2024 Year in Review

THE Water Research FOUNDATION®

OUR PURPOSE

To advance the science of water to improve the quality of life for all communities.

OUR VISION

The science and knowledge we generate allow the water sector to provide high-quality, safe, accessible, and affordable water services that contribute to healthy, resilient communities and a sustainable global environment.

OUR MISSION

To help our subscribers discover opportunities and solve problems by delivering actionable water research to meet the needs of the communities they serve.

THE Water Research FOUNDATION®

BY THE NUMBERS

AS OF 8/31/2024

SUBSCRIBERS

916 UTILITIES

31 MANUFACTURERS

50 CONSULTANTS

FUNDED RESEARCH

$95 MILLION

$58 MILLION CASH
Contractually Funded Research

$37 MILLION COST SHARE

RESEARCH PORTFOLIO

270 ACTIVE PROJECTS

73 CO-FUNDED PROJECTS
171 CO-FUNDERS

11 FEDERAL/STATE GRANTS

1 FEDERAL CONTRACTS

2 PRIVATE GRANTS

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46 WRF STAFF

RESEARCH PRIORITY | TAILORED COLLABORATION | EMERGING OPPORTUNITIES | GRANTS/AWARDS | PAUL L. BUSCH AWARD | FACILITATED & UNSOLICITED RESEARCH

Bringing $10M of Research to Life

2024

RESEARCH PRIORITY PROGRAM

- Research Planning Summit: **250** experts, **46** concepts
- RAC approved **26** new projects totaling **$5.9M**
- RFPs posted in September
- Received **140** proposals

TAILORED COLLABORATION PROGRAM

- Received **15** pre-proposals
- TCRC selected **14** for full-proposals
- TCRC approved funding for **12** proposals totaling **$1.59M**

UNSOLICITED RESEARCH PROGRAM

- Received over **164** pre-proposals
- RAC selected **24** for full-proposals
- RAC approved **11** proposals totaling **$1.8M**

EMERGING OPPORTUNITIES PROGRAM

- **15** Projects funded totaling **$942K**

FACILITATED RESEARCH PROGRAM

- **4** projects funded totaling over **$1M**

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RESEARCH PRIORITY PROGRAM

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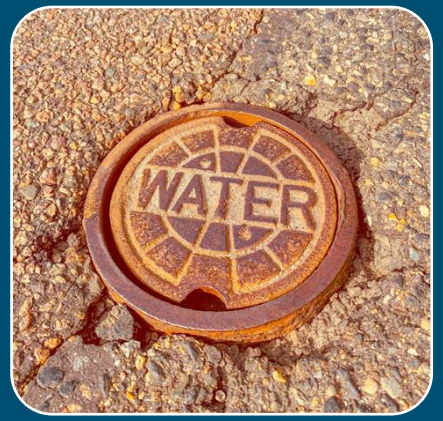
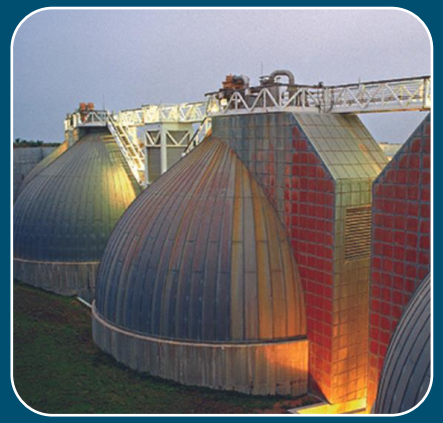




Healthy Communities & Environment

- Holistic Watershed Management & Integrated Planning
- Monitoring Tools at Watershed & Sewershed Scale
- Receiving Water Quality Management

Treatment: Innovation & Optimization

- Treatment & Process Optimization
- Nature-based Solutions
- Diversifying Water Systems

Efficient Resource Use & Recovery

- Energy Efficiency, Intensification & Resource Recovery
- Climate Change Mitigation: Addressing Greenhouse Gases
- Nutrient Removal & Recovery
- Solids Management

Resilient Infrastructure

- Asset Management
- Distribution System Integrity & Water Quality
- Collection Systems Integrity & Water Quality Impacts

Utility Operations & Management

- Water Resource Planning
- Workforce Management
- Financial Management

Climate Risk Assessment & Adaptation, Communication, Environmental Justice, Digital Transformation

Projects Funded

2024

	DRINKING WATER	WASTEWATER	WATER REUSE	STORMWATER
Available Options for Regeneration or Disposal of PFAS-Laden Drinking Water Residuals, Media, and Waste (5285)	■			
Identification and Valuation of Innovative Wastewater Residual Products Beyond Conventional Biosolids (5286)		■		
Method Refinement and Standardization for Microplastics Sample Collection and Analysis (5287)	■	■	■	■
Tradeoffs Between Process Optimization, Greenhouse Gas Mitigation, and Energy Efficiency (5288)	■	■	■	■
Thinking Outside the Pipe: Comparison of Non-invasive, Non-destructive Condition Assessment Technologies for Distribution Pipe (5289)	■	■	■	■
The Emergence of AI in the Water Sector: Opportunities and Challenges for Water Resources Planning (5290)	■	■	■	■
Next-Generation Analytical Methods for Understanding Biological Nutrient Removal Processes (5291)		■		
Pipeline Infrastructure Replacement Costs Guide (5292)	■	■	■	■
Comprehensive Corrosion Control Strategies for Various Water Infrastructure Materials (5293)	■	■	■	
Data Management Best Practices: Integrating Data Sources for Treatment Optimization and Efficiency (5294)	■			
Balancing Human and Natural Assets in a One-Water IWRM Framework (5295)	■	■	■	■
Smart and Connected Energy Management (5296)	■	■	■	■
Implementing a Smart Sewer System to Optimize Capacity to Reduce Surface Flooding and Sewer Overflows (5297)		■		■

Projects Funded

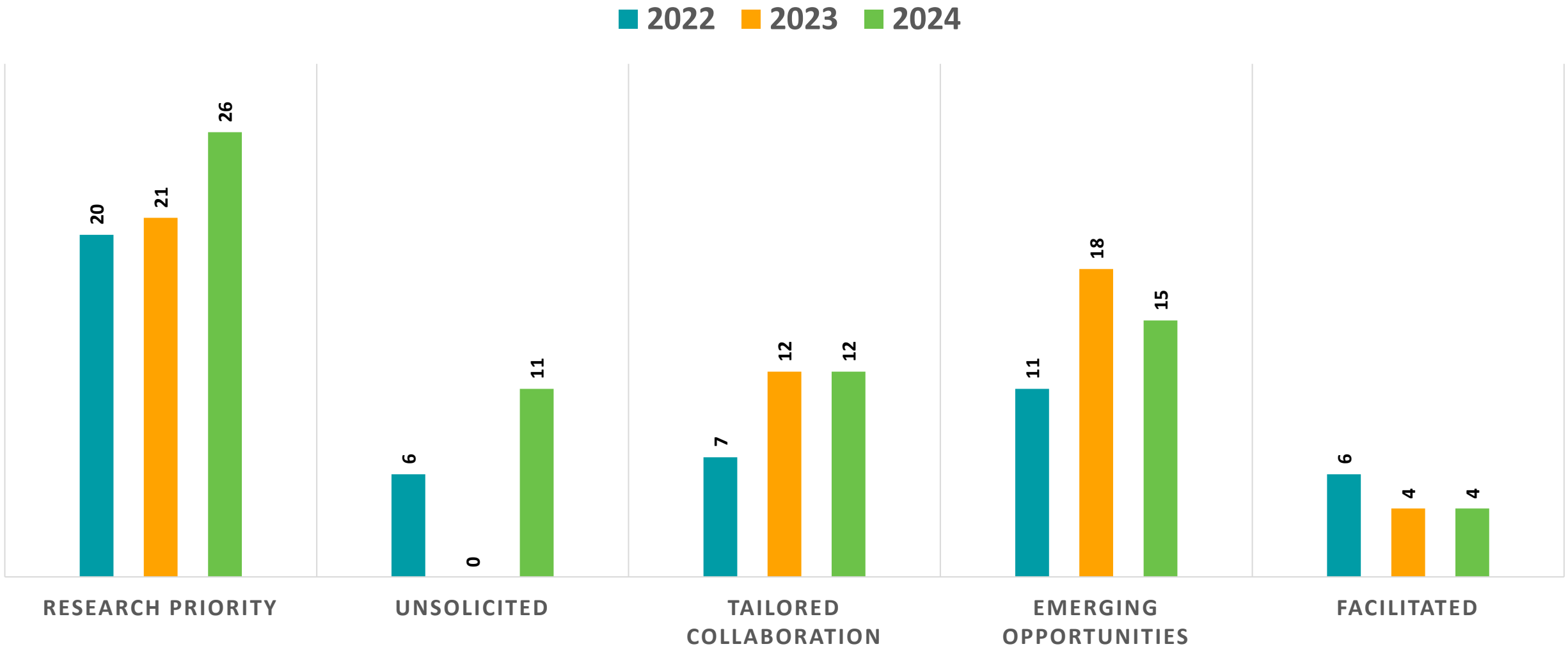
2024

	DRINKING WATER	WASTEWATER	WATER REUSE	STORMWATER
Benchmarking Microbial and Chemical Contamination in Source Water Using Hyperspectral Microscopy (5298)	■	■	■	■
Assessment of CCT Pipe Rig Study Data Compared to Distribution System Lead Levels (5299)	■	■	■	
Recognizing Inst. and Organizational Capacity for Effective Workforce Development Programs (5300)	■	■	■	■
Integrating Requirements, Drivers, and Technologies for Enhanced DS Water Quality Monitoring (5301)	■		■	
Understanding the Practices, Policies and Impacts of System Development Fees and Upgrade Requirements (5302)	■	■	■	■
Integrating Equitable Outcomes into Water Reuse Projects (5303)			■	
Optimizing Nature-based Solutions at the Watershed Scale with Real-time Sensing and Controls (5304)	■	■	■	■
Operationalizing the Benefits of Nature-based Solutions to Inform Decisions in a Changing Climate (5305)	■	■	■	■
The Foundations of Water Resources Planning: Establishing Water Utility Service Level Standards, State of the Field and Guidance (5306)	■	■		
Investigating Progression Pathways Across the Water Workforce (5307)	■	■	■	■
Assessing Changing Salinity in Water Sources (5308)	■	■	■	■
Developing a Protocol for Evaluating Pathogen Concentrations in Secondary Effluent (5309)			■	
Head-to-Head GHG Measurement Comparisons: Evaluating Plant-wide and Process-specific Quantification Methods (5310)		■		

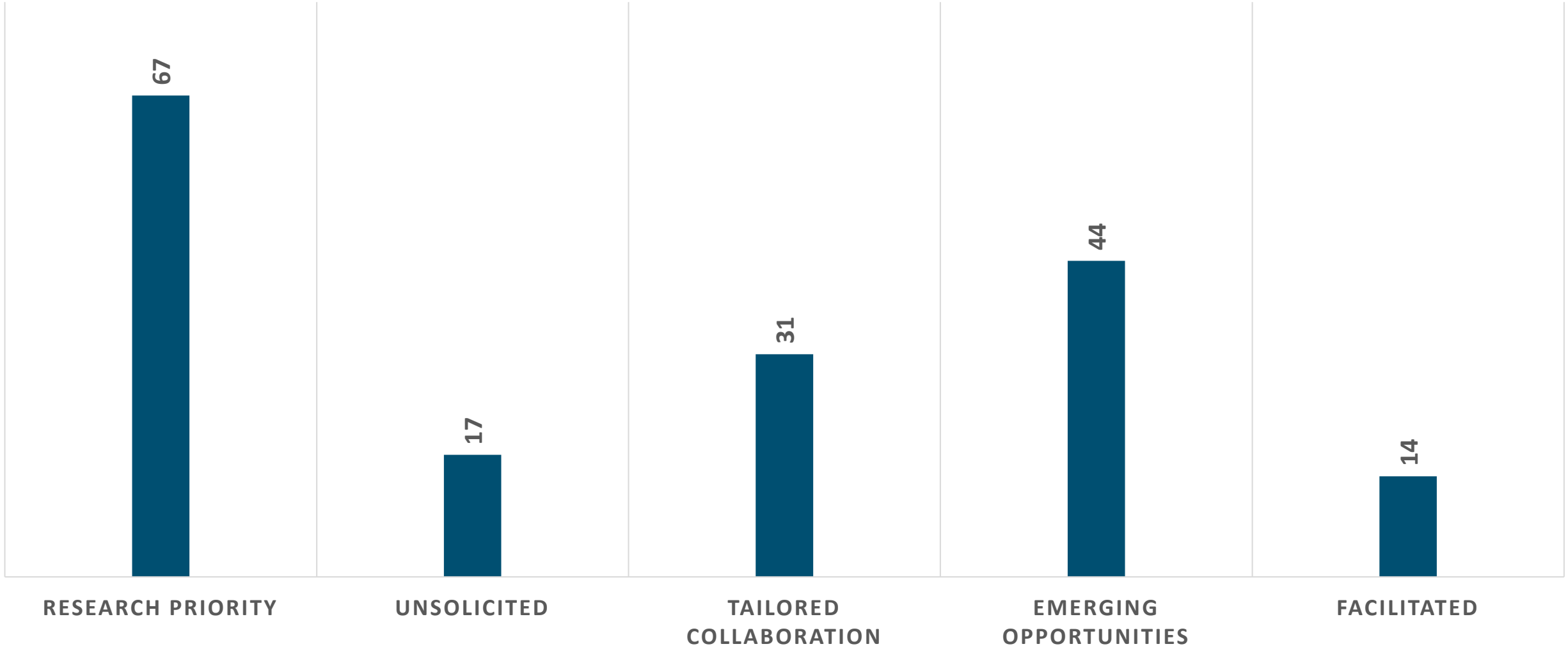
THE Water Research FOUNDATION®

HOL. Holistic Watershed Management & Integrated Planning
MON. Monitoring Tools at Watershed & Sewershed Scale
RWQ. Receiving Water Quality Management
TPO. Treatment & Process Optimization
NbS. Nature-based Solutions
DWS. Diversifying Water Systems
EN. Energy Efficiency, Intensification, & Resource Recovery
NUT. Nutrient Removal & Recovery
CCM. Climate Change Mitigation: Addressing Greenhouse Gases
SM. Solids Management
WRP. Water Resource Planning
WRK. Workforce Management
FM. Financial Management
AM. Asset Management.
CS. Collection System Integrity & Water Quality Impacts
DS. Distribution System Integrity & Water Quality
Other. Not proposed under a subtopic

RESEARCH PROJECTS 2022-2024



RESEARCH PROJECTS 2022-2024



THE Water Research FOUNDATION®

UNSOLICITED RESEARCH PROGRAM

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Project #	Project Title	PI Organization	Foundation Funds Requested	Cost Share/ 3rd Party Contribution	Total Budget
5322	Optimizing BAC Performance for Chemical Peaking in Potable Reuse	Trussell Technologies, Inc.	$175,000	$440,500	$615,500
5323	Pilot-Scale Adsorption of PFAS in RO Concentrate from Potable Reuse Systems	Kennedy Jenks Consultants	$175,000	$139,266	$314,266
5324	A New Rulebook for Effluent Organic Matter (EfOM): Redefining Optical Surrogates for Carbon-based Advanced Treatment (CBAT) in Potable Water Reuse	University of Colorado Boulder	$169,132	$111,011	$280,143
5325	Headworks Reservoir Complex Direct Potable Reuse Pilot	Los Angeles Dept. of Water and Power	$175,000	$1,123,000	$1,298,000
5326	Treatment Mitigation of the Chemical Peaking of Low Molecular Weight Organic Contaminants in Potable Reuse	Southern Nevada Water Authority	$175,000	$90,000	$265,000
5327	Reforming the Water Utility Business Model to Respond to and Better Incentivize Demand Reduction	Alliance for Water Efficiency, NFP	$86,500	$59,005	$145,505
5328	Hydrothermal Alkaline Treatment of PFAS-Contaminated Sludge	Rensselaer Polytechnic Institute	$175,000	$220,038	$395,038
5329	Evaluation and Management of PFAS-Enriched Solids Dewatering Streams	CDM Smith	$169,921	$91,326	$261,247
5330	Development of a Novel Low-Cost Boron Doped Diamond Microfluidic Cell for Rapid Online PFAS Destruction, Detection and Quantification in Water	Fraunhofer USA, Inc.	$123,000	$41,000	$164,000
5331	Nanobubbles for Mitigating Membrane Fouling: A Novel Approach to Anti-fouling and De-fouling	Clemson University	$175,000	$284,826	$459,826
5332	Developing Aromatic DBPs as Improved Metrics for DBP Exposure	Stanford University	$175,000	$67,705	$242,705
		Total	$1,773,553	$2,667,677	$4,441,230

THE Water Research FOUNDATION®

TAILORED COLLABORATION PROGRAM

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Project Title	Sponsoring Utility	Submitting Organization	Foundation Funds Requested	Cost Share/3rd Party Contribution	Total project budget
Breaking the Forever PFAS Cycle: Recycle Stream Treatment to Reduce PFAS Loading to WRRF Influent and Biosolids	Washington Suburban Sanitary Commission	Black & Veatch	$150,000	$365,000	$515,000
Microplastics in Drinking Water Distribution Systems	Eugene Water and Electric Board	CIMA Canada Inc.	$150,000	$252,500	$402,500
Artificial Intelligence-Based Early-Warning & Mitigation System for Harmful Algal Blooms	Charlotte Water	University of North Carolina at Charlotte	$148,980	$148,979	$297,959
Per Capita Water Use Calculation	Central Utah Water Conservancy District	Central Utah Water Conservancy District	$150,000	$270,000	$420,000
Estimating PFAS Using Total Fluorine Methods in Influent and Effluents from a Pilot-Scale Adsorption System	Orange County Water District	Orange County Water District	$150,000	$288,752	$438,752
Advancing HTL Adoption: Integrating HTL Aqueous into WRRF Digestion Processes through Pilot Testing and Assessing Associated PFAS Destruction	Metro Vancouver	Metro Vancouver	$150,000	$382,025	$532,025
PFAS Removal: Comparison of GAC/Sand vs. Anthracite/Sand Prior to Post-filter GAC	Passaic Valley Water Commission	Cornwell Engineering Group	$150,000	$150,000	$300,000
Electrochemical-Driven Partial Denitrification Anammox (ePdNA) Process for Reverse Osmosis Concentrate (ROC) Treatment	Los Angeles County Sanitation Districts	Hazen and Sawyer	$50,000	$110,000	$160,000
Investigating the Effect of Operational Strategies and the Role of Microbial Biomass for Extending the Lifetime of Granular Activated Carbon	City of Ann Arbor	City of Ann Arbor	$150,000	$330,429	$480,429
One PFAS: A One Water Approach to Managing PFAS Pollution	Fairfax Water	Fairfax Water	$150,000	$529,000	$679,000
Process Intensification and Decarbonization via Carbon Management: Pilot-scale Demonstration of the Triple A Settler Technology in Municipal Wastewater Treatment	South Platte Renew	Tetra Tech	$115,000	$373,100	$488,100
Practical Considerations for the Application of Phosphorus Recovery in Biosolids Utilizing Struvite-Based Mineral Production	Metro Water Recovery	Black & Veatch	$75,000	$328,060	$403,060
		Total	**$1,588,980**	**$3,527,845**	**$5,116,825**

THE Water Research FOUNDATION®

EMERGING OPPORTUNITIES PROGRAM

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2024 Emerging Opportunities Projects

Project Number	Title	EO Funds
5207	Project 5207 Add-on: A Framework to Integrate Stormwater Capture into Water Supply Planning	$25,000
5211	Project 5211 Add-on: Assessing the Impact of Gasification on Fate of PFAS in Biosolids at a Full-Scale Facility	$40,000
5283	Toward More Resilient Water Systems in the Face of Fire: Solutions to Understanding and Preventing Infrastructure Damage	$150,000
5208	Project 5208 Add-on: Acid+ (Full Acid+ Process Lab Scale Testing)	$25,000
5284	Exploring the Career Pathways of Diverse and Inclusive Utility Leadership	$25,000
5169	Project 5169 Add-on: Evaluating Innovative and Sustainable Treatment Options for Biosolids (Detailed LCA Framework)	$40,000
5311	Artificial Intelligence (AI): Exploring Opportunities and Risks for WRF Research & Engagement	$50,000
5318	Collaborative Forum on Microplastics Research	$65,000

2024 Emerging Opportunities Projects

Project Number	Title	EO Funds
5319	Application of In-Line ATP Monitoring for Distributed Water System Performance Verification	$85,000
5217	Project 5217 Add-on: Evolution and Characterization of Water Quality in Quarry Lakes	$32,500
5320	Creating a Foundational Understanding of Utility Governance Structures	$65,000
5321	The Role of Generative AI (GenAI) for the Global Water Sector	$50,000
5212	Project 5212 Add-on: Development of a Prototype Aerosol/Froth Capture System for PFAS Removal in WWTPs	$40,000
5366	Design Guidelines for Direct-Bury Large-Diameter Butterfly Valves	$150,000
5348	Reducing Nitrification Risks Through Voluntary Collaboration Between Drinking Water Wholesalers and Consecutive Systems	$100,000
	Total	**$942,500**

THE Water Research FOUNDATION®

FACILITATED RESEARCH PROGRAM

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Funded in 2024

Project Number	Title	Participating Utilities	Research Team	Project Funding
5279	**Data Management Best Practices and Solutions for Water Utilities – Phase II**	Philadelphia Water Department	HDR	$80,000
5280	**Peer Review for 'Evaluation of PFAS Removal by Post-Filter GAC'**	Passaic Valley Water Commission	Cornwell	$35,000
5263	**North Hollywood Pump Station Zone 1 Pumps Surge Analysis**	LADWP	Scott Foster Engineering	$40,000
5312	**Fiber Optics Pilot Projects**	LADWP	Fiber Sense US	$898,654
			Total	**$1,053,654**

THE Water Research FOUNDATION®

SPONSORED PROGRAMS

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Grants and Awards: Ongoing

Grant or Award Title	Granting Organization(s)	Award Value (Includes Cost Share)	Project Number
Potable & Non-Potable Reuse	California State Water Board + MWD	$3.5 Million + $975,000	Multiple
Development of Sensors and Controls to Support the Implementation of Mainstream Shortcut Nitrogen Removal (SCNR) Processes	National Philanthropic Trust	$441,560	5278
EPA-Nutrients/HABs-Mainstream Deammonification with Biological Phosphorus Removal	Environmental Protection Agency	$1.0 Million	5095
Innovative Water Technologies for Small Systems (WRF Sub)	Environmental Protection Agency	$82,000 ($1 Million Total)	5147
Unregulated Organic Chemicals in Biosolids	Environmental Protection Agency	$2.2 Million	5125
Viral Pathogens & Surrogates for Assessing Treatment Performance in Reuse	Environmental Protection Agency	$1.2 Million	5126
Unlocking the Nationwide Potential for Water Reuse	Environmental Protection Agency	$3,245,999	5197
Water Resource Recovery: Integration of Data-Driven Control	Department of Energy	$2.2 Million	5141
Water Resource Recovery: Transforming Aeration Energy (WRF Sub)	Carollo-Department of Energy	$28,000 ($4.6 Million Total)	5148
Quantifying Wastewater Sources of Antibiotic Resistance to Aquatic and Soil Environments and Associated Human Health	Environmental Protection Agency	$3.6 Million	5313
Advancing Energy Efficiency in CA (WRF Sub)	California Energy Commission	$40,000 ($4.0 Million Total)	5150

2024 Paul L. Busch Award Recipient

Jeffrey McCutcheon, PhD

General Electric Professor
of Advanced Manufacturing
Department of Chemical &
Biomolecular Engineering

University of Connecticut

Paul L. Busch Award

Research Funding Allocation

Program	Percent Allocation	Amount
Research Priority	60%	$4,851,883
Tailored Collaboration	20%	$1,617,294
Emerging Opportunities	10%	$808,647
Unsolicited	10% (10% reserved each year; the program launches every other year)	$808,647

THE Water Research FOUNDATION®

2024 Engagement Dashboard

916 UTILITIES **50** CONSULTANTS **31** MANUFACTURERS	**$95M** FUNDED RESEARCH	**270** ACTIVE PROJECTS	**8,882** WEBCAST VIEWS	**1.3B** MEDIA REACH	**79,333** SOCIAL MEDIA FOLLOWERS

Most Visited Research Project Pages

1. Residential End Uses of Water, Version 2 (4309)
2. Occurrence of PFAS Compounds in US Wastewater Treatment Plants (5031)
3. Developing Strategic Consumer Messaging for Microplastics in Drinking Water Supplies (5155)
4. Occurrence of Legionella pneumophila In Drinking Water Distribution Systems (5156)
5. Leading Water Utility Innovation (4907)

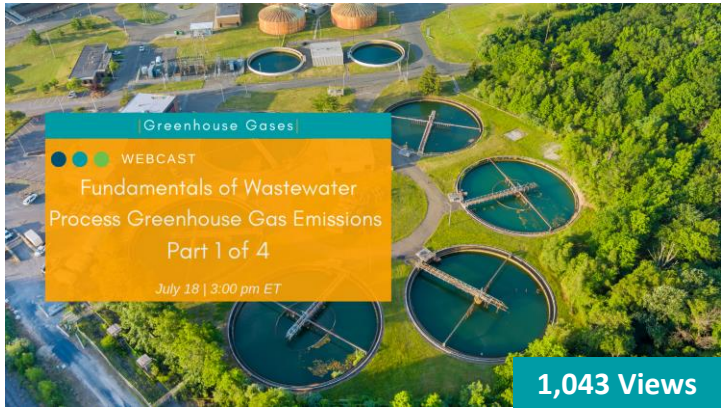
Top Visitor Countries

1. United States
2. Canada
3. India
4. China
5. Australia
6. United Kingdom
7. Germany
8. France
9. Philippines
10. Netherlands

Most Popular Topics

1. PFAS
2. Climate Change
3. Advanced Treatment
4. Lead & Copper
5. Integrated Planning & Water Management
6. Utility Management
7. Energy Optimization
8. Biosolids
9. Water Use & Efficiency
10. Resource Recovery

Most Popular Webcast



1,043 Views

Most Visited Website Resources

1. Greenhouse Gas Emissions in the Water Sector: Let's Uncover the Basics! *Webcast*
2. Residential End Uses of Water, Version 2: Executive Report
3. Wastewater Process Emissions Fundamentals-Part 1 of 4 *Webcast*
4. Occurrence of PFAS Compounds in US Wastewater Treatment Plants *Report*
5. Guidelines for Optimizing Nutrient Removal Plant Performance *Technology Deliverable*

WRF in the News

Energy recovery and saving in municipal wastewater treatment engineering practices *(Nature Sustainability, doi.org/10.1038/s41893-024-01478-5)*

14M Reach

Top Social Media Post

We are pleased to announce the selection of Dr. Kenan Ozekin as the new Chief Research Officer of The Water Research Foundation (WRF)

19K Impressions

Research Deliverables Published

2024

BY THE NUMBERS

32 Final Reports

→ **$11.7M** Research Investment

58 Project Updates

29 Project Information Summaries

Research Published in 2024

One Water Cities: Development of Guidance Documents and Assessment Metrics

Case Studies on Water Sector Interdependencies

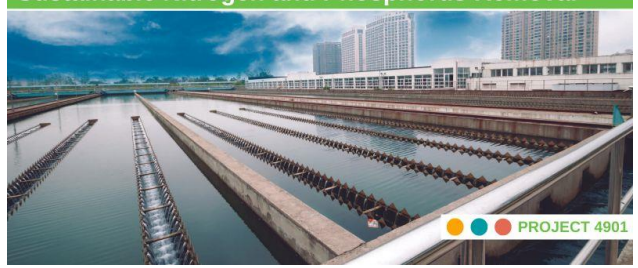
Developing a New Foundational Understanding of SAR—Soil Structure Interactions for Improved Management of Agricultural Recycled Water Use

Assessing the State of Knowledge and Impacts of Recycled Water Irrigation on Agricultural Crops and Soils

Optimizing OH Radical Scavenging Potential Measurement

Integration of High-Frequency Performance Data for Microbial and Chemical Compounds Control in Potable Reuse Treatment Systems

Combining Nitrite-Shunt/Anammox Processes with Side-Stream EBPR Process for Simultaneous and Sustainable Nitrogen and Phosphorus Removal



Demonstrating the Effectiveness of Flushing for Reducing the Levels of Legionella in Service Lines and Premise Plumbing

Carlsbad Desalination Integration and Regional Salinity Reduction Study

Developing Strategic Consumer Messaging for Microplastics in Drinking Water Supplies

Application of Finite Element Analysis in the Design of Large-Diameter Buried Pressure Pipes-Special Cases

Successful Implementation of Decentralized Reuse and Treatment Systems

One Water Cities: Development of Guidance Documents and Assessment Metrics

Case Studies on Water Sector Interdependencies

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Carlsbad Desalination Integration and Regional Salinity Reduction Study

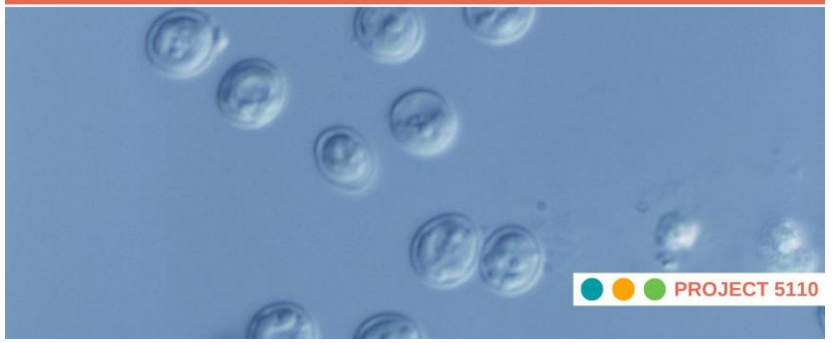
Developing Strategic Consumer Messaging for Microplastics in Drinking Water Supplies

Application of Finite Element Analysis in the Design of Large-Diameter Buried Pressure Pipes-Special Cases

Successful Implementation of Decentralized Reuse and Treatment Systems

Environmental Persistence and Disinfection of the Lassa Virus and SARS-CoV-2 to Protect Worker and Public Safety

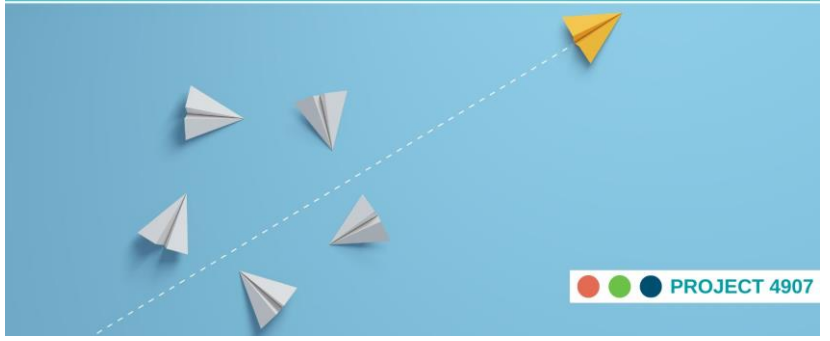
Filtration Process Control for Pathogen Removal and Climate Change Adaptation



Investigation of Alternative Management Strategies to Prevent PFAS from Entering Drinking Water Supplies and Wastewater

Advancement in Continuous Flow Densified Sludge System Design and Operation

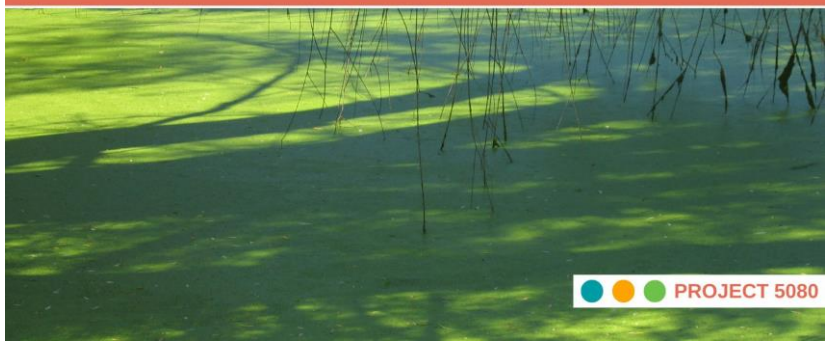
Leading Water Utility Innovation



Occurrence of *Legionella pneumophila* in Drinking Water Distribution Systems

Development of a Community-Based Lead Risk and Mitigation Model

Assessment of Vulnerability of Source Waters to Toxic Cyanobacterial Outbreaks



Impact of Haloacetic Acid MCL Revisions on DBP Exposure and Health Risk Reduction

Occurrence of PFAS Compounds in U.S. Wastewater Treatment Plants

Developing a Framework for Quantifying Energy Optimization Reporting

Improving BNR Control Systems and Online Analytical Measurement Reliability and Accuracy

Autonomous in situ Monitoring of Harmful Algal Blooms

Diversifying Water Portfolios through Stormwater Capture and Use: Contributing to a Water Resilient Future

Development of Hybrid Digital Twins for Predictive Nutrient Control

THE Water Research FOUNDATION®

2024 YEAR IN REVIEW
Webcasts

11,908	6,431	2,430	8,882
REGISTRATIONS	LIVE VIEWERS	ON-DEMAND VIEWS	WEBCAST VIEWS

MOST VIEWED WEBCASTS

Fundamentals of Wastewater Process Greenhouse Gas Emissions

Nitrous Oxide Emissions from Wastewater Treatment

Methane Emissions from Wastewater Treatment

THE Water Research FOUNDATION®

2024 YEAR IN REVIEW
Webcasts

Date	Title
1/18/24	2024 Unsolicited Research Program Update
1/30/24	Biogas Harvester Demonstration
5/9/24	Your Water System is Not Isolated – Interdependencies are Important
5/16/24	Developing Strategic Consumer Messaging for Microplastics in Drinking Water Supplies
5/23/24	Demonstrating the Effectiveness of Flushing for Reducing the Levels of Legionella in Service Lines and Premise Plumbing
5/28/24	Guidance for Using Pipe Rigs to Inform Lead and Copper Corrosion Control Treatment Decisions
6/6/24	Guidance for Complying with LCR Revisions for Water Systems with No- to Low Prevalence of Lead Service Lines (LSL, LSLs)
7/18/24	Fundamentals of Wastewater Process Greenhouse Gas Emissions - 1 of 4
8/20/24	Incorporating Academic Research into the Coordinated National Research Strategy for Water Reuse
8/29/24	Beginning your Digital Transformation Journey
9/3/24	Exploring Data Science Careers in the Water Sector
9/19/24	Methane Emissions from Wastewater Treatment - 2 of 4

2024 YEAR IN REVIEW
Webcasts

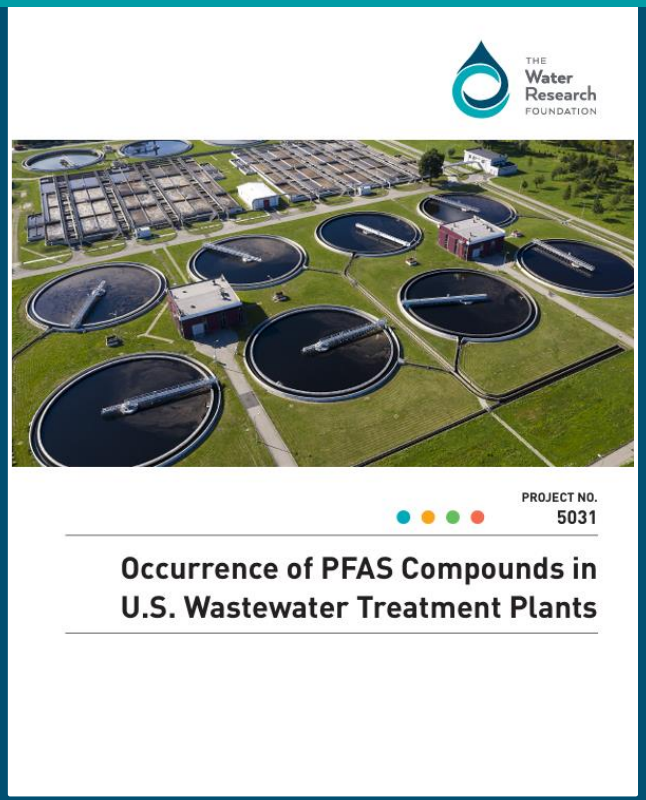
Date	Title
10/1/24	Exploring Utility Digital Transformations
10/15/24	Transforming Nutrient Removal in Water Resource Recovery Facilities (WRRFs) through Suboxic / Low DO Treatment-1 of 3
10/24/24	Occurrence of Legionella pneumophila In Drinking Water Distribution Systems
10/29/24	Establishing a Framework for Integrating Stormwater Capture into Water Supply Planning
10/31/24	Nitrous Oxide Emissions from Wastewater Treatment - 3 of 4
11/5/24	Transforming Aeration Energy in Water Resource Recovery Facilities (WRRFs) through Suboxic Nitrogen Removal: Part 2
11/19/24	Transforming Nutrient Removal in Water Resource Recovery Facilities (WRRFs) through Suboxic / Low DO Treatment: Part 3
12/3/24	Leading Water Utility Innovation
12/10/24	Surveillance of Antimicrobial Resistance Emergence in the Environment
12/12/24	Opportunities for Process Emissions Reductions - 4 of 4
12/19/24	Doing More with Less: Using Open-Source Code and Mapping Water Challenges for Water Reuse Potential

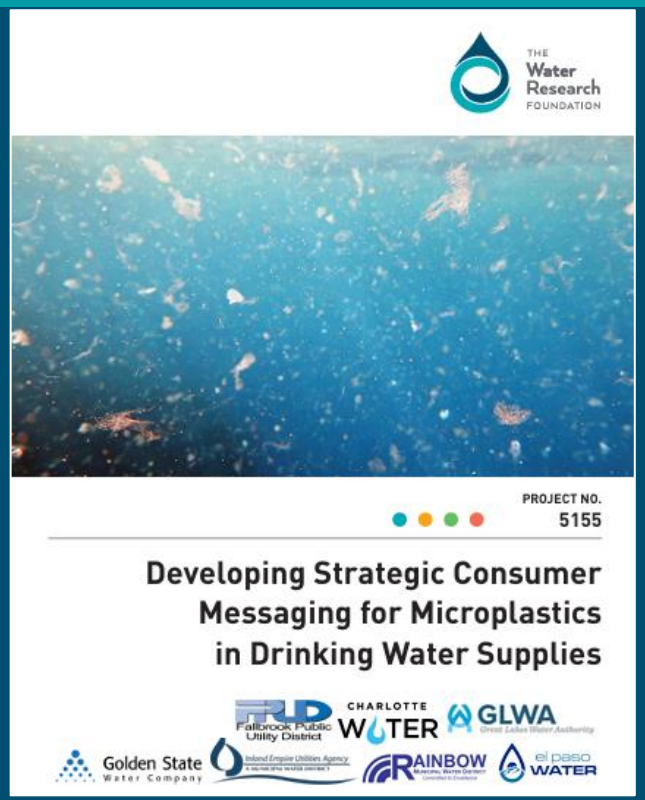
THE Water Research FOUNDATION®

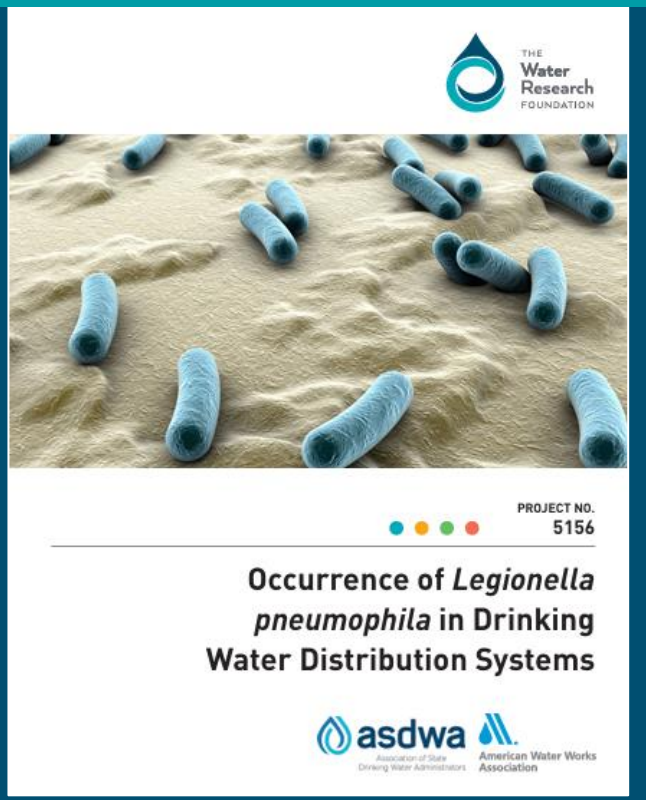
2024 YEAR IN REVIEW
Research Published

32	$11.7M	58	29
FINAL REPORTS	PUBLISHED RESEARCH INVESTMENT	PROJECT UPDATES	PROJECT INFORMATION SUMMARIES

Most Visited Project Webpages







THE Water Research FOUNDATION®

2024 YEAR IN REVIEW
Research Published

Project Number	Title	Research Investment
4969	One Water Cities: Development of Guidance Documents and Assessment Metrics	$325,507
5086	Case Studies on Water Sector Interdependencies	$298,392
4963	Developing a New Foundational Understanding of SAR—Soil Structure Interactions for Improved Management of Agricultural Recycled Water Use	$380,000
4964	Assessing the State of Knowledge and Impacts of Recycled Water Irrigation on Agricultural Crops and Soils	$152,500
5194	Optimizing OH Radical Scavenging Potential Measurement	$25,000
4954	Integration of High-Frequency Performance Data for Microbial and Chemical Compound Control in Potable Reuse Treatment Systems	$739,957
4901	Combining Nitrite-Shunt/Anammox Processes with Side-Stream EBPR Process for Simultaneous and Sustainable Nitrogen and Phosphorus Removal	$918,771
5061	Carlsbad Desalination Integration and Regional Salinity Reduction Study	$135,069
5033	Demonstrating the Effectiveness of Flushing for Reducing the Levels of Legionella in Service Lines and Premise Plumbing	$526,924
5031	Occurrence of PFAS Compounds in US Wastewater Treatment Plants	$899,693

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2024 YEAR IN REVIEW
Research Published

Project Number	Title	Research Investment
5091	Developing a Framework for Quantifying Energy Optimization Reporting	$441,825
5085	Impact of Haloacetic Acid MCL Revisions on DBP Exposure and Health Risk Reduction	$274,154
5155	Developing Strategic Consumer Messaging for Microplastics in Drinking Water Supplies	$171,360
5109	Application of Finite Element Analysis in the Design of Large-Diameter Buried Pressure Pipes-Special Cases	$199,670
5040	Successful Implementation of Decentralized Reuse and Treatment Systems	$345,772
4965	Development of a Community-Based Lead Risk and Mitigation Model	$2,371,790
5029	Environmental Persistence and Disinfection of the Lassa Virus and SARS-CoV-2 to Protect Worker and Public Safety	$295,031
5110	Filtration Process Control for Pathogen Removal and Climate Change Adaptation	$522,236
5082	Investigation of Alternative Management Strategies to Prevent PFAS from Entering Drinking Water Supplies and Wastewater	$793,734
5130	Advancement in Continuous Flow Densified Sludge System Design and Operation	$200,000
5092	Understanding and Improving Reuse Biofilter Performance during Transition from GAC to BAC	$279,803

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2024 YEAR IN REVIEW
Research Published

Project Number	Title	Research Investment
4907	Leading Water Utility Innovation	$1,159,980
5156	Occurrence of Legionella pneumophila In Drinking Water Distribution Systems	$463,381
5180	Incorporating Equity and Social Dimension into Community Climate Adaptation Planning and Watershed Management – Interim Deliverable	N/A
5080	Assessment of Vulnerability of Source Waters to Toxic Cyanobacterial Outbreaks	$492,764
5087	Implementation of Innovative Biological Nutrient Removal Processes through Improvement of Control Systems and Online Analytical Measurement Reliability and Accuracy	$303,939
5154	Autonomous in situ Monitoring of Harmful Algal Blooms	$308,143
5106	Concept of Operations (CONOPS) Plan for Water Distribution System Testing and Recovery – Interim Deliverable	N/A
5236	Diversifying Water Portfolios through Stormwater Capture and Use: Contributing to a Water Resilient Future	$23,000
5121	Development of Hybrid Digital Twins for Predictive Nutrient Control	$666,135
5040	Successful Implementation of Decentralized Reuse and Treatment Systems (project paper/fact sheet)	N/A
4813	Critical Evaluation and Assessment of Health and Environmental Risks from Antibiotic Resistance in Reuse and Wastewater	$443,314

THE Water Research FOUNDATION®

2024 YEAR IN REVIEW
Media Reach

1.3B	1,400	25	79,333
ARTICLE VIEWS WRF APPEARED IN	WRF APPEARANCES IN ARTICLES	COUNTRIES WRF WAS MENTIONED IN ARTICLES	SOCIAL MEDIA FOLLOWERS

Most Popular Key Phrases in Articles WRF Was Mentioned

industry service and leadership past chairman
leading research organization
water
data water sector
related utility services provider of water
water and wastewater system professional services provider

Article Mention with Highest Reach

Energy Recovery and Saving in Municipal Wastewater Treatment Engineering Practices *(Nature Sustainability)*
doi.org/10.1038/s41893-024-01478-5

Cheryl Norton's Lasting Journey with WRF and the Water Sector

PROFILE

Learning Something New Every Day

Read Full Story

"WRF became a huge resource for me to learn about what was happening in the industry, what the challenges were, and what people were doing to address those challenges."

- Cheryl Norton

WRF Board Member
Chief Operations Officer and Executive Vice President of American Water

Gary Burlingame Reminisces on Learning and Growing Alongside WRF

PROFILE

It's More Than Just the Research

Read Full Story

"It was a real growth experience for me—taking me out of my laboratory in Philadelphia, taking me out of the city of Philadelphia, and letting me hear and see what's happening all around the world."

- Gary Burlingame

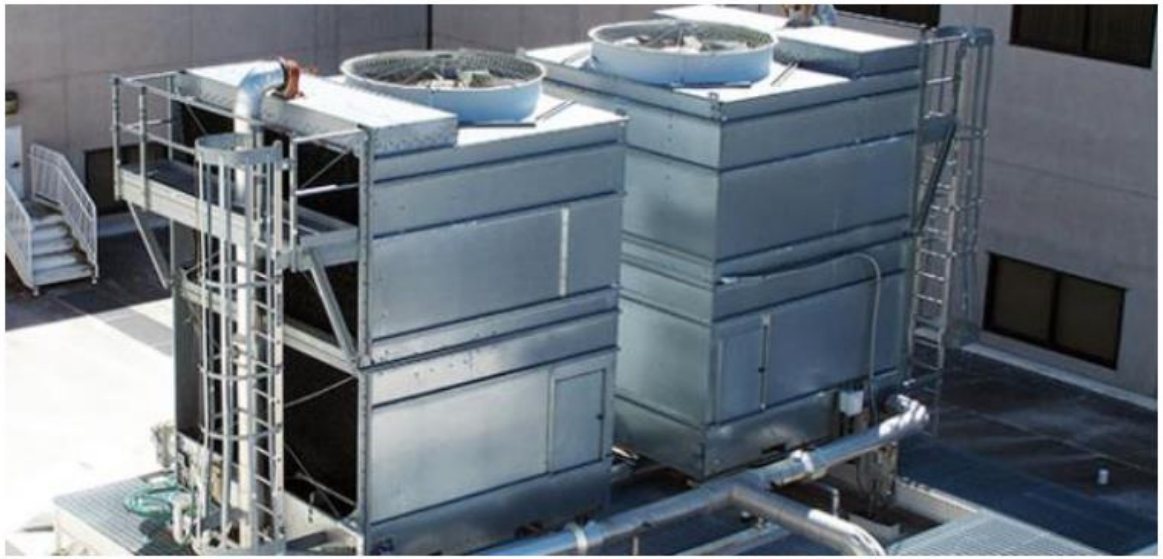
Holistic Flood Management Under Climate Impacts

Read Full Story

"A holistic approach to flood mitigation planning and modeling is needed to balance competing management objectives while minimizing system vulnerabilities."

- Harry Zhang, PhD, PE
WRF Research Principal

It Started in a Washtub



Advancing Desalination of Cooling Tower Blowdown

Read Full Story

> "I certainly did not do it alone...It took a team. A team that I am extremely proud of, especially the students that worked on it."
>
> *- Eric Dole*