Ozone National Ambient Air Quality Standard Health Exceedances on July 2, 2018

Exceedance Locations and Levels

On Monday, July 2, 2018, there were eight (8) 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 2, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	56
Bayonne	92
Brigantine	44
Camden Spruce St	68
Chester	81
Clarksboro	55
Colliers Mills	60
Columbia	63
Flemington	97
Leonia	91
Millville	44
Monmouth University	60
Newark Firehouse	96
Ramapo	85
Rider University	91
Rutgers University	75
Washington Crossing*	No Data
TOTAL EXCEEDANCES	8

*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 seventeen (17) 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 2, 2018

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	92
CT	Greenwich	72

CT	Madison-Beach Road	71
CT	Middletown-CVH-Shed	58
CT	New Haven	67
CT	Stratford	72
CT	Westport	64
DE	BCSP (New Castle Co.)	65
DE	BELLFNT2 (New Castle Co.)	60
DE	KILLENS (Kent Co.)	56
DE	LEWES (Sussex Co.)	50
DE	LUMS 2 (New Castle Co.)	59
DE	MLK (New Castle Co.)	65
DE	SEAFORD (Sussex Co.)	52
MD	Fair Hill	53
NY	Babylon	83
NY	Bronx - IS52	74
NY	CCNY	86
NY	Holtsville	82
NY	Pfizer Lab	85
NY	Queens	76
NY	Riverhead	61
NY	Rockland Cty	111
NY	White Plains	93
NY	Fresh Kills	81
PA	BRIS (Bucks Co.)	91
PA	CHES (Delaware Co.)	65
PA	NEWG (Chester Co.)	50
PA	NORR (Montgomery Co.)	73
PA	LAB (Philadelphia Co.)	68
PA	NEA (Philadelphia Co.)	88
PA	NEW (Philadelphia Co.)	79
	TOTAL EXCEEDANCES	17

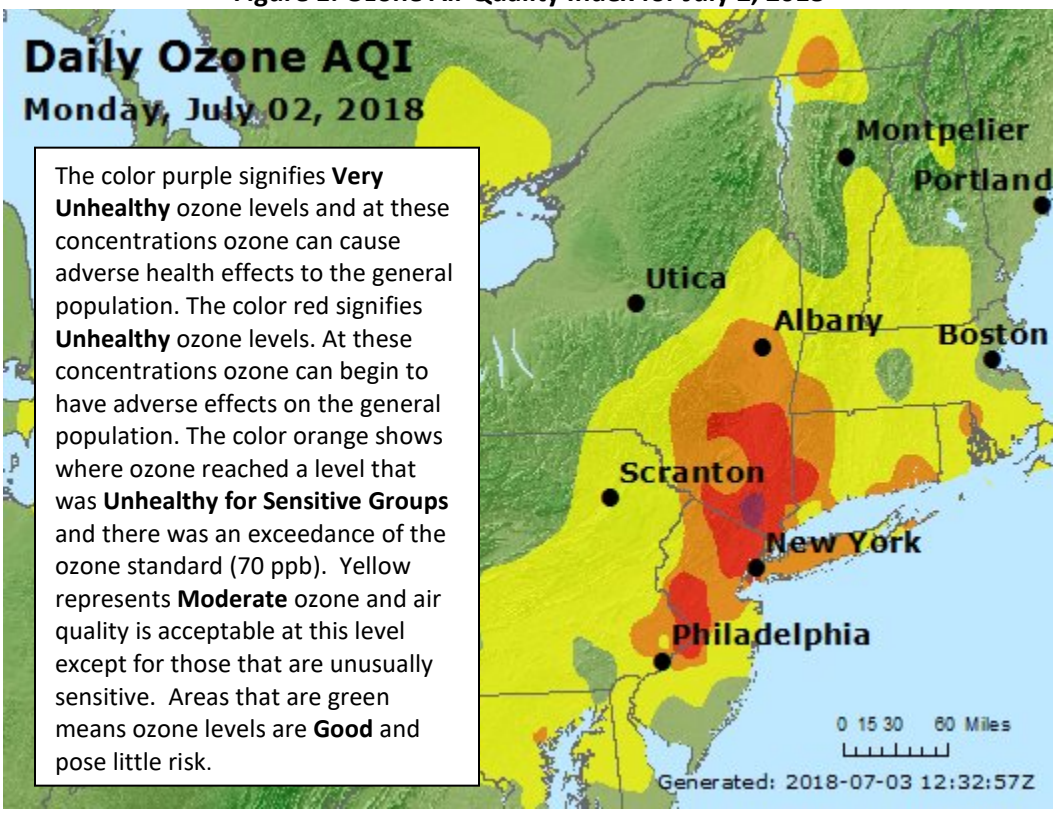
The number of days in 2018 on which exceedances of the ozone NAAQS were recorded for all the states is summarized in Table 3. Figure 1 shows graphically the region's ozone concentrations on July 2, 2018.

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 2, 2018 NAAQS = 70 ppb
Connecticut	9

Delaware	4
Maryland	4
New Jersey	11
New York	10
Pennsylvania	8

Figure 1. Ozone Air Quality Index for July 2, 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

A large high pressure system, extending along much of the U.S. eastern seaboard, continued to dominate our weather pattern on Monday, July 2nd. Multiple high pressure centers were noted over the Mid-Atlantic region throughout the day as a weak cold front stalled to the west, near the Ohio River Valley, in the evening hours. Ahead of this front, a surface trough developed, extending from central New York south to the Appalachian Valley. Under the influence of high pressure, abundant sunshine was noted throughout the nonattainment area allowing temperatures to reach near 100˚F. Winds tended to remain light and variable (calm at times) for much of the day with the high pressure center so close to our region. As the above-mentioned front approached from the west and high pressure pushed more off shore, winds gradually tended more southerly in the afternoon/evening hours.

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 2, 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	Danbury	92
NJ	Bayonne	92
NJ	Flemington	97
NJ	Newark Firehouse	96
NJ	Rider University	91
NY	CCNY	86
NY	Rockland County	111
NY	White Plains	93
PA	BRIS (Bucks County)	91
PA	NEA (Philadelphia County)	88

Surface level back trajectories (Figure 2) originated over the Chesapeake Bay and portions of Maryland during the evening hours on Saturday. Surface level winds passed through the state of Maryland and the Chesapeake Bay which saw widespread levels of Moderate and isolated USG air quality on Saturday, June 30th. Air at the surface continued to travel through Maryland and Delaware on Sunday picking up emissions from cars, trucks and industry along the way. Trajectories traveling to central New Jersey passed through the greater Philadelphia area before reaching their destination. Trajectories traveling to New York and Connecticut traveled northeast passing over the Atlantic Ocean before making a turn toward the northwest passing over Long Island and the Sound picking up emissions along its path. Trajectories at the surface remained at the surface for the duration of their path. Mid-level trajectories (Figure 3) followed a similar pathway as the surface trajectories. Originating in Virginia and traveling northeastward, some trajectories passed through the DC metropolitan area while others passed through the Chesapeake Bay area. Mid-level trajectories then crossed through southeastern Pennsylvania where they eventually reached their endpoints in either Philadelphia or New Jersey. Mid-level trajectories traveling to Northern New Jersey passed through the Philadelphia before traveling to Northern New Jersey. Trajectories traveled very slowly as they recirculated around New Jersey and Long Island before making a turn northward to their destinations. Trajectories at the upper level (Figure 4) experienced a large recirculation around Virginia, Maryland, and Delaware, all of which saw widespread moderate air quality on Saturday, June 30th and Sunday July 1st. At the point of recirculation, there was a surface high located just off the coast of Virginia and at this same location, there was a strong upper level ridge steering winds in the clockwise direction around the high. Winds at the upper level passed over the Chesapeake Bay, and multiple urban centers including Philadelphia and New York which saw USG air

quality the previous day before arriving at their destinations. Air at all levels traveled at very slow speeds leading to a heavily polluted air mass upon arrival.

Figures 5 and 6 show how the air mass grew increasingly polluted in the days preceding this high ozone event. Trajectories traveled slowly as they passed through a region that saw widespread moderate and isolated USG air quality.

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

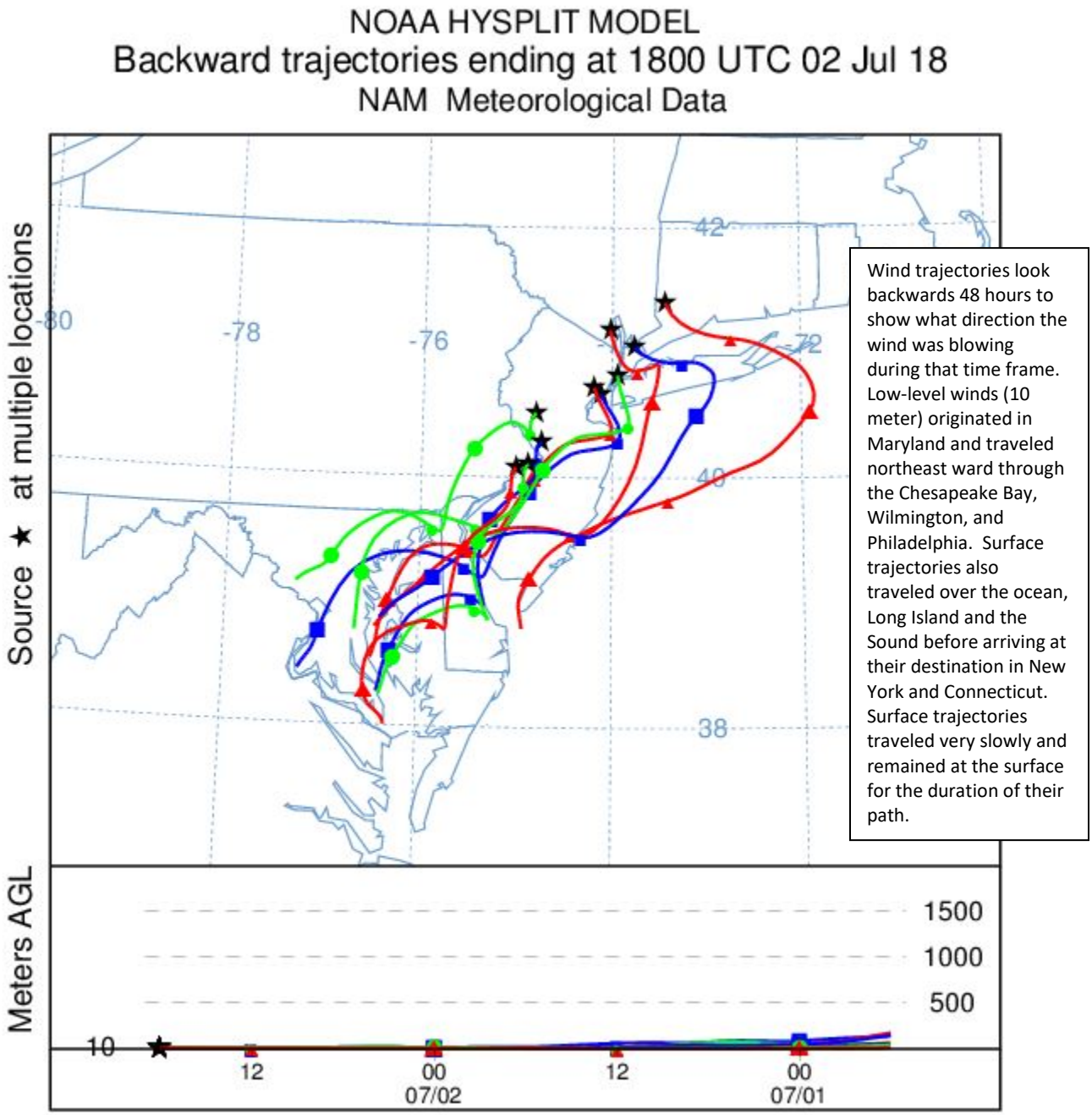
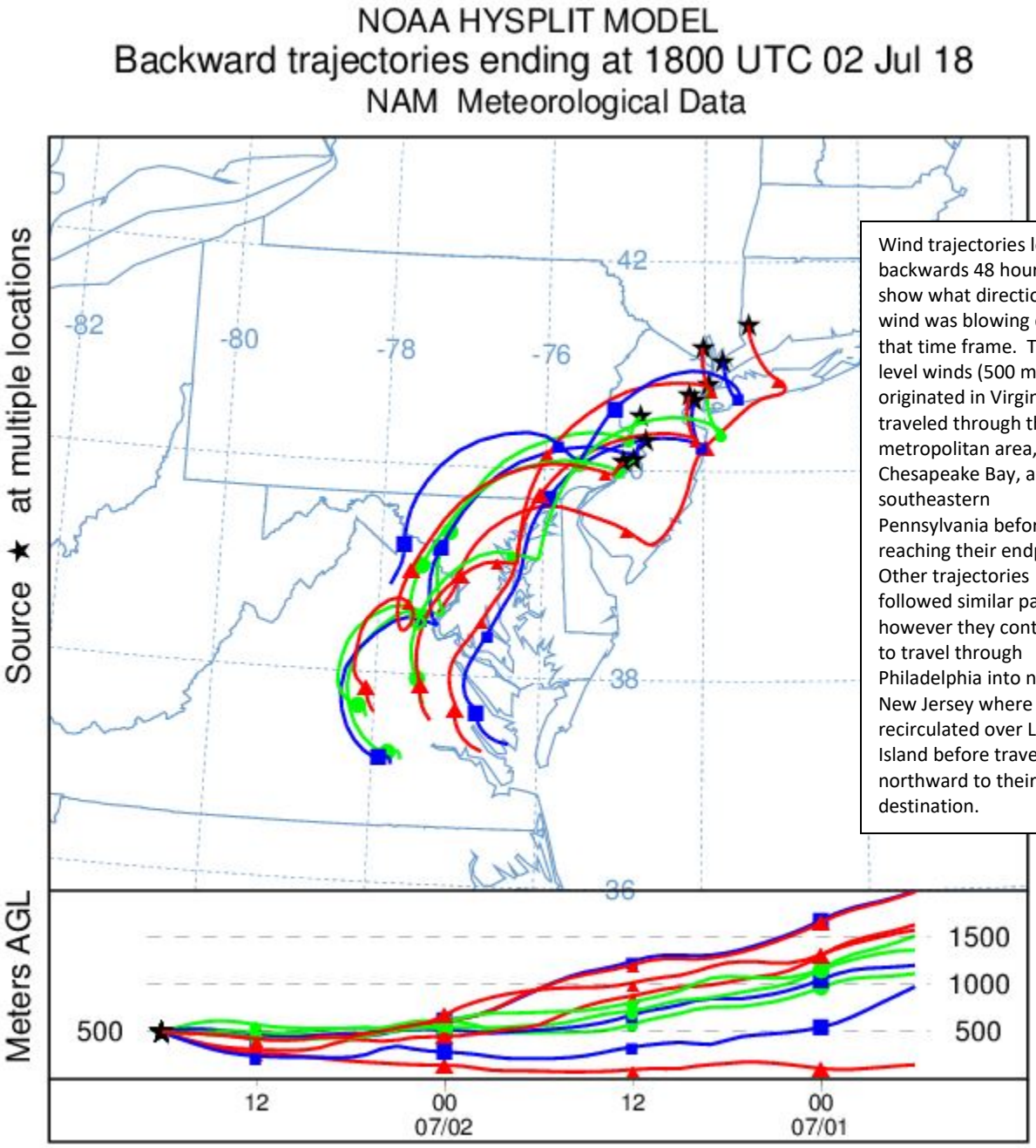


Figure 3. 48-hour Back Trajectories for July 2, 2018 at 500 meters



Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. The mid-level winds (500 meter) originated in Virginia and traveled through the DC metropolitan area, Chesapeake Bay, and southeastern Pennsylvania before reaching their endpoints. Other trajectories followed similar pathways however they continued to travel through Philadelphia into northern New Jersey where they recirculated over Long Island before traveling northward to their destination.

Figure 4. 48-hour Back Trajectories for July 2, 2018 at 1500 meters

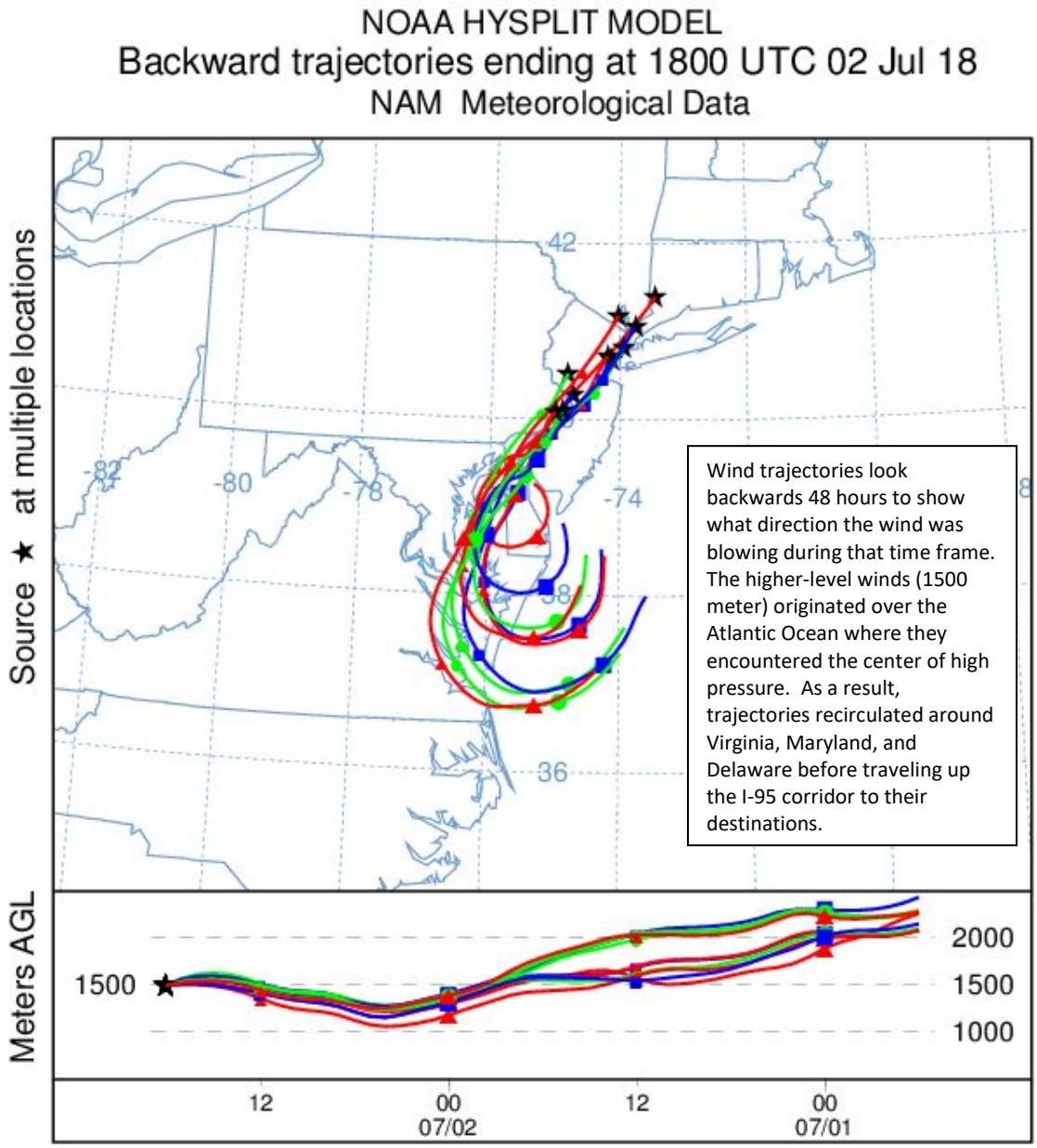


Figure 5. Ozone Air Quality Index for the United States on June 30, 2018

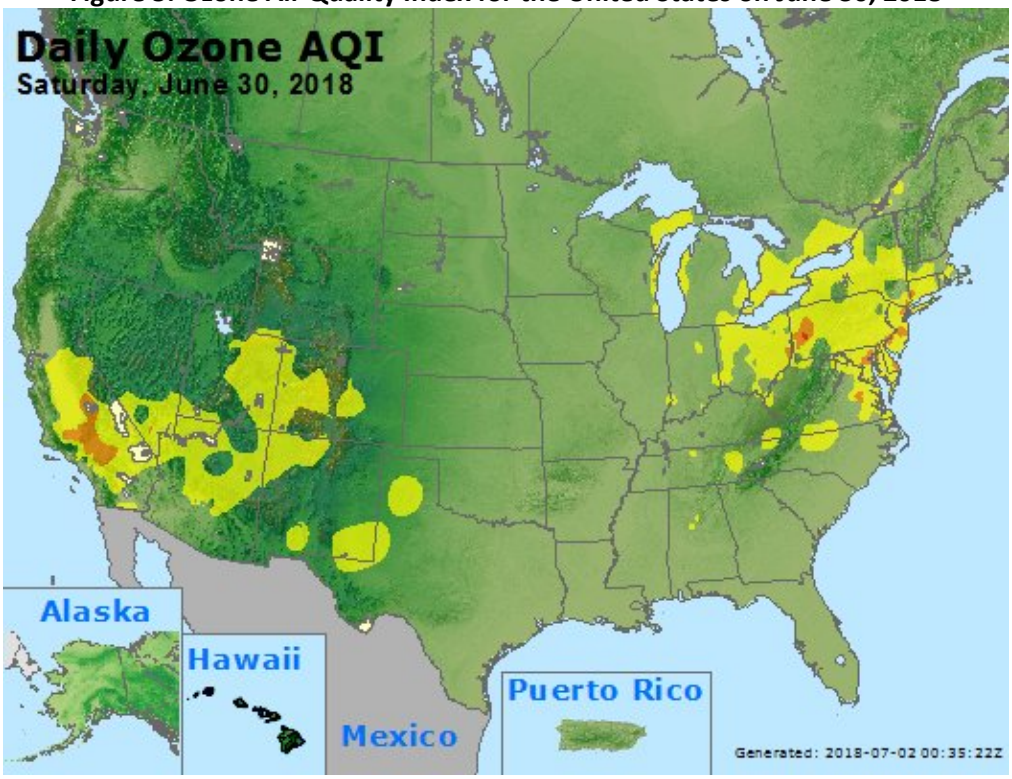
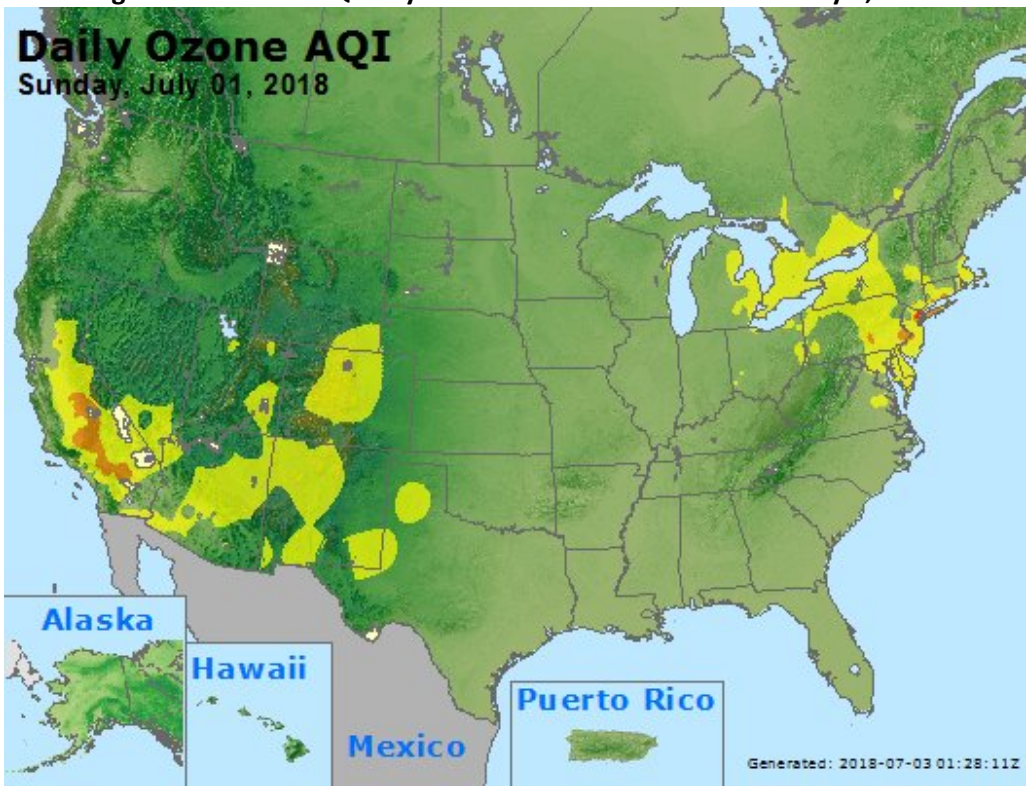


Figure 6. Ozone Air Quality Index for the United States on July 1, 2018



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.