

Chapter 3

AIR

Key issues facing Utah's air

- 3.A** Uinta Basin Ozone Improving with Increased Industry Efficiency
- 3.B** The Impacts of Drought on Great Salt Lake Dust Emissions
- 3.C** Utahns' Beliefs and Behaviors Related to Air Quality
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YELLOW LAKE WILDFIRE SMOKE IN OAKLEY, UT | AARON FORTIN

Chapter Introduction

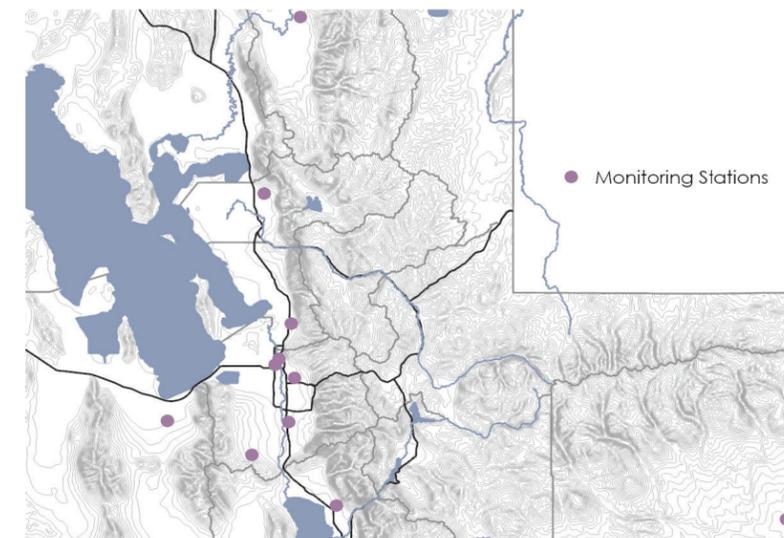
BRIAN STEED

Air quality remains a top concern in Utah. High-pressure events naturally trap air in Northern Utah's valleys, holding pollutants in the state's most populated areas. Wildfire and summer ozone have emerged as additional threats to our air quality.

In the Uinta Basin, winter ozone, linked to oil and gas production, has been the main issue. The good news is that both urban and rural Utah have made substantial progress in air quality. PM_{2.5} (particulate matter under 2.5 microns) levels have improved, with fewer bad air days, thanks to policy adaptations, new technology, and better public awareness—a reason to celebrate.

That being said, there are emerging concerns about less-measured pollutants. While monitoring of PM_{2.5} and summer ozone has increased, the state has under monitored PM₁₀ (particulate matter or dust under 10 microns). Blowing dust from the drying Great Salt Lake seems to be more common along the Wasatch Front, and halogens, ammonia, and other airborne pollutants may be cause for greater vigilance. The solution to these newer concerns is a more robust monitoring network. Although the state has invested in new equipment, further efforts are needed to understand and respond to air quality concerns.

Figure 3.I.1 Air quality monitoring sites near Great Salt Lake



Source: Utah Division of Air Quality



YELLOW LAKE WILDFIRE SMOKE IN OAKLEY, UT | AARON FORTIN

Uinta Basin Ozone Improving with Increased Industry Efficiency

SETH LYMAN

The Uinta Basin is on track to meet the EPA's ozone standards, thanks to industry emission reductions, but there is still work to do.

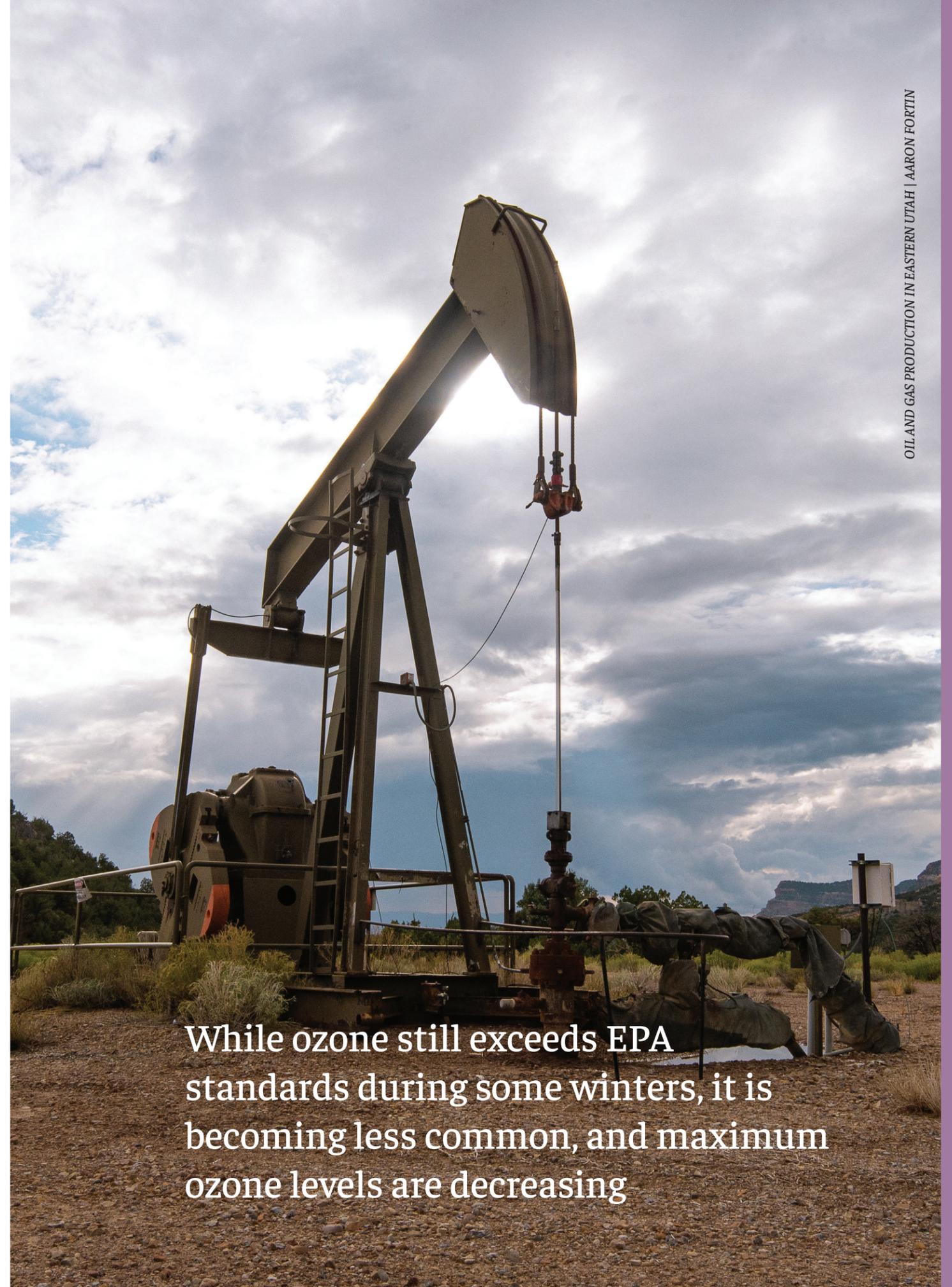
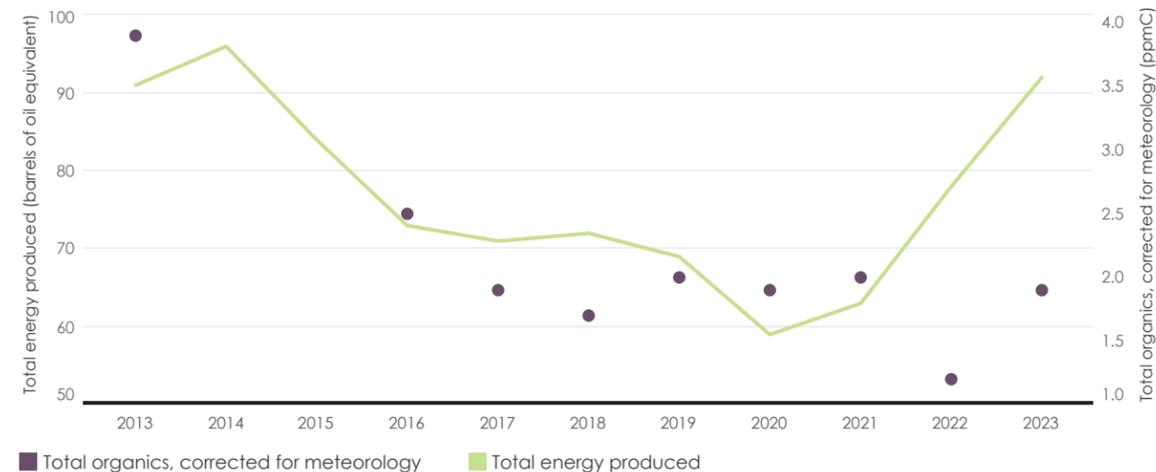
During winters with strong temperature inversions and snow cover, Uinta Basin ozone levels exceed Environmental Protection Agency standards. The largest source of ozone-forming pollution is the local oil and gas industry, a key driver of the local economy. High ozone threatens public health, and regulations targeting the oil and gas industry have the potential to harm economic development.

Energy production in the Uinta Basin rose until 2014 and then declined through 2020. But in 2021, persistent high energy prices led to a surge in production, as shown in the figure. Even as oil and gas activity has increased, however, pollution levels have remained flat when corrected for meteorological conditions. This indicates that improvements in new oil and gas infrastructure results in less pollution emissions than older infrastructure.

Since the issue was first discovered in 2009, regulatory changes and voluntary action by the oil and gas industry have led to decreases in ozone and related pollutants. While ozone still exceeds Environmental Protection Agency standards during some winters (most recently in January and February 2023), it is becoming less common, and maximum ozone levels are decreasing.

Because of this progress, this year the Environmental Protection Agency has begun the process to classify the Uinta Basin ozone levels as attaining air quality standards. More work is needed because high ozone still occurs during years like 2023, when there were many strong inversions and the basin experienced deep snow cover. The good news is that cooperative efforts by many partners are addressing this long-standing problem.

Figure 3.A.1 Total energy produced compared to total pollution (2013-2023)



While ozone still exceeds EPA standards during some winters, it is becoming less common, and maximum ozone levels are decreasing



GREAT SALT LAKE DUST NEAR FARMINGTON BAY | MOLLY BLAKOWSKI

The Impacts of Drought on Great Salt Lake Dust Emissions

MOLLY BLAKOWSKI & JANICE BRAHNEY

Policymakers need to remain vigilant on the potential for emissive dust from the exposed playa of Great Salt Lake. Additional monitoring is likely required to provide accurate data for addressing this issue.

Great Salt Lake has fallen to unprecedented low levels, exposing hundreds of square miles of dry lakebed to the atmosphere. Recent studies have traced metal-laden dust from the lakebed across the Wasatch Front, raising considerable concerns for public health.

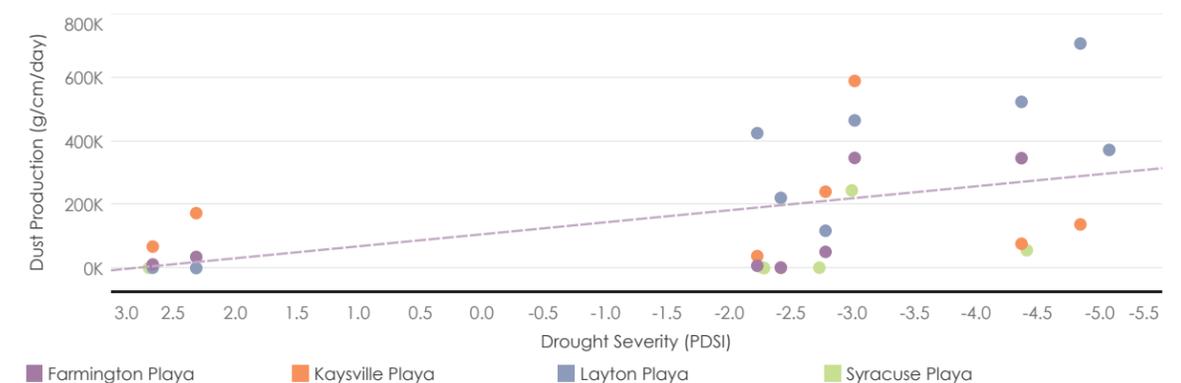
Between 2019 and 2021, Utah State University researchers have maintained a network of wind erosion samplers on the dry lakebed of Great Salt Lake. The amount of dust produced varied greatly by site, with most exhibiting the highest rates of wind erosion in 2021 (Figure 3.B.1). The research team found a significant association between dust production and drought conditions, which worsened between 2019 and 2021. Droughts reduce soil moisture and make soil surfaces more susceptible to emitting fine dust when bombarded by large, bouncing particles during high wind events. At the site with the highest rates of dust production, the research team found that particle size

became more fine over time in response to the weathering of protective surface crusts in the surrounding area.

Paired with drought conditions, a gradual breakdown of surface crusts may lead to more frequent, low-intensity dust events of fine lakebed sediments by relatively low wind speeds. While particles of any size can impact human and ecosystem health, finer particles require less wind energy to travel farther from the lakebed, such as to the Wasatch Mountains, where they may speed snowmelt by laying down a layer of dark material on the white snow, increasing the absorption of the heat from the sun.

In addition to this project, researchers are also investigating different pathways through which populations may be exposed to harmful metals in Great Salt Lake dust, as well as evaluating the sources of metal pollution that have accumulated in lakebed sediments over time.

Figure 3.B.1 Rates of dust production from four wind erosion monitoring sites across the dry lakebed plotted against drought severity



Utahns' Beliefs and Behaviors Related to Air Quality

SYDNEY O'SHAY & MEHMET SOYER

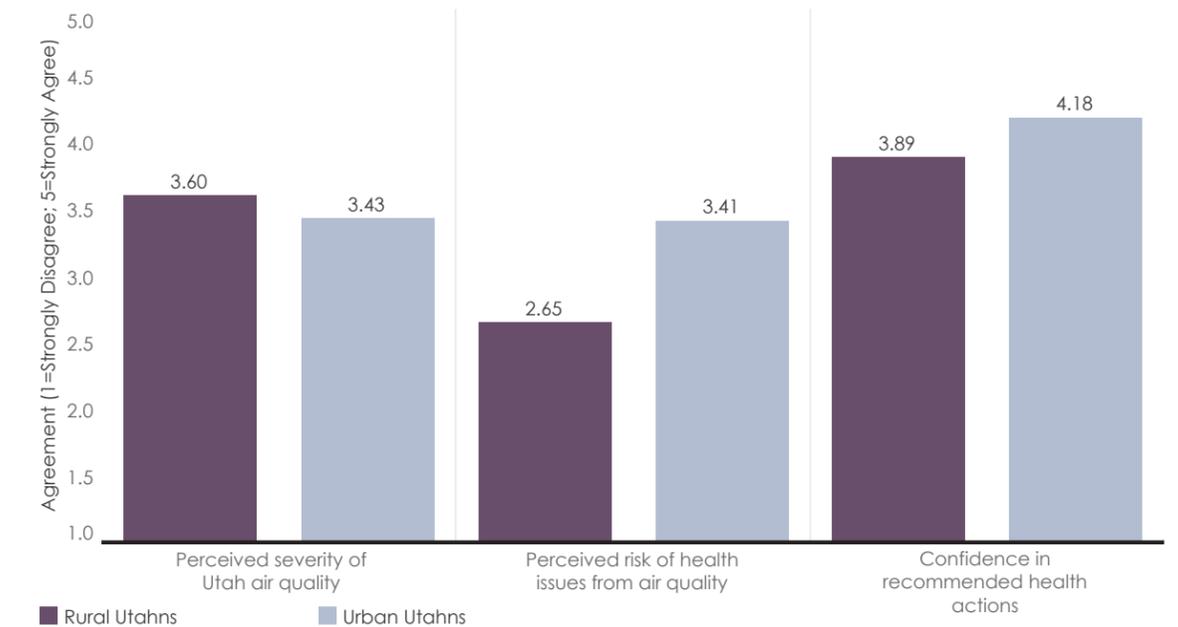
Air quality health messaging and solutions should address the distinct ways urban and rural Utahns think about and respond to Utah's air quality.

Air quality is one of the top environmental concerns for Utahns today.^{3C} Health risks associated with air pollution can range from mild physiological impacts to death from cardiovascular and respiratory disease.^{3C}

Attitudes and behavior regarding air pollution and associated health risks vary among Utahns. According to findings from the 2023 Utah People and the Environment Poll (Figure 3.C.1), people living in urban areas view air pollution as a greater health risk compared to those

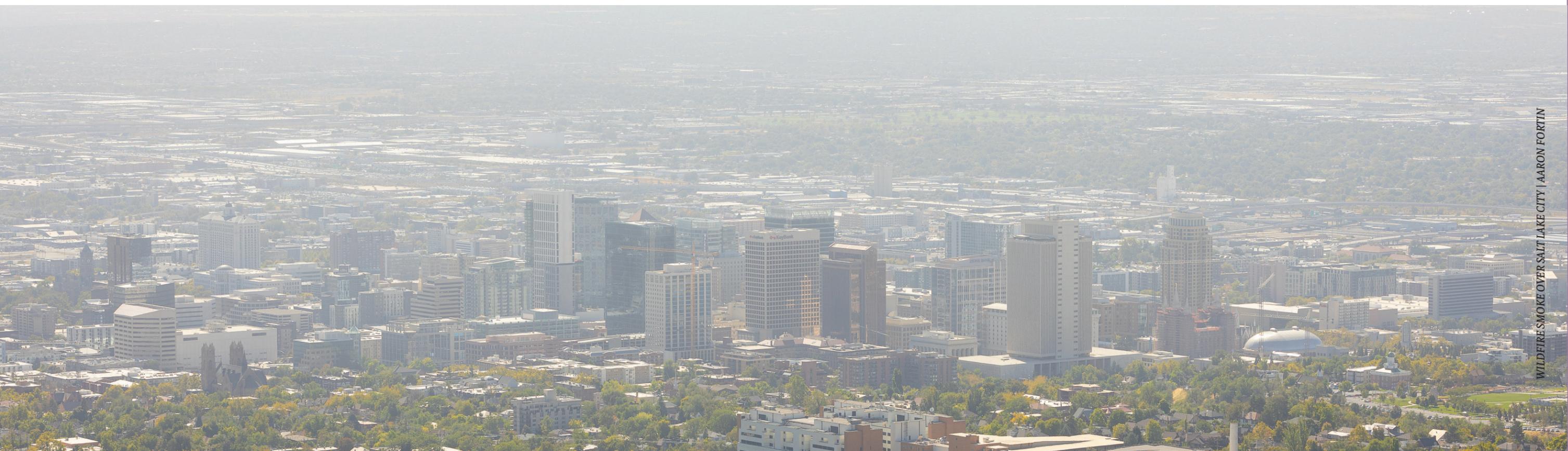
in rural areas. Urban areas experience air pollution differently than in rural parts of the state. As a result, urban Utahns are more likely to protect themselves by using an air purifier or avoiding strenuous outdoor activities on poor air quality days. On the other hand, because rural Utahns don't experience air pollution as a persistent risk, they are less likely to take action during poor air quality events unless the air pollution is severe enough, such as with wildfire events.

Figure 3.C.1 Rural and urban Utahns' perceptions of severity, health risk, and recommended health actions related to poor air quality



These findings can be used to improve air pollution messaging techniques of policy makers, health practitioners, and communicators. Proposed solutions to air quality issues will be more effective if they're crafted in ways that target urban and rural Utahns' specific needs. Messaging and solutions should avoid instilling fear while

also helping Utahns recognize the risks air pollution poses, encourage confidence in combating pollution while planning ahead for bad air days, and provide resources that enable Utahns to act, such as affordable public transportation or e-bike and air purifier rebate programs.



WILDFIRE SMOKE OVER SALT LAKE CITY | AARON FORTIN

Uneven Extreme Heat Distribution in Salt Lake City

WEI ZHANG

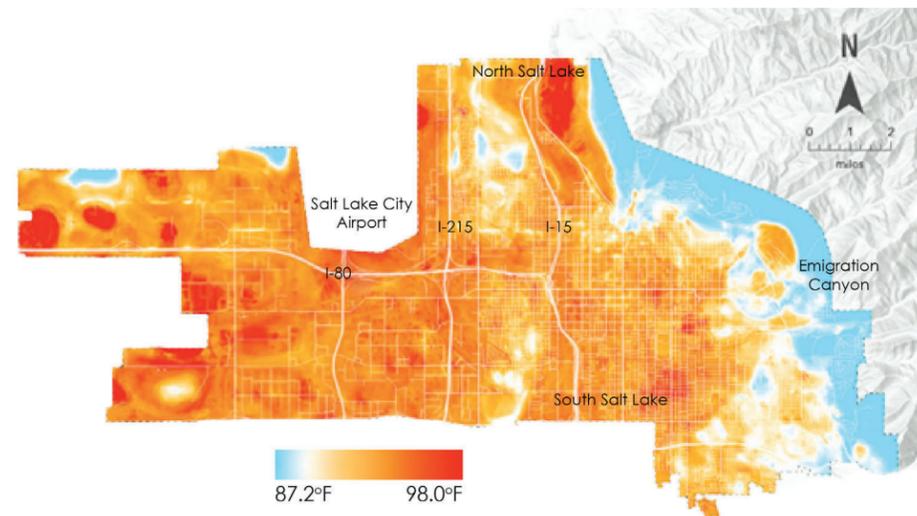
Data from a Heat Watch campaign in July 2023 shows extreme heat can impact the west side of Salt Lake City more than the east side.

Extreme heat is one of the deadliest natural disasters, and its impacts are not evenly distributed across places and communities. People living in underserved communities are typically hit the hardest by the effects of extreme heat. Historically, data on extreme heat events has lacked sufficiently detailed geographic coverage. With support from the National Oceanic and Atmospheric Administration's National Integrated Heat Health Information System, a team led by Utah State University scientists accomplished a Heat Watch campaign in Salt Lake City in July 2023. The detailed heat mapping results—based on 58,707 temperature measurements over an area of 72.6 square miles—show that the west side of Salt Lake City suffers more extreme heat than the east side (Figure 3.D.1). Among the reasons for this difference are that the west side of the city has less tree coverage,

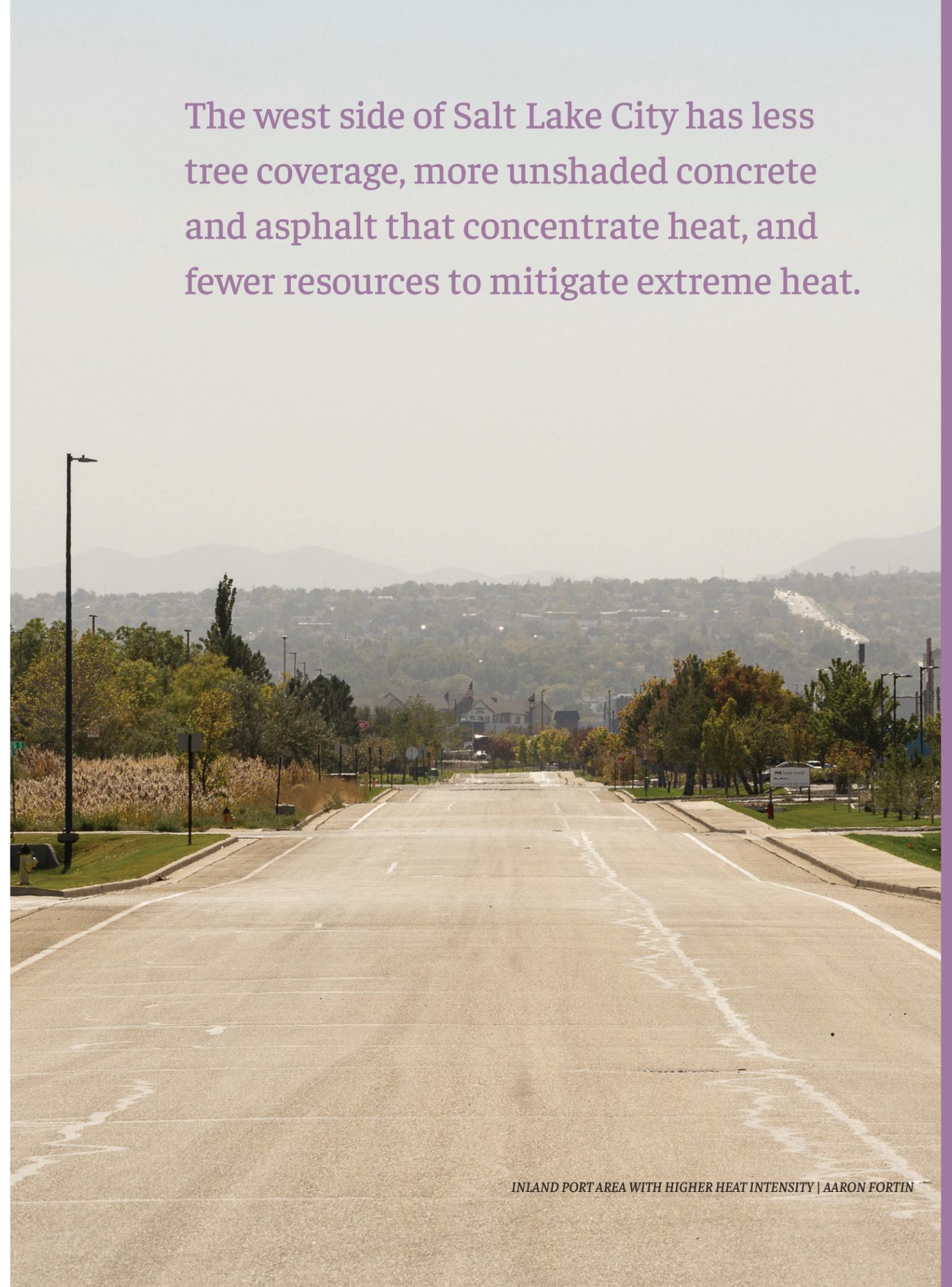
more unshaded concrete and asphalt that concentrate heat, and fewer resources to mitigate extreme heat. This campaign lays the groundwork for future adaptation efforts amidst escalating extreme heat risks. By employing community engagement and sensor innovations, a high-resolution heat description has been developed for the region, fostering local partnerships to address the inequitable risks associated with extreme heat.

Utah State University's co-leadership in the Center for Collaborative Heat Monitoring, funded by the National Oceanic and Atmospheric Administration, empowers communities through science-based observations and data collection on local heat impacts. Utah's proactive stance exemplifies its crucial role in tackling nationwide extreme heat challenges.

Figure 3.D.1 Heat mapping results for Salt Lake City for 3-4 pm in summer 2023



The west side of Salt Lake City has less tree coverage, more unshaded concrete and asphalt that concentrate heat, and fewer resources to mitigate extreme heat.



INLAND PORT AREA WITH HIGHER HEAT INTENSITY | AARON FORTIN

Filling an Education Gap: Utah's Statewide Clean Air Marketing Contest

EDWIN STAFFORD & ROSLYNN MCCANN

The statewide contest offers thousands of teens essential context about Utah's air quality and empowers them with practical ways to make a difference.

Now celebrating its ten year anniversary, the Utah High School Clean Air Marketing Contest has engaged over 6,500 teens on the topic of air pollution in Utah, teaching responsible transportation strategies and helping them understand how to preserve air quality in their own communities. The contest message focuses on practical strategies: limiting idling, carpooling, taking the bus, trip-chaining, biking, and avoiding the drive-thru. Combining environmental science, art, and savvy marketing, teens are given the opportunity to create public service announcements to promote clean air actions that appeal to their high school peers and to Utah citizens.

Contest entries are often funny, edgy, and provocative—reflecting teen culture. Participants win cash and gift cards donated by Utah businesses, foundations, and

citizens. This year over a thousand teens across the state participated, from Whitehorse High School on the Navajo Nation in the south to Preston High School in Idaho (which shares northern Utah's airshed in Cache Valley).

Surveys conducted after the contest show that teens have a greater willingness and commitment to act in ways that will preserve air quality, such as shutting off their engines and sharing rides. Teens report persuading their parents to do the same in what is called “the inconvenient youth” effect. Parents also generally welcome such interactions. This research has shown a gap in Utah school curricula on air quality and pollution, even though it is a high-profile and high-impact issue affecting everyone in the state. Most participants reported that the contest offered the only formal clean air education they recall receiving.

Figure 3.E.1 Selected winners from the 2024 contest



The contest message focuses on practical strategies: limiting idling, carpooling, taking the bus, trip-chaining, biking, and avoiding the drive-thru.

The Wasatch Front is Making Progress on PM_{2.5} Levels

RANDY MARTIN

Despite growth in population, PM_{2.5} levels have generally decreased along the Wasatch Front over the past decade.

Small particulate matter (PM) measuring 2.5 microns or less across the Wasatch Front is monitored at several locations in order to assess air quality. As is widely known, airborne particulate matter is a large concern because Utah's air is impacted by the way weather patterns, population growth, wildfire smoke, pollution from various industries and transportation, and topography all intersect to create challenges to Utah's air quality. Higher levels of PM_{2.5} affect human health but also affect how the state is perceived by visitors and recreators from outside the state.

quality monitoring, and upgrades to industries that have historically contributed to air pollution have been working together to improve Utah's air. One of the interesting observations of PM_{2.5} levels over the last decade is that while population has grown along the Wasatch Front, overall PM_{2.5} levels have declined. This shows that such collaboration has produced some positive results; however, as shown in Figure 3.F.1, it must be noted that northern Utah's airsheds are only a bad (i.e. stagnant) winter away from excessive violations (see 2021 and 2023).

PM_{2.5} is one of the measurements that the Environmental Protection Agency uses to determine whether Utah is attaining healthy levels of cleaner air. During the past decade, legislation, management and policy, air

This past wildfire season was one of Utah's busiest in years in terms of human-caused wildfires (Figure 3.F.2). There are some interesting correlations between days when PM_{2.5} levels were higher and times when

Figure 3.F.1 Chronological Northern Utah 24-hr 98th percentile PM_{2.5}

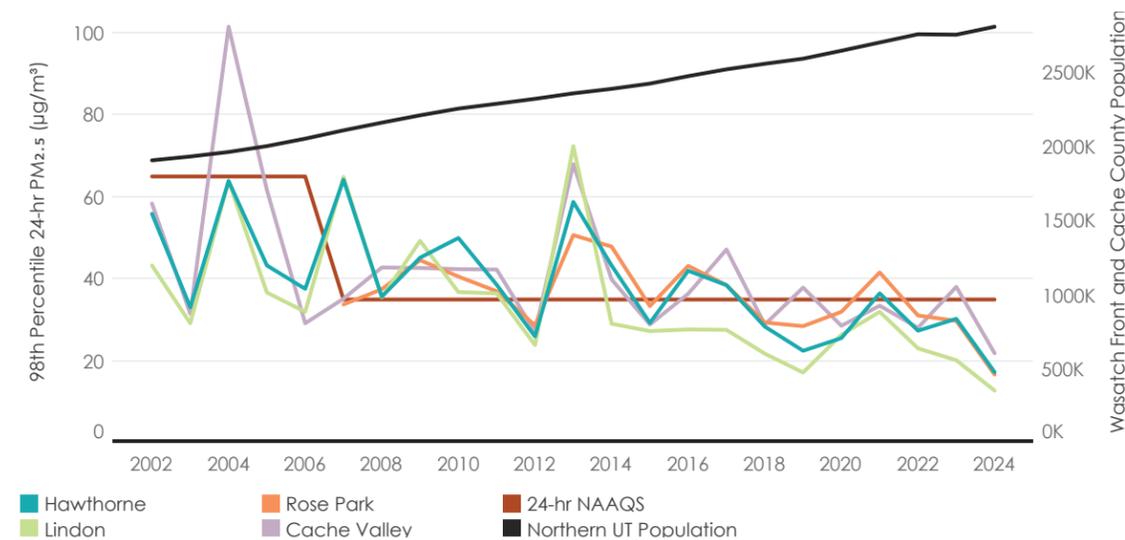
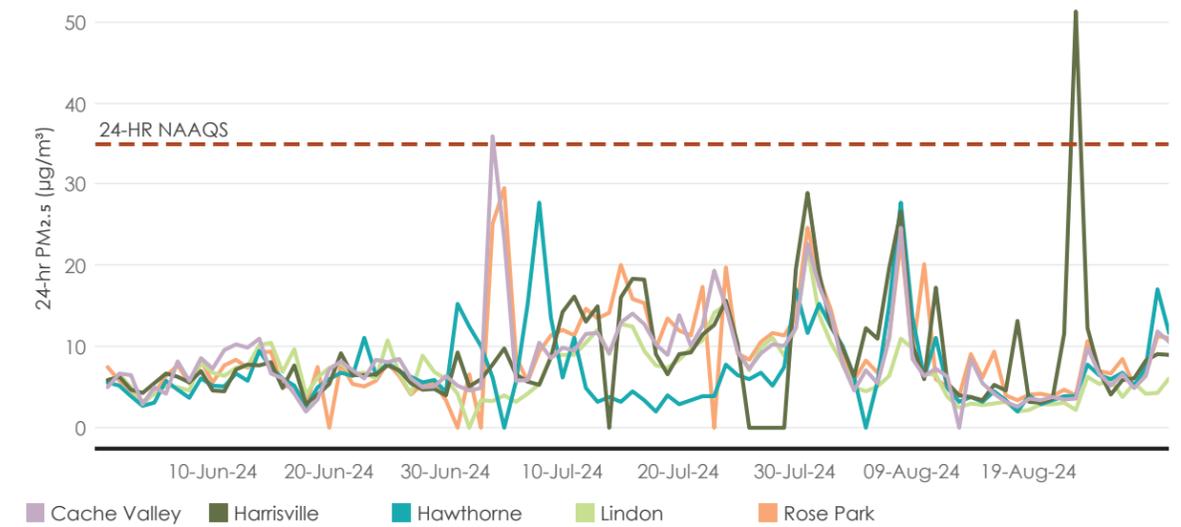


Figure 3.F.2 Summer 2024 newsworthy hazy smoke days

July 15-17	August 2-3
July 23-24	August 6-10
July 28-31	August 28-30

Figure 3.F.3 PM_{2.5} levels through summer 2024



the air was filled with trapped smoke due to weather patterns. This was particularly true for events in mid-July and early August (Figure 3.F.3). Some of that smoke came from Utah's fires, but some was also attributed to wildfires burning in other states. While Utahns must continue to work together to improve our state's contributions to air pollution and manage the size of Utah wildfires, we are still sometimes subject to outside influences on our air quality.

Additionally, on Feb. 24, 2024, the U.S. EPA announced a revision to the annually averaged PM_{2.5} standard, lowering from 12 µg/m³ to 9 µg/m³. As shown in the Figure 3.F.4, over the past 3-year averaging period, several monitoring locations showed year-to-year violations of the new standard, but only the Near Road location in the central Salt Lake City valley showed consistent and regulatory-enforceable exceedance of the 3-year average relative to the new annual standard.

Figure 3.F.4 Three-year average PM_{2.5} by monitoring station

	2021	2022	2023	Average
Smithfield (SM)	9.26	7.52	7.55	8.1
Harrisville (HV)	8.10	6.60	5.85	6.9
Bountiful (BV)	9.42	7.18	7.26	8.0
Rose Park (RP)	9.43	8.55	6.69	8.2
Hawthorn (HW)	8.43	7.31	7.85	7.9
Near Road - SLC (NR)	11.4	9.88	9.45	10.1
Lindon (LN)	8.20	7.23	6.69	7.4

Utah's AIR in the news

As we've tracked Utah and national news through 2024, we have compiled some of the key air issues and topics that have appeared in media outlets this year.

1. PAUSE ON EPA OZONE RULE

In 2024, the U.S. Supreme Court halted the EPA's Good Neighbor rule, which sought to curb interstate ozone pollution. This decision temporarily blocks the rule's implementation, affecting how Utah and other states manage cross-border air quality impacts. The ruling has created uncertainty around future air pollution regulations and compliance measures in Utah.

2. AIR QUALITY IMPACTS ON UTAH'S ECONOMY

Air pollution is increasingly impacting Utah's economy, affecting industries like tourism and raising concerns for the 2034 Olympic Winter Games. Poor air quality can deter visitors and disrupt outdoor events, which are key economic drivers. A Utah Foundation study showed support for environmental protection, but enthusiasm wanes if solutions increase costs, highlighting the challenge of balancing clean air with economic interests.

3. WEST SIDE AIR QUALITY

Recent news coverage in 2024 highlighted how air pollution disproportionately affects residents on the west side of Salt Lake Valley. Proximity to industrial sites, highways, and prevailing wind patterns has led to higher pollution levels in these communities. Concerns about long-term health impacts have sparked calls for targeted air quality improvements in the area.

4. SUMMERTIME OZONE

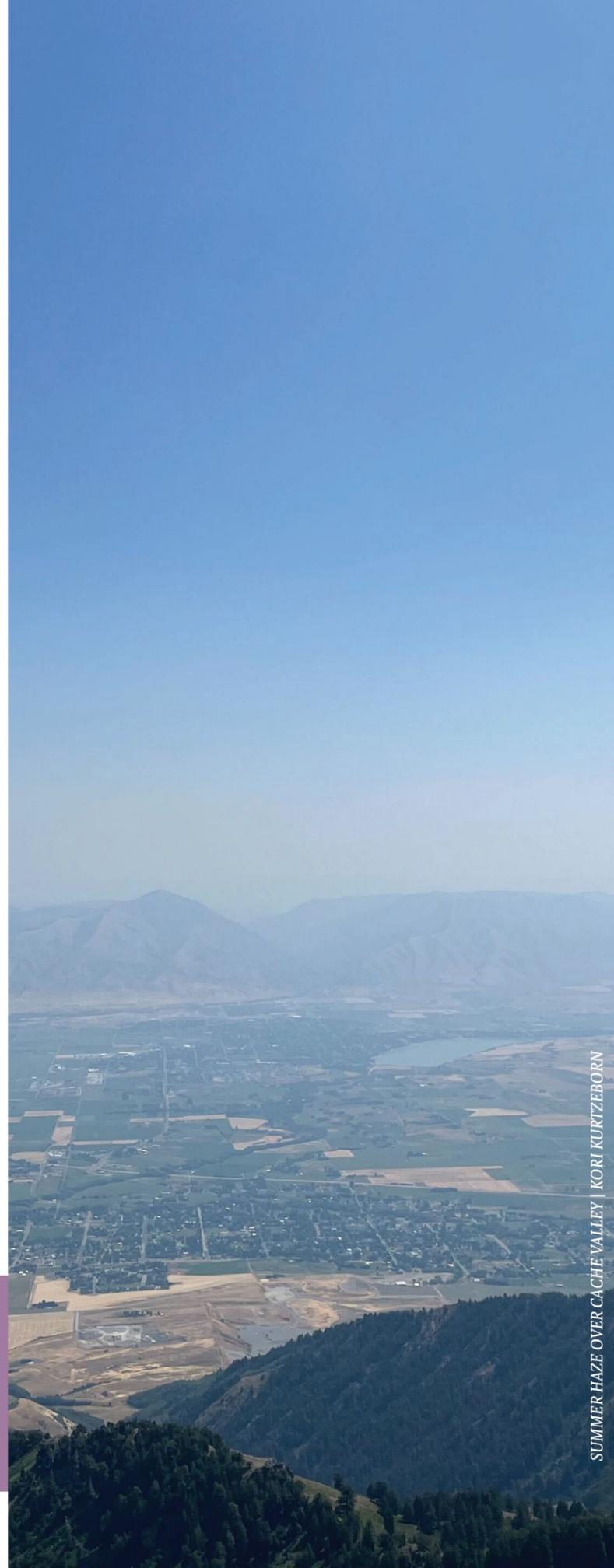
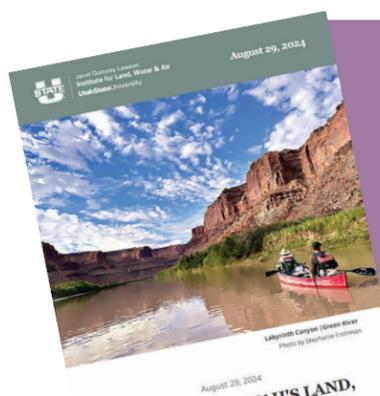
In 2024, elevated summertime ozone levels continued to raise health concerns in Utah, especially along the Wasatch Front. High temperatures and vehicle emissions contributed to frequent ozone spikes, affecting air quality and posing respiratory risks. State agencies have urged residents to reduce emissions during ozone action days to help mitigate these seasonal air quality challenges.

5. SUPPORT FOR AIR QUALITY EFFORTS

UCAIR, Utah's nonprofit focused on improving the state's air quality through education and partnerships, appointed Lindsie Smith as its new executive director. The organization also honored Utah State University's Dr. Randy Martin as Person of the Year for his significant contributions to air quality research, particularly in reducing harmful pollutants such as PM_{2.5} across the state.

What's going on in Utah's land, water and air?

We publish a weekly email newsletter containing a roundup of stories in the media related to Utah's land, water, and air. This year, we shared nearly 2,000 stories, primarily from local media, with additional coverage from national outlets. Subscribe to our weekly email news roundup at: usu.edu/ilwa/newsletter.



SUMMER HAZE OVER CACHE VALLEY | KORI KURTZBORN

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