Ozone National Ambient Air Quality Standard Health Exceedances on July 1, 2018

Exceedance Locations and Levels

On Sunday, July 1, 2018, there were four (4) exceedances in New Jersey of the National Ambient Air Quality Standard (NAAQS) for ozone (daily maximum 8-hour average of 70 ppb). See Table 1.

Table 1. New Jersey 8-hr Maximum Ozone Concentrations on July 1, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	66
Bayonne	95
Brigantine	58
Camden Spruce St	75
Chester	51
Clarksboro	71
Colliers Mills	70
Columbia	51
Flemington	65
Leonia	90
Millville	62
Monmouth University	64
Newark Firehouse	68
Ramapo	55
Rider University	65
Rutgers University	60
Washington Crossing*	No Data
TOTAL EXCEEDANCES	4

*The Washington Crossing station is operated and maintained by EPA as part of the nationwide Clear Air Status and Trends Network (CASTNET).

From the out-of-state stations within New Jersey's ozone non-attainment areas, there were thirteen (13) exceedances of the ozone NAAQS. See Table 2.

Table 2. 8-hr Maximum Ozone Concentrations for Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on July 1, 2018

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	48
CT	Greenwich	57

CT	Madison-Beach Road	77
CT	Middletown-CVH-Shed	55
CT	New Haven	59
CT	Stratford	75
CT	Westport	62
DE	BCSP (New Castle Co.)	60
DE	BELLFNT2 (New Castle Co.)	64
DE	KILLENS (Kent Co.)	67
DE	LEWES (Sussex Co.)	66
DE	LUMS 2 (New Castle Co.)	65
DE	MLK (New Castle Co.)	68
DE	SEAFORD (Sussex Co.)	65
MD	Fair Hill	63
NY	Babylon	81
NY	Bronx - IS52	71
NY	CCNY	82
NY	Holtsville	79
NY	Pfizer Lab	69
NY	Queens	80
NY	Riverhead	69
NY	Rockland Cty	56
NY	White Plains	64
NY	Fresh Kills	77
PA	BRIS (Bucks Co.)	78
PA	CHES (Delaware Co.)	66
PA	NEWG (Chester Co.)	60
PA	NORR (Montgomery Co.)	71
PA	LAB (Philadelphia Co.)	71
PA	NEA (Philadelphia Co.)	76
PA	NEW (Philadelphia Co.)	75
	TOTAL EXCEEDANCES	13

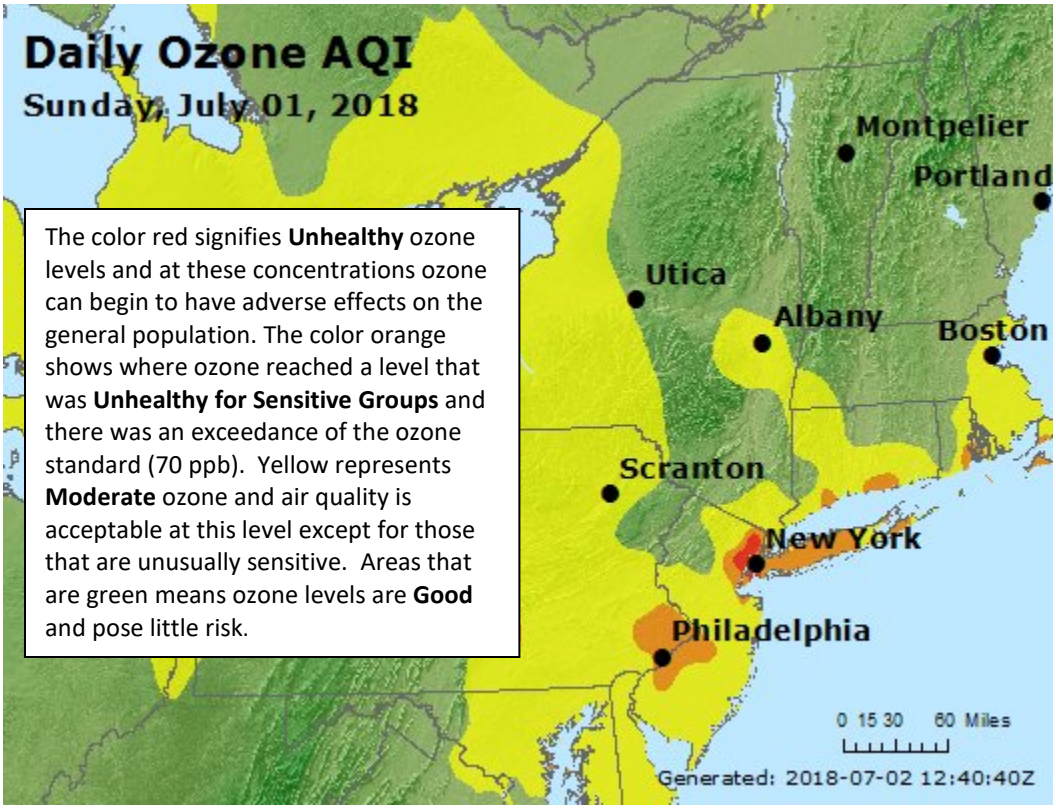
The number of days in 2018 on which exceedances of the ozone NAAQS were recorded for all the states is summarized in Table 3. Figure 1 shows graphically the region's ozone concentrations on July 1, 2018.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2018

STATE	# of Days NAAQS was Exceeded January 1 – July 1, 2018 NAAQS = 70 ppb
Connecticut	8

Delaware	4
Maryland	4
New Jersey	10
New York	9
Pennsylvania	7

Figure 1. Ozone Air Quality Index for July 1, 2018



Source: www.airnow.gov

For ozone terminology definitions see NJDEP Air Quality Planning's Glossary and Acronyms webpage: http://nj.gov/dep/baqp/glossary.html

Weather

Meteorological observations from across the region show that temperatures on July 1st reached the mid-upper 90s with high humidity. Sunday, July 1st was the second day in a multi-day ozone event where high pressure remained in place as the dominant weather feature. High pressure continued to build over the region and remained anchored over the Mid-Atlantic supplying the area with hot temperatures, mostly sunny skies, and light/variable winds. Strong upper level ridge provided light winds aloft transporting air from a region that was saw moderate and isolated USG air quality the day before. In addition, upper level ridging allowed warm air to surge northward promoting favorable temperatures

aloft for ozone production. In addition, localized transport from the Philadelphia and New York City metropolitan areas likely played a factor in contributing to the ozone exceedances observed in New Jersey.

Where Did the Air Pollution that Caused Ozone Come From?

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedance July 1, 2018. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Ten (10) monitoring stations with an 8-hr ozone exceedance were used to run back trajectories. The selected sites and the maximum 8-hr ozone level recorded are listed in Table 4 below:

Table 4. Monitoring Stations with 8-hr Ozone Exceedances that Were Selected to Run 48-hr Back Trajectories

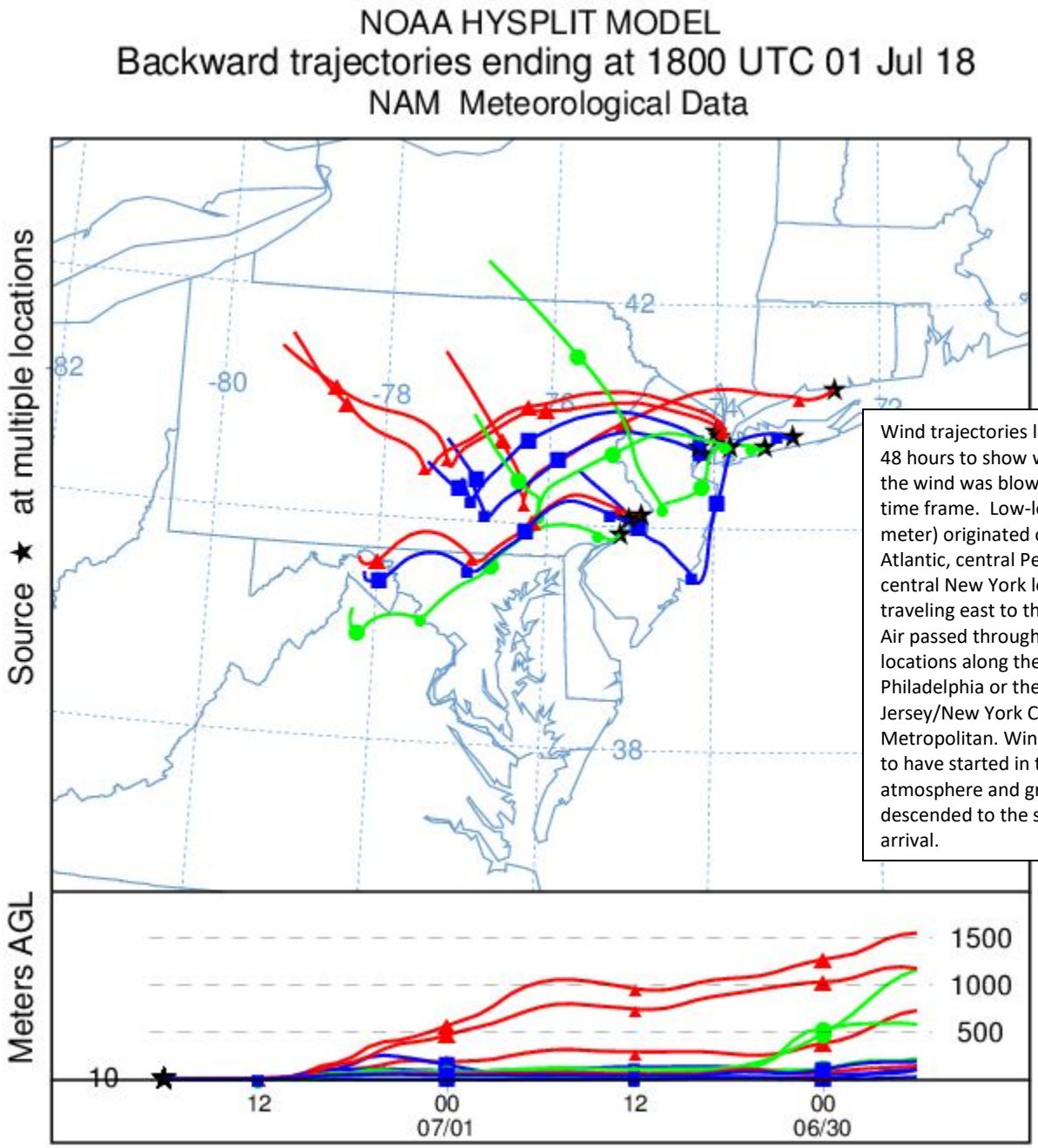
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Madison – Beach Road	77
NJ	Bayonne	95
NJ	Camden – Spruce Street	75
NJ	Leonia	90
NY	Babylon	81
NY	CCNY	82
NY	Holtsville	79
NY	Queens	80
PA	BRIS (Bucks Co.)	78
PA	NEA (Philadelphia Co.)	76

Surface level back trajectories (Figure 2) originated in in varying locations west of their destinations in the mid- to upper-atmosphere. Air affecting the Philadelphia Metropolitan area originated near the West Virginia/Maryland/Virginia border while air affecting more northern locations originated in central Pennsylvania and/or in the Twin Tiers location of New York/Pennsylvania. As air traveled east, it descended in the atmosphere and tended to slow in the early morning hours of June 30th as it was under the influence of multiple high pressure centers. Air then traveled directly to its endpoint through various urban locations including Philadelphia and Northern New Jersey/New York City metropolitan areas. Air traveled along the surface at this time picking up emissions from cars, trucks, and industry along the way. Mid-level back trajectories (Figure 3) show that air affecting northern locations of our nonattainment area originated in the upper atmosphere over the Great Lakes/Ohio River Valley region before traveling east toward the Hudson Valley though early July 1st. Air gradually descended in the atmosphere during this time and briefly recirculated while passing through portions of Pennsylvania and Western New York. Once over the Hudson Valley, air turned more south to its destination, passing through portions of the New York City Metropolitan area as well as the Long Island Sound. Meanwhile, mid-level back trajectories show that air affecting the Philadelphia Metropolitan area originated more in the Two Tiers region of New York/Pennsylvania. Air traveled southward through early June 30th,

recirculated in the southern Pennsylvania or central Maryland vicinity, and then traveled generally east through the Philadelphia Metropolitan area through arrival. Finally, upper-level back trajectories (Figure 4) were mostly influenced by the large ridge of high pressure noted over the eastern half of the United States. Air originated over the Great Lakes region and traveled generally east then southeast through New York and Pennsylvania respectively. There was some slight variation in path noted which was due to location relative to the high pressure center.

Figures 5 and 6 show air quality in the United States for June 29th and 30th. Back trajectories for the July 1st exceedances show that polluted air from the Great Lakes/Ohio River Valley region had multiple opportunities to be transported to our nonattainment area, enhancing an already polluted atmosphere.

Figure 2. 48-hour Back Trajectories for July 1, 2018 at 10 meters



Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. Low-level winds (10 meter) originated over the Mid-Atlantic, central Pennsylvania or central New York locations before traveling east to their endpoints. Air passed through various urban locations along the way such as Philadelphia or the Northern New Jersey/New York City Metropolitan. Winds were noted to have started in the upper atmosphere and gradually descended to the surface through arrival.

Figure 3. 48-hour Back Trajectories for July 1, 2018 at 500 meters

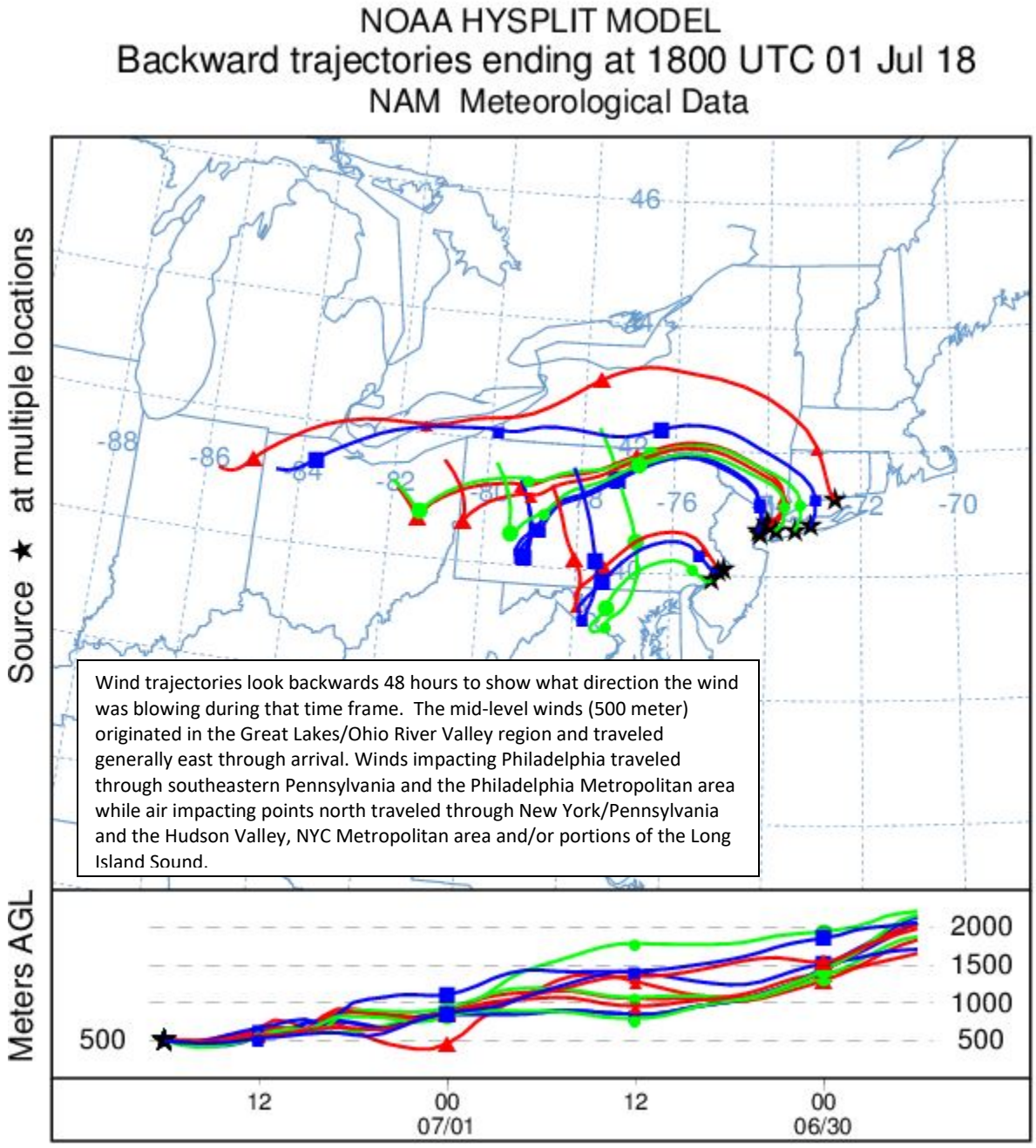


Figure 4. 48-hour Back Trajectories for July 1, 2018 at 1500 meters

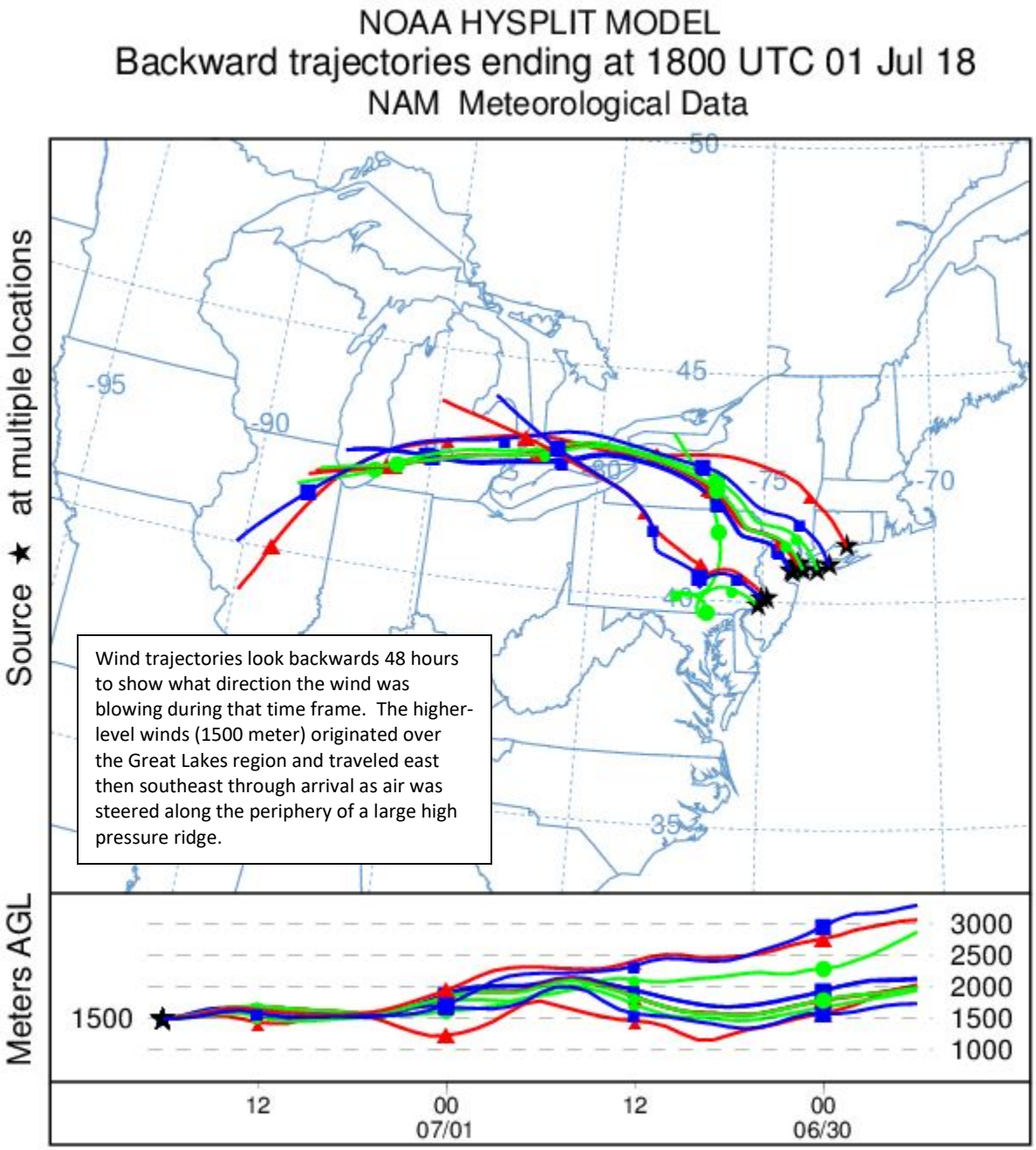


Figure 5. Ozone Air Quality Index for the United States on June 29, 2018

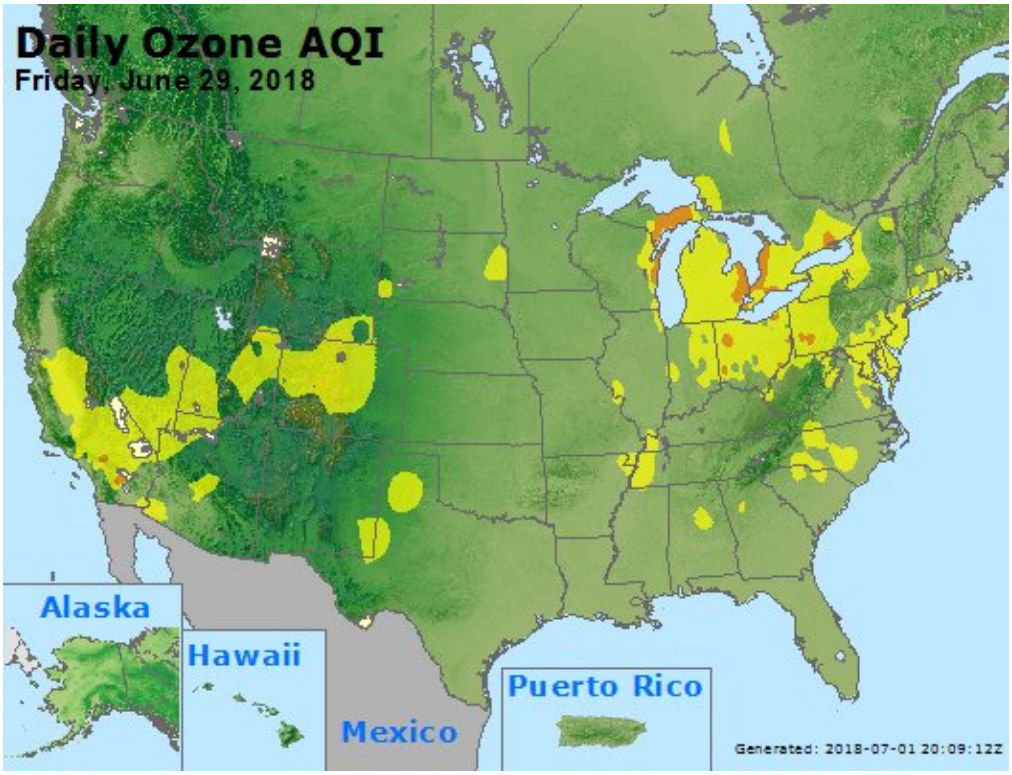
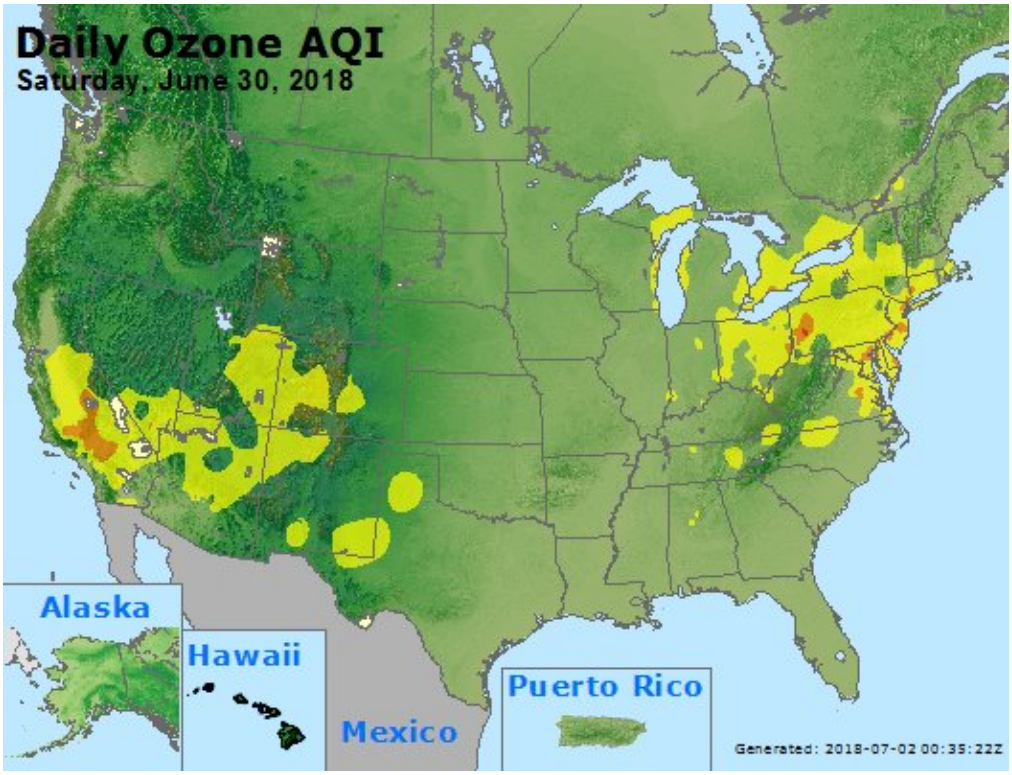


Figure 6. Ozone Air Quality Index for the United States on June 30, 2018



How is Ozone Created?

Ground-level ozone is an air pollutant known to cause a number of health effects and negatively impact air quality and the environment in New Jersey. Ozone is formed when oxides of nitrogen (NOx) and volatile organic compounds (VOCs) react in the presence of sunlight. Ozone can irritate any person's lungs, but the effect may be more pronounced for those with existing lung-related deficiencies, and therefore, one should take extra precautions on bad ozone days.

Find Out About Air Quality Every Day

The "What's Your Air Quality Today?" page at http://www.nj.gov/dep/cleanairnj/ tells you how to sign up to receive notifications and find out when your local air has reached unhealthy ozone levels.