

Table 6. Monthly Power

in millions of kilowatt-hours

Item	Month						
	JAN	FEB	MAR	APR	MAY	JUN	JUL
ENERGY USED BY SWP PUMPING AND POWER PLANTS							
Hyatt-Thermalito Pumpback and Station Service	41.59	30.95	10.30	0.54	3.48	7.49	0.90
North Bay Interim Pumping Plant	0.33	0.33	0.06	0.06	0.01	0.00	0.00
Cordelia Pumping Plant	0.03	0.01	0.01	0.01	0.09	0.63	1.18
Barker Slough Pumping Plant	0.03	0.01	0.01	0.02	0.04	0.29	0.65
South Bay Pumping Plant	6.80	5.74	14.03	14.19	15.60	14.02	14.32
Del Valle Pumping Plant	0.01	0.01	0.31	0.46	0.31	0.07	0.00
Banks Pumping Plant	111.70	96.64	71.90	60.18	55.76	50.07	31.17
Gianelli Pumping-Generating Plant (SWP Share)	91.32	47.75	19.74	14.90	7.31	0.06	0.06
Dos Amigos Pumping Plant (SWP Share)	12.48	17.28	25.20	24.01	26.46	37.58	52.32
Buena Vista Pumping Plant	18.07	10.59	29.66	33.38	29.22	26.57	37.47
Wheeler Ridge Pumping Plant	20.43	8.62	28.55	36.48	31.11	23.55	33.93
Chrisman Pumping Plant	45.87	17.94	62.25	81.52	67.98	49.97	73.39
Edmonston Pumping Plant	163.07	62.67	218.92	287.97	237.74	173.43	254.95
Alamo Powerplant (Station Service)	0.03	0.05	0.01	0.00	0.01	0.01	0.01
Pearblossom Pumping Plant	17.10	2.72	34.87	43.83	43.18	31.07	42.38
Devil Canyon Powerplant (Station Service)	0.01	0.02	0.01	0.00	0.00	0.00	0.00
Oso Pumping Plant	12.95	6.52	11.78	16.03	9.88	7.02	11.51
Warne Powerplant (Station Service)	0.03	0.08	0.06	0.02	0.00	0.01	0.01
Las Perillas Pumping Plant	0.17	0.52	0.67	0.83	1.11	1.55	1.96
Badger Hill Pumping Plant	0.39	1.38	1.78	2.24	3.06	4.17	5.21
Subtotal	542.41	309.83	530.12	616.67	532.35	427.56	561.42
System Losses and Unaccounted for Energy	1.71	13.79	6.37	12.19	14.02	18.45	14.26
Total	544.12	323.62	536.49	628.86	546.37	446.01	575.68
SWP ENERGY SOURCES							
Hyatt and Thermalito Powerplants	55.79	60.74	135.00	162.76	132.29	189.83	241.44
Gianelli Pumping-Generating Plant (SWP Share)	0.00	0.27	3.67	9.59	17.14	29.94	63.88
Alamo Powerplant	1.48	0.35	2.40	2.91	2.62	2.15	2.65
Devil Canyon Powerplant	26.23	4.49	65.55	62.13	73.17	64.11	64.12
Warne Powerplant	27.81	13.84	25.03	33.83	20.63	14.83	24.49
Castaic Powerplant	42.50	22.30	39.15	54.95	32.71	26.24	38.08
Bottle Rock Powerplant	16.39	14.85	14.63	15.27	15.40	13.78	12.91
Reid Gardner Unit No. 4	166.67	152.99	167.18	52.07	148.55	120.45	146.80
Pine Flat Powerplant	-0.03	2.00	17.79	10.03	11.96	51.03	35.38
TERA Power Corporation	0.01	0.03	0.24	0.33	0.67	0.58	0.67
MWDSC Hydroelectric Plants	8.62	6.53	20.21	18.59	22.78	19.01	18.57
Power Exchange Delivered to SCE	-94.16	-66.52	-165.26	-160.09	-186.26	-206.31	-222.19
Power Exchange Received from SCE	467.89	216.77	289.40	367.37	256.93	185.50	345.32
Power Exchange Bonneville Power Administration	0.00	0.00	0.00	-26.40	-55.10	0.00	77.59
Power Exchange Salt River Project	0.00	0.00	0.00	0.00	0.00	1.57	0.00
SCE-SBVMWD Exchange	-0.06	-0.09	-0.14	-0.13	-0.13	-0.26	-0.26
USBR Scheduled Excess Purchases	0.00	0.03	0.10	0.06	0.13	0.12	0.00
British Columbia Hydro Power Authority	0.00	0.00	0.00	3.36	0.00	0.00	0.76
Bonneville Power Administration	0.00	0.00	0.00	0.00	1.80	0.00	0.00
Pacific Power and Light Company	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Portland General Electric Company	0.00	0.58	1.03	0.00	0.00	0.00	0.00
Arizona Power Company	0.00	0.00	0.00	0.83	0.00	0.00	0.00
Montana Power Company	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Salt River Agricultural Improvement and Power District	0.00	0.08	5.52	45.60	23.24	24.04	1.09
Washington Water and Power Company	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Southern California Edison Company	0.00	0.00	5.54	2.50	0.00	0.00	0.00
Pacific Gas and Electric Company	0.00	0.87	0.00	0.00	0.00	0.00	0.00
San Diego Gas and Electric Company	0.00	1.33	0.00	0.00	0.00	0.00	0.00
Subtotal	719.14	431.44	627.04	708.36	628.73	536.61	696.12
Less Sales	175.02	107.82	90.55	79.50	82.36	90.60	120.44
Total	544.12	323.62	536.49	628.86	546.37	446.01	575.68

Operation in 1988

in millions of kilowatt-hours

Month						Item
AUG	SEPT	OCT	NOV	DEC	TOTAL	
ENERGY USED BY SWP PUMPING AND POWER PLANTS						
15.28	37.52	50.01	68.45	54.48	320.99	Hyatt-Thermalito Pumpback and
0.00	0.00	0.00	0.00	0.00	0.79	North Bay Interim Pumping Plant
1.10	1.13	1.02	0.74	0.70	6.65	Cordelia Pumping Plant
0.58	0.63	0.55	0.37	0.30	3.48	Barker Slough Pumping Plant
12.12	9.02	8.08	8.59	9.72	132.23	South Bay Pumping Plant
0.01	0.01	0.01	0.01	0.01	1.22	Del Valle Pumping Plant
41.44	49.53	21.83	21.66	37.45	649.33	Banks Pumping Plant
0.16	9.92	3.29	3.08	11.66	209.25	Gianelli Pumping-Generating Plant
41.14	21.74	15.38	15.07	20.46	309.12	Dos Amigos Pumping Plant (SWP Share)
29.75	24.80	17.74	21.92	31.91	311.08	Buena Vista Pumping Plant
26.60	26.82	19.43	24.71	36.43	316.66	Wheeler Ridge Pumping Plant
58.10	59.66	42.50	55.75	82.16	697.09	Chrisman Pumping Plant
201.08	208.35	148.58	196.72	288.14	2441.62	Edmonston Pumping Plant
0.02	0.01	0.01	0.03	0.01	0.20	Alamo Powerplant (Station Service)
33.06	26.72	29.89	18.19	28.20	351.21	Pearblossom Pumping Plant
0.00	0.00	0.00	0.00	0.00	0.04	Devil Canyon Powerplant (Station Service)
8.85	12.96	4.58	15.87	23.09	141.04	Oso Pumping Plant
0.02	0.02	0.09	0.02	0.00	0.36	Warne Powerplant (Station Service)
1.36	0.70	0.64	0.16	0.12	9.78	Las Perillas Pumping Plant
3.59	1.86	1.81	0.40	0.28	26.17	Badger Hill Pumping Plant
474.26	491.40	365.44	451.74	625.12	5928.31	Subtotal
12.60	8.49	7.91	5.54	7.75	123.09	System Losses and Unaccounted for Energy
486.86	499.89	373.35	457.28	632.87	6051.40	Total
SWP ENERGY SOURCES						
160.82	129.88	102.97	101.29	78.99	1551.80	Hyatt and Thermalito Powerplants
27.96	3.21	4.66	1.17	0.00	161.49	Gianelli Pumping-Generating Plant (SWP Share)
2.25	1.97	2.28	1.27	2.25	24.58	Alamo Powerplant
52.31	56.83	59.99	28.76	33.14	590.83	Devil Canyon Powerplant
19.26	26.63	9.07	34.06	48.47	297.95	Warne Powerplant
30.50	42.71	10.59	55.91	77.04	472.68	Castaic Powerplant
12.72	3.33	8.41	6.17	6.55	140.41	Bottle Rock Powerplant
153.22	131.09	137.02	121.89	133.75	1631.68	Reid Gardner Unit No. 4
-0.21	-0.20	-0.20	-0.09	0.00	127.46	Pine Flat Powerplant
0.70	0.47	0.40	0.11	0.10	4.31	TERA Power Corporation
17.23	15.65	17.13	17.30	10.65	192.27	MWDSC Hydroelectric Plants
-178.73	-174.40	-160.83	-109.62	-117.22	-1841.59	Power Exchange Delivered to SCE
310.03	350.88	346.73	589.82	513.42	4240.06	Power Exchange Received from SCE
3.91	0.00	0.00	0.00	0.00	0.00	Power Exchange Bonneville Power Administration
0.00	0.00	0.00	0.00	0.00	1.57	Power Exchange Salt River Project
-0.30	-0.27	-0.25	-0.20	-0.20	-2.29	SCE-SBVMWD Exchange
0.11	0.07	0.08	0.00	0.12	0.82	USBR Scheduled Excess
						Purchases
3.60	0.00	0.00	0.00	1.40	9.12	British Columbia Hydro Power Authority
0.00	4.40	0.00	0.00	0.00	6.20	Bonneville Power Administration
0.00	0.00	0.00	0.00	0.80	0.80	Pacific Power and Light Company
8.90	0.00	0.00	0.00	3.20	13.71	Portland General Electric Company
0.00	0.00	0.00	0.00	0.00	0.83	Arizona Power Company
0.00	0.00	0.00	0.00	1.60	1.60	Montana Power Company
						Salt River Agricultural Improvement and Power District
1.39	1.09	0.02	0.00	0.00	102.07	Washington Water and Power Company
0.00	0.00	0.00	0.00	2.07	2.07	Southern California Edison Company
0.00	0.00	0.00	0.00	0.00	8.04	Pacific Gas and Electric Company
0.00	1.60	0.00	0.00	0.00	2.47	Pacific Gas and Electric Company
0.00	0.00	0.00	0.00	0.00	1.33	San Diego Gas and Electric Company
617.85	594.94	538.07	847.84	796.13	7742.27	Subtotal
130.99	95.05	164.72	390.56	163.26	1690.87	Less Sales
486.86	499.89	373.35	457.28	632.87	6051.40	Total

Table 6A. Reconciliation of Energy Use in 1988 for SWP

in millions of kilowatt-hours

Item	Month						
	JAN	FEB	MAR	APR	MAY	JUN	JUL
Banks Pumping Plant							
Energy Metered at Pumping Plant	114.35	99.57	76.38	75.99	55.76	50.07	59.57
Less Energy Scheduled by USBR for CVP Pumping	-2.65	-2.93	-4.49	-15.81	0.00	0.00	-28.40
Plus Excess Daily Energy Scheduled by USBR	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy Used for SWP Pumping	111.70	96.64	71.90	60.18	55.76	50.07	31.17
Dos Amigos Pumping Plant							
Energy Metered at Pumping Plant	31.64	44.41	37.25	36.22	41.35	71.90	92.47
Less Energy Scheduled by USBR for CVP Pumping	-19.17	-27.13	-12.04	-12.21	-14.89	-34.32	-40.15
Less Energy Scheduled by USBR for Station Service	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plus Excess Daily Energy Scheduled by USBR	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy Used for SWP Pumping	12.48	17.28	25.20	24.01	26.46	37.58	52.32
Gianelli Pumping-Generating Plant (Pumping)							
Energy Metered at Plant	118.99	47.75	36.51	41.05	12.42	0.13	0.10
Less Energy Scheduled by USBR for CVP Pumping	-27.67	0.00	-16.70	-26.07	-5.02	0.00	0.00
Less Energy Scheduled by USBR for Station Service	0.00	0.00	-0.17	-0.14	-0.09	-0.08	-0.05
Plus Excess Daily Energy Scheduled by USBR	0.00	0.00	0.10	0.06	0.00	0.00	0.00
Energy Used for SWP Pumping	91.32	47.75	19.74	14.90	7.31	0.06	0.06
Las Perillas Pumping Plant							
Energy Metered at Pumping Plant	0.17	0.52	0.67	0.83	1.11	1.55	1.96
Less Energy Scheduled by USBR for CVP Pumping	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Energy Used for SWP Pumping	0.17	0.52	0.67	0.83	1.11	1.55	1.96
Gianelli Pumping-Generating Plant (Generation)							
Energy Metered at Plant	0.00	2.98	4.34	9.59	45.65	104.91	103.93
Less Energy Scheduled by USBR for CVP Pumping	0.00	-2.74	-0.68	0.00	-28.65	-75.08	-40.05
Plus Excess Daily Energy Scheduled by USBR	0.00	0.03	0.00	0.00	0.13	0.12	0.00
SWP Share of Energy Generated	0.00	0.27	3.67	9.59	17.14	29.94	63.88

Energy generation at the SWP aqueduct recovery plants (Gianelli, Alamo, Devil Canyon, Warner, and Castaic) totaled about 1.55 billion kWh, about 17 percent higher than last year's amount. The combined output of the recovery plants and the Hyatt-Thermalito facilities was sufficient to meet about 51 percent of SWP energy requirements in 1988.

Other SWP hydroelectric power resources are obtained under contract with the Kings River Conservation District and The Metropolitan Water District of Southern California. The KRCD con-

tract provides DWR with all of the output of the 165-MW Pine Flat Powerplant. The plant furnished 0.13 billion kWh to the SWP in 1988. Under the MWDSC contract, DWR receives energy from five small hydroelectric plants on the MWDSC system (30 MW total capacity). As explained in Chapter VI, DWR has exchange agreements with Southern California Edison Company and the Los Angeles Department of Water and Power to facilitate transmission of energy from the MWDSC plants to the SWP.

and CVP Pumping at SWP Plants and Joint-Use Facilities

in millions of kilowatt-hours

Month						Item
AUG	SEP	OCT	NOV	DEC	TOTAL	
						Banks Pumping Plant
73.09	59.10	34.51	42.11	53.67	794.17	Energy Metered at Pumping Plant
-31.76	-9.57	-12.68	-20.45	-16.22	-144.94	Less Energy Scheduled by USBR for CVP Pumping
0.10	0.00	0.00	0.00	0.00	0.10	Plus Excess Daily Energy Scheduled by USBR
41.44	49.53	21.83	21.66	37.45	649.33	Energy Used for SWP Pumping
						Dos Amigos Pumping Plant
69.01	28.13	21.09	19.60	24.77	517.84	Energy Metered at Pumping Plant
-27.86	-6.39	-5.71	-4.53	-4.31	-208.71	Less Energy Scheduled by USBR for CVP Pumping
0.00	0.00	0.00	0.00	0.00	0.00	Less Energy Scheduled by USBR for Station Service
0.00	0.00	0.00	0.00	0.00	0.00	Plus Excess Daily Energy Scheduled by USBR
41.14	21.74	15.38	15.07	20.46	309.12	Energy Used for SWP Pumping
						Gianelli Pumping-Generating Plant (Pumping)
0.29	22.17	15.56	38.01	55.55	388.54	Energy Metered at Plant
0.00	-12.09	-12.19	-34.75	-43.78	-178.28	Less Energy Scheduled by USBR for CVP Pumping
-0.14	-0.23	-0.16	-0.18	-0.23	-1.45	Less Energy Scheduled by USBR for Station Service
0.00	0.07	0.08	0.00	0.12	0.43	Plus Excess Daily Energy Scheduled by USBR
0.16	9.92	3.29	3.08	11.66	209.23	Energy Used for SWP Pumping
						Las Perillas Pumping Plant
1.36	0.70	0.68	0.16	0.12	9.83	Energy Metered at Pumping Plant
0.00	0.00	-0.05	0.00	0.00	-0.05	Less Energy Scheduled by USBR for CVP Pumping
1.36	0.70	0.64	0.16	0.12	9.78	Energy Used for SWP Pumping
						Gianelli Pumping-Generating Plant (Generation)
40.49	3.70	4.66	1.17	0.00	321.42	Energy Metered at Plant
-12.54	-0.49	0.00	0.00	0.00	-160.22	Less Energy Scheduled by USBR for CVP Pumping
0.01	0.00	0.00	0.00	0.00	0.29	Plus Excess Daily Energy Scheduled by USBR
27.96	3.21	4.66	1.17	0.00	161.49	SWP Share of Energy Generated

Under the 1979 power contract between DWR and Southern California Edison (in effect since April 1983) and the 1981 Capacity Exchange Agreement (in effect since April 1987), part of the Hyatt-Thermalito Complex generation and all of the output of Devil Canyon and Alamo powerplants is delivered to SCE. The energy is generally delivered to SCE during on-peak periods, and a greater amount of energy is returned to DWR during off-peak periods. The additional energy is primarily in payment for the power capacity available to SCE. Table 6 shows the monthly quantities of energy delivered and returned under

these contracts. The net gain to the SWP during 1988 was 2.40 billion kWh.

Bottle Rock Powerplant provided 0.14 billion kWh, and Reid Gardner Unit No. 4 supplied 1.63 billion kWh in 1988. DWR also has a contract with TERA Power Corporation for the purchase of energy produced at Bethany Wind Park, near the South Bay Pumping Plant. About 45 50-kW wind turbines were operational at the end of 1988; over 4.3 million kWh of wind-generated energy was delivered to DWR during the year.

Table 7. SWP Power and Transmission Service Purchases in 1988

Supplier	Type of Service Purchased	Energy kWh	Energy Cost dollars	Transmission Cost dollars	Total Cost dollars
SWP Transmission and Energy Purchases					
British Columbia Hydro Power Authority	Nonfirm energy	9,116,000	205,338		205,338
Montana Power Company	Nonfirm energy	1,600,000	36,480		36,480
Washington Water Power Company	Nonfirm energy	2,065,000	48,116		48,116
Pacific Power and Light Company	Nonfirm energy	800,000	16,800		16,800
Portland General Electric Company	Nonfirm energy	13,710,000	315,490		315,490
Bonneville Power Administration	Nonfirm energy	6,200,000	142,220		142,220
Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas and Electric Company	EHV transmission			1,500,000	1,500,000
TERA Power Corporation	Wind energy	4,310,296	367,722		367,722
Kings River Conservation District	Hydroelectric energy	130,311,551	993,960		993,960
Pacific Gas & Electric Company	Nonfirm energy and transmission	2,465,000	60,283	6,378,605	6,438,888
Southern California Edison Company	Nonfirm energy, transmission and dispatching	8,042,000	195,717	493,612	689,329
Los Angeles Department of Water and Power	Transmission and dispatching			64,763	64,763
MWD of Southern California	Hydroelectric energy	179,422,200	9,645,737		9,645,737
San Diego Gas and Electric Company	Nonfirm energy	1,330,000	28,690		28,690
Nevada Power Company	Transmission			1,026,372	1,026,372
Salt River Agricultural Improvement and Power District	Nonfirm energy	102,062,000	1,756,464		1,756,464
Arizona Power Company	Nonfirm energy	831,000	19,113		19,113
Subtotal		462,265,047	13,832,130	9,463,352	23,295,482
Other SWP Power Service Purchases					
Bonneville Power Administration	Energy storage cost				190,400
Western States Power Pool	Start-up and operation & maintenance				5,875
MCR Geothermal Corporation	Bottle Rock geothermal steam				1,353,328
Coleman Partnership & Fluid Energy Corporation	Bottle Rock steam field royalty payments				81,167
Calpine Corporation	Bottle Rock steam field operation and maintenance				396,985
Kings River Conservation District	Pine Flat operation & maintenance				2,668,747
	Pine Flat debt service				5,327,809
Pacific Gas & Electric Company	Transmission ownership charges				6,973
Nevada Power Company	Reid Gardner No.4 fuel cost				29,785,404
	Reid Gardner No.4 operation & maintenance and insurance				15,781,299
	Reid Gardner No.4 property taxes				1,750,932
Subtotal					57,348,919
Total					80,644,401

Table 8. SWP Power Sales in 1988

Purchaser	Power kilowatt-hours	Amount of Sale dollars
Northern California Power Agency	35,295,000	771,165
Turlock Irrigation District	241,031,000	9,202,763 (a)
Modesto Irrigation District	65,875,000	1,342,480 (b)
Pacific Gas and Electric Company	445,753,000	7,935,908
Southern California Edison Company	167,190,000	2,728,212 (c,d)
Los Angeles Department of Water and Power	1,265,000	893,490 (e)
The Metropolitan Water District of Southern California	105,340,000	1,870,300
City of Glendale	180,000	4,770
City of Anaheim	6,610,000	180,671
City of Riverside	350,000	9,586
City of Vernon	473,803,000	13,440,840 (f)
City of Azusa	7,590,000	598,365 (g)
San Diego Gas and Electric Company	100,000	3,400
Nevada Power Company	137,325,000	4,271,387 (h)
Salt River Agricultural Improvement and Power District	3,160,000	87,040
Total	1,690,867,000	43,340,377

- a) Includes \$3,004,850 for capacity.
- b) Includes \$105,350 for capacity.
- c) Includes \$55,530 for interruptible transmission.
- d) In addition to this amount, 2,282,000 kWh of energy delivered to SCE under the DWR-SCE Generation Replacement Agreement has been valued at \$56,936. Pursuant to the 1982 DWR-San Bernardino Valley Municipal Water District Energy Purchase Agreement, DWR delivered this energy to SCE to replace generation lost because of water SBVMWD diverted from the Santa Ana River and Mill Creek.
- e) Includes \$860,600 for peaking capacity foregone.
- f) Includes \$1,620,000 for capacity and \$57,584 for interruptible transmission, dispatching, and administration.
- g) Includes \$300,000 for capacity and \$120,660 for 40,000,000 kWh of discretionary energy never scheduled. The discretionary energy is not included.
- h) Includes \$614,608 for peaking capacity.

developed facilities accommodate the public. Fifty-eight percent of the total recreational use of SWP facilities in 1988 occurred at the four major reservoirs in Southern California--Silverwood, Perris, Pyramid, and Castaic. In addition to regular recreational use, nearly four-hundred thousand visitor days of use occurred at SWP visitors centers during 1988. These figures (shown in the following tabulation) include people entering visitors centers, stopping at overlooks, and participating in guided tours of SWP facilities.

Location	Visitor Days
Project Operations Control Center, Sacramento	200
Oroville Field Division	151,000
Delta Field Division	800
San Luis Field Division	144,100
San Joaquin Field Division	4,500
Southern Field Division	87,500
SWP Total	388,100

For the second consecutive year, a "Juniors Only" Pheasant Hunt sponsored by the Department of Fish and Game was held at the White Slough Wildlife Area, a DWR-maintained recreation area near Stockton. As in 1987, this year's hunt was held on the second weekend of the regular pheasant season (November 19 and 20) and was organized to accommodate 200 hunters under age 16.