

DCC Early Year Runoff Operations Period
 Analysis of RiverFlows and Diversion Rates
 to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

Sacramento River Reach from
 CWF Project Intake No. 5 to the
 Delta Cross Channel and
 Mokelumne Join

Analogous to C2VSIM CG Stream Node 387

Max Depth = 52 ft
 Typical River
 Bottom for Reach

Total Depth
 (based on USGS
 Gage Data WY

55 Assume Average Side Slope of 20 degrees

Flow Rate (cfs)	Length (Miles)	Length (feet)	Bank Top Typical Width	Streambed Conductivity (ft/month)	Max Depth (ft amsl in NAVD88)	Total Depth (based on USGS Gage Data WY 2011-2012)	Side Slope Length	Bottom Width	Wetted Perimeter for Peak Stage	Projected Area in Flow (sq. ft)	Required Velocity (fps)
833.3	11.9	62,649	450	8.88	-28	30	88	400	575	12,750	0.07
5000.0	11.9	62,649	450	8.88	-28	31.8	93	400	586	13,515	0.37
16666.7	11.9	62,649	450	8.88	-28	32.2	94	400	588	13,685	1.22
23400.0	11.9	62,649	450	8.88	-28	32.5	95	400	590	13,813	1.69
30000.0	11.9	62,649	450	8.88	-28	34.85	102	400	604	14,811	2.03
50000.0	11.9	62,649	450	8.88	-28	39.8	116	400	633	16,915	2.96
100,000	11.9	62,649	450	8.88	-28	49	143	400	687	20,825	4.80
125,000	11.9	62,649	450	8.88	-28	54	158	400	716	22,950	5.45

	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)	
February													
Base Flow	73,670	68,716	61,782	54,750	48,168	40,135	32,712	24,786	18,656	13,931	12,132	(94.2)	
Diversions	9,000	9,000	9,000	8,982	7,792	6,406	5,305	4,085	2,055	843	671		
Base Flow - Diversions	65,409	59,716	50,180	45,526	38,548	32,489	27,736	20,969	17,126	12,736	11,454		
Flow Weighted Averaging Calc	64,670	59,716	52,782	45,768	40,376	33,729	27,407	20,701	16,601	13,088	11,461		
Flow Discrepancy Using Avg.	(739)	-	2,602	242	1,828	1,240	(329)	(268)	(525)	352	7		
% Discrepancy	-1.1%	0.0%	5.2%	0.5%	4.7%	3.8%	-1.2%	-1.3%	-3.1%	2.8%	0.1%		
Wetted Perimeter (ft)	662.1	656.4	648.2	640.0	632.3	622.9	614.2	605.0	597.8	592.3	590.2		
BaseFlow GW Recharge (ac-ft/month)	8,457	8,383	8,279	8,174	8,076	7,956	7,845	7,726	7,635	7,564	7,537		Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	423	838	828	817	808	796	784	773	763	756	377		7,963.43
Wetted Perimeter (ft)	652.5	645.8	634.7	629.2	621.1	614.0	608.4	600.5	596.0	590.9	589.4		
BaseFlow - Diversions Recharge (ac-ft/month)	8,333	8,248	8,106	8,036	7,932	7,841	7,770	7,669	7,612	7,546	7,527	Time Weighted Monthly Total (ac-ft/month)	
Time Weighted Recharge Fractions	417	825	811	804	793	784	777	767	761	755	376	7,869.21	
Change in Area in Flow	605,263.60	659,424.32	850,071.22	675,836.66	704,851.33	560,217.59	364,603.03	279,669.18	112,072.83	87,578.88	49,614.35		

DCC Early Year Runoff Operations Period
 Analysis of RiverFlows and Diversion Rates
 to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)	
March													
Base Flow	67,576	62,330	55,972	49,778	43,538	33,700	26,814	24,454	22,116	14,324	13,224	(85.7)	
Diversions	9,000	9,000	8,744	8,189	7,850	6,958	5,578	4,097	2,285	720	643		
Base Flow - Diversions	58,576	54,098	47,743	42,332	36,309	27,927	22,263	19,698	16,527	13,581	12,531		
Averaging Calc	58,576	53,330	47,228	41,589	35,688	26,742	21,236	20,357	19,831	13,604	12,581		
Discrepancy	-	(768)	(516)	(744)	(621)	(1,185)	(1,027)	659	3,305	23	49		
% Discrepancy	0.0%	-1.4%	-1.1%	-1.8%	-1.7%	-4.2%	-4.6%	3.3%	20.0%	0.2%	0.4%		
	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance		
Wetted Perimeter (ft)	655.0	648.9	641.5	634.2	626.9	615.4	607.3	604.6	601.9	592.7	591.5		
BaseFlow GW Recharge (ac-ft/month)	8,366	8,287	8,192	8,100	8,007	7,860	7,757	7,721	7,687	7,570	7,554		Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	418	829	819	810	801	786	776	772	769	757	378		7,913.97
Wetted Perimeter (ft)	644.5	639.3	631.8	625.5	618.5	608.7	602.0	599.0	595.3	591.9	590.6		
BaseFlow - Diversions Recharge (ac-ft/month)	8,231	8,164	8,069	7,989	7,899	7,773	7,689	7,650	7,603	7,559	7,543	Time Weighted Monthly Total (ac-ft/month)	
Time Weighted Recharge Fractions	412	816	807	799	790	777	769	765	760	756	377	7,828.25	
Change in Area in Flow	659,424.32	603,138.79	602,904.33	545,534.41	529,693.57	422,984.07	333,448.90	348,483.77	409,517.16	54,409.83	50,761.02		
April													
Base Flow	66,924	61,254	44,494	34,294	27,240	21,590	17,788	15,010	13,606	12,348	10,307	(60.4)	
Diversions	9,000	8,525	7,080	6,217	4,597	3,504	1,664	1,473	737	696	557		
Base Flow - Diversions	59,155	52,850	37,899	27,014	23,818	18,055	16,062	13,555	12,174	10,230	9,149		
Averaging Calc	57,924	52,729	37,414	28,077	22,643	18,086	16,124	13,537	12,869	11,652	9,750		
Discrepancy	(1,231)	(121)	(485)	1,062	(1,175)	31	62	(18)	695	1,422	601		
% Discrepancy	-2.1%	-0.2%	-1.3%	3.9%	-4.9%	0.2%	0.4%	-0.1%	5.7%	13.9%	6.6%		
	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance		
Wetted Perimeter (ft)	654.3	647.6	628.0	616.1	607.8	601.2	596.8	593.5	591.9	590.4	588.0		
BaseFlow GW Recharge (ac-ft/month)	8,356	8,271	8,021	7,868	7,763	7,679	7,622	7,580	7,559	7,541	7,510		Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	418	827	802	787	776	768	762	758	756	754	376		7,783.75
Wetted Perimeter (ft)	645.2	637.8	620.3	607.6	603.8	597.1	594.8	591.8	590.2	588.0	586.7		
BaseFlow - Diversions Recharge (ac-ft/month)	8,240	8,146	7,922	7,760	7,712	7,626	7,596	7,559	7,538	7,509	7,493	Time Weighted Monthly Total (ac-ft/month)	
Time Weighted Recharge Fractions	412	815	792	776	771	763	760	756	754	751	375	7,723.36	
Change in Area in Flow	569,215.07	615,755.77	483,182.18	533,371.70	250,757.09	259,007.22	126,462.93	106,621.59	104,921.74	155,169.87	84,831.28		

DCC Early Year Runoff Operations Period
 Analysis of RiverFlows and Diversion Rates
 to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

May	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)
Base Flow	57,084	47,156	40,368	29,554	24,854	17,980	14,248	13,386	11,950	10,077	8,348	(61.0)
Diversions	8,872	8,448	8,321	6,998	4,518	2,394	1,340	791	690	617	513	
Base Flow - Diversions	48,817	38,754	31,977	24,313	18,572	15,923	13,262	11,937	10,201	8,273	7,613	
Averaging Calc	48,212	38,708	32,047	22,556	20,336	15,586	12,908	12,595	11,260	9,460	7,835	
Discrepancy	(604)	(47)	70	(1,757)	1,764	(337)	(354)	658	1,059	1,187	222	
% Discrepancy	-1.2%	-0.1%	0.2%	-7.2%	9.5%	-2.1%	-2.7%	5.5%	10.4%	14.4%	2.9%	
	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	
Wetted Perimeter (ft)	642.8	631.1	623.2	610.6	605.1	597.0	592.7	591.6	590.0	587.8	585.8	
BaseFlow GW Recharge (ac-ft/month)	8,209	8,061	7,959	7,798	7,727	7,625	7,569	7,556	7,535	7,507	7,481	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	410	806	796	780	773	762	757	756	753	751	374	7,718.10
Wetted Perimeter (ft)	633.1	621.3	613.4	604.4	597.7	594.6	591.5	590.0	587.9	585.7	584.9	
BaseFlow - Diversions Recharge (ac-ft/month)	8,085	7,935	7,834	7,719	7,634	7,594	7,554	7,535	7,509	7,480	7,470	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	404	794	783	772	763	759	755	753	751	748	373	7,657.07
Change in Area in Flow	605,747.18	615,579.93	614,817.93	384,034.07	460,263.52	150,715.09	72,228.94	106,152.66	128,133.47	132,192.60	53,852.99	

Total Change in Recharge for DCC Early Runoff Period (ac-ft)
(279.7)

DCC Late Spring Operations Period
 Analysis of RiverFlows and Diversion Rates
 to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

Sacramento River Reach from
 CWF Project Intake No. 5 to
 the Delta Cross Channel and
 Mokelumne Join

Analogous to C2VSIM CG Stream Node 387

Max Depth = 52 ft

55 Assume Average Side Slope of 20 degrees

Flow Rate (cfs)	Length (Miles)	Length (feet)	Bank Top Typical Width	Streambed Conductivity (ft/month)	Typical River Bottom for Reach (ft amsl in NAVD88)	Total Depth (based on USGS Gage Data WY 2011-2012)	Side Slope	Length	Bottom Width	Wetted Perimeter for Peak Stage	Projected Area in Flow (sq. ft)	Required Velocity (fps)
833.3	11.9	62,649	450	8.88	-28	30	88	88	400	575	12,750	0.07
5000.0	11.9	62,649	450	8.88	-28	31.8	93	93	400	586	13,515	0.37
16666.7	11.9	62,649	450	8.88	-28	32.2	94	94	400	588	13,685	1.22
23400.0	11.9	62,649	450	8.88	-28	32.5	95	95	400	590	13,813	1.69
30000.0	11.9	62,649	450	8.88	-28	34.85	102	102	400	604	14,811	2.03
50000.0	11.9	62,649	450	8.88	-28	39.8	116	116	400	633	16,915	2.96
100,000	11.9	62,649	450	8.88	-28	49	143	143	400	687	20,825	4.80
125,000	11.9	62,649	450	8.88	-28	54	158	158	400	716	22,950	5.45

	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)
May												
Base Flow	57,084	47,156	40,368	29,554	24,854	17,980	14,248	13,386	11,950	10,077	8,348	(61.0)
Diversions	8,872	8,448	8,321	6,998	4,518	2,394	1,340	791	690	617	513	
Base Flow - Diversions	48,817	38,754	31,977	24,313	18,572	15,923	13,262	11,937	10,201	8,273	7,613	
Averaging Calc	48,212	38,708	32,047	22,556	20,336	15,586	12,908	12,595	11,260	9,460	7,835	
Discrepancy	(604)	(47)	70	(1,757)	1,764	(337)	(354)	658	1,059	1,187	222	
% Discrepancy	-1.2%	-0.1%	0.2%	-7.2%	9.5%	-2.1%	-2.7%	5.5%	10.4%	14.4%	2.9%	
Wetted Perimeter (ft)	642.8	631.1	623.2	610.6	605.1	597.0	592.7	591.6	590.0	587.8	585.8	
BaseFlow GW Recharge (ac-ft/month)	8,209	8,061	7,959	7,798	7,727	7,625	7,569	7,556	7,535	7,507	7,481	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	410	806	796	780	773	762	757	756	753	751	374	7,718.10
Wetted Perimeter (ft)	633.1	621.3	613.4	604.4	597.7	594.6	591.5	590.0	587.9	585.7	584.9	
BaseFlow - Diversions Recharge (ac-ft/month)	8,085	7,935	7,834	7,719	7,634	7,594	7,554	7,535	7,509	7,480	7,470	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	404	794	783	772	763	759	755	753	751	748	373	7,657.07

DCC Late Spring Operations Period
 Analysis of RiverFlows and Diversion Rates
 to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

Change in Area in Flow	605,747.18	615,579.93	614,817.93	384,034.07	460,263.52	150,715.09	72,228.94	106,152.66	128,133.47	132,192.60	53,852.99	
June	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)
Base Flow	42,420	34,370	25,058	19,598	16,034	13,840	12,346	11,250	10,822	9,680	8,342	(58.6)
Diversions	9,000	8,354	7,263	6,095	5,244	4,393	2,440	1,535	737	632	511	
Base Flow - Diversions	33,420	26,958	20,793	15,596	11,561	10,440	10,099	9,406	8,060	6,405	6,195	
Averaging Calc	33,420	26,016	17,795	13,503	10,790	9,447	9,906	9,715	10,085	9,048	7,832	
Discrepancy	-	(943)	(2,998)	(2,093)	(771)	(993)	(193)	309	2,025	2,643	1,637	
% Discrepancy	0.0%	-3.5%	-14.4%	-13.4%	-6.7%	-9.5%	-1.9%	3.3%	25.1%	41.3%	26.4%	
Wetted Perimeter (ft)	625.6	616.2	605.3	598.9	594.7	592.2	590.4	589.1	588.6	587.3	585.7	
BaseFlow GW Recharge (ac-ft/month)	7,990	7,870	7,730	7,649	7,596	7,563	7,541	7,524	7,518	7,501	7,481	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	399	787	773	765	760	756	754	752	752	750	374	7,622.64
Wetted Perimeter (ft)	615.1	607.5	600.3	594.2	589.5	588.2	587.8	587.0	585.4	583.5	583.2	
BaseFlow - Diversions Recharge (ac-ft/month)	7,855	7,759	7,667	7,589	7,529	7,512	7,507	7,497	7,477	7,452	7,449	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	393	776	767	759	753	751	751	750	748	745	372	7,564.01
Change in Area in Flow	659,424.32	543,043.25	312,523.17	293,224.01	327,719.23	249,115.85	164,636.27	135,108.72	202,399.30	239,986.49	157,353.30	

11/31sts of May and Half of June Accounted	Total Change in Recharge for DCC Late Spring Period (ac-ft)
	(51.0)

DCC Dry Season Operations Period
Analysis of RiverFlows and Diversion Rates
to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

Sacramento River Reach
from CWF Project Intake No.
5 to the Delta Cross Channel
and Mokelumne Join

Analogous to C2VSIM CG Stream Node 387

Max Depth = 52 ft

55 Assume Average Side Slope of 20 degrees

Flow Rate (cfs)	Length (Miles)	Length (feet)	Bank Top Typical Width	Streambed Conductivity (ft/month)	Typical River Bottom for Reach (ft amsl in NAVD88)	Total Depth (based on USGS Gage Data WY 2011-2012)	Side Slope Length	Bottom Width	Wetted Perimeter for Peak Stage	Projected Area in Flow (sq. ft)	Required Velocity (fps)	
833.3		11.9	62,649	450	8.88	-28	30	88	400	575	12,750	0.07
5000.0		11.9	62,649	450	8.88	-28	31.8	93	400	586	13,515	0.37
16666.7		11.9	62,649	450	8.88	-28	32.2	94	400	588	13,685	1.22
23400.0		11.9	62,649	450	8.88	-28	32.5	95	400	590	13,813	1.69
30000.0		11.9	62,649	450	8.88	-28	34.85	102	400	604	14,811	2.03
50000.0		11.9	62,649	450	8.88	-28	39.8	116	400	633	16,915	2.96
100,000		11.9	62,649	450	8.88	-28	49	143	400	687	20,825	4.80
125,000		11.9	62,649	450	8.88	-28	54	158	400	716	22,950	5.45

June	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)
Base Flow	42,420	34,370	25,058	19,598	16,034	13,840	12,346	11,250	10,822	9,680	8,342	(58.6)
Diversions	9,000	8,354	7,263	6,095	5,244	4,393	2,440	1,535	737	632	511	
Base Flow - Diversions	33,420	26,958	20,793	15,596	11,561	10,440	10,099	9,406	8,060	6,405	6,195	
Averaging Calc	33,420	26,016	17,795	13,503	10,790	9,447	9,906	9,715	10,085	9,048	7,832	
Discrepancy	-	(943)	(2,998)	(2,093)	(771)	(993)	(193)	309	2,025	2,643	1,637	
% Discrepancy	0.0%	-3.5%	-14.4%	-13.4%	-6.7%	-9.5%	-1.9%	3.3%	25.1%	41.3%	26.4%	
Wetted Perimeter (ft)	625.6	616.2	605.3	598.9	594.7	592.2	590.4	589.1	588.6	587.3	585.7	
BaseFlow GW Recharge (ac-ft/month)	7,990	7,870	7,730	7,649	7,596	7,563	7,541	7,524	7,518	7,501	7,481	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	399	787	773	765	760	756	754	752	752	750	374	7,622.64
Wetted Perimeter (ft)	615.1	607.5	600.3	594.2	589.5	588.2	587.8	587.0	585.4	583.5	583.2	
BaseFlow - Diversions Recharge (ac-ft/month)	7,855	7,759	7,667	7,589	7,529	7,512	7,507	7,497	7,477	7,452	7,449	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	393	776	767	759	753	751	751	750	748	745	372	7,564.01
Change in Area in Flow	659,424.32	543,043.25	312,523.17	293,224.01	327,719.23	249,115.85	164,636.27	135,108.72	202,399.30	239,986.49	157,353.30	

DCC Dry Season Operations Period
Analysis of RiverFlows and Diversion Rates
to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

July	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)
Base Flow	24,178	21,726	20,352	18,160	16,114	14,940	13,442	12,116	10,714	9,366	8,450	(83.8)
Diversions	8,612	8,575	8,403	8,275	7,502	7,166	5,034	4,803	3,415	156	-	
Base Flow - Diversions	18,110	16,562	14,904	12,319	10,332	9,141	8,095	6,949	5,904	3,249	1,275	
Averaging Calc	15,566	13,151	11,949	9,885	8,612	7,774	8,408	7,313	7,299	9,210	8,450	
Discrepancy	(2,544)	(3,411)	(2,955)	(2,434)	(1,720)	(1,367)	313	364	1,395	5,960	7,175	
% Discrepancy	-14.0%	-20.6%	-19.8%	-19.8%	-16.6%	-15.0%	3.9%	5.2%	23.6%	183.4%	562.5%	
	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	
Wetted Perimeter (ft)	604.3	601.4	599.8	597.2	594.8	593.5	591.7	590.2	588.5	586.9	585.9	
BaseFlow GW Recharge (ac-ft/month)	7,717	7,681	7,660	7,627	7,597	7,579	7,557	7,537	7,516	7,496	7,482	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	386	768	766	763	760	758	756	754	752	750	374	7,585.10
Wetted Perimeter (ft)	597.2	595.4	593.4	590.4	588.1	586.7	585.5	584.1	582.9	579.8	577.5	
BaseFlow - Diversions Recharge (ac-ft/month)	7,627	7,604	7,579	7,540	7,511	7,493	7,477	7,460	7,444	7,405	7,375	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	381	760	758	754	751	749	748	746	744	740	369	7,501.31
Change in Area in Flow	444,570.25	378,381.19	399,137.14	427,947.11	423,656.89	424,908.31	391,754.04	378,562.34	352,443.64	448,153.20	525,676.78	
August	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)
Base Flow	23,056	20,986	18,720	17,292	15,220	14,450	13,338	12,156	11,458	9,531	8,912	(65.2)
Diversions	7,785	7,524	7,215	7,005	5,483	4,852	4,138	2,893	376	250	7	
Base Flow - Diversions	17,547	14,875	13,834	13,121	11,764	11,152	9,485	8,361	7,188	4,916	3,966	
Averaging Calc	15,271	13,462	11,505	10,287	9,737	9,598	9,200	9,263	11,082	9,281	8,905	
Discrepancy	(2,276)	(1,413)	(2,329)	(2,834)	(2,027)	(1,554)	(285)	901	3,895	4,365	4,939	
% Discrepancy	-13.0%	-9.5%	-16.8%	-21.6%	-17.2%	-13.9%	-3.0%	10.8%	54.2%	88.8%	124.5%	
	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	
Wetted Perimeter (ft)	603.0	600.5	597.9	596.2	593.8	592.9	591.6	590.2	589.4	587.1	586.4	
BaseFlow GW Recharge (ac-ft/month)	7,701	7,670	7,636	7,614	7,584	7,572	7,555	7,538	7,527	7,499	7,489	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	385	767	764	761	758	757	756	754	753	750	374	7,578.96
Wetted Perimeter (ft)	596.5	593.4	592.2	591.3	589.7	589.0	587.1	585.8	584.4	581.7	580.6	
BaseFlow - Diversions Recharge (ac-ft/month)	7,618	7,578	7,563	7,552	7,532	7,523	7,498	7,481	7,464	7,430	7,415	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	381	758	756	755	753	752	750	748	746	743	371	7,513.71
Change in Area in Flow	403,632.68	447,762.26	358,020.94	305,601.58	253,241.61	241,634.69	282,277.22	278,027.50	312,893.40	338,124.46	362,372.15	

DCC Dry Season Operations Period
 Analysis of RiverFlows and Diversion Rates
 to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

September	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)	
Base Flow	24,716	22,820	18,056	16,604	15,830	14,410	13,056	12,134	11,234	9,964	9,763		(50.6)
Diversions	8,366	8,093	4,153	3,857	3,282	2,614	2,282	1,329	1,044	604	323		
Base Flow - Diversions	17,115	16,359	15,053	13,823	11,852	11,379	10,565	9,747	8,867	7,712	7,128		
Averaging Calc	16,350	14,727	13,903	12,747	12,548	11,796	10,774	10,805	10,190	9,361	9,440		
Discrepancy	(765)	(1,632)	(1,150)	(1,076)	696	417	208	1,057	1,323	1,649	2,311		
% Discrepancy	-4.5%	-10.0%	-7.6%	-7.8%	5.9%	3.7%	2.0%	10.8%	14.9%	21.4%	32.4%		
Wetted Perimeter (ft)	604.9	602.7	597.1	595.4	594.5	592.8	591.3	590.2	589.1	587.6	587.4		
BaseFlow GW Recharge (ac-ft/month)	7,725	7,697	7,626	7,604	7,593	7,571	7,551	7,537	7,524	7,505	7,502	Time Weighted Monthly Total (ac-ft/month)	
Time Weighted Recharge Fractions	386	770	763	760	759	757	755	754	752	751	375	7,582.27	
Wetted Perimeter (ft)	596.0	595.1	593.6	592.2	589.9	589.3	588.3	587.4	586.4	585.0	584.3		
BaseFlow - Diversions Recharge (ac-ft/month)	7,612	7,601	7,581	7,563	7,533	7,526	7,514	7,502	7,489	7,471	7,463	Time Weighted Monthly Total (ac-ft/month)	
Time Weighted Recharge Fractions	381	760	758	756	753	753	751	750	749	747	373	7,531.68	
Change in Area in Flow	556,912.39	473,401.52	219,999.80	203,756.73	291,431.49	222,057.25	182,491.05	174,860.14	173,409.66	165,040.15	193,032.41		
October	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)	
Base Flow	19,631	18,061	16,008	14,164	12,682	12,195	10,628	9,714	9,164	7,915	7,379		(50.0)
Diversions	6,769	5,899	4,927	4,423	3,776	3,363	2,911	2,203	782	5	-		
Base Flow - Diversions	13,533	12,618	11,689	9,864	9,336	8,842	8,102	7,533	7,075	5,887	5,732		
Averaging Calc	12,861	12,162	11,081	9,741	8,906	8,832	7,717	7,511	8,381	7,910	7,379		
Discrepancy	(672)	(455)	(608)	(123)	(429)	(10)	(385)	(22)	1,307	2,023	1,648		
% Discrepancy	-5.0%	-3.6%	-5.2%	-1.2%	-4.6%	-0.1%	-4.7%	-0.3%	18.5%	34.4%	28.7%		
Wetted Perimeter (ft)	598.9	597.1	594.7	592.6	590.8	590.3	588.4	587.4	586.7	585.2	584.6		
BaseFlow GW Recharge (ac-ft/month)	7,649	7,626	7,595	7,568	7,546	7,538	7,515	7,501	7,493	7,474	7,466	Time Weighted Monthly Total (ac-ft/month)	
Time Weighted Recharge Fractions	382	763	760	757	755	754	751	750	749	747	373	7,541.47	
Wetted Perimeter (ft)	591.8	590.7	589.7	587.5	586.9	586.3	585.5	584.8	584.3	582.9	582.7		
BaseFlow - Diversions Recharge (ac-ft/month)	7,558	7,545	7,531	7,504	7,496	7,488	7,477	7,469	7,462	7,444	7,442	Time Weighted Monthly Total (ac-ft/month)	
Time Weighted Recharge Fractions	378	754	753	750	750	749	748	747	746	744	372	7,491.50	
Change in Area in Flow	446,748.27	398,839.33	316,463.03	315,051.44	245,195.24	245,665.90	185,106.25	159,787.47	153,055.96	148,549.35	120,716.87		

Total Change in Recharge for DCC Dry Period (ac-ft)
(278.9)

DCC Winter Operations Period
Analysis of RiverFlows and Diversion Rates
to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

Sacramento River Reach from CWF
Project Intake No. 5 to the Delta
Cross Channel and Mokelumne Join Analogous to C2VISM CG Stream Node 387

Max Depth = 52 ft
Typical River Bottom for Reach (ft amsl in NAVD88)

55 Assume Average Side Slope of 20 degrees

Flow Rate (cfs)	Length (Miles)	Length (feet)	Bank Top Typical Width	Streambed Conductivity (ft/month)	Max Depth Typical River Bottom for Reach (ft amsl in NAVD88)	Total Depth (based on USGS Gage Data WY 2011-2012)	Side Slope Length	Bottom Width	Wetted Perimeter for Peak Stage	Projected Area in Flow (sq. ft)	Required Velocity (fps)
833.3	11.9	62,649	450	8.88	-28	30	88	400	575	12,750	0.07
5000.0	11.9	62,649	450	8.88	-28	31.8	93	400	586	13,515	0.37
16666.7	11.9	62,649	450	8.88	-28	32.2	94	400	588	13,685	1.22
23400.0	11.9	62,649	450	8.88	-28	32.5	95	400	590	13,813	1.69
30000.0	11.9	62,649	450	8.88	-28	34.85	102	400	604	14,811	2.03
50000.0	11.9	62,649	450	8.88	-28	39.8	116	400	633	16,915	2.96
100,000	11.9	62,649	450	8.88	-28	49	143	400	687	20,825	4.80
125,000	11.9	62,649	450	8.88	-28	54	158	400	716	22,950	5.45

	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)
November												
Base Flow	32,159	23,144	20,772	16,445	14,714	13,725	12,638	11,852	10,434	7,854	7,169	(42.9)
Diversions	7,189	6,929	5,685	3,951	3,268	2,547	1,684	1,378	1,153	34	-	
Base Flow - Diversions	27,503	20,950	15,414	13,399	11,651	10,837	9,300	8,716	7,798	7,267	6,836	
Averaging Calc	24,970	16,215	15,087	12,494	11,446	11,178	10,954	10,474	9,281	7,820	7,169	
Discrepancy	(2,533)	(4,735)	(327)	(905)	(205)	342	1,654	1,758	1,482	553	333	
% Discrepancy	-9.2%	-22.6%	-2.1%	-6.8%	-1.8%	3.2%	17.8%	20.2%	19.0%	7.6%	4.9%	
Wetted Perimeter (ft)	613.6	603.1	600.3	595.2	593.2	592.0	590.8	589.9	588.2	585.2	584.4	
BaseFlow GW Recharge (ac-ft/month)	7,837	7,702	7,666	7,602	7,576	7,561	7,545	7,533	7,512	7,474	7,463	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	392	770	767	760	758	756	754	753	751	747	373	7,582.11
Wetted Perimeter (ft)	608.2	600.5	594.0	591.7	589.6	588.7	586.9	586.2	585.1	584.5	584.0	
BaseFlow - Diversions Recharge (ac-ft/month)	7,767	7,669	7,586	7,556	7,530	7,518	7,495	7,486	7,473	7,465	7,458	Time Weighted Monthly Total (ac-ft/month)
Time Weighted Recharge Fractions	388	767	759	756	753	752	750	749	747	746	373	7,539.18
Change in Area in Flow	341,151.41	160,750.15	392,575.15	223,195.78	224,393.09	211,608.14	244,607.04	229,759.58	193,114.33	42,979.73	24,409.69	

DCC Winter Operations Period
Analysis of RiverFlows and Diversion Rates
to Assess Changes in Groundwater Recharge by River

SJC-240

DWR South American Groundwater Basin

December	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)	
Base Flow	61,824	56,582	35,690	28,617	24,218	21,885	17,708	15,851	13,294	12,395	10,118		(32.7)
Diversions	6,884	5,755	4,408	2,415	1,477	923	830	816	774	609	406		
Base Flow - Diversions	54,381	51,606	31,081	26,090	22,533	20,540	16,857	15,211	12,642	11,685	9,712		
Averaging Calc	54,940	50,827	31,282	26,202	22,741	20,962	16,878	15,035	12,520	11,786	9,712		
Discrepancy	559	(779)	201	112	208	422	22	(176)	(121)	101	-		
% Discrepancy	1.0%	-1.5%	0.6%	0.4%	0.9%	2.1%	0.1%	-1.2%	-1.0%	0.9%	0.0%		
Wetted Perimeter (ft)	648.3	642.2	617.7	609.5	604.3	601.6	596.7	594.5	591.5	590.5	587.8	Monthly Total (ac-ft/month)	
BaseFlow GW Recharge (ac-ft/month)	8,280	8,201	7,889	7,784	7,718	7,683	7,621	7,593	7,555	7,541	7,507		
Time Weighted Recharge Fractions	414	820	789	778	772	768	762	759	755	754	375	7,747.86	
Wetted Perimeter (ft)	639.6	636.3	612.3	606.5	602.3	600.0	595.7	593.8	590.8	589.7	587.3	Monthly Total (ac-ft/month)	
BaseFlow - Diversions Recharge (ac-ft/month)	8,168	8,127	7,820	7,746	7,693	7,663	7,608	7,583	7,545	7,531	7,501		
Time Weighted Recharge Fractions	408	813	782	775	769	766	761	758	755	753	375	7,715.12	
Change in Area in Flow	545,314.81	364,616.53	337,723.85	185,139.03	123,434.22	98,540.96	62,370.25	46,899.56	47,804.89	52,013.92	29,712.93		
January	5% Exceedance	10% Exceedance	20% Exceedance	30% Exceedance	40% Exceedance	50% Exceedance	60% Exceedance	70% Exceedance	80% Exceedance	90% Exceedance	95% Exceedance	Change in Recharge (ac-ft/month)	
Base Flow	72,836	64,488	58,272	50,724	35,680	27,320	22,938	19,332	15,462	12,119	10,490		(63.7)
Diversions	9,000	9,000	8,535	7,615	5,968	2,740	1,778	1,114	844	711	651		
Base Flow - Diversions	63,836	55,553	50,880	42,717	30,934	24,264	20,162	17,973	14,708	11,313	9,845		
Averaging Calc	63,836	55,488	49,737	43,109	29,712	24,580	21,160	18,218	14,618	11,408	9,839		
Discrepancy	-	(65)	(1,143)	391	(1,222)	316	998	245	(90)	96	(7)		
% Discrepancy	0.0%	-0.1%	-2.2%	0.9%	-4.0%	1.3%	4.9%	1.4%	-0.6%	0.8%	-0.1%		
Wetted Perimeter (ft)	661.2	651.4	644.1	635.3	617.7	607.9	602.8	598.6	594.1	590.2	588.3	Time Weighted Monthly Total (ac-ft/month)	
BaseFlow GW Recharge (ac-ft/month)	8,444	8,319	8,227	8,114	7,889	7,764	7,699	7,645	7,587	7,537	7,513		
Time Weighted Recharge Fractions	422	832	823	811	789	776	770	764	759	754	376	7,875.99	
Wetted Perimeter (ft)	650.6	641.0	635.5	625.9	612.2	604.4	599.6	597.0	593.2	589.2	587.5	Time Weighted Monthly Total (ac-ft/month)	
BaseFlow - Diversions Recharge (ac-ft/month)	8,310	8,186	8,116	7,994	7,818	7,719	7,657	7,625	7,576	7,525	7,503		
Time Weighted Recharge Fractions	415	819	812	799	782	772	766	762	758	753	375	7,812.28	
Change in Area in Flow	659,424.32	654,691.12	541,607.17	586,638.53	347,707.12	223,911.19	203,366.46	99,580.40	55,259.76	59,077.09	47,189.14		
Total Change in Recharge for DCC Winter Period (ac-ft)												(116.8)	

DWR South American Groundwater Basin

Total Change in Recharge for DCC Early Runoff Period (ac-ft)	Total Change in Recharge for DCC Late Spring Period (ac-ft)	Total Change in Recharge for DCC Dry Period (ac-ft)	Total Change in Recharge for DCC Winter Period (ac-ft)
(279.7)	(51.0)	(278.9)	(116.8)
Annual Depletion to So. American Basin			(726.4)