MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

FIVE-YEAR ASSESSMENT OF
MAINE'S AMBIENT AIR MONITORING NETWORK

July 1, 2025

Every five years, each state must prepare and submit to the United States Environmental Protection Agency (EPA) an assessment of its monitoring network, which considers the following:

- Whether the network meets required monitoring objectives;
- Whether new sites are needed;
- Whether existing sites are no longer needed and can be terminated; and
- Whether any new technologies are appropriate for incorporation into the ambient air monitoring network.

The assessment must also consider the following:

- The ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma); and
- The effect on data users other than the agency itself for any sites that are being proposed for discontinuation.

Table of Contents

Tables of Figures

Tables of Figures

Executive Summary

The ambient air monitoring network in the State of Maine meets required monitoring objectives as established by the EPA and the Clean Air Act. In evaluating the monitoring network, Maine Department of Environmental Protection (DEP) staff confirmed the ability of existing and proposed monitoring sites to support air quality characterization for the state and affirmed that if any sites were to be slated for discontinuance such action should have minimal or no effect on data users. The consideration criteria as specified in federal monitoring regulations are addressed in the following summary paragraphs for each monitored pollutant. More extensive discussion of Maine's monitoring network for each specified pollutant is contained in the body of this report.

Ozone Monitoring

The ozone monitoring network in Maine covers the most populated regions of the state, and areas that are expected to experience the highest levels of ozone, as well as rural and sparsely populated areas. Many monitoring sites are strategically located throughout the southern and central coastal areas of Maine, one of the most densely populated and fastest growing regions in Maine over the last few decades. Additional ozone monitoring sites located further inland from the southern and coastal sites and including the populous region along the Downeast coastline, helps to establish and determine if there is an attainment/nonattainment boundary inland and better delineate ozone forecasting. The remaining ozone monitoring sites are in rural western and northern areas that have predominately less intense ozone levels.

Maine plans to relocate multiple ozone monitoring sites.

- The Kennebunkport site routinely records the highest ozone values in the state; however, this site has been under threat from coastal storms for many years and relocating this site to a more secure location is considered a priority for the DEP. The DEP has found a suitable replacement location for this site in Wells, Maine, which is anticipated to have similar results as the current site. This location change is expected to take place after the 2025 ozone season.
- Monitoring began at the current Gardiner site in 2020, after moving from its previous location, less than 0.5 miles away. The 2020 move was made necessary by the site host requesting the monitoring shelter be removed. The current site consistently records lower ozone concentrations than nearby sites, while the opposite was true at the previous Gardiner location. The DEP believes this decrease in observed concentrations is due to the southern fetch being more obstructed and has found a location in Augusta with significantly improved fetch.
- The Portland Dearing Oaks site is being moved during the summer of 2025. The current location is being redeveloped into a walking and biking path, and the DEP needs to remove the monitoring equipment. The DEP is working with the City of Portland to relocate this site.

Particulate Matter, Visibility/Speciation Monitoring

Particulate matter (PM) monitors in the state are located primarily in the most densely populated areas, in regions near sources of interest, or in regions where previous exceedances of the standard have occurred. There are no new sites needed to meet the required monitoring objectives.

In 2020, several federal reference method (FRM) samplers for fine particulate matter with a diameter of 2.5 micrometers (μm) or less ($PM_{2.5}$) were shut down at monitoring sites where continuous $PM_{2.5}$ monitors operate. In 2024, additional $PM_{2.5}$ FRM samplers and all FRM samplers for particulate matter with a diameter of 10 μm or less (PM_{10}) were shut down to allow for the reallocation staff time and resources. Since 2023, the DEP has been replacing the network of continuous Met One model 1020 instruments with the Teledyne model T640x instruments.

The DEP takes advantage of low-cost particulate sensors to investigate potential hot spots throughout the state. One example of this is in the Rumford and Mexico area, where the towns are in a deep, complex river valley. Inversions drive the build-up of PM in the valley, and when the inversions break up, these particulates mix into the ground-level air, driving routine moderate air quality days for both towns.

The Portland Dearing Oaks site is being moved during the summer of 2025. The current location is being redeveloped into a walking and biking path, and the DEP needs to remove the monitoring equipment. The DEP is working with the City of Portland to relocate this site. Additionally, DEP is considering moving the current Rumford site. The DEP is studying particulate concentrations in the Rumford/Mexico valley to determine if an alternative location would provide data to support more accurate forecasting for the area, thus providing more protection for public health.

The visibility/speciation monitoring network meets the monitoring requirements for all three Class I areas in and near Maine. There are five IMPROVE monitoring sites in Maine.

Carbon Monoxide Monitoring

Carbon monoxide (CO) is currently monitored at two locations in Maine. Based on the historically low concentrations monitored to date, the only required CO monitor in the state is the monitor in Acadia National Park. The Mi'kmaq tribe operates the other monitor in Presque Isle.

The DEP plans to monitor CO in Portland for a minimum of one year at the new monitoring location to determine if a need for continued monitoring should be conducted. The monitor that is used by the Mi'kmaq tribe is past its expected lifetime and is planned to be retired soon. There currently is no replacement planned or funds available for a replacement monitor. CO monitoring is expected to stop in Presque Isle when that monitor is retired.

The DEP has recently obtained low-cost sensors capable of measuring CO. These sensors may be used to determine if more substantial monitoring is needed in areas where the public has concerns about nearby sources of emissions that are likely to contain CO.

Sulfur Dioxide Monitoring

There are currently two sulfur dioxide (SO_2) monitoring sites in Maine. Of these two sites, only the National Core Multipollutant Network (NCore) site in Acadia National Park is required by the EPA. A site in Portland was operated 2008-2021 to provide data in support of the licensing program. The Mi'kmaq tribe continues to operate an SO_2 monitor in Presque Isle; however, this monitor is past its expected lifetime and is planned to be shut down soon.

The DEP plans to monitor SO_2 in Portland for a minimum of one year at the new monitoring location to determine if a need for continued monitoring should be conducted.

Nitrogen Dioxide and Reactive Oxides of Nitrogen Monitoring

There is currently one site (Portland Deering Oaks) in Maine where monitoring is conducted for nitrogen dioxide (NO_2), Portland Deering Oaks, and one site (Bar Harbor) for reactive oxides of nitrogen (NO_y).

The DEP monitored NO_y at the Cape Elizabeth site until quarter four of 2023. This monitor was significantly past its expected lifetime was shut down when continued operation became increasingly difficult. The Mi'kmaq tribe monitored for NO_2 through early of 2025, when the monitor failed and could not be repaired.

When the DEP relocates the current Portland monitoring site, the new site will include a monitor for NO_2.

The DEP has recently obtained low-cost sensors capable of measuring NO_2. These sensors may be used to determine if more substantial monitoring is needed in areas where the public has concerns about nearby sources of emissions that are likely to contain NO_2.

Lead Monitoring

Maine does not monitor for lead. National monitoring data indicates no lead (Pb) monitoring sites in Maine are necessary. EPA requires lead monitoring only at urban NCore sites, and the Acadia National Park NCore site is designated as a rural site, thus there is no lead monitoring requirement in Maine.

Hazardous Air Pollutants Monitoring

Maine has a network of five sites throughout the state at which sampling for a suite of hazardous air pollutants is conducted for urban scale[1] monitoring. In addition to these sites, Maine also conducts special purpose monitoring at several additional locations throughout the state where local emissions require middle and neighborhood scale monitoring to properly assess public health risks. This ambitious program, constituting a major portion of the ambient air monitoring program, along with the monitoring required in 40 CFR Part 58, *Ambient Air Quality Surveillance*, helps to increase our understanding of total air quality trends in the state. Maine's target pollutants include some of the most prevalent combustion byproducts, such as benzene, toluene, ethylbenzene, and certain xylenes, as well as ozone precursor compounds. Hazardous air pollutant monitoring provides background and baseline data for the pollutants monitored, a means to assess long-range transport from outside Maine and, for sites located upwind of emission sources in the state, assessment of pollution loads from in-state sources.

Atmospheric Deposition Monitoring

Maine operates monitors as part of the National Atmospheric Deposition Program's National Trends Network and the Mercury Deposition Network. While these monitors are not required under 40 CFR Part 58, the monitors within Maine are part of a nationwide program of approximately 250 other identical monitors, all operating with the same quality assurance protocols, geared toward understanding and addressing the national problem of acidic and mercury contamination of managed and natural ecosystems and cultural resources.

[1] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-58/appendix-Appendix%20D%20to%20Part%2058

Regulatory Background

Five-Year Monitoring Assessment

Section 58.10(d) of Title 40 of the Code of Federal Regulations[2] requires each state to prepare and submit to the U.S. Environmental Protection Agency (EPA) an assessment of its ambient air monitoring network once every five years. The current of these five-year assessments is to be submitted to EPA by July 1, 2025. In the five-year assessment, the DEP must determine the following:

- Whether the network meets required monitoring objectives;
- Whether new sites are needed;
- Whether existing sites are no longer needed and can be terminated; and
- Whether any new technologies are appropriate for incorporation into the ambient air monitoring network.

The assessment must also consider the following:

- The ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma); and
- The effect on data users other than the agency itself for any sites that are being proposed for discontinuation.

This document serves as Maine's Five-Year Ambient Air Monitoring Network Assessment. The conclusions of this assessment are that Maine's ambient air monitoring network meets required monitoring objectives, except as noted and explained in the specific sections of this report, no new sites are needed, existing sites shall be maintained, and no new technologies are appropriate for incorporation at this time.

National Ambient Air Quality Standards (NAAQS)

The Clean Air Act (CAA)[3], last amended in 1990, and 40 CFR Part 50, *National Primary and Secondary Ambient Air Quality Standards,* require the EPA to set National Ambient Air Quality Standards (NAAQS)[4] for pollutants considered harmful to public health and the environment. The CAA established two types of national ambient air quality standards: primary standards to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly; and secondary standards to protect public welfare, including protection against decreased visibility and against damage to animals, crops, vegetation, and buildings.

The EPA Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for six principal pollutants, called "criteria" pollutants, as detailed in Table 1. Maine Ambient Air Quality Standards are identical to the NAAQS, as enacted in 38 M.R.S.A.§584-A. Units of measure for the standards are as follows:

µg/m^3 = micrograms per cubic meter of air
mg/m^3 = milligrams per cubic meter of air
ppm = parts per million by volume
ppb = parts per billion by volume

[2] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-58/subpart-B/section-58.10
[3] https://www.epa.gov/clean-air-act-overview/clean-air-act-text
[4] https://www.epa.gov/naaqs

Table 1: US National Ambient Air Quality Standards

Pollutant		Type of Standard	Averaging Time	Standard	Applicable Caveats
Carbon Monoxide (CO)		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		Primary and Secondary	Rolling 3 month average	0.15μg/m^3 (5)	Not to be exceeded
Nitrogen Dioxide (NO_2)		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and Secondary	1 year	53 ppb (6)	Annual Mean
Ozone		Primary and Secondary	8 hour	0.070 ppm (7)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter (PM)	$PM_{2.5}$	Primary	1 year	9.0 μg/m^3	Annual mean, averaged over 3 years
		Secondary	1 year	15.0 μg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24 hours	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24 hours	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1 hour	75 ppb (8)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	1 year	10 ppb	Annual mean, averaged over 3 years

[5] In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m3 as a calendar quarter average) also remain in effect.

[6] The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

[7] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards

[8] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

Maine's Monitoring Network: Background and Overview

The Maine Department of Environmental Protection (DEP), in conjunction with Maine tribes operates a network of air monitoring sites that measure ambient concentrations of specific pollutants for which the EPA has established National Ambient Air Quality Standards (NAAQS). Those pollutants include ozone (O_3), particulate matter smaller than 10 microns (PM_{10}), fine particulate matter smaller than 2.5 microns ($PM_{2.5}$), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and lead (Pb). The criteria pollutant monitoring sites are part of the EPA's State or Local Air Monitoring Sites (SLAMS) network.

The majority of Maine's air monitoring sites are located in or near Maine's population centers, primarily along the coast in the south and south-central region of the state. Maine's northeast location in the continental United States and the prevailing air flow pattern make Maine particularly vulnerable to pollution generated elsewhere along the eastern U.S. seaboard, central U.S., and eastern Canada. Many pollutants, including ozone and its precursors, air toxics, heavy metals, and particulates, which include sulfates, nitrates, and organic compounds, are being transported into Maine's ambient air from upwind emissions sources. The following paragraphs describe specific public health and welfare concerns pertaining to specific monitored pollutants.

Ozone and Ozone Precursor Pollutants

Motor vehicle exhaust, industrial emissions, gasoline vapors, chemical solvents, and natural sources emit nitrogen oxides (NO_x) and volatile organic compounds (VOC) that contribute to ozone formation. Ground-level ozone has been associated with a variety of health problems including chest pain, coughing, and congestion, and the exacerbation of symptoms of bronchitis, emphysema, and asthma. Inhalation of ground-level ozone also can reduce lung function, inflame the linings of the lungs, and may permanently scar lung tissue.

Particle Pollution

Particle pollution, especially the fine particles ($PM_{2.5}$), has been linked to a variety of ailments including irritation of respiratory airways, coughing, or difficulty breathing; decreased lung function; aggravated asthma; development of chronic bronchitis; irregular heartbeat; and nonfatal heart attacks.

Fine particle pollution (sulfates, organic matter, nitrates, elemental carbon, and soil dust) is the primary cause of reduced visibility (haze) in scenic areas such as national parks and wilderness areas and of regional haze (visibility degradation). Particle pollution can also stain and damage stone and other materials, including culturally important objects such as statues and monuments.

Particles can be carried over long distances by wind and then settle on ground or water. Effects of this settling include the following: increasing the acidity of lakes and streams; changing the nutrient balance in coastal waters and large river basins; depleting nutrients in soil; damaging sensitive forests and farm crops; and affecting the diversity of ecosystems.

Carbon Monoxide

Carbon monoxide (CO) is a colorless and odorless gas that is a byproduct of incomplete combustion of carbon-based fuels. When inhaled, CO reacts with hemoglobin in the blood, preventing uptake and transportation of oxygen. Most health effects directly associated with CO are likely due to decreases in oxygen delivery to vital organs such as the heart and brain. People

with cardiovascular disease, such as angina, and people with asthma, emphysema, and other lung diseases that limit efficient use of inhaled oxygen may be especially sensitive to the effects of CO inhalation.[9]

Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, irritating gas. It is emitted mainly from stationary sources that utilize fossil fuels (e.g., coal and oil) such as power plants, ore smelters, and refineries. SO2 is linked to acid deposition. SO_2 is severely irritating to the eyes, mucous membranes, skin, and respiratory tract, and it can trigger bronchospasms, pulmonary edemas, pneumonitis, and acute airway obstruction. Inhalation at very low concentrations can aggravate chronic pulmonary diseases. Respiratory irritation from SO_2 can induce symptoms such as sneezing, sore throat, wheezing, shortness of breath, chest tightness, and a feeling of suffocation.[10]

Nitrogen Dioxide

Nitrogen dioxide (NO_2) can irritate the lungs and lower resistance to respiratory infections such as influenza. Continued or frequent exposure to high NO_2 concentrations is associated with increased incidences of acute respiratory illness in children. NO_2 has also been identified as contributing to ozone formation and to the formation of acid rain.[11]

Lead

Once taken into the body via inhalation or ingestion, lead distributes throughout the body and accumulates in the bones. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems, and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. Lead effects most commonly encountered are neurological effects in children and cardiovascular effects in adults.[12]

In addition, to better understand potential public health and welfare impacts from airborne pollutants, the DEP, Maine tribes, and the EPA monitor ambient levels in Maine of toxic air pollutants and of ozone precursors (substances that react in the atmosphere to form ground-level ozone) and conduct atmospheric deposition monitoring of mercury and ions contributing to acidic precipitation. Each of these is discussed in more detail in this report.

[9] https://www.epa.gov/sites/default/files/2020-07/documents/co-rea-amended-july2010.pdf
[10] https://www.epa.gov/sites/default/files/2018-05/documents/primary_so2_naaqs_-_final_rea_-_may_2018.pdf
[11] https://www.epa.gov/sites/default/files/2020-07/documents/20150504reaplanning.pdf
[12] https://ordspub.epa.gov/ords/eims/eimscomm.getfile?p_download_id=548355

Maine Specific Health Impact Evaluations

Federal regulation 40 CFR §58.20(d) specifies that five-year assessments must include an evaluation of whether changes in the distribution of population within the state warrant changes in the location of population-oriented monitoring sites. Figure 1 illustrates Maine population changes based on U.S. census records from 2010 and 2020, with project populations for 2025 onward conducted by the state. The populations of York, Cumberland, and Waldo counties in southern Maine have realized growth, with a projected gain of 10.7%, 8.1%, and 5.3% respectively between 2010 and 2025. The Aroostook and Piscataquis County populations show a fair decline, projected at -7.3% and -6.3% respectively between 2010 and 2025. The populations of the remaining counties in Maine have projected changes between -5% and 5%. Overall, the state is projected to have a 3.5% increase in population from 2010 to 2025, with a projected gain of over 46,000 residents. Maine population is projected to continue growing over the next 10 years, mostly in the southern Maine counties.

Those who are age 19 and younger as well as those who are age 65 and older are considered more sensitive to air pollution, and the Maine population for these two age groups trend differently than overall population trends, as depicted in Figure **2** and Figure **3**. Maine's population of residents age 19 and younger has decreased, a trend expected to continue at similar rates into the future. The state's population of those age 65 and older has been steadily increasing, and this rate of change is projected to increase as the present population ages and more retirees choose to live in Maine.

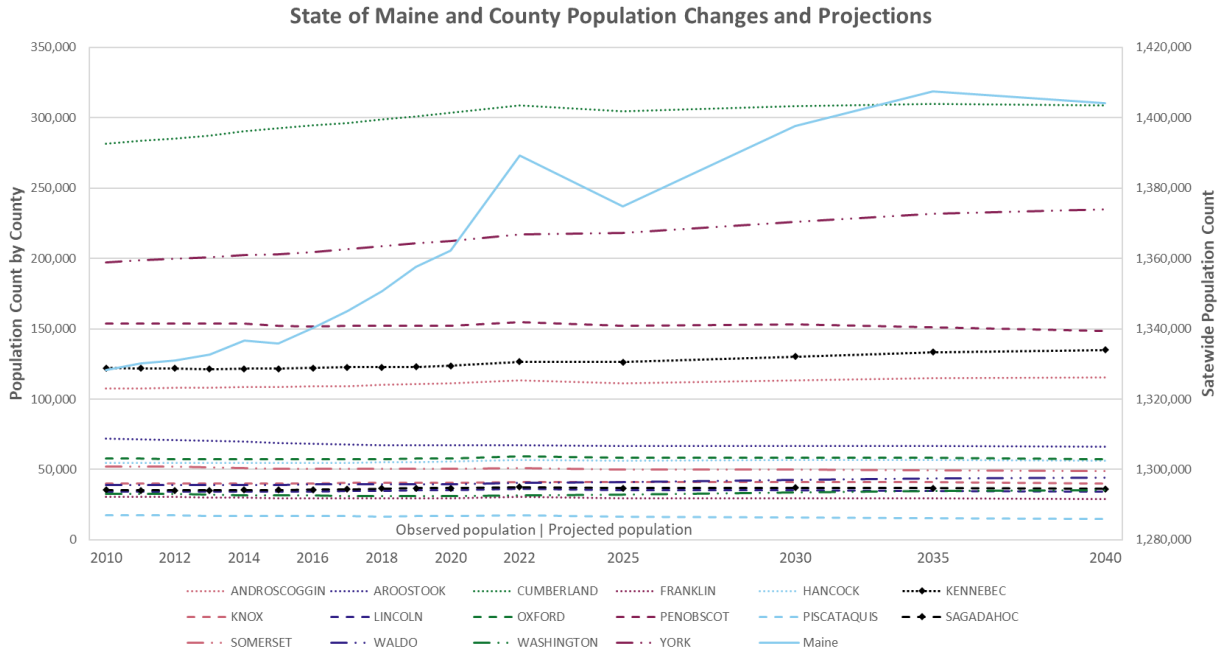

Figure 1: Maine state and county populations and projections

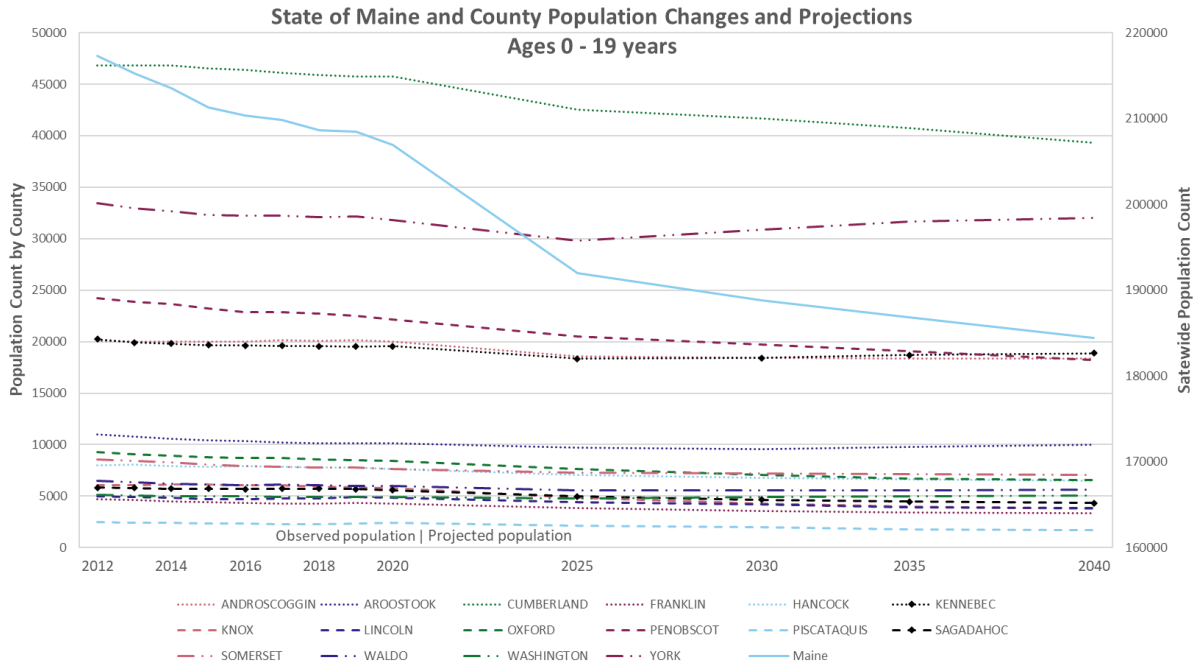

Figure 2: Maine state and county populations and projections, ages 19 and younger

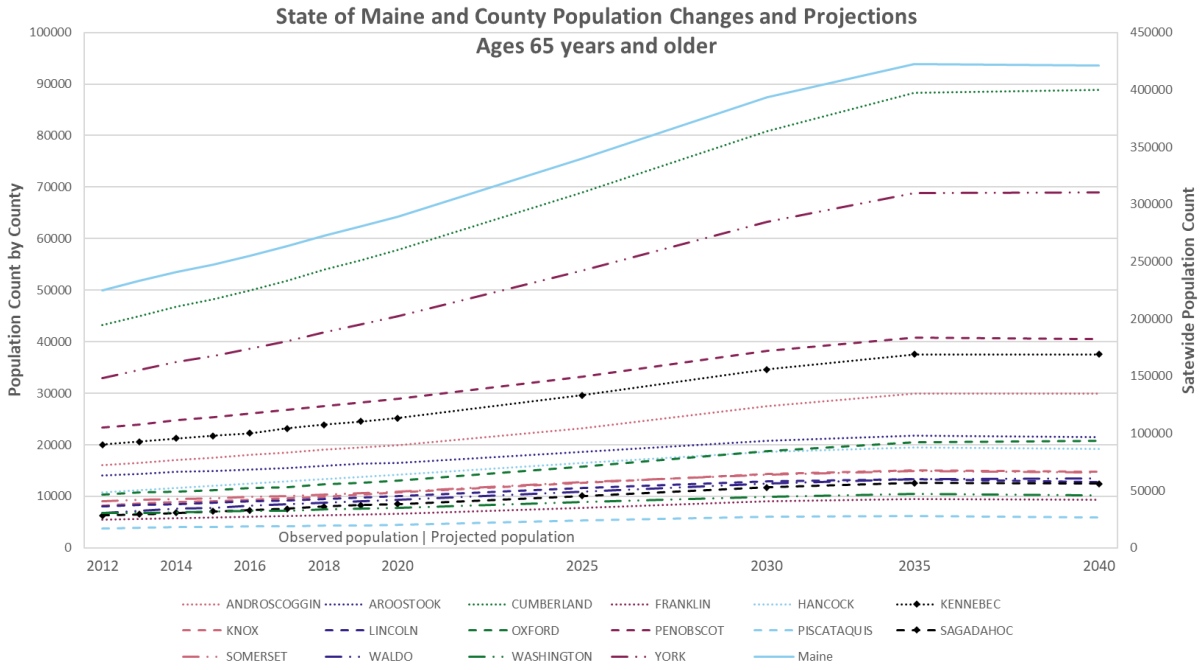

Figure 3: Maine state and county populations and projections, ages 65 and older

Health data was analyzed to identify areas in the state with higher concentrations of sensitive populations, recognized by higher-than-average percentages of children with asthma, incidence of heart attacks, and infants born with low birth weights. These conclusions were then used to

evaluate whether the state's ambient air monitoring network adequately characterizes air quality in these areas.

Asthma

According to the U.S. Center for Disease Control (US CDC), Maine has some of the highest rates of asthma. Approximately 12.5% of Maine adults have asthma, compared to 7.7% of adults in the U.S. with asthma.[13] The percentage of Maine children with asthma (8.5%) is similar to the percentage among U.S. children (8.4%).[14] Asthma-related visits to emergency departments vary throughout the state, with an age adjusted rate of 43 visits per 10,000 people in Somerset County compared to a low of 16 in Cumberland County.[15]

Asthma, a chronic inflammatory disease of the airways, can be aggravated by exposures to certain substances such as microbes, allergens, airborne particle pollution, and ozone. The network of ozone and particulate monitors in Maine informs accurate forecasts of air quality and is important to maintain so that those with asthma are alerted when high levels of ozone and/or particulates are forecast and know how to limit their activity during these periods.

Heart Disease

Heart disease is the leading cause of death in the United States, and second only to cancer, is one of the leading causes of death in Maine.[16] According to the American Heart Association, worldwide epidemiological studies have demonstrated consistent associations between short-term elevations in PM and increases in daily cardiovascular morbidity and mortality, particularly within certain at-risk subsets of the population. Studies have also reported adverse cardiovascular outcomes in relation to long-term PM exposure, even after adjustment for a variety of individual-level risk factors such as tobacco smoking (including exposure to second hand smoke), gender, body mass index, educational attainment, occupational exposures, hypertension, and diabetes.[17] In Maine, the counties of Aroostook, Piscataquis, Somerset, and Washington have higher rates of heart attacks than other Maine counties.[18]

Low Birth Weights

A body of evidence is emerging from several countries on the adverse consequences of ambient air pollution on fetal/birth outcomes, including pre-term birth and fetal growth restriction.[19] The low birth weight rates in Maine is the third lowest in New England, and that is lower than the national average. Many other factors also influence birth weights, so establishing any link between low birth weights and air pollution in Maine may be very difficult.

---

[13] Most Recent Asthma Data. (2021). National Center for Environmental Health. https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm

[14] Maine Asthma Prevention and Control Program - Asthma Burden in Maine 2006 - 2010 https://www.maine.gov/dhhs/mecdc/population-health/mat/documents/MaineAsthmaBurden_03-30-2018.pdf

[15] Maine Health Tracking data portal: https://data.mainepublichealth.gov/tracking/home

[16] http://www.medicalnewstoday.com/articles/282929.php

[17] Air Pollution and Cardiovascular Disease. (2015). AHA Scientific Statement from the American Heart Association, Inc. http://circ.ahajournals.org/content/109/21/2655.full#content-block

[18] Maine Health Tracking data portal: https://data.mainepublichealth.gov/tracking/home

[19] DQ Rich, et al, 2009, "Ambient air pollutant concentrations during pregnancy and the risk of fetal growth restriction," Journal of Epidemiology and Community Health, Vol. 63, pp. 488-496

Table 2 presents a collection of at-risk population statistics, by county. Analysis of Maine's population information shows that monitors in the state's monitoring network are located appropriately, and further changes in the location of monitors are not warranted at this time.

Table 2: Maine At-Risk Population Statistics by County

	Asthma ED Visits (Age-adjusted rate per 10,000) [1]	Asthma Hospitalizations (per 10,000) [1]	Myocardial Infraction Hospitalizations (Age-adjusted per 10,000) [1]	Low Birth Weight Rate (Percent)[2]	Count of 0-19 Year Olds [3]	Percent of 0-19 Year Olds [3]	Count of 65+ Year Olds [3]	Percent of 65+ Year Olds [3]
Androscoggin	39.1	2.0	21.6	8.0	19987	18.0%	19902	17.9%
Aroostook	32.1	3.0	26.5	6.7	10116	15.1%	16555	24.7%
Cumberland	16.0	0.8	15.1	5.1	45770	15.1%	57775	19.0%
Franklin	27.2	3.7	19.5	8.3	4261	14.5%	6689	22.7%
Hancock	16.4	1.1	26.6	5.7	7617	13.7%	14259	25.7%
Kennebec	23.1	1.1	25.4	7.2	19548	15.8%	25148	20.3%
Knox	18.1	1.8	13.3	4.5	5774	14.2%	10721	26.4%
Lincoln	23.2	0.9	18.1	6.4	4879	13.9%	10052	28.6%
Oxford	36.0	1.5	19.9	7.0	8450	14.6%	12999	22.5%
Penobscot	17.5	1.8	26.2	6.2	22156	14.6%	28882	19.0%
Piscataquis	34.2	NR[4]	30.1	8.8	2384	14.2%	4471	26.7%
Sagadahoc	22.0	0.6	19.0	5.3	5588	15.2%	8494	23.2%
Somerset	43.4	1.2	27.9	7.0	7609	15.1%	10965	21.8%
Waldo	18.8	1.3	21.5	7.7	5998	15.1%	9298	23.5%
Washington	29.0	NR[4]	42.1	5.5	4953	15.9%	7757	25.0%
York	16.5	1.5	14.1	4.7	31835	15.0%	44887	21.2%
Maine	22.5	1.4	20.8	6.1	206925	15.2%	288854	21.2%
New England				5.3 - 6.5				

1: Maine Asthma and Myocardial Infractions data (https://data.mainepublichealth.gov/tracking/home) [2020]
2: Low Birth Weight (https://ephtracking.cdc.gov/) [2021] as percent of <2,500grams of live singleton births
3: Maine Population demographics (https://www.maine.gov/dafs/economist/demographic-projections) [2020]
4: Data is 'Not Reported' per the Maine CDC Privacy Policy.

Maine's Criteria Pollutants Monitoring Network Evaluation

The following sections present the evaluation of these considerations, by pollutant:

- The current monitoring network;
- The NAAQS and a comparison of recent measurements with the NAAQS;
- Trends in pollutant levels measured;
- Whether the network meets the EPA's monitoring criteria;
- Whether new sites are needed;
- Whether any existing sites are no longer needed;
- Whether new monitoring technologies are available that should be adopted;
- Whether the current network adequately characterizes air quality in Maine; and
- Plans for modification of the network in the future.

Ozone (O_3) and Enhanced Monitoring Plan (EMP) Network

Ozone (O_3), a gas at ambient conditions, is considered either "good" or "bad" depending on its location in the atmosphere. "Good" ozone is found in the stratosphere approximately 10 to 30 miles above the earth's surface in a layer where the presence of ozone serves to protect the earth from the sun's harmful ultraviolet rays. Ground-level ozone has detrimental effects both on human health and on vegetation and is therefore considered "bad" ozone. Ozone is not usually emitted from sources as a pollutant directly into the air. At ground level, ozone is formed by a reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Sunlight and hot weather facilitate ground-level ozone formation in potentially harmful concentrations; as a result, ozone is known as a summertime air pollutant.

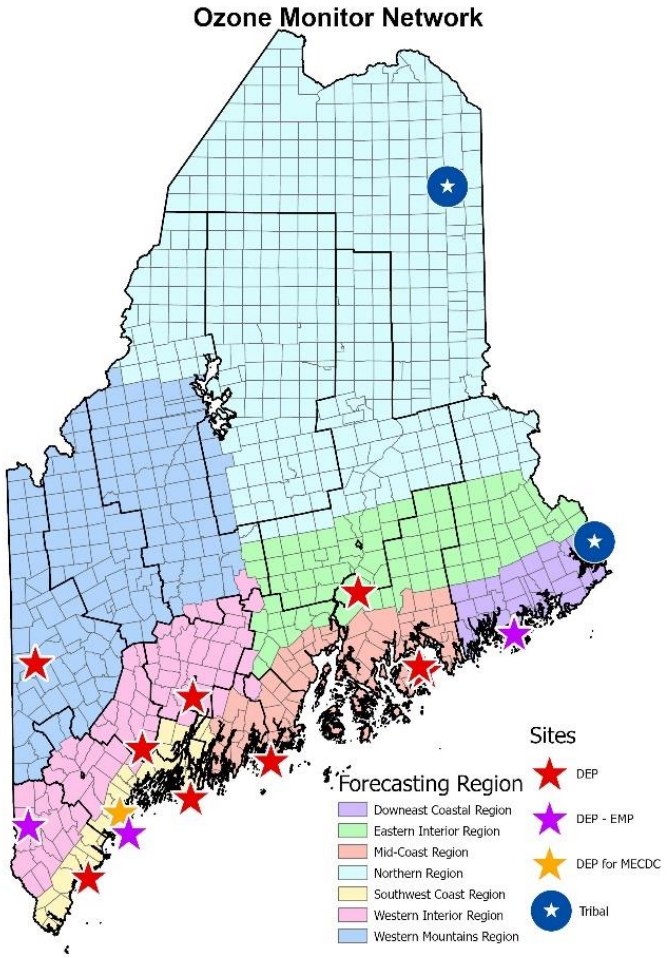

Figure 4: Map of the Maine DEP and Tribal Ozone Monitoring Network and Forecasting Regions

Under the authority of the Clean Air Act, the EPA has set protective health-based standards for ozone in the ambient air to protect both public health and the public welfare (e.g., crops and vegetation). The 2008 NAAQS for ozone was the three-year average of the fourth-high maximum daily eight-hour average not

to exceed 0.075 parts per million (ppm). On October 1, 2015, the EPA revised the ozone NAAQS standard to 0.070 ppm (effective December 28, 2015).

The Photochemical Assessment Monitoring Stations (PAMS) network, originally established in 1993, was designed to measure ozone precursor pollutants for Serious, Severe, or Extreme Non-attainment areas. The monitoring regulations for PAMS provide for the collection of an "enhanced" ambient air quality database, which can be used to better characterize the nature and extent of ground-level ozone, aid in tracking VOC and NO_x emissions reductions, assess air quality trends, make attainment/non-attainment decisions, and evaluate photochemical grid-model performance. DEP has operated two PAMS in Maine, one on Cadillac Mountain and one in Cape Elizabeth. The Cadillac Mountain site was discontinued at the end of the 2014 ozone season due to significant declining trends of precursor pollutants, increasingly limited resources, and other higher priority monitoring needs.

When EPA revised the National Ambient Air Quality Standards for ozone in 2015, part of that rulemaking also changed the criteria for when and where PAMS program monitoring would be required. Under these new PAMS monitoring regulations, Maine was no longer required to operate and maintain any PAMS sites. However, this change also required all states within the Ozone Transport Region, as defined by the Clean Air Act Amendments of 1990, which includes Maine, to create an Enhanced Monitoring Plan (EMP). The EMP originally consisted of maintaining the Cape Elizabeth site as a 'legacy PAMS' site when submitted in 2016. This included continuing year-round measurements of ozone, NO_y, and meteorological parameters, along with seasonal continuous precursor VOC measurements collected and analyzed on an auto-GC. In the summer of 2022, to assess the potential reallocation of staff time and resources to other higher priority monitoring needs, the DEP reached out to the EPA and other states within the Ozone Transport Region to determine if and how the data collected at the Cape Elizabeth site was being used. DEP received a verbal response that the isoprene values at this site were useful for modeling as one of the few remaining rural auto-GC on the East Coast still operating. DEP did not consider this enough evidence to continue supporting the auto-GC, and worked with US EPA Region 1 staff to alter the EMP. The current DEP EMP consists of maintaining the year-round ozone monitoring at the Cape Elizabeth site with seasonal meteorology, seasonal ozone and wind speed and direction at the Jonesport site, and seasonal ozone monitoring at the Shapleigh site.

A plot indicating the current and historical NAAQS status at several sites in Maine is shown in Figure 5. All monitoring sites in Maine are currently in attainment for both the 2008 and the 2015 ozone NAAQS and have continued to be in attainment for most three-year periods starting with 2003-2005. The summit of Cadillac Mt. monitoring site had a design value greater than the 2015 NAAQS for the 2015-2017 three-year period but has since been in attainment.

Though it is more likely for urban areas to have high levels of ozone, rural areas in Maine are also subject to increased ozone levels because prevailing winds carry ozone and its precursor pollutants hundreds of miles from their original sources.

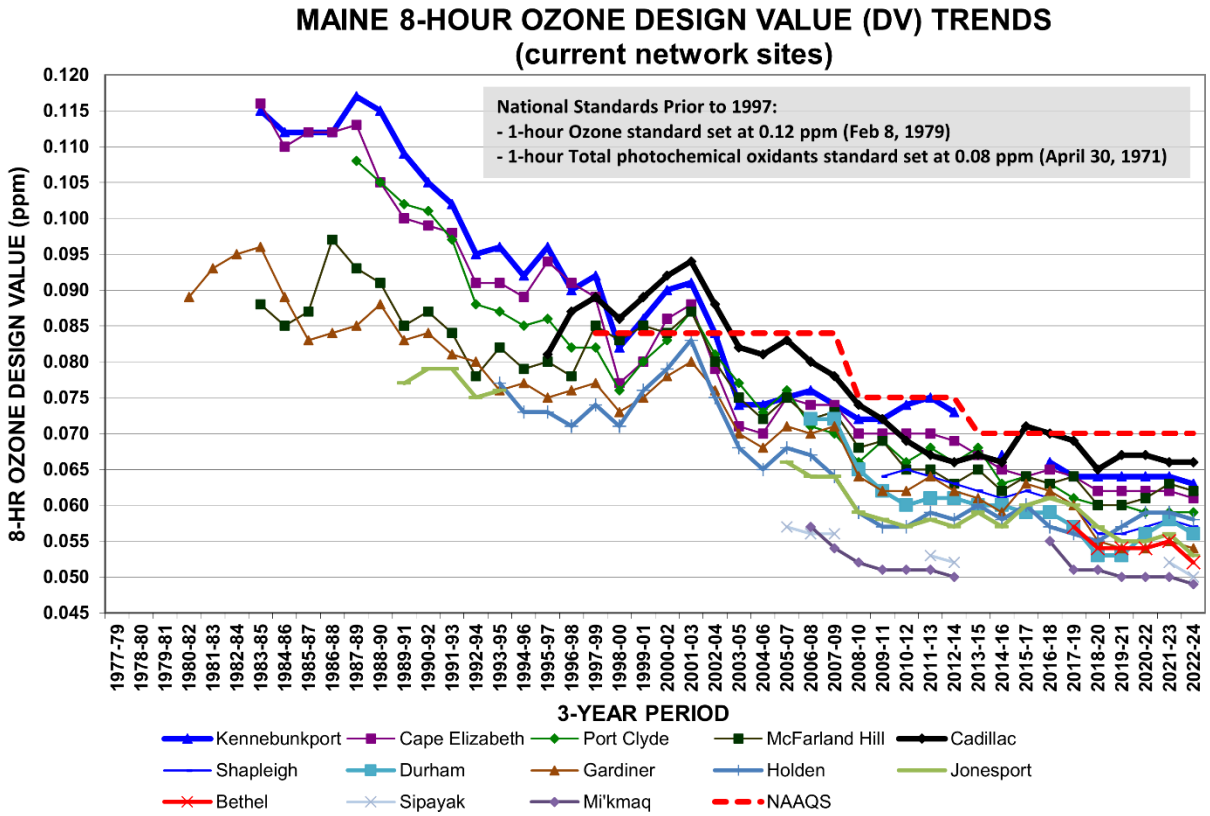

Figure 5: Maine 8-Hour Ozone Design Value Trends

Ozone Monitoring Network

Maine's program to monitor ambient levels of ozone, started in 1975, and has been expanded and modified since its initiation to most effectively identify and delineate non-attainment areas and to provide near-real-time hourly data useful for the tracking and forecasting of ozone levels throughout the state.

DEP currently operates a network of 12 sites with an additional two sites operated by Maine tribes. The locations of these sites in Maine are shown in Figure 4. The current Maine ozone monitoring network is broken into eight forecasting regions, seven of which are visible in Figure 4, with the eighth being High Elevation coastal areas. These regions are geographically based following town lines. DEP determined these regions after years of ozone monitoring to provide the most accurate delineation for forecasting. The DEP Air Quality Forecasting webpage[20] can be used to find the forecasting region by town.

This monitoring network covers the most populated regions of Maine and areas that are expected to experience the highest levels of ozone. The network also covers many rural and sparsely populated areas.

The Southwest Coast, Mid-Coast, and High Elevation forecasting regions are where the highest ozone measurements in Maine have historically been recorded and occasionally still occur.

[20] https://apps.web.maine.gov/cgi-bin/online/dep/air/aqforecast/index.pl

Monitors are located at Kennebunkport, Cape Elizabeth, Portland (non-regulatory), Phillpsburg, Port Clyde, McFarland Hill, and the summit of Cadillac Mountain in Acadia National Park. A number of coastal monitoring sites in Maine are presently recording concentrations below the current standard. Continued operation of these monitors is important to show continued compliance, a requirement in existing maintenance plans for the 1997 ozone standard and/or a return to non-attainment in the future. These regions contain some of the more populous regions in Maine, including the Portland-South Portland-Biddeford Metropolitan Statistical Area (MSA) and the Rockland Micropolitan Statistical Area (μSA), and include areas of the state with the largest population growth. These monitors are strategically located throughout the southern and mid-coast areas of Maine.

The two interior regions and the Downeast region have an important role in delineating air quality forecasting and any potential attainment/nonattainment boundaries. These regions have sites located in Shapleigh, Durham, Gardiner, Holden, and Jonesport, and there is a Passamaquoddy operated ozone monitor at Sipayik. These regions also contain the most densely populated areas away from the coastline, including the Bangor and Lewiston-Auburn MSAs, part of the Portland-South Portland-Biddeford MSA, and the Augusta-Waterville MSA.

The Western Mountains and Northern regions each have one operating ozone monitor, the DEP operates one in Bethel, and the Mi'kmaq operate one monitor in Presque Isle. These sites are important for ozone mapping and forecasting purposes, especially during the spring months. The highest background ozone concentrations during the year occur in the spring months before leaf-out. Maine has recently experienced some high spring ozone concentrations at inland sites as a result of the high background, long-range transport, weather patterns, and the lack of vegetation to absorb ozone before leaf-out.

Figure 6, Table 3A, and Table 3B (pages 17 - 19 verify that the Southwest Coast, Mid-coast and High Elevation regions contain sites with the highest ozone levels in the state, with each site having unique statistics. The values recorded at the Portland monitoring site are typically lower than other Southwest Coast region sites. The Portland monitor is a special purpose monitor installed for the Department of Health and Human Services, Maine Center for Disease Control and Prevention, and because it does not meet NAAQS siting criteria is considered a non-regulatory monitor.

The Popham Beach site came online in 2022 after several years of looking for a monitoring location to fill a gap in Maine's coastal monitoring network between Cape Elizabeth and Port Clyde.

Figure 6 also verifies that the remaining regions contain sites with lower ozone levels. The Holden, Bethel, and Presque Isle (Mi'kmaq Tribe) sites are the only sites in their forecasting regions. Jonesport and Sipayik (Passamaquoddy Tribe) are both in the Downeast Coast region, neither of these sites went Unsafe for Sensitive Groups (USG) for the 2020-2024 period; however, they both provide insightful information for the long-range transport of ozone for forecasting.

Durham, Gardiner, and Shapleigh are all in the Western Interior region. All three sites show a decrease in ozone concentrations for 2020-2024 compared to 2015-2019, with Gardiner showing the largest decrease. This shift for the Gardiner monitoring location is theorized to be due to the relocation from the Pray Street School to the Gardiner Area High School.

Future Ozone and EMP Monitoring Network:

The Kennebunkport site routinely records the highest ozone values in the state; however, this site has been under threat from coastal storms for many years and relocating this site to a more secure location is considered a priority for the DEP. The DEP has found a suitable replacement location for this site in Wells, Maine, which is anticipated to detect similar ozone concentrations as the current site. This location change is expected to take place after the 2025 ozone season.

Monitoring began at the current Gardiner site in 2020, after moving from its previous location, less than 0.5 miles away. The 2020 move was made necessary by the site host requesting the monitoring shelter be removed. The current site consistently records lower ozone concentrations than nearby sites, while the opposite was true at the previous Gardiner location. The DEP believes this decrease in observed concentrations is due to the southern fetch being more obstructed and has found a location in Augusta with significantly improved fetch.

The Portland Dearing Oaks site is being moved during the summer/fall of 2025. The current location is being redeveloped into a walking and biking path, and the DEP will need to remove the monitoring equipment. The DEP is working with the City of Portland to relocate this site.

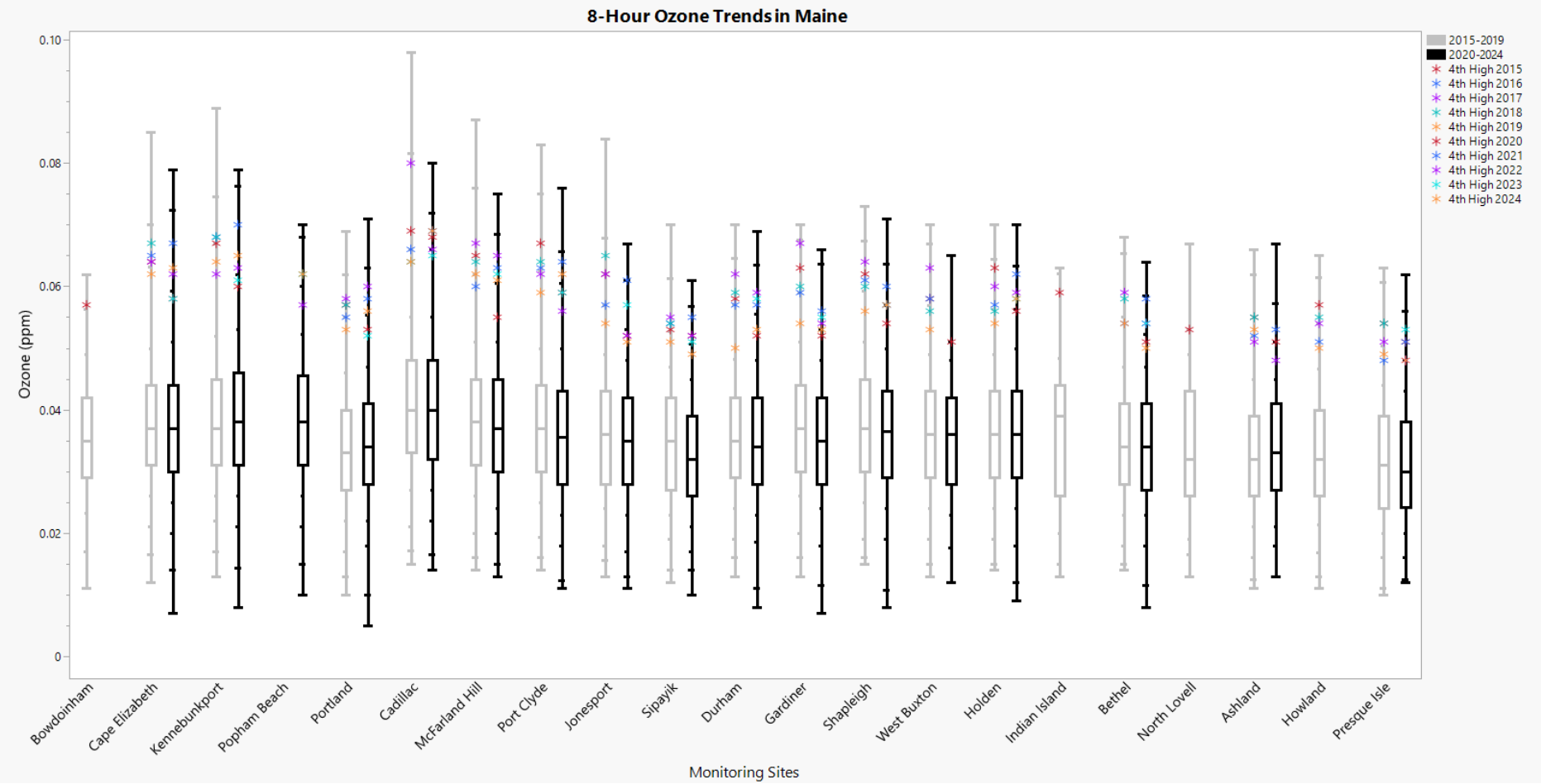

Figure 6: Maine Ozone Data Trends - Box & Whisker

Figure 6 shows 8-hour ozone data trends in Maine through a quantile box and whisker plot. The box and whisker plots with gray outlines contain data between 2015 and 2019, while the box and whisker plots with black outlines contain data between 2020 and 2024. Each box shows the 25th and 75th percentiles, with the center line indicating the 50th percentile (median). The bottom whiskers have markers at 0.0, 0.5, 2.5, and the 10th percentile, while the top whiskers have markers at 90, 97.5, 99.5 and the 100th percentiles. The red stars indicate the average 4th high for the 5-year period (2015-2019 or 2020-2024) at each site. The values for each point on this figure are shown below in **Error! Reference source not found.**. Ozone values in parts per million (ppm) are on the y-axis.

The monitoring sites are organized on the x-axis by forecast region, with sites in alphabetical order within those regions. Bowdoinham, Cape Elizabeth, Kennebunkport, Popham Beach, and Portland are in the Southwest Coast region. Cadillac, McFarland Hill, and Port Clyde are in the Mid-Coast region, with Cadillac being a high elevation site in Acadia National Park. Jonesport and Sipayik (Passamaquoddy Tribe) are in the Downeast Coast region. Durham, Gardiner, Shapleigh, and West Buxton are in the Western Interior region. Holden and Indian Island (Penobscot Nation) are in the Eastern Interior region. Bethel and North Lovell are in the Western Mountains region. Ashland, Howland, and Presque Isle (Mi'kmaq Tribe) are in the Northern region. Monitoring sites that only have a gray plot ended operations before 2020 and sites with only a black plot began operating between 2020 and 2024.

Table 3A: Maine Ozone Data - 2015-2019 and 2020-2024 Percentiles

	Forecasting Region, Site and Date Range	Percentile - 0.0% Lowest Value	Percentile - 0.5%	Percentile - 2.5%	Percentile - 10.0%	Percentile - 25.0%	Percentile - 50.0% Median	Percentile - 75.0%	Percentile - 90.0%	Percentile - 97.5%	Percentile - 99.5%	Percentile - 100.0% Highest Value	Sample Count
Southwest Coast	Bowdoinham 2015-2019	0.008	0.008	0.017	0.024	0.030	0.038	0.044	0.050	0.055	0.062	0.062	201
	Cape Elizabeth 2015-2019	0.012	0.016	0.021	0.026	0.030	0.036	0.042	0.048	0.057	0.067	0.085	1810
	Cape Elizabeth 2020-2024	0.007	0.013	0.020	0.025	0.030	0.036	0.042	0.048	0.056	0.064	0.079	1790
	Kennebunkport 2015-2019	0.013	0.017	0.022	0.027	0.032	0.039	0.045	0.051	0.065	0.073	0.089	967
	Kennebunkport 2020-2024	0.008	0.014	0.020	0.026	0.032	0.039	0.045	0.052	0.061	0.075	0.079	1055
	Popham Beach 2020-2024	0.010	0.015	0.021	0.026	0.031	0.038	0.045	0.051	0.059	0.068	0.070	587
	Portland 2015-2019	0.004	0.011	0.015	0.021	0.026	0.032	0.038	0.043	0.051	0.059	0.069	1791
	Portland 2020-2024	0.005	0.009	0.016	0.022	0.027	0.033	0.039	0.044	0.051	0.060	0.071	1782
Mid-Coast	Cadillac 2015-2019	0.015	0.018	0.022	0.027	0.033	0.040	0.048	0.055	0.066	0.081	0.098	949
	Cadillac 2020-2024	0.014	0.017	0.022	0.027	0.033	0.041	0.047	0.054	0.065	0.072	0.080	1108
	McFarland Hill 2015-2019	0.014	0.017	0.021	0.027	0.032	0.037	0.043	0.049	0.057	0.067	0.087	1788
	McFarland Hill 2020-2024	0.013	0.015	0.021	0.026	0.031	0.037	0.043	0.049	0.056	0.065	0.075	1788
	Port Clyde 2015-2019	0.014	0.016	0.020	0.025	0.031	0.038	0.045	0.050	0.061	0.074	0.083	999
	Port Clyde 2020-2024	0.011	0.013	0.018	0.024	0.029	0.036	0.042	0.049	0.058	0.064	0.076	1222
Downeast Coast	Jonesport 2015-2019	0.013	0.015	0.019	0.024	0.029	0.037	0.045	0.050	0.056	0.067	0.084	1097
	Jonesport 2020-2024	0.011	0.013	0.018	0.024	0.029	0.037	0.043	0.048	0.053	0.061	0.067	1139
	Sipayik 2015-2019	0.011	0.016	0.020	0.025	0.030	0.036	0.041	0.046	0.050	0.059	0.070	1620
	Sipayik 2020-2024	0.010	0.014	0.018	0.023	0.028	0.034	0.040	0.044	0.049	0.055	0.061	1690
Western Interior	Durham 2015-2019	0.013	0.016	0.019	0.025	0.030	0.037	0.043	0.048	0.056	0.064	0.070	1044
	Durham 2020-2024	0.008	0.010	0.019	0.024	0.029	0.036	0.042	0.048	0.054	0.062	0.069	1109
	Gardiner 2015-2019	0.013	0.016	0.020	0.026	0.032	0.038	0.045	0.051	0.058	0.067	0.070	1087
	Gardiner 2020-2024	0.007	0.012	0.018	0.024	0.029	0.036	0.042	0.047	0.053	0.063	0.066	1020
	Shapleigh 2015-2019	0.015	0.016	0.020	0.026	0.031	0.039	0.046	0.051	0.057	0.066	0.073	1109
	Shapleigh 2020-2024	0.008	0.012	0.018	0.024	0.030	0.037	0.043	0.048	0.056	0.062	0.071	1360
	West Buxton 2015-2019	0.013	0.016	0.019	0.025	0.030	0.038	0.044	0.049	0.056	0.067	0.070	1118
	West Buxton 2020-2024	0.012	0.012	0.018	0.023	0.030	0.038	0.043	0.047	0.051	0.063	0.065	234
Eastern Interior	Holden 2015-2019	0.014	0.016	0.019	0.024	0.030	0.038	0.044	0.049	0.056	0.063	0.070	1103
	Holden 2020-2024	0.009	0.013	0.019	0.025	0.030	0.038	0.045	0.050	0.056	0.063	0.070	1162
	Indian Island 2015-2019	0.010	0.010	0.014	0.020	0.026	0.034	0.041	0.046	0.057	0.063	0.063	172
Western Mtns.	Bethel 2015-2019	0.013	0.015	0.018	0.024	0.028	0.035	0.042	0.047	0.054	0.064	0.068	891
	Bethel 2020-2024	0.008	0.012	0.018	0.023	0.028	0.036	0.042	0.047	0.052	0.058	0.064	1199
	North Lovell 2015-2019	0.013	0.013	0.017	0.019	0.026	0.032	0.043	0.049	0.053	0.067	0.067	179
Northern	Ashland 2015-2019	0.010	0.013	0.017	0.022	0.027	0.033	0.039	0.044	0.049	0.057	0.066	1790
	Ashland 2020-2024	0.009	0.013	0.017	0.022	0.028	0.034	0.039	0.044	0.049	0.054	0.067	846
	Howland 2015-2019	0.008	0.013	0.017	0.022	0.027	0.034	0.040	0.045	0.050	0.058	0.065	1495
	Presque Isle 2015-2019	0.009	0.012	0.016	0.021	0.025	0.032	0.038	0.043	0.048	0.056	0.063	1669
	Presque Isle 2020-2024	0.011	0.013	0.017	0.021	0.026	0.032	0.038	0.043	0.047	0.053	0.062	1675

Table 3A presents the data shown in the Figure 6 box and whisker plots in tabular format, including the number of samples for each data set. Cadillac Mountain is in two regions, the Mid-Coast and High Elevation Coastal regions.

Table 3B: 4th High Daily Average by Year

Forecasting Region and Site		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Southwest Coast	Bowdoinham	0.057									
	Cape Elizabeth	0.064	0.065	0.064	0.067	0.062	0.058	0.067	0.062	0.058	0.063
	Kennebunkport	0.067	0.068	0.062	0.068	0.064	0.060	0.070	0.063	0.061	0.065
	Popham Beach								0.057	0.062	0.062
	Portland	0.057	0.055	0.058	0.057	0.053	0.053	0.058	0.060	0.052	0.056
Mid-Coast	Cadillac	0.069	0.066	0.080	0.064	0.064	0.068	0.069	0.066	0.065	0.069
	McFarland Hill	0.065	0.060	0.067	0.064	0.062	0.055	0.063	0.065	0.062	0.061
	Port Clyde	0.067	0.063	0.062	0.064	0.059	0.059	0.064	0.056	0.059	0.062
Downeast Coast	Jonesport (Public Landing)	0.062	0.057	0.062	0.065	0.054	0.052	0.061			
	Jonesport (Coast Guard)								0.052	0.057	0.051
	Sipayik	0.053	0.054	0.055	0.054	0.051	0.052	0.055	0.052	0.051	0.049
Western Interior	Durham	0.058	0.057	0.062	0.059	0.050	0.052	0.057	0.059	0.058	0.053
	Gardiner (Pray Street School)	0.063	0.059	0.067	0.060	0.054					
	Gardiner (Area High School)						0.052	0.056	0.054	0.055	0.053
	Shapleigh	0.062	0.061	0.064	0.060	0.056	0.054	0.060	0.057	0.057	0.057
	West Buxton	0.058	0.058	0.063	0.056	0.053	0.051				
Eastern Interior	Holden	0.063	0.057	0.060	0.056	0.054	0.056	0.062	0.059	0.058	0.058
	Indian Island	0.059									
Western Mtns.	Bethel		0.054	0.059	0.058	0.054	0.051	0.058	0.054	0.054	0.050
	North Lovell	0.053									
Northern	Ashland	0.055	0.052	0.051	0.055	0.053	0.051	0.053	0.048		
	Howland	0.057	0.051	0.054	0.055	0.050					
	Presque Isle	0.054	0.048	0.051	0.054	0.049	0.051	0.051	0.048	0.053	0.048

Table 3B presents the data shown in Figure 6 annual 4th high in tabular format. This table also shows when Gardiner and Jonesport monitoring sites moved but stayed within the same town. Cadillac Mountain is in two regions, the Mid-Coast and High Elevation Coastal regions.

Particulate Matter (PM)

Particulate Matter (PM) is made up of coarse and fine particles based on size, as follows:

Name	Label	Description	Examples
Inhalable PM	PM_{10}	Particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers (10 µm)	Smoke, soot, dust, dirt, pollen
Coarse PM	$PM_{10-2.5}$	Particles with an aerodynamic diameter less than or equal to a nominal 10 µm but greater than 2.5 µm	
Fine PM	$PM_{2.5}$	Particles with an aerodynamic diameter less than or equal to a nominal 2.5 µm	Sulfates, nitrates, heavy metals

Table 4: Particulate Matter NAAQS

The EPA has established primary and secondary air quality standards for $PM_{2.5}$ on an annual basis and a 24-hour basis, and for PM_{10} on a 24-hour basis as identified in Table 1**.**

$PM_{2.5}$

The current $PM_{2.5}$ 24-hour Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors in Maine operated to track compliance with the $PM_{2.5}$ NAAQS are primarily located in the most densely populated. An additional $PM_{2.5}$ monitor is located in Acadia National Park at the McFarland Hill site to meet the requirements of the National Core Network (NCore), a multi-pollutant network that integrates several advanced measurement systems for particles, pollutant gases, and meteorology. Additionally, operating in the three largest cities in Maine are continuous $PM_{2.5}$ monitors such as the Met One BAM 1020 and Teledyne T640x, used to help inform the public and to track compliance with the NAAQS. Additional monitors are located at sites in Maine to monitor potential wintertime woodsmoke impacts. The types of monitors and their locations are shown in Figure 7.

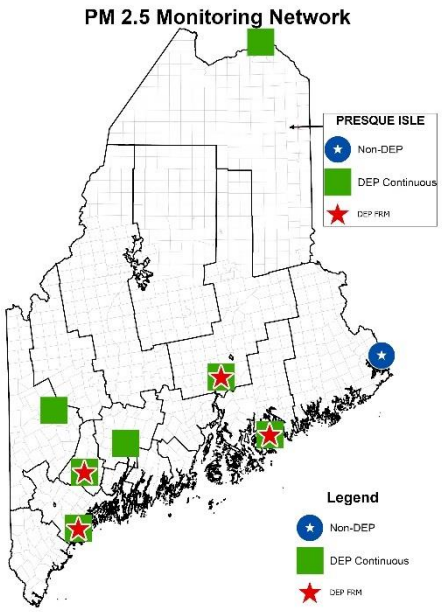

Figure 7: Map of Maine DEP and Tribal $PM_{2.5}$ Monitoring Network

$PM_{2.5}$ Monitoring Sites by Monitoring Strategy Category:

Highest Population Areas
Portland (BAM and FRM)
Lewiston (BAM, T640x and FRM)
Bangor (T640x)

NCore Site
McFarland Hill (FRM and T640x)

Heating Season Sites of Interest
Rumford (BAM)
Madawaska (T640x)

Other Population Centers of Interest
Augusta (T640x)
Presque Isle (FRM and T640x)

In addition to depicting downward trends, Figure 8 and Figure 9 demonstrate that all monitors are showing attainment of the both current 24-hour $PM_{2.5}$ NAAQS and the annual $PM_{2.5}$ NAAQS. Figure 10 shows the max quarterly average concentrations of $PM_{2.5}$ for all sites in Maine. Historically, wintertime $PM_{2.5}$ is an important issue in Maine, which drove the installation of particulate monitors in Rumford, Madawaska, and Presque Isle. These towns are in valleys where inversions occur during certain weather conditions, trapping pollutants at ground level between valley walls, and where woodsmoke may cause higher $PM_{2.5}$ concentrations in the ambient air. During the summer of 2023, Maine was affected by long-range transport of woodsmoke. Additionally, one site, Portland – Tukeys Bridge, was severely impacted by nearby demolition and roadwork on the adject highway. The anomalous 2023 Q3 max average is attributed to these multiple sources of $PM_{2.5}$.

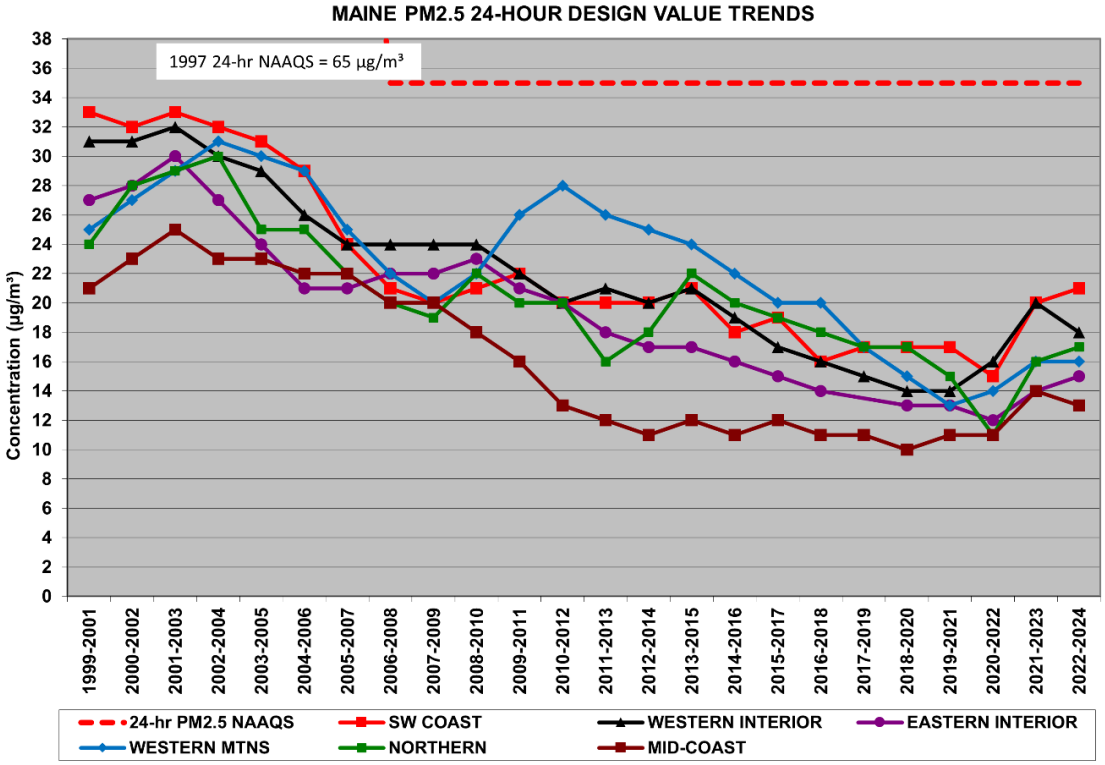

Figure 8: Maine $PM_{2.5}$ 24-Hour Design Values

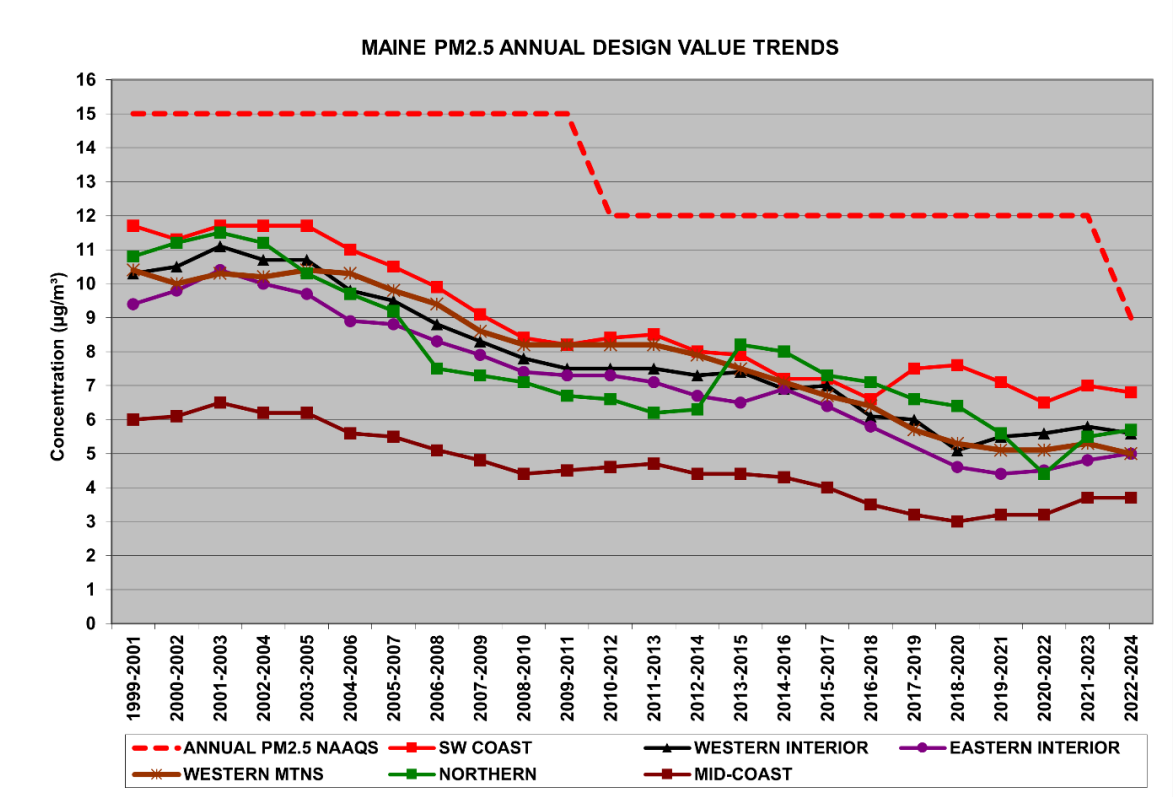

Figure 9: Maine $PM_{2.5}$ Annual Design Values

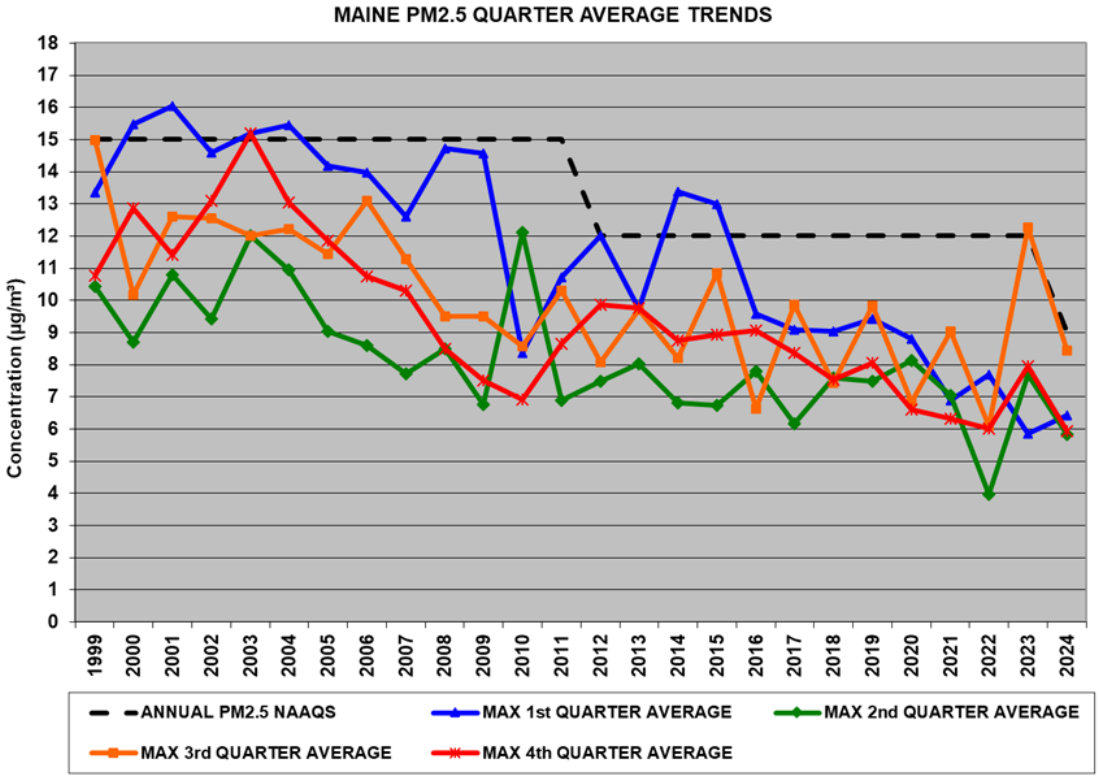

Figure 10: Maine $PM_{2.5}$ Quarterly Average

Future $PM_{2.5}$ Monitoring Network

The Portland Dearing Oaks site is being moved during the summer/fall of 2025. The current location is being redeveloped into a walking and biking path, and the DEP needs to remove the monitoring equipment. The DEP is working with the City of Portland to relocate this site. Additionally, DEP is considering moving the current Rumford site. The DEP is studying particulate concentrations in the Rumford/Mexico valley to determine if an alternative location will provide data to support more accurate forecasting for the area, thus providing more protection for public health.

PM_{10}

The continuous PM_{10} FEM monitors in the State of Maine used to track compliance with the NAAQS are in the more populated areas, at a source of interest, or located in areas with historical exceedances of the standard. The locations of the PM_{10} monitors are shown in Figure 11.

Figure 12 shows all sites in attainment of the current PM_{10} NAAQS. The most recent exceedance of the 24-hour standard occurred in Madawaska in 2018. In 2020, a continuous PM_{10} sampler was established in Madawaska in order to document the attainment status of the area.

The DEP operates a continuous PM_{10} monitor at the NCore site in Acadia National Park. There is an indirect requirement for PM_{10} at NCore sites, as the EPA requires PM Coarse ($PM_{10-2.5}$) to be measured at NCore sites. PM Coarse can be directly collected by a few methods; the most popular method is to collect both $PM_{2.5}$ and PM_{10} and calculate the PM Coarse value by subtracting $PM_{2.5}$ from PM_{10}.

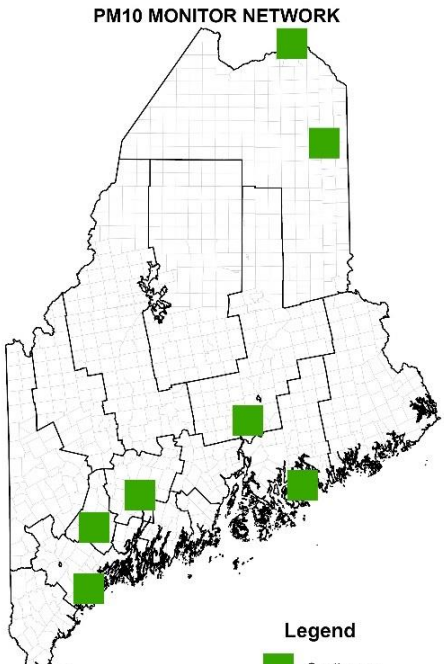

Figure 11: Map of Maine DEP PM_{10} Monitoring Network

PM_{10} Monitoring Sites by Monitoring Strategy Category:

Highest Population Areas
Portland
Lewiston
Bangor

Other Population Centers of Interest
Augusta

Regions with Historical Exceedances
Presque Isle (maintenance plan)
Madawaska

Other Required Monitoring
Bar Harbor (NCore)

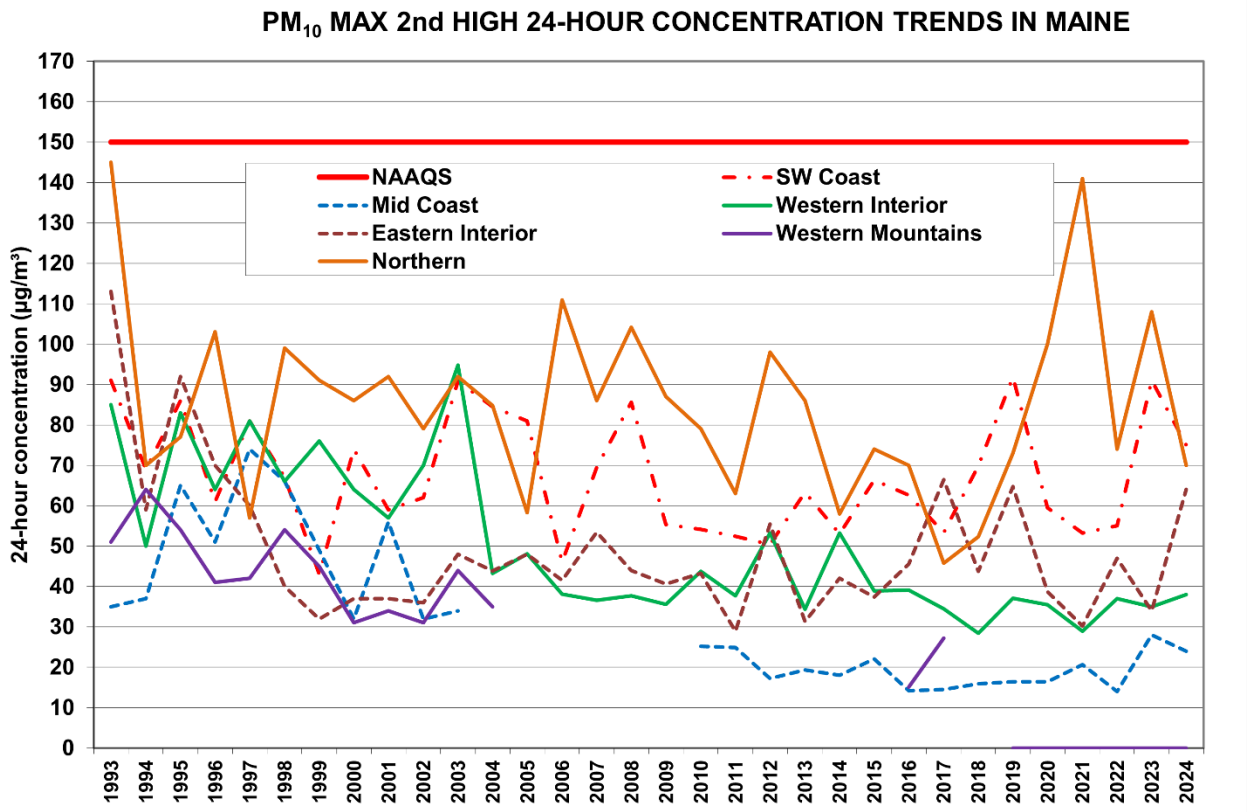

Figure 12: PM_{10} Max 2nd High 24-Hour Contraction Trends

Future PM_{10} Monitoring Network

The current PM_{10} network monitors are located in the highest population centers and maintenance areas of the state and satisfy federal monitoring requirements. The DEP plans to replace the Met One BAM 1020 instruments, which can only measure $PM_{2.5}$ or PM_{10}, currently operating in Rumford and Portland Dearing Oaks Park, with Teledyne T640x instruments, which will measure $PM_{2.5}$ and PM_{10} simultaneously.

Visibility/Speciation

Maine operates a particle speciation monitoring network as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) program. Maine currently operates a monitor in Freeport. The Bridgton monitor was discontinued in 2016. Monitors are also operated by the National Park Service in the Acadia National Park Class I Area, by the U.S. Fish and Wildlife Service in the Moosehorn Wilderness Class I Area, and by the Penobscot Nation and Mi'kmaq Tribe. The Moosehorn Wilderness visibility/speciation monitoring provides data representative of conditions at the nearby Roosevelt-

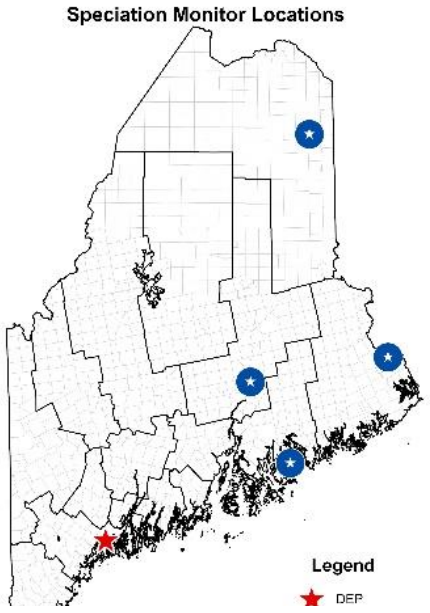

Figure 13: Speciation (IMPROVE)

Campobello International Park (RCIP) Class I area; thus, no monitor is needed at RCIP. Figure 13 indicates the location of the IMPROVE monitors in the state.

Figure 14 and Figure 15 show how the IMPROVE data is used to track visibility using the deciview metric at the Acadia National Park and Moosehorn sites for the second regional haze State Implementation Plan (SIP). Deciview is a visibility metric based on the light extinction coefficient that expresses incremental changes in perceived visibility. All other sites in Maine show similar improvements.

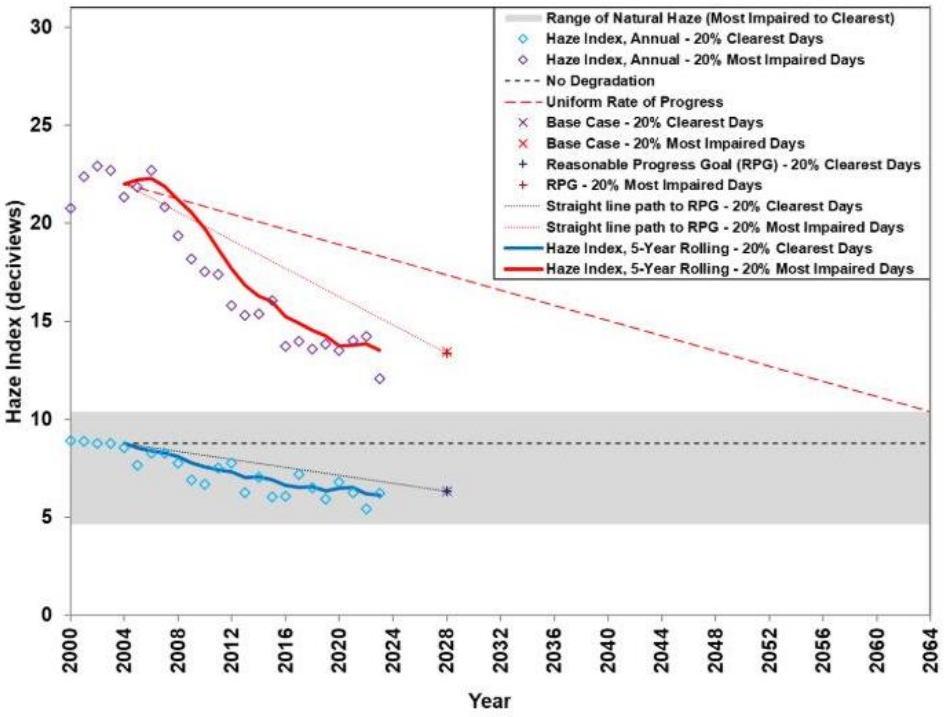

Figure 14: Acadia National Park Deciview Data

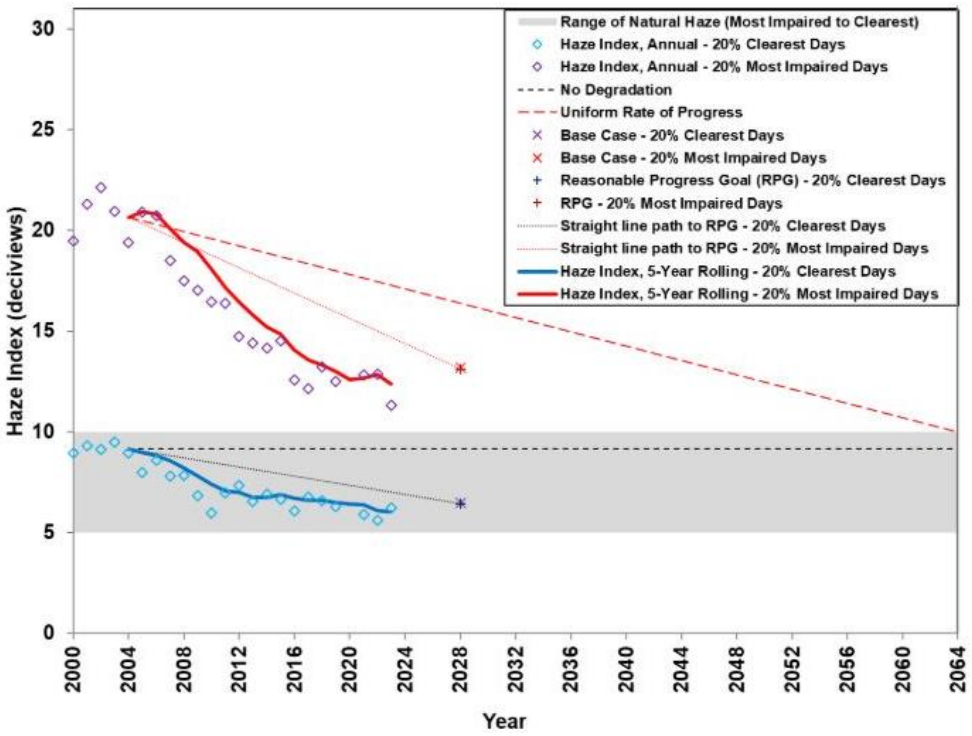

Figure 15: Moosehorn Deciview Data

The visibility/speciation network meets monitoring requirements at all three Class I areas in and near Maine. Continued monitoring at the three Class I areas to track visibility conditions is required in the Regional Haze Rule. Such monitoring is also a commitment made in Maine's State Implementation Plan (SIP). The Freeport site is a speciation site as required by EPA's $PM_{2.5}$ network design criteria for Maine. The Tribes also operate speciation sites in Presque Isle (Mi'kmaq Tribe) and on Indian Island (Penobscot Nation). Although the Freeport and tribal sites are in Class II areas and not in Class I areas, the Department and tribes opted to use IMPROVE Protocol samplers (required for Class I monitoring sites) at those sites so that all PM speciation data in the state would be generated using the same equipment and collected filters would be analyzed by the same lab.

Figure 16 shows the average concentrations of sulfate, nitrate, and organic compound measurements as well as the 90th percentiles since 2014 at all sites in Maine. Results clearly show that each site is measuring different local haze conditions. Class I sites at Acadia National Park (ACAD) and Moosehorn (MOOS) measure relatively clean rural coastal conditions. The Penobscot Nation (PENO) and Freeport (CABA) sites are measuring more polluted urban conditions, while the Mi'kmaq (PRIS) site is measuring inland rural conditions.

Future Visibility/Speciation Monitoring Network

No changes are planned.

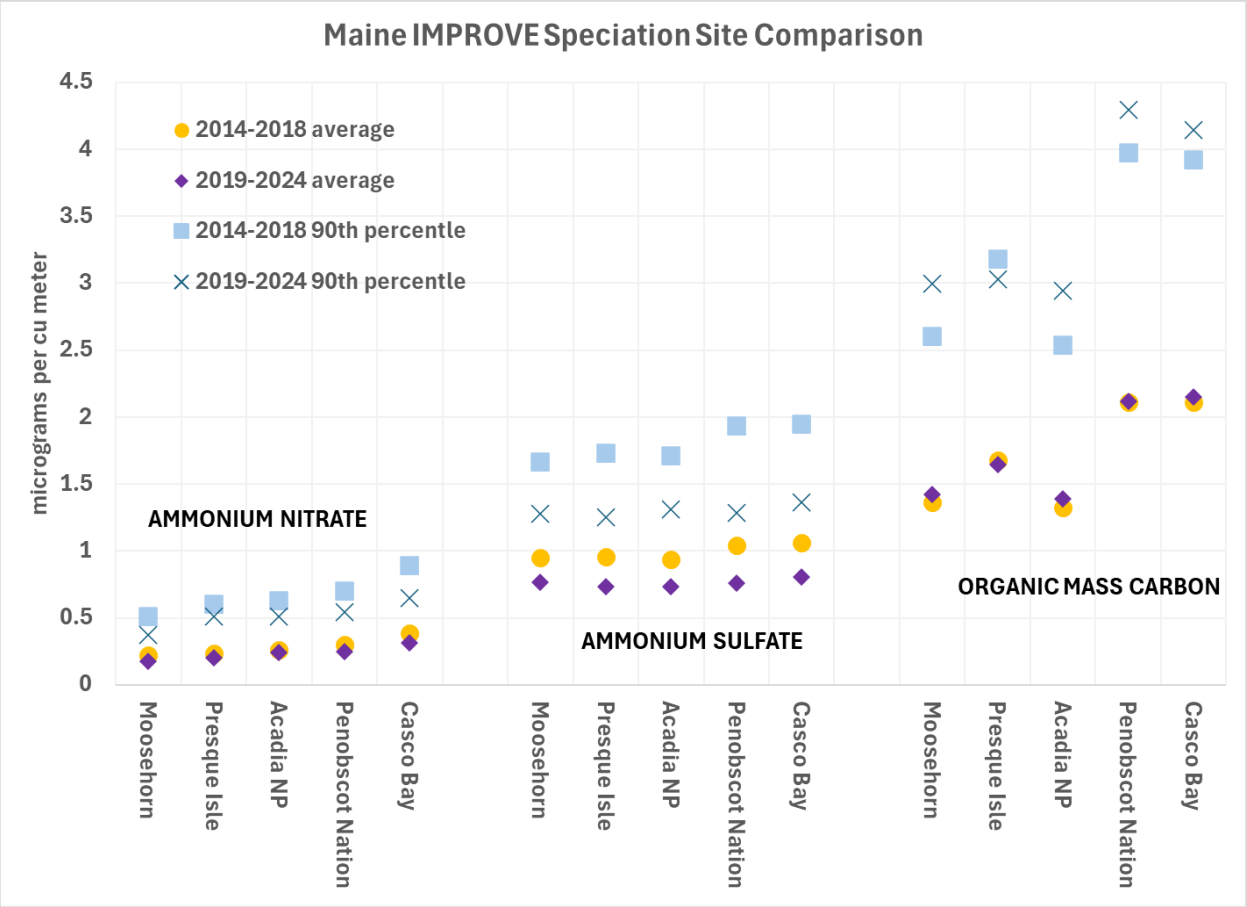

Figure 16: Speciation Site Comparisons

PM Coarse ($PM_{10-2.5}$)

PM Coarse is the fraction of particles from 2.5 up to 10 microns in size. There is currently no regulatory standard for this size range. EPA has proposed a standard in the past but opted to do more research rather than promulgate a standard. As of January 1, 2011, PM Coarse was required to be monitored at all NCore sites.

PM Coarse is currently only reported for one site in Maine. PM Coarse data at the Acadia National Park NCore site is attained by using a Teledyne T640x monitor, which measures the $PM_{2.5}$ and PM_{10} fractions of PM simultaneously. PM Coarse is then calculated by subtracting $PM_{2.5}$ from PM_{10}.

Future PM Coarse Monitoring Network

DEP currently has no plans to change the PM Coarse monitoring network, however all current PM_{10} and planned PM_{10} monitoring sites have or will have a Teledyne T640x. These sites will be able to collect and report PM Coarse data if the DEP is required to.

Carbon Monoxide (CO)

The NAAQS for CO as defined in Table 1 are as follows:

- 35 ppm as a 1-hour average, not to be exceeded more than once per year (design value is the highest annual 2nd maximum 1-hour concentration); and
- 9 ppm as an 8-hour average, not to be exceeded more than once per year (design value is the highest annual 2nd maximum non-overlapping 8-hour concentration).

Carbon monoxide is currently monitored by the DEP at the NCore site in Acadia National Park. The Mi'kmaq Tribe operates a CO monitor in Presque Isle. These two locations are shown in Figure 17 along with a planned monitoring site in Portland, Maine. Maine has experienced no CO non-attainment problems.

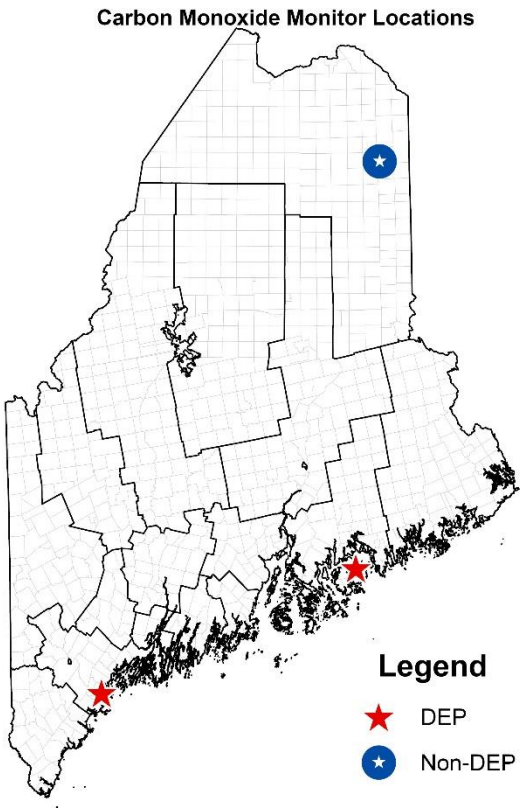

Figure 17: Maine DEP and Tribal CO Monitoring Network

Future CO Monitoring Network

The DEP plans to monitor CO in Portland for a minimum of one year at the new monitoring location to determine if continued monitoring should be conducted. The monitor that is used by the Mi'kmaq tribe is past its expected lifetime and is planned to be retired soon. There currently is no replacement planned or funds available for a replacement monitor. CO monitoring is expected to stop in Presque Isle when that monitor is retired.

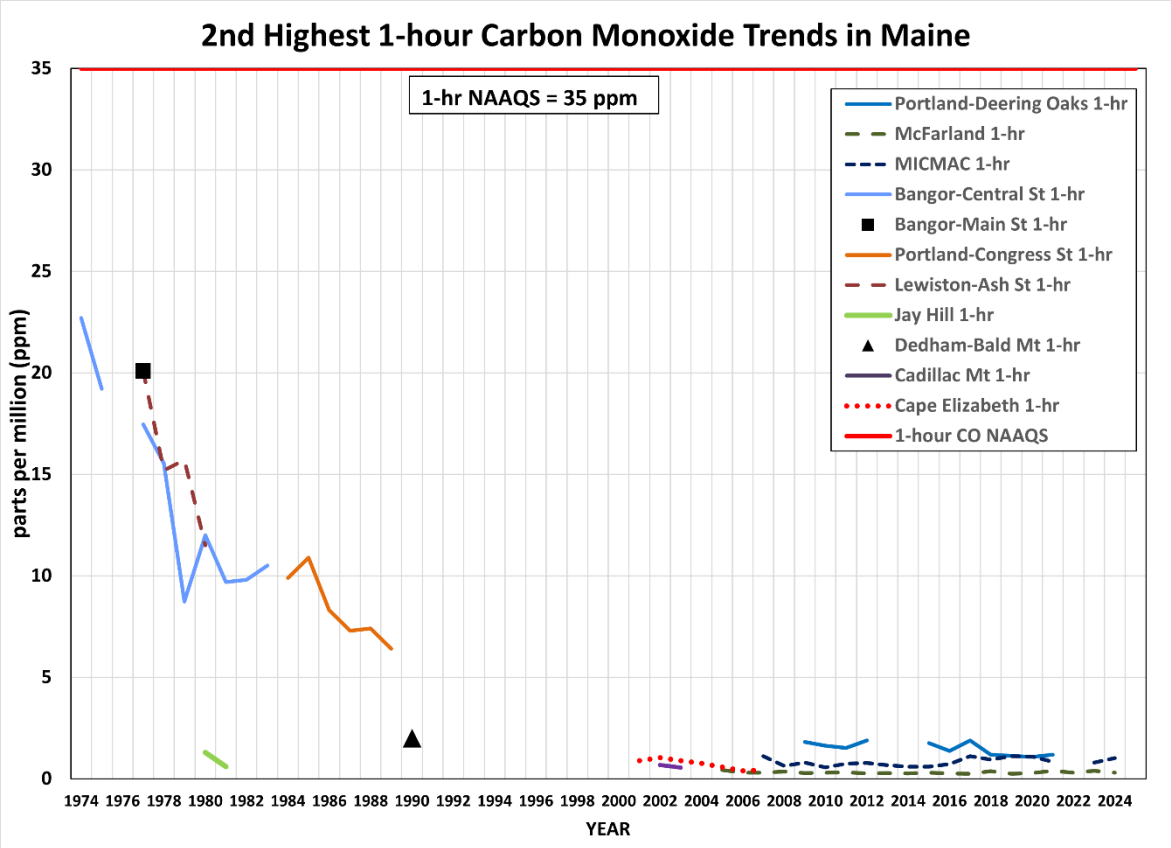

Figure 18: Maine CO 1-Hour Trends

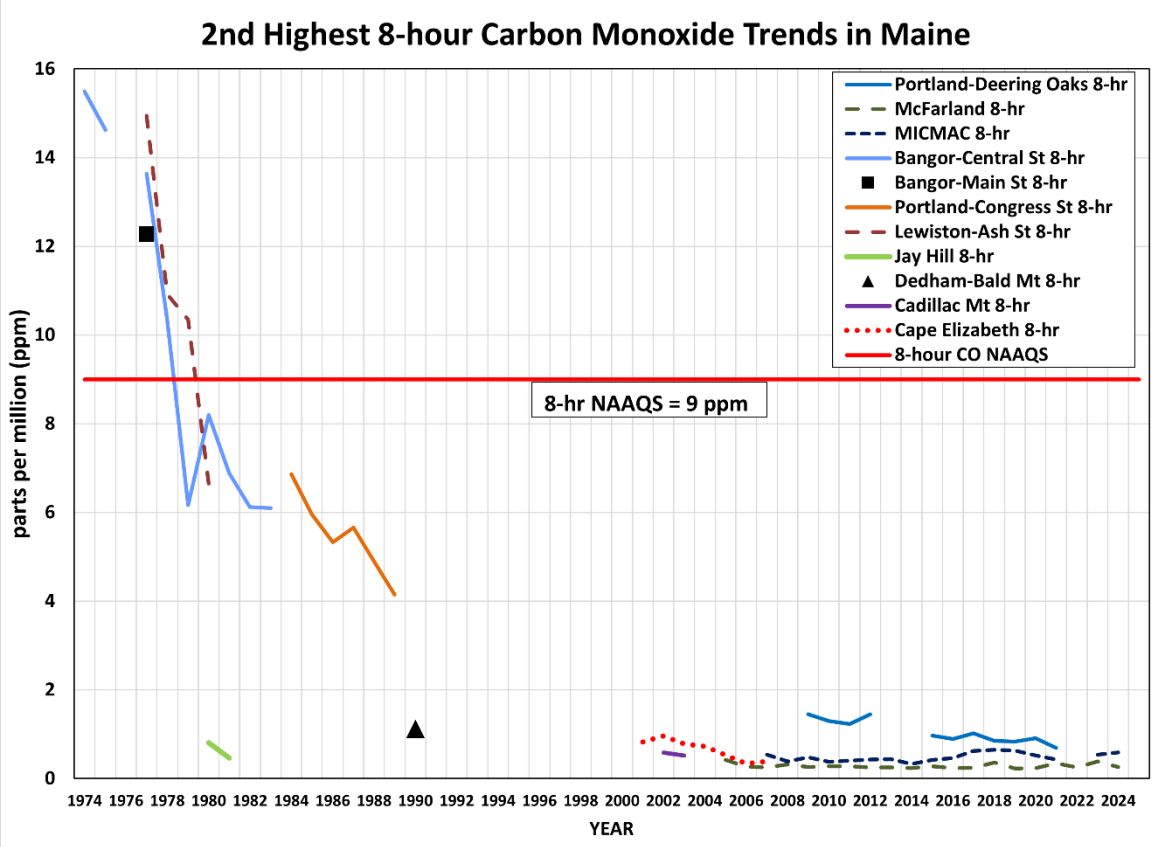

Figure 19: Maine CO 8-Hour Trends

Sulfur Dioxide (SO_2)

The NAAQS for SO_2 as outlined in Table 1 are as follows:

- 75 ppb as a primary standard, as the 99th percentile of 1-hour daily maximum, averaged over 3 years; and
- 10 ppb as a secondary standard, as an annual mean averaged over 3 years.

The only requirement for SO_2 monitoring in Maine is the NCore site in Acadia National Park, a trace level SO_2 monitor. The Mi'kmaq operate an SO_2 monitor at their site in Presque Isle. DEP plans to operate an SO_2 monitor in Portland for a minimum of 1-year. The locations of these monitors are shown in **Error! Reference source not found.**

Figure 21 depicts 99th percentile 1-hour concentration trends at all sites in Maine. The maximum 1-hour concentration recorded in Portland in the last three years is 12.0 ppb, and the latest valid 2016-18 design value is 7 ppb, which is well below the 75 ppb NAAQS.

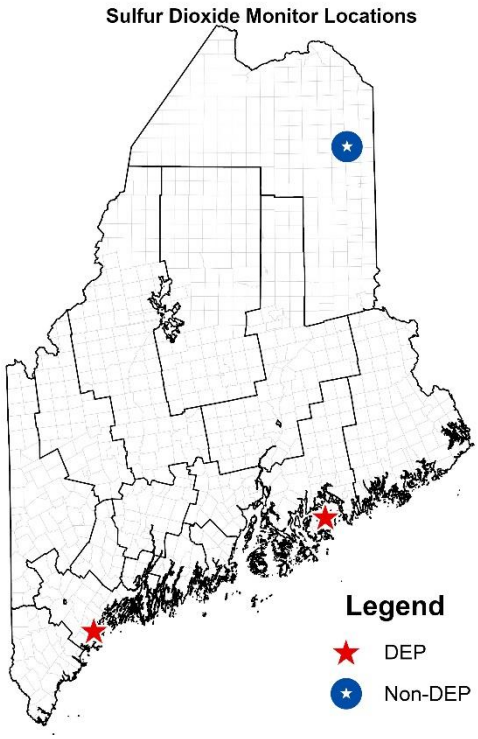

Figure 20: Maine DEP and Tribal SO_2 Monitoring Network

Future SO_2 Monitoring Network

The DEP plans to monitor SO_2 in Portland for a minimum of one year at the new monitoring location to determine if there is a need for continued monitoring. The monitor that is used by the Mi'kmaq tribe is past its expected lifetime and is planned to be retired soon. There currently is no replacement planned or funds available for a replacement monitor. SO_2 monitoring is expected to stop in Presque Isle when that monitor is retired.

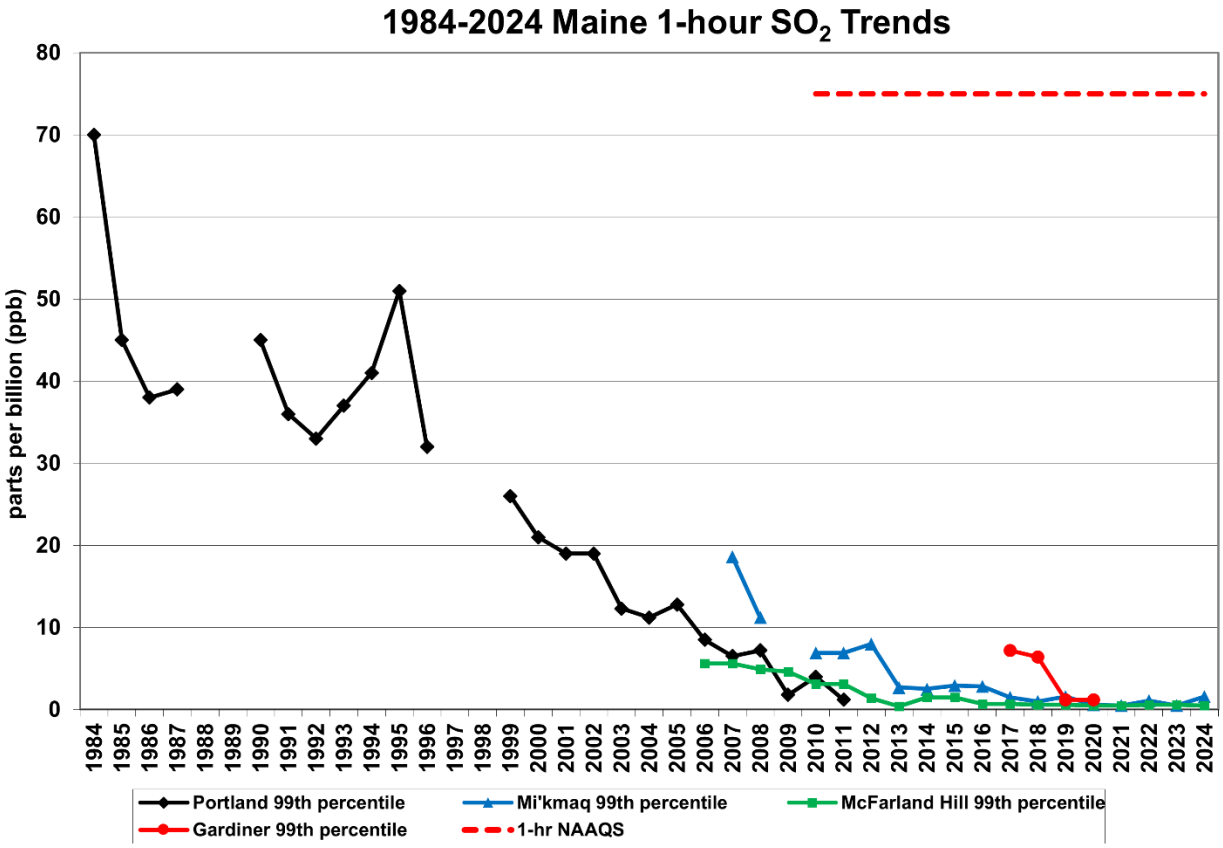

Figure 21: Maine SO_2 1-Hour Trends

Nitrogen Dioxide (NO_2) and Reactive Oxides of Nitrogen (NO_y)

The current NAAQS for NO_2 are as follows:

- 100 ppb as a primary standard, as the 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years; and
- 53 ppb as a primary and secondary standard, as an annual mean.

There are no NAAQS for NO_y.

The locations of monitors for nitrogen dioxide (NO_2) and reactive oxides of nitrogen (NO_y) are shown in Figure 22. NO_y is currently monitored at the NCore site in Acadia National Park. NO_2 is currently monitored in Portland at the Deering Oaks site. The Mi'kmaq operated an NO_2 monitor in Presque Isle until spring 2025 when their monitor stopped functioning. Figure 22 depicts 1-hour concentration trends for all NO_2 monitors in Maine.

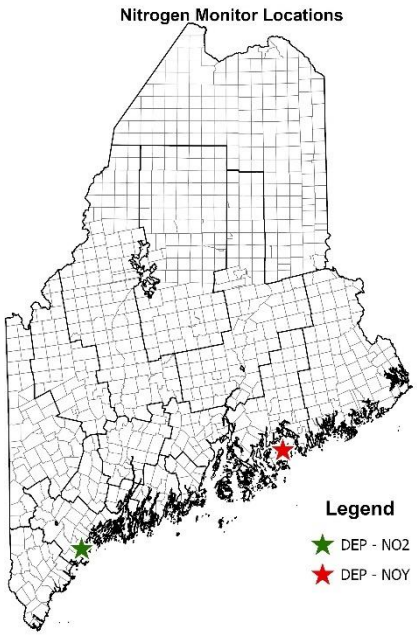

Figure 22: Maine and Tribal Nitrogen Oxides Monitoring Network

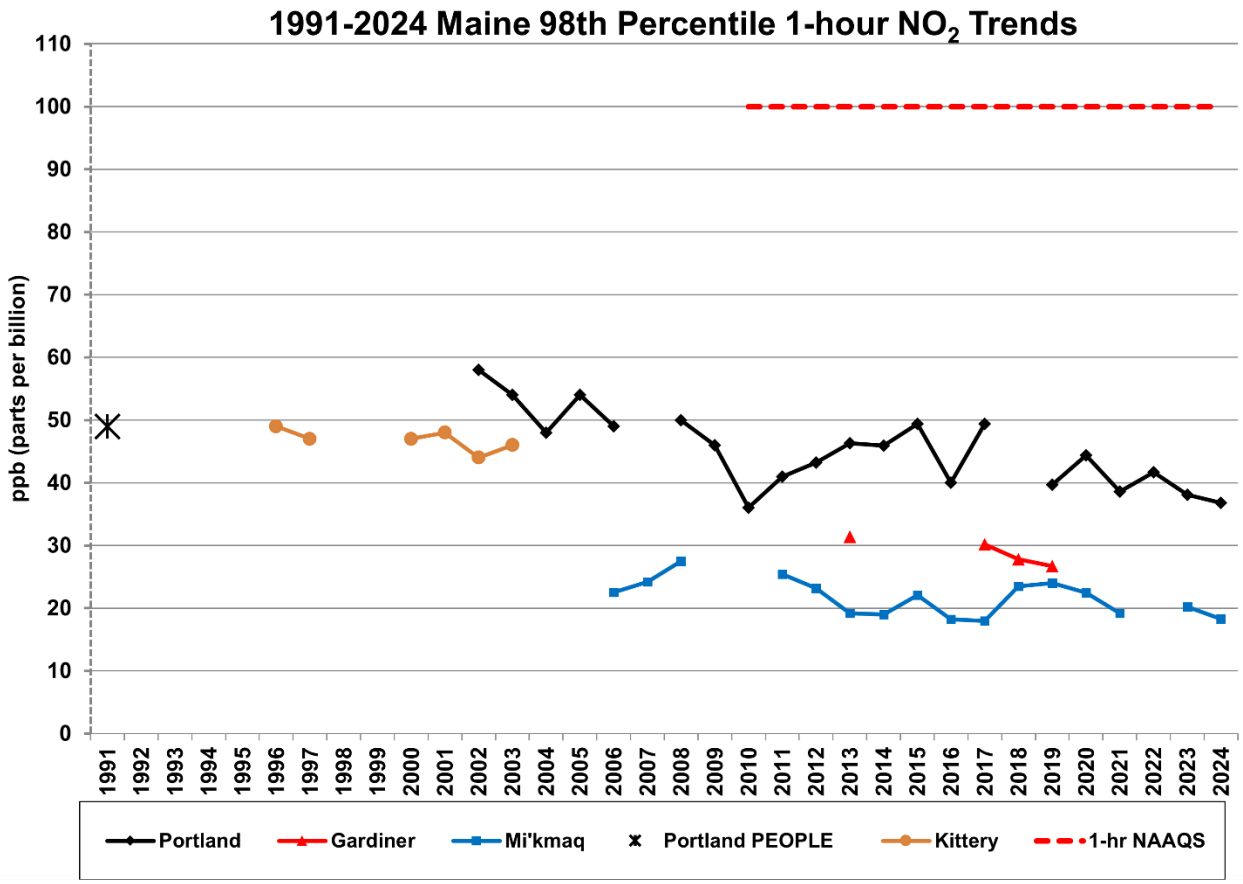

Figure 23: Maine NO_2 1-Hour Trends

Future NO_2 Monitoring Network

When the DEP relocates the current Portland monitoring site, the new site will include a monitor for NO_2.

Lead (Pb)

In 2008, EPA promulgated a new lead standard and issued minimum monitoring requirements. At that time, Maine was to be required to operate one monitor in the Portland Core-Based Statistical Area (CBSA). In anticipation of meeting this requirement, the DEP purchased an X-ray fluorescence (XRF) analyzer to analyze PM_{10} filters for lead concentrations in-house, in lieu of contracting long-term with an outside lab. The XRF analyzer also provided the DEP with the ability to determine ambient levels of a couple dozen trace metals, many of which are on Maine's Air Toxics Priority List (i.e., pollutants in need of ambient air quality data). The EPA lead monitoring requirement was subsequently revised to require lead monitoring at urban NCore sites only. Maine's Bar Harbor NCore site is designated as a rural site, so there was no requirement for lead monitoring in Maine.

Having already acquired the XRF analyzer, the DEP determined it would still be worthwhile to update Maine's understanding of state background levels of lead and other trace metals and began

analyzing previously collected and archived PM_{10} filter samples. In addition, to make the most and best use of Maine's XRF capability, the DEP offered this analytical service to other Northeast states' air monitoring programs essentially at cost and at a much more affordable rate than that available from the very few other labs performing XRF analyses. In response, Rhode Island's Department of Environmental Management opted to have Maine conduct their lead analyses during their lead monitoring requirement, which was in place from 2011 – 2015.

Having lead and trace metals data determined by the same analytical method offers an opportunity within the Northeast to look for regional trends, distributions, and relevance of background concentrations using data collected and analyzed by a common set of procedures.

Future Lead Monitoring

The XRF owned by the DEP is currently nonfunctional. The DEP plans to retain ownership of this instrument, but at this time cannot justify the high cost of repair.

Maine's Hazardous Air Pollutants Monitoring

Maine monitors year-round for multiple hazardous air pollutants (HAPs) including photochemical organics, in 11 Maine cities and towns. Although this is a major component of Maine's ambient air monitoring program, it is not required by federal regulation 40 CFR Part 58, *Ambient Air Quality Surveillance*. Figure 24 indicates the locations and type of monitoring conducted at these sites. EPA Method TO-15 is employed to sample and analyze selected compounds from the Maine Air Toxics Initiative's Air Toxics Priority List. These monitors provide concentration data for air toxics and guide the selection of specific toxic air pollutants for study and further evaluation. The DEP conducts ongoing evaluation of appropriate toxic air pollutants to monitor following TO-15 National Air Toxics Trends Stations (NATTS) protocols.

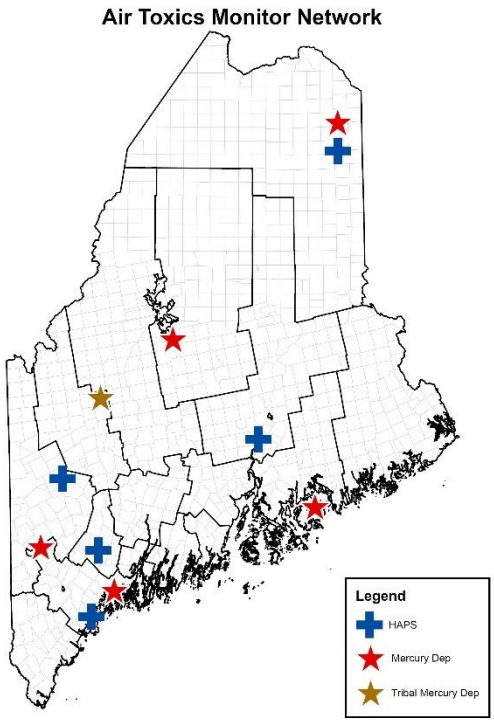

Figure 24: Hazardous Air Pollutants Monitoring Network

The HAPs monitoring conducted in Maine provides background and baseline data for the pollutants monitored. Data from these sites is analyzed to determine impacts and to identify any trends in ambient air levels of these compounds, possibly identifying contributing factors to specific health problems identified in localized areas.

Maine's ambient air toxics concentrations are used as inputs to EPA's AirToxScreen analysis. DEP reviews AirToxScreen data to compare Maine data to other locations throughout the U.S.

The most recent AirToxScreen results are available for the year 2020. These data were made available to the public in May 2024.

Several of the PAMS program target compounds are also considered hazardous air pollutants. DEP conducted continuous HAPs monitoring during the ozone season at the Cape Elizabeth through 2022 and Cadillac Mountain through 2015. Historically, year-round HAPs monitoring via TO-15 at Cape Elizabeth began in 2014 and continued until June 2019.

In addition to routine HAPs monitoring, DEP initiated a large special purpose monitoring program in Portland and South Portland focused on ambient HAPs concentrations in June 2019. This project originally consisted of the DEP Portland – Dearing Oaks HAPs monitoring site, and seven additional HAPs monitoring sites in Portland and South Portland municipalities to conduct middle and neighborhood scale ambient air monitoring to assess public health risks.

The Department HAPs monitoring efforts include measurements of some of the most prevalent combustion by-products: benzene, toluene, ethylbenzene, and xylenes (BTEX compounds). The EMP auto-GC measurement data from the Cape Elizabeth help estimate local versus transported pollutant concentrations of the BTEX compounds at other sites. Enhanced ozone and PAMS data also provide more than a decade of measurements that can be used to evaluate trends. Figure 25 indicates a significant decline in overall annual average BTEX concentrations in the late 1990s and much smaller variations in recent years. Year-round monitoring data is available to be examined in conjunction with enhanced ozone data for more in-depth analyses of patterns in pollutant concentrations.

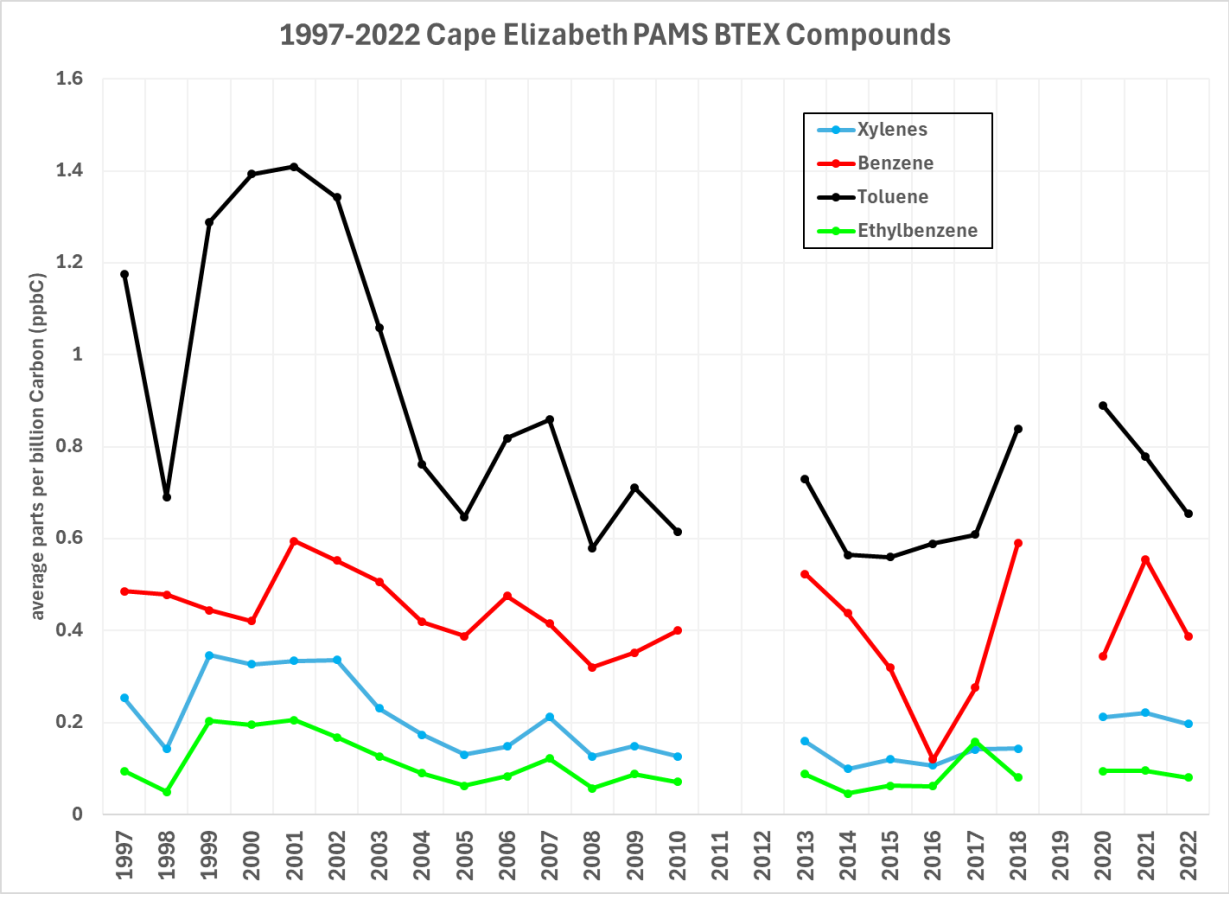

Figure 25: CETL Annual Average BTEX Compounds

Figure 26 illustrates benzene monitoring results from five of Maine's year-round toxic air pollutant monitoring sites during the period 2019-2023. The annual cycle of measured benzene reveals higher concentrations in the colder months and lower concentrations during the warmer months. In addition, the data points for the individual sites indicate a slight decline in baseline values throughout the state. Using the long-term data compiled from the Department's HAP monitoring sites, the Department can evaluate trends for any of the monitored compounds.

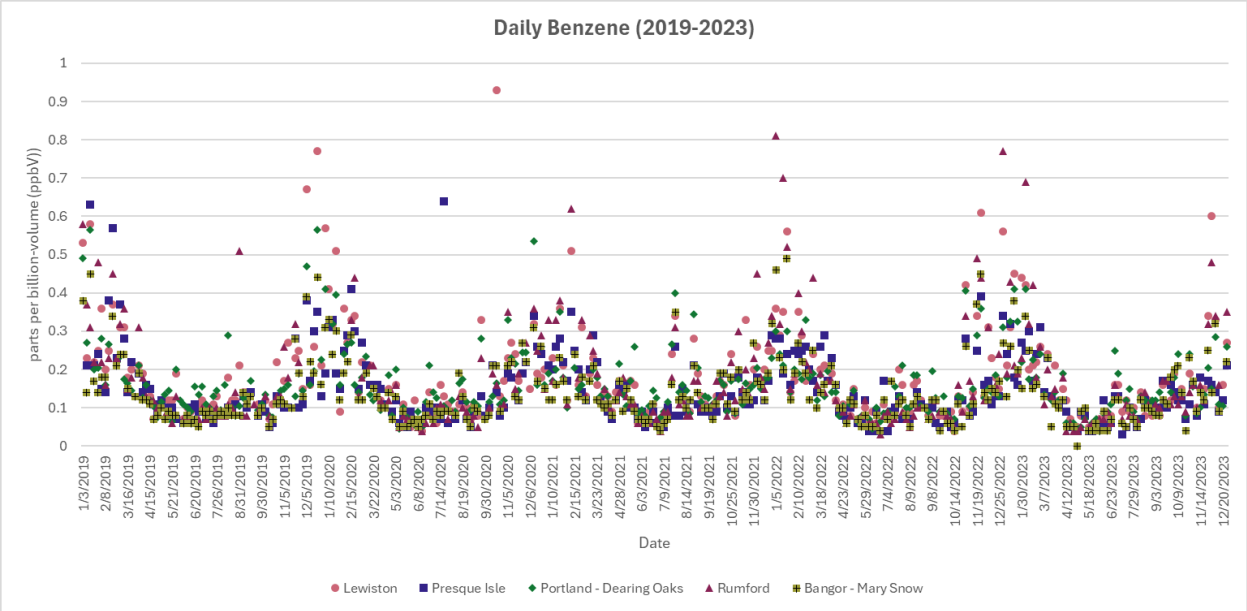

Figure 26: Daily Benzene Data - State Monitoring Network

Future HAPs Monitoring Network

The DEP is currently working with the City of Portland to relocate our Portland - Dearing Oak monitoring site to another location in the city, combining with the Portland – Ocean Gateway special purpose monitoring site used to assess local health risks. Figure 27 shows the benzene concentrations for these two sites. Ocean Gateway has a slightly elevated baseline compared to Dearing Oaks.

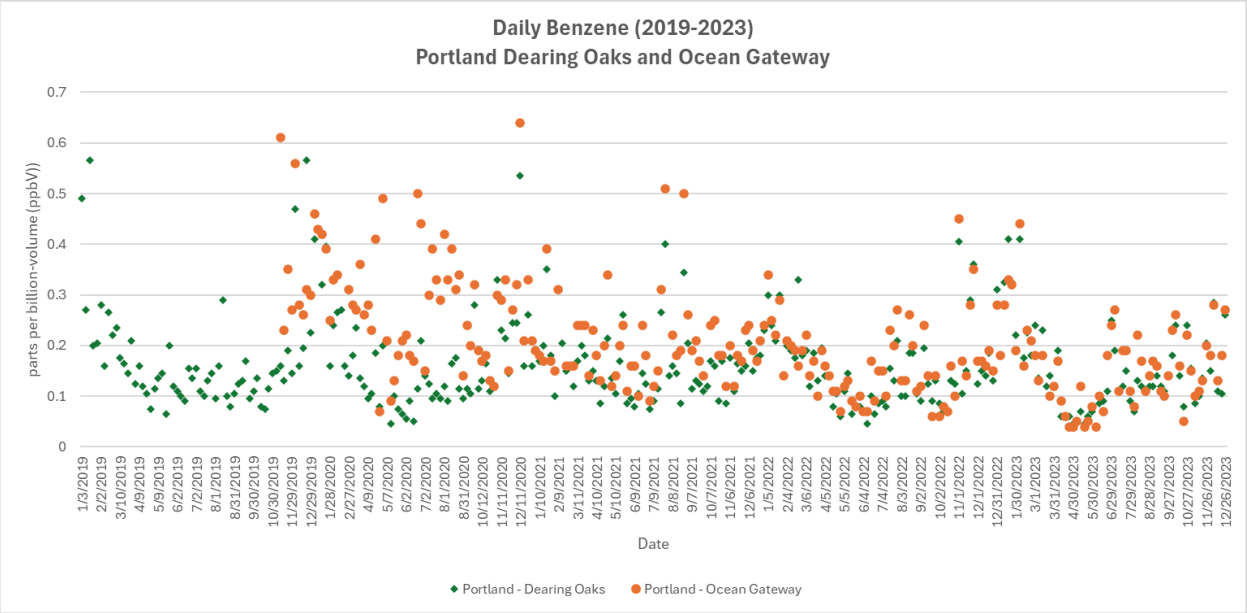

Figure 27: Daily Beneze - Portland

Maine's Atmospheric Deposition Monitoring

The National Atmospheric Deposition Program (NADP) was organized in 1977 under the leadership of the State Agricultural Experiment Station (SAES) program to increase understanding of the causes and effects of acidic precipitation on agricultural crops, forests, rangelands, surface waters, and other natural and cultural resources. The National Trends Network (NTN), a long-term precipitation chemistry monitoring network of wet-only deposition sites, distant from point source emission influences, began operation in 1978 collecting one-week-long bulk precipitation samples. Samples were analyzed by the Central Analytical Laboratory at the University of Illinois in Champaign. In March 2018, the Central Analytical Laboratory was moved to the Wisconsin State Laboratory of Hygiene at the University of Wisconsin-Madison. The parameters listed in the table below were analyzed to determine amounts, temporal trends, and geographic distributions of the atmospheric deposition of acids, nutrients, and base cations by precipitation.

Wet Deposition Chemistry Parameters

Calcium	Magnesium	Potassium
Sodium	Ammonium	Nitrate
Chloride	Sulfate	Bromide
Free acidity (as pH)	Specific conductance	Orthophosphate (for QA purposes)

Sites in the NTN benefit from having identical siting criteria, operating procedures, a common analytical laboratory, as well as a common quality assurance program. Presently, there are approximately 250 sites nationally in the NTN. The locations of NTN sites in Maine are identified in Figure 28. Sites within this network in Maine were established as follows:

Site Location	Year Established	Establishing Agency	Discontinued?	Notes
Greenville	1979	University of Maine		Relocated to Greenville Airport in 2022
Caribou	4/1980	National Oceanic and Atmospheric Admin. NOAA)		
Bridgton	9/1980	Maine DEP		
Acadia National Park, Paradise Hill	11/1980	National Park Service	Yes	Relocated to McFarland Hill
McFarland Hill	11/1981	National Park Service		
Presque Isle	6/1984	NOAA	Yes	9/30/1988
Freeport	1/1998	Maine DEP		As part of the three-year Casco Bay Estuary Air Deposition Project
Gilead (White Mtn. National Forest)	9/1999	U.S. Geological Survey		
Carrabassett Valley	3/2002	Penobscot Indian Nation		
Near Scraggly Lake	6/2002	Passamaquoddy Tribe	Yes	Ended in 2006; replaced by Indian Township site
Indian Township	10/2013	Passamaquoddy Tribe		

In 1996, a Mercury Deposition Network (MDN) was created within NADP to provide information on the wet deposition of this pollutant to surface waters, forested watersheds, and other receptors, helping to understand the contribution of air pollution to water pollution. Samples from this network were analyzed by a central laboratory for total mercury and may also be analyzed for methyl mercury to provide data on amounts, temporal trends, and geographic distributions of the atmospheric deposition of mercury and mercury containing compounds by precipitation. Presently, there are approximately 110 sites nationally in the MDN. Eleven upwind states have been identified as the most significant contributors to mercury deposition in Maine. The locations of MDN sites in Maine are identified in Figure 28. Monitoring sites within this network in Maine were established as follows:

Site Location	Year Established	Establishing Agency	Discontinued?	Notes
McFarland Hill in Acadia National Park, Bar Harbor	3/1996	Maine DEP and the National Park Service		
Greenville (collocated with the NTN site)	9/1996	Maine DEP		Relocated to Greenville Airport in 2022
Bridgton	6/1997	Maine DEP	Identified for discontinuance, but still operating at this time	
Freeport	1/1998	Maine DEP	Identified for discontinuance, but still operating at this time	As part of the three-year Casco Bay Estuary Air Deposition Project
Caribou	5/2007	Maine DEP		
Carrabassett Valley	2/2009	Maine DEP		Collocated with NTN site

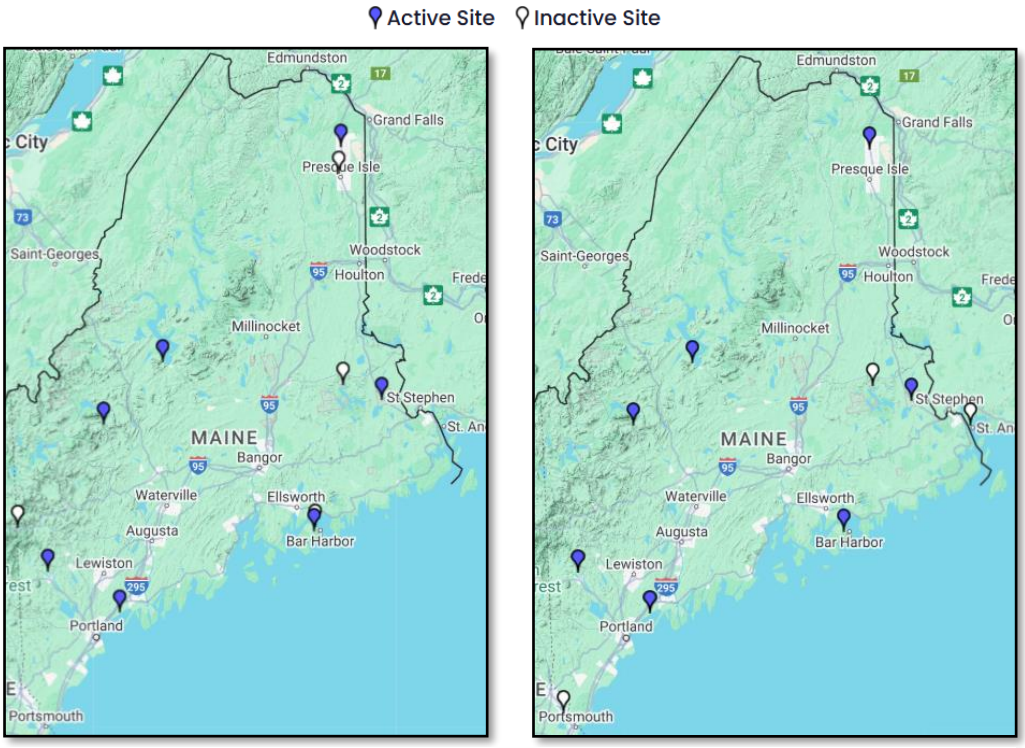

Figure 28: Maine Nation Trends Network (NTN) Stations (Left) and Maine Mercury Deposition Network (MDN) Stations (Right)

NADP data collected from NTN and MDN sites in the U.S. are used to produce national heatmaps of both concentrations and deposition amounts, as shown on pages 39 to 45. All heatmaps and trend plots show widespread reduction in concentrations in NTN parameters and decreased acidity of deposition. Mercury does not show an apparent improvement as many monitoring locations are not mature, and do not have long-term for trend analyses. Trend plots use the two longest consecutively running NTN stations that present southern and central Maine, Bridgeton, and Greenville.

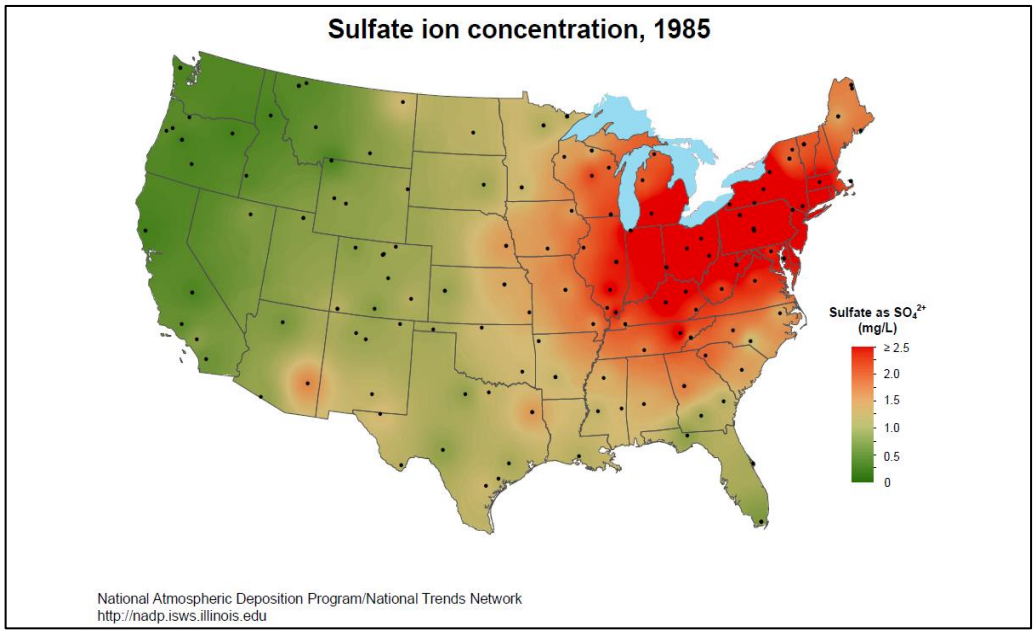

Figure 29: 1985 U.S. sulfate ion concentration heatmap

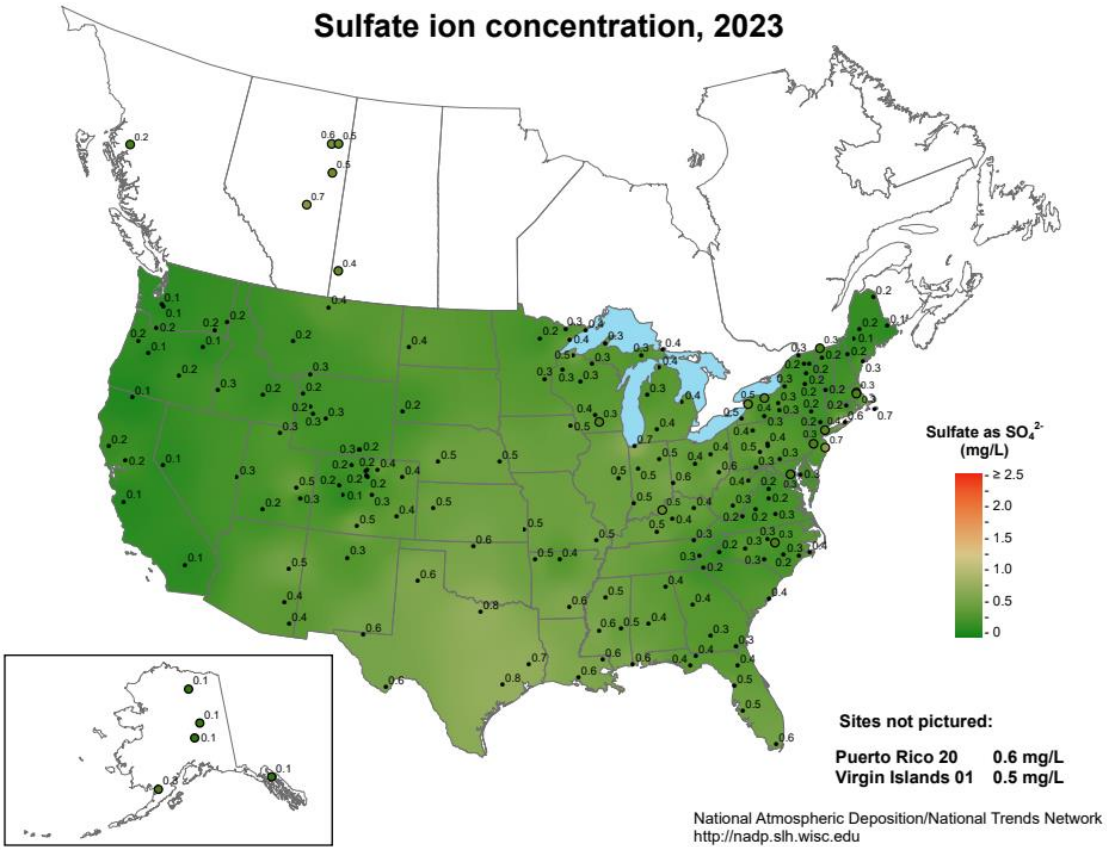

Figure 30: 2023 U.S. sulfate ion concentration heatmap

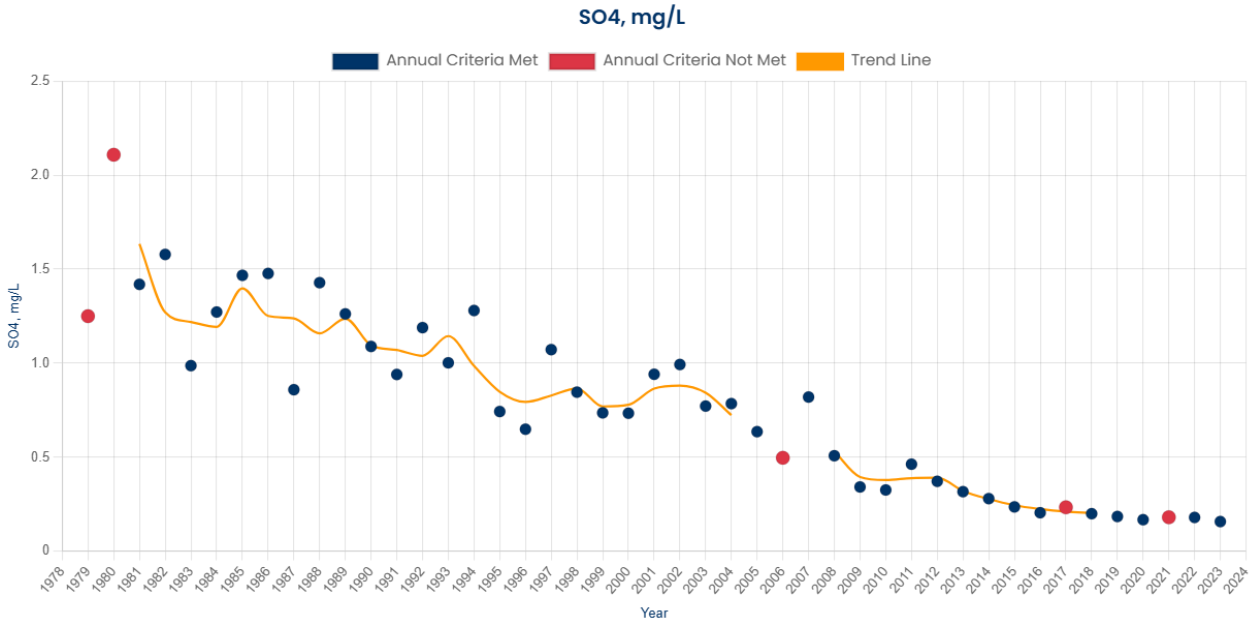

Figure 31:Annual SO_4 concentrations for Greenville

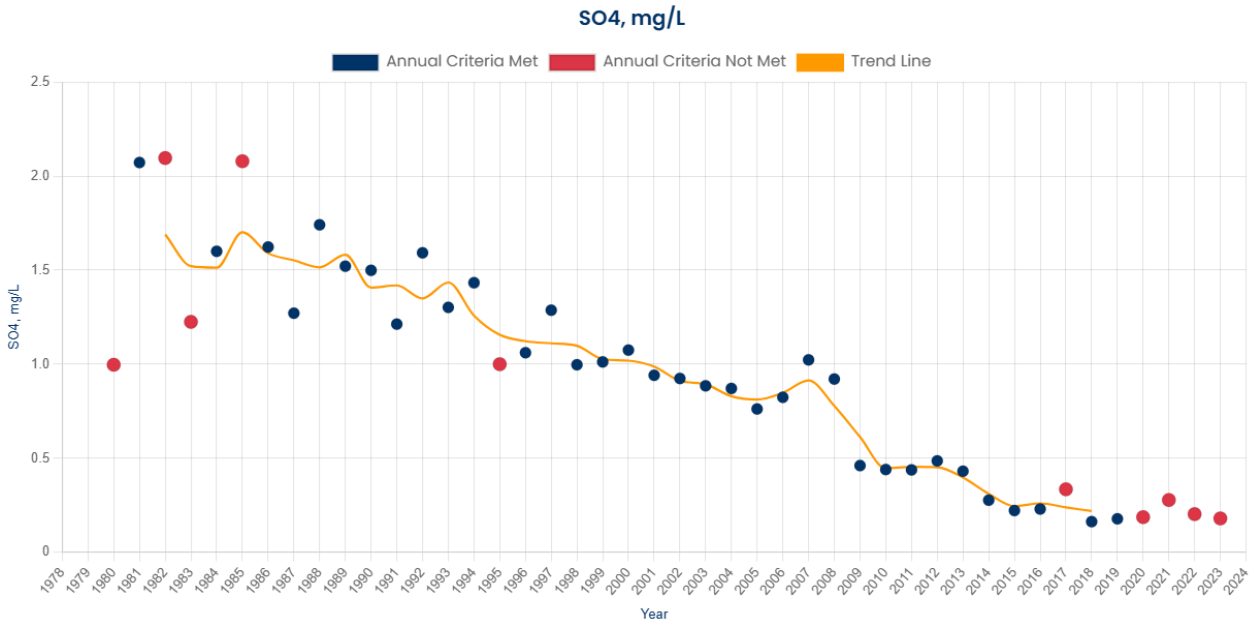

Figure 32: Annual SO_4 concentrations for Bridgeton

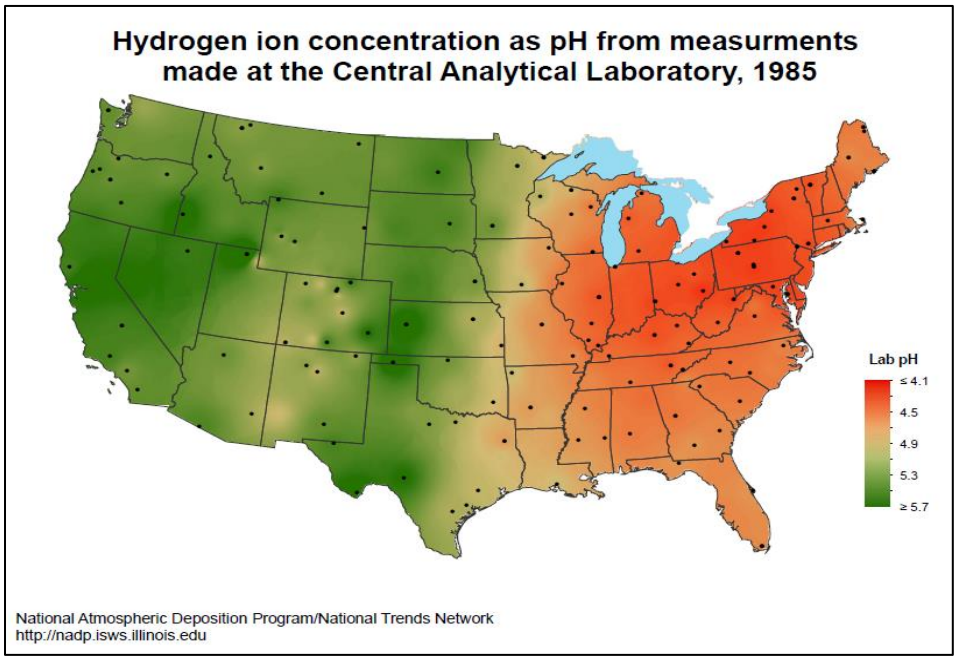

Figure 33: 1985 U.S. Hydrogen Ion concentration heatmap

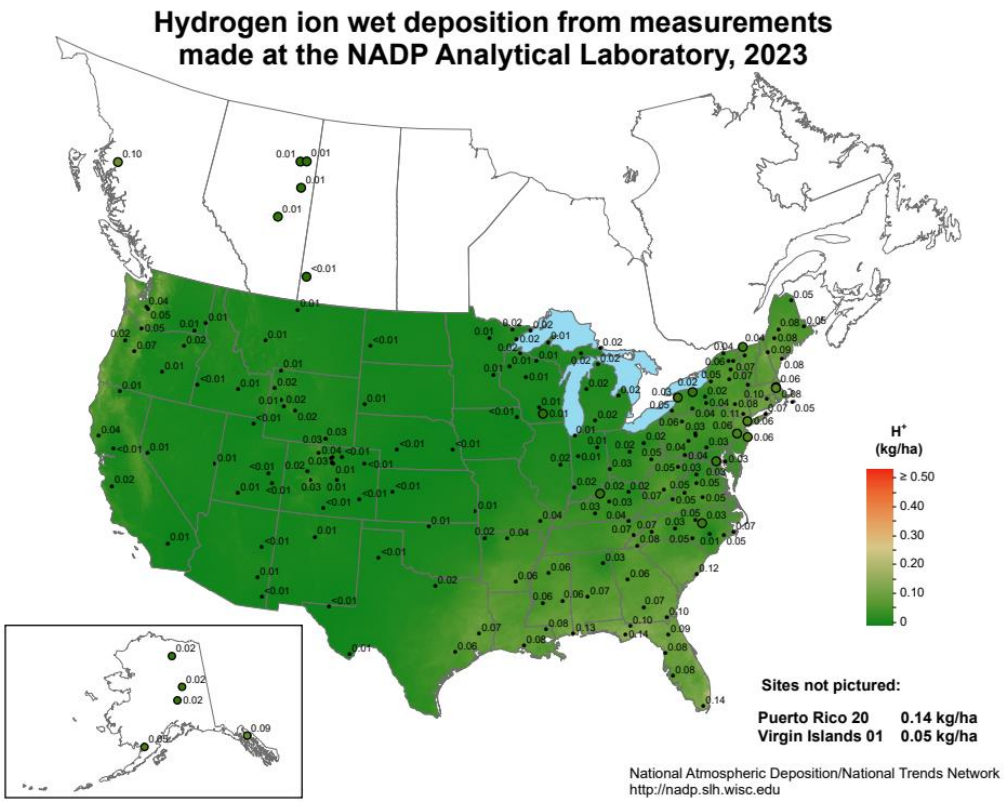

Figure 34: 2023 U.S. Hydrogen Ion concentration heatmap

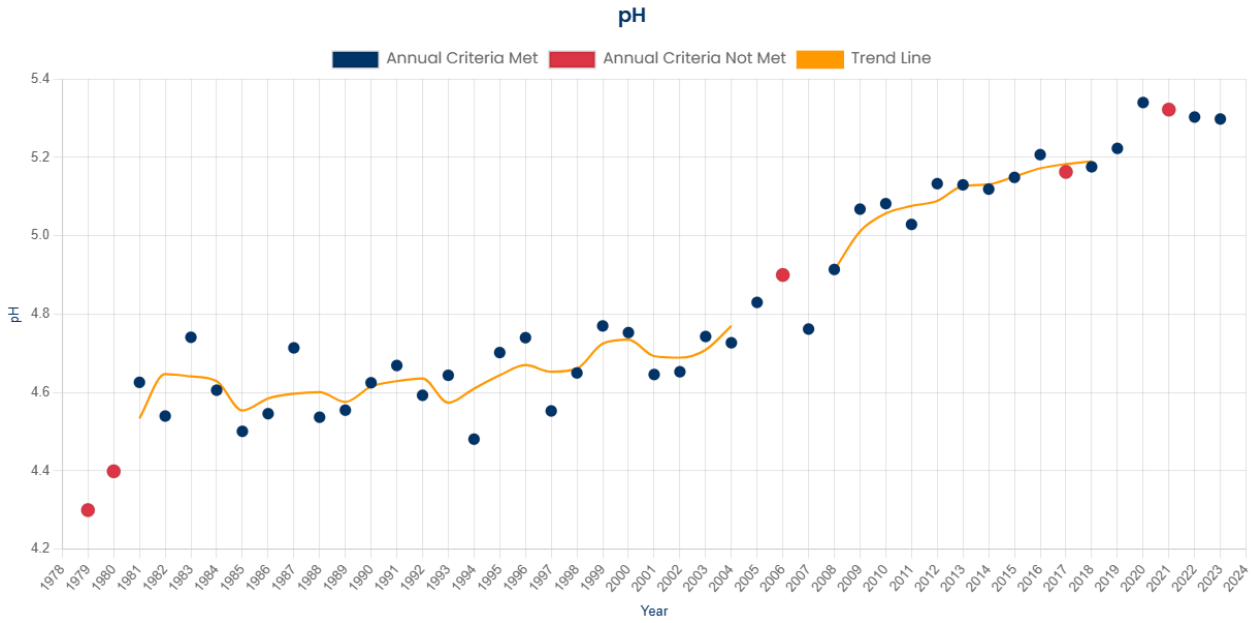

Figure 35: Annual pH values for Greenville

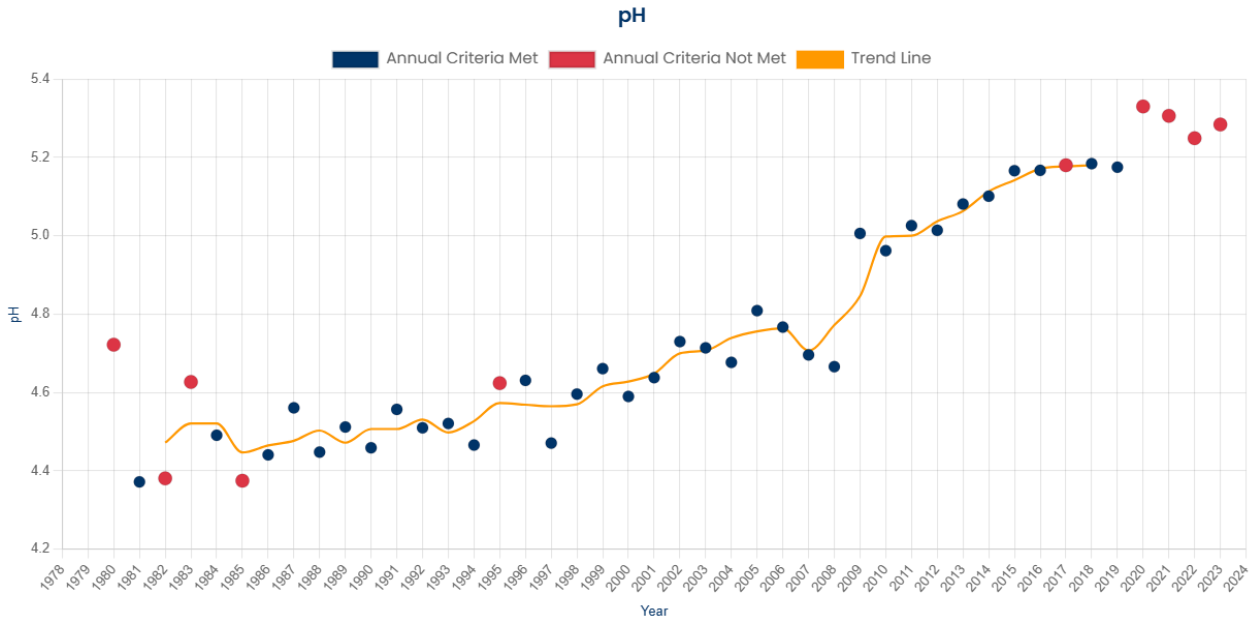

Figure 36: Annual pH values for Bridgeton

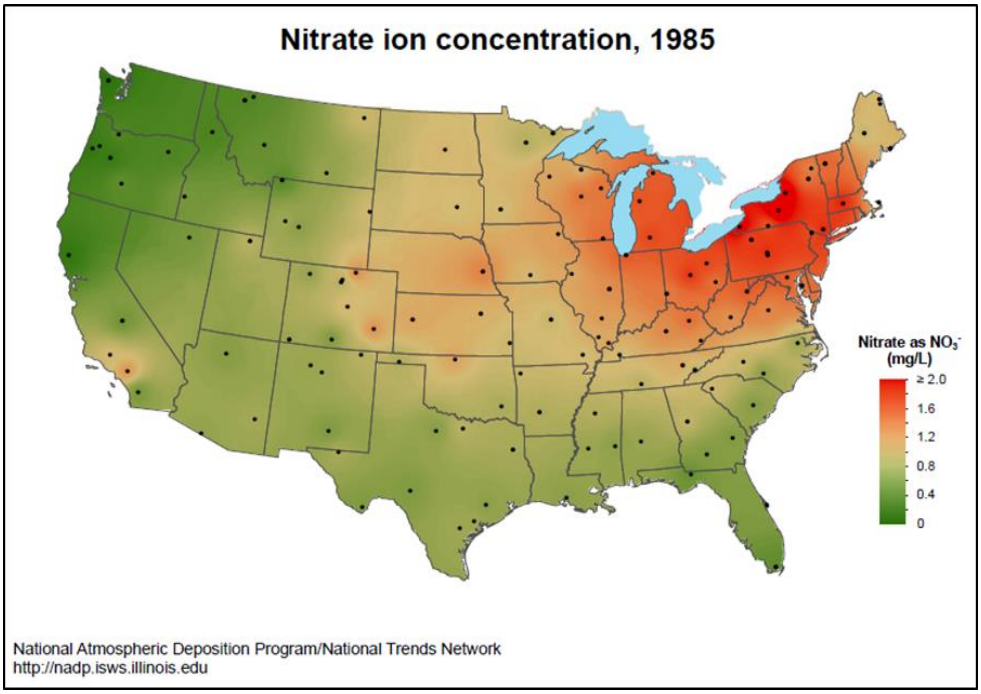

Figure 37: 1985 U.S. nitrate ion concentration heatmap

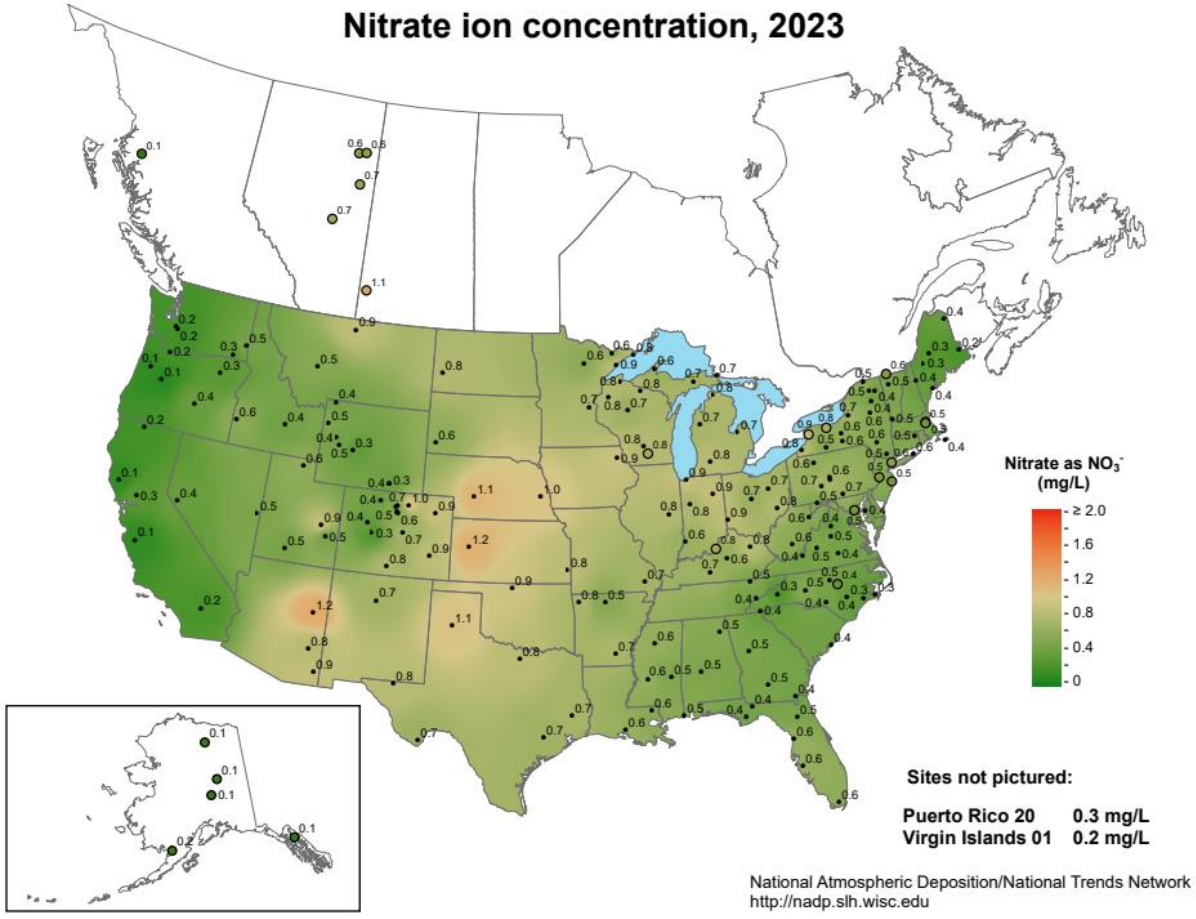

Figure 38: 2023U.S. nitrate ion concentration heatmap

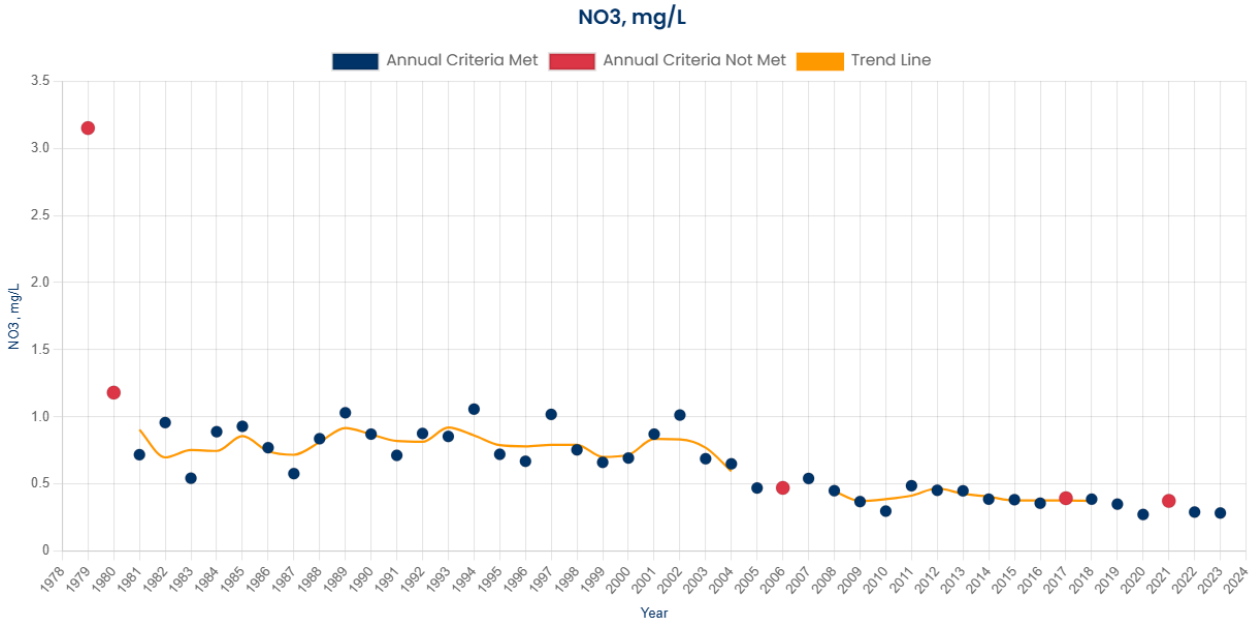

Figure 39: Annual NO_3 concentrations for Greenville

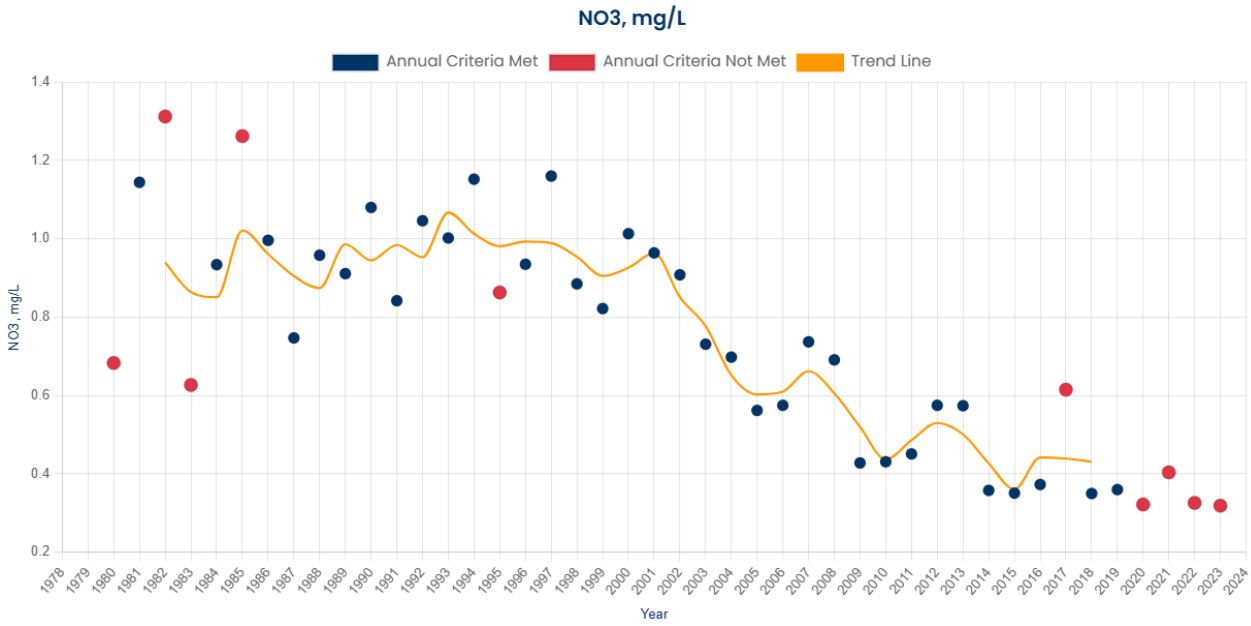

Figure 40:Annual NO_3 concentrations for Bridgeton

Figure 41andFigure 42 show the annual color-shaded contour maps of the MDN sites nationally from 2003 and 2023. Trends are not as readily apparent over the 20-year time period represented by these maps. The appearance of mercury concentrations in the western half of the country between 2003 and 2023 is due in part to the increase in the spatial density of sites in the MDN, which then provides the NADP mapping software with more data source points to use in the interpolation of concentration levels between sites, which sites and data it didn't have in 2003.

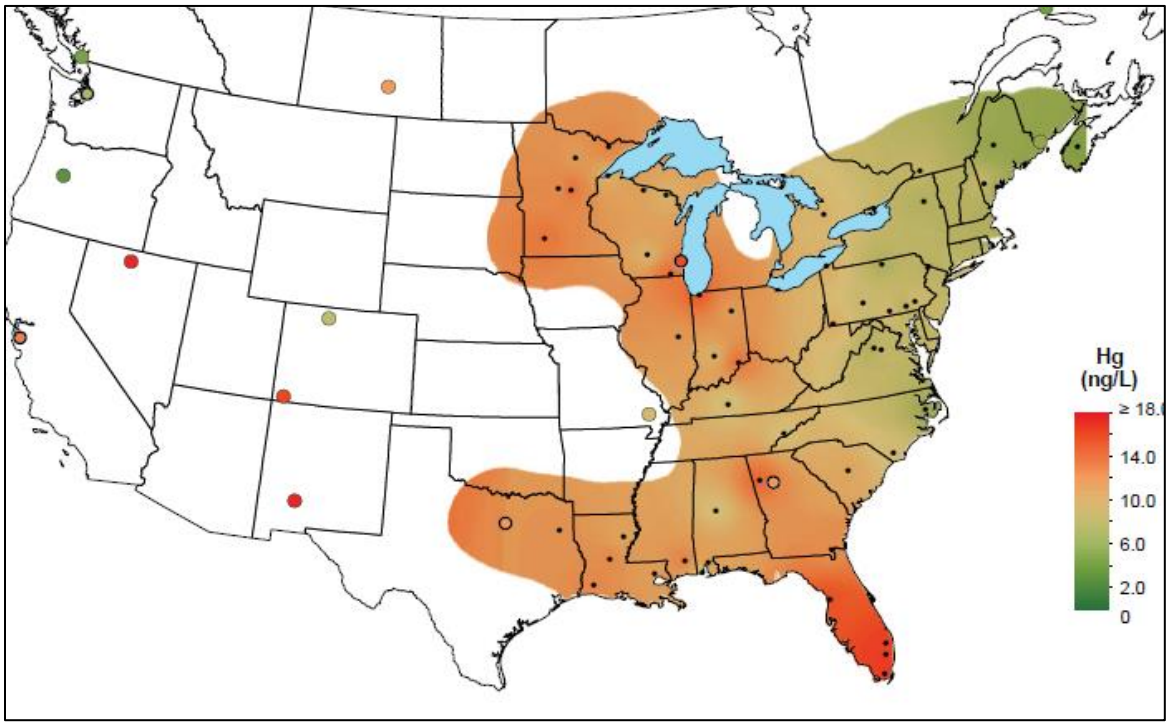

Figure 41: 2003 U.S. mercury concentration heatmap

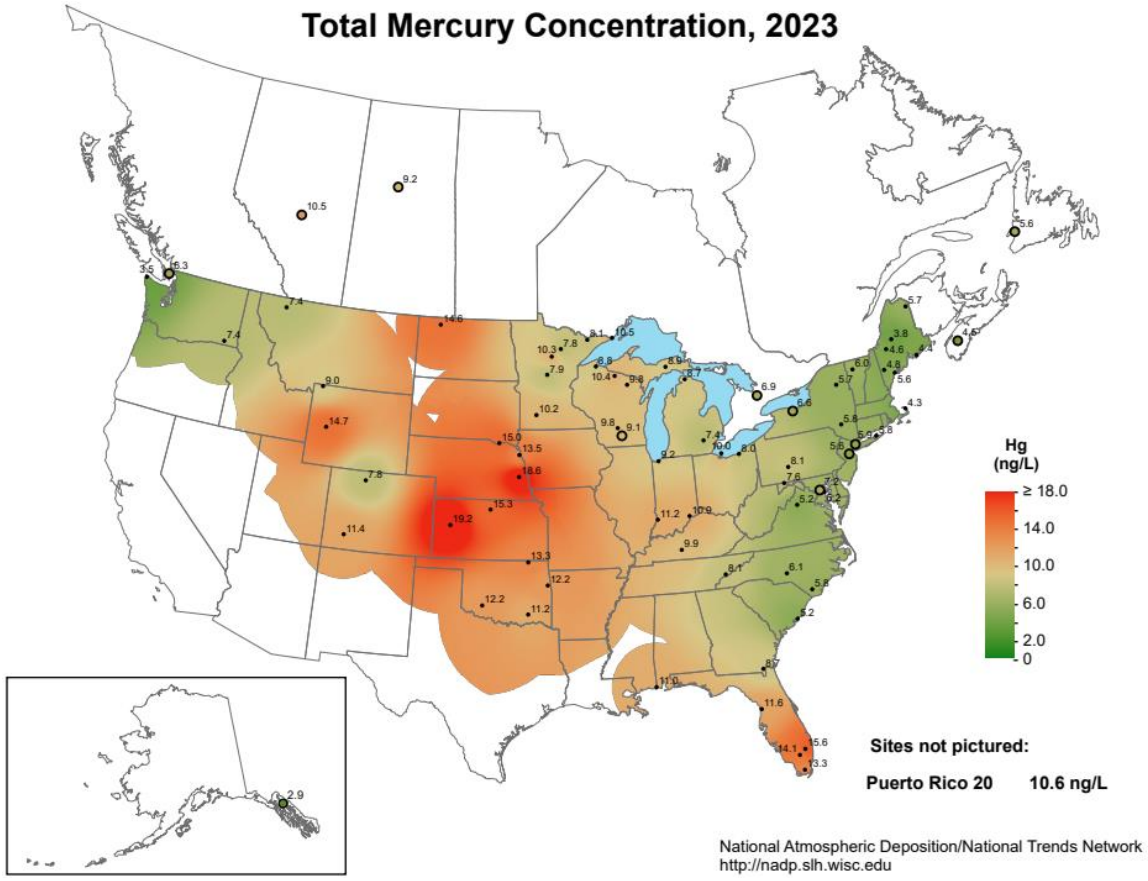

Figure 42: 2023 U.S. mercury concentration heatmap

Future NTN and MDN Monitoring Plans

The State of Maine's DEP plans to continue the statewide NTN and MDN deposition monitoring networks and funding of the sites it currently sponsors. Their data are valuable not only to internal data users, policy makers, and the public, but also to various users representing many other scientific disciplines, such as wildlife biologists, water quality specialists, epidemiologists, atmospheric chemists, government regulators, and academic researchers. In recent years, the Department has taken over both funding and operational support of some of the oldest and longest running sites in the state and the nation. The original sponsoring organizations were faced with funding cutbacks that would have meant the closing of these sites. Specifically, DEP assumed responsibility for the NTN sites at Greenville (ME09) and Caribou (ME00) when the University of Maine and NOAA, respectively, had their funding cut for continued operation of these sites. The shutdown of these two sites would have represented an irreversible loss in continued documentation of long-term deposition trends in Maine and the country with confounding interruption in the dataset. As long as resources allow, Maine is committed to preserving the operational status of the sites currently operated in the state.

In response to the Governor's PFAS (perfluoroalkyl and polyfluoroalkyl substances) Task Force's final report released in January 2020, which recommended that the DEP should "consider establishing an air deposition sampling program for a suite of PFAS," the Department has communicated this interest to and had conversations with the NADP Program Office and the Wisconsin State Laboratory of Hygiene. As part of a pilot subnetwork with funding support from the U.S. EPA Office of Research and Development (ORD) and other invested stakeholder, the NADP program was able to initiate PFAS analysis of NTN samples whenever there was sufficient sample volume in the amount of precipitation collected by the NTN sampler for multiple U.S. collection sites, which included Freeport Maine. This analysis started in late 2020 and has been funded by the U.S. EPA ORD since. Continued funding for this analysis is uncertain. If federal funding for this analysis stops, DEP would like to continue this analysis, but an alternate funding source has not been secured.

Monitoring Equipment Evaluation

The existing inventory of monitoring equipment is adequate to maintain the current network at this time; however, a large portion of the monitoring equipment has surpassed the equipment's expected lifespan, typically 10 years, and are approaching 1.5 * expected lifespan, which is the timeframe the DEP uses to assess needs to procure replacements. Depending on available funds and inclusive costs, the actual equipment replacement cycle for monitoring and laboratory instrumentation is usually longer, approximately 15-20 years. In recent years, DEP has purchased several new continuous particulate monitors (Teledyne T640x), replaced several ozone monitors and calibrators, and are replacing the NCore trace level carbon monoxide.

The Department established short-term special monitoring sites in Augusta, Farmington, and Jay in response to monitoring requests from municipal officials with specific neighborhood health concerns, and the Department will continue to provide such support for future requests. These special monitoring sites, mostly using monitors from the Department's spare equipment inventory, are often temporary arrangements, and the data are representative of only very small,

sub-neighborhood areas. These efforts have served to provide factual data for municipalities and industrial sources to use as a common denominator in further discussion and, in some cases, resolutions. The advancement in low-cost sensors may proliferate more of these special purpose monitoring projects due to the decreased cost of monitoring and reduced staff time. These low-cost sensors have been used in other short-term monitoring projects in Waterville and Patten, and are currently in use in Rumford / Mexico, Portland / South Portland, and Juniper Ridge Landfill monitoring projects.

Quality Assurance Evaluation

EPA policy requires all projects involving the generation, acquisition, and use of environmental data to be planned and documented and to have an EPA-approved quality assurance project plan (QAPP) prior to the start of data collection. The primary purpose of the QAPP is to provide an overview of the project, describe the need for the measurements, and define quality assurance/quality control (QA/QC) activities to be applied to the project, all within a single document. The QAPP is to be detailed enough to provide a clear description of every aspect of the project and include information for every member of the project staff, including samplers, lab staff, and data reviewers. The QAPP facilitates communication among clients, data users, project staff, management, and external reviewers. Effective implementation of the QAPP assists project managers in keeping projects on schedule and within the resource budget. The EPA's QA policy is described in the Quality Manual and EPA QA/R-1, *EPA Quality System Requirements for Environmental Programs.*

Maine currently has three QAPPs in place for various air monitoring programs. The approval and revision status of each is identified in the table below.

QAPP	EPA Approval Date	Current Status
Particulate Matter (PM) NAAQS Pollutants	February, 2021	Currently undergoing revisions and being updated to the new QAPP Standards. A new revised version of this document is expected in 2025.
Gaseous NAAQS Pollutants	February, 2022	Currently undergoing revisions and being updated to the new QAPP Standards. A new revised version of this document is expected in 2025.
Air Toxic Volatile Organic Compound (VOC) Pollutants	September 28, 2004	Currently being rewritten and updated to new QAPP Standards.
Hydrogen Sulfide	None	Currently under development. The first version of the QAPP is expected to be completed in July 2025.

Maine currently operates an extensive quality assurance program that includes auditing of all ambient monitors by staff from the Laboratory and Quality Assurance Section. To evaluate and ensure accuracy of data collected by ambient monitors, lab and QA staff conduct quarterly audits of the instruments, far exceeding minimum EPA requirements.