Advancing Water Reuse in the Bay Area: Exploring Opportunities and Challenges for Interagency Collaboration

Moderated by: Melody LaBella, Central San

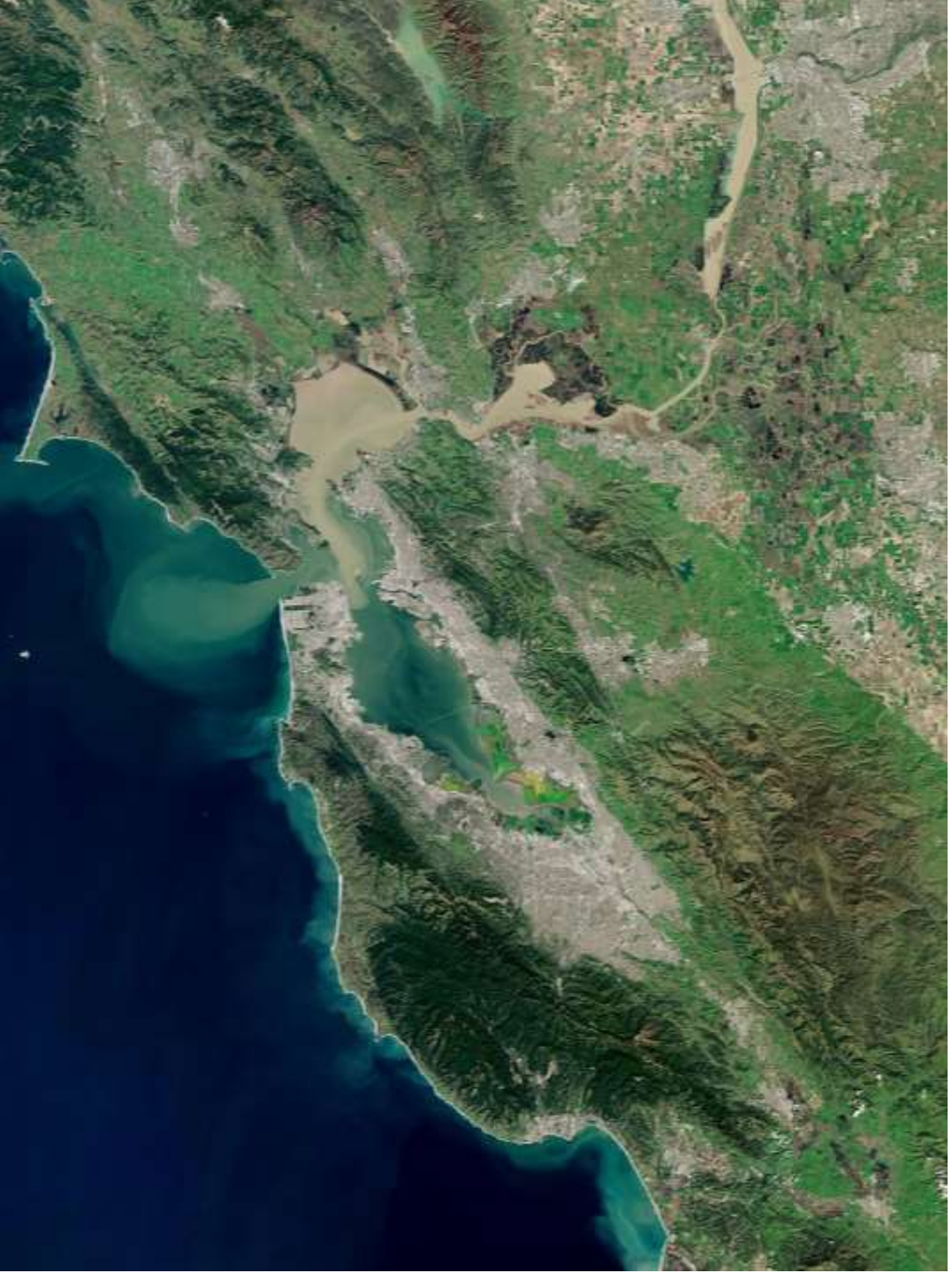
September 20, 2023

Welcome & Introduction

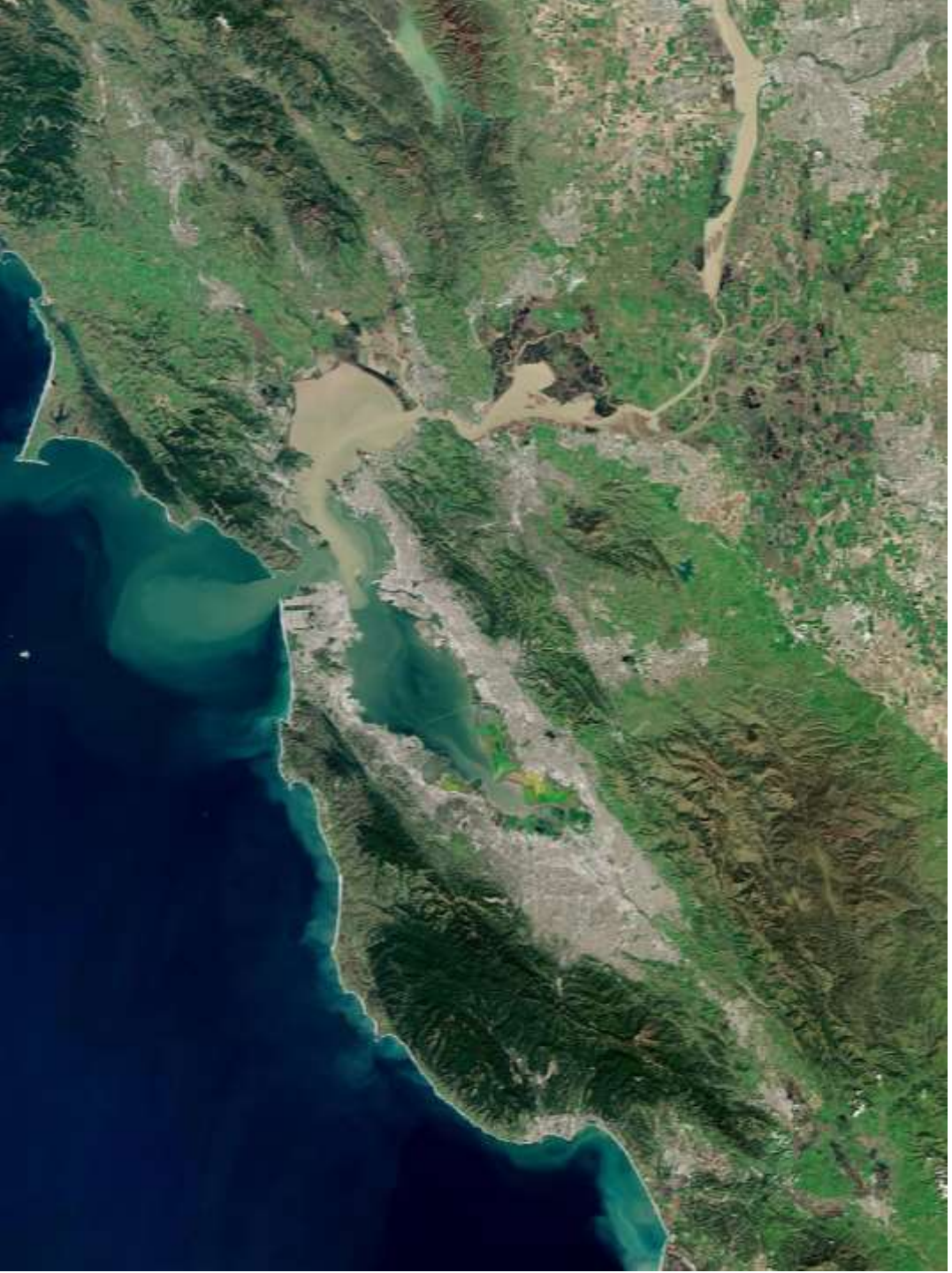
The Bay Area wastewater community is facing up to a $15B investment in nutrient treatment upgrades to protect San Francisco Bay.

The Bay Area

community is facing up to a $15B investment in nutrient treatment upgrades to protect San Francisco Bay.



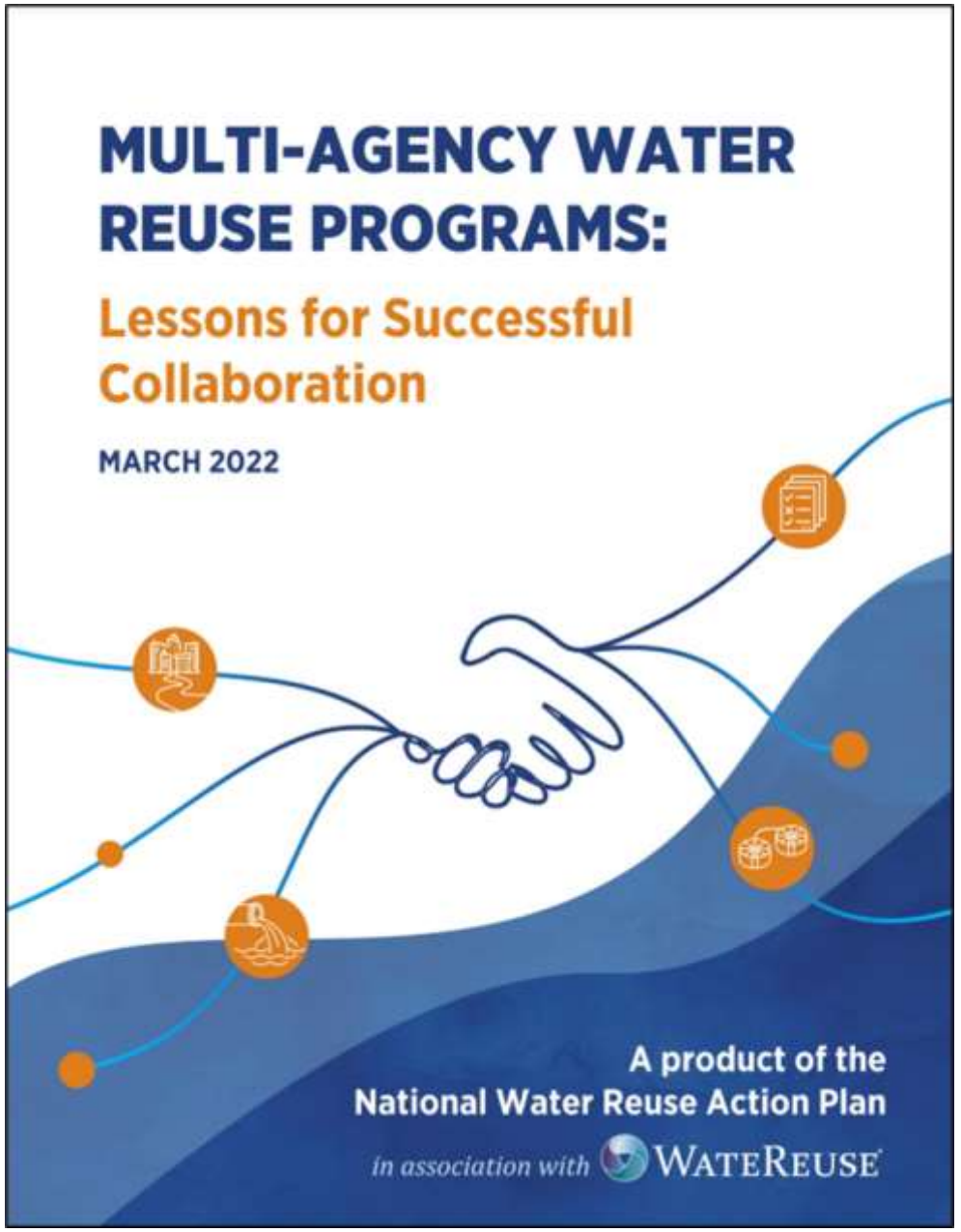
California experiences frequent droughts and the Bay Area water community experiences water shortages in long-term droughts.



California experiences frequent droughts and the Bay Area community experiences water shortages in long-term droughts.


The climate is changing.

Do we have an opportunity for collaboration here?



EPA WateReuse Action Plan 2.16 Team

Eric Rosenblum

Felicia Marcus

Bob Raucher

Shannon Spurlock

Bahman Sheik
(In memoriam)

Dave Smith

Planning Committee – Thank you!

- BACWA (Lorien Fono and Mary Cousins)
- Consultants
  - HDR (Mike Falk)
  - Kennedy Jenks (Melanie Tan)
- Regional Board (Melissa Gunter)
- San Francisco Estuary Partnership (Natasha Daniels and Will Geiken)
- Individual Agencies
  - Central San (Melody LaBella)
  - City of San Jose/South Bay Water Recycling (Pedro Hernandez)
  - EBDA (Jackie Zipkin)
  - EBMUD (Linda Hu, Florence Wedington, Reena Thomas)
  - SFPUC (Manisha Kothari)
  - Valley Water (Hossain Ashktorab)

Overview of the Day

- Icebreaker
- Drivers and Opportunities
- Break
- Small Group Breakout #1 and Report Out
- Lunch
- Overview of Findings and Lessons Learned in WRAP 2.16
- Small Group Breakout #2 and Report Out
- Next Steps

Desired Outcomes

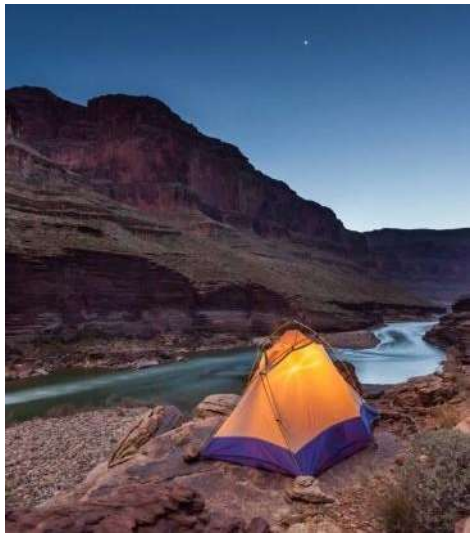
- Identify similarities and differences in **issues and drivers**
- Recognize **opportunities for partnerships** to address current and future reuse challenges
- Evaluate **the right scale(s)** (regional/ subregional/local) to address these challenges
- Improve **capacity for and commitment to collaboration** among Bay area agencies and utilities

Icebreaker Exercise

- Why are you here?
- What do you want to accomplish in water reuse and what's getting in the way?

Drivers & Opportunities

- **Wastewater (Lorien Fono, BACWA)**
- Water (Manisha Kothari, SFPUC and Hossein Ashktorab, Valley Water)
- Regional Board (Alexis Strauss Hacker)
- Importance of Collaboration and Breakout Group #1 Charge (Felicia Marcus, Stanford University)



The Wastewater Perspective: Water Recycling in the San Francisco Bay Region

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AGENCIES

Lorien Fono

September 20, 2023

RW Interagency Collaboration Workshop

Who are the wastewater agencies (POTWs)?

- 44 POTWs
  - 37 discharge to SF Bay
  - 4 discharge to Ocean
  - 3 discharge to upper Napa River
- 7.1M service population
- Many different treatment technologies
- Individual permitted flows from **0.03 mgd** to **120 mgd**
- BACWA is a JPA representing the POTW community

Visit www.bacwa.org/nutrients

POTW community's evolving mission

Protecting public health

Environmental protection

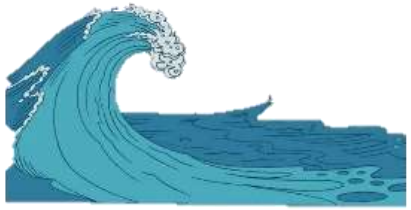
Regulatory Driver: Nutrient discharges are of concern all over the world

- Nutrients of concern in water bodies are nitrogen and phosphorus.
  - In San Francisco Bay, nitrogen is the element that controls growth.
- Nutrient over-abundance is linked to phytoplankton (algae) over-growth, leading to low dissolved oxygen in water bodies, which suffocates wildlife.
  - This process is called “eutrophication”.
- Some phytoplankton species can generate harmful chemicals that are toxic to wildlife, humans, or pets.

San Francisco Bay has historically been resilient to nutrients

1. High turbidity blocks the light phytoplankton needs to grow

2. Strong tidal mixing reduces nutrient concentrations



3. Filter-feeding clams reduces phytoplankton concentrations

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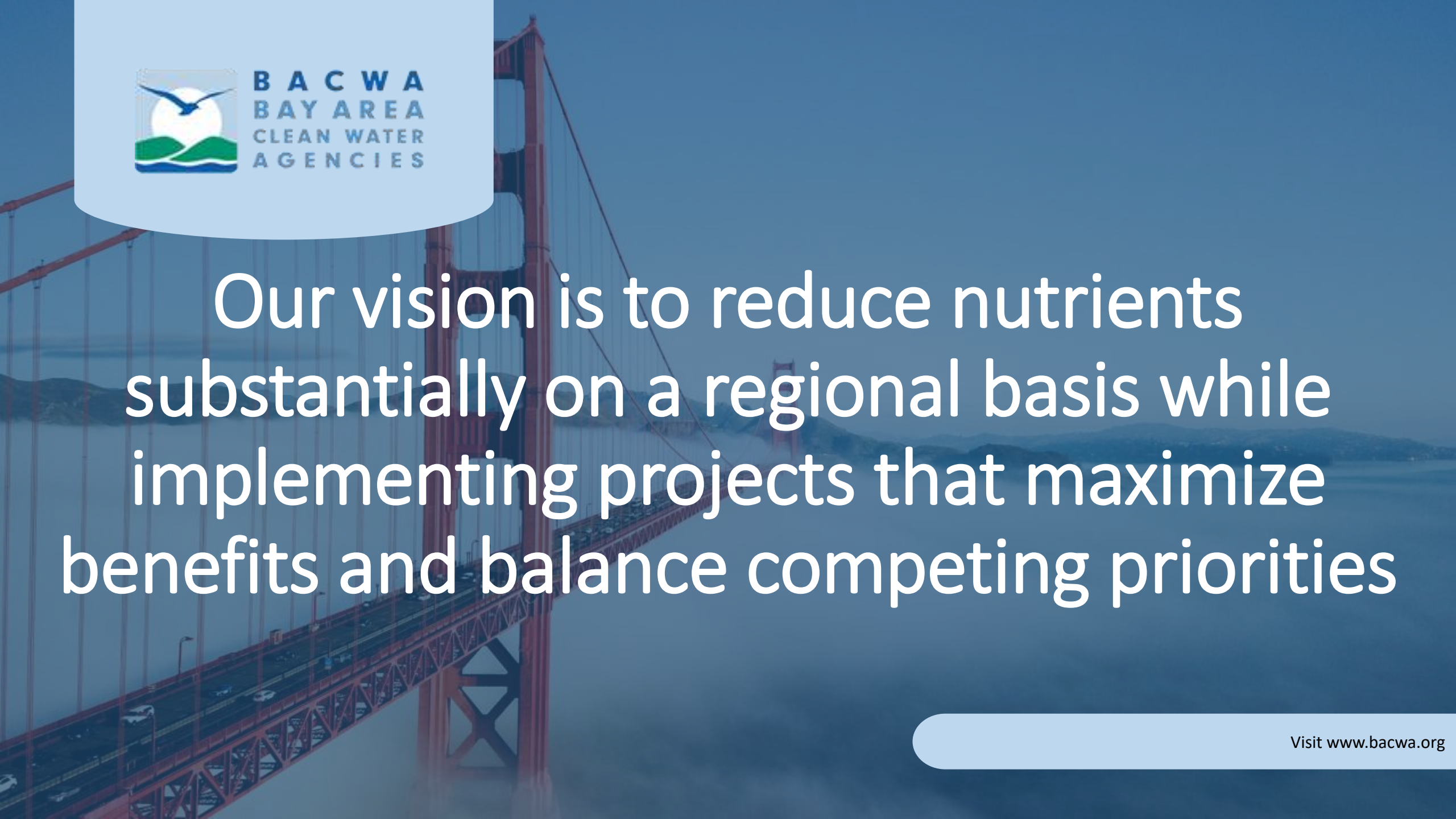
The "Game-Changer"

San Francisco Chronicle

Poop and pee fueled the huge algae bloom in San Francisco Bay. Fixing the problem could cost $14 billion


BACWA
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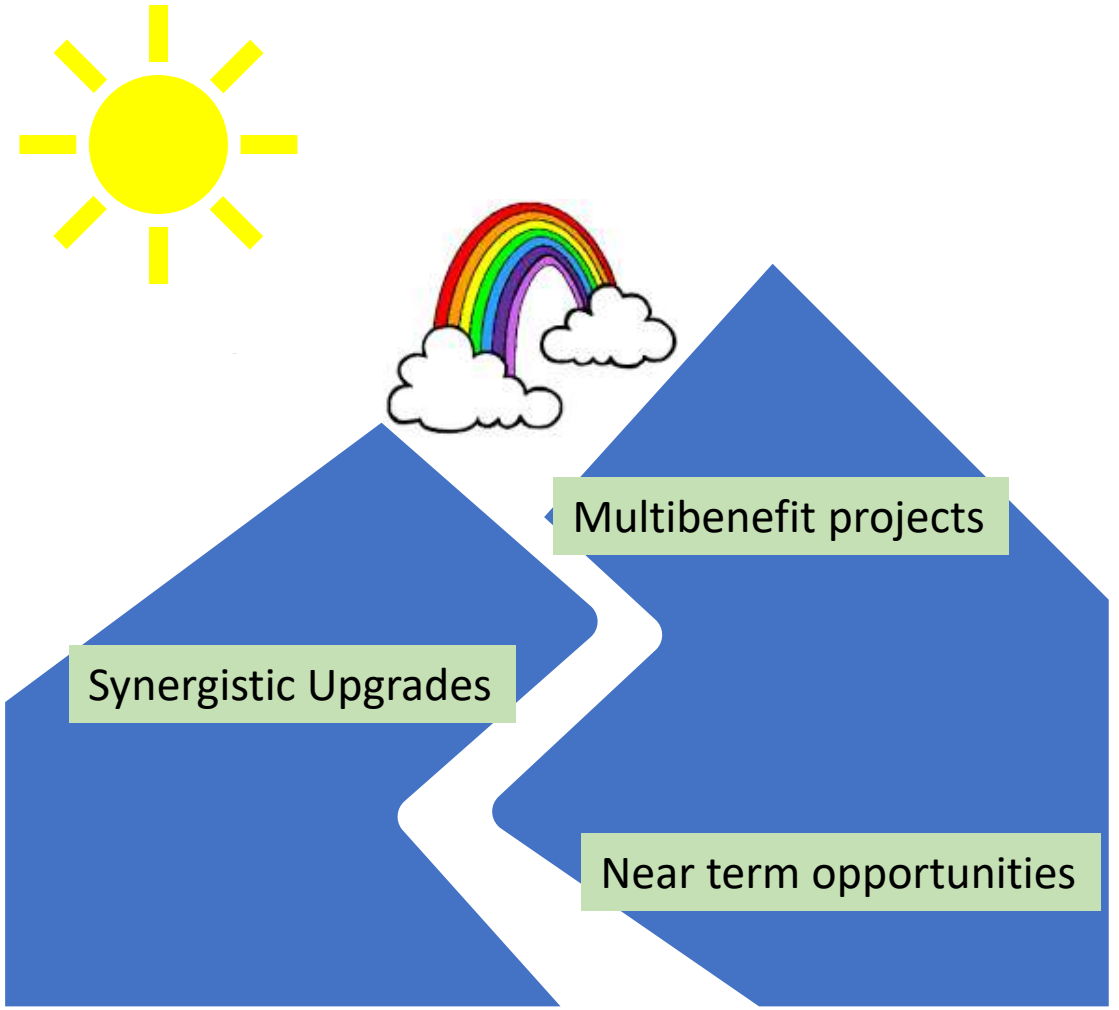
AGENCIES
Our vision is to reduce nutrients substantially on a regional basis while implementing projects that maximize benefits and balance competing priorities
Visit www.bacwa.org

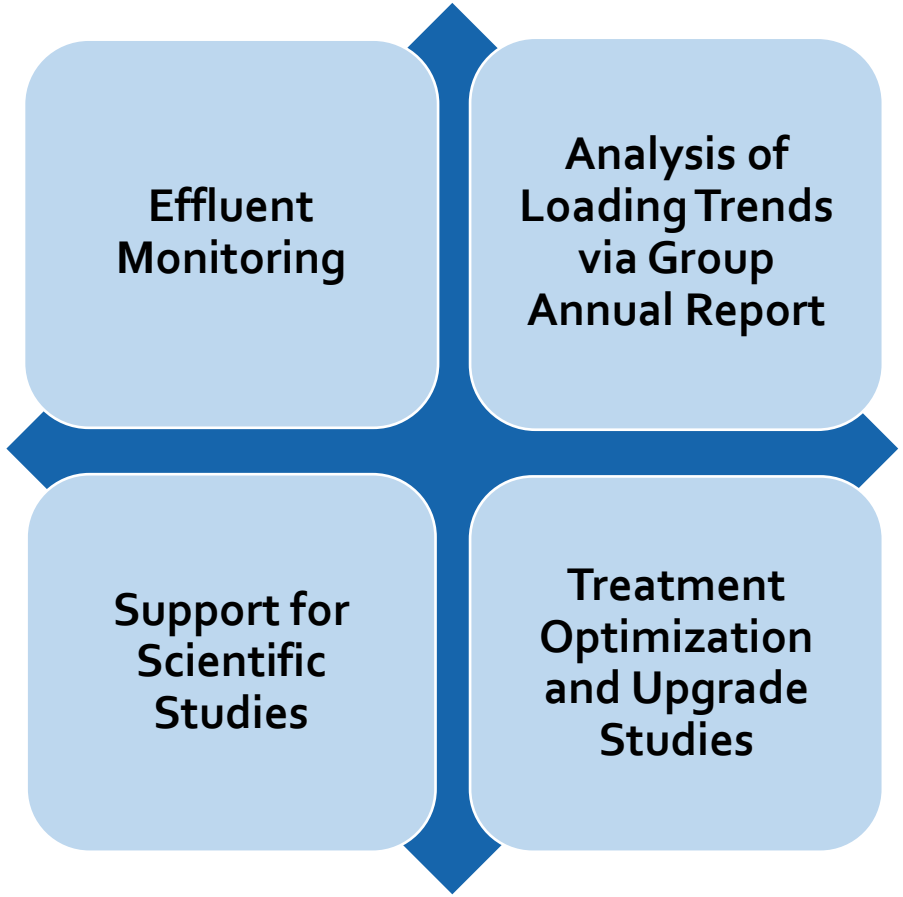
Our regional approach to nutrient reduction



Nutrient Watershed Permit

Watershed Permit 1: 2014 – 2019

Regional management of nutrients

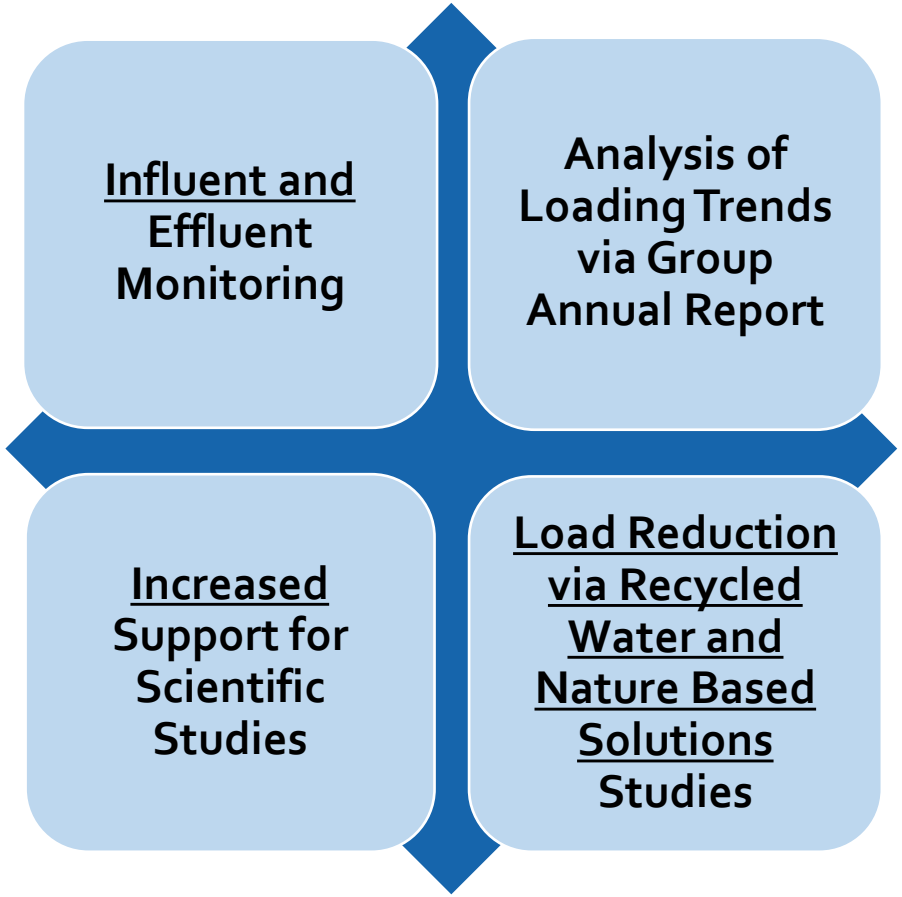


Visit www.bacwa.org/nutrients

Nutrient Watershed Permit

Watershed Permit 2: 2019 – 2024

Regional management of nutrients



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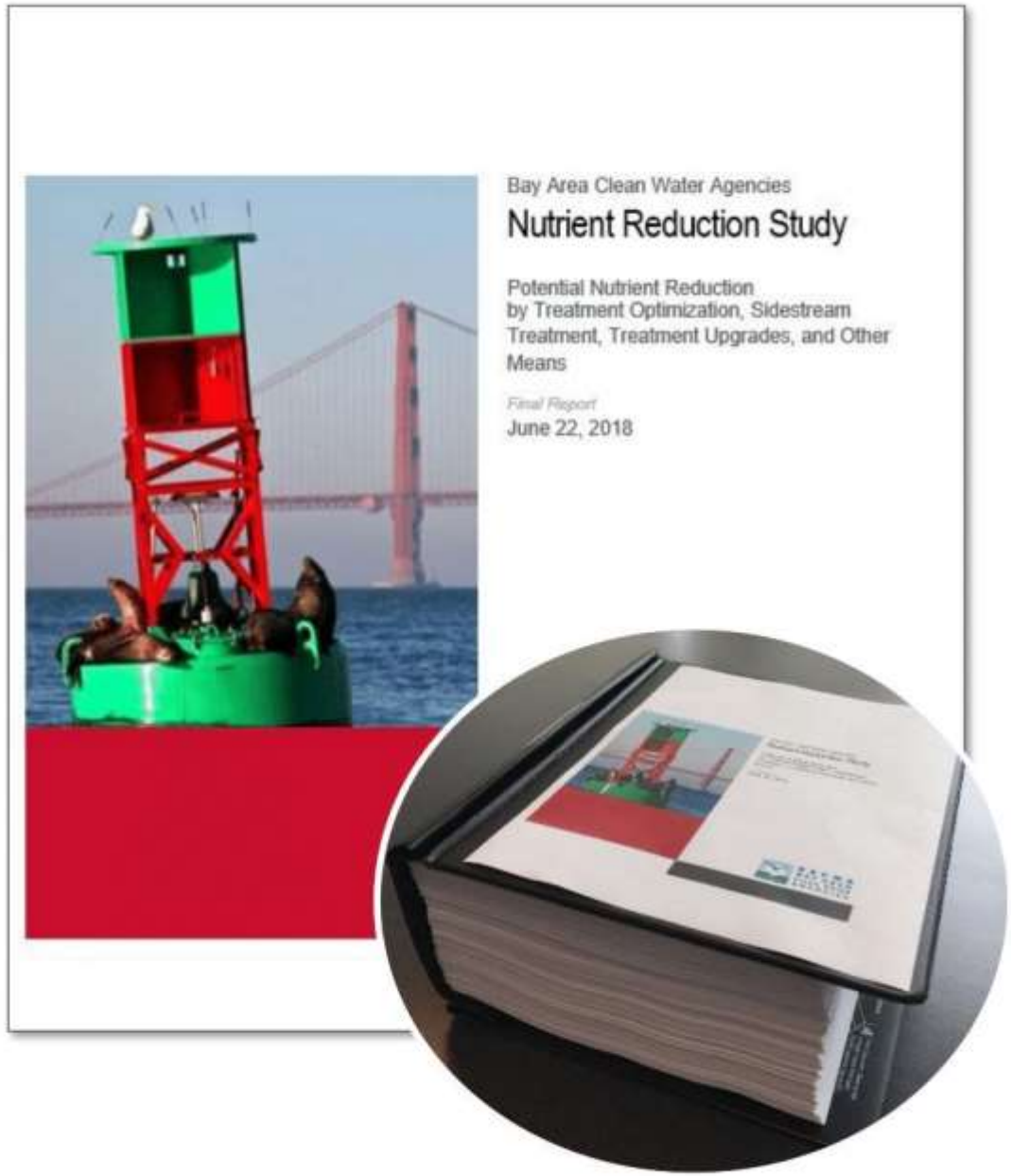


Strategy	Total N Load Reduction to the Bay	Total Present Value* ($)
Optimization	**7%**	**$200 M**
Sidestream Treatment	**19%**	**$870 M**
Upgrade Level 2 (15 mg N/L)	**57%**	**$10.8 B**
Upgrade Level 3 (6 mg N/L)	**82%**	**$13 B**

*Updated to 2023 $. Assumes dry season TIN only reduction.

Recycled Water Flows Diverted from Bay Projected into the Future

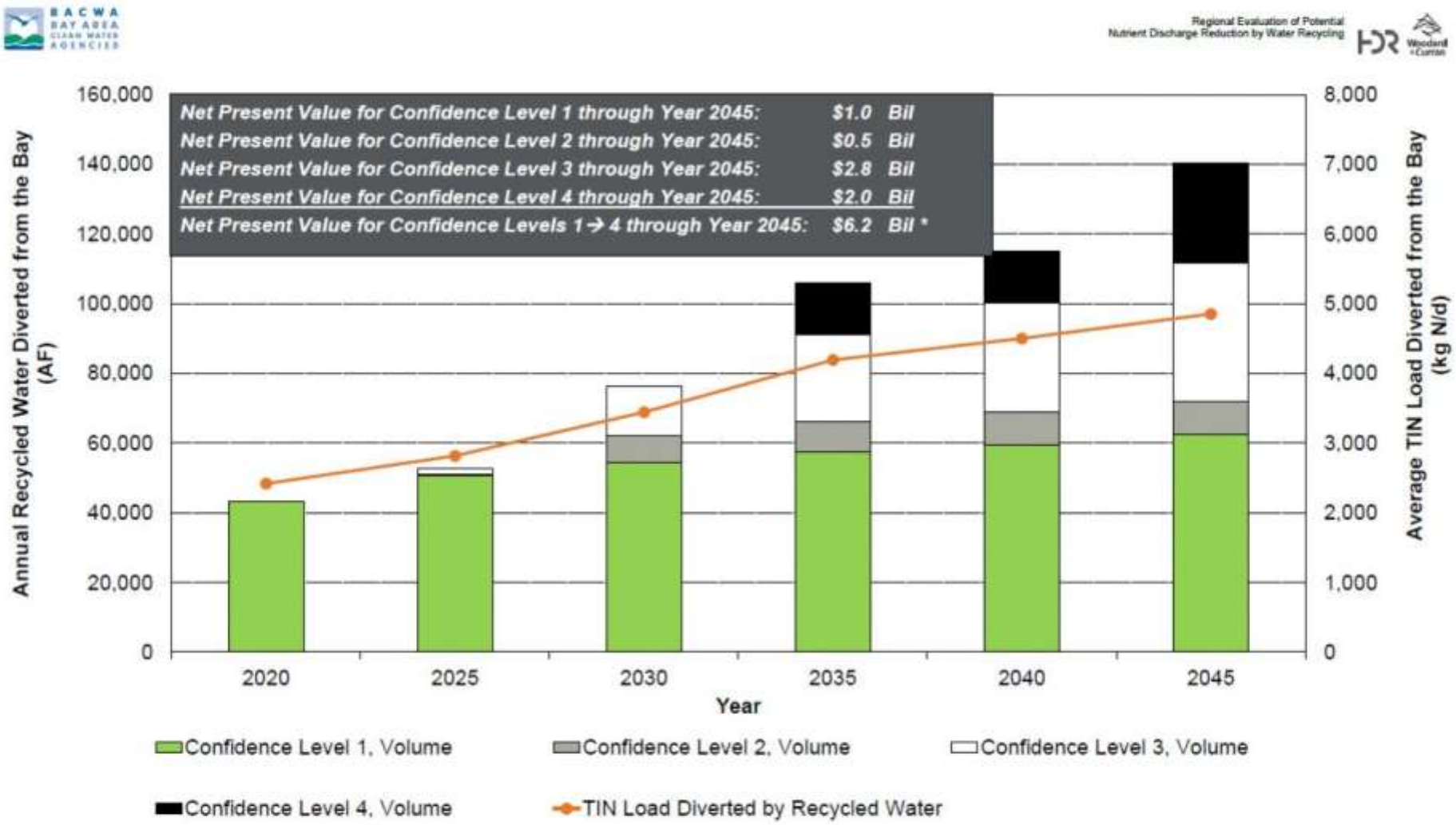


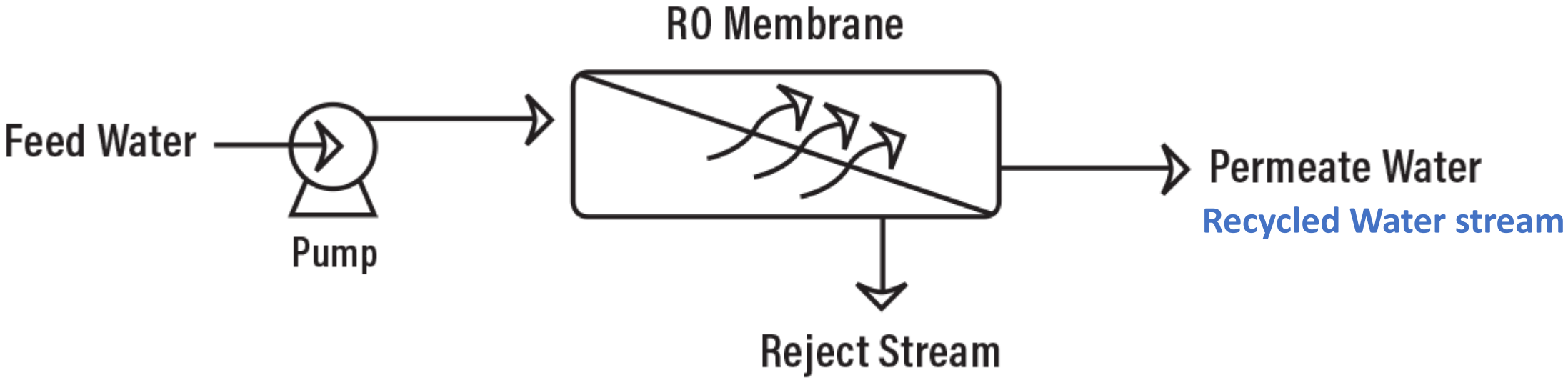
Figure ES - 2. Summary of Existing and Proposed Annual Recycled Water Flows and the Corresponding Total Inorganic Nitrogen Load Diversions from SF Bay Dischargers

Confidence level = level of confidence in the values provided. 1 = includes projects that are already in place and/or currently budgeted; 2 = includes projects that are in master planning stages; 3 = includes projects that are conceptual, and 4 = includes projects that are conceptual in nature and require agreements across multiple jurisdictions/agencies.

* The total net present value might vary from the sum of the listed confidence levels due to rounding.

For Perspective: the Current Discharge Flows to the Bay are Approximately 400 mgd (about 9% of Effluent is Currently Recycled)

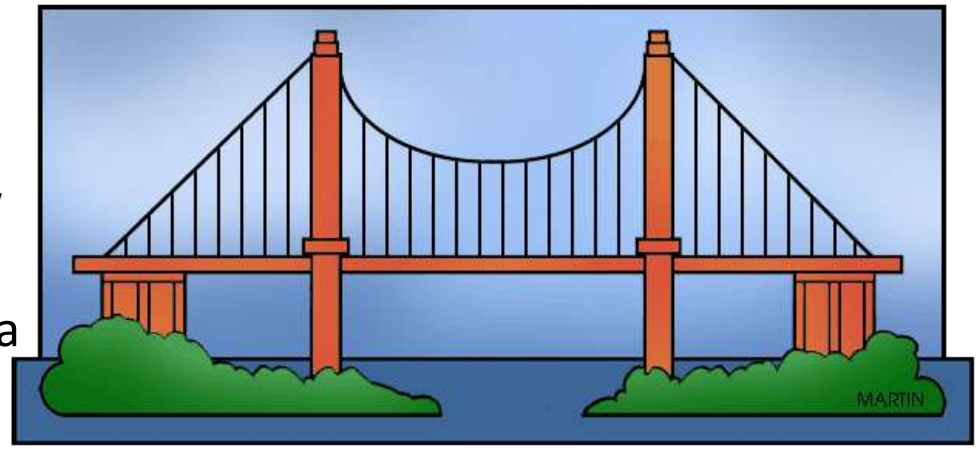
RO Concentrate management complicates potable reuse projects



RO Concentrate contains most of the salts, pollutants, and nutrients from the feed water

How do we bridge the gap?

- RW is more expensive per lb nitrogen removed than traditional upgrades
- RW is a relatively expensive new water supply
- RO concentrate management is a major challenge



- We think creatively/holistically and work together to break down institutional silos
- We make best/highest use of all water within our region
- We consider multiple benefits whenever implementing infrastructure improvements

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Thank You

Lorien Fono

BACWA Executive Director
lfono@bacwa.org

Visit www.bacwa.org

Drivers & Opportunities

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- **Water (Manisha Kothari, SFPUC and Hossein Ashktorab, Valley Water)**
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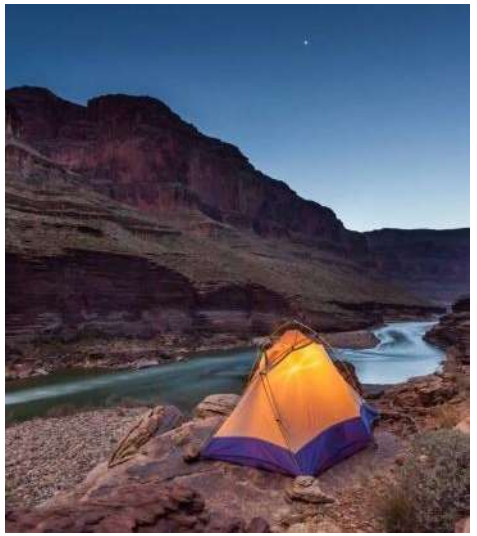


Hetch Hetchy Regional Water System

Drivers and Opportunities for Reuse

Water Agency Perspective: SFPUC

September 20, 2023

Hetch Hetchy Regional Water System

San Francisco Public Utilities Commission (SFPUC)

Water Agency Drivers for Reuse

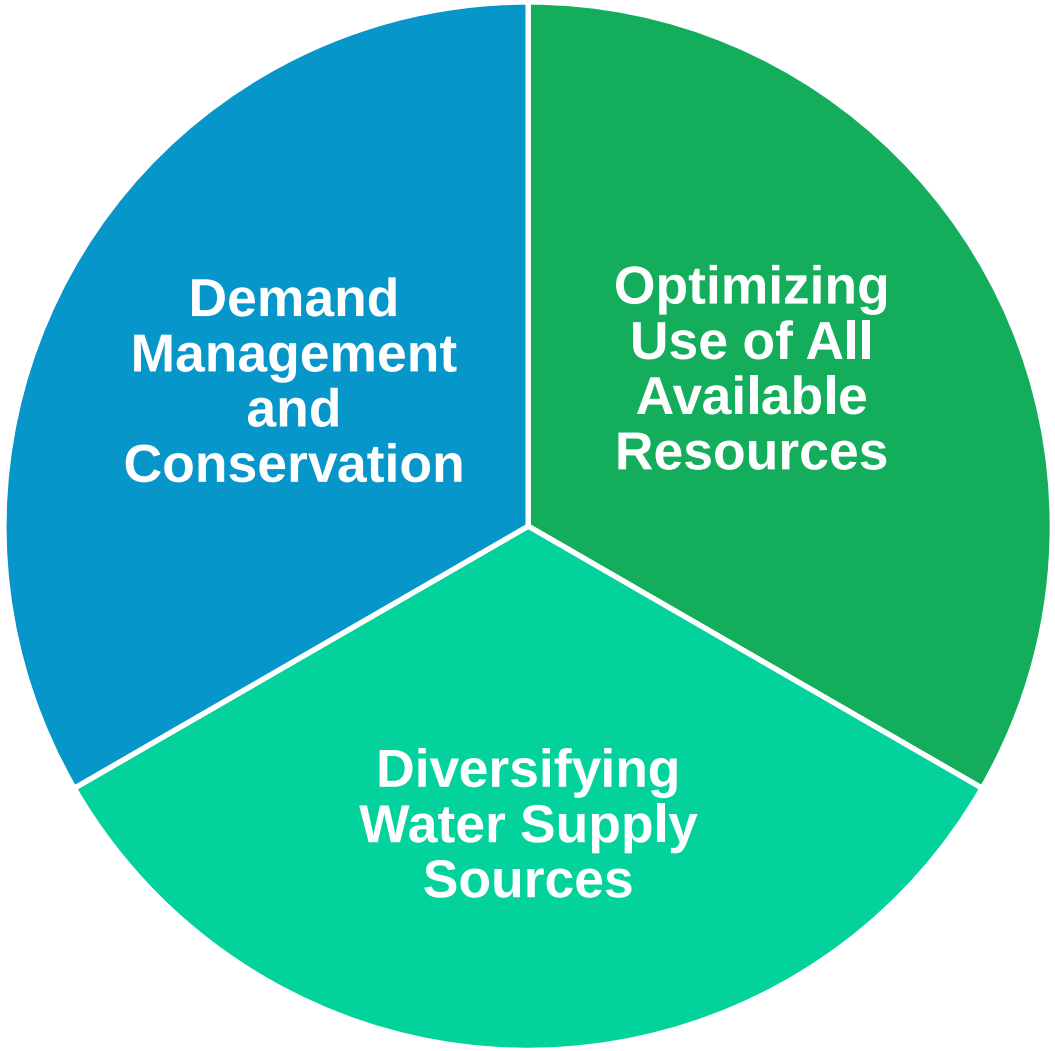
1. **Regulatory changes:** new regulations that can limit water availability (environmental flows, curtailments, other licensing and permitting needs)

2. **Climate change:** increasing frequency and/or severity of droughts

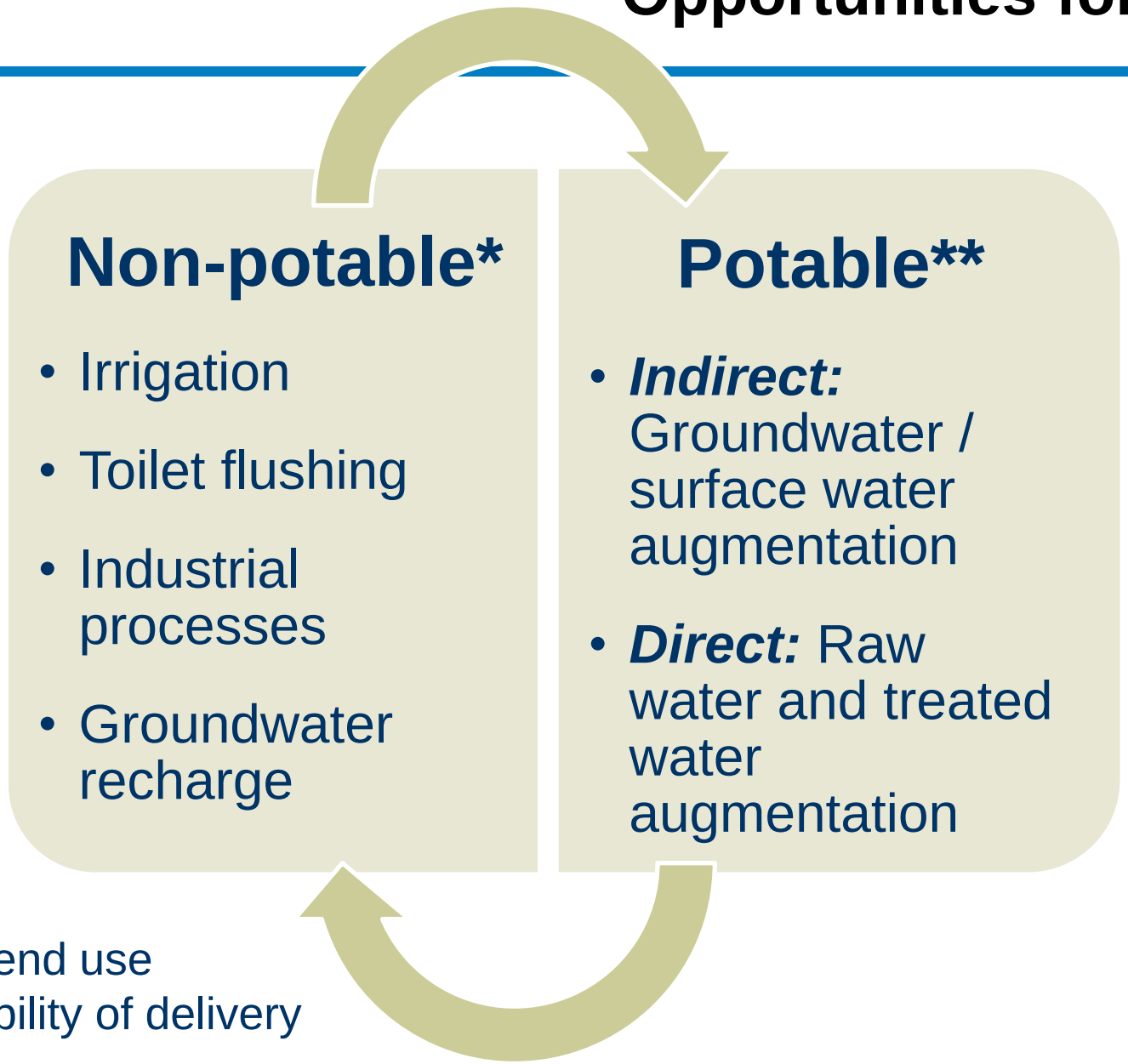
3. **Demographic changes:** population growth, changing employment patterns, housing needs

Water reuse can help alleviate water scarcity and enhance drought resilience

Reuse in an Integrated Water Resources Management Approach



Opportunities for Water Reuse



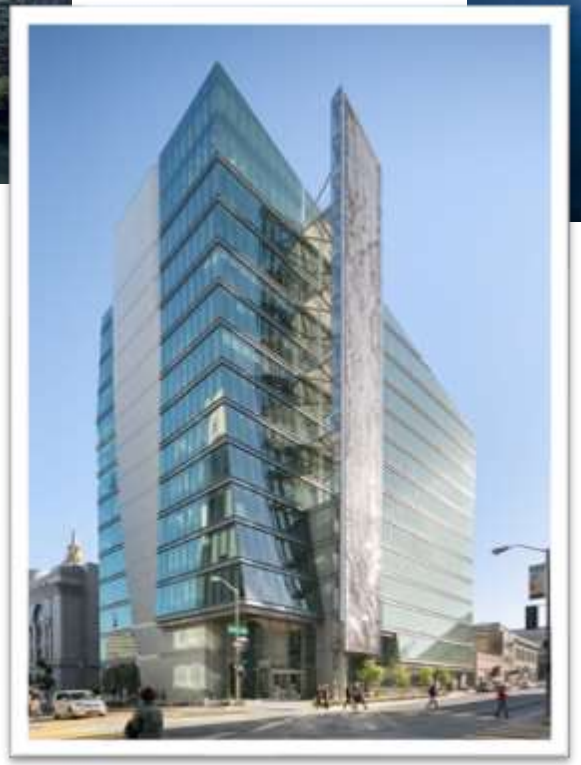
**May be limited by infrastructure

*May be limited by end use demands and feasibility of delivery

Water Agency Considerations for Reuse

- Nature, location, and timing of end user demands
- Infrastructure needs
- Regulatory requirements
- Costs and ratepayer impacts
- Community acceptance

Onsite Reuse Projects in San Francisco



45 Permitted Onsite Water Treatment Systems; 29 projects planned for future

Recycled Water Projects in San Francisco

Partnerships with Neighbors *(operating)*

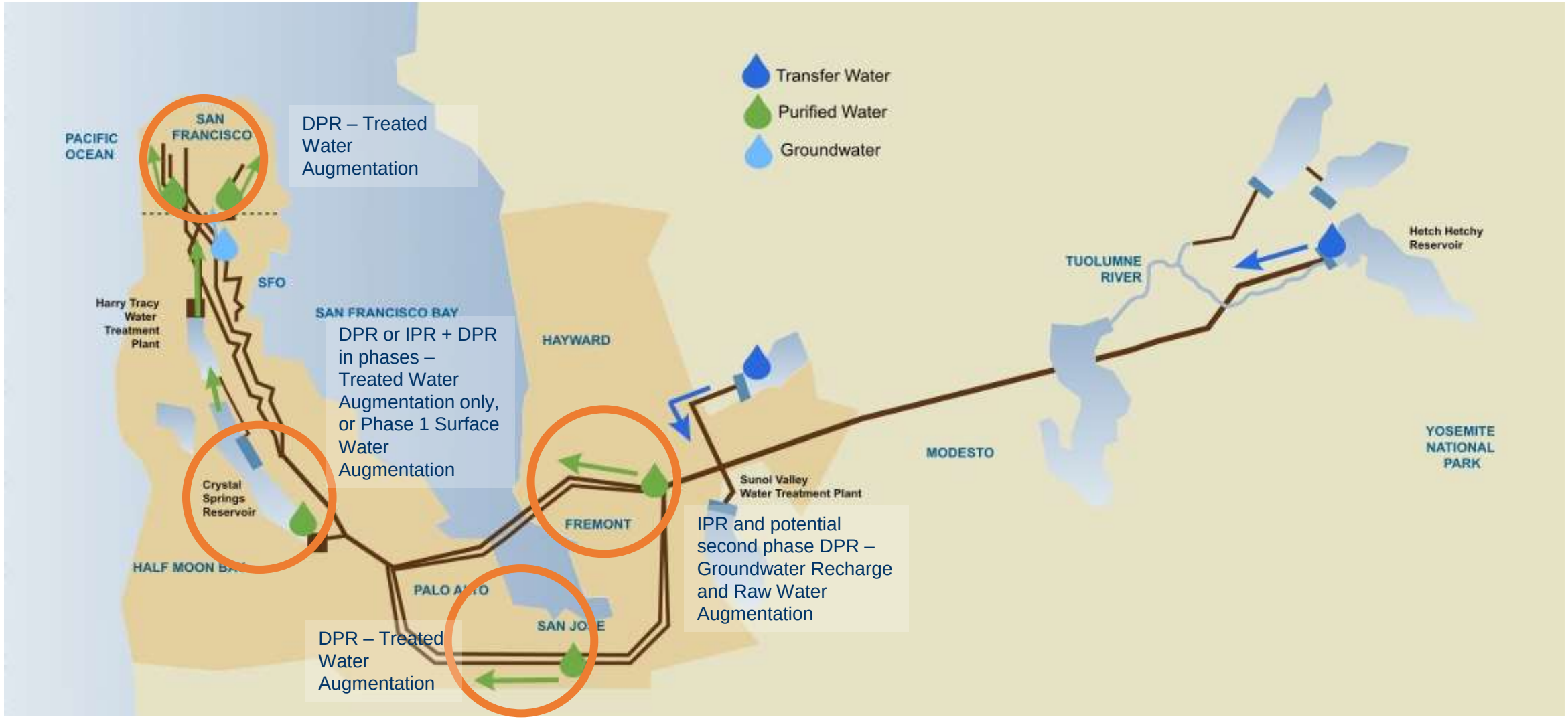
- Harding Park Recycled Water
- Sharp Park Recycled Water

SFPUC-only Project *(under construction)*

- Westside Enhanced Water Recycling (serving Golden Gate Park, Lincoln Park Golf Course, SF Zoo, and others)

Hetch Hetchy Regional Water System

Purified Water Planning in Service Area



Hetch Hetchy Regional Water System

Key Takeaways

1. The risk of water scarcity and a need for drought resilience are driving water agencies to include reuse in water supply planning.

2. Reuse is an important part of integrated water management for water agencies.

3. Water agencies must consider infrastructure needs, regulatory requirements, and costs just like wastewater agencies do, but they are likely different.

4. Water agencies are customer-focused: demands, public perception, and delivery are critical to project success.

5. Strong partnerships are important for the success of most reuse projects.

Inter-jurisdictional Partnership Efforts for Potable Reuse in Silicon Valley

Sept 20, 2023

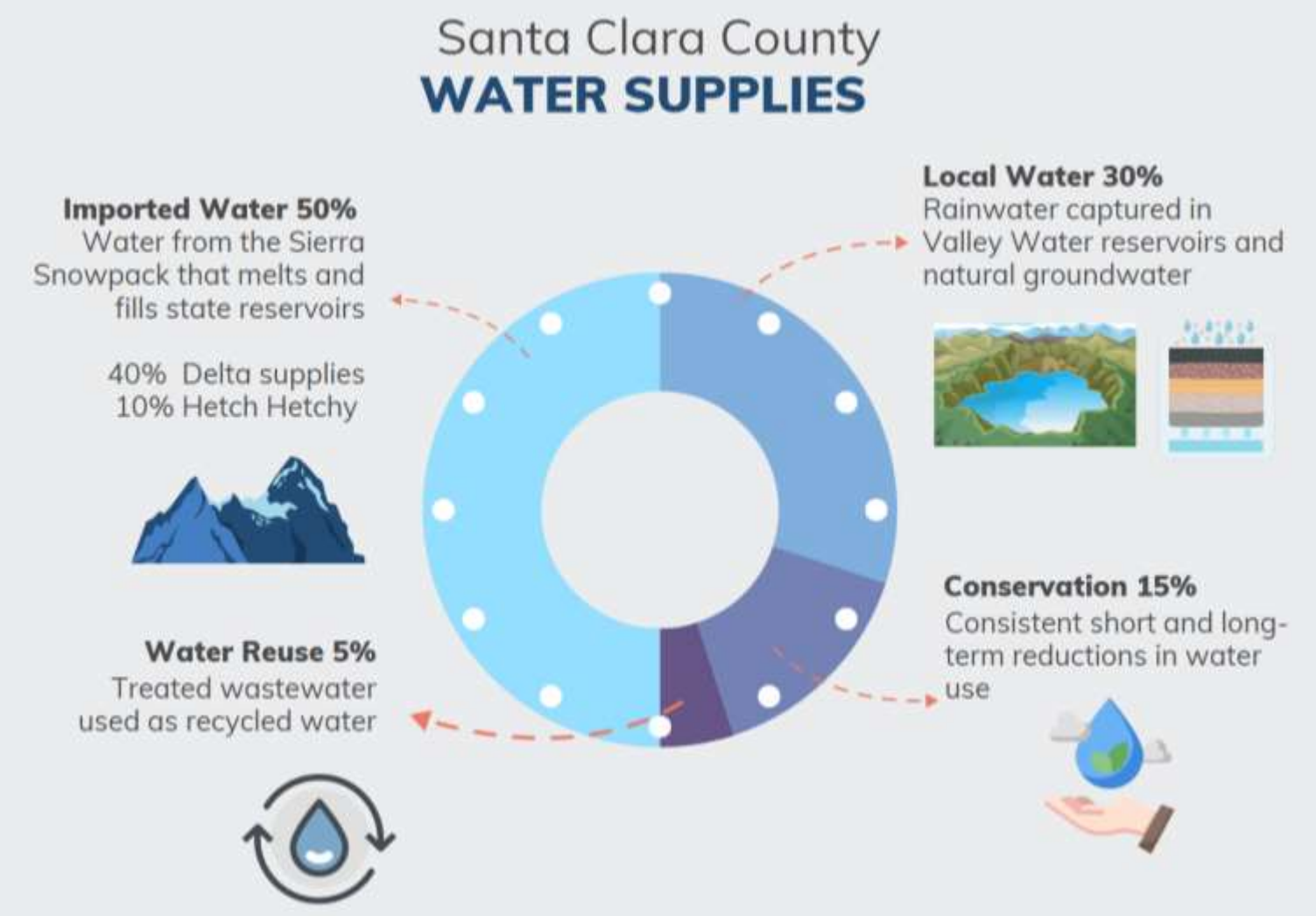
Hossein Ashktorab, Ph.D.

Valley Water

siliconvalley

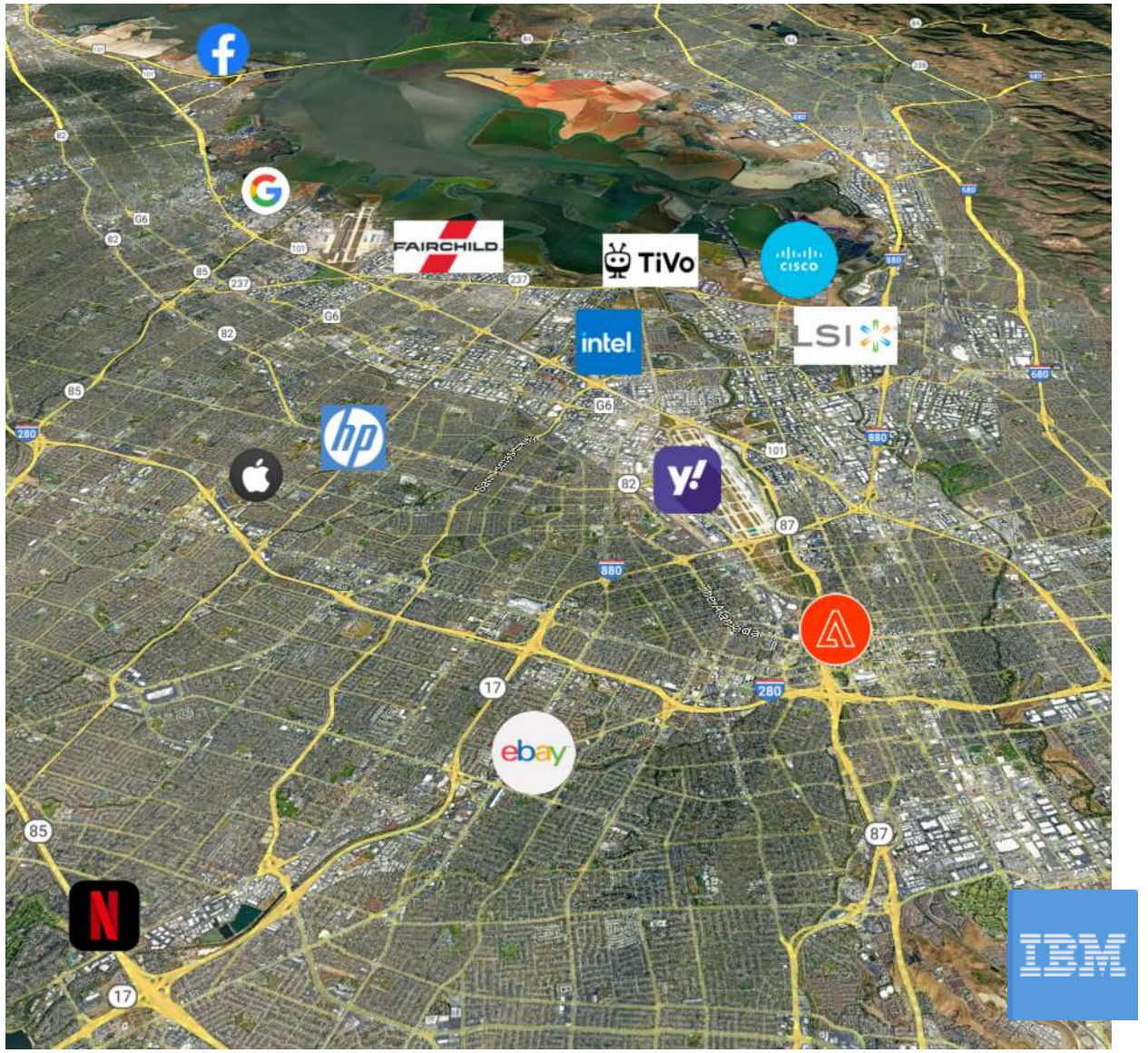
ADVANCED WATER PURIFICATION CENTER

Water Supply Breakdown



Valley Water

Economic impacts of water shortages



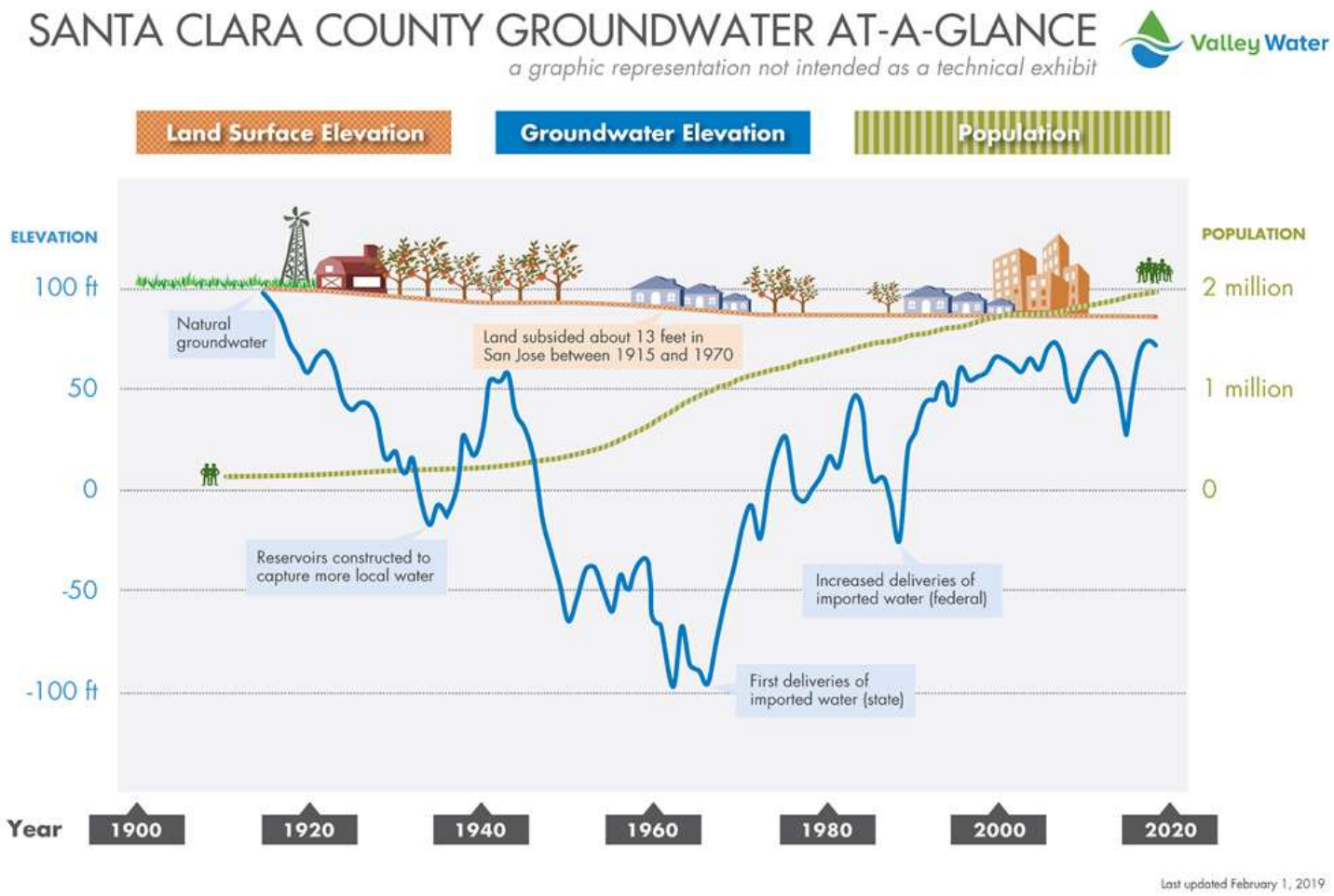
Valley Water

Economic impacts of water shortages

Drought realities

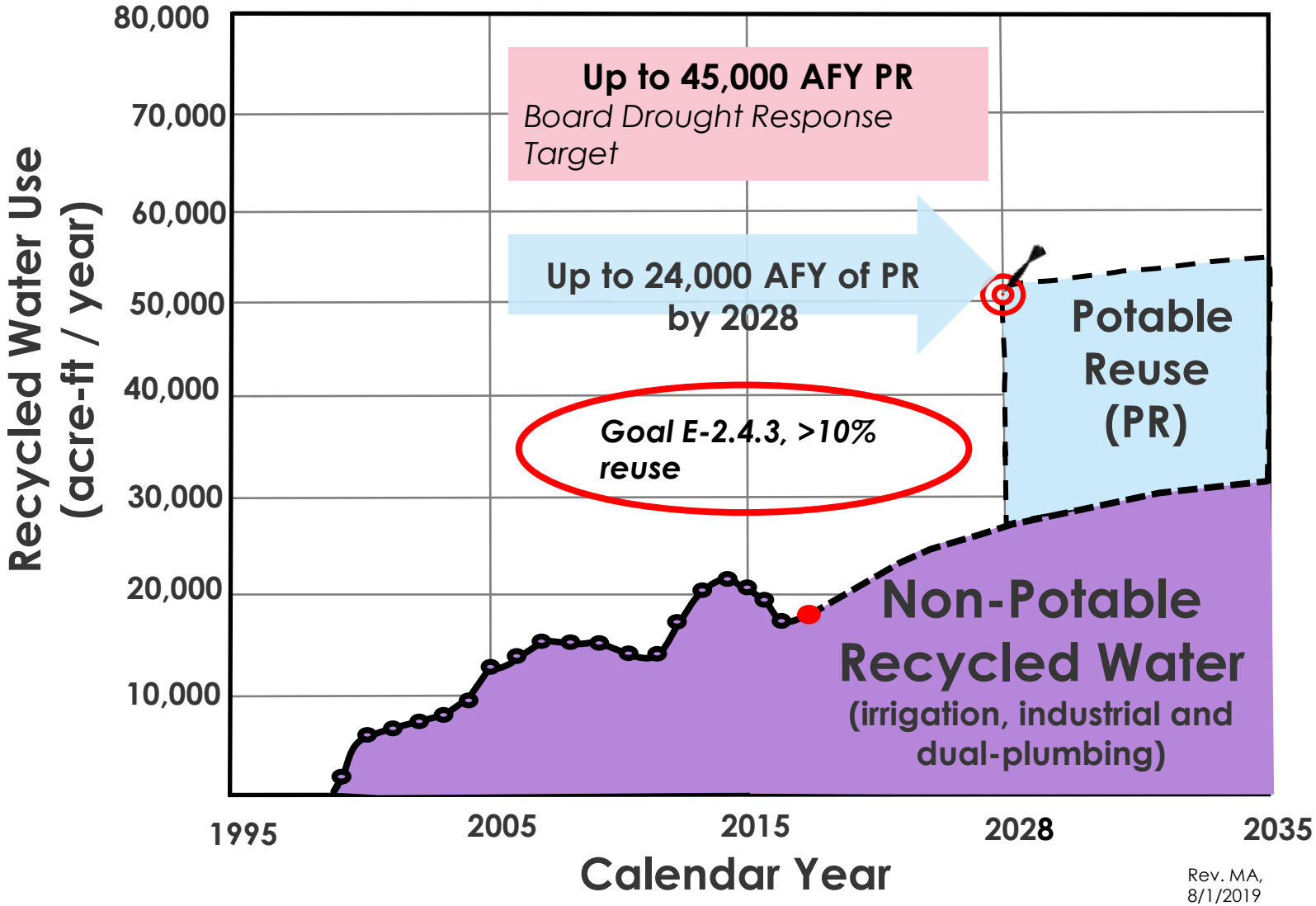
Economic impacts

Land subsidence risk



Valley Water

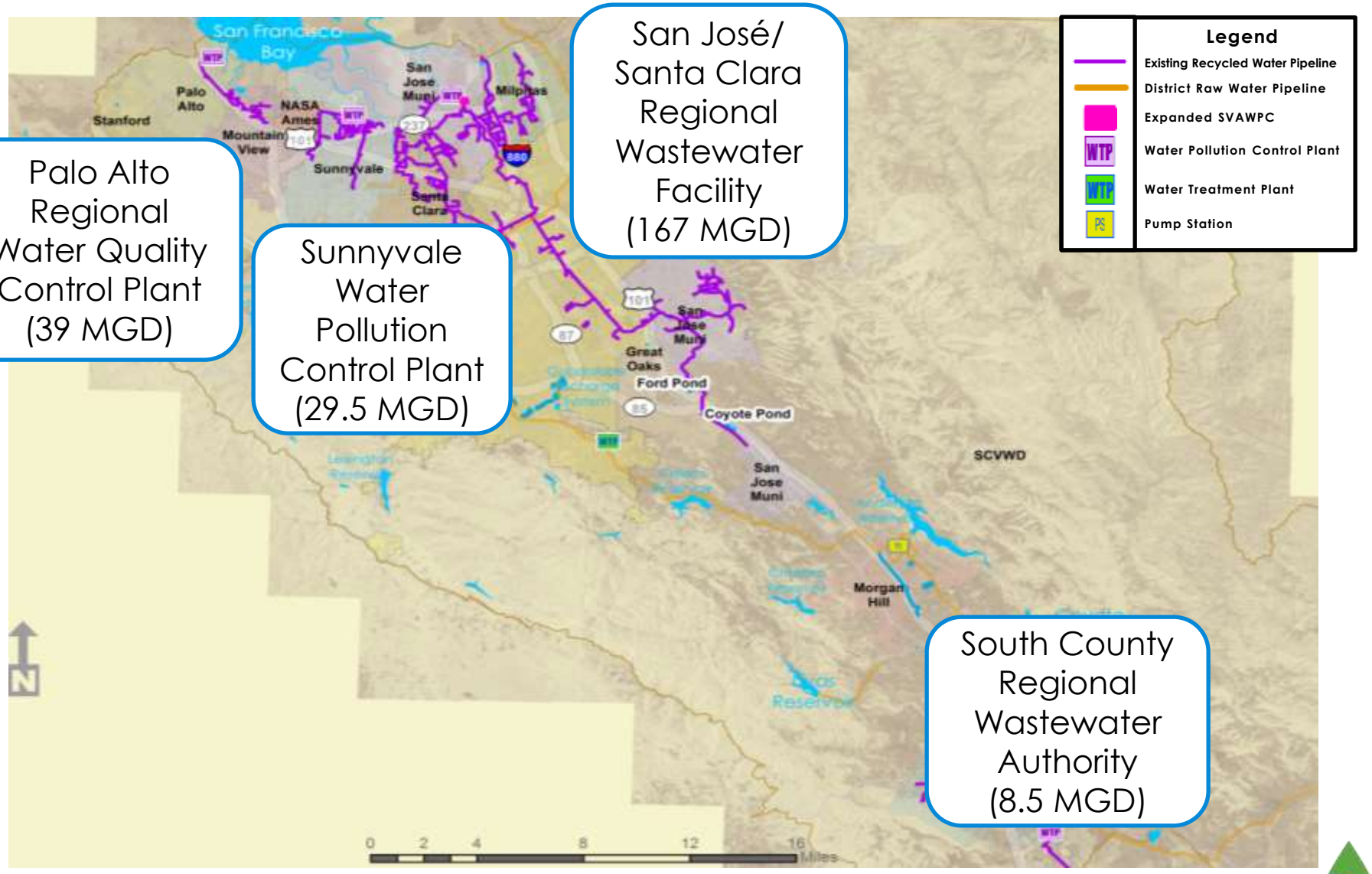
Potable and Non-Potable Goals



Rev. MA, 8/1/2019

Valley Water

Partnership Opportunities and Challenges



San José/ Santa Clara Regional Wastewater Facility (167 MGD)

Palo Alto Regional Water Quality Control Plant (39 MGD)

Sunnyvale Water Pollution Control Plant (29.5 MGD)

South County Regional Wastewater Authority (8.5 MGD)

Valley Water

Critical Pathway and Planning

- Partnership Efforts
  - San José
  - Sunnyvale
  - Palo Alto/ Mountain View
  - South County Regional Water Authority
  - San Francisco Public Utilities Commission
- Countywide Recycled and Purified Water Master Plan

Inter-jurisdictional Efforts

- Establish a collaborative process to facilitate policy discussion and share of technical information
- Develop short-Term and long-term proposals
- Establish overlapping interest (Win-Win-Win)

Valley Water

Get elected officials involved

- **Joint Recycled Water Advisory Committee**

  (City of Palo Alto/SCVWD)

- **Joint Recycled Water Committee**

  (City of Sunnyvale/SCVWD)

- **Joint Recycled Water Policy Advisory Committee**

  (City of San Jose/SCVWD/City of Santa Clara)

- **Joint Water Resources Committee**

  (City of Gilroy, City of Morgan Hill, and SCVWD)

- **Memoranda of Understanding** for assessing water reuse feasibility
  - City of Sunnyvale
  - City of Palo Alto
  - City of Mountain View
  - San Francisco Public Utilities Commission

Valley Water

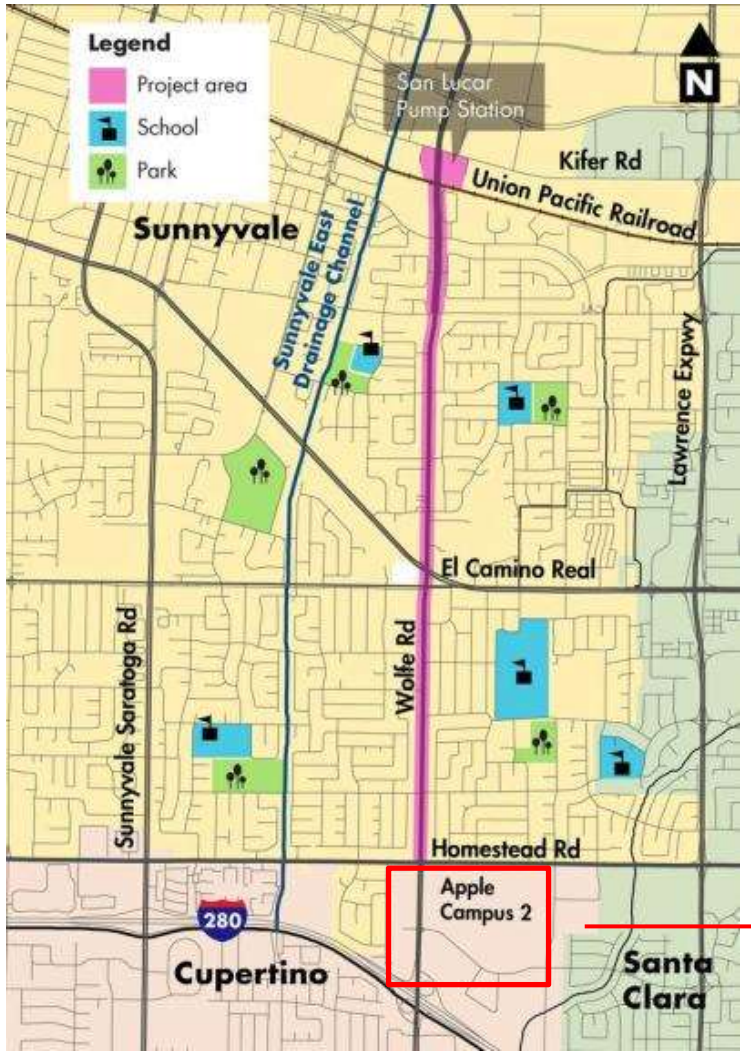
Past

Silicon Valley Advanced Water Purification Center

- Online since 2014; provides up to 8 MGD purified water
- Purpose:
  - To reduce salinity (TDS) of South Bay Water Recycling System.
    - Service in San Jose, Santa Clara and Milpitas
  - Platform to conduct potable reuse studies and pilot projects.
  - To engage the public through tours and outreach.

Valley Water

Past Wolfe Road Pipeline RW Expansion



- **$17.5M Public-Private Partnership**
  - Apple Inc.
  - California Water Service Company
  - City of Sunnyvale
  - Santa Clara Valley Water District
  - CA DWR grants
- Completed in 2017
  - Potential future connections in Sunnyvale and Cupertino

Valley Water

Countywide Water Reuse Master Plan (CoRe Plan)

- Improve water supply reliability throughout the region
- Evaluate a wide range of reuse opportunities
- Identify water available for potable reuse development
- Potable reuse over a planning horizon of 2040
- Regional integration
- Sewershed considerations
- Governance

Next Steps
Develop IPR in Palo Alto and Collaborate on DPR with SJ/SC

San Jose

Palo Alto/Mountain View

Valley Water

RO Concentrate Studies

Valley Water Nature Based Solution

- Engineered Treatment Cells / Open Water Wetland

2017/ 2019

- Floating Wetland Treatment

2020/ 2023

- Oro Loma Sanitary District Horizontal Levee

2019/ Ongoing

Demonstrate various degrees of reduction of nutrients, metals and CEC's present in ROC

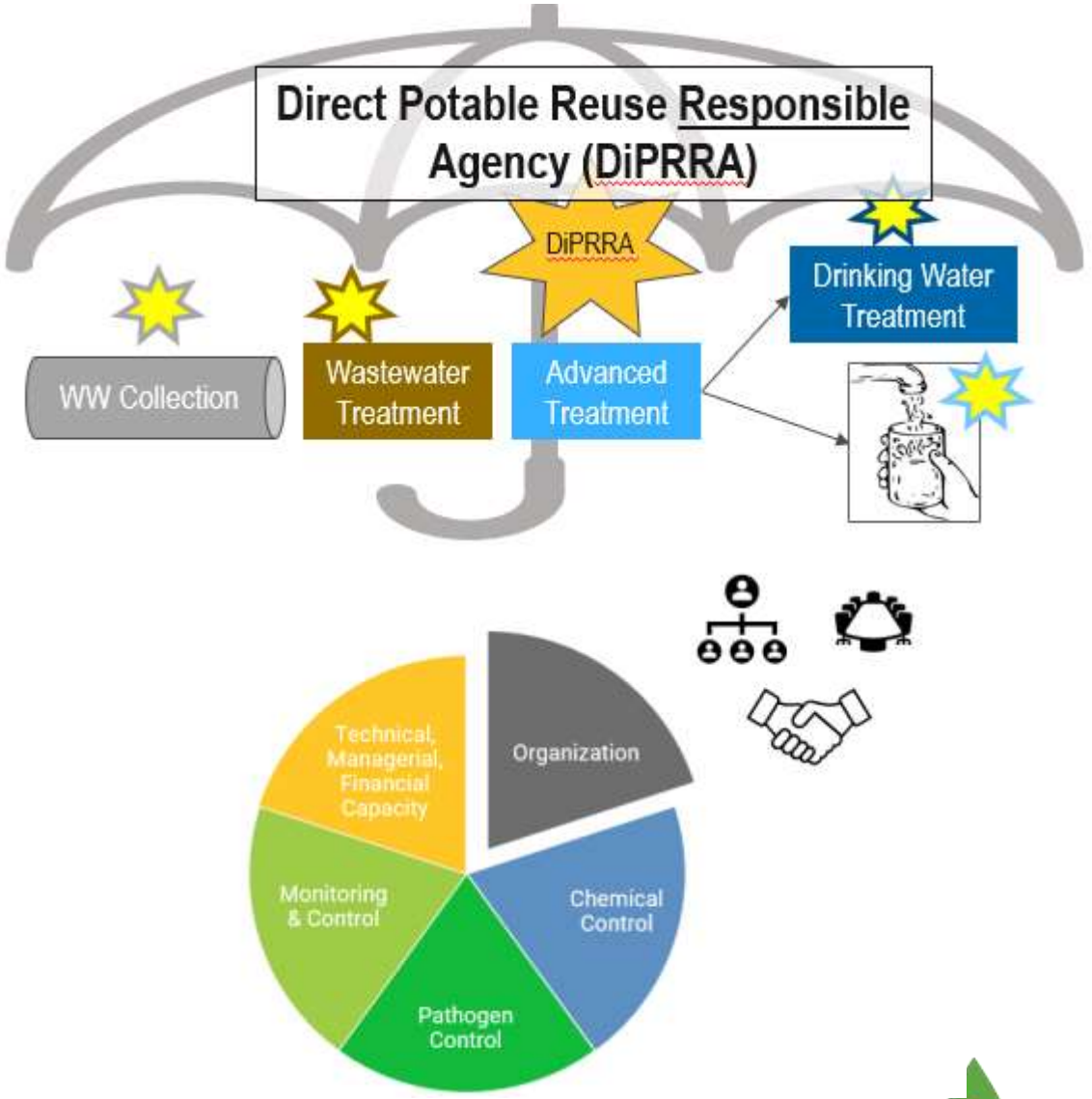
Have great potential as an alternative for treatment of ROC

Valley Water | Berkeley UNIVERSITY OF CALIFORNIA | Stanford University

Intrinsyx Environmental | Oro Loma Sanitary District | Humboldt State University Founded 1913 | SFEI San Francisco Estuary Institute & the Aquatic Science Center | Aquatic Science Center

DPR Regulations, Partnerships, and Agreements

- **Potential DPR Project**
  - ❑ City of San Jose, City of Santa Clara, Valley Water, and other tributaries to SJ/SC RWF
  - ❑ New Regional Supply
  - ❑ Benefits Region & State
- **Responsible Agency (DiPPRA)**
  - ❑ 1 Agency Responsible per Reg's



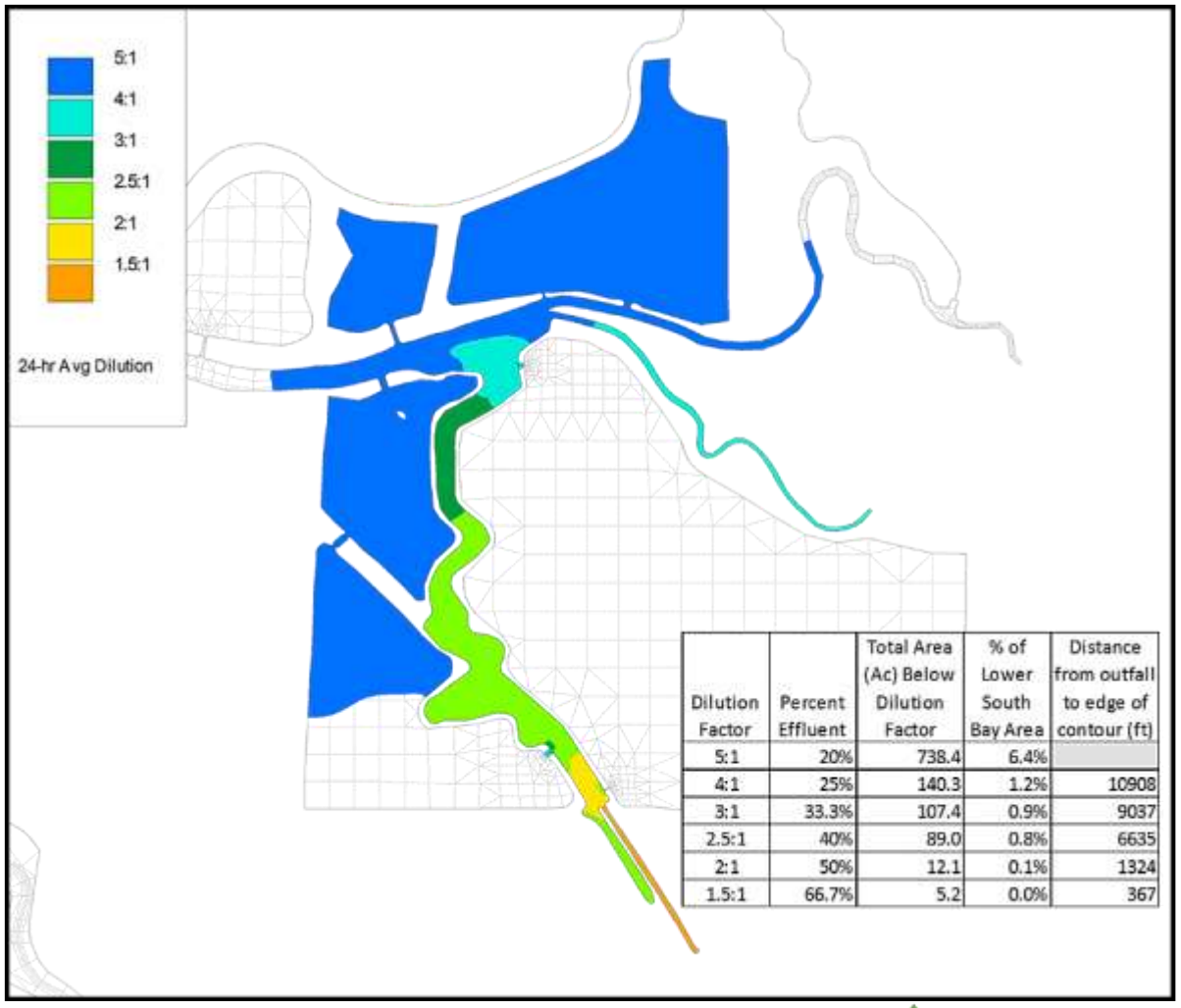
Valley Water

ROC Studies to Support NPDES Reissuance

- Hydrodynamic Model
- Reasonable Potential Analysis
- Effluent Limits Analysis

(Selenium, Cyanide, Mercury, Copper)

- Mass Balance Analysis



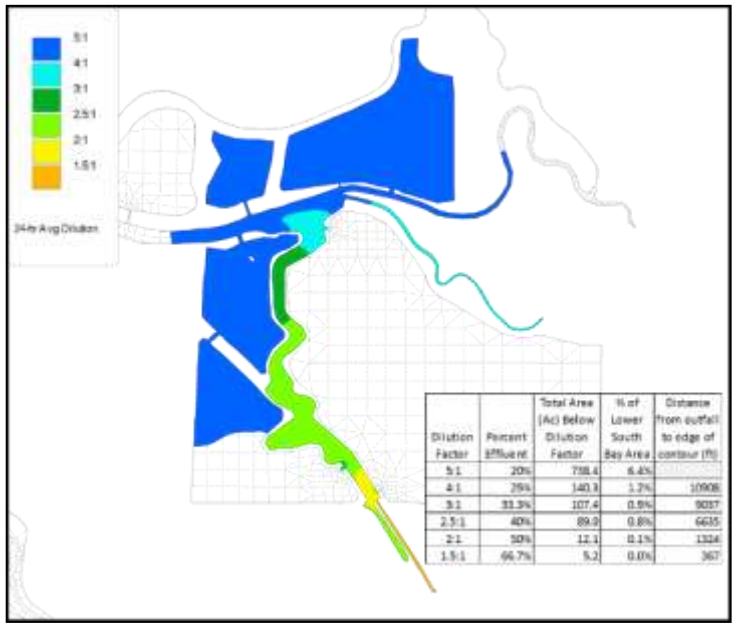
Dilution Factor	Percent Effluent	Total Area (Ac) Below Dilution Factor	% of Lower South Bay Area	Distance from outfall to edge of contour (ft)
5:1	20%	738.4	6.4%	
4:1	25%	140.3	1.2%	10908
3:1	33.3%	107.4	0.9%	9037
2.5:1	40%	89.0	0.8%	6635
2:1	50%	12.1	0.1%	1324
1.5:1	66.7%	5.2	0.0%	367

Valley Water

ROC studies to support NPDES revisions and reissuance

- Hydrodynamic Modeling

SFEI-DFM model used for performing the ROC dilution studies in the Lower South Bay



- Reasonable Potential Analysis

Identified constituents that would require NPDES permit limits for Palo Alto

- Mass Balance and Effluent Limits Analysis

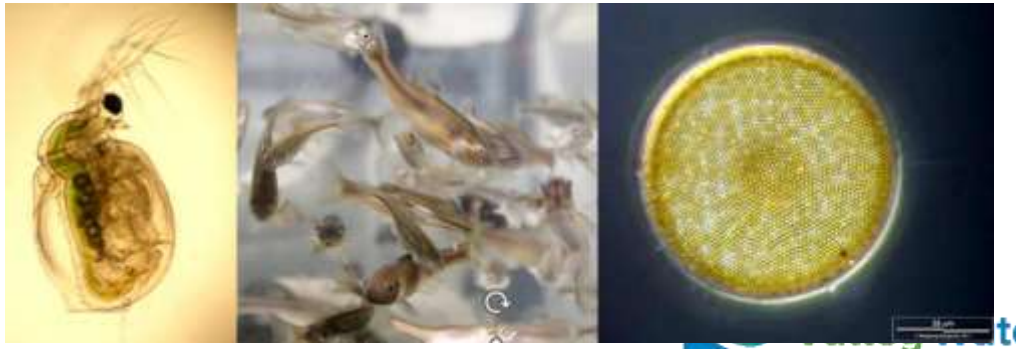
Identified dilutions needed for the constituents identified under RPA (Copper, Nickle, Selenium, Zinc, Cyanide)

- Toxicity Analysis

3 species selected to be tested quarterly for 1 year (Topsmelt, Mussel, and Giant kelp)

- Constituents of Emerging Concerns (CECs)

Monitor and analyze selected CECs



Drivers & Opportunities

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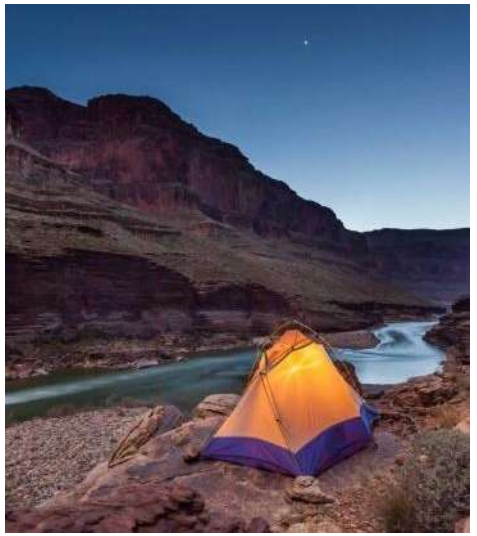

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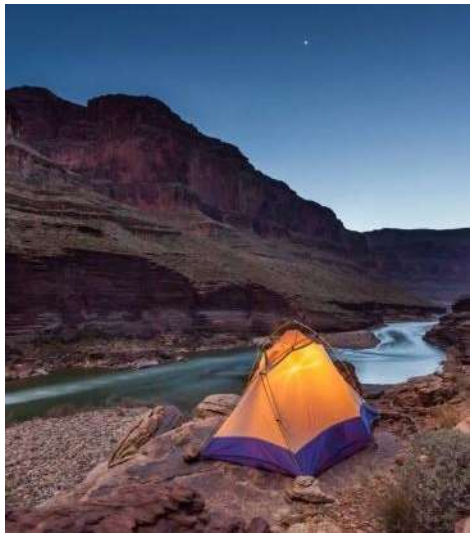

Break time! Please report to your small breakout group by 10:25 am.

Small Group Breakout #1 – Report Out

Question 1.

- What are your agency's top two priorities?
  - What are the greatest water challenges you face?
  - What solutions are you considering?

Question 2.

- What are your thoughts about how water reuse fits into your future plans?
  - If you're not considering water reuse, why not?

Question 3.

- If you had a magic wand, what would you do *today* to move water reuse forward?
  - What obstacles would you remove to allow action?
  - What support do you need to allow action?

Overview of Findings and "Lessons Learned" in WRAP 2.16

Governance	Regulation	Economics	Management	Leadership
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Advances in Interagency Collaboration

Advancing Water Reuse in the Bay Area:
Exploring Opportunities and Challenges for Interagency Collaboration

September 20, 2023

USEPA National Water Reuse Action Plan

- Released February 2020 *"to **advance consideration of water reuse** to ensure the **security**, **sustainability**, and **resilience** of our nation's water resources."*
- **Action Item 2.16**: *"Support Local and Regional Reuse Projects by Identifying Challenges, Opportunities and Models for Interagency Collaboration"*

> "A host of public and private entities must work together with authorities at both the state and local levels at each step of the project…**the Action Plan cannot overlook the opportunity to support collaboration on a regional and local level between water and wastewater utilities.**"
>
> *Letter to EPA from Eric Rosenblum, Bahman Sheikh, and Robert S. Raucher (16 Dec 2019)*

Multi-Agency Water Reuse Programs: Lessons for successful collaboration

- Research Team:
  - Felicia Marcus
  - Bob Raucher
  - Eric Rosenblum
  - Dave Smith
  - Shannon Spurlock
- Funding:
  - US Environmental Protection Agency
  - WateReuse Association
  - **Bay Area Clean Water Agencies**

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Advancing Water Reuse in the Bay Area:
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5 Multi-Agency Case Studies

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Advancing Water Reuse in the Bay Area:
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Governance Lessons: Change demands collaboration

- Community needs **evolve more quickly than the utilities** created to serve them
- To reuse water, utilities **reach beyond their institutional borders** to develop collaborative relationships.
- Collaboration involves **reassessing organizational purpose**, structure, and goals.

Regulatory Lessons: Regulations can drive sustainable water

- Review the **regulatory landscape**
- **Engage regulators** in the vision, not just the permit
- Strategic **regulations can be your friend**; strategic regulators keep their eyes on the results

Economic Lessons: Economies of scale and scope

- Agencies with overlapping service areas realize that customers pay their bills out of "**separate pockets in the same pair of pants**."
- Utilities can **combine responsibilities** to capture, treat, and reuse water more efficiently
- Agencies **recognize community benefits** and avoided costs when projects span jurisdictional boundaries

Management Lessons: Take time to build trust

- **Mutual recognition** of individual agency benefits and constraints—as well as the greater good.
- Collaborating managers **build trust** to promote shared responsibility.
- **Pilot projects** provide engineers, operators, laboratory technicians and others the opportunity to work together.
- Improve formal communication with **informal relationships**: “Let’s do lunch!”

Leadership Lessons: Balance short-term needs, long-term interests

Successful leaders:

- Meet the **immediate needs** of their ratepayers
- Provide services whose **long-term value** extends beyond their boundaries.
- **Communicate the benefits** of long-term, regional planning to their constituents

Some Key Lessons Learned

- **Re-evaluate** the water utility's mission in the light of current challenges
- **Engage** with regulators early and often
- Economic analysis should account for **multiple benefits** and take advantage of economies of scope.
- Collaboration proceeds at the speed of **trust**.
- Agency leaders can fulfill their **core mission** at the same time they serve long-term **regional goals**.

Multi-agency Water Reuse Programs:
Lessons for Successful Collaboration

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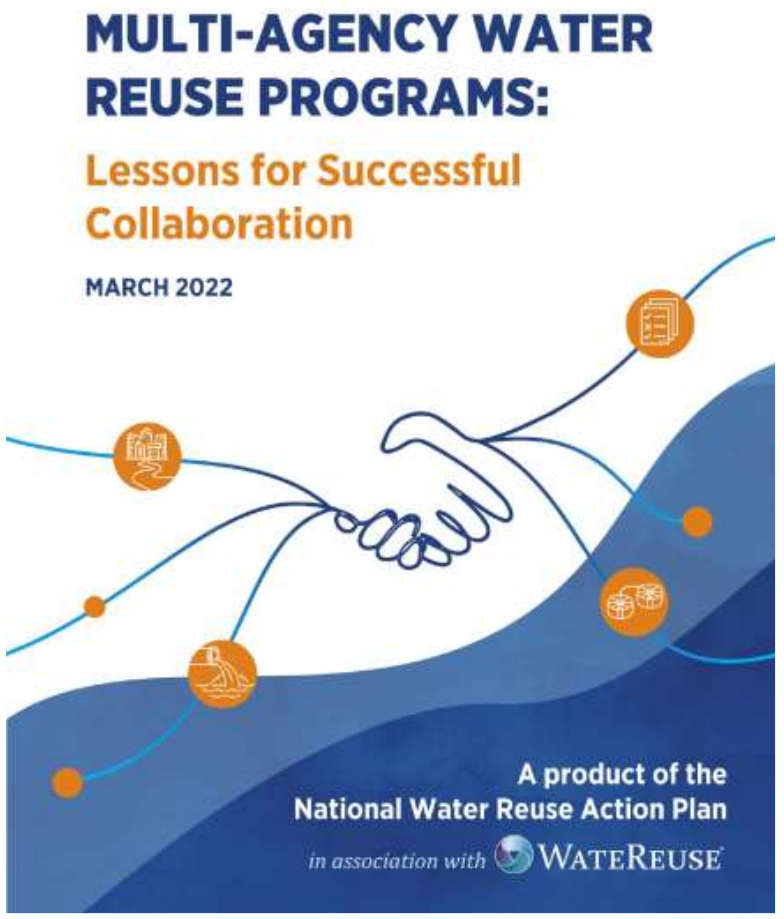

https://www.epa.gov/system/files/documents/2022-03/multi-agency_water_reuse_programs-lessons_for_successful_collaboration_march_2022.pdf

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Advancing Water Reuse in the Bay Area:
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Governance and Recycled Water

Dave Smith

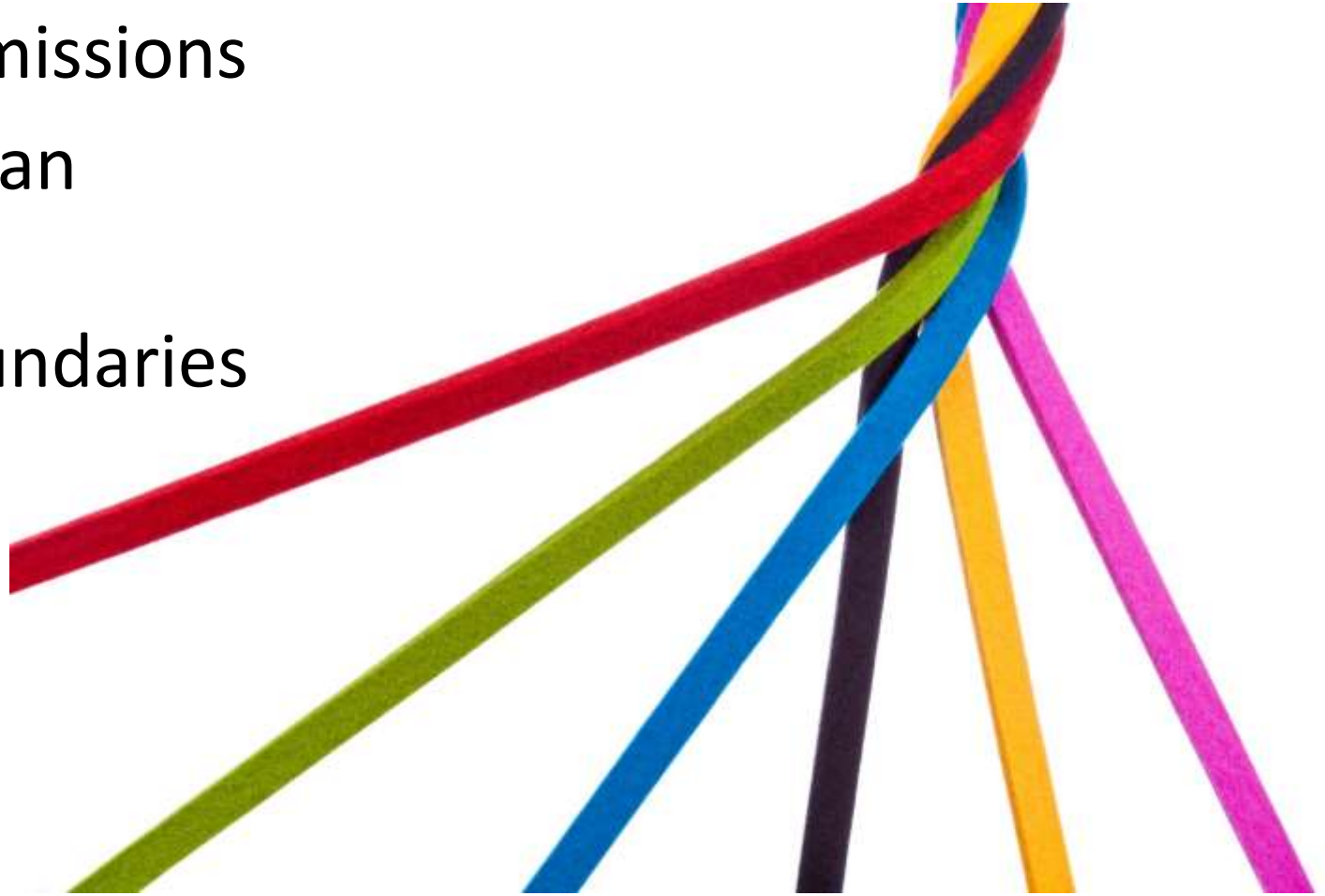
Bay Area Clean Water Agencies Workshop

20 September 2023

Complicated?

Structure & Collaborative Vision

- Existing utilities' narrow missions
- Problems evolve faster than governance structures
- Viewing structures as boundaries or connection points?



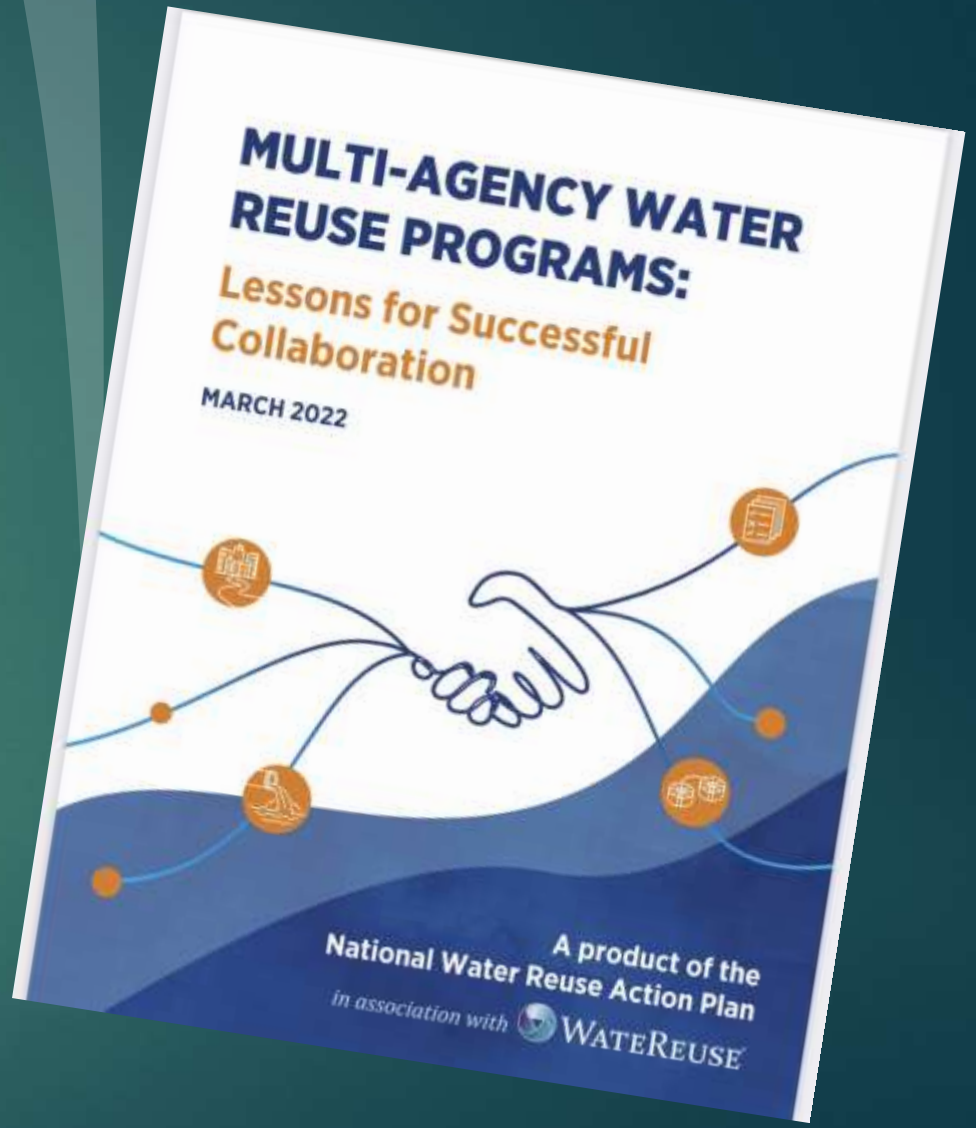
Collaboration Approaches

- Informal collaboration structures
  - Bay Area Regional Reliability
  - Bay Area One Water Network
- Formal arrangements
  - MOUs/multiparty agreements
  - Joint Powers Authorities
  - Consolidation
- Regional or subregional scales

Evolving Governance To Meet Challenges

- Aligning agency goals/missions
- “Porous” governance boundaries
- Right geographical scale(s)?
- Integration within existing structures

A Few Further Thoughts on Regulatory Issues



Felicia Marcus
Landreth Visiting Fellow
Stanford University
Former, President City of Los Angeles Board of Public Works
Former Chair, State Water Resources Control Board
Former RA, USEPA, Region IX
Board Member, WateReuse Association
Technical Advisory Group, Hyperion 2035

Regulatory Lessons: Regulators and Permittees Can Help Each Other Do Great Things

- The most successful project proponents engage regulators early and often
  - Not to "sell" their projects, but to understand what the regulators need and to enlist them in helping solve a community problem
  - Not to argue about the rules, but to see how they can help give regulators what they need to get to yes
- The best regulators if given the chance can help advance the project through early advice, project acceleration, and even funding
- Successful projects involved a willingness to collaborate, and taking the time to find creative ways to meet each others' needs

Regulatory Lessons: Regulators and Permittees Can Help Each Other Do Great Things

- Barriers:
  - Assumptions without talking to each other
  - Hearing what you expect to hear or fear vs. what is said even when you do talk
  - Lack of resources to spend the time together
  - Lack of guidance, or training about flexibilities
  - Multi-benefit/multi-party permitting is complex and a little scary
- Some tips:
  - Review the **regulatory landscape**
  - **Engage regulators in the vision**, not just the permit
  - **Strategic regulations** can be your friend
  - Strategic regulators keep their eyes on the results
  - Remember the ecosystem *and* the "egosystem"

Tools can help facilitate the collaboration required

- Whether between local agency partners or between permitters and permittees
- E.g.,
  - Checklists
  - Facilitation
  - Diagrams
  - Trainings
  - Guidance
  - Food
- Not just about being friendly or nice—takes [illegible] and leadership support

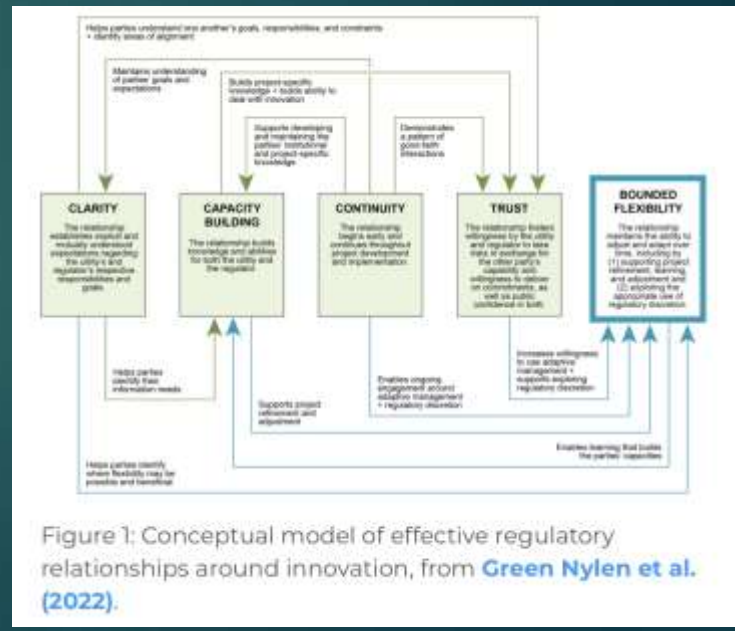


Figure 1: Conceptual model of effective regulatory relationships around innovation, from **Green Nylen et al. (2022)**.

Economics and Recycled Water

Bob Raucher

Bay Area Clean Water Agencies Workshop

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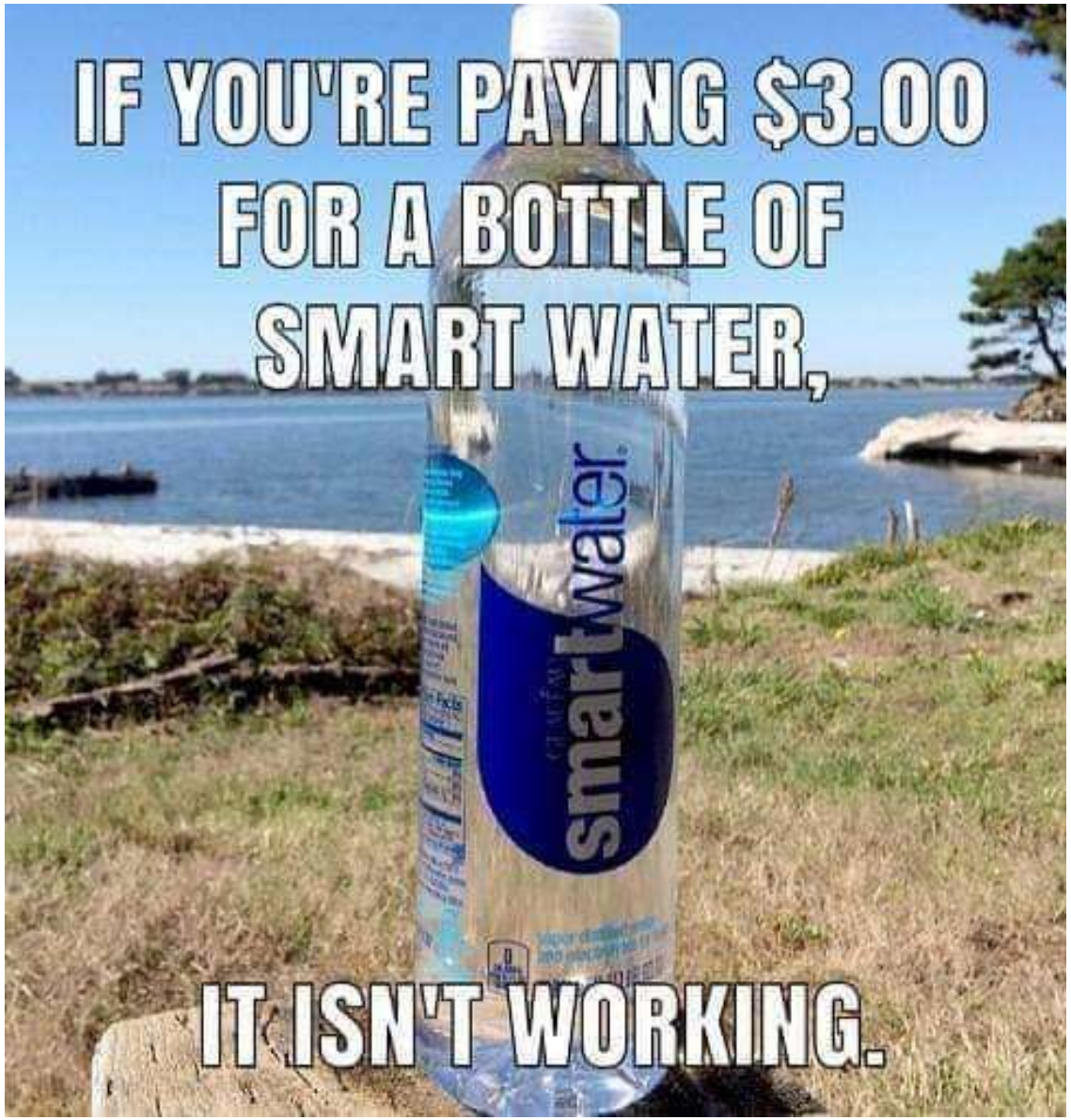
“Recycled Water is Expensive”



Three Key Questions regarding “Costs”

Compared to what?	• Historic, fully tapped sources? • Desal, Conservation? What are your other options?
Who pays?	• It is a WW problem, they should pay • It is a precious resource, water suppliers should pay
Is it Worth it?	• What are the Benefits? • Who are the beneficiaries?

What is the Solution?

Beneficiaries pay

Identify and quantify the array of benefits

Consider all who ultimately benefit

Different pockets, same pair of pants

Ultimately, you a serve the same customers

In balance with other key considerations

Affordability, social equity

Operational and other utility responsibilities

What are the Benefits?

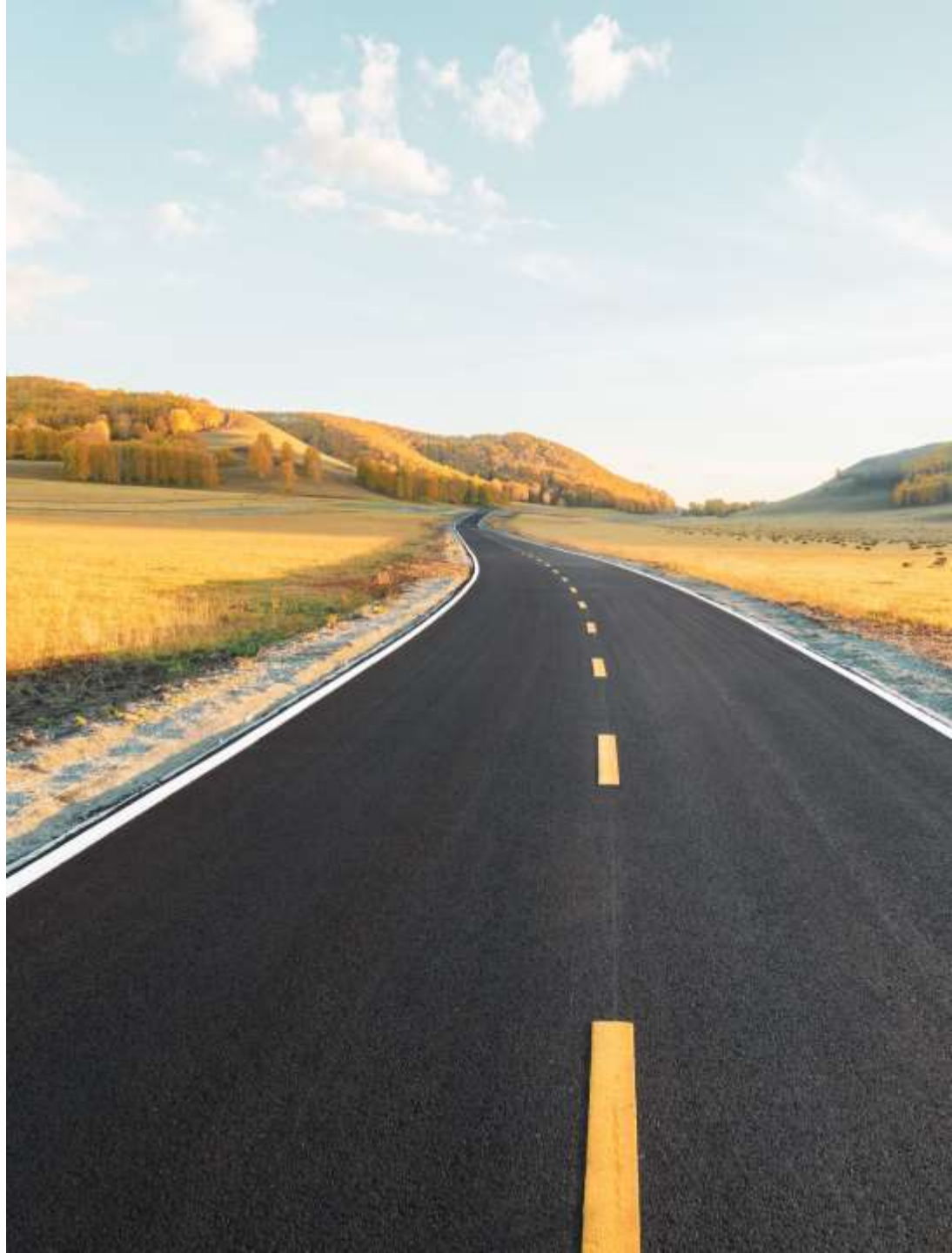
- Two birds with one stone
  - Solving a WW problem *and* a WS problem
  - Access to more funding sources
- Triple Bottom Line values
  - Quality of life
  - Ecologic
  - Avoided costs

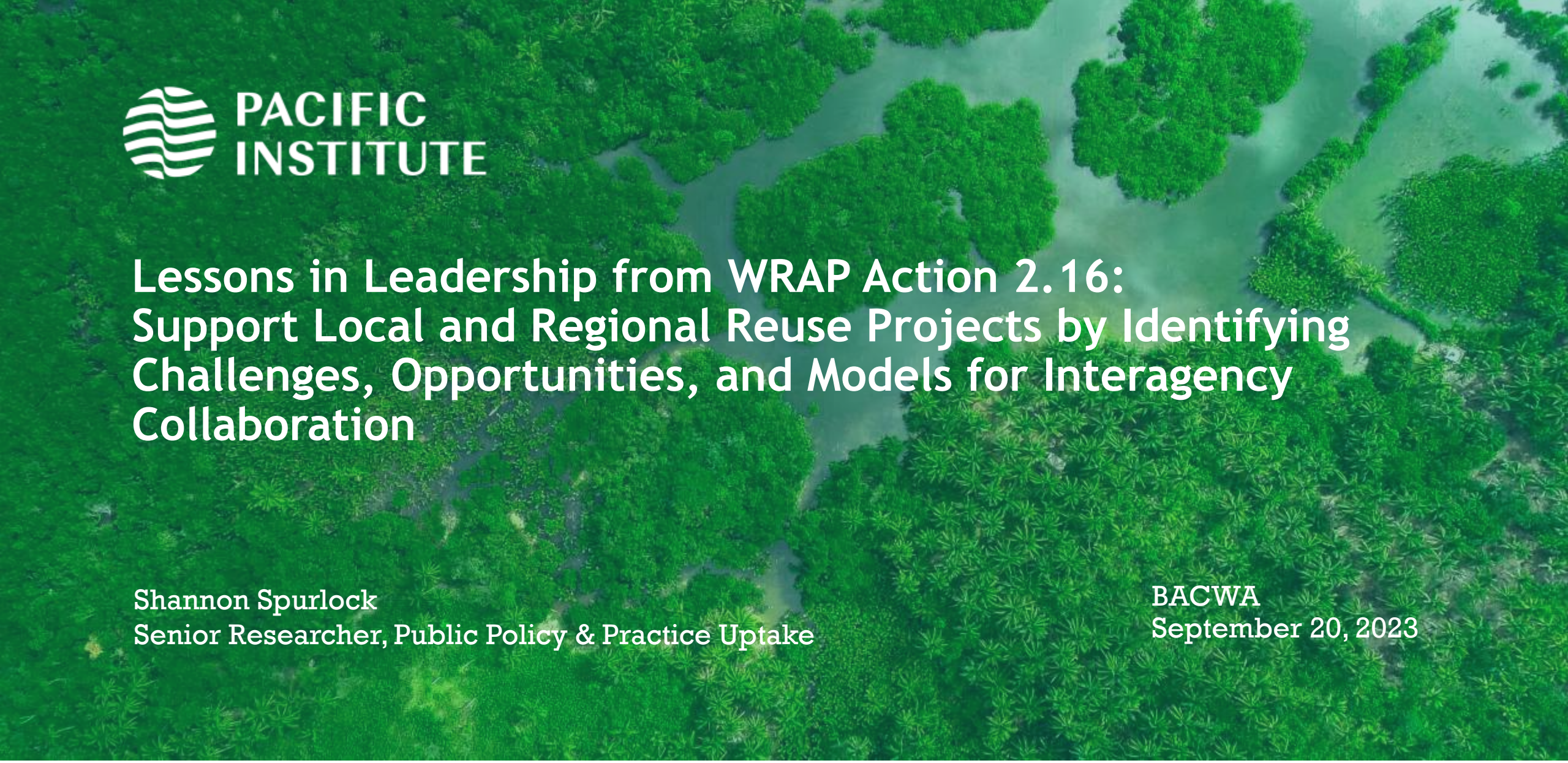
What are the Benefits?

- Two birds with one stone
- Triple Bottom Line values
- Supply Reliability and Resiliency
  - Locally available, locally controlled
  - Hedge against many risks
- Avoided costs of water supply shortfalls
  - $1M+ per MG (lost economic output)

What is the Path Forward?

- Start by counting all your benefits
  - Identify & describe
  - *Communicate*
  - Quantify and monetize, as feasible
- Consider who benefits
- Allocate costs accordingly





Lessons in Leadership from WRAP Action 2.16: Support Local and Regional Reuse Projects by Identifying Challenges, Opportunities, and Models for Interagency Collaboration

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BACWA
September 20, 2023

Leadership: Navigating & Thriving in Uncertain Times

Leadership: Codifying Change

Legal agreements do not create mutual trust, they only codify it.

Denis Qualls, Dallas Water Utilities

Leadership: Champions of Change

Meta-Champion Type	Relevance to Water Reuse
Collaboration Champions	Facilitate collaboration within their utilities and between complementary and regional utilities to advance the collective conversation.
Human Rights Champions	Advance equality and understand that treated wastewater is a reliable source of water that can be safely used to offset growing water scarcity (UNESCO, 2017).
Innovation Champions	Foster innovations such as new and novel technologies that treat wastewater and extract valuable resources (e.g., phosphorus) from wastewater.
Product Champions	See the value in bringing a new water supply/resource to market to augment supplies in water scarce areas.
Project Champions	Initiate and/or implement collaborative reuse projects which help communities have a reliable water supply and minimize their nutrient discharge.
Service Champions	Drive improvements in the adoption of reuse through sharing research and timely communication that increases public acceptance.
Strategic Champions	Guide utilities toward a collaborative and integrated water management approach that emphasizes incorporation or expansion or water recycling.
Sustainability Champions	Advocate policies and programs that yield TBL benefits and recognize the valuable contribution of recycled water.
Technology Champions	Share information across digital platforms so that water utilities can collaborate to use their water supply as efficiently as possible and minimize waste.
Venture Champions	Back innovative strategies and support the scalability of these strategies to expand water reuse.

Leadership: Lesson Learned

1. Climate change and population growth contribute to a future of "permanent whitewater" requiring collaborative strategies that build resilience.
2. Managers who can identify future challenges and understand the "economy of scope" lead people out of their silos by showing how reuse supports their multiple missions.
3. When planning for a resilient future, there can be no fixed presumptions, other than change will be constant.
4. The most successful water reuse projects demonstrate support for leadership at the individual and organizational level.
5. When utilities and agencies set goals together, they increase the likelihood of successful implementation by embracing shared accountability and responsibility for the process.
6. For a vision to be embraced by multiple stakeholders, the leader or champion, must be able to convey the benefits and vision in such a way that others are compelled to adopt and follow.

Small Group Breakout #2 – Report Out

Question 1.

How is your ability to form partnerships impacted by governance, regulation, economics, management, and leadership?

Question 2.

Which external partnerships do you need to establish to enhance the effectiveness of your organization now and in the future for considering and advancing water reuse?

Question 3.

What individuals or groups at your agency and in the broader Bay Area community need to be brought to the table to successfully implement water reuse?

Potential Actions and Next Steps

What actions are you willing to commit to?

What would you like to see as a next step for recycled water?

Thank you & safe travels!