

WEATHER PROGRAM OFFICE SCIENCE REVIEW

January 24-27, 2023

Weather Program Office Response to Panel Review Recommendations



December 18, 2023

Submitted by:

John Ten Hoeve, Deputy Director

Introduction

The National Oceanic and Atmospheric (NOAA) Line Office, Oceanic and Atmospheric Research (OAR), conducts program and laboratory science reviews to evaluate the quality, relevance, and performance of research activities supported by its programs and conducted across its laboratories. The Weather Program Office (WPO) had its first Program Evaluation virtually in January 2023, over the course of 3 days. This external review covers the programmatic activities and management of WPO over the past 5 years (2017–2022).

In this report, each actionable recommendation provided by the Science Review Panel is followed by WPO response. OAR’s and WPO’s strategic goals and objectives are mapped to the recommendations and WPO action items. The recommendations are given a Priority Rating of High, Medium, or Low according to what is achievable within appropriations, staff capacity, and span of control within WPO. A table summarizing the actions with timelines for completion is included below. Detailed responses can be found in the Appendix.

The 5-Year Evaluation of the Weather Program Office and full Program Review can be found [here](#).

Recommendations, Responses and Action Plans

FMC Science Review Action Sheet				
Recommendation	Action	Champion	Target start & Completion Dates	Status/Notes
#1 Expand the pool of professionals trained in weather-research fields by	<ul style="list-style-type: none"> • Explore additional opportunities to engage students and early career 	Management and	FY24 - FY26	Priority Rating: High

<p>considering efforts such as early-career summer training programs (perhaps modeled after the Butler-Williams Scholars Program at the National Institute on Aging), faculty sabbaticals, programs for undergraduate/graduate fellows (perhaps modeled after the Bill Anderson Fund that is expanding the number of historically underrepresented professionals in the hazards and disasters field).</p>	<p>individuals, including through mentoring.</p> <ul style="list-style-type: none"> • Expand community engagement efforts with students through various non-traditional organizations. • Serve as a liaison between students and NOAA Labs, Centers, and Program Offices 	<p>Administration Division</p>		<p>Status: In Progress</p> <p>Meets Goal 4 (4.1) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goals 1 and 3 (1.8-1.12 and 3.6) of the WPO Strategic Plan FY 2022-2026</p>
<p>#2 In response to concerns about the ability of PIs not previously funded by NOAA to be successful without “insider information” (e.g., partnering with existing/past NOAA-funded PIs or NOAA CIs), design and implement virtual workshops and webinars targeted to non-R1 and minority serving institutions (MSIs), and then publicize those recorded materials, released around the time of the NOFO announcement.</p>	<ul style="list-style-type: none"> • Analyze and implement ACES survey suggestions for the FY25 NOFO to improve the NOFO process. • Expand our contact list of stakeholders and applicants to include those that may be new to the NOFO process. • Provide videos on our website about the NOFO process to increase transparency. 	<p>Management and Administration Division</p>	<p>FY23 - FY25</p>	<p>Priority Rating: High</p> <p>Status: In Progress</p> <p>Meets Goals 3 and 4 (3.2 and 4.1) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 1 (1.3) of the WPO Strategic Plan FY 2022-2026</p>
<p>#3 Invite MSIs to participate in UFS user workshops and have an MSI host a UFS workshop.</p>	<ul style="list-style-type: none"> • Serve as a liaison between NOAA Cooperative Institutes and Cooperative Science Centers to increase community engagement and 	<p>Earth System Research and Modeling Division</p>	<p>FY24 - FY26</p>	<p>Priority Rating: Medium</p> <p>Status: In Progress</p>

	<p>establish some MSIs as “UFS Modeling Centers of Excellence.”</p> <ul style="list-style-type: none"> • Broaden stakeholder engagement efforts by actively considering using an MSI as a host institution for a future Unifying Innovations in Forecasting Capabilities Workshop (UFCW). 			<p>Meets Goals 3 and 4 (3.2, 4.1 and 4.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 3 (3.2) of the WPO Strategic Plan FY 2022-2026</p>
<p>#4 Develop an active presence on social media to communicate with the public</p>	<ul style="list-style-type: none"> • Share information about research and grant opportunities on social media. • Share information about the NOFO, the application process, and WPO webinars to increase accessibility of our funding opportunities. • Share information and/or links of NOAA resources and research related to current events. • Due to the limited support we currently have in our communications function and because we have been focused on other communication channels, we listed this as a Low priority. 	<p>Communications Lead</p>	<p>FY23 - FY24</p>	<p>Priority Rating: Low</p> <p>Status: Some actions in progress</p> <p>Meets Goal 4 (4.1) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 1 (1.7) of the WPO Strategic Plan FY 2022-2026</p>

<p>#5 Prioritize tasks including identifying a small number of keystone focus areas as the WPO lacks the resources to do everything it is being asked to do.</p>	<ul style="list-style-type: none"> • Integrating social and physical sciences so that our forecast products and services are increasingly focused towards effective outcomes • Improving collaboration with NWS/STI to understand top-most R&D priorities across multiple service areas and the weather value chain • Focusing the WPO FY25 NOFO on a few keystone focus areas across multiple program competitions • Specific focus areas could include: S2S forecast improvement, with a focus on the new Seasonal Forecast System; Integrating observations that are focused on models/forecast improvement and NWS's next-generation radar system 	<p>WPO Leadership Team</p>	<p>FY24 - ongoing</p>	<p>Priority Rating: High</p> <p>Status: Beginning in FY24</p> <p>Meets Goal 3 (3.2 and 3.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 2 (2.1-2.3, 2.4 and 2.5-2.7) of the WPO Strategic Plan FY 2022-2026</p>
<p>#6 Establish a suitably funded hurricane program, as reliance on supplemental funding is inefficient and inadequate to address needs.</p>	<ul style="list-style-type: none"> • Continue to include tropical science priorities in our future funding competitions • Given a flat budget scenario, WPO does not have the resources to be able to dramatically increase funding to hurricane programs beyond the 	<p>WPO Leadership Team</p>	<p>FY24 - ongoing</p>	<p>Priority Rating: Low</p> <p>Meets Goals 3 and 4 (3.2 and 4.2) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 2 (2.1-2.7) of the WPO</p>

	support it currently provides, which is why we listed this as a Low priority.			Strategic Plan FY 2022-2026
#7 Expand the social-science research focus beyond communicating forecasts, in order to better incorporate the impact and recovery stages of major extreme events, as there is a need to demonstrate the long-term impact that exposure to these events can have on social and economic life for communities	<ul style="list-style-type: none"> The Social Science Program will continue to work in partnership with both internal NOAA partners and the external weather, water, and climate enterprise to shape timely and relevant science priorities related to impacts and recovery for funding competitions within existing appropriations. WPO will explore including relevant impact/recovery questions in future social science surveys as appropriate. 	Science, Technology, and Society Division	FY24 - FY26	<p>Priority Rating: Medium</p> <p>Status: Beginning in FY24</p> <p>Meets Goals 2, 3, and 4 (2.3, 3.2, 3.3, and 4.1) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goals 2 and 4 (2.1-2.3 and 4.9-4.10) of the WPO Strategic Plan FY 2022-2026</p>
#8 Hire more professionals to address the imbalance between the current staffing level and the increasing demands on the WPO.	<ul style="list-style-type: none"> WPO has added 10 additional FTE in the last year associated with our reorganization, all of whom are on track to be hired by the end of calendar year 2023. WPO will continue to focus on recruitment and retention efforts over the next year. 	Deputy Director	FY23 - FY24 Many actions already in progress	<p>Priority Rating: High</p> <p>Status: Nearly complete - to be completed in FY24</p> <p>Meets Goal 4 (4.1) of the OAR Strategic Plan FY 2020-2026</p>

				Meets Goal 1 (1.10) of the WPO Strategic Plan FY 2022-2026
#9 Build the capacity of the Social Science Program to be able to respond to demands and opportunities as there are only two Social Sciences Specialists compared to fourteen General Physical Scientists.	<ul style="list-style-type: none"> WPO is working with the NWS to execute \$40M of service delivery and social science projects under the Bipartisan Infrastructure Law (BIL). Under that effort, WPO is hiring another Federal social scientist in addition to the recently-hired IT project manager to work on the Societal Data Insights Initiative. As new weather projects seek and are appropriated resources, we aim to include the social science component of the value chain in our spend plans. As these new initiatives are supported, the increased funding will support the additional staff needed to execute these programs. Exploring hiring individuals with interdisciplinary or social science backgrounds for our other programs, particularly since these disciplines are critical for many aspects of scientific program management including building coalitions and partnerships, evaluating the impact and effectiveness of research, etc. 	Science, Technology, and Society Division	FY24 - FY26	<p>Priority Rating: Low</p> <p>Status: Hiring actions for funded positions will be complete in FY24</p> <p>Meets Goals 2, 3, and 4 (2.3, 3.2, 3.3, and 4.1 and 4.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 1 (1.4) of the WPO Strategic Plan FY 2022-2026</p>

	<ul style="list-style-type: none"> Given a flat budget scenario, WPO will not have the resources to be able to dramatically increase funding to hire more social scientists, which is why we listed this as a Low Priority. 			
<p>#10 Nurture WPO staff by ensuring that the work environment and the demands on their time are manageable so that overworked staff do not burn out or find employment elsewhere. Use annual surveys to assess needs.</p>	<ul style="list-style-type: none"> Clarifying roles, responsibilities, and policies associated with our reorganization, which should reduce uncertainty, confusion and burnout. Continue to deploy an annual culture survey in FY24, which WPO first developed in FY23 	WPO Leadership Team	FY23 - ongoing	<p>Priority Rating: High</p> <p>Status: Many actions in progress, but continual attention required</p> <p>Meets Goal 4 (4.1) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 1 (1.8) of the WPO Strategic Plan FY 2022-2026</p>
<p>#11 Provide professional development opportunities by asking WPO staff to give seminars about EPIC and UFS initiatives at universities (MSIs, R1, and non-R1), and AMS and AGU conferences.</p>	<ul style="list-style-type: none"> Reach out to the AMS Board on Higher Education and/or the AGU Heads and Chairs Program to gauge future potential opportunities to engage with the academic community. Continue to provide seminars, presentations, etc. about EPIC and UFS at a variety of venues. 	Earth System Research and Modeling Division	FY23 - ongoing	<p>Priority Rating: Medium</p> <p>Status: In Progress</p> <p>Meets Goals 3 and 4 (3.1, 3.2, 4.1, and 4.3) of the OAR Strategic Plan FY 2020-2026</p>

	<ul style="list-style-type: none"> Developing a skills/interests matrix to align employees' skills and interests with future development opportunities including speaking engagements. 			Meets Goals 1 and 3 (1.7, 1.10 and 3.2 and 3.9) of the WPO Strategic Plan FY 2022-2026
<p>#12 Create an external advisory board to participate in regular reviews—such as the quarterly program review—and provide perspective on WPO activities (e.g., a “Strategic Advisory Board” akin to the NOAA Science Advisory Board), and to serve as resources when discussing future directions such as how to conduct outreach to expand diversity of PIs on submitted proposals or facilitate new/expanded partnerships that promote WPO-funded findings.</p>	<ul style="list-style-type: none"> WPO will continue to solicit input and advice from the Environmental Information Services Working Group (EISWG) and other entities under the Science Advisory Board, including on the topics listed in this recommendation It will be difficult to establish a new federal advisory committee (FAC) just for WPO due to the limited number of FACs across the government, and so we have listed this as a Low priority. 			<p>Priority Rating: Low</p> <p>Meets Goal 4 (4.1 and 4.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 1 (1.6 and 1.7) of the WPO Strategic Plan FY 2022-2026</p>
<p>#13 Form an oversight group/committee to monitor timeliness of EPIC updates and community contributions as well as their quality, as UFS is a highly ambitious system and it remains unclear how the open source/open science component will be implemented</p>	<ul style="list-style-type: none"> This recommendation is aligned with Recommendation #17. WPO is contributing to the establishment of a NOAA UFS Working Group. This group will include leadership from the various Labs, Programs and Centers within NOAA that are involved in the UFS, 	<p>Earth System Research and Modeling Division</p>	<p>FY24 - FY25</p>	<p>Priority Rating: Medium</p> <p>Status: Beginning in FY24</p> <p>Meets Goals 3 and 4 (3.1, 3.3, 4.1, and 4.3) of the OAR</p>

	<p>and will provide clear prioritization and strategic alignment on NOAA's interests and investments in the UFS.</p> <ul style="list-style-type: none"> The Community Modeling Board is anticipated to be established soon and will provide community perspectives for the UFS and will help with prioritizing infrastructure needs that EPIC might support. 			<p>Strategic Plan FY 2020-2026</p> <p>Meets Goal 3 (3.1-3.6) of the WPO Strategic Plan FY 2022-2026</p>
<p>#14 Enhance coordination with CPO on UFS-related activities and support of S2S research to cover both foundational research on understanding S2S predictability and R2O research on improving S2S predictions.</p>	<ul style="list-style-type: none"> WPO held an internal WPO S2S workshop in late FY23 to discuss and coordinate S2S research needs and activities across NOAA, which included CPO. WPO will organize a S2S-focused stakeholder engagement workshop in FY24. We are partnering with CPO, the OAR Labs, NWS Centers, and other Line Offices on this workshop. This workshop will help WPO prioritize research activities in coordination with other offices such as CPO. 	<p>Earth System Research and Modeling Division</p>	<p>FY23 - FY25</p>	<p>Priority Level: Medium</p> <p>Status: In Progress</p> <p>Meets Goals 3 and 4 (3.1-3.3, 4.1, and 4.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goals 1, 2 and 3 (1.7, 2.4.3, 3.4, and 3.7) of the WPO Strategic Plan FY 2022-2026</p>
<p>#15 Consider creating/expanding partnerships with entities such as UCAR or Unidata to identify collaborations, skill-building opportunities, and data</p>	<ul style="list-style-type: none"> WPO is leading the effort from NOAA to develop the next NOAA-NCAR MOA, which will include areas of collaboration such as data standards, 			<p>Priority Rating: Low</p> <p>Status: In Progress</p>

<p>sharing potential (e.g., coding examples, hosting data at the UCAR Research Data Archive).</p>	<p>workforce development, community code development, etc.</p> <ul style="list-style-type: none"> • WPO is working towards developing software standards jointly between UFS/EPIC and with NCAR • WPO is partnering with social scientists across the community under the Societal Data Insights Initiative (SDII) to conduct hackathons and other workshops to explore new innovative approaches to integrate meteorological and other environmental data with demographic and other types of social data to study changes in flood events. 			<p>Meets Goals 3 and 4 (3.2, 4.1 and 4.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goals 1 and 4 (1.2, 1.7 and 4.6) of the WPO Strategic Plan FY 2022-2026</p>
<p>#16 To better utilize capabilities in the private sector, expand collaboration with OAR's Technology Partnership Office, including exploring opportunities to use the Small Business Innovation and Research Program to address WPO priorities (e.g., new observing systems); and, as appropriate, work with other offices in NOAA to consider intellectual property approaches (e.g., data licenses) that support NOAA needs and provide incentives for private sector engagement.</p>	<ul style="list-style-type: none"> • WPO will continue to build on its already-strong relationship with TPO. In particular, we are already in the process of discussing with TPO how to develop additional CRADAs to advance industry innovations into operations, and also how to help PIs commercialize some of our funded observations technology projects. We will also continue to serve as reviewers for the SBIR program and explore how to further collaborate with that program. 	<p>Observations and Research Support Division</p>	<p>FY24 - ongoing</p>	<p>Priority Rating: High</p> <p>Status: In Progress</p> <p>Meets Goals 2 and 3 (2.2, 3.1 and 3.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goals 1 and 4 (1.6 and 4.11) of the WPO Strategic Plan FY 2022-2026</p>

	<ul style="list-style-type: none"> WPO employees will attend trainings delivered by TPO, including on Intellectual Property. 			
<p>#17 Encourage the EPIC team to work with its operational modeling partners to improve the cost-benefit ratio of collaboration with WPO (e.g., more focus on operational deliverables, reducing management burden, ensuring strategic priorities are shared) and expand its efforts to build a vibrant community around UFS by establishing an ongoing external advisory committee or a workgroup under an existing advisory committee to obtain input on priorities, policies, and governance approaches. Specific actions should include seeking input from social science experts on how to build and maintain a strong modeling community; adopting appropriate best practices from other community modeling efforts (including for earth system, ocean, and atmospheric composition models); cultivating two-way communication between NOAA and the broader community to develop common, mutually beneficial goals; providing a useful example that demonstrates the value of UFS for modelers; considering ways to provide at least 3 years of support for</p>	<ul style="list-style-type: none"> This recommendation is aligned with Recommendation #13. Establish an effective governance in NOAA and UFS, and a Community Modeling Board. Focus on the development and support of 1-3 applications. WPO will establish code standards for UFS and utilize the governance to ensure organizations contributing to the UFS utilize those standards. 	<p>Earth System Research and Modeling Division</p>	<p>FY24 - FY25</p>	<p>Priority Rating: Medium</p> <p>Status: Beginning in FY24</p> <p>Meets Goals 3 and 4 (3.1, 3.3, 4.1, and 4.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 3 (3.1-3.6) of the WPO Strategic Plan FY 2022-2026</p>

<p>graduate students to ensure sufficient time for them to learn UFS and make significant contributions; engaging OAR to work with other NOAA offices to think “outside of the box” and reduce high performance computing-related barriers for external EPIC partners; and ensuring that data management approaches addresses needs of the community.</p>				
<p>#18 For OAR to improve the return on investment for transition plans while still building strong partnerships, rescind the rigid rules that require projects to create transition plans and instead trust the judgment of the transition experts in WPO to effectively implement NOAA’s policy on transition plans and to require plans or components of planning (e.g., discussions between grantees and NWS) where they will be beneficial.</p>	<ul style="list-style-type: none"> WPO has developed a new 3 phase transition plan process in collaboration with NWS. Each phase has increasing requirements for the transition planning process, which improves the effectiveness and efficiency of the R2O2R process. These phases include: <ul style="list-style-type: none"> Phase 1 - Research to Development or Knowledge Phase 2 - Development to Demonstration Phase 3 - Demonstration to Deployment & Operations 	<p>Observations and Research Support Division</p>	<p>FY24</p>	<p>Priority Rating: High Status: In Progress</p> <p>Meets Goal 4 (4.2 and 4.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goals 1 and 4 (1.4 and 4.11) of the WPO Strategic Plan FY 2022-2026</p>

<p>#19 Coordinate with additional groups and expand coordination with existing partners (e.g., ICAMS committees on observational systems and research and innovation; key National Air Quality Forecast Capability stakeholders including state and local air quality forecasters, the U.S. Environmental Protection Agency, and the U.S. Forest Service; and OAR programs that have shared interests, including ocean observations and unmanned systems) to inform WPO priorities.</p>	<ul style="list-style-type: none"> • After performing an assessment of current engagements, we will assess the time commitment and purpose of each engagement and identify gaps. • We will identify key current and future partnerships to achieve common goals. • WPO will utilize its new Policy and Partnerships Lead to develop a partnerships strategy for WPO and identify and nurture the most promising partnerships across the federal and international landscape. • Due to bandwidth constraints across the office, WPO will only be able to pursue targeted partnerships in the near term. As a result, we do not foresee an ability for WPO to rapidly increase partnerships with a large number of partners including ICAMS, NAQFC stakeholders, other federal agencies, other OAR offices, etc. even though we would like to. As a result, we listed it as a Low priority. 	<p>Earth System Research and Modeling Division</p>	<p>FY24 - FY27</p>	<p>Priority Rating: Low</p> <p>Status: In Progress</p> <p>Meets Goals 2, 3 and 4 (2.1, 2.2, 3.1, 3.3, and 4.1) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 1 (1.1-1.4, 1.7) of the WPO Strategic Plan FY 2022-2026</p>
<p>#20 Develop a coherent and consistent strategy for OAR to task the WPO, CPO,</p>	<ul style="list-style-type: none"> • With CPO, map out areas that are clearly weather or climate and within one office's scope, and also areas where there is overlap or a continuum 	<p>WPO Leadership Team</p>	<p>FY24 - FY26</p>	<p>Priority Rating: Low</p> <p>Meets Goals 3 and 4 (3.2 and 4.1) of the</p>

<p>etc., to provide a balanced and manageable portfolio of programs.</p>	<p>that needs additional focus and discussion.</p> <ul style="list-style-type: none"> • For the areas where there is overlap, articulate a holistic program that covers the disciplinary scope, assign roles and responsibilities, identify any gaps, and eventually develop a joint approach to efficiently manage. • With current vacancies in the OAR DAA for Programs position and without permanent WPO and CPO Directors, we have listed this as a Low priority. 			<p>OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 1 (1.12) of the WPO Strategic Plan FY 2022-2026</p>
<p>#21 Fund adequately and assign management responsibility to the WPO for the Joint Effort for Data assimilation Integration (JEDI) activity under the Joint Center for Satellite Data Assimilation.</p>	<ul style="list-style-type: none"> • WPO's primary approach is to carefully scrutinize additional funding pending satisfactory delivery of data assimilation systems needed by NOAA operations and our community partners. • WPO will also work closely with the existing JCSDA management committee to encourage WPO priorities are included in future JCSDA AOPs • The decision to assign management responsibility for the funding that WPO provides to JCSDA is not with WPO. As a result, we have listed this 	<p>Earth System Research and Modeling Division</p>	<p>FY24</p>	<p>Priority Rating: Low</p> <p>Meets Goals 2, 3 and 4 (2.3, 3.2, and 4.1-4.3) of the OAR Strategic Plan FY 2020-2026</p> <p>Meets Goal 3 (3.7) of the WPO Strategic Plan FY 2022-2026</p>

	as a Low priority because we will need OAR and NOAA buy-in to fully address this recommendation.			
--	--------------------------------------------------------------------------------------------------	--	--	--

Appendix

Recommendations, Responses and Action Plans

R 1: Expand the pool of professionals trained in weather-research fields by considering efforts such as early-career summer training programs (perhaps modeled after the Butler-Williams Scholars Program at the National Institute on Aging), faculty sabbaticals, programs for undergraduate/graduate fellows (perhaps modeled after the Bill Anderson Fund that is expanding the number of historically underrepresented professionals in the hazards and disasters field).

R 1 Response: WPO agrees that engaging students and early career individuals to foster the next generation of weather-related research professionals is paramount to sustaining a strong and diverse workforce. WPO recently hosted interns and fellows through a variety of programs including the William M. LaPenta Internship and the José E. Serrano Educational Partnership Program with Minority Serving Institutions (EPP/MSI). The IRA funded DA Consortium will provide, at a minimum, 20% of its approximately \$7M program to support students in MSI's (Minority Serving Institutions). WPO-supported students through these initiatives will have greater access to NOAA Labs, Centers, and Programs, and potential career opportunities.

R 1 Action Plan: WPO will explore additional opportunities to engage students and early career individuals through internships, mentorships, panel discussions, and career fairs, particularly at minority serving institutions. Specifically WPO will:

- Explore additional opportunities to engage students and early career individuals, including through mentoring.
- Expand community engagement efforts with students through various non-traditional organizations.
- Serve as a liaison between students and NOAA Labs, Centers, and Program Offices.

R 2: In response to concerns about the ability of PIs not previously funded by NOAA to be successful without “insider information” (e.g., partnering with existing/past NOAA-funded PIs or NOAA CIs), design and implement virtual workshops and webinars targeted to non-R1 and minority serving institutions (MSIs), and then publicize those recorded materials, released around the time of the NOFO announcement.

R 2 Response: WPO concurs with this recommendation, and is committed to expanding the diversity and breadth of applicants, reviewers, and recipients of WPO funding opportunities. WPO has implemented a yearly webinar beginning in 2022 focused on expanding access and understanding of the annual notice of funding opportunity (NOFO), particularly for new

applicants. WPO also collects feedback from the PI community on WPO's NOFO application process through a Applicant Customer Experience Satisfaction (ACES) survey. The intent of these engagement efforts are to continue to improve on the application process, decrease barriers to entry, and broaden the scope of applicants and future PIs.

R 2 Action Plan:

- Analyze and implement ACES survey suggestions for the FY25 NOFO to improve the NOFO process.
- Expand our contact list of stakeholders and applicants to include those that may be new to the NOFO process
- Provide videos on our website about the NOFO process to increase transparency.

R 3: Invite MSIs to participate in UFS user workshops and have an MSI host a UFS workshop.

R 3 Response: WPO concurs with this recommendation, and recognizes the significance of increasing its diversity and engagement efforts to expand opportunities for MSIs, HSIs, TCUs (Tribal Colleges and Universities), and other academic institutions of higher learning.

R 3 Action Plan: WPO is planning the following:

- Serve as a liaison between NOAA Cooperative Institutes and Cooperative Science Centers to increase community engagement and establish some MSIs as "UFS Modeling Centers of Excellence."
- Broaden stakeholder engagement efforts by actively considering using an MSI as a host institution for a future Unifying Innovations in Forecasting Capabilities Workshop (UIFCW).

R 4: Develop an active presence on social media to communicate with the public.

R 4 Response: WPO has an account on X (formerly Twitter). @NOAA_WPO currently shares daily posts of new material and research from other NOAA offices, while also sharing WPO-relevant information. By sharing information from other NOAA offices on the WPO feed, other NOAA offices have begun following WPO, liking and/or reposting posts. This has increased the exposure of programs and research within WPO to be shared with a larger audience that receives thousands of views beyond the current 440+ followers. The number of WPO followers increased by more than 33% in 5 months and continues to grow.

R 4 Action Plan: WPO is planning the following:

- Share information about research and grant opportunities on social media.
- Share information about the NOFO, the application process, and WPO webinars to increase accessibility of our funding opportunities.
- Share information and/or links of NOAA resources and research related to current events.
- Due to the limited support we currently have in our communications function and because we have been focused on other communication channels, we listed this as a Low priority.

R 5: *Prioritize tasks including identifying a small number of keystone focus areas as the WPO lacks the resources to do everything it is being asked to do.*

R 5 Response: WPO concurs with the need to sharpen focus around a few keystone areas. With the creation of a new WPO Strategic Plan in 2022, which was developed with significant input from across NOAA and our stakeholder community, and with a new WPO reorganization in 2023 where similar functions and activities have been grouped together, we have identified some possible keystone focus areas to be able to move forward deliberately.

R 5 Action Plan: WPO keystone focus areas include:

- Integrating social and physical sciences so that our forecast products and services are increasingly focused towards effective outcomes
- Improving collaboration with NWS/STI to understand top-most R&D priorities across multiple service areas and the weather value chain
- Focusing the FY25 NOFO on a few keystone focus areas across multiple program competitions
- Specific focus areas could include: S2S forecast improvement, with a focus on the new Seasonal Forecast System; Integrating observations that are focused on models/forecast improvement and NWS's next generation radar system.

R 6 : *Establish a suitably funded hurricane program, as reliance on supplemental funding is inefficient and inadequate to address needs.*

R 6 Response: Since appropriations for the Hurricane Forecast Improvement Program (HFIP) are provided to NWS, WPO does not have a specific funding line or program to support hurricane research. However, WPO still provides substantial funding for hurricane research

through a distributed effort across multiple programs (Hurricane and Ocean Testbed, JTTI, Social Science, Observations and EPIC). In FY22, WPO funded approximately \$6M for hurricane research across these programs. Over the next few years, EPIC will be supporting the release of the HAFS UFS model to the community. WPO also has designated a focal point for hurricane research who works closely with the NWS STI Hurricane Program Manager.

R 6 Action Plan:

- WPO to continue tropical science priorities in our future funding competitions.
- Given a flat budget scenario, WPO does not have the resources to be able to dramatically increase funding to hurricane programs beyond the support it currently provides, which is why we listed this as a Low priority.

R 7: Expand the social-science research focus beyond communicating forecasts, in order to better incorporate the impact and recovery stages of major extreme events, as there is a need to demonstrate the long-term impact that exposure to these events can have on social and economic life for communities.

R 7 Response: WPO's Social Science Program (SSP) funds work that covers both the antecedents and consequences of service delivery as well as work that attempts to elucidate how forecast information can be most effectively communicated visually and verbally to the broadest range of affected audiences. One of the SSP's larger focus areas includes collecting baseline and longitudinal data on the general public's weather-related decision-making processes. While the SSP research portfolio does not yet span the full range of weather hazards, our science priorities are inclusive of all-weather hazards. We also have extended into economic components with new funded work examining the direct economic value of augmented hurricane observations. Finally, response and recovery is also included in the Weather Ready Research grants funded by WPO and administered through the Natural Hazards Center.

R 7 Action Plan: To address the reviewer's recommendations, WPO is planning the following:

- The Social Science Program will continue to work in partnership with both internal NOAA partners and the external weather, water, and climate enterprise to shape timely and relevant science priorities related to impacts and recovery for funding competitions within existing appropriations.
- WPO will explore including relevant impact/recovery questions in future social science surveys as appropriate

R 8: Hire more professionals to address the imbalance between the current staffing level and the increasing demands on the WPO.

R 8 Response: In 2023, WPO designed a new organizational structure that was implemented this year. WPO added several federal FTE (full time equivalent) positions to support key areas, and established four division chiefs to share the supervisory workload. WPO also received five term FTE positions associated with our supplemental appropriations. In total, WPO added 10 FTE positions since the beginning of FY23, all of which should be hired by the end of FY24Q1. At the same time, WPO is continuously monitoring the percentage of funding we use for operating expenses to maximize the funding for research. Next year, WPO will evaluate if our current steady state staffing model is appropriate given the workload, and will adjust if appropriate.

R 8 Action Plan:

- WPO has added 10 additional FTE in the last year associated with our reorganization, all of whom are on track to be hired by the end of calendar year 2023.
- WPO will continue to focus on recruitment and retention efforts over the next year.

R 9: Build the capacity of the Social Science Program to be able to respond to demands and opportunities as there are only two Social Sciences Specialists compared to fourteen General Physical Scientists.

R 9 Response: WPO continuously evaluates the workforce needs of the SSP. The SSP program manager was hired into the Division Chief position. WPO will hire a social scientist program manager to backfill the vacancy, resulting in three FTEs with a social science background. The social science team employs four contractors, more than any other team in WPO.

With the recent Bipartisan Infrastructure Law appropriation, the SSP started a new Societal Data Insights Initiative (SDII). As part of this initiative, WPO is in the process of hiring another Federal social scientist in addition to the recently-hired IT project manager, and WPO has resources to support more social scientists as the project evolves.

R 9 Action Plan: WPO is planning the following:

- WPO is working with the NWS to execute \$40M of service delivery and social science projects under the Bipartisan Infrastructure Law (BIL). Under that effort, WPO is hiring another Federal social scientist in addition to the recently-hired IT project manager to work on the Societal Data Insights Initiative.
- As new weather projects seek and are appropriated resources, we aim to include the social science component of the value chain in our spend plans. As these new initiatives are supported, the increased funding will support the additional staff needed to execute these programs.

- Exploring hiring individuals with interdisciplinary or social science backgrounds for our other programs, particularly since these disciplines are critical for many aspects of scientific program management including building coalitions and partnerships, evaluating the impact and effectiveness of research, etc.
- Given a flat budget scenario, WPO will not have the resources to be able to dramatically increase funding to hire more social scientists, which is why we listed this as a Low priority.

R 10: Nurture WPO staff by ensuring that the work environment and the demands on their time are manageable so that overworked staff do not burn out or find employment elsewhere. Use annual surveys to assess needs.

R 10 Response: We agree that burnout is a risk within WPO, although unfortunately not unlike the rest of NOAA. WPO initiated a discussion within the office about burnout and conducted a WPO workplace well-being survey and organizational culture survey. WPO also hired a contracting firm to help the office specifically in this area. Based on the feedback received, WPO drafted a Culture Action Plan and also identified several initiatives to reduce burnout. We also added 10 new positions, including 4 supervisors, who are already making significant strides to address individual concerns, including those related to workload and work environment within each division. WPO is also in the process of clarifying roles, responsibilities, and policies, which will reduce uncertainty and confusion, and thus burnout.

R 10 Action Plan: WPO is in the process of:

- Clarifying roles, responsibilities, and policies associated with our reorganization, which should reduce uncertainty, confusion and burnout.
- Continue to deploy an annual culture survey in FY24, which WPO first developed in FY23

R 11: Provide professional development opportunities by asking WPO staff to give seminars about EPIC and UFS initiatives at universities (MSIs, R1, and non-R1), and AMS and AGU conferences.

R 11 Response: WPO partners with NWS to provide sessions and town halls about EPIC and UFS at AMS and AGU conferences. EPIC routinely hosts training and engagement events virtually and in-person during AMS and AGU conferences and continues to improve how we communicate and advertise these events. EPIC is working with the UFS Steering Committee to plan UFS roadshows at universities, while also initiating UFS Student and Faculty Ambassador Programs. The first UFS Student Ambassador—a summer intern with the EPIC program team—provided valuable recommendations to WPO. We also anticipate that the upcoming Data

Assimilation University Consortium will provide opportunities for EPIC and WPO to engage with students and postdocs that are supported by the Consortium.

R 11 Action Plan: WPO is planning to:

- Reach out to the AMS Board on Higher Education and/or the AGU Heads and Chairs Program to gauge future potential opportunities to engage with the academic community.
- Continue to provide seminars, presentations, etc. about EPIC and UFS at a variety of venues
- Developing a skills/interests matrix within WPO to align employees' skills and interests with future development opportunities including speaking engagements

R 12: Create an external advisory board to participate in regular reviews—such as the quarterly program review—and provide perspective on WPO activities (e.g., a “Strategic Advisory Board” akin to the NOAA Science Advisory Board), and to serve as resources when discussing future directions such as how to conduct outreach to expand diversity of PIs on submitted proposals or facilitate new/expanded partnerships that promote WPO-funded findings.

R 12 Response: Standing up a new federal advisory committee (FAC) focused on WPO solely is challenging due to the administrative cost of managing such a committee. Under the NOAA Science Advisory Board is the Environmental Information Services Working Group. WPO provides the OAR liaison to this working group. This working group provided reports on EPIC, S2S, HFIP and also authored the Priorities for Weather Research Report, which was a significant driver of our WPO 2022-2026 Strategic Plan. These EISWG reports do not focus on WPO alone, but on cross-NOAA efforts. This larger scope is more useful since it provides a holistic perspective of how Labs, Programs and Line Offices work together to achieve key outcomes.

R 12 Action Plan:

- WPO will continue to solicit input and advice from the Environmental Information Services Working Group (EISWG) and other entities under the Science Advisory Board, including on the topics listed in this recommendation
- It will be difficult to establish a new federal advisory committee (FAC) just for WPO due to the limited number of FACs across the government, and so we have listed this as a Low priority.

R 13: Form an oversight group/committee to monitor timeliness of EPIC updates and community contributions as well as their quality, as UFS is a highly ambitious system and it remains unclear how the open source/open science component will be implemented.

R 13 Response: As noted above, the SAB EISWG includes EPIC among the high-priority projects that it monitors and advises. In FY23, within the UFS structure, EPIC has supported the establishment of a UFS Release Coordination Cross-Cutting team to provide recommendations for timelines and content of UFS releases, and scoping activities summarized in a white paper on “*Hierarchical System Development for the Unified Forecast System*”. The EPIC team is also working closely with the UFS System Architecture and Infrastructure cross-cutting team in identifying and establishing tiger teams to address key topics in establishing and enhancing the UFS Community Modeling Infrastructure.

R 13 Action Plan: WPO is is planning to:

- This recommendation is aligned with Recommendation #17.
- WPO is contributing to the establishment of a NOAA UFS Working Group. This group will include leadership from the various Labs, Programs and Centers within NOAA that are involved in the UFS, and will provide clear prioritization and strategic alignment on NOAA’s interests and investments in the UFS.
- The Community Modeling Board is anticipated to be established soon and will provide community perspectives for the UFS and will help with prioritizing infrastructure needs that EPIC might support.

R 14: Enhance coordination with CPO on UFS-related activities and support of S2S research to cover both foundational research on understanding S2S predictability and R2O research on improving S2S predictions.

R 14 Response: WPO is leading a NOAA-wide effort to develop an S2S Program Plan, beginning with an internal NOAA S2S Meeting. The Meeting and Plan will identify NOAA-wide key priorities, metrics, and strategic approach. The priorities will require better understanding of S2S predictability and stakeholder research needs. A related area where coordination is increasing is the engagement of the Water Management sector. This sector needs precipitation information at various timescales for different kinds of decisions. We are collaborating on fostering partnerships, identifying needs, and sorting out how NOAA addresses these holistically. This effort is larger than WPO and CPO alone.

R 14 Action Plan:

- WPO held an internal WPO S2S workshop in late FY23 to discuss and coordinate S2S research needs and activities across NOAA, which included CPO

- WPO will organize a S2S-focused stakeholder engagement workshop in FY24. We are partnering with CPO, the OAR Labs, NWS Centers, and other Line Offices on this workshop. This workshop will help WPO prioritize research activities in coordination with other offices such as CPO.

R 15: Consider creating/expanding partnerships with entities such as UCAR or Unidata to identify collaborations, skill-building opportunities, and data sharing potential (e.g., coding examples, hosting data at the UCAR Research Data Archive).

R 15 Response: Some current collaborations that are underway or under consideration include funding a project to share NOAA and NASA data to reduce the cost of reanalysis research and development. WPO also supports the IRI Data Library in ensuring the availability of subseasonal and seasonal data to the international WWRP/WCRP community.

R 15 Action Plan: WPO will continue to:

- WPO is leading the effort from NOAA to develop the next NOAA-NCAR MOA, which will include areas of collaboration such as data standards, workforce development, community code development, etc.
- WPO is working towards developing software standards jointly between UFS/EPIC and with NCAR.
- WPO is partnering with social scientists across the community under the Societal Data Insights Initiative (SDII) to conduct hackathons and other workshops to explore new innovative approaches to integrate meteorological and other environmental data with demographic and other types of social data to study changes in flood events.

R 16: To better utilize capabilities in the private sector, expand collaboration with OAR's Technology Partnership Office, including exploring opportunities to use the Small Business Innovation and Research Program to address WPO priorities (e.g., new observing systems); and, as appropriate, work with other offices in NOAA to consider intellectual property approaches (e.g., data licenses) that support NOAA needs and provide incentives for private sector engagement.

R 16 Response: WPO coordinates closely with OAR's Technology Partnership Office (TPO) to ensure important aspects of intellectual property and patents are appropriately addressed in WPO's Transition Plans. WPO has funded several grants to develop new observing system technologies where these aspects have come into play. In addition, TPO has advised WPO on how to foster the commercialization of previously-funded grants. WPO also partners with TPO to serve as merit reviewers for each other's proposals. This collaboration has revealed future

opportunities to inform each other's annual funding priorities and mechanisms for follow-on agreements (i.e. CRADAs) and funding for promising SBIR projects.

R 16 Action Plan:

- WPO will continue to build on its already-strong relationship with TPO. In particular, we are already in the process of discussing with TPO how to develop additional CRADAs to advance industry innovations into operations, and also how to help PIs commercialize some of our funded observations technology projects. We will also continue to serve as reviewers for the SBIR program and explore how to further collaborate with that program.
- WPO employees will attend trainings delivered by TPO, including on Intellectual Property.

R 17: Encourage the EPIC team to work with its operational modeling partners to improve the cost-benefit ratio of collaboration with WPO (e.g., more focus on operational deliverables, reducing management burden, ensuring strategic priorities are shared) and expand its efforts to build a vibrant community around UFS by establishing an ongoing external advisory committee or a workgroup under an existing advisory committee to obtain input on priorities, policies, and governance approaches. Specific actions should include seeking input from social science experts on how to build and maintain a strong modeling community; adopting appropriate best practices from other community modeling efforts (including for earth system, ocean, and atmospheric composition models); cultivating two-way communication between NOAA and the broader community to develop common, mutually beneficial goals; providing a useful example that demonstrates the value of UFS for modelers; considering ways to provide at least 3 years of support for graduate students to ensure sufficient time for them to learn UFS and make significant contributions; engaging OAR to work with other NOAA offices to think “outside of the box” and reduce high performance computing-related barriers for external EPIC partners; and ensuring that data management approaches addresses needs of the community.

R 17 Response: EPIC is already moving forward using a staged approach, and is increasingly cognizant of the need to develop an effective core of committed NOAA Labs, EMC, and skilled external partners. Those steps are listed below in the Action Plan. Some of the broader outreach will be much more successful once this core is developed. Yet, EPIC has still made progress in a number of areas: The EPIC program has 1. led the discussions between NOAA and NCAR on community modeling infrastructure to lower barriers to collaboration, 2. recruited and funded a community modeling specialist at UCAR to better understand and support the community, and 3. established the WINGS Dissertation Fellowship for Ph.D. candidates to focus on developing NOAA's future modeling workforce WPO in partnership with UCAR, and

4. reduced barriers to HPC for external EPIC partners, as well as releasing EPIC datasets through the NOAA Open Data Dissemination Program.

R 17 Action Plan: EPIC's focus for now is to:

- This recommendation is aligned with Recommendation #13.
- Establish an effective governance in NOAA and UFS and a Community Modeling Board.
- Focus on the development and support of 1-3 applications.
- Establish code standards for UFS and utilize the governance to ensure organizations contributing to the UFS utilize those standards.

R 18: *For OAR to improve the return on investment for transition plans while still building strong partnerships, rescind the rigid rules that require projects to create transition plans and instead trust the judgment of the transition experts in WPO to effectively implement NOAA's policy on transition plans and to require plans or components of planning (e.g., discussions between grantees and NWS) where they will be beneficial.*

R 18 Response: Transition plans are a requirement of NOAA Administrative Order 216-105B. Aligned with this recommendation, WPO is collaborating with NWS to significantly revise WPO's current "one size fits all" approach to transition plans, and has recently reached an agreement with NWS to adopt a new set of best practices. The new approach will be implemented in FY24Q1. The core of the best practices is a three phase approach to transition plans, that increase in detail and NWS engagement as the project life cycle and Readiness Levels (RL) increase. These new guidelines are in line with this recommendation and will increase the efficiency and effectiveness of the overall transition plan process.

R 18 Action Plan: WPO has developed a new 3 phase transition plan process in collaboration with NWS. Each phase has increasing requirements for the transition planning process, which improves the effectiveness and efficiency of the R2O2R process. These phases include:

- *Phase 1* - Research to Development or Knowledge
- *Phase 2* - Development to Demonstration
- *Phase 3* - Demonstration to Deployment & Operations

R 19: *Coordinate with additional groups and expand coordination with existing partners (e.g., ICAMS committees on observational systems and research and innovation; key National Air Quality Forecast Capability stakeholders including state and local air quality forecasters, the U.S. Environmental Protection Agency, and the U.S. Forest Service; and*

OAR programs that have shared interests, including ocean observations and unmanned systems) to inform WPO priorities.

R 19 Response: We appreciate this recommendation. WPO staff are already extensively engaged in interagency activities, including all of those mentioned in the recommendation, but we do need to gain better internal coordination on that engagement. Since the review, we had a staff meeting dedicated to discussing opportunities to better engage with ICAMS. In addition, WPO has recently hired a Policy and Partnerships Lead to develop a partnerships strategy for WPO and identify and nurture the most promising partnerships across the federal and international landscape.

R 19 Action Plan:

- After performing an assessment of current engagements, we will assess the time commitment and purpose of each engagement and identify gaps.
- We will identify key current and future partnerships to achieve common goals.
- WPO will utilize its new Policy and Partnerships Lead to develop a partnerships strategy for WPO and identify and nurture the most promising partnerships across the federal and international landscape.
- Due to bandwidth constraints across the office, WPO will only be able to pursue targeted partnerships in the near term. As a result, we do not foresee an ability for WPO to rapidly increase partnerships with a large number of partners including ICAMS, NAQFC stakeholders, other federal agencies, other OAR offices, etc. even though we would like to. As a result, we listed it as a Low priority .

R 20: Develop a coherent and consistent strategy for OAR to task the WPO, CPO, etc., to provide a balanced and manageable portfolio of programs.

R 20 Response: WPO and CPO are coordinating in many areas, including hydroclimatology, subseasonal to seasonal research and development (see Recommendation #14 above), fireweather, and social science. NOAA/OAR is developing Program Plans in several areas that detail NOAA goals, metrics, and the contributions/roles of various groups within NOAA.

R 20 Action Plan: WPO is planning the following:

- With CPO, map out areas that are clearly weather or climate and within one office's scope, and also areas where there is overlap or a continuum that needs additional focus and discussion.

- For the areas where there is overlap, articulate a holistic program that covers the disciplinary scope, assign roles and responsibilities, identify any gaps, and eventually develop a joint approach to efficiently manage.
- With current vacancies in the OAR DAA for Programs position and without permanent WPO and CPO Directors, we have listed this as a Low priority.

R 21: Fund adequately and assign management responsibility to the WPO for the Joint Effort for Data assimilation Integration (JEDI) activity under the Joint Center for Satellite Data Assimilation.

R 21 Response: WPO oversight of JCSDA activities is provided by the interagency Management Oversight Board (MOB), and WPO is an ex-officio member of this body based on appointment by OAR leadership. The MOB has urged WPO to maintain its base support to JCSDA (\$1.6M/year) and we have thus far complied with that request. JCSDA and NOAA MOB members are coordinating reasonably well with the NOAA Program Offices that fund JCSDA, including both WPO and NWS OSTI, however there is room for ongoing attention and vigilance to maintain these relationships. Attention to this need is now being given at the Deputy Assistant Administrator level in three Line Offices.

R 21 Action Plan:

- WPO's primary approach is to carefully scrutinize additional funding pending satisfactory delivery of data assimilation systems needed by NOAA operations and our community partners.
- WPO will also work closely with the existing JCSDA management committee to encourage WPO priorities are included in future JCSDA AOPs.