

U.S. ENVIRONMENTAL PROTECTION AGENCY



REGION 8

Climate Change Adaptation Implementation Plan

OCTOBER 2022

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEP 12 2022



DEPUTY ADMINISTRATOR

Preface

Climate change is threatening communities across the nation. Millions of Americans feel the destructive effects of climate change each year when the power goes down, rivers and lakes go dry, homes are destroyed by wildfires and communities are flooded by hurricanes. Underserved communities are especially vulnerable to the climate crisis and are more likely to experience the negative health and environmental effects of extreme weather events.

The Biden-Harris Administration is actively confronting the climate crisis while also advancing environmental justice. As part of a whole-of-government approach, the U.S. Environmental Protection Agency is strongly committed to taking the actions necessary to protect human health and the environment and to increase the resilience of the entire nation, even as the climate changes.

The EPA's commitment to action is reflected in its FY 2022-2024 Strategic Plan and in the 2021 Climate Adaptation Action Plan. Both documents present priority actions the agency will take to ensure that its programs, policies and operations remain effective under future climate conditions while we work to support states, territories, tribes and communities in increasing their own adaptive capacity and resilience to climate change impacts.

From flooding at Superfund sites, to wildfires causing air pollution, to sea-level rise affecting water quality and infrastructure, the EPA will boldly address climate impacts in both its programs and the communities it serves. We recognize the importance of tribal, state and local government partnerships in efficient, effective and equitable implementation of climate change adaptation strategies. Our plans were informed and improved by input we received in listening sessions we held to engage these and other partners as we developed these plans.

To ensure we are addressing the climate crisis in a comprehensive way, each of our national program and regional offices has developed individual Climate Adaptation Implementation Plans that outline how the EPA will attain the agencywide goals described in the broader Climate Adaptation Action Plan. These plans describe how programs and regions will integrate climate adaptation into their programs, partnerships and operations. They also describe how they will help partners build their resilience and capacity to adapt, while delivering co-benefits, including curbing greenhouse-gas emissions and other pollution, and promoting public health, economic growth and climate justice. Of course, the EPA has a major role to play on emissions reductions as well, though that is not the focus

of these plans. Indeed, we must focus on both climate adaptation and mitigation to ensure our nation and communities thrive in an era of climate change.

As part of this effort, we will empower our staff and partners by increasing awareness of how climate change may affect our collective ability to implement effective and resilient programs. We will also provide them with the necessary training, tools, data, information and technical support to make informed decisions and integrate climate adaptation into our work.

The EPA will work to modernize its financial assistance programs to encourage climate-resilient investments across the nation. We will also focus on ensuring that investments funded by the Bipartisan Infrastructure Law, the Inflation Reduction Act and other government programs are resilient to the impacts of climate change. Finally, as our knowledge advances and as impacts continue to develop, our response will likewise evolve. We will work to share these developments to enhance the collective resilience of our nation.

The actions outlined in these implementation plans reflect the EPA's commitment to build every community's capacity to anticipate, prepare for, adapt to and recover from the increasingly destructive impacts of climate change. Together with our partners, we will work to create a healthy and prosperous nation that is resilient to the ever-increasing impacts of climate change — which is vital to the EPA's goal of protecting human health and the environment and to ensuring the long-term success of our nation.



Janet G. McCabe

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Chapter 1. Introduction

The U.S. Environmental Protection Agency (EPA) is committed to identifying and responding to the challenges that a changing climate poses to human health and the environment. In 2014, EPA released an Agency-wide Climate Change Adaptation Plan. In turn, EPA National Program Offices, all 10 EPA Regional Offices, and several EPA National Support Offices released Climate Adaptation Implementation Plans in 2014. These documents contained “vulnerability assessments” that analyzed how climate change might affect the work of the Agency, as well as priority activities to address these vulnerabilities.

The January 27, 2021, Executive Order (E.O.) 14008 entitled *Tackling the Climate Crisis at Home and Abroad*ⁱ directs all federal agencies to prepare Climate Adaptation Action Plans. To begin this process, on May 26, 2021, EPA Administrator Michael Regan issued an updated Policy Statement on Climate Adaptation. In the Policy Statement, the Administrator directed all EPA National Program and Regional Offices to update their 2014 Climate Adaptation Implementation Plans. In October 2021, EPA, along with over 20 other federal agencies, released an Agency-wide 2021 Climate Adaptation Action Planⁱⁱ in response to E.O. 14008.

EPA’s Climate Adaptation Action Plan reinforces that the impacts of climate change within and across U.S. regions will not be distributed equally and recognizes that certain communities and individuals are particularly vulnerable to the impacts of climate change. EPA commits to prioritizing the most vulnerable populations with the goal of attaining a more equitable, just, and resilient future within and across communities.ⁱⁱⁱ

EPA Region 8, through its updated Climate Adaptation Implementation Plan, commits to:

- Leverage Region 8 programs and resources to promote state, tribal, and community adaptation to climate change, with a particular focus on advancing environmental justice.
- Place a priority on building climate resiliency in populations that are particularly vulnerable to the impacts of climate change, such as low-income communities, communities of color, children, the elderly, communities situated in air quality non-attainment areas, persons with asthma and other chronic respiratory issues, the homeless, outdoor workers, and Indigenous Peoples.
- Work with our external partners to leverage expertise and resources, with a particular emphasis on overburdened and vulnerable populations.
- Recognize that different parts of Region 8 are experiencing different climate change impacts and to differing degrees, thus have diverse climate adaptation needs.
- Maintain an internal climate change workgroup to facilitate cross-division communication and coordination.

The updated Region 8 Climate Adaptation Implementation Plan, along with all updated EPA National Program Office, National Support Office, and Regional Office plans, includes the following five elements:

- Designation of a Senior Career Leader responsible for overseeing climate adaptation activities in EPA Region 8.
- Updated Climate Vulnerability Assessment specific to EPA Region 8.

- Priority Actions that will be taken by EPA Region 8 to address the Agency-wide priorities identified by EPA’s Agency-wide 2021 Climate Adaptation Action Plan.
- A training plan for enhancing staff knowledge about climate adaptation.
- Identification of science needs.

EPA Region 8 has designated Daniel Heffernan, Associate Deputy Regional Administrator, as its Senior Career Leader responsible for overseeing climate adaptation activities in Region 8.

Region 8 formed a Climate Adaptation Team (Table 1) in late 2021 comprised of representatives appointed from each division and office. The Climate Adaptation Team led the development of this updated Region 8 Climate Adaptation Implementation Plan and will guide implementation of the Plan and associated priority actions in the coming years.

<i>Air and Radiation Division</i>	Emily Bertram (Climate Change Coordinator)
<i>Enforcement and Compliance Assurance Division</i>	Alison Ruhs
<i>Land, Chemicals, and Redevelopment Division</i>	Kyle Corcoran, Rebecca Perrin, Tim Rehder, Patrick Wauters
<i>Laboratory Services and Applied Sciences Division</i>	Billy Bunch
<i>Mission Support Division</i>	Jordan Rogers
<i>Office of the Regional Administrator</i>	Justin Bleiler
<i>Office of Regional Counsel</i>	Kimi Matsumoto
<i>Superfund and Emergency Management Division</i>	Sabrina Forrest, Becky Geyer
<i>Water Division</i>	Jason Gildea, Andrew Todd
<i>Lead Region Coordinator, Office of International and Tribal Affairs</i>	Jennifer Wintersteen
<i>Senior Career Leader for Climate Adaptation</i>	Daniel Heffernan

Throughout Region 8’s Climate Adaptation Implementation Plan, the terms climate change adaptation, adaptive capacity, climate resilience, and climate change mitigation are used. Table 2 provides these key definitions.

<i>Climate change adaptation</i>	or climate adaptation means taking action to prepare for and adjust to both the current and projected impacts of climate change.
<i>Adaptive capacity</i>	is the ability of a human or natural system to adjust to climate change (including climate variability and extremes) by moderating potential damages, taking advantage of opportunities, or coping with the consequences.

<i>Climate resilience</i>	can be generally defined as the capacity of a system to maintain function in the face of stresses imposed by climate change and to adapt the system to be better prepared for future climate impacts.
<i>Climate change mitigation</i>	refers to actions limiting the magnitude and rate of future climate change by reducing greenhouse gas emissions.

Chapter 2. Climate Vulnerability Assessment

2.1 Background

EPA Region 8's climate vulnerability assessment builds upon the assessment developed for the 2014 Region 8 Climate Adaptation Implementation Plan and reflects the latest scientific information contained in the Fourth U.S. National Climate Assessment (NCA4),^v and EPA's Climate Change Indicators in the United States.^{vi} The climate vulnerability assessment contains an updated list of climate change impacts in Region 8, and considers:

- How EPA Region 8 programs are vulnerable to the impacts.
- How the impacts may affect vulnerable populations.
- Actions taken to address the risks, remaining vulnerabilities, and barriers to further actions.
- Resource and budget issues.

Vulnerabilities were considered for the following Region 8 program areas:

- Facilities, Operations, and Workforce
- Air Programs
- Water Programs
- Chemical Safety and Pollution Prevention Programs
- Emergency Response and Waste Management Programs
- Enforcing Environmental Laws and Ensuring Compliance

Vulnerable Populations. Vulnerable populations are mentioned throughout Region 8's climate vulnerability assessment. Populations vulnerable to climate change impacts may include children, the elderly, people of color, low-income communities, persons with underlying medical conditions and disabilities, those with limited access to information, Indigenous populations, communities overburdened by pollution, and the homeless and outdoor workers who may have more exposure to heat and air pollution. Certain geographic locations may also contribute to vulnerability, such as areas of air quality non-attainment.

In September 2021, EPA released a report entitled *Climate Change and Social Vulnerability in the United States: A Focus on Six Impact Sectors*,^{vii} an environmental justice study that looks at how projected climate change impacts may be distributed across the American public. The analysis shows that the most severe harms from climate change fall disproportionately upon underserved communities who are least able to prepare for, and recover from, heat waves, poor air quality, flooding, and other impacts. EPA's analysis indicates that racial and ethnic minority communities are particularly vulnerable to the greatest impacts of climate change.

Advancing Environmental Justice. EPA's climate adaptation planning supports the Agency's and government-wide efforts to advance environmental justice. EPA Region 8's Climate Adaptation Implementation Plan, and the priority actions found within, support the Agency's efforts to strengthen the adaptive capacities and increase the resilience of the nation by consulting and partnering with states, tribes, territories, local governments, environmental justice organizations, community groups, businesses, and other federal agencies, with a particular focus on environmental justice. When

integrating climate adaptation into the Agency's programs, policies, and processes, EPA will account for the impacts of climate change and related environmental justice concerns. EPA places a special emphasis on working with overburdened and vulnerable populations to increase their resilience to climate change. Such populations include communities of color, low-income communities, children, persons with disabilities, the elderly, tribes, and Indigenous Peoples. These groups and individuals may be especially vulnerable to climate change impacts due to a variety of factors including higher pollution burdens, disproportionate exposure to environmental contaminants, lack of financial resources, limited access to quality health care, and other barriers.^{viii}

Rural Communities. Region 8 is home to some of the most rural counties in the nation. Region 8 lacks the urban areas that other parts of the country have, relatively speaking, as almost 50% of the area (145 out of the 291 counties) is classified as "100% or completely rural," according to the U.S. Census counties. Out of the 10 EPA regions, Region 8 is ranked 2nd in terms of having the highest number of "100% rural" counties. Throughout its climate adaptation planning, Region 8 will consider the unique needs of our rural communities. EPA Region 8 understands that the challenges posed by climate change and the obstacles to adapting to a changing climate in these communities are often different than those in urban and suburban areas and may require unique solutions and targeted assistance.

Tribes and Indigenous Peoples. Indigenous Peoples may also be particularly vulnerable to the impacts of climate change due to the integral nature of the environment within their traditional lifeways and cultures. Region 8 places a priority on the development of adaptation strategies that promote sustainability and reduce the impact of climate change on Indigenous Peoples, with a focus on Indigenous Traditional Ecological Knowledge (ITEK). ITEK refers to knowledge, which have accumulated over generations through direct contact with the environment, that focus on the relationships between humans, plants, animals, natural phenomena, and the landscape. Indigenous knowledge broadly includes systems of observing, monitoring, researching, recording, communicating, and learning, and their social adaptive capacity to adjust to or prepare for changes.^{ix}

EPA values its unique relationship with Indian tribes and recognizes and supports the sovereign decision-making authority of tribal governments. Under the Constitution, treaties with tribal nations are part of the supreme law of the land, establishing unique sets of rights, benefits and conditions for the treaty-making tribes who were forced to cede millions of acres of their homelands to the United States, in return for recognition of property rights in land and resources as well as federal protections. Tribal treaty rights have the same legal force and effect as federal statutes and they should be integrated into and given the fullest consideration throughout EPA's collective work. Reserved rights are the rights tribes retain that were not expressly granted to the United States by tribes in treaties. Treaty and reserved rights, including but not limited to the rights to hunt, fish and gather, may be found both on and off-reservation lands. Agencies should consider treaty and reserved rights in developing and implementing climate adaption plans in order to protect these rights and ensure the Agencies meet their legal and statutory obligations and other mission priorities as we work to combat the climate crisis.

In September 2021, EPA joined 16 other federal agencies in signing a Memorandum of Understanding (MOU)^x that committed those parties to identifying and protecting tribal treaty rights early in the decision-making and regulatory processes. Accordingly, EPA will consider and protect

treaty and reserved rights in developing and implementing climate adaptation plans through strengthened consultation, additional staff training and annual reporting requirements.

2.2 Regional Description

EPA Region 8's "Mountains and Plains" office serves Colorado (CO), Montana (MT), North Dakota (ND), South Dakota (SD), Utah (UT), Wyoming (WY), and 28 Tribal Nations. Region 8 encompasses two different climate regions, as defined by the U.S. Global Change Research Program (USGCRP)^{xi}- the Southwest (CO and UT) and the Northern Great Plains (MT, ND, SD, and WY).

Region 8 states and sovereign tribal nations encompass the heart of the American West, including much of the Rocky Mountains, Great Plains, and Colorado Plateau. Over two-thirds of the Region's roughly 10 million people live in two distinct bands of urban development- Colorado's Front Range and Utah's Wasatch Front.^{xii} Region 8 is characterized by vast open spaces, including mountains, plains, canyons, and deserts, as well as small population centers. Region 8 is home to some of the most iconic landscapes, including Yellowstone, Glacier, Rocky Mountain, Badlands, and Zion National Parks, as well as dozens more national parks, national monuments, and forests. Region 8 encompasses range, farm, and grass lands.

Region 8 is arid, stressing the availability and quality of water resources, particularly to meet competing demands from industry and human consumption. Many water resources originate in Region 8, such as the Missouri, Rio Grande, Colorado, Arkansas, and Platte rivers. Due to the significant amount of publicly owned lands, partnership with other federal agencies such as the U.S. Forest Service (USFS), the Bureau of Land Management (BLM), the National Park Service (NPS), and the Federal Emergency Management Agency (FEMA), is critical. The 28 sovereign tribal nations collectively make up an area in Region 8 the size of Tennessee. Region 8 works closely with other federal agencies, these 28 tribal nations, as well as state and local governments to protect human health and safeguard the natural environment.

2.3 Climate Change Impacts in EPA Region 8

EPA Region 8 has identified climate change impacts that may affect the Region and our programmatic work (Table 3). The impacts are premised on the measurable increase of greenhouse gases in the atmosphere^{xiii} and may be considered individually or in combination. Impacts are referenced to the U.S. Global Change Research Program (USGCRP)'s Fourth National Climate Assessment and/or the U.S. EPA's Climate Change Indicators in the United States (see references for more detail).

Table 3. Climate Change Impacts in EPA Region 8		
<i>Air</i> ^{xiv xv}	<i>Water/Snow/Ice</i> ^{xvi xvii xviii xix xx}	<i>Health and Society</i> ^{xxi xxii xxiii xxiv xxv xxvi}
Increasing air temperatures	Increasing water temperatures	Increasing exposure to wildfire smoke
Increasing particulate matter levels	Increasing heavy precipitation events	Increasing risk of health impacts on vulnerable populations
Increasing length of wildfire season and related air quality impacts	Decreasing snowpack and extent of glaciers	Increasing health effects from airborne allergens
Increasing ground-level ozone levels	Increasing risk of water shortages in the Southwest	Increasing urban heat island effects
Increasing indoor air pollution	Increasing risk of harmful algal blooms	Increasing heat wave frequency, duration, and intensity
Increasing airborne allergens	<i>Indigenous Peoples</i> ^{xxvii xxviii xxix}	Increasing risk of extreme weather events
<i>Agriculture</i> ^{xxx xxxi xxxii xxxiii}	Increasing risks to Indigenous Peoples' livelihoods and economies	Increasing risk of landslides and debris flows.
Increasing length of the growing season	Impacts to Indigenous Peoples' cultural resources	Increasing exposure to vector-borne diseases
Decreasing soil moisture	Increasing risks to Indigenous Peoples' physical and mental health	Compounding effects of more than one impact occurring at a given time
Expanded distribution and incidence of pests and diseases for crops and livestock	<i>Ecosystems</i> ^{xxxiv xxxv}	<i>Infrastructure</i> ^{xxxvi xxxvii}
Depletion of groundwater for irrigation	Shifts in the phenologies, range, and abundance of certain species	Deteriorating water infrastructure at risk
Increasing risks to rural populations	Decreasing integrity of ecosystems and ecosystem services	Transportation infrastructure at risk
Increasing risks to livestock	Increasing spread of invasive species	Increasing residential summer electricity use
Increasing risk of extreme weather events	Increasing extent of and damage caused by wildfires	Deteriorating dams and levees at risk
Increasing risk of drought		

2.4 EPA Region 8 Program Vulnerabilities

Facilities, Operations, and Workforce

Region 8's headquarters building is located at 1595 Wynkoop Street in downtown Denver, Colorado. Region 8 also operates an office in the Baucus Federal Building in Helena, Montana and a laboratory in the Denver Federal Center in Lakewood, Colorado.

The operation of EPA Region 8 facilities may be affected. Increasing air temperatures and climate extremes may affect cooling and heating requirements in Region 8 facilities. The operation of Region 8 facilities could also be affected by water shortages due to drought, and electric power interruptions due to extreme weather events and wildfires. Drought, extreme temperatures, and extreme precipitation events may also make it more difficult to maintain the viability of green roofs upon which Region 8 relies for stormwater retention services at its headquarters building in Denver, Colorado. Region 8 has been adapting to these impacts by reducing its energy and water use and by maximizing the ability of personnel to work remotely for an extended period of time. Building air filtration has also been upgraded in many locations, and the Region is exploring the availability of heat pumps and micro grids to provide localized cooling, heating, and electric power to build long-term resiliency and reduce its environmental footprint. Resource and budget issues may delay or prevent the implementation of many desired actions and the tracking of performance over time.

Air Programs

Tropospheric ozone pollution is likely to increase in certain areas due to the effects of climate change. Higher temperatures and regional air stagnation associated with climate change may lead to the formation of more tropospheric or ground-level ozone even with the same level of emissions. While tropospheric ozone is higher in urban areas, some rural and tribal areas may also be affected due to widespread oil and gas development. Additionally, background levels of tropospheric ozone are increasingly becoming more elevated due to atmospheric transport and increasing contributions from wildfire smoke. Climate change also has the potential to lengthen the ozone season by increasing time throughout the year conducive to the formation of tropospheric (ground level) ozone. Vulnerable populations and active individuals are at a higher risk for health effects from exposure to increased ozone concentrations.

Particulate matter (PM) levels are likely to be affected by increased frequency and intensity of wildfires. There is evidence indicating that climate change will elevate PM levels through increases in the frequency and intensity of wildfires. Impacts from large scale wildfires affect regional air quality on scales so vast that populations impacted by the smoke may not be able to escape areas with very poor air quality. The Intergovernmental Panel on Climate Change (IPCC) has reported with very high confidence that in North America, disturbances such as wildfires are increasing and are likely to intensify in a warmer future with drier soils and longer growing seasons. Forest fires are likely to increase in frequency, severity, distribution, and duration in the Intermountain West and the West due to climate change. This regional area is also downwind from smoke and pollutant transport emanating from the

Pacific Northwest and Canada. This, in addition to the recent pine beetle outbreak in the Rocky Mountains, is changing the fire regime in the area and complicating Region 8's efforts to protect public health and the environment from PM pollution. Additionally, drought conditions may increase dust storms and contribute to degraded air quality due to PM. Vulnerable populations may be especially at risk from increased exposure to PM.

Climate change may impact air quality monitoring, standards, planning and permitting programs. Region 8 can adapt to climate driven changes in air quality trends using existing regulatory processes. However, it may be necessary to develop new regulatory and policy tools to address persistent large scale air quality issues. EPA uses monitoring data to inform decisions and apply the appropriate regulatory framework. Monitoring of some pollutants and some areas has decreased as urban air quality trends drastically improved since the 1970s, 80s, and 90s. However, with increasing population and energy development, fuel consumption, and the potential for climate-driven extreme events such as severe wildfires, there may be value and need to expand monitoring networks in areas heretofore unmonitored. Monitoring information is important to protect populations from extremely poor air quality as well as to verify air modeling. High quality air quality modeling is important to project the effects that EPA and state decisions may have on air quality.

National Ambient Air Quality Standards (NAAQS) are set to protect public health and the environment. If an area does not meet the NAAQS for any of the six criteria pollutants, the area must be designated as nonattainment for the NAAQS for that pollutant and the state must develop a plan for how the state will attain and maintain the NAAQS in that area. The state's plan is submitted to EPA for approval. If air quality is greatly affected by climate-driven events, it may be necessary to reevaluate existing regulation and policy, which currently allows for the exclusion of exceptional events such as wildfires or high winds from some regulatory determinations, including decisions as to whether an area has attained the NAAQS. While these events may not be in the control of regulators, or any person in some cases, they nevertheless affect human health and the environment.

Permitting programs for stationary sources are another mechanism that EPA and the states use to protect air quality. EPA and the states can use these programs to adapt to changing trends in air quality that have already started to occur, but we may be limited in how we can use permitting programs to deal with changes that have not yet been experienced.

In addition, Region 8's Air and Radiation Division assists the Region's National Environmental Policy Act (NEPA) program in developing and providing comments pursuant to Clean Air Act Section 309 and NEPA, to other federal agencies regarding potential air quality impacts of proposed federal actions that may significantly affect the quality of the human environment. EPA provides recommendations to lead federal agencies for analyzing and mitigating greenhouse gas emissions and for adaptation to environmental impacts that may be exacerbated by climate change.

Climate change may worsen indoor air quality (IAQ) and increase exposures. Changes in the climate can affect the air we breathe indoors in many ways. The worsening quality of outdoor air can infiltrate indoors. Rising carbon dioxide (CO₂) levels and warmer temperatures can increase outdoor airborne allergens, which can also contaminate indoor spaces. Warmer temperatures and shifting weather patterns can lead to more frequent and severe wildfires. In turn, wildfire smoke can infiltrate and contribute to levels of indoor particulate matter.

Climate change is also increasing the risk of extreme weather events such as extreme precipitation that can lead to flooding, which can result in damage to buildings and allow water or moisture to enter indoors. Increased indoor dampness and humidity can lead to more mold, dust mites, bacteria, and other biological contaminants indoors. Extreme weather events can also create conditions that support increases in pests and infectious agents that can make their way indoors. As more frequent and more intense weather events occur, power outages are more likely. These outages make it more difficult to maintain comfortable indoor temperatures and healthy indoor air quality, and subsequently lead to more frequent use of portable generators. Carbon monoxide poisoning from improper use of portable generators results in hundreds of deaths and thousands of illnesses each year.

As climate change exacerbates these and more IAQ issues, vulnerable populations may be disproportionately impacted. For example, people in low-income areas may be more likely to be exposed to indoor air contaminants because they have fewer resources to mitigate the impacts of these contaminants. Similarly, landlords often lack incentive to provide healthy indoor environments for their tenants, causing rental properties to be notorious for IAQ issues such as mold infestations and high radon levels.

Region 8 can utilize various EPA programs, tools, resources, and partnerships to adapt to this impact. Region 8's IAQ, Safer Choice, Pollution Prevention, ENERGY STAR® and the Clean, Green and Healthy Schools programs are avenues through which public education and preparedness measures could occur. EPA's Indoor airPLUS program helps builders to construct new homes to specifications that minimize exposure to indoor airborne pollutants and contaminants. Similarly, by incorporating IAQ considerations into building renovations alongside energy efficiency upgrades, existing Region 8 buildings can be made more resilient to climate change and its IAQ impacts.

Water Programs

Climate change impacts, such as warmer temperatures, heavier precipitation, and drought, may affect EPA Region 8's ability to protect and restore watersheds, aquatic ecosystems, and wetlands.

Warmer air temperatures will result in warmer water, potentially leading to low oxygen levels and hypoxia, harmful algal blooms (HABs), and changes in the toxicity of some pollutants. Colder water aquatic organisms may be replaced by species better adapted to warmer waters, and this process may occur at an uneven pace disrupting aquatic system health and allowing non-indigenous and/or invasive species to become established. Additionally, temperature increases may lead to water losses from increased evapotranspiration rates. Surface water quality can decline as water temperatures increase and more frequent high-intensity rainfall events mobilize pollutants. Indirect impacts on water quality are also possible in response to an increased frequency of forest pest/disease outbreaks, wildfires and resultant debris flows, and other terrestrial ecosystem changes. Wildfires create ash and debris that can end up in reservoirs, rivers, canals, and pipelines, and ultimately into municipal water-treatment facilities. Fires also scorch soils, leading to more runoff and erosion.

Heavier precipitation may increase flood risk, expand floodplain area inundated, increase the variability of and magnitude of streamflow, and increase streambank and bed erosion from high water velocities. Increases in storm event frequency and intensity can also result in more nutrients, pathogens, and toxins

being washed into water bodies, especially if they force an increase in sewer overflows and wastewater bypasses. Extreme precipitation events are projected to increase and may lead to more severe floods and greater risk of water and wastewater infrastructure failure in some regions. Drought, changing patterns of precipitation, reduced snowpack, earlier spring runoff, and increased evapotranspiration may lead to reduced streamflow later in the summer, potentially altering stream and lake permanence, impacting resident aquatic communities, and increasing water quality impairments. Certain aquatic ecosystems that are unique to the region may also be threatened, such as the prairie potholes of North and South Dakota, reducing their water recharge function and the habitat they provide for plants and animals.

Additionally, in several ways, climate change is altering the timing and length of the snowpack within Region 8. For example, the ongoing pine beetle outbreak in the Rocky Mountains has altered the hydrological functioning of these mountain ecosystems by influencing snow distribution and snowmelt in complex ways. Studies suggest that warming temperatures are allowing pine beetles, which normally reproduce just once a year, to reproduce twice annually. Pine beetle outbreaks, in addition to quickly leading to death of pines, can potentially cause a forest which is typically considered a “carbon sink” become a “carbon source.” Studies indicate that increased pine beetle activity may impact snow accumulation and melt, triggering earlier snowmelt and increased water yields from snowpack that accumulates beneath affected pine trees.^{xxxviii}

Other considerations that affect the timing of snowmelt include increased dust deposition and rain on snow events. Specifically, increased air temperatures have reduced the fraction of winter precipitation occurring as snow in the western United States and warming has resulted in a shift in the timing of snowmelt runoff to earlier in the year. Long-term datasets and future climate projections both indicate large declines in snowpack in the West. Glaciers continue to melt in the western United States and resultant shifts in the hydrological regime due to glacial melting will alter stream water volume, water temperature, runoff timing and aquatic ecosystems in this region.

Significant changes in both water quantity and quality are already being observed in the southwest, and continued drought conditions exacerbate pressures on already stressed aquatic ecosystems. Annual precipitation has decreased in the west and southwest and current projections indicate that parts of the southwest will receive less precipitation in winter and spring moving forward. Intensifying droughts, increasing heavy downpours and reduced snowpack are combining with increased water demand to our impact water supply within the Region.

Warmer temperatures and heavy precipitation associated with climate change contribute to the development of HABs. HABs can introduce toxin-producing cyanobacteria into recreational and drinking water sources, resulting in necessary restrictions on access and use. Conditions that encourage cyanobacteria growth such as higher water temperatures, increased runoff, and episodic increases in nutrient loading, are all projected to occur more frequently in Region 8 with climate change, thereby increasing the frequency, magnitude, and risk of HABs.

The impacts discussed above may have adverse effects on Region 8’s work to protect water quality, the health of watersheds, aquatic ecosystems and wetlands, and the recovery of threatened fish species (e.g., the cold water-dependent bull trout in western Montana). Additionally, more waterbodies may have trouble meeting a variety of climate-sensitive water quality standards and may need to be listed as impaired, thus requiring the development of a total maximum daily load (TMDL). Nonpoint source

pollution control programs may need to be adjusted to reflect changing conditions, source water protection practices may need to be updated and/or enhanced, and baselines used in water quality standard development and implementation could shift, requiring new scientific analyses to be valid. Finally, certain economic and cultural practices of tribal communities related to water may be impacted. These program vulnerabilities may require greater use of biological monitoring and assessment techniques to understand trends, management techniques that build resilience into aquatic environments, and the increased management of wetlands for stormwater control purposes and to buffer the impacts of drought.

The current trend of research may need to be refocused to address shifts in water quality. Region 8's capacity to adapt to this impact is varied, and there may be numerous opportunities that can be explored. For example, Region 8 provides ongoing support to its states and tribes to monitor and analyze samples from suspected HABs, as well as regular information sharing opportunities throughout the year. EPA has partnered with the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA) to create the Cyanobacteria Assessment Network (CyAN) utilizing daily satellite data to serve as an early warning system for HABs to states, tribes, and other federal partners (covering over 2,000 lakes and reservoirs in the United States).

Climate change impacts, such as heavier precipitation and drought, may affect drinking water, wastewater, and stormwater infrastructure. Heavier precipitation may increase the risk of floods, expand floodplains, and cause more nutrients, pathogens, and toxins to be washed into waterbodies. This could damage or overwhelm water infrastructure, leading to releases of waterborne diseases and pathogens in the environment. In urban areas, stormwater collection and management systems may need to be redesigned to provide increased capacity. Low stream flows resulting from drought, earlier spring runoffs, reduction in snowpack, and increased evapotranspiration may affect drinking water storage and distribution systems, drinking water intakes, and dilution flows available at wastewater outfalls. To date, no comprehensive assessment has been conducted to robustly evaluate climate-related vulnerabilities of United States water infrastructure, to evaluate the potential resulting damages, or to estimate the costs of reconstruction and recovery. There is a need to better understand the condition of water infrastructure nationally in order to identify areas of greatest risk. Infrastructure design, operation, financing, and regulatory standards typically do not account for a changing climate and are not optimized to address changing conditions. Changes in frequency and intensity of climate extremes relative to the 20th century and deteriorating water infrastructure are contributing to declining community and ecosystem resilience. Moving forward, drinking water and wastewater utilities will need to consider these impacts and the concept of non-stationarity in their planning activities. Non-stationarity refers to the concept that, as the climate changes, the magnitude, duration, and frequency of impacts such as drought and flooding may occur outside the historical observation range, thus making it more challenging to predict or plan for the future water conditions. Additionally, vulnerable populations may have problems accessing safe drinking water due to these infrastructure challenges.

Clean Water and Drinking Water State Revolving Funds (SRF) may need to be increased as the need for additional investments in water infrastructure increases. Region 8 and its state and tribal partners may need to re-prioritize project requests due to increasing and changing needs at the local level. Tribes and other vulnerable populations, including small and rural communities, may require special considerations with respect to climate change and water infrastructure challenges. Region 8's work to promote green

infrastructure in urban areas may be more in demand to serve multiple purposes: to manage storm water runoff, to provide flood mitigation, to manage air quality, and to reduce the urban heat island effect.

The quality and availability of safe drinking water may be affected. Drought, changing patterns of precipitation and snowmelt, increased evapotranspiration, and reduced snowpack may result in changes to the availability and demand for drinking water. Competition for water for agriculture, industry, fire protection, and energy production purposes may also increase, especially in areas experiencing population growth. These factors may shift demand to underground aquifers, or prompt development of reservoirs or other water retention strategies.

Under drought conditions, a decrease in surface water resources can lead to increased reliance on groundwater aquifers. This is already happening in many western U.S. areas. When long-term pumping exceeds the recharge rate, pore space collapse can occur and lead to compaction of the aquifer. When this occurs, that portion of the aquifer loses the ability to be recharged and thus the aquifer's storage capacity is decreased. This type of system compression is referred to as aquifer compaction and is responsible for permanent land subsidence.

Soil erosion and increased runoff following wildfires can foul water and challenge water-treatment facilities. Heavy precipitation events may exacerbate this problem, leading to more runoff of sediment and other contaminants into drinking water sources, requiring additional treatment. Drinking water intakes and wastewater outfalls could also become overwhelmed or damaged, causing an increased incidence of waterborne diseases and pathogens. Increased water temperatures may also lead to an increased growth of algae and microbes that may affect drinking water quality. These impacts may have adverse effects on the ability of public water supplies to cost-effectively meet drinking water standards. Smaller and rural communities could face additional resource challenges if faced with the need to rapidly adapt to changing quality and availability of water.

Various Region 8 programs protect drinking water quality and are concerned with the availability of safe water supplies. National Pollutant Discharge Elimination System (NPDES) discharge permits for wastewater and stormwater from municipal and other facilities may need to be adjusted to maintain water quality under future climate regimes. As the need for water retention grows, an increase in Clean Water Act (CWA) Section 404 permits may be necessary and NEPA reviews of water supply and storage projects may increase. There may also be a need to enhance or construct wetlands, that could require CWA Section 404 permits.

Limited water availability and drought in some regions may require drinking water providers to reassess the security and stability of their water supplies, and consider alternative pricing, allocation, and water conservation options. Region 8's work to promote voluntary actions through its various initiatives may be more in demand.

Chemical Safety and Pollution Prevention Programs

Heavy precipitation events, floods, extreme temperatures, and wildfires may threaten the structural integrity and safe operation of underground storage tanks (USTs). Throughout urban and rural areas, USTs are used to store petroleum and other materials that can be hazardous when released

into the environment. Extreme events may cause an increase in leaking USTs (LUSTs) and subsequently an increased need for cleanup and response. The Region 8 Resource Conservation and Recovery Act (RCRA) Branch would help the state UST and LUST programs prepare for and respond to impacts to USTs. The RCRA Branch would also need to respond to a potential increased LUSTs in Region 8's Indian country.

Sites at which polychlorinated biphenyls (PCBs) are disposed in-place located in zones at risk for heavy precipitation events, floods, extreme temperatures, and wildfires have increased potential for PCBs to be mobilized. Toxic Substances Control Act (TSCA) submittals to EPA for such sites typically do not consider increased risk from natural events caused by climate change. However, TSCA disposal-in-place remedies are intended to remain effective in perpetuity (or until the contamination is removed with EPA approval, as needed). Remedial decisions for PCB and RCRA sites or facilities often rely upon engineering controls, including pumps and electrical equipment, and physical barriers (e.g., hard caps, liners) to ensure protectiveness over time. Region 8 needs to ensure that both its RCRA and PCB cleanup site remedies and permit decisions are sufficiently resilient to withstand the effects of severe weather events, as well as increased risk of fire danger for select sites/conditions.

Climate change may result in an increased role for pollution prevention. Pollution prevention (P2) approaches can be applied to all potential and actual pollution-generating activities, including those found in the energy, agriculture, federal, consumer and industrial sectors. Prevention practices are essential for preserving wetlands, groundwater sources and other critical ecosystems; areas in which it is important to stop pollution before it begins.

EPA Region 8's programs may see an increase in and need for additional promotion, education, and adoption of P2 awareness and best practices. This work is mostly implemented through the P2 and Source Reduction Assistance Grant programs where grantees work with individual businesses to implement P2 measures. These P2 solutions are then transferred to other businesses and the larger industry. The Region 8 P2 program, in conjunction with grantees, may need to increase awareness with consumers, manufactures, small businesses, and the general public and assist with identifying ways they can implement water and energy conservation practices, adopt less environmentally harmful pesticides, modify production processes to produce less waste, substitution of non-toxic or less toxic chemicals as cleaners, degreasers and other maintenance chemicals, reusing materials such as drums and pallets rather than disposing of them as waste.

Region 8 can utilize various EPA programs, tools, resources, and partnerships, such as WaterSense, Safer Choice, Sustainable Materials Management (SMM), and ENERGY STAR® to assist with adapting to this growing need. However, it will depend on all available resources.

Climate change may affect exposures to a wide range of chemicals because of changing environmental conditions or use patterns. For example, it may lead to increased pest pressure and a changing mix of pests, affecting how, when, where, and what pesticides are used. The earlier timing of spring events, like the emergence of leaves, flowers, and pollinators, may lead to a longer growing season and an increase in the quantity of pesticides used. Other climate impacts like extreme temperatures and heavy precipitation may lead to reduced crop yields, fields taken out of production, changes in crop mixes and farming methods, and increased runoff into streams and rivers, increasing exposures. There may also be an increase in the use of insecticides and rodenticides to control

mosquitoes and rodents in response to certain health threats. Vulnerable populations may be at a higher risk for health effects from exposure to pesticides. Generally speaking, changes in climate may impact where a wider variety of species, in addition to “pests,” migrate. This may impact which chemistry can be used and/or how it can be used.

Region 8’s programs may see an increase in requests for emergency exemptions for unregistered pesticides, state/local special need registrations, as well as requests to approve additional or new end uses of registered products. These requests are mostly handled by EPA Headquarters, but Region 8 monitors and supports them as appropriate to ensure a timely response. Additionally, Region 8’s work to promote Integrated Pest Management and other sustainable agriculture practices may be in greater demand. Region 8’s adaptive capacity to this growing need is largely dependent on available funding and resources.

Climate change may affect brownfield revitalization. Brownfield revitalization—the sustainable redevelopment of contaminated and abandoned properties—can support community efforts to become more resilient to climate change impacts by incorporating adaptation strategies throughout the assessment, cleanup, and redevelopment process. When planning for assessment and cleanup, it is important to identify community priorities related to assessment, cleanup, and long-term revitalization of brownfields. Planning should also include an evaluation of existing environmental conditions, zoning and building codes, local market potential, and needed infrastructure improvements. The redevelopment phase of a brownfield project provides the visible end product of community planning and commitment to climate change resiliency and mitigation. Each brownfield redevelopment also provides the opportunity to improve the connectivity of various elements of the built environment to meet the economic, environmental, and local health and welfare needs of revitalizing communities. Throughout the brownfield revitalization process, particular attention should be paid to equitable development to prevent displacement and ensure the improvements meet the needs of longtime residents.

Emergency Response and Waste Management Programs

EPA Region 8’s emergency response and disaster mitigation and recovery efforts may increase due to an increasing risk of heavy precipitation events, floods, drought, and wildfires, as well as other extreme weather events like severe winds and tornados. EPA has authority under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Clean Water Act (CWA), and other statutes to respond to various releases/discharges that present a threat to public health or the environment. Such releases/discharges may increase if extreme weather events damage industrial facilities or otherwise lead to damage. EPA also has a role in responding to national disasters under the National Response Framework (NRF). Under the NRF, EPA is the lead for Emergency Support Function (ESF) 10 Oil & Hazardous Materials and supports numerous other ESFs. Increased extreme weather events could lead to greater disasters which could then lead to more requests for EPA assistance. If EPA assistance during disaster response is required, this work is tasked by the Federal Emergency Management Agency (FEMA) via a mission assignment. Mission assignments are typically issued to EPA under ESF10 or ESF3, but EPA could be tasked under any of the ESFs depending on the

assistance requested. Work conducted under mission assignment is funded by the Stafford Act Disaster Relieve Fund (managed by FEMA) and a cost share paid by the affected state.

In addition to federally coordinated disaster response activities, FEMA also coordinates federal recovery and mitigation activities. The National Disaster Recovery Framework (NDRF) gives structure to, and expands, the nation's commitment to these activities. EPA is listed as a possible resource agency in five of the six NDRF Resource Support Function (RSF) areas. Following a Presidential Disaster Declaration, FEMA may activate the NDRF to provide federal support to state and local recovery efforts by activating one or more RSFs. EPA is a primary agency for Health and Social Services and Natural and Cultural Resources RSFs. Federal support is coordinated by the corresponding FEMA region with the impacted state(s), territory(ies), tribe(s), and/or communities. EPA recovery support may be requested by FEMA and/or the state. For example, FEMA may request EPA to provide a Sustainability Advisor to advise the Federal Coordinating Officer (FCO), RSF teams, state partners, and local officials on sustainable communities, climate adaptation, resiliency, green and energy efficient growth, and materials and products for recovery planning and construction. The Sustainability Advisor is one of many recovery roles or resources that may be requested of EPA. The impacted EPA region is responsible for deciding how this type of staffing would happen, in consultation with and support from OHS and other headquarters programs. FEMA would provide funding under a mission assignment or individual assistance for EPA activities under NDRF.

While most mitigation activities occur at the local and regional levels, federal agencies, including EPA, play a critical role in supporting and incentivizing these actions using federal resources. Coordination among EPA programs and other federal agencies is necessary to successfully support communities, to effectively leverage federal funds to further EPA's mission, and to track how funds are used. Close coordination with state, tribal, territorial, and local agencies is also critical to ensure that communities are well served before and after disasters.

As defined in the NMF, mitigation supports protection and prevention activities, eases response, and speeds recovery to create better prepared and more resilient communities. Mitigation efforts can come well before a disaster occurs, but they may also be used as part of recovery to break the cycle of disaster damage, reconstruction, and repeated damage.

One of EPA's Mitigation and Recovery Principles is to promote sustainable and resilient rebuilding; meaning to use EPA's expertise to inform federal, state, tribal, territorial, and local partners about rebuilding for the long-term viability of the affected area's people, economies, and natural ecosystems, including:

- Helping communities adapt to climate change, anticipate disaster impacts to infrastructure, and incorporate green infrastructure, sustainable materials management, and other adaptation strategies for mitigation and recovery planning;
- Helping communities define a shared vision for mitigation and rebuilding;
- Collaborating with other federal agencies to leverage all federal resources in support of sustainable and resilient recovery; and
- Partnering with non-federal agencies and organizations to leverage non-federal funds for resilient rebuilding, where appropriate.

As the frequency and intensity of climate-related natural disasters increase, it is likely response, recovery and mitigation needs will also increase. This may create a high demand on EPA staff and resources, especially if disasters are simultaneous and/or overlapping.

The most common program areas involved in response and recovery efforts include disposal of household hazardous waste, contaminated debris management, project permitting (for drinking water, wastewater, and storm water management), site assessments, sustainable community design, and climate resiliency. Coordination and collaborative efforts with federal, state, tribal, and local entities is a vital part of these response and recovery efforts.

Adapting to this impact will be dependent on effective disaster risk management and proactive disaster mitigation actions to incorporate climate change considerations into such things as permitting and infrastructure funding.

Climate change impacts may threaten contaminated sites. Temperature extremes, heavy precipitation events and wildfires may threaten contaminated sites in Region 8 and the remedies put in place to cleanup and prevent releases of hazardous substances. Region 8's Superfund Program may need to alter chemical containment strategies, as well as monitoring and sampling protocols on sites. EPA Headquarters has been developing new protocols for addressing the impacts of climate change.

The Site Assessment program is required to evaluate sites based on criteria established in the Hazard Ranking System (HRS). Currently, the HRS rule does not consider factors associated with climate change to determine if a site is eligible for placement on the National Priorities List (NPL).

As the program has limited capacity, the Site Assessment program could prioritize evaluating sites that may be impacted by extreme climate events and wildfires. Furthermore, the program could refer sites to the EPA removal program or state cleanup programs based the potential for releases of hazardous substances due to possible extreme climate events and wildfires.

Climate change may impact EPA Region 8's preparedness and homeland security programs. EPA has several roles related to preparedness. Fundamentally, Region 8's preparedness program is focused on reducing the impacts from oil and/or hazardous substance incidents by coordinating with state, local, tribal, and industrial partners to assess the oil and/or hazardous substance threats in their jurisdictions or communities and develop contingency plans to mitigate those threats or respond if a release/discharge should occur. This work is done through a mix of education, partnership, training and exercises, facility inspections, and contingency plan development.

Environmental changes prompted by climate change could result in increased requests or demand for education, training and/or exercises, contingency planning and assistance, or even relocation of industrial facilities into or out of the region, changing the preparedness needs to communities on a large scale.

Heavy precipitation events, floods, drought, extreme temperatures, and wildfires may threaten the treatment, storage and/or disposal of hazardous and non-hazardous waste. These events may lead to a loss of electrical power, impede access, and interrupt operations of facilities that treat, store, and dispose of waste. Landfill and recycle capacity may be insufficient to handle surges in hazardous and municipal wastes from extreme weather events and wildfires.

In the event of such extreme events, the Region 8's RCRA Branch would work closely with the Region 8 states, who are all authorized to implement the RCRA solid and hazardous waste requirements, to respond to and adapt to the waste-related challenges. The RCRA Branch, in conjunction with authorized state programs, may need to work with treatment, storage, and disposal facilities (TSDFs) to alter chemical containment strategies to ensure protection of groundwater and adjacent sites. The RCRA Branch may need to help authorized states implement emergency permitting activities or adjust permit requirements to address current and future climate impacts. Adapting to this impact will largely depend on available funding and resources, but the RCRA Branch, in cooperation with the authorized states, could help TSDFs prepare for extreme events, thereby potentially mitigating impacts.

Enforcing Environmental Laws and Ensuring Compliance

Climate change may affect environmental monitoring and sampling in various media. Heavy precipitation events, floods, and wildfires, as well as other extreme weather events such as severe winds and tornados, could cause damage to Region 8's environmental monitoring equipment and prevent access to sampling locations. Additionally, increased air and water temperatures, and the earlier timing of spring events like snowmelt and runoff, could affect data quality and the baselines on which they rely. Environmental sampling methods and strategies may also be compromised and require modifications. These impacts may also require monitoring for a suite of chemicals not typically analyzed. Adapting to this impact may require a shift in resources and funding.

Chapter 3. Climate Adaptation Goals and Priority Actions

3.1 Background

Goal 1 of EPA’s FY 2023-2026 Strategic Plan is to “Tackle the Climate Crisis,” and includes the three objectives listed below that address the priorities found in E.O. 14008.

- Objective 1.1: Reduce Emissions that Cause Climate Change
- Objective 1.2: Accelerate Resilience and Adaptation to Climate Change Impacts
- Objective 1.3: Advance International and Subnational Climate Efforts

The priority actions outlined in Region 8’s Climate Adaptation Implementation Plan will assist EPA in achieving Objective 1.2 of its strategic plan, with co-benefits assisting with the broader achievement of Goal 1.

Region 8 has identified priority actions that can be accomplished concurrent with or as a part of its ongoing activities, or as additional resources become available. Some priority actions will require “national-level” action before the Region can address the priority and are noted as such below. By listing an action as a priority, the Region is not making a commitment to take or complete that action, or to take or complete it by a particular point in time.

Region 8 priority actions are aligned with the five priorities listed below that are identified in EPA’s 2021 Agency-wide Climate Adaptation Action Plan.

- Priority 1: Integrate climate adaptation into EPA programs, rulemaking processes, and enforcement activities.
- Priority 2: Consult and partner with states, tribes, territories, local governments, environmental justice organizations, community groups, businesses, and other federal agencies to strengthen adaptive capacity and increase the resilience of the nation, with a particular focus on advancing environmental justice.
- Priority 3: Implement measures to protect the agency’s workforce, facilities, critical infrastructure, supply chains and procurement processes from the risks posed by climate change.
- Priority 4: Measure and evaluate performance.
- Priority 5: Identify and address climate adaptation science needs.

3.2 Monitoring and Evaluating Performance

There are three long-term performance goals within EPA’s Strategic Plan that aim to measure the Agency’s progress in meeting Objective 1.2, Accelerate Resilience and Adaptation to Climate Change Impacts.

- By September 30, 2026, implement all priority actions in EPA’s Climate Adaptation Action Plan and the 20 National Program and Regional Climate Adaptation Implementation Plans to account for the impacts of climate change on human health and the environment.
- By September 30, 2026, assist at least 400 federally recognized Tribes to take action to anticipate, prepare for, adapt to, or recover from the impacts of climate change.

- By September 30, 2026, assist at least 450 states, territories, local governments, and communities, especially communities that are underserved and disproportionately at risk from climate change, to take action to anticipate, prepare for, adapt to, or recover from the impacts of climate change.

Region 8's priority actions, as well as other regionally-led assistance activities, will assist EPA achieve the three Agency-wide climate adaptation long-term performance goals.

Region 8 will evaluate its climate change adaptation activities to assess progress toward mainstreaming climate change adaptation into programs, policies, rulemaking processes, and operations. Based on lessons learned about the most effective climate change adaptation strategies, Region 8 can adjust its approach.

Some metrics exist that will enable Region 8 to measure the results of its activities and others will need to be developed over time. In general, these metrics will reflect:

- *changes in knowledge* (e.g., number of staff/partners taking formal training to increase their awareness of the importance of adaptation planning);
- *changes in behavior* (e.g., increases in the use of decision support tools to integrate climate adaptation planning into activities such as infrastructure planning decisions); and
- *changes in state/condition* (e.g., changes in the ability of communities to withstand more frequent and intense storm events and avoid, for example, combined sewer overflows).

Region 8 recognizes that the integration of climate adaptation planning will occur over time. This will happen in stages, and measures should reflect this evolution. The earliest changes in many programs may be changes in knowledge and awareness, followed by changes in behavior and the use of adaptation tools, and then implementation of projects that build adaptive capacity and lead to changes in state and condition.

3.3 EPA Region 8 Climate Adaptation Goals

Region 8's climate adaptation work aims to achieve the five overarching goals listed below.

- **Planning and Implementation:** Strengthen climate change adaptation across Region 8 programs through planning, evaluation, and coordination within programs, across programs, and in concert with EPA headquarters and other federal agencies.
- **Strengthen Internal Adaptive Capacity:** Strengthen resilience and adaptive capacity of Region 8 programs, workforce, and infrastructure to climate change impacts and identified program vulnerabilities through enhanced technical assistance, training, and preparedness activities.
- **Strengthen Adaptive Capacity of Our Partners:** Strengthen resilience and adaptive capacity of Region 8 partners, including Region 8 states, Tribes, communities, the general public, and other federal agencies, to climate change impacts through enhanced technical assistance and training.

- **Research, Data, and Integration:** Promote, foster, and integrate climate change impacts and climate adaptation research into Region 8 programs with a focus on the latest science, and improved data collection and analysis.
- **Outreach and Education:** Work within EPA and with external partners to review, compile, and develop materials for Region 8 stakeholders, especially at-risk populations, on the impacts of climate change in our Region and opportunities to adapt to a changing climate.

Climate adaptation and financial mechanisms. Incorporating climate adaptation considerations into EPA’s financial mechanisms is a priority for the Agency as a whole. Financial mechanisms may include grants (competitive and non-competitive), cooperative agreements, interagency agreements, loans, implementation of Infrastructure Investment and Jobs Act (IIJA, or Bipartisan Infrastructure Law [BIL]) funds, and contracts.

Region 8 will take steps to ensure the outcomes of infrastructure investments using BIL funds are resilient to the impacts of climate change. Region 8 will explore opportunities to integrate climate change considerations into its financial assistance programs in order to expand support for projects that increase climate resilience while delivering co-benefits for public health, the mitigation of greenhouse gases, and the reduction of other pollution. Region 8 will also provide technical assistance to recipients of BIL funds to help them make climate smart infrastructure investments.

BIL is a historic investment in the water infrastructure improvements, pollution cleanup initiatives, and workforce opportunities necessary to transform communities around the country. Much of the federal assistance provided through BIL will scale up EPA’s existing grant and loan programs, such as the State Revolving Fund Programs and Brownfields Grants. It will also be delivered through the creation of new low-interest financing programs, primarily for tribes and rural or disadvantaged communities. With this significant influx of capital from BIL, it will be more important than ever for EPA – and our state, tribal, and local partners – to invest in resilient infrastructure projects that withstand climate change for decades to come.

EPA’s National Program and Regional Offices will work through the programs that received BIL funding to encourage resilient infrastructure outcomes across the country. Internally, EPA is taking steps to consider how its policies, operations, and program activities can be better aligned to accelerate resilient infrastructure projects, with an emphasis on the most vulnerable communities. EPA will take steps to ensure that its financial assistance programs support resilient infrastructure investments that consider anticipated climate change impacts. It will also be critical that EPA’s technical assistance programs are readily accessible to stakeholders as they take intermediate steps to make climate-informed infrastructure investments. EPA will support its external partners by providing technical assistance opportunities for BIL-funded projects to help build their adaptive capacity. Consistent with the Agency’s Climate Adaptation Action Plan, EPA’s Offices will seek opportunities to engage with other federal agencies, external partners, and federal funding recipients to achieve climate-resilient infrastructure.

3.4 EPA Region 8 Climate Adaptation Priority Actions

Region 8 is proposing a series of priority actions for fiscal years 2022 and 2023 to achieve each climate adaptation goal and to address the program vulnerabilities discussed above. Priority actions are organized under one of the five overarching goals discussed above.

The following are identified for each priority action:

- *Lead* - Region 8 division or office responsible for leading the action (see Table 4 for acronym list).
- *Fiscal Year* - Fiscal year that the action will start and end, or ongoing if the action is anticipated to extend beyond FY23.
- *Performance Metric* - How progress on each action will be demonstrated.
- *Agency-Wide Priority* - Associated Agency-wide climate adaptation priority/priorities (priorities are numbered 1-5, see discussion above).
- *Resource Requirement* - Whether existing resources exist to complete the action or if additional resources (financial, people, technical, etc.) are needed. Resources are identified as one of the following: resources available; resources TBD; resources currently unavailable; or partial resources available.
- *Vulnerability* - Associated program vulnerabilities.
- *Co-benefits* - Additional benefits provided by the action in addition to the immediate, climate-adaptation related program vulnerability that the action addresses.

<i>ARD</i>	Air and Radiation Division
<i>ECAD</i>	Enforcement and Compliance Assurance Division
<i>LCRD</i>	Land, Chemicals, and Redevelopment Division
<i>LSASD</i>	Laboratory Services and Applied Science Division
<i>MSD</i>	Mission Support Division
<i>ORA</i>	Office of the Regional Administrator
<i>ORC</i>	Office of Regional Counsel
<i>SEMD</i>	Superfund and Emergency Management Division
<i>WD</i>	Water Division

Planning and Implementation

EPA Region 8 will work to strengthen climate change adaptation across our programs through planning, evaluation, and coordination within programs, across programs, and in concert with EPA headquarters and other federal agencies.

<i>Update Region 8 Climate Adaptation Implementation Plan.</i>	
<i>Lead</i>	ARD
<i>Fiscal Year</i>	2022-2022
<i>Performance Metric</i>	Plan developed.
<i>Agency-Wide Priority</i>	1
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce and facilities, improved measurement and tracking, science needs addressed.

<i>Form a network of federal agencies covering the EPA Region 8 states (CO, MT, ND, SD, UT, WY) and Tribes to coordinate and communicate on climate adaptation.</i>	
<i>Lead</i>	ARD, SEMD
<i>Fiscal Year</i>	2023-2023
<i>Performance Metric</i>	Network established.
<i>Agency-Wide Priority</i>	2
<i>Resource Requirement</i>	Partial resources available
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners, improved understanding of available tools and resources, improved coordination across federal agencies and a better understanding of points of contact.

<i>Ensure a Disaster Mitigation Coordinator is identified in the Region per requirements of EPA Order 2074.</i>	
<i>Lead</i>	SEMD
<i>Fiscal Year</i>	2022-2022
<i>Performance Metric</i>	Position filled.
<i>Agency-Wide Priority</i>	2, 1
<i>Resource Requirement</i>	Resources currently unavailable
<i>Vulnerability</i>	Non-compliance with EPA Order 2075; lack of capabilities to support ongoing and future hazard mitigation work.
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce.

<i>Identify opportunities within our regional climate adaptation planning to address the challenges specific to Region 8 rural communities posed by climate change.</i>	
<i>Lead</i>	ARD, LCRD

<i>Fiscal Year</i>	2022-2022
<i>Performance Metric</i>	Opportunities identified in planning documents.
<i>Agency-Wide Priority</i>	1, 2
<i>Resource Requirement</i>	Partial resources available
<i>Vulnerability</i>	Region 8 states have a large percentage of rural communities that may not have traditionally been fully considered in climate adaptation planning efforts.
<i>Co-benefits</i>	Assistance to partners.

Strengthen Internal Adaptive Capacity

EPA Region 8 will work to strengthen resilience and adaptive capacity of our programs, workforce, and infrastructure to climate change impacts and identified program vulnerabilities through enhanced technical assistance, training, and preparedness activities.

Initiate discussions for tracking inspections and case resolutions that have climate components. Engage in cross-branch discussions within ECAD and with ORC and EPA’s Office of Enforcement and Compliance Assurance (OECA) on further defining specific “climate change-related components” of inspections and case resolutions that should be tracked.

<i>Lead</i>	ECAD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Number of meetings; plan developed for how to collect and track information.
<i>Agency-Wide Priority</i>	1
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Potentially all vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Improved inter-divisional and cross-divisional communication, climate-ready workforce, improved measurement and tracking.
<i>Notes</i>	Will dictate approach and feasibility for tracking system.

Permit aquifer storage and recovery (ASR) projects within the Region primarily through direct implementation (DI) Class V permitting to authorize storage of scarce drinking water sources in aquifers during periods of low demand to better meet the future needs of Colorado’s Front Range communities.

<i>Lead</i>	WD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Number of underground injection (UIC) permits re/issued within 18 months of receipt of a complete application.
<i>Agency-Wide Priority</i>	1

<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Drought, changing patterns of precipitation and snowmelt, increased evapotranspiration, and reduced snowpack may result in changes to the availability and demand for drinking water.
<i>Co-benefits</i>	Assistance to partners.

Make recommendations on ways to build resiliency to threats and hazards in National Pollutant Discharge Elimination System (NPDES) permits and/or the statement of basis related to asset management.

<i>Lead</i>	WD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Number of EPA permits issued with asset management requirements and/or recommendations.
<i>Agency-Wide Priority</i>	2, 1
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Climate change impacts may result in a need for NPDES discharge permits for wastewater and stormwater from municipal and other facilities to be adjusted to maintain water quality under future climate regimes.
<i>Co-benefits</i>	Assistance to partners.

Assess feasibility for plugging/capping abandoned oil and gas wells to curb passive emissions.

<i>Lead</i>	SEMD
<i>Fiscal Year</i>	2022-2022
<i>Performance Metric</i>	Feasibility inquiries made and assessment completed.
<i>Agency-Wide Priority</i>	1
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	Temperature extremes, heavy precipitation events and wildfires may threaten contaminated sites and the remedies put in place to cleanup and prevent releases of hazardous substances.
<i>Co-benefits</i>	Assistance to partners.

Assuming feasibility, develop and begin implementing plugging/capping abandoned oil and gas wells strategy to curb passive emissions.

<i>Lead</i>	SEMD
<i>Fiscal Year</i>	2023-2023
<i>Performance Metric</i>	Implementation of plugging and capping.
<i>Agency-Wide Priority</i>	1

<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Temperature extremes, heavy precipitation events and wildfires may threaten contaminated sites and the remedies put in place to cleanup and prevent releases of hazardous substances.
<i>Co-benefits</i>	Assistance to partners.
<i>Notes</i>	Dependent on feasibility.

Research resiliency options for the leaking underground storage tank (LUST) program and seek staff training to build technical capacity so that the LUST program can make recommendations on ways to build resiliency to threats and hazards. Once Region 8 has achieved some level of expertise, train the states, Tribes, and other stakeholders.

<i>Lead</i>	LCRD
<i>Fiscal Year</i>	2023-2023
<i>Performance Metric</i>	Research and training complete.
<i>Agency-Wide Priority</i>	1, 2
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Extreme events may cause an increase in LUSTs and subsequently an increased need for cleanup and response.
<i>Co-benefits</i>	Assistance to partners.

Research resiliency options for the Resource Conservation and Recovery Act (RCRA) hazardous waste program and seek staff training to building technical capacity so that the RCRA program can make recommendations on ways to build resiliency to threats and hazards. Once Region 8 has achieved some level of expertise, train the states, Tribes, and other stakeholders.

<i>Lead</i>	LCRD
<i>Fiscal Year</i>	2023-2023
<i>Performance Metric</i>	Research and training complete.
<i>Agency-Wide Priority</i>	1, 2
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Heavy precipitation events, floods, drought, extreme temperatures, and wildfires may threaten the treatment, storage and/or disposal of hazardous and non-hazardous waste.
<i>Co-benefits</i>	Assistance to partners.

<i>Compile and/or develop climate adaptation recommendations and training materials, consistent with national program office efforts, for various program areas to assist them in incorporating climate adaptation components into their core program work. Provide training to staff and managers on the recommendations and materials.</i>	
<i>Lead</i>	ARD
<i>Fiscal Year</i>	2023-ongoing
<i>Performance Metric</i>	Percentage of staff trained per module.
<i>Agency-Wide Priority</i>	1
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce and facilities.
<i>Notes</i>	Dependent on completion of EPA Headquarters-developed training modules.
<i>Evaluate and begin to implement, in partnership with the Office of Mission Support (OMS), opportunities to enhance the resilience of Region 8's internal workforce, facilities, and processes. For example, ensuring building and IT equipment resilience to the impacts of a changing climate, such as potential power outages and storm damage.</i>	
<i>Lead</i>	MSD
<i>Fiscal Year</i>	2022-ongoing
<i>Performance Metric</i>	Resilience measures evaluated and implemented where appropriate and feasible.
<i>Agency-Wide Priority</i>	3
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce and facilities.
<i>Provide timely grant awards and oversight for climate adaptation-related work.</i>	
<i>Lead</i>	MSD
<i>Fiscal Year</i>	2022-ongoing
<i>Performance Metric</i>	Timely awards and oversight provided.
<i>Agency-Wide Priority</i>	3
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce and facilities.

Strengthen Adaptive Capacity of Our Partners

EPA Region 8 will work to strengthen resilience and adaptive capacity of our partners, including states, Tribes, communities, the general public, and other federal agencies, to climate change impacts through enhanced technical assistance and training.

<i>Promote the use of EPA tools, resources, and industry-accepted practices to build resiliency with environmental justice (EJ) grantees that have climate as a focus.</i>	
<i>Lead</i>	ORA
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Number of grantees with climate as a focus.
<i>Agency-Wide Priority</i>	2, 5
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners.

<i>Encourage Tribes to incorporate climate adaptation actions into their EPA Tribal Environmental Plans (ETEPA) and General Assistance Program (GAP) grant workplans.</i>	
<i>Lead</i>	ORA
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Number of ETEPAs and GAP workplans which include climate adaptation actions.
<i>Agency-Wide Priority</i>	2, 5
<i>Resource Requirement</i>	Partial resources available
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners.

<i>Explore with states, Tribes, other federal agencies, landowners, and others on ways to build watershed resiliency, including through the protection and enhancement of soil health, wetlands, instream flows, and forest resources.</i>	
<i>Lead</i>	WD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Engagement occurred around watershed resiliency.
<i>Agency-Wide Priority</i>	2, 1

<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Climate change impacts, such as warmer temperatures, heavier precipitation, and drought, may affect the Region’s ability to protect and restore watersheds, aquatic ecosystems, and wetlands.
<i>Co-benefits</i>	Assistance to partners.

Engage Region 8 stakeholders across the water sector to build technical, financial, scientific, and organizational capability to spur implementation on water reuse, thereby helping ensure a clean, sustainable water supply that is resilient to pressures such as climate change and aging infrastructure.

<i>Lead</i>	WD, LSASD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Number of engagements with Region 8 stakeholders around the issues of water reuse.
<i>Agency-Wide Priority</i>	2, 1
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Drought, changing patterns of precipitation and snowmelt, increased evapotranspiration, and reduced snowpack may result in changes to the availability and demand for drinking water.
<i>Co-benefits</i>	Assistance to partners.

Compile a master list of key EPA (and other) climate adaptation tools and resources. Tailor the list for various EPA Region 8 programs and other stakeholders, and share as appropriate.

<i>Lead</i>	ARD
<i>Fiscal Year</i>	2023-2023
<i>Performance Metric</i>	List completed.
<i>Agency-Wide Priority</i>	1, 2
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce and facilities.

Provide technical assistance to the City of Missoula Public Works Department for development of district heating and cooling system for new multi-use development. Missoula Public Works will install, own, and operate the district system which will be based on ground-source heat pumps.

<i>Lead</i>	LCRD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Guide developed and webinar completed.

<i>Agency-Wide Priority</i>	2
<i>Resource Requirement</i>	Partial resources available
<i>Vulnerability</i>	Increase in extreme weather events leading to increase in power outages.
<i>Co-benefits</i>	Assistance to partners, climate-ready facilities.
<i>Notes</i>	Resources available to begin project, however, additional funding may be required to complete all necessary analysis/modeling.

<i>Host a Region 8 Tribal Climate Summit, co-hosted by EPA Region 8 and the Region 8 Regional Tribal Operations Committee (RTOC), with the goal of sharing knowledge with a focus on ITEK, planning efforts, best practices, and potential assistance opportunities related to climate change.</i>	
<i>Lead</i>	ORA, ARD
<i>Fiscal Year</i>	2023-2023
<i>Performance Metric</i>	Summit held.
<i>Agency-Wide Priority</i>	2, 5
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	All vulnerabilities impacting Region 8 Tribes.
<i>Co-benefits</i>	Assistance to partners, climate mitigation/greenhouse gas reduction best practices.

Research, Data, and Integration

EPA Region 8 will work to promote, foster, and integrate climate change impacts and climate adaptation research into our programs with a focus on the latest science, and improved data collection and analysis.

<i>Identify and incorporate climate adaptation concerns for Region 8 states, Tribes, communities, and vulnerable populations into regional science priorities.</i>	
<i>Lead</i>	ARD, LSASD
<i>Fiscal Year</i>	2022-2022
<i>Performance Metric</i>	Climate adaptation integrated into science priorities.
<i>Agency-Wide Priority</i>	1, 2, 5
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce and facilities, improved measurement and tracking, science needs addressed.

<i>Track inspections and case resolutions that have climate-related components (for example, climate-related injunctive relief, mitigation, or SEPs).</i>	
<i>Lead</i>	ECAD
<i>Fiscal Year</i>	2023-2023
<i>Performance Metric</i>	Inspections and case resolutions tracked.
<i>Agency-Wide Priority</i>	1
<i>Resource Requirement</i>	Resources currently unavailable
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce, improved measurement and tracking.
<i>Notes</i>	Dependent on initial meetings within ECAD/ORC and on direction taken by OECA.

<i>Develop a regional monitoring network in Region 8 to assess long term trends in climate sensitive water quality indicators and as a basis for water quality criterial development or refinement.</i>	
<i>Lead</i>	WD
<i>Fiscal Year</i>	2023-2023
<i>Performance Metric</i>	Draft plan for regional monitoring network developed.
<i>Agency-Wide Priority</i>	2, 1
<i>Resource Requirement</i>	Partial resources available
<i>Vulnerability</i>	Climate change will likely impact the Region’s work to protect water quality, the health of watersheds, aquatic ecosystems and wetlands, and the recovery of threatened fish species.
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce and facilities, improved measurement and tracking, science needs addressed.

<i>Add relevant data layers identified by the Remedial Branch to TERA, the emergency response ArcGIS viewer, for extreme climate impacts.</i>	
<i>Lead</i>	SEMD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Data layers identified and added.
<i>Agency-Wide Priority</i>	1, 2
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	Lack of climate-related data to incorporate into decision making at National Priority List (NPL) sites.
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce, improved measurement and tracking.

<i>Explore and develop process to assess existing need for Region 8 to complete climate vulnerability analysis on a subset of Superfund Alternative Approach (SAA), proposed, final, deleted National Priorities List (NPL) sites.</i>	
<i>Lead</i>	SEMD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Assessments completed.
<i>Agency-Wide Priority</i>	1
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Unanticipated impacts from climate change, with site-specific variability (-ies), such as wildfire, drought, high winds, and floods.
<i>Co-benefits</i>	Improved engineering and design controls for fire resiliency, assistance to partners, climate-ready workforce, improved measurement and tracking.

<i>Review and assess applicable climate resiliency and adaptation information, including how this information relates to updates to EJ definitions and EJ concerns to our Superfund sites. Update site profile pages to reflect this information.</i>	
<i>Lead</i>	SEMD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Number of site profile pages updated.
<i>Agency-Wide Priority</i>	1, 2, 4
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Vulnerabilities are site-specific.
<i>Co-benefits</i>	Assistance to partners.
<i>Notes</i>	Dependent on EPA Headquarters template.

<i>Explore and identify climate extreme data layers helpful to proposed, final, deleted NPL sites, and one SAA site to assist characterization and remedy design regarding various risks (drought, flooding, wildfire, wind, etc.) to add to appropriate database, e.g., TERA-FY22.</i>	
<i>Lead</i>	SEMD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Data layers identified and report completed.
<i>Agency-Wide Priority</i>	1, 3
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Vulnerabilities are site-specific.
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce, improved measurement and tracking.

Work with regional Superfund Redevelopment Initiative coordinator and possibly other staff to screen proposed, final, deleted NPL sites, and one SAA site, for remedy evaluation, as well as reuse and renewables development opportunities to add to Superfund Redevelopment Mapper and other tools, e.g., Re-Powering America’s Land Initiative.

<i>Lead</i>	SEMD
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Number of sites.
<i>Agency-Wide Priority</i>	1
<i>Resource Requirement</i>	Resources TBD
<i>Vulnerability</i>	Vulnerabilities are site-specific.
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce, improved measurement and tracking.

Outreach and Education

EPA Region 8 will work within the Agency and with external partners to review, compile, and develop materials for stakeholders, especially at-risk populations, on the impacts of climate change in our Region and opportunities to adapt to a changing climate.

During interactions with states, Tribes, communities, and the public, promote the use of EPA tools and resources to build resiliency to threats and hazards to air, water and land, and respond to public inquiries regarding the use of the tools and resources.

<i>Lead</i>	See below sub-actions.
<i>Fiscal Year</i>	2022-2023
<i>Performance Metric</i>	Number of interactions.
<i>Agency-Wide Priority</i>	1, 2
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	See below sub-actions.
<i>Co-benefits</i>	Assistance to partners.

Sub-action: *Promote the use of EPA tools and resources that assist in adapting to the ambient and indoor air quality impacts of climate change, and respond to public inquiries. These tools may include but are not limited to AirNow Air Quality Index, EnviroFlash Air Quality Alerts, Smoke-Ready Toolbox for Wildfires, Heat Island Reduction Program, and emergency preparedness, resilience, and response indoor air quality resources.*

<i>Lead</i>	ARD
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<i>Fiscal Year</i>	See above
<i>Performance Metric</i>	See above
<i>Agency-Wide Priority</i>	See above
<i>Resource Requirement</i>	See above
<i>Vulnerability</i>	Increased severity and frequency of wildfires, increased ground level ozone levels, and increased air temperature will impact air quality and public health.
<i>Co-benefits</i>	See above

Sub-action: Promote the use of EPA tools, resources, and industry accepted practices to build resiliency to threats and hazards within LCRD programs. These may include but are not limited to the following: - Underground Storage Tank Flood Guide – Post Severe Weather Checklist – Planning for Natural Disaster Debris.

<i>Lead</i>	LCRD
<i>Fiscal Year</i>	See above
<i>Performance Metric</i>	See above
<i>Agency-Wide Priority</i>	See above
<i>Resource Requirement</i>	See above
<i>Vulnerability</i>	Heavy precipitation events, floods, extreme temperatures, and wildfires may threaten the structural integrity and safe operation of USTs, the Region’s programs may see an increase and need in additional promotion, education, and adoption of Pollution Prevention awareness and best practices, etc.
<i>Co-benefits</i>	See above

Sub-action: Promote EPA tools, resources, and industry accepted practices to help build the capacity of stakeholders with respect to climate adaptation within the Children’s Environmental Health Program. Examples of this may include, but are not limited to, webinars, conferences, press releases, fact sheets, and other means of disseminating information.

<i>Lead</i>	ORA
<i>Fiscal Year</i>	See above
<i>Performance Metric</i>	See above
<i>Agency-Wide Priority</i>	See above
<i>Resource Requirement</i>	See above
<i>Vulnerability</i>	All vulnerabilities impacting the Region (see Chapter 2).
<i>Co-benefits</i>	See above

<i>Incorporate climate adaptation objectives and fact sheets into outreach activities directed at Local Emergency Planning Committees, Facility Response Plans, and Risk Management Plan facilities.</i>	
<i>Lead</i>	SEMD
<i>Fiscal Year</i>	2022-2022
<i>Performance Metric</i>	Factsheets updated.
<i>Agency-Wide Priority</i>	1, 2
<i>Resource Requirement</i>	Resources available
<i>Vulnerability</i>	The Region’s emergency response and disaster mitigation and recovery efforts may increase due to an increasing risk of heavy precipitation events, floods, drought, and wildfires, as well as other extreme weather events like severe winds and tornados.
<i>Co-benefits</i>	Assistance to partners, climate-ready workforce and facilities.

Chapter 4. Climate Adaptation Training Plan

4.1 Training Approach

A central element of Region 8's efforts to adapt to a changing climate will be to increase staff awareness of how climate change may affect their work by providing them with the necessary data, information, and tools. Additionally, states, Tribes, and local communities share responsibility for protecting human health and the environment. Partnerships with EPA are at the heart of this. Working in concert with EPA National Program Offices, National Support Offices, and other Regional Offices will prove imperative as training is developed that tests and enhances climate adaptation knowledge at general and program-specific levels. These partnerships will be critical for efficient, effective, and equitable implementation of climate adaptation training, which will evolve over time.

Region 8's training approach includes the key elements listed below.

- Ensure that technical staff and their partners have access to training on the importance of climate adaptation, and how they can incorporate climate adaptation considerations into their work.
- Ensure that technical staff and their partners have access to specific approaches, data, and tools for integrating climate adaptation into decision-making processes.^{x1}
- Develop a Region 8 climate adaptation communication strategy to enhance external climate change communication, which may include state and tribal partners, municipalities, industry, the public, and other relevant parties. The communication strategy will include but is not limited to information on climate change impacts and risks, and the programs, tools, and resources available to stakeholders to enhance adaptation and resiliency (which may include elements of the various climate adaptation training modules found below).
- Work with other federal agencies to enhance understanding of climate change, leverage collective knowledge about climate adaptation planning, reduce duplication, and avoid conflicting efforts, which may include training.

4.2 Climate Adaptation Training Modules

EPA National Program Offices and National Support Offices will be developing and/or updating climate adaptation training modules to support Goal 1 of EPA's Strategic Plan. Currently, the training modules will be rolled out as follows. Once available, Region 8 will utilize various methods to distribute and deliver the EPA Headquarters-developed training modules.

Table 5. Region 8 Climate Adaptation Training Tentative Schedule

<i>Climate Adaptation Training Module^a</i>	<i>Tentative Availability of Training Module^b</i>	<i>Tentative Region 8 Distribution and Delivery of Training Module^c</i>	<i>Region 8 Target Audience^d</i>
<i>Office of Policy (OP) Climate Adaptation 101 (updating existing training module)</i>	Summer FY22	FY23-ongoing	All Region 8 employees
<i>Rule Writers</i>	End of FY22	FY23-ongoing	TBD
<i>Office of Water (OW) (updating existing training module)</i>	End of FY22	FY23-ongoing	Region 8 WD employees
<i>Office of Land and Emergency Management (OLEM) (updating existing training module)</i>	End of FY22	FY23-ongoing	Region 8 LCRD and SEMD employees
<i>Office of Air and Radiation (OAR)</i>	End of FY23	FY24-ongoing	Region 8 ARD employees
<i>Office of Chemical Safety and Pollution Prevention (OCSPP)</i>	End of FY23	FY24-ongoing	Region 8 LCRD employees
<i>Office of Enforcement and Compliance Assurance (OECA)</i>	End of FY23	FY24-ongoing	Region 8 ECAD employees
<i>Office of Mission Support (OMS)</i>	End of FY23	FY24-ongoing	Region 8 MSD employees
<i>Office of Homeland Security (OHS)</i>	End of FY23	FY24-ongoing	TBD
<i>Office of International and Tribal Affairs (OITA)</i>	End of FY23	FY24-ongoing	All Region 8 employees
<i>Office of Research and Development (ORD)</i>	End of FY23	FY24-ongoing	All Region 8 employees

^a New climate adaptation training modules to be developed unless otherwise noted.

^b Tentative availability of individual climate adaptation training modules has been provided by OP and is subject to timelines developed by EPA Headquarters' National Program Offices and National Support Offices.

^c Region 8 distribution and delivery of EPA Headquarters-developed climate adaptation training modules is dependent on availability.

^d Climate adaptation training modules will be targeted to audiences in Region 8, however, open to all Region 8 employees. New employees will be made aware of all available training modules, as well as employees changing roles and responsibilities within the Region.

Region 8 will rely on a variety of methods and avenues to distribute and deliver EPA Headquarters-developed training modules, which will include but not be limited to the following:

- Existing organizational structures within Region 8 that could be utilized to disseminate information on tailored climate adaptation training, such as Senior Leadership Team (SLT), Regional Leadership Team (RLT), and individual division/office-level branch meetings;
- Existing bodies within Region 8 that spearhead topic discussions related to climate adaptation, such as the Regional Science Council, Speak Green Series, and Green Ops Team;
- Concentrated efforts by the Region 8 Climate Adaptation Team, which is comprised by nominated representatives from each division and office; and
- Coordination with Region 8's Human Resources Branch to target new employees and employees in new positions.

Chapter 5. Climate Adaptation Science Needs

Region 8 has identified the following region-specific areas where additional support is needed to assess climate impacts and build resilience. Region 8's proposed science needs are organized by division/office. The following needs were identified as part of the development of this planning document and are subject to change, as well as growth as new science needs identified. This would take place in future fiscal years as Region 8 implements its priority actions and engages in further conversation with stakeholders and partners around the topic of climate adaptation.

Air and Radiation Division

- To study whether the PM_{2.5} NAAQS is the best forecasting metric for wildfire smoke or whether a separate metric should be added to the Air Quality Index (AQI) to better reflect the immediate health impacts of wildfire smoke, which often contains significant levels of air toxics in addition to nitrogen oxides (NO_x), volatile organic compound (VOC), carbon monoxide (CO), and PM emissions.
- To conduct research on wildfire emissions through greenhouse gas quantification to address and build resilience in both the rural and urban greenhouse gas adaptation sector. This research will build capacity in the Region 8 Air and Radiation Division under the Clean Air Act and the Paris Climate Agreement statutory authorities.
- To conduct research on VOC emissions from consumer products through public awareness and outreach tools to help communities reduce emissions and adapt and build resilience. This research will build capacity in Region 8 Air and Radiation Division under Clean Air Act statutory authority.

Laboratory Services and Applied Sciences Division

- To research the beneficial reuse of produced water to improve drought resiliency across the arid west. Local, state, and federal governments are considering the expanded use of alternative water sources (e.g., industrial wastewater) to replace or augment fresh water as a direct result of climate change and increased water demand. EPA's National Water Reuse Action Plan (WRAP) identifies produced water as one of five alternative water sources being explored. The goal of this research is to identify the potential toxicity of treated and untreated produced water and to identify which constituents are contributing to toxicity. Understanding potential toxicity will inform appropriate use and/or treatment that may be needed for various uses of produced water including irrigating crops, livestock consumption, roadway dust suppression, and discharge to surface water.
- To conduct research to address increased acid rock and acid mine drainage (ARD/AMD) due to increased oxidation rates and summer air temperatures to improve remedial decision making at mine sites. This research will build capacity in the Superfund program under CERCLA statutory authority.

Land and Chemical Redevelopment Division

- To research the beneficial use of electric arc furnace (EAF) slag. Industrial sectors including the steel industry generate hundreds of millions of tons of secondary materials each year that are sent for disposal. Secondary materials are any materials that are not the primary products from manufacturing and other industrial sectors. Appropriate beneficial use of secondary materials can encourage greater resource sustainability by returning valuable resources back into the circular economy, while also keeping them out of landfills.

Office of the Regional Administrator

- To conduct research on the impacts of climate change in tribal communities to help inform how they can best utilize their resources to build resiliency. Impacts to Tribes include, but are not limited to, flooding, droughts, crop failure, the destruction of culturally significant sites, and impacts to drinking water and/or recreational areas (e.g., due to HABs).
- To conduct research on air quality through PM_{2.5} air monitoring to address climate adaptation in rural, plains and mountainous communities, and build resilience in environmental and public health sectors. This research will build capacity in the Environmental Justice, Tribal Affairs Branch, and Clean Air programs under the Clean Air Act statutory authority.

Superfund and Emergency Management Division

- To conduct research on impacts of climate change on superfund sites (including remedy selection and resilience) to address impacts of climate change and extreme weather (fires, floods, etc.) and build resilience in the Superfund cleanup sector. This research will build capacity in the superfund program under CERCLA statutory authority.

Water Division

- To research climate-related shifts in HABs, including the uptake of algal toxins into plant and animal tissue, use of social and citizen science to achieve positive outcomes in reducing excess nutrients, and understanding of the extent and impact of benthic cyanobacteria in Region 8.
- To coordinate the development of a long-term regional water quality monitoring network to assess long term trends in climate sensitive indicators and as a basis for water quality criteria development or refinement.
- To research and estimate climate change-related shifts in the magnitude, duration, and timing of the flow regime and plan ways to incorporate these shifts into Water Division work (e.g., 7Q10, TMDL critical conditions).

Chapter 6. Conclusion

EPA Region 8's Climate Adaptation Implementation Plan is intended to complement and support EPA's Agency-wide Climate Adaptation Action Plan, released in October 2021. EPA Region 8's plan aims to encourage and integrate climate adaptation throughout our programs in response to the climate change impacts we are already experiencing here in Region 8 and those we anticipate. We have identified specific programmatic vulnerabilities resulting from climate change to which the Region will likely need to adapt. EPA Region 8 is committed to building not only our own adaptive capacity but also the adaptive capacity of our partners and stakeholders.

EPA's leadership and commitment to building the nation's adaptive capacity are vital to its mission of protecting human health and the environment.

Appendix A. Stakeholder and Partner Engagement

Region 8 conducted two periods of stakeholder and partner engagement during the development of its Climate Adaptation Implementation Plan.

Early Engagement on EPA's Climate Adaptation Planning Process and Climate Impacts

In order to engage early in the planning process, Region 8 met with stakeholders and partners to raise awareness of E.O. 14008, EPA's process for updating its Climate Adaptation Action Plan, and the forthcoming efforts by EPA regional and program offices to update or develop respective Climate Adaptation Implementation Plans. During the second half of calendar year 2021 and into early 2022, Region 8 used standing meetings, as well as ad hoc meetings and conversations, to reach a variety of stakeholders and partners. During these engagements, Region 8 shared a draft *Table 2. Climate Change Impacts in EPA Region 8* and asked four discussion questions.

1. What are your thoughts on the draft updated list of climate change impacts in EPA Region 8?
2. Are there any impacts you would suggest adding or deleting?
3. What might be the effects of these impacts on your programmatic work?
4. Do you have any other comments or suggestions related to the update of EPA Region 8's Climate Adaptation Implementation Plan?

Audiences for early engagement included but were not limited to Tribal Environmental Directors / Region 8 Regional Tribal Operations Committee (RTOC), Region 8 State Environmental Directors, Region 8 State Oil and Gas Directors, Region 8 State Air Directors, Region 8 State Water Directors, Region 8 Agriculture Commissioners, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), Four Corners Air Quality Group (4CAQG), and Region 8 pesticide directors.

Engagement on Draft Region 8 Climate Adaptation Implementation Plan

During the months of May and June 2022, Region 8 prepared and implemented a stakeholder and partner engagement strategy to share key and relevant elements of the draft Region 8 plan with various audiences.

Region 8 hosted two identical listening sessions in the month of June 2022, open to the public and targeting non-governmental organizations, community groups, and academia.

Engagement with Region 8 Tribes was coordinated both at the regional level and in concert with EPA Headquarters' Office of International and Tribal Affairs (OITA) by offering tribal consultation as well as engagement opportunities through a national listening session and through the Region 8 RTOC.

Engagement with Region 8 state and local governments was coordinated through existing networks such as State Environmental Directors and other state media directors. A dedicated session for state government was also held at the request of the State Environmental Directors. Local government

engagement was coordinated through meetings with umbrella organizations and local government attendance at the Region 8 listening sessions. A national listening session was also held for state and local government associations.

A PDF of the draft Region 8 plan was posted to EPA’s Climate Adaptation Plan website (www.epa.gov/climate-adaptation/climate-adaptation-plan) during this period of external engagement.

Tribal Government Engagement

Summary of Tribal Government Engagement Activities		
Activity	Timeframe	Description
<i>Region 8 Tribal Consultation</i>	May 16-June 30, 2022	Forty-five-day consultation, led by Region 8’s Tribal Affairs Branch. No requests for government-to-government consultation were received.
<i>National Tribal Consultation</i>	May 16-June 30, 2022	Forty-five-day consultation, led by OITA. Draft Region 8 plan was listed in the OITA offer for tribal consultation.
<i>Region 8 RTOC</i>	June 22, 2022	Presentation and discussion of draft Region 8 plan, as well as presentation by OITA on all draft national program office and regional office plans (focus on Tribes).
<i>National Tribal Consultation Listening Session</i>	June 1, 2022	Led by OITA, the listening session summarized all draft national program and regional office plans (focus on Tribes).

State and Local Government Engagement

Summary of State and Local Government Engagement Activities		
Activity	Timeframe	Description
<i>Region 8 State Environmental Directors</i>	June 16, 2022	Update on draft Region 8 plan provided at regularly scheduled meeting. It was requested that EPA set up a specific session on the draft Region 8 that the State Environmental Directors could, in turn, share with appropriate staff at the state level to learn more about the plan and provide input/feedback.

<i>Region 8 State Engagement Session</i>	June 29, 2022	This session was arranged at the specific request of the State Environmental Directors. Nineteen attendees total representing all six Region 8 states.
<i>Region 8 State Air Directors</i>	June 22, 2022	Presentation and discussion of draft Region 8 plan at regularly scheduled meeting. A link to the draft Region 8 plan was also provided to the State Air Directors.
<i>National State and Local Government Association Listening Session</i>	June 9, 2022	The EPA Headquarters-led listening session targeted the following organizations: ECOS; National Governors Assoc.; National Assoc. of Counties; U.S. Conference of Mayors; National League of Cities; International City/County Mgmt. Assoc.; National Assoc. of State Depts. of Agriculture; African American Mayors Assoc.
<i>Other Region 8 State Media Directors</i>	June 2022	Similar to the engagement with the Region 8 State Air Directors, all Region 8 divisions were encouraged to inform and/or engage with state counterparts on the draft Region 8 plan.

Region 8 Listening Sessions

During the month of June 2022, Region 8 hosted two identical listening sessions on the draft Region 8 plan. The sessions featured opening remarks by Regional Administrator KC Becker, followed by a 20-minute presentation on the draft Region 8 plan. Each session then provided an opportunity for attendees to provide up to three minutes of input on the draft Region 8 plan. The web link to the PDF of the draft Region 8 was provided in advance to attendees.

Region 8 Listening Sessions		
Session	Timeframe	Description
<i>Listening Session 1</i>	June 9, 2022 (day: 10 am-12 pm MT)	A total of 36 individuals attended the first Listening Session. Six individuals (all representing either non-governmental organizations, academia, or local government) provided specific input by speaking during the session. This session was recorded so that EPA Region 8 could ensure all input is received and considered as we begin to implement our plan.
<i>Listening Session 2</i>	June 15 (evening: 6-8 pm MT)	A total of 16 individuals attended the first Listening Session. Two individuals (no specific affiliation) provided input by speaking during the session. This session was recorded so that EPA Region 8 could ensure all input is received and considered as we begin to implement our plan.

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^{xl} Tools include such things as the EPA's Climate Ready Water Utilities CREAT decision-support tool, the EPA Global Change Research Program's Integrated Climate and Land Use Scenarios (ICLUS), and community-based social marketing strategies.