



Minutes

March 4, 2022

Remote via zoom

Attendees:

WAC Members: **Wayne Chouinard** (Chair, Town of Arlington), **Kannan Vembu** (Vice-Chair), **Adrianna Cillo** (BWSC), Craig Allen, **Dan Winograd**, George Atallah, **James Guiod** (AB), **Karen Lachmayr**, **Martin Pillsbury**, **Mary Adelstein**, Philip Ashcroft, **Stephen Greene**, **Taber Keally** (NepRWA) (Members in attendance in **bold**)

Guests: Wendy Leo, Katie Ronan, Sally Carroll, Christopher Goodwin, Brian Kubaska, Jeremy Hall, David Wu, Patrick Smith, Michael O'Keefe (MWRA) Jim Barsanti, Laura Schiffman (MassDEP), Michele Barden, Alexa Sterling (EPA) Stephen Perkins (MyRWA), Judy Pederson (OMSAP), Kristin Anderson, David White, Gwen Speeth (Save the Alewife Brook), Erica Caserano, Don Walker (AECOM), Mike Armes (ADS Environmental), Lisa Kumpf, Julie Wood, Emily Norton (CRWA), Amy Scofield (BWSC), Lexi Dewey (WSCAC), Lou Taverna (MWRA AB)

Staff: Andreae Downs, WAC Executive Director

VOTE: February minutes

REPORTS:

MWRA: Hiring—also hiring paid interns (college & graduate students); mask order in Charlestown lifted. Already lifted in other areas. Other precautions in place. Supply chain delays still affecting MWRA capital projects, but working around them.

Advisory Board: also hiring an intern. March 17 meeting will be the MWRA budget hearing. Still some volatility in the budget projections, supply issues, but the budget is more of a normal process this year than last.

Director: **Wipes labeling bill** was reported favorably out of the Environment committee; now before Ways & Means Committee. INDA (manufacturers' association)

interested in standard conditions with CA and WA. This bill's language is modeled on the CA bill.

Covid population monitoring via sewers was called out by CDC last week. Very valuable tool.

Will be sending out draft language on a possible new NPDES permit for Deer Island and a draft comment letter for the Clinton draft permit.

PRESENTATION:

Brian Kubaska: Purpose of this presentation is to review findings of the CSO assessment. Last week held a public briefing—this is shorter to allow for questions.

CSO goals and how they are measured. What was required under the Boston Harbor case. Long term performance goals—met. Performance assessment findings. What future work is planned to further meet these goals.

Goals from 2006: Required closure of 30 outfalls, limits on number and volumes of activations of remaining outfalls.

to Second Stipulation

SUMMARY OF TYPICAL YEAR CSO ACTIVATION FREQUENCY AND VOLUME

OUTFALL	TYPICAL YEAR		REFERENCE ^(*)
	LONG TERM CONTROL PLAN 2005 ^(*)		
	Activation Frequency	Volume (MG)	
ALEWIFE BROOK^(*)			
CAM001	5	0.19	5
CAM002	4	0.69	5
MWR003	5	0.98	5
CAM004	To be closed	N/A	5
CAM400	To be closed	N/A	5
CAM401A	5	1.61	5
CAM401B	7	2.15	5
SOM001A	3	1.67	5
SOM001	Closed	N/A	
SOM002A	Closed	N/A	
SOM003	Closed	N/A	
SOM004	Closed	N/A	
TOTAL		7.29	
UPPER MYSTIC RIVER			
SOM007A/MWR205A (Somerville Marginal)	3	3.48	
SOM007	Closed	N/A	
TOTAL		3.48	
MYSTIC / CHELSEA CONFLUENCE			
MWR205 (Somerville Marginal)	39	60.58	
BOS013	4	0.54	6
BOS014	0	0.00	6
BOS015	Closed	N/A	6
BOS017	1	0.02	9

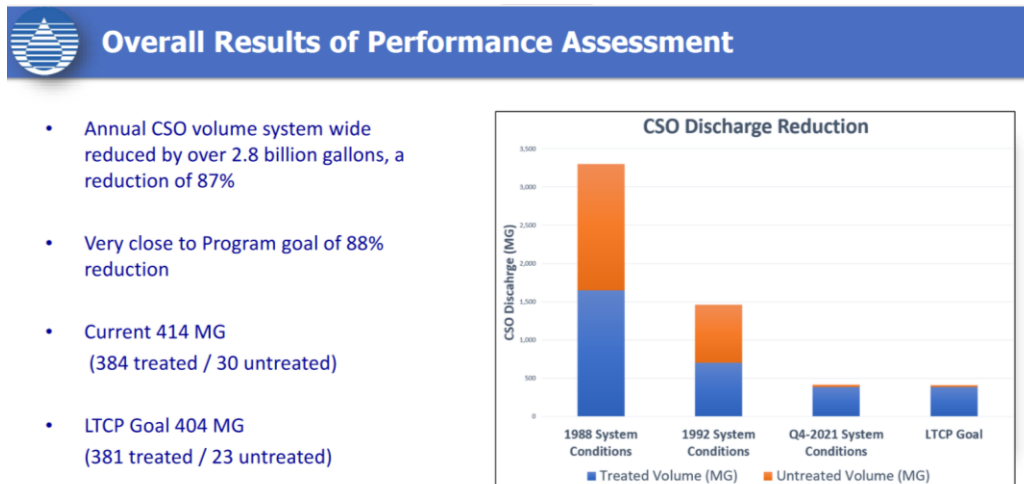
The construction project included optimization of current system, 100s of miles of new sewer and stormwater pipes, interceptor relief projects-- \$80m in East Boston alone,

detention and treatment facilities upgrades, storage in new tunnel for South Boston beaches, significant number of outfall closures—completed by 2015.

CSO post construction performance report submitted Dec. 2021. Past 4 years work included four main tasks:

- Inspected all closed CSOs
- Inspected all regulators & metered them to verify activation & volume data
- Calibrated the hydraulic model
- Development and calibration of receiving water quality models & to help assess CSO impacts and where other sources of contamination may be coming from

Results



Overall results are impressive. In 1988, there was 2.8 billion gallons of sewage discharge annually into the rivers and ocean. 87% reduction (goal was 88%). Current total CSO discharge 414m gallons, of which 384m gallons are treated (screened, disinfected, dechlorinated).

A good number of the overflows within the system were closed. What was required was to close 25 outfalls. Communities closed another 10 outfalls, and MWRA closed 5 outfalls (effectively) along the So. Boston beaches.

Outfalls closed

CSO Performance Assessment Results for 86 Outfalls



- 25 outfalls required to be closed, confirmed closed.
- 10 additional outfalls closed by CSO communities.
- 5 outfalls along South Boston Beaches “effectively eliminated.”
- Totalling 40 outfalls closed or effectively eliminated.

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Of the 46 remaining potentially active outfalls, 30 meet the LCTP goals. Many are in non-variance waters. 10 are in the variance waters (Charles, Alewife & upper Mystic). Have 16 outfalls that don’t yet meet the plan’s goals. MWRA has plans for 6 of them— should be fixed in the next 3 years, concepts developed for 4 overflows, working with BWSC (Boston Water & Sewer Commission), and 6 overflows that remain challenging.

The performance assessment does provide a complete account of current levels of control:

CSO Performance Assessment Results for 86 Outfalls



- Although substantial reductions have been achieved 16 outfalls do not currently meet LCTP goals.
- Plans are in design or construction for 6 Outfalls, projected to meet within the next 3 years.
- Concept designs developed for 4 Outfalls.
- 6 Outfalls remain particularly challenging.

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These are all “typical year” results.

Chart of model results—have a plan for all the outfalls in light blue to reduce flows (dark blue meets goals)

Typical Year Performance Q4-2021 Model Results

Outfall currently achieves LTCP activation and volume goals.			Outfall is forecast to achieve LTCP goals after Dec 2021.			
OUTFALL	1992 SYSTEM CONDITIONS ⁽¹⁾		Q4-2021 SYSTEM CONDITIONS		LONG TERM CONTROL PLAN ⁽²⁾	
	Activation Frequency	Volume (MG)	Activation Frequency	Volume (MG)	Activation Frequency	Volume (MG)
ALEXIS BROOK						
CA0001	0	0.15	1	0.02	0	0.15
CA0002	11	2.25	0	0.00	4	0.30
BO0003	0	0.07	3	0.01	0	0.00
CA0004	20	0.10	Closed	N/A	Closed	N/A
CA0005	13	2.01	Closed	N/A	Closed	N/A
CA0001A	10	2.12	0	0.00	0	1.01
CA0002	0	0.00	4	0.00	7	2.00
SC0003A ⁽³⁾	10	11.00	0	4.47	3	1.07
SC0001	0	0.00	Closed	N/A	Closed	N/A
SC0002	0	0.00	Closed	N/A	Closed	N/A
SC0002A	0	0.00	Closed	N/A	Closed	N/A
SC0003	0	0.00	Closed	N/A	Closed	N/A
SC0004	0	0.00	Closed	N/A	Closed	N/A
TOTAL	5	0.30	Closed	N/A	Closed	N/A
UPPER MYSTIC RIVER						
SC0007A/MWR200A ⁽⁴⁾	0	7.81	0	4.50	3	3.40
SC0007	0	0.00	Closed	N/A	Closed	N/A
SC0007	0	0.00	Closed	N/A	Closed	N/A
TOTAL	0	7.81	Closed	4.50	3	3.40
MYSTIC/CHESAPEAKE CONFLUENCE						
MS0001 ⁽⁵⁾ (Dorchester Regional CSO Facility)	33	120.37	30	99.71	30	80.99
BO0017 ⁽⁶⁾	30	4.40	0	0.27	4	0.94
BO0018	20	4.91	0	1.40	0	0.00
BO0019	10	2.75	Closed	N/A	Closed	N/A
BO0020	40	7.10	0	0.34	1	0.02
BO0021	40	2.81	Closed	N/A	4	0.22
BO0022	30	3.30	0	0.00	3	0.04
BO0024	44	18.11	2	0.00	3	0.02
BO0025	30	22.20	0	1.04	0	0.00
TOTAL	33	185.96	Closed	N/A	0	0.00

- Complete account with reductions since 1992 provided in Performance Assessment.
- Grey shaded numbers are higher than LTCP Goals.
- Dark blue shaded outfalls meet. Light blue outfalls forecasted to meet.

David Wu: Water quality findings.

Water quality models for Charles and Mystic—Boundary (upstream conditions), dry weather sources, CSOs

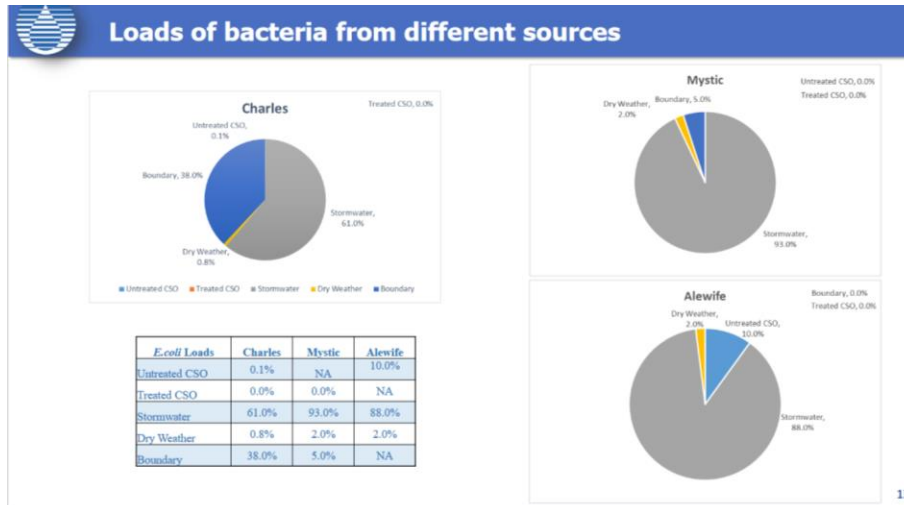
Receiving Water Models

- The Receiving Water Models allowed us to:
- ✓ separately evaluate the water quality impacts of SW, Boundary, CSO and other sources of bacteria
 - ✓ track the movement of the discharges downstream
 - ✓ understand water quality between sampling points
 - ✓ generate WQ results for a Typical Year
 - ✓ assess the amount of time there is an impact (exceedance of WQ standards)
 - ✓ run various scenarios to assess water quality impacts of reduced CSO, cleaner stormwater, or other condition changes



Have very extensive monitoring program. Models help interpolate between monitoring locations. Have 15-16 locations per watershed.

MWRA models bacterial levels for both watersheds, and to tease out where the pollution is coming from. The models show that the vast majority of bacterial load comes from stormwater. The Mystic has dry weather contamination, which could be the result of leaks from the sewers into the storm drains (or illicit connections)



Broken into 3 regions—Charles, Mystic and Alewife.

Charles upstream of Watertown Dam—stormwater contributes the bulk of pollution; some smaller CSO contribution along with stormwater in the basin.

In the Mystic & Alewife, the bulk of pollution comes via stormwater. In the Mystic, some of that is upstream of the CSO outfalls and they may have illicit connections to storm drains.

Exception is the Alewife—the second largest contributor to pollution appears to be untreated CSO, after stormwater and some illicit connections.

In Charles & Mystic most of the CSO is treated. Have permit limits at facilities there.

Hours of exceedance: Long Term Control goal to meet state water quality standards (<235 *E. coli* colonies per 100ml) 95% of the time in a typical year. Hours in a year= 8,760.

These tables are very conservative—any exceedance applies to whole river.

Charles meets water quality standards about half of the year.



Charles River – Hours of Exceedance

Q1-2021 Condition	Percent Annual Compliance with <i>E. coli</i> Single Sample Maximum Criterion (235#/100mL)					
	All Sources	Non-CSO Sources Only	Stormwater Only	Dry Weather Sources Only	Boundaries Only	CSOs Only
Charles River	48%	48%	64%	100%	59%	99.9%

Charles River

- Non-CSO Sources of pollutant loading (stormwater, boundary, dry weather) result in >4,000 hours (over half the year) of *E. coli* exceedance in a typical year
- CSO Only contributes to 8 hours of *E. coli* exceedance in a typical year

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Non-CSO sources 48%. If all other inputs are turned off, 64% compliance. Model didn't find significant dry-weather sources. 59% with all sources. CSO—meets water quality standards except for 8 hours (99%) of the typical year.

Alewife Brook:



Alewife Brook – Hours of Exceedance

Q1-2021 Condition	Percent Annual Compliance with <i>E. coli</i> Single Sample Maximum Criterion (235#/100mL)					
	All Sources	Non-CSO Sources Only	Stormwater Only	Dry Weather Sources Only	Boundaries Only	CSOs Only
Alewife Brook	45%	45%	48%	100%	100%	99.6%

Alewife Brook

- Non-CSO sources of pollutant loading (stormwater, boundary, dry weather) result in >4,500 hours (more than half the year) of *E. coli* exceedance in a typical year
- CSO Only contributes to 35 hours of *E. coli* exceedance in a typical year

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Again—all sources a little less than ½. Stormwater is a huge factor. CSO-only 99.6%, or 9 hours of a typical year.



Mystic River – Hours of Exceedance

Q1-2021 Condition	Percent Annual Compliance with <i>E. coli</i> Single Sample Maximum Criterion (235#/100mL)					
	All Sources	Non-CSO Sources Only	Stormwater Only	Dry Weather Sources Only	Boundaries Only	CSOs Only
Upper Mystic River	55%	55%	56%	100%	91%	97.9%

Upper Mystic River

- Non-CSO sources of pollutant loading (stormwater, boundary, dry weather) result in >3,500 hours of *E. coli* exceedance in a typical year
- CSO Only contributes to 184 hours of *E. coli* exceedance in the Upper Mystic in a typical year

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All sources=55%. Stormwater a big contributor. CSO only 35 hours a year. 97.9% of a typical year.

Have run various scenarios—if CSO outfalls met their goals, the water quality improvements would not be significant.

Changes in any further CSO reductions would probably NOT change the water quality. Stormwater changes would really help improve the water quality.

Real-time monitoring of CSO discharges via text or email.

Kubaska—MWRA has 3 more years of court order. Will focus on 16 outfalls that don't meet the goals, and submitting progress reports.



Outfalls Forecast to Attain LTCP Goals After 2021

OUTFALL	LOCATION	SYSTEM IMPROVEMENT(S)	TO BE IMPLEMENTED BY	TENTATIVE SCHEDULED COMPLETION
MWR205	Somerville Marginal CSO Facility	Construct new connection from the facility influent conduit to the interceptor and replace tide gate.	MWRA	2024
SOM007A/MWR205A				
BOS003	East Boston	Complete BWSC Sewer Separation Contract 3, including upgrade of Interceptor connection at regulator RE003-12.	BWSC	2023
BOS009				
BOS014				
CHE008	Chelsea Creek	Replace/upgrade Interceptor connection	MWRA	2022

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Outfalls With Conceptual Plans to Achieve LTCP Goals

OUTFALL	Q4-2021 SYSTEM CONDITIONS MODEL		LONG TERM CONTROL PLAN		OUTFALLS WITH MODELED CONCEPT DESIGNS PREDICTED TO ATTAIN LTCP GOALS
	Activation Frequency	Volume (MG)	Activation Frequency	Volume (MG)	
MYSTIC/CHELSEA CONFLUENCE					
BOS017	6	0.34	1	0.02	•MWRA has developed a concept design to construct modifications to the Sullivan Square siphon structure including adjustable stop logs upstream of each siphon barrel. MWRA is coordinating with BWSC on the feasibility and cost of this alternative.
FORT POINT CHANNEL					
BOS062	5	1.26	1	0.01	•MWRA is coordinating with BWSC on the feasibility and cost of an alternative to relieve the interceptor connection.
BOS065	1	0.62	1	0.06	•MWRA is coordinating with BWSC on the feasibility and cost of an alternative to raise the weir at the regulator.
BOS070/DBC	7	6.14	3	2.19	•MWRA is coordinating with BWSC on the feasibility and cost of an alternative to add a parallel relief pipe downstream of regulator RE070/7-2.



Outfalls with Significant Challenges to Achieve LTCP Goals

OUTFALL	Q4-2021 SYSTEM CONDITIONS MODEL		LONG TERM CONTROL PLAN		OUTFALLS PRESENTING SIGNIFICANT CHALLENGES
	Frequency	(MG)	Frequency	(MG)	
ALEWIFE BROOK					
SOM001A	8	4.47	3	1.67	-Potential mods include weir raising, interceptor connection relief, relining portions of the Alewife Brook Conduit (ABC) and Alewife Brook Branch Sewer (ABBS). - MWRA is coordinating with City of Somerville to review potential flood control measures which may provide a CSO reduction benefit.
CHARLES RIVER					
MWR201 (Cottage Farm)	2	9.1	2	6.3	-Evaluate upstream sewer separation and targeted groundwater infiltration removal. -Further alternative development and evaluation with consideration of water quality benefits and cost to be considered beyond December 2021.
CAM005	8	0.74	3	0.84	-Coordinate with community to balance weir raising, outfall cleaning, and sewer separation. -Further alternative development and evaluation with consideration of water quality benefits and cost to be considered beyond December 2021.
MWR018	2	1.12	0	0	-Evaluated alternatives including raising weirs, reducing head loss in the BMC, and redirecting upstream BWSC separate storm drains.
MWR019	2	0.48	0	0	-Further alternative development and evaluation with consideration of water quality benefits and cost to be considered beyond December 2021.
MWR020	2	0.48	0	0	-Further alternative development and evaluation with consideration of water quality benefits and cost to be considered beyond December 2021.

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Need to ensure that by controlling CSOs you are not creating flooding upstream.

MWRA suggests that further investment in CSO control must consider the significant additional cost for the small water quality benefits.

Q—low-hanging fruit done. Rest that can be accomplished is very expensive. Larger projects with millions of gallons—can you chase the best first?

Per our variance requirements, MWRA will be looking at value of total elimination of CSO. Current plan was just to meet the objectives of the LCPT.

Q—Save Alewife’s Kristin Anderson:

Notes challenges of pollution in Alewife Brook, also challenges of flooding of homes situated in the 100-year flood zone there.

Questions with outfall MW003

1. Why constructed:

This is relief for two main interceptors along the Brook. Outfall was re-constructed it to give it more functionality, make it hold more flow, added a gate. Its function is to protect upstream streets (and residents) from flooding.

2. Why 2021 so much discharge from this outfall?

2021 was an exceptional year—the greatest precipitation for the month of July on record. CSOs are in place to protect upstream communities and homes when there's high water. If they weren't there, the water would flood homes and streets upstream. During storms as seen this past summer, capacity is limited in the MWRA system downstream of MWR003 to take all that water.

3. What neighborhoods contribute to this overflow?

Rindge Ave, Cambridge, a portion of Arlington & of Belmont...Not a terribly large area. Mostly from the Alewife T station to the pond and just shy of the Charles River. 3 sewer lines from Belmont contribute also.

Are the overflows treated? What does that entail?

Overall, MWRA treatment facilities (384 million gallons/year IS treated) include Cottage Farm (Charles River Basin) Prison Point (Inner Harbor), Somerville Marginal (upstream and downstream of Amelia Earhart), Union Park (Ft. Point channel). Treatment except Somerville Marginal include detention— (for example, can hold on to approx. 1.3m gallons in Cottage Farm. All include fine screens, hypochlorite to disinfect, and bisulfate to dechlorinate.

Does any of the 3 CSOs on the Alewife get treated?

No. Floatable controls but not disinfection. There are also 3 outfalls owned by Cambridge and Somerville. What's discharged out of these CSOs is primarily

stormwater. Highest sewage concentration is at most 5%. Stormwater alone carries a lot of bacteria and other pollutants.

What will the currently-planned CSO improvements for the next 3 years cost?

Not sure—but currently-awarded contracts and planned concept designs are in excess of \$10m, and MWRA will still be looking to address the more challenging outfalls.

Q—in the next round of CSO planning, in 2023, can you include climate-change scenarios for the next 2 decades, or at least a range of scenarios?

We understand our Typical Year requires update, and we are considering more modern numbers.

Q—Is treatment being considered for all remaining CSOs?

Hasn't been yet, but that doesn't rule it out. Treatment requires facilities, which need both siting, funding, and continued operation and maintenance.

Q—How does the CSO system protect from other contaminants from stormwater, such as phosphorus?

That wasn't the focus of the control plan—the focus was entirely on bacteria. But the other big pollutant for freshwater is phosphorus. That's mostly controlled via MS4 permits (municipal storm sewer system). The Charles has a total discharge limit for Phosphorus (it has too much Phosphorus in it); there's not a lot of data on phosphorus, but most of it comes from stormwater.

Q—why has Cambridge asked for a continued CSO at Cottage Farm?

Cambridgeport had made a significant effort at sewer separation, and that would have put stormwater into the Charles at every rainfall. Asked MWRA to accept stormwater on a trial basis into Cottage Farm's CSO facility up to a limited amount. Takes

significant phosphorus from the stormwater in smaller storms and treats it at Deer Island instead.

Q—sounds like Alewife system cannot handle common storm events. Is there a plan to increase capacity?

Alewife Brook overflow is mostly from Somerville 1A. Recently upgraded the Alewife Pump Station. There are storms that exceed the capacity of that station, but also that of the downstream infrastructure—Chelsea Creek Headworks and Deer Island. There are no plans to increase the capacity of the facilities and interceptor systems along Alewife Brook and downstream of it at this time.

Q—If the sewers were separated, wouldn't that increase downstream capacity?

Yes. But, the challenge is what to do with all the stormwater. MWRA 004 now goes to the Cambridge constructed wetland, but there's not the capacity for the stormwater.

Q—but there is DCR land on either side of the Alewife

But that would be a stormwater and state project, and MWRA does not do stormwater projects.

Q—but we want more of that!

Q—how does the Alewife wetland do at cleaning the stormwater?

No definitive study of the wetland's effect on bacterial loads to the Alewife.

WAC BUSINESS

CLF suit against MWRA TRAC program is something MWRA can't talk with WAC about.

Possible Deer Island NPDES permit:

Consensus items: Contingency Plan—

- WAC would like removed from permit
- Ambient Monitoring—WAC likes, but would like it easier to amend
- Permit Dry-Day flow—unique to MWRA/ Deer Island—and flow is diminishing. Consensus that does not make sense
- I/I task force – WAC consensus that this is perhaps a better way of handling I/I than co-permittees.
- Water conservation measures—a relic of high withdrawal rates from Quabbin in the 1980s and before. MWRA water demand has been well under the danger levels. Water conservation is best affected by high water costs. But conservation is a good thing.
- Reporting on-line WAC likes, but the paper copies should be removed
- Nitrogen? There are no limits, but the studies MWRA has done, there has not had any detrimental effect and is unlikely to at or above current levels. However, removing nitrogen is not trivial. MWRA is not seeing that the cost would create any environmental benefit. Instead, removing nitrogen would create additional emissions & energy use.

DRAFT Clinton Permit

Comments due April 11.

VOTE: WAC should comment. Focus on co-permittees and EPA regulations
 Andrae will circulate a draft to WAC members via email (bcc).

Next Meeting: April 19, 10:30 am, joint with WSCAC, on MWRA budgets

NEBRA Biosolids and PFAS Panel 2/3

Ian Pepper, Professor U of AZ—leading national research project on fate and transport of PFAS through land-applied biosolids.

Exposure to PFAS in biosolids is all indirect—leaching into water, uptake by plants or animals

Now looking nationally at whether land-applied biosolids are a significant pathway to human exposure to PFAS.

Objectives of this study:

SPECIFIC OBJECTIVES

- Conduct a **literature review** of land application/PFAS studies, past and present to ensure collaborations with, and extensions of, ongoing work and avoid duplicative research
- At dozens of biosolids land application sites in all regions nationwide, measure:
 - **Incidence of PFAS in soil** following long-term land application of biosolids – occurrences (“hits”) and levels at various soil depths
 - **Assess Mobility** (leaching) of PFAS analytes through soil and vadose zone under natural conditions including the influence of rainfall and/or irrigation, using paired data sets of soil PFAS concentrations and groundwater PFAS levels
 - **Crop uptake** of PFAS analytes, utilizing paired data sets of soil PFAS concentrations versus plant uptake
 - Include a variety of different soils, depths to groundwater, and climates, by studying land application plots across the entire United States, including irrigated and non-irrigated soils.

Depth and breadth of dataset should be sufficient to:

- **Prove hypothesis that typical, background levels of biosolids applied long-term do not increase soil levels of PFAS to levels that threaten groundwater or crop safety.**
- **Provide robust field data to calibrate modeling that predicts PFAS in groundwater & crops.**

They will look at soils with vs without biosolids application over time. Also, at plant uptake.

Need \$1m. Will be asking utilities for donations, scaled by how much wastewater they treat

Number of participants point out that current biosolids will probably have less PFAS than historic applications. Beecher agreed.

List of PFAS to be tested for will be subject to input from stakeholders. Likely to change, as the number of PFAS grows.

Difference between background and industrially-impacted biosolids. Currently, rule of thumb is >150ppb.

WSCAC 2/8

Director's Report: DCR has filled nearly all of its 18 vacancies.

Ware River Public Access Plan in draft, and residents seem to prefer having multi-use trails rather than many single-use trails.

Quabbin: Visitor's center is open & doing virtual programming, not as many gulls. Rangers are busy. Walks at cemetery. 60% design for new drinking water well for Admin building.

Annual filtration waiver for Wachusett is back. Quabbin not in yet.

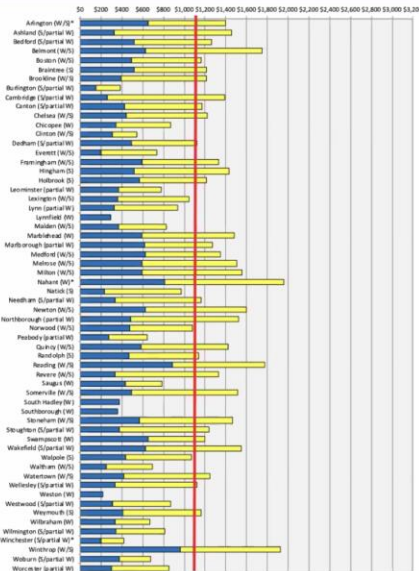
Following Drought Bill and Invasives bill. Both reported out favorably. Update on Better Bottle Bill—needs to move through Senate & then House.

Advisory Board Rate survey:

	2020	2021
MWRA Wholesale Assessment Increase	1.00% (FY20-FY21)	2.95% (FY21-FY22)
Average MWRA Retail Rate Increase	2.83% (CY 2020)	2.92% (CY 2021)
Average MWRA Service Area Combined Retail Cost (120 HCF)	\$1,709 (per year)	\$1,760 (per year)
Adjusted Average MWRA Service Area Combined Retail Cost	\$870 (per year)	\$911 (per year)
	63 HCF/ year	70 HCF/ year



Combined



Average Retail Combined Bill
(81.5 HCF) for MWRA Service
Area:

\$1,111.83

Burlington: \$388.57
Winchester: \$415.04

Dedham: \$1,117.10
Wellesley: \$1,120.67

Winthrop: \$1,927.48
Nahant: \$1,956.24

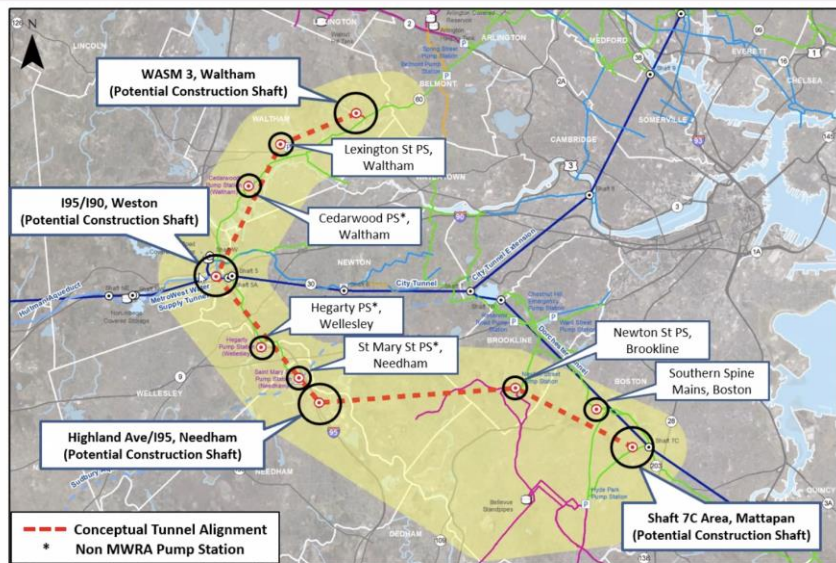
Metro Tunnel Program, Kathy Murtaugh

Two tunnels--



Metropolitan Water Tunnel Program

- ~14 miles of 10 ft diameter, hard rock, pressure tunnel
- Time to complete: 17 to 23 years (design - commissioning)
- Current plan is for tunnels to begin in the Mass Pike/Route 128 vicinity
- Northern Tunnel - ~4.5 miles, ends in Waltham/Belmont area @ WASM3
- Southern Tunnel - ~9.5 miles, ends in Mattapan near Shaft 7C
- Anticipate first tunnel construction to start in 2027
- Estimated cost - ~\$1.5B (2021\$)



Conceptual for discussion only

Still targeting first construction for 2027.

Preliminary design is about to start. In the MEPA review process now. Prelim. Design goes to Jan. 2024

Final design starts then.

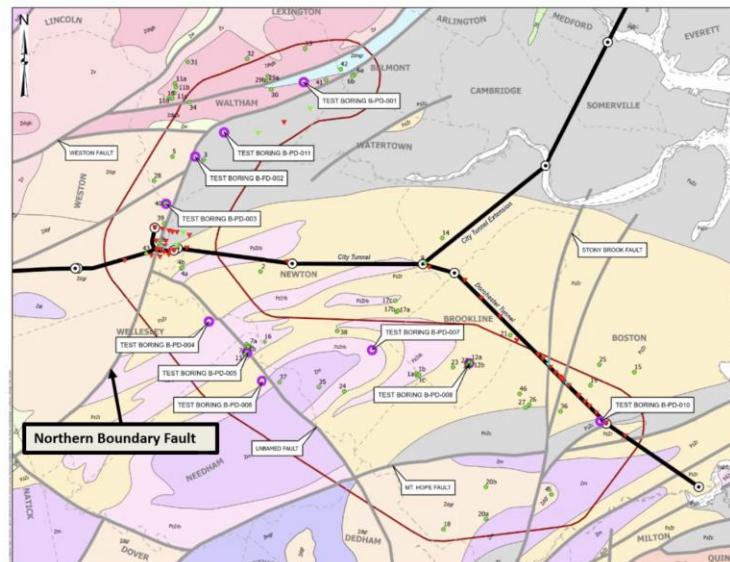
Bought first shaft site--at 167 School St. in Waltham. Minimizes amount of community disruption.

Several faults run through the geology of the region--the northern boundary fault is where Africa crashed into New England many millennia ago. The City Tunnel crosses this fault at about the Weston-Newton border.

Geotechnical Field Investigation – Why is it Needed

Why?

- Collect information about ground conditions (complex geology) to support alternatives evaluation of tunnel routes
- Provide information for the design and construction of the Program



Conceptual for discussion only

Seismic refraction surveys, boring, gives an idea of where the bedrock lies, where the water table is.



Phase 1A Program – Seismic Refraction Survey



Hamilton Field in Newton

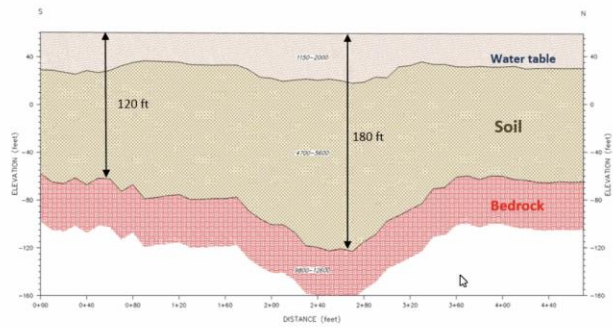


Mount Feake Cemetery in Waltham



McDevitt Middle School in Waltham

Non-invasive method used to determine subsurface conditions including variations in top of bedrock



NOTES

1. Estimated accuracy (standard deviation) of depth of bedrock is 8.0% or 2 feet, whichever is greater.
2. The depths determined for bedrock are depths of unconsolidated, weathered and/or fractured bedrock might occur at shallower depths.
3. Surface elevations estimated from plans provided by MWRA.
4. Data were analyzed using the Generalized Refraction Method.

LEGEND

- Unconsolidated soils
- Consolidated/bedrocked soils
- Bedrock
- 1400-1800 Velocity (ft/s)
- Interface determined from seismic refraction data

Conceptual for discussion only

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Borings are finding about what MWRA expected. Finding hard quartz, pink granite, pudding stone. Storing them at Deer Island and testing, sample selection, taking photos. Paul Savard: Looking at alternative tunnel locations, shaft locations. Depends on land availability, environmental impacts, geology, constructability, schedule and cost.

Started with over 30 alternatives, now down to 10. Will get to 3, all of which will be evaluated equally to determine the preferred alternative.



Alternatives Evaluation Process



Fun things coming: naming the tunnels, shaft sites, tunnel boring machines. School Education program...

Fault: yes, was part of Northern Africa east of Weston. Granite west of it, different type of rock east of it. Will have to cross it.

Can tunnels be made flexible so they don't break? Unless ground does a big shear (usually only in CA), tunnels move with the ground. Concrete liner is more brittle, but in the tunnel is a steel liner, which is more flexible.

Think can have 2 or 3 tunnel boring machines in the ground at once. 5-7 years to build with all the boring machines together--would be longer if bored one at a time. Unlikely to use just one contractor. Expect probably two big ones.

MWRA - Steve Estes-Smargiassi:

Retiree wave continues, hiring is hard. Delays. COVID is also impacting staff availability. Because staffed down for years, gaps in age structure. Having to hire from outside.

Review of new Lead & Copper regulations.

Corrosion control review happening to see if the MWRA can better prevent lead dissolving into drinking water.

Water use: down. Much more efficient than in the past.

Water Resources Commission 2/10

Executive Director's Report

Drinking Water protection grant applications are available

Hydrologic Conditions

Wet January, streamflow about normal.

Some lower than normal 2 & 3-month precipitation in southeast, Cape and Islands.

Auburn Water District's Interbasin Transfer Act Application to Purchase Water from the City of Worcester

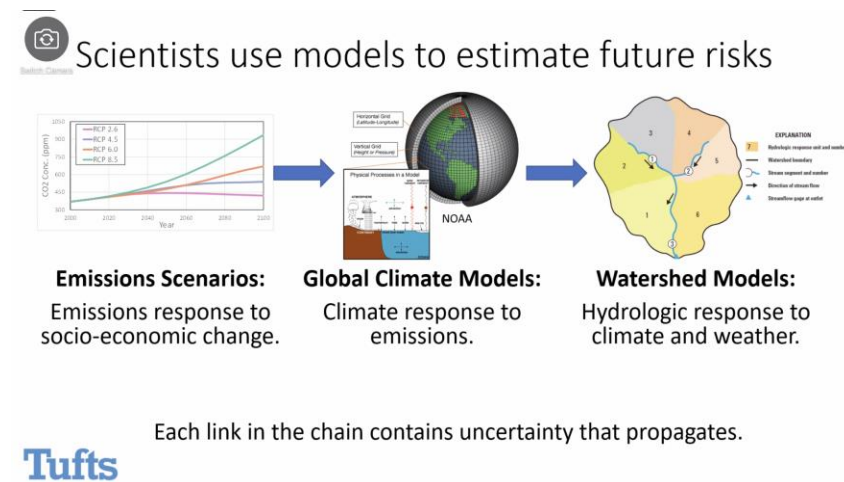
- Current sources imperiled by highways--salt, possible contamination.
- No alternative sources in Auburn.
- Currently conservation measures are in place and adequate.
- Not expecting that this transfer will affect flows in Worcester's system.

Massachusetts Climate and Hydrologic Risk - Pilot Watershed Project

USGS, Cornell & Tufts

How will climate and hydrologic extremes & frequency change? How can we predict (flooding, drought, extreme cold/heat)?

Taking various models and scenarios to try to predict frequency & duration of extreme weather



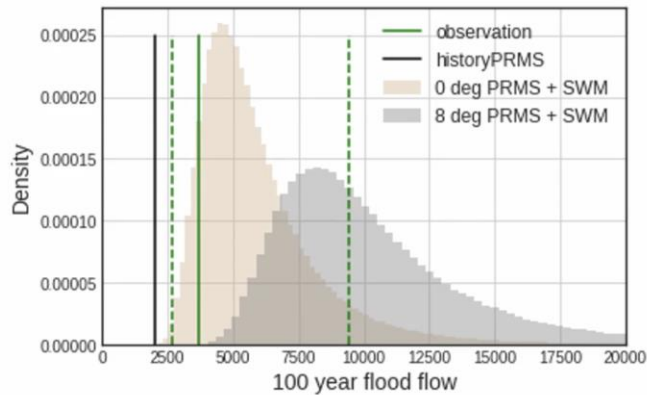
Most watershed models underestimate flooding and low flows. They miss the variability.

Used the Squannacook River watershed because had long-term data, minor water withdrawals and no controls.

New models they are using are slightly more accurate.



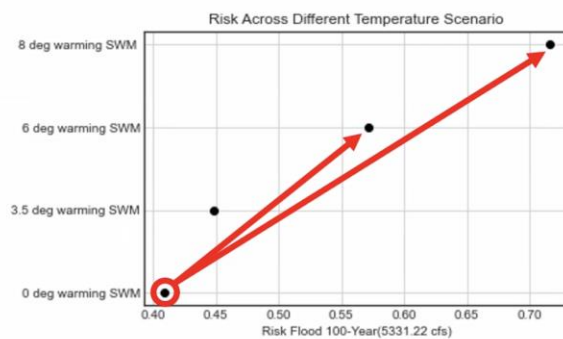
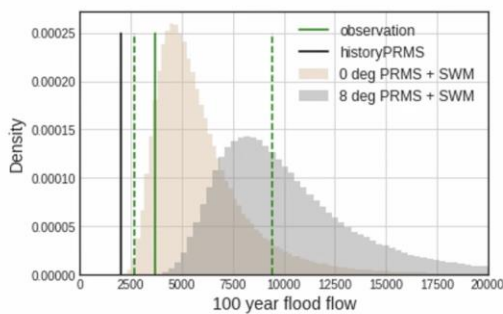
Pilot Result 2, future: Extreme events under climate change



1. Now provide distributions of design stats, not point estimate.
2. For 0 degrees warming (beige), consistent with B17B (green).
3. Warming (grey) shifts distribution larger, extends fat tail.



Warming conditions substantially increase risk of extreme floods



Risk: Probability the design event will be exceeded over a design life/planning period.

6 degrees increases 100-year flood risk over 50-year design life from 40% to 57%.



8 degrees increases risk over 50-year design life from 40% to 72%.

Uses maps of watersheds to help visualize the data.

MWRA Board 2/16

Commissioner's report: Thankful for the BioBot data--and that it is trending in the right direction.

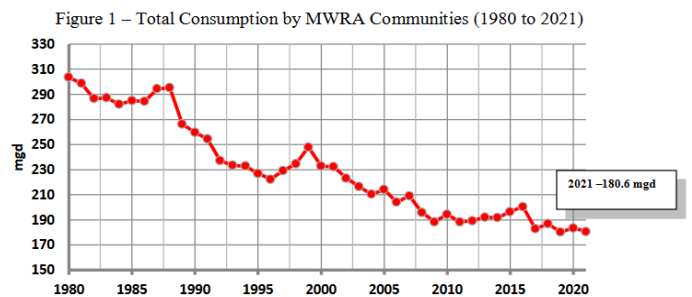
Laskey report: CSO hearing tomorrow & anticipating watershed organizations will be there & vocal, despite millions of dollars spent to remove CSOs.

Vitale: thanks from Mayor Wu and BWSC for MWRA's help with a particularly difficult water main break this month.

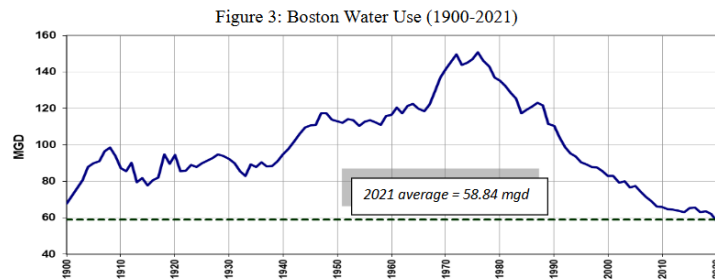
EXECUTIVE SESSION --Items included Prison Point update & HEEC litigation status

WATER SUBCOMMITTEE

Report on 2021 Water Use Trends and Reservoir Status

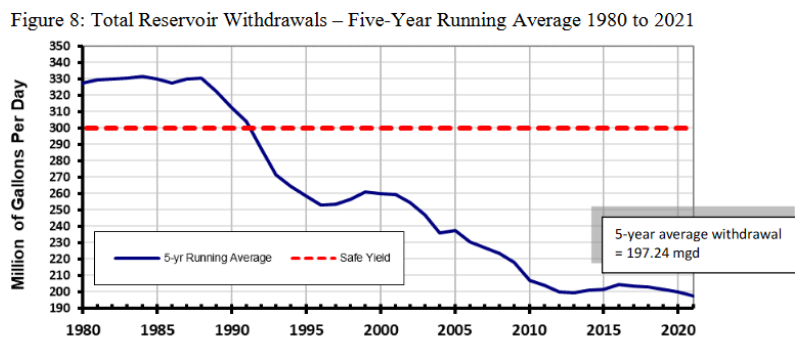


Here's Boston's historic demand:



Boston's share dropped during the pandemic, but is starting to recover.

Seasonal (winter/summer) demand is also declining. Outdoor water use is about 11% annually.



MWRA is withdrawing about 197 mgd. Original plan was over 400 mgd in 1985. This decline even with addition of 5 new communities and the hatchery. Currently at 96% of capacity at Quabbin Reservoir.

Longest drought on record is the 1960s drought. Nothing like that since. With climate change, reservoirs store the higher precipitation in the wet years and have it available for the dry.

Vitale: water sales are so low for Boston that they have had to dip into reserves. Raised rates, but commercial water users are taking measures to conserve.

Metropolitan Redundancy Interim Improvements Projects Update

These improvements improve redundancy prior to the metro tunnel.

- Comm Ave pump station--8% of City of Newton's water from Shaft 6 of the City Tunnel. Added low service supply and new pumps with variable frequency drives.
- Low service pressure reducing valves--Nonantum road in Brighton and in Medford. Adding capacity.
- Shaft tops in Newton, Malden, xx
- Rehabilitation of the Weston aqueduct supply main. Cleaning & lining.
- Design of Chestnut Hill Pump Station--new connection to Dorchester/City tunnels just in case. Construction in the fall.

Contract Awards

- Northern Extra Pipeline Improvements Section 63 (Lexington): Albanese D&S Inc., Contract 6522 \$11.7m. Engineer's estimate was \$9.6m

Contract Amendments/Change Orders

- John J. Carroll Water Treatment Plant Sodium Hypochlorite System: Modifications: Harding and Smith, LLC Contract 7085H, Change Order--another \$1m and more time, plus flexibility for the ED to approve another \$250K. AP: 42% overage. Likely to get higher? Not foreseen, except for when the pumps get connected.

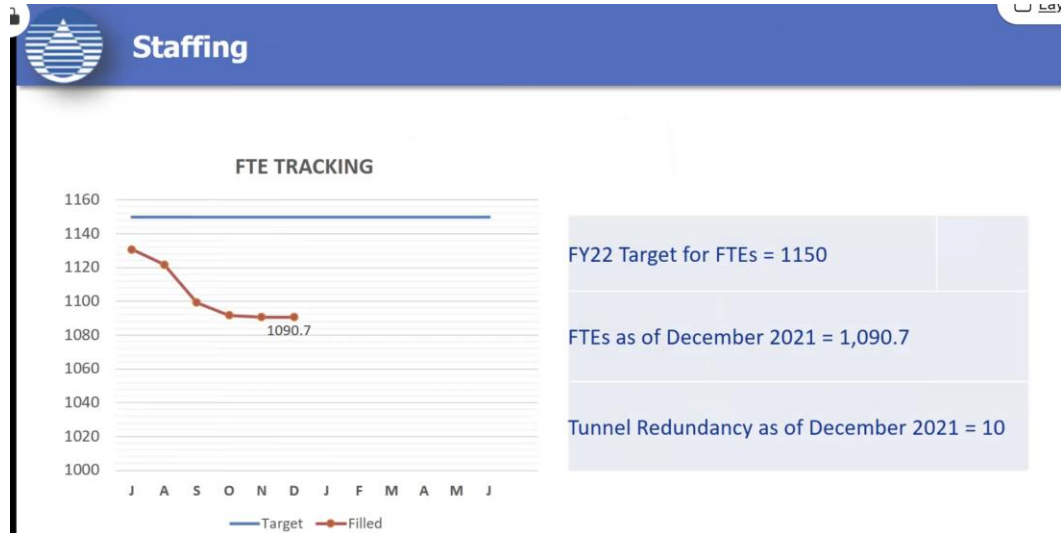
PERSONNEL & COMPENSATION

- Update on Diversity, Equity and Inclusion--DEI goals are now part of the MWRA's Strategic Business Plan. Pipeline now has a DEI page. Mentoring, training regularly. Recruitment and retention focus. Internships & outreach via educational program (Meg Tabaksco). Going to undertake a disparity study, which hasn't happened for a few years. Environmental Justice is a new focus. Foti: mentoring is very popular at MassDOT. The MWRA program is also popular with mentors. 47% of the workforce is minority and/or female. Lost a lot of good people to retirements, struggling to hire new--but also promoted a lot from within.
- Approval of the 2022 Affirmative Action Plan

ADMINISTRATION, FINANCE & AUDIT

- FY2022 Second Quarter Orange Notebook

- Staff turnover and Omicron have affected operations in TRAC, lab performance



- The Deer Island plant set new high flow records in both July and September. Interestingly, Deer Island set low flow records during the first quarter of the prior fiscal year. As a result of higher flows, energy use up by 30% above budget because of the needed pumping
- Increased precipitation meant a rolling average flow exceedance at Clinton
- Rain also caused bacterial exceedances in the drinking water & thus more chlorine.
- FY2022 Mid-Year Capital Project Spending Report
 - 22% under budget (about \$62m)

MWRA also has a number of projects currently in design or under construction. Expenditures for some of the larger active contracts are:

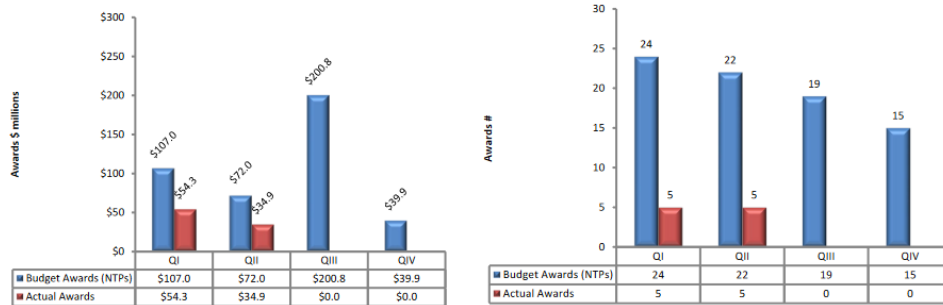
Wastewater System Improvements

Project	FY22 Budget \$s in 000	Life to Date Spending \$s in 000	% Complete
Corrosion & Odor Control Nut Island Odor Control HVAC Improvement Construction Phase 2	\$59,741	\$32,895	55.1%
Facility Asset Protection Ward St & Colum Pk Headworks Design/Construction Admin	\$28,897	\$1,525	5.3%
Wastewater Meter System-Equipment WW Metering Asset Protect/Equip Purchase	\$12,953	\$3,046	23.5%
Corrosion & Odor Control Nut Island Odor Control & HVAC Design/Construction Admin/Resident Engineer Inspection	\$8,366	\$5,952	71.1%
Siphon Structure Rehabilitation Design/CS/RI	\$2,855	\$1,612	56.5%
CSO Support CSO Performance Assessment	\$5,284	\$4,806	91.0%
Deer Island Treatment Plant Asset Protection E Seawall Des/ESDC/REI	\$2,600	\$664	25.5%
Deer Island Treatment Plant Asset Protection MCC Switchgr Repl Des/ESDC/REI	\$2,880	\$806	28.0%

- Underspending in wastewater mostly the result of delays

Status of Contract Awards Planned for FY22

MWRA's FY22 CIP projected 80 contracts to be awarded for the year with a value of \$420.0 million. Through December, 46 awards with a value of \$179.2 were planned. Through mid-year, MWRA has awarded 10 contracts with a value of \$89.3 million or 49.8% of plan. The two largest contract awards total \$66.4 million and include the Prison Point Rehabilitation and CP-3 Section 23, 24, 47 Rehabilitation.



-
- FY2022 Financial Update and Summary as of January 2022
 - \$7.7m put in defeasance account year to date, mostly lower variable interest rates. \$14.9m variance (under budget) --mostly continuing vacancies
 - Projecting \$32.3m budget surplus

- Preliminary FY2023 Water and Sewer Assessments

The Proposed FY23 CEB recommends a Rate Revenue Requirement of \$819,138,000, an increase of 3.4% over the final FY22 requirement.

	FY23 Preliminary	FY22 Approved	\$ Change from FY22	% Change from FY22
Water	\$288,304,865	\$277,415,068	\$10,889,797	3.9%
Sewer	\$530,833,135	\$514,668,932	\$16,164,203	3.1%
Total	\$819,138,000	\$792,084,000	\$27,054,000	3.4%

Advisory board will have 60 days to review this rate revenue requirement. Urges communities to consider the utility-level increases, as water is going up more--and sewer is a heavier lift.

- Transmittal of FY2023 Proposed Current Expense Budget
 - Higher debt costs are the biggest driver--61% of the CEB
 - Direct expenses are 57% personnel
 - Indirect costs--mostly watershed at \$28m or 48%. More employees in DCR's Watershed division driving it up.
 - Capital financing--mostly Senior debt (60%) at \$305.0m. Another 15% is subordinate debt and the state revolving fund is 19%.
 - Rate revenue is 97%

- Proposed Amendments to the Management Policies of the Board of Directors
Carried over from last month's BoD meeting, this increases the Executive Director's (and other staff) ability to approve expenditures with "Delegated Authority" (i.e., doesn't need a BoD vote) to a more reasonable range. These are reported monthly to the BoD in the Delegated Authority report. John Walsh, who often questions lines in the Delegated Authority report is uncomfortable with the levels in the new policy.
- Groundskeeping Services, Metropolitan Boston: C&W Services, Contract OP-439--
question on why no minority or woman-owned contractor was in the bidding
- New Next Generation Firewall System: ePlus Technology, Inc., WRA-5073Q, State
Contract ITS74

WASTEWATER POLICY & OVERSIGHT

- CSO Post-Construction Monitoring and Performance Assessment: AECOM Technical
Services, Inc., Contract 7572, Amendment 3
This contract amendment adds cost and time to the current contract
CSO discharge down by 87% of 1988 levels. 93% treated. Total cost \$911m.
Demonstrated water quality improvements.
But future challenges--3-year extension request to continue work.
AECOM has documented improvements, done the hydraulic model and more.
- Nut Island Headworks Odor Control and HVAC System Improvements: Walsh
Construction Co. II, LLC, Contract 7548, Change Order 9

CORRESPONDENCE TO THE BOARD

Water Supply Citizens Advisory Committee (WSCAC) Letter Regarding CSXT Settlement Agreement

CSO Long Term Control Plan Performance assessment hearing 2/17

Nearly 100 participants

Background of the court case, work completed. 40 outfalls closed, Typical Year model...
Betsy Reilley--water quality standards (met 95% of the time) and required levels of control.
Jeremy Hall: explanation of Typical year and charts showing last 11 years & how they match up--
the TY is about average for rainfall and outfall, but varies month to month. Even with climate
change.

Water Quality Standards and Required Levels of CSO Control

Water Quality Standard Classification	Receiving Water Segment	Required Level of CSO Control
Class B	Neponset River	CSO prohibited (25-year storm control for the South Boston beaches)
Class SB	North Dorchester Bay South Dorchester Bay Constitution Beach	
Class B(cso)	Back Bay Fens	>95% compliance with Class B or SB ("fishable/swimmable") Must meet level of control for CSO activation frequency and volume in the approved Long-Term Control Plan (LTCP)
Class SB(cso)	Mystic/Chelsea Rivers Confluence Boston Inner Harbor Fort Point Channel Reserved Channel	
Class B (CSO Variance)	Alewife Brook Upper Mystic River Charles River	Class B standards sustained with temporary authorizations for CSO discharges as the LTCP is implemented and verified (1998-2024)

Laskey: modeling is complex. We had a very unusual 2021--esp. July!

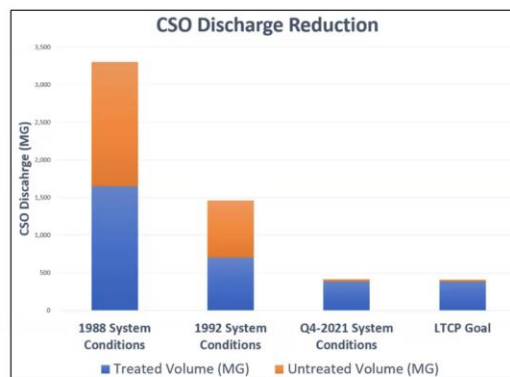
Reilley: MWRA monitors water quality

Hall: projects, treatment...

Very close to 88% reduction in discharges

Overall Results of Performance Assessment

- Annual CSO volume system wide reduced by over 2.8 billion gallons, a reduction of 87%
- Very close to Program goal of 88% reduction
- Current 414 MG (384 treated / 30 untreated)
- LTCP Goal 404 MG (381 treated / 23 untreated)



Notes that all discharges are treated.

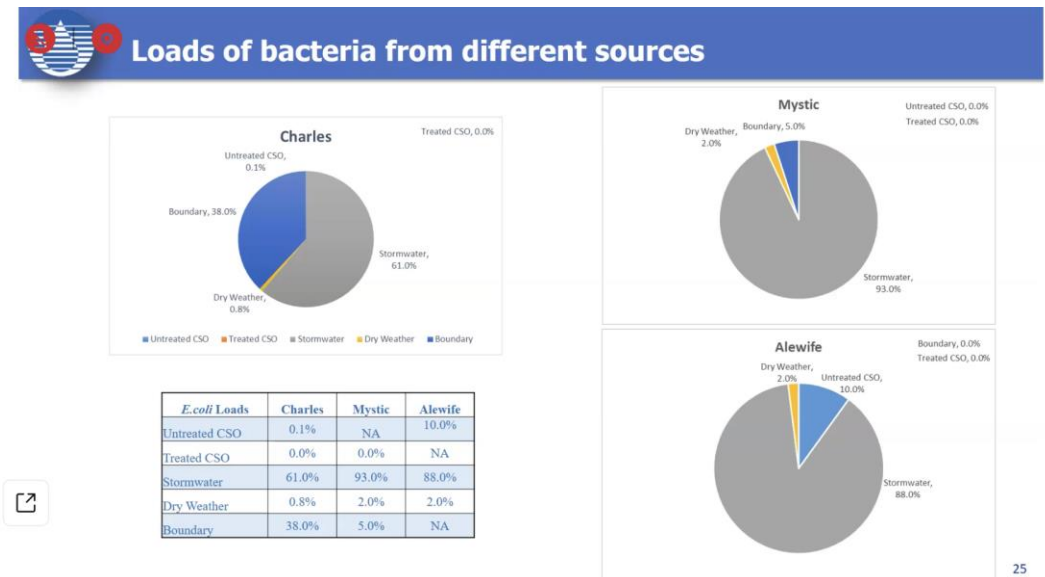
MWRA is still working on 6 additional outfalls to bring them into compliance with the LCTP goals in the next 3 years.

Laskey: points out that while some outfalls exceed goal limits, overall, the amount of sewage is well under the overall goal.

Reilly: monitoring of the water quality, and where the water doesn't make the grade--but mostly dilutes to become good quality. Headwater of the Fort point Channel and the Alewife are the lowest quality. Identify the bacteria sources and differentiate between CSOs and stormwater.

Use a receiving water model for the variance waters--Alewife, Charles and Mystic--which has advantages because it can allow for spatial and temporal variations.

Where bacteria are coming from:



Water quality is mostly affected (by levels and by hours) by stormwater. Break out by waterbody.

Show a cool video showing a rainstorm and where the bacteria enter & linger. When only look at CSOs, don't see any (because overflows are treated, unlike stormwater).

Reilley notes real time monitoring of all MWRA outfalls, rapid notification, interactive web pages and more to come.



Water Quality Summary

- In the Charles River and Alewife Brook/Upper Mystic River, the annual percent attainment with *E. coli* criteria was driven by the non-CSO loads.
- Further reduction of CSOs to a level such that all CSOs to the Charles River and Alewife Brook/Upper Mystic River met the numerical targets for activation frequency and volume per the LTCP would not substantively change the percent attainment.
- Reductions in *E. coli* loading from stormwater would improve the annual percent attainment, but even with an order-of-magnitude reduction in *E. coli* counts in stormwater, non-CSO sources would still be the primary driver of non-attainment of the *E. coli* criteria.
- Even with all other sources of bacteria capped at the Water Quality Standard, CSO would have only a minor impact on non-compliance.



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Future -- annual progress reports, meetings with regulators, watershed associations and CLF. doing more work in East Boston on sewer separation, Somerville, and Chelsea.

Hall: work continues in the communities. Cost-benefit.

Questions

A Needham rower comments on the development & pollution from run-off into the river. Reilley: this is an issue, but is not related to CSOs, but to stormwater pollution that is uncontrolled. Lots of opportunities to improve water quality there.

What other pollutants are left in the water from treated CSOs? --
Remove floatables and bacteria. Last look at 1994. Viruses don't usually survive disinfection.

Comment about how bad Alewife is during a rainstorm.

Why are 3 Somerville outfalls exceeding goals?

Most of Somerville's outfalls have been closed--these are the three left. These three have been challenging to fix, but there is work going on that should bring them into compliance. Issue is that you don't want to cause flooding during really big storms.

Comment: Alewife Brook work by MWRA is a failure.

Laskey: Takes strong exception. Largest CSO wetland, much of brook in a pipe that runs backward in flood weather. Much of what MWRA has designed & built has been more successful than thought. Need to use science to determine where to spend the \$\$.

Several commenters argue against any further housing development in the watersheds because it would increase stormwater pollution.

Patrick Herron: asks why not control for a 25-year storm

Laskey: That's a hurricane--no way to control for that. What MWRA has done is instead ensure most days have great water quality at least from the perspective of CSOs at beaches and shellfish beds.

Decided not to eliminate the 25-year storm overflow at Alewife? Right--that would be inordinately difficult, and isn't a swimming beach.

Stormwater is the major contaminant of the Alewife, so adding more sewer separation there would not have done much for water quality. Issue also whether the sewers could handle the water.

Also, if you remove more CSO in Cambridge on the Charles, you run into a phosphorus concentration issue.

Question on bioretention basins and native plants to contain the stormwater.

MWRA: green infrastructure is a key component of CSO control across the country. They are effective, but there's not enough real estate in this watershed to make a real dent in the large storms that now cause most CSOs in the Alewife brook.

But climate change...bigger storms, CSOs, SSOs...

Laskey: have to save the sewer treatment systems to ensure they survive the storm.

Friends of Alewife Brook: Model does not account for climate change, and it should.

Advisory Board 2/17

Executive Director--Katherine Dunphy died. Longest-serving AB Chair. John Carroll back in the hospital. Turns 94 this month. Walter Woods is turning 104

MWRA received another 3-year extension on the CSO LTCP
Legislative PFAS report will be released soon.

Presentation: Division of Water Supply Protection (DWSP) Update – John Scannell, DWSP Director

Land Acquisition:

Land Acquisition



- Just hired new Land Acquisition coordinator, Felicia Bakaj.
- Land acquisition continued on selective parcels of land
- \$1M average annual budget for purchases
- FY2021 summary:
 - 37 acres
 - \$517,500
 - One was a 1-acre piece of commercial land very close to the Route 12 bridge at Wachusett

DCR also does watershed preservation restrictions--has to monitor every 2-3years

24 active timber sales in 2021; forest inventory, also done for the first time in Wachusett and Sudbury. Consistent monitoring over all watersheds.

Controlled burns...expect will use it in the future--Prescott peninsula likely this year. This is a way to regenerate oak forests.

Slash walls --keep deer and moose out of regenerating forest. Carbon releases slowly

In the Harvest Outside the Slashwall



Wildlife management--including bird harassment, control of deer (hunting)..use drones to locate birds & remove food sources. Beaver trapping year-round.

Public Access--ranger programs. Lots of new visitors and a number of violations (50% swimming).

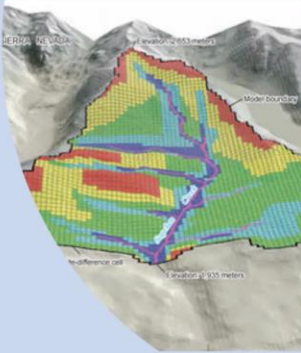
Education: Doing by YouTube and webinar, resuming some in-person education.

Monitoring water quality in the reservoirs--now using a buoy for continuous monitoring. Also look at stream flow, etc.

Working to reduce road salt & Chloride in the water

Modeling Efforts

- UMASS-Amherst has an existing ISA with DCR to investigate watershed-based reservoir inputs and to use their existing hydrodynamic and water quality model to predict various outcomes under a variety of conditions
 - Recent publication: Soper et al. Long-term analysis of road salt loading and transport in a rural drinking water reservoir watershed *Journal of Hydrology*, September 28, 2021
 - "The decadal response of the reservoir system reflects the slow-moving nature of the baseflow-dominated chloride loading and suggests that measurable water quality improvements will only be realized with a sustained long-term decrease in the amount of road salt applied."



Tracking how much salt applied in the watershed, logging mayflies!

Invasive aquatic plant controls--continuing to see progress. Also working on removing direct stormwater discharges to the reservoir. Latest is Rt. 110 in Sterling.

COVID drove up visitor numbers.

Hiring: FTEs up to 140, 2 new staff coming in next weeks.

Questions: visitors, trespassers & violators numbers are high--fires, swimming, etc. How are they so high? Ticket is how much? --A--much more accurate tracking, have iPads when enforce & can id repeat offenders.

Invasive bugs? Working on Asian Longhorn beetle survey. None found in the zone recently. Gypsy moths are cyclical, but had a bad season 3 years ago.

Continue with boat inspections.

AB looking forward to DCR filling remaining positions.

Regionalization & expansion: Have a task force working on infrastructure funding, now have board and MWRA members. First meeting hoped to be in March.

Ex. Comm would like to lower admission fee & work on repayment timeline. Will now bring to the full AB.

Finance Committee – Elena Proakis Ellis

Working on the budgets has already begun--James recaps the program since FY19. Notes delays because of COVID, plus costs of moving MWRA from Charlestown offices.

CEB and rate revenue--look at actual utility-level impacts to communities.

The budget hearing will be March 17th.