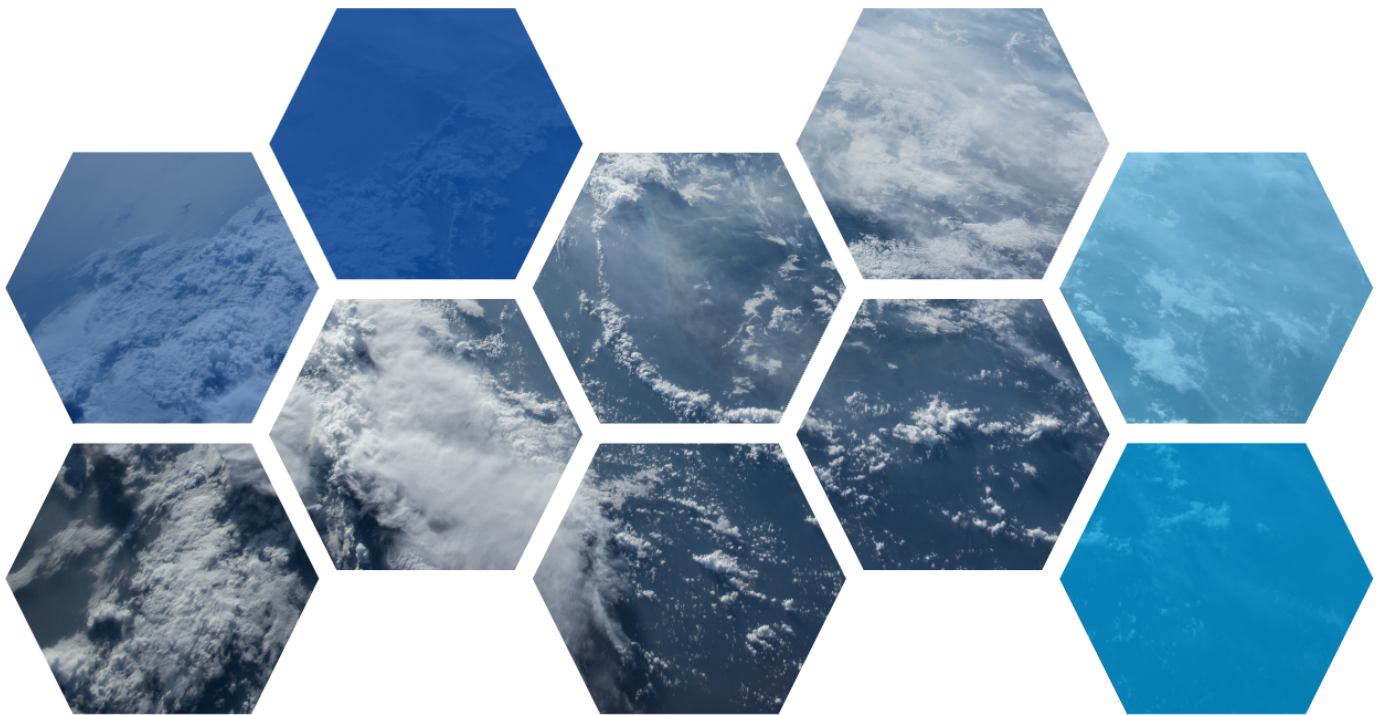


Equitable Services for a Weather-Ready Nation

NWS Service Equity Priority Actions
2023-2026

Last Update: 17-Mar-2023



NOAA | National Weather Service



A Message from Our Director

To excel in our mission ***“to provide weather¹, water, and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy,”*** we must provide these services equitably. We must double our efforts to provide education and outreach so that all communities regardless of their social vulnerability can understand and act upon the valuable services we provide and improve their outcomes in the face of environmental and man-made hazards. With our national coverage and presence in every community, NWS is uniquely positioned to be a leader among federal agencies in delivering transformational equitable services to all.

Implementing all the Service Equity Priority Actions set forth in this document requires commitment across the whole of NWS. We all have a role to play in its success. I look forward to seeing these actions completed, and the pride of achievement that comes with it.

Ken Graham

¹ “In this document, “weather” is used generally to mean all service areas which the NWS supports, including space weather, tsunamis, aviation, fire, marine, etc.”

INTRODUCTION

Service Equity is Mission Critical



In over 150 years of service to our nation, the fundamental need to protect the American public from the dangers of severe weather remains mission critical. While severe weather impacts everyone, underserved communities, which we refer to as Historically Underserved Socially Vulnerable Communities (HUSVCs), face a number of barriers outlined in the [NOAA Service Equity Assessments](#) (SEA). Those barriers range from inadequate communication and technology systems to lack of awareness, training, and engagement on the part of field offices and core partners. These barriers prevent HUSVCs from receiving and acting upon weather information and warnings. The increasing threats of climate change, from intense storms, wildfires, and extreme heat to flooding and drought, underscores that the NWS and its core partners need to

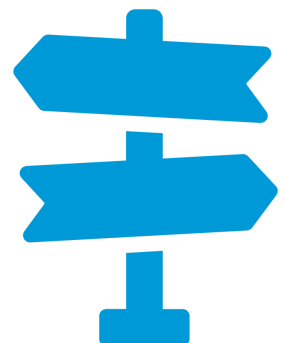
overcome the barriers outlined in the SEA to ensure that all communities are prepared to protect themselves and their property from hazardous weather.

Historically, the NWS' approach was to view and treat the communities we serve equally, providing education and outreach and operational services in a 'one-size-fits-all' manner. Such an approach has the unfortunate consequence that, due to their unique cultures and intrinsic vulnerabilities, not every community can take advantage of the highly valuable forecasts, warnings, and Impact-Based Decision Support Services (IDSS) that we provide to remove themselves from harm's way. The paramount charge of service equity is to move away from a 'one-size-fits-all' model of service delivery to one that explicitly accounts for the unique needs of each community and adapts our operational and education and outreach services accordingly.

OUR MANDATE & RESPONSE

*“Affirmatively advancing equity, civil rights, racial justice, and equal opportunity is the responsibility of the whole of our Government.”
Executive Order 13985.*

In 2021, the President issued two Executive Orders (Executive Order 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government and Executive Order 14035: Diversity, Equity, Inclusion, and Accessibility (DEIA) in the Federal Workforce). Each of the Executive Orders seeks to transform the way we represent and serve our communities, through assessing our programs and policies internally as an agency and externally through our partner engagement. In response, there was a NOAA-wide assessment to which the NWS contributed. Four (4) NWS programs most directly relevant to the question of serving vulnerable communities were assessed to understand barriers that prevent communities from receiving the life saving information, products, and services we provide.



The programs were: Warning Coordination Meteorologist (WCM), Impact Decision Support Services (IDSS), StormReady®, and Weather-Ready Nation™ Ambassador (WRNA).

The NWS Assessment identified seven (7) barriers to achieving Equitable Services:

- **Trust**
 - Community engagement can only be built on a foundation of trust. Without trust, critical relationships can neither be made nor sustained.
- **Awareness**
 - Understanding the vulnerable communities we serve begins with the basic awareness that they exist. The adage “out of sight, out of mind” can be a significant barrier, especially considering how rapidly community demographics are changing.
- **Language**
 - Most NWS operational services (forecasts and warnings) as well as education and outreach materials are conveyed exclusively in English. This leaves non-English and English as a Second Language speakers unable or compromised in understanding and acting on the valuable weather information we provide.
- **Culture**
 - NWS organizational culture has sometimes viewed community outreach as a low mission priority.
- **Resources**
 - There are currently not enough staff hours to meet the growing demand for IDSS in our Weather Forecast Offices (WFOs), which can leave very little discretionary staff time for community engagement, education and outreach activities.
- **Access**
 - It is impossible to provide education and outreach if we don’t have access to the communities we serve. This lack of access can take many forms, technological (e.g. lack of broadband internet), physical (e.g. located in remote or inaccessible areas), and relational (e.g. lack of trusted community partner).
- **Partners**
 - Emergency managers who are unable or ineffective at serving HUSVCs within their jurisdiction, are barriers to the WFO's ability to serve them. NWS must identify the correct core partners to address the needs of HUSVCs.

While the staff at some NWS Field Offices and National Centers creatively used the four (4) programs to meet the needs of HUSVCs, the assessment revealed a mission-critical need for NWS to systematically and intentionally engage HUSVCs at all WFOs to provide them with equitable weather, water, and climate services.

Protecting the American public from the dangers of high impact weather cannot be achieved if some communities remain underserved. Leaving some communities vulnerable, leaves all communities less protected because the impacts of severe weather do not respect zip codes, state lines, or demographics. In [Executive Order 13985](#) the term ‘equity’ is defined as “**...the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment**”. Only by addressing the needs of underserved communities through equitable services can the NWS truly achieve a Weather-Ready Nation (WRN) that works for all.

THE GOAL



The NWS seeks to reduce and/or eliminate the systemic barriers that prevent HUSVCs from receiving, understanding, and acting upon the NWS's lifesaving information, products, and services. Our Service Equity Priority Actions will guide the steps we must take to ensure that HUSVCs receive weather, water, climate forecasts, and warning information in a timely manner and to help them prepare for the inevitable impacts of hazardous weather.

To reach this goal, we must view our work through the lens of service equity to drive operational change with policies and guidance that empower our staff to overcome barriers and deliver their best to HUSVCs. These Service Equity Priority Actions are a major milestone for our organization. They represent the first formal call to continue the work we do to advance our enduring mission everyday with a renewed commitment toward providing equitable services to HUSVCs.

SERVICE EQUITY FRAMEWORK

Our strategy is built upon a framework consisting of five (5) interdependent priority areas: Community Engagement, People and Policies, Training and Development, Tools and Technology, and Applied Research. The whole framework is greater than the sum of the individual parts and is aimed at

providing a holistic approach toward advancing equity internally and externally. It is intended to create new norms, practices and activities to ensure equity is consistently and systematically at the center of our operational, outreach, and education services.

Our forecasts, watches, and warnings, only have value if they reach and are understood by the people who need them. The intent of this framework is to develop internal capacity to ultimately reduce and/or eliminate barriers to equitable weather, water, and climate services.



water, and climate services. Central to this framework is engaging HUSVCs to co-develop tangible goals that are clear and culturally sensitive. Ultimately this framework will significantly

increase the resiliency of HUSVCs and help our organization advance the NWS mission through focused and dedicated outreach and education efforts.

This framework engages every part of our organization to help us:

- **Address** - the variables that create and/or maintain barriers for HUSVCs.
- **Promote** - greater understanding and prioritization of service equity as a core tenet of our operations, outreach, and education services.
- **Advance** - the delivery of equitable products, services, and resources through investments in technology and tools to overcome language and accessibility barriers.
- **Encourage** - long-term sustainable collaboration, communication, and greater involvement in HUSVCs through NWS-led efforts and partner engagement.

FOUNDATIONAL ACTIONS:

1. **Establish a Cross-NWS Implementation Team to complete, manage, and report progress on all actions in this document.**
2. **Use the annual budget process as well as supplemental funding opportunities to seek resources for actions in this document and use Governance processes to determine how to prioritize staff resources for Service Equity activities.**
3. **Establish a robust internal/external communications strategy for Service Equity.**

PRIORITY AREA 1: COMMUNITY ENGAGEMENT



Delivering actionable weather, water, and climate information is part of a large process that relies on observing infrastructure, data collection, modeling, interpretation, and communication. This requires cooperation among many entities and multiple levels of government (federal, state, and local).

Lessons learned from past extreme weather events along with information gathered through the [NOAA Service Equity Assessments](#) demonstrated and revealed that accurate forecasts and warnings alone do not sufficiently protect life and property. More community-based external engagement is needed to ensure communities are ready, responsive, and resilient to extreme weather, water, and climate events.

To achieve this, NWS must adopt a whole-community approach toward community engagement. Because we do not have an exhaustive knowledge of the needs of the diverse communities we serve, we must strengthen collaboration with trusted partners in our efforts. HUSVCs have a great wealth of social capital that can be brought to bear on improving outcomes when we tap into the relevant trusted community partners for help.

The three (3) primary NWS community engagement programs are the StormReady®, Weather-Ready Nation™ Ambassador, and SKYWARN® programs. Each has programmatic opportunities to address NWS Service Equity goals. However, when integrated within a whole-community concept, the result has the potential to significantly strengthen community resilience, especially for those individuals most vulnerable.

The StormReady® program currently recognizes over 3,000 counties, cities, towns, Indian Tribes/Nations, and other municipalities, as well as critical infrastructure (e.g., airports, hospitals) and business sites (e.g., factories, corporate campuses). Achieving StormReady® status entails the successful completion of specific requirements such as warning delivery systems and emergency operations planning. By focusing outreach efforts on the most vulnerable communities, obstacles that may have prevented these important preparedness activities to occur can be removed and preparedness of these communities strengthened.

The Weather-Ready Nation™ Ambassador (WRNA) program is well-aligned with NWS Service Equity goals as a pathway to greater partnerships with organizations that serve HUSVCs. Growth areas for community engagement include increased collaboration with faith-based organizations, social service-missioned non-profits, and local businesses. WRN Ambassadors help the NWS identify needs, connect offices to partnership opportunities, and act as trusted sources in the community. They also promote WRN preparedness messages to their stakeholders. Efforts to increase the recruitment of WRNAs from HUSVCs include the development of training resources on how to engage various types of organizations as well as documented best practices to share across the agency.

The NWS SKYWARN® Spotter program is a longstanding success story where the public is trained and connected to NWS offices to be the “eyes in the sky” observing and reporting severe weather such as tornadoes and flooding. Confirming such hazards with eyewitness reports is a critical piece to the NWS mission of saving lives and property. SKYWARN®, even as a gold standard for NOAA Citizen Science, can be of even greater value by involving underserved and vulnerable communities.

Evolving StormReady®, WRNA, and SKYWARN® programs using an integrated strategic approach would better prepare HUSVCs for extreme weather, water, and climate events. In serving HUSVCs, we aim for meaningful interpersonal interactions where we can gain an understanding of their lived experiences with respect to weather impacts. The goal is to work in a way that a sense of belonging, inclusion, partnership, and trust are fostered, culture is acknowledged and respected, and local weather, water, and climate needs are met.

Our whole community engagement approach must build the necessary partnerships, processes, and internal infrastructure to translate what we learn from the community into actions that address the needs and concerns of the community.

PRIORITY AREA 1: COMMUNITY ENGAGEMENT ACTIONS

- 4. Establish a comprehensive Community Engagement Program.**
- 5. Overhaul the existing community outreach programs (e.g. StormReady®, Weather-Ready Nation™ Ambassadors, SKYWARN®) under a holistic community engagement model/approach.**
- 6. Increase the percentage of SKYWARN® Spotters and Weather-Ready Nation™ Ambassadors in HUSVCs.**
- 7. Establish Community Engagement metrics at the local, regional, and national levels.**
- 8. Prioritize Education and Outreach activities and resources based on need, social vulnerability, and outreach gaps.**
- 9. Promote NOAA Ambassadors Program to expand collaboration with HUSVCs.**
- 10. Partner with other NOAA Line Offices to initiate ‘whole-community’ engagement demonstration projects.**
- 11. Promote the creation of community consortia to include academic institutions and other weather enterprise partners to develop community readiness, resilience and preparedness and increase diverse candidate pools**

PRIORITY AREA 2: PEOPLE & POLICIES

OUR PEOPLE

The driving force behind the NWS has always been our people. As an organization we know that it is impossible to achieve our mission without our dedicated and talented workforce. The strength of our workforce lies within the diversity of talent, experience, skills, and knowledge that each one brings toward achieving our mission. We must continue to cultivate a healthy workplace culture that welcomes and values diversity in all its forms. There is still work to be done to achieve this.

Consistent findings across NOAA service equity assessments revealed the intersectional relationship of our internal diversity work and external service delivery. Simply stated, when we reflect the rich diversity of our nation, it is that diversity that builds trust and grants access into communities that may have been inaccessible in the past. Therefore, it is important that our workforce reflects the communities we serve.

There is a critical need to better understand and effectively interact with people across all demographics. NWS should continue to improve our hiring processes by ensuring diversity and inclusion - in terms of identity, experience, and skills, are represented in the local WFO staff and across all NWS offices to adequately support HUSVCs efforts. As we work to build more equitable service delivery strategies to benefit the nation, we will do that work with a dual-focused lens: Internal - build

internal capacity to ensure offices have the right tools, skills, diverse staff, and resources to effectively engage with HUSVCs in ways that are meaningful and accessible and External - work with partners to develop relationships with community leaders, build trust with HUSVCs and reduce barriers to our services.

OUR POLICIES

To drive organizational change and targeted investments toward equity, new equity goals and objectives will be addressed and detailed in specific NWS policy directives and in foundational documents that support our governance, strategic vision, and operations. As a priority the following three (3) documents will be reviewed and revised, as appropriate, to include specific direction on engaging with and serving HUSVCs.

The NWS 2023-2033 Strategic Plan

Our strategic plan sets the course by which we envision achieving our mission in the future. We must fully commit to providing fair, impartial access to weather, water and climate information to ensure that every American receives the timely, accurate observations, forecasts, and warnings needed. Our operations, systems, and processes will align with the principles of diversity, equity, inclusion, and accessibility to ensure the equitable provision of reliable products and services. Our organization will continue to evolve through prioritized investment in our people, partnerships, and organizational performance.

The NWS Diversity, Equity, Inclusion, and Accessibility (DEIA) Strategic Action Plan (SAP)

The DEIA Program is within the Office of Organizational Excellence (OOE). OOE provides leadership, direction, and policy guidance for Equal Employment Opportunity (EEO) program development and Diversity, Equity, Inclusion, and Accessibility (DEIA) initiatives. The office partners with other NOAA and National Weather Services initiatives in these efforts.

The program's primary objectives are to promote equal employment opportunities and to advance a culture of diversity, inclusion, and belonging where people of different backgrounds, races, life experiences, identities, and perspectives are able to thrive and engage. The DEIA SAP sets forth a set of long-range, agency-wide drivers focused on optimizing diversity, equity, and inclusion practices to cultivate a workplace culture that respects the individual and offers equal opportunities for all employees to develop to their full potential. Additionally, the DEIA SAP will help managers strengthen their ability to recruit, hire, develop, promote, and retain diverse talent and remove barriers to equal opportunities for advancement.

The NWS Organizational Health Blueprint

This document outlines a holistic approach toward empowering every level of the NWS to further improve and sustain the health of the organization going forward. It reflects the high value we all place on effective working relationships and creating a rewarding and fulfilling work environment. Diversity, Equity, Inclusion and Accessibility (DEIA) are all fundamental to organizational health and culture and are integrated within the four key focus areas to further improve and sustain our long-term organizational health and culture.

PRIORITY AREA 2: PEOPLE & POLICIES ACTIONS

- 12. Review all relevant NWS policies and update to ensure inclusion of service equity goals.**
- 13. Establish award criteria to recognize significant contributions toward advancing service equity within existing NWS award recognition programs.**
- 14. Support the Organizational Health Blueprint.**
- 15. Establish Service Equity principles within existing and/or new NWS Policy Directives.**
- 16. Develop a DEIA NWS Directive that includes Service Equity goals.**
- 17. Include Service Equity goals in the Customer Experience initiative.**
- 18. Include Service Equity goals in the Service Delivery Framework initiative.**
- 19. Use diverse hiring panels and include diversity-related interview questions.**

PRIORITY AREA 3: TRAINING & DEVELOPMENT

A lack of comprehensive staff training on how to incorporate service equity, including training in interpersonal skills, was among one of the significant findings from our service equity assessment. The NWS needs to ensure that all WFO staff and managers have the high-quality training and resources needed to develop the broad range of competencies and skills for understanding the communities they serve. This will provide the tools that each NWS employee can use to advance service equity in ways appropriate to their roles and responsibilities.

The DEIA program, in collaboration with the NWS Office of the Chief Learning Officer, developed a comprehensive DEIA training plan that includes learning modules on topics such as effective communications, handling conflict, managing diversity, and leadership. There are currently three (3) levels of training available in the Commerce Learning Center (CLC) with courses that cover a range of topics to address diversity, inclusion, unconscious bias, and belonging. Additional training resources focused on allyship, using demographic data for outreach, and cultural competency are topics that are expected to be developed and provided both in person and online in the CLC through the NWS Office of the Chief Learning Officer.

Implementing these training and development initiatives will reduce barriers toward reaching people in HUSVCs by better preparing relevant staff to carry out successful community engagement in communities and with community leaders that have historically been overlooked.

PRIORITY AREA 3: TRAINING & DEVELOPMENT ACTIONS

- 20. Develop “Principles of Community Engagement” training for relevant NWS field and headquarters staff.**
- 21. Introduce Service Equity concepts into all relevant NWS Training Courses (e.g SOO Development, Supervisory Training, New hire training, etc).**
- 22. Ensure managers are properly trained and well versed in DEIA principles.**
- 23. Establish NWS Service Equity Community in VLab to showcase and share best practices on community engagement and other service equity innovations**
- 24. Develop a course on using various social vulnerability indices and other demographic datasets to advance Service Equity goals.**
- 25. Develop a comprehensive, experiential service equity residence course.**

PRIORITY AREA 4: TOOLS & TECHNOLOGY

Providing equitable services is fundamentally about building trust and relationships with the communities we serve through a robust community engagement program. Without that, no tool or technology alone will have a significant impact. However, tools and technology can be powerful enablers to our success with equitable services because they help remove key barriers.

NWS is committed to investing in technological capabilities to improve outcomes for HUSVCs. The following efforts represent several initiatives we are undertaking to ensure significant progress toward achieving equitable products and services.

Accurate and Precise Warnings

Providing timely and accurate weather and flood warnings with high spatial precision are core to the NWS mission. We need to alert only those communities that are under threat. Currently our legacy warning preparation and dissemination paradigm results in significant overwarning. Overwarning foments public complacency and erodes trust in our services. For many vulnerable populations, overwarning results in costly and unnecessary evacuations that they can ill afford.

Multi Language Translation

Since the issuance of [Executive Order 13166](#) "Improving Access to Services for Persons with Limited English Proficiency," we have made significant progress toward providing services to Spanish-speaking communities by delivering a number of NWS operational products and services in Spanish. However our language translation efforts are produced manually therefore, the process is laborious and time consuming. The Office of Central Processing (CP) is implementing technology to increase automation and enable translation into multiple languages to broaden access to language translation capabilities and increase efficiency,

Social Media

We currently expend significant labor toward communicating with the public via Social Media platforms. However, we do not have the resources to systematically examine either the impact or the effectiveness of the various platforms, particularly with regard to reaching HUSVCs. We need to invest in tools and research that can help us better hone our application of Social Media to improve preparedness and response especially for people in HUSVCs.

Application of Demographic Information and GIS-based Tools in Operations

To deliver better actionable information to the communities we serve, we need to provide our forecasters with detailed geographic, demographic, and social vulnerability information that is integrated into the core operational systems they use to carry out the mission. The application of GIS-based tools is a powerful way to integrate critical societal information with our highly valuable services to reduce the negative impacts of hazardous weather and floods.

Probabilistic Forecasting

Research shows that in general, people make better decisions when information for decision-making is provided in a probabilistic framework, regardless of education and numeracy levels. We must hasten our pivot to probabilistic warning and forecast products and services, and work with our core partners to improve outcomes for everyone.

IDSS Management System

The IDSS Management System (IMS) is a high priority future operational capability that will provide a robust enterprise solution for managing relationships and interactions with NWS Core Partners and other general partners. Beyond the limited set of requirements met in the Initial Operating Capability of IMS, we must enhance IMS functionality to support our community engagement efforts and the provision and evaluation of IDSS for HUSVCs.

PRIORITY AREA 4: TOOLS & TECHNOLOGY ACTIONS

- 26. Develop a comprehensive plan to implement multilingual translation for NWS services (for operational activities and for education and outreach).**
- 27. Prototype automated enterprise multilingual translation capability for NWS products and services.**
- 28. Implement the IDSS Management System.**
- 29. Implement NOAA Social Behavioral and Economic Science (SBES) Observation Database.**
- 30. Update and expand the Cooperative Observer Program (COOP) in order to improve its viability and presence in HUSVCs.**
- 31. Implement Social Media Demographics Tool.**
- 32. Implement GIS-based Social Vulnerability Impact Assessment Tool.**
- 33. Implement high-precision polygon-based approach for all NWS products and services.**
- 34. Implement comprehensive probabilistic forecasting and hazard services.**

- 35. Seek innovative opportunities to explore new mobile and assistive technologies while investing in increased integration into a new adaptive web presence (e.g., weather.gov 2.0) for more effective weather information conveyance to underserved communities.**
- 36. Modernize the NWS Outreach and Education Events System (NOEES).**

PRIORITY AREA 5: APPLIED RESEARCH

The NWS is at a critical juncture where the value of service equity is now recognized. We must seize on that momentum to view our current research through a service equity lens. A combination of two actions will get us where we need to be.

The first is to assess user needs of NWS services across all eleven (11) national service programs (NSPs) and mission support programs. We need research to provide recommendations on how to improve the efficacy and delivery of NWS products and services to ensure an equitable distribution of benefits especially to HUSVCs. Part of this assessment involves leveraging existing economic and demographic spatial data sets to help prioritize our activities. Indices such as the CDC Social Vulnerability Index are extremely valuable in helping us prioritize where and how to focus our outreach efforts.

Assessing user needs of HUSVCs will also require NWS to employ qualitative methods including focus groups, in-depth interviews, ethnographies, and participant observations to complement quantitative survey data. We began making progress on understanding user needs in the recent research awards in the Collaborative Science, Technology, and Applied Research (CSTAR) Program. The projects funded in FY 2022 focus on research and development related to improving weather, water, and climate services to HUSVCs. There are also research projects funded by the Weather Program Office Social Science Program in Oceanic and Atmospheric Research that will be beneficial to NWS equity efforts.

The second action is working with HUSVC's to co-produce knowledge. Equity is a dual focused lens in that we are a part of the communities we serve. These collaborations must respect the responsible use of traditional knowledge that members of these communities hold. There is tremendous opportunity for leadership to support intentional and purposeful collaborations with the communities that we serve to strengthen community response, recovery, and resiliency strategies.

Funding is essential to these applied research actions. To meet our mission of saving lives and property and the enhancement of the national economy we need to understand what capacity HUSVCs have to work with the NWS and the methods that they prefer. The acquisition of sustainable funding for engagement coupled with the recruitment and retention of employees with expertise to conduct culturally appropriate applied social science research should be in NWS budget requests.

PRIORITY AREA 5: APPLIED RESEARCH ACTIONS

37. **Develop an Agent-Based Modeling² capacity.**
38. **Establish a routine, proactive SBES Evaluative/Investigative Function.**
39. **Targeted SBES research on high-impact events (e.g. heat, floods, air quality, etc) which disproportionately impact vulnerable communities.**
40. **Partner with Minority-Serving Institutions and Cooperative Science Centers on research to better understand HUSVCs user needs and behaviors.**

SUMMARY



The NWS Service Equity Priority Actions and other related efforts will ensure our services, products, and programs benefit every community, family, and individual in our country, especially those who have been underserved for far too long.

The compelling set of bold and meaningful actions set forth in this document squarely address the barriers that were identified in our assessment. The Service Equity Implementation Team will help to ensure accountability and timely completion of all actions*. This is the beginning of an ongoing effort that will set the foundation of our holistic service equity framework to be woven into the fabric of who we are and what we do as an agency. As we work to build a

Weather-Ready Nation, let us envision a world more ready and resilient than any previous generation has known.

** The implementation of the Priority Actions would be the responsibility of the Implementation team who would develop plans for addressing each action. The proposed time window is 2023 to 2026. The Priority Actions will be reviewed and updated in 2027.*

REFERENCES

[NOAA Service Equity Assessments](#)

[NWS Organization Health Blueprint](#)

[NWS DEIA Strategic Action Plan](#)

[DoC Equity Plan](#)

²An agent-based model (ABM) is a computational model for simulating the actions and interactions of autonomous agents (both individual or collective entities such as organizations or groups) in order to understand the behavior of a system and what governs its outcomes. It has been used in the weather domain to understand how to maximize the efficacy of hurricane evacuations and related IDSS, as well as when winter storm warnings have maximum in reducing the negative impacts on ground transportation.

