

Overview of the Water Quality Monitoring Program for Quabbin Reservoir Watershed and Ware River Watershed

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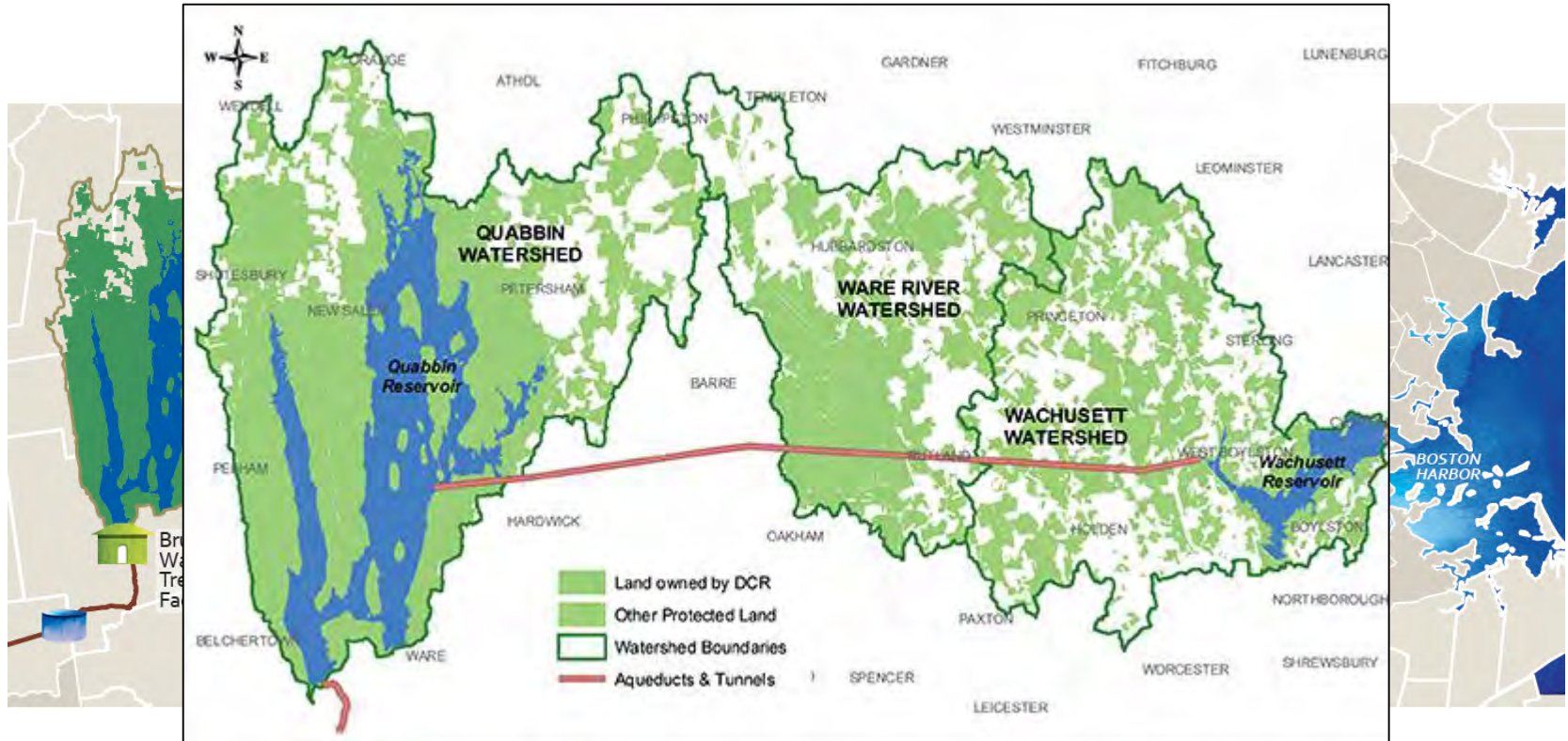
Water Supply Citizens Advisory Committee Meeting, Tuesday June 11th, 2019



Presentation Outline

- Introduction to the DCR/MWRA System
- Public Water System Regulations
- Goals of the Water Quality Monitoring Program
- Overview of the Water Quality Monitoring Program
 - Quabbin Reservoir Watershed
 - Ware River Watershed
 - Core & EQA Sites
 - Reservoir Monitoring Sites
 - Winsor Intake
 - Forestry Monitoring
- Results from the Water Quality Monitoring Program (2018)
- Closing Remarks & Opportunity for Questions

Introduction to the DCR/MWRA System



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Public Water Supply System Regulations

Source Water Treatment Rule (SWTR) – US EPA, 1989

- Established to protect against pathogens
 - Requires water sources be treated (disinfection + filtration)
- Quabbin Reservoir meets criteria to exist as an unfiltered source since 1989

Filtration Avoidance Criteria			
		Requirement	Frequency
SOURCE WATER QUALITY CONDITIONS	Microbial Quality	Monitor fecal coliform or total coliform density in representative samples of source water immediately prior to the first point of disinfectant application: <ul style="list-style-type: none"> ▶ Fecal coliform density concentrations must be $\leq 20/100$ mL; OR ▶ Total coliform density concentrations must be $\leq 100/100$ mL. Sample results must satisfy the criteria listed above in at least 90% of the measurements from previous 6 months.	1 to 5 samples per week depending on system size and every day the turbidity of the source water exceeds 1 NTU.
	Turbidity	Prior to the first point of disinfectant application, turbidity levels cannot exceed 5 NTU.	Performed on representative grab samples of source water every four hours (or more frequently).



Water Quality Monitoring Program Goals

1. **Protect** present and future **public health**
 - a) Maintain **long-term water quality** data

2. Satisfy **filtration avoidance requirements** of the SWTR
 - a) Turbidity
 - b) Microbial Quality (Fecal and Total Coliform)

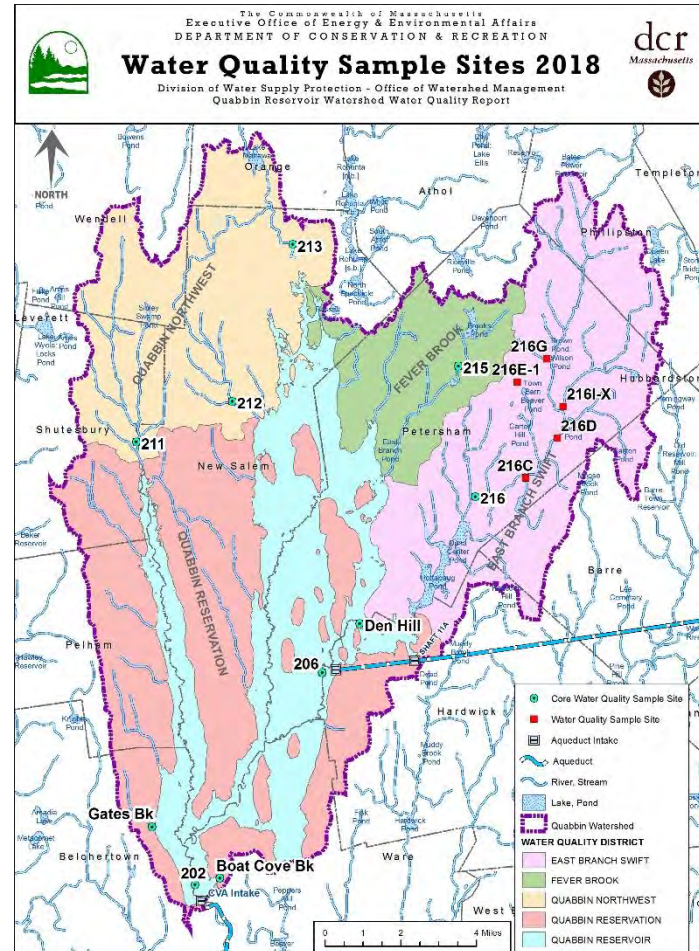
3. **Identify**
 - a) Measures to **eliminate** or **mitigate pollution** sources

4. Proactive **surveillance of water quality trends**
 - a) Support ongoing **assessments of threats** to water quality

Overview of the Water Quality Monitoring Program

Quabbin Reservoir Watershed

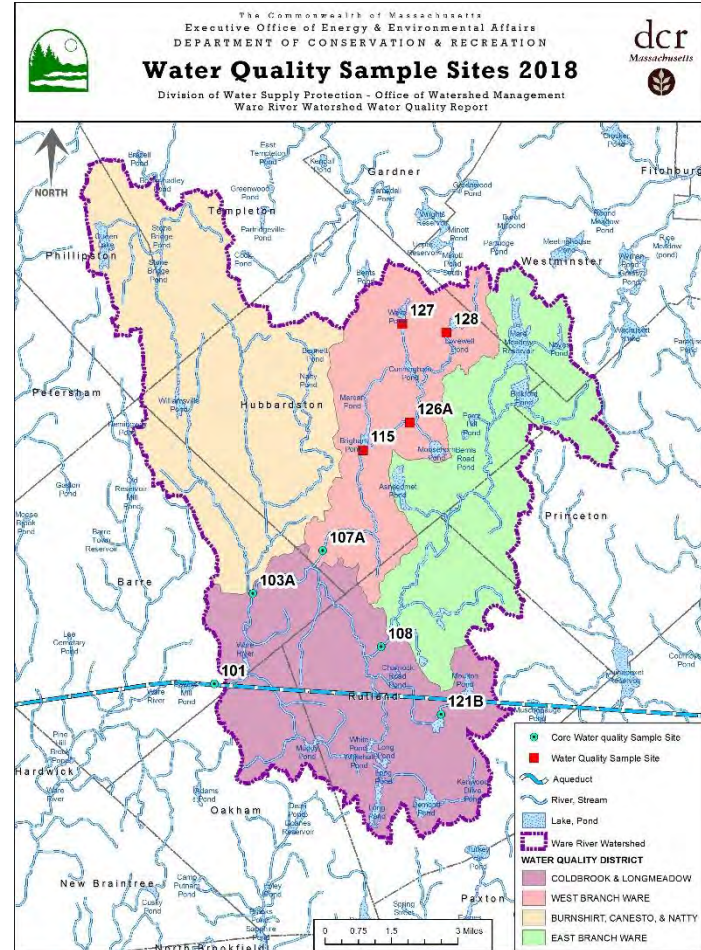
- Four Sanitary Districts
- 7 Core Sites
- 3 Reservoir Locations
- 5-7 EQA Sites, depending on sanitary district



Overview of the Water Quality Monitoring Program

Ware River Watershed

- Four Sanitary Districts
- 5 Core Sites
- 4-5 EQA Sites, depending on sanitary district



What does DCR DWSP monitor?

Watershed Core + EQA Sites

Physical Parameters

Stream flow (qualitative)

Stream characteristics

Temperature

Specific conductance

Dissolved oxygen

pH



Water Quality Parameters

Alkalinity

Turbidity

Fecal Coliform

E. Coli

Nutrients

UV₂₅₄

Sodium

Chloride



What does DCR DWSP monitor?

Quabbin Reservoir Sites

Physical Parameters

Weather

Water Conditions

Temperature

Specific conductance

Dissolved oxygen

pH

Transparency

Water Quality Parameters

Alkalinity

Turbidity

Fecal Coliform

E. Coli

Nutrients

UV₂₅₄

Phytoplankton

Zooplankton

Cyanobacteria

Chlorophyll-a



MWRA *and* DCR DWSP monitor Winsor Intake

Intake serving CVA communities

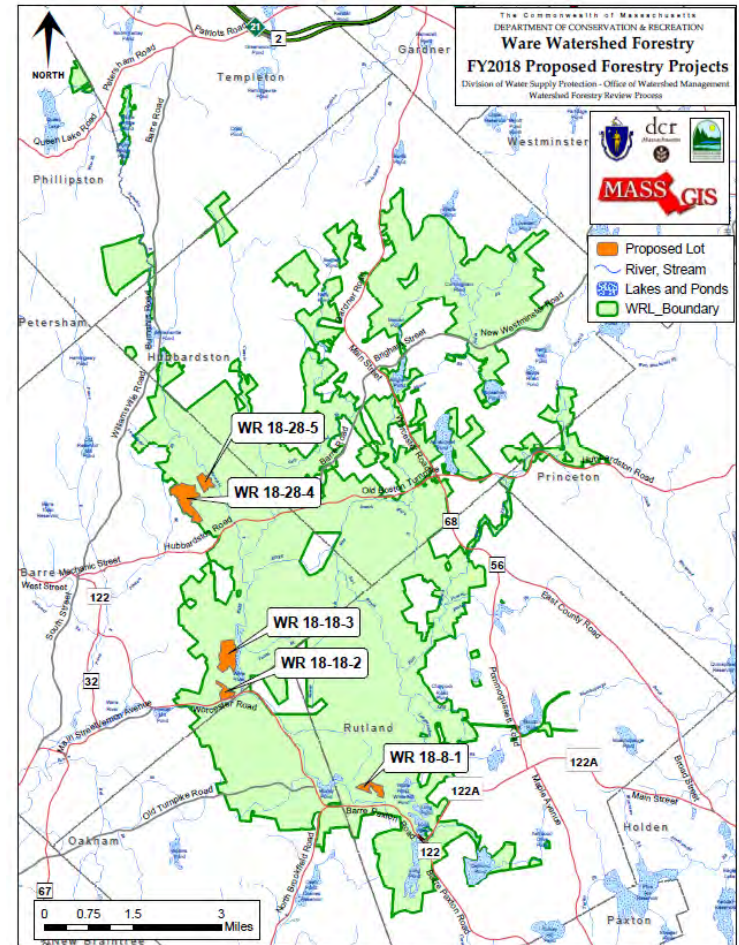
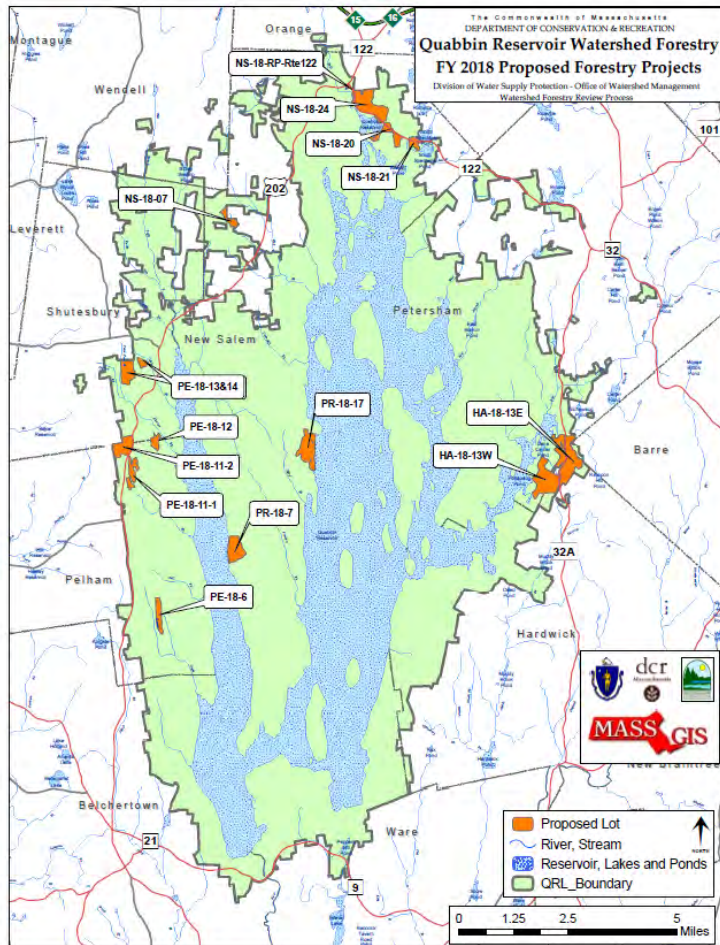
Water Quality Parameters

Turbidity {daily}

Fecal Coliform {daily}



Short-term Forestry Monitoring



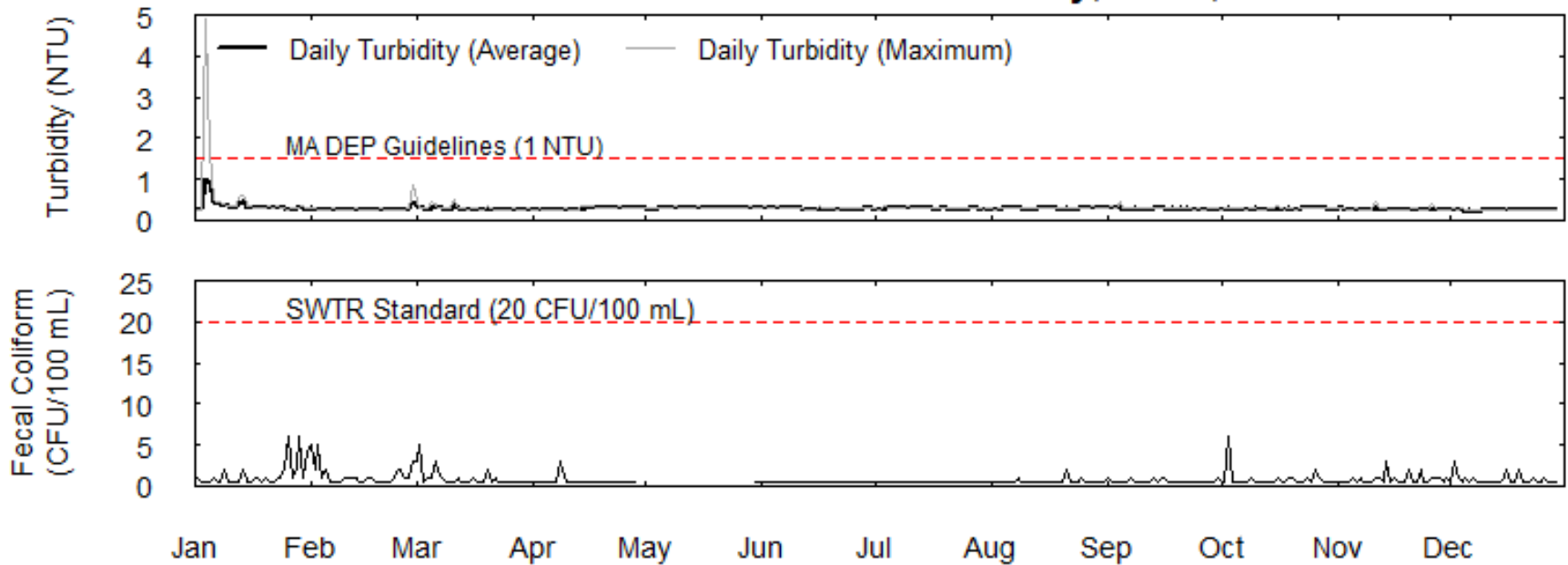
Short-term Forestry Monitoring

- Review timber lot showings quarterly
- Stream crossings over perennial streams are monitored for turbidity:
 - ✓ Before the start of any activity to establish baseline conditions
 - ✓ During harvest operations, including installation/removal of temporary crossing structures when necessary and if streams are flowing
 - ✓ Monthly for 12 months after harvesting is complete.
- Brief summary reports are included periodically in the annual water quality report – none in 2018.



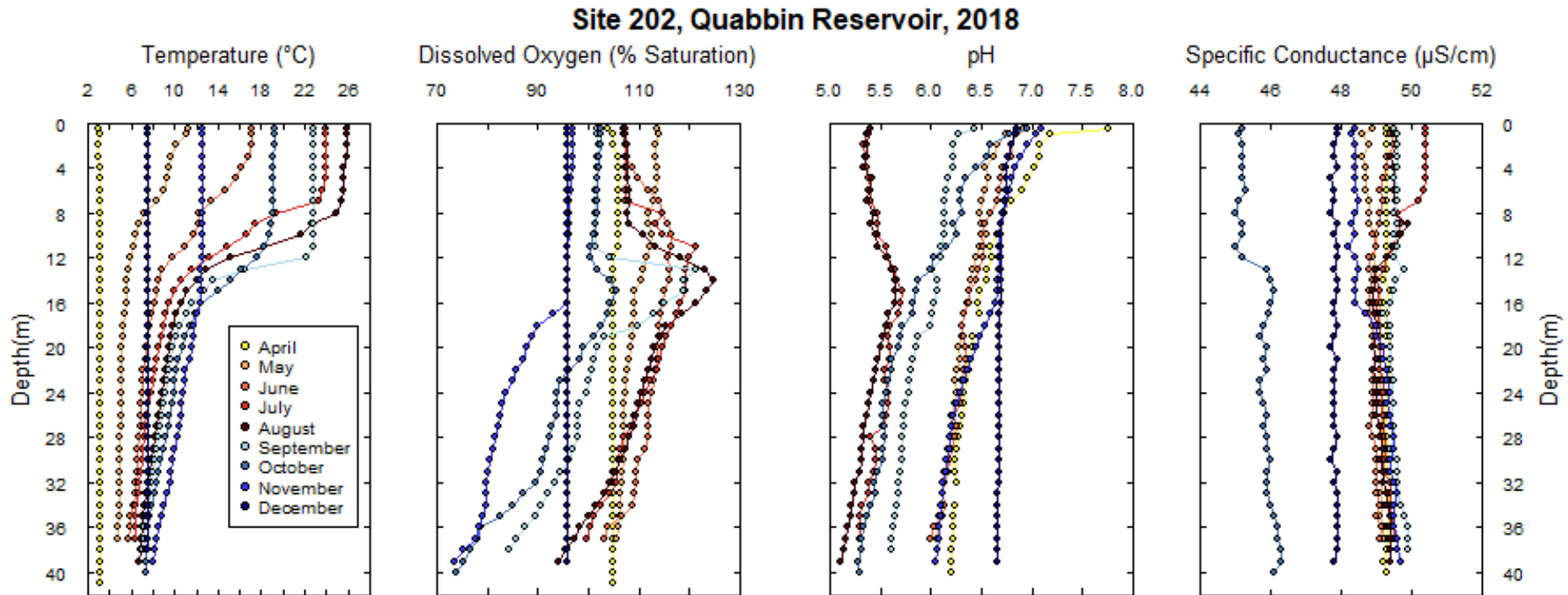
Results: Source Water at CVA Intake, 2018

Quabbin Reservoir Source Water Prior to Disinfection Brutsch Water Treatment Facility, Ware, MA



Source water at the CVA Intake **met the SWTR criterion** in 2018

Results: Reservoir Depth Profiles

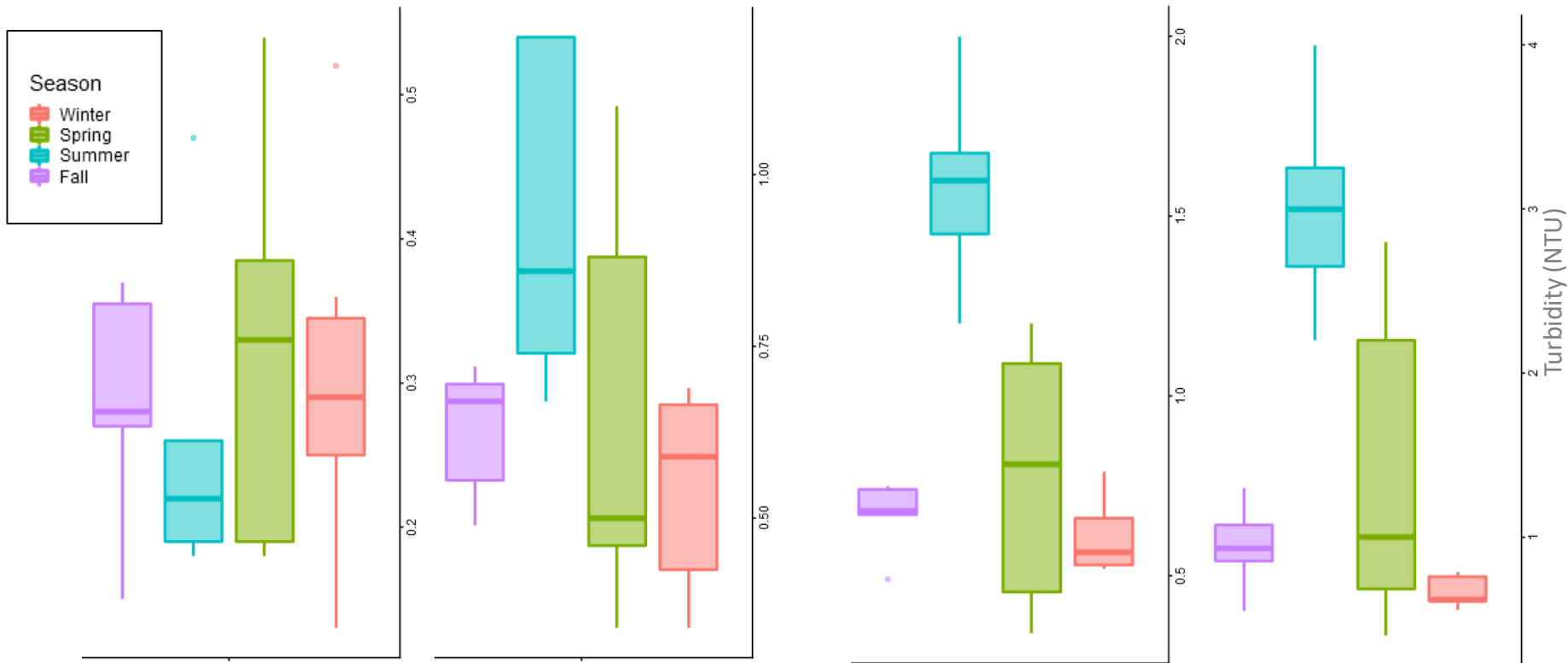


Show timing of **turnover** and **stratification**

Results: Turbidity in Select Tributaries

Quabbin Reservoir Tributaries

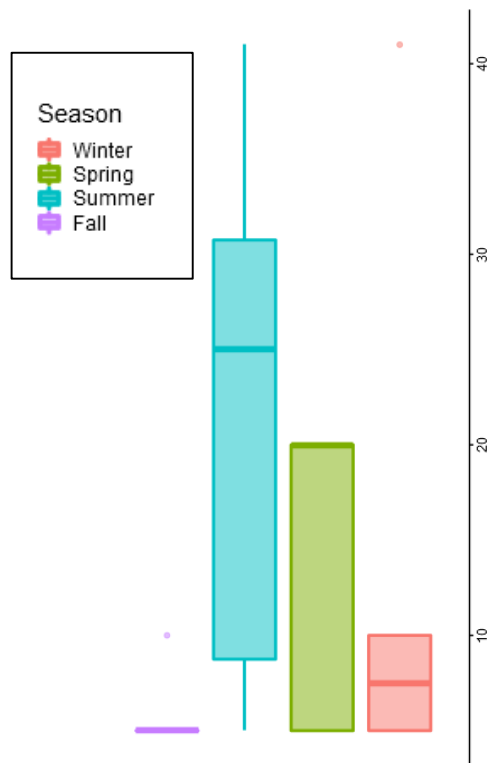
Ware River Tributaries



- Elevated following heavy precipitation events

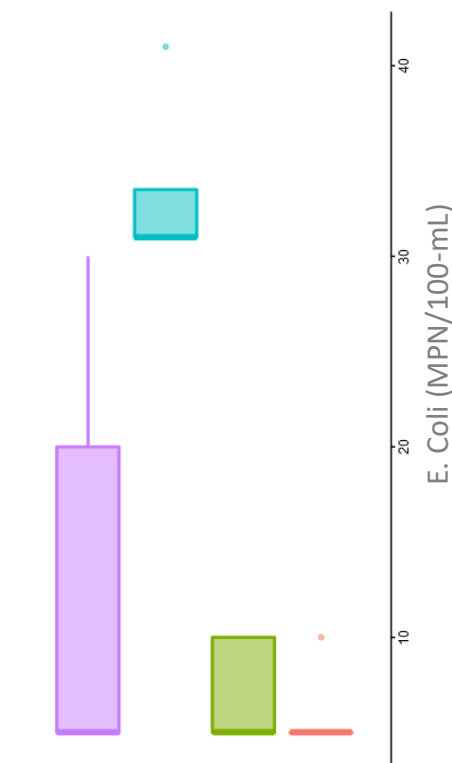
Results: E. Coli in Select Tributaries

Quabbin Reservoir Tributaries



Sample site 101.
High water mark shown on the gauge.

Ware River Tributaries

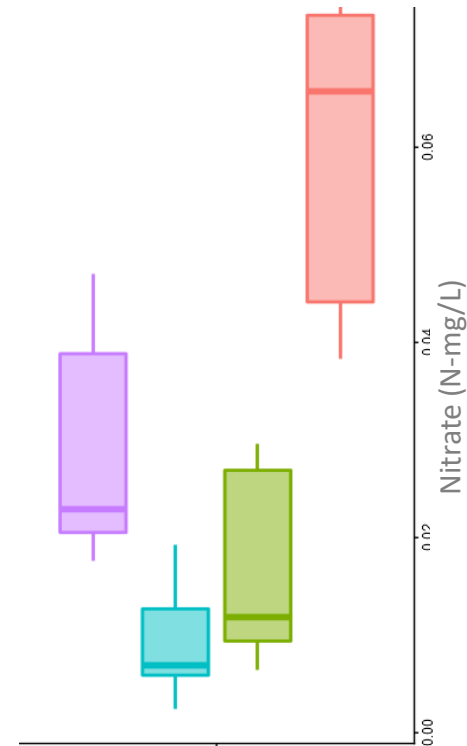
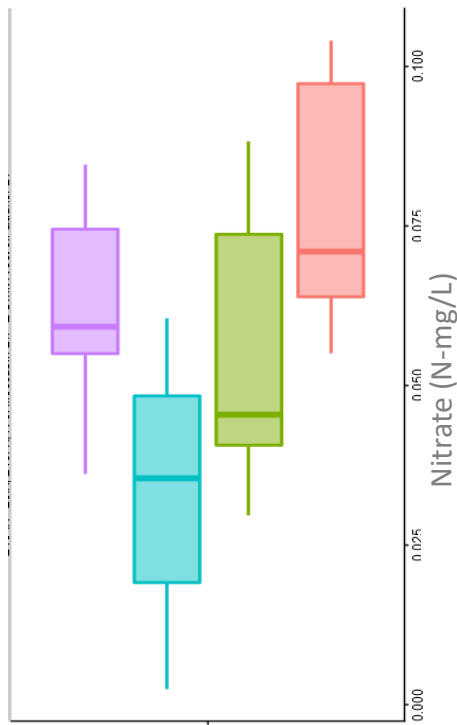


- Resample sites when E. Coli exceedances occur to identify cause

Results: Conductivity & Nutrients in Select Tributaries

Quabbin Reservoir Tributaries

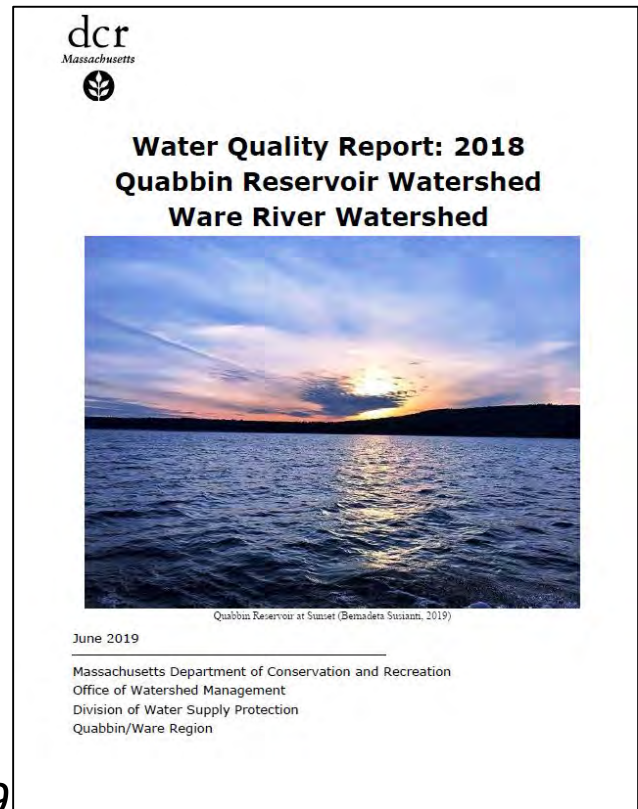
Ware River Tributaries



- Continued Monitoring for 2019

Closing Remarks

- Continued excellent water quality of the Quabbin Reservoir, Quabbin Reservoir watershed, and Ware River watersheds
- The requirements of the filtration avoidance criteria under the SWTR were satisfied
- Greater turbidity in the Ware River than the Quabbin Reservoir watershed
→function of land use differences
- Water quality monitoring continues through 2019
- 2018 Water Quality Report – *Summer 2019*



Questions

Special thanks to

Massachusetts Water Resources Authority
DCR DWSP management and staff



Image source: <https://www.mass.gov/locations/quabbin-reservoir>