

Appendix A -
Selected GSP Information Summaries
By Hydrologic Region

Appendix A1 -
GSP Information Summaries for
Sacramento River Hydrologic Region

Table A-SV-1. Sacramento Valley Hydrologic Region GSP General Information

Name	Basin Status	Basin Priority	GSP Area (ac)	Plan Type	Approval Status	Author/Consultant	Model
Anderson	Not COD	Medium	98,705	Single	Approved	Jacobs	EAGSA model
Antelope	Not COD	High	19,091	Single	Incomplete	Luhdorff & Scalmanini	Numerical: Tehama IHM
Big Valley (127)	Not COD	Medium	24,227	Single	Approved	Luhdorff & Scalmanini, Stantec	Big Valley integrated Hydrologic Model (BVIHM); uses MODFLOW
Big Valley (95)	Not COD	Medium	92,057	Single	Incomplete	GEI, UCCE	Budget spreadsheet
Bowman	Not COD	Very Low	122,532	Single	In review	Luhdorff & Scalmanini	Numerical: Tehama IHM
Butte	Not COD	Medium	265,500	Single	Approved	Davids Engineering, Woodard & Curran, GEI	Butte Basin Groundwater Model, IWFM
Colusa	Not COD	High	723,823	Single	Incomplete	Davids Engineering, ERA, West Yost, Woodard & Curran, CSU Sacramento	C2VSimFG, Colusa IHM
Corning	Not COD	High	207,335	Single	Incomplete	Montgomery & Associates, Davids Engineering, CBI, Hydrolytics, Kearns & West, Westwater Research	C2VSimFG 1.0
Enterprise	Not COD	Medium	61,288	Single	Approved	Jacobs	EAGSA, built from numerical model REDFEM
Los Molinos	Not COD	Medium	99,414	Single	Incomplete	Luhdorff & Scalmanini	Tehama IHM; Integrated SW & GW, SVSim. IWFM-2015
North American	Not COD	High	342,540	Single	Approved	GEI	CoSANA - integrated model covering North American, South American and Cosumnes subbasins. IWFM 2015.
North Yuba	Not COD	Medium	60,837	Single	Approved	Woodard & Curran	Yuba Subbasin Groundwater Model, numerical gw and sw, IWFM, CalSim3, CVHM
Red Bluff	Not COD	Medium	271,794	Single	Incomplete	Luhdorff & Scalmanini	Tehama IHM - integrated gw and sw model, based on SVSim for Sac Valley
Sierra Valley	Not COD	Medium	117,760	Single	Approved	Larry Walker & Associates lead of large consultant team	Sierra Valley Hydrogeologic System Model developed by DS&A. Integrated model with 3 parts: Upper watershed model (PRMS); soil water budget model ad GW-SW model (MODFLOW). Note: different than model developed for Sierra Valley by UC Davis.
Name	Basin Status	Basin Priority	GSP Area	Plan Type	Approval Status	Author/Consultant	Model

Solano	Not COD	Medium	354,671	Single	Approved	Luhdorff & Scalmanini	Solano IHM, Integrated GW and SW, based on SVSim, refined locally
South American	Not COD	High	248,029	Single	Approved	Larry Walker & Associates, Woodard & Curran, Kennedy Jenks, Stockholm Environment Institute, HDR	CoSANA numerical model for Cosumnes, S. American and N. American basins, using IWFM
South Yuba	Not COD	High	109,020	Single	Single	Woodard & Curran	Yuba Subbasin Groundwater Model, numerical, IWFM, CalSim3, CVHM
Sutter	Not COD	Medium	285,803	Single	Approved	Woodard & Curran	C2VSimFG-Sutter
Vina	Not COD	High	184,917	Single	Approved	Geosyntec	Butte Basin Groundwater Model, IWFM
Wyandotte Creek	Not COD	Medium	59,382	Single	Approved	Geosyntec	Butte Basin Groundwater Model, IWFM
Yolo	Not COD	High	540,693	Single	Approved	GEI	MODFLOW, IWFM, finite element numerical model using original Integrated Groundwater Surface-Water Model (IGSM)

GSP = Groundwater Sustainability Plan

COD = Critically Overdrafted

Table A-SV-2. Sacramento Valley Hydrologic Region Demand Reduction and Supply Augmentation Strategies

GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Anderson	There is no managed recharge in the subbasin. Recharge from unlined canals is estimated at 44,000 AFY.	None	None	None	None	None
Antelope	None	None	Several types planned as PMAs: multi-benefit recharge; direct groundwater recharge of stormwater and floodwater; rain-MAR; stormwater management improvements; levee setback and stream channel restoration. No specific locations, area, or amount provided.	General description of possibility of using tertiary treated water but no specific projects described.	Curtail and/or restrict groundwater extractions through a land fallowing program. Would be considered if other planned PMAs are insufficient to maintain sustainability.	Only considered if other PMAs are insufficient to reach sus yield. Curtail and/or restrict groundwater extractions through a groundwater extraction allocation program.
Big Valley (127)	None	None for land application or urban use. Some recycled water used for geothermal power production.	None. Investigating recharge locations; Tier 2 PMA only considered after Tier 1 PMAs.	None. Plans to expand recycled water capacity for power production.	None	None
Big Valley (95)	None	None	Researching and considering FloodMar or AgMAR on alfalfa/pasture grass.	None	None	None
Bowman	None	None	Multi-benefit recharge included as PMA developed for implementation, based on TNC guidelines, but no specific details about location or amount is given and is dependent on rainfall.	None	None	None
GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Butte	None	None	Multi-benefit recharge possible PMA in early planning stages. Estimated 100 ac would participate	None. Included only as an as needed PMA.	None	None

			and benefit of 175 average annual AFY.			
Colusa	On-farm multi-benefit managed aquifer recharge and shorebird habitat program; Ongoing PMAs: Glenn-Colusa ID strategic winter water use for GW recharge and multiple benefits; Sycamore Marsh farm direct recharge project.	None	Colusa Subbasin multi-benefit GW recharge; Sycamore Slough GW recharge pilot projects.	None	None	None
Corning	None	None	California Olive Ranch GW Recharge Project (alternative project) - no estimate of benefit, feasibility analysis ongoing for use with 215 water; City of Corning Stormwater Recharge (conceptual); Recharge through unlined conveyance features (no estimate of expected benefit); groundwater recharge pond south of Corning (alternative project) - very small 2-4 AF; TNC multi-benefit recharge projects (alternative project); Thomes Creek flood water diversions to recharge (alternative project)	Recycled water use for crop irrigation (alternative project) - City of Corning permitted for 1.4M gpd effluent.	None	None

GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Los Molinos	None	None	Multi-benefit recharge programs - planned PMA - no specific description; possible use of Thomes Creek and Elder Creek Diversion for direct recharge.	None. Considered, but only conceptually.	None	None
Sierra Valley	None	None	GW recharge and MAR are Tier 2 PMAs, which are not prioritized.	Reuse is a Tier 1 management action that is ongoing. Considers	None	None

				reuse of treated WW from Loyalton WWTP and former Loyalton Mill/Co-gen plant for crop irrigation. Will evaluate if additional opportunities for reuse exist. No specific estimated benefits.		
Solano	None	None	Westside Streams Stormwater Capture Project (FloodMAR) - expect 1,200 ac with 2,100 AFY; Rain-MAR Demonstration Project with various suitable sites, sump and berm methods. All in Northwest Focus Area. Potential PMAs: City of Vacaville to investigated ASR. Various construction of private GW recharge basins, but not specified. Considering incentive-based recharge strategy for Flood MAR, Rain MAR and dedicated recharge basins.	Proposed City of Vacaville potable water offset of 2,830 AFY reused for landscape irrigation and industrial use.	None	None

GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
South American	City of Roseville uses ASR; pilot program that conveys American River water through Folsom South Canal and discharges to the Cosumnes River at the canal crossing - anticipated to enhance recharge.	The Sacramento Regional County Sanitation District is the only recycled water purveyor - distribution is negligible and not included in water budget.	Near-term planned project: Omochumne-Hartness WD GW Recharge Project - IRWM grant in 2011 to RWA, off-season irrigation, up to 4K AFY diverted from Cosumnes River to 1,168-ac areas between Cosumnes River and Deer Creek, in future up to 6K AFY planned to be diverted. Investigating opportunities for ASR, surface spreading and constructed recharge basins (could used abandoned aggregate mining pits north and south of Jackson Highway); recharge potential along Cosumnes River.	Near-term planned project: Harvest Water will provide disinfected tertiary-treated recycled water for ag uses, delivering up to 50K AFY to irrigate 16K ac of ag and habitat conservation lands near Cosumnes River and Stone Lakes Wildlife Refuge, operational by 2025. Expected to raise GW levels up to 35 ft. within 15 yrs; expected to increase GW storage	None	None

				<p>volume by 245K AF within 10 yrs and 450K in 40 yrs. Supplemental Project: SAFCA Flood-MAR, Sac. Area Flood Control Agency modifications to the outlet works of the three largest non-federal dams in the American River Basin to create reservoir storage space for flood control when extreme atmospheric rivers are forecasted to occur in the American River Basin. Will safely contain flood with a 1 in 500 annual prob. of occurrence.</p>		
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GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Sutter	None	None	Sutter Multi-benefit GW Recharge Project: planned and seeking grant funding; PMA to be implemented as needed: ASR.	None. PMA to be implemented as needed: Advanced treatment and water recycling.	None	None
Vina	None	None	FloodMAR, surface water supply and recharge (1,000 AFY/project), recharge from the Miocene Canal (2,000 AFY).	PMA expected benefit = 5,000 AFY.	Extend orchard replacement	None
Wyandotte Creek	None	None	FloodMAR. Conceptual PMA: ASR.	None	Conceptual PMA: extend orchard replacement	None
Yolo	ASR by City of Woodland; diverting Cache Creek into canal system,	City of Woodland WWTP - 0.5 MGD used as water source in model; City of Davis 33M GPY (to UCD)	Direct recharge and MAR planned - flood water and drain flows in Yolo Bypass, drain flows in Colusa Basin Drain, and over-application of irrigation Zamora area winter recharge from Cache Creek via China Slough (would need to rehabilitate China Slough); Hardwood Subdivision Recharge; Schaad Ranch/Buckeye Creek Recharge; new ASR well (City of	Woodland Recycled Water Utility Expansion Project Phases II and III; City of Davis Recycled Water Pump Station; City of Winters Recycled Water Utilization.	None	None

			Woodland); Madison Farmer Filed Stormwater Capture and GW Recharge; West Winters ASR; North of Winters 5,000-ac storm water retention pond; YCFC&WCD Winter Recharge; Rumsey and Guinda Ditch Winter Recharge; Dry well GW recharge on California Olive Ranch.			
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Table A-SV-3. Sacramento Valley Hydrologic Region Historical Water Budget Data Collection Summary

GSP Identifiers			Land and Surface Water Budget Components (AFY)					Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow (AFY)			
GSP ID	Name	Timeframe	Precipitation	Surface water supplies	Tail water return	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
83	Anderson	1999-2018	280,000	50,000	ND	73,000	160,000	111,000	247,000	128,000	309,000	156,000	23,000	0
134	Antelope	1990-2018	41,000	43,000	ND	ND	45,500	12,000	0	50,000	48,000	0	13,000	0
127	Big Valley	1988-2019	73,800	600	ND	ND	33,700	16,000	4,500	6,900	0	0	27,100	0
95	Big Valley ¹	1984-2018	137,300	75,800	5,000	ND	154,000	14,700	24,600	1	0	0	44,600	0
137	Bowman	1990-2018	290,000	81,000	ND	ND	174,700	52,600	43,000	0	0	88,000	9,100	0
98	Butte	2000-2018	501,000	1,926,800	21,600	ND	816,000	265,800	277,200	103,100	218,500	295,200	142,200	0
92	Colusa	1990-2015	1,210,000	11,747,000	96,000	ND	1,740,000	441,000	345,000	200,000	366,000	146,000	502,000	0
94	Corning	1974-2015	391,800	79,000	ND	214,900	328,600	161,200	51,100	99,800	84,200	84,800	135,900	0
82	Enterprise	1999-2018	199,000	42,000	0	28,000	97,000	70,000	161,000	84,000	265,000	30,000	21,000	0
139	Los Molinos	1990-2018	210,000	630,000	ND	ND	175,000	53,600	33,000	0	0	56,000	33,200	0
100	North American	2009-2018	551,000	307,800	ND	ND	791,900	177,500	151,000	54,600	44,400	10,500	296,400	0
53	North Yuba	1997-2017	112,200	183,500	26,000	241,100	178,600	36,200	36,500	31,100	28,800	17,800	57,600	0
140	Red Bluff	1990-2018	580,000	120,000	ND	ND	421,370	70,000	0	49,000	39,000	0	89,700	0
125	Sierra Valley	2001-2015	170,400	25,000	ND	33,900	21,800	16,100	7,400	3,700	21,800	0	9,100	0
117	Solano	1991-2017	580,000	28,000,000	7,900	ND	797,000	210,000	14,000	0	0	35,000	180,000	0
111	South American	2009-2018	399,000	131,700	500	ND	293,300	119,400	117,440	38,500	18,100	42,300	207,400	0
52	South Yuba	1997-2017	188,900	196,700	24,100	300,900	229,000	65,100	89,800	13,000	9,800	47,000	104,200	0
112	Sutter	1996-2015	455,000	572,000	ND	ND	604,000	189,000	179,000	88,000	224,000	100,000	139,000	0
86	Vina	2000-2018	400,900	493,800	2,600	ND	362,900	192,700	24,000	137,400	59,800	70,400	243,500	0
99	Wyandotte Creek	2000-2018	130,800	1,066,800	100	ND	87,100	70,700	34,000	24,900	36,300	26,000	47,100	0
96	Yolo	1971-2018	1,147,000	600,000	10,000	904,000	1,227,000	353,000	48,000	0	0	28,000	346,000	28,000

Notes: ND = No data. Groundwater recharge by surface water includes recharge from conveyance systems.

¹The value of 1 for recharge by the subsurface was provided in the GSP.

Table A-SV-3. Sacramento Valley Hydrologic Region Historical Water Budget Data Collection Summary

GSP Identifiers			Land and Surface Water Budget Components (AFY)					Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow (AFY)			
GSP ID	Name	Timeframe	Precipitation	Surface water supplies	Tail water return	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
83	Anderson	1999-2018	280,000	50,000	ND	73,000	160,000	111,000	247,000	128,000	309,000	156,000	23,000	0
134	Antelope	1990-2018	41,000	43,000	ND	ND	45,500	12,000	0	50,000	48,000	0	13,000	0
127	Big Valley	1988-2019	73,800	600	ND	ND	33,700	16,000	4,500	6,900	0	0	27,100	0
95	Big Valley ¹	1984-2018	137,300	75,800	5,000	ND	154,000	14,700	24,600	1	0	0	44,600	0
137	Bowman	1990-2018	290,000	81,000	ND	ND	174,700	52,600	43,000	0	0	88,000	9,100	0
98	Butte	2000-2018	501,000	1,926,800	21,600	ND	816,000	265,800	277,200	103,100	218,500	295,200	142,200	0
92	Colusa	1990-2015	1,210,000	11,747,000	96,000	ND	1,740,000	441,000	345,000	200,000	366,000	146,000	502,000	0
94	Corning	1974-2015	391,800	79,000	ND	214,900	328,600	161,200	51,100	99,800	84,200	84,800	135,900	0
82	Enterprise	1999-2018	199,000	42,000	0	28,000	97,000	70,000	161,000	84,000	265,000	30,000	21,000	0
139	Los Molinos	1990-2018	210,000	630,000	ND	ND	175,000	53,600	33,000	0	0	56,000	33,200	0
100	North American	2009-2018	551,000	307,800	ND	ND	791,900	177,500	151,000	54,600	44,400	10,500	296,400	0
53	North Yuba	1997-2017	112,200	183,500	26,000	241,100	178,600	36,200	36,500	31,100	28,800	17,800	57,600	0
140	Red Bluff	1990-2018	580,000	120,000	ND	ND	421,370	70,000	0	49,000	39,000	0	89,700	0
125	Sierra Valley	2001-2015	170,400	25,000	ND	33,900	21,800	16,100	7,400	3,700	21,800	0	9,100	0
117	Solano	1991-2017	580,000	28,000,000	7,900	ND	797,000	210,000	14,000	0	0	35,000	180,000	0
111	South American	2009-2018	399,000	131,700	500	ND	293,300	119,400	117,440	38,500	18,100	42,300	207,400	0
52	South Yuba	1997-2017	188,900	196,700	24,100	300,900	229,000	65,100	89,800	13,000	9,800	47,000	104,200	0
112	Sutter	1996-2015	455,000	572,000	ND	ND	604,000	189,000	179,000	88,000	224,000	100,000	139,000	0
86	Vina	2000-2018	400,900	493,800	2,600	ND	362,900	192,700	24,000	137,400	59,800	70,400	243,500	0
99	Wyandotte Creek	2000-2018	130,800	1,066,800	100	ND	87,100	70,700	34,000	24,900	36,300	26,000	47,100	0
96	Yolo	1971-2018	1,147,000	600,000	10,000	904,000	1,227,000	353,000	48,000	0	0	28,000	346,000	28,000

Notes: ND = No data. Groundwater recharge by surface water includes recharge from conveyance systems.

¹The value of 1 for recharge by the subsurface was provided in the GSP.

Table A-SV-4. Sacramento Valley Hydrologic Region Current Water Budget Data Collection Summary

GSP Identifiers			Land and Surface Water Budget Components (AFY)				Groundwater Recharge/Inflow (AFY)				Groundwater Discharge/Outflow (AFY)			
GSP ID	Name	Timeframe	Precipitation	Surface water supplies	Tail water return	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
83	Anderson	2015-2018	321,000	50,000	ND	72,000	163,000	131,000	252,000	130,000	319,000	155,000	24,000	0
134	Antelope	2016-2018	42,000	43,000	ND	ND	47,790	11,000	0	37,000	38,000	0	17,000	0
127	Big Valley	2014-2019	75,700	400	ND	ND	32,100	15,300	5,100	6,600	0	0	28,600	0
95	Big Valley ¹	2019-2069	137,300	75,800	5,000	ND	154,000	14,700	24,600	1 ²	0	0	44,600	0
137	Bowman	2016-2018	300,000	82,000	ND	ND	194,700	51,000	46,000	0	0	84,000	8,900	0
98	Butte	2015-2016	525,900	1,926,500	17,400	ND	822,700	268,000	355,400	110,700	154,800	417,700	162,800	0
92	Colusa	2013/2015	1,183,000	12,556,000	93,000	ND	1,790,000	416,000	379,000	203,000	349,000	149,000	499,000	0
94	Corning	2015/2018	389,500	46,200	ND	204,000	302,100	139,300	57,900	103,600	57,900	76,200	157,900	0
82	Enterprise	2015-2018	235,000	32,000	0	26,000	97,000	87,000	161,000	85,000	275,000	29,000	21,000	0
139	Los Molinos	2016-2018	230,000	820,000	ND	ND	170,200	51,000	64,000	0	0	71,000	27,800	0
100	North American	1970-2019	590,800	306,600	ND	ND	825,100	183,500	151,400	49,900	53,000	13,700	303,400	0
53	North Yuba	1997-2017	112,200	185,800	25,700	241,200	176,500	33,400	36,900	31,200	27,700	17,500	55,400	0
140	Red Bluff	2022-2072	590,000	120,000	ND	ND	441,660	65,000	0	58,000	21,000	0	98,700	0
125	Sierra Valley	2016-2020	257,500	30,300	ND	38,200	31,000	29,600	10,800	3,700	31,000	0	8,400	0
117	Solano	2014-2017	520,000	25,000,000	7,500	ND	796,000	160,000	69,000	0	0	55,000	170,000	0
111	South American ¹	1970-2019	411,100	138,700	600	ND	289,400	121,100	113,730	40,200	22,200	37,600	212,800	0
52	South Yuba ¹	1997-2017x3	188,900	213,200	25,700	307,600	227,300	61,700	88,700	11,900	10,100	48,700	94,400	0
112	Sutter	2013	417,000	629,000	ND	ND	627,000	203,000	166,000	83,000	212,000	104,000	155,000	0
86	Vina	2015-2016	421,700	533,300	1,900	ND	348,300	191,800	27,700	143,200	78,500	76,200	209,200	0
99	Wyandotte Creek	2015-2016	136,100	923,300	100	ND	82,500	69,600	37,400	22,500	32,000	26,700	43,100	0
96	Yolo	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes: ND = No data. Groundwater recharge from surface water includes recharge from conveyance systems.

¹Current and projected conditions used same timeframe/baseline hydrology.

²This value has been verified and is provided in the GSP.

Table A-SV-5. Sacramento Valley Hydrologic Region Projected Baseline Water Budget Data Collection Summary

GSP Information		Water Budget Scenario		Land and Surface Water Budget (AFY)					Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow			
ID	Name	Conditions	Timeframe	Precipitation	Surface water inflow	Tail water return	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
83	Anderson		2019-2071	276,000	46,000	ND	65,000	137,000	119,000	242,000	127,000	308,000	155,000	27,000	0
134	Antelope	Current land use	2022-2072	43,000	43,000	ND	ND	47,200	11,000	0	42,000	38,000	0	16,000	0
134	Antelope	Future land use	2022-2072	43,000	43,000	ND	ND	46,820	11,000	0	33,000	28,000	0	15,000	0
127	Big Valley		2020-2070	73,900	700	ND	ND	34,300	15,700	4,800	7,700	0	0	28,500	0
95	Big Valley		2019-2069	143,700	77,048	5,072	ND	156,900	14,980	27,476	1	0	0	45,162	0
137	Bowman	Current land use	2022-2072	300,000	83,000	ND	ND	173,800	53,000	47,000	0	0	91,000	9,300	0
137	Bowman	Future land use	2022-2072	300,000	83,000	ND	ND	174,650	53,000	48,000	0	0	92,000	9,500	0
98	Butte		2022-2072	525,900	1,931,200,	18,300	ND	822,100	268,000	356,300	105,400	152,700	415,700	162,600	0
92	Colusa		2016-2065	1,183,000	12,556,000	93,000	ND	1,790,000	415,000	379,000	203,000	349,000	149,000	499,000	0
94	Corning		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
82	Enterprise		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
139	Los Molinos	Current land use	2022-2072	220,000	650,000	ND	ND	170,500	51,800	55,300	0	0	86,000	28,300	0
139	Los Molinos	Future land use	2022-2072	220,000	650,000	ND	ND	170,300	51,000	59,000	0	0	89,000	27,000	0
100	North American		50 yrs	590,800	370,100	ND	ND	872,300	167,500	172,800	53,600	46,300	16,800	325,200	0
53	North Yuba		50 yrs	112,200	184,800	25,200	239,600	175,900	32,900	36,900	31,200	28,100	17,800	54,800	0
140	Red Bluff	Current land use	2022-2072	600,000	120,000	ND	ND	447,210	67,000	0	53,000	21,000	0	100,200	0
140	Red Bluff	Future land use	2022-2072	600,000	120,000	ND	ND	475,770	68,000	0	74,000	9,300	0	134,800	0
125	Sierra Valley		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
117	Solano	Current land use	2022-2072	570,000	29,000,000	7,500	ND	795,000	210,000	27,000	0	0	74,000	170,000	0
117	Solano	Future land use	2022-2072	570,000	29,000,000	7,500	ND	795,000	210,000	32,000	0	0	69,000	170,000	0
111	South American		50 yrs	411,100	212,100	600	ND	322,700	122,200	125,930	44,900	20,100	39,000	234,200	0
52	South Yuba		1997-2017x3	188,900	210,100	29,800	308,000	223,000	60,300	89,700	12,800	9,700	48,100	97,900	0
112	Sutter		1996-2015x3	454,000	579,000	ND	ND	645,000	179,000	162,000	145,000	268,000	79,000	138,000	0
86	Vina		2022-2072	421,700	532,000	1,900	ND	347,300	189,300	27,800	142,800	74,000	72,000	215,800	0
99	Wyandotte Creek		2022-2072	136,100	923,400	100	ND	81,500	67,300	37,700	22,500	29,500	25,600	45,000	0
96	Yolo		2030s-2070s	1,147,000	618,000	10,000	888,000	1,274,000	308,000	62,000	0	0	40,000	320,000	16,000

Notes: ND=no data. Groundwater recharge from surface water includes recharge from conveyance systems.

Table A-SV-6. Sacramento Valley Hydrologic Region Projected 2030 with Climate Change Water Budget Data Collection Summary

GSP Information		Water Budget Scenario		Land and Surface Water Budget (AFY)				Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow (AFY)				
ID	Name	Conditions	Timeframe	Precipitation	Surface water inflow	Tail water return	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
134	Antelope	Current land use	2022-2073	44,720	44,720	ND	ND	49,088	12,000	0	31,000	38,000	0	17,000	0
134	Antelope	Future land use	2022-2072	44,720	44,720	ND	ND	48,693	11,000	0	31,000	27,000	0	16,000	0
127	Big Valley	Wetter and warmer ¹	2020-2070	94,400	700	ND	ND	36,200	19,400	1,400	9,200	0	0	30,100	0
137	Bowman	Current land use	2022-2072	320,000	92,000	ND	ND	180,000	51,000	48,000	0	10,000	89,000	9,800	0
98	Butte		2022-2072	546,900	1,931,900	17,600	ND	836,500	269,700	361,000	105,700	137,200	411,300	189,400	0
92	Colusa		2016-2065	1,198,000	12,597,000	92,000	ND	1,841,000	415,000	387,000	205,000	337,000	148,000	525,000	0
94	Corning		2020-2070	400,000	46,200	ND	210,300	310,700	141,600	60,900	104,800	65,500	76,900	164,200	0
139	Los Molinos	Current land use	2022-2072	220,000	650,000	ND	ND	170,000	52,000	62,000	0	0	87,000	29,000	0
139	Los Molinos	Future land use	2022-2072	230,000	710,000	ND	ND	180,000	51,000	66,000	0	0	91,000	28,000	0
53	North Yuba		50 yrs	117,800	192,100	25,200	247,800	182,500	33,300	37,200	31,300	28,400	17,500	55,700	0
140	Red Bluff	Current land use	2022-2072	600,000	120,000	ND	ND	0	67,000	0	54,000	18,000	0	105,200	0
140	Red Bluff	Future land use	2022-2072	640,000	140,000	ND	ND	0	68,000	0	77,000	6,000	0	144,600	0
125	Sierra Valley		2021-2070	207,900	30,600	ND	40,100	27,900	26,200	7,200	3,700	27,900	0	9,500	0
125	Sierra Valley	Drier and extreme warming ¹	2021-2070	217,700	29,800	ND	41,000	25,500	25,200	7,000	3,700	25,500	0	11,100	0
117	Solano	Current land use	2022-2072	610,000	29,000,000	7,500	ND	815,000	210,000	38,000	0	0	72,000	170,000	0
117	Solano	Future land use	2022-2072	610,000	29,000,000	7,500	ND	825,000	200,000	42,000	0	0	67,000	180,000	0
52	South Yuba		1997-2017x3	198,300	221,600	30,000	320,600	230,300	60,900	90,800	12,800	9,900	48,400	99,000	0
86	Vina		2022-2072	438,200	553,100	1,700	ND	358,200	194,500	27,800	144,600	72,000	70,700	225,900	0
99	Wyandotte Creek		2022-2072	141,500	985,800	100	ND	84,100	69,900	38,500	22,100	28,500	27,600	46,600	0
96	Yolo		2030s-2070s	1,201,000	635,000	11,000	922,000	1,314,000	321,000	62,000	0	0	37,000	337,000	15,000
96	Yolo	Drier and extreme warming ¹	2030s-2070s	1,530,000	657,000	11,000	931,000	1,326,000	424,000	43,000	0	29,000	79,000	325,000	24,000

Notes: ND=no data; Groundwater recharge from surface water includes recharge from conveyance systems.
Anderson, Big Valley (95), Enterprise, North American, South American, and Sutter GSPs did not include this scenario.
¹ Alternative condition to 2030 central tendency.

Table A-SV-7. Sacramento Valley Hydrologic Region Projected 2070 with Climate Change Baseline Water Budget Data Collection Summary

GSP Information		Water Budget Scenario		Land and Surface Water Budget (AFY)					Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow			
ID	Name	Conditions	Timeframe	Precipitation	Surface water inflow	Tail water return	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
134	Antelope	Current land use	2022-2072	46,870	46,870	ND	ND	51,448	11,000	0	29,000	34,000	0	18,000	0
134	Antelope	Future land use	2022-2072	46,870	46,870	ND	ND	51,034	11,000	0	29,000	22,000	0	18,000	0
127	Big Valley	Warmer and drier ¹	2020-2070	75,100	700	ND	ND	35,500	16,100	5,200	7,700	0	0	29,300	0
95	Big Valley		2019-2069	152,800	81,239	5,335	ND	165,800	15,802	30,515	1	0	0	47,500	0
137	Bowman		2022-2072	320,000	92,000	ND	ND	180,000	51,000	49,000	0	0	90,000	9,900	0
98	Butte		2022-2072	561,300	1,922,200	17,400	ND	862,800	269,600	363,200	104,200	123,500	405,000	210,500	0
92	Colusa		2016-2065	1,258,000	12,715,000	90,000	ND	1,901,000	411,000	401,000	209,000	323,000	147,000	559,000	0
94	Corning		2020-2070	413,700	46,300	ND	218,400	319,800	140,300	66,100	2,100	61,500	78,700	172,200	0
139	Los Molinos	Current land use	2022-2072	230,000	710,000	ND	ND	180,000	50,000	67,000	0	0	88,000	31,000	0
139	Los Molinos	Future land use	2022-2072	230,000	710,000	ND	ND	180,000	49,000	70,000	0	0	92,000	30,000	0
140	Red Bluff		2022-2072	600,000	120,000	ND	ND	ND	64,000	0	56,000	12,000	0	115,500	0
125	Sierra Valley		2021-2070	216,600	30,300	ND	40,400	28,300	27,500	5,900	3,700	28,300	0	10,000	0
125	Sierra Valley	Wetter moderate warming ¹	2021-2070	260,500	29,900	ND	38,700	35,700	36,100	4,700	3,700	35,700	0	8,800	0
117	Solano	Current land use	2022-2072	650,000	34,000,000	7,500	ND	846,000	200,000	51,000	0	0	68,000	180,000	0
117	Solano	Future land use	2022-2072	650,000	34,000,000	7,500	ND	856,000	190,000	55,000	0	0	62,000	190,000	0
112	Sutter		1996-2015x3	480,000	578,000	ND	ND	690,000	174,000	174,000	152,000	263,000	79,000	157,000	0
86	Vina		2022-2072	453,100	565,900	1,600	ND	371,400	196,800	27,400	145,500	66,600	67,800	238,000	0
99	Wyandotte Creek		2022-2072	144,900	1,035,600	100	ND	86,500	70,700	39,300	22,200	26,600	29,900	48,700	0
96	Yolo		2030s-2070s	1,259,000	655,000	11,000	962,000	1,345,000	340,000	62,000	0	0	35,000	358,000	15,000
96	Yolo	Wetter moderate warming ¹	2030s-2070s	1,530,000	657,000	11,000	931,000	1,326,000	424,000	43,000	0	29,000	79,000	325,000	24,000

Notes: ND=no data. ¹Alternative scenario to 2070 central tendency.

Anderson, Enterprise, North Yuba, South American and South Yuba did not model this scenario.

¹ This value has been verified and was provided in the GSP.

Appendix A2 -
GSP Information Summaries for
San Joaquin River Hydrologic Region

Table A-SJR-1. San Joaquin River Hydrologic Region GSP General Information

Name	Basin Status	Basin Priority	GSP Area (ac)	Plan Type	Approval Status	Author/Consultant	Model
Chowchilla	COD	High	145,569	Single	Inadequate	Davids Engineering, (Revised GSP), Luhdorff & Scalmanini (Revised GSP), ERA Economics, Stillwater Sciences, and California State University, Sacramento	Numerical, Integrated GW Flow Model MCSim based on C2VSim-FG.
Cosumnes	Not COD	Medium	210,300	Single	Approved	EKI	Numerical model for GW flow
Delta Mendota -Aliso	COD	High	26,580	Multi-plan	Inadequate	Provost & Pritchard	CVHM2
Delta Mendota - Farmers	COD	High	2,211	Multi-plan	Inadequate	Luhdorff & Scalmanini	Numerical, MODFLOW-NWT
Delta Mendota - Fresno County	COD	High	22,178	Multi-plan	Inadequate	Luhdorff & Scalmanini	Numerical, MODFLOW-NWT
Delta Mendota - Grassland	COD	High	104,212	Multi-plan	Inadequate	Provost & Pritchard	Numerical, MODFLOW-NWT
Delta Mendota - North Central	COD	High	315,887	Multi-plan	Inadequate	Woodard & Curran, Provost & Pritchard	Central Valley Hydrologic Model 2 (CVHM2). Numerical flow model using MODFLOW-NWT
Delta Mendota -San Joaquin River Exchange Contractors	COD	High	292,921	Multi-plan	Inadequate	Luhdorff & Scalmanini	Numerical, MODFLOW-NWT
East Contra Costa	Not COD	Medium	107,479	Multi-plan	Approved	Luhdorff & Scalmanini	Numerical groundwater flow model. East Contra Costa Groundwater-Surface Water Simulation Model (ECCSim).
Eastern San Joaquin	COD	High	764,798	Single	Approved	Woodard & Curran	ESJWRM. Eastern San Joaquin Water Resources Model
Madera – Gravelly Ford Water District	COD	High	8,459	Multi-plan	Approved	QK Engineering	Analytical water balance; overdraft calculated using specific yield and long-term average water level change over hydrologic base period.
Madera – Joint	COD	High	325,067	Multi-plan	Approved	Luhdorff & Scalmanini	MCSim based on C2VSim

Name	Basin Status	Basin Priority	GSP Area	Plan Type	Approval Status	Author/Consultant	Model
Madera – New Stone	COD	High	4,181	Multi-plan	Approved	Luhdorff & Scalmanini, Davids Engineering	Basin-wide numerical model
Madera – Root Creek Water District	COD	High	9,631	Multi-plan	Approved	Luhdorff & Scalmanini, Davids Engineering	Basin-wide numerical model. GSA-specific model. Some use of analytical model as well.

Merced	COD	High	512,532	Single	Approved	Woodard & Curran	Numerical integrated model, IWFM. Merced WRM (Water Resources Model)
Modesto	Not COD	High	245,250	Single	Incomplete	Todd Groundwater, Woodard & Curran	Numerical model adapted from C2VSimFG
Tracy	Not COD	Medium	238,388	Single	Approved	GEI	C2VSim-FG_v1.0
Turlock	Not COD	High	348,187	Single	Incomplete	Todd Groundwater, Woodard & Curran	C2VSim-Turlock/Modesto

GSP = Groundwater Sustainability Plan

COD = Critically Overdrafted

Table A-SJR-2. San Joaquin River Hydrologic Region Demand Reduction and Supply Augmentation Strategies

GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery (ASR)	Recycled Water	Fallowing	Pumping Restrictions
Chowchilla	2 existing, 3,800 AF recharge in 2019. Recharge Basin (1,359 AFY).	None	Flood-MAR (5,836 AFY), Additional 1,000 ac of Recharge Basins (10,803 AFY), Madera County East Recharge (3,015 AFY), Madera County West Recharge Basins (27,953 AFY), SVMWC Recharge Basin (4,344 AFY), Eastside Bypass Flood Water / Redtop Joint Banking (TTWD Recharge Basins) (24,657 AFY). Total estimated benefit = 74,952 AFY.	None	Voluntary	County of Madera GSA: demand management program that will reduce demand by placing restriction on groundwater pumping. Total estimated benefit = 27,550 AFY.
Cosumnes	None	Harvest Water Program by Sacramento County Regional Sanitation District (now Sacramento Area Sewer District) recycled water project that will use 50,000 AFY for irrigating ag.	Omochumne-Hartnell WD (OHWD) Agricultural flood managed aquifer recharge (Flood-MAR). Cosumnes Groundwater Authority groundwater banking and sale, no estimate of benefit.	City of Galt recycled water project. Expected benefit of 300 AFY.	Voluntary (assuming 750 ac). Phase 1 benefit estimated at 2,700 AFY and Phase 2 benefit estimated at 6,300 AFY (full implementation).	None
Delta Mendota - Aliso	230 ac of existing recharge basins (6,500 AFY) Chowchilla Bypass recharge facility, 80-ac, diverts 10,000 AF per wet year.	None	Cottonwood Creek Recharge Facility (2,500-10,000 AFY), Aliso Lateral as Linear Recharge Ponds, Recharge in Bypass, Recharge Water Outside of District, Groundwater Injection Wells, recharge amounts not provided.	None	Voluntary, unspecified benefit.	None. The (groundwater extraction) fee schedule would not be implemented provided that the district is able to achieve sustainability by other means.
Delta Mendota - Farmers	None	None	None	None	none	None. Pumping reduction plan has not been formally developed.
Delta Mendota - Fresno County	None	None	None	None	None	None
Delta Mendota - Grassland	North Grassland Water Conservation and Water Quality Control Project (NGWCWQCP). Floodwater Capture, recharge	North Valley Regional Recycled Water Program (NVRWWP). In 2018, the City of Modesto delivered about 14,700 acre-feet of recycled water through the Project facilities.	Flood Water Capture as future consideration; no estimate of benefit provided.	North Valley Regional Recycled Water Program for wetlands; 11,800 AFY.	None	None

	amount not provided					
Delta Mendota - North Central	Orestimba Creek Recharge and Recovery Project (7,500 af/yr)	North Valley Regional Recycled Water Program (NVRWP) – Modesto and Early Turlock Years. West Stanislaus Irrigation District Lateral 4-North Recapture and Recirculation Reservoir.	Little Salado Creek Groundwater Recharge and Flood Control Basin. Ortigalita Creek Groundwater Recharge and Recovery Project. Los Banos Creek Recharge and Recovery Project (200 AFY), City of Patterson Percolation Ponds for Stormwater Capture and Recharge (1,700 AFY), Little Salado Creek Groundwater Recharge and Flood Control Basin (489 AFY), Patterson Irrigation District Groundwater Bank and/or Flood-MAR (3,000 AFY), Ortigalita Creek Groundwater Recharge and Recovery Project (3,000 AFY). Total estimated benefit = 15,689 AFY.	Kaljia Drainwater Reuse Project (500 AFY). North Valley Regional Recycled Water Program for ag (30,000 AFY). Total estimated benefit = 30,500 AFY.	None	Revision to Tranquillity Irrigation District Lower Aquifer Pumping; lower aquifer pumping limits for minimizing subsidence.
Delta Mendota - San Joaquin River Exchange Contractors	Los Banos Creek Recharge and Recovery, Orestimba Creek Recharge and Recovery.	None	Los Banos Creek Recharge and Recovery Expansion (4,500 AFY), Orestimba Creek Recharge and Recovery Expansion (7,500 AFY), BB Limited Recharge and Recovery (1,500 AFY), Farmers Water District Recharge and Recovery (6,500 AFY). Total estimated benefit = 27,500 AFY.	None	None	Private well pumping for credits.
East Contra Costa	None	Ironhouse SD - 4,800 AFY; half for habitat and half released to SJV. Delta Diablo District - 9,000 AFY for cooling two power plants, and 50 AFY for City of Antioch. Recycled water supplies range 50 AFY to 500 AFY (less than 1 percent of total supply) from 2010 to 2019.	None	Diablo Water District Recycled Water up to 2,800 AFY; City of Brentwood up to 1,661 AFY more used citywide.	Potential PMA	None. Demand management program is considered "backstop" to other PMAs. At conceptual planning stage. Potentially includes allocation, allocation plus water market, land repurposing, and/or other financial incentives.
Eastern San Joaquin	Tracy Lake recharge project, Cal-Fed/Costa recharge project and Farmington recharge program.	NSJWCD Winery Recycled Water, 750 AFY. Recycled Water Transfer to Agriculture 5,193 AFY. SSJID Storm Water Reuse. 1,100 AFY. City of Escalon Wastewater Reuse 672 AFY.	Two planned projects are in-lieu. Potential, Not Planned: BNSF Railway Company Intermodal Facility Recharge Pond AF 1,000. South System Groundwater Banking with EBMUD AF 4,000. NSJWCD North System Modernization/ Lakso Recharge AF	None. Potential: White Slough Water Pollution Control facility expansion (115 AFY); recycled water transfer to ag from City of Manteca (5,193 AFY).	None	None

			2,600. Project 13: Manaserro Recharge Project AF 8,000. Tecklenburg Recharge Project AF 8,000. Total estimated benefit = 47,000 AFY. Mobilizing recharge opportunities - no estimated benefit.			
Madera – Gravelly Ford Water District	None	None	GFWD will develop recharge basins. Water will be diverted from Cottonwood Creek into basins where it will percolate into the deep aquifer. The size, location, and performance of the recharge basins depends on site-specific characteristics that are currently being assessed by GFWD. Possible 2,620 AFY.	None	None	None
Madera – Joint	Madera Irrigation District Recharge Basin Rehabilitation (5,029 AFY), Ellis Recharge Basin (243 AFY), Berry Recharge Basin (24 AFY), Allende Recharge Basin (1,045 AFY).	From dairies; no details	Madera Irrigation District Additional Recharge Basins (5,474 AFY by 2023; 21,894 AFY by 2040), Flood-MAR (1,686 AFY), Madera County Recharge of Millerton Flood Releases (7,059 AFY), Madera County Chowchilla Bypass Flood Water Recharge Basins (26,500 AFY). Total estimated benefit = 87,170 AFY.	None	Potential, voluntary or mandatory; incentivized through easement programs.	Demand management program may include allocations, water trading program, and easements to fund fallowing. Overall expected to decrease GW pumping by 90,000 AFY.
Madera – New Stone	None. Overdraft is minimal so recharge efforts assumed to offset.	None	In-lieu only, Chowchilla Bypass	None	Potential	None
Madera – Root Creek Water District	None	None	None (possible in-lieu only using holding contract).	None	None	None
Merced	Merced ID confirmed to have 2 intentional recharge facilities within GSP (near El Nido and Winton), but GSP does not document.	None	Planned Planada Groundwater Recharge Basin Pilot Project, Merquin County Water District Recharge Basin (no recharge estimates for either), LeGrand-Althone Water District Intertie and Recharge Project. No estimate of benefit.	None	None	None
Modesto	None	None	In-lieu - Waterford/Hickman Surface Water Pump Station and Storage Tank).	None	Voluntary Conservation and/or Land Fallowing	Groundwater Extraction and Surface Water Reporting Program.

Tracy	None	City of Tracy ASR (3,000 AFY)	None (ASR - potential project for City of Tracy (3,000-16,000 AFY)).	None	None	No restrictions, but pumping planned to be reduced by 1,000 AFY from expanded BCID distribution facilities.
Turlock	None.	None	None. Several potentials noted: Dianne Storm Basin (22.5 AFY), Stanislaus State Stormwater Recharge (460 AFY), TID On-Farm Recharge Project (4,000 AFY), Agricultural Recharge Project (5,000 AFY), Mustang Creek Flood Control Recharge Project (600 AFY), Upland Pipeline Project (1,770 AFY). San Joaquin River Flood Diversions, La Grange Recharge Project, Additional TID Regulating Reservoirs, Recharge from TID Conveyance System, Rouse Lake Pipeline Project, Sand Creek Watershed Runoff Recharge, Diffused Stormwater Project, Dry Creek Watershed Recharge, Direct Recharge in Agricultural Areas.	None	Voluntary	Groundwater Allocation and Pumping Management Program. Groundwater Extraction Fee. Groundwater Pumping Credit Market and Trading Program.

Table A-SJR-3. San Joaquin River Hydrologic Region Historical Water Budget Data Collection Summary

GSP Identifiers			Land and Surface Water Budget Components (AFY)				Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow (AFY)			
GSP ID	Name	Timeframe	Precipitation	Surface water supplies	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
7	Chowchilla	2003-2012	15,500	10,000	85,800	70,700	28,800	44,600	21,300	0	11,100	85,800	0
12	Cosumnes	1989-2014	124,200	374,400	89,700	350,900	125,400	63,100	47,300	0	0	264,900	0
106	Delta Mendota -Aliso	1999-2014	315,200	34,000	ND	239,700	104,700	33,800	4,700	16,400	7,600	130,700	0
14	Delta Mendota -Farmers	2003-2013	1,860	121,520	125,360	4,660	3,678	3,470	4,260	0	2,520	7,020	0
20	Delta Mendota -Fresno County	2003-2012	18,600	1,041,500	529,450	23,300	29,000	0	51,818	0	65,000	17,500	0
38	Delta Mendota -Grassland	2003-2013	34,300	283,900	46,900	307,300	62,400	21,400	25,600	0	59,300	46,900	0
13	Delta Mendota - North Central	2003-2012	191,000	419,000	ND	615,000	58,000	0	78,000	0	96,000	108,000	30
15	Delta Mendota - San Joaquin River Exchange Contractors	2003-2012	34,300	283,900	404,900	307,300	83,300	0	25,600	0	59,300	46,900	0
120	East Contra Costa	1997-2018	127,417	151,823	198,278	235,474	90,069	38,262	3,236	0	8,500	46,455	74,833
47	Eastern San Joaquin	1996-2020	972,000	567,000	205,000	1,295,000	262,000	428,000	193,000	131,000	80,000	709,000	0
61	Madera – Gravelly Ford Water District	1989-2014	7,200	11,732	ND	18,100	6,900	6,200	5,200	0	4,100	15,900	0
21	Madera – Joint	1989-2014	298,500	425,800	ND	655,900	222,721	145,200	69,400	0	0	471,500	0
49	Madera – New Stone	2003-2012	3,300	ND	9,700	9,500	2,000	1,600	4,500	0	0	9,700	0
45	Madera – Root Creek Water District	1989-2014	8,400	4,800	24,800	24,900	5,400	0	17,200	0	11,000	20,000	0
9	Merced	2006-2015	506000	290000	ND	834000	316000	272000	75000	40000	92000	723000	0
85	Modesto	1991- 2015	27,100	290,000	513,000	487,000	272,000	89,000	80,000	100,000	73,000	311,000	0
122	Tracy	1974-2015	ND	148,000	ND	ND	173,537	110,007	100,608	103,997	109,868	167,378	0
110	Turlock	1991-2015	335,000	437,800	786,700	810,100	280,500	140,000	112,900	118,100	74,800	404,400	0

Notes: ND = No data. No values were provided for Tail Water Return. Groundwater recharge from surface water includes recharge from conveyance systems.

Table A-SJR-4. San Joaquin River Hydrologic Region Current Water Budget Data Collection Summary

GSP Identifiers			Land and Surface Water Budget Components (AFY)				Groundwater Recharge/Inflow (AFY)				Groundwater Discharge/Outflow (AFY)		
GSP ID	Name	Timeframe	Precipitation	Surface water supplies	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
7	Chowchilla	1989-2014	124,300	374,400	89,300	398,000	123,000	62,100	0	0	0	307,600	0
12	Cosumnes	2015-2018	362,900	28,400	ND	239,500	104,700	38,100	5,300	16,300	6,000	133,100	0
106	Delta Mendota -Aliso	2003-2012	10,600	ND	103,471	76,000	36,300	44,500	21,300	0	0	103,271	11,100
14	Delta Mendota -Farmers	2013	1,100	160,000	163,100	3,200	3,700	3,700	9,900	0	6,600	10,500	0
20	Delta Mendota -Fresno County	2013	11,500	1,000,000	514,000	28,000	39,000	0	51,818	0	65,000	28,000	0
38	Delta Mendota -Grassland	2013	30,400	270,000	322,100	309,600	56,400	20,100	25,600	0	51,000	52,100	0
13	Delta Mendota - North Central	2013	149,000	413,000	ND	568,000	50,000	0	64,000	0	79,000	124,000	0
15	Delta Mendota - San Joaquin River Exchange Contractors	2013	30,400	270,000	521,000	309,600	76,500	0	25,600	0	51,000	52,100	0
120	East Contra Costa	2015	113,946	151,823	198,278	217,705	95,701	31,413	2,051	0	12,975	28,966	87,732
47	Eastern San Joaquin	1969-2018	984,000	493,000	204,000	1,449,000	272,000	475,000	212,000	109,000	47,000	851,000	0
61	Madera – Gravelly Ford Water District	2014	2,500	ND	ND	18,000	0	0	0	0	300	22,800	0
21	Madera – Joint	1989-2014	298,500	425,800	ND	715,800	225,500	144,900	0	0	0	533,100	0
49	Madera – New Stone	2017	3,600	270	9,670	9,800	2,500	1,600	4,500	0	0	9,400	0
45	Madera – Root Creek Water District	2015	9,100	6,300	25,000	25,400	6,300	0	17,200	0	11,000	19,000	0
9	Merced	2006-2015	506,000	290,000	ND	834,000	316,000	272,000	75,000	40,000	92,000	723,000	0
85	Modesto	2010	22,600	282,000	611,000	531,000	257,000	98,000	79,000	80,000	63,000	416,000	0
122	Tracy	2003-2013	ND	ND	ND	ND	178,805	123,275	105,141	96,702	120,006	178,281	0
110	Turlock	2010	278,800	448,600	810,100	807,000	261,000	154,800	118,500	93,300	65,400	414,300	0

Notes: ND=No data. No values were provided for Tail Water Return. Groundwater recharge from surface water includes recharge from conveyance systems.

Table A-SJR-5. San Joaquin River Hydrologic Region Projected Baseline Water Budget Data Collection Summary

GSP Identifiers			Land and Surface Water Budget Components (AFY)				Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow (AFY)			
GSP ID	Name	Timeframe	Precipitation	Surface water supplies	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
7	Chowchilla	2040-2090	144,100	329,200	83,000	394,300	117,500	67,200	71,400	0	0	297,800	0
12	Cosumnes	50 yrs	315,200	34,000	ND	239,700	108,000	35,200	5,500	17,900	4,200	256,600	0
106	Delta Mendota - Aliso	2014-2070	23,666	7,447	41,655	69,505	30,408	44,400	15,526	0	26,561	76,563	0
14	Delta Mendota -Farmers	2014-2070	1,811	215,830	200,840	1,740	5,600	3,930	5,156	0	2,121	11,789	0
20	Delta Mendota -Fresno County	2014-2070	17,849	899,474	458,452	32,787	41,316	0	0	0	0	17,781	0
38	Delta Mendota -Grassland	2014-2070	94,256	275,095	45,467	298,380	72,135	11,969	26,389	0	57,007	52,037	0
13	Delta Mendota - North Central	2014-2070	246,000	422,000	0	620,000	83,000	0	86,000	0	94,000	138,000	11,000
15	Delta Mendota - San Joaquin River Exchange Contractors	2014-2070	94,256	275,095	423,211	298,380	84,104	0	26,389	0	57,007	52,037	0
120	East Contra Costa	2019-2068	131,086	144,779	192,419	231,298	95,701	31,413	2,051	0	12,975	28,966	87,732
47	Eastern San Joaquin	1969-2020	985,000	528,000	ND	1,340,000	282,000	451,000	202,000	108,000	91,000	751,000	0
61	Madera – Gravelly Ford Water District	50 yrs	7,200	13,800	ND	18,000	0	1,200	0	0	4,100	14,100	0
21	Madera – Joint	2040-2090	346,100	374,200	ND	704,800	217,100	162,000	108,200	0	0	548,000	0
49	Madera – New Stone	2040	3,600	2,600	12,300	8,600	2,000	1,600	4,500	0	0	7,000	0
45	Madera – Root Creek Water District	2040-2090	9,100	15,000	20,700	21,000	5,900	2,100	17,200	0	11,000	12,100	0
9	Merced	50 yrs	506,000	274,000	ND	853,000	318,000	312,000	69,000	44,000	110,000	598,000	0
85	Modesto	50 yrs	269,000	292,000	497,000	535,000	228,000	123,000	77,000	50,000	75,000	314,000	0
122	Tracy	2016-2065	ND	ND	ND	ND	180,334	139,714	107,290	93,446	129,538	199,549	0
110	Turlock	50 yrs	340,600	439,500	777,800	834,100	252,700	194,800	110,300	71,000	80,300	414,100	0

Note: ND=No data. No values were provided for Tail Water Return. Groundwater recharge from surface water includes recharge from conveyance systems.

NOTE: No GSPs in the San Joaquin River Hydrologic Region modeled CC 2030.

Table A-SJR-6. San Joaquin River Hydrologic Region Projected 2070 with Climate Change Water Budget Data Collection Summary

GSP Information		Water Budget Scenario		Land and Surface Water Budget Components				Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow			
ID	Name	Conditions	Timeframe	Precipitation	Surface water inflow	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
12	Cosumnes	CC 2070	50 yrs	315,200	34,000	ND	239,700	101,500	37,900	5,100	16,100	1,100	168,400	0
12	Cosumnes	CC 2070 DEW	50 yrs	315,200	34,000	ND	239,700	94,400	38,700	4,800	14,100	1,900	176,100	0
12	Cosumnes	CC 2070 WMW	50 yrs	315,200	34,000	ND	239,700	120,300	36,700	6,800	20,800	8,100	262,200	0
120	East Contra Costa	Future Land Use & Climate Change 2070	2019-2068	138,317	140,494	169,461	202,415	97,002	30,549	1,645	0	11,423	33,956	84,026
120	East Contra Costa	Future Land Use, Climate Change 2070 & Sea Level Rise	2019-2068	138,317	140,494	169,461	201,734	97,054	31,263	1,645	0	11,432	33,952	81,068
47	Eastern San Joaquin	CC 2070	1969-2020	1,082,000	528,000	216,000	1,416,000	286,000	483,000	217,000	100,000	91,000	833,000	0
122	Tracy	CC 2070	2016-2065	ND	ND	ND	ND	176,342	147,357	107,543	85,610	123,251	221,393	0

Note: Chowchilla, Delta Mendota (all GSPs), Madera (all GSPs), Merced, Modesto, and Turlock did not model this scenario. No values were provided for Tail Water Return. Groundwater recharge from surface water includes recharge from conveyance systems.

DEW – Drier with extreme warming

WMW – Wetter with moderate warming

Appendix A3 -
GSP Information Summaries for
Tulare Lake Hydrologic Region

Table A-TL-1. Tulare Lake Hydrologic Region GSP General Information

Name	Basin Status	Basin Priority	GSP Area (ac)	Plan Type	Approval Status	Author/Consultant	Model
Castac Lake Valley	Not COD	Very Low	3,563	Single	In Review	EKI	Analytical for historical and numerical - Castac Basin Groundwater Flow Model (CMGFM) for historical and projected
Kaweah - East Kaweah	COD	High	117,257	Multi-plan	Inadequate	Provost & Pritchard, Montgomery & Associates	Numerical, MODFLOW - Kaweah Subbasin Hydrologic Model (KSHM)
Kaweah - Greater Kaweah	COD	High	219,696	Multi-plan	Inadequate	2020: GEI Consultants GSI Water Solutions 2022 Revisions: Provost & Pritchard Montgomery & Associates	Numerical model, MODFLOW - Kaweah Subbasin Hydrologic Model (KSHM)
Kaweah - Mid-Kaweah	COD	High	104,122	Multi-plan	Inadequate	2020: GEI Consultants GSI Water Solutions 2022 Revisions: Provost & Pritchard Montgomery & Associates	Numerical model, MODFLOW - Kaweah Subbasin Hydrologic Model (KSHM)
Kern Co. - Buena Vista	COD	High	51,048	Multi-plan	Inadequate	GEI Consultants	C2VSim and analytical
Kern Co. - Henry Miller WD	COD	High	26,058	Multi-plan	Inadequate	Luhdorff & Scalmanini	C2VSIM
Kern Co. Kern River	COD	High	232,489	Multi-plan	Inadequate	Todd Groundwater	C2VSimFG-Kern numerical model, analytical, and "electronic subtraction of annual groundwater elevation contour maps".
Kern Co. Olcese	COD	High	3,201	Multi-plan	Inadequate	EKI Environment & Water	Combined approach utilizing numerical groundwater flow model (C2VSim-FG) and analytical approach
Kern Co. KGA	COD	High	1,254,969	Multi-plan	Inadequate	Todd Groundwater	C2VSimFG-Kern
Kern Co. - South of Kern River	COD	High	214,499	Multi-plan	Inadequate	EKI Environment & Water, Inc	C2VSimFG-Kern
Kings - Central Kings	COD	High	160,667	Multi-plan	Approved	Provost & Pritchard	Analytical
Kings - James	COD	High	29,025	Multi-plan	Approved	Todd Groundwater Ken Schmidt Provost & Pritchard	Analytical
Name	Basin Status	Basin Priority	GSP Area	Plan Type	Approval Status	Author/Consultant	Model
Kings - Kings River East	COD	High	191,347	Multi-plan	Approved	4 Creeks	Analytical

Kings - McMullin Area	COD	High	120,557	Multi-plan	Approved	Provost & Pritchard	Analytical
Kings - North Fork Kings	COD	High	168,308	Multi-plan	Approved	Ken Schmidt, Provost & Pritchard	Analytical
Kings - North Kings	COD	High	310,763	Multi-plan	Approved	Provost & Pritchard	Analytical
Kings - South Kings	COD	High	160,667	Multi-plan	Approved	Peters Engineering, Provost & Pritchard, Yamabe & Horn	Analytical
Pleasant Valley	Not COD	Medium	48,196	Single	Incomplete	Provost & Pritchard, KDSA	Analytical
Tulare Lake	COD	High	535,872	Single	Inadequate	Geosyntec	Tulare Lake Subbasin Hydrologic Model - MODFLOW
Tule - Alpaugh	COD	High	14,376	Multi-plan	Inadequate	Jacobs	Numerical; based on TH&Co 2020 groundwater flow model for Tule Subbasin & CalSim-II Model
Tule - Delano-Earlimart ID	COD	High	64,758	Multi-plan	Inadequate	4Creeks	Numerical; based on TH&Co 2020 groundwater flow model for Tule Subbasin & CalSim-II Model
Tule - Eastern Tule	COD	High	160,833	Multi-plan	Inadequate	4Creeks R.L. Schafer BSK Associates	Numerical; based on TH&Co 2020 groundwater flow model for Tule Subbasin & CalSim-II Model
Tule - Lower Tule River ID	COD	High	105,307	Multi-plan	Inadequate	4Creeks	Numerical; TH&Co 2020 groundwater flow model for Tule Subbasin & CalSim-II Model
Tule - Pixley ID	COD	High	69,877	Multi-plan	Inadequate	4Creeks	Numerical; based on TH&Co 2020 groundwater flow model for Tule Subbasin & CalSim-II Model
Tule - Tri-County WA	COD	High	61,683	Multi-plan	Inadequate	Geosyntec	Numerical; based on TH&Co 2020 groundwater flow model for Tule Subbasin & CalSim-II Model
Westside	COD	High	622,208	Single	Approved	Luhdorff & Scalmanini	Westside Groundwater model, numerical, using USGS One-Water Hydrologic Flow Model 2.0. based on Farm Process (FMP) MODFLOW-2005
White Wolf	Not COD	Medium	107,546	Single	Approved	EKI	White Wolf Groundwater Flow Model (WWGFM) numerical, MODFLOW-NWT

Notes: GSP = Groundwater Sustainability Plan
COD = Critically Overdrafted

Table A-TL-2. Tulare Lake Hydrologic Region Demand Reduction and Supply Augmentation Strategies

GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Castac Lake Valley	None	None	Aquifer Replenishment Project: estimated to add 70-100 AFY and up to 300 AFY certain years resulting in net increase of 30 AFY - would use imported SW from CA aqueduct. Cuddy Creek Bank Modifications Project for recharge in wet years.	Future Wastewater Reclamation Project: using WW from future TMV to maintain Castac Lake levels, would reduce demand for imported surface water.	None	None
Kaweah - East Kaweah	IID has 15 acres of recharge basins and 3 miles of creek used for recharge.	None	Lewis Creek Recharge (3,000 AFY), Cottonwood Creek Recharge (1,800 AFY), Yokohl Creek Recharge (1,800 AFY), Rancho de Kaweah Water Management, Recharge and Banking Project (9,000 AFY), Lindmore/Exeter Dry Wells (2,010 AFY), Lindsay Recharge Basin (150 AFY), Wutchumna Ditch Recharge (480 AFY) = 18,240 AFY total.	None	None	None
Kaweah - Greater Kaweah	Paregien Flood Control & Recharge Project (2,370 AFY)	None	Recharge basin improvement (1,600 AFY), New Recharge Basins (3,600 AFY), Kings River Floodwater Arrangement, Kings River Surplus water, On-Farm Recharge and Storage (1,900 AFY), Ketchum Flood Control & Recharge Project (300 AFY), Basin No. 4 Improvement Project (500 AFY), Peoples Recharge Expansion Project (300 AFY) Total estimated benefit = 21,370 AFY.	None	Planned fallowing program by KCWD & LIWD WDs will develop program in their combined areas to lease 1,500 acres of ag land to fallow instead of irrigating a crop. Estimated benefit = 3,750 AFY.	Fee and incentive program. Estimated benefit not provided.
Kaweah - Mid-Kaweah	Cordeniz Recharge Basin (1,610 AFY), Okieville Recharge Basin (630 AFY)	None	Projects by Tulare ID, City of Tulare and City of Visalia. Total estimated benefit = 23,095 AFY.	None	None	None
Kern Co. - Buena Vista	Palms Groundwater and Banking and Recharge Project (25,000 AFY), Corn Camp Water Bank, McAllister Ranch Banking facilities	None	Direct recharge takes place through operation of BVWSD facilities including unlined irrigation canals, and dedicated groundwater recharge projects. Due to the nature of the BVGSA's soils and irrigation practices, deep percolation of applied irrigation water contributes little to aquifer recharge. Key recharge facilities within the BVGSA are presented in Figure 2-19 – Existing Recharge and Spreading Centers (Figure 2-19 – Refer to Figures Tab) = 25,000 AFY total.	None	15K ac-ft or 12% of ETa; max 4K ac compensated.	Adaptive management alternative if other PMAs don't achieve sustainability.
Kern Co. - Henry Miller Water District GSA	Several ongoing recharge projects on permeable soils on Kern Fan.	None	GSA is a recharge participant in the Pioneer Project Banked Water Recovery. Project to optimize recovery. Expected benefit not provided.	None	None. Prior to SGMA, district tried to reduce permanent crop coverage in the area due to water supply and need for dry-year land fallowing; continued effort with the possibility of dry-year land fallowing as needed within the district.	None

GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Kern Co. KRGSA	Kern River water is used to recharge within Kern River channel. Unlined canals. Recharge basins and banking programs: Bakersfield 2800 Ac Project (13 recharge basins, capacity of>150K AFY - averaged	Recycled water is used for recharge. City of Bakersfield has >340 stormwater basins to capture and recharge (average 8,500 AFY).	Phase 1 Management Actions - phase 2 expansion of approximately 700 acres for construction of additional basins to increase recharge capacity as needed.	City of Bakersfield - increased use of recycled water within GSA from 2026 onward. Estimated benefit = 13,407 AFY.	Conversion to urban land. Expected benefit = 27,000 AFY.	None

	37,606 AFY in 20-yr historical period), Berrenda Mesa spreading grounds (6 recharge basins, 20-yr average = 9,221 AFY), Kern Delta Water District groundwater banking facilities, stores up to 50K AFY with max of 250 AF. Note: water is banked within the subbasin for use outside the subbasin, and water banked outside the subbasin is used within the subbasin.					
Kern Co. Olcese	None (several projects in multi-GSA area).	None	None	None	None	None
Kern Co. KGA	On-Farm Recharge, RRID Recharge (5,000 AFY), Kimberlina Recharge Project (19,000 AFY), Stockdale East Groundwater Storage and Recovery Project (4,000 AFY), Recharge of Carrot Wash Water (300 AFY).	Secondary-treated municipal wastewater is from the North of the River Sanitary District is currently used for irrigation and infiltrated into groundwater within the Annex Area. The Taft WWTF currently produces undisinfected secondary effluent that is suitable for and applied to feed crops.	See note 5.	Irrigation with reclaimed water from Arvin and Bakersfield; Taft recycled water program; municipal ww from North of the River Sanitary District possible increase. Estimated benefit = 18,603 AFY.	Various programs including incentives for land conversion, voluntary land conversion, land acquisition, conversion of ag land to urban use, district fallowing program, rotational land fallowing program, reduction of irrigated acreage. Total estimated benefit = 31,693 AFY.	None
Kern Co. - South of Kern River	Have already begun developing new recharge basins, Recharge of Carrot Wash Water (300 AFY). Increase out of district banking operations (9,225 af/mo).	None	AEWSD Sunset Spreading Works (2,500 AFY), Private and Caltrans Basin Connections (275 AFY), On-Farm Recharge, Caliente Creek Rehabilitation Mitigation and Groundwater Recharge, On-Farm Recharge (2,000 AFY), In-district banking facilities (2,000 AFY), Conversion of Granite Quarry to Sycamore Reservoir (4,500 AFY) = 20,800 AFY total.	None	Not directly fallowing, but possible land conversion incentives to reduce demand. Land Retirement program in Wheeler Ridge - would include the purchase and permanent fallowing of lands within the district. More of an adaptive management action in that it's a worst-case scenario action.	None

GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Kings - Central Kings	Natural recharge within streams/channels. Other recharge occurring within unlined canals, reservoirs, stormwater basins, recharge basins, and deep percolation via ag and landscape irrigation water. Not quantified.	7,300 AFY 35% of city of Selma municipal water = effluent water sent to recharge basins.	Plans involve construction of ~2000 acres of recharge basins within the district, the 50k expected additional AFY is noted above. = 50,000 AFY total.	None	Planned	Planned
Kings - James	K-Basin Groundwater Recharge (1,125 AFY), Distribution System Recharge (2,400 AFY), Southwest Groundwater Banking (4,500 AFY), Fallow Land Recharge (500 AFY).	None	Basins 1 & 2 Storage and Recharge (520 AFY), Basin 3 Floodwater Capture and Recharge (180 AFY), Floodway Recharge and Spreading (1,000 AFY), City of San Joaquin Storm Water Pond Recharge (220 AFY), Carmichael Slough Recharge (468 AFY), James Main Canal Spreading (90 af/mo), Fresno Slough Recharge (27 af/mo), Mud Dam Spreading and recharge (540 af/mo), Distributed Recharge Basins (2,700 af/mo), James Ranch Recharge Basin (14,400 AFY). Total estimated benefit = 20,000 AFY total.	None	None	None (metering)
Kings – Kings River East	Primary sources of recharge include intentional recharge basins, no additional information.	None	Several projects with total estimated benefit = 57,800 AFY.	None	None	None
Kings – McMullin Area	See Note 4.	None	Fresno City Wastewater Treatment Plant Recharge Basins - FID Houghton Canal System (14,726 AFY) and Lower Dry Creek System (9,973 AFY), Southwest Groundwater Banking (2,625 AFY), Lassen Avenue Reverse Flow Recharge 93,000 AFY), James Bypass Surface Water Supply & Recharge Project (29,760 AFY), McMullin On-Farm Flood Capture Phase 2 and 3 (27,120 AFY), Houghton Wasteway Expansion Project (2,190 AFY), South	None	Planned; needed to reach sustainability, no details provided.	The GSA may consider a groundwater pumping restrictions management action encompassing policies related to the restriction of new groundwater exports, requiring new developments to prove sustainable water supply, pumping

			Sandridge Canal Water Supply & Recharge (4,800 AFY), Stinson North Canal Water Supply & Recharge Phase 2 (59,400 AFY), Stinson North Canal Water Supply and Recharge (39,670 AFY), Grantland Area Recharge (7,920 AFY), Upgradient Recharge Programs (15,360 AFY) = Total estimated benefit = 305,000 AFY.			restrictions during droughts, and moratorium on new production wells that are not replacement wells.
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GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Kings – North Fork Kings	Basin 11 Improvement (1,420 AFY), Basin 11 Expansion (1,110 AFY) = 1,530 AFY total.	None	Laton Recharge Project (3,080 AFY), North Fork Regional Recharge Project (11,660 AFY), Zonneveld Pond Improvement Project (430 AFY), On-Farm Recharge (5,000 AFY), Cerini Recharge Project (6,500 AFY), Kamm Recharge Project (10,400 AFY), Terra Linda Recharge Project (1,560 AFY), Misc. Landowner Recharge Basins (4,180 AFY), Upgradient Recharge outside NFKGSA (4,500 AFY), Mussel Slough Recharge Project (4,730 AFY), Misc. Dry Well Recharge Systems (2,000 AFY), Laton North Phase 2 Recharge Project (3,080 AFY), Pires Recharge Project (550 AFY), North Fork Group Site 16 (130 AFY), North Fork Group Site 3 (320 AFY), North Fork Group Site 6 (150 AFY) Total estimated benefit = 65,380 AFY.	None	Fallowing would be implemented not GSA-wide but on the part of the individual landowner. No GSA-wide fallowing program.	"The GSA may consider a groundwater pumping restrictions management action encompassing policies related to the prohibition of new groundwater exports, requiring new developments to prove sustainable water supply, pumping restrictions during droughts, moratorium on new production wells." GW Allocation Management Actions: Notes possibility of utilizing a by-acre GW allocation approach in the future if needs require it. Would take into account water rights, DACs, community service districts and other components.
Kings – North Kings	Fresno Irrigation District Basin, Fresno Metropolitan Flood Control District Basin, City of Clovis Basin	None	Nielsen Recharge Facility (3,500 AFY), Biola Groundwater Recharge Project (150 AFY), Marion Recharge Basin Improvements (2,500 AFY), Lions Park Groundwater Recharge Project (195 AFY), Central Basin Recharge Project (2,592 AFY), Wagner Recharge Basin (2,300 AFY), Savory Pond Expansion (1,200 AFY), On-Farm Recharge Program (10,000 AFY), Ricchiuti Recharge Basin Project (150 AFY), Basin CF- Stormwater Recharge and Flood Protection Project (970 AFY), County of Fresno NKGSA Recharge Program (2,000 AFY) Estimated total benefit = 149,944.	City of Fresno dev. of tertiary tmt 5-MGD SW Reclamation Facility and 8-MGD SE Reclamation facility. Estimated benefit=13,367 AFY	None	None
Kings – South Kings	GSA does not have any dedicated recharge basins for diverting surface water. However, cities have ww treatment facilities that percolate effluent to recharge GW. SKGSA has approximately 31 ac of stormwater basins that may also act as dedicated recharge facilities in the future.	None	Numerous basins. Total benefit = 8,357 OD shared with Central Kings; several recharge projects all listed under potential projects but status description shows that some will start as soon as funding is acquired.	None	None	Pumping restrictions during droughts. Estimated benefit not provided.
Pleasant Valley	None	Small amount of treated WW from prison used for private ag irrigation.	Los Gatos Creek Gravel Pits Recharge Project (720 AFY), Zapato Chino Creek Instream Recharge Project (62.5 AFY), PV Water Banking Project (7,050 AFY). Potential: City of Coalinga WWTP Recharge, Los Gatos Creek in-Creek	None	Potential management action with incentives for growers	Plans to implement pumping allocations based on sustainable yield. P. 187. Refers to schedule, but not specified.

			Recharge, Jacalitos Creek in0Creek Recharge, Flood-MAR, Intentional Recharge Basin, Dry Well Recharge.			Considering tiered costs for pumping exceedances.
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GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Tulare Lake	See note 1.	There are a number of small to mid-sized wastewater treatment plants (WWTPs) throughout the Subbasin operated by, including but not limited to, various cities, municipalities, the Department of Defense, Native American facilities, and manufacturing plants. At most WWTPs, treated wastewater is discharged into seepage ponds, used as recycled water, or utilized for irrigation by local farmers. The ratio of WWTP seepage to re-use is not well documented and needs further investigation.	Mid-Kings River GSA - Rehab of existing recharge basins in Kings Co. WD (1,500 AFY); Cartrights Basin improvements, KCWD, Lakeside Irrig WD (650 AFY); recharge basin construction KCWD (44,444 AFY); South Fork Kings GSA - ASR (13,000 AFY); Kid-Kings Recharge basin (7,000 AFY) Total estimated benefit=181,344 AFY.	None	Mid-Kings River GSA - fallowing program (6,250 AFY); South Fork Kings GSA - Cropping/Fallowing program (13,300 AFY); El Rico GSA (15,000 AFY). Total estimated benefit = 19,250 AFY.	Demand reduction (undefined) in El Rico and Tri-County WA GSAs (15,000 AFY and undefined, respectively) Demand reduction may include SW delivery improvement, on-farm efficiency improvements, permanent or long-term fallowing and seasonal fallowing programs.
Tule - Alpaugh	None	None	None	None	3100 ac-ft/yr	None
Tule - Delano-Earlimart ID	Existing in-district recharge/banking operations (4,535 AFY), existing out of district banking operations (1,727 AFY).	None	Increase in-district recharge/banking (6,151 AFY), increase out of district banking operations (recharge amount not provided).	None	None	No specifics provided. Only noted that they may be introduced, and if so, decisions will be based on best available data.
Tule - Eastern Tule	See note 2.	Increase of recycled water applied to ag. No details. Estimated benefit = 3,600 AFY	MAR and Banking (Expansion of Porterville Recharge Basins, Expansion of Irrigation District Recharge Basins, Development of Landowner and District Recharge Basins) recharge volumes not provided; estimated benefit = 17,867 AFY.	None	None	Pricing change - fee pumping.
Tule – Lower Tule River ID	See note 3.	None	Planned managed aquifer recharge and banking projects although recharge estimates not provided. District currently owns 4,516 ac of land for recharge and would like to develop additional district and landowner recharge basins. 1,900 AFY.	None	None	None
Tule - Pixley ID	Existing 940 ac of district recharge basins, recharge amount not provided; estimated 3,000 AFY	None	Managed Aquifer Recharge and Banking (Expansion of District recharge basins, development of landowner recharge basins), recharge amount not provided.	None	20,000 ac. Estimated benefit = 73,700 AFY.	None
Tule - TCWA	None. Area, in general, not favorable for groundwater banking because of A-Clay and/or other fine-grained deposits.	None	Prosperity Farms Project (1,500 AFY).	None	Estimated benefit = 15,000 AFY.	None

GSP Name	Existing (AFY)		Planned (AFY)			
	Managed Recharge	Recycled Water	Recharge & Aquifer Storage and Recovery	Recycled Water	Fallowing	Pumping Restrictions
Westside	Pasajero Ground Recharge Project - anticipated 10,800 AFY in wet year; 15 private ASR projects; 7 existing active or	None	Broadview ASR - expected 2,000 AFY in very wet years; 25 ASR, sublateral recharge and percolation projects have been approved - total recharge capacity of up to 600 AF/day. GW pilot credit program includes ASR - potentially for 12,300 AFY from 400 wells.	None	None	Allocation program will begin with the commencement of an 8 year transition period from 2022-2030(“transition period”) in which a uniform annual

	approved basins totaling 1,804 ac. Others not documented in GSP, per Westside pers. Comm.					allocation is established at 1.3 AF per acre and then subsequently reduced each year by 0.1 AF until 2030.
WHITE WOLF	Grapevine Development (630 AFY).	TCWD recycled water.	WRMWSD Mettler Recharge Project (36,000 AFY) - built but not operational as of the GSP submittal, WRMWSD El Paso Creek Recharge Project (32,400 AFY).	If/when Grapevine is developed, all non-potable water demands will be met with treated recycled water.	None	Possible allocations.

¹ Tulare Lake existing managed recharge: Kings County WD - intermittent intentional recharge operation in 25 basins totaling about 720 acres throughout the MKR GSA when water is available; operated a water bank on the Old Kings River channel since 2002. Approximately 73,600 AF of water has been recharged over this 17-year period via percolation through approximately 150 acres of ponds and approximately 48,500 AF have been recovered using five recovery wells since 2002. Kings River flood waters along the Old Kings River channel since the 1940s (referred to as Condition 8 water). Condition 8 water is surface water that naturally would have infiltrated along an approximately 7.75-mile reach of the Old Kings River channel during high river flow years had the river not been diverted for irrigation. Between 1990 and 2016, Condition 8 recharge has ranged from as little as 0 AF in most years and as much as 36,800 AF in flood years (1995) and averaged approximately 30,370 AFY in wet years. The Corcoran Irrigation District also owns and operates nine percolation basins totaling about 2,760 acres. Estimated percolation rates are about 0.25 ft/d. A review of aerial photographs suggests only one or two basins are typically utilized each year between March and September when surface water is available, percolating an estimated average of 23,500 AFY (Figure 3-43). During wet years, as much as 147,700 AF of water has been estimated to be percolated using these percolation basins. In the Chamberlain Ranch area (ER GSA), 640 acres has been utilized for percolation basins. In 2017, approximately 5,000 AF was recharged. Immediately adjacent to the eastern boundary of the ER GSA in the Tule Subbasin, there are recharge basins that are operated by ER GSA landowners. These recharge facilities are covered by a neighboring GSP.

² Eastern Tule existing managed recharge: Managed recharge water use is assigned to surface water specifically diverted to percolation ponds and banking facilities, and treated wastewater effluent that is recycled for groundwater recharge via percolation ponds. period of 1986/87-2016/17, an approximate average annual 14,600 acre-feet of groundwater was extracted for municipal purposes, of which an approximate annual average of 5,850 acre-feet was recycled and diverted to recharge basins where it either evapotranspiration, irrigated crops, or recharged the groundwater aquifer. Several groundwater recharge sites are maintained - recharge water from the Tule River, Deer Creek, Friant-Kern Canal, or from a treatment facility. City of Porterville currently maintains three primary recharge efforts: (1) percolation of treated wastewater effluent in six percolation ponds, (2) purchase and transfer local and imported surface water that is diverted into recharge basins, and (3) maintenance of ~25 stormwater detention basins that provide groundwater recharge. Estimated benefit = 5,800.

³ Lower Tule River ID existing managed recharge: Several recharge ponds and groundwater recharge sites are maintained by the District. These sites generally recharge native surface water from the Tule River, and imported surface water from the FKC. Deer Creek Tule River Authority (DCTRA), a joint powers authority formed in 1994, has functioned to coordinate groundwater recharge efforts amongst several local water agencies, which includes the District. 10 recharge basins. Total 12,500 AFY.

⁴Fresno City Wastewater Treatment Plant Recharge Basins - FID Houghton Canal System (14,726 AFY) and Lower Dry Creek System (9,973 AFY), Southwest Groundwater Banking (2,625 AFY), Lassen Avenue Reverse Flow Recharge 93,000 AFY), James Bypass Surface Water Supply & Recharge Project (29,760 AFY), McMullin On-Farm Flood Capture Phase 2 and 3 (27,120 AFY), Houghton Wasteway Expansion Project (2,190 AFY), South Sandridge Canal Water Supply & Recharge (4,800 AFY), Stinson North Canal Water Supply & Recharge Phase 2 (59,400 AFY), Stinson North Cnal Water Supply and Recharge (39,670 AFY), Grantland Area Recharge (7,920 AFY), Upgradient Recharge Programs (15,360 AFY) = Total estimated benefit = 305,000 AFY

⁵ Kern Co. Kern Groundwater Authority planned managed recharge: 212,078 AFY total estimated benefit: AEWSD Sunset Spreading Works(2,500 AFY), Caliente Creek Habitat Mitigation and Groundwater Recharge, Conversion of Granite Quarry to Sycamore Reservoir (4,500 AFY), CWD Increase Groundwater Recharge and Banking Capacity (1,000 AFY), New Cawelo GSA Banking Partners (500 AFY), Out of Cawelo GSA Banking (2,550 AFY), NKWSD Banking Program Expansion (122,000 AFY), RRID Expanded Recharge (6,000 AFY), Bell Recharge Project (1,728 AFY), James Groundwater Storage and Recovery Project (3,000 AFY), Kern Fan Groundwater Storage Project (10,000 AFY), Ten Section Water Recharge Project (2,000 af/mo), SSJMUD In-District Spreading and Recovery Facility (2,800 AFY), SSJMUD Conversion of Dairy to Recharge Facility, SSJMUD On-Farm Recharge Activities, SWID On-Farm Groundwater Recharge, SWWD Enhanced Groundwater Recharge (20,000 AFY), Poso Creek MAR (1,200 AFY), Poso Spreading Grounds, Schuster Spreading Grounds, WRMWSD On-Farm Recharge (2,000 AFY), WRMWSD In-District Banking Facilities (2,000 AFY).

Table A-TL-3a. Tulare Lake Hydrologic Region Historical Water Budget Data Collection Summary

GSP Identifiers			Land and Surface Water Budget Components (AFY)				Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow (AFY)			
GSP ID	GSP Name	Timeframe	Precipitation	Surface water inflow	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
67	Castac Lake Valley	1998-2017	3,410	1,090	ND	ND	2,040	0	1,390	570	2,070	1,530	0
58	Kaweah - East Kaweah	1981-2017	ND	99,200	249,900	1,700	67,600	10,900	62,500	0	12,900	153,900	0
30	Kaweah - Greater Kaweah	1997-2017	10	138,000	559,600	1,300	223,600	130,900	272,900	0	207,400	453,400	0
50	Kaweah - Mid-Kaweah	1997-2017	10	88,300	220,500	600	119,800	53,000	111,300	0	103,800	192,300	0
37	Kern Co. - Henry Miller WD	1995-2014	6,762	32,298	ND	35,803	6,908	17	0	0	0	7,220	0
54	Kern Co. Kern River	1995-2014	ND	327,786	ND	ND	71,527	248,355	0	0	0	321,871	0
44	Kern Co. Olcese	1995-2015; 1995-2014	1,008	655,460	ND	2,838	2,281	730	0	0	2,201	857	0
36	Kern Co. KGA	1995-2014	ND	ND	ND	ND	669,398	730,964	0	0	87,102	1,590,373	0
31	Kings - James	1997-2011	16,414	60,407	ND	68,562	4,603	19,191	9,087	0	22,141	15,501	0
23	Kings - Kings River East	1997-2011	199,300	252,300	ND	428,400	127,400	71,500	2,600	0	4,700	225,900	0
25	Kings - North Fork Kings	ND	116,600	175,300	ND	399,100	92,000	71,300	34,500	0	16,200	277,600	0
24	Kings - North Kings	1997-2011	304,900	507,000	852,400	555,200	213,500	227,800	0	0	122,000	345,400	-
26	Kings – South/Central Kings	1997-2011	141,600	281,900	ND	358,000	79,900	103,900	400	0	35,400	0	0
145	Pleasant Valley	1998-2010	28,200	6,200	ND	35,510	7,000	14,700	0	0	1,700	34,400	0
42	Tulare Lake	1990-2016	56,363	597,560	ND	1,018,558	142,093	177,934	118,312	0	136,525	386,272	0
48	Tule - Alpaugh	1987 - 2017	7,000	2,800	ND	30,200	6,700	800	46,000	0	26,000	27,200	0
63	Tule - Delano-Earlimart ID	1987 - 2017	38,000	111,900	N/A	166,000	13,300	26,700	46,000	0	66,000	55,700	0
43	Tule - Eastern Tule	1987 - 2017	129,000	221,000	N/A	357,050	53,300	59,900	92,000	0	67,000	206,600	0
56	Tule - Lower Tule River ID	1987 - 2017	64,000	122,200	ND	271,500	51,300	108,000	130,000	0	134,000	197,800	0
65	Tule - Pixley ID	1987 - 2017	39,000	25,600	ND	160,900	36,700	55,000	154,000	0	72,000	146,800	0
57	Tule - Tri-County WA	1987 - 2017	29,000	5,900	ND	78,100	14,400	1,800	124,000	0	71,000	73,000	0
8	Westside	1989-2015	389,000	841,000	ND	1,185,000	317,000	10,000	151,000	0	169,000	324,000	0
123	White Wolf	1995-2014	81,400	66,500	ND	142,400	47,800	8,700	100	0	8,900	43,900	0

Notes: ND = No data. No values were reported for Tail Water Return. Recharge from surface water includes recharge from conveyance systems.

Kern Co. – Buena Vista – Insufficient data; South of Kern River - Lands overlap other GSAs. See Table A-TL-4b for summary of Kern Subbasin change in groundwater storage for the historical scenario.

Kings McMullin – Multiple modeling methods and insufficient data to reconcile. See Table A-TL-3c for the Kings Subbasin water budget summary for the historical scenario.

Table A-TL-3b. Change in Groundwater Storage for Water Budgets of Projected Scenarios in the Kern Subbasin

Scenario	C2VSimFG-Kern Model Results	Adjusted Model Results
	Change in Groundwater Storage (AFY)	
Historical	277,114	277,114

Table A-TL-3c. Summary of Current Water Budget for the Kings Subbasin in AFY

Description	Total	McMullin	North Fork Kings	North Kings	Central/South Kings	Kings River East	James ID
Total Supply	3,547,400	379,500	616,200	1,167,200	614,700	677,500	92,300
Consumptive Use Subtotal	2,094,600	296,000	399,100	544,500	358,000	428,400	6,860
Groundwater Recharge Subtotal	1,362,500	239,800	202,300	460,900	216,100	210,400	33,000
Nonrecoverable Subtotal	631,200	31,900	65,500	325,000	110,400	76,300	2,210
Method 1							
Estimated Annual Change in Groundwater Storage	-198,200	-61,600	-91,500	-6,500	-10,500	-23,500	-4,600
Recharge	1,362,500	239,800	202,300	460,900	216,100	210,400	33,000
Pumping	1,341,800	282,900	277,600	345,400	191,200	229,200	15,500
Outflow	200,400	0	16,200	122,000	35,400	4,700	22,100
Other change in storage	18,500	18,500	0	0	0	0	0
Method 2 – Calculated Annual Change in Groundwater Storage	-134,000	-18,000	-59,000	-24,000	-17,000	-11,000	-5,000

Source: Kings Subbasin GSPs – Basin Setting Water Budgets

Notes: No units were provided with this table; assuming AFY.

Table A-TL-4a. Tulare Lake Hydrologic Region Current Water Budget Data Collection Summary

GSP Identifiers			Land and Surface Water Budget Components (AFY)				Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow (AFY)		
GSP ID	GSP Name	Timeframe	Precipitation	Surface water inflow	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping
58	Kaweah - East Kaweah	1997-2017	ND	88,300	ND	ND	73,800	99,000	111,300	0	103,800	192,200
37	Kern Co. - Henry Miller WD	2015	2,757	29,329	ND	28,398	2,495	0	0	0	0	14,878
54	Kern Co. Kern River	2015	ND	437,780	ND	ND	61,792	101,312	0	0	0	401,177
31	Kings - James	2016-2017	16,414	59,891	ND	67,490	4,637	19,465	9,087	0	22,141	16,721
23	Kings - Kings River East	2017 WY	199,300	252,300	ND	424,600	125,500	71,400	2,600	0	4,700	219,900
25	Kings - North Fork Kings	2017	116,600	175,300	ND	403,200	93,000	71,300	34,500	0	16,200	282,700
24	Kings - North Kings	2016-2017	304,900	507,300	795,500	504,200	202,500	227,300	0	0	122,000	288,200
26	Kings - South Kings	2014-2017	141,600	281,900	ND	350,300	79,400	103,900	400	0	35,400	0
145	Pleasant Valley	2020	28,200	10,600	ND	47,500	8,277	14,700	0	0	1,700	43,300
42	Tulare Lake	1998-2010	62,529	298,620	ND	1,018,558	145,617	189,742	114,532	0	138,827	365,350
48	Tule - Alpaugh	1987 - 2017	7,000	2,800	ND	30,200	6,700	800	46,000	0	26,000	27,200
63	Tule - Delano-Earlimart ID	1987 - 2017	38,000	111,900	ND	166,000	13,300	26,700	46,000	0	66,000	55,700
43	Tule - Eastern Tule	1987 - 2017	129,000	221,000	ND	357,050	53,300	59,900	92,000	0	67,000	206,600
56	Tule - Lower Tule River ID	2018 - 2070	65,000	100,500	ND	253,800	40,300	98,800	96,000	0	96,000	157,200
65	Tule - Pixley ID	2018 - 2070	39,000	31,800	ND	106,100	16,800	40,000	84,000	0	58,000	69,100
57	Tule - Tri-County WA	2018 - 2070	29,000	39,100	ND	75,800	5,800	8,800	103,000	0	89,000	33,300
8	Westside	2016	467,000	255,000	ND	1,081,000	186,000	0	239,000	0	175,000	558,000
123	White Wolf	2015-2019	84,500	46,800	ND	149,200	41,400	7,700	500	0	9,100	60,700

Notes: ND = no data. No values reported for Tail Water Return. Groundwater recharge from surface water includes recharge from conveyance systems. There were no data for subsurface drains for any GSP.

Castac Lake Valley – No data for this scenario.

Kaweah-Greater and Mid-Kaweah – No data for this scenario. See Table A-TL-4b for Kaweah Subbasin summary of the current water budget.

Kern Co. – Buena Vista - Insufficient data.

Kern Co. – Olcese – No data for this scenario.

Kern Co. – KGA – No data for this scenario.

Kern Co. – South of Kern River – Lands overlap other GSAs.

Kings – Central Kings was not used as the land overlaps South Kings and was included there.

Kings McMullin – Data was not used due to the methods not reconciling.

Table A-TL-4b. Summary of Current Water Budget for the Kings Subbasin in AFY

Description	Total	McMullin	North Fork Kings	North Kings	Central/South Kings	Kings River East	James ID
Total Supply	3,490,400	389,400	621,300	11,110,300	604,900	671,500	93,000
Consumptive Use Subtotal	2,043,000	303,800	403,200	493,600	350,300	424,600	67,500
Groundwater Recharge Subtotal	1,352,000	241,900	203,300	449,400	215,700	208,400	33,300
Nonrecoverable Subtotal	635,400	31,900	65,500	330,400	109,200	76,300	22,100
Method 1							
Estimated Annual Change in Groundwater Storage	-119,400	-69,400	-63,100	39,200	-1,100	-19,500	-5,500
Recharge	1,352,000	241,900	203,300	449,400	215,700	208,400	33,300
Pumping	1,285,000	292,800	282,700	288,200	181,400	223,200	16,700
Outflow	200,400	0	16,200	122,000	35,400	4,700	22,100
Other change in storage	14,000	-18,500	32,500	0	0	0	0

Source: Kings Subbasin GSPs – Basin Setting Water Budgets

Notes: No units were provided with this table; assuming AFY.

Table A-TL-5a. Tulare Lake Hydrologic Region Projected, Projected Climate Change 2030, and Projected 2070 Baseline Water Budget Data Collection Summary

GSP Identifiers		Land and Surface Water Budget Components (AFY)					Groundwater Recharge/Inflow (AFY)			Groundwater Discharge/Outflow (AFY)			
GSP ID	Name	Timeframe	Precipitation	Surface water supplies	Applied water	ET	Deep percolation of irrigation and precipitation	Surface water	Subsurface	Surface water	Subsurface	Groundwater pumping	Subsurface drains
67	Castac Lake Valley	50-yrs	ND	ND	ND	ND	2,170	0	260	10	1,960	530	0
67	Castac Lake Valley - CC 2030	50-yrs	ND	ND	ND	ND	2,180	0	260	10	1,960	530	0
67	Castac Lake Valley - CC 2070	50-yrs	ND	ND	ND	ND	2,090	0	280	0	1,930	520	0
51	Kern Co. - Buena Vista	2030	20,600	10,070	ND	114,100	ND	ND	ND	ND	ND	ND	ND
51	Kern Co. - Buena Vista - CC 2070	2070	21,100	9,642	ND	119200	ND	ND	ND	ND	ND	ND	ND
37	Kern Co. - Henry Miller WD	50-yrs	3,290	27,482	ND	19,440	ND	ND	ND	ND	ND	ND	ND
37	Kern Co. - Henry Miller WD - CC 2070	50-yrs	3,290	25,681	ND	20,966	ND	ND	ND	ND	ND	ND	ND
44	Kern Co. Olcese - CC 2070	ND	1,027	29	ND	2,287	ND	ND	ND	ND	ND	ND	ND
36	Kern Co. KGA - CC 2030	ND	ND	ND	ND	ND	77,780	0	583,598	0	87,102	1,625,000	0
22	Kings - Central Kings	2040	145,900	281,900	ND	363,000	84,000	103,900	400	0	35,400	0	0
31	Kings - James - CC 2040	to 2040	16,414	66,669	ND	67,641	4,738	19,465	9,087	0	22,141	17,906	0
31	Kings - James - CC 2070	to 2070	16,263	66,292	ND	67,873	4,961	19,465	9087	0	22,141	19,191	0
23	Kings - Kings River East	2040	199,300	251,300	ND	435,000	130,100	66,500	2,600	0	4,700	236,400	0
28	Kings - McMullin Area	2040	92,700	1,900	ND	316,000	75,000	17,100	153,000	0	0	308,200	0
25	Kings - North Fork Kings	ND	116,600	175,300	ND	409,000	94,700	71,300	34,500	0	16,200	290,200	0
24	Kings - North Kings	To 2040	305,900	510,356	922,556	560,400	261,700	234,500	0	0	122,000	412,200	0
26	Kings - South Kings	to 2040	145,900	281,900	ND	363,000	84,000	103,900	400	0	35,400	0	0
145	Pleasant Valley	2020-2042	28,200	31,265	ND	50,200	9,560	14,700	0	0	1,700	23,336	0
63	Tule - Delano-Earlimart ID	2020 - 2070	38,000	119,300	N/A	151,900	8,100	25,800	26,000	0	42,000	28,900	N/A
43	Tule - Eastern Tule	2018 - 2070	128,000	273,700	N/A	303,150	41,100	73,900	59,000	0	56,000	113,000	N/A
56	Tule - Lower Tule River ID	ND	ND	ND	ND	ND	0	0	0	0	0	0	0
65	Tule - Pixley ID	2018 - 2070	39,000	31,800	ND	106,100	16,800	40,000	84,000	0	58,000	69,100	0
8	Westside	2017-2020	404,000	726,000	ND	79,000	281,000	10,000	160,000	0	185,000	320,000	ND
8	Westside - CC 2030	2017-2020	416,000	726,000	ND	79,000	281,000	10,000	160,000	0	183,000	313,000	ND
8	Westside - CC 2070	2017-2020	423,000	523,000	ND	79,000	305,000	11,000	231,000	0	189,000	471,000	ND
123	White Wolf	2020-2072	81,400	66,500	ND	142,400	41,900	8,700	1,500	0	3,300	53,300	0
123	White Wolf - CC 2030	2020-2072	81,400	66,500	ND	142,400	40,500	8,700	1,900	0	2,000	57,500	0
123	White Wolf - CC 2070	2020-2072	81,400	66,500	ND	142,400	37,500	8,200	2,400	0	400	63,200	0

Note: No values were provided for Tail Water Return. Groundwater recharge from surface water includes recharge from conveyance systems.

Kaweah-East, Greater and Mid; Kern Co. – Kern River and South of Kern River; Tulare Lake, and Tule-Alpaugh did not have data for these scenarios. See Table A-TL-5b for Kaweah Subbasin summary of projected water budgets as provided in the Kaweah GSPs. See Table A-TL-5b for Kern Subbasin summary of projected water budgets as provided in the GSPs. See Table A-TL-5c for Kings Subbasin summary of projected water budgets as provided in the Kaweah GSPs

Table A-TL-5b. Summary of Projected Water Balance under Baseline, 2030 and 2070 Conditions for the Kaweah Subbasin

	Annual Water Supply and Demand (TAFY)		
	Baseline	2030	2070
Changes in Primary Water Sources			
Upstream Inflow into Kaweah Lake	465	442	442
Total CVP Friant-Kern Canal Diversions	1,200	1,093	991
Total Kings River Full Natural Flow	1,751	1,733	1,731
Surface Water Supply in Kaweah			
Rain Percolation (Cropland + non-ag)	118	119	116
Upstream Inflow Available for Kaweah	365	347	347
Imported Water CVP Friant-Kern Canal	169	154	140
Imported Water Kings River	13	13	13
Total Surface Supply in Kaweah	672	625	603
Water Demand in Kaweah			
Crop Water Demand	1,004	1,036	1,086
Municipal and Industrial Demand	69	69	69
Total Water Demand in Kaweah	1,073	1,105	1,155
Total Water Deficit in Kaweah	408	472	539

Source: Table 37 in Kaweah Basin Setting Water Budget

Table A-TL-5c. Change in Groundwater Storage for Water Budgets of Projected Scenarios in the Kern Subbasin

Scenario	C2VSimFG-Kern Model Results	Adjusted Model Results
	Change in Groundwater Storage (AFY)	
Projected Baseline	324,326	324,326
2030 Climate Change (no PMAs)	380,900	372,120
2070 Climate Change (no PMAs)	489,828	472,336

Table A-TL-5d. Summary of Projected Water Budget for the Kings Subbasin in AFY

Description	Total	McMullin	North Fork Kings	North Kings	Central/South Kings	Kings River East	James ID
Total Supply	3,686,945	404,800	628,800	1,238,356	627,000	687,000	100,989
Consumptive Use Subtotal	2,139,841	297,500	409,000	547,000	365,000	435,000	67,641
Groundwater Recharge Subtotal	1,434,453	245,100	205,000	518,400	219,500	213,100	33,353
Nonrecoverable Subtotal	645,541	50,400	65,500	336,100	113,500	76,400	22,141
Method 1							
Estimated Annual Change in Groundwater Storage	0	0	0	0	0	0	0
Recharge	1,434,453	245,100	205,000	518,400	219,500	213,100	33,353
Pumping	1,467,406	308,200	290,200	412,200	199,200	239,700	17,906
Outflow	200,441	0	16,200	122,000	35,400	4,700	22,141
Other change in storage	14,000	-18,500	32,500	0	0	0	0

Source: Kings Subbasin GSPs – Basin Setting Water Budgets

Notes: No units were provided with this table; assuming AFY.