

NOAA Service Equity Assessments Final Report

This report meets the 200-day requirement of Section 5 of EO 13985 to conduct an equity assessment of key services and programs to identify potential barriers that underserved communities and individuals may face in benefiting from them. NOAA selected the three programs/services below to assess: (i) the National Sea Grant College Program (Sea Grant), (ii) the Sea-Level Rise Viewer and associated products, and (iii) various programs contributing to us becoming a more Weather-Ready Nation. The format follows a template provided by OMB. NOAA submitted our report to the Department of Commerce on June 15, and it will be combined with the results from other Commerce Bureaus to provide a single report to the Assistant to the President for Domestic Policy.

(1) **Findings regarding specific programs, policies, or processes.** For this reporting, agencies should be sure to identify what they assessed, why, and what they learned. For each set of programs and policies agencies selected for intensive assessment (as documented in section 3 of your agencies' 90 Day Report).

Name of program/policy: The National Sea Grant College Program (Sea Grant)

- **Potential barriers and perceived opportunity (hypothesis)**

The National Sea Grant College Program (Sea Grant) was established by the U.S. Congress in 1966 and works to create and maintain a healthy coastal environment and economy. The Sea Grant network consists of a federal/university partnership between NOAA and 34 university-based programs in every coastal and Great Lakes state, Puerto Rico, and Guam. The Sea Grant network draws on the expertise of more than 3,000 scientists, engineers, public outreach experts, educators and students to help citizens better understand, conserve and utilize America's coastal resources.

Sea Grant's funding structure includes federal appropriations as well as a minimum 50% non-federal match. The total annual investment in Sea Grant, including federal and non-federal sources, exceeds \$120 million.

Sea Grant's mission is carried out through three functional areas of work--extramural, grant-funded research, community-based extension, and "K(inderergarten) to gray" education. Each year, over 50% of Sea Grant's budget, or about \$60 million (federal and non-federal sources combined), is used to fund research projects and student fellowships through grants and cooperative agreements. Research projects are awarded to professional project teams. Sea Grant's fellowships are offered to undergraduate, masters, and PhD students.

There is an opportunity to more fully understand barriers to ensuring the grant-based funding Sea Grant provides to researchers and interns/fellows is equitable to the maximum extent possible. Foundational work on this subject has been completed by the Sea Grant Diversity, Equity, Inclusion, and Justice (DEIJ) Community of Practice, and such needs are identified in Sea Grant's DEIJ vision and action plan (2018, updated 2021).

- **Summary of Equity Assessment approach**

The National Sea Grant Office utilized the Service Equity Assessment questionnaire and engaged members of the Sea Grant DEIJ teams in both the National Sea Grant Office and throughout the Sea Grant network to complete the questionnaire. The team consisted of individuals with expertise and leadership roles in student opportunities, research opportunities, and community engagement. Team members worked collaboratively to answer the questionnaire and, where appropriate, pulled in existing, foundational work by Sea Grant.

The assessment also aligns with the priority actions identified by the Sea Grant DEIJ community of practice and could potentially be useful for other grant-based programs across NOAA and other agencies. In addition, this assessment has identified tangible actions that can be accomplished within a short time.

- **Definition and description of impacted underserved communities**

Within the scope of this assessment, the communities of focus include professional, university-based scientists and other research professionals as well as students enrolled in degree programs related to Sea Grant's work. It is worth noting that Sea Grant's approach includes heavy engagement with geographic communities for most, if not all, aspects of its work. The scope of this assessment is intended to direct actions and implementation strategies to tangible, measurable programs.

Stakeholder engagement is woven throughout Sea Grant's work and is a strong component of every aspect of its work. Calls for research proposals and fellowship applications are informed by broad stakeholder input through Sea Grant's strategic planning process and advisory boards. Several research and fellowship competitions incorporate stakeholder participation into the design and selection of Sea Grant projects.

However, despite having a rich system for gaining insights into community needs to inform Sea Grant’s research and fellowship opportunities, there is little data to suggest that the efforts are specifically or intentionally focused on underserved/underrepresented communities. The exceptions to this are recent efforts by Sea Grant’s DEIJ Community of Practice, Sea Grant’s Traditional and Local Knowledge Community of Practice, and the Sea Grant Research Coordinators. All groups have worked in collaboration to identify needs and barriers and have begun to engage members of underserved/underrepresented communities to inform Sea Grant’s research and fellowship opportunities.

- **Limitations and opportunities related to data, data disaggregation, and measurement**

Sea Grant professionals have spent significant efforts studying existing work and analyses on making research and student opportunities more diverse, equitable, and inclusive. There is limited data at the national and state levels on who knows about opportunities, who applies for those opportunities, and who receives funding through the opportunities. A lack of demographic information on applicants and awardees has been identified by Sea Grant as a barrier to measuring the success of stated DEIJ goals, and gaining approval to collect such data will be important moving forward. Additionally, Sea Grant does not have a tracking mechanism for its advertised opportunities on a national and holistic scale, which is another limiting factor in data collection related to this effort. This limitation exists because there is confusion about the extent of the legal and policy constraints.

In addition, it is difficult to incorporate the qualitative component(s) of making funded research and student opportunities, along with many other activities Sea Grant conducts, more equitable. In other words, Sea Grant operates through partnerships, which take time and effort to establish trusted relationships. To ensure robust partnerships and meaningful collaborations that result in a request for research proposals that align with the priorities of a particular community, a significant amount of effort has to be directed toward strengthening the relationships and partnerships described above. Such an effort takes time, proper perspective, and in some cases, additional training. These are all complex limitations that cannot be accounted for when describing quantitative data and measurements. Sea Grant currently has no fewer than 2,700 unique partnerships. While we cannot give a percentage of how many of these could be considered “diverse,” we can offer qualitative information and descriptions of such partnerships as examples:

- Diversity, Equity and Inclusion: Current Conditions and Best Practices across the National Sea Grant Network,
- Reaching Outward and Looking Inward: Building Sea Grant Resilience from the lens of Diversity, Equity, and Inclusion
- Sea Grant Traditional and Local Knowledge Vision and Action Plan (2018)

- **Target equitable outcomes, as derived from equity assessment, and how success of improvements will be measured moving forward**

Sea Grant's service assessment focuses on the funded researchers and students for various projects and programs. Each year, Sea Grant funds hundreds of extramural research projects and supports over 1,000 undergraduate and graduate students through fellowships and research experiences. For the last several years, Sea Grant professionals have actively participated in a community of practice focused on advancing DEIJ in all aspects of Sea Grant's work and have identified barriers to achieving some of the DEIJ program goals. One such barrier identified by the program, though certainly not unique to Sea Grant, is the demographic makeup, and associated perspectives and lived experiences, of review panels for research and fellowship competitions.

While Sea Grant has much to learn and assess to fully understand how to make opportunities for research and student experiences more equitable, it has a deep understanding of the complexities involved and recognize that specific actions on targeted aspects of this overall effort are needed to define and measure success.

Sea Grant has a robust planning, implementation, and evaluation system (PIE) that builds on the planning efforts described earlier in this report. Evaluation consists of annual reports and reviews of those reports by the National Sea Grant Office. Sea Grant annual reports include quantitative and qualitative components. Quantitative data includes metrics such as the number of students supported, the number of research projects funded, etc. as well as performance measures such as the number of communities that increase resiliency as a result of Sea Grant efforts. Measures and metrics directly relevant to this assessment include researchers supported, peer-reviewed publications published, students supported, students graduating, and students finding jobs in their field following graduation. The reports also include qualitative data in the form of accomplishment, or program output, and impact, or societal outcome, narrative. Sea Grant's evaluation process also includes an in-depth quadrennial review to assess the completion of goals and actions described in each program unit's strategic plan. The quadrennial review includes a robust comprehensive report as well as a site visit composed of briefings, stakeholder perspectives, and questioning by evaluators. (See Sea Grant PIE system details.)

Depending on which specific action items are implemented as a result of this assessment, Sea Grant will incorporate new measures and metrics into its annual reporting system. The FY22 NOAA budget request includes a request for Sea Grant DEI activities and specifically lists the following performance measure: "Number of Sea Grant tools, products, and information services that are used to advance environmental literacy and workforce development services for underserved communities." Additionally, the National Sea Grant Advisory Board and National

Sea Grant Office have already emphasized the need to incorporate DEI concepts into local and national level strategic plans, which sets the expectation that quadrennial evaluations at the local and national level will include DEI components as well.

- **Reform actions implemented thus far, and those under consideration based on equity assessment**

Major Findings

- ✓ Systemic barriers to racial (and other types of) equity in the STEM fields, specifically in student and research opportunities, are significant and well-documented.
- ✓ There is a lack of demographic data, and the ability to collect it, to assess efforts and establish baselines.
- ✓ Barriers across all aspects of student and research opportunities are both opportunity-specific and, at times, systemic.
- ✓ The Sea Grant DEIJ community of practice has articulated a strong vision and action plan to address systemic barriers; however, there is limited staff and financial resources to address needed DEIJ activities.

Recommendations

- ✓ Internal efforts by Sea Grant
 - Targeted Research Awards and Fellowships: The DEIJ 10-year vision plan recommends that Sea Grant programs and the National Sea Grant Office develop targeted research calls aimed at addressing research needs of underrepresented and underserved communities.
 - Extend Application Time Periods: Support the co-production of proposals and application materials to better support sustainable and inclusive projects with underrepresented groups. Would allow for deeper formation of partnerships.
 - Flexibility in Data Ownership: It has been recognized that many communities, specifically tribal and indigenous communities, prefer to have ownership over data. By allowing for flexibility in data ownership, would increase the willingness to work between these communities.
 - Change national metrics to recognize efforts to include underrepresented groups: Allow for tracking and reporting of work that supports underrepresented groups
 - Work with external partners such as HBCUs/MSIs, agencies and communities: By establishing these partnerships without necessarily an ask, would allow for relationships to be established so RFPs/NOFOs could be co-produced to better incorporate underrepresented groups.
 - Increased diversity of new hires, advisory boards, and partner organizations as well as expanding institutionalizing DEIJ training for staff and advisory boards: Would bring

diverse voices to discussions on RFP development and award selection.

✓ External to Sea Grant

- Update federal policies and mechanisms for collecting demographic data, including the existing OMB form 4040-0001 Research and Related Personal Data form, to be more inclusive.
- Align equity assessment findings with many aspects of federal funding opportunities, including policies and staff training, to allow for change.
- Develop alternatives to or eliminate the non-federal match required by Sea Grant and many other types of federal funding opportunities.
- Initiate agency-level, robust engagement with Tribal-serving institutions (TSIs), Historically Black Colleges and Universities (HBCUs), and other minority-serving institutions (MSIs).

- **What steps has the agency taken or will you take to accomplish these ends?**

Foundational work on this subject has been completed by the Sea Grant DEIJ community of practice, and such needs are identified in Sea Grant’s DEIJ vision and action plan. This effort is timely in that 30 individuals in the Sea Grant program recently completed intensive training on overcoming systemic racism in the sciences (See [URGE](#), January to May 2021).

The foundational knowledge and motivation to conduct and act on this type of an assessment are rich and growing. Sea Grant will work with NOAA to consider how the recommendations and actions that resulted from this service equity assessment may be applied to other grant-based programs in NOAA, and share with other federal agencies as appropriate.

- **Are new policies, regulations, or guidance documents necessary to advance equity in the program/policy?**

Sea Grant has identified the existing OMB form 4040-0001 Research and Related Personal Data form as a barrier in its existing format and would recommend updating the form to be more inclusive (e.g., the form currently asks only for binary gender information).

- **Are additional capacity, expertise, or resources required for further work, and do you plan to incorporate this into your budget request?**

NOAA included a specific request for Sea Grant to expand its DEI work to build on its existing foundational efforts and specifically work to implement the findings of this assessment.

Proposed activities include 1) Launching a national research competition, which will solicit innovative, transdisciplinary research projects from integrated MSI/Sea Grant-led teams; and 2) offering student opportunities that specifically address barriers outlined in this assessment. The activities specifically proposed in the budget will be rounded out by “changes in the way we do business” outlined in our assessment.

Preliminary work by Sea Grant on assessing and making research funding efforts more equitable centers around first understanding and then assisting partners, such as tribes and HBCUs, to be able to make the non-federal match required by Sea Grant and many other types of federal funding. We are pouring over existing policies and reviewing creative ways applicants can potentially make the match requirement and could greatly benefit from gaining knowledge about the financial constraints and designs of potential partners and funding recipients.

- **Immediate, tangible improvements in people’s lives that you anticipate these potential reforms making or that have resulted to date from the equity assessment**

The National Sea Grant Office processes between 350 and 600 grant actions each year, which represents 12% of all NOAA grant actions. The grant actions by the National Sea Grant Office are a small fraction of the secondary grant actions taken by each of the 34 Sea Grant programs at the university level. The results of Sea Grant improving its granting processes to increase equity have the potential to influence thousands of funded researchers and students each year. Additionally, recommendations and actions that resulted from this service equity assessment may be applicable to other grant-based programs in NOAA and other federal agencies.

Name of program/policy: Sea Level Rise Viewer, and Associated Products (Office for Coastal Management)

- **Potential barriers and perceived opportunity (hypothesis)**

The Coastal Zone Management Act (CZMA) was first enacted in 1972, at a time when coordinated land use planning was generally supported in Congress. Planning was seen as central to achieving the protection and wise use of land and water resources of the coastal zone, while fostering compatible economic development. Since 1972, pressures for both preservation and development have grown more intense as people continue to migrate to coastal areas to take advantage of economic opportunities, to retire, and to pursue recreational interests; as economic activities continue to concentrate in coastal locations; and as natural resources are burdened or threatened by the magnitude and location of these changes. A recent study shows that the U.S. could see a one percent reduction in its GDP due to coastal flooding alone by 2100 if no significant mitigation actions are taken.¹

The NOAA Sea Level Rise Viewer (SLRV) and other tools and visualization resources were developed in direct response to customer needs. State, territorial, and local governments, as well as non-profit entities engaged in outreach, expressed the need for SLR visualization tools and

¹ Schinko, T. , Drouet, L., Vrontisi, Z., Hof, A.F., Hinkel, J., Mochizuki, J. , Bosetti, V., Fragkiadakis, K., et al. (2020). Economy-wide effects of coastal flooding due to sea level rise: A multi-model simultaneous treatment of mitigation, adaptation, and residual impacts. Environmental Research Communications 2 (1) e015002. 10.1088/2515-7620/ab6368.

learning resources to help coastal communities understand their risk and vulnerability to hazards and begin to prioritize solutions to enhance their resilience. In responding to the needs of these stakeholders, the Office for Coastal Management (OCM) must ensure that it is serving all coastal communities equitably. This extends not only to direct users of the SLRV tool and associated products such as coastal practitioners, but also the communities which are served or potentially underserved by them.

- **Summary of Equity Assessment approach**

Using the Service Equity Assessment questionnaire, the Office for Coastal Management (OCM) engaged a range of internal physical and social scientists, geospatial experts, trainers, and service delivery managers associated with the SLRV. They reviewed the questionnaire and suggested potential points to make and provided examples of services and gaps in services regarding equity. The next step involved a small writing team consisting of OCM leadership that used the points and examples from staff to craft draft narrative responses. An external team of leaders in equity, but unfamiliar with the SLRV, reviewed the draft responses for clarity and any unintentional biases, and pushed OCM to think more deeply about the issues. Discussions were held on the issues and comments were addressed. Opportunities for improvement that surfaced during the assessment and discussions were inserted into assessment responses. Using those responses as a primer, a preliminary report was produced with sections focusing on service context, service performance on equity issues, service design, service system, NOAA equity, and conclusions. In addition, several findings, actions, and recommendations briefings were provided by the OCM team to NOAA leadership.

- **Definition and description of impacted underserved communities**

The first-line interactions and customer base for the SLRV and associated data, tools, and training are with coastal practitioners (state and territory coastal, estuarine, and coral reef management programs; land use and urban planners and policy-developers; floodplain managers; natural resource managers) and decision-makers whose actions have significant impacts on the lives of community residents. However, although OCM program staff interact at certain levels with underserved communities, these communities typically have more direct interaction with the customer base noted. Resource limitations create a barrier for increasing more direct interaction to help build awareness, thus OCM's long-standing strategy has been to focus resources on supporting and building the capacity of these coastal practitioners and decision makers, rather than individual communities. The SLRV team relies on partners and practitioners involved with the Digital Coast that have more direct interaction with some of these communities to provide outreach, awareness, and training on how they can benefit from OCM's products and services. OCM program staff are available to provide technical assistance in understanding or applying data, tools and training products, but OCM currently does not have any governance structure specifically overseeing service delivery particularly to underserved populations beyond the audio support for deaf users and translated sites for non-English users.

The SLRV might better support underserved communities if OCM can identify and engage organizations that work with these communities, followed by targeted outreach, training and technical assistance in a “train the trainer” type model. This approach has been implemented through NOAA-external community partnerships to provide demonstrations of the SLRV to underserved communities. These interactions are captured on Digital Coast’s SLRV ["Stories from the Field"](#).

- **Limitations and opportunities related to data, data disaggregation, and measurement**

The SLRV is inherently a Web-accessible science-based tool that provides information and prompts questions regarding what service equity impacts arise when considering how the information is accessed, who uses the information, what governmental or institutional entities leverage the information, and who ultimately benefits from information regarding the SLRV, associated products, tools, training, and education materials. One of the key limitations is user tracking and tool use determination. While OCM accounts for governmental and coastal management interactions, as well as generalized website hits, it is statutorily limited in what user analytics it is able to leverage on the Digital Coast website, where the SLRV is hosted. OCM, in coordination with other NOAA offices and other federal agencies, should seek to characterize the most vulnerable populations within coastal communities and identify best practices in ensuring equitable service delivery. For example, with regard to hazard impacts, a coastal community may be commonly vulnerable to the physical extent of projected sea level rise, yet the relative vulnerabilities of certain populations and property within the zone of impact, and thus the ability of those populations to successfully mitigate or adapt to changes, may vary widely. Operationalizing the NOAA-developed Service Delivery Framework, particularly if we ensure equity is an overlay, will advance the NOAA’s ability to better understand and improve on processes that identify distinctions in tool users and their uses, and in measuring and validating how changes to engagement tactics can create more equitable customer experiences.

OCM lacks data that targets if and how underserved community members are using the SLRV and associated data tools and training. While individual use-cases around the country have been well-documented, it is difficult to fully understand everyone who is using the SLRV because collection of web data is limited to URL and zip code. Evaluations, technical assistance engagements, and past needs requirements surveys have shown that the SLRV is used extensively by coastal practitioners.

- **Target equitable outcomes, as derived from equity assessment, and how success of improvements will be measured moving forward**

Identifying underserved, underrepresented, and potentially vulnerable entities and infrastructure in coastal areas, and understanding how governmental institutions, coastal managers, and a

variety of decision makers consider issues relating to climate change and sea level rise, is the first step to ensuring service equity and considerations of the relative capacity of some populations to plan for, mitigate and/or adapt to hazards. To measure success, OCM must establish targets, considering strategic analysis and resource implications, to modify products and services to better reach underserved audiences. Potential metrics and targets include: Number of products and services modified to better meet equity needs with a target of 10 to 15 enhancements per year, and Number of engagements per year with representatives from underserved populations with a target of 20 per year. The Coastal Effects Chapter of the 4th National Climate Assessment finds that as the pace and extent of coastal flooding and erosion accelerate, climate change impacts along our coasts are exacerbating pre-existing social inequities, as communities face difficult questions about determining who will pay for current impacts and future adaptation and mitigation strategies and if, how, or when to relocate.² This suggests a greater sense of urgency.

- **Reform actions implemented thus far, and those under consideration based on equity assessment**

Major Findings

- ✓ OCM lacks data that identifies if and how underserved community members are using the Viewer as well as the baseline data needed to confidently expand the Viewer to underserved geographies.
- ✓ OCM, in coordination with other NOAA offices and other federal agencies, should seek to characterize the most vulnerable populations within coastal communities and identify best practices in ensuring equitable service delivery.
- ✓ OCM should work more intentionally and systemically with its networks and partners (current and new) to ensure underserved audiences are benefitting from OCM's data, tools, and training.

Recommendations

- Address constraints on socioeconomic data collection and sharing (OMB policy, procedural, tools).
- Build partnerships with trusted intermediaries at NOAA level (procedural, GSA techniques).
- Address gaps in physical data and mapping requirements (DOC tools, technology).
- Address coordination issues that will arise with multiple agencies working to better address

² Fleming, E., J. Payne, W. Sweet, M. Craghan, J. Haines, J.F. Hart, H. Stiller, and A. Sutton-Grier, 2018: Coastal Effects. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 322–352. doi: 10.7930/NCA4.2018.CH8

equity and inadvertently overwhelming the very communities the government is trying to help. (OMB procedural).

- **What steps has the agency taken or will you take to accomplish these ends?**

The SLRV is hosted on OCM's Digital Coast website, and members of the Digital Coast Partnership were some of the first coastal practitioners that identified the needs of coastal community decision makers and coastal resource managers to analyze their vulnerability to coastal flooding or sea level rise, and to consider the potential impacts on natural resources, infrastructure, and populations. The Digital Coast Partnership has recently (2021) released its new strategic plan. The Strategic Plan includes strategies to increase equity through:

- Focusing technical assistance and outreach to fully understand how different people access and use Digital Coast resources, to include underserved communities, urban and rural communities, and tribal and state and territorial partners.
- Identifying coastal counties, from the more densely populated to the rural and underserved, that require new or updated data.
- Increasing applicability of newly emerging social science data sets (e.g., socio-cultural values, well-being, health) to inform risk communication, coastal stewardship decisions, and social and environmental justice concerns.
- Ensuring that content continues to be easily understood, accessible, and useful.

NOAA's Weather, Water, and Climate team has approved a NOAA Service Delivery Framework and an Implementation Approach is being finalized. The framework identifies equity as a priority of the service delivery process, and further identifies some of the current constraints.

Recommendations for NOAA include: Focus on equity and diversity by investing in partnerships and services at national to local scales; delivering equitable services to all communities by building capacity through the development of training, guidance, and user support services; and incorporating best practices on maintaining partner relationships, including those from the private sector. NOAA needs to better understand, assist, and document how users (including traditionally underserved audiences) are applying NOAA products and services to their decision-making.

- **Are new policies, regulations, or guidance documents necessary to advance equity in the program/policy?**

While the intent behind the PRA is recognized and important, the implementation of the PRA presents challenges of efficiency and effectiveness. OMB and NOAA can better support programs that deliver services to underserved audiences by facilitating PRA solutions that create the essential demographic and use data.

- **Are additional capacity, expertise, or resources required for further work, and do you plan to incorporate this into your budget request?**

NOAA should develop and support a database where underserved audience characterizations, needs assessments and evaluations, results of technical assistance engagements, and other social science data can be curated and shared to assist programs and provide a baseline through which to measure the progress of NOAA actions.

Increased investments are needed to acquire and process data for geographies that lack the foundational data and geodetic control to map, model, and visualize inundation. Most underserved communities do not have the means to purchase their own data and can be challenged to provide matching funds for competitive proposal opportunities that are designed to enhance community resilience.

There are elements of the NOAA FY 2022 budget request that might be able to support some of this data gathering and processing.

- **Immediate, tangible improvements in people's lives that you anticipate these potential reforms making or that have resulted to date from the equity assessment**

Being able to visualize potential impacts from SLR is a powerful risk communication, teaching, and planning tool. The SLRV covers all ocean coastal states and territories except Alaska and some smaller islands in Northern Mariana Islands. A companion Lake Level Viewer covers the Great Lakes' coastal zone. The purpose of the SLRV is to provide coastal managers and scientists with a preliminary look at possible SLR and coastal flooding impacts given different sea level rise scenarios. While social science data and concepts of equity have been inherent to the development of this tool, this formal process defined by the OMB service equity assessment encourages a thorough review in the risk communication and use side of the tool and associated products, information, and training. It will also identify the strengths and opportunities for growth for these products and associated services.

Name of program/policy: Equitable Services for a Weather-Ready Nation

- **Potential barriers and perceived opportunity (hypothesis)**

Some 98 percent of all Presidentially declared disasters are related to weather, leading to around 500 deaths per year and nearly \$15 billion in damage. The Weather-Ready Nation vision developed in 2011 builds towards a societal outcome in which communities across the nation are ready, responsive, and resilient to extreme weather and water events (Uccellini and Ten Hoeve, 2019). This vision became the foundation of a new strategy for NOAA’s National Weather Service (NWS), which includes federal, state, and local agencies involved in disaster response, as well as America’s Weather Industry, academia, and nonprofit organizations working together to reduce the impact of extreme weather (DOC, 2018). Over the last 10 years, NWS has made great strides building relationships with core partners, including emergency managers (EMs), water resource managers, public safety officials, and the media. The NWS does this through “Impact-Based Decision Support Services,” or IDSS.

Even with these advancements, there are still significant gaps in our ability to fully meet our mission and achieve the vision of a Weather-Ready Nation. While we are transforming our relationship with the emergency management community, we are just beginning to build relationships with communities and organizations to ensure our products and services are reaching all Americans, regardless of their socio-economic status, race, language, or other factors that might lead to inequitable access. While NWS has established long-standing national programs to lead community engagement at the national, regional, and local level, including the StormReady Communities Program, Skywarn Spotters Program, and the Weather-Ready Nation Ambassadors Program, several of these programs were developed decades ago and not designed with equity at the core. Yet, the impacts of climate change are often unequal, disproportionately impacting underserved communities (Watts et al., 2021).

There is significant heterogeneity in people’s exposure to weather hazards, as well as their ability to receive, understand, and act on weather forecasts and information. This assessment of the NWS’s disaster preparedness programs enables the NWS to identify potential barriers (such as language, disability, lack of community resources, access to broadband, communities within a jurisdiction that don’t have their own representation, etc.) to access the program’s services. Through this exercise and follow-on analyses, the NWS can help identify communities where the NWS has strong effective relationships, and highlight areas where the NWS may need to make additional or more targeted efforts.

- **Summary of Equity Assessment approach**

The NWS programs we assessed focus on disaster preparedness for local communities. The NWS hopes to ensure these programs are equitably engaging communities and reaching the most vulnerable populations. The NWS has long recognized the importance of engaging with the

communities it serves to maximize the benefits of the weather warnings and forecasts it provides to the public, and over the years it has put in place the following key programs to advance this goal: The Warning Coordination Meteorologist (WCM) Program, The StormReady (SR) Program, the Weather Ready Nation Ambassador (WRNA) Program, and the Impacts-Based Decision Support (IDSS) Program. We initially considered these programs separately and thought to perhaps limit the scope of the assessment to just one, but quickly determined that they are all intrinsically linked through the WCM Program (Figure 1).

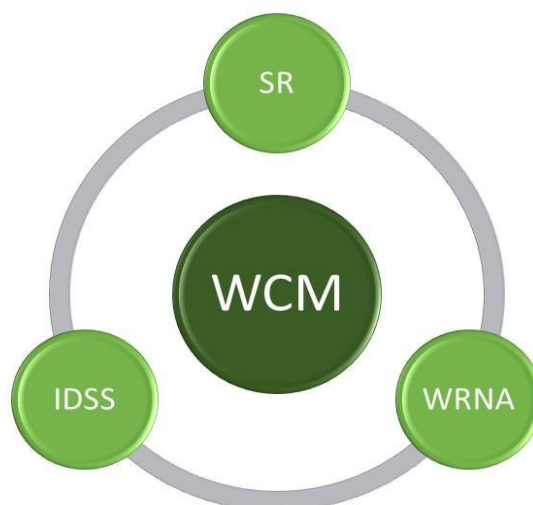


Figure 1: Conceptual Relationship between the four programs examined for the NWS Service 1 Equity Assessment

Warning Coordination Meteorologist (WCM) Program

The WCM Program was established in the early 1990s as part of the NWS Modernization. The WCM serves as the principal interface between the local Weather Forecast Office (WFO) and the users of WFO products and services in leading the effort to insure their evaluation, adjustment, and improvement. They are fully responsible for planning, coordinating, and carrying out WFO area-wide public awareness programs to educate the public and mitigate death, injury, and property damage or loss caused by severe natural hydrometeorological events. Since 2015 the WCM has become the key WFO focal point on disseminating IDSS and building bridges to core partners (See IDSS Program below).

The WCM Program is managed by the Analyze Forecast and Support Office at NWS Headquarters. WCM duties are many and included working with federal, state, local, and tribal government agencies having weather related interests in developing plans for access to and proper usage of NWS products and services with the intent to protect property and guard against loss of life due to hydro-meteorological events (See Appendix I for full WCM duties).

StormReady (SR) Program

The StormReady Program was established in 2002. StormReady uses a grassroots approach to help communities develop plans to handle all types of extreme weather—from tornadoes to winter storms. The program encourages communities to take a new, proactive approach to improving local hazardous weather operations by providing emergency managers with clear-cut guidelines on how to improve their hazardous weather operations. Sub-programs of StormReady include StormReady Supporter and TsunamiReady.

To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises

StormReady Communities must be recertified every 4 years.

Impact-Based Decision Support (IDSS) Program

New and evolving needs in society call for the NWS to shift to a Impact-Based Decision Support (IDSS) approach. IDSS are forecast advice and interpretative services the NWS provides to help core partners, such as emergency personnel and public safety officials, make decisions when weather, water and climate impacts the lives and livelihoods of the American people. This support may be needed in response to a particular event or routinely to support high-value decision making. NWS staff across the U.S. work hand-in-hand with partners at local, state, and national levels to ensure these decision-makers have the most accurate, reliable, and trustworthy weather, water and climate information. The NWS accomplishes this task not only through a commitment to science and technology, but by building trust through deep relationships with key decision-makers across the nation. Deep relationships are developed with those core partners that the NWS has a legal mandate to support or whose actions involve national security concerns; who have a high degree of authority for public safety; and who have the capability to amplify NWS messaging to other NWS partners.

In addition to the production and rapid dissemination of accurate and consistent forecast information, the NWS is evolving by continuously working with these key decision makers to answer these questions:

- What weather, water, and climate events have a high impact?

- How and what events affect core partners' key decisions?
- How should uncertainty information be communicated to decision makers?

These questions are not answered when impactful weather is ongoing, but instead are addressed well before the storm arrives through frequent interaction, simulation exercises, and effective communication. Furthermore, the answers to these questions are constantly being refined with each passing event and as NWS personnel build deeper relationships with key decision makers.

When impactful events do occur, the method of communication comes in several forms, but generally falls into three categories: remote support with forecast advice through various means (such as phone calls, email, or online webinars), on-site support at an emergency operations center, or on-site support at an incident or event (such as NWS deployment to a wildfire). The information being communicated to emergency personnel and public safety officials includes detailed information beyond just the most likely scenario. This includes expressing forecast confidence, probabilities of different scenarios occurring, and distinguishing more commonplace weather events from the truly historical or extreme weather and water events.

Weather Ready Nation (WRN) Ambassador Program

Established in 2017, the Weather-Ready Nation Ambassador™ initiative is the NOAA's effort to formally recognize NOAA partners who are improving the nation's readiness, responsiveness, and overall resilience against extreme weather, water, and climate events. WRN Ambassador program partners commit to working with NOAA and other ambassadors to strengthen national resilience against extreme weather. In effect, the WRNA initiative helps unify the efforts across government, non-profits, academia, and private industry toward making the nation more ready, responsive, and resilient against extreme environmental hazards. WRN is a strategic outcome where society's response should be equal to the risk from all extreme weather, water, and climate hazards.

WRN Ambassadors serve a pivotal role in affecting societal change — helping to build a nation that is ready, responsive, and resilient to the impacts of extreme weather and water events. To be officially recognized as a WRN Ambassador, an organization must commit to:

- Promoting Weather-Ready Nation messages and themes to their stakeholders;
- Engaging with NOAA personnel on potential collaboration opportunities;
- Sharing their success stories of preparedness and resiliency; and
- Serving as an example by educating employees on workplace preparedness.

WRN Ambassadors serve as change agents and leaders in their community. They strive to inspire others to be better informed and prepared, helping to minimize or even avoid the impacts of natural disasters. WRN Ambassadors are not required to periodically revalidate their commitment to the principles cited above.

The NWS Service Equity Assessment Team reviewed all documentation and policy pertaining to the four programs in order to identify any information relevant to the question of service equity and socially vulnerable communities. The communities considered included both local contiguous ones as well as demographic cross-cut communities such as the deaf and hard of hearing, the visually impaired, homeless, and the elderly.

Using the Service Equity Assessment questionnaire, we interviewed the program managers and supporting staff about their programs specifically focusing on vulnerable communities and potential programmatic gaps in providing equitable service to them. We also interviewed staff at a diverse sample of 18 WFOs to learn from their experience and perspectives about how, on a practical level, these programs intersect and support the effort to provide services for vulnerable communities, as well as about barriers that they encounter in serving them. The communities these WFOs served varied greatly on a wide range of demographic dimensions and the relevant hazards varied significantly as well. Many of these factors had important implications for the ability of local WFOs to meet a community's needs.

In addition, we conducted a preliminary examination of CDC's Social Vulnerability Index at the county level nationwide with respect to geographic coverage of StormReady Counties. Our data from these process steps was an extensive set of notes. We reviewed these notes looking for common barriers that stood out qualitatively as significant and compelling. These became the basis for our final set of findings, actions, and recommendations.



Figure 2: Service Equity interviews conducted with Weather Forecast Office (WFO) staff, usually with the Warning Coordination Meteorologist (WCM) and/or Meteorologist-in-Charge (MIC).

- **Definition and description of impacted underserved communities**

Weather impacts everyone, but the ability to receive and act upon weather information varies substantially based on a wide range of characteristics. The NWS is leveraging existing knowledge to work with known vulnerable and under-resourced populations (e.g., deaf, blind and other disabled individuals) and working with new and existing data such as vulnerability indices and NOAA-funded surveys to identify other groups where there may be systematic reasons that weather information is not being received.

- **Limitations and opportunities related to data, data disaggregation, and measurement**

The NWS has 122 different local WFOs. Each WFO has its own local knowledge, partners, communities and hazards. It is difficult to aggregate across these local contexts. Nevertheless, the team was able to clearly identify significant common findings and themes across the majority of offices interviewed.

- **Target equitable outcomes, as derived from equity assessment, and how success of improvements will be measured moving forward**

There are several equity outcomes that are straightforward and easily achievable. For example, NWS can increase the number of Skywarn Spotter Training and other preparedness/outreach events held within the jurisdictions of HUSVCs, (2) increase the number of StormReady certifications for HUSVCs, and (3) increase the number of WRN Ambassadors who explicitly address service equity to HUSVCs such as National Urban League, United Way, National Association of the Deaf, etc. These simple actions can be baselined into trackable measures with explicit annual goals. In the longer term, survey methodology and other data-driven analytics

approaches can be established to measure the actual hazard understanding and preparedness levels of vulnerable populations. These can be translated into suitable measures of progress and tracked against a baseline determined by longitudinal research.

- **Reform actions implemented thus far, and those under consideration based on equity assessment**

Major Findings

- ✓ This assessment has revealed a mission critical need for NWS to systematically and intentionally engage the historically underserved and socially vulnerable communities (HUSVCs) that it serves with relevant weather, water, and climate information products and services. This is the only way to fully meet the mission of the NWS and realize the vision of a Weather-Ready Nation.
- ✓ Significant systemic barriers exist in the WCM, StormReady, IDSS, and WRNA programs that disenfranchise HUSVCs, preventing them from receiving these services and leaving large gaps across the country that compromise the integrity of the NWS' ability to work for the whole country.

Recommendations

- ✓ Adapt NWS culture to embrace equitable service to all communities
 - Promote a community integration mindset and cultivation of a wide-range of community partners
 - Prioritize outreach and community engagement at the same level as accurate forecasts and warnings
- ✓ Update and strengthen the WCM Program
 - Redefine program objectives to reach HUSVCs
 - Require comprehensive community engagement, facilitation, and intercultural competency training for all WCMs and WFO staff performing outreach to HUSVCs
 - Establish at least (1) new FTE in each WFO to work with the WCM and staff as a community liaison
- ✓ Adapt the StormReady, IDSS, and WRNA Programs to better serve HUSVCs
 - Expand current policies and procedures to include specific direction on engaging and serving HUSVCs and codify metrics to track and assess interactions
 - Strengthen partnerships with and beyond the EM community through the development and implementation of strategic community engagement plans
 - Establish guidelines and engagement standards/responsibilities for entities applying to become Ambassadors
- ✓ Accelerate efforts to diversify NWS field staff
 - Management performance plans should include accountability and metrics that ensure annual training on interviewing, hiring, and retaining diverse staff
 - Active utilization of NOAA education programs, partnerships with HBCUs and other MSIs, and direct hiring authorities to recruit STEM graduates from underrepresented

populations

- **What steps has the agency taken or will you take to accomplish these ends?**

Moving from the previous 10 years of building a Weather-Ready Nation and looking towards the next 10 years, the NWS will pair IDSS to core partners with more engagement/outreach to communities to ensure that NWS products and services are understandable, accessible, and actionable for all.

- **Are new policies, regulations, or guidance documents necessary to advance equity in the program/policy?**

While the IDSS program has authorization in the Weather Act of 2017, the NWS may not have explicit legislative authorization to promote extreme weather preparedness, understanding, and response in communities with a focus on HUSVCs or to implement several executive orders. The team proposes to work with the federal Administration and Congress to expand existing legislation to include authorization to promote extreme weather preparedness, understanding, and response across all U.S. communities.

- **Are additional capacity, expertise, or resources required for further work, and do you plan to incorporate this into your budget request?**

The demand for the WCM's time is effectively without bound, especially considering the broad scope of their duties. The focus on IDSS in particular is increasing this demand significantly by directing more and more attention to the EM community. Staff time for outreach to HUS and SVCs is becoming increasingly scarce.

- **Immediate, tangible improvements in people's lives that you anticipate these potential reforms making or that have resulted to date from the equity assessment**

Timely and relevant forecasts, watches, and warnings are major strengths of NOAA's National Weather Service. The NWS ability to predict natural disasters relevant to the protection of life and livelihoods and the advancement of the Nation's economy is unparalleled. However, the recommended improvements identified by the service equity assessment would ensure these capabilities reach and benefit all communities, particularly to the historically underserved and socially vulnerable ones. Filling the gap in education and outreach to these communities would better prepare them to respond to and recover from the impacts of hazardous weather, resulting in fewer injuries, fatalities and property loss.