2018 Western Groundwater Congress. Thank You!

By R.T. Van Valer, GRA Director

As my final responsibility as chair of the 2018 Western Groundwater Congress I was asked to write this article for HydroVisions. Historically this article summarizes the event for all who attended and gives an overview of “what you missed” for those who were not able to be at the venue. The truth is, over the course of those three days (September 25th-27th), so many things happened, I don’t know how to begin to summarize it. Staring at a blank computer screen, all I could think of was after almost a year of hard work, planning, conference calls, and thousands of emails, I am very proud to say the 1st Annual Western Groundwater Congress (WGC) was an absolute success! The technical content, the networking opportunities, the social events, the key groundwater industry leaders who attended…everything was a success! I started to think back to the beginning at our quarterly board meeting at Roscoe Moss Company, when the board asked me to chair the largest event in the rich 26-year history of GRA. Having never been a part of an event planning process I was terrified. All I could think was “I am going to need a lot of help,” and throughout this process, that’s exactly what I received! That being said, instead of trying to summarize all of the remarkable presentations, the hands-on workshops, and the social events, I wanted to use this platform to say “THANK YOU” to all the people who made the WGC one of the most incredible GRA events ever.

The WGC started off as a dream by a few of our Board Members to produce a large professional and technical event, with a new and fresh feel compared to past events. We wanted to use the WGC to make strides toward achieving GRA’s vision of “Sustainable Groundwater for All” by interfingering the four strategic areas and goals that support our mission throughout the event (1. Education and Events, 2. Affiliation and Collaboration, 3. Communications and Membership, 4. Advocacy). This event would incorporate and also take the place of the Annual Conference that had been a staple of GRA. Knowing that, the idea was to make this new event bigger and better with a program that included top-notch presentations, delivered by key members in our industry. After working for 9 months, our team of track and session chairs created a program containing world class technical presentations, broken into four tracks entitled Water Resources, Sustainable Groundwater Management Act, Contaminants, and Special Topics.

The WGC was opened by an incredible Keynote Speaker, Professor David L. Rudolph who presented his talk entitled A Renaissance in Regional Hydrogeology. I’d like to express my gratitude to Professor Rudolph for opening the event as he

Continued on page 5…
Inside this Issue

Features

2018 Western Groundwater Congress 1
Presentation of GRA’s 2018 Lifetime Achievement Award to Dr. Dennis Helsel 19
GRA’s David K. Todd Distinguished Lecturers for 2019 20
Kevin J. Neese Award 20

Columns & Corners

President’s Message 3
Upcoming Events 7
Technical Corner 9
California Legislative Corner 12
Federal Legislative/Regulatory Corner 17
Chemist’s Corner 18
Branch Highlights 23
Organizational Corner 24

The Groundwater Resources Association of California is dedicated to resource management that protects and improves groundwater supply and quality through education and technical leadership.

Photo: Quaking aspen showing color in the Sierra Nevada. Photo Credit: John Karachewski

HYDROVISIONS is the official publication of the Groundwater Resources Association of California (GRA). GRA’s mailing address is 700 R Street, Suite 200, Sacramento, CA 95811. Any questions or comments concerning this publication should be directed to the newsletter editor at editor@grac.org or faxed to (916) 231-2141.
Reflecting on 2018 and Looking Forward to 2019

By Steve Phillips, U.S.G.S.

Events

GRA implemented changes in 2018 and had a big year! Of particular note was our 1st annual Western Groundwater Congress, and 27th Annual Meeting, held September 25–27 in Sacramento. With the addition of a third day and double the number of tracks (from 2 to 4), this event was much bigger than our past annual gatherings and drew over 430 people. Attendees provided enthusiastic feedback indicating that they enjoyed the enhanced presenter-audience interactions, expanded networking time and opportunities, workshop options (including wine tasting, in which I happily indulged), and other innovations. Some of these enhancements were successfully implemented during the 1st annual GSA Summit in June. We rode that momentum into the Congress with enthusiasm and upped our game even more.

In addition to the Congress and Summit, GRA’s offerings in 2018 included the 16th Biennial Symposium on Managed Aquifer Recharge and the annual Legislative Symposium, as well as several short-courses and over a dozen GRACasts. Most of the presentations from these events are available to all GRA members here — see other member resources available there as well.

Event planning for 2019 is well under way, and GRA will lead off with Bridging the Gap, January 28–29 in San Diego. This conference takes a holistic look at managed aquifer recharge (MAR), and focuses on ways to improve weather forecasting, reservoir operations and other processes to increase MAR potential. Registration is open, so click the link above to sign up.

Also open for registration is the Groundwater Sustainability Bootcamp, a short-course on groundwater, watersheds, and the nuts & bolts of groundwater sustainability plans (GSPs). This will be held at UC Davis, February 5–6.

The first GSA Summit was so well received by GSA members, stakeholders and other professionals supporting development of GSPs, that GRA is excited to make this a recurring event. On June 5–6, GRA will feature the 2nd annual GSA Summit, which will be held in Fresno. This event will focus on a range of Sustainability Groundwater Management Act (SGMA) topics, providing perspectives and ideas from GSA members, other stakeholders, state agencies, and practitioners to help provide guidance as GSPs are being developed. GSA members will again be very involved in the planning and execution of the Summit, so you can expect to see highly relevant content. Stay tuned for agenda and registration information.

Plans are already underway for GRA’s 2nd annual Western Groundwater Congress, and 28th Annual Meeting, which will be held on September 17–19 in Sacramento. Save these dates! Christy Kennedy, who played a big role in this year’s Congress, has taken on the lead role in planning the 2019 event. If you have ideas to share, you can contact Christy via the Board page on our website.

Continued on the following page…
GRACasts and other events are being planned, so stay tuned! We are currently updating the format of the annual Legislative Symposium, coming next spring, and developing a November event focused on optimizing remediation and long-term monitoring. Also, keep an eye out for meetings of our eight GRA Branches, which feature great networking opportunities and a wide range of interesting topics and speakers.

Leadership in GRA

Leadership takes on many forms in GRA, which is volunteer-led. One group of volunteers is GRA’s Board of Directors, for which a call for nominations went out in the previous issue of HydroVisions and via email. The strong response to this call was very gratifying, and I think members will be pleased when they see the proposed slate. I personally would like to thank all who applied, as doing so is a generous act.

Another key leadership position in GRA is involvement in our committees; if you have potential interest in being involved at this level, please click this link, see what looks interesting, and use the “contact us” link on that page to learn more.

A great deal of leadership also occurs at the local scale, within our eight Branches. Click this link for contact and other information about Branch involvement.

Membership

It’s that time of year to renew your membership or join, so please go to GRA’s website, and click the membership tab. There are many resources there, and we’ve enabled auto-renew for your convenience!

As always, we welcome ideas on future events and directions. If you are not a GRA member, please consider joining, and engaging in all that is offered!

Cheers,

Stan Phillips
set the tone for the entire conference and from that point on, all of our orators consistently delivered the informative and interesting content expected of GRA for 26 years. As survey results come in, we have been flooded with praise for the outstanding opportunities for learning and gathering information provided over the three day period. In fact, one of the biggest criticisms was, there were too many first-rate presentations at the same time, making it difficult to select one in each session.

The one presentation everyone chose to attend was the Awards Luncheon and GRA Annual Meeting where we made some big announcements. First, our GRA President, Steve Phillips, gave an update of the success of GRA, and discussed how the Board of Directors is making changes in order to become a more efficient working board. After his presentation, and the announcement of the 2019 David Keith Todd Lecturers, we continued our long standing tradition of giving out the Kevin J. Neese Award and the Lifetime Achievement Award. The recipient of the Kevin J. Neese Award was the UCLA Institute of the Environment and Sustainability; UCLA Sustainable LA Grand Challenge; and Colorado School of Mines and was accepted by Mark Gold who I want to thank for taking the time to tell us about the entire project. I also want to thank and congratulate our Lifetime Achievement Award winner, Dr. Dennis Helsel, on his lifetime of work applying statistics to practical issues in environmental sciences. We closed the lunch program with the announcement of the 2019 WGC Chair and the dates for the 2nd Annual WGC. My special thanks go out to Christy Kennedy who has already hit the ground running, planning for next year’s WGC, September 17th-19th. It will take a lot of hard work, time, and energy which is why I can’t thank the track chairs, session chairs, and speakers enough for the tireless effort you put forth in organizing and delivering such an outstanding overall program.

Truth be told, I knew we were capable of delivering strong technical presentations, but I also wanted to create a new and fresh feel with the entire program. For this I leaned heavily on Smith, Moore & Associates (SMA), who serve as the GRA’s Association Management Team. To list everything they did would be an article in itself, so I truly can’t thank them enough for guiding us in building this new event. Lead by Sarah Erck, her team helped us create a format for the WGC unlike previous GRA events. The podiums were stripped away, for a more “Ted Talk” like feel, enhancing the interaction between the audience and the presenter. For panel discussions, panelists and their moderator were placed in “soft seating” and encouraged to have open discussions with each other and the audience. The SMA Team was also instrumental in developing 15 hours of networking time (a membership request). Some of those opportunities included longer breaks as well as two of the three lunches “presentation-free,” giving all who attended the WGC ample time to link-up/networking with other key members of the groundwater industry. There were also rave reviews about the food served throughout the event, and all of the credit for those tingling taste buds goes to the SMA team.

We not only wanted to make the WGC a leading technical event, but we also wanted to make it a fun event too! That’s where the Social Functions Committee made their mark on the WGC. They were in charge of putting together the receptions, the raffles, coordinating with our Sponsors & Exhibitors, and putting on one of our highlight events, the Sustainable Practices in Wine Making & Wine Tasting workshop. On the first evening there was a fabulous President’s Reception, featuring live musical entertainment by Water Hammer. On the second night, the “I AM GRA” reception opened the doors to more great food and networking

Continued on the following page…
opportunities. However, on this night, GRA members were able to take advantage of Member Only Benefits such as a signature drink, extra raffle tickets, and a massage station. This reception also gave GRA members and attendees who purchased tickets a chance to win one of over 50 different raffle prizes donated by our incredible Sponsors & Exhibitors. Before this reception, the committee organized the Sustainable Practices in Wine Making & Wine Tasting Workshop where attendees were able to explore sustainability in wine making with both their minds and their palates, thanks to some of our local sustainable vineyards. The committee was also committed to a wellness aspect of the event, so they developed the Darcy Dash 5K and sprinkled in the 7-Minute Workout during the morning breaks. This allowed all of us to feel loose and energized to take on the day full of information. With all of their work, this Social Functions Committee really went above and beyond to include a dose of fun to the WGC that I know everyone who attended, including myself, is very thankful for!

I mentioned our Sponsors & Exhibitors, and I especially want to thank our co-sponsors Ramboll, EN Rx, Inc., and I-GIS for headlining an absolutely amazing group of Sponsors & Exhibitors! It would be impossible to continue to put on great events, like the WGC, without the support from these wonderful organizations. In fact, we received so much support for The Congress this year we are developing ways to allow for more space and more opportunities to exhibit and sponsor at the 2019 WGC. If you didn’t get a chance to talk to all of the Sponsors & Exhibitors at the venue, I would encourage everyone to take a look at the full list of everyone who supported this event on the GRA website.

At the end of the day, the 1st WGC, the largest event in GRA history, was comprised of 437 attendees traveling from 15 states, six countries, and numerous California cities. Whether you traveled 15 minutes or 15+ hours, I want to express my gratitude to all of you for joining us for this inaugural event. While we put on events for you, you are what make them special. You are what motivate presenters, panelists, and chairs to work diligently to create the best possible program. You come from all different walks of life and use your experiences to ask us questions that make us think and dream about how to be better in the groundwater industry; how to succeed in our mission to protect and improve groundwater supply and quality through education and technical leadership; and ultimately, how together we can achieve our vision of Sustainable Groundwater for All. Without your support and attendance, we would have no reason to build this substantial three-day, four-track event, and for that, I truly thank you all!

With Christy Kennedy taking over the reins in 2019, I know GRA and its Board of Directors is committed to continuing to make this a premier groundwater conference for the West. We look forward to hearing more of your comments, and seeing you all on September 17th-19th at the 2nd Annual Western Groundwater Congress!

THANK YOU,

R.T. Van Valer
Groundwater Resources Association of CA
2018 Western Groundwater Congress Chair

THANK YOU, TO THE CO-SPONSORS,

Western Groundwater Congress presentations are available to the attendees for a limited time and as always current members can access presentations from any GRA event.

SAVE THE DATE
GRA’s Second Annual Western Groundwater Congress
September 17-19, 2019 – Sacramento, CA
Watch the event webpage for coming details.
Event Details:

California’s water supplies rely on adequate precipitation; however, the variability in annual precipitation is higher in California compared to anywhere else in the nation. With predicted decreases in snowpack and increased intense storm events, it is more critical than ever that we understand the interplay between weather forecasting, operations of surface water reservoirs, and opportunities for managed aquifer recharge. In this conference we bring together experts in atmospheric sciences, weather forecasting, surface water reservoir operators and those involved in managed aquifer recharge with flood flows (e.g., Flood-MAR) to Bridge the Gap in knowledge between the sky, surface and groundwater. This conference takes integrated water management to the next level by including water where it begins, in the sky.

As you will find, the conference agenda is packed with experts and practitioners and is sure to be educational and will provide a great opportunity to make new connections. There will be a poster session, so those interested in presenting a poster on topics that fit within the subjects being presented orally, please submit an abstract by Friday, November 30, 2018.

The Dana Hotel is an extremely nice venue and hotel space is limited, so be sure to register and reserve your room today.

For more information visit our website: https://www.grac.org/events/217/.

SAVE THE DATE

GRA’s Second Annual GSA Summit

June 5-6, 2019 – Fresno, CA
Radisson Hotel Fresno Conference Center

Watch the event webpage for coming details.
Groundwater Sustainability Bootcamp – A Shortcourse:

Introduction to Groundwater, Watersheds, and the Nuts and Bolts of Sustainable Groundwater Plans

FEBRUARY 5-6, 2019 – DAVIS, CA
Co-Sponsored by: University of California Cooperative Extension Groundwater Hydrology Program
Approved MCLE Credits - 13.25 hours

Course Description

Understanding the fundamental principles of groundwater and watersheds and how we monitor, assess, and sustainably manage these resources with climate change and variability is critical and integral to Groundwater Sustainability Plans (GSPs) and other water-related programs. Whether at the local, state, or federal level, these programs are designed for sustainable development, management, and protection of water resources in California among competing users. As Groundwater Sustainability Agencies in California develop and implement their GSPs, professionals, decision makers, executives, agency employees, and stakeholders, become directly or indirectly involved in the sustainable management and assessment of groundwater and surface water to meet the requirements of the Sustainable Groundwater Management Act (SGMA). Yet, many participants find themselves lacking the multidisciplinary background and expertise to meaningfully participate in the technical and regulatory efforts related to water resources management. The amount of technical information available often seems overwhelming.

This shortcourse will review the fundamental principles of groundwater and watershed hydrology, water budgets, water quality, and water law and regulation in an intuitive, highly accessible fashion. Through real world examples, participants will learn about the most common tools for measuring, monitoring, and assessing groundwater and surface water resources. The course will then review the key elements of a GSP. Case studies are used so participants learn about:

- development of conceptual models, water budgets, and GSP sustainability criteria;
- designing minimum thresholds and operating targets (measureable objectives) for GSPs and how to link those to monitoring networks;
- methods for addressing climate variability and climate change;
- recharge as a tool to enhance groundwater supplies;
- GSA governance; and
- available online planning resources.

The course is specifically geared towards an audience that is or will be involved in the management, assessment, and protection of groundwater and surface water resources under SGMA, but also engages with, e.g., source water assessments, urban water management plans, and integrated regional water management plans. Course attendees, who may have some experience with but no formal training in hydrology or related engineering or science fields, will benefit from the basic and intuitive, yet comprehensive approach of this course.
Roto-Sonic Drilling\(^2\) – Exploration and small diameter well installation

Roto-sonic (Sonic) drilling, or rotary vibration drilling, advances a borehole using high frequency resonant energy applied along the axis of the drill pipe. This force is generated by hydraulically powered, out of balance, and counter-rotating rollers housed in an oscillator which is located at the drill head.\(^3\) These adjustable high frequency vibrations are directed down the drill pipe, aided by rotation as needed, causing temporary liquefaction\(^4\) and reduction in porosity at the drill bit.\(^5\) Vibration frequencies are controlled by the operator and typically range from 50 to 160 hertz (cycles per second), depending on the material encountered, to maximize penetration rates. Sonic drilling can be a cost-effective method of subsurface exploration or small diameter (\(\phi\)) well installations in unconsolidated formations (fms) and some rock environments, allowing for continuous coring to depths of 700-feet (ft) below ground surface (bgs). Importantly, drilling is typically completed in the absence of artificial drilling fluids such as bentonite or polymer muds, though small amounts of mud or water can be used under certain conditions\(^6\). Drilling can be performed either vertically or inclined.

Sonic drilling was originally developed to expedite oil drilling operations during the late 1940’s but improved dramatically since the 1990’s in terms of availability and reliability\(^7\). Sonic drilling utilizes a double-casing (dual) system including an outer override (or drive) casing and inner core barrel for sampling. The casing is equipped with a cutting face (drive shoe) which allows independent advancement depending on project needs or the lithology encountered during drilling. While there are several operating techniques, the core barrel is often advanced first for collection of the fm sample, typically in runs of 10-ft. The outer override casing is then advanced around the core barrel, casing the borehole, and the core barrel is retrieved from the boring. The outer drive casing remains in the borehole. Subsequent sampling is performed in the same manner, with initial advancement of the core barrel for sample collection, outer override casing advancement, and retrieval of the core barrel. Typical cores range from 3 to 8-inch (\(\prime\)) \(\phi\) and typical boreholes range from 5 to 12” \(\phi\). Casing sections (joints) are commonly 10-ft long and are threaded together with the rotation feature on the drill head.

Support equipment generally includes the drilling rig, pipe truck or support truck with pipe racks, forklift and dump hopper. A three-person crew is generally needed to position and operate this equipment, though it can be done with two when necessary. The work-site footprint is small, and set-up can be rapid. When projects are properly designed, sonic boring equipment can be set-up in about 60-minutes within the width of a single lane of traffic (Figure 1). In boreholes requiring multiple days to complete, the casing can be counter-sunk below grade and covered with a steel plate, allowing the drilling rig to be removed at the end of the shift. At the start of the next shift, the steel plate can be removed, the drill rig set back on the borehole, and casing reconnected. This flexibility can facilitate exploration or well installation in urban environments where hollow-stem auger (HSA) drilling is unable to reach required depths or where there is insufficient room or other logistical concerns with rotary drilling.

Sonic drilling provides exceptional core recovery, including quality, quantity, and accurate assessment of depth (Figure 2). Continuous coring is easily achieved in unconsolidated fms without the need to calculate where cuttings originated or risking the loss of finer-grained fractions. The volume of sample retrieved facilitates accurate logging and collection for sieve analysis. High percentage sample recovery is aided where necessary by shorter core runs, flapper bits\(^8\), and other specialized bits as appropriate. In addition, depth-discrete groundwater sampling is possible by the cased-nature of the borehole. A common sampling method is to deploy a

Continued on the following page…
K-packer⁹ and screen assembly in the override casing, removing the casing to a depth above the assembly (traditional pull-back method), and allowing the fm materials to collapse against the screen. This temporary well point can be purged until water quality parameters stabilize for sample collection. A Hydropunch¹⁰ tool can similarly be advanced into undisturbed materials ahead of the override casing for water sample collection. Vertical hydraulic gradients can be assessed by measuring depth to water as the borehole is advanced due to the isolating effects of the outer casing. However, when completed, downhole geophysics is limited due to the steel casing, though natural gamma radiation logs can be run. Cuttings generation is less than other drilling methods, which can benefit environmental remediation applications by reducing the cost of cuttings disposal and by reducing breathing zone concerns with limited cuttings handling.

Rates of borehole penetration are comparable with other continuous coring methods and commonly exceed 100-ft per day (10-hour shift). Unlike HSA or rotary methods however, these rates will usually decrease at greater depths because of the need to retrieve the core barrel at each interval the time required to trip-in and -out increases as the borehole is advanced. The fracturing effects of the vibration at the drill bit allows coring through many subsurface obstructions such as boulders which reduces the tendency of the drill string to deflect (as with rotary) or encounter refusal (as with HSA).

Depending on project needs, typical tooling configurations include either a nominal (nom.) 6” drive casing and nom. 4” core barrel (6 by 4 system), or nom. 8” drive casing with nom. 6” core barrel (8 by 6 system). When greater depths are required, additional casing sizes can be added to telescope the borehole and relieve sidewall friction. When attempting to reach a depth of 400-ft bgs, for example, a 6 by 4 configuration by itself may be quite challenging. The contractor might therefore use nom. 7” drive casing for, say, the upper 200-ft before returning to the nom. 6” drive casing. In this configuration the nom. 7” is left in place and the nom. 6” inserted inside of it, allowing it to be unencumbered by the sidewall friction of the upper 200-ft of fm. Multiple tooling configurations can be used to telescope the borehole and achieve the greatest borehole depths. Three or more override casing diameters may be required to achieve the deepest depth.

Override casing and core barrels are available in multiple wall thicknesses, each with benefits and drawbacks. Thicker-walled casing is less likely to break downhole, but the added weight can limit total depth (TD) of exploration depending on pull-back limitations of the drilling rig. Similarly, thinner-walled casing may decrease string weight and allow for greater depths to be achieved, but the thinner wall casing is more likely to break downhole.

When abandoning the borehole or performing well installation¹¹, the cased borehole provides an open, uniform and plumb conduit to the subsurface. The TD of the borehole can be physically measured, annular volumes easily calculated and decisions about borehole abandonment or well completion need not be made immediately. In many situations the override casing can be left in-place for several days, including over a weekend, allowing borehole details to be fully reviewed before abandonment or well completion¹². Laboratory analysis can be completed if required, and decisions can be made regarding whether the depth of the borehole is sufficient. When setting a small φ well, such as a monitoring well or piezometer, the final construction design can be fully reviewed with clients or permitting agencies and materials can be ordered without the need to continuously monitor the borehole or circulate drilling fluids. In some cases, one drilling rig can have multiple boreholes open at one time, thereby reducing down-time while decisions are being made. This ability can also be critically important in the case of

Continued on the following page…

---

Figure 2 – Sonic core laid out, after the geologist has broken the core and completed logging. Soil cores are 4” φ and each bag represents 2-feet of formation.
equipment breakdowns or other project delays. Decisions to leave casing in-place should be thoroughly discussed with the drilling contractor prior to starting work and duration should be minimized to the extent possible.

As with all drilling methods, Sonic drilling is not without its limitations or drawbacks. In consolidated fms where penetration rates are low, the vibration of the bit can cause the sample to heat substantially and therefore can bake-off water content, making water bearing materials appear dry. Operating noise levels are higher than HSA or rotary methods, making drilling in urban areas potentially challenging. Despite these issues, Sonic remains a fast, high quality and cost-effective drilling method for small φ borehole of shallow to moderate depths.

REFERENCES

1 This quarter’s guest writer is well-versed in the use of Roto-sonic drilling methods and well completions, working as a supervisor on the installation of numerous borings/wells for a confidential client over the past 3 years as well as several other projects.

2 This is the fifth article in a series of Wells and Words on drilling methods: Cable Tool (v.21, no.2); Direct-Circulation Rotary (v.21, no.3); Reverse-Circulation (v.21, no.4); and Auger Drilling (v.22, no.1).

3 https://www.sonic-drill.com/HOW_SONIC_WORKS.html

4 Liquefaction: the transformation of loosely packed sediment into a more tightly packed fluid mass as a result of sudden shocking …; in saturated, cohesionless soil, the transformation from a solid to a liquid state as a result of increased pore pressure and reduced effective stress. (AGI, 2005, Glossary of Geology 5th Edition)

5 https://www.sonicsampdrill.com/sonic-drilling/how-does-sonic-drilling-work.htm


8 Flapper bits are used to improve recovery in loose sands. A hinged steel plate is designed to open during advancement and close during retrieval, decreasing loss of loose material through the drill bit.

9 K-Packers are designed to provide a sand tight seal between the well screen and casing and are typically used on the top of telescope size screens in the water well, construction and environmental drilling industries. http://www.di-corp.com/products/view-product/k-packers

10 The Hydropunch™ is a stainless steel sampling tool used for collecting a representative groundwater sample without requiring the installation of a groundwater monitoring well - see https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1745-6592.1989.tb01161.x


12 Note that Sonic and cable tool drilling methods share common features. The similarity of advancing an outside casing and sampling with the inner core barrel can be accomplished with cable tool; well completion designs are also similar to the pull-back method used in cable tool drilling to expose the well screen.
With just a few months left in office for Governor Edmund G. Brown Jr., Governor-elect Gavin Newsome has not revealed his water agenda. Governor Brown finishes up his fourth term on January 1, 2019. Brown once said: “We are getting [stuff] done,” and “We’re here to lead,” and “not to listen to that clown in Washington tear the country apart.” He accomplished a lot for the state, including (listing just a few things here) balancing the state budget, funding needed road repairs, setting the climate agenda for the state as an example for the nation and world, and the Sustainable Groundwater Management Act.

Governor Brown signed Senate Bill 100 (authored by Senate President pro Tempore Emeritus Kevin de León) setting a state goal for 100 percent clean electricity, and issued an executive order establishing a goal to be carbon neutral – both by 2045. The Governor issued an executive order to safeguard California’s unique plants, animals, and ecosystems that are threatened by climate change. In October, the state also issued its Fourth Climate Change Assessment, which details new science on the devastating impacts of irreversible climate change in California and provides planning tools to support the state’s response.


Governor Brown really was the architect for SGMA, the law that is finally taking the state down the road, somewhat painfully, to sustainable groundwater management. He started this process in his first set of two terms back in the ‘70s when he was known for being a fiscal conservative, walking to work and driving a Plymouth Satellite sedan instead of being chauffeured like other high-level officials. It was back in those days that he established a Governor’s commission to review California water rights law which helped lay the groundwork for SGMA decades later. Nobody said this groundwater law is perfect, and I suspect with Brown gone, we may see some efforts to weaken SGMA, but nearly everyone acknowledges something had to be done, something significant.

Another of Governor Brown’s ongoing significant initiatives is the Cal WaterFix, the state’s project to fix the broken state water delivery system that goes through the Delta. The project is complex, with a myriad of components and includes restoration of 3,200 acres of habitat, protection of another 13,500 acres of habitat, and construction of water conveyance tunnels 150 feet below the ground for about 30 miles beneath the Delta to reduce the impact on fisheries from the existing pumps and to protect aging levees failures from damage due to earthquakes, floods and sea level rise. Public review of the California WaterFix Draft Supplemental EIR/EIS for compliance with NEPA begins on September 21, 2018, when the U.S. Environmental Protection Agency posts the notice of availability in the Federal Register. The public comment period closed November 5, 2018, at 5:00 p.m. For more detailed information visit: https://www.californiawaterfix.com/resources/draft-supplemental-environmental-impact-report-environmental-impact-statement-eir-eis/.

A Benefit-Cost Analysis was conducted for the California WaterFix by Dr. David Sunding, a professor of natural resource economics at UC Berkeley. He found the WaterFix could bring billions of dollars in benefits to Californians who obtain their water from participating State Water Project (SWP) contractors.

Continued on the following page…
Additional Summary Administrative Items

• Oroville Dam – Concrete placement on the main spillway to be completed November 1, 2018. The emergency spillway continues with it 83% complete and will continue past November 1st. [https://water.ca.gov/What-We-Do/Emergency-Response/Oroville-Spillways]

• DWR announced its New Climate Change Goal in September: By 2030, the department will cut its greenhouse gas emissions (GHG) by 60 percent or more below 1990 levels. DWR’s revamped climate change goal coincides with the release of “Clean Energy for California”, a guidebook outlining DWR’s methods and accomplishments in cutting greenhouse gas emissions.

• New Recharge Initiative – A number of organizations are focusing on recharge opportunities and pursuing increasing recharge in California, including Central Valley Flood Control Plan, Department of Water Resources (Flood-MAR), California Department of Food and Agriculture, UC Water, and Sustainable Conservation. GRA and UC Water published a white paper “Call to Action to Increase Recharge in California.” More information available at DWR’s website at: [https://water.ca.gov/Programs/All-Programs/Flood-MAR]

• 2018 Proposition 1 Round 1 IRWM Implementation Grant Draft PSP
  - On October 5, 2018, DWR released the 2018 Proposition 1 - Round 1 IRWM Implementation Grant Draft Proposal Solicitation Package and IRWM Grant Program Guidelines for public review. These newly released documents, as well as other information pertaining to this solicitation can be found at: [http://www.water.ca.gov/Work-With-Us/Grants-And-Loans/IRWM-Grant-Programs/Proposition-1-Implementation-Grants]
  - Public comment period closed November 20th. Three public meetings will be held to provide potential grant applicants an opportunity to provide feedback to DWR on the Draft Solicitation documents. Please check DWR’s website often at the link provided above for upcoming public meeting dates and locations.

Public Trust and SGMA

In a recent decision in litigation over flows and salmon survival in the Scott River system, the California Court of Appeal has ruled that groundwater pumping that diminishes the volume or flow of water in a navigable surface stream may violate the public trust. The public trust doctrine does not protect groundwater itself. Rather, the public trust doctrine applies if extraction of groundwater adversely impacts a navigable waterway to which the public trust doctrine does apply.” The court also concluded that the Sustainable Groundwater Management Act (SGMA) does not preempt or preclude independent application of the public trust to groundwater pumping, finding “no legislative intent to eviscerate the public trust in navigable waterways in the text or scope of SGMA.” [https://californiawaterblog.com/2018/10/07/the-public-trust-and-sgma/]

2018 California Economic Summit – Million Acre-feet Challenge Working Session – November 15-16 in Santa Rosa
[https://summit.caeconomy.org/]

Key discussion topics from previous venues include the following:

• Identifying and preserving sites for recharge and other benefits
• SGMA requirements and water budgets
• Water rights and water quality
• Regulatory process improvements
• Fiscal incentives
• Statewide data compilation on land and site suitability for recharge
• State support for research, best practices, and creative funding approaches.
• Policy recommendations to coordinate groundwater recharge with water and land use policies and requirements.
• Funding and regulatory incentives for coordinating land, water, and flood management.

PPIC Water Priorities for California’s Next Governor November 13, 2018 - 9AM-12:30PM – Sheraton Grand Sacramento

A moderated forum on PPIC’s water priorities for the new Governor: [http://www.ppic.org/event/water-priorities-for-californias-next-governor/]

Water Resources Development Act of 2018

The “America’s Water Infrastructure Act,” [S. 3021], was signed into law by the president October 23, 2018. This is the third WRDA Act passed in the past six years, moving WRDA back to a two-year authorization cycle. The Act authorizes $6.1 B for US Army Corps studies and projects, and $4.4B for the state drinking water revolving loan fund program. Other provisions of interest to counties include the following:

Continued on the following page…
• Requiring the Army Corps to develop a process to consult with stakeholders, including states and local governments, on future and pending WRDA projects, annual district budgets, deauthorized projects and guidance documents.

• Authorizing study of the existing cost-benefit analyses used by the Army Corps and the White House Office of Management and Budget to determine which water resource projects are submitted to Congress for WRDA authorization.

• Allowing communities to work with the Army Corps on decertified levees. The bill would allow the Army Corps to provide technical assistance, on a reimbursable basis, to local governments that own levees not accredited by the Federal Emergency Management Agency. Decertified levees lead to higher National Flood Insurance Program costs for homeowners. This provision would authorize the Army Corps to identify barriers to certification.

• Increasing the focus on natural and nature-based features. The Army Corps could consider and include natural and nature-based features into projects with an aquatic ecosystem or estuary.

• Increasing the focus on renewable energy projects. The bill would require the Army Corps to identify dams that can be used for hydropower and ports that can be used for wind energy. This would increase the use of renewable energy nationwide.

• Requiring drinking water systems with more than 3,300 users to undertake risk assessment and emergency response plans to assess the risk to and resilience of its system from both natural and manmade hazards.

Groundwater Sustainability Progress

Implementation of the sustainable Groundwater Management Act (SGMA) has continued past its first key milestone of Groundwater Sustainability Agency formation, and many of those agencies are in the midst of Groundwater Sustainability Plan preparation and obtaining sustainable financing. GSAs are required to develop, adopt and submit to DWR groundwater sustainability plans by either January 31, 2020 (critically overdraft basins) or January 31, 2022.

Over the past year, DWR was incredibly busy with enhancing data and tools available, setting up a SGMA portal, providing facilitation and technical support services, conducting basin boundary modification and alternative plan reviews, releasing the draft 2018 SGMA Basin Prioritization, and providing information to locals as requested. The DWR SGMA team is great and hats off to them for the good and hard work they are doing! For more info, visit: https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management

Proposition 1 GSP grant applications were awarded and DWR is in the process of finalizing contracts with the GSAs, with $86M available for the 127 SGMA priority basins. This funding will certainly help these new agencies get their GSPs completed, but a big challenge for nearly all of them is securing sustainable funding to pay for the administration of the new agency. More information is available at https://water.ca.gov/News/News-Releases/2018/April-18/DWR-Finalizes-Over-85-Million-in-Grants-for-Local-Implementation-of-SGMA

GRA Tracked/Supported/Opposed Legislation

This was the second year of the Legislature’s current two-year session, which ended on August 31, 2018. Lawmakers are now on recess until they reconvene on January 2019. Below are some of the bills that GRA tracked closely or took a position.

AB18 Garcia - California Clean Water, Climate, Coastal Protection, and Outdoor Access For All Act of 2018 – in Senate Appropriations - 2-year bill – Died in Suspense File


AB574 Quirk – Potable Reuse – consistency in water reuse terminology GRA Support Position - Chaptered

AB1369 Gray – Water Quality and Storage – would require DWR to increase water storage capacities by 25% by 2025 and 50% by 2050 – would continuously appropriate 25% of the annual proceeds from the Greenhouse Gas Reduction Fund beginning in 2019 – Died pursuant to the Constitution (Art. IV, Sec. 10(c))

AB1427 Eggman – Underground Storage and Beneficial Use – revises the beneficial use doctrine for water rights to additionally provide that certain uses of groundwater storage constitute beneficial use - Died pursuant to the Constitution (Art. IV, Sec. 10(c))

AB 1668 Friedman – water management planning - requires the State to adopt long-term standards for the efficient use of water, as provided, and performance measures for commercial, industrial, and institutional water use - Chaptered

AB 2050 Caballero – small systems consolidation - Small System Water Authority Act of 2018 - Vetoed

Continued on the following page…
AB 2649 Arambula – groundwater recharge – would require SWRCB permitting streamlining to capture recharge and local storage, and consistent with local GSP – GRA Support Position – *Died and became a bill focused on State Water Supply Contracts*

SB 5 De Leon – California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access For All Act of 2018 – Chaptered – *Voters passed Proposition 68*

SB 120 Hueso – this is a repeat of AB 1000 from last year that was defeated and GRA and CGC opposed – requires additional environmental review on top of CEQA and EIRs that have been completed on groundwater basin projects involving groundwater transfers – GRA Oppose Position on the basis of setting policy for additional environmental review beyond CEQA – *Bill Died*

SB 231 Hertzberg – Articles XIIIC and XIIID of the California Constitution regarding Proposition 218 Omnibus Implementation Act definition of the term “sewer” – *Chaptered*

SB 623 Monning – Safe and Affordable Drinking Water Fund – Would impose a fertilizer fee on fertilizer sellers and distributors, and a Dairy Fee on milk handlers, a public goods fee (water fee) on water users, and requires SWSRBC to annually prepare a map of aquifers exceeding MCLs in Senate – 2 year bill – *Bill Died – was broken up into two paired bills SB844 and SB 845 which had to pass together*

SB 844 Monning – Water quality – agricultural safe drinking water fees – taxes on dairies and fertilizer supported by agriculture, but only if a Safe and Affordable Drinking Water Fund is passed – GRA Support Position – *Bill Died*

SB 845 Monning – Safe and Affordable Drinking Water Fund – would require the State Water Resources Control Board to administer provisions relating to the regulation of drinking water to protect public health - would require a community water system with 200 or more service connections to provide an opportunity for each customer of a community water system to provide a voluntary remittance either as part of the customer’s regular water bill or by using a specified notification procedure, to advance the purposes of the fund – *Bill Died - Opposed by ACWA*

Look for this issue to resurface in 2019, as the discussion on the whether a public goods charge versus some sort of additional state tax should support safe and affordable drinking water.

SB 919 Dodd – statewide stream gage network – would require the Department of Water Resources and the State Board, upon appropriation by the Legislature, to develop a plan to deploy a network of stream gages that includes a determination of funding needs and opportunities for modernizing and reactivating existing gages and deploying new gages – GRA Support - *Bill Died*

SB 966 Weiner – onsite wastewater treatment – requires state to adopt regulations for risk-based water quality standards for the onsite treatment and reuse of nonpotable water - GRA Support Position - *Chaptered*

**Other Administrative Items GRA Weighed In on in 2018**

GRA provided written comments on the following state documents:
- DWR GSP Draft Sustainable Management Criteria Guidelines
- DWR Draft 2018 SGMA Basin Prioritization
- AB 1755 Open and Transparent Water Data Act Draft Report

**Water Bonds**

There is significant funding needed for the major water and groundwater sustainable management related projects, however funding is limited. One way our state has successfully funded water and groundwater related projects in the past is through the development of propositions and issuance of bonds. Propositions need to go on the ballot for voters to approve, and if readers who are in the water and groundwater industry are so inclined to support bonds for water, they could also consider explaining to friends and neighbors the importance of funding for water and especially for groundwater at this time.

**Proposition 68, The California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access For All Act of 2018**

Proposition 68, The California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access For All Act of 2018 ($4.1B), was passed by voters in the June election, and allocates $2.83 billion in funding for parks and natural resources projects, including over $1 billion to local parks throughout the state with the majority going to fund new parks in neighborhoods that lack parks. The measure allocates $1.27 billion in funding for water related investments including safe drinking water projects, groundwater cleanup and management as well as funding to better protect California communities from the twin threats of drought and flood.

**Stanford Groundwater Architecture Project – DWR, SWRCB, Denmark, Butte County, Indian Wells Valley Water District and San Luis Obispo County**

Denmark, the State and three local agencies (Butte County, Indian Wells Valley Water District and San Luis Obispo County) have entered into an agreement and have *Continued on the following page*
begun work on three pilot basins to develop hydrogeologic conceptual models. Each basin will develop a plan and acquisition of aerial electromagnetic (geophysics) data and use a hydrogeologic conceptual model with 3D software called GEOScene3D. The next step will be geostatistical derivation of multiple realizations of the texture distribution. The Indian Wells Valley basin has already been flown with a data management system already developed and populated, the traditional hydrogeologic conceptual model is nearly complete, and draft report is in preparation. The Butte County basin anticipates AEM acquisition in the November-December timeframe, and San Luis Obispo County, the first quarter next year. This is a really exciting project and I will report on it periodically to keep our readers informed.

Looking Ahead

As GRA expected, groundwater was an important part of legislative discussions in Sacramento again this year. Continued, significant groundwater industry work is ongoing with more on the horizon to successfully continue implementation of the Sustainable Groundwater Management Act.

Next year, we anticipate that work will continue with the Legislature and industry to increase recharge statewide and to develop a safe and affordable drinking water fund. These two initiatives have significant implications for statewide groundwater sustainability and compliance with SGMA in the next 20 years. DWR has a tremendous amount of work to do over the next five years to meet the mandates outlined in SGMA, in addition to continue work on Oroville and Cal WaterFix and to address statewide conveyance, flood risk, safety and supply. GRA will continue to provide assistance and input to DWR as needed.

Next year is also the first year for a new governor and his administration. Governor Brown has done more to help bring recognition and effect good policy on groundwater than any previous governor in the history of California. GRA’s Legislative Committee will miss Governor Brown and will be looking forward to continuing our efforts with the new governor to meet our mission of resource management that protects and improves groundwater supply and quality through education and technical leadership in the industry and at the capitol. We look forward to learning the new Administration’s water agenda and priorities. Additionally, after the November election, we will know if the voters approved Proposition 3, the water supply and water quality act, which if passed, will provide much needed funding for projects throughout the state and supplement Proposition 68 passed earlier in the year.

GRA will continue to be an important source of information and sound science for legislators, the administration, and their staff as the groundwater discussion continues, including the SGMA implementation process within state agencies and departments and any groundwater-related legislation next year.

SAVE THE DATE

2019 Annual Legislative Symposium

March 27, 2019 – Sacramento, CA

Find out why the new water bond, water fees, and increasing recharge statewide are important to you – and what’s next!
EPA Provides $135 Million for Innovative Groundwater Replenishment Project Expansion in Orange County.

The U.S. Environmental Protection Agency (EPA) announced a $135 million Water Infrastructure Finance and Innovation Act (WIFIA) loan to the Orange County Water District to help finance its Groundwater Replenishment System final expansion. With the loan, the Orange County Water District will purify treated wastewater from the Orange County Sanitation District to produce an additional 30 million gallons per day of drinking water, which will be stored in the Orange County Groundwater Basin. This additional drought-proof drinking water supply reduces the region’s need to import water, benefits the environment through reduced discharges into the ocean, and increases replenishment of the local groundwater source. Find out more about EPA’s WIFIA program here: https://www.epa.gov/wifia.


California released new science and planning tools to support state leadership on actions to address climate change through their Fourth Climate Change Assessment. The report includes 44 technical reports and 13 summary reports on climate change impacts to help ready the state for a future punctuated by severe wildfires, more frequent and longer droughts, rising sea levels, increased flooding, coastal erosion and extreme heat events. Among the key findings are those in one of the summary reports by U.S. Geological Survey, in collaboration with U.C. Berkeley, the Carbon Cycle Institute, and The Nature Conservancy, which studied how increasing the organic carbon content in soil in California’s rangelands and croplands can sequester greenhouse gases and increase hydrologic resiliency to climate change. To read more, visit: https://ca.water.usgs.gov/highlights/2018/08/greenhouse-gas-news.

EPA, California Settle with UC Regents over Davis Superfund Site Cleanup.

EPA and the California Department of Toxic Substances Control (DTSC) have reached a settlement with the Regents of the University of California to begin an estimated $14 million cleanup of contaminated soil, solid waste, and soil gas at the Laboratory for Energy-related Health Research/Old Campus Landfill Superfund site in Davis, Calif. From the 1950s to the mid-1980s, the University and the Department of Energy conducted studies on the health effects of radiation on animals at the laboratory. In addition, from the 1940s through the mid-1960s, low-level radioactive and mixed waste from the University and laboratory research activities were disposed of at the site. Contaminants found at the site include carbon-14, polychlorinated biphenyls, pesticides, solvents, such as chloroform, and metals, such as lead. For more information about this site and its cleanup: https://www.epa.gov/superfund/lehr.

EPA Begins Construction of Groundwater Treatment System in Puente Valley.

EPA announced the start of construction of a groundwater treatment system in Puente Valley as part of ongoing cleanup at the San Gabriel Valley Superfund Site. In 1984, groundwater monitoring revealed significant volatile organic compounds (VOCs) contamination in groundwater within the southeastern portion of the San Gabriel Valley resulting from decades of improper handling and disposal practices by individual facilities that released industrial solvents into the soil and groundwater. The new $40 million treatment system, expected to be completed by 2020, will capture and remove VOCs, 1,4 dioxane, perchlorate, and hexavalent chromium from groundwater. For more information, please visit: www.epa.gov/superfund/sangabrielpuentevalley.

Jamie Marincola is the California Coordinator at the U.S. Environmental Protection Agency Region 9 Water Division. For more information on any of the above topics, please contact Jamie at 415-972-3520 or marincola.jamespaul@epa.gov.
Limits on cadmium in soil were originally set to minimize leaching to surface water and groundwater. However, now there is also concern for cadmium in crops and its body burden in animals and people. Cadmium has long been recognized as a contaminant of concern; in countries where it is naturally abundant, people have developed “ouch-ouch” disease, because of the effect of weakened bones.

World-wide, cadmium levels in soil have been increasing because of atmospheric deposition plus the application of sewage sludge and phosphate fertilizer. Cadmium is a major human toxicant, and it is widely accepted that exposures should be limited. Vegetables and grains are the most common sources of fertilizer-derived cadmium in the diet. Fertilizer runoff into surface waters may also contribute to high levels of cadmium in fish and shellfish.

Cadmium Concentrations in fertilizer may be expressed as mg Cd/kg P, or mg Cd/kg P₂O₅ [phosphorus pentoxide].

The environmental fate of cadmium in soil includes three routes:

1) Uptake by plants
2) Accumulation in soil
3) Leaching to groundwater

It is difficult to predict the uptake of cadmium into plants, since it depends on many factors, including soil salinity, soil pH, organic content, and the type of plants. The EU established limits for vegetables (0.10 mg/kg) and leafy vegetables (0.20 mg/kg). The FDA market basket survey has found higher cadmium levels in sunflower seeds, spinach, lettuce, potatoes, liver, wheat and other grains, along with other leafy and stem vegetables. A survey of vegetables by the Northwest Pollution Prevention Resource Center (PPRC) found cadmium in lettuce and radish greens.

The Office of Environmental Health Hazard Assessment established the Proposition 65 safe harbor level (the maximum allowable dose for reproductive toxicity) for cadmium is 4.1 μg/day (oral). Although the California limits on cadmium in fertilizer are more restrictive than other states, these limits remain unlikely to achieve the safe harbor level for cadmium.

For Fertilizers, CDFA Regulations State:

For each percent available phosphate (P₂O₅), the fertilizing material shall not exceed the following concentrations of non-nutrient metals: arsenic, 2 parts per million; cadmium, 4 parts per million; lead, 20 parts per million. For specialty fertilizers that guarantee less than 6% available phosphate (P₂O₅) but make no micronutrient claim, the maximum allowable concentrations of non-nutrient metals shall not exceed: arsenic, 10 parts per million; cadmium, 20 parts per million; and lead, 100 parts per million.

As reported in the New York Times, Russia influenced the proposed EU standard for cadmium in phosphate fertilizer. The EU countries have almost no domestic supply of phosphate rock, and primarily depend on imports from Morocco and Russia. Moroccan fertilizers have higher levels of cadmium than Russian fertilizers. A lower limit on Cadmium would essentially give Russia a monopoly on fertilizer. PhosAgro, the Russian company with ties to the Kremlin, has lobbied for lower limits of cadmium. The European Parliament commissioned a study by Erik Smolders, a Belgian soil scientist. He concluded that cadmium levels would not accumulate in soil if the fertilizers contained less than 73 mg Cd/Kg of phosphate. PhosAgro then commissioned a study by Paul Romkens at Wageningen University, which concluded that the limit should be 20 mg/Kg, which would essentially ban Moroccan fertilizer. Subsequently, the two researchers worked together, developed a new model and a new limit: 44 mg/Kg. Because of PhosAgro influence, when the PhosAgro-sponsored study was published, the new model was mentioned, but the new limit was not. The battle over cadmium limits continues and will eventually be decided by the European Council.

Thus, esoteric concern of leaching cadmium into surface water and groundwater has evolved into an international crisis with Russian intrigue.

Bart can be reached at bartonps@aol.com.
Presentation of GRA’s 2018 Lifetime Achievement Award to Dr. Dennis Helsel

Dr. Dennis Helsel was presented the Lifetime Achievement Award during a luncheon at the First Annual Western Groundwater Congress (27th Groundwater Resources Association (GRA) of California Annual Meeting) in Sacramento on September 26, 2018. The purpose of the GRA Lifetime Achievement Award is to recognize individuals who have made exemplary contributions to the groundwater industry. Dr. Helsel’s lifetime of work contributed significantly towards improving the way the groundwater industry uses statistics to draw information from data sets that contain non-detects.

In the 1990s, it was common practice to substitute half the detection limit when working with data that contain non-detects. This amounts to little more than fabrication of data, as Dr. Helsel has often pointed out, and often produces poor results. Today, the appropriate statistical methods that D. Helsel advocated, are more commonly used.

In the 1990’s, Dr. Helsel collaborated with the GRA to offer a number of training seminars and symposiums to teach statistical methods. Teaching well-established methods that were commonly used by biostatisticians in the Life Sciences, but rarely used at the time by the Groundwater Industry, Dr. Helsel served as a translator, and gave many professionals their first introduction to survival analysis, bootstrapping, and regression on ordered statistics.

During his 30-year tenure with the US Geological Survey, Dr. Helsel co-authored “Statistical Methods in Water Resources.” This is an excellent free textbook and is a standard reference in the water resource community. The book is available for download at https://pubs.usgs.gov/twri/twri4a3/. Dr. Helsel indicated that an updated edition will likely be published before the end of the year.

Dr. Helsel authored the books “Non-Detects and Data Analysis” and more recently “Statistics for Censored Environmental Data Using Minitab and R.” These books provide readers with the tools they need to understand and use a number of advanced statistical methods for hypothesis testing, calculating background concentrations of metals, estimating exposure point concentrations, testing for trends, seeing multivariate patterns, and more.

Since retiring from the USGS, Dr. Helsel continues to provide statistical training and consulting for the environmental sciences and natural resources through his company, Practical Stats (http://www.practicalstats.com/).

The award was presented by Mr. Walter Floyd, Central Valley Regional Water Quality Control Board. Mr. Floyd, who nominated Dr. Helsel for the award, was a student in a class taught by Dr. Helsel during the 1990’s. In his opinion, the class concepts and material improved his technical career.

Dr. Helsel has taught webinars for the National Water Quality Monitoring Council and others; provided workshops for the American Statistical Association and others; and taught environmental statistics courses in North America, Europe, and Asia.

Dr. Dennis Helsel received his PhD in Environmental Science and Engineering from Virginia Tech. He authored over 50 journal articles. In 2003, Dr. Helsel received the Distinguished Achievement Award from the American Statistical Association’s Section on Statistics and the Environment for his training courses in applied statistics.

Dr. Helsel has made a significant contribution towards changing the way the groundwater industry uses statistics, and for this, he is well deserving of the Lifetime Achievement Award.
Kevin J. Neese Award

By Brett Wyckoff, GRA Director

The Kevin J. Neese Award was established in 1999 to honor the late GRA Director, geologist, and attorney, and recognizes a recent significant accomplishment by a person, persons, or entity that fosters the understanding, development, protection, and management of groundwater. GRA Director Brett Wyckoff presented the 2018 Kevin J. Neese Award to the Los Angeles Sustainable Water Project, described in a series of reports released in early 2018. The reports detail a study that examines all water resources within the Los Angeles area and whether integrated management of these resources can be accomplished to achieve 100% reliance on locally sourced water by the year 2050. The authors demonstrated that Los Angeles could indeed end its reliance on imported water by 2050 by integrating the various resource management systems including wastewater recycling, stormwater capture, contaminated groundwater clean-up, and conservation. This would require an increased effort and investing in greater recharge of the area’s groundwater basins. This area imported as much as 89 percent of its water from more than 200 miles away as recent as 2011. The study’s findings may be both useful and encouraging to other local water resource management agencies that are facing similar challenges in establishing resilient and sustainable resource supplies and management practices in a changing climate. The award was presented to the study’s two co-authors: the UCLA Institute of the Environment and Sustainability, and the Colorado School of Mines Hydrologic Science and Engineering Program, in addition to the UCLA Sustainable LA Grand Challenge, a UCLA research initiative that aims to transition Los Angeles County through cutting edge research, technologies, policies, and strategies to 100% renewable energy and 100% locally sourced water, while enhancing ecosystem and human health, by 2050. Accepting the award for the three co-recipients was Dr. Mark Gold, Vice-Chancellor for Environment and Sustainability, UCLA Institute of the Environment and Sustainability.

GRA’s David K. Todd Distinguished Lecturers for 2019

GRA proudly announces the speakers for the ninth year of the David Keith Todd (DKT) Distinguished Lecture Series. Dr. Maurice Hall and Mr. David Sandino have enthusiastically accepted the 2019 David Keith Todd Lectureship. The objective of this program is to foster interest and excellence in applied groundwater science and technology through GRA-sponsored lectures at California universities, local GRA meetings, and statewide GRA events. These lectures further a key GRA objective: to develop scientific educational programs that promote the understanding and effective implementation of groundwater assessment, protection, and management. The 2019 DKT Lecture Series will provide a broad perspective on groundwater beyond the typical focus by engineers and hydrogeologists.

GRA held Dr. David Keith Todd in the highest esteem for his enormous contributions to groundwater science and technology, and in 1999 awarded him GRA’s Lifetime Achievement Award. We named the series in his honor to pay tribute to his legacy as groundwater science and education leader. The nomination and evaluation process for lecturers ensures that highly-qualified individuals are selected to represent GRA and David Keith Todd’s legacy.

Traditionally, the DKT Lectures have been assigned either a northern California or southern California lecture circuit. However, Dr. Hall and Mr. Sandino are available to give presentations throughout California pending their availability. Each will provide a minimum of five lectures, including lectures at two GRA Branch Meetings, two academic institutions, and the Second Annual Western Groundwater Congress. Lecture Series funding comes from sponsors; voluntary support from the lecturer’s institution, organization, or firm; and universities hosting the lecturer. Universities and GRA Branches interested in hosting a lecture by either of these speakers should contact the GRA Education Committee (dkt2019@grac.org) to book as early as possible to ensure their availability. Look for the Lecture Series schedule to be posted on GRA’s website.

Continued on the following page…
In his David Keith Todd Distinguished lecture for 2019, Maurice Hall will share his vision on how more holistic and inclusive groundwater management can increase the resilience of our water supply and sustain and enhance the services that groundwater basins provide for a wide range of stakeholders. Maurice will share some suggestions on how the flexibility offered by California’s Sustainable Groundwater Management Act allows for innovative approaches that support multiple benefits and how engaging stakeholders beyond water interests in shaping groundwater management can lead to more resilient rural communities and strengthen regional cooperation.

Speaker Bio:
As associate vice president of water for the ecosystems program, Maurice Hall oversees Ecosystems-Water Environmental Defense Fund’s (EDF) work to revitalize working rivers and their ability to provide a resilient water supply. He focuses on developing collaborative water management approaches to meet ecosystem needs alongside the needs of farms and cities. Approaches central to this work include shaping water transaction programs that achieve resilient water supplies while protecting the environment and vulnerable communities, improving information systems to inform smart management of water resources, and shaping water governance that proactively considers multiple objectives and responds to climate change.

Maurice joined EDF in May 2016. Previously, he served as the water program lead for the Water Funder Initiative, a collaborative effort to identify and activate promising water solutions through strategic philanthropic investments in the United States, starting in the American West. He also spent seven years with The Nature Conservancy (TNC) where his roles included science and engineering lead for the California Water Program. His work focused on improving our understanding of the relationship between hydrology and water-dependent ecosystems and developing integrated water management strategies to restore and protect ecosystems. Maurice holds a B.S. from the University of Tennessee Chattanooga and a PhD in Earth Resources, Watershed Sciences from Colorado State University.

Continued on the following page…
Some aspects of the groundwater legal systems do not accurately reflect the physical environment, posing challenges for effective groundwater management. For instance, groundwater law developed independently of surface water rights laws, and does not fully reflect the interconnection between groundwater and surface waters. Likewise, groundwater legal systems have failed to adequately model how groundwater quality may be impaired in the environment or in some cases have exempted groundwater degradation from regulation altogether. This presentation will review groundwater legal systems, describing areas where they do not accurately reflect the physical environment and pose problems for effective groundwater management. The presentation will propose changes to groundwater legal systems that better reflect the physical environment with the goal of improved groundwater management.

Speaker Bio:
David Sandino served as Chief Counsel for the California Department of Water Resources (DWR) from 2006-2010 under an appointment by Governor Arnold Schwarzenegger and currently serves as senior staff counsel. He has worked on significant water, environmental, tribal, and energy issues during his twenty-five year career with the Department. He also served as General Counsel for the Central Valley Flood Control Board from 2000-2004. The Department operates the largest state-built water system in the United States, which delivers water to 27 million Californians and 750,000 acres of farmland.

His academic career has centered on teaching professional and undergraduate natural resource courses. He taught water law, environmental law, renewable energy law, real property and local government law at Texas Tech University School of Law, Boyd School of Law at University of Nevada, Las Vegas, Santa Clara University School of Law, University of San Francisco School of Law, Golden Gate University School of Law, Lincoln Law School of Sacramento, University of Redlands, and Sacramento State University.

Mr. Sandino also created and teaches courses for environmental professionals on California water law and policy, the Sacramento-San Joaquin Delta, and tribal water law. He received a distinguished teaching award from the UC Davis Extension for his contribution to natural science education. He received a 1999 Fulbright Fellowship to teach in Russia, where he taught international environmental law at the Moscow State Academy, and he is an active member of the Fulbright Association.

He is on the Board of Editors of California Environmental Law Reporter, and he wrote numerous articles about natural resources issues. He has been a frequent speaker and lecturer on water, tribal, and environmental issues at universities, conferences and seminars. He is a graduate of the Santa Clara University School of Law, King’s College (London), and UC Davis.
Sacramento Branch Meeting
Speakers for Winter 2018-2019:

- **December 6** (Thursday): Chris Doolittle, PG, CEG, County of Santa Barbara Public Works Department, *The Thomas Fire Debris Flow in Montecito, CA*
- **January 9**: Amy Wilson, PhD, PE Technical Director, Engineering, Construction, and Remediation, TRC, PFAS – Understanding Emerging Issues with these Widespread Compounds
- **March 13**: Marice Hall Nature Conservancy, Northern California David Keith Todd Lecturer, Annual Student Scholarship meeting at the California State University in Sacramento (CSUS) Alumni Center

By Linda Bond, Branch President

**SOUTHERN CALIFORNIA**

By Herbert Vogler, Branch Secretary

The Southern California Branch, focusing on Los Angeles and Orange Counties, had two branch meetings during the past 3 months. For the first of these meetings, held on Tuesday, October 2, 2018, John C. Kennedy, P.E., Executive Director of Engineering and Water Resources for the Orange County Water District (OCWD), gave his presentation entitled “Proposed Huntington Beach Poseidon Resources Ocean Desalination Project.” John explained that the OCWD manages the local groundwater basin in Orange County and is considering partnering with Poseidon Resources to develop a 56,000 acre feet per year (afy) ocean desalination plant in the city of Huntington Beach. He told us that total water demand for the 19 retail agencies operating in the basin is approximately 410,000 afy, which by the year 2040 is projected to increase to 447,000 afy. Currently, approximately 120,000 afy of imported water is needed to meet existing annual water demand, so a source of additional supply is needed.

John told us that in 2015, OCWD and Poseidon developed and approved a non-binding Term Sheet, subsequently modified in 2018, that provides the general terms of each entity’s role and responsibilities in developing the project. Poseidon Resources is responsible for the development, financing, construction and operation of the desalination treatment plant, whereas OCWD is responsible for the development, financing, construction and operation of the distribution system necessary to serve ocean desalination water to OCWD and other participating agencies. OCWD also has an option to require Poseidon Resources to design and construct the necessary distribution system after which OCWD could purchase it. Poseidon Resources is obtaining the necessary permits from the Santa Ana Regional Water Quality Control Board, and if successful, the California Coastal Commission, whereas OCWD is working to develop an efficient distribution system. John’s interesting presentation included slides that illustrated the existing site where the facility would be located, the new facility’s intake and outfall design, and project costs.

At our subsequent branch meeting held on Tuesday, October 2, 2018, Kirby Brill, P.E., former General Manager of the Mojave Water Agency and current GRA David Keith Todd Lecturer, gave his presentation entitled “Building Bridges to a New World in Water Resource Management.” Kirby’s presentation emphasized that the world of water resource management is undergoing radical changes due to challenges of population growth, climate change, and new regulations (such as the Sustainable Groundwater Management Act), and this increasingly requires new tools, skillsets, and approaches. He explained that there are three aspects fundamental to developing a portfolio of water management actions: (1) “science-based” evaluations; (2) “market-driven” policies; and (3) robust outreach with the local community. Kirby told us that in today’s “new world,” our leaders will need to look ahead and develop new leadership with fresh ideas to carry the ball forward for the next several decades. These new leaders must have a solid science-based platform. They must have the ability to analyze complex systems and must be excellent communicators to enable them to convert information into knowledge and share it with the public and other decision-makers. These ambitious cornerstones and methods

Continued on the following page…
require heavy investment of time and resources, with the return on investment being water sustainability through development of well-equipped future leaders having multi-disciplinary training and perspectives – leaders who can build bridges with technical, social, economic, and political skills to find solutions embedded within the complex systems.

The Southern California Branch again thanks all GRA Members who participate in our branch. We hope you’ll attend our upcoming branch meetings and look forward to seeing you there.

Special Thanks to Our Event Chairs, Sponsors and Exhibitors

First Annual Western Groundwater Congress

Chair:
R.T. Van Valer

Administrative Director:
Sarah Erck

Co-Sponsors:
EN Rx, Inc.
I-GIS
Ramboll

President’s Reception Sponsor:
The Water Replenishment District of Southern California

Entertainment Sponsor:
West Yost Associates

I am GRA Reception Sponsor:
Dudek

Awards and Annual Meeting Luncheon Sponsor:
Sacramento Groundwater Authority

Tuesday Lunch Sponsor:
Jacobs

Thursday Lunch Sponsor:
Montgomery & Associates

Breakfast Sponsor:
SGS North America Inc.

Afternoon Break Refreshment Sponsor:
GHD

Wellness Sponsors:
EKI Environment & Water
GEI Consultants, Inc.

Gourmet Water Station Sponsor:
Roscoe Moss Company

Tote Bag Sponsor:
INTERA Incorporated

Lanyard Sponsor:
Woodard & Curran

Members Only Chair Massage
Session Sponsor:
ASR Resources, LLC

Sustainable Wine Workshop Sponsors:
Brownstein Hyatt Farber Schreck
Haley & Aldrich

Member Exhibitors:
ASR Resources, LLC
BESST, Inc.
Blaine Tech Services
Cascade Drilling Technical Services
Collier Consulting, Inc.
Confluence Environmental, Inc.
Directed Technologies Drilling
GeoSystems Analysis, Inc.
GHD
Gregg Drilling and Testing, Inc.
hydroGEOPHYSICS, Inc.
INTERA
Pace National
Pumpsight
Ranch Systems, LCC - Novato, CA
Silver State Analytical/ Enviro Tech
SkyTEM Canada Inc.

Non-member Exhibitors:
Aqua Geo Frameworks, LCC
FGL Environmental
KISTERS North America
Maven’s Notebook/Groundwater Exchange
REGENESIS
Solinst Canada Ltd.

Tote Bag Swag Sponsors:
Confluence Environmental, Inc.
EnRx
Maven’s Notebook/Groundwater Exchange
Montgomery & Associates
Orange County Water District
SGS North America Inc.
Vista Analytical Laboratory
WSP
GRA Welcomes the Following New Members
AUGUST 2 – NOVEMBER 2, 2018

Alfred Martini  
Alin Repede  
Alka Singhal  
Anne Jurek  
Anthony Brillante  
Becca Fong  
Bill Samarin  
Brandon Amrhein  
chad wegley  
Chelsea Bokman  
Christine Brown  
Christopher Ely  
Derrik Williams  
Emilio Grande  
Enrique Lopezcalva  
Erik Piatt  
Ian Gottschalk  
Jane Ladrech  
Jeremy Cox  
Jessica Droege  
John Merrill  
John McKendry  
John P Brandenburg  
Julie Leimbach  
katy daniell  
Leroy Ellinghouse  
Mars Nelson Tredwell  
Maryam Taidy  
Masih Akhbari  
Matt Ables  
Matthew Landon  
Maureen Kerner  
Maya Teyechea  
Rick Cramer  
Robert Emmens  
Robert TerBerg  
Ryan Stevenson  
Sam Boland-Brien  
Sean Stewart  
Sean Storey  
Shaden Musleh  
Sheri Avoux  
Terry Winsor  
Tim Moore  
Tom Biglione  
Trevor Kent  
Vivian Underhill  
Westin Skillings  
Zack Levinson  
Zeno Levy  
Zizheng Qu

Dates & Details
GRA EVENTS & KEY DATES
(Please visit www.grac.org for detailed information, updates and registration unless noted)

Bridging the Gap
January 28-29, 2019 | San Diego, CA

Groundwater Sustainability Bootcamp – A Short Course
February 5-6, 2019 | Davis, CA

For information on how to sponsor or exhibit at an upcoming event, please contact Sarah Erck at serck@grac.org.

2019 Advertising Rates

FULL COLOR WEB EDITION

<table>
<thead>
<tr>
<th>1X</th>
<th>4X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Card Ad</td>
<td>$95.00–$90.00 per issue</td>
</tr>
<tr>
<td>1/3 Page Square</td>
<td>$185.00–$160.00 per issue</td>
</tr>
<tr>
<td>1/2 Page Horizontal</td>
<td>$365.00–$290.00 per issue</td>
</tr>
<tr>
<td>2/3 Page Vertical</td>
<td>$500.00–$400.00 per issue</td>
</tr>
<tr>
<td>Full Page</td>
<td>$750.00–$600.00 per issue</td>
</tr>
</tbody>
</table>

The above prices assume advertisements are received as high resolution PDF files. For additional information, visit www.grac.org or contact Sarah Erck, GRA Administrative Director, at serck@grac.org or 916-446-3626.

TO ADVERTISE IN HYDROVISIONS CALL 916-446-3626 TODAY
Tule fog season in California traditionally develops between November and March, when rains bring moisture to the Central Valley. The term “tule” comes from the plant of the same name, a giant sedge which dominates freshwater marshes in the region.

Tule fog has declined by 46 percent over the past 32 winters according to a 2014 study, published in Geophysical Research Letters by Dennis Baldocchi, PhD, a biometeorologist at the University of California, Berkeley. “Generally, when conditions are too dry or too wet, we get less fog,” Baldocchi said. “If we’re in a drought, there isn’t enough moisture to condense into the air. During wet years, we need the rain to stop so that the fog can form.”

Tule fog is crucial to the Central Valley’s fruit and nut crops, which represent about 95 percent of U.S. production of foods such as cherries, almonds, peaches, and apricots. Fruit and nut trees need a winter chill period to become dormant. Tule fog helps contribute to that chill, and shields buds from the sun.

“The trees need this dormant time to rest so that they can later develop buds, flowers, and fruit during the growing season,” said Baldocchi, whose father grew almonds and walnuts in Antioch and Oakley. “An insufficient rest period impairs the ability of farmers to achieve high quality fruit yields.”

Climate change forecasts suggest that the duration of winter chill will continue to decrease in the Central Valley. Baldocchi said that fruit developers are already experimenting with cultivars that can tolerate less winter chill. “Farmers may also need to consider adjusting the location of orchards to follow the fog, so to speak,” said Baldocchi. Some regions along the foothills of the Sierra Nevada are promising candidates.

Photographed at Mount Diablo State Park. Approximate GPS coordinates of the photograph are 37.881876° and -121.914756°. Information for visiting the park is available at the https://www.parks.ca.gov/?page_id=517 and https://www.mdia.org/.