

2024 PM2.5 Year in Review (Updates on Designations and Exceptional Events Too)

Bureau of Air Quality
5/22/2025





Pennsylvania
Department of
Environmental Protection

Agenda

- DEP's PM2.5 Designation Process
- DEP's PM2.5 Exceptional Event Process
- 2024 PM2.5 Year in Review
 - A review of the meteorology
 - PM2.5 Concentration Data
- Next Steps



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DEP's PM_{2.5} Designation Process

DEP's PM_{2.5} Designation Process

- On February 7, 2024, EPA signed the final rule for a new PM_{2.5} NAAQS, revising the primary annual standard to 9.0 µg/m³ and retaining the primary 24-hour standard to 35 µg/m³.
- EPA finalized 2023 PM_{2.5} design values in August 2024. DEP used these 2023 PM_{2.5} design values for its designation purposes.
- In its plan, DEP used five factors (air quality data, emissions data, meteorology data, geography/topography data and jurisdictional boundary data) to define its proposed PM_{2.5} nonattainment areas.
- The result: DEP proposed four areas in the Commonwealth for nonattainment area designation.
- DEP went out for public comment on its recommended PM_{2.5} designation from December 21, 2024 until January 28, 2025.

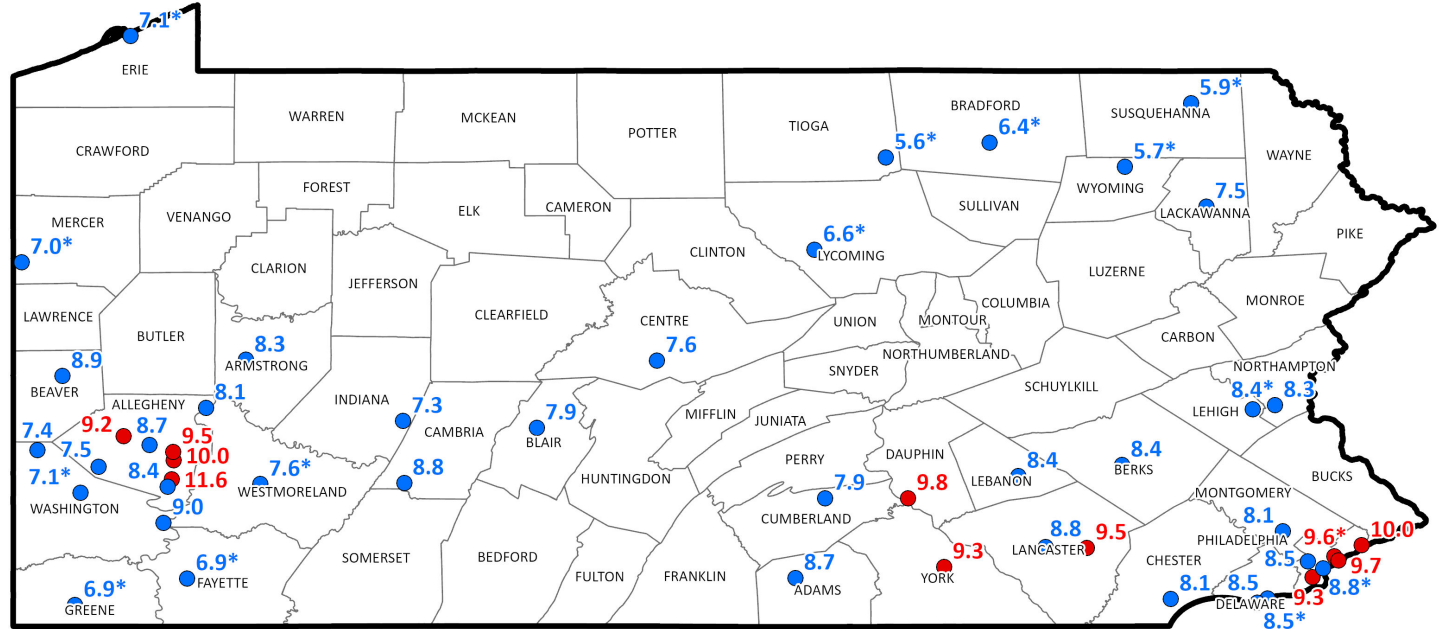
DEP's PM2.5 Designation Process

Facts about the public comment period:

- DEP extended the public comment period due to a request that was submitted.
- In total, DEP received 24 public comments.
- Public comments were submitted from Pennsylvania citizens in addition to different environmental organizations, including from Allegheny County Clean Air Now, Breathe Project, Carnegie Mellon University's CREATE Lab, Clean Air Council, Environmental Health Project, Environmental Integrity Project, Group Against Smog and Pollution, PennEnvironment Research and Policy Center, PennFuture, and Protect PT.
- Final comment and response document will be published to DEP website once approved for publication.



DEP's PM2.5 Designation Process – Final 2023 Annual DV



Appearing in Red – 2023 annual PM2.5 design value above 9.0 µg/m³ (2024 PM2.5 Standard)

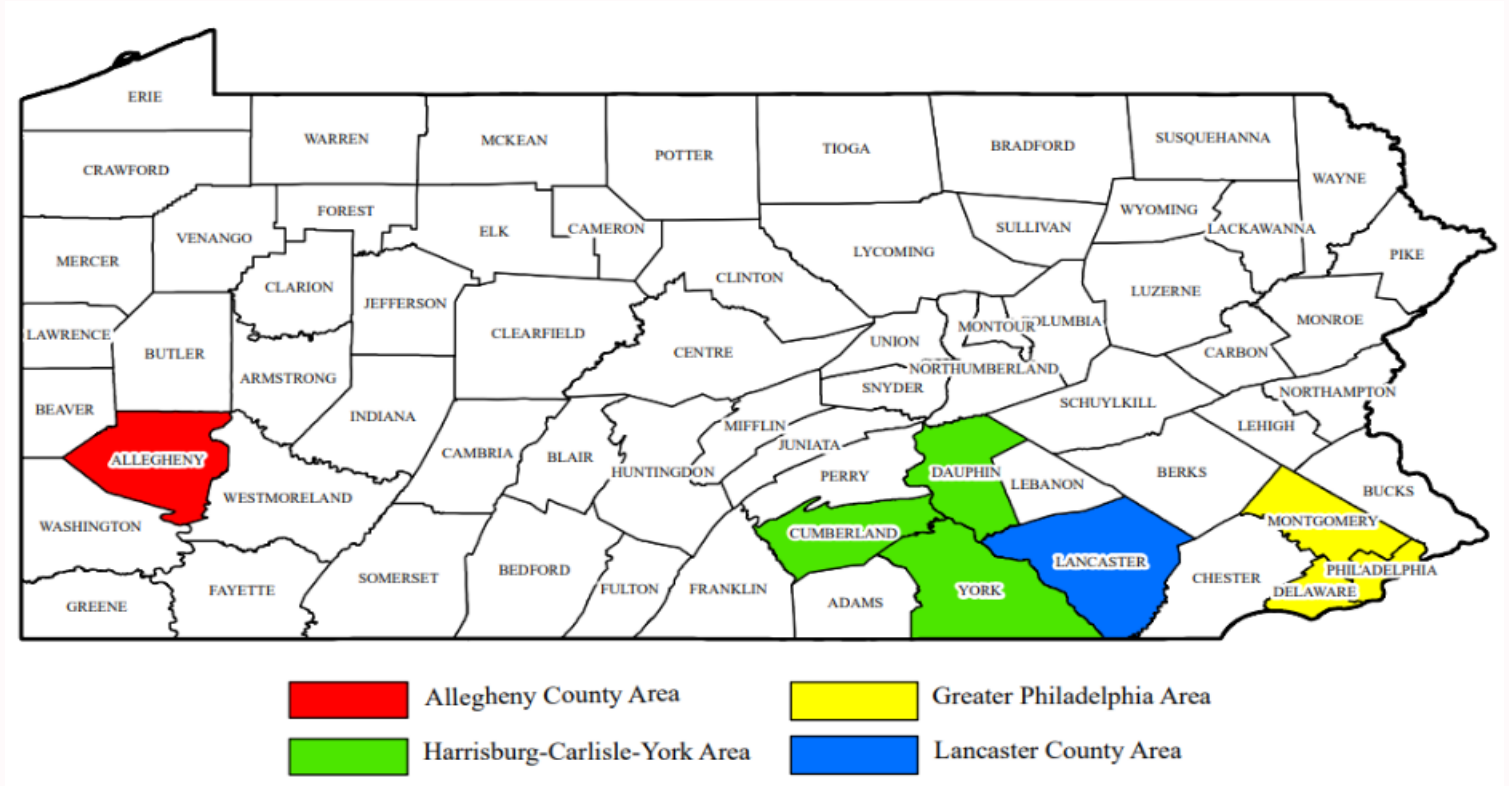
Appearing in Blue – 2023 annual PM_{2.5} design value at or below 9.0 µg/m³ (2024 PM_{2.5} Standard)

Asterisk (*) appearing behind the design value means the data is incomplete during 3-year period.



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DEP's PM_{2.5} Designation Process – Final Proposal





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DEP's PM_{2.5} Exceptional Event Process

DEP's PM2.5 Exceptional Event Process

- Coinciding with the 2024 PM2.5 NAAQS designation process, DEP embarked on a PM2.5 exceptional event analysis.
- The events focused on two different time periods in June 2023: June 6 – June 8 and June 28 – July 1. Both events were centered on wildfires in eastern Canada (Quebec province).
- DEP focused the analysis on three sites: Avalon (ACHD), York (DEP), Fire Admin Bldg (PAMS).
- Result: the analysis demonstrated that if the PM2.5 data from the two events were excluded for determination of the compliance with the 2024 PM2.5 NAAQS, the three sites would no longer be exceeding the 2024 PM2.5 NAAQS based on the 2023 PM2.5 design value period, thereby meeting the “regulatory significance” requirement of completing an exceptional event analysis.
- The exceptional event analysis went out for public comment from February 15, 2025 to March 17, 2025. DEP received no public comments.



DEP's PM2.5 Designation Process – Final 2023 Annual DV



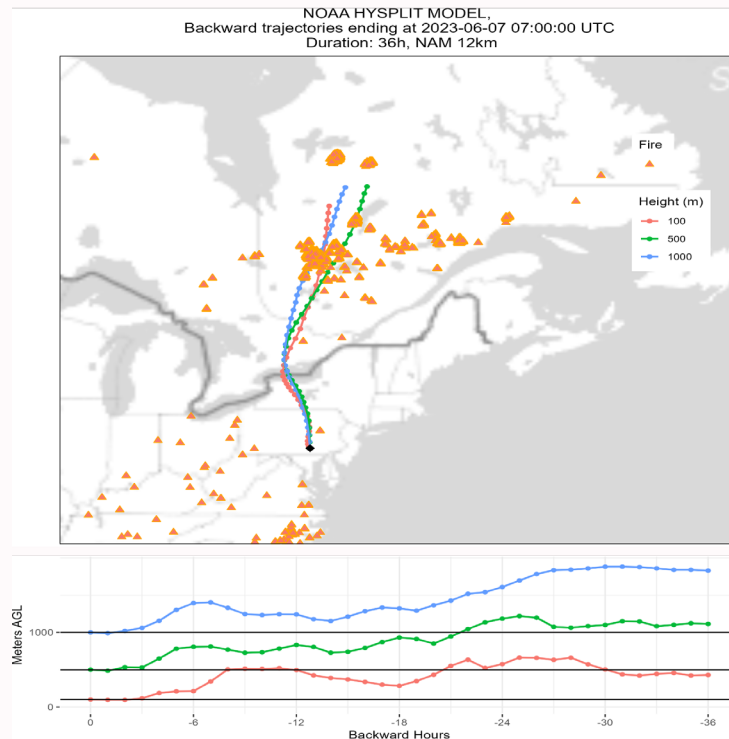
Asterisk (*) appearing behind the design value means the data is incomplete during 3-year period.



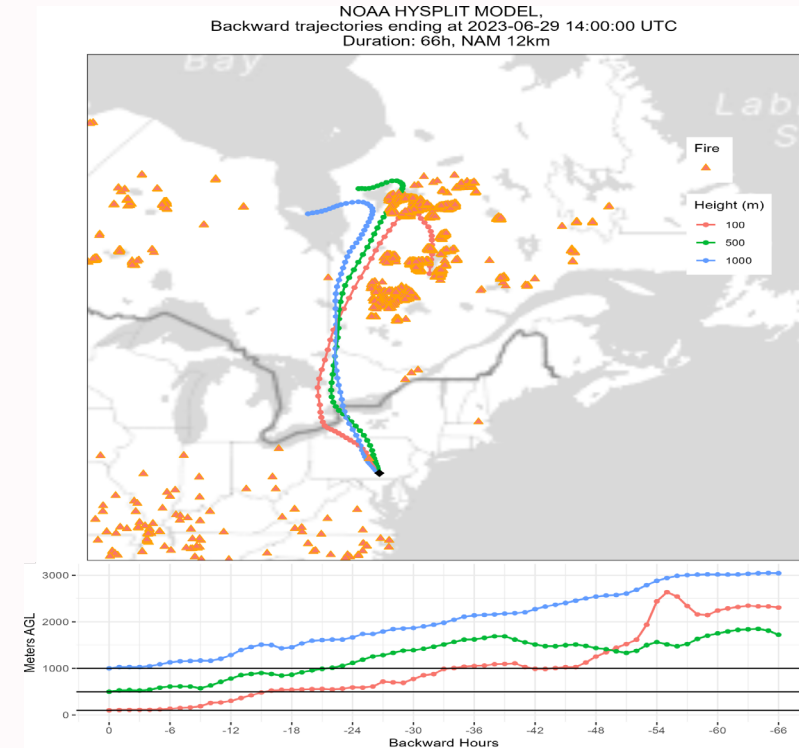
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DEP's PM_{2.5} Exceptional Event Process – Back Trajectories

June 7, 2023

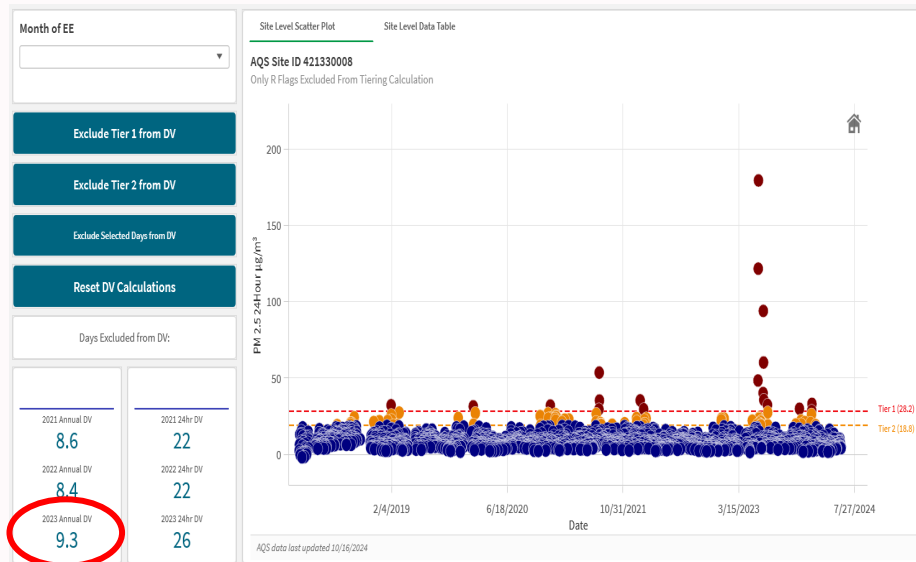


June 29, 2023

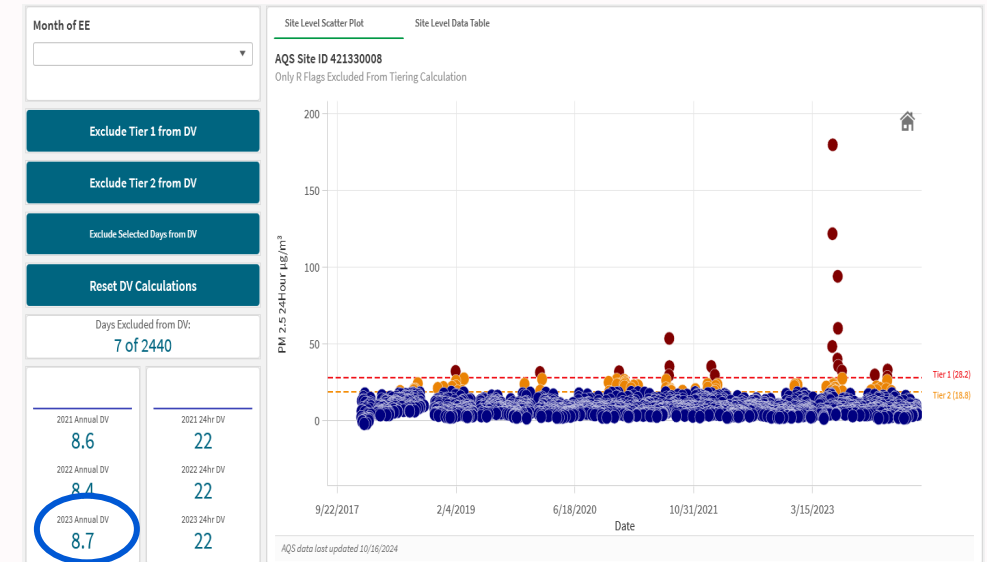


DEP's PM2.5 Exceptional Event Process – PM2.5 Concentrations

York – No Days Excluded



York – Seven Days Excluded



Graphics from EPA Website: <https://www.epa.gov/air-quality-analysis/pm25-tiering-tool-exceptional-events-analysis>



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2024 PM_{2.5} Year in Review



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Meteorology – Winter 2024

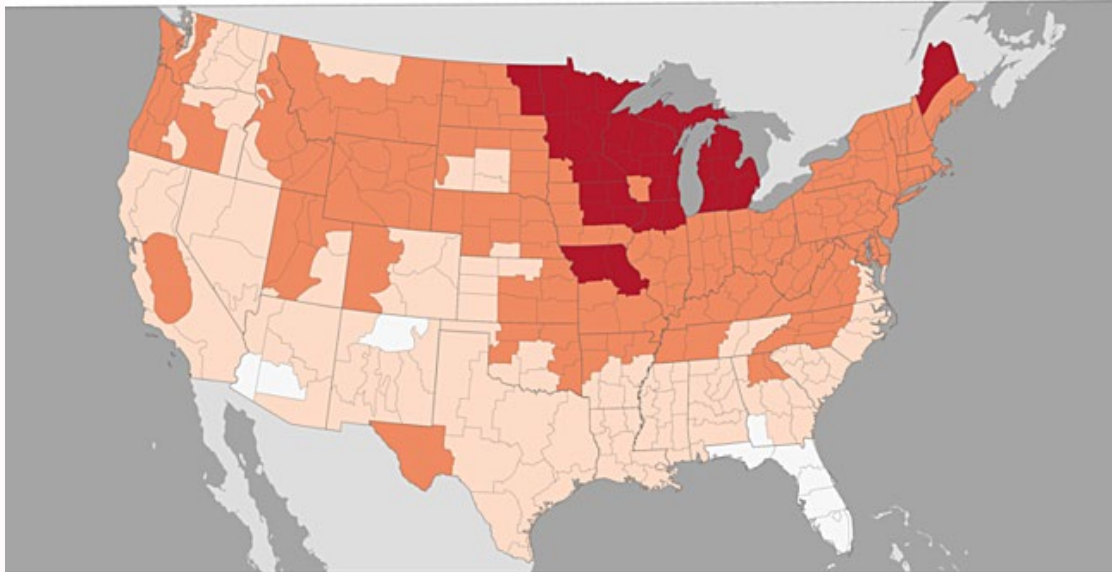
Temperature

Divisional Maximum Temperature Ranks

December 2023–February 2024

Ranking Period: 1895–2024

NOAA's National Centers for Environmental Information



Record Coldest
Much Below Average
Below Average
Near Average
Above Average
Much Above Average
Record Warmest



Created: Wed Mar 6 2024
Source: nClimGrid – Monthly

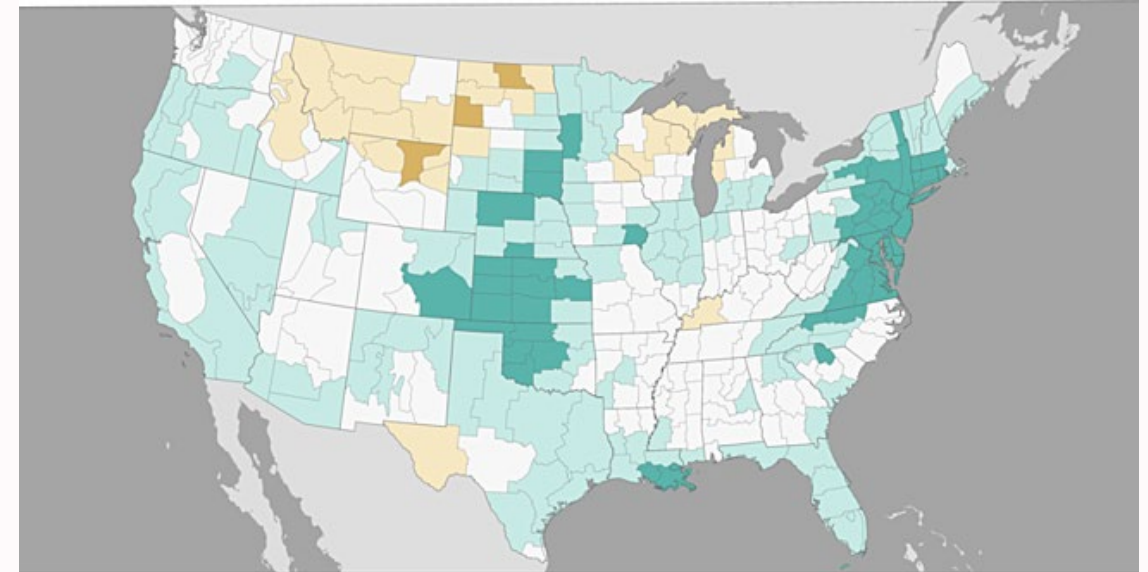
Precipitation

Divisional Precipitation Ranks

December 2023–February 2024

Ranking Period: 1895–2024

NOAA's National Centers for Environmental Information



Record Driest
Much Below Average
Below Average
Near Average
Above Average
Much Above Average
Record Wettest



Created: Wed Mar 6 2024
Source: nClimGrid – Monthly



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Meteorology – Spring 2024

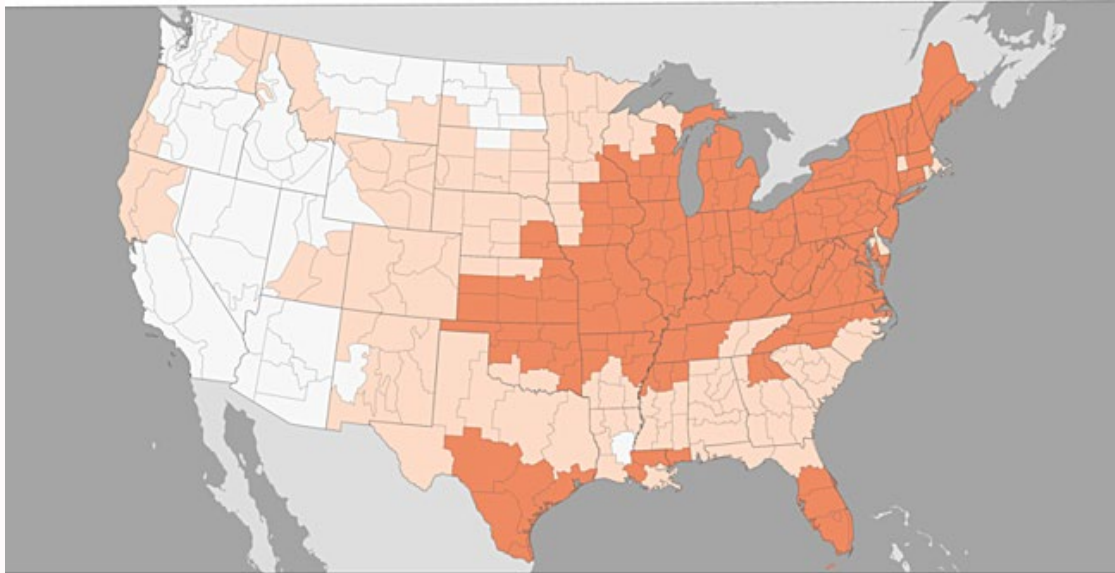
Temperature

Divisional Maximum Temperature Ranks

March–May 2024

Ranking Period: 1895–2024

NOAA's National Centers for Environmental Information



Record Coldest
Much Below Average
Below Average
Near Average
Above Average
Much Above Average
Record Warmest



Created: Thu Jun 6 2024
Source: nClimGrid – Monthly

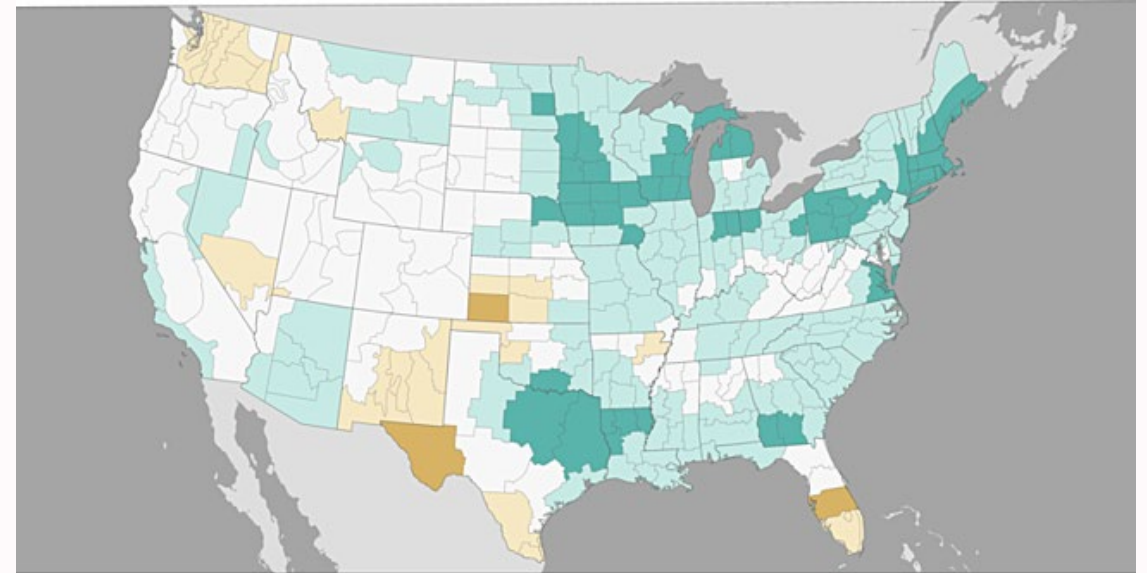
Precipitation

Divisional Precipitation Ranks

March–May 2024

Ranking Period: 1895–2024

NOAA's National Centers for Environmental Information



Record Driest
Much Below Average
Below Average
Near Average
Above Average
Much Above Average
Record Wettest



Created: Thu Jun 6 2024
Source: nClimGrid – Monthly



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Meteorology – Summer 2024

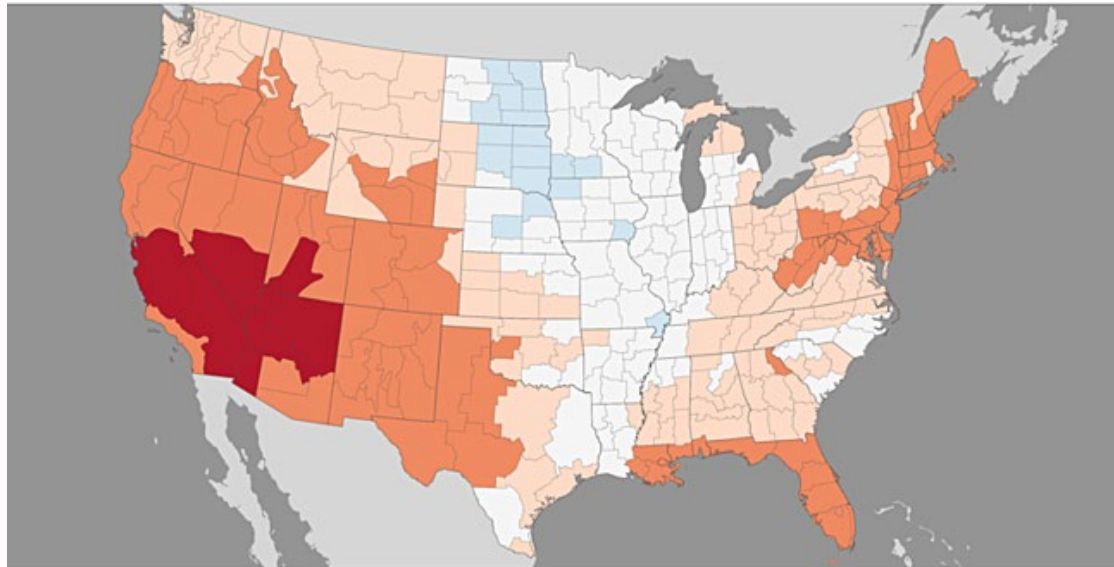
Temperature

Divisional Maximum Temperature Ranks

June-August 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information



Created: Fri Sep 6 2024
Source: nClimGrid - Monthly



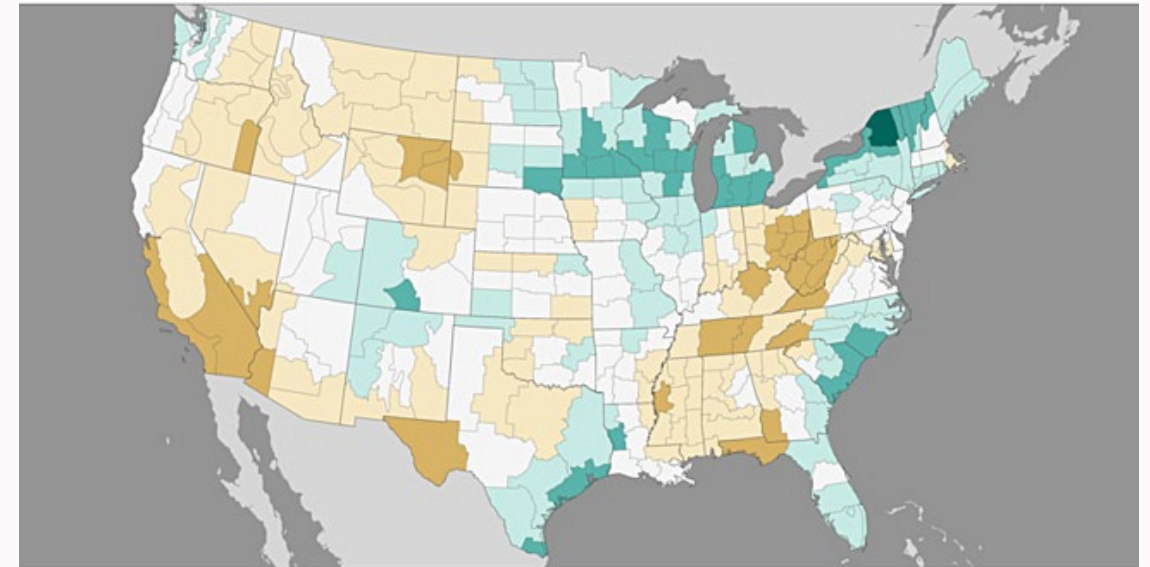
Precipitation

Divisional Precipitation Ranks

June-August 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information



Created: Fri Sep 6 2024
Source: nClimGrid - Monthly





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Meteorology – Fall 2024

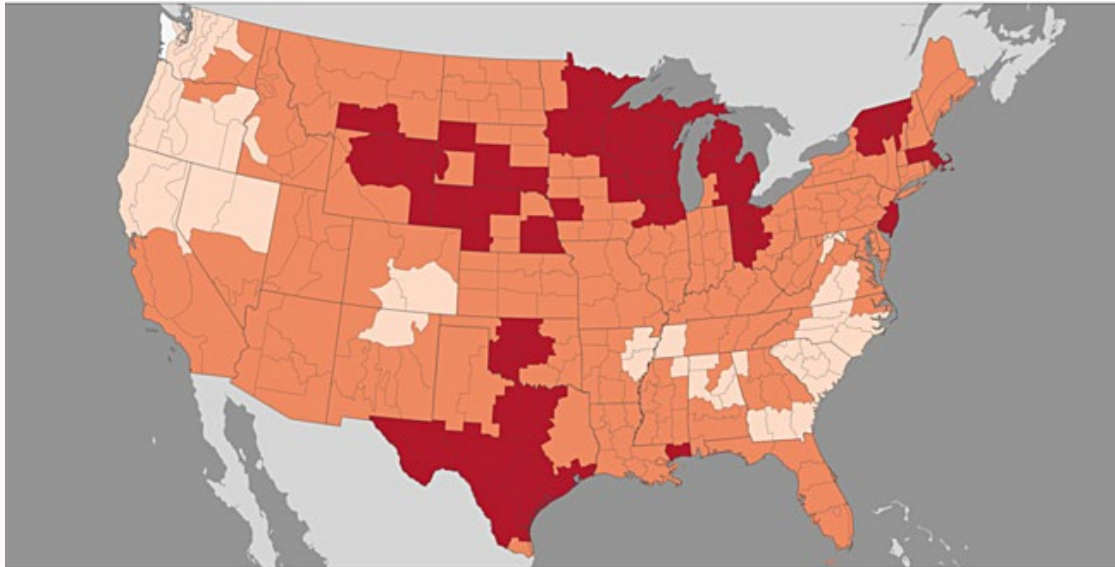
Temperature

Divisional Maximum Temperature Ranks

September-November 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information



Created: Thu Dec 5 2024
Source: nClimGrid - Monthly



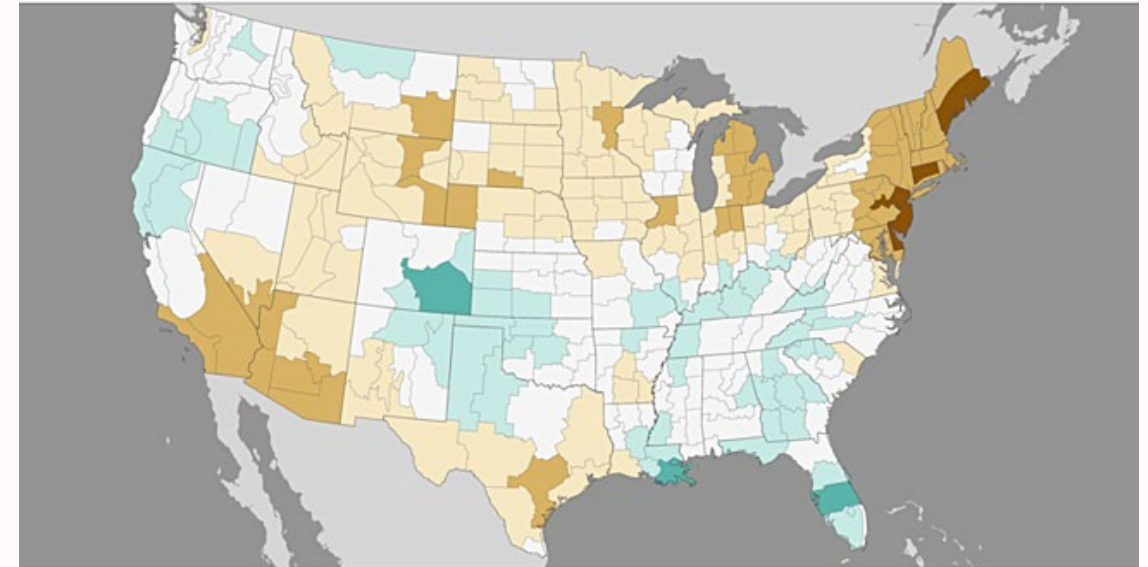
Precipitation

Divisional Precipitation Ranks

September-November 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information



Created: Thu Dec 5 2024
Source: nClimGrid - Monthly



2024 PM2.5 Monitoring Summary

- PM2.5 monitoring season – Year-round
- Overview of the 2024 design value (DV) for the 24-hour and annual PM2.5 national ambient air quality standard (NAAQS) continuous monitors:
 - 2024 24-hour DV calculation – 98th percentile value from 2022, 2023, and 2024 averaged over a 3-year period.
 - 2024 annual DV calculation – Annual average calculated from quarterly (January – March, and so on) averages. Annual average for 2022, 2023, and 2024 averaged over a 3-year period.

Number of 24-hour PM2.5 Exceedances

Number of PM2.5 exceedance days and total number of exceedances per year within Pennsylvania's PM2.5 monitoring network (~46 total monitors):

- 2022: 9 days | 12 total exceedances
- 2023: 20 days | 204 total exceedances
- 2024: 8 days | 10 total exceedances



The map displays the following counties and their corresponding winning candidates and vote percentages (Biden/Trump):

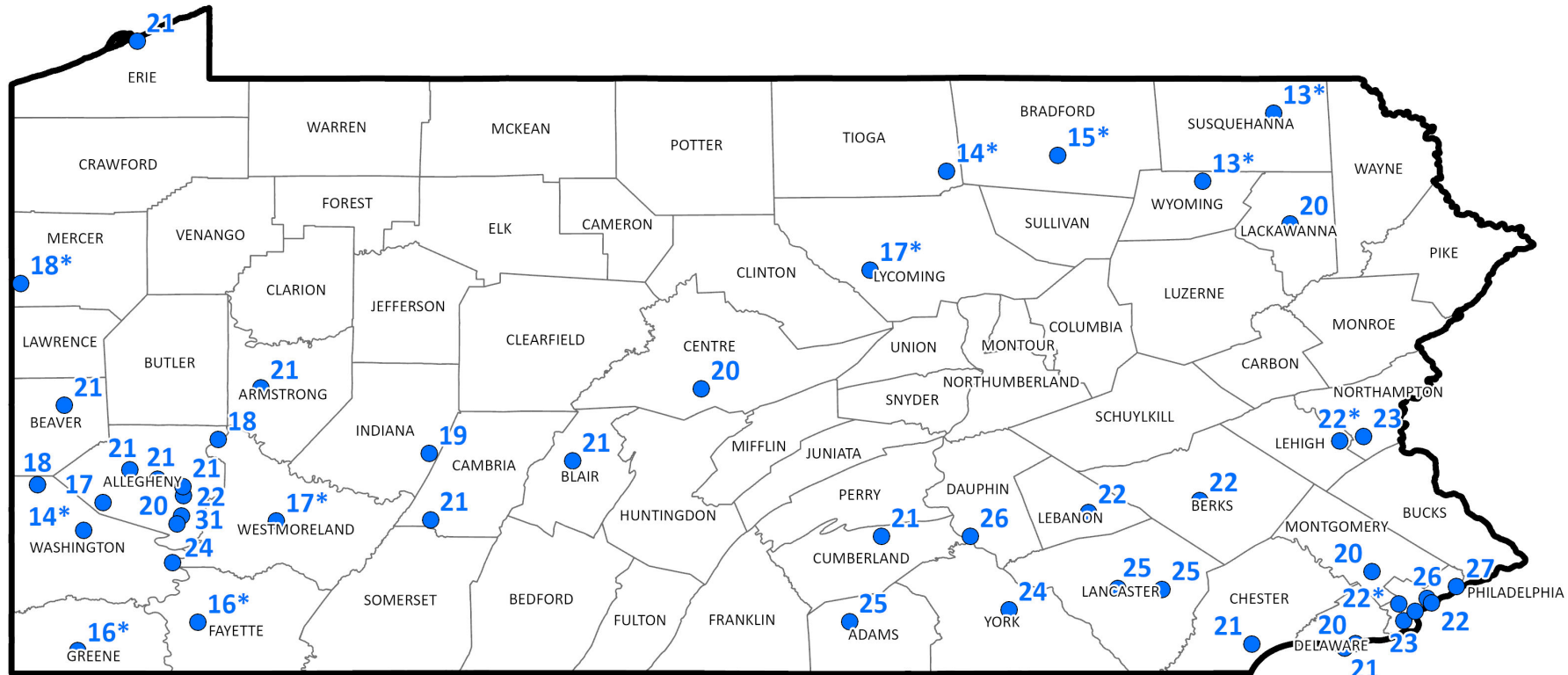
- ERIE: Biden (22*)
- CRAWFORD: Biden (21*)
- WARREN: Biden (21*)
- MCKEAN: Biden (21*)
- POTTER: Biden (21*)
- TIOGA: Biden (15*)
- BRADFORD: Biden (16*)
- SUSQUEHANNA: Biden (15*)
- WAYNE: Biden (20)
- PIKE: Biden (20)
- LYCOMING: Biden (17*)
- CLINTON: Biden (21)
- COLUMBIA: Biden (26*)
- MONROE: Biden (24)
- CARBON: Biden (26*)
- NORTHAMPTON: Biden (24)
- LEHIGH: Biden (26*)
- BUCKS: Biden (24)
- MONTGOMERY: Biden (22)
- PHILADELPHIA: Biden (24*)
- DELAWARE: Biden (24)
- CHESTER: Biden (23)
- LANCASTER: Biden (26)
- BERKS: Biden (24)
- DAUPHIN: Biden (27)
- JUNIATA: Biden (23)
- PERRY: Biden (23)
- CUMBERLAND: Biden (25)
- ADAMS: Biden (25)
- YORK: Biden (26)
- FULTON: Biden (22)
- FRANKLIN: Biden (22)
- BEDFORD: Biden (22)
- HUNTINGDON: Biden (22)
- BLAIR: Biden (22)
- CAMBRIA: Biden (21)
- INDIANA: Biden (21)
- JEFFERSON: Biden (21)
- CLEARFIELD: Biden (21)
- CENTRE: Biden (21)
- CLARION: Biden (23)
- ARMSTRONG: Biden (19)
- BUTLER: Biden (23)
- ALLEGHENY: Biden (23)
- WASHINGTON: Biden (16*)
- WESTMORELAND: Biden (19*)
- SOMERSET: Biden (17*)
- FAYETTE: Biden (17*)
- GREENE: Biden (16*)

Asterisk (*) appearing behind the design value means the data is incomplete during 3-year period.



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2024 24-hour PM_{2.5} Design Values



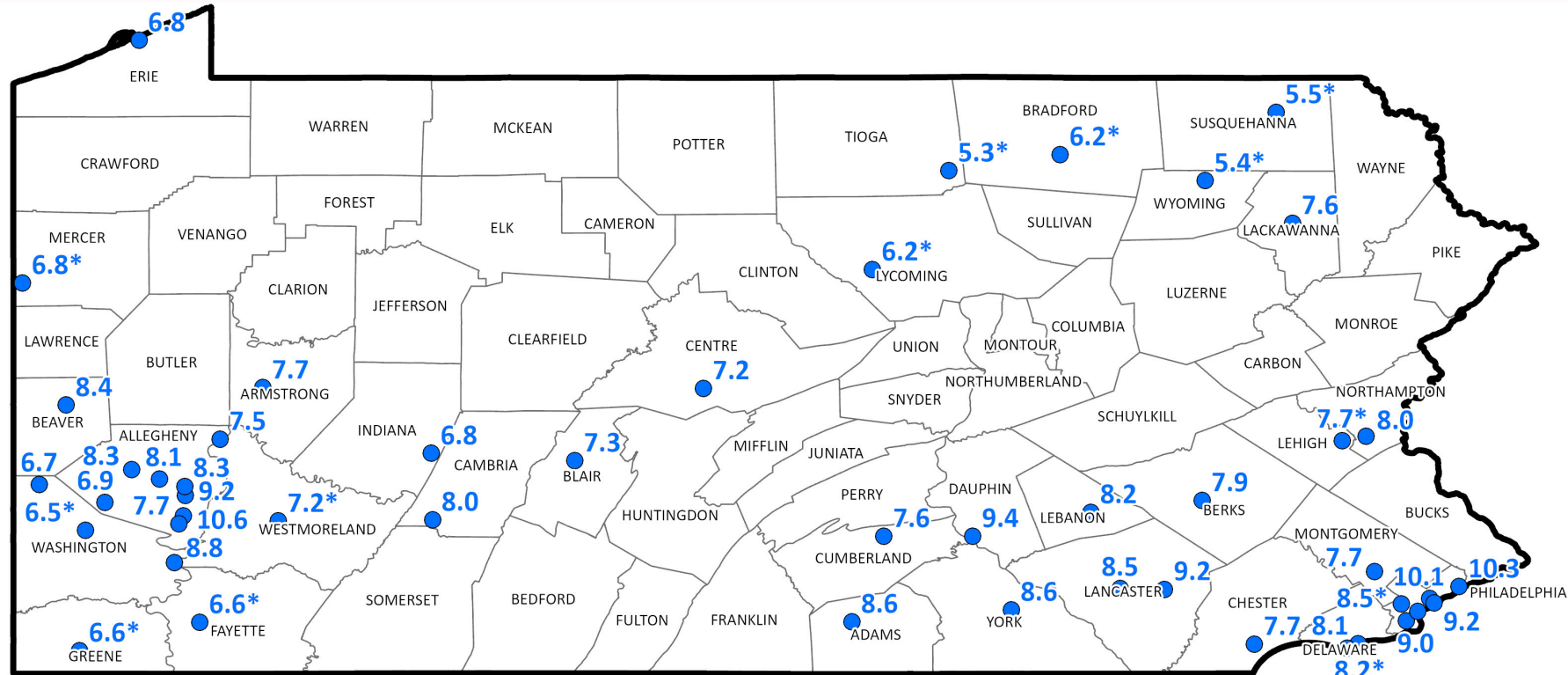
Appearing in Red – 2024 24-hour PM_{2.5} design value above 35 $\mu\text{g}/\text{m}^3$ (2024 PM_{2.5} Standard)

Appearing in Blue – 2024 24-hour PM_{2.5} design value at or below 35 $\mu\text{g}/\text{m}^3$ (2024 PM_{2.5} Standard)

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2024 Annual PM2.5 Design Values – 2012 NAAQS (12.0 $\mu\text{g}/\text{m}^3$)



Appearing in Red – 2024 annual PM_{2.5} design value above 12.0 µg/m³ (2012 PM_{2.5} Standard)

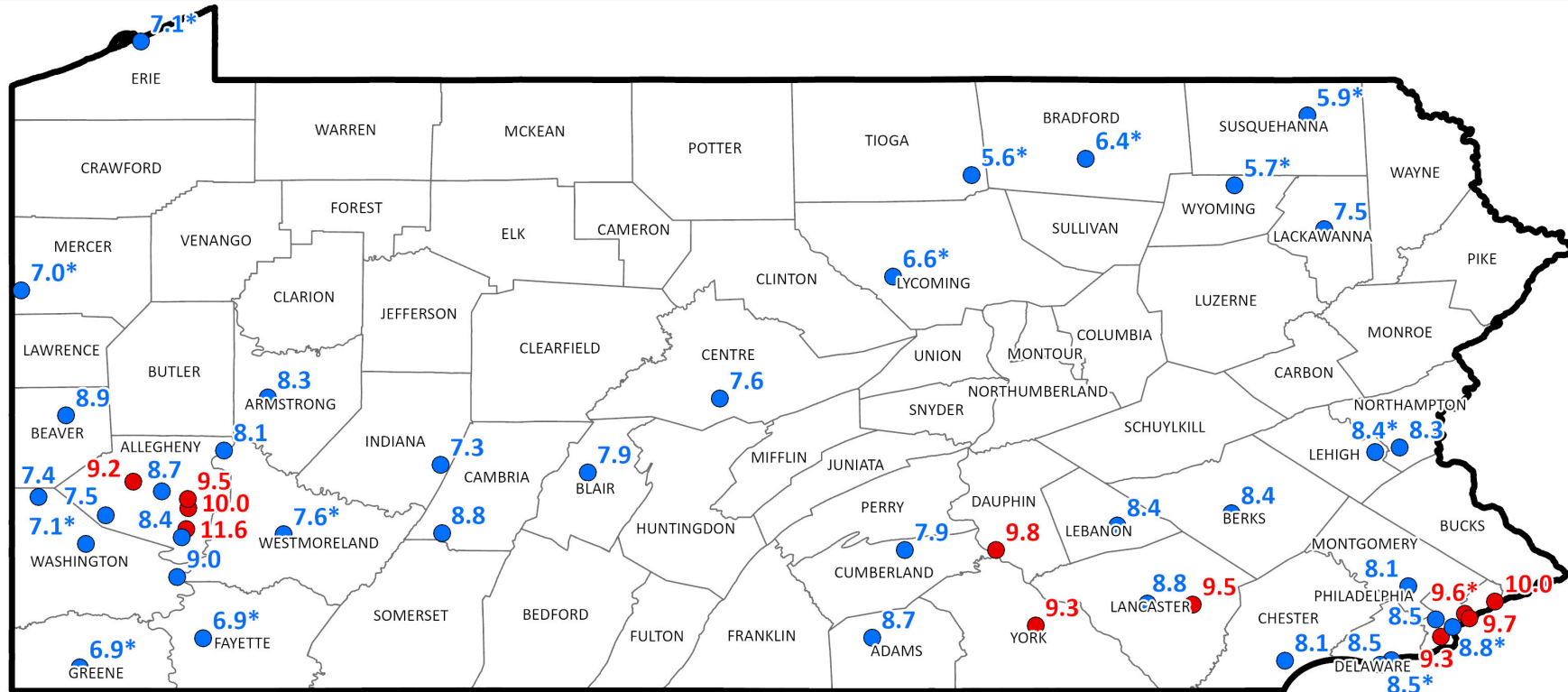
Appearing in Blue – 2024 annual PM_{2.5} design value at or below 12.0 µg/m³ (2012 PM_{2.5} Standard)

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2023 Annual PM_{2.5} Design Values – 2024 NAAQS (9.0 µg/m³)



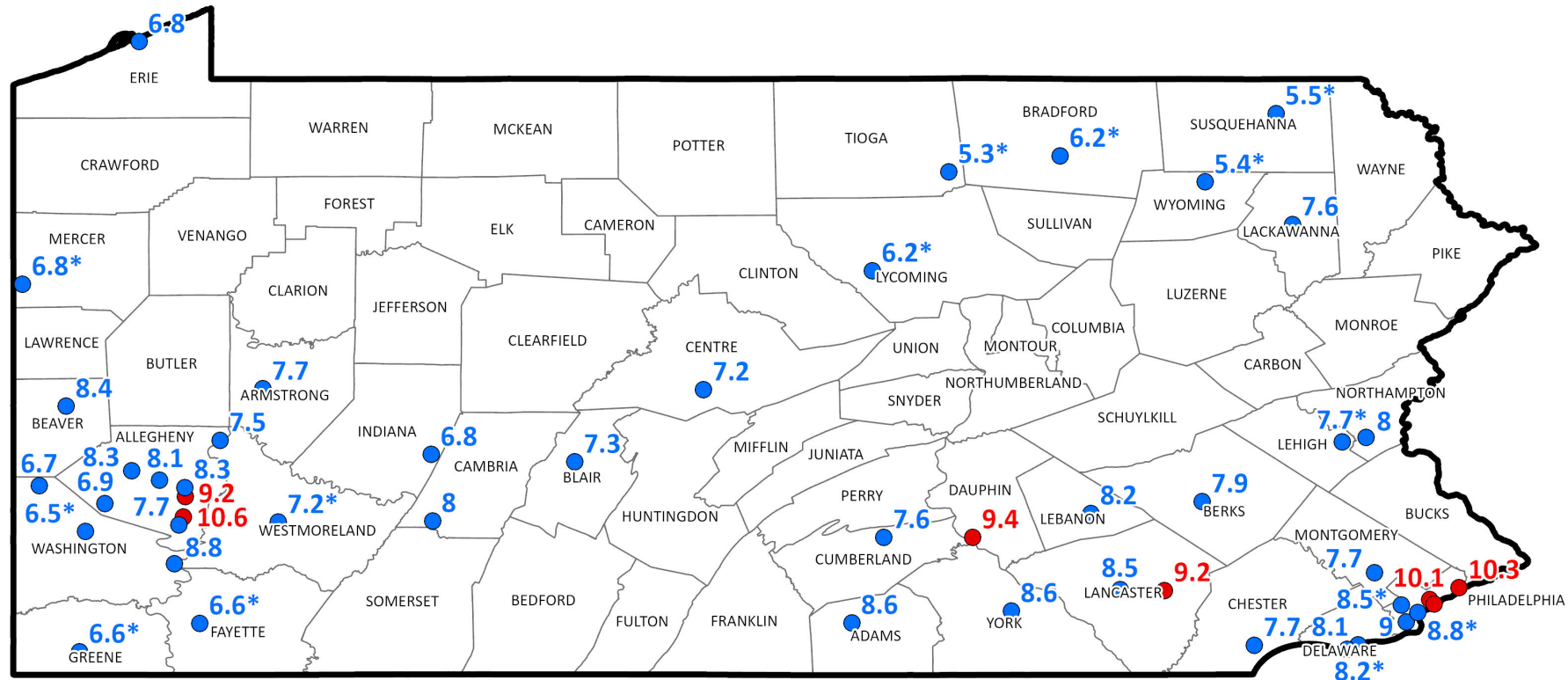
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Appearing in Blue – 2023 annual PM_{2.5} design value at or below 9.0 µg/m³ (2024 PM_{2.5} Standard)

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2024 Annual PM2.5 Design Values – 2024 NAAQS (9.0 µg/m³)



Appearing in Red – 2024 annual PM2.5 design value above 9.0 µg/m³ (2024 PM2.5 Standard)

Appearing in Blue – 2024 annual PM_{2.5} design value at or below 9.0 µg/m³ (2024 PM_{2.5} Standard)

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Next Steps



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Next Steps



Image Source: <https://www.istockphoto.com>

- DEP early certified its 2024 PM_{2.5} data for consideration for the PM_{2.5} designation process.
- We await decisions at the federal level about our PM_{2.5} recommended designations and our PM_{2.5} exceptional event analysis.
- If current PM_{2.5} annual NAAQS stays at 9.0 µg/m³, we will reevaluate the need for additional exceptional event analyses (that may now be “regulatory significant”) with respect to the June 2023 wildfire event.



Map of Pennsylvania showing county-level COVID-19 case rates per 100,000 people. The map displays 67 counties with their names and corresponding case rates. Rates are color-coded: blue for lower rates (6.2 to 8.8) and red for higher rates (9.2 to 10.6). Some rates are marked with an asterisk (*). The highest rates are in Philadelphia (10.3) and Montgomery (10.1).

County	Case Rate (per 100,000)
ALLEGHENY	8.2
ARMSTRONG	7.7
BUTLER	7.5
BEAVER	8.4
BEDFORD	7.3
BLAIR	7.3
BRADFORD	6.2*
BUCKS	7.7*
BUTLER	7.5
CAMBERIA	6.8
CAMERON	7.2
CARLISLE	8.1
CARLISLE	8.3
CARLISLE	8.4
CARLISLE	8.5
CARLISLE	8.6
CARLISLE	8.7
CARLISLE	8.8
CARLISLE	9.2
CARLISLE	9.4
CARLISLE	9.6
CARLISLE	9.8
CARLISLE	10.0
CARLISLE	10.2
CARLISLE	10.4
CARLISLE	10.6
CARLISLE	10.8
CARLISLE	11.0
CARLISLE	11.2
CARLISLE	11.4
CARLISLE	11.6
CARLISLE	11.8
CARLISLE	12.0
CARLISLE	12.2
CARLISLE	12.4
CARLISLE	12.6
CARLISLE	12.8
CARLISLE	13.0
CARLISLE	13.2
CARLISLE	13.4
CARLISLE	13.6
CARLISLE	13.8
CARLISLE	14.0
CARLISLE	14.2
CARLISLE	14.4
CARLISLE	14.6
CARLISLE	14.8
CARLISLE	15.0
CARLISLE	15.2
CARLISLE	15.4
CARLISLE	15.6
CARLISLE	15.8
CARLISLE	16.0
CARLISLE	16.2
CARLISLE	16.4
CARLISLE	16.6
CARLISLE	16.8
CARLISLE	17.0
CARLISLE	17.2
CARLISLE	17.4
CARLISLE	17.6
CARLISLE	17.8
CARLISLE	18.0
CARLISLE	18.2
CARLISLE	18.4
CARLISLE	18.6
CARLISLE	18.8
CARLISLE	19.0
CARLISLE	19.2
CARLISLE	19.4
CARLISLE	19.6
CARLISLE	19.8
CARLISLE	20.0
CARLISLE	20.2
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CARLISLE	20.8
CARLISLE	21.0
CARLISLE	21.2
CARLISLE	21.4
CARLISLE	21.6
CARLISLE	21.8
CARLISLE	22.0
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CARLISLE	23.0
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CARLISLE	36.6
CARLISLE	36.8
CARLISLE	37.0
CARLISLE	37.2
CARLISLE	37.4
CARLISLE	37.6
CARLISLE	37.8
CARLISLE	38.0
CARLISLE	38.2
CARLISLE	38.4
CARLISLE	38.6
CARLISLE	38.8
CARLISLE	39.0

Appearing in Blue – 2024 annual PM_{2.5} design value at or below 9.0 µg/m³ (2024 PM_{2.5} Standard)

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Get In Touch

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The Department of Environmental Protection's mission is to protect Pennsylvania's air, land and water resources and to provide for the health and safety of its residents and visitors, consistent with the rights and duties established under the Environmental Rights Amendment (Article 1, Section 27 of the Pennsylvania Constitution).