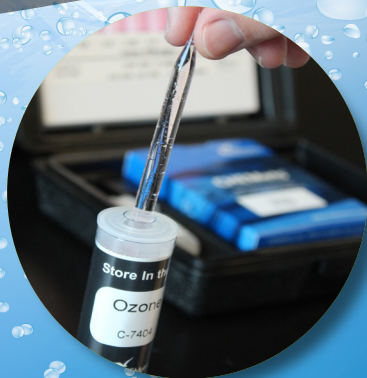
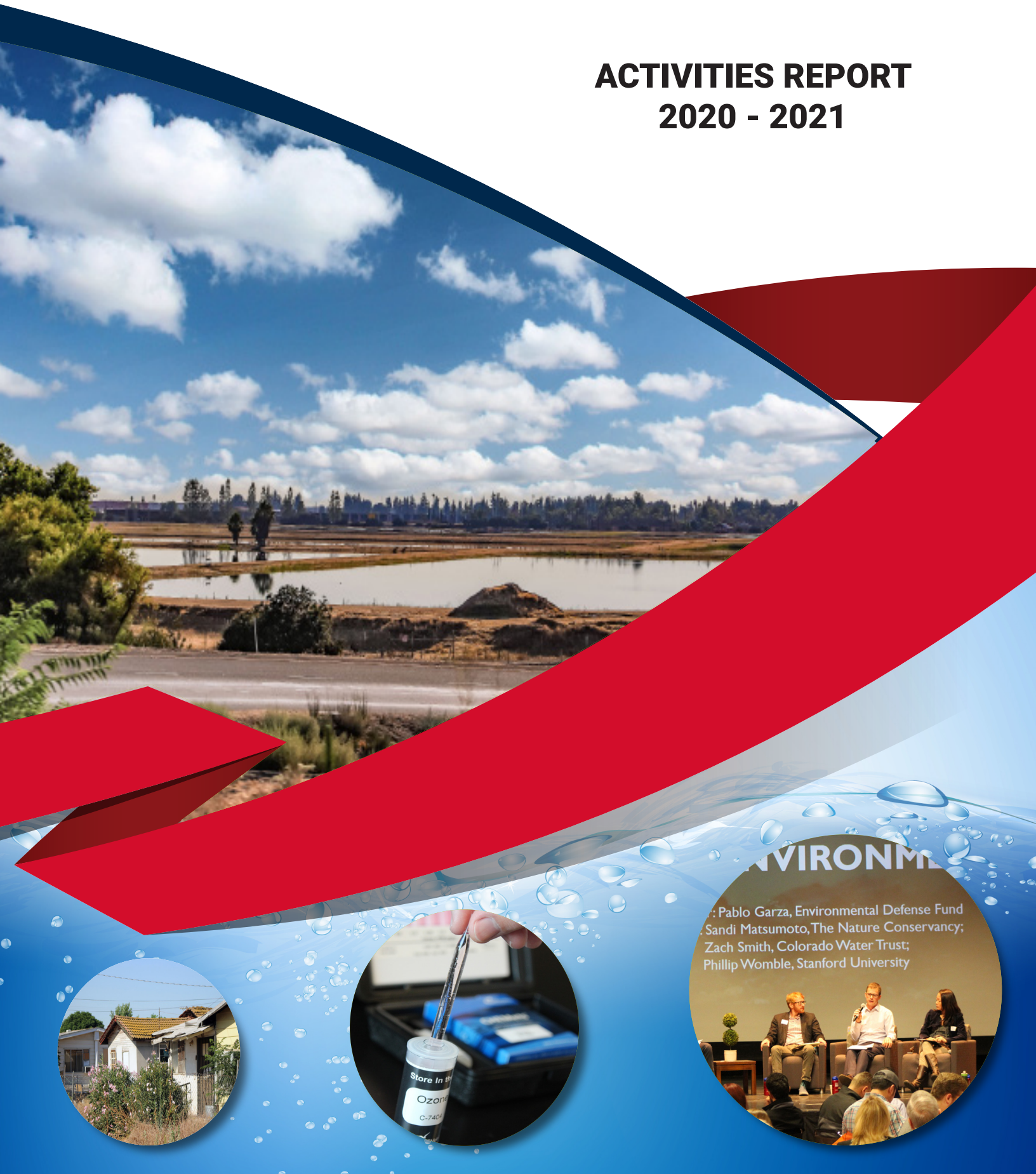


## ACTIVITIES REPORT 2020 - 2021



### ENVIRONMENT

Panelists: Pablo Garza, Environmental Defense Fund; Sandi Matsumoto, The Nature Conservancy; Zach Smith, Colorado Water Trust; Phillip Womble, Stanford University

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## Director's Message



The San Joaquin Valley finds itself at a tipping point in water resource management. Groundwater supplies are impacted and now regulated by the Sustainable Groundwater Management Act, and surface water supplies are becoming more erratic due to climate change. Water uncertainty will make the management of this precious resource during times of excess to survive during times of scarcity existentially important. The California Water Institute (CWI) at Fresno State is geographically situated in the heart of the San Joaquin Valley to carry out its mission of education, outreach, and research on water and its vital place in the life of the valley.

The year was filled with educational and outreach activities. On the educational theme, we participated with the National Resource Conservation Service to educate farmers in the Calleguas Creek watershed on the Sustainable Groundwater Act and how to interface with their Groundwater Sustainability Agency. Following that, we conducted two series of water education seminars with the Tulare World Ag Expo. In June, we finished the year with a one-day summer program hosted by the Lyles College of Engineering on water for high school and middle school students.

Outreach for the year included hosting and leading a significant symposium on impacts to the San Joaquin Valley through the implementation of SGMA and water management infrastructure improvement to help mitigate those impacts. We participated in Fresno States Day of Giving (DOG), Campus Spotlight, and initiated a legislative roundtable on water.

The highlight of CWI's research efforts for this year was featured in the Spring Fresno State Magazine. The article describe the process of our subsurface groundwater recharge site on the Fresno State University Farm, we hope you had a chance to read it.

This past year, CWI has leveraged our location and the resources at Fresno State to embark on significant changes to the approach to water management in the San Joaquin Valley. We worked with the various colleges at Fresno State to create both the CWI Faculty Fellow and the Campus Advisory Committee.

We invite all our existing and new partners to work with us in the 2021-2022 fiscal year to enlarge our education, outreach, and research activities to engage with water and the valley.

Sincerely,

Cordie Qualle  
Interim Director 2020-2021

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## Faculty Fellows

The California Water Institute (CWI) Faculty Fellows is a program that engages full-time faculty and their graduate and undergraduate students in research that advances CWI's mission. Through these projects, students gain practical experience that will equip them as water professionals.

The first year of the faculty fellows program was a very successful one. Fourteen faculty from all over the campus joined with CWI to collaborate to advance research at Fresno State. The faculty fellows have accomplished writing three white papers to show the reseach they have completed this past year. 2020-2021 Faculty Fellows:



STEVEN  
BLUMENSHINE



MIKE MUSTAFA  
BERBER



FLORENCE  
CASSEL



JIAOCHEN LIANG



ZHI LIANG



LUBO LIU



ROBERT LULL



KALYANI MAITRA



LALITA OKA



AARON SCHUELKE



BALAJI SETH



QUN SUN



BETH WEINMAN



YUANYUAN XIE

## Campus Advisory Committee

The Campus Advisory Committee was formed from one faculty member from each college to provide multidisciplinary guidance to CWI.



FLORENCE  
CASSEL



DAVID DREXLER



ANDRES  
JAUREGUI



ANDREW JONES



ROBERT LULL



FAYZUL PASHA



FREDERICK  
PEINADO NELSON



MONICA RIVERA



BETH WEINMAN

## Education and Outreach

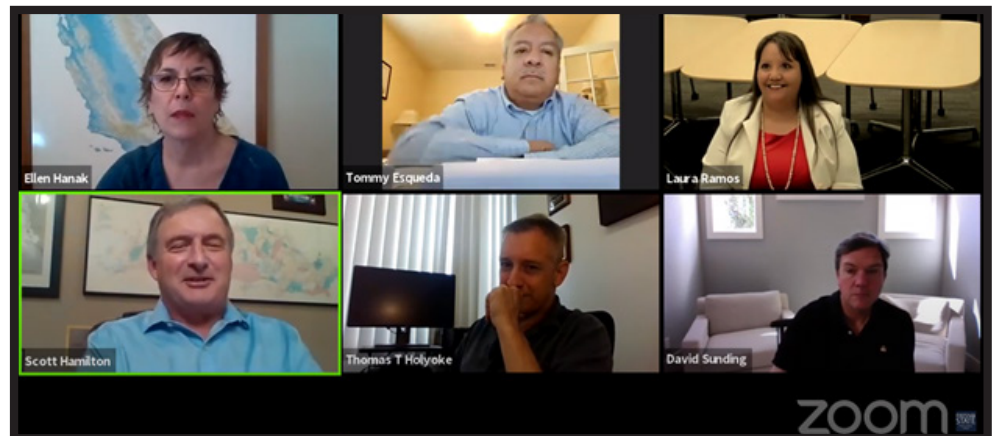
### Funding Water Infrastructure in the San Joaquin Valley Summit (August 2020)

A series of publications were released in 2019 and 2020 regarding water infrastructure in the San Joaquin Valley that led to the Funding Water Infrastructure in the San Joaquin Valley Summit. The summit was a three-day virtual event that was free and open to the public. Attendees heard from leading experts on what strategies can be used to finance capital investments in water infrastructure to reduce the potential economic losses in the agricultural sector. Topics specific to the San Joaquin Valley that were discussed were historical social-economic conditions, economic impacts of SGMA, water infrastructure improvement needs, traditional funding approaches, funding options, and governing strategies.

Stakeholders from academia, agricultural, environmental, federal resource agencies, state resource agencies, local resource agencies, legal/financial/real estate/consulting, reporters, and water agency/utility/district attended and engaged in discussions regarding the future of water infrastructure needs in the San Joaquin Valley through the Slack platform.

The recording of the three-day virtual summit can be found on California Water Institute's YouTube channel: [bit.ly/CWYouTube](https://bit.ly/CWYouTube). The series of publications can be found on CWI's website: [bit.ly/CWIpublications](https://bit.ly/CWIpublications).

Closing session panel discussion. Panelists include Ellen Hanak, Thomas Esqueda, Scott Hamilton, Thomas Holyoke, and David Sunding. Moderator was CWI's Programs Manager Laura Ramos.



Leaky Acres in Fresno, California is an example of how the fallowed land can be utilized, as a groundwater recharge area.

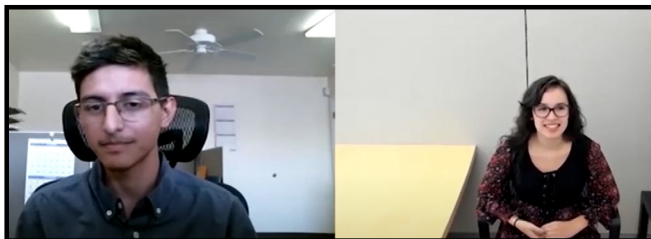
## Fresno State's Day of Giving (November 2020)

CWI participated in Fresno State's fourth annual Day of Giving which is a day to donate to Fresno State's colleges, schools, and areas on campus. Throughout the day, the participants for Day of Giving were given thirty-minutes to demonstrate to potential donors what they offer to the campus and community.

CWI's thirty-minutes of "It's a WATER-ful Life!" covered information on CWI's mission, current projects, and how donors can help get students involved with CWI. Current students that work with CWI gave their story about their experience with CWI and viewers watched a question-and-answer session with former Fresno State and CWI student who is now employed with a local Groundwater Sustainability Agency. The session also included educating the audience a little about the water topics CWI works on.

"CWI gave me the opportunity to receive real-world experience learning about water quality issues and the different methods of treatment in the Central Valley. During this time, we worked on a project of consolidating disadvantaged communities which had historical water quality issues. These experiences motivated me to continue a culture of learning to improve water in similar communities."

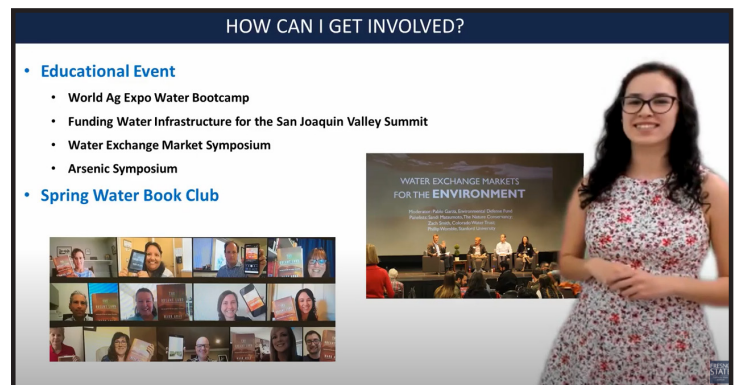
~ Cruz Romeo, former Civil Engineering student, current employee of Kaweah Groundwater Sustainability Agency



Former Fresno State Civil Engineering student, Cruz Romero, being interviewed by current Fresno State Business Marketing student, Cailie Smith, on how CWI has positively impacted his career goals and current job duties at the Kaweah Groundwater Sustainability Agency.

## Fresno State Campus Spotlight (February 2021)

CWI's was invited to take place in the monthly spotlight that highlights different centers and resources on campus. In February, CWI's staff and student presented on CWI's current research projects, outreach efforts, and educational opportunities for students, staff, and faculty on campus.

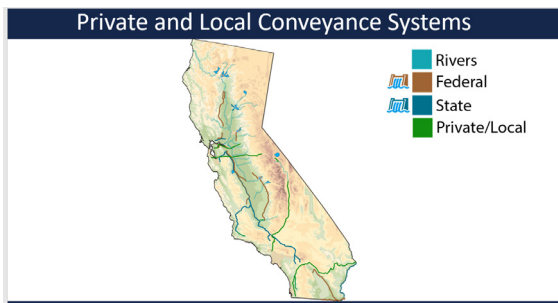


Fresno State Craig School of Business student presenting to the Campus Spotlight attendees about how they can get involved with CWI through events and annual Water Book Club.

## Water Bootcamp (February and May 2021)

### World Ag Expo Online Show

The California Water Institute was invited to be a part of the World Ag Expo's online show for 2021. CWI jumped at this opportunity to educate the community about water topics. The topics were recorded and available on demand. Over 350 people registered and attended the Water Bootcamps. Attendees learned about topics that covered hydrology, where my water comes from, surface water rights, groundwater, CV-SALTS, and the Water Blueprint for the San Joaquin Valley.



CWI staff presented a map of California that showed the audience the differences between California's federal, state, and local water projects.

### Water Awareness Month

In honor of water awareness month, CWI partnered with the World Ag Expo to bring this free educational water series to the public. Over the three days of the Water Bootcamp, CWI staff and two guest speakers presented the following topics: hydrology, California watersheds, groundwater overview, surface water rights, surface water distribution, Sacramento-San Joaquin Delta, groundwater regulations, private wells, CV-SALTS and irrigated lands regulatory program, and the San Joaquin Valley Water Collaborative Action Program. There was an average of 133 registrants per day, and those who attended engaged in answering questions about the topics, materials presented, and more. Many who attended learned water topics related to their career.

## Water Book Club (February - May 2021)

During the spring of 2021 staff, faculty and students at Fresno State read "The Death and Life of Great Lakes" by Dan Egan. The club met virtually and discussed topics such as, invasive species, water pollution, ecosystems, the history of the Great Lakes and more. Attendees learned and asked questions about how we can learn from the mistakes of the Great Lakes and apply them to lakes, rivers, and the delta in California.



Participants from the Spring 2021 Water Book Club during the last Zoom get together.

**Water Legislative Roundtable (May 2021)**

The Water Legislative Roundtable was held to better inform our local legislators and their staff about water concerns in the San Joaquin Valley, especially due to this year’s statewide drought. CWI had 4 guest speakers who presented their water stakeholder needs to local legislators. The water stakeholders they represented were agricultural, environmental, safe drinking water, and urban.

**Institute for Food and Agriculture: Kids Ag Virtual Summer Camp (June 2021)**



CWI student filming the water module presentation.

The Institute for Food and Agriculture had planned a virtual summer camp for a week to focus on water and water’s relation to agriculture. The California Water Institute was more than pleased to be a partner and teach elementary school students from ages seven to eleven about water. CWI students filmed a video of a water module presentation that covered what water is utilized for, where our water comes from, and how to efficiently irrigate. The presentation was followed by a detailed reading of the San Joaquin Valley’s water cycle and demonstration of a groundwater contamination activity.

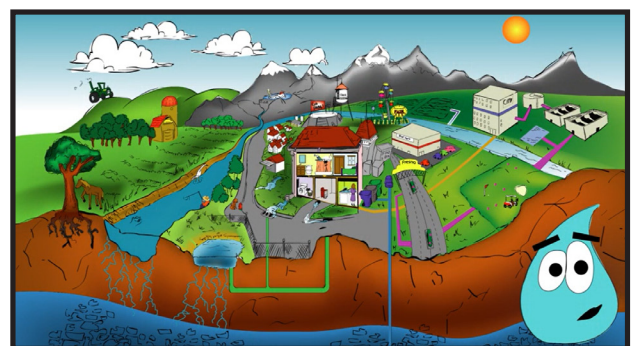
**Lyles College of Engineering: Engineering & Construction Management Summer Camp (June 2021)**

Fresno State’s Lyles College of Engineering reached out to the California Water Institute to teach about groundwater contamination and water treatment at their Engineering & Construction Management Summer Camp for a day to middle school and high school students. Students engaged in a variety of ways, including participating in a game of Kahoot, groundwater contamination activity, and water treatment activity. The game and activities were lead by a Fresno State student who has the goal of becoming an elementary teacher after graduating. The “Story of a Water Drop” video was played to the students. The water droplet was voice by a Media, Communications, and Journalism student.



Top Image: Fresno State Kremen School of Education student leading an activity over Zoom that demonstrates water treatment.

Bottom Image: The opening scene to CWI’s educational video “Story of a Water Drop.”





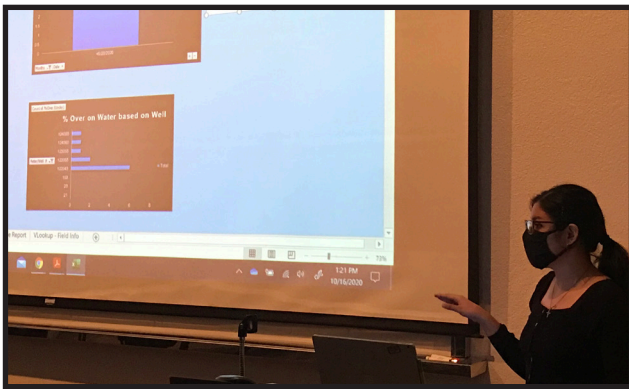
## Research Projects

### Climate Smart Farmland Transition

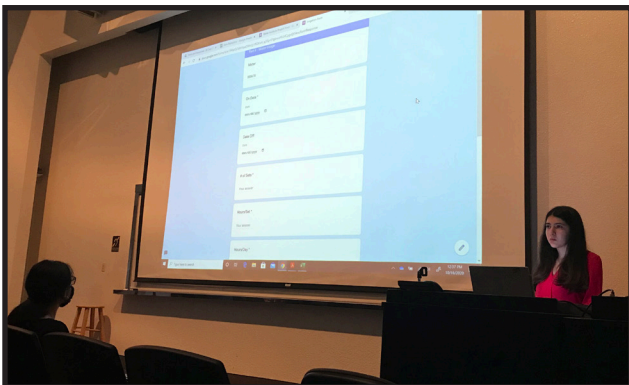
SGMA will likely require the removal of agricultural land from production to achieve sustainable groundwater levels. Land should be properly planned to preserve high-value lands from following and mitigate potential negative impacts. The Public Policy Institute of California (PPIC) is researching planning options for fallowed land (CWI is assisting PPIC with stakeholder outreach and engagement). The effort will engage a diverse group of stakeholders including growers, agricultural and urban water managers, land planners, and air quality experts to propose and vet solutions.



Leaky Acres in Fresno, California is an example of how the fallowed land can be utilized, as a groundwater recharge area.



Top and Bottom Images: Craig School of Business students, majoring in data analytics, working on CWI's project that focuses on B-Corporation certification presented to a group of farmers in an auditorium.

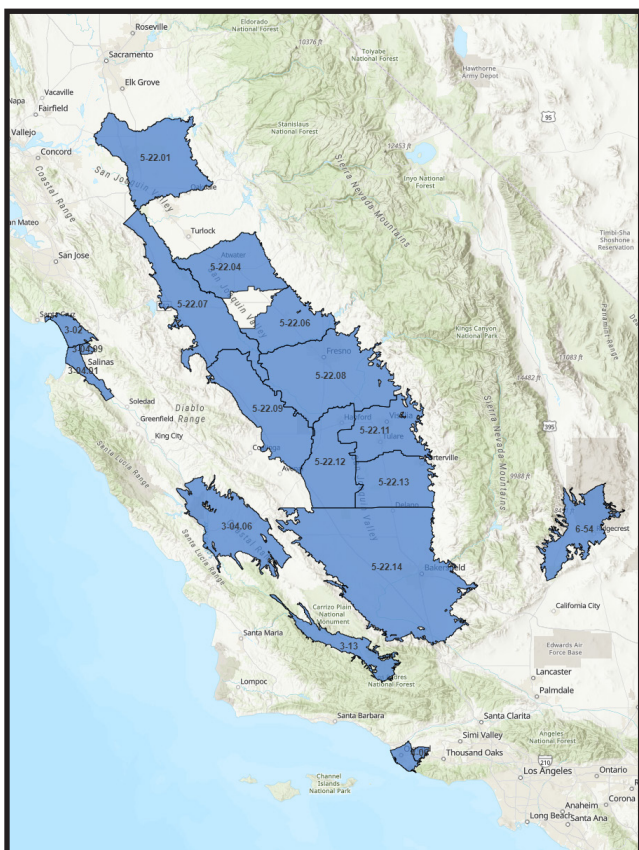


### Environmental Management System Plan

A family-owned agribusiness committed to producing high-quality, nutritious food while reducing its farming operations' resource impacts partnered with CWI on this project. Consistent with this philosophy, they elected to obtain B-Corporation certification, which is awarded to for-profit corporations that practice the highest standards of verified social and environmental performance, public transparency, and legal accountability in their business practices.

CWI helped the business achieve B-Corporation certification using data analytics and developing an Environmental Management System Plan. CWI engaged and managed Fresno State data analytics students who analyzed manually collected pesticide, fertilizer, and water use data that enabled the business to visualize their use of these consumables versus established industry baseline amounts to improve efficiencies.

CWI re-engaged the students to develop an automated system to collect water use data for the business.



The critically overdrafted GSA's within the state of California.

## Governance Summary for Groundwater Sustainability Agencies (GSA)

The Sustainable Groundwater Management Act (SGMA) is landmark legislation passed by the State of California to stabilize declining aquifer levels. SGMA required the State of California Department of Water Resources (DWR) to delineate high priority, medium priority, and low priority groundwater basins in the State. The twenty-one high-priority basins were required to create GSAs to develop Groundwater Sustainability Plans (GSPs) by January 2020. SGMA laid out basic goals, requirements, and authorities granted to the GSAs but left the GSAs' governance structure to local stakeholders to engender their acceptance.

Medium priority groundwater basins must develop their GSPs by January 2022. DWR contracted with Stantec Corporation, which subcontracted with CWI to create a searchable database of high priority GSA governance structures. An accompanying report will provide a research synopsis and case studies of the high priority GSAs' experiences to assist medium priority GSAs in making decisions on their governance structure.

## Subsurface Groundwater Recharge Research

CWI is partnering with Civil Engineering graduates and undergraduate students to research subsurface groundwater recharge technology. This research utilizes perforated pipe placed below the root zone to recharge the aquifer using filtered canal water. The extension of this work is the ability to conduct groundwater recharge using excess floodwater in agricultural fields without taking land out of production, exposing infiltrating water to upper soil pesticide and fertilizer residuals, or impacting the ability to conduct farming operations. The technology is called Subsurface Artificial Groundwater Recharge (SAGR). It is another form of Flood Managed Aquifer Recharge that does not flood the land. The research will measure the applied recharge water, account for the field's water balance, and measure the energy and costs to conduct the recharge effort. The volume of recharge water per acre-

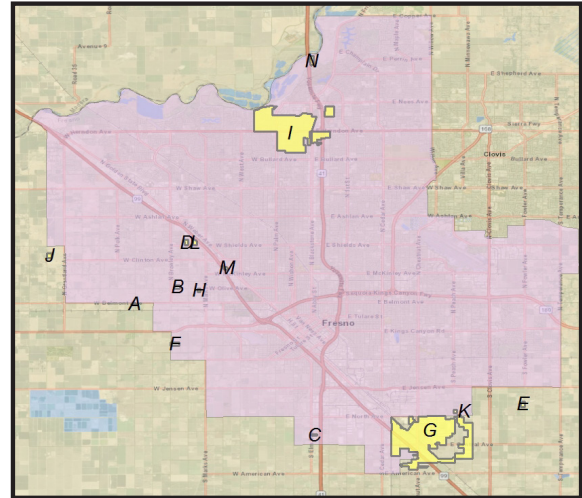
foot compared to the cost per acre-foot to recharge the water will be compared to other technologies to determine the feasibility of the SAGR technology and develop design guidelines for future installations.



Preparation of site where the perforated pipe is being placed below the surface.

## Water System Consolidation Outreach and Education for Small Water System Owners

Having successfully completed the feasibility study in 2020 for consolidation, the State Water Resources Control Board (SWRCB) extended their contract with CWI to assist in conducting an outreach and education program to inform the twelve water system owners on the consolidation program, its pros and cons for the water system, its owners and customers, and the cost to consolidate with the City of Fresno. CWI's persistence resulted in ten of the twelve water system owners agreeing to participate in the outreach and education program. CWI prepared presentations, contacted system owners, and conducted presentations in cooperation with DDW, City of Fresno, Self-Help Enterprises, and SWRCB - Department of Drinking Water



City of Fresno Consolidation Study Index Map created by students.



Water, Energy, and Technology (WET) Center hydraulic laboratory at Fresno State.

## Water Meter Evaluation Program

The Greater Kaweah Groundwater Sustainability Agency (GSA), the Mid-Kaweah GSA, and the East Kaweah GSA formed a joint powers agency to acquire a grant to fund testing of water well flow meters, telemetry, and cloud data platform systems. Monitoring groundwater extracted by the 4,000 wells in the GSAs is required to comply with their Groundwater Sustainability Plans (GSPs).

The three GSAs have partnered with CWI and its sister institute, the Center for Irrigation Technology (CIT), to develop and perform the water meter and data acquisition systems testing to verify manufacturer's claims regarding their products. Testing took place in the Water, Energy, and Technology (WET) Center hydraulic laboratory at Fresno State under the direction of CWI and CIT. CWI will prepare a final report on the results of the laboratory and field evaluations. The GSAs will use this information to select preferred water flow meters and telemetry and cloud data system that GSAs will implement to monitor groundwater use.

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Phone: (559) 278-7001



**FRESNO STATE**

California Water Institute

