

# Northern NJ-NY-CT Nonattainment Area 2018 Ozone Season in Review

Long Island Sound Tropospheric Ozone Study (LISTOS) Meeting

Sharon Davis  
Bureau of Evaluation and Planning  
New Jersey Department of Environmental Protection

April 11, 2019

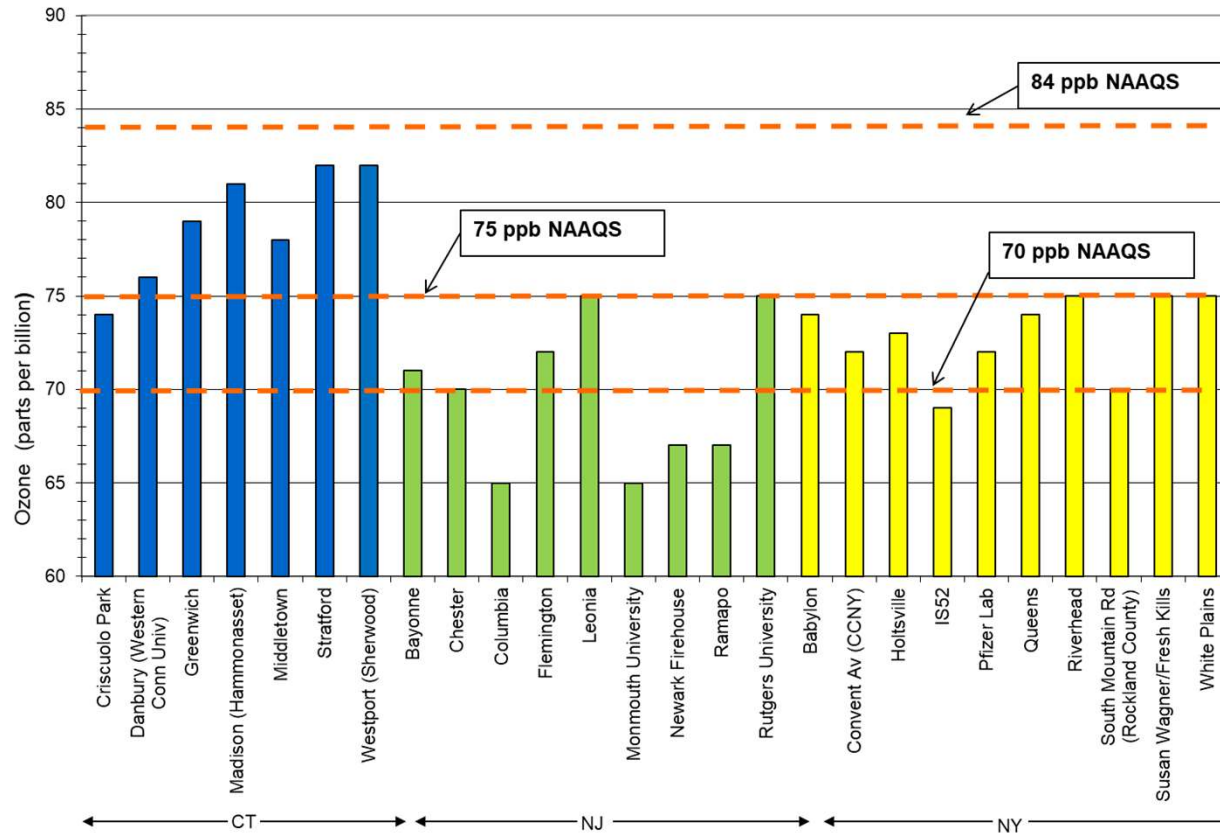
# Overview

- Focus on Northern NJ-NY-CT Nonattainment Area (NNY-NJ-CT NAA)
- DV = Design Value for 8-hour Ozone NAAQS  
(Annual 4<sup>th</sup> highest daily 8-hour concentration averaged over 3 years)
- Trends:
  - Design Values (DVs)
  - 4<sup>th</sup> Maximum Daily 8-Hour Average (ppb)
- Exceedance Days
- Characterize 2018 Summer Weather Patterns
- 2018 monitoring data is “Preliminary” until certified by the State.

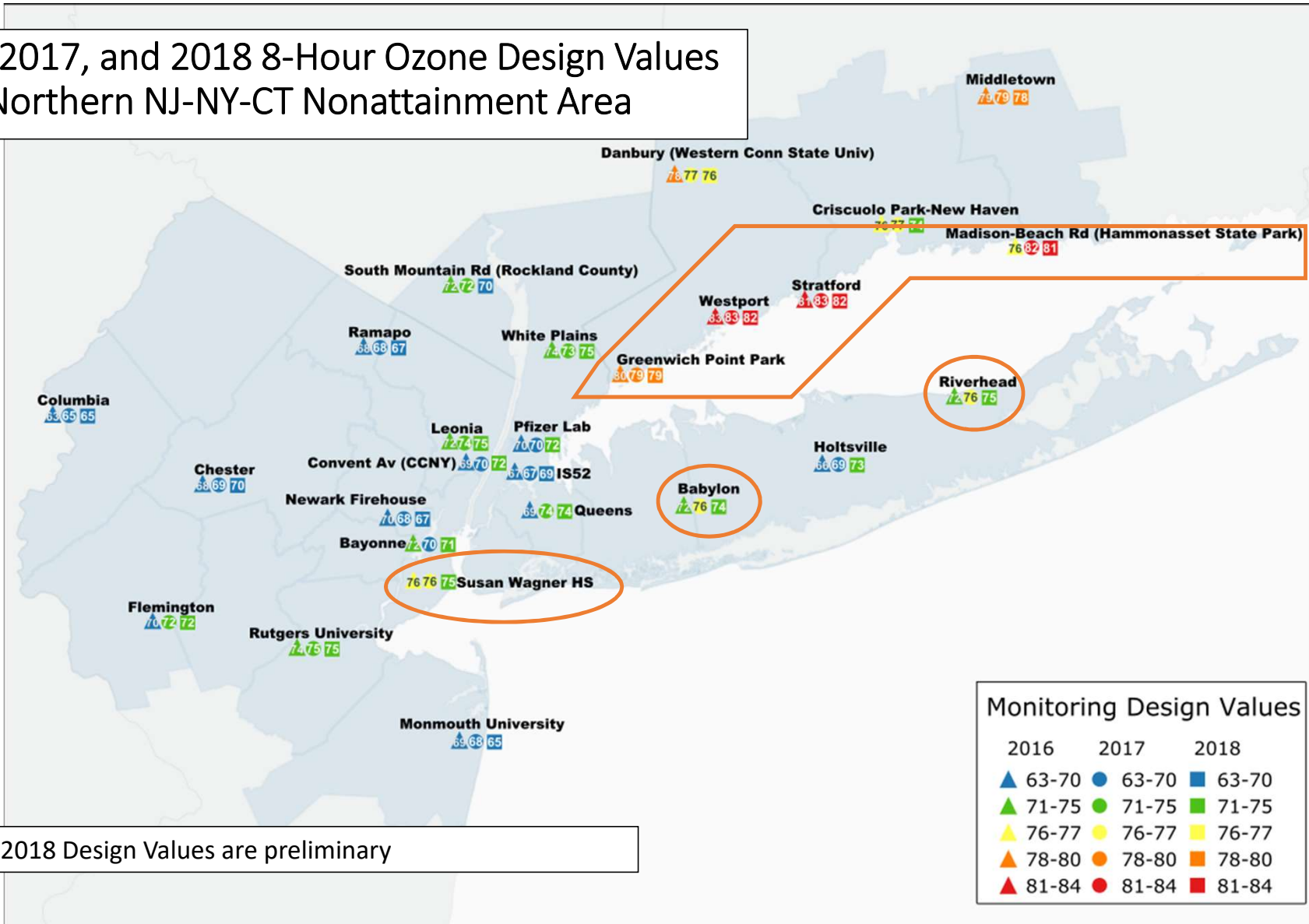
# 2018 Monitoring Data

2018			4th Max (ppb)			Design Values
AQS ID	State	Site	AQS AMP450 (7-31-18)		AirNow	Preliminary *
			2016	2017	2018	2018
090090027	CT	New Haven-Criscuolo Pk	75	75	72	74
090011123	CT	Danbury	81	72	75	76
090010017	CT	Greenwich	79	74	84	79
090099002	CT	Madison-Beach Rd	80	86	77	81
090070007	CT	Middletown	80	79	No Data	No Data
090079007	CT	Middletown-CVH	No Data	No Data	77	No Data
090013007	CT	Stratford	83	81	83	82
090019003	CT	Westport	81	81	84	82
340170006	NJ	Bayonne	68	67	78	71
340273001	NJ	Chester	67	70	73	70
340410007	NJ	Columbia	65	64	67	65
340190001	NJ	Flemington	73	72	72	72
340030006	NJ	Leonia	73	74	79	75
340250005	NJ	Monmouth University	68	60	68	65
340130003	NJ	Newark Firehouse	68	64	71	67
340315001	NJ	Ramapo	68	66	69	67
340230011	NJ	Rutgers University	75	75	76	75
361030002	NY	Babylon	73	77	74	74
360610135	NY	Convent Av	71	70	77	72
361030009	NY	Holtsville	73	71	76	73
360050110	NY	IS52	69	69	71	69
360050133	NY	Pfizer Lab	70	69	77	72
360810124	NY	Queens	71	79	73	74
361030004	NY	Riverhead	78	76	73	75
360870005	NY	South Mountain Rd	73	66	72	70
360850067	NY	Susan Wagner	77	72	No Data	No Data
360850111	NY	Fresh Kills	No Data	No Data	77	No Data
361192004	NY	White Plains	75	72	78	75

## Preliminary 8-hour Ozone Design Values 2016-2018 Northern NJ-NY-CT Nonattainment Area

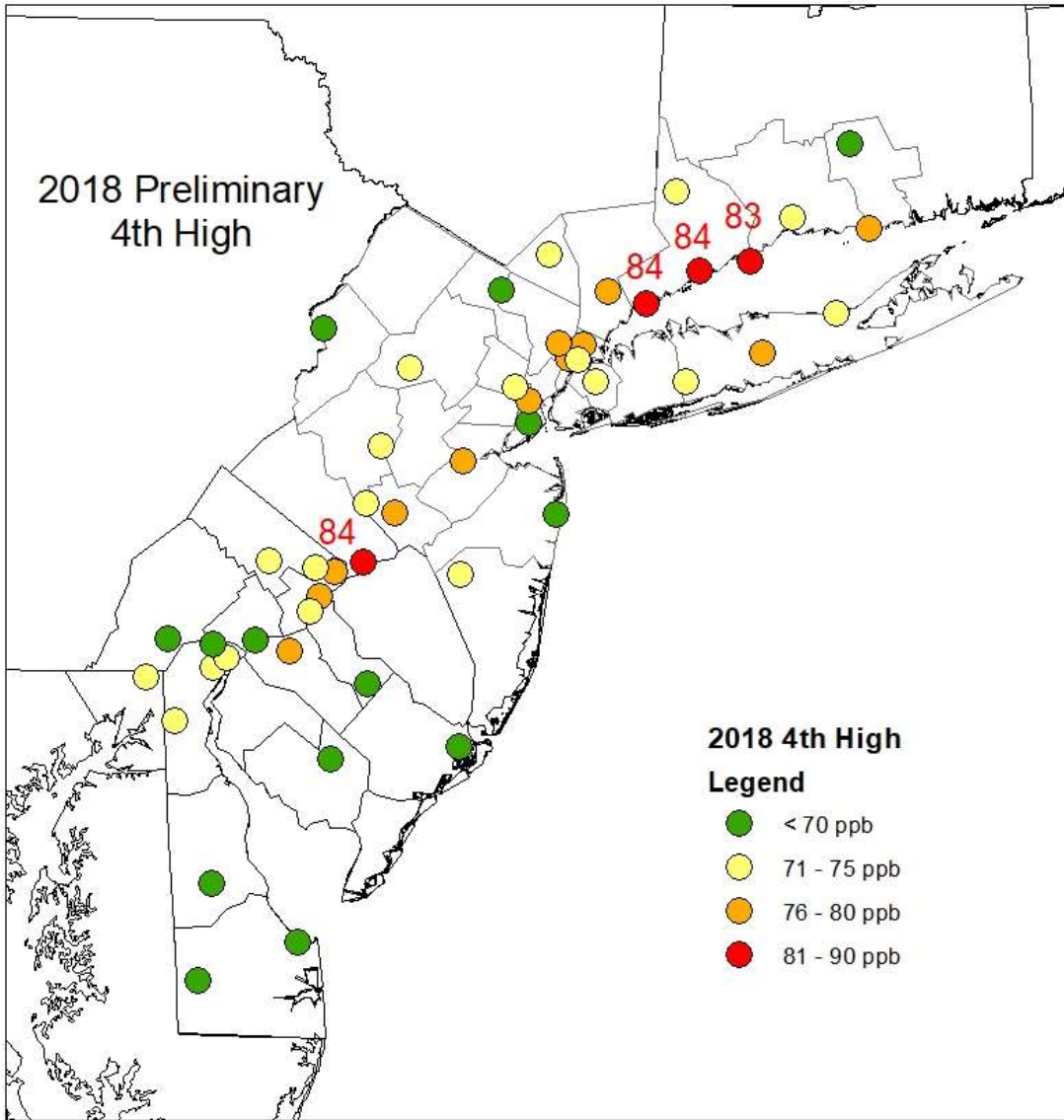


# 2016, 2017, and 2018 8-Hour Ozone Design Values Northern NJ-NY-CT Nonattainment Area



**Note:** 2018 Design Values are preliminary

2018 Preliminary  
4th High

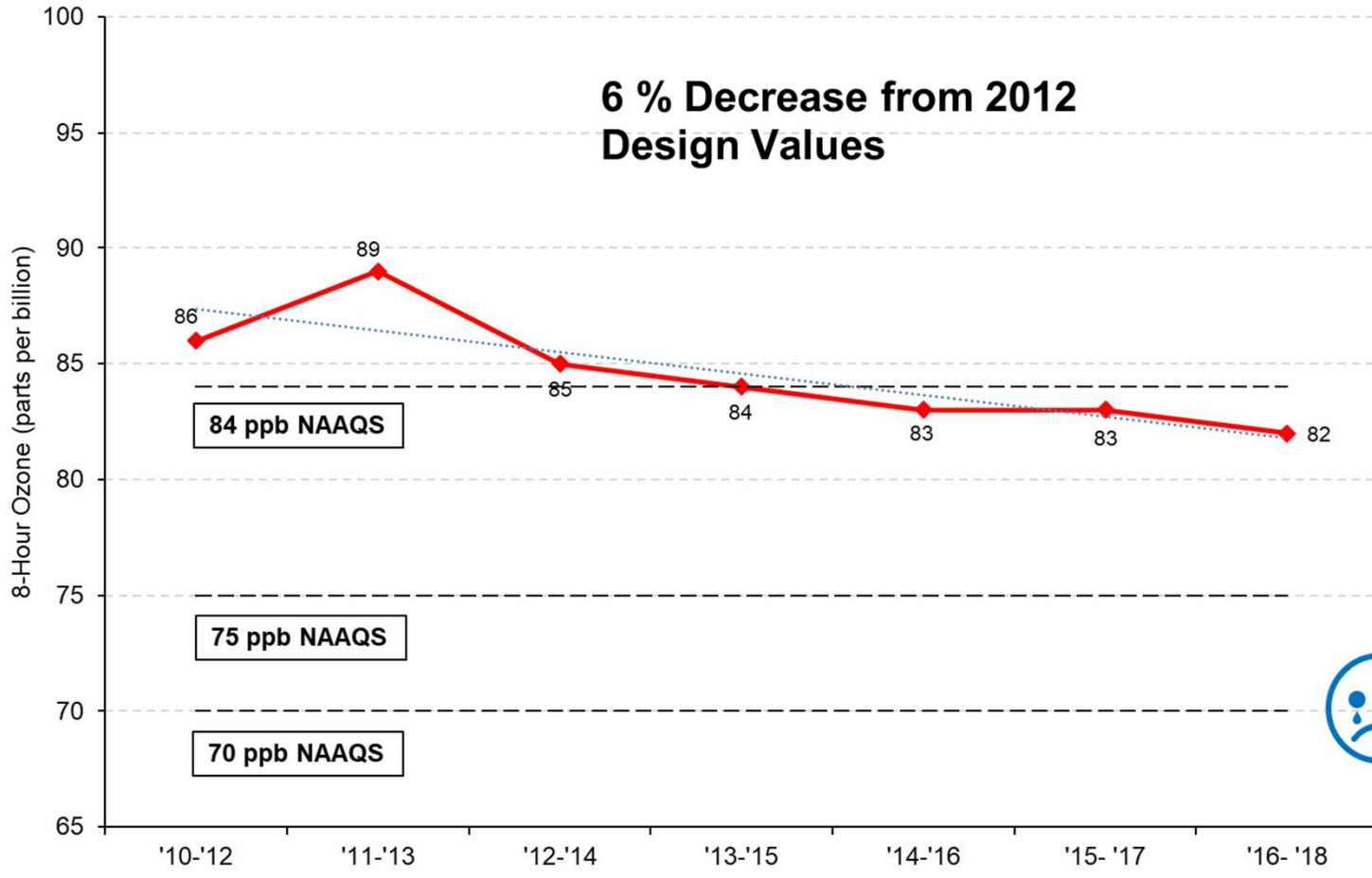


2018 Preliminary  
4<sup>th</sup> High –  
Combined NJ  
Nonattainment  
Areas

# 8-Hour Ozone Design Value Trends 2012 - 2018

Northern NJ-NY-CT Nonattainment Area

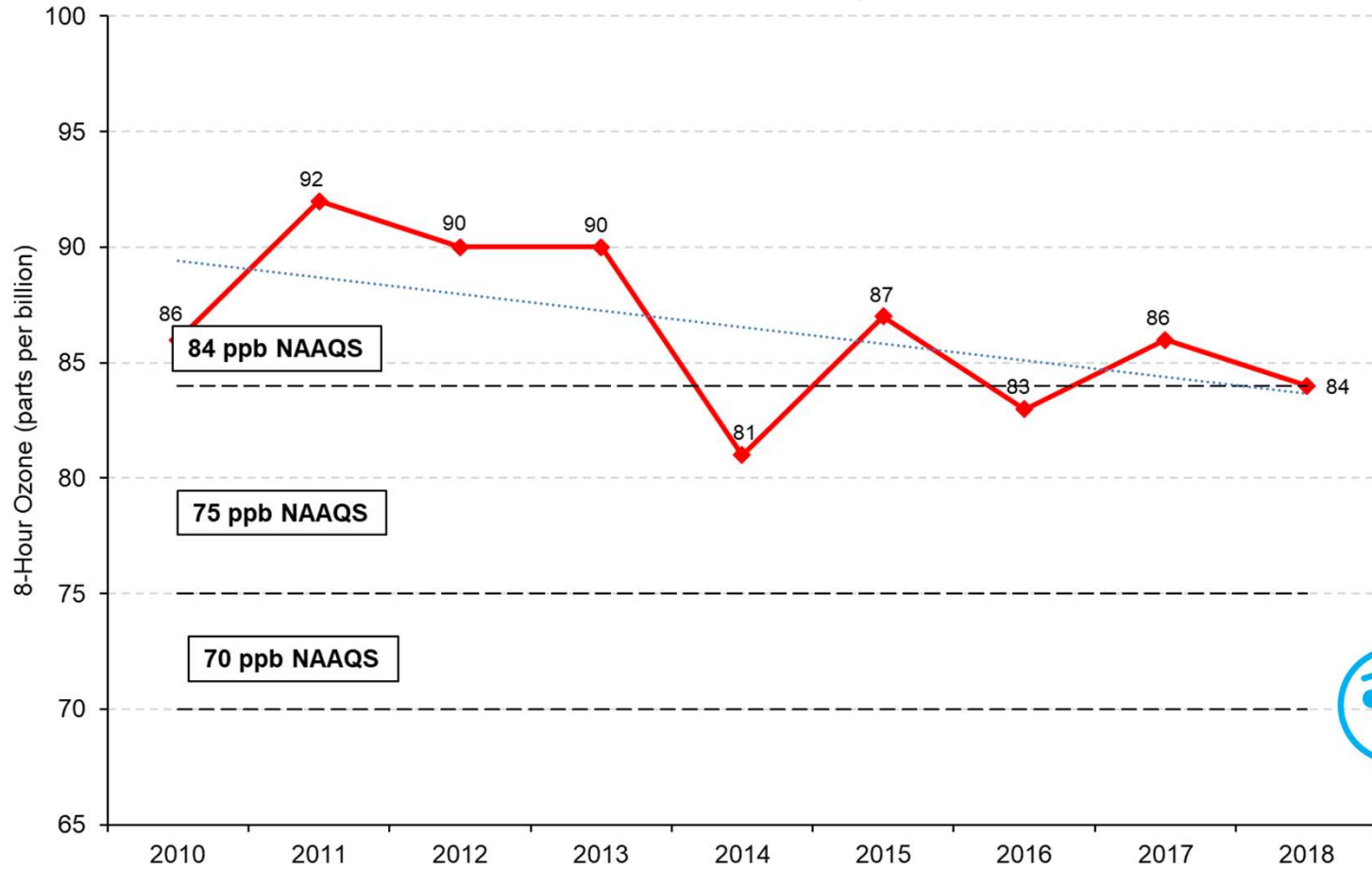
2016-2018 Design Values are Preliminary



# 8-Hour Ozone 4th High Trends 2010 - 2018

## Northern NJ-NY-CT Nonattainment Area

2018 Values are Preliminary





# 2018 OZONE EXCEEDANCE DAYS

 = Northern NJ-NY-CT Nonattainment Area Exceedances

April						
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

May						
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

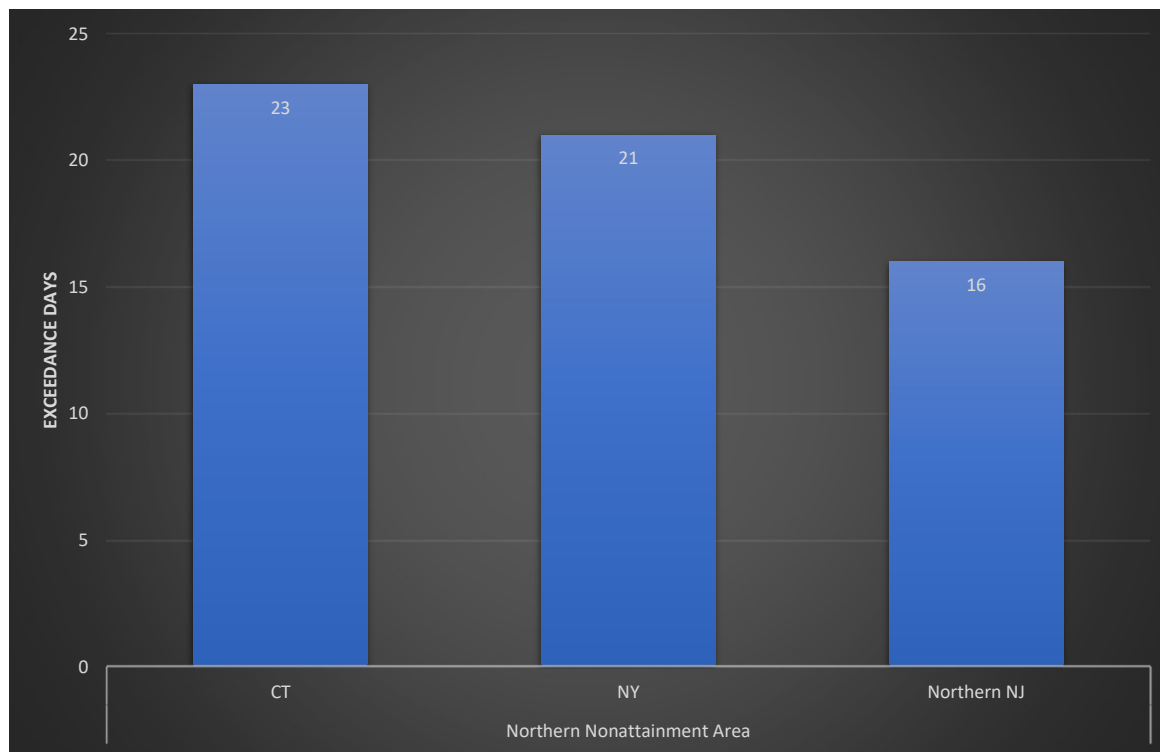
June						
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

July						
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

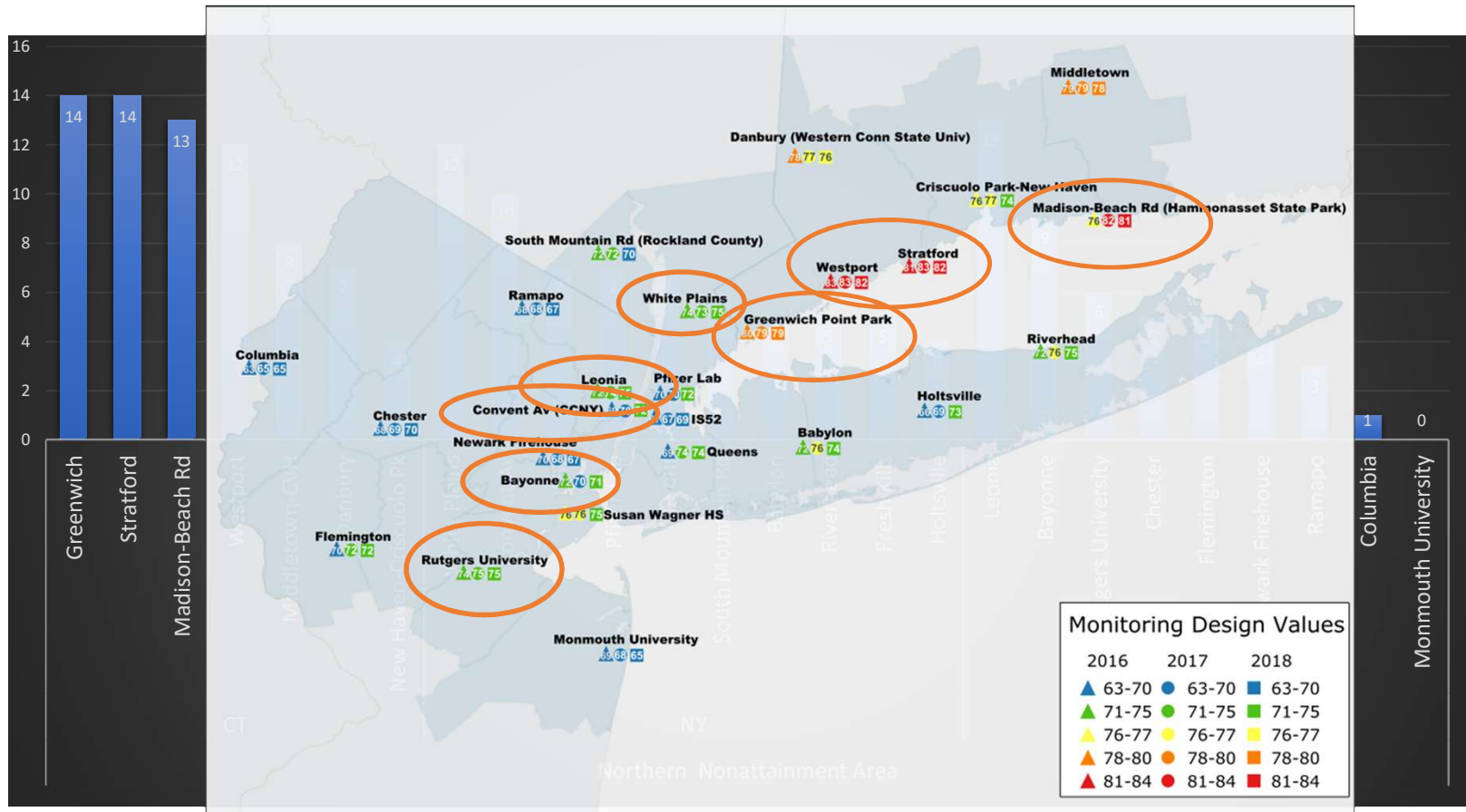
August						
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

September						
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

# 2018 Number of Exceedance Days



# Number of Exceedances per site



# New Jersey “Binning” Analysis

- Goals to improve forecasting analyses and uncover patterns for isolated events
- Data analyzed included:
  - Daily weather features: Temperature, Wind Direction, Humidity, etc.
  - Upper air data
  - Surface Data
  - Cloud cover
- Identified 4 Bins
  - #1 – Bermuda High
  - #2 – Southeastern US High
  - #3 – Mid-Atlantic High
  - #4 – Locally and Regionally Generated

# Characterizing Summer 2018 weather

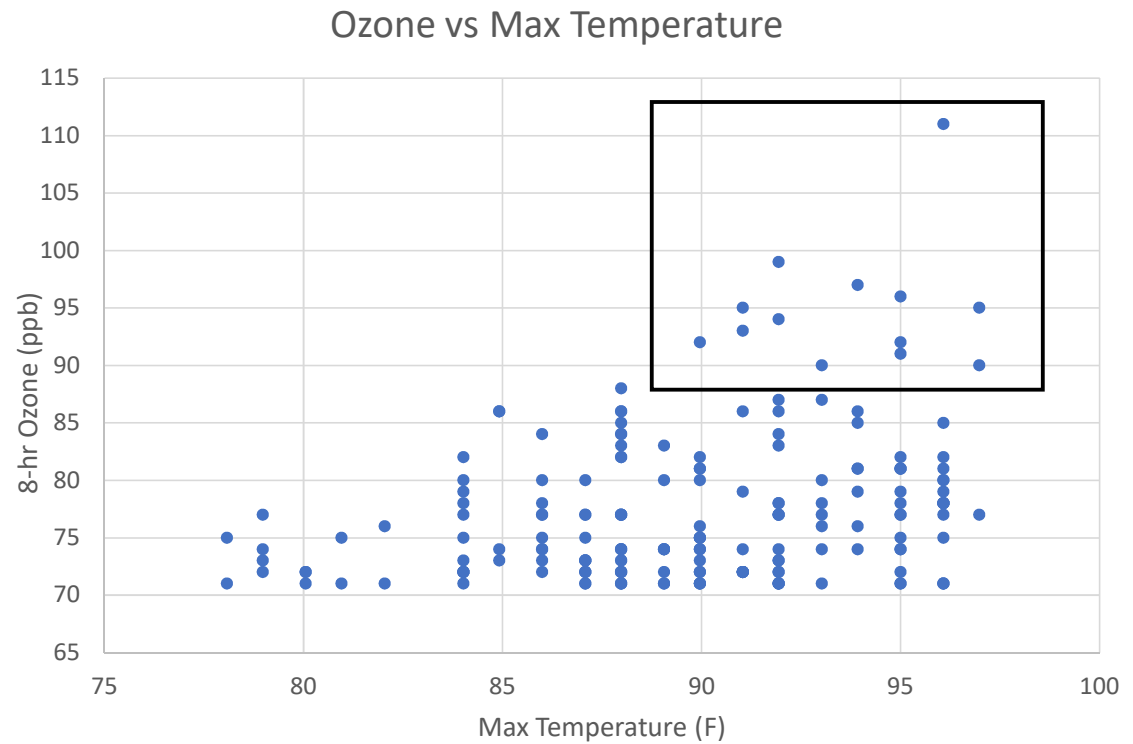
- Variable and unpredictable weather pattern
- High pressure tended to be over the Mid-Atlantic
- Stalled frontal boundaries were frequent
- Hot, Humid, and Rainy

# Ozone vs Max Temperature

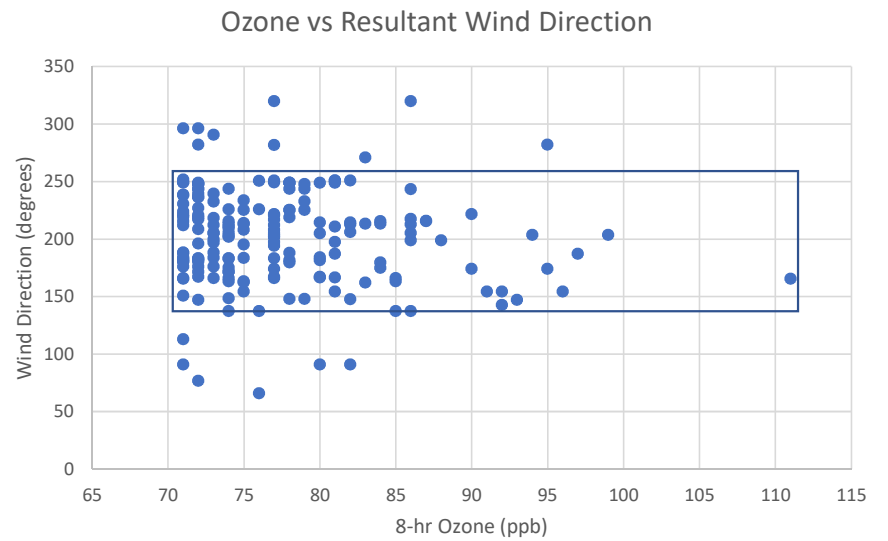
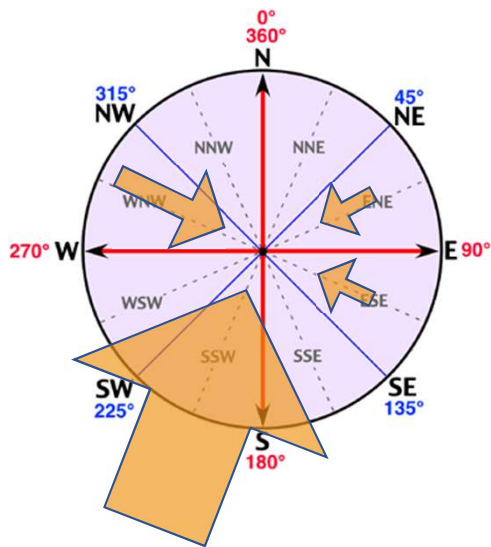
On highest ozone concentration days it was HOT!

Higher temperature range compared to 2017

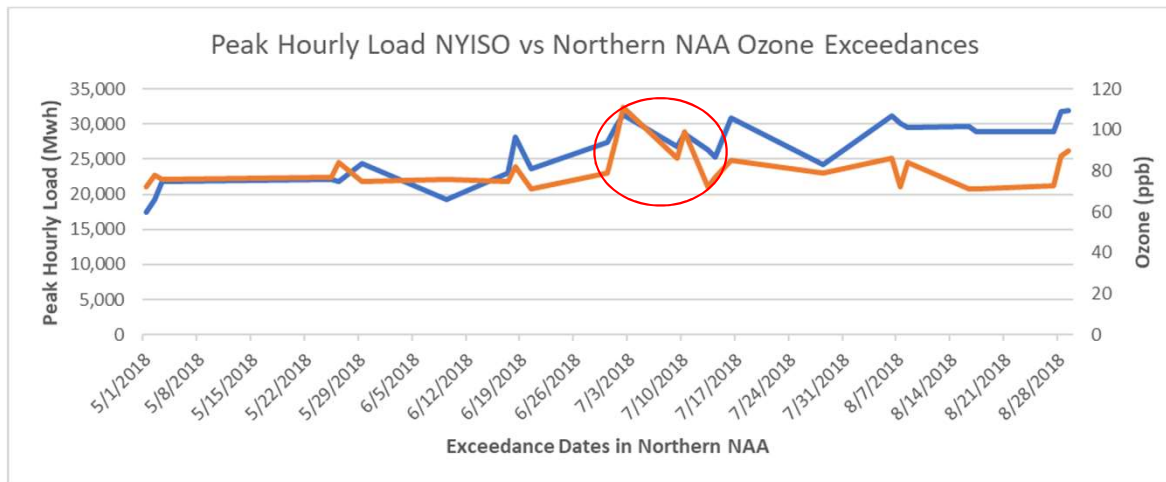
Higher ozone values compared to 2017



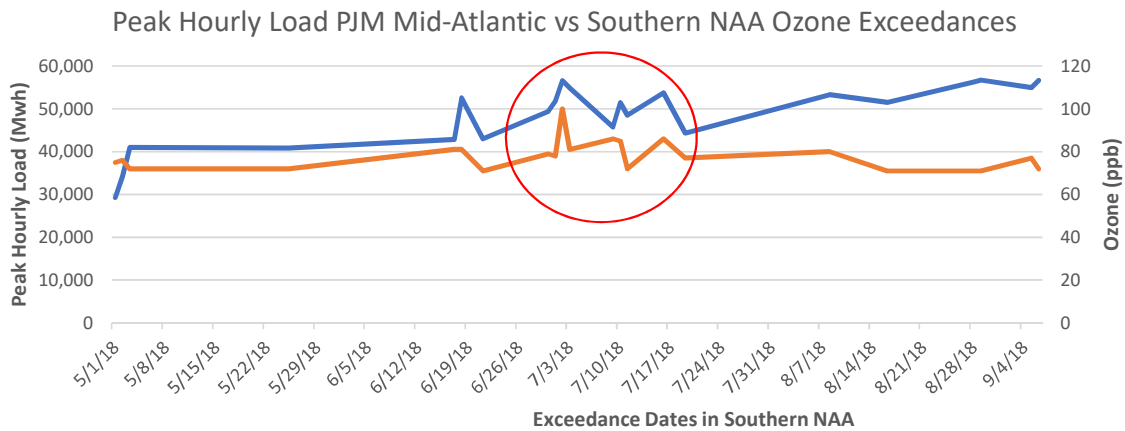
# Ozone vs Resultant Wind Direction



# Peak Load



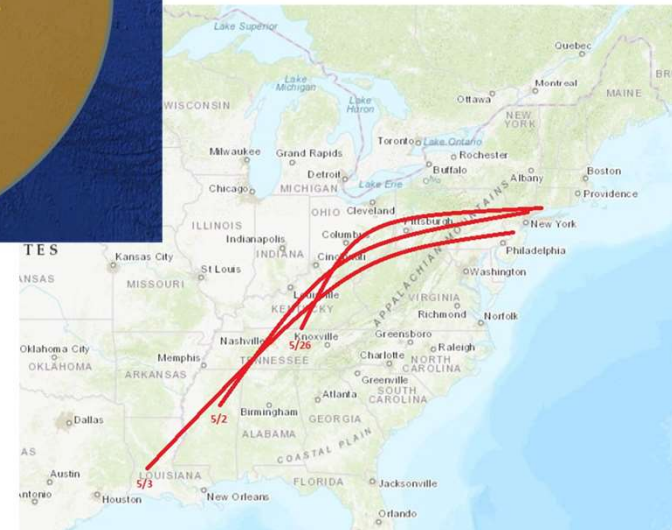
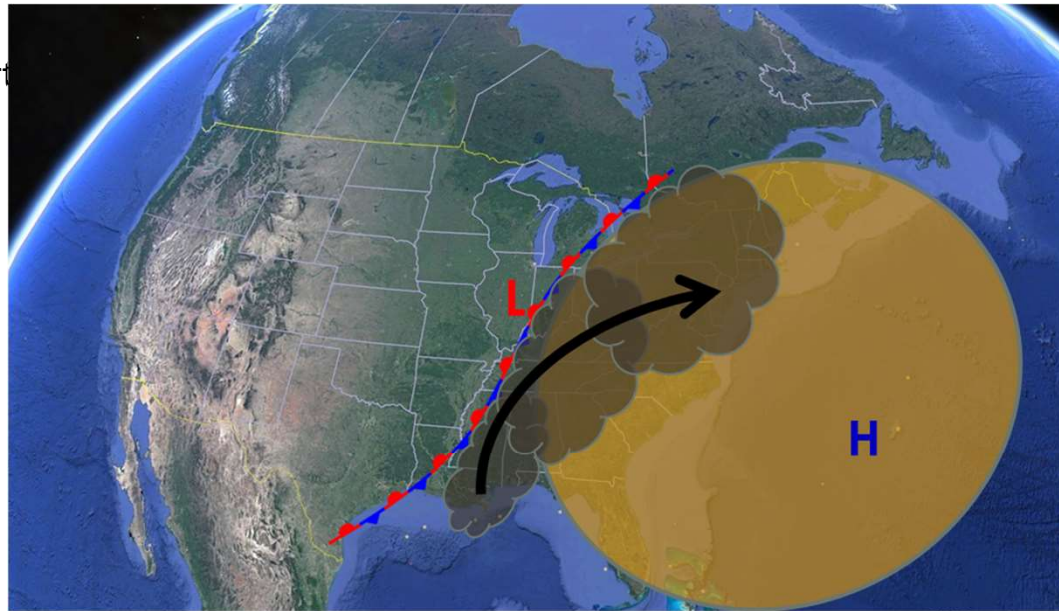
— Ozone concentrations  
— Peak Load





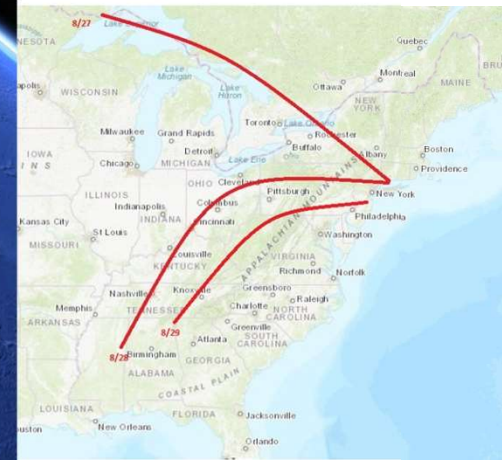
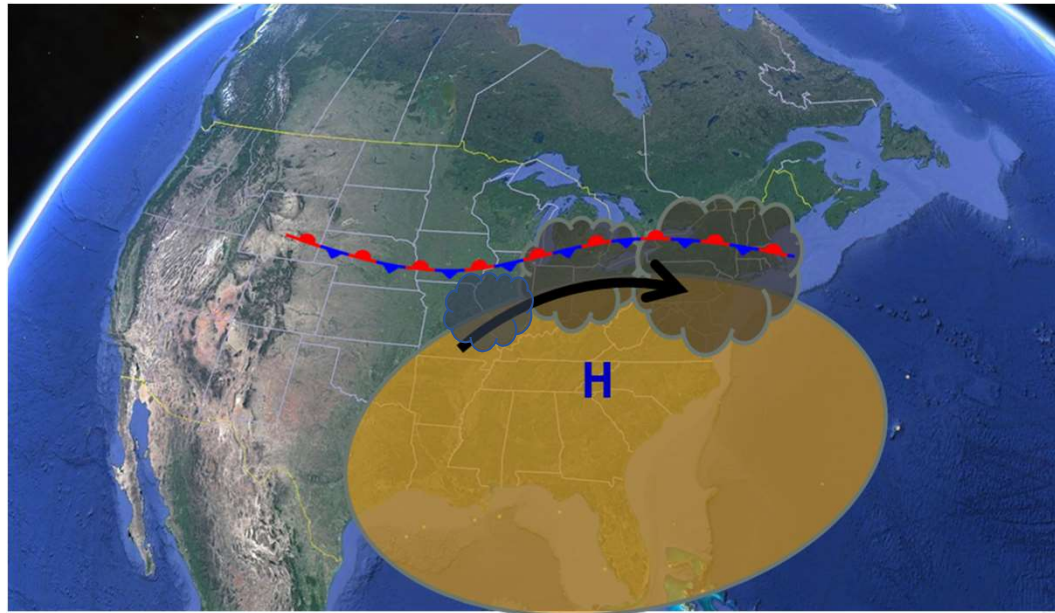
# Bin #1: Bermuda High “Classic Ozone Event” (Mississippi & Ohio River Valley)

- Typically, best scenario for widespread transport from polluted areas in the south
- Warm advection with southwesterly winds
- Hazy, hot, & humid
- Ample sunshine
- Potential for surface trough development
- Elevated humidity leading to higher fine particulates

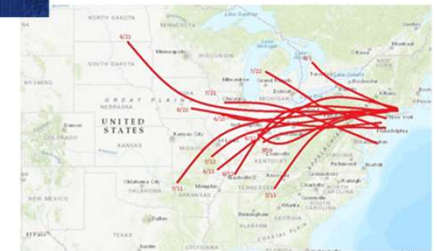


## Bin #2: Southeastern US High (Great lakes & Ohio River Valley)

- Provides transport from the Great Lakes Region and Ohio River Valley
- Ample sunshine
- Hot temperatures
- Center of the high typically located in the Southeastern U.S. or just off eastern seaboard
- Likely to develop surface trough
- Zonal upper level pattern producing westerly transport aloft



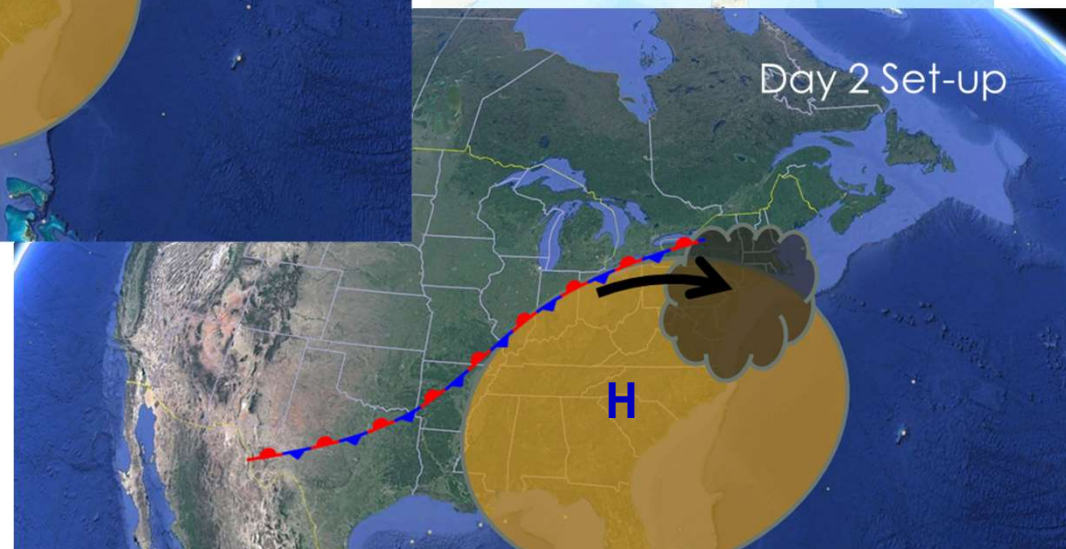
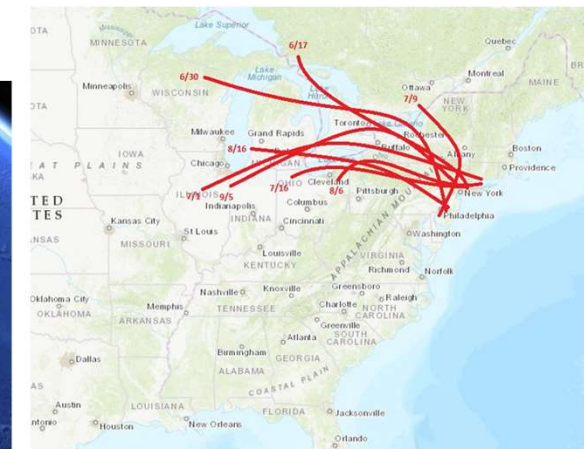
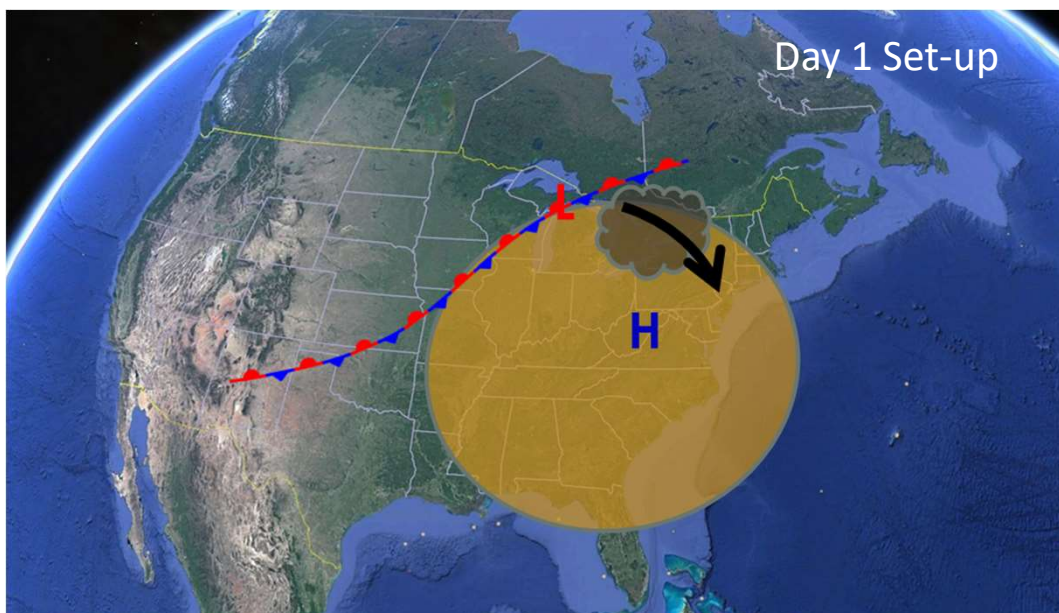
2017





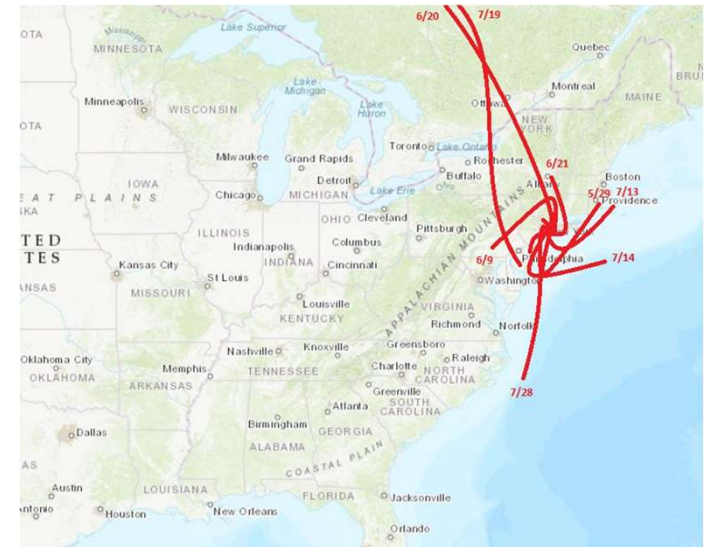
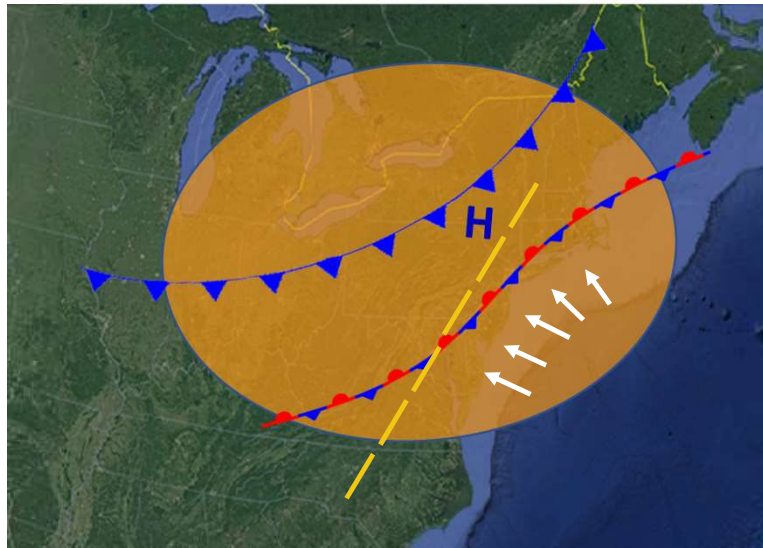
## Bin #3: Mid-Atlantic High (Mid-Atlantic States and local)

- Typically occurs as a multi day event
- Occurs in combination with approaching front from the Great Lakes
- Mostly sunny skies
- Hot temperatures
- May develop surface trough
- Center of the high typically located over the Mid-Atlantic States
- Close proximity to center of high results in stagnant winds at surface and aloft.
- Stagnant winds aloft produce short trajectories from the Ohio Valley on Day 2.



## Bin #4: Locally & Regionally Generated

- Stalled/slowly approaching frontal boundaries
- High pressure over head
- Seabreeze
- Surface trough



# Conclusions

- Slight trend in ozone air quality improvement
- Connecticut monitors seeing highest DV's and exceedance events
- Bin #3 – Mid-Atlantic High dominant weather pattern
- Classic transport patterns (Bermuda and Mid-Atlantic Highs) set up wide-spread ozone events
- Local and isolated events occur when no clear pattern sets up.
- **NJ 2019 Goals:** Continue to learn about the development of locally generated events and be observant of new weather patterns developing.