

# Comparison of 2020 Nitrogen Oxides and Fine Particle Concentrations in New Jersey with Data from 2014-2019

The Impact of the “Stay at Home” Directive on Air Quality in New Jersey

NJDEP Bureau of Air Monitoring

5/5/2020

# Stay at Home

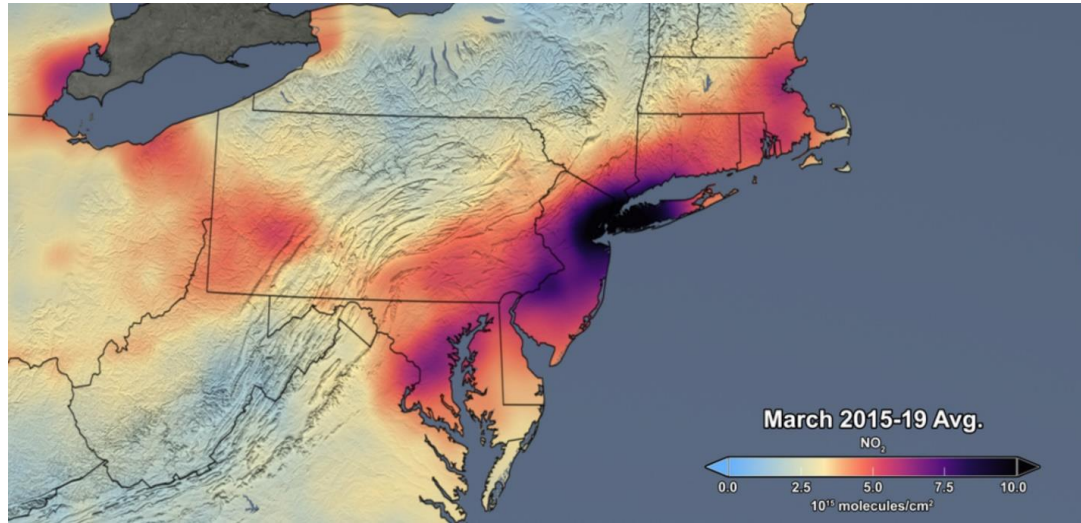
- Office workers work from home.
- All schools and colleges closed; study from home.
- Closure of all non-essential retail businesses
- Closure of all recreational and entertainment businesses.
- All non-essential construction projects must stop.

## Results:

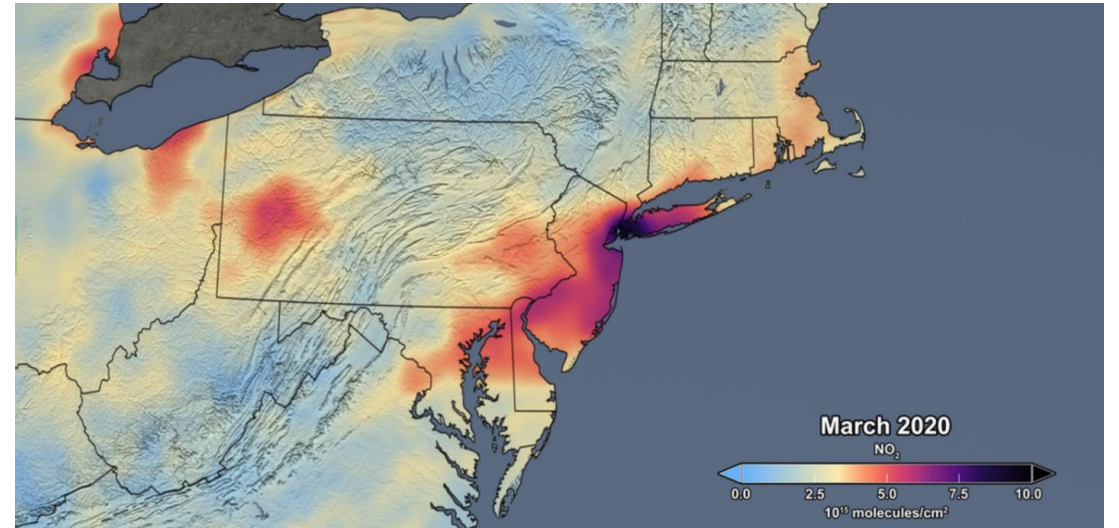
- 38% overall reduction in motor vehicle traffic (a)
- 5%-14% reduction in power use (b,c)

# Satellite Images of NO<sub>2</sub> Levels

**NO<sub>2</sub> Levels, March 2015-2019**



**NO<sub>2</sub> Levels, March 2020**



<https://www.nasa.gov/feature/goddard/2020/drop-in-air-pollution-over-northeast>

# News Media Use Satellite Images to Promote Substantial Improvement in Air Quality

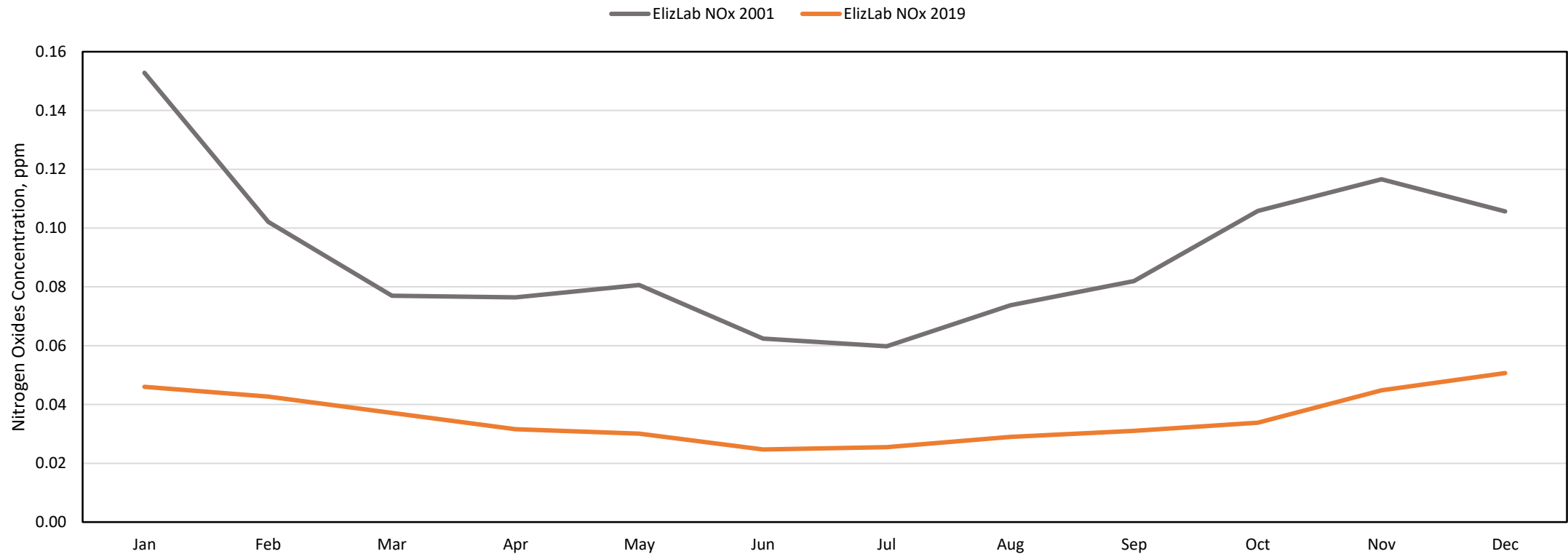
- “[C]leanest since 9/11,”  
<https://www.nj.com/coronavirus/2020/04/njs-air-is-the-cleanest-its-been-since-911-due-to-coronavirus-shutdown.html>
- “[P]andemic response has cleared the air from LA to Wuhan,”  
<https://www.washingtonpost.com/weather/2020/04/09/air-quality-improving-coronavirus/>
- “Reductions in traffic and industry have lowered nitrogen dioxide levels,” <https://www.wired.com/story/the-pandemic-has-led-to-a-huge-global-drop-in-air-pollution/>

# Satellite Images and Ground-Level Data

- Differences between satellite data and ground-level data:
  - Satellites detect  $\text{NO}_2$  once it has reached steady state with  $\text{NO}$  and  $\text{O}_3$  at an elevation from the height of the satellite to 50 meters above ground level
  - Ground-level  $\text{NO}$  and  $\text{NO}_2$  data is highly variable due to rapid reactions with ground-level  $\text{O}_3$  and other VOCs
  - For ground-level data, March and April are generally among the cleanest months of the year due to seasonal meteorology
- Monitors show steady declines since 2001 which contradicts reports that this is cleanest air since 9/11

# NOx data from Elizabeth, 2001 vs. 2019

Comparison of Monthly Nitrogen Oxides (NOx) Concentrations at Elizabeth Lab in 2001 and 2019  
Parts per Million, ppm

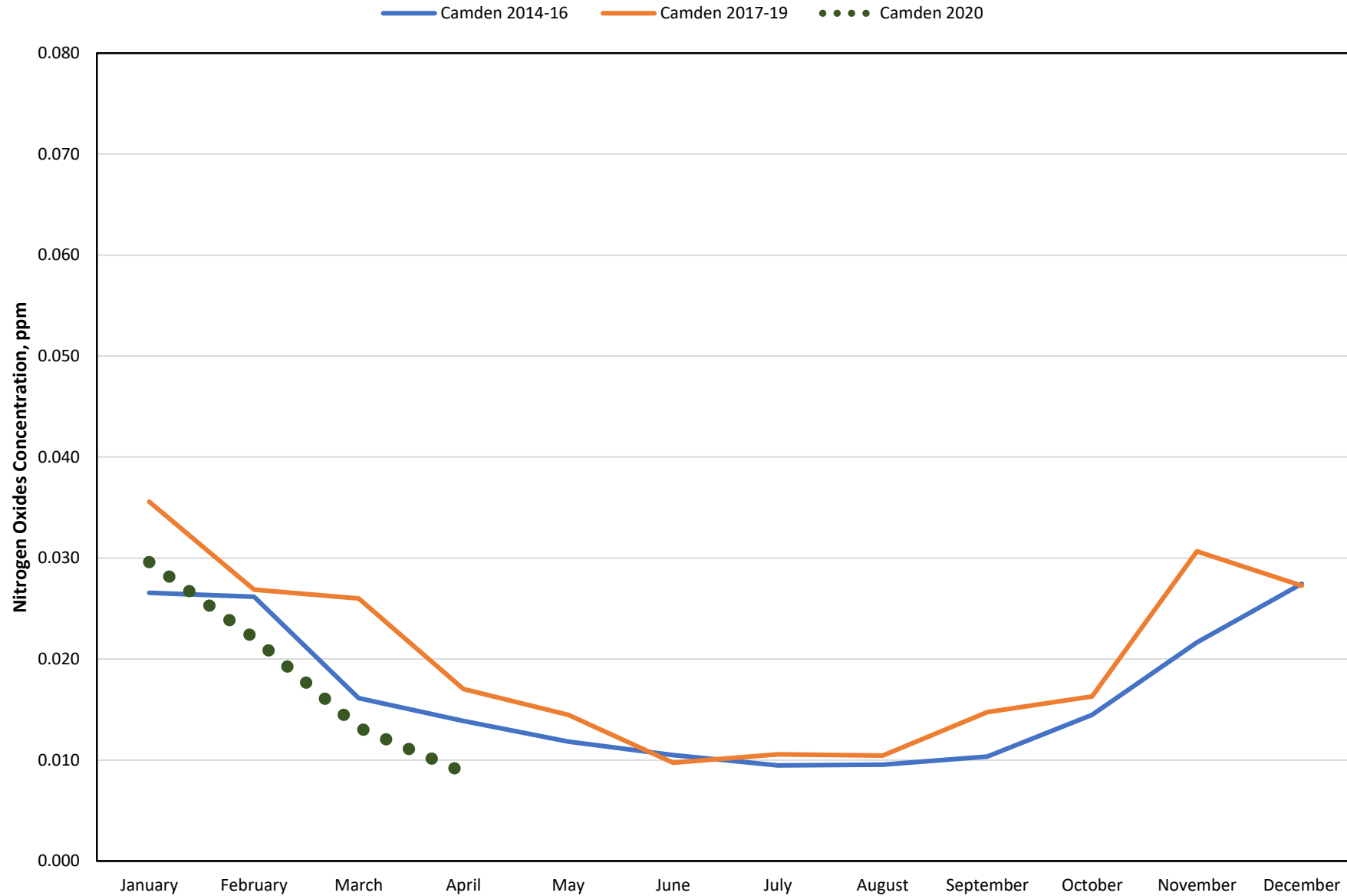


# Multi-Year Analysis of NOx and PM<sub>2.5</sub>

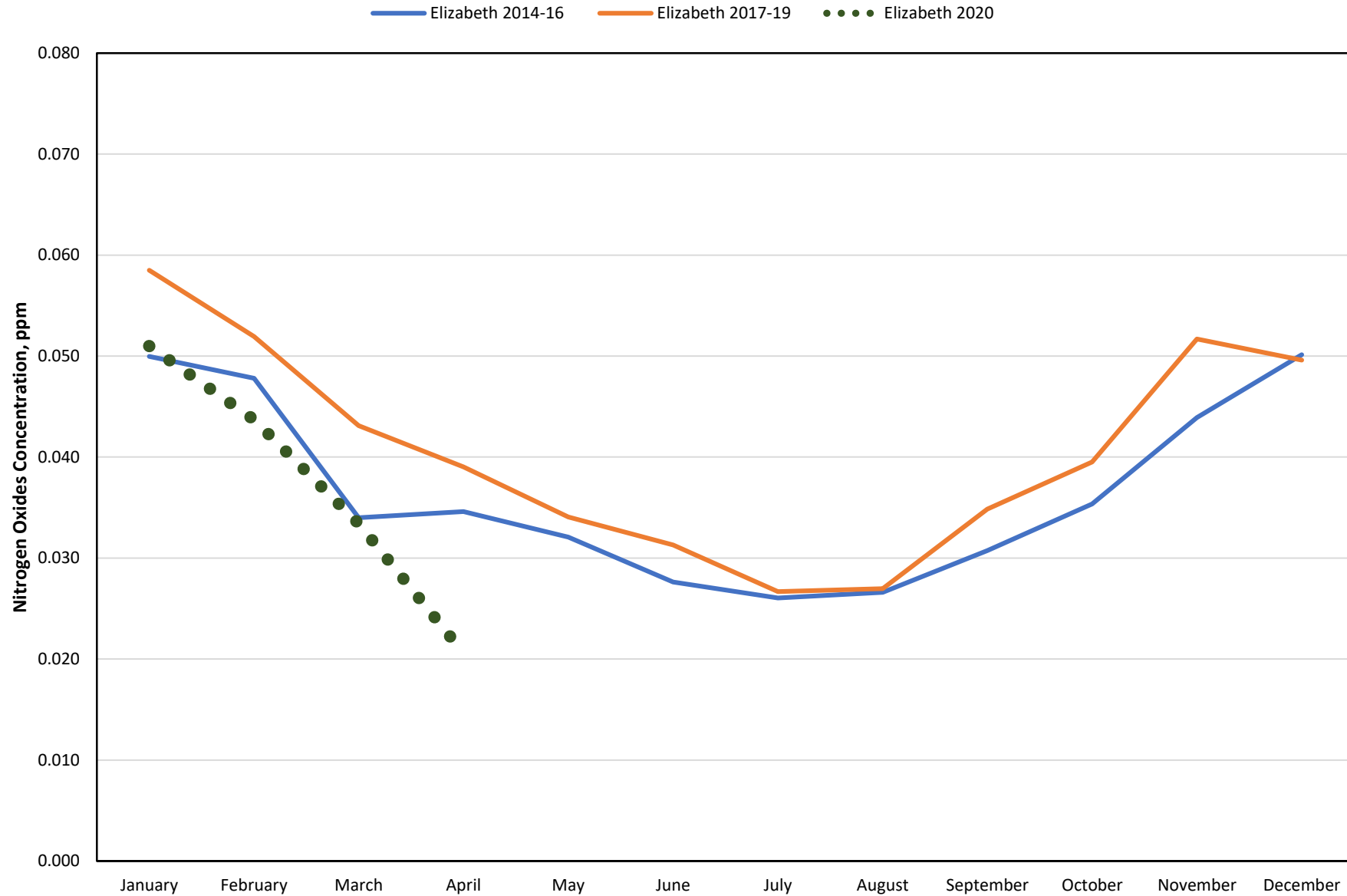
- Reduce effect of high and low concentration years by averaging 3-year periods, 2014-2016 and 2017-2019
- Use monthly averages for NOx and PM<sub>2.5</sub>
- Focus on urban air monitoring stations
  - Camden Spruce Street
  - Elizabeth Lab (NJ Turnpike Exit 13)
  - Jersey City

April 2020 data shows significant decrease in NOx and PM<sub>2.5</sub> levels at all stations compared with historical April data.

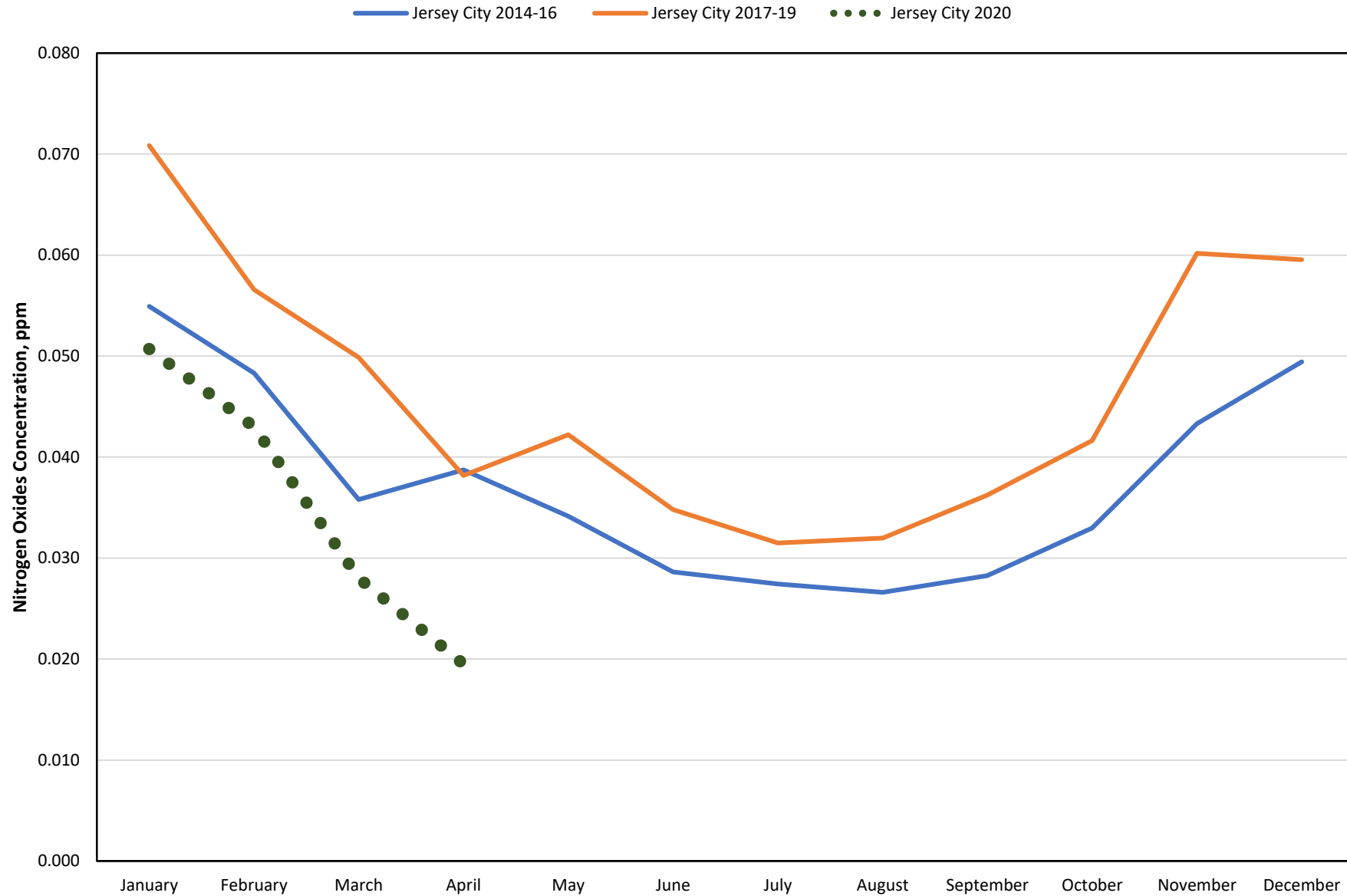
Comparison of 3-Year Average Monthly Nitrogen Oxides (NOx) Concentrations at Camden Spruce Street, 2014-16 and 2017-19 with 2020, Parts Per Million, PPM



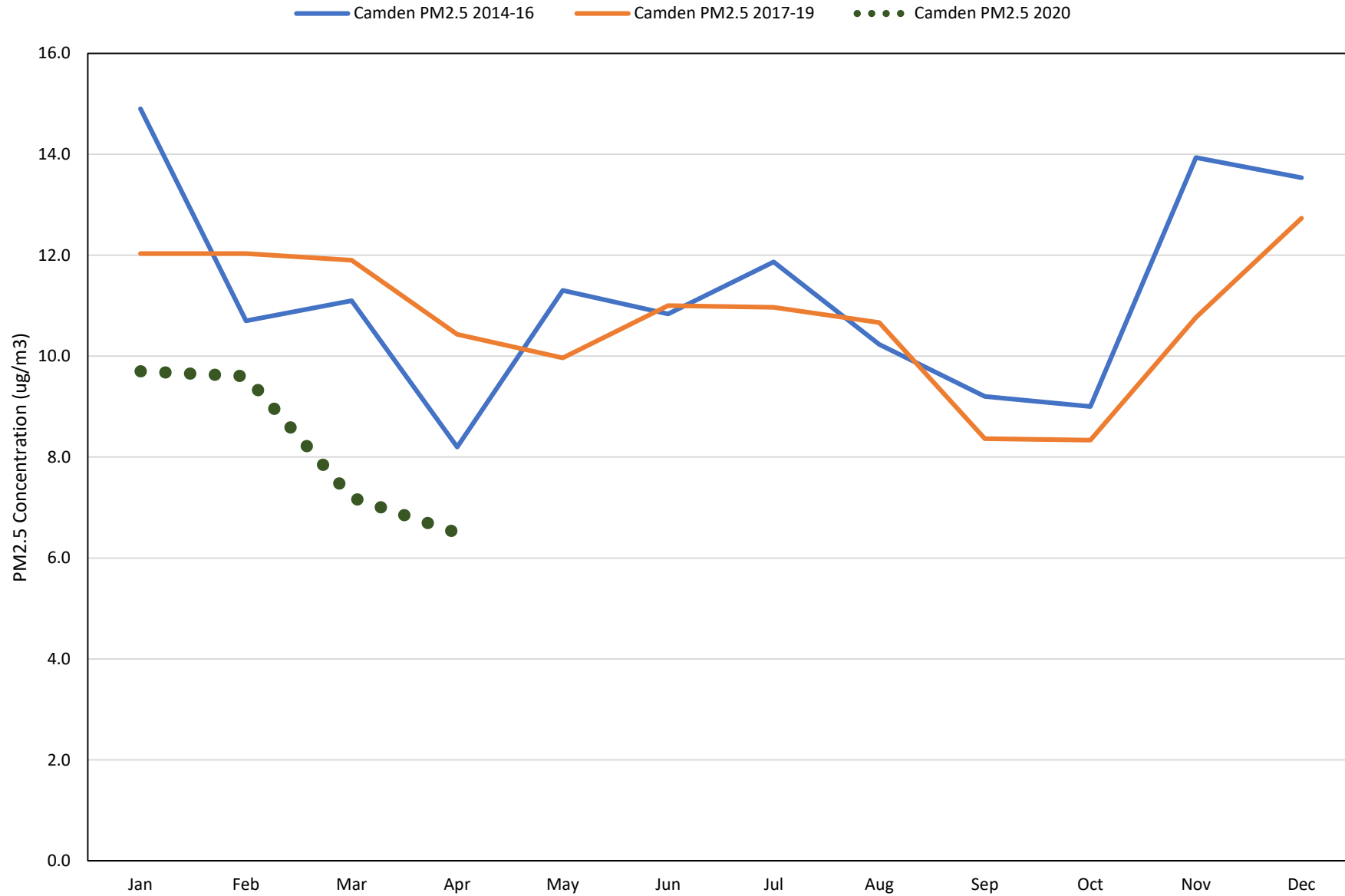
Comparison of 3-Year Average Monthly Nitrogen Oxides (NOx) Concentrations at Elizabeth, Exit 13, 2014-16 and 2017-19 with 2020, Parts Per Million, PPM



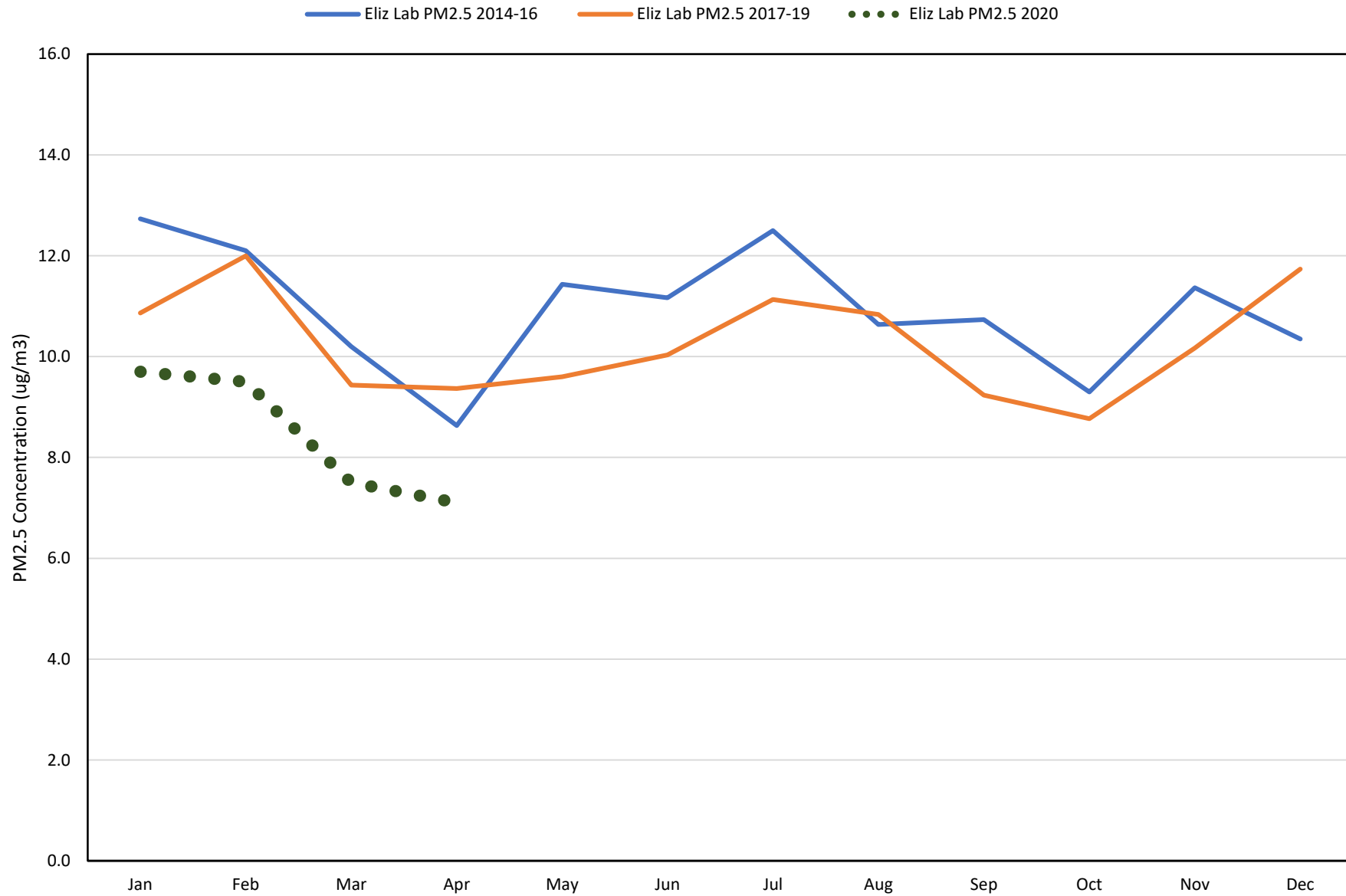
Comparison of 3-Year Average Monthly Nitrogen Oxides (NOx) Concentrations at Jersey City, 2014-16 and 2017-19 with 2020, Parts Per Million, PPM



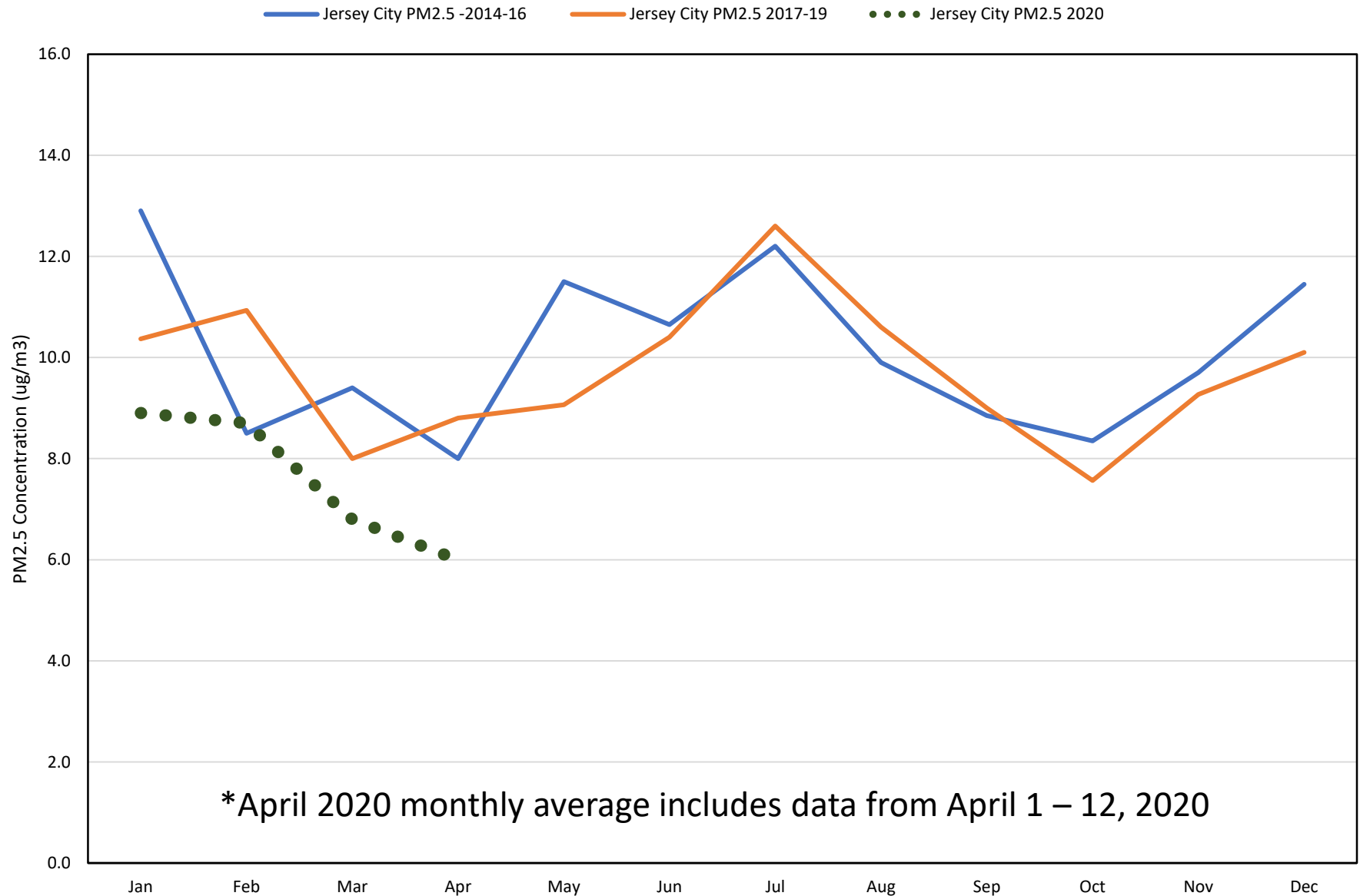
Comparison of 3-Year Average Monthly Fine Particle (PM2.5) Concentrations at Camden, 2014-16, and 2017-19 with 2020, Micrograms per Cubic Meter, ug/m3



Comparison of 3-Year Average Monthly Fine Particle (PM2.5) Concentrations at Elizabeth Lab Exit 13, 2014-16 and 2017-19 with 2020, Micrograms per Cubic Meter, ug/m3



Comparison of 3-Year Average Monthly Fine Particle (PM2.5) Concentrations at Jersey City, 2014-16 and 2017-19 with 2020\*, Micrograms per Cubic Meter, ug/m3



\*April 2020 monthly average includes data from April 1 – 12, 2020

# Summary of NOx Concentrations

- Percent Change in 2014-2019 Monthly Average NOx Concentrations versus 2020 NOx Concentrations

	March 2020	April 2020
Camden	-37%	-43%
Elizabeth Lab	-13%	-44%
Jersey City	-35%	-49%

# Summary of PM<sub>2.5</sub> Concentrations

- Percent Change in 2014-2019 Monthly Average PM<sub>2.5</sub> Concentrations versus 2020 PM<sub>2.5</sub> Concentrations

	March 2020	April 2020
Camden	-38%	-30%
Elizabeth Lab	-23%	-21%
Jersey City*	-21%	-29%

\*April 2020 monthly average includes data from April 1 – 12, 2020

End

[www.nj.gov/dep/airmon](http://www.nj.gov/dep/airmon)

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# References

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- <https://www.utilitydive.com/news/utilities-are-beginning-to-see-the-load-impacts-of-covid-19-as-economic-sh/574632/>