## Ozone National Ambient Air Quality Standard Health Exceedances on July 16, 2018

### Exceedance Locations and Levels

On Monday, July 16, 2018, there were three (3) 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 16, 2018**

| STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|
| Ancora State Hospital | 54 |
| Bayonne | 68 |
| Brigantine | 38 |
| Camden Spruce St | 69 |
| Chester | 58 |
| Clarksboro | 66 |
| Colliers Mills | 59 |
| Columbia | 53 |
| Flemington | 61 |
| Leonia | 78 |
| Millville | 51 |
| Monmouth University | 49 |
| Newark Firehouse | 67 |
| Ramapo | 58 |
| Rider University | 77 |
| Rutgers University | 80 |
| Washington Crossing* | 70 |
| TOTAL EXCEEDANCES | 3 |

*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 eighteen (18) 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 16, 2018**

| STATE | STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|---|
| CT | Danbury | 81 |
| CT | Greenwich | 81 |

| | | |
|---|---|---|
| CT | Madison-Beach Road | 73 |
| CT | Middletown-CVH-Shed | 73 |
| CT | New Haven | 85 |
| CT | Stratford | 80 |
| CT | Westport | 77 |
| DE | BCSP (New Castle Co.) | 60 |
| DE | BELLFNT2 (New Castle Co.) | 64 |
| DE | KILLENS (Kent Co.) | 55 |
| DE | LEWES (Sussex Co.) | 53 |
| DE | LUMS 2 (New Castle Co.) | 61 |
| DE | MLK (New Castle Co.) | 62 |
| DE | SEAFORD (Sussex Co.) | 51 |
| MD | Fair Hill | 64 |
| NY | Babylon | 66 |
| NY | Bronx - IS52 | 68 |
| NY | CCNY | 71 |
| NY | Holtsville | 67 |
| NY | Pfizer Lab | 72 |
| NY | Queens | 71 |
| NY | Riverhead | 73 |
| NY | Rockland Cty | 73 |
| NY | White Plains | 80 |
| NY | Fresh Kills | 71 |
| PA | BRIS (Bucks Co.) | 86 |
| PA | CHES (Delaware Co.) | 65 |
| PA | NEWG (Chester Co.) | 60 |
| PA | NORR (Montgomery Co.) | 61 |
| PA | LAB (Philadelphia Co.) | 72 |
| PA | NEA (Philadelphia Co.) | 78 |
| PA | NEW (Philadelphia Co.) | 76 |
| | TOTAL EXCEEDANCES | 18 |

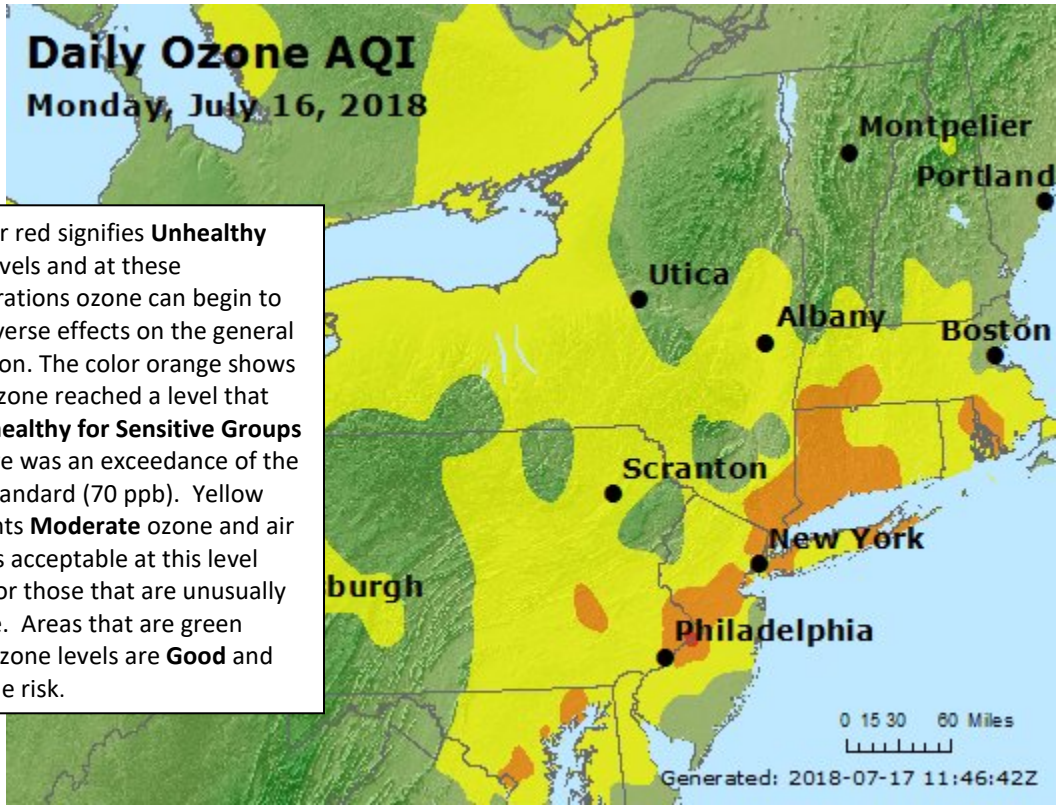
The number of days in 2018 on which exceedances of the ozone NAAQS were recorded for all the states is summarized in Table 3.

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

| STATE | # of Days NAAQS was Exceeded<br>January 1 – July 16, 2018<br>NAAQS = 70 ppb |
|---|---|
| Connecticut | 14 |

| | |
|---|---|
| Delaware | 8 |
| Maryland | 6 |
| New Jersey | 15 |
| New York | 14 |
| Pennsylvania | 12 |

**Figure 1. Ozone Air Quality Index for July 16, 2018**




The color red signifies **Unhealthy** ozone levels and at these concentrations ozone can begin to have adverse effects on the general population. The color orange shows where ozone reached a level that was **Unhealthy for Sensitive Groups** and there was an exceedance of the ozone standard (70 ppb). Yellow represents **Moderate** ozone and air quality is acceptable at this level except for those that are unusually sensitive. Areas that are green means ozone levels are **Good** and pose little risk.

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 area of high pressure covered the eastern half of the United States on Monday, July 16th. Multiple high-pressure centers were noted throughout the day leading to surface trough development over the nonattainment area. In addition, an upper-level ridge moved over region allowing for a southwest flow and increasing temperatures aloft.

These weather features allowed for hazy, hot, and humid conditions throughout the nonattainment area. Scattered locations to the south experienced early morning fog while areas to the north saw clear conditions for most of the morning. This morning sunshine gave way to partly cloudy skies in the afternoon with isolated afternoon/evening thunderstorms. Meanwhile, winds tended from the

west/southwest in the morning hours before becoming light and variable (calm at times) later in the day.

All these conditions are known to elevate ozone levels. However, wind direction and speed seemed to play the largest role for this particular episode. With movement along the I-95 corridor in the morning and light, near stagnant, conditions in the afternoon, emissions were able to be collected and increased throughout the day, leading to the multiple exceedances throughout the nonattainment area.

**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 14, 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 levels 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 | 81 |
| Ct | Greenwich | 81 |
| NJ | Flemington | 72 |
| NJ | Leonia | 78 |
| NJ | Rider University | 77 |
| NJ | Rutgers University | 80 |
| NY | White Plains | 80 |
| PA | BRIS | 86 |
| PA | NEA | 78 |
| PA | NEW | 76 |

Surface level trajectories (Figure 2) originated over the Chesapeake Bay area and in coastal Virginia. Air at the surface traveled through multiple metropolitan areas including Baltimore, Wilmington, Philadelphia, and New York City. As low-level winds traveled up the I-95 corridor through multiple urban centers, they likely picked up emissions from cars, trucks, and industry along the way. Air at the surface remained at the surface for the duration of its path, becoming increasingly polluted along the way. Most of the mid-level trajectories (Figure 3) originated in West Virginia, and traveled through Virginia, the Washington, D.C. metropolitan area, Baltimore, Wilmington, and Philadelphia, before reaching their destination in central New Jersey and Pennsylvania. Meanwhile, some mid-level trajectories originated in eastern Ohio/Pennsylvania and traveled across the state, through New Jersey where they eventually reached the I-95 corridor. In the final 6 hours of their path, they traveled up the I-95 corridor and through New York City. Air at the mid-levels originated higher in the atmosphere and mixed down to 500m upon arrival. Upper level trajectories (Figure 4) originated in Kentucky and Ohio. Air at the upper levels then traveled westward through multiple states depending on its destination.

Most upper air trajectories passed through Ohio and Pennsylvania and either New York or Philadelphia before reaching their endpoints. These upper trajectories passed over many industrialized areas and urban centers along their path. Figure 5 below shows the ozone air quality index values recorded for the United States on July 16, 2018.

**Figure 2. 48-hour Back Trajectories for July 16, 2018 at 10 meters**

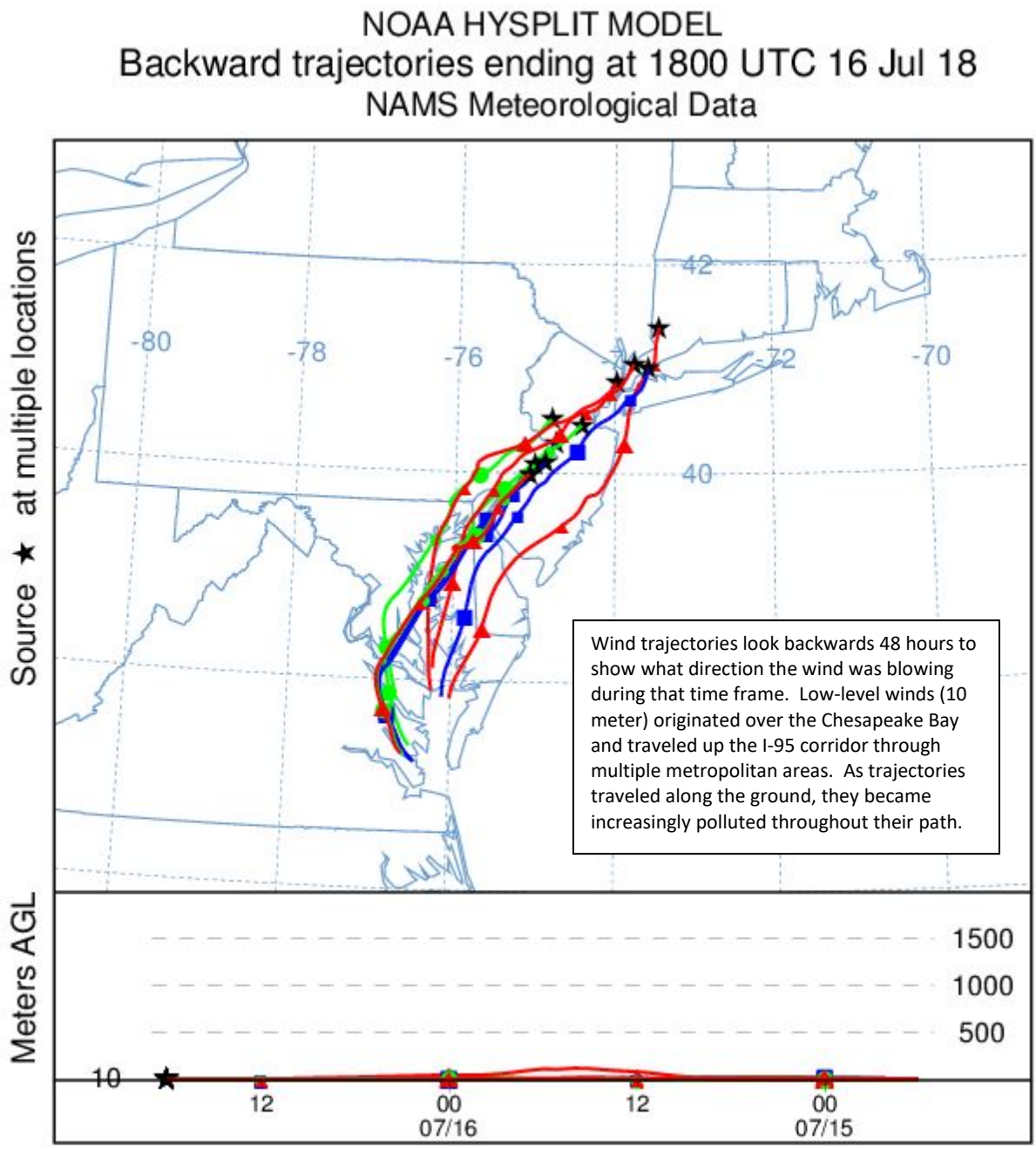


**Figure 3. 48-hour Back Trajectories for July 16, 2018 at 500 meters**

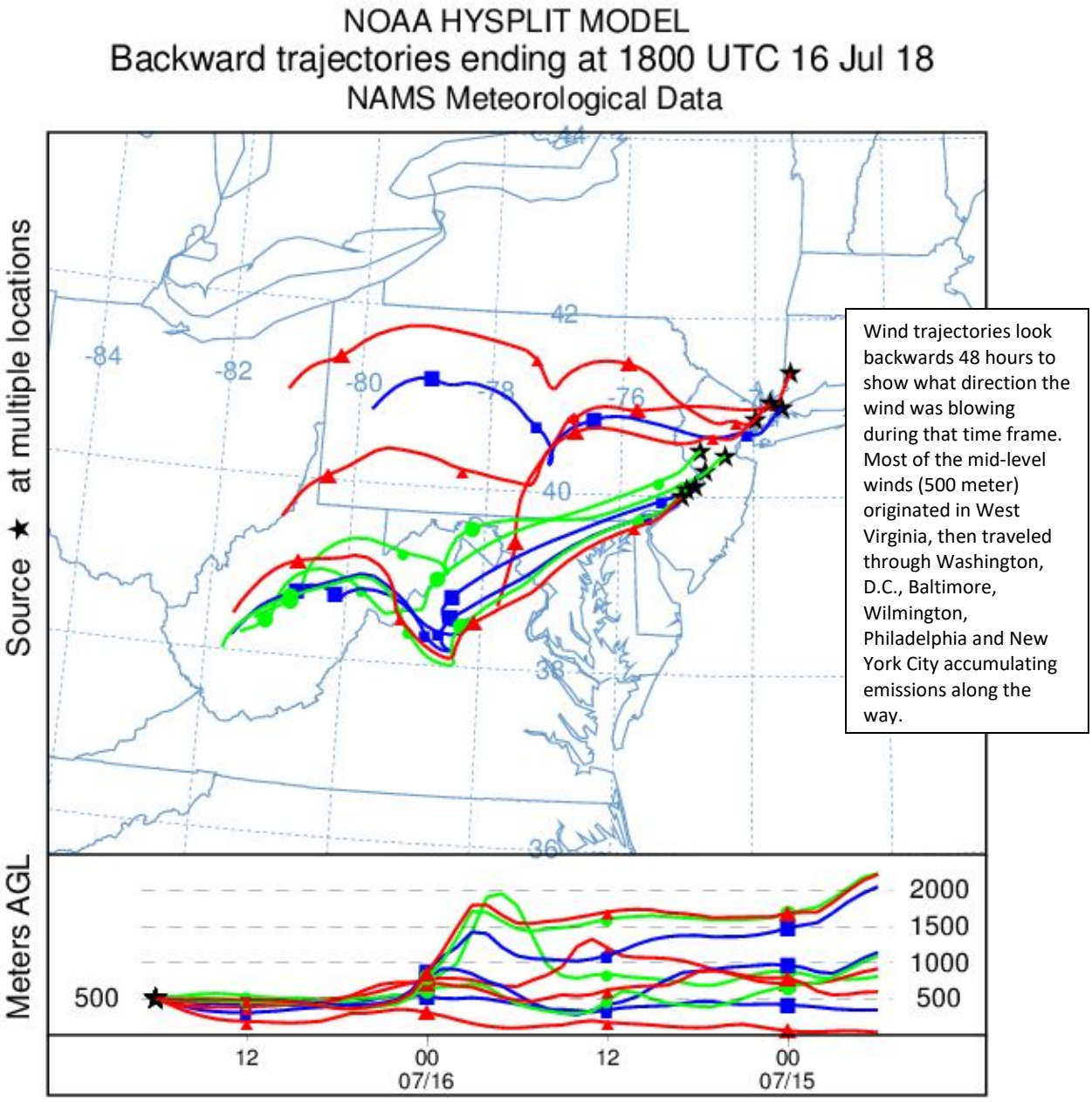


**Figure 4. 48-hour Back Trajectories for July 16, 2018 at 1500 meters**

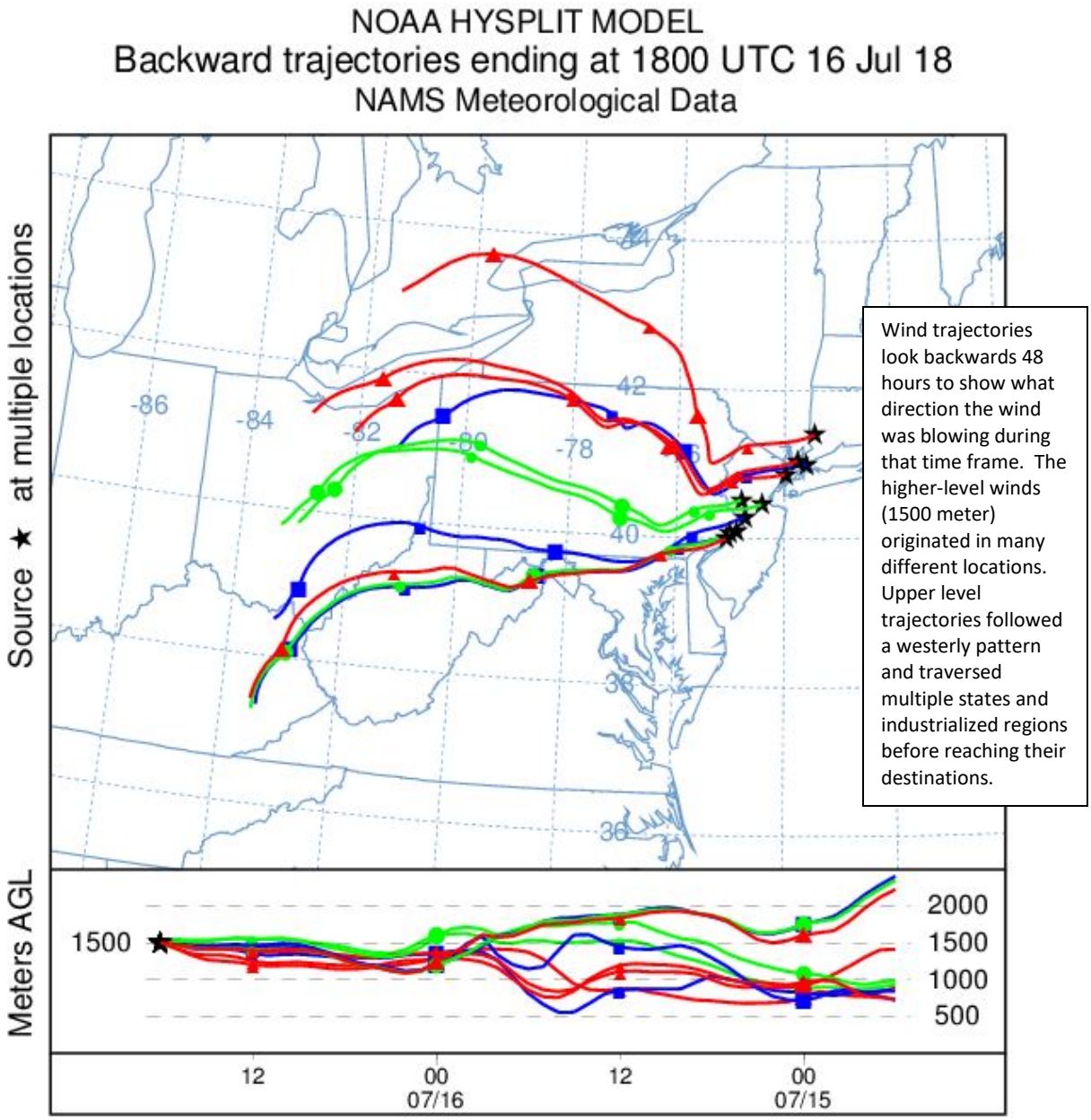
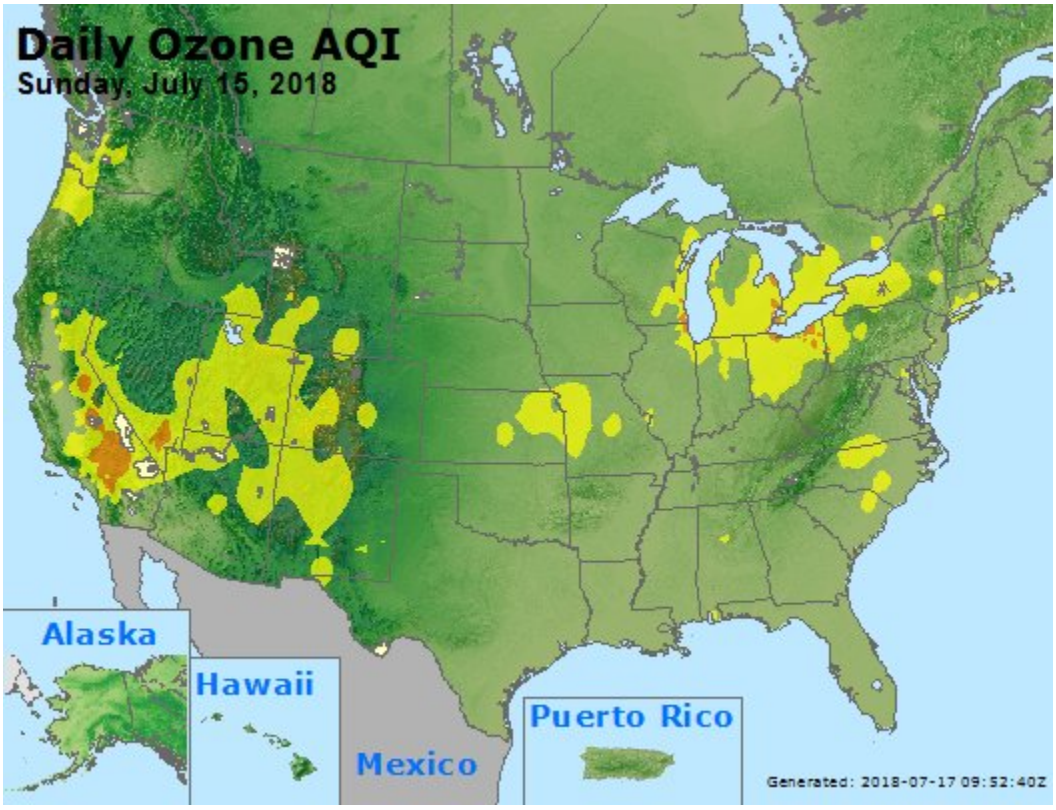


**Figure 5. Ozone Air Quality Index for the United States on July 15, 2018**




**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.