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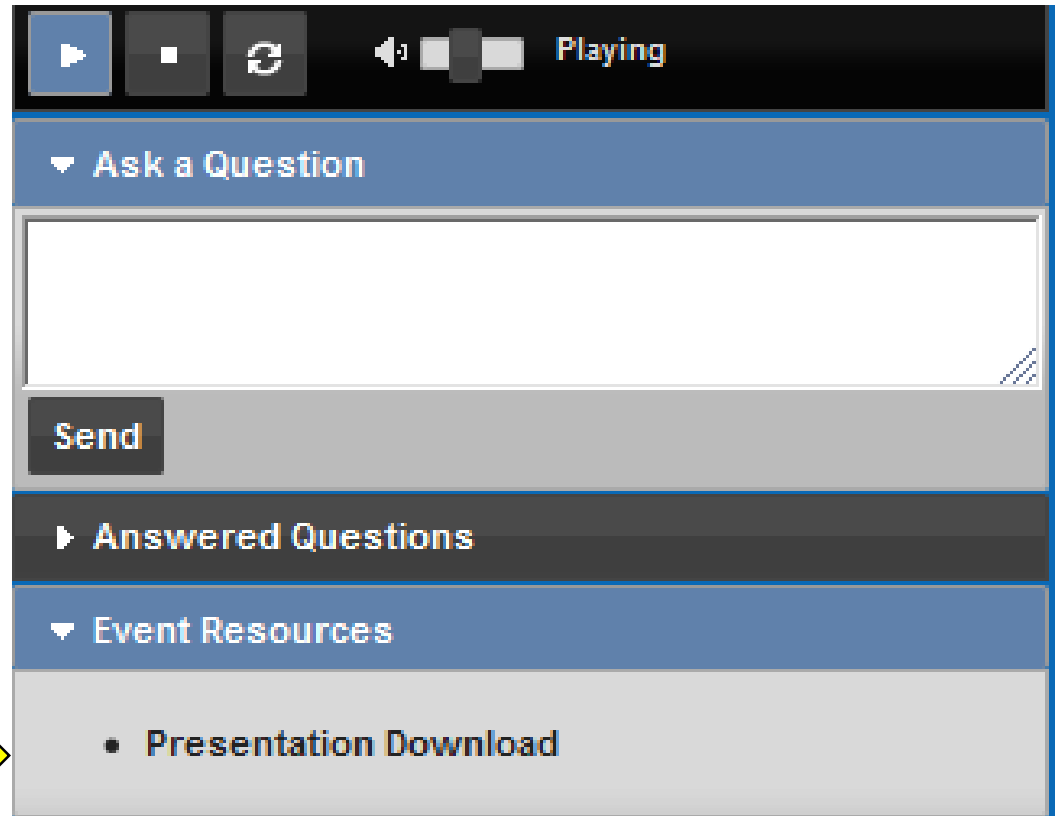
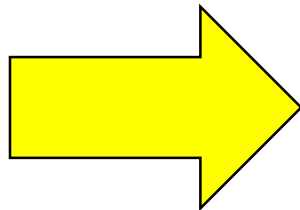
WRF Webcast

Adapting to Change: Utility Systems and Declining Flows

January 28, 2020

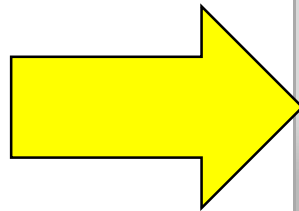
Download presentation

Slides and
recording will be
available to WRF
subscribers
WITHIN 24 hours
after the webcast

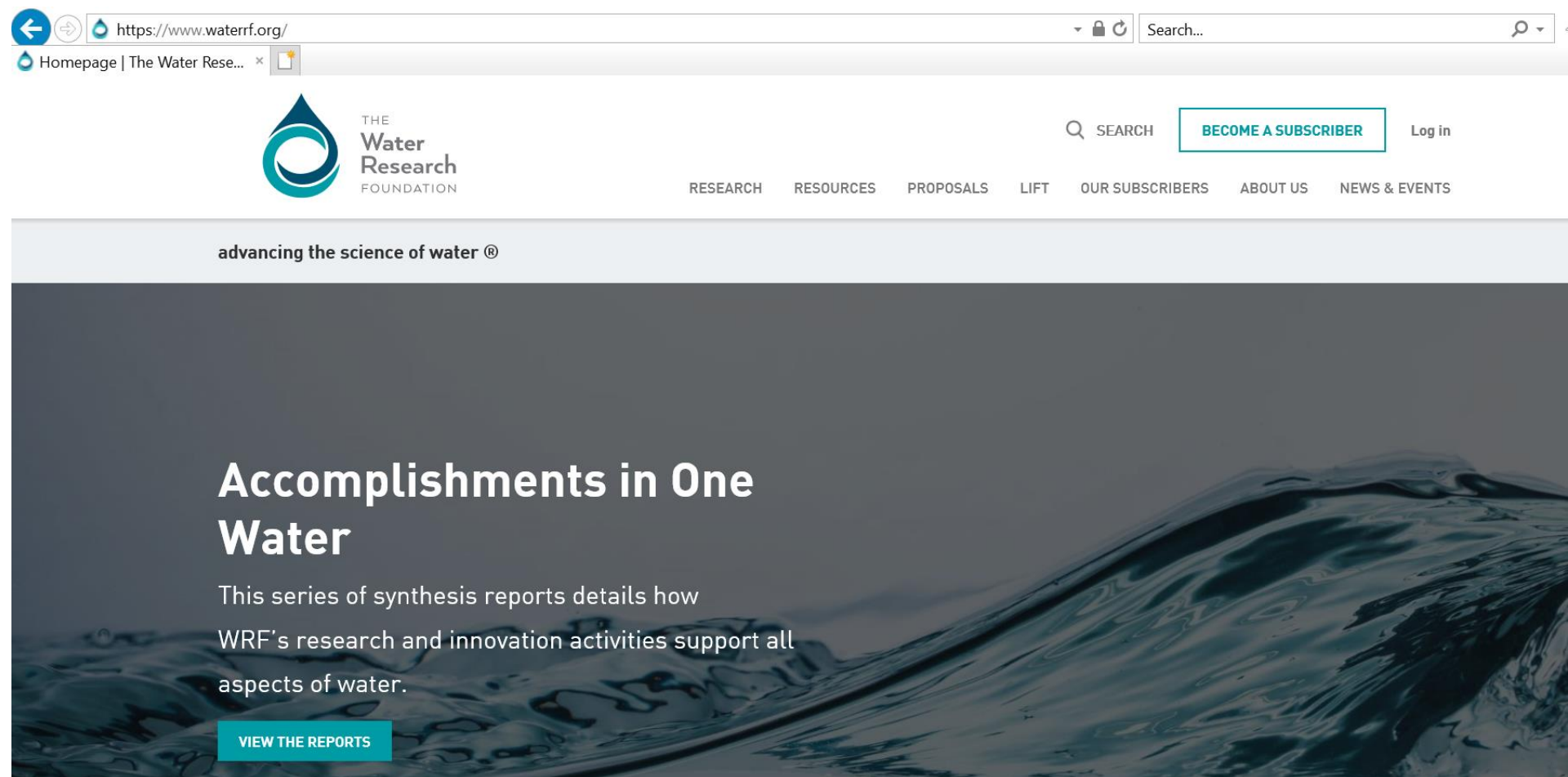


Input your webcast questions

Q&A at the end of
the webcast

A screenshot of a webcast player interface. At the top is a black control bar with buttons for play, pause, and refresh, along with a volume icon and the word 'Playing'. Below this is a blue header for the 'Ask a Question' section. Underneath is a large white text input field. To the left of the bottom of this field is a grey 'Send' button. Below the input field is a dark grey header for 'Answered Questions'. Underneath that is a blue header for 'Event Resources'. At the bottom is a grey area containing a bullet point followed by the text 'Presentation Download'.

New website for WRF - www.waterrf.org




New - WRF Website Account required for:

1. **Public Plus = free to public**
2. **WRF Subscriber only**

The screenshot shows the login page of The Water Research Foundation (WRF) website. The browser address bar displays <https://www.waterrf.org/user/login>. The page header includes the WRF logo, a search bar, and navigation links: RESEARCH, RESOURCES, PROPOSALS, LIFT, OUR SUBSCRIBERS, ABOUT US, and NEWS & EVENTS. A yellow arrow points to the 'BECOME A SUBSCRIBER' button in the top right corner. The main content area features a 'Sign In' form with fields for 'Username *' and 'Password *'. Below the password field is a 'LOG IN' button and a link for 'Trouble Logging In?'. At the bottom of the form, there is a link 'Not a Member?' and a yellow arrow pointing to the 'CREATE AN ACCOUNT' button.

Log in | The Water Research... x

 THE Water Research FOUNDATION

SEARCH [BECOME A SUBSCRIBER](#) Log in

RESEARCH RESOURCES PROPOSALS LIFT OUR SUBSCRIBERS ABOUT US NEWS & EVENTS

Sign In

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Enter your The Water Research Foundation username.

Password *

Enter the password that accompanies your username.

[Trouble Logging In?](#) [LOG IN](#)

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www.waterrf.org - search 4736

The screenshot shows the project page for Project #4736, titled "Adapting to Change: Utility Systems and Declining Flows". The page features a dark background image of an industrial facility. Key information includes:

- Project #4736**
- Adapting to Change: Utility Systems and Declining Flows**
- Research Investment:** \$10,000
- Completion Year:** 2019
- Principal Investigator:** MELANIE HOLMER
- Research Manager:** MS. MAUREEN HODGINS
- Contractor:** BROWN AND CALDWELL
- Related Topics:** CLIMATE CHANGE, UTILITY MANAGEMENT, RESILIENCE, WATER DEMAND & FORECASTING
- Status:** COMPLETED
- Action:** FINAL REPORT

Resources


The screenshot shows the Resources section with two project papers. Yellow arrows point to the "Public Plus" labels on each paper.

- Adapting to Change: Utility Systems and Declining Flows**
REPORT #4736 06/09/2019
- Adapting to Change: Informing Water Use Efficiency and Adjusting to Declining Flows**
PROJECT PAPER 10/31/2019

<https://www.cuwa.org/> - Publications

Publications — CUWA


cuwa.org/publications



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MEMBER AGENCIESCONTACT US


PUBLICATIONS



Dec 11, 2019 · Policy Principles

Addressing Constituents of Emerging Concern to Ensure Safe Drinking Water Policy Principles

DOWNLOAD



Nov 27, 2019 · Policy Principles

Water Reuse Policy Principles

VIEW BY TYPE

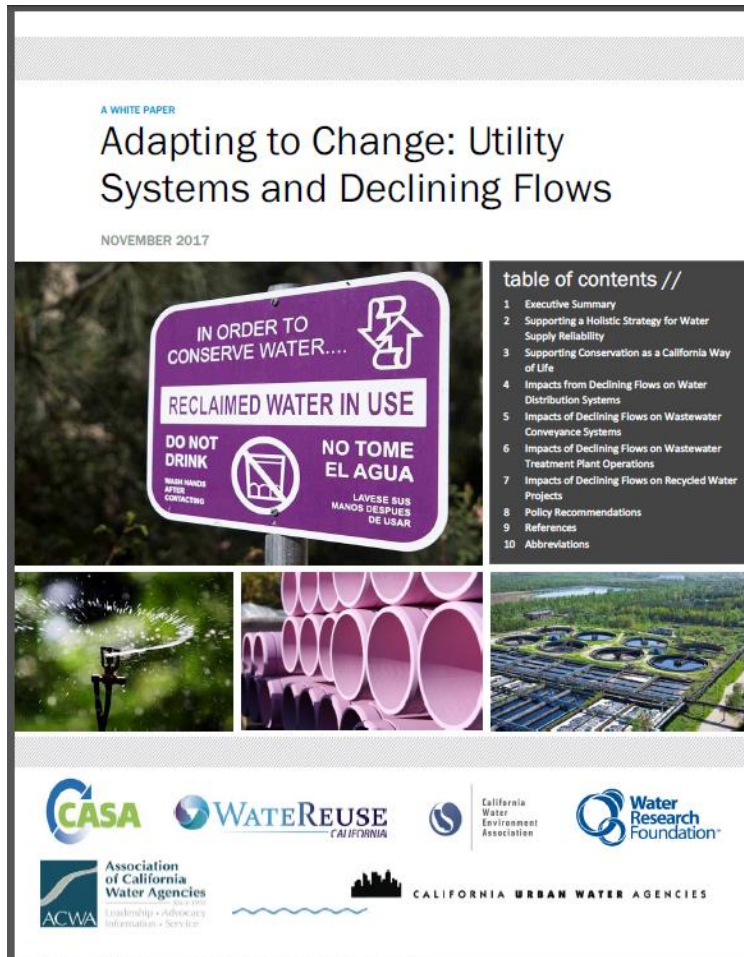
CUWA Annual Reports

Fact Sheets and Reports

Policy Principles

Press Release

CUWA's Final Products



ISSUE BRIEF

Adapting to Change: Informing Water Use Efficiency and Adjusting to Declining Flows

While California's conservation and water use efficiency efforts support water supply reliability and resilience, declining flows have caused unintended consequences in water, wastewater, and recycled water systems. In 2018, the state enacted legislation that set a provisional standard for indoor residential water use of 55 gallons per capita day (R-GPCD), which will gradually decrease to the greater of 50 R-GPCD or a standard recommended by the California Department of Water Resources (DWR) and State Water Resources Control Board (State Board). Building on CUWA's 2017 white paper, "Adapting to Change: Utility Systems and Declining Flows," this issue brief helps to inform future standards, implications, and adaptations following the 2018 legislation.

Key Takeaways

During the period of mandated conservation, a wide range of water, wastewater, and recycled water systems experienced impacts from reduced flows.

In California Urban Water Agencies' (CUWA) 2017 survey, utilities representing a wide range of per capita residential water use reported impacts to water, wastewater, and recycled water systems due to reduced flows. The reported issues—such as treatment facility idling, odor complaints, and limited recycled water production—carry direct and indirect operational, financial, and physical consequences. Many of these challenges are caused or exacerbated by a combination of system-specific characteristics, such as water or wastewater quality, pipe material and size, and spatial topography, which makes it difficult to define a specific R-GPCD threshold that triggers adverse effects.

Systems with large, unexpected flow reductions may experience significant operational challenges.

In the decades since most urban infrastructure was designed and built, water demands supporting the basis of designs have changed. Large reductions in flow may lead to systems operating well below design capacity, affecting system performance and operations. This effect will persist unless population growth moves service demand closer to planned capacity or agencies adapt. Systems designed with greater flexibility typically have more ability to adapt with operational adjustments.

Given time and resources, utilities can and will adapt to declining flows.

Declining flows are one example of many changes facing California utilities. Agencies need time, investment, and coordinated planning across the service area to adjust and maintain compliance with sometimes competing goals, including conservation standards, end user needs, and fire flow and public health requirements. The broad reach of impacts emphasizes the interconnected nature of infrastructure tying together water, wastewater, and recycled water systems and the benefits of a holistic, integrated, One Water planning and management approach.

This brief builds on CUWA's 2017 white paper to inform the state's studies on a new indoor residential water use standard by analyzing the impacts of lower residential water use on water, wastewater, and recycled water systems.

WRF Water Demand Research 2009-2017



Driver - drinking water utilities saw changing water use trends in last 20 years



18 projects funded, 16 published.

~\$3.5M WRF \$ + \$3.1M co-funding, cost share, or in-kind



Studies of water use by customer category, demand forecasting, & planning under uncertainty.

Results are useful for planning utility operations, revenue, and capital improvements.



<https://www.waterrf.org/news/water-demand-improving-effectiveness-forecasts-and-management>

<https://www.waterrf.org/research/topics/water-use-efficiency>

Agenda

| Topic | Presenter / Organization |
|--|--|
| Introductions | Maureen Hodgins, WRF |
| Overview of 2017 CUWA study | Wendy Broley, CUWA |
| Overview of 2019 CUWA study | Rucker Alex, CUWA |
| Agency experience (drinking water) | Chris Castaing, San Diego County Water Authority |
| Agency experience (wastewater and recycled water) | Tom Rosales, City of San Diego |
| Agency experience (wastewater conveyance and treatment) | Seppi Henneman, Brown and Caldwell for El Estero Water Resource Center, Santa Barbara |



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2017 CUWA Study

Wendy Broley
CUWA Staff Engineer

Who is CUWA?

Population Served **26 million**

Retail Agencies:

- Alameda County Water District (ACWD)
- East Bay Municipal Utility District (EBMUD)
- Los Angeles Department of Water and Power (LADWP)
- City of Fresno

Retail/Wholesale Agencies:

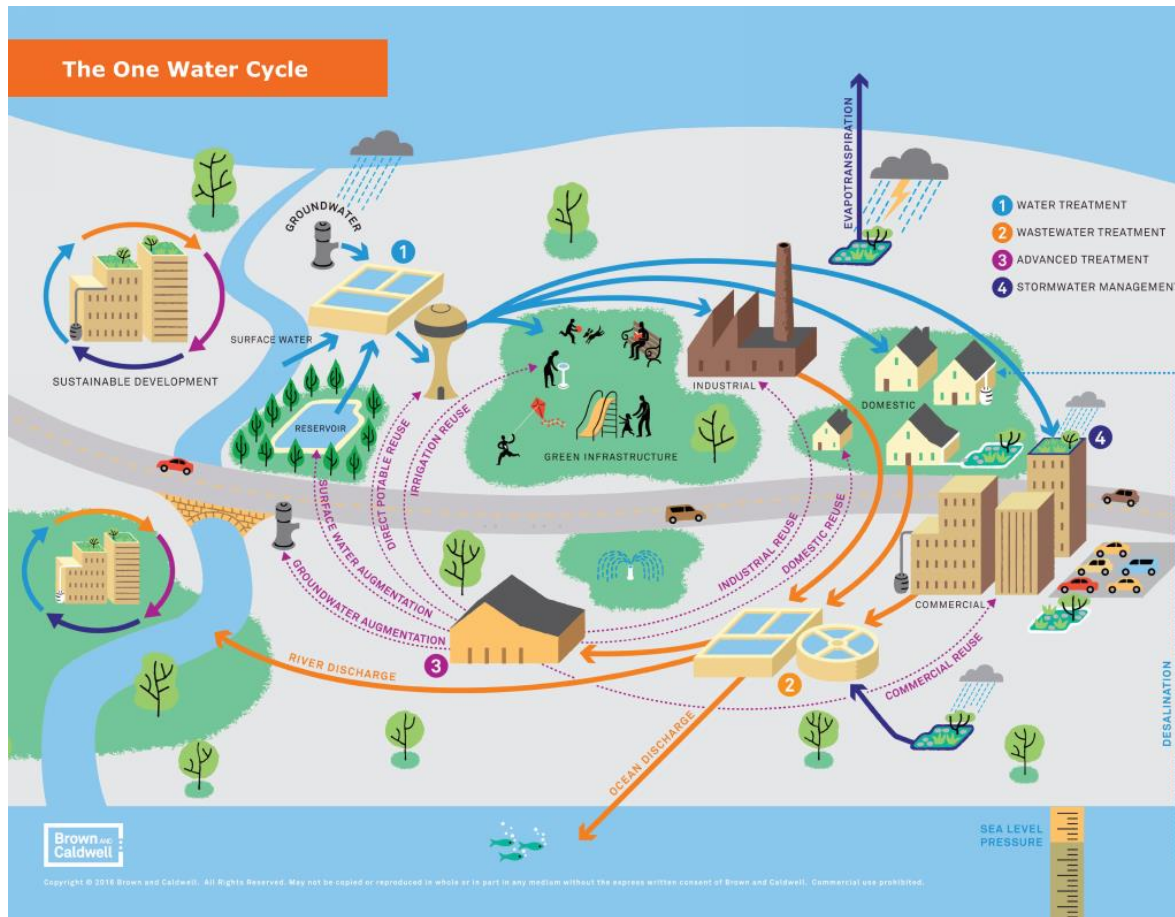
- Contra Costa Water District (CCWD)
- City of San Diego (San Diego)
- San Francisco Public Utilities Commission (SFPUC)

Wholesale Agencies:

- Metropolitan Water District of Southern California (MWDSC)
- Santa Clara Valley Water District (SCVWD)
- San Diego County Water Authority (SDCWA)
- Zone 7 Water Agency (Zone 7)

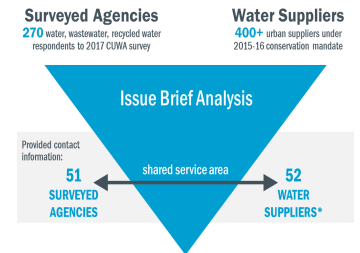
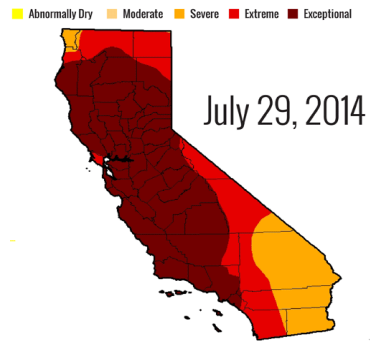
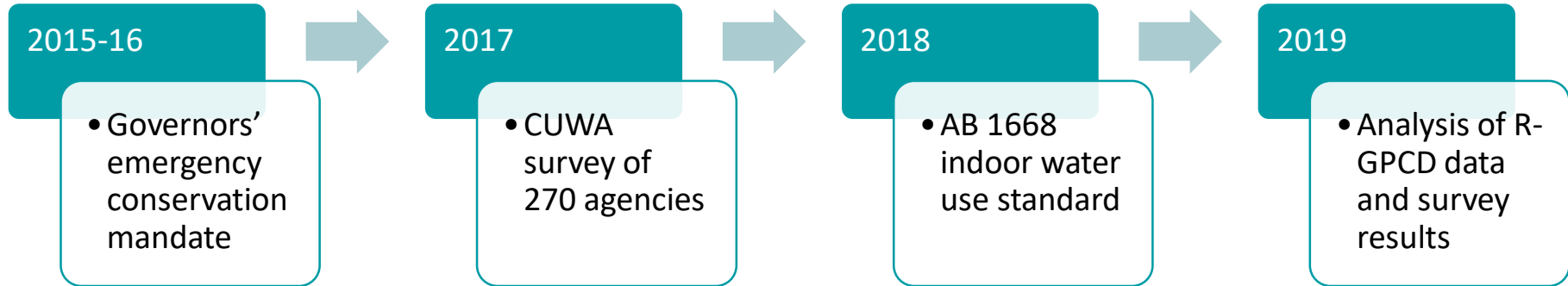


CUWA supports a holistic approach to addressing California's water supply challenges



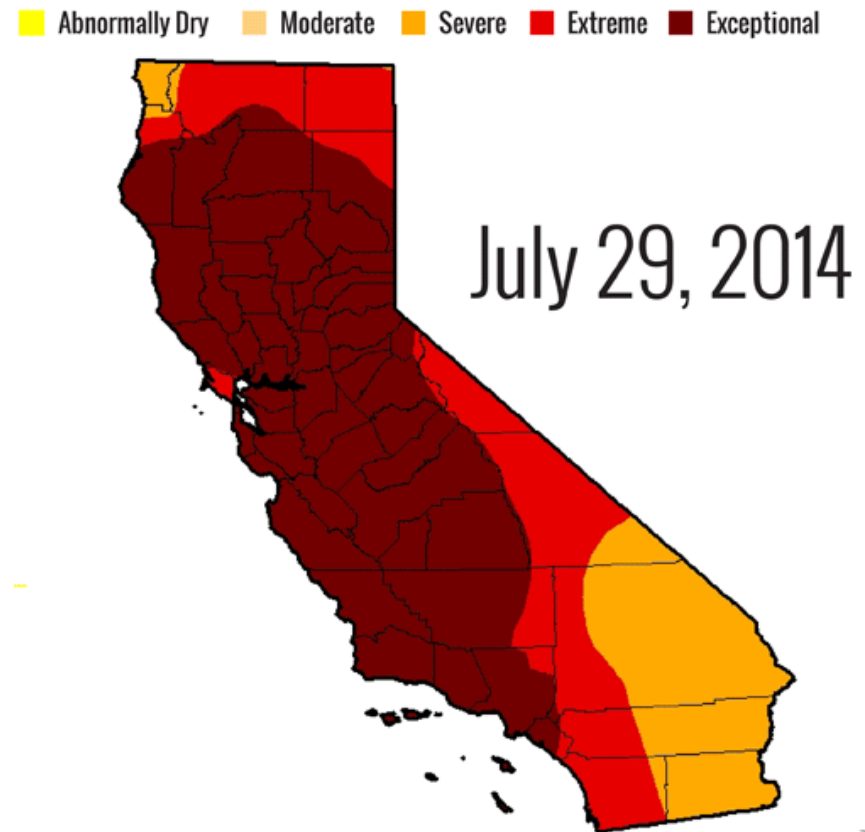
Understanding how WUE strategies affect the interconnected water supply system is critical to optimizing future water management.

Timeline

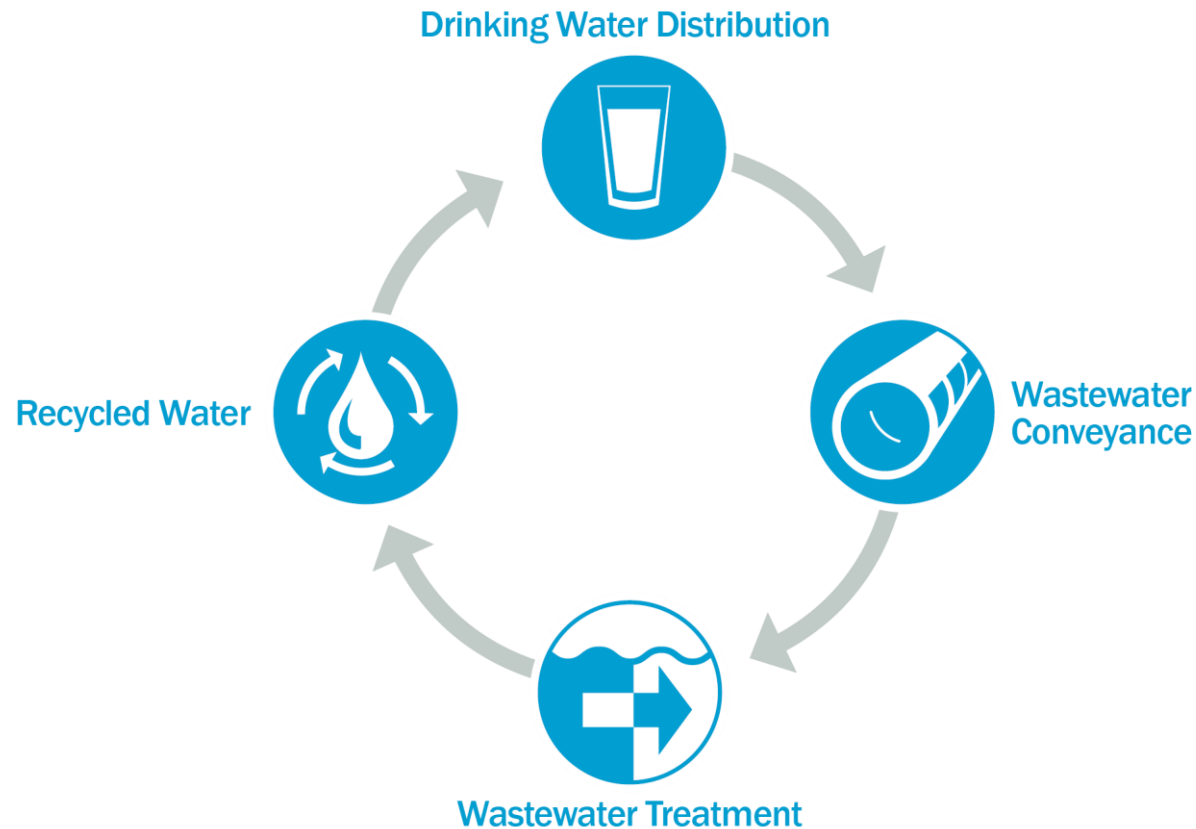


In 2015, Governor issued emergency conservation Executive Order

- Californians **reduced water use by an average of 25%** during the 2015-16 drought.
- Significant reduction in water demands **revealed some impacts** from declining flows.
- Observations **offer a preview** into the potential impact of establishing permanent indoor water use targets.



Research reveals declining flows have impacts on the interconnected urban water cycle



CUWA is working with collaborative partners to better understand these impacts



California
Water
Environment
Association



CALIFORNIA URBAN WATER AGENCIES



Wise water use is encouraged through short term conservation and long term WUE

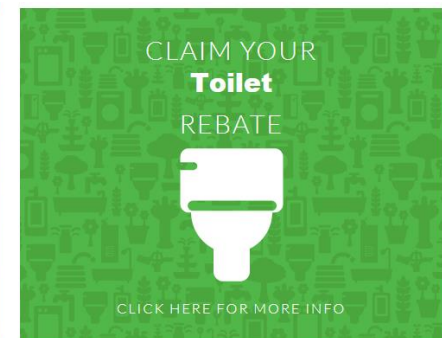
Conservation

Short-term, emergency response for demand reductions during a drought



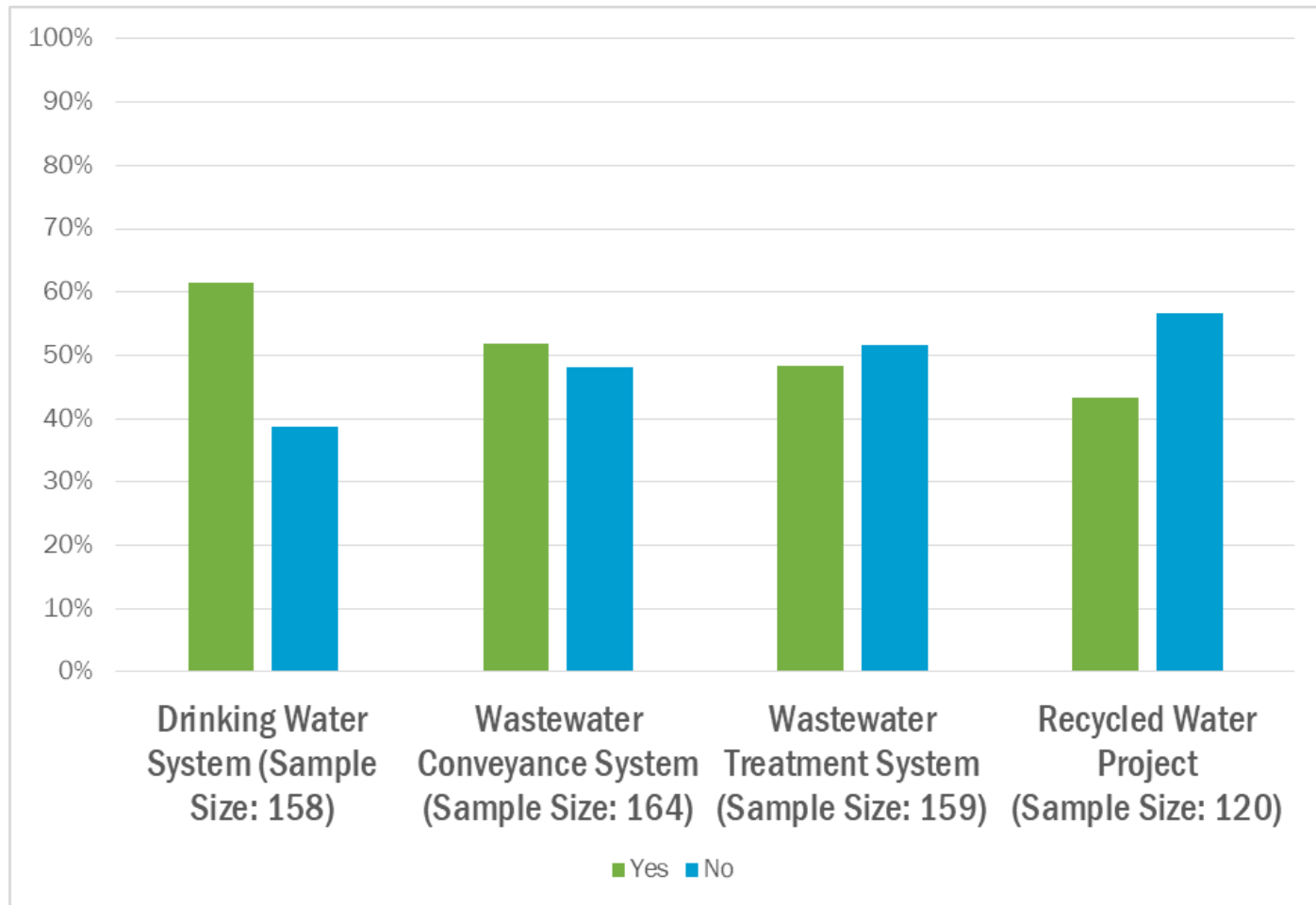
Water Use Efficiency

Long-term strategy for more sustained demand management

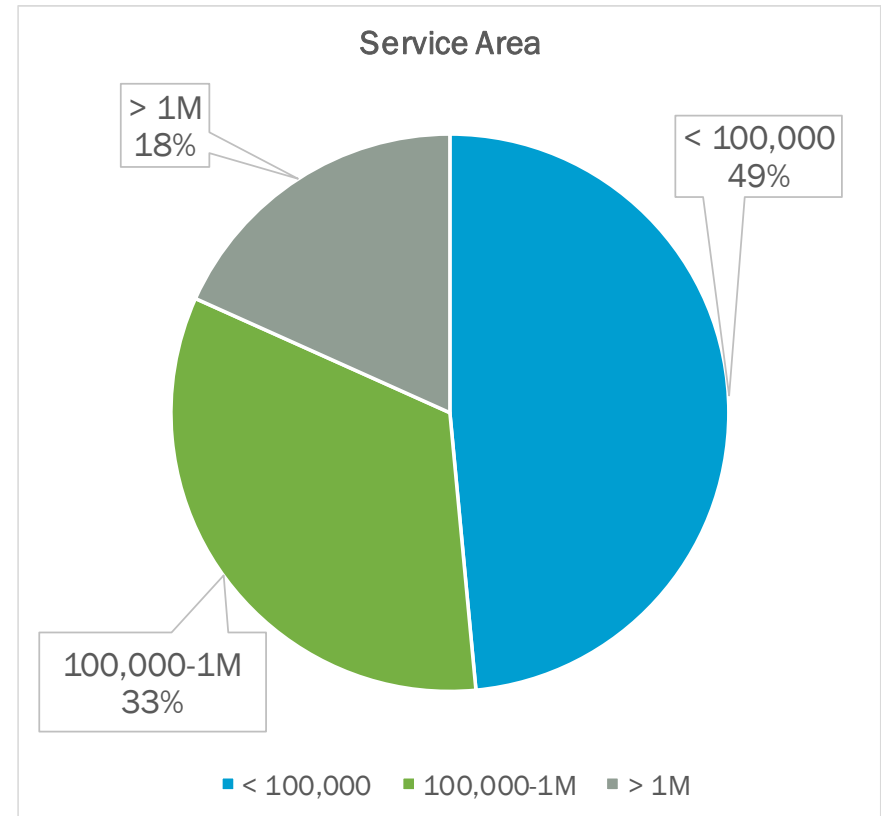
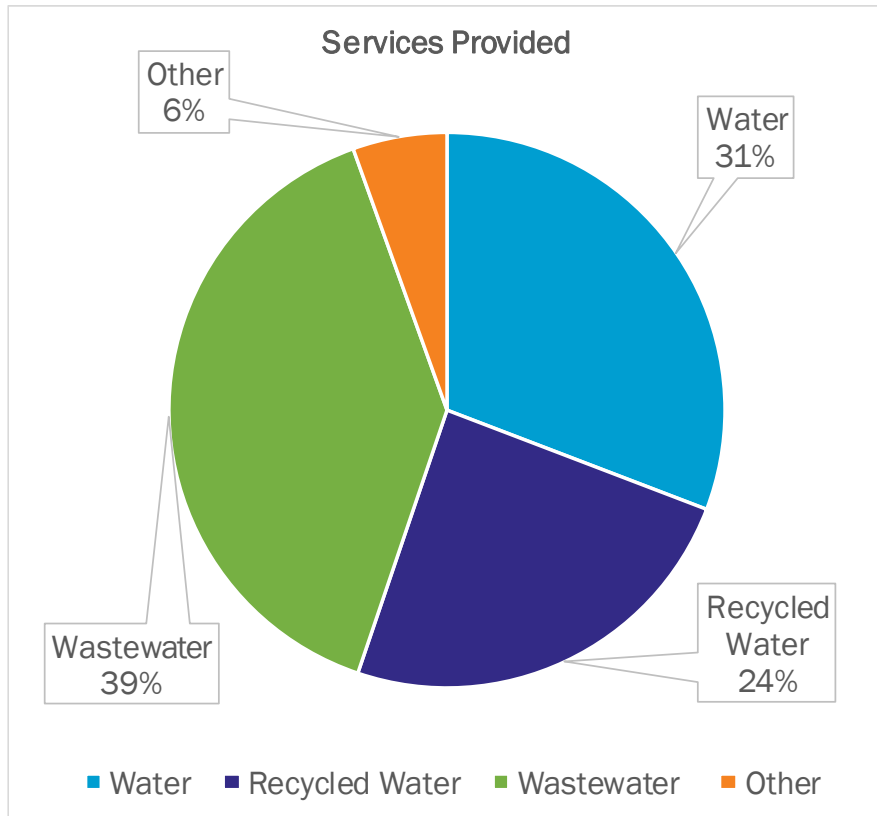


Source: Department of Water Resources

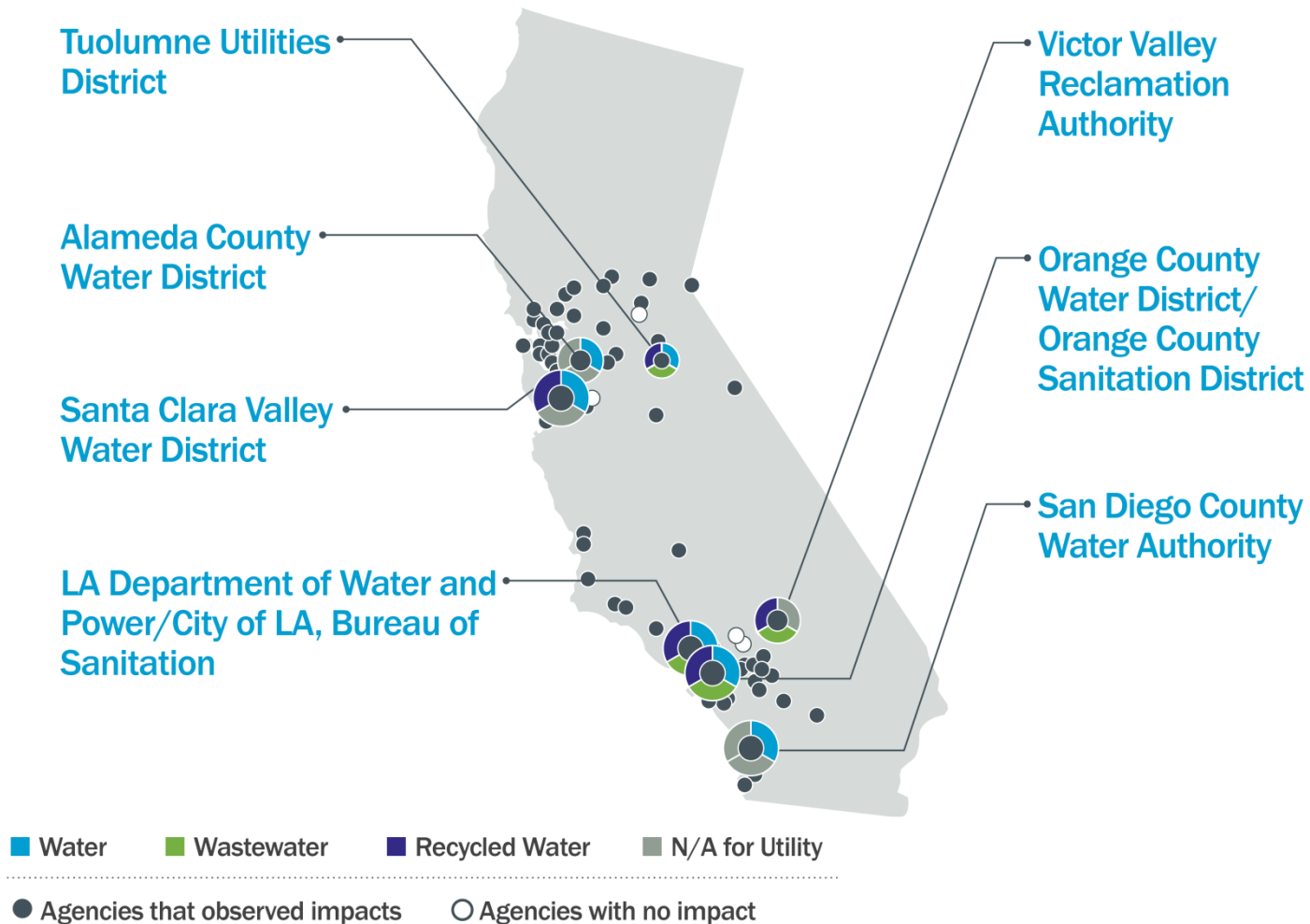
Nearly half of survey respondents have experienced impacts of declining flows



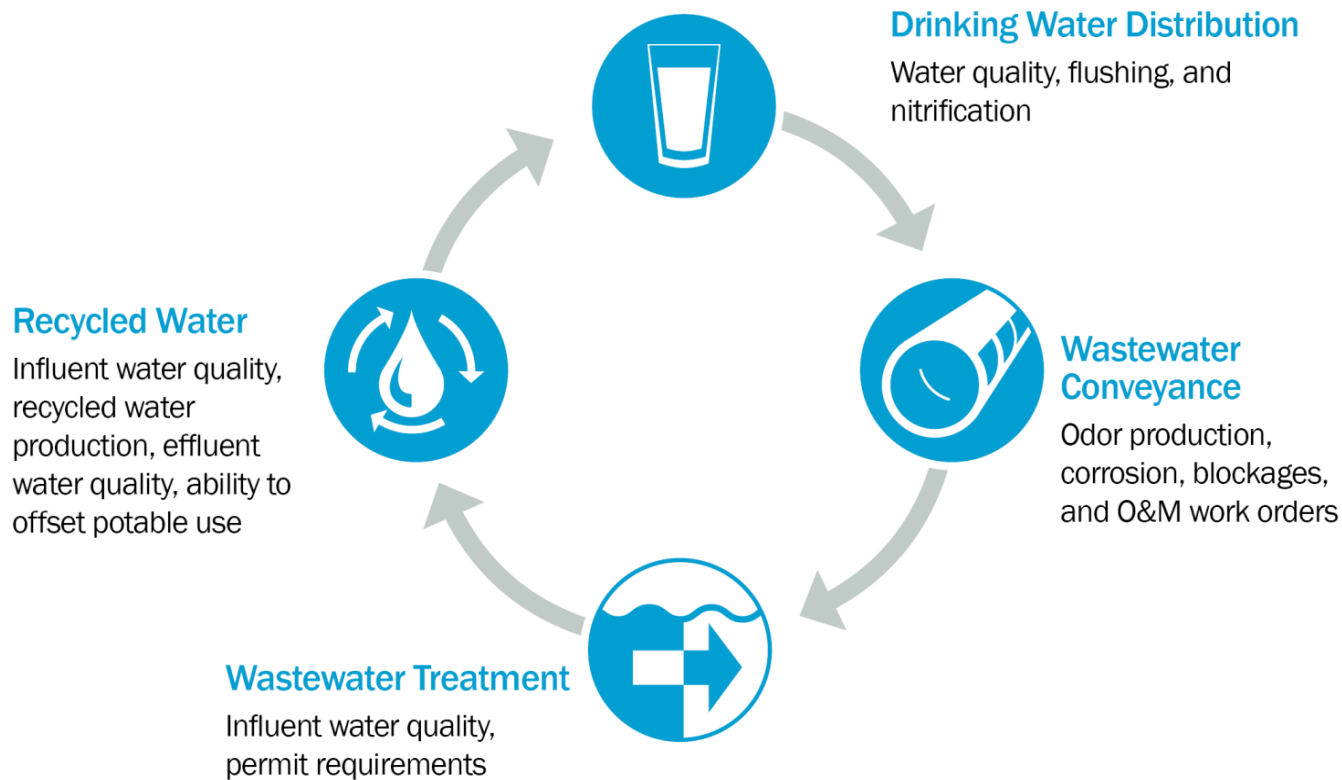
The high-level survey provided nearly 300 representative viewpoints



Many utilities are feeling the impacts and working to adapt



Impacts from declining flows experienced in all elements of the urban water cycle



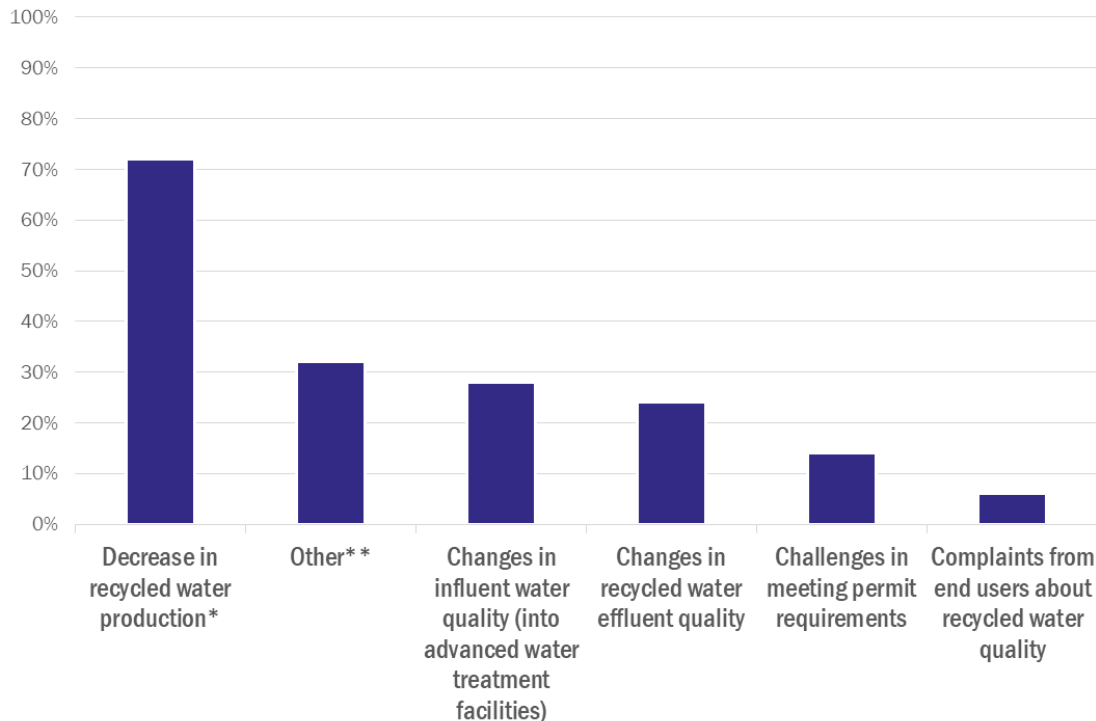
The survey provided insights into the most significant impacts within each type of system

Impacts on Water Distribution Systems

Impacts on Wastewater Conveyance Systems

Impacts on Wastewater Treatment Plants

Impacts on Recycled Water Projects



Of the impacted water system respondents, 49% reported operational challenges in water distribution systems due to low flows.

Of the impacted wastewater conveyance respondents, 50% indicated increased solids deposition, odor problems, and O&M challenges.

Of the impacted wastewater treatment respondents, 68% indicated changes in wastewater influent quality.

Of the impacted recycled water respondents, 70% indicated a decrease in recycled water production.



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2019 CUWA Study

Rucker Alex

CUWA Staff Planner

In 2018, the State enacted legislation that set a provisional standard for indoor water use



California
LEGISLATIVE INFORMATION

Assembly Bill No. 1668

- Defines the current interim standard as **55 R-GPCD**.
- Standard may reduce to as low as **50 R-GPCD** in 2030.
- Requires **studies by DWR and State Board** to analyze how the changing standard will impact water and wastewater management.

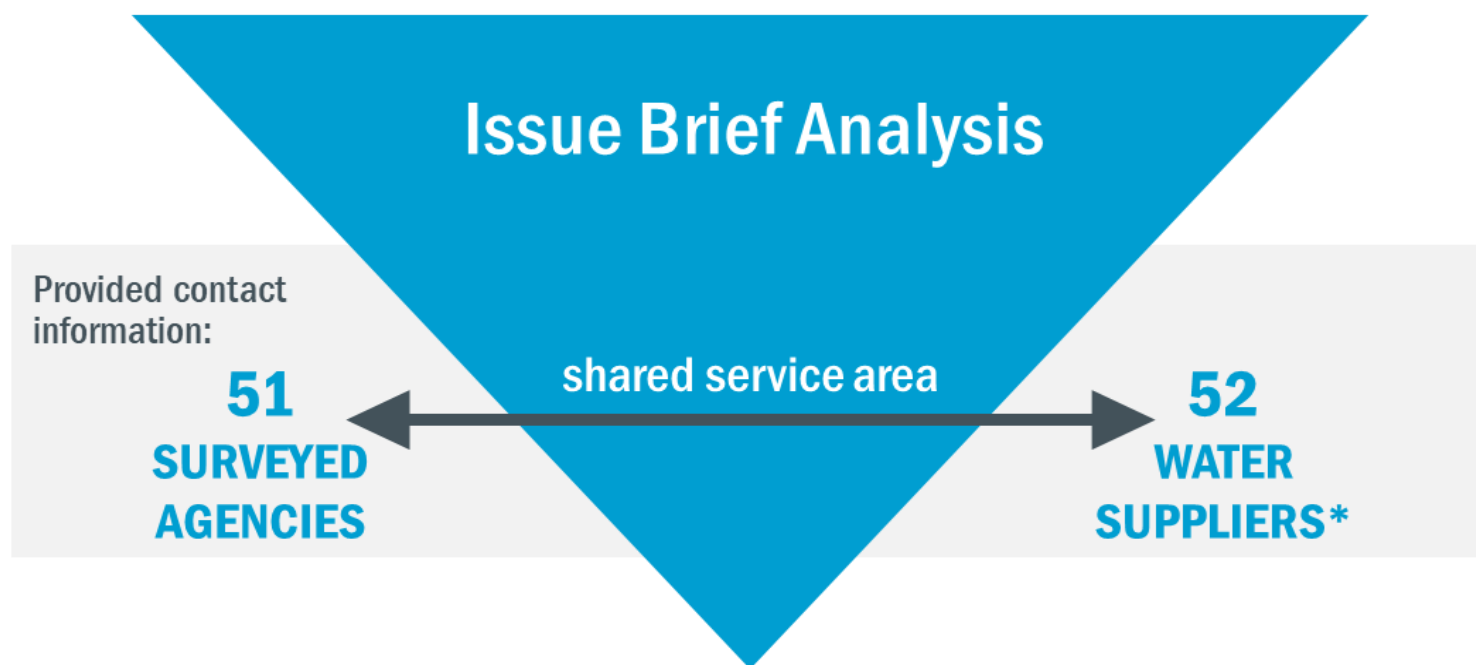
In 2019, CUWA revisited 2017 survey to examine relationship between water use and impacts

Surveyed Agencies

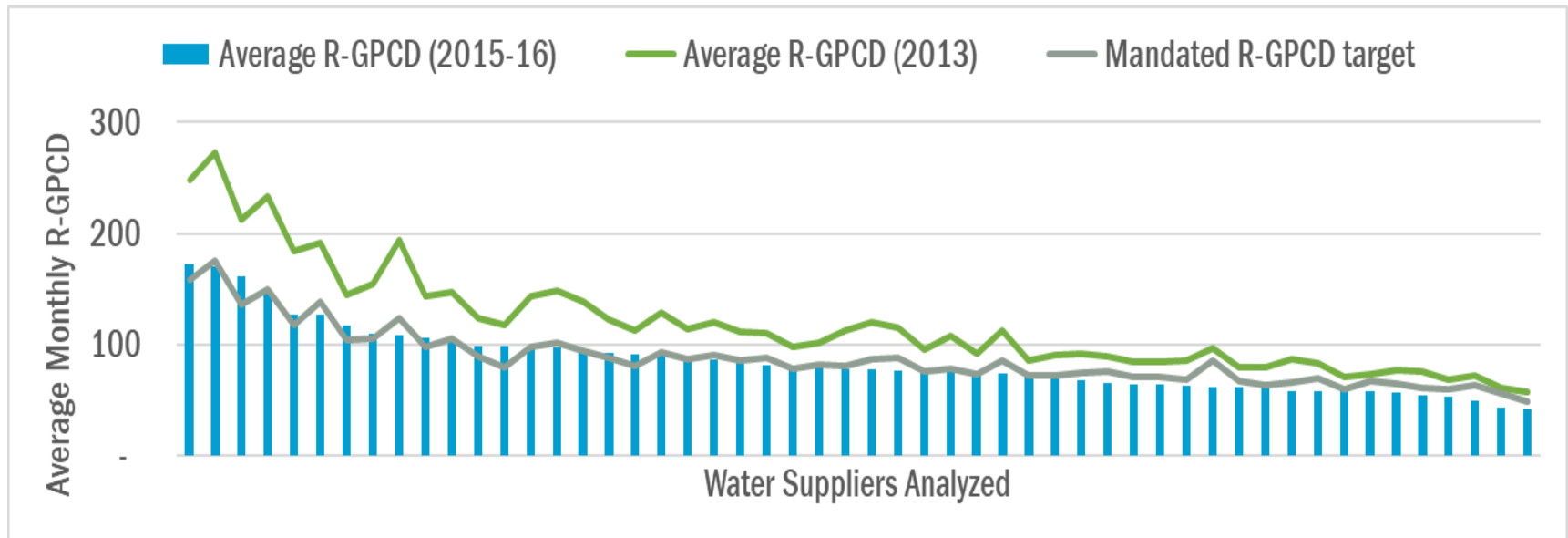
270 water, wastewater, recycled water respondents to 2017 CUWA survey

Water Suppliers

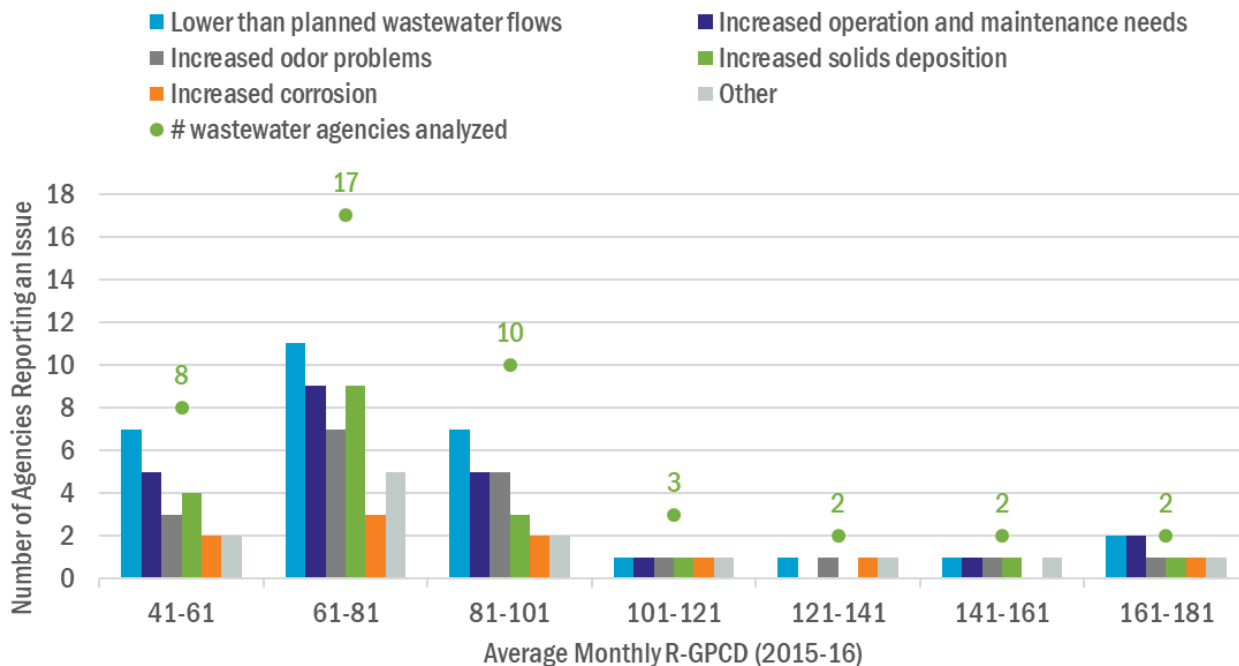
400+ urban suppliers under 2015-16 conservation mandate



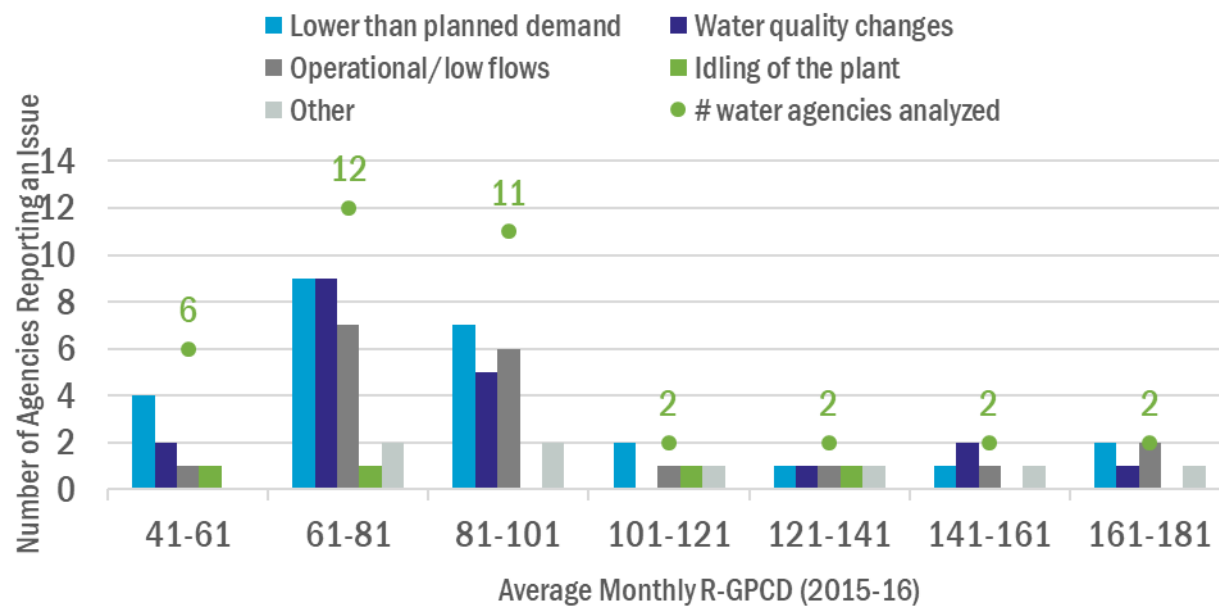
Water use of analyzed suppliers aligned with the State's drought emergency goals



Data Analysis: Wastewater Conveyance



Data Analysis: Drinking Water



CUWA Studies:
***Key Takeaways and
Recommendations***

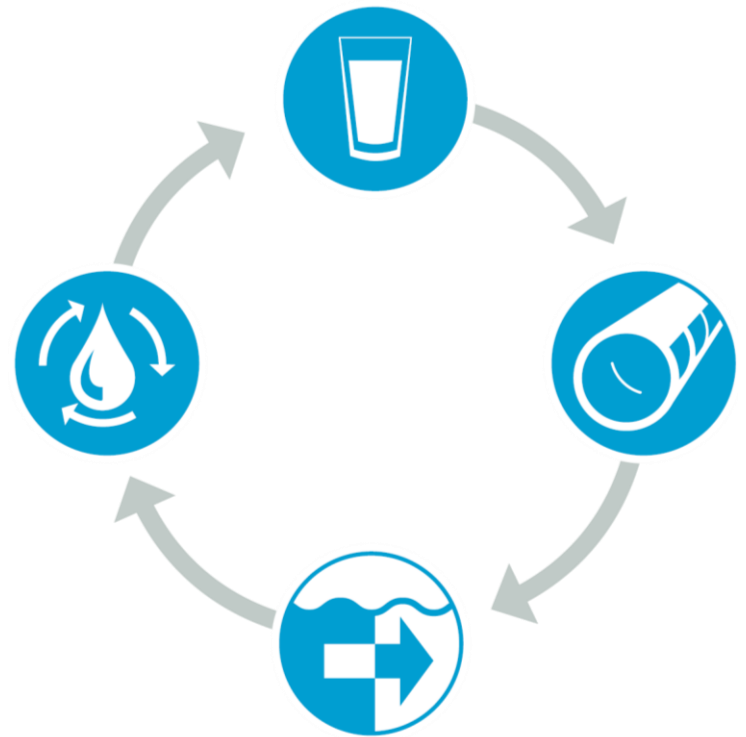
A wide range of water and wastewater systems experienced impacts from reduced flows

- Reported issues carry direct and indirect operational, financial, and physical consequences.
- Many challenges are caused by a combination of system-specific characteristics.
- **This makes it difficult to define a specific R-GPCD threshold that triggers impacts.**



Systems with large, unexpected flow reductions may experience significant operational challenges

- Water demands supporting the basis of designs have changed.
- Large reductions in flow may lead to systems operational well below design capacity.
- **Systems designed with greater flexibility may have more of an ability to adapt.**



Given time and resources, utilities can and will adapt to declining flows

- Agencies need time, investment, and coordinated planning across the service area to adjust.
- They are sometimes adjusting to competing goals.
- **This emphasizes the importance of a holistic, integrated, One Water planning and management approach.**



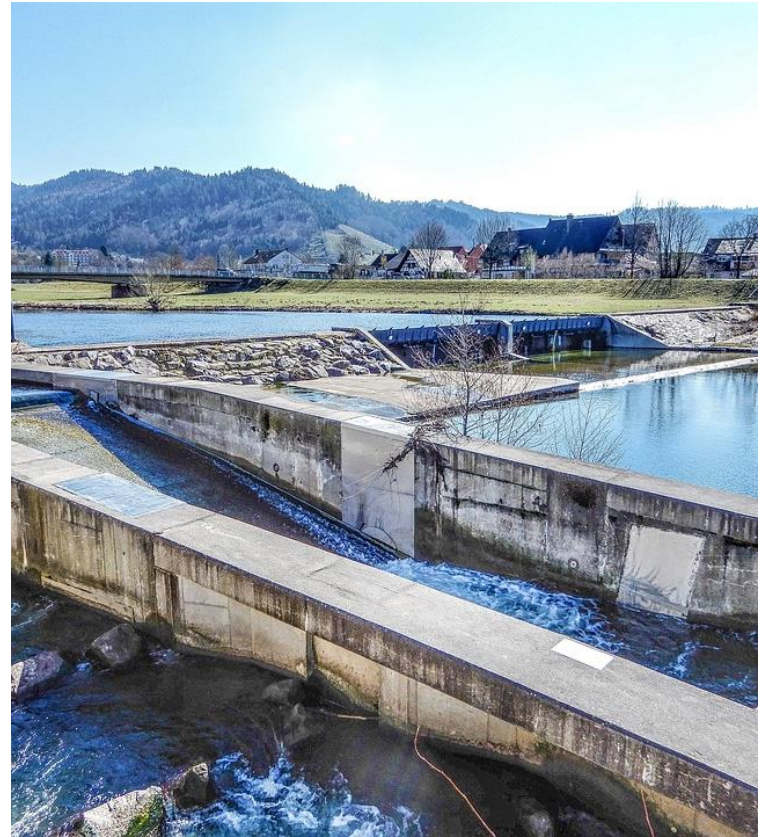
Recommendations for the State

- ✓ Account for system-specific characteristics when evaluating appropriate indoor water use standards.
- ✓ Ensure that state policies for water use efficiency and reuse are complementary.



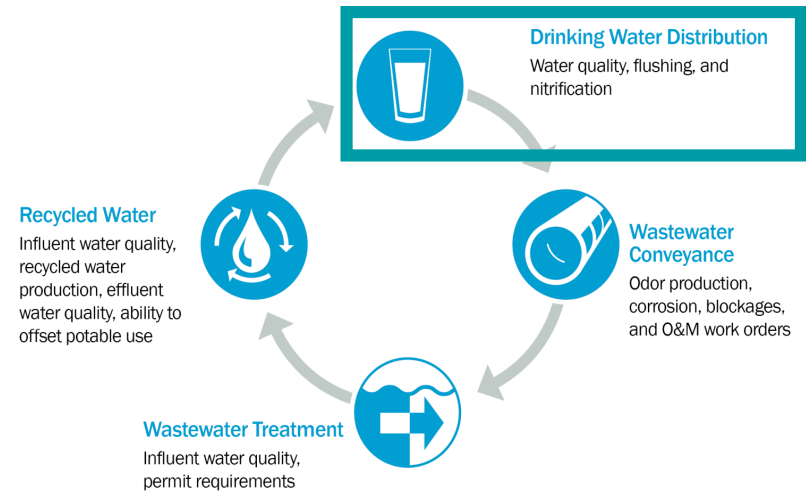
Recommendations for utilities

- ✓ Strengthen planning, coordination, and collaboration between water and wastewater agencies.
- ✓ Assess vulnerabilities and potential impacts throughout the system.





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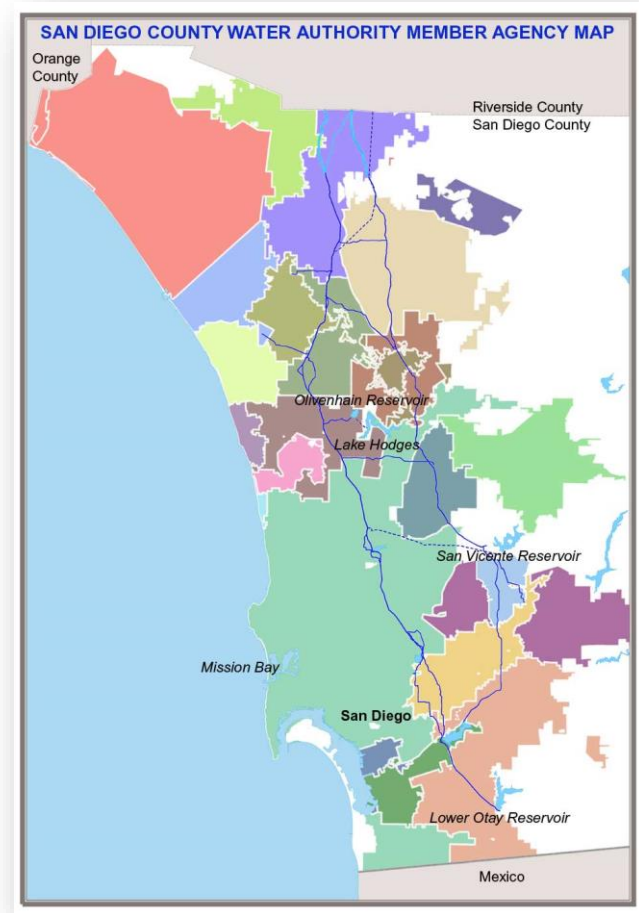
Agency Experience:

San Diego County Water Authority, San Diego County

Chris Castaing, O&M Manager

San Diego County Water Authority

- ▶ Wholesale water agency
 - 24 member agencies
 - Serves 3.3 million people
 - Service area of 1500+ square miles
 - Provide untreated and treated water

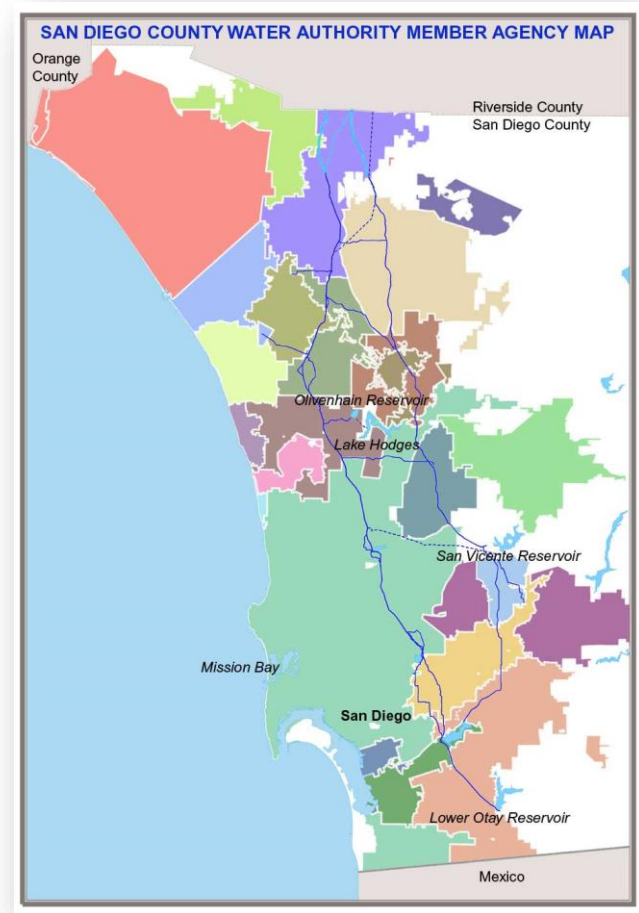


Member Agency Boundaries

San Diego County Water Authority

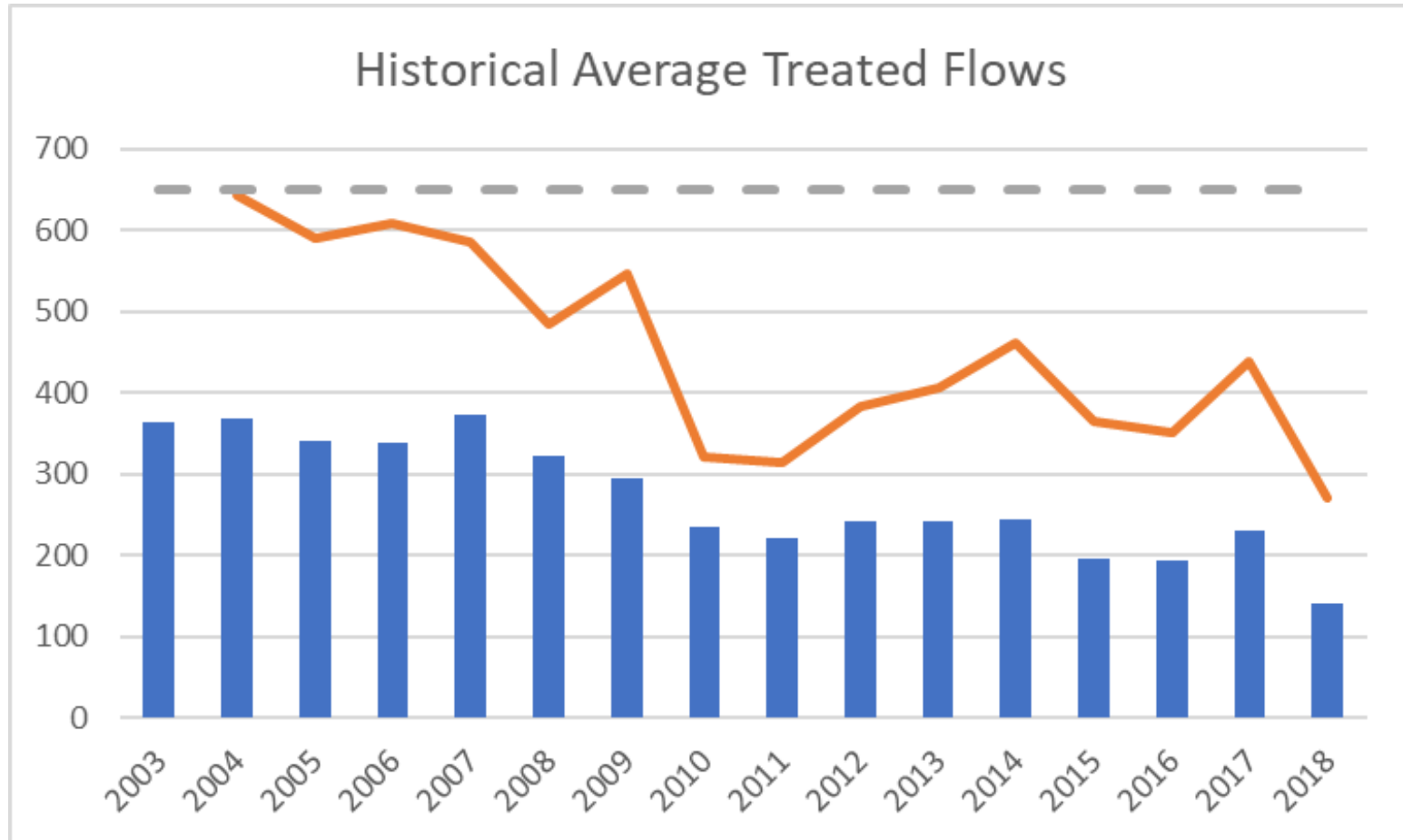
► Aqueduct Delivery System

- 300+ miles pipeline
 - 48" to 108"
- 1,600 structures
- 100 flow control facilities



Member Agency Boundaries

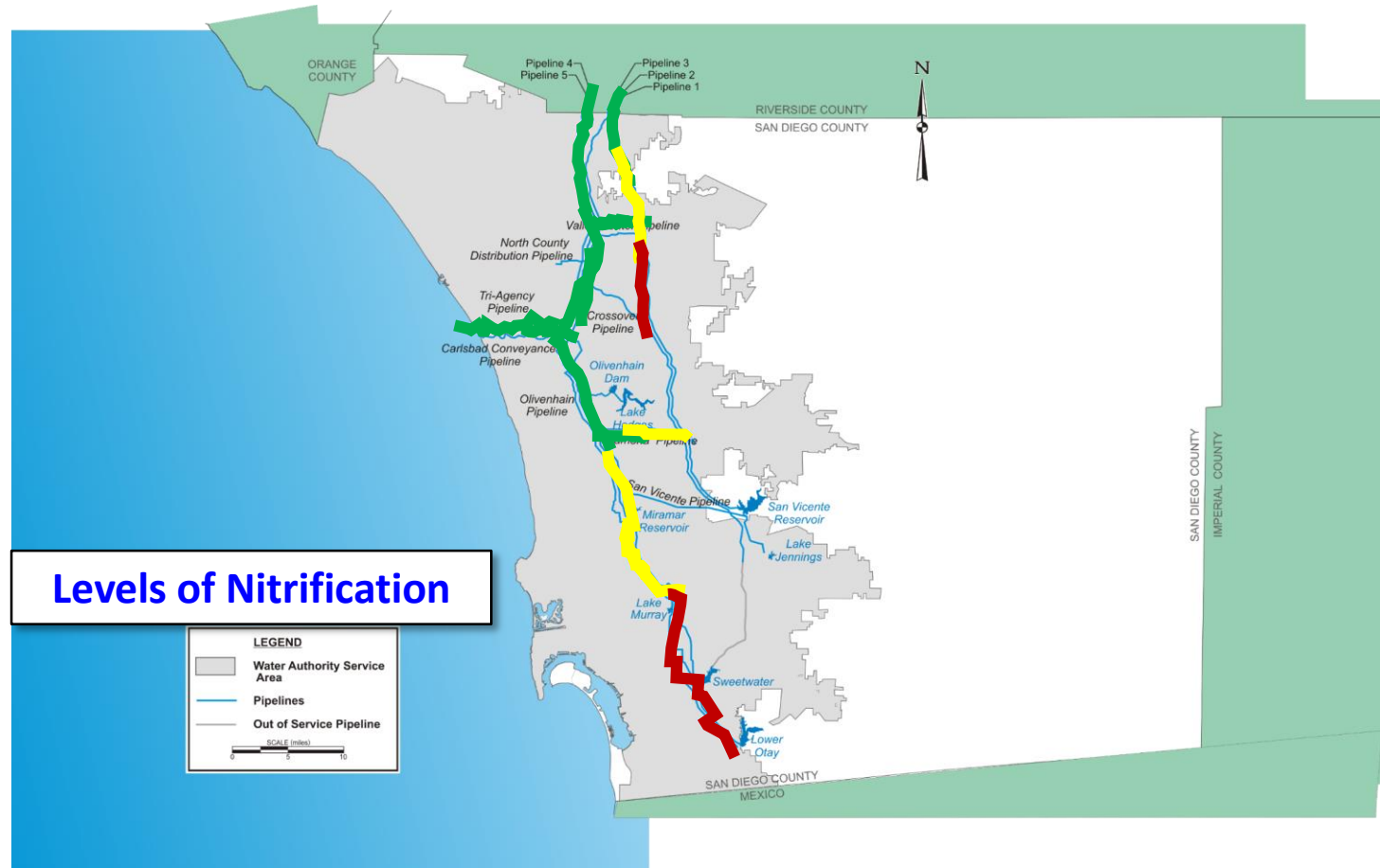
History



Current Status

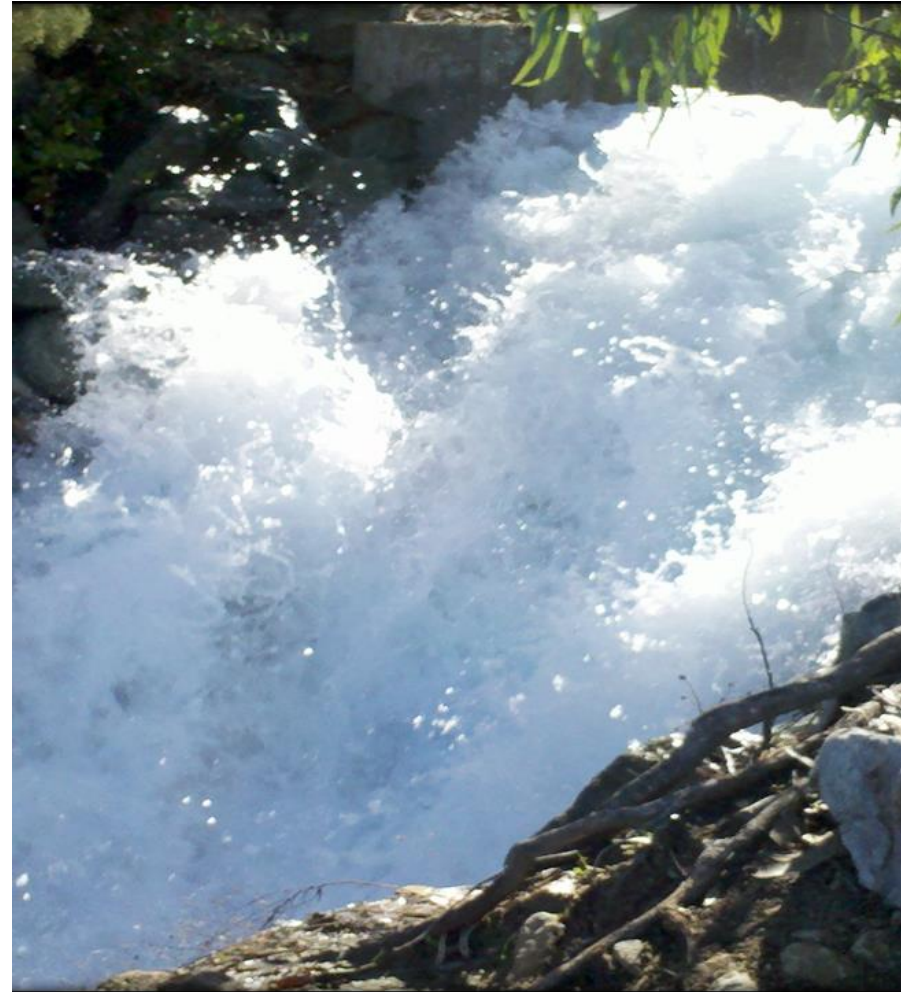
- Demand lower
- Excess Capacity
- Increased detention time
- Water Quality challenges
 - Chloramine residual
 - Nitrification

Treated Water Quality Challenges

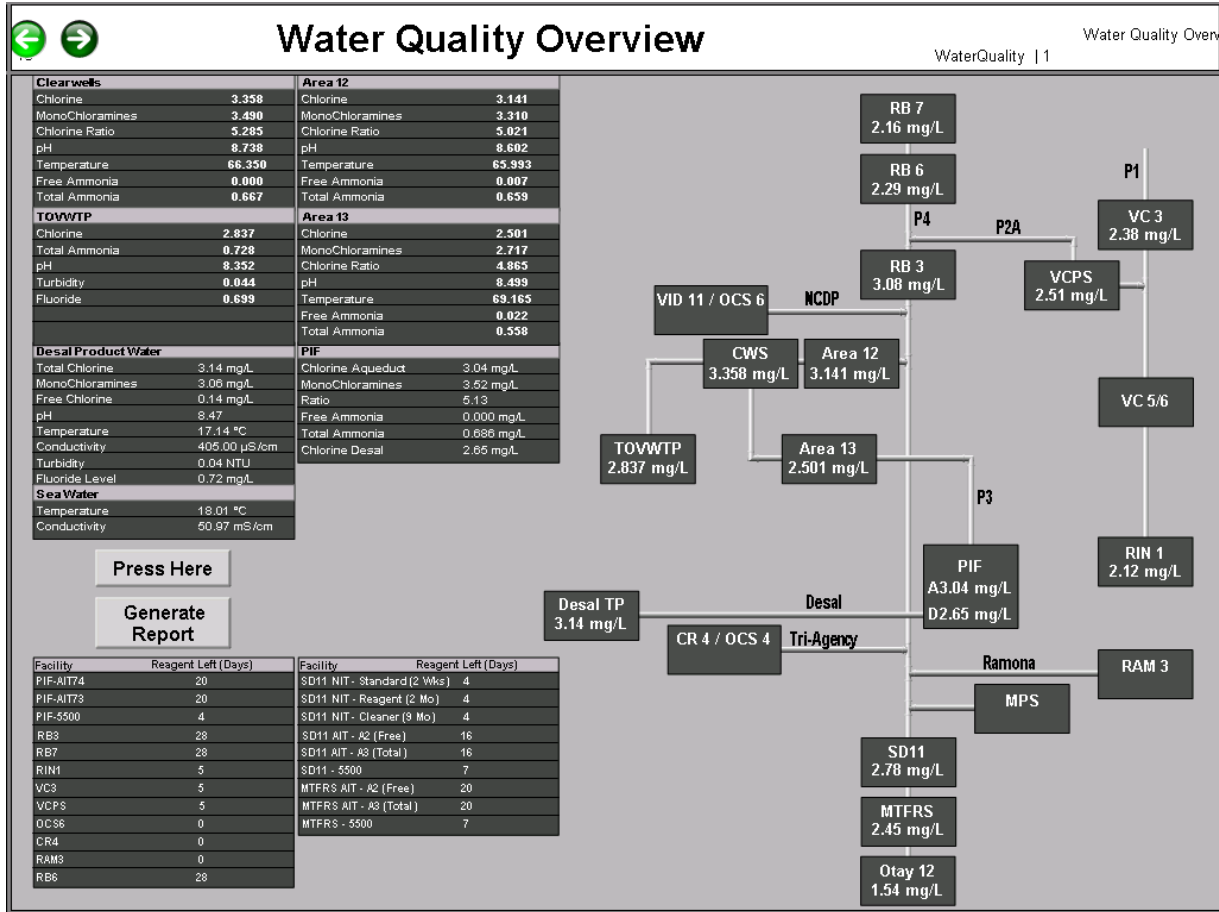


Mitigation Measures

- Flushing
- Adjust treatment process
- Reduce detention time
- Online water quality
- Free chlorine transition
- Boost chlorine



SCADA – Water Quality



Pipeline 4

Fallbrook

✱ Rainbow

✱ Rainbow

Valley Center

Oceanside

Mitigation
Measures:

Online Water Quality
Analyzers



Pump Station



Pipelines 1 & 2

Yuima

Valley Center ✱

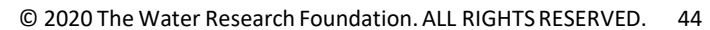
Valley Center

Escondido

Vallecitos

Vista

Rincon Del Diablo ✱



Upstream Online Analyzers



Downstream Online Analyzers



Water Quality Results and Benefits

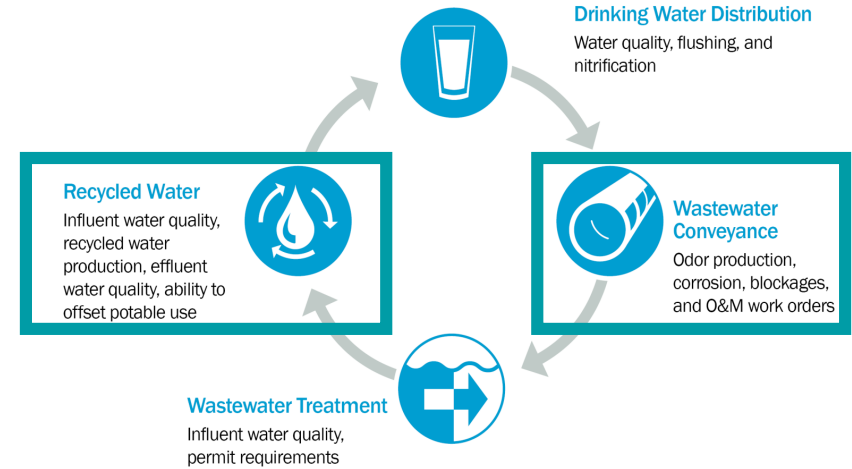
- Initial Results:
 - Nitrites are being oxidized
 - Free ammonia is re-combining with added chlorine
 - Residual is being boosted
- Benefits:
 - Freshen up water in the southern portion resulted in reduced flushing
 - Maintain high quality water to member agencies

Summary

- Operational challenge continues
- Development and implementation of mitigation strategies
- Collaborate with Member Agencies throughout the region
- A light-switch solution there is not!



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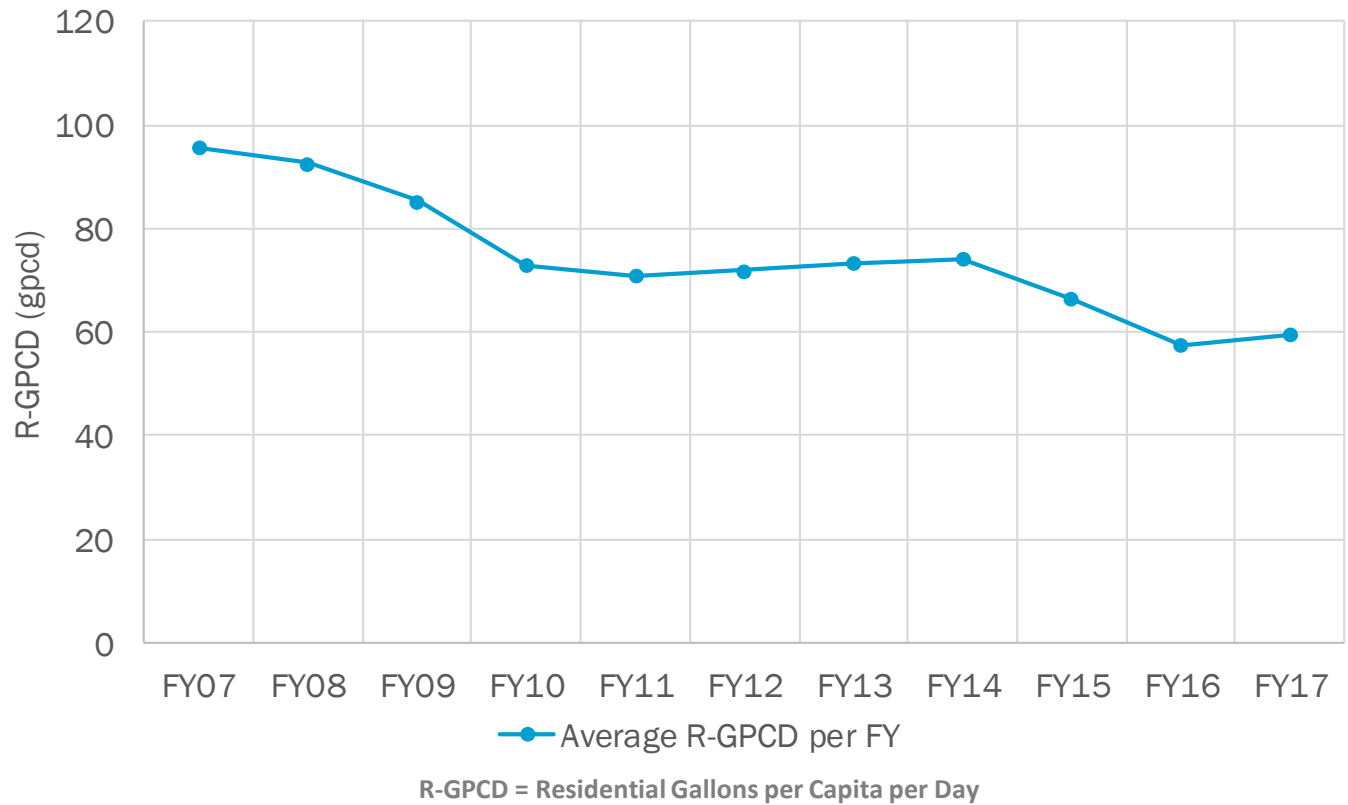


Agency Experience: Public Utilities Department, City of San Diego

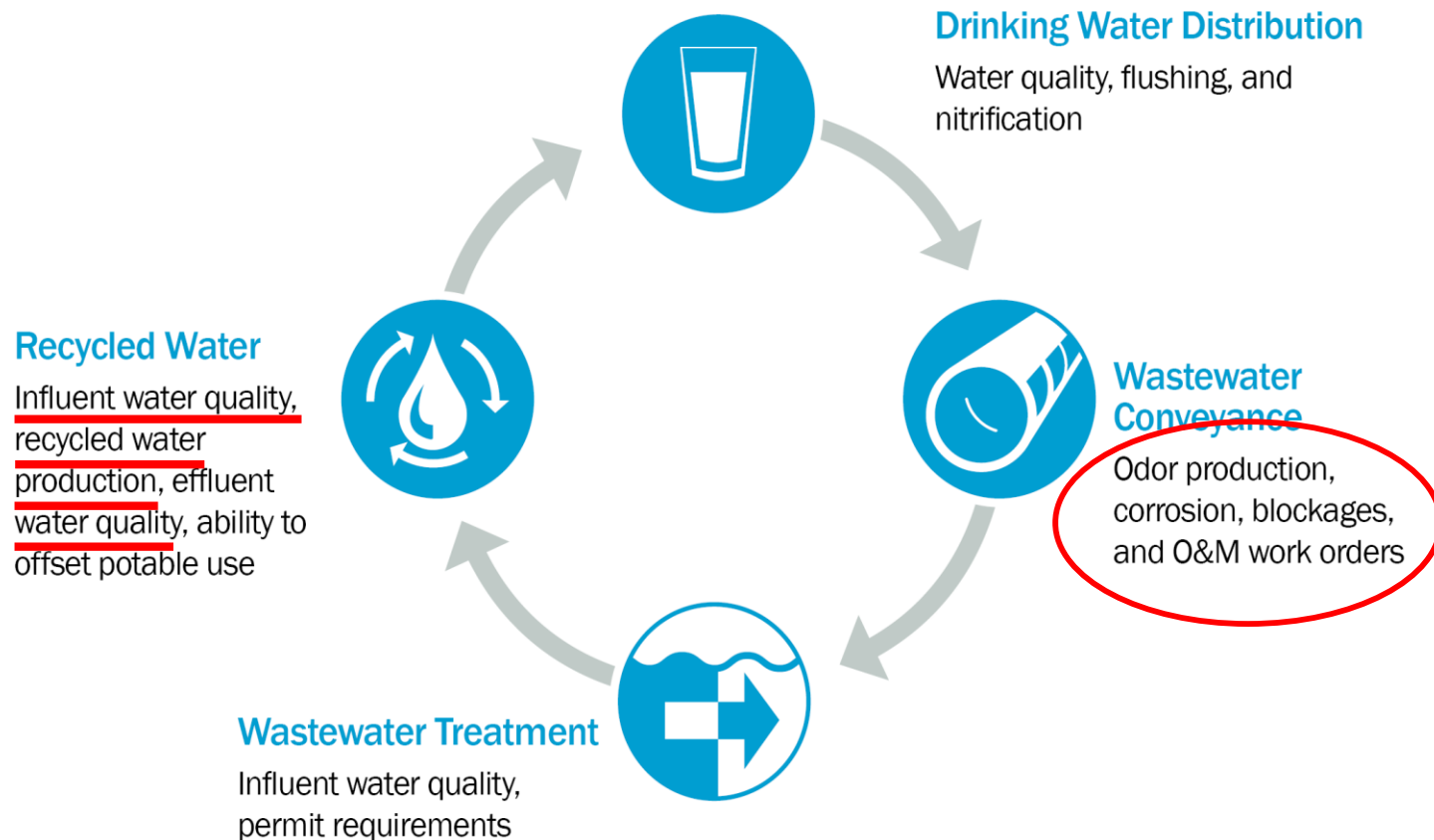
Tom Rosales, Deputy Director

Declining R-GPCD Results in Lower Wastewater Flows

The City's continued commitment to conservation

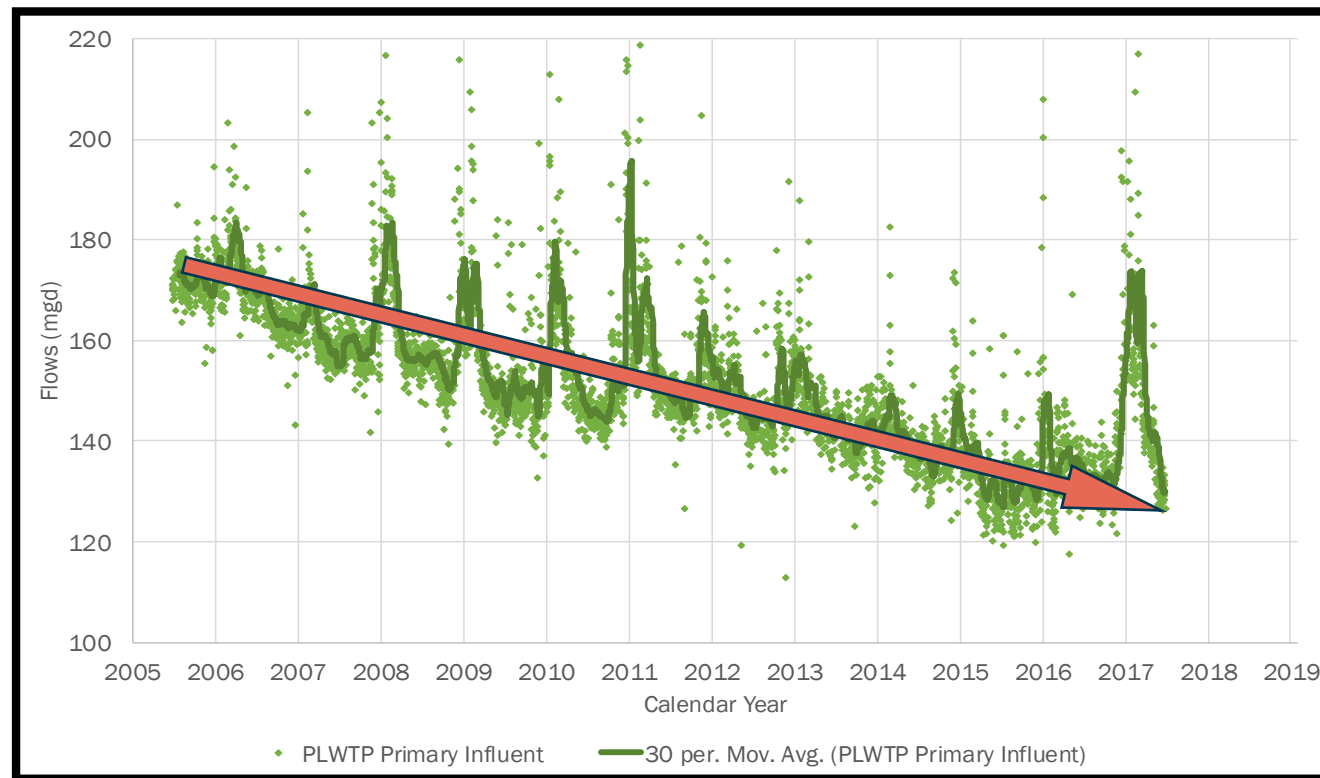


Impacts from Declining Flows in San Diego's System



Declining R-GPCD Results in Lower Wastewater Flows

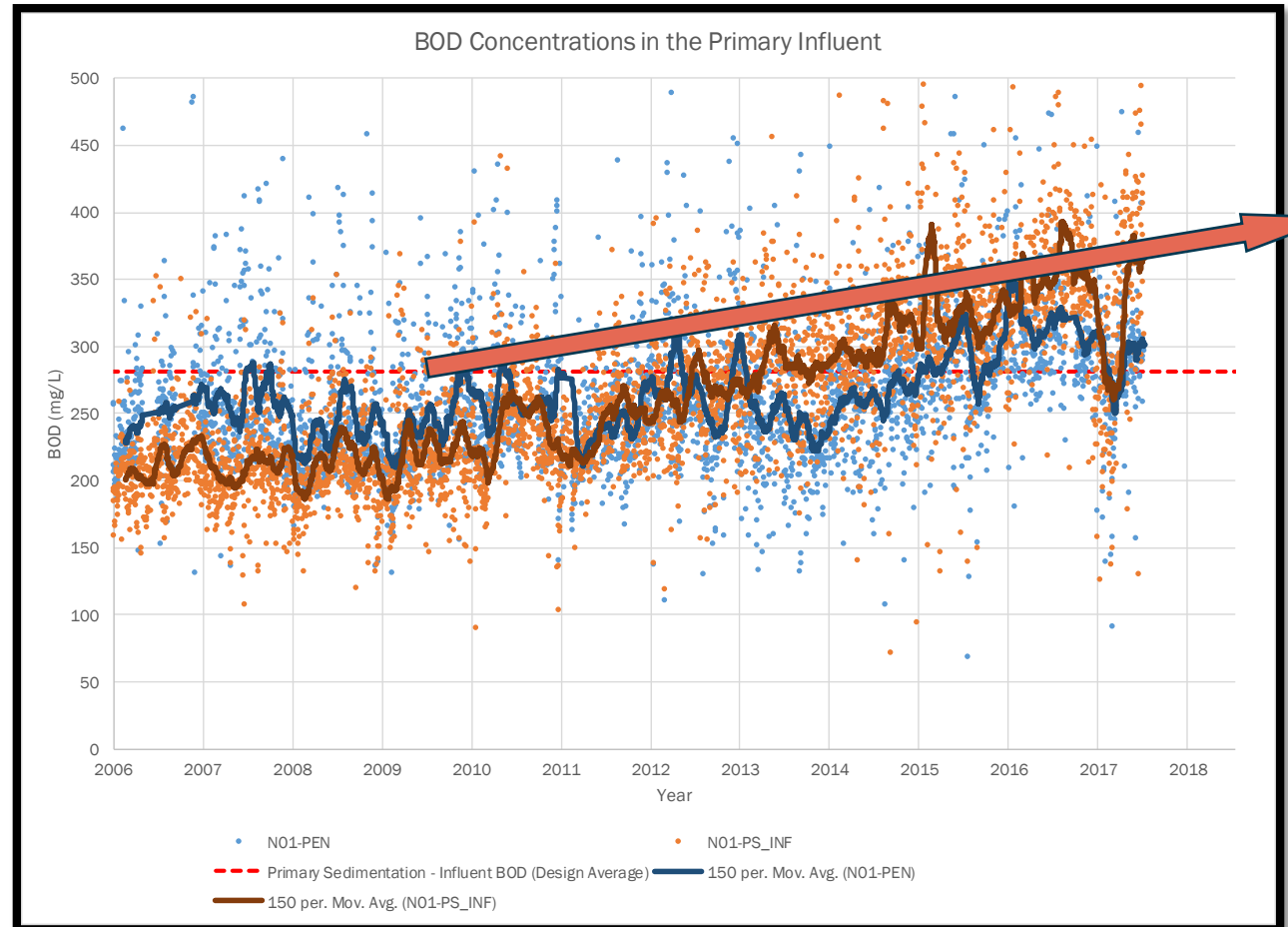
Flows at the Point Loma WWTP have been declining



Steady Increase in Influent BOD

Observation: Increase in BOD concentrations in the primary influent beyond initial engineering design estimate

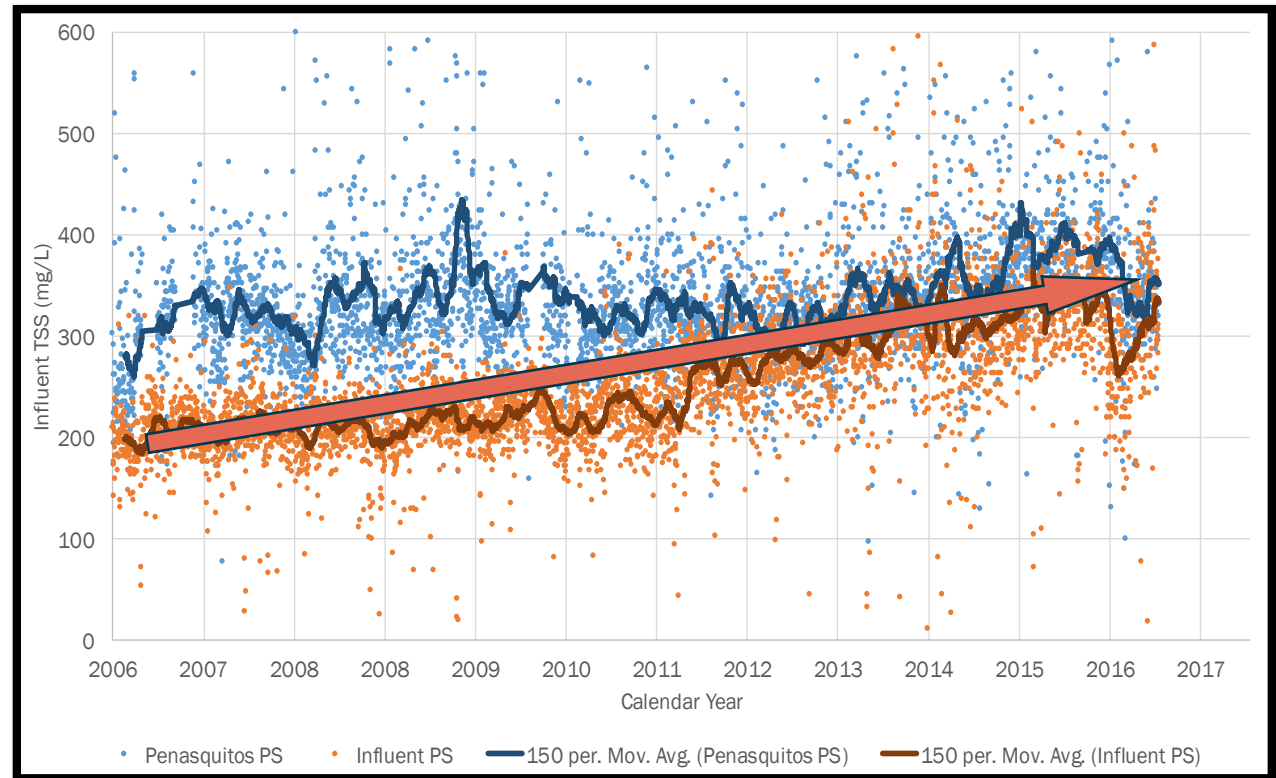
Potential Impact: Upgrades needed to ensure proper treatment at higher loading rates



Steady Increase in Influent TSS

Observation: Increase in TSS concentrations in the primary influent beyond initial engineering design estimate

Potential Impact: Upgrades needed to ensure proper treatment at higher loading rates



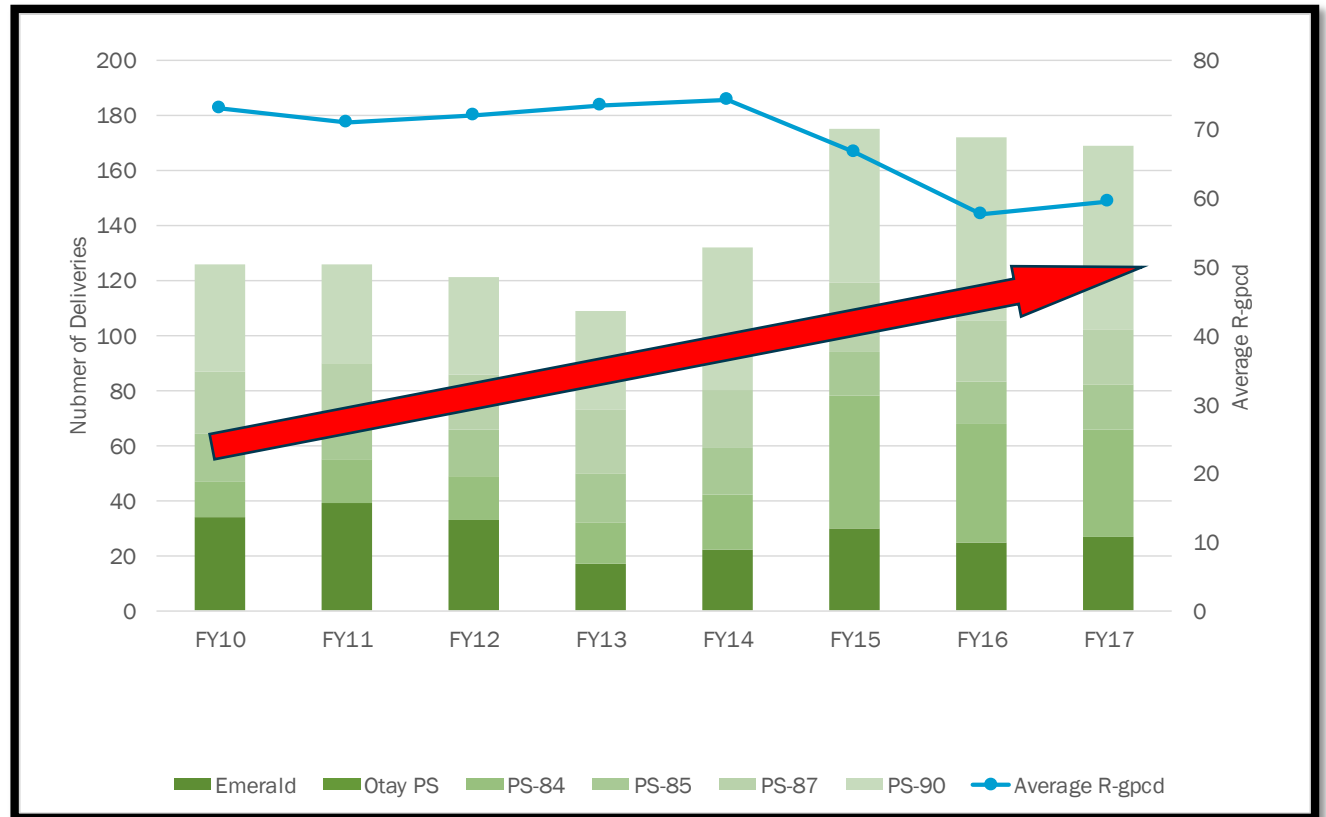
Increase in Purchase & Delivery of Odor Control Chemical

Observation:

Increase in purchase and delivery of odor mitigation products

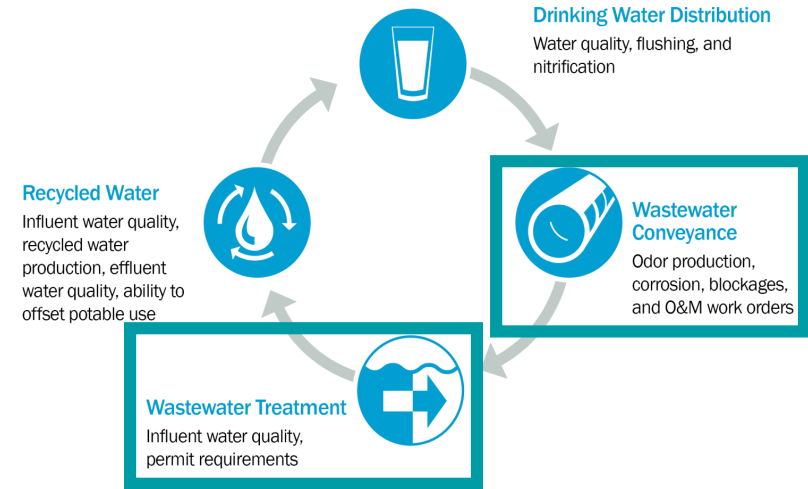
Potential Impact:

Higher cost to maintain level of service





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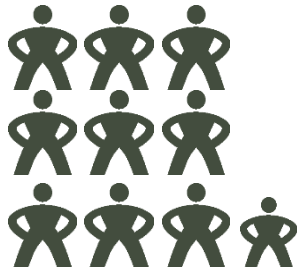
Agency Experience: El Estero Water Resource Center, Santa Barbara

Seppi Henneman, Brown and Caldwell

El Estero Water Resource Center (EEWRC)

~100,000

Population



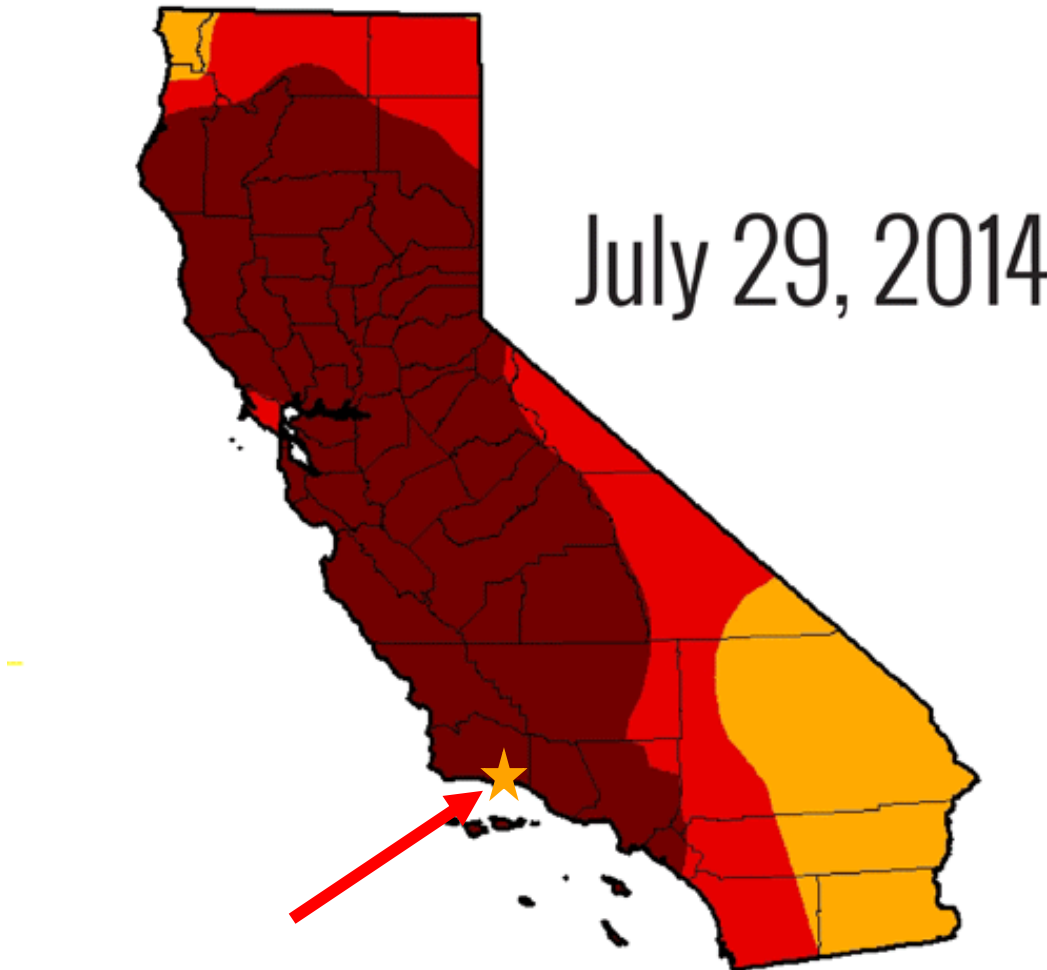
Permitted to discharge
up to 11 mgd ADWF

Recently upgraded to
Step-feed BNR

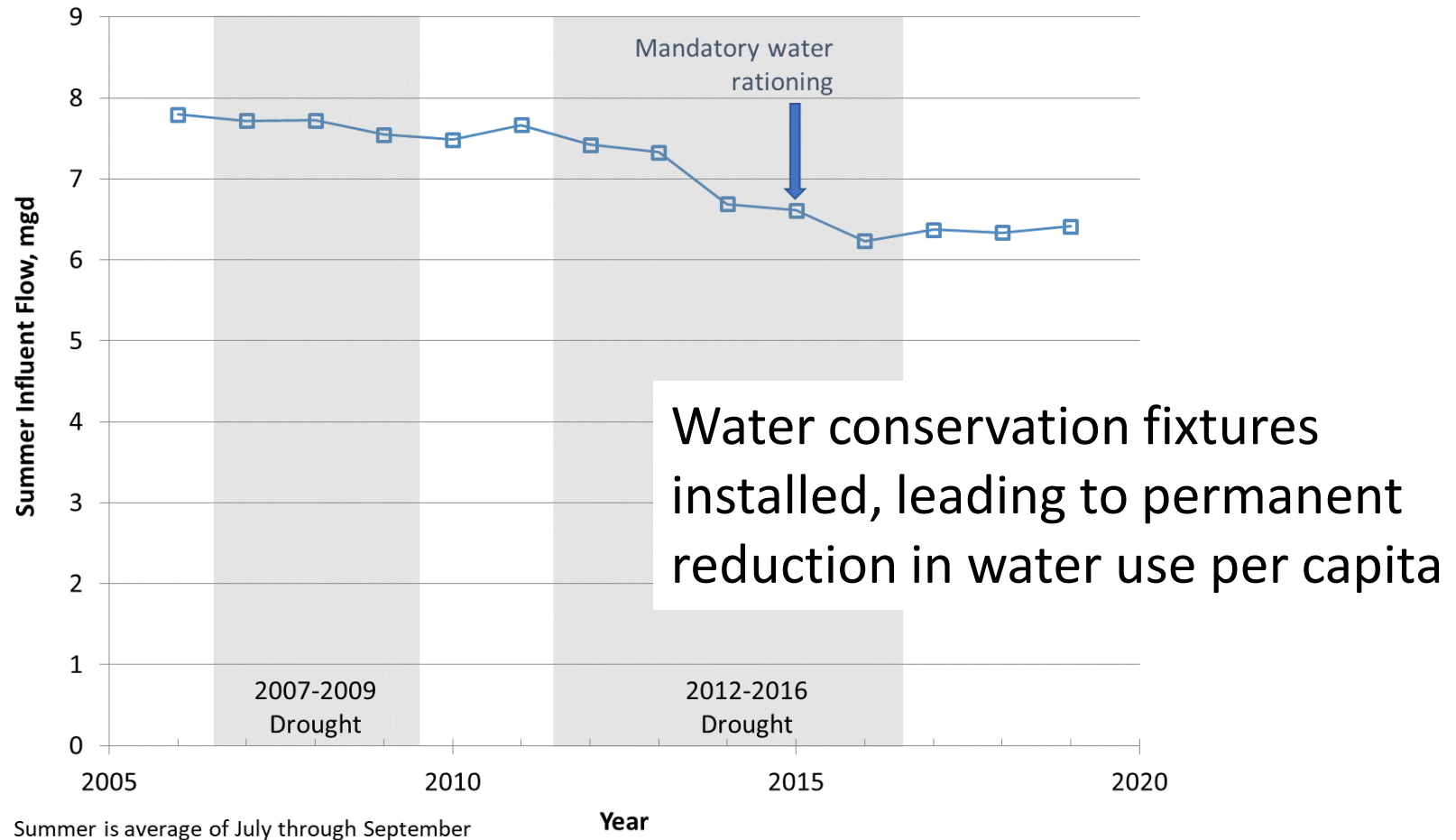
Produces T22
recycled water
for irrigation

Santa Barbara Hit Hard by Drought

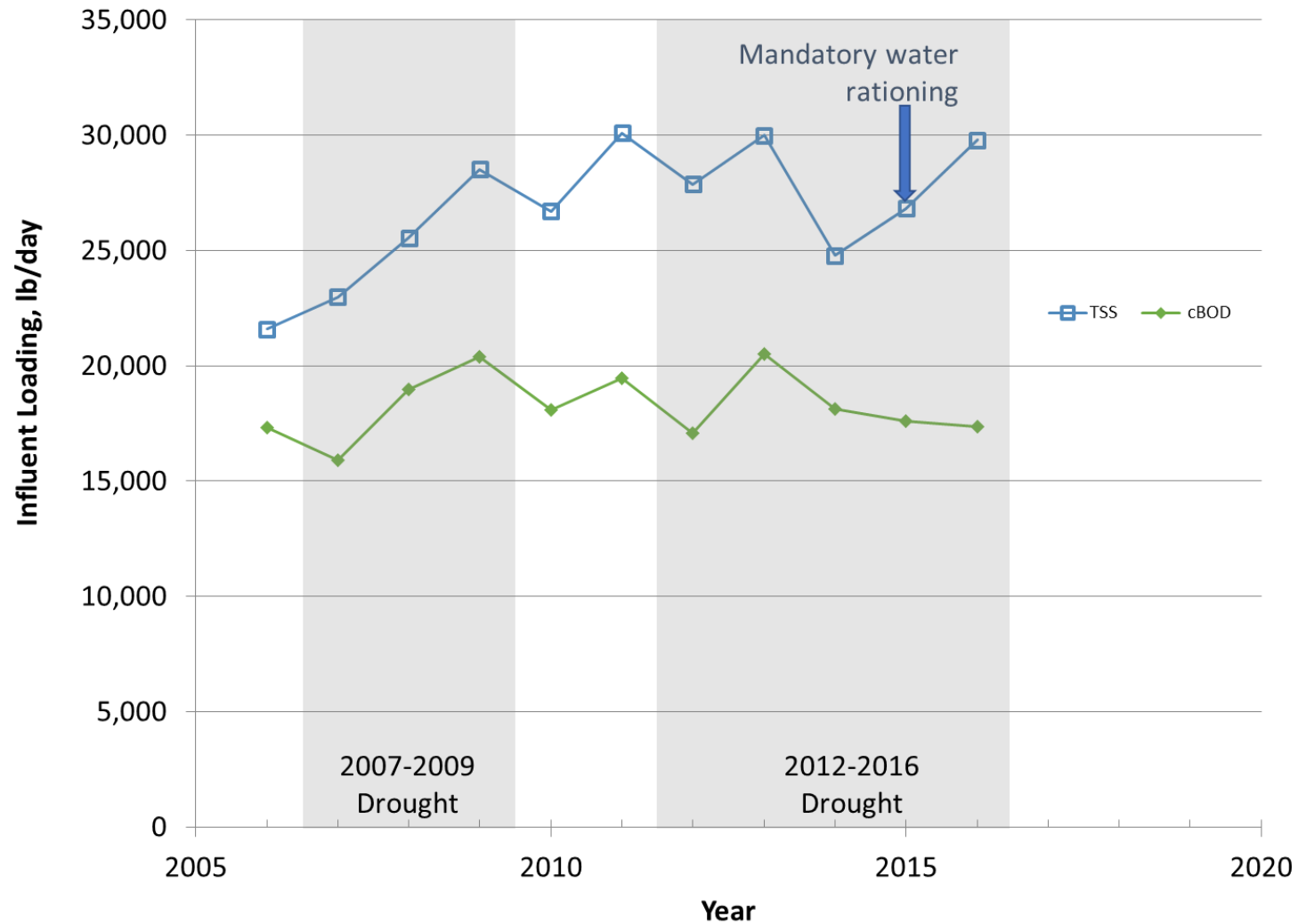
Abnormally Dry Moderate Severe Extreme Exceptional



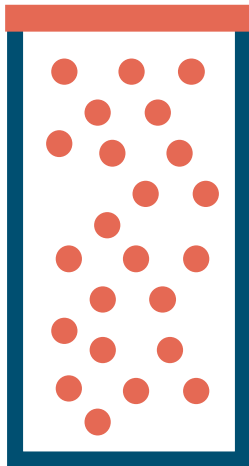
Water Conservation Results in Lower Wastewater Flows



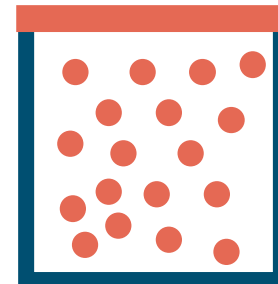
But Influent Loadings Did Not Decrease



Loading Capacity versus Flow Capacity Example



Load = 30,000 lb/d
Flow = 9 mgd
C = 400 mg/L
Effluent Nitrate = 10 mg/L



Load = 30,000 lb/d
Flow = 6 mgd
C = 600 mg/L
Effluent Nitrate = 15 mg/L

Alkalinity Concerns

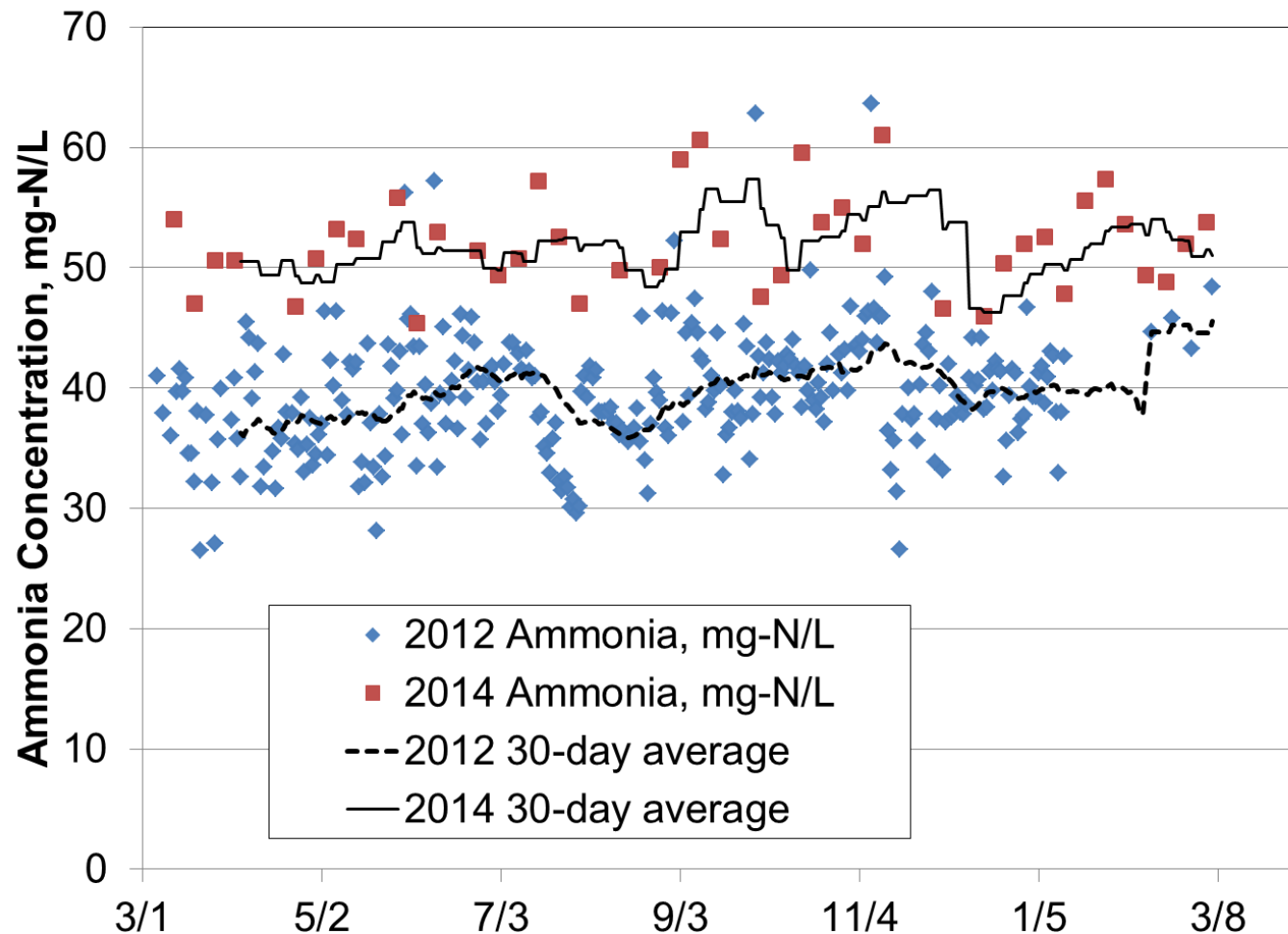
Case Study – El Estero Plant in Santa Barbara

- Activated Sludge
- Converting to nitrification
- Alkalinity required to nitrify

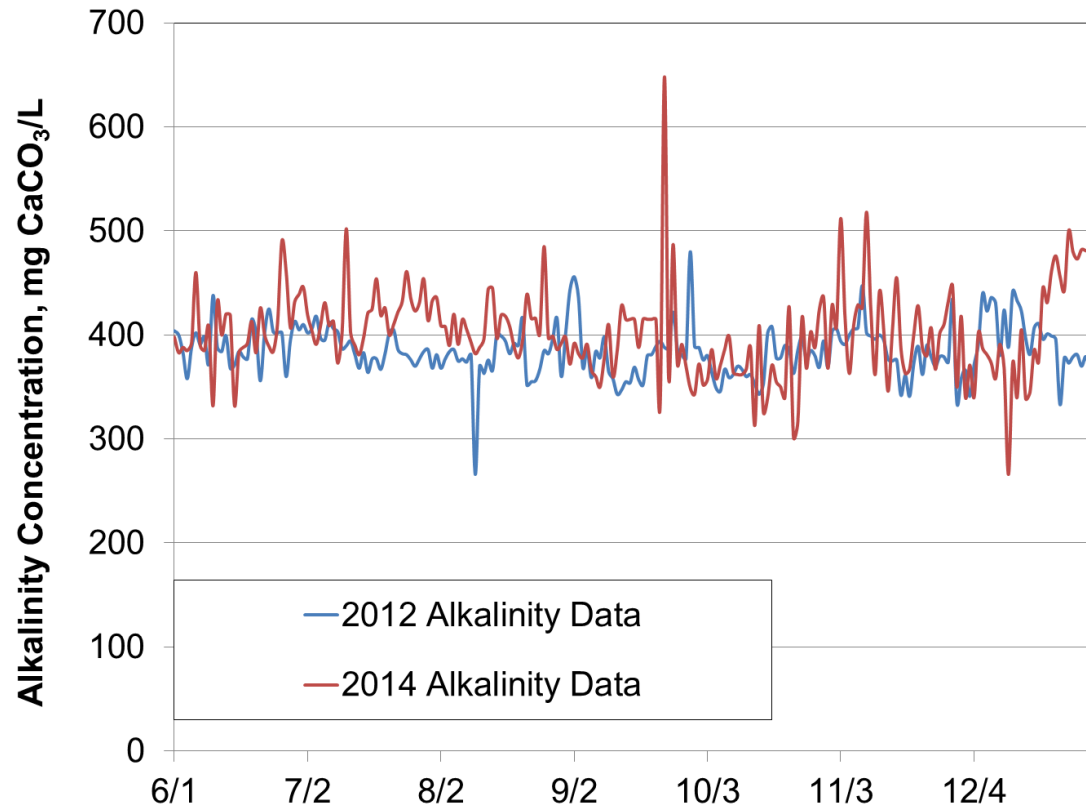


Reference: Sawyer et al, “Planning for Future Droughts – Lessons Learned at Water Resource Recovery Facilities, WEFTEC 2016

El Estero Influent Ammonia Increased 30%

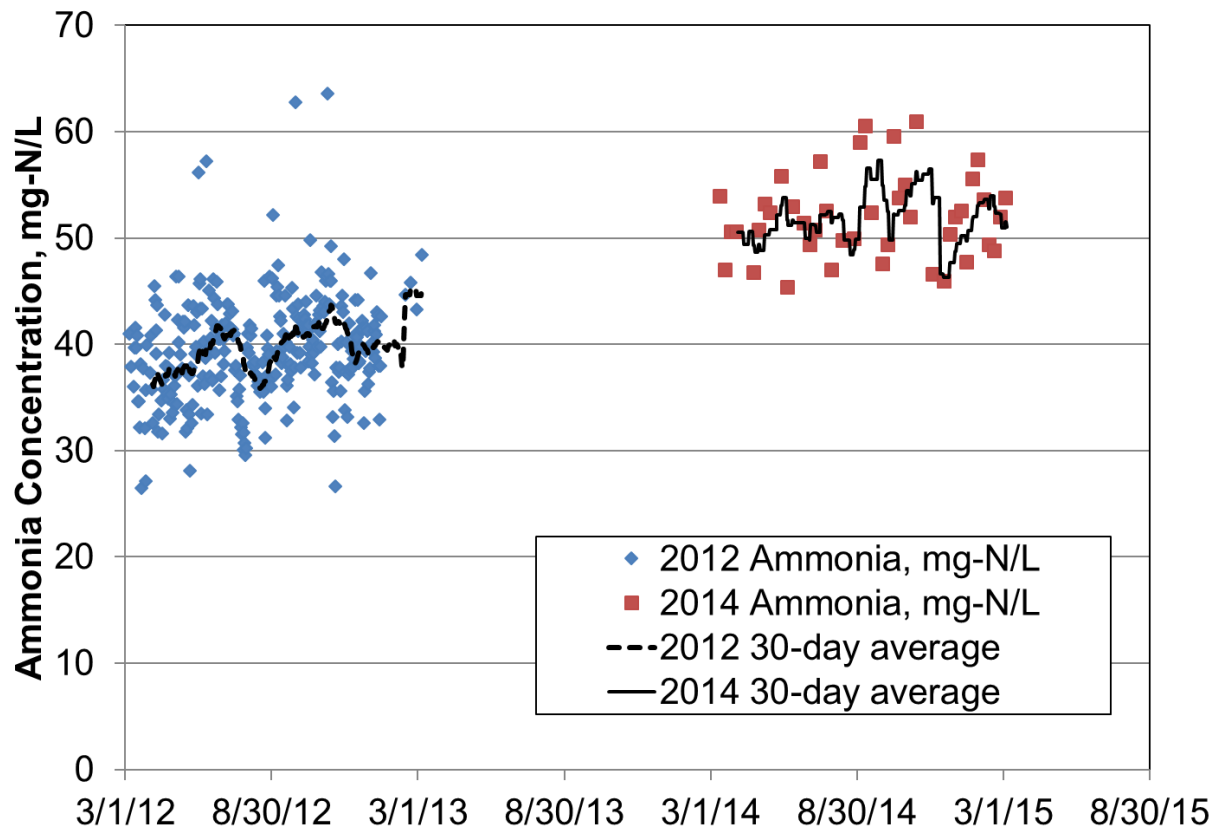


Alkalinity Concentration Only Increased 4%



Alkalinity loading is attributed to source water in addition to contributions from the population.

Increasing Influent Ammonia Concentrations Lead to Operational Adjustments



At the EEWRC in Santa Barbara, increased ammonia revealed alkalinity limitations.

Desalination Online in 2017



Desalination removes salt/minerals from the source water, leaving water low in alkalinity into the distribution system.

Historical wastewater alkalinity concentration was **400 mg/L** as CaCO_3

Desalination removes virtually all alkalinity, added back in at **40 mg/L**, **90% lower**

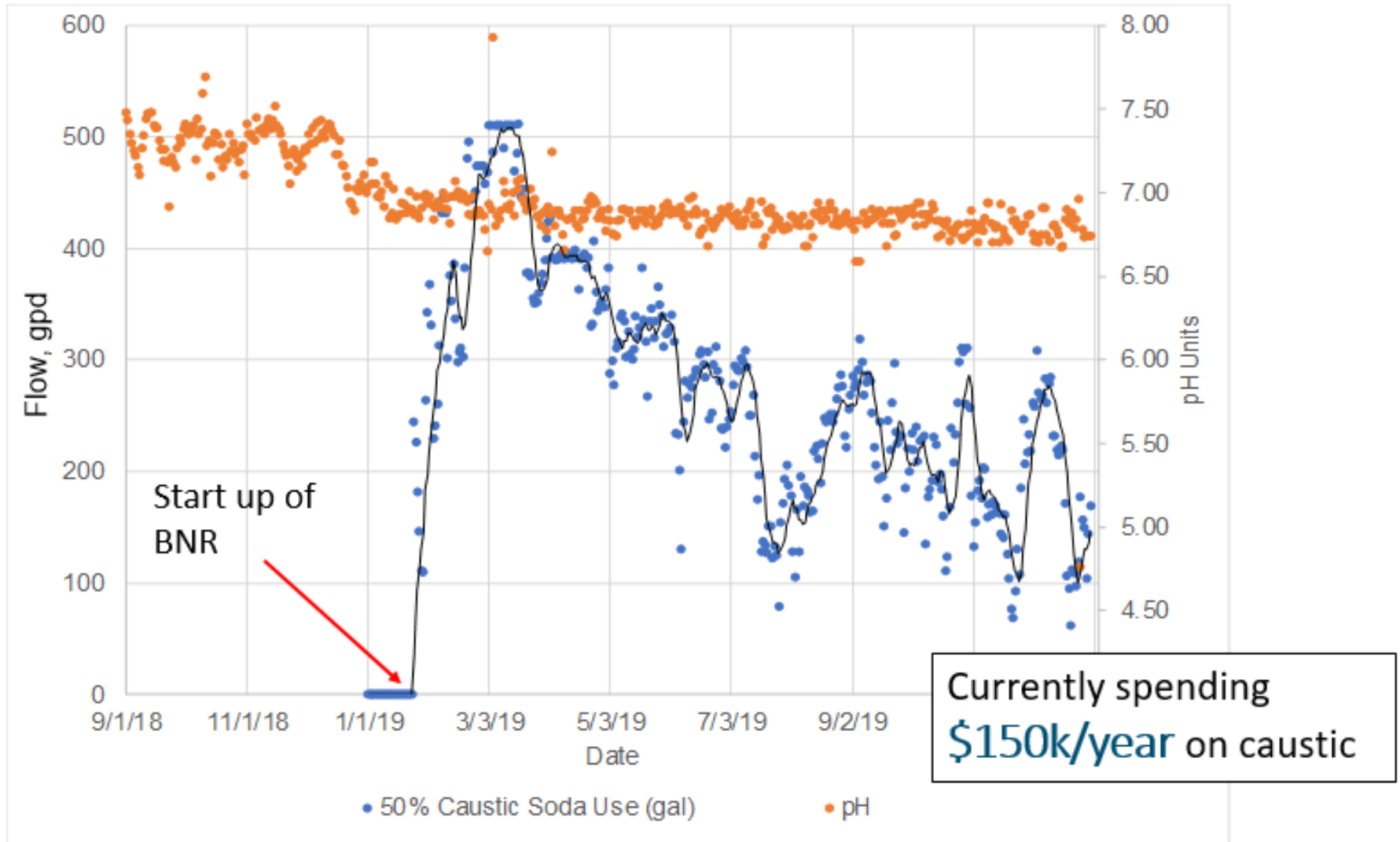
Photo credit: <https://www.jewishla.org/israeli-inventions-desalination-and-drought/>

Design Considerations at the Time

| | 2012 | 2014 | Projected with desalination |
|---|------|--------------|-----------------------------|
| Average alkalinity, mg CaCO ₃ /L | 385 | 402 | 309 |
| Average Ammonia, mg N/L | 39 | 52 | 52 |
| ALK:N Ratio | 10 | 7.7 | 6 |
| Supplemental alkalinity needed? | No | Occasionally | Continuously |

- Before drought, alkalinity was sufficient
- Based on 2014 data, alkalinity supplementation was needed
- Source water changes resulting in needing more supplemental alkalinity

Alkalinity Supplementation Needed



Summary of Drought-Related Impacts

- Decreases in dry weather flow generally result in an increase in pollutant concentrations, but not necessarily alkalinity
- Design “Rated” flow rate may not be accurate
- Decreases in flow also decrease velocity in sewers, resulting in more deposition, odor potential, and corrosion potential
- Collection system maintenance O&M may increase due to tree root intrusion, with dry roots looking for moisture



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Questions?



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Thank You

Comments or questions, please contact:

Maureen Hodgins
303-734-3465
mhodgins@waterrf.org

For more information, visit
www.waterrf.org



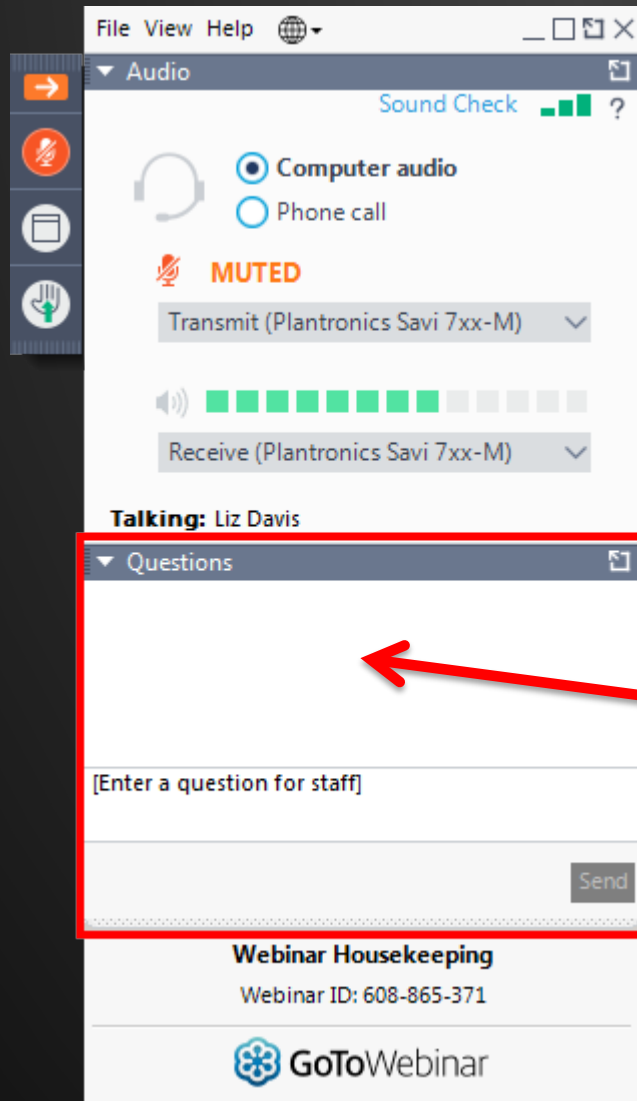


**Water Environment
Federation®**
the water quality people®

Updates on Novel Coronavirus for Water Professionals

Tuesday February 25, 2020
2:30 – 4:00 PM ET

How to Participate Today



- Audio Modes
 - Listen using Mic & Speakers
 - Or, select “Use Telephone” and dial the conference (please remember long distance phone charges apply).
- Submit your questions using the Questions pane.
- A recording will be available for replay shortly after this webcast.

Opening Comments



Walt Marlowe, P.E., CAE
Executive Director



Today's Moderator

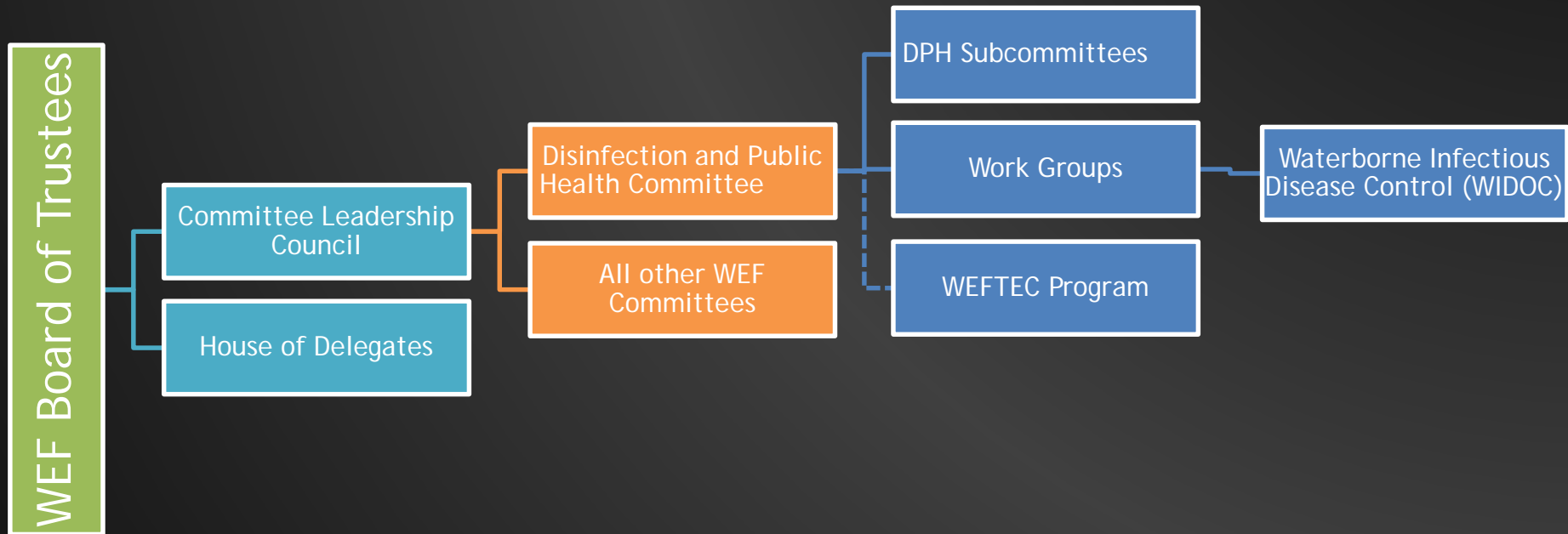


Scott Schaefer, P.E.

*Wastewater Practice Leader,
AE2S*

*Chair, WEF Disinfection &
Public Health Committee*

Disinfection and Public Health Structure



WE&T - January 2020

FEATURE ► Preventive Protocols



LESSONS FROM THE EBOLA OUTBREAK

How the water sector can transition from panic to preparedness

Rasha Maal-Bared, Kyle Bibby, Kari Brisolara, Lee Gary, Robert S. Reimers,
Scott Schaefer, and Jay Swift

Over the last century, humanity has been confronted with various disease outbreaks that have put our resilience as a species to the test. During these outbreaks, public health and health care systems play an undisputed role in providing treatment services, surveillance, and protection against disease-causing microorganisms on the frontlines. Less commonly articulated in the press and the public imagination, however, is the key contribution the water sector provides during these potentially catastrophic events. Collection system and wastewater treatment workers are unsung heroes of public health protection, often putting themselves at risk to protect the public.

On July 17, 2019, the World Health Organization (WHO; Geneva) director-general declared the ongoing Ebola outbreak in the Democratic Republic of the Congo a Public Health Emergency of International Concern under the International Health Regulations. As we prepare for this growing outbreak, we must ask whether the water sector is more prepared this time around.

So, are we — as water professionals — more prepared today to deal with epidemics that may involve waterborne spread of disease than we were a decade ago?

Epidemics Are Reality

In 1918 and 1919, the world saw the onslaught of the Spanish Influenza, which resulted in the deaths of an estimated 50 to 100 million people. The HIV/AIDS epidemic has killed more than 30 million individuals over the last few decades. Cholera continues to plague many developing countries and reared its ugly head in Haiti in 2010. Severe acute respiratory syndrome (SARS) and the 2009 Influenza A (H1N1) epidemics followed. These are just the tip of the iceberg, with Dengue fever, resistant typhoid fever, polio, and other infectious diseases making a comeback every day. While it is becoming increasingly difficult to predict what is next and who will be affected, the only thing we know with certainty is that outbreaks are inevitable.

Outbreaks, epidemics, and pandemics all pose major health, social, and economic risks. In 2017, the World Bank estimated that a moderately severe to severe pandemic could result in millions of deaths and destroy up to 1% of the global GDP (roughly \$US 570 billion, or 0.7% of global income). With the unprecedented mobility of people, products and food, and the fact that disease-causing microorganisms — called pathogens — are increasingly resistant and mobile, this is no longer an issue that impacts only developing countries. No nation is immune to the growing global threat posed by an isolated infectious disease outbreak in a seemingly remote part of the world.

The Example of Ebola

An example of the ripple effects and difficulty in controlling outbreaks is what happened between 2013 and 2016 when West Africa experienced the biggest outbreak of the Ebola virus ever known. By October 2015, WHO reported 28,457 official cases. Almost all were reported in Sierra Leone, Liberia, and Guinea with about 11,312 deaths, which many experts believe is an underestimate. What few people know is that the West Africa Ebola outbreak revealed the chink in the armour of the water sector.

Today's Speakers

- Mark Sobsey
 - Virus ecology, transmission and detection methods
- Matt Arduino
 - Epidemiology, transmission, and severity
- Christopher Brown
 - OSHA recommendations
- Christine Tomlinson
 - Interagency coordination and emergency response
- Rasha Maal-Bared
 - The Water Professional's Guide to COVID-19

2019-nCoV, COVID-19 and Wastewater Management

Mark D. Sobsey, PhD

Research Professor

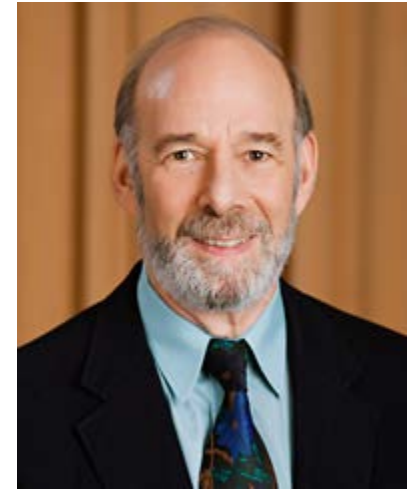
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University of North Carolina

Chapel Hill, NC 27599-7431

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mark_sobsey@unc.edu



- The virus and the disease
- Virus ecology and transmission
- Detection methods
- Survival in feces and wastewater
- Risk to wastewater workers
 - USA
 - Global
- WHO recommendations compared to other recommendations

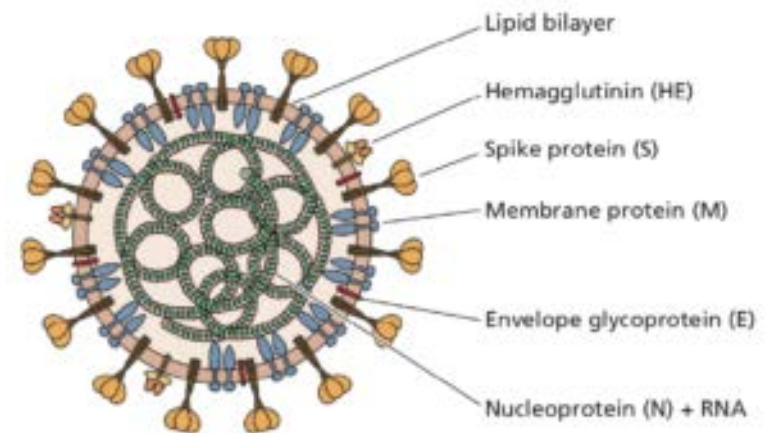
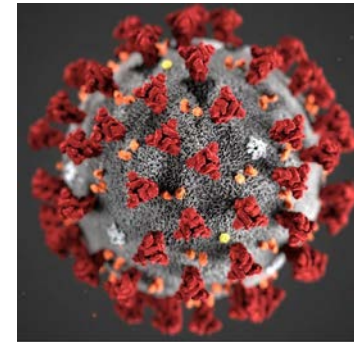
Introduction to Novel 2019 Coronavirus (2019-nCoV) and the Illness it Causes (COVID-19)

Implications for Wastewater Workers
and Measures to Reduce Virus
Presence and Infection Risk

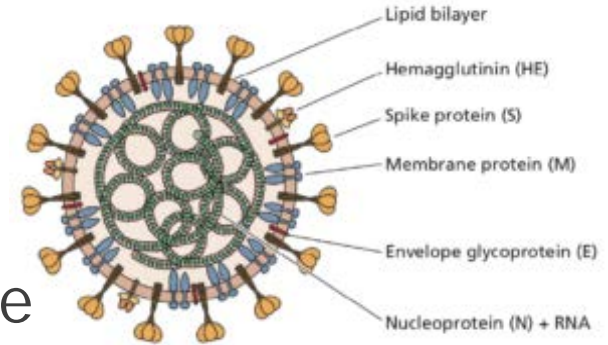
Mark D. Sobsey
University of North Carolina

2019-nCoV, COVID-19 and Wastewater Management

- The virus and the disease
- Virus ecology and transmission
- Detection methods
- Survival in feces and wastewater
- Effects of disinfection and other treatment processes
- Risks to wastewater workers
 - USA
 - Global
- WHO recommendations compared to other recommendations

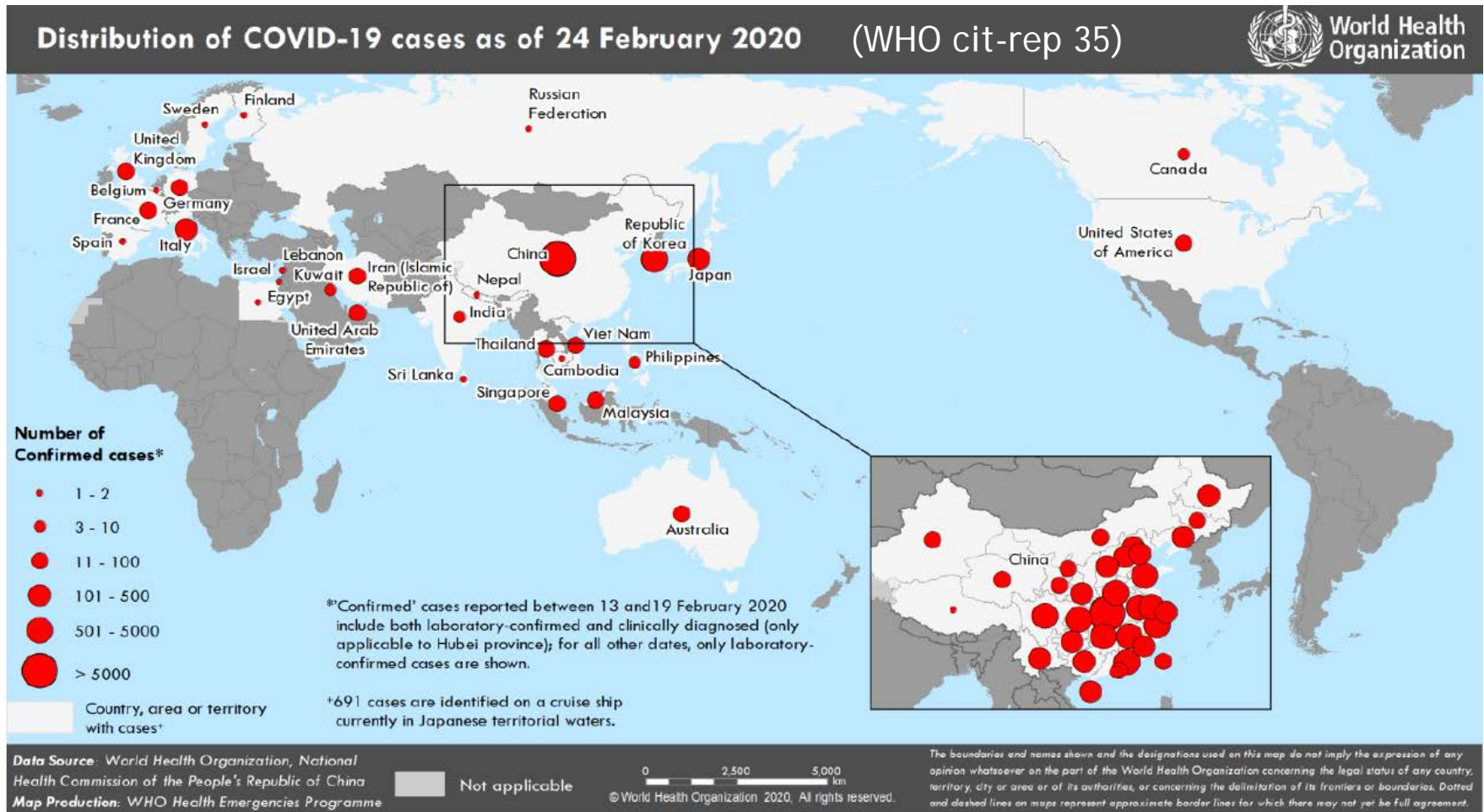


2019-nCoV: a Coronavirus



- A large virus with a lipid outer envelope
- Similar to SARS and MERS coronaviruses
- Zoonotic (goes from animal hosts to people)
 - Bats are main reservoir hosts; arose by mutation
 - Other wild animals caught for food and medicines are hosts that often transmit coronaviruses to people
 - Pangolins (scaly anteaters) ?
- First discovered in December 2019 in a Wuhan city, Hubei Province, China “wet” (live animal) market
- Has now spread within China and to many other countries (~39) by infected people

COVID Cases & Deaths Worldwide

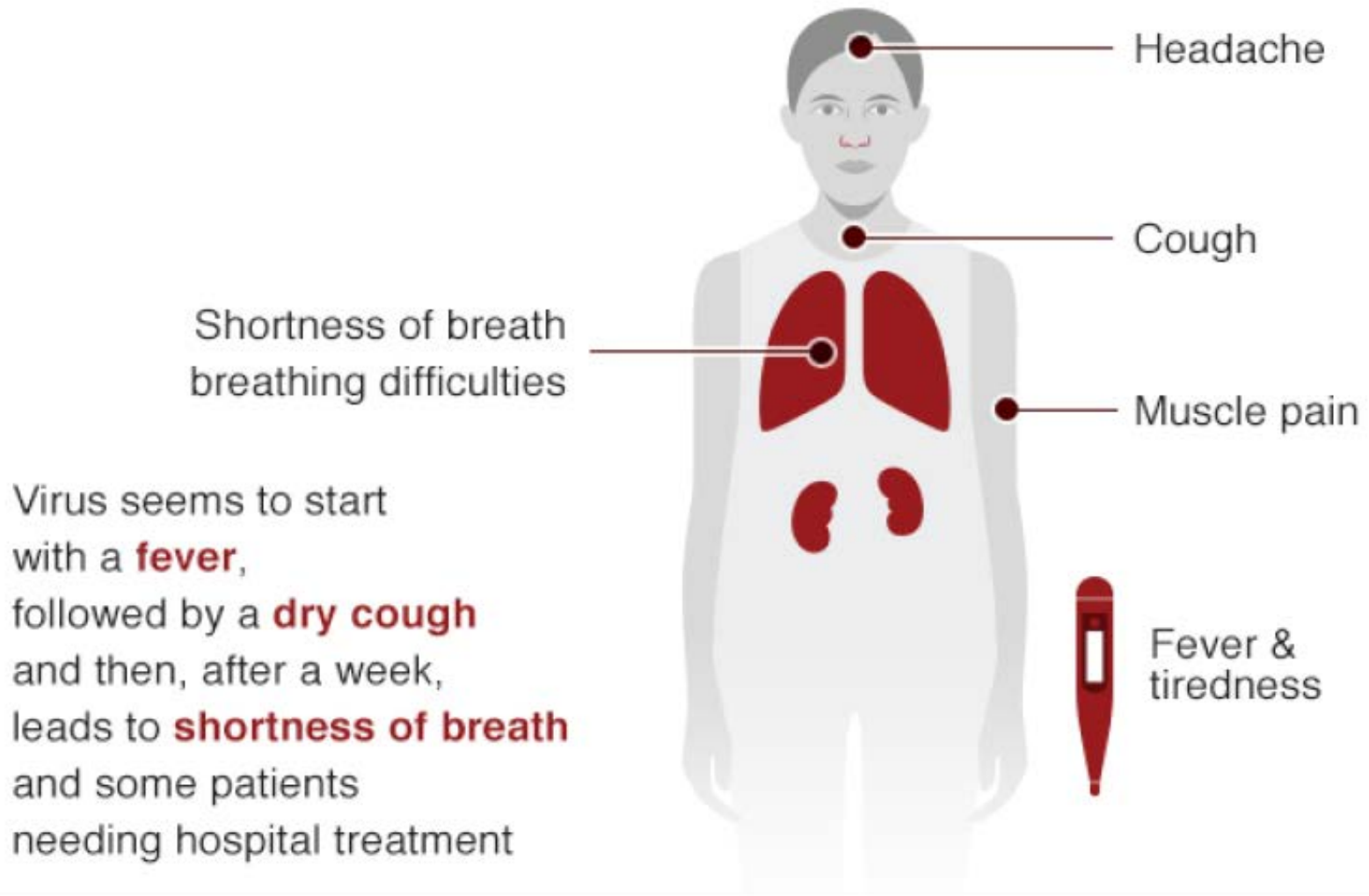


Cases = 80,348; Deaths = 2707; Recovered = 27,899; as of 2/24/2020

Epicenter is China; now spreading rapidly and extensively elsewhere

(Numbers from: https://www.worldometers.info/coronavirus/?utm_source=share&utm_medium=ios_app&utm_name=iossmf)

Symptoms of China coronavirus (COVID-19)



Source: WHO



UNC
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GLOBAL PUBLIC HEALTH



COVID-19 Disease

- Typical respiratory infection: coughing, sneezing, shortness of breath; like other viral respiratory infections
- Illness: most cases (~80%) are mild and people recover
- Some cases (~20%) are severe and require hospitalization
 - Some need mechanical ventilation
- Some develop gastrointestinal illness: diarrhea, vomiting and nausea
- Limited evidence of enteric infection, but plausible
- Virus is in respiratory secretions, blood and sometimes fecal matter; shedding can occur before illness appears
- Incubation period is 2-14 days, typically several days
- Duration of illness: days or longer; mortality: several %
- Duration of virus shedding is days to possibly weeks
- Asymptomatic infection occurs and can cause spread
- Some cases are “superspreaders”; can infect >10 people

COVID-19 Transmission

- Person-to person by direct contact is a major route
- Virus presence in respiratory secretions is also major source of spread to others by:
 - Secreted droplets (airborne, within a few feet)
 - Secretions (e.g., droplets) on inanimate surfaces
 - Indirect contact; touch surfaces; other fomites
- Virus presence in feces is a potential exposure source
 - Extent of fecal transmission is still uncertain
- Airborne spread from sources (bioaerosols) is uncertain
- Possible evidence of a case from exposure to sewage from faulty toilets and leaky sewage pipes 10 floors above in highrise apartment building in Hong Kong; unconfirmed
- Virus concentrations in respiratory secretions and feces are still unknown, as infectious units or gene copies.

2019-nCOV Detection

- 2019-nCOV is a biosafety level 3 pathogen; a high risk agent
- Requires high level containment in specialized labs with trained staff
- Detection is usually by nucleic acid amplification & detection – reverse transcription-polymerase chain reaction (RT-PCR)
 - Detects viral nucleic acid and NOT infectious virus
 - Can detect inactivated viruses & bits of virus nucleic acid
 - Does not prove infectious viruses are present; maybe?
- Detection of infectious 2019-nCOV in a fecal sample by cell culture has been reported in China. See:
 - <http://weekly.chinacdc.cn/en/article/id/ffa97a96-db2a-4715-9dfb-ef662660e89d>
 - Virus concentration in the sample was not reported.
- Therefore, concentrations of infectious 219-nCOV in clinical and environmental samples remains unknown at this time.
 - More efforts needed to determine infectious virus concentrations

2019-nCoV Presence and Survival in the Environment: Knowns and Unknowns

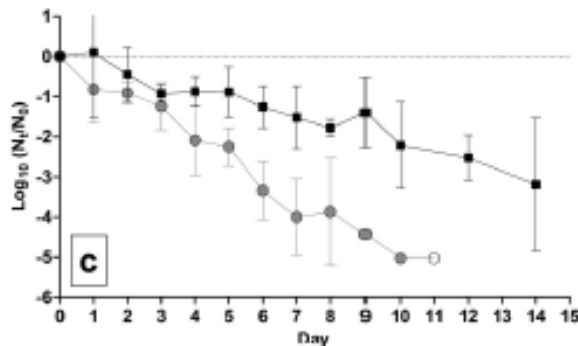
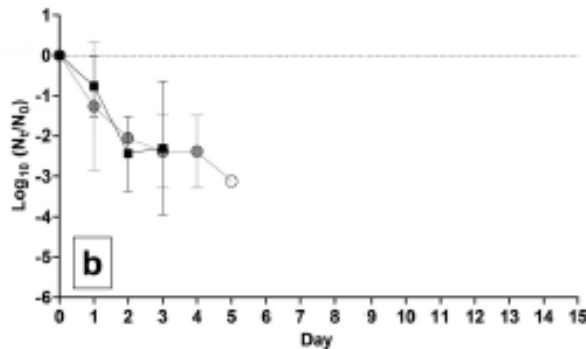
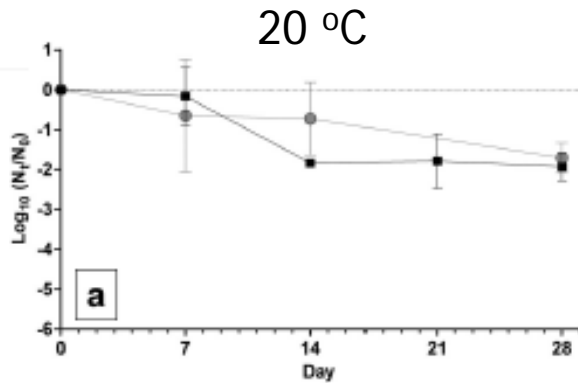
Presence:

- 2019-nCoV concentrations in feces, sewage or water are unknown
- Concentrations of other CoVs, such as SARS and “common cold” CoVs in some samples are known
 - Whether predictive of 2019-nCoV concentrations is unknown

Survival:

- 2019-nCoV survival in feces, sewage, water and other media is unknown
- Survival of other CoVs, such as SARS, “common cold” and animal CoVs is known for some media (sewage, water, surfaces and some foods).
 - Assumption: Survival of other CoVs may be predictive of 2019-nCoV survival. Animal CoVs and common cold CoVs
 - For now, such CoV survival data is considered informative

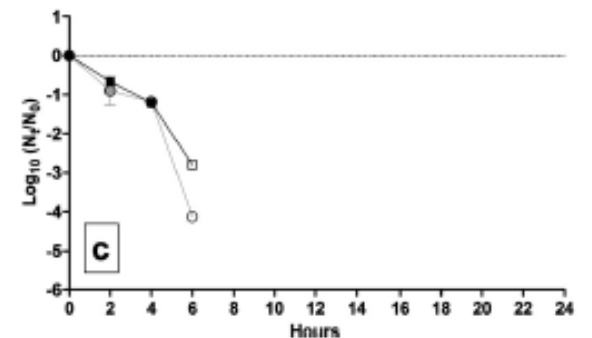
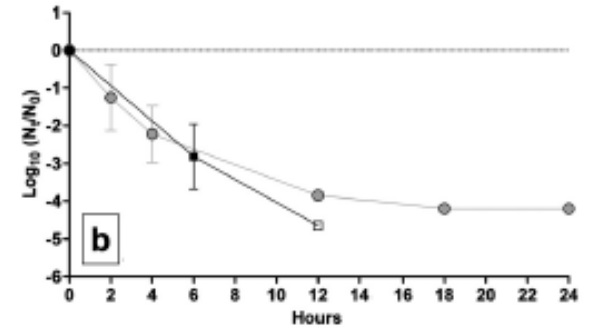
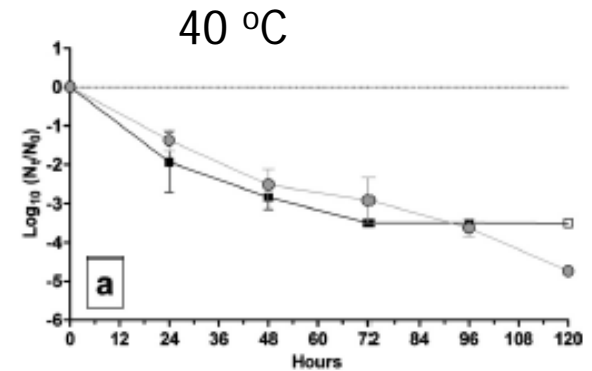
CoV Survival on Surfaces: Temp. and RH



Survival of TGEV (●)
and MHV (■) at:
20% RH (a)
50% RH (b)
80% RH (c)
20 °C (left)
40 °C (right)

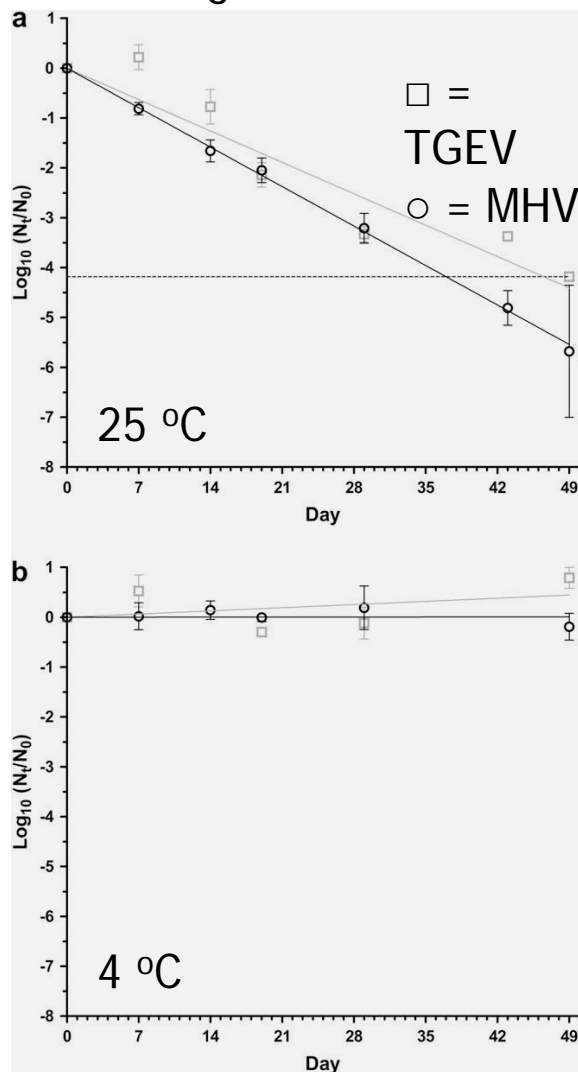
Both CoVs survive
greater at lower
temperature and
lower RH

Casanova LM, Jeon S, Rutala WA,
Weber DJ, Sobsey MD. (2010)
Effects of air temperature and
relative humidity on coronavirus
survival on surfaces. Appl Environ
Microbiol. 2010 May;76(9):2712-7.



CoV Survival in Water

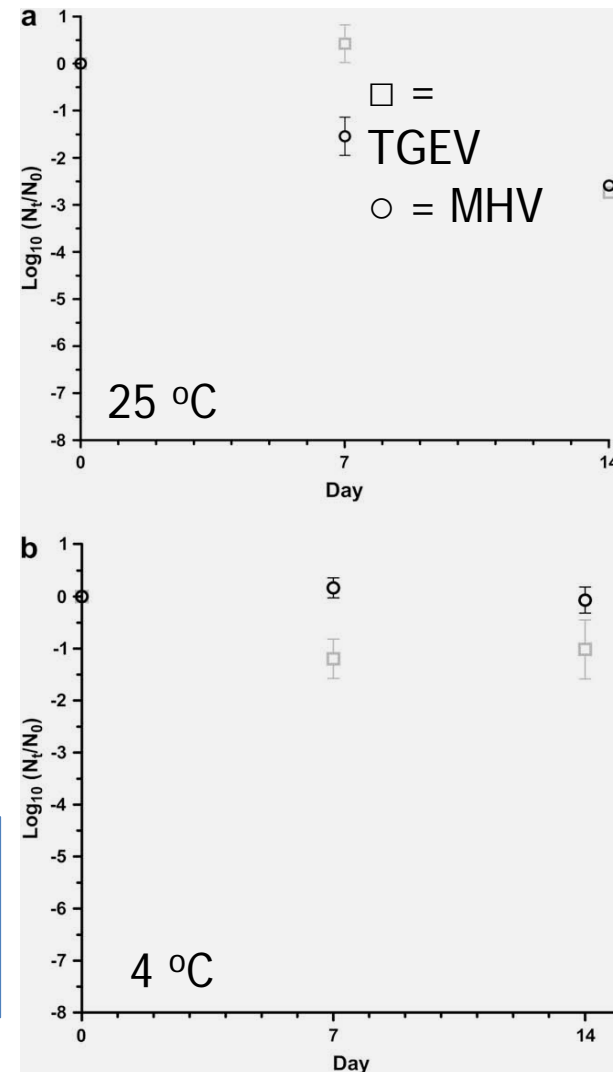
Reagent Water



- CoVs survived for long time periods in reagent or lake water.
- Especially at lower temperature

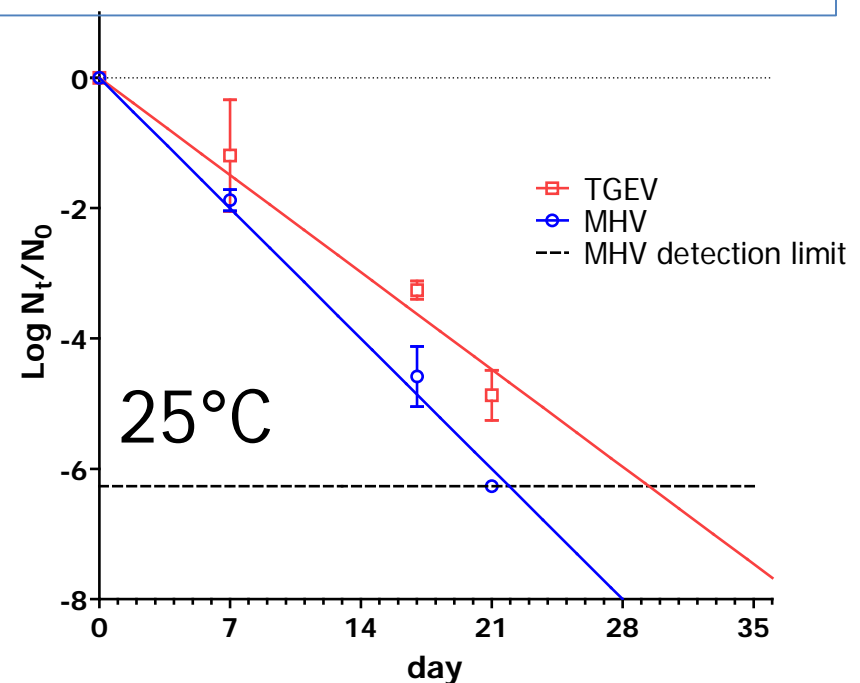
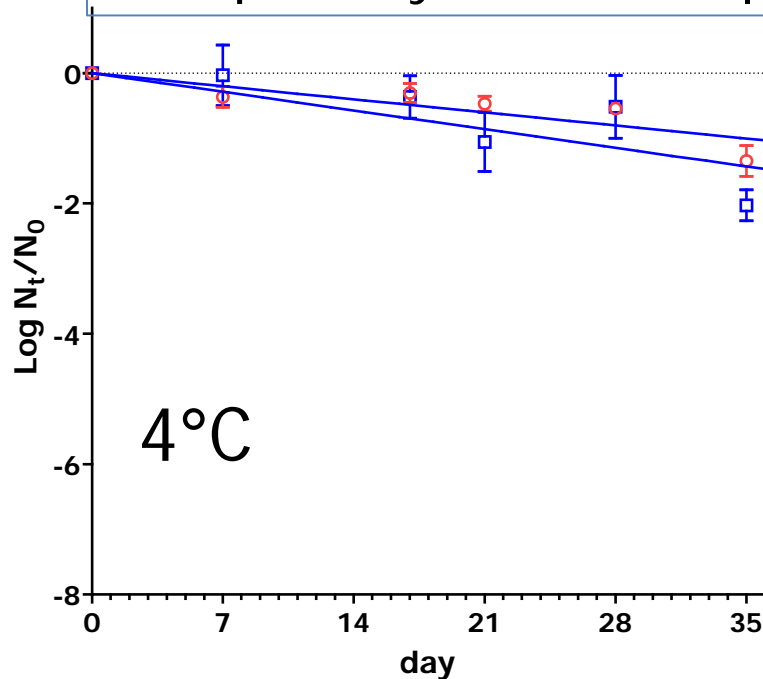
Casanova L, Rutala WA, Weber DJ, Sobsey, MD. 2009. Survival of surrogate coronaviruses in water. Water Res. 43(7): 893-8.

Lake Water



Survival of Coronaviruses (TGEV and MHV) in Settled Sewage

- CoVs survived quite long time periods in settled sewage
- Especially at low temperature



Casanova L, Rutala WA, Weber DJ, Sobsey, MD. 2009. Survival of surrogate coronaviruses in water. Water Res. 43(7): 893-8.

Expectations for 2019-nCoV Virus Survival in Environmental Media

- 2019-nCoV may be expected to survive for extended periods of time in environmental media
- Inactivation is not immediate or very rapid
- Extensive declines of virus infectivity are expected over several days or weeks in aqueous media (sewage & water), depending on temperature, matrix/medium and other environmental conditions
- On environmental surfaces, extensive declines of virus infectivity are expected in hours, days or weeks, depending on the matrix/medium, surface and environmental conditions

Disinfection of 2019-nCov and Other CoVs on Surfaces

- Data on disinfection of 2019-nCOV is not available yet
- Disinfection data on other CoVs indicates susceptibility to a range of chemical disinfectants and UV radiation (UVC)
- Surface disinfection can be achieved with a range of chemical agents:
 - Free chlorine, ethanol (70%), quaternary ammonium compounds, glutaraldehydes, peracetic and peroxyacetic acids, chlorine dioxide and phenolic compounds
 - Available as EPA-certified formulations
 - Use at recommended concentrations or dilutions

Disinfection of 2019-nCoV and Other CoVs in Fecal Wastes, Sewage and Water

- Disinfection data for 2019-nCoV is not available yet
- Disinfection data on other CoVs indicates susceptibility to a range of chemical disinfectants and UV radiation (UVC). More sensitive than enteric viruses.
- Disinfection can be achieved with a range of chemicals: Lime, quaternary ammonium compounds, peracetic and peroxyacetic acids and chlorine dioxide
 - Use at recommended concentrations or dilutions
 - Free chlorine is less effective in wastes with high organic load (e.g., fecal matter and strong sewage)
 - Must achieve breakpoint chlorination; impractical
- Conventional wastewater treatment systems are likely to reduce 2019-nCoV at least as well as other human viruses

WEF and OSHA Recommendations for Wastewater Management

- Current WEF guidance on 2019-nCoV is adequate to minimize risks
- All elements of WEF and OSHA guidance should be practiced. See:
https://www.osha.gov/SLTC/covid_19/controlprevention.html#solidwaste
<https://www.wef.org/news-hub/wef-news/the-water-professionals-guide-to-the-2019-novel-coronavirus/>
- Handle solid waste with 2019-nCoV as Category B Medical Waste
- Workers in contact with fecal wastes should wear recommended PPE
 - Follow recommendations for good hygiene (e.g., handwashing)
- Wastewater disinfection using free chlorine, peracetic acid or UV radiation is effective if using sufficient doses and contact times
- Free chlorine dosed to achieve a free residual of 0.2 to 0.5 mg/L readily inactivates SARS CoV, other viruses and probably 2019-nCoV

WHO Recommendations on 2019-nCoV in Wastes and Waste Management

- Recommendations for management of 2019-nCoV in fecal wastes, wastewaters and waters are being developed and will be available soon; similar to those for Ebola virus. See:
 - https://www.who.int/water_sanitation_health/WASH_and_Ebola.pdf
- Separate housing and sanitation facilities for cases
- Waste containment and storage for die-off over time; then safe disposal. Worker IPC; Sanitation Safety Plan
- Wastes can be transferred safely to effectively managed sanitation systems (on-site systems or central treatment systems with disinfection. Safe conveyance & worker IPC
- On-site waste disinfection for small systems is an option
 - Recommended disinfectant is lime
 - Alternatives: peracetic acid, quaternary ammonium compounds or chlorine dioxide

Research Needs for 2019-nCoV Survival and Disinfection in Environmental Media

- Develop data for survival of infectious 2019-nCoV and candidate surrogate viruses in human wastes and environmental media
- Compare survival of 2019-nCoV and surrogates as a basis to then extrapolate or estimate 2019-nCoV survival based the survival of surrogates in a range of matrices for a range of environmental conditions, including waste treatment and disinfection processes.
- Candidate disinfectants to test include, free chlorine, peracetic acids/peroxyacetic acids, quaternary ammonium compounds, chlorine dioxide, lime, gluteraldehydes and other as available

Closing words:

- Be sensible and take precautions
- Follow available guidance and recommendations
- Don't panic!



- Thank-you!
- Questions or comments?

<http://aseanews.net/2020/02/12/editorial-the-straits-times-says-panic-and-fear-more-deadly-than-virus/>

Our Next Speaker



Matthew Arduino, DrPH

Senior Adviser, Environmental
Hygiene and Infection Prevention



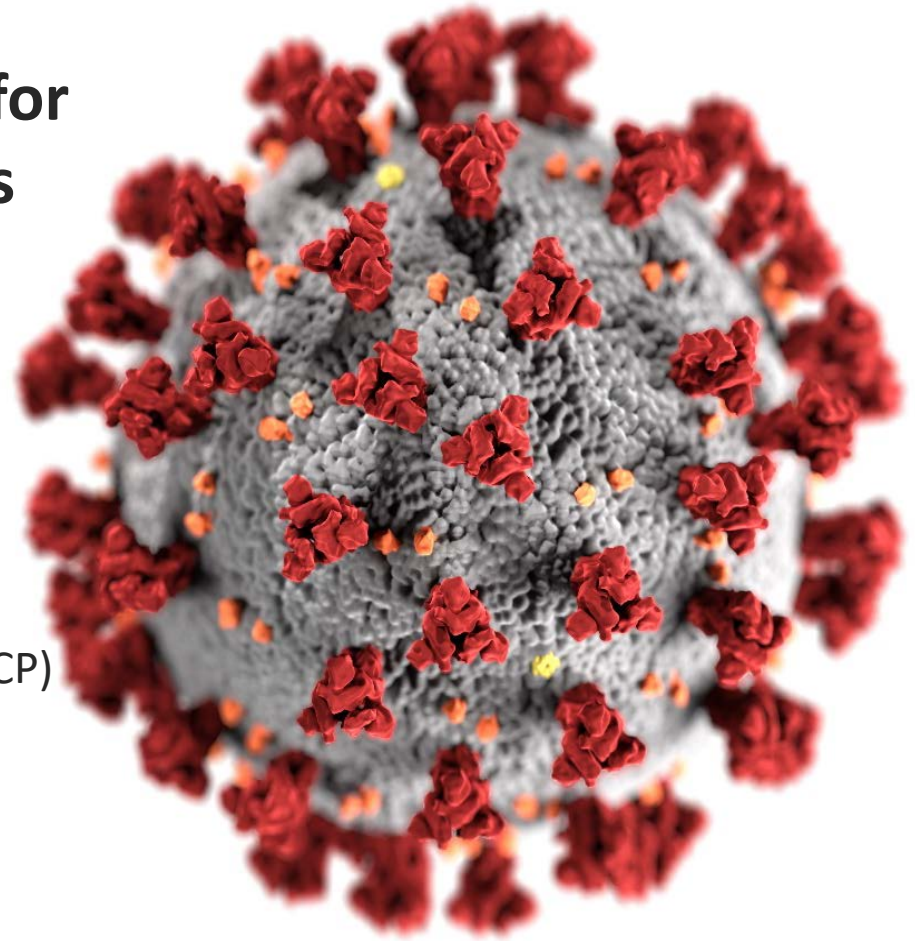


CDC 2019 Novel Coronavirus Response

Novel Coronavirus for Water Professionals

Matthew J Arduino, MS, DrPH, FSHEA, M(ASCP)

February 25, 2020



For more information: www.cdc.gov/COVID19

Coronavirus Disease 2019 (COVID-19)



Name Update: 2019-nCoV → COVID-19

- On February 11, 2020:
 - The International Committee on Taxonomy of Viruses, charged with naming new viruses, named the novel coronavirus for this outbreak to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)
 - The virus is related to SARS-CoV, however it is not the same virus.
 - The World Health Organization [announced](#) an official name for the illness caused by SARS-COV2. The new name is coronavirus disease 2019 (COVID-19)
- CDC will be updating our website and other CDC materials to reflect the updated name



COVID-19: Emergence



- Identified in Wuhan, China in December 2019
- Caused by the virus SARS-CoV-2
- Early on, many patients were reported to have a link to a large seafood and live animal market
- Later patients did not have exposure to animal markets
 - Indicates person-to-person spread
- Travel-related exportation of cases reported
 - First US case: January 21, 2020
- CDC is reporting confirmed COVID-19 cases in the US online at www.cdc.gov/coronavirus/2019-ncov/cases-in-us.html



COVID-19: Situation Overview

- As of February 21, 2020:
 - 30 international locations (in addition to the U.S.) have reported confirmed cases of SARS-CoV-2 infection
 - 15 infections reported in the U.S. in seven states
 - Most recent U.S. cases are people who recently returned from China on U.S. State Department chartered flights
 - Two instances of person-to-person spread in the U.S. have been detected
 - Both cases occurred after close, prolonged contact with a returned traveler from Wuhan
 - First death of American citizen in China announced

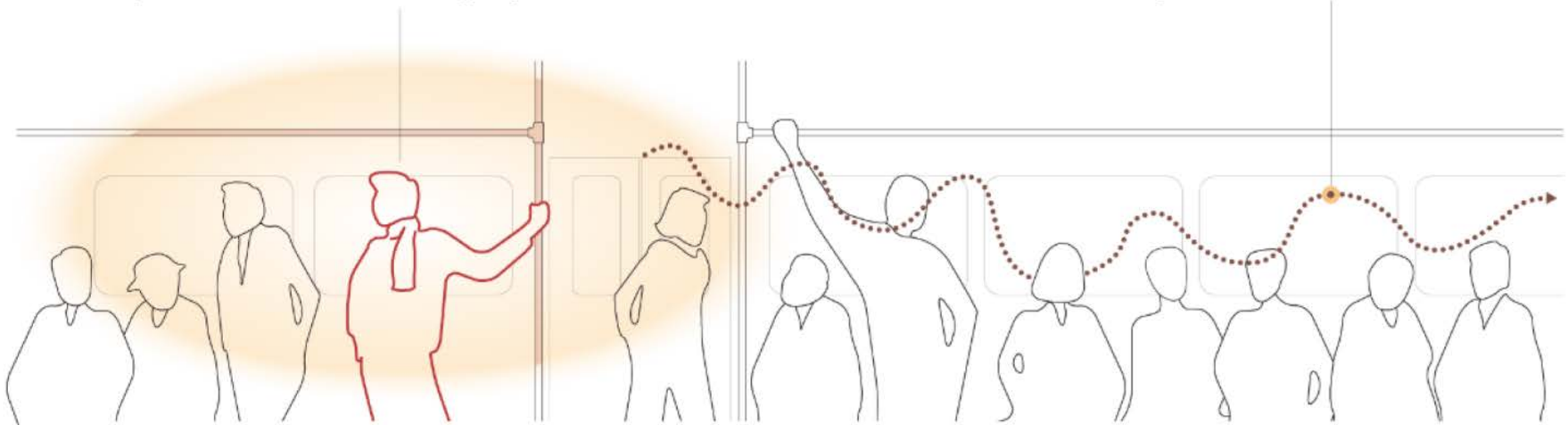


Virus Characteristics

How far viruses travel

Coronaviruses like the **Wuhan virus** can travel only about six feet from the infected person. It's unknown how long they live on surfaces.

Some other viruses, like **measles**, can travel up to 100 feet and stay alive on surfaces for hours.



New York Times, January 31, 2020

Clinical Overview



COVID-19: How It Spreads

- Investigations are ongoing to better understand spread
- Largely based on what is known from other coronaviruses
 - Presumed to occur primarily through close person-to-person contact (about 6 feet)
 - May occur when respiratory droplets are produced when an infected person coughs or sneezes
 - Possibly by touching a surface or object that has the virus on it and then touching the mouth, nose, or eyes
 - People are thought to be most contagious when they are symptomatic.



COVID-19: Clinical Presentation

- Limited case reports and case series describe the clinical presentation of patients with
- Incubation period estimated ~2-14 days
- Sign & Symptoms
 - Fever (83–98%)
 - Cough (46–82%)
 - Myalgia or fatigue (11–44%)
 - Shortness of breath (31%)
 - Nausea, vomiting and diarrhea (10% reported in one case report)



Infection Prevention and Control



COVID-19: Infection Prevention and Control

- The U.S. healthcare system responds to infectious disease threats every day.*
- CDC's recommended actions and strategies to stop the spread of COVID-19 are **not new**. They work and most are not reliant on PPE.
 - Established infection control strategies.
- CDC's goal—provide sound infection prevention control recommendations that protect healthcare workers AND are feasible and acceptable to implement.



*For a summary of routine outpatient infection control guidance see:
<https://www.cdc.gov/hai/settings/outpatient/outpatient-care-guidelines.html>

COVID-19: Infection Prevention and Control

- Healthcare personnel caring for patients with confirmed or possible 2019-nCoV should adhere to CDC recommendations for [infection prevention and control](#) (IPC)
 - Assess and triage patients with acute respiratory symptoms and risk factors to minimize chances of exposure
 - Place a facemask on the patient
 - Isolate them in an Airborne Infection Isolation Room (AIIR), if available
 - Use [Standard Precautions](#), [Contact Precautions](#), and [Airborne Precautions](#) and eye protection when caring for patients with confirmed or possible COVID-19
 - Perform hand hygiene



COVID-19: Infection Prevention and Control

Airborne Infection Isolation Rooms (AIIR)

- Evaluation of PUIs and confirmed COVID-19 should occur in either
 - AIIR
 - or
 - Examination room with the door closed
 - Room should ideally not have exhaust that is recirculated within the building without HEPA filtration.
- PUIs or patients with confirmed disease who require hospitalization should preferably be cared for in an AIIR.
 - If AIIR is not immediately available, consideration transferring patient to a facility with AIIR availability.



COVID-19: Infection Prevention and Control

■ Environmental Cleaning and Disinfection

- Routine cleaning and disinfection procedures are appropriate for COVID-19 in healthcare settings, including those patient-care areas in which aerosol-generating procedures are performed.
- Products with [EPA-approved](#) emerging viral pathogens claims are recommended for use against SARS-CoV-2 (the virus that causes COVID-19).



COVID-19: Infection Prevention and Control

- Coronaviruses are susceptible to the same disinfection conditions in community and healthcare settings as other viruses
- Waste generated in the care of PUIs or patients with confirmed COVID-19
 - Same considerations for waste and wastewater disinfection
 - Current disinfection conditions in wastewater treatment facilities are expected to be sufficient.
 - Including conditions for practices such as:
 - oxidation with hypochlorite (i.e., chlorine bleach)
 - peracetic acid
 - inactivation using UV irradiation.

COVID-19: Infection Prevention and Control

- Medical waste (trash) coming from healthcare facilities treating COVID-2019 patients is no different than waste coming from facilities without COVID-19 patients.
- CDC's guidance states that management of laundry, food service utensils, and medical waste should be performed in accordance with routine procedures.
- There is no evidence to suggest that facility waste needs any additional disinfection.



COVID-19: Infection Prevention and Control

- Wastewater and sewage workers should:
 - Use standard practices
 - Basic hygiene precautions
 - Wear PPE as prescribed for current work tasks
- There is no evidence to suggest that employees of wastewater plants need any additional protections in relation to COVID-19.

COVID-19: Infection Prevention and Control

- There are steps HCP can take to prepare for arrival, elevation and transportation of patients.

- Healthcare Personnel Preparedness Checklist for COVID-19

- <https://www.cdc.gov/coronavirus/2019-ncov/hcp/hcp-personnel-checklist.html>

Healthcare Personnel Preparedness Checklist for 2019-nCoV

Front-line healthcare personnel in the United States should be prepared to evaluate patients for 2019 novel coronavirus (2019-nCoV). The following checklist highlights key steps for healthcare personnel in preparation for transport and arrival of patients potentially infected with 2019-nCoV.

- ☐ Stay up to date on the latest information about signs and symptoms, diagnostic testing, and case definitions for 2019-nCoV disease (<https://www.cdc.gov/coronavirus/2019-nCoV/summary.html>).
- ☐ Review your infection prevention and control policies and CDC infection control recommendations for 2019-nCoV(<https://www.cdc.gov/coronavirus/2019-nCoV/infection-control.html>) for:
 - ☐ Assessment and triage of patients with acute respiratory symptoms
 - ☐ Patient placement
 - ☐ Implementation of Standard, Contact, and Airborne Precautions, including the use of eye protection
 - ☐ Visitor management and exclusion
 - ☐ Source control measures for patients (e.g., put facemask on suspect patients)
 - ☐ Requirements for performing aerosol generating procedures
- ☐ Be alert for patients who meet the persons under investigation (PUI)(<https://www.cdc.gov/coronavirus/2019-nCoV/infection-control.html>) definition
- ☐ Know how to report a potential 2019-nCoV case or exposure to facility infection control leads and public health officials
- ☐ Know who, when, and how to seek evaluation by occupational health following an unprotected exposure (i.e., not wearing recommended PPE) to a suspected or confirmed nCoV patient
- ☐ Remain at home, and notify occupational health services, if you are ill
- ☐ Know how to contact and receive information from your state or local public health agency



COVID-19: Infection Prevention and Control

- CDC's current guidelines are designed to prevent the spread of COVID-19 within healthcare facilities to HCP and other patients who may be exposed
- CDC's Interim Infection Prevention and Control Guidance for HCP caring for patients with confirmed or possible COVID-19 is available at <https://www.cdc.gov/coronavirus/2019-nCoV/hcp/infection-control.html>

Interim Infection Prevention and Control
Recommendations for Patients with Confirmed 2019
Novel Coronavirus (2019-nCoV) or Persons Under
Investigation for 2019-nCoV in Healthcare Settings

Updated February 12, 2020



Tools and Resources



COVID-19: Tools and Resources

- **Current Interim Guidance**

- [Evaluating and Reporting Persons Under Investigation \(PUI\)](#)
- [Healthcare Infection Control Guidance](#)
- [Clinical Care Guidance](#)
- [Home Care Guidance](#)
- [Guidance for EMS](#)
- [Healthcare Personnel with Potential Exposure Guidance](#)

- **Persons Under Investigation (PUIs)**

- [Evaluating and Reporting PUI Guidance](#)
- [Flowchart to Identify and Assess COVID-19](#)
- [Reporting a PUI for COVID-19](#)

- **Clinical Care**

- [Clinical Care Guidance](#)
- [Disposition of Hospitalized Patients with COVID-2019](#)



COVID-19: Tools and Resources (cont'd.)

- **Infection Control**

- [Infection Control](#)
- [Frequently Asked Questions: Healthcare Infection Prevention and Control](#)

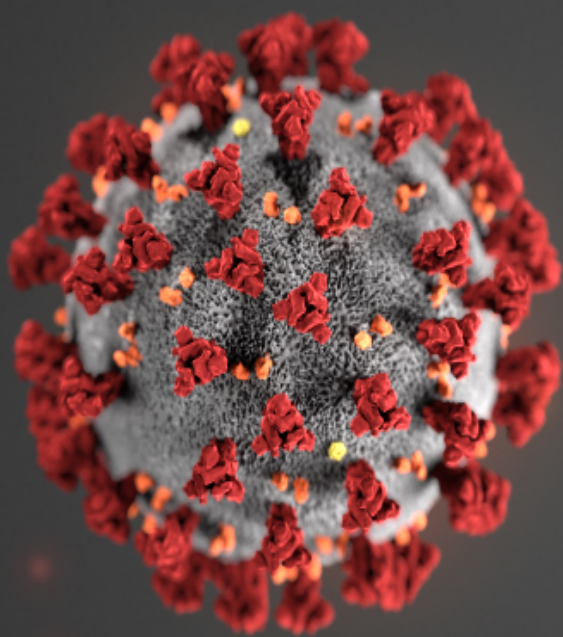
- **Supply of Personal Protective Equipment (PPE)**

- [Healthcare Supply of Personal Protective Equipment](#)
- [Strategies for Optimizing Supply of N95 Respirators](#)
- [FAQ about Respirators](#)

- **Home Care**

- [Implementing Home Care of People Not Requiring Hospitalization](#)
- [Preventing COVID-19 from Spreading in Homes and Communities](#)
- [Disposition of Non-Hospitalized Patients with COVID-19](#)





For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



Our Next Speaker



Christopher K. Brown, PhD

Acting Director, Office of Science
and Technology Assessment



WEF

Updates on Novel Coronavirus for Water Professionals

Webcast | February 25, 2020

Protecting Workers from the COVID-19 Novel Coronavirus

Christopher K. Brown, PhD, MPH, CPH

**Acting Director, Office of Science and Technology Assessment
Directorate of Technical Support and Emergency Management
Occupational Safety and Health Administration**

Occupational exposure risks

- OSHA is closely coordinating with CDC, including NIOSH, and other agencies to monitor the ongoing outbreak.
- Currently, most U.S. workers are at low risk of exposure, similar to other members of the = public.
- OSHA does not recommend any special precautions, beyond general hygiene practices, for most workers.



Photo: U.S. Navy / Seaman Rob Aylward

www.osha.gov/covid-19

Occupational exposure risks

- **Workers in some sectors may have increased risk of occupational exposure to COVID-19, including in:**
 - Healthcare, including in fixed facilities and EMS
 - Mortuary services and other deathcare
 - Laboratories
 - Airline operations
 - Border protection and passenger screening
 - Solid waste and **wastewater management**
 - International business travel



Photo: U.S. Customs and Border Protection / James Tourtellotte

www.osha.gov/covid-19

Existing OSHA standards protect workers from exposure

- Follow existing OSHA standards to help protect workers from exposure to and infection with COVID-19.
- Employers should also remember that OSHA can use the General Duty Clause, Section 5(a)(1), of the Occupational Safety and Health Act to ensure that workers are protected from recognized safety and health hazards that may cause serious harm.

www.osha.gov/covid-19

Relevant OSHA requirements

- Personal Protective Equipment (29 CFR 1910 subpart I), including:
 - PPE General Requirements (1910.132)
 - Eye and Face Protection (1910.133)
 - Respiratory Protection (1910.134)
 - Hand Protection (29 CFR 1910.138)
- Bloodborne Pathogens (29 CFR 1910.1030)
- Hazard Communication (29 CFR 1910.1200)
- Recordkeeping (29 CFR part 1904)

OSHA Enforcement

OSHA:

- Typically responds to emergencies, including disease outbreaks, in a technical assistance posture.
- Provides compliance assistance to employers to help ensure workers are protected.
- Provides technical assistance and support to other federal agencies, as well as state/local partners.

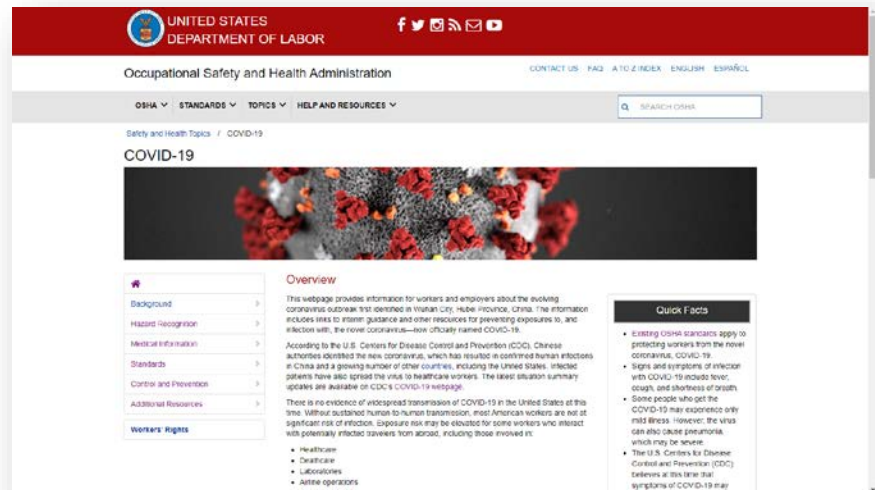
OSHA enforcement authority

- During emergency response operations, even when OSHA is operating in a technical assistance and support mode, OSHA standards remain in effect and OSHA retains its ability to enforce the OSHA standards under the OSH Act.
- Enforcement of OSHA standards follows the jurisdiction in place before the emergency, such as in states operating OSHA-approved occupational safety and health programs called State Plans.

www.osha.gov/covid-19

OSHA guidance

- OSHA has developed a website with information for workers and employers on how to stay healthy during the outbreak.
- Website includes information on implementing the hierarchy of controls when workers have specific exposure risks.



www.osha.gov/covid-19

OSHA guidance

- OSHA guidance helps employers comply with OSHA standards, and generally aligns with CDC recommendations for infection prevention.
- Guidance is based on anticipated hazards and risks, and incorporates standard precautions, contact and airborne precautions, and use of face/eye protection.
- Guidance should be adapted based on employer's hazard assessment and workers' tasks.

Clockwise from L: public domain; WikimediaCommons;
CDC/Kimberly Smith & Christine Ford



www.osha.gov/covid-19

OSHA guidance

For all workers, regardless of specific exposure risks:

- Practice good and frequent hand hygiene.
- Follow good cough/sneeze etiquette.
- Avoid touching the eyes, nose, or mouth with unwashed hands.
- Avoid close contact with people who are sick.



Photo: U.S. Department of Defense

www.osha.gov/covid-19

OSHA guidance

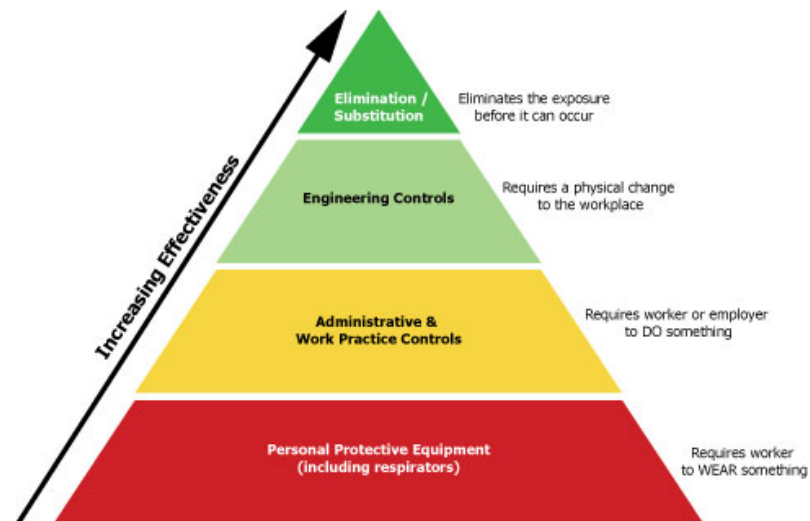
- Train all workers about their risk of occupational exposure to COVID-19, as well as on what to do if they have traveled to high-risk areas or been exposed to possible cases.
- For workers at particular risk of exposure (e.g., in healthcare, others), discuss:
 - Sources of exposure to the virus and hazards associated with that exposure.
 - Appropriate ways to prevent or reduce the likelihood of exposure, including use of engineering and administrative controls, safe work practices, and PPE.
- Some OSHA standards (e.g., BBP, PPE) require worker training.

www.osha.gov/covid-19

OSHA guidance

For U.S. workers and employers of workers with potential occupational exposures to COVID-19:

- Identify and isolate suspected cases.
- Implement other precautions appropriate for the worksite and job tasks, and according to the hierarchy of controls.



www.osha.gov/covid-19

OSHA guidance

- **What should standard, contact, and airborne precautions consist of in workplaces where workers may be exposed to COVID-19?** OSHA guidance breaks this down by worker type.
 - Engineering controls, such as isolation rooms and other physical barriers, can limit most workers' exposures.
 - Administrative controls and safe work practices include measures such as limiting access to patient care areas, effective sharps management, and worker training.
 - PPE may include gloves, gowns, goggles or face shields, and N95 or better respirators.

www.osha.gov/covid-19

Questions?

- **Christopher K. Brown, PhD, MPH, CPH**

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www.osha.gov

800-321-OSHA (6742)



Our Next Speaker



Christine Tomlinson, PhD
Senior Biologist, Consequence
Management Advisory Division,
Office of Emergency Management



- Interagency Coordination Response
- Emergency Response
 - What On-Scene-Coordinators do
 - How EPA develops information for On-Scene Coordinators
 - How EPA ERP compares with that of CDC and OSHA

Our Next Speaker



Rasha Maal-Bared, PhD
Senior Microbiologist



The Water Professional's Guide to COVID-19

Preparedness, Not Panic

Behind the webpage

- The authors
 - WEF Disinfection and Public Health Committee
 - Waterborne Infectious Disease Outbreak Control (WIDOC) Working Group
- The process
 - Internal
 - External
- The webpage: <https://wef.org/coronavirus>



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The Latest on the Coronavirus and How to Protect the Workforce

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The Water Environment Federation is a nonprofit association that provides technical education and training for thousands of water quality professionals who clean water and

[LEARN MORE](#)



Where Do I Start?

To help put the outbreak of COVID-19 into perspective for the water sector, the WEF Disinfection and Public Health Committee (DPHC) Waterborne Infectious Disease Outbreak Control (WIDOC) Working Group has created a series of articles that explain the current situation. These articles also contain many links to developing research on this epidemic.

THE WATER PROFESSIONAL'S GUIDE
TO THE 2019 NOVEL CORONAVIRUS

HOW CORONAVIRUS COMPARES
TO SARS AND MERS

SIGNS AND SYMPTOMS OF
CORONAVIRUS INFECTION

WEBCAST: UPDATES ON NOVEL CORONAVIRUS (COVID-19) FOR WATER PROFESSIONALS

Note: The information posted here is a summary of current knowledge about this emerging viral pathogen. The state of knowledge will evolve as additional investigation and research is conducted, so continuous review of reputable sources and websites is advised.

How Can I Stay Informed?

This situation is developing and changing quickly. The link below point to reputable and reliable sources of information for that are updated frequently with technical guidance, public health information, and the latest research.

WORLD HEALTH ORGANIZATION (WHO)

CENTERS FOR DISEASE CONTROL AND PREVENTION

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

More About
Coronavirus

- How to Avoid Coronavirus
- Will WRRFs Stop Coronavirus?
- Do Wastewater Workers Need to Take Special Precautions?
- Where Can I Find More Info on Personal Protective Equipment?



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The Water Professional's Guide to COVID-19

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February 11, 2020

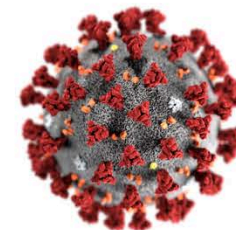
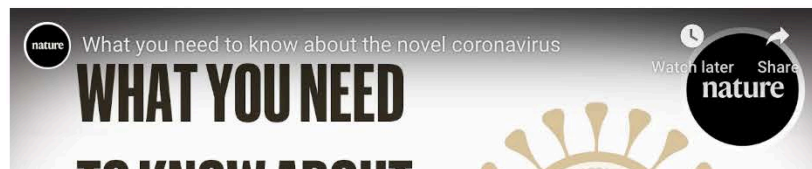
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The 2019 Novel Coronavirus was identified as the cause of an outbreak of respiratory illness, referred to as COVID-19. It was first detected in Wuhan, China on Dec. 12, 2019. Because this disease already has begun to spread worldwide, it is important that water sector professionals keep informed on the attributions of this virus and any measures needed to protect both workers and public health, in general.

Disclaimer: The information posted here is a summary of current knowledge about this emerging viral pathogen. The state of knowledge will evolve as additional investigation and research is conducted, so continuous review of reputable sources and websites is advised.

Extent of the 2019 Novel Coronavirus Outbreak



Wastewater Treatment and COVID-19

[Authors & Acknowledgements](#)[More Resources on Coronavirus](#)

More Resources on Coronavirus

Resources on Coronavirus

- [Current Priority: Coronavirus \(COVID-19\)](#)
- [The Water Professional's Guide to COVID-19](#)
- [How Coronavirus Compares to SARS and MERS](#)
- [Signs and Symptoms of Coronavirus Infection](#)

How Can I Stay Informed?

The organizations below are reputable and reliable sources that are frequently updated.

WORLD HEALTH ORGANIZATION (WHO)

CENTERS FOR DISEASE CONTROL AND PREVENTION

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

In an effort to increase transparency and communication, major publishers have created Coronavirus information centers, where relevant and current research is freely available. This includes [Springer Nature](#), [Elsevier](#) and [Wiley](#). Several major journals have done the same, including: [The Lancet](#), [New England Journal of Medicine](#) and [The British Medical Journal](#).



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How Coronavirus Compares to SARS and MERS

Home > WEF News Hub > WEF News > How Coronavirus Compares to SARS and MERS

February 11, 2020

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Within the coronavirus family, COVID-19 appears to be more easily transmitted but less severe than SARS or MERS.

Like SARS and MERS, COVID-19 person to person transmission is not efficient, as this coronavirus infects the lower lungs making it less transmissible than the flu, which infects the upper airways and nose."

While COVID-19 lab-confirmed case numbers soared from about 50 in China to more than 17,000 in at least 23 countries in 3 weeks, the 9-month SARS outbreak only resulted in 8,098 confirmed cases.

Similarly, MERS had been circulating since 2012 with only about 2,500 known cases. However, the higher number of COVID-19 confirmed cases could be due to improved virus detection technologies over recent years.

Although most human Coronavirus infections are typically mild, mortality rates were 10% for SARS and 37% for MERS. In comparison, COVID-19 has a much lower estimated mortality rate of 2%, dropping from a high of 4.1 % in Wuhan to approximately 0.17% elsewhere in mainland China. The factors that cause some COVID-19 infections to be more severe than others still need to be determined.

How does Coronavirus compare to Ebola?

The Novel Coronavirus is different from the Ebola virus. Ebola virus is a bloodborne, highly infectious, enveloped filovirus. In contrast, SARS and MERS are from the same family of coronaviruses and have similar physical and

Table 1. Comparing the novel Coronavirus, SARS and Ebola.

| <i>Factor</i> | <i>2019 Novel Coronavirus</i> | <i>SARS</i> | <i>Ebola virus</i> |
|---|---|---|--|
| <i>Etiology</i> | RNA virus from Coronaviridae family | RNA virus from Coronaviridae family | RNA virus from Filoviridae family |
| <i>Source</i> | Zoonotic | Zoonotic | Zoonotic |
| <i>Transmission</i> | Direct contact with infected person respiratory droplets | Direct contact with infected person respiratory droplets | Direct contact with infected person blood or bodily fluids |
| <i>Incubation period</i> | 2-14 days | 2-14 days | 2-21 days |
| <i>Symptoms</i> | Fever, cough, shortness of breath or difficulty breathing, diarrhea | Fever, cough, headache, malaise, shortness of breath, diarrhea | Fever, headache, vomiting, stomach and muscle pain, bleeding, diarrhea |
| <i>Asymptomatic individuals infective</i> | Yes | No | No |
| <i>Secondary transmission (fomites)</i> | Unknown | Yes | Yes |
| <i>Airborne</i> | Unknown | Yes | Yes |
| <i>Detected in feces</i> | Yes | Yes | Yes |
| <i>Persistence in wastewater</i> | Likely | Yes | Yes |
| <i>Effective skin disinfectants</i> | Handwashing with soap and water (min. 20 sec); alcohol-based sanitizer (min. 60%) | Handwashing with soap and water; alcohol based-sanitizer as per manufacturer's instructions | Handwashing with soap and water (min. 40 sec); 0.05% hypochlorite solution ; alcohol-based sanitizer (min. 60%, min. 20 sec) |
| <i>Effective surface</i> | Common detergents | Common detergents are | 0.5% hypochlorite |

Signs and Symptoms of Coronavirus Infection

Home > WEF News Hub > WEF News > Signs and Symptoms of Coronavirus Infection

February 11, 2020

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A study published by the Lancet reported that as of Jan. 2, 2020 the most common symptoms at onset of illness were fever [98%], cough [76%], and myalgia, or fatigue [44%]. Less common symptoms were sputum production [28%], headache [8%], haemoptysis (coughing up blood) [5%], and diarrhea [3%].

One distinguishing feature of this Coronavirus infection, named COVID-19, is dyspnoea or shortness of breath, which has been [reported in more than half of patients \(55%\)](#). It can take anywhere from [2 to 14 days for symptoms to develop](#), according to the U.S. Centers for Disease Control and Prevention.

Treatment or vaccine for the Coronavirus?

There currently are neither vaccines nor direct treatments against the novel Coronavirus. Upon admission to hospitals patients are provided with supportive therapies to help with symptom relief until the immune system can fight the virus.

How can I stay healthy?

While the [CDC reports that the immediate risk of this new virus to the American public is believed to be low](#) at this time, they recommend that everyone do their part to help us respond to this emerging public health threat. Because people of all ages have been infected by COVID-19, the [WHO advises](#) everyone to take proper infection control precautions. The best way to prevent infection is to avoid being exposed to this virus. However, as a reminder, CDC always recommends [everyday preventive actions](#) to help prevent the spread of respiratory viruses, including:

- Stay informed!
- Wash your hands often with soap and water [for at least 20 seconds](#).
- If soap and water are not available, use an alcohol-based hand sanitizer with at least 60% alcohol content.
- Avoid touching your eyes, nose, and mouth with unwashed hands.
- Avoid close contact with people who are sick.
- Stay home when you are sick.
- Cover your cough or sneeze (ideally with a disposable tissue).
- Clean and disinfect frequently touched objects and surfaces.
- Do not place your personal belongings on the floor or on surfaces that may be contaminated.

What should you do if you think you are infected?

If you feel sick with fever, cough, have difficulty breathing, and have traveled to China or were in close contact with someone with COVID-19 in the 14 days before you began to feel sick, seek medical care immediately.

Before you go to a doctor's office or emergency room, call ahead and tell them about your recent travel and your symptoms.

...

["Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China"](#)

Questions? Concerns?
Comments?

Authors & Acknowledgements

More Resources on Coronavirus

Authors & Acknowledgements

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The authors would like to thank Matthew Arduino (CDC, DDID), Christopher K. Brown (OSHA), Matthew Magnuson (U.S. EPA), Jonathan Yoder (CDC, DDID), and Jill Shugart (CDC, NIOSH) for their comments and feedback. (Note: The conclusions, findings, and opinions expressed by the authors contributing to this piece do not reflect the official

Questions for Our Speakers

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- Mark Sobsey, UNC Chapel Hill
- Matt Arduino, CDC
- Christopher Brown, OSHA
- Christine Tomlinson, EPA
- Rasha Maal-Bared, WEF DPHC, WIDOC