SOUTHERN CALIFORNIA STEELHEAD PASSAGE ASSESSMENT, LOWER SANTA MARGARITA RIVER, CALIFORNIA AND CUP SURFACE WATER AVAILABILITY ANALYSIS (TM 1.1)

APPENDIX C

LSMR MODEL RESULTS

Table C-1, Unimpaired Flow WY 1931-1945

Average Subbasin Water Budget (af/y)

	Upper Ysidora	Chappo	Lower Ysidora	SMR Basin	
Inflow:					
Santa Margarita River Inflow	41,490	42,800	42,760	41,490	88%
Subsurface Underflow *	610	720	450	610	1%
Lake O'Neill Spill and Release	-	-	-	-	0%
Fallbrook Creek	1,190	-	-	1,190	3%
Minor Tributary Drainages	800	1,380	880	3,070	7%
Areal Precipitation	180	350	250	790	2%
Total Inflow:	44,270	45,250	44,340	47,130	
Outflow:					
Santa Margarita River Outflow	42,800	42,760	43,210	43,210	92%
Subsurface Underflow *	720	450	60	60	0%
Groundwater Pumping	-	-	-	-	0%
Evapotranspiration *	830	2,040	950	3,820	8%
Diversions to Lake O'Neill	-	-	-	-	0%
Total Outflow:	44,350	45,250	44,220	47,080	
Net Simulated Change of Groundwater in Storage: *	-80	0	120	50	
	-	-	-	-	

Note: * Subbasin Averages are based on the last rate of the stress period
Values are rounded to the nearest 100 acre-feet, closest number adjusted to eliminate rounding error

Median Subbasin Water Budget (af/y)

	Upper Ysidora	Chappo	Lower Ysidora	SMR Basin
Inflow:				
Santa Margarita River Inflow	21,900	22,700	42,800	21,900
Subsurface Underflow *	600	700	400	600
Lake O'Neill Spill and Release	0	-	-	0
Fallbrook Creek	400	-	-	400
Minor Tributary Drainages	700	1,200	800	2,700
Areal Precipitation	200	300	200	700
Outflow:				
Santa Margarita River Outflow	22,700	42,800	22,900	22,900
Subsurface Underflow *	700	400	100	100
Groundwater Pumping	-	-	-	-
Evapotranspiration *	800	2,100	1,000	3,900
Diversions to Lake O'Neill	-	-	-	-
Net Simulated Change of Groundwater in Storage: *	0	0	0	0

Note: The sum of median values does not reflect the change of groundwater in storage.
Median values are not cummulative.
* Subbasin Medians are based on the last rate of the stress period
Values are rounded to the nearest 100 acre-feet

Table C-2 Unimpared Flow, WY 1931-1945, Annual Water budget Summary

Lower Santa Margarita River Groundwater Model — Unimpaired Flow

Modflow Volumetric Budget Output and Streamflow — 5/26/11

Annual Surface Water Budget

AF/WY	MY	SMR Flow In	Str Gain+ / Loss-	GAGE SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
1931	1	5,478	-428	5,050	-1,450	3,600	-52	3,549	-1,929
1932	2	46,246	2,130	48,376	-93	48,283	635	48,918	2,672
1933	3	8,325	19	8,344	-288	8,056	387	8,443	118
1934	4	5,811	-55	5,755	-705	5,050	218	5,268	-543
1935	5	10,227	224	10,450	68	10,519	599	11,118	891
1936	6	8,833	117	8,951	-805	8,145	99	8,245	-589
1937	7	105,899	3,810	109,709	1,192	110,901	1,412	112,314	6,415
1938	8	119,870	3,168	123,038	427	123,465	-115	123,350	3,479
1939	9	25,176	446	25,621	-267	25,355	433	25,788	612
1940	10	21,858	799	22,657	-293	22,365	537	22,901	1,043
1941	11	119,374	5,676	125,049	2,307	127,356	2,066	129,422	10,049
1942	12	20,815	273	21,088	-621	20,467	132	20,599	-216
1943	13	75,417	2,077	77,494	689	78,182	1,065	79,248	3,831
1944	14	28,335	951	29,285	-469	28,816	277	29,093	758
1945	15	20,620	481	21,100	-279	20,822	387	21,209	589
		41,485	**1,312**	42,798	**-39**	42,759	**539**	43,297	**1,812**
		21,858	481	22,657	-279	22,365	387	22,901	758

Table C-2 Unimpared Flow, WY 1931-1945, Annual Water budget Summary (continued)

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Annual Groundwater Budget — Model Run: Unimpaired Flow

WY	**INFLOW:** Storage	Rch	Stream Leakance	GHB	TOTAL GW IN	**OUTFLOW:** Storage	Wells	ET	Stream Leakance	GHB	TOTAL GW OUT	NET Storage	NET Str Lknc	In-Out	**% bal**
1931	1,341	192	4,728	615	6,876	1,269	-	3,628	1,924	56	6,876	-73	-2,804	-0.4	-0.01%
1932	879	623	5,259	609	7,371	1,467	-	3,756	2,092	57	7,372	588	-3,168	-0.4	-0.01%
1933	1,066	427	4,716	607	6,816	854	-	3,748	2,161	54	6,816	-212	-2,555	-0.7	-0.01%
1934	1,161	229	4,581	608	6,579	886	-	3,648	1,996	50	6,580	-275	-2,585	-1.5	-0.02%
1935	994	413	5,250	607	7,264	1,244	-	3,787	2,174	59	7,264	250	-3,076	-0.3	0.00%
1936	1,338	353	4,346	611	6,648	975	-	3,658	1,965	52	6,650	-363	-2,381	-1.7	-0.03%
1937	754	912	5,521	606	7,793	1,590	-	3,865	2,276	60	7,792	836	-3,245	1.0	0.01%
1938	569	460	5,090	606	6,725	564	-	3,877	2,228	56	6,725	-5	-2,862	-0.5	-0.01%
1939	582	438	5,246	606	6,872	695	-	3,866	2,255	57	6,872	112	-2,991	-0.1	0.00%
1940	713	486	5,002	607	6,809	560	-	3,882	2,310	58	6,809	-153	-2,692	-0.7	-0.01%
1941	857	1,292	4,929	601	7,679	944	-	3,988	2,680	68	7,679	87	-2,249	0.2	0.00%
1942	582	357	5,154	606	6,699	521	-	3,875	2,250	57	6,703	-61	-2,904	-3.3	-0.05%
1943	682	697	5,062	605	7,046	711	-	3,907	2,365	60	7,042	28	-2,697	4.2	0.06%
1944	622	465	5,135	608	6,830	603	-	3,893	2,280	58	6,834	-19	-2,856	-3.7	-0.05%
1945	584	440	5,124	607	6,754	579	-	3,868	2,252	56	6,755	-4	-2,872	-1.0	-0.01%
avg	848	519	5,009	607	6,984	897	-	3,816	2,214	57	6,985	49	-2,796	-0.6	-0.01%
med	754	440	5,090	607	6,830	854	-	3,866	2,250	57	6,834	-5	-2,856	-0.5	-0.01%

Table C-3 Year Average Monthly Water Budget
Lower Santa Margarita River Groundwater Model
Modflow Volumetric Budget Output and Streamflow

Unimpaired Flow
5/26/11

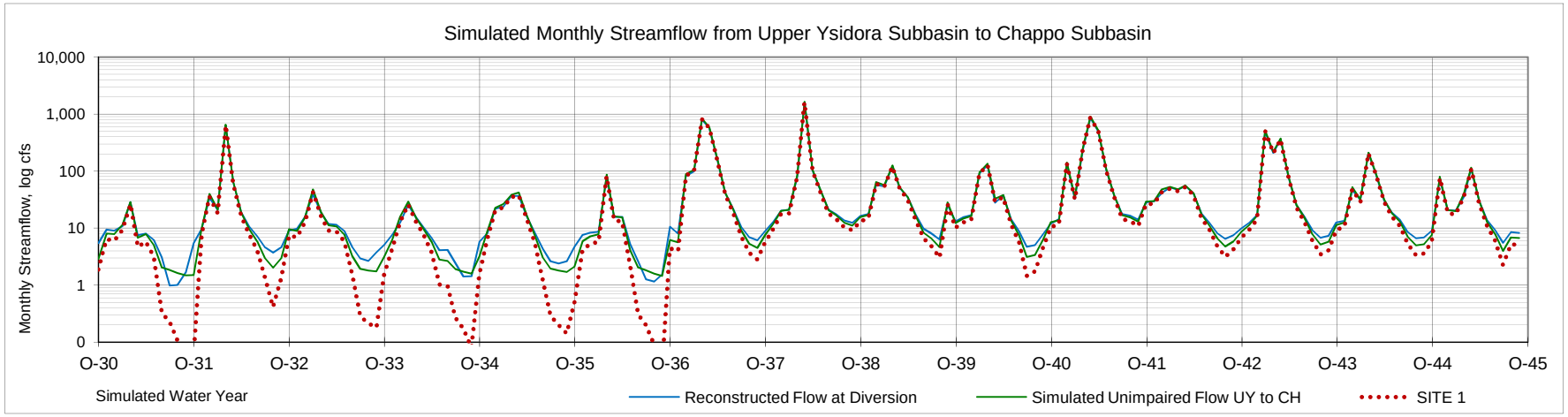
Atreamflow

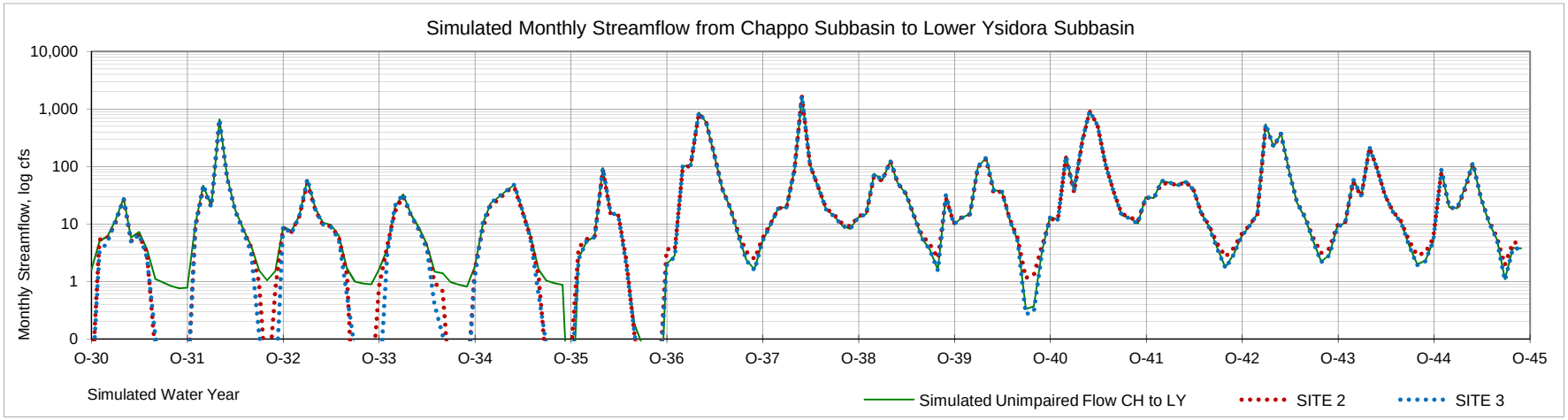
Avg AF/M	SMR Flow In	Str Gain+ / Loss-	SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
Oct	639	-92	547	-126	421	-28	393	-246
Nov	987	-17	971	-80	891	-14	878	-110
Dec	2,198	166	2,364	204	2,568	170	2,738	540
Jan	4,191	230	4,421	205	4,626	179	4,805	613
Feb	9,944	571	10,514	329	10,843	270	11,113	1,170
Mar	15,892	577	16,469	182	16,652	103	16,754	862
Apr	4,285	137	4,422	-65	4,357	8	4,366	81
May	1,413	-21	1,393	-126	1,267	-25	1,242	-171
Jun	699	-60	639	-141	498	-33	465	-234
Jul	429	-60	369	-150	219	-33	187	-242
Aug	365	-64	301	-152	149	-36	113	-252
Sep	442	-54	387	-120	267	-23	244	-197
Avg Monthly	3,457	109	3,566	-3	3,563	45	3,608	151
Med Monthly	1,200	-19	1,182	-100	1,079	-18	1,060	-141
Avg Total=Anl	41,485	1,312	42,798	-39	42,759	539	43,297	1,812

Lower Santa Margarita River Groundwater Model
Modflow Volumetric Budget Output

Groundwater Model

Avg AF/M	**INFLOW:** Storage	Recharge	Stream Leakance	GHB	TOTAL IN	**OUTFLOW:** Storage	Wells	ET	Stream Leakance	GHB	TOTAL OUT	OUT-IN NET Storage	OUT-IN NET Str Lknc	In-Out	% bal
Oct	20	13	526	52	611	192	-	268	147	4	611	172	-378	0.0	0.00%
Nov	4	23	490	50	567	204	-	191	166	5	566	200	-324	0.6	0.10%
Dec	3	100	448	51	601	224	-	161	210	6	601	221	-238	0.5	0.08%
Jan	12	86	403	50	551	122	-	181	241	7	551	111	-161	0.1	0.02%
Feb	25	140	361	46	572	109	-	222	234	6	572	83	-127	0.4	0.07%
Mar	71	65	387	51	573	14	-	310	244	6	574	-57	-143	-0.8	-0.14%
Apr	107	36	385	49	578	4	-	361	206	5	577	-103	-178	0.0	0.01%
May	139	20	403	52	614	0	-	426	184	4	615	-139	-219	-0.3	-0.06%
Jun	125	14	410	50	600	0	-	438	159	3	600	-125	-251	-0.1	-0.02%
Jul	154	8	398	52	612	0	-	461	149	3	613	-154	-249	-0.8	-0.14%
Aug	125	7	397	53	582	0	-	440	139	3	582	-125	-258	-0.2	-0.04%
Sep	63	6	403	51	523	27	-	359	133	3	523	-35	-270	0.1	0.02%
Avg Monthly	71	43	417	51	582	75	-	318	184	5	582	4	-233	0.0	-0.01%
Med Monthly	67	22	403	51	580	20	-	335	175	5	580	-46	-243	0.0	0.00%
Avg Total=Anl	848	519	5,009	607	6,984	897	-	3,816	2,214	57	6,985	49	-2,796	-0.6	





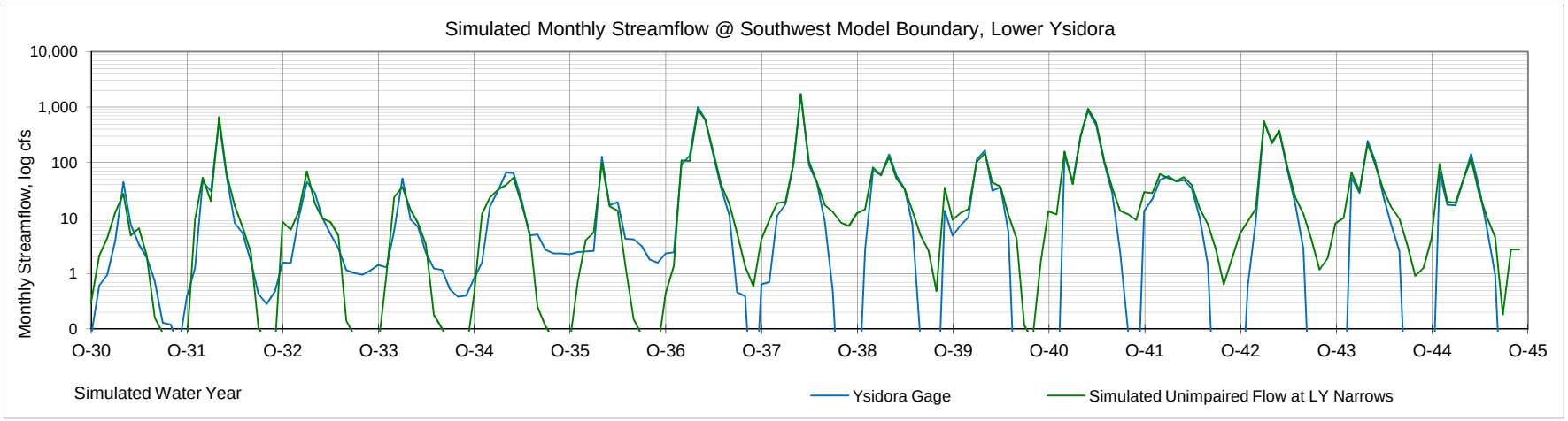


Figure C-1. Simulated Streamflow; Unimpaired Flow .

DRAFT

Table C-4

Recent Historical Flow WY 1997-2009

Average Annual Hydrologic Budget

	Upper Ysidora (AFY)	Chappo (AFY)	Lower Ysidora (AFY)	SMR Basin (AFY)	
Inflow:					
Santa Margarita River	41,040	38,900	36,190	41,040	89%
Subsurface Underflow [1]	600	1,040	220	600	1.3%
Lake O'Neill Release	740	-	-	740	1.6%
Fallbrook Creek	1,030			1,030	2.2%
Waste Water Oxidation Ponds	-	30	10	30.00	0.1%
Minor Tributary Drainages	500	860	600	1,950	4.2%
Areal Precipitation [2]	160	260	200	620	1.3%
Total Inflow:	44,070	41,090	37,220	46,010	
Outflow:					
Santa Margarita River	38,900	36,190	35,200	35,200	76%
Subsurface Underflow [1]	1,040	220	40	40	0.1%
Groundwater Pumping	2,140	3,220	1,220	6,580	14%
Evapotranspiration [1,2]	930	1,490	780	3,190	6.9%
Diversions to Lake O'Neill	1,080	-	-	1,080	2.3%
Total Outflow:	44,090	41,120	37,240	46,090	
Net Simulated Change					
Groundwater in Storage: [1]	-20	-40	-20	-80	

Note: 1 Subbasin Averages are based on the last rate of the stress period

2 Evapotranspiration includes evaporation from the recharge ponds

Values are rounded to the nearest 10 acre-feet, which may result in a summation rounding error

Table C-5 Recent Historical Flow WY 1997-2009 Annual Water Budget Summary

Lower Santa Margarita River Groundwater Model — Recent Historical Flow WY 1997-2009 v2

Modflow Volumetric Budget Output and Streamflow — 10/10/11

Annual Surface Water Budget

MY	SMR Flow In	Ponds Diversion	LON Diversion	Str Gain+ / Loss-	GAGE SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY
1997	25,245	3,633	-	-623	24,621	-1,613	23,008	613	23,621	-1,623
1998	119,742	4,368	291	1,775	121,517	-1,991	119,526	697	120,223	481
1999	11,300	2,955	-	-1,867	9,433	-3,895	5,538	-576	4,962	-6,339
2000	14,092	4,648	-	-2,339	11,753	-3,558	8,195	-429	7,766	-6,326
2001	20,311	4,272	743	-2,203	18,108	-3,933	14,175	-252	13,923	-6,389
2002	6,325	219	-	-1,375	4,950	-3,257	1,693	-632	1,061	-5,264
2003	48,616	9,919	1,225	-3,302	45,314	-4,167	41,147	-212	40,936	-7,681
2004	14,849	4,881	1,555	-1,702	13,147	-3,724	9,423	-440	8,983	-5,866
2005	173,411	6,973	1,913	2,345	175,756	-988	174,768	727	175,495	2,084
2006	24,197	5,543	2,615	-4,552	19,645	-2,135	17,510	-581	16,929	-7,268
2007	10,071	3,886	1,230	-3,997	6,074	-3,698	2,377	-1,073	1,303	-8,768
2008	39,738	8,163	2,634	-4,828	34,910	-1,977	32,933	-652	32,281	-7,457
2009	25,600	6,503	1,885	-5,066	20,534	-2,789	17,745	-911	16,834	-8,766
	41,038	5,074	1,084	**-2,133**	38,905	**-2,902**	36,003	**-286**	35,717	**-5,322**
	24,197	4,648	1,225	-2,203	19,645	-3,257	17,510	-440	16,834	-6,339

Table C-6 Recent Historical Flow WY 1997-2009 Monthly Water Budget

Lower Santa Margarita River Groundwater Model — Recent Historical Flow WY 1997-2009 v2

Modflow Volumetric Budget Output and Streamflow — 10/10/11

Streamflow

	Avg AF/M	SMR Flow In	Diversion	Str Gain+ / Loss-	SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
	Oct	1,640	149	-209	1,431	-253	1,177	-6	1,172	-469
	Nov	1,406	293	287	1,693	-512	1,181	-222	959	-447
	Dec	3,476	417	-432	3,044	-319	2,725	-91	2,633	-842
	Jan	8,142	748	-378	7,764	-146	7,618	66	7,684	-458
	Feb	14,367	1,091	-148	14,220	94	14,314	201	14,515	148
	Mar	4,944	1,171	-478	4,466	-276	4,190	-22	4,168	-776
	Apr	2,877	1,018	-206	2,671	-211	2,460	9	2,470	-407
	May	1,868	615	-78	1,790	-327	1,463	-55	1,408	-460
	Jun	911	335	0	911	-325	586	-67	518	-393
	Jul	596	168	-105	491	-299	192	-39	153	-443
	Aug	427	97	-193	234	-182	52	-31	21	-406
	Sep	384	57	-194	190	-145	45	-29	16	-369
	Avg Monthly	3,420	513	-178	3,242	-242	3,000	-24	2,976	-443
	Med Monthly	1,754	376	-194	1,742	-265	1,322	-30	1,290	-445
	Avg Total=Anl	41,038	6,158	-2,133	38,905	-2,902	36,003	-286	35,717	-5,322

Table C-6 Recent Historical Flow WY 1997-2009 Annual Groundwater Budget Summary

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Annual Groundwater Budget Model Run: Recent Historical Flow WY 1997-2009 v2

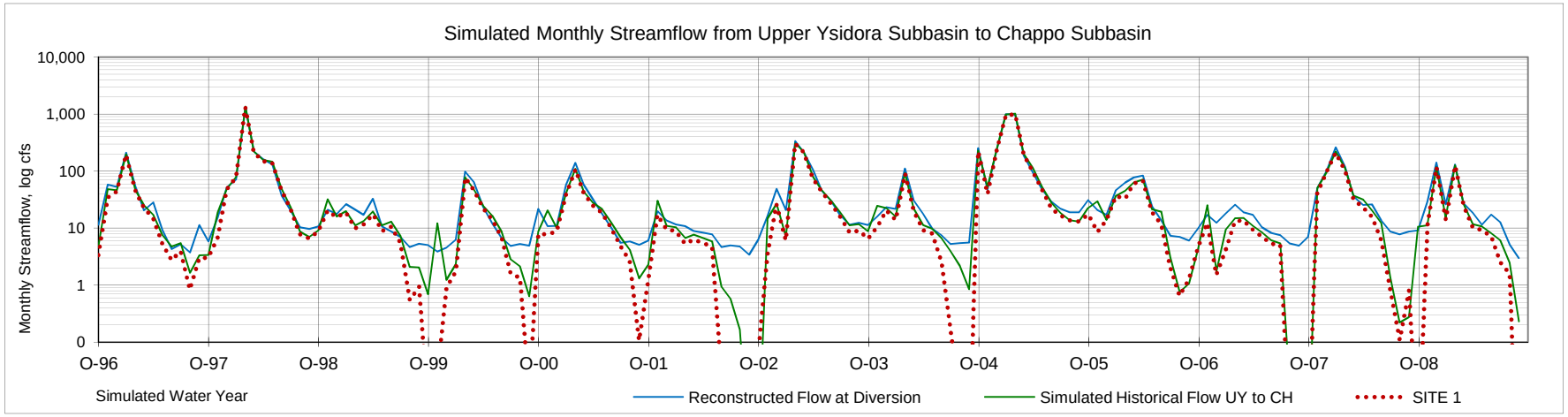
	INFLOW:					OUTFLOW:						(out-in)	(in-out)	
MY	Storage	Recharge	Stream Leakance	GHB	TOTAL GW IN	Storage	Wells	ET	Stream Leakance	GHB	TOTAL GW OUT	NET Storage	NET Str Lknc	In-Out
	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY
1997	3,599	4,221	6,447	606	14,873	2,214	6,304	3,351	2,945	60	14,875	-1,385	3,501	-2.0
1998	3,332	5,481	8,122	596	17,531	3,688	6,494	3,352	3,936	61	17,531	356	4,186	-0.4
1999	3,098	3,198	7,683	603	14,581	2,709	6,119	3,170	2,534	50	14,582	-389	5,149	-0.4
2000	4,574	4,901	7,356	603	17,435	3,997	7,059	2,774	3,569	35	17,434	-576	3,787	0.6
2001	3,310	4,780	8,444	601	17,134	3,896	6,364	3,154	3,674	47	17,135	587	4,770	-1.1
2002	3,712	450	7,672	609	12,443	2,196	6,451	2,612	1,148	40	12,446	-1,517	6,525	-3.3
2003	2,512	10,287	9,281	595	22,675	5,728	6,481	3,081	7,339	45	22,673	3,216	1,942	2.4
2004	4,128	5,197	5,808	600	15,733	1,763	6,655	3,062	4,215	42	15,737	-2,365	1,593	-3.4
2005	3,368	8,308	8,503	592	20,771	5,170	6,219	3,515	5,813	57	20,773	1,802	2,691	-2.3
2006	4,141	5,716	5,948	605	16,410	2,798	6,841	3,411	3,315	46	16,412	-1,343	2,633	-1.6
2007	3,962	3,976	6,786	613	15,337	3,248	7,234	2,863	1,965	23	15,333	-714	4,821	4.4
2008	4,708	8,533	6,028	608	19,878	5,211	6,878	3,143	4,614	35	19,881	503	1,414	-3.6
2009	3,281	6,683	6,247	610	16,820	4,008	6,398	3,352	3,033	32	16,823	728	3,214	-3.2
avg	3,671	5,518	7,256	603	17,048	3,587	6,577	3,141	3,700	44	17,049	-84	3,556	-1.1
med	3,599	5,197	7,356	603	16,820	3,688	6,481	3,154	3,569	45	16,823	-389	3,501	-1.6

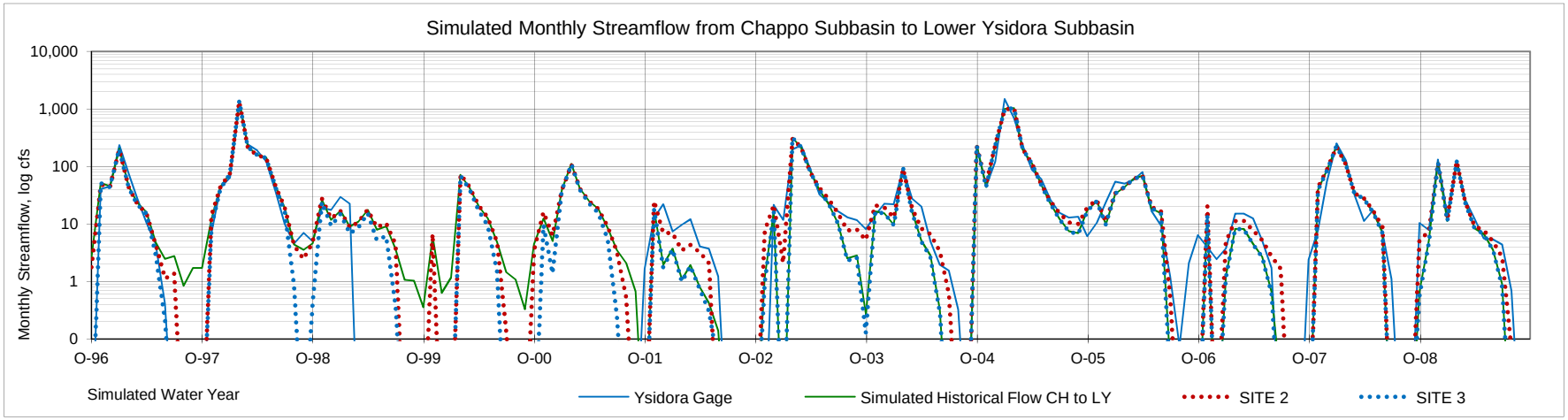
Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Groundwater Model

	INFLOW:					OUTFLOW:						OUT-IN	OUT-IN	
Avg AF/M	Storage	Recharge	Stream Leakance	GHB	TOTAL IN	Storage	Wells	ET	Stream Leakance	GHB	TOTAL OUT	NET Storage	NET Str Lknc	In-Out
Oct	258	127	752	53	1,189	282	655	171	79	2	1,189	24	672	0.0
Nov	38	227	1,140	51	1,456	770	446	132	104	3	1,455	732	1,036	0.3
Dec	60	246	822	51	1,179	542	361	123	149	4	1,179	482	672	0.2
Jan	28	672	631	50	1,382	591	353	148	285	6	1,382	563	346	0.0
Feb	45	1,054	551	45	1,696	717	315	196	462	6	1,696	672	89	-0.2
Mar	166	1,116	456	50	1,788	415	395	286	686	6	1,787	249	-230	0.7
Apr	219	924	481	48	1,672	183	460	340	685	5	1,673	-36	-204	-0.6
May	412	597	485	50	1,545	34	552	399	555	4	1,544	-379	-70	0.8
Jun	579	252	510	49	1,390	9	664	396	319	3	1,391	-570	191	-1.3
Jul	650	153	523	52	1,378	10	799	385	181	3	1,378	-641	342	0.1
Aug	665	84	462	52	1,265	13	809	327	114	2	1,265	-653	348	-0.8
Sep	550	65	444	51	1,110	22	769	237	80	1	1,110	-527	364	-0.3
Avg Monthly	306	460	605	50	1,421	299	548	262	308	4	1,421	-7	296	-0.1
Med Monthly	238	249	516	50	1,386	232	506	262	233	4	1,386	-6	344	0.0
Avg Total=Anl	3,671	5,518	7,256	603	17,048	3,587	6,577	3,141	3,700	44	17,049	-84	3,556	-1.1





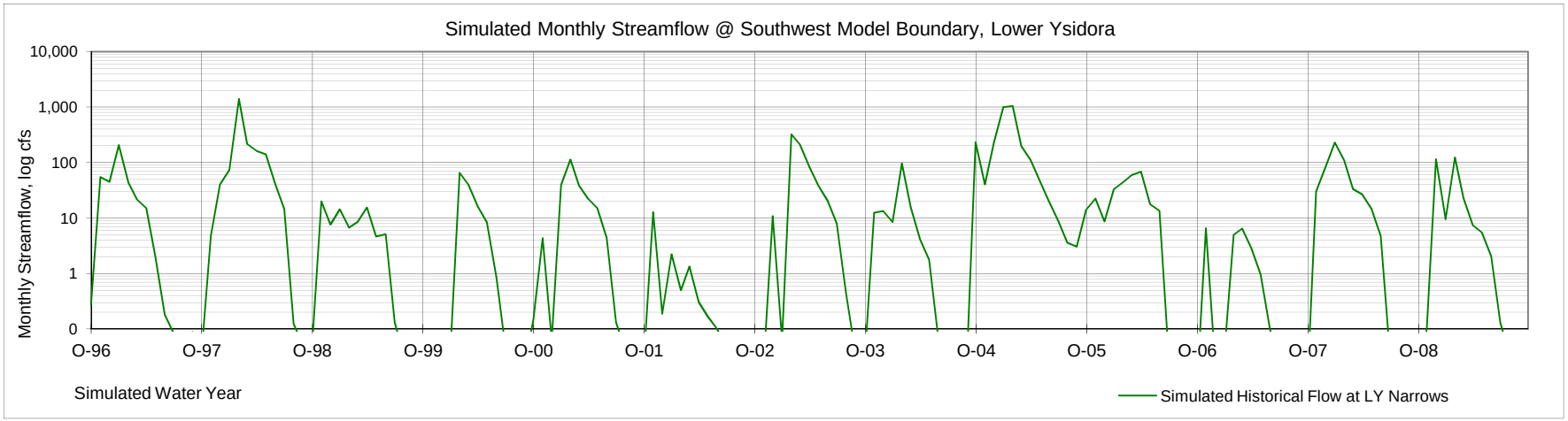


Figure C-2. Simulated Streamflow; WY 1997-2009 Historical Flow

DRAFT

Table C-7

FUTURE PROJECT CUP

13-Year Average Annual Hydrologic Budget

	Upper Ysidora (AFY)	Chappo (AFY)	Lower Ysidora (AFY)	SMR Basin (AFY)	
Inflow:					
Santa Margarita River	41,560	33,960	29,840	41,560	89%
Subsurface Underflow [1]	600	1,610	740	600	1.3%
Lake O'Neill Spill and Release	1,100	-	-	1,100	2.3%
Fallbrook Creek	1,030			1,030	2.2%
Waste Water Oxidation Ponds	-	0	0	-	0.0%
Minor Tributary Drainages	500	860	600	1,950	4.2%
Areal Precipitation [2]	160	260	200	620	1.3%
Total Inflow:	44,950	36,690	31,380	46,860	
Outflow:					
Santa Margarita River	33,960	29,840	30,380	30,380	65%
Subsurface Underflow [1]	1,610	740	50	60	0.1%
Groundwater Pumping	6,850	4,970	0	11,820	25%
Evapotranspiration [1,2]	770	980	850	2,590	5.6%
Diversions to Lake O'Neill	1,680	-	-	1,680	3.6%
Total Outflow:	44,870	36,530	31,280	46,520	
Net Simulated Change					
Groundwater in Storage: [1]	-70	-170	-100	-330	

Note: 1 Subbasin Averages are based on the last rate of the stress period

2 Evapotranspiration includes evaporation from the recharge ponds

Values are rounded to the nearest 10 acre-feet, which may result in a summation rounding error

Hydrologic Conditions correspond to WY 1997-2009

Table C-8 Future Project Flow WY 1997-2009 Annual Surface Water Budget Summary

Lower Santa Margarita River Groundwater Model | Model Run: Future Project

Modflow Volumetric Budget Output and Streamflow | 11/3/11

Annual Surface Water Budget

MY	SMR Flow In	Ponds Diversion	LON Diversion	Str Gain+ / Loss-	GAGE SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY
1	26,690	12,368	1,793	-7,394	19,297	-1,998	17,299	797	18,096	-8,594
2	121,259	17,540	1,635	-10,131	111,128	-4,806	106,321	1,137	107,459	-13,800
3	13,194	8,917	1,691	-8,419	4,775	-4,008	767	-123	645	-12,550
4	15,504	6,795	1,694	-7,719	7,784	-3,215	4,569	-230	4,339	-11,165
5	20,633	10,976	1,640	-8,028	12,605	-3,073	9,533	131	9,664	-10,969
6	6,550	2,931	1,580	-5,770	780	-780	0	39	39	-6,511
7	48,533	15,162	1,787	-11,110	37,423	-4,482	32,942	408	33,350	-15,184
8	14,849	8,166	1,693	-7,456	7,394	-3,357	4,037	9	4,046	-10,804
9	173,411	22,667	1,654	-7,608	165,803	-2,521	163,282	1,864	165,147	-8,265
10	24,197	14,837	1,679	-9,267	14,930	-4,398	10,533	-81	10,452	-13,745
11	10,071	6,062	1,681	-8,382	1,689	-1,666	23	19	42	-10,029
12	39,738	14,990	1,714	-8,982	30,756	-4,602	26,154	-108	26,046	-13,691
13	25,600	11,508	1,588	-8,710	16,890	-4,456	12,434	-10	12,424	-13,176
	41,556	11,763	1,679	**-8,383**	33,173	**-3,335**	29,838	**296**	30,134	**-11,422**
	24,197	11,508	1,681	-8,382	14,930	-3,357	10,533	19	10,452	-11,165

Table 6 Historical Flow WY 1997-2009 Monthly Water Budget

Lower Santa Margarita River Groundwater Model | Future Project WY 1997-2009

Modflow Volumetric Budget Output and Streamflow | 11/3/11

Streamflow

	Avg AF/M	SMR Flow In	Diversion	Str Gain+ / Loss-	SMR @ UY->CH	Str Gain+ / Loss-	SMR @ CH->LY	Str Gain+ / Loss-	SMR Flow Out	LSMR Str Gain+ / Loss-
	Oct	1,652	510	-694	958	-1	957	38	995	-657
	Nov	1,428	976	-221	1,207	-683	524	-37	487	-941
	Dec	3,536	1,498	-1,557	1,978	-253	1,725	15	1,740	-1,796
	Jan	8,254	2,000	-1,608	6,646	-191	6,454	102	6,556	-1,697
	Feb	14,417	2,437	-1,514	12,902	-104	12,798	219	13,017	-1,400
	Mar	5,018	2,333	-1,094	3,925	-480	3,445	-7	3,438	-1,580
	Apr	2,928	1,673	-450	2,478	-386	2,093	20	2,113	-815
	May	1,879	1,108	-284	1,594	-449	1,146	-20	1,125	-754
	Jun	949	696	-305	643	-324	319	-14	305	-644
	Jul	624	77	-75	549	-242	307	-10	296	-328
	Aug	459	79	-270	188	-130	59	-7	51	-407
	Sep	414	52	-309	105	-93	12	-2	10	-404
	Avg Monthly	3,463	1,120	-699	2,764	-278	2,487	25	2,511	-952
	Med Monthly	1,766	1,042	-379	1,400	-248	1,051	-4	1,060	-784
	Avg Total=Anl	41,556	13,442	-8,383	33,173	-3,335	29,838	296	30,134	-11,422

Table C-9 Future Project Flow WY 1997-2009 Annual Groundwater Budget Summary

Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Annual Groundwater Budget Model Run: Future Project

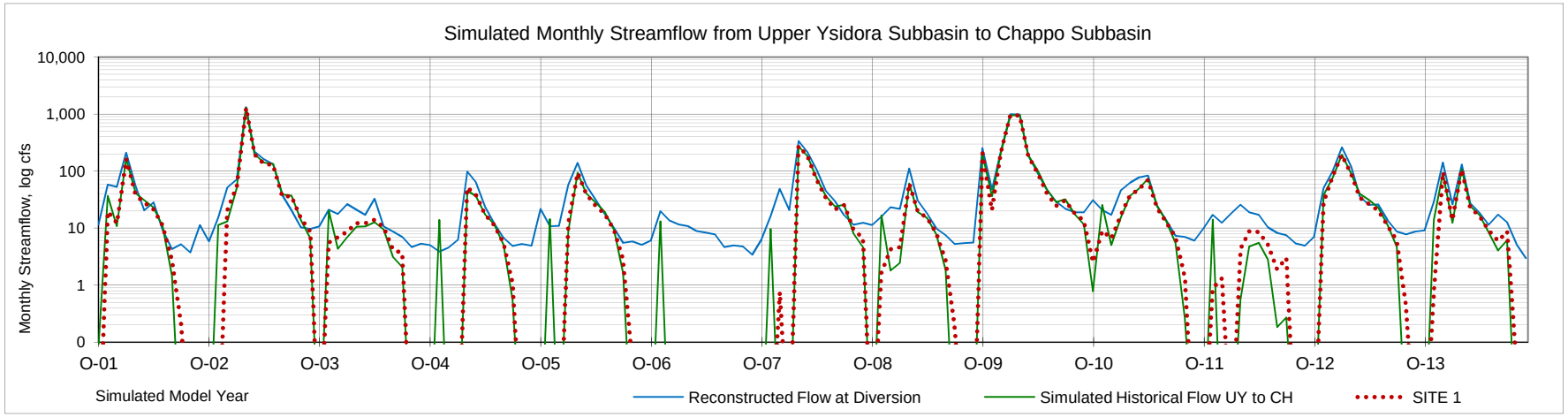
	INFLOW:					OUTFLOW:						(out-in)	(in-out)		
MY	Storage	Recharge	Stream Leakance	GHB	TOTAL GW IN	Storage	Wells	ET	Stream Leakance	GHB	TOTAL GW OUT	NET Storage	NET Str Lknc	In-Out	% bal
	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	AFY	
1	9,131	12,836	6,354	598	28,918	4,239	14,622	2,861	7,137	61	28,921	-4,892	-783	-2.7	-0.01%
2	5,322	18,436	11,028	588	35,375	8,465	14,143	2,983	9,722	64	35,377	3,143	1,306	-2.5	-0.01%
3	5,275	9,031	6,867	595	21,769	3,873	11,802	2,698	3,345	51	21,769	-1,402	3,522	-0.6	0.00%
4	6,021	6,924	6,947	607	20,498	6,220	9,121	2,655	2,459	47	20,501	199	4,488	-3.2	-0.02%
5	7,135	11,322	6,827	596	25,880	6,317	11,221	2,854	5,433	53	25,879	-818	1,394	1.3	0.01%
6	6,912	3,039	3,242	610	13,803	1,983	10,544	1,192	53	39	13,811	-4,929	3,189	-7.6	-0.05%
7	4,922	15,592	10,914	603	32,031	11,302	11,001	2,399	7,282	46	32,030	6,380	3,632	0.7	0.00%
8	5,937	8,306	6,304	599	21,146	4,502	10,843	2,540	3,216	49	21,150	-1,435	3,088	-4.2	-0.02%
9	6,134	23,825	9,006	580	39,544	8,666	11,561	3,525	15,723	65	39,540	2,532	-6,717	4.1	0.01%
10	7,045	14,929	7,025	590	29,589	4,855	13,802	3,039	7,837	55	29,589	-2,190	-813	-0.5	0.00%
11	5,764	6,120	4,743	602	17,229	3,524	10,843	1,568	1,260	39	17,234	-2,241	3,483	-4.8	-0.03%
12	7,140	15,319	9,194	595	32,248	9,318	11,221	2,743	8,919	48	32,250	2,179	275	-1.9	-0.01%
13	6,699	11,639	7,842	595	26,775	5,829	12,943	2,608	5,349	50	26,779	-870	2,493	-4.1	-0.02%
avg	6,418	12,101	7,407	597	26,523	6,084	11,820	2,590	5,980	51	26,525	-334	1,427	-2.0	-0.01%
med	6,134	11,639	6,947	596	26,775	5,829	11,221	2,698	5,433	50	26,779	-870	2,493	-2.5	-0.01%

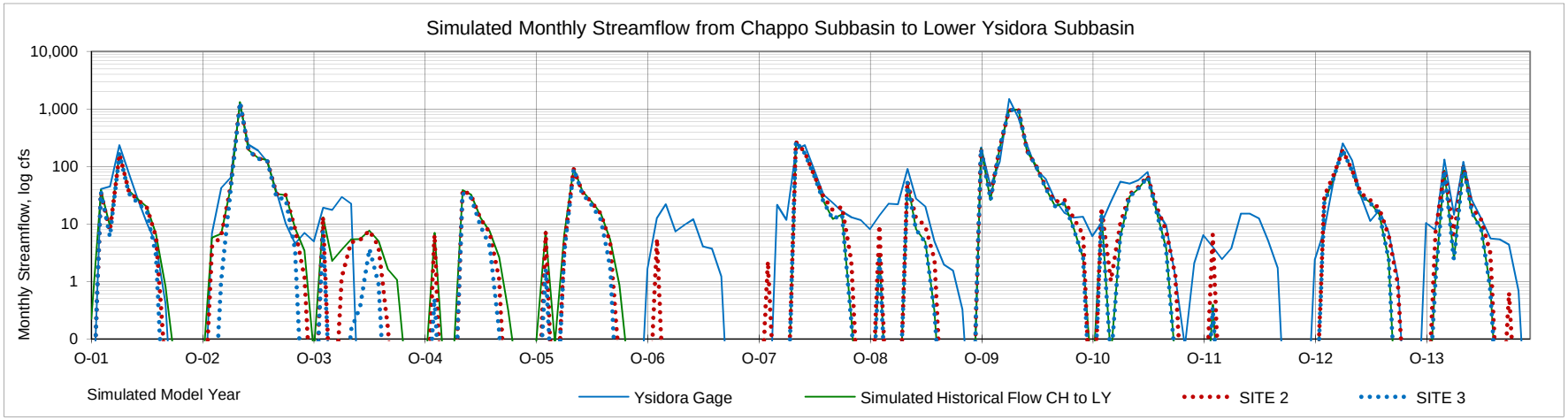
Lower Santa Margarita River Groundwater Model

Modflow Volumetric Budget Output

Groundwater Model

	INFLOW:					OUTFLOW:						OUT-IN	OUT-IN		
Avg AF/M	Storage	Recharge	Stream Leakance	GHB	TOTAL IN	Storage	Wells	ET	Stream Leakance	GHB	TOTAL OUT	NET Storage	NET Str Lknc	In-Out	% bal
Oct	583	293	388	52	1,317	261	901	138	13	4	1,317	-322	375	0.0	0.00%
Nov	60	971	1,320	50	2,401	1,363	818	108	107	4	2,401	1,304	1,213	0.1	0.00%
Dec	373	811	700	51	1,935	795	839	99	198	5	1,936	422	502	-0.8	-0.04%
Jan	197	1,598	634	50	2,480	1,006	880	115	472	6	2,479	808	163	0.9	0.03%
Feb	82	2,401	829	45	3,357	1,469	836	157	890	6	3,358	1,387	-60	-0.5	-0.02%
Mar	251	2,417	675	49	3,392	817	962	237	1,369	6	3,391	567	-693	0.7	0.02%
Apr	478	1,645	644	48	2,815	217	1,035	289	1,268	5	2,814	-261	-624	0.2	0.01%
May	774	1,091	572	50	2,486	91	1,134	341	918	4	2,488	-683	-346	-1.7	-0.07%
Jun	846	676	453	49	2,024	26	1,157	332	506	3	2,023	-821	-52	0.8	0.04%
Jul	1,046	173	454	51	1,724	16	1,185	317	202	3	1,724	-1,030	251	0.0	0.00%
Aug	976	20	360	52	1,407	10	1,099	266	32	2	1,408	-966	328	-1.2	-0.09%
Sep	752	6	376	50	1,185	13	974	190	5	3	1,185	-738	371	-0.4	-0.03%
Avg Monthly	535	1,008	617	50	2,210	507	985	216	498	4	2,210	-28	119	-0.2	-0.01%
Med Monthly	530	891	603	50	2,213	239	968	214	337	4	2,212	-292	207	0.0	0.00%
Avg Total=Anl	6,418	12,101	7,407	597	26,523	6,084	11,820	2,590	5,980	51	26,525	-334	1,427	-2.0	





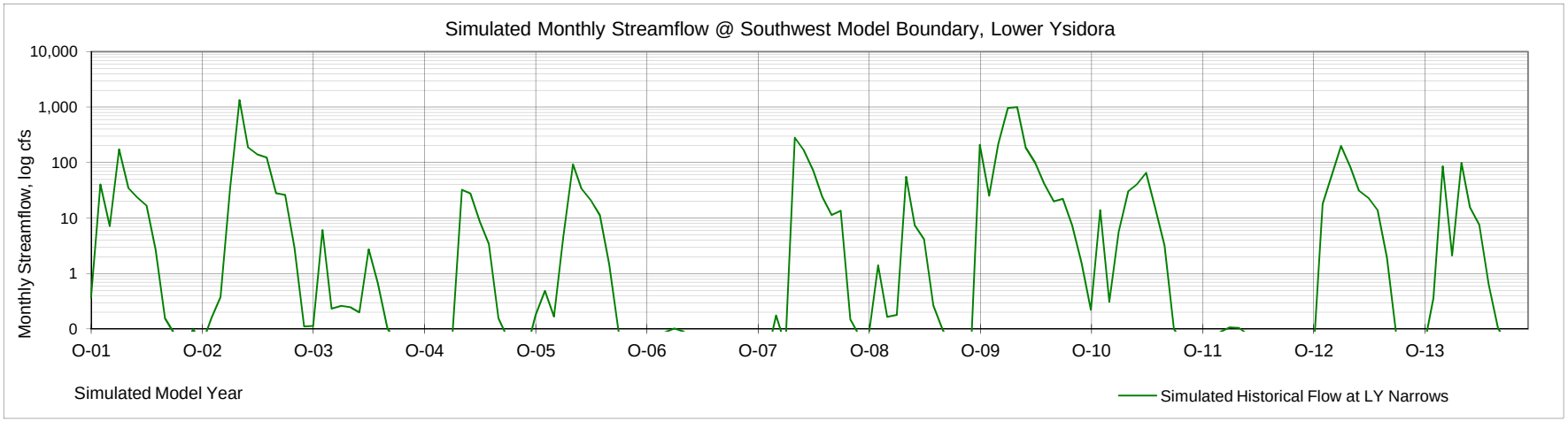


Figure C-3. Simulated Streamflow; MY 1-13 Future Project Flow