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CHG

Technical Memorandum

Date: March 18, 2014
From: Spencer Harris, HG 633
To: ISJ Group

SUBJECT: Recycled Water Discharges to Los Osos Creek

This memorandum characterizes the interaction between Los Osos Creek and the underlying groundwater basin. The purpose of the memorandum is to evaluate the effects of recycled water discharges to Los Osos Creek on the available water resources for domestic, agricultural, and environmental demands, compared to other recycled water management options.

Los Osos Creek and Groundwater Basin Interaction

Stream seepage from Los Osos Creek is one of the primary sources of recharge to the Los Osos Valley Groundwater basin. Inflow to the basin from surface flows in Los Osos Creek directly recharges the valley alluvial deposits. Groundwater in the alluvial deposits, in turn, flows into the upper and lower aquifers in the Eastern Area (formerly Creek Compartment). Groundwater flow between the Eastern Area and the Central Area is controlled by permeability, cross-sectional area, and hydraulic gradient, both within the upper and lower aquifers, and across the regional aquitard.

The hydrologic budget for the basin under 2012 conditions at steady state is estimated to be 4,330 acre-feet per year (AFY), of which approximately 3,180 AFY of inflow is from outside the basin (percolation of precipitation, capture of stream flow and other runoff, and subsurface inflow from bedrock). Los Osos Creek contributes approximately 610 AFY, or 20 percent of the freshwater inflow to the basin under current conditions (2012 draft hydrologic budget attached).

Los Osos Creek may be divided into four reaches within the groundwater basin limits: Upper, Upper Central, Lower Central, and Lower (Figure 1). Each of these reaches has a different interaction with the underlying groundwater basin, as described below.

<u>Upper Reach</u>

The Upper reach is approximately 2,700 feet long, located between the upstream basin boundary and the southern Los Osos Oaks State Reserve boundary. This reach is characterized by coarse-grained stream channel deposits and alluvial fill directly overlying the lower aquifer, in an uplifted portion of the basin. Stream seepage rates are interpreted to be the highest among the four reaches, based

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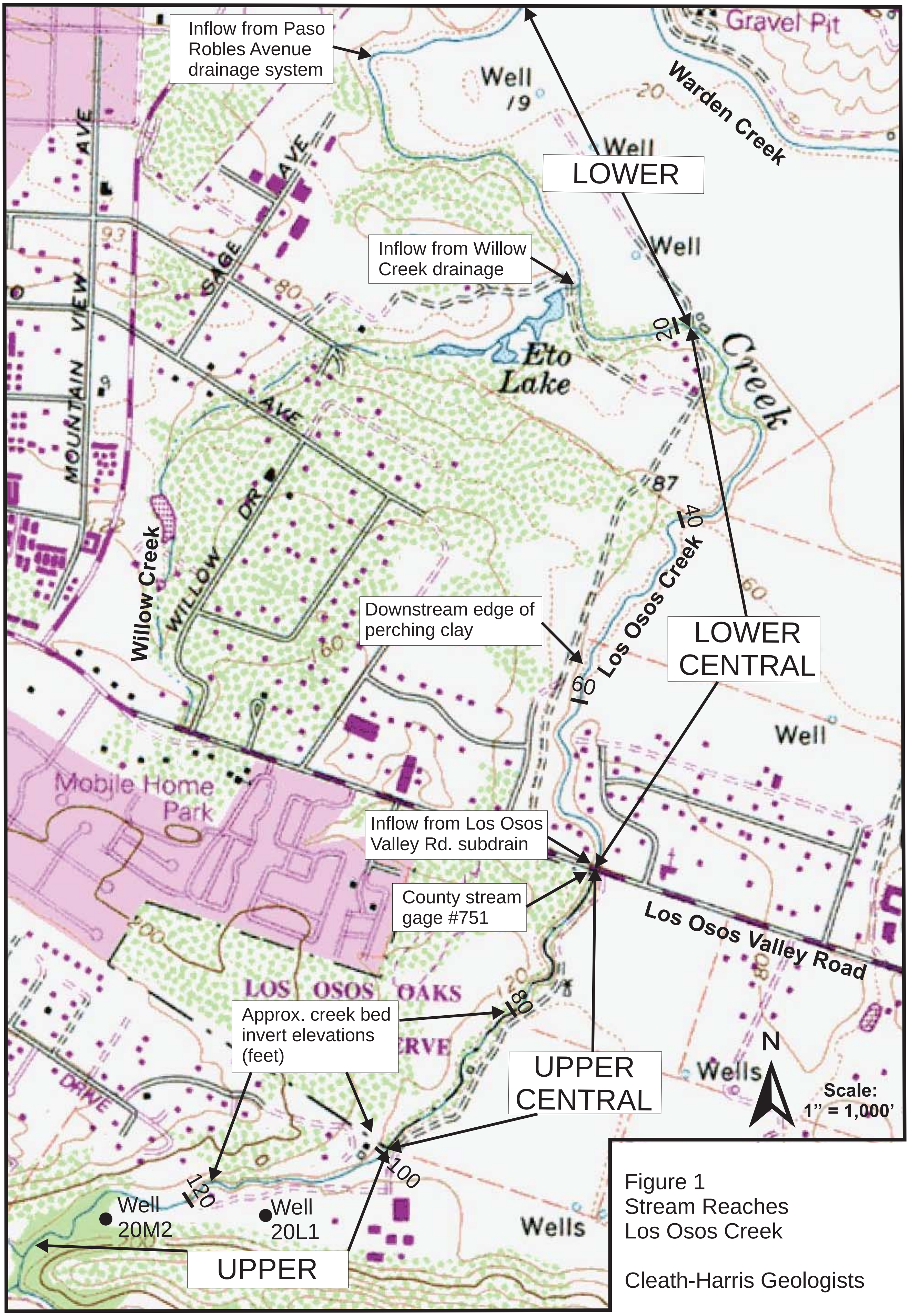

Figure 1
Stream Reaches
Los Osos Creek

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on permeable streambed materials, good hydraulic connection to the main buried alluvial channel, and observations during stream flow studies in 2009 and 2010 (CHG, 2010).

Water level hydrographs for two wells (20M2 and 20L1) are available along this reach, separated from each other by approximately 1,200 feet (locations shown in Figure 1, hydrographs shown in Figure 2). The seasonal (spring and fall) groundwater levels fluctuate of up to 50 feet at 20L1 (an inactive well) but only 10 feet at 20M2. Both wells are approximately the same depth (100-120 feet deep). The greater seasonal fluctuations at the downstream well, and steep hydraulic gradient between the wells is interpreted to be due to an increasing hydraulic connection with the main groundwater basin, and indicates that stream seepage percolating into the uplifted portion of the basin (the Upper reach) can easily move into the main basin through the alluvial deposits.

Downward movement of groundwater from Upper reach alluvial deposits also recharges directly into the lower aquifer. Local uplift is inferred from a drillers log in the area that describes marine sand (fine sand and sea shells) underlying the Upper reach alluvium through 200 feet depth. Subsurface flow between the uplifted portion of the lower aquifer and the main basin lower aquifer appears restricted to the northwest (towards downtown), based on water level differences.

Upper Central Reach

The Upper Central reach continues along the eastern boundary of the Los Osos Oaks State Reserve for approximately 2,600 feet, terminating at the Los Osos Valley Road bridge. The stream bed is composed of fine to coarse grained sands and gravels, but clay beds are present in several places in the banks, some of which likely extent beneath the channel and limit percolation, compared to the Upper reach.

County stream gage #751 is located at the downstream end of the Upper Central reach and measures runoff from a watershed area of 7.27 square miles. Stream flow records are available for 19 years between 1976 and 2002 (attached, San Luis Obispo County, 2005). The average flow on Los Osos Creek at the gage was 3,769 AFY. Median flow was 2,110 AFY. Annual flow ranged from no flow (2002) to over 19,270 acre-feet (partial flow for 1995).

Most of the seepage into the groundwater basin takes place upstream of the gage location, therefore surface flows entering the basin on Los Osos Creek are typically greater than measured at the gage. Approximately two-thirds of the total average annual recharge from Los Osos Creek likely occurs in the Upper and Upper Central reaches, based on the Basin Model results.

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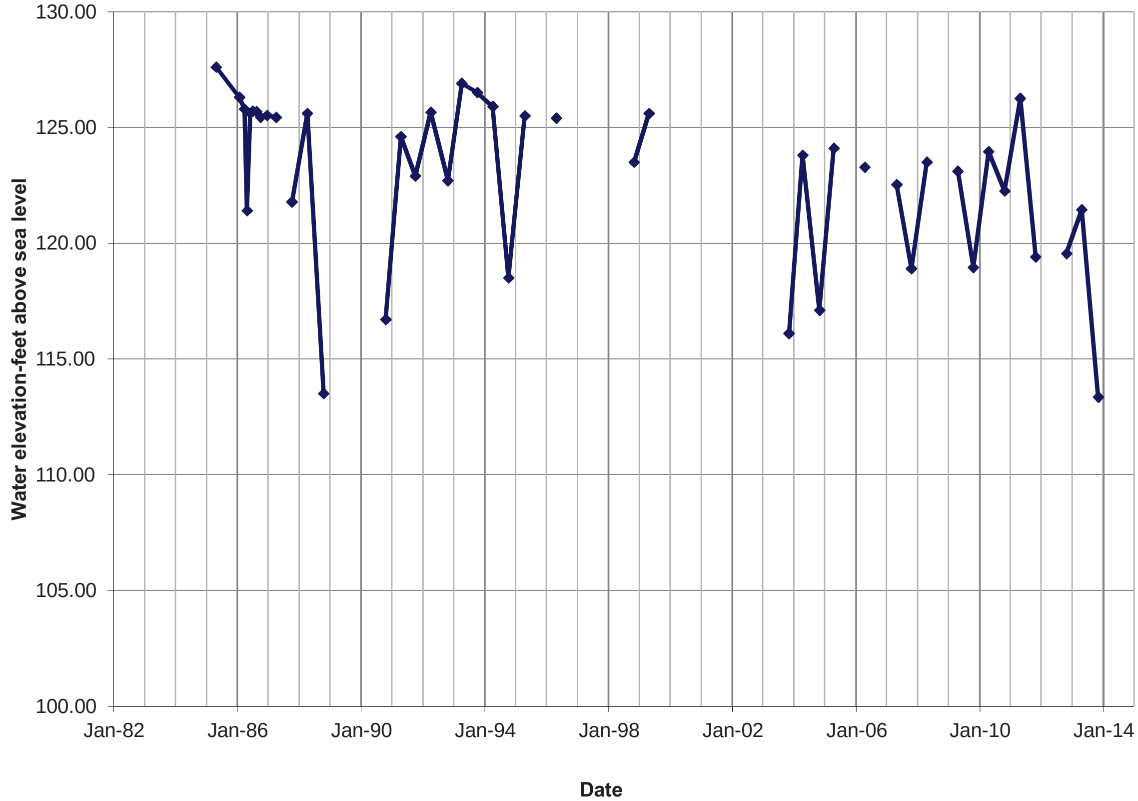
Upper Reach Hydrograph 20M02 (upstream)



Upper Reach Hydrograph 20L01(downstream)

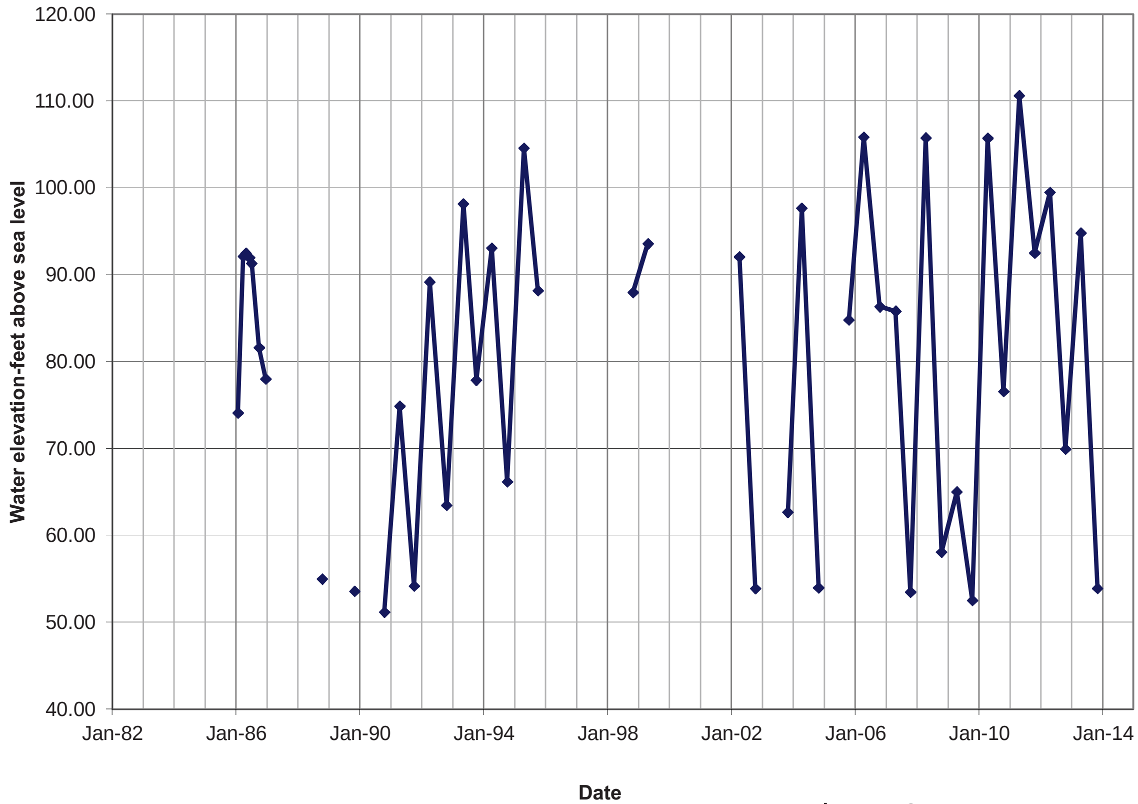


Figure 2
Upper Reach Hydrographs
Los Osos Creek

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Lower Central Reach

The Lower Central reach extends approximately 5,200 feet from Los Osos Valley Road to the nominal creek invert elevation of 20 feet above sea level, which is approximately 1,000 feet upstream of the Willow Creek/Eto Lake drainage confluence (Figure 1).

Two major clay horizons within the basin, the perching clay and the regional aquitard, are converging beneath the Lower Central reach, and constricting the hydraulic connection between the creek valley alluvium and the upper aquifer. The stream bed is interpreted to overlie the perching clay for approximately 1,500 feet downstream of Los Osos Valley Road, with minimal seepage loss (CHG, Creek Valley Yield Evaluation - Technical Memorandum, July 9, 2009). The remaining one-third of Los Osos Creek stream seepage is interpreted to occur in the Lower Central reach downstream of the perching clay (more average stream seepage than the Upper Central reach, but less than the Upper reach).

Lower Reach

The Lower reach extends approximately 4,000 feet from the creek invert elevation of 20 feet to the downstream basin boundary. At the stream bed invert elevation of approximately 20 feet above mean sea level, Los Osos Creek is interpreted to shift from a losing stream to a gaining stream, as groundwater from the upper aquifer moves toward the creek valley, rather than toward the pumping depression between downtown Los Osos and the east side private domestic wells. Not only does the upper aquifer begin to drain to the creek, but the principal drainage system for the perched aquifer (Willow Creek/Eto Lake) joins Los Osos Creek along this reach. The Basin Model indicates close to 100 AFY of average annual groundwater basin outflow to Los Osos Creek occurs over the Lower reach.

Recycled Water Management

The Draft Basin Plan defines two water reinvestment programs that include recycled water management, the Urban Water Reinvestment program and the Agricultural Water Reinvestment Program (2013 Draft Basin Plan). Urban Water Reinvestment includes 780 AFY of recycled water use under current conditions, increasing to 1,120 AFY with additional agricultural reuse at buildout under the Agricultural Reinvestment Program. Table 1 below summarizes the recycled water uses listed in the Water Reinvestment Program.

Table 1
Recycled Water Uses in the Water Reinvestment Program

Potential Use	Current Conditions (AFY)	Buildout (AFY)
Broderson Leach Fields	448	448
Bayridge Estates Leach Fields	33	33
Urban Reuse	63	63
Sea Pines Golf Course	40	40
Los Osos Valley Memorial Park	50	50
Agricultural Reuse	146	486
Total	780	1,120

Source: Basin Plan Public Review Draft

Recycled water discharge to Los Osos Creek would reduce the equivalent quantity of water from one or more uses listed in Table 1 above. Bayridge Estate leach field flows are intended for perched aquifer recharge in the Willow Creek area (part of the environmental water reservation), which could not be achieved through Los Osos Creek discharges. Urban reuse and Sea Pines golf course reuse create a direct reduction in Central and Western area water demand, which also could not be achieved through creek discharges. For practical purposes, the only two sources of recycled water that need to be considered for creek discharge are Broderson leach field flows and agricultural reuse flows (recycled water reuse at Los Osos Valley Memorial Park is equivalent to agricultural reuse).

<u>Broderson Recycled Water Exchange</u>

Broderson will provide all-weather recycled water disposal that also increases basin yield and reduces seawater intrusion. The Basin Model was used to compare the long-term effects of Broderson discharge versus Los Osos Creek discharge. Two development scenarios were evaluated, the first with Program A, B, and C, and the second scenario with Program D added (refer to draft Basin Plan for program details). Model results are attached.

Assuming basin infrastructure Program A, B , and C (everything but Program D), shifting recycled water discharges from Broderson to Los Osos Creek would decrease basin yield by approximately 50 percent of the amount of water shifted (100 AFY decrease in yield for 200 acre-feet shifted). Even with Program D added, model results show well facilities operating in the Eastern Area would not be able to capture more than approximately 50 percent of the recycled water shifted from Broderson to Los Osos Creek.

There is a decrease in well yields in the Western and Central basin areas due to lower water levels after shifting recycled water discharges away from Broderson. The shifted discharges cannot be fully captured by Los Osos Creek, so there is a net loss of basin yield.

The reason why there is only partial capture of the recycled water flows shifted from Broderson to creek discharge is that there is a limit to the amount of surface water that can be transmitted into the aquifers through the stream bed, based on the permeability of the underlying sediments. For Basin Yield Metric 100 scenarios (basin yield scenarios), the maximum stream seepage condition is already being approached, so there is a diminishing return to basin yield when adding more stream flow.

When recycled water is shifted from Broderson to creek discharge under lower Basin Yield Metric scenarios, where production is held constant at less than maximum yield, the seawater/freshwater interface encroaches farther inland. For example, at a Basin Yield Metric of 72 for Basin Plan Scenario UG+ABC, a shift of 200 acre-feet from Broderson to Los Osos Creek discharge results in approximately 2,000 feet of inland movement of the seawater interface.

The basin model is a steady-state model, so there are no seasonal fluctuations in stream flow. To differentiate managed recycled water discharges from seasonal natural flows, the recycled water is injected directly into basin aquifers adjacent to the Upper reach of the stream channel. This provides a mechanism for simulating increased recharge during dry-season managed discharges, that would otherwise require a transient model.

<u>Agricultural Reuse Exchange</u>

The Basin Plan identifies two tiers of agricultural reuse. Higher priority will be given to properties overlying the basin that intend to use recycled water to offset existing pumping in the basin, followed by properties overlying the basin that will use recycled water for new agricultural demands.

Shifting recycled water from the higher priority agricultural reuse properties to creek discharge would not change the available water for agriculture or purveyors. With basin infrastructure Programs A, B and C implemented, shifting agricultural reuse on existing crops to creek discharge increases basin groundwater yield by the full amount shifted (425 AFY; 100 percent recovery of water shifted), but this is only because irrigation well production in the creek valley had been reduced by 425 AFY to accept recycled water. *The yield scenario for agricultural reuse is not a maximum yield (Basin Yield Metric 100) scenario, so maximum stream seepage capacity was not being approached, and all of the reuse that is shifted to recycled water discharges can be captured by wells.*

Under Program D, which is a maximum yield (Basin Yield Metric 100) scenario, shifting recycled water from higher priority agricultural reuse to creek discharge increases total basin yield by approximately 40% of the amount of water shifted, although the purveyor well yield decreases (see attached model results). The relatively low efficiency in capturing recycled water discharges under Program D, as with the Broderson exchange scenarios, is because the pre-shift yield scenario is approaching maximum stream seepage capacity, so there is a diminishing return to basin yield when adding more stream flow.

Shifting recycled water from the lower priority agricultural reuse properties to creek discharge would increase basin yield. Assuming basin infrastructure Programs A, B and C are implemented, shifting 425 AFY of recycled water from ag reuse on new crops to creek discharge would increase basin yield by an estimated 165 AFY, or close to 40 percent of the water shifted. With Program D, the benefit of shifting recycled water is reduced to 115 AFY, or close to 30 percent of the shift.

At lower Basin Yield Metric values, with basin production kept constant, there would be no change in the position of the seawater/freshwater interface when shifting existing (higher priority) agricultural reuse to creek discharge. The interface would retreat toward the coast when shifting new (lower priority) agricultural reuse to creek discharge.

Seasonal Discharge Strategies

Recycled water discharges to Los Osos Creek can percolate into the stream channel deposits and creek valley alluvium when the stream channel is dry. A seepage capacity of up to 10 cubic feet per second (CFS) has been documented for the Upper and Upper Central reaches (CHG, 2010). Adding discharges to existing natural flow can also increase percolation to groundwater, until the bed seepage capacity is reached, or the alluvial deposits are full, at which point surface flows will continue downstream into Morro Bay Estuary.

Due to the seasonal nature of precipitation, local stream flow, and agricultural irrigation schedules, Los Osos Creek is typically dry during the summer and fall in the upper reaches. While this is the best time to introduce recycled water, there is a finite amount of storage space available to fill. If the available space is filled with recycled water in the fall, then there will be less room for storm water runoff the recharge the groundwater basin in the winter and spring. Seasonal strategies have been developed that increase the efficiency of a creek discharge program, potentially minimizing the amount of natural recharge from stream seepage that is displaced by recycled water discharges.

Records for water levels in the creek valley are available over the last 40 years. While there are some gaps, a representative data set has been generated for the average spring water level in the creek valley and the average fall-to-spring water level recovery. Spring water levels are important for managing discharges to Los Osos Creek because they indicate the amount of storage capacity remaining in the Eastern Area aquifers following the wet season. Average fall-to-spring water level recovery has been used to calibrate storage capacity volumes.

The average groundwater level recovery, based on 11 creek valley wells, was close to 10 feet from fall to spring between 1986 and 2013, a balanced hydrologic period (1 inch cumulative departure from mean rainfall). Using the basin model estimate of approximately 600 acre-feet of average annual stream seepage, the correlation between water levels and stream seepage would be a nominal 60 acre-feet of stream seepage per foot of water level recovery. In other words, for every vertical foot of space between the average water level and a full condition, there would be 60 acre-feet of available space for stream seepage.

For example, if the average spring water level in the creek valley is four feet below the full condition, up to 240 acre-feet of recycled water (at 60 acre-feet per foot of storage space) could have been percolated the prior fall without significant increases in winter runoff to Morro Bay Estuary. The critical unknown factor is what the natural recharge from stream seepage will be between the fall discharge period and the following spring of any given year.

A preliminary evaluation of adjusting fall recycled water discharges based on prior spring water levels indicates that an improvement of 20 percent efficiency is possible over annual, fixed discharges. There would be less overall volume discharged to the creek, but more of the discharge would benefit the basin. Figure 3 shows the amount of spring storage space available for stream seepage from 1974 to 2013. Table 2 summarizes the results of the management evaluations.

As shown in Table 2, the percent discharge efficiency (percent of recycled water recharge that does not displace natural recharge) is lowest when discharges are introduced every year at the same volume with no minimum spring storage requirement. Lower volumes of constant discharge would have higher efficiency. When a minimum storage volume is required in the spring prior to summer/fall discharging, the efficiency increases. Raising the minimum spring storage volume increases efficiency, but there are fewer qualifying years (less years with sufficient spring storage capacity). Maximum efficiency (close to 90 percent) is reached when the minimum spring storage is more than twice the subsequent recycled water discharge.

Note that if recycled water discharges had actually been implemented during the period from 1974 to 2013, the data set would have been altered. While the discharge management strategies would still be valid, the number of qualifying years would likely be reduced, depending on the carry-over volumes from spring to spring.

The inefficiencies of recycled water capture in the Basin Model scenarios are not additive to the management strategy inefficiencies for creek discharge. Although the mechanisms are different, both are operating on the same applied discharge water. For most scenarios, the benefit to the basin will be restricted by permeability-based capture efficiency (30-40 percent of shifted water). The exception is when shifting agricultural reuse for existing crops to creek discharge (100 percent capture), which would then be restricted by management strategies and available aquifer storage.

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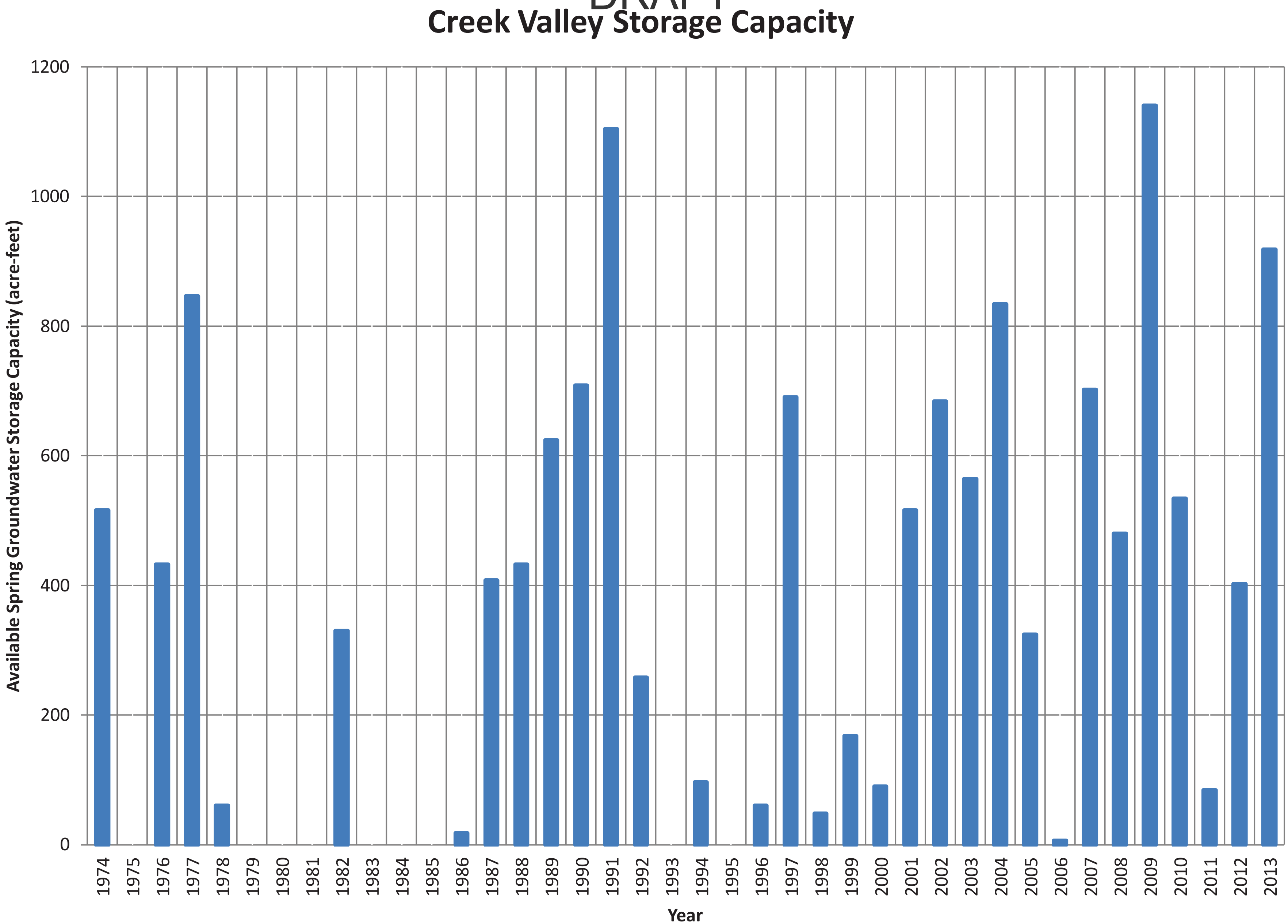

Figure 3
Creek Valley Spring Storage Capacity
Los Osos Creek

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TABLE 2
RECYCLED WATER DISCHARGE MANAGEMENT
PERCENT EFFICIENCY BASED ON APPLYING STRATEGIES TO 1974-2013 DATA SET

	NO MIMUMUM STORAGE (ACRE-FEET)			MINIMUM STORAGE (ACRE-FEET)					VARIABLE MINIMUM (ACRE-FEET)
DISCHARGE TO CREEK	100	200	350	100	200	100	200	350	1/3 PRIOR STORAGE
MINIMUM STORAGE	none	none	none	100	200	350	350	350	VARIABLE
QUALIFYING YEARS	40	40	40	22	21	18	18	18	35
TOTAL IN	4000	8000	14000	2200	4200	1800	3600	6300	4386
TOTAL OUT	-1238	-2970	-5808	-512	-1202	-208	-608	-1326	-930
NET RECHARGE	2762	5030	8192	1688	2998	1592	2992	4974	3456
RECHARGE PER YEAR	69.05	125.75	204.8	77	143	88	166	276	192
PERCENT EFFICIENCY	**69**	**63**	**59**	**77**	**72**	**88**	**83**	**79**	**79**

Reservation for Environmental Demand

Recycled water discharge to Los Osos Creek can be credited toward the environmental water reservation in Coastal Development Permit Condition 97 (reservation of not less than 10 percent of the total volume of treated effluent). Depending on how recycled discharges to Los Osos Creek are viewed, all of the discharges may be credited toward satisfying the environmental reservation, or at a minimum, the flows that are not credited toward basin yield. There will always be more water available for environmental demand after shifting recycled water from other areas to creek discharge.

Conclusions

Moving recycled water from Broderson to creek discharge results in either a decline in basin yield of 50 percent of the amount of water shifted or, with constant basin production, inland encroachment of the seawater/freshwater interface.

Under Basin Plan programs A+B+C, moving recycled water from reuse on existing crops to creek discharge results in no effective change to the water available to purveyors or agriculture, and no movement of the seawater/freshwater interface. With Program D, purveyor production capacity in the creek valley will be reduced.

The greatest potential benefit to purveyor wells would occur when moving water from new crop agricultural reuse to creek discharge. Basin yield increases by 30-40 percent of the amount of water shifted, with all the increased yield available to purveyor wells. For constant production scenarios, the seawater/freshwater interface would retreat toward the coast. Available water for new agriculture would decrease by the amount shifted.

Strategies for varying the amount of recycled water discharges in the fall, based on prior spring water levels, can increase the effective capture of discharged water compared to fixed annual discharges. Efficiencies range from approximately 60 to 90 percent effective recharge, with higher efficiencies for lower volume discharges.

All scenarios for recycled water discharge to Los Osos Creek will increase average stream flow and provide water for environmental demand.

References

Carollo, 2007, Potential Viable project Alternatives Rough Screening Analysis, San Luis Obispo County - Los Osos Wastewater Project Development, march 2007.

Cleath-Harris Geologists, 2010, Summary of Los Osos Creek Flow Survey Results Dec. 2009 - Feb. 2010, Draft Technical Memorandum, April 14, 2010.

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Morro Group, 1987, Final Environmental Impacts Report, County Service Area No. 9 Wastewater Treatment Facilities, Los Osos, Baywood Park and Cuesta-by-the-Sea, San Luis Obispo County, California; SCH# 84121914, ED 83-191, August 1987.

San Luis Obispo County Public Works Department, 2005, Hydrologic Report, Water Years 2001-2002 and 2002-2003, May 16, 2005.

ATTACHMENTS:

Hydrologic Budget
Stream Gage #751 Data Summary
Basin Model Results

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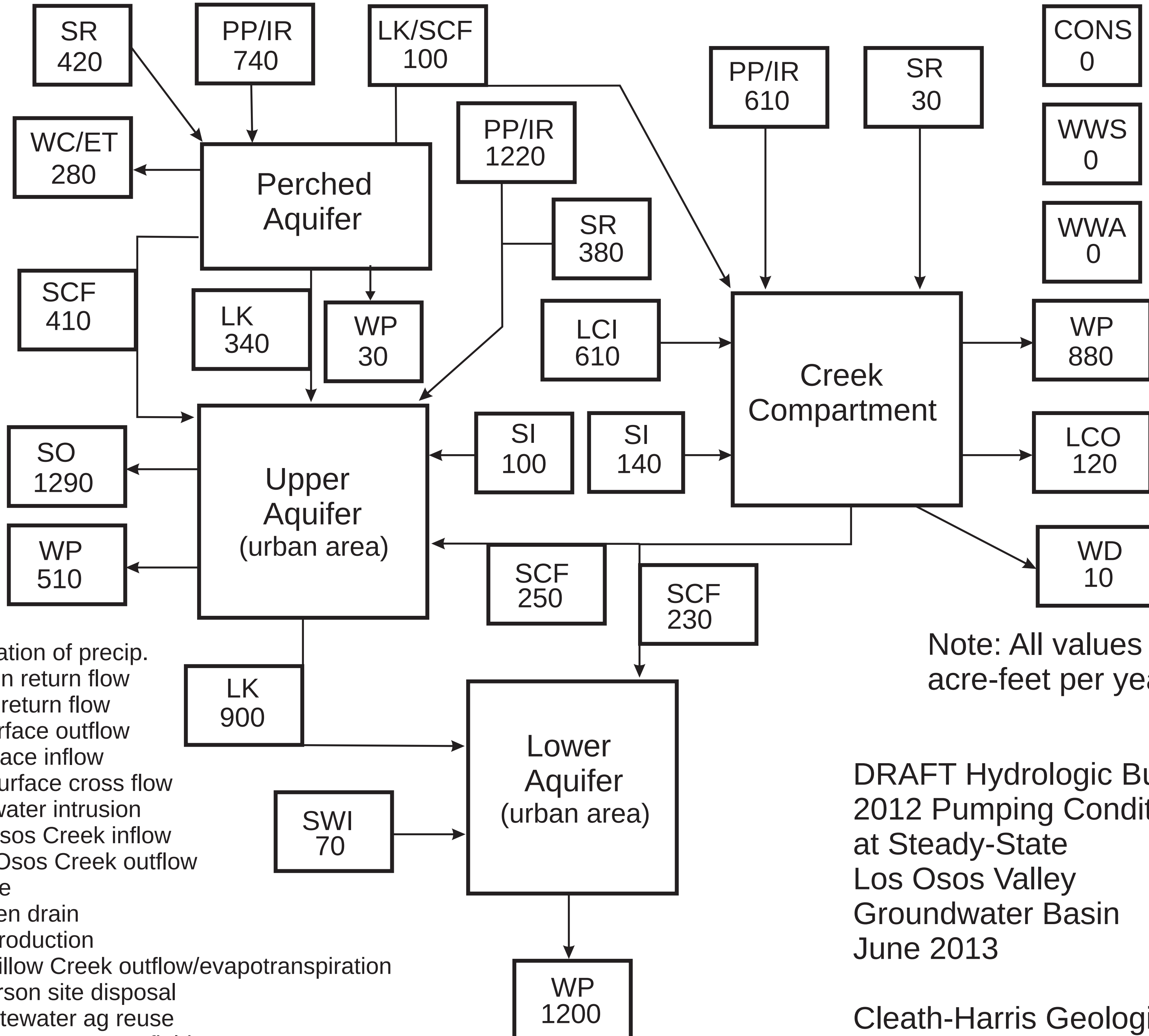

Legend

PP = percolation of precip.
IR = irrigation return flow
SR = septic return flow
SO = subsurface outflow
SI = subsurface inflow
SCF = subsurface cross flow
SWI = sea water intrusion
LCI = Los Osos Creek inflow
LCO = Los Osos Creek outflow
LK = leakage
WD = Warden drain
WP = well production
WC/ET = Willow Creek outflow/evapotranspiration
BR = Broderson site disposal
WWA = wastewater ag reuse
WWS = wastewater spray field
CONS = water conservation

Note: All values in acre-feet per year

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2012 Pumping Conditions
at Steady-State
Los Osos Valley
Groundwater Basin
June 2013

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Stream Flow

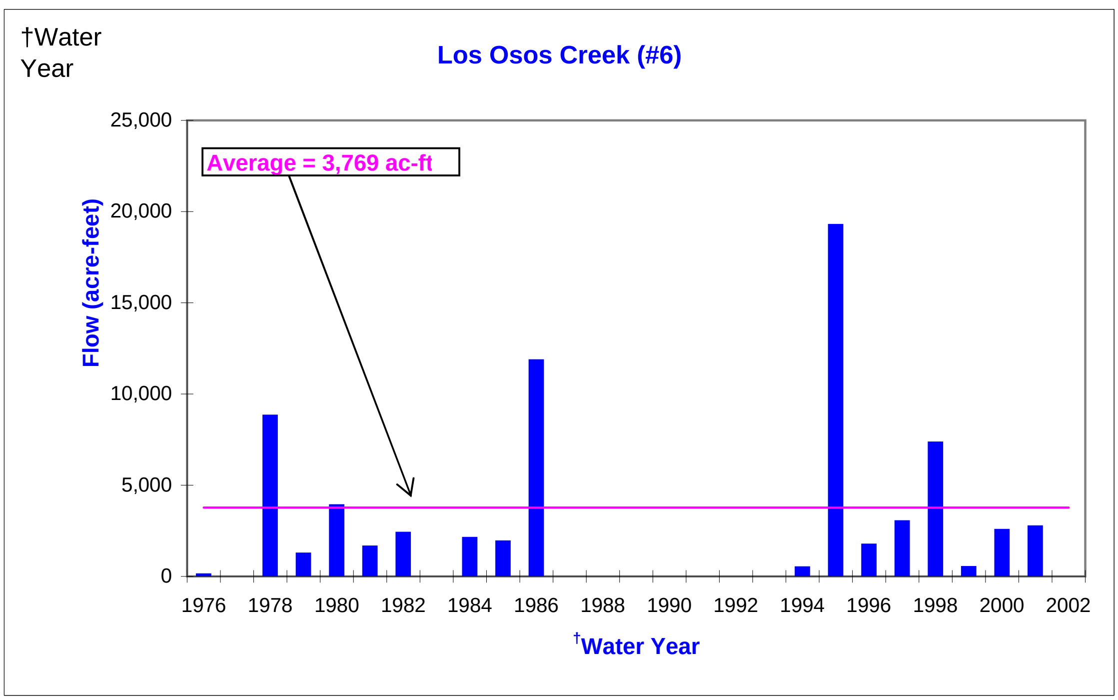
Stream Gage Name: **Los Osos Creek (#6)**
Water Planning Area: **3**

Water Year†	Annual Stream Flow (acre-feet)	Water Year†	Annual Stream Flow (acre-feet)
1976	110 [1]	1990	[9]
1977	0	1991	[10]
1978	8,810	1992	[11]
1979	1,240	1993	[12]
1980	3,890 [2]	1994	497
1981	1,630	1995	19,270
1982	2,390 [3]	1996	1,740
1983	[4]	1997	3,020
1984	2,110	1998	7,340
1985	1,920	1999	505
1986	11,850 [5]	2000	2,540
1987	[6]	2001	2,470
1988	[7]	2002	0
1989	[8]	2003	NA [13]

[1] gage put into operation in February
[2] missing data for one day in February
[3] missing data for various days in February, March, and April
[4] only visual observations were available for this year
[5] missing data for the end of February and beginning of March
[6-12] no data available for this time period
[13] Data not available at the time the report was published

From Annual Stream Flow Records	
Average Flow:	3,769 AFY
Median Flow:	2,110 AFY
Minimum Flow (2002):	0 AFY
Maximum Flow (1995):	19,270 AFY

(notations as recorded in San Luis Obispo County stream flow log books)



† October 1 - September 30

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BASIN MODEL RESULTS

BASIN INFRASTURCTURE PROGRAMS WITH BRODERSON SHIFT TO CREEK DISCHARGE

BX = 200 AFY Shift from Broderson

Well ID	2012 PROD	A+B+C	A+B+C/BX	A+B+C+D	A+B+C+D/BX
CREEK DISCHARGE	**0**	**0**	**200**	**0**	**200**
Rosina	152	0	0	0	0
Buckskin	0	200	200	200	200
Cabrillo	75	75	75	75	75
Rosina (upper)	0	200	200	200	200
LO#3	144	135	135	135	135
Skyline	0	150	**100**	150	**100**
So. Bay #1	333	275	**300**	200	200
Subtotal	704	1035	1010	960	910
Palisades	218	0	0	0	0
10th	200	200	**125**	200	**125**
8th (lower)	235	0	0	0	0
Farrell (upper)	0	150	150	150	150
8th (upper)	0	150	150	150	150
SBB (upper)	0	50	50	50	50
3rd	50	75	75	75	75
SBB (lower)	54	150	150	150	150
Subtotal	757	775	700	775	700
S&T 5	67	0	0	0	0
S&T (new upper)	0	100	100	125	**100**
EXP #1 (MHP)	0	300	300	300	300
EXP #2 (East Gap)	0	100	100	100	100
Creek Valley wells	0	0	0	200	**250**
PURVEYOR TOTAL	**1528**	**2310**	**2210**	**2460**	**2360**
golf	80	50	50	50	50
private	200	190	190	190	190
Agriculture	800	800	800	800	800
Comm. Park	0	0	0	0	0
BASIN TOTAL (YIELD)	**2608**	**3350**	**3250**	**3500**	**3400**
Percent efficient*			-50		-50
Intrusion	70	28	26	29	28
Net creek seepage (natural)	490	776	655	877	770
Creek seepage (recycled)	0	0	200	0	200
Subsurface outflow	1290	865	905	841	830

*percent of recycled water shifted to creek discharge that increases basin yield

RED = Decrease well production after shift; **BLUE** = increase well production affter shift

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BASIN MODEL RESULTS
BASIN INFRASTURCTURE PROGRAMS WITH AG REUSE SHIFT TO CREEK DISCHARGE
AX = 425 AFY shift from New Ag (NA) or Existing Ag (EA) Reuse

		Ag Reuse on new crops VS Creek Discharge				**Ag Reuse on existing crops VS Creek Discharge**			
Well ID	2012 PROD	A+B+C/NA	A+B+C/AX	A+B+C+D/NA	A+B+C+D/AX	A+B+C/EA	A+B+C/AX	A+B+C+D/EA	A+B+C+D/AX
CREEK DISCHARGE	**0**	**0**	**425**	**0**	**425**	**0**	**425**	**0**	**425**
Rosina	152	0	0	0	0	0	0	0	0
Buckskin	0	200	200	200	200	200	200	200	200
Cabrillo	75	75	75	75	75	75	75	75	75
Rosina (upper)	0	200	200	200	200	200	200	200	200
LO#3	144	135	135	135	135	135	135	135	135
Skyline	0	150	150	150	150	150	150	150	150
So. Bay #1	333	275	**340**	200	**340**	340	340	175	**340**
Subtotal	704	1035	1100	960	1100	1100	1100	935	1100
Palisades	218	0	0	0	0	0	0	0	0
10th	200	200	**250**	200	**250**	250	250	200	**250**
8th (lower)	235	0	**25**	0	**25**	25	25	0	**25**
Farrell (upper)	0	150	150	150	150	150	150	150	150
8th (upper)	0	150	150	150	150	150	150	150	150
SBB (upper)	0	50	50	50	50	50	50	50	50
3rd	50	75	75	75	75	75	75	75	75
SBB (lower)	54	150	150	150	150	150	150	150	150
Subtotal	757	775	850	775	850	850	850	775	850
S&T 5	67	0	0	0	0	0	0	0	0
S&T (new upper)	0	100	**125**	125	125	125	125	125	125
EXP #1 (MHP)	0	300	300	300	300	300	300	300	300
EXP #2 (East Gap)	0	100	100	100	100	100	100	100	100
Creek Valley wells	0	0	0	200	**100**	0	0	600	**100**
PURVEYOR TOTAL	**1528**	**2310**	**2475**	**2460**	**2575**	**2475**	**2475**	**2835**	**2575**
golf	80	50	50	50	50	50	50	50	50
private	200	190	190	190	190	190	190	190	190
Agriculture	800	800	800	800	800	375	**800**	375	**800**
Comm. Park	0	0	0	0	0	0	0	0	0
BASIN TOTAL (YIELD)	**2608**	**3350**	**3515**	**3500**	**3615**	**3090****	**3515**	**3450**	**3615**
Percent efficient*			39		27		100		39
Intrusion	70	28	27	29	29	28	27	27	29
Net creek seepage (natural)	490	776	543	877	607	541	543	831	607
Creek seepage (recycled)	0	0	425	0	425	0	425	0	425
Subsurface outflow	1290	865	846	841	831	849	846	867	831

*percent of recycled water shifted to creek discharge that increases basin yield

**not a maximum yield (Basin Yield Metric 100) scenario

RED = Decrease well production after shift; **BLUE** = increase well production affter shift