

Blenheim-Gilboa Pumped Storage Power Project Operations

Features, Functions, Storm Response

January 19, 2012

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Regional Manager, Central NY

Overview

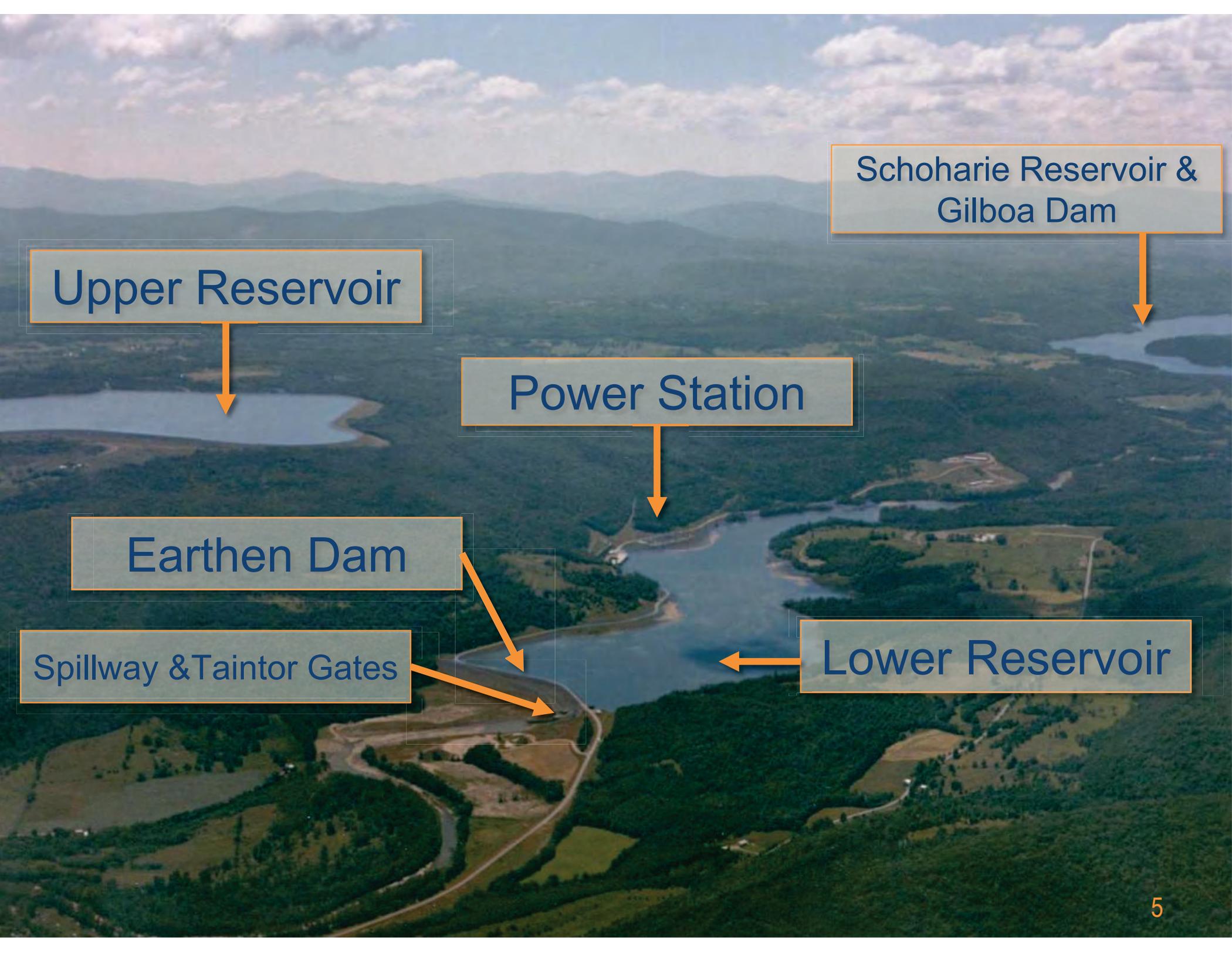
- Welcome
- Presentation Purpose
- Blenheim-Gilboa Power Project Description
- Water Flows and Flood Forecasting
- Tropical Storm Irene Timeline & NYPA response
- Questions from the Audience

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

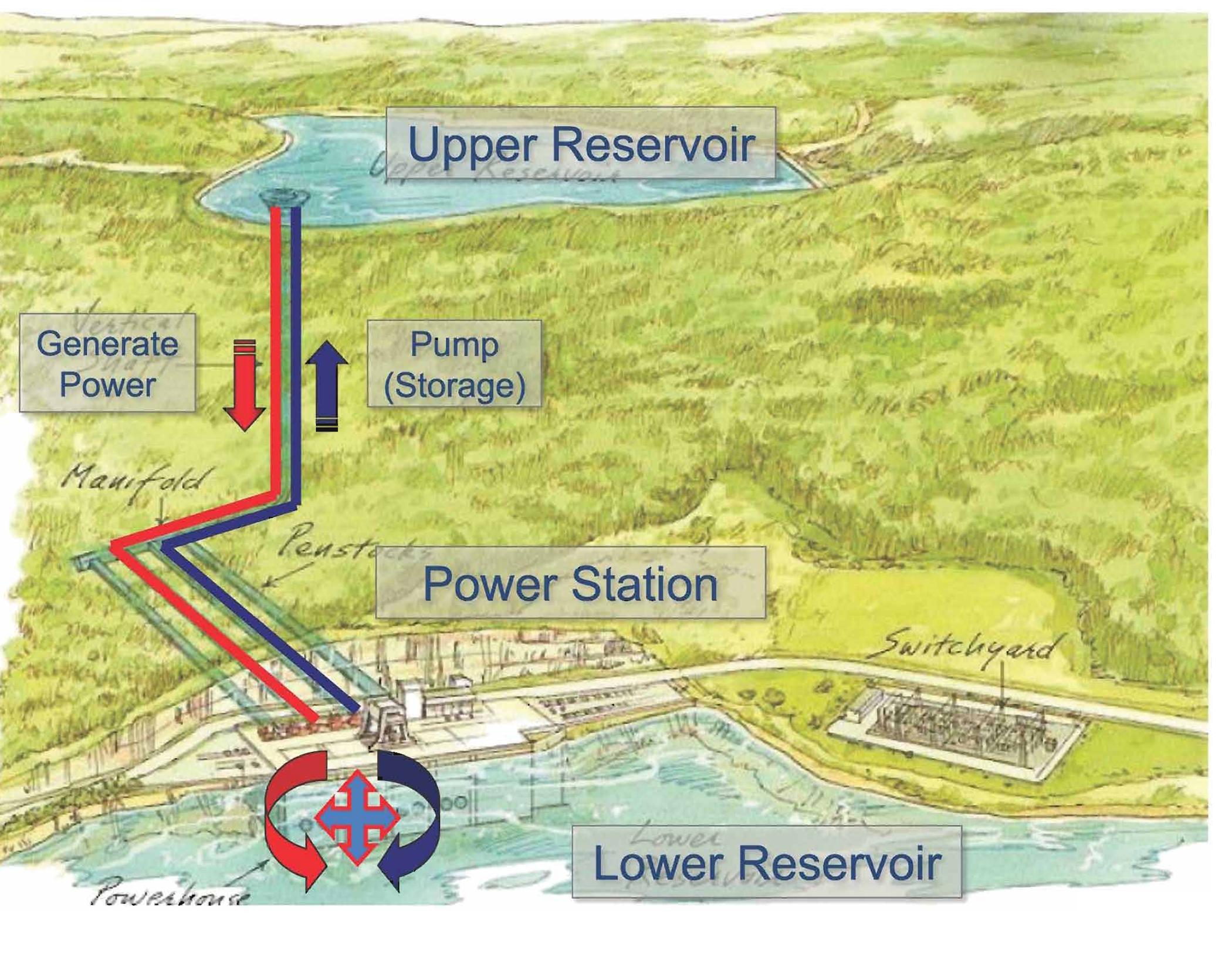
Upper Reservoir

Power Station

Earthen Dam

Spillway & Taintor Gates

Lower Reservoir



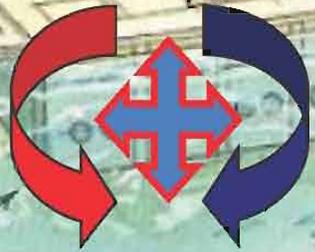
Upper Reservoir

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)



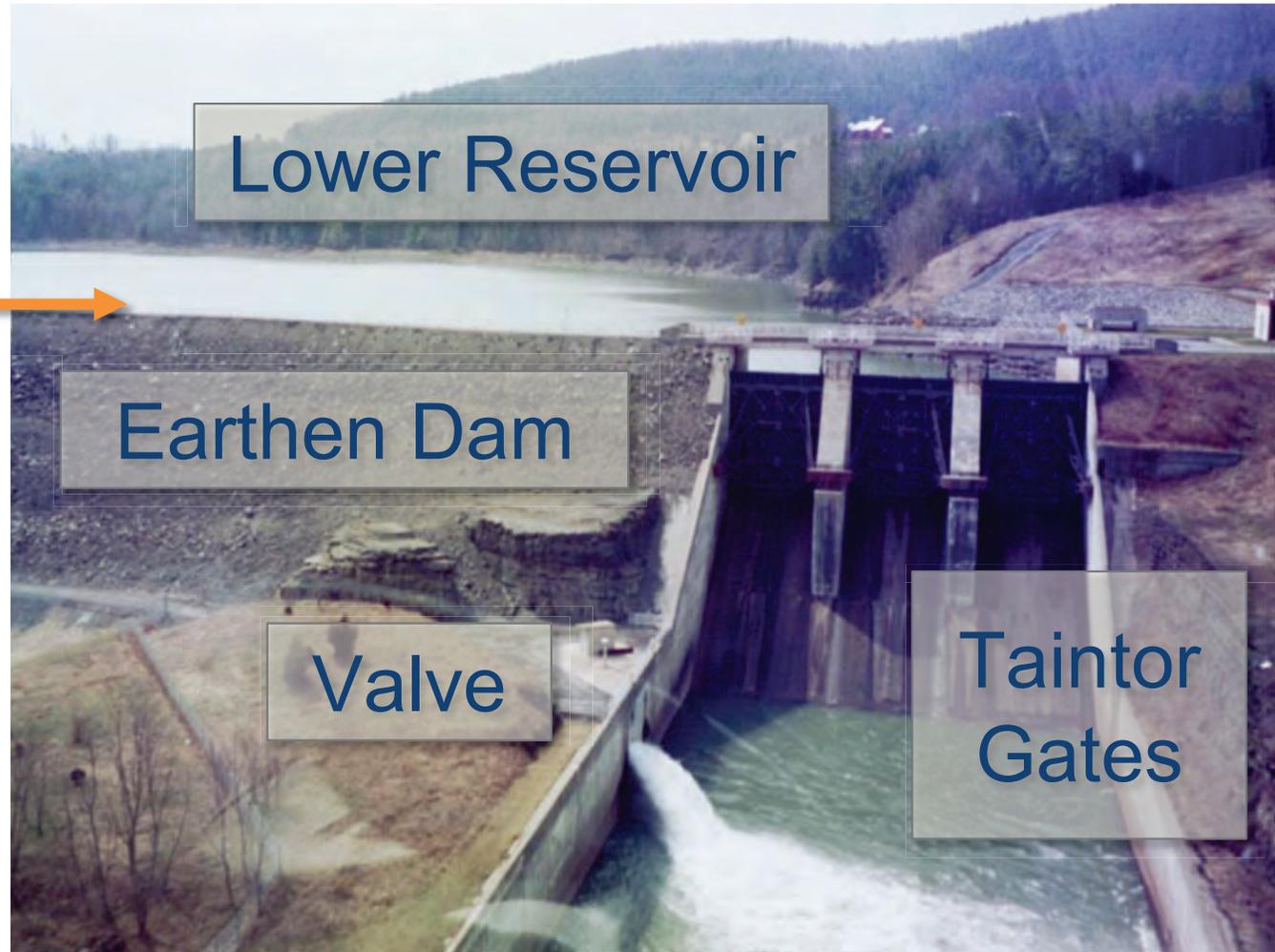
Earthen Dam Design

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

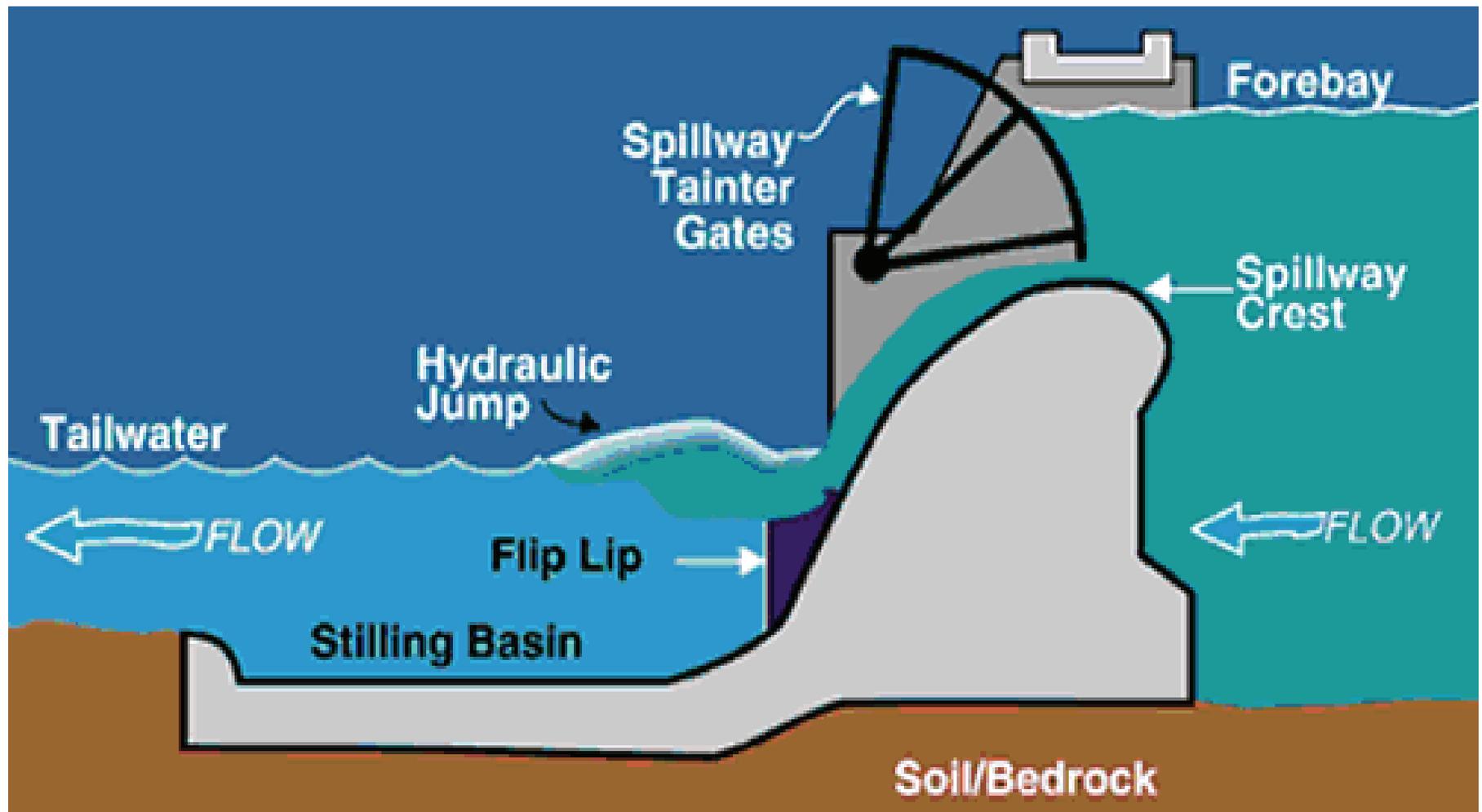
910 ft.
over top



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

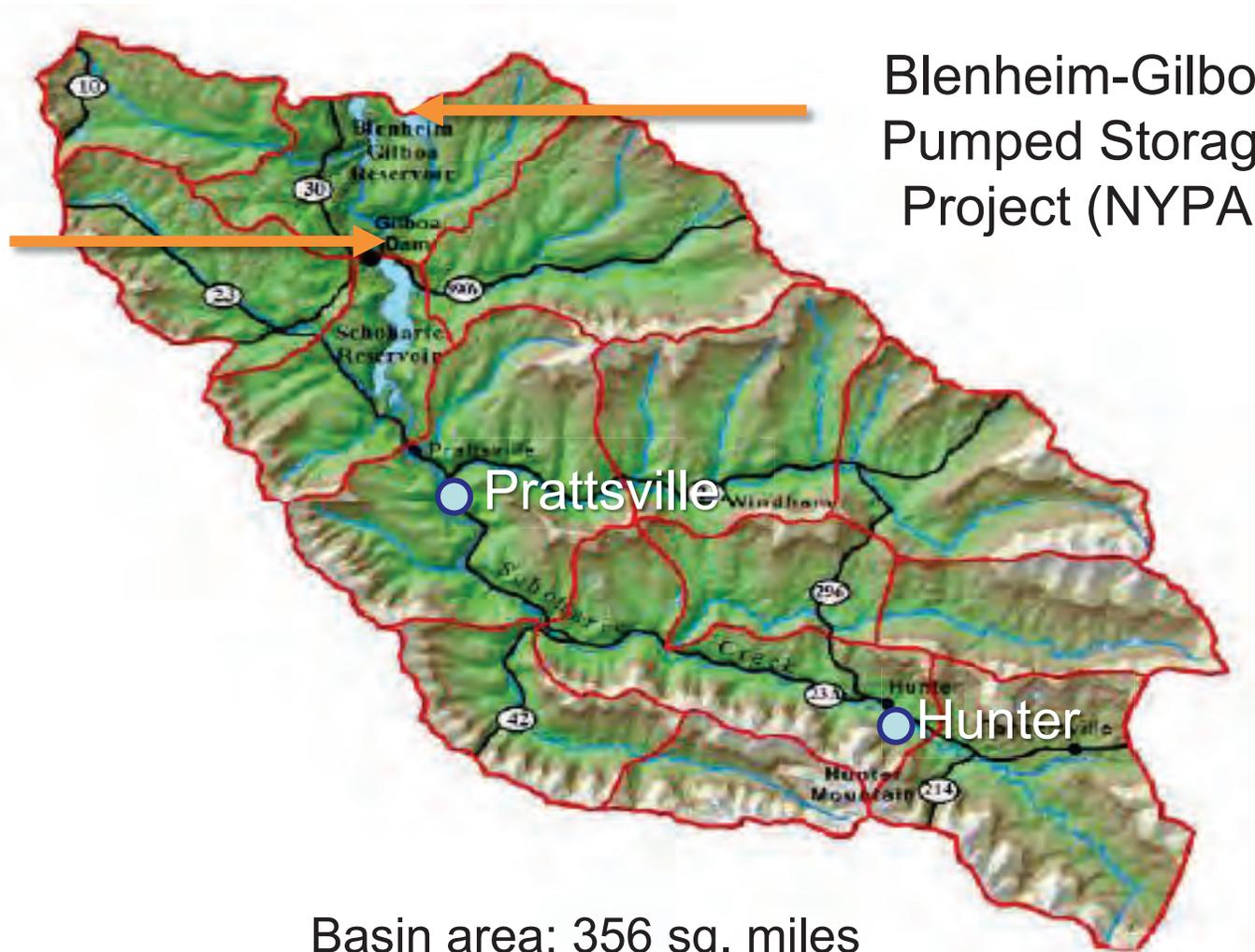


Blenheim Gilboa Drainage Basin

North



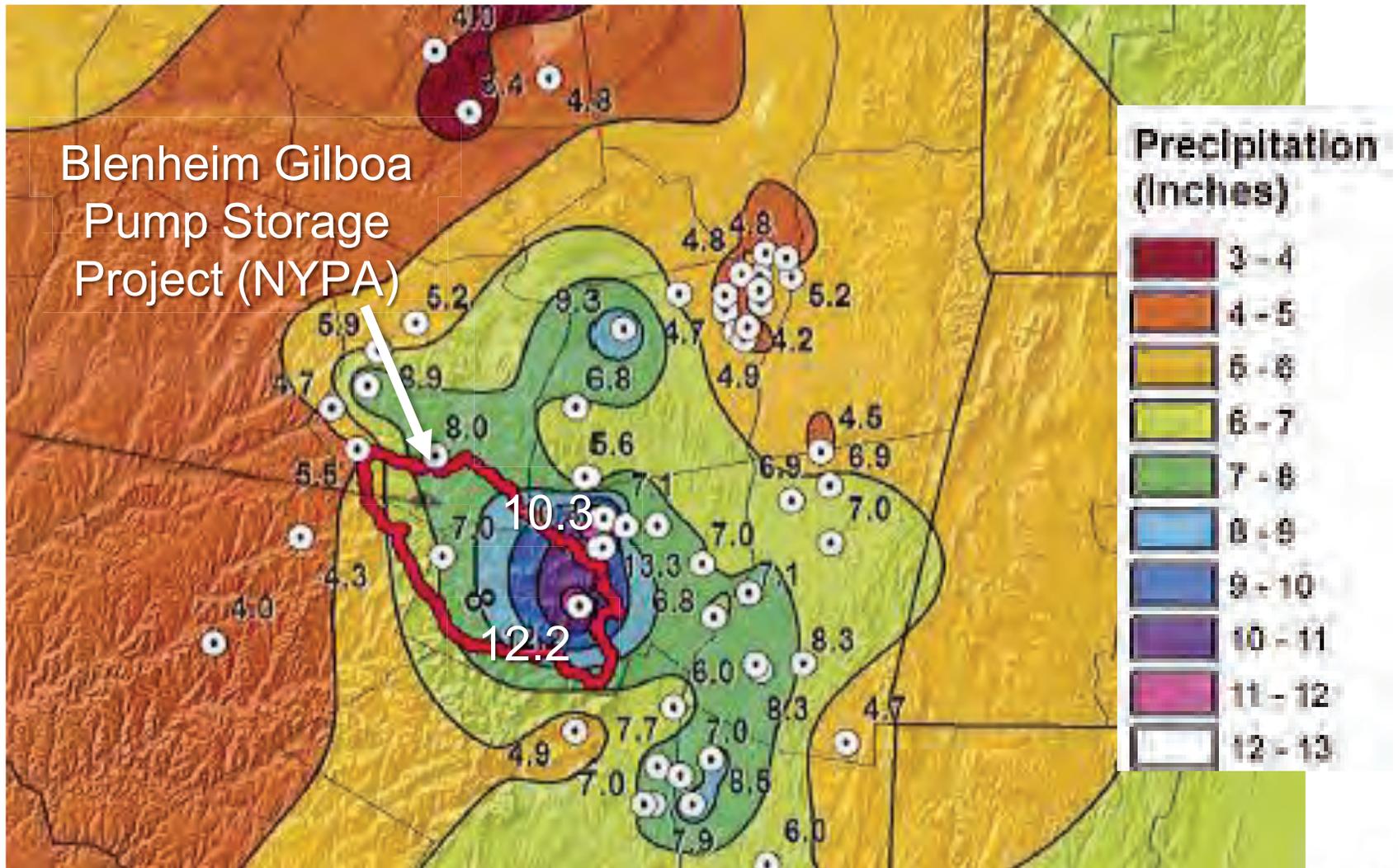
Gilboa Dam
(NYC DEP)



Blenheim-Gilboa
Pumped Storage
Project (NYPA)

Basin area: 356 sq. miles

Rainfall Totals: August 27-30, 2011



Operations During the Storm

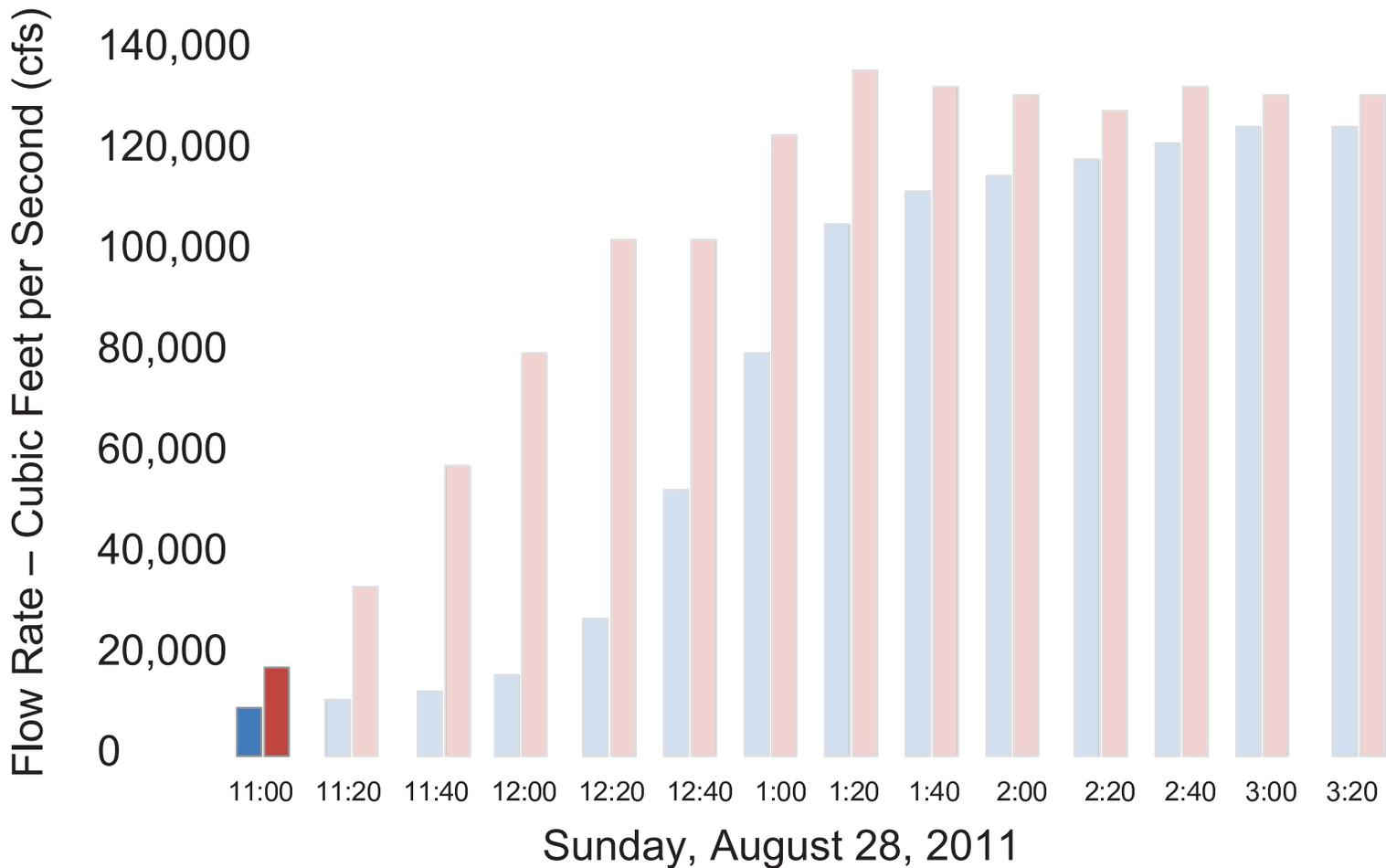
- Follow Emergency Action Plan (EAP) per training and procedures
- Tropical Storm Irene = 500 year flood event
- Manage record water inflows:
 - Focus on preventing over top of the earthen dam
 - Reduce outflow as much as possible within operating limits
- Manage operational challenges, requiring redundant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

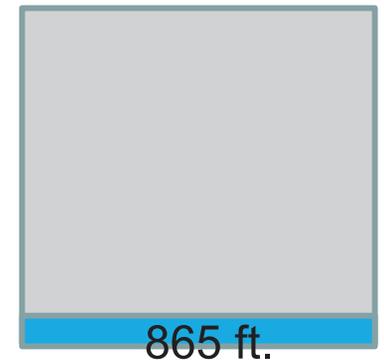
Sunday, 11:00 a.m.



NYPA Lower Reservoir

910 ft. overtop

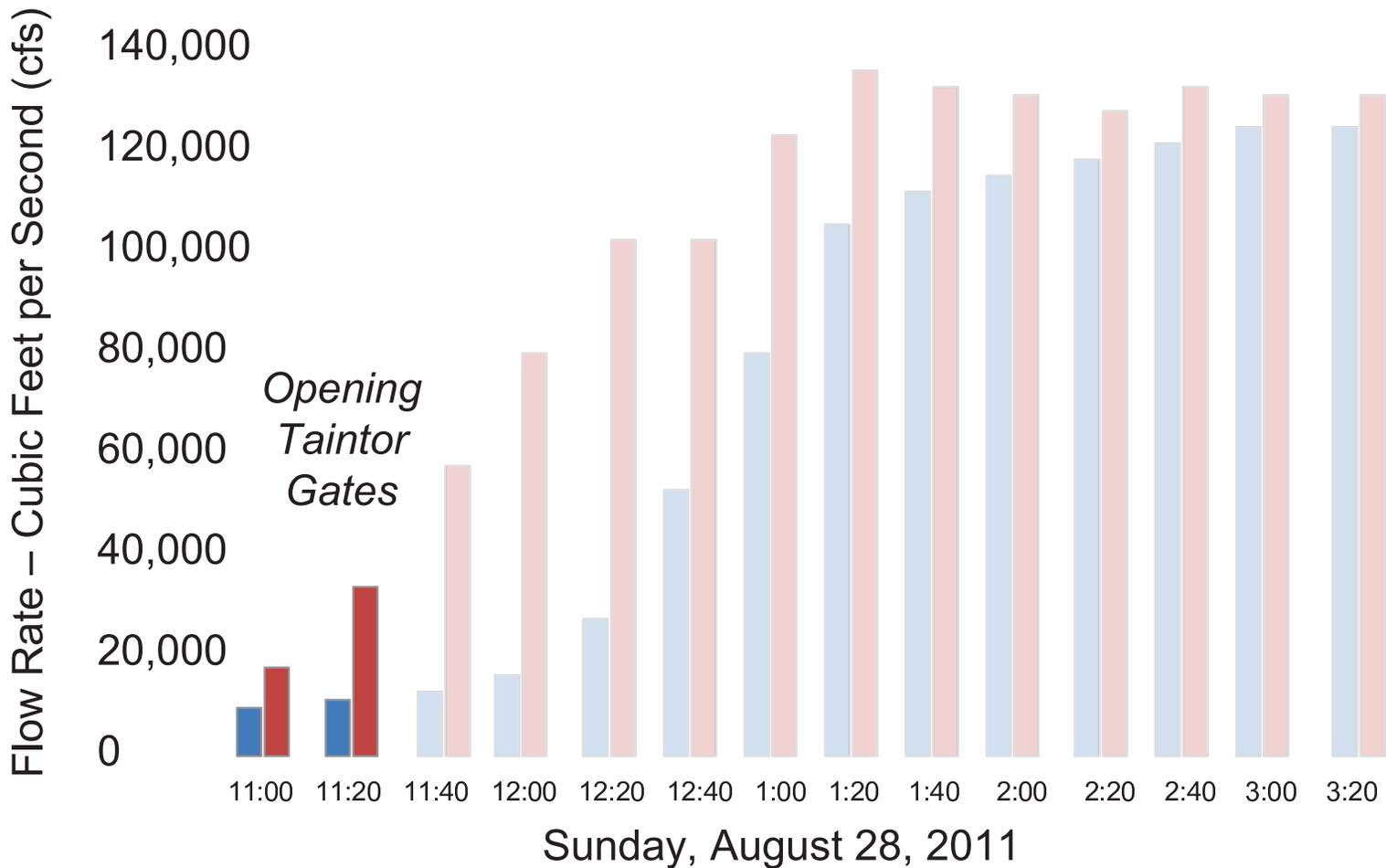
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 11:20 a.m.



NYPA Lower Reservoir

910 ft. overtop

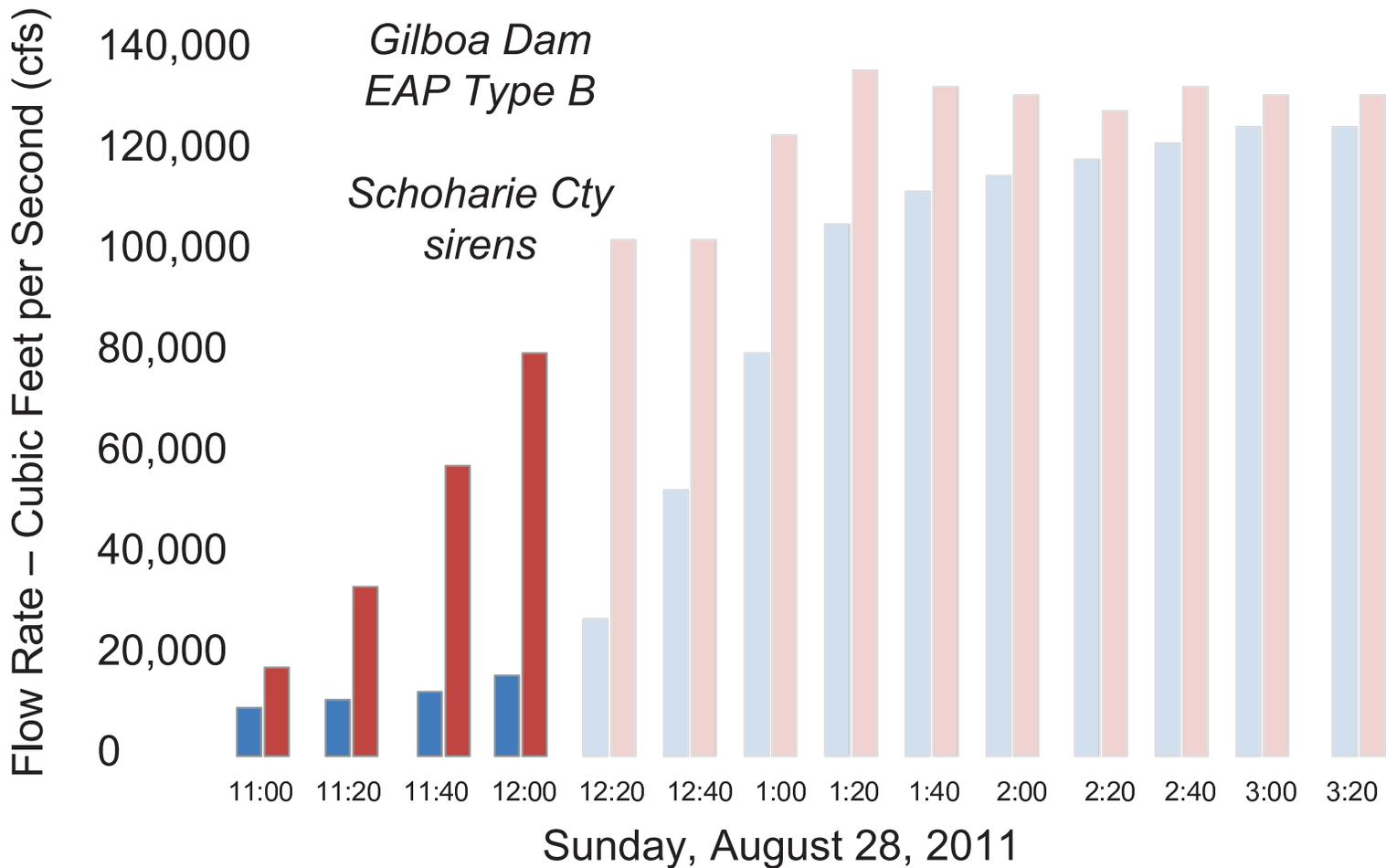
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 12:00 p.m.



NYPA Lower Reservoir

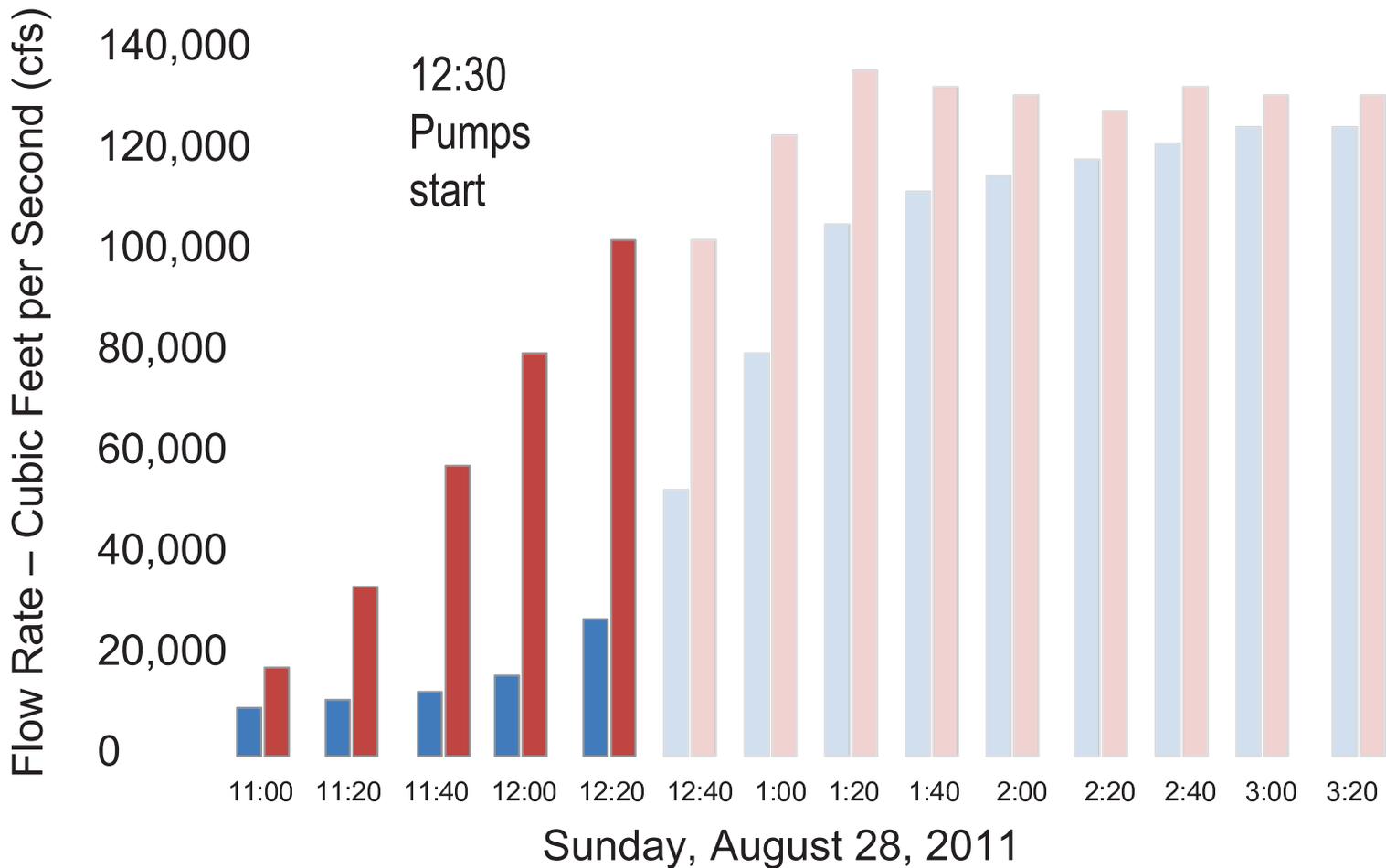
910 ft. overtop
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 12:20 p.m.



NYPA Lower Reservoir

910 ft. overtop

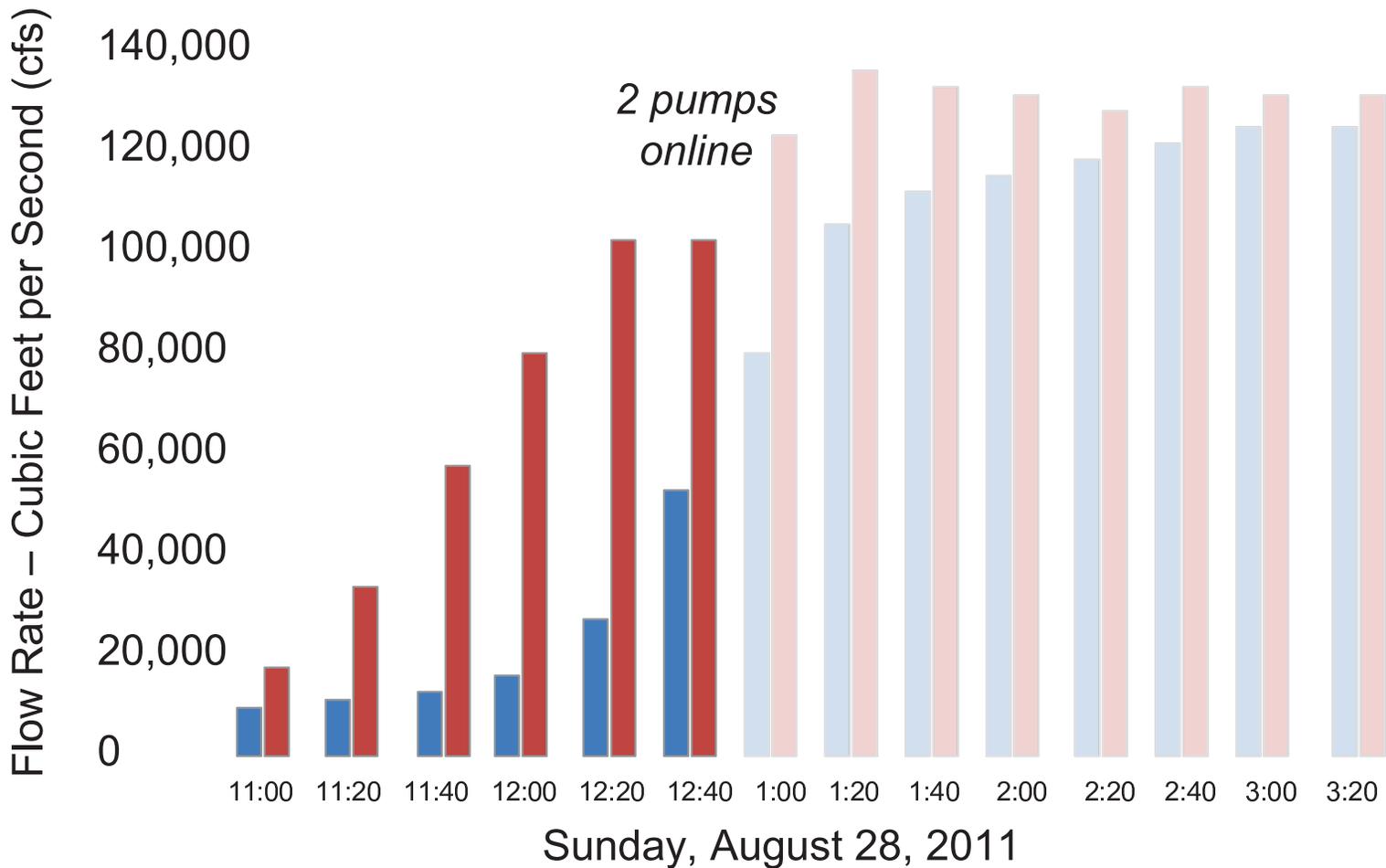
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 12:40 p.m.



NYPA Lower Reservoir

910 ft. overtop

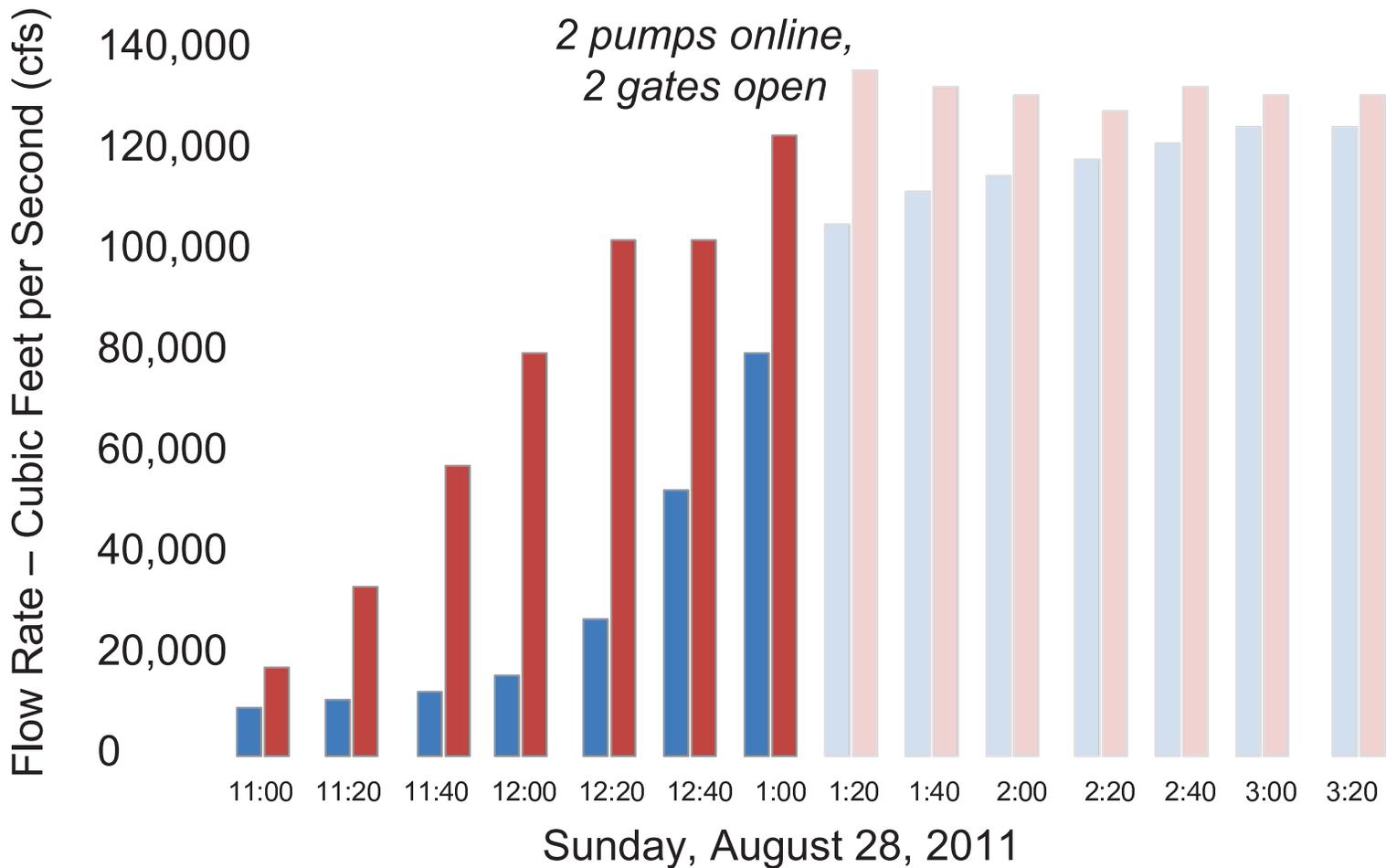
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 1:00 p.m.



NYPA Lower Reservoir

910 ft. overtop

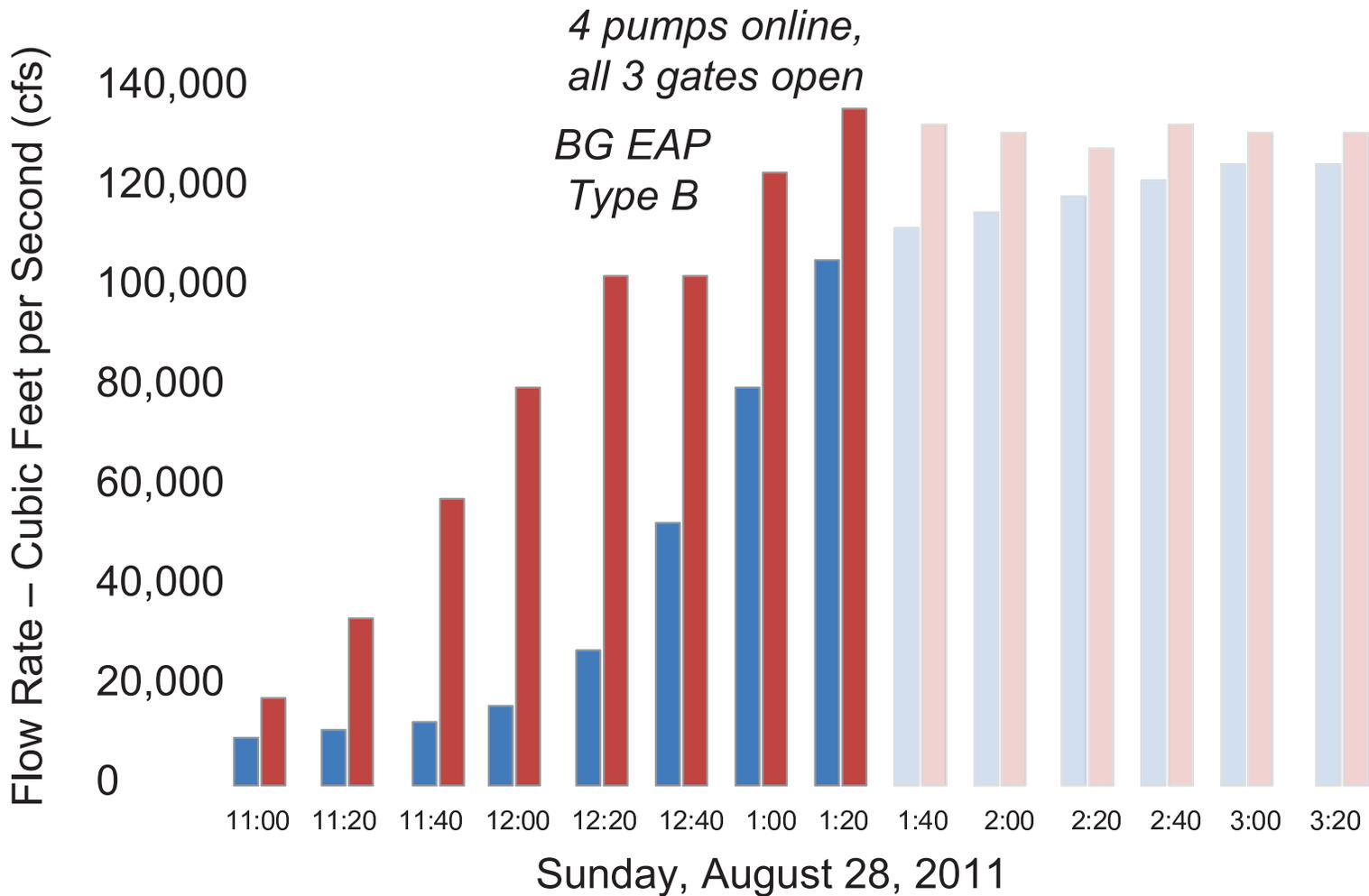
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 1:20 p.m. – Peak Inflow



NYPA Lower Reservoir

910 ft. overtop

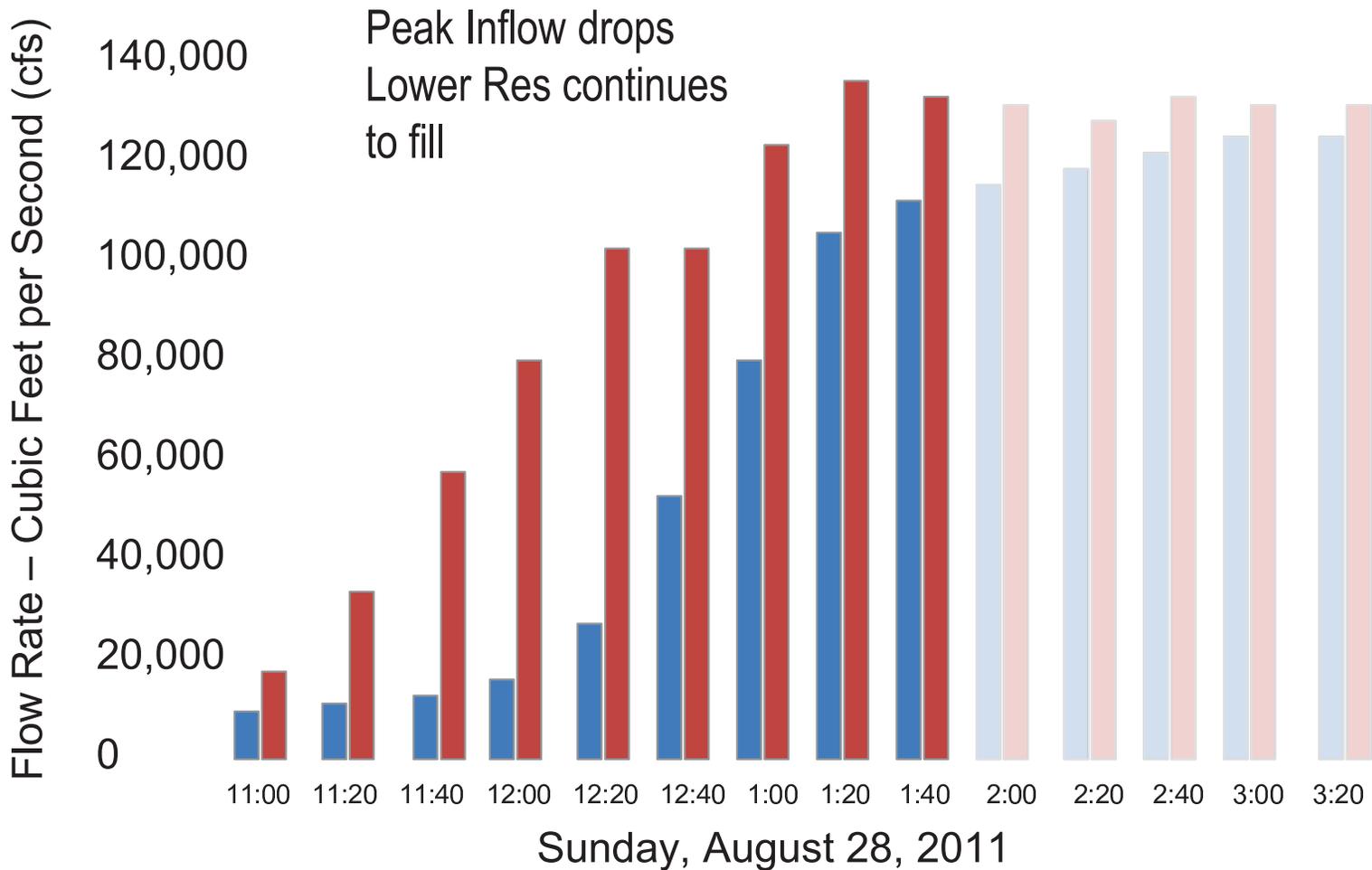
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 1:40 p.m.



Outflows 
Inflows 

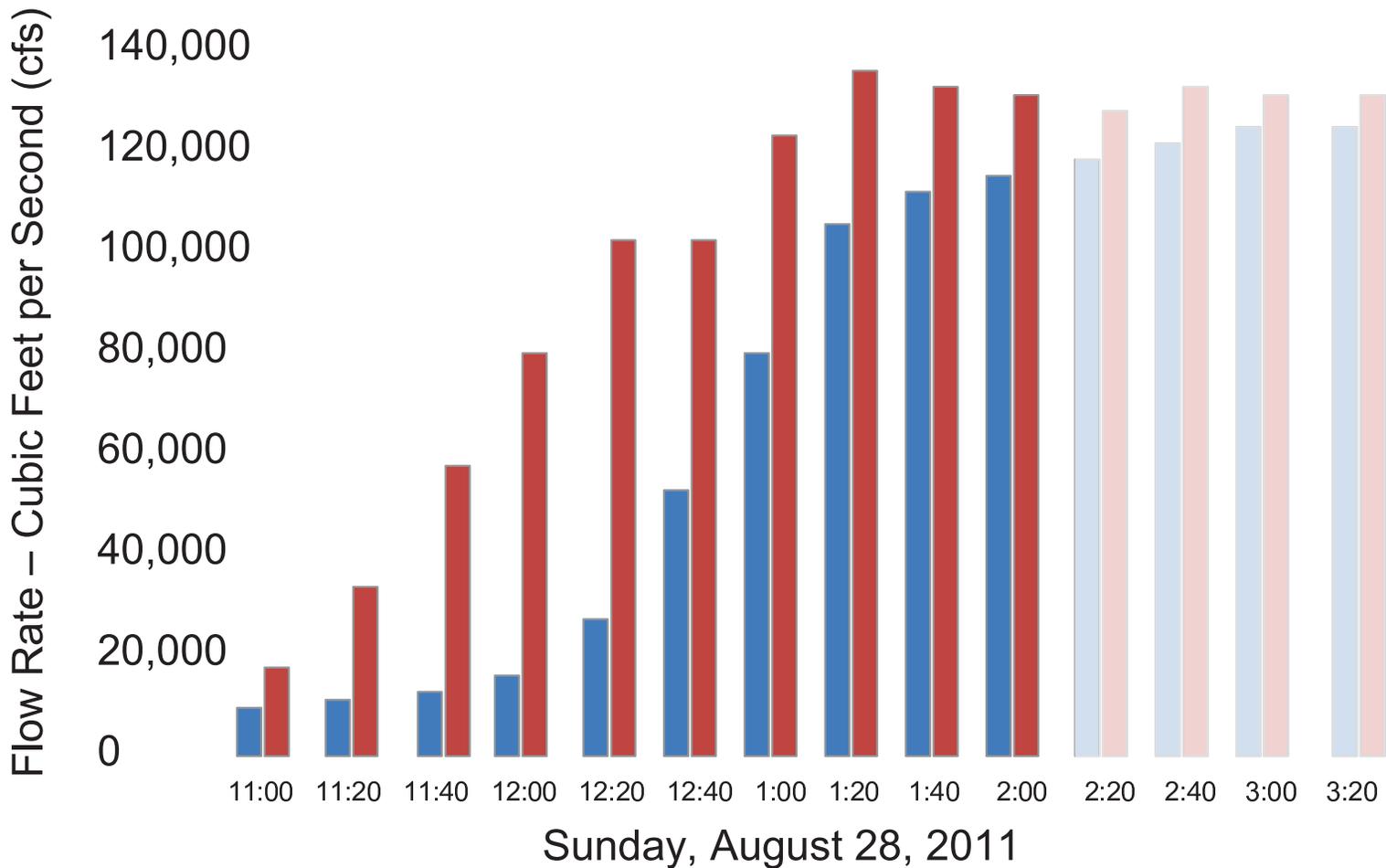
NYPA Lower Reservoir

910 ft. overtop
900 ft. full



Tropical Storm Irene Response

Sunday, 2:00 p.m.



NYPA Lower Reservoir

910 ft. overtop

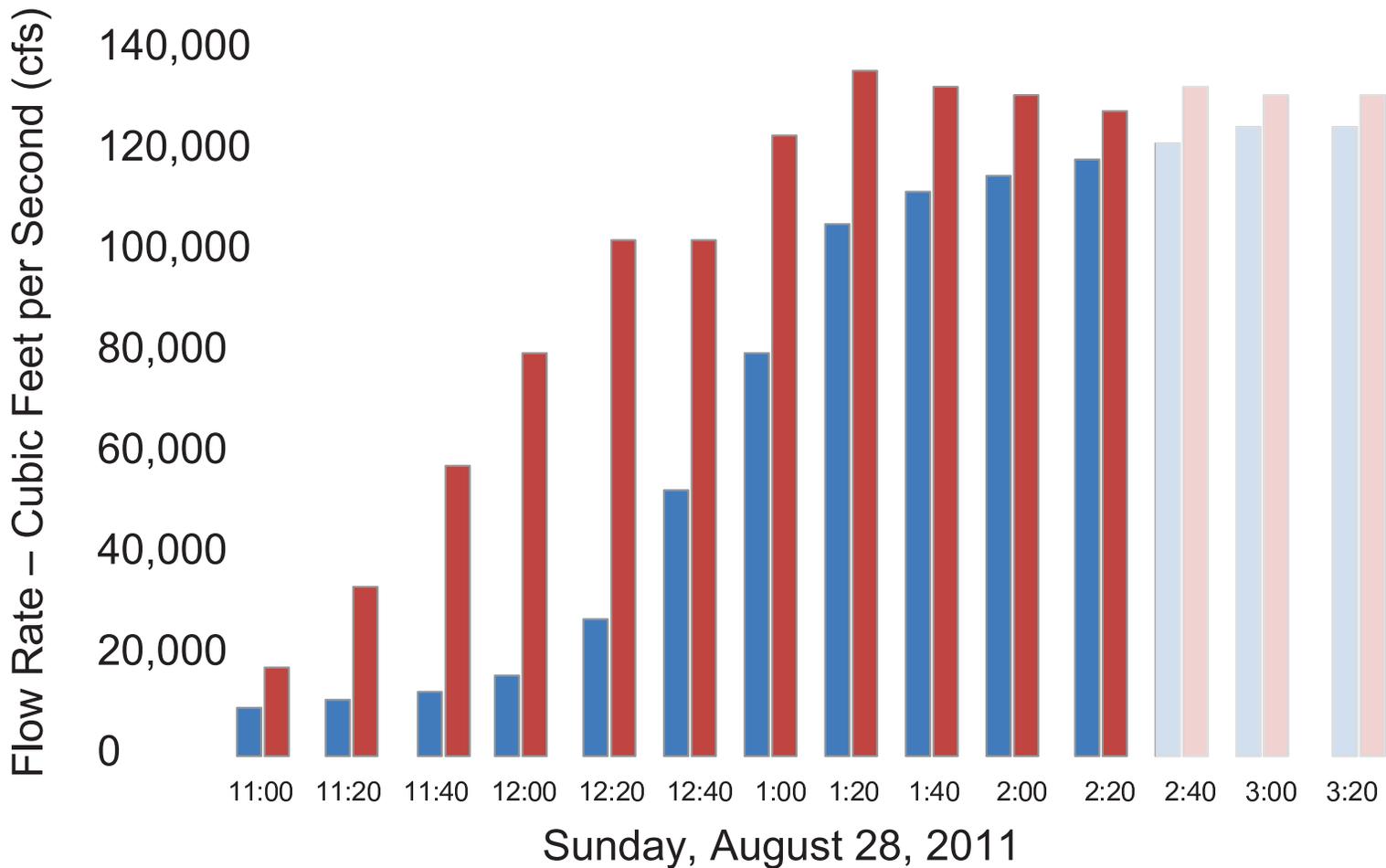
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 2:20 p.m.



NYPA Lower Reservoir

910 ft. overtop

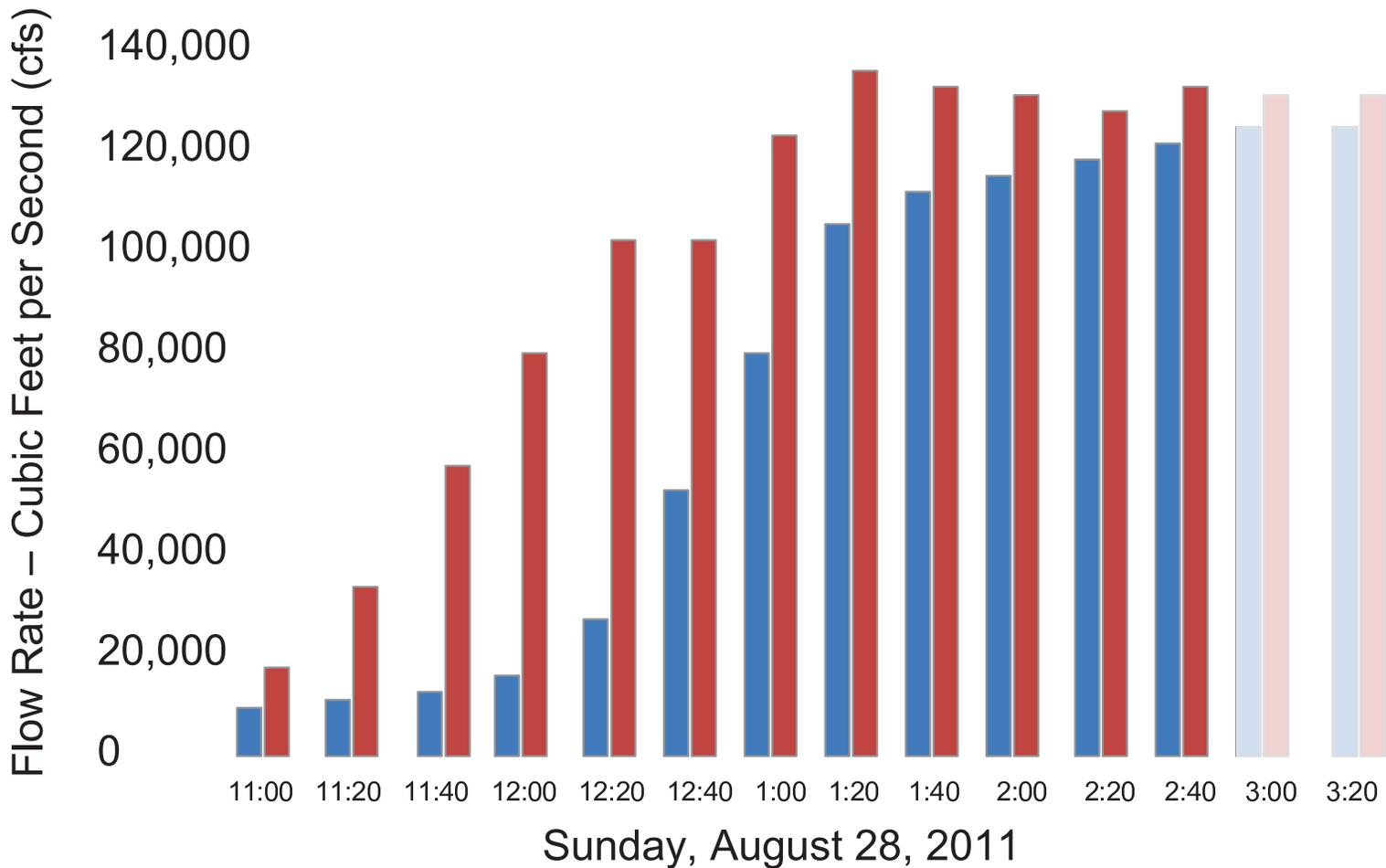
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 2:40 p.m.



NYPA Lower Reservoir

910 ft. overtop

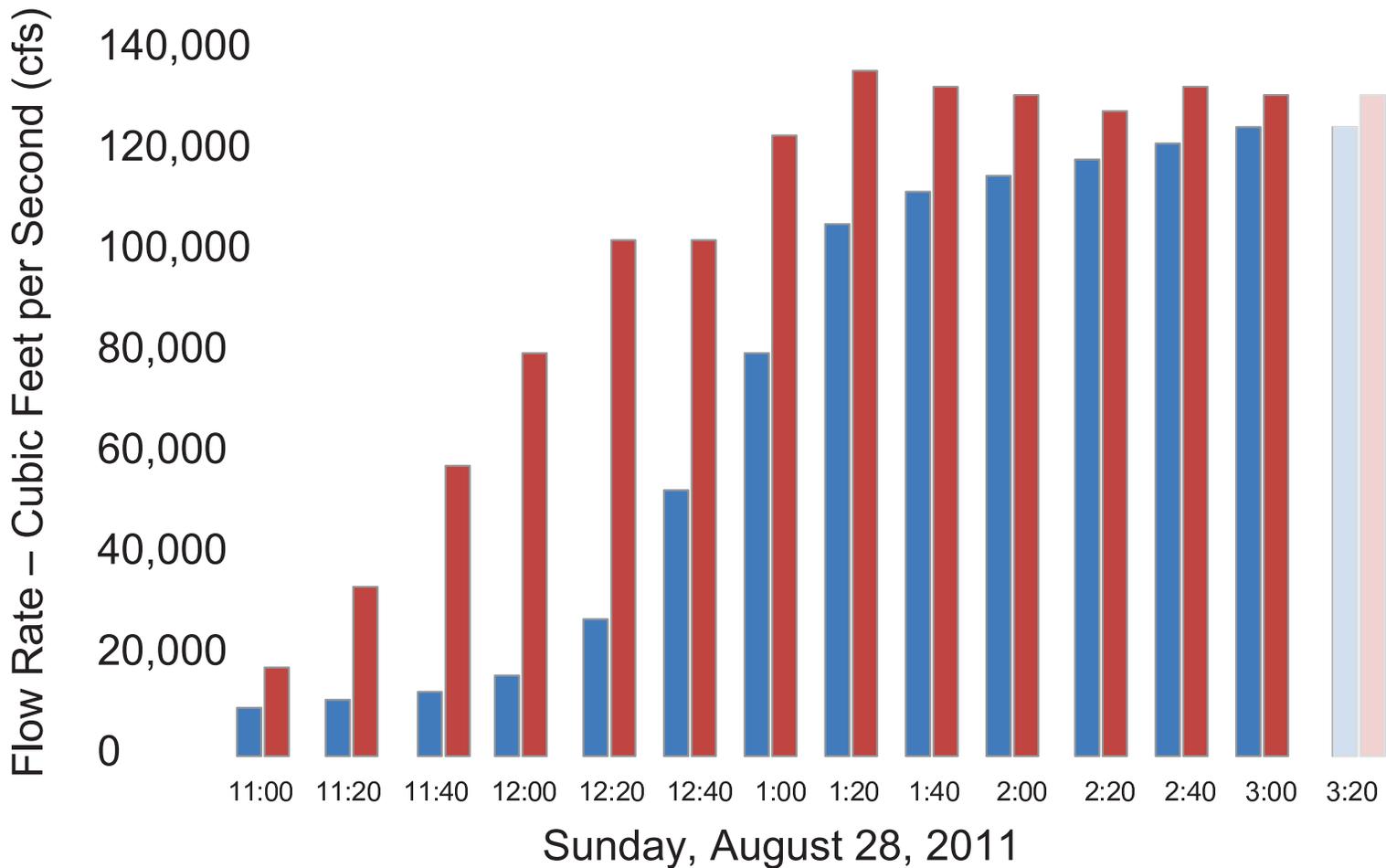
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

Sunday, 3:00 p.m.



NYPA Lower Reservoir

910 ft. overtop

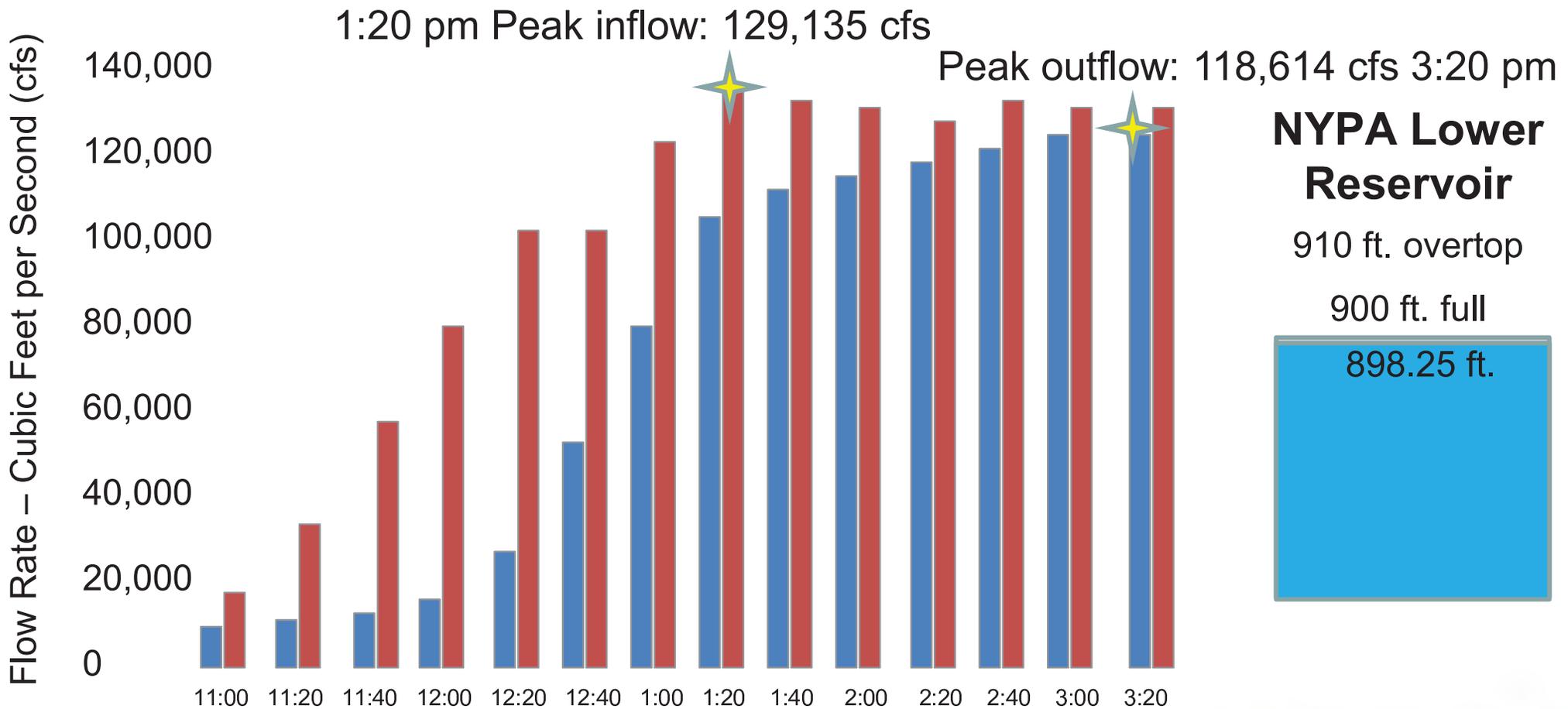
900 ft. full



Outflows 
Inflows 

Tropical Storm Irene Response

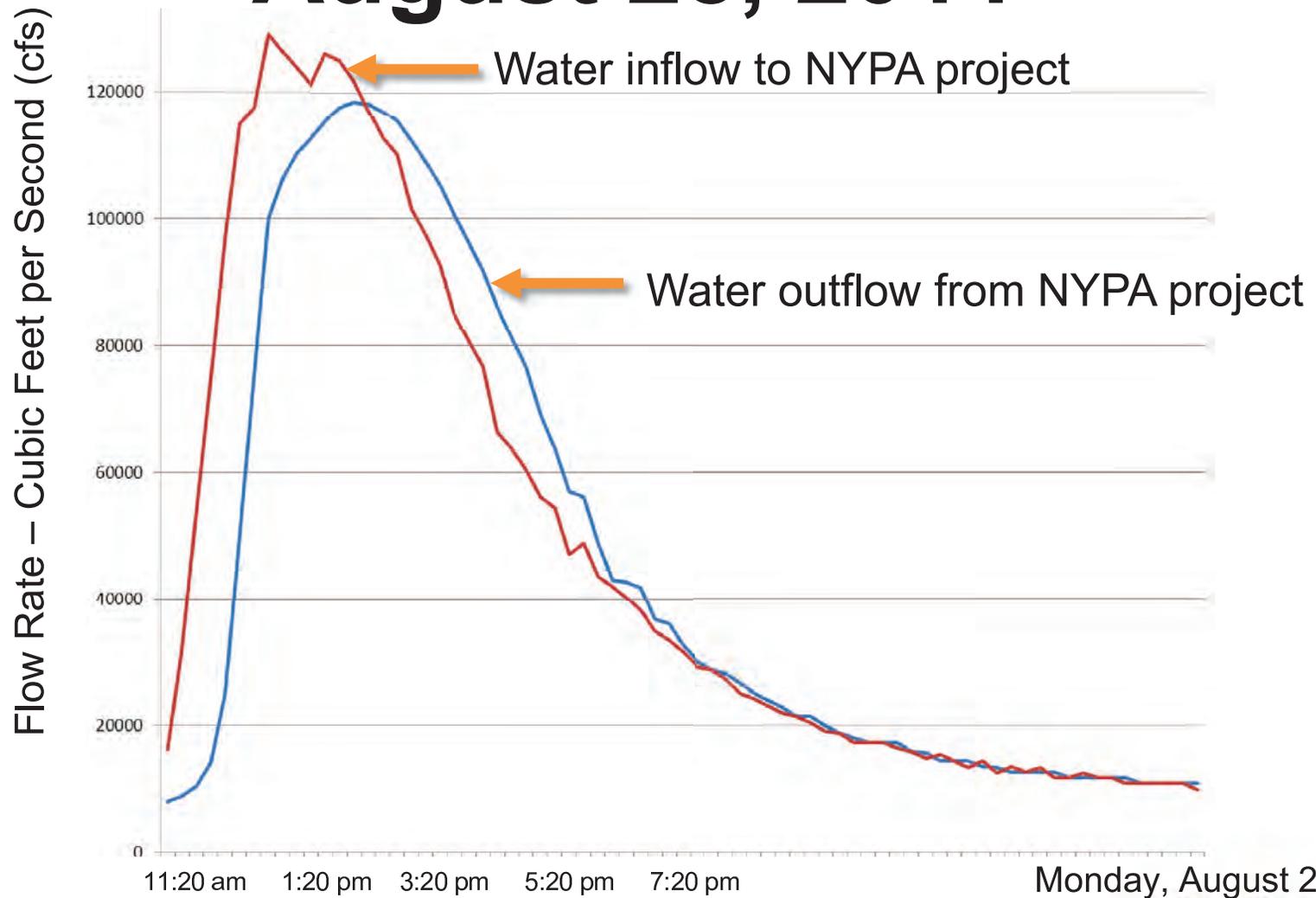
Sunday, 3:20 p.m.



Outflows 
 Inflows 

Water Flow Peak Shaved

August 28, 2011



Sunday, August 28, 2011

Outflows 
Inflows 

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?