,311	Inflow, Dos Amigos P.P.(Fed. and Other)
343,647	279,158	187,594	162,270	93,134	51,381	1,812,926	Total Inflow, Dos Amigos P.P.
0	0	0	0	0	0	0	Flow into Aqueduct
1	1	0	0	0	0	72	Deliveries to Dept. of Fish and Game (State)
0	1	0	0	0	79	140	Deliveries to Dept. of Fish and Game (Fed.)
0	0	0	0	0	0	0	Miscellaneous Outflow
979	1,123	329	185	168	101	8,246	Deliveries, SWP Transfer (State)
78,639	48,300	29,242	24,340	13,904	6,894	433,521	Deliveries to Fed. Customers
267,421	224,007	149,526	131,873	70,942	39,461	1,335,743	Outflow, Check 21 (State)
0	2,282	3,600	3,995	5,272	2,796	20,270	Outflow, Check 21 (Fed.)
-227	969	-827	-575	1,069	-537	877	Change in Storage
3,166	-2,475	-5,724	-2,452	-1,779	-2,587	-14,058	Computed Losses (-), Gains (+)
							SAN JOAQUIN FIELD DIVISION
							California Aqueduct, Check 21 to Buena Vista Pumping Plant
267,421	224,007	149,526	131,873	70,942	39,461	1,335,743	Inflow, Check 21 (State)
0	2,282	3,600	3,995	5,272	2,796	20,270	Inflow, Check 21 (Fed.)
267,421	226,289	153,126	135,868	76,214	42,257	1,356,013	Total Inflow, Check 21
0	0	0	0	0	0	0	Kern River Intertie (Inflow)
0	0	0	0	0	0	0	Kern River Intertie (Outflow)
96,114	70,598	23,412	15,819	2,775	1,557	355,214	Deliveries to Contracting State Agencies
0	2,282	3,600	3,995	5,272	2,796	20,270	Deliveries to Fed. Customers (incl. CVC)
-20,739	-8,811	-7,720	-38,379	-57,263	-31,837	-374,346	Miscellaneous Pump In
158,800	150,427	121,039	145,461	123,917	69,339	1,216,995	Outflow, Buena Vista P.P.
19,876	16,657	10,795	8,191	837	1,156	104,751	Coastal Br. Diversion (Las Perrillas PP)
800	-680	261	116	-42	316	-86	Change in Storage
-12,571	4,183	-1,738	-665	-718	1,071	-33,216	Computed Losses (-), Gains (+)
							California Aqueduct, Buena Vista P.P. to Teerink Pumping Plant
158,800	150,427	121,039	145,461	123,917	69,339	1,216,995	Inflow, Buena Vista P.P.
18,646	15,065	11,811	8,095	3,777	1,962	110,192	Deliveries to Contracting State Agencies
-195	-445	-8,604	-8,994	-9,301	-6,343	-61,822	Inflow, Pump in and Payback
147,265	141,934	123,723	152,259	135,491	77,157	1,224,299	Outflow, Teerink Pumping Plant
339	-28	-263	264	246	452	940	Change in Storage
7,255	6,099	5,628	6,163	6,296	3,889	56,614	Computed Losses (-), Gains (+)
							California Aqueduct, Teerink Pumping Plant to Chrisman Pumping Plant
147,265	141,934	123,723	152,259	135,491	77,157	1,224,299	Inflow, Teerink Pumping Plant
0	-28	-57	-97	-647	-952	-2,788	Inflow, Payback
6,317	3,800	2,095	971	486	3	26,007	Deliveries to Contracting State Agencies
135,474	132,875	117,044	145,845	132,879	74,902	1,155,735	Outflow, Chrisman Pumping Plant
55	-13	-5	16	-16	46	74	Change in Storage
-5,419	-5,300	-4,645	-5,523	-2,789	-3,158	-45,271	Computed Losses (-), Gains (+)
							California Aqueduct, Chrisman Pumping Plant to Edmonston Pumping Plant
135,474	132,875	117,044	145,845	132,879	74,902	1,155,735	Inflow, Chrisman Pumping Plant
3,857	3,026	2,391	1,780	646	300	21,048	Deliveries to Contracting State Agencies
133,273	131,566	116,619	146,786	131,464	76,124.30	1,150,644	Outflow, Edmonston Pumping Plant
81	-52	-20	43	104	80	196	Change in Storage
1,737	1,664	1,946	2,764	-665	1,602	16,152	Computed Losses (-), Gains (+)
							Coastal Branch, California Aqueduct
19,876	16,657	10,795	8,191	837	1,156	104,751	Inflow, Las Perillas P.P.
0	0	0	0	0	0	0	B.M.W.S.D. Pumpback
19,120	15,982	10,906	8,274	657	1,135	102,509	Deliveries to Contracting State Agencies
0	0	0	0	0	0	0	Deliveries to Fed. Customers
-8	37	12	-166	165	20	29	Change in Storage
-764	-637	123	-83	-15	-1	-2,213	Computed Losses (-), Gains (+)

**Table 22. Summary of California Aqueduct Operation
2009**

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun
SOUTHERN FIELD DIVISION						
California Aqueduct, Edmonston Pumping Plant to Junction of West Branch						
Inflow, Edmonston Pumping Plant	51,087	47,573	62,190	52,003	90,057	111,902
Outflow, West Branch	40,938	44,277	48,172	29,375	61,242	51,904
Outflow, East Branch	10,196	3,231	14,074	22,596	28,740	60,049
Change in Storage	-77	69	-61	6	53	-91
Computed Losses (-), Gains (+)	-30	4	-5	-26	-22	-40
California Aqueduct, Junction of West Branch to Pearblossom P.P.						
Inflow (Aqueduct)	10,196	3,231	14,074	22,596	28,740	60,049
Inflow (L.A.D.W.P.)	0	0	0	0	0	0
Deliveries to Contracting State Agencies	1,575	1,289	2,054	3,684	5,770	6,068
Outflow, Pearblossom P.P.	6,678	1,935	11,804	17,227	21,176	51,122
Change in Storage	-280	302	-91	-201	236	-100
Computed Losses (-), Gains (+)	-2,223	295	-307	-1,886	-1,558	-2,959
California Aqueduct, Pearblossom P.P. to Silverwood Lake						
Inflow, Pearblossom P.P.	6,678	1,935	11,804	17,227	21,176	51,122
Deliveries (Exchange of Natural Inflow)	281	12	722	1,471	1,279	1,915
Exchange of Natural Inflow (Los Flores T.O.)	180	310	555	527	539	480
Outflow to Silverwood Lake	6,087	2,015	10,679	15,769	20,117	49,224
Change in Storage	143	-254	153	-158	-156	-207
Computed Losses (-), Gains (+)	13	148	305	382	603	290
Silverwood Lake Operation						
Inflow, Project	6,087	2,015	10,679	15,769	20,117	49,224
Inflow, Natural	387	3,178	1,314	406	147	37
Deliveries to Contracting State Agencies	122	88	93	86	114	109
Recreation Deliveries	2	2	3	7	8	10
Outflow, Natural Inflow Released	10	1,214	11	133	10	9
Outflow, At San Bernardino Tunnel	6,405	3,186	13,572	15,055	19,951	48,584
Change in storage	-179	1,457	-901	958	-485	913
Computed Losses (-), Gains (+)	-114	754	785	64	-666	364
California Aqueduct, Silverwood Lake to Lake Perris						
Inflow, SBMWD Reverse Flow	0	0	0	0	0	0
Inflow, San Bernardino Tunnel	6,405	3,186	13,572	15,055	19,951	48,584
Outflow, East Branch Ext. Deliveries	1,830	1,318	1,401	1,995	2,394	8,076
Deliveries to Contracting State Agencies	4,328	1,742	6,489	11,556	15,997	37,966
Outflow to Lake Perris	0	370	5,415	2,138	1,059	2,216
Change in Storage	21	4	-6	-268	-209	151
Operational Losses (-), Gains (+)	-226	248	-273	366	-710	-175
Lake Perris Operation						
Inflow	0	370	5,415	2,138	1,059	2,216
Deliveries to Contracting State Agencies	5,814	4,164	1,022	937	150	210
Recreation Deliveries	141	141	70	140	140	140
Outflow (Reverse Flow)	0	0	0	0	0	0
Change in Storage	-6,666	-3,947	2,906	-190	432	608
Computed Losses (-), Gains (+)	-711	-12	-1,417	-1,251	-337	-1,258

Table 22. Summary of California Aqueduct Operations

2009

(in acre-feet)

Jul	Aug	Sep	Oct	Nov	Dec	Total	Description
							SOUTHERN FIELD DIVISION
							California Aqueduct, Edmonston Pumping Plant to Junction of West Branch
133,273	131,566	116,619	146,786	131,464	76,124.30	1,150,644	Inflow, Edmonston Pumping Plant
56,716	49,380	42,519	50,649	59,771	61,323.00	596,266	Outflow, West Branch
76,538	82,148	74,036	96,130	71,624	14,724.00	554,086	Outflow, East Branch
34	-5	14	-56	41	70	-3	Change in Storage
15	-43	-50	-63	-28	-7	-295	Computed Losses (-), Gains (+)
							California Aqueduct, Junction of West Branch to Pearblossom P.P.
76,538	82,148	74,036	96,130	71,624	14,724	554,086	Inflow (Aqueduct)
0	0	0	0	0	0	0	Inflow (L.A.D.W.P.)
9,058	9,579	8,040	6,969	5,096	3,214	62,396	Deliveries to Contracting State Agencies
68,943	69,064	61,932	84,872	64,220	10,925	469,898	Outflow, Pearblossom P.P.
-402	362	370	-364	283	104	219	Change in Storage
1,061	-3,143	-3,694	-4,653	-2,025	-481	-21,573	Computed Losses (-), Gains (+)
							California Aqueduct, Pearblossom P.P. to Silverwood Lake
68,943	69,064	61,932	84,872	64,220	10,925	469,898	Inflow, Pearblossom P.P.
3,447	3,982	4,421	1,207	1,047	430	20,214	Deliveries (Exchange of Natural Inflow)
465	270	120	93	92	5	3,636	Exchange of Natural Inflow (Los Flores T.O.)
65,230	65,920	57,737	85,446	63,929	10,608	452,761	Outflow to Silverwood Lake
160	552	-380	-46	150	175	132	Change in Storage
359	1,660	-34	1,828	998	293	6,845	Computed Losses (-), Gains (+)
							Silverwood Lake Operation
65,230	65,920	57,737	85,446	63,929	10,608	452,761	Inflow, Project
0	0	0	0	6	582	6,057	Inflow, Natural
180	193	179	155	116	119	1,554	Deliveries to Contracting State Agencies
13	10	9	6	3	2	75	Recreation Deliveries
9	8	8	9	8	225	1,654	Outflow, Natural Inflow Released
65,460	64,291	58,423	83,941	63,387	12,814	455,069	Outflow, At San Bernardino Tunnel
-1,282	-132	-499	953	503	-1,325	-19	Change in storage
-850	-1,550	383	-382	82	645	-485	Computed Losses (-), Gains (+)
							California Aqueduct, Silverwood Lake to Lake Perris
0	0	0	0	0	0	0	Inflow, SBMWD Reverse Flow
65,460	64,291	58,423	83,941	63,387	12,814	455,069	Inflow, San Bernardino Tunnel
8,980	9,421	8,906	8,499	8,123	2,779	63,722	Outflow, East Branch Ext. Deliveries
54,054	53,230	48,272	73,617	52,335	8,231	367,817	Deliveries to Contracting State Agencies
3,618	2,640	2,285	2,698	2,658	2,039	27,136	Outflow to Lake Perris
55	54	-55	-205	222	-35	-271	Change in Storage
1,247	1,054	985	668	-49	200	3,335	Operational Losses (-), Gains (+)
							Lake Perris Operation
3,618	2,640	2,285	2,698	2,658	2,039	27,136	Inflow
1,131	1,718	611	671	208	1,510	18,146	Deliveries to Contracting State Agencies
94	49	5	46	34	20	1,020	Recreation Deliveries
0	0	0	0	0	0	0	Outflow (Reverse Flow)
295	-868	295	752	1,029	-246	-5,600	Change in Storage
-2,098	-1,741	-1,374	-1,229	-1,387	-755	-13,570	Computed Losses (-), Gains (+)

Table 22. Summary of California Aqueduct Operation

2009

(in acre-feet)

Description	Jan	Feb	Mar	Apr	May	Jun
SOUTHERN FIELD DIVISION (Cont.)						
West Branch California Aqueduct Tehachapi Afterbay to Oso P.P.						
Inflow	40,938	44,277	48,172	29,375	61,242	51,904
Outflow, Oso Pumping Plant	41,082	44,080	48,347	29,277	61,014	52,061
Change in Storage	-236	210	-187	20	163	-280
Computed Losses (-), Gains (+)	-92	13	-12	-78	-65	-123
West Branch California Aqueduct Oso P.P. to Pyramid Lake						
Inflow, Oso P.P.	41,082	44,080	48,347	29,277	61,014	52,061
Deliveries to Contracting State Agencies	0	0	0	0	0	0
Outflow Through Warne to Pyramid Lake	39,113	43,838	44,964	27,786	56,912	52,337
Change in Storage	1,179	493	1,049	-973	543	-898
Operational Losses (-), Gains (+)	-790	251	-2,334	-2,464	-3,559	-622
Pyramid Lake Operation						
Inflow, Project	39,113	43,838	44,964	27,786	56,912	52,337
Inflow, Natural	1,282	2,864	3,671	1,313	730	519
Inflow, Pumpback from Elderberry Forebay	28,704	21,664	14,844	0	25,134	14,227
Deliveries (Fish Enhancement)	0	0	0	0	0	0
Deliveries to Contracting State Agencies	0	0	0	0	0	0
Deliveries to Dept. of Parks and Rec. (State)	1	1	2	2	3	3
Outflow, Pyramid Diversion	1,379	3,067	2,638	1,447	1,001	598
Outflow, Angeles Tunnel	68,687	64,909	57,913	27,735	79,736	65,716
Change in Storage	-1,569	-572	2,218	25	1,039	-2,252
Computed Losses (-), Gains (+)	-601	-961	-708	110	-997	-3,018
Elderberry Forebay Operation						
Inflow, Project through Castaic P-G Plant	68,687	64,909	57,913	27,735	79,736	65,716
Inflow, Natural	18	1,052	335	104	7	0
Outflow, Pumpback to Pyramid Lake	28,704	21,664	14,844	0	25,134	14,227
Outflow, Released to Castaic Lake	44,068	43,328	43,305	29,577	54,537	48,574
Change in Storage	-4,654	1,872	-290	-2,045	-236	2,707
Computed Losses (-), Gains (+)	-587	903	-389	-307	-308	-208
Castaic Lake Operation						
Inflow	44,068	43,328	43,305	29,577	54,537	48,574
Inflow, Natural	144	1,113	475	163	40	23
Deliveries to Contracting State Agencies	37,424	22,124	37,304	54,833	53,714	53,255
Deliveries to Recreation	12	4	2	7	11	24
Deliveries to Recreation (Lagoon)	0	0	0	0	0	0
Outflow, (LADWP to Lagoon)	313	779	1,478	1,218	220	230
Change in Storage	8,147	21,997	5,229	-25,299	1,114	-4,215
Computed Losses (-), Gains (+)	1,684	463	233	1,019	482	697
Castaic Lagoon Operation						
Inflow	0	0	0	0	0	0
Inflow, Project	313	779	1,478	1,218	220	230
Inflow, Non-project	0	0	0	0	0	0
Outflow	186	740	1,213	1,134	186	180
Inflow (Deliveries to Recreation)	0	0	0	0	0	0
Change in Storage	-27	78	12	-116	-43	27
Computed Losses (-), Gains (+)	-154	39	-253	-200	-77	-23

Table 22. Summary of California Aqueduct Operations

2009

(in acre-feet)

Jul	Aug	Sep	Oct	Nov	Dec	Total	Description
							SOUTHERN FIELD DIVISION (Cont.)
							West Branch California Aqueduct Tehachapi Afterbay to Oso P.P.
56,716	49,380	42,519	50,649	59,771	61,323	596,266	Inflow
56,655	49,267	42,323	50,626	59,563	61,089	595,384	Outflow, Oso Pumping Plant
106	-17	44	-170	124	214	-9	Change in Storage
45	-130	-152	-193	-84	-20	-891	Computed Losses (-), Gains (+)
							West Branch California Aqueduct Oso P.P. to Pyramid Lake
56,655	49,267	42,323	50,626	59,563	61,089	595,384	Inflow, Oso P.P.
0	0	0	0	0	0	0	Deliveries to Contracting State Agencies
57,871	47,563	42,435	53,574	60,156	61,983	588,532	Outflow Through Warne to Pyramid Lake
-13	534	330	-1,046	596	55	1,849	Change in Storage
1,203	-1,170	442	1,902	1,189	949	-5,003	Operational Losses (-), Gains (+)
							Pyramid Lake Operation
57,871	47,563	42,435	53,574	60,156	61,983	588,532	Inflow, Project
199	134	174	361	436	1,763	13,446	Inflow, Natural
42,417	26,986	31,714	15,078	6,114	11,948	238,830	Inflow, Pumpback from Elderberry Forebay
0	0	0	0	0	0	0	Deliveries (Fish Enhancement)
0	0	0	0	1,230	1,920	3,150	Deliveries to Contracting State Agencies
4	4	3	3	4	1	31	Deliveries to Dept. of Parks and Rec. (State)
449	199	149	210	281	1,149	12,567	Outflow, Pyramid Diversion
97,222	72,504	71,590	62,314	63,294	70,516	802,136	Outflow, Angeles Tunnel
-420	496	-674	2,221	-2,691	-2,122	-4,301	Change in Storage
-3,232	-1,480	-3,255	-4,265	-4,588	-4,230	-27,225	Computed Losses (-), Gains (+)
							Elderberry Forebay Operation
97,222	72,504	71,590	62,314	63,294	70,516	802,136	Inflow, Project through Castaic P-G Plant
0	0	0	0	0	12	1,528	Inflow, Natural
42,417	26,986	31,714	15,078	6,114	11,948	238,830	Outflow, Pumpback to Pyramid Lake
							Outflow, Released to
54,597	43,911	43,661	47,523	52,879	61,321	567,281	Castaic Lake
16	1,143	-3,936	-182	3,904	-2,232	-3,933	Change in Storage
-192	-464	-151	105	-397	509	-1,486	Computed Losses (-), Gains (+)
							Castaic Lake Operation
54,597	43,911	43,661	47,523	52,879	61,321	567,281	Inflow
0	0	0	0	15	601	2,574	Inflow, Natural
68,949	66,157	58,861	38,998	37,213	25,385	554,217	Deliveries to Contracting State Agencies
24	22	22	14	15	7	164	Deliveries to Recreation
0	0	0	0	0	0	0	Deliveries to Recreation (Lagoon)
189	169	158	89	59	595	5,497	Outflow, (LADWP to Lagoon)
-14,503	-22,877	-14,986	8,410	15,073	35,037	13,127	Change in Storage
62	-440	394	-12	-534	-898	3,150	Computed Losses (-), Gains (+)
							Castaic Lagoon Operation
0	0	0	0	0	0	0	Inflow
189	169	158	89	59	595	5,497	Inflow, Project
0	0	0	0	0	0	0	Inflow, Non-project
186	186	180	186	180	186	4,743	Outflow
0	0	0	0	0	0	0	Inflow (Deliveries to Recreation)
-122	-142	-166	-103	-150	439	-313	Change in Storage
-125	-125	-144	-6	-29	30	-1,067	Computed Losses (-), Gains (+)

Glossary

accretion - the water accumulated and retained within a service area.

acre-foot (AF) - a quantity or volume of water covering one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons.

active storage capacity - the total usable reservoir capacity available for seasonal or cyclic water storage. It is gross reservoir capacity minus inactive storage capacity.

afterbay - a reservoir that regulates fluctuating discharges from a hydroelectric power plant or a pumping plant.

alluvium - a stratified bed of sand, gravel, silt, and clay deposited by flowing water.

aquifer - a geologic formation that stores and transmits water and yields significant quantities of water to wells and springs.

average annual runoff - the average value of annual runoff amounts for a specified area calculated for a selected period of record that represents average hydrologic conditions.

balanced water conditions - exist when upstream reservoir storage releases, plus other inflows, approximately equal the water supply needed to (1) satisfy Sacramento Valley and Sacramento-San Joaquin Delta in-basin needs, including Delta water quality requirements, and (2) meet export needs.

benthic invertebrates - aquatic animals without backbones that dwell on or in the bottom sediments of fresh or salt water. Examples: clams, crayfish, and a wide variety of worms.

biota - all living organisms of a region, as in a stream or other body of water.

brackish water - water containing dissolved minerals in amounts that exceed normally acceptable standards for municipal, domestic, and irrigation uses. Considerably less saline than sea water.

carriage water - the amount of water needed above an increased export so as to not increase salinity in the Delta.

conjunctive use - the operation of a ground water basin in combination with a surface water storage and conveyance system. Water is stored in the ground water basin for later use by intentionally recharging the basin during years of above-average water supply.

Decision 1485 operating criteria - standards for operating water project facilities under Water Rights Decision 1485 regarding the Sacramento-San Joaquin Delta and Suisun Marsh, adopted by the State Water Resources Control Board, August 1978.

Delta consumptive use - the sum of evapotranspiration and changes in soil moisture of Delta lands and evaporation from Delta channels.

Delta outflow index - a calculated approximation of this seaward freshwater outflow as it passes Chipps Island near Pittsburg, beyond the confluence of the Sacramento and San Joaquin Rivers.

depletion - the water consumed within a service area and no longer available as a source of supply.

dissolved organic compounds - carbon substances dissolved in water.

drainage basin - the area of land from which water drains into a river; for example, the Sacramento River Basin, in which all land area drains into the Sacramento River. Also called, "catchment area," "watershed," or "river basin."

drought condition - hydrologic conditions during a defined drought period during which rainfall and runoff are much less than average.

ecology - the study of the interrelationships of living organisms to one another and to their surroundings.

ecosystem - recognizable, relatively homogeneous units, including the organisms they contain, their environment, and all the interactions among them.

effluent - waste water or other liquid, partially or completely treated or in its natural state, flowing from a treatment plant.

environment - the sum of all external influences and conditions affecting the life and development of an organism or ecological community; the total social and cultural conditions.

estuary - the lower course of a river entering the sea influenced by tidal action where the tide meets the river current.

evapotranspiration (ET) - the quantity of water transpired (given off), retained in plant tissues, and evaporated from plant tissues and surrounding soil surfaces. Quantitatively, it is usually expressed in terms of depth of water per unit area during a specified period of time.

evapotranspiration of applied water (ETAW) - the portion of the total evapotranspiration which is provided by irrigation.

forebay - a reservoir or pond situated at the intake of a pumping plant or power plant to stabilize water levels; also a storage basin for regulating water for percolation into ground water basins.

fry - a recently hatched fish.

gross reservoir capacity - the total storage capacity available in a reservoir for all purposes, from the streambed to the normal maximum operating level. Includes dead (or inactive) storage, but excludes surcharge (water temporarily stored above the elevation of the top of the spillway).

ground water - water that occurs beneath the land surface and completely fills all pore spaces of the alluvium, soil or rock formation in which it is situated.

ground water basin - a ground water reservoir, defined by an overlying land surface and the underlying aquifers that contain water stored in the reservoir.

ground water overdraft - the condition of a ground water basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average.

ground water recharge - increases in ground water storage by natural conditions or by human activity.

ground water table - the upper surface of the zone of saturation, except where the surface is formed by an impermeable body.

hydraulic barrier - a barrier developed in the estuary by release of fresh water from upstream reservoirs to prevent intrusion of sea water into the body of fresh water.

hydrologic balance - an accounting of all water inflow to, water outflow from, and changes in water storage within a hydrologic unit over a specified period of time.

hydrologic basin - the complete drainage area upstream from a given point on a stream.

hydrologic region - a study area, consisting of one or more planning subareas.

joint-use facilities - specific pumping plants, power plants, canals, and reservoirs in which both State and Federal agencies participated in the construction, use, and maintenance.

land subsidence - the lowering of the natural land surface in response to earth movements; lowering of fluid pressure (or lowering of ground water level); removal of underlying supporting materials by mining or solution of solids, either artificially or from natural causes; compaction caused by wetting (hydrocompaction); oxidation of organic matter in soils; or added load on the land surface.

megawatt - one million watts.

milligrams per liter (mg/L) - the weight in milligrams of any substance dissolved in one liter of liquid; nearly the same as parts per million.

natural flow - the flow past a specified point on a natural stream that is unaffected by stream diversion, storage, import, export, return flow, or change in use caused by modification in land use.

percolation - the downward movement of water throughout the soil or alluvium to a ground water table.

permeability - the capability of soil or other geologic formations to transmit water.

phytoplankton - minute plants, usually algae, that live suspended in bodies of water and that drift about because they cannot move by themselves or because they are too small or too weak to swim effectively against a current.

pollution (of water) - the alteration of the physical, chemical, or biological properties of water by the introduction of any substance into water that adversely affects any beneficial use of water.

prior water right - a water designation used for water delivered based on its use prior to SWP construction.

pumping-generating plant - a plant at which the turbine-driven generators can also be used as motor-driven pumps.

recharge basin - a surface facility, often a large pond, used to increase the percolation of surface water into a ground water basin.

riparian vegetation - vegetation growing on the banks of a stream or other body of water.

runoff - the total volume of surface flow from an area during a specified time.

Sacramento River index - the sum of the Sacramento Valley's unimpaired runoff at the following four locations: Sacramento River near Red Bluff; total Feather River inflow to Lake Oroville; Yuba River at Smartville; and total American River inflow to Folsom Lake.

salinity - generally, the concentration of mineral salts dissolved in water. Salinity may be measured by weight (total dissolved solids), electrical conductivity, or osmotic pressure. See **total dissolved solids**.

salinity intrusion - the movement of salt water into a body of fresh water. It can occur in either surface water or ground water bodies.

salt-water barrier - a physical facility or method of operation designed to prevent the intrusion of salt water into a body of fresh water.

sediment - soil or mineral material transported by water and deposited in streams or other bodies of water.

seepage - the gradual movement of a fluid into, through, or from a porous medium.

service area - the geographical land area served by a distribution system of a water agency.

snow water content - a calculated or measured amount of water contained in packed snow based on its depth and density.

spawning - the depositing and fertilizing of eggs (roe) by fish and other aquatic life.

streamflow - the rate of water flow past a specified point in a channel.

surplus water - developed water supplies in excess of contract entitlement or apportioned water.

total dissolved solids (TDS) - a quantitative measure of the residual minerals dissolved in water that remain after evaporation of a solution. Usually expressed in milligrams per liter. See **salinity**.

transpiration - an essential physiological process in which plant tissues give off water vapor to the atmosphere.

unimpaired runoff - represents the natural water production of a river basin, unaltered by upstream diversions, storage, or by export or import of water to or from other watersheds.

waste water - the water, liquid waste, or drainage from a community, industry, or institution.

water conservation - reduction in applied water due to more efficient water use.

water quality - used to describe the chemical, physical, and biological characteristics of water, usually in regard to its suitability for a particular purpose or use.

water right - a legally protected right to take possession of water occurring in a natural waterway and to divert that water for beneficial use.

water table - see **ground water table**.

water year - a continuous 12-month period for which hydrologic records are compiled and summarized. In California, it begins on October 1 and ends September 30 of the following year.

watershed - see **drainage basin**.