

Blenheim-Gilboa Pumped Storage Power Project Operations

Features, Functions, Storm Response

January 19, 2012

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Overview

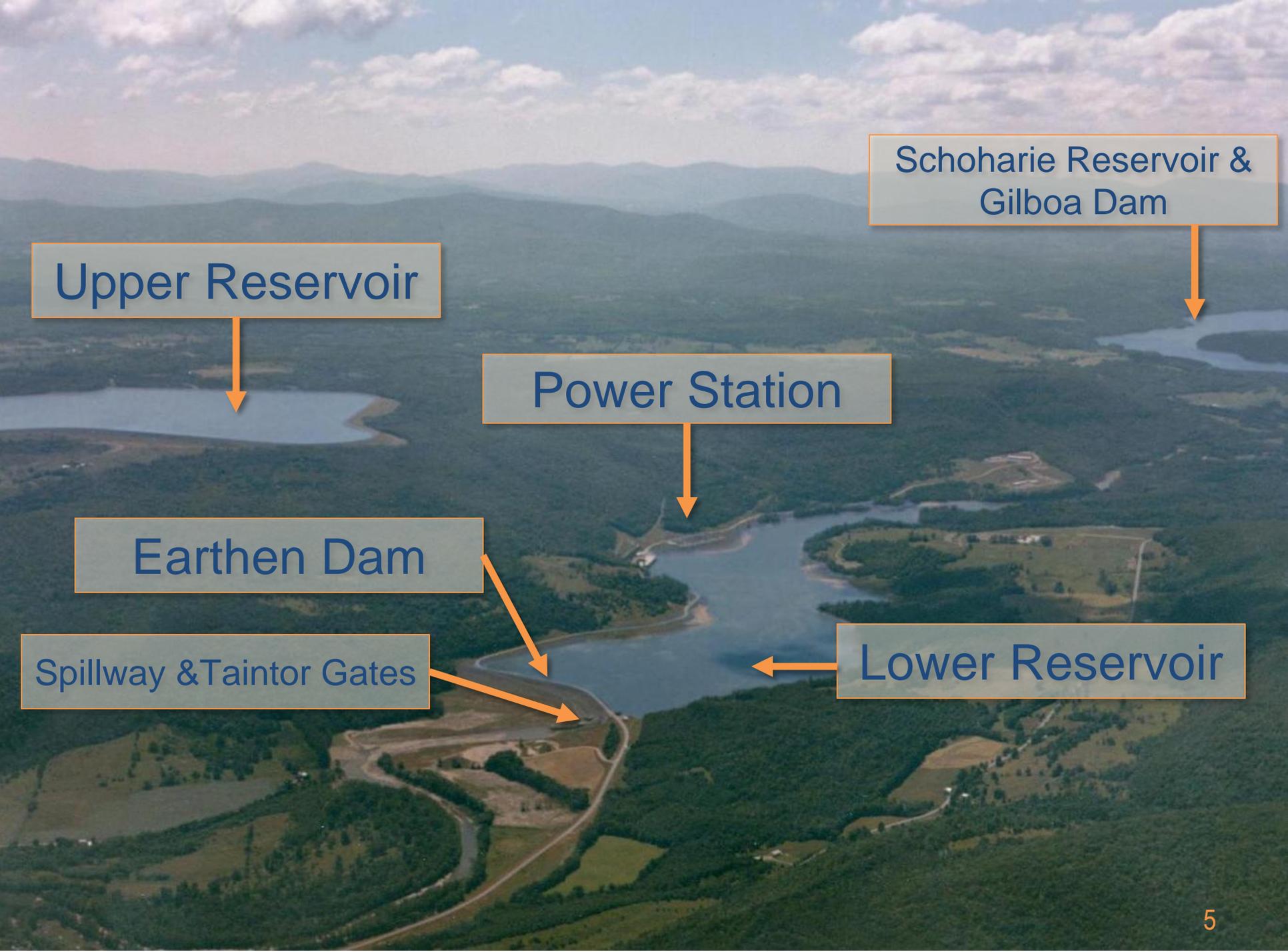
- Welcome
- Presentation Purpose
- Blenheim-Gilboa Power Project Description
- Water Flows and Flood Forecasting
- Tropical Storm Irene Timeline & NYPA response
- Questions from the Audience

Presentation Purpose

- Explain normal and emergency operations of this NYPA power plant
- Clarify misinformation:
 - NYPA was not generating power during the storm
 - Plant not designed for flood mitigation
- Review timeline of Tropical Storm Irene with NYPA actions and outcomes

Blenheim-Gilboa Pumped Storage Power Project





Schoharie Reservoir & Gilboa Dam

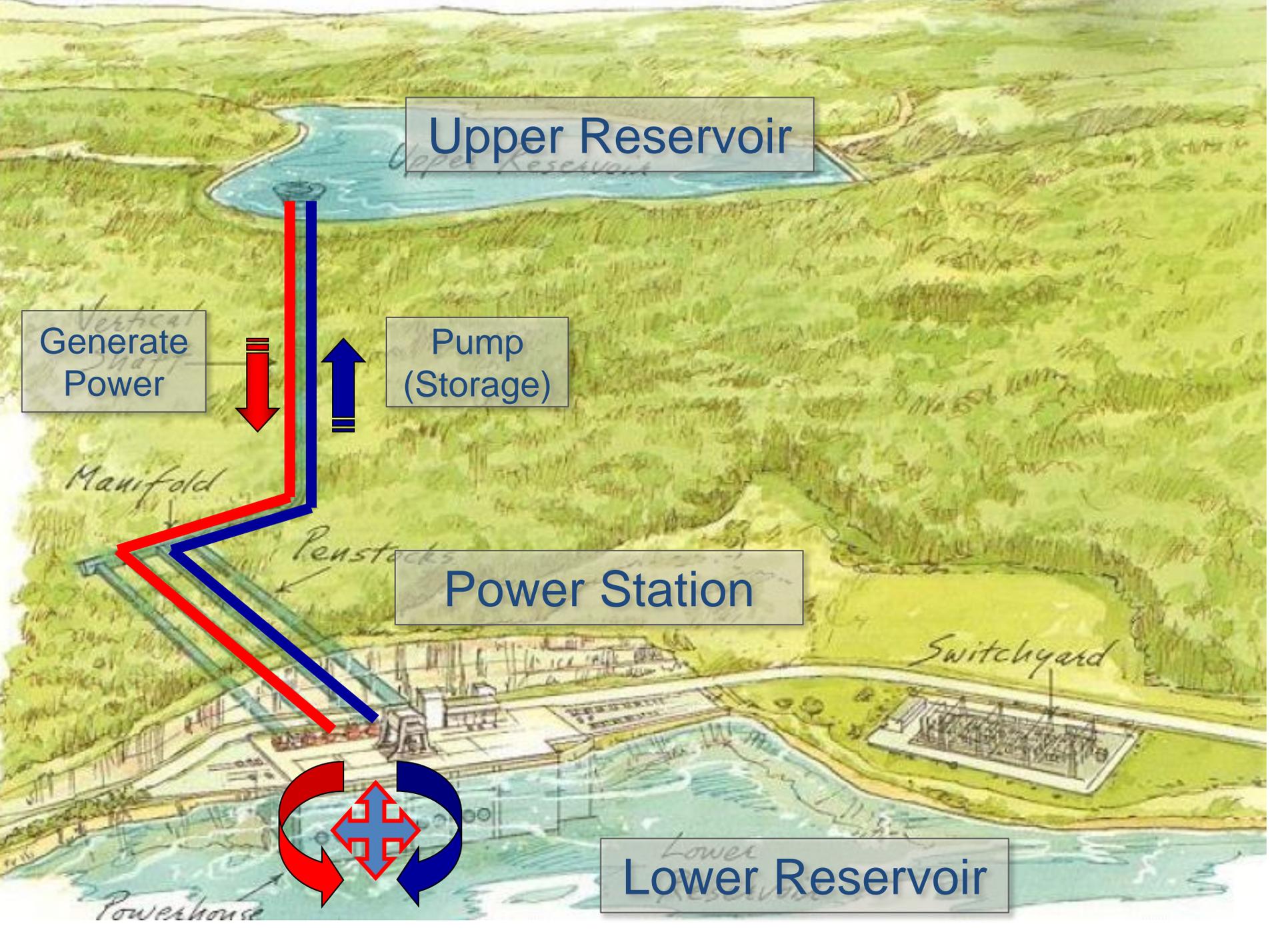
Upper Reservoir

Power Station

Earthen Dam

Spillway & Taintor Gates

Lower Reservoir



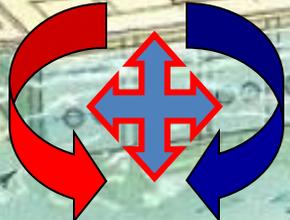
Upper Reservoir

Generate Power

Pump (Storage)

Power Station

Lower Reservoir



Manifold

Penstocks

Switchyard

Powerhouse

Closed System: 40 ft. Operating Range

Lower Reservoir
At high level (pool)



Lower Reservoir
At low level (pool)



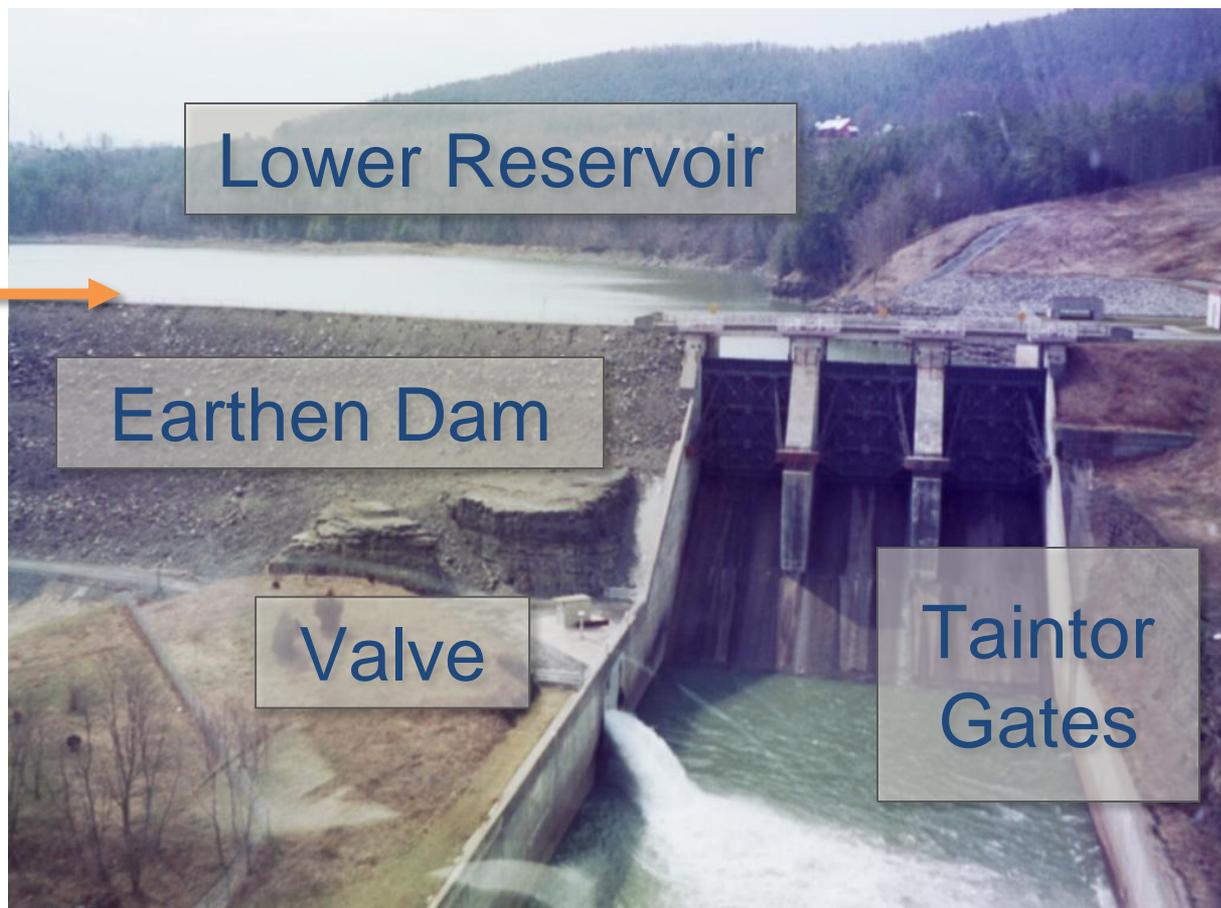
Earthen Dam Design

Blenheim-Gilboa Project

- Designed to hold back water with full lower reservoir, elevation of 900 ft.
- Not designed for water to overtop dam. Dam's nominal elevation was 910 ft.
- Maximum outflow design for spillway was 165,000 cubic feet per second (cfs) at 908.5 ft.
- Taintor Gates used to regulate outflows following design of project

Blenheim-Gilboa Project Spillway

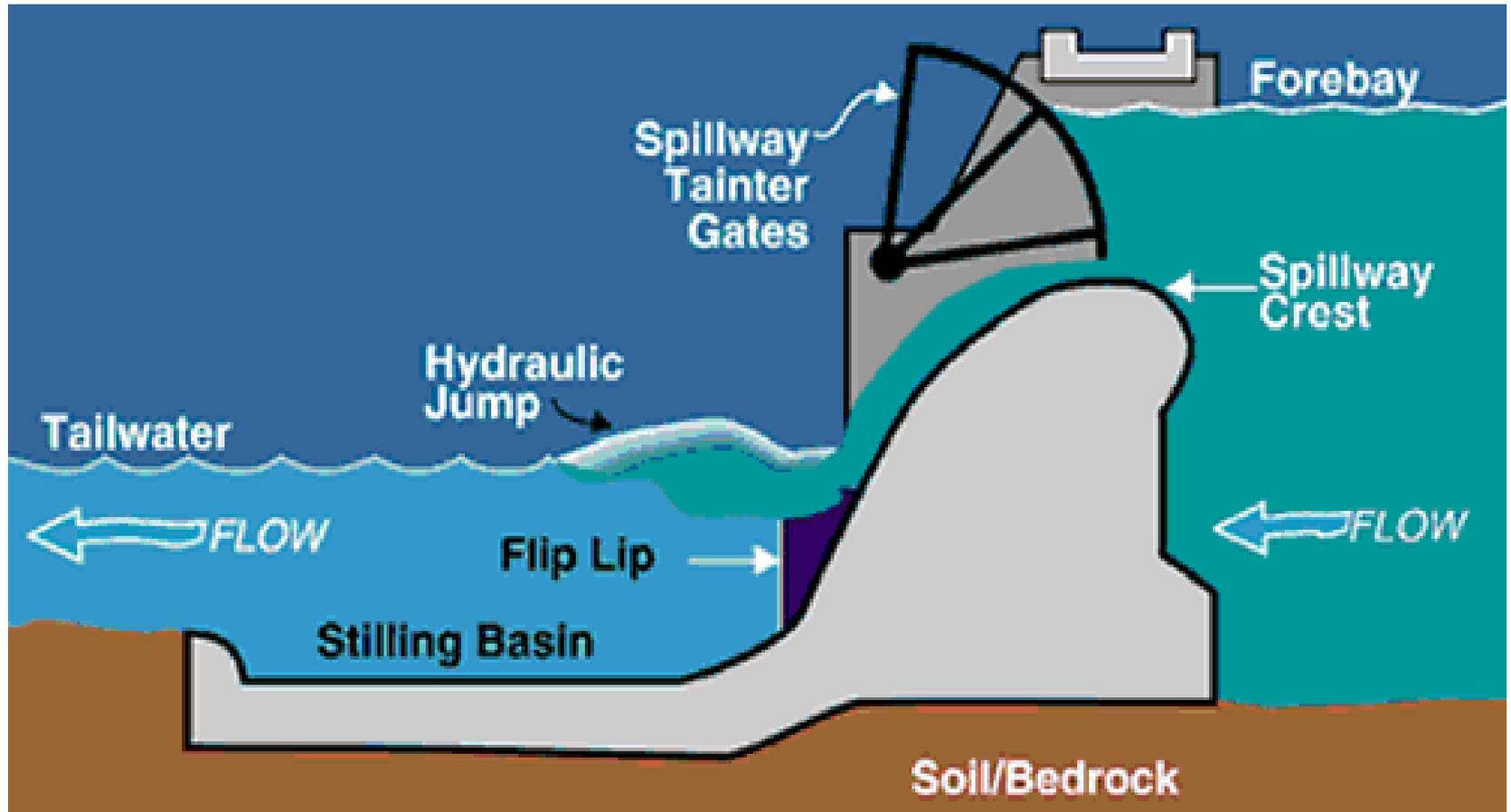
910 ft.
over top



Spillway Operation

- Orifice Flow – gates submerged
 - Normal mode of operation
 - Allows generation operation while controlling flow
 - Slightly lower flows than free discharge
- Free discharge – gates out of water (“natural” operation)
 - Allows max discharge at a given reservoir elevation
 - Generation must be curtailed
 - Assures that when the reservoir elevation is constant or rising that discharge will be slightly lower than inflows

Taintor Gate Operations



Taintor Gate Operations



- Gates open at 1 ft per minute
 - Requires 42 minutes to fully open, each gate
- Redundant gate motor operators and gearboxes
- Redundant power supplies to operate gates

Water Flow and Flood Forecasting

- Measured in cubic feet per second (cfs)
- National Weather Service is the lead
- Models are river-specific using:
 - Precipitation forecast
 - Actual precipitation amounts from radar, observers, collection equipment, and others
 - Actual flows from United States Geological Survey (USGS) stations and gages
- All data is used to come up with an estimated flow in the creek, many variables can make actual flows deviate

Real-Time Flood Forecasting During Tropical Storm Irene

- Contact with National Weather Service and others
- Projected flows changed from 11,000 cfs to 78,000 cfs in a few hours.
- Flash flooding apparent on local roads, culverts and ditches
- Heavy rains continue
- Accuracy and condition of gages

Hurricane / Tropical Storm Irene Projection as of August 24, 2011

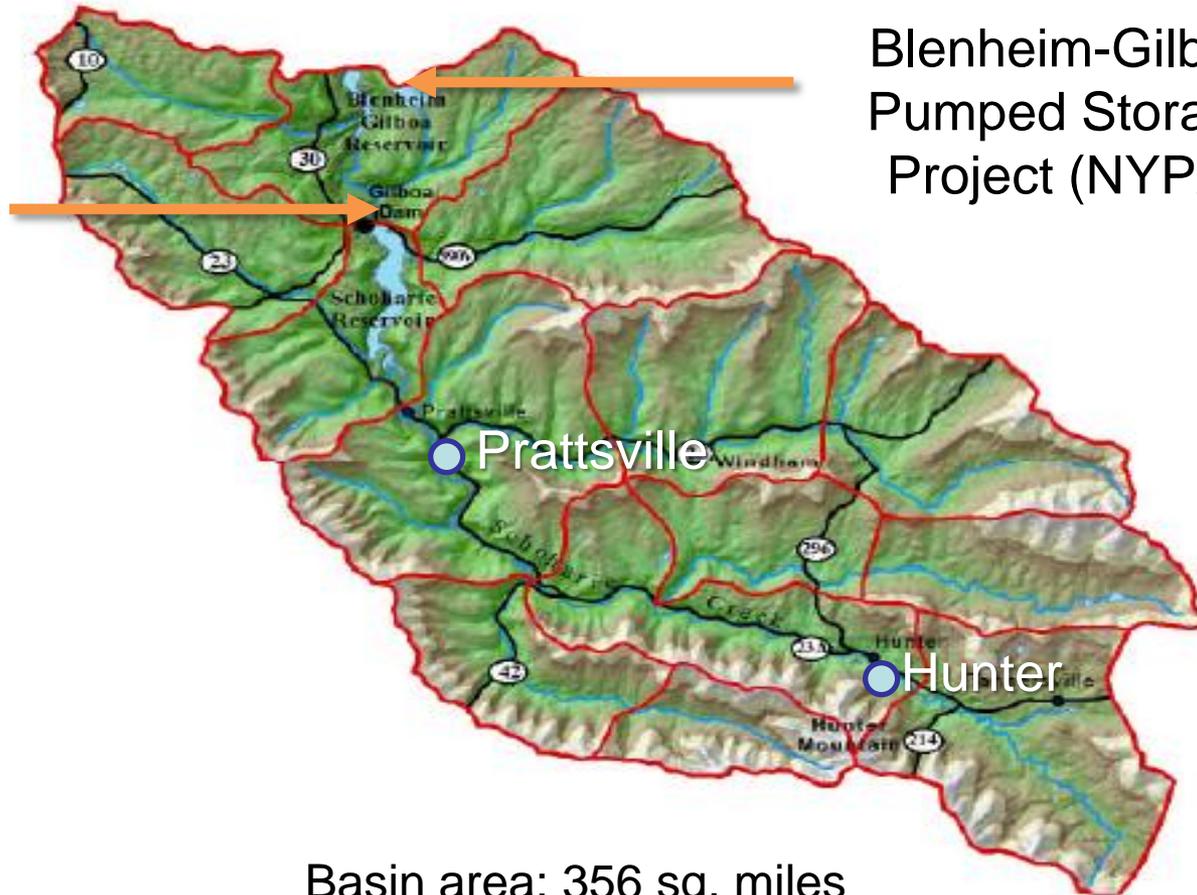


Blenheim Gilboa Drainage Basin

North



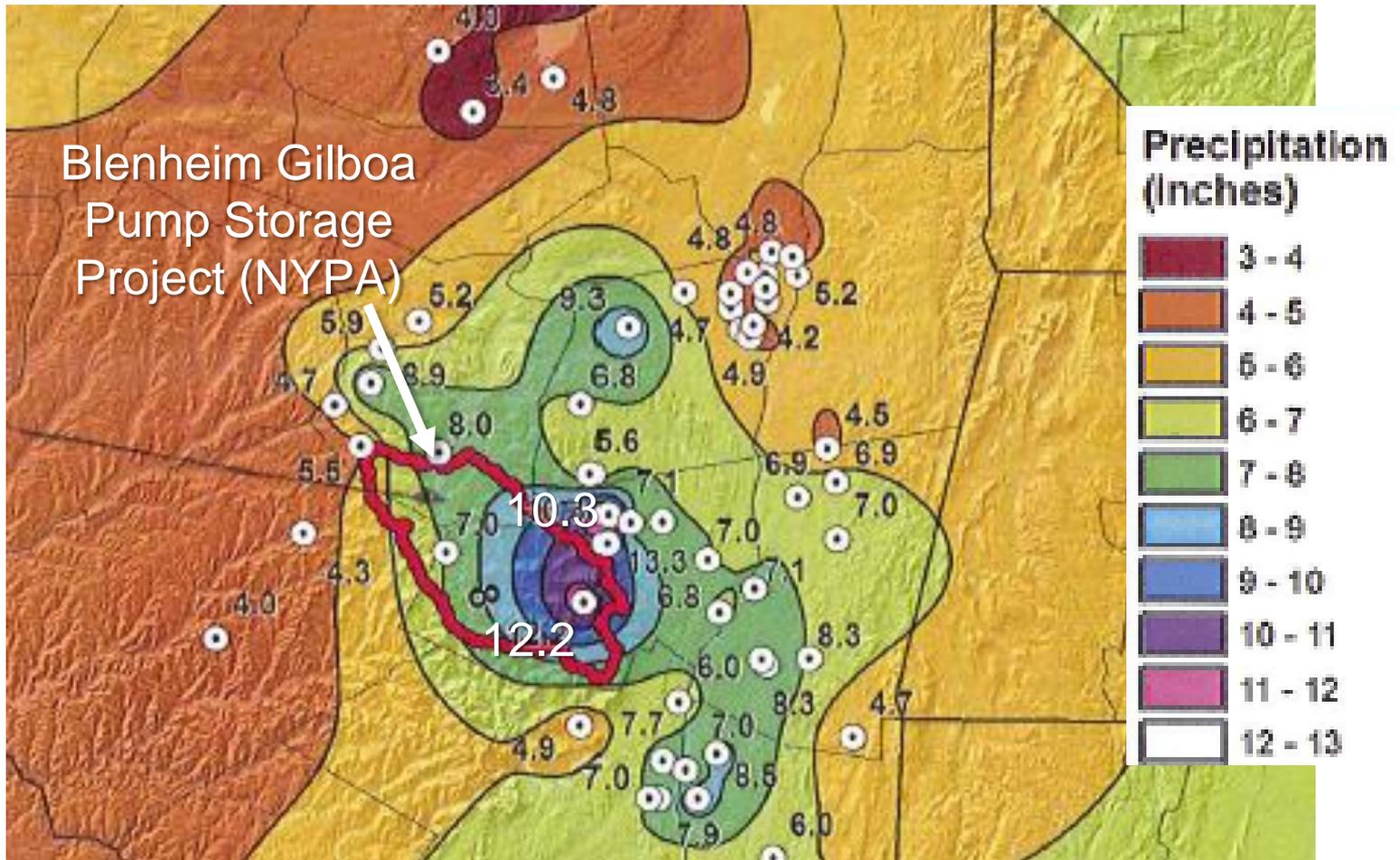
Gilboa Dam
(NYC DEP)



Blenheim-Gilboa
Pumped Storage
Project (NYPA)

Basin area: 356 sq. miles

Rainfall Totals: August 27-30, 2011



Operations During the Storm

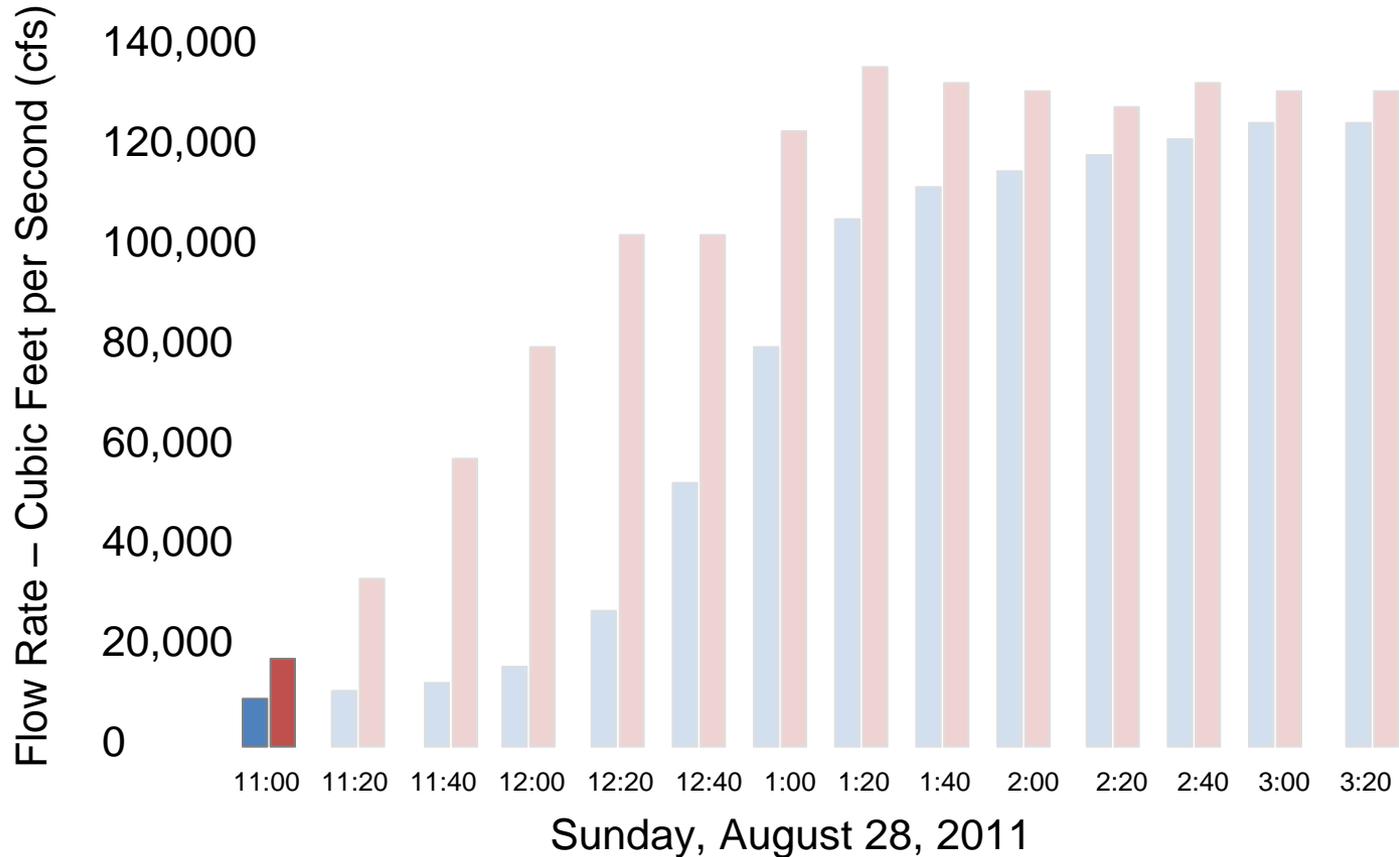
- Follow Emergency Action Plan (EAP) per training and procedures
- Tropical Storm Irene = 500 year flood event
- Manage record water inflows:
 - Focus on preventing over top of the earthen dam
 - Reduce outflow as much as possible within operating limits
- Manage operational challenges, requiring redundant power supply for gate operation
- Concern for employee, family and community safety

Emergency Action Plan (EAP)

- Annual and periodic training and drills conducted
- Required, approved and monitored by Federal Energy Regulatory Commission
 - FERC attends drills
- Type A: Failure is imminent or has occurred
- Type B: A potentially hazardous situation is developing

Tropical Storm Irene Response

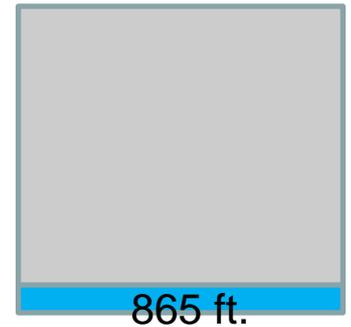
Sunday, 11:00 a.m.



NYPA Lower Reservoir

910 ft. overtop

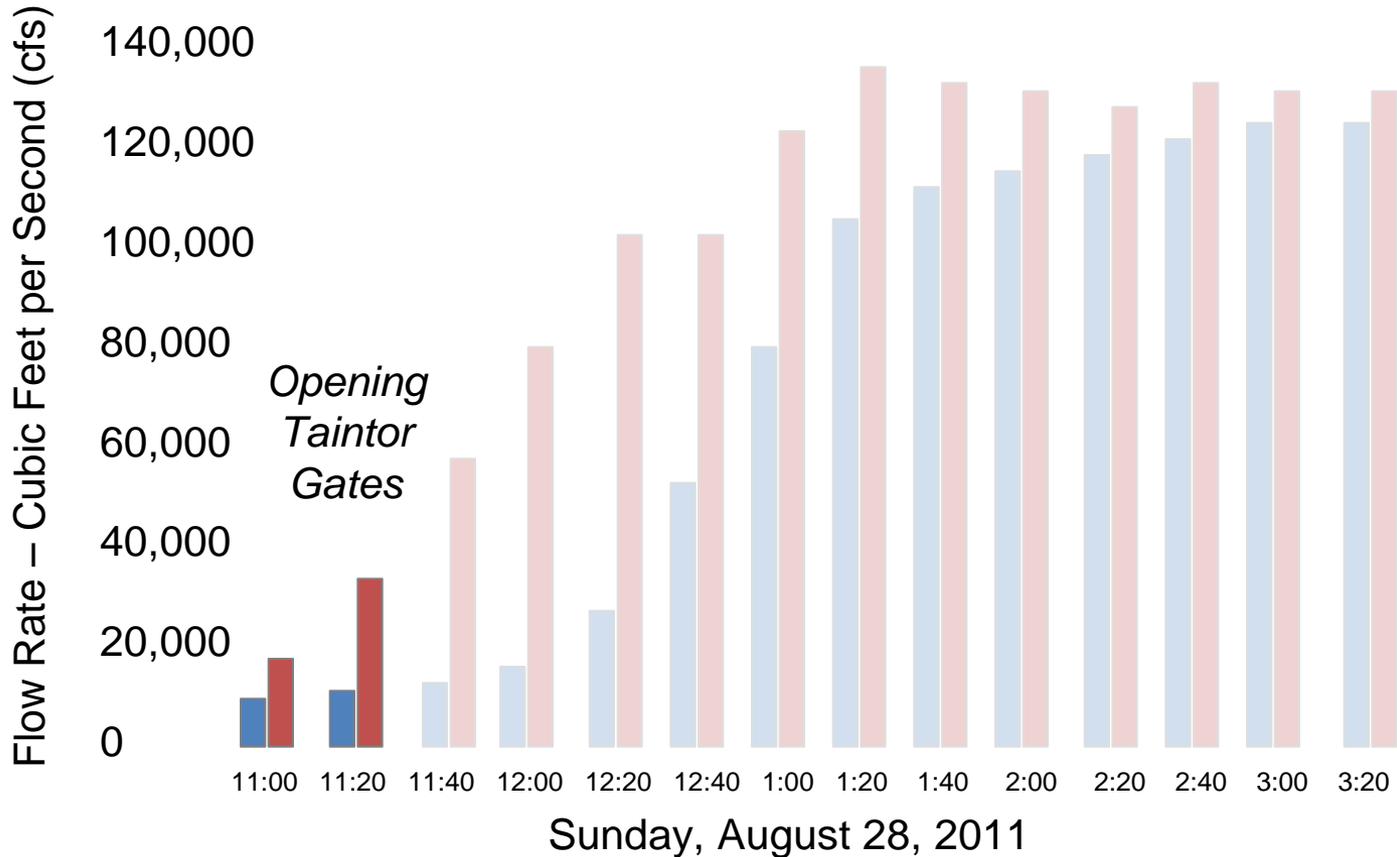
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 11:20 a.m.



NYPA Lower Reservoir

910 ft. overtop

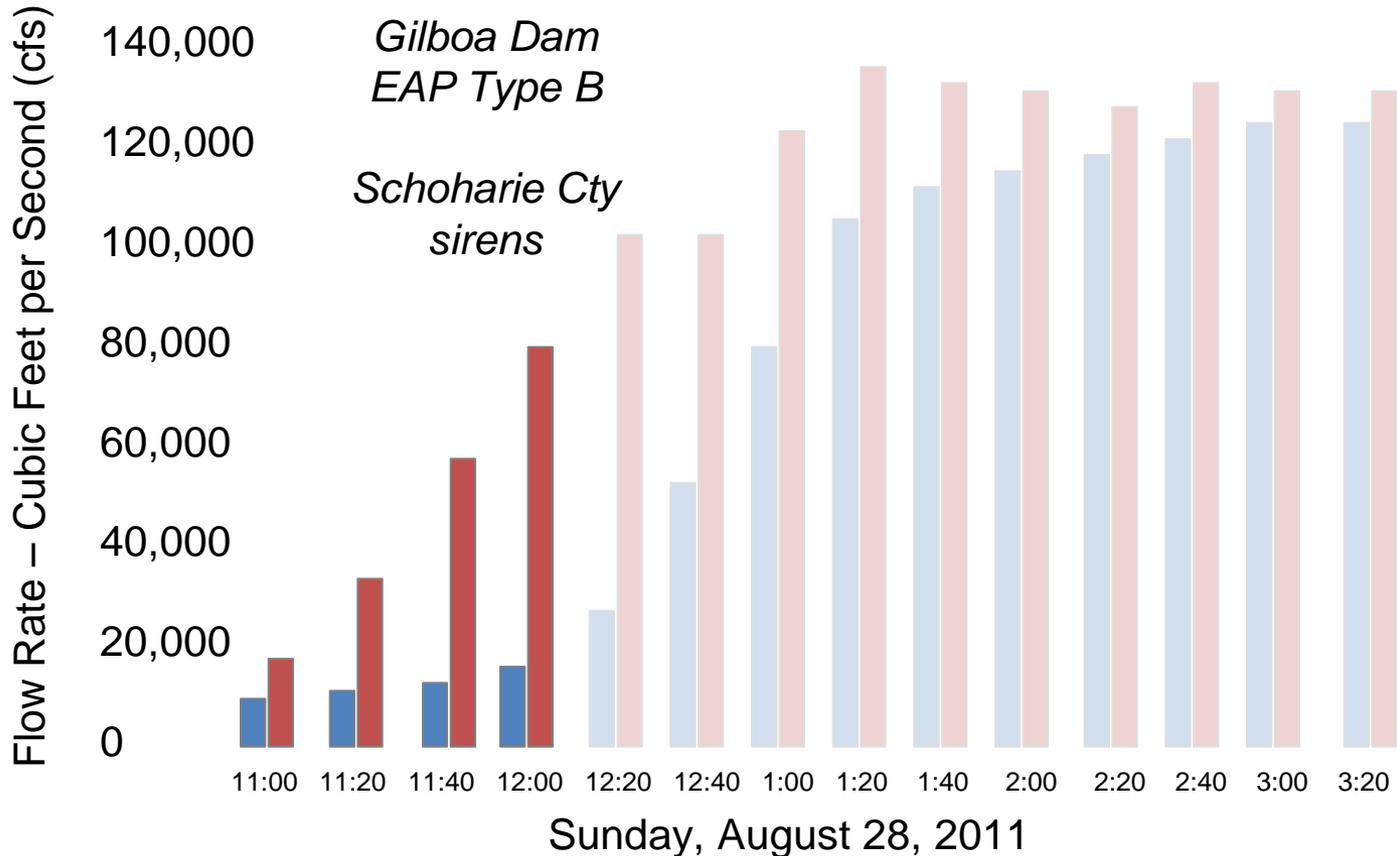
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 12:00 p.m.



Outflows 
Inflows 

**NYPA Lower
Reservoir**

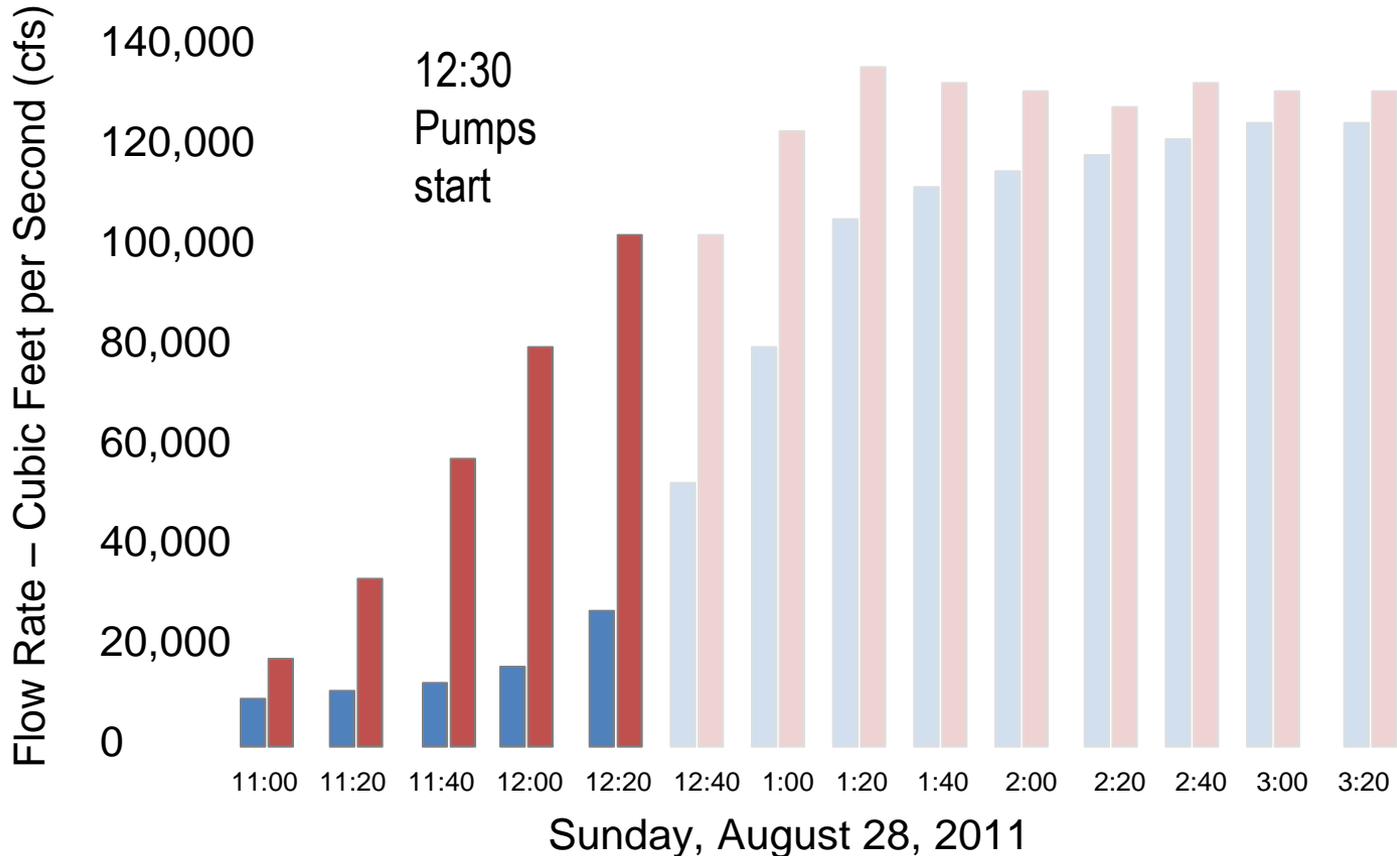
910 ft. overtop

900 ft. full



Tropical Storm Irene Response

Sunday, 12:20 p.m.

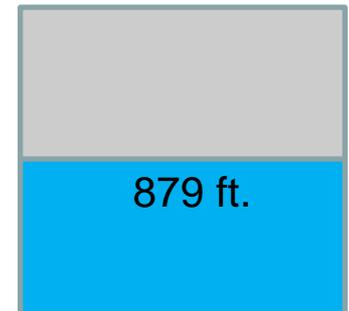


Outflows 
Inflows 

NYPA Lower Reservoir

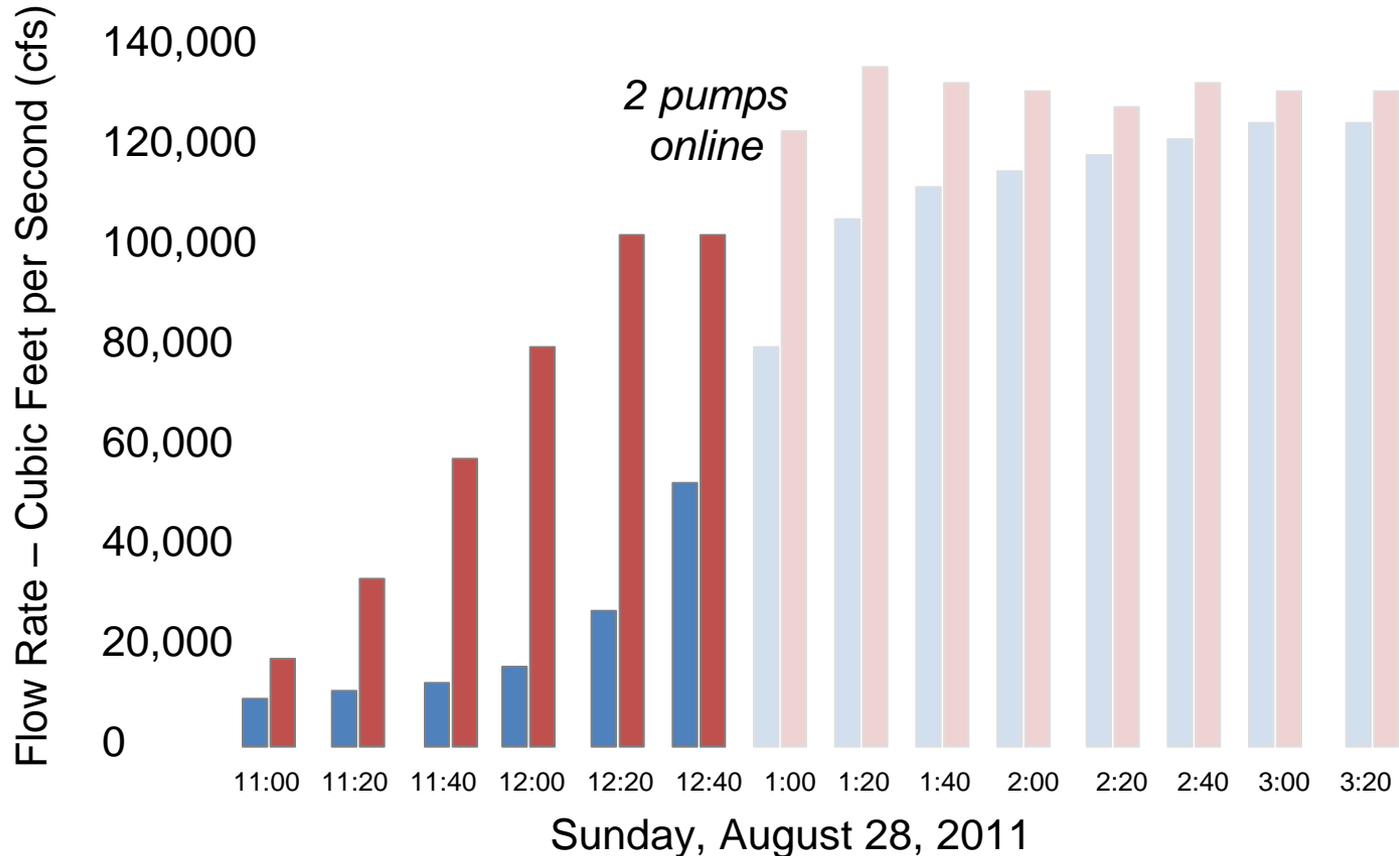
910 ft. overtop

900 ft. full



Tropical Storm Irene Response

Sunday, 12:40 p.m.

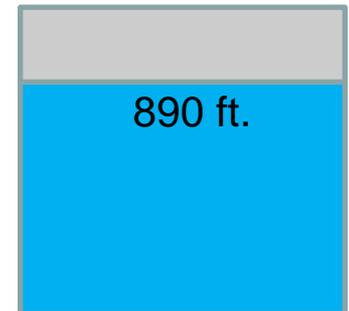


Outflows 
Inflows 

NYPA Lower Reservoir

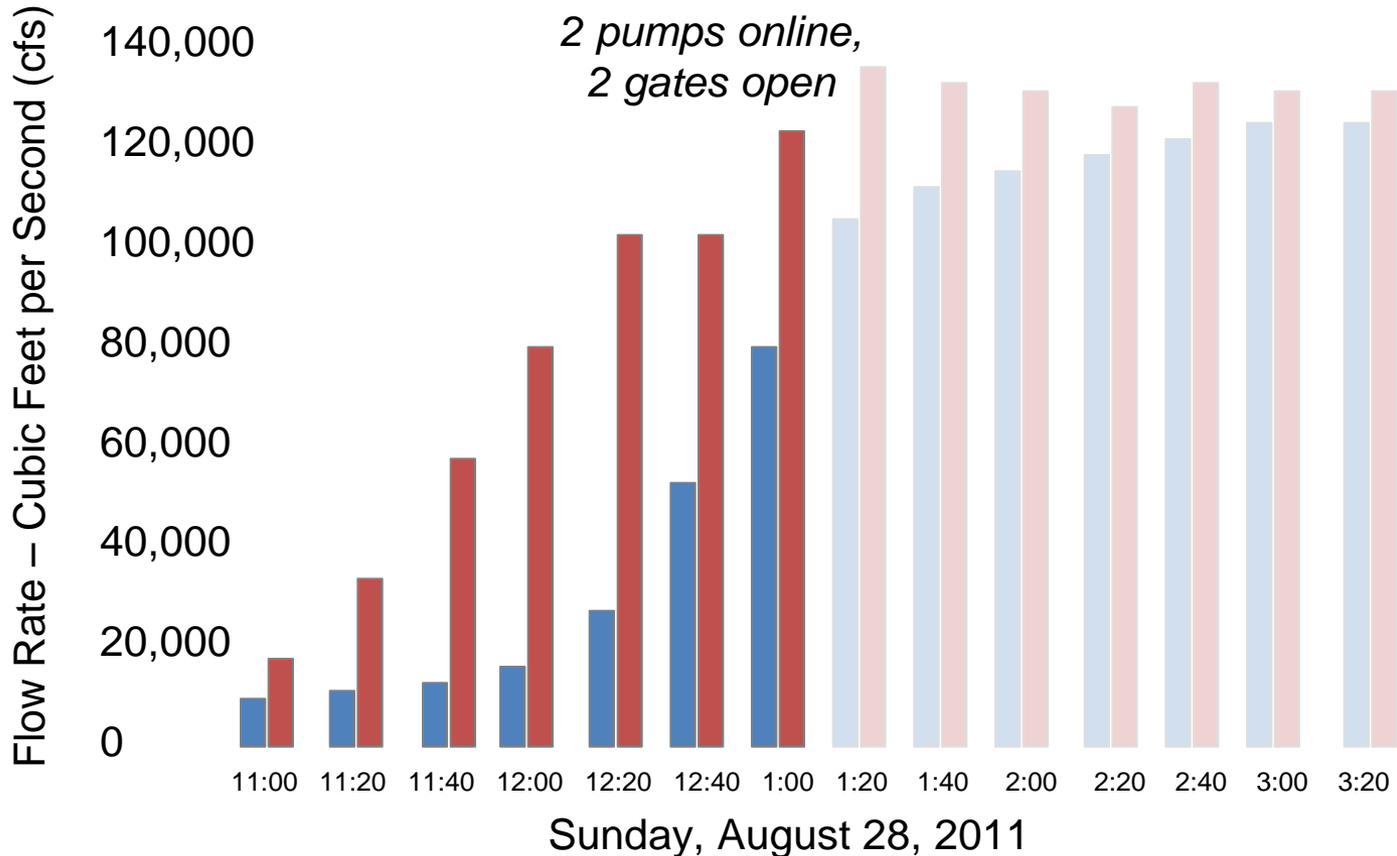
910 ft. overtop

900 ft. full



Tropical Storm Irene Response

Sunday, 1:00 p.m.



Outflows 
Inflows 

NYPA Lower Reservoir

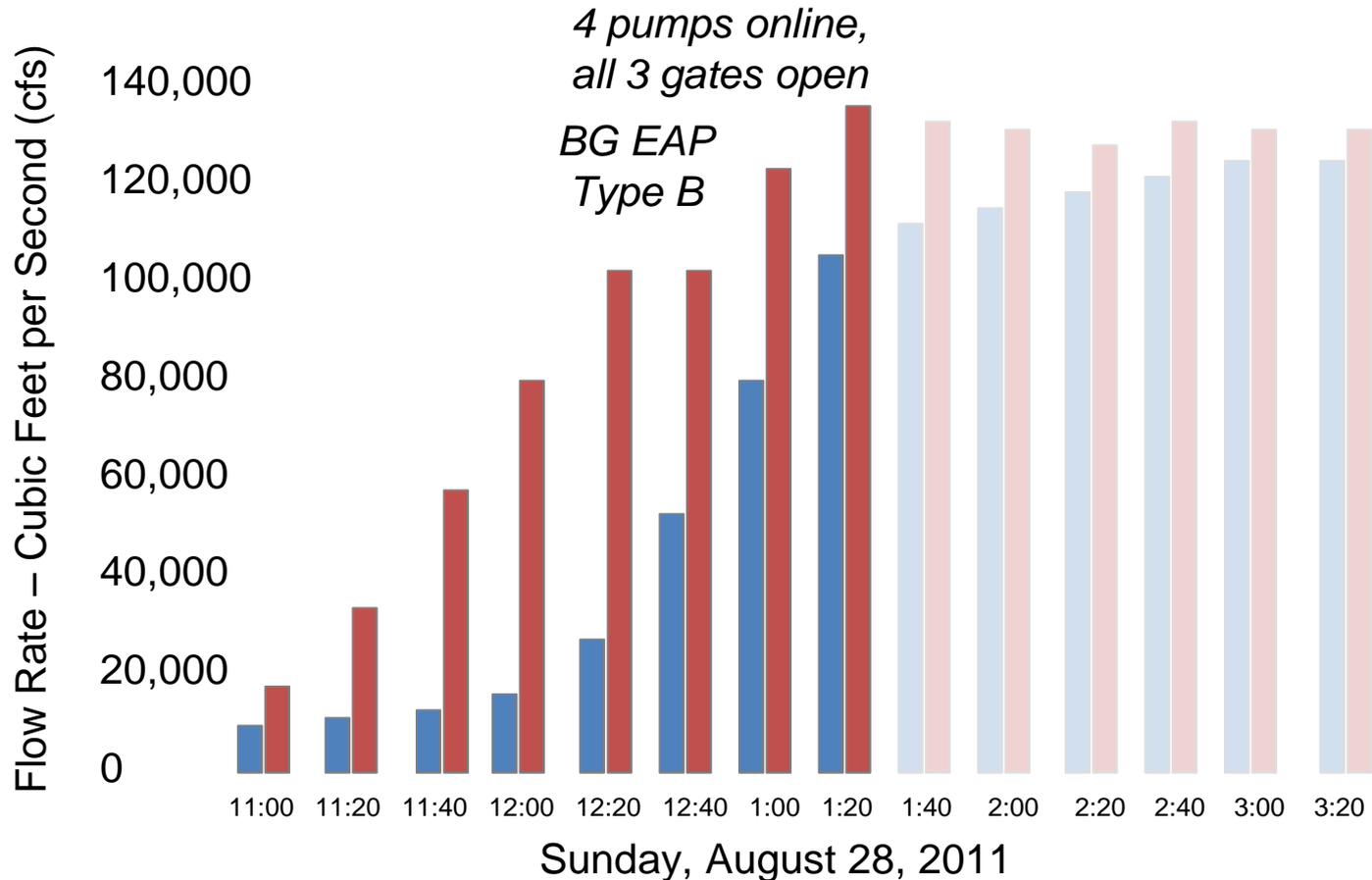
910 ft. overtop

900 ft. full



Tropical Storm Irene Response

Sunday, 1:20 p.m. – Peak Inflow



Outflows 
Inflows 

NYPA Lower Reservoir

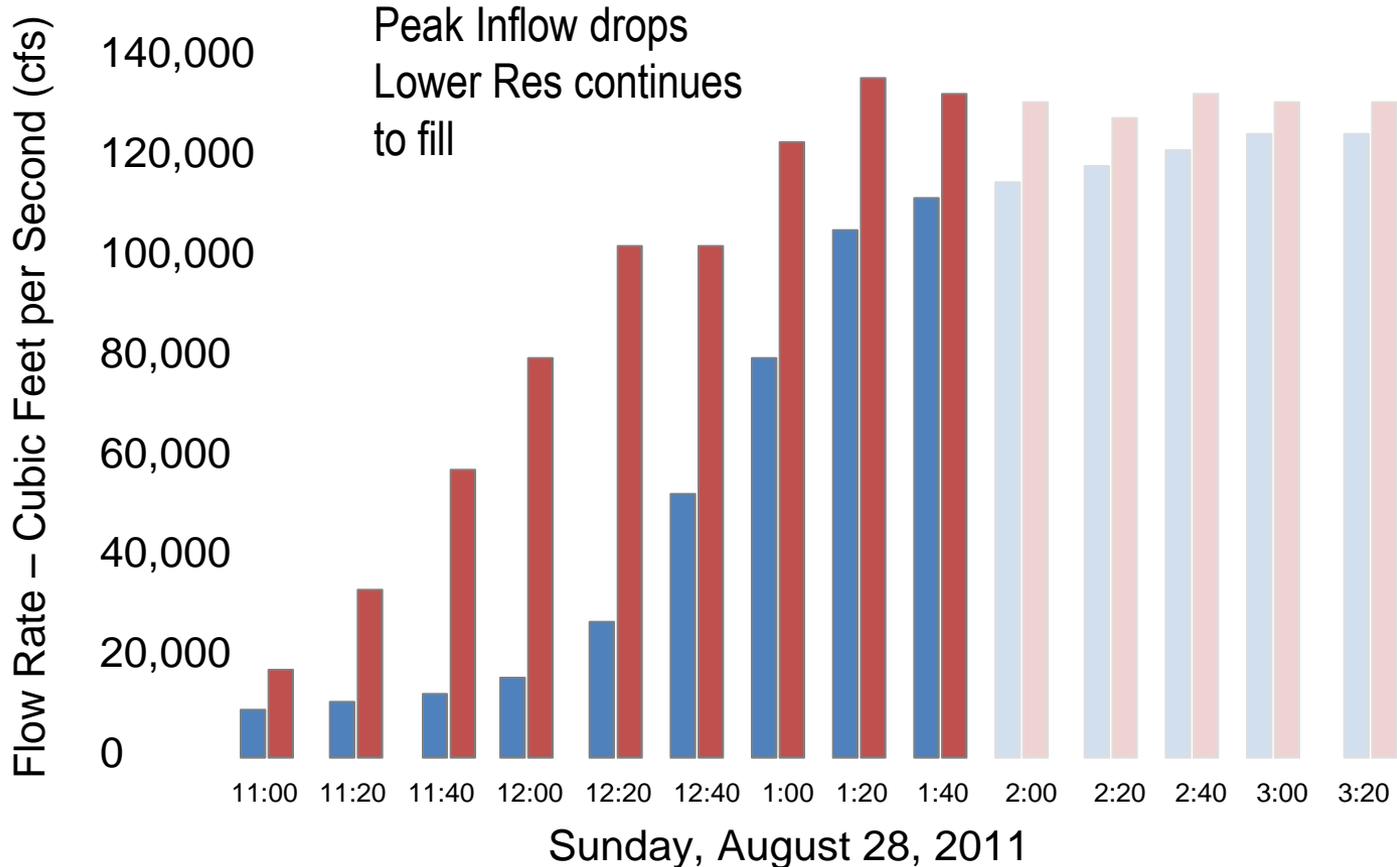
910 ft. overtop

900 ft. full



Tropical Storm Irene Response

Sunday, 1:40 p.m.

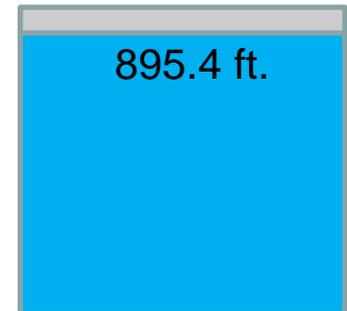


Outflows 
Inflows 

NYPA Lower Reservoir

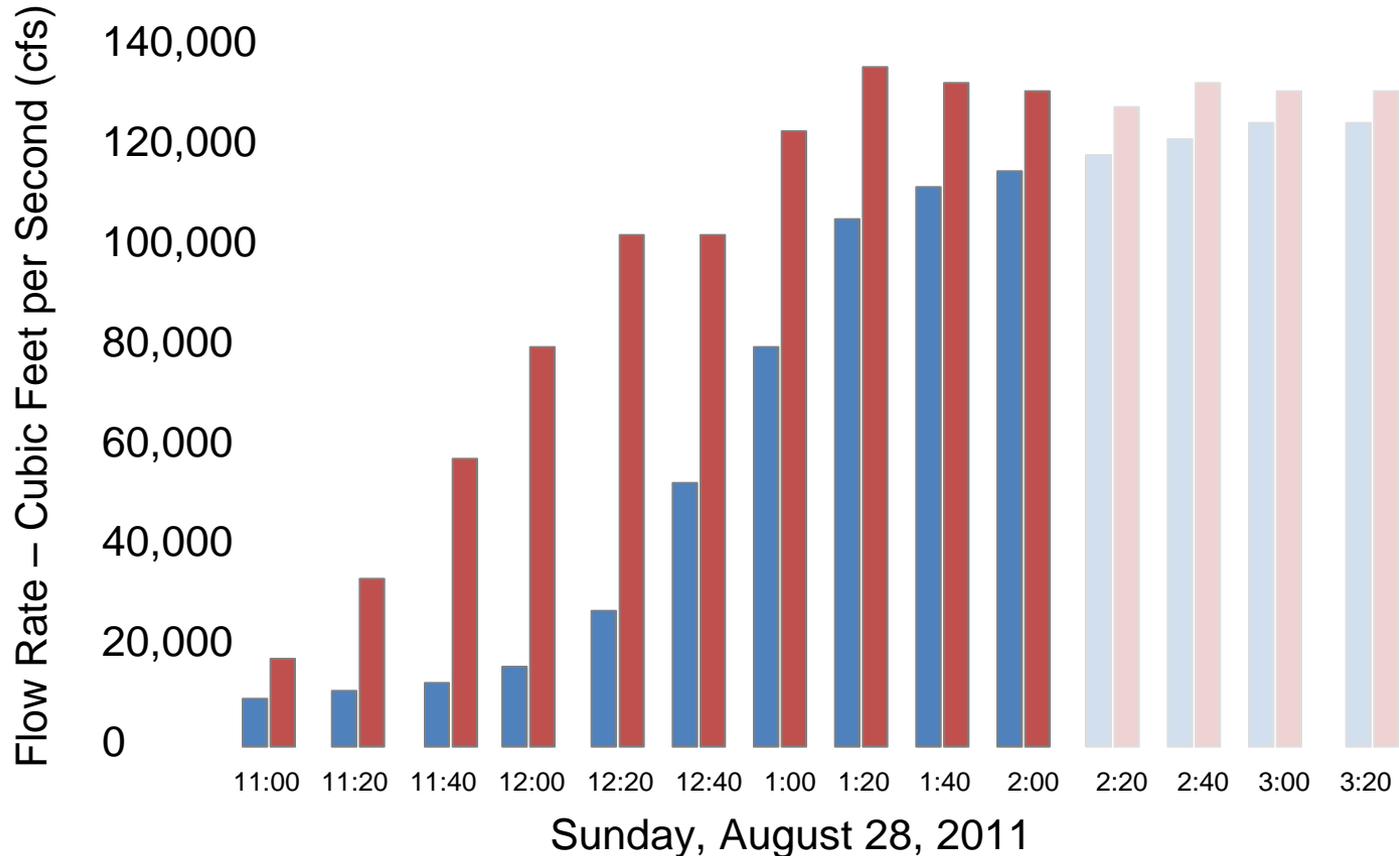
910 ft. overtop

900 ft. full



Tropical Storm Irene Response

Sunday, 2:00 p.m.



NYPA Lower Reservoir

910 ft. overtop

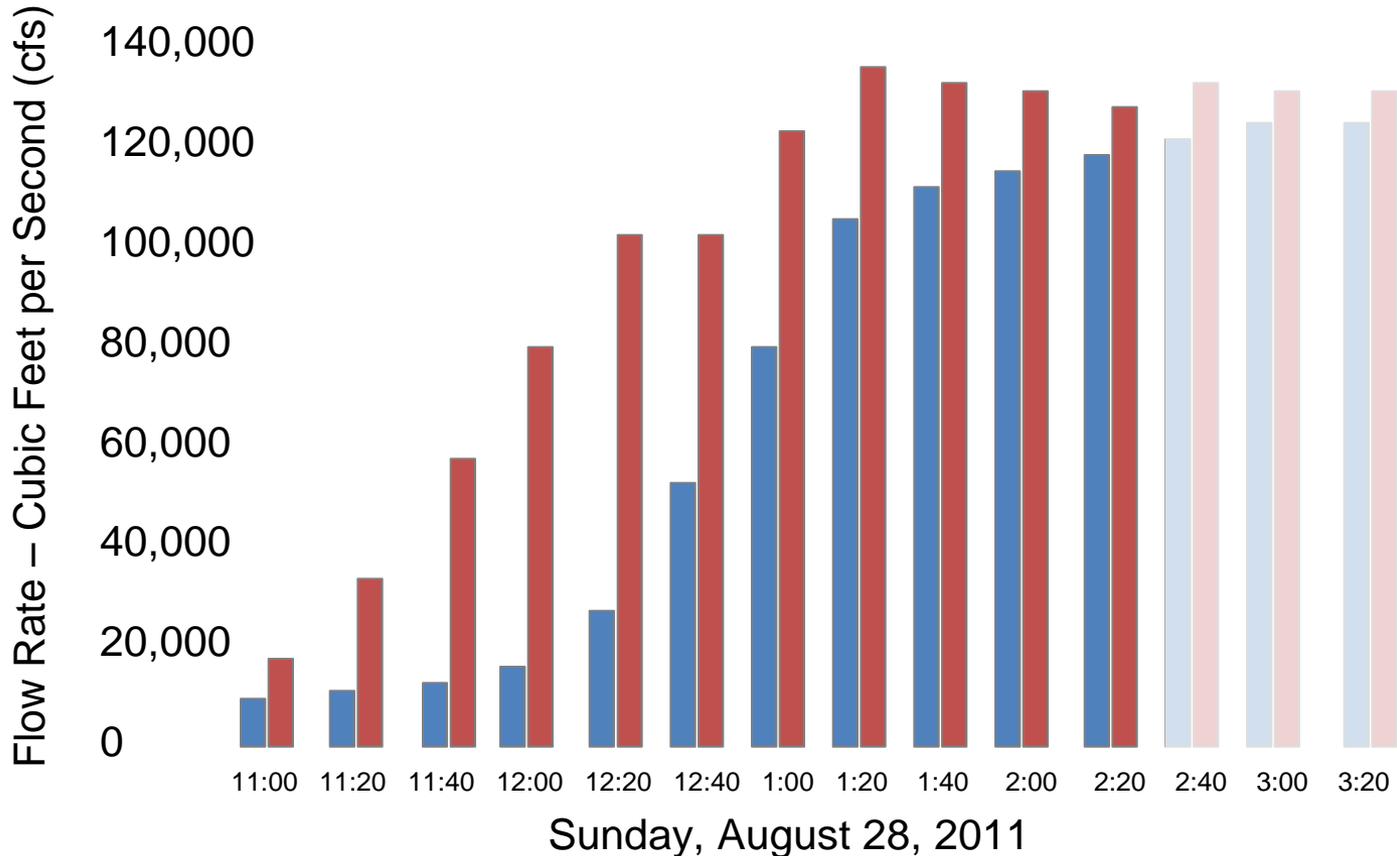
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 2:20 p.m.



NYPA Lower Reservoir

910 ft. overtop

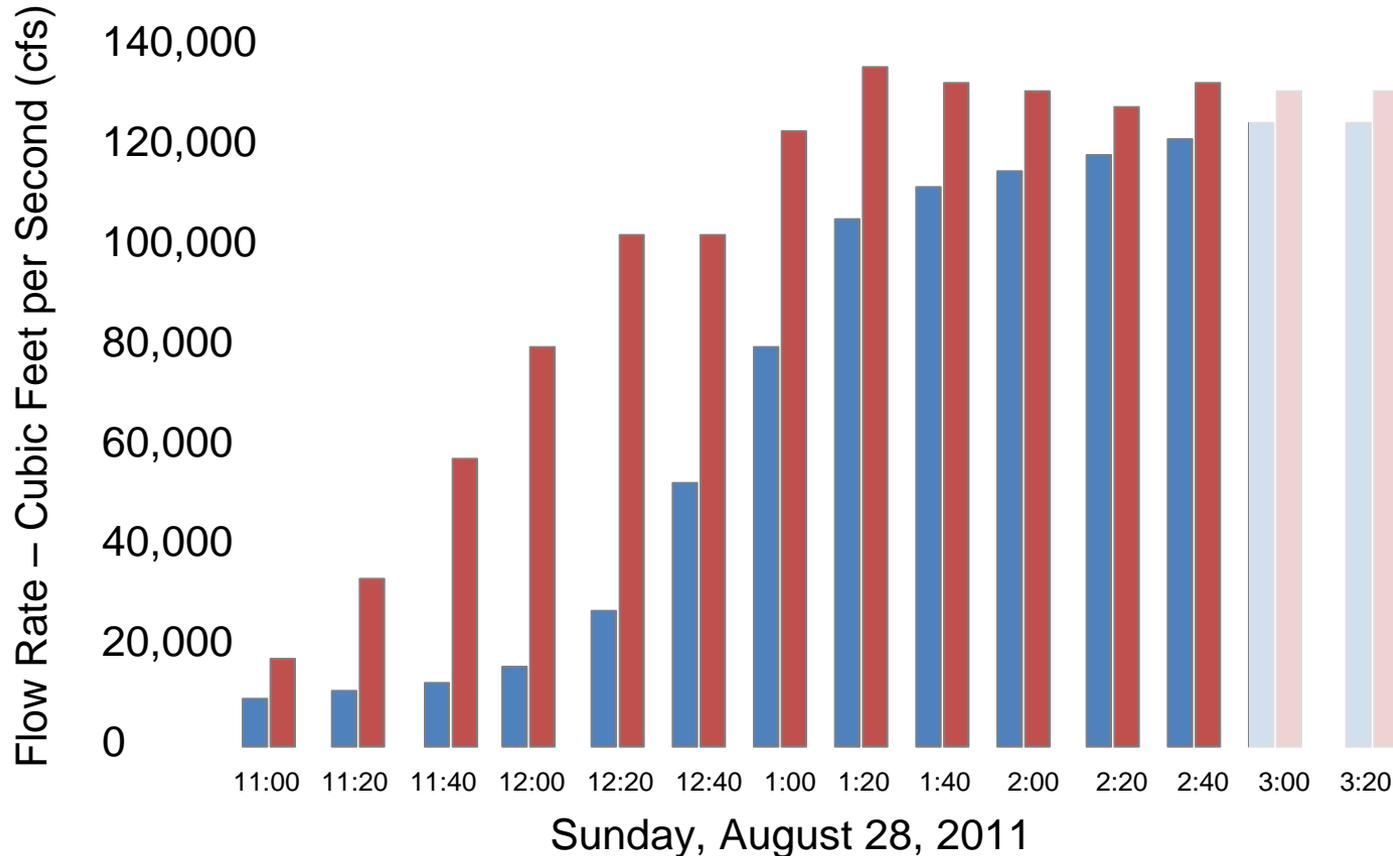
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 2:40 p.m.



NYPA Lower Reservoir

910 ft. overtop

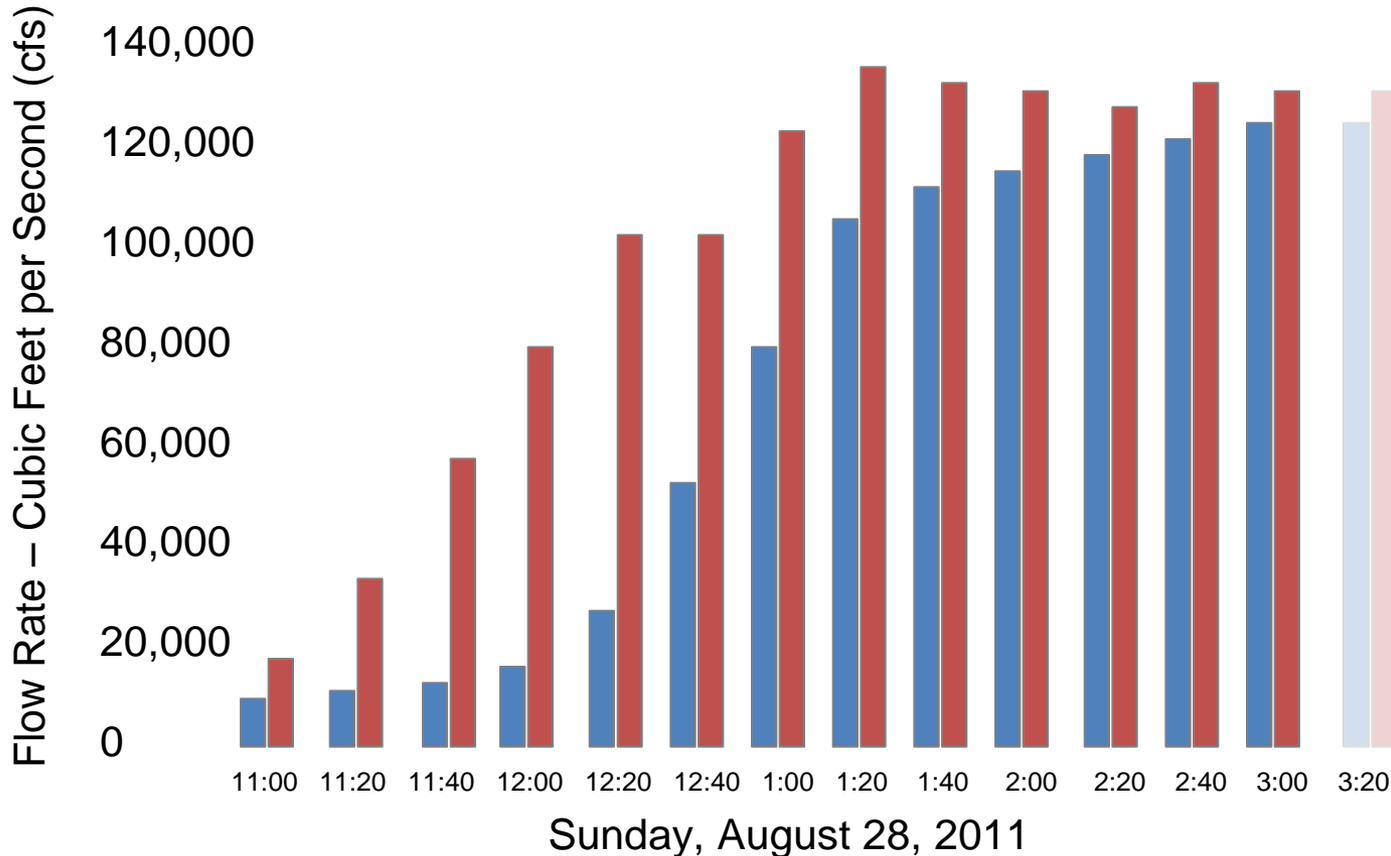
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 3:00 p.m.



NYPA Lower Reservoir

910 ft. overtop

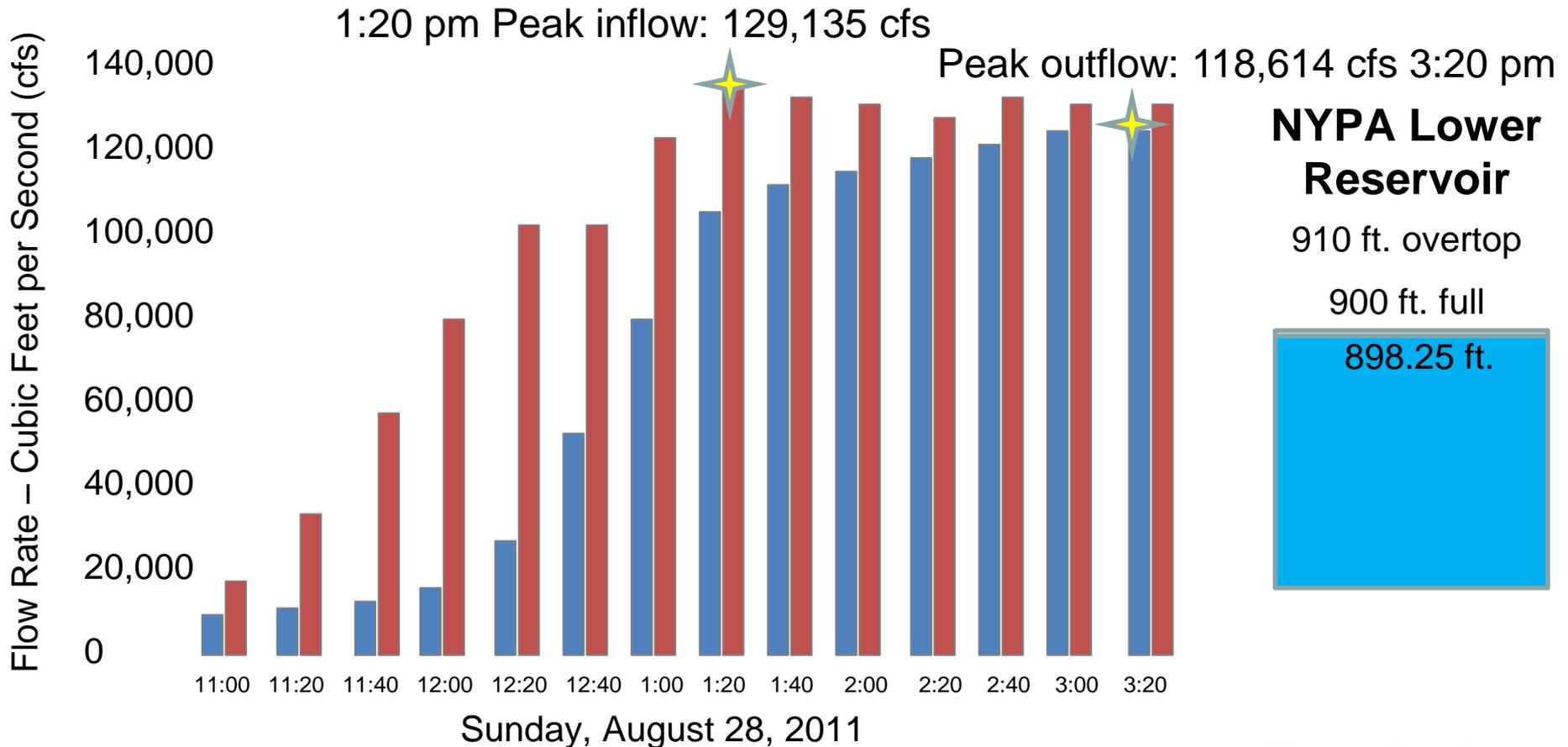
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 3:20 p.m.



NYPA Lower Reservoir

910 ft. overtop

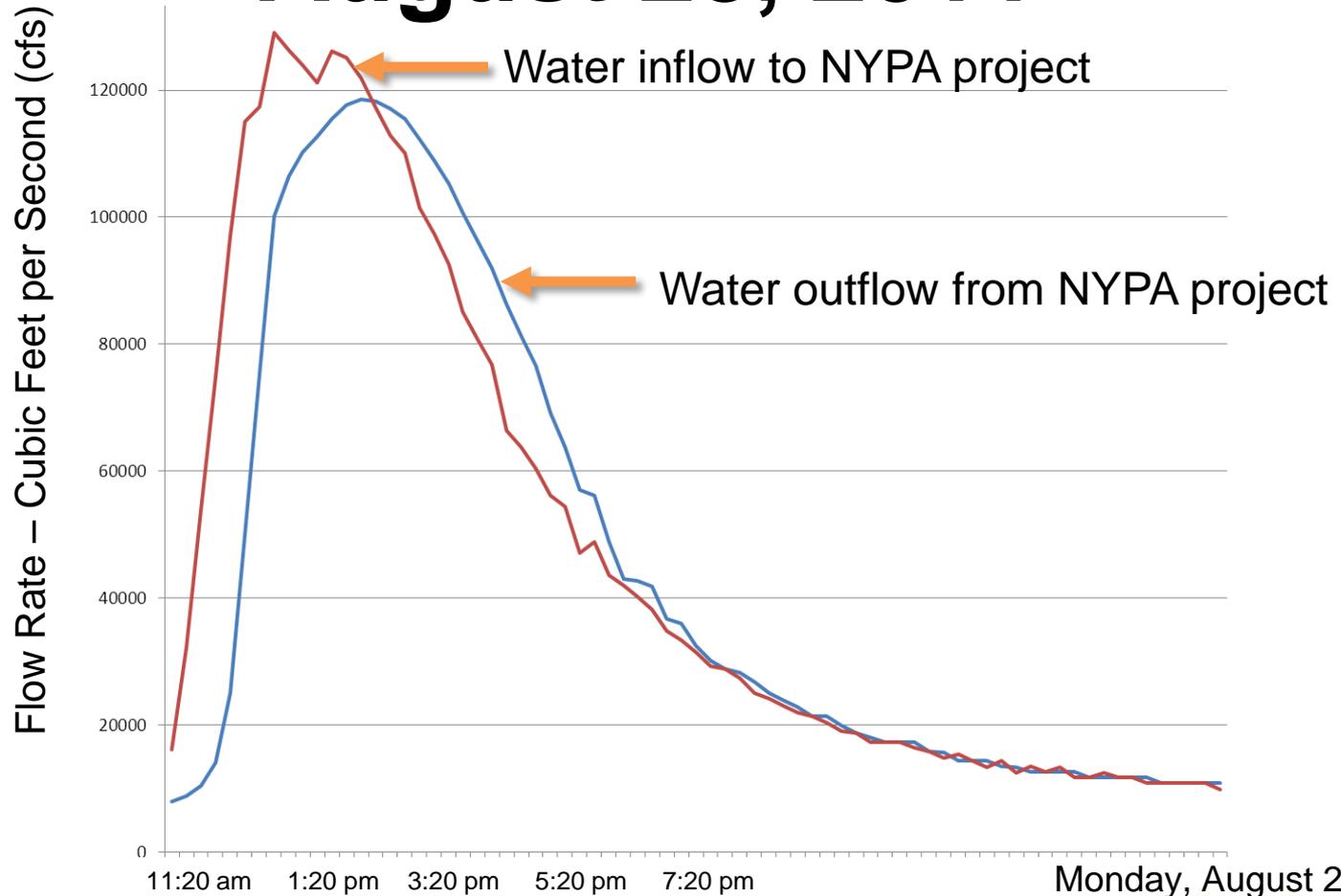
900 ft. full

898.25 ft.

Outflows 
Inflows 

Water Flow Peak Shaved

August 28, 2011



Outflows 
Inflows 

Sunday, August 28, 2011

Storm Comparisons

Previous Flood of Record (1996)

- Heavy rain at 60°F, melted over 4 ft. snow pack
- January 1996
- Peak inflow: 82,899 cfs
- Peak outflow: 74,677 cfs

Tropical Storm Irene New Flood of Record (2011)

- Heavy rain at 1-inch per hr for 12 hours. 16-18-inches localized
- August 2011
- Peak inflow: 129,135 cfs
- Peak outflow: 118,614 cfs

After the Storm

- Gomez & Sullivan inspection
- Army Corp of Engineers inspection
- Bathymetric survey in December 2011
 - Conducted within normal operating parameter
- Provided community assistance
 - Assistance to NYS DOT Route 30 Bridge repair
 - Assistance to neighboring communities
- Evaluating communications infrastructure

QUESTIONS?