U.S. DEPARTMENT OF AGRICULTURE

ACTION PLAN FOR CLIMATE ADAPTATION AND RESILIENCE

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A Message from Secretary Vilsack

Dear Reader,

As evidenced by the historic drought in the western United States, vast wildfires, and soaring temperatures across the country, climate change is already on our doorstep, and America's producers are on the front lines. We are operating in new territory, and the changing climate creates immense uncertainty and threatens the resilience of the American agriculture and forestry sectors. Not only does climate change have a direct impact on a producer's ability to plan and manage risk, it has wider impacts on the natural systems we rely on to support production of food and fiber, keep our waters clean, and maintain cultural resources.

As the "People's Department," USDA is preparing to help communities across the United States, both rural and urban, plan for and build resilience to the impacts of climate change. Answering President Biden's call for a whole-of-government approach to climate, USDA is taking a whole-of-Department approach to address the challenges and opportunities posed by climate change. In USDA's recent Climate-Smart Agriculture and Forestry Strategy: 90-Day Progress Report, we laid out our mitigation strategy to ensure that farmers, ranchers, and landowners can seize on these opportunities and contribute to greenhouse gas emissions reductions and sequestration. Alongside those actions, we must make sure that we provide producers, landowners, and communities with the tools to manage risk and adapt to this changing reality.

This Action Plan for Climate Adaptation and Resilience outlines how USDA will provide relevant information, tools, and resources to its stakeholders and target programs and activities to increase resilience to climate impacts. USDA will prioritize equity, promote environmental justice through a focus on healthy communities, and target adaptation actions with co-benefits for climate mitigation, conservation, and sustainability.

In addressing the climate crisis, the USDA research enterprise will develop innovative tools and practices for farmers and land managers of the future. USDA will tailor its climate outreach and assistance to be regionally specific through its vast field operations and innovative partnerships and enhance department-wide coordination through its ten regional Climate Hubs. Building climate literacy across all levels will enable USDA staff to best serve its stakeholders in the decades ahead.

Our plan will serve as the foundation for iterative climate adaptation across the Department. Taking these steps to prepare American farmers, ranchers, forest landowners, resource managers, and communities for the effects of climate change will help ensure that our agriculture and forestry sectors continue to provide healthy food and fiber for America and the world, and that we conserve our soil, air, and water for generations to come.

Sincerely,

Secretary Tom Vilsack

I. INTRODUCTION

On January 27, 2021, in Executive Order (E.O.) 14008 Tackling the Climate Crisis at Home and Abroad, President Biden laid out a vision for a United States government-wide approach and a set of coordinated domestic actions to address the risks and opportunities posed by climate change. One of these actions directs the U.S. Department of Agriculture (USDA) to submit an action plan of steps to bolster adaptation and increase resilience to the impacts of climate change across our mission and operations.

Climate change poses a significant risk to agriculture, forests, and grasslands across the United States and the communities that support and depend upon them. This risk is disproportionately high for disadvantaged communities, including Tribal nations, low-income, and minority communities. USDA is unique among federal departments in the breadth of its Mission Areas and its reach across the United States to urban, rural, and Tribal communities. Steps to reduce the vulnerability and increase the adaptive capacity of American farmers, ranchers, forest owners, and other stakeholders to climate change are needed to maintain competitiveness and sustainability in the coming decades. Through climate change adaptation planning, USDA will increase the resilience of these sectors and communities to climate change.

Agricultural producers and forest landowners have extensive experience dealing with uncertain conditions, yet climate change is producing new challenges. Adaptation actions by USDA and our stakeholders can reduce the impacts of climate change while creating opportunities or co-benefits for mitigation, sustainable production, and conservation. The co-benefits of adaptation actions may also stretch as far as the social welfare of rural and urban communities by improving economic opportunities, infrastructure, and equity. The research and development necessary to support agricultural and forestry climate adaptation have the potential to spur new tools, practices, and technologies that may underpin the future of these sectors.

USDA last undertook extensive climate adaptation planning in 2014 in response to E.O. 13653 Preparing the United States for the Impacts of Climate Change. In that plan, USDA laid out a vision for how to integrate consideration of climate change into agency operations and overall mission objectives in the context of USDA's strategic goals. USDA provided progress and strategic updates to its climate adaptation planning via USDA's annual Strategic Sustainability Performance Plan, most recently in 2017.

FY 2021 is a transition year for USDA as its leadership develops a 2022-2026 USDA Strategic Plan, to align with the Biden-Harris Administration's priorities, which include addressing climate change. At the same time, USDA is tracking key performance indicators (KPIs) for the 2018-2022 Strategic Plan. A draft of the new goals was provided to the Office of Management and Budget (OMB) in June 2021. From June to September 2021, a cross-departmental working group will establish KPIs to gauge progress towards specific performance goals that are in alignment with the new strategic plan. A full draft strategic plan will be provided to OMB in September 2021. USDA's 2021 Annual Performance Report and 2023 Annual Performance Plan, due to OMB in November

2021, will close the 2018-2022 performance cycle's KPIs and, where possible, reflect the new draft KPIs. Finally, for FY 2021, USDA's Risk Profile will be updated to incorporate risks and risk mitigation strategies that reflect the Biden-Harris Administration's priorities, like climate change, where possible.

The complete package of this USDA Action Plan for Climate Adaptation and Resilience includes:

- This Action Plan for Climate Adaptation and Resilience that builds on prior adaptation plans,
- An update to USDA Departmental Regulation 1070-001 USDA Policy Statement on Climate Change Adaptation, and
- Identification of the Director of the Office of Energy and Environmental Policy (OEEP) in the Office of the Chief Economist (OCE) as the senior agency official responsible for carrying out the climate adaptation activities described in this Plan.

This Plan, which aligns with guidance from the White House Council on Environmental Quality (CEQ), includes:

- Five vulnerabilities due to climate change that USDA has identified and must address;
- Five actions USDA will implement in its mission, programs, operations, and management in anticipation of and in response to a changing climate;
- A description of efforts to enhance the climate literacy of USDA's workforce; and
- Descriptions of how climate adaptation and preparedness is built into management and decision-points for USDA climate-ready sites, facilities, products, and services.

II. CLIMATE VULNERABILITIES

Climate change presents many challenges to USDA and its stakeholders. The five vulnerabilities below build on prior vulnerability assessments of the Department and draw from our best understanding of the threats posed by climate change and its impacts in the Fourth National Climate Assessment. The potential climate impacts to agricultural productivity, water quantity and quality, vulnerable communities, public lands and infrastructure, and as a result of extreme events will have broad Department-wide effects. For each vulnerability, we describe the threat and propose adaptation actions to address it. Some of these actions overlap with the cross-cutting actions outlined in section III, while others specifically target the vulnerabilities described below.

1. Decreased agricultural productivity

Climate change threatens growth in agricultural productivity through direct effects such as changes in temperature and precipitation patterns, and secondary effects, such as increased pest and disease pressures, decline in pollinator health, reduced crop and forage quantity and quality, and infrastructure damage. Agricultural productivity is additionally threatened by impacts to water supply and increased frequency and intensity of extreme weather events, which are described in more detail in Vulnerabilities #2 and #4. Agricultural productivity is vulnerable to the impacts of climate change via:

- **Crop and livestock production.** With variation at local, regional, and continental scales, climate change is projected overall to impact crop production by reducing both quantity and quality of yields, altering optimal growing season periods, and increasing likelihood of crop failure and damage. Similarly, livestock production will be impacted by reducing the quantity and quality of pasture and forage, lowering the yield of feed grain, affecting livestock health, and fostering the spread and resilience of pathogens and parasites that affect livestock development.

- **Reduced soil quality.** Agricultural, forest, and grassland soils are sensitive to long term changes in temperature and precipitation, management practices, and multiple uses like recreation. The interactive effects of these stressors can increase erosion rates, reduce soil quality, and alter soil composition that supports plant growth. Additionally, increases in temperature, changes in moisture levels, and disturbances like wildfire, pests, and disease can release carbon stored in soil organic matter.
- **Pest and disease pressure.** Climate change may expand or shift the range of a pest, pathogen, or vector organism, increasing its ability to establish in areas not previously considered at risk, elevating the risks to agriculture and forestry. Climate change may also lead to changes in wildlife migratory patterns, diseases, disease life cycles, predator-livestock interactions, and mass mortality events. These increased pressures may impact the Animal and Plant Health Inspection Service's (APHIS) ability to monitor for animal and plant pests and diseases in traded and domestically produced goods.
- **Pollinator health.** Pollinator health, which is essential to successful crop production and highly correlated with floral landscapes, is threatened by climate-driven temperature and rainfall extremes. Areas vulnerable to climate change include the commercial beekeeping industry, non-managed pollinator populations, and the subsequent threats to specialty crop industries.
- **Crop insurance.** Agricultural producers purchase crop insurance for protection against numerous production and price risks, which can include climate and weather-related losses from hurricanes, flood, drought, hail, and wildfires. Forecasts of more rapid changes in climatic conditions have raised concerns that these risks will increase relative to historical conditions. In addition to implications for landowner decisions regarding land use, crop mix, and production practices, changing agricultural risks could affect the performance of the Federal Crop Insurance Program (FCIP), managed by the Risk Management Agency (RMA). Economic Research Service (ERS) analysis suggests that even with some adaptation actions taken by producers, climate change could lower domestic production of major commodities, leading to higher prices, higher premiums and, consequently, higher FCIP subsidies. Without adaptation actions on the part of farmers, these potential cost increases are likely to be even greater.

In response to the threats and impacts to agricultural productivity described above, USDA has identified several key adaptation actions:

- **Increase implementation of on-farm adaptation strategies and practices.** The Farm Service Agency (FSA) and the Natural Resources Conservation Service (NRCS) can leverage existing programs to support farmers, ranchers, and landowners in understanding the vulnerabilities of their operations to a changing climate and implementing adaptive practices and management strategies. NRCS programs, such as the Conservation Stewardship Program (CSP) and Environmental Quality Incentives Program (EQIP), and initiatives, such as the Soil Health Initiative, can

provide financial and technical assistance and resources for implementing practices, like cover crops, reduced and no tillage, and improved irrigation systems, that contribute to more resilient landscapes. FSA loan programs, including Operating Loans, the Farm Ownership Loan Program, and the Conservation Loan Program, can also provide funds for a wide range of purposes, including short-term equipment or operating needs or long-term infrastructure enhancements to support increased resilience. USDA agencies will continue to evaluate and modify existing programs, like the Conservation Reserve Program (CRP), the Emergency Conservation Program (ECP), and the Emergency Forest Restoration Program (EFRP), for climate risks and adaptation opportunities. In administering disaster-related programs, USDA will aim to build resilience and adaptive capacity to future shocks whenever possible. Barriers to scaling up the adoption of adaptation practices include high costs of implementation, insufficient incentives, and need for additional technical assistance to aid decision-making and implementation.

- **Support active landscape-scale management and disturbance responses.** Supporting healthy landscapes starts with ensuring that whole ecosystems are managed at the landscape scale, considering multiple components, interactions, and timescales. For example, the Forest Service's (FS) Burned Area Emergency Response (BAER) teams assess post-wildfire disturbances and implement short-term treatments to stabilize soils to minimize threats to built and natural infrastructure, helping to ensure long-term ecosystem integrity. On private working lands, NRCS's area-wide and watershed planning processes bring together state agencies, soil and water conservation districts, regional planning commissions, counties, and other governmental entities to coordinate long-term resource management at the landscape level. Current barriers include capacity to translate science into practice and ensuring sufficient workforce and public education around these topics.
- **Improve access to climate data and tools.** Improved access to climate and climate-related data can help producers better understand changing conditions and adjust their management decisions accordingly. The USDA Climate Hubs play a pivotal role in developing and curating data and tools for producers and the public. USDA's Office of the Chief Economist (OCE) will continue to partner with the National Drought Mitigation Center (NDMC) to improve their capacity to provide actionable information to the public and record observed drought impacts.
- **Enhance systems for monitoring and mitigating vector and disease spread.** APHIS and FS will improve current monitoring systems and responses to vector and disease spread, incorporate state-of-the-art modeling to inform surveillance, develop early warning systems, and identify better options for vector control and animal protection. APHIS will also evaluate its regulatory framework for biotechnology and genome editing as use of these technologies increases to support the development of climate-adapted crops and livestock.
- **Continue research into climate impacts on agricultural productivity and adaptation strategies and practices.** Further research is needed to understand the full range of potential impacts, inform implementation of adaptation strategies, and identify barriers to access. The Agricultural Research Service (ARS) and the National Institute of Food and Agriculture (NIFA) support research on adaptation strategies, including adapted cultivars and crops, enhanced water and input-use efficiency, optimal production efficiency, and improved resistance to diseases and pests. ARS's Long-Term

Agroecosystem Research (LTAR) sites will continue landscape and regional-scale approaches to investigate sustainable intensification of U.S. agriculture. The Office of the Chief Scientist (OCS) will continue to coordinate research into pollinator health, including changes in plant pollen ranges, co-benefits of resilient plant species to pollinators and carbon sequestration, co-location of pollinator habitat with renewable energy sites, and practices to address increased stress on pollinator health.

- **Provide climate-smart risk management products.** New and continuing actions that RMA will take to help producers manage climate-related production risks include:
  - Evaluation and monitoring of climate risks to the FCIP and update of program parameters, like earliest and final planting dates and sales closing dates, based on these analyses;
  - Implementation of state-funded incentives to encourage cover crop planting;
  - Use of the Whole Farm Revenue Protection product to support farmers who use crop diversification to reduce risk;
  - Continued insurance coverage for crops that accommodate new agronomic practices that minimize water use;
  - Implementation of procedures that facilitate access to insurance coverage to accommodate climate-driven shifts in production areas;
  - Application of recently revised premium rating methodology so that rates more quickly reflect changes in risk; and
  - Monitoring of premium rating methodology, loss adjustment standards, underwriting standards, and other insurance program materials to ensure they are appropriate for new production regions or practice changes within regions.

  In parallel with these efforts, the Climate Hubs will continue to provide information and tools to support producers' capacity to manage for impacts to crop insurance, such as the AgRisk Viewer, a decision-support tool that provides historic crop insurance data to assess climate risk.

Many of the actions described above are in-progress or positioned to begin soon through coordinated Department-level efforts and creative applications of existing USDA resources and programs. Additional investments directed towards these efforts will enable USDA to more effectively address actions that rely on new data or expertise or require significant program enhancements. In the near-term, progress can be measured using existing systems that correlate well with target outcomes, like data from the North American Long-Term Soil Productivity study, led by Forest Service Research & Development (FS R&D). Agency record-keeping can also support progress measurement, including loan funds use, technical and financial assistance disbursed, and programmatic changes or additional investments made considering assessed climate risks.

2. Threat to water quantity and quality

Climate change impacts on the water cycle are resulting in earlier snowmelt, reduced water supply, more intense and frequent drought, degraded water quality, excess soil moisture, and greater flooding, all of which will alter crop and animal production and quality and management of forest and rangeland systems. In 2021, producers in areas like the Klamath River Basin and the Colorado River Basin are again experiencing severe drought conditions resulting in historically low water allocations. Key threats and impacts related to water supply include:

- **Water quantity and drought.** With climate change, producers are confronting greater intra- and interannual variability in the distribution, quantity, and timing of precipitation. Drought has become more

persistent and widespread with impacts on soil moisture and health, groundwater recharge, runoff, and ultimately agricultural productivity. Changes in snowpack also impact water supply and seasonal runoff timing. These changes in the water supply have the potential to drastically shift the geographic distribution of agriculture and exert greater pressure on finite groundwater resources.

- **Water quality.** Precipitation extremes can cause excessive runoff and soil erosion, which lead to field production issues and downstream impacts on quality of water resources, including eutrophication and hypoxia.
- **Riparian and aquatic ecosystems.** Changes in climate and the water cycle are affecting aquatic and riparian ecosystem structure and function, potentially resulting in loss of at-risk species, new species being put at risk, the introduction of additional or expansion of existing invasive species, and the establishment of new diseases and pathogens.
- **Forest resilience.** Declines in forest health because of drought, excess soil moisture and flooding will lead to increased vulnerability to disasters (see Vulnerability #4) such as wildfires, severe storms, and forest insect and pathogen outbreaks. These disasters will impact communities through decreases in ecosystem health and delivery of ecosystem services.

Priority actions that can be taken to respond to these risks to water quantity and quality include:

- **Target existing programs to support water issues.** Projected changes in water availability will require programmatic shifts that specifically integrate climate adaptation and resilience-building. FSA currently delivers several assistance programs for producers who have experienced hardships due to water-related impacts including the Noninsured Crop Disaster Assistance Program (NAP), the Emergency

Conservation Program (ECP), the Tree Assistance Program (TAP), the Livestock Forage Program (LFP), and ad hoc programs like the Quality Loss Adjustment program (QLA). USDA will evaluate the existing programs within legislative authority to ensure that coverage or grazing periods accurately represent when threats to water quantity and quality could occur. For example, FSA programs could adapt to support water quantity and quality issues by broadening support to annual cropping systems that increase water use efficiency. NRCS's Regional Conservation Partnership Program (RCPP) and EQIP can provide financial and technical assistance to the irrigated agricultural sector in support of additional water storage infrastructure and soil enhancing practices.

- **Build resilience by enhancing soil health.** Through a variety of conservation practices, soils can be enhanced to promote water infiltration and be less prone to surface runoff and downstream flooding. Building soil health is a slow process that can take a number of years and requires changes in cropping systems and management practices. Programs like EQIP, RCPP, and the Soil Health Initiative help promote practices such as cover crops, reduced tillage, and prescribed grazing that can improve soil health and

build more resilient landscapes. Adaptation Action #1, below, further highlights the impact that improvements to soil health can make on long-term sustainability.

- **Use a landscape approach in addressing water issues.** Successful adaptation will require an integrated, landscape scale approach, including managing water resources across private and public lands, restoring terrestrial and aquatic ecosystems to enhance their resilience to climate stressors, and addressing the effects of pathogens and invasive species. Heterogeneous land cover makes developing resilience strategies for water resources on this scale complicated and requires participation, cooperation, and coordination of diverse stakeholders.
- **Explore innovative technology and approaches.** Drought-adapted varieties, dynamic and data-driven irrigation technology, and increasingly efficient delivery, storage, and recycling of water will be important adaptation tools. Improved and integrated climate, groundwater, and surface water measurements and modeling will help predict vulnerability in water availability and identify priority areas for reduced water use. Innovative translation of water management research and technology to on-field realities through extension and education will be essential to support user adoption and alleviate producer and land manager concerns.
- **Invest in water management infrastructure and adaptive irrigation systems.** Investing in additional water storage infrastructure, such as new reservoirs and managed aquifer recharge, and increasing the ability of water-related infrastructure to survive extreme events, can help irrigated agriculture adapt to a variable future and expand availability of seasonal runoff. In traditional rainfed agricultural regions, producers may adapt to more variable growing season precipitation by beginning to irrigate or practicing supplemental irrigation. Barriers to these actions include the need to address the ecosystem impacts of dams, the relative lack of institutions to guide the development of managed aquifer recharge, and the high cost to build on-farm irrigation infrastructure.
- **Leverage existing federal coordination mechanisms.** USDA will continue to play a leading role in existing interagency drought coordination networks including the National Oceanic and Atmospheric Administration's (NOAA) National Integrated Drought Information System (NIDIS) and National Drought Resilience Partnership (NDRP). OCE and NDMC will continue to leverage their partnership to support Climate Hub projects that provide useful and usable drought products to end users. Moreover, the Climate Hubs will continue supporting NIDIS in their regional Drought Early Warning Systems (DEWS). A Drought Learning Network (DLN) was jointly developed by the Climate Hubs, NDMC, and NIDIS, and allows stakeholders to share experiences in preparing for, responding to, and recovering from drought.

Many current USDA programs are well-suited to address these water-related threats and can provide a strong foundation for completing the necessary actions. It will also take new and reinforced partnerships within federal government and with Tribes, states, non-governmental organizations (NGOs), and businesses to tackle the significant challenge of addressing the long-term sustainability of the Nation's water supply. Much of this work will take years to complete and therefore requires five- or ten-year timelines to measure progress. USDA's National Agricultural Statistics Service (NASS) data on the market value attributable to irrigated farms and irrigated land, which is collected in the Census of Agriculture, will be used to assess the efficacy of future adaptation efforts in the irrigated agricultural sector. U.S. Geological Survey's (USGS) water use reports, which are released at 5-year intervals, will serve as another useful

tool to measure changes in water use over time. Improvements in monitoring, infrastructure, and research could be realized with additional investments to further minimize the climate risks to water for soil and forest ecosystems.

3. Disproportionate impacts on vulnerable communities

Socially disadvantaged, low-income, minority, and rural populations as well as American Indians, Alaska Natives, and sovereign Tribal governments are more likely to be vulnerable to the impacts of climate change. These communities' ability to adapt to a changing climate is often limited by financial, social, and other constraints. Climate change is likely to disproportionately impact these communities via several pathways:

- **Health.** Many communities who are exposed to the impacts of climate change are already burdened by air and water pollution and other environmental health hazards. Health risks of climate change may compound existing health issues in Tribal and Alaska Native communities, including risks from the loss of traditional food and practices, community displacement, new infectious diseases, and other effects of climate change.
- **Food.** Climate change poses risks for the U.S. food system, including production risks (as described in Vulnerability #1), transport and trade vulnerabilities, the potential for increased food loss and waste, and diminished food safety. These vulnerabilities challenge USDA's mission to provide leadership on food, nutrition, and related issues.
- **Ecosystem services and livelihoods.** Climate change threatens ecosystem services that many communities depend on including clean air and water, subsistence foods, medicine, fiber, fuel, and cultural services, such as cultural heritage and identity, spiritual, aesthetic, and educational values, and recreation and tourism opportunities. Rural communities, many of whose livelihoods are tightly tied to the agriculture and forestry sectors, and migrant workers, who provide a large share of agricultural labor in some regions, are particularly vulnerable to climate change impacts.
- **Extreme weather event impacts.** As described further in Vulnerability #4, the impacts of extreme weather events influenced by climate change are expected to have a disproportionate impact on populations lacking resources to cope with economic and environmental shocks and uncertainty. Communities in risk-prone areas can face cumulative exposure to multiple pollutants and climate event impacts. Without action, the adverse effects of extreme weather events, severe wildfire, flooding, drought, and invasive species on these populations and Tribal communities will only intensify.

USDA actions to help the most vulnerable communities adapt to climate change will include:

- **Increase equity and environmental justice awareness, skills, and abilities of USDA staff.** USDA will take additional steps to educate its staff on environmental justice, including disproportionate impacts from climate change, and how it relates to USDA agencies, programs, and activities. This will

enable the Department to assess its current and future activities, identify areas and strategies for improvement, and develop metrics to ensure progress in supporting communities most vulnerable to the impacts of climate change.

- **Engage meaningfully with impacted and vulnerable communities.** The Department will leverage existing relationships and build off past and on-going Tribal consultation and stakeholder engagement processes, including those recently initiated to seek input on the Department's climate-smart agriculture and forestry strategy. As the Department and individual agencies continue to develop adaptation and environmental justice strategies, they should engage directly with environmental justice leaders and communities impacted by climate change to understand vulnerabilities and risks, identify barriers to and resources for adaptation, and collaboratively develop solutions and responses, including through participatory adaptation planning.
- **Evaluate programs and activities for risks to communities.** In carrying out actions to address climate risks, USDA should develop robust processes to ensure disproportionately high impacts and maladaptation are avoided or mitigated. FS has developed guidance for incorporating analysis and consideration of impacted communities during Land Management Planning and National Environmental Policy Act (NEPA) processes and has established a robust Urban Forestry program to address environmental justice issues in urban areas. Evaluating risks to vulnerable communities may involve leveraging new and updated vulnerability assessments and existing and emerging tools, such as the proposed Climate and Economic Justice Screening Tool, to identify communities at risk.
- **Provide assistance and resources.** USDA will continue work to ensure its programs and resources are distributed equitably and are accessible to those most at risk of climate change impacts and in need of adaptation support. Several USDA programs have special provisions or dedicated funding for historically underserved producers—which may include socially disadvantaged, beginning, limited resource, and veteran farmers and ranchers—who are among the most vulnerable to impacts. Activities to integrate environmental justice and equity into existing programs will require removing barriers to participation, establishing trust, transparency, and accountability, identifying opportunities for broader inclusivity, and targeting education and outreach. Additional areas for advancing equity and environmental justice are described within USDA's Climate-Smart Agriculture and Forestry Strategy: 90-Day Progress Report.

Ensuring environmental justice and equity is an ongoing activity for USDA. The actions presented here can build on recent outreach efforts that have resulted in increases in program participation by historically underserved producers. Agencies will need to prioritize environmental justice in their planning and budget processes and when implementing new programs and policies. Indicators of success will be identified in coordination with the White House Environmental Justice Interagency Council's forthcoming performance metrics.

4. Shocks due to extreme climate events

Climate change is causing more frequent and intense disruptive events including hurricanes, floods, drought (see Vulnerability #2), and fires, which can have significant impacts on agriculture and forestry. Rural and vulnerable communities will be disproportionately impacted by these events while lacking the resources to adequately prepare for and respond to them. Key areas of impact associated with extreme climate events include:

- **Hurricanes, floods, and other extreme weather events.** Extreme weather events are not new, but recent increases in frequency and severity of these events, like hurricanes, floods, tornadoes, hail, and other severe storms, have negatively affected working lands. Hurricanes and floods are expected to increasingly affect U.S. agriculture and forests leading to crop loss and production delays, degradation of soil and water resources, damage to infrastructure, alteration of forest health and productivity, and impacts to community health and safety. As hurricanes become more frequent and severe, wind, rain, and debris damage to buildings, power grids, and telecommunications will be increasingly common. Landslides, stream washouts, and downed trees can threaten water quality and community and animal safety, and frequently require targeted restoration and salvage efforts.
- **Wildfire.** Climate change is expected to continue to alter fire regimes, increasing the frequency and extent of wildfire. As the wildland-urban interface expands, wildfire presents increased risks to human health and infrastructure. Severe wildfire can leave forests in need of reforestation and restoration and heighten the risk of secondary disturbances such as erosion, landslides, and invasive species.
- **Vulnerability of rural communities.** As mentioned in Vulnerability #3, rural communities are particularly vulnerable to extreme weather events due to a greater direct dependence on agriculture, forestry, and outdoor recreation for income and employment, existing challenges with infrastructure and connectivity, and limited capacity to prepare and respond to these events. Severe weather events threaten ongoing rural development efforts, negatively impacting projects, destroying properties, delaying construction, and disrupting revenue for existing loans. Increasing climate variability will result in increasing uncertainty in agricultural and forest industries in rural communities, likely leading to long-lasting shifts in community structure and composition. Current declining trends in population and employment tend to also reduce resources available to local government and community associations to deal with climate change variability.

In addition to the resilience-building actions described in Vulnerabilities #1 and #2, further actions can be taken to adapt to the risks from extreme climate events:

- **Update vulnerability assessments.** With the support of the USDA Research, Education, and Economics (REE) agencies and FS R&D, in 2015 the Climate Hubs conducted vulnerability assessments for each of their ten regions based on the Fourth National Climate Assessment. Likewise, FS engaged in science management partnerships to develop vulnerability assessments in over 100 national forests and grasslands, including other public and private lands, with applications in land management and project plans. The Hubs will update their vulnerability assessments for the forthcoming Fifth National Climate Assessment and continue to support the development of

more place-based assessments that identify climate-smart practices to build resilience.

- **Use monitoring tools to build resilience.** NASS has developed a series of geospatial agricultural monitoring portals that can be used to identify and quantify impacts from extreme climatic events. These portals can provide near real-time updates on major storm disaster events, crop condition and soil moisture, decision-support system capabilities, and annual planted crop area to inform agricultural adaptation strategies. Examples of these NASS portals and other USDA-supported decision-support tools include:
  - NASS Disaster Analysis Program, which captures impacts from major storm events,
  - The joint vegetative condition and soil moisture monitoring portal,
  - AgroClimate, a weather and climate-based decision support system for agriculture, and
  - After Fire: Toolkit for the Southwest, a resource to assess post-fire risks.
- **Build forest and grassland resilience through management, planning, and responses.** Active management to build resilience to wildfire, insects, and disease is a high priority for the FS. USDA's Climate-Smart Agriculture and Forestry Strategy: 90-Day Progress Report and Adaptation Action #1, below, discuss these efforts further. Specific actions related to extreme events include development of information on disaster preparedness and response, support for forest products and markets for salvage and small-diameter timber, and support for post-disturbance emergency stabilization and rehabilitation. Wildfire and hurricanes can provide opportunities to increase climate resilience through species selection and soils restoration in disturbed areas. Barriers to implementation include underdeveloped markets and feedstock sources that slow use of hurricane salvage and small-diameter timber.
- **Strengthen disaster assistance and relief programs.** In addition to assistance programs mentioned in Vulnerability #2 (NAP, ECP, TAP, LFP, and QLA), FSA offers the Livestock Indemnity Program (LIP), Emergency Assistance for Livestock, Honeybees and Farm-raised Fish (ELAP), and Wildfire and Hurricane Indemnity Program and Program Plus (WHIP and WHIP+) to help producers cope with impacts of extreme events and natural disasters. FSA also provides Emergency Loans for producers who might otherwise be forced to terminate operations, and Disaster Set-Aside options, which allow direct loan borrowers to forego an installment until the end of the loan term to reduce short-term financial strain due to a disaster.
- **Enhance the adaptive capacity of rural communities.** Resilience to extreme events and other climate impacts will require increasing local capacity to make adaptive improvements to community resources and expanding options for economic opportunities. USDA's Climate-Smart Agriculture and Forestry Strategy: 90-Day Progress Report highlights ways in which USDA can support new and better for markets for agriculture and forestry products while simultaneously building the resilience of rural communities. Examples of actions include supporting participation in voluntary carbon markets, renewable energy development and energy efficiency activities, and loans and grants to expand broadband access.

Many measures to build resilience to extreme events are long term investments whereas some programs will have distinct timelines triggered by the occurrence of such events. For example, while loan assistance is on-going, Emergency Loan and Disaster Set-Aside assistance is only available after a declared disaster. The level of support proposed in the FY 2022 budget and other

mechanisms will be used to address the backlog of National Forest System (NFS) restoration projects and enhance current work on risk identification, vulnerability assessment, adaptation planning, and disaster preparedness and recovery. Program records, including FSA's loan disbursement records and NRCS's reporting on conservation and investments, can be used to track activities. Progress on NFS lands will be monitored through the FS Climate Scorecard and the number of acres restored.

5. Stress on infrastructure & public lands

The increasing frequency, severity, and extent of disturbances with climate change can have far-reaching consequences on natural and built infrastructure on public lands. Changes in flood frequency, wildfire intensity, sea level, and extreme precipitation events can cause damage to low-elevation infrastructure, threaten utilities and air quality, endanger coastal communities, and increase erosion and landslides. For the NFS, in the absence of any climate adaptation action, reforestation and restoration needs will continue to increase, ecosystem services will be lost or diminished, aging infrastructure will deteriorate, and social and economic benefits will be disrupted. Roads and bridges damaged or lost because of increased flooding can limit access to Federal lands, create safety hazards, and reduce the availability of water resources. Actions USDA can take regarding built infrastructure and forest resilience include:

- **Increase resilience of built infrastructure.** Infrastructure must be upgraded, or newly designed, to withstand increasing extreme events and disturbances. The FS is using decision support tools and climate change vulnerability assessments to identify when and where to relocate or decommission vulnerable infrastructure and improve transportation infrastructure to reduce erosion and sedimentation. Other adaptation actions include improving streamflow forecasting and expanding streamflow and snowpack monitoring networks to help managers respond to extreme events and ensure water allocation downstream. Barriers to implementation include funding to upgrade existing infrastructure and uncertainty in future flood projections.
- **Address forest restoration needs.** FS will need to increase the pace of restoration to address 1 to 4 million acres of restoration needs on national forests as described in the FS reforestation strategy. This action will require the use of planning tools and decision-making frameworks to enable collaborative planning and implementation of large restoration treatments across management boundaries.
- **Build resilience to severe wildfires and their effects.** Building resilience to wildfire necessitates the accelerated use of prescribed fire and the strategic implementation of hazardous fuel treatments to reduce wildfire impacts. Following severe wildfires, FS will prioritize public safety, forest rehabilitation, and slope stabilization. Rural Development (RD) and FS will work together to identify opportunities to link post wildfire restoration efforts with bioenergy generation. Barriers to implementing this action include limited

capacity and competing priorities during periods of widespread wildfire activity, State and local air quality compliance for prescribed fires, and public resistance to wildfire and fuels management.

Addressing the growing reforestation and restoration backlog over the next 10 years will require a four-fold increase in planting and a 30 percent increase in certification of natural regeneration, resulting in 3.6 million acres reforested. Given the importance of forest health and resilience to the long-term sustainability of forest landowners and surrounding communities, these efforts are described in further in Adaptation Action #1 below. For infrastructure like roads, bridges, and facilities, their long service life means that adaptation will be a long-term effort. Long-term monitoring will help detect potential climate change effects and evaluate the effectiveness of adaptation options. Existing FS monitoring efforts include the Climate Scorecard (biennially through 2025), the Key Performance Indicator for Terrestrial Condition Assessment (annually for all NFS lands), the Watershed Condition Framework, Biennial Monitoring Reports, and Forest Inventory and Analysis.

Already, the Great American Outdoors Act (GAOA) is being leveraged to develop more resilient infrastructure. In March 2021, USDA announced investment via GAOA's National Parks and Public Land Legacy Restoration Fund, which will enable implementation of more than 500 infrastructure improvements across national forests and grasslands. The Forest Service also continues to use Land and Water Conservation Fund (LWCF) programs to strategically conserve forests on private and public lands. Future investments to address the reforestation backlog and wildfire risk could be targeted towards nurseries and natural infrastructure, accelerated project planning, building expertise, and improving management strategies to build resilience to wildfire. Continued and expanded cross-boundary collaboration with other federal agencies, Tribes, states, and partners will help achieve the requisite scale of response.

III. USDA'S ADAPTATION ACTIONS

Building on the vulnerabilities identified above, USDA will take cross-cutting adaptation actions to prepare the American agriculture and forestry sectors and rural and urban communities to be resilient in a changing climate. These actions aim to bridge the gap between innovative science and technology for climate adaptation and preparedness and in-field and on-site practices to build soil and forest health. These actions will reduce producers' vulnerability to climate change through increased access to relevant climate data and expanded education and outreach efforts.

The Fourth National Climate Assessment outlines the key challenges associated with adaptation planning for USDA consideration. The first challenge is that adaptation planning must be a sustained, iterative process. Mainstreaming the climate preparedness thought process rather than making it an additive step in decision-making will lead to greater success. Secondly, it is essential that USDA considers both current and projected climate change and variability in its planning and decision-making. Supporting climate literacy within the USDA workforce, as discussed later in this Plan, can support this new mode of thinking.

A third challenge is ensuring that climate adaptation actions are not limited to the stages of awareness, assessment, and planning but are implemented, monitored, and re-evaluated, which will require sustained attention and measures of success. Finally, the impacts of climate change on USDA and its stakeholders will vary regionally and locally, requiring climate adaptation actions at relevant scales.

USDA proposes adaptation actions to:

1. Build resilience across landscapes with investments in soil and forest health;
2. Increase outreach and education to promote adoption and application of climate-smart adaptation strategies;
3. Broaden access to and availability of climate data at regional and local scales for USDA Mission Areas, producers, land managers, and other stakeholders;
4. Increase support for research and development of climate-smart practices and technologies to inform USDA and help producers and land managers adapt to a changing climate; and
5. Leverage the USDA Climate Hubs as a framework to support USDA Mission Areas in delivering adaptation science, technology, and tools.

1. Build resilience to climate change across landscapes with investments in soil and forest health

Economic vitality and quality of life throughout America depends on healthy, climate-adapted agricultural and forest systems. Proactive investments in soil and forest health will build resilience to climate change into these systems. This action includes efforts to build resilience via conservation practices, improved water management and efficiency, climate-informed reforestation and forest management, and ecosystem restoration and management. Enhancing soil and forest health will protect ecosystem functions that support the long-term resilience of working lands and forests and enable producers to successfully and sustainably enhance productivity to meet growing global demand in a changing climate.

Climate change threatens to increase the degradation of soil and water resources, including via increases in extreme precipitation events that lead to soil erosion, degraded water quality in lakes and streams, damage to infrastructure, and diminished crop production. On forest land, a combination of acute disturbances and shifts due to gradual climate change are expected to alter forest structure, function, productivity, and health, which will decrease the ability of forests to provide important ecosystem services. The rate at which restoration services are needed across the landscape is currently outpacing the capacity of land management agencies and their partners.

A variety of conservation management practices to restore soil structure and hydrologic function of agricultural landscapes can be adopted to improve resilience, including no till and reduced till, cover crops and crop rotations, improved nutrient management, agroforestry practices such as windbreaks and buffers, and prescribed grazing. These practices help to reduce erosion and

increase organic matter in the soil, which improve water holding capacity and water infiltration, thereby increasing resilience to drought, heavy precipitation, and extreme temperatures. Current adoption of these practices varies by practice, region, and crop. For example, U.S. farmers have rapidly expanded their use of cover crops, a 50 percent increase from 2012 to 2017, yet their use spans only 5 percent of total harvested cropland. Active forest management, including thinning forests and treating fire-deficient landscapes by prescribed burning, and climate-smart reforestation can increase resilience and reduce risks of wildfire, insect, and disease related mortality.

Many of these practices provide co-benefits for climate change mitigation via enhanced soil carbon sequestration and reduced emissions and for water quality and quantity through reduced erosion and runoff. Improvements in forest health can mitigate emissions from increased wildfire, increase soil carbon sequestration, mitigate risks to communities in the wildland-urban interface, and maintain other valuable forest ecosystem services.

Recent and ongoing USDA activities to promote resilience via enhanced soil and forest health include:

- Creation of The Adaptation Workbook, which producers can use to assess threats and document management choices to minimize climate change impacts to their operations. The workbook uses menus of adaptation strategies and approaches for forests, urban ecosystems, forested watershed and water resources management, agriculture and working lands, and recently published menus focusing on Tribal perspectives, forest carbon, and recreation. The workbook has been used to generate hundreds of adaptation demonstration projects using real-world examples of forest and farm management.
- Curation and continued growth of an online compendium of nearly 500 adaptation approaches with numerous associated examples on the FS Climate Change Resource Center (CCRC).
- Awards through NIFA's Agriculture and Food Research Initiative (AFRI) to fund 14 Soil Health grants and 7 Signals in Soil grants, an interagency program with the National Science Foundation (NSF).
- Investment in NRCS's Conservation Innovation Grants (CIG) to support the development of innovative tools, approaches, practices, and technologies to further natural resource conservation on private lands. The Soil Health Demonstration Trial, part of the CIG On-Farm Conservation Innovation Trials, will focus extensively on implementation of conservation practices and systems that improve soil health.
- Commitment of NRCS resources to fund 85 locally driven, public-private partnerships via the Regional Conservation Partnership Program (RCPP) to address climate change, improve water quality, combat drought, enhance soil health, support wildlife habitat, and protect agricultural viability.
- Encouraging enrollment in the Conservation Reserve Program (CRP) with new incentives and other adjustments to payments and a focus on the program's role in climate change mitigation. CRP provides annual payments to producers in exchange for removing environmentally sensitive lands from production and implementing practices to improve soil health and provide other benefits. In addition to general and continuous CRP sign-up, FSA offers CRP Grasslands and pilot programs focused on soil health and clean water, such as Clean Lakes, Estuaries and Rivers 30-year contracts (CLEAR30). FSA administers CRP on behalf of the Commodity Credit Corporation.
- Investments in the FS and NRCS's Joint Chiefs' Landscape Restoration Partnership, which includes projects to mitigate wildfire risk, improve water quality, and restore healthy forest ecosystems on public and private lands.

- Release of a new fire mapping tool, Southeast FireMap, to enable resource managers to improve their approaches to managing wildfire risk and fire management needs through targeted prescribed burns and training.

Building on the efforts described above and in conjunction with the objectives of the Climate-Smart Agriculture and Forestry Strategy: 90-Day Progress Report, USDA will use strategic investments to carry out climate-informed forest management and restoration activities, provide wildfire mitigation response, incentivize and scale up voluntary adoption of soil and forest health enhancing practices, and support markets that value the enhanced resilience of producers and ecosystems. Climate-adaptation practices will need to fit the geographic context and align with the interests of farmers and land managers. This is especially important because implementation costs are usually incurred on shorter timescales than the soil and forest health benefits are realized. A combined effort from NRCS, FSA, FS, USDA research agencies, the Climate Hubs and other USDA agencies will be essential to implement these actions effectively and address these challenges.

NRCS will play a key role by providing technical and financial assistance to farmers to implement and incentivize conservation practices through several existing programs and initiatives, including EQIP, CSP, RCPP, CIG, and the Soil Health Initiative. The backbone of NRCS data for designing assistance is the National Cooperative Soil Survey Program, which provides information on soil and ecological site resources of farms and ranches across the United States. FSA aims to increase enrollment in CRP by 4 million acres or more over the coming year, with the long-term goal to establish valuable land cover to improve water quality, soil health and carbon sequestration, and prevent soil erosion and loss of wildlife habitat. REE agencies and other programs, like the National Agroforestry Center, will provide the science and innovations that will underpin the management choices taken by the program

agencies, as described in Adaptation Action #4.

FS will scale up its activities to accelerate the strategic implementation of hazardous fuel treatments and prescribed fire to reduce wildfire risks and to increase forest restoration and reforestation. To significantly reduce the risk of high intensity wildfire, over the next 10 years, the FS will need to treat an additional 20 million acres of NFS land and 30 million acres of other Federal, State, Tribal and private land, especially in the Western United States. These goals are consistent with the recommendations outlined in USDA's Climate Smart Agriculture and Forestry Strategy: 90-Day Progress Report and current

budget priorities. A number of FS programs and initiatives will be engaged to build resilience on forests and grasslands including the Forest Legacy Program, which supports easements and land purchases for private-land conservation, as well as the Community Forest Program (CFP), Forest Stewardship Program (FSP), Sustainable Forestry African American Land Retention Program (SFLR), and Urban and Community Forestry (UCF) Program. Planning and decision-making in these programs and management activities will be based on climate-smart principles informed by FS R&D and the Climate Hubs.

The Climate Hubs will support efforts to build soil and forest health through ongoing work to empower land managers to incorporate climate adaptation into their land management planning. Further details of the Hubs' outward and inward-facing efforts are included in Adaptation Actions #2 and #5, respectively.

Scope, Performance, and Resources

- This action will work to build resilience across diverse landscapes at local to national scales, with a particular emphasis on supporting producers and land managers most vulnerable to climate change impacts. While conservation practices are often implemented at the field, farm, and stand levels, conservation planning can also be coordinated at the area and watershed levels. Large-scale forest treatment and restoration often spans management boundaries.
- USDA will track and estimate benefits of soil health practices using national survey data and program data. These data can be used to estimate soil carbon benefits and other co-benefits of soil health practices. USDA is planning to improve conservation data collection and reporting by implementing new surveys, which will provide more information on the adoption and benefits of soil health practices.
- FS will use its Climate Scorecard, particularly the Adaptation element, to monitor progress.
- Active forest management treatments to reduce wildfire risk on Federal, State, Tribal and private lands will require cross-government coordination.
- The President's FY 2022 Discretionary Funding Request includes significant investments within FS, NRCS, and other USDA agencies to enhance soil and forest health and resilience on public and private lands, including through support for voluntary conservation on working lands and for high-priority hazardous fuels and forest resilience projects.

2. Increase outreach and education to promote adoption and application of climate-smart adaptation strategies

The Nation's farmers, foresters, and ranchers face increased vulnerability of their operations to extreme weather and long-term changes in climate. Low-income, minority, and Tribal communities as well as small-scale, beginning, young, underrepresented, and underserved farmers and foresters will bear the brunt of negative climate change impacts, made more difficult by lack of accessible and useful information sources. Maladapted agriculture and forestry sectors could lead to a less diverse and resilient food system, degraded natural resources, and missed economic opportunities.

The goal of this action is to promote adoption and application of climate-smart adaptation strategies. USDA's Climate Hubs and NIFA, in partnership with the Cooperative Extension Service, Historically Black Colleges and Universities, Tribal colleges, Hispanic Serving Institutions, additional university partners, NGOs, and others, can provide resources to farmers, ranchers, and forest landowners to increase awareness of and engagement in opportunities to address climate change. Investments in the Climate Hubs program will allow the network to scale up their efforts to

develop and deliver science-based, region-specific information and technologies. The Climate Hubs will strengthen partnerships to enhance support for science-based decision-making and facilitate knowledge sharing of climate risks, vulnerabilities, and adaptation strategies. NIFA will evaluate the inclusiveness of climate in its education and extension portfolio and leverage its resources to encourage stakeholders to partner with the Climate Hubs to develop and deliver resources to America's farmers, ranchers, and landowners. Together, the Climate Hubs and NIFA can strengthen the role of extension as a force multiplier in increasing adoption and application of climate-smart practices. With a presence in nearly all of the more than 3,000 counties of the United States, the Cooperative Extension System's network of agents and specialists will be essential to expanding the use of climate-smart strategies described in Adaptation Action #1.

Recent accomplishments by NIFA and the Climate Hubs towards this goal include:

- NIFA support for Cooperative Extension professionals who are actively engaged in the National Extension Climate Initiative (NECI), which promotes the recognition of the climate crisis, coordination and management of climate-smart agriculture and forestry outreach activities, and sharing of program materials;
- A NIFA solicitation for extension and education projects that include partnerships with the USDA Climate Hubs through AFRI's Foundational and Applied Science Request for Applications (RFA);
- Through the Climate Hubs, development of 11 curricula reaching 402 students, production of 118 in-person or virtual workshops with an estimated 7,800 participants, 214 presentations, and 439 engagements with Tribes or Tribal organizations in FY 2020.

The Climate Hubs are a focal point for outreach and education efforts around climate impacts and risk management on working lands. Moreover,

the Hubs act as conveners helping to gather information from Tribal and stakeholder groups to understand regional issues and deliver actionable, relevant information to enhance climate-informed decision making. While many of the Climate Hubs already engage with local communities, states, and Tribes, the Hubs' capacity to increase climate outreach and education could be enhanced through dedicated Tribal and state liaisons. In addition, the Climate Hubs can expand their reach into under-resourced and underserved communities through delivery of timely, relevant, and credible information, data, and tools. NIFA can leverage existing and new funding sources to support colleges and universities, especially minority-serving institutions, in developing partnerships with the Climate Hubs. NIFA will also increase consultations with community colleges and minority-serving institutions to ensure widely accessible climate education and outreach opportunities.

Implementation will be accomplished through an expansion of the USDA Climate Hubs program and establishment of NIFA funding opportunities to address this Adaptation Action. USDA intends to leverage opportunities for enhanced technology transfer and implementation of climate-smart practices by linking USDA staff with other federal climate change coordination efforts such as the Department of the Interior's Climate Adaptation Science Centers (CASCs), NOAA's Regional

Climate Centers and Regional Integrated Sciences and Assessments (RISAs), and U.S. Global Change Research Program (USGCRP) working groups.

The Climate Hubs will evaluate success based on activities including vulnerability assessments, adaptation planning and menus, jointly developing decision-support tools, building technology to support climate resilience, and stakeholder workshops/listening sessions. Key metrics for NIFA include number of RFAs published that include climate change language and projects funded that support climate outreach and education.

Scope, Performance, and Resources

- The USDA Climate Hubs are located at five ARS and five FS research stations comprising ten regions spanning the United States and its territories. The Climate Hubs support local, state, and regional efforts including cross-region and national initiatives when there are common interests or technology needs.
- The Climate Hubs are overseen at the national level by an Executive Committee (EC) comprised of senior program leaders from across the Department who provide leadership on action development, implementation, monitoring, evaluation, and oversight. The National Lead, a 2-year rotating position among ARS, FS, and NRCS, works through the EC to ensure national coordination to capitalize on synergies and efficiencies.
- New NIFA programmatic support for climate extension and education is expected in FY 2022. NIFA will need to balance climate with other priorities across its research, education, and extension portfolio. Additional National Program Leaders with social and behavioral science expertise will help develop effective climate outreach and education programs.
- The President's FY 2022 Discretionary Funding Request for the Climate Hubs will support an expansion of climate science tools and landowner awareness and engagement in climate adaptation practices.

3. Broaden access to and availability of climate data at regional and local scales for USDA Mission Areas, producers, land managers, and other stakeholders

Increasing access to and use of climate data, models, and decision support tools at the regional and local scales for producers, land managers, state and local policymakers, and USDA Mission Areas is a critical and ongoing priority for supporting timely responses to the impacts of climate change. This action necessitates organizing, streamlining, and coordinating data access points and online data delivery. Ensuring that climate adaptation strategies are accessible to all farmers, ranchers, forest landowners, and communities will require that USDA address internet access and other infrastructure or resource issues that limit access and use of climate data.

The Department aims to increase access to reliable climate data by supporting the collection and curation of scientific information on climate change and translating that information into user-friendly decision support tools, models, and recommendations to provide guidance on benefits and outcomes associated with agronomic decisions. To accomplish this goal, the Department must also provide equitable access to technical assistance and training for climate data end users.

Ways in which USDA already collects and provides data for improved resource management in a changing climate include:

- ARS's development of the Agricultural Collaborative Research Outcomes System

(AgCROS) database to provide data to the public research and development community and its Partnerships for Data Innovation (PDI) program to implement sensors and other data collection, integration, and sharing systems that will help farmers get the most from their limited resources;

- ERS's regular evaluation of its Agricultural Resources and Management Survey data products;
- NRCS, which delivers data on conservation practices and is modernizing its Plant List of Accepted Nomenclature, Taxonomy, and Symbols (PLANTS) database;
- FS's Forest Inventory and Analysis (FIA), which provides annual data on forests to assess sustainability of management practices, monitor forest health, productivity and carbon stock change, and predict the effects of climate change;
- NIFA with its AFRI Data Science for Food and Agricultural Systems program area that supports projects that harness data science to aid land managers in decision-making and a collaboration with the National Agriculture Library on an open data framework; and
- The Climate Hubs, which have improved the discoverability and usability of RMA crop insurance data for enhanced climate risk management with the AgRisk Viewer.

This action provides an opportunity to deliver credible science and user-friendly decision-making tools that can help producers and land managers apply climate change and weather-related information to their operations. Reliable data can inform planting decisions, farming practices, and business decisions. By improving current data access, this action enables USDA to provide support and incentives for agricultural data standards and to encourage partnerships with public and private data trusts. Additionally, this action presents the opportunity to create a USDA-wide open access agricultural, rangeland and forestry database to drive development of more advanced tools for producers and land managers.

The Department will identify existing or emerging issues with data access as well as opportunities for improvement, with a particular focus on access for low-income, socially disadvantaged and historically underserved communities. Consistent financial support will be key to ensure that the necessary infrastructure exists for data access. The lack of a cohesive and consistent cloud computing environment will restrict the ability to deliver spatial data sets, and Chief Information Officer restrictions on research and development application development may delay delivery of user-friendly climate dashboards and tools. Other challenges include the availability of temporally resolved geospatial imagery, the need for additional data science expertise, and the capacity to incorporate social and behavioral sciences to evaluate human dimensions of the food system. Data and decision-support tools need to be accessible to rural communities, which may be challenging with current broadband and internet infrastructure in some communities. Collaborations with federal funding agencies to provide research support will aid in understanding complex climate issues and allow the Department to craft models and decision-making products essential for the sustainability of economic and natural resource systems.

Scope, Performance, and Resources

- Increasing access to climate data is an ongoing priority in the Department, and a reasonable timeframe for achieving the goal will be FY 2021 through FY 2025. The first key milestone of this action will be leveraging new technologies and computing resources to effectively deliver additional climate data through online tools in FY 2022 and FY 2023.
- This action will require contributions and support from ARS, ERS, FS, NASS, NIFA, NRCS, and OCS.
- Maintaining current levels of delivery and data access will likely be possible with existing resources. Direction of additional investments and technical capacity towards this action could further improve data quality, timeliness of delivery and ease of access by users.
- Increased access to and consistency of climate data should be addressed at the national, regional, and local scales.
- Supporting information tools that provide resolution across multiple scales will be critical to allow users to adjust output based on their specific need.
- Increased availability of technical assistance to support climate data and tools, increased access and use of climate and climate-related data, feedback from user communities on the usefulness of information and data, and the reduction in gaps of science and science delivery for agriculture will serve as useful performance measures.
- USDA will work to better understand Tribe and stakeholder needs for climate data, particularly in underserved communities.
- The Department will coordinate with science agencies across the federal government, including the NSF, the Department of Energy, the National Aeronautics and Space Administration, and NOAA to ensure that federal climate-related data are accessible to those in the agriculture, rangeland, and forestry sectors.

4. Increase support for research and development of climate-smart practices and technologies to inform USDA and help producers and land managers adapt to a changing climate

USDA will continue to support and coordinate the efforts of its research agencies to develop innovations in climate-smart agriculture and forestry. Evaluating the efficacy of adaptive practices and technologies on working lands, including productivity synergies and tradeoffs and mitigation co-benefits on soil carbon storage and GHG emission reductions, is a research priority. Other key topics for climate research include improved fertilizer technologies, genetic studies to identify climate resilient plants and trees, and studies of the impacts of climate change on pollinator communities and vector-borne livestock diseases. Modeling efforts can project the affordability of climate-smart activities, infer adoption likelihood, and project pest and disease outbreaks under different climate change scenarios. USDA's long-term monitoring networks for snowpack, precipitation, and soil moisture provide data to investigate trends and develop management options.

The Department's research activities form the basis for validating existing climate adaptation options and identifying and developing new ones, while ensuring the actions are regionally relevant and economically viable. USDA's research integrates climate and socioeconomic change with production and land-management outcomes, while considering the secondary effects of climate's influence on pollinators, pests, diseases, invasive species, and extreme events such as flooding and drought. New scientific information and tools, contextualized and implemented locally, can help

land and resource managers increase the resilience of those systems and the communities that depend on them. To date, however, implementation has been slow. Increasing partner engagement, science co-production, and delivery will ensure that the best available science is understood and put into practice.

USDA's efforts to understand and minimize climate risks for its stakeholders have yielded important accomplishments, a few of which are highlighted here:

- In July 2020, USDA published a report documenting 20 Climate Indicators for Agriculture to support decision making and to understand the larger climate context of U.S. agriculture.
- NIFA currently supports approximately 400 active projects related to climate change representing an investment of approximately $200 million.
- Scientists at ARS are developing a Grand Challenge Synergy Project proposal "Creating pollinator landscapes and beekeeping practices for a changing climate," to synergize efforts across ARS and other federal and state agencies to find solutions to the climate change challenges experienced by pollinators. In May 2021, Project Leaders held a workshop to obtain perspectives from scientists and stakeholders and build collaborations required to generate and implement solutions to pollinator loss from climate change.
- FS has developed national and regional syntheses of climate effects on forests, agroforestry, non-timber forest products, forest and rangeland soils, invasive species, and the wildland urban interface and identified management opportunities and adaptation practices.
- In collaboration with ARS, NRCS, NDMC, and university partners, the Climate Hubs developed Grass-Cast to provide enhanced decision support to ranchers and grassland managers by estimating forage productivity during the growing season.

- FS's FIA program has successfully led to practical tools for forest carbon assessment and monitoring climate change effects on forest species composition and abundance.
- NRCS's Snow Survey and Water Supply Forecasting and Soil Climate Analysis Network data are used to manage water resources and plan for water shortages in the Western United States.

Managing competing research priorities will require a coordinated effort at the Department and agency levels. As described in Adaptation Action #3, translating experimental data into information and decision tools is a complex process that is required for the adoption of climate-smart practices and technologies. Evaluating the effectiveness, tradeoffs, and synergies of climate-smart practices will require a multidisciplinary systems approach.

USDA anticipates that existing organizational, administrative, and coordination capacity will rapidly and efficiently integrate many of the new research and development priorities outlined in this Plan. As described in Adaptation Actions #2 and #5, USDA will work through the Climate Hubs, extension, and other means to understand stakeholder needs and deploy new information, data, practices, tools, and technologies to private landowners and managers for implementation. Relationships with land-grant universities, technical service providers, and other cooperators will be leveraged to achieve this goal. Finally, USDA will use internal and interagency working

groups and review of existing funding authorities to identify research opportunities and increase support where appropriate for climate-smart research activities.

Many ongoing USDA research projects with climate adaptation applications will continue into the foreseeable future, for example:

- ARS has numerous climate adaptation research projects throughout its crop, animal, natural resource, and food nutrition programs.
- FS activities to increase support for applied climate science to develop and evaluate practices and technologies, engage in the development and co-production of science, and use social science to identify adoption barriers will be initiated in FY 2022 and continue at least through FY 2026.
- NIFA will support new Artificial Intelligence Research Institutes focused on climate change in FY 2022 and continue to support climate science in the AFRI Sustainable Agricultural Systems (SAS) RFA.
- FSA's evaluation of the soil benefits of the Conservation Reserve Program will undergo a significant expansion in FY 2021 and will continue for at least five years, with the potential to go beyond 15 years.

Existing monitoring efforts and those developed by USDA's research agencies during adaptation planning will be used to track the outcomes of science implementation and adaptation actions. These efforts will consider the outcomes of focused listening sessions, adaptation case studies, dissemination and training workshops, new tools and tool improvements, research partnerships and measures like adoption rates, publications, data usage, fellowships, and funding levels.

Scope, Performance, and Resources

- OEEP coordinates USDA's climate change activities, including execution of this Plan, through the monthly USDA Global Change Task Force (GCTF) and represents USDA to the interagency USGCRP. OCS provides Department-wide coordination of agricultural research, education, and extension needs.
- USDA's research spans field-scale practices, whole-farm or forest systems, regional monitoring networks, and national-scale analysis and assessment.
- Coordination is generally a national headquarters activity, while primary research activities largely occur in the field to capture diversity in environmental conditions, production types, and management.
- USDA will continue its participation in the USGCRP's Federal Adaptation and Resilience Group to ensure that climate-driven challenges are anticipated by new information, practices, technologies, and tools.
- Outside of the federal government, shared stewardship agreements between the FS and states will facilitate implementation of adaptive actions and support monitoring efforts.
- USDA agencies will increase consultations with Tribal communities to incorporate traditional ecological knowledge into climate-smart practices.
- Additional consultations with community colleges and minority-serving institutions will be used to make research opportunities under this effort widely accessible.
- International partnerships and dialogues allow USDA's expertise to improve global outcomes beyond U.S. borders.
- USDA research agencies are already or planning to realign personnel time and resources towards USDA's climate priorities. Additional investments would permit expansion of essential research efforts, climate-related program analysis, monitoring networks, and technology transfer.

5. Leverage the USDA Climate Hubs as a framework to support USDA Mission Areas in delivering climate adaptation science, technology, and tools

The Climate Hubs provide necessary USDA infrastructure to deliver climate adaptation science, technology, and tools to USDA agencies who, through their missions, support farmers, ranchers, and forest landowners. The Hubs were established in 2014 with the aim to develop and deliver science-based information and technologies to enable producers and natural resource managers to make climate-smart decisions and minimize risk to their operations. In January 2020, the Hubs completed a five-year review to assess their effectiveness and provided recommendations to inform a new, forthcoming, strategic plan. Over a five-year period (2014-2019), the Climate Hubs and partners hosted over 435 in-person workshops and training events and engaged over 16,000 stakeholders on critical climate issues and adaptation opportunities. The Hubs provided technical expertise through 237 webinars, podcasts, and other digital communication reaching over 17,000 people, and developed more than 25 web-based decision-support tools, including Grass-Cast and AgRisk Viewer.

To integrate climate-smart agriculture and forestry in USDA's mission, programs, operations, and management, USDA will take advantage of the Climate Hubs' unique position to work across organizational boundaries and engage their expertise and awareness of regional priorities. The Climate Hubs and USDA Mission Areas will work together within the three Hubs workstreams:

Workstream 1: Science and Data Synthesis

- The Hubs will promote coordination and joint production of resources and tools between USDA science and program agencies.
- Hubs' applied vulnerability assessments for fire, flood, drought, extreme temperatures, and hurricanes will be used to make recommendations to USDA Mission Areas to increase landscape and community resilience to extreme climate events.
- Using an adaptive management approach, the Climate Hubs plan, implement and monitor actions, analyze and synthesize results, and share their learning. USDA will use the Hubs' regional expertise and awareness of climate-smart agriculture and forestry successes to inform Mission Area management and decision-making.

Workstream 2: Technology and Tool Development and Implementation Support

- The Climate Hubs will leverage their co-production model to produce tools relevant to USDA agencies that use existing technologies and data.
- To promote co-production of tools and resources with stakeholders, the Hubs will pass back local and regional knowledge and climate adaptation needs to ensure that USDA's work is relevant and usable by farmers, ranchers, and landowners.

Workstream 3: Outreach, convening, and training

- The Hubs will provide a platform for USDA agencies to convene and work on common issues and expand their outreach.

- The Hubs will develop new partnerships and strengthen existing relationships with USDA agencies to enhance uptake of existing tools and jointly develop new products. Opportunities to partner with APHIS, FS, FSA, NRCS, RD, RMA, and other agencies will be sought.
- To build a practice of climate-thinking across USDA, the Hubs will integrate the best available science into messaging tools like research publications, gray literature, social and other media communications, and video and podcast products.
- To reach specific agency staff, the Climate Hubs will jointly develop and curate relevant educational modules, webinars, workshops, and trainings.

Scope, Performance, and Resources

- Resources to support the Hubs program are contained within the President's FY 2022 Discretionary Funding Request. These investments will allow the program to expand to meet growing demand from within and outside USDA.
- Indicators relevant to this action will include training or capacity building activities provided to USDA staff, an increase in intra-agency research or program collaborations, and development of tools, resources, and research to support Mission Area objectives. The Hubs will continue to track webinars, trainings, and other interactions with the public.
- The Climate Hubs report on their progress through quarterly reports to the Executive Committee, newsletters, and annual reports.
- The Climate Hubs have built strong relationships with external partners from local to national scales and across sectors, providing opportunities for collaboration with NGOs and other stakeholder communities to develop adaptation resources and tools to enhance USDA activities.
- The Climate Hubs will share climate adaptation science, tools, and technologies through partnerships with other federal climate service networks including the RISAs, CASCs, and NIDIS DEWS. The Hubs can assess how to adapt these interagency efforts for USDA use to increase efficiency and avoid duplication of efforts.

IV. ENHANCING CLIMATE LITERACY IN USDA'S WORKFORCE

A climate-informed and capable workforce underpins the success of the adaptation actions outlined in the sections above. Enhancing climate literacy across USDA's workforce is an essential element of integrating climate preparedness into USDA's mission, programs, operations, and management. USDA has nearly 100,000 employees at more than 4,500 locations across the United States and abroad with a diverse range of roles, responsibilities, and backgrounds. To prepare USDA's current and future workforce for the impacts of climate change, USDA will expand opportunities for education focused on how climate change affects the mission of the Department and its work. Core education and training should be accessible to staff at all levels in all locations.

Examples of ongoing activities to build climate literacy include:

- The Office of Property and Environmental Management's (OPEM) Sustainable Practices team convenes working groups on Facilities, Sustainable Buildings, Green Purchasing, Fleet Management, and Real Property to discuss policies, goals, best practices, challenges, and progress in achieving sustainability and climate goals.
- OPEM also hosts events and issues a quarterly newsletter, The EnviroPost, to increase employee awareness of sustainability and climate issues by highlighting agency

successes, best practices, awards, and training opportunities.

- The CCRC, a joint online platform of FS R&D and FS Office of Sustainability and Climate (OSC), hosts a series of three modules on climate change and natural resource management. The modules cover basic climate change science and modeling, climate change effects on forests and grasslands, and responses to climate change.
- FS OSC hosts webinar series on topics related to its mission; its current series is focused on topics related to environmental justice, including Tribes and climate adaptation, water, air, and recreation.
- FS R&D and OSC, the Climate Hubs, and NRCS regularly host webinars and training at various technical levels on topics related to climate that are accessible to USDA staff.

To build on these existing efforts, USDA can:

- Form a climate literacy working group. Coordinated by the Climate Hubs, this group would survey USDA agencies and offices for prior and ongoing climate education activities, identify climate literacy training needs for staff, including environmental justice issues, and suggest how to use existing frameworks to enhance climate literacy. Recognizing the Climate Hubs' intra-agency reach and experience in innovative and interactive methods to increase climate literacy, this working group will suggest how the Hubs can build climate capacity within USDA agencies, including how to reach regional and local offices.
- Expand information dissemination and training access. OEEP and the Climate Hubs will develop a sustainable strategy to disseminate climate science information from REE agencies, FS R&D, and USGCRP to relevant USDA staff. Building off the Climate Hubs' social science insights on encouraging knowledge co-production, USDA can ensure information sharing and training is relevant, useful, and equitable. USDA can ensure access to and expand the CCRC modules described above to equip staff with an understanding and common vocabulary of climate change and adaptation and mitigation responses.
- Establish a USDA climate seminar series. OEEP will continue development of a yearlong, monthly seminar series that will be at a level accessible to a diverse audience of USDA staff and develops climate literacy with progressively complex topics. The series will be science-focused, for experts and non-experts, and will provide opportunities throughout to ask questions that help dispel misconceptions related to climate. Potential subjects include GHGs in agriculture, climate impacts on crop production and animal agriculture, and options for climate adaptation and mitigation.
- Consider early climate literacy development. Hiring, training, and maintaining a climate literate workforce can start with students before they become USDA staff. Working with land-grant and other university partners, NIFA will continue to play an important role funding training and education. With investments from NIFA and assistance from the Climate Hubs, youth organizations like 4–H could be supported to deliver early climate literacy and promote positive youth development. In addition, USDA could look for opportunities to develop climate-tracks within its Internship and Recent Graduates Programs.

Performance measures developed during agency and office-level adaptation planning should include workforce climate literacy targets. Current means of evaluating climate literacy include annual Sustainability Plans, OMB Scorecards for Efficient Federal Operations and Management, and, at the Forest Service, climate-related training can support progress towards Climate Scorecard elements.

V. USDA ACTIONS FOR CLIMATE-READY SITES AND FACILITIES

USDA will continue to improve the climate resilience of sites, fleet, and facilities and implement its Departmental Regulations and Directives for sustainable and climate adaptive operations of sites, fleet, and facilities. OPEM is responsible for coordinating with agencies, setting annual strategic goals, developing actions, and measuring progress by creating agency scorecards for improvement.

Construct and Operate Climate-Ready Real Property

The Department implements Department of Homeland Security structural integrity guidance to prepare for increasingly frequent and intense natural hazards, such as extreme weather and wildfires. Recent vulnerability assessments indicate many FS dams are vulnerable to large storm events for which they were not originally designed. To enhance resilience, USDA will evaluate needs to increase capacities of spillways to handle extreme storm events.

USDA is raising its standards for design, construction, operation, and maintenance of facilities and infrastructure by applying climate adaptive technologies, increasing renewable energy use and equipment efficiencies to conserve energy, and reducing its GHG footprint. New buildings are performing 30 percent more energy efficiently than the industry standard and over 45 percent of USDA-owned buildings 10,000 gross square feet and larger meet the Guiding Principles for Sustainable Federal Buildings. USDA uses third-party certification systems such as LEED or Green Globes to validate its green buildings. For construction materials, USDA prefers wood for new buildings due to its capacity for energy savings and ability to sequester carbon. Equipment performance is monitored throughout system lifecycles.

For leased buildings, USDA increasingly seeks out third-party certified green and ENERGY STAR facilities with access to public transit. However, USDA often leases facilities in remote and rural markets with limited options for green buildings. USDA will work to build climate adaptation, resilience, and sustainability awareness in these communities to achieve further facilities-related emissions reductions and climate resilience in the future. In new leases, USDA will follow the General Service Administration's green leasing guidance. By requiring sustainable and resilient buildings in all new leases, the Department would increase availability of these sustainable and resilient buildings in remote and rural markets.

To raise facility performance levels nationwide in sustainability and resilience, USDA also plans to develop a Departmental Manual to guide staff to align sustainable and resilient facility operations with the USDA Departmental Regulations on Climate Change Adaptation and Sustainable Operations.

USDA chooses locations for utility equipment and central data centers to improve operational resilience to flooding and rising sea levels. These centers feature direct digital controls, thermal aisle design, emergency power, and redundant cooling for continuity, lower operating costs, and higher capacities.

Increase Facilities' Energy and Water Resilience

USDA will take the following actions related to facilities energy and water management that

enhance climate adaptation and resilience or have adaptation and resilience co-benefits:

- **Increase onsite renewable energy capacity and installation of microgrids.** The energy and power supply at many USDA facilities are susceptible to the increased frequency and severity of storms. Accordingly, USDA will work to increase onsite renewable energy capacity and install microgrids to improve resilience at its facilities. This may include transitioning from propane/diesel generators to mobile solar energy systems with battery backup at remote sites and installing solar panels to enable facilities to operate off-grid. Exploring the use of energy performance contracts to install solar energy equipment, geothermal energy systems, and microgrids at remote facilities to mitigate impacts from future storms will also be considered. These climate adaptation actions will reduce the cost of electricity and eliminate the dependence on unreliable and poor-quality power at remote sites.
- **Improve the condition and resilience of government-owned infrastructure.** USDA owns miles of aging overhead and underground electrical wiring, steam pipes, natural gas pipes, and domestic water and sewer lines, which are vulnerable to severe weather events. This infrastructure requires periodic maintenance to improve and maintain reliability, functionality, and resilience. To address this issue, agencies will implement actions that have co-benefits to climate adaptation and resilience. Specifically, agencies will perform leak tests on water systems that show inconsistent consumption or lack of integrity, conduct cost-effective maintenance and repair on equipment and infrastructure, and establish and maintain good communications with local utility providers.
- **Switch fuel types, use dual fuel equipment, and reduce the carbon footprint of facilities.** Dual fuel equipment is critical for USDA's remote buildings that rely on heat from fossil fuels because interruptible natural gas supply requires secondary fuels as a backup, is subject to supply shortages, and can result in extremely high costs and damage to heating equipment. To address this issue, agencies will convert to dual fuel heating equipment, select secondary fuel types with the best GHG emission ratings, and convert heating equipment from fossil fuels to electric heat pumps that can be powered by solar panels.

Optimize Fleet Inventory and Efficiency

USDA is committed to maintaining an optimal fleet inventory and reducing its fleet's carbon footprint for climate adaptation and resilience. This effort includes developing standardized acquisition strategies that identify and eliminate inefficient vehicles and replace them, with safer, more efficient vehicles that use less petroleum per mile, alternative fuels, and electric and hybrid-electric vehicle technology. A focus on efficiency will encourage climate adaptation management actions and sustainable behaviors. Looking ahead, USDA plans to incorporate a standardized fleet replacement planning initiative to transition from primarily fossil fuel vehicles to a combination of biofuels, fully dedicated electric, and hybrid-electric vehicles to reduce costs, improve fleet efficiency, and meet environmental goals. USDA will also identify locations to install biofuel, alternative fueling, and electric vehicle charging infrastructure to better support non-petroleum vehicles.

VI. USDA ACTIONS TO ENSURE A CLIMATE-READY SUPPLY OF PRODUCTS AND SERVICES

Through its Office of Contracting and Procurement (OCP), USDA supports E.O. 14008 Sec. 206 and E.O. 14005 Ensuring the Future Is Made in All of America by All of America's Workers, issued January 25, 2021. USDA is

committed to adhering to the requirements of the Made in America Laws in making clean energy, energy efficiency, and clean energy procurement decisions. Consistent with applicable law, USDA is applying and enforcing the Davis-Bacon Act and prevailing wage and benefit requirements. USDA will stay vigilant should the Secretary of Labor take steps to update prevailing wage requirements or should the Federal Acquisition Regulatory Council develop regulatory amendments to promote increased contractor attention to climate adaptation and resilience with co-benefits of reduced carbon emissions and federal sustainability. Focusing on these adaptation areas can help prevent disruption of supplies and services for mission critical activities. Furthermore, USDA procurement leadership seeks to use contracting as a lever to promote protection of communities and ecosystems where USDA has a presence. Our efforts will focus on the effects of climate change while also building long-term resilience to evolving environmental conditions.

The Department has implemented policies and practices to purchase energy efficient, sustainable, and USDA-designated biobased products in compliance with requirements in the Federal Acquisition Regulation to support climate adaptation efforts. Energy efficiency contributes to climate adaptation by reducing peak energy demand as more energy is required for air conditioning and to address uncertainty in energy generation and use resulting from extreme weather events. USDA is committed to increasing the use of sustainability criteria in its purchasing. For example, USDA continues to use blanket purchase agreements that provide efficient electronic equipment that is registered with the Electronic Product Environmental Assessment Tool (EPEAT). Purchasing EPEAT-registered equipment reduces GHG emissions, hazardous waste, and water pollutants over the life of the equipment. Procurement requirements to promote resilience apply to contracts for design, construction, operations, and maintenance. USDA selects materials made with post-consumer and pre-consumer recycled materials including carpet, gypsum board, ceiling tiles, millwork, furniture, and furnishings. In addition, the BioPreferred Program continues to support climate adaptation, working with CEQ, OMB's Office of Federal Procurement Policy, and other federal agencies, to develop guidance for establishing annual biobased-only procurement targets.

The five critical areas where procurement processes are at risk due to acute or chronic climate change impacts are:

1. **Facility upgrades.** USDA facilities need modernization to improve energy efficiency and provide resilient infrastructure. Energy efficiency, water conservation, and sustainability are all considerations for new construction and modernization. To the extent possible, USDA will expand the Solar ARS program, which is based on a contract template that was developed to be customized for performance contracts and appropriate funds projects.
2. **Forest Service infrastructure.** Forest Service infrastructure is highly susceptible to climate change and large storm events, for which it was not originally designed. For dam infrastructure, actions to address this include an inventory assessment of dam spillway capacity and a spillway rehabilitation plan.
3. **Puerto Rico infrastructure.** Puerto Rico and its infrastructure are vulnerable to the impacts of climate change particularly increased frequency and severity of storms. At ARS Mayaguez and Isabela facilities, a project to install a microgrid has been developed but remains unfunded. It can be implemented with a performance contract with sufficient capital infusion. The microgrid would eliminate the dependence of the research program on the local electrical grid.

4. **Growth of net-zero facilities.** ARS has one net-zero electricity facility and another under construction that align with current budget priorities. In 2019 an Energy Conservation Measure at the Jornada Experimental Range in Las Cruces, New Mexico, was awarded an Energy and Water Management Award by the Department of Energy's Federal Energy Management Program. A net-zero project carried out this year, at the Fort Collins Research Farm in Colorado, is complete and awaiting final connection. As energy is saved, environmental sustainability will improve due to decreasing GHG emissions and conservation of limited resources.

5. **Forest restoration.** Four Forest Restoration Initiative (4FRI) is accelerating a large-scale restoration program across 2 million acres in northern Arizona to improve forest and watershed health so forests are more resilient to climate change. 4FRI has embarked on an ambitious project to award a 20-year contract to provide forest restoration treatments on over 500,000 acres. Increased certainty of supply will help stimulate investment in restoration to reduce the impacts of climate change while supporting forest industries that strengthen local economies and conserving natural resources and aesthetic values.

VII. NEXT STEPS

Concurrent with the release of this plan, USDA will develop guidance for agencies and offices to prepare new climate adaptation plans in line with updated Departmental Regulation 1070-001 with the aim of completing these plans by spring 2022. Agencies and offices will identify how climate change is likely to affect their ability to achieve mission, operations, and program objectives. Through adaptation planning, they will develop, prioritize, implement, and evaluate actions to integrate climate risks into strategic planning and decision-making. Agencies and offices will identify alignment with the vulnerabilities identified in this Plan and how they might contribute to the vulnerability-specific and cross-cutting adaptation actions. This process will provide the opportunity to identify knowledge gaps or programmatic needs that can be addressed through coordination with OEEP, the Climate Hubs, and intra-agency collaborations.

To measure progress towards achieving climate adaptation goals, during adaptation plan formulation, USDA agencies and offices will develop metrics relevant to their missions and adaptation strategies. The Forest Service Climate Scorecard is one model internal to USDA that can be emulated for each agency's unique needs. These agency-relevant frameworks will be used for measuring, sharing, and learning from adaptation successes and enable USDA to demonstrate how adaptation actions are making the Department and its stakeholders more resilient. Through iterative climate risk management, USDA will address emerging and future climate risks, adjust efforts and resources, and prepare American agriculture, forestry, and rural and urban communities to be resilient in a changing climate.

APPENDIX

U.S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C. 20250

DEPARTMENTAL REGULATION	NUMBER: DR 1070-001
SUBJECT: U.S. Department of Agriculture Policy Statement on Climate Change Adaptation	DATE: May 26, 2021
OPI: Office of the Secretary	EXPIRATION DATE: May 26, 2026

1. PURPOSE

This Departmental Regulation (DR) provides guidance on the establishment and periodic revision of the United States Department of Agriculture's (USDA) *Climate Change Adaptation Plan*. It is consistent with guidance from the Council on Environmental Quality (CEQ) for the implementation of Executive Order (E.O.) 14008, *Executive Order on Tackling the Climate Crisis at Home and Abroad*, issued on January 27, 2021.

Climate change poses a significant risk to the agriculture and forestry sectors and the communities that support and depend upon them. Through climate adaptation planning and implementation, USDA will identify how climate change is likely to affect its ability to achieve its mission, operations, and policy and program objectives. Climate change adaptation is a critical complement to mitigation; both are required to address the causes and consequences of climate change. Through climate adaptation planning, USDA will develop, prioritize, implement, and evaluate actions to minimize climate risks, and exploit new opportunities that climate change may bring. Climate adaptation planning and implementation should align with USDA efforts to ensure equity and environmental justice. By integrating climate change adaptation strategies into USDA's programs and operations, USDA better ensures that taxpayer resources are invested wisely, and that USDA services and operations remain effective under current and future climate conditions. Through climate adaptation planning, USDA is taking a leadership role in ensuring the vision of a resilient, healthy, and prosperous Nation in the face of a changing climate.

2. ACTIONS ORDERED

This policy establishes the USDA directive to integrate climate change adaptation planning, implementing actions, and performance metrics into USDA programs, policies, and operations in accordance with executive orders and additional guidance from CEQ.

a. The Chief Economist, with the full support and participation of USDA Mission Areas, agencies, and staff offices, will:

(1) Develop a *USDA Climate Change Adaptation Plan* in accordance with E.O. 14008 and CEQ guidance;

(2) Issue guidance in accordance with CEQ guidance to Mission Areas, agencies, and staff offices to complete or update their climate adaptation plans, as well as required interim deliverables; and

(3) Update the *USDA Climate Change Adaptation Plan* as appropriate and provide progress reports on the status of implementation efforts annually in accordance with CEQ guidance.

b. USDA Mission Area, agency, and staff office heads, in developing organization-specific contributions, will:

(1) Analyze how climate change may affect the ability of their organization to achieve its mission and policy, program, and operational objectives and authorities to:

(a) Identify potential impacts of climate change on their organization's areas of responsibility;

(b) Prioritize, implement, and integrate response actions into their Mission Area's, agency's, or staff office's operation, contingent on the availability of resources;

(c) Continuously assess and improve the capacity to adapt to current and future changes in the climate; and

(d) Prepare contributions to the Department's *Climate Change Adaptation Plan*.

(2) Identify, as appropriate, key performance measures to evaluate progress in climate change adaptation in the annual Departmental and Mission Area, agency, and staff office budget material, to include measures in the Summary of Budget and Performance section of the explanatory notes, submitted as part of the Congressional justification.

(a) Identify, to the extent possible, the costs associated with the accomplishment of Mission Area, agency, or staff office performance measures and provide accessible information to producers; and

(b) Identify returns to Mission Area, agency, or staff office end-users for climate adaptation actions in terms of a list of expected accomplishments.

(3) Identify, as part of the annual budget process, to the Office of Budget and Program Analysis (OBPA), areas where budget adjustments would be necessary to carry out actions identified under this DR;

(4) Identify, as appropriate, for USDA's Office of the General Counsel, areas where legal analysis is needed to carry out actions identified under this DR; and

(5) Identify the point of contact for and coordinate actions with the USDA's Global Change Task Force, as appropriate.

c. USDA Mission Areas, agencies, and staff offices will integrate information that reflects the current understanding of global climate change and its projected impacts when undertaking long-term planning exercises, setting priorities for scientific research and investigations, developing performance metrics, and making decisions affecting Mission Area, agency, or staff office resources, programs, and operations.

3. EFFECTIVE DATE AND TERMINATION

a. The provisions of this DR are effective immediately and will remain in effect until superseded or revoked.

b. This policy supersedes and replaces DR 1070-001, *U.S. Department of Agriculture (USDA) Policy Statement on Climate Change Adaptation*, dated June 15, 2015.

/s/ THOMAS J. VILSACK
SECRETARY OF AGRICULTURE