



Ozone Formation in the Austin Area

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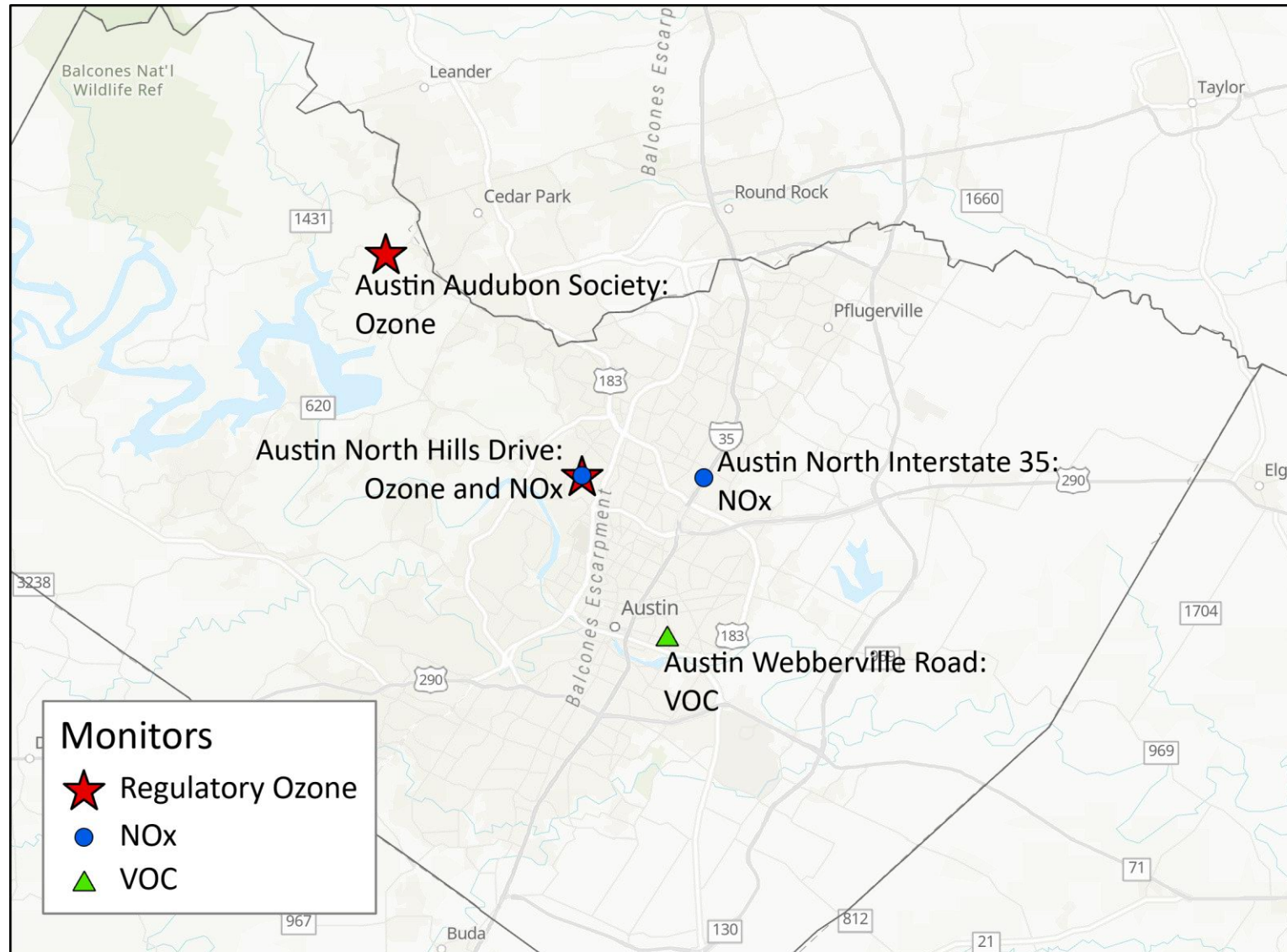
Clean Air Force – Air Quality Professionals Forum

August 10, 2023

Ozone Formation in the Austin Area: Topics

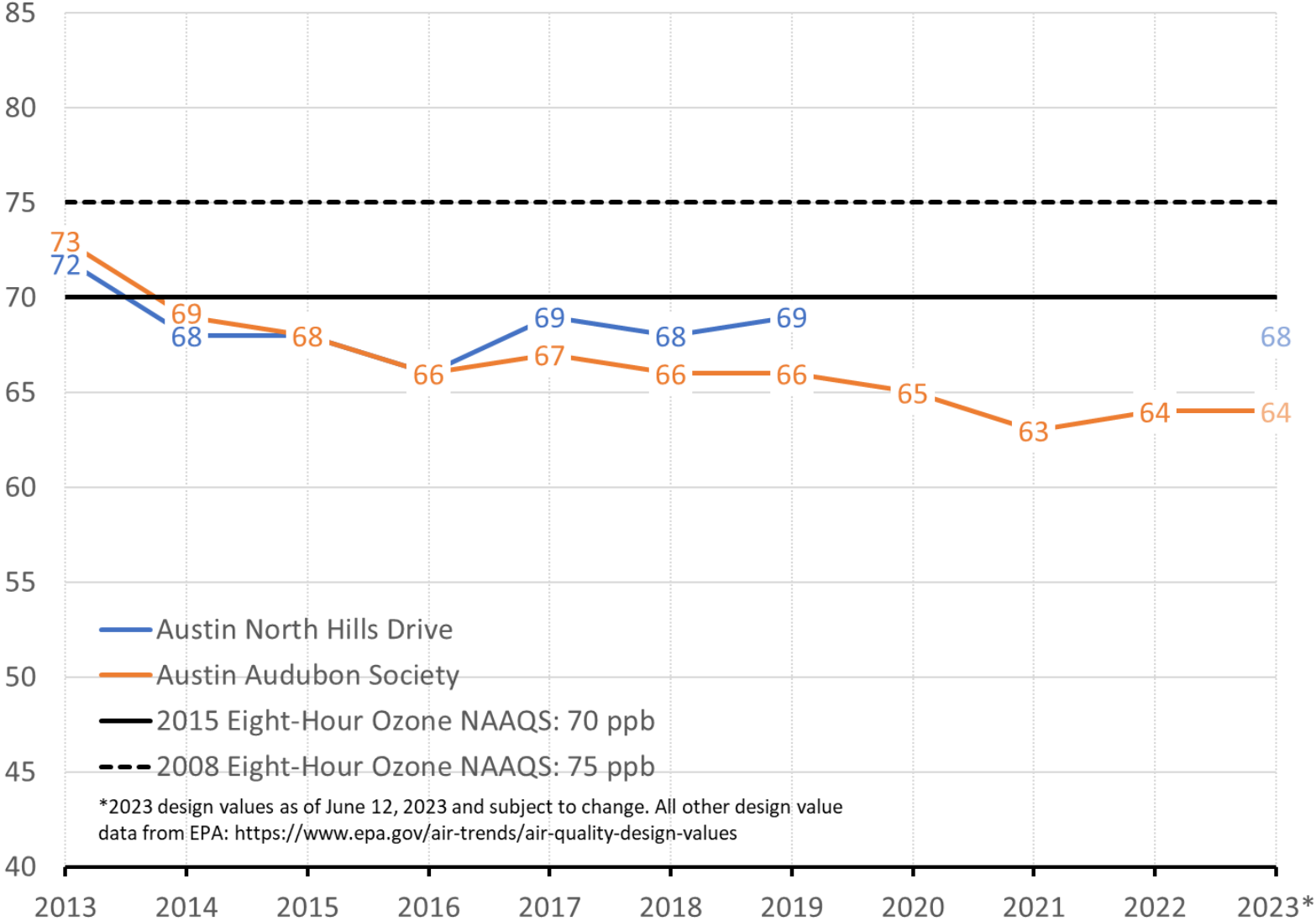
- Currently, all Austin monitors meet attainment for the 2015 eight-hour ozone National Ambient Air Quality Standard (NAAQS) of 70 ppb.
- The following topics were investigated to determine causes of ozone formation in the Austin area:
 - Concentrations & trends;
 - Ozone precursors
 - Ozone chemistry; and
 - Meteorology and its affect on ozone.
- Analysis uses ten years of data: 2013 through 2022.
- Analysis uses May through October to represent the ozone season in the Austin area.

Austin Area Monitors

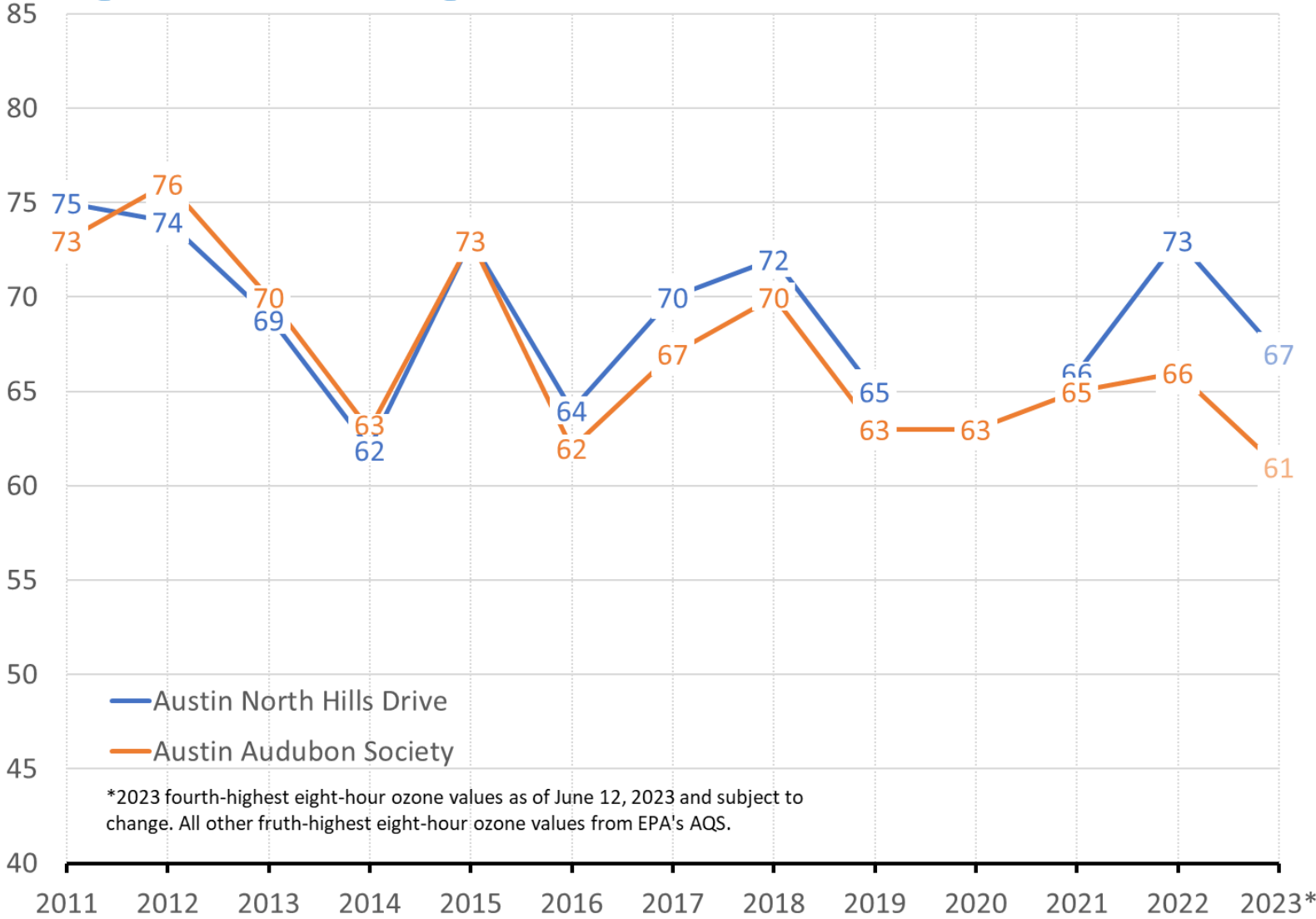


Ozone Concentrations and Trends

Eight-Hour Ozone Design Values

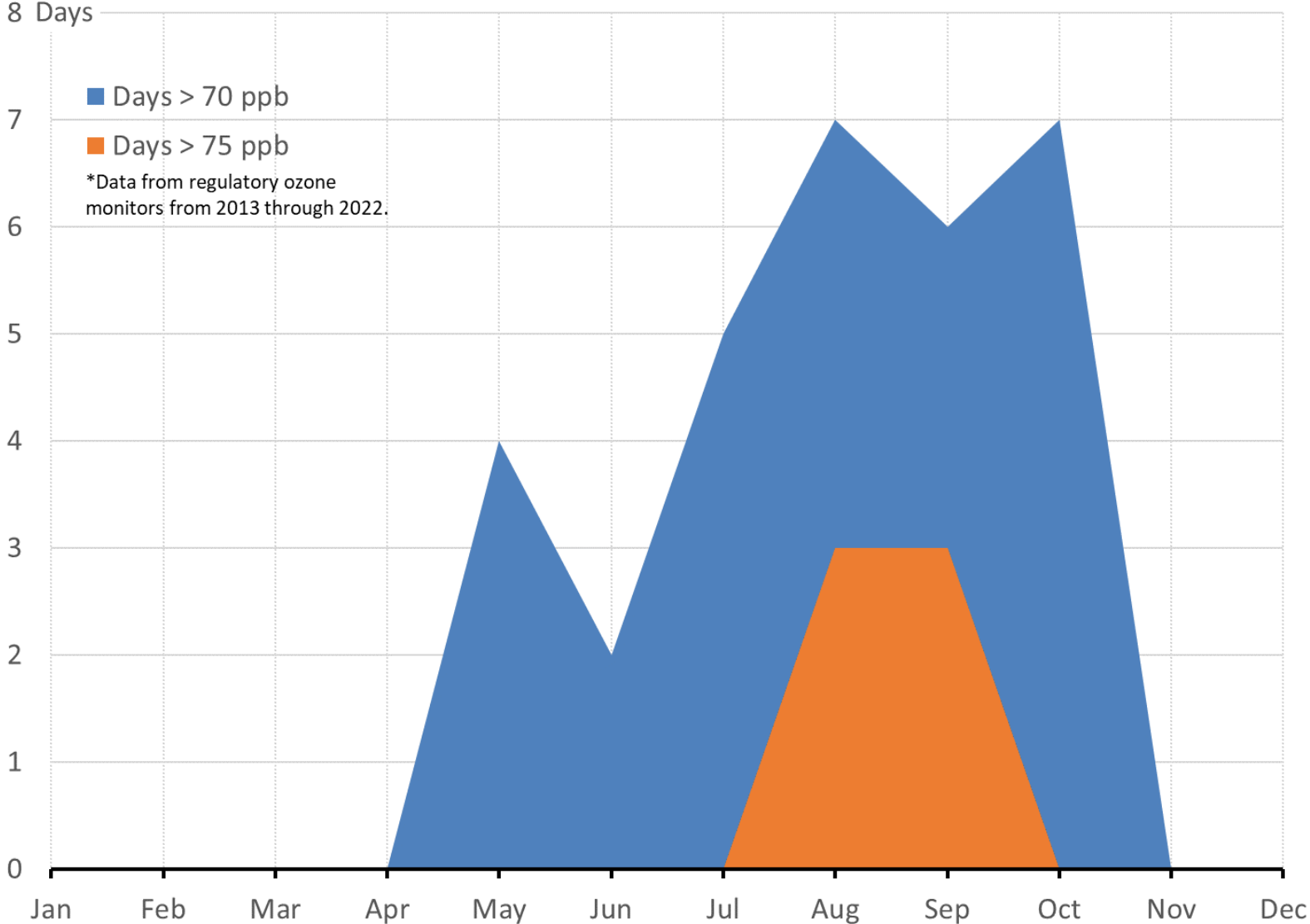


Fourth-Highest Eight-Hour Ozone Values

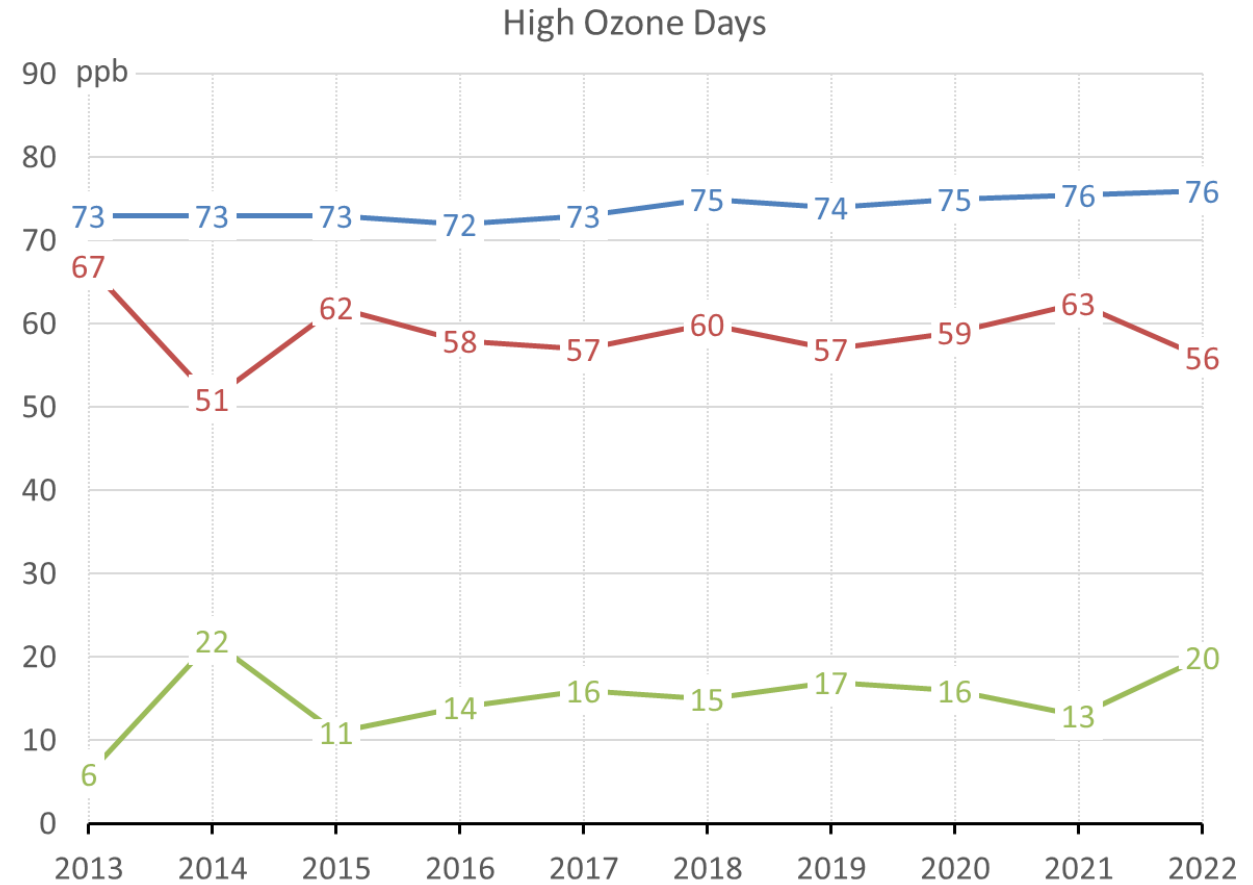
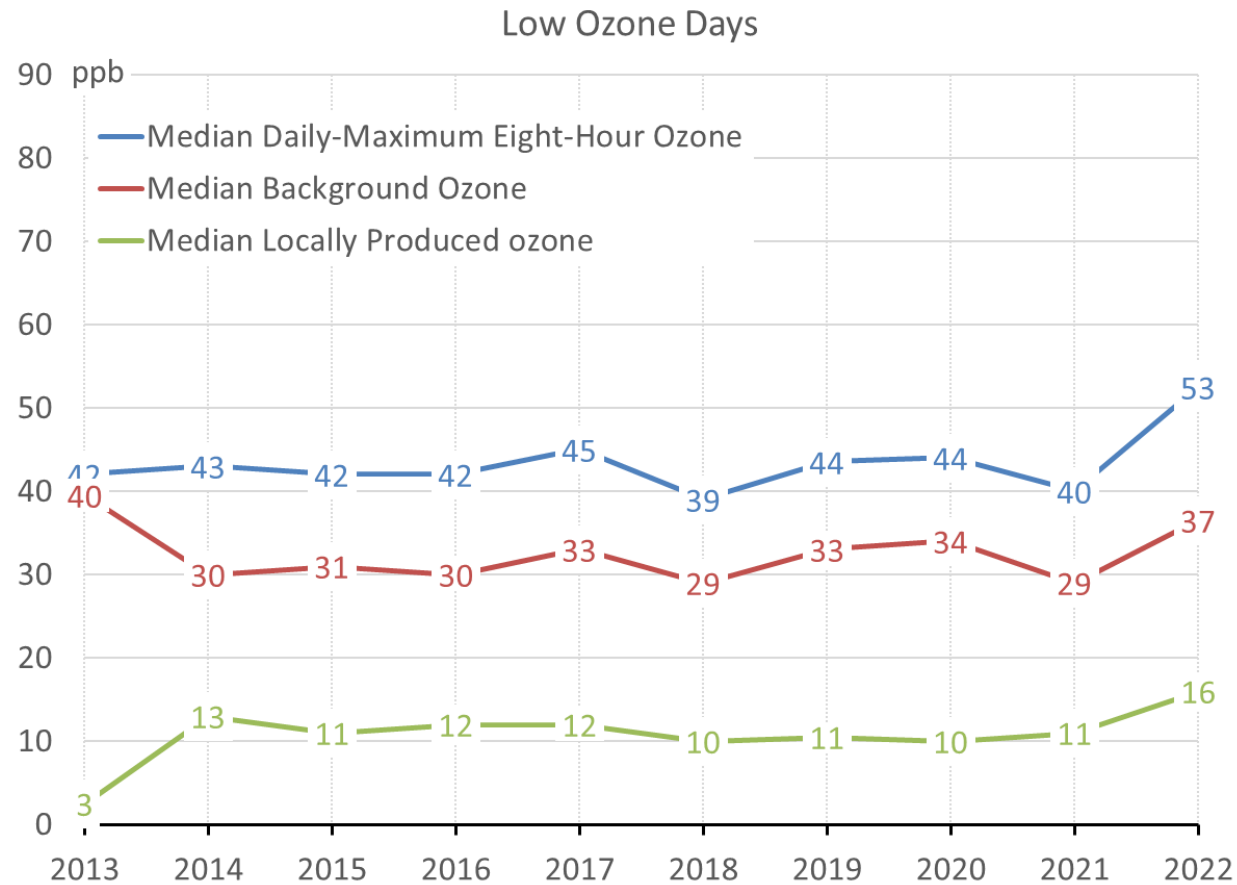


*2023 fourth-highest eight-hour ozone values as of June 12, 2023 and subject to change. All other fourth-highest eight-hour ozone values from EPA's AQS.

Eight-Hour Ozone Exceedance Days by Month

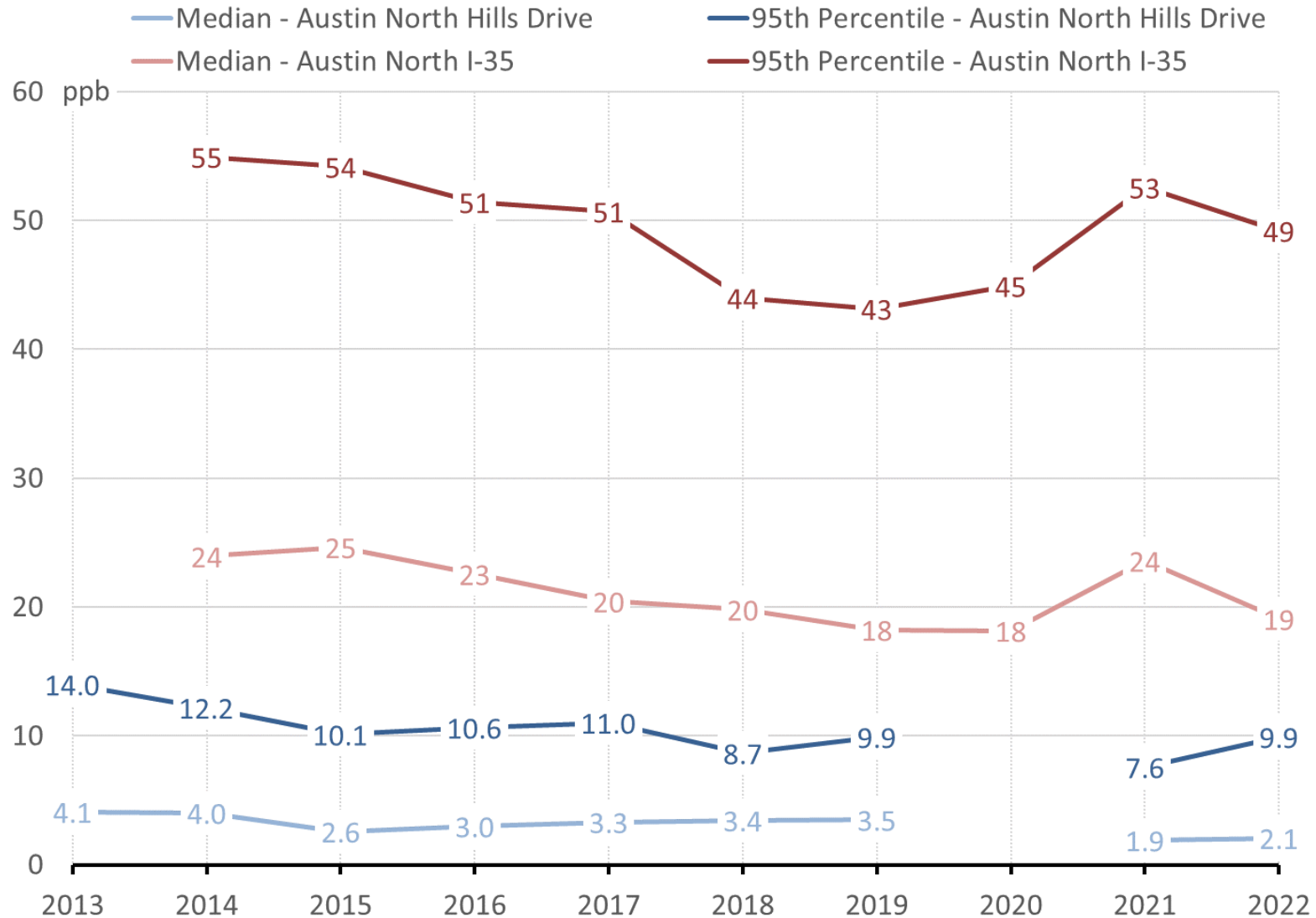


Ozone Season Regional Background Ozone



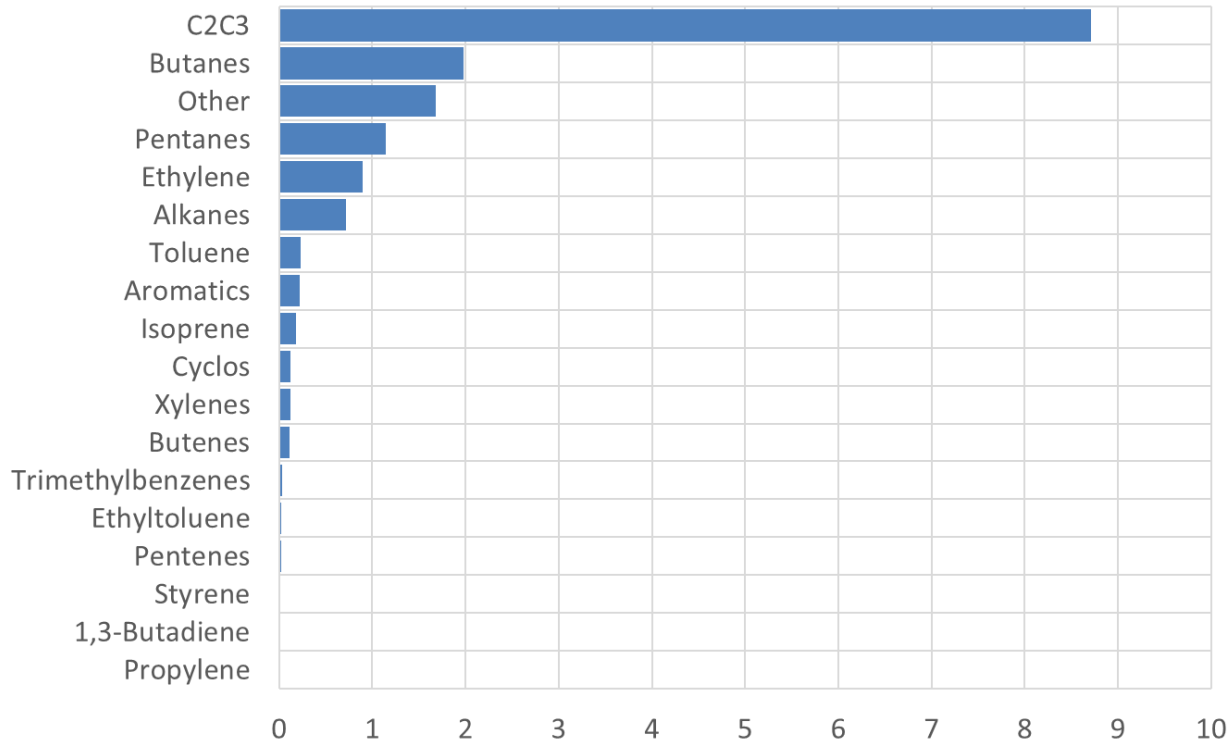
Ozone Precursor Concentrations and Trends

Ozone Season Nitrogen Oxides (NO_x) Trends

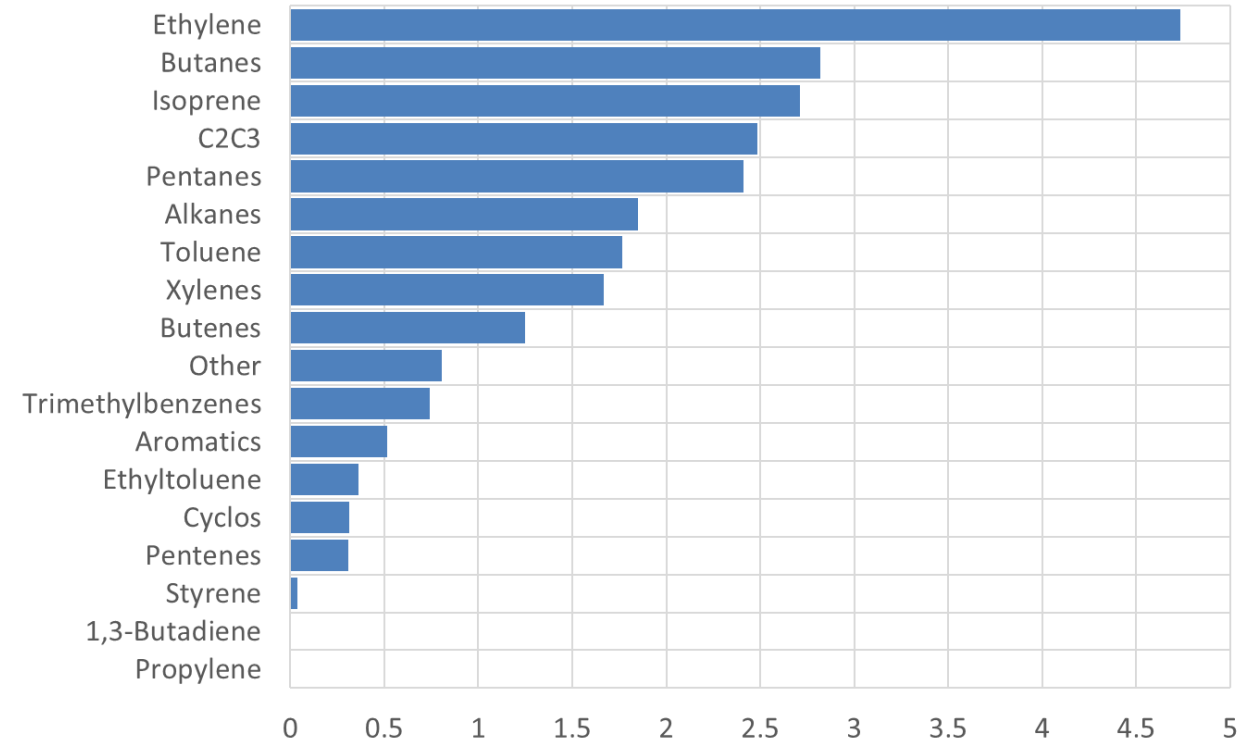


Ozone Season Volatile Organic Compound (VOC) Composition at Austin Webberville Rd

Median (ppb)

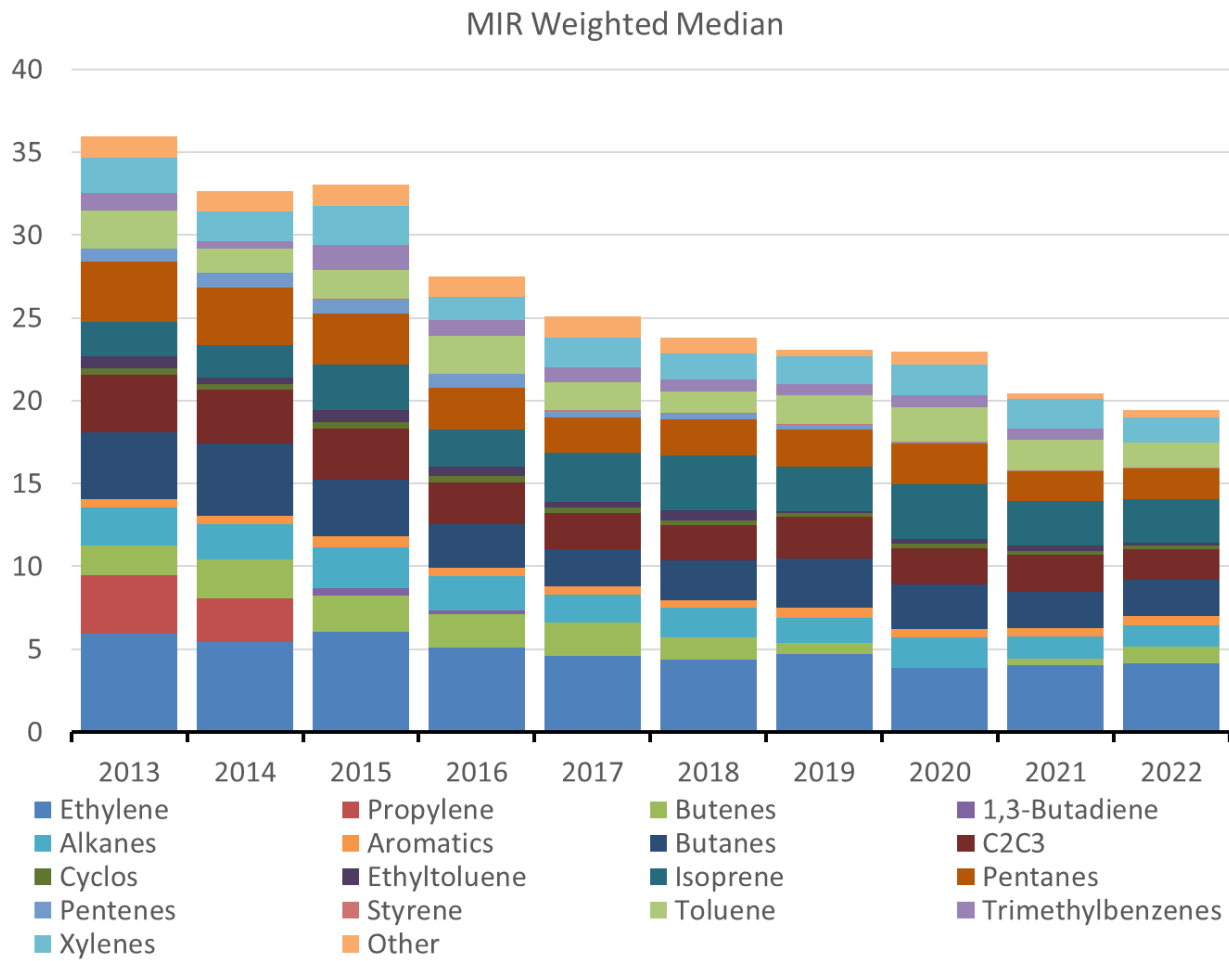
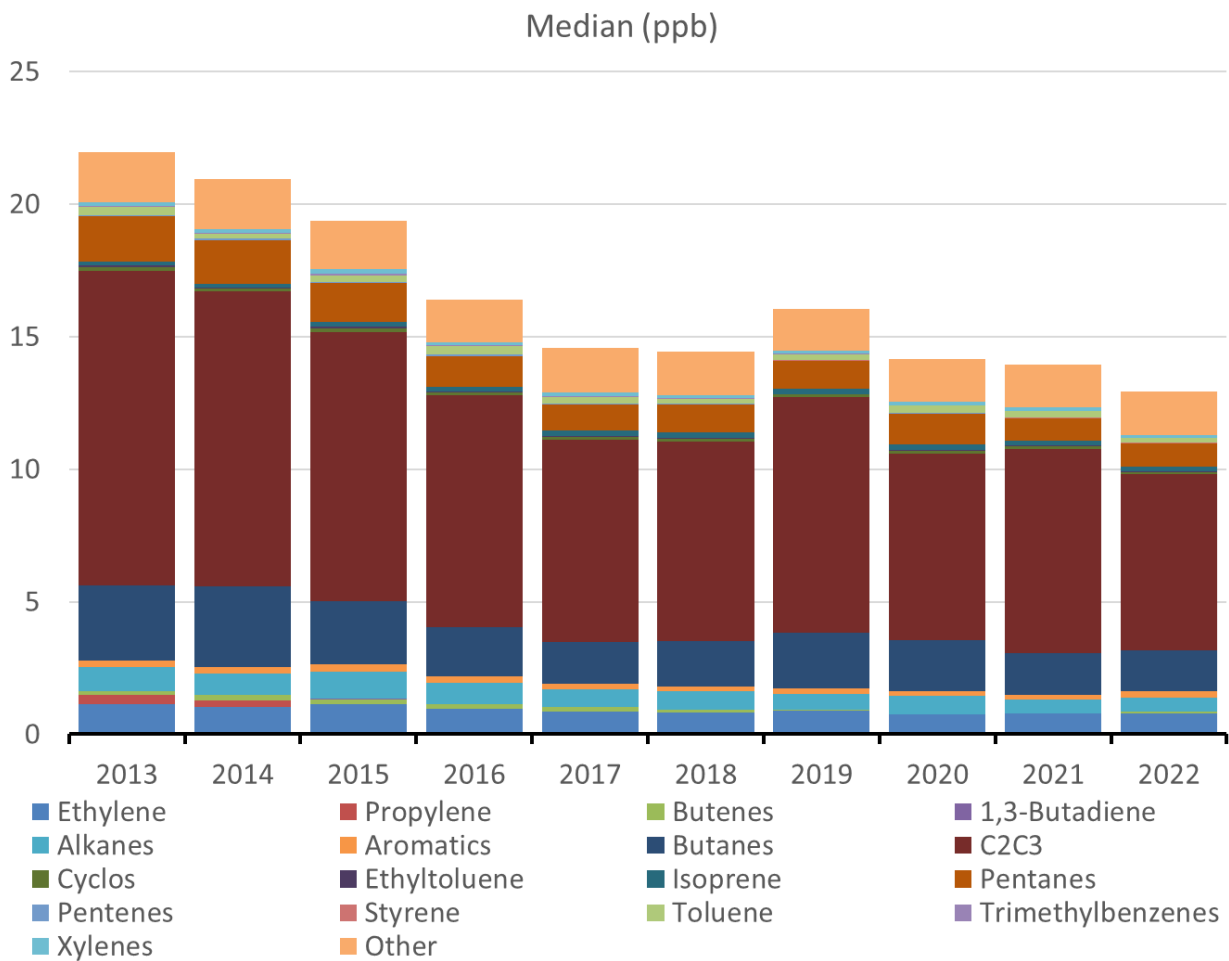


Maximum Incremental Reactivity (MIR) Weighted Median

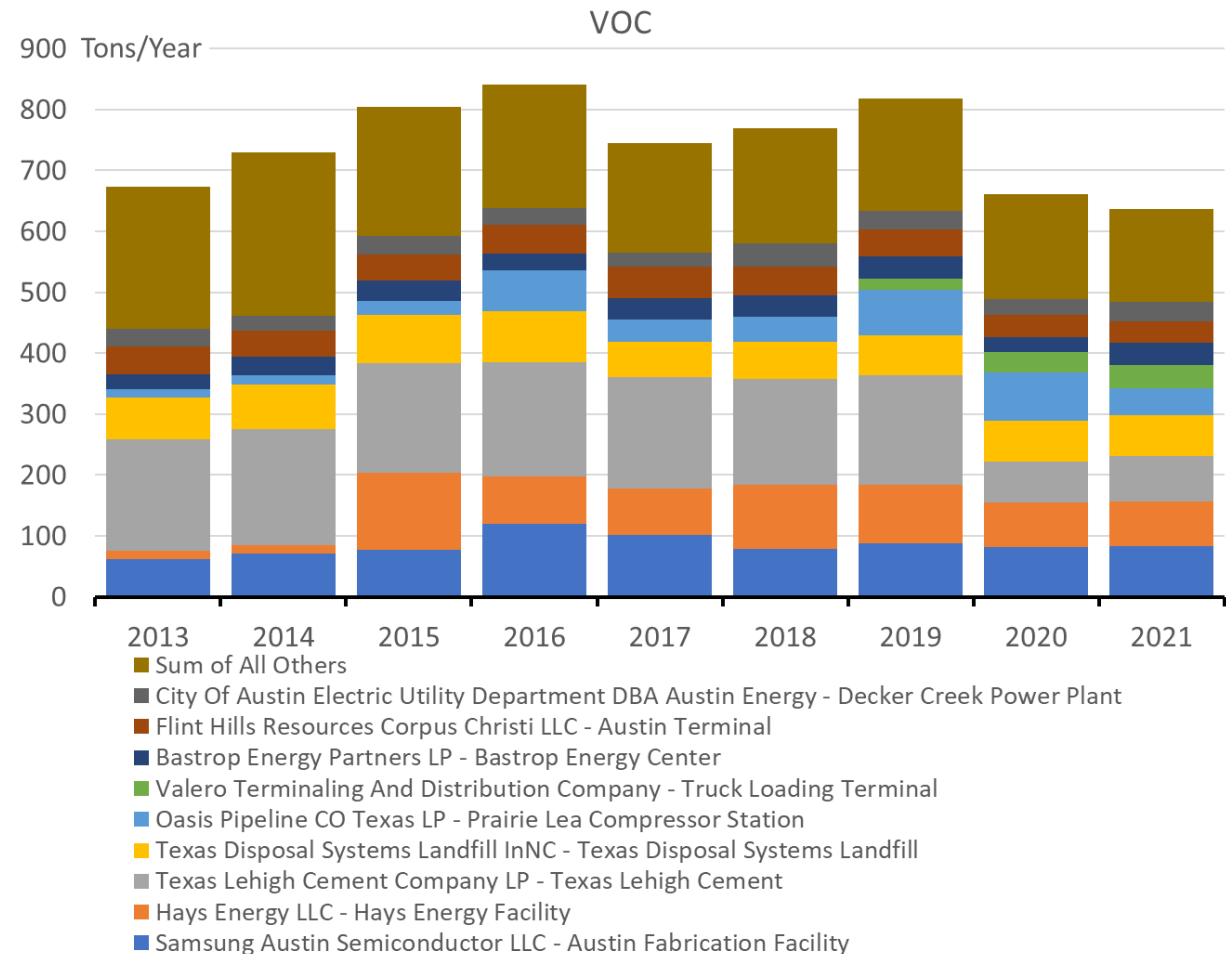
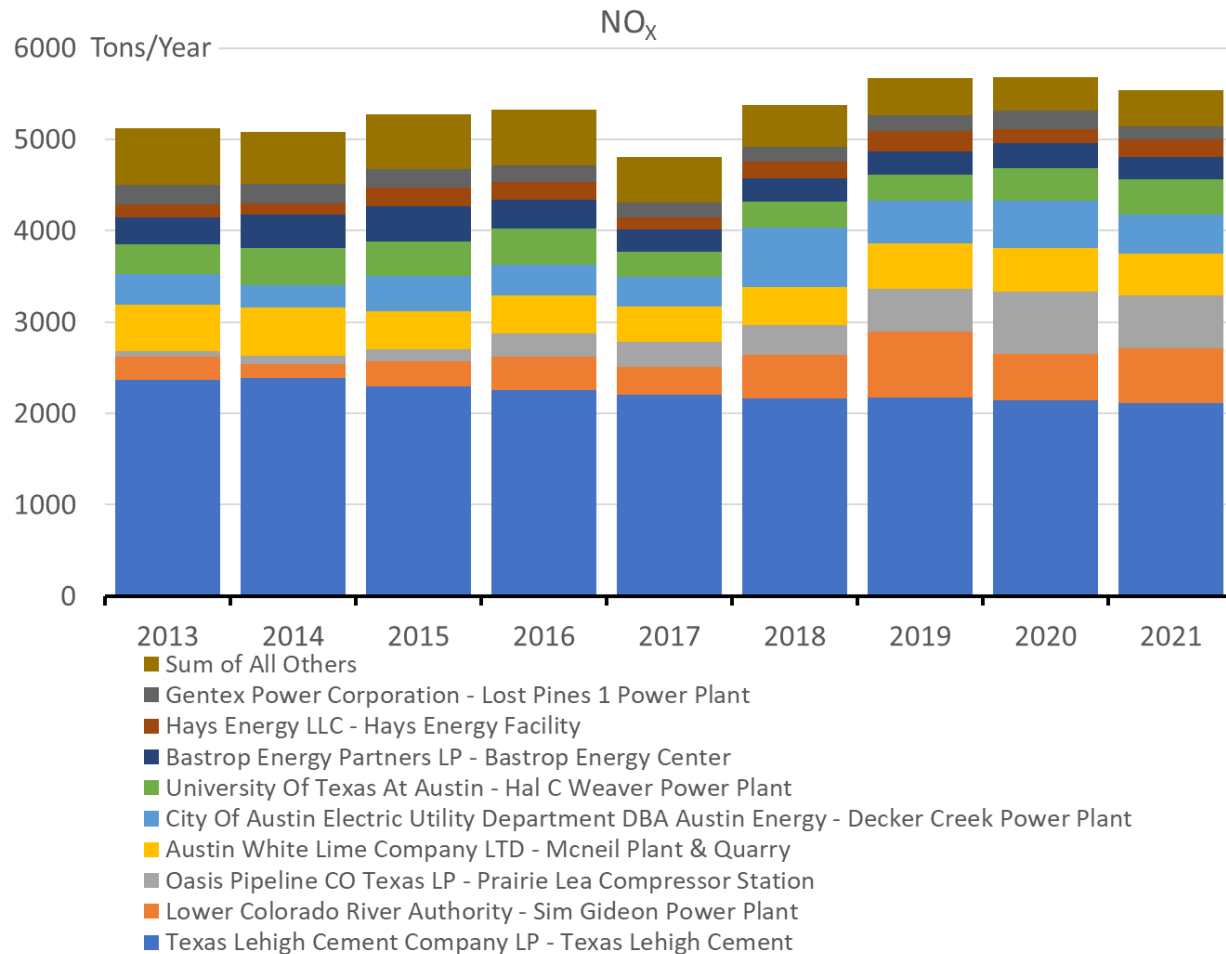


*Data from 2013 through 2022.

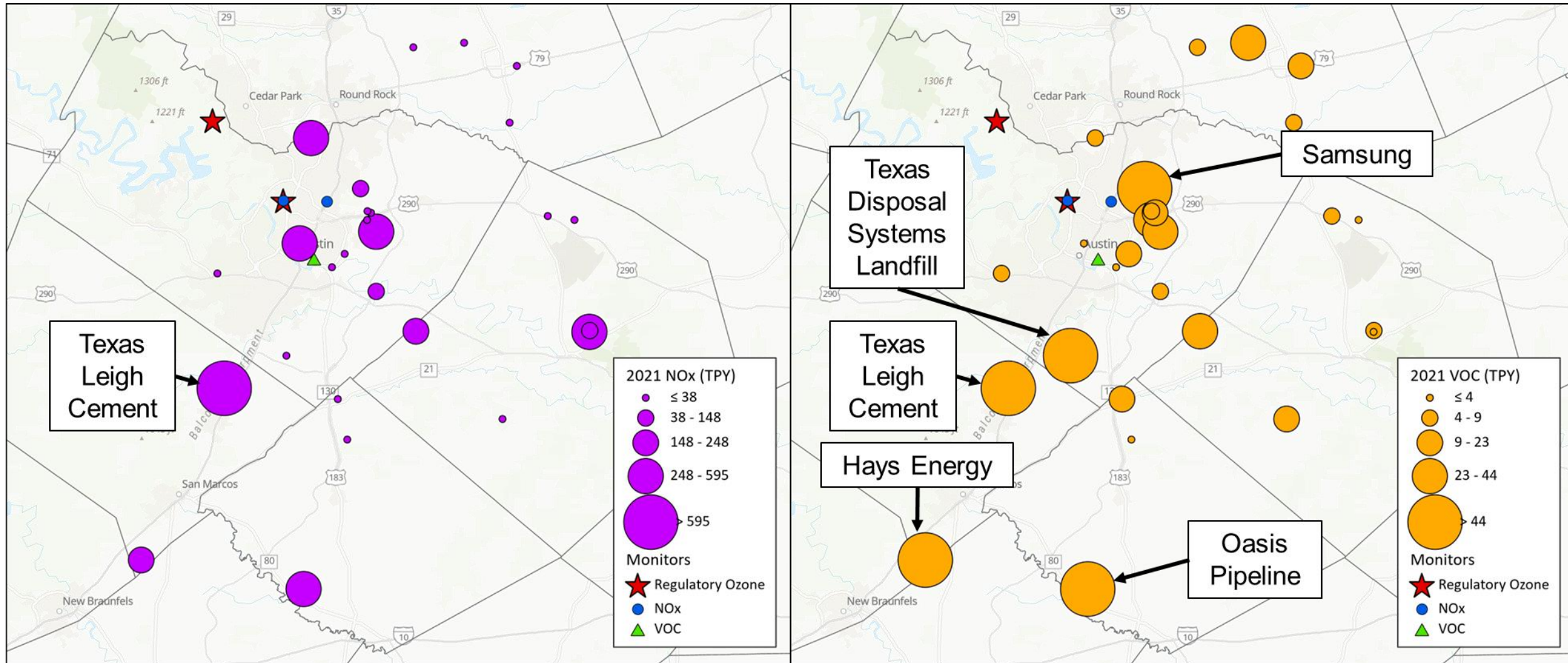
Ozone Season Speciated VOC Trends at Austin Webberville Rd



Point Source NO_x and VOC Emissions

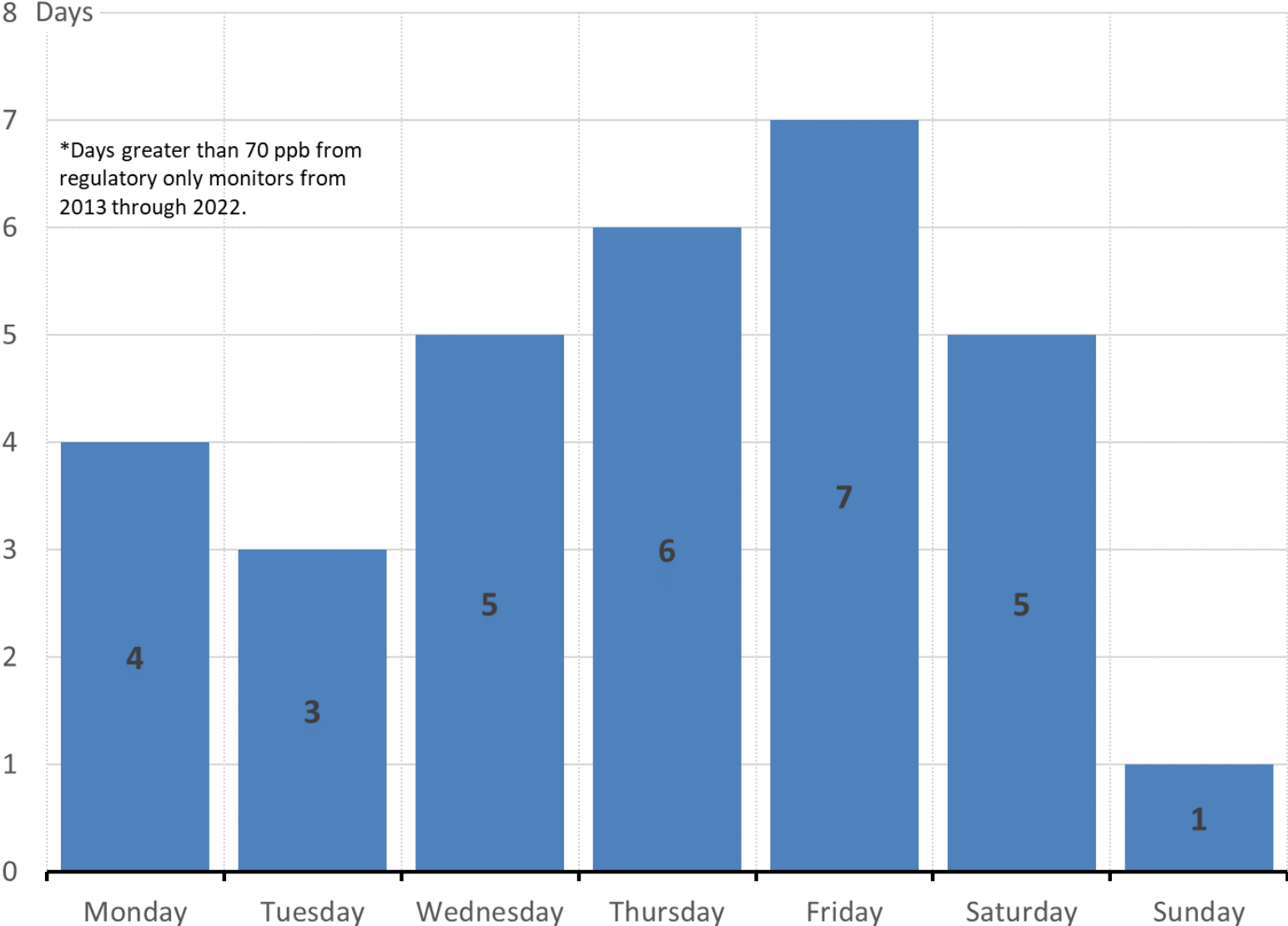


2021 Point Source NO_x and VOC Emissions

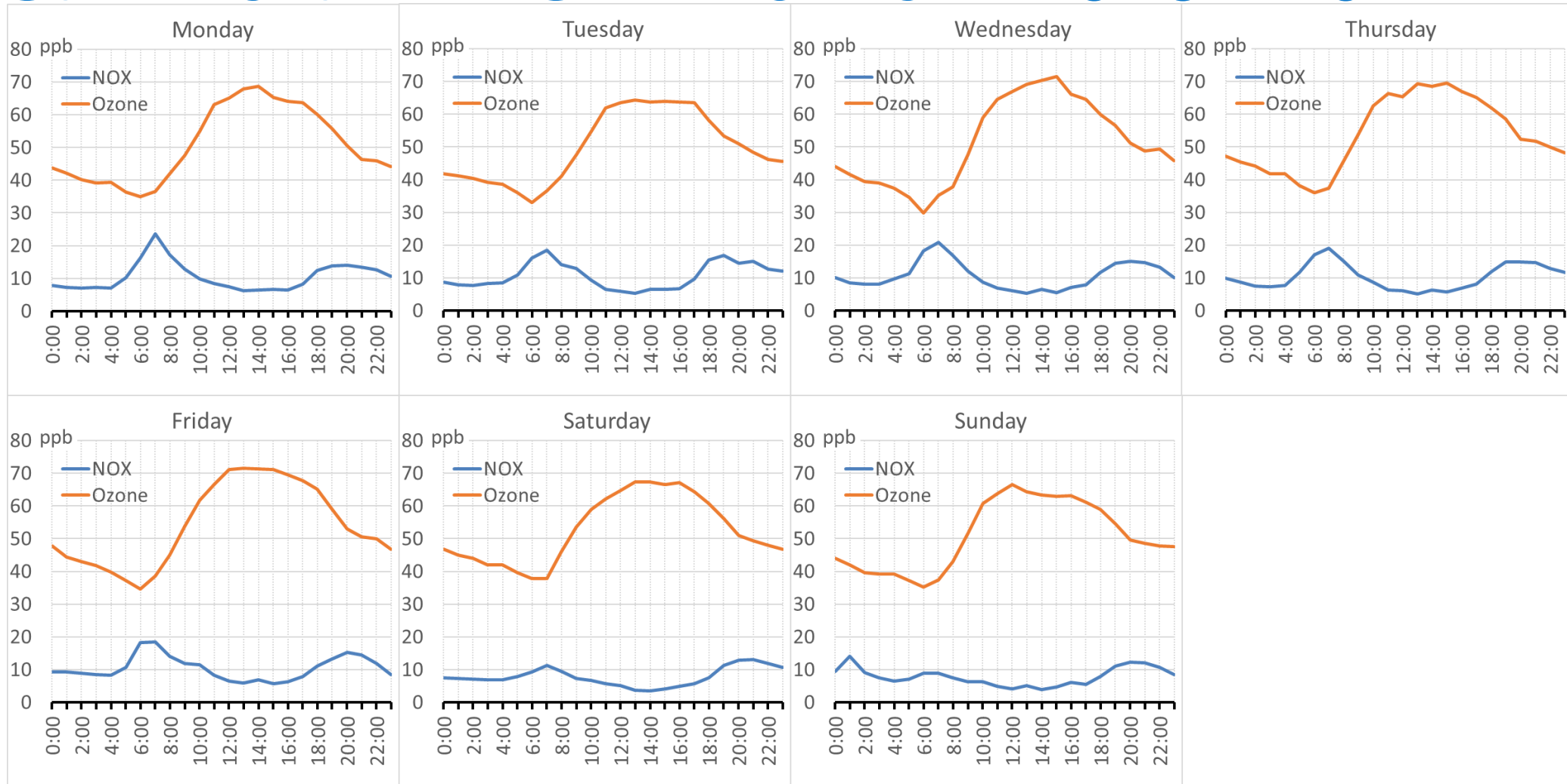


Temporal Profiles/Ozone Chemistry

Ozone Exceedance Days by Day of the Week

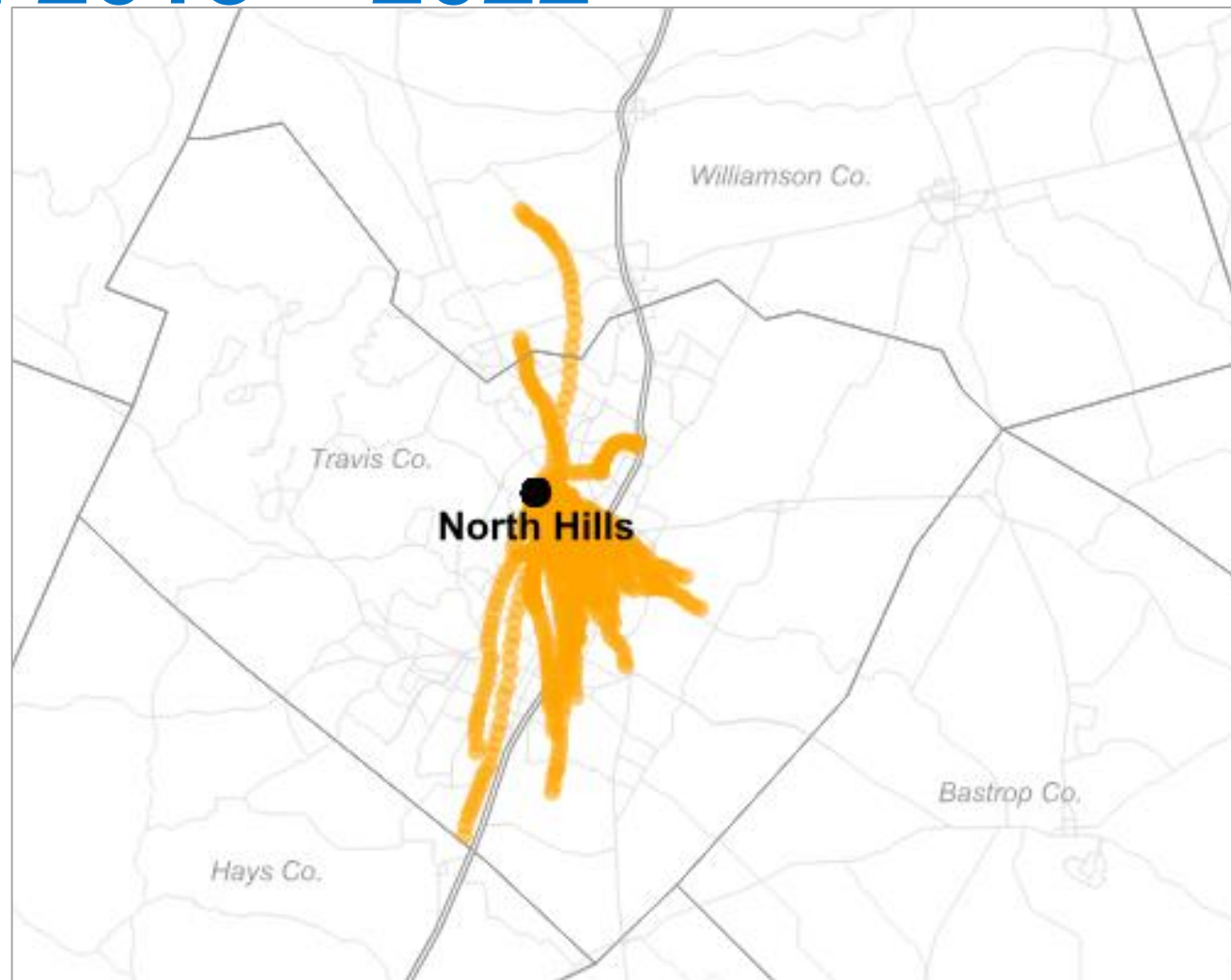


95th Percentile One-Hour Ozone and NO_x at Austin North Hills Drive from 2013 - 2022



Meteorology and its Affect on Ozone

Surface-Level Winds on Ozone Exceedance Days from 2013 – 2022



Surface-Level Winds on Select Ozone Exceedance Days

DT:2015-10-11 00:00

North Hills Drive

October 11, 2015
Daily Maximum Eight-Hour Ozone:
71 ppb

DT:2017-09-01 00:00

North Hills Drive

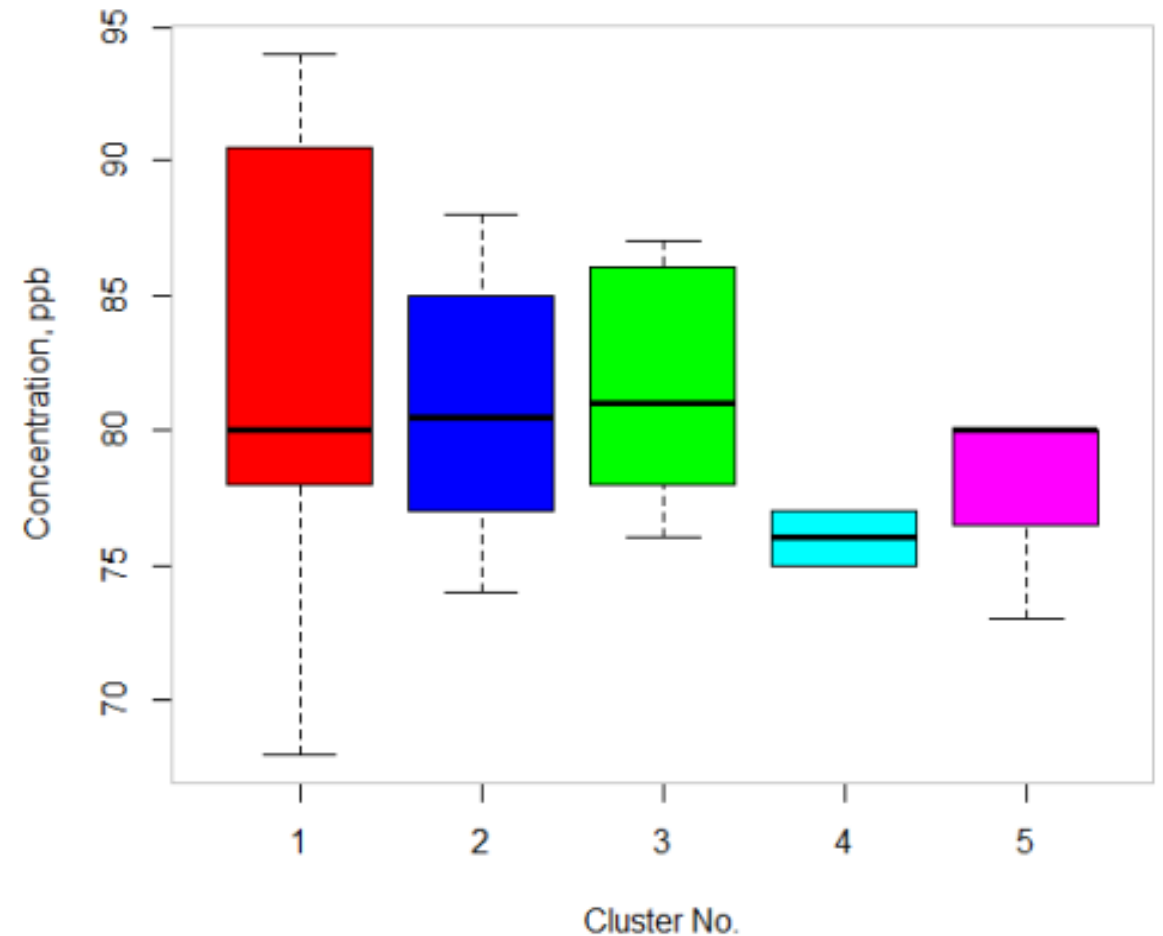
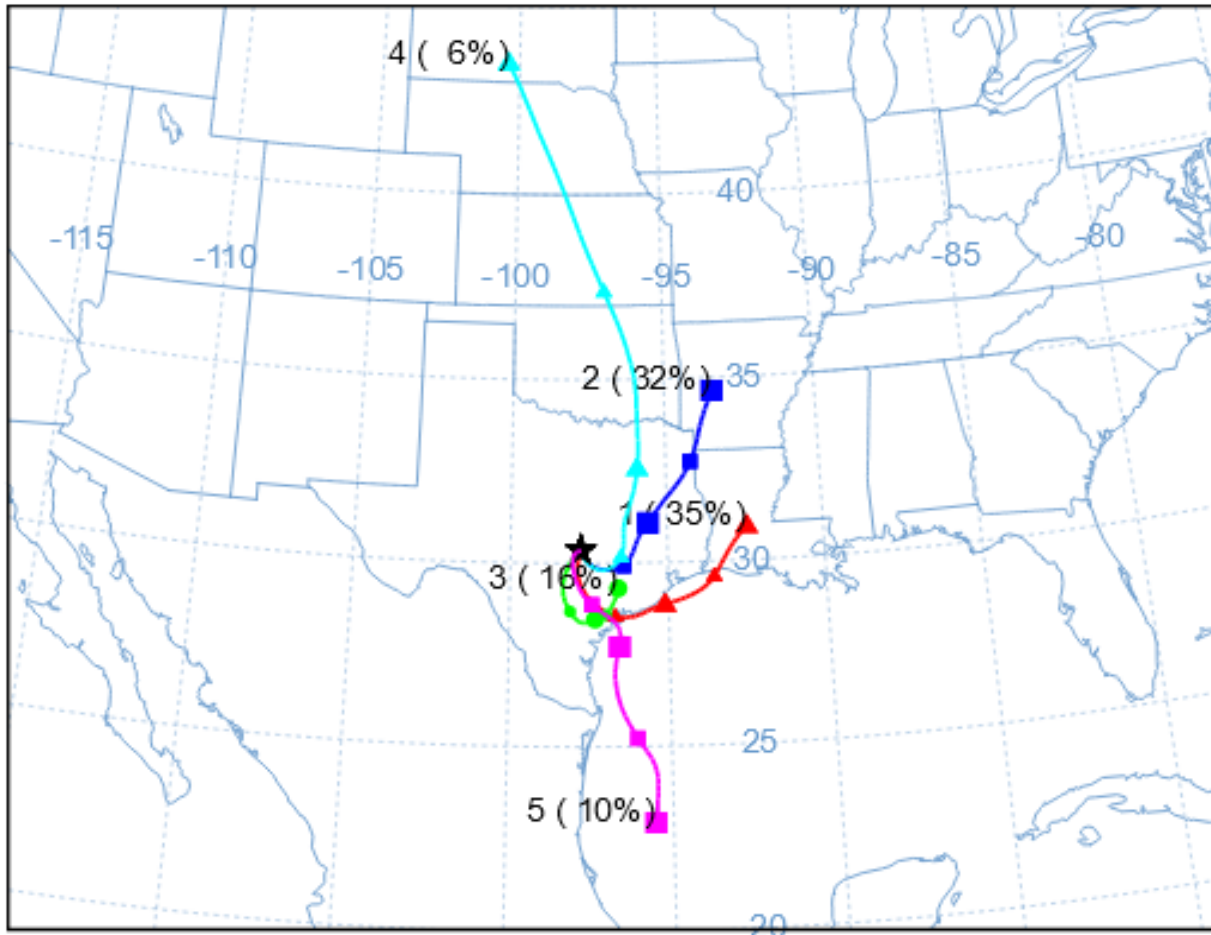
September 1, 2017
Daily Maximum Eight-Hour Ozone:
71 ppb

DT:2018-08-02 00:00

North Hills Drive

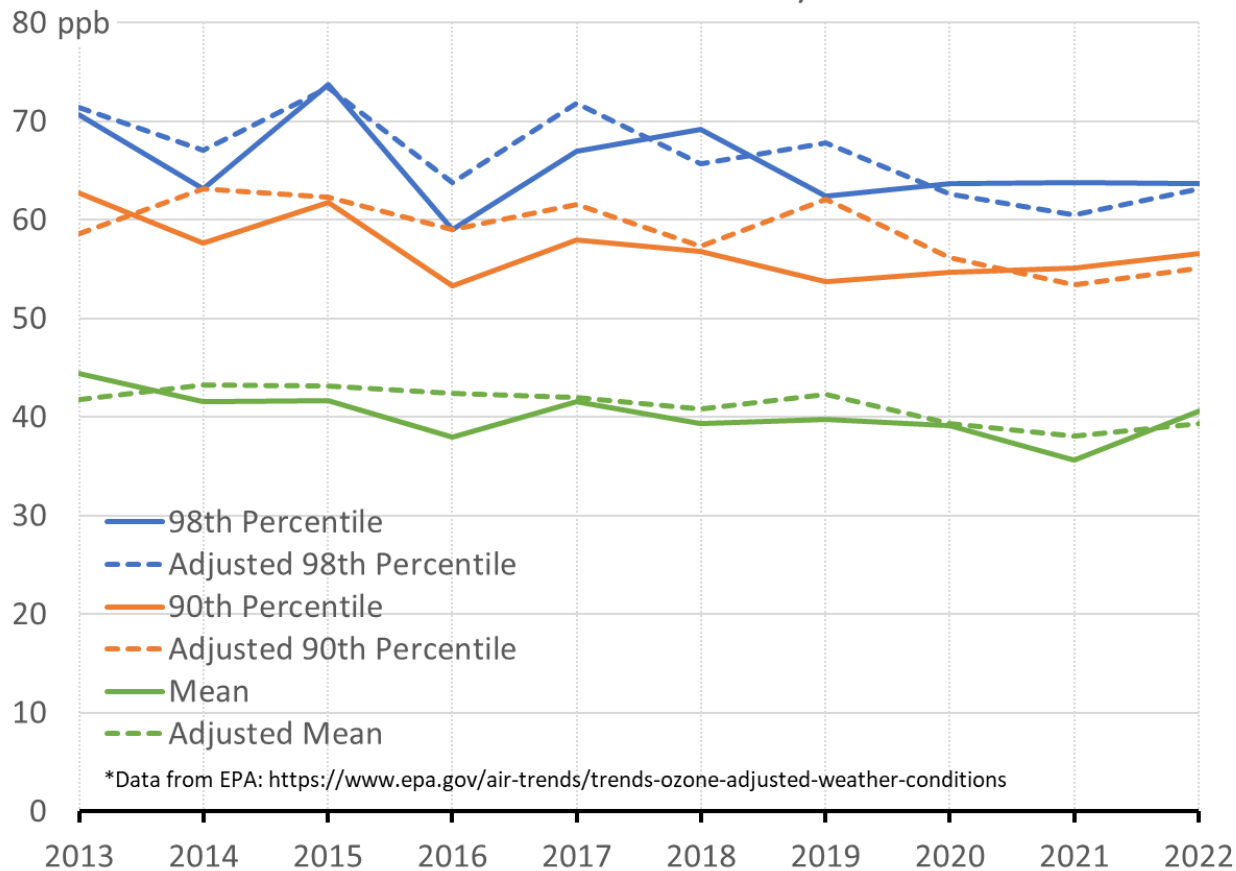
August 2, 2018
Daily Maximum Eight-Hour Ozone:
75 ppb

HYSPLIT Clusters on Ozone Exceedance Days at Austin North Hills Drive from 2013 – 2022

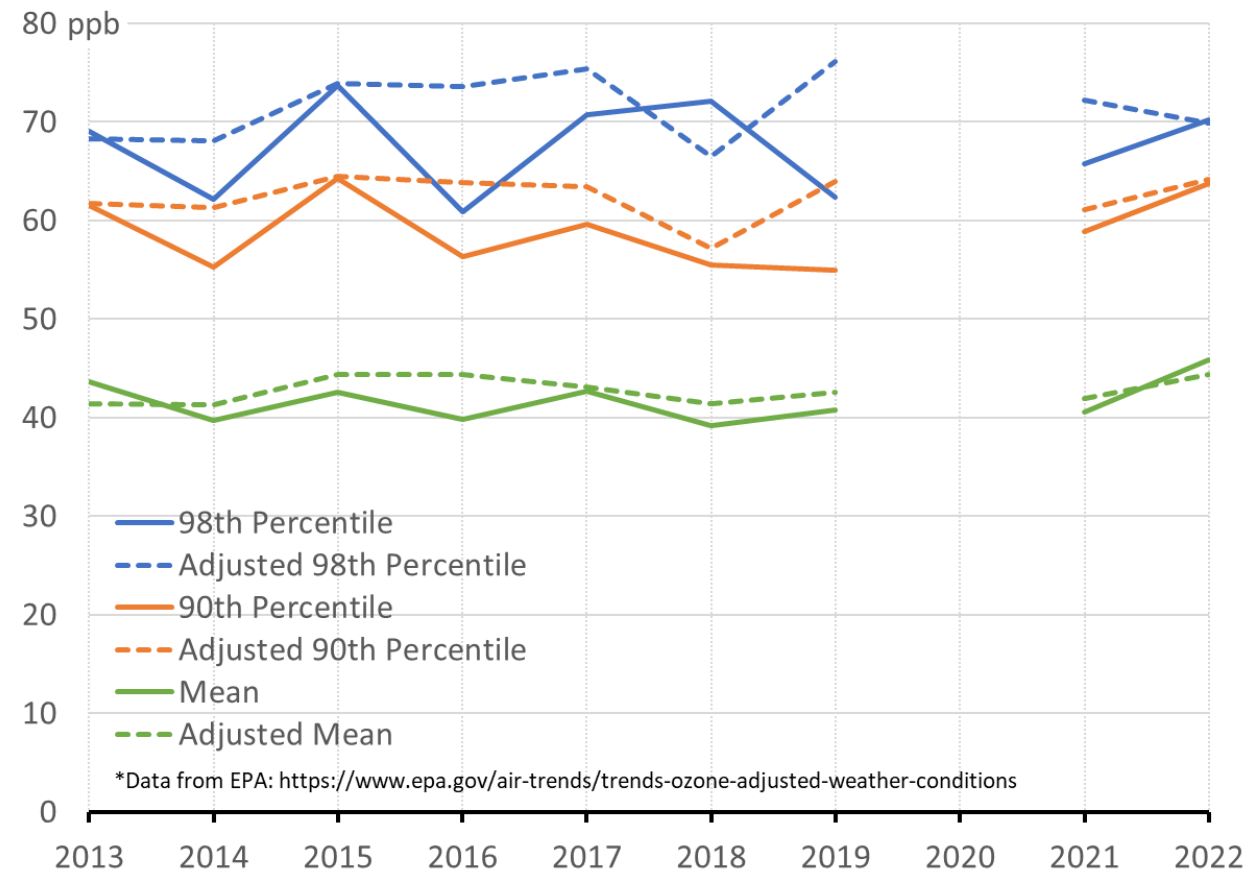


Ozone Season Trends Adjusted for Meteorology

Austin Audubon Society



Austin North Hills Drive



Summary of Ozone Formation in the Austin Area

- Eight-hour ozone design value trends decreased and remain below the 2015 eight-hour ozone NAAQS of 70 ppb.
- Austin Audubon Society has larger ozone decreases compared to Austin North Hills Drive.
- Ozone formation peaks in May and then again from July through October, with a “mid-summer minimum” occurring in June.
- Concentrations of NO_x and VOC are decreasing, but NO_x emissions from point sources has increased.

Summary of Ozone Formation in the Austin Area

- High ozone typically occurs on hot sunny days with dry conditions and slow winds out of the south to southeast.
- Emissions located south and southeast of the area combine with urban mobile emissions to create ozone and slow winds transport it to the monitors located in the northwest.
- These conditions also create high levels of regional background ozone, which accounts for about 75% of the area's ozone concentrations.
- The air mass appears to be NO_x limited, meaning NO_x controls may be more effective in reducing ozone compared to VOC.

Questions?

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