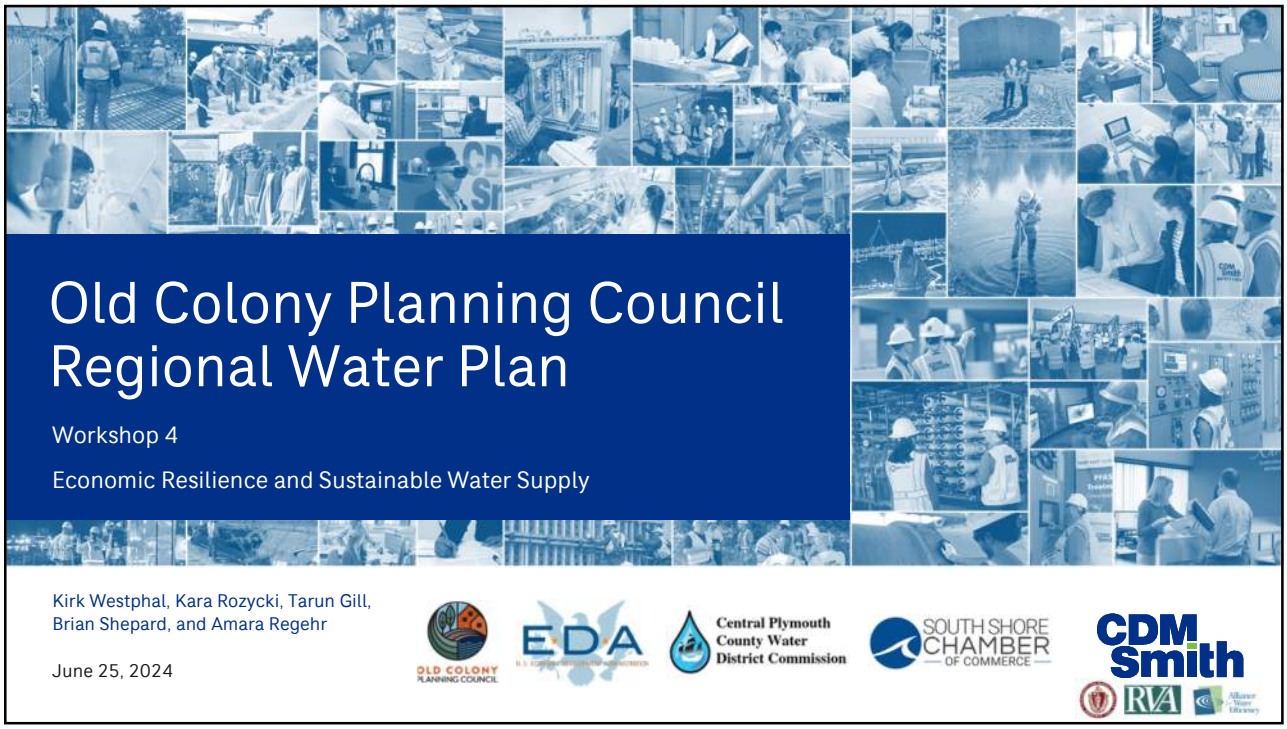
Old Colony Planning Council
Regional Water Plan
Workshop 4
Economic Resilience and Sustainable Water Supply
Kirk Westphal, Kara Rozycki, Tarun Gill,
Brian Shepard, and Amara Regehr
June 25, 2024
OLD COLONY PLANNING COUNCIL
EDA
Central Plymouth County Water District Commission
SOUTH SHORE CHAMBER OF COMMERCE
CDM Smith
RVA

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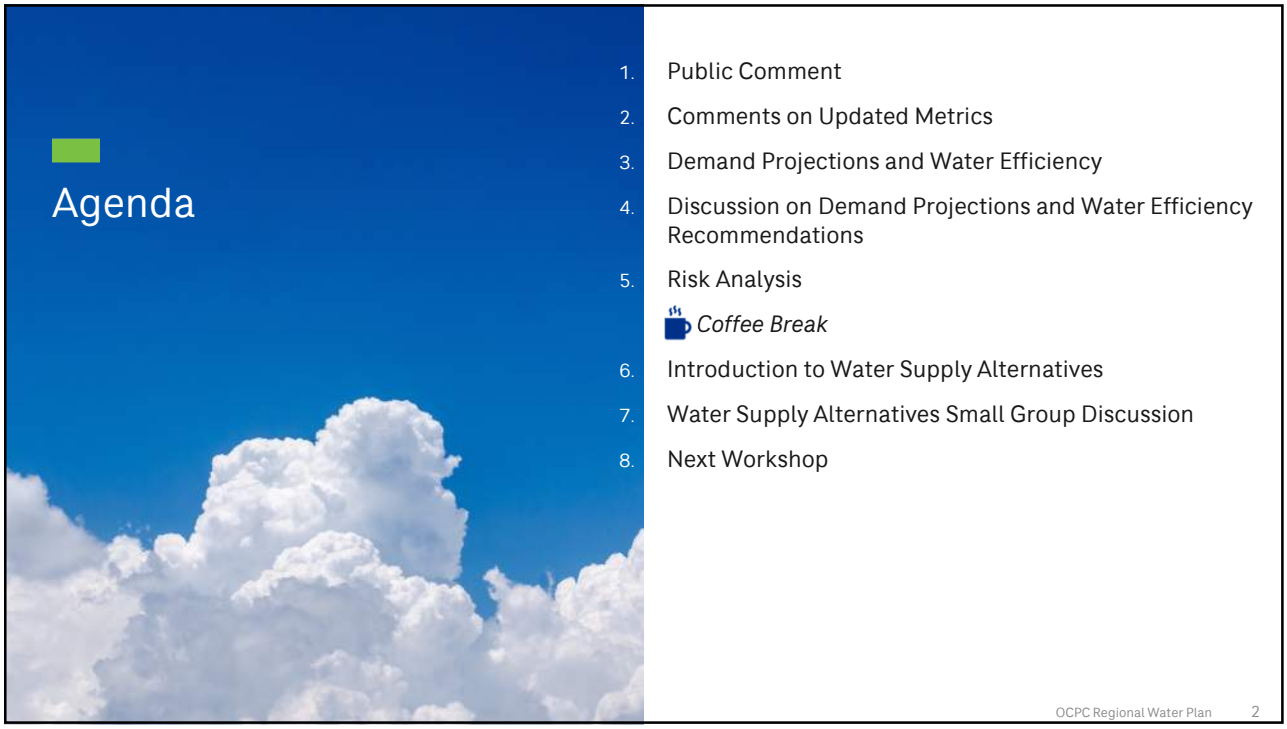
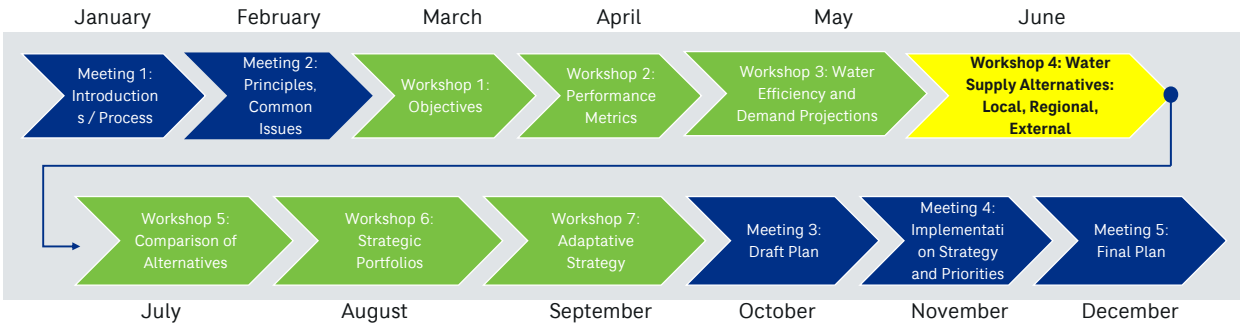

Agenda
1. Public Comment
2. Comments on Updated Metrics
3. Demand Projections and Water Efficiency
4. Discussion on Demand Projections and Water Efficiency Recommendations
5. Risk Analysis
Coffee Break
6. Introduction to Water Supply Alternatives
7. Water Supply Alternatives Small Group Discussion
8. Next Workshop
OCPC Regional Water Plan 2

2

3

Overview of Regional Water Plan Process



OCPC Regional Water Plan 4

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Comments on Updated Metrics

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Comments on Updated Metrics

- Updated metrics sent out in advance of this meeting (on June 18th).
  - Request for Metrics Feedback by July 3, 2024

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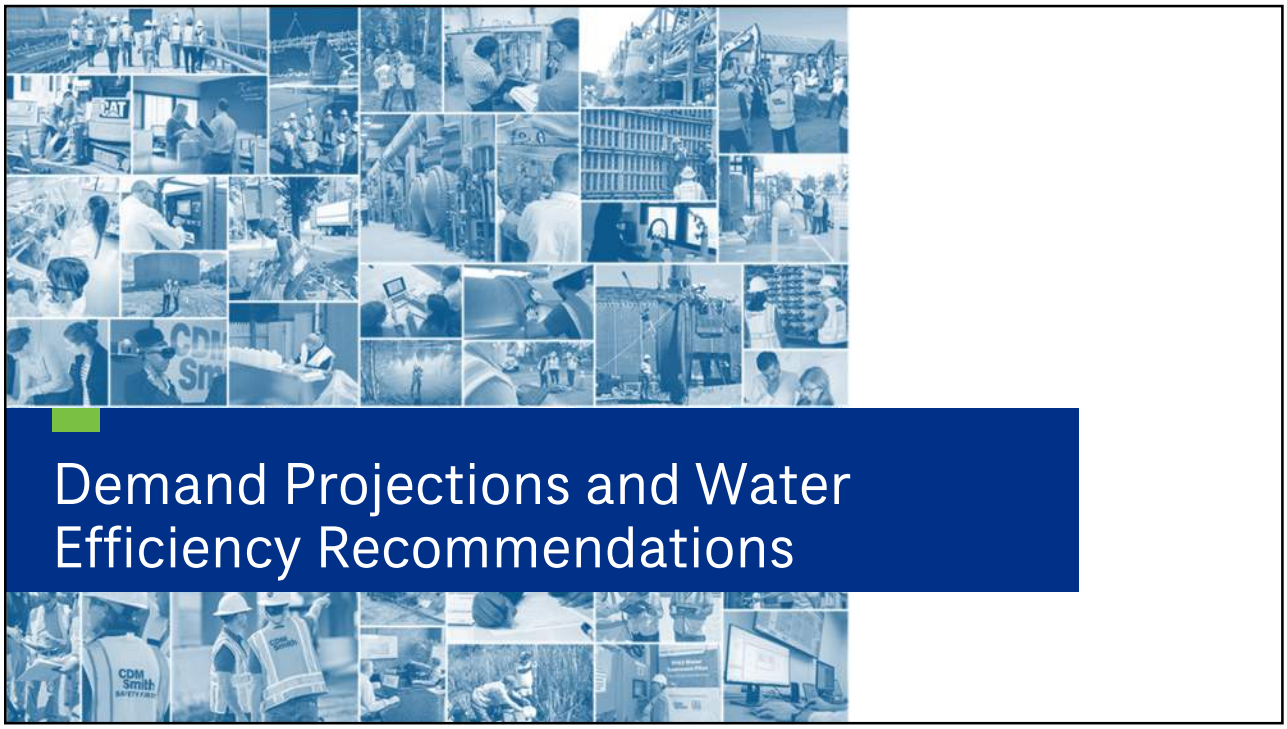

Demand Projections and Water Efficiency Recommendations

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Demand Projections Introduction

- Different methodologies exist with varying cost and complexity
- Methods fall along a spectrum rather than being a strict or exact approach
- Selecting which method depends on purpose of forecast (e.g., policy vs master planning), data availability and quality, cost and time constraints, and importance of geospatial accuracy

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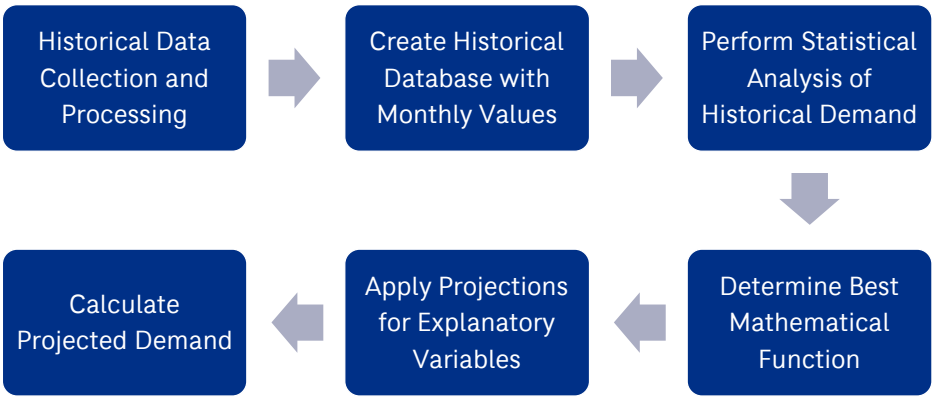
Overview of Econometric Demand Projection Process



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List of Data Used in Analysis

Statistically Significant Variables (Included in Model)	Statistically Insignificant Variables (Not Included in Model)
Average maximum temperature	Average minimum temperature
Number of days in a month above 85°F	Max temperature in prior month
Total monthly precipitation	Number of days in a month above 90°F and 80°F
Total monthly precipitation in prior month	Number of days in a month without precipitation
Indoor water use efficiency index	Unemployment rate
Summer months (June, July, August) (binary)	Median household income

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Explanatory Variables included in Demand Analysis

Temperature

10% increase in max temperature = **2.12% increase** in demand

10% increase in number of days over 85°F = **0.34% increase** in demand

10% increase in both = **2.46% increase** in demand

Precipitation

10% decrease in total precipitation = **0.99% increase** in demand

Efficiency Index

10% increase in water use efficiency = **9.39% decrease** in demand

Summer Months

In the months of **June, July, and August** → **9.76% increase** in demand

Impact over the **entire year** → **2.44% increase** in demand

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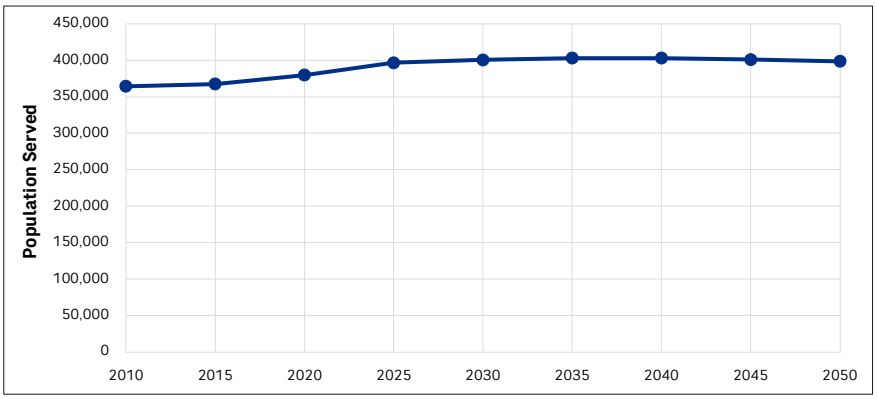
Population Estimates

- Projected population from UMass Donahue Institute (same as DCR)
- Population served is projected to **increase 6.1%** between 2020 and 2035
- Population served is then projected to **decrease 1.1%** between 2035 and 2050



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Future Scenarios for Planning

Planning Scenario	Population Growth	Future Climate Change	Water Use Efficiency	Trend in UAW	Private Wells to Public Supply
1. **Baseline**	Expected	Historical Average	Average increase in efficiency	Historical Average	None
2. **Low Stress**	Expected	Cool/Wet	Greater than average increase	Decrease	None
3. **Significant Stress**	10% greater than expected	Hot/Dry	Less than average increase	Increase	100%*
4. **Significant Stress with Mitigation**	10% greater than expected	Hot/Dry	Greater than average increase	Decrease	100%*

*100% of private wells from publicly available data. Not a comprehensive list.

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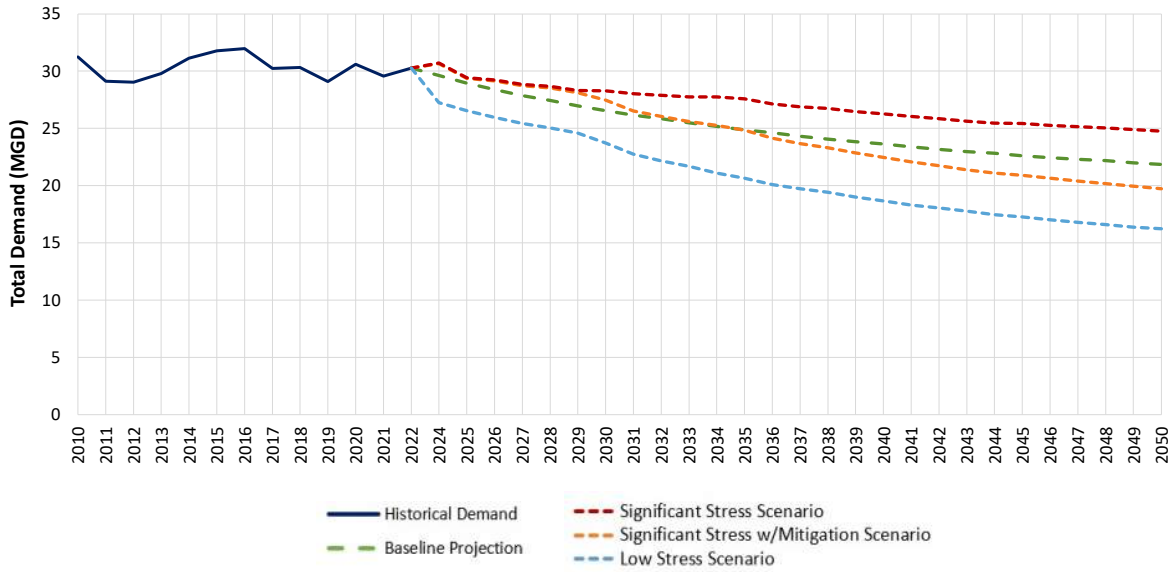
OCPC Planning Area Demand Projections



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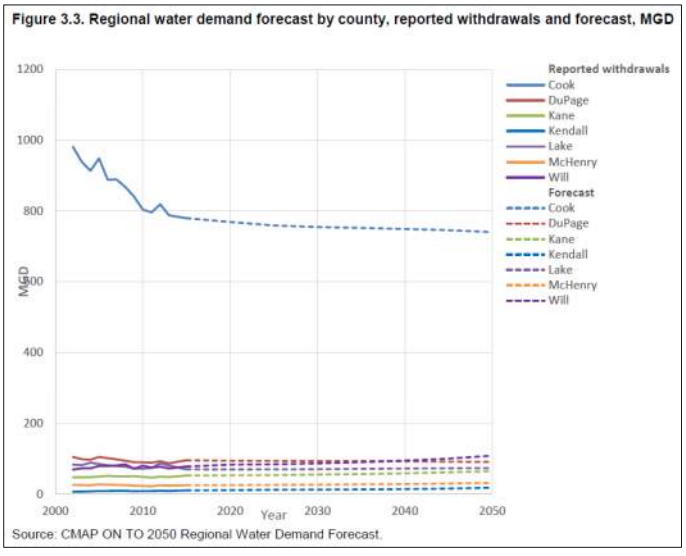
Indoor Water Use Efficiency Index: Passive Conservation

- **Massachusetts Efficiency Standards**
  - Enacted Jan 1, 2023. Applies to faucets, showerheads, and toilets sold in Massachusetts
  - More stringent than existing Federal standards, results in 22.5% reduction for those end uses
- **Department of Energy (DOE) Standards**
  - Applies to residential clothes washers sold in U.S.
  - Latest standard is approx. 45% more efficient for top loaders and 60% more efficient for front loaders compared to estimated efficiency in 2016*
- **Flume Water data**
  - Real world water use data for Boston metro area indicates current indoor use of 34 GPCD**
  - OCPC planning area indoor water use is estimated at approx. 46 GPCD, indicating reduction of 12 GPCD (-26%) is obtainable with available fixtures and appliances

*Based on *2016 Residential End Uses of Water* from Water Research Foundation (Project #4309)
**Available at: https://flumewater.com/water-index/

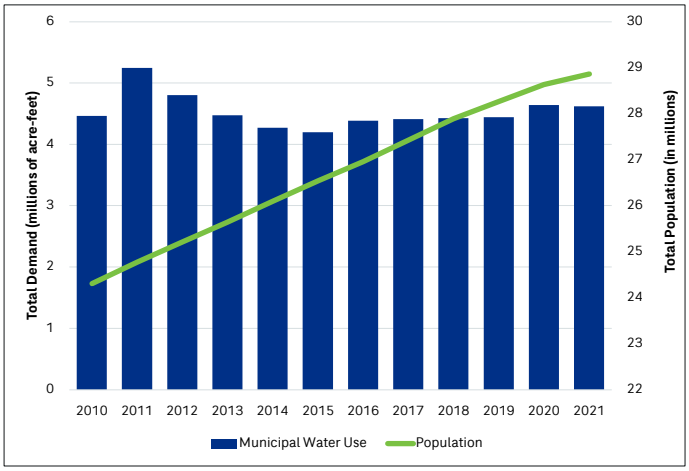
Impact of Passive Conservation on Total Demand

- Example from Illinois
  - **Demand** is projected to **decrease** over the planning horizon
  - **Population** growth is projected to be **relatively flat**
  - Improved **efficiency** drives the **decrease** in **demands**
  - No state efficiency standards



Impact of Passive Conservation on Total Demand

- Example from Texas
  - Total municipal use has been **relatively steady** between 2012 and 2021 **despite population increase** of 3.65 million (14.5%)
  - **Per capita** demand decreased 16% between 2012 and 2021
  - State efficiency standard implemented in **2014** more stringent than Federal standard

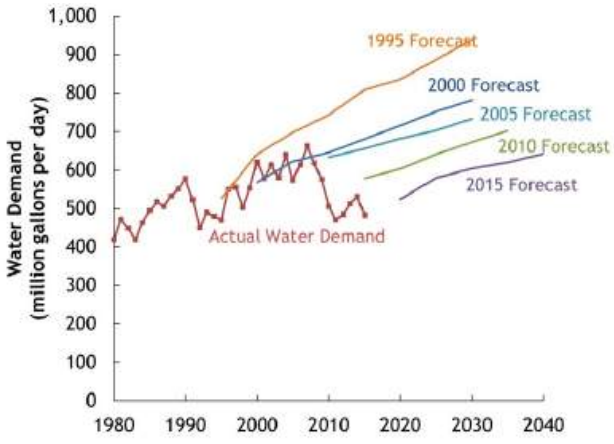


Sources: Texas Water Development Board and U.S. Census Bureau

Impact of Passive Conservation on Total Demand

- Changes in per capita demand from passive conservation are often not accounted for in demand projections
- Typical approach is a trend extrapolation
- Examples of demand projections overestimating demands are available across the U.S.

Demand Projections for San Diego, California



Source: Alliance for Water Efficiency

Summary of Demand for Communities

The minimal increase in population served and increased water use efficiency over the planning horizon produces a downward trend in water demand for the OCPC planning area through 2050.

Community	Percent Change in Demand by 2050
Abington	-22.6%
Avon	-36.0%
Bridgewater	-29.4%
Brockton	-24.4%
Duxbury	-32.1%
East Bridgewater	-26.4%
Easton	-37.9%
Halifax	-36.3%

Community	Percent Change in Demand by 2050
Hanover	-28.5%
Hanson	-32.0%
Kingston	-22.1%
Pembroke	-33.7%
Plymouth	-26.7%
Stoughton	-36.9%
West Bridgewater	-22.3%
Whitman	-29.7%

Compared to historical average water use by community for 2016-2022

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Alliance for Water Efficiency (AWE) Recommendations Update

- AWE will issue a memorandum summarizing their recommendations
- Recommendations for utilities include:
  1. Conduct, Validate, and Act on Annual American Water Works Association Water Loss Audits
  2. Adopt Advanced Metering Infrastructure and Monthly Billing
  3. Implement Customer-Side Leak Detection Program
  4. Improve Increasing Block Rate Designs
- **Consider collaborating on water efficiency and water conservation measures for communities with shared water sources**

Alliance for Water Efficiency

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RM0

Public Water Supply Watershed Sources

South Coastal Basin	Combination	Taunton River
- Duxbury - Hanover - Kingston - Pembroke - Plymouth	- Abington - Brockton -Whitman*	- Avon - Bridgewater - East Bridgewater - Easton - Halifax - Hanson - West Bridgewater

* Whitman purchases its public water supply from Brockton
Note: Plympton not included as there is no public water supply, but private well users span both South Coastal Basin and Taunton River Watersheds

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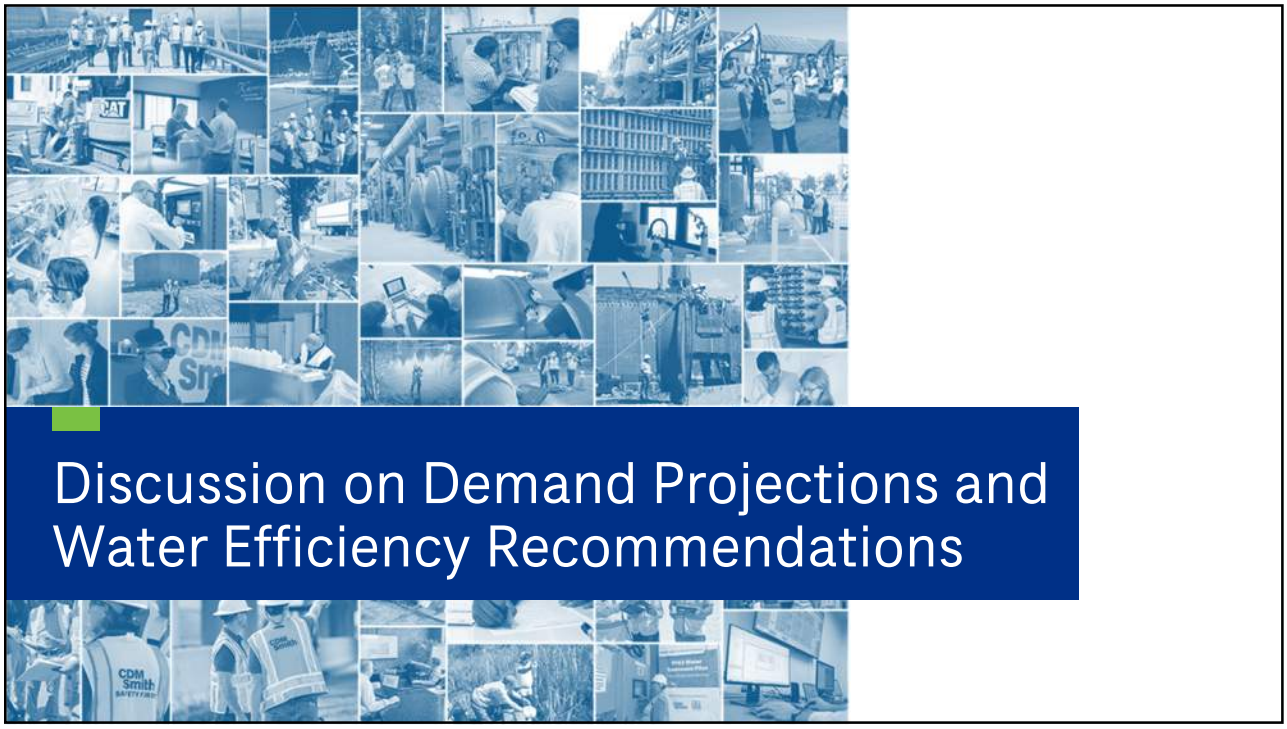

Discussion on Demand Projections and Water Efficiency Recommendations

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Discussion on Demand Analysis and Water Efficiency

- Demand Analysis
  - What are your thoughts on the demand analysis for the region?
  - Do the scenarios adequately provide a range of future scenarios useful for planning purposes?
- Water Efficiency
  - Is there interest in collaboration across watershed source waters for water conservation measures?
  - Is there interest in collaboration across watershed source waters for resource protection?
  - If so, what could this look like?

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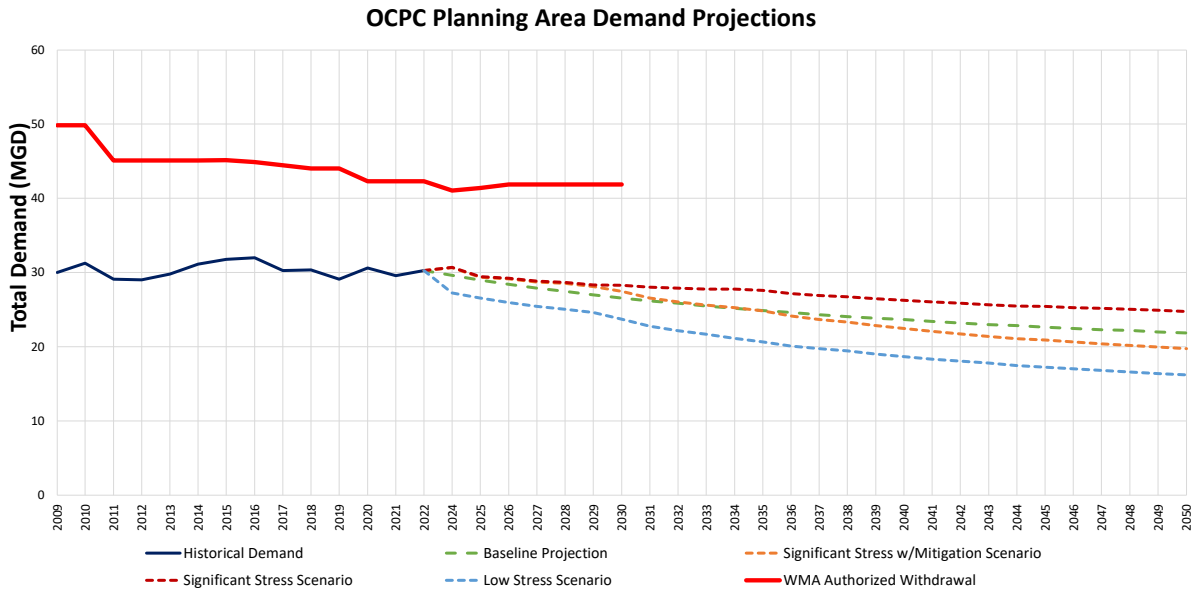

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RM0

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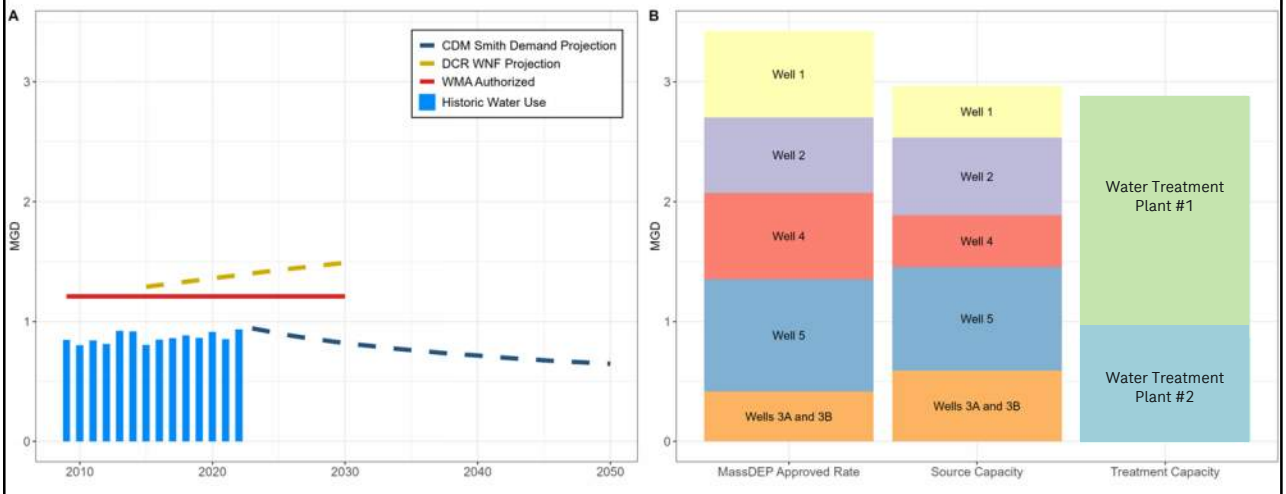
Risk Analysis - *Demand Projections and Capacity Memo*

Feedback requested by 7/12 via email



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Risks/Uncertainties That Could Help Shape the Plan

Are these and other risks important to mitigate in the Regional Water Plan?

- Supply Risks
  - Climate Change
    - More Droughts
    - Sea Level Rise / Saltwater intrusion
  - PFAS
    - More public sources
    - Private wells
  - Desalination
    - Funding challenges
- Demand Risks
  - Climate Change
    - Less summer rain, higher temps
    - Private wells seeking public supply
  - Population
    - Growth outpaces projections
  - Water Use Efficiency
    - Projections not met
    - Aging infrastructure
- Ecological Risks
  - Climate Change
    - Lower flows
    - Lower water table
  - Development
    - Reduced open space and ecological connectivity
  - Water Quality
    - Nutrients/Algae
    - Toxins
    - Other
- Policy/Regulatory Risks AR0
  - MBTA Zoning
  - WMA Renewals
  - State/Federal drinking water regs
  - Reclaimed water regs in MA
  - Economic policy / borrowing rates

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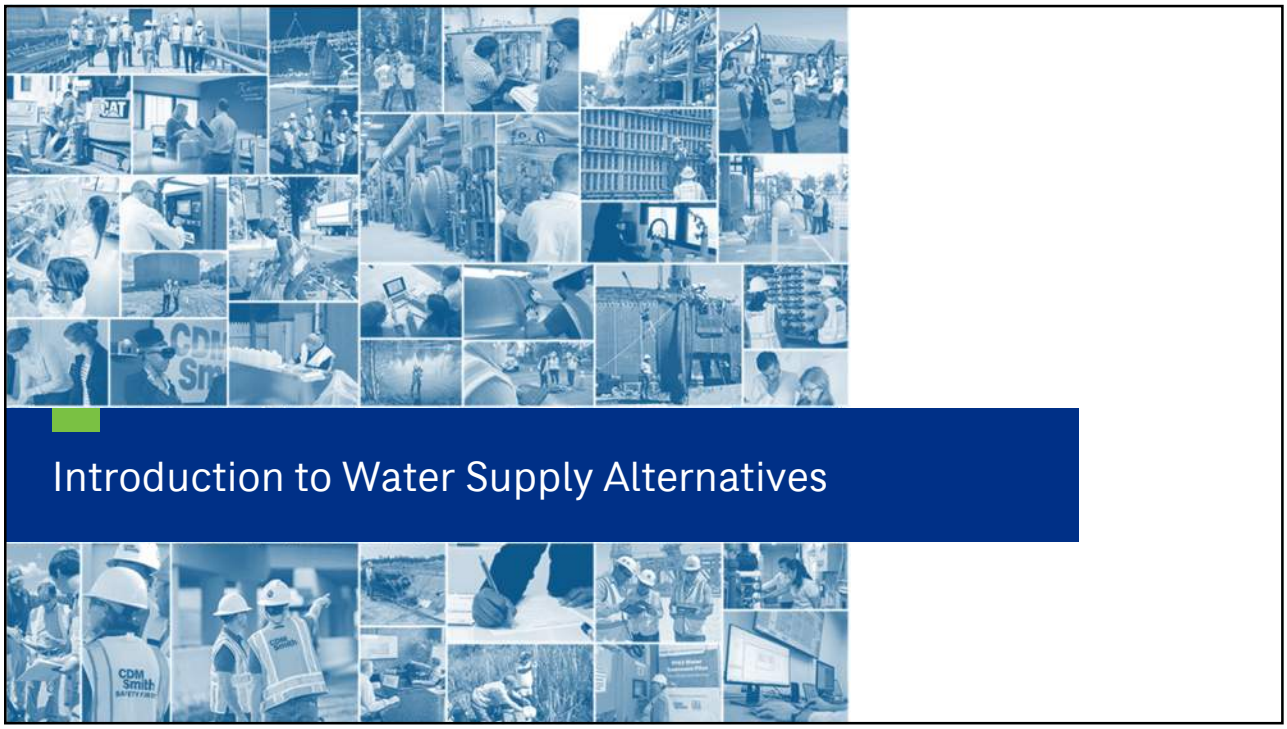

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Update on Interviews with Municipalities

Abington	Avon	Bridgewater	Brockton	Duxbury
East Bridgewater	Easton	Halifax	Hanover	Hanson
Kingston	Pembroke	Plymouth	Plympton	Stoughton
	West Bridgewater	Whitman		

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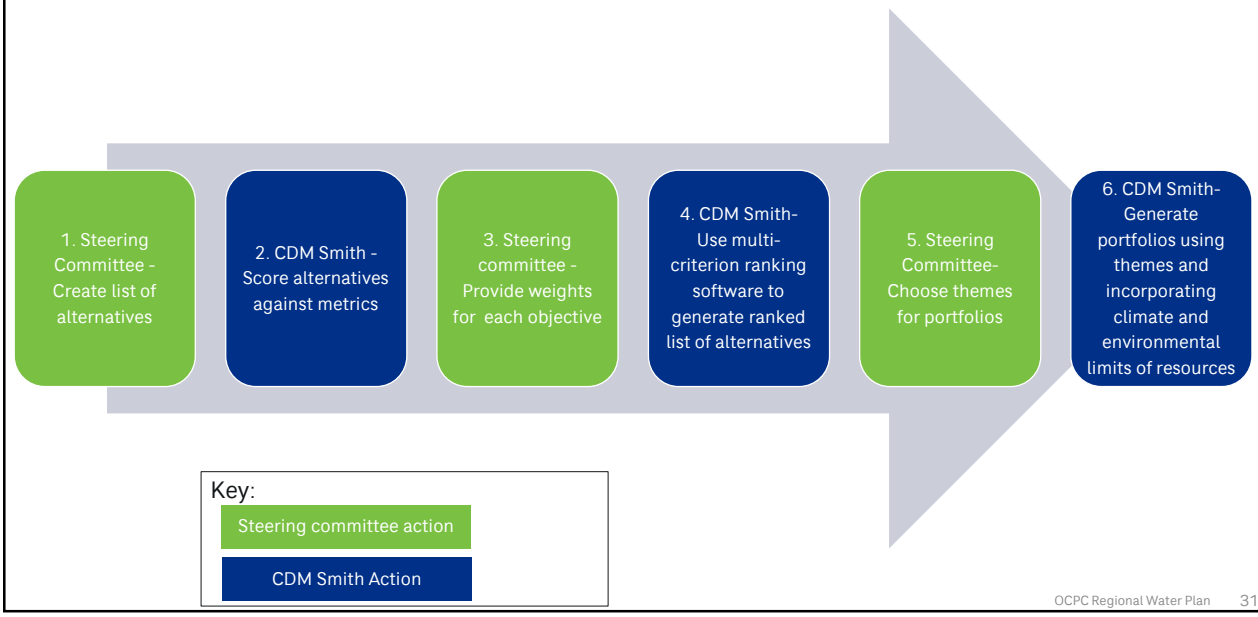
Upcoming steps for selection of alternatives



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Hypothetical Alternatives ("Projects/Policies") for OCPC

Supply Side

- MWRA for all communities
- MWRA for communities abutting Stoughton and those abutting Weymouth
- MWRA for communities abutting Weymouth
- More MWRA for Stoughton
- Desalination at max capacity to supply X communities
- Increasing capacity of desalination to supply to X communities
- Inter-municipal PFAS treatment facilities
- Individual municipal PFAS treatment facilities
- Municipal Interconnections for Supply
- Additional Municipal Wells
- Stormwater capture
- Reclaimed water for non-potable uses

Examples

Demand Side

- Conduct, Validate, and Act on Annual AWWA Water Loss Audits
- Adopt AMI and Monthly Billing
- Implement Customer-Side Leak Program
- Improve Tiered Rate Designs

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Score Projects Against Metrics

Objectives	Reliable Municipal Supply		Cost Effectiveness	Ecological Health	Innovation	Fairness		Drinking Water Quality	Efficiency and Adaptability	
Alternatives										
MWRA for all communities	100%	10%	20M/benefit	5	2	0.1	3	100%	1	5
MWRA for communities abutting Stoughton and abutting Weymouth	70%	4%	12M/benefit	3	2	0.4	2	70%	1	3
MWRA for communities abutting Weymouth	...							...		
More MWRA for Stoughton	...							...		
Desal at max capacity to supply X communities	...							...		
Desal at 80% capacity to retain buffer										
Centralized PFAS treatment facilities	75%	15%	18M/benefit	3	1	0.6	1	75%	1	2
Decentralized PFAS treatment programs	...							...		
Interconnections: A, B, C, D, E, F, ...etc.	...							...		
Brackish groundwater	...							...		
Stormwater capture	5%	0%	4M/benefit	3	3	0.8	1	5%	1	1
Reclaimed water for non-potable uses										
Unaccounted-For Water reductions	80%	15%	6M/benefit	4	1	0.4	1	80%	5	4

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Collect Stakeholder Weights

	Reliable Municipal Supply	Cost Effectiveness	Ecological Health	Innovation	Fairness	Drinking Water Quality	Efficiency and Adaptability
Stakeholder A	50	10	10	5	15	5	5
Stakeholder B	25	10	25	10	10	10	10
Stakeholder C	5	5	5	60	10	5	10
Stakeholder D	20	5	5	5	10	15	40
Stakeholder E	5	5	70	5	5	5	5
Stakeholder F	14.3	14.3	14.3	14.3	14.3	14.3	14.3
Stakeholder G	...	...	...	...			
Stakeholder H	...	...	...				
Stakeholder I	...	...					
Stakeholder J	...						

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Use Multicriteria Ranking Software to Generate Ranked Lists of Projects

Sort on Average Rank

Examples:
Results entirely random

	Average	STAKEHOLDERS																
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Unaccounted-For Water reductions	2.4	2	1	3	3	1	3	4	3	2	2	1	3	4	3	1	2	3
Desal at 80% capacity to retain buffer	3.0	1	3	5	2	5	4	5	2	1	1	3	2	5	4	3	3	2
MWRA for communities abutting Weymouth	3.6	6	4	6	4	2	1	3	6	6	3	2	1	2	2	5	7	1
Centralized PFAS treatment facilities	3.8	3	5	2	1	3	7	2	5	3	4	5	5	1	6	4	4	5
Incentivize 60 gpcd for all residential users	4.6	7	7	4	5	7	6	1	7	8	5	4	7	3	1	2	1	4
Other water efficiency measures	8.3	4	2	8	15	11	9	6	1	10	11	7	11	12	9	7	9	9
Reclaimed water for non-potable uses	9.2	13	8	1	6	6	2	14	8	13	8	17	8	10	5	13	14	11
Outreach to encourage water conservation	9.2	5	6	7	16	12	8	15	4	4	10	6	10	11	15	10	11	7
Interconnections: A, B, C, D, E, F, ...etc.	9.8	10	10	14	8	16	12	11	11	5	9	13	6	7	8	9	12	6
Decentralized PFAS treatment programs	9.8	9	11	13	9	15	11	10	12	7	6	11	4	6	16	8	10	8
Brackish groundwater	10.4	11	9	16	7	4	10	13	10	14	7	14	9	9	7	12	15	10
Grey water recycling for industries	10.8	16	15	9	13	10	5	7	9	9	12	8	12	13	13	14	6	13
More MWRA for Stoughton	12.2	14	14	10	12	13	17	8	14	16	13	9	15	14	10	6	5	17
Desal at max capacity to supply X communities	13.0	8	12	11	17	14	16	9	16	12	14	10	16	17	14	15	8	12
MWRA for communities abutting Stoughton and Weymouth	13.5	12	13	17	10	8	14	17	15	15	17	12	13	8	12	16	17	14
Stormwater capture	13.6	15	17	12	11	9	13	16	13	11	15	16	17	16	11	11	13	15
MWRA for all communities	15.6	17	16	15	14	17	15	12	17	17	16	15	14	15	17	17	16	16

Consistently High Ranking for all Stakeholders: Build portfolios starting with these

Wide ranges of rankings – explore with stakeholders to either elevate or de-emphasize

Consistently Low Ranking for all Stakeholders: Avoid these in portfolios

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Develop Portfolios (Exploratory, for comparison)

Themes to be developed with Steering Committee

Portfolio 1
Internal to Region

Project	Average Rank	Cost ($M)	Water Benefit (mgd)
UAW	2.4	$40	20%
Centralized PFAS	3.8	$80	40%
60 gpcd incentives	4.6	$10	10%
Efficiency measures	8.3	$12	15%
Inter-connections	9.8	$28	15%
TOTAL:		**$170**	**100%**

Portfolio 2
Internal and External

Project	Average Rank	Cost ($M)	Water Benefit (mgd)
UAW	2.4	$40	20%
Desal at 80%	3.0	$80	60%
MWRA abutting Weymouth	3.6	$20	15%
Efficiency measures	8.3	$12	15%
TOTAL:		**$152**	**110%**

Portfolio 3
Least Cost

Project	Average Rank	Cost ($M)	Water Benefit (mgd)
TOTAL:		**$170**	**100%**

Examples

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Water Supply Alternatives Discussion

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Water Supply Discussion

1. What are you committed to right now and in the next 5 years?
3. Longer term, do you feel there is a need for redundancy for drought, cyber security, short term issues or other concerns? Are you open to the following:
   a) MWRA
   b) Desalination
   c) Municipal Interconnections
   d) Reclaimed Water for Non-Potable Use (eg golf courses…)
   e) Other
4. What are actions that your organization would like to see included in the Regional Water Plan?

As you answer these questions, consider local and regional resiliency.

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Next Workshop

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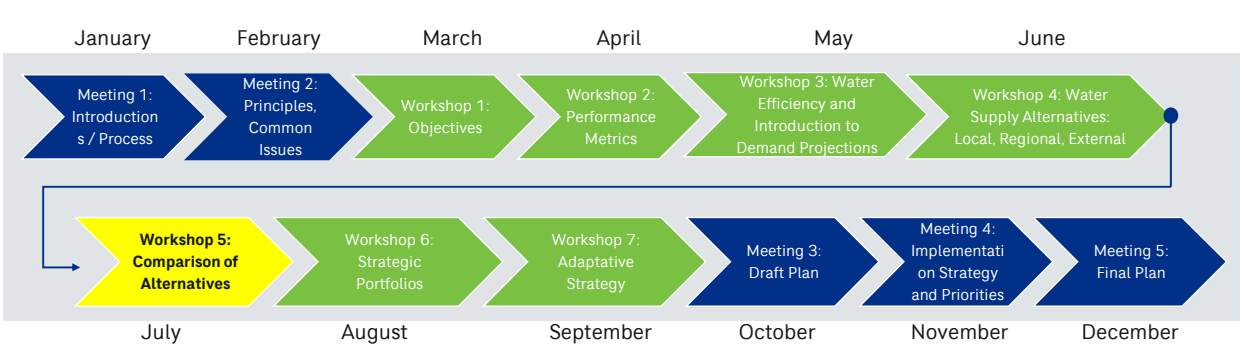
Next Workshop



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Upcoming Schedule

WHEN	DETAILS
Wednesday July 31st 9:00 am – 12:00 pm	Workshop 5
Tuesday, August 27th 9:00 am – 12:00 pm	Workshop 6
Tuesday, September 24th 9:00 am – 12:00 pm	Workshop 7
Tuesday, October 29th 9:00 am – 12:00 pm	Meeting 3
Monday, November 18th 8:00 am – 12:00 pm	Meeting 4
Tuesday, December 10th 8:00 am – 12:00 pm	Meeting 5

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Steering Committee Homework

- Annotated Bibliography
  - Final comments due 6/28/2024 to rozyckikm@cdmsmith.com via email.
- Scoring objectives and updated metrics
  - Feedback due by 7/12 rozyckikm@cdmsmith.com
- Demand Projections and Capacity Memo (by municipality)
  - Will be sent via email by end of this week
  - Feedback due by 7/12 rozyckikm@cdmsmith.com
- Interviews
  - Email Kyle Olsen at RVA (kolsen@reginavilla.com) if you have not yet scheduled your interview.

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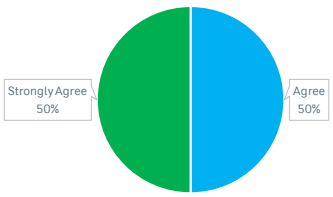
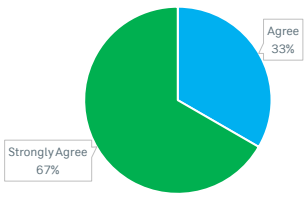
Last Meeting: Feedback Survey Results

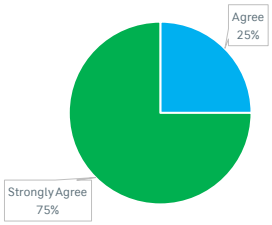
The meeting had a clear agenda.



Facilitation of today's meeting was effective.



I had plenty of opportunity to participate in the discussion today.



Legend
- Strongly Agree
- Agree
- Disagree
- Strongly Disagree

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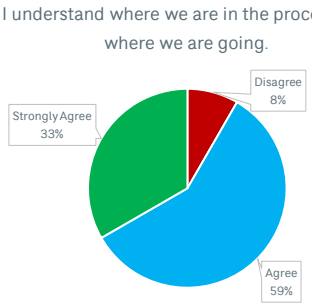
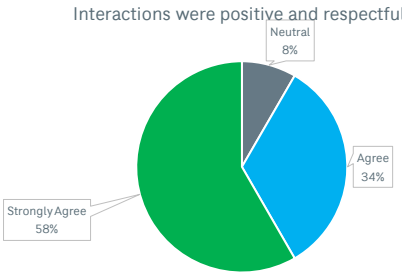
Last Meeting: Feedback Survey Results





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Water Supply Discussion Questions

- What decisions have already been made for near term supply? AR0
- How vulnerable are current and near-term supplies to PFAS, climate uncertainty, population?
- What local opportunities exist for supply enhancement / resilience?
- What regional opportunities exist for supply enhancement / resilience?
- Is redundancy needed?
  - Could additional high-volume temporary interconnections provide redundancy?
  - Could future access to MRWA provide drought-proofing or buffers against known or unknown risks?
  - Could future access to Desalinated water from Brockton provide redundancy?
- What towns have surplus that could be shared?
- How do supply decisions affect local ecology and environment?

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