AJS Lecture 2018

Can California Successfully Integrate Groundwater and Surface Water Under SGMA?

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I. Introduction/Overview (Maurice)

What Kevin and I hope to do tonight is to take you on something of a thought journey that mirrors how our own thinking has progressed as we have worked in different settings to wrestle with how we can appropriately address the inevitable interrelationships of groundwater and surface water. The crux of the problem is how the practice of groundwater management can effectively straddle the physical realities and the legal realities – two realities that really don't match very well.

Kevin and I are going to make some prepared remarks, and then we're going to have a conversation.

In our prepared remarks, I will first give an overview of the physical aspects of the integration of groundwater and surface water and highlight a few specific issues that are particularly important to our later discussion.

Kevin will then provide an overview of the legal setting – that of water rights and of SGMA.

Then he and I will tag-team on some ideas for how Groundwater Sustainability Agencies might address the surface water depletion aspects of SGMA – the dreaded "undesirable Result #6" – as they develop and implement their sustainability plans.

Our discussion will be somewhat Central Valley focused, but the principles and ideas should be reasonably transferable to other settings, especially those groundwater basins that are highly developed for water supplies and where streams still flow.

I know many of you may have the acronyms burned into your minds, but just to make sure, I want to review a few important ones. Try as we may, we will almost certainly revert to using some of these acronyms as the conversation proceeds:

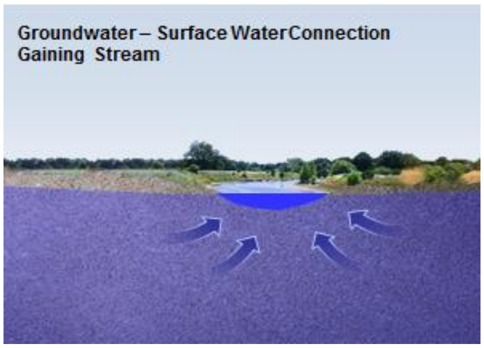
- SGMA – is the sustainable groundwater management act, passed in 2014
- GSA – is groundwater sustainability agency – the local entity that is established pursuant to the law, to develop and implement sustainability plans
- GSP – is the groundwater sustainability plan that is developed by the GSA, in compliance with SGMA
- We will introduce and define a few other acronyms as we talk, and then you have to pass a quiz in order to get a drink at the reception.

II. Hydrogeology Background (Maurice)

A. General principles of groundwater-surface water interaction

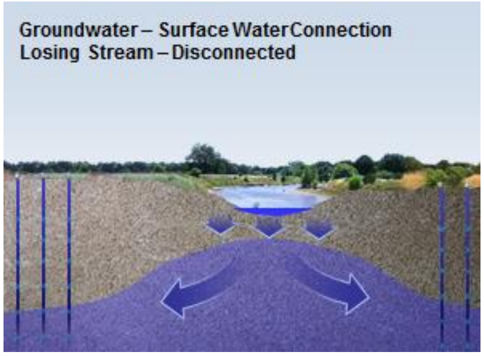
i. Wherever a river or stream in California is running across a broad valley floor, there is likely to be an aquifer underneath.

ii. In the absence of groundwater pumping, the groundwater levels will tend to be higher than the river or stream and therefore will be groundwater discharge to the stream a large portion of the time.

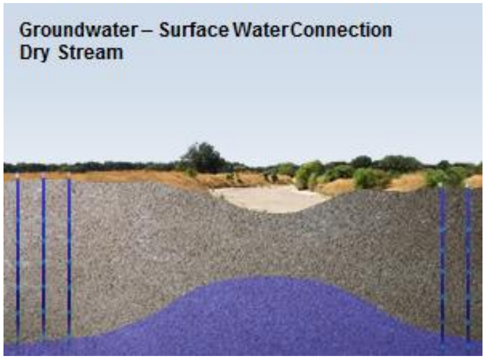


iii. When groundwater is pumped by wells, the groundwater levels will be lowered by the pumping. This decreases the groundwater discharge to the streams, and if groundwater levels become lower than the stream, the flow between groundwater and the stream will be reversed. In this case the stream loses flow to the groundwater – becoming a source of groundwater recharge. We call this condition a "losing stream." In this condition, the lower the surrounding groundwater levels, the more the stream loses to the groundwater.

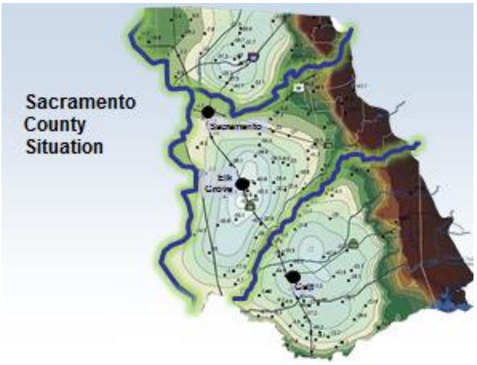
iv. If groundwater levels are drawn down far enough, the groundwater and surface water become what we call "disconnected," and the sediments below the streambed are no longer saturated. In this case, the stream, as long as it is flowing, still leaks water to the groundwater, but it no longer matters how far below the stream the groundwater levels are. The stream leakage is controlled by the permeability of the sediments.



v. If leakage over a reach of stream exceeds the stream flow, all of the stream flow will recharge the groundwater and the stream will be left dry below some point for all or part of the time.



B. A local example of groundwater-surface water interaction – the situation in Sacramento County – To see an example of how this interaction has played out in a real place, let's look at Sacramento County.



i. Sacramento County sits on the floor of the Central Valley. On the east side of the county we have the Sierra foothills, and on the west side we have the Sacramento River.

ii. Underlying most of the county is the greater Central Valley Aquifer. The map of groundwater levels in the county shows three large regional "cones of depression," areas where groundwater levels have been drawn down by pumping for a range of uses – mostly for cities in the north and for a combination of cities and agriculture further south.

iii. Separating these three regional cones of depression are "ridges" of comparatively higher groundwater levels. These higher groundwater levels are due to the fact that rivers flow across the valley floor – the Cosumnes further south and the American in the north, through the city of Sacramento.

iv. Both rivers are losing flow to the surrounding groundwater – providing groundwater recharge, which keeps the groundwater levels higher along the river corridors.

v. The Cosumnes River is largely un-dammed in its upper reaches, so it's flows are dependent on natural runoff from the Sierras, which is higher in the winter and lower in the summer. As a result, even though the river is flowing year-round out of the foothills, it goes dry in its lower reaches every year, due to all of its flow leaking into the groundwater.

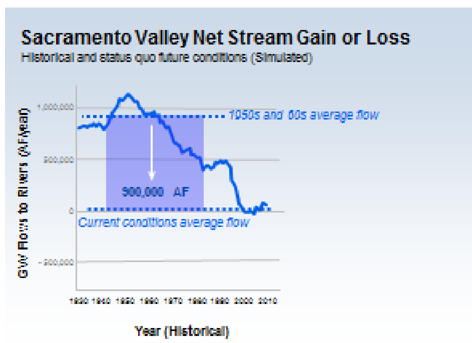
vi. In contrast, on the American, releases from Folsom reservoir, just upstream, keep flow in the river all the time. These releases, in fact, have to be enough to meet downstream water deliveries – for water supply and Delta water quality requirements – AND overcome the losses of river flow to the groundwater. So in some ways, you might say the reservoir partially functions as a recharge facility for the groundwater basin.

vii. Greater California and Central Valley situation

1. Across the Central Valley, and across California, there is a spectrum of gaining, losing, and disconnected streams. And many streams that flowed part of the time or all of the time historically are now for much longer periods, or dry all of the time, due to groundwater pumping.

2. It is clear that groundwater pumping has caused significant depletions of surface water and has impacted the beneficial uses of that surface water – this has happened across the Central Valley – in fact, it happens pretty much everywhere in California where you have rivers flowing over large alluvial Valleys where water is pumped for cities or irrigation.

3. How significant is the stream depletion from groundwater pumping? In the Sacramento Valley, some modeling work done by The Nature Conservancy has shown the approximate range of these depletions (https://www.scienceforconservation.org/assets/downloads/GroundwaterStreamInteraction_2016.pdf). Using DWR's Central Valley integrated model, we estimated that groundwater depletions of flows from the whole Sacramento River system upstream of Sacramento have increased roughly 900,000 af/yr since the 1950s and 1960s. Of course, this is modeling, which is always inaccurate. The actual number may be significantly higher or lower, but suffice it to say, there is considerably less river flow showing up in the Sacramento River than would otherwise have been there without groundwater pumping from the valley's aquifers.



C. Groundwater-surface water interaction and instream flows

i. This information on the Sacramento River highlights an issue that I want to discuss a little further.

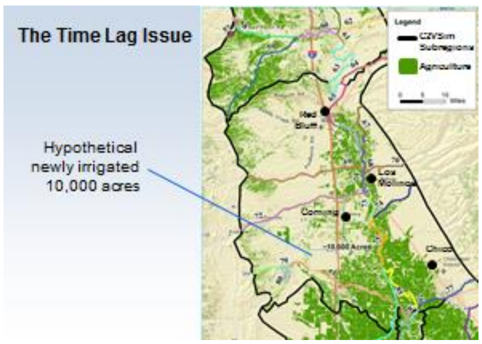
ii. Groundwater pumping, along with surface diversions and reservoir management, is partially responsible for decreases in flows in rivers and streams. (Of course, natural flow variability, plays a role, as well.) But when additional flows are needed to meet flow needs – for water quality, environmental needs, or for meeting senior water supply commitments downstream, the only knobs to turn are knobs on surface diversions and reservoirs. It's difficult to turn groundwater depletions on and off.

iii. As a result, in this, our normal approach to meeting instream flow requirements or downstream water deliveries, surface water users bear a disproportionate burden of meeting those instream or downstream requirements.

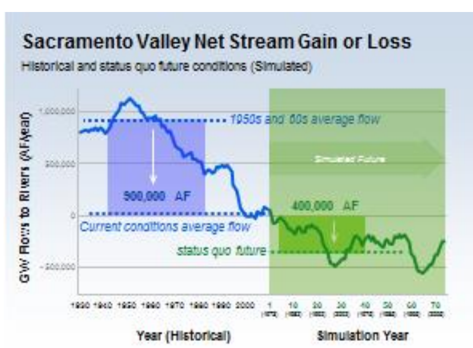
D. The "time lag" issue and its implications for management.

i. When new pumping, or increases in pumping, are initiated. First, groundwater levels are lowered in the well and this drawdown propagates into the surrounding aquifer. If the pumping continues, over time the impact of that new pumping on groundwater levels spreads further and further. Eventually, if there is a stream around, the increased pumping will translate into stream depletions. But it can take a long time for this to happen.

ii. To get an idea of how long it takes for new pumping to impact surface flows, we used the same model as I described before – DWR's C2VSim model of the Central Valley. For a hypothetical new area of pumping, roughly 15 miles from the river, impacts in the form of additional depletions on the Sacramento River, began showing up in just a few years. It took over 20 years for the full depletion impact of the new pumping to show up at the river. Again, this is modeling, so it's imprecise, but the general point is – it can take a long time – decades in a large aquifer, for groundwater pumping to fully translate into surface flow depletions – but it will (https://www.scienceforconservation.org/assets/downloads/GroundwaterStreamInteraction_2016.pdf).



iii. Those depletions, or reductions in flow, I mentioned earlier in the Sacramento River are expected to increase further in the future due to pumping that has already started. Our modeling suggested that if pumping continued at current levels and no other actions were taken to increase recharge, further depletions of around 400,000 af/yr would likely develop over the following 20 years or so (https://www.scienceforconservation.org/assets/downloads/GroundwaterStreamInteraction_2016.pdf).



III. Legal Background (Kevin)

A. Topics I will cover

i. Pre-SGMA California law regarding interconnected surface water and groundwater (relevant to later discussion of water right priorities)

ii. How SGMA takes certain steps toward integrating the management of surface water and interconnected groundwater

iii. Management tools provided under SGMA to address situations where groundwater pumping is causing impacts on surface streams

iv. Possible procedural scenarios under which issues of this type may play out: SGMA process alone; SGMA process with SWRCB intervention; and SGMA process with adjudication of water rights.

B. California law regarding interconnected groundwater and surface water pre-SGMA

i. It's sometimes said that California is the only western state that treats groundwater and surface water under separate and distinct legal regimes.

ii. While it's true that California treats rights to surface water and right to groundwater under separate legal regimes a case decided by the California Supreme Court way back in 1909 suggests that there is precedent, in certain factual settings, for administering rights to surface water and interconnected groundwater in an integrated fashion.

iii. The case is *Hudson v. Dailey* (1909) 156 Cal. 617. Ms. Hudson owned 760 acres that were riparian to stream known as San Jose Creek near Pomona. In the valley above her the defendants drilled and began operating a number of wells in an aquifer that fed the Creek (gaining stream). Pumping cause stream flow to diminish to extent Ms. Hudson deprived of quantity of water which, for 30 years, she had been accustomed to use.

iv. Ms. Hudson argued that her right was paramount and superior to the upstream overlying groundwater pumpers because she was a riparian. Supreme Court rejected this argument. Supreme Court recognized that, where surface streams and groundwater aquifers are closely interconnected, "[s]uch waters, together with the surface stream supplied by them, <u>should be considered a common supply</u>, . . ." Court held that Ms. Hudson and the up-gradient groundwater pumpers each had a common and correlative right to the use of water from the common supply. "[T]here can be no doubt that the taking of a part of the underground waters by the defendants is not unlawful, unless they take an unreasonable share thereof."

v. As I will discuss shortly, common supply rule remains relevant to issues that will arise under SGMA.

C. How does SGMA integrate management of interconnected surface water and groundwater?

i. Definition of "Sustainable Yield": "[T]he maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result." Cal. Water Code § 10721(v)

ii. Definition of "Undesirable Result": One or more of the following effects caused by groundwater conditions occurring throughout the basin:

1. Chronic lowering of groundwater levels;

2. Reduction of groundwater storage;

3. Seawater intrusion;

4. Degraded water quality;

5. Land subsidence that substantially interferes with surface land uses;

6. Surface water depletions that have significant and unreasonable adverse impacts on beneficial uses of surface water.

Cal. Water Code § 10721(w) (emphasis added)

D. How does SGMA address interconnected groundwater/surface water scenarios?

i. What is "significant' in this context? GSAs will borrow from CEQA. Significance criteria.

ii. What is "unreasonable"? Different type of analysis. Similar to analysis of reasonable use under Article X, Section 2. Consider all the facts and circumstances and make a policy determination as to whether a particular impact on surface water beneficial uses is unreasonable. Notion of what is reasonable changes over time (e.g., water wheels to generate electricity). The analysis is highly fact-driven.

iii. Who decides whether an impact is significant and unreasonable? GSAs in the first instance? What if DWR or the SWRCB disagree? Deference to GSA?

iv. Baseline. Water Code 10727.2(b)(4): "[The GSP] may, but is not required to, address undesirable results that occurred before, and have not been corrected by, January 1, 2015. Notwithstanding paragraphs (1) to (3), inclusive, a groundwater sustainability agency has discretion as to whether to set measurable objectives and the timeframes for achieving any objectives for undesirable results that occurred before, and have not been corrected by, January 1, 2015."

v. I suspect that in most cases GSAs will opt to establish a baseline so that they don't have to deal with undesirable results that occurred before January 15, 2015.

vi. An interesting (and as yet unresolved) question: where groundwater pumping was occurring before 1/1/15 but the impacts of that pumping on surface water beneficial uses are not detected until after 1/1/15 can the GSA avoid addressing the problem under the baseline provision?

vii. Based on a literal reading of the statute, if the undesirable result (in this case significant and unreasonable adverse impacts on beneficial uses of surface water) did not occur before January 1, 2015 GSA will need to address them in GSP.

viii. What tools available under SGMA if a GSA determines that groundwater conditions are causing significant and unreasonable impacts on beneficial uses of surface?

1. GSA Authority to Control Extractions. A GSA may "control groundwater extractions by regulating, limiting or suspending extractions from individual groundwater wells or extractions from groundwater wells in the aggregate, construction of new groundwater wells, enlargement of existing groundwater wells, or reactivation of abandoned groundwater wells, or otherwise establishing groundwater extraction allocations." (Cal. Water Code § 10726.4(a)(2))

2. No alteration of water rights. "Nothing in this part, or in any groundwater management plan adopted pursuant to this part, determines or alters surface water rights or groundwater rights under common law or any provision of law that determines or grants surface water rights." (Cal. Water Code § 10720.5(b)).

3. Implications of "no alteration of water rights" provision. Any pumping curtailment must be consistent with water right priorities. Junior rights curtailed first. In the groundwater context absent prescription this means appropriators cut off first. Cities, special districts, CPUC regulated utilities. For example, an across the board percentage reduction in pumping that affects more senior (overlying) rights in the same manner that it affects more junior (appropriative) would be objectionable.

ix. The "time lag" issue. In most cases curtailing groundwater pumping will not have an immediate impact on surface water flows. As his example indicates, it may take as long as 20 years (or more) for reductions in groundwater pumping to have an effect on the flow of a surface stream. A reduction in groundwater pumping closer to the stream will have a more immediate effect on surface flows. <u>This has really important implications for management</u>.

x. I predict that, because of this time lag issue, GSAs will tend to address the impacts of groundwater pumping on surface streams not by curtailing groundwater pumping <u>but by developing physical solutions</u> that will, over time, mitigate the impacts of groundwater pumping on surface flows.

1. <u>Colorado</u>. As a side note this is what happens in the state with the most fully integrated system of surface water and "tributary" groundwater—Colorado. Rather than strictly enforcing the priority system in Colorado the focus is often on the development of "Plans for Augmentation"—projects that augment the native groundwater supply. In California we call these types of projects 'physical solutions."

2. What is a physical solution? A physical solution is an equitable remedy that courts (or SWRCB or GSAs) have the power to impose. It's a practical remedy that avoids waste or unreasonable use and is consistent with the water rights of the parties.

3. Key early case: *City of Lodi v. East Bay Municipal Utility District et al.* (1936) 7 Cal.2d 316. City of Lodi operated a municipal well field, from which it pumped 3,600 afy. Trial court established a system of operation for EBMUD, enforced by an injunction, so that "normal percolation" to the City's well field would be maintained. California Supreme Court reversed trial court. Court characterized this as "tremendous waste." Supreme Court held that trial courts have broad authority (and duty) to impose physical solutions to prevent waste or unreasonable use even in the absence of an agreement among the parties.

4. <u>Physical solutions come in various forms</u>. May take the form of a groundwater recharge project. Or it may allocate the cost of bringing in a supplemental water supply, as occurs in the Mojave basin.

5. <u>Allocating Cost of Physical Solutions</u>. If a GSA or court imposes a physical solution it may <u>not</u> ignore water right priorities. *See City of Barstow et al. v. Mojave Water Agency et al*. (2000) 23 Cal.4th 1224 "[A]lthough it is clear that a trial court may impose a physical solution to achieve a practical allocation of water to competing interests, the solution's general purpose cannot simply ignore the priority rights of the parties asserting them."

E. Possible procedural scenarios. Let's assume GSA makes a determination that groundwater conditions are causing significant and unreasonable impacts on surface water beneficial uses. How might this play out? Three scenarios.

i. GSA adequately addresses the problem on its own through the GSP. Might involve pumping restrictions, physical solution or combination of the two. (Maurice)

ii. Scenario 2. GSA fails to adequately address the problem; SWRCB intervenes. What might that scenario look like?

1. Water Code § 10735.2(a)(5)(B). SWRCB, after notice and hearing, may designate a high or medium-priority basin a probationary basin if after January 31, 2025 SWRCB finds that both of the following have occurred: (i) DWR, in consultation with Board, determines GSP inadequate or not being implemented in manner that will achieve sustainability goal, and (ii) Board "determines that the basin is in a condition where groundwater extractions result in significant depletions of interconnected surface waters." What happened to the "unreasonable" criterion?

2. If SWRCB designates a basin as "probationary" and the deficiency is not remedied by the GSA, may develop an interim plan. Water Code § 10735.8(c) provides: Interim plan may include (1) restrictions on groundwater extraction; (2) a physical solution; or (3) "principles and guidelines for the administration of rights to surface waters that are connected to the basin."

3. SWRCB has no authority to finance and implement a physical solution (that's not what we do). Emphasis will be on pumping curtailments.

iii. Scenario 3. What if following SWRCB intervention a group of water users believes their water rights have not been honored? In that circumstance I think there's a reasonable chance that the dispute will end up in an adjudication.

1. What is an adjudication? An adjudication is a special proceeding, usually judicial, in which the priority and scope of the legal rights of all water uses from the same source or supply are determined.

2. Adjudications are typically lengthy and contentious. For example the Snake River adjudication in Idaho (surface water and interconnected groundwater) was initiated in 1987 and just recently concluded (30 years). Six disputes related to the adjudication made it to the Idaho Supreme Court.

3. Another example: Santa Maria. Case originally commenced in 1997 and resolved following appeal in 2012 (15 years). Since then another appeal.

4. There are some benefits of adjudication: judicial determination of the nature and extent of property rights; certainty (to some degree).

5. Some (especially municipalities and regulated utilities) say adjudications are expensive but given the value of water resources in California they are worth it.

6. How would adjudication process integrate with the SGMA process?

   a. After SGMA, concern that adjudications would be utilized to end run the SGMA process--a legitimate concern.

   b. "Follow-on" adjudication streamlining legislation (codified at Code Civ. Proc. § 830 et seq.) did two things: (1) streamlined the adjudication process in certain respects, and (2) clarified the relationship between the adjudication process and the SGMA process.

   c. In an adjudication action for a basin that's subject to SGMA, "the court shall manage the proceedings in a manner that minimizes interference with the timely completion and implementation of a groundwater sustainability plan. . ." CCP § 10737.2.

   d. Court may stay adjudication in order to facilitate adoption of a groundwater sustainability plan that provides for a physical solution or otherwise addresses issues in the adjudication. Code Civ. Proc. § 848(a)(1).

   e. My opinion: In some basins a "hybrid approach" will emerge. A hybrid approach would combine the SGMA process and the adjudication process. GSAs will focus on the development of physical solutions and the courts will focus on determining water right priorities and cost allocation.

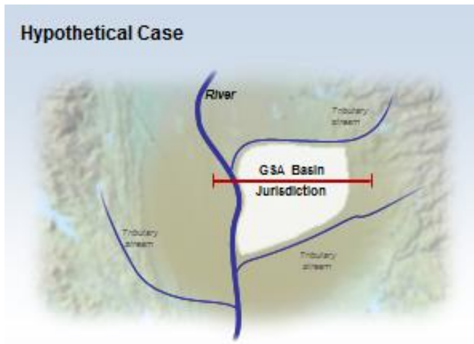
IV. How groundwater/surface water issues might play out in the real world (Maurice and Kevin—25 minutes)

A. The central question: how might GSAs address situations where groundwater pumping is – or might be – significantly and unreasonably impacting surface water beneficial uses?

B. Our thesis is that one of two approaches will emerge as the dominant approach in California: (1) an approach that relies exclusively on the SGMA process to develop rules and solutions, or (2) a hybrid approach that involves court adjudication of water rights but within the over-arching framework of SGMA.

C. Let's look at a hypothetical case study to talk about how the stream depletion issue might look in a 'middle of the road' groundwater basin and how GSAs might consider addressing it

i. Plan view for hypothetical



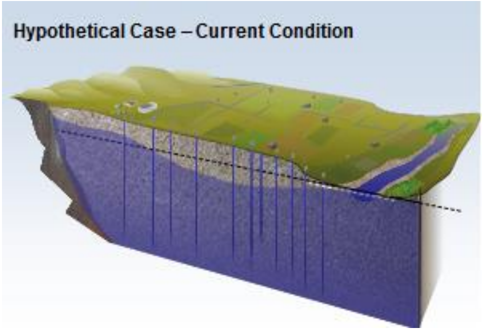
1. Assume a hypothetical GSA that oversees an area bounded by a significant river on the west, tributary streams on the north and south, and the edge of the groundwater basin on the east.

2. The groundwater is still connected to the streams.

3. Let's assume that the flow on the river, downstream of this point, is all fully allocated some of the time to one or more beneficial uses – water supply, water quality, instream flows, or otherwise. This condition applies to many of the streams in California, including the Sacramento and San Joaquin, which means that the condition also applies on the tributaries of these streams.

4. If this is the case, then it can easily be argued that any additional depletions of these streams would impact the beneficial uses of those streams, at least during those times when the streams are fully allocated. But, as I described earlier, it's difficult to turn groundwater depletions on and off, so it's similarly difficult to deplete the stream further and be sure you're not further impacting beneficial uses of the surface water.

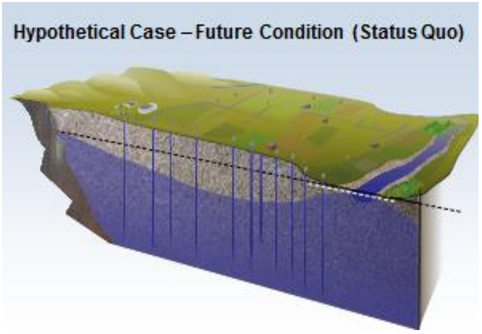
ii. Cross-section view



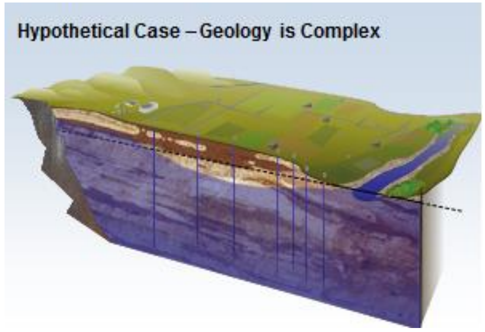
1. Now let's look at what's happening in the aquifer in our hypothetical case

2. Current condition – Let's assume that under current conditions the river is losing flow to the groundwater – it is a losing reach of the river.

3. Future Condition (Status Quo) – Let's further assume that the GSA has developed a good model of the basin and their modeling shows that, if current levels of pumping continue and no preventative measures are taken, the groundwater levels will continue to decline. This will, of course, increase the depletion of the river.

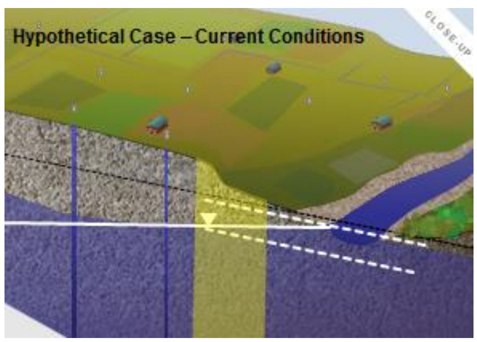


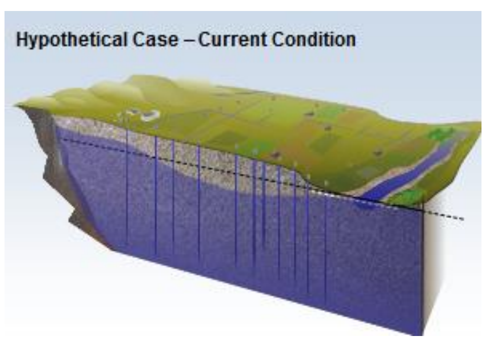
iii. Let's look, in more detail, at what is happening near the stream, where stream depletion is occurring. If we assume that river levels after 2015 don't change appreciably from pre-2015 conditions, then the rate of stream depletion is basically a function of how steep the gradient of groundwater is as you move away from the stream. Basically, this equates to groundwater levels in the vicinity of the stream.

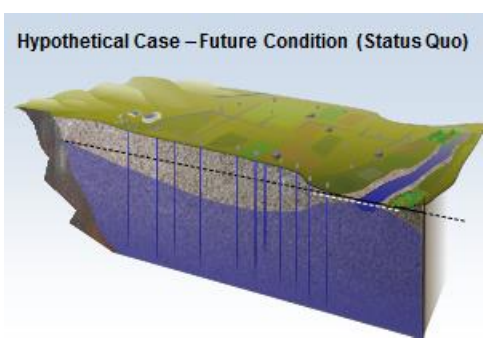


iv. As an aside, it's important to keep in mind that the aquifer isn't anything close to the uniform bowl of sand as it is illustrated here. In fact, it is a very complex mix of sediments. This means that details of the behaviors are highly localized. That said, the general principles of hydraulics still apply.

v. In order to ensure that stream depletion doesn't increase beyond pre-2015 levels, the GSA needs to manage so that the groundwater levels adjacent to the stream are as high as or higher than they were prior to 2015.







vi. Now it's not a simple matter to "manage to keep levels in the vicinity of the stream" above a certain threshold – established to mimic pre-2015 levels. There are lots of details to work out, including:

1. What were the levels prior to 2015 and how did they vary during the year and during wet and dry years?

2. How far from the stream should threshold levels be established?

3. How do you account for wells that are very near the stream?

4. How many threshold levels do you need to establish along a given length of stream?

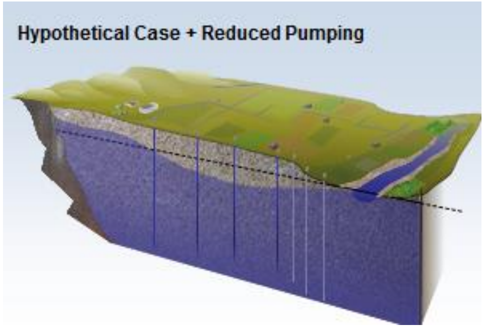
vii. But we do have precedent for this approach to management – in the case of salt water intrusion. In many ways managing to halt salt water intrusion is analogous to managing to avoid increased surface water depletion. We have some good examples of how this is done, in Los Angeles and Long Beach, among others.

D. What a SGMA-based approach might look like

i. My assertion is that 1) SGMA offers a lot of flexibility in how a GSA addresses the stream depletion and 2) the voluntary pathway (as opposed to the adjudication pathway) has some notable advantages

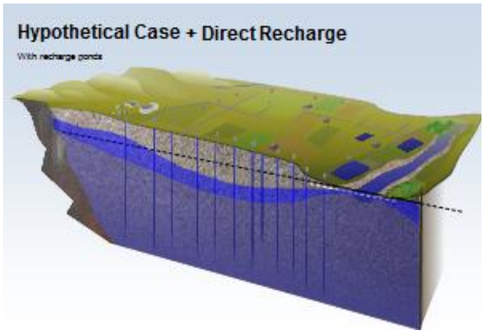
ii. How can we avoid further depletion with cooperative approaches? Here are some examples of how GSPs might address groundwater/surface water interaction issues answer the question. As described above, it's really about managing groundwater levels in the vicinity of the stream, managing the levels to control the groundwater gradient toward or away from the stream

1. You can cut back pumping, but of course, this may not be the first choice. If the GSA does decide to cut back pumping, cutting it back in the vicinity of the stream can provide more immediate improvement in reducing (or halting the increase) in stream depletions. A water trading program within a groundwater basin, can be a helpful tool in reducing pumping. This can allow those who have the ability to reduce or forgo water use temporarily or permanently to transfer their water to those who need additional supplies – beyond their allocation – and are willing to pay for the additional water.

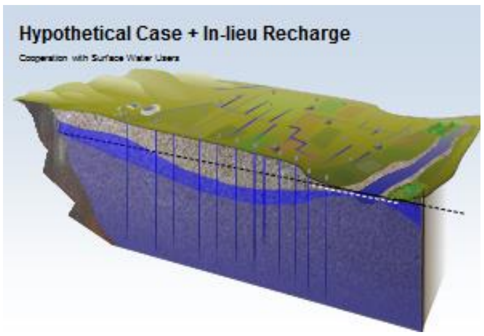


2. Another tool for managing the levels is increasing recharge. Again, preferentially increasing recharge near the stream can allow more tight and immediate control on the depletion. Recharge can be:

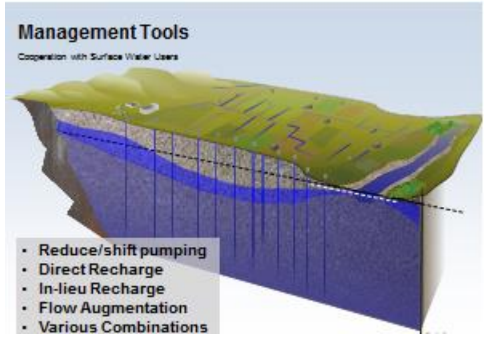
    a. Direct recharge – using recharge basins, or practicing on-farm recharge, which is being implemented in some parts of the San Joaquin valley.

    b. In-lieu recharge – there are a number of ways to accomplish this. If a basin has some surface water users, then cooperation between surface water users and groundwater pumpers through the GSA can be especially powerful.

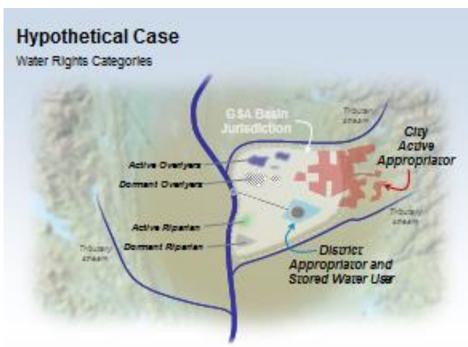
3. So, there are a number of management tools that can be brought to bear to manage groundwater levels in the vicinity of a stream to avoid increasing depletions of surface water. All of these require cooperation, and there are certainly some challenges to work out.



4. And of course, these things cost, and as Kevin has pointed out, the apportionment of costs for these activities will certainly require some good thinking.

5. What I've described are essentially "physical solutions," to use the term commonly used in adjudications. It is possible that the same outcomes I've described might be accomplished with an adjudication. But, if it can be accomplished through cooperative means, results can be achieved much faster, and without additional constraints that may accompany an adjudication – not to mention the costs – social and financial – that adjudications can bring.

E. What a hybrid SGMA/Adjudication approach might look like



i. Threshold issue: Does the "common supply" doctrine apply?

ii. Assuming common supply doctrine applies, you will need to consider the priorities of groundwater rights and surface water rights collectively.

iii. Absent prescription riparian rights to surface water and overlying rights to groundwater will generally (though not always) have senior priority.

iv. Absent prescription, public water purveyors (cities, counties, special districts, public utilities) are deemed appropriators (lower priority).

v. In over-drafted basins: prescriptive rights will be an issue.

vi. Right to recapture return flows from imported and salvaged water. It has long been established that one who imports water into an area has a prior right to recapture that portion of the imported water that makes its way into the groundwater basin. *City of Los Angeles v. City of San Fernando* (1975) 14 Cal.3d 199 .

vii. Right to recapture return flows from salvaged (stored) water. In *City of Santa Maria v. Adam* (2012) 211 Cal.App.4th 266, the court extended the right of recapture to situations where the water is native to the watershed but due to the operation of a surface water reservoir it is salvaged from loss during periods of high flow. Salvaged water may be native to the extent it would naturally flow within the stream to which it is released but it is "foreign in time" to the degree that "it would not find its way in the basin absent a reclamation project to divert it, store it, and release it on a schedule to augment natural recharge." *Id*.

viii. Scope of the Adjudication. Should it include groundwater and interconnected surface water? New statutory authority to encompass all interconnected water.

ix. McCarran Amendment. In watersheds where the Bureau of Reclamation has a substantial presence any adjudication will need to encompass both surface water and interconnected groundwater. McCarran Amendment provides for a limited waiver of sovereign immunity (United States can be sued in state court) but only if the adjudication is "comprehensive."

x. Because of the "time lag" issue physical solutions will be favored over pumping curtailments (though both may occur).

xi. Costs of implementing and operating physical solutions will be an important issue. Under *Mojave*, need to establish water right priorities in order to properly allocate costs.

xii. Sorting out water right priorities will be a complex process. Two issues in particular may heighten this complexity: (1) resolving prescriptive right claims in over-drafted basins, and (2) treatment of non-native basin supplies for water right priority purposes.

xiii. Strong incentive to attempt to subordinate unexercised overlying rights and riparian rights through the adjudication process.

V. Conclusion

What we've described – on the one hand, a voluntary approach, and on the other hand, a more adversarial approach – through adjudication or a combination of state board action and one of the other approaches – are really just different routes to the same endpoint. That endpoint being a combination of management actions that meet the groundwater depletion requirements of SGMA while respecting existing water rights. It may be helpful to view this endpoint as a "physical solution."

We (Kevin and Maurice) have come to the conclusion that a Voluntary Approach is the preferred route in most circumstances.

The voluntary approach can be implemented comparatively quickly, beginning immediately, and offers quite a bit of flexibility in how the local GSAs accomplish the endpoint. In many settings, that solution can be beneficial to both groundwater pumpers and surface water users that engage with groundwater pumpers.

If the adjudication route is taken, there is a likely to be a fairly long period of uncertainty, with a lack of clarity on what progress can be made in the interim. And, in the case of the Central Valley, an adjudication route is likely to make that 30 year Snake River adjudication look like a cakewalk.