



# State Water Resources Control Board

## Division of Drinking Water

### Expert Panel to Review Proposed Criteria for Direct Potable Reuse

August 24-25, 2021



Kevin M. Hardy

Executive Director  
National Water Research Institute  
Fountain Valley, CA

Welcome



## About NWRI

The nation's collaborative resource for the advancement of water resources science, policy, and innovation.

The independent expert advisory services provider of choice for challenging water quality, water resource management, and related innovation issues.

We provide insight and understanding of current and future issues in water science and technology.



## Co-Chairs and Panelists

**Co-Chair James Crook, PhD, PE**  
Environmental Engineering Consultant

**Co-Chair Adam Olivieri, DrPH, PE**  
EOA, Inc.

**Richard Bull, PhD**  
Washington State University (Emeritus)

**Jörg E. Drewes, PhD**  
Technical Univ of Munich

**Charles Gerba, PhD**  
University of Arizona

**Charles Haas, PhD**  
Drexel University

**Amy Pruden, PhD**  
Virginia Tech

**Joan Rose, PhD**  
Michigan State University

**Shane Snyder, PhD**  
Nanyang Technological University

**Jacqueline E. Taylor, REHS, MPA**  
Los Angeles County Department of Public Health (Retired)

**George Tchobanoglous, PhD, PE**  
University of California, Davis (Emeritus)

**Michael P. Wehner, MPA**  
Orange County Water District (Retired)





## Meeting No. 1 Objectives

- Review the Panel charge, meeting process, and time frame for completion.
- Educate the Panel members on the current status and goals for the project.
- Allow the Panel members time to identify topics of interest or concern.
- Present the draft DPR criteria and provide time for Panel questions.



## Agenda

Tuesday, August 24, 2021

9:45 a.m.	Panel Member Login/Audio Test	
10:00 a.m.	Welcome, Introductions, Review Agenda, Overview of Panel Process	Kevin M. Hardy, NWRI
10:20 a.m.	Co-Chairs Welcome <ul style="list-style-type: none"><li>• Discuss the meeting process</li><li>• Self-introduction of the Panel members</li><li>• Establish no conflict of interest of Panel members</li></ul>	Adam Olivieri and Jim Crook, Panel Co-Chairs
10:35 a.m.	Overview of the DPR Feasibility Report	Adam Olivieri and Jim Crook
10:50 a.m.	<b>Break</b>	
11:00 a.m.	<ul style="list-style-type: none"><li>• Statutory Mandate and Tasks of the Panel</li><li>• Overview of Regulation Development</li><li>• Overview of Drinking Water Regulations</li><li>• Overview of Draft Criteria</li><li>• Next Steps</li></ul>	DDW Project Team Staff
12:00 p.m.	<b>Lunch Break</b>	
12:30 p.m.	WRF Research Projects and Findings Briefing: Pathogen Monitoring and Plant Reliability-QMRA (DPR-1 and DPR-2)	Project Primary Investigator: Brian Pecson, Trussell Technologies
1:10 p.m.	DDW Briefing on Draft Criteria: Pathogens	DDW Project Team Staff
1:50 p.m.	Clarifying Questions From Panel	Adam Olivieri and Jim Crook
2:00 p.m.	<b>Adjourn Day 1</b>	



## Meeting Ground Rules

- We appreciate your patience!
- Keep yourself muted unless recognized to speak.
- Please keep your camera turned off unless you are speaking.
- GoToMeeting supports internet or phone audio. Please:
  - ✓ Enter your name when you sign in so we can identify who is speaking
  - ✓ If you join by phone, use the audio PIN
  - ✓ Keep the phone number handy
  - ✓ Use the chat feature if needed to communicate
- Remain present and minimize multitasking but ... take breaks as needed.
- Question and answer periods are for Expert Panel members.
- This meeting is being recorded.



## To Speak During Public Comment Session Tomorrow

1. E-mail DDW staff to request special link and passcode at: [DDWrecycledwater@waterboards.ca.gov](mailto:DDWrecycledwater@waterboards.ca.gov)
2. In the subject line write **DPR Criteria Expert Panel Meeting 1**
3. In the body of the email, provide the following:
  - Your name
  - Who you represent (yourself, another person, an organization)
  - Whether you will attend by videoconference or telephone
  - For phone commenters only, the last three digits of the phone number from which you intend to call.



## **Panel Co-Chairs**

**James Crook, PhD, PE**

**Adam Olivieri, DrPH, PE**



## Potable Reuse in California

## Regulations and Research Topics

### Expert Panel Process

- Introductions
- Establish no conflict of interest
- Panel charge
- Meetings, work groups, and schedule

### Background – Current Regulations

- Groundwater recharge
- Surface water augmentation

### Direct Potable Reuse

- DPR Feasibility – Expert Panel findings
- Regulations/definitions
- Investigations



## **Expert Panel Process**

- Self-Introductions
- Establish No Conflict of Interest

A conflict of interest is real when the Expert Panelist has interests in the outcome of the project that may lead to a personal advantage (for example, benefit a member of the Expert's family and/or friends) and which might, therefore, compromise the integrity of the Expert Panel's findings and recommendations.



## Panel Expertise

- Microbial Risk Assessment
- Chemistry
- Microbiology
- Water Treatment Engineering
- Wastewater Treatment Engineering
- Toxicology
- Multi-Barrier System Reliability
- Public Health
- Potable Reuse Operations
- Water Recycling Regulations





## **Expert Panel Process**

- Panel Charge
- Meetings, Work Groups, and Schedule



## Enabling Legislation AB 574 (2017)

California Water Code (CWC) §13561.2(a) requires the SWB (DDW) to **adopt proposed regulations on or before December 31, 2023.**

Prior to adopting the proposed regulations, **DDW must submit the proposed criteria to an expert review panel** convened pursuant to CWC §13561.2(c).

CWC §13561.2(a)(2) requires that an expert review panel **review the proposed criteria and adopt a finding as to whether, in its expert opinion, the proposed criteria would adequately protect public health.**



## **External Scientific Peer Review Required**

In addition, the statutory mandate for external scientific peer review codified at California Health and Safety Code §57004 states that the reviewer's responsibility is to determine whether the scientific portion of the proposed rule is based upon sound scientific knowledge, judgment, methods, and practices.



## Panel Process and Schedule

### Four to Five Full Panel Meetings

- Meeting No. 1 today
- Quarterly though mid-2022

### Technical Work Groups (5) and Support

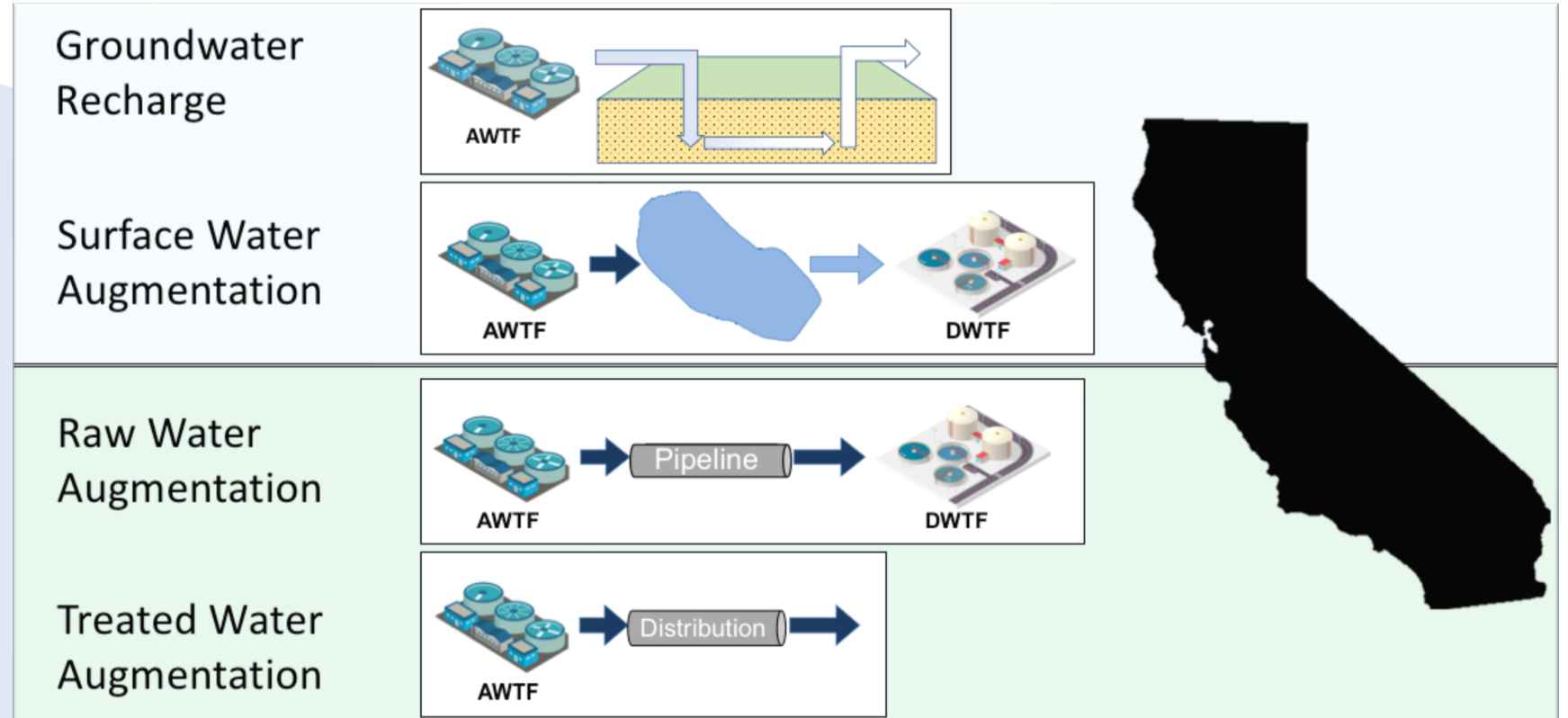
- Following Meeting No. 1
- Through December 2023



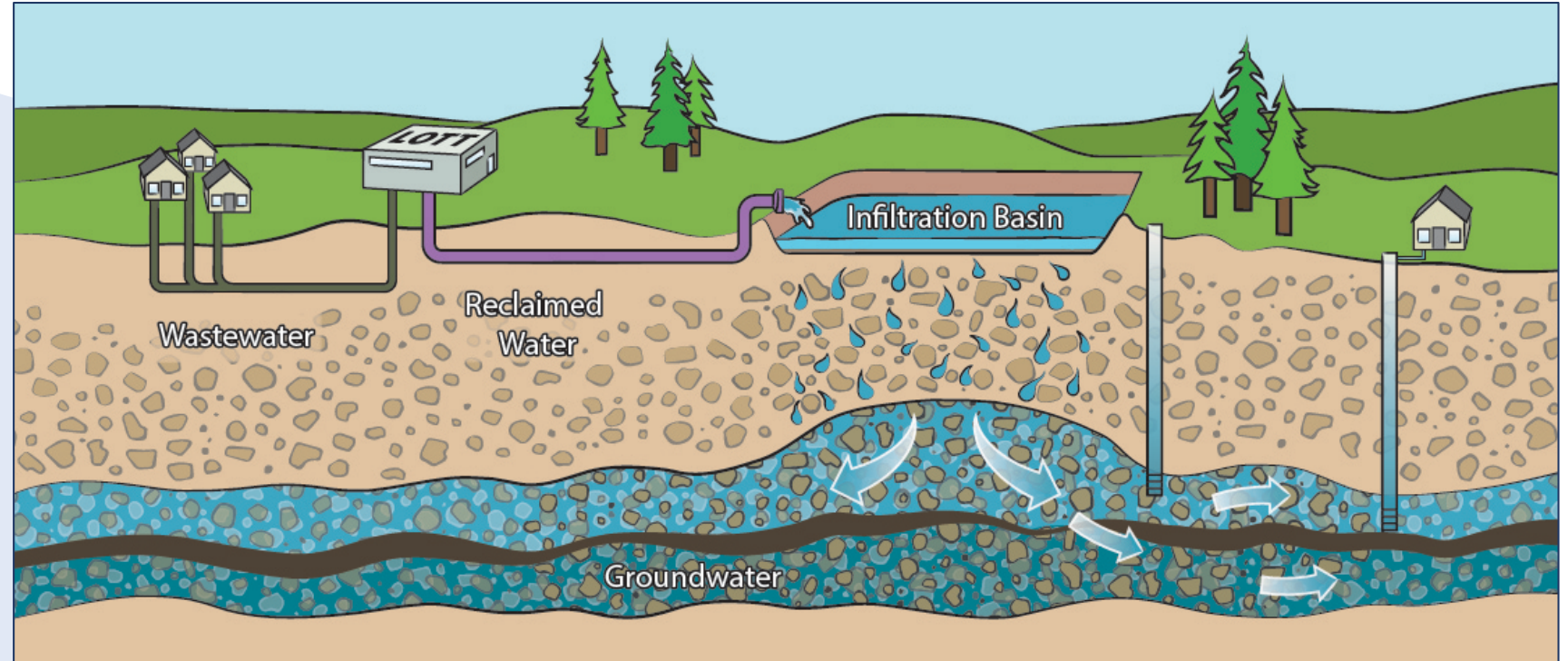
## **Background Current Regulations**

- Groundwater Recharge
- Surface Water Augmentation

## Potable Reuse in California



## Groundwater Recharge



## Surface Water Augmentation



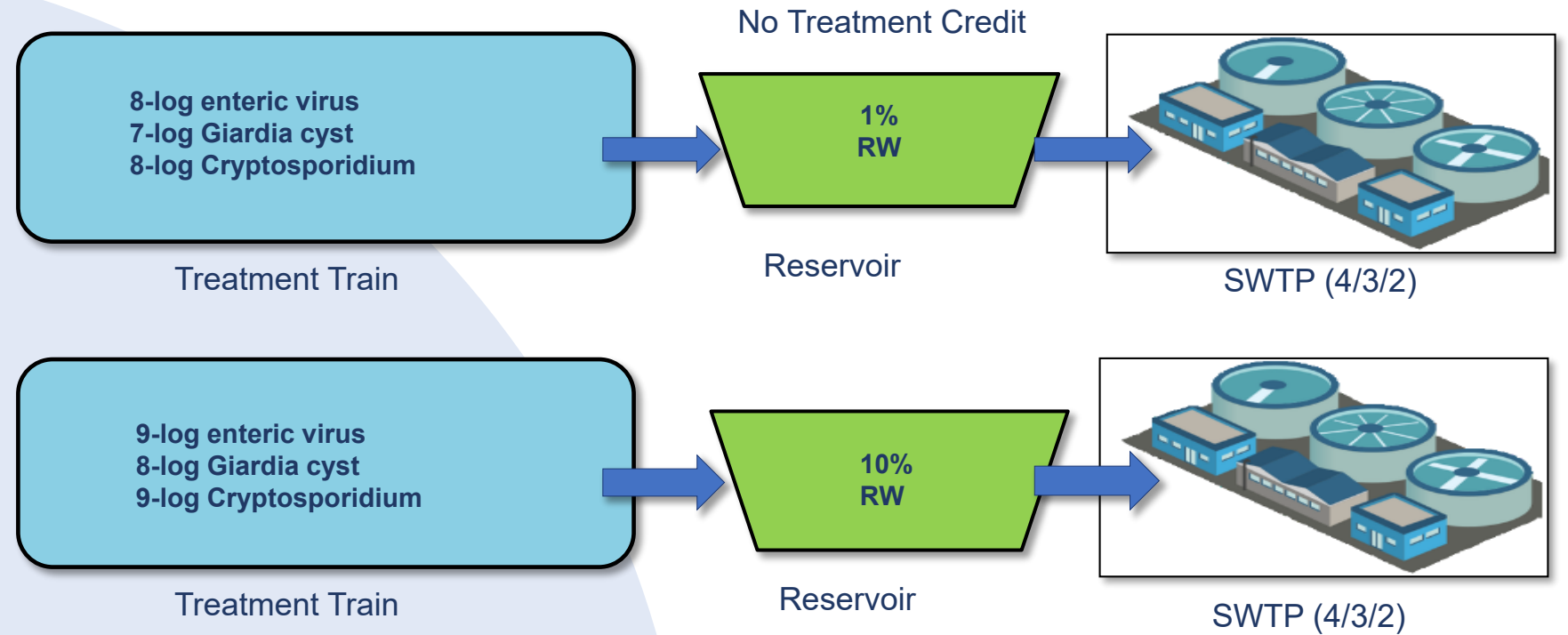


## Environmental Buffer Benefits

- Attenuate chemical spikes
- Robust pathogen barrier
- Response time
- “Hand of Hygiea”



**Potable Reuse  
Reservoir  
Augmentation  
(Surface Water)  
Pathogen Control**





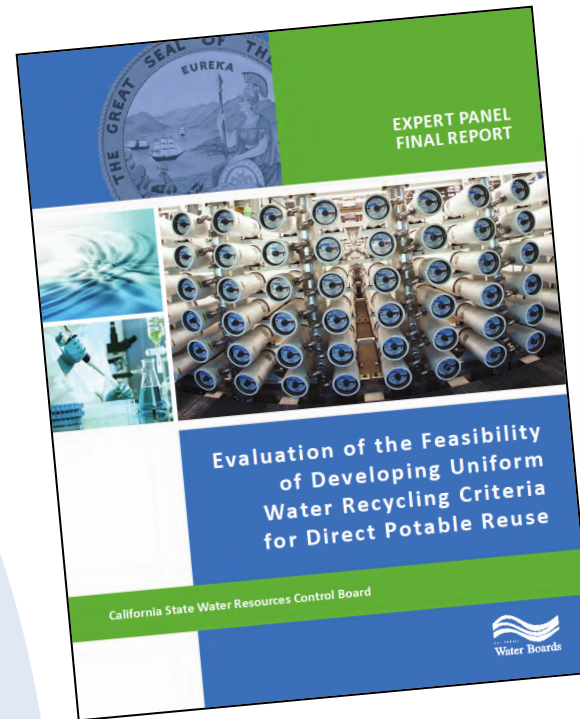
## 2021 DPR Expert Panel

- 2016 DPR Feasibility Report Findings
- Investigations – SWB/WRF
- Regulatory Definitions



## 2016 DPR Feasibility Report Findings

- Expert Panel assessed DPR feasibility.
- Concluded it is feasible to create uniform regulations for DPR.
- Panel recommended six topics for further research.





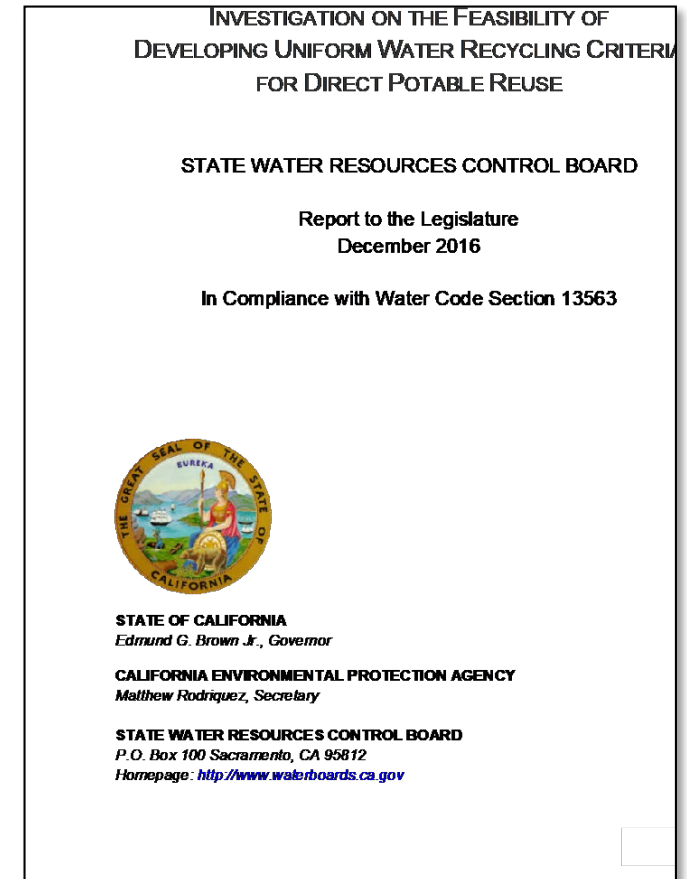
## California State Water Board Conclusions on DPR

DDW concurred on feasibility of DPR.

More information on research topics is needed **before** regulations could be written.

*“The use of recycled water for DPR has great potential but it presents very real scientific and technical challenges that must be addressed to ensure the public’s health is reliably protected at all times.” – SWRCB 2016*

AB 574 requires DPR regulations by 2023.





## **2021 DPR Expert Panel**

- 2016 DPR Feasibility Report Findings
- Investigations – SWB/WRF
- Regulatory Definitions

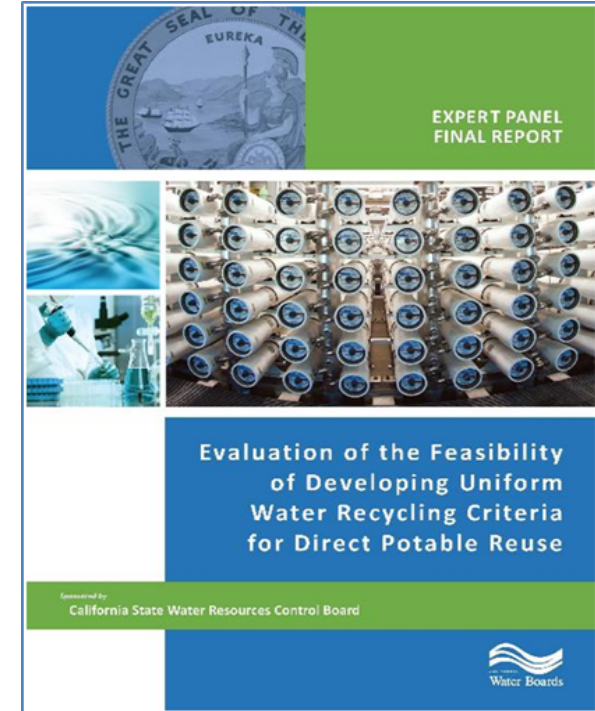




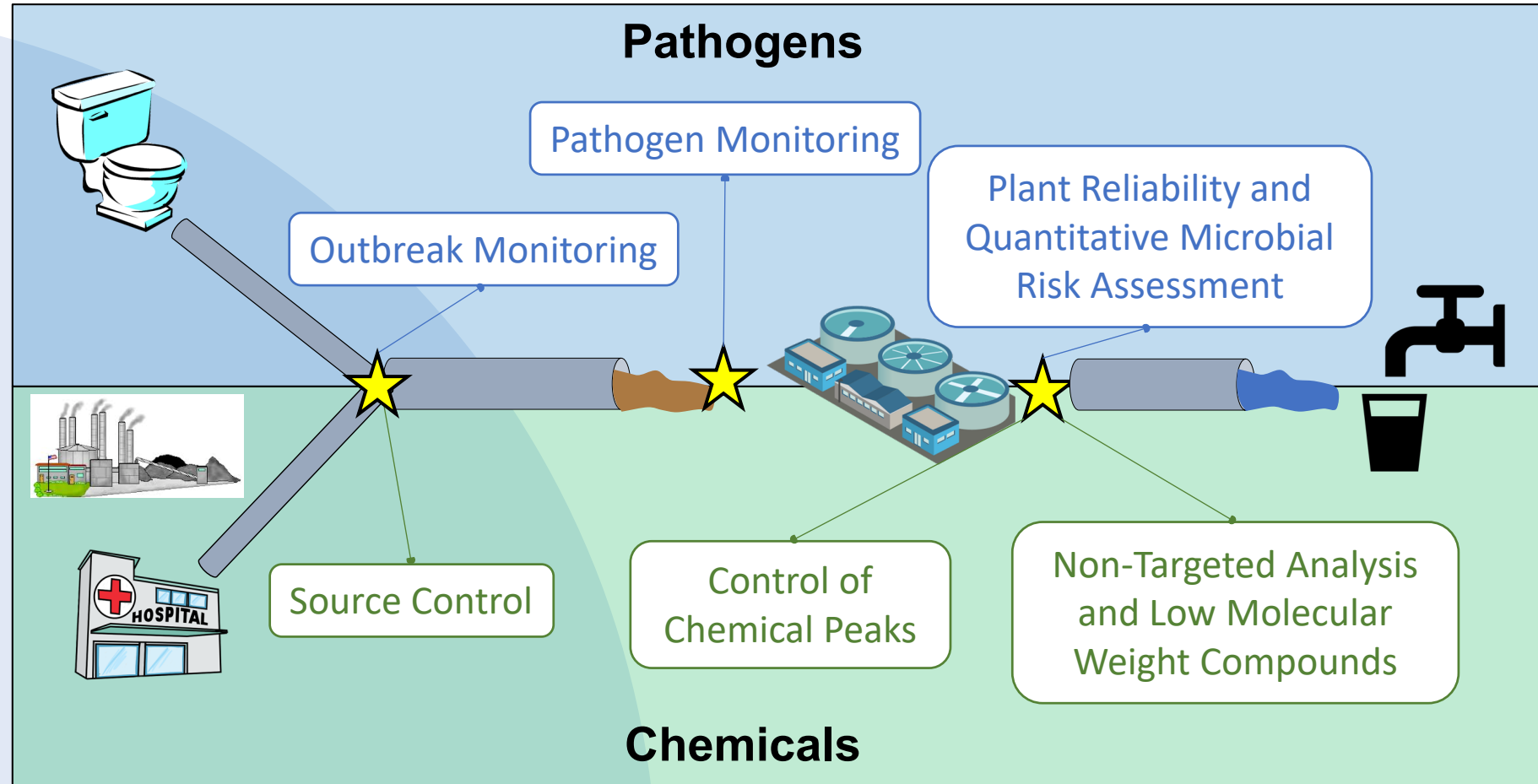
## State Water Board DPR Research Projects

1. Develop Probabilistic Analysis Tools for DDW to Assess Treatment Performance and Quantitative Microbial Risk
2. Collect Pathogen Data in Untreated Wastewater
3. Investigate Feasibility of Collecting Pathogens in Wastewater During Outbreaks
4. Evaluate Options to Reduce Potential Chemical Peaks
5. Investigate Feasibility of Analytical Methods for Non-Targeted Analysis of Recycled Water with focus on Low Molecular Weight Compounds
6. Establish an enhanced source control program

Projects 1 – 5 are Water Research Foundation Grant projects



## Research Related to Protecting Public Health







## Project 1: Quantitative Microbial Risk Assessment and Evaluation of Plant Reliability

### GOALS

- ✓ Develop method to identify necessary removal levels for selected waterborne pathogens
- ✓ Apply this method to evaluate performance and reliability of DPR treatment trains

### RELEVANCE

- ✓ DPR must provide the same level of protection as drinking water, which requires risk-based goals
- ✓ Tools allow Division of Drinking Water to quantify public health protection provided by different treatment requirements
- ✓ Informs DPR regulations by providing insight into treatment criteria

## Project 2: Measure Pathogens in Wastewater



### GOALS

- ✓ Develop recommendations for collection and analysis of data on pathogens in raw (untreated) wastewater
- ✓ Conduct monitoring of raw wastewater to develop better data on pathogen concentrations and variability

### RELEVANCE

- ✓ The industry lacks sufficient high-quality pathogen data necessary for the development of regulations
- ✓ New standard procedures will address limitations of previous monitoring efforts
- ✓ Research will provide industry's largest dataset of raw wastewater pathogen concentrations
- ✓ Results will feed into evaluation of treatment and QMRA



## Project 4: Treatment for Averaging Potential Chemical Peaks

### GOAL

- ✓ Identify options for final treatment that can provide averaging with respect to potential chemical peaks, particularly for persistent chemicals

### RELEVANCE

- ✓ Defining a chemical peak
- ✓ Full advanced treatment (MF/RO/UV-AOP) is a highly effective treatment train used for groundwater recharge; however, fluctuation in chemical levels has been observed
- ✓ Management options including source control, plant operations, and treatment



## DPR Research Reports Available Online

Most began in early 2019, completed in early 2021:

- ✓ DPR-1 Quantitative Microbial Risk Assessment
- ✓ DPR-2 Raw pathogen data\*
- ✓ DPR-3 Worst case raw pathogen levels (outbreak)
- ✓ DPR-4 Reduce chemical spikes\*
- ✓ DPR-5 Analytical methods for unknown low molecular weight chemicals\*

\* Available online

<https://www.waterrf.org/california-state-water-board-grant>



## 2021 DPR Expert Panel

- 2016 DPR Feasibility Report Findings
- Investigations – SWB/WRF
- Regulatory Definitions

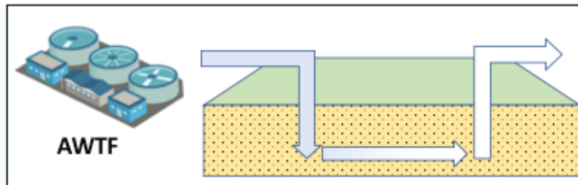


## Background: California Water Code Requirements

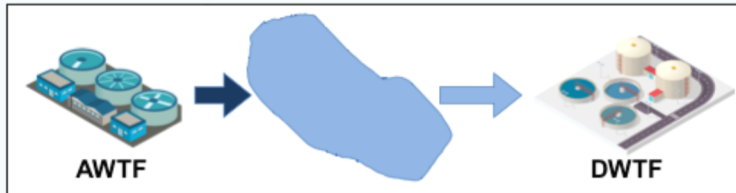
- **California Water Code §13561 defines DPR** as “the planned introduction of recycled water either directly into a public water system, or into a raw water supply immediately upstream of a water treatment plant.”
- **DPR** is defined to include, but is not limited to, the following: (1) “**raw water augmentation**” which means the planned placement of recycled water into a system of pipelines or aqueducts that deliver raw water to a drinking water treatment plant that provides water to a public water system, and (2) “**treated drinking water augmentation**” which means the planned placement of recycled water into the water distribution system of a public water system.

## Potable Reuse in California

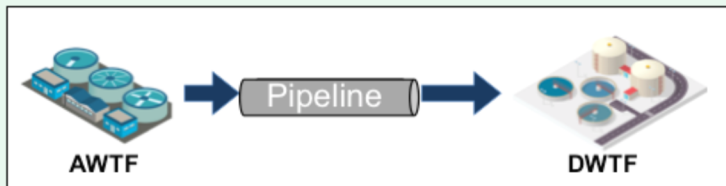
Groundwater Recharge



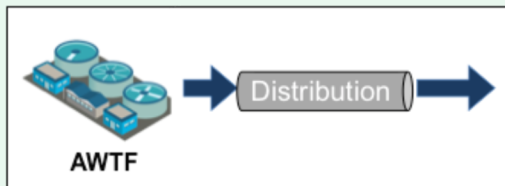
Surface Water Augmentation



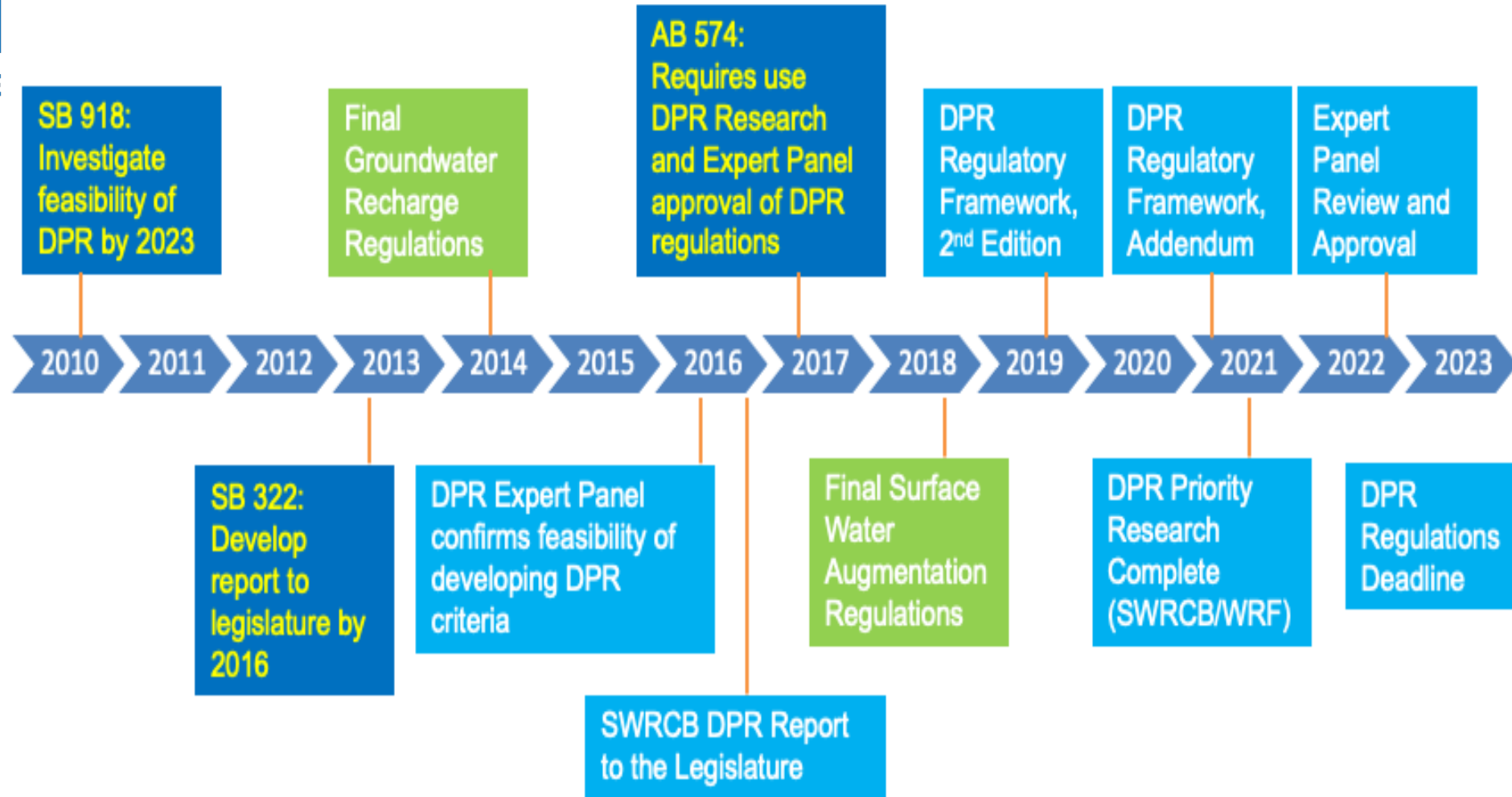
Raw Water Augmentation



Treated Water Augmentation



## California: The Path to DPR







**WARNING**



**CHALLENGES  
AHEAD**



Thank you

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