Citizens Advisory Committee Presentation

CSO Long Term Control Plan

Sewer System Baseline Conditions

**October 7, 2009**

Outline

- **Model development**

  - **Software overview**

  - **Model extents**

  - **Design rainfall**

- **Calibration**

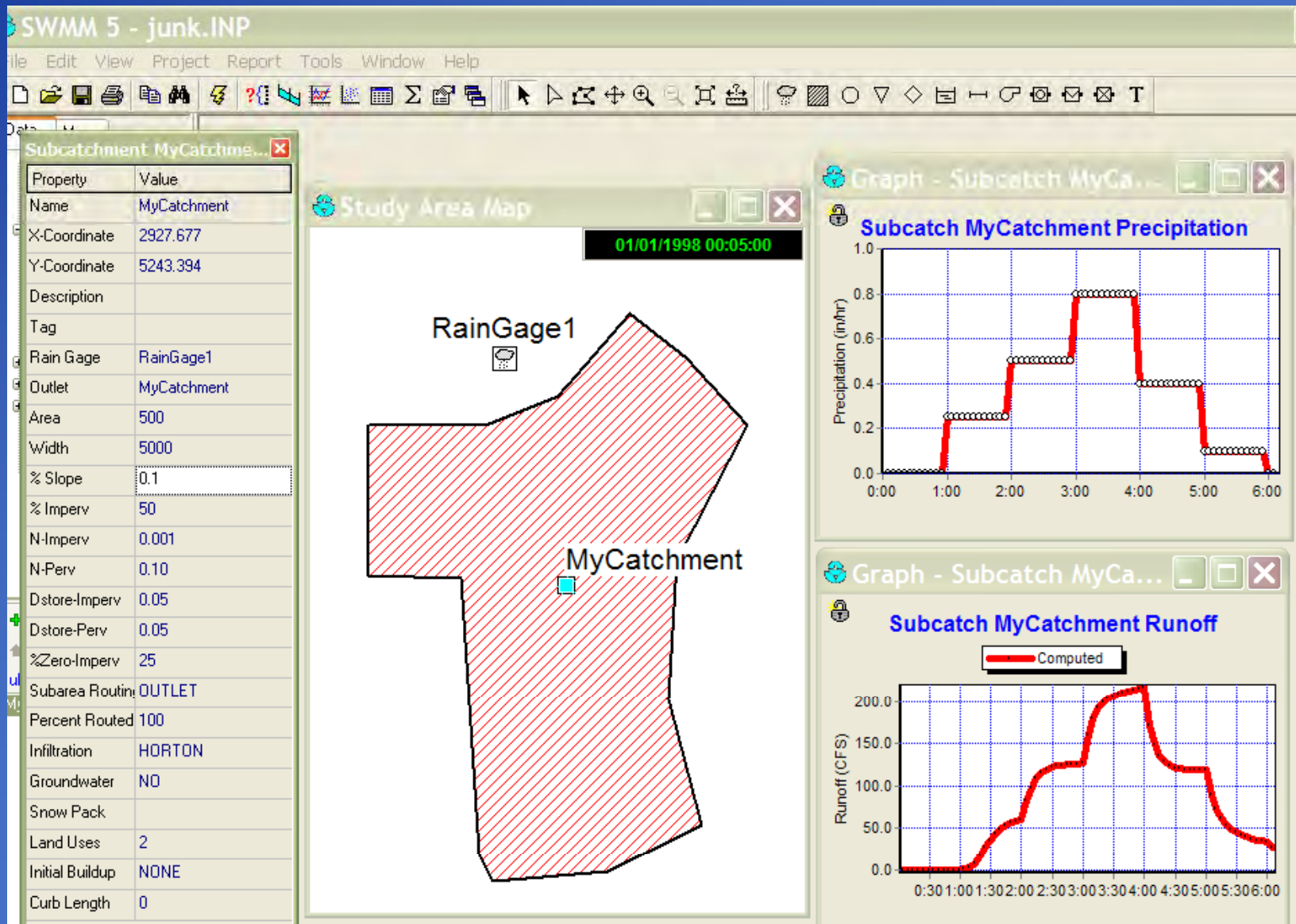- **Baseline conditions**

Sewer Modeling Process

- **State-of-the-art EPA SWMM 5 software**

- **Four models: Albany North, Albany South, Rensselaer, and Troy**

- **Models based on sewer plans, GIS, and field inspections**
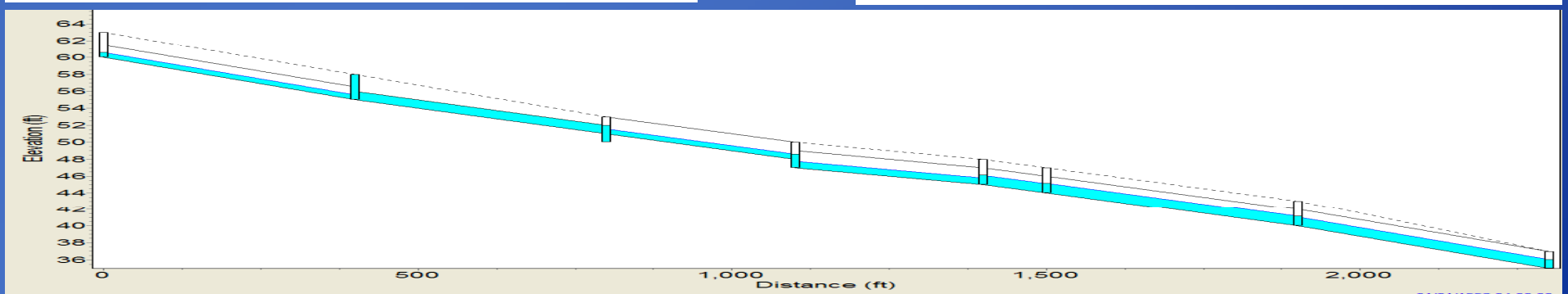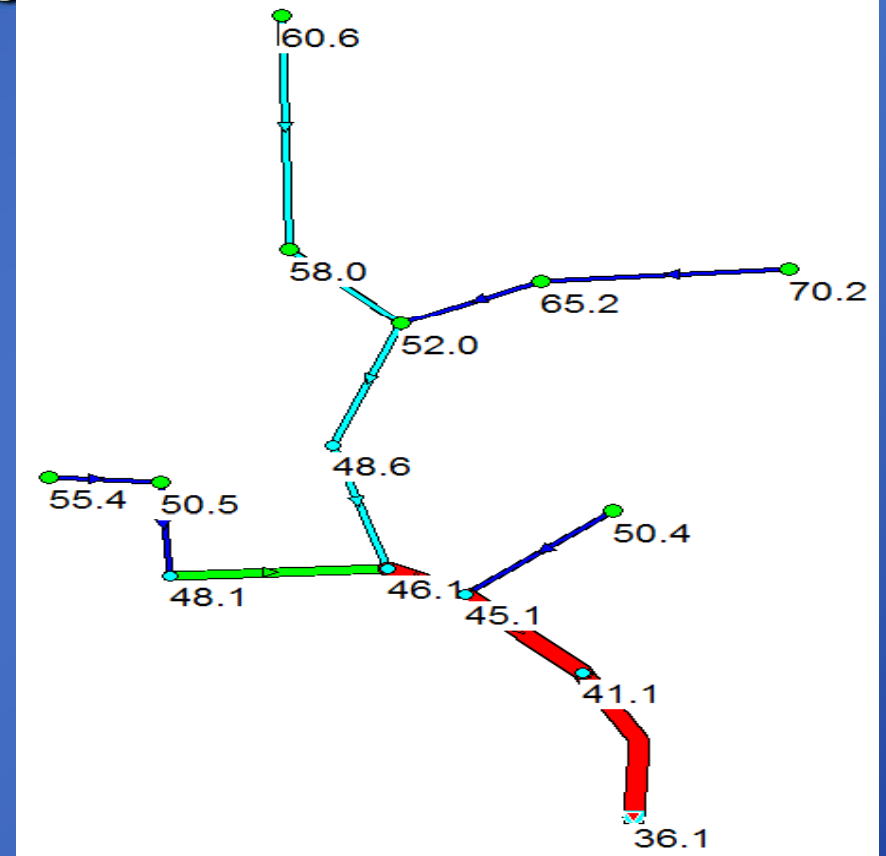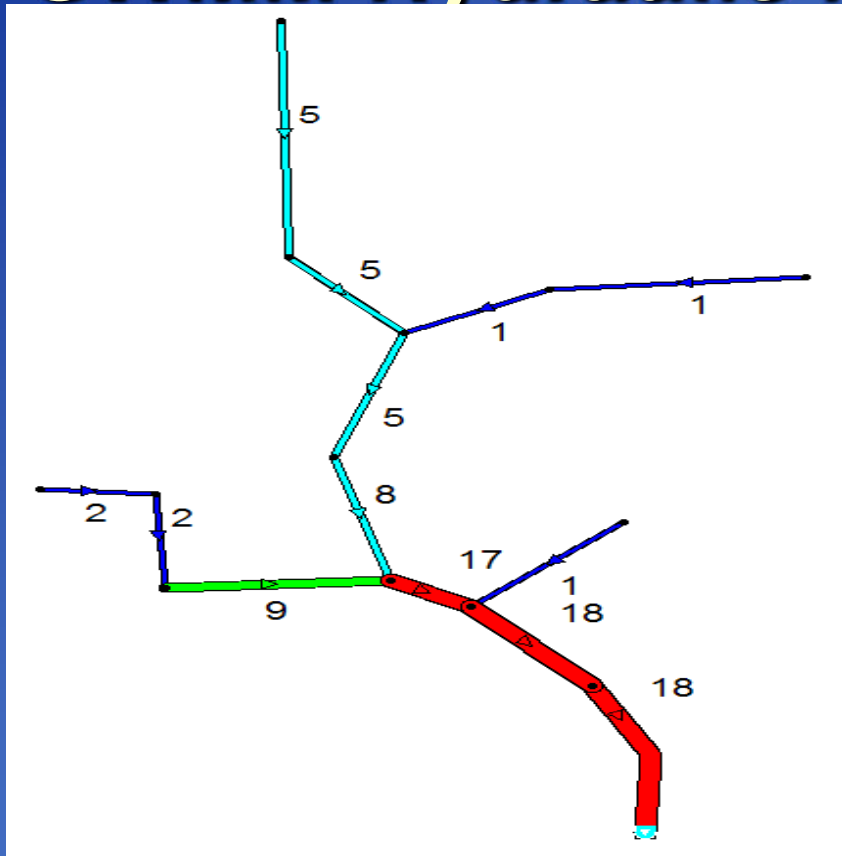
- **Calibrated to 2008 flow metering**

albany pool   Joint Venture Team   **CDM**   MALCOLM PIRNIE   CHA
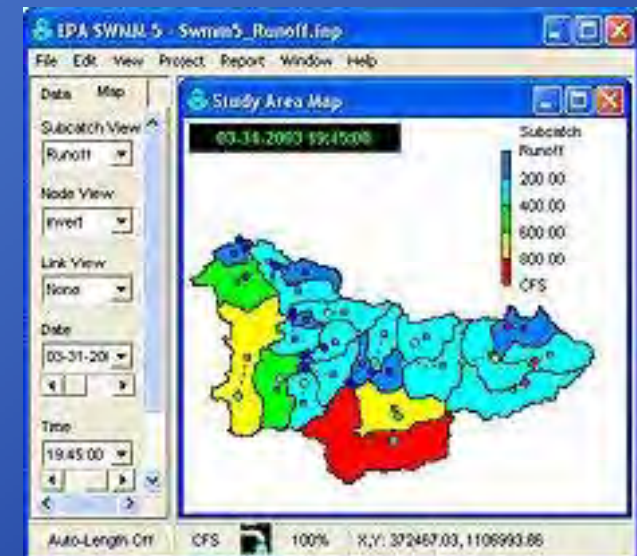
SWMM Process Models
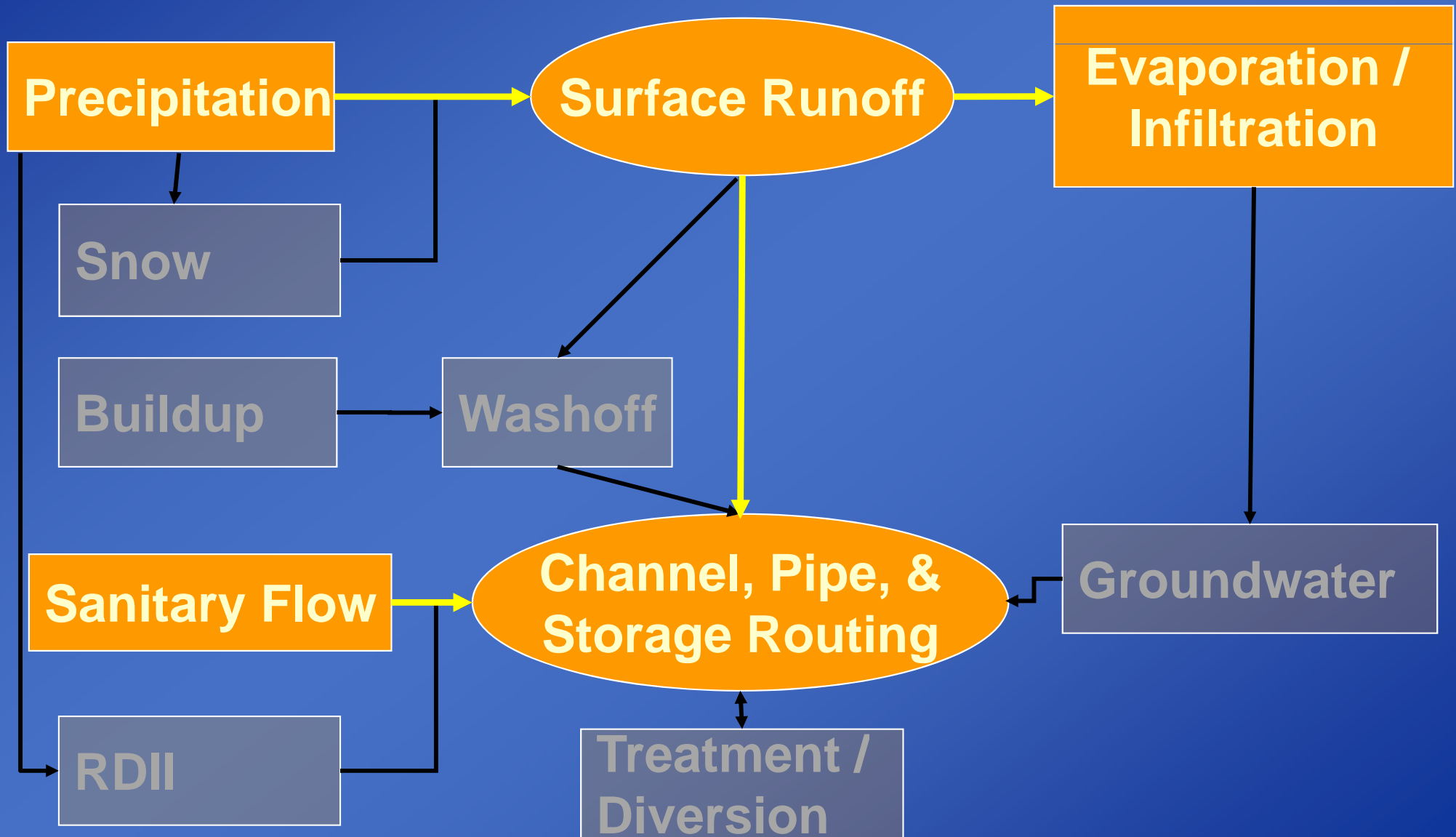
SWMM Runoff Modeling

SWMM Hydraulic Modeling

Model components

- **Pipe hydraulics**

- **Dry weather flow**

  - Sanitary wastewater

  - Base infiltration

- **Runoff hydrology**

  - Combined drainage

  - Sanitary sewer infiltration/inflow

  - Direct drainage connections
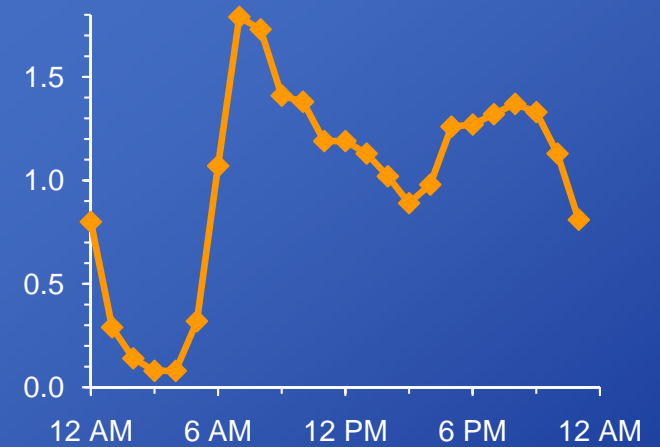
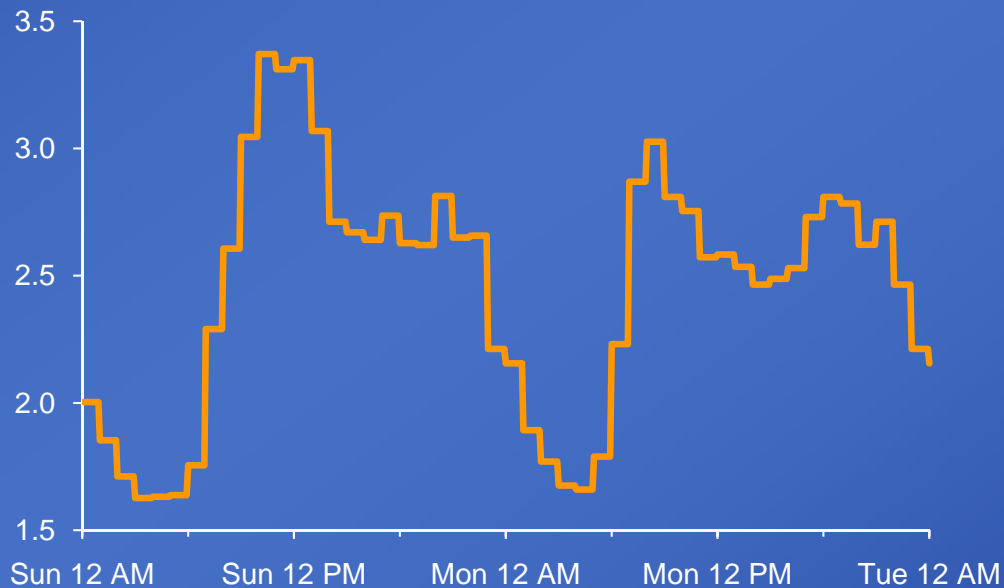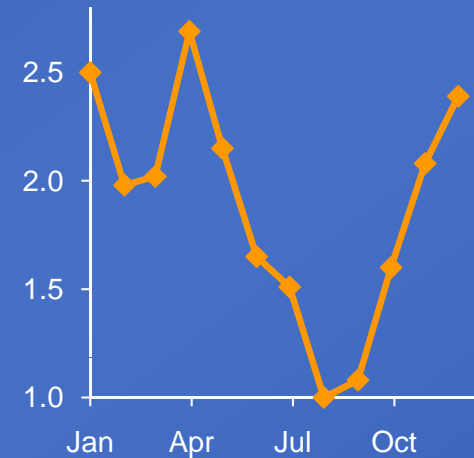# Hydraulics

- **Modeled pipes**

  - **All CSO regulators**

  - **All interceptors**

  - **Principal trunk sewers**

- **Pump stations, WWTPs, real-time controls**

- **Hudson River stage boundary**
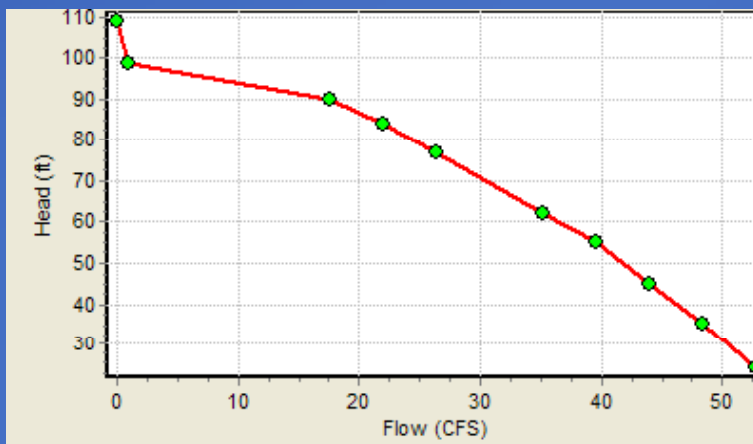
Rule Big_C_Regulator_2
If Node Scso_017R Depth = 2.58
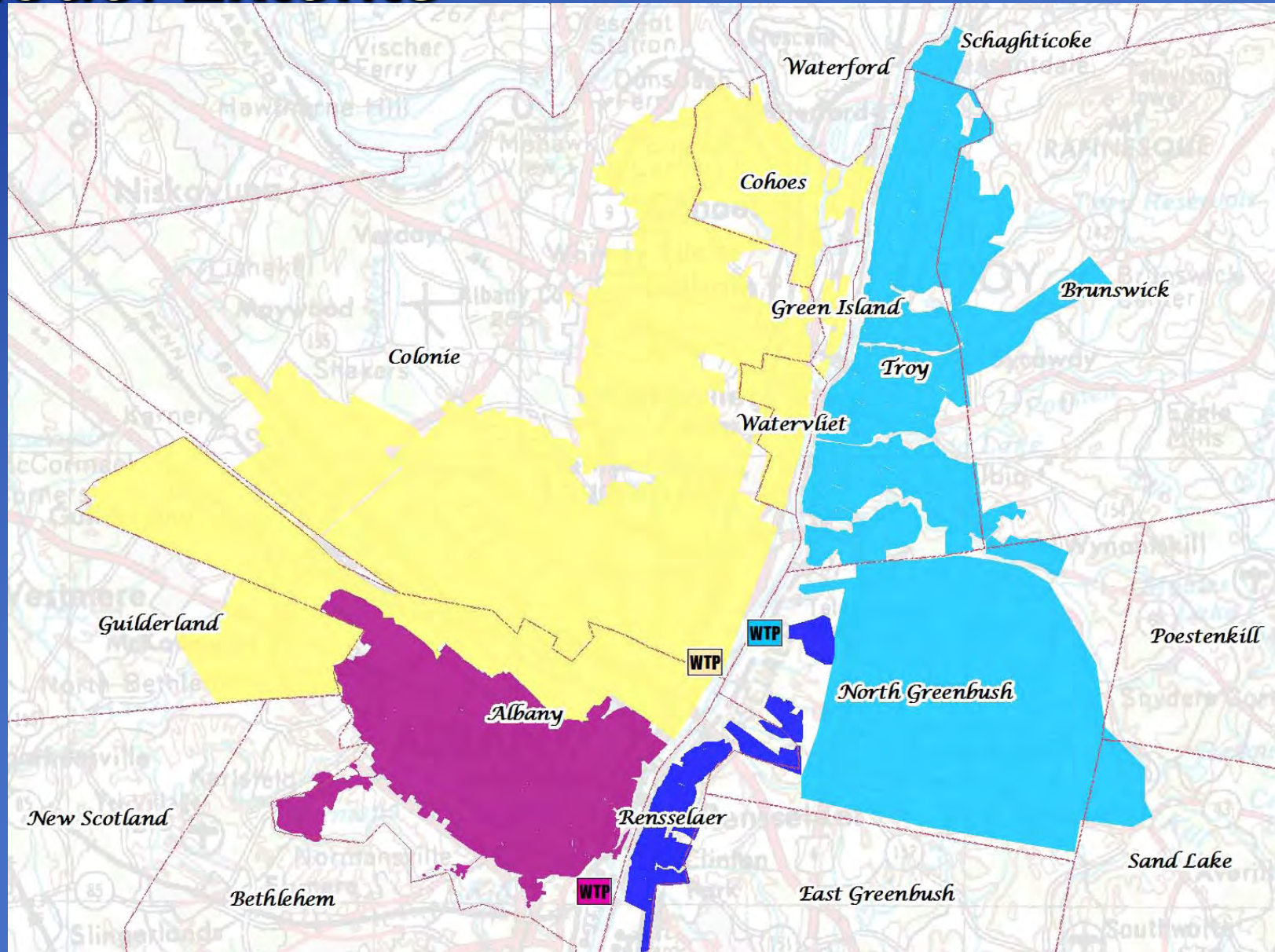Then Orifice Big_C_Gate Setting = 0.87

Dry Weather Flow

- **Average sanitary and baseflow**
- **Diurnal patterns**
- **Baseflow variation**

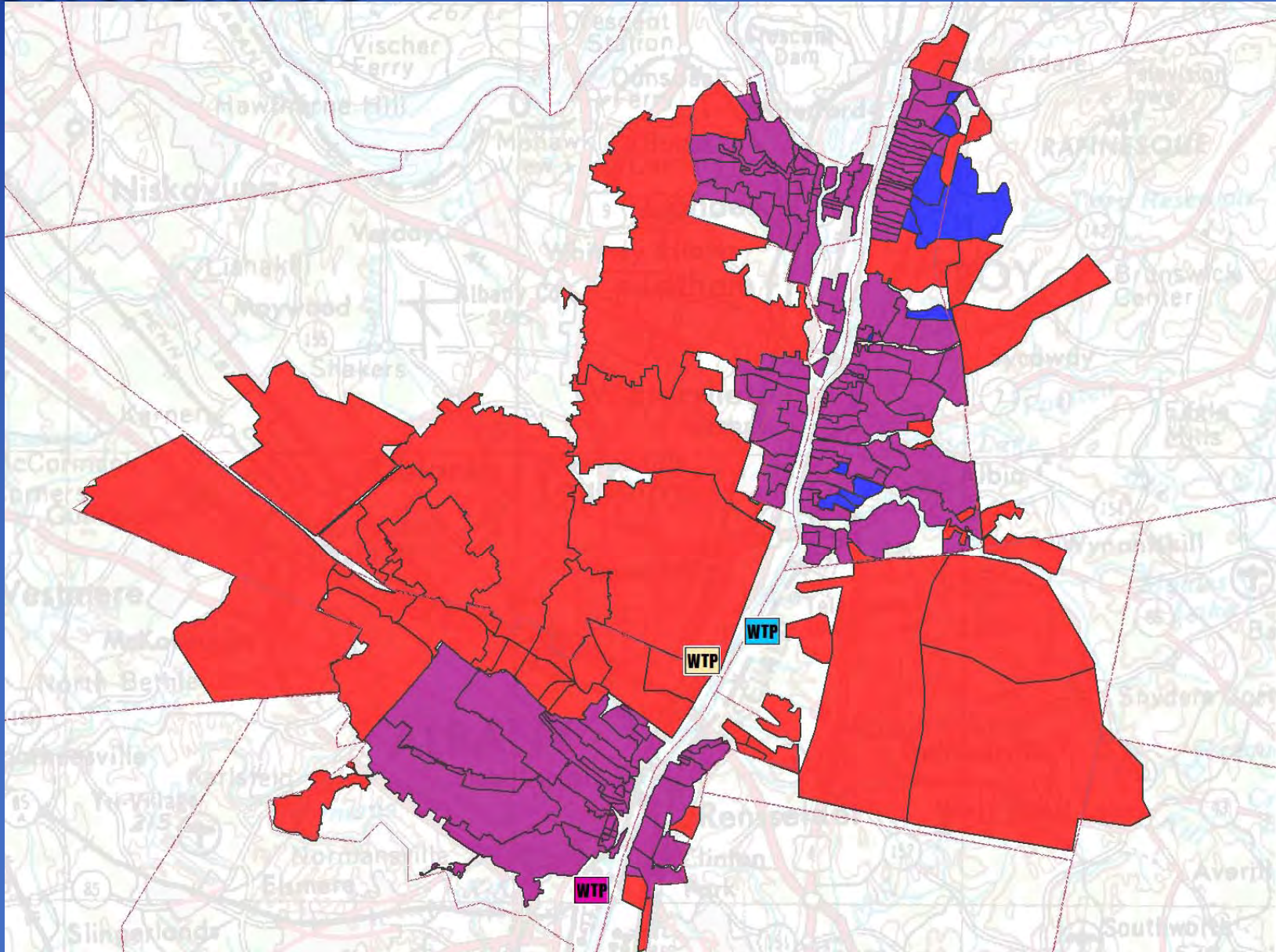# Hydrology

- **All areas tributary to ACSD-N, ACSD-S and RCSD WWTPs**

- **Dynamically simulate:**
  - **runoff to combined sewers**
  - **infiltration / inflow into sanitary sewers**
  - **upstream drainage entering sewer system**

Model Extents

Sewersheds

Albany North Model

- **600 pipes**
- **68 catchments**
- **24 CSOs**
- **13 pump stations**
- **Includes Patroons Creek Interceptor**
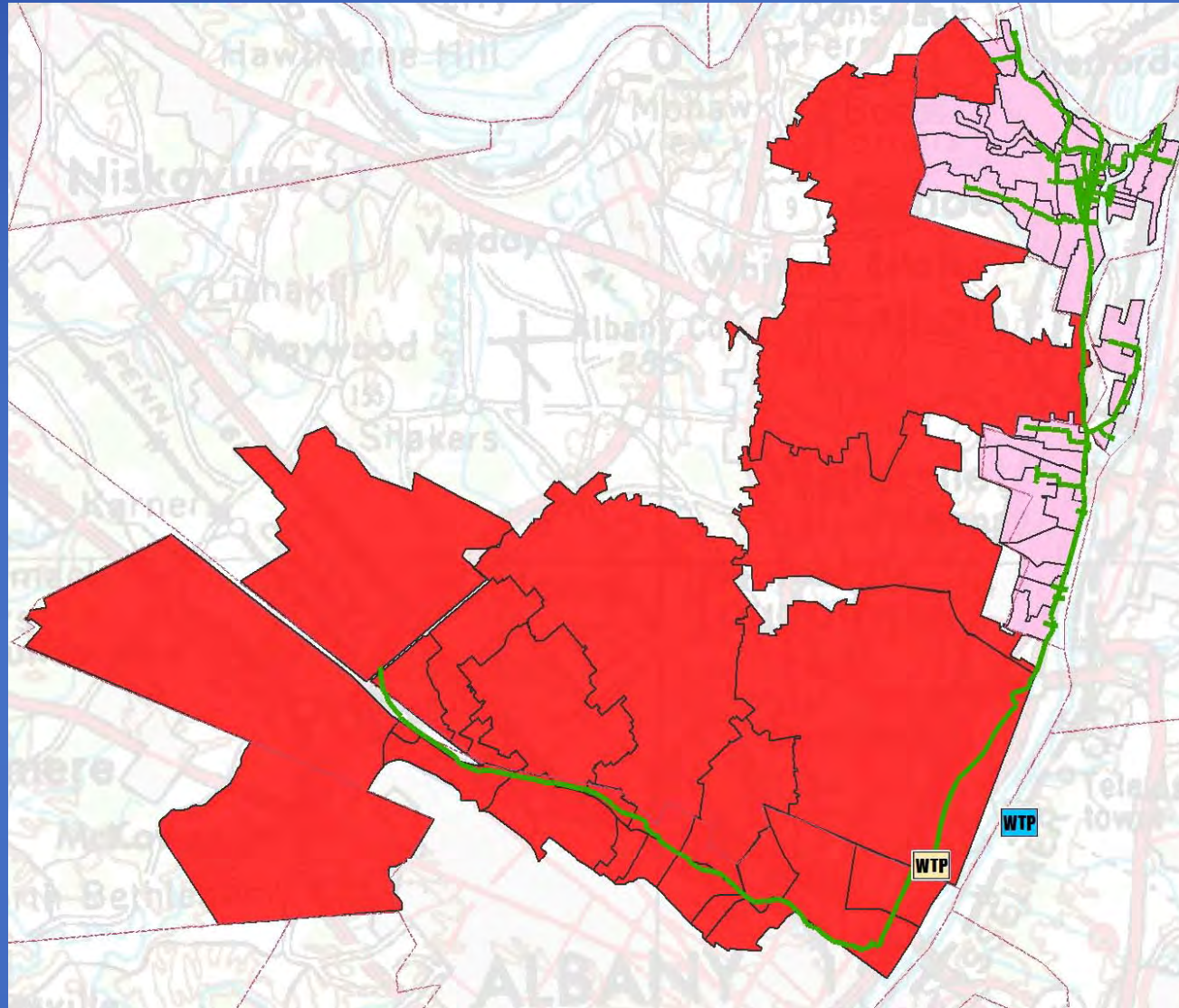
Albany South Model

- **220 pipes**
- **30 catchments**
- **20 regulators**
- **12 CSOs**
- **Tidal influence**
- **Significant I/I below Big C**
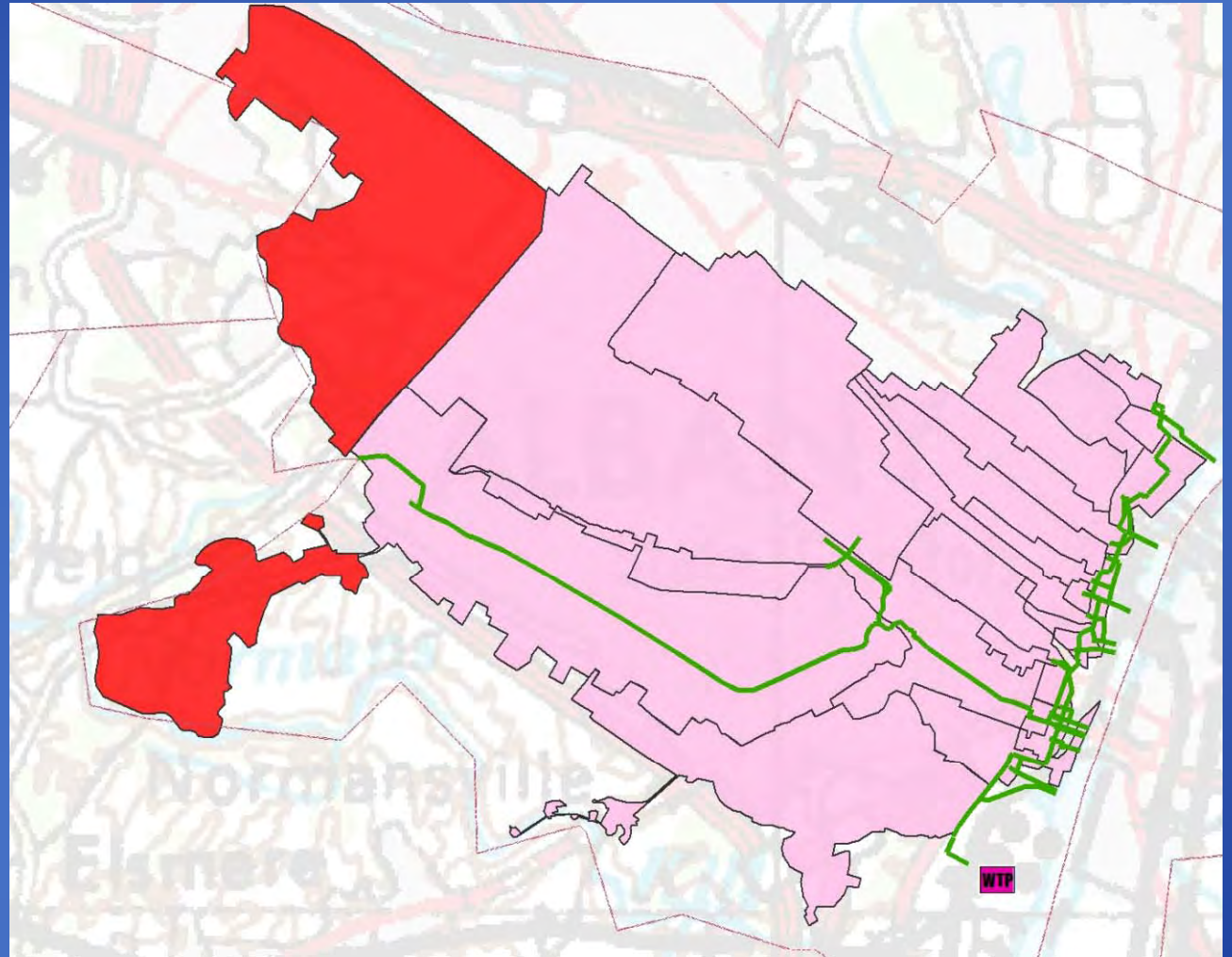
ACSD Interceptor Profiles

- **Hudson River**
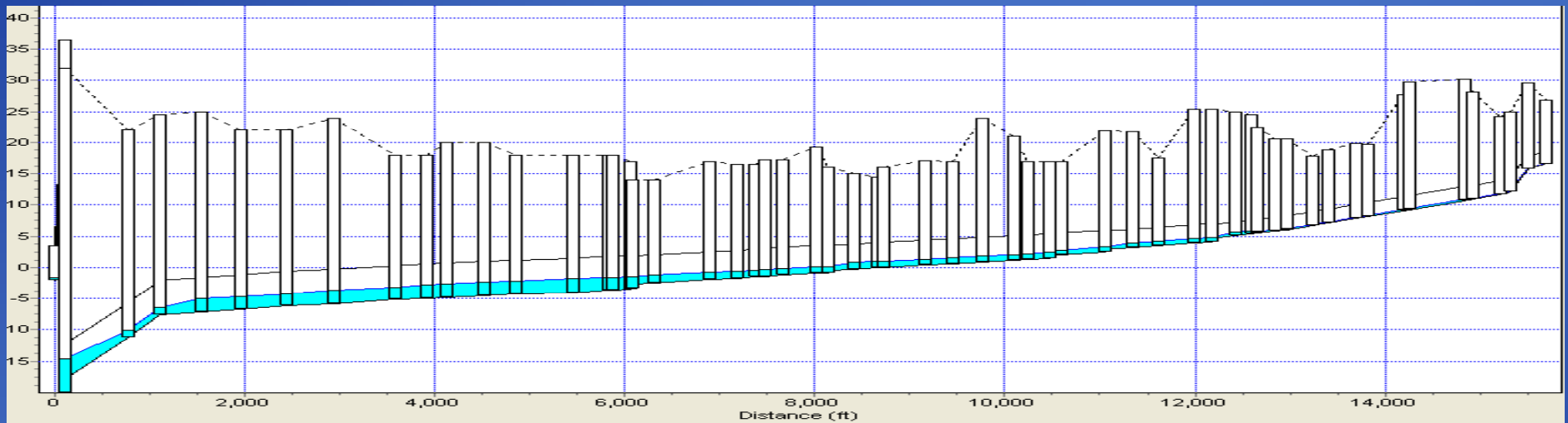
- **Beaver Creek**

Rensselaer Model

- **90 pipes**
- **17 catchments**
- **9 CSOs**
- **Aiken, Forbes PS**
- **CSOs to tidal zone**
- **Considerable separation**
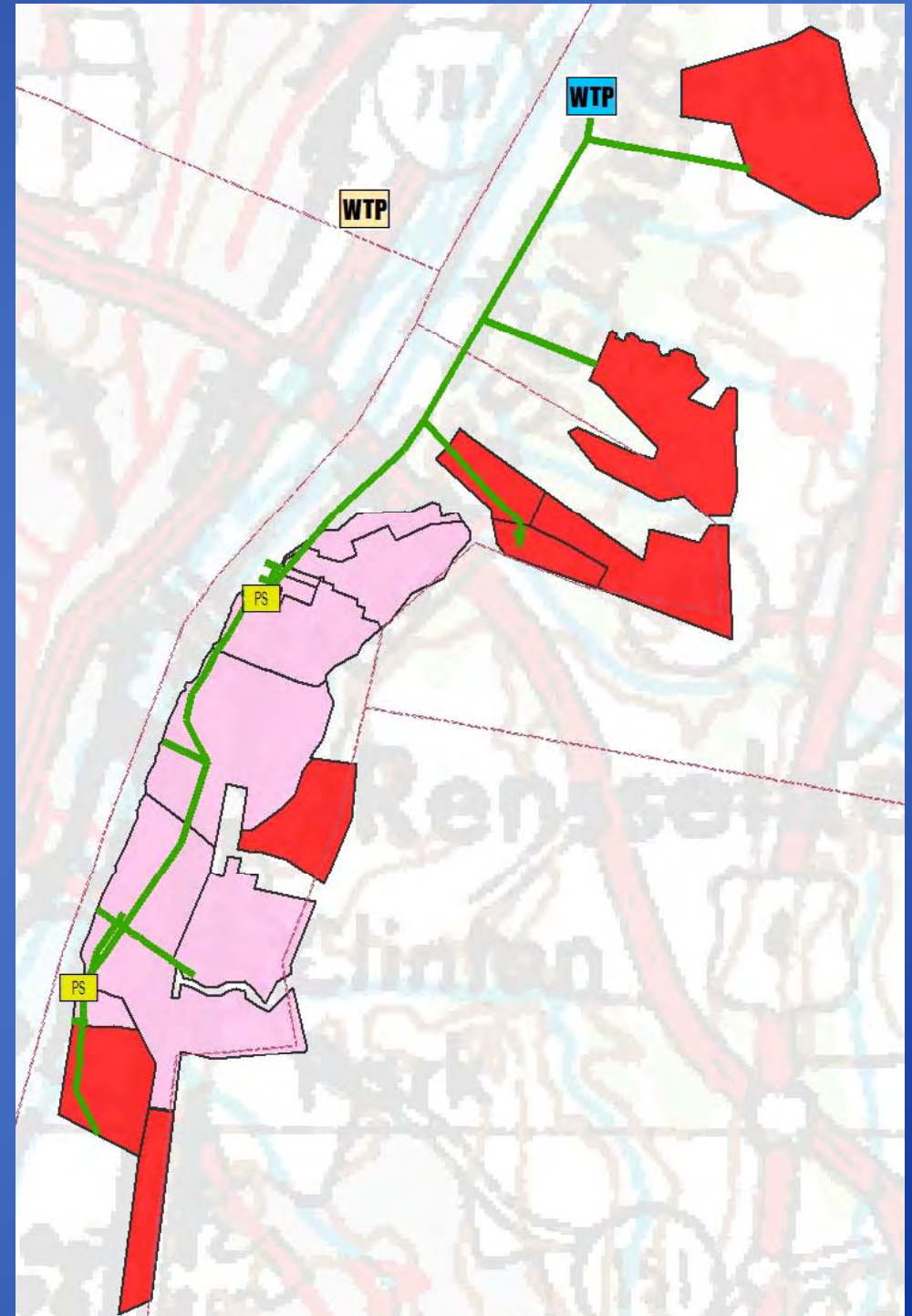
Troy Model

- **470 pipes**

- **100 catchments**

- **49 CSOs**

- **106th, Monroe St. PS**

- **CSOs above and below Federal Dam**

- **Sanitary flows from Schaghticoke, Brunswick, and North Greenbush**
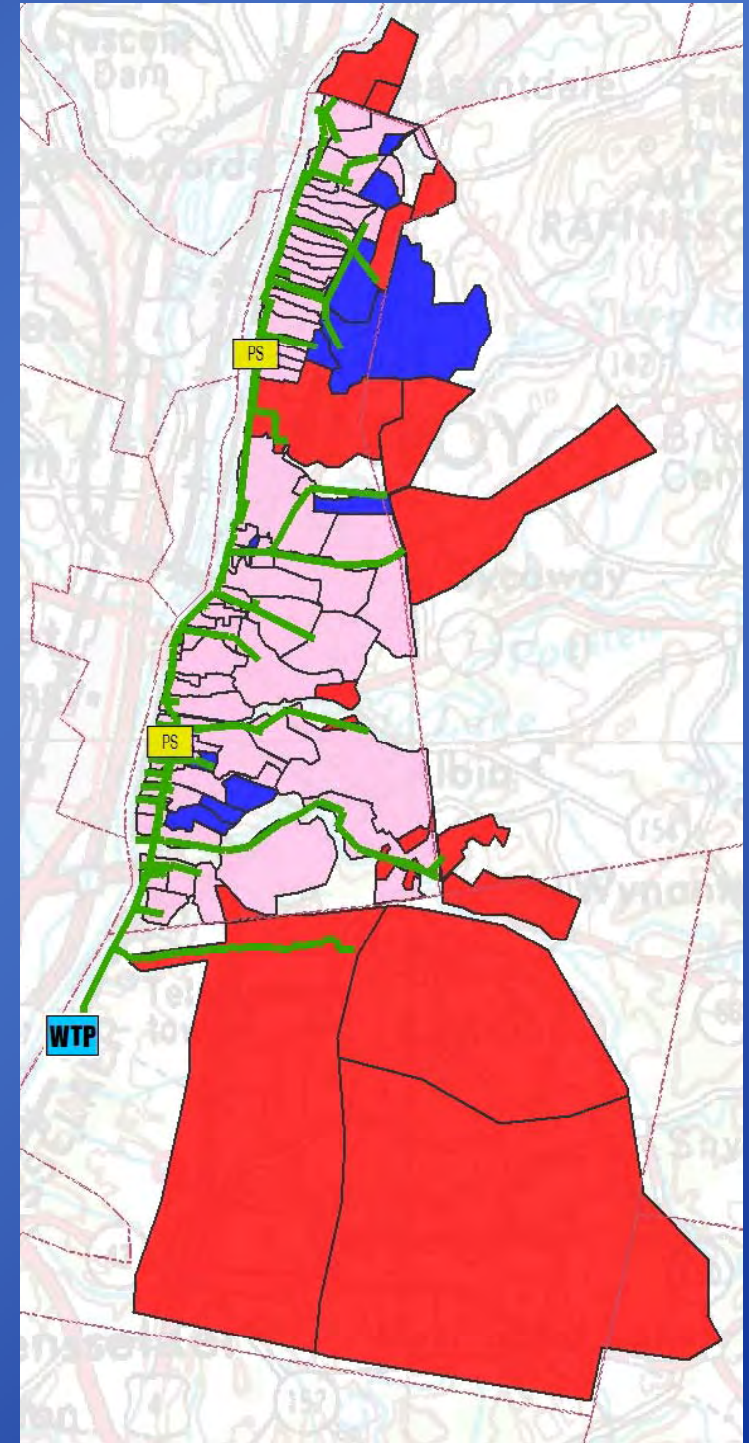
RCSD Interceptor Profile
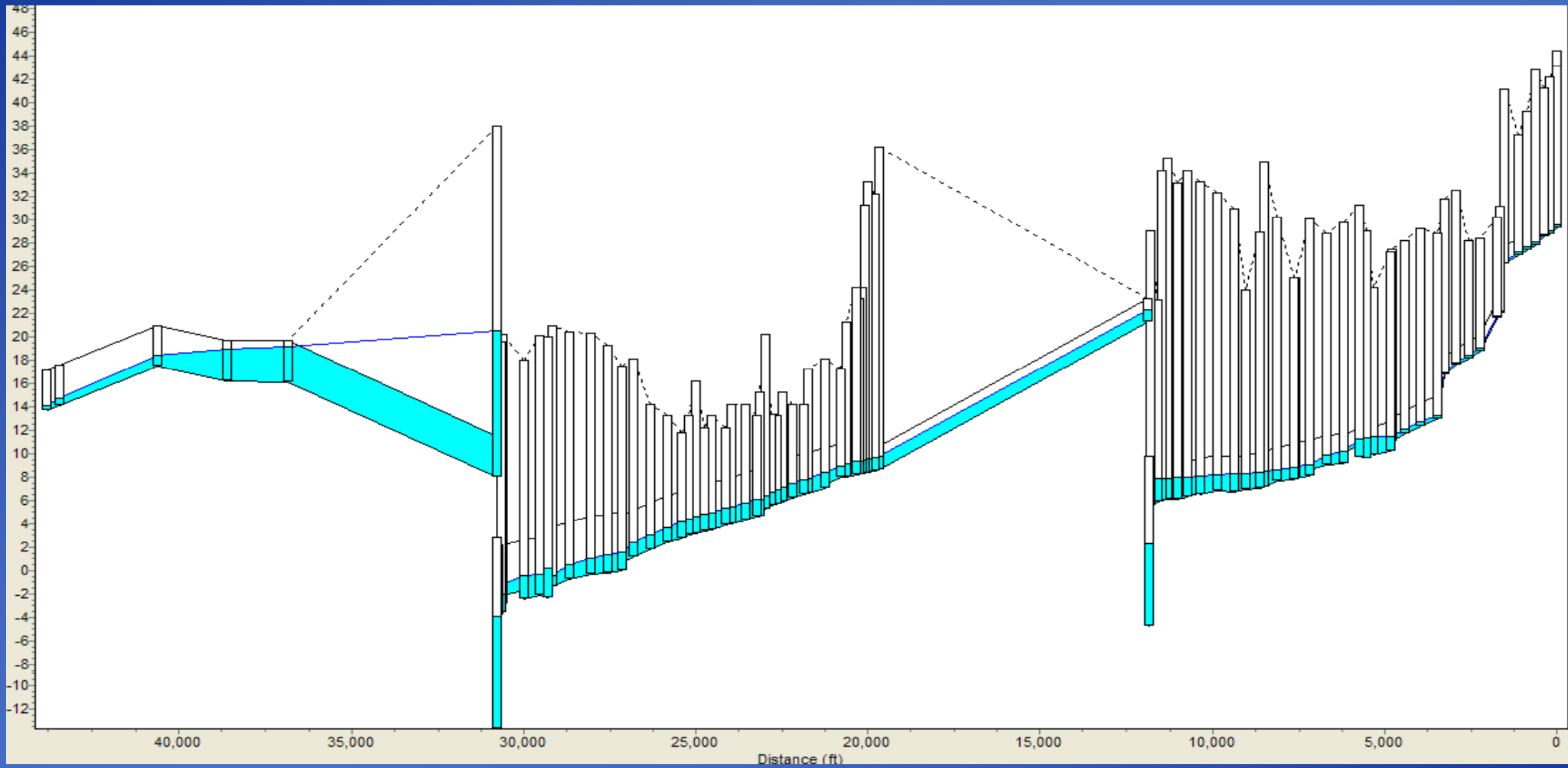
Representative Period Selection

- **5-year period for long-term CSO statistics**
  - average precipitation
  - wet and dry years
  - storm depths and frequencies

Average Annual Precipitation by Decade
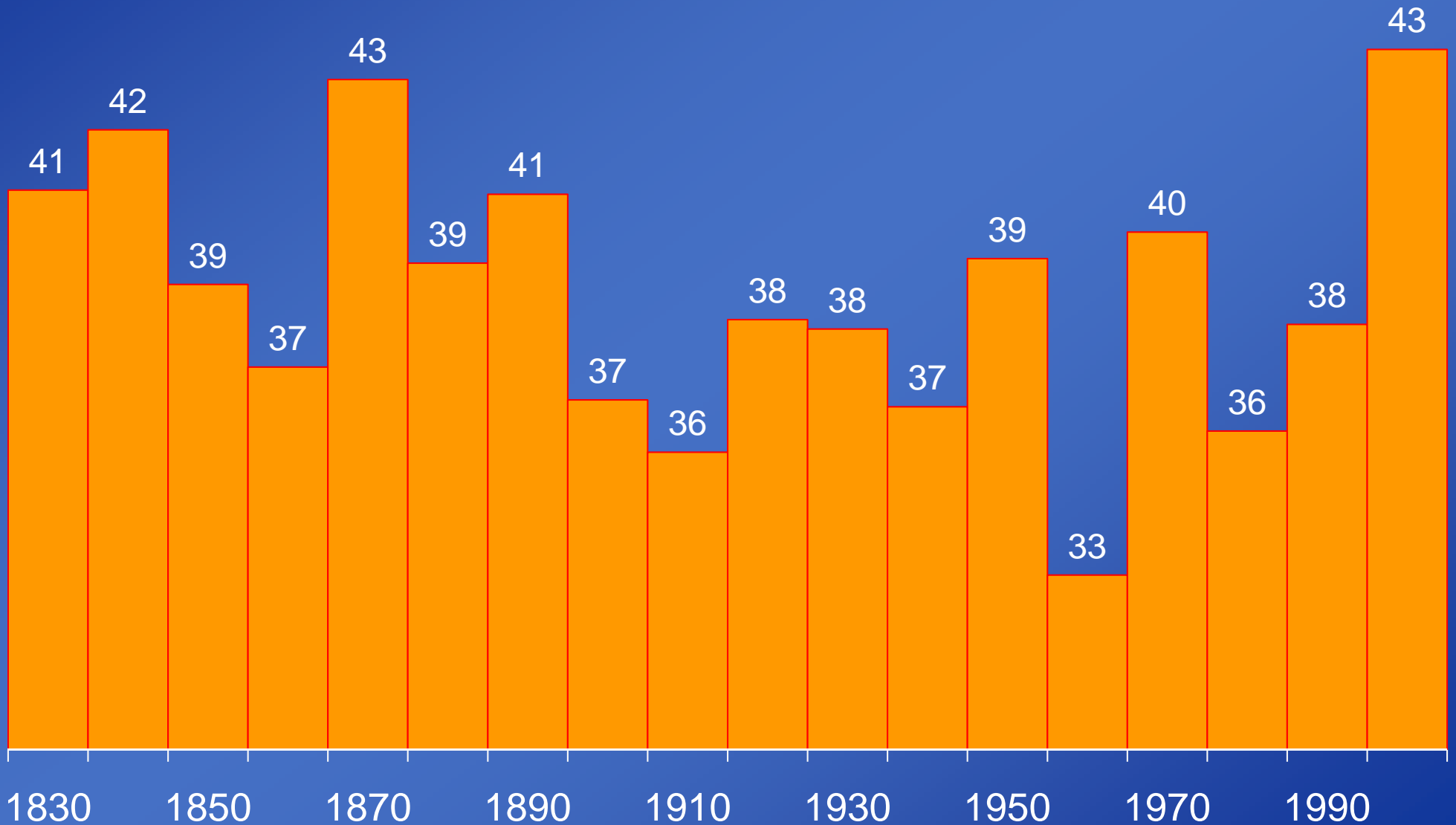
Annual Precipitation 1985-1989

Year	Precipitation (inches)	Percentile
1985	30.0	13%
1986	44.0	86%
1987	39.3	68%
1988	29.6	10%
1989	39.7	72%
5-year average	36.5	
Long-term mean	36.8	

Storm Depth Histograms 1985-1989

Year	≥0.25"	≥0.50"	≥0.75"	≥1.0"	≥1.5"	≥2.0"	≥2.5"
1985	33	20	12	6	2	0	0
1986	40	29	20	18	5	3	2
1987	41	25	19	11	4	3	2
1988	33	20	13	7	1	1	1
1989	44	27	19	12	6	1	0
5-year average	38	24	17	11	3.6	1.6	1.0
Long-term mean	41	24	15	8	3.4	1.3	0.7

River Stage

- **Stage/discharge at Green Island**
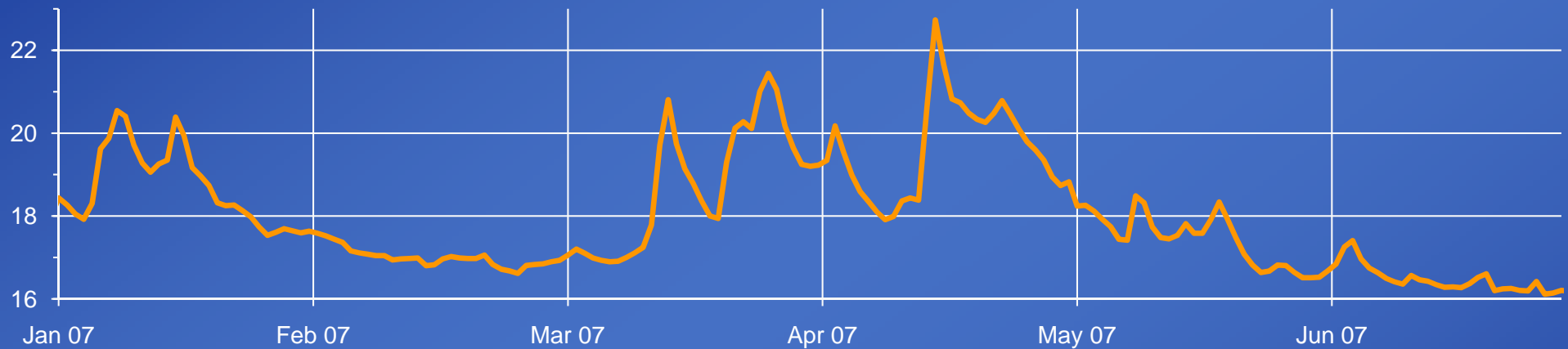
- **Albany tide gage**
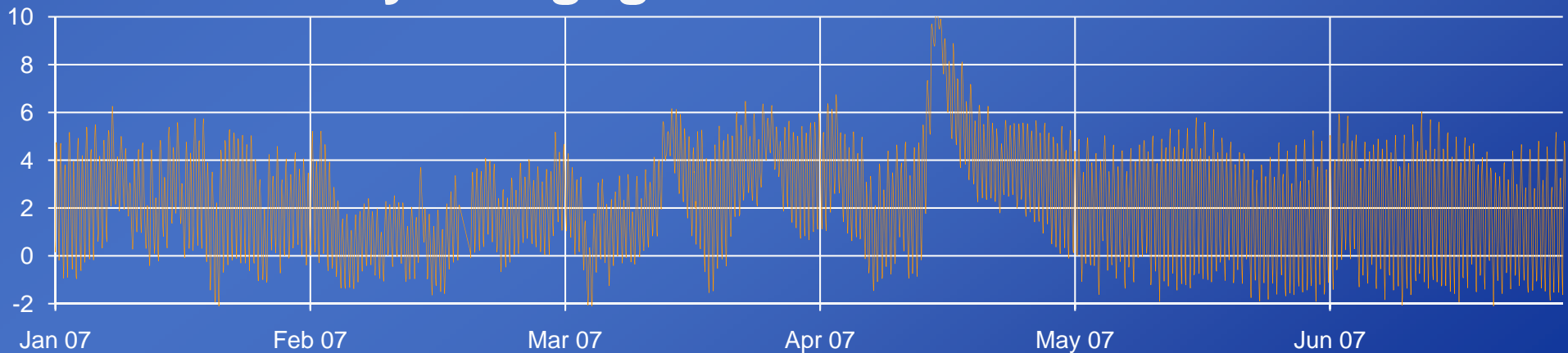
Calibration and Application

- **Calibration to summer 2008 flow metering**

- **Models capable of running 5-year continuous simulations**

- **Calibrated models provide robust annual statistics for each CSO**

  - **Volume**

  - **Duration**

  - **Frequency**
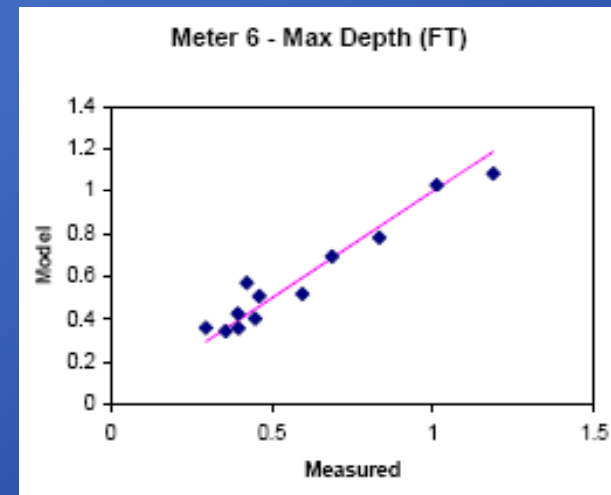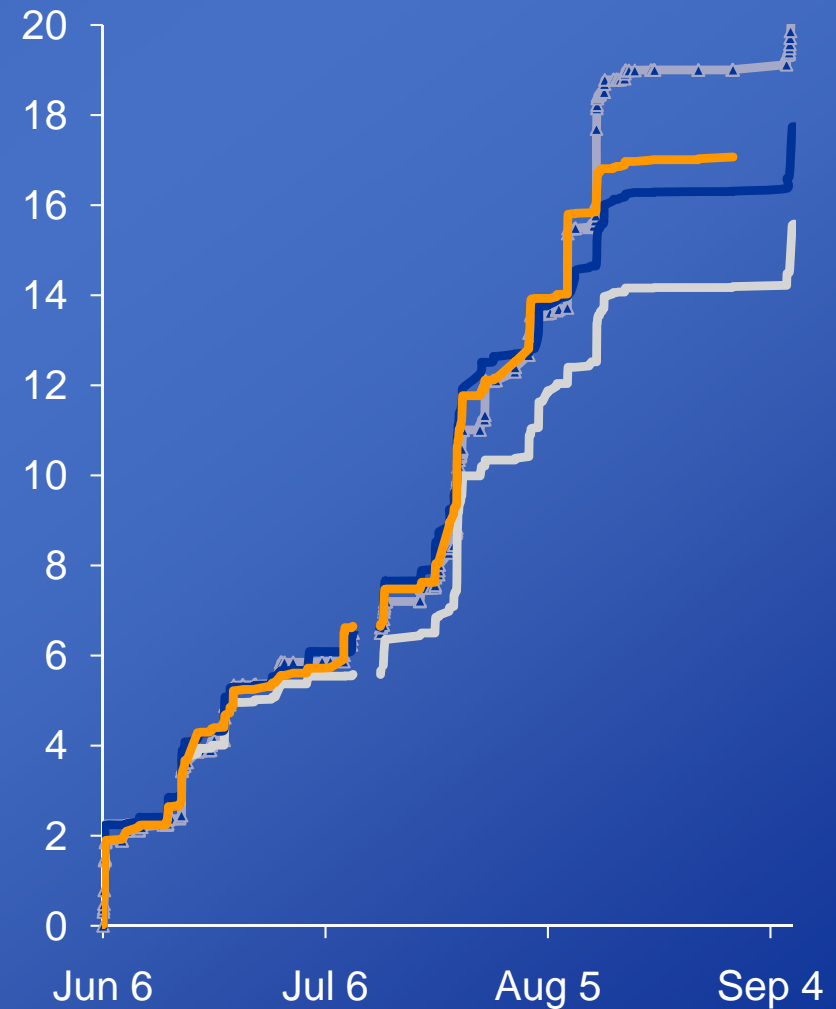

Meter 6 - Max Depth (FT)

2008 Metering Rainfall

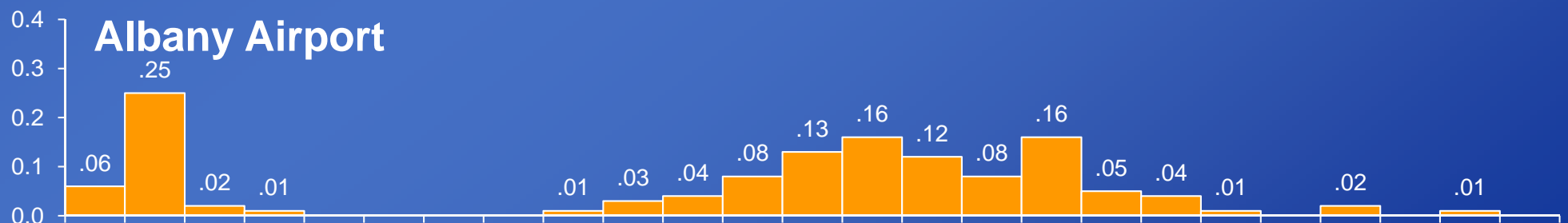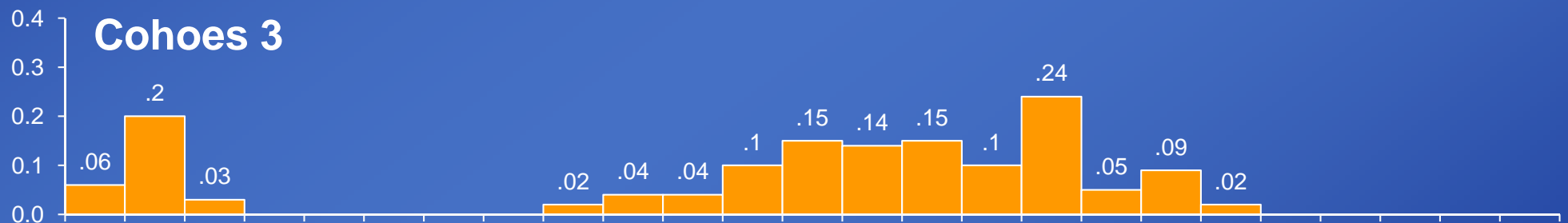| Date	Rennselaer	Troy	Cohoes	Albany	Airport
June 6	1.9	2.3	2.2	1.9	1.8
June 16	1.3	1.1	1.2	1.0	1.4
July 13	0.7	0.8	1.2	0.8	1.1
July 23	2.6	2.9	2.7	2.8	3.5
July 27	1.1	0.4	0.6	0.4	0.2
August 2	1.2	0.7	0.1	1.4	0.4
August 7	1.8	0.4	0.1	1.8	0.1
August 11	3.0	1.5	1.4	1.0	1.5
September 6	1.6	1.4	1.4		1.3

Calibration Methodology

- Discharge volume

- Timing of hydrographs

- Peak flows

- Water levels

- Velocity

2008 Metering Data

- Flow metering

- WWTP flow data

- River stage above and below dam

September 6, 2008 storm
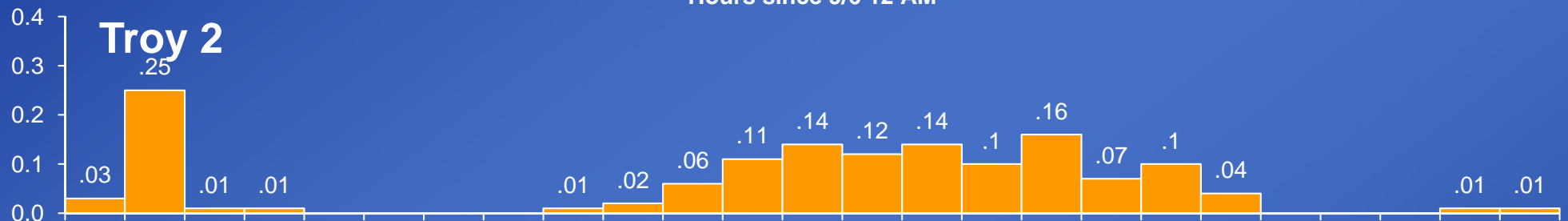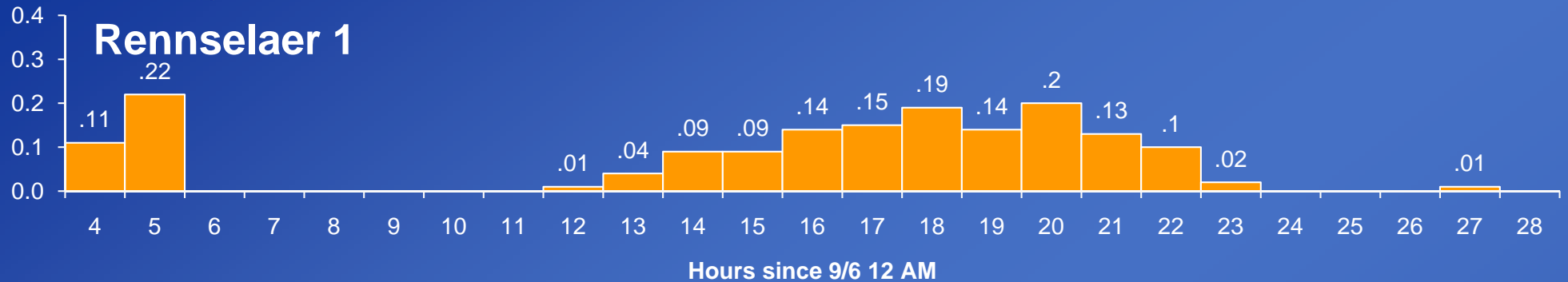
Calibration Hydrographs

Sept6, 1.4 in
Troy RCSD_15
Dm=0.6 ft Do=0.7 ft

Sept6, 1.4 in
Troy RCSD_15
Vm=0.90 MG Vo=0.82 MG; Qm=1.7 cfs Qo=1.9 cfs

Sept6, 1.4 in
Troy RCSD_15
Vm=2.5 ft/s Vo=2.2 ft/s
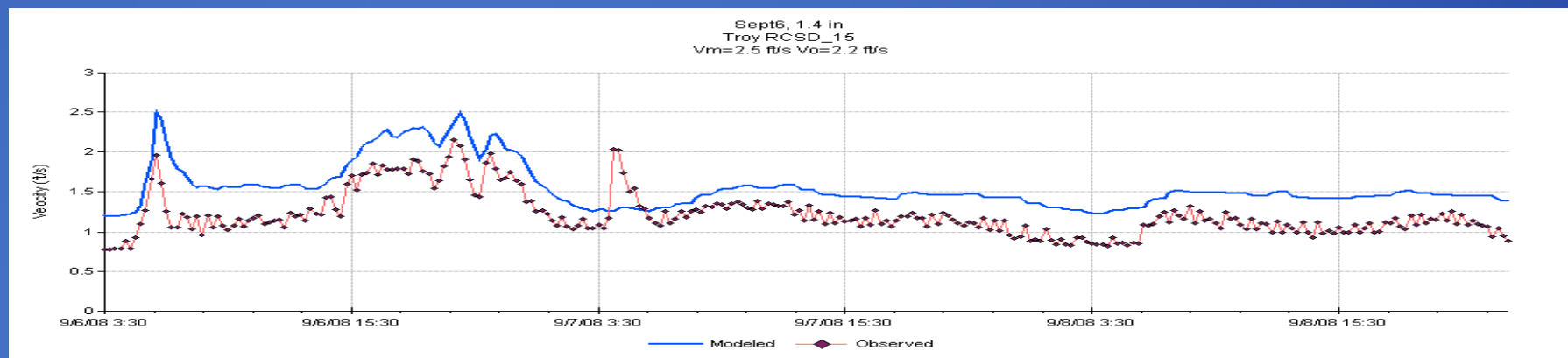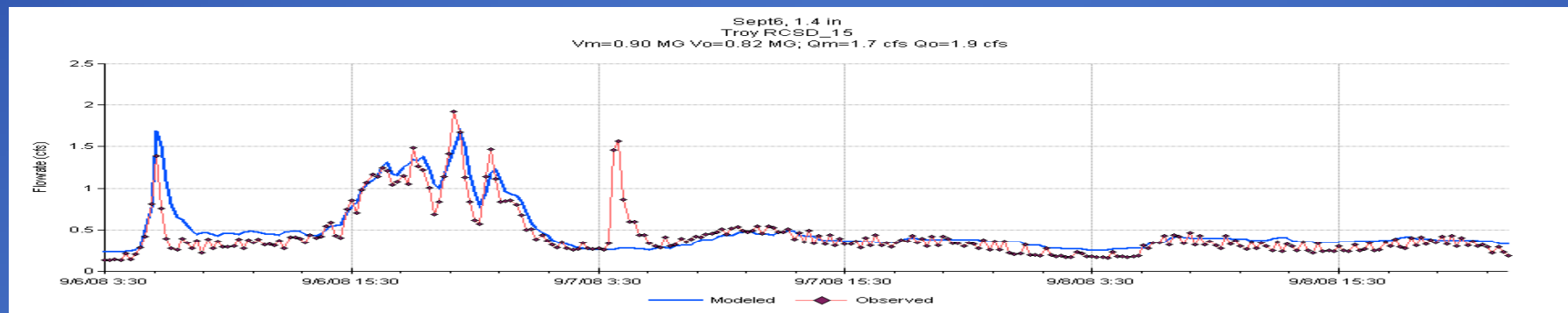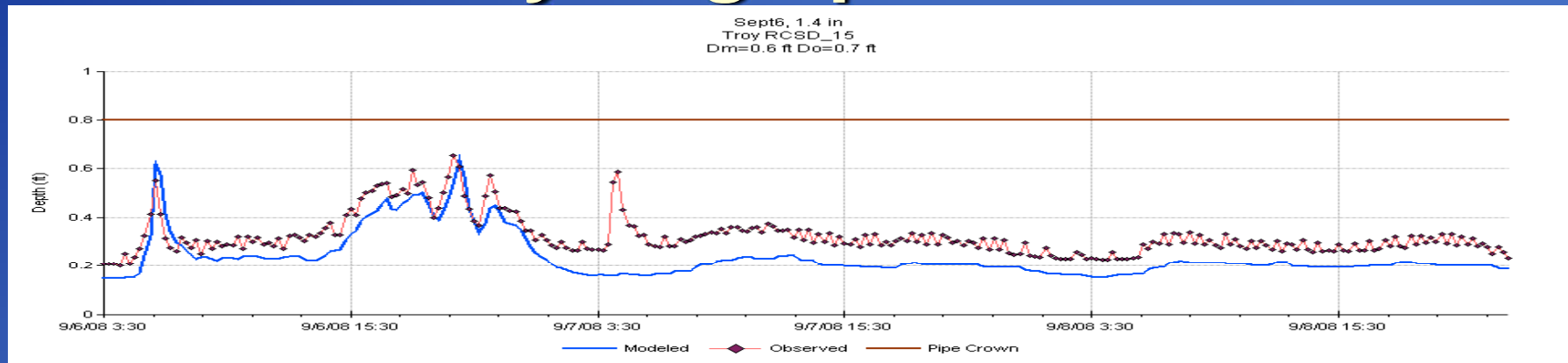
All Storms Scatterplots
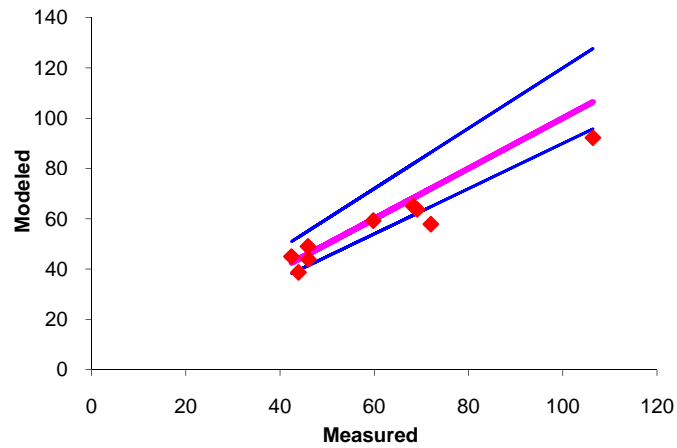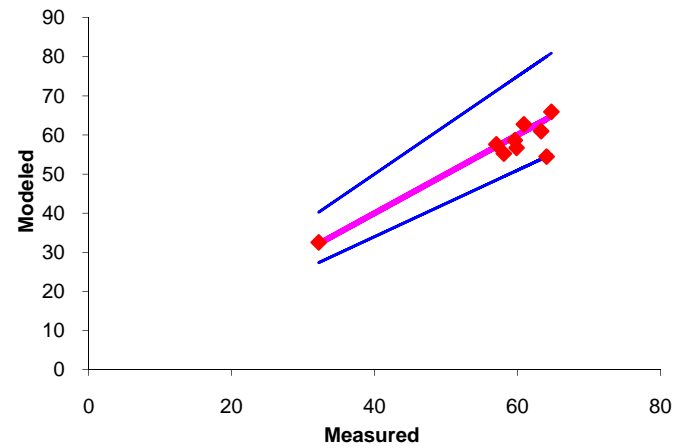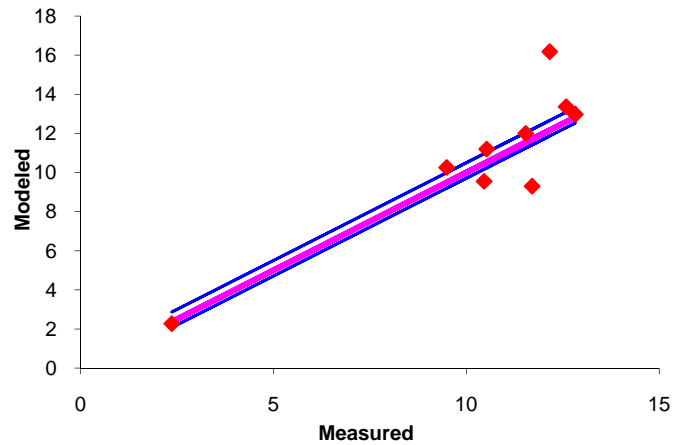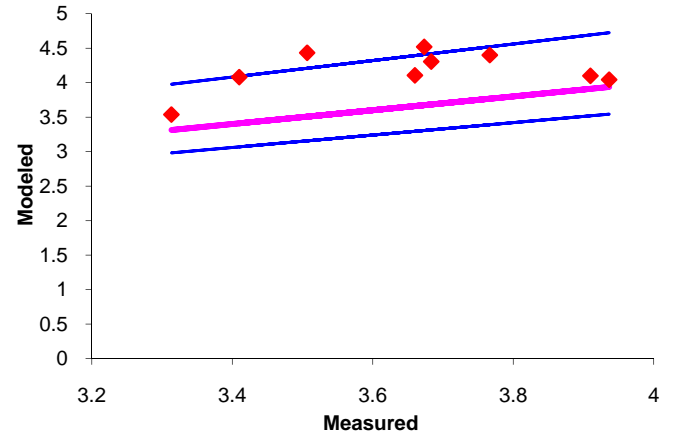
Baseline Conditions

- **CSO statistics by system**

- **Most active CSOs**

- **Community-specific issues**

Regional CSO

City	MG/year
Buffalo	4,000
Albany	1,251
Hartford	1,040
Syracuse	690
Springfield	630

Albany Pool Annual CSO

System	MG/year	Hours	Events	% Capture
Albany North	30	380	61	91
Albany South	753	640	58	63
Rensselaer	20	190	52	88
Troy	448	720	65	67
Total	1251			

Albany North - Most Active CSOs

Location	SPDES	Mgal	Hours	Events
Little C	008	8.6	30	11
7th Street		4.5	330	44
Mohawk Street	007	4.2	380	21
Swan Street		4.0	209	41
Continental Ave	005	2.9	23	11

Five CSOs active ≥40 events/year
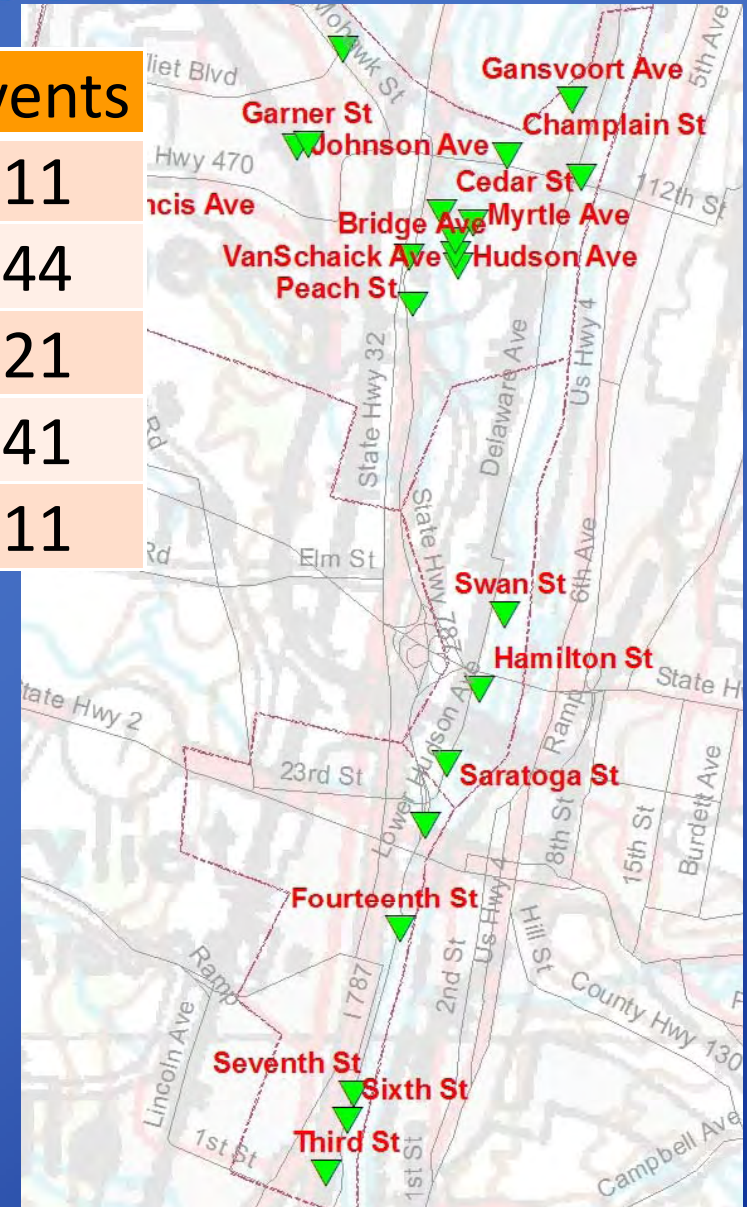
System Issues: Albany North

- **Cohoes, Green Island, and Watervliet compete with separate sanitary contributors for Hudson River Interceptor capacity**

- **Capacity of 42-inch Cohoes Interceptor**

- **13 pump stations, some with capacity limitations**

- **Multiple high frequency, low volume CSOs**

Most Active CSOs – Albany South

Location	SPDES	Mgal	Hours	Events
Big C	017	547	513	48
Bouck	013	94	637	58
Maiden/ Orange/ Steuben	029	48	496	56
Livingston/ Jackson/ Quackenbush	031	36	260	55
Division/ State/ Hudson	025	19	213	42
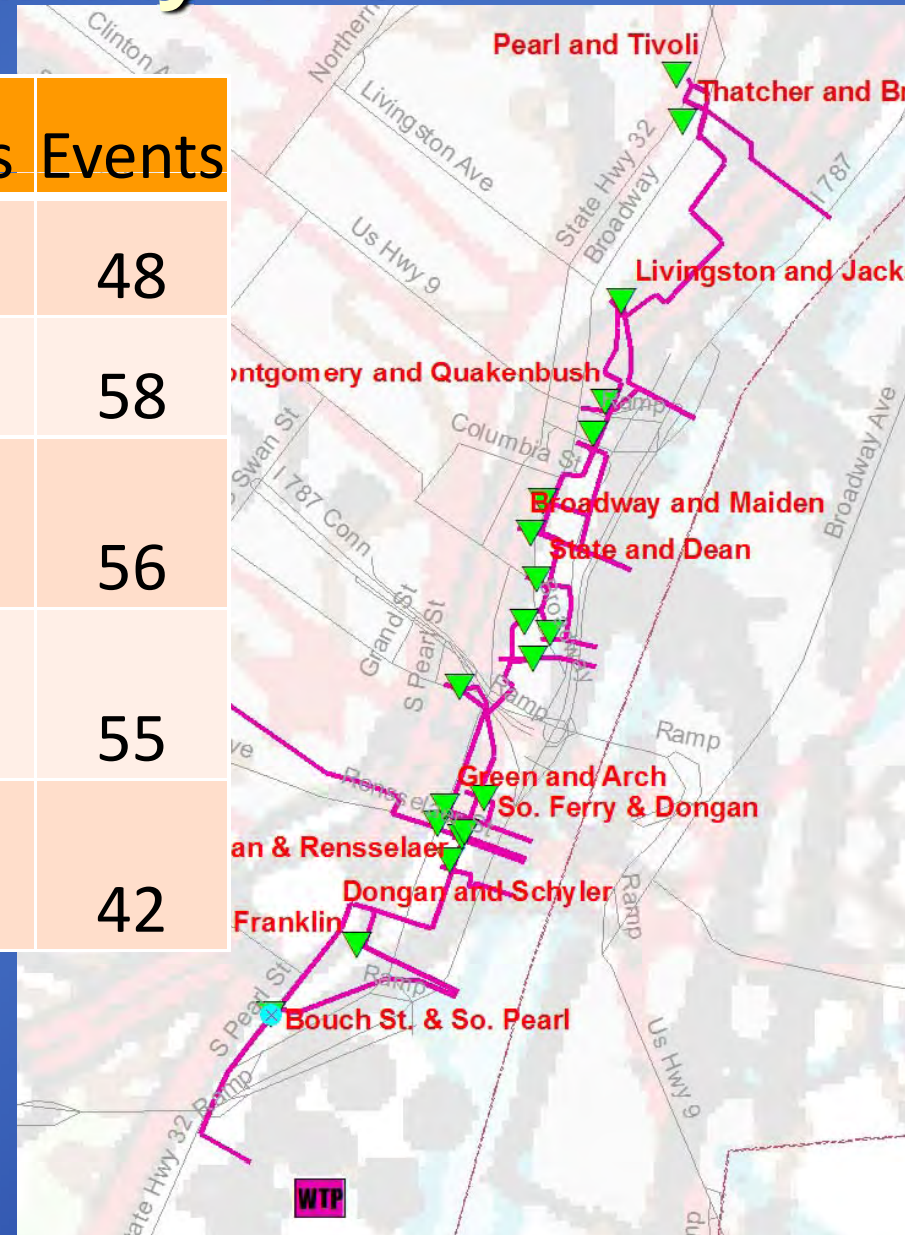
System Issues: Albany South

- **Combined sewers serve 75% of ACSD-S area**

- **Anecdotal evidence of widespread flooding**

- **Two outfalls account for 85% of CSO**
  - **Big C (017) 72%**
  - **Bouck (013) 13%**

- **High overflow frequency everywhere**

- **Peak flows far exceed WWTP capacity**

Most Active CSOs – Rensselaer

Location	SPDES	Mgal	Hours	Events
Columbia/ Second	003	8.5	109	41
Partition	006	5.6	192	40
Central/ Barnet	010	3.2	158	52
Fowler	007	1.8	108	42
Belmore	002	0.5	39	27
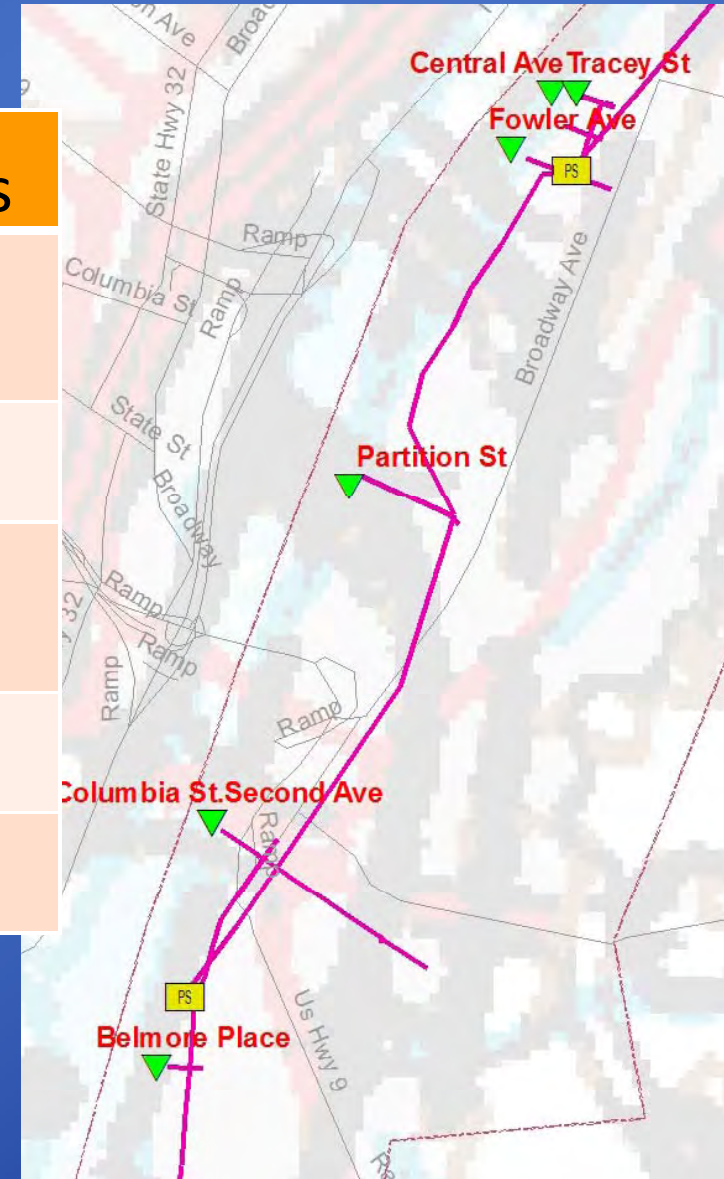
System Issues: Rensselaer

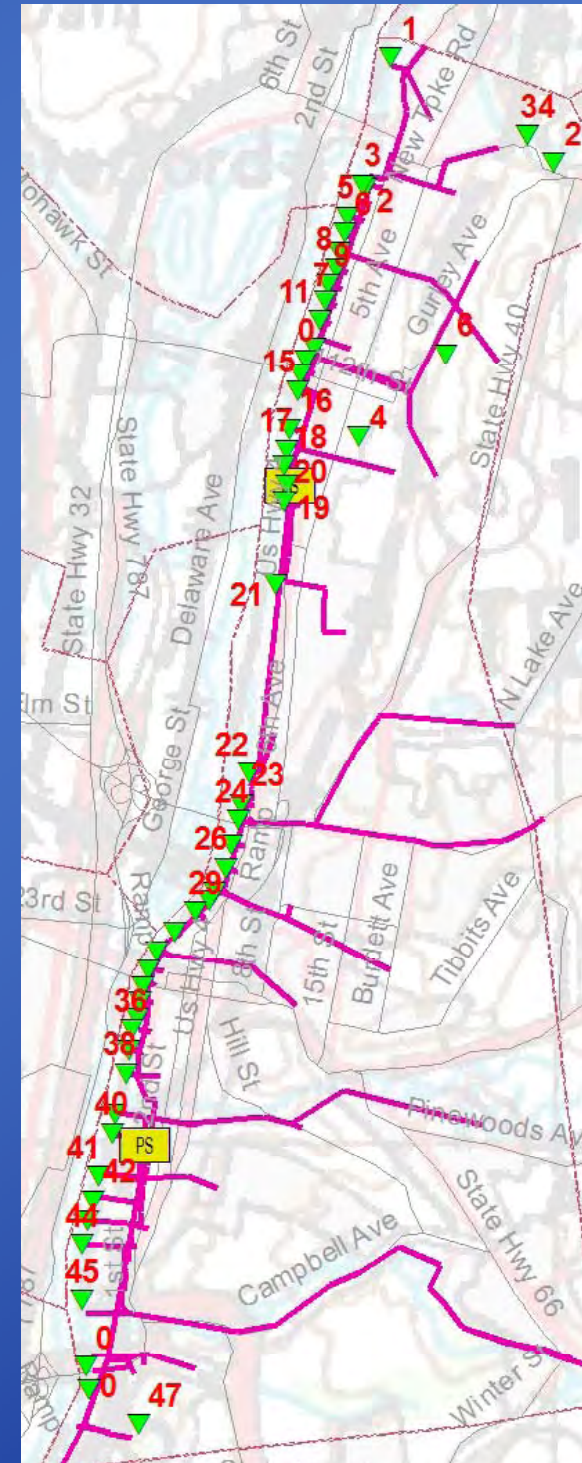- **Low CSO volume, but high frequency**
- **Pump station and force main constraints**

Most Active CSOs – Troy

Location	SPDES	MGal	Hours	Events
Liberty	035	55	518	53
State	031	54	414	52
Hoosick	024	25	99	33
Adams	037	25	346	50
Jacob	026	23	429	62
Federal	027	19	217	51

- **Four CSOs active 500-700 hours/y**
- **17 CSOs ≥50 events/y**

System Issues: Troy

- **Two confirmed and three unconfirmed DWO locations identified**

- **RCSD regulator modifications have been identified to eliminate DWOs**

- **Pump station constraints**

- **River inflow**

- **Stream connections**

Findings

- **1,250 MG CSO per year, mostly in Troy and Albany South systems**

- **Limited opportunities for optimization**

- **Few low-cost solutions**

- **DWOs in Troy; BMP solutions identified**
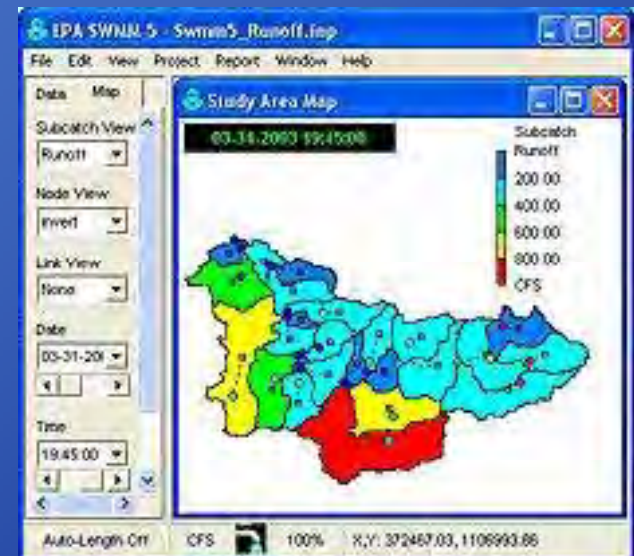
Next Steps

- **System optimization**

- **Hudson River water quality modeling**

- **Long-term solutions**
  - **Community-specific**
  - **East - west**
  - **Systemwide**