



Environmental
Protection

DELAWARE AQUEDUCT REPAIR PROJECT

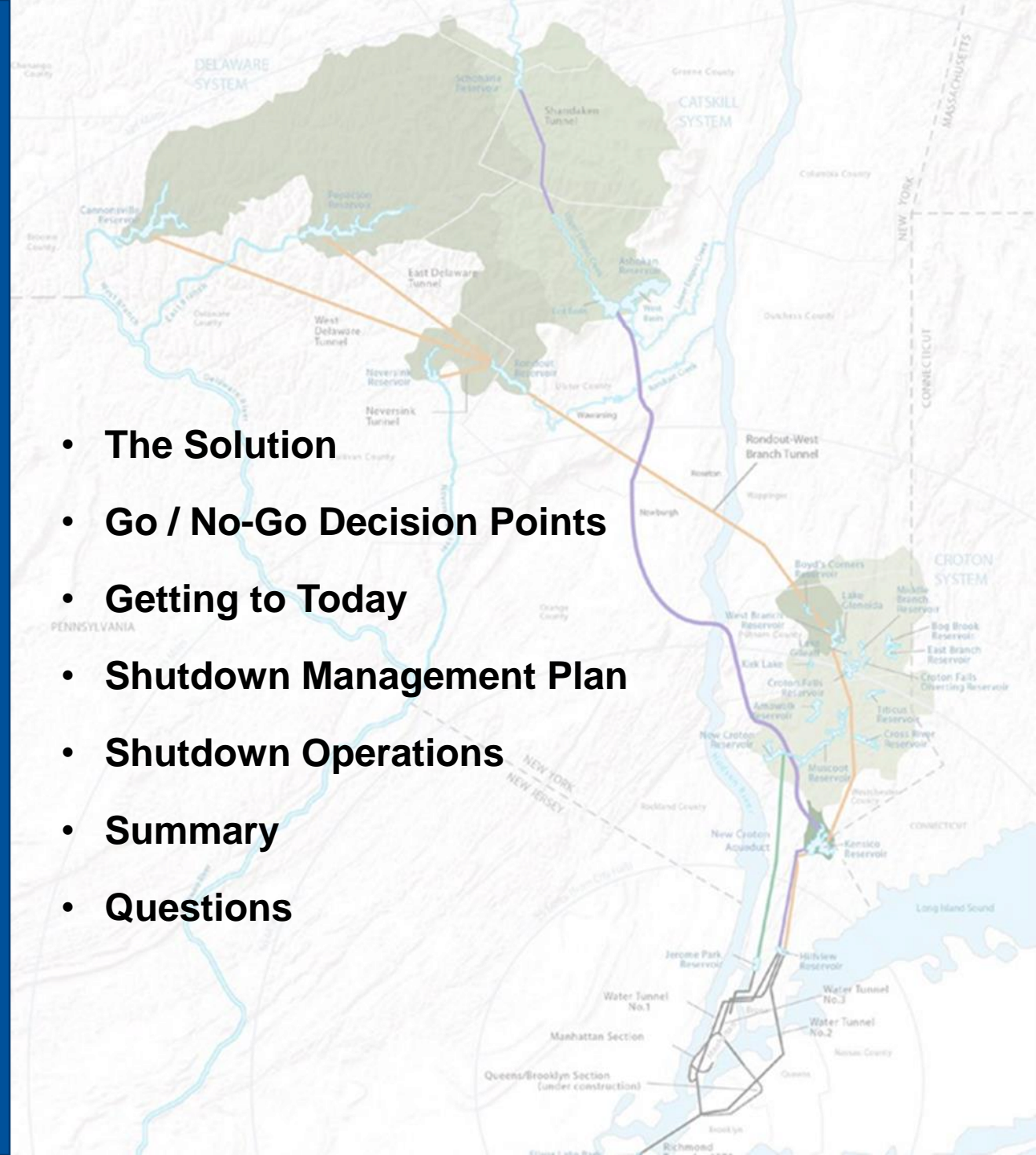
This content is draft, preliminary and for discussion at the April 29, 2024, DRBC Regulated Flow Advisory Committee Meeting. Content may not be published or re-posted in whole or in-part without the DRBC's or the presenter's permission. Presented by Jennifer Garigliano, NYCDEP.

Agenda

Jennifer Garigliano

DIRECTOR, WATER RESOURCES MANAGEMENT
BUREAU OF WATER SUPPLY

- The Solution
- Go / No-Go Decision Points
- Getting to Today
- Shutdown Management Plan
- Shutdown Operations
- Summary
- Questions

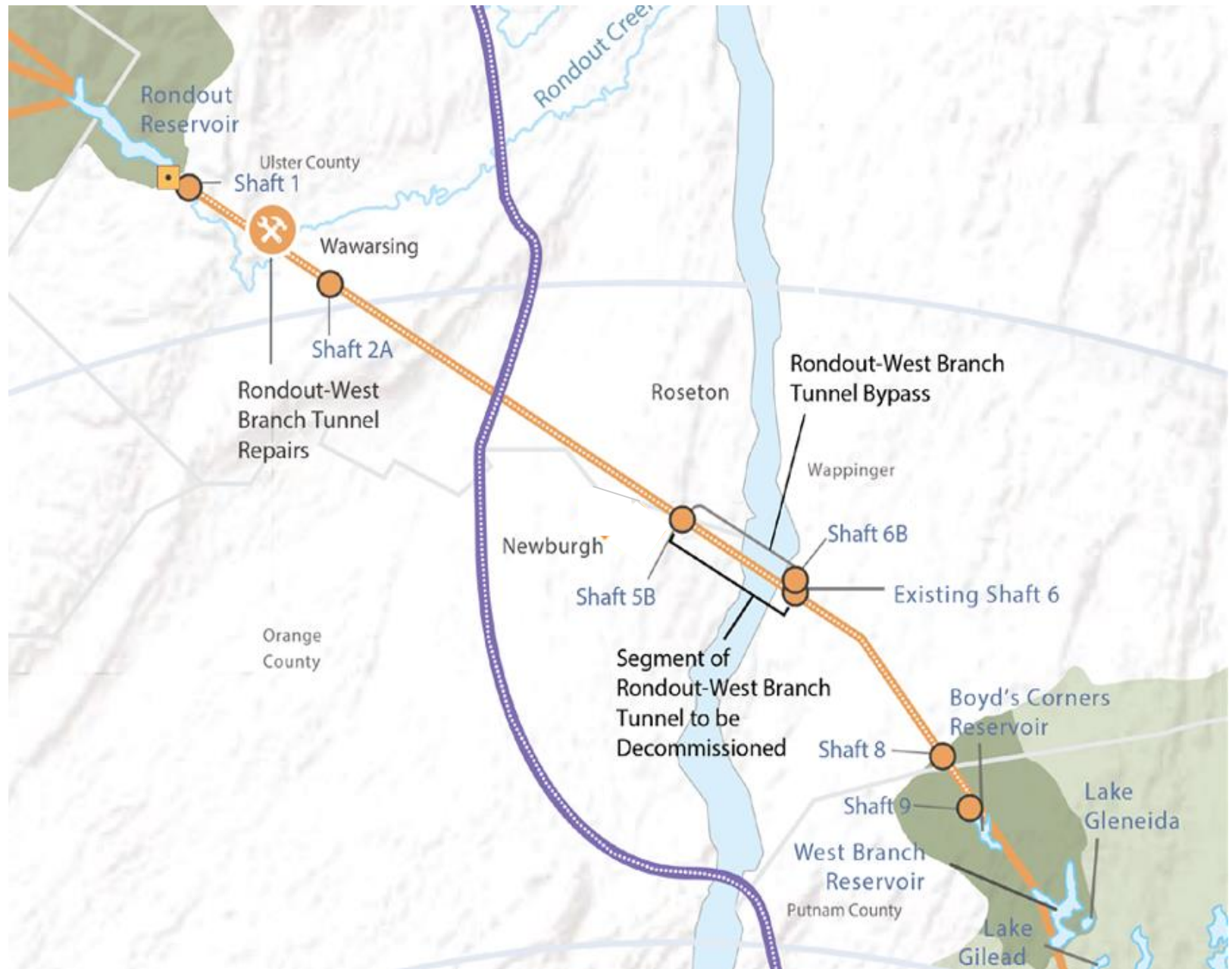


Delaware Aqueduct Bypass Tunnel

- Largest and most complex repair project in the 180-year history of NYC's municipal water supply
- Tunnel program cost \$1+ billion
- Fixing or eliminating leaks in the Delaware Aqueduct
- Building and connecting a new 2.5-mile-long tunnel 600 feet below the Hudson River from Newburgh to Wappinger
- First tunnel under Hudson River since the south tube of the Lincoln Tunnel was completed in 1957



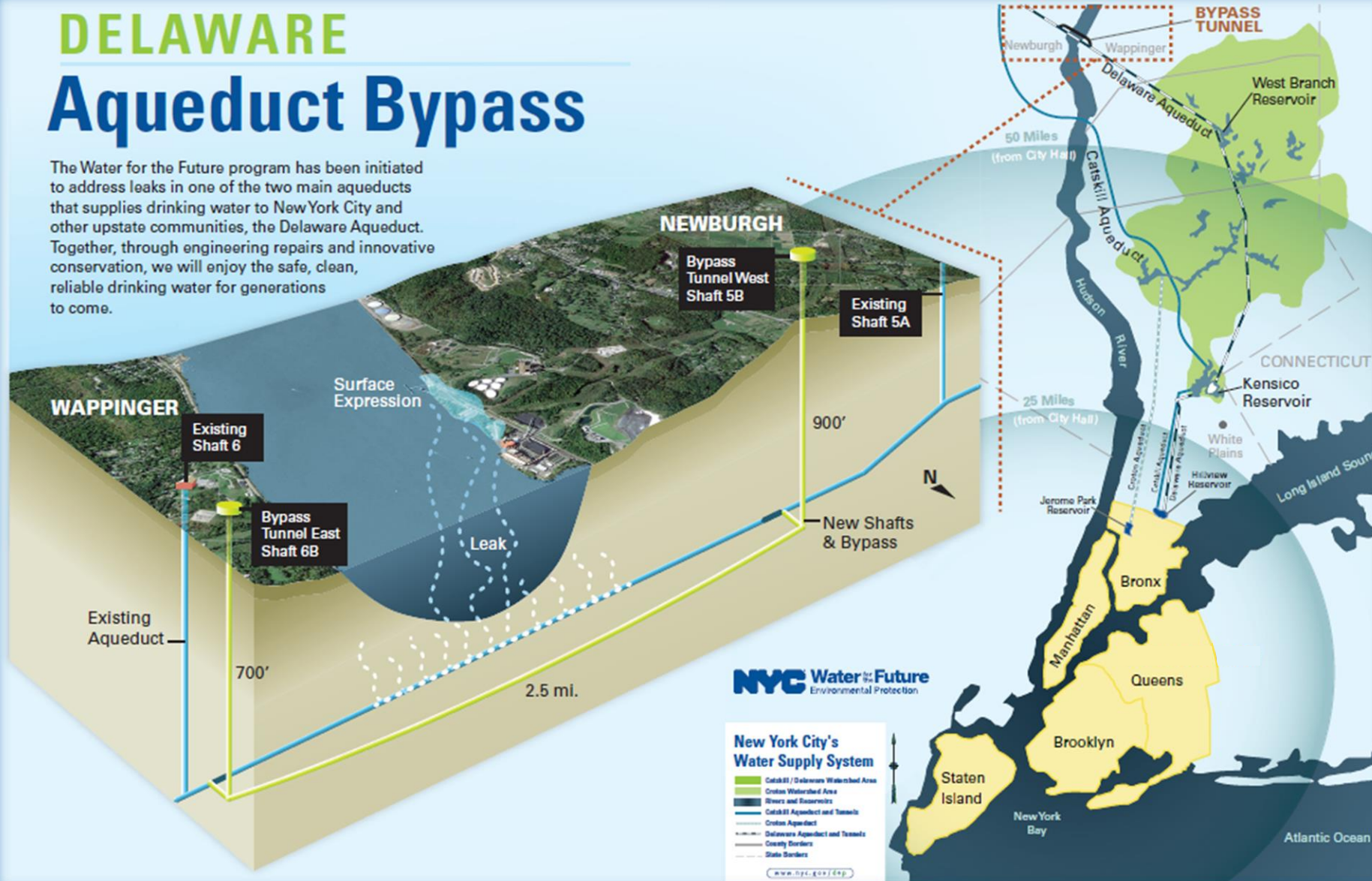
Primary Areas of Concern



The Solution!

DELAWARE Aqueduct Bypass

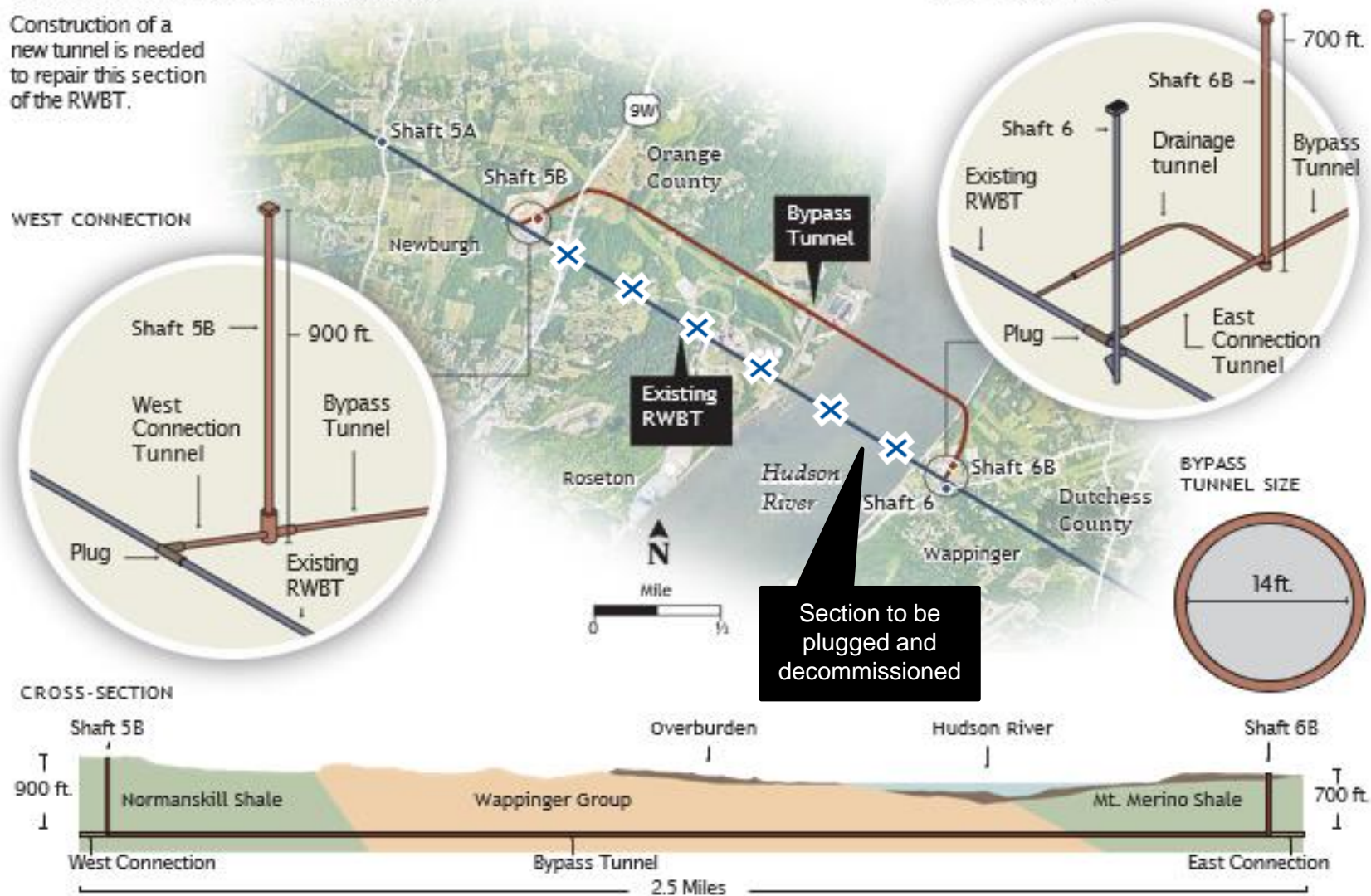
The Water for the Future program has been initiated to address leaks in one of the two main aqueducts that supplies drinking water to New York City and other upstate communities, the Delaware Aqueduct. Together, through engineering repairs and innovative conservation, we will enjoy the safe, clean, reliable drinking water for generations to come.



Bypass Tunnel to Connect at Both Ends Under Hudson

THE BYPASS TUNNEL AT ROSETON CROSSING

Construction of a new tunnel is needed to repair this section of the RWBT.



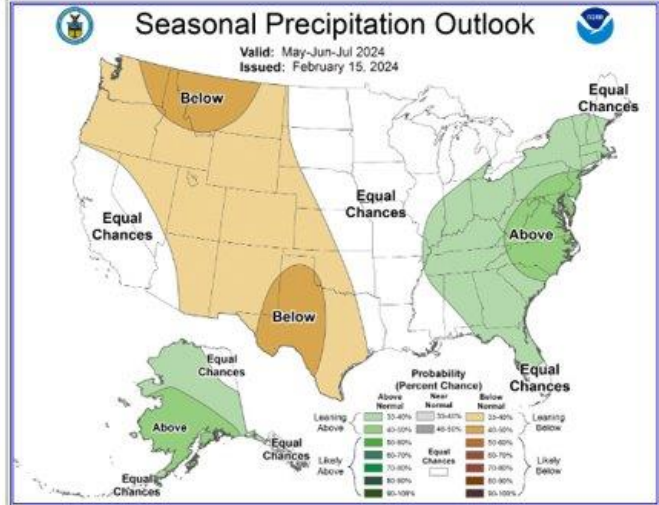
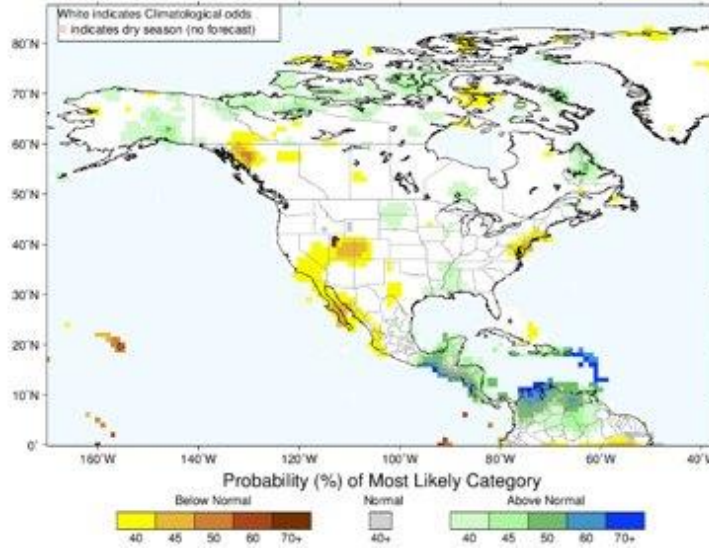
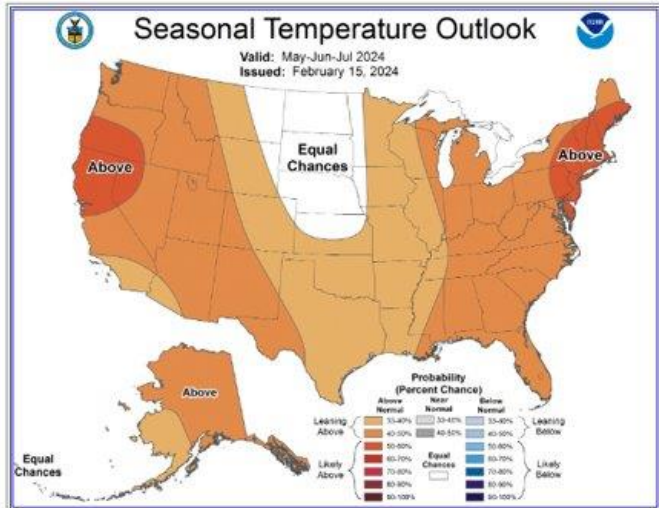
Go/No-Go Decision Points

Extended Temperature and Precipitation Forecast May 2024 – Jul 2024

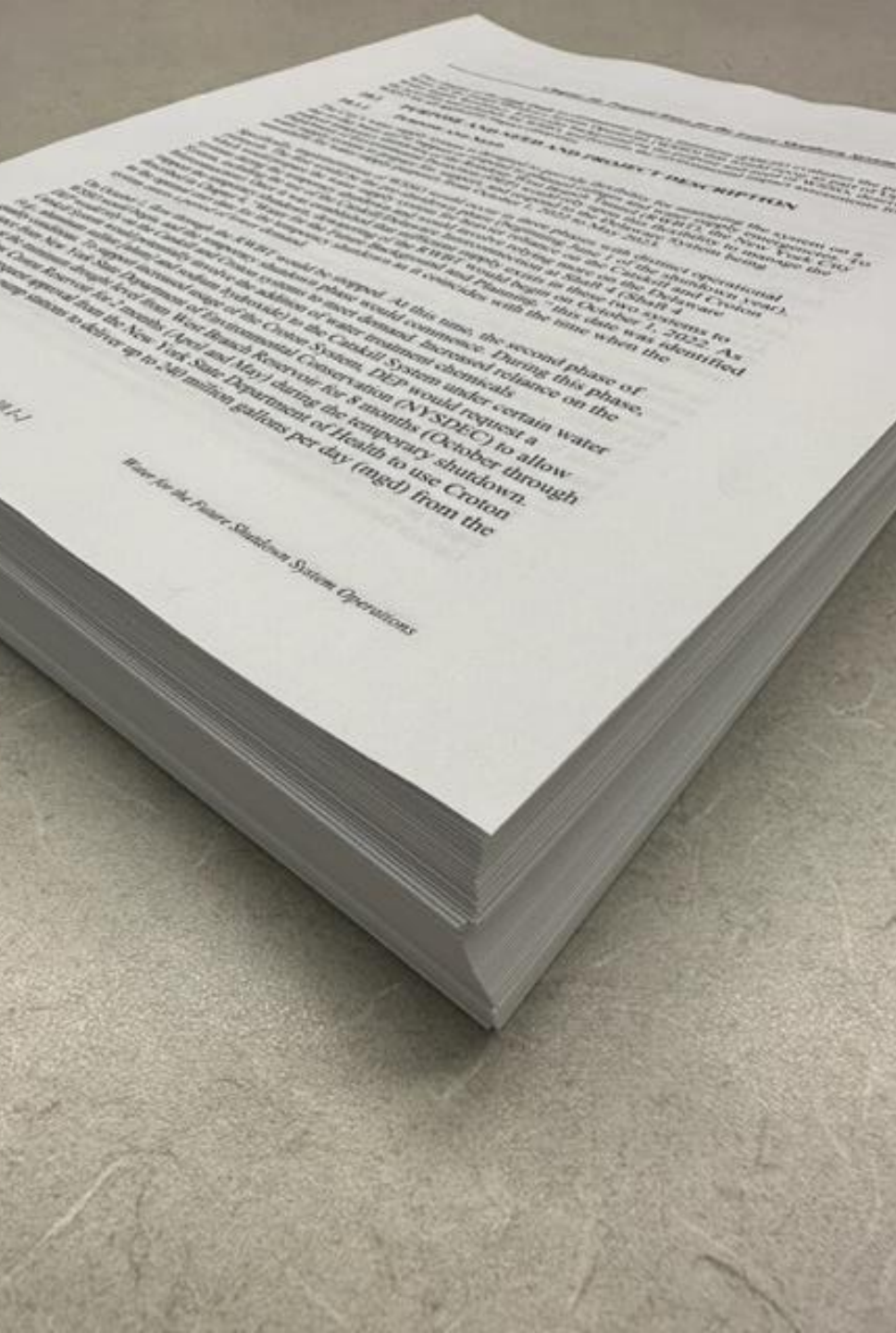
NOAA's Climate Prediction Center

IRI Multi-Model Probability Forecast for Precipitation for May-June-July 2024, Issued March 2024

DEP is using multiple long-term weather prediction services to assist modeling shutdown operations



All “go” / “no go” and potential project bailout decisions are made in real time based on precision data and in coordination with expert and regulatory partners. Bailout return-to-service during shutdown can take between 1 and 9 weeks.



Getting to Today

- **Shutdown Management Plan was subject to a full environmental review process**
- Notice of Completion of Final Environmental Impact Statement was issued on December 15, 2017
- **Chapter 10: [Proposed Water for the Future Shutdown System Operations](#) 429 Pages**
- www.nyc.gov/assets/dep/downloads/pdf/environmental-reviews/upstate-water-supply-resiliency/chapter-10-wsso.pdf

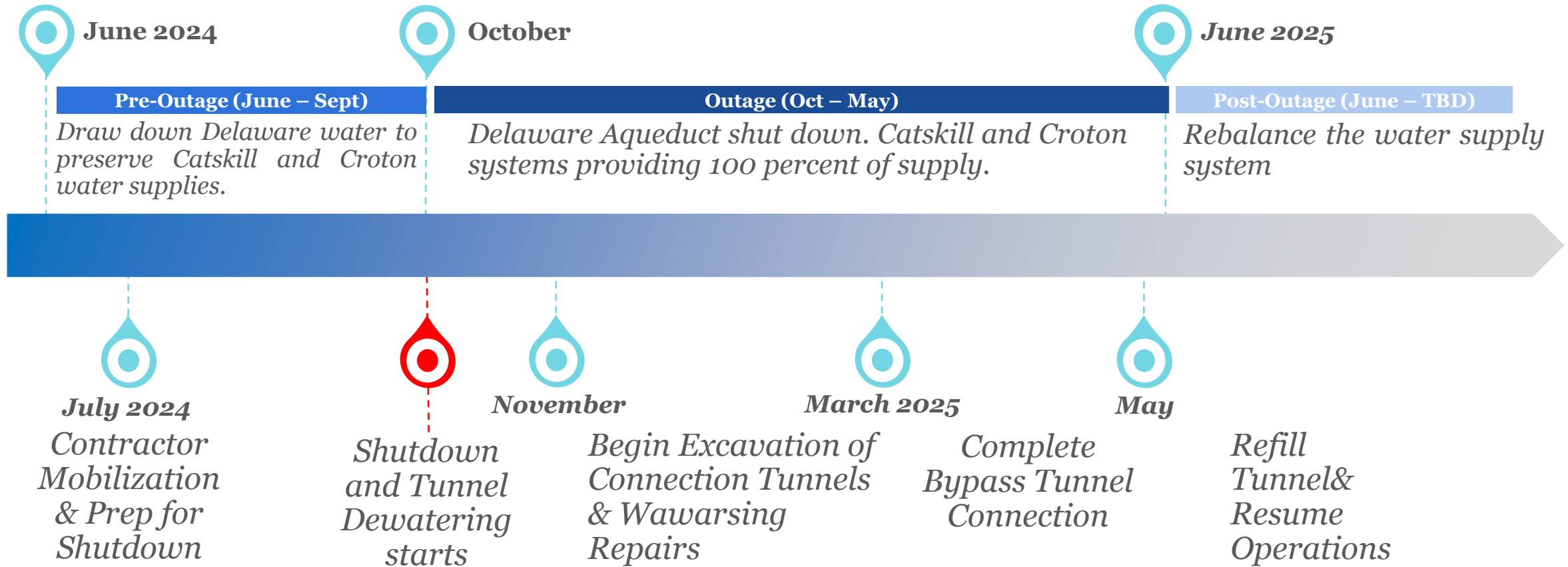
Water Supply Augmentation

During the 8-month shutdown how will New York City meet demand?

Source	Max. Capacity
Catskill System	600 MGD
Croton Pump Stations	240 MGD
Croton System	290 MGD



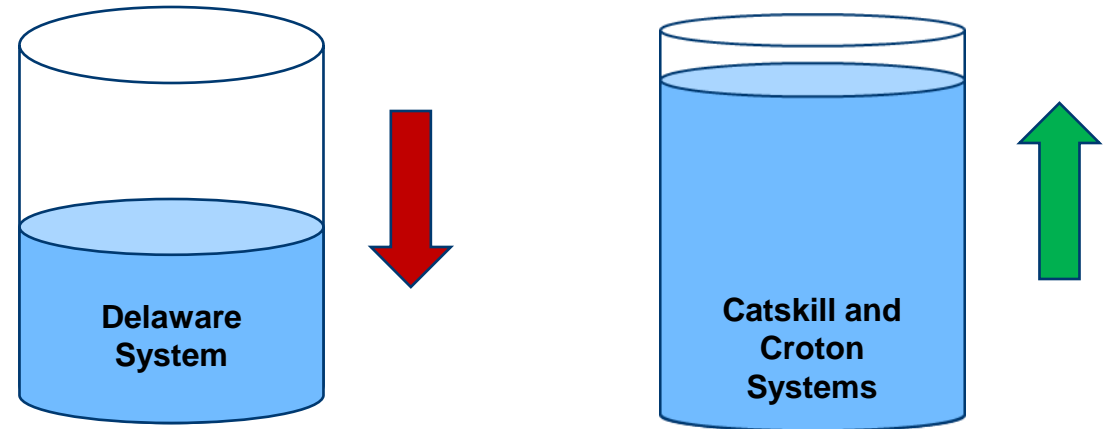
Shutdown Operations and Tunnel Connection Timeline



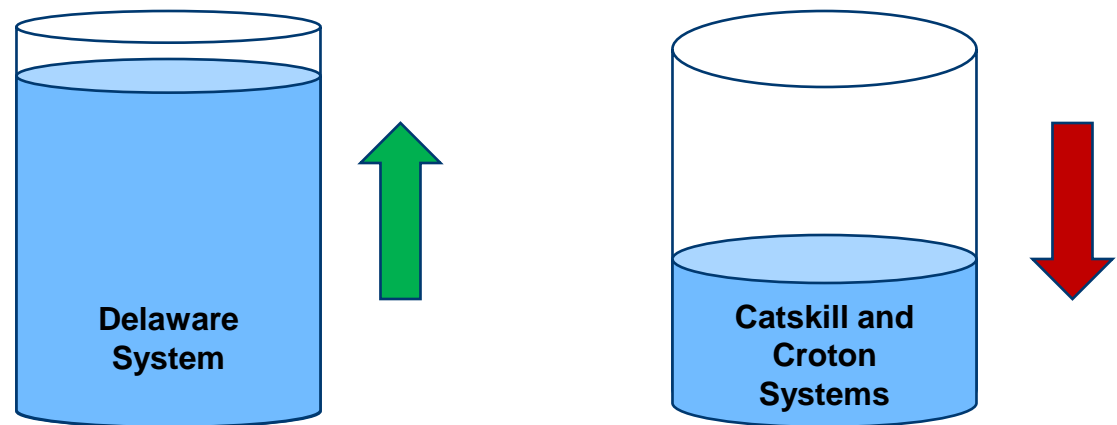
All “go” / “no-go” and potential project bailout decisions are made in real time based on precision data and in coordination with expert and regulatory partners. Bailout return-to-service during shutdown can take between 1 and 9 weeks.

Shutdown Operations

Before the aqueduct shutdown

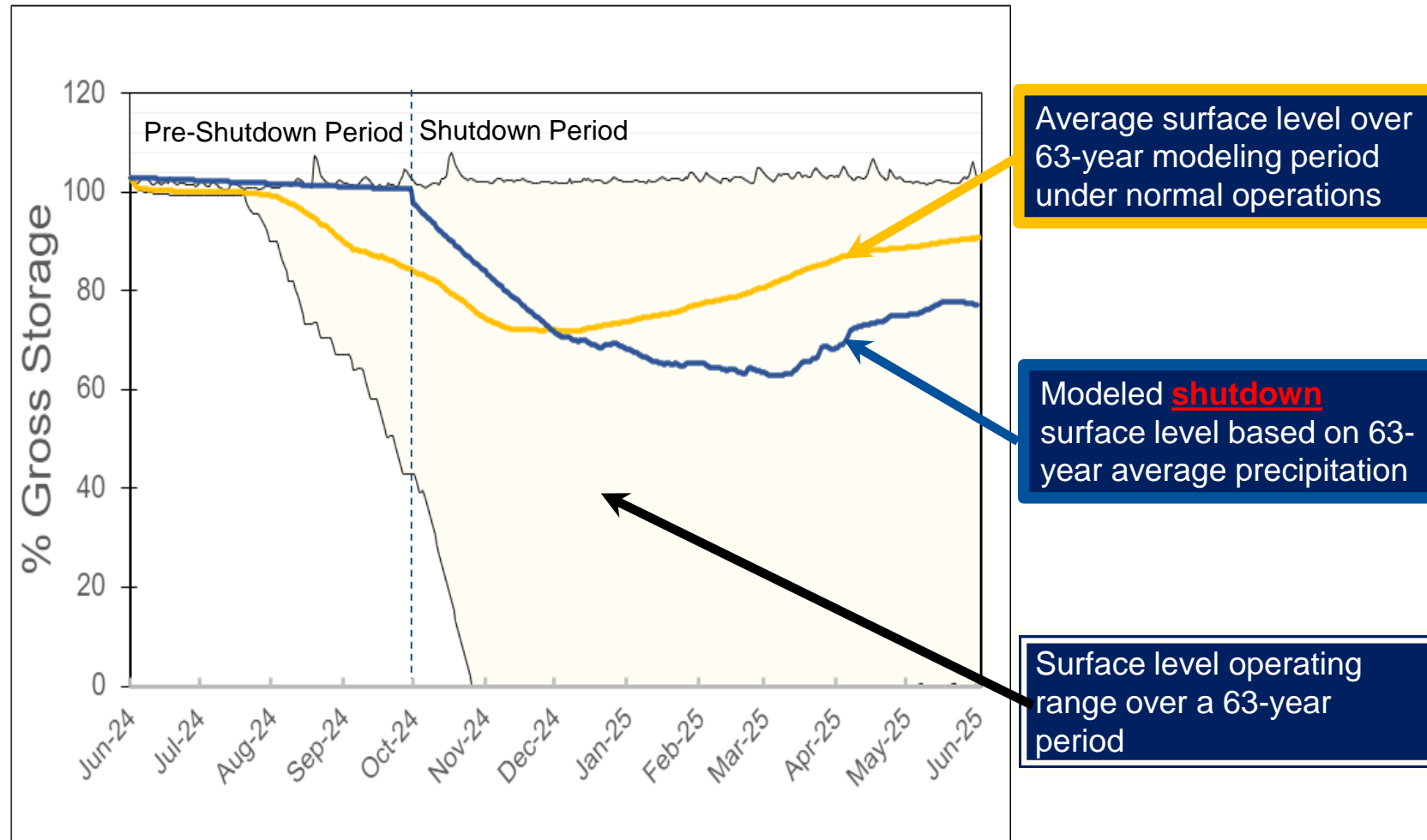


During the aqueduct shutdown



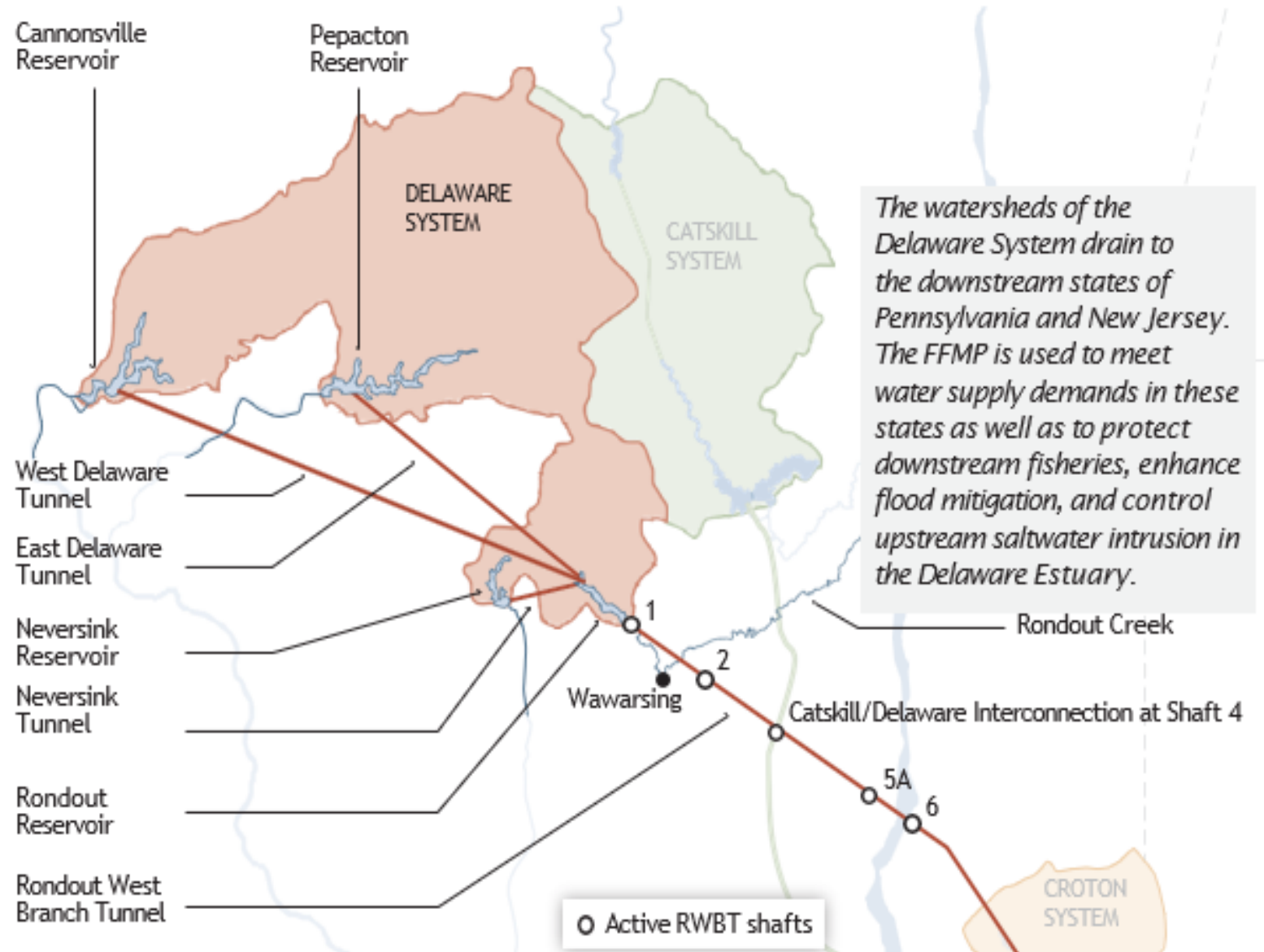
Reservoir Modeling leading up to and through the 8-month shutdown

The following visual graphs are based on predictive modeling and historic averages. Actual conditions will likely differ based on precipitation patterns and forecasts, storage conditions, operational releases and diversions, and various other factors throughout the year.



Delaware System Leading into the Shutdown

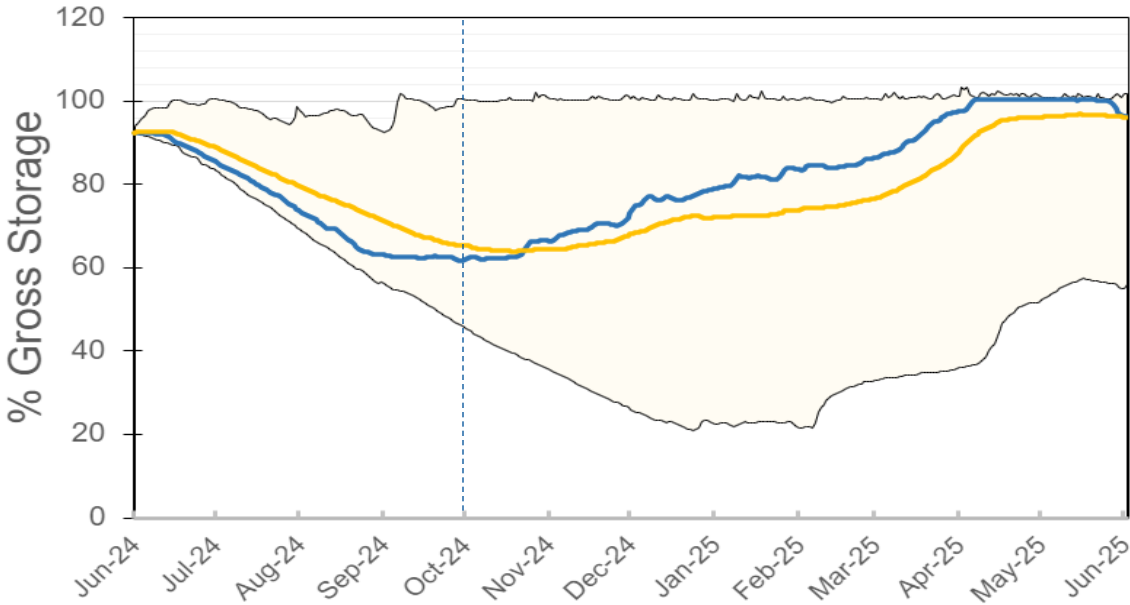
- Depending on rainfall, DEP expects to draw down the Cannonsville, Neversink and Pepacton reservoirs by 30 percent or more ahead of the shutdown
- Preserve Catskill system water for the shutdown



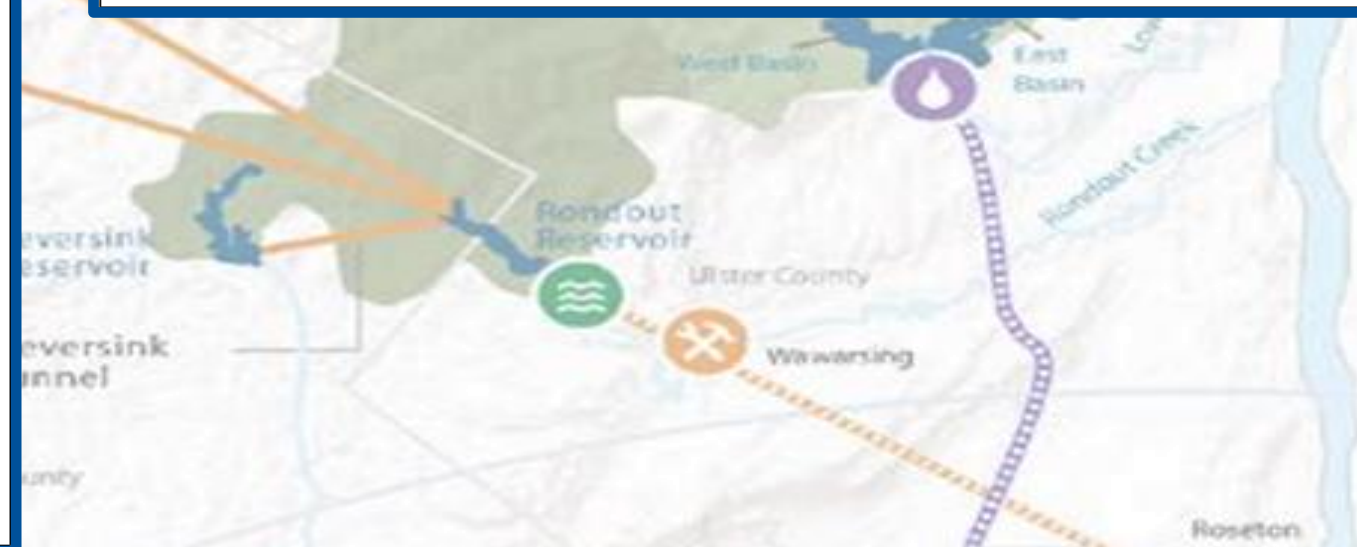
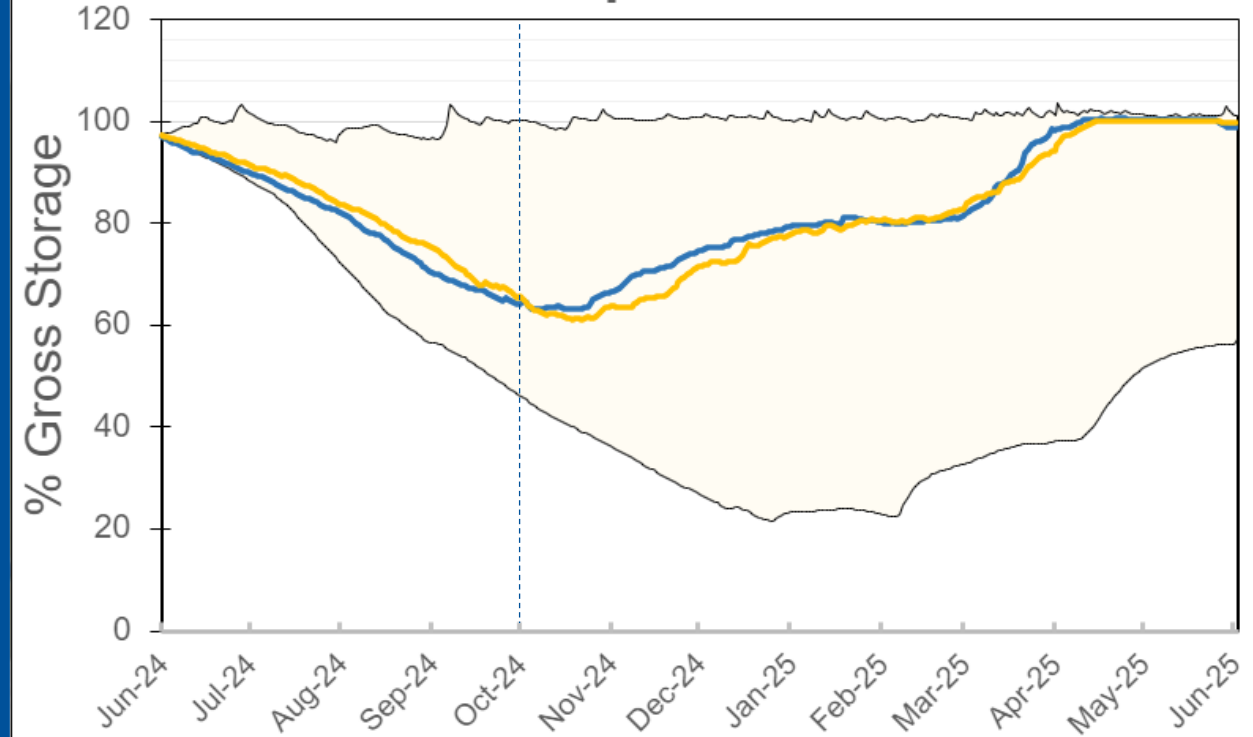
Prior to the shutdown, The Cannonsville, Pepacton and Neversink will be drawn down, leaving a substantial void for refill and spill attenuation

During shutdown operations, releases from each of those reservoirs into the Delaware River tributaries will continue pursuant to the Flexible Flow Management Program (FFMP). All diversions of water into the tunnels will be shut down

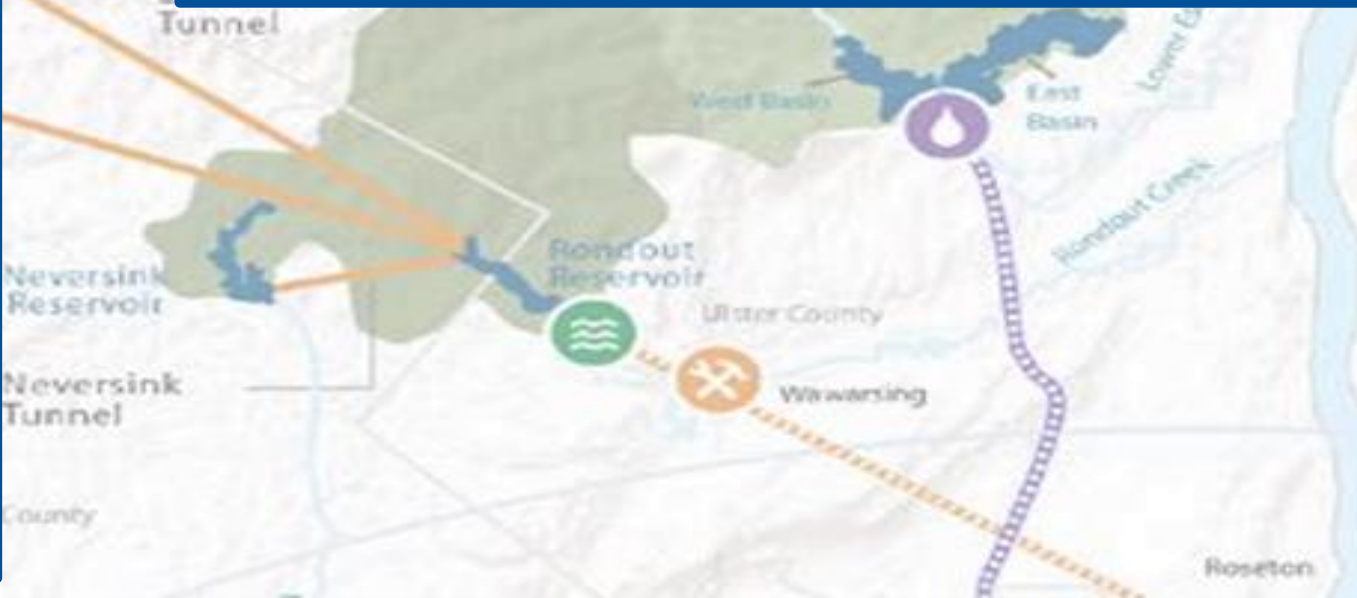
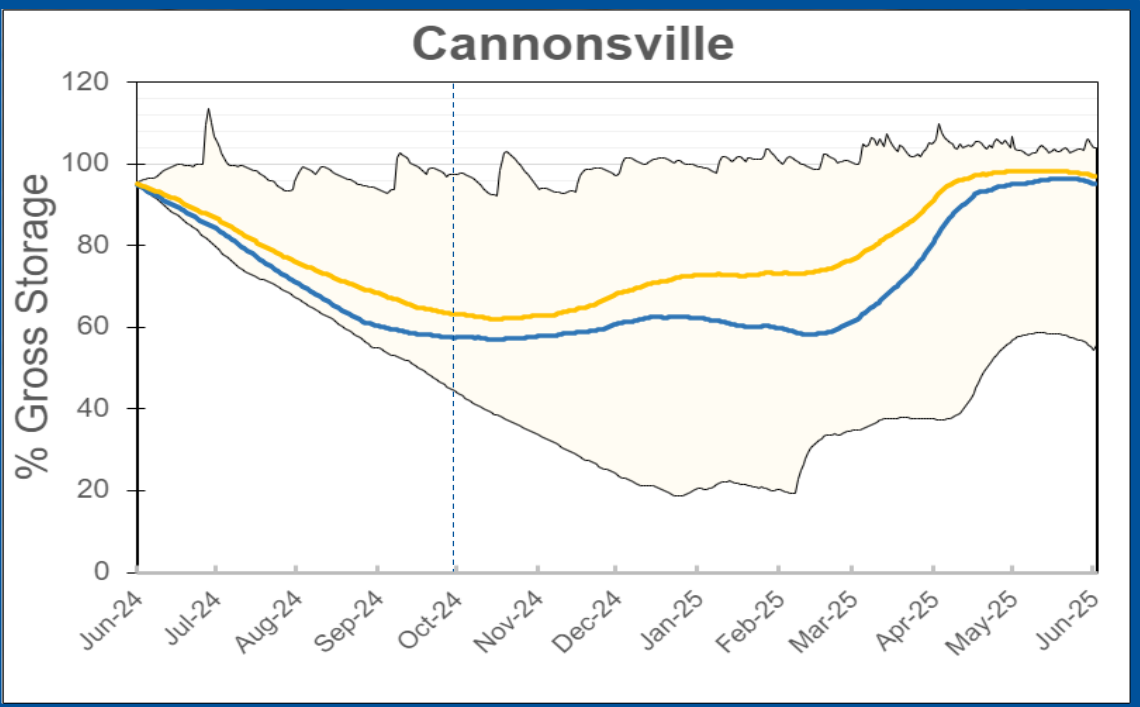
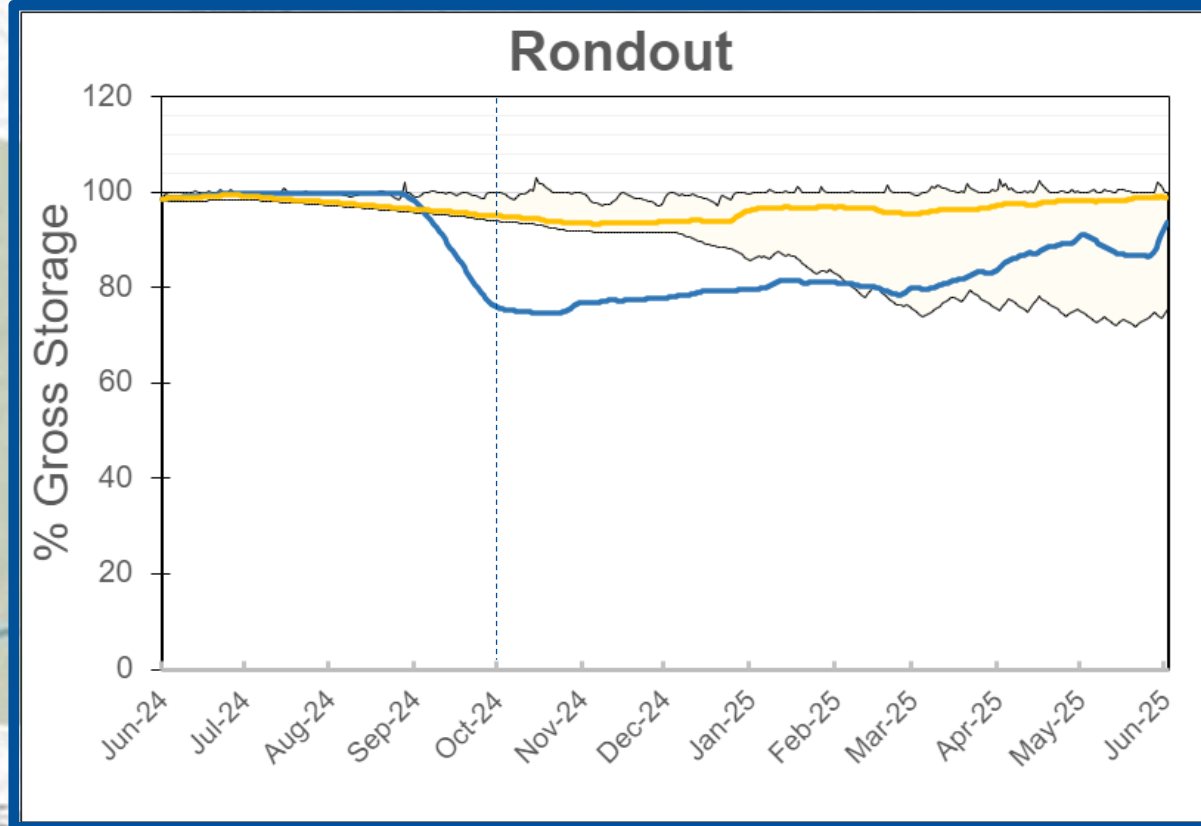
Neversink



Pepacton



During Delaware Aqueduct shutdown operations three new temporary siphons will be used to help manage the Rondout Reservoir's surface elevation by enabling the release of as much as 260 million gallons per day (similar to the flow of a small creek) into the Rondout Creek. Siphons cease operations within 1 foot of flood action stage on Rondout Creek



Delaware System Expanded Waterfowl Management Program



- Longstanding management program has been in place at Kensico and Hillview Reservoirs in Westchester to prevent contamination from wildlife waste
- Program includes monitoring of waterfowl and mitigating their effects on water quality
- Waterfowl are typically dispersed by motorboats combined with noisemakers (pyrotechnics)
- **At the end of the shutdown period, DEP may use same practices at Rondout Reservoir to minimize fecal coliform contributions as Delaware System is brought back on line**
- **All activities are conducted pursuant to an Environmental Impact Statement to minimize and mitigate impacts to nontarget species, such as Bald Eagles**
 - protective buffers are maintained for Bald Eagle Nest Sites, in consultation with DEC and USFWS as needed
- Concerns can be directed to Director of Outreach John Milgrim at (845) 334-7868 or jmilgrim@dep.nyc.gov

An aerial photograph of two kayakers on a large, calm reservoir. The water is dark grey with subtle ripples. One kayaker is in a white kayak with a blue stripe, and the other is in a blue and white kayak. Both are wearing life jackets and paddling. The kayakers are positioned in the lower-left quadrant of the image.

Delaware System Recreational Uses

- Permitted boating and fishing activities from shore or boat will be allowed on all reservoirs
- Boating (recreational and fishing) on the Neversink, Cannonsville, and Pepacton reservoirs will remain active for the entire season
- During periods with lower reservoir levels, access to the water may be more difficult for fishing and recreational boat users
- No restrictions will be placed on any land-based recreational activities, including hunting, hiking, or trapping

Summary

- The Rondout to West Branch Tunnel shutdown planning started more than 20 years ago
- Multiple required predecessor projects needed to be successfully completed prior to this point
- The water supply management plan is based on extensive computer modeling and engineering experience and is subject to state and federal regulatory review and oversight
- DEP will continue reviewing multiple data points and projections, and conduct continuous systems monitoring and testing up to and throughout the shutdown

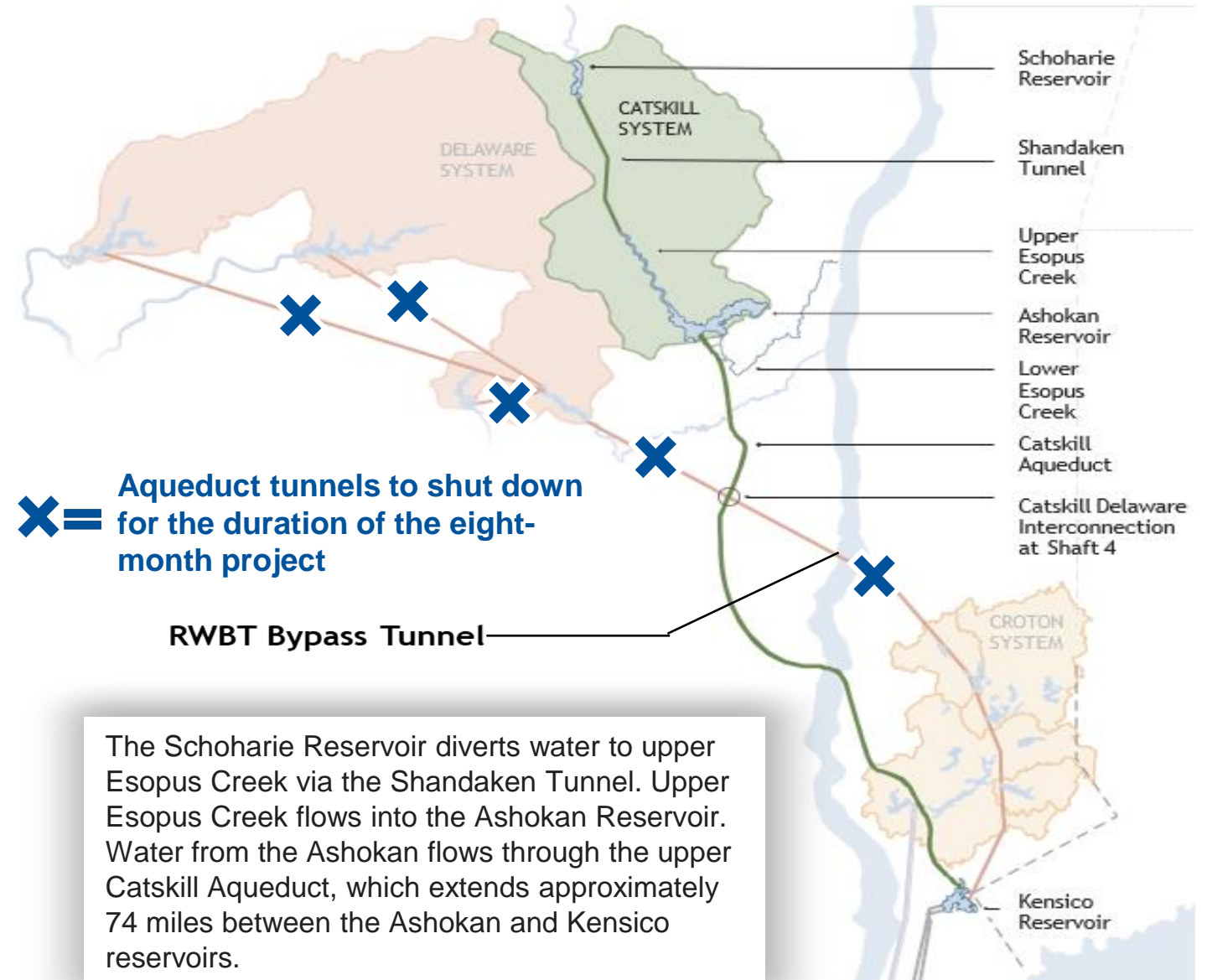


Questions?



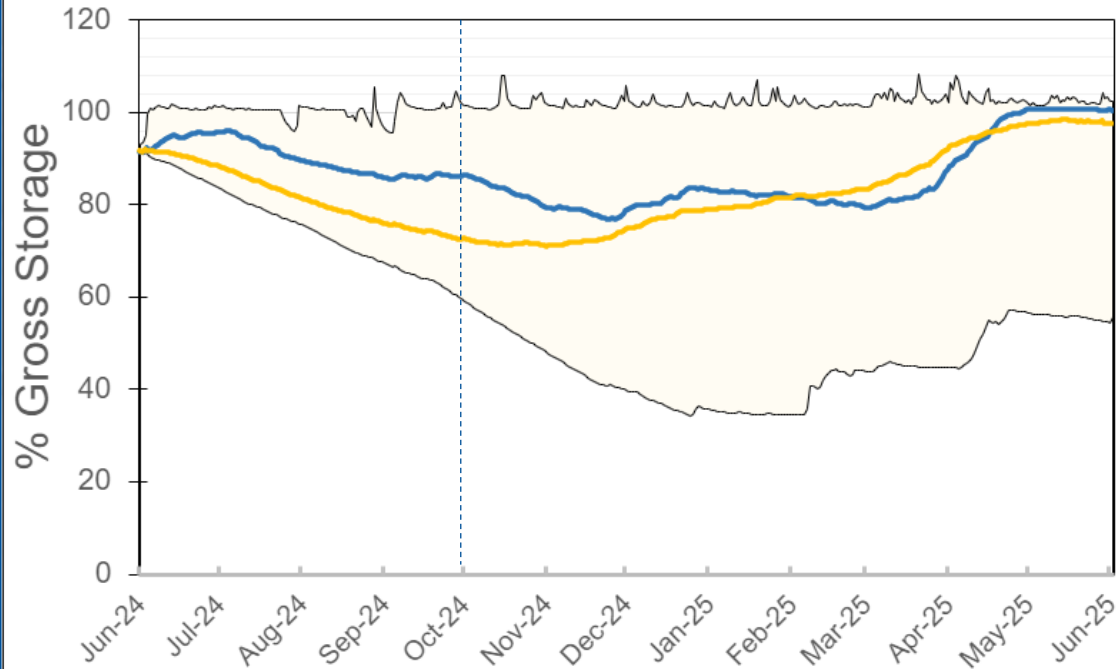
Catskill System During Delaware Shutdown

Starting October 1, 2024 the Delaware Aqueduct and tunnels from the Cannonsville, Pepacton and Neversink reservoirs to the Rondout Reservoir will shut down for up to eight months and the total City water supply will come from the Catskill System supplemented by the Croton System as contractors work to connect the bypass tunnel under the Hudson

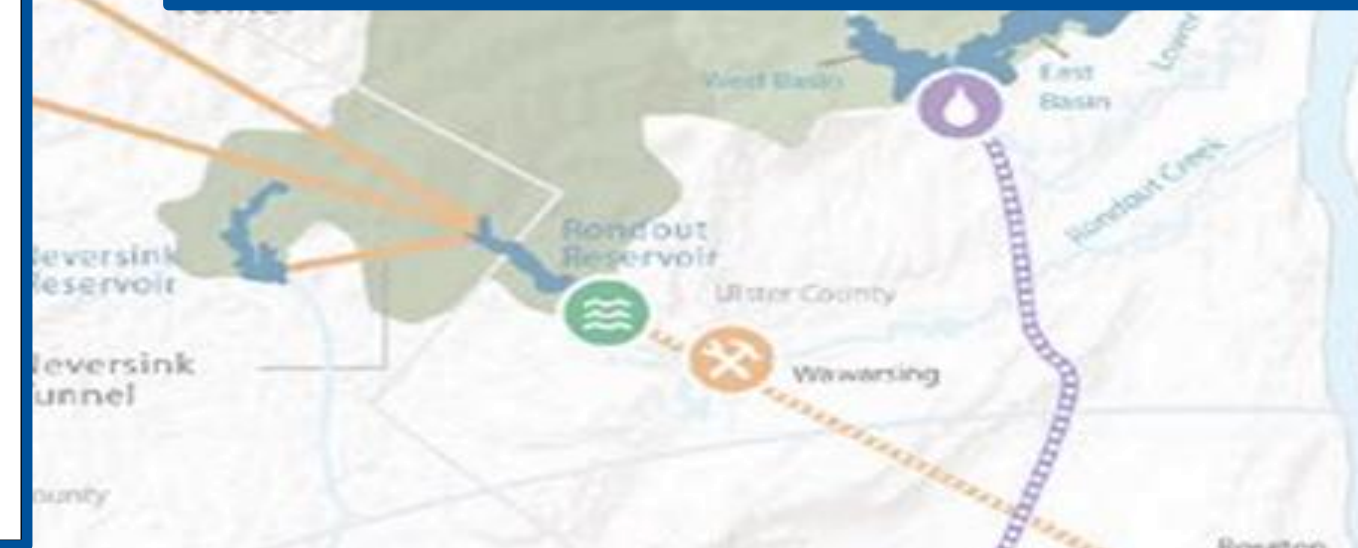
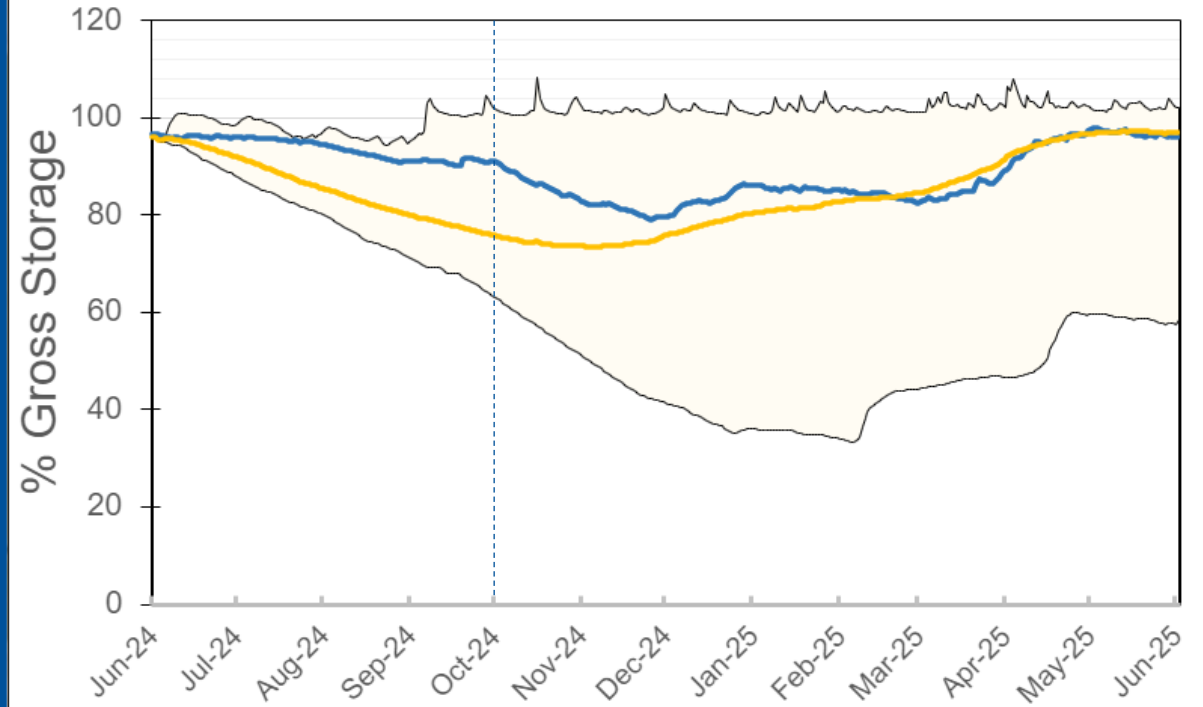


Releases to the lower Esopus Creek leading up to and during the Delaware Aqueduct shutdown will continue pursuant to the Interim Release Protocol, and DEP anticipates operating the Ashokan pursuant to the Conditional Seasonal Storage Objective maintaining a 10 percent void after October 15

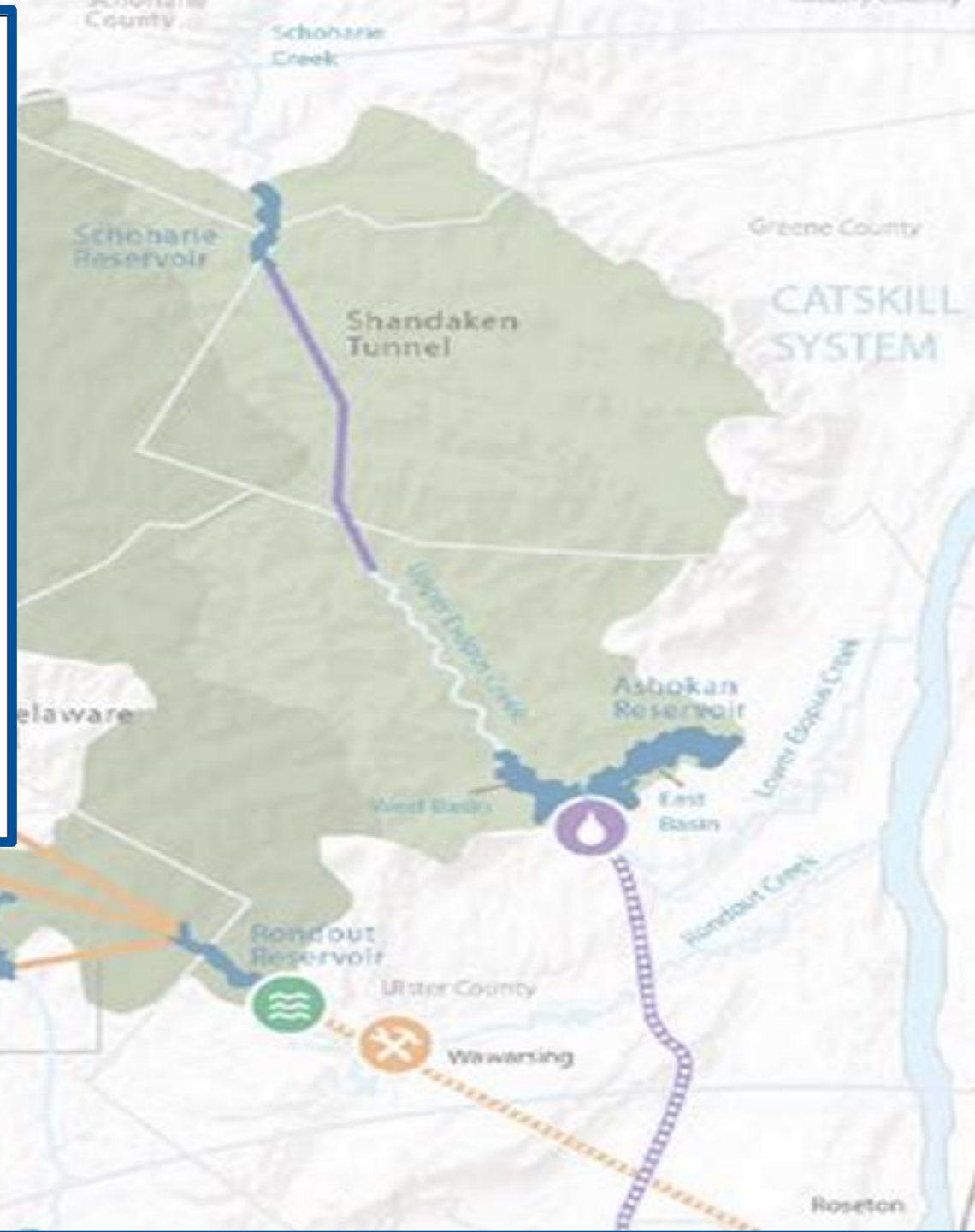
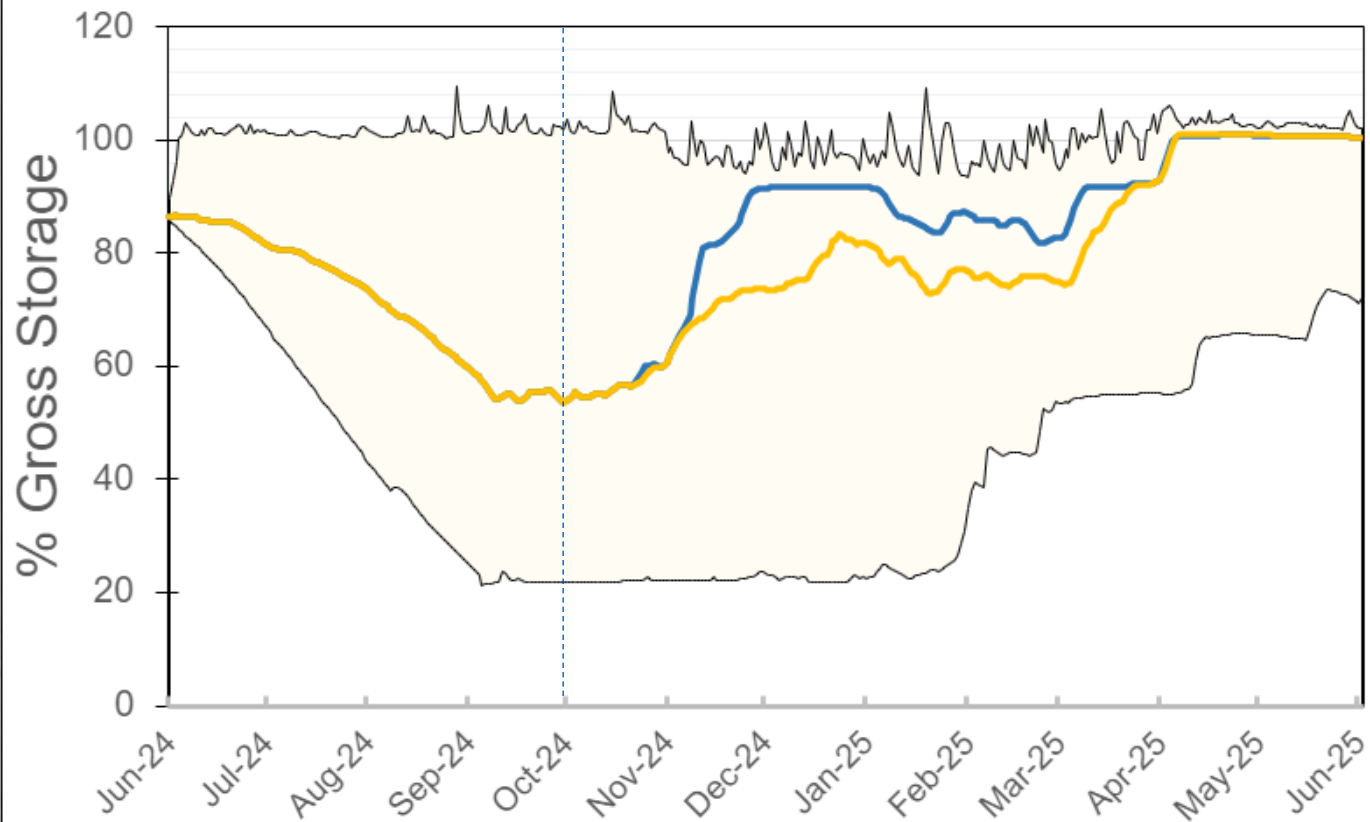
West Ashokan



East Ashokan



Schoharie



Diversions from the Schoharie through the Shandaken Tunnel to the Upper Esopus are expected to continue.

Catskill System Expanded Waterfowl Management Program



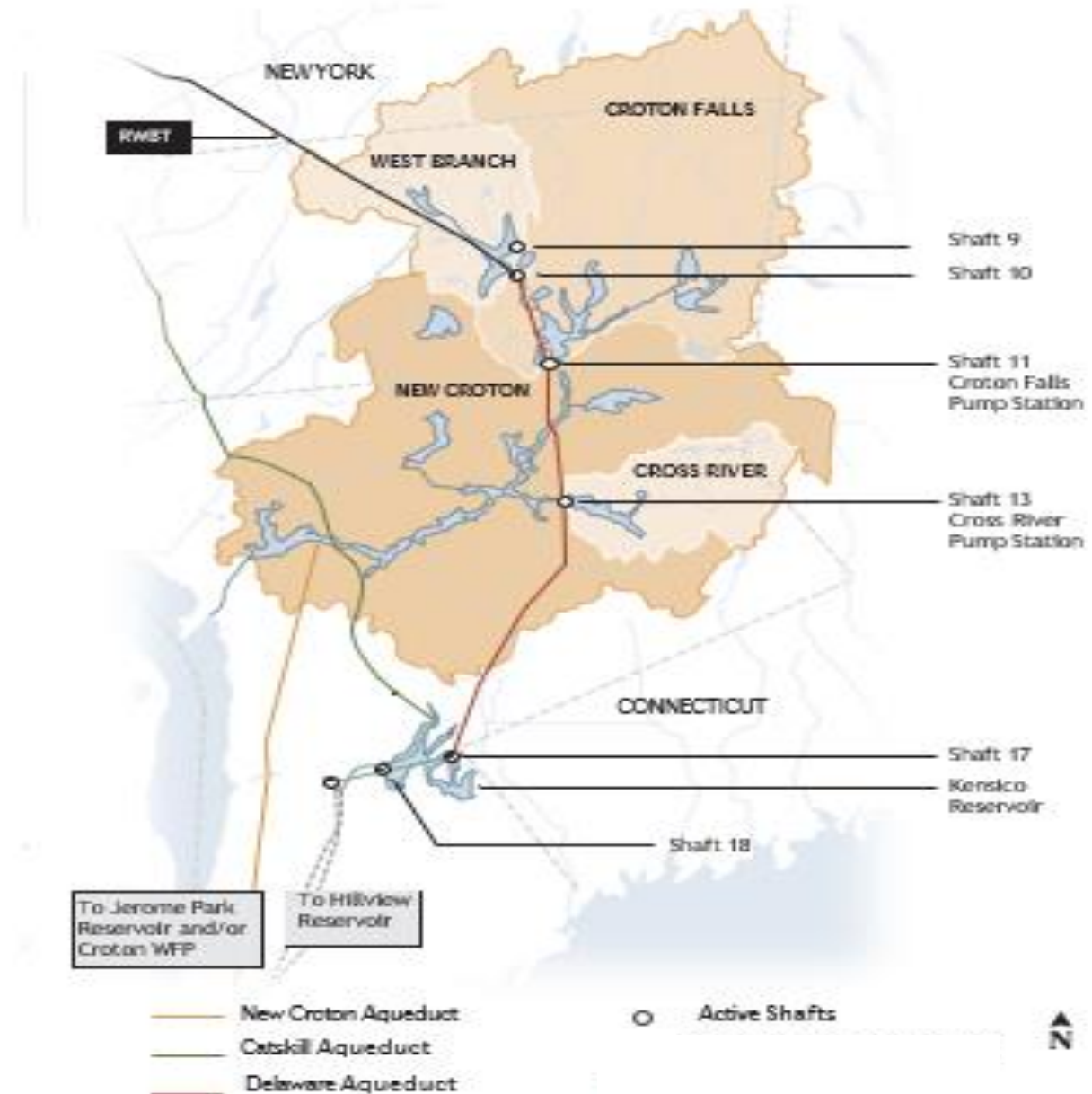
- Longstanding management program has been in place at Kensico and Hillview Reservoirs to prevent contamination from wildlife waste
- Program includes monitoring of waterfowl and mitigating their effects on water quality
- Waterfowl are typically dispersed by motorboats combined with noisemakers (pyrotechnics)
- **During the shutdown period, DEP will use same practices at Ashokan Reservoir as needed to protect water quality, and they may be noticeable from the Ashokan Rail Trail and Promenade**
- **All activities are conducted pursuant to an Environmental Impact Statement to minimize and mitigate impacts to nontarget species, such as Bald Eagles**
 - protective buffers are maintained for Bald Eagle Nest Sites, in consultation with DEC and USFWS as needed
- Concerns can be directed to Director of Outreach John Milgrim at (845) 334-7868 or jmilgrim@dep.nyc.gov

Catskill System Recreational Uses

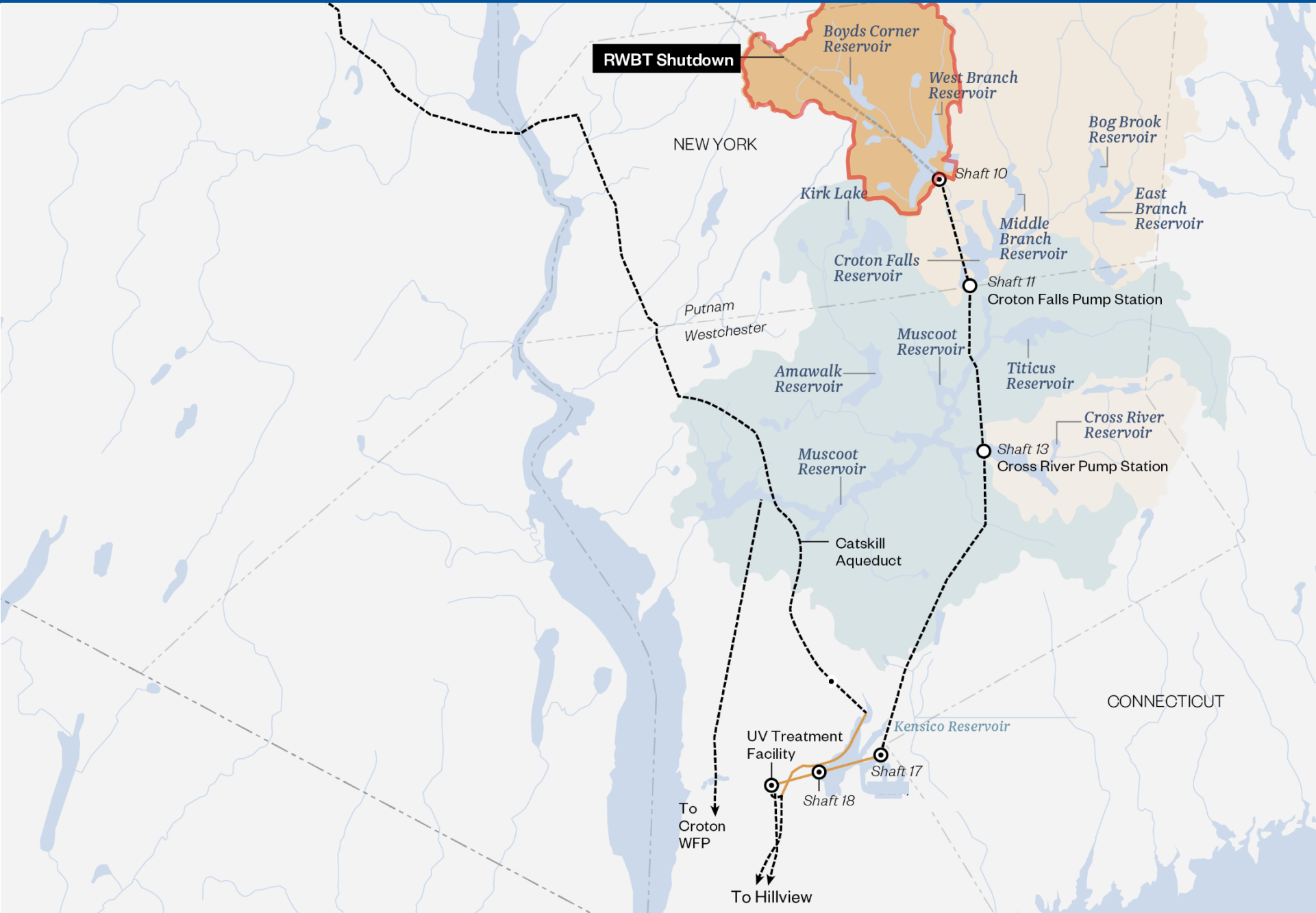
- Permitted fishing activities from shore or boat will be allowed on both the Schoharie and Ashokan reservoirs
- Recreational Boating on the Schoharie reservoir will remain active for the entire season
- During periods with lower reservoir levels, access to the water may be more difficult for fishing and recreational boat users
- No restrictions will be placed on any land-based recreational activities, including hunting, hiking, or trapping



The Croton System, the oldest watershed in the City's supply system, will be tapped at full capacity during the Delaware Shutdown period and treated as four separate subsystems. Additionally, pump stations will supplement water into the lower Delaware Aqueduct



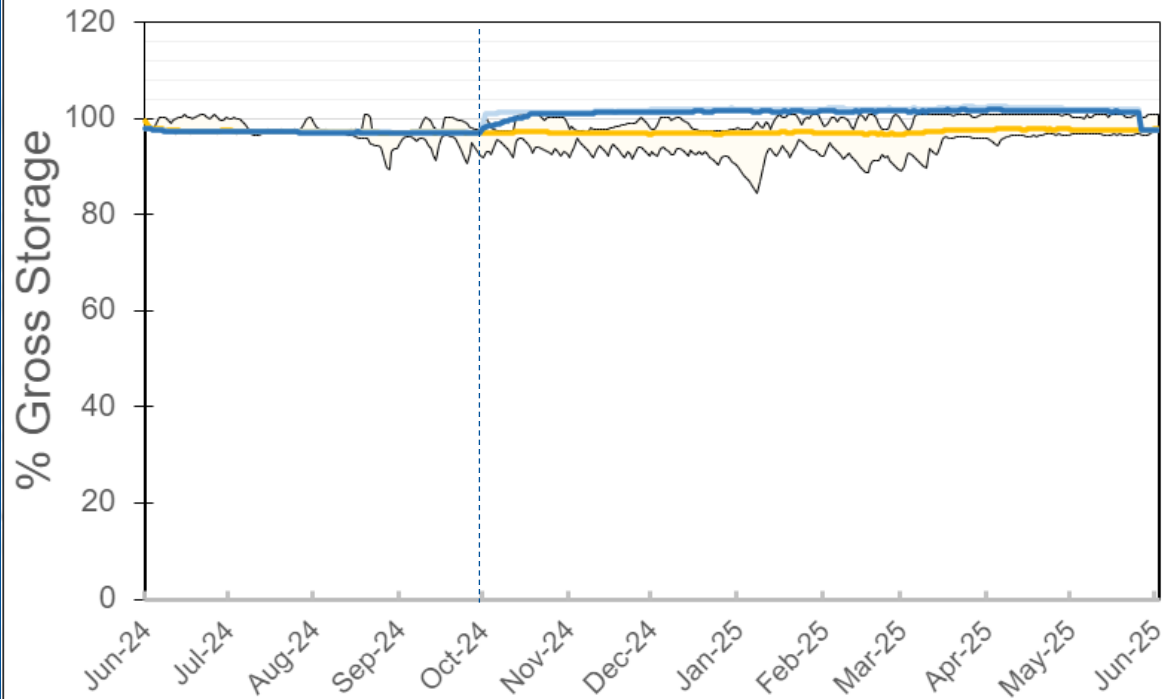
Outage Operations - Croton: West Branch Subsystem



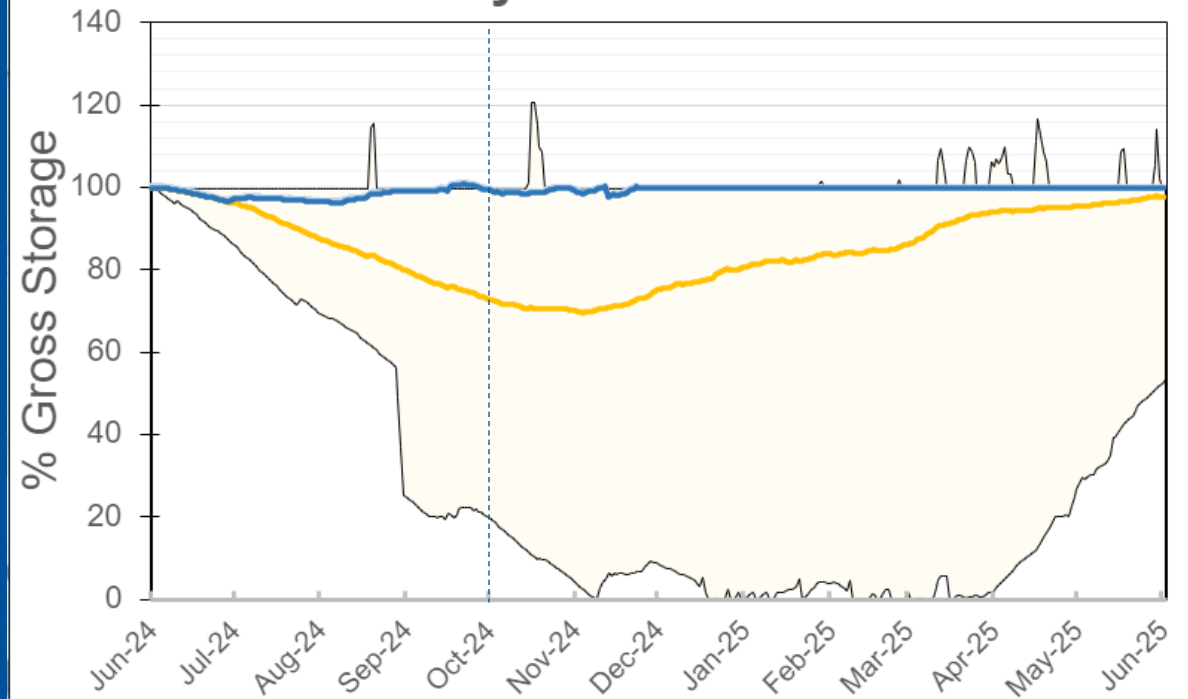
The Delaware Aqueduct will remain operational from the West Branch Reservoir to New York City throughout the shutdown and water in the West Branch and Boyds Corner reservoirs will be held as reserve up to and during the shutdown period with minimal downstream releases.



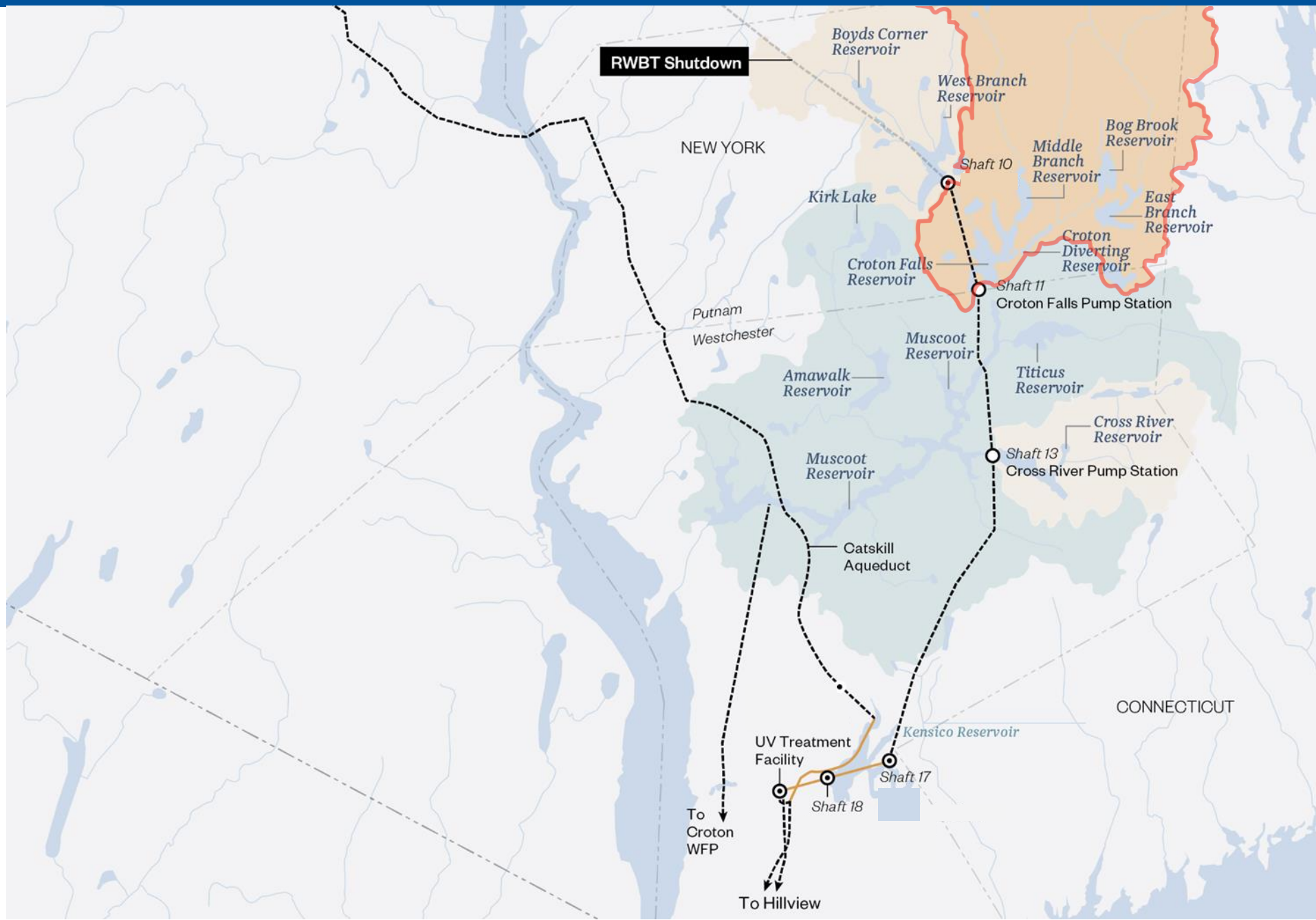
West Branch



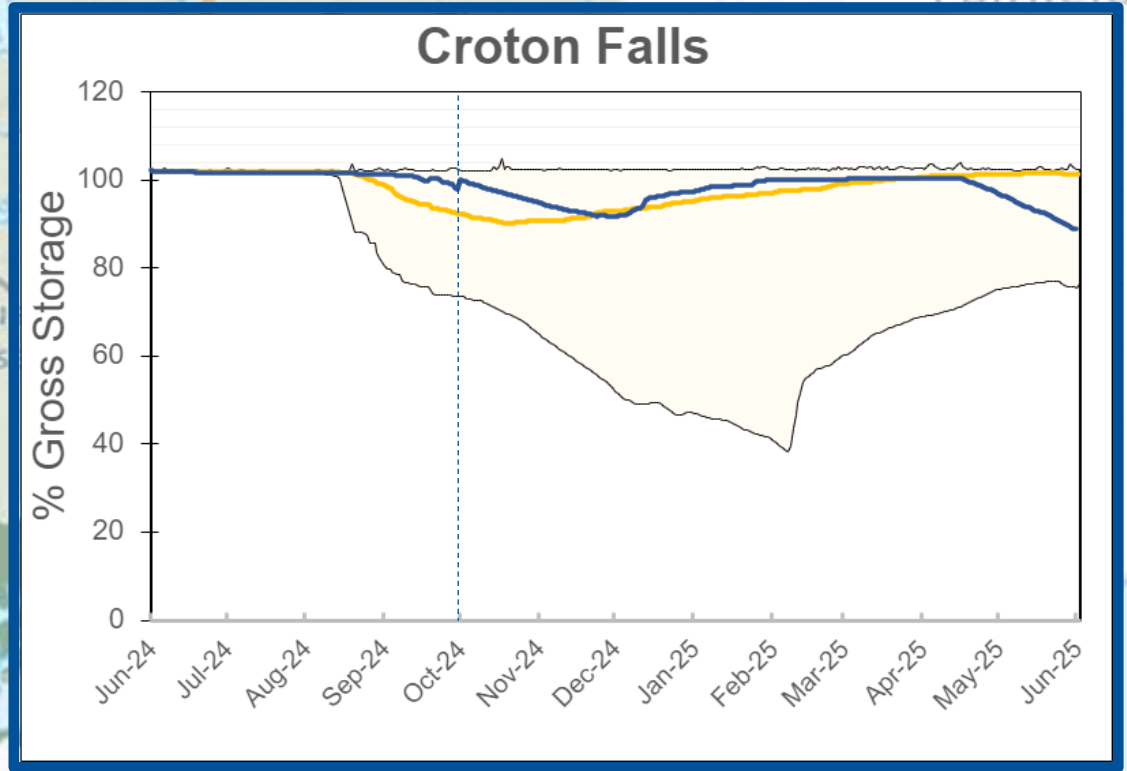
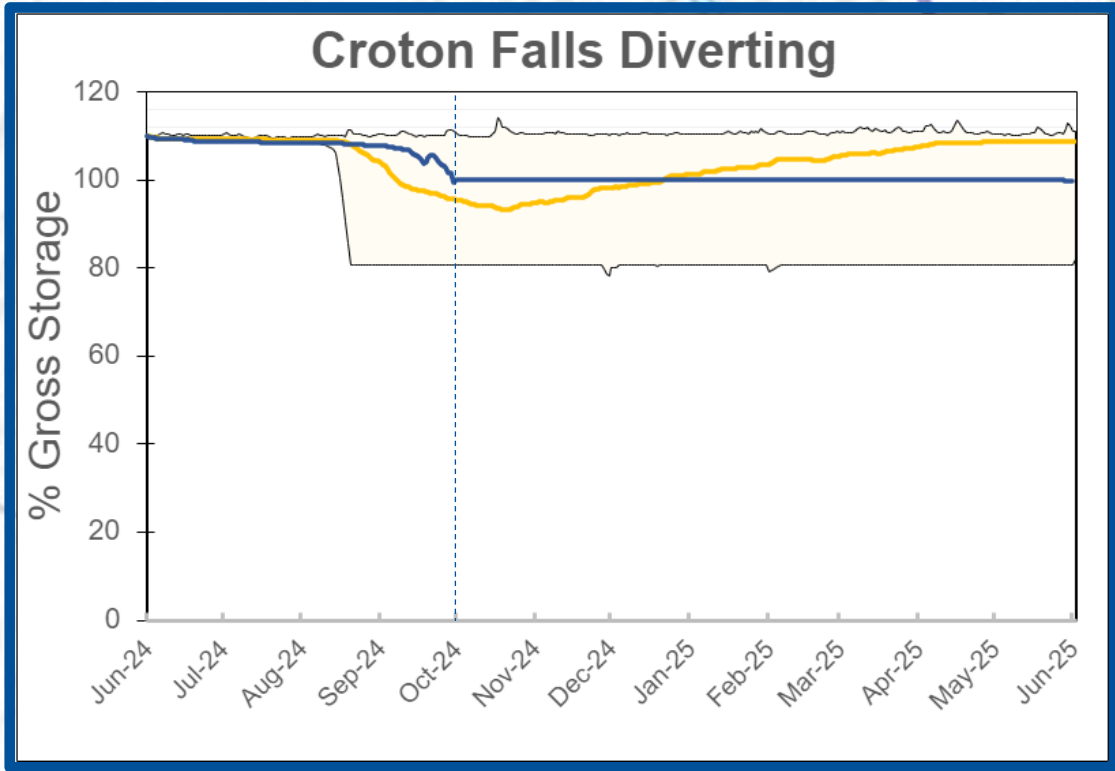
Boyd's Corner



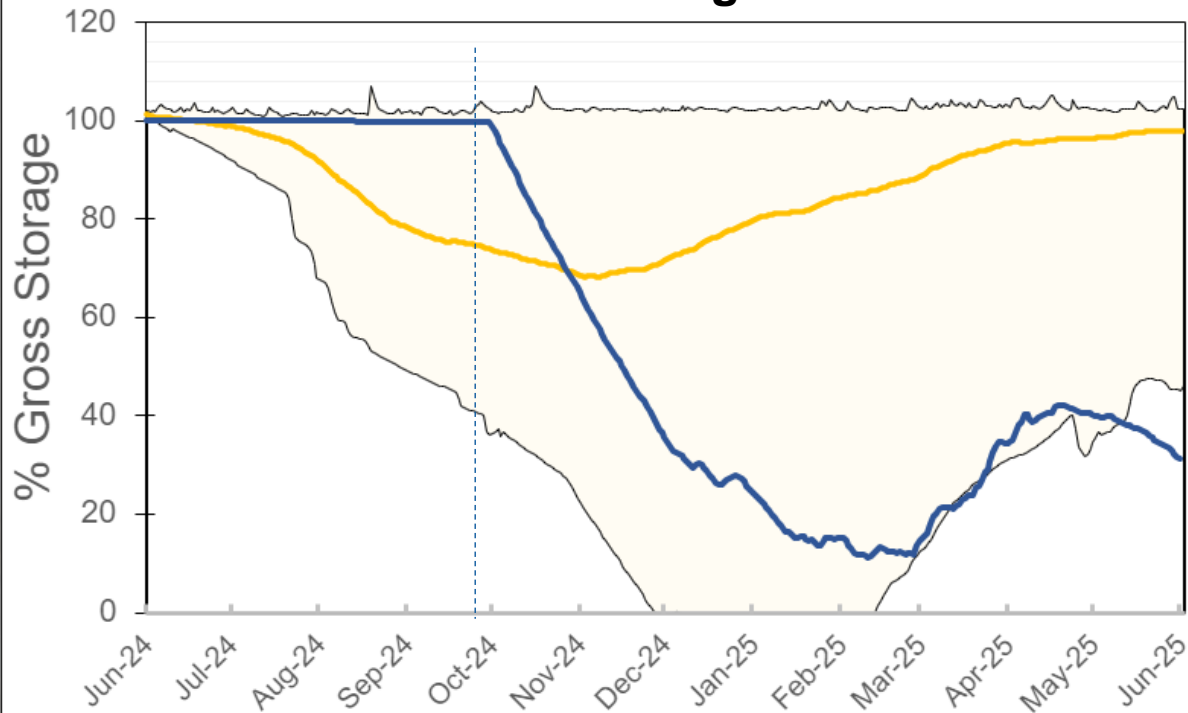
Outage Operations - Croton: Croton Falls Subsystem



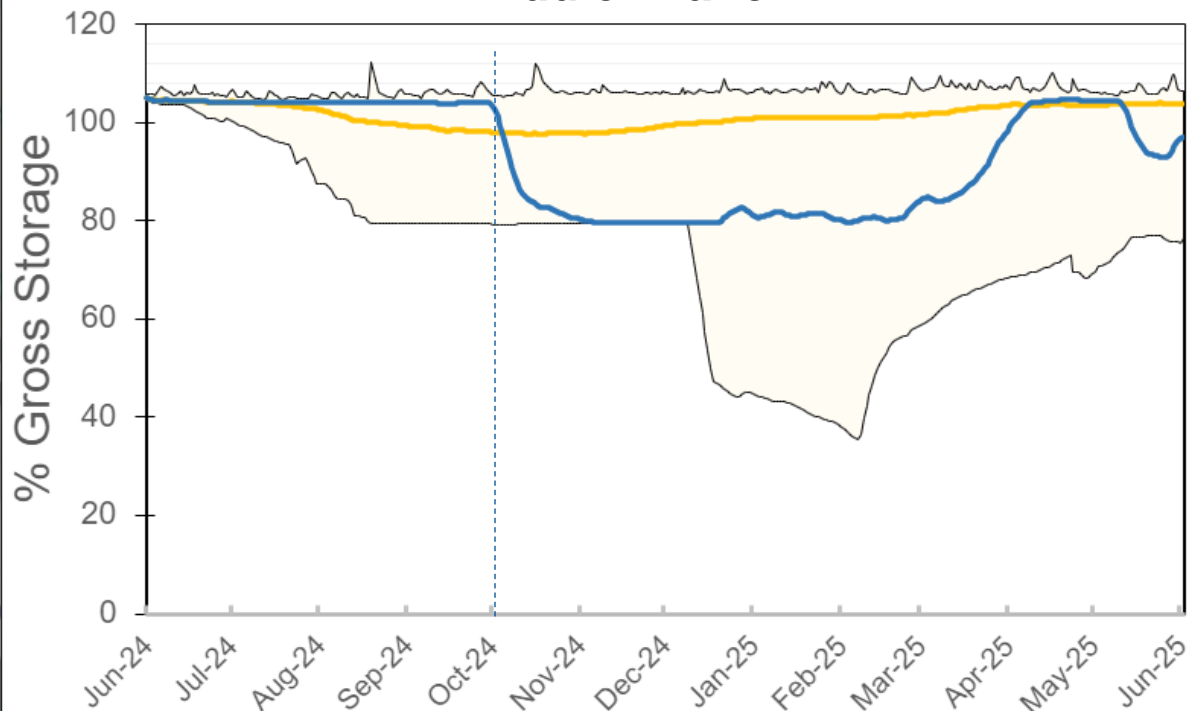
- Pump an average 150 million gallons a day (mgd) from Croton Falls Reservoir into Shaft 11 (Delaware Aqueduct) and send water to Kensico Reservoir.
- Reduce downstream releases from the Croton Falls and Croton Diverting during outage to maintain surface elevation and maximize pumping efficiency (Per 6 NYCRR Part 672-3).



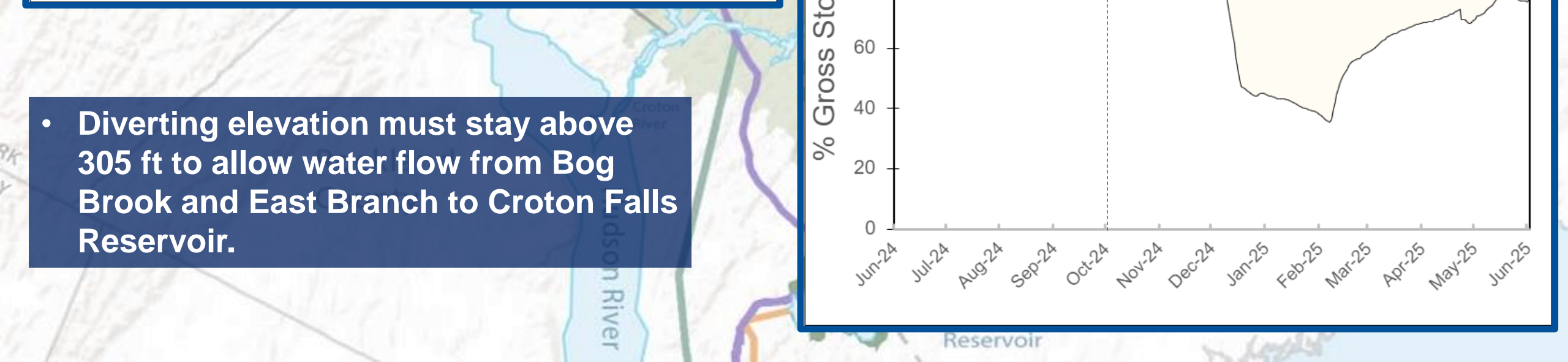
East Branch / Bog Brook



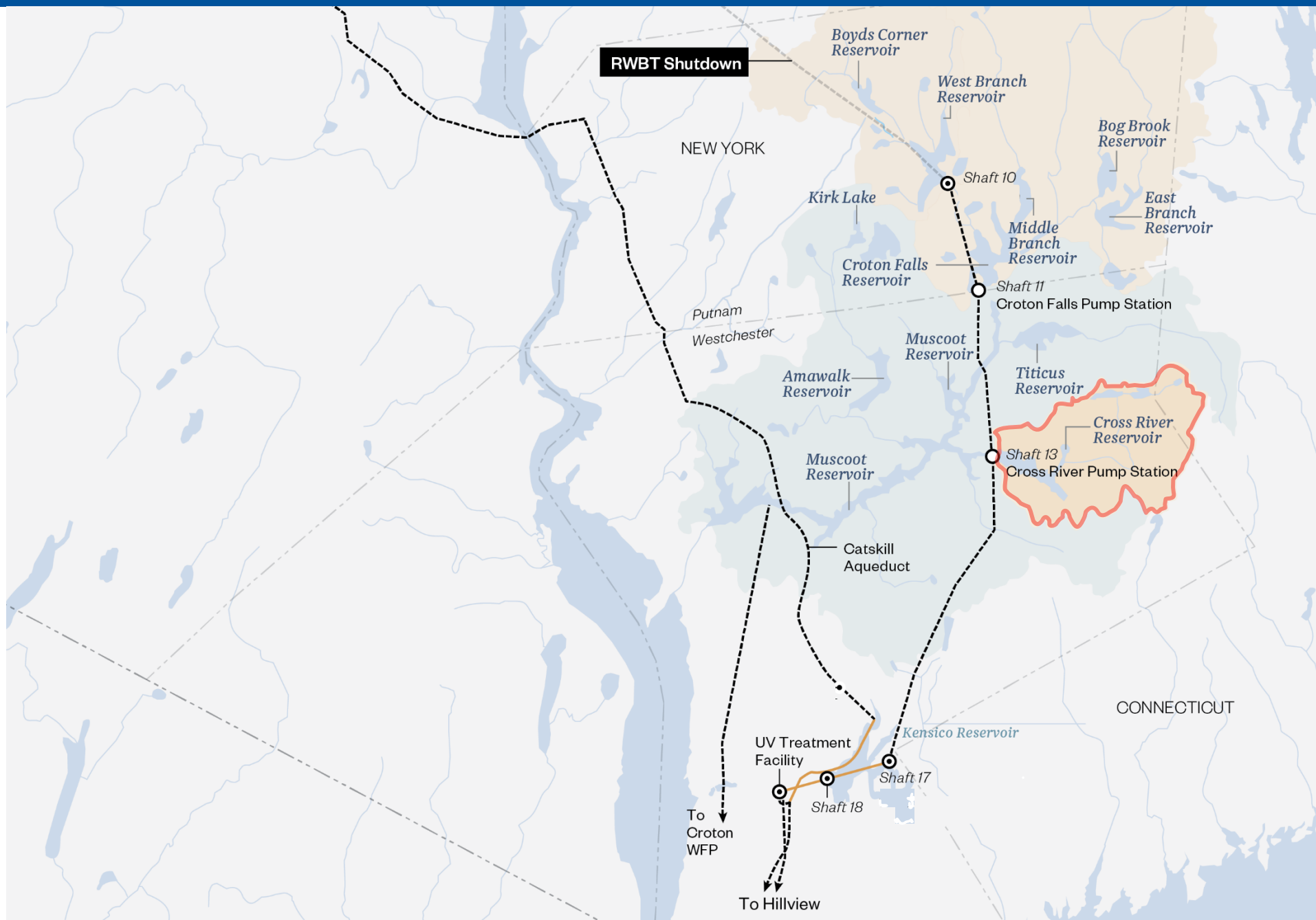
Middle Branch



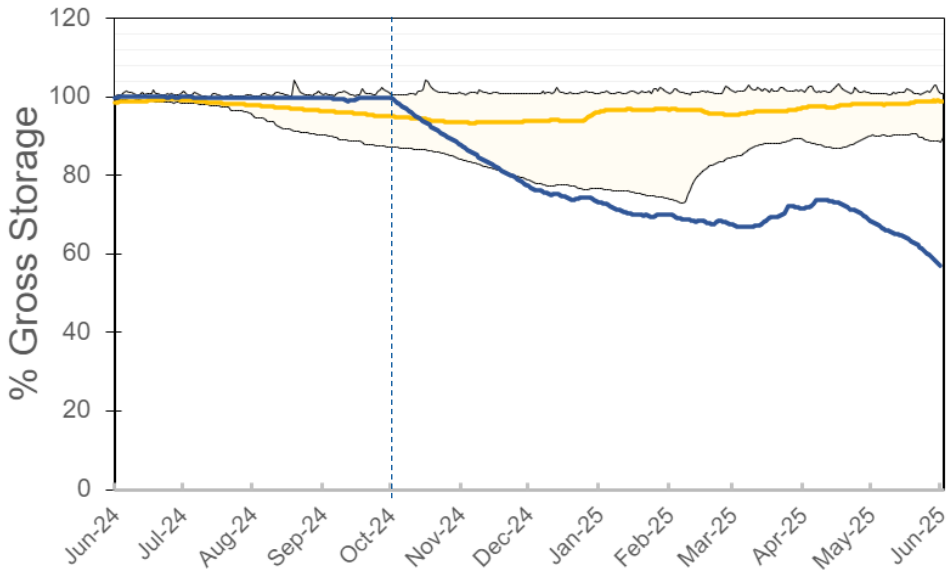
- Diverting elevation must stay above 305 ft to allow water flow from Bog Brook and East Branch to Croton Falls Reservoir.



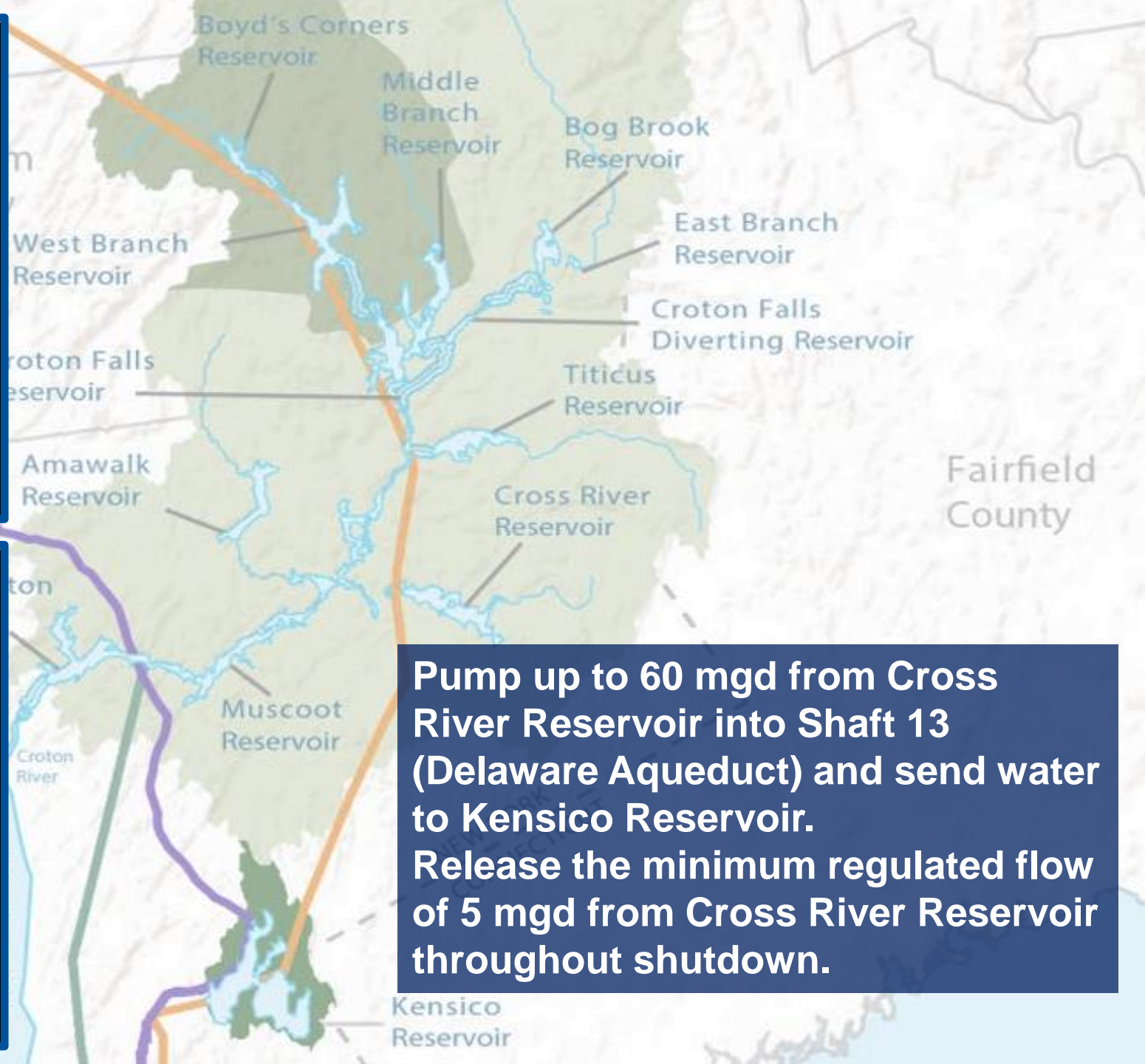
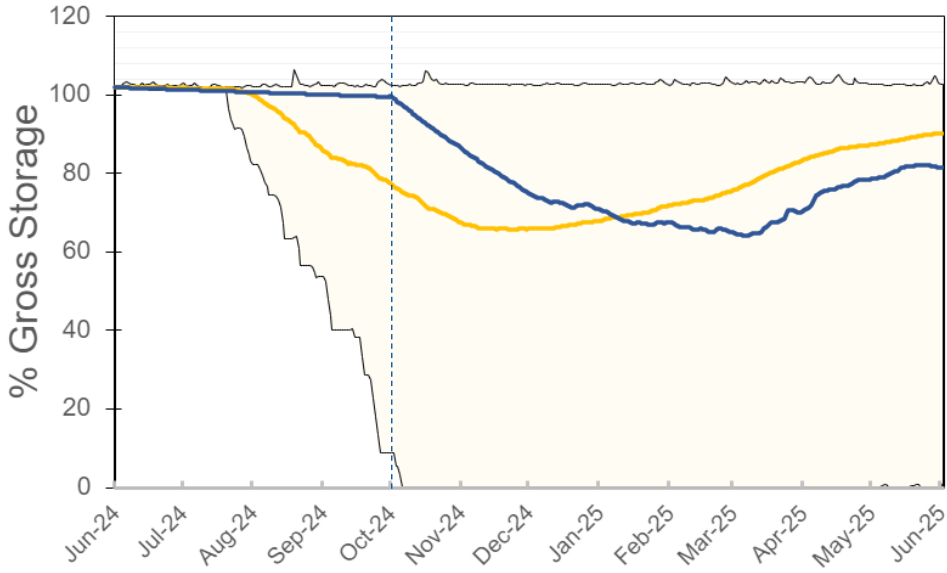
Outage Operations - Croton: Cross River Subsystem



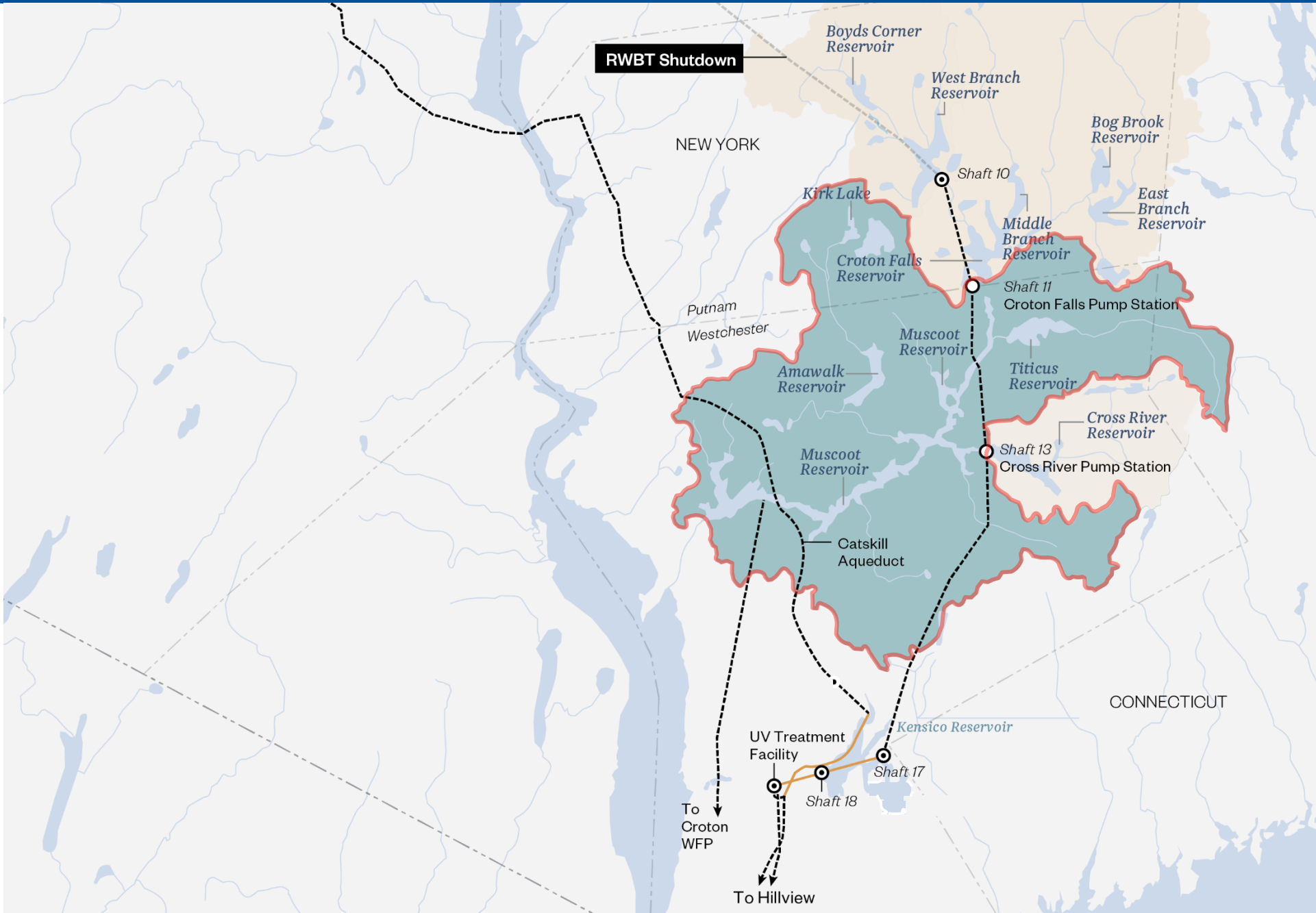
Cross River



Titicus



Outage Operations - Croton: New Croton Subsystem



Orange
County

Putnam
County

Byrd's Corner
Reservoir

West Branch
Reservoir

Croton Falls
Reservoir

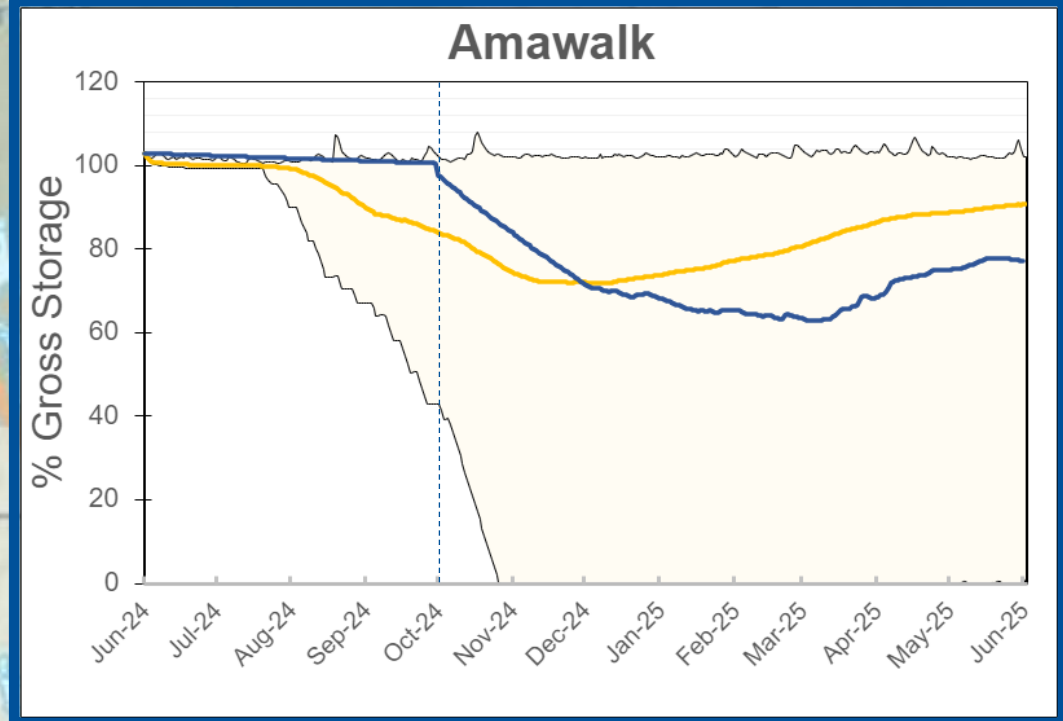
Amawalk
Reservoir

Muscoot
Reservoir

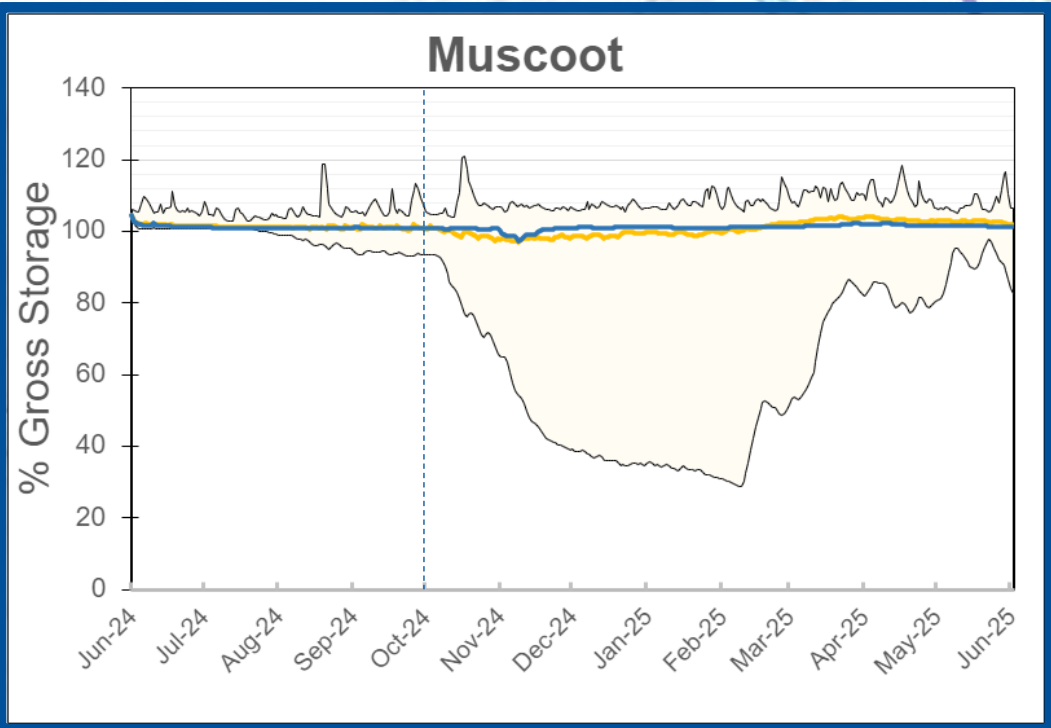
NEW YORK
CONNECTICUT

Kensico
Reservoir

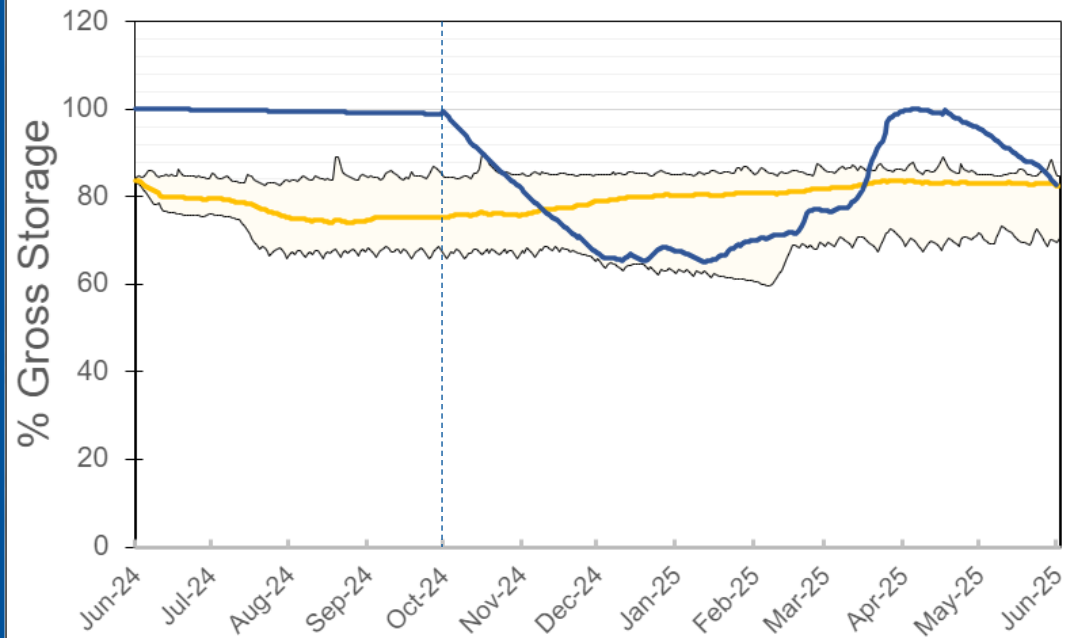
Amawalk



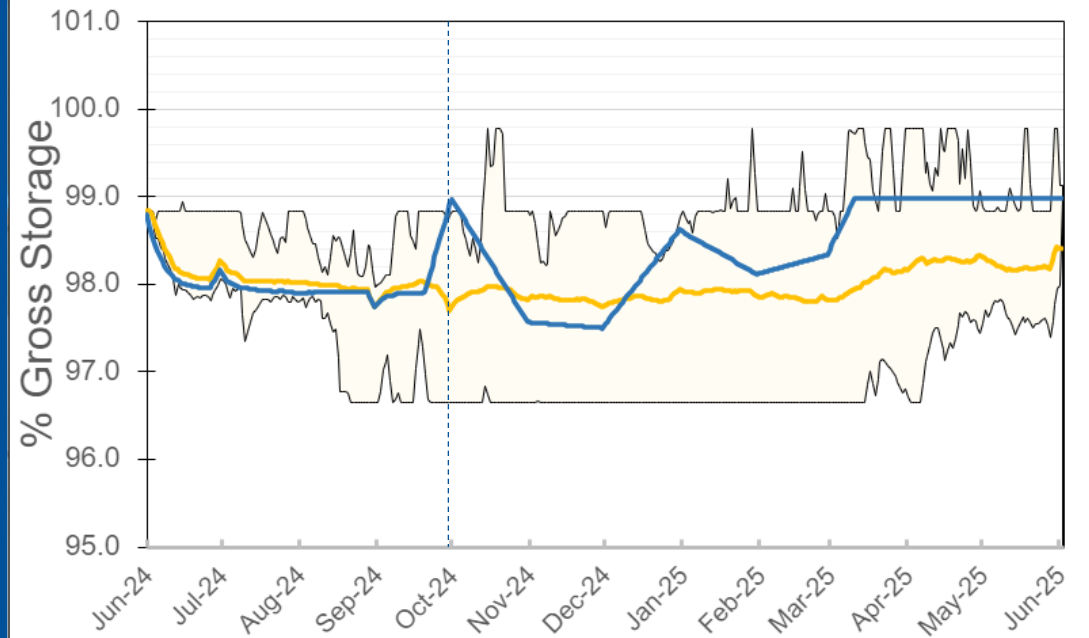
Muscoot



New Croton



Kensico



Release the minimum regulated flow of 5.5 million gallons a day (mgd) into the Croton River from the New Croton Reservoir from October through March 2025 (Per 6 NYCRR Part 672-3). April and May 2025 will release 11 mgd as opposed to 75 mgd with variance.



Croton System Episodic Taste and Odor Issues

- In recent years, there have been episodic taste and odor issues from the Croton System attributed to naturally occurring organic compounds
- Up to and during the shutdown period, DEP will enhance water quality monitoring as well as treat for any known nuisance algae that may have the potential to produce taste and odor compounds
- DEP has also installed granular activated carbon (GAC), an effective treatment for removal of taste and odor compounds, at its treatment plant to further mitigate any potential issues occurring during the project
- As the Croton System will be more heavily relied on to augment supply in the City and certain Westchester communities during the shutdown, it should be noted that ecologies in the different watershed systems can naturally result in subtle flavor variations in the water supply

Croton System Expanded Waterfowl Management Program



- Longstanding management program has been in place at Kensico and Hillview Reservoirs to prevent contamination from wildlife waste
- Program includes monitoring of waterfowl and mitigating their effects on water quality
- Waterfowl are typically dispersed by motorboats combined with noisemakers (pyrotechnics)
- During the shutdown period, DEP will use same practices at Boyd's Corners, West Branch, Cross River, and Croton Falls Reservoirs as needed to protect water quality
- All activities are conducted pursuant to an Environmental Impact Statement to minimize and mitigate impacts to nontarget species, such as Bald Eagles
 - Protective buffers are maintained for Bald Eagle Nest Sites, in consultation with DEC and USFWS as needed
- Concerns can be directed to Director of Outreach John Milgrim at (845) 334-7868 or jmilgrim@dep.nyc.gov

Croton System Recreational Uses

- Permitted fishing activities from shore or boat will be allowed on all reservoirs
- During periods with lower reservoir levels, access to the water may be more difficult for fishing boats
 - DEP will allow anglers to store fishing boats closer to the water during low water conditions
- No restrictions will be placed on any land-based recreational activities, including hunting, hiking, or trapping
- In-stream discharges (releases from reservoirs) will be reduced and may impact stream fishing
- Due to water level fluctuations, Ice fishing will be restricted on several Croton system reservoirs during the winter 2024-2025 season

