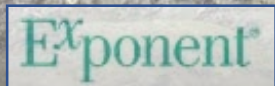


San Lorenzo Valley Water District

presentation to

Santa Margarita Basin Groundwater Sustainability Agency

*Nick Johnson, PhD, PG, CHg
Exponent, Senior Managing Scientist
June 28, 2018*

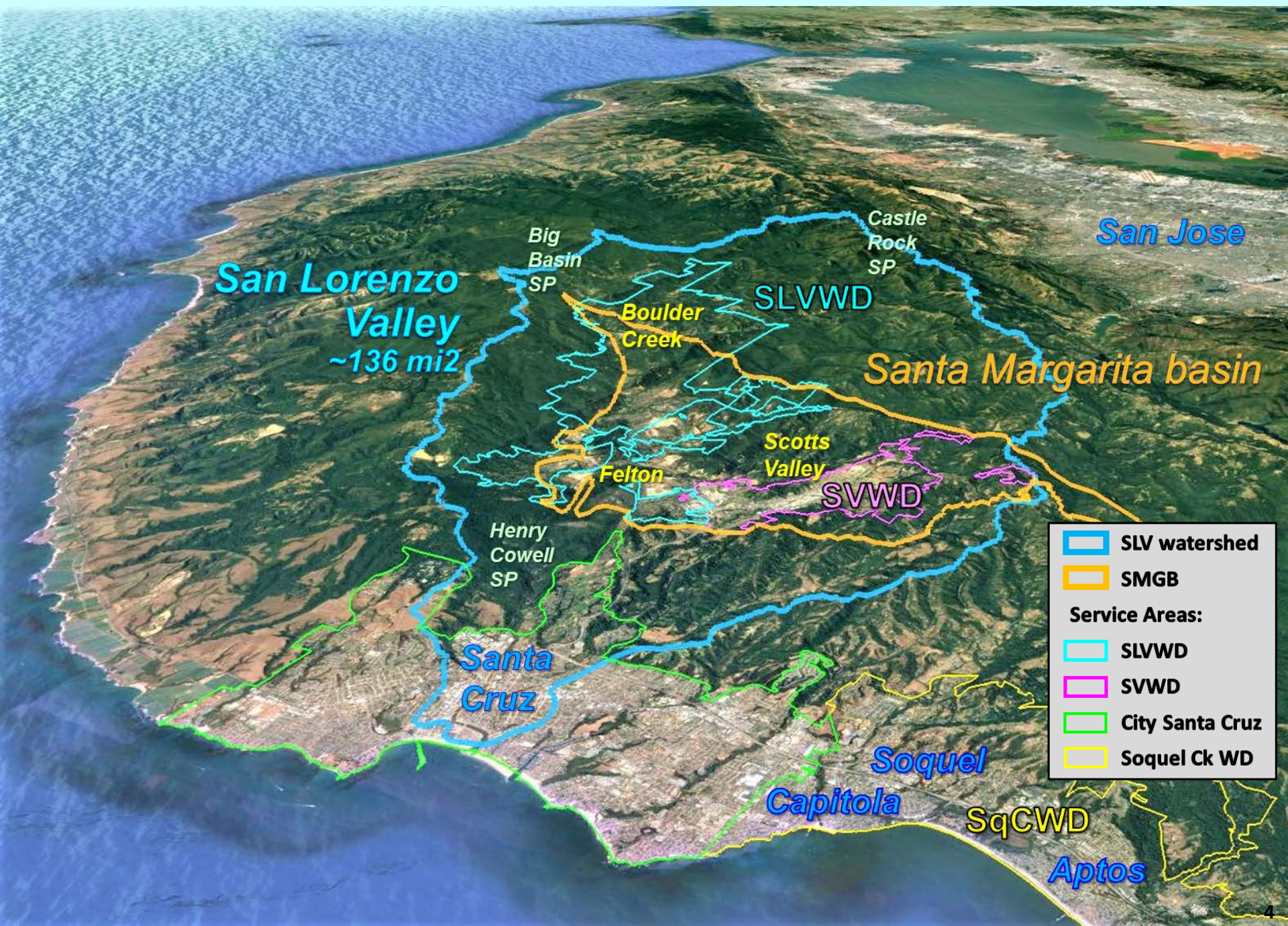


San Lorenzo Valley Water District

- 1. Overview*
- 2. Surface Water*
- 3. Groundwater*
- 4. Conjunctive Use & Drought*
- 5. Issues and Opportunities*

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	SLV watershed
	SMGB
Service Areas:	
	SLVWD
	SVWD
	City Santa Cruz
	Soquel Ck WD



*Steep-canyon
stream diversions
(legacy from logging)*

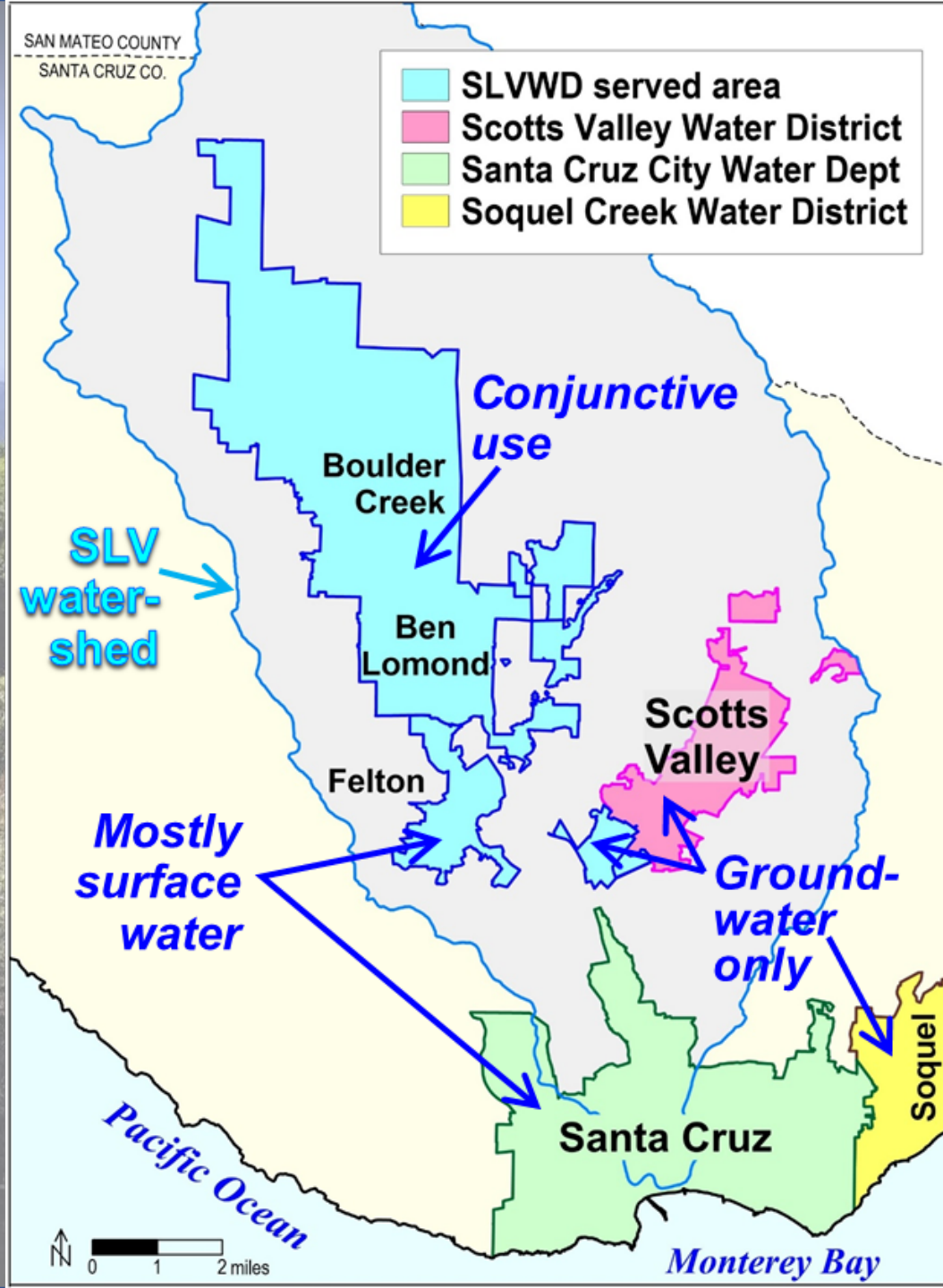


*SLVWD
Water Supply
Sources*

*Sandhill
groundwater
recharge and
storage*

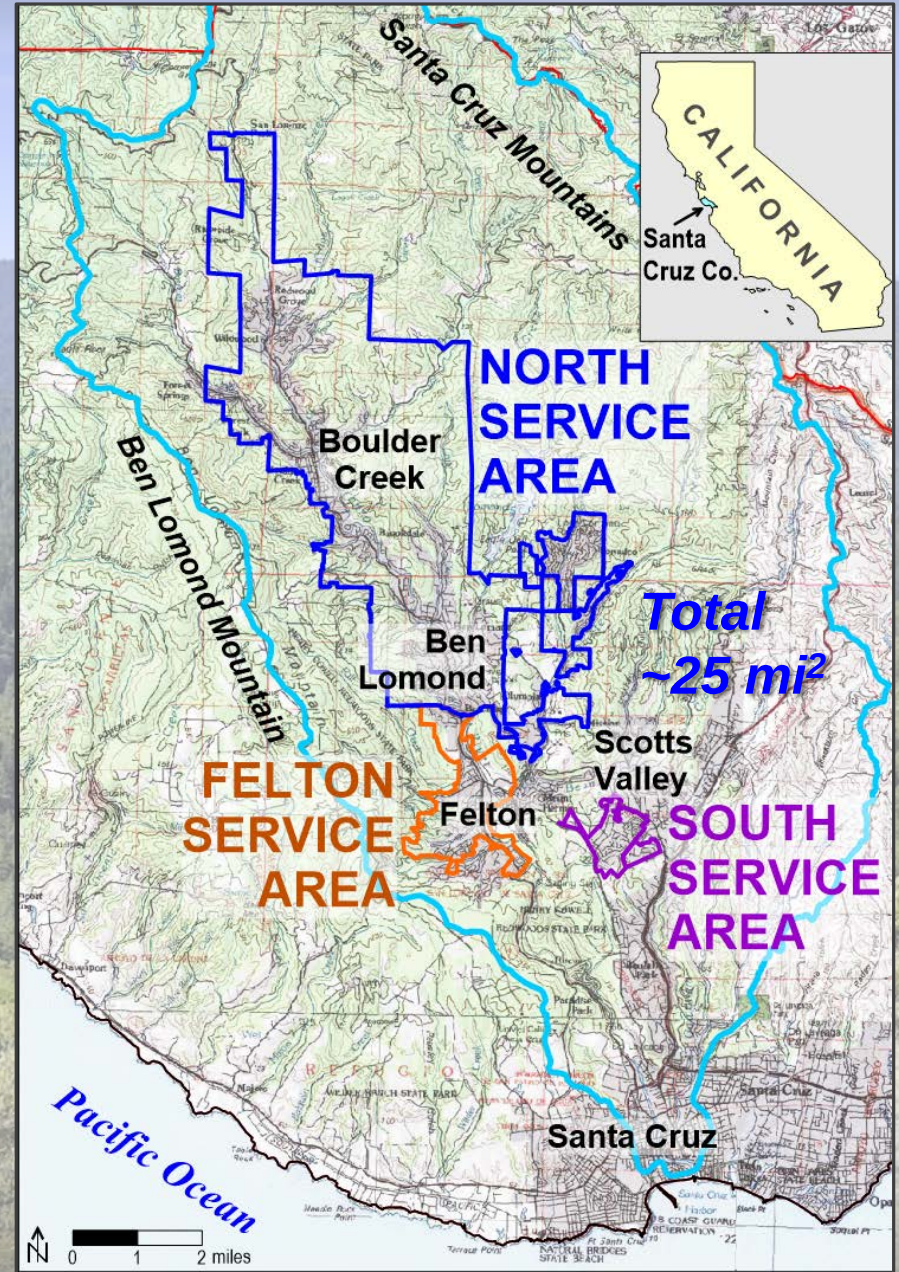
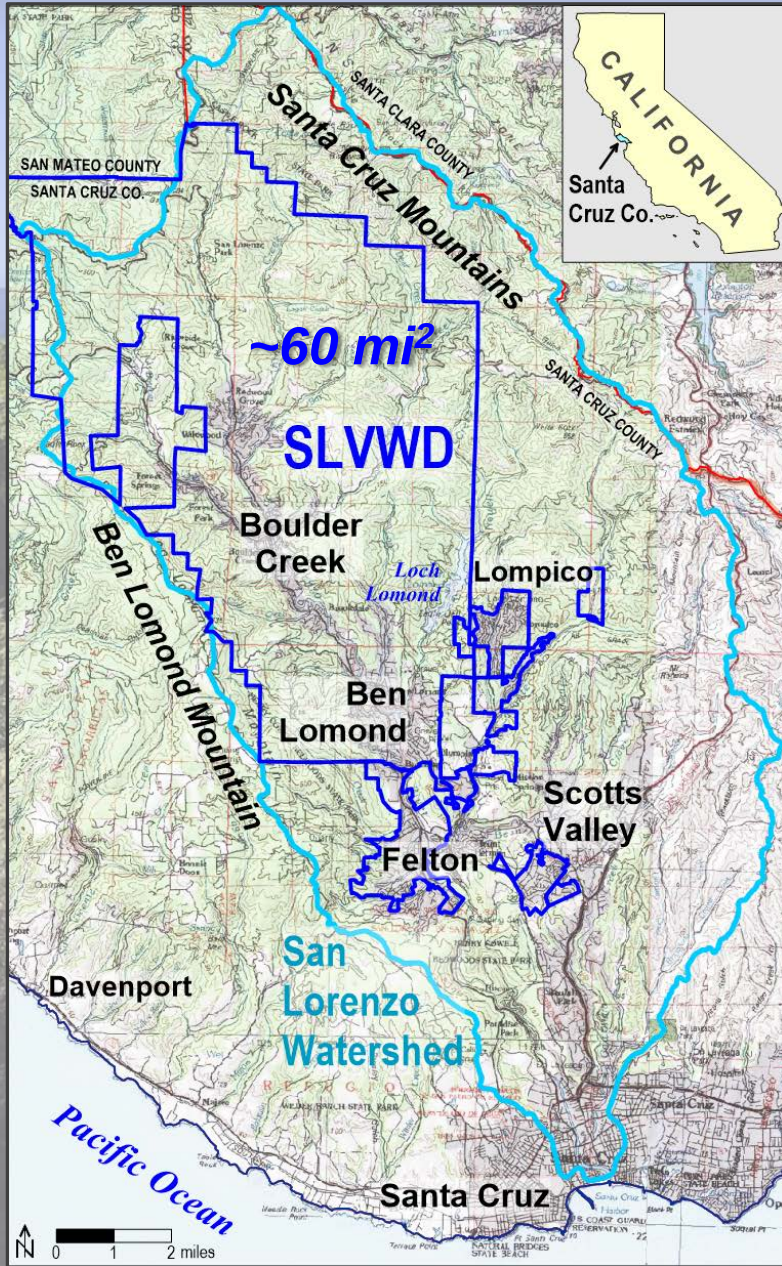


Regional Mix of Water Supplies

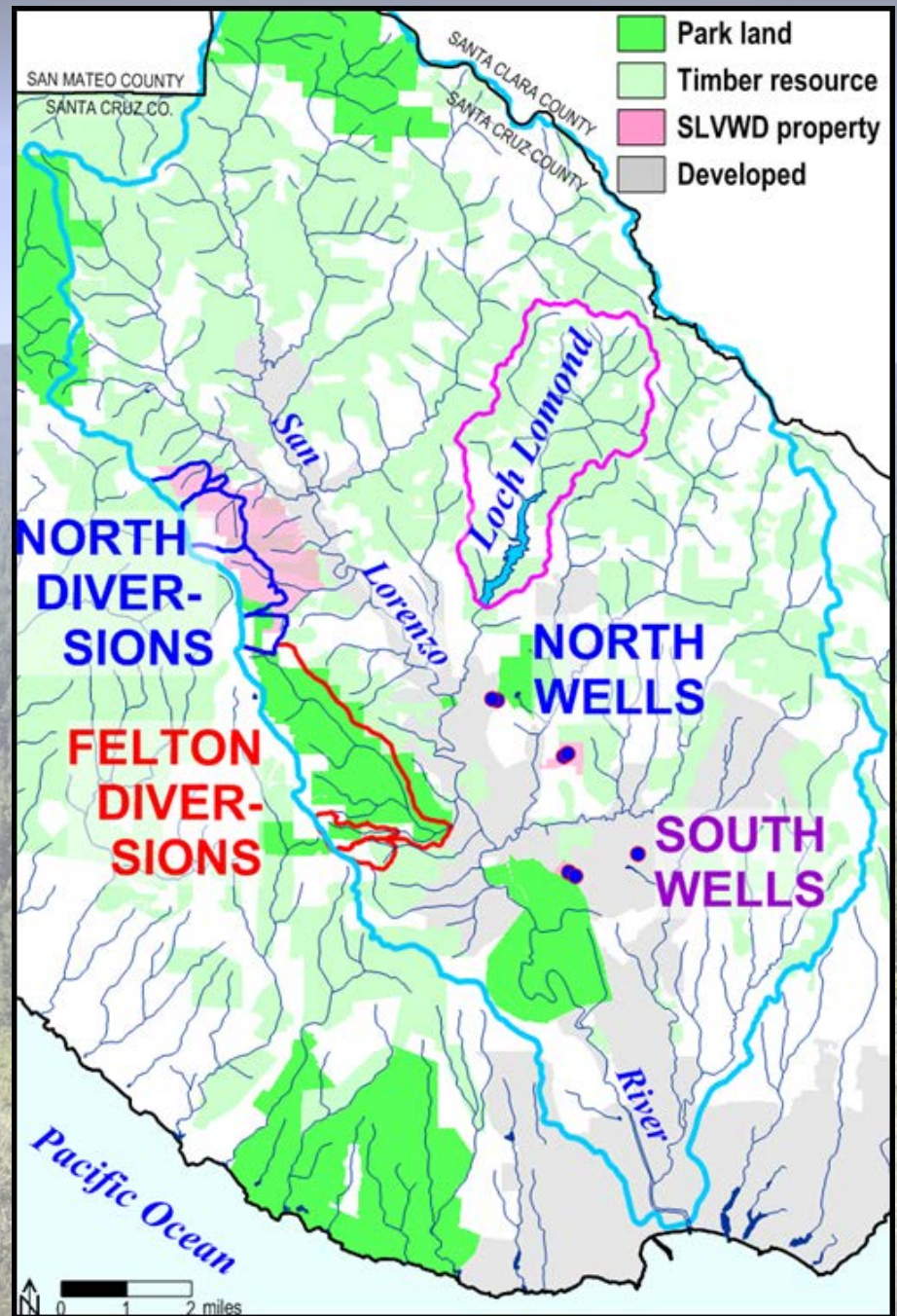
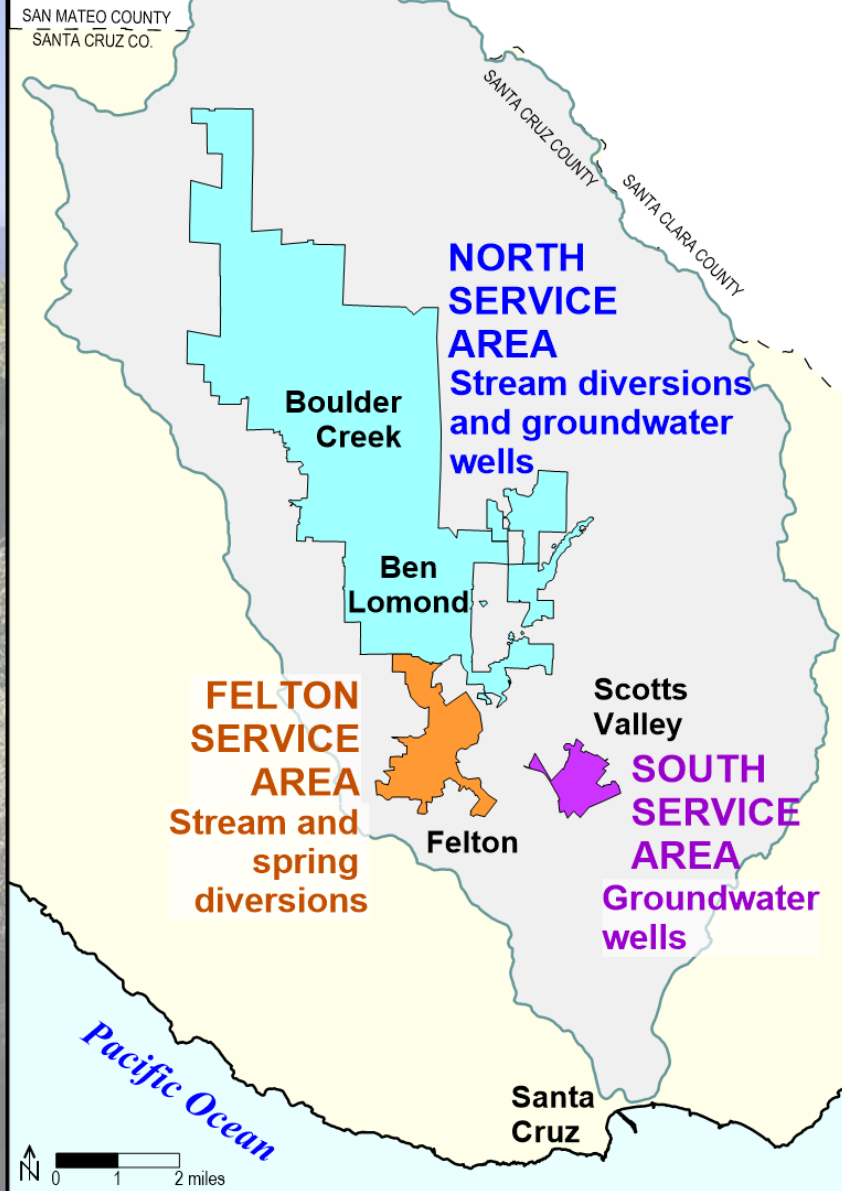


District Boundary

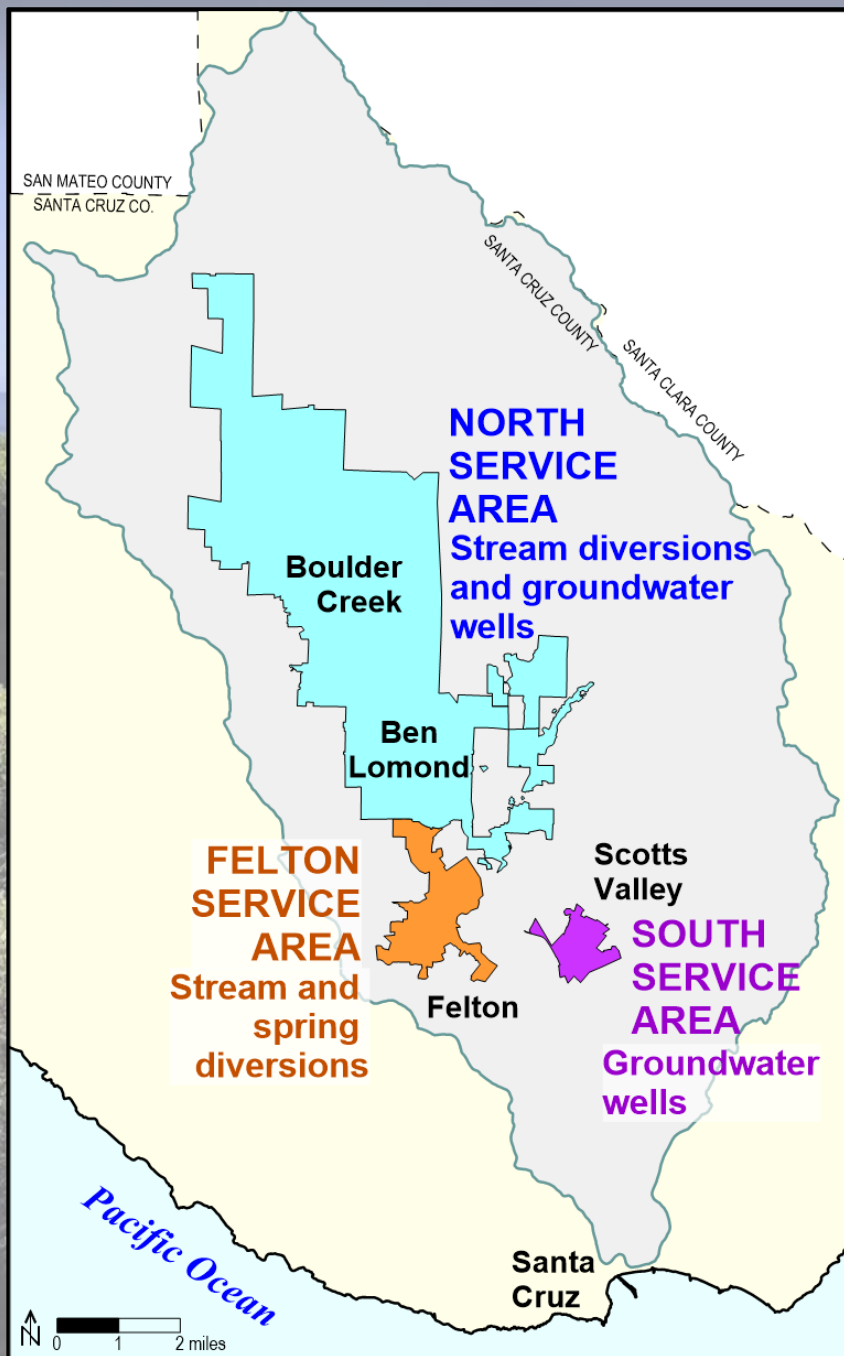
Three Separate Systems



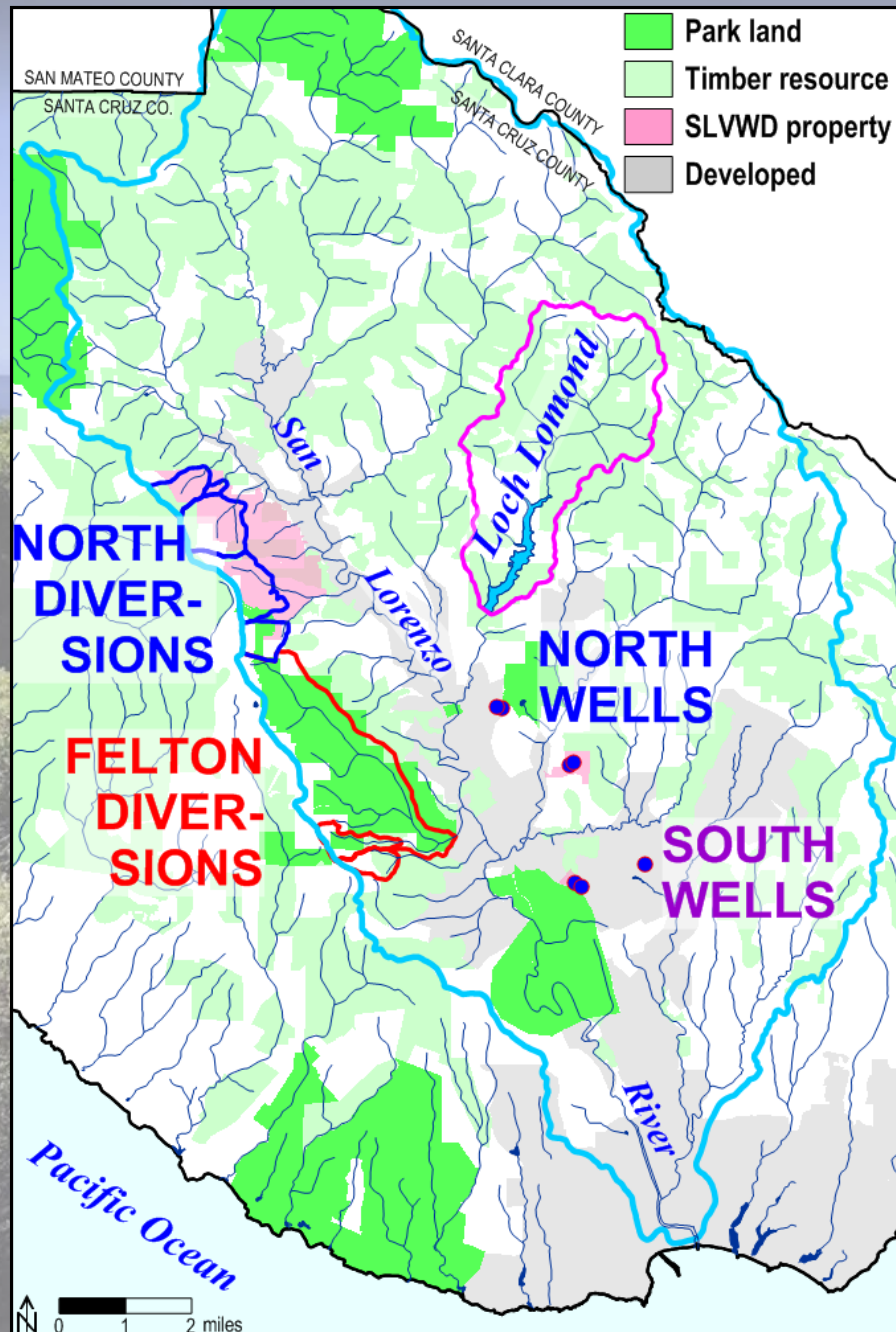
Water Sources



Population and Water Served



SLVWD	Service Area			Total
	North	South	Felton	
District Area (mi ²)	60			
Service Areas (mi ²)	22.0	0.8	2.2	25.0
<u>2010 Population Served:</u>				
	15,660	2,500	4,020	22,170
	71%	11%	18%	100%
no.connections	5,290	680	1,335	7,310
% residential	97%	100%	88%	96%
<u>2001-10 Water Demand:</u>				
average (AFY)	1,650	410	440	2,500
(MGY)	540	135	145	695
	66%	16%	18%	100%
peak monthly (MGD)	1.6	0.4	0.5	1.9
<u>2006-10 per capita use (GPCD):</u>				
	91	148	99	96

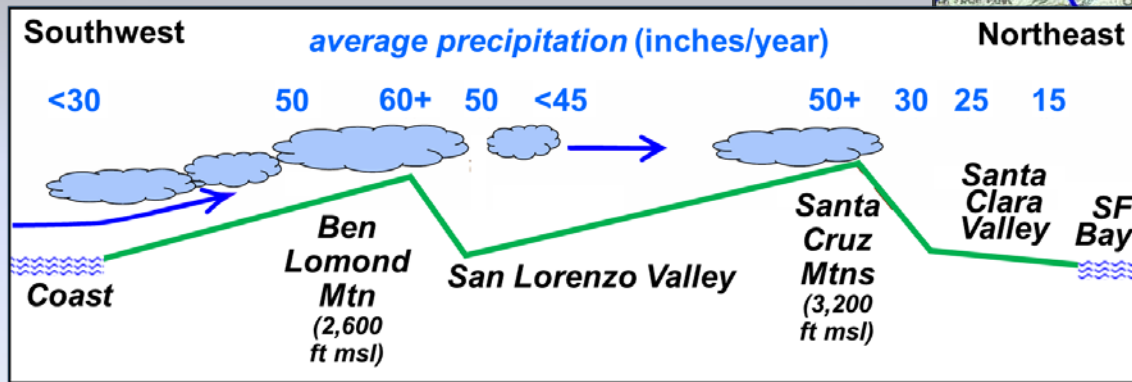


Water Sources and Distribution

SLVWD	Service Area			Total
	North	South	Felton	
<u>Stream & Spring Diversions:</u>				
points of diversion	6	0	4	11
watershed (acres)	1,400	-	2,940	4,340
capacity (GPM)	1,200	-	700	1,900
<u>Groundwater Extraction:</u>				
active wells	4	3	-	7
capacity (GPM)	1,100	400	-	1,500
<u>Water Distribution:</u>				
pressure zones	22	2	6	30
storage tanks	23	4	7	34
storage capacity (MG)	8.1	0.4	0.9	9.4
pipelines (miles)	>150			
booster stations	24	1	3	28

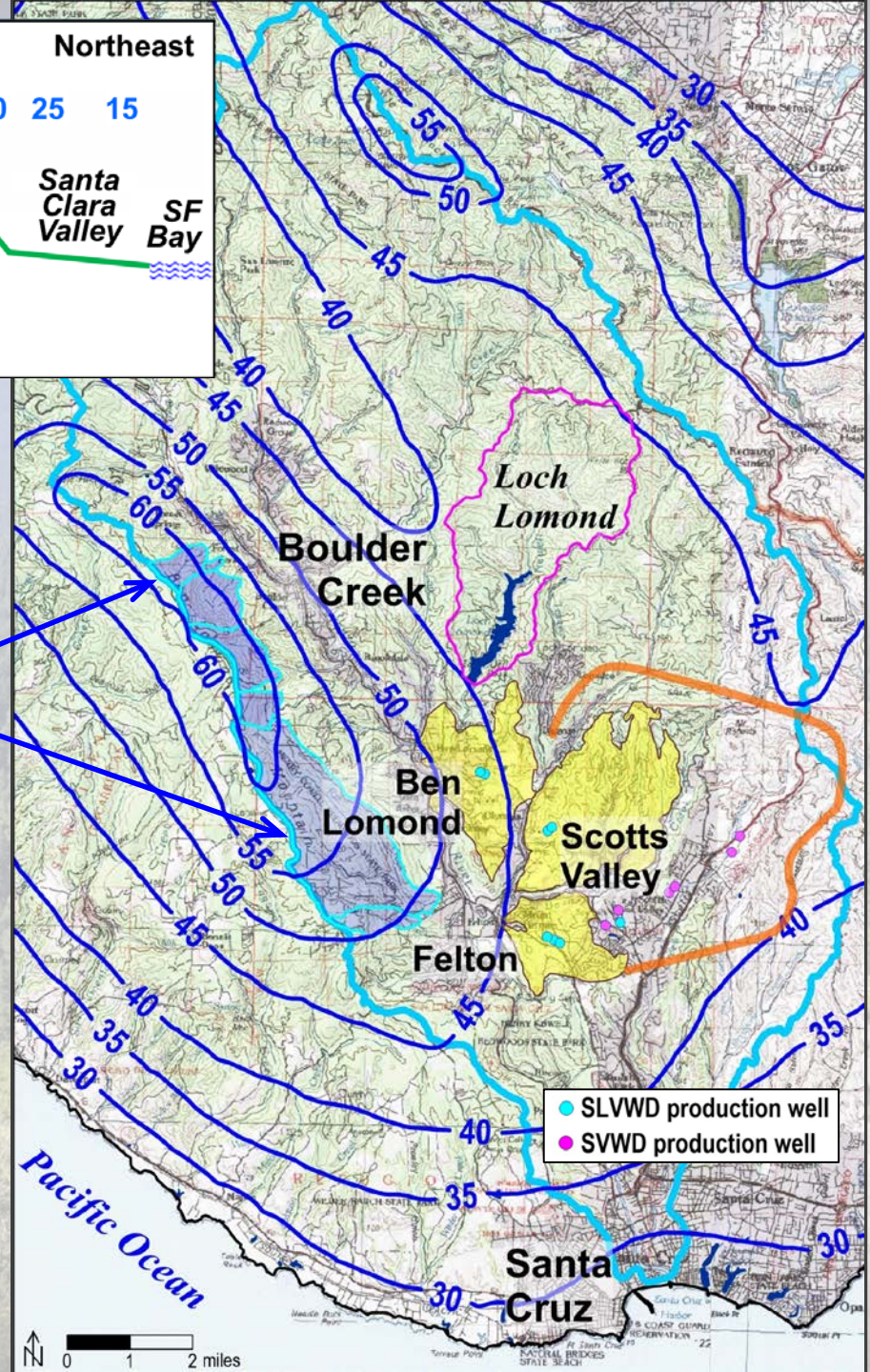
San Lorenzo Valley Water District

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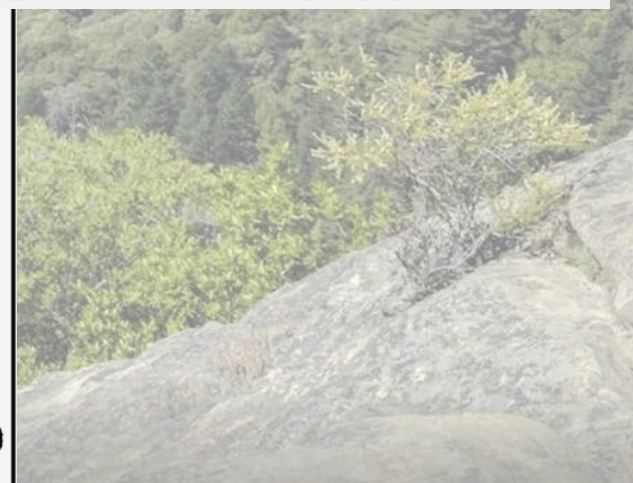
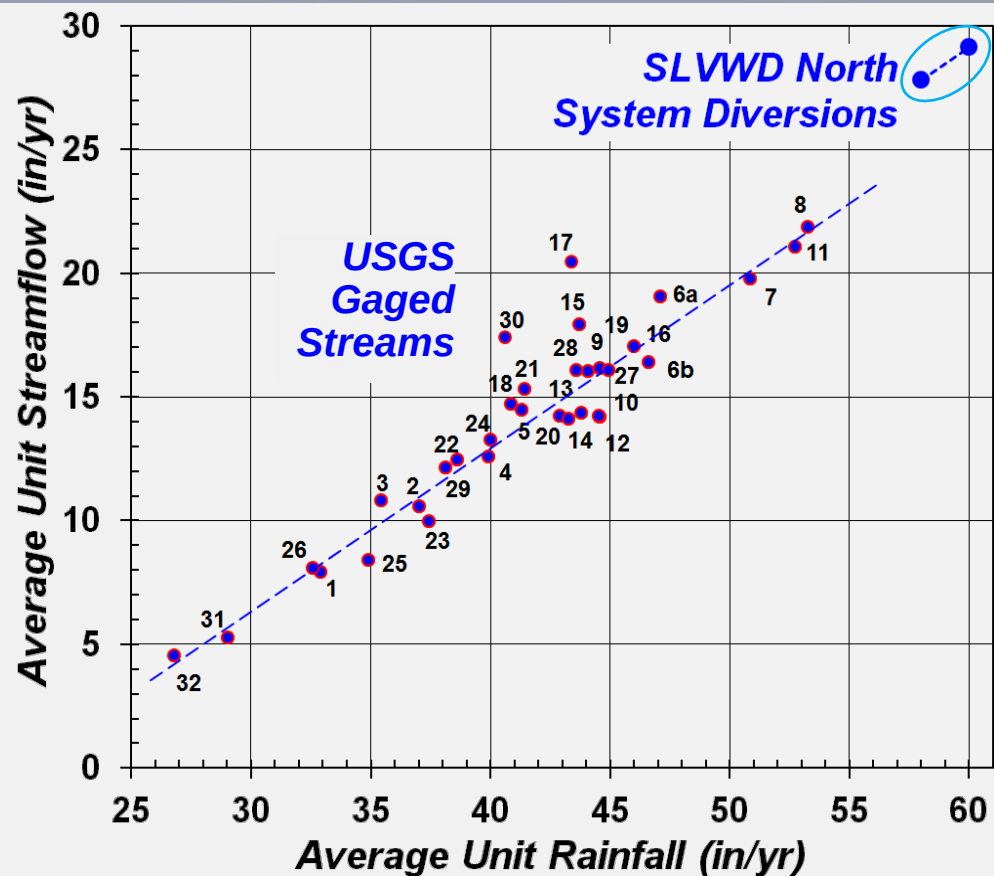
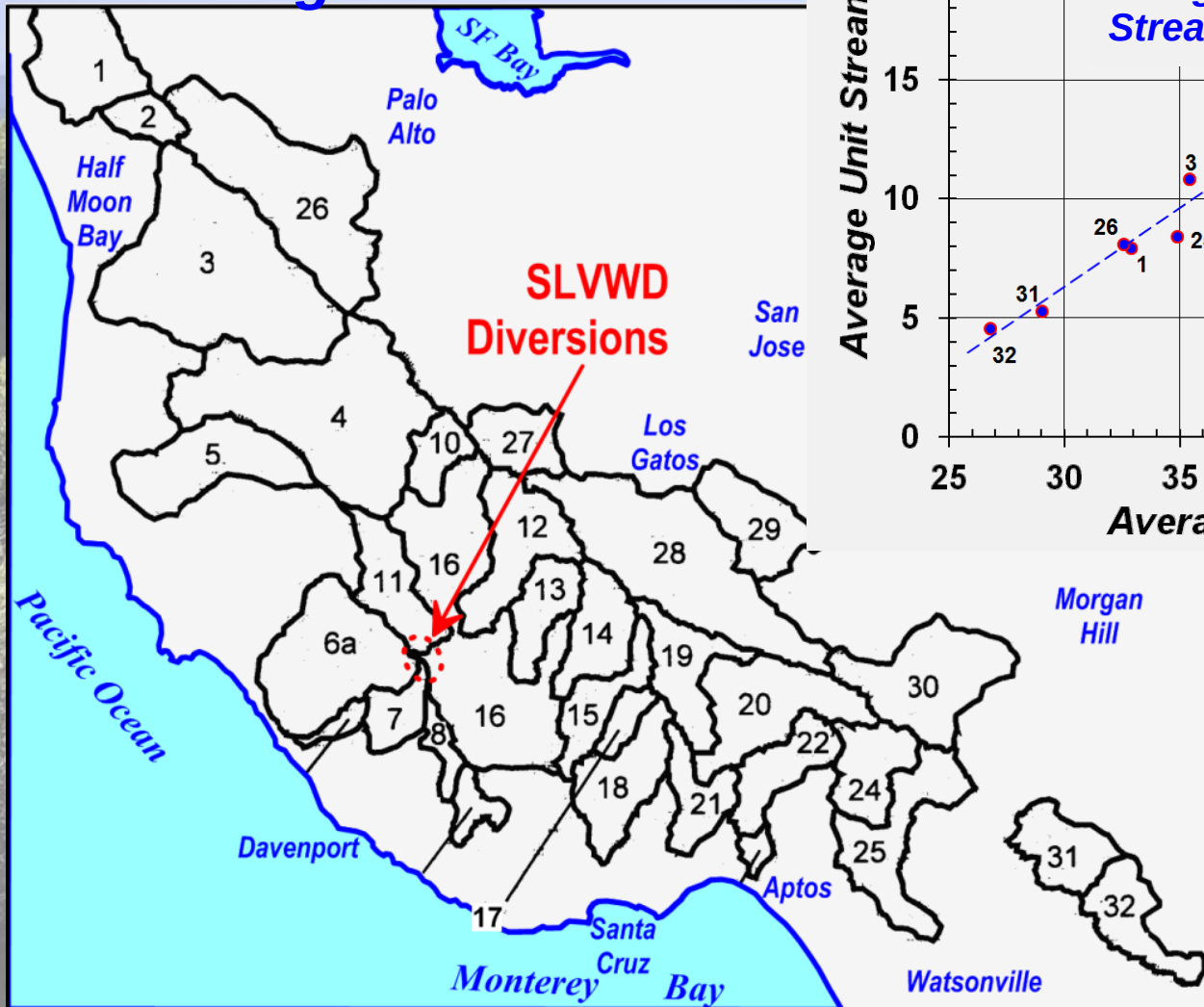
**SLVWD
diversion
watersheds**

**Mean annual
precipitation
(inches/year)**

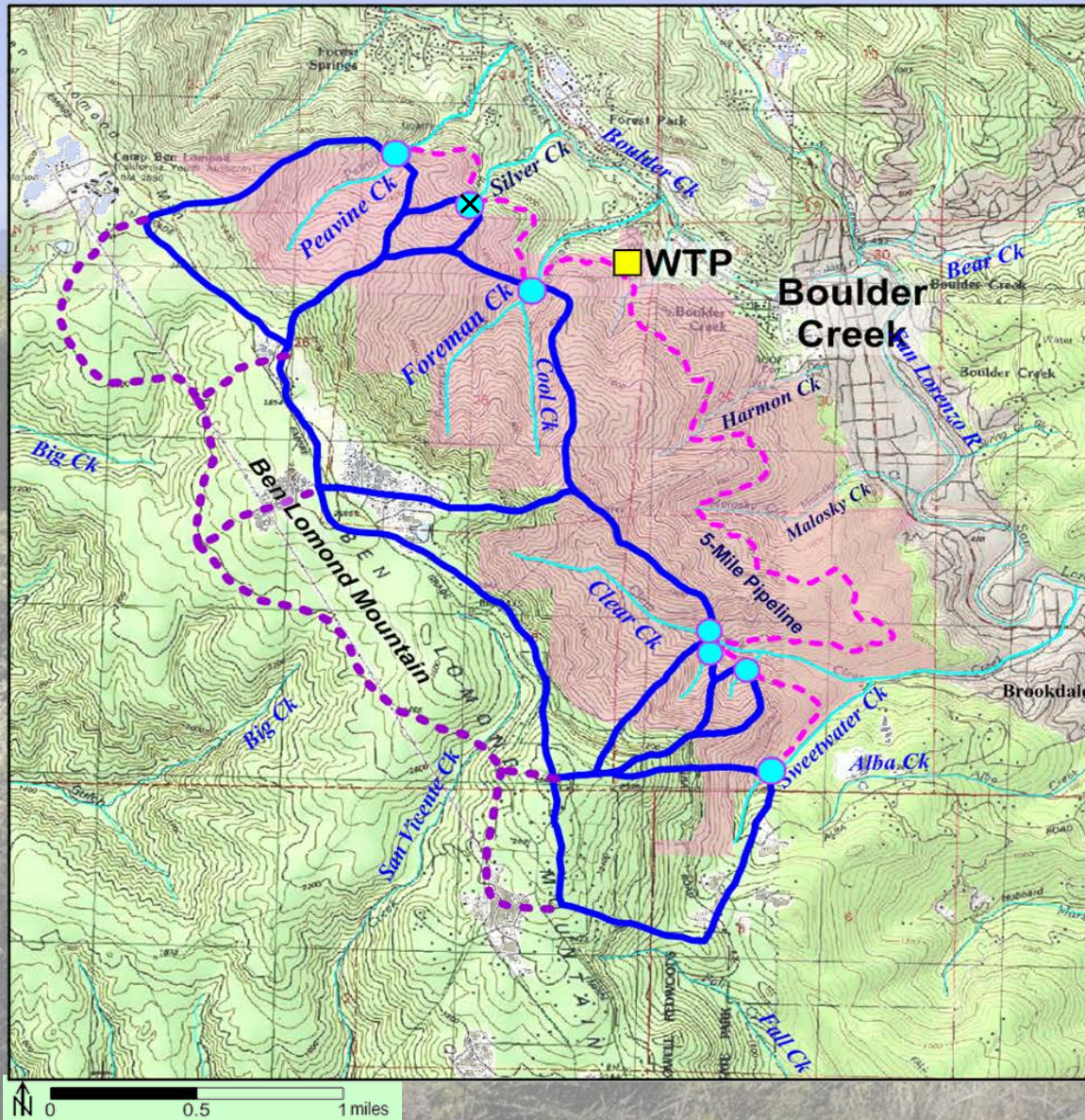


Relation Between Rainfall and Runoff

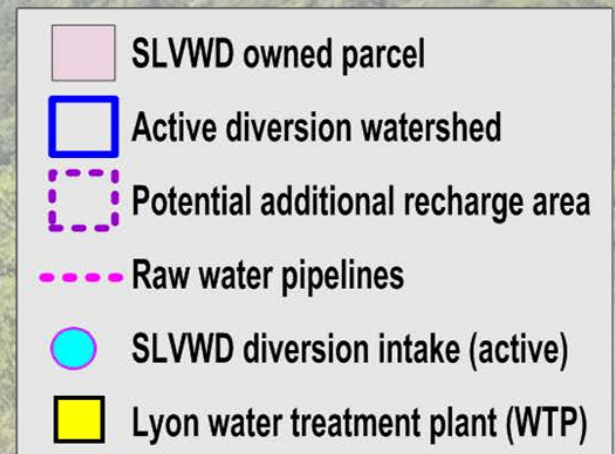
USGS Gaged Watersheds



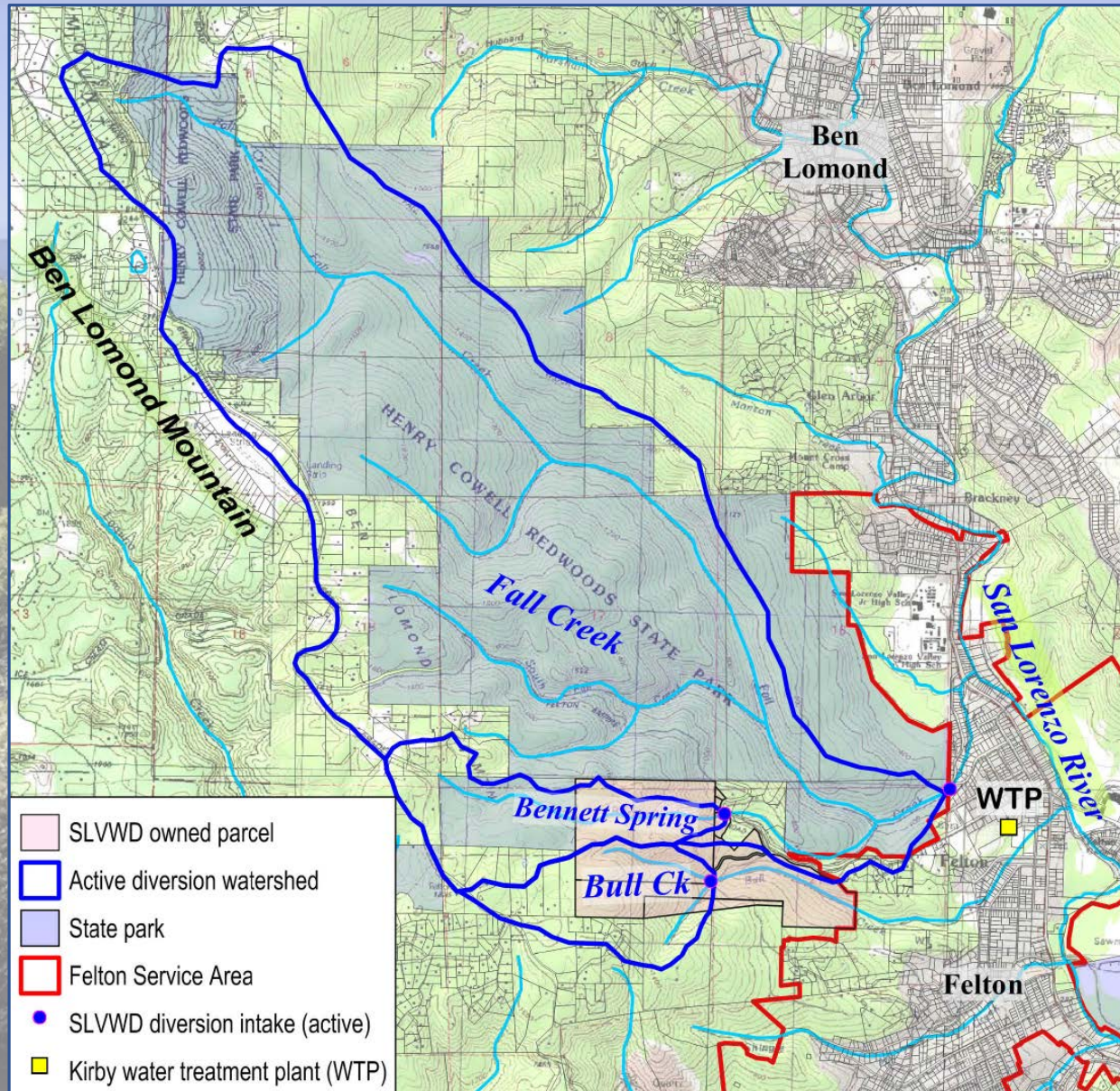
North System Diversion Watersheds



Total ~1,400 acres

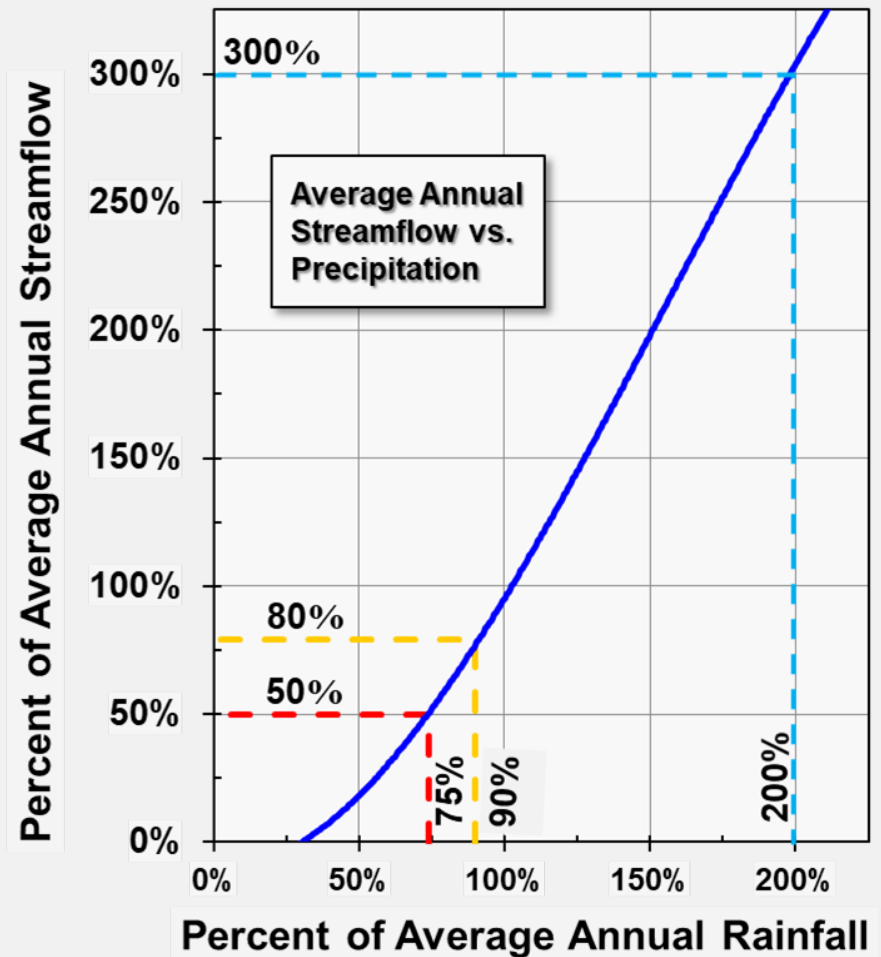
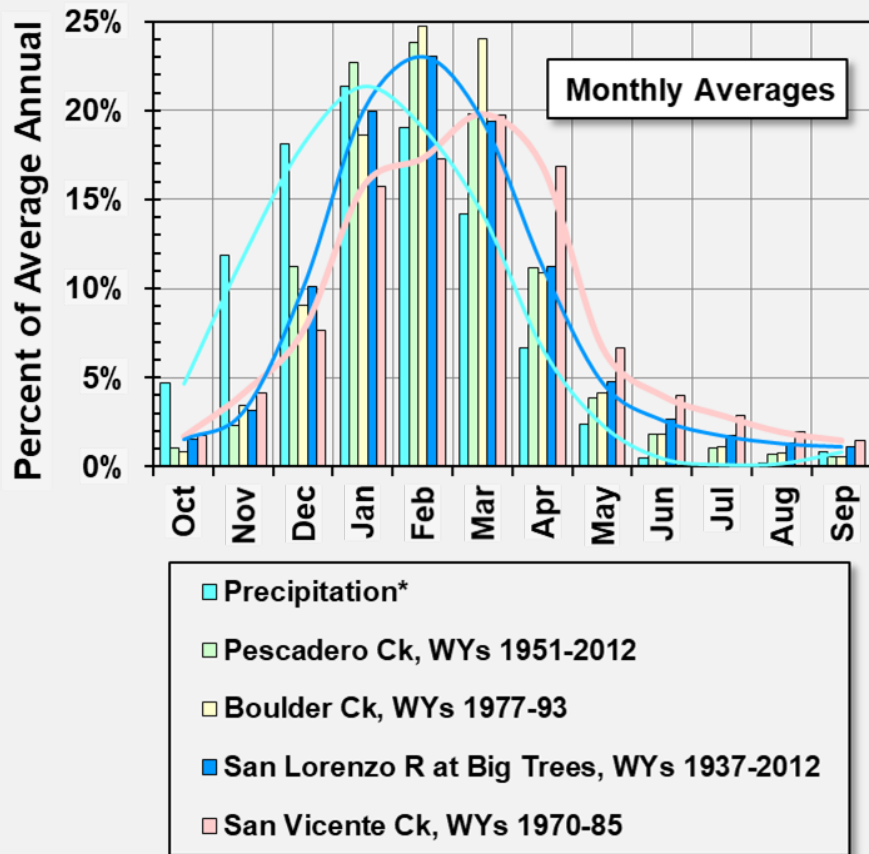
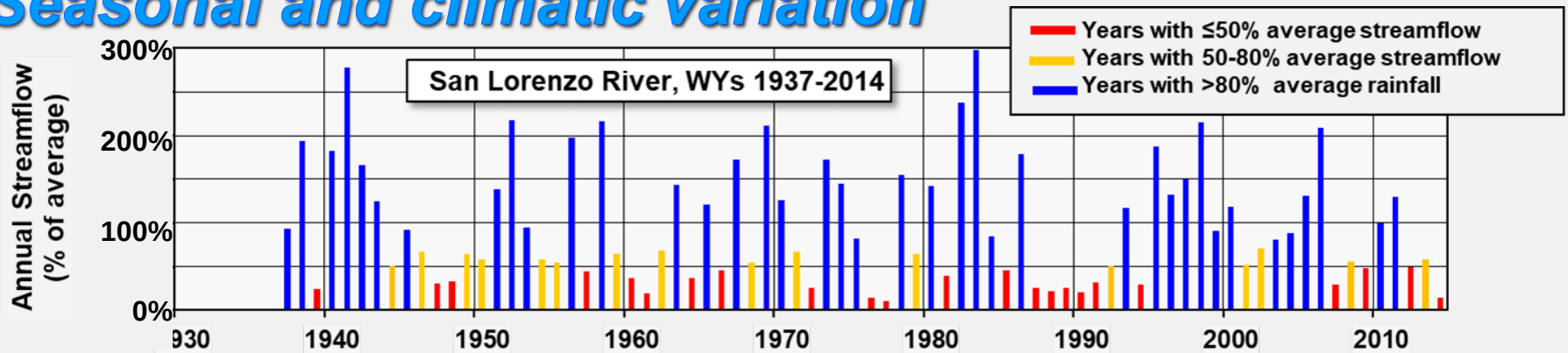


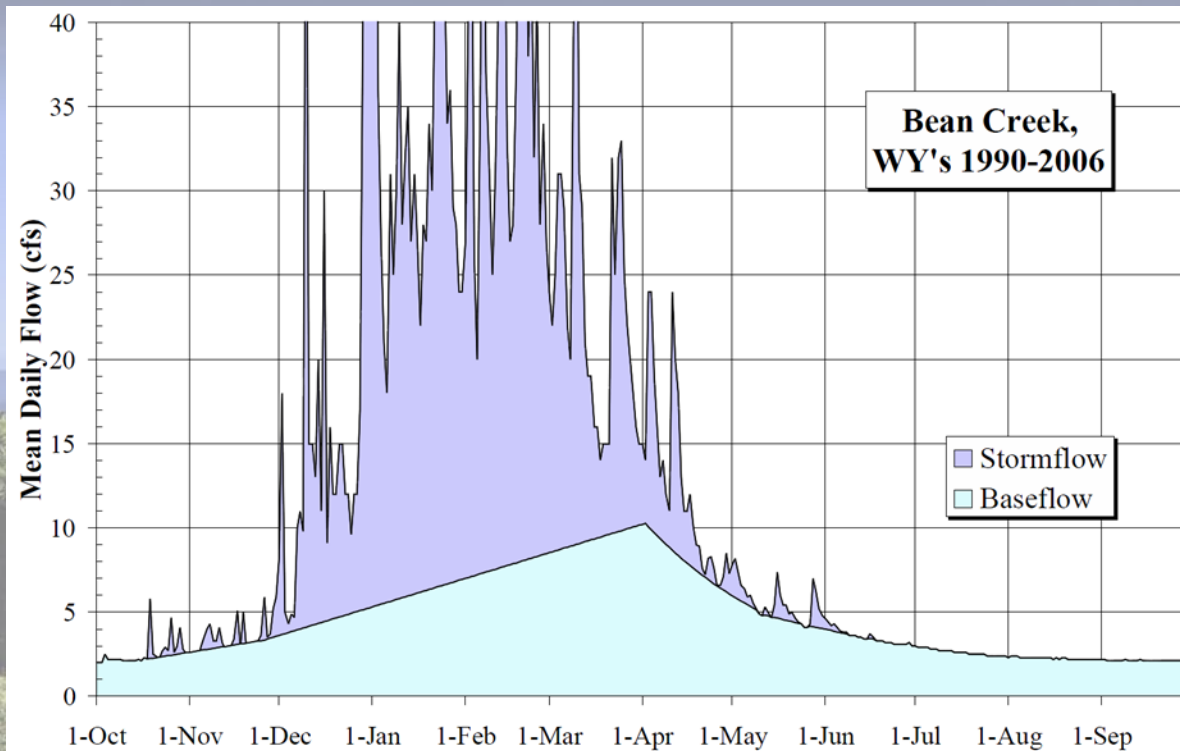
Felton System Diversion Watersheds



Total ~2,900 acres

Seasonal and climatic variation





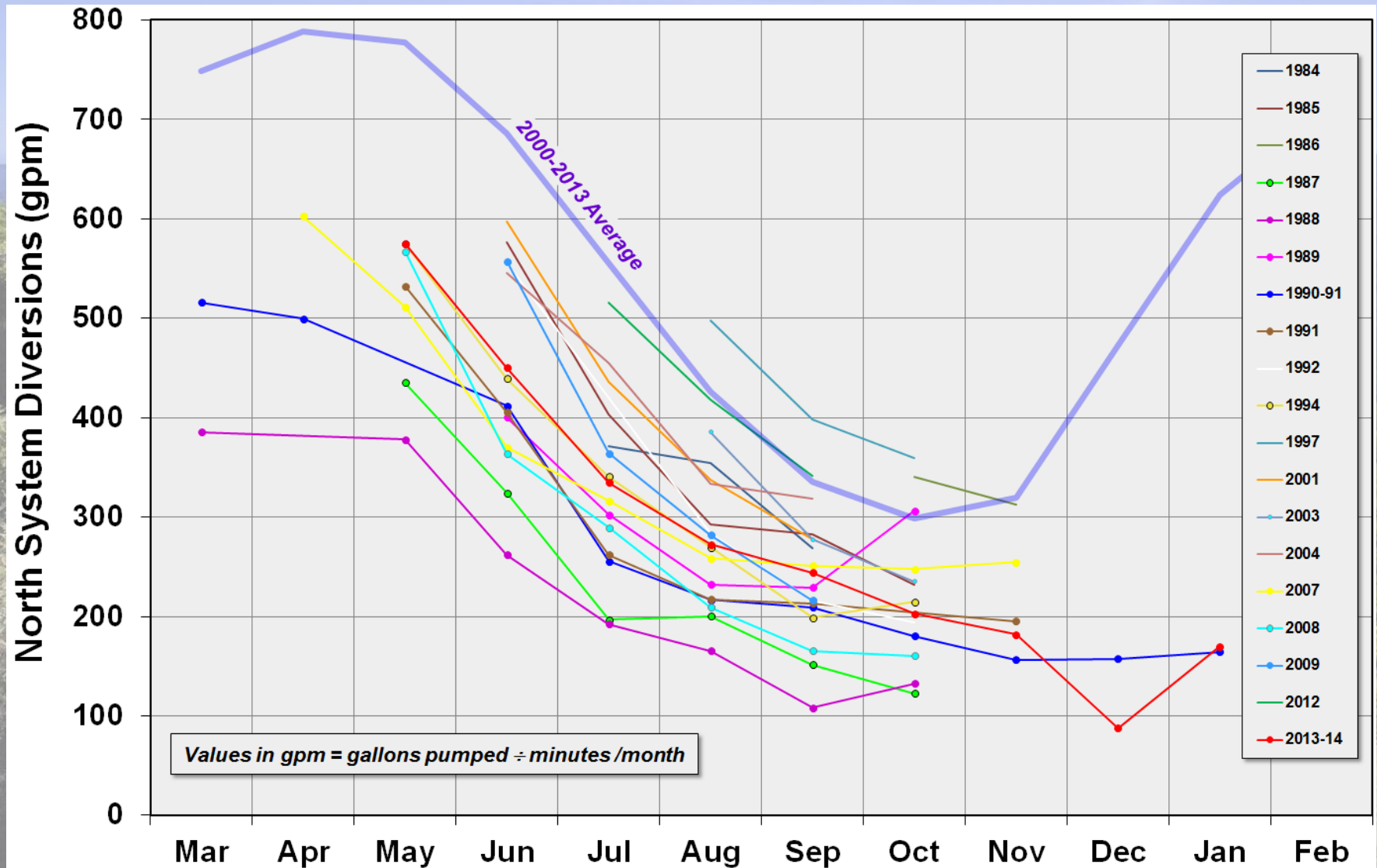
Stormflow- Baseflow Separation

Water Balance

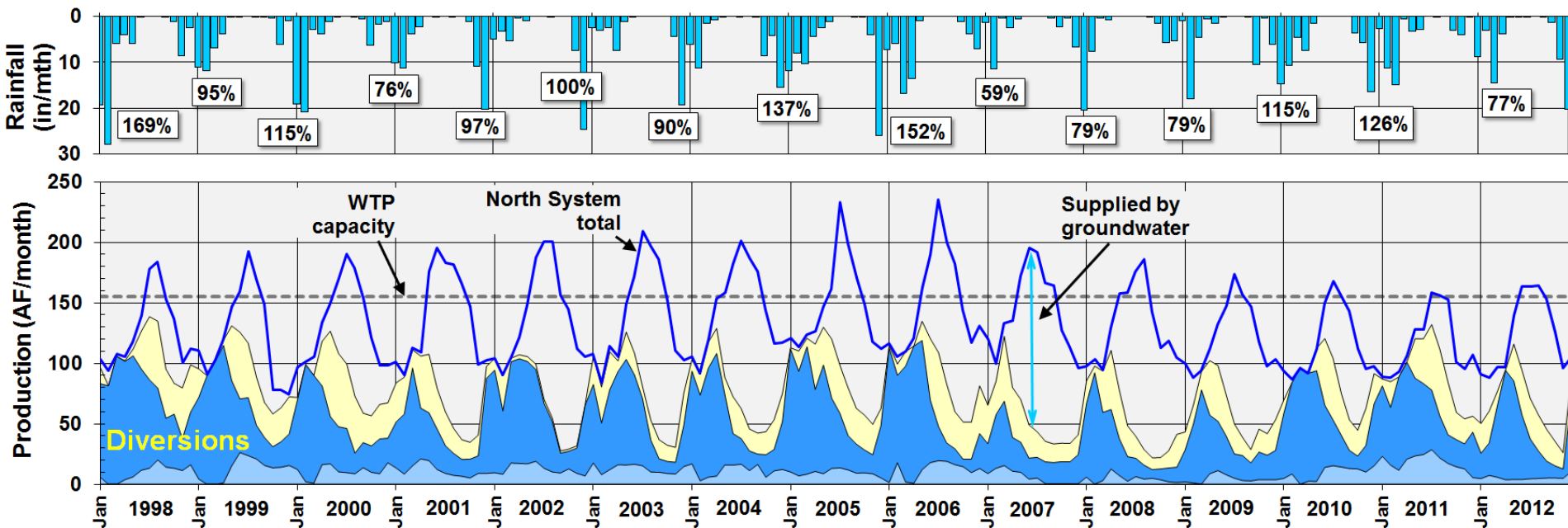
1-Apr	1-May	1-Jun	1-Jul	1-Aug	1-Sep	Water- shed Precip.	Unit Streamflow			ET		
Stream					Drainage Area (mi ²)		Total	Baseflow (= Recharge)	Storm Run- off			
											(inches/year)	
Pescadero Ck						46	40	13	5	37%	8	27
San Vicente Ck						6	51	21	10	49%	11	30
SLR at Waterman Switch						6	45	15	6	41%	9	30
Boulder Ck						11	53	22	8	38%	13	31
Zayante Ck						11	44	15	5	35%	10	29
Bean Ck						9	44	18	7	38%	11	26
SLR at Big Trees						107	46	17	7	41%	10	29

SLR = San Lorenzo River

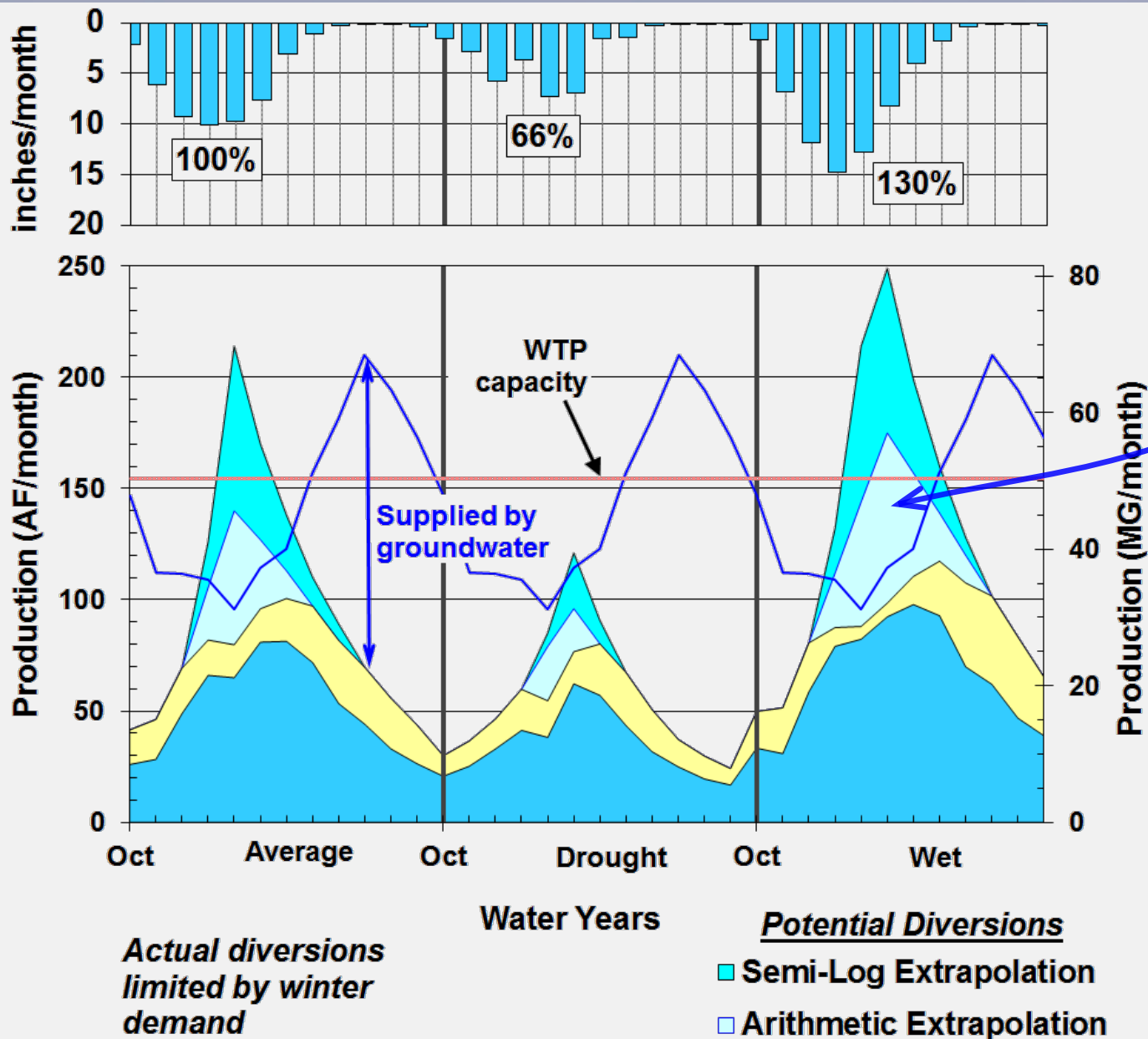
Dry period stream baseflow recession



North System Diversions



Diversions limited by winter demand

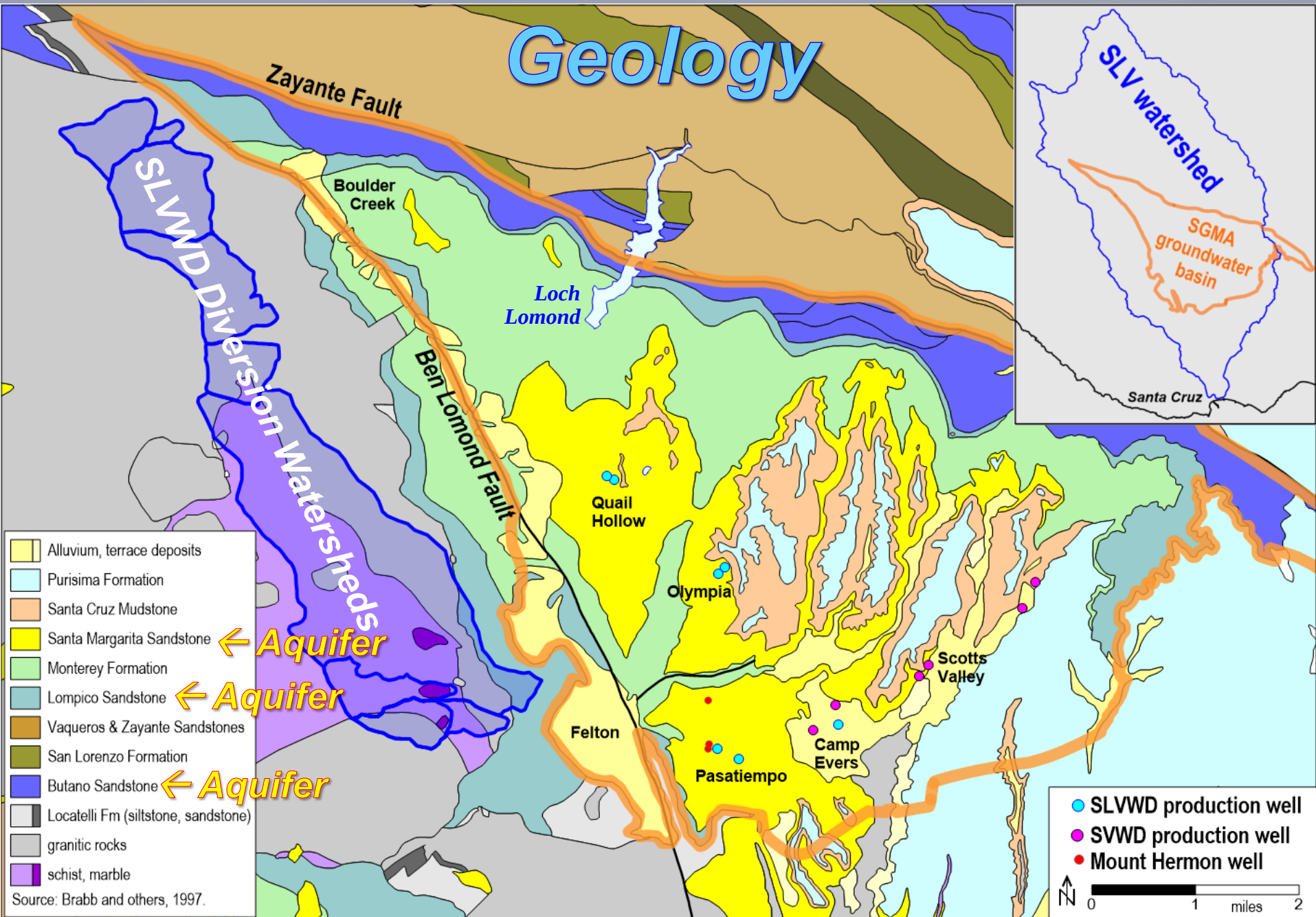


Potential diversions (existing diversion infrastructure)

San Lorenzo Valley Water District

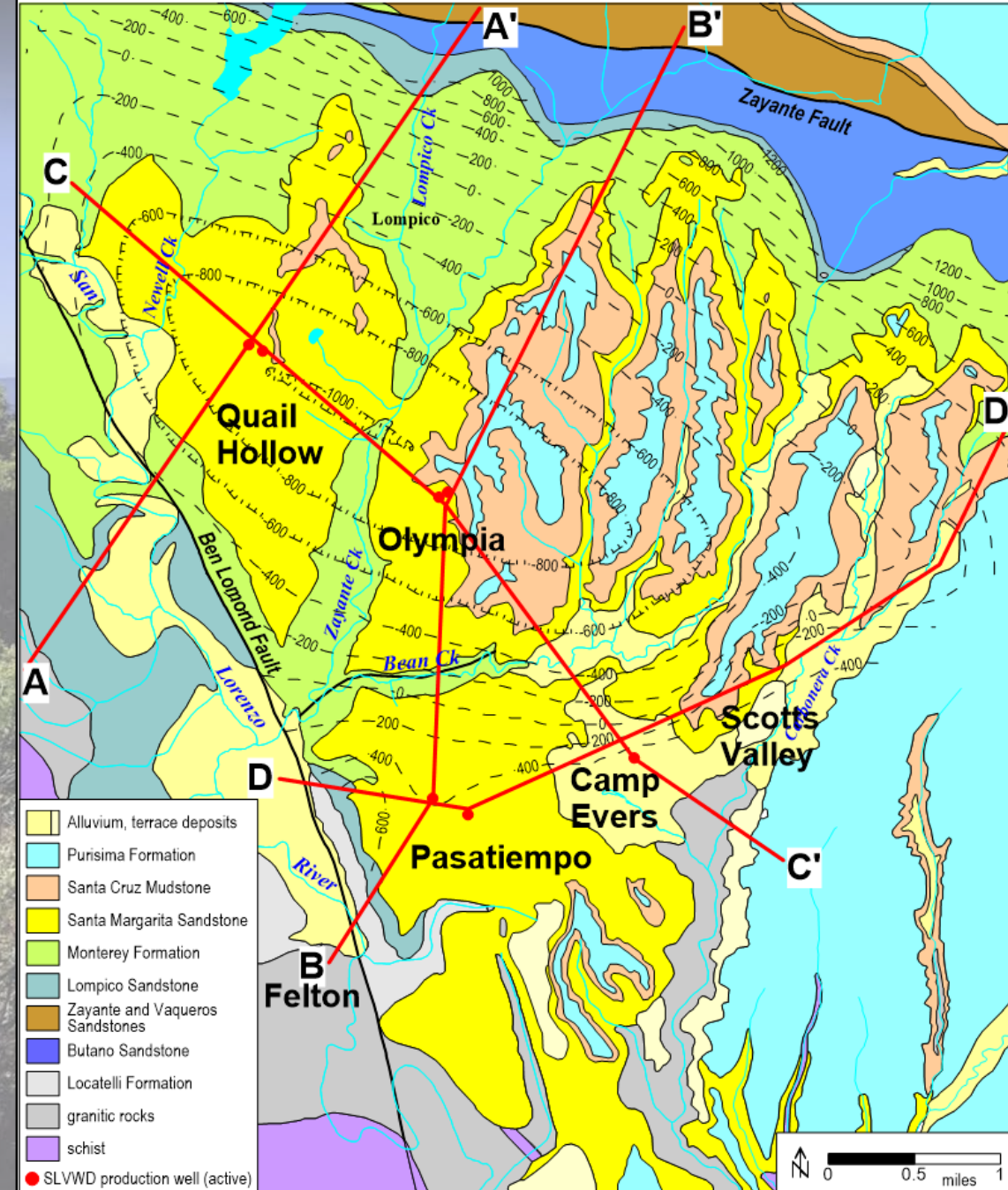
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Geology



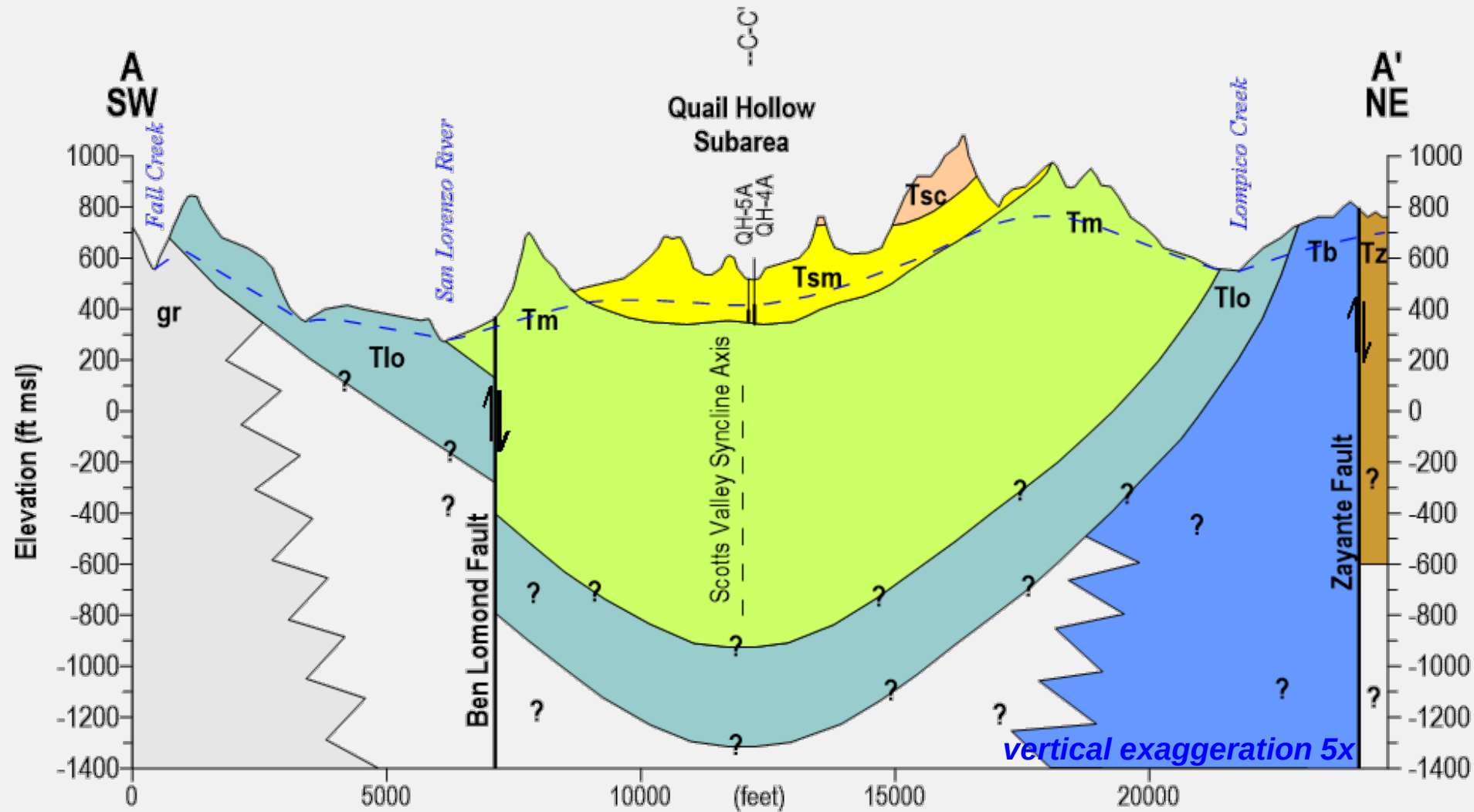
Hydrogeologic Structure

Scotts Valley Syncline

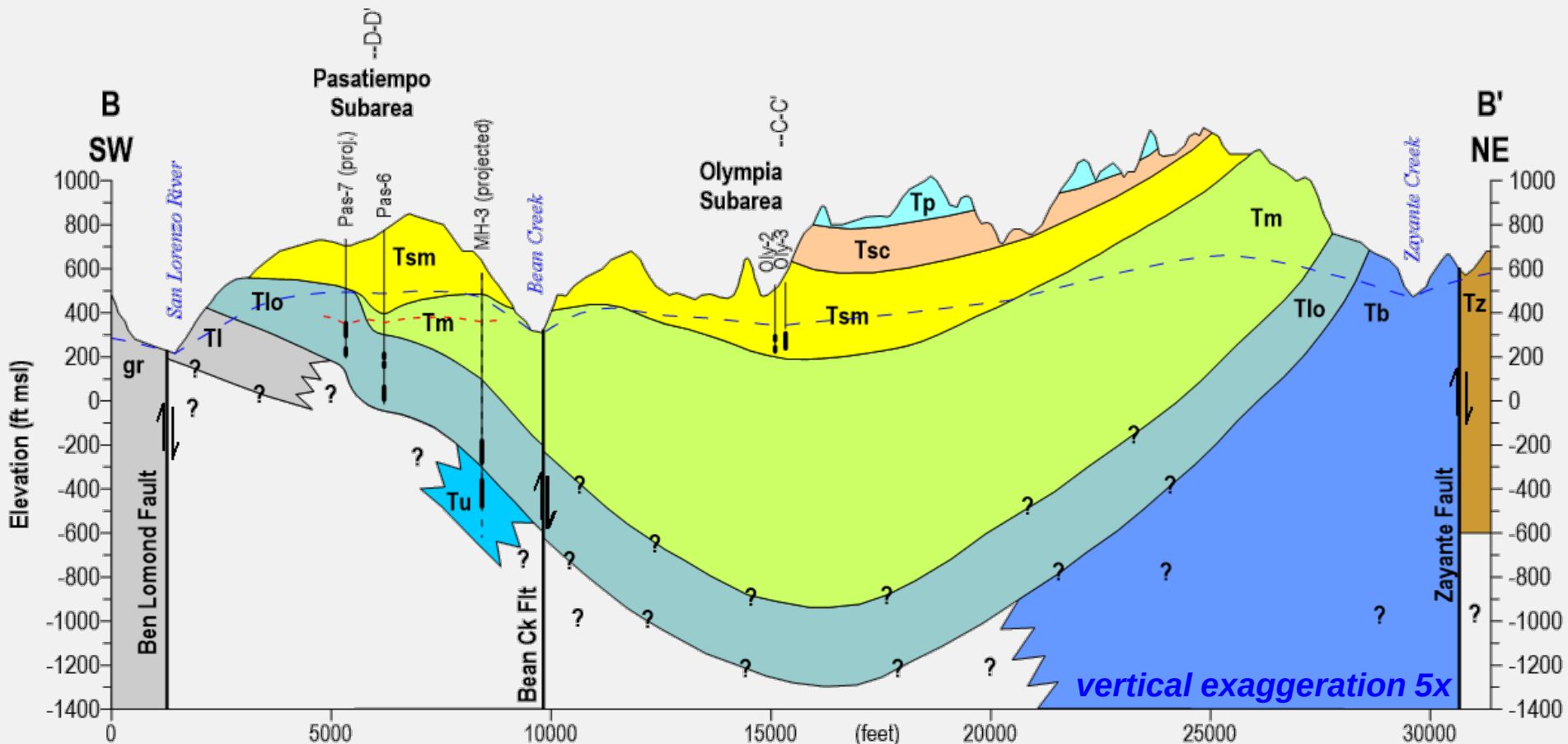


Estimated Elevation of the Top of the Lompico Sandstone

Hydrogeologic Cross Sections

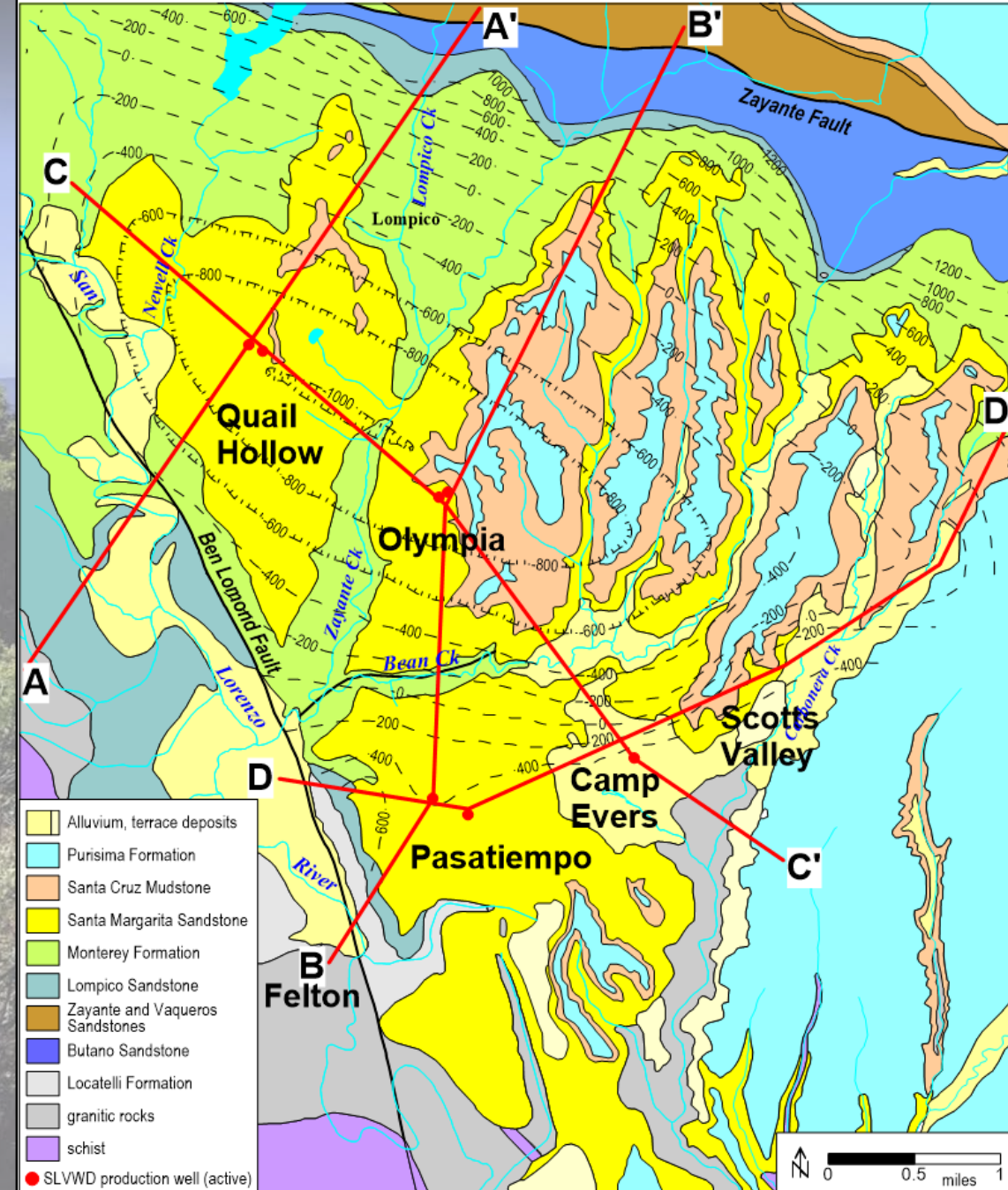


Hydrogeologic Cross Sections



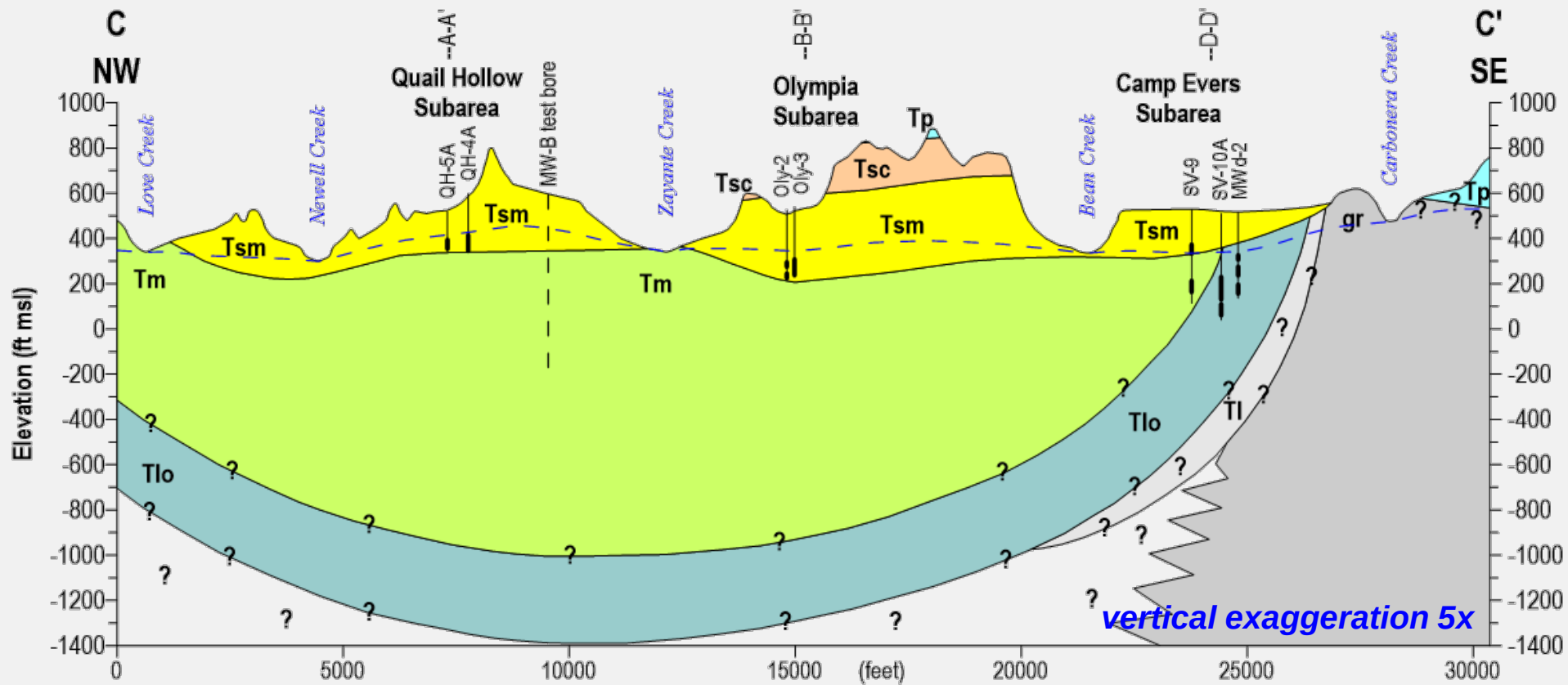
Hydrogeologic Structure

Scotts Valley Syncline



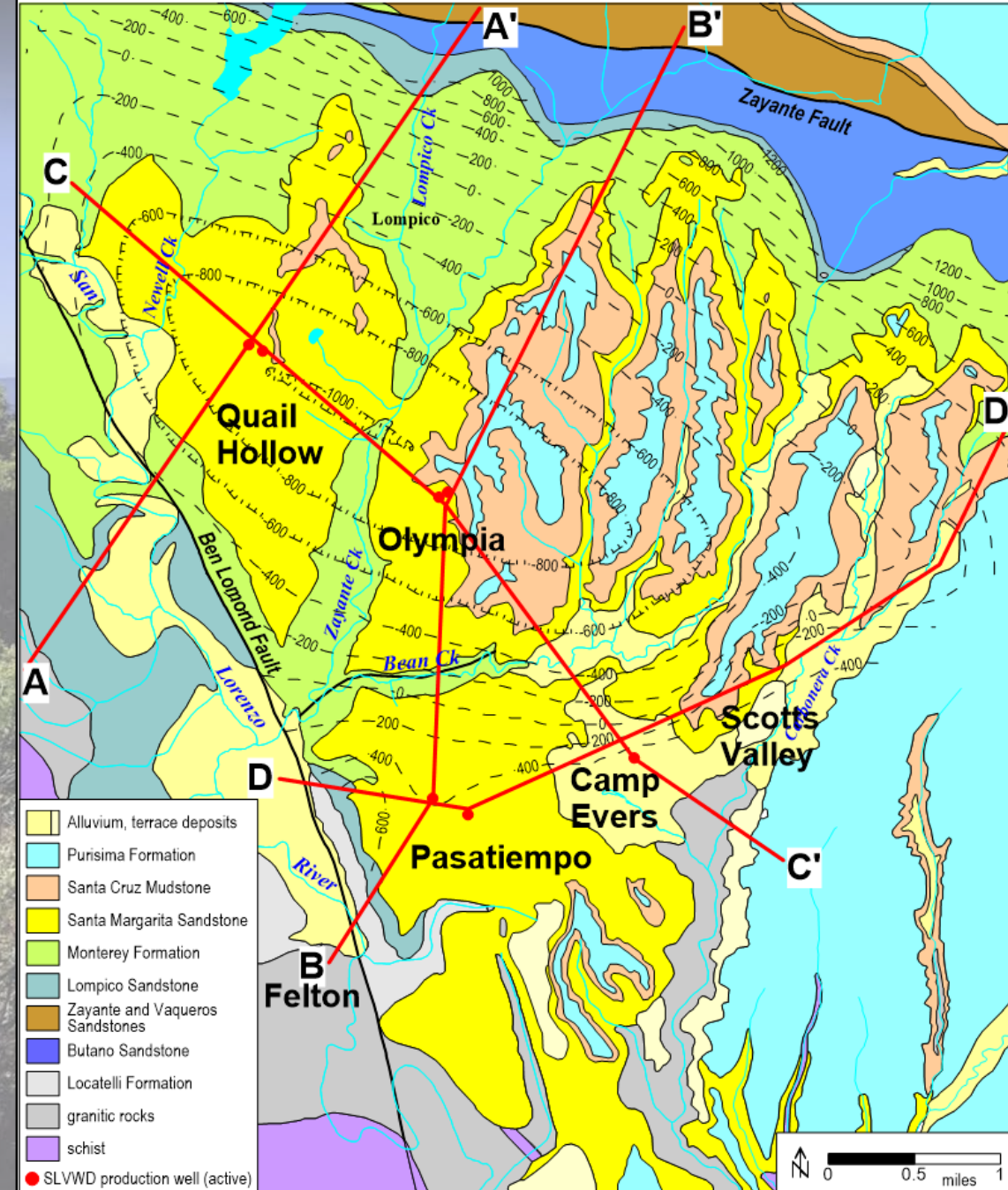
Estimated Elevation of the Top of the Lompico Sandstone

Hydrogeologic Cross Sections



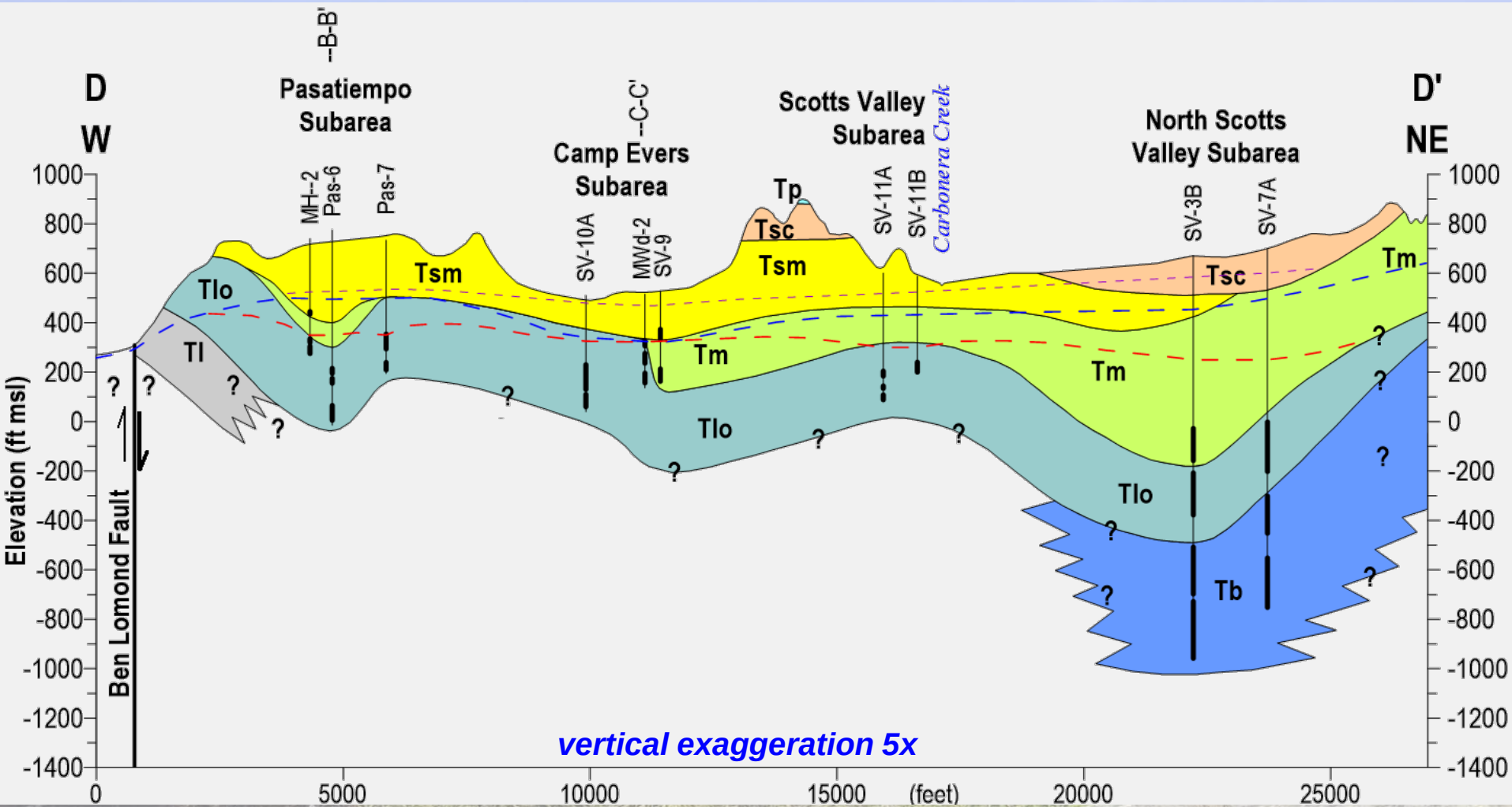
Hydrogeologic Structure

Scotts Valley Syncline

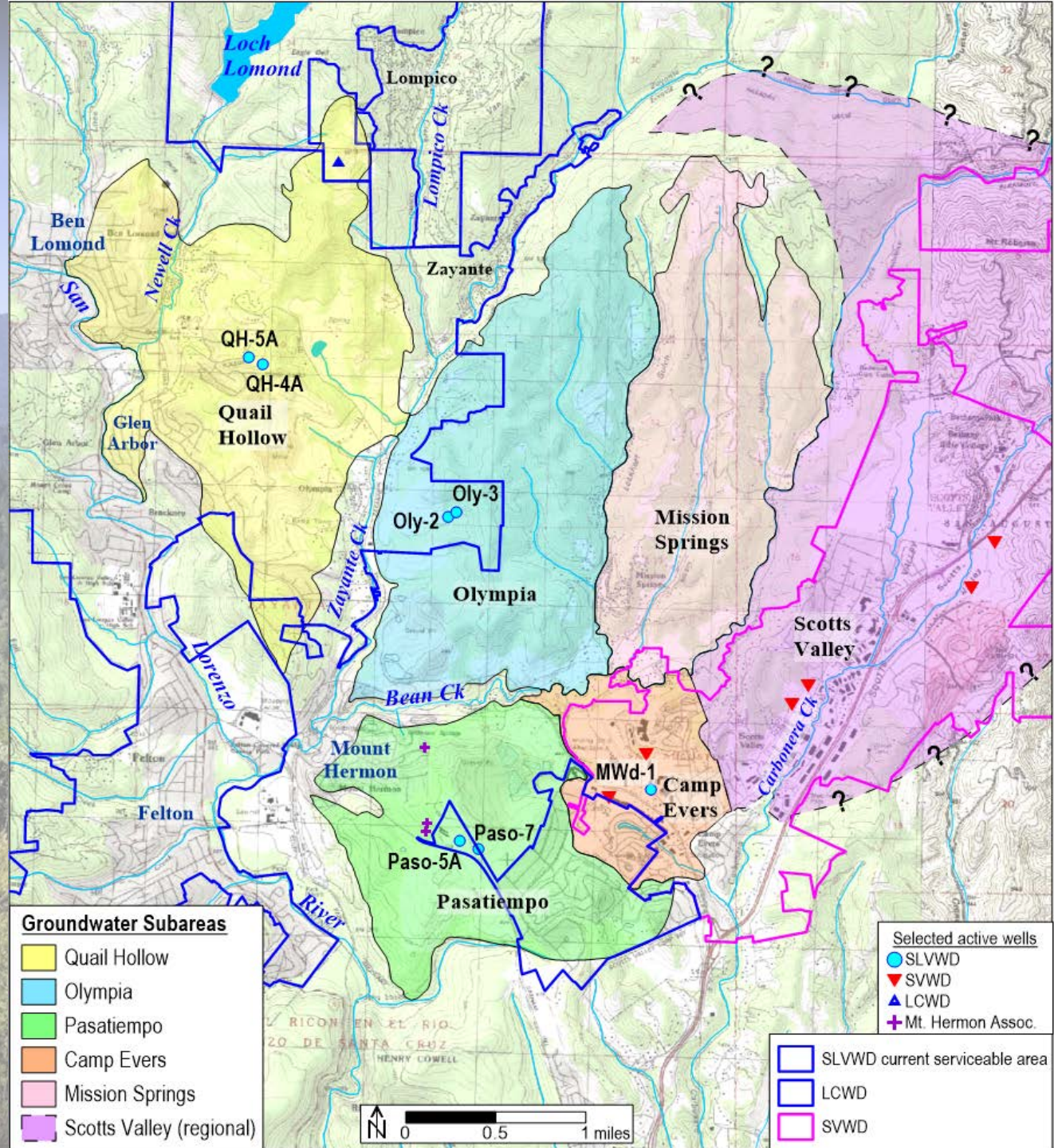


Estimated Elevation of the Top of the Lompico Sandstone

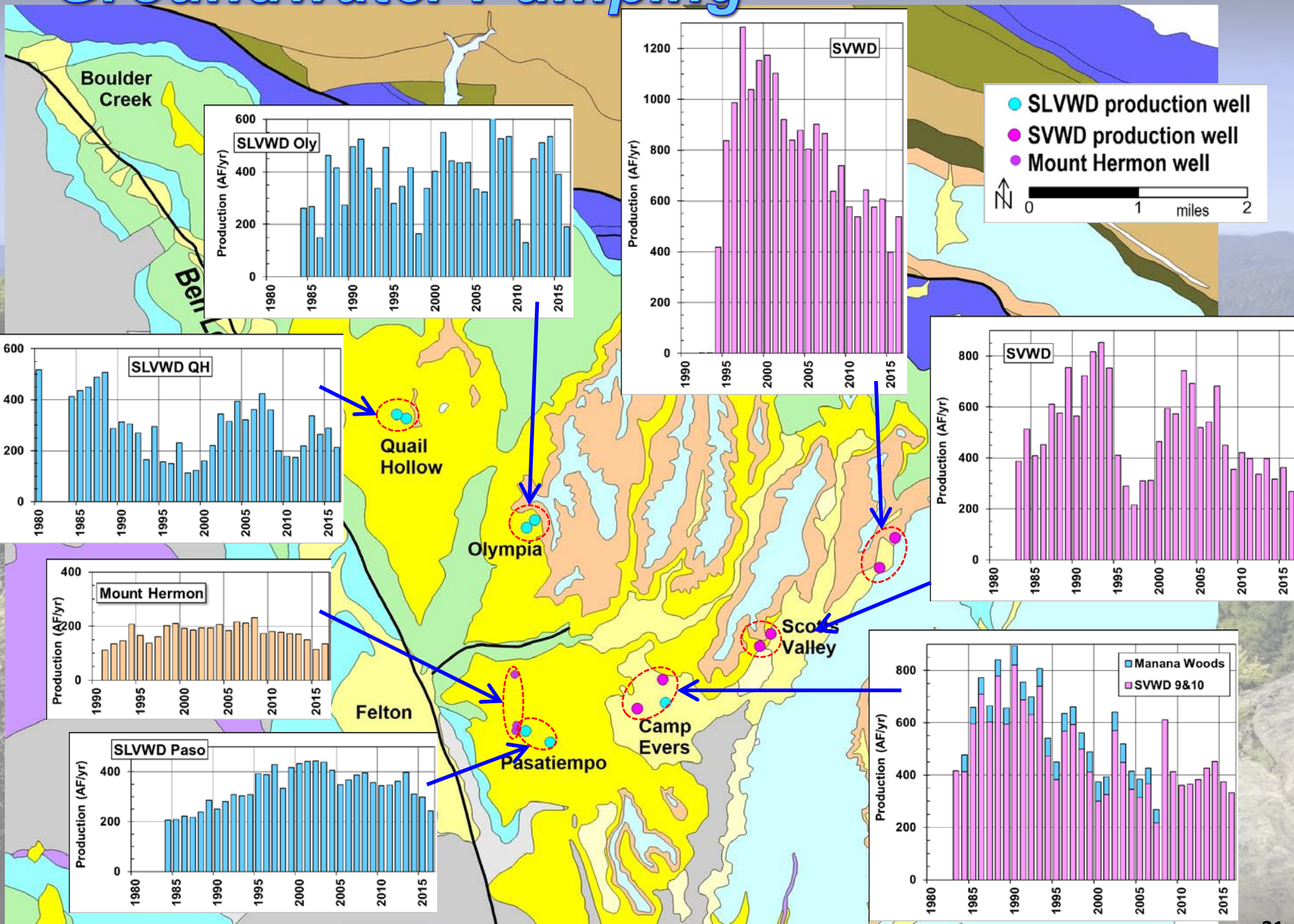
Hydrogeologic Cross Sections



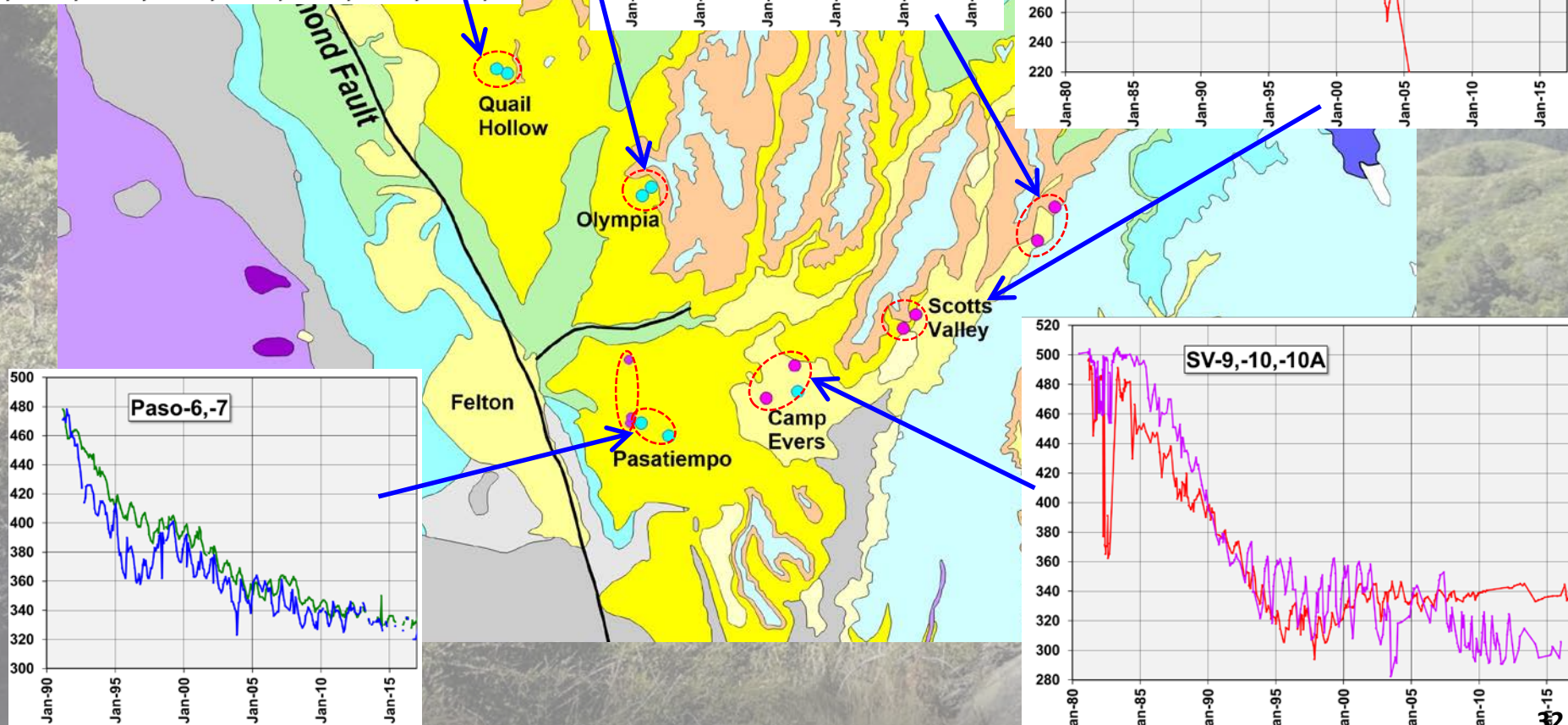
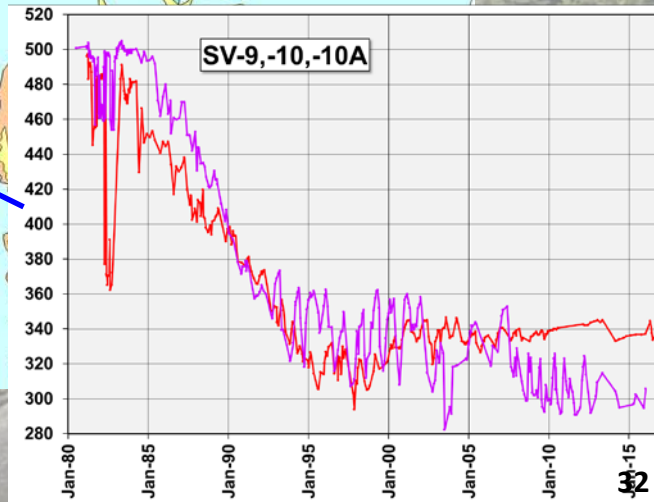
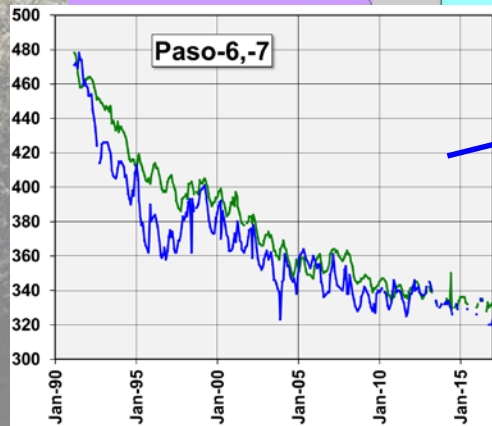
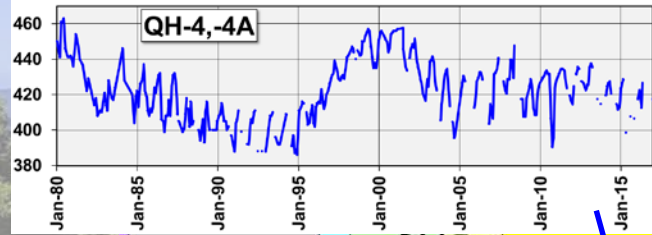
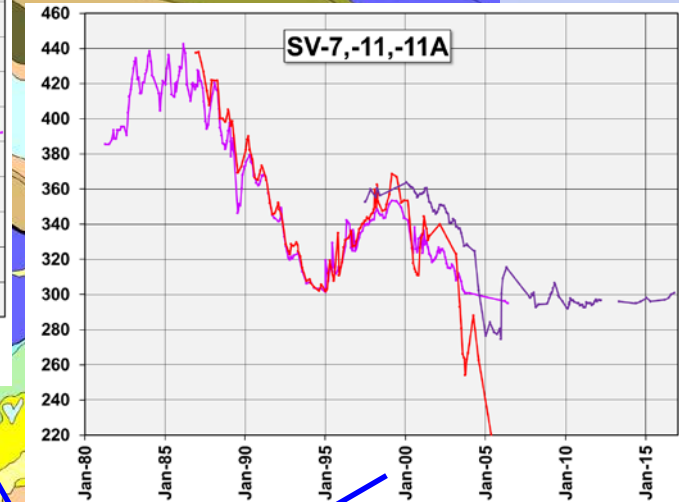
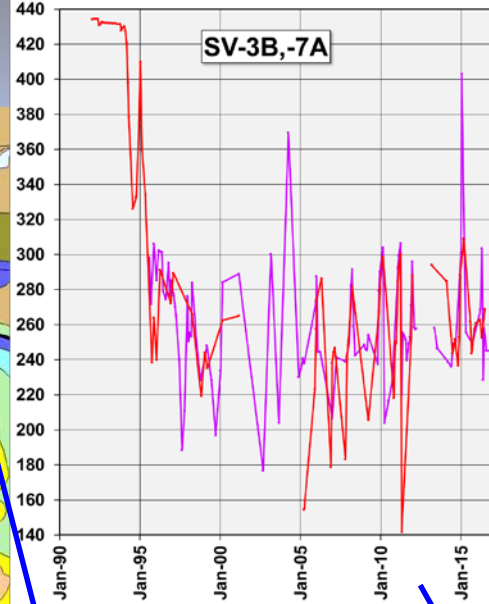
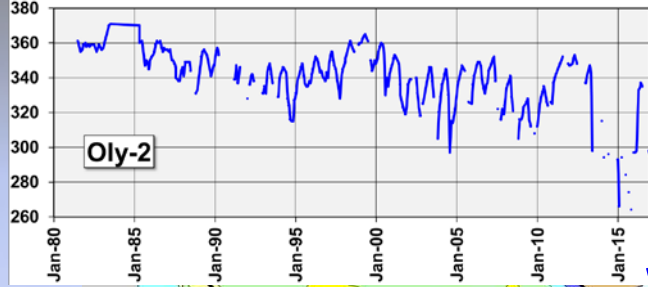
Groundwater Subareas

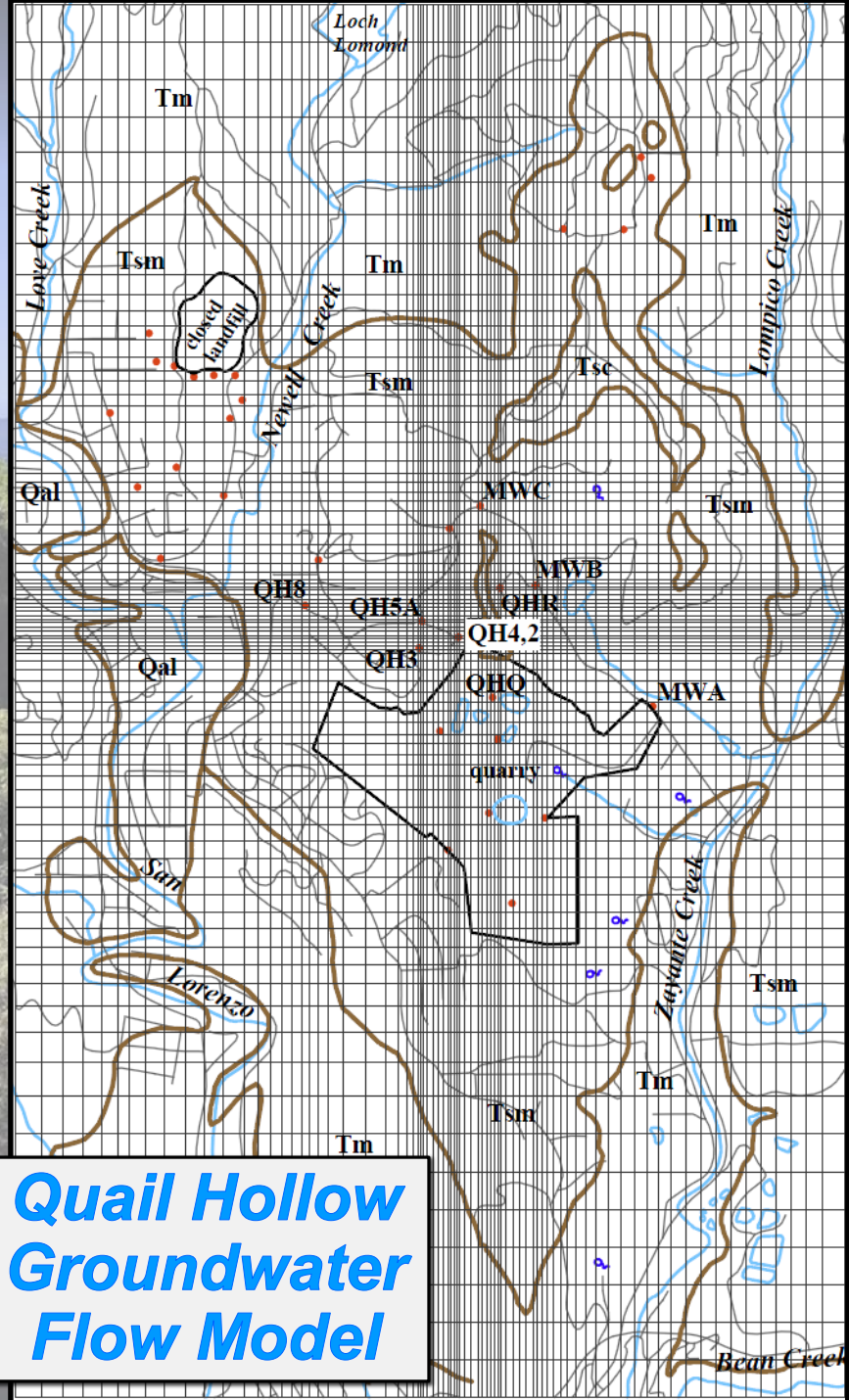


Groundwater Pumping

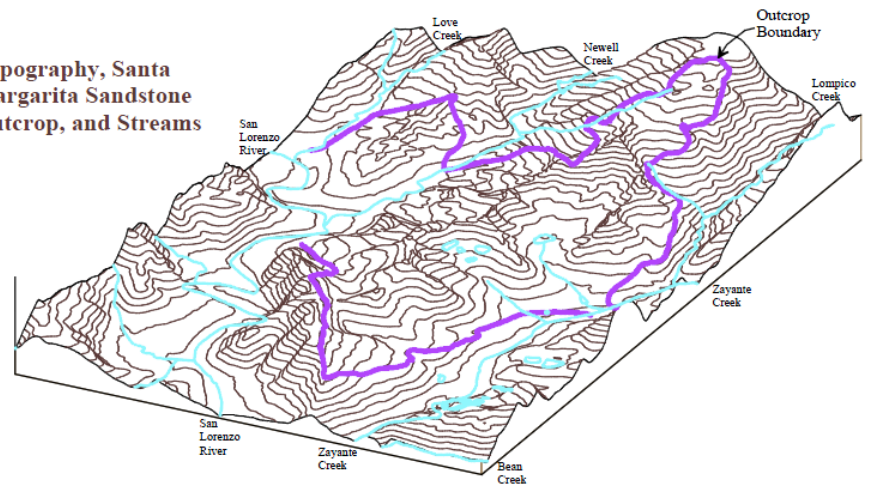


Groundwater Levels

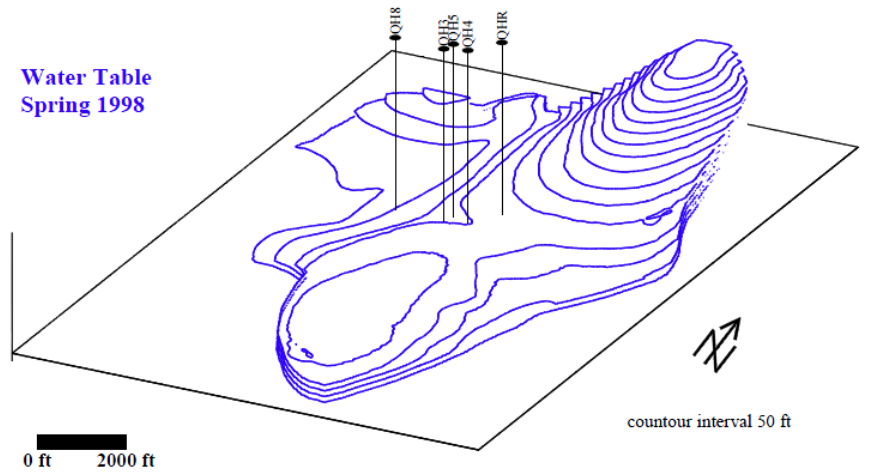




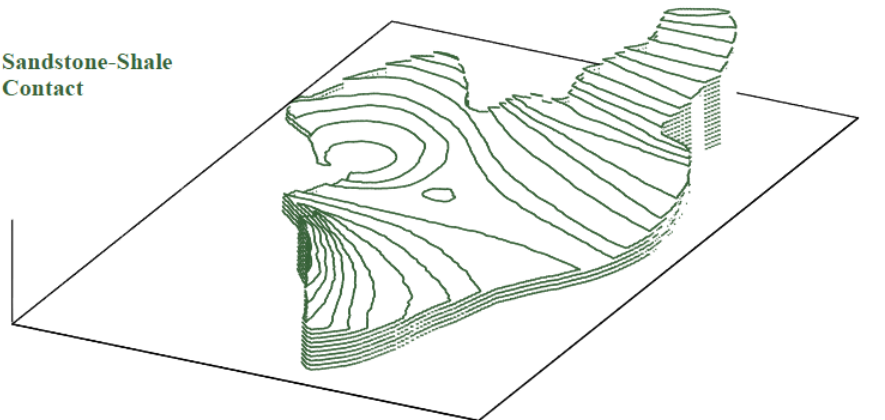
Topography, Santa Margarita Sandstone Outcrop, and Streams



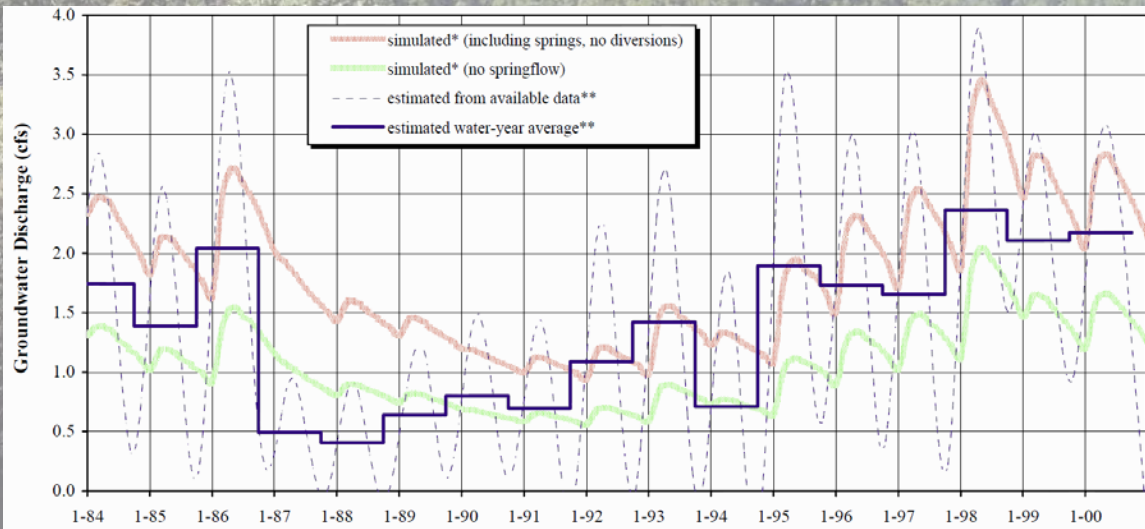
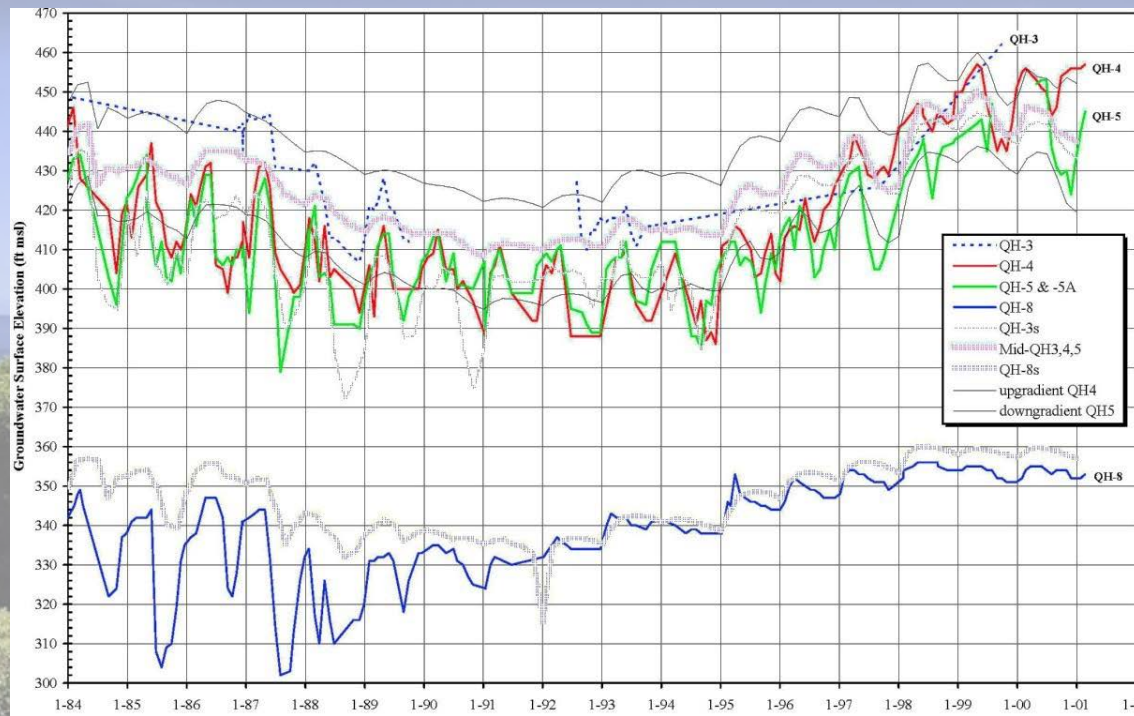
Water Table Spring 1998



Sandstone-Shale Contact



Model calibration to groundwater levels, springflows, and stream baseflows



Sand Hill Calibrated Water Balance			
Water-shed Precip.	Ground-water Recharge from Precip.	Storm Runoff	ET
(inches/year)			
47	20 (!)	7	20

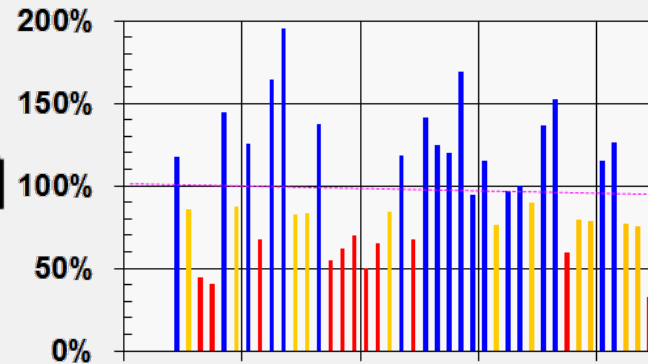
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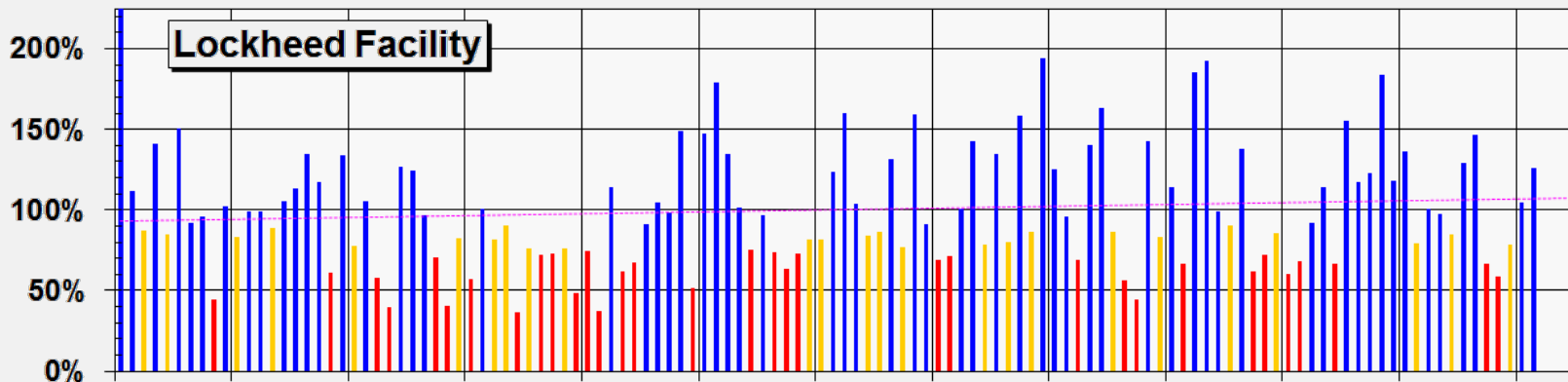
Long-term Precipitation Record

- Years with $\leq 75\%$ average rainfall
- Years with 76-90% average rainfall
- Years with $>90\%$ average rainfall

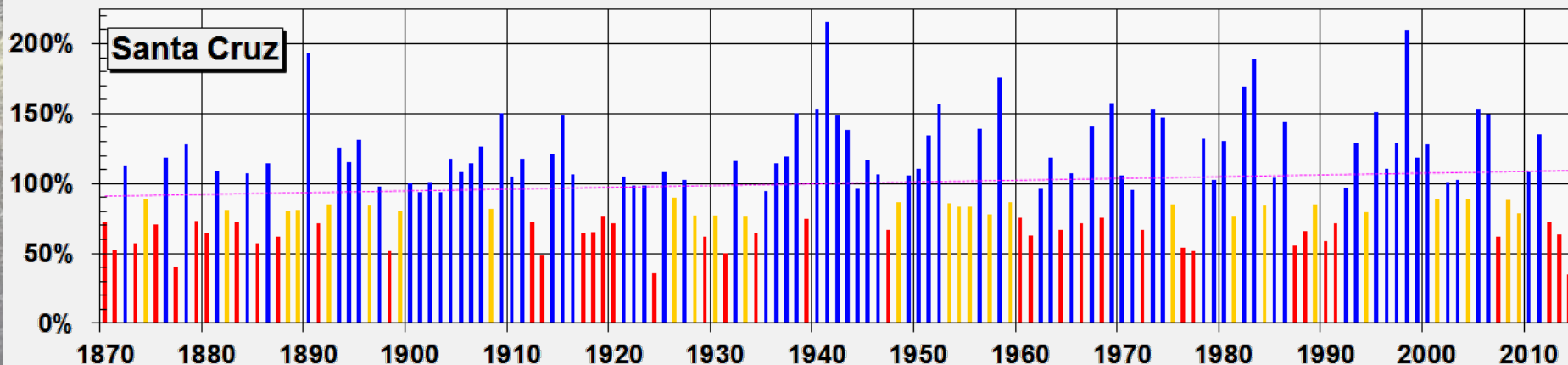
Ben Lomond 4



Lockheed Facility

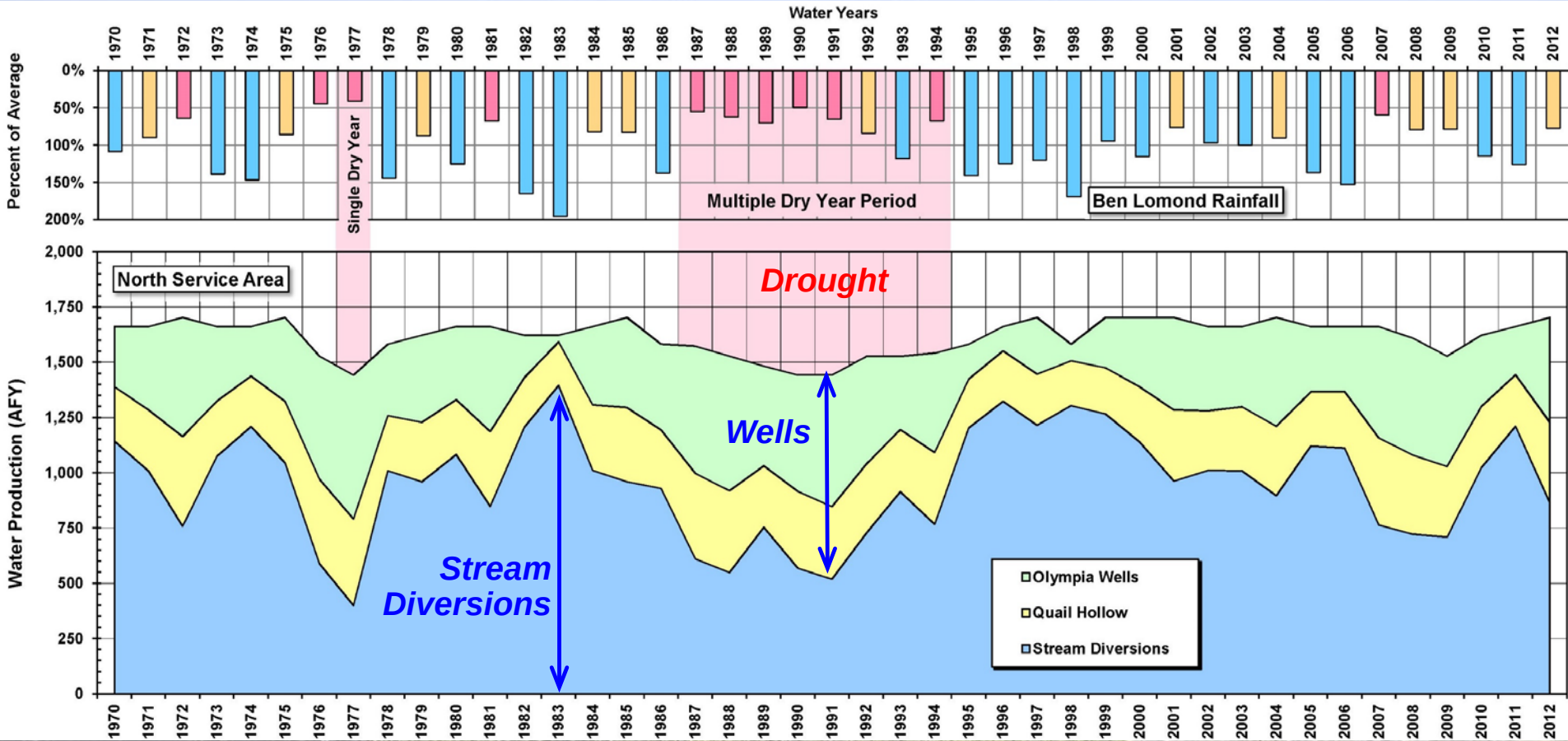


Santa Cruz

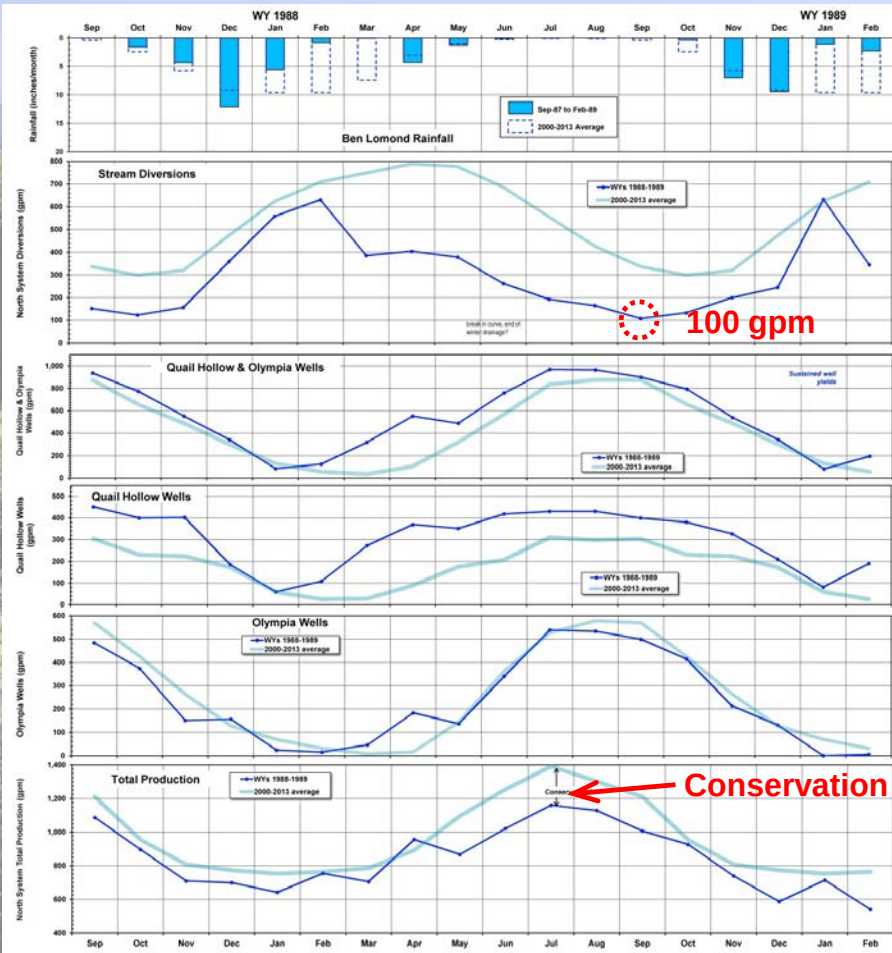


Water Years

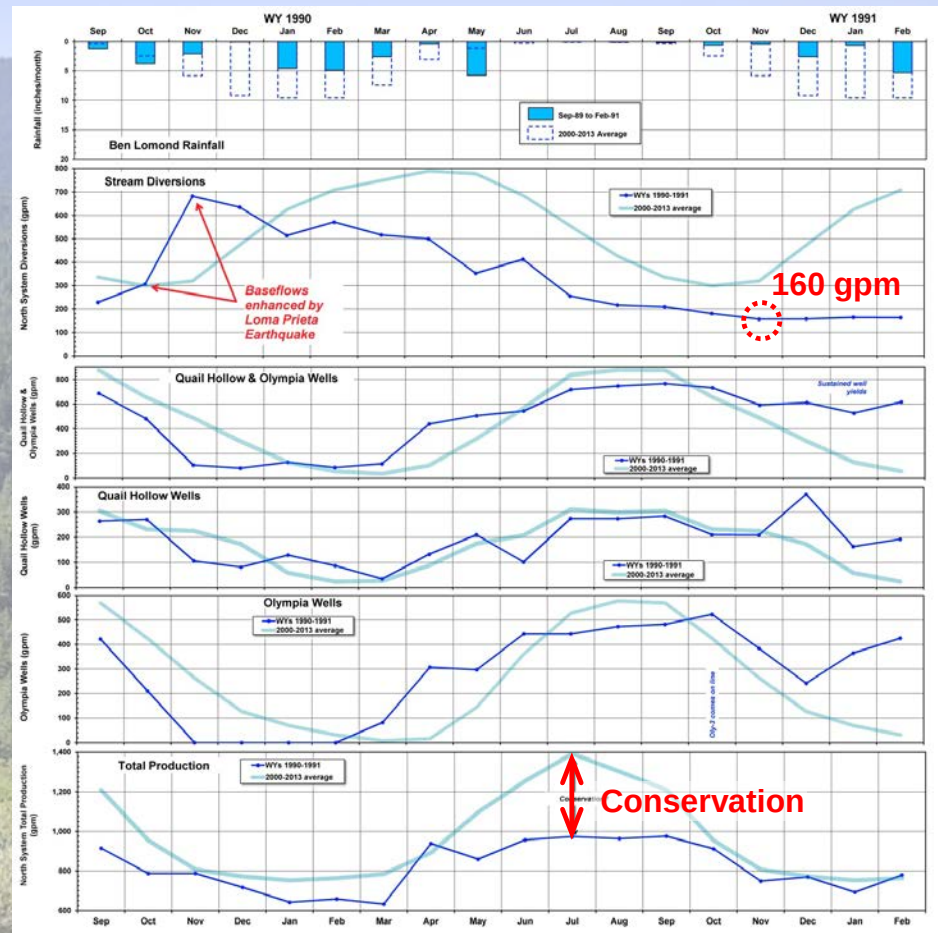
SLVWD North System Conjunctive Use Supplies 2035 Demand through the 1970-2012 Climatic Cycle



WY 1988 2nd year of drought

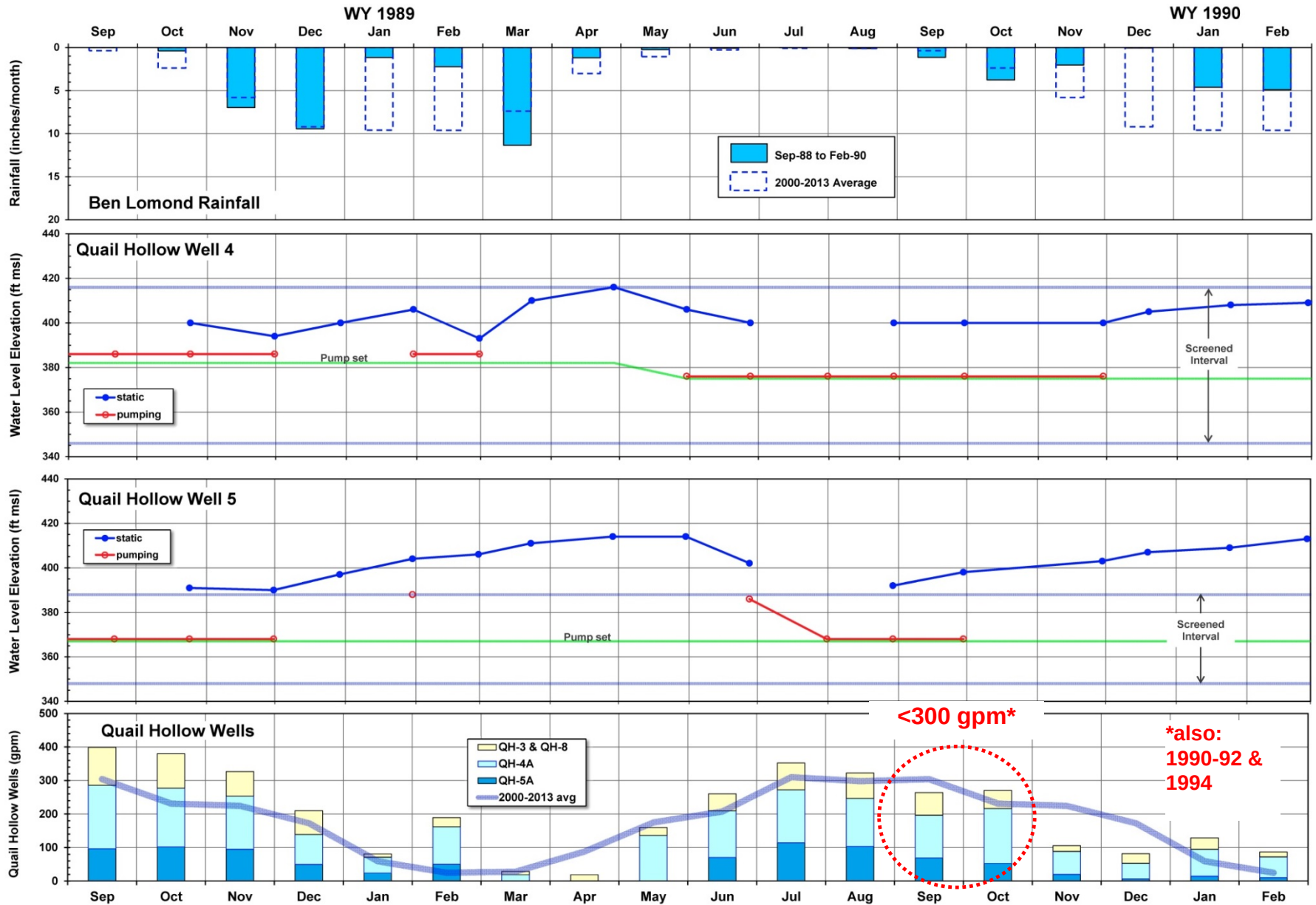


WY 1990 4th year of drought



Quail Hollow Wells 1989

3rd year of drought



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SLVWD issues and opportunities:

- *Climate change requires increased water supply resiliency during drought.*
- *Although diversions are Felton's sole water source, they are not permitted during low-flow periods that occur often during October and drought.*
- *Fish and wildlife agencies may impose diversion limitations and bypass requirements for SLVWD's pre-1914 appropriative rights.*

SLVWD issues and opportunities:

- *The 2014 Sustainable Groundwater Management Act (SGMA) requires addressing overdraft in the Scotts Valley area, which has impacted production from SLVWD's Pasatiempo wells.*
- *SLVWD's entitlement to 313 acre-feet per year from Loch Lomond reservoir has not been exercised since 1977.*
- *Bidirectional emergency interties constructed since 2014 between SLVWD's three service areas, and SVWD, provide increased opportunities for the conjunctive use of surface and groundwater supplies.*

Questions?

