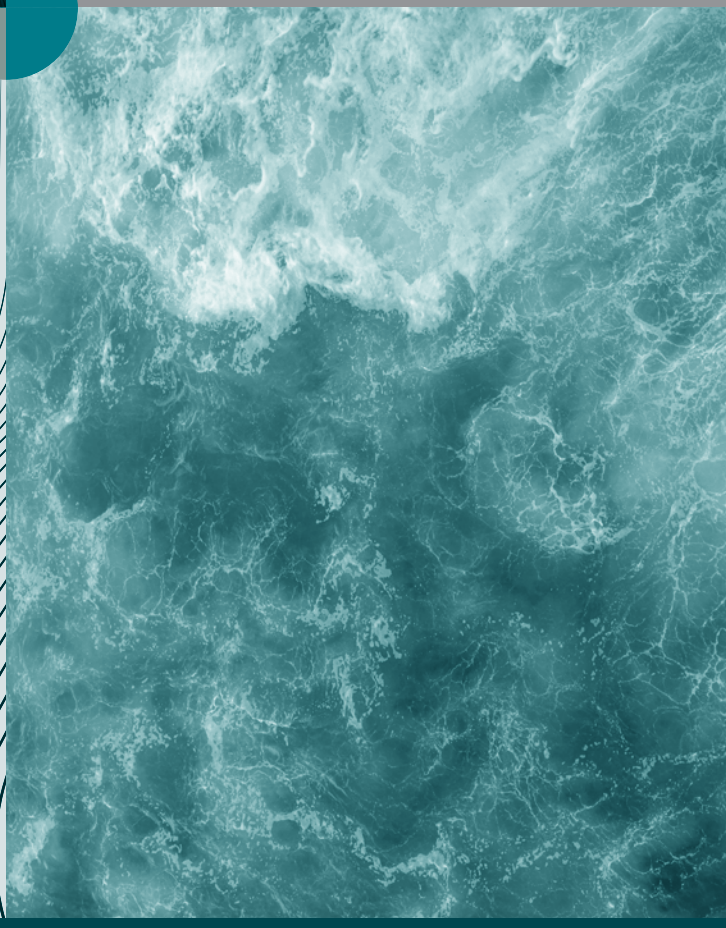
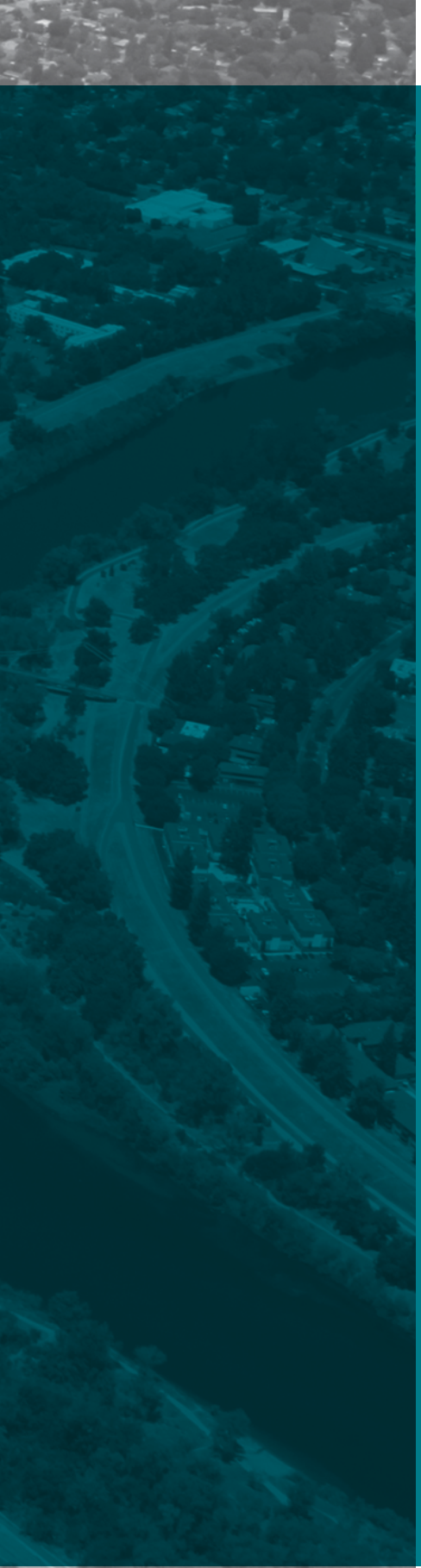
Training,
Research,
Public
Education

Annual Report

2023–2024



WATER PROGRAMS
Sacramento State



Contents

Welcome OWP's New

Executive Director

Office of Water Programs (OWP) has a history of steady, long-term leadership, and OWP's retiring executive director Dr. Ramzi Mahmood focused on continuing that tradition as he led a search for his replacement in FY 2023–2024. That successful search led to the hiring of Dr. Akram Botrous.

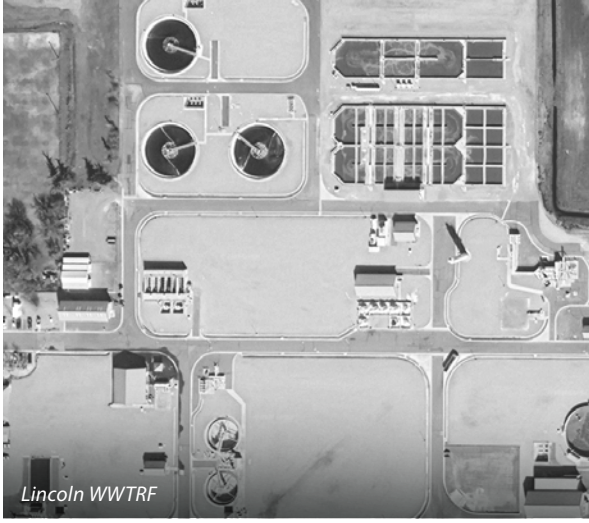
Dr. Botrous has more than 30 years of teaching, research, and consulting experience. He received his BS in civil engineering from the Cairo University, his Masters in sanitary engineering from IHE, Delft, the Netherlands, and his PhD in environmental engineering from the University of Nebraska. His primary interest is environmental engineering, particularly in wastewater treatment.

Early in his career, Dr. Botrous was a lecturer at Cairo University where he taught courses in geotechnical engineering, hydraulics, and sanitary engineering. After finishing his graduate studies, he worked in the industry for more than two decades and designed over 25 wastewater treatment plants in the United States.

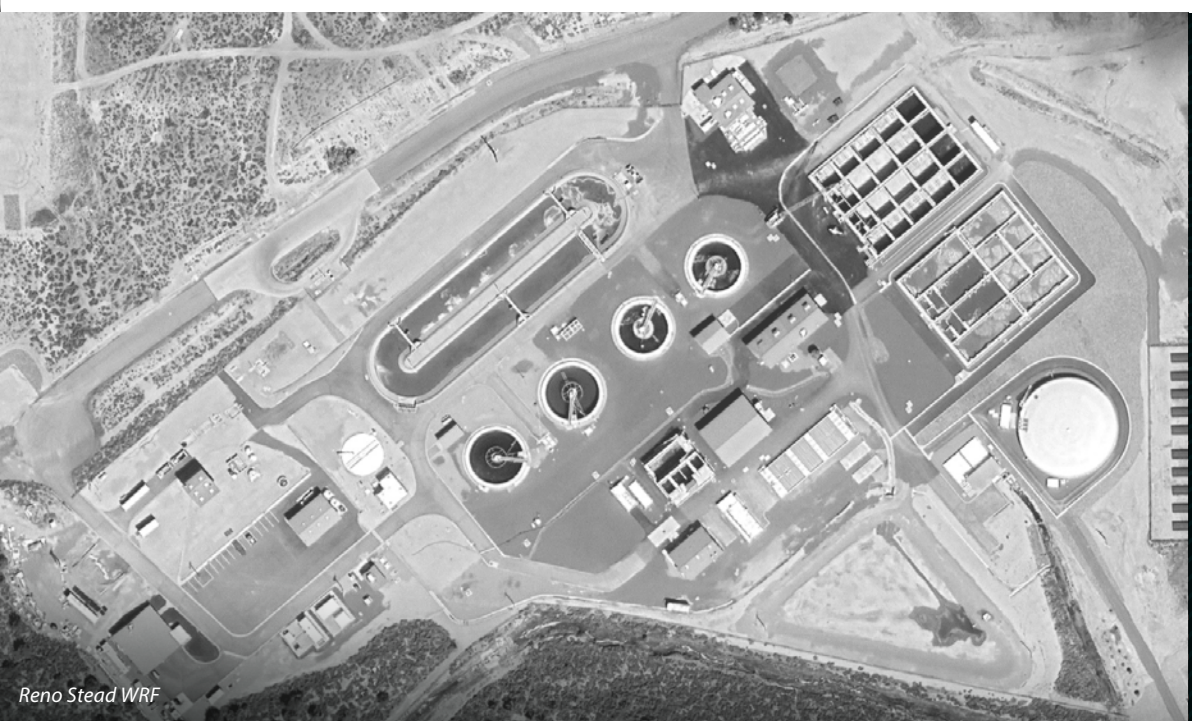
His areas of expertise include secondary treatment, solids handling, biological nutrient removal (BNR), and membrane bioreactors (MBR). In addition to wastewater treatment plant design, he has delivered projects for many clients to improve effluent quality and meet regulatory permit requirements through process simulation, hydraulic modeling, process optimization, troubleshooting, capacity assessment, and pilot studies.

He has published papers and spoken at conferences on the latest developments in wastewater engineering. He is the primary author of the primary treatment chapter in *Design of Water Resource Recovery Facilities*, MOP8, 6th edition, from the Water Environment Foundation. He is a Professional Civil Engineer (PE) and a Board Certified Environmental Engineer (BCEE).

Merced WWTP



Lincoln WWTRF



Reno Stead WRF

Before joining OWP, Dr. Botrous designed over 25 wastewater treatment plants across the United States.

From My Desk:

Akram Botrous

As I present my very first annual report, I feel honored to carry on the legacy of Dr. Ken Kerri, the founder of OWP, and Dr. Ramzi Mahmood, the former executive director of OWP, whose significant contributions and vision have shaped the success of this great organization. I am filled with excitement and pride for the remarkable achievements made this year. Although I have been in the office for only two months, I am confident our journey will be driven by a shared commitment to provide the best-in-class operator training materials and to tackle the pressing water challenges through advanced, and more importantly, applied research projects.

This annual report serves as a record of our achievements and as a testament to the dedication and collaboration of our talented team and how we collaborate with partners and stakeholders. Some examples of our work in the last fiscal year include:

- OWP released the new 4th edition of *Industrial Waste Treatment*, Volumes 1 and 2, significantly updating both training manuals in the series.
- OWP's project team collected drinking water quality data at California licensed child care centers for a statewide effort to reduce lead exposure in young children. We collected 4,405 drinking water samples from 749 child care facilities.
- OWP assisted the University of California, Los Angeles Luskin Center with performing a statewide needs assessment on California's wastewater systems.
- OWP updated the California State University, Sacramento (Sacramento State) campus utility map with infrastructure features using Environmental Systems Research Institute's ArcGIS Field Maps mobile application.

As we reflect on the last year, we are not only celebrating our accomplishments, but also looking forward to a new year filled with innovation, growth, and opportunities. The landscape of the water sector continues to evolve, and we are committed to leading the way through practical research and education.

I want to express our deepest gratitude to our funding agencies for their confidence in OWP, our students for their trust in our training materials, and our staff for their dedication.

Sincerely,

Akram Botrous

Akram Botrous, PhD, PE, BCEE
Executive Director, OWP

About Us

OWP publishes the industry standard in drinking water and wastewater training materials and provides valuable, science-based applied research services for water management in California and elsewhere.

Our team of over 60 professionals, trained in a variety of academic disciplines, collaborates to produce high-caliber work that furthers OWP's mission and values. The next three pages highlight the local, national, and international universities, colleges, and degree programs from which OWP staff made their start.

California State University, Sacramento

MS, Civil Engineering (4)
MS, Civil & Environmental Engineering
MS, Computer Science
MS, Geology
MA, English Literature
MBA, Management (2)
BA, Mathematics
BA, Communication Studies (2)
BA, English (2)
BS, Business Administration
BS, Civil Engineering (3)
BS, Geology
BS, Computer Science (2)
BS, Mechanical Engineering
BS, Graphic Design (2)
Instructional Design for eLearning Certificate

University of California, Davis

PhD, Civil & Environmental Engineering (2)
PhD, Agricultural & Resource Economics
MA, Creative Writing
MS, Civil & Environmental Engineering
MS, Hydrologic Sciences
BA, English Language and Literature
BS, Civil Engineering
BS, Civil & Environmental Engineering (2)
BS, Environmental Biology and Management
BS, Geology

University of California, Berkeley

PhD, Civil & Environmental Engineering
MS, Civil & Environmental Engineering
Professional Technical Editing Certificate

University of California, Santa Cruz

BA, Biology
BA, Global Economics

Stanford University

MS, Environmental Engineering (2)
MS, Civil & Environmental Engineering
BA, Human Biology
BS, Civil Engineering (2)

California State Polytechnic University, Humboldt

BA, Economics

California Polytechnic State University, San Luis Obispo

BS, Environmental Management & Protection

California State Polytechnic University, Pomona

BS, Civil Engineering (Environmental Focus)

California State University, Fresno

BA, Mass Communication & Journalism

California State University, Northridge

BA, English (Writing)

California State University, East Bay

Single Subject Credential English

Brandman University

MBA, Business Intelligence & Data Analytics
BA, Business Administration

Mills College

MFA, English & Creative Writing

Washington State University

MS, Geology

Utah State University

PhD, Environmental Engineering
MS, Mathematics
MS, Environmental Engineering

University of Wisconsin, Madison

BS, Civil & Environmental Engineering

New York University

MS, Integrated Marketing

Skidmore College, Saratoga Springs

BA, Government

University of Oregon

BS, Journalism

Oregon State University

MS, Civil & Environmental Engineering

University of Arizona
MS, Chemical Engineering

University of North Texas, Denton
MPA, Public Administration

Indiana University, Bloomington
PhD, Public Affairs

University of Georgia
PhD, Water Resources & Remote Sensing

Harvard University
MA, History

Brandeis University
BA, English and History

Tufts University
BS, Chemical Engineering

University of Nebraska, Lincoln
PhD, English

Southern New Hampshire University
BA, Graphic Design & Media Arts (Web Design)

University of Maine
MS, Agriculture & Resource Economics

Zhytomyr State Technological University
MS, Computer Engineering

American University of Beirut
BS, Geology

University of Baghdad
BS, Civil Engineering (Structures Division)

Queen Mary University of London
PhD, Water Quality Management

Imperial College London
MS, Engineering Hydrology

University of Leeds
MS, Engineering Geology

University of Surrey
BS, Chemical Engineering

Punjab Technical University, Mohali, India
BT, Computer Science

Professionals from around the globe...

Student Assistants

OWP has hired more than 70 student assistants since 2021. After graduation, a few have moved into full-time positions at OWP while others have attained positions with high-profile companies in the Sacramento area and beyond.

2023–2024 Student Assistant Majors

Business Administration, Management Information Systems (2)

Civil Engineering (4)

Communication Sciences and Disorders (1)

Communication Studies (1)

Computer Engineering (1)

Computer Science (11)

English (1)

Family Studies and Human Development (1)

Graphic Design (1)

Health Science (2)

Student Assistants Employed in 2023–2024

6 Graduate Candidates

19 Undergraduate Candidates

Computer Science student assistants, left to right: Kushagra Verma, Danny Phan, Alekya Paladugu, and Vikas Mishra. Far right: Ayush Shukla (Web Developer)

Student assistants help bring new perspectives and fresh ideas to OWP.

Training Services

2023–2024 Highlights

Offering over 50 print, online, and video courses for water and wastewater sector professionals, OWP delivers affordable training materials that help operators, managers, and inspectors do their jobs better.

Manual orders

28,471

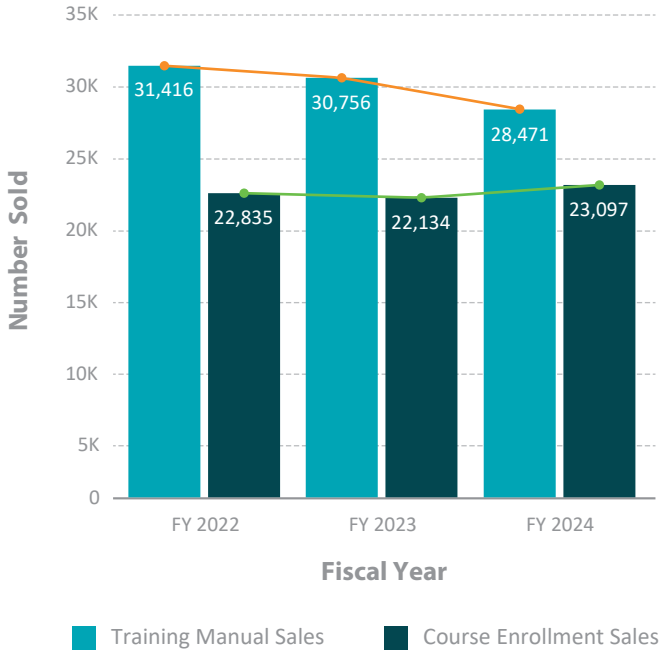
Adult learners

13,985

Course enrollments

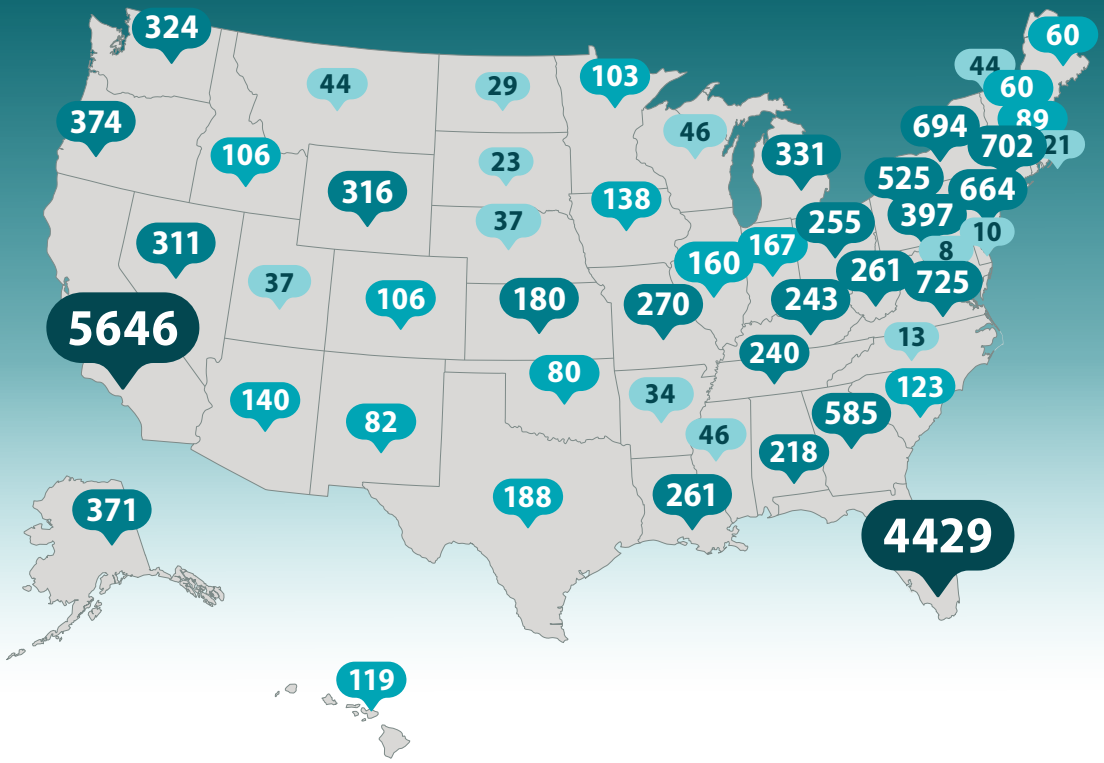
23,097

Training Manual Sales & Course Enrollments (Y2Y)



- Training manual orders reached 28,471, with 82% of orders placed outside California.
- 13,985 adult learners were enrolled in our courses for continuing education units, contact hours, or academic credit, accounting for more than 23,097 of our course enrollments.
- With the majority of our US students residing outside of California, OWP continues to be a leading national training provider.
- International orders from the Canada, Belize, New Zealand, Jamaica, Barbados, and others accounted for 9% of our manual sales and 12% of our course enrollments this year.

US Course Enrollments Sold (by State)

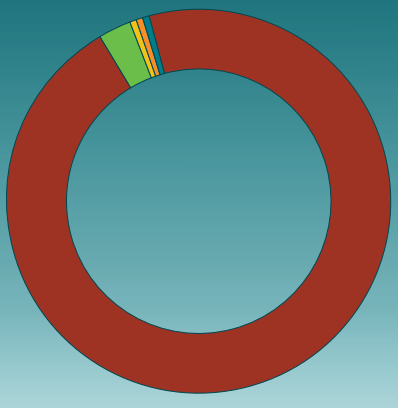


20,461
Total US Course Enrollments

12,380
US Student Enrollees

26,269
Training Manuals Sold in US

Course Enrollments Sold Outside the US (by Country)



Canada	2,502
Jamaica	72
Belize	19
Barbados	12
Cayman Islands	11

Not shown, countries with less than 10 enrollments: Bahrain (1), Honduras (1), India (5), Mexico (1), New Zealand (4), Philippines (3), Spain (1), Turks & Caicos Islands (1), Trinidad & Tobago (2), and the British Virgin Islands (1).

2,636
Course Enrollments Outside US

1,624
Student Enrollees Outside US

2,202
Training Manuals Outside US

Popular Training Materials

Wastewater Courses

Operation of Wastewater Treatment Plants, 3 volumes (training manual, course enrollment)

Advanced Waste Treatment (training manual, course enrollment)

Membrane Bioreactors (training manual, course enrollment)

Operation and Maintenance of Wastewater Collection Systems, 2 volumes (training manual, DVD, course enrollment)

Collection Systems: Methods for Evaluating and Improving Performance (training manual, course enrollment)

Small Wastewater System Operation and Maintenance, 2 volumes (training manual, course enrollment)

Industrial Waste Treatment, 2 volumes (training manual, course enrollment)

Treatment of Metal Wastestreams (training manual, course enrollment)

Pretreatment Facility Inspection (training manual, DVD, course enrollment)

Drinking Water Courses

Water Treatment Plant Operation, 2 volumes (training manual, course enrollment)

Water Distribution System Operation and Maintenance (training manual, course enrollment, online)

Small Water System Operation and Maintenance (training manual, DVD, course enrollment, online)

Water Systems Operation and Maintenance Video Training Series (training manual, DVD, course enrollment)

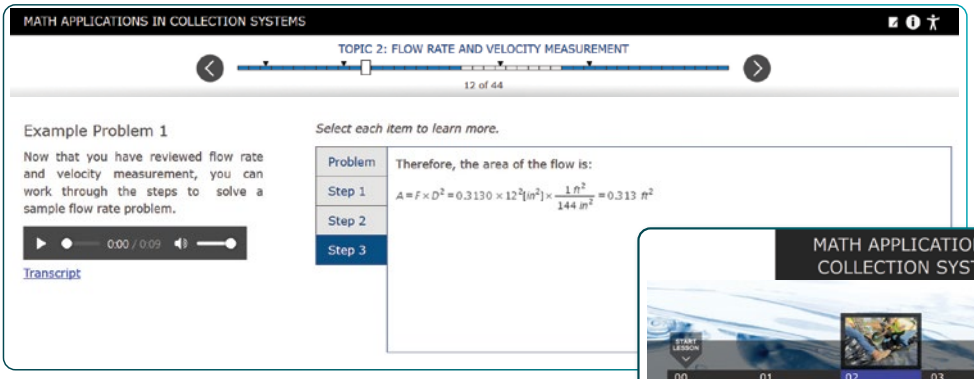
Basic Small Water System Operations (training manual)

Management Courses

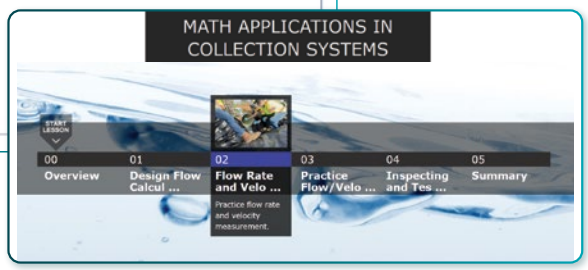
Manage for Success (training manual, course enrollment)

Utility Management (training manual, course enrollment)

Online Math Courses for Operators



Step-by-step examples with audio notes



Start screen menu with lesson topics

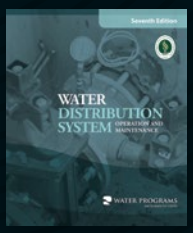
Math applications in:

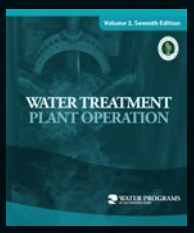
- Water Treatment
- Water Distribution Systems
- Collection Systems
- Wastewater Treatment

Courses feature:

- Detailed, step-by-step example problems
- Example problems include audio notes, figures, and tables to expand your learning experience
- US and metric versions available

Most Popular





- Water Treatment Plant Operation, Volume 1
- Water Distribution System Operation and Maintenance
- Water Treatment Plant Operation, Volume 2
- Operation of Wastewater Treatment Plants, Volume 1
- Operation of Wastewater Treatment Plants, Volume 2

Seminars connect water to people, climate, and policy.

WATER SEMINAR SERIES

Exploring Water Use, Management, & Protection in California

OWP's Water Seminar Series brings together expert speakers, water sector professionals, the Sacramento State community, and the public to explore key California water issues.

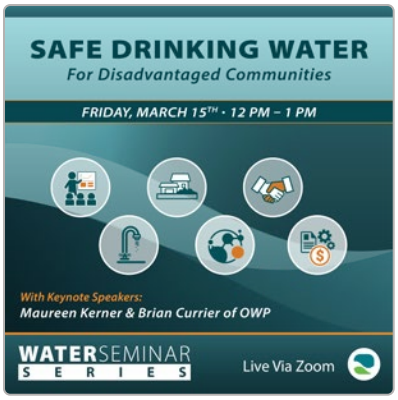
**Seminars are currently presented live via Zoom.*

October 2023

Major Improvements to the Sacramento River Flood Control Project

David Pesavento, supervising engineer at California's Department of Water Resources (DWR); Dan Tibbitts, principal engineer with the Sacramento Area Flood Control Agency (SAFCA); and Sean McNeil, senior project manager for the Sacramento District of the US Army Corps of Engineers (USACE) discussed the need to expand the conveyance capacity in the Sacramento River Flood Control Project bypass system to protect the Sacramento Valley and the Sacramento metropolitan area from future floods. The bypass system, which is critical in passing large flood events through the Sacramento River Flood Control Project, was designed to convey flows experienced in 1907 and 1909. Since completion of construction in the 1950s, it has experienced flows in excess of the design conveyance capacity, with some distress. Key details of the design and construction of both the DWR setback levee project and the USACE Sacramento Weir extension project were presented.

March 2024



Safe Drinking Water for Disadvantaged Communities

For nearly a decade, OWP at Sacramento State has been helping small, disadvantaged, and otherwise underserved communities throughout California and the nation develop plans and access funding to address substandard drinking water and wastewater infrastructure and services. OWP research engineers Maureen Kerner and Brian Currier discussed community water needs in California, California's Human Right to Water (AB 685), various state agency programs and initiatives for improved water services for all, and OWP's involvement through contracts with the California State Water Resources Control Board (State Water Board) and Environmental Protection Agency (EPA). The speakers discussed OWP's collaboration with the State Water Board, EPA, disadvantaged communities, and Sacramento State students through technical assistance addressing funding for equity and resilience, environmental finance programs, water sector needs assessments, lead testing and remediation at child care centers, and per-and polyfluoroalkyl substances (PFAS) drinking water well testing.

Through these and other technical assistance activities, OWP directly supports several Sacramento State Strategic Plan imperatives and confronts inequities, transforms student lives, and strengthens communities in alignment with Sacramento State's goals as an Anchor University.

Listen now at:
www.owp.csus.edu/water-seminars/ ›

SPOTLIGHT

PFAS Water Well Sampling and Analysis Assistance

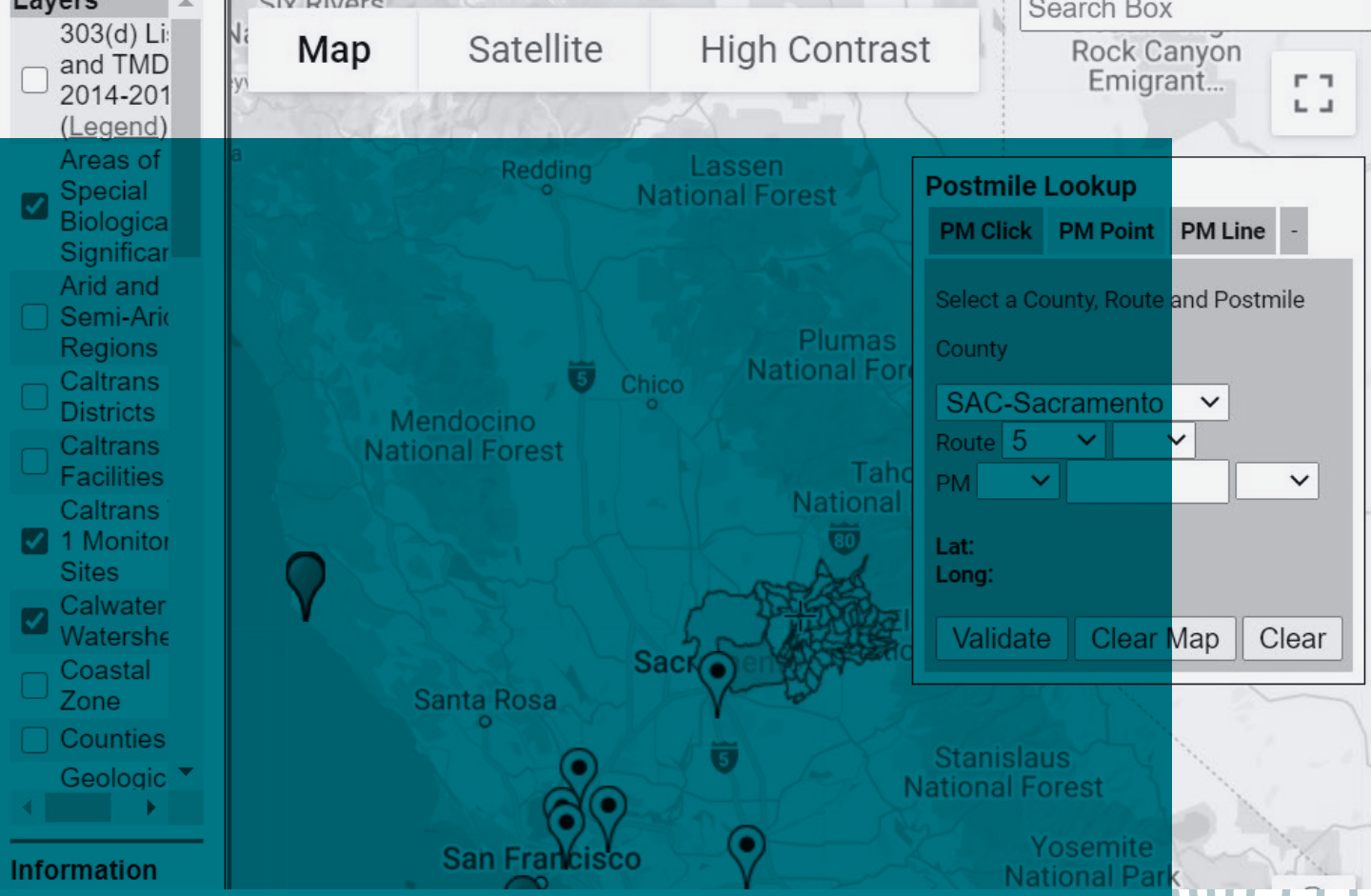
Per-and polyfluoroalkyl substances (PFAS) is a class of more than 14,000 chemicals found in a variety of products from fire-fighting foam to clothing treated to obtain waterproofing or stain resistance. PFAS has been linked with negative human health outcomes such as decreased fertility, decreased immune response, and increased cancer risk and cholesterol levels. With funding from the State Water Board under the direction of the Division of Drinking Water, OWP launched a project to provide technical assistance to water systems with wells serving disadvantaged communities and severely disadvantaged communities that are subject to State Water Board Order DW 2024-0002-DDW.

The technical assistance consists of collecting and analyzing drinking water well samples for PFAS. Over 3,700 wells are expected to be tested. Sampling and analysis services are provided by OWP and our partners at no cost to the water systems. All drinking water wells are sampled once.

Sampling services are provided by our subcontractor Geosyntec, who will collect water samples from the water systems in compliance with EPA Method 533 and other planned methods. Babcock Laboratory provides analysis under a direct contract with the State Water Board. The sample collection date and well access is coordinated with the water systems. Data will be reported by the laboratory to the State Water Board and to OWP. OWP will share results with the water systems, along with necessary actions based on the results of the analysis.

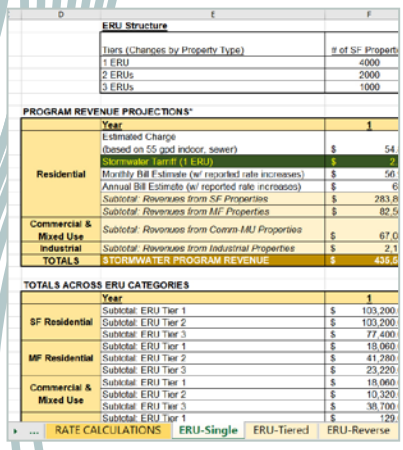
OWP, relying on an indispensable team of 5 computer science student assistants, developed an interactive project website that allows water systems to assign staff for scheduling, assign staff for well access, view the pending sampling appointments, and view results.

The website, found at **pfas.owp.csus.edu**, also provides the public with infographics that gives an overview of our daily progress in sampling and analysis. In addition, the site links to resources on PFAS impacts and other resources developed by the State Water Board. Testing will be completed in 2026.



Technical Tools & Services

Our robust, science-based, and customizable resources for water sector professionals focus on research, design, and planning and include numerical modeling, permit compliance, and stormwater design software tools developed and maintained by OWP's research engineers.



ERU Structure

Tiers (Changes by Property Type)	# of SF Properti
1 ERU	4000
2 ERUs	2000
3 ERUs	1000

PROGRAM REVENUE PROJECTIONS*

	Year	1
Residential	Estimated Charge (based on 55 gpd indoor, sewer)	$ 54
	Stormwater Tariff (1 ERU)	$ 2
	Monthly Bill Estimate (w/ reported rate increases)	$ 56
	Annual Bill Estimate (w/ reported rate increases)	$ 6
	Subtotal: Revenues from SF Properties	$ 283,8
	Subtotal: Revenues from MF Properties	$ 82,5
Commercial & Mixed Use	Subtotal: Revenues from Comm-MU Properties	$ 67,0
Industrial	Subtotal: Revenues from Industrial Properties	$ 2,1
TOTALS	STORMWATER PROGRAM REVENUE	$ 436,5

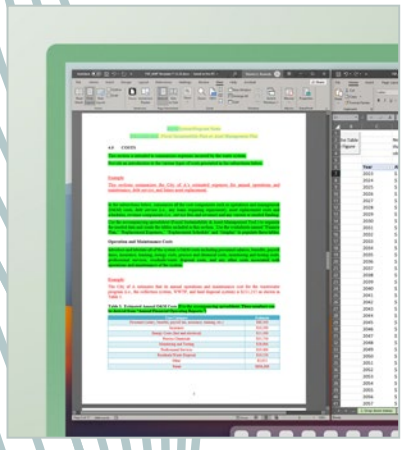
TOTALS ACROSS ERU CATEGORIES

	Year	1
SF Residential	Subtotal: ERU Tier 1	$ 103,200
	Subtotal: ERU Tier 2	$ 103,200
	Subtotal: ERU Tier 3	$ 77,400
MF Residential	Subtotal: ERU Tier 1	$ 18,060
	Subtotal: ERU Tier 2	$ 41,280
	Subtotal: ERU Tier 3	$ 23,220
Commercial & Mixed Use	Subtotal: ERU Tier 1	$ 18,060
	Subtotal: ERU Tier 2	$ 10,320
	Subtotal: ERU Tier 3	$ 30,700
	Subtotal: ERU Tier 1	$ 129

... RATE CALCULATIONS | ERU-Single | ERU-Tiered | ERU-Reverse

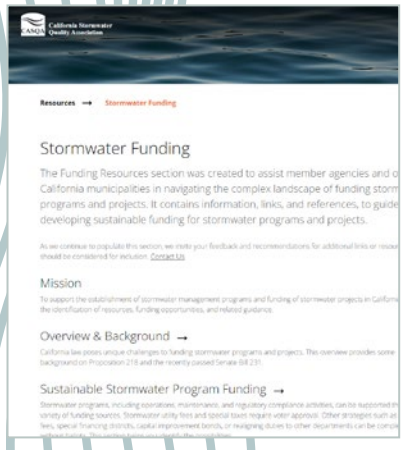
Toolkit for Stormwater Asset Management and Funding

OWP's Environmental Finance Center (EFC) developed a free toolkit to assist municipal stormwater practitioners in implementing asset management. The toolkit includes a guidance report and worksheets that help record data on system assets from pipes to gutters to green infrastructure. The toolkit also helps prioritize maintenance needs, estimate long-term costs, and evaluate revenues from various rate scenarios.



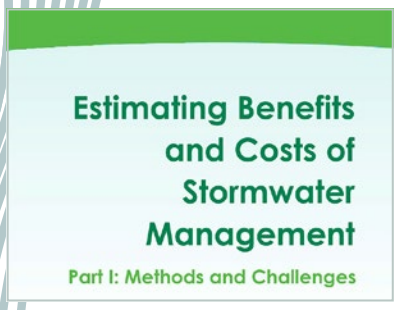
Fiscal Sustainability Plan/Asset Management Plan (FSP/AM) Template and Tool

OWP's EFC developed a downloadable kit called the Fiscal Sustainability and Asset Management Plan Template and Tool for small water and wastewater community service districts (CSDs). The template document provides CSDs with a starting point when developing their own asset management plans. This can be used to fulfill the fiscal sustainability plan required to receive funding from the Clean Water State Revolving Fund. The Fiscal Sustainability tool also provides CSDs with a blueprint to help track their ongoing costs and keep their budgets on track throughout the life of their systems. These documents have been distributed through the EFC network and are available on the EFC at Sacramento State's website.



California Stormwater Quality Association Stormwater Funding Resources Webpages

OWP's EFC collaborated with SCI Consulting and Larry Walker Associates to develop stormwater funding resources webpages for the California Stormwater Quality Association (CASQA). These provide municipal stormwater practitioners with comprehensive resources to explore opportunities for and obtain program and project funding. Program funding topics include stormwater utility fees, realignment of services, local development impact fees, and special taxes. Project funding topics include ways to achieve multiple benefits, resources for estimating costs, and opportunities for grants and loans.

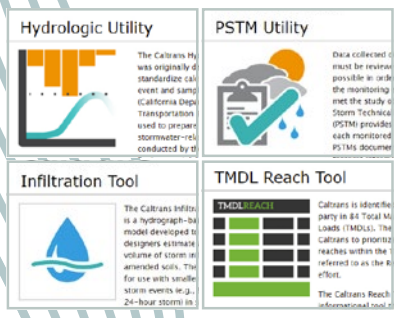


Data Tables and Analysis for Costs of California Stormwater Programs

OWP's EFC accumulated, standardized, and analyzed costs for stormwater management across California municipalities. Reported spending activities and the data used in the analysis are available as executable files. The database serves as the basis for statewide assessments of municipal permit compliance costs by the State Water Board.

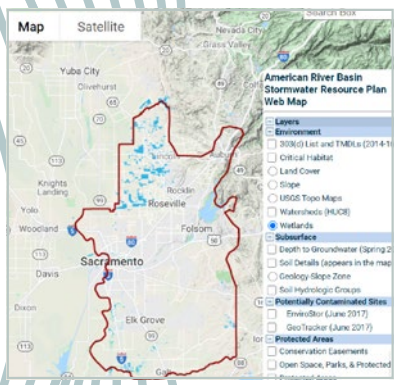
The Stormwater Funding Storyboard

The EFC at Sacramento State developed an interactive storyboard with tools and information that stormwater utilities can use to create effective and sustainable stormwater programs, including resources for early-stage stormwater utility planning and rate development systems.



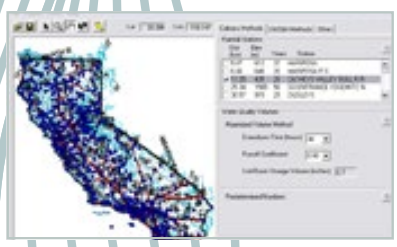
Caltrans Stormwater Tools and Utilities

OWP develops and maintains multiple stormwater analysis and data management tools for California Department of Transportation (CalTrans). Many of these tools are developed to meet specific requirements for the collection, management, and analysis of data for various regulatory monitoring and compliance tasks. Other tools assist designers with meeting stormwater design requirements and documentation.



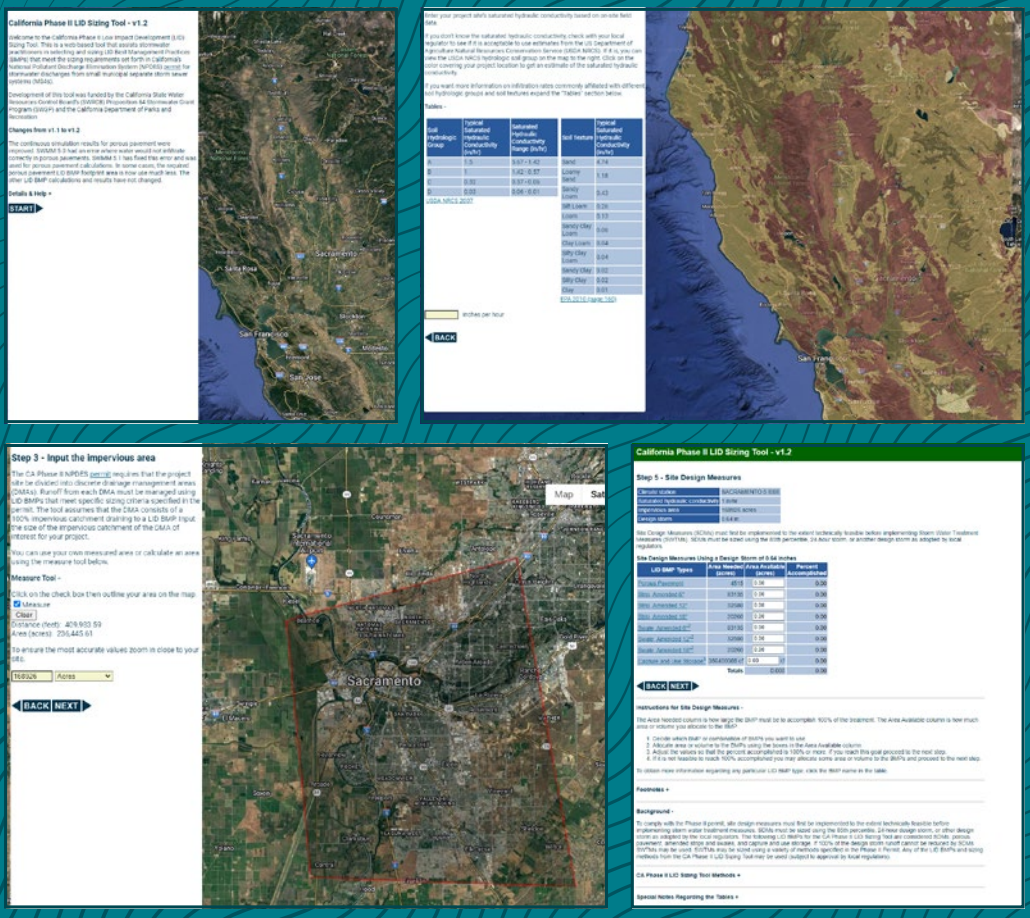
American River Basin Stormwater Resource Plan Web Map

This web-based geographic information system (GIS) map assists users in identifying and evaluating stormwater capture and use project opportunities for the American River Basin Stormwater Resource Plan. The interactive map provides multiple layers of surface, subsurface, environmental, and community characteristics for eastern Sacramento County, western Placer County, and surrounding regions. OWP developed the tool with funding awarded from the State Water Board Proposition 1 Storm Water Planning Grant Program.



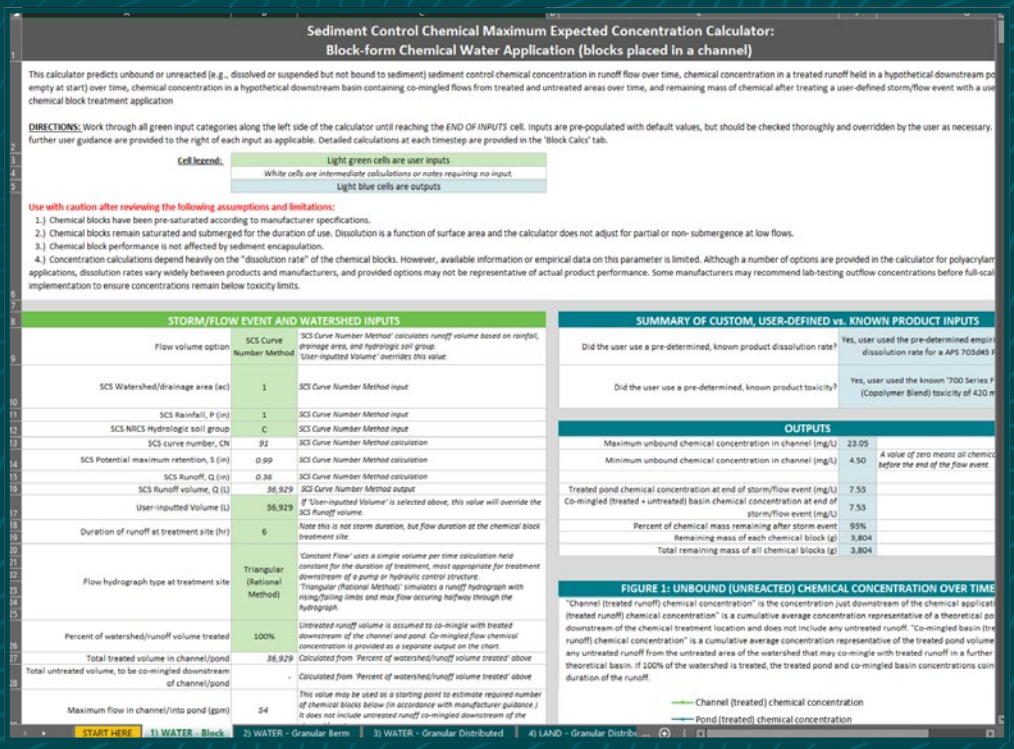
Basin Sizer

Assisting stormwater practitioners in sizing stormwater basins anywhere in California, Basin Sizer is a software tool that calculates water quality volumes and water quality flows using various methods and data obtained from rainfall stations throughout the state. Users can easily select project locations using the interactive map.



California Phase II Low Impact Development Sizing Tool

The Low Impact Development (LID) Sizing Tool assists stormwater practitioners with selecting and sizing LID best management practices that meet sizing requirements in California's National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharges from small municipal separate storm sewer systems. OWP developed the tool with funding awarded from the State Water Board's Proposition 84 Stormwater Grant Program. Subsequent improvements were funded by the California Department of Parks and Recreation.



Sediment Control Chemical Maximum Expected Concentration Calculator:
Block-form Chemical Water Application (blocks placed in a channel)

This calculator predicts unbound or unreacted (e.g., dissolved or suspended but not bound to sediment) sediment control chemical concentration in runoff flow over time, chemical concentration in a treated runoff held in a hypothetical downstream po
empty at start) over time, chemical concentration in a hypothetical downstream basin containing co-mingled flows from treated and untreated areas over time, and remaining mass of chemical after treating a user-defined storm/flow event with a use
chemical block treatment application

DIRECTIONS: Work through all green input categories along the left side of the calculator until reaching the *END OF INPUTS* cell. Inputs are pre-populated with default values, but should be checked thoroughly and overridden by the user as necessary.
further user guidance are provided to the right of each input as applicable. Detailed calculations at each timestep are provided in the 'Block Calcs' tab.

Cell legend:
Light green cells are user inputs
White cells are intermediate calculations or notes requiring no input
Light blue cells are outputs

Use with caution after reviewing the following assumptions and limitations:
1.) Chemical blocks have been pre-saturated according to manufacturer specifications.
2.) Chemical blocks remain saturated and submerged for the duration of use. Dissolution is a function of surface area and the calculator does not adjust for partial or non- submergence at low flows.
3.) Chemical block performance is not affected by sediment encapsulation.
4.) Concentration calculations depend heavily on the "dissolution rate" of the chemical blocks. However, available information or empirical data on this parameter is limited. Although a number of options are provided in the calculator for polyacrylam
applications, dissolution rates vary widely between products and manufacturers, and provided options may not be representative of actual product performance. Some manufacturers may recommend lab-testing outflow concentrations before full-scal
implementation to ensure concentrations remain below toxicity limits.

STORM/FLOW EVENT AND WATERSHED INPUTS

Flow volume option	SCS Curve Number Method	*'SCS Curve Number Method' calculates runoff volume based on rainfall, drainage area, and hydrologic soil group. 'User-inputted Volume' overrides this value.*
SCS Watershed/drainage area (ac)	1	*SCS Curve Number Method input*
SCS Rainfall, P (in)	1	*SCS Curve Number Method input*
SCS NRCS Hydrologic soil group	C	*SCS Curve Number Method input*
SCS curve number, CN	91	*SCS Curve Number Method calculation*
SCS Potential maximum retention, S (in)	0.99	*SCS Curve Number Method calculation*
SCS Runoff, Q (in)	0.36	*SCS Curve Number Method calculation*
SCS Runoff volume, Q (L)	36,929	*SCS Curve Number Method output*
User-inputted Volume (L)	36,929	*If 'User-inputted Volume' is selected above, this value will override the SCS Runoff volume.*
Duration of runoff at treatment site (hr)	6	*Note this is not storm duration, but flow duration at the chemical block treatment site.*
Flow hydrograph type at treatment site	Triangular (Rational Method)	*'Constant Flow' uses a simple volume per time calculation held constant for the duration of treatment, most appropriate for treatment downstream of a pump or hydraulic control structure. 'Triangular (Rational Method)' simulates a runoff hydrograph with rising/falling limbs and max flow occuring halfway through the hydrograph.*
Percent of watershed/runoff volume treated	100%	*Untreated runoff volume is assumed to co-mingle with treated downstream of the channel and pond. Co-mingled flow chemical concentration is provided as a separate output on the chart.*
Total treated volume in channel/pond	36,929	*Calculated from 'Percent of watershed/runoff volume treated' above*
Total untreated volume, to be co-mingled downstream of channel/pond	-	*Calculated from 'Percent of watershed/runoff volume treated' above*
Maximum flow in channel/into pond (gpm)	54	*This value may be used as a starting point to estimate required number of chemical blocks below (in accordance with manufacturer guidance.) It does not include untreated runoff co-mingled downstream of the*

SUMMARY OF CUSTOM, USER-DEFINED vs. KNOWN PRODUCT INPUTS

Did the user use a pre-determined, known product dissolution rate?	Yes, user used the pre-determined empir dissolution rate for a APS 703dt3
Did the user use a pre-determined, known product toxicity?	Yes, user used the known '700 Series P (Copolymer Blend) toxicity of 420 m

OUTPUTS

Maximum unbound chemical concentration in channel (mg/L)	23.05	
Minimum unbound chemical concentration in channel (mg/L)	4.50	*A value of zero means all chemic before the end of the flow event.*
Treated pond chemical concentration at end of storm/flow event (mg/L)	7.53	
Co-mingled (treated + untreated) basin chemical concentration at end of storm/flow event (mg/L)	7.53	
Percent of chemical mass remaining after storm event	93%	
Remaining mass of each chemical block (g)	3,804	
Total remaining mass of all chemical blocks (g)	3,804	

FIGURE 1: UNBOUND (UNREACTED) CHEMICAL CONCENTRATION OVER TIME

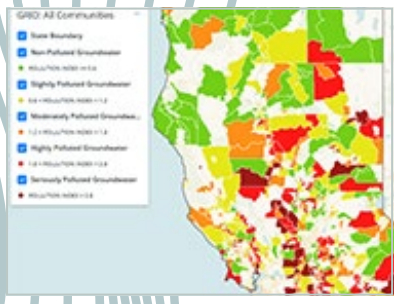
"Channel (treated runoff) chemical concentration" is the concentration just downstream of the chemical applicat
(treated runoff) chemical concentration" is a cumulative average concentration representative of a theoretical po
downstream of the chemical treatment location and does not include any untreated runoff. "Co-mingled basin (tre
runoff) chemical concentration" is a cumulative average concentration representative of the treated pond volume
any untreated runoff from the untreated area of the watershed that may co-mingle with treated runoff in a further
theoretical basin. If 100% of the watershed is treated, the treated pond and co-mingled basin concentrations coin
duration of the runoff.

Channel (treated) chemical concentration
Pond (treated) chemical concentration

START HERE | 1) WATER - Block | 2) WATER - Granular Berm | 3) WATER - Granular Distributed | 4) LAND - Granular Distrib...

Passive Chemical Dosing Discharge Calculator

The passive chemical dosing discharge calculator employs a mass balance timestep modeling approach to predict the maximum expected concentration of erosion control treatment chemicals in effluent water following a user-defined pre-storm application for erosion control or enhanced treatment via sedimentation. The tool, developed using information gathered from a literature review of existing empirical data and existing best management practices, manufacturer and vendor guidance, and input from a technical advisory committee, demonstrates the benefits of using basins to attenuate spikes in concentration over a larger volume. This planning tool assists users in designing environmentally safe erosion and sediment controls that use treatment chemicals at construction and industrial sites.



The California Groundwater Risk Index

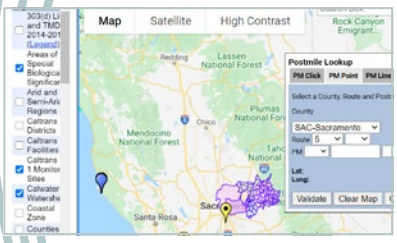
The California Groundwater Risk Index (GRID) is an interactive map that shows disadvantaged communities at risk of exposure to contaminated groundwater. Developed to support grant-funded groundwater remediation projects, GRID combines and maps multiple data sources, including California's Groundwater Ambient Monitoring and Assessment (GAMA) Program data and the CalEnviroScreen tool, to identify disadvantaged and severely disadvantaged communities.

Stormwater Practitioner Training and Exam Administration

In partnership with CASQA and the State Water Board, OWP developed and continues to coordinate training and exam administration programs for Construction and Industrial Permit compliance. The program has certified over 11,000 Qualified Stormwater Developers, Qualified Stormwater Practitioners, and Qualified Industrial Stormwater Practitioners since its inception in 2011.

Struvite Tool

The Struvite Tool makes struvite control planning easier by calculating the struvite precipitation potential for a facility based on user-input water quality parameters. The user can vary input parameters to examine "what-if" scenarios when conditions are changed to control struvite precipitation.



Water Quality Planning Tool

This tool provides planners with an easy-to-use website that makes available the watershed information required to create and comply with stormwater permits. A feature of the website enables the user to find a watershed through interactive maps or by entering the postmile number of a project location.

Hydrologic Analysis Tool

Originally developed to prepare hydrographs for stormwater-related studies conducted by OWP, the Hydrologic Analysis Tool (HAT) standardizes complex calculations required for event-based stormwater monitoring. HAT is freely available to the public for NPDES permit monitoring and stormwater studies.

For more information about software tools, visit us online at: www.owp.csus.edu/research/software-tools.php ›

Applied Research

2023–2024 Highlights

Lead Testing in Child Care Centers

In 2023–2024, a team led by OWP collected 4,405 drinking water samples from 749 California-licensed child care centers for the **Lead Testing in Child Care Centers** program. In compliance with AB 2370 (2018), the samples are analyzed for lead (Pb) and compared to an action level that was developed specifically for child care centers. Water from drinking water outlets (such as faucets and fountains) that test at or above 5.5 parts per billion (ppb) were immediately taken out of service to protect the health of children, which is why the OWP Lead Assistance Team's mantra is, "A tested facility is a safe facility." All child care centers tested by OWP that exceeded the action level were offered financial assistance to replace affected outlets. The sampling effort includes retesting. Replaced outlets that retest below 5.5 ppb can be returned to service. All child care centers, even those that pay for their own testing, can contact OWP to get an explanation of their test results and discuss next steps. To manage outreach efforts, sample scheduling, and testing results, OWP developed a website for both the public and team members: **ab2370assistance.owp.csus.edu**.

Our team of student assistants is integral to the success of this project.

In 2023–2024, a team led by OWP collected 4,405 drinking water samples from 749 California-licensed child care centers for the Lead Testing in Child Care Centers program.

Partners include the California Rural Water Association and the California Child Care Resource and Referral Network. Two state agencies—the State Water Board and the California Department of Social Services—provide funding. Eight student assistants in Public Health, Family and Consumer Sciences, Civil Engineering, and Computer Science majors assisted the OWP Lead Assistance team with performing literature reviews, pipe flow calculations, outreach, and website and database programming. **Our team of student assistants is integral to the success of this project.** This project will continue into the next fiscal year.

Utilities Mapping Support

OWP updated Sacramento State's campus utility maps by making them available to Facilities Management staff via ESRI's ArcGIS Field Maps mobile application. The utilities mapped by OWP include the campus drinking water, wastewater, stormwater, electrical, and irrigation systems. The mobile application, available for Android and iOS users, provides staff with the ability to view their location relative to infrastructure and add notes, photos, and additional details to each mapped feature. Staff also have the ability to update the maps via the mobile application as new infrastructure is constructed.

Wastewater Needs Assessment

OWP assisted the UCLA Luskin Center with performing a statewide needs assessment on California's wastewater systems. The project has two phases: Phase I aims to understand the baseline conditions of California's wastewater infrastructure, and Phase II identifies wastewater systems of concern and potential solutions. OWP's primary roles are compiling publicly available data and identifying data gaps, identifying potential solutions, and modeling solutions and costs for systems of concern.

Applied Research

Funded Grants & Contracts

Wastewater Needs Assessment

UCLA Luskin School of Public Affairs contracted $1,605,490 with OWP (7/1/23–6-20/24) to provide assistance with the statewide wastewater needs assessment.

Per- and Polyfluoroalkyl Substances (PFAS) Sampling and Analyses

The State Water Board contracted $6,093,729 with OWP (6/30/23–2/28/27) to provide technical assistance with collecting and analyzing drinking water well samples for PFAS; as well as related community outreach to the water systems.

Stormwater Capture Estimation

The State Water Board contracted $299,802 with OWP (4/1/24–3/2/26) to develop a method to estimate current stormwater capture in California.

Environmental Finance Center (Region 9)

The EPA awarded OWP $4,800,000 to develop, operate, and maintain an Environmental Finance Center for Region 9 between July 2016 and September 2023. Based on the success of these services, EPA awarded OWP an additional $5,000,000 grant to continue EFC services from May 2023 through September 2028.

Environmental Compliance Support

Sacramento State Facilities Management contracted $38,200 with OWP to assist with stormwater pollution prevention plan (SWPPP) development, trash assessments, and other related tasks.

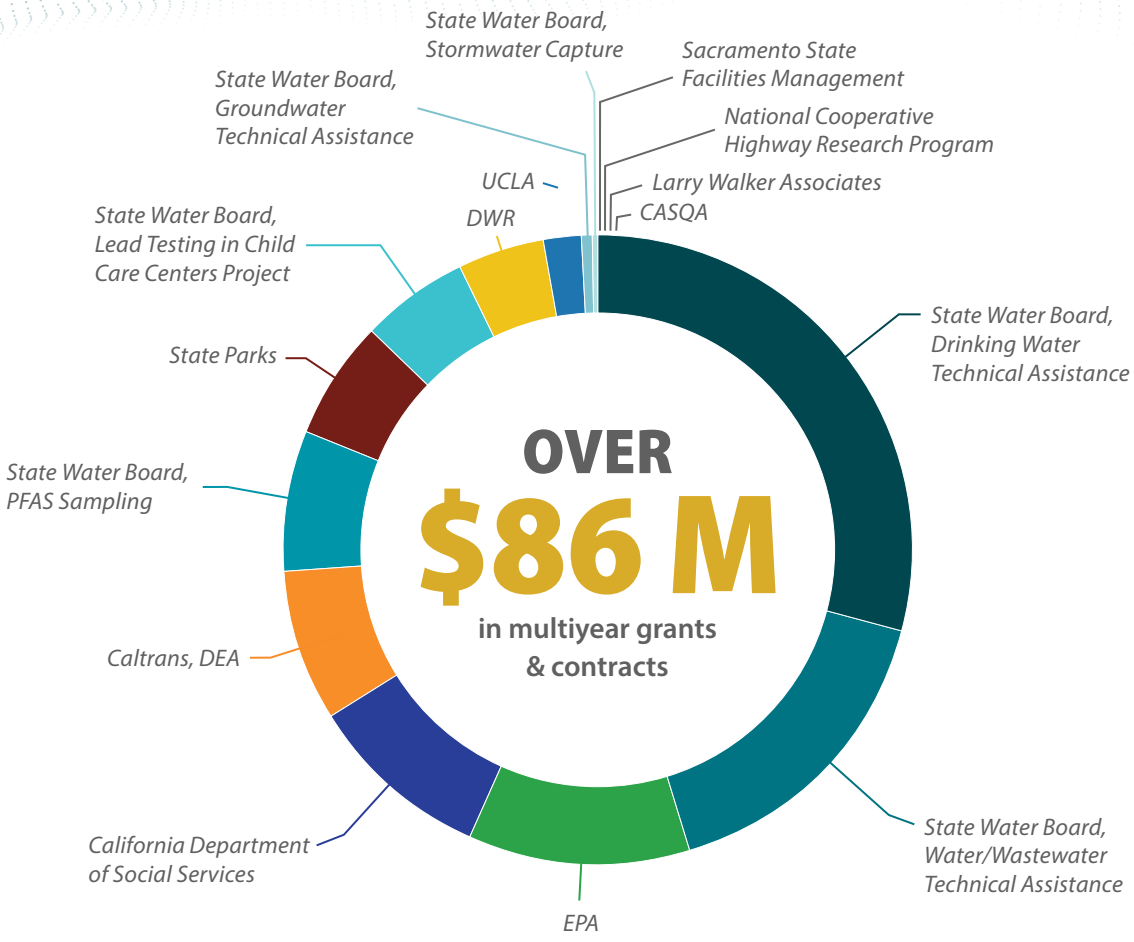
Utilities Mapping Support

Sacramento State Facilities Management contracted $35,248 with OWP to update campus utility maps and make them available to Facilities Management staff via a mobile application. Facilities Management staff can also add information about campus infrastructure using the app.

Lead in Drinking Water Projects

The State Water Board contracted $4,900,000 with OWP (10/1/19–1/31/25) to provide technical assistance to Licensed Child Care Centers to collect and analyze drinking water samples and, subsequently, remediate lead contamination that exceeds thresholds.

The California Department of Social Services (CDSS) contracted $8,102,400 with OWP (7/1/21–6/30/25) to provide the Community Care Licensing Division Child Care Program (CCP) with assistance in outreach and technical assistance to priority licensed child care centers to collect and analyze drinking water samples for lead.



ˆ *Individual funded grants and contracts range from $16K to $25M and may have a time span of about 6 months to 12 years.*

Stormwater Technical Assistance Project

Larry Walker Associates contracted $16,750 with OWP (7/01/23–12/31/24) to assist with regulatory and monitoring services for the Sacramento Stormwater Quality Partnership.

Stormwater Program Technical Assistance

The California Department of Parks and Recreation (State Parks) contracted $5,300,000 with OWP (6/29/21–2/28/25) to provide technical assistance for its stormwater program.

Sustainable stormwater management: A greener future, one drop at a time.

Stormwater Research Technical Assistance

The CalTrans, Division of Environmental Analysis (DEA) contracted $6,794,000 with OWP (12/1/22–11/30/27) to provide technical assistance with stormwater research focusing on discharge characterization, source identification and control, and treatment control studies.

Division of Safety of Dams Mapping Project

The California Department of Water Resources (DWR) contracted $3,750,000 with OWP (1/1/13–6/30/25) to assist the Division of Safety of Dams (DSOD) with dam break flood analysis and emergency action plan development.

Qualified SWPPP Developer and Qualified SWPPP Practitioner Testing and Certification

CASQA contracted with OWP (executed on 1/21/11) to develop and implement an online training delivery system to administer and grade tests and issue certifications for Qualified SWPPP Developers and Qualified SWPPP Practitioners.

Qualified Industrial Stormwater Practitioners Training and Testing

CASQA contracted with OWP (executed on 05/23/16) to develop and implement an online system to train and test Qualified Industrial Stormwater Practitioner certificate candidates.

Safe, clean water helps communities stay healthy and thrive.

Drinking Water and Wastewater Technical Assistance and Outreach

The State Water Board, under a Proposition 1 grant, contracted $14,057,000 with OWP (9/1/16–2/28/26) to provide drinking water and wastewater technical assistance to disadvantaged communities in California.

Drinking Water Technical Assistance and Outreach

The State Water Board, under the Safe and Affordable Funding for Equity and Resilience (SAFER) grant, contracted $25,000,000 with OWP (3/9/20–2/28/26) to provide drinking water technical assistance to disadvantaged communities in California.

Groundwater Technical Assistance and Outreach

The State Water Board, under a Proposition 1 grant, contracted $482,363 with OWP (9/1/16–12/31/23) to provide groundwater technical assistance to disadvantaged communities in California.

Trash Rapid Assessment Data Exchange

OWP is assisting Dr. Julian Fulton (Sacramento State Environmental Studies) with an EPA contract for the Trash Rapid Assessment Data Exchange (TRADE) project. OWP is acting as the liaison to the State Water Board and stormwater permittees for the duration of the project (10/1/20–9/30/23).

Bioretention Stormwater Control Measures Synthesis

The National Cooperative Highway Research Program contracted $45,000 with OWP (executed on 3/2/22) to synthesize current state department of transportation practices for the implementation and use of bioretention stormwater control measures.


CAT

Professional Activities

Conferences, Forums, & Webinars

Conferences offer insight into the latest trends and technologies relevant to the water sector.

July 2023

EPA On-Boarding Webinar to Technical Assistance Providers, Virtual (presenter)

September 2023

California Stormwater Quality Association (CASQA) Conference, San Diego, CA (3 abstract reviewers)

January 2024

Water Professionals International (WPI) Innovation in Certification Conference, Newport Beach, CA (presenter and exhibitor)

February 2024

California Water Environment Association (CWEA) Pretreatment, Pollution Prevention, and Stormwater Conference, Seaside, CA (presenter)

February 2024

Pacific Water Conference, Honolulu, HI (presenter)

March 2024

Nevada Rural Water Association Training, Technical Conference and Expo, Sparks, NV (presenter)

March 2024

Workshop for Nevada Water and Wastewater Utilities, Virtual (2 presenters)

April 2024

Contra Costa Clean Water Program Countywide Stormwater Funding Options Workshop, Virtual (2 facilitators)

CSU-Water Annual Conference, Costa Mesa, CA (3 presenters)

June 2024

Multi-Media EFC Day at EPA, Virtual (presenter)

Professional Activities

Committees & Meetings

ASTM Committee E64 on Stormwater Control Measures

California Stormwater Quality Association (CASQA)

Strategic Planning Committee

BMP Effectiveness Subcommittee

BMP Handbook Subcommittee

True Source Control Subcommittee

Conference Subcommittee

Construction Subcommittee

Industrial Subcommittee

Monitoring and Science Subcommittee

Non-Traditional Phase II Subcommittee

Phase II Subcommittee

Policy and Permitting Subcommittee

Stormwater Capture and Use Subcommittee

Scholarship and Fellowship Working Group

Stormwater Funding Subcommittee

We encourage growth by sharing knowledge and helping bring change.

EFC Network

State Water Resources Control Board (State Water Board)

- *Construction General Permit Training Team*
- *Industrial General Permit Training Team*
- *Southern CA Beach Water Quality Work Group*
- *Safe to Swim Work Group*
- *State Revolving Fund Stakeholder Advisory Group*

NCHRP 25-61: Effective On-Bridge Treatment of Stormwater

- *Panel Member*

NCHRP 24-50: Rewrite of the AASHTO Drainage Manual

- *Panel Member*

Calleguas Creek Watershed TMDL Stakeholder Group

Transportation Research Board

- *Hydraulics, Hydrology, and Stormwater Committee*

Washington State TAPE External Board of Reviewers

Water Environment Federation (WEF)

- *Stormwater Committee*
- *Industrial Subcommittee*

Professional Activities

Awards

CASQA Outstanding Service Award

John Heltzel, September 2023

OWP research engineer John Heltzel received a 2023 CASQA Outstanding Service Award for his work on updating the CASQA BMP Construction Handbook to address the newly adopted 2022 Construction General Stormwater Permit. He also assisted with the development of a reissuance review to help stormwater practitioners better understand requirements of the newly adopted construction stormwater permit.

Promoting the future of the water sector and providing solutions for protecting and enhancing water resources, public health, and the environment . . .

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