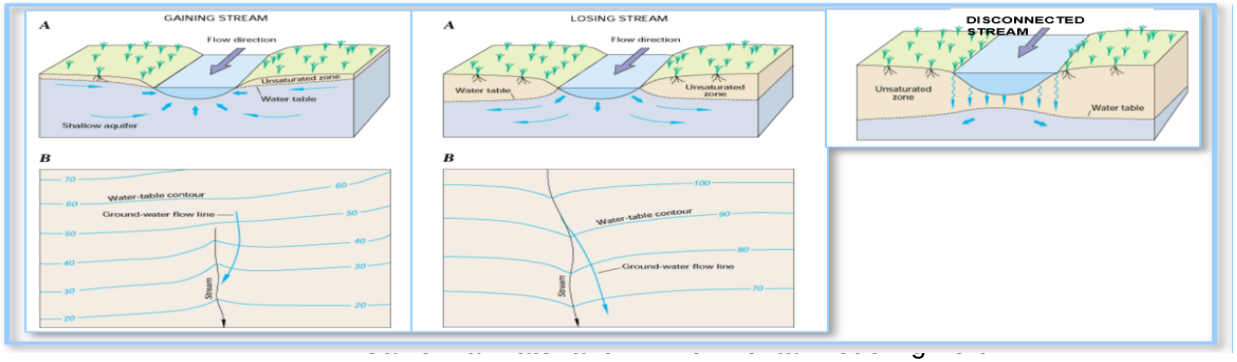
19 March 2023
California Water and Environmental Modeling Forum

Kicking the Can Up the Hill: How SGMA Can Help Resolve the Disconnect in California's Treatment of Surface Water - Groundwater Interconnectivity

MCCORD, James T., Lynker-Intel, LLC, 5485 Conestoga Ct, Boulder, CO 80301
jtmccord@lynker.com

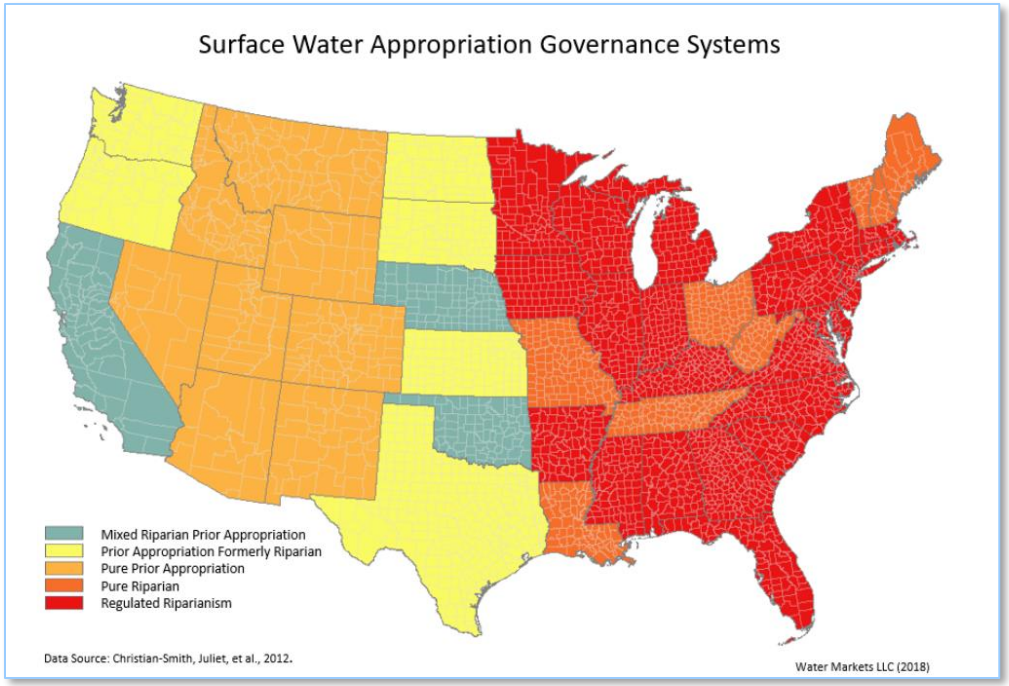
MILIBAND, Wesley A., Atkinson, Andelson, Loya, Ruud & Romo, APC, 2151 River Plaza Drive, Suite 300, Sacramento, CA 95833 wes.miliband@aalrr.com



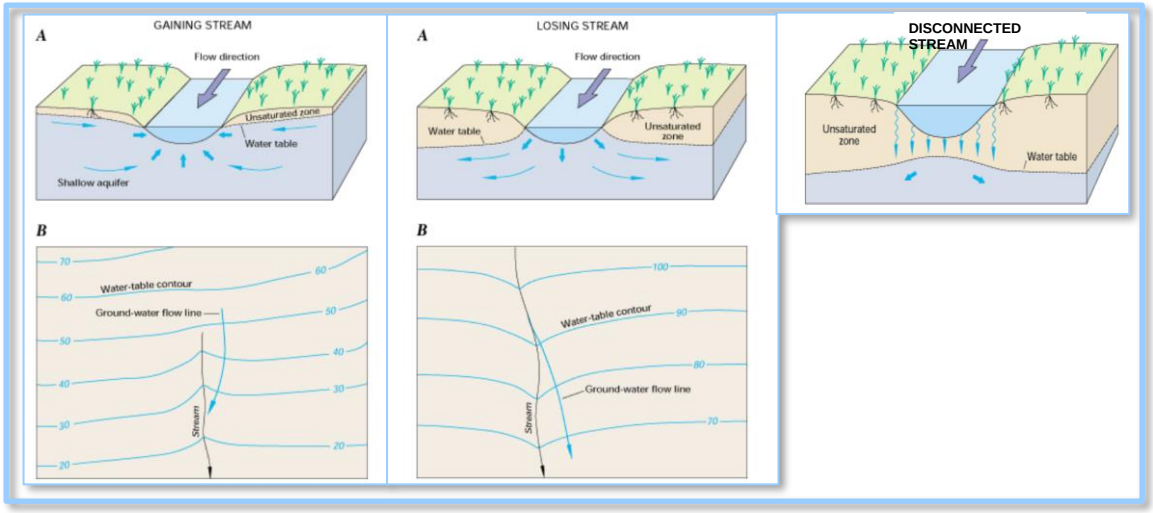
How SGMA Can Help Resolve the Disconnect in California's Treatment of Surface Water and Groundwater Interconnectivity

OUTLINE

- **General doctrines of water law across the US**
  - Riparian
  - Prior Appropriation
- **Surface water – groundwater connectivity**
  - Hydrogeology and impacts of well pumping on SW
- **Groundwater regulation**
  - Intermountain west
  - History of groundwater regulation in California
- **SGMA case studies**



What Hydrogeologists Know About Potential Connections Between Surface Water and Groundwater



- There can exist conditions where there is hydraulic connection between SW and GW
- For those situations where a connection exists, GW pumping can impact SW flows
- The magnitude and timing of potential impacts depends on the hydraulic properties of the streambed and connected aquifer

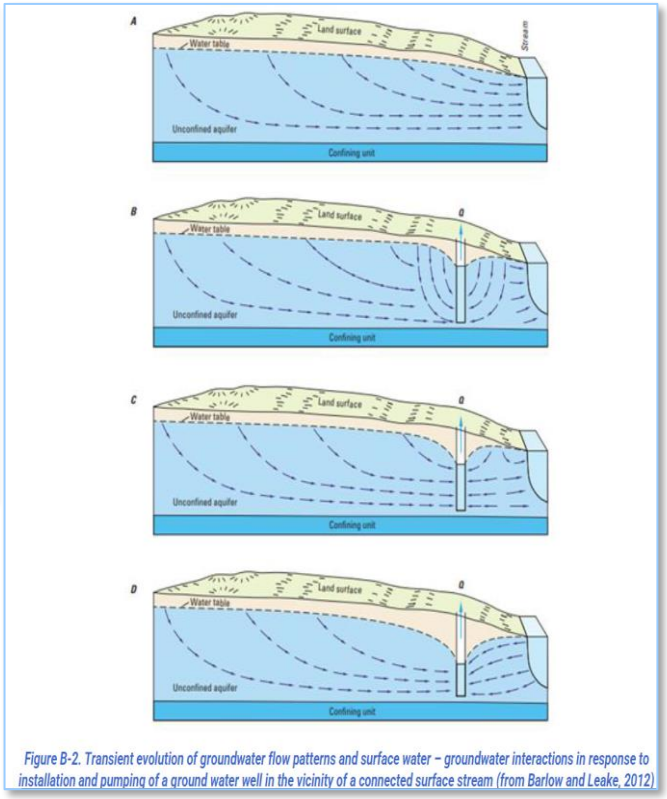


Figure B-2. Transient evolution of groundwater flow patterns and surface water – groundwater interactions in response to installation and pumping of a ground water well in the vicinity of a connected surface stream (from Barlow and Leake, 2012)

Hydrogeologic Models Can Be Applied to Quantify Connections Between Surface Water and Groundwater

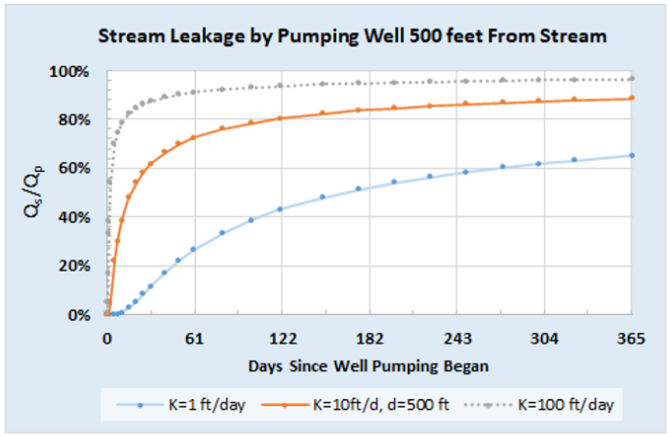


Figure B-3. Illustration of streamflows losses induced by well pumping as a function of aquifer hydraulic conductivity

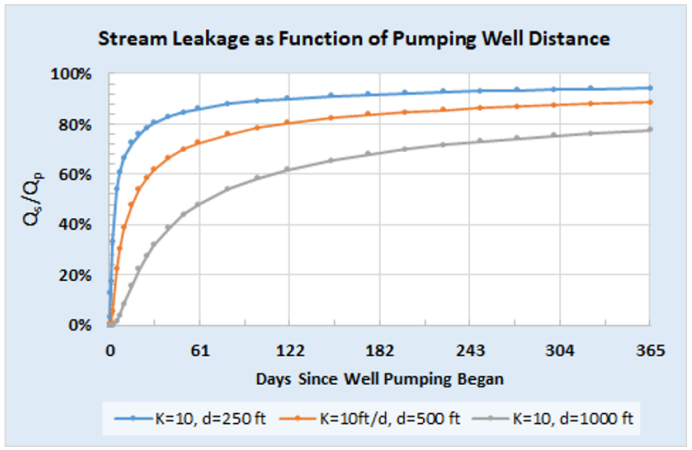
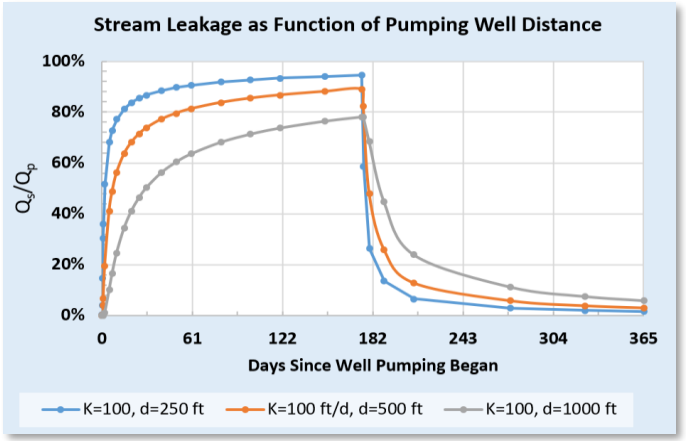


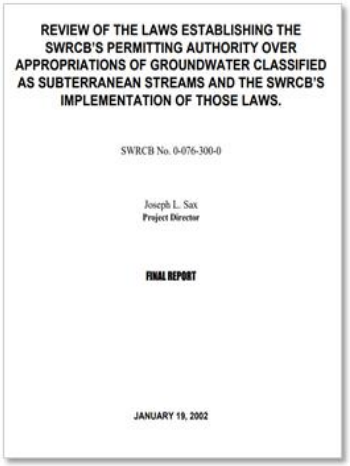
Figure B-4. Illustration of streamflows losses induced by well pumping as a function of well distance to the stream

The lagged impacts of pumping on SW flows means that turning off a well does not necessarily mean impacts of past pumping from that well cease



California Groundwater Law:

Underground Channels, Percolating Groundwater, and Non-Water Bearing Formations



REVIEW OF THE LAWS ESTABLISHING THE SWRCB'S PERMITTING AUTHORITY OVER APPROPRIATIONS OF GROUNDWATER CLASSIFIED AS SUBTERRANEAN STREAMS AND THE SWRCB'S IMPLEMENTATION OF THOSE LAWS.

SWRCB No. 0-076-300-0

Joseph L. Sax
Project Director

FINAL REPORT

JANUARY 19, 2002

State Water Rights Rules

https://www.waterboards.ca.gov/waterrights/board_info/faqs.html

General Rule:

Groundwater Classification as "Underground Stream" or "Percolating GW"

- California groundwater law harkens back to Pomeroy vs Los Angeles (1899)
- The concept of "underground channels" and "connected groundwater" versus "percolating groundwater" is a legal concept adopted by a judge in 1899
- Groundwater determined to be part of an "Underground Stream" is administered as part of the surface water rights system
  - *determination by Garrapata criteria (1999)*
- All other groundwater is "percolating groundwater," which is regulated locally and often is considered part of the bundle of property rights of overlying landowners
- SGMA seeks to define and apply a uniform system of evaluating and managing the long-term sustainability of California's groundwater basins

California Groundwater Law vs Intermountain West States

- The US intermountain west states ("Pure Prior Appropriation" in image to right) generally consider a significant degree of connection between surface water and groundwater, and administers the two conjunctively as a single system
  - *In most cases, there is a presumption of complete connection, unless one can demonstrate hydrologically the contrary*
  - *The degree and timing of the SW impacts of well diversions from connected groundwater are computed using hydrologic models*
- In California, defining what is a subterranean stream has been the subject of many Commissions, legislative investigations, and legal cases since 1899.
- In the 1999 Garrapata Creek case, the SWRCB set four criteria for defining a "subterranean stream":

  (1) A subsurface channel must be present;

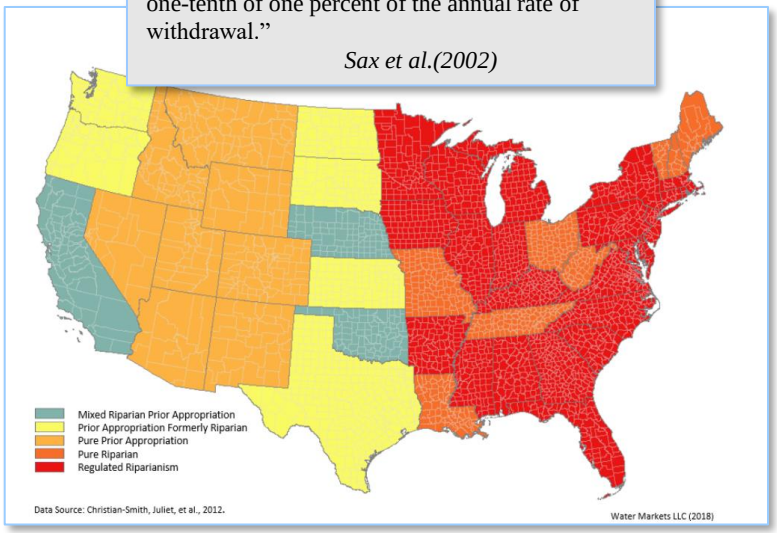
  (2) The channel must have relatively impermeable bed and banks;

  (3) The course of the channel must be known or capable of being known by reasonable inference; and

  (4) Groundwater must be flowing in the channel
- Groundwater meeting these criteria is considered part of a subterranean stream and administered by the SWRCB as part of the surface water permitting system.
- SGMA deals w percolating gw in Bull 118 basins

Colorado has adopted a "bright line" standard: whether "the withdrawal from a well will... Within one hundred years, deplete the flow of a natural [surface] stream...at an annual rate greater than one-tenth of one percent of the annual rate of withdrawal."

Sax et al.(2002)



There will always be great difficulty in fixing a line, beyond which the water in the sand and gravels over which a stream flows and which supply or uphold the stream, ceases to be a part thereof and becomes what is called percolating water.

Hudson v. Dailey, 156 Cal. 617, 627-28 (1909)

Examples from Intermountain West and CA

Intermountain West examples where hydrologic models with SW-GW interactions are employed to support water rights administration:

New Mexico:

- *Middle Rio Grande basin ag-to-municipal water rights transfers*
- *Pecos Basin Adjudication Settlement Agreement*

Colorado:

- *South Platte groundwater pumpers affecting surface rights*
- *Coalbed methane producers need to demonstrated lack of SW – GW connection*

Idaho:

- *Eastern Snake River Plain groundwater pumpers*

California SGMA Basins w Likely Stream – Aquifer Connectivity

- *Santa Ynez Basin CMA and WMA*
- *Upper Ventura River Basin*
- *Modoc county*
- *Napa*
- *others?*

Example of Garrapata Bright-Line Fallacy: Impact of Well Pumping on Streamflow Losses

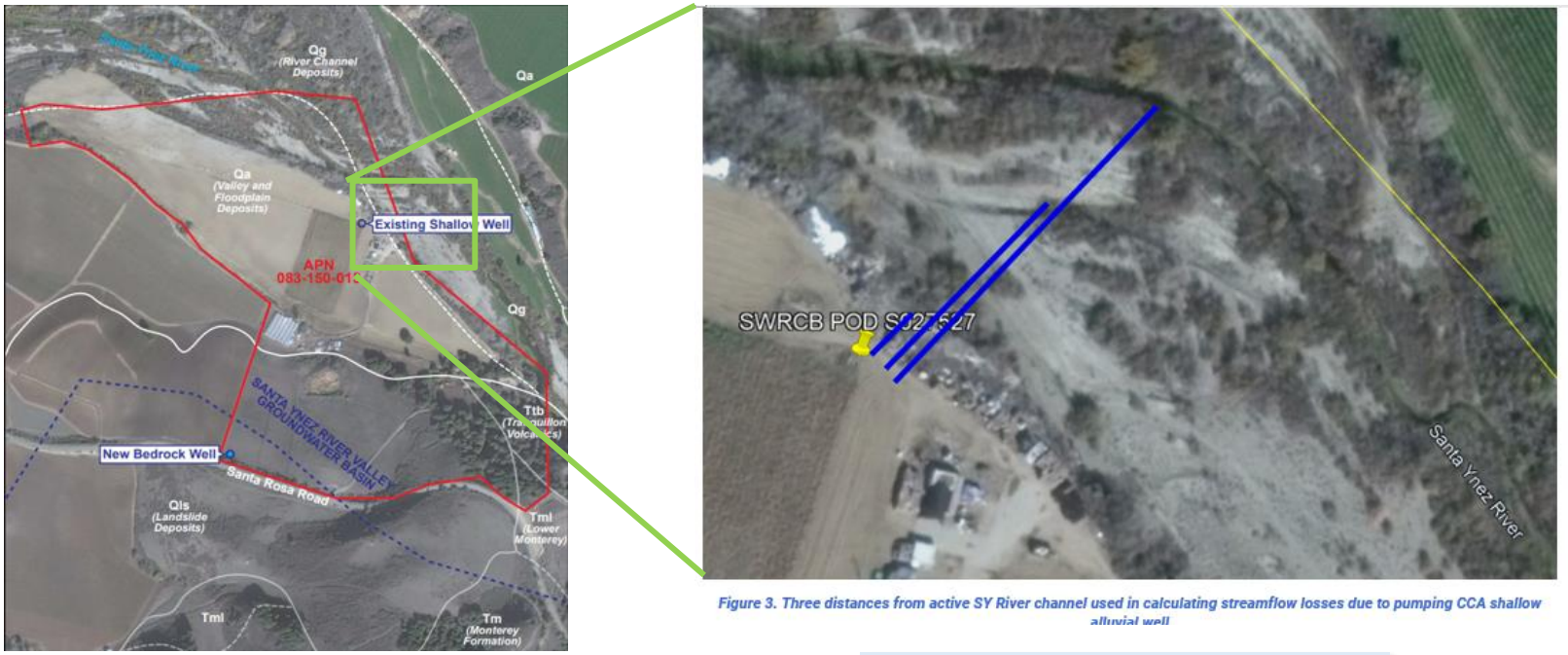
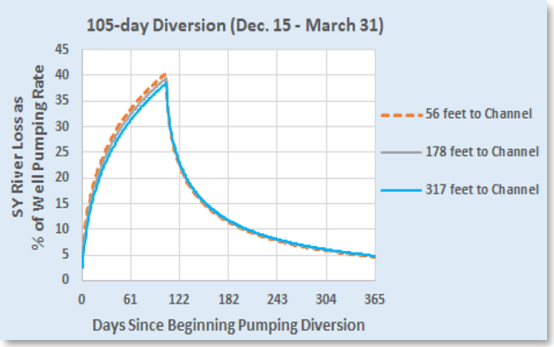
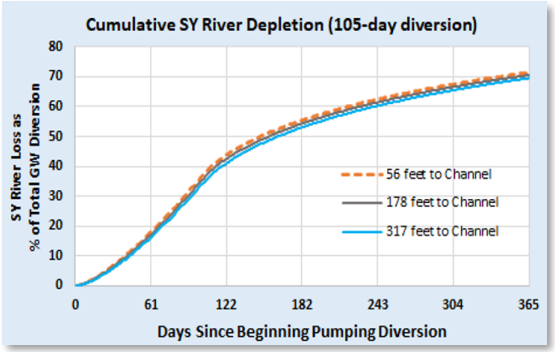
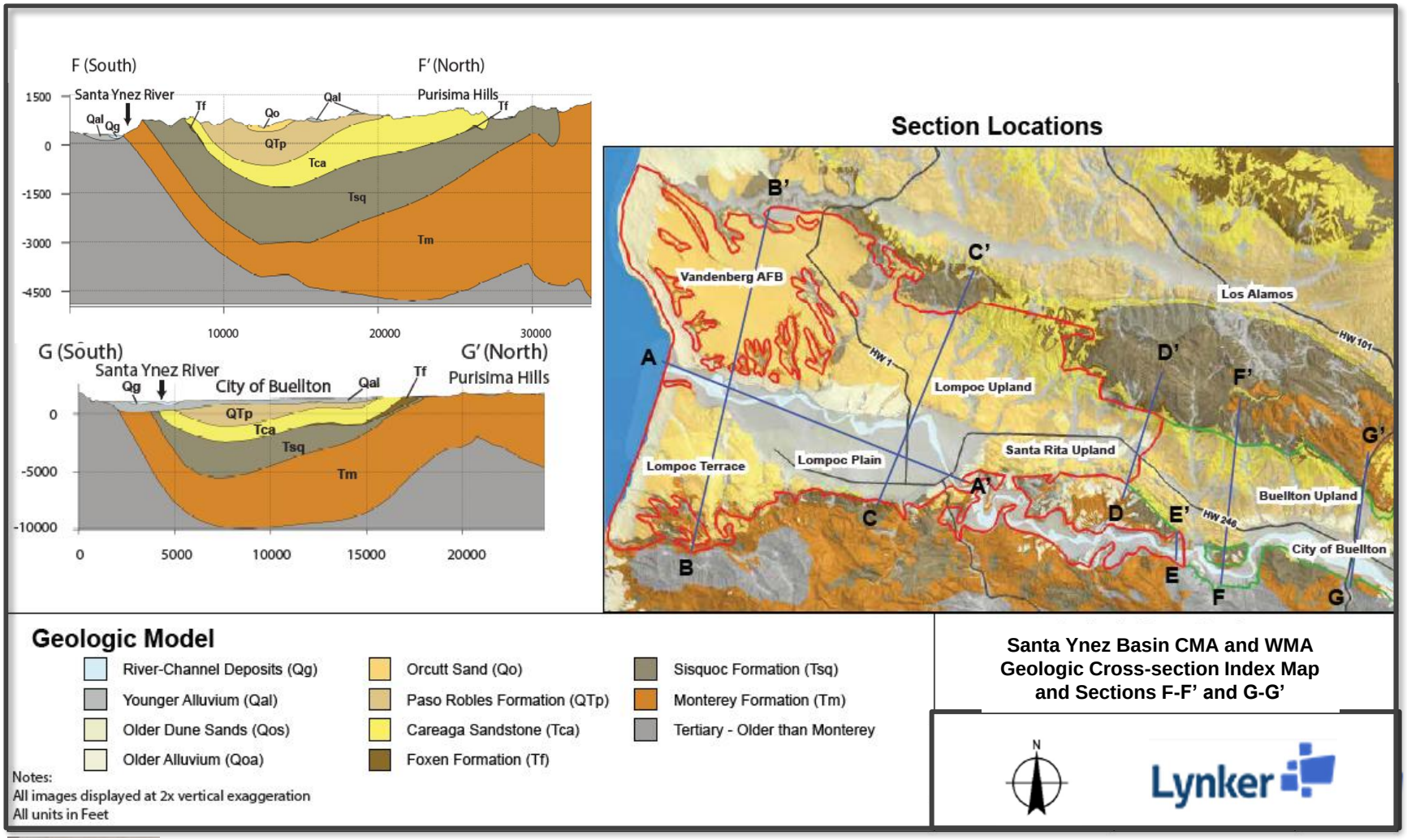


Figure 3. Three distances from active SY River channel used in calculating streamflow losses due to pumping CCA shallow alluvial well

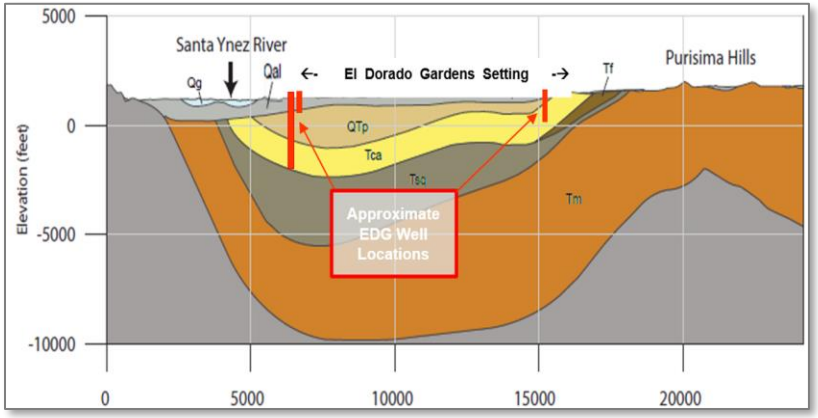


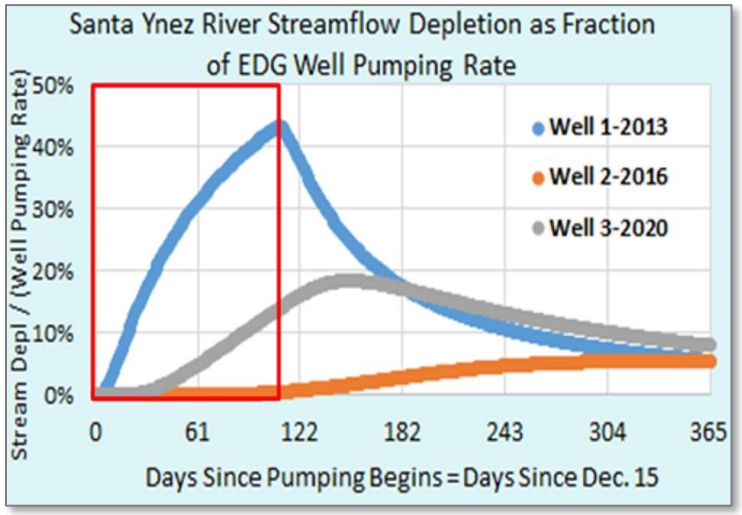


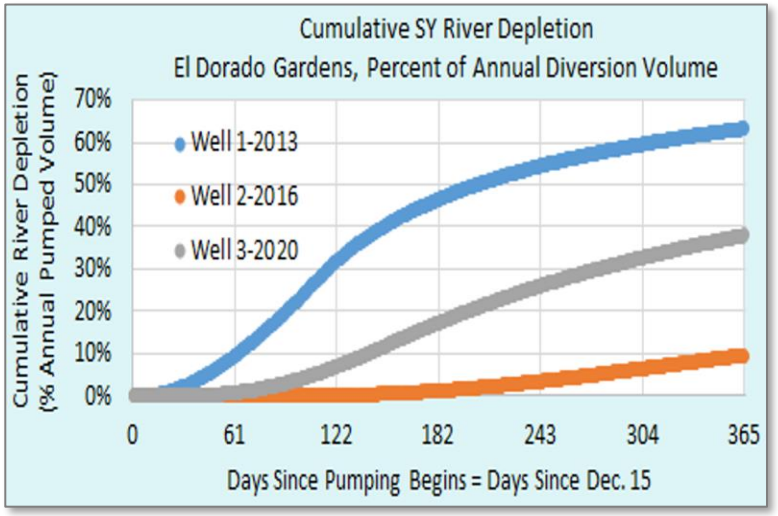
How Pumping from Bulletin 188 / SGMA Basin Can Impact Surface Water (1/2)



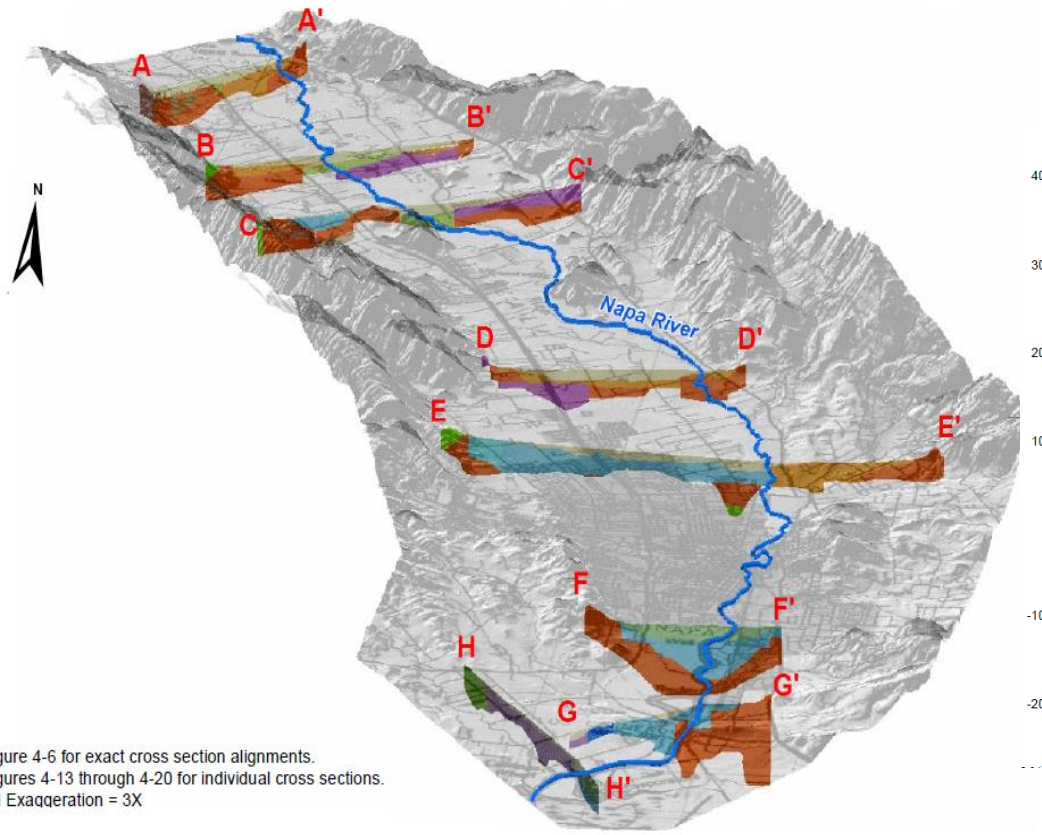
How Pumping from Bulletin 188 / SGMA Basin Can Impact Surface Water (2/2)



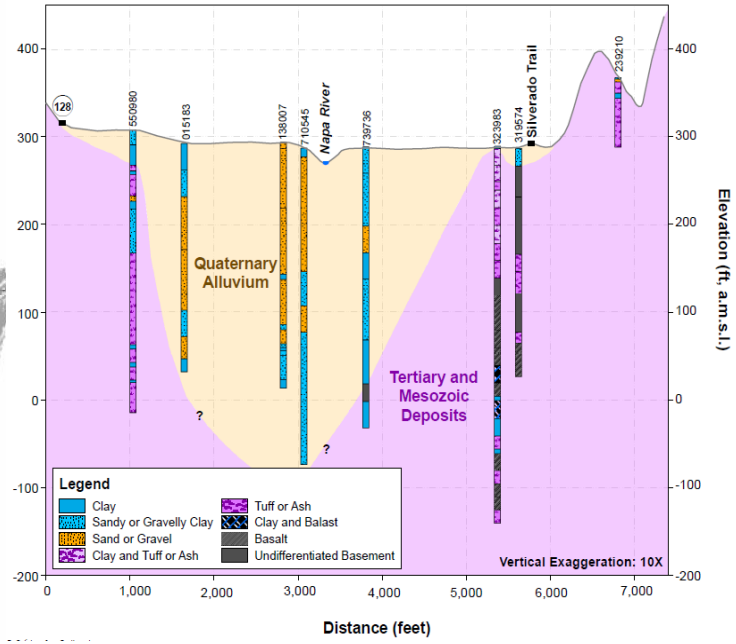




Napa Basin
X-Sections from GSP (Luhdorff and Scalalamini)



See Figure 4-6 for exact cross section alignments.
See Figures 4-13 through 4-20 for individual cross sections.
Vertical Exaggeration = 3X



How SGMA Can Help

How SGMA can help, enforce avoiding Sixth Undesirable Condition:

"Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water."

Bulletin 118-2003 or DWR Bulletin 118 Groundwater Basin Maps and Descriptions. Figure 5-2 shows the location of the alluvial groundwater basins and subbasins in the region, and Table 5-1 lists the name and number associated with the alluvial groundwater basins and subbasins.

Groundwater extracted by wells located outside of the alluvial basins is supplied largely from fractured-rock aquifers. In some cases, groundwater stored in a thin overlying layer of alluvial deposits or a thick soil horizon may also contribute to a well's groundwater supply.

"Kicking the Can Up the Hill"

Pumping Outside DWR Bulletin 118 Basin Boundary is Exempt from SGMA