

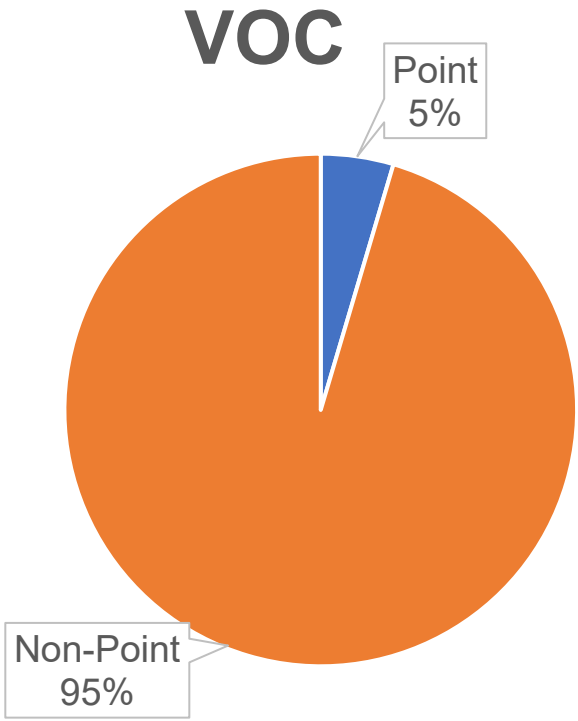
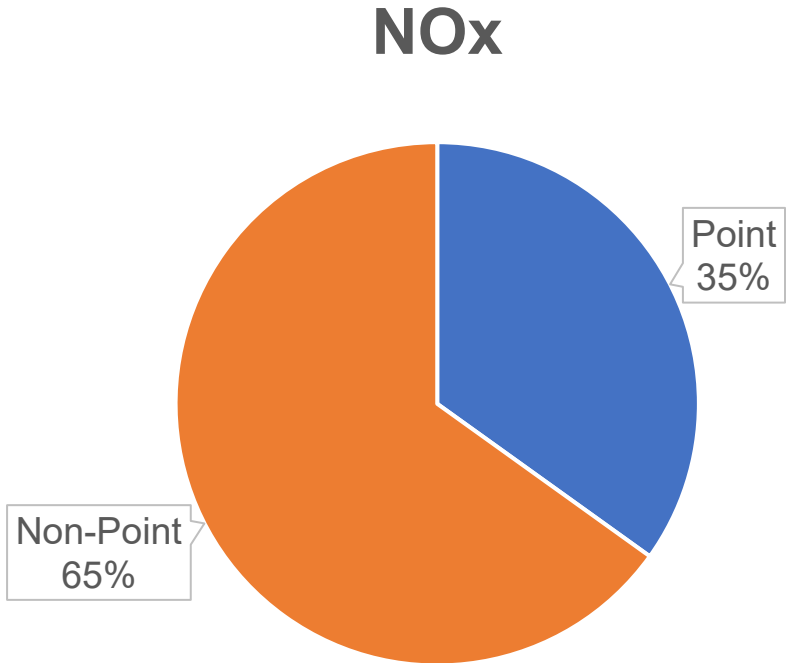


# Area Source Emissions Inventory Development for Air Quality Modeling

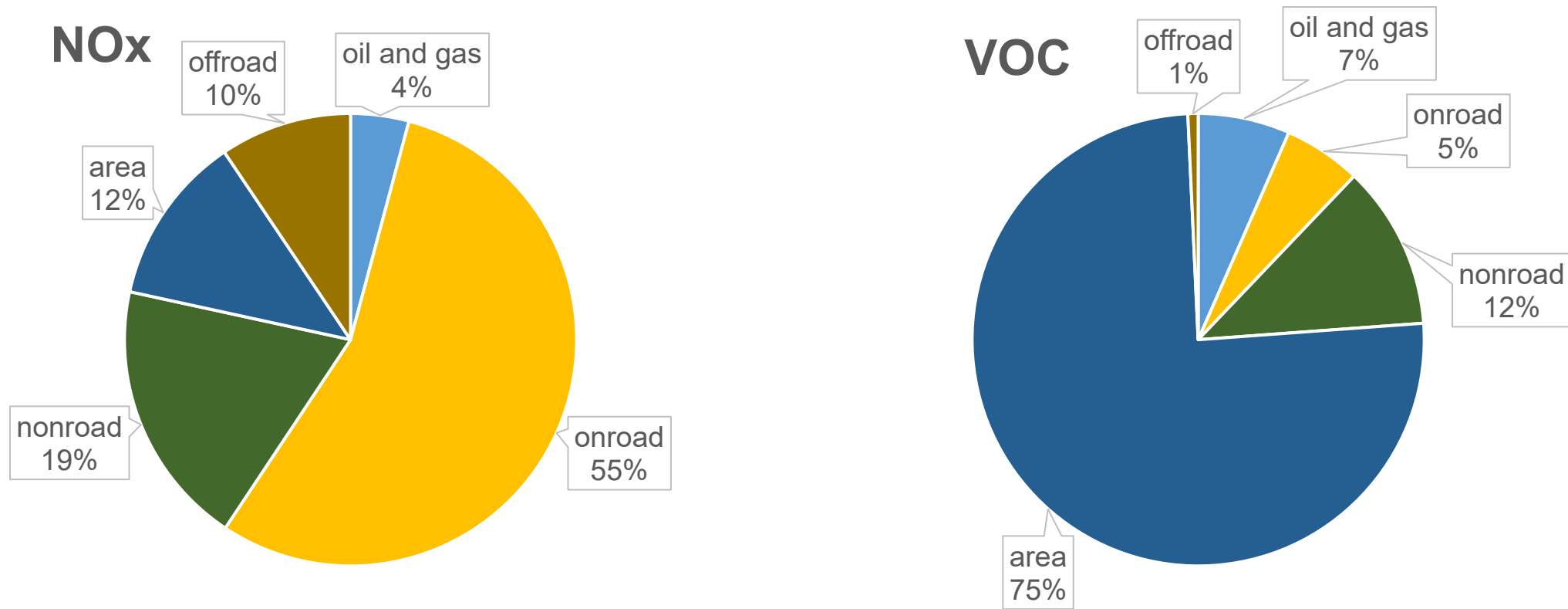
Bryce Kuchan

Presented at the SAN Air Quality Technical Information Meeting on August 22, 2022

# 2019 SAN Summer Day Emissions



# 2019 SAN Summer Day Emissions by Non-point Sector



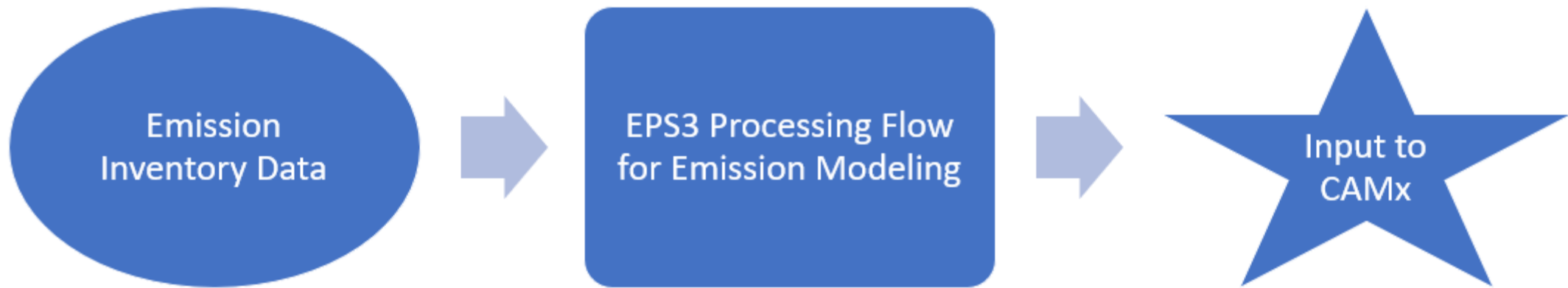
# Area Sources

- Stationary source emissions from sites and processes that do not meet reporting requirements for point sources.
- Area sources include small industrial, residential, and commercial sources that create emissions.
  - Gas stations.
  - Agriculture (feedlots, crop burning, tilling).
  - Consumer and commercial products.
- Emissions are estimated by multiplying an established emission factor by the appropriate activity or activity surrogate (e.g. human population).
- Oil and Gas production emissions data is not included in TCEQ area source emissions modeling.
  - Modeled separately as Oil & Gas sector.

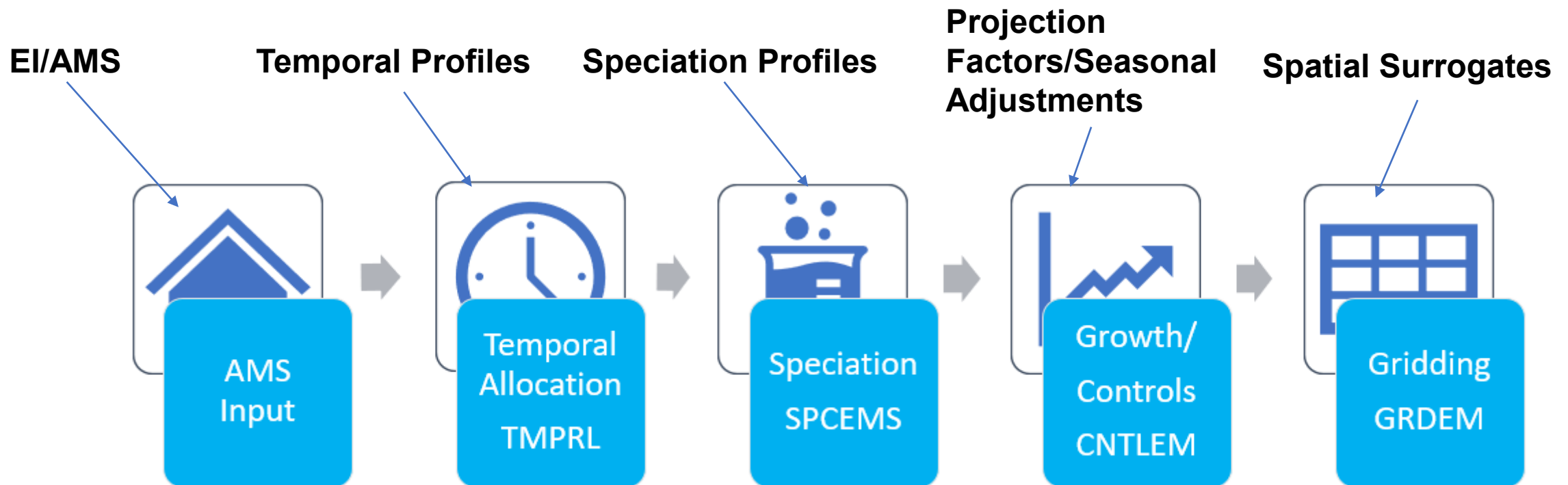
# Area Source Emissions Modeling: Data Sets

- Current release of TCEQ 2019 modeling platform uses a Texas Air Emissions Reporting (TexAER) 2017 version 2 periodic inventory.
  - An updated modeling inventory is being developed that uses a TexAER 2020 inventory.
- Non-Texas data is from EPA 2016v1 Modeling Platform (Rest of U.S. outside of Texas, Mexico, and Canada).

# 2019 Modeling Platform Data Processing



# Area Source Emissions Modeling: EPS3 Overview



# Area Source Emissions Modeling: Temporal Allocation

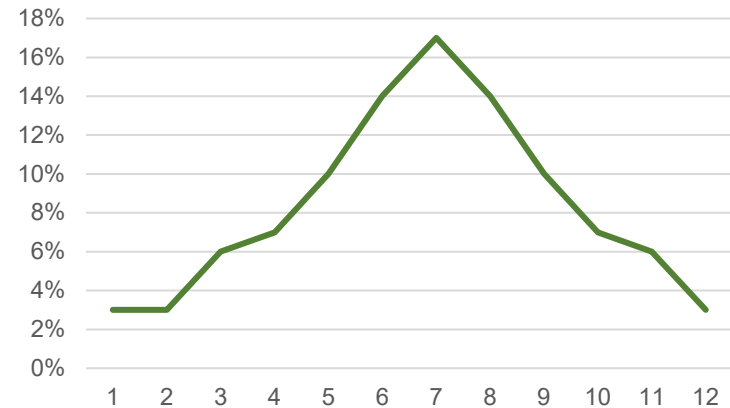
- Temporal profiles tell EPS3 how to allocate average day emissions from different sources (SCC's) to day type (weekday, Saturday, and Sunday) and diurnal profile (hourly).
- Most profiles are from EPA SMOKE profiles based on ancillary data from the EPA 2017gb platform.



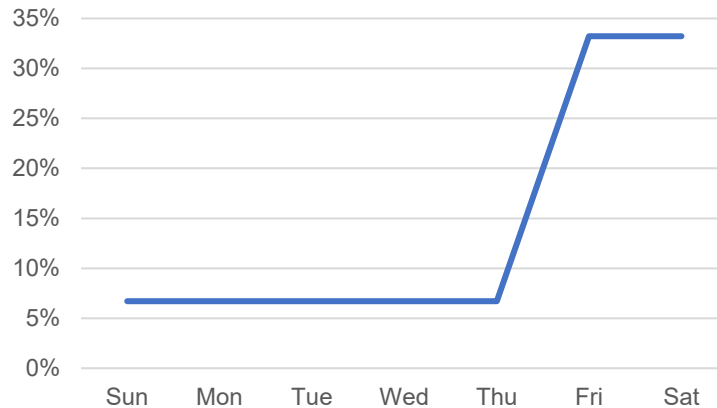
# Area Source Emissions Modeling: Temporal Allocation Example

- Various temporal profiles used to allocate emissions from backyard grilling across different time periods.

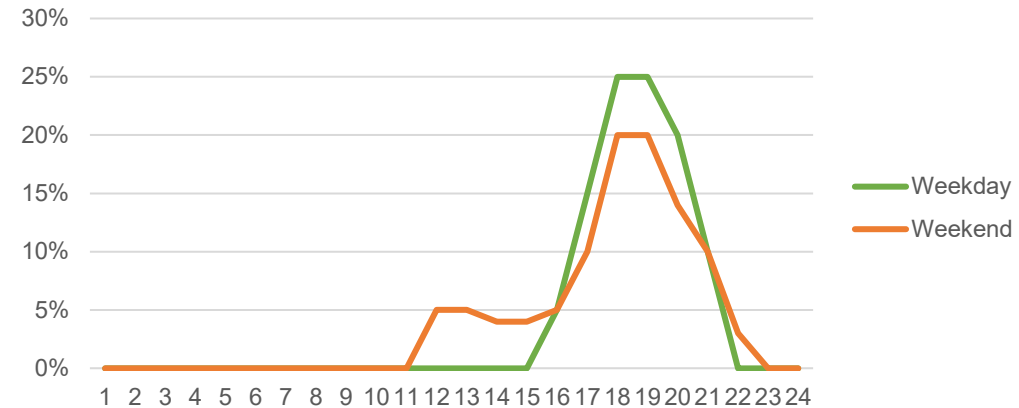
Monthly



Day of Week



Hour of the Day



# Area Source Emissions Modeling: Speciation

- Specifies how criteria pollutants from different sources ( $\text{NO}_x$ , VOC, CO) are speciated into model species.
  - VOC is split into dozens of specific compounds.
  - Depending on source,  $\text{NO}_x$  is split into NO,  $\text{NO}_2$ , and HONO.
- Carbon-bond version 6 (CB6) is speciation scheme used in EPS3/CAMx.



# Area Source Emissions Modeling: Projection

- 2017 inventory emissions for Texas are projected to 2019 base year and two future years using growth factors specific to Texas.

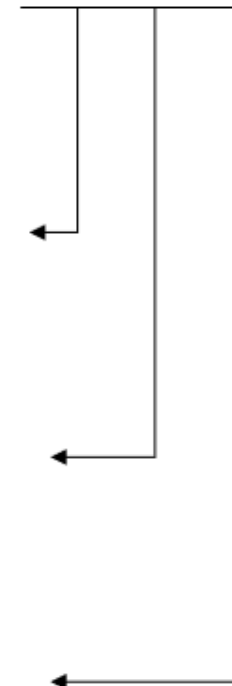


2017 Inventory

2019 Base Year

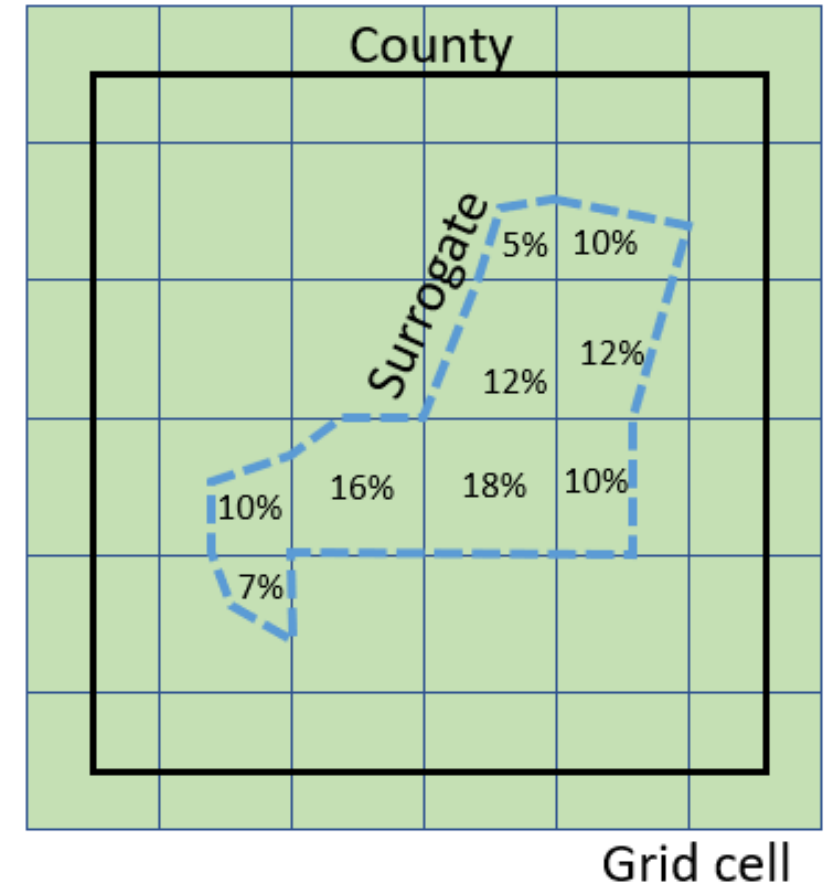
2023 Future Year

2026 Future Year

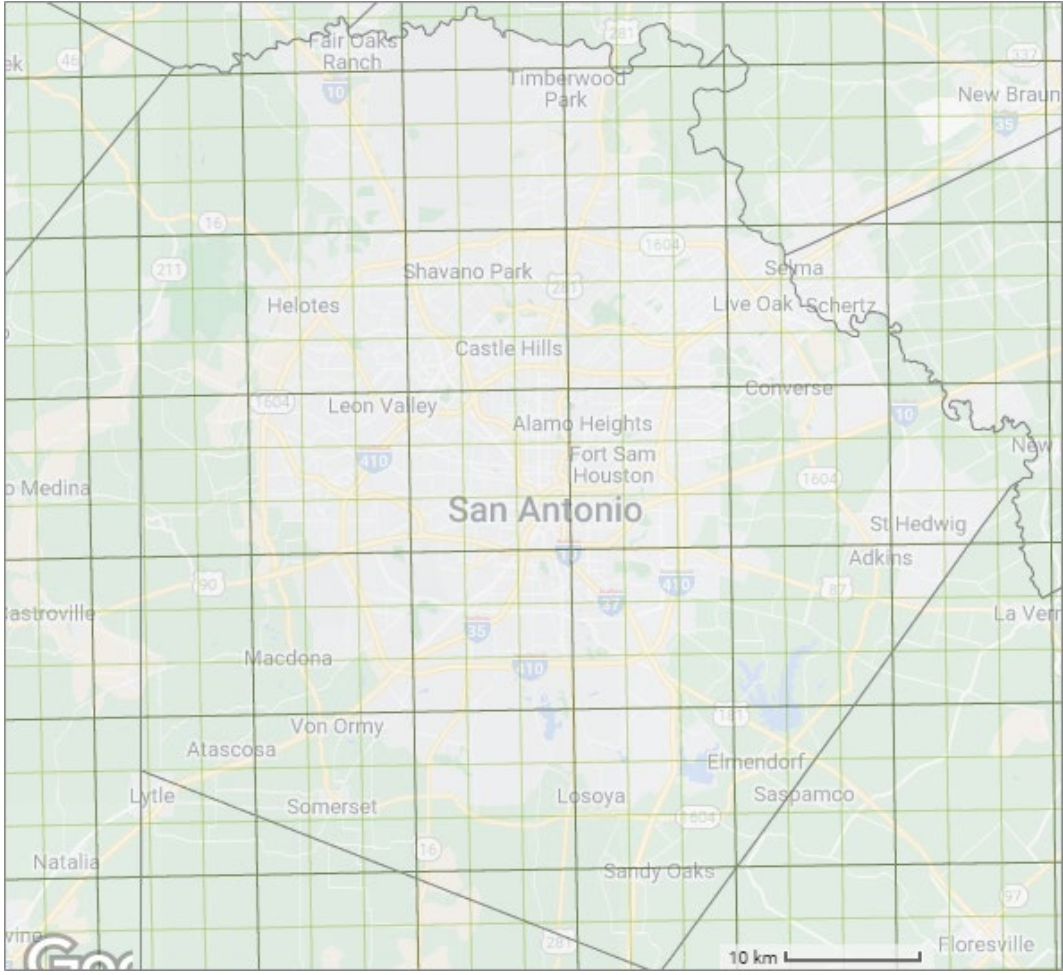
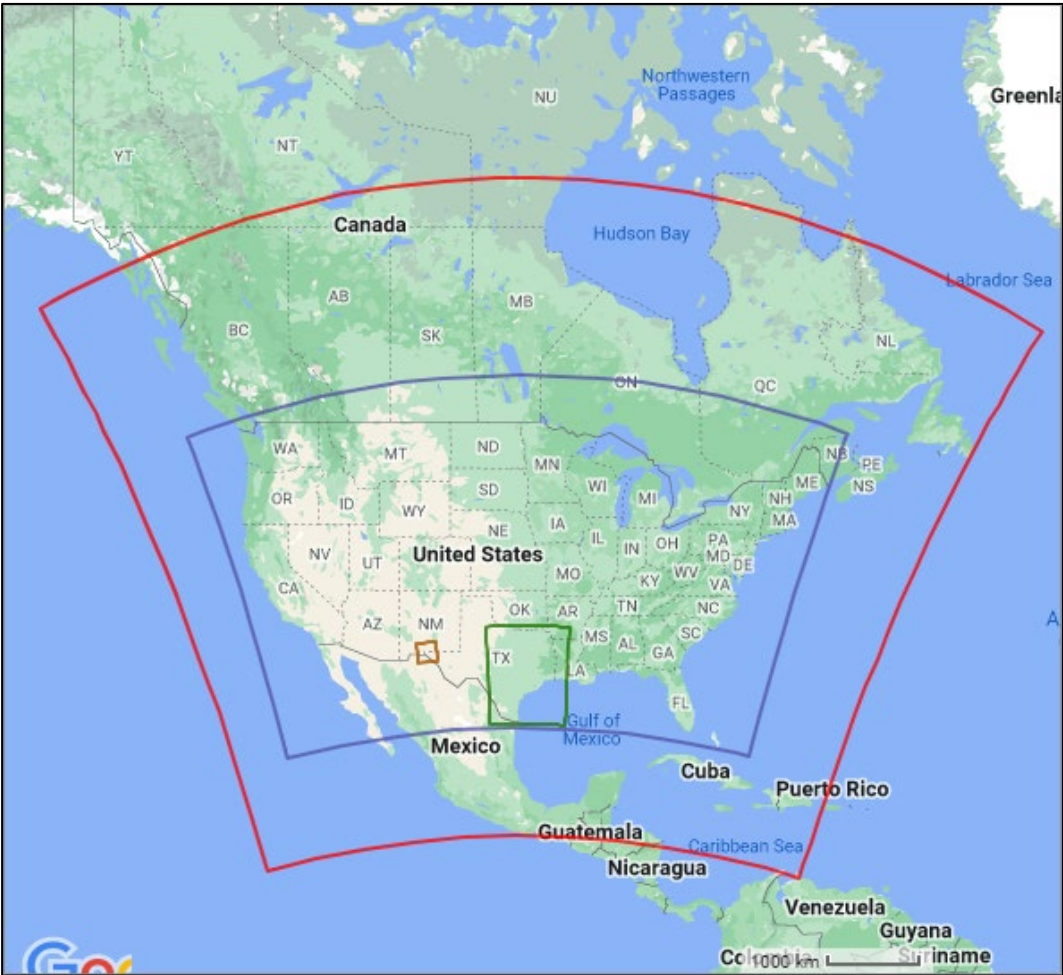


# Area Source Emissions Modeling: Spatial Allocation

- Emissions need to be spatially allocated for use in the air quality model.
  - Area source inventory is by county; counties contain multiple air quality model grids.
  - Emissions need to be split up into grid cells using surrogates.
    - Surrogates are spatial quantities that are known or estimated and are assumed to be similar to the emissions from some source category.
    - Area source surrogates obtained from EPA 2017gb platform.



# Area Source Emissions Modeling: Spatial Allocation



# Area Source Emissions Modeling: Emissions Summary

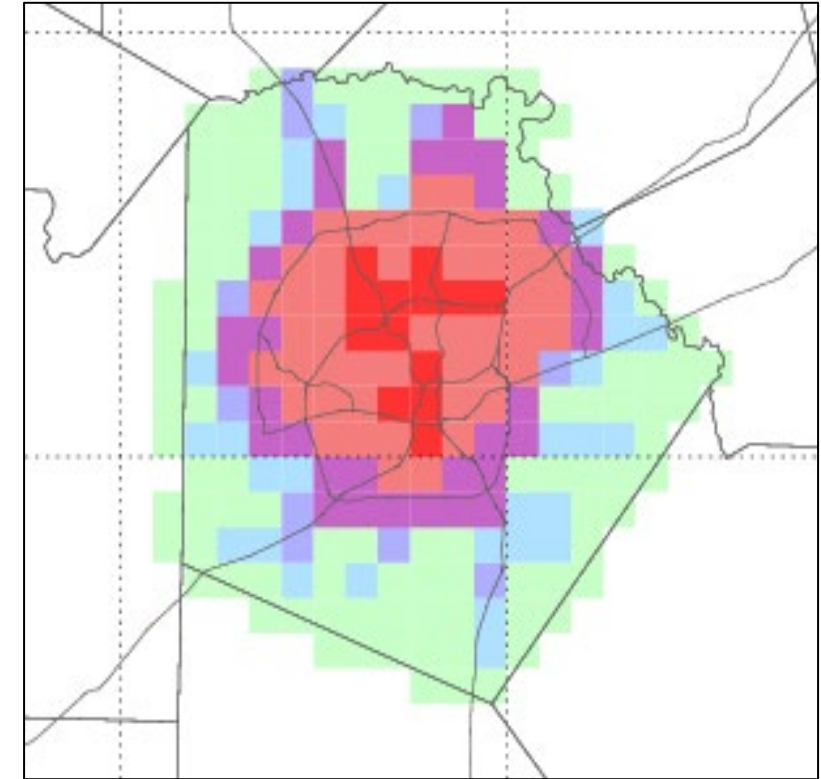
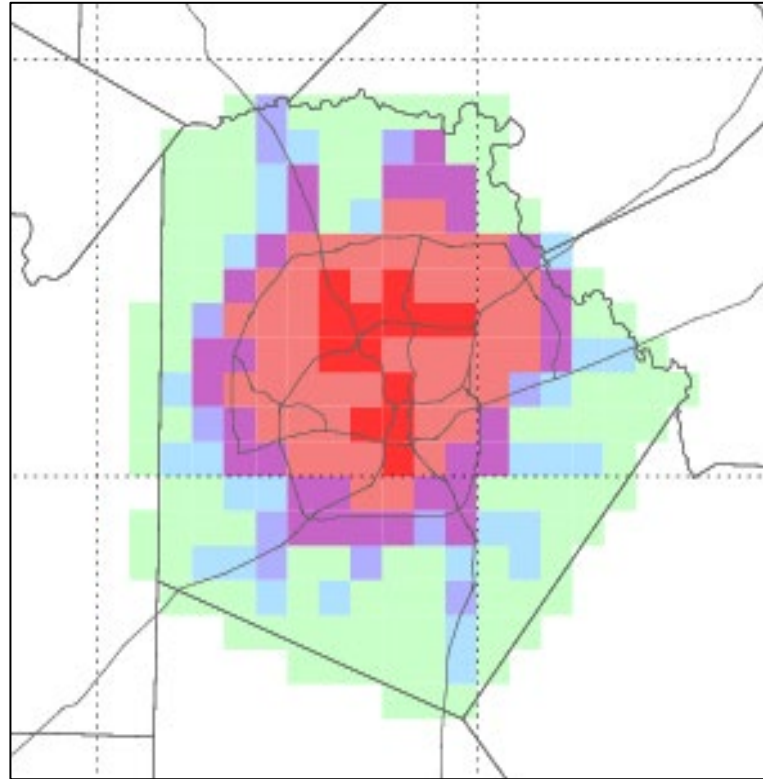
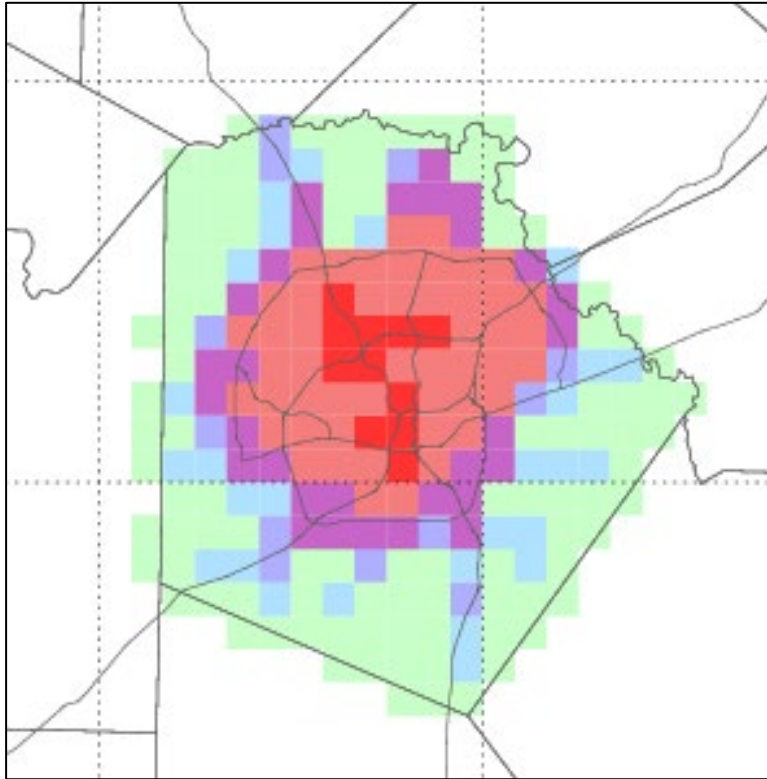
**Area Source Summer Weekday Emissions  
(tons per day)**

Year	NO <sub>x</sub>	VOC	CO
2019	4.99	73.19	6.01
2023	5.18	75.72	6.28
2026	5.30	77.57	6.48

**2019 Summer Weekday VOC Emissions (tons per day)**

**2023 Summer Weekday VOC Emissions (tons per day)**

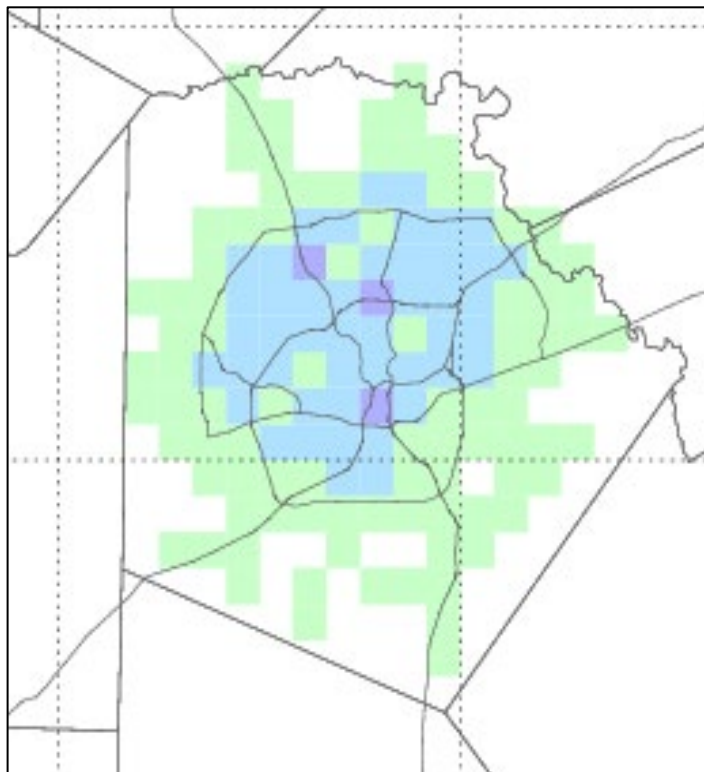
**2026 Summer Weekday VOC Emissions (tons per day)**



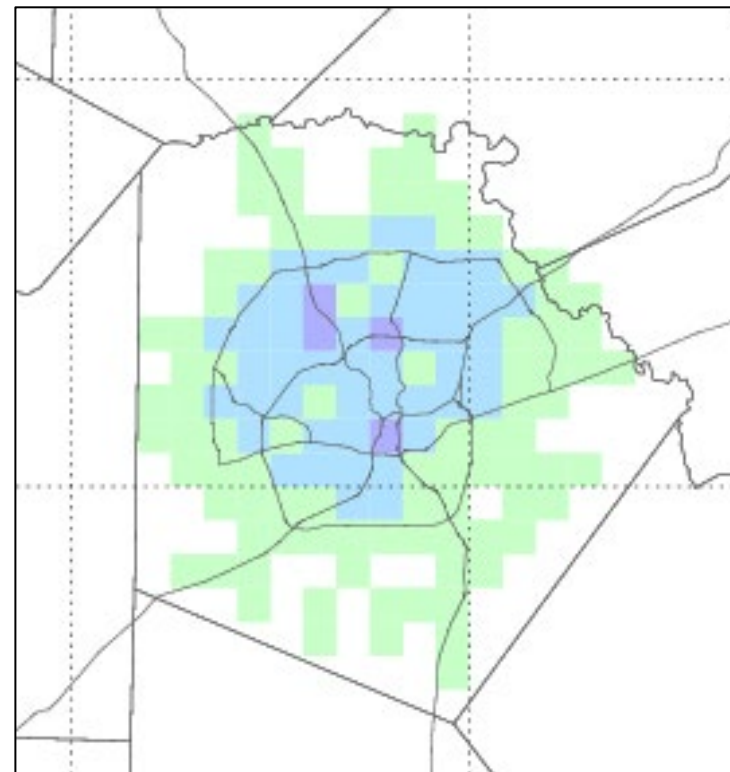
**2019 Summer Weekday NOx Emissions (tons per day)**



**2023 Summer Weekday NOx Emissions (tons per day)**



**2026 Summer Weekday NOx Emissions (tons per day)**





# Area Source Emissions Modeling: New Version

- New version of area source sector in TCEQ 2019 modeling platform (not yet released).
  - Uses more recent 2020 TexAER inventory.
  - Back-casted to 2019; projected to 2023 & 2026.

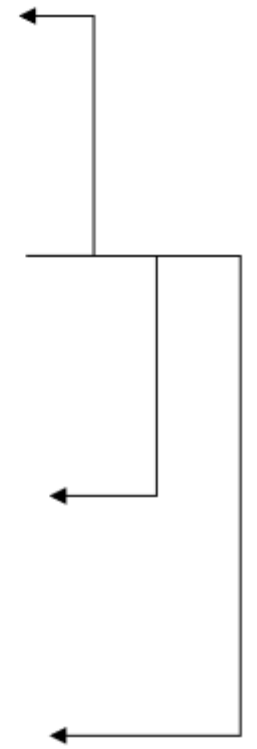


2019 Base Year

2020 Inventory

2023 Future Year

2026 Future Year



**2019 Summer Weekday Emissions (tons per day)**

Area	NOx 2017v2	NOx 2020v1	VOC 2017v2	VOC 2020v1	CO 2017v2	CO 2020v1
Bexar County	4.99	5.34	73.19	54.64	6.01	9.66

# Contact

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# Questions?