

Ozone National Ambient Air Quality Standard Health Exceedances on July 27, 2020

Exceedance Locations and Levels

On Monday, July 27, 2020, there were no 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 Ozone Concentrations on 7/27/2020

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	60
Bayonne	57
Brigantine	No Data
Camden Spruce St	53
Chester	58
Clarksboro	59
Colliers Mills	64
Columbia	No Data
Flemington	59
Leonia	58
Millville	59
Monmouth University	61
Newark Firehouse	62
Ramapo	56
Rider University	60
Rutgers University	59
Washington Crossing*	58
TOTAL EXCEEDANCES	0

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

From the out-of-state stations within New Jersey's ozone non-attainment areas, there were (7) exceedance of the ozone NAAQS. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on 7/27/2020

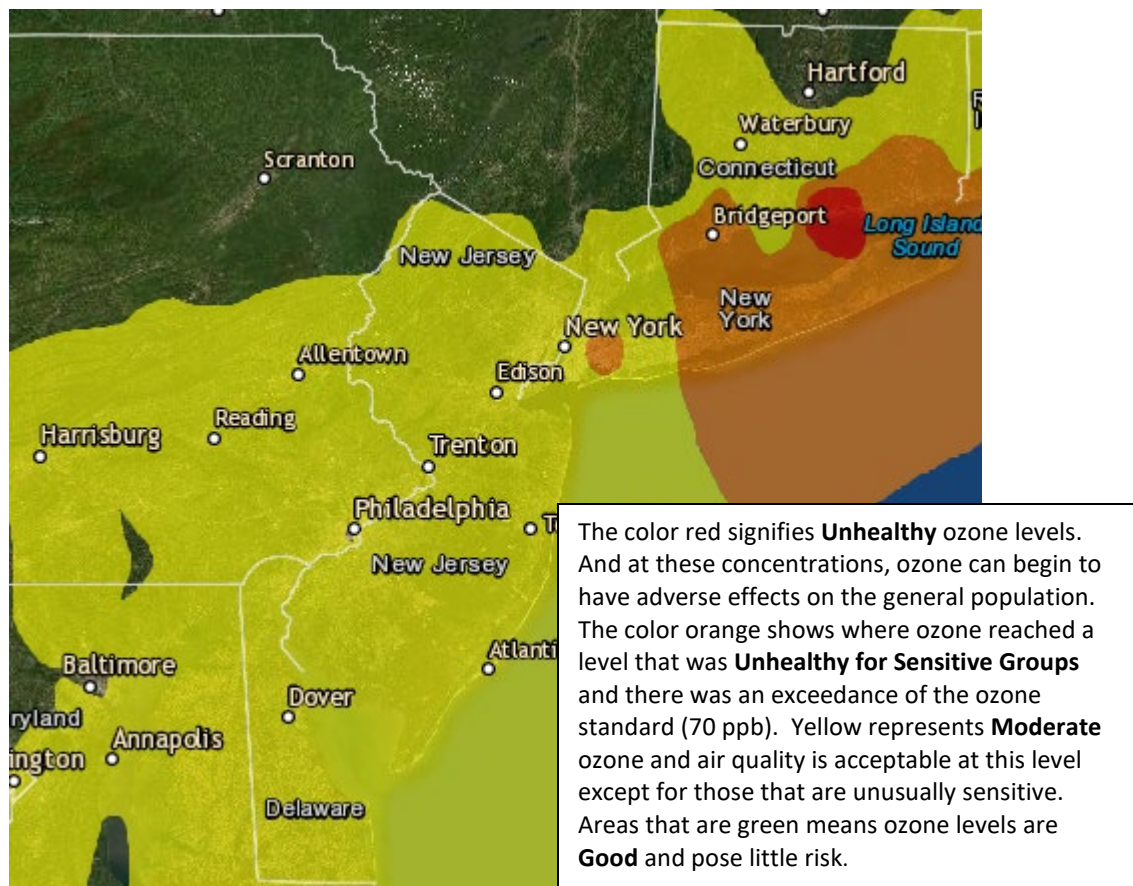
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	53
CT	Greenwich	68
CT	Madison-Beach Road	88
CT	Middletown-CVH-Shed	60
CT	New Haven	58
CT	Stratford	80
CT	Westport	73
DE	BCSP (New Castle Co.)	57
DE	BELLFNT2 (New Castle Co.)	59
DE	KILLENS (Kent Co.)	59
DE	LEWES (Sussex Co.)	57
DE	LUMS 2 (New Castle Co.)	59
DE	MLK (New Castle Co.)	59
DE	SEAFORD (Sussex Co.)	57
MD	Fair Hill	60
NY	Babylon	72
NY	Bronx - IS52	60
NY	CCNY	59
NY	Fresh Kills	59
NY	Holtsville	74
NY	Pfizer Lab	64
NY	Queens	72
NY	Riverhead	75
NY	Rockland Cty	53
NY	White Plains	61
PA	BRIS (Bucks Co.)	58
PA	CHES (Delaware Co.)	59
PA	NEWG (Chester Co.)	57
PA	NORR (Montgomery Co.)	62
PA	LAB (Philadelphia Co.)	55
PA	NEA (Philadelphia Co.)	59
PA	NEW (Philadelphia Co.)	58
	TOTAL EXCEEDANCES	7

The number of days in 2020 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey's ozone non-attainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2020

STATE	# of Days NAAQS was Exceeded January 1 – July 27, 2020 NAAQS = 70 ppb
Connecticut	9
Delaware	1
Maryland	0
New Jersey	4
New York	5
Pennsylvania	3

Figure 1. Ozone Air Quality Index for July 27, 2020



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

High pressure dominated the non-attainment area on Monday July 27, 2020, while a surface trough extended from New England southward into portions of the southeastern United States. Sunny skies, hot temperatures, and winds from the southwesterly direction allowed for widespread elevated levels of ozone throughout the non-attainment area with levels reaching the unhealthy for sensitive groups (USG) and unhealthy category along the Connecticut coastline and Long Island region.

A large high-pressure system established itself over the southeastern United States on July 27th. High pressure ridging extended northward into the non-attainment area allowing for favorable conditions for ozone formation. Abundant sunshine and temperatures reaching into the low 90s were observed. Winds became breezy in the afternoon on Long Island, having more of a westerly component, while the Connecticut coastline had a lighter southwesterly wind. In addition, the high-pressure system allowed for long range transport of previously polluted air from the west and the New York City metro area into the non-attainment area. As air traveled east, a broad sinking motion associated with the high pressure allowed the polluted air aloft to mix toward the surface. Finally, a surface trough, extending from New England southward through the non-attainment area was observed throughout the day and provided an additional opportunity for any ozone aloft to mix toward the surface, enhancing already rising levels of ozone.

The ozone exceedances noted in Connecticut and New York on July 27th were influenced heavily by localized transport from New York City metro area in combination with long range transport from the west, along with a broad sinking motion associated with high pressure.

Where Did the Air Pollution that Caused Ozone Come From?

Please note, this exceedance is occurring while COVID-19 restrictions in New Jersey are in place, which have impacted transportation, business operations and energy use. As more data becomes available, the Department may have a better characterization of the conditions that influenced elevated ozone pollution levels in 2020.

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedances on July 27, 2020. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Seven monitoring stations were chosen to run back trajectories and are listed in Table 4 below.

Table 4. Monitoring Stations with an 8-hr Ozone Exceedance that were Selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Stratford	80
CT	Madison-Beach Road	88
CT	Westport	73
NY	Babylon	72
NY	Holtsville	74
NY	Queens	72
NY	Riverhead	75

Back trajectories from July 27th show that exceedances observed in New York and Connecticut were heavily influenced by high pressure over the area. This high pressure caused a sinking motion at all levels of the atmosphere that allowed for air transported from the west, where widespread moderate air quality was observed, to mix down to the surface. All of this, in combination with a previously polluted air mass over the region and the favorable meteorological conditions mentioned above, led to air quality reaching the unhealthy for sensitive groups (USG) and unhealthy category in Long Island and Connecticut.

Surface-level back trajectories (Figure 2) show air at the surface originated over eastern Ohio and far western Pennsylvania. The air then traveled in an easterly direction through central Pennsylvania, northern New Jersey, and New York City, picking up emissions from cars, trucks, and industry over these areas before arriving at their destinations in Long Island and the Connecticut coastline. Similarly, mid-level back trajectories (Figure 3) originated over Ohio and traveled briefly northeast toward western Pennsylvania through late July 26th before making a turn eastward and quickly traveling along the New York / Pennsylvania border in the overnight hours. Air then slowed as it entered the northern New Jersey / NYC metropolitan area into arrival. Finally, upper-level back trajectories (Figure 4) originated in the Great Lakes region and traveled generally east through the duration of its path. Air at this level passed through portions of western New York, Pennsylvania, and the northern New Jersey / NYC metropolitan area into arrival.

Figure 5 shows the National Air Quality Index observed on July 26th, the day prior to this high ozone event. As shown in the figure, moderate and an isolated region of USG air quality was observed within the non-attainment area as well as portions of Pennsylvania, the Ohio River Valley, and southern Great Lakes region on the 26th. The transport of this previously polluted air from upwind states to an already polluted air mass over the non-attainment area allowed for an abundance of ozone precursors in the region. At all levels, we can see that the air experienced a very strong sinking motion towards the surface under the influence of high pressure, indicating that previously polluted air from upwind states was able to mix down to the surface and enhance ozone production. This in combination with other favorable weather conditions allowed for ozone levels to reach the unhealthy for sensitive groups category in Long Island, NY and coastal portions of Connecticut on July 27th, with widespread moderate throughout the remainder of the non-attainment area.

Figure 2. 48-hour Back Trajectories for July 27, 2020 at 10 meters

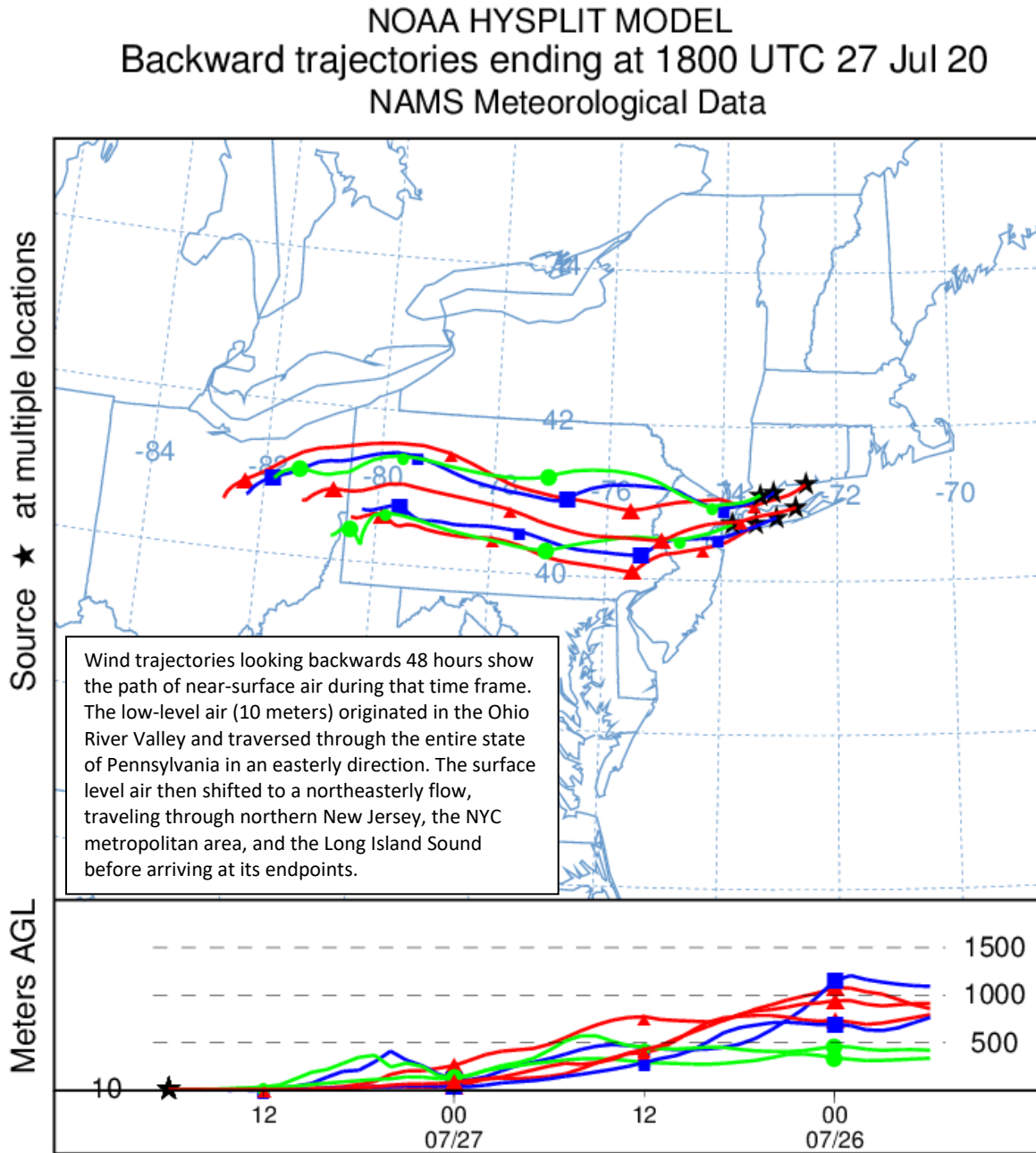


Figure 3. 48-hour Back Trajectories for July 27, 2020 at 500 meters

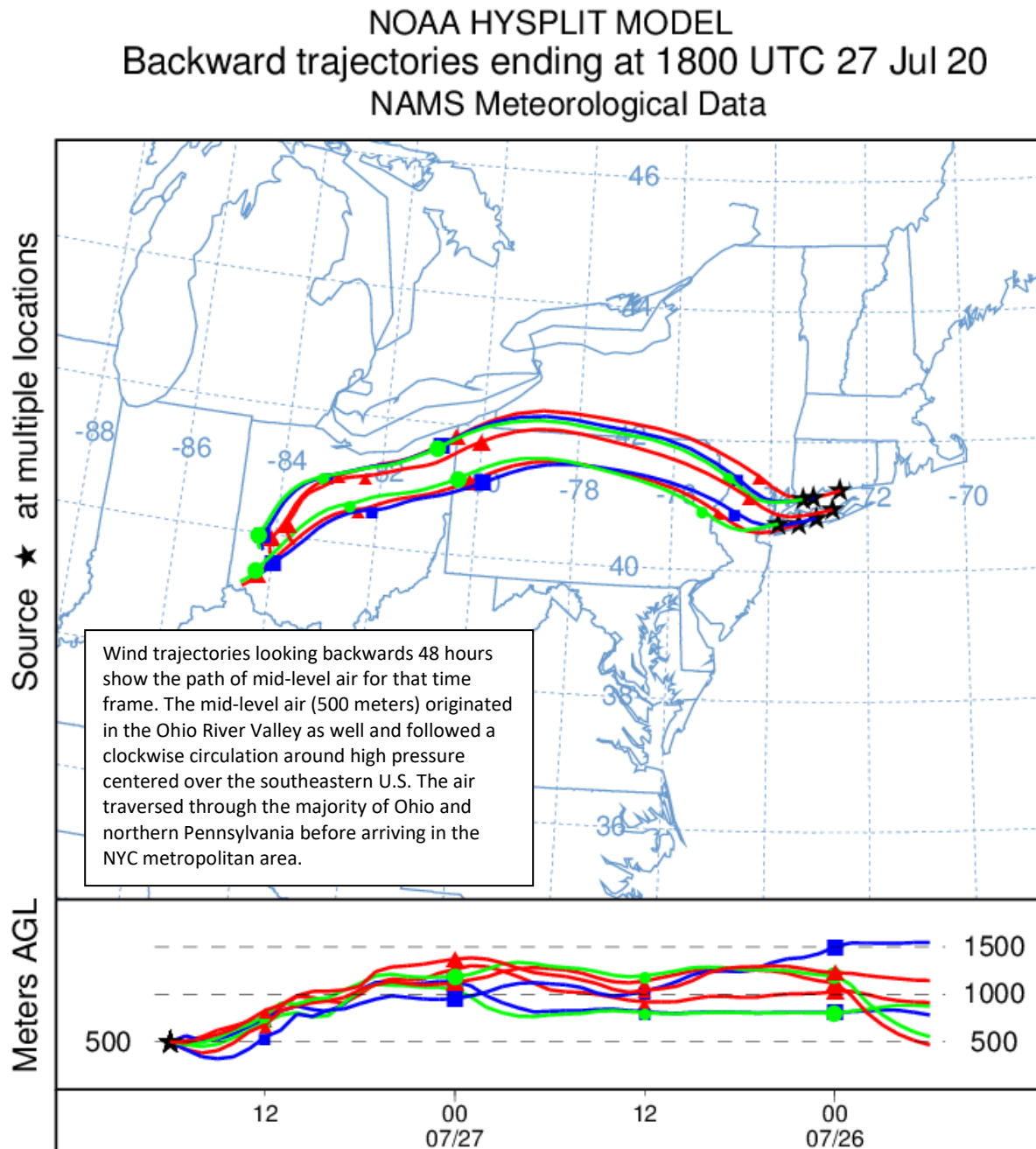


Figure 4. 48-hour Back Trajectories for July 27, 2020 at 1500 meters

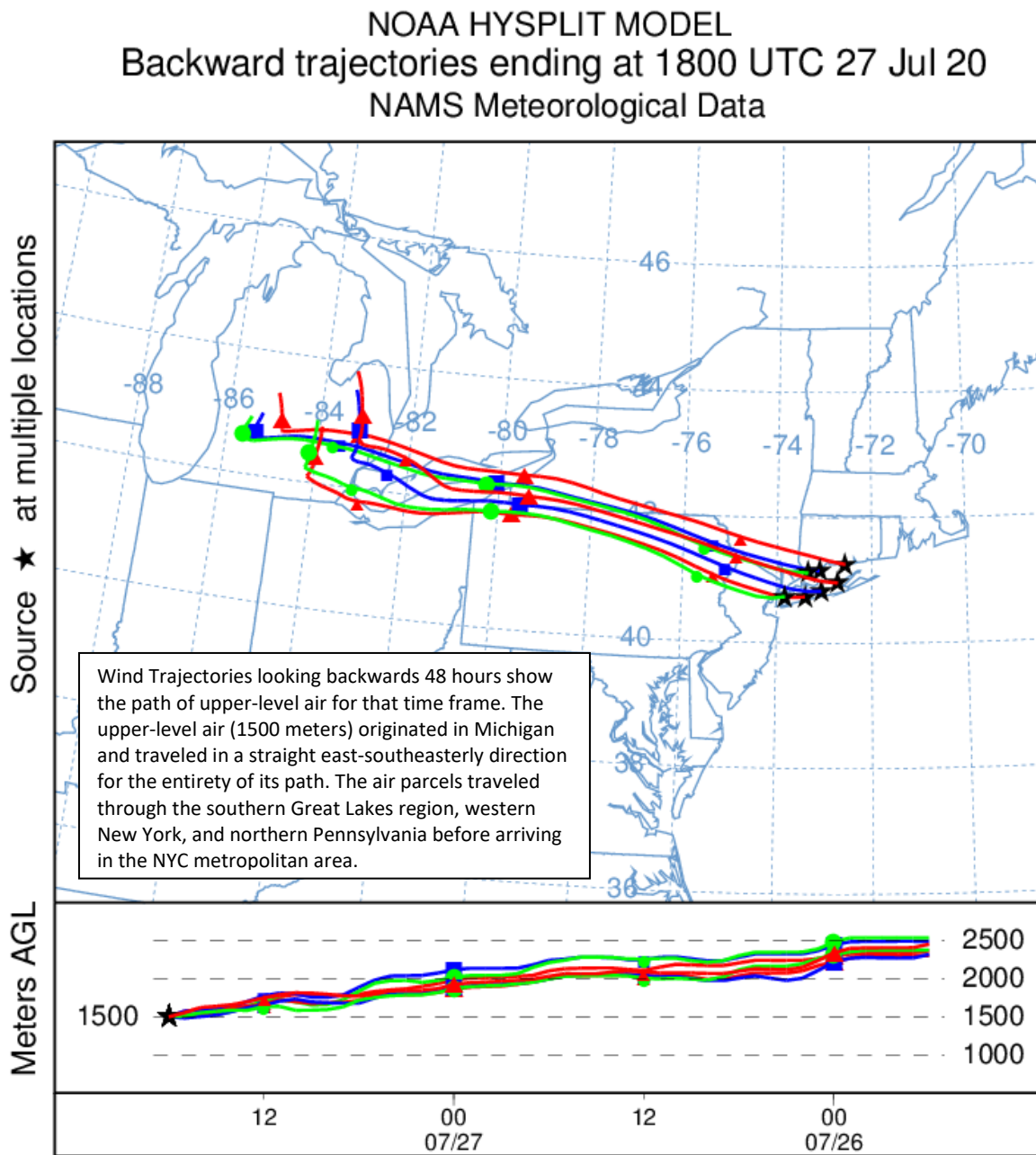
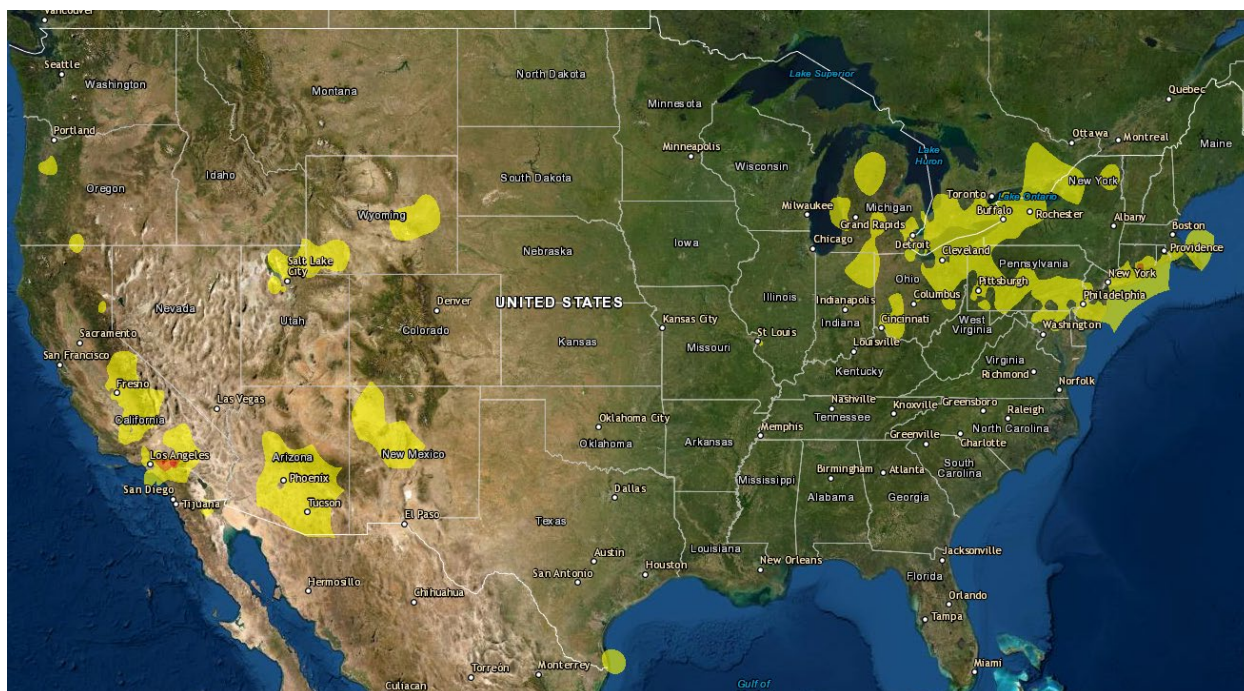


Figure 5. Combined Air Quality Index for the United States on July 26, 2020



Source: www.airnow.gov

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

Learn more about your local ozone air quality forecast by visiting the "What's Your Air Quality Today?" page at <http://www.nj.gov/dep/cleanair/nj/>.