A year in the life of Upper Ventura River Groundwater Basin

Upper Ventura River Groundwater Basin
UVRBGSA

Jordan Kear, PG, CHG
08 March 2018

KEAR GROUNDWATER

Today's Discussion…

- Upper Ventura River Groundwater Basin Geology and Well Locations
- Precipitation in 2017 and 2018 and historically
- Surface flow in the river and its tributaries
- Groundwater Levels responses
- Fires and debris flows affects on surface water and groundwater resources from a chemical and physical perspective

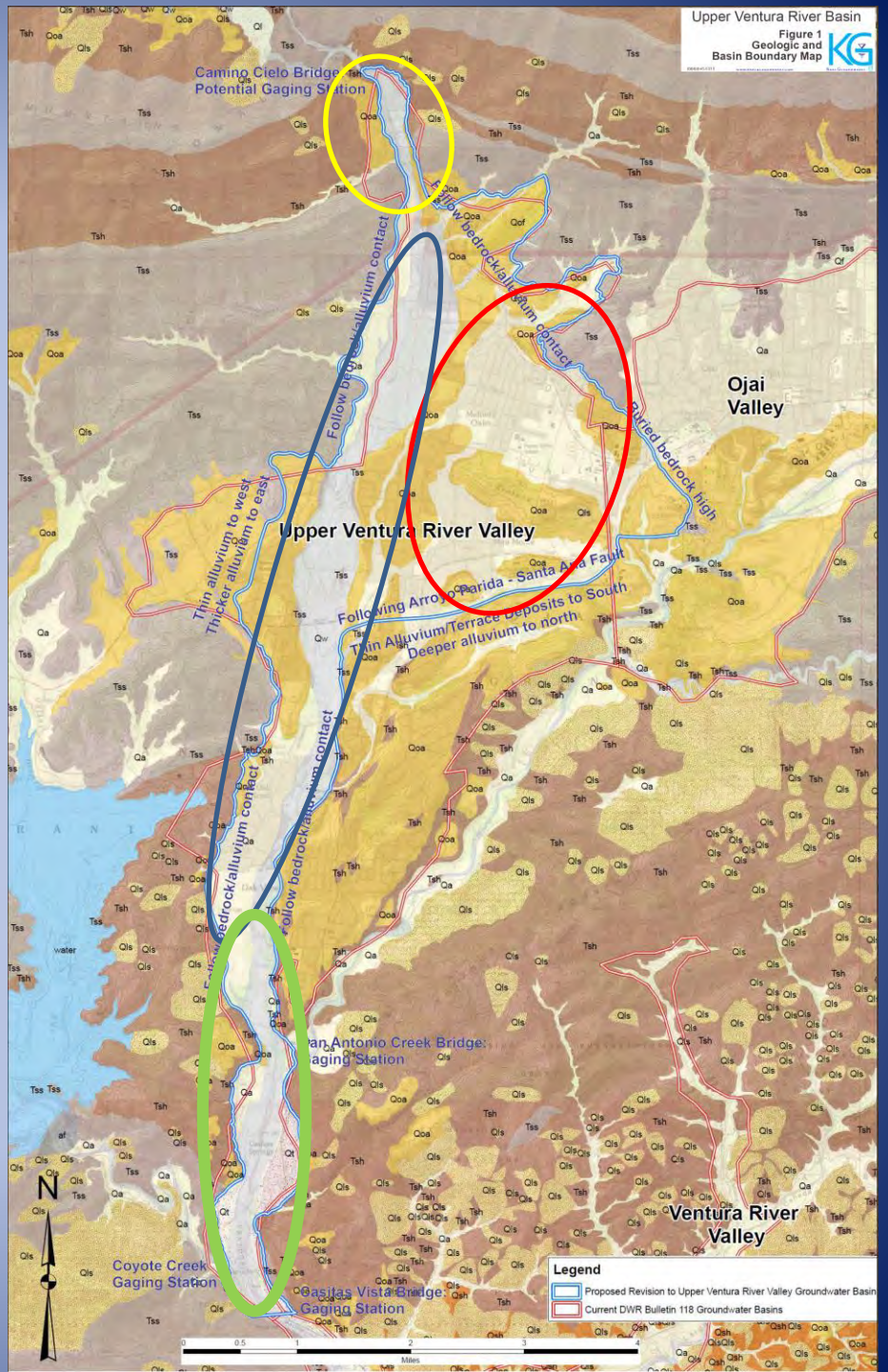
Geology and Well Location Areas within Basin

Northern portion: groundwater under the influence of surface water

East area: deep portion, lower transmissivity

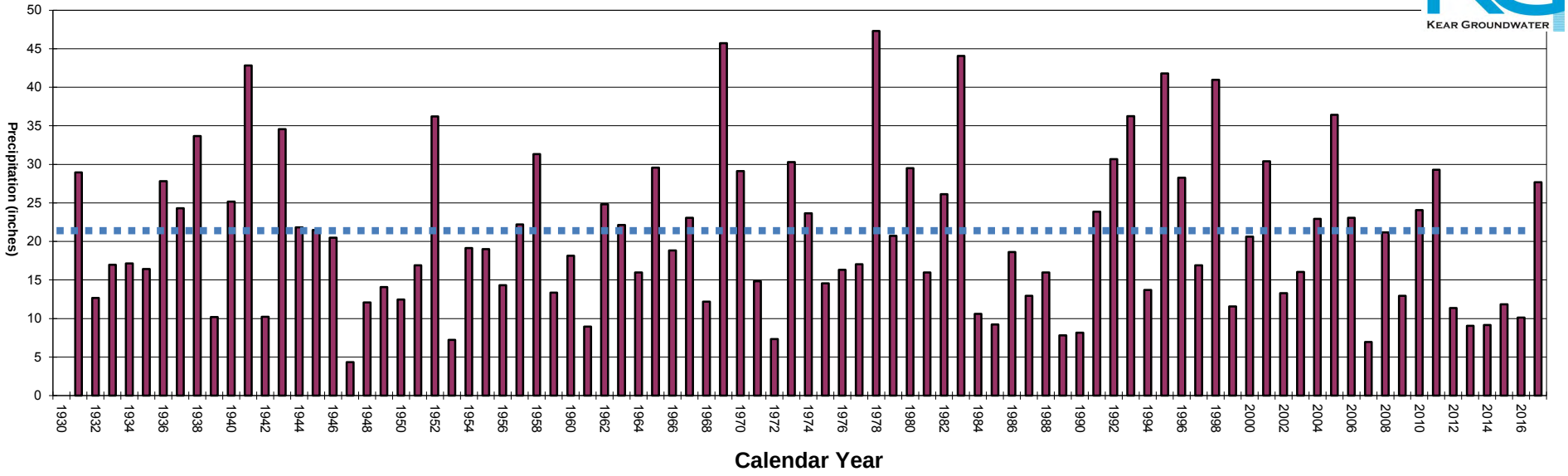
Robles Reach: Deepening river alluvium

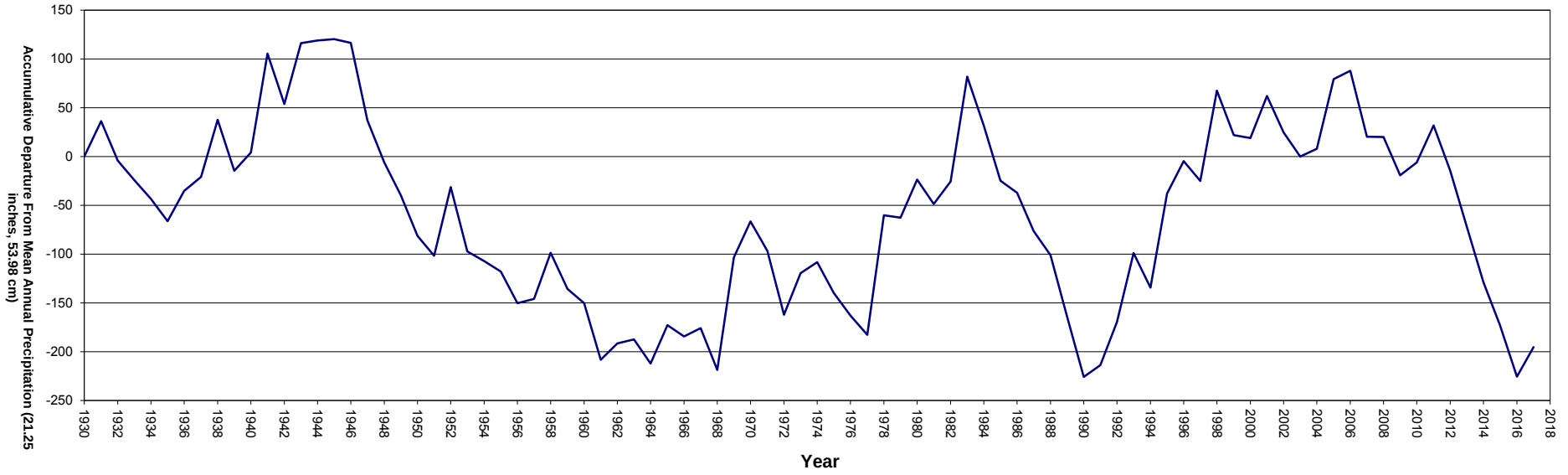
Live Reach: Daylighting groundwater as surface flow

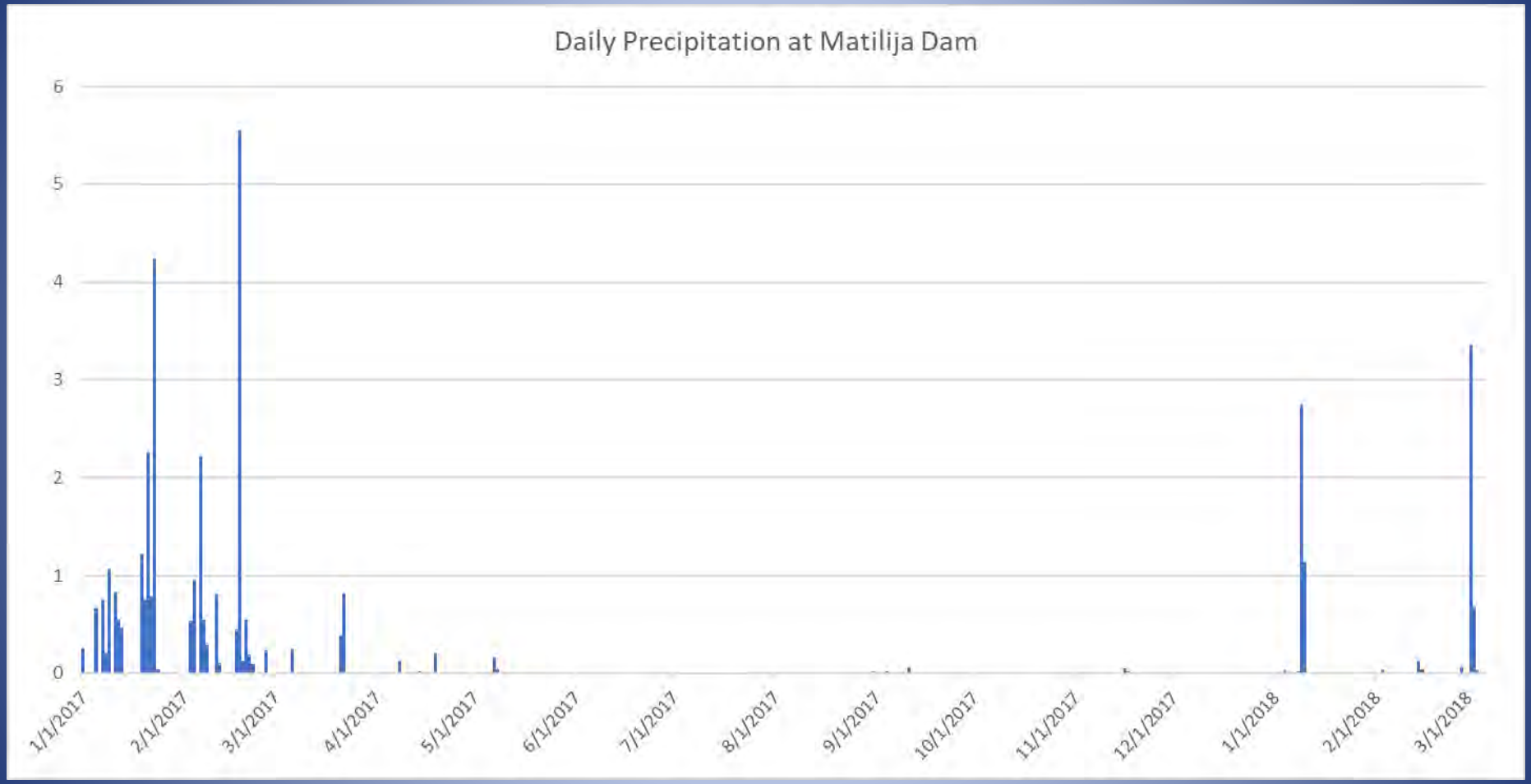


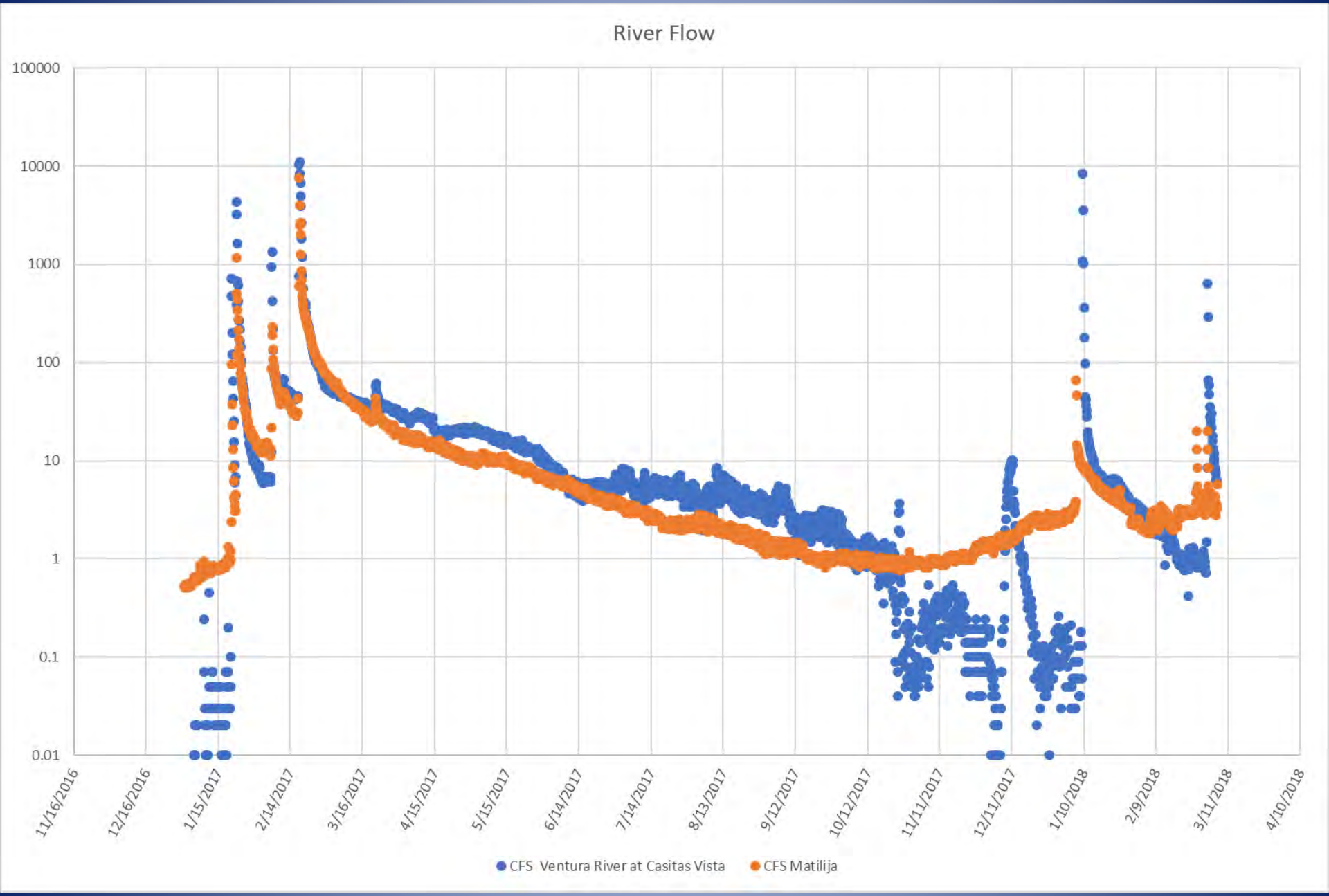
Rain Gauge Location: 34.4480 N 119.2300 W *Rain Gauge Elevation: 745 ft (227 m) above mean sea level*

KEAR GROUNDWATER



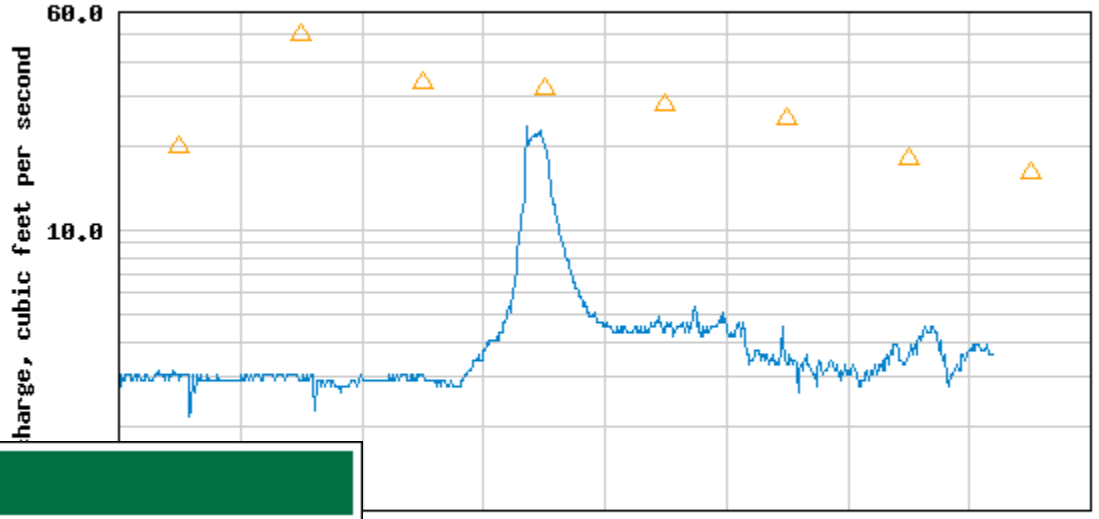



Daily Precipitation at Matilija Dam
6
5
4
3
2
1
0
1/1/2017
2/1/2017
3/1/2017
4/1/2017
5/1/2017
6/1/2017
7/1/2017
8/1/2017
9/1/2017
10/1/2017
11/1/2017
12/1/2017
1/1/2018
2/1/2018
3/1/2018


River Flow
100000
10000
1000
100
10
1
0.1
0.01
11/16/2016
12/16/2016
1/15/2017
2/14/2017
3/16/2017
4/15/2017
5/15/2017
6/14/2017
7/14/2017
8/13/2017
9/12/2017
10/12/2017
11/11/2017
12/11/2017
1/10/2018
2/9/2018
3/11/2018
4/10/2018
CFS Ventura River at Casitas Vista
CFS Matilija

USGS

USGS 11114495 MATILIJA C NR RES NR MATILIJA HOT SPRINGS CA

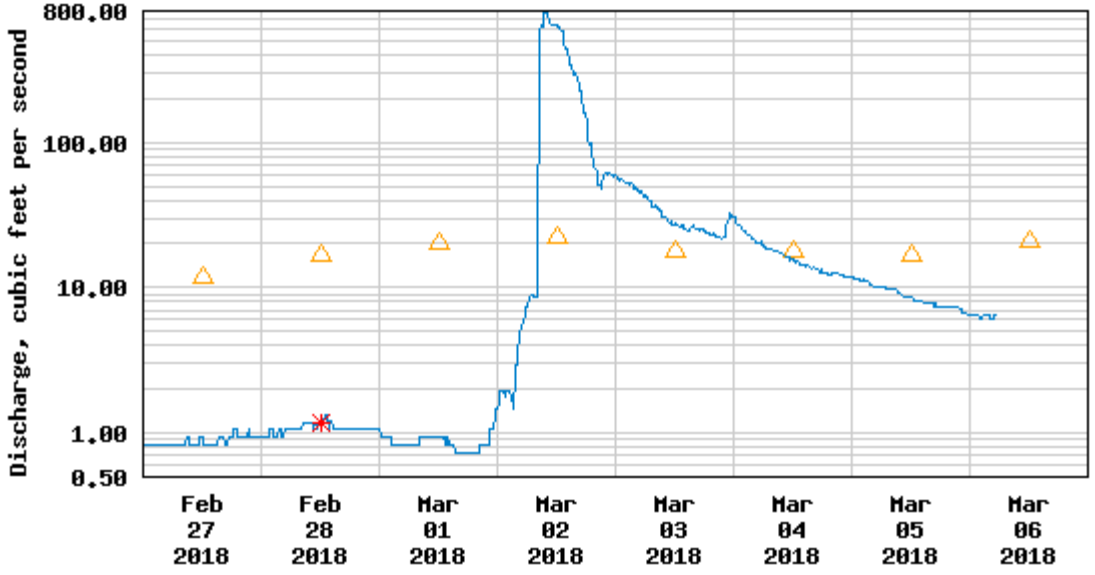


rovisional Data Subject to Revision ----

tistic (15 years) — Discharge

USGS

USGS 11118500 VENTURA R NR VENTURA



---- Provisional Data Subject to Revision ----

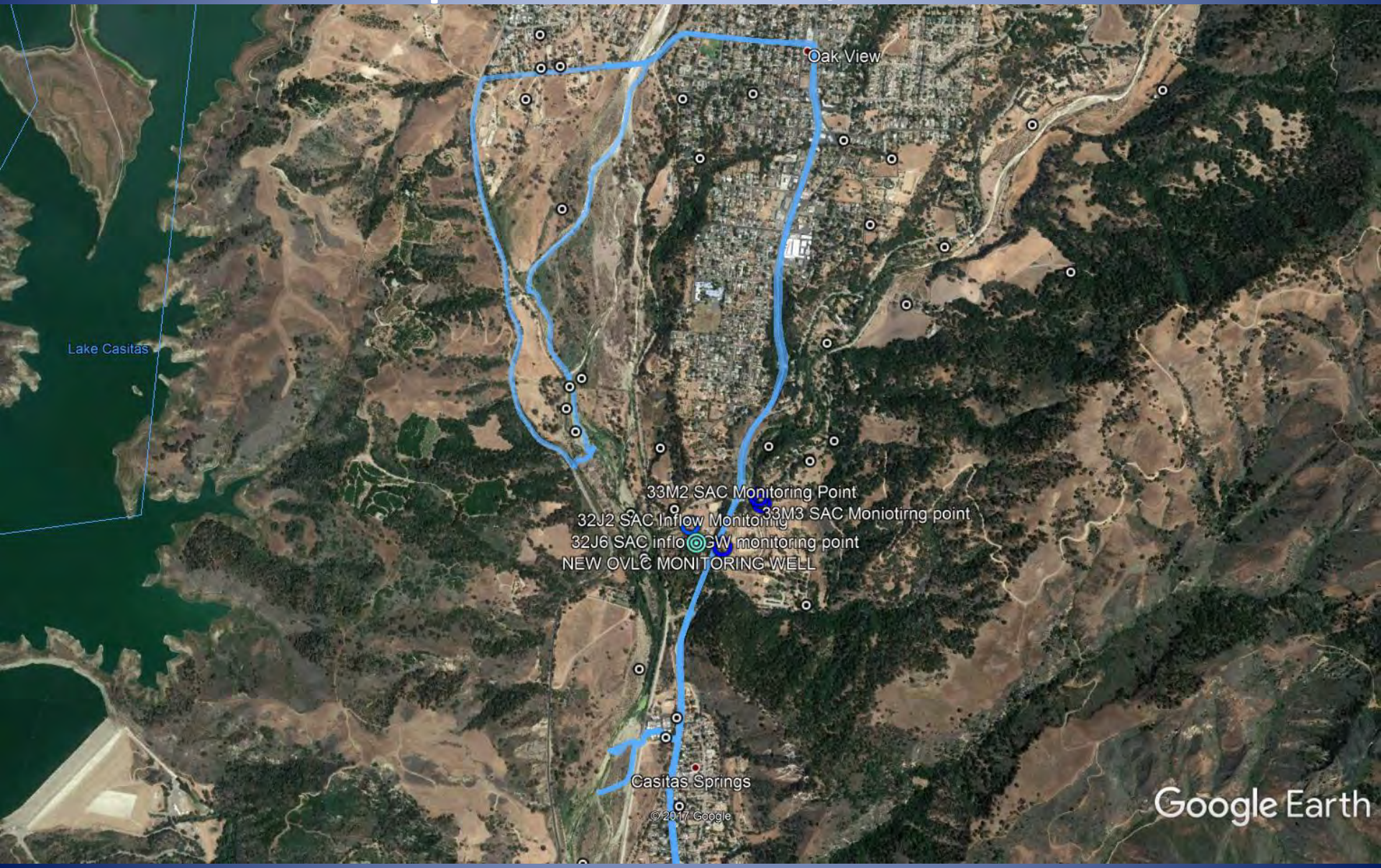
△ Median daily statistic (58 years) ✳ Measured discharge

— Discharge

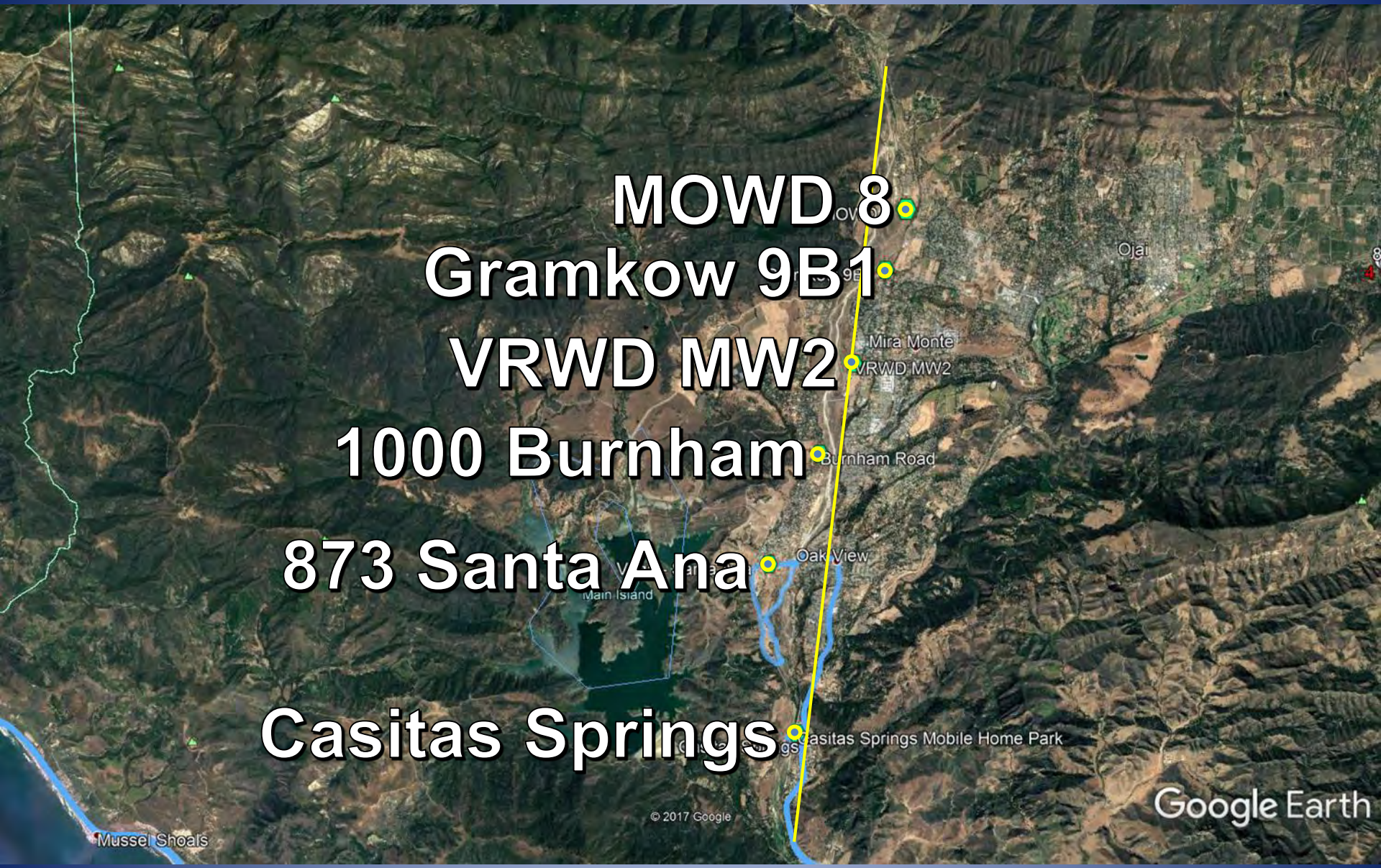
KG

Kear Groundwater

September 20, 2017




9/20/17 Ventura River Near Casitas Springs Mobile Home Park
149 147 145 143 141 139 137 135 133 131 129 127 125 123 121 119 117 115 113 111 109 107 105 103 101 99 97 95 93 91 89 87 85 83 81 79 77 75 73 71 69 67 65 63 61 59 57 55 53 51 49 47 45 43 41 39 37 35 33 31 29 27 25 23 21 19 17 15 13 11 9 7 5 3 1
0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
3.31 cfs
9/20/17 Ventura River near Gas Line Repair
65 63 61 59 57 55 53 51 49 47 45 43 41 39 37 35 33 31 29 27 25 23 21 19 17 15 13 11 9 7 5 3 1
0.00 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 0.90 1.00
3.26 cfs
Google Earth


MOWD 8
Gramkow 9B1
VRWD MW2
1000 Burnham
873 Santa Ana
Casitas Springs
Ojai
Mira Monte
VRWD MW2
Burnham Road
Oak View
Main Island
Casitas Springs Mobile Home Park
Mussel Shoals
© 2017 Google
Google Earth

MOWD 8

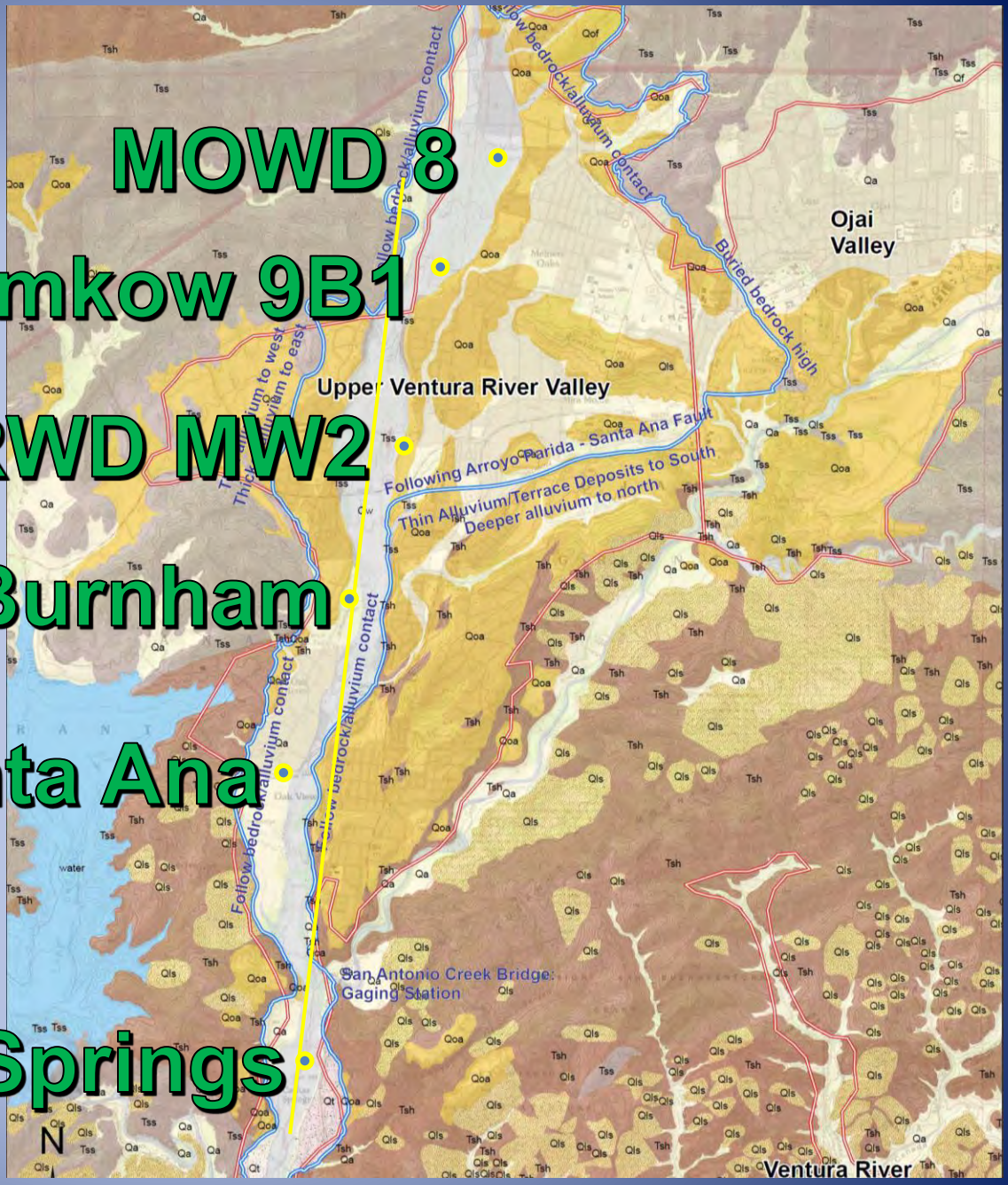
Gramkow 9B1

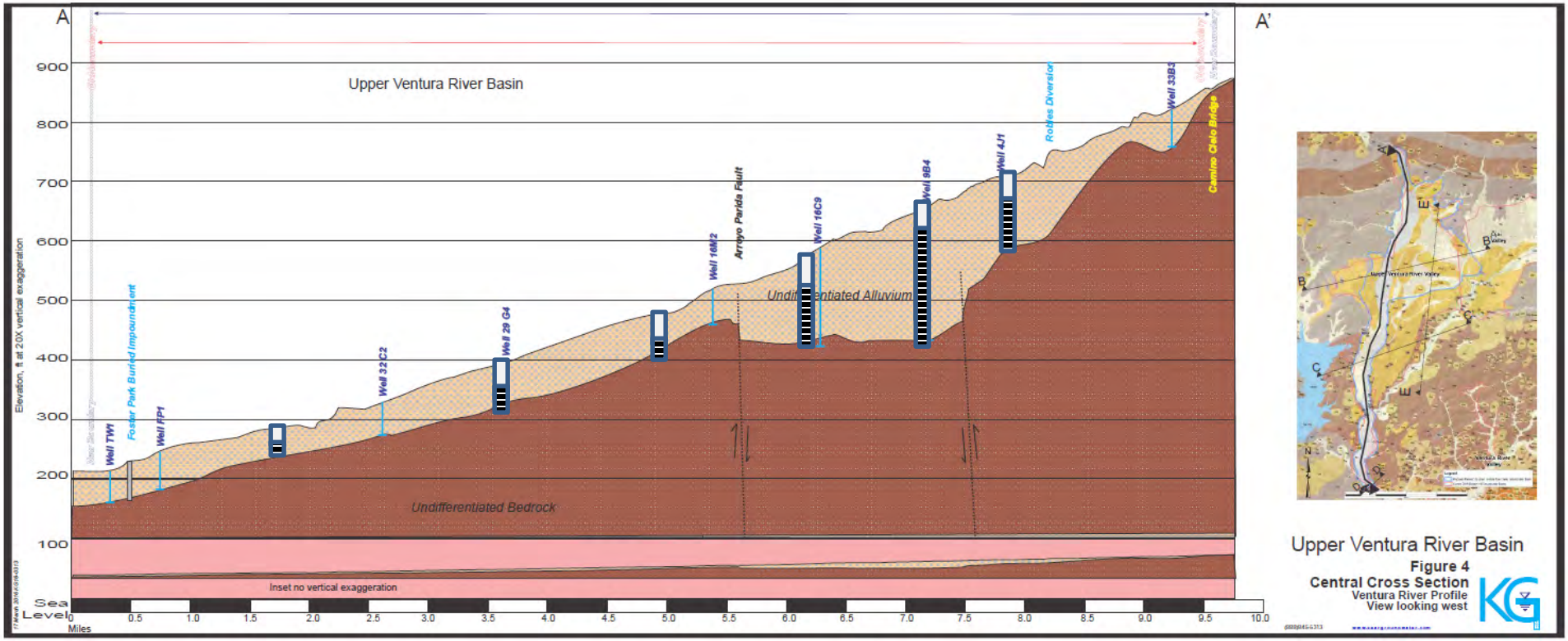
VRWD MW2

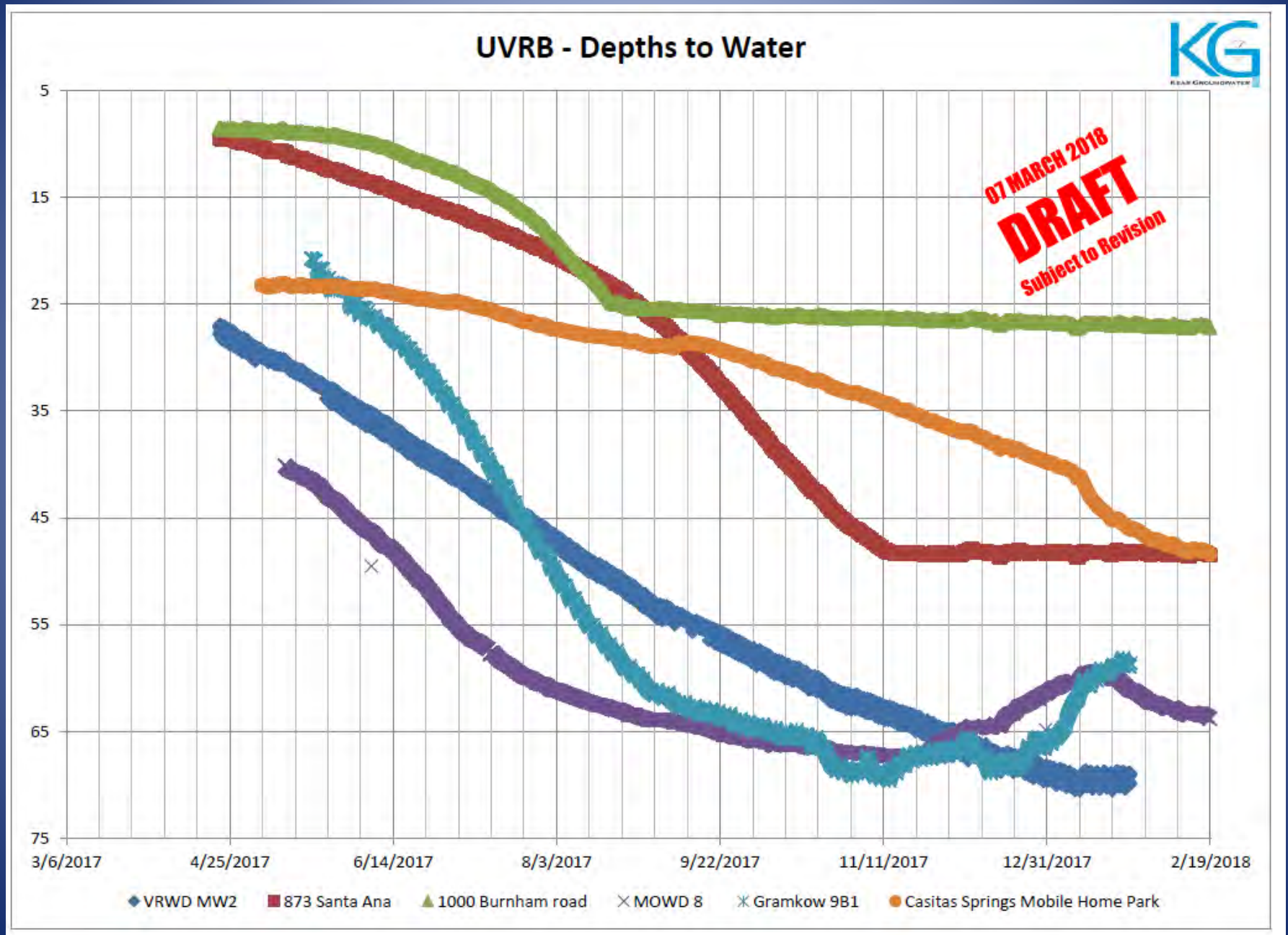
1000 Burnham

873 Santa Ana

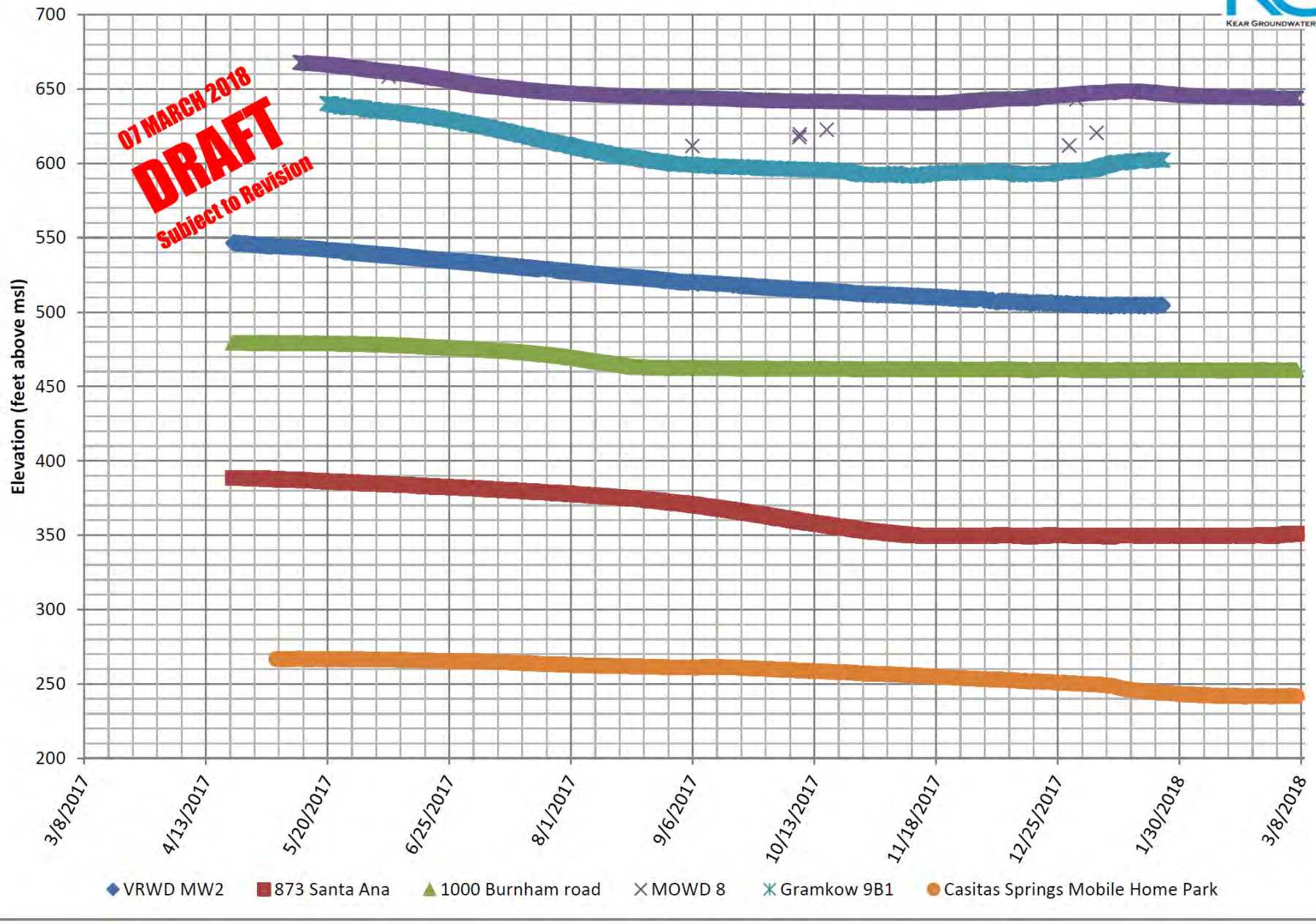
Casitas Springs

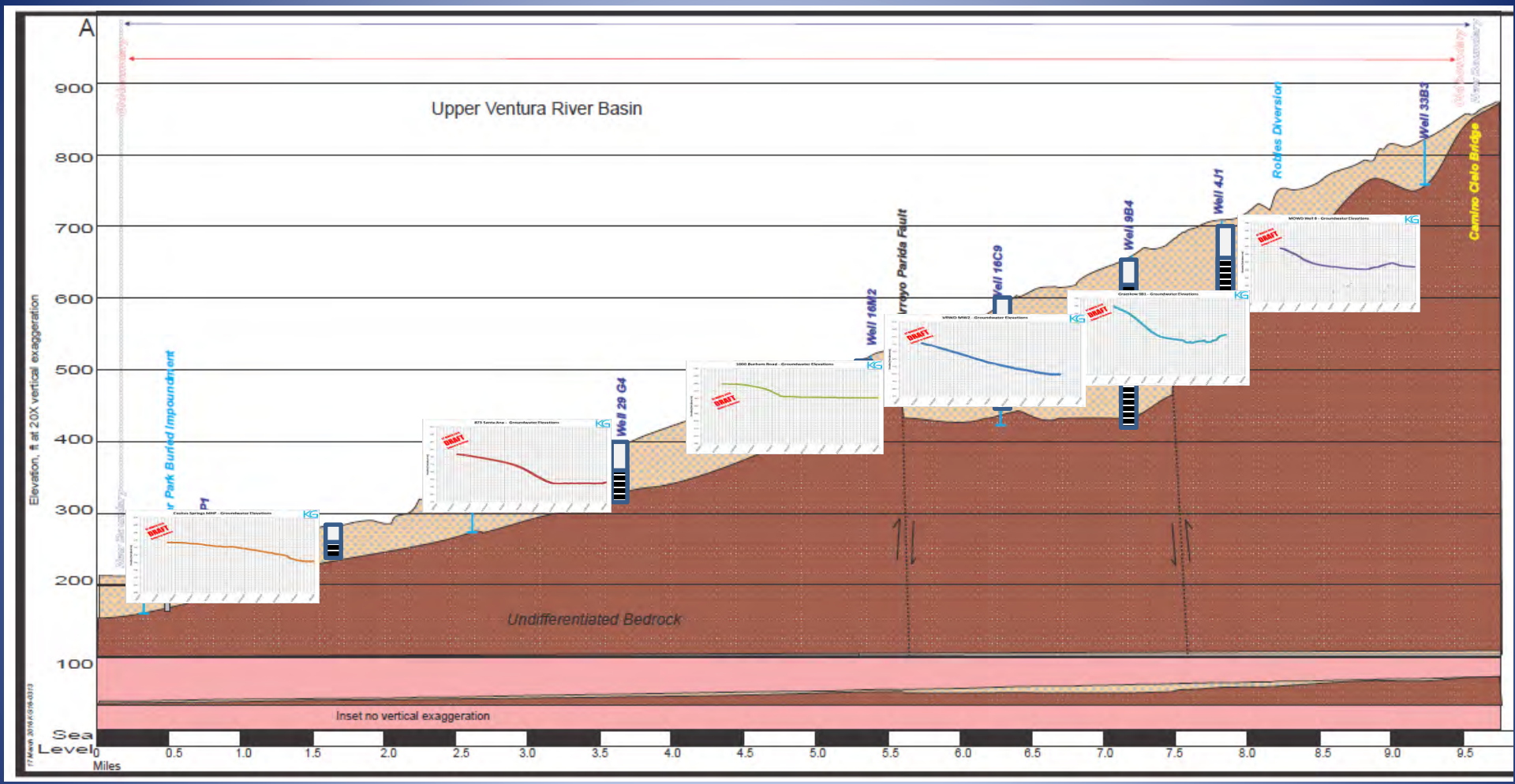



A
A'
Upper Ventura River Basin
Elevation, ft at 20X vertical exaggeration
900
800
700
600
500
400
300
200
100
Sea Level
Well TW1
Foster Park Buried Impoundment
Well FP1
Well 32C2
Well 29 G4
Well 16M2
Arroyo Parida Fault
Well 16C9
Well 9B4
Well 4J1
Robles Diversion
Well 33B3
Camino Cielo Bridge
Undifferentiated Alluvium
Undifferentiated Bedrock
Inset no vertical exaggeration
0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
10.0
Miles
Upper Ventura River Basin
Figure 4
Central Cross Section
Ventura River Profile
View looking west

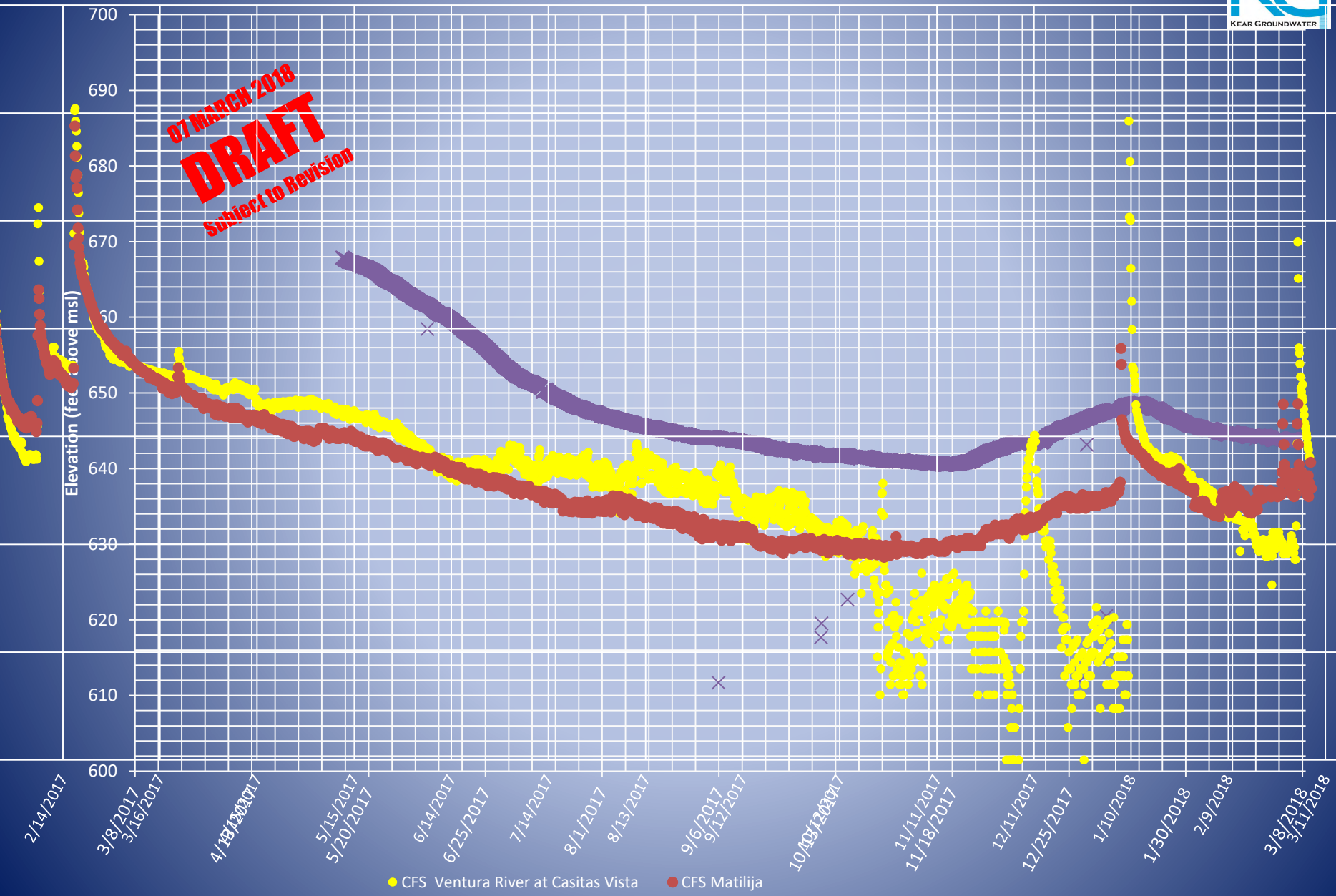

UVRB - Depths to Water
07 MARCH 2018
DRAFT
Subject to Revision
5
15
25
35
45
55
65
75
3/6/2017
4/25/2017
6/14/2017
8/3/2017
9/22/2017
11/11/2017
12/31/2017
2/19/2018
VRWD MW2
873 Santa Ana
1000 Burnham road
MOWD 8
Gramkow 9B1
Casitas Springs Mobile Home Park

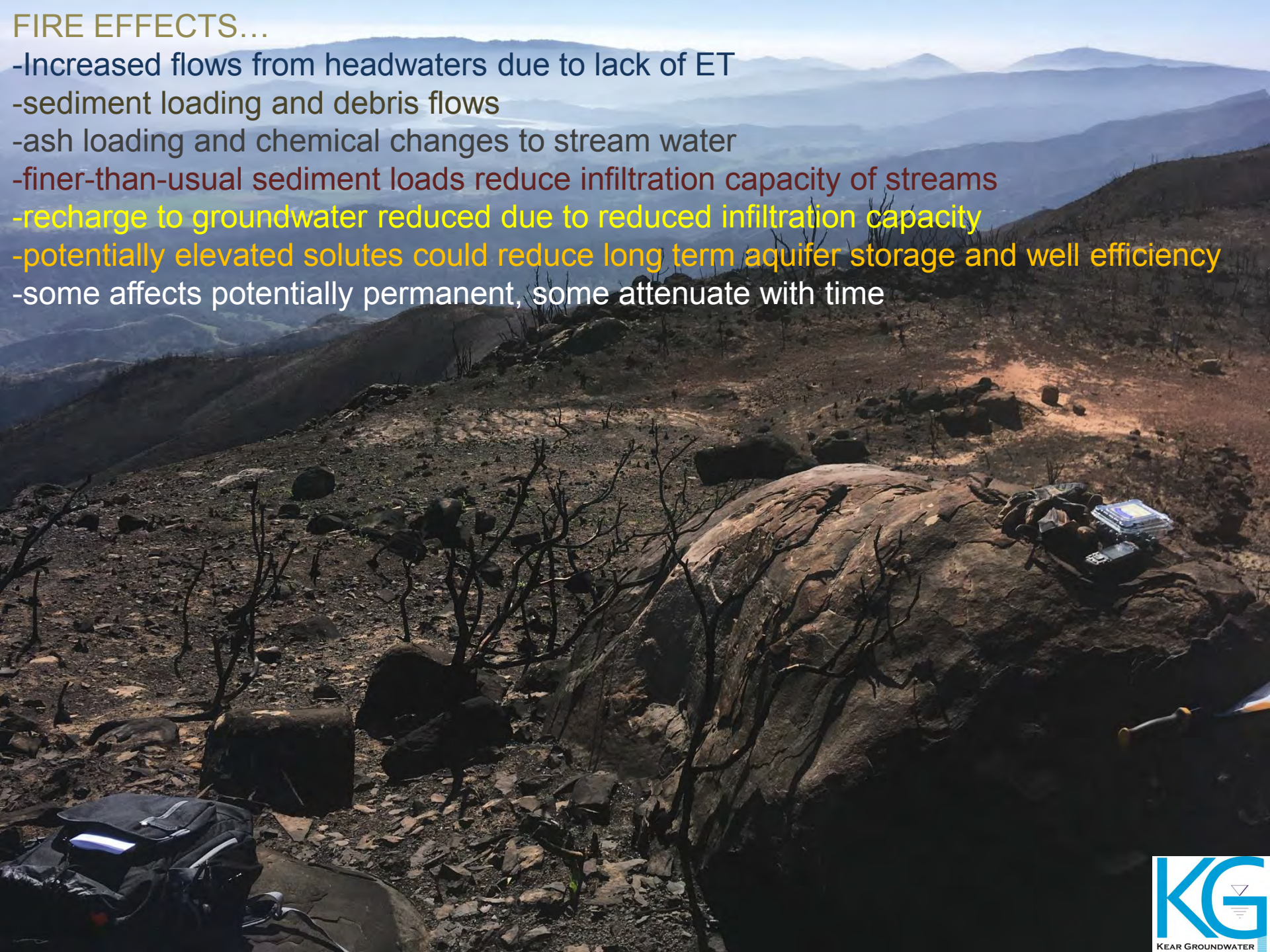
UVRB Groundwater Elevations




A
Upper Ventura River Basin
Elevation, ft at 20X vertical exaggeration
900
800
700
600
500
400
300
200
100
Sea Level
Undifferentiated Bedrock
Inset no vertical exaggeration
Miles
0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0
9.5
Park Buried Impoundment
P1
Well 29 G4
Well 16M2
Arroyo Parida Fault
Well 16C9
Well 9B4
Well 4J1
Robles Diversion
Well 33B3
Camino Cielo Bridge
DRAFT

MOWD Well 8 River Flow Groundwater Elevations





FIRE EFFECTS…

-Increased flows from headwaters due to lack of ET

-sediment loading and debris flows

-ash loading and chemical changes to stream water

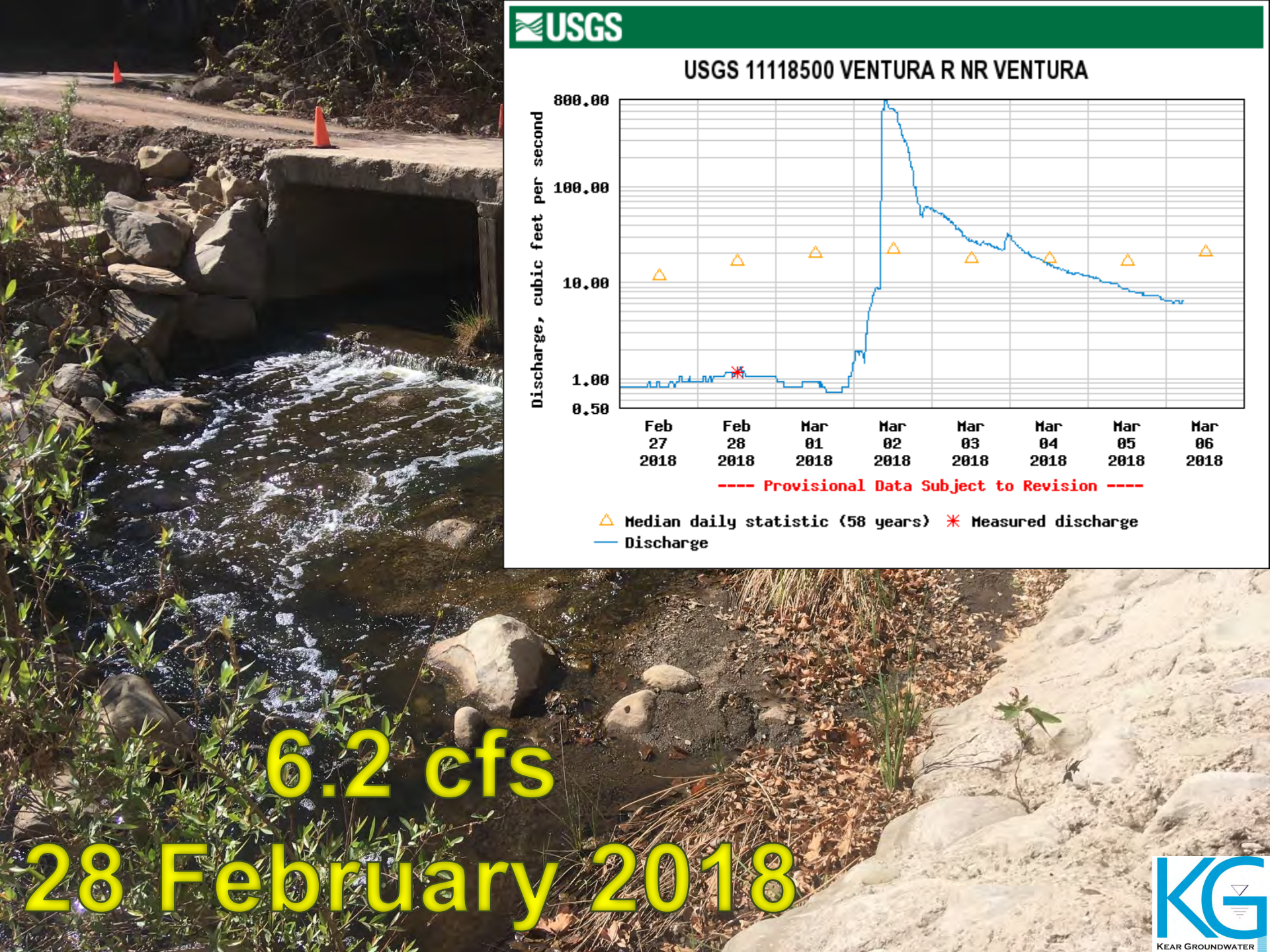
-finer-than-usual sediment loads reduce infiltration capacity of streams

-recharge to groundwater reduced due to reduced infiltration capacity

-potentially elevated solutes could reduce long term aquifer storage and well efficiency

-some affects potentially permanent, some attenuate with time

KEAR GROUNDWATER


USGS
USGS 11118500 VENTURA R NR VENTURA
Discharge, cubic feet per second
800.00
100.00
10.00
1.00
0.50
Feb 27 2018
Feb 28 2018
Mar 01 2018
Mar 02 2018
Mar 03 2018
Mar 04 2018
Mar 05 2018
Mar 06 2018
---- Provisional Data Subject to Revision ----
Median daily statistic (58 years)
Measured discharge
Discharge
6.2 cfs
28 February 2018
KEAR GROUNDWATER


KG
KEAR GROUNDWATER

INFILTRATION FLUX

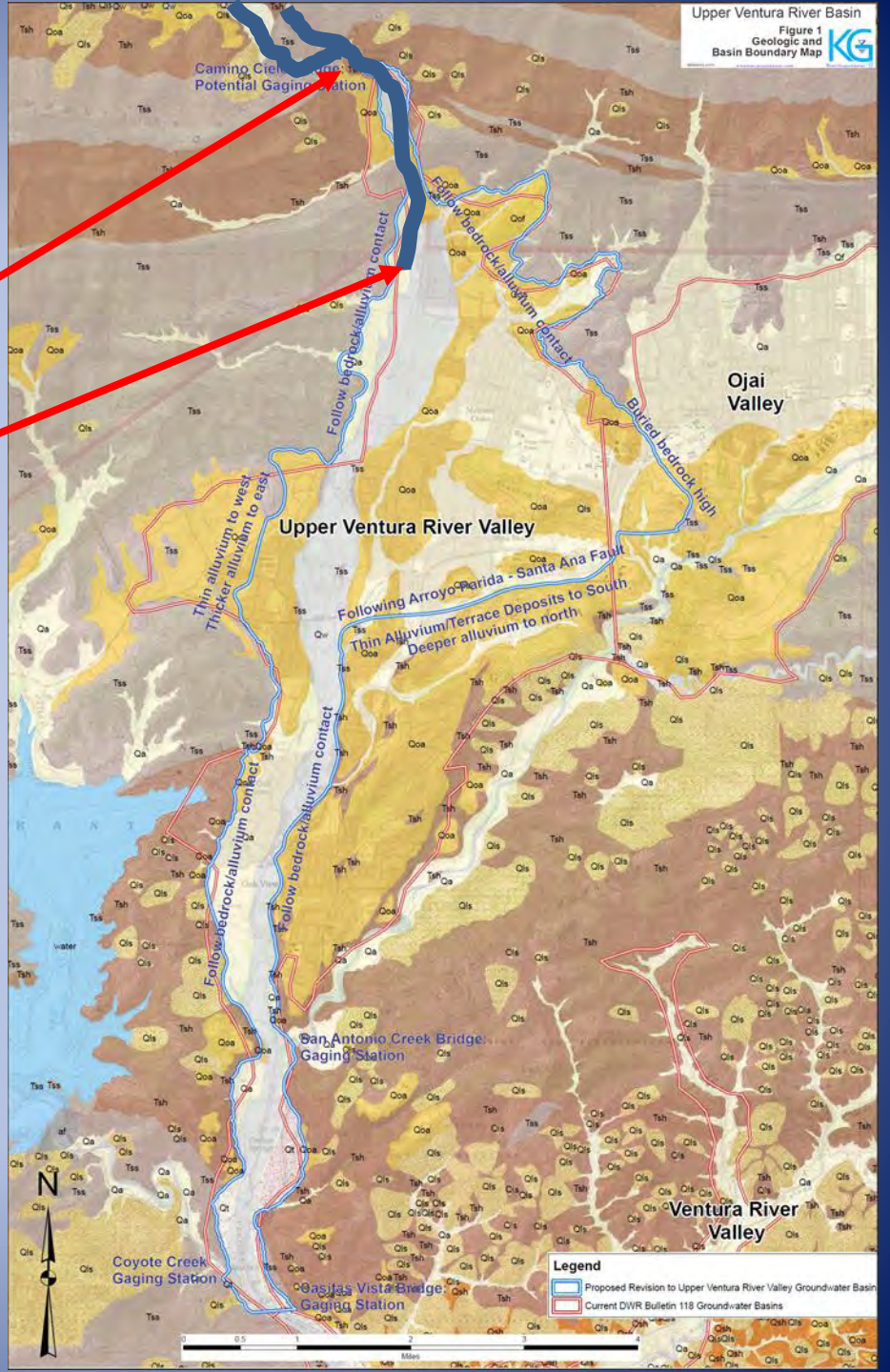
Measured in flow into aquifer per mile of stream reach

Pre-fire:

5 cfs at Camino Cielo Bridge

Infiltrates completely by 2 miles

=5cfs/2 mi => 2.5cfs/mile



INFILTRATION FLUX

Measured in flow into aquifer per mile of stream reach

Pre-fire:

5 cfs at Camino Cielo Bridge

Infiltrates completely by 2 miles

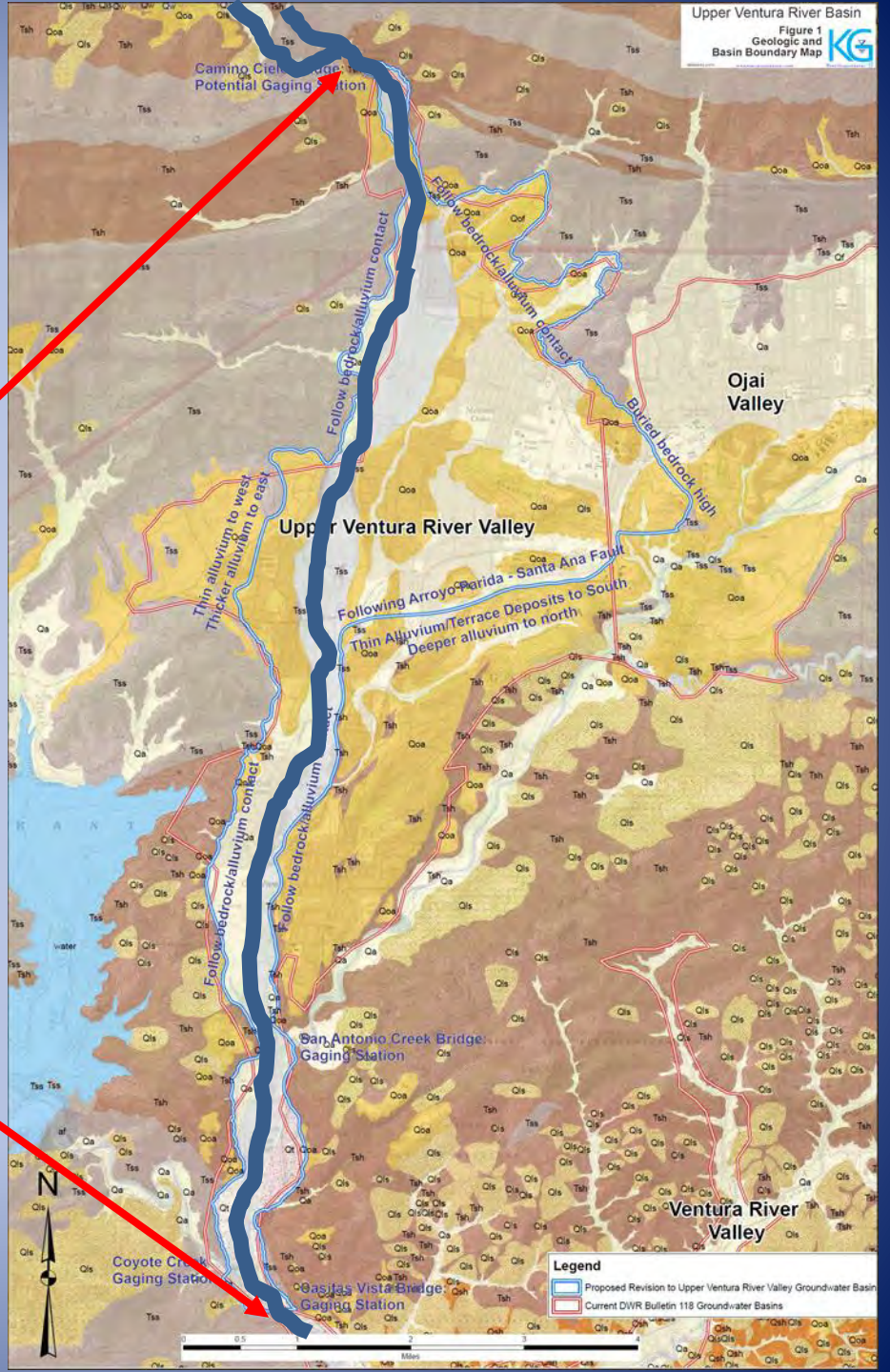
=5cfs/2 mi => 2.5cfs/mile

Post-fire:

6.2 cfs at Camino Cielo Bridge

1.2 cfs at Casitas Vista Bridge

=5 cfs/10 mi = > 0.5 cfs/mile



INFILTRATION FLUX

Measured in flow into aquifer per mile of stream reach

Pre-fire:

5 cfs at Camino Cielo Bridge

Infiltrates completely by 2 miles

=5cfs/2 mi => 2.5cfs/mile

Post-fire:

6.2 cfs at Camino Cielo Bridge

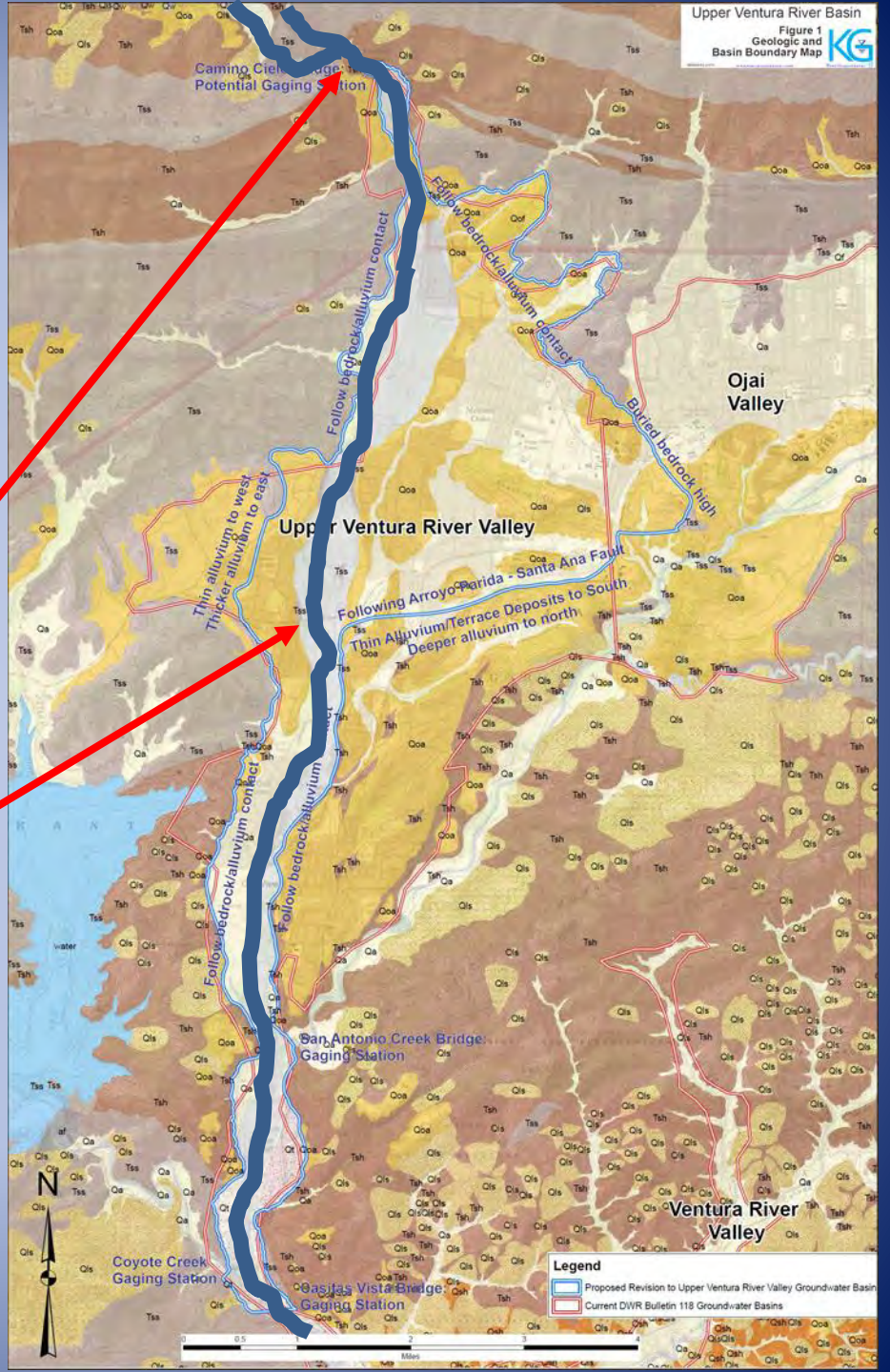
1.2 cfs at Casitas Vista Bridge

=5 cfs/10 mi = > 0.5 cfs/mile

6.2 cfs at Camino Cielo Bridge

1.2cfs at Highway 150 bridge

=5 cfs/5 mi = > 1 cfs / mile

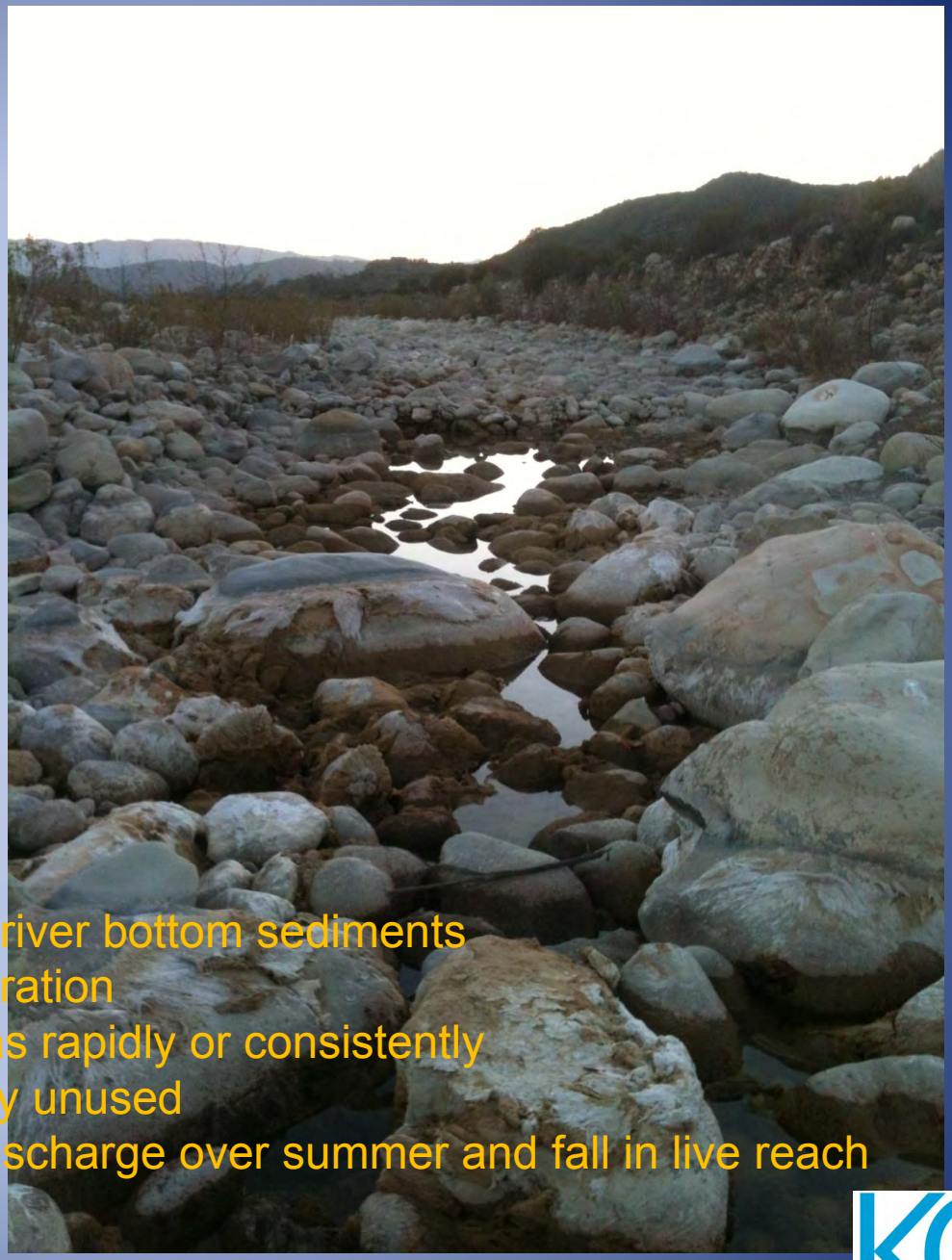


Southern Wet Edge Of Surface Flow

Moves constantly

-Advances southward with:
increase surface water
or increased groundwater
storage

-Recedes northward with:
decreased surface water and loss
or decreased groundwater
in storage in balance with surface
water



Ash component:

-decreases infiltration capacity of river bottom sediments
-River flows to ocean without infiltration
-Groundwater does not respond as rapidly or consistently
-Available aquifer storage capacity unused
-less water available for natural discharge over summer and fall in live reach

KEAR GROUNDWATER

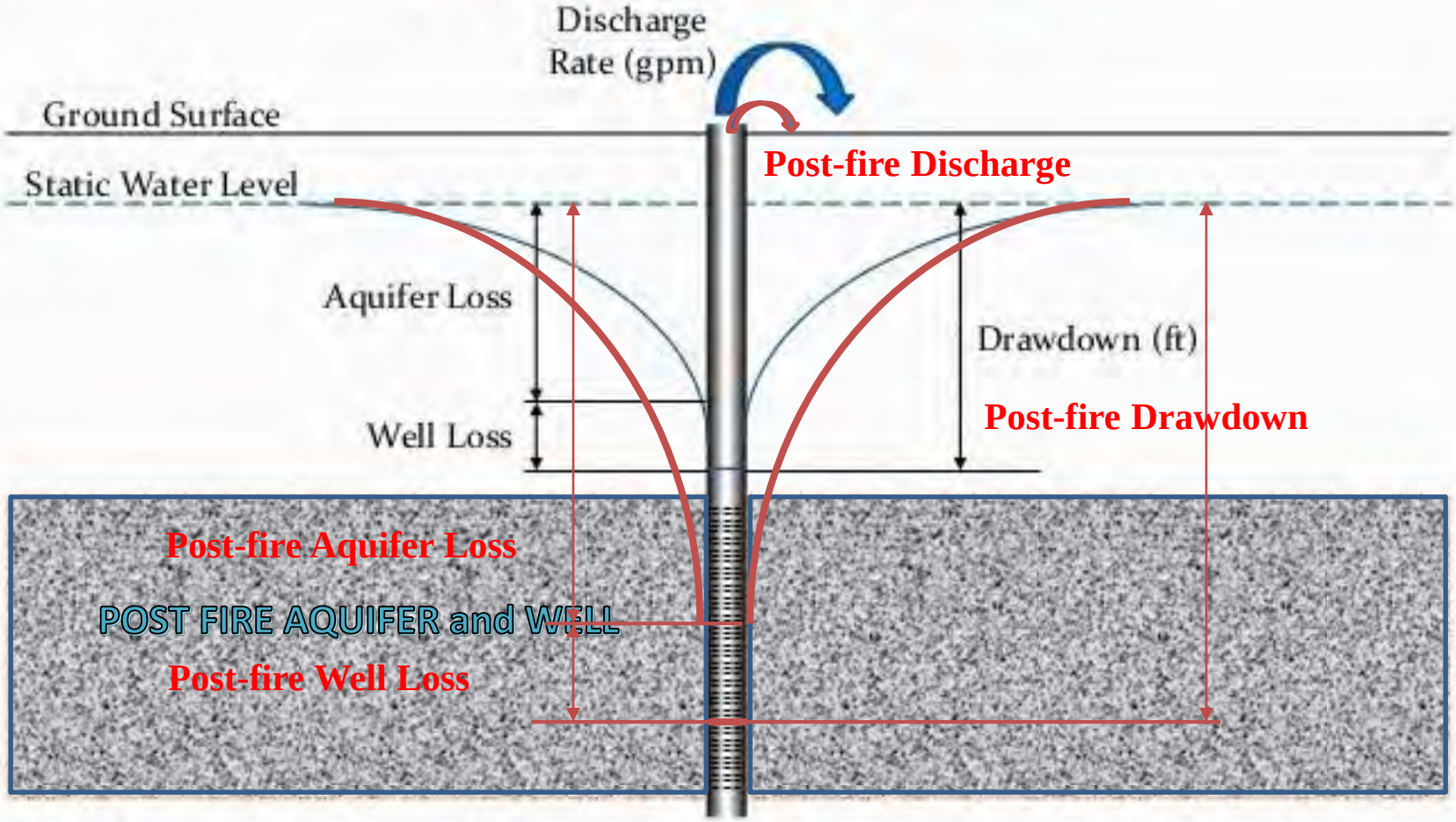
Water escapes watershed

KEAR GROUNDWATER

Test Description	Result				Graphical Results Presentation				
Cations	mg/L	Meq/L	% Meq	Lbs/AF	Good	Possible Problem	Moderate Problem	Increasing Problem	Severe Problem
Calcium	100	5	42	270	**				
Magnesium	30	2.5	21	82	**				
Potassium	2	0.051	0	5	**				
Sodium	103	4.5	37	280					
Anions									
Carbonate	< 10	0	0	0					
Bicarbonate	200	3.3	31	540	**				
Sulfate	225	4.7	45	610	**				
Chloride	88	2.5	24	240					
Nitrate	< 0.5	0	0	0					
Nitrate Nitrogen	< 0.1			0					
Fluoride	0.9	0.047	0	2					
Minor Elements									
Boron	1.5			4.1					
Copper	< 0.01			0.00					
Iron	0.090			240					
Manganese	0.010			27					
Zinc	< 0.02			0.00					
TDS by Summation	749			2000					
Other									
pH	7.8			units					
E. C.	1.15			dS/m					
SAR	2.3								
Crop Suitability									
No Amendments	Fair								
With Amendments	Fairly		Good						


Fe
As
Mn
TOC
Na
Cl
SO_4
TSS
Turbidity
pH
ORP
LSI
Alkalinity
Tannin

Well Efficiency



Well Efficiency (%) = Aquifer Loss / Total Drawdown