Southern California Water Dialogue

One Step Closer to Direct Potable Reuse

April 26, 2023

Southern California Water Dialogue
Co-chairs

CONNER EVERTS

Executive Director

Southern California Watershed Alliance

DEE ZINKE

Assistant General Manager - External Affairs

The Metropolitan Water District of Southern California

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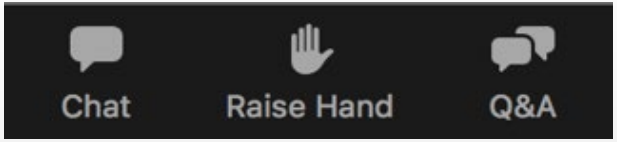
- RICH ATWATER
  Foothill Municipal Water District
- KATHY CALDWELL
  So Cal Water Dialogue, Coordinator

Webinar Ground Rules



- **Technical Difficulties:** Use chat feature to let us know
- **Asking a Question:** Use Q/A feature, type in question, and click send. Questions addressed after presentation.
- **Poor Connection:** Move closer to your wireless router and turn off other services using bandwidth (e.g. Netflix)
- **Audio Muted:** Attendee audio on mute by default
- **Timetable** : Presentation runs apx 60 minutes followed by Q/A session

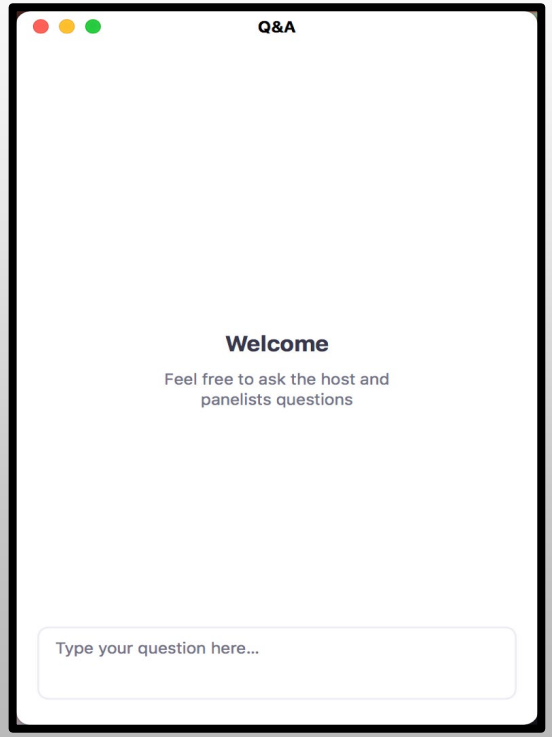
Southern California Water Dialogue

How to Ask A Question

On the bottom of your screen, click “Q&A”

Southern California Water Dialogue

Type in question and then click send



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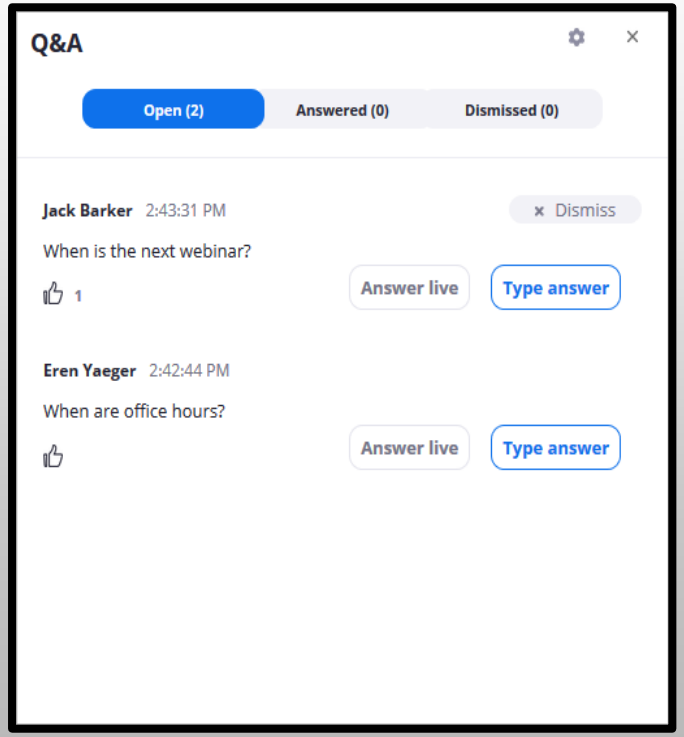


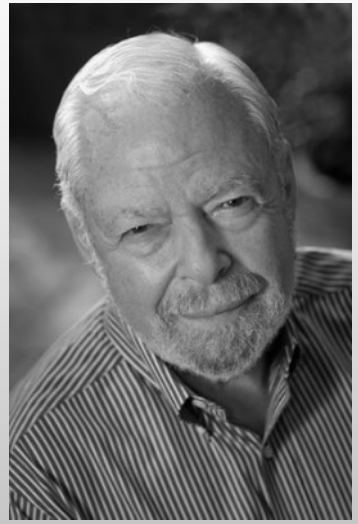
Southern California Water Dialogue

Agenda

- Announcements and Introduction of Speakers – Conner Everts
- Kevin Hardy, Moderator
- Discussion
- Dialogue (Q/A) – Led by Dee Zinke
- Concluding remarks

Speakers

Kevin M. Hardy
Executive Director,
National Water Research Institute



George Tchobanoglous ,
Professor Emeritus, UC Davis, and Chair of Pure Water San Diego Independent Advisory Panel

Jennifer West
Managing Director of WateReuse California

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ONE STEP CLOSER TO DIRECT POTABLE REUSE
DISCUSSION TOPICS

About NWRI

Defining Direct Potable Reuse

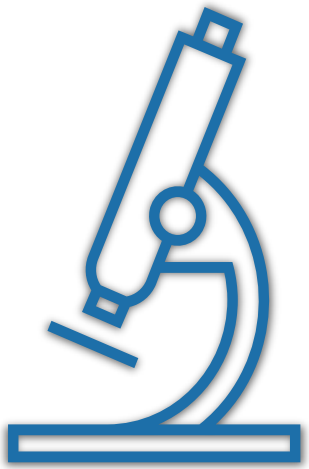
Scientific, Technical and Policy Dimensions

The Critical Role of Wastewater Utilities

California's Path to DPR Regulations

NWRI
NATIONAL WATER RESEARCH INSTITUTE

ABOUT NWRI



NATIONAL WATER RESEARCH INSTITUTE

Members:

- Inland Empire Utilities Agency
- Irvine Ranch Water District
- Los Angeles Department of Water and Power
- Metropolitan Water District of Southern California
- Orange County Sanitation District
- Orange County Water District

Our Work:

- An international resource for the collaborative advancement of water resources science, policy, and innovation.
- The independent expert advisor of choice for communities facing challenging water quality and water resource management issues.
- Our research delivers wholistic, relevant and practical insight into the most complex issues in water science and technology.

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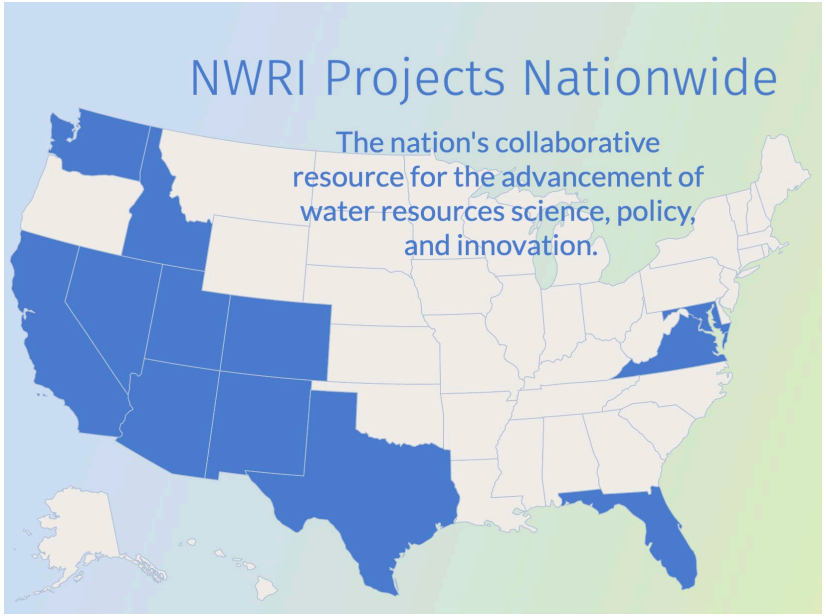


30th Annual

Athalie Richardson Irvine Clarke Prize *for* Outstanding Achievement in Water Science and Technology

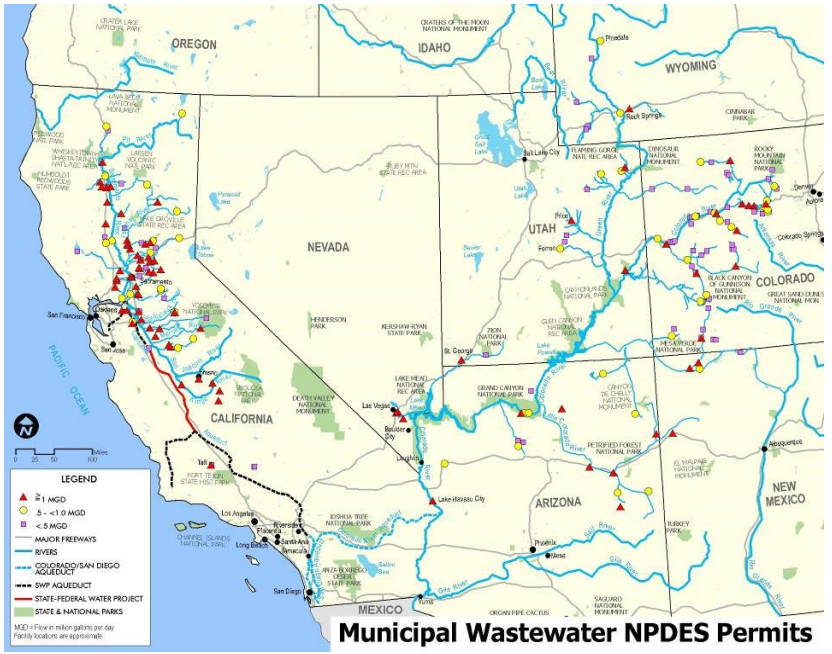
- **Nominations by May 30, 2023**
- **Event October 21, 2023**
- **Laureate 29: Dr. Eric M. V. Hoek**
  - Professor, UCLA Department of Civil & Environmental Engineering, Institute of the Environment & Sustainability and the California NanoSystems Institute.
  - Faculty Director of the UCLA Sustainable LA Grand Challenge

DEFINING DIRECT POTABLE REUSE

DIFFERENTIATING DPR

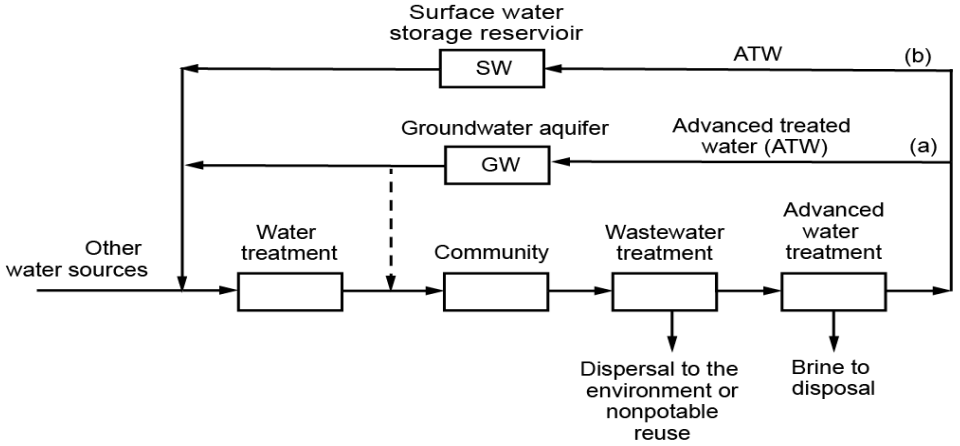
Three (3) Types of Potable Reuse

1. ***de facto* Potable Reuse**
2. **Indirect Potable Reuse (IPR)**
   a. Surface Water Augmentation
   b. Groundwater Replenishment
3. **Direct Potable Reuse (DPR)**
   a. No or insufficient environmental barrier
   b. Raw Water Augmentation
   c. Treated Water Augmentation

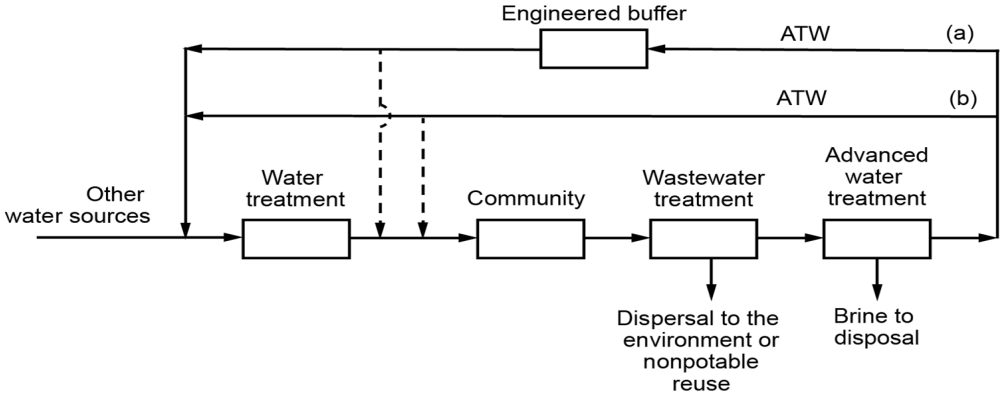


Environmental & Engineered Buffers

Indirect potable reuse (IPR) with environmental buffer



Direct potable reuse(DPR) with and without engineered storage buffer



Two Forms of DPR Authorized by Statute in California

CHAPTER 7.3. Potable Reuse [13560 - 13570] (Heading of Chapter 7.3 amended by Stats. 2017, Ch. 528, Sec. 1.)

13561.
For purposes of this chapter, the following terms have the following meanings:

(b) “Direct potable reuse” means **the planned introduction of recycled water either directly into a public water system**, as defined in Section 116275 of the Health and Safety Code, **or into a raw water supply immediately upstream of a water treatment plant**. Direct potable reuse **includes, 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, as defined in Section 116275 of the Health and Safety Code.

(2) “Treated drinking water augmentation,” means **the planned placement of recycled water into the water distribution system** of a public water system, as defined in Section 116275 of the Health and Safety Code.

(Amended by Stats. 2017, Ch. 528, Sec. 4. (AB 574) Effective January 1, 2018.)

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SCIENTIFIC, TECHNICAL AND POLICY DIMENSIONS OF DPR

KEY PUBLIC HEALTH CONCEPTS

1. Multi-Barrier Approach
2. Critical Control Points
3. Source Control
4. Full Advanced Treatment
5. Constituent of Emerging Concern
6. Low Molecular Weight Compounds
7. Disinfection Byproducts
8. Bioanalytical Tools
9. Log Reduction Value
10. Response Retention Time
11. DiPRA
12. Technical, Managerial and Financial Capacity

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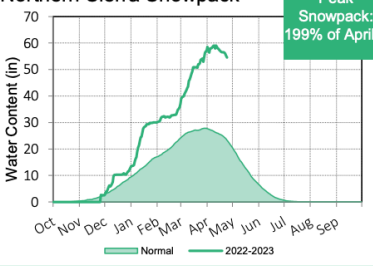
State Water Project Resources

As of: 04/24/2023

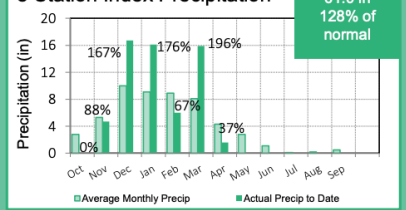
Northern Sierra Snowpack

Peak Snowpack: 199% of April 1



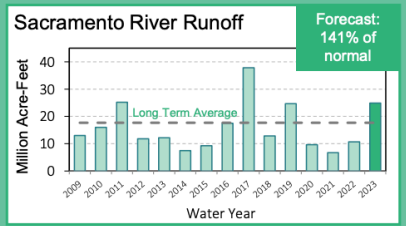
8 Station Index Precipitation

61.0 in 128% of normal



Sacramento River Runoff

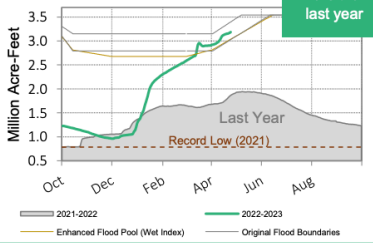
Forecast: 141% of normal



Oroville Reservoir Storage

Capacity: 3.54 MAF

1.32 MAF more than last year



Other SWP Supplies

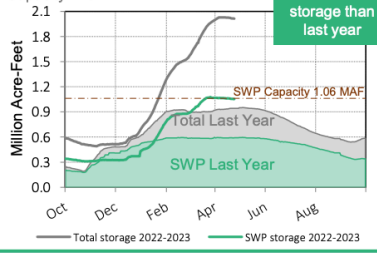
Calendar Year 2023

Carryover	39,000 acre-feet
Article 21	83,000 acre-feet

San Luis Reservoir Storage

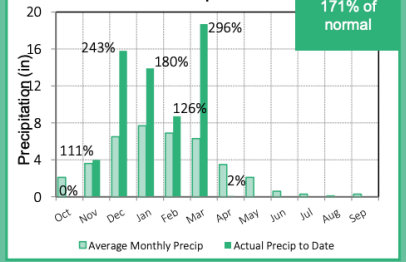
Capacity: 2.04 MAF

463 TAF more SWP storage than last year



5 Station Index Precipitation

61.2 in 171% of normal



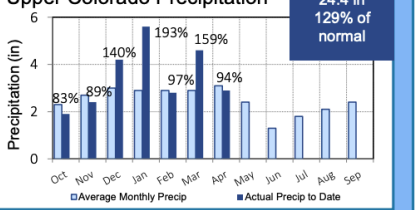
https://www.mwdh2o.com/WSCR

Colorado River Resources

As of: 04/24/2023

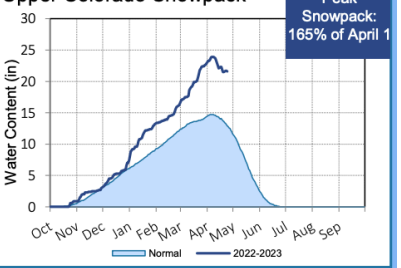
Upper Colorado Precipitation

24.4 in 129% of normal



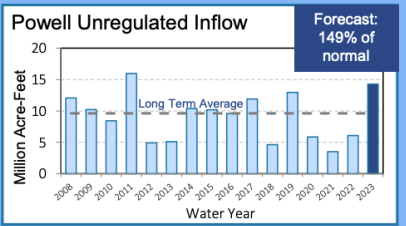
Upper Colorado Snowpack

Peak Snowpack: 165% of April 1



Powell Unregulated Inflow

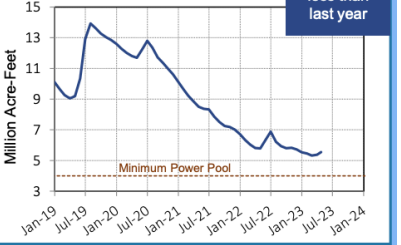
Forecast: 149% of normal



Lake Powell Storage

Capacity: 24.3 MAF

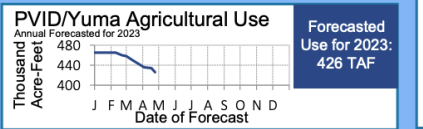
220 TAF less than last year



PVID/Yuma Agricultural Use

Annual Forecasted for 2023

Forecasted Use for 2023: 426 TAF



Projected Lake Mead ICS

Calendar Year 2023

Put (+) / Take (-)

TBD

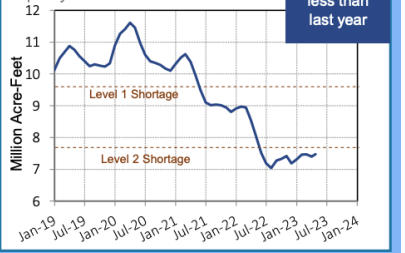
Lake Mead Surplus/Shortage Outlook

April 2023 modeling results to be available soon.

Lake Mead Storage

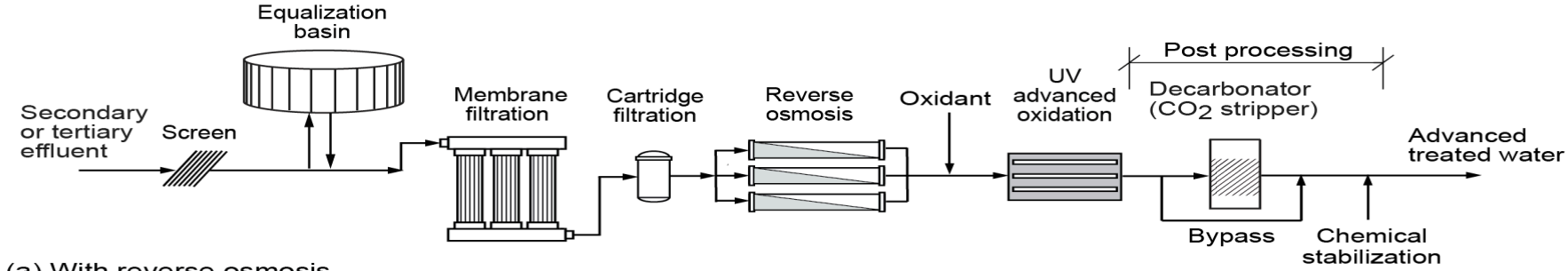
Capacity: 26.1 MAF

672 TAF less than last year

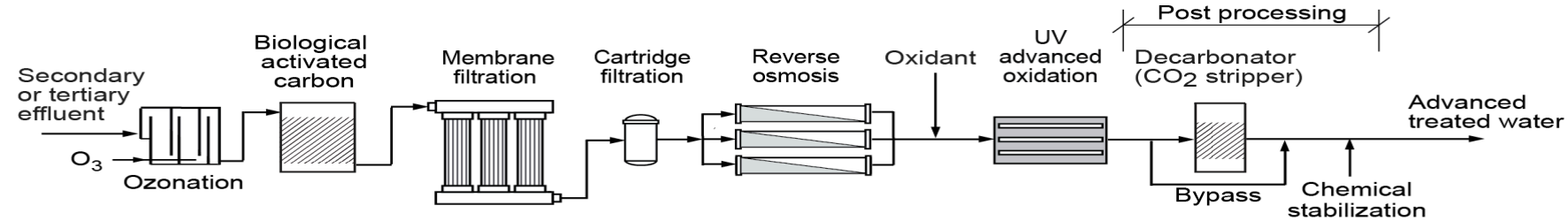


https://www.mwdh2o.com/WSCR

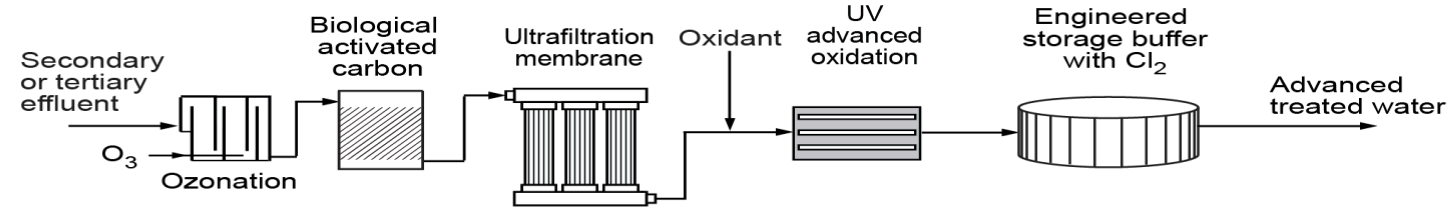
TREATMENT TECHNOLOGY IS NOT A LIMITING CONSTRAINT



(a) With reverse osmosis



(b) With reverse osmosis with ozone/biological activated carbon for the removal of specific organic compounds



(c) Without reverse osmosis

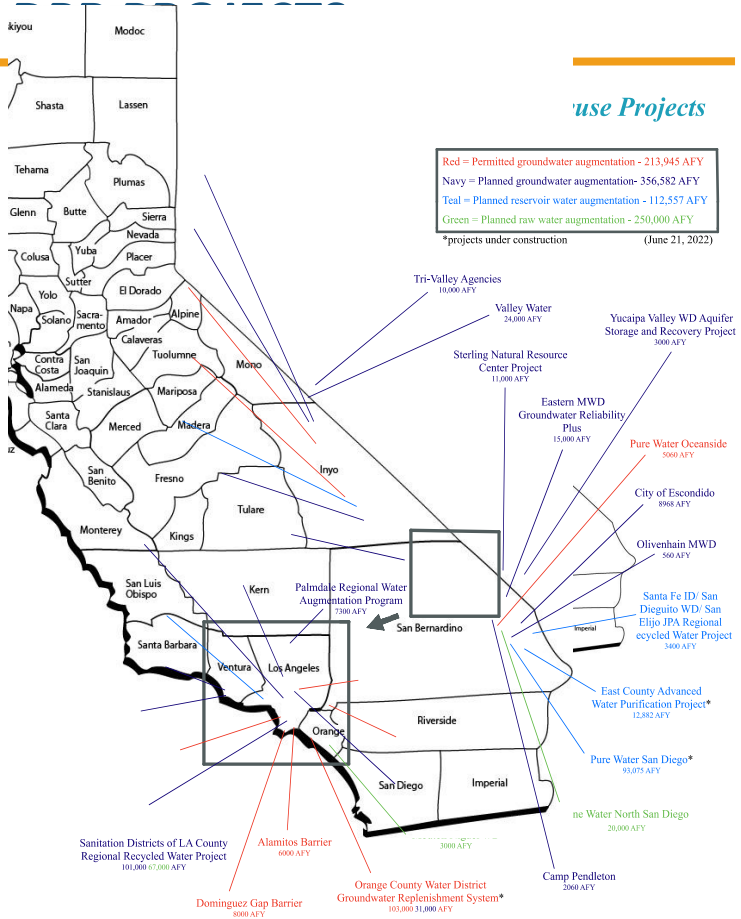
OPERATIONAL

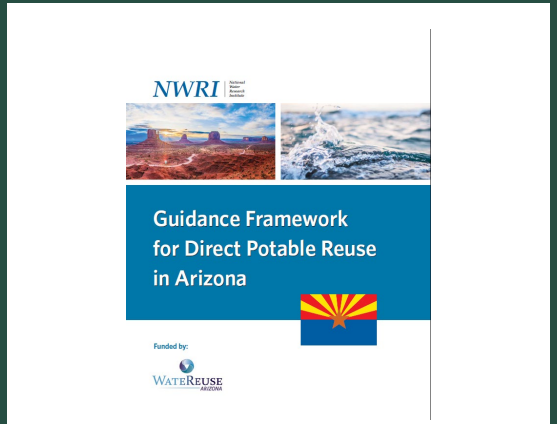
NOT Direct Potable Reuse

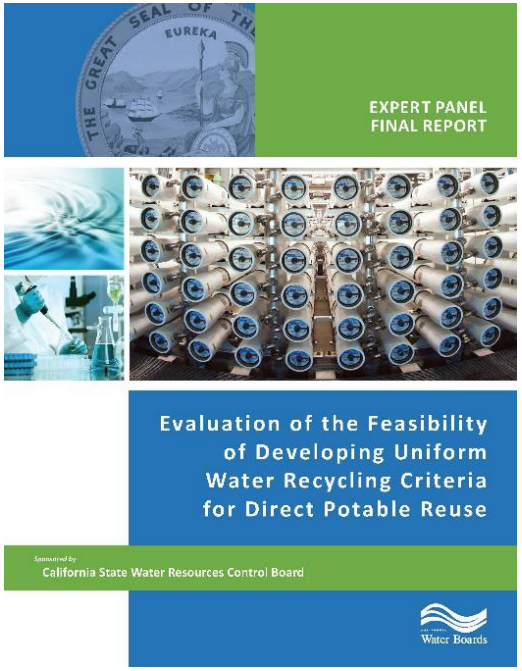
- Orange County Water District Groundwater Replenishment System
- Singapore Public Utilities Bureau, NEWater
- Remaining permitted and planned groundwater and reservoir augmentation in California

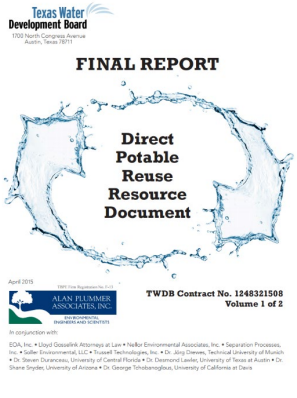
Direct Potable Reuse

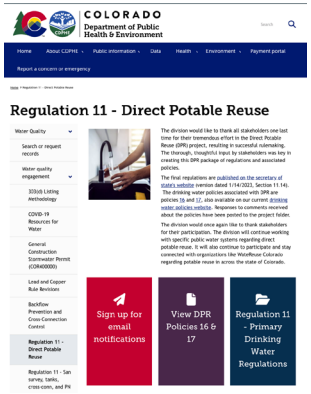
- Windhoek, Namibia
- Beaufort West, South Africa
- Cloudcroft, New Mexico
- Big Spring, Texas
- Wichita Falls, Texas
- 3 Projects - 250,000 AFY planned RWA

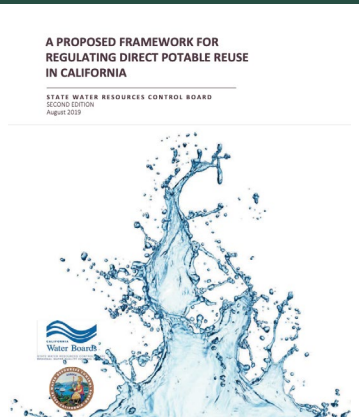



NWRI
Guidance Framework for Direct Potable Reuse in Arizona
Funded by:
WaterReuse Arizona

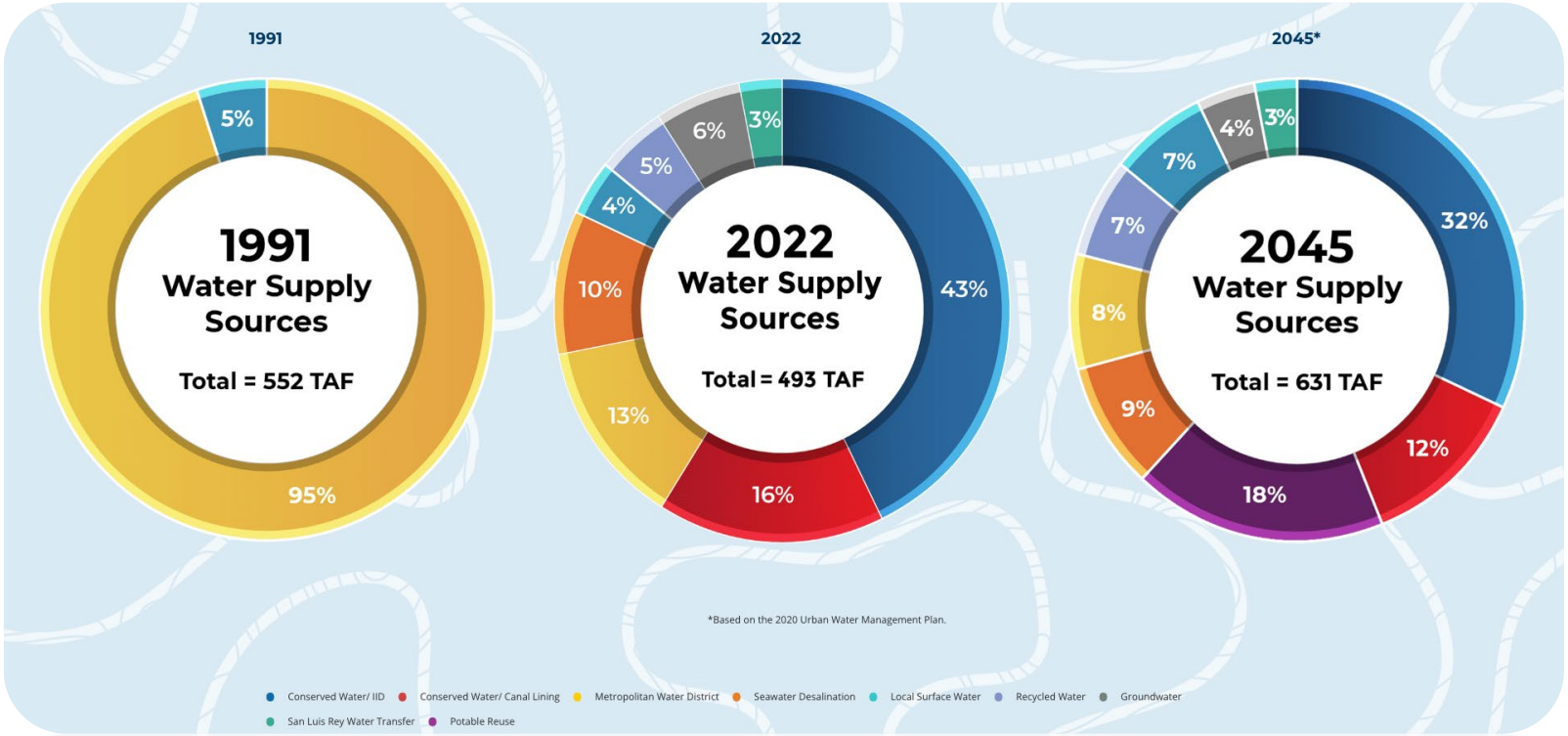

EXPERT PANEL FINAL REPORT
Evaluation of the Feasibility of Developing Uniform Water Recycling Criteria for Direct Potable Reuse
Sponsored by
California State Water Resources Control Board
Water Boards


Texas Water Development Board
FINAL REPORT
Direct Potable Reuse Resource Document
ALAN PLUMMER ASSOCIATES, INC.
TWDB Contract No. 1248321508
Volume 1 of 2


COLORADO
Department of Public Health & Environment
Regulation 11 - Direct Potable Reuse
Sign up for email notifications
View DPR Policies 16 & 17
Regulation 11 - Primary Drinking Water Regulations


A PROPOSED FRAMEWORK FOR REGULATING DIRECT POTABLE REUSE IN CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD
SECOND EDITION
August 2019
Water Boards

THE EMERGING ROLE OF POTABLE REUSE IN LOCAL WATER SUPPLY PORTFOLIO PLANNING - SAN DIEGO COUNTY WATER AUTHORITY



SCIENTIFIC, TECHNICAL AND POLICY CHALLENGES & OPPORTUNITIES

Scientific

- Stimulate innovation to better characterize and ensure reliable public health protection for all communities in the DPR setting
- Gain public trust on CECs and antibiotic resistance

Technical

- Resourcefully leverage assets of the natural and built environments into multi-benefit water resources management programs
- Create secure pathways for project implementation in California

Policy

- Assert and maintain domain leadership
- Feasible solution for the kaleidoscope of California's water stressed communities in-need
- Project life-cycle costs, who pays and how

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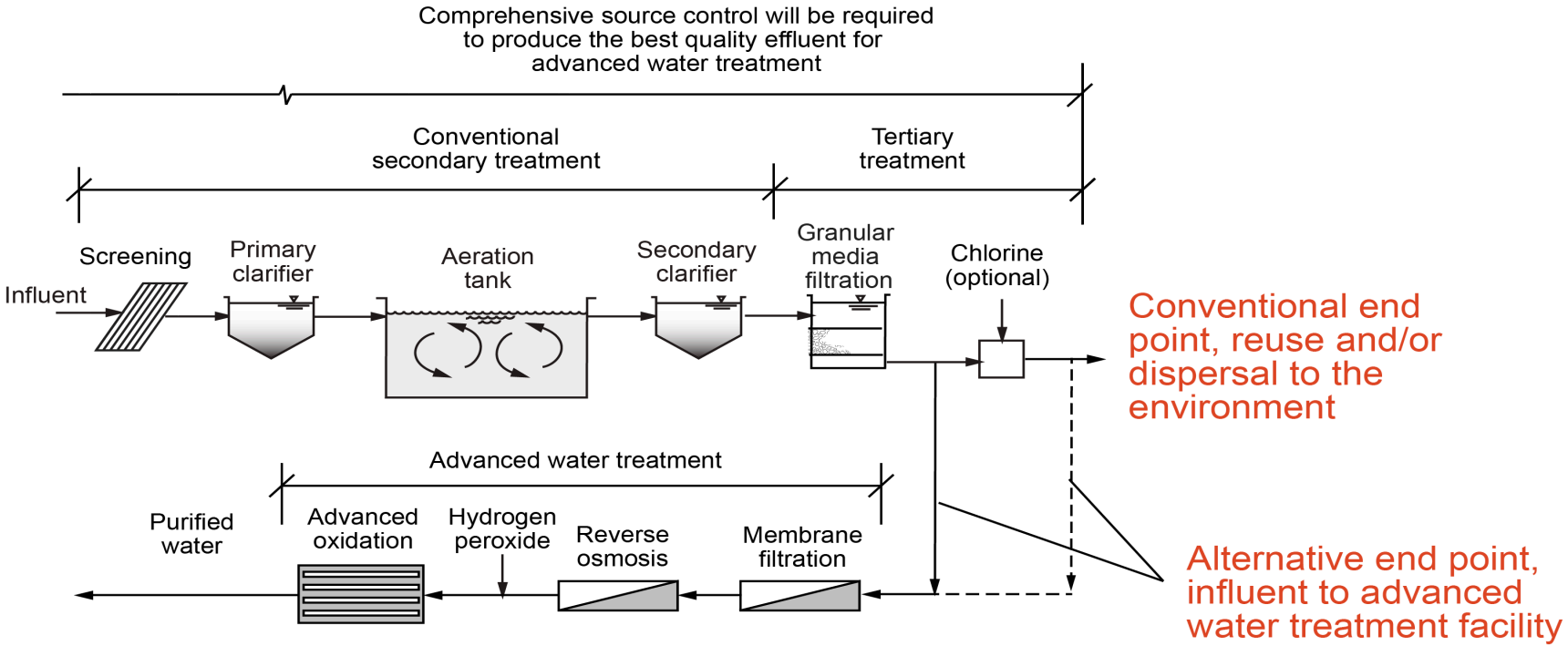
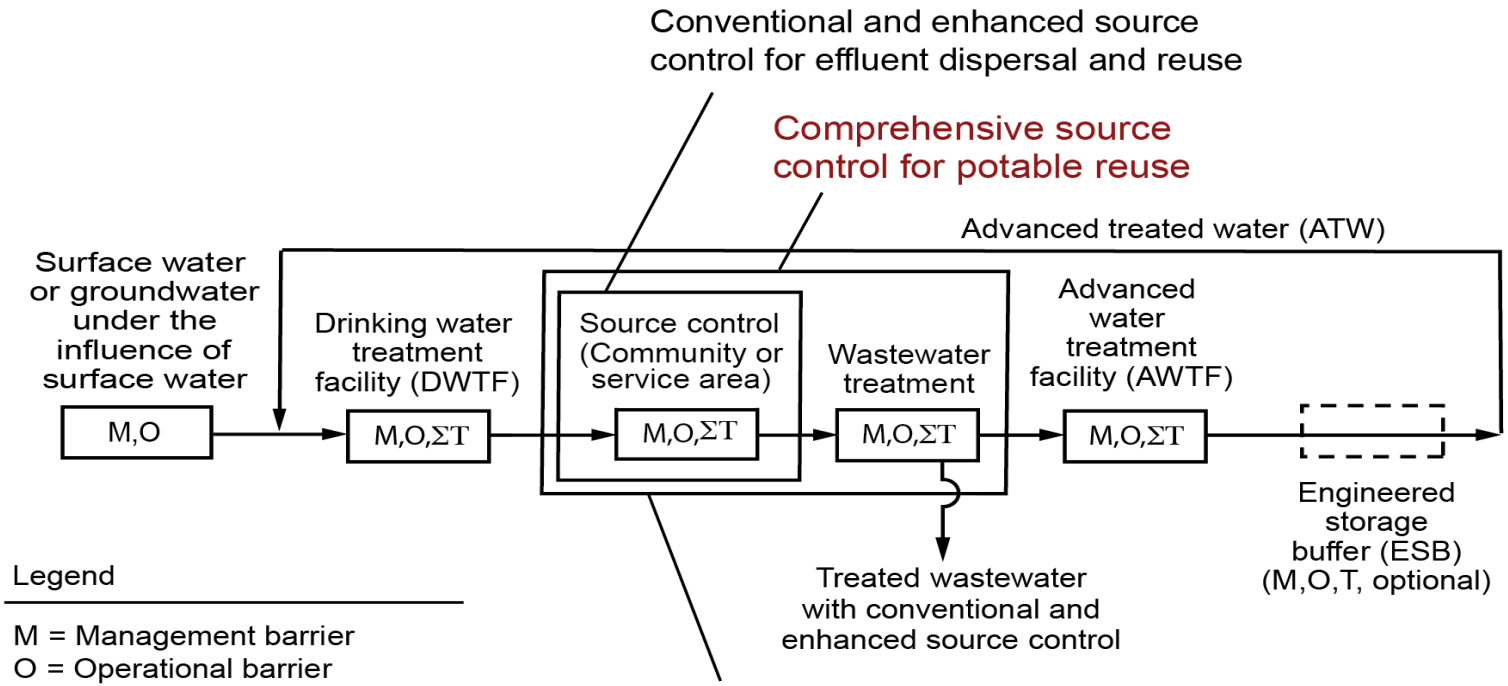
THE CRITICAL ROLE OF WASTEWATER UTILITIES IN DPR

END POINT OF WASTEWATER TREATMENT



Must think differently about the operation of wastewater treatment plants for potable reuse applications

COMPREHENSIVE SOURCE CONTROL FOR DPR



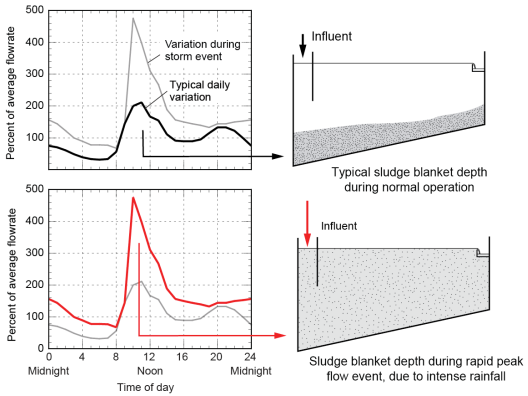
Comprehensive source control includes those measures that can be taken to optmize the performance of existing and new WWTFs for potable reuse, in addition to the conventional and enhanced source control measures within the sewershed.

ELEMENTS OF COMPREHENSIVE SOURCE CONTROL FOR EXISTING AND NEW WWTFs TO SUPPORT PUBLIC HEALTH IN A DPR PROJECT SETTING

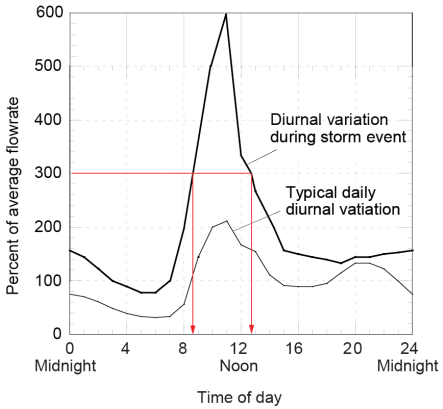
Area of concern	Principal impact(s)
Changing wastewater characteristics	Reduced flow rates, increased constituent concentrations (especially, fats, oils, and grease and nutrients), decreased effluent quality
Climate change	Peak-flow events, surge flows, decreased effluent quality without flow equalization, washout of biological treatment process, flows exceeding disinfection facility capacity
Influent flow and load equalization	Improved treatment performance and effluent quality, improved process reliability, less biological reactor size
Enhanced primary treatment	Improved treatment performance and effluent quality, reduced energy usage in biological treatment
Equalization and treatment of return flows	Improved effluent quality and process reliability
Modification of biological treatment process operational mode	Improved treatment performance and effluent quality, process reliability
Implementation of new biological treatment process(es)	Improved treatment performance and effluent quality, process reliability
Improved process monitoring	Improved process performance, process reliability
Effluent filtration	Improved effluent water quality, minimizes impacts on advanced treatment from wastewater treatment upsets
Effluent disinfection method	Minimization of disinfection byproducts, microbial pathogen control consistent with advanced treatment needs

CLIMATE CHANGE: IMPACT OF RAINFALL INTENSITY

KEY CONCEPT: Wet areas are getting wetter, dry areas are getting drier, but of greater concern is the intensity of rainfall events

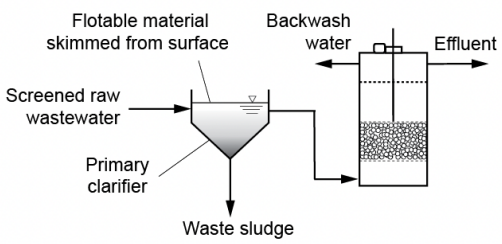


New wastewater management strategies are needed

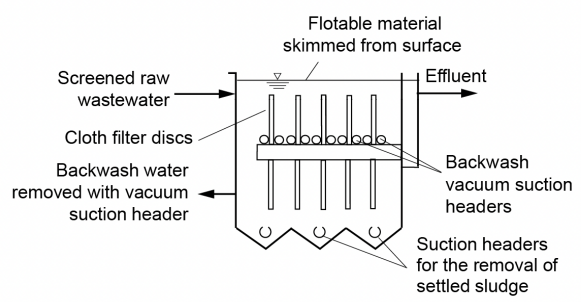


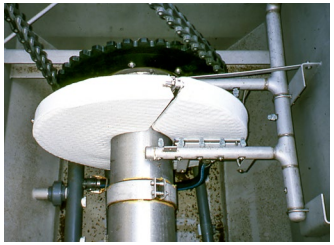
Time, 0-24	Percent of average flow	Concentration, mg/L	
		Nitrogen	Phosphorus
7	100	70	11
8	200	35	5.5
9	330	21.2	3.3
10	500	14	2.2
11	600	11.6	1.8
12	330	21.2	3.3
13	275	25.5	4
14	205	34.2	5.4
15	160	43.8	6.9

ENHANCED PRIMARY TREATMENT ALTERING THE CHARACTERISTICS OF RAW WASTEWATER

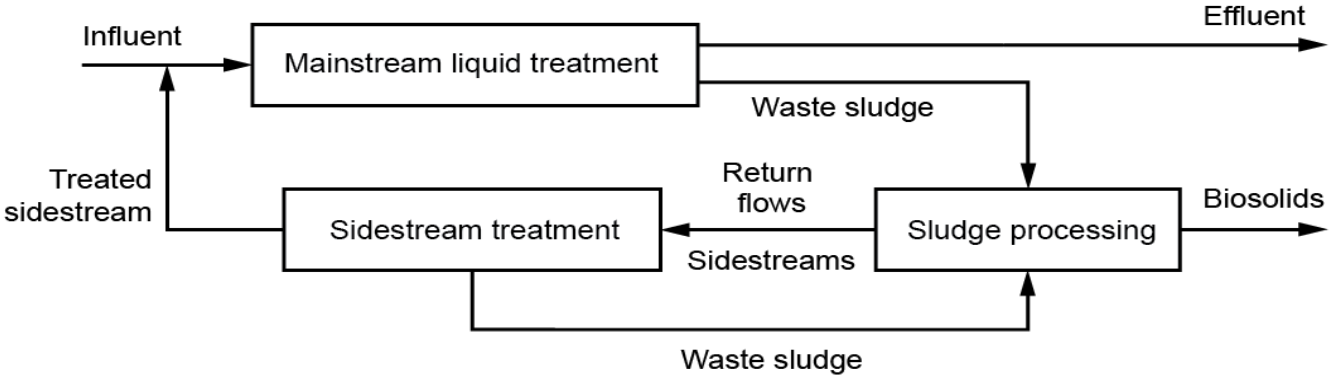


PRIMARY EFFLUENT FILTRATION (PEF)

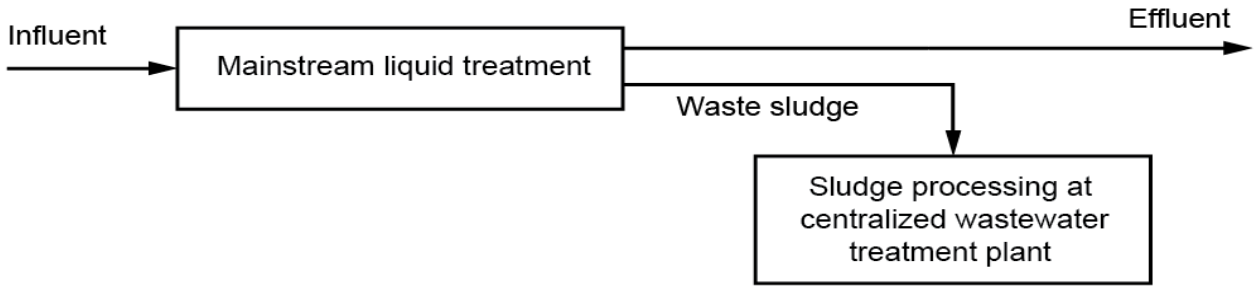




PRIMARY FILTRATION (PF) WITH 5 MICRON PORE SIZE FILTER CLOTH

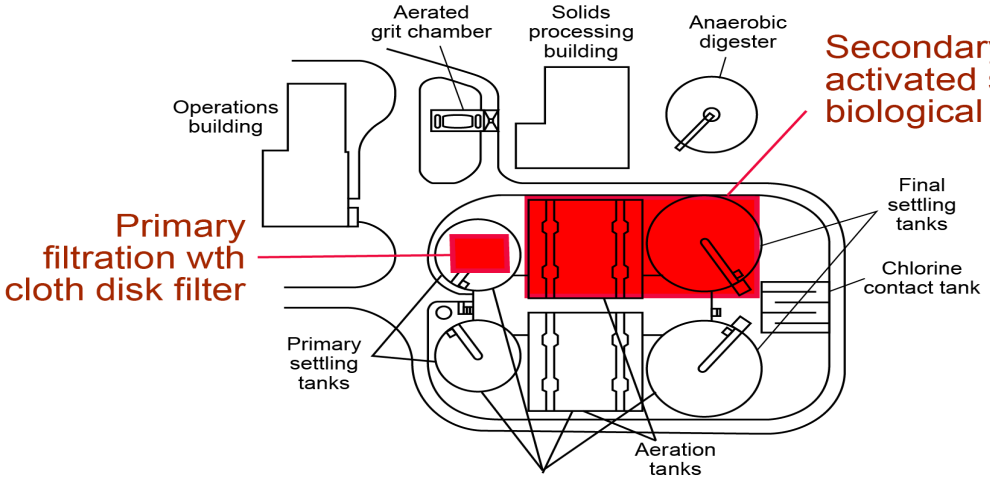


SIDESTREAM TREATMENT OF RETURN FLOW(S)

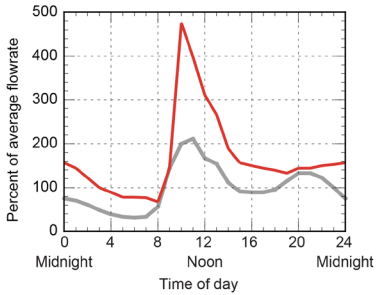


TREATMENT WITHOUT RETURN FLOW(S)
(e.g. divided and/or satellite treatment)

IMPACT OF NEW TECHNOLOGIES ON WASTEWATER TREATMENT

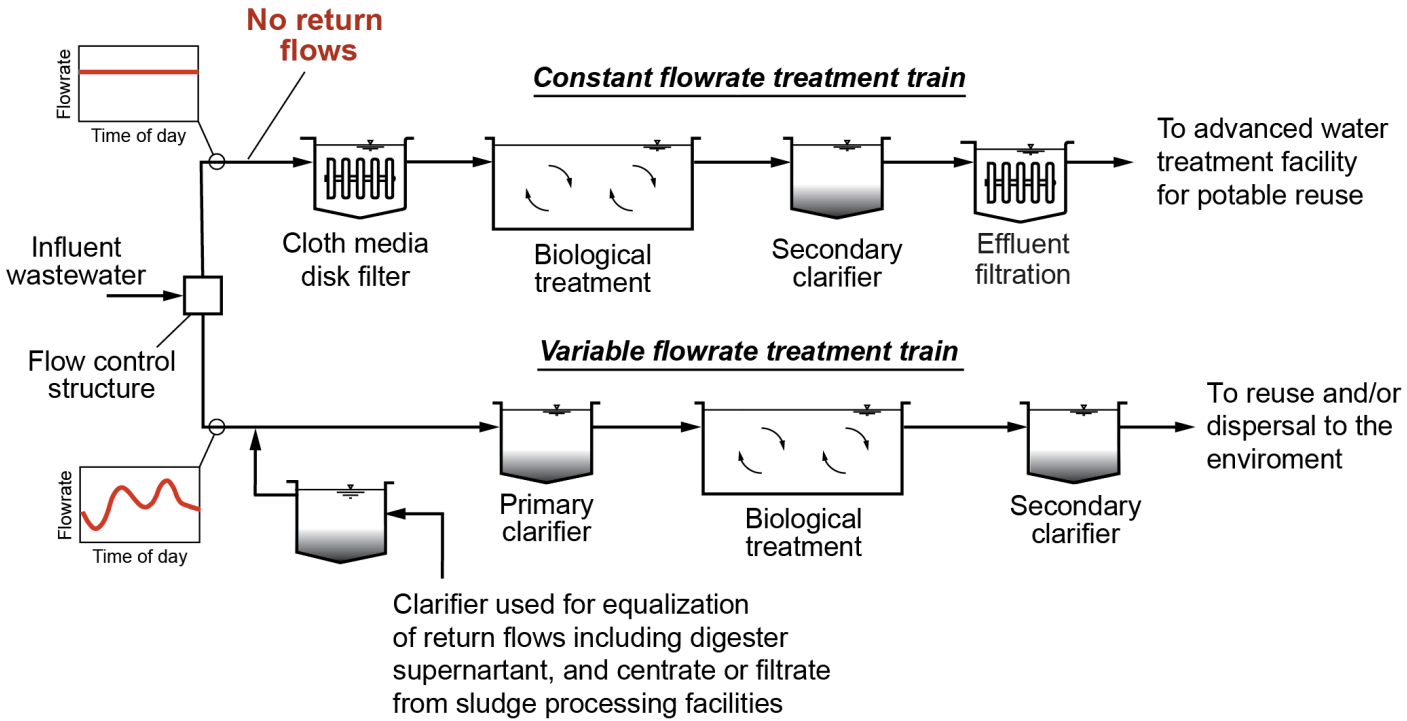


Primary clarifiers and other tankage can now be used for influent and/or return flow equalization, stormwater management, advanced treatment, etc.

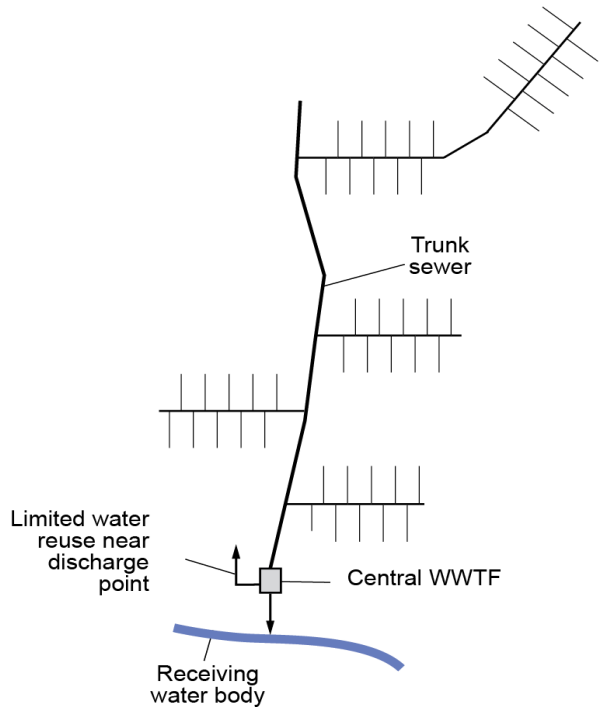


As treatment tankage gets smaller, management of peak stormwater flows will require new operational strategies, including sewershed storage, flow equalization, and flow diversion.

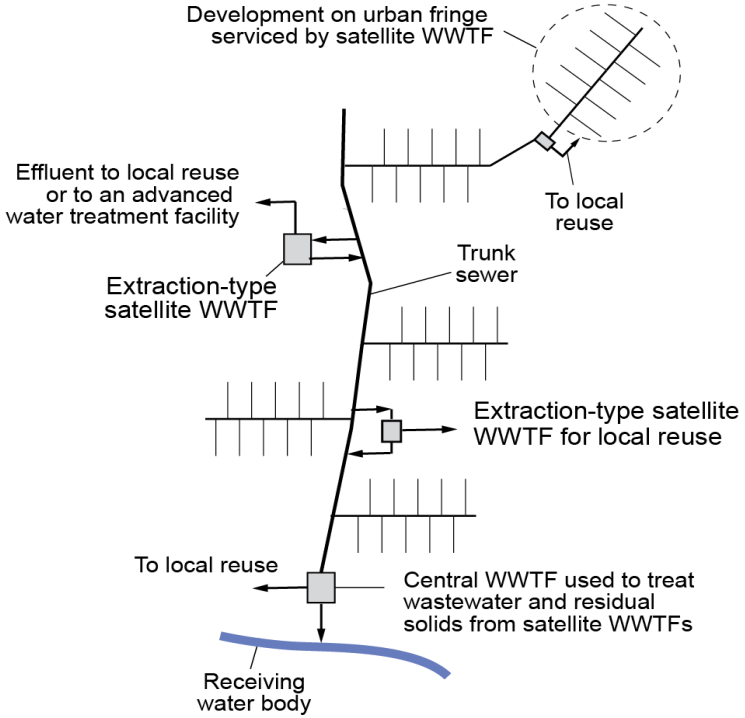
DIVIDED WASTEWATER TREATMENT AT WWTFs TO SUPPORT DPR



DECENTRALIZED TREATMENT FOR POTABLE AND OTHER REUSE APPLICATIONS

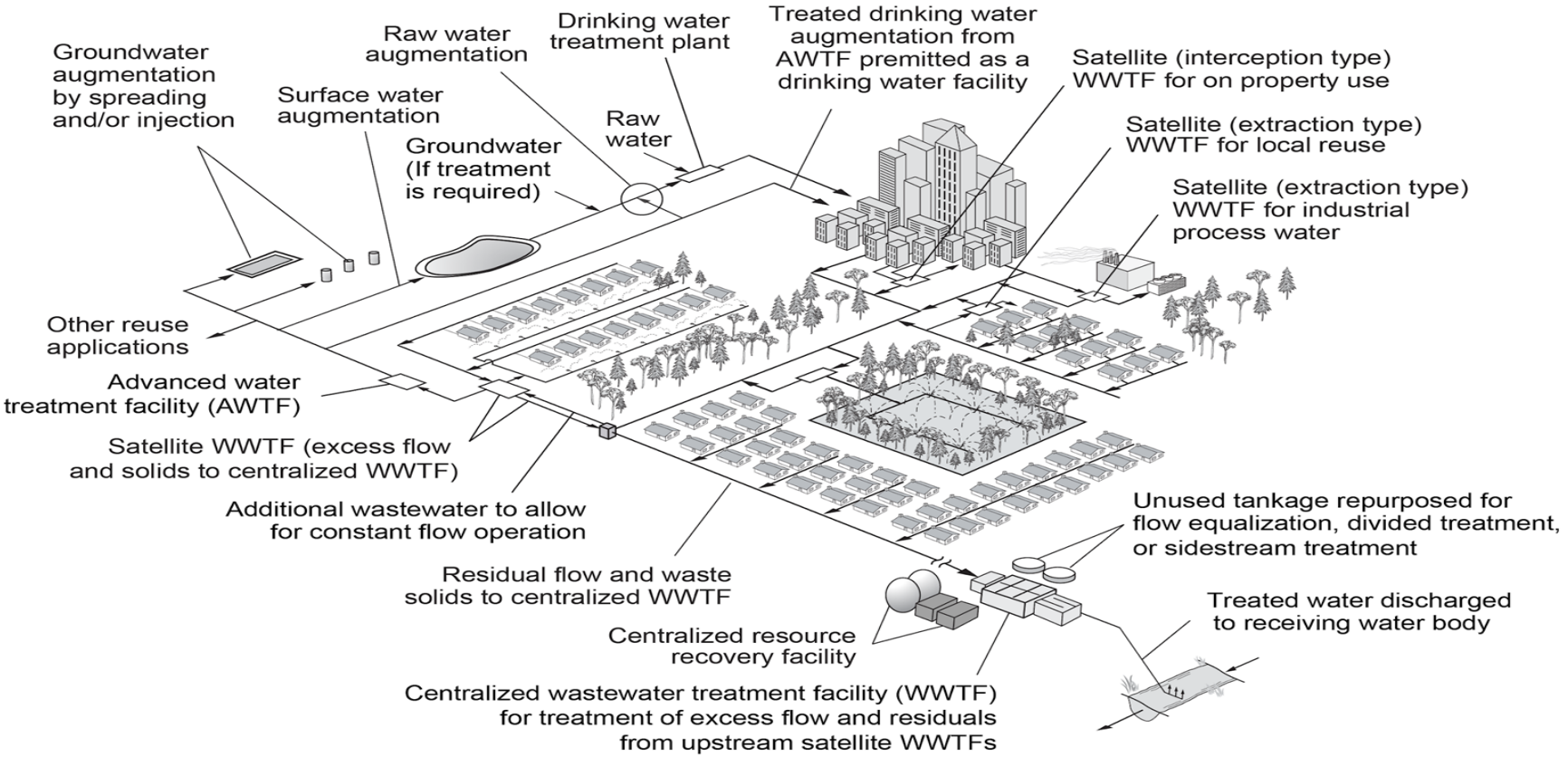


Current: Centralized Wastewater Treatment Regime



Future: Decentralized, Integrated Treatment Regime

INTEGRATED WASTEWATER MANAGEMENT USING SATELLITE WASTEWATER TREATMENT



BENEFITS OF SATELLITE TREATMENT IN POTABLE AND NONPOTABLE REUSE APPLICATIONS

- Facilities located near the point of reuse result in lower capital and O&M costs.
- Can be operated at constant flow, flow equalization facilities not required.
- No concentrated return flows, solids management occurs at regional facility.
- Can bypass excess flows, treatment effectiveness not impacted by storm events.

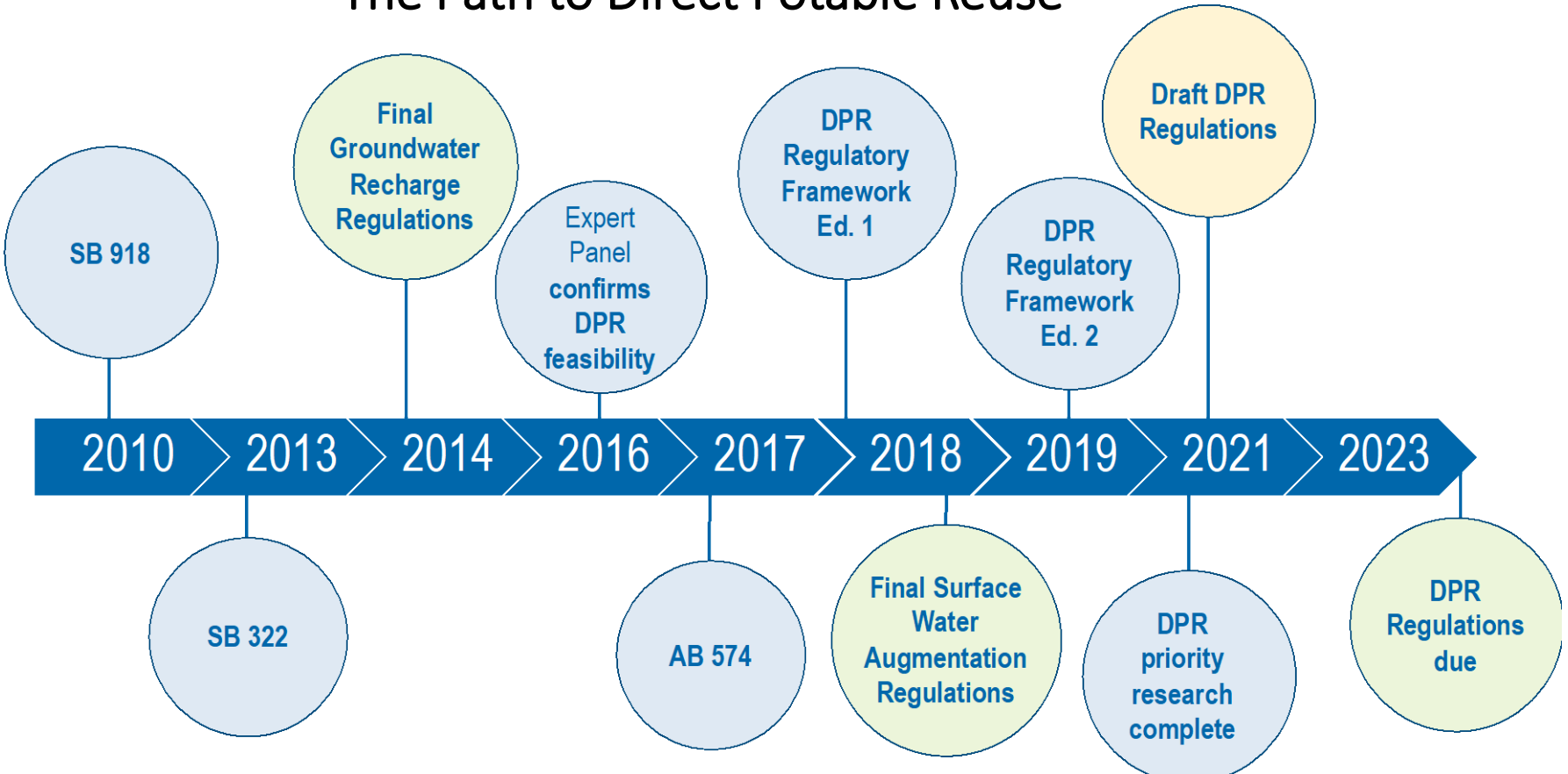
FUTURE CHALLENGES FOR THE WASTEWATER UTILITY IN DPR

- Paradigm shift to move beyond ideas that are limiting or no longer valid
- Resolve the deleterious unintended consequences of past decisions
- Implement policies and systems for community relevant integrated water and wastewater management

CALIFORNIA'S PATH TO DPR REGULATIONS

WATEREUSE CALIFORNIA

The Path to Direct Potable Reuse



WRCA-CA Coastkeeper Sponsored

- Makes sure Water Board moves forward with DPR
- Consulted with Water Board on all aspects of the bill
  - Dates
  - Definitions
  - Inclusion of the Expert Panel Language

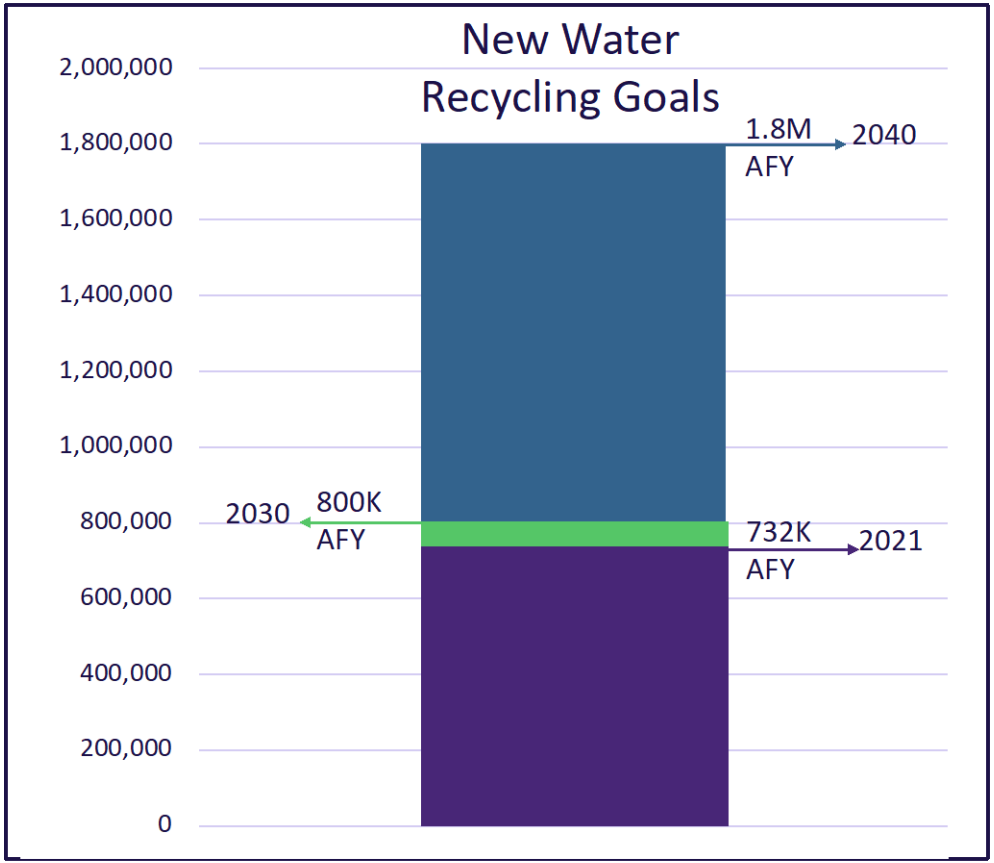
CALIFORNIA'S WATER SUPPLY STRATEGY

Adapting to a Hotter, Drier Future

New Goals for Recycled Water

- 800,000 AFY by 2030
- 1.8 MAF by 2040

- Complete DPR regulations a key strategy!

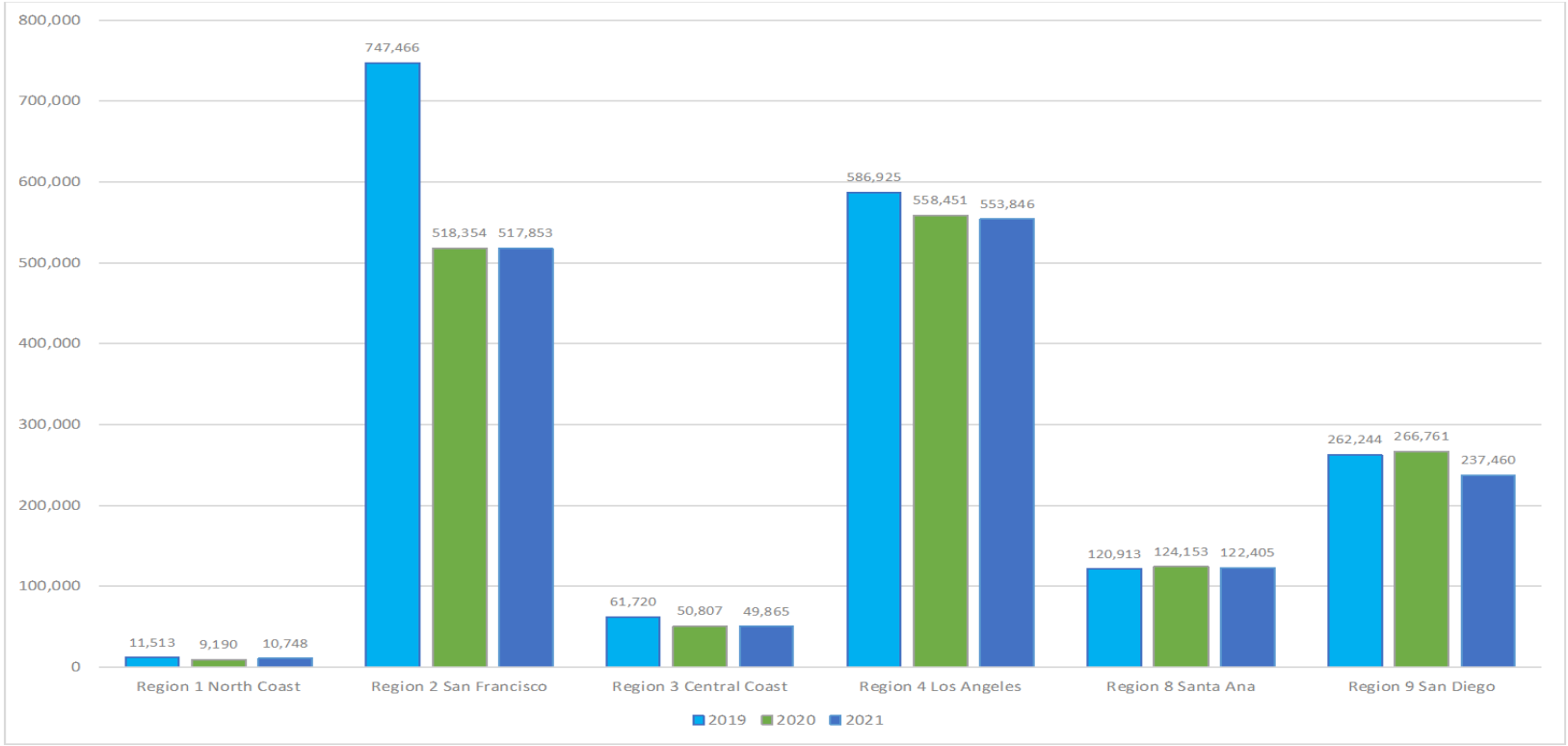


Thank you DWQ, Water Board for the graphic!

WATEREUSE CALIFORNIA

Wastewater Discharges to Ocean and Bays 2019-2021

1,790,781 to 1,492,177 -- 16.67% Decrease

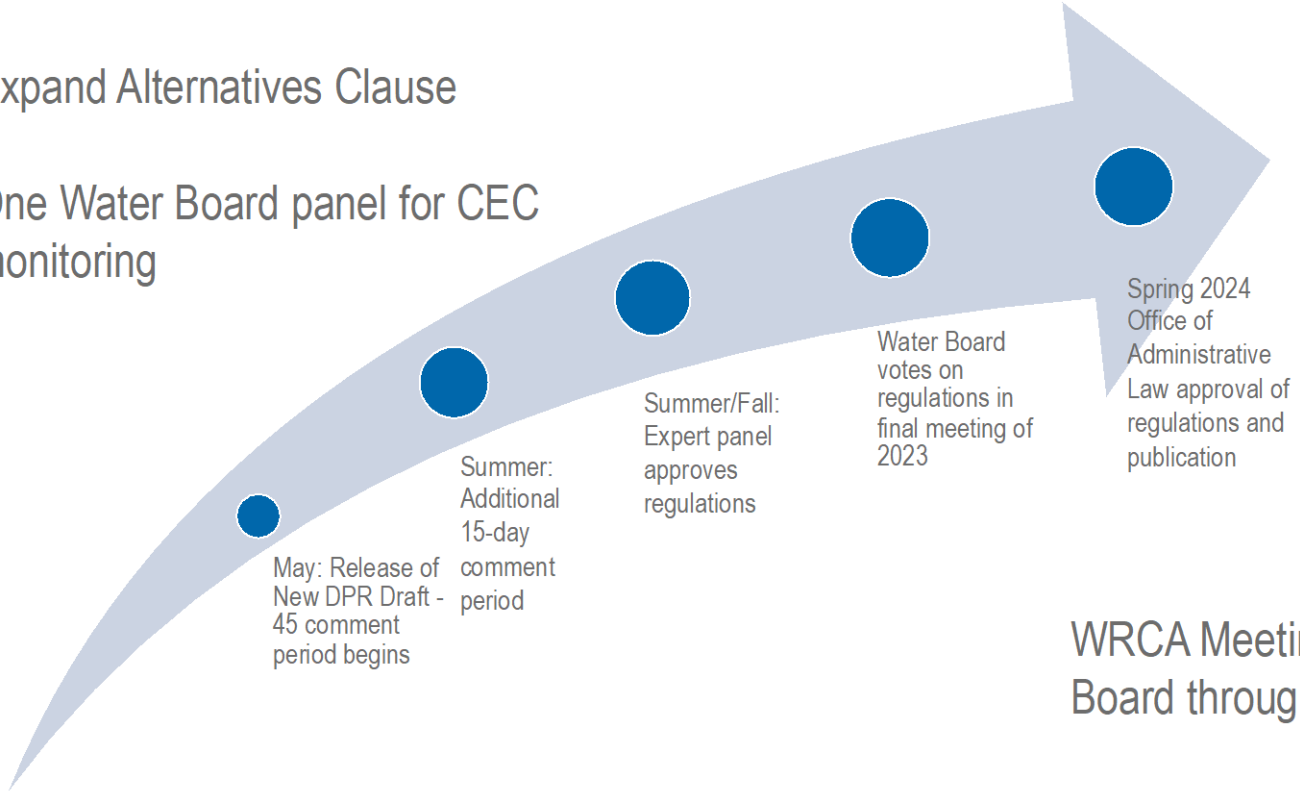


Based on data from the Water Board's annual volumetric reporting.

Thank you DWQ, Water Board for the graphic!

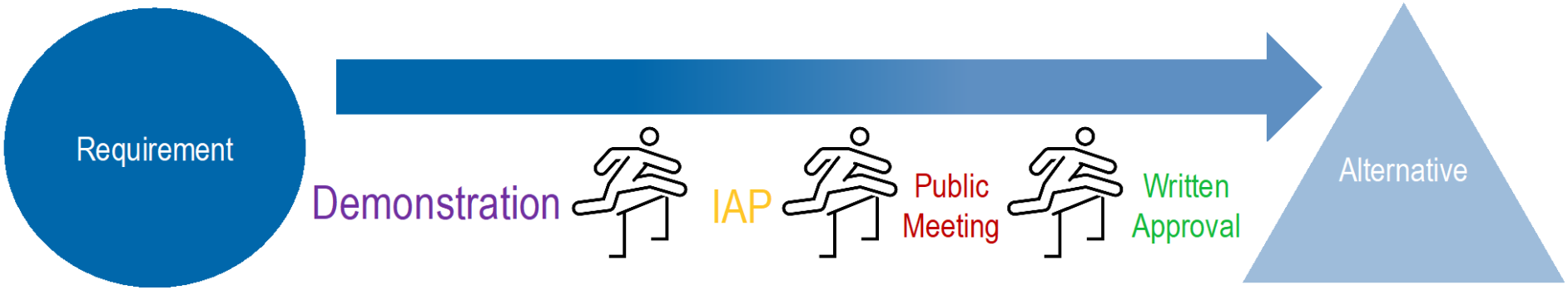
2023 Final Countdown to DPR

- Expand Alternatives Clause
- One Water Board panel for CEC monitoring



WRCA Meetings with Water Board throughout 2023!

Alternatives



- **Only applies to chemical control criteria** (64669.50)
- Equivalent or better level of performance of removal of contaminants of concern to public health
- At least the same level of protection to public health

Alternatives Clause

- Allows Water Board to adapt to research without opening DPR regulations
- Water Board unanimously approved broad clause -- **TWICE**
- Office of Administrative Law approved -- **TWICE**
- Water Board has full control whether to consider or ignore an “Alternative” request to the DPR regulations
- Water Board can specify a section if they don’t want it to apply – ie log removal reduction

Request: One Water Board Expert Panel to Provide CEC Guidance for DPR Projects

- Current Draft -- Quantitative Risk Assessment:
  - *Each project develops its own public health thresholds for unregulated chemicals*
  - *Could result in data inconsistencies across projects*
  - *Will result in much less certainty for project proponents*

- WRCA committed to support this approach through funding and statutory change if necessary.

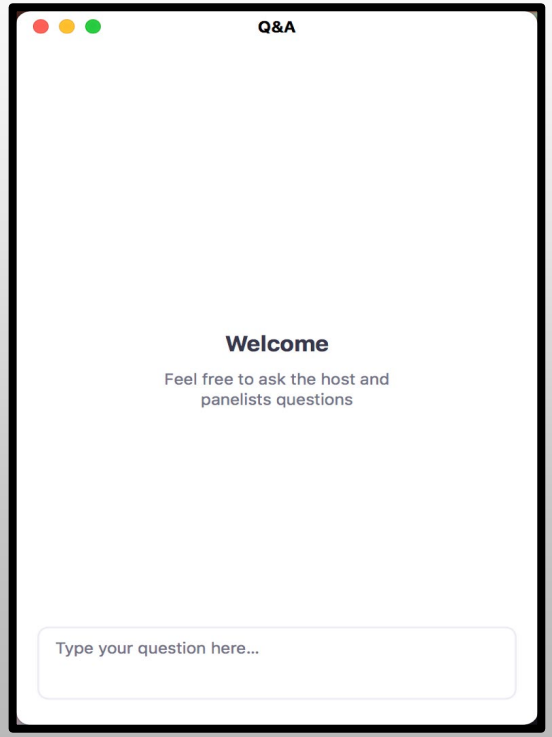
Question and Answer

How to Ask a Question

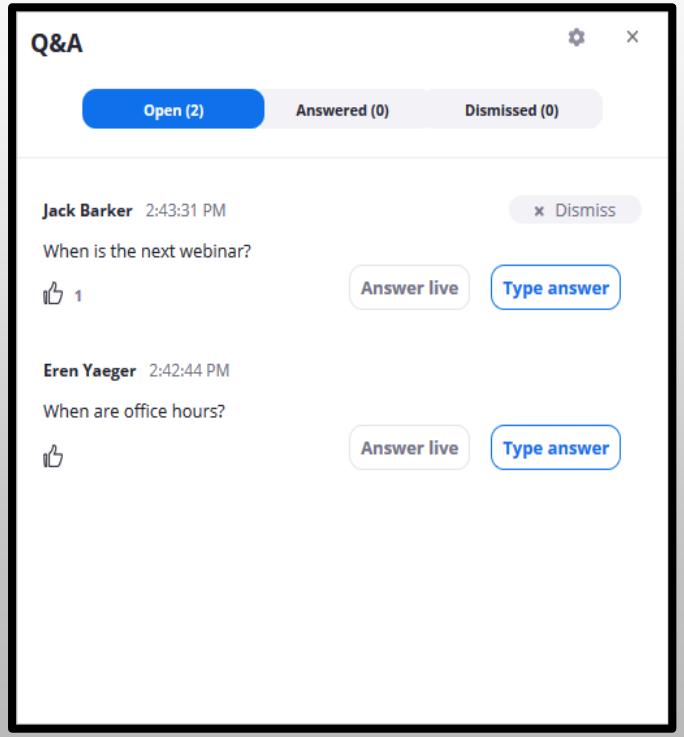
Click “Q&A” on the bottom of your screen

Southern California Water Dialogue

Type in question
and then click send



You can upvote
by clicking
“thumbs up” icon



Southern California
Water Dialogue

Next
Southern California Water Dialogue Webinar

Wednesday, May 24, 2023

Your feedback on today's meeting is important to us.

For the next ten minutes, you can use the Zoom Chat feature to send us any comments.

Southern California Water Dialogue