WEATHERING CHANGE

ANTIOCH UNIVERSITY NEW ENGLAND
Center for Climate Preparedness and Community Resilience

Strengthen communities to prepare, respond and recover in the face of climate impacts and other disruptions through collaborative, innovative solutions.

communityresilience-center.org

Dr. Abigail Abrash Walton
Co-Director CCPCR

Local Solutions for Strong Communities

… a series of online courses focused on the fundamentals of climate change resilience.

- Engage in each course for 4 weeks
- Enroll for graduate credit or audit the course
- Increase your skill set in climate resilience for better outcomes
- Discover solutions to local issues you face on the job or in your community.
- Register for one course or the whole series.

http://www.communityresilience-center.org/climate-change-resilience-series/

Climate Change Resilience

… a series of online courses focused on the fundamentals of climate change resilience.

Join us for the next online course in this series

Climate Impacts: Communication, Facilitation, and Stakeholder Capacity Building

November 10 – December 14, 2019

http://www.communityresilience-center.org/climate-impacts/

Instructor: Dr. Christa Daniels

Local Solutions for Strong Communities

Save the Date!

2020 Local Solutions Eastern Climate Preparedness Conference

May 11-12, 2020 • Portland, Maine

http://www.communityresilience-center.org/conferences/2020-local-solutions-eastern-climate-preparedness-conference/

Film and Panel Discussion on Climate Change

…a powerful, intimate story that looks at a worsening global threat through the lens of Chesapeake Bay's most vulnerable county

High Tide in Dorchester

November 8 @ 7:00 pm - 9:00 pm

Antioch University New England campus – 40 Avon Street, Keene NH

https://www.antioch.edu/new-england/event/high-tide-in-dorchester-film-and-panel-discussion-on-climate-change/

This event is co-sponsored by Antioch University New England's Center for Climate Preparedness and Community Resilience and The League of Conservation Voters.

ANTIOCH UNIVERSITY NEW ENGLAND
Center for Climate Preparedness and Community Resilience

LCV
Our Earth Is Worth Fighting For

U.S. Climate Resilience Toolkit

Meet the challenges of a changing climate by finding information and tools to help you understand and address your climate risks.

toolkit.climate.gov

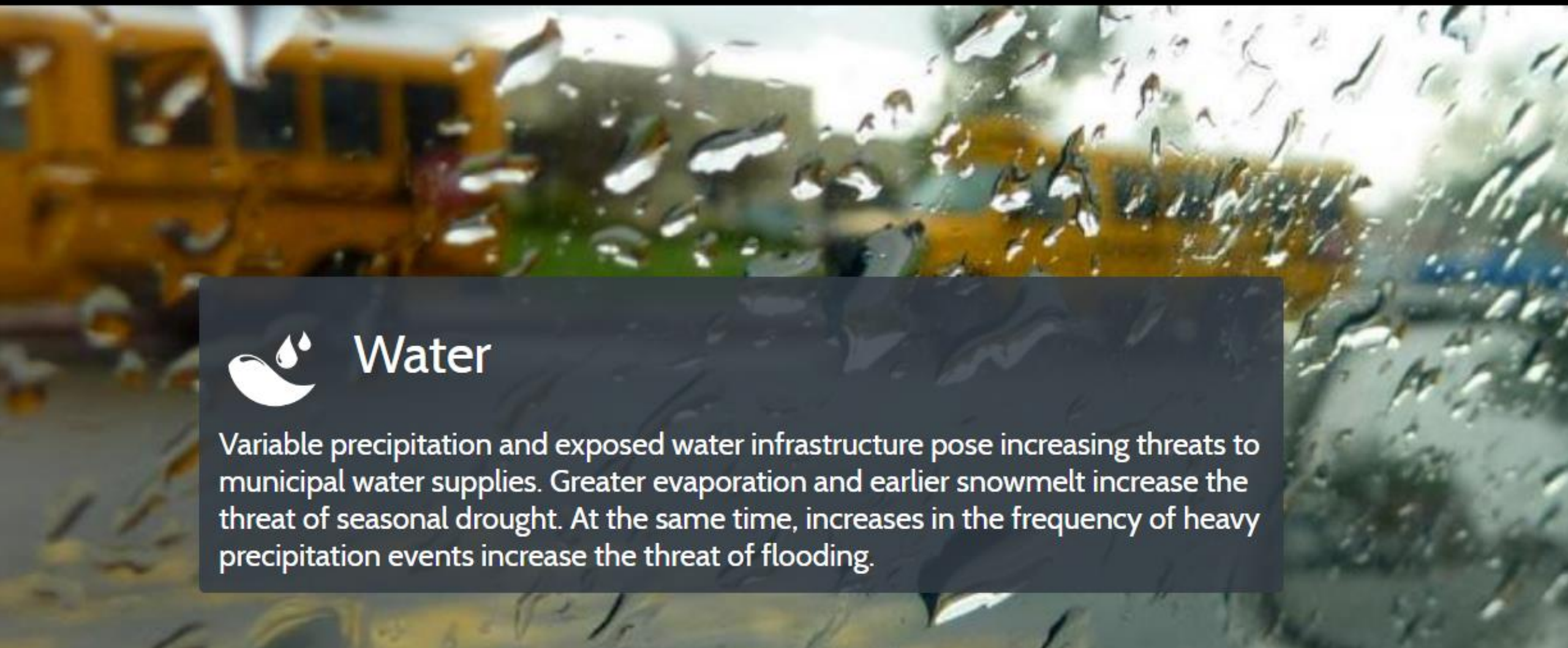
Dr. Ned Gardiner,
Engagement Manager

Logistics

If you have a question, please write it in the Q&A section (not Chat) and select to All Panelists, so we can see the questions.

If you are having technical difficulty, please use Chat and send to Host, so we can address the issue with you directly.

The presentation will be recorded and posted to the Antioch website within a week www.communityresilience-center.org

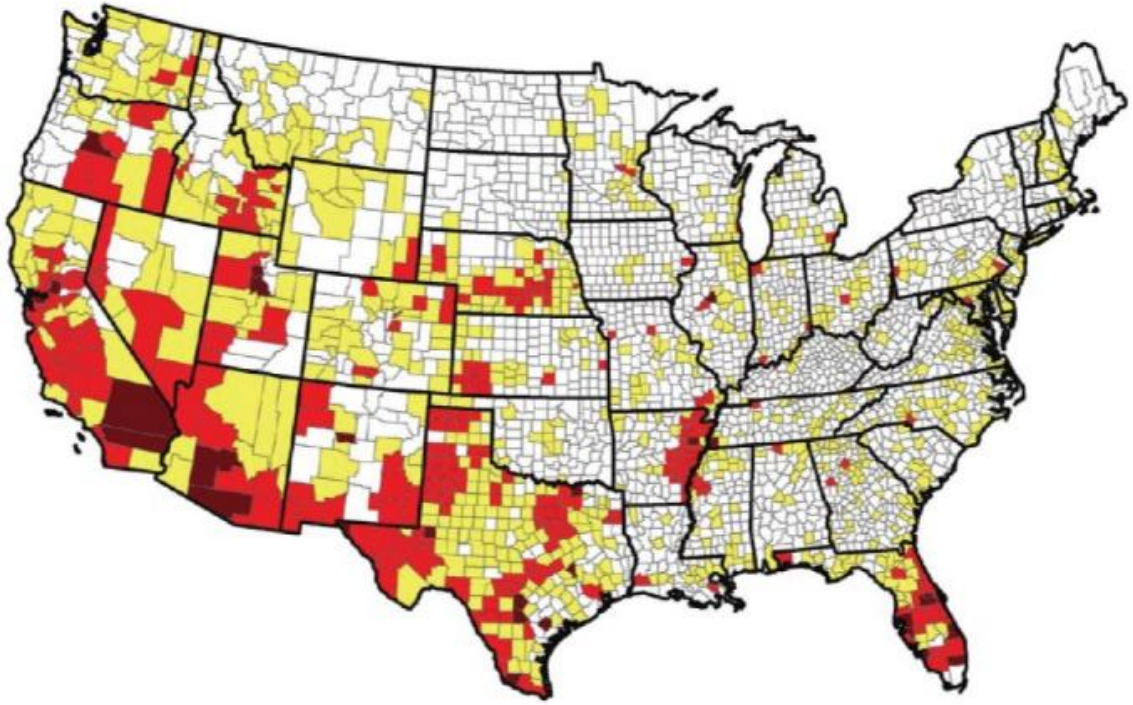


Water

Variable precipitation and exposed water infrastructure pose increasing threats to municipal water supplies. Greater evaporation and earlier snowmelt increase the threat of seasonal drought. At the same time, increases in the frequency of heavy precipitation events increase the threat of flooding.

Water Supplies Projected to Decline

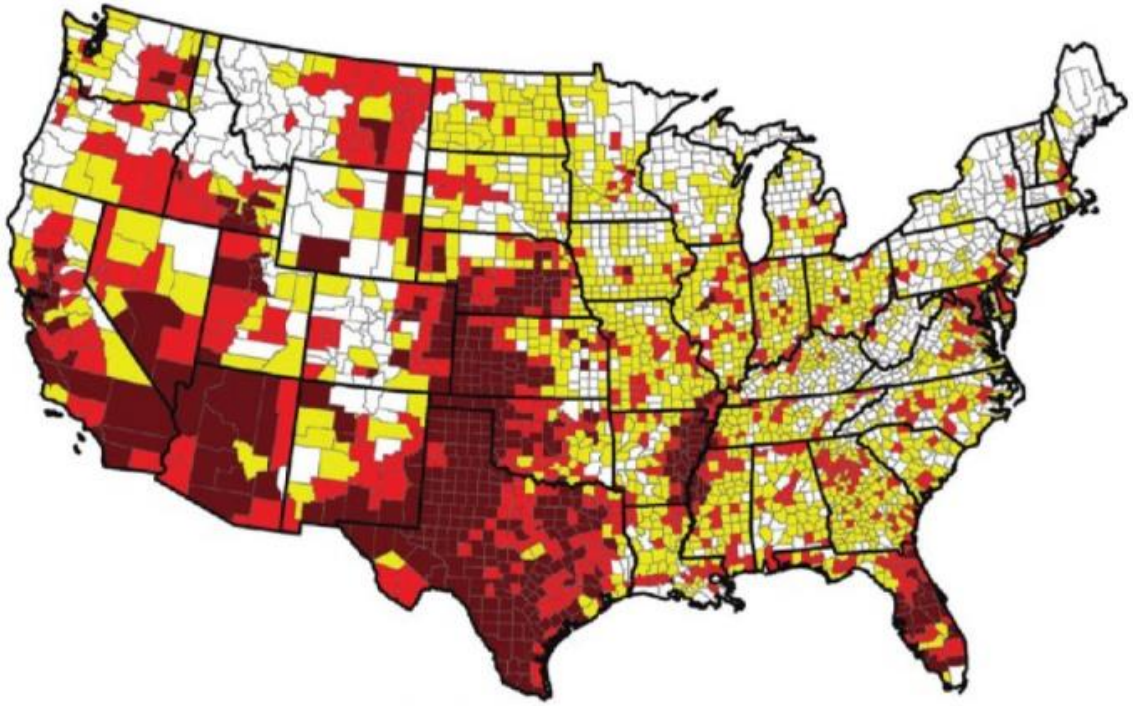
No Climate Change Effects



Water Supply Sustainability Risk Index (2050)

- Extreme (29)
- High (271)
- Moderate (821)
- Low (2020)

Climate Change Effects



Water Supply Sustainability Risk Index (2050)

- Extreme (412)
- High (608)
- Moderate (1192)
- Low (929)

Roy, Sujoy B., Limin Chen, Evan H. Girvetz, Edwin P. Maurer, William B. Mills, and Thomas M. Grieb, 2012: "Projecting Water Withdrawal and Supply for Future Decades in the U.S. under Climate Change Scenarios." Environmental Science & Technology, 46(5), 2545–2556, DOI: 10.1021/es2030774.

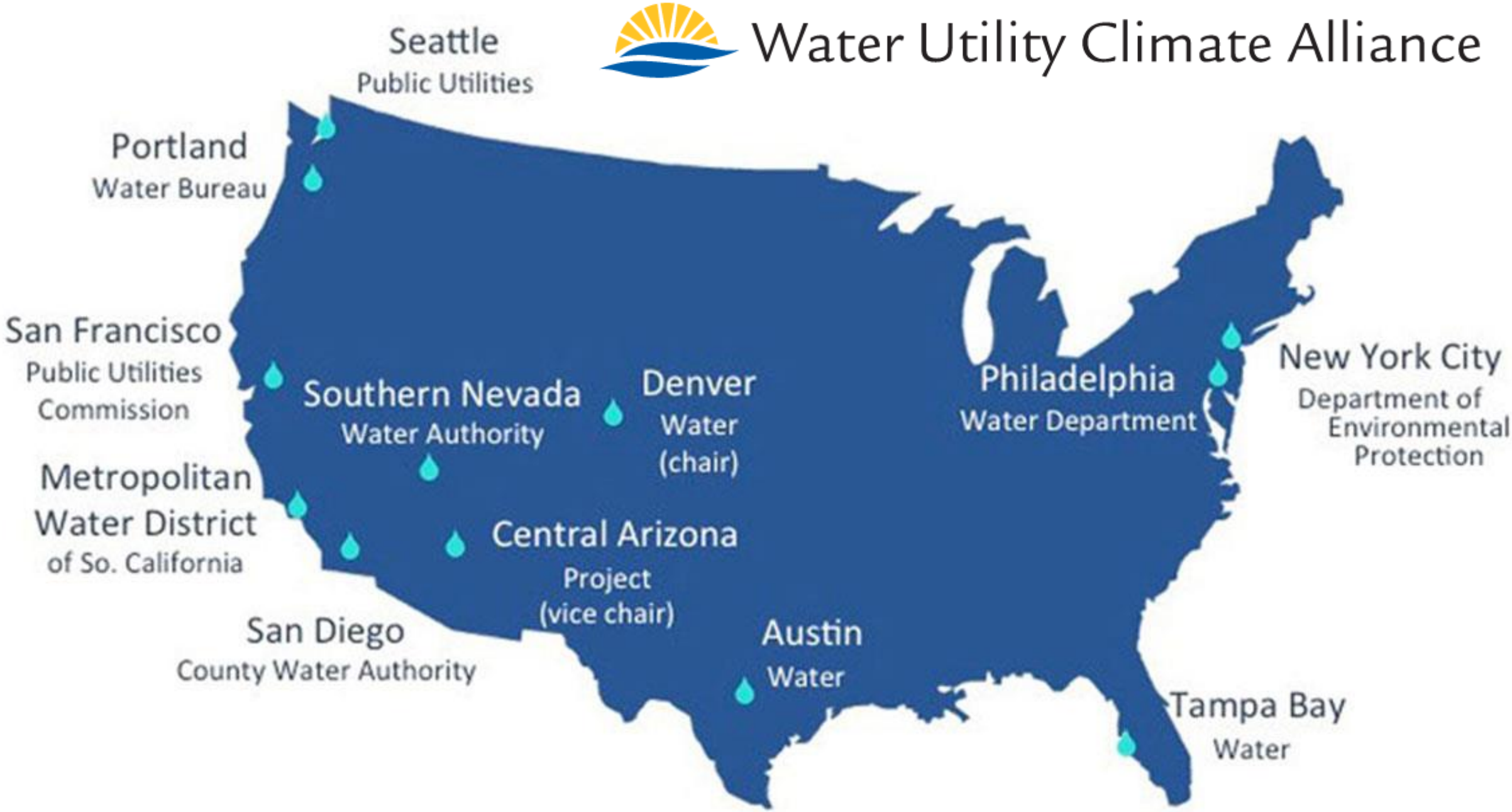
FOURTH NATIONAL CLIMATE ASSESSMENT

CHAPTER 3: WATER

- "… there is no comprehensive assessment of the climate-related vulnerability of U.S. water infrastructure."
- "... tools, case studies, and other information are available…"
- "… there are no common design standards or operational guidelines that address how infrastructure should be designed and operated in the face of changing climate risk or that even target the range of climate variability seen over the last 500 years."

https://nca2018.globalchange.gov/chapter/3#key-message-2

Water Utility Climate Alliance



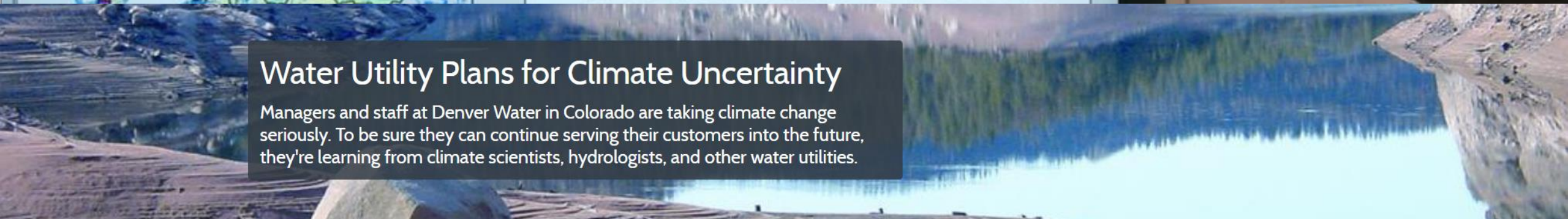
U.S. Climate Resilience Toolkit

A New Generation of Water Planners Confronts Change Along the Colorado River

Reduced flows and increased demand for Colorado River water represent a real and present danger in the West. To address the threat, water managers and modelers initiated a study to understand the system, consider options, and take action.

Climate Outlooks Help Water Supply Planning

When water utility personnel recognized their groundwater withdrawals were damaging ecosystems in the Tampa Bay area, they found new ways to reduce their dependence on it.



Water Utility Plans for Climate Uncertainty

Managers and staff at Denver Water in Colorado are taking climate change seriously. To be sure they can continue serving their customers into the future, they're learning from climate scientists, hydrologists, and other water utilities.

Water Utility Climate Alliance

Strategies for 21st Century Risk Management and Climate Change Communication

Abby Sullivan

Environmental Scientist, Philadelphia Water Department

Dr. Alison Adams

Principal Engineer, INTERA Incorporated

WEATHERING CHANGE

U.S. Climate Resilience Toolkit

AU | ANTIOCH UNIVERSITY NEW ENGLAND
Center for Climate Preparedness and Community Resilience

Strategies for 21st Century Risk Management and Climate Change Communication

October 31, 2019

Abby Sullivan,
Environmental Scientist,
Philadelphia Water Department

PHILADELPHIA WATER DEPARTMENT

WUCA
Water Utility Climate Alliance

AU

Acknowledgement:

- Julia Rockwell, Manager of the Climate Change Adaptation Program, Philadelphia Water Dept.
- Kelly Anderson, Manager of the Watershed Protection Program, Philadelphia Water Dept.
- Sebastian Malter, Engineer, CDM Smith (formerly Philadelphia Water Dept).
- The Water Utility Climate Alliance
  - Laurna Kaatz, Climate Program Manager, Denver Water (WUCA Chair)
  - Keely Brooks, Climate Science and Adaptation Lead, Southern Nevada Water Authority
  - Heidi Roop, Lead Scientist for Science Communication, Climate Impacts Group, U. of Washington

Climate Change, a Super Wicked Problem

Wicked Problem (Rittel & Webber, 1973)

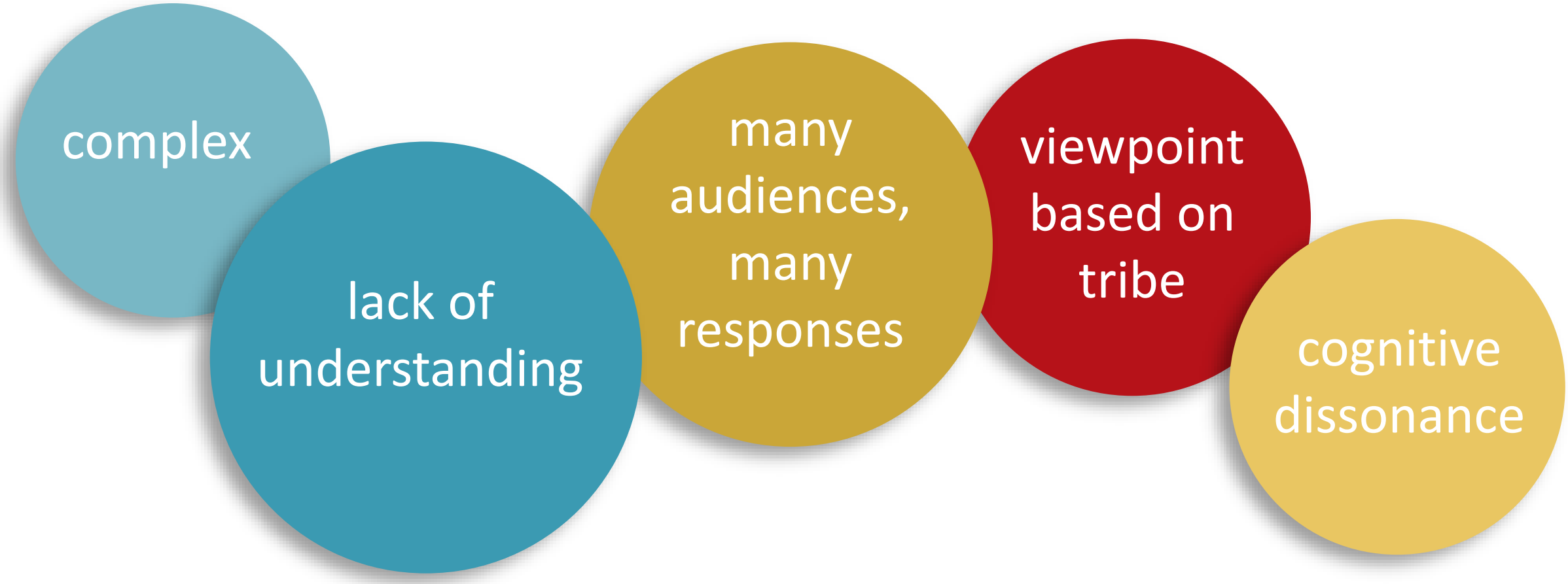
Wicked problems lack a simplistic, straightforward solution because they are difficult to define, have many interdependencies, have numerous stakeholders and opinions, involve economic burden and are interconnected with other problems (Rittel & Webber, 1973).

Super Wicked Problem (Levin et al., 2007)

A problem with even further exacerbating features:

1. Time is running out
2. Those who cause the problem also seek to provide a solution
3. The central authority needed to address the problem is weak or non-existent
4. Irrational discounting occurs, pushing responses into the future

Climate Change Communication Challenges



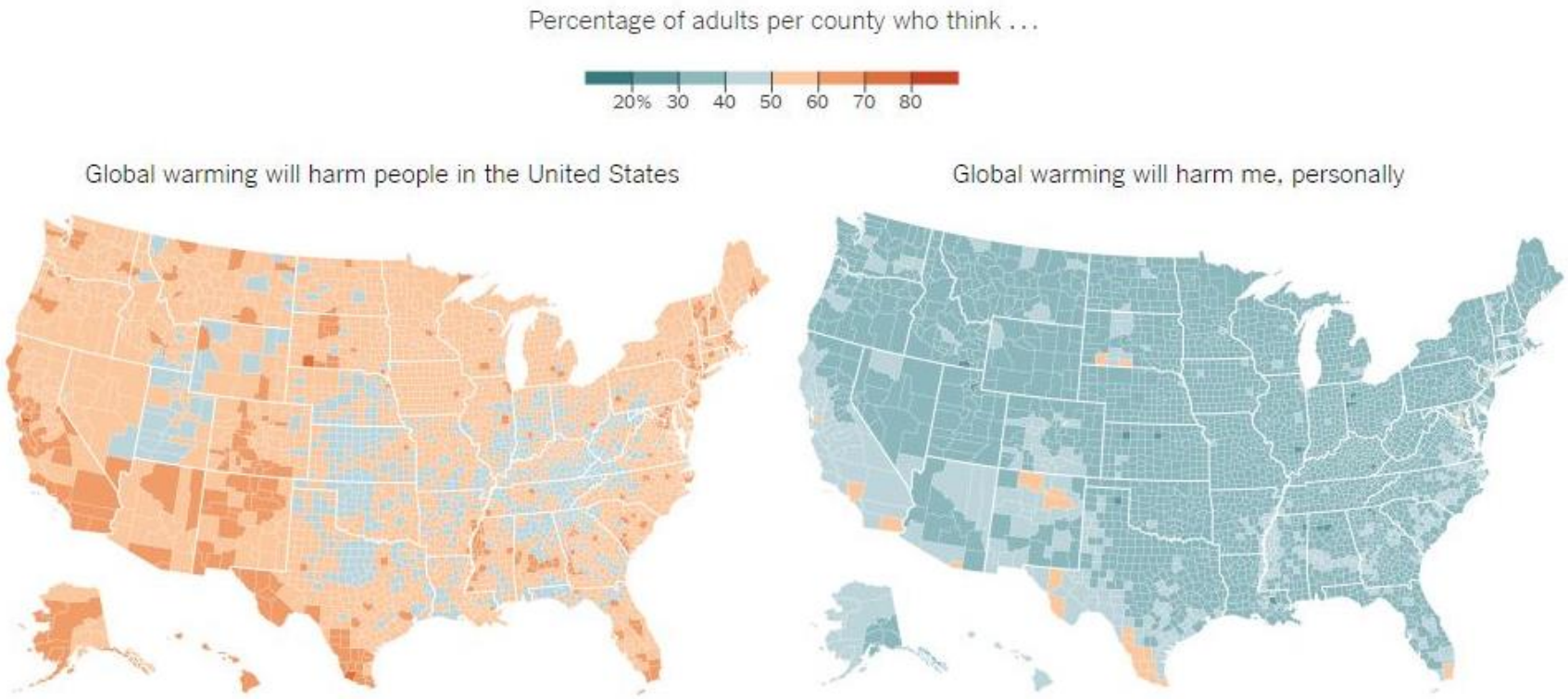
Climate Change Communication Challenges

My desire to be well-informed is currently at odds with my desire to remain sane.

Cartoon by David Sipress

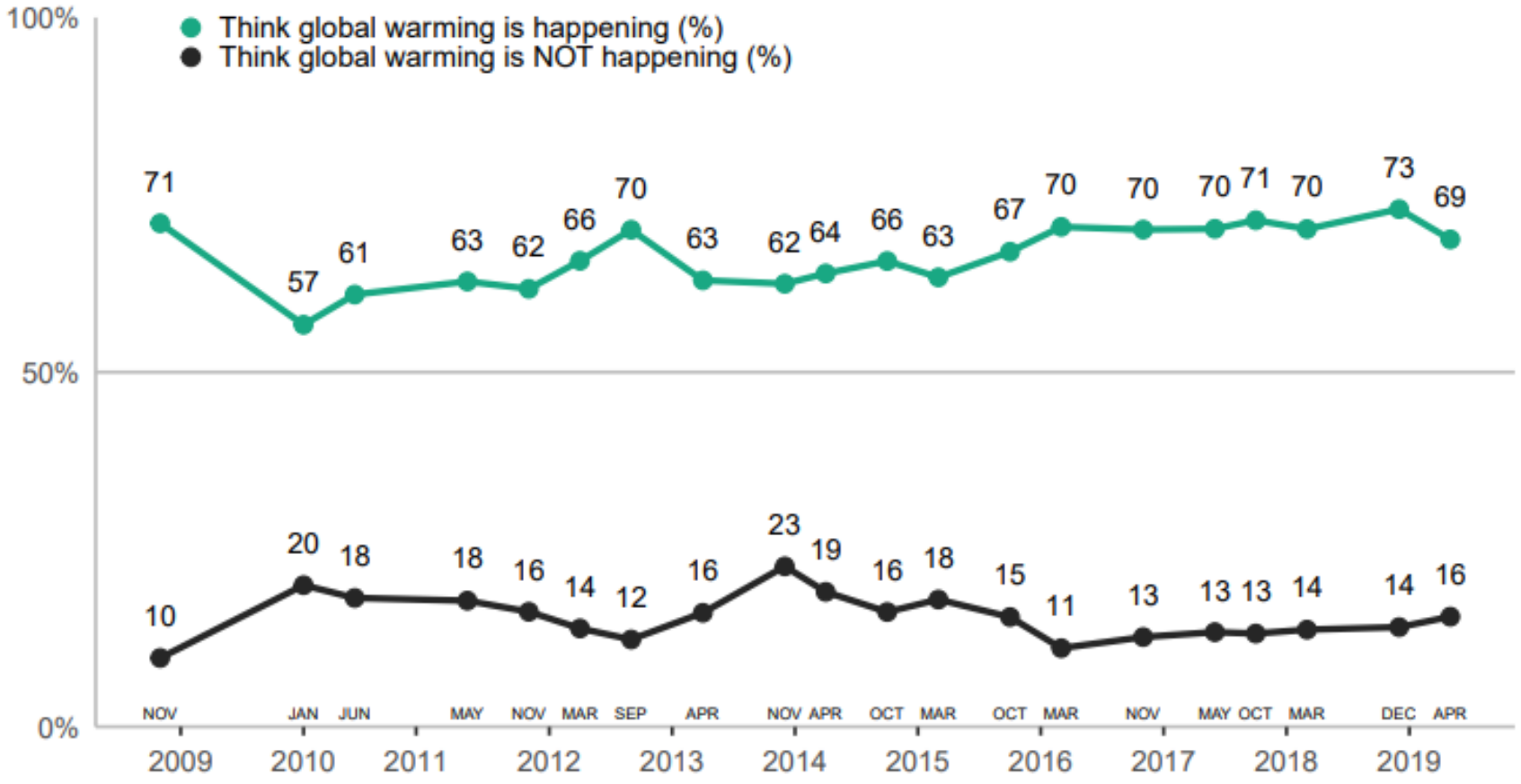
Climate Change Communication Challenges

Most People Think that climate change will harm Americans but they don't think it will happen to them



Source: New York Times, March 21, 2017 article *How Americans Think about Climate Change, in Six Maps*

The (mostly) good news…



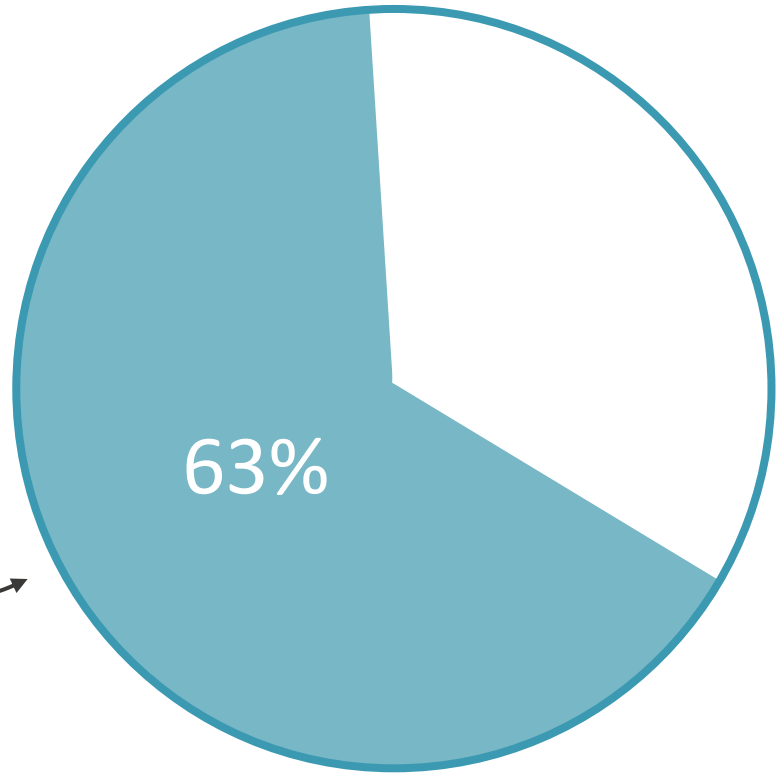
Roughly 7 in 10 Americans think global warming is happening

YALE PROGRAM ON
Climate Change Communication

GEORGE MASON UNIVERSITY
CENTER *for* CLIMATE CHANGE COMMUNICATION

Communication is the key!

About six in ten Americans (63%) say they "rarely" or "never" discuss global warming with family and friends



Source: Leiserowitz, et al., 2019

Katherine Hayhoe
climate scientist/communicator
extraordinaire

Internal Communications and Mainstreaming

Climate Change can be really overwhelming!

Internal Communications and Mainstreaming

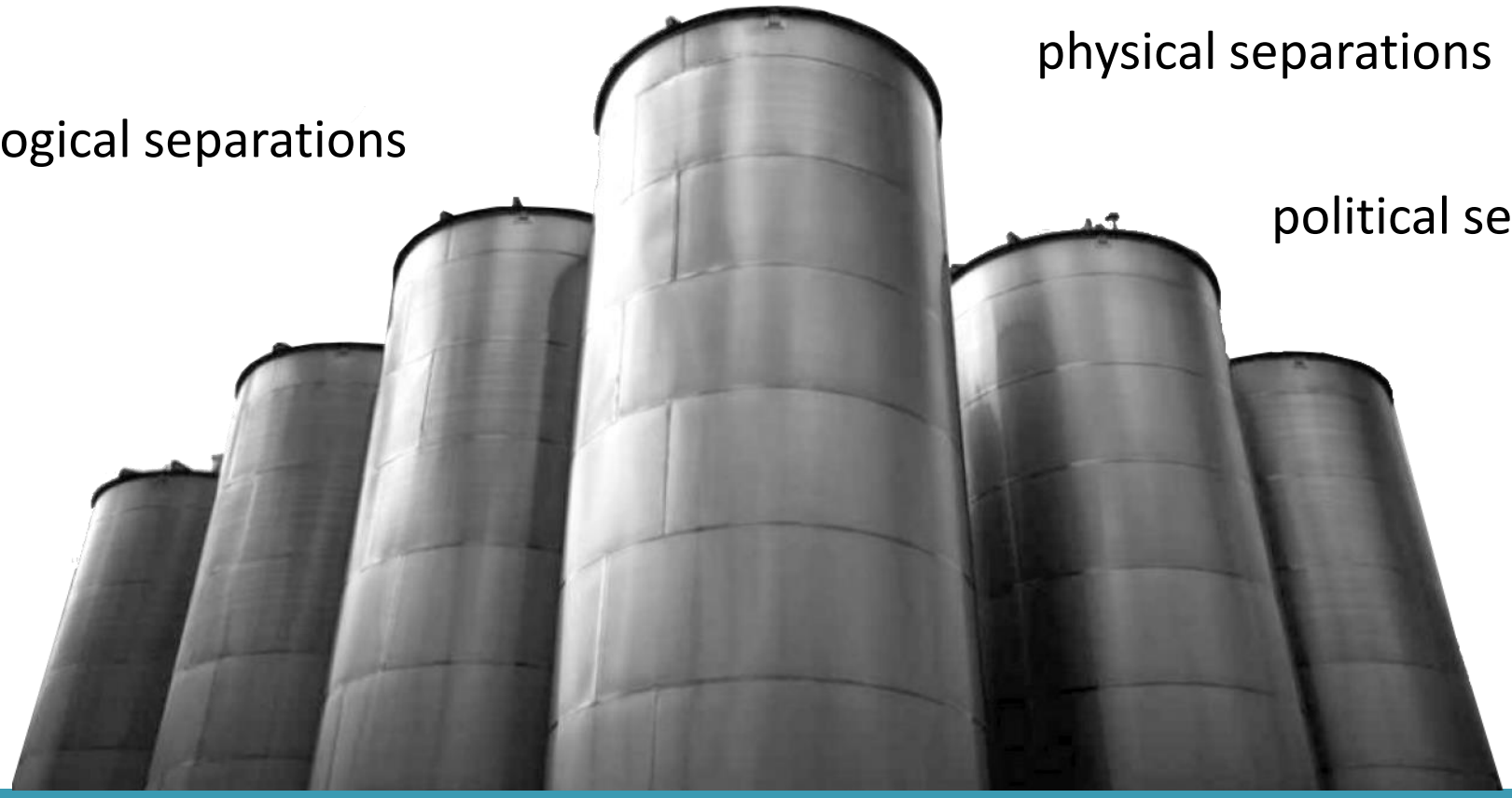
Management/leadership style

physical separations

ideological separations

political separations

large staff



Internal Communications and Mainstreaming

Management/leadership style

physical separations

ideological separations

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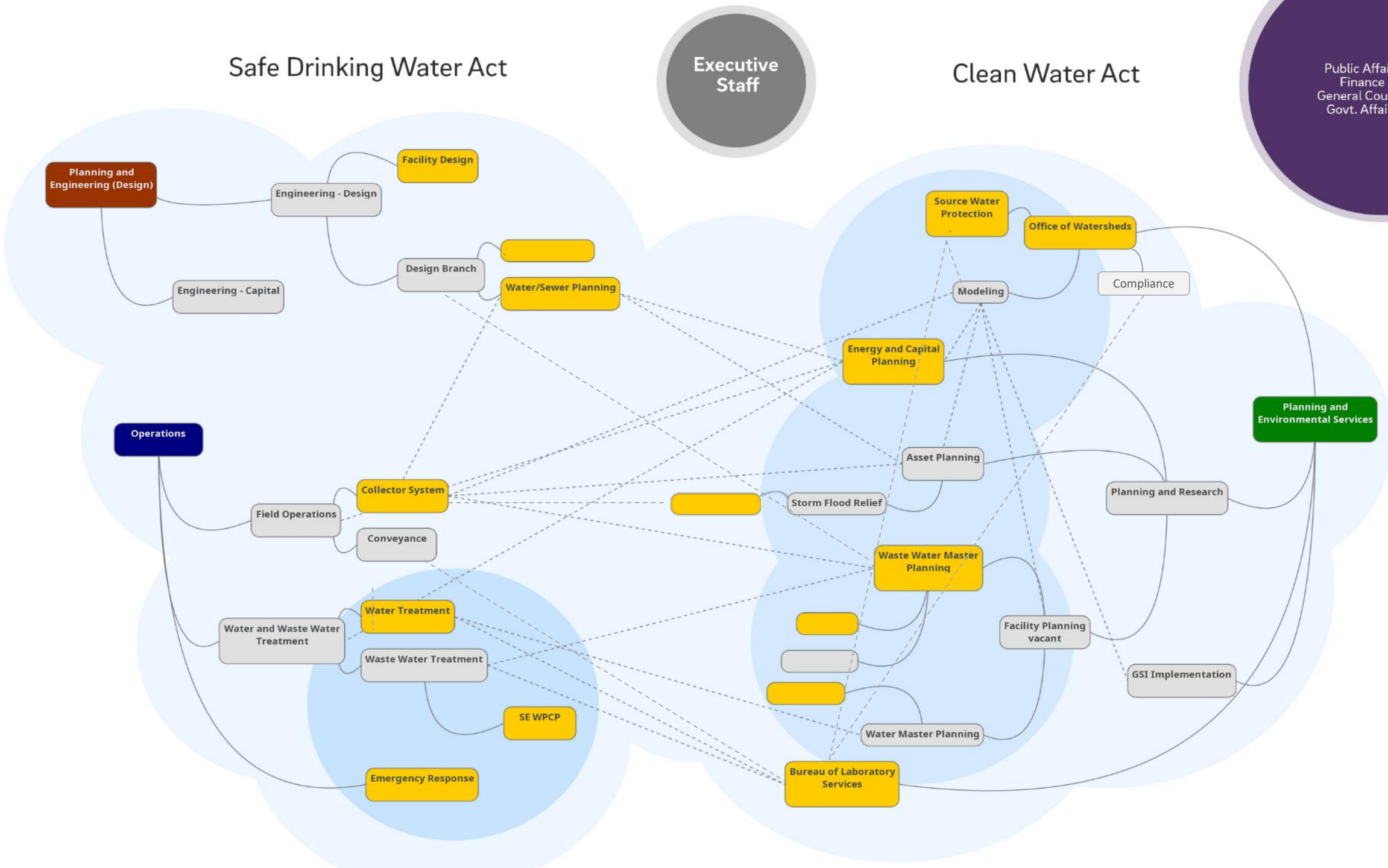
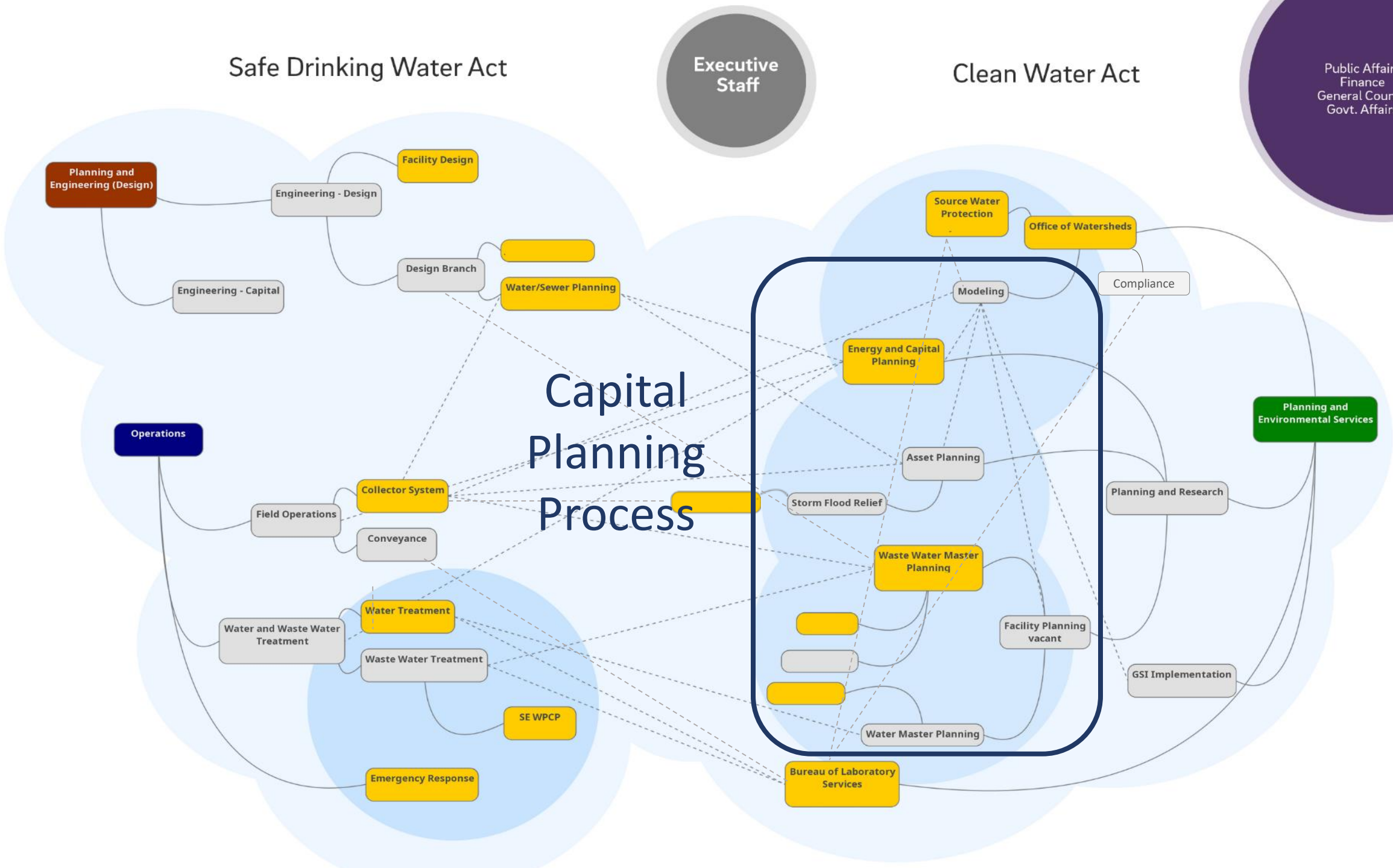
large staff

Roll Out Strategy - Organization Map



Roll Out Strategy - Organization Map



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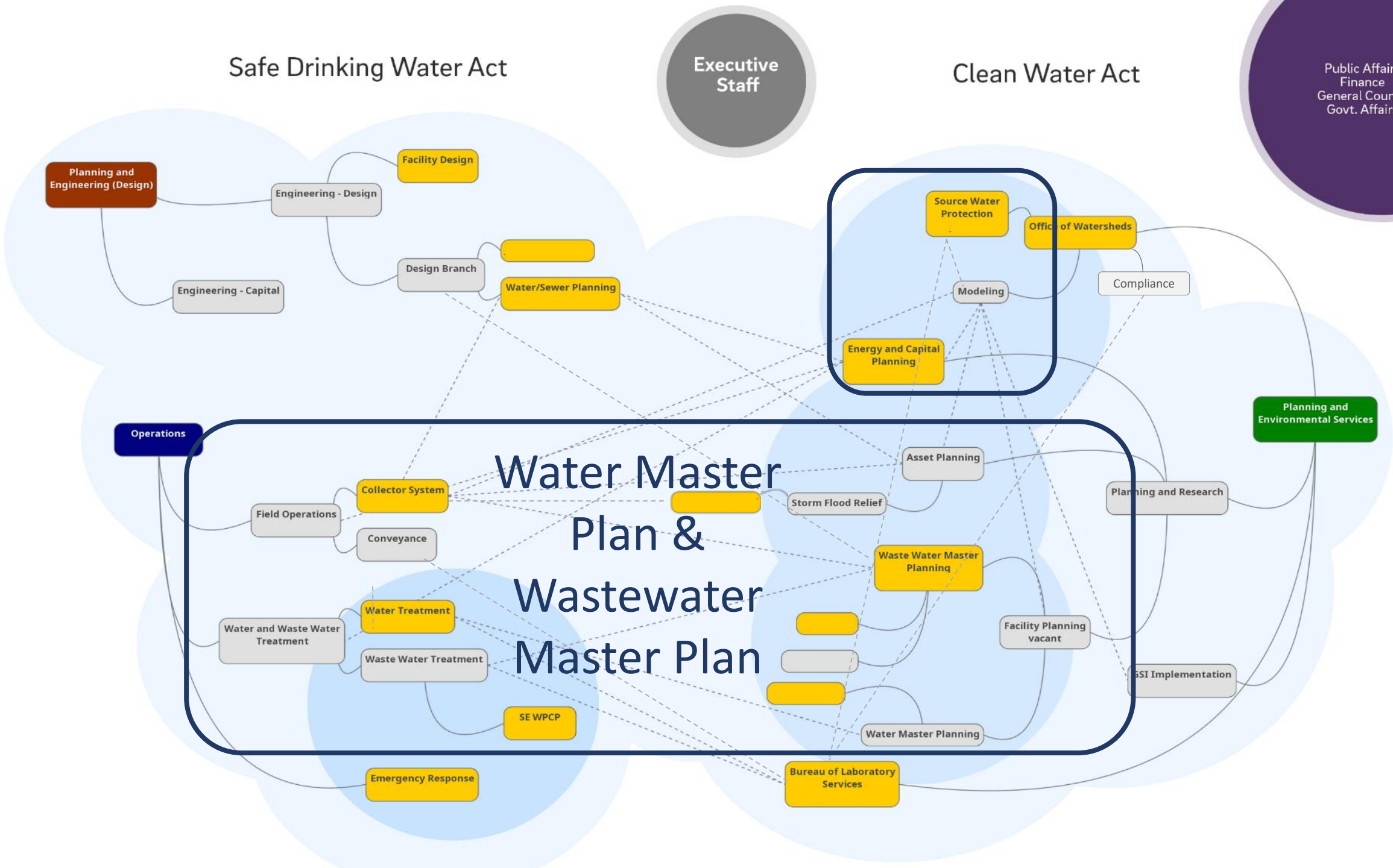

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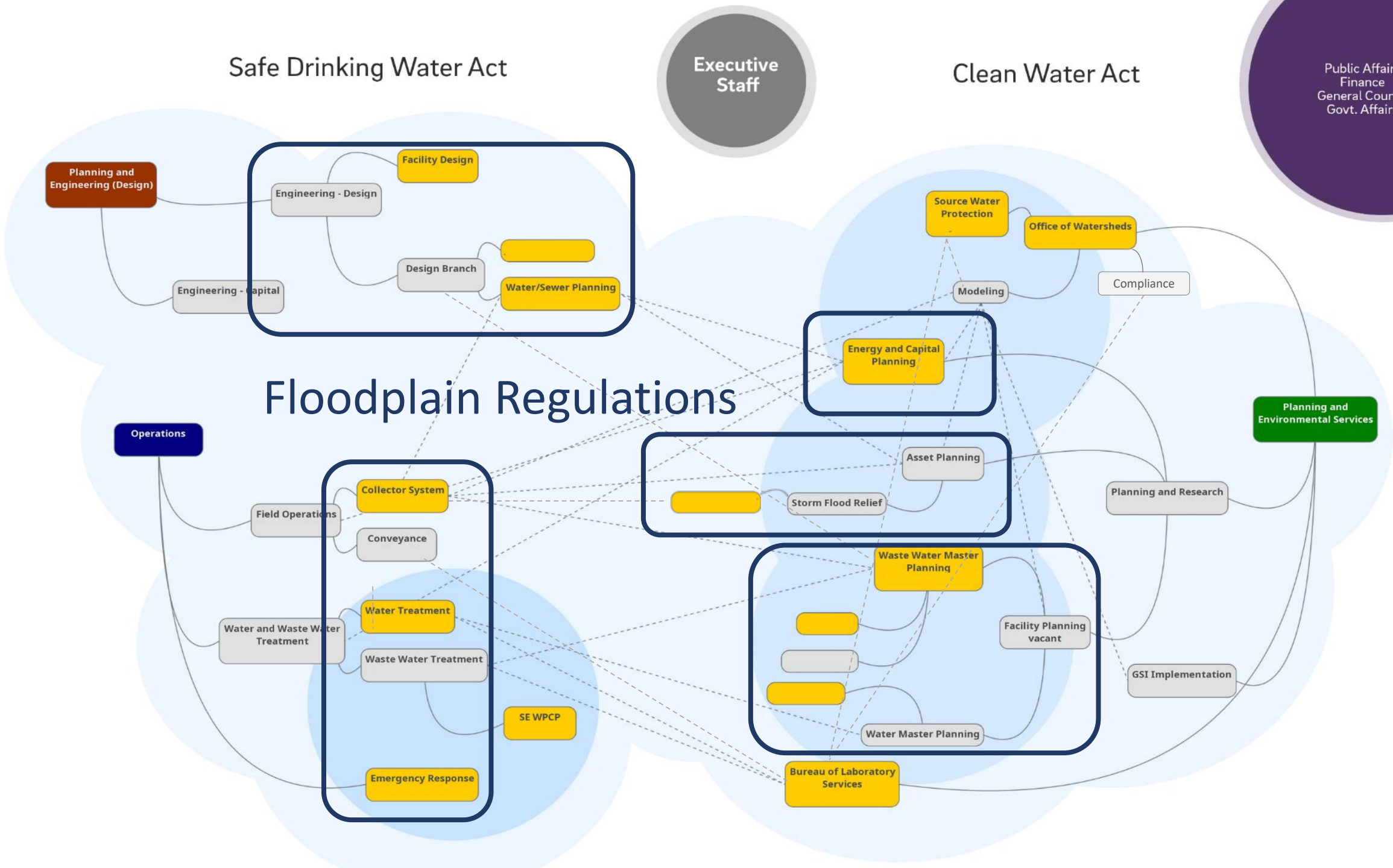

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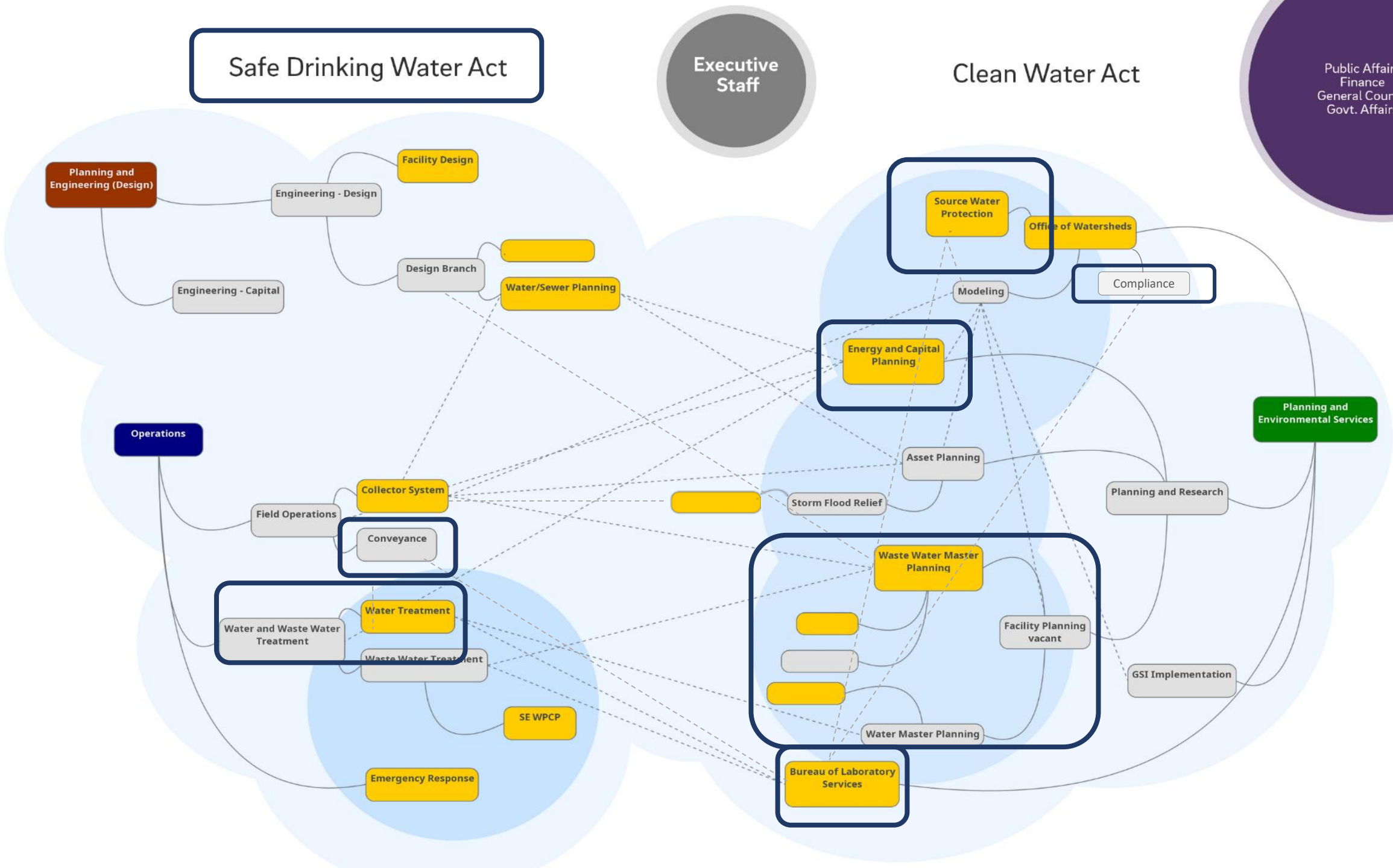
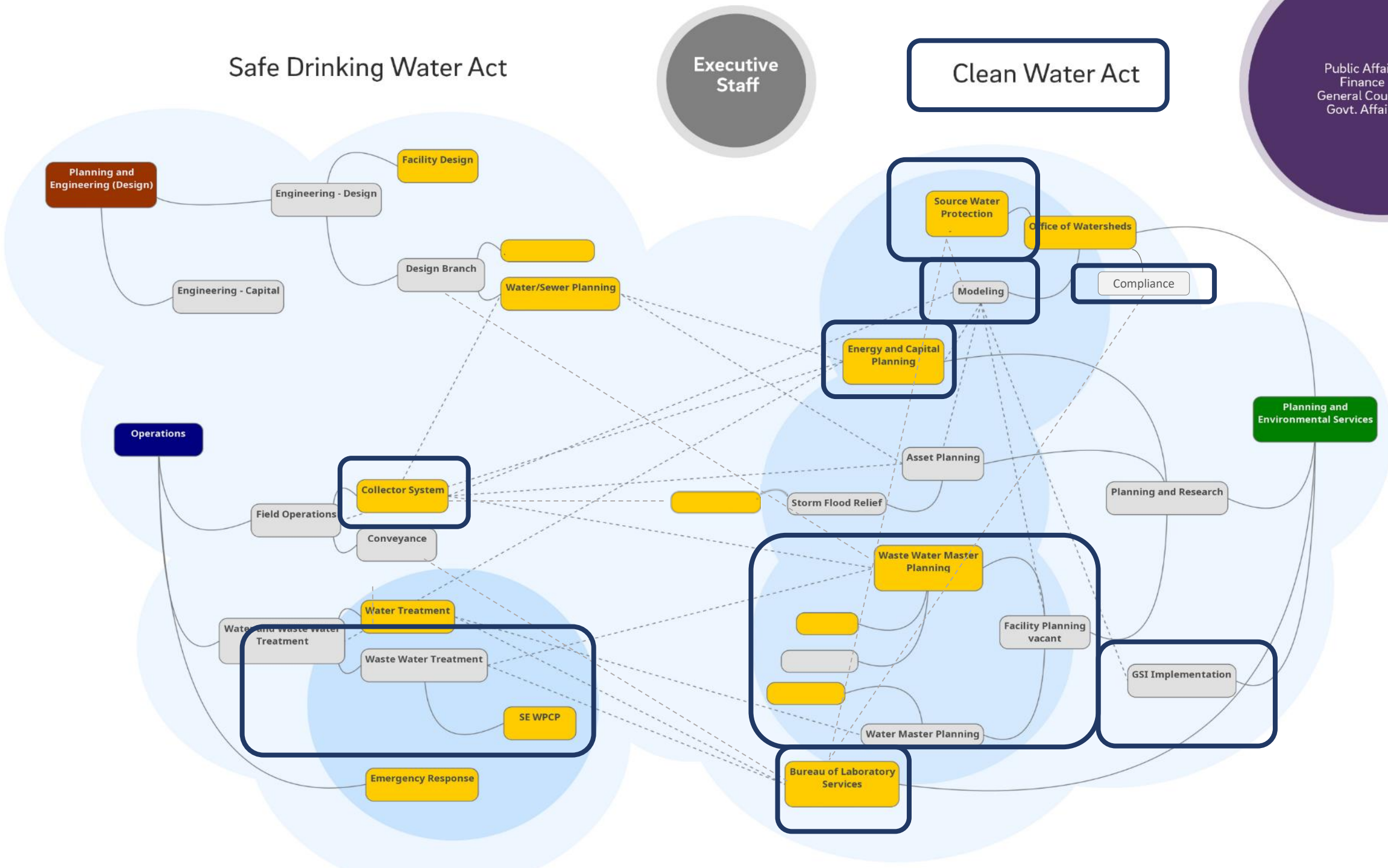


Roll Out Strategy - Organization Map



Internal Communications and Mainstreaming

Sea Level Rise

What could be affected?

Structural systems

- Drinking water treatment plants
- Wastewater treatment plants
- Pumping stations
- Stormwater system (CSO & MS4)
- Wastewater drainage system
- Electrical equipment (all facilities)

Non-Structural systems

- Source water quality
- Source water quantity
- Energy demand

Units affected?

- Planning & Research
- Office of Watersheds
- GSI Implementation
- Operations
- Design
- Emergency Management

Programs, plans & processes affected?

- Wastewater Master Plan
- Water Master Plan
- Operations (treatment, pumping)
- Storm Flood Relief Program
- Capital Planning Program
- Linear Asset Management
- Source Water Protection Program
- Green City Clean Waters (H&H modeling, GSI)
- Emergency Planning & Response

Internal Communications and Mainstreaming

- Identify champions
- Form a working group
- Embed climate change into existing programs & plans

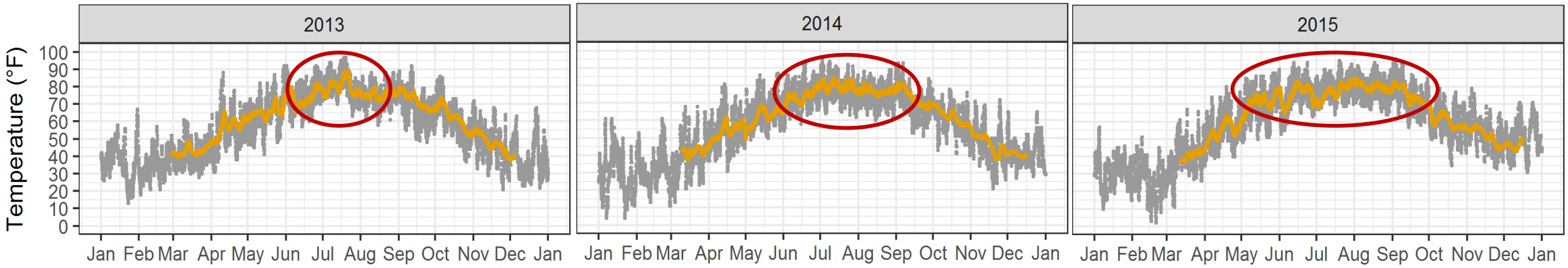
Internal Communications and Mainstreaming

CCAP Champions Database					
Unit	Division	Staff member	email	phone	Location
Planning and Engineering	Facility Design				
	?				
	Engineering - Design Branch				
	Water/sewer Planning				
Operations	Field Operations				
	Conveyance				
	Waste water Treatment?				
	Waste Water Treatment				
	Emergency Response				
	Water Treatment				
	Field Operations				
Planning & Envrionmental Services	Planning and Research - capital planning and Energy				
	Planning and Research				
	OOW - Source Water/ Water Master Plan				
	Planning and Research - Waste water planning				
	Planning and Research - Waste water planning				
	Planning and Research - Waste Water Planning				
	GSI Implementation - GSI maintenance				
	GSI Implementation				
	GSI Implementation - Ecological Restoration Unit				
	GSI Implementation - Ecological Restoration Unit				
	GSI Implementation - Ecological Restoration Unit				
	OOW - H&H Modeling Group				
	OOW - H&H Modeling Group				
	Bureau of Laboratory Services				
	Bureau of Laboratory Services				


gifak-net
RESISTANCE

Internal Communications and Mainstreaming

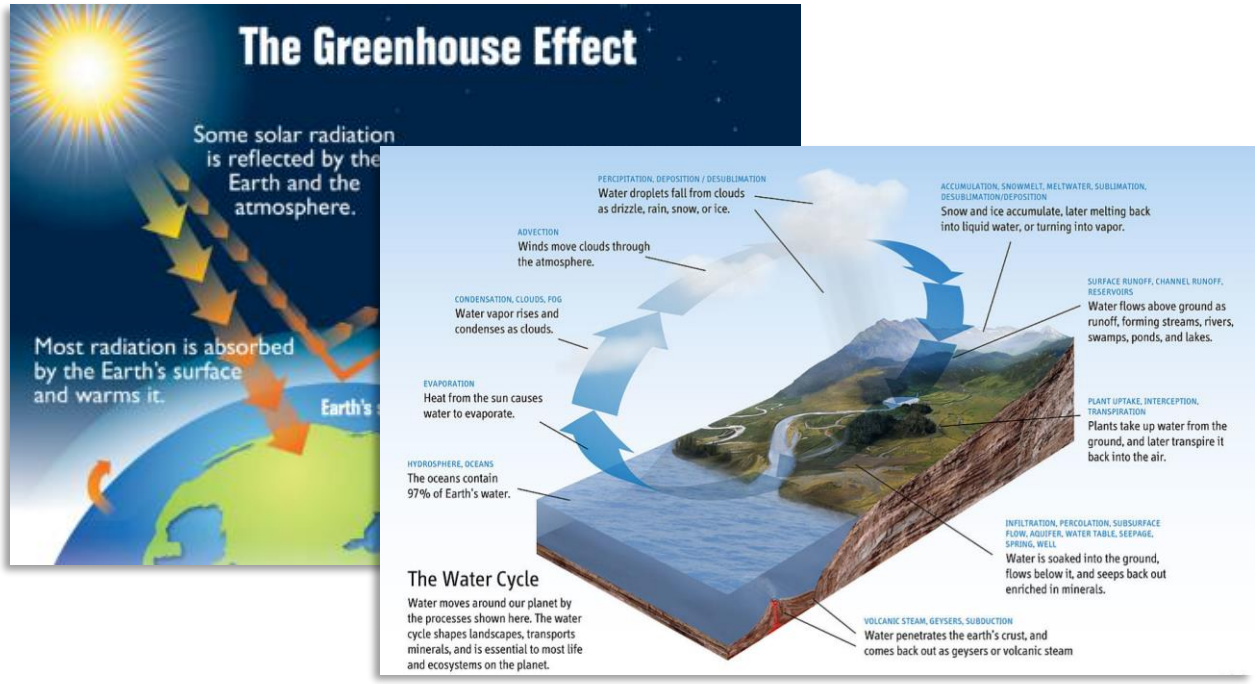
Talk about climate change in the context of what people already know



Climate change amplifies and multiplies issues we already deal with.

Internal Communications and Mainstreaming

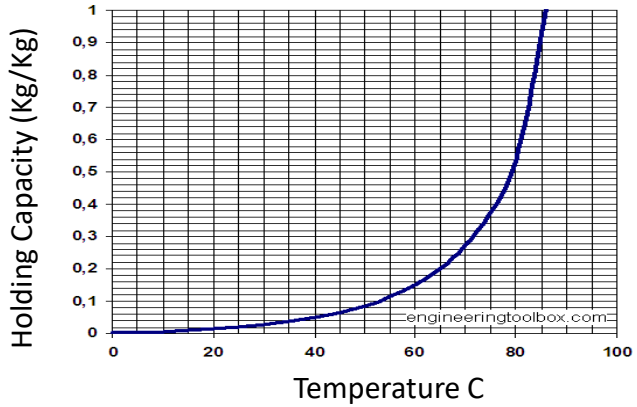
Educate people, have discussions, get them involved



- Provide the basics
- Cater your presentations
- Give people ownership
- Let them suggest solutions
- Getting stakeholders to the table is the most important part!

Principle #1

Warm air holds more moisture than cold air.
"Atmospheric holding capacity"

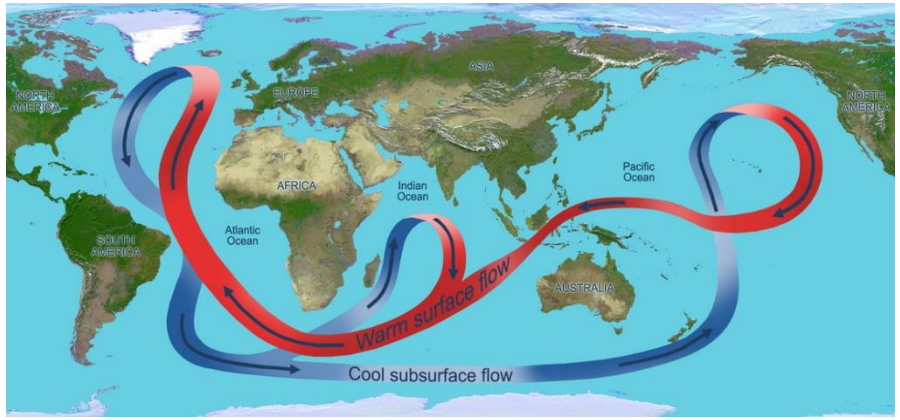


Principle #2

Warm air increases evaporation and transpiration rates

Principle #3

Temperature changes influence global circulation patterns (atmosphere & ocean)

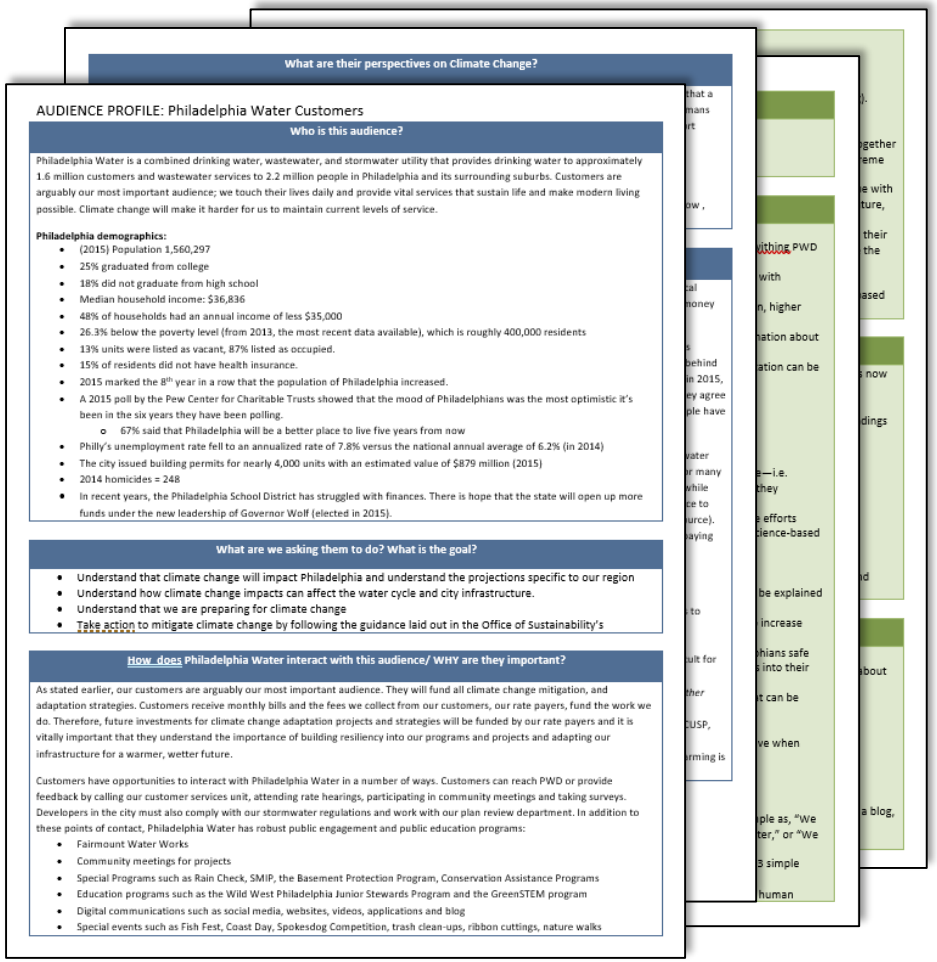


Source: Water Research Foundation Project 4381

Best Practices – external communication

Know your audience (do your homework!)

- Who is your target audience?
- Create audience profiles
- What matters to them (values)?
- If you don't know your audience:
  - Look at Yale climate opinion maps
  - Survey the audience: raise of hands



What are their perspectives on Climate Change?

AUDIENCE PROFILE: Philadelphia Water Customers

Who is this audience?

Philadelphia Water is a combined drinking water, wastewater, and stormwater utility that provides drinking water to approximately 1.6 million customers and wastewater services to 2.2 million people in Philadelphia and its surrounding suburbs. Customers are arguably our most important audience; we touch their lives daily and provide vital services that sustain life and make modern living possible. Climate change will make it harder for us to maintain current levels of service.

Philadelphia demographics:

- (2015) Population 1,560,297
- 25% graduated from college
- 18% did not graduate from high school
- Median household income: $36,836
- 48% of households had an annual income of less $35,000
- 26.3% below the poverty level (from 2013, the most recent data available), which is roughly 400,000 residents
- 13% units were listed as vacant, 87% listed as occupied.
- 15% of residents did not have health insurance.
- 2015 marked the 8th year in a row that the population of Philadelphia increased.
- A 2015 poll by the Pew Center for Charitable Trusts showed that the mood of Philadelphians was the most optimistic it's been in the six years they have been polling.
  - 67% said that Philadelphia will be a better place to live five years from now
- Philly's unemployment rate fell to an annualized rate of 7.8% versus the national annual average of 6.2% (in 2014)
- The city issued building permits for nearly 4,000 units with an estimated value of $879 million (2015)
- 2014 homicides = 248
- In recent years, the Philadelphia School District has struggled with finances. There is hope that the state will open up more funds under the new leadership of Governor Wolf (elected in 2015).

What are we asking them to do? What is the goal?

- Understand that climate change will impact Philadelphia and understand the projections specific to our region
- Understand how climate change impacts can affect the water cycle and city infrastructure.
- Understand that we are preparing for climate change
- Take action to mitigate climate change by following the guidance laid out in the Office of Sustainability's

How does Philadelphia Water interact with this audience/ WHY are they important?

As stated earlier, our customers are arguably our most important audience. They will fund all climate change mitigation, and adaptation strategies. Customers receive monthly bills and the fees we collect from our customers, our rate payers, fund the work we do. Therefore, future investments for climate change adaptation projects and strategies will be funded by our rate payers and it is vitally important that they understand the importance of building resiliency into our programs and projects and adapting our infrastructure for a warmer, wetter future.

Customers have opportunities to interact with Philadelphia Water in a number of ways. Customers can reach PWD or provide feedback by calling our customer services unit, attending rate hearings, participating in community meetings and taking surveys. Developers in the city must also comply with our stormwater regulations and work with our plan review department. In addition to these points of contact, Philadelphia Water has robust public engagement and public education programs:

- Fairmount Water Works
- Community meetings for projects
- Special Programs such as Rain Check, SMIP, the Basement Protection Program, Conservation Assistance Programs
- Education programs such as the Wild West Philadelphia Junior Stewards Program and the GreenSTEM program
- Digital communications such as social media, websites, videos, applications and blog
- Special events such as Fish Fest, Coast Day, Spokesdog Competition, trash clean-ups, ribbon cuttings, nature walks

Best Practices – external communication

WHO IS THIS AUDIENCE?

WHAT IS OUR COMMUNICATION GOAL?

WHY IS THIS AUDIENCE IMPORTANT?

WHAT ARE THEIR PERSPECTIVES?

WHAT ARE KEY MESSAGES?

WHAT IS OUR COMMUNICATION STRATEGY

WHAT TOOLS CAN WE USE?

Best Practices – external communication

Knowing your audience allows you to frame your message

<u>People connect on values:</u>

- Family
- Health
- <u>Our</u> responsibility – (to children & environment)
- Tell stories
- Convey how climate change will impact them (without necessarily using the words “climate change”)

Best Practices – external communication

Knowing your audience allows you to frame your message

Debbie Dooley, Tea Party Member

When talking to Republicans, promote renewable energy by talking about energy independence and freedom of choice, not by linking it to climate change.

Lessons learned – external communication

Language has weight. You don’t need to use the words “climate change”

- Belief Bias
- People feel attacked when beliefs are challenged
- “Extreme events” or “changing conditions”

Lessons Learned – external communication

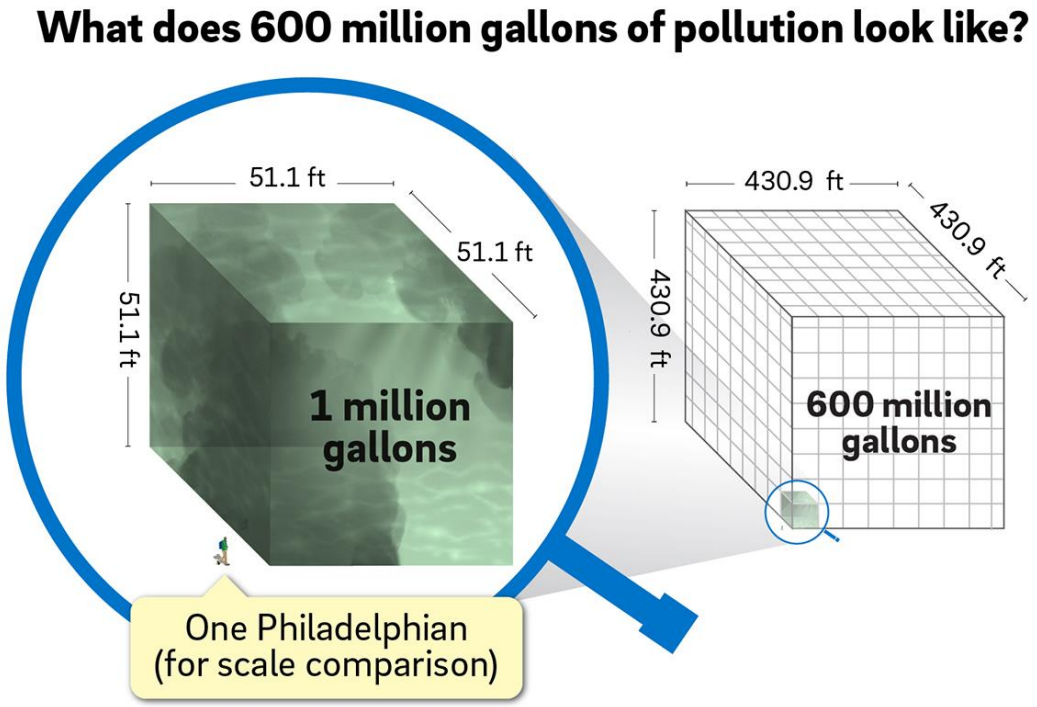
It’s important to listen and learn.
Building trust takes time and effort…

- Take the time to talk to people
- Listen to their concerns
- People want to be heard

Best Practices – external communication

Simple, clear, informative, repeated messages

- Never assume, but don't talk down
- Simple graphs
- Communicate on a human scale
- Make the science and statements meaningful
- 27 words or less



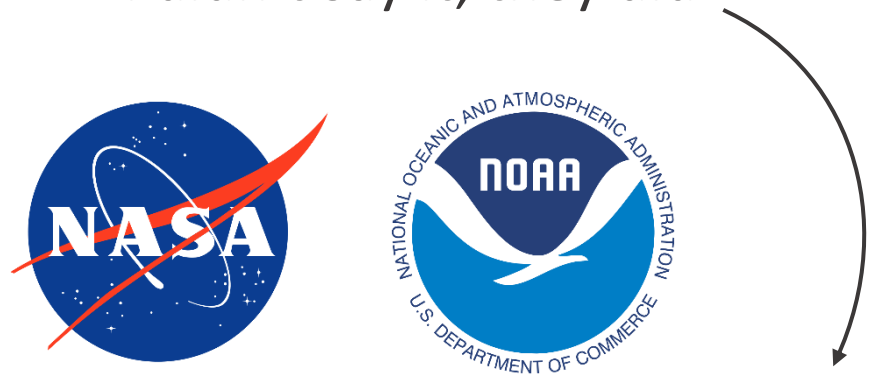
Source: Philadelphia Water Department

Lessons Learned – external communication

The messenger matters

- Convey through a trusted community member
- Send information from trusted sources
- Engage through existing channels
- Channel the power of groups
- Meet people where they are

I didn't say it, they did



ASCE
American Society of Civil Engineers

American Water Works Association

United States Global Change Research Program

Moody's

Standard & Poor's

Best Practices – external communication

97% of them!

Source: Yale/George Mason | Graphic: Cook et al., 2019

Emotions….

- Common wisdom says keep emotion out of messaging
- People shut down when they feel it is beyond hope
- Majority do not want emotion in climate change messages

However….

- More people are persuaded to take action when the message was conveyed with emotion
- There are differences in reaction based on gender, age, etc.

Source: Bloodhart, Swim & Dicicco (2019) in the journal *Science and Environmental Communication*

Keeping people engaged

- Don’t read your notes!
- Don’t use a lot of text!
- Make eye contact
- Practice your presentation

THANKS

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Philadelphia Water Department

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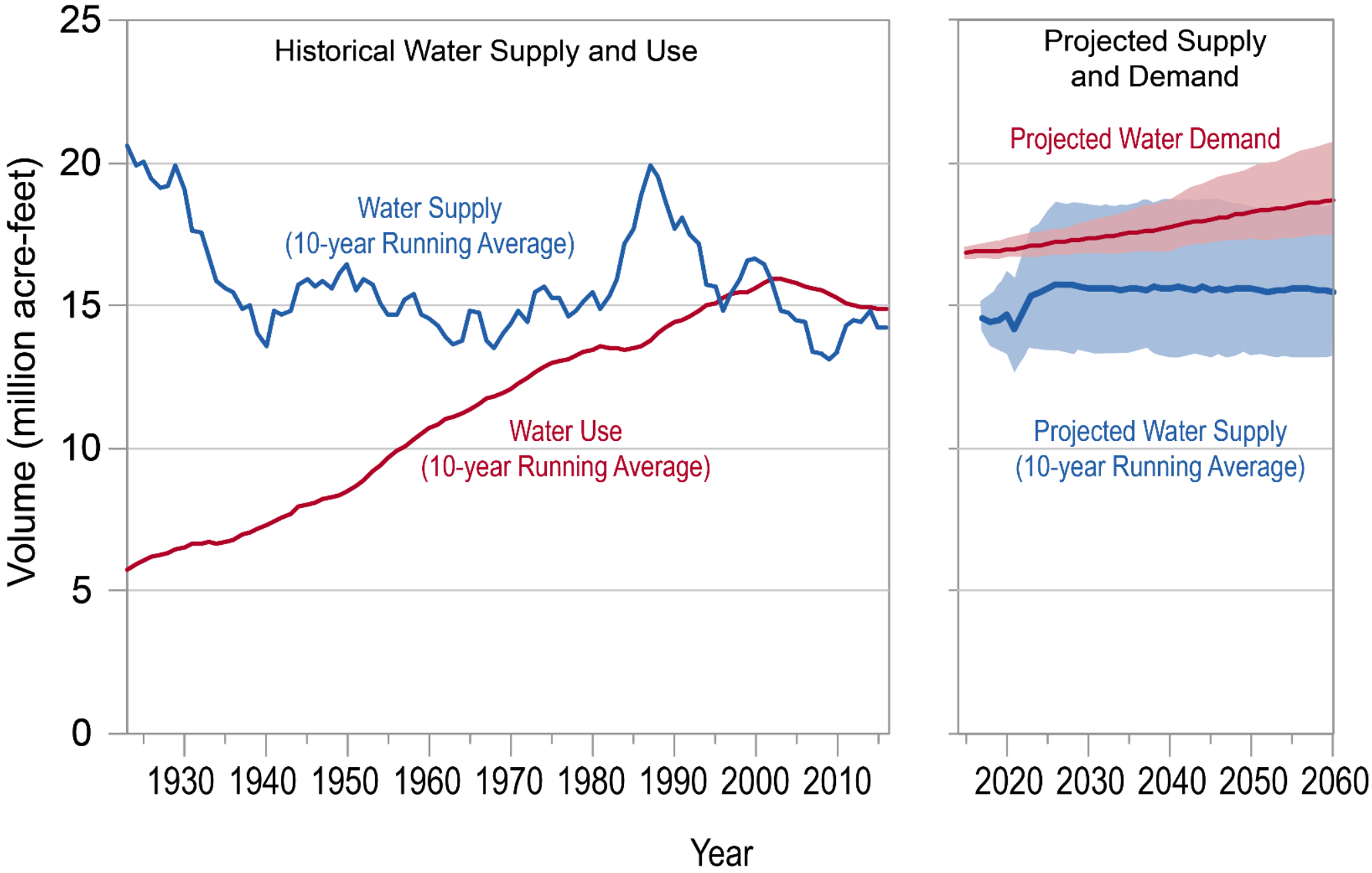
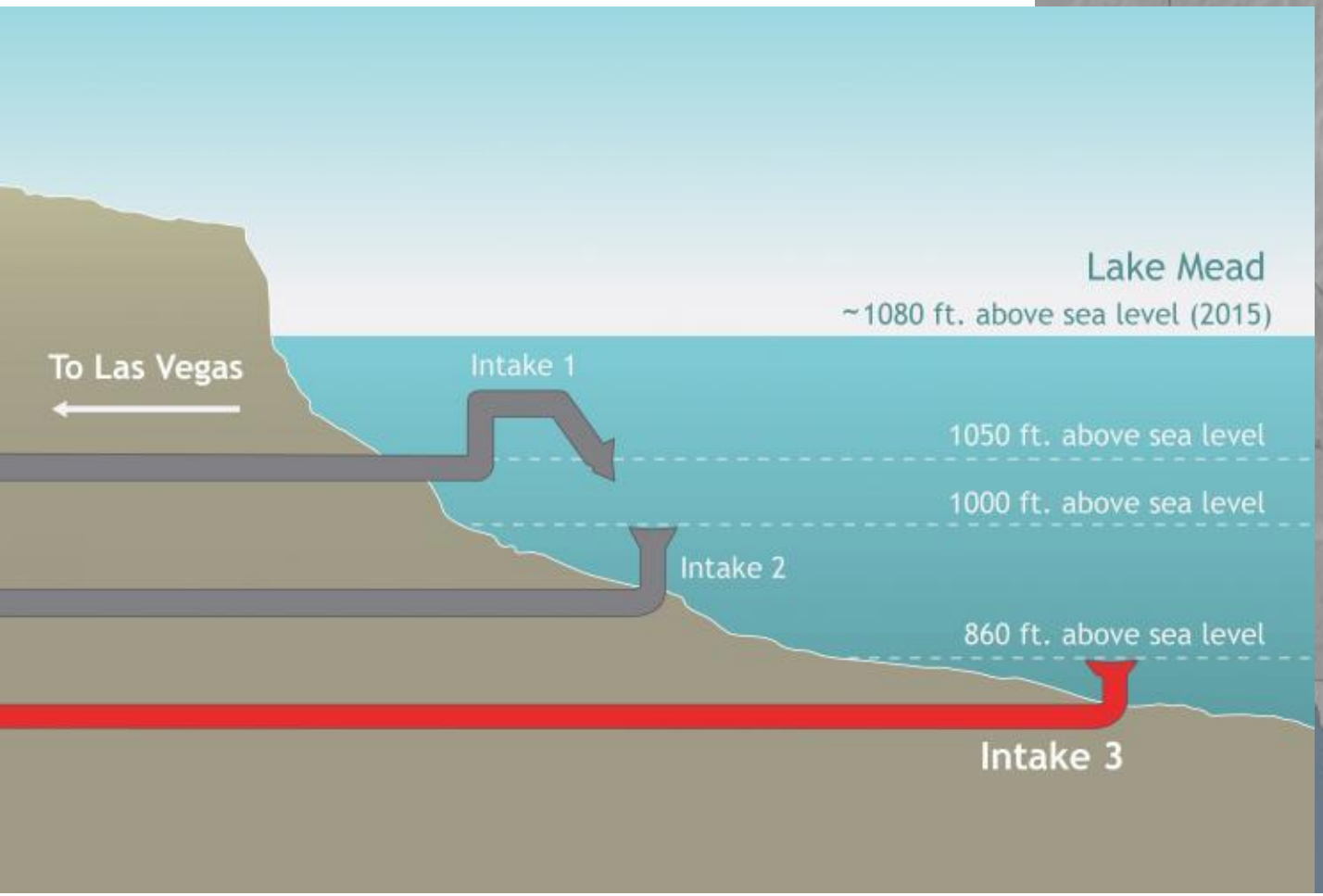
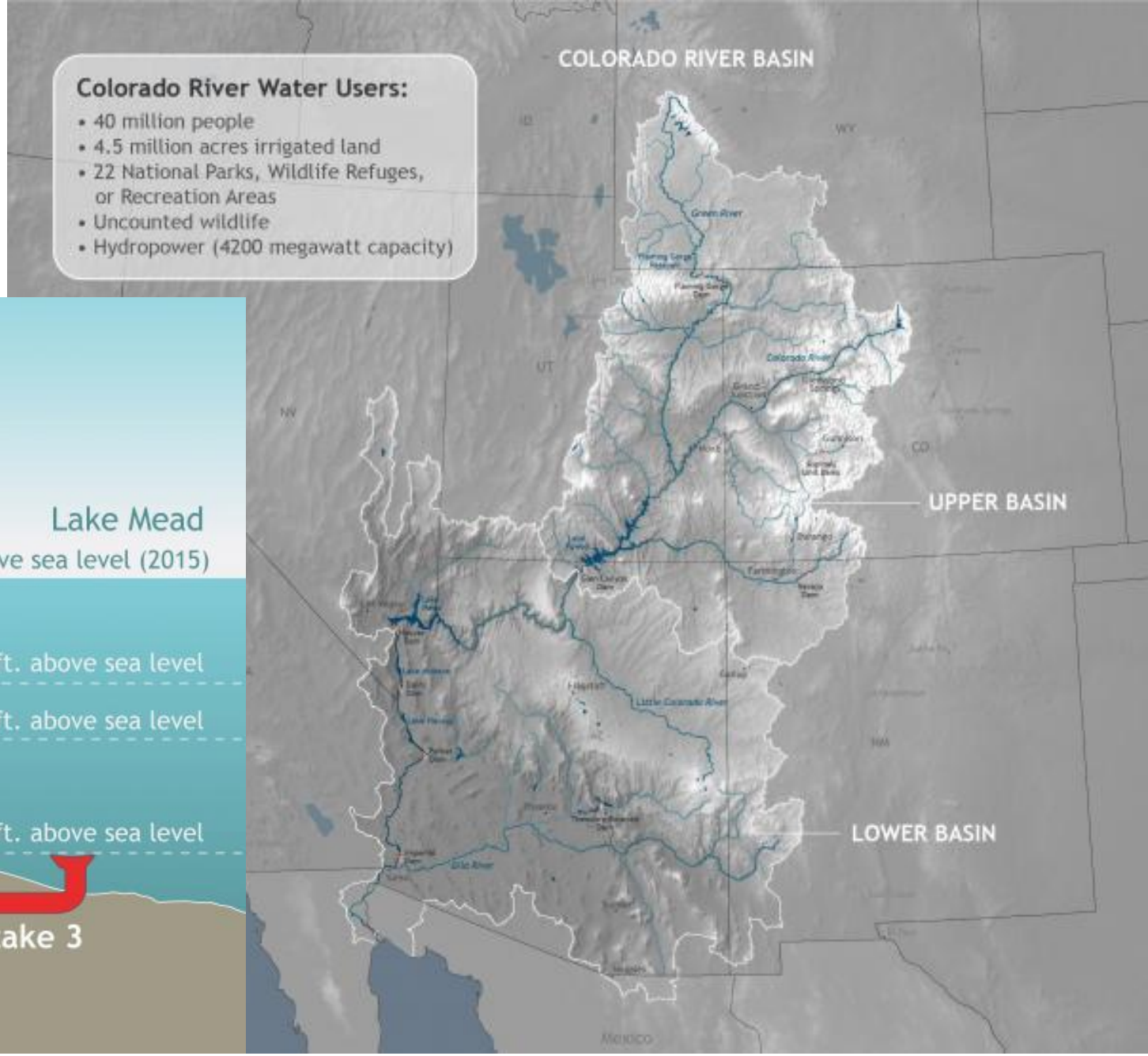
Water Utility Climate Alliance



https://https://nca2018.globalchange.gov/chapter/3#fig-3-3

The Colorado River, Lake Mead, and the Southern Nevada Water Authority



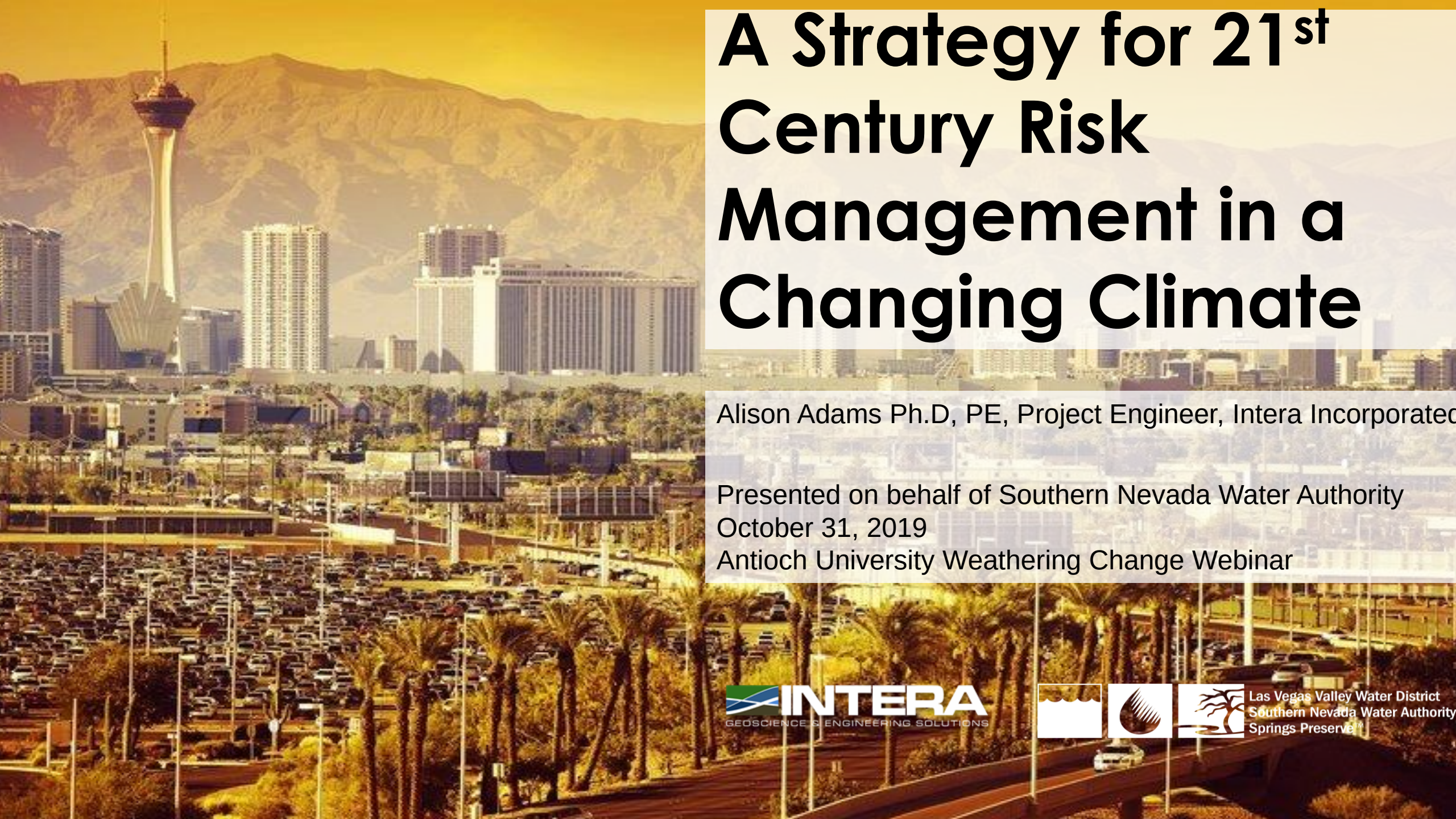


https://toolkit.climate.gov/case-studies/new-generation-water-planners-confronts-change-along-colorado-river

A Strategy for 21st Century Risk Management in a Changing Climate

Alison Adams Ph.D, PE, Project Engineer, Intera Incorporated

Presented on behalf of Southern Nevada Water Authority
October 31, 2019
Antioch University Weathering Change Webinar

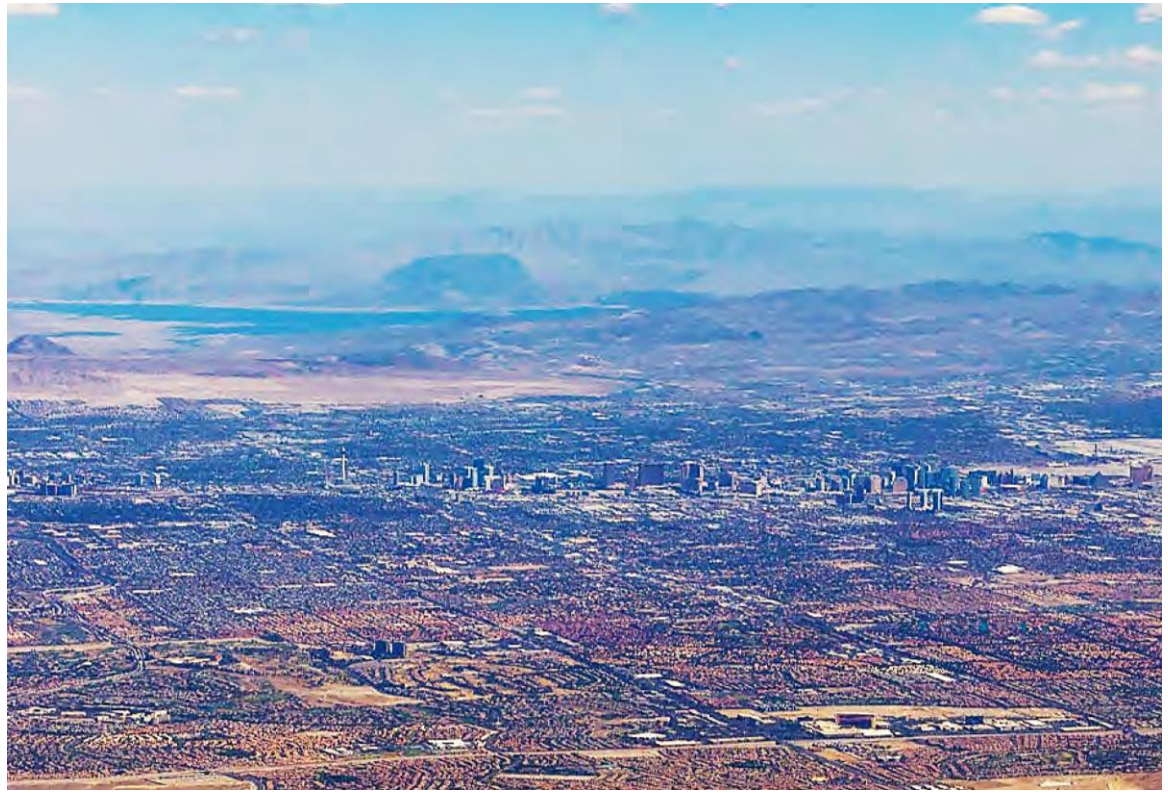


Outline

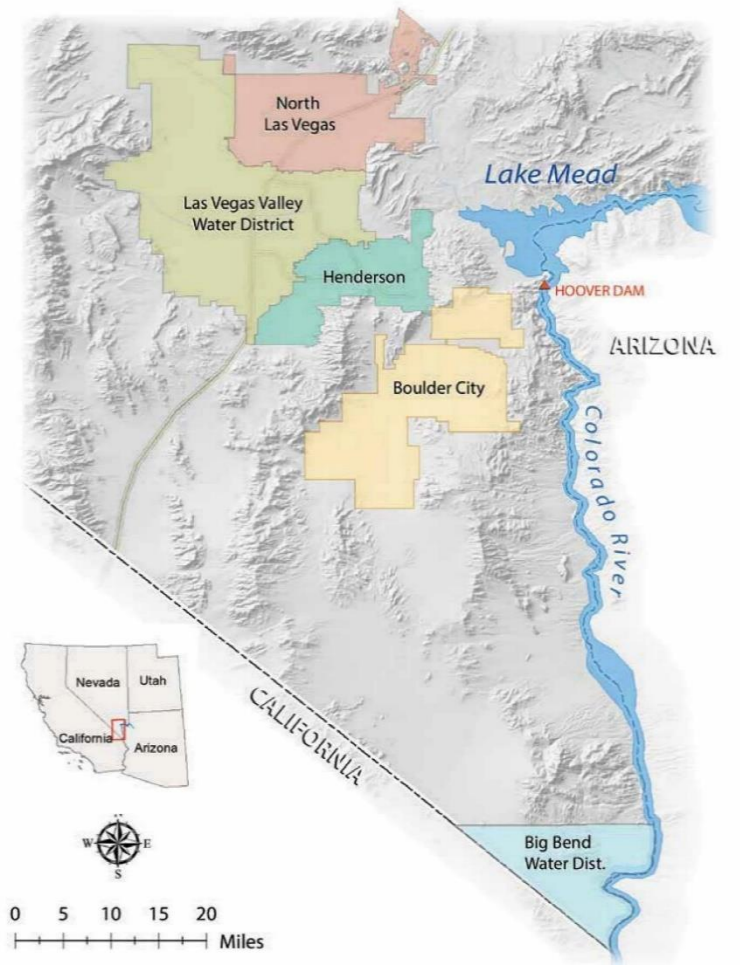
SOUTHERN NEVADA WATER AUTHORITY

LAS VEGAS VALLEY WATER DISTRICT

- Background
- Approach
  - Climate Changes
  - Enterprise Risk Management
- Project Goals & Objectives
- Process
- Results
- Key Take Aways /Lessons Learned



Background



SOUTHERN NEVADA WATER AUTHORITY

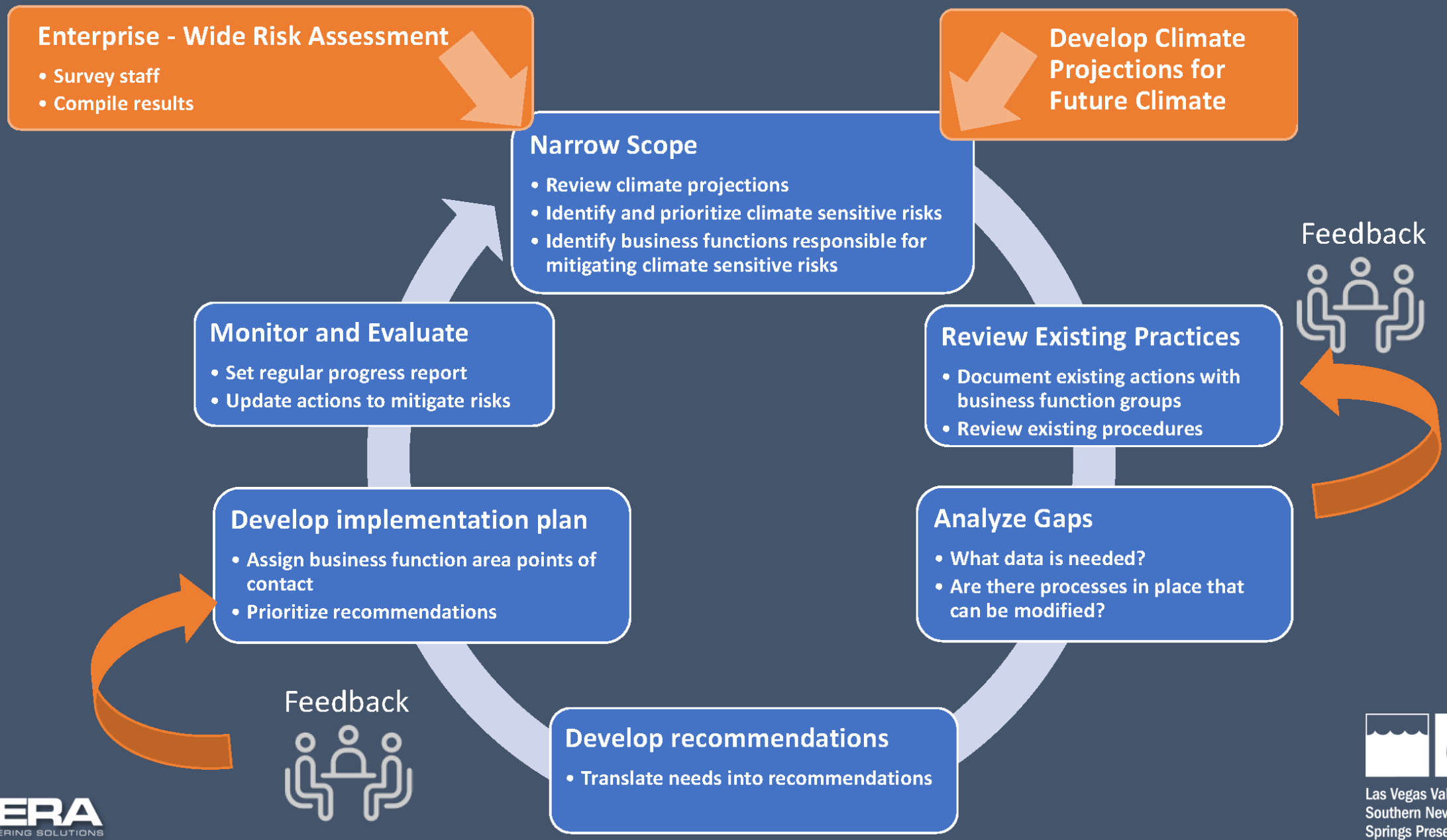
WUCA
Water Utility Climate Alliance

- Formed in 1991
- Seven member agencies serve 2.2 million people
- Colorado River 90% of supply

LAS VEGAS VALLEY WATER DISTRICT™

- Serves 1.4 million people
- 6,500 miles of pipe, 102 wells, 54 pump stations, 79 distribution storage reservoirs

Operationalizing Climate Information



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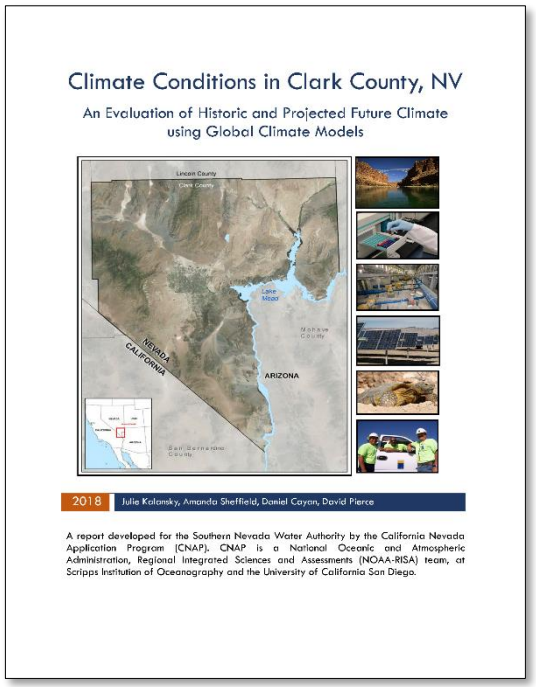
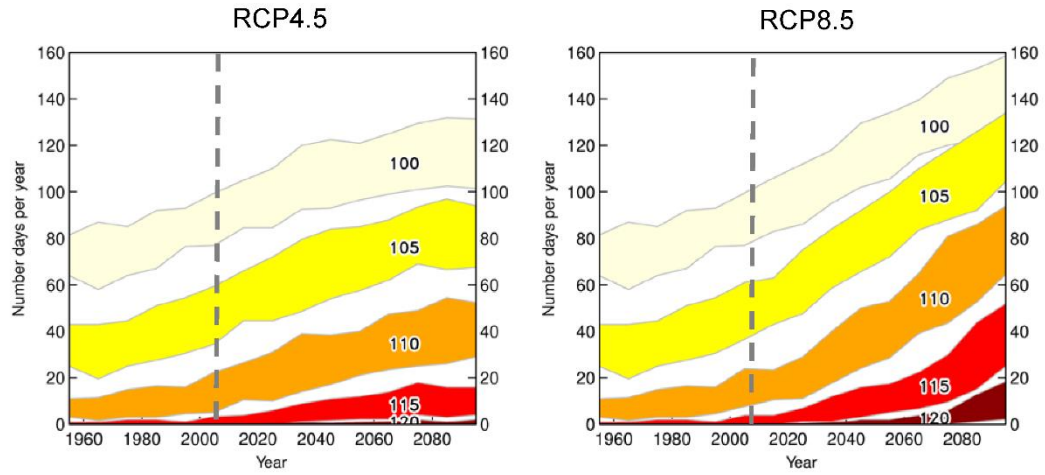
Projected Change in Climate – Clark County



- **Mean annual temperature projected to increase 3.8 to 6.5 °F by the 2050s**
- **Night time lows increase more rapidly than day time highs**
- **High heat days increase significantly**



Evolution of Enterprise Risk Management

Traditional Risk Management

- Historically focused
- Ad hoc activity
- Accounting, treasury, and internal audit
- Fragmentation (Silo Approach)
- Financial Risk
- Inspect, detect, react
- Focus on people

Enterprise Risk Management

- Strategic
- Continuous activity
- All of management
- Focused and coordinated (Holistic)
- Business Risk
- Anticipate, detect, monitor
- Focus on processes and people

Enterprise Risk Management – Types of Risk

Hazard	Financial	Operational	Strategic
• Property Damage • Natural Catastrophe	• Asset Value • Liquidity • Credit	• Service Failure • Human Resources	• Reputation • Competition • Regulatory

ERM Progress To Date

ERM Committee held 115 meetings and interviewed 181 supervisors, managers, directors and DGMs between February and June 2018

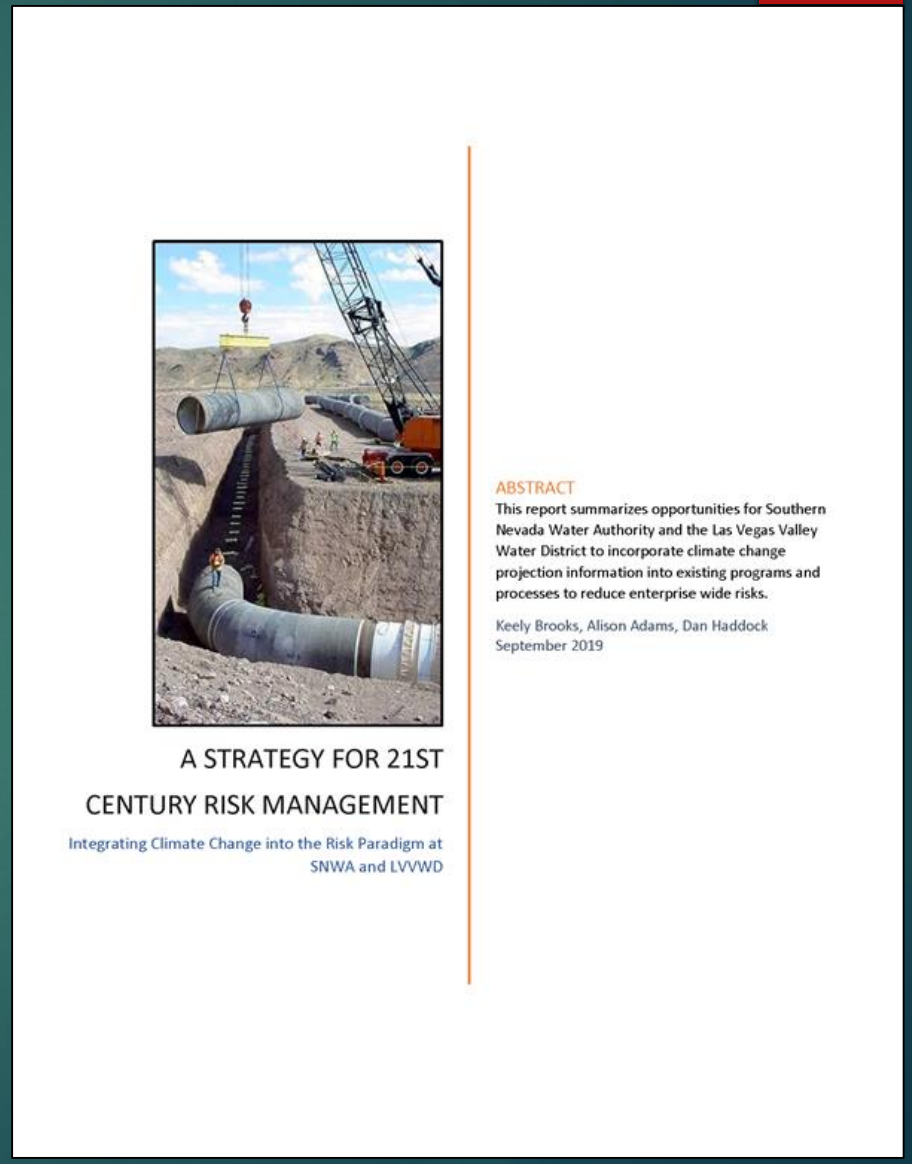
Compiled 928 comments

Based on comments 59 risks were identified

Marsh Analytics study completed

SNWA Mainstreaming Project

- **GOALS:**
  - **Operationalize climate change information**
  - **Reduce potential risks through a streamlined approach**
- **OBJECTIVES:**
  - **Characterize and prioritize climate – related risks**
  - **Identify opportunities to incorporate climate change information into existing processes, procedures, and programs**
  - **Identify data and baseline information needs for monitoring and evaluating future impacts**
  - **Develop an implementation plan**



Engagement Process

- **Identify climate sensitive risk from the Enterprise Risk Management List**
- **Identify business function groups and staff for engagement**

Business Function Areas

- **59** enterprise-wide potential risks
- **17** climate sensitive
- Addressed **11** climate-sensitive potential risks
- Managed by **7** Business Function Areas

Water Resources

Environmental Health and Safety

Capital Program Governance

Engineering Design Standards

Infrastructure Management

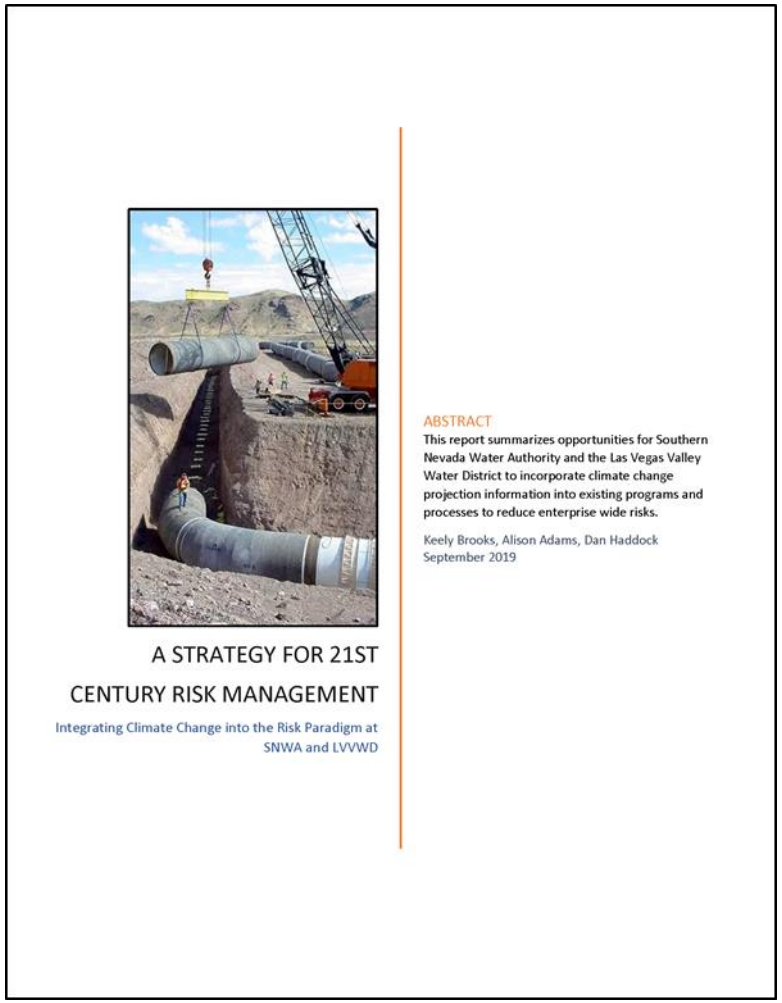
Distribution System Operations

Water Quality Treatment and Monitoring

Engagement Process (con't)

- **Held 17 small group meetings to identify data and baseline information needs for monitoring and evaluating future impacts**
- **Iterative process to develop an implementation plan**

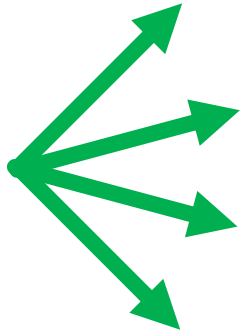
Results

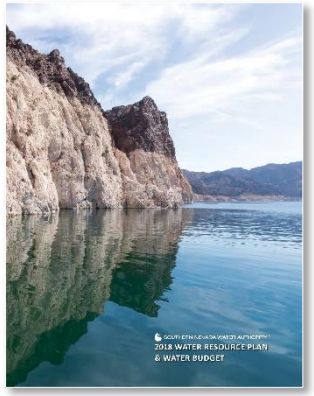


- **37** recommendations to help manage increased risk
  - **Collect and monitor data**
  - **Educate and Train**
  - **Adapt procedures**
  - **Research and modeling**
  - **Strategic**

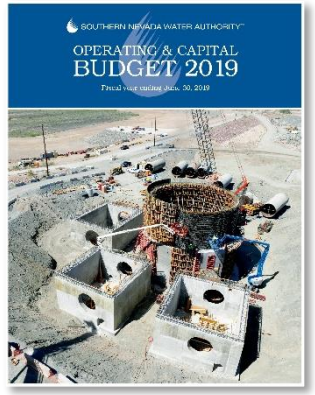
Establish a Common "Reference Climate Future"

Reference Climate Future



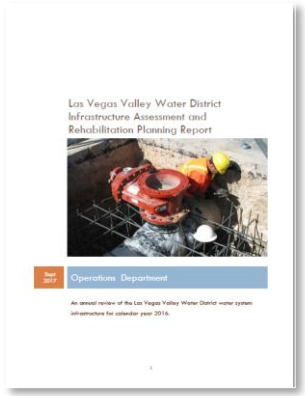


Water Resource Plan



Budgets

Capital Investment Plan



Asset Management Plan

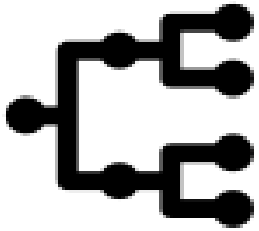
Establish a Common "Reference Climate Future"

Reference Climate Future

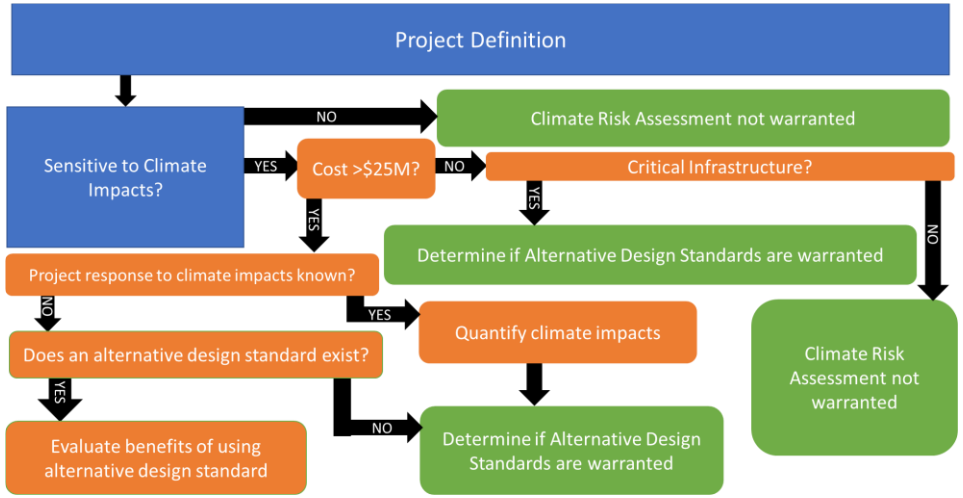
	Today	2020s	2050s	2080s
Mean annual temperature (°F)	62.7	+1.3 to +3.1	+3.8 to +6.5	+7.2 to +9.7
# of days above 100°F	84	+17	+38	+56
# of days above 105°F	44	+18	+44	+67
# of days above 110°F	12	+11	+33	+60
# of days above 115°F	1	+3	+11	+29
# of days above 120°F	0	+0	+0	+7
# of days below 60°F	236	-13	-32	-53
# of days below 50°F	174	-15	-31	-55
# of days below 32°F	42	-15	-25	-33
Change in Cooling Degree Days (CDD)[1,2]	2190	NA	2847 to 3679	NA
Mean annual precipitation[3]	4.21	NA	NA	-1.36 to +2.92 in

Early Wins

- **Revised Engineering Design Standards**
- **Project initiation decision tree & climate conditions guide**
- **Increased data collection and tracking**
- **Enhanced education and training for extreme heat**



Decision Tree



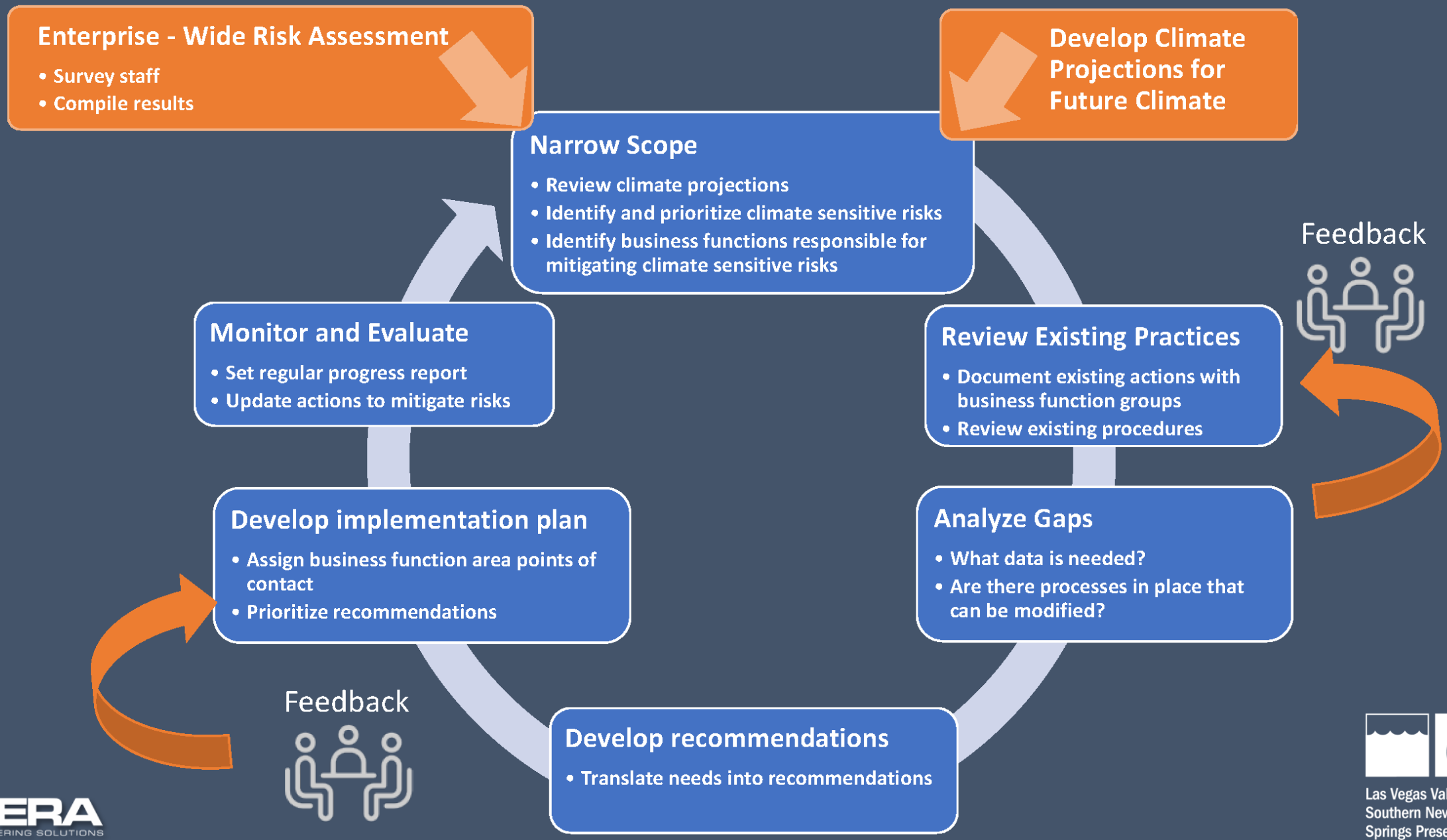
Key take aways

- **Climate change is a threat multiplier**
- **Start with what you are already doing**
- **Risk management is a logical home for climate change planning**
- **Go to the internal experts - let the Business Function Areas offer up solutions**
- **Opportunities exist to supplement organizational "controls" to address new and increasing risks**

Lessons Learned

- Know your utilities risk profile (conduct an enterprise risk assessment)
- Create a reference climate future for consistent planning (future climate projections)
- Start with existing mitigation strategies
- Iterative process using small group meetings
- Feedback is important
- Accountability

Operationalizing Climate Information



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Acknowledgements & Questions

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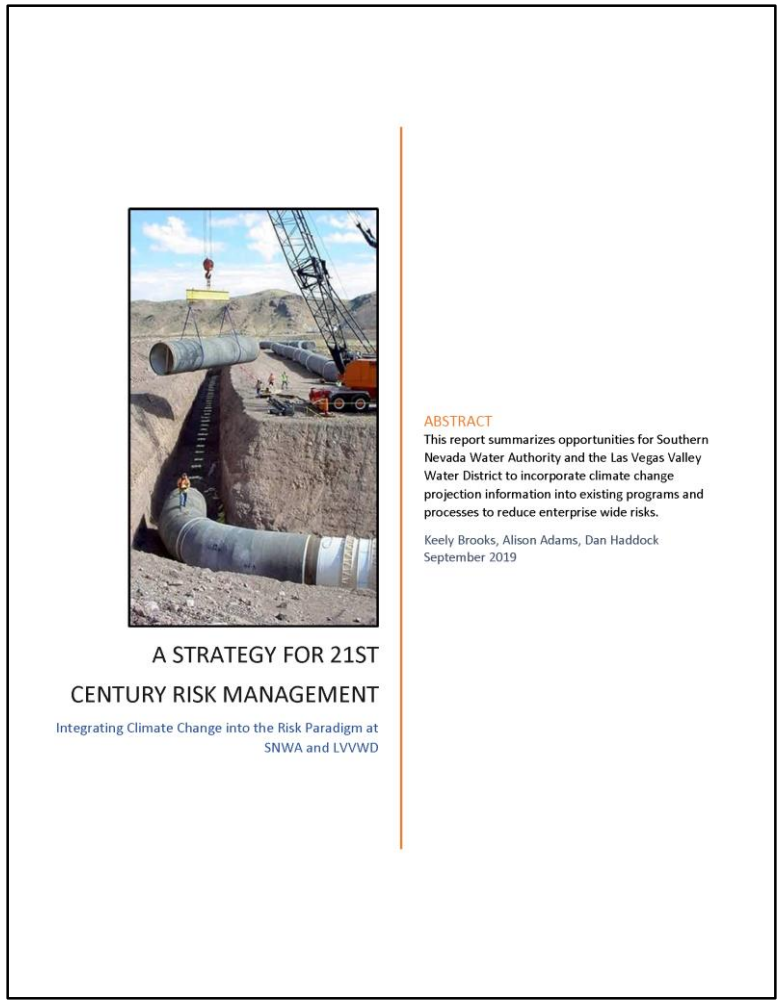

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