Ozone National Ambient Air Quality Standard Health Exceedances on June 28, 2021

Exceedance Locations and Levels

On Monday, June 28, 2021, 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 6/28/2021

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	28
Bayonne	54
Brigantine	21
Camden Spruce St	35
Chester	37
Clarksboro	30
Colliers Mills	30
Columbia	50
Flemington	39
Leonia	56
Millville	24
Monmouth University	27
Newark Firehouse	44
Ramapo	36
Rider University	50
Rutgers University	50
Washington Crossing*	43
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 nonattainment areas, there was one (1) exceedance of the ozone NAAQS. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Nonattainment Areas on 6/28/2021

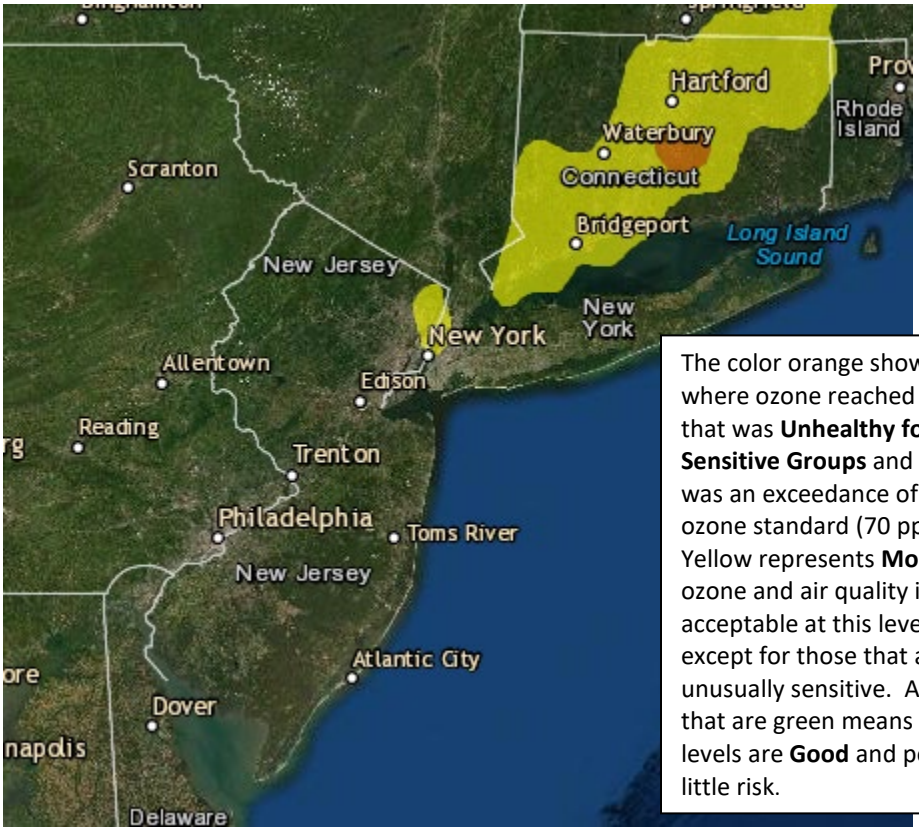
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	56
CT	Greenwich	55
CT	Madison-Beach Road	52
CT	Middletown-CVH-Shed	72
CT	New Haven	56
CT	Stratford	57
CT	Westport	62
DE	BCSP (New Castle Co.)	30
DE	BELLFNT2 (New Castle Co.)	31
DE	KILLENS (Kent Co.)	23
DE	LEWES (Sussex Co.)	25
DE	LUMS 2 (New Castle Co.)	31
DE	MLK (New Castle Co.)	32
DE	SEAFORD (Sussex Co.)	20
MD	Fair Hill	32
NY	Babylon	33
NY	Bronx - IS52	50
NY	CCNY	61
NY	Fresh Kills	54
NY	Holtsville	26
NY	Pfizer Lab	49
NY	Queens	42
NY	Riverhead	32
NY	Rockland Cty	42
NY	White Plains	51
PA	BRIS (Bucks Co.)	44
PA	CHES (Delaware Co.)	34
PA	NEWG (Chester Co.)	29
PA	NORR (Montgomery Co.)	36
PA	LAB (Philadelphia Co.)	31
PA	NEA (Philadelphia Co.)	41
PA	NEW (Philadelphia Co.)	38
	TOTAL EXCEEDANCES	1

The number of days in 2021 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey's ozone nonattainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Nonattainment Areas in 2021

STATE	# of Days NAAQS was Exceeded January 1 – June 28, 2021 NAAQS = 70 ppb
Connecticut	7
Delaware	2
Maryland	2
New Jersey	5
New York	4
Pennsylvania	4

Figure 1. Ozone Air Quality Index for June 28, 2021



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

High pressure continued to dominate the weather pattern over the eastern United States on Monday June 28th, 2021, as a frontal system lingered over the Great Lakes Region and southern Ontario / Quebec. Favorable weather conditions for ozone formation and the local and regional transport of emissions allowed for elevated levels of ozone over portions of the northern nonattainment area, with an exceedance observed at the Middletown, CT monitor.

A large high-pressure system centered east of the Canadian Maritimes continued to impact the region for another day. This system, which had provided several days of clean air quality across the eastern United States with persistent onshore southerly winds, shifted slightly allowing for a more southwesterly flow across the nonattainment area on Monday. This shift in wind direction allowed for the transport of localized emissions along the I-95 corridor, leading to a gradual deterioration of air quality in portions of the northern nonattainment area. With the support of favorable weather conditions for ozone formation, such as mostly sunny skies and hot temperatures, ozone levels increased along the Connecticut coastline in the afternoon hours. As coastal winds picked up later in the day, any ozone and precursors in the area were then transported inland and contributed to an exceedance at the central Connecticut monitor.

The isolated exceedance in central Connecticut can be attributed to the transport of local and regional emissions along the I-95 corridor and New York City metropolitan area into a location favorable for ozone formation.

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 exceedances on June 28, 2021. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. One monitoring station was chosen to model back trajectories and is listed in Table 4.

Table 4. Monitoring Station with an 8-hr Ozone Exceedance that was selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Middletown - CVH	72

Back trajectories from June 28th show that the isolated exceedance observed in Connecticut was likely influenced by a large high-pressure system dominating the northeastern United States, as well as favorable weather conditions mentioned above. This allowed for localized transport of emissions from New York City and Long Island at the surface. The combination of these features led to air quality reaching the unhealthy for sensitive groups (USG) category in Connecticut.

Surface-level back trajectories (Figure 2) show air at the surface originated off the North Carolina coastline, traveling in a clockwise direction along the New Jersey coastline, over central Long Island and the Long Island Sound, before reaching its destination in Connecticut. Air traveled at the surface for much of its path and slowed significantly as it approached its destination. At this time, air traveling at ground level picked up local emissions from cars, trucks, and industry as it continued to travel in a northeasterly direction into Connecticut, where it arrived at the exceedance location.

Mid-level trajectories (Figure 3) originated over the Atlantic Ocean off the coast of North Carolina. Mid-level trajectories traveled in a northwesterly direction while crossing over the North Carolina coast and made a turn northward into Virginia. Here, mid-level trajectories passed over the city of Norfolk and the Washington D.C. metropolitan center. Upon exiting the metropolitan D.C. area, trajectories traveled northeastward through Maryland and the Chesapeake Bay region, followed by Philadelphia, and the I-95 corridor. As trajectories continued northeastward, they passed over New York City and portions of the Long Island Sound, where emissions may have been accumulating in the days prior. It is likely, after exiting this region that trajectories accumulated pollutants from various metropolitan centers before arriving at the exceedance location in Middletown, Connecticut.

The upper-level back trajectory (Figure 4) originated over central Georgia and traveled in a clockwise direction around high pressure. The trajectory first traveled northward over Tennessee, then over West Virginia, Pennsylvania, and finally over the lower Hudson Valley. The air experienced a gentle sinking motion as it passed over these areas and reached its endpoint in Connecticut, allowing any pollutants aloft to mix down to the surface.

Figure 5 shows the National Air Quality Index observed on June 27th, the day prior to this exceedance event. As the figure shows, the area saw widespread good air quality, which suggests there was no build-up of previously polluted air to increase ozone concentrations. This relatively clean airmass over the region helped to keep ozone concentrations below the unhealthy for sensitive groups category in much of the nonattainment area except for Middletown, Connecticut, where favorable meteorological conditions and local and regional emissions lead to an exceedance of the 8-hour ozone standard.

Figure 2. 48-hour Back Trajectories for June 28, 2021 at 10 meters

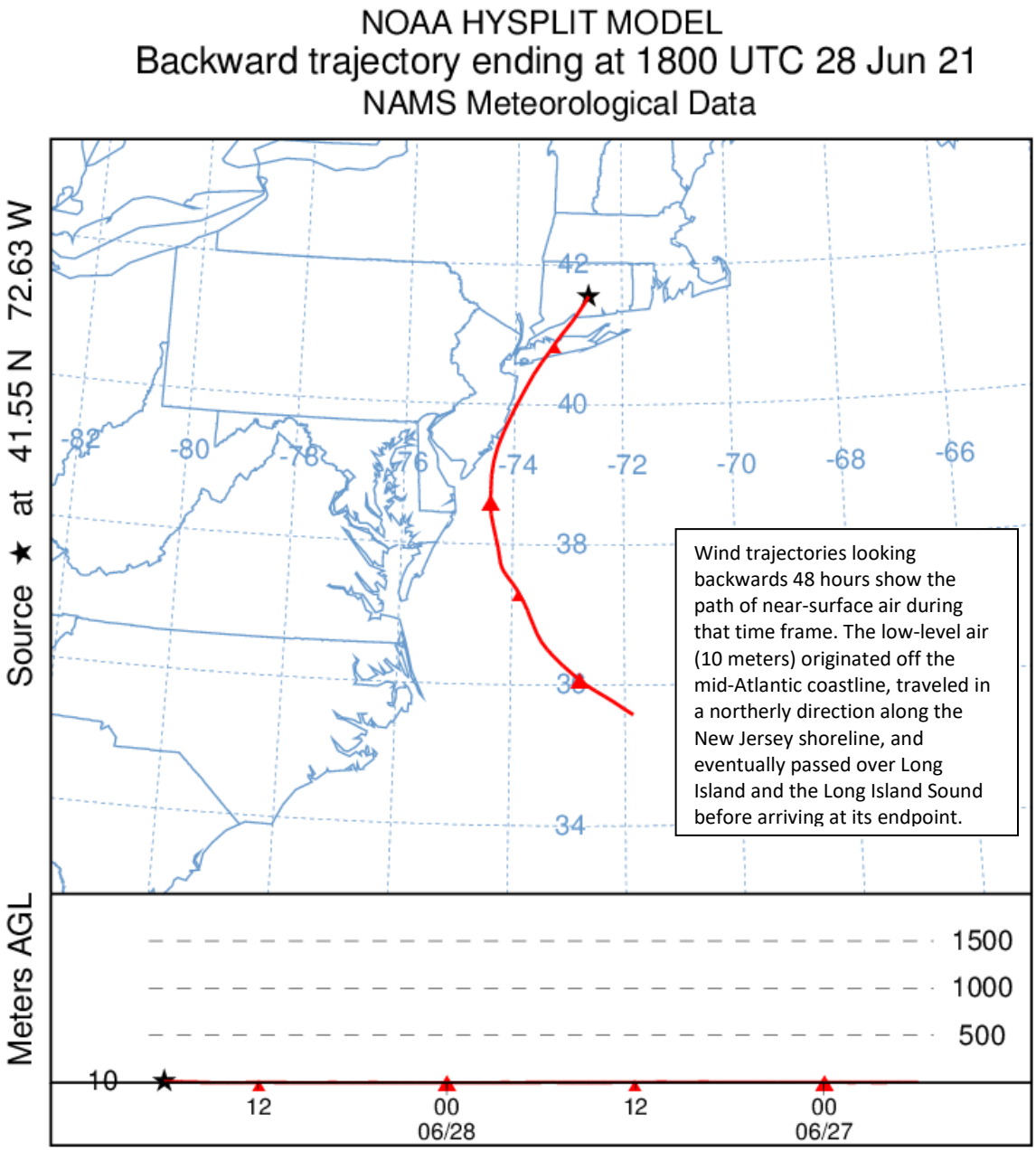


Figure 3. 48-hour Back Trajectories for June 28, 2021 at 500 meters

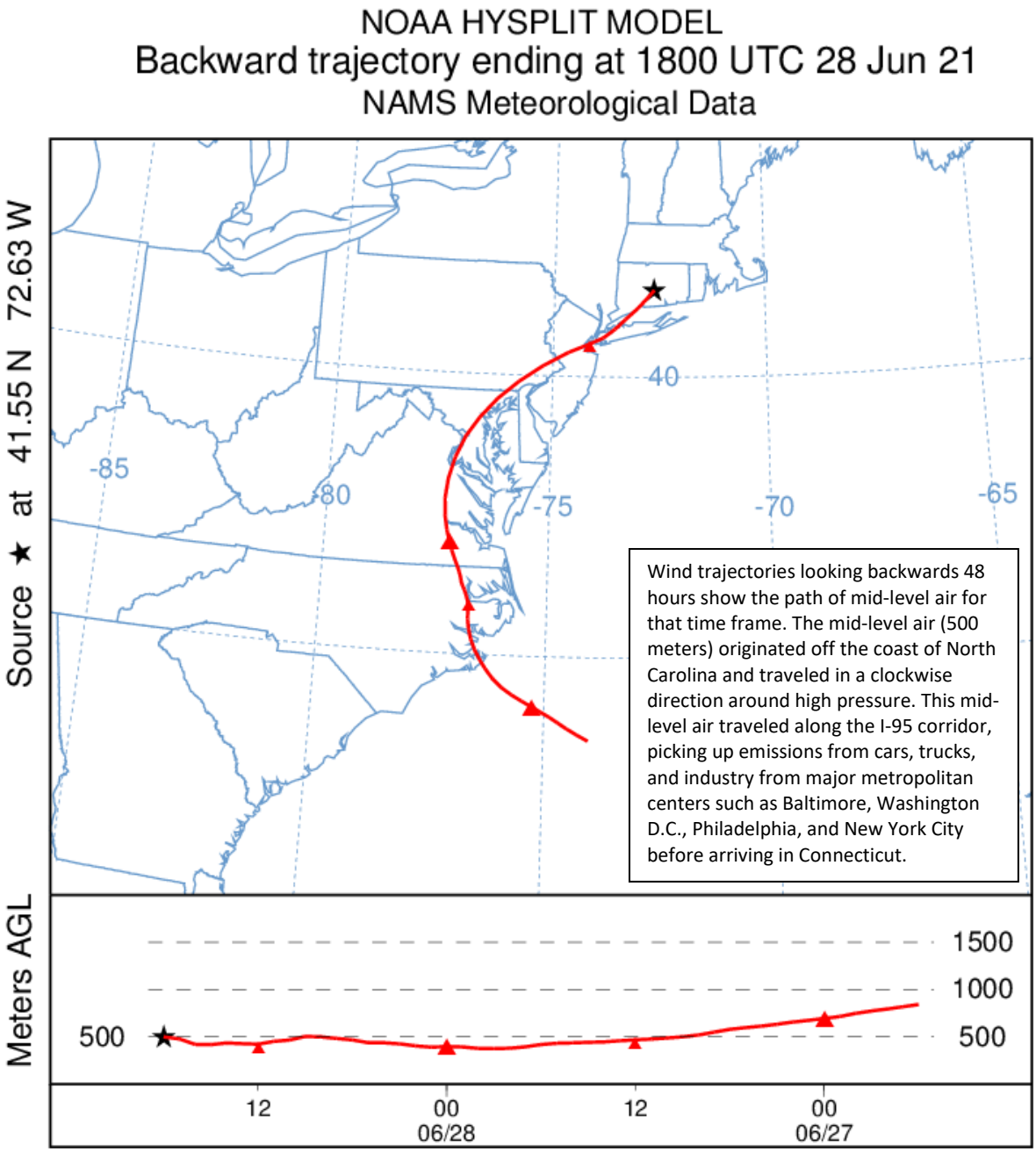


Figure 4. 48-hour Back Trajectories for June 28, 2021 at 1500 meters

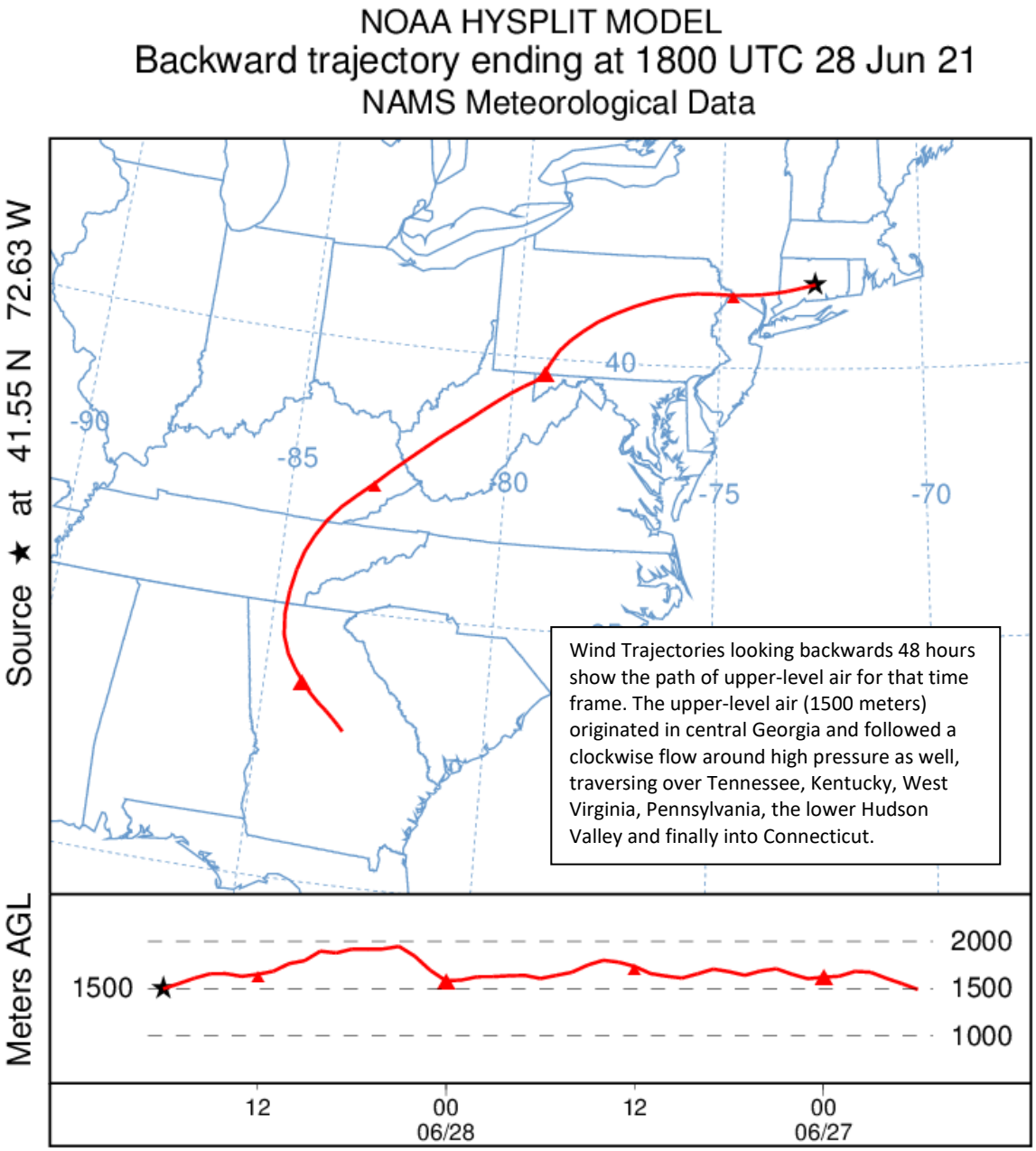
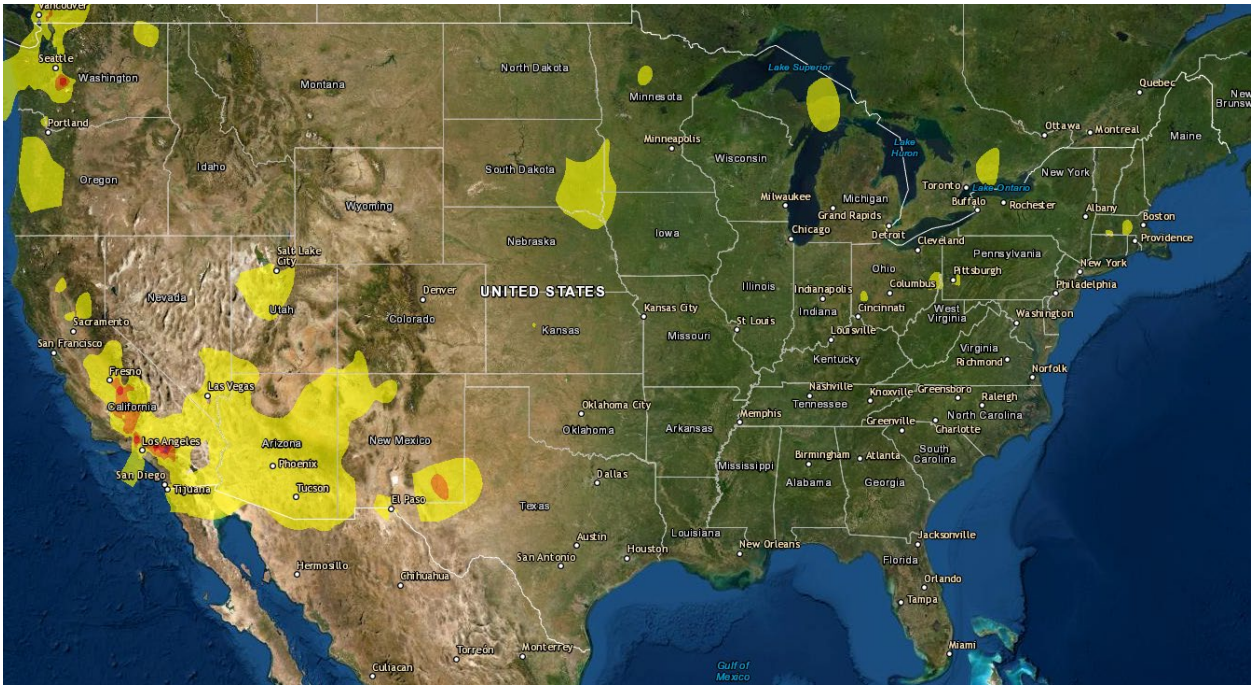


Figure 5. Combined Air Quality Index for the United States on June 27, 2021



Source: www.airnow.gov

How is Ozone Created?

Ground-level ozone is an air pollutant known to cause several 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/cleanairnj/ .