



NYC – Reservoir System Current Operations

December 14, 2010

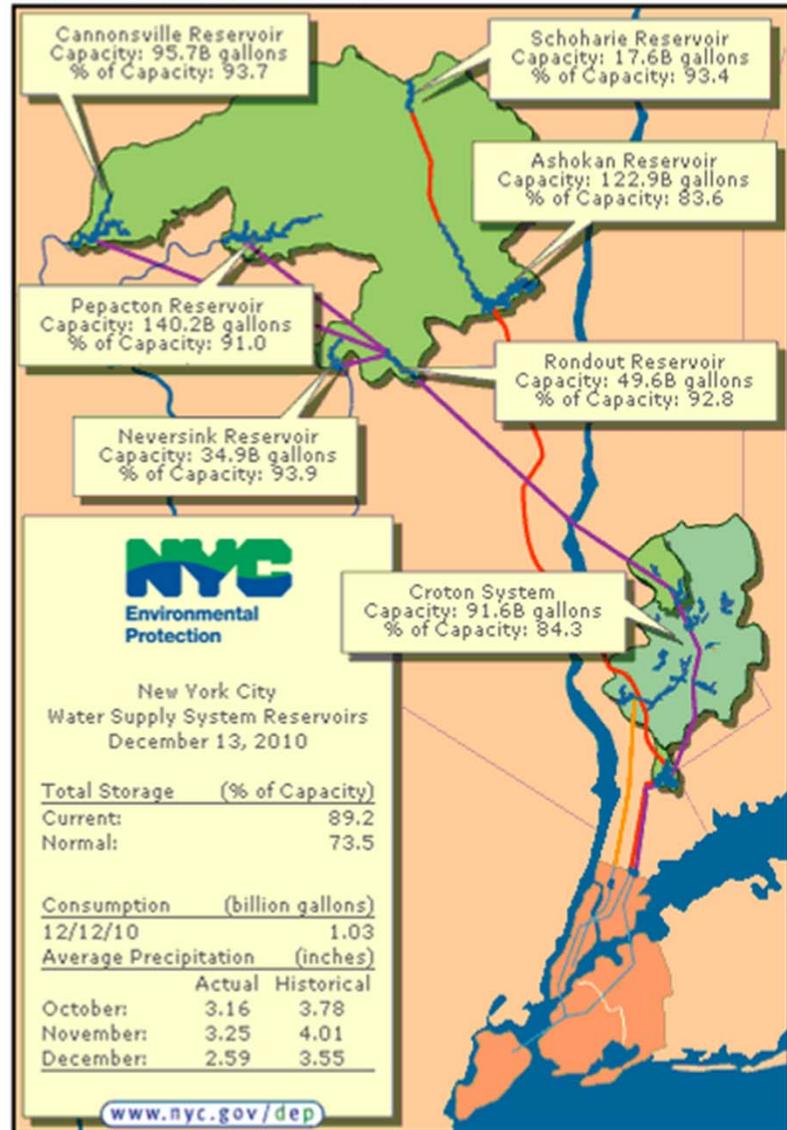
- ❖ System Status
 - ❖ Storm Events
 - ❖ Impacts to Reservoirs
 - ❖ NYC Response
 - ❖ Current Operations
 - ❖ Plan moving forward
- 
- An aerial photograph of a large, winding reservoir system, likely the Catskill/Delaware system, surrounded by dense green forest. The sky is blue with scattered white clouds. The reservoirs are interconnected by narrow channels and have irregular, winding shapes. The surrounding land is covered in thick, green trees.

System Status

Consumption NYC + upstate communities

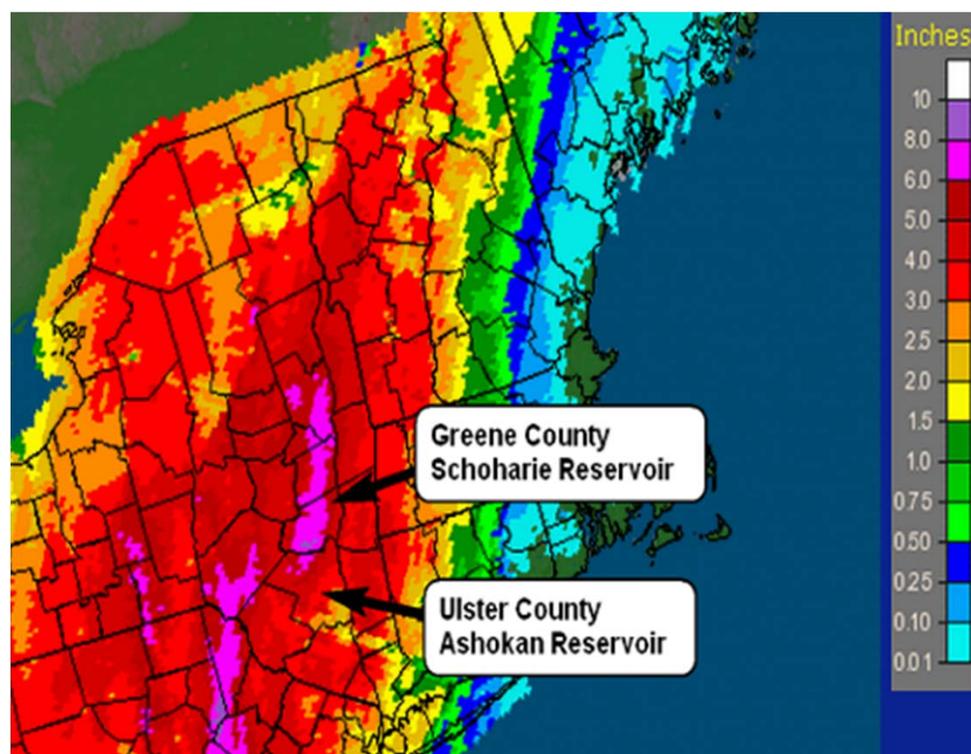
- ❖ October = 1.13 BGD
- ❖ November = 1.10 BGD
- ❖ December = 1.10 BGD

Current Reservoir Levels



Storm Event #1

- ❖ 6"+ average rainfall 9/26 – 10/1
- ❖ Inflow 9/30 – 10/3: Ashokan = 18 BG / Schoharie = 18 BG
- ❖ Turbidities above 2300 NTU entered Ashokan Reservoir
- ❖ Ashokan west basin turbidity ranged from 10–360 NTU



Oct 1, 2010 rainfall (inches) Selected rain gages	
Greene County	
TANNERSVILLE	9.0
Ulster County	
PHOENICIA	8.3
WEST SHOKAN	7.6
SLIDE MOUNTAIN	7.4

NYC Operations Response to Storm Event #1

- ❖ Delaware Reservoir diversions shutdown
- ❖ Rondout draft remained below 2 NTU
- ❖ Delaware Reservoir turbidities ranged from 0.6 – 6.2 NTU
- ❖ Delaware diversions into Rondout restored 10/5



Neversink Reservoir

Storm Event #1 rainfall (inches) Selected rain gages	
CANNONSVILLE	5.5
PEPACTON	6.1
NEVERSINK	7.9
RONDOUT	7.3

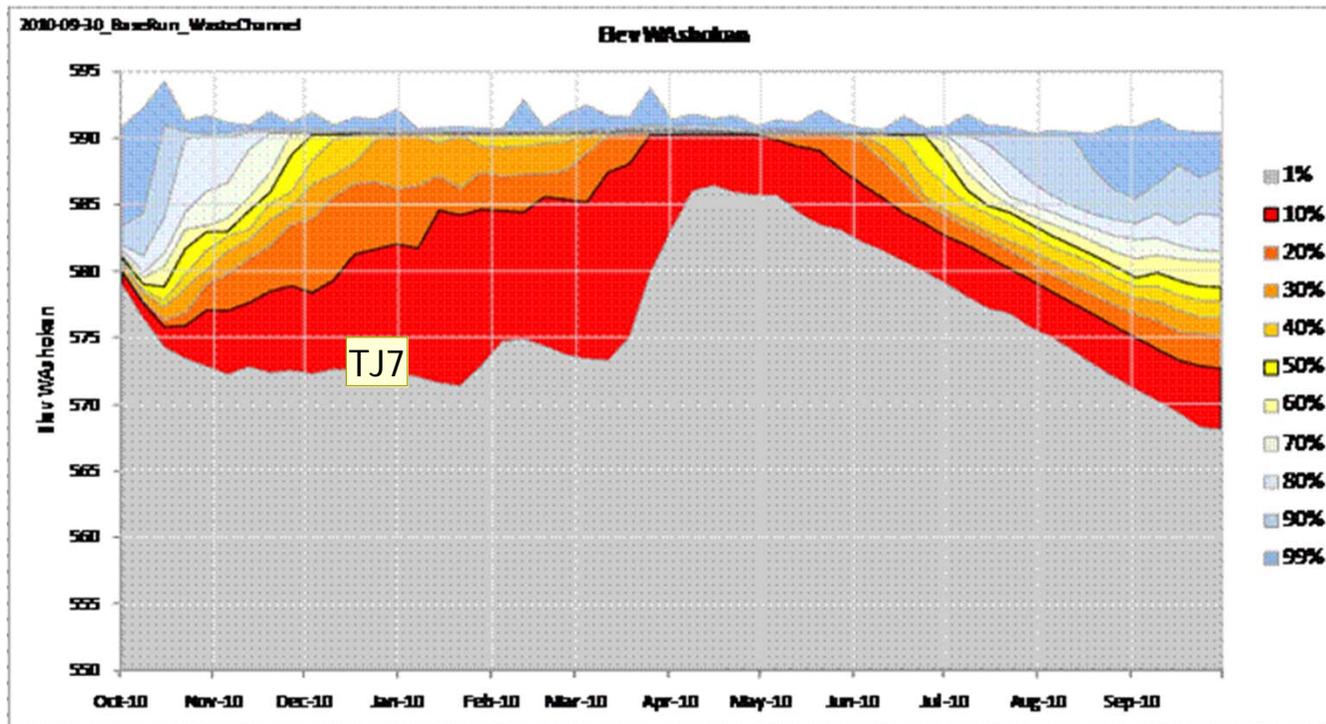
NYC Operations Response to Storm Event #1

- ❖ Delaware diversions shut down
- ❖ Shandaken Tunnel closed
- ❖ Ashokan Dividing Weir opened
- ❖ Ashokan draft reduced
- ❖ Rondout draft maximized
- ❖ Waste Channel activated 10/7
- ❖ Ashokan draft reductions required down-stream stop shutter placement and increased dependence on the Delaware System.
- ❖ Dividing Weir flow reduced once it was determined West Basin would not spill and East Basin could be isolated



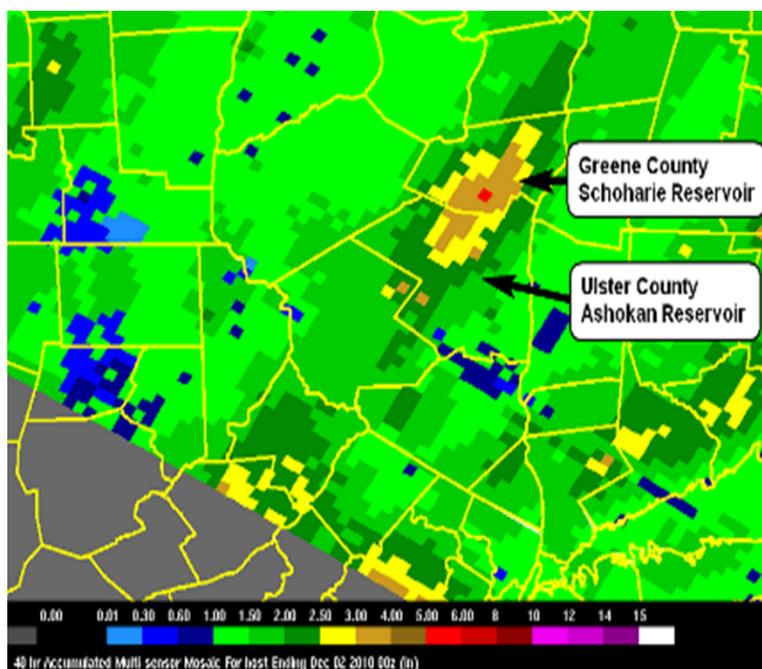
OST/Projections

- ❖ OST was used to determine waste channel could be used and Rondout could be maximized and Delaware and Catskill systems would still be refilled



Storm Event #2

- ❖ 2.5" average rainfall 11/30 – 12/1.
- ❖ Runoff 12/1 – 12/6: Ashokan = 18 BG / Schoharie = 15 BG
- ❖ Turbidities above 1100 NTU entered Ashokan Reservoir
- ❖ West Basin Turbidity ranged from 30 – 500 NTU

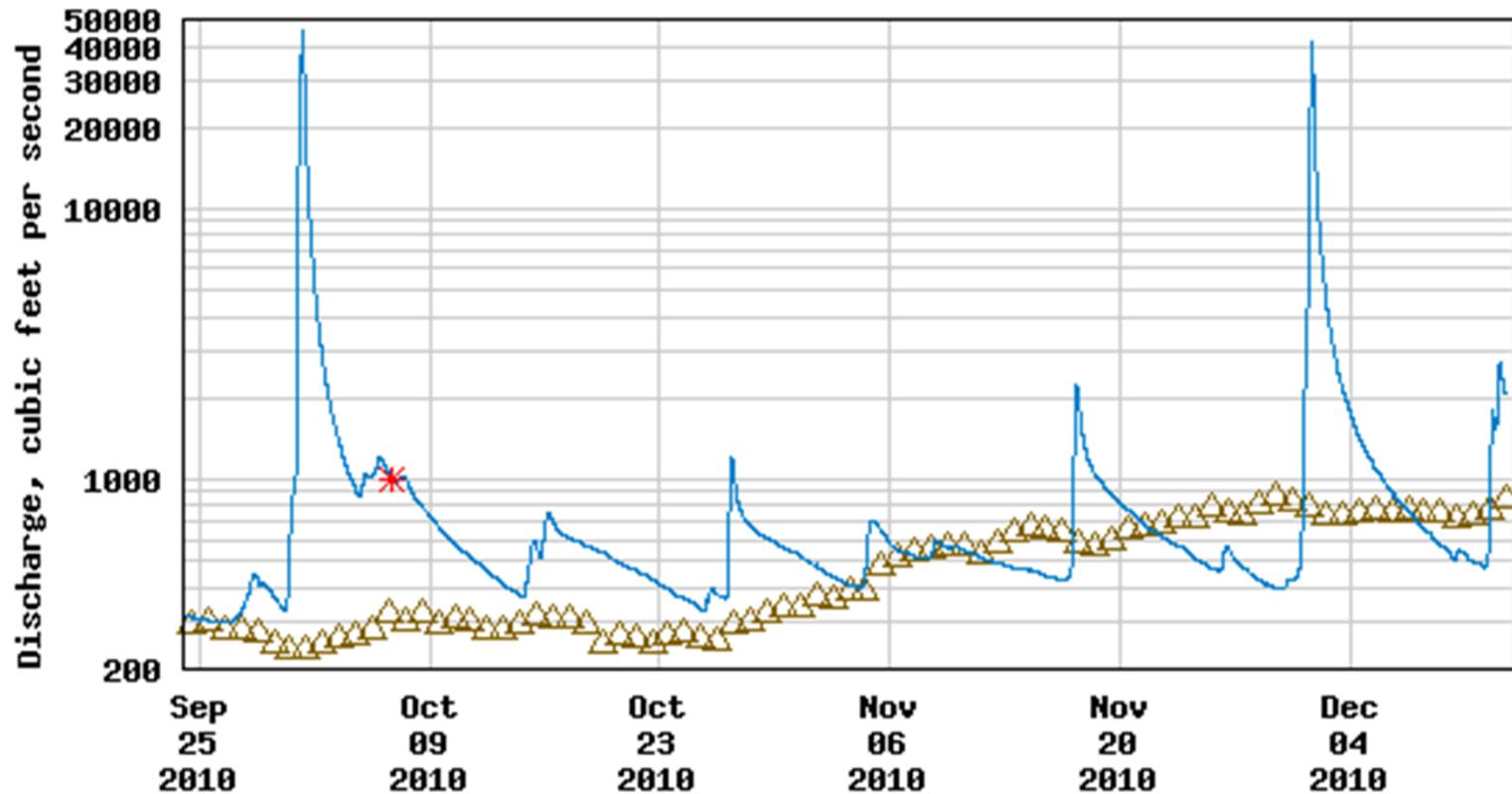


Dec 1, 2010 rainfall (inches) Selected rain gages	
Greene County	
TANNERSVILLE	5.5
EAST JEWETT	5.3
LEXINGTON	3.6
Ulster County	
PHOENICIA	6.7
WEST SHOKAN	6.0
SLIDE MOUNTAIN	3.9

Storm Event #2



USGS 01362500 ESOPUS CREEK AT COLDBROOK NY



----- Provisional Data Subject to Revision -----

- △ Median daily statistic (78 years)
- * Measured discharge
- Discharge

NYC Operations Response to Storm Event #2

- ❖ Delaware Reservoir diversions shutdown
- ❖ Rondout draft remained below 2 NTU
- ❖ Delaware Reservoir Turbidities ranged from 1.7 – 3.7 NTU
- ❖ Delaware diversions into Rondout restored (07-DEC / 09-DEC)

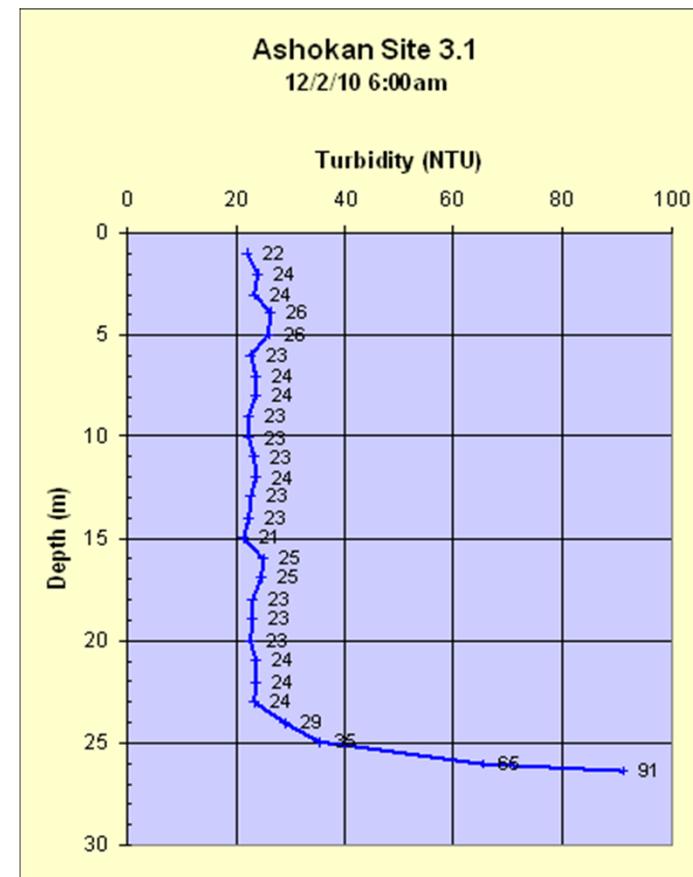
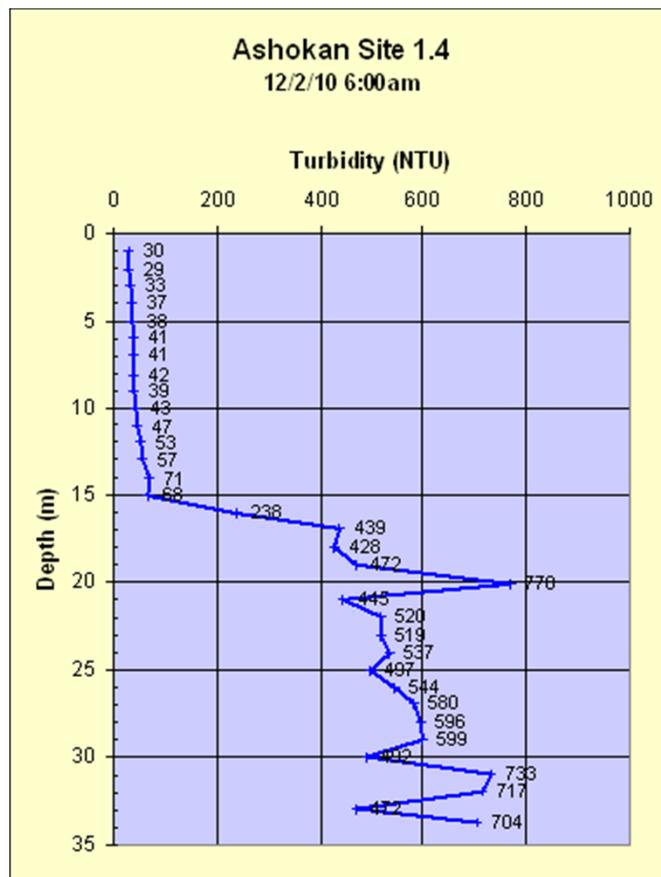


Rondout Reservoir

Storm Event #2 rainfall (inches)	
CANNONVILLE	2.3
PEPACTON	1.6
NEVERSINK	2.7
RONDOUT	3.2

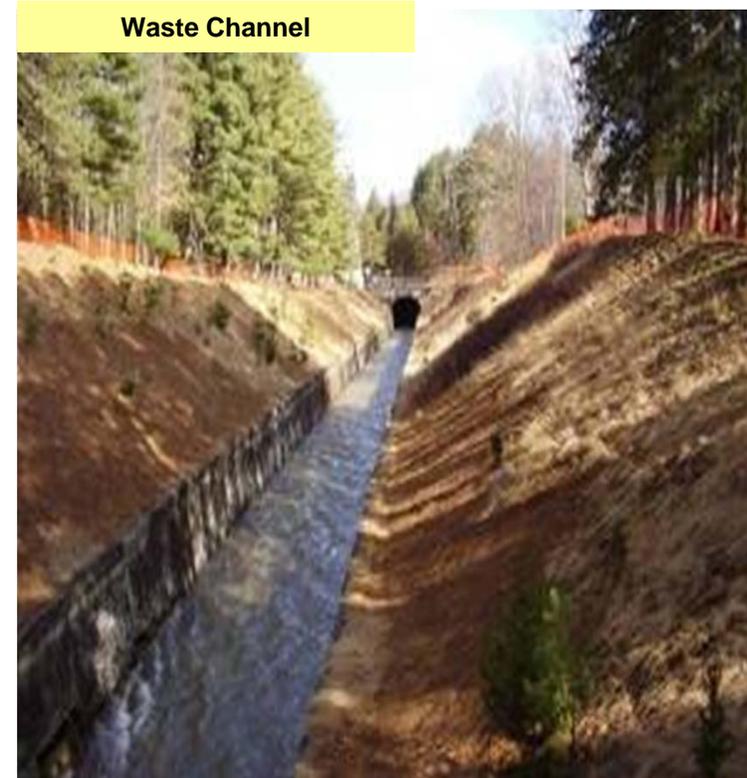
Catskill System Issues

- ❖ Catskill Turbidity has been a significant challenge due to turbid inflow from recent storms
- ❖ Cannot exceed 5 NTU from Kensico – violation of FAD



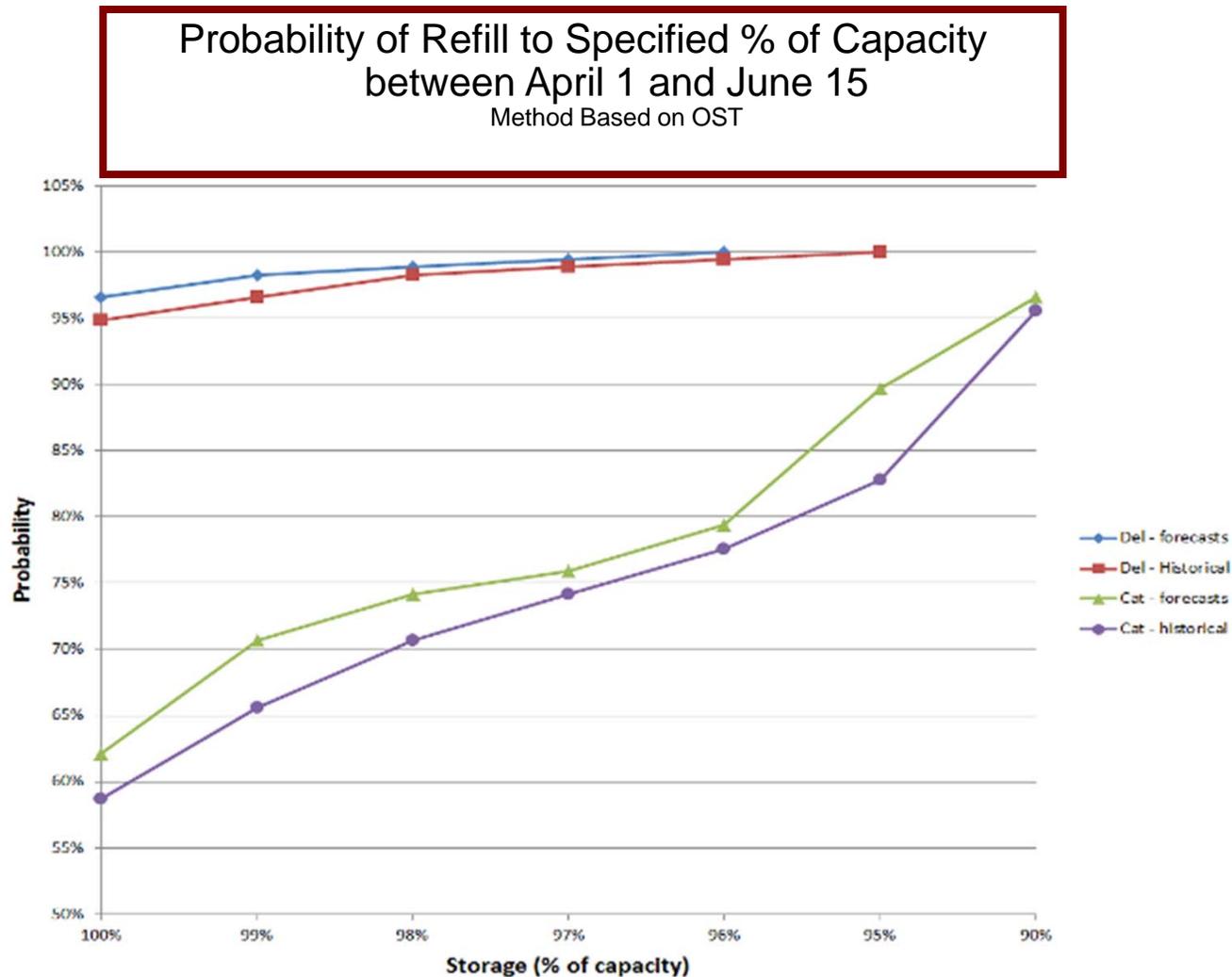
NYC Operations Response to Storm Event #2

- ❖ Ashokan Dividing Weir opened to minimize spilling from west basin to east basin
- ❖ Shandaken Tunnel closed
- ❖ Waste Channel remains activated
- ❖ Ashokan diversion turbidity above 50 NTU
- ❖ Ashokan flow reduced to 50 MGD
- ❖ Rondout draft remained at full flow
- ❖ Dividing Weir flow reduced once it was determined West Basin would not spill and East Basin could be isolated



OST/Projections

- ❖ Continue to use OST to determine waste channel could continue to be used and Rondout could remain maximized and Delaware and Catskill systems would still be refilled

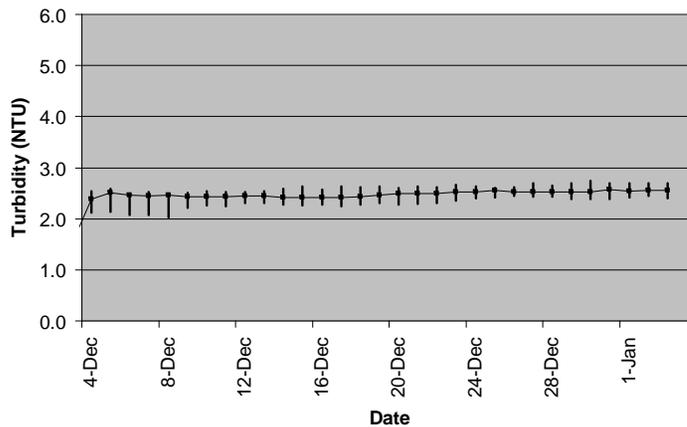


Catskill System Modeling

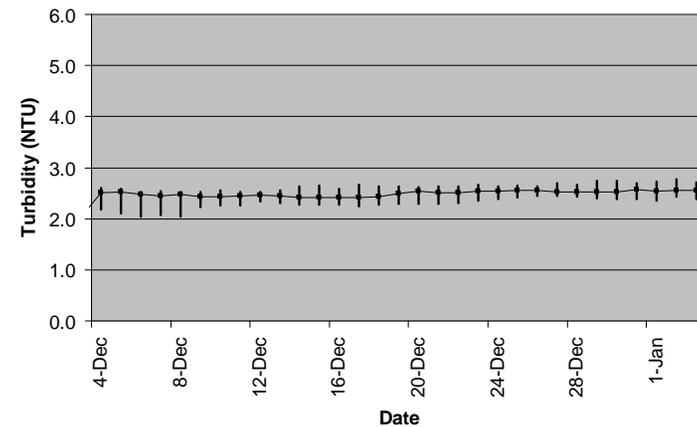
DEP has developed an extensive suite of water quality and water system models which are used to analyze turbidity transport in the Catskill System.

Catskill Aqueduct Inflow = 50 MGD ; Delaware Aqueduct Inflow = 1000 MGD

Catskill Effluent Turbidity



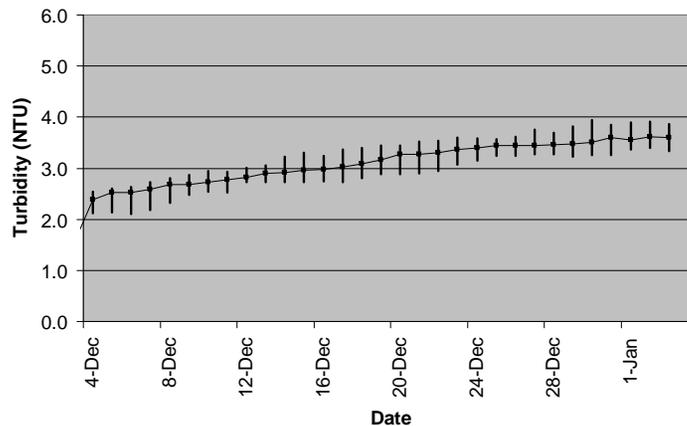
Delaware Effluent Turbidity



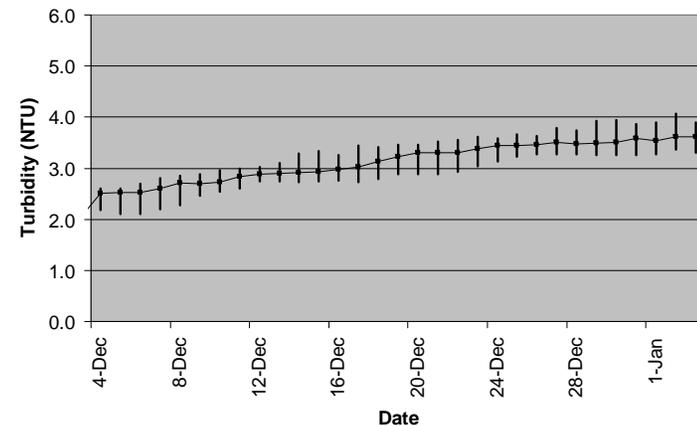
Catskill
Turbidity =
40 NTU

Catskill Aqueduct Inflow = 100 MGD ; Delaware Aqueduct Inflow = 950 MGD

Catskill Effluent Turbidity



Delaware Effluent Turbidity



Catskill
Turbidity =
40 NTU

Current Status

Delaware / Catskill System

Reservoir	Storage %	Draft / Diversion MGD	Turbidity NTU	Release MGD
Rondout	93.6	835	1.6	10
Cannonsville	93.7	0	2.1	970
Pepacton	91.0	450	2.3	120
Neversink	93.9	200	3.4	123
Ashokan	83.6	50	56	Waste Channel 580
Schoharie	93.4	0	130	—
West Branch	55.0	1050	1.9	20
Kensico	97.7	1045	1.3	—

Croton System Issues

- ❖ Extensive capital work continues in the Croton Aqueduct to support new Croton Filtration Plant
- ❖ Croton is held to stricter criteria than Kensico, and is more prone to violations due to lesser quality than that provided by the Delaware and Catskill systems
- ❖ Croton turbidity ranges from 1.4 NTU to 2.6 NTU, Color ranges from 22 to 40 units
- ❖ If Croton was activated at this time, DEP could receive entry-point violations for both color and turbidity



Plan moving forward

- ❖ Operate at reduced Ashokan flow until quality improves
- ❖ Maintain dependence upon Delaware System
- ❖ Continue to perform OST runs as well as water quality monitoring and modeling
- ❖ Exhaust West Branch & Boyds Reservoir storages
- ❖ If quality does not improve, consider Alum (Aluminum Sulfate) treatment for the Catskill Aqueduct diversion from Ashokan
 - ❖ Requires NYSDEC and NYSDOH approval under SPDES permit

