

Summer 2017

WESTERN WATER

**Now Comes the Hard Part:
Building Sustainable Groundwater Management
in California**

Published by the Water Education Foundation



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Editor's Note

#40YearsStrong

When the Water Education Foundation got its start in 1977 amid a punishing drought, the hashtag above would most certainly have raised eyebrows over its meaning. It may still in some circles.

As we gear up to celebrate 40 years of the Water Education Foundation's existence, we launched a social media campaign using the hashtag #40YearsStrong with #TBT (Throwback Thursday) posts showing our first logo when we were called the Western Water Education Foundation, the first Layperson's Guides on key water topics (Auburn Dam and the Peripheral Canal in 1979) and other interesting historical tidbits about the people behind the Foundation. Entrepreneurship has always been one of the driving forces and as the record shows, we even raffled off a side of beef donated by our first Board President Ira "Jack" Chrisman, a Tulare County rancher and California Water Commissioner, at an ACWA conference to help fund the first incarnation of our popular California water map in 1979. You can check out our historical posts every Thursday by following us on Facebook and Twitter @WaterEdFdn.

Boy, have things changed. But back then, and still today, we rely on our generous contributors to support us in carrying out our mission, and we're grateful to them.

We take a lot of pride in serving as a vital source of nonpartisan, in-depth information about water resource issues in California and the West through our vast repertoire of educational materials, products and services such as our water tours, lectures, *Western Water* magazine and Project WET (Water Education for Teachers).

According to our count:

- More than **35,000** people have attended water tours, workshops and conferences over the years.
- More than **350** young lawyers, engineers, planners, community and environmental leaders have completed our annual Water Leaders educational and mentorship program.
- More than **15,000** K-12 teachers have completed Water Education for Teachers training, reaching **5.4 million** students in California with lesson activities about water in math, reading and science programs since the program began in 1995.
- And more than **225 issues** of *Western Water* have been published to help inform debate about many controversial issues.

And we'd like to think that through our educational efforts, we've played a role in the resolution of water resource issues over the years by bringing different voices together.

As we celebrate our own milestone, we wrote about another milestone in California water history for this latest issue of *Western Water*. Our in-depth article provides an update to the state's first-ever groundwater management law, the Sustainable Groundwater Management Act of 2014. Enjoy the article! And for those history buffs and supporters, join us Oct. 26 in Sacramento at the Sterling Hotel for our 40th anniversary celebration. Visit here for more information: www.watereducation.org/40YearsStrong. ❖

Jenn

– Jennifer Bowles



Happenings...

Celebrate Our 40th Anniversary



Follow along on Twitter and Facebook as the Foundation celebrates its 40th anniversary this year. Every Thursday we are posting Throwback Thursday (#TBT) items on Facebook and Twitter @WaterEdFdn to highlight milestones and interesting facts about our history using the hashtag #40YearsStrong.

Our anniversary year will be highlighted by a gala dinner on Oct. 26 in Sacramento, with the added bonus of a special reunion aimed at graduates of our Water Leaders program, celebrating its own 20th birthday.

Your organization can sponsor this special, limited-capacity event to secure seats at the dinner. The highest sponsorship level secures a full table of 10 seats. Sponsors already include: Northern California Water Association, Nossaman LLP, CH2M, MWH, now part of Stantec, and Gilbert Associates.

Contact Kasey Chong, kchong@watereducation.org, for sponsorship information.

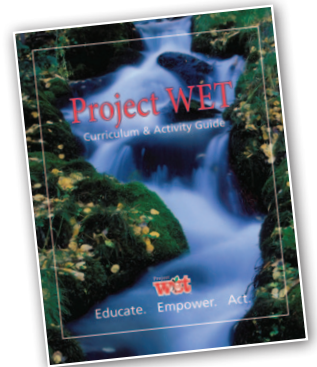
Back to School with Project WET

Project WET (Water Education for Teachers) is a great way to teach K-12 students about one of the most precious resources on the planet – water. A program of the Water Education Foundation, California Project WET offers excellent professional development experience with an activity guide full of 90 interactive, interdisciplinary activities studying all aspects of water.

Formal and non-formal educators who attend a daylong workshop will not only receive *The Project Wet Curriculum and Activity Guide* but will learn how to teach their students about local and regional water issues related to, water conservation, watershed management, stormwater runoff, nonpoint source pollution, and more.

These engaging, interactive lessons are focused on water resources that provide strong foundations for STEM (Science, Technology, Engineering, & Math) and Service-Learning programs, and are correlated to the Common Core and Next Generation Science Standards.

Learn more about Project WET and see a list of upcoming workshops organized by California WET coordinator Brian Brown at www.watereducation.org/projectwet.



Hop on a Tour Bus This Fall

Our Fall tours will offer participants the chance to see the damaged Oroville Dam spillway and hear firsthand about the latest activities on efforts to restore the San Joaquin River's Chinook salmon population.

The Northern California Tour, slated for Oct. 11-13, follows the Sacramento River and its tributaries as participants learn about the issues associated with a key source for the state's water supply. Visits to Oroville and Shasta dams are included in this 3-day, 2-night tour. This year, officials from the Department of Water Resources will offer a briefing about reconstruction of Oroville Dam's spillway, damaged in the February storms. <http://www.watereducation.org/general-tours>

The Nov. 1-2 San Joaquin River Restoration Tour discusses issues related to one of the nation's largest and most expensive river restoration plans. A 2006 settlement between the federal government, Friant Water Authority and a coalition of environmental groups set the project in motion to restore flows to a 60-mile, mostly dry stretch of the San Joaquin River while reducing or avoiding adverse water supply impacts to farmers. The 2-day, 1-night tour travels from Friant Dam near Fresno to the confluence of the Merced River.



Water Leaders - Where Are They Now?

Scott A. Morris

*Shareholder, Kronick Moskowitz
Tiedemann & Girard*

Class Year: 1998

Class Research Project: Water Transfers
in California

What was your job when you were in the water leaders class? I was an associate attorney at my current firm – Kronick Moskowitz Tiedemann & Girard

What does your job focus on these days?

I serve as general counsel to several public water agencies, so my legal focus is broader than my Water Leader days. For example, I now need to be concerned about the Brown Act, public contracting and construction law, the Public Records Act, conflict-of-interest rules, and Prop 218, rather than primarily just water and environmental laws. Working as a lawyer is exciting as our world is constantly changing, such as implementation of the new Sustainable Groundwater Management Act (SGMA).

What is the most pressing water issue that you are dealing with?

Right now, it seems that, in addition to my general counsel duties, my world is revolving largely around SGMA. It is a whirlwind of activity due to the extremely tight deadlines imposed by the law. There is no time to reflect on each accomplishment along the way, like forming a Groundwater Sustainability Agency, because right behind it is the requirement to actually prepare a Groundwater Sustainability Plan. There is no rest for the weary. It is truly exciting to be working on



the most significant water legislation in over 100 years.

What memories do you have of your time in our Water Leaders program?

I remember how excited everyone – from my classmates to the Foundation staff and Jean Auer (our fearless leader) – was to be involved in the program. Remember, this was only its second year so no one really knew what to expect. We all got along well right off the bat, which was due to the excitement Rita Schmidt Sudman and Jean generated. It was a lot of fun and we all learned a great deal. I also remember how good the water tours were. I was amazed at how much information the Foundation packed into the tours and how much I learned. I also really enjoyed the one-on-one conversations on those tours and with my classmates.

Who was your mentor and what valuable advice did you get?

Barry Nelson, then a senior fellow at the Save the San Francisco Bay Institute. I specifically asked to have a mentor from the environmental community as my work already exposed me to the water user community. I think that started the current trend of matching people of

different viewpoints. Barry exposed me to those opposite views.

What did you learn during the Water Leaders class that is helping you now?

I think the Water Leaders program instills confidence in the participants which is, of course, invaluable throughout one's career. It also opens the door to many real world water leaders who serve as mentors and/or participate in class seminars or the like. You learn these leaders are human and they want to help you learn the trade and to be successful. Also, that you shouldn't be afraid to ask for their advice and counsel or even their friendship. They are following in the footsteps of those who helped them and in general, they are happy to pay it forward.

What advice do you have for young professionals in the water world?

When it comes to water, don't be afraid to seek viewpoints from every point of view. Water is a very scarce, precious resource that all interests need. While there are unfortunately battles to be fought, there is far more common ground than people realize when they first start evaluating a situation.

Our one-year Water Leaders program began in 1997, and many graduates have gone on to achieve great things. We profile alums here so you can see where they are now and what they learned during their time with us. For more information on our program, visit www.watereducation.org/water-leaders

Sense of Place

Lake Tahoe

Lake Tahoe, the iconic high Sierra waterbody that straddles California and Nevada, has sat for more than 10,000 years at the heart of the Washoe tribe's territory. In fact, the name Tahoe came from the tribal word dá'aw, meaning lake.

The lake's English name was the source of debate for about 100 years after it was first "discovered" by people of European descent when General John C. Fremont's expedition made its way into the region in 1844. Not long after, a man who carried mail on snowshoes from Placerville to Nevada City named it Lake Bigler in honor of John Bigler, who served as California's third governor. But because Bigler was an ardent secessionist, the federal



Interior Department during the Civil War introduced the name Tahoe in 1862. California, meanwhile, kept it as Lake Bigler and didn't officially recognize the name as Lake Tahoe until 1945.

In the mid-1800s, the discovery of gold and silver in the Tahoe region caused it to mushroom into a bustling commerce area, and the forest in the basin was feverishly

cut down to supply timber to shore up the mines.

World renowned today for its crystal clear, azure water, the lake is fed by 63 streams but water only flows out of one – the Truckee River, which makes its way to Pyramid Lake. It is the nation's second-deepest lake after Oregon's Crater Lake, stretching down 1,645 feet.

To read more about Lake Tahoe and its environmental challenges, visit Aquapedia, our online encyclopedia at www.watereducation.org/aquapedia. We will stop at Lake Tahoe on our upcoming Sept. 13-14 Headwaters Tour. Check out <http://www.watereducation.org/tour/headwaters-tour-2017> for more information.

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California Department of Water Resources
Gary Pitzer

On the Cover

Implementation of the 2014 Sustainable Groundwater Management Act is well underway as California agencies work to develop plans to bring groundwater basins into balance. Cover design: Graphic Communications

The Water Education Foundation thanks all the sources and experts who reviewed this magazine for balance and accuracy.

The mission of the Water Education Foundation, an impartial, nonprofit organization, is to create a better understanding of water resources and foster public understanding and resolution of water resource issues through facilitation, education and outreach.

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Now Comes the Hard Part: Building Sustainable Groundwater Management in California

by Gary Pitzer

After more than two years of intense activity, there is a new layer of local groundwater management agencies in California; agencies that are beginning the task of bringing their basins to a level of sustainability.

The impetus is the Sustainable Groundwater Management Act (SGMA), the landmark 2014 law that aims to repair the effects of decades of unmanaged groundwater pumping, which have left some parts of the state in what the California Department of Water Resources (DWR) calls “critical” overdraft. Fifteen of the 21 critically overdrafted basins are in the south-central San Joaquin Valley.

Under SGMA, almost 300 Groundwater Sustainability Agencies (GSAs) have formed around the state to begin the process of bringing overdrafted basins into balance.

The deadline for the formation of GSAs in basins designated by DWR as “high” or “medium” priority was June 30, 2017. According to DWR, 99 percent of those basins met that deadline.

For these basins the GSAs are required to draft and submit to the state a Groundwater Sustainability Plan (GSP) during the next three to five years, a roadmap for how

those areas will achieve sustainable groundwater management by 2040 (or 2042).

GSAs “will need to take specific technical, legal, communication, financial, and management actions to achieve specific objectives,” said a 2016 report by the University of California, Berkeley School of Law called *Designing Effective Groundwater Sustainability Agencies: Criteria for Evaluation of Local Governance Options*. “A GSA will have in-house capacities, but the ability to leverage external resources will also be important.”

GSA formation “was supposed to be the easy part,” said Mark Nordberg, senior engineering geologist with DWR, at the July 10 Law Seminars International’s Sustainable Groundwater Planning Conference in Sacramento. “Now comes the GSP preparation and that, dare I say, is going to be a little more difficult.”

The difficulty stems from many factors, not the least of which are

the wide swings in precipitation that have occurred recently.

“One of the challenges the GSPs are going to have to recognize in their first go-around is how to deal with the extreme conditions that may be occurring over the next 10 to 20 years,” said Thomas Harter, chair for Water Resources Management and Policy at the University of California, Davis. “What if we are right back to drought next year?”

Harter, who has written extensively on groundwater issues, likens the problem of widespread overdraft to the long-standing issues associated with the state’s surface water conveyance system. “The fact that agencies are given a 20-year planning horizon to fix their ‘local Delta’ is recognition that things take time, especially because it’s not a top-down approach,” he said.

Experts believe the people in charge of drafting a sustainability plan will have to forge ahead in the absence of complete data.

“Planning with certainty is a rare thing,” said Abhishek Singh, senior environmental scientist with INTERA, a geoscience and engineering consulting firm in Torrance. “Planning under uncertainty is a necessity. You can account for uncertainty or just ignore it.”

Singh, who spoke at the Groundwater Resources Association of California’s May SGMA Conference in Modesto, said an extensive consultation process with stakeholders is necessary “to move the unknown unknowns to the known unknowns” and that a conceptual water budget “is a really good place to start” in the GSP process.

The schedule under the law for getting the most severely overdrafted

groundwater basins back into balance has been described as both too slow *and* too ambitious by water stakeholders.

California Water Commissioner David Orth said SGMA was created to not be a shock to the system. “The tactical decision when SGMA was created was that it took us 100 years to get to this situation and we need time to recover because the economic impact of an immediate sustainability action, which can only be achieved through groundwater allocations, is significant,” said Orth, who in his previous position as general manager of the Kings River Conservation District played an active role in development of the legislation. “The cost of doing that would be the idling of 30 to 50 percent of ag land in various portions of the San Joaquin Valley.”

DWR is in charge of overseeing SGMA’s implementation, providing grants and technical assistance to help GSAs construct their GSPs. SGMA’s legal backstop is the State Water Resources Control Board (State Water Board), which has the authority to intervene in cases where local agencies are unable or unwilling to come up with a plan for sustainable management. Intervention can occur if DWR and the State Water Board believe a GSP is inadequate or inadequately implemented.

Speaking at the Sustainable Groundwater Planning Conference, California Environmental Protection Agency (Cal/EPA) Undersecretary Gordon Burns said the state has no interest in managing local groundwater basins and that intervention by the State Water Board “would be more expensive and not as good as a local plan would be.”

“Even in the case of intervention, the idea is to get to local sustainability for groundwater management,” he said. “Intervention is worse than having local agencies having to make the hard decisions themselves.”

Groundwater overdraft – the amount of water withdrawn that exceeds recharge – in some agricultural regions averages about 2 million acre-feet annually, according to the Public Policy Institute of California.

“Even in the case of intervention, the idea is to get to local sustainability for groundwater management. Intervention is worse than having local agencies having to make the hard decisions themselves.”

– Gordon Burns, California EPA

During the latest drought, the pace of well drilling increased as farmers and communities sought new sources of water. As water tables dropped, more than 3,500 domestic wells went dry statewide.

In its 2017 report, *Water Available for Replenishment*, DWR acknowledged that “getting groundwater basins into a sustainable regime of pumping and recharge will not be easy or painless.”

“Regions that have, for years, pumped more groundwater than is replenished – in some cases to the point of causing subsidence – must either find other sources of supply or do without,” the report says.

The inevitable change in groundwater pumping resulting from

SGMA compliance will be transformative to the state's agricultural regions that have pumped groundwater without restrictions for generations. Unlike surface water, most of which requires a water rights permit, landowners overlying a groundwater basin have the right to pump a reasonable amount of groundwater to support beneficial uses. Not surprisingly, the idea of putting a lid on groundwater use did not sit well with the most affected entities. With the law in place, the attention has turned to ensuring its equitable application.

"While we didn't support SGMA's adoption, we are working hard for it to be successful now," said Jack Rice, associate counsel with the California Farm Bureau Federation, at the GRA conference.

By the June 30 deadline, 261 GSAs had been formed, some single entities, others the result of a memorandum of understanding or the formation of a joint powers authority. Overlaying GSAs across such a wide landscape was a complex, sometimes messy process, with jurisdictional as well as geographical jockeying. (The Delta-Mendota Subbasin alone has 24 GSAs, Nordberg said).

Forming the GSAs was one thing; establishing a GSP takes time and money. GSAs will need a long-term, stable funding source to support their mission of keeping basins from falling into overdraft. How that occurs is a work in progress.

"The funding mechanisms under SGMA are not good and they can really put SGMA into jeopardy," said Don Cameron, vice president and general manager of Terranova Ranch, a farming operation of more than 6,000 acres about 30 miles southwest of Fresno that relies

almost exclusively on groundwater. "We all want to have stable groundwater, but being able to raise money when you are talking to growers that really haven't paid anything for what they are doing – other than their groundwater pumping costs – to tell them they are going to have to pony up quite a bit of money to build the conveyance systems or we are going to have to cut back the water that can be pumped. Those are the only two options."

The last two years have seen a nonstop schedule of conferences, workshops and stakeholder meetings to help people understand SGMA and its implications on groundwater use. Because most of the affected basins lie in the heart of California's agricultural community, there is concern where farmers will find themselves once local GSPs are implemented.

"Farmers are a little overwhelmed right now, that's one of the challenges we face," Rice said. "SGMA presents a really big obstacle for everyone and agriculture is the most impacted stakeholder, yet finding the bandwidth to participate in endless SGMA processes is very difficult."

California's SGMA journey has been likened to what occurred in Australia, where a 10-year reform process during a major drought resulted in greater knowledge about how much water existed, its location and condition, who controls it and who is using it.

At the June California Water Summit in Sacramento, Mike Young, a professor of environmental and water policy at the University of Adelaide who was instrumental in the Australian reform process, said GSAs should issue shares of groundwater

allocations to individual users, a process that "brings a lot of security and confidence" to groundwater use.

Young, who developed a groundwater sustainability mock-up that "is built on global best practice," said it is important that a sense of trust and community respect for a GSP be developed as well as a willingness to start the implementation journey.

"The most important thing that people need to know is the answer to 'What are you going to do and how will this affect me?'" he said.

Avoiding 'Undesirable Results'

California could not get by without groundwater. It provides about 40 percent of the water used by farms and cities in average years and up to 60 percent during droughts. Some areas rely exclusively on groundwater for drinking water and it is the sole source of supply for many farmers in each of the state's agricultural regions.

California's most recent drought was severe, with the period between fall 2011 and fall 2015 the driest since record keeping began in 1895. The dryness, combined with record heat, strained surface water deliveries and reliance on already overburdened aquifers intensified. But the dependence on groundwater pumping has come at a price. Statewide, overdraft may be as much as 2 million acre-feet annually, with about 1.4 million acre-feet of that occurring in the Tulare Lake Basin, according to DWR.

The volume of groundwater storage capacity is large, three times the size of the state's existing reservoirs. As the reliability of imported water deliveries has wavered, there has

been a renewed focus on finding ways to recharge depleted basins, a development heightened by the surging river runoff into the valley.

“It’s the one natural resource you can’t recreate,” said Mark Hutson, senior vice president with Hancock Farmland Services in Madera County. Hutson manages property on behalf of his company’s clients west of Highway 99 in the Central Valley, which is part of the vast agricultural swath where rivers flowing from the mountains once regularly spilled their banks, creating vast wetlands and filling the huge underground basins.

Taking advantage of the high flood flows and his proximity to the Fresno River, Hutson diverts water to some of the fallowed farmland to recharge thousands of acre-feet of water back into the aquifer.

“Millions of acre-feet” of water could have been deposited throughout the valley this year if all the conditions to facilitate widespread recharge were in place, he said during a June tour of his property, which saw the vast potential offered by this year’s big flows on the river.

“My eyes really opened when I saw this,” he said. “We must prepare and plan for the future. More farmers and water districts need to start and take that step. We can recharge the shallow aquifers and wells very quickly. A good area will recharge one-half an acre-foot per acre per day.”

Hutson was joined by members of Point Blue Conservation Science, a science research outfit that is exploring wetland restoration opportunities that exist on agricultural land.

Wendell Gilgert, working landscapes program director with Point

Blue, said the right land stewardship practices can increase the amount of water the soil retains by thousands of gallons per acre and that the idea is to keep water on and in the ground in some form year-round instead of creating three to four months of flood runoff.

Record rainfall in winter 2016-2017 effectively ended the drought. But while the end of the drought was a welcome relief, it will take time

for overdrafted aquifers to recover. In a March post at the *California WaterBlog*, Harter wrote that “like the economy after a deep recession, recovery will be slow” but that steps can be taken to get water back into the ground.

“If we dedicate some of the lighter soils with higher infiltration rates for use as intentional recharge basins, a likely recharge rate would be on the order of one or perhaps even a few

Groundwater Basins Subject to Critical Conditions of Overdraft



Prepared by California Department of Water Resources for *Bulletin 118, Interim Update 2016*.



To date, almost 300 Groundwater Sustainability Agencies have been formed throughout the state, a process that requires hundreds of hours of research and stakeholder meetings.

feet of recharge in one month,” he wrote.

The drought and problems of overdraft are what helped SGMA emerge as a legislative solution. As surface water supplies became inadequate to support the growing agricultural economy, farmers turned to pumping with powerful wells that reached deep into the ground. The loss of water exported from the Delta because of drought and regulatory restrictions increased the dependency on groundwater even as more permanent tree crops were planted.

“SGMA requires actions that have been necessary for many years or, in some cases, decades, but have not been politically feasible without a state mandate,” Tara Moran, sustainable groundwater program lead at Stanford’s Water in the West

program, wrote in her 2016 report, *Projecting Forward: A Framework for Groundwater Model Development Under the Sustainable Groundwater Management Act*.

SGMA’s language speaks of avoiding the “undesirable results” of too much pumping: chronic lowering of groundwater levels, “significant and unreasonable reduction” of groundwater storage, seawater intrusion, degraded water quality, subsidence and the effect on interconnected surface water. While not explicitly stated in the law, state intervention is considered the seventh undesirable result.

“Many local agencies are justifiably uncomfortable with this possibility, since the State Water Board lacks the capacity to develop the creative, locally tailored solutions that GSAs can, in concept, implement,” said Michael Kiparsky, director of the Wheeler Water Institute at the U.C. Berkeley Law School’s Center for Law, Energy & the Environment. “How and under what con-

ditions the threat of a heavy-handed state intervention would materialize is one of SGMA’s unanswered questions. In a sense, this is appropriate since the uncertainty around that threat can and should motivate better local implementation.”

SGMA was written as an alternative to a top-down, state-driven approach that permitted groundwater use. Matters such as water rights, water allocation, administration, accounting and enforcement are left to locals to decide.

DWR is helping local agencies in many ways, such as its proposed “Water Budget Framework for California,” and the associated “Water Budget Dashboard,” an online tool presenting water budget information for use by GSAs that accounts for such parameters as subsurface inflow, evapotranspiration and surface water diversions. Because of its novelty, DWR continues the development and enhancement of the tool’s capabilities to share information.

“We want to know what’s going to work and what’s not going to work,” Todd Hillaire with DWR’s Northern Region Office told attendees at the GRA conference in Modesto.

There is much to consider, given the complex nature of groundwater science and the sometimes-scattered disposition of data.

“What do we use as a basis? How does all the data fit, can we test it and does it work?” Hillaire said. “The goal is to adjust to different spatial and temporal scales.”

An important factor is ensuring that everyone is using common water budget vocabulary for terms such as land use and crop patterns, Hillaire said.

Recharge

A monumentally wet winter has heightened the interest in finding ways to expand groundwater recharge opportunities. It's estimated the amount of available groundwater storage far exceeds the 42 million acre-feet of current total surface storage capacity. However, the state simply doesn't have the infrastructure and capacity to divert and hold flows like those released from Lake Oroville for infiltration and groundwater storage.

"That's an arena that's ripe to be infused with creative ideas," Harter said. There has been talk of expanding flood plains so they can retain flows for a longer amount of time and get more water into the ground. "Over a very large area, even if very slowly, there's a significant amount of water that can be recharged," he said.

Furthermore, there is opportunity to get more water into the ground through revised reservoir storage operations that capture more winter flows for use later in recharging aquifers.

"One example would be rather than leaving the reservoirs three-quarters full in the fall, empty it all out and put it in a groundwater reservoir and start filling [surface reservoirs] again with the winter rain in the hopes that it will be a wet year and if it turns out to be a dry year that water is still in the groundwater reservoir," Harter said.

At Cameron's Terranova Ranch, active groundwater recharge is a way of doing business.

"We have been farming here for 36 years, and on the average we have seen a two to a two and a half foot decline in the water level per year," he said. "We figured it out a long time

ago that we needed to do something to solve the problem and stop the decline. That's what got us started with groundwater recharge and capturing flood water on-farm. Then we took it to the next level and started flooding our wine grapes and trees. We did things other people wouldn't do but we learned a lot by doing it."

Filling in the Puzzle

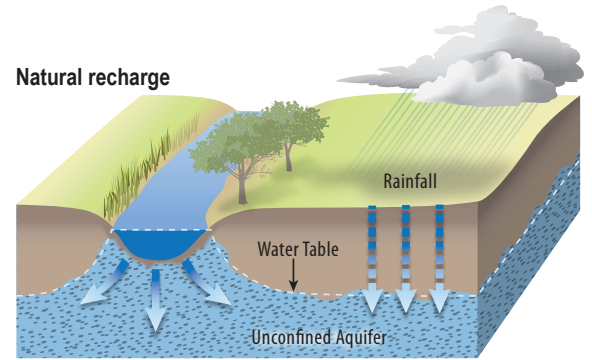
It could be said the GSP is the heart of SGMA – the preferred alternative to state control of groundwater pumping. The flip side of that is the requirement that GSAs create plans that withstand state scrutiny and honestly address the issues facing not just the immediate users within a given area but their neighbors as well.

"We want to see a basin-level perspective reflected in these plans," said Cal/EPA Undersecretary Burns, adding that collectively, groundwater users "stand or fall together."

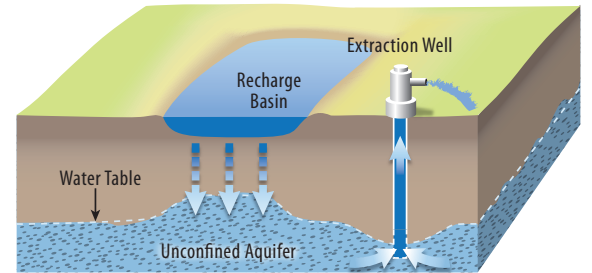
Among other things, GSPs must identify recharge areas and the water available to supply them. In that respect, the process is similar to the stormwater planning process that also identifies available acreage and the limits to infiltration.

It is left to local communities to decide how a GSP will encourage and require water conservation and how water will be allocated during times of drought, Young with the University of Adelaide said, adding that a GSP "has to be able to work well in the worst of circumstances."

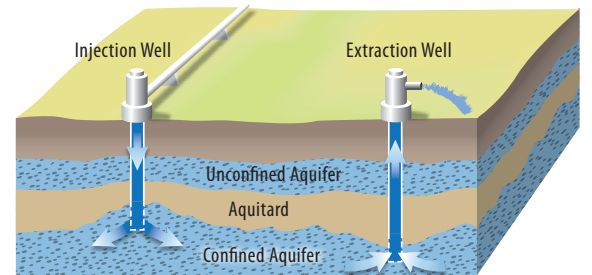
GSP development may be new but the majority of GSAs consist of people well-versed in the analytics of water supply management in regions of the state where complexities abound.



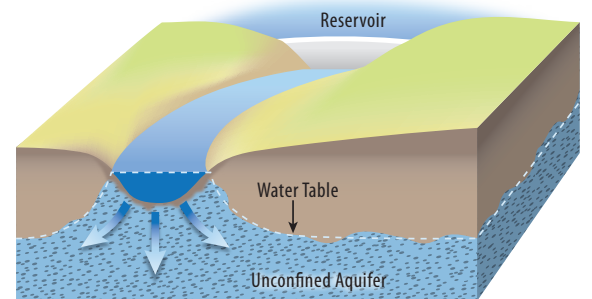
Managed recharge: recharge basins



Managed recharge: injection wells



Managed recharge: stream/canal seepage



Finding water to recharge overdrafted aquifers is a key part of implementation of the Sustainable Groundwater Management Act, and more agencies are expected to pursue various means of purposefully getting water back into the ground.

“The keys to a good plan are building trust and having a portfolio of options,” said Christina Babbitt, manager of the Environmental Defense Fund’s (EDF) California Groundwater Program, at the GRA conference.

Groundwater management often requires asking people to change what they do in a way “that has an actual or perceived financial impact,” she said. “To accept a system, people need to feel that the system is fair [and] it is also important to have financial and personnel resources to carry out monitoring and enforcement. Political and community support is very important.”

In preparing a GSP, local agencies will have to identify what is not known about the basin, characterize it and incorporate it into the final document, said Singh, the scientist consultant with INTERA. The “uncertain variables” that are of the greatest importance must be reduced through data acquisition, he said.

One template for GSPs could come from Nebraska, the subject of one of several EDF case studies. The state uses 23 Natural Resource Districts (NRDs) to manage groundwater supply and groundwater quality. In place for more than 40 years, the NRDs are built on a hydrological boundary, which allows them to tailor management practices to local conditions. The Upper Republican NRD, the focus of the EDF case study, uses a combination of regulations, incentives, water supply augmentation and education to keep the available supply in balance, Babbitt said.

The Upper Republican NRD in southwest Nebraska certifies the total number of irrigated acres within

its boundary and no new acres are allowed. Babbitt said each irrigated acre is allowed a certain amount of water each year, which is determined every five years. Between 2013 and 2017, it was 13 inches per acre per year or 65 inches for five years.

Groundwater in the NRD is managed through a variety of management tools, including a moratorium on new wells and through the metering of existing wells. Groundwater can be transferred within the region subject to the approval of the district’s board of directors.

Knowledge varies about groundwater conditions in California. Adjudicated basins are well mapped and some areas have several decades of well information. One source of information is DWR’s California Statewide Groundwater Elevation Monitoring (CASGEM) program, which provides an online portal to current conditions gathered by local entities. Still, as the process of building GSPs begins, GSAs have much to learn.

“I think the really big question is data,” Orth said. “Despite CASGEM and despite a lot of integrated planning processes over the last decade, there are still limitations on data that will make it difficult to substantiate allocations of groundwater. There are some districts talking about spreading the resource equally across all lands regardless.”

Unlike the surface water diversion rights that are well documented by the State Water Board, accounting for groundwater use is much hazier.

“Part of this is there is not a good legal foundation for any of these groundwater rights decisions,” Orth said. “You have to figure out: What ultimately will the stakeholders in

the region support? Do you start distinguishing areas with surface water that have conjunctively managed the resource and create a mound conceptually against the guys who do nothing but pump?”

Uncertainty is an intrinsic part of how SGMA lays out its requirements for sustainability criteria, Singh said. It exists in determining the basin setting, projected water budget and minimum thresholds and objectives. SGMA purposely leaves it up to the GSAs and the local stakeholders to fill in the pieces of the puzzle.

“The idea is you start trying to put together a plan ... while trying to reduce your uncertainty range,” he said, likening the experience to the everyday practice that motorists undertake in making a left turn in traffic while incorporating a level of uncertainty.

One of the challenges for GSAs will be establishing a limit on groundwater use – a limit that may be reached quickly if drought conditions return. That scenario could force some “fairly drastic decisions” because of the need to demonstrate sustainability by 2040, Harter said, adding “they can’t continue to borrow water from the future.”

Getting Water Back into the Ground

Those who live with SGMA every day are keenly aware that its implementation represents a new era in groundwater management.

“The stakes involved in SGMA implementation are high,” said a June 2017 report by the UC Berkeley School of Law called *Trading Sustainably: Critical Considerations for Local Groundwater Markets Under the Sustainable Groundwater Management*

Act. “Changing where or when groundwater is pumped or the place, method, timing, or purpose of its use can change the impacts experienced by people and ecosystems. Groundwater management decisions made today will affect everyone in a basin, now and well into the future. The full impacts of poor decisions may not be felt until long after they are made, and some impacts may be irreversible.”

Still, the rapidity by which attention has turned to groundwater management is encouraging, Harter said.

“To me the fact that we have essentially been able in a little over two years to create over 200 new public agencies in this state; that’s an unprecedented public policy experiment,” he said. “And the fact that it appears we are mostly covered is a fantastic indication that we are turning the corner.”

Bringing affected basins into a sustainable status by 2040 (or 2042, depending on designation as critical or high priority) reflects the severity of the problem and the complexity of devising a practical and durable schedule of recovery.

“It was a policy decision to say 20 years is a reasonable amount of time for those folks to figure out and build projects that will either increase the amount of groundwater they have over the long run through recharge or figure out ways to decrease the demand on groundwater use in a way that will not destroy the economy overnight,” Harter said.

Young said the dire circumstances in some areas could dictate an accelerated rate of SGMA implementation.

“As groundwater levels go down, pumping costs go up and land values go down,” he said. “As they get into

SGMA, many communities, especially those with land subsidence and seawater intrusion issues, may decide to transition at a faster rate than that required by the legislation.”

Burns was blunt about what local regions face if they are unable to construct an acceptable GSP. The State Water Board “won’t come in and try to do what the locals want them to do,” he said. Instead, “they will come in and cut pumping.”

The State Water Board will be notifying groundwater extractors in unmanaged areas of the need to report their withdrawals, said Nicole Kuenzi, senior staff counsel, at the Law Seminars International conference. She noted that “it’s a little bit of a reach-out in the dark because we don’t know where all the wells are.”

Part of the GSP framework is finding ways to get water back into the ground and accelerate the

Paying for Sustainability

The cost of implementing SGMA falls on GSAs, which must, in turn, find ways to get the funding from the water users under their jurisdiction. Under the law, that means charging fees to cover the regulatory and operational aspects of groundwater management.

There are several funding needs, beginning with the creation of GSPs themselves, followed by inspections and enforcement, project construction and the necessary daily operations and maintenance. That money may be drawn from different sources: from taxes, assessments, property-related fees and regulatory fees. Fees can be fixed or based on the volume of production, said

Jonathan Cristy, an attorney with Kronick, Moskovitz, Tiedemann and Girard, at the Sustainable Groundwater Planning Conference.

Regulatory fees levied on groundwater extraction are designed to fund GSP preparation and enforcement and may not exceed “reasonable regulatory costs,” Cristy said.

Operational fees, implemented after the completion of a GSP, cover

the activities to keep a GSA going such as regular operations and maintenance, maintaining an adequate financial reserve, the cost of facilities and water supply distribution. They are levied on property owners and measured by the level of extraction.

Taxes and assessments are subject to approval by an election or a balloting process. Property-related fees for operational costs are subject to majority protest under Prop. 218, but “there is no election required, so you don’t have that hurdle to get over,” Cristy said.

He noted that the “tricky part” about fee application is that the amount charged has to be proportional to the cost of providing service to each parcel.

recharge process. In its report, DWR notes that “developing available water can be challenging because of a number of societal and technical factors, including laws, regulations, and environmental needs, as well as the characteristics of water demand and use.”

With a limited amount of water, “hard decisions” will have to be made regarding future groundwater use, Harter said.

“This is going to be the challenge that these GSAs have and the state has to figure out: what are some of the alternative economic uses for land that needs to be retired from agriculture because the water is simply not available.”

Developing more groundwater recharge capabilities and wildlife habitat on farmland is the goal of Hancock Farmland Services and Point Blue Conservation Science. Below, Nathan Seavy, research director with Point Blue, whiteboards some ideas on how to make it happen.

Rice with the Farm Bureau said it’s important that the people affected by SGMA are part of the planning process.

“How do you get agriculture’s voice heard in the GSA?” he said. “Farmers are not clear what they want to say or how their voice is going to be heard. And to meaningfully participate, someone needs to translate the technical aspects of groundwater management so that the people that must live with the GSP understand the scientific basis. Finally, we don’t want to politicize the science. It is important to keep the science objective because politicization of the science is going to be a risk.”

Furthermore, there is the need to “explain to people why it’s a value to them to pay a fee” for the GSA’s services so people are more likely to understand and accept the fees, he said. Burns with Cal/EPA said there are concerns about “fragmented

governance” that could ultimately hinder the execution of GSPs. The GSA formation aspect of the law “was the easy part,” he said.

SGMA planning efforts have resulted in a cross pollination of data as neighboring basins work out the details of their respective GSPs.

“We are trying our best and are coordinating with other GSAs within the subbasin to put together the modeling we need,” Cameron with Terranova Ranch said. “In that respect, we are all working together for the same goal, so we are all going to need the modeling data and we are going to have to have sustainable yield for each area within the GSA. It gets pretty complicated and there are going to be questions about how much each GSA is responsible for overdraft within the subbasin. We have a long way to go and we have to fund everything we are doing.”

It is clear that expanding groundwater recharge is key to rehabilitating aquifers in those parts of the state where they’ve been drawn down the farthest, such as the southern San Joaquin Valley and parts of the Central Coast.

“Complex technical, legal, and institutional challenges and future uncertainties will affect the planning and estimation of water available for replenishment,” DWR’s recharge report says. “The current challenges include institutional and regulatory issues, spatial and temporal connectivity of the water system, data availability, water quality, system operations and capacity, financial feasibility, and environmental sustainability. There is also uncertainty about how water availability may be affected by future institutional and regulatory changes, new infrastructure, climate



change, population growth, and land use changes.”

Hancock’s Hutson cited impediments such as the complexities of making floodwater available for recharge and getting it to the right areas for maximum infiltration.

“It is a capacity question,” he said. “What can we take and what can people hold. If we use the existing canals and infrastructure that farmers and water districts already have, we can spread the water during high rain/flood events to farmland/recharge areas very quickly and with little cost. It’s getting people to say ‘how do I set aside 3 percent to 5 percent of my acreage to prep it for when [flood flows] happen.’”

The “main impediment” to groundwater recharge within Cameron’s Terranova Ranch growing region has been conveyance, he said.

“We haven’t had a water district to put canals in to distribute the water,” he said. “We have to start from zero in building conveyance and the problem with that is – to raise money under SGMA – you are pretty much forced to do a Prop. 218 election that may or may not pass.”

About 60 miles northwest of Cameron’s operation, Kole Upton, president of the Chowchilla Water District, believes using floodwater for groundwater recharge can be done at the water district level.

“I proposed this in the early 1970s,” he said during the tour of Hutson’s recharge operation. “I said we should require every farm to have some environmental habitat. It doesn’t have to be that expensive for smaller farmers [and] we can give people SGMA credit for recharge so they can pump when it’s dry.”

Because its use is so important in

such large parts of the Central Valley, it seems likely California’s water market will expand to incorporate the necessity of adhering to a local sustainability plan. Markets “offer the most efficient way of managing access to a limited resource,” Young said. “The important thing is building robust administrative systems. If you do that, markets will emerge naturally.”

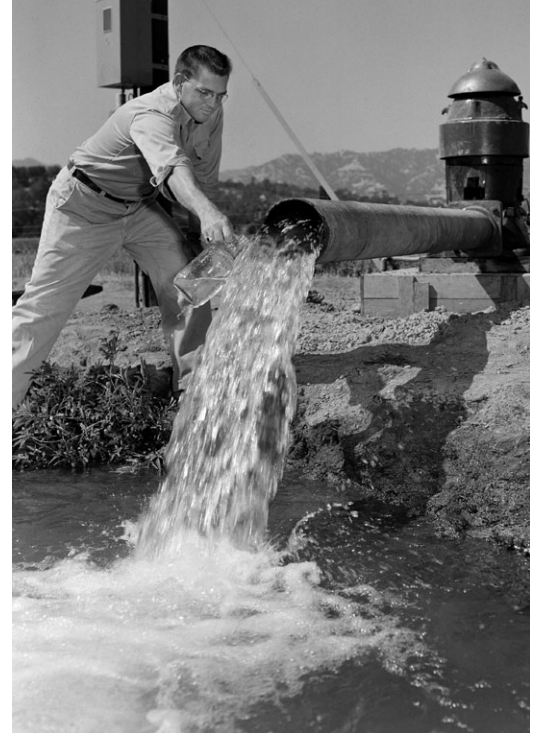
Marketing groundwater allocations as a means of preserving the resource is the focus of a June 2017 report by the UC Berkeley School of Law called *Trading Sustainably: Critical Considerations for Local Groundwater Markets Under the Sustainable Groundwater Management Act*.

The authors of the report note that “SGMA potentially opens the door for the development of local groundwater markets,” and that in such a market, “a willing seller might trade a portion of their groundwater extraction allocation to a willing buyer, allowing the buyer to pump groundwater in the seller’s stead.”

Done correctly, the markets system “could potentially contribute to socially, environmentally, and economically desirable reallocation of groundwater resources in some basins, but success is not a foregone conclusion,” the report said, noting that “unrestricted or poorly administered transfers could result in significant negative externalities, including the undesirable results SGMA requires GSAs to avoid.”

Getting overdrafted groundwater basins into a sustainable condition is not going to happen in a month, a year or even 10 years but SGMA has begun the process of accountability.

“It took Australia something like 15 years to put an authority over



In this 1957 photo, DWR’s Jim Windsor gathers groundwater samples from a pump in the San Joaquin County area.

all of our surface and groundwater systems and bring everything into a sharing framework,” Young said. “It was a long journey and I hope California can do it faster than that but the reality is you have to start slowly, build the basic understanding and then move forward.”

Cameron views SGMA’s implementation as a matter of practicality.

“I know we have to regulate our groundwater,” he said. “We can’t continue to overdraft and keep drilling deeper wells. At some point we are going to have to be sustainable if we want to continue to farm the land we have here in California.”

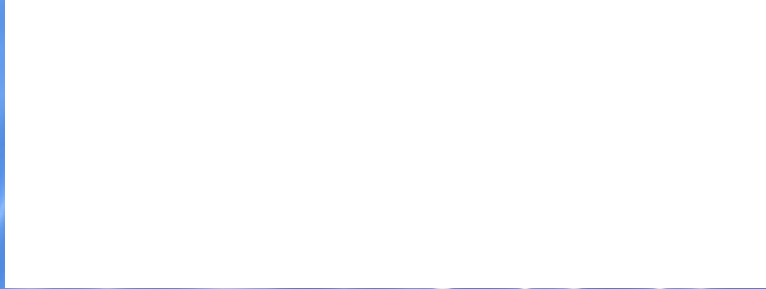
SGMA’s greatest accomplishment may be the heightened awareness it placed on groundwater and its importance to California. For many years neglected, misunderstood and fraught with complexity, groundwater is receiving more attention than ever – a good sign when the significance of sustainability is more important than ever. ❖



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