

U.S. ENVIRONMENTAL PROTECTION AGENCY



REGION 7

Climate Change Adaptation Implementation Plan

OCTOBER 2022

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

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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.

A handwritten signature in blue ink, appearing to read 'J.G. McCabe', is centered on the page.

Janet G. McCabe

Acknowledgements

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Introduction

The U.S. Environmental Protection Agency’s (EPA) Region 7 is made up of four states and nine tribal nations. It’s roughly 14.1 million people are spread across both rural and metropolitan areas, including St. Louis, Kansas City, Springfield, Des Moines, Cedar Rapids, Omaha, Lincoln, and Wichita.

Region 7’s lands are managed by its states, tribal nations, and federal agencies. These entities have interests that include agriculture, energy development and production, environmental protection and stewardship, manufacturing, recreation, tourism, and commercial development.



Figure 1. Region 7 States and Tribal Nations

The Region spans three geographical regions defined by the Fourth National Climate Assessment: the Midwest region (includes Missouri and Iowa), the Northern Great Plains region (includes Nebraska), and the Southern Great Plains region (includes Kansas). The Fourth National Climate Assessment identifies water, agriculture, indigenous peoples, and human health as main areas impacted by climate change across these three regions.

The Intergovernmental Panel on Climate Change’s (IPCC) Sixth Assessment report, released in 2021, projects that Central North America will experience increases in drought and fire weather and projected increases in extreme precipitation and river and pluvial flooding. These changes are coupled with temperature increases due to human influence.

To continue to achieve EPA’s mission in the face of a changing climate, Region 7 has developed this Climate Adaptation Implementation Plan to address climate risks that impact its programmatic areas of responsibility. It will continue to integrate climate adaptation and resilience practices into its existing programs and identify new opportunities to increase adaptive capacity as regulations change, new initiatives and priorities are instituted, and funding opportunities are identified. Region 7’s climate adaptation priority actions (see [Section 3](#)) align with the five agency-wide climate adaptation priorities outlined in the 2021 EPA Climate Adaptation Action Plan:

1. Integrate climate adaptation into EPA programs, policies, rulemaking processes, and enforcement activities;
2. Consult and partner with states, tribes, territories, 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;
3. Implement measures to protect the agency’s workforce, facilities, critical infrastructure, supply chains, and procurement processes from the risks posed by climate change;
4. Measure and evaluate performance; and
5. Identify and address climate adaptation science needs.

Tribal Treaty and Reserved Rights

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 adaptation plans in order to protect these rights and ensure the agencies meet their legal and statutory obligations and other mission priorities as they work to combat the climate crisis.

In September 2021, EPA joined 16 other federal agencies in signing a [Memorandum of Understanding](#) (MOU) 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.

In addition, the White House Council on Environmental Quality (CEQ) is encouraging agencies to include consideration of Traditional Ecological Knowledge (TEK) in climate adaptation plans. The CEQ, working jointly with the White House Office of Science and Technology Policy, is developing interagency guidance on how to elevate TEK in federal decision-making and is requiring progress reports on agency considerations related to TEK and climate.

EPA's Office of International and Tribal Affairs (OITA) is committed to developing and deploying training to EPA staff in order to implement the interagency TEK guidance once it is final. Based on the current timeline, OITA is proposing this training for FY 2023. Region 7 commits to participate in this training.

[The Infrastructure Investment and Jobs Act](#)

The Infrastructure Investment and Jobs Act (IIJA, or Bipartisan Infrastructure Law [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 its 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.

Region 7 will take steps to ensure the outcomes of infrastructure investments using BIL funds are resilient to the impacts of climate change. Region 7 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 7 will also provide technical assistance to recipients of BIL funds to help them make climate-smart infrastructure investments.

Section 1. Designation of a Senior Career Leader

The EPA Region 7 Deputy Regional Administrator (DRA) is responsible for the development, management, and execution of Region 7's Climate Adaptation Implementation Plan. The DRA will work with Region 7 divisions and offices to ensure the Plan's priority actions and management activities are implemented.

Section 2. Vulnerability Assessment

This section contains a discussion of the climate change impacts affecting Region 7's four states and nine tribal nations as well as an examination of the risks posed to key Region 7 programs. It builds on the work presented in Section 4 of the 2021 EPA Climate Adaptation Action Plan.

The subsections below describe climate change vulnerabilities to EPA Region 7's mission, facilities, and operations, organized by major program areas. Limitations in the adaptive capacity and resilience of Region 7's partners, the disproportionate impacts climate change has on certain communities, and the costs associated with implementing changes are additional vulnerabilities for Region 7 across all program areas.

2.1 Air Quality

Tropospheric ozone pollution is likely to increase in certain regions

Tropospheric, or ground-level, ozone is created by photochemical reactions of short-lived pollutants in the atmosphere. Emissions from industrial facilities, electric utilities, motor vehicles, chemical solvents, controlled agricultural burning, and oil and gas production are some of the major sources of these ozone precursor pollutants in Region 7. While tropospheric ozone is higher in urban areas, some rural areas with oil and gas production activities in Region 7 may also have high levels based on experiences in Region 8 regarding this industry.³

There is strong evidence that climate change is worsening ozone pollution, even as Clean Air Act regulations continue to reduce ozone concentrations.² High temperatures and regional air stagnation associated with climate change may lead to more ozone formation, even with the same level of emissions. Biogenic emissions, or emissions from natural sources, are not expected to remain the same, however. Biogenic emissions like isoprene, an ozone precursor, are likely to increase with rising temperatures.¹

Additionally, Region 7 has historically observed increased ozone as a result of prescribed burning of rangeland in advance of the growing season. Controlled burn events release volatile organic compounds, oxides of nitrogen, and carbon monoxide at low altitudes. As growing season shifts are an effect of climate change, these shifts have the potential to lengthen the ozone season by increasing the duration when conditions are conducive to the formation of troposphere ozone.

Heightened concentrations of tropospheric ozone can cause an increase in hospital and emergency room visits and lost days of school, health effects such as aggravated asthma, shortness of breath, and premature death, lower outdoor worker productivity, and damage to crops and plant communities.⁴ Vulnerable populations may be at higher risk for health problems from increased exposure to ozone.

Increases in tropospheric ozone due to climate change may require greater pollution controls to attain or maintain the ozone National Ambient Air Quality Standard (NAAQS). Region 7 works with partners at state, local, and tribal levels to meet this standard through State Implementation Plans (SIPs) and other measures. These efforts may need to be adjusted as climate change progresses. Although Region 7's adaptive capacity with respect to this impact is dependent on national standard setting efforts, there are leverage points and voluntary actions that can be used.

Particulate matter levels (both fine and coarse) are likely to be affected through changes in frequency and intensity of wildfires, controlled burns, and high winds

There is evidence indicating that climate change will affect particulate matter (PM) levels through changes in the frequency or intensity of wildfires,⁴ changing weather patterns, and the effects of drought on land. The IPCC has reported with very high confidence that, in North America, disturbances such as wildfires are increasing and are expected to intensify in a warmer future with drier soils and longer growing seasons. This could complicate Region 7 efforts to protect public health and the environment from PM pollution.

Certain areas of Region 7 utilize controlled burning of rangeland to reduce invasive vegetation and prepare the soil for new grass production for cattle grazing. Climate change has the potential to affect how prescribed burning is used in rangeland management, necessitating changes in the timing of burning events to coincide with favorable conditions associated with precipitation, wind, temperature, and the spring growing season. Changes in climate may result in revised burning schedules and have the potential to impact air quality that affects vulnerable populations.

Additionally, drought conditions associated with climate change can promote wind-borne dust or PM during high wind events. Wind-borne PM is principally associated with dry soil conditions and the lack of adequate vegetative cover. Due to extensive agricultural activity in Region 7, the area is very susceptible to wind-borne PM in the early spring during the period of land preparation (tilling, fertilizing, and planting). During this period, topsoil is more susceptible to being distributed in the air during high wind events, and the problem is exacerbated if the soil is dry due to low precipitation or elevated temperatures, which can be associated with climate change.

Heightened concentrations of PM can cause an increase in hospital and emergency room visits and lost days of school, health effects such as aggravated asthma, shortness of breath, and premature death, lower outdoor worker productivity, and damage to crops and plant communities.⁴ Vulnerable populations may be especially at risk from increased exposure to PM.

Increases in PM due to climate change may require greater pollution controls applied to permitted sources to attain or maintain the PM NAAQS. Region 7 works with partners at state, local, and tribal levels to meet this standard through SIPs and other measures. Increases in PM as a result of wildfires, controlled burns, and high winds may be considered "exceptional events," which are exempt from certain regulatory actions under the Clean Air Act and NAAQS. Additionally, the challenge of fire mitigation and firefighting falls on national, regional, and local agencies with authorities peripheral of EPA's jurisdiction. However, there may be air monitoring or risk communication opportunities that Region 7 can use to assist other agencies in adapting to this impact.

Climate change may worsen the quality of indoor air and increase exposure to contaminants

Climate change may worsen existing indoor environmental problems and introduce new ones due to temperature increases and an increased frequency and severity of extreme weather events. For example, warmer temperatures may affect the emergence, evolution, and geographic range of pests, infectious agents, and disease vectors.⁵ This may lead to shifting patterns of indoor exposure to pesticides as occupants and building owners respond to new infestations.⁶ Additionally, heavy precipitation events may contribute to increases in indoor dampness and building deterioration, increasing occupants' exposure to mold and other biological contaminants as well as emissions from building materials. Outdoor air quality changes also have the potential to move into the indoor environment. Increased levels of ozone and PM outside can lead to increased levels of exposure to these pollutants inside as well.

Residents may weatherize buildings to increase comfort and indoor environmental quality in addition to saving energy. Although, in general, these actions should be encouraged, this may lead to a reduction in ventilation and an increase in indoor environmental pollutants unless measures are taken to preserve or improve indoor air quality.

EPA has developed practical guidance for improving or maintaining indoor environmental quality during home energy upgrades or remodeling in single-family homes and schools. EPA's guidance and protocols may need to be revised to include state and local considerations for projected changes in climate. In addition, these programs may need to increase partnerships with other agencies to address training needs and workforce development for building owners, managers, and others and develop new tracking mechanisms to assess the effectiveness of weatherization and remodeling techniques as they relate to indoor environmental quality.

Residents may also spend more time indoors and become more prone to health risks from indoor environmental conditions. Public health risks, particularly for vulnerable populations, may increase.⁶ For example, more people may be exposed to indoor air contaminants in homes in low-income areas because they have access to fewer resources to make adjustments to their dwellings and because these homes tend to have greater occupant density. Region 7 can utilize various EPA programs, tools, resources, and partnerships to adapt to this impact. For example, Region 7's Radon program and Healthy Homes and Healthy Schools initiatives are avenues through which public education could occur.

Climate change may affect the response of ecosystems to the atmospheric deposition of sulfur, nitrogen, and mercury

While there is limited scientific evidence on this topic, additional research is underway to better understand how patterns in the atmospheric deposition of sulfur, nitrogen, and mercury due to projected changes in the climate and carbon cycle will affect ecosystem growth, species changes, surface water chemistry, and mercury methylation (a natural process that makes mercury biologically available to fish and grazed animals that are consumed by humans) and bioaccumulation. The potential impacts could have consequences for the effectiveness of ecosystem protection from Region 7's emissions reduction programs.

There is already heightened awareness around mercury contamination in Region 7 lakes, rivers, and streams with the presence of fish consumption advisory programs.⁷ This may present an opportunity to adapt to the impact through partnerships and public education. Region 7 may want to provide additional education on this topic for populations where subsistence fishing is pervasive.

Stratospheric ozone layer recovery may be more difficult

The interactions between the changing climate and recovery of the stratospheric ozone layer are complex.² Current projections establish 2065 as the date ozone levels should recover to 1980 concentrations.⁸ However, climate change-induced alterations in chemical transport, atmospheric composition, and temperature may negatively impact these projections and could pose serious risks to human health, such as increased exposure to extreme heat and UV radiation. UV radiation can damage DNA and cause non-melanoma skin cancer as well as eye damage (e.g., cataracts). It may also damage some materials, crops, and marine organisms.⁹

Key international efforts, including the signing of the Montreal Protocol, have been taken to limit ozone depleting substances from entering the atmosphere. Region 7's adaptive capacity with respect to this impact may be limited. Region 7 can utilize various EPA educational tools to educate the public about the stratospheric ozone layer and UV radiation. There may be potential to further adapt to the impact through partnerships and public education.

The ability to measure, communicate, and monitor air quality may be affected

Climate change may increase the intensity and number of extreme weather events like floods, wildfires, and severe winds. Extreme weather events have the potential to damage Region 7's environmental monitoring equipment and prevent access to the monitoring network, which could affect EPA's efforts to ensure compliance with environmental requirements by regulated entities and take effective enforcement action in cases of violations.

Changes in meteorology (e.g., increasing temperatures, changes in circulation, inversions) could also alter where maximum concentrations occur, thereby affecting air monitoring network adequacy and EPA's ability to effectively model or predict future air quality and provide useful and timely information to the public. As the climate becomes less predictable and more dynamic, EPA's capacity to manage these worsening endpoints will degrade as the likelihood of extreme events increases and predictions become more difficult. Region 7's adaptive capacity to this impact is largely dependent on available funding and resources.

2.2 Water Quality

Increased protection and restoration of aquatic ecosystems, watersheds, and wetlands may be needed

As air temperatures warm and the rate of evapotranspiration increases, aquatic ecosystems are at risk of undergoing compositional changes, such as changes in water chemistry and water availability. This can lead to widespread deoxygenation and hypoxia of freshwater lakes, a trend that is expected to continue.¹⁰ Warmer temperatures may also impact the toxicity of certain pollutants that are temperature dependent (such as ammonia) as well as the rates of nutrient and chemical reactions. As cyanobacteria are well suited to warmer waters, there is an increased risk of harmful algal blooms. Additionally, temperature increases can also lead to the establishment of nuisance or invasive species (pests) that are better adapted to warmer temperatures.

Climate change may bring both increased storm intensity as well as increased evapotranspiration, leading to periods of extreme flooding as well as increased agricultural drought. The Fourth National Climate Assessment reports that flooding on the Mississippi and Missouri Rivers in May of 2011 caused an estimated \$5.7 billion in damages (in 2018 dollars).¹¹ Precipitation changes may continue to increase flood risk, expand floodplain areas, increase stream flow variability, and increase erosion from high water velocity. Increases in storm event frequency and intensity can result in more nutrients, pathogens, and toxins being washed into waterbodies, especially if they result in sewer overflows and wastewater bypasses.

Drought conditions in 2012 led to record low flows on the Mississippi River.¹² Drought, changing patterns of precipitation, and increased evapotranspiration may increase the risk of reduced stream flow later in the summer, altering aquatic environments and increasing impairments. Certain aquatic ecosystems that are found in Region 7, such as prairie potholes in Iowa and the Missouri and Mississippi River floodplains, are particularly vulnerable to these impacts, which may reduce the habitat they provide for plants and animals.¹³

As climate change increases the number of higher temperature days, flooding, drought, and the spread of pests and pathogens, some human adaptations may further impair streams. These adaptations include the increasing use of agricultural drainage systems, application of pesticides and herbicides, and spring tillage.¹⁴ Urban and suburban communities may adapt by increasing lawn maintenance fertilizer application, leading to further pesticide exposure.

Climate change impacts may affect Region 7's work to protect water quality and the health of aquatic ecosystems, watersheds, and wetlands. Additional water bodies may have trouble meeting water quality standards and need to be listed as impaired. Nonpoint source pollution control programs may need to be adjusted to reflect changing conditions. The scientific basis of water quality standard development and implementation could be threatened by shifting baselines. National Environmental Policy Act (NEPA) considerations may also need to expand to provide greater protections.

These combined impacts could have cascading effects on ecosystems. For example, food webs may be altered as terrestrial plant productivity decreases, wetlands may become separated from lakes and streams, natural features that provide beneficial functions could be damaged, and animal migrations and species ranges may change. It is imperative for communities to understand the impacts of land cover and climate changes on their local ecosystems.

These program vulnerabilities may require greater use of biological monitoring, assessment, and management techniques that build resilience into aquatic environments, such as wetlands, to leverage their natural ability to control stormwater and buffer the impacts of drought. With increased precipitation variability caused by climate change, vulnerable wetlands may be at risk. Wetland conditions and processes may be altered, which could lead to a decrease in water quality. Region 7's adaptive capacity with respect to this impact is varied, and there may be numerous leverage points and opportunities that can be explored.

Some communities may be more at risk than others for watershed degradation, depending on surrounding land use, impervious surface coverage, proximity to industry, agriculture, urban growth, and other socioeconomic factors. Tools such as EPA's [EJScreen](#) can help identify risk levels for communities to help determine those most at risk.

Between 2001 and 2013, water and wastewater treatment prices across the U.S. increased faster than the Consumer Price Index, and these increases are expected to continue.¹⁵ In Region 7, rural communities are especially vulnerable to utility rate increases as population decreases lead to a smaller consumer base to pay for upgrades, with 72% of Region 7 counties experiencing population loss from 2010 to 2020.¹⁶

One area where EPA supports the protection and restoration of aquatic ecosystems is with Region 7's Regional Monitoring Strategy. This entails partnering with Region 7 states and tribes in the development of a regional strategy focused on the Missouri and Mississippi Rivers and continuing to support the regional monitoring network. The regional monitoring network established climate change monitoring sites in Central Plains streams.

Furthermore, Region 7 is partnering with EPA's Office of Research and Development (ORD) to provide input on ORD's Safe and Sustainable Water Resources' (SSWR) Strategic Research Action Plan (StRAP). This involves working with ORD through the Regional Science Liaison, Office of Water (OW) Lead Region Coordinator, Regional Research Area Coordination Team representatives, Regional Science Community of Practice, Regional Science Council, other water science agencies, and the water research community to further define scientific needs and develop research opportunities to deliver the information needed to support the implementation of SSWR's StRAP outputs and products. This includes providing the decision support tools needed by water resource managers.

Region 7 continues to prioritize aquatic ecosystem protection by implementing point and nonpoint source programs to minimize the escalating environmental impacts of climate change. One example is the Total Maximum Daily Load program's collaboration with the Clean Water Act Section 319 Nonpoint Source program and USDA in Shell Creek, Nebraska. This project resulted in an increase in watershed conservation tillage from 15 to 85 percent, a decrease in flooding frequency and severity, and critical stream repairs necessitated by herbicide pollution.

Drinking water, wastewater, and stormwater infrastructure may be at increased risk

The increase in precipitation intensity and resulting flood risk discussed above also places water infrastructure at risk of being damaged or overwhelmed. For example, as reported in the Fourth National Climate Assessment, aging and deteriorating water infrastructure is at increased risk when exposed to moderate or extreme precipitation, such as the 2019 Missouri River levee failure¹⁷ and 2019 Spencer Dam failure in Nebraska.¹⁸ In urban areas, stormwater collection and wastewater management systems may need to be redesigned to handle the increased capacity. Areas reliant on septic systems may be at risk of septic system failure during heavy precipitation events. Low stream flows due to drought, earlier spring runoff, snowpack reduction (snowpack in the mountains and upstream affects summertime flows in rivers coursing across Region 7, including the Missouri, Loup, Little Blue, Solomon, and both Platte Rivers), and increased evapotranspiration increase risks to drinking water intakes and wastewater outfalls. Uncontrolled and controlled burning events scorch soils, leading to more runoff and erosion. Drinking water and wastewater utilities need to consider these climate change impacts and must not rely on past hydrologic and weather patterns as an indicator of future conditions due to both natural and human-caused changes in climate.

According to the 2021 EPA Climate Change and Social Vulnerability in the United States report, inland flooding and property damage risk can be higher for certain socially vulnerable groups.¹⁹ These risks depend on geographic location and are mapped out in the report. For example, in Iowa and Missouri, individuals with no high school diploma are 10 percent more likely to live in areas projected to have the worst flooding damages, relative to those with a high school diploma, while minorities are 8 percent more likely than non-minorities to live in those areas.¹⁹ Nebraska shows a higher disparity among minorities and individuals ages 65 and over, with both groups being 15 percent more likely to live in areas projected to have the worst flooding damage risk compared to reference groups.¹⁹

Region 7 and its state partners may need to re-prioritize project requests due to increasing and changing needs at the state and local levels. Region 7's work to promote green infrastructure in urban areas and areas with environmental justice concerns may be more in demand to serve multiple purposes, such as stormwater runoff management, flood mitigation, water supply, air quality management, and urban heat island reduction. Additional staffing and funding resources may be required to address this significant impact.

Region 7's Water Division is currently developing a resiliency document that focuses on water infrastructure, environmental equity, wetlands, and water quality activities. It also intends to establish a team to develop an action-oriented strategy for working with small systems that incorporates concepts such as capacity development, asset management, and financial sustainability. Additionally, it's been involved in the Lower Meramec River Watershed Integrated Planning and Community Resiliency workgroup, which so far has implemented a \$100K Healthy Watersheds and Green Infrastructure pilot project.

To help address disaster emergency responses, FEMA and EPA's State Revolving Fund (SRF) program formed an agreement to closely coordinate disaster responses. This has assisted states and communities in determining the eligibility of certain projects and counting on reimbursement and funding through both programs.

Region 7 also remains involved in the Federal Mitigation and Resiliency workgroup to guide implementation of the National Mitigation Investment Strategy. This workgroup held a virtual workshop in June 2020 for state, local, and tribal partners titled "Defining our Future Path to Resilient Watersheds."

Region 7 has supported state partners with hazard mitigation resilience planning as well. This includes presentations at State Hazard Mitigation Team meetings to inform state partners of EPA tools and programs that can be used to reduce hazards and improve water quality.

As required by the America's Water Infrastructure Act of 2018, Region 7 continues to work with OW, states, tribes, and community water systems to ensure completion of required risk and resilience assessment and emergency response plan updates by the end of fiscal year 2021. Additionally, Region 7 is working with its states' drinking water programs to update their capacity development strategies to include asset management by December 2022.

Region 7 is working with state and local partners to protect drinking water sources for communities, including leading an effort with EPA headquarters and other EPA regions to convene water quality professionals on the topic of reducing nitrate contamination in groundwater. Furthermore, Region 7 is working with ORD to conduct research that will aid communities in source water protection planning and open avenues to funding for pollution mitigation practices. Region 7 is also working with state agencies to unify nonpoint source pollution mitigation efforts and source water protection pollution mitigation efforts to maximize the ability of both programs to deliver safe drinking water to communities throughout the region.

Region 7 plans on using the Clean Water and Drinking Water Set-Aside programs to help states, tribes, and community water and wastewater systems. Since 2010, the Clean Water SRF has required funds allotted to the states to include a percentage to the Green Project Reserve to address green infrastructure, water and energy efficiency, or other environmentally innovative activities. Many of these were assuredly used to address climate adaptation and resilience measures. Region 7 encourages green infrastructure when and where appropriate and participates in many EPA headquarters-led green infrastructure initiatives, including regular conference calls, webinars, and grant and technical assistance opportunities. These programs are diverse across Region 7 states and are reported in each state's annual report. States can also include provisions in their SRF intended use plans to provide funding to communities in the event of emergencies like extreme weather events or flooding. For example, during floods in Iowa, the Iowa SRF loaned funds with no interest to communities for immediate action, with the promise to be reimbursed subsequent FEMA assessment and payment.

The Drinking Water SRF can also be used by states for emergency preparedness and security. An example of this at work is the Nebraska Set-Aside workplan, which designated \$275,000 for grants up to \$10,000 per public water system for upgrades like alarm systems, fencing, lighting, and generators. The tribal portion of the Drinking Water SRF will also continue to be used by working with the Indian Health Service (IHS) and tribal water systems for water infrastructure projects that promote resilience and preparedness.

The quality and availability of safe drinking water may be threatened

Changes in precipitation, drought, and increased evapotranspiration increase stress on water systems as availability of water decreases while industrial and agricultural demand for water increases. As sedimentation increases due to flooding events, sediment infill of already stressed reservoir systems may be exacerbated. These factors may further increase demand on underground sources of water, resulting in the lowering of the water table, decreasing dilution and thereby increasing pollutant concentrations, land subsidence, and other detrimental effects. Aquifer recharge and other sustainable water retention strategies can be a critical alternative to the development of reservoirs.

Wildfires can foul water and challenge water treatment facilities. Heavy precipitation events exacerbate the problem, leading to more runoff of sediment and other contaminants into drinking water sources, requiring additional treatment. Drinking water intakes and wastewater outfalls could be overwhelmed or damaged, causing an increased incidence of waterborne diseases and pathogens. Increased water temperatures can also lead to an increased growth of algae and microbes that affect drinking water quality.

Limited water availability and drought in some regions may require drinking water providers to reassess the security of their water supplies and consider alternative pricing, allocation, and water conservation options. With increased demand on groundwater systems, communities (especially those small and rural) may also need to implement practices that reduce nutrient percolation into groundwater (e.g., cover crops, no-till, variable rate fertilizer application), since many do not have the ability to treat their drinking water for nutrient contamination.

Various EPA programs protect drinking water quality and are concerned with the availability of 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. As the need for water retention grows, NEPA reviews of water supply and storage projects may increase. There may also be a need to enhance or construct wetlands, requiring permits.

Increased agricultural water demand may further deplete ground and surface water resources

Agriculture is the main economic activity and greatest sector use of water resources in Region 7. The agriculture industry relies heavily on precipitation and ground and surface water resources to maintain production of food and feed products. Drought and changing precipitation patterns may exacerbate these water availability issues as

farmers have an increased water demand to maintain agriculture-related production. This may result in reduced stream flows and lower water table levels, which could adversely affect water quality and water availability for humans and groundwater-dependent ecosystems.

Ground and surface water resources are managed and controlled under a variety of state and federal entities. These include state boards and regional cooperatives or districts that manage groundwater withdrawal and surface water diversion within the state that it is used for crop irrigation and drinking water. Federal agencies, such as the Bureau of Land Management and the U.S. Army Corps of Engineers, manage land activities and jurisdictional waters of the U.S. These have a significant impact on water availability to the regional agriculture sector and drinking water systems.

The eastern states of Region 7 (Iowa and Missouri) rely predominantly on precipitation and surface water to support agriculture production. As the quantity and timing of precipitation varies as a result of climate change, the agriculture industry may not be able to rely on precipitation to provide the water necessary to sustain crop production. In response, a greater reliance on ground and surface water may occur, which could reduce groundwater levels. As the industry relies more on groundwater, there is greater potential for contamination and degradation of the resource due to the greater number of wells and reduction in groundwater volume. Increasing the number of wells provides opportunities for surface contaminants to enter the resource through poor well design or well completion. Groundwater degradation also occurs as the resource is depleted and dissolved solids make up a greater percentage of the resource volume. In Missouri, where the majority of communities and residents outside of municipalities rely on groundwater for drinking water, a reduction in groundwater level and quality may negatively impact the public's access to affordable clean drinking water. Some wetlands rely solely on groundwater as their source of hydrology. The lowering of the groundwater level may remove the source of hydrology for these wetlands and negate the water quality benefits that these wetlands provide, further decreasing water quality.

The western states of Region 7 (Kansas and Nebraska) rely predominantly on groundwater and, to a lesser extent, precipitation to support agriculture production. As of 2017, Nebraska ranks first nationally with over 8.5 million acres of irrigated land, and Kansas ranks 7th with over 2.5 million acres of irrigated land.²⁰ As the Great Plains region is more arid than the Midwest region, decreased precipitation is expected for this region under nearly all climate change modeling scenarios. Consequently, the agriculture sector in these two states may rely on groundwater to an even greater degree to sustain current levels of agriculture production.

The main groundwater resource in western Nebraska and Kansas is the Ogallala Aquifer, one of the largest aquifer systems in the world and the principal geologic unit of the High Plains Aquifer System. In 2017, the U.S. Geological Survey estimated that, from 2013 to 2015, the area weighted average water-level change in the High Plains aquifer was a decline of 0.6 feet.²¹ The 2015 total recoverable water storage was estimated to be at 2.91 billion acre-feet, with a nine percent decline of about 273.2 million acre-feet since predevelopment.²¹ The Fourth National Climate Assessment reports that the High Plains Aquifer has a rate of withdrawal for irrigation that is nearly ten times the rate of natural recharge.¹¹ Like Missouri, communities located in Kansas and Nebraska depend almost entirely on groundwater for public drinking water systems. In rural areas of both Kansas and Nebraska, the vast majority of homes use groundwater as the predominant source of water. As groundwater resources are used more extensively (especially by the agriculture sector), the resource may become less available for use as a drinking and public water resource.

Region 7 states and federal entities servicing the agriculture sector need to consider how greater reliance on ground and surface water will impact water resources as well as the communities that share the resources. Region 7 resources supporting public drinking water systems may be in greater demand as public utilities spend more resources accessing clean water and developing systems that reuse water, such as managed aquifer recharge.

2.3 Contaminated Sites

Climate change impacts can adversely affect cleanups and compromise the effectiveness of cleanup remedies selected without those conditions in mind

Heavy precipitation events, floods, and wildfires may threaten contaminated sites in Region 7 and the remedies put in place to cleanup and prevent releases of hazardous substances. Extreme weather and flooding can lead to loss of electricity, affecting contaminated sites prone to toxic material releases to soils and waters. Resource Conservation and Recovery Act (RCRA) activities to treat, store, or dispose of hazardous and non-hazardous waste may also be threatened.

Region 7's Superfund, RCRA, and Brownfields programs may need to alter chemical containment strategies to ensure the protection of groundwater and adjacent sites. RCRA permitting activities may increase or requirements may need to be updated to reflect current and future climate impacts. Current scientific monitoring and sampling protocols on sites may no longer be effective and may require adjustments. The adaptive capacity to this impact is largely dependent on available funding and resources, but there may be leverage points or innovative technologies that could be used for site remediation or materials management.

Climate change may threaten waste management sites and increase the amount of debris sent to landfills

Natural disasters can interfere with the management of materials, resulting in increased disruption of and access to solid waste and recycling services and higher costs for managing disaster debris. Landfill capacity may be insufficient to handle surges in hazardous and municipal wastes from floods or extreme weather events. Extreme temperatures and other weather events may lead to a loss of electrical power, affecting the operations of treatment and waste management facilities.

Region 7 promotes pollution prevention and sustainable materials management principles to prevent the generation of hazardous and solid waste. Following the principles of pollution prevention, or source reduction, will make room for unexpected volume resulting from climate change impacts. In addition, Region 7 will continue to promote the EPA Disaster Debris Recovery Tool to help communities find the nearest waste management and recycling services to manage disaster debris and incorporate disaster debris recovery into their climate action and disaster plans.

Climate change may lead to an increased need for emergency response

Due to an increase in heavy precipitation events, floods, and wildfires, as well as other extreme weather events like severe winds and tornados that may be exacerbated by climate change, Region 7's emergency response and disaster recovery efforts may increase. Subsequently, this may lead to limitations in the Region's response capabilities due to staff and financial resource constraints. The adaptive capacity to this impact is dependent on available funding and resources and the frequency of natural disasters regionally and nationally.

2.4 Chemical Safety and Pollution Prevention

Climate change impacts will likely result in changes where crops are grown, the presence of pests and diseases, and the presence and concentration of chemicals in the environment

Climate change will likely lead to increased pest pressure and a changing mix of pests, which affects pesticide use. Longer growing seasons lead to an increase in the quantity of pesticide use. Climate change and the subsequent alteration of ecosystems will likely result in changes in where crops are grown and the presence of pests and diseases. This may lead to more chemicals present in soil and water. Extreme temperatures and heavy precipitation may lead to changes in crop mixes and farming methods, which could increase runoff into streams and rivers and

increase exposures. There may be increased spraying and chemical use to control mosquitos and rodents in response to certain health threats. There may be an increase in requests for emergency exemptions for unregulated pesticides, state/local special need registrations, and approval of additional or new end uses of registered products if current registered pesticides are ineffective.

Poor control of pesticide use can impact the region economically. An inability to successfully control pests could potentially affect regional and local food supplies. Children may be at higher risk for health effects from exposure to pesticides. Tribes are also vulnerable to these climate change impacts due to the integral nature of the environment within their traditional lifestyles and culture.

As a result, Region 7's work to promote Integrated Pest Management (IPM) may be more in demand. Region 7's adaptive capacity to these impacts is dependent on available funding and resources. Region 7 will continue to promote IPM and other sustainable agriculture practices as new products and strategies become available. Promoting the use of best management practices can reduce pesticide runoff into surface water.

2.5 Facilities and Operations

Increased frequency and severity of extreme weather events can affect the agency's personnel safety, facilities, physical security, and emergency communications

Region 7 personnel and facilities could be affected by water shortages due to drought, electric power interruptions due to extreme weather events, and wildfires that affect local air quality. Additionally, flooding and other climate change impacts could damage records or monitoring equipment needed to evaluate compliance with environmental laws. Extreme weather events could lead to longer lead times for ordering supplies. Drought and extreme temperatures may also make it more difficult to maintain green infrastructure, which Region 7 relies on for stormwater management services, among other things, at its regional headquarters building in Lenexa, Kansas. Responding to these situations would cause an increased reliance upon emergency communications and physical security systems. Planning and management of emergency operations can be limited by the increased frequency and severity of extreme weather. Region 7's adaptive capacity to these impacts is reliant on resources to purchase available water and energy and avoid the health impacts of reduced air quality. Region 7 staff have the capacity to work remotely for an extended period, which may alleviate some of the vulnerabilities to personnel safety.

Section 3. Climate Adaptation Priority Actions

Region 7’s climate adaptation priority actions align with the five agency-wide climate adaptation priorities outlined in the 2021 EPA Climate Adaptation Action Plan and are organized accordingly below. They were constructed within the legal bounds of EPA’s existing environmental statutes and are extensions of existing or planned program actions tailored to address specific climate change vulnerabilities. They rely on partnerships with state, tribal, and local environmental organizations. Many include efforts related to communication, education, and outreach.

Integrate climate adaptation into EPA programs, policies, rulemaking processes, and enforcement activities

| Develop Region 7’s Climate Adaptation Implementation Plan. | |
|---|--|
| <i>Fiscal Year Start-Complete</i> | 2022-2022 |
| <i>Performance metric</i> | Develop and submit Region 7’s Implementation Plan by August 1, 2022 |
| <i>Associated vulnerability</i> | All vulnerabilities impacting Region 7 (see Section 2) |
| <i>Co-benefits</i> | Assistance to partners, climate-ready workforce and facilities, improved measurement and tracking, science needs addressed |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

| Award and manage Environmental Justice (EJ) grants that relate to climate adaptation. | |
|--|---|
| <i>Fiscal Year Start-Complete</i> | 2022-ongoing |
| <i>Performance metric</i> | Grant funds awarded and workplan progress assessed |
| <i>Associated vulnerability</i> | Specific vulnerabilities addressed will vary by grant |
| <i>Co-benefits</i> | Co-benefits will vary by grant |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |
| <i>Notes</i> | In 2022, three EJ grants that include climate adaptation activities were awarded in Region 7. Additional EJ grants that relate to climate adaptation are anticipated in future years. |

| Map RCRA and Coal Combustion Residual sites within regional floodplains to have available during flooding events. | |
|--|---|
| <i>Fiscal Year Start-Complete</i> | 2022-2023 |
| <i>Performance metric</i> | Mapping completed and shared within the region by the end of fiscal year 2023 |
| <i>Associated vulnerability</i> | Flooding |
| <i>Co-benefits</i> | Public health, environmental justice |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

| Develop and begin implementation of a climate adaptation strategy for Region 7's Superfund and Emergency Management Division. | | | |
|--|---|---|--|
| <i>Subcomponents</i> | Develop strategy | Map National Priority List site boundaries to determine sites with flooding vulnerabilities | Develop a draft climate adaptation checklist for Superfund removal use |
| <i>Fiscal Year Start-Complete</i> | 2022-2022 | 2023-2023 | 2023-2023 |
| <i>Performance metric</i> | Strategy developed by the end of fiscal year 2022 | Mapping completed by the end of fiscal year 2023 | Checklist developed by the end of fiscal year 2023 |
| <i>Associated vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation) | Flooding | Extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Public health | Public health | Public health |
| <i>Resource requirements</i> | Existing resources are available to complete this activity | Existing resources are available to complete this activity | Existing resources are available to complete this activity |
| <i>Notes</i> | Additional implementation activities, such as development of a checklist for remedial use and conducting pilots of site vulnerability assessments, will take place in future years according to the strategy developed in fiscal year 2022. | | |

| Conduct training for Enforcement and Compliance Assurance Division staff on climate change impacts to regulated industry sectors to include examples from extreme weather events and onsite observations. | |
|--|--|
| <i>Fiscal Year Start-Complete</i> | 2022-2022 |
| <i>Performance metric</i> | Percent of staff trained by the end of fiscal year 2022 |
| <i>Associated vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Public health, environmental justice, improved technical assistance to state and tribal partners |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

| Seek enforcement mitigations and remedies that consider climate change impacts and include climate adaptation actions. | |
|---|---|
| <i>Fiscal Year Start-Complete</i> | 2022-ongoing |
| <i>Performance metric</i> | Number of climate adaptation actions included in enforcement mitigations and remedies each fiscal year |
| <i>Associated vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Public health, greenhouse gas reductions |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |
| <i>Notes</i> | Region 7 will promote the use of Supplemental Environmental Projects that increase climate resilience in settlements. |

Consult and partner with states, tribes, territories, local governments, EJ 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 EJ

Provide tribal drinking water infrastructure funding through interagency agreements with the IHS to support climate resilience for tribal drinking water systems.

| | |
|-----------------------------------|---|
| <i>Fiscal Year Start-Complete</i> | 2022-ongoing |
| <i>Performance metric</i> | Number of interagency agreements implemented that support climate resilience each fiscal year |
| <i>Associated vulnerability</i> | Drought, extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Public health, environmental justice, safe water for consumption |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

Partner with states and tribes to assess indoor air quality health risks related to climate impacts and develop recommendations on messaging and outreach.

| | |
|-----------------------------------|--|
| <i>Fiscal Year Start-Complete</i> | 2022-2023 |
| <i>Performance metric</i> | Messaging developed and provided to partners by the end of fiscal year 2023 |
| <i>Associated vulnerability</i> | PM levels may increase due to the frequency and intensity of wildfires, controlled burns, and high winds |
| <i>Co-benefits</i> | Public health |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

Address air quality climate impact challenges and risks.

| | | |
|-----------------------------------|--|---|
| <i>Subcomponents</i> | Partner with states and tribes to assess air quality challenges, including but not limited to monitoring risks, and develop recommendations consistent with national guidance to address the risks | Integrate air quality monitoring risks into the regional review process |
| <i>Fiscal Year Start-Complete</i> | 2022-2023 | 2023-2023 |
| <i>Performance metric</i> | Recommendations developed and provided to partners by the end of fiscal year 2023 | Regional review process updated by the end of fiscal year 2023 |
| <i>Associated vulnerability</i> | Extreme weather events (e.g., flooding, wind), increasing temperatures | Extreme weather events (e.g., flooding, wind), increasing temperatures |
| <i>Co-benefits</i> | Public health, data availability | Public health, data availability |
| <i>Resource requirements</i> | Existing resources are available to complete this activity | Existing resources are available to complete this activity |

Strengthen local food system infrastructure by connecting stakeholders to build resilience in the face of climate-related food insecurities.

| | | |
|-----------------------------------|---|--|
| <i>Subcomponents</i> | Host two regional food summits | Create a web-based food system atlas for the Kansas City metropolitan area |
| <i>Fiscal Year Start-Complete</i> | 2022-2023 | 2022-2023 |
| <i>Performance metric</i> | Two summits held – one in fiscal year 2022 and one in fiscal year 2023 | Online atlas completed by the end of fiscal year 2023 |
| <i>Associated vulnerability</i> | Drought, extreme weather events (e.g., flooding, heavy precipitation), increasing temperatures, increasing pest pressures, wildfires | |
| <i>Co-benefits</i> | Public health, environmental justice, increased food equity and access | |
| <i>Resource requirements</i> | Existing resources are available to complete this activity | Existing resources are available to complete this activity |
| <i>Notes</i> | If additional funding is available, Region 7 will hold additional food summits in communities across the region and develop online food system atlases for additional metropolitan areas. | |

Partner with state solid waste leaders and their networks to identify potential excess food in food manufacturing and processing. Promote food security and equity through the reduction of food loss and waste by facilitating the charitable and safe donation of healthy food from manufacturers and processors to vulnerable communities that are food insecure.

| | | |
|-----------------------------------|--|--|
| <i>Fiscal Year Start-Complete</i> | 2022-2023 | |
| <i>Performance metric</i> | Number of meetings held with state leaders each fiscal year | |
| <i>Associated vulnerability</i> | Drought, extreme weather events (e.g., flooding, heavy precipitation), increasing temperatures, increasing pest pressures, wildfires | |
| <i>Co-benefits</i> | Public health, environmental justice, greenhouse gas reductions, waste diversion | |
| <i>Resource requirements</i> | Existing resources are available to complete this activity | |

Engage agricultural stakeholders to solicit data and insights regarding climate-induced changes to weed, insect, and disease pests and their impacts to inform Office of Pesticide Programs (OPP) policy, registration, and regulatory decision-making. Facilitate communication promoting OPP IPM priorities to promote adaptive responses to climate-induced pest pressures.

| | | |
|-----------------------------------|--|--|
| <i>Fiscal Year Start-Complete</i> | 2024-ongoing | |
| <i>Performance metric</i> | Number of growers/grower organizations educated on IPM as a means for adapting to climate-influenced pest pressures each fiscal year | |
| <i>Associated vulnerability</i> | Changes in pest pressures, increasing temperature, moisture changes | |
| <i>Co-benefits</i> | Sustainable food supply, economic benefits, water quality and soil health improvements | |
| <i>Resource requirements</i> | New resources are needed to complete this activity | |

Work with local governments and communities in the Mississippi River corridor under the Memorandum of Understanding with the Mississippi River Cities and Towns Initiative (MRCTI) to identify technical support needs for climate adaptation related to solid waste infrastructure, recycling, and plastic pollution reduction, with a focus on underserved and low-income communities.

| | |
|-----------------------------------|---|
| <i>Fiscal Year Start-Complete</i> | 2023-ongoing |
| <i>Performance metric</i> | Number of planning meetings with MRCTI and local governments in the Mississippi River corridor each fiscal year |
| <i>Associated vulnerability</i> | Drought, extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Public health, environmental justice, sustainable materials management, trash-free waters |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |
| <i>Notes</i> | Region 7 has limited existing resources to meet with local governments. Additional resources are needed for anticipated technical assistance to communities in Iowa and Missouri. |

Work with FEMA and state emergency management agencies to identify properties subject to flooding that have or may be bought out by local governments through available FEMA grant programs. Offer climate-resilient redevelopment assistance to local governments from Region 7’s Brownfields program.

| | |
|-----------------------------------|---|
| <i>Fiscal Year Start-Complete</i> | 2022-2024 |
| <i>Performance metric</i> | Number of communities assisted each fiscal year |
| <i>Associated vulnerability</i> | Flooding |
| <i>Co-benefits</i> | Public health, environmental justice, economic development and job creation |
| <i>Resource requirements</i> | New resources are needed to complete this activity |

Offer assistance to local governments to incorporate climate adaptation (e.g., green infrastructure, urban forestry, native landscaping, outdoor shade structures) into brownfield site redevelopment, resulting in decreased heat island impacts.

| | |
|-----------------------------------|---|
| <i>Fiscal Year Start-Complete</i> | 2022-2024 |
| <i>Performance metric</i> | Number of communities assisted each fiscal year |
| <i>Associated vulnerability</i> | Increasing temperatures |
| <i>Co-benefits</i> | Public health, environmental justice, greenhouse gas reductions |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

Conduct outreach and grant training to Region 7 communities, including tribal and rural communities, to increase their capacity to develop strong grant applications, including grants related to climate adaptation and resilience.

| | |
|-----------------------------------|---|
| <i>Fiscal Year Start-Complete</i> | 2022-ongoing |
| <i>Performance metric</i> | Number of tribes and/or communities with environmental justice concerns represented at training events each fiscal year |
| <i>Associated vulnerability</i> | All vulnerabilities impacting the region (see Section 2) |
| <i>Co-benefits</i> | Public health, environmental justice, economic development and job creation |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

Implement measures to protect the agency’s workforce, facilities, critical infrastructure, supply chains, and procurement processes from the risks posed by climate change

Enhance the reliability of logistics support operations by coordinating within the region to increase local stockage levels of expendable critical response, monitoring, and enforcement materials.

| | |
|-----------------------------------|--|
| <i>Fiscal Year Start-Complete</i> | 2022-ongoing |
| <i>Performance metric</i> | Minimum stockage levels and reorder points established |
| <i>Associated vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Economic development and job creation |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

Continue to consolidate information technology servers to reduce demand on local utilities.

| | |
|-----------------------------------|--|
| <i>Fiscal Year Start-Complete</i> | 2022-ongoing |
| <i>Performance metric</i> | Number of servers consolidated |
| <i>Associated vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Greenhouse gas reductions |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

Continue to utilize the Environmental Management System (EMS) to ensure regional facilities have climate impact contingency plans for water/electricity reductions in place and to promote staff water and electricity use efficiencies.

| | |
|-----------------------------------|---|
| <i>Fiscal Year Start-Complete</i> | 2022-ongoing |
| <i>Performance metric</i> | EMS administered to include annual contingency plan validation and quarterly messaging to staff |
| <i>Associated vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Greenhouse gas reductions |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

Identify and address climate adaptation science needs

Identify and incorporate climate adaptation concerns for Region 7 states, tribes, communities, and vulnerable populations into regional science priorities.

| | |
|-----------------------------------|--|
| <i>Fiscal Year Start-Complete</i> | 2022-2022 |
| <i>Performance metric</i> | Science priorities developed by the end of fiscal year 2022 |
| <i>Associated vulnerability</i> | All vulnerabilities impacting the region (see Section 2) |
| <i>Co-benefits</i> | Assistance to partners, climate-ready workforce and facilities, improved measurement and tracking, science needs addressed |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

Support ORD’s Sustainable and Healthy Communities team with piloting a tool for assessing waste management infrastructure resilience strategies in Davenport, Iowa.

| | |
|-----------------------------------|---|
| <i>Fiscal Year Start-Complete</i> | 2021-2023 |
| <i>Performance metric</i> | Pilot and final report completed by the end of fiscal year 2023 |
| <i>Associated vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Public health, environmental justice, greenhouse gas reductions |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |

Make improvements to the region’s mobile laboratory to increase capacity for responding to drinking water emergencies associated with extreme weather events.

| | |
|-----------------------------------|---|
| <i>Fiscal Year Start-Complete</i> | 2022-2023 |
| <i>Performance metric</i> | Improvements to the mobile lab completed by the end of fiscal year 2023 |
| <i>Associated Vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation) |
| <i>Co-benefits</i> | Public health |
| <i>Resource requirements</i> | New resources are needed to complete this activity |

Improve the real-time water monitoring network capabilities to capture the impact of extreme weather events on regional waterways.

| | |
|-----------------------------------|---|
| <i>Fiscal Year Start-Complete</i> | 2022-ongoing |
| <i>Performance metric</i> | Number of monitoring sensors installed or upgraded each fiscal year |
| <i>Associated Vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation), increasing temperatures |
| <i>Co-benefits</i> | Public health, ecological health |
| <i>Resource requirements</i> | New resources are needed to complete this activity |

Develop a strategic approach for data management of continuous stream monitoring data collected by the region’s water monitoring network.

| | |
|-----------------------------------|--|
| <i>Fiscal Year Start-Complete</i> | 2022-2023 |
| <i>Performance metric</i> | Data management approach developed by the end of fiscal year 2023 |
| <i>Associated Vulnerability</i> | Extreme weather events (e.g., flooding, heavy precipitation), increasing temperatures |
| <i>Co-benefits</i> | Public health, ecological health |
| <i>Resource requirements</i> | Existing resources are available to complete this activity |
| <i>Notes</i> | Priorities and activities outlined in the strategic approach could lead to additional climate adaptation actions in future years and may require additional funds. |

Section 4. Training Plan

As stated in Objective 1.2 of the FY 2022-2026 EPA Strategic Plan, EPA will develop, update, and expand its existing climate adaptation training modules to prioritize two primary goals:

1. Increase awareness about the importance of climate adaptation and encourage all EPA staff and partners to consider the changing climate in the normal course of business; and
2. Introduce specific methods and tools for integrating climate adaptation into decision-making processes.

Region 7 is committed to ensuring employees have the opportunity to participate in agency-wide and program-specific climate adaptation training modules developed by the EPA National Program Offices. The anticipated training modules and their tentative release dates are outlined in the table below. As training modules are made available, Region 7 will distribute information to promote each training opportunity and encourage participation. Participation metrics will be made available to Headquarters, upon request.

| Climate Adaptation Training Module by Lead Office | Tentative Date Module Available |
|---|--|
| Office of Policy (OP) Climate Adaptation 101 | Summer 2022 |
| Regulation Writers | End of 2022 |
| Office of Water (OW) | End of 2022 |
| Office of Land and Emergency Management (OLEM) | End of 2022 |
| Office of Air and Radiation (OAR) | End of 2023 |
| Office of Chemical Safety and Pollution Prevention (OCSP) | End of 2023 |
| Office of Enforcement and Compliance Assurance (OECA) | End of 2023 |
| Office of Mission Support (OMS) | End of 2023 |
| Office of Homeland Security (OHS) | End of 2023 |
| Office of International and Tribal Affairs (OITA) | End of 2023 |
| Office of Research and Development (ORD) | End of 2023 |

To supplement the training developed by EPA headquarters offices, Region 7 will provide additional climate adaptation training opportunities for staff. These training events will be designed to focus on specific climate change impacts affecting the region, tools and resources to help integrate adaptation into Region 7’s work, and effective climate adaptation and resilience communications. Examples include providing training on EPA’s Adaptation Resource Center (ARC-X), speakers presenting local examples of climate-smart agricultural practices, demonstrations of how to use the EJSscreen climate change indicators, and risk communication training. An approach and timeline for this component of the training plan will be developed as more is known about staffing and funding resources for climate adaptation work in Region 7. Region 7 will look for ways to collaborate with other regions on shared training interests to make effective use of resources.

Region 7 will also assist partners by providing training on EPA climate adaptation tools, program-specific climate adaptation topics, and grant writing techniques. Region 7 will engage with partners, listen to their training needs, and work to respond to those needs with quality information to support them as they advance their adaptive capacity. Specifics about external training offerings will be included in the regional training plan as it is developed.

Section 5. Science Needs

Region 7's Regional Science Liaison works across Region 7 programs and with state and tribal partners to compile and prioritize the regional science needs, including those related to climate adaptation. Determining the fiscal year 2022-2025 regional science needs and priorities is a priority action for Region 7 in fiscal year 2022.

Region 7's science needs cover a wide range of topics that correspond with the programmatic work being done across the region. Examples include:

- Identifying communities with the most disproportionate environmental and public health impacts from the cumulative impacts of climate change to facilitate better targeting and a more holistic approach to addressing concerns;
- Social science projects to understand how EPA can better assist with and integrate climate resilience planning in communities;
- Understanding secondary impacts of climate change on local communities (e.g., how changes in precipitation could impact water quality);
- Mapping resources for climate change predictions (with metadata) for use by states and regions;
- Region-wide data compilation and analysis on climate trends (e.g., temperature, precipitation, algal growth, dissolved oxygen);
- Monitoring wadeable streams for velocity, flow, and macroinvertebrates due to dynamic changes in precipitation (e.g., floods, drought) and extreme temperatures; and
- Vulnerability assessments for contaminated sites.

Science needs and priorities will be communicated to ORD through the Regional Science Liaison. As opportunities and funding become available, Region 7 programs will work with the Regional Science Liaison and ORD to develop projects to address climate adaptation and resilience. Specific projects will be included as priority actions during updates to Region 7's Climate Adaptation Implementation Plan.

Conclusion

In Region 7 and elsewhere across the country, the ability to adapt and be resilient to climate impacts has become imperative. Region 7 is committed to working with its partners and listening to those it serves as it takes action to increase its own adaptive capacity and assist others to become more resilient in the face of a changing climate.

This Region 7 Climate Adaptation Implementation Plan is dynamic. Regular reviews will incorporate up-to-date information and determinations about regional climate conditions, vulnerabilities, and vulnerable populations that will enable Region 7 to revise the Plan if needed, including new priority actions.

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