Increase in Houston Ozone Violations Hits Communities of Color Hardest

November 30, 2023

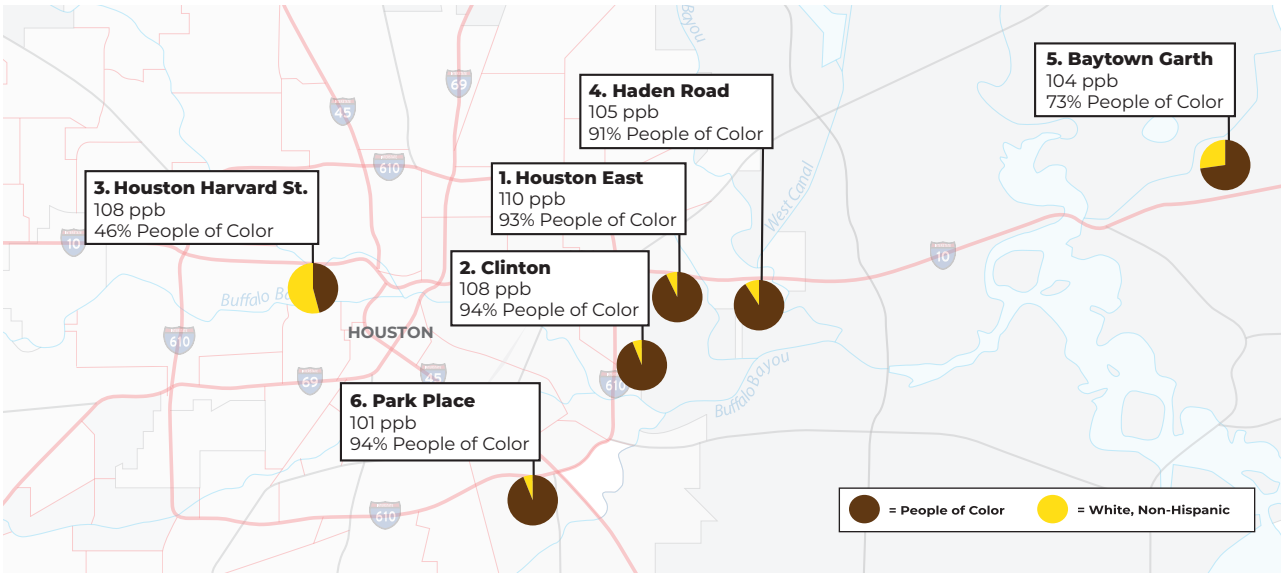
Air quality monitors in the greater Houston area measured ozone levels that violated health-based standards on 55 days in 2023, more than any other year since 2011. Scorching temperatures combined with air pollution triggered the buildup of ozone across the region, which includes Harris, Galveston, Brazoria, and Montgomery Counties. Although the worsening air pollution affected everyone, some neighborhoods were hit harder than others: people of color and low-income residents were more likely to live where ozone reached the highest levels this summer and over the three years from 2021 to 2023. For the most part, smog has gotten worse over time in these ozone hotspots, which do not even meet air quality limits adopted fifteen years ago. (For online, interactive maps showing the demographics of these neighborhoods and their ozone levels over time, click here.)

Ozone, also known as smog, is formed by the reaction between nitrogen oxide and volatile organic chemicals under bright sunlight and high temperatures. Although an unusually hot summer in the Houston area drove ozone levels higher, climate forecasters predict temperatures will continue to rise as global warming advances.

According to the U.S. Environmental Protection Agency (EPA), high ozone levels can trigger coughing or sore throats and "...make it more difficult to breathe deeply, inflame or damage the airways, aggravate diseases such as asthma, emphysema, and chronic bronchitis, [and] increase the frequency of asthma attacks."[1] Newer studies suggest that long-term exposure to ozone actually causes asthma, not merely

Map A. Demographic Breakdown of Houston Neighborhoods with Highest Daily Smog Levels in 2023

Monitoring locations recording eight-hour ozone levels over 100 ppb. Current federal standard is 70 ppb.



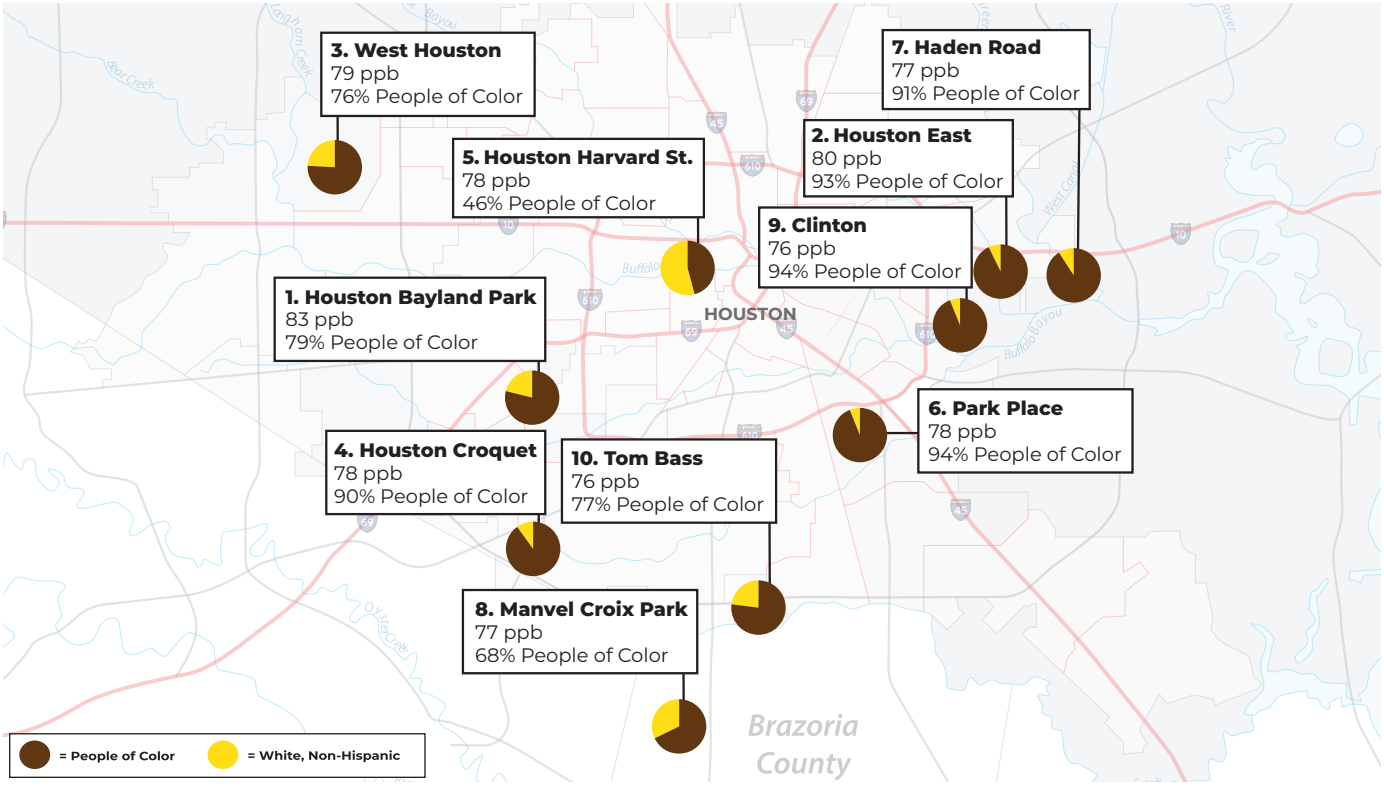
worsens symptoms in those who already have the disease, and also contributes to premature mortality. The EPA advises that, "People most at risk…include people with asthma, children, older adults" and those who recreate or work outdoors, have certain genetic characteristics, or reduced intake of nutrients such as Vitamins C and E.

EPA has gradually tightened ozone standards over the past fifteen years in response to scientific evidence about the damage caused by smog. The Bush Administration adopted a 2008 standard to keep ozone concentrations averaged over eight hours at or below 75 parts per billion (ppb), which the Obama Administration reduced to 70 ppb in 2015. The 2008 and 2015 standards are still in effect, and the Houston area is out of compliance with both of them.[2]

The Environmental Integrity Project reviewed ozone monitoring data from Harris, Galveston, Montgomery, and Brazoria Counties from the Texas Commission on Environmental Quality[3], and identified the days that eight hour ozone levels exceeded the current air quality limit of 70 ppb. For the area within three miles of each ozone monitoring location, our report identifies the total population, the percentage who are people of color or low income, and the number of children under five. For comparison, people of color account for 58 percent of the statewide population, 73 percent in Harris County, 55 percent in Brazoria County, and 45 percent in Galveston County. An estimated 34 percent of Texans live in "low-income" households where income is no greater than twice the poverty level.

Map B. Monitoring Locations with Highest Smog Levels in 2021-2023

Ozone at These Locations Exceeded Both 2015 and 2008 Federal Standards

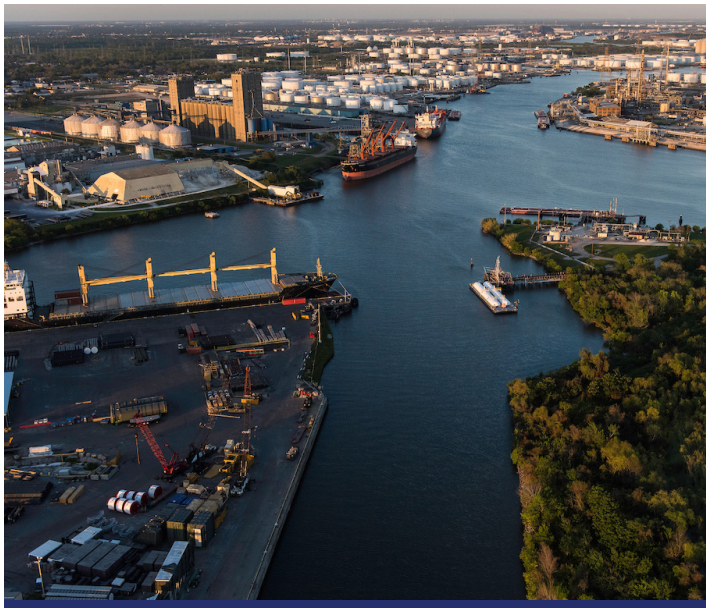


- **Smoggiest Days in 2023:** In Harris County, six air quality monitors recorded the worst daily smog levels in 2023, with ozone levels ranging from 100 to 114 parts per billion, far above federal ozone limits. People of color — predominately Latino and African American — accounted for more than 90 percent of residents within three miles of four of these locations (Clinton, Park Place, Houston East, and Haden Road). And about half the population in each of those four cases live in low-income households. (See page 4 for data for all six sites).
- **Worst Smog in 2021-23:** Twenty-two of 36 Houston-area air monitoring locations violated the most recent federal ozone standards (70 ppb) for 2021-2023, based on the three-year average used to determine compliance with federal ozone rules (see page 5).[4] But the ten monitors recording the worst smog — nine in Harris County and one in Brazoria County — measured 3-year ozone concentrations also exceeding the less stringent 75 ppb standard established in 2008. People of color were from 76 to 94 percent of those living within three miles of all but one of the nine Harris County monitors, and about two-thirds of residents within three miles of the Brazoria County monitoring location. The percentage of low-income residents in six of the ten neighborhoods surrounding these monitors ranges from 43 to 53 percent, well above the statewide average of 34 percent. (See Map B above and Table B below).
- **Smog Worse or Unchanged Since 2008-2010:** Ozone levels at six of the locations that exceeded the 2008 (75 ppb) standard in 2021–2023 are either unchanged or higher than the three-year average in 2008–2010. Again, the percentage of people of color and those with low income who live near these places are far higher than either the state or county average. (See Map and Table C below)
- **Most Daily Smog Events:** Our report also looked at how many days the ozone standard was exceeded at various locations in the greater Houston area. People of color accounted for a disproportionate share of those living within three miles of six of ten monitors reporting the most days above the 70 ppb ozone limit from 2021 through 2028, with a higher than average number of low-income residents at five of these locations (Map and Table E Below).

These smoggy hotspots are home to thousands of very young children at greater risk because their lungs are still developing and they are more likely to be outside in hot summer weather when ozone concentrations peak. (For annual ozone exceedance days in the Houston area, see Appendix A. For locations and ozone measurements for all individual monitors, see Appendices B and C.)

Measuring Compliance with the Federal Air Quality Limits for Ozone

Air quality monitors identify the highest eight-hour concentration of ozone for each day. A county or metropolitan area violates the Clean Air Act's health-based standard whenever the three-year average of the fourth highest ozone concentration in each year exceeds the applicable standard. For example, the fourth highest 8-hour ozone observed at the Park Place monitor in Harris County was 78 parts per billion in 2021, 72 ppb in 2022, and 85 ppb in 2023, yielding a 3-year average of 78 ppb that violates both the 2008 and 2015 standards. Along with several other metropolitan areas, greater Houston is currently in "severe nonattainment" with the 2008 ozone standard of 75 ppb. "Severe" is the second worst EPA classification, just below "extreme." When a region fails to meet the ozone limit, the Clean Air Act requires the area's polluters to meet tougher emission limits for the volatile chemicals and nitrogen oxides that contribute to ozone.



The Houston Ship Channel, where some of the worst smog levels in recent years have been recorded, is lined with oil refineries and chemical plants.

While at least one location in the Houston region exceeded the 8-hour, 70 ppb standard on 57 days between March 1

and October 31 of 2023, unhealthy levels of smog were much higher, more persistent, and more frequent in neighborhoods where people of color and low-income households make up a higher-than-average share of the population.

The latest data from the U.S. Census American Community Survey[5] describes 40.7 percent of Texas residents as non-Hispanic whites, 39.8 percent as Hispanic or Latino, 11.8 percent as Black or African American, 5 percent as Asian, and 0.2 percent as Native American. Comparable Census demographic data for Harris, Brazoria, and Galveston counties are provided in each of the charts that follow. Statewide, 58 percent of Texas residents are people of color and the percentages for each county are referenced in the table below. Thirty-four percent of residents statewide live in "low-income" households according to the EPA's environmental justice database, called EJScreen, which defines "low-income" as a household whose income is less than or equal to twice the federal poverty level.[6]

For the area within three miles of each ozone monitoring location, our report identifies the total population, the percentage who are people of color or low income, and the number of children under five.

Places With the Highest Ozone Levels, 2023

The map above and Table A below identify six Houston area locations that recorded at least one 8-hour ozone level higher than 100 ppb this year, which is far above the current ozone limits At least 90 percent of those living within three miles of four of these monitors — Houston East, Clinton, Haden Road and Park Place — are people of color, who also account for 73 percent of the population near a fifth monitor at Baytown Garth. While 34 percent of Texans statewide live in low-income households, the proportion is much higher among the population within three miles of four of these six locations, ranging from 46 percent (Haden Road) to 53 percent (Park Place). Children under five make up seven to eight percent of the total residents near five of these sites, higher than the statewide average of six percent.

Table A: Monitoring Locations Recording 8-Hour Ozone Levels Over 100 ppb in 2023

#	Monitor Name (County)	Date	8-hour Ozone Concentration (ppb)	3-mile Population	3-mile %POC	3-mile %Low Income	3-mile Children Below 5
1	Houston East (Harris)	5/18/2023	110	74,707	93%	49%	5,977
2	Clinton (Harris)	5/18/2023	108	75,494	94%	51%	6,040
3	Houston Harvard Street (Harris)	5/18/2023	108	185,846	46%	17%	11,151
4	Haden Road (Harris)	5/18/2023	105	78,894	91%	46%	5,523
5	Baytown Garth (Harris)	6/9/2023	104	20,312	73%	26%	1,219
6	Park Place (Harris)	5/18/2023	101	133,566	94%	53%	10,685

Note: The current federal ozone standard, set in 2015, is 70 parts per billion (ppb). Concentrations over 71 ppb exceed the standard.

People of Color (POC): 58% of Texas Population, 73% Harris Co.; Low Income: 34% of Texas Population, 35% Harris Co.

The Houston East, Clinton, Haden Road, Park Place and Baytown Garth monitors are located near the Houston Ship Channel, where neighborhoods face increased health risks due to a toxic mixture of air pollutants emitted from industry and heavy traffic.

The Houston East, Clinton, and Haden Road monitors are located on the north side of the Houston Ship Channel near the city of Galena Park, an 85-percent Latino suburb east of Houston with about a quarter of the population living below the poverty line. Galena Park is an environmental justice community of some 10,000 residents in which concerns about pollution and public health run high due to its proximity to the petrochemical industry, freight rail lines, and high traffic roadways. The city's main road, Clinton Drive, is used by heavy-duty vehicles hauling freight to and from the Port of Houston. Next to Galena

Park, and also subject to some of the worst air pollution, is Clinton Park, an historically African-American community just outside Interstate 610.

The Park Place monitor is located on the south side of the Houston Ship Channel near the city of South Houston, a community about the size of Galena Park where where 98 percent of residents are Latino and a quarter live below the poverty line.

The Baytown Garth air monitor is located to the east of the Houston Ship Channel on the outskirts of Houston in the heavily industrialized area of Baytown and Highlands. Baytown is home to the massive ExxonMobil oil refinery and chemical plant, one of the largest and most polluting in the country. South of Houston, an air monitor in Tom Bass Park registered 89 ppb ozone in 2023[7] and has a surrounding community that is 42 percent Black and 24 percent non-white Hispanic.

Not all the Houston neighborhoods with the worst smog in 2023 were Latino or African American communities. For example, the neighborhood surrounding the Harvard Street monitor, west of downtown, is 54 percent non-Hispanic white and registered an ozone reading of 108 ppb in 2023. That made it tied for second highest with majority Latino neighborhoods east of downtown along the Houston Ship Channel.

Highest Three-Year Average Smog Levels, 2021–2023

As noted earlier, air monitors identify the highest 8-hour average ozone concentration on a daily basis and flag those days when ozone exceeds the federal limit. Although each day smog standards are exceeded is harmful to public health, only the fourth highest concentration from each monitoring site within a year are considered when determining whether a region meets the federal ozone standard. Based on the three-year average from 2021 to 2023, 22 of the 36 Houston area monitoring locations violated the 70 ppb ozone standard adopted in 2015.[8] As illustrated in Table B, 11 of those 22 locations measured ozone levels high enough to exceed the 75 ppb standard for 2021–2023, even though this less stringent standard was established 15 years ago in 2008. People of color account for more than three quarters of those living within three miles of eight of these eleven locations and more than 90 percent at five of them. Measured in percentages, the proportion of people of color living within 10 of these 11 smoggy hotspots is significantly higher than either state or county-wide averages.

Table B: Monitoring Locations Exceeding Federal Ozone Standards for 2021-2023

#	Monitor Name (County)	4th Highest Ozone (3-year average)	3-mile Population	3-mile %POC	3-mile %Low Income	3-mile Children Below 5
1	Houston Bayland Park (Harris)	83	229,074	79%	51%	18,326
2	Houston East (Harris)	80	74,707	93%	49%	5,977
3	West Houston (Harris)	79	91,548	76%	32%	5,493
4	Houston Croquet (Harris)	78	127,234	90%	43%	8,906
5	Houston Harvard Street (Harris)	78	185,846	46%	17%	11,151
6	Park Place (Harris)	78	133,566	94%	53%	10,685
7	Haden Road (Harris)	77	78,894	91%	46%	5,523
8	Manvel Croix Park (Brazoria)	77	53,446	68%	13%	4,810
9	Clinton (Harris)	76	75,494	94%	51%	6,040
10	Tom Bass (Harris)	76	53,549	77%	18%	3,213

Note: The current federal ozone standard, set in 2015, is 70 parts per billion (ppb). Concentrations 71 ppb or above exceed the standard. The 2008 standard of 75 ppb is still in effect, and concentrations 76 ppb or above exceed that limit.

People of Color (POC): 58% of Texas Population, 73% Harris Co., 55% Brazoria Co., 45% Galveston Co.
Low Income: 34% of Texas Population, 35% Harris Co., 21% Brazoria Co., 26% Galveston Co.

More than 40 percent of the people living in neighborhoods that surround seven of the eleven monitoring locations with the highest 2021–2023 ozone levels qualify as low-income, according to EPA's EJScreen, which is significantly more than the statewide average. Low-income residents make up half or more of those living within three miles of four of these hotspots: Bayland Park, Houston East, Park Place, and Clinton. Population density is significantly higher around these smoggier sites, which are home to families with young children especially vulnerable to air pollution. For example, more than 18,000 children under five live within three miles of the Bayland Park monitor, where the fourth highest ozone levels averaged 83 ppb from 2021 to 2023, the highest in the Houston area.

Many children, who are especially vulnerable to air pollution, live in the neighborhoods along the Houston Ship channel that have the highest ozone levels.

Highest Three-Year Average Smog Levels 2021-2023 vs. 2008–2010

Smog levels declined by five percent or greater at 21 of the 33 locations where ozone was measured every year since 2008 (see Appendix B), although over a third of the locations continue to show violations of either the 2008 or the more stringent 2015 federal ozone standard.[9] But as Table C shows, ozone at eight of the 10 locations with the highest concentrations in 2021–2023 are about the same or even a little worse than they were in 2008–2010. People of color account for between 76 and 94 percent of the population within three miles of six of the eight monitors where high ozone levels in 2021-2023 are unchanged or have worsened since 2008-2010. Again, the neighborhoods in these hotspots are characterized by a higher percentage of low-income households, greater population densities, and large numbers of children under 5 years old.

Map C. Change Since 2008-2010 for 10 Sites Recording Highest 2021-2023 Ozone Levels

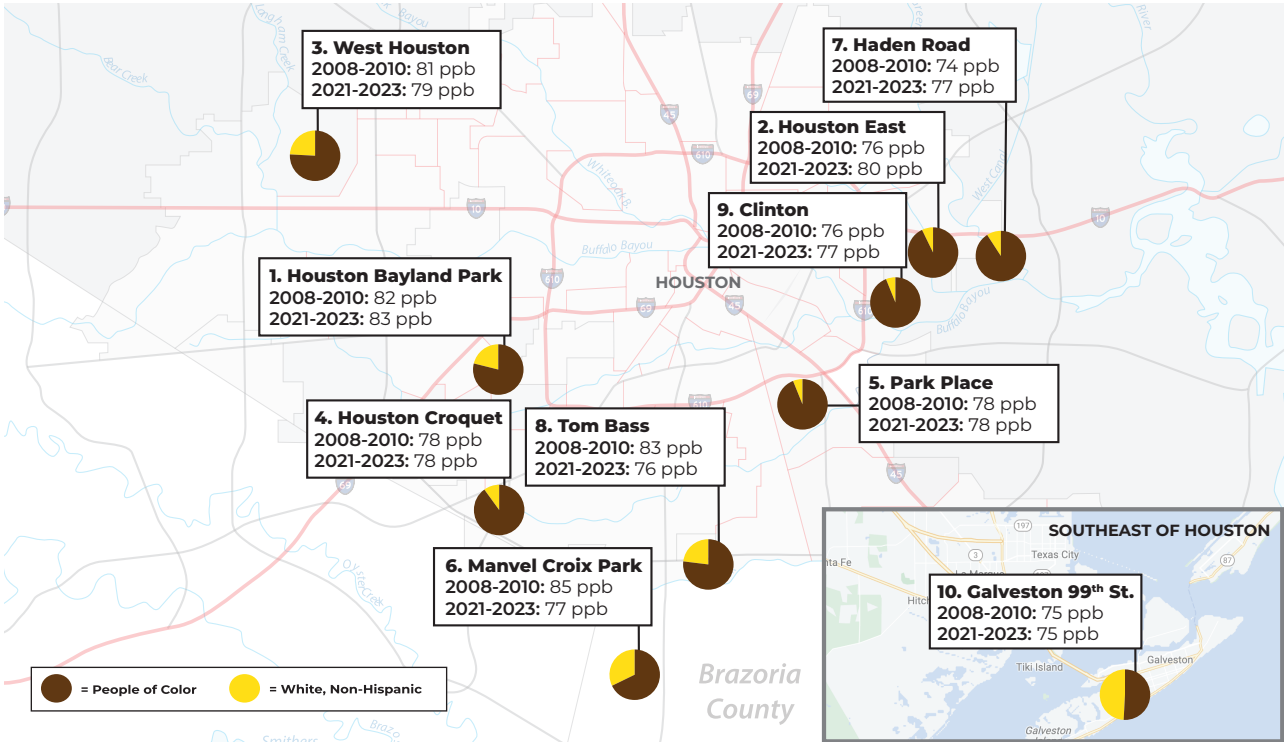


Table C. Change Since 2008-2010 for 10 Sites Recording Highest 2021-2023 Ozone Levels

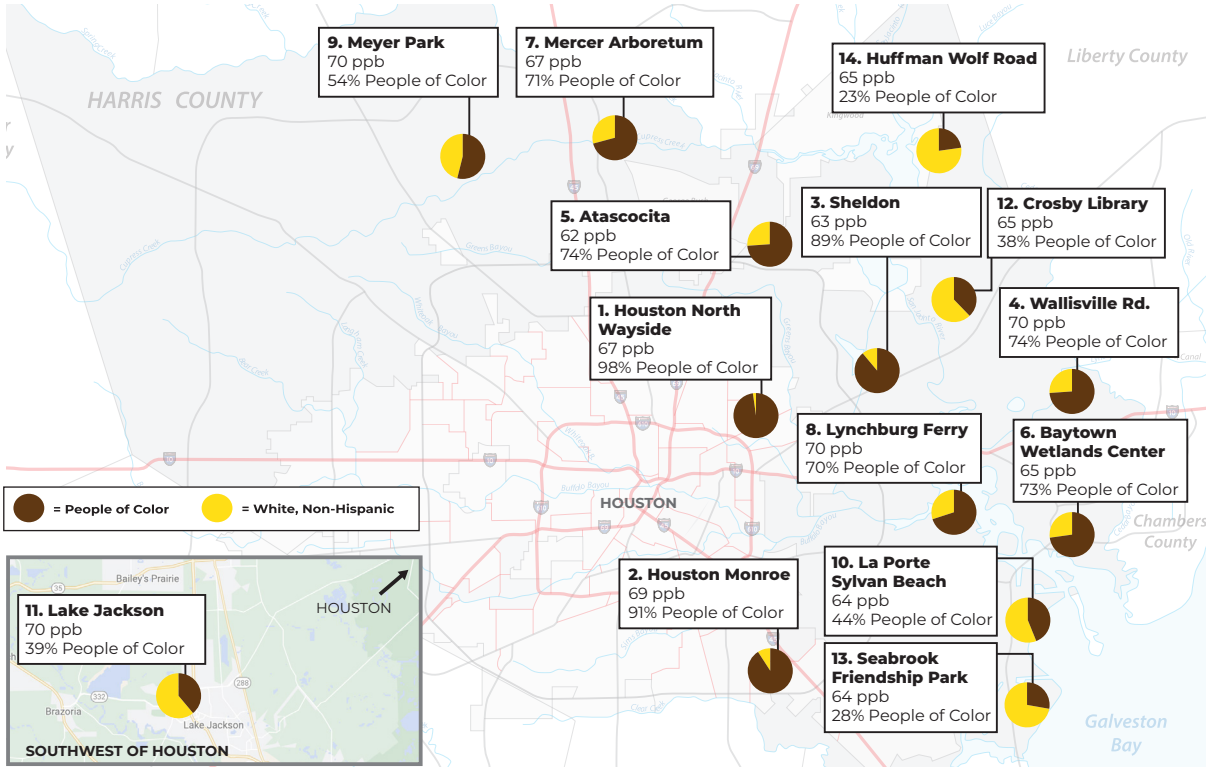
#	Monitor Name (County)	4th Highest Ozone, ppb (2008 – 2010 average)	4th Highest Ozone, ppb (2021 – 2023 average)	3-mile Population	3-mile %POC	3-mile %Low Income	3-mile Children Below 5
1	Houston Bayland Park (Harris)	82	83	229,074	79%	51%	18,326
2	Houston East (Harris)	76	80	74,707	93%	49%	5,977
3	West Houston (Harris)	81	79	91,548	76%	32%	5,493
4	Houston Croquet (Harris)	78	78	127,234	90%	43%	8,906
5	Park Place (Harris)	78	78	133,566	94%	53%	10,685
6	Manvel Croix Park (Brazoria)	85	77	53,446	68%	13%	4,810
7	Haden Road (Harris)	74	77	78,894	91%	46%	5,523
8	Tom Bass (Harris)	83	76	53,549	77%	18%	3,213
9	Clinton (Harris)	76	76	75,494	94%	51%	6,040
10	Galveston 99th St. (Galveston)	75	75	19,836	51%	35%	793

Note: The current federal ozone standard, set in 2015, is 70 parts per billion (ppb). Concentrations 71 ppb or above exceed the standard. The 2008 standard of 75 ppb is still in effect, and concentrations 76 ppb or above exceed that limit.

People of Color (POC): 58% of Texas Population, 73% Harris Co., 55% Brazoria Co., 45% Galveston Co.
Low Income: 34% of Texas Population, 35% Harris Co., 21% Brazoria Co., 26% Galveston Co.

In contrast, people of color are somewhat less likely to be under-represented in neighborhoods that are within three miles of monitoring locations with the lowest ozone concentrations in the Houston area. Table D identifies the 14 monitoring stations where the fourth highest ozone concentrations between 2021 and 2023 averaged 70 ppb or lower, i.e., demonstrating compliance with all federal ozone standards,

Map D. Monitoring Locations Meeting All Ozone Air Quality Standards, 2021—2023



Refineries and chemical plants in Houston are significant contributors to the region's smog, and many are planning expansions.

even the most recent and most stringent standard established in 2015. People of color accounted for between 23 percent and 54 percent of the surrounding population near six of these monitors, or less than the statewide or county average; from 70 percent to 74 percent near five monitors (close to the average for Harris County); and from 89 percent to 98 percent of the residents near three monitoring sites.

Table D. Monitoring Locations Meeting All Ozone Air Quality Standards, 2021—2023

#	Monitor Name (County)	4th Highest Ozone (3-year average)	3-mile Population	3-mile %POC	3-mile %Low Income	3-mile Children Below 5
1	Houston North Wayside (Harris)	67	62,337	98%	60%	3,740
2	Houston Monroe (Harris)	69	97,539	91%	40%	7,803
3	Sheldon (Harris)	63	31,728	89%	34%	2,856
4	Wallisville Road (Harris)	70	21,196	74%	27%	1,484
5	Atascocita (Harris)	62	73,338	74%	23%	4,400
6	Baytown Wetlands Center (Harris)	65	53,669	73%	45%	4,830
7	Mercer Arboretum (Harris)	67	74,650	71%	31%	5,226
8	Lynchburg Ferry (Harris)	70	10,527	70%	35%	947
9	Meyer Park (Harris)	70	108,675	54%	22%	6,521
10	La Porte Sylvan Beach (Harris)	64	13,253	44%	28%	1,060
11	Lake Jackson (Brazoria)	70	24,692	39%	21%	1,482
12	Crosby Library (Harris)	65	18,688	38%	22%	1,869
13	Seabrook Friendship Park (Harris)	64	25,900	28%	15%	1,295
14	Huffman Wolf Road (Harris)	65	3,858	23%	24%	193

Note: The current federal ozone standard, set in 2015, is 70 parts per billion (ppb). Concentrations 71 ppb or above exceed the standard. The 2008 standard of 75 ppb is still in effect, and concentrations 76 ppb or above exceed that limit.

People of Color (POC): 58% of Texas Population, 73% Harris Co., 55% Brazoria Co., 45% Galveston Co.
Low Income: 34% of Texas Population, 35% Harris Co., 21% Brazoria Co.

Smog Frequency

Strictly speaking, only the fourth highest ozone days in each year are used to measure compliance with the federal smog standards. But every day that ozone levels exceed the federal standards is bad for public health. While the number of high ozone days have declined at many Houston area monitors since 2008, some locations exceed smog limits far more often than others. For example, ozone concentrations at Houston Bayland Park were higher than 70 ppb limit on 49 days from 2021 through 2023, with 8 hour averages ranging from 71 to as high as 110 ppb over the three year period. In contrast, smog levels at the Conroe monitor exceeded the 70 ppb limit on a total of 17 days from 2021-2023. Table E identifies the ten locations with the most number of days exceeding the ozone limit in 2021-2023. Again, people of color make a disproportionate share of the population within three miles of locations recording the most frequent violations of the 70 ppb ozone limit.

Map E: 10 Monitoring Locations with the Most Days Exceeding the 70 ppb Ozone Standard

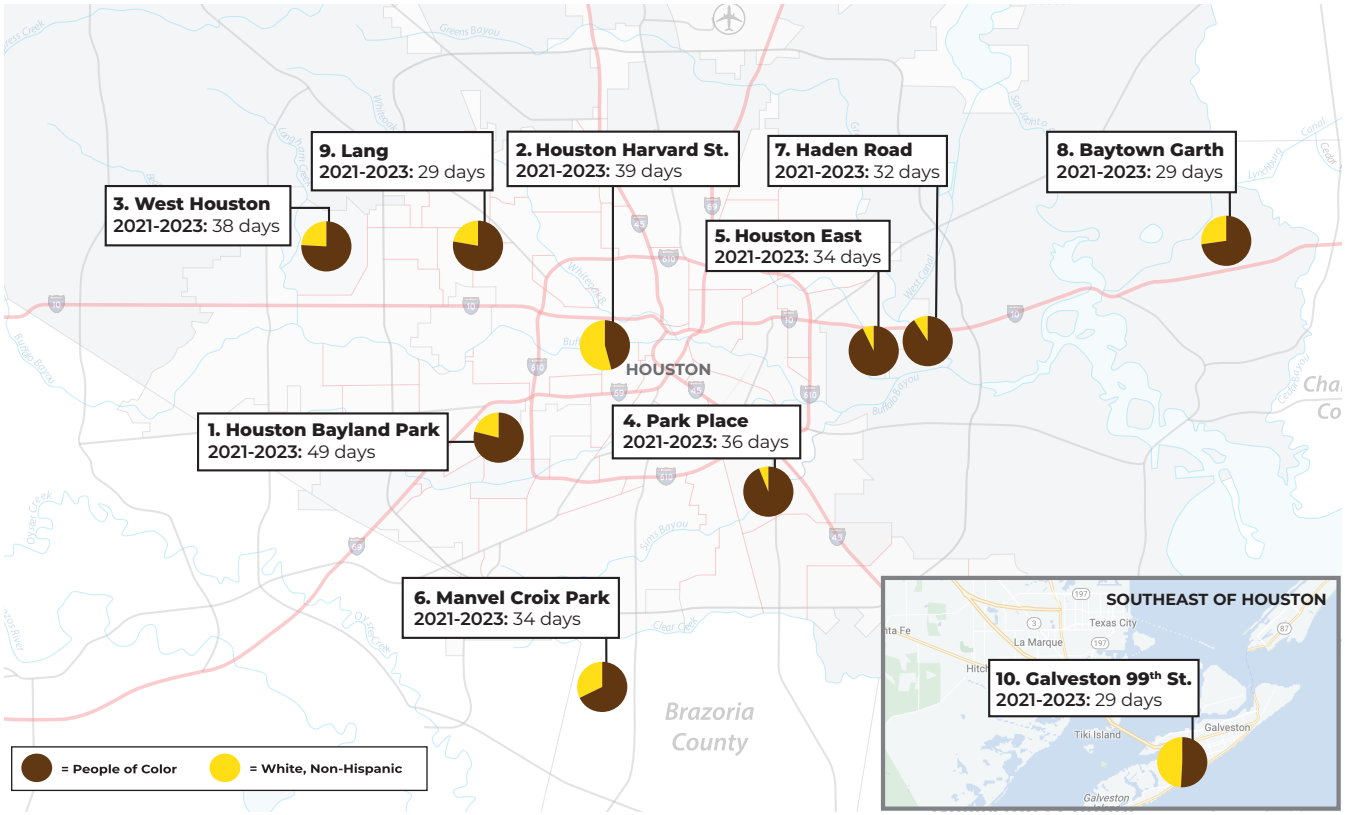


Table E. 10 Monitoring Locations with the Most Days Exceeding the 70 ppb Ozone Standard

#	Monitor Name (County)	Total days exceeding 2015 ozone standard (2021 - 2023 average)	3-mile Population	3-mile %POC	3-mile %Low Income	3-mile Children Below 5
1	Houston Bayland Park (Harris)	49	229,074	79%	51%	18,326
2	Houston Harvard Street (Harris)	39	185,846	46%	17%	11,151
3	West Houston (Harris)	38	91,548	76%	32%	5,493
4	Park Place (Harris)	36	133,566	94%	53%	10,685
5	Houston East (Harris)	34	74,707	93%	49%	5,977
6	Manvel Croix Park (Brazoria)	34	53,446	68%	13%	4,810
7	Haden Road (Harris)	32	78,894	91%	46%	5,523
8	Baytown Garth (Harris)	29	20,312	73%	26%	1,219
9	Lang (Harris)	29	143,226	78%	46%	10,026
10	Galveston 99th St. (Galveston)	29	19,836	51%	35%	793

Note: The current federal ozone standard, set in 2015, is 70 parts per billion (ppb). Concentrations 71 ppb or above exceed the standard. The 2008 standard of 75 ppb is still in effect, and concentrations 76 ppb or above exceed that limit.

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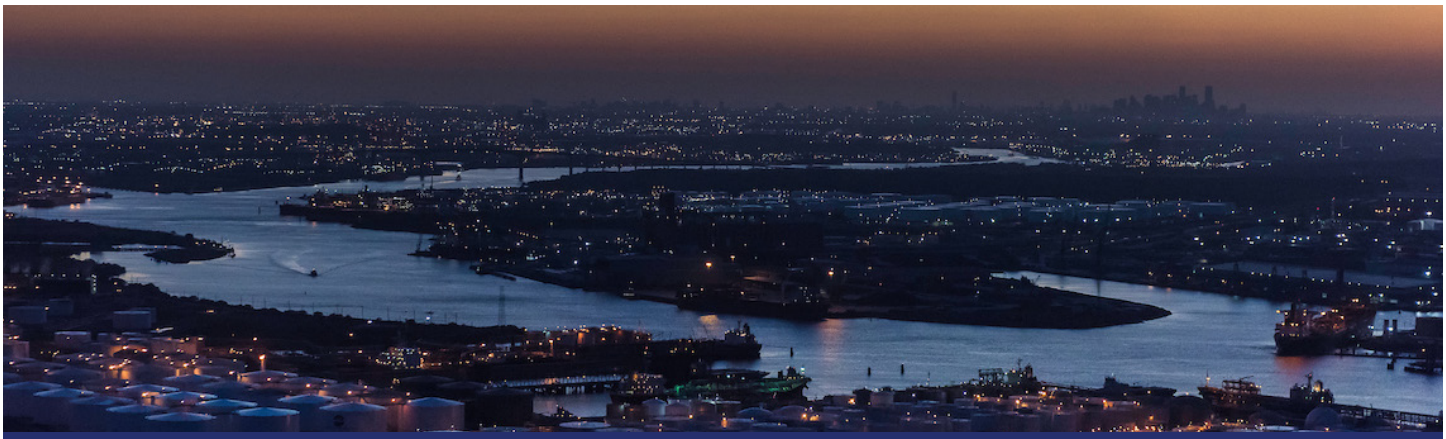

Although the Houston area already suffers from high levels of smog, Texas has approved at least 20 new petrochemical industry projects that could add more than 12,000 additional tons a year of ozone-forming chemicals.

Conclusion

Ozone is formed by the interaction between nitrogen oxides and volatile organic chemical compounds exposed to sunlight, high temperatures, and other meteorological conditions, e.g., inversions that hold pollution in place for long periods of time. These pollutants are released by cars, trucks, and off-road vehicles and from so-called “stationary sources” that include power plants and the large petrochemical manufacturers spread throughout the greater Houston area. While pollutants like nitrogen oxide can travel a great distance, it is no accident that some of the worst smog levels in recent years have been recorded near freeways and in areas along the Houston Ship Channel that are lined with oil refineries and chemical plants. While “higher than normal” temperatures drove ozone levels higher in 2023, climate forecasters predict that temperatures will continue to rise in Houston and other coastal areas as global warming increases.

Although ozone levels have declined in some neighborhoods over the past 15 years, smog has plagued residents throughout the Houston area for a long time. But the data shows that people of color and those living on low incomes are more likely to be exposed to ozone concentrations that are higher, more persistent, and less likely to have improved since 2008.

Smog can be gradually cleared up through regulations and permit limits and by cracking down on illegal emissions of nitrogen oxide and volatile chemicals, especially when they pollute neighborhoods already suffering from unhealthy air quality. Yet at least 22 new industrial projects have been proposed since 2016 and, if approved, could release more than 12,000 additional tons of smog-forming chemicals in the greater Houston area. The state has also turned a blind eye to the pollution from hundreds of "emission events" every year that escape enforcement because industries claim they are "unpreventable."

An October 12, 2023, letter from Texas Governor Greg Abbott to EPA Administrator Michael Regan complained about being forced to reclassify Houston from "moderate" to "serious" nonattainment with the 2015 ozone standard of 70 parts per billion.[10] But it is impossible to see how either EPA or the state could decide otherwise, given the state's severe noncompliance with the more lenient 75 ppb standard established fifteen years ago. While the governor's letter worries about the potential for "detrimental impacts to the industry in our state," it expresses no concern about the impact on public health or the near-record ozone levels that Houstonians sweated through all the way to the end of September 2023. But Governor Abbott's message is consistent with the state's long history of treating the oil, gas, and petrochemical industries as their most important "customers." Ozone is especially dangerous to outdoor workers laboring under the hot sun. This year, the governor signed a law in the middle of one of the hottest summers on record that prohibits Harris County and other local governments from requiring companies to give workers a water break. Why?

To finally clear up the smog over greater Houston, EPA will have to discharge its responsibilities under the Clean Air Act by increasing the level of oversight in Texas. Harris County and other local governments should be given more authority to protect their most vulnerable residents by establishing and enforcing air pollution control requirements within their boundaries. And ultimately, the public will need to demand cleaner air for everyone living, working, or raising their families in the greater Houston area.

Methods:

All ozone data was downloaded from the Texas Commission on Environmental Quality (TCEQ) yearly summary reports for each monitoring location.[11] These yearly summary reports publish hourly ozone data for each monitoring location. To determine which 8-hour periods exceeded the ozone threshold, EIP calculated the maximum eight-hour average for each day at each location. These calculations were made in accordance with EPA regulations, meaning only valid 8-hour rolling averages were included in the analysis.[12] The data for each year were narrowed to ozone concentrations measured between March and October of each year, as this is the time period each year when ozone exceedances are most likely to occur due to higher atmospheric temperatures.

Demographic data estimates within three miles of each monitor come from EPA's Environmental Justice Screening and Mapping Tool Version 2.2 (EJScreen 2.2). EJScreen 2.2 is a screening tool developed by the U.S. Environmental Protection Agency that utilizes demographic estimates from the U.S. Census' decennial census and the American Community Survey 2017–2021 5-Year Estimates (ACS 2021). The ACS is not a full census of all households, but instead relies on surveys to estimate the demographic breakdown of an area at the block-group level. For a complete list of limitations and detailed description of methodology, refer to the EJScreen Technical Documentation. County-level demographic estimates come directly from ACS 2021 data.

Authors of Report:

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Photo Credit:

Photos by Garth Lenz of the International League of Conservation Photographers.

Endnotes

[1] All EPA references in this paragraph can be found at https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution

[2] Texas Commission on Environmental Quality, "Houston-Galveston-Brazoria: Current Attainment Status Compliance of HGB-area counties with the National Ambient Air Quality Standards (NAAQS)." Available at: https://www.tceq.texas.gov/airquality/sip/hgb/hgb-status, accessed Nov. 14, 2023.

[3] EIP reviewed data collected between March and October, or what is otherwise called "ozone season."

[4] Though exceedance of the federal air quality standard is based on a three-year average of the fourth highest 8-hour ozone concentration each year, it's worth noting that in 2023, the fourth highest ozone concentration at 34 of 36 monitors exceeded the 2015 ozone limit of 70 parts per billion.

[5] U.S. Census, "American Community Survey, 2017–2021," includes five year estimates, link: https://www.census.gov/programs-surveys/acs

[6] The demographic statistics were obtained from EPA's Environmental Justice Screening and Mapping Tool, "EJ Screen," link: https://www.epa.gov/ejscreen

[7] The fourth highest ozone monitor reading in 2023, which was used for compliance purposes. The most recent federal ozone standard is 70 ppb.

[8] Though exceedance of the federal air quality standard is based on a three-year average of the fourth highest 8-hour ozone concentration each year, it's worth noting that in 2023, the fourth highest ozone concentration at 34 of 36 monitors exceeded the 2015 ozone limit of 70 parts per billion.

[9] Four monitors included in the trend analysis, Sheldon, West Houston, Mercer Arboretum, and Bunker Hill Village are missing one year of data between 2008 and 2023. The first three monitors are missing data for 2018 and Bunker Hill Village is missing data for 2017. They were included in the trend analysis because they had full years of data in the years 2008 to 2010 and 2021 to 2023.

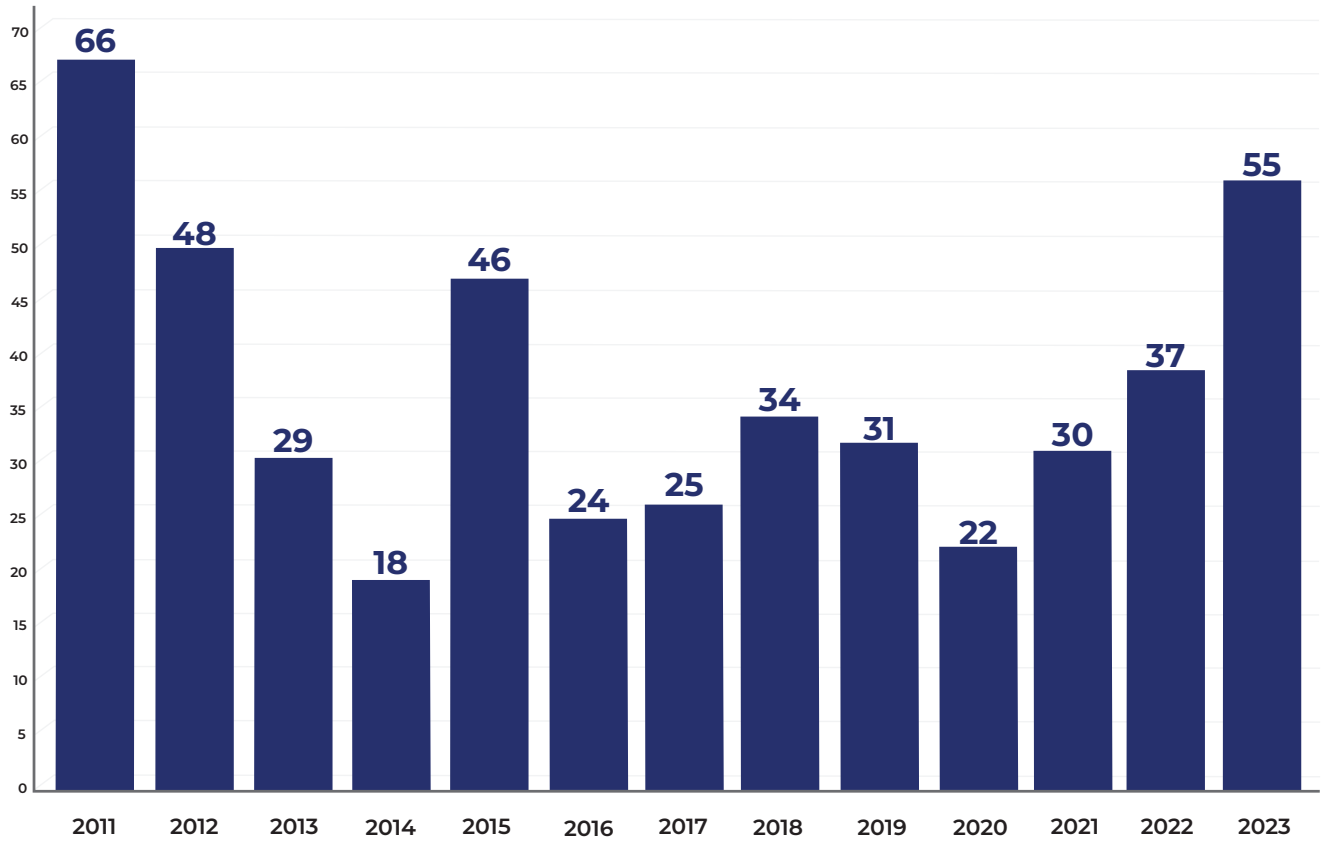
[10] Letter from Texas Governor Greg Abbott to EPA Administrator Michael Regan, October 10, 2023, link: https://environmentalintegrity.org/wp-content/uploads/2023/11/TX-Gov-Greg-Abott-letter-to-EPA-Administrator-Michael-Regan.pdf

[11] Texas Commission on Environmental Quality web page, "Data by Year by Parameter," link: https://www.tceq.texas.gov/cgi-bin/compliance/monops/yearly_summary.pl

[12] For a variety of reasons, some days include data gaps during which no ozone measurements are recorded. EPA regulations allow for the extrapolation of 8-hour results where data is incomplete under certain circumstances, and EIP's analysis is consistent with those procedures. For more information, see Appendix U of the National Ambient Air Quality Standards for Ozone.

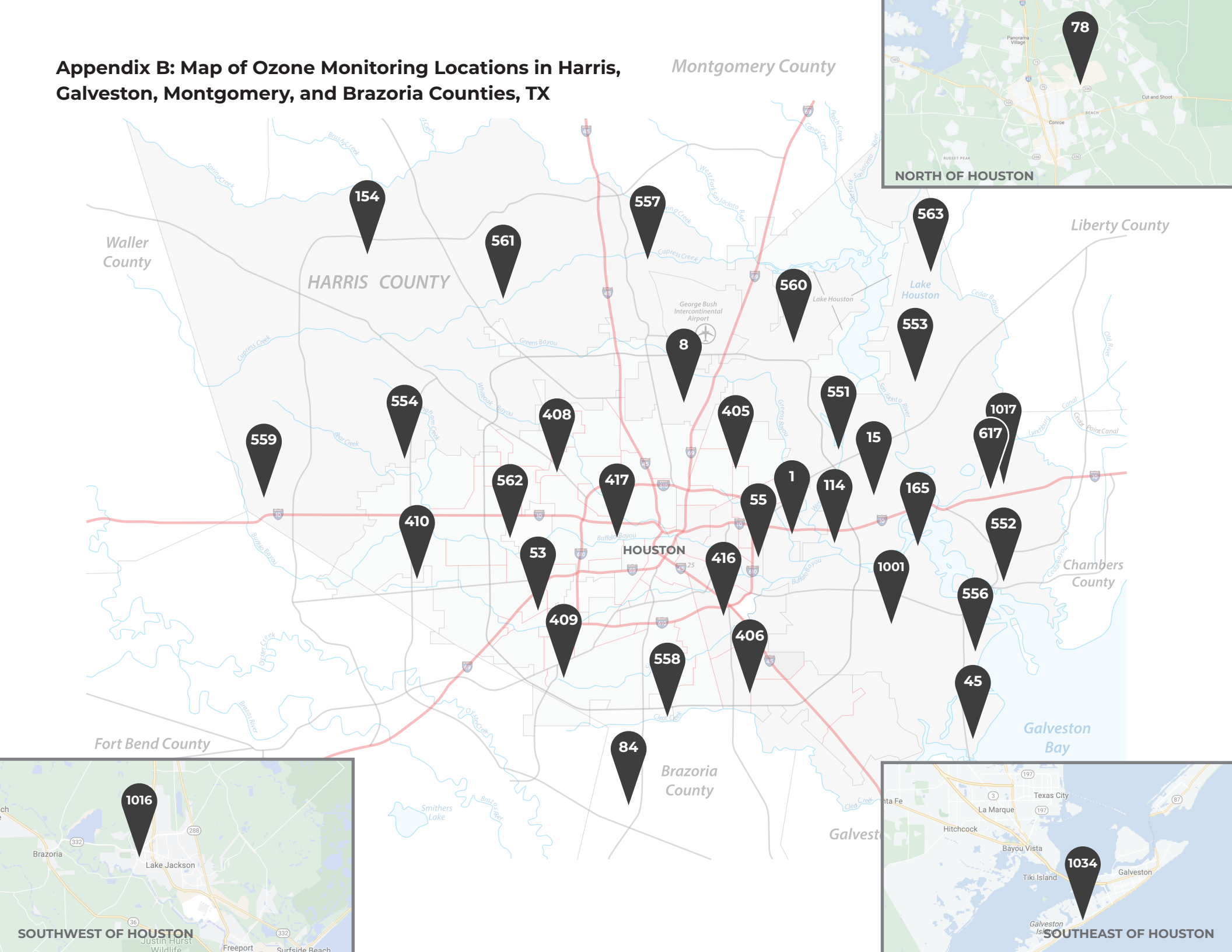
Appendix A

Annual Number of Days with Unhealthy Smog in the Houston Area



NOTE: *Annual number of days exceeding federal ozone standard (70 ppb) as recorded on at least one monitor in the greater Houston area, including Harris, Galveston, Brazoria and Montgomery counties.*

Appendix B: Map of Ozone Monitoring Locations in Harris, Galveston, Montgomery, and Brazoria Counties, TX

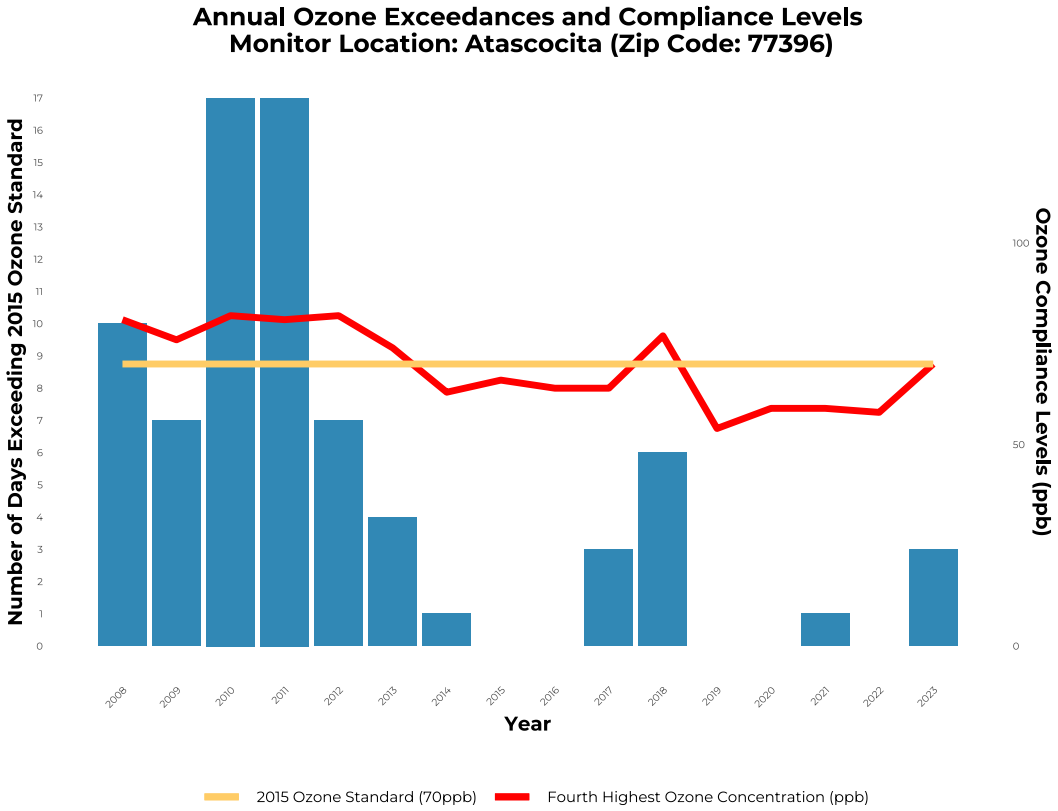


Appendix B: Table of Ozone Monitoring Locations in Harris, Galveston, Montgomery, and Brazoria Counties, TX

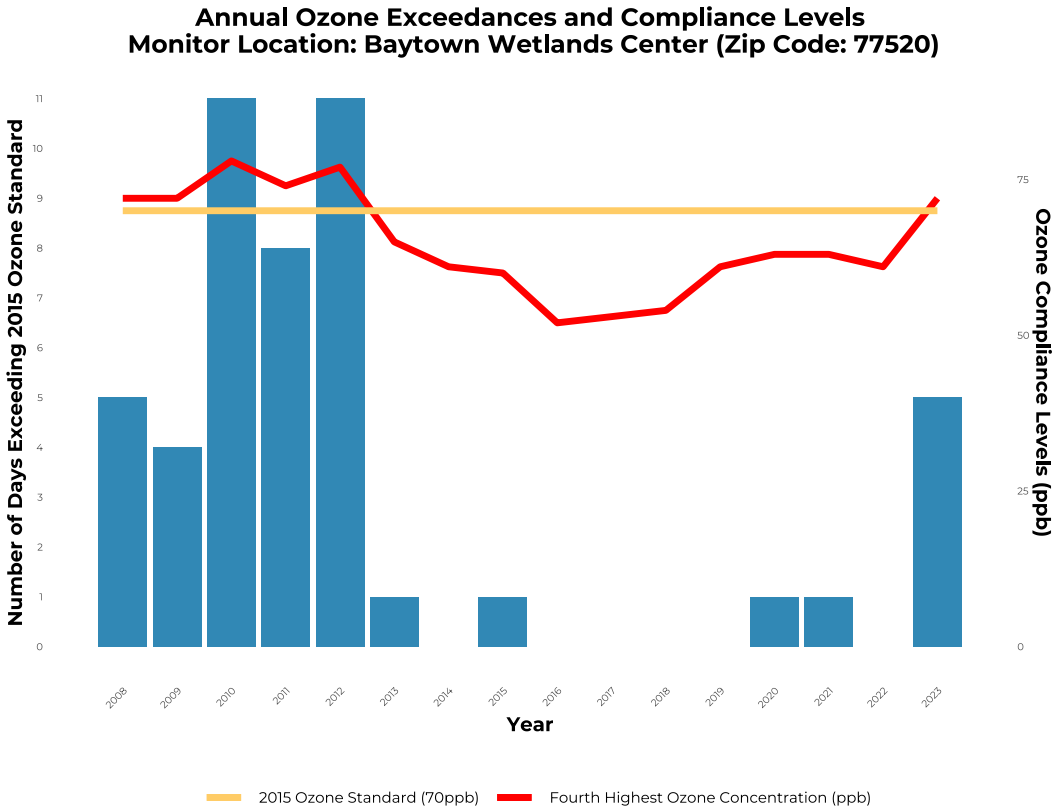
CAMS ID	Monitor Name	Years Monitored	Demographic Data (3-mile radius)				Highest Concentration Recorded in 2023 (ppb)	Date of Highest Concentration Recorded in 2023	4th Highest Ozone, ppb		Total Days Exceeding the Standard	
			Total Population	%POC	%Low Income	Children Under 5			2008 to 2010 Average	2021 to 2023 Average	2008 to 2010	2021 to 2023
1	Houston East	2008 - 2023	74,707	93%	49%	5,977	110	5/18/23	76	80	26	34
417	Houston Harvard Street	2021 - 2023	185,846	46%	17%	11,151	108	5/18/23	N/A	78	N/A	39
55	Clinton	2008 - 2023	75,494	94%	51%	6,040	108	5/18/23	76	76	15	23
114	HRM #3 Haden Road	2008 - 2023	78,894	91%	46%	5,523	105	5/18/23	74	77	23	32
1017	Baytown Garth	2012 - 2023	20,312	73%	26%	1,219	104	6/9/23	N/A	75	N/A	29
416	Park Place	2008 - 2023	133,566	94%	53%	10,685	101	5/18/23	78	78	25	36
165	Lynchburg Ferry	2008 - 2023	10,527	70%	35%	947	99	5/18/23	74	70	12	13
53	Houston Bayland Park	2008 - 2023	229,074	79%	51%	18,326	97	5/18/23	82	83	30	49
617	Wallisville Road	2008 - 2023	21,196	74%	27%	1,484	97	9/12/23	82	70	40	14
408	Lang	2008 - 2023	143,226	78%	46%	10,026	96	5/18/23	76	75	24	29
1001	Houston Deer Park #2	2008 - 2023	90,313	56%	26%	6,322	95	9/11/23	81	75	37	27
562	Bunker Hill Village	2008 - 2023	140,783	54%	29%	9,855	93	5/18/23	81	72	45	15
409	Houston Croquet	2008 - 2023	127,234	90%	43%	8,906	92	9/18/23	78	78	31	27
15	Channelview	2008 - 2023	62,359	87%	36%	4,989	91	6/9/23	78	72	21	14
552	Baytown Wetlands Center	2008 - 2023	53,669	73%	45%	4,830	89	5/18/23	74	65	20	6
561	Meyer Park	2008 - 2023	108,675	54%	22%	6,521	89	8/2/23	79	70	34	14
1034	Galveston 99th Street	2008 - 2023	19,836	51%	35%	793	89	8/28/23	75	75	23	29
558	Tom Bass	2008 - 2023	53,549	77%	18%	3,213	89	9/11/23	83	76	38	24
554	West Houston	2008 - 2023	91,548	76%	32%	5,493	89	9/18/23	81	79	43	38
154	Northwest Harris County	2008 - 2023	24,902	44%	15%	1,992	89	9/19/23	81	74	35	21
84	Manvel Croix Park	2008 - 2023	53,446	68%	13%	4,810	88	9/1/23	85	77	42	34
410	Houston Westhollow	2008 - 2023	161,010	82%	38%	9,661	86	9/18/23	75	74	15	18
553	Crosby Library	2008 - 2023	18,688	38%	22%	1,869	85	9/12/23	78	65	35	4
405	Houston North Wayside	2008 - 2023	62,337	98%	60%	3,740	84	5/18/23	72	67	12	10
559	Katy Park	2008 - 2023	63,102	57%	23%	5,679	84	9/9/23	75	71	23	13
557	Mercer Arboretum	2008 - 2023	74,650	71%	31%	5,226	83	6/9/23	80	67	35	15
406	Houston Monroe	2008 - 2023	97,539	91%	40%	7,803	83	9/11/23	73	69	15	11
551	Sheldon	2008 - 2023	31,728	89%	34%	2,856	83	9/12/23	74	63	23	6
8	Houston Aldine	2008 - 2023	82,549	95%	60%	5,778	81	6/9/23	83	72	48	16
1016	Lake Jackson	2008 - 2023	24,692	39%	21%	1,482	80	8/28/23	75	70	15	10

CAMS ID	Monitor Name	Years Monitored	Demographic Data (3-mile radius)				Highest Concentration Recorded in 2023 (ppb)	Date of Highest Concentration Recorded in 2023	4th Highest Ozone, ppb		Total Days Exceeding the Standard	
			Total Population	%POC	%Low Income	Children Under 5			2008 to 2010 Average	2021 to 2023 Average	2008 to 2010	2021 to 2023
78	Conroe Relocated	2008 - 2023	24,216	62%	47%	1,695	77	5/19/23	72	72	13	17
560	Atascocita	2008 - 2023	73,338	74%	23%	4,400	76	9/12/23	80	62	34	4
45	Seabrook Friendship Park	2008 - 2023	25,900	28%	15%	1,295	75	5/23/23	76	64	21	10
556	La Porte Sylvan Beach	2008 - 2023	13,253	44%	28%	1,060	75	6/7/23	79	64	23	5
563	Huffman Wolf Road	Sept. 2010 - 2023	3,858	23%	24%	193	74	5/19/23	N/A	65	N/A	5

Appendix C

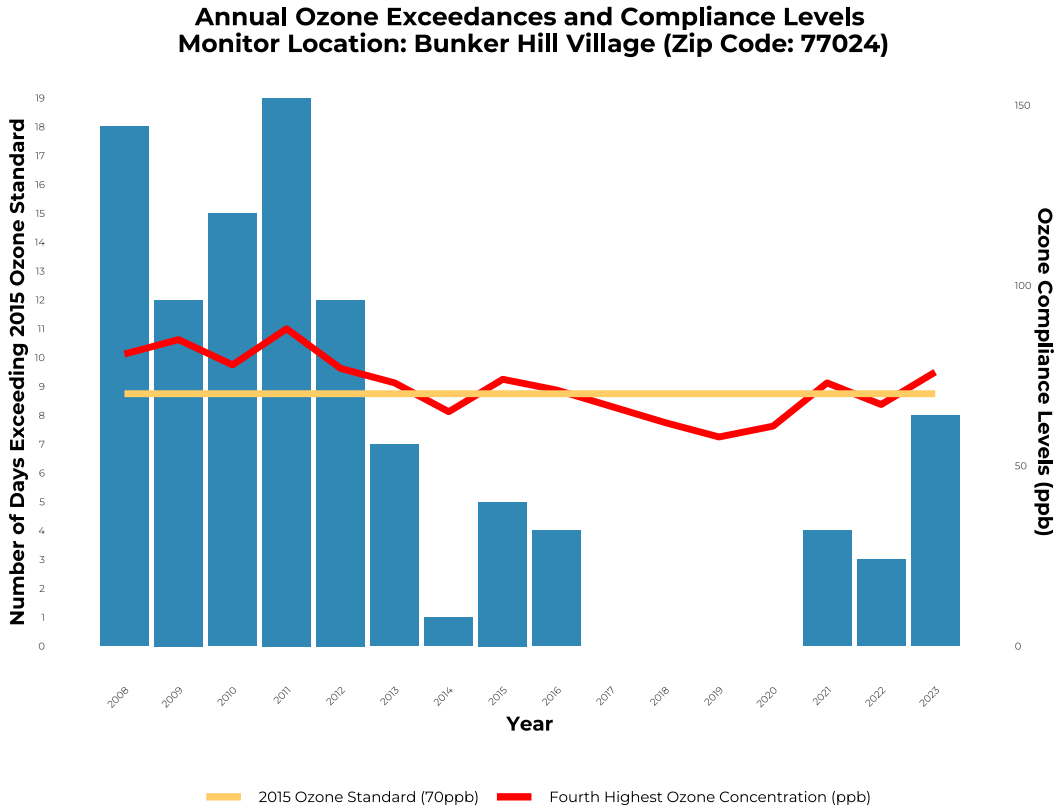


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

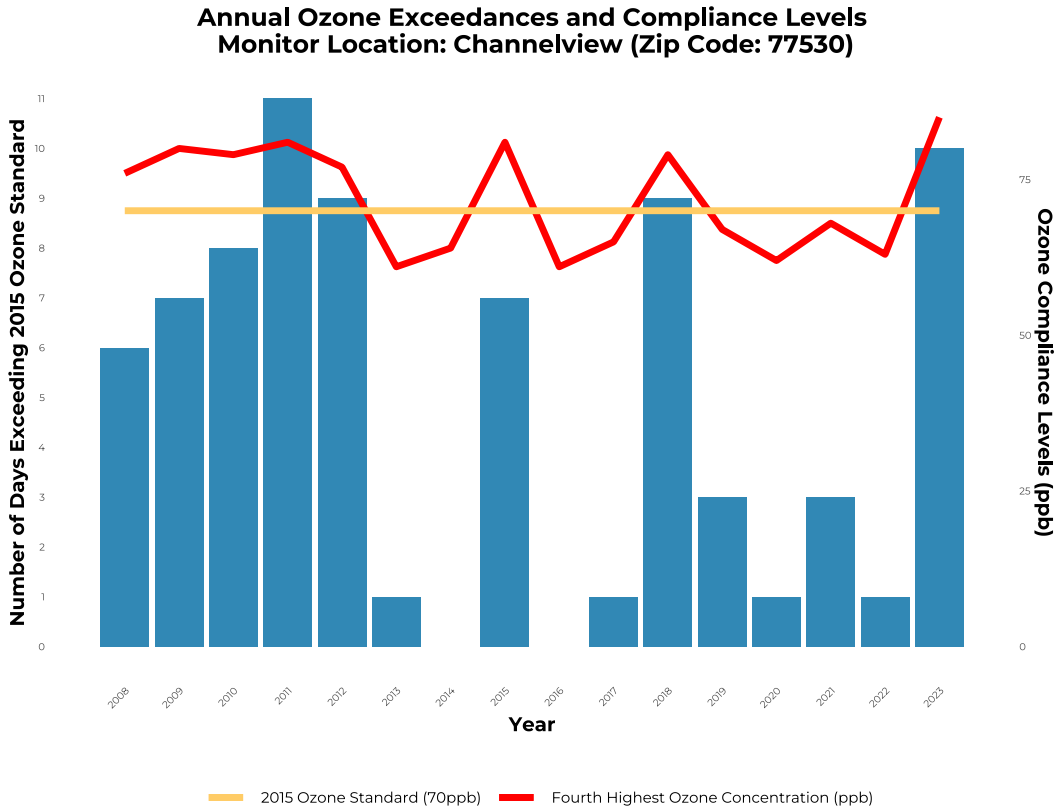


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

Appendix C

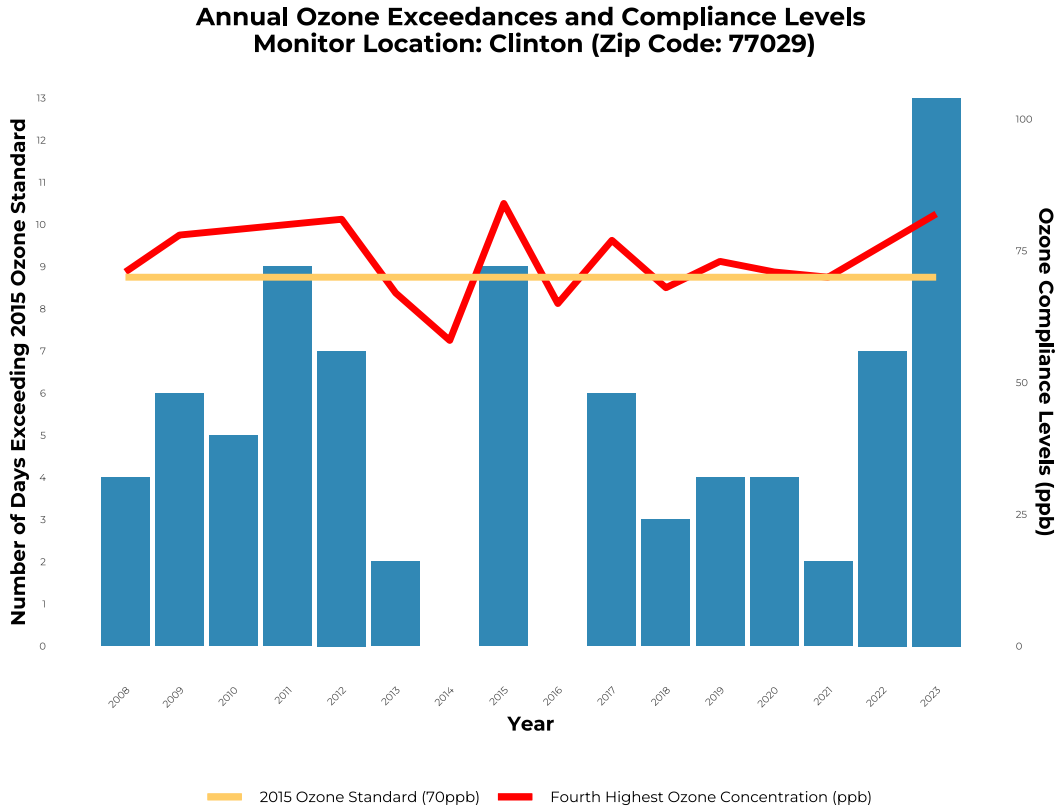


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

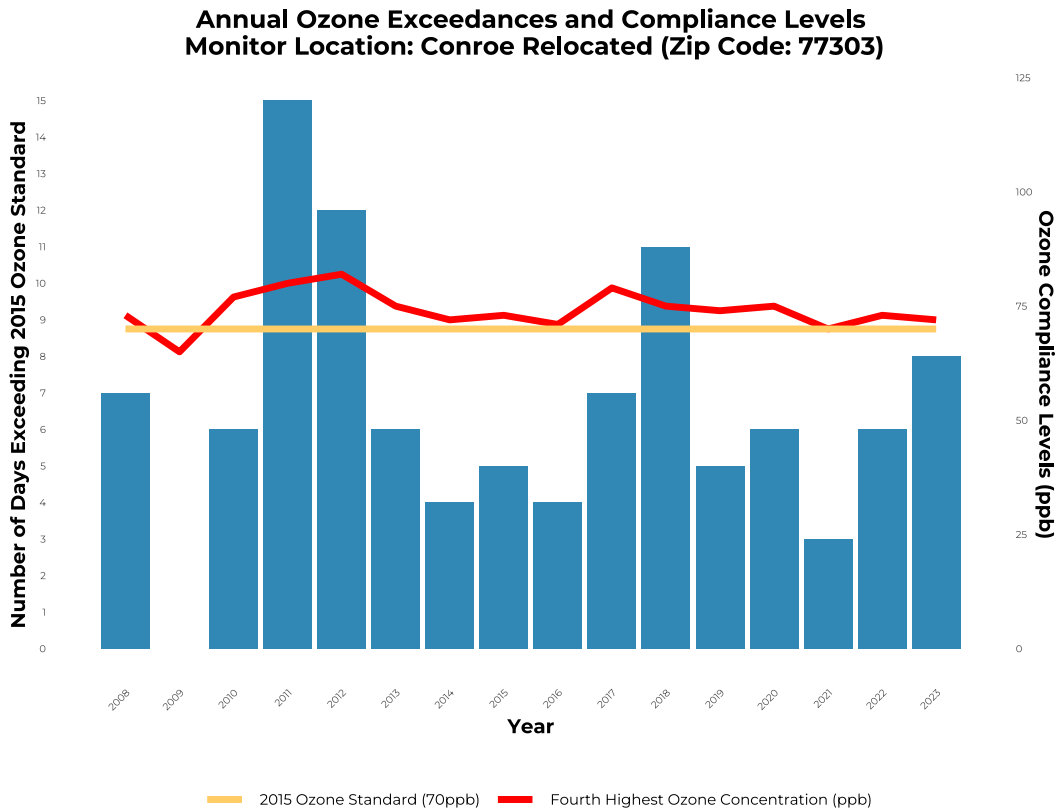


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

Appendix C

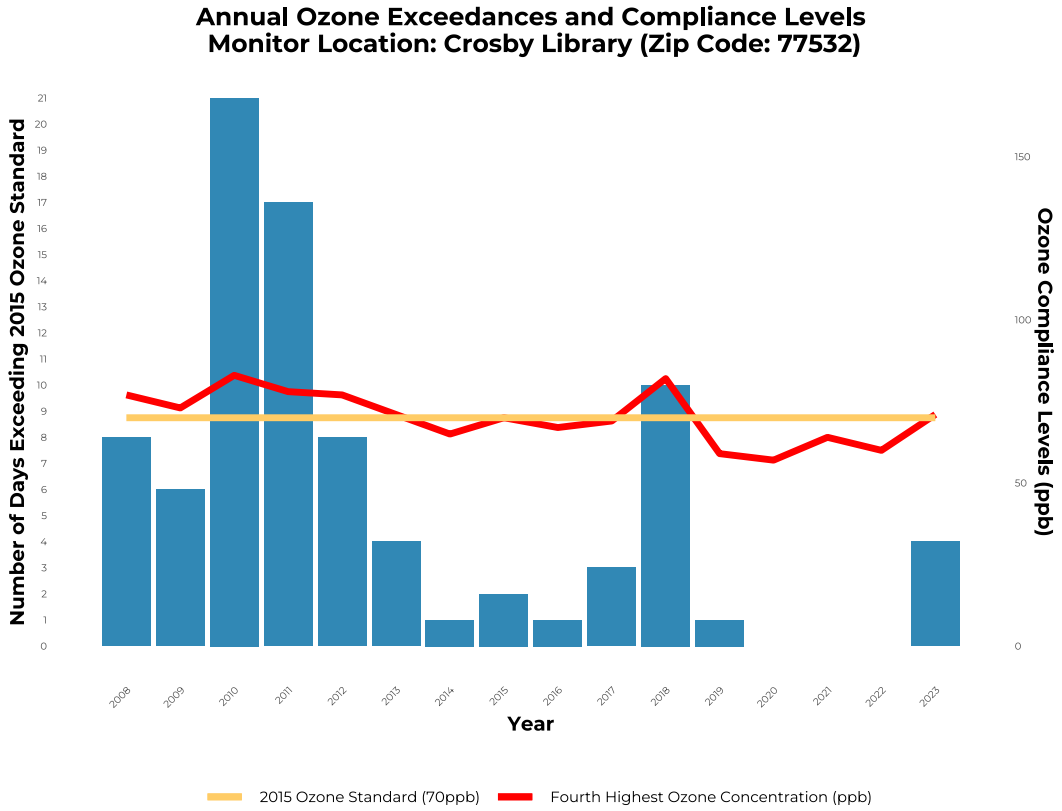


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

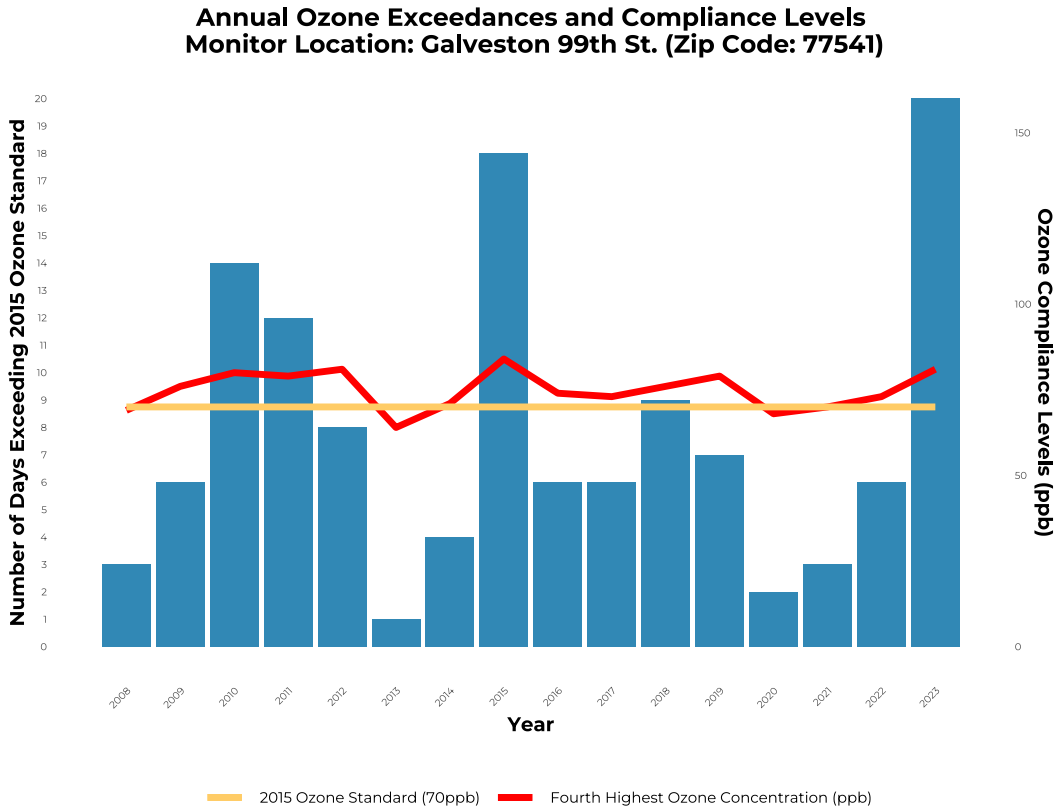


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

Appendix C



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

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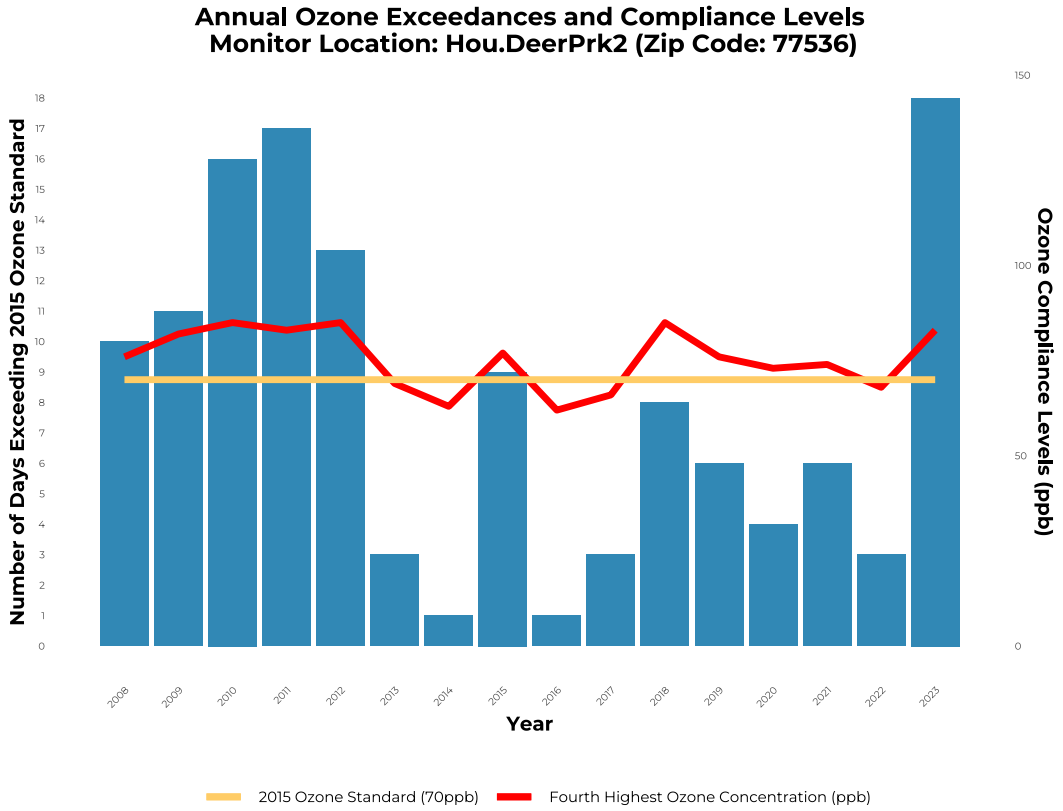
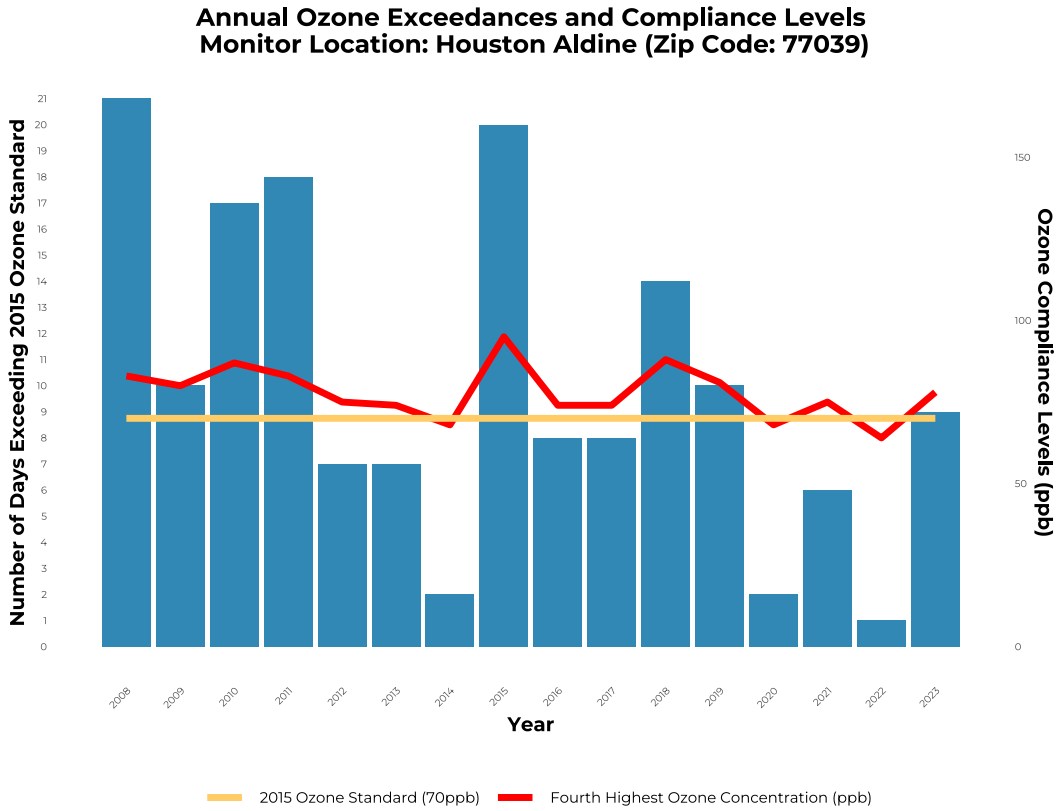


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

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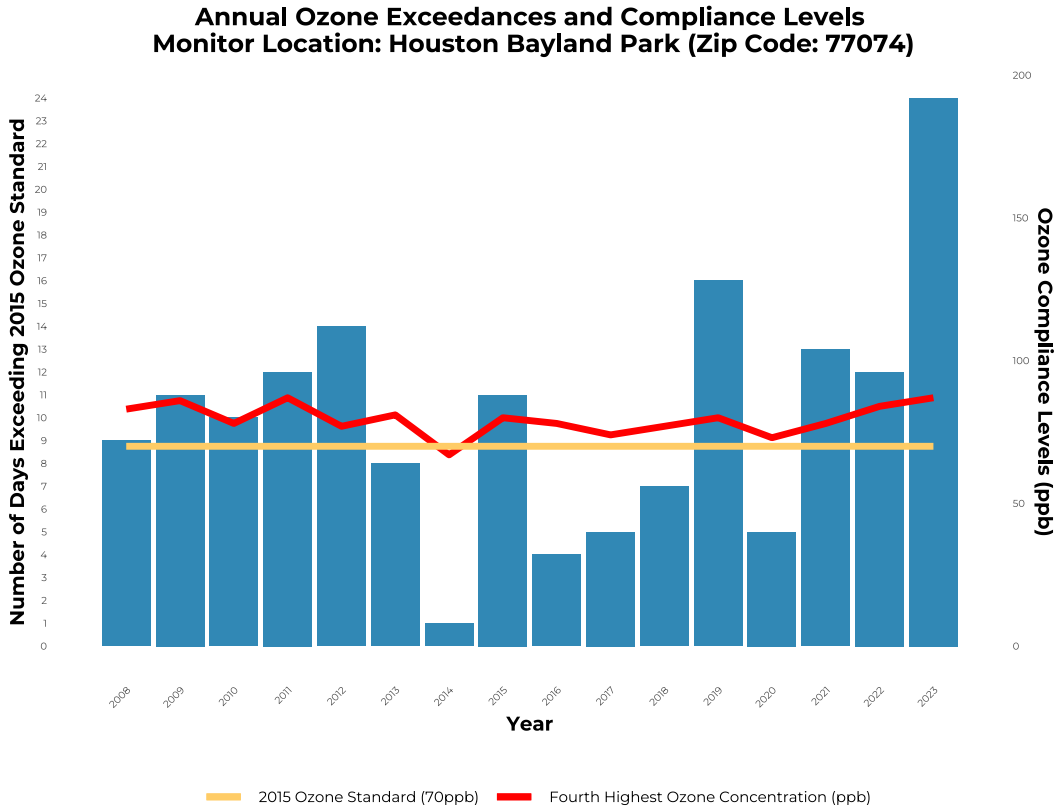
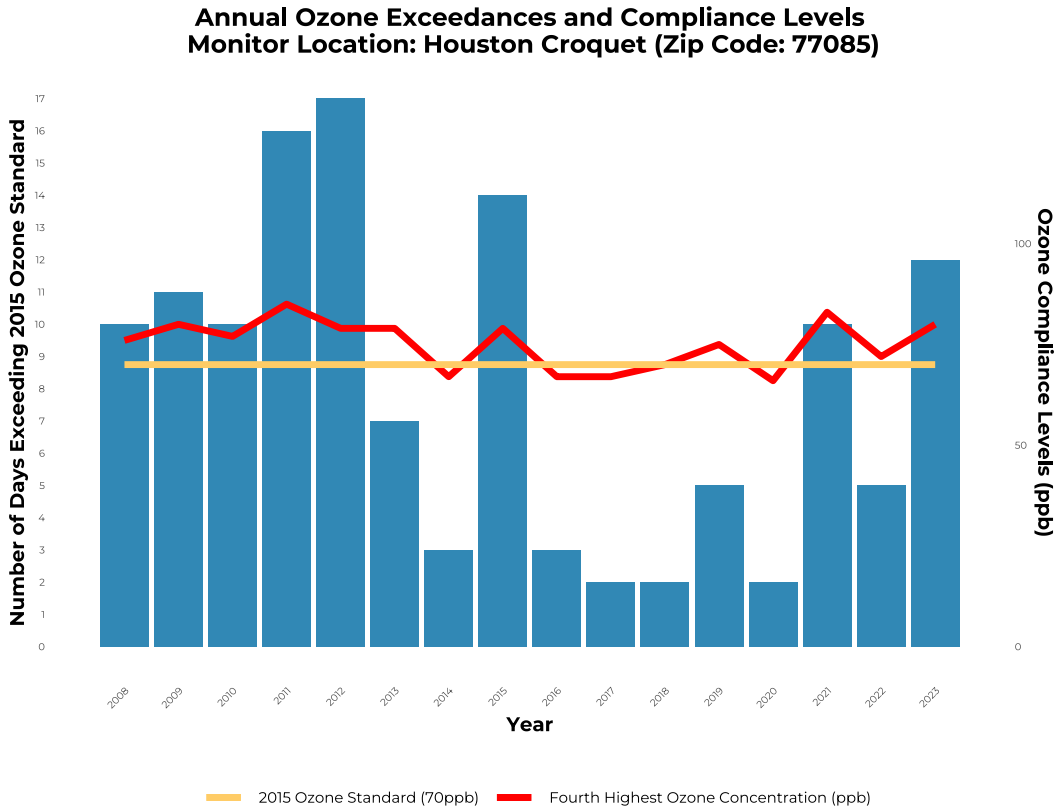


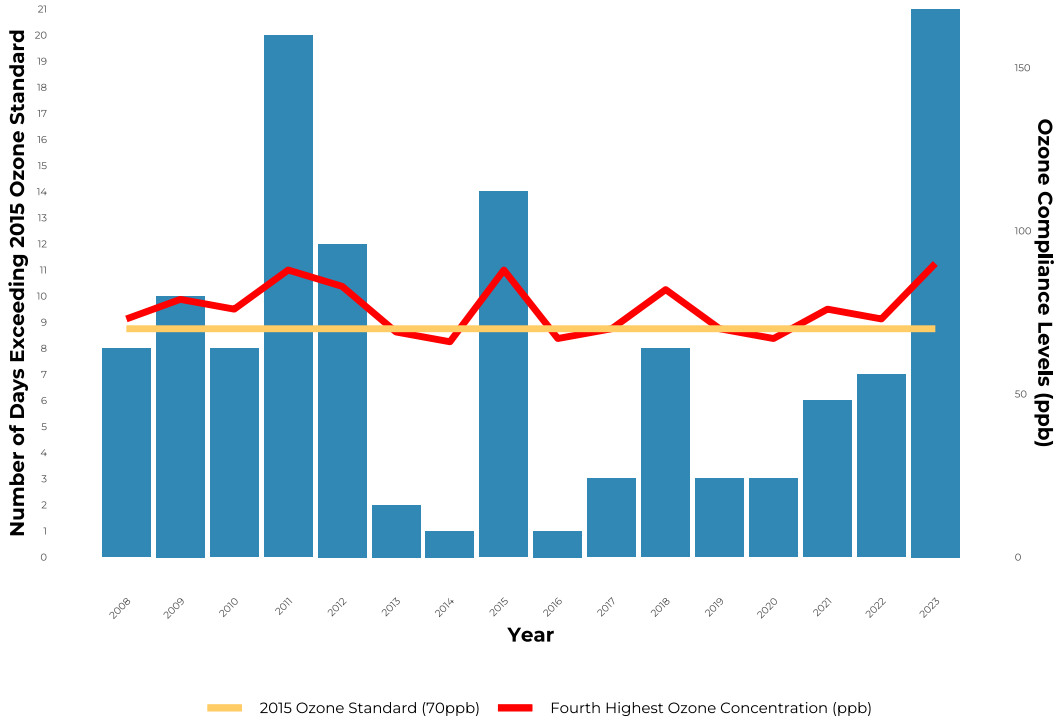
Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

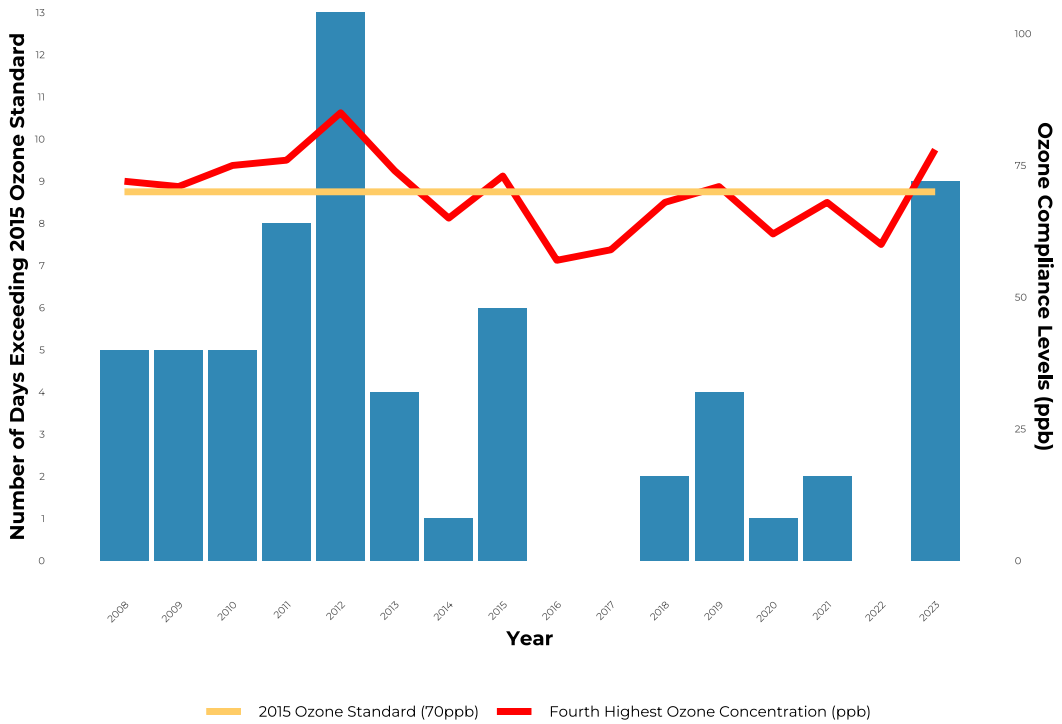
Appendix C

Annual Ozone Exceedances and Compliance Levels
Monitor Location: Houston East (Zip Code: 77015)



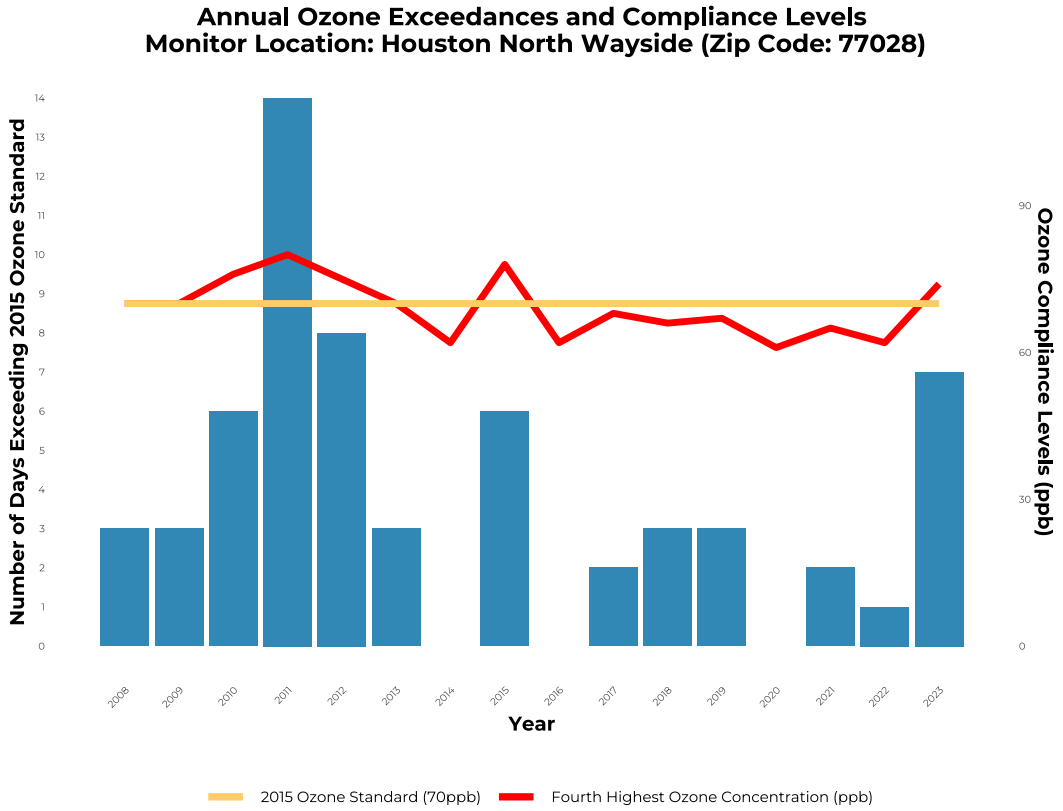
Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

Annual Ozone Exceedances and Compliance Levels
Monitor Location: Houston Monroe (Zip Code: 77075)

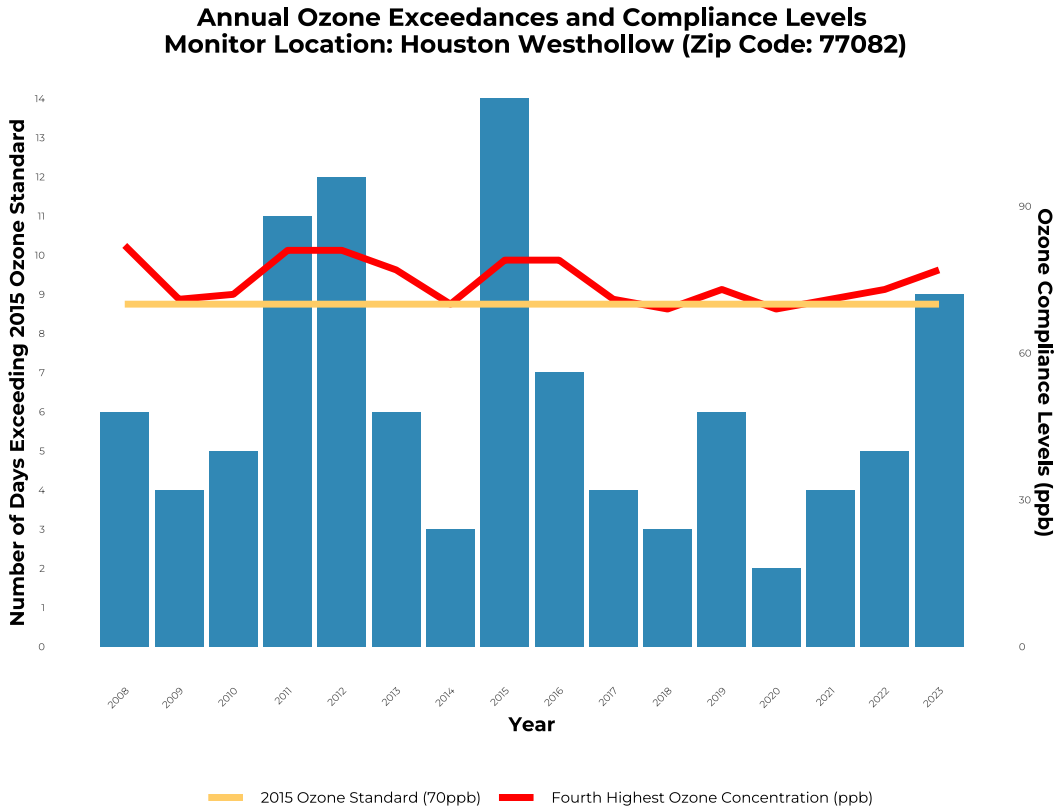


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

Appendix C



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

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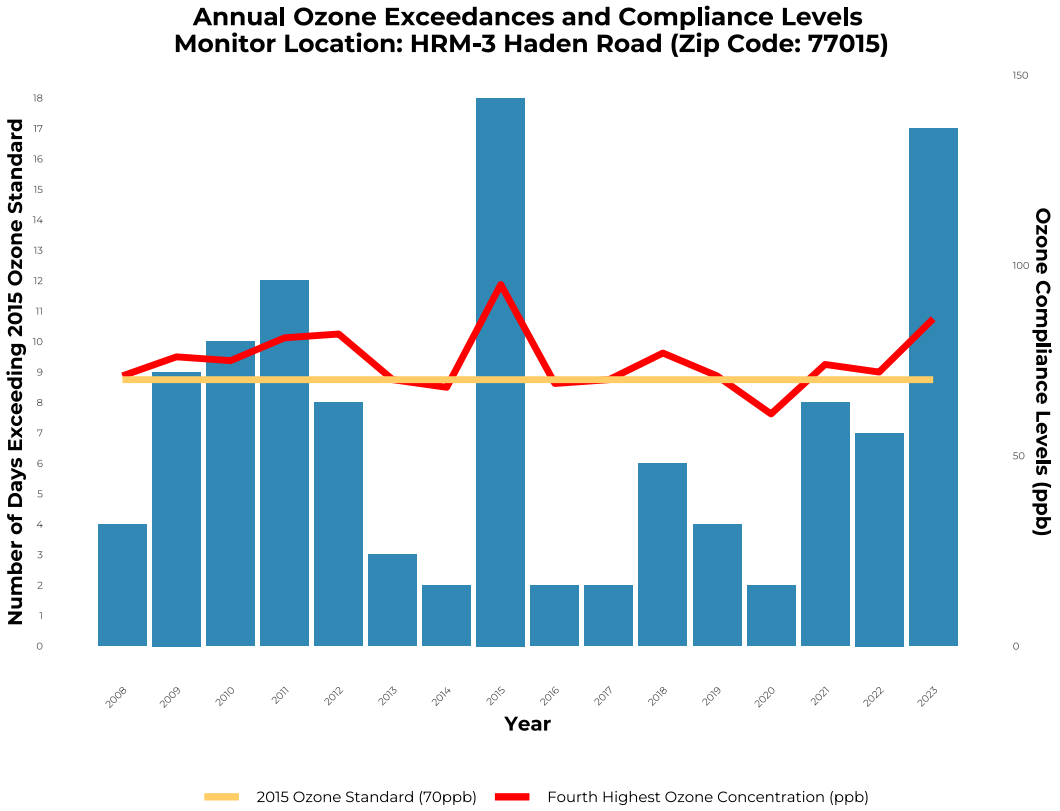
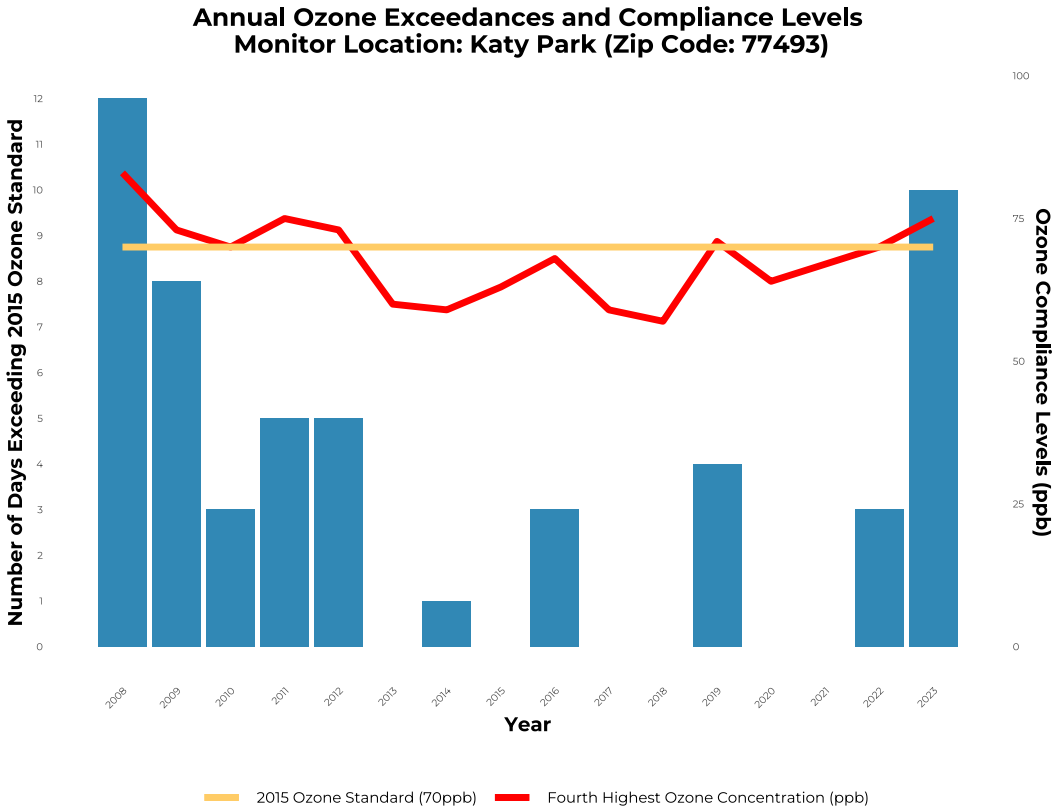


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

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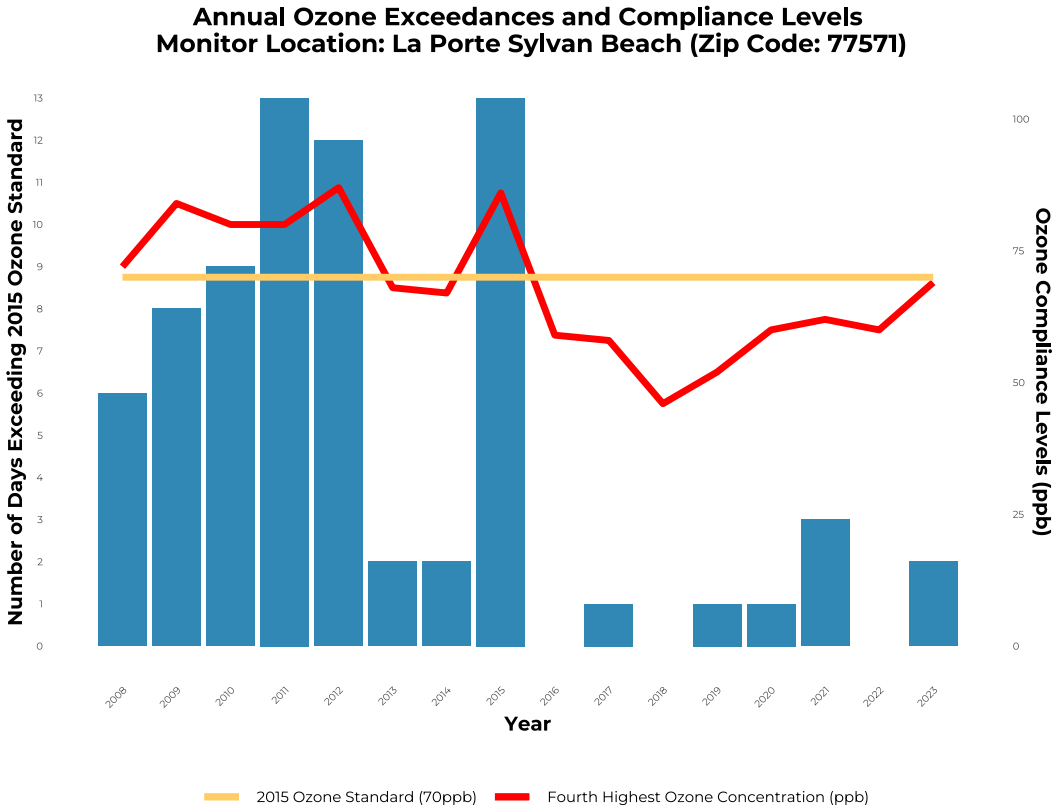
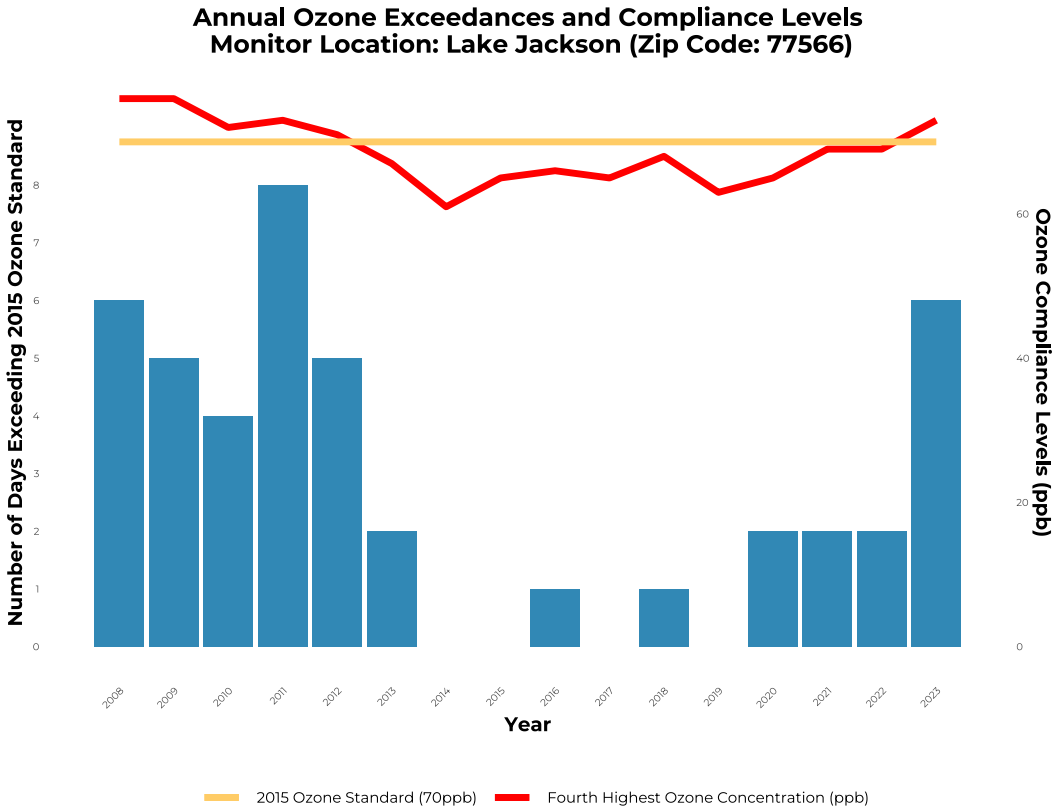


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

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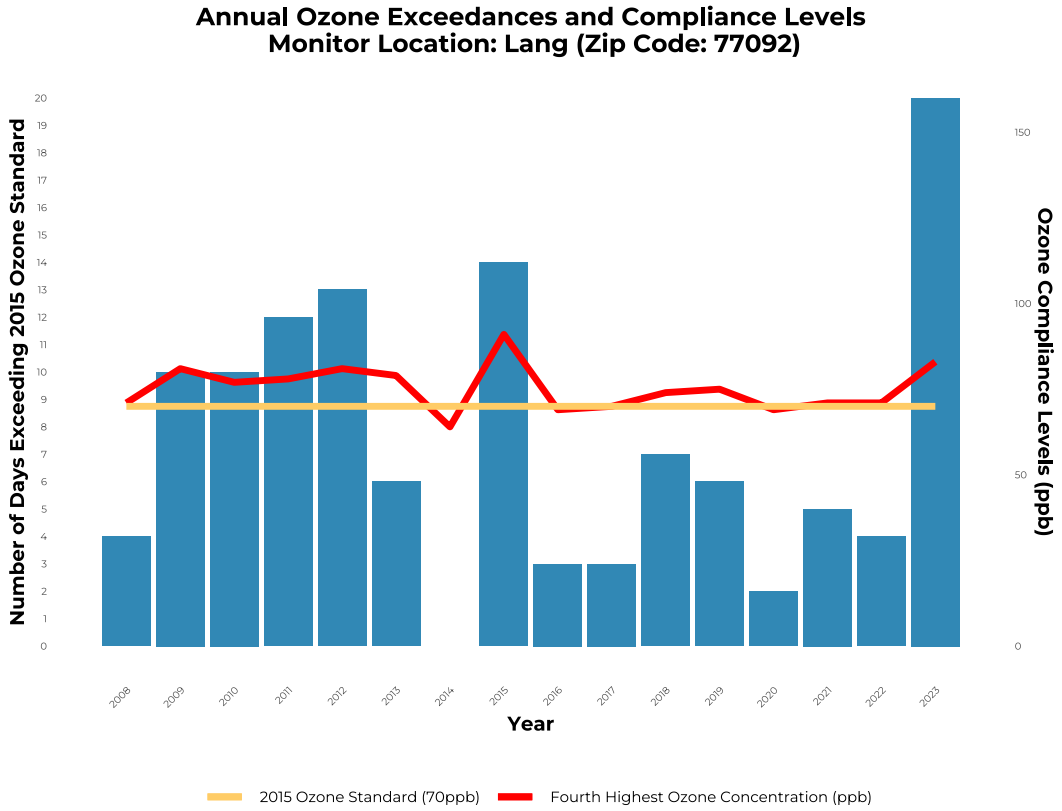
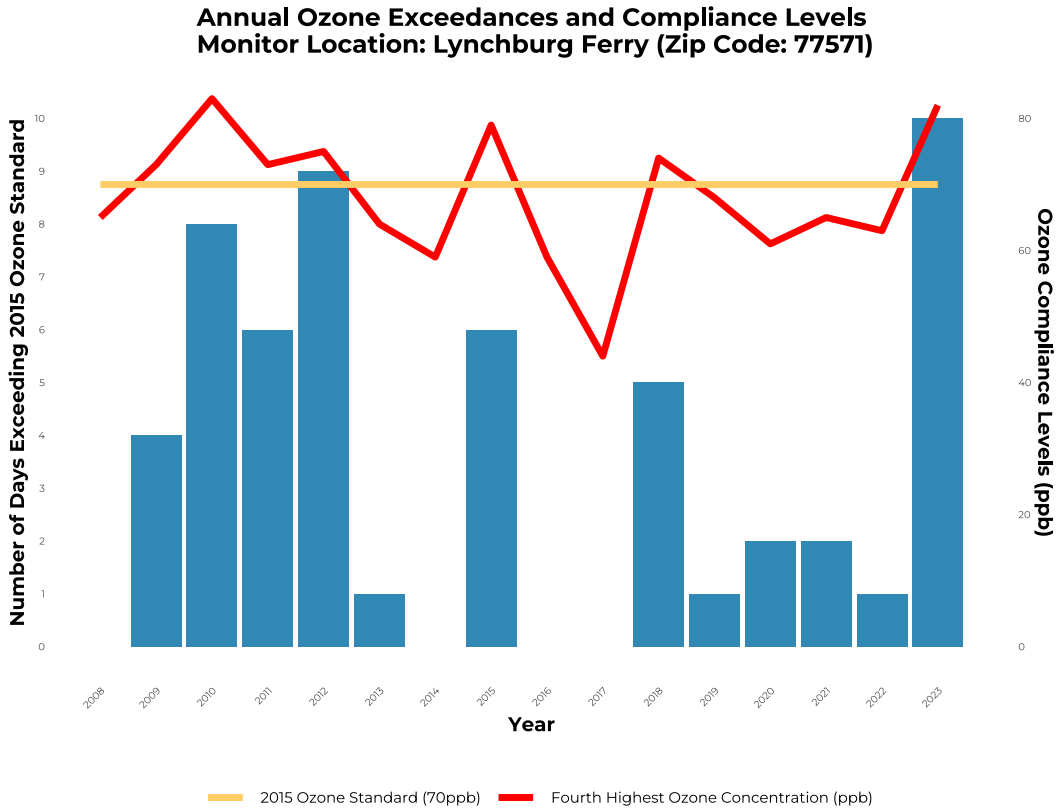


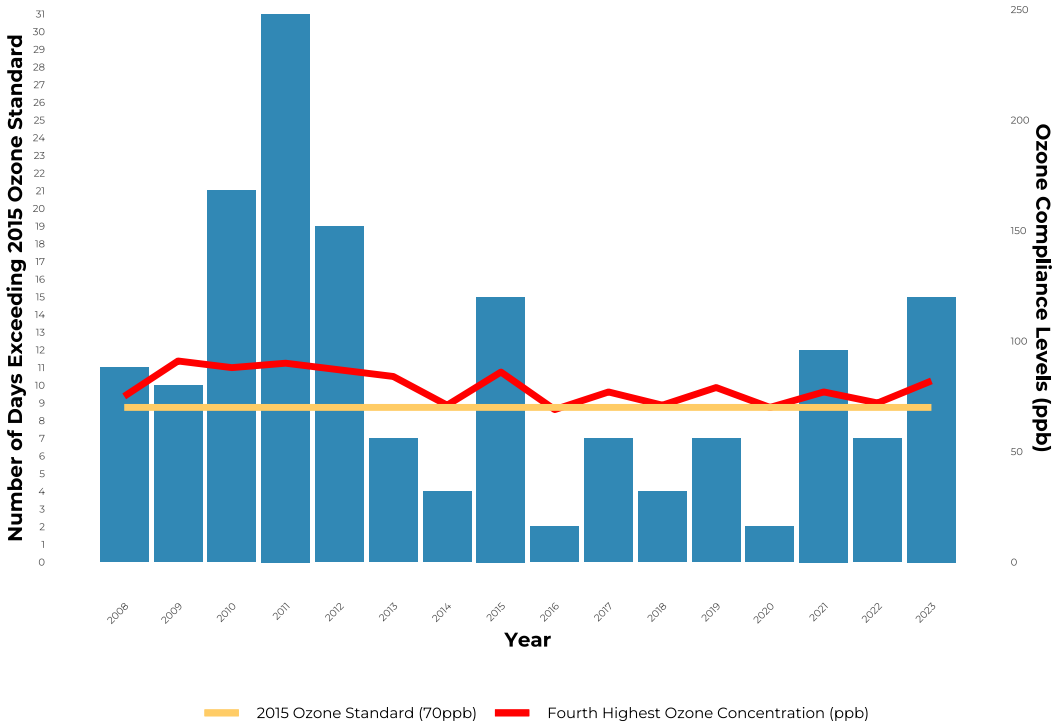
Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

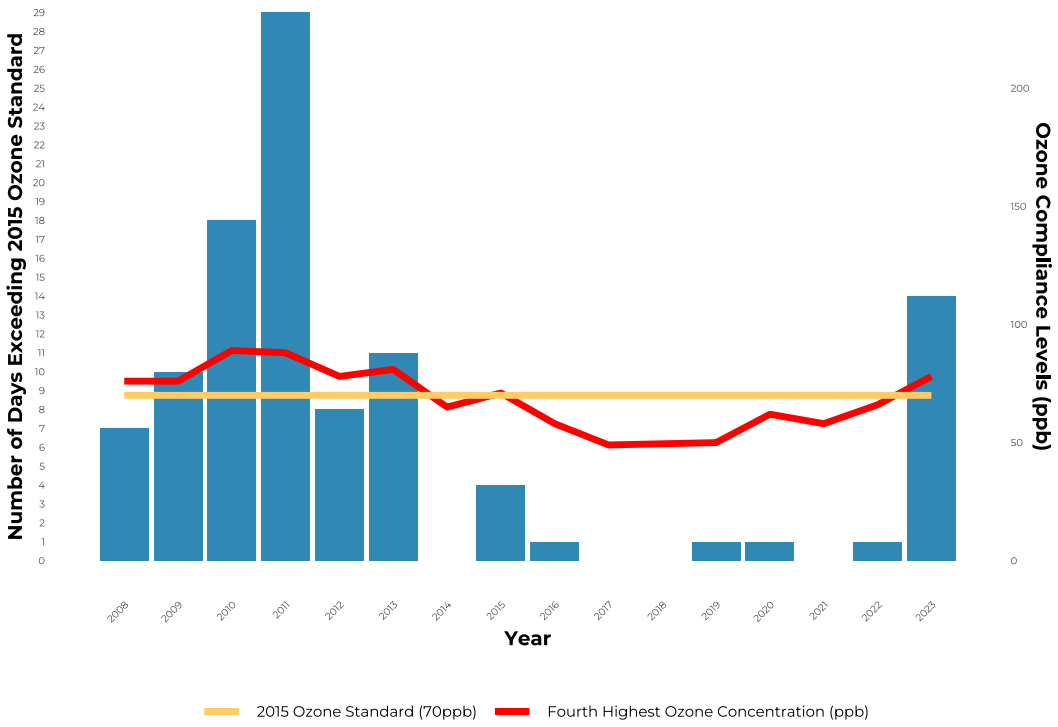
Appendix C

Annual Ozone Exceedances and Compliance Levels
Monitor Location: Manvel Croix Park (Zip Code: 77578)



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

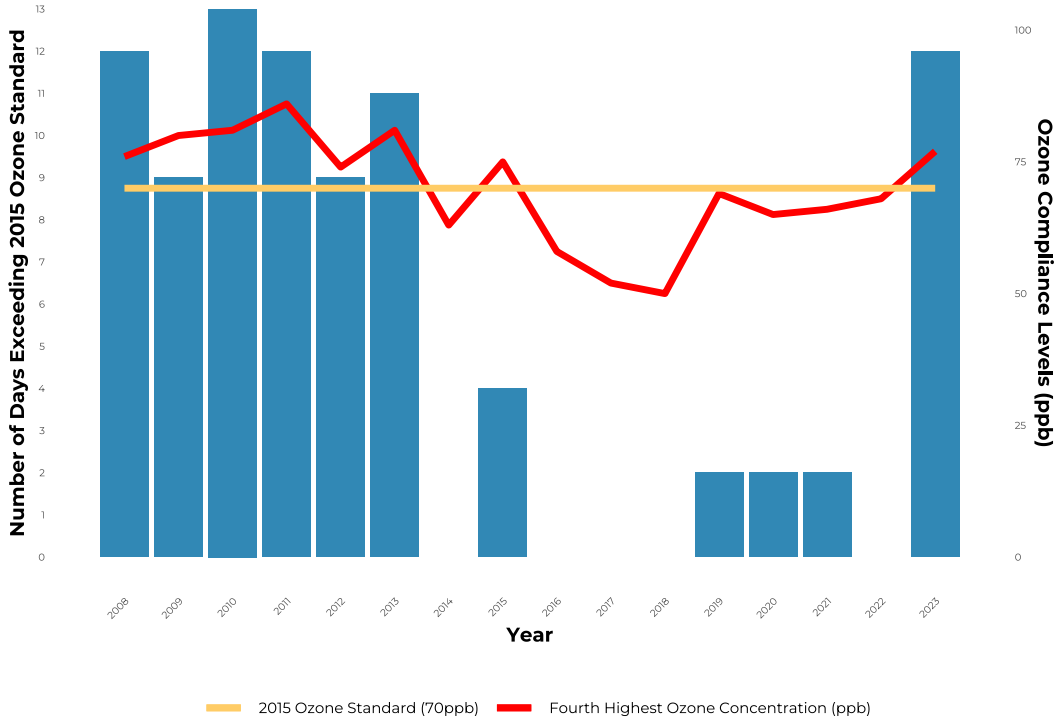
Annual Ozone Exceedances and Compliance Levels
Monitor Location: Mercer Arboretum (Zip Code: 77338)



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

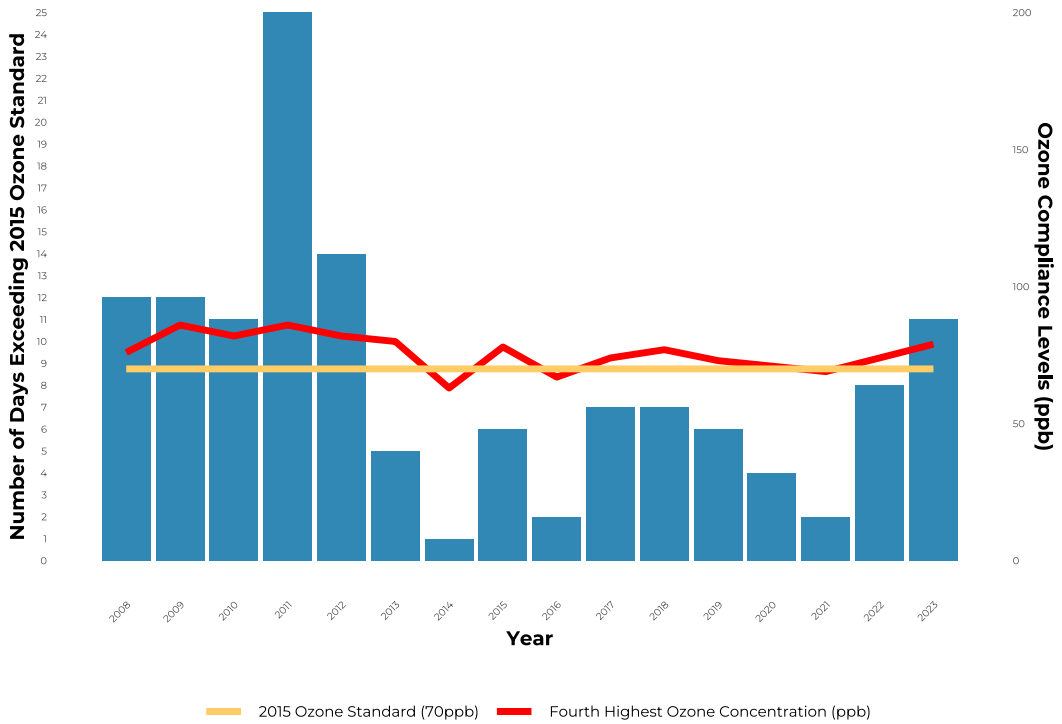
Appendix C

Annual Ozone Exceedances and Compliance Levels
Monitor Location: Meyer Park (Zip Code: 77379)



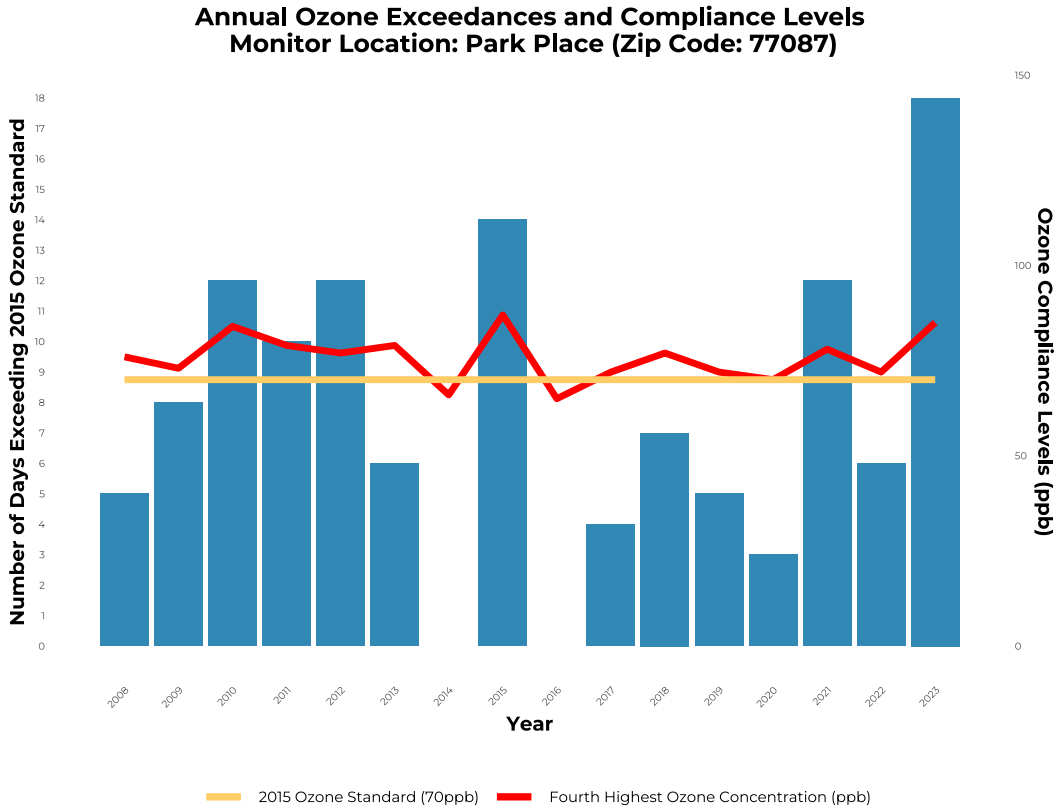
Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

Annual Ozone Exceedances and Compliance Levels
Monitor Location: Northwest Harris Co. (Zip Code: 77429)

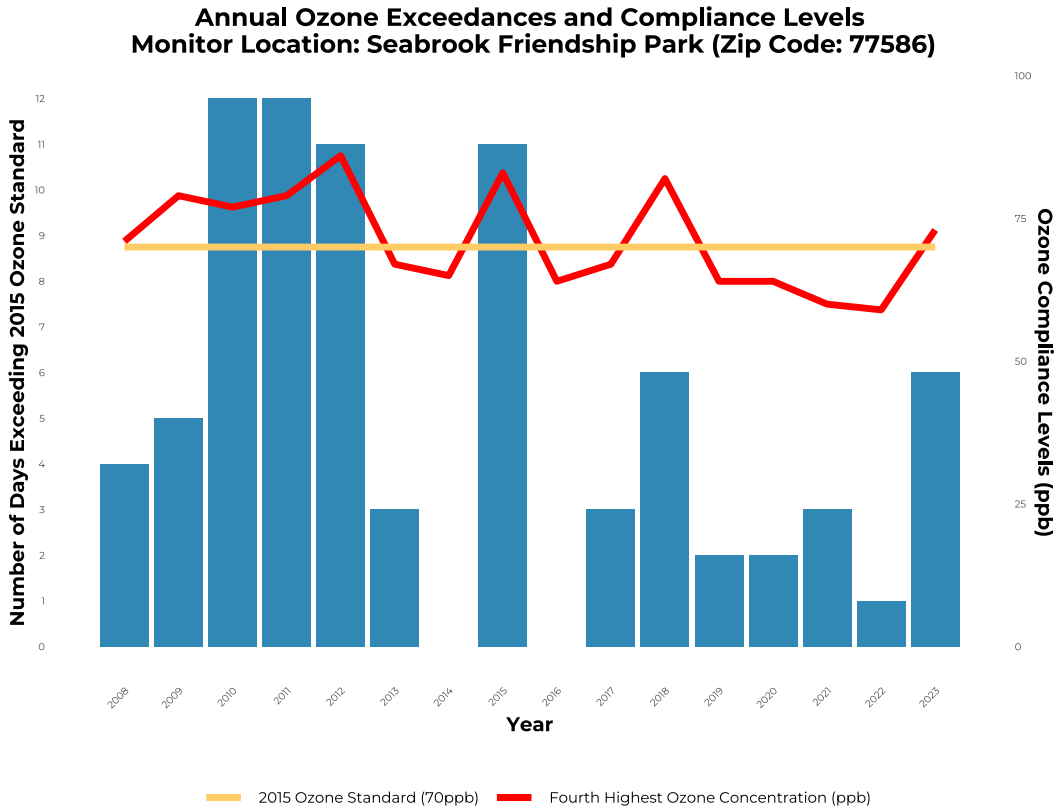


Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

Appendix C



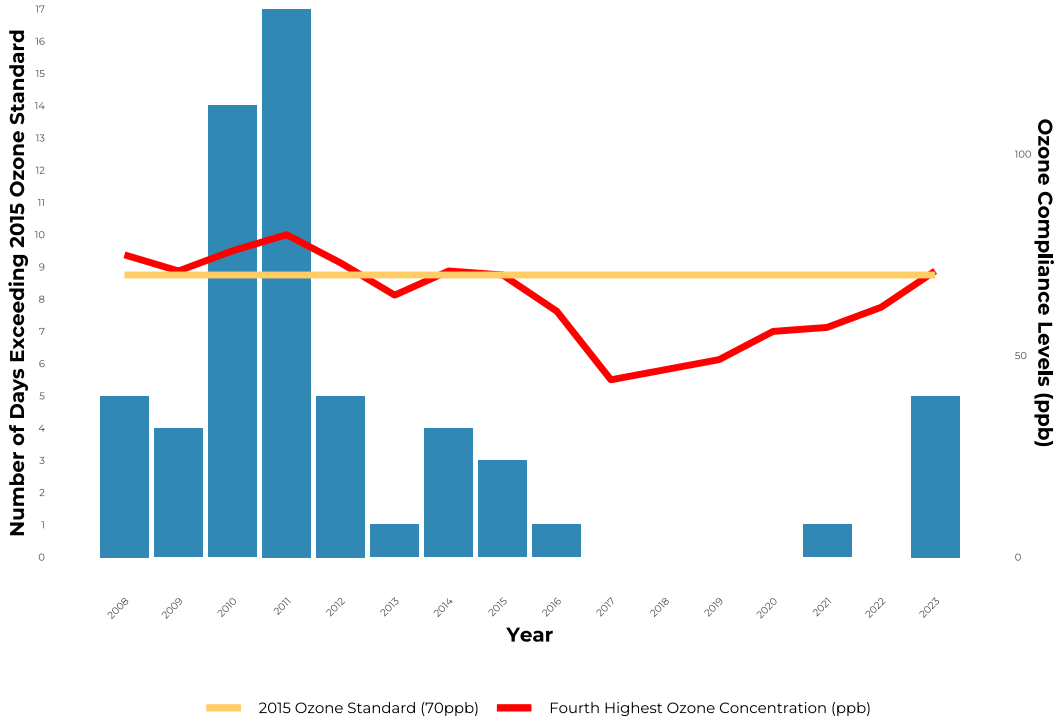
Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

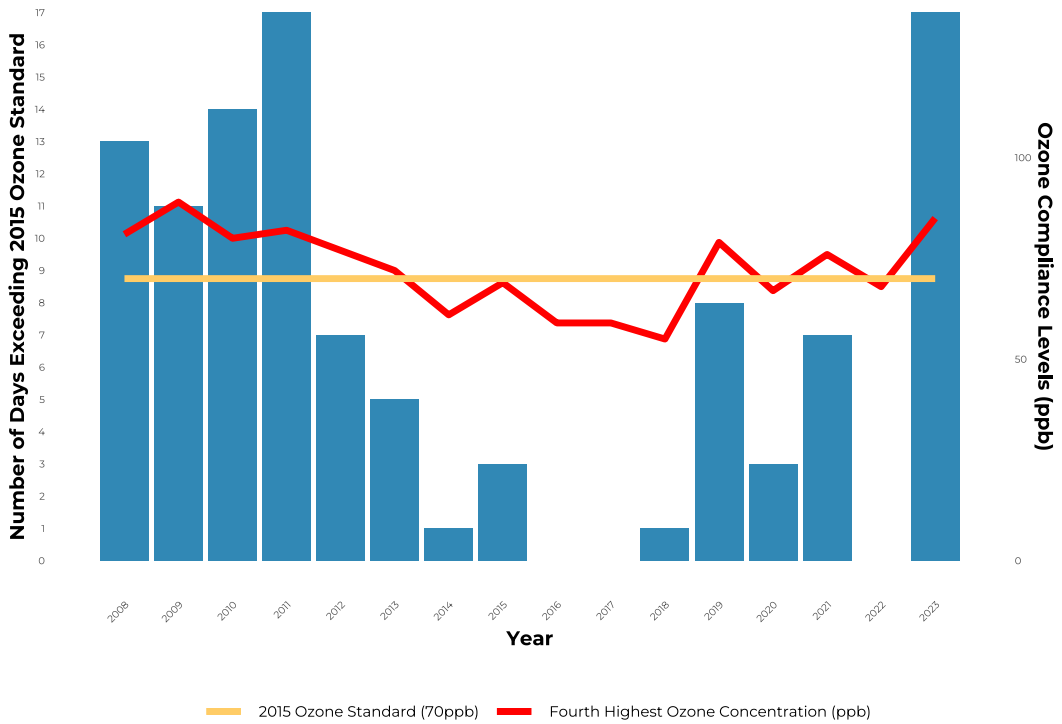
Appendix C

Annual Ozone Exceedances and Compliance Levels
Monitor Location: Sheldon (Zip Code: 77044)



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

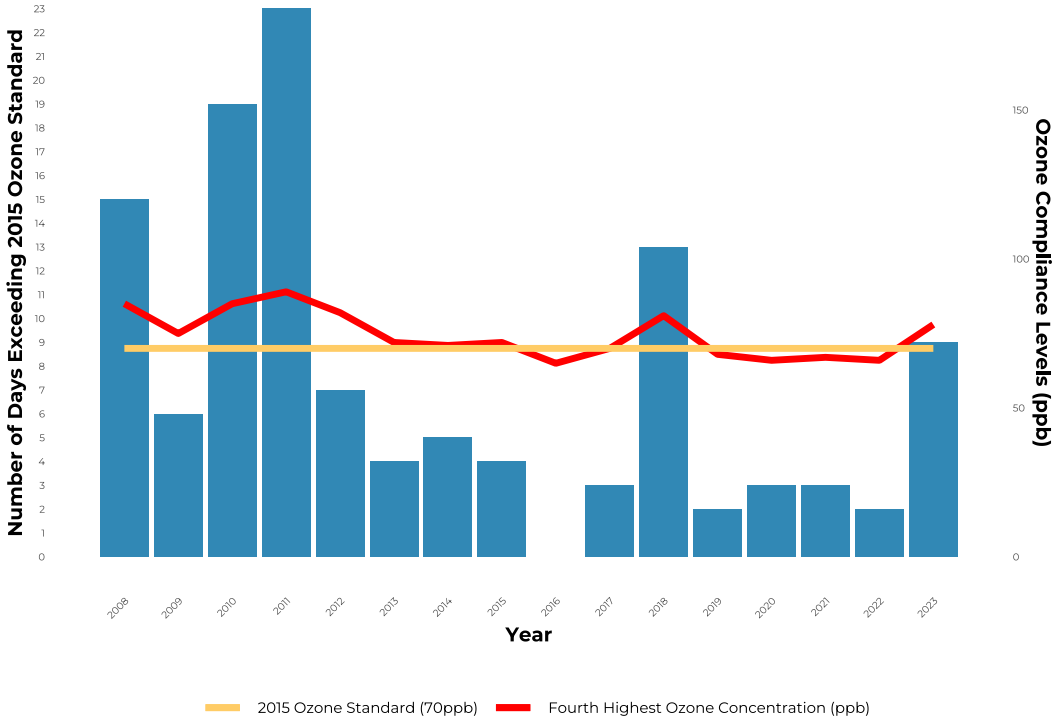
Annual Ozone Exceedances and Compliance Levels
Monitor Location: Tom Bass (Zip Code: 77047)



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

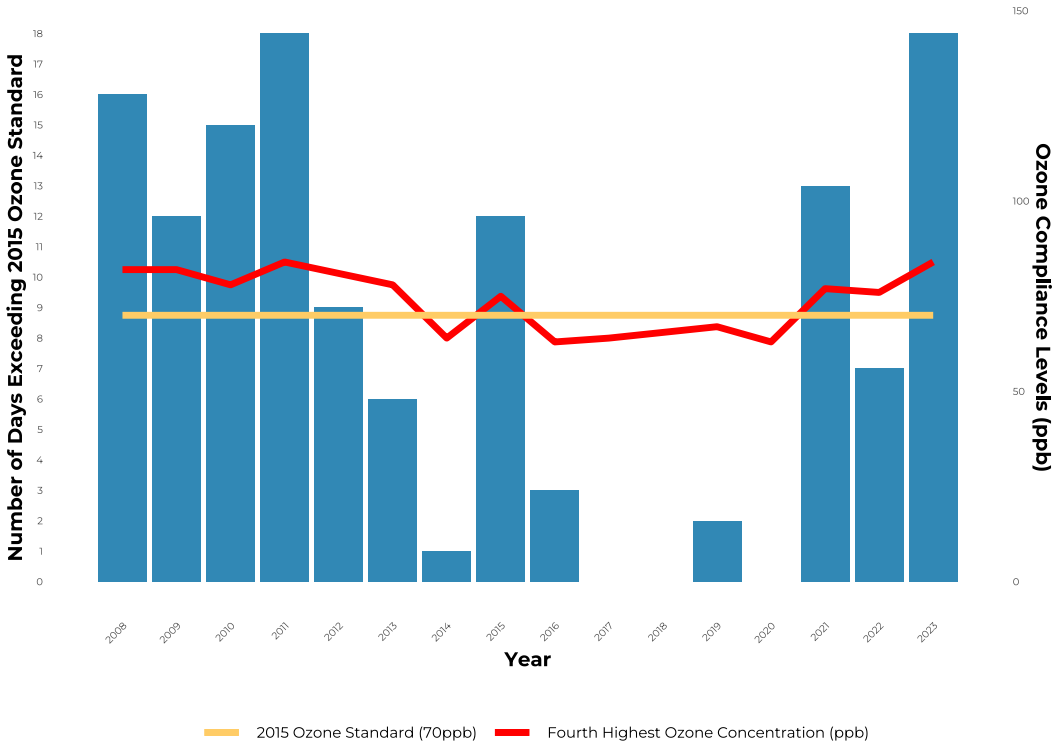
Appendix C

Annual Ozone Exceedances and Compliance Levels
Monitor Location: Wallisville Road (Zip Code: 77521)



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.

Annual Ozone Exceedances and Compliance Levels
Monitor Location: West Houston (Zip Code: 77084)



Compliance with federal ozone standards is determined by calculating the three-year average of the fourth highest daily maximum eight-hour ozone concentration in each year.