

The Weather Prediction Center Five Year Roadmap (2022-2027)



The Weather Prediction Center is located within the NOAA Center for Weather and Climate Prediction in College Park, Maryland

National Weather Service

National Oceanic and Atmospheric Organization | Department of Commerce

Message from the Director

Society is increasingly dependent on timely, reliable, and accurate weather information for the protection of life and property and enhancement of the economy. Extreme weather causes hundreds of deaths and hundreds of billions of dollars in damage annually, and these extreme weather events are increasing. At the same time, we are seeing rapid changes in society, technology, and our workforce that require continuous evolution.

The Weather Prediction Center serves as the nation's premier center for forecasting rain storms, winter storms, extreme temperatures and relaying the big-picture weather story. We have a cadre of expert meteorologists focused 24 hours a day, 7 days a week on the weather across the country - from Puerto Rico to Alaska - serving to enhance readiness for hazardous weather events. WPC is at the heart of the weather enterprise and is interwoven into the national readiness framework for extreme weather. For example, some of our products, such as the National Forecast Chart, reach over 45,000 email inboxes of federal, state, and local officials on a daily basis. We are continuously working to improve our forecast capabilities through rigorous science and new innovation, to better communicate the uncertainty inherent in forecasts, and importantly, to connect forecasts to critical decisions.

Additionally, we are the 'glue' of the NWS, collaborating directly with the 122 local Weather Forecast Offices, 13 River Forecast Centers, and other Centers across the nation to develop accurate and consistent weather forecasts and messaging. When you're at the forecast desk, it's 2 o'clock in the morning, and you are making a tough forecast decision, we are 'there' to talk through the meteorology.

This roadmap lays a path to adapt and thrive in this environment of rapid changes in weather, society, technology, and our workforce. It is built upon the National Weather Service and NCEP strategic plans, and provides a more granular plan specific to WPC. Importantly - the roadmap is built upon the foundation of our exceptional people, who are committed to protecting lives and livelihoods by providing the best forecasts for critical decisions. This includes a culture of mutual trust, teamwork, commitment, and service to others. Together we stand united and ready to face the challenges ahead.

David Novak

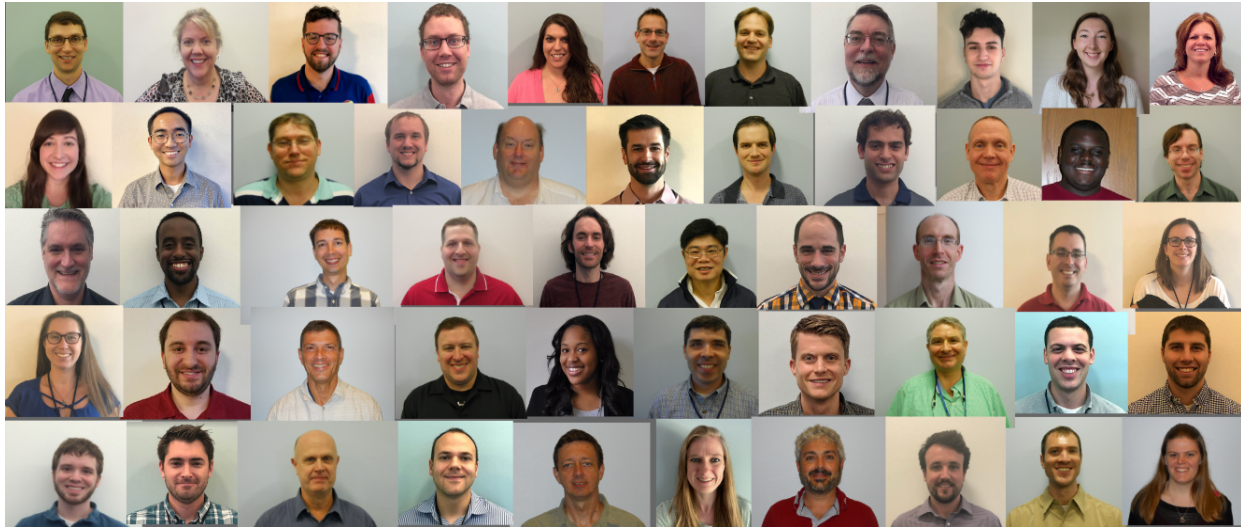
Dr. David R. Novak
Director, Weather Prediction Center



Who We Are:

Our Vision: To be the foundation for impact-based decision support, providing meteorological expertise and service that supports critical decisions.

Our Mission: To synthesize the nation's daily weather story and champion the operational prediction of rain storms, winter storms, and extreme temperature events for the protection of life and property.



WPC synthesizes vast arrays of weather information to crystalize the nation's big-picture weather story. Within this envelope, WPC serves as the nation's premier center for forecasting rain storms, winter storms, and temperature extremes. This wide range of responsibility is unique among national centers, which typically have 1 or 2 phenomenon focus areas (e.g., hurricanes, tornadoes, etc.). It is also a strength, helping to build synergies and efficiencies across programs.



Our Core Principles:

1. Our people drive our success; we are dedicated to our science-based service to the Nation;
2. We provide the best forecasts possible, connecting them to decisions that reduce impacts;
3. We cannot do it alone; teamwork and partnerships are essential for success;
4. We strive for excellence, continuously improving our science and engineering for mission performance.

Guiding Perspectives

WPC is a resource of meteorological expertise to serve and power NWS field offices while also serving as a resource for federal partners and the weather enterprise. It is the NWS's "meteorological nerve-center". This includes the rigorous transition of research-to-operations (R2O), accomplished through the Hydrometeorological Testbed. As local Impact-Based Decision Support Services (IDSS) are expanded, the NWS is looking to WPC for meteorological expertise and to push the scientific envelope. As WPC expands national IDSS partnerships itself, WPC must strike a healthy balance of serving the meteorological community and serving national partners.

Another key balance is the breadth and scope of WPC services. As the NWS looks to embrace WPC as a resource of meteorological expertise to serve and power NWS field offices and the weather enterprise, internal efficiencies must continue to be exploited. Implementation of improved and skillful first guess fields to aid the forecaster is an initial step. Outdated and peripheral products must also be terminated.

WPC does not shy away from automation. However, for the most critical decisions, human meteorological oversight is essential. Much like aircraft pilots who are at-the-ready in an increasingly automated cockpit, our forecasters will be at-the-ready to support critical decision making using, in part, a suite of automated tools. As the National Blend of Models continues to mature, WPC envisions a cadre of experts who use the automated NBM output to monitor, address deficiencies, and intervene when and where it matters ('over-the-loop'). As artificial intelligence (AI) techniques advance, WPC will exploit AI not to replace the forecaster, but rather to *assist* the forecaster.

As we evolve towards more explicit use of probabilistic information, we need to understand what a 'forecaster over-the-loop' process looks like for automated probabilistic elements. Does a forecaster have skill at identifying when the ensembles are under dispersive or missing extremes? WPC will be at the heart of these and other questions - exploring new probabilistic frameworks for the future of weather forecasting.

Partnerships are essential. WPC endeavors to serve field offices with exceptional support 24x7x365. There are local meteorological nuances that WPC may not be aware of, and there is skill that comes from WPC's day-after-day focus on specific areas. The Collaborative Forecast Process recognizes we are best together. This ethos is applied to our work with the National Water Center, where the best water resource forecasts require both meteorological and hydrologic expertise, and our R2O work with the Meteorological Development Lab and Environmental Modeling Center, where the best forecast applications come from a combination of developer expertise and practical forecaster feedback.

We also must improve our science, forecasts, and services and link them to the decisions communities face. For example, the impacts from extreme precipitation are deadly, damaging, and increasing with a warming climate. WPC is leading the charge in a NOAA-wide initiative called the "Precipitation Prediction Grand Challenge" to provide two additional days of lead time for extreme rainfall events for decision makers. WPC is also a champion of the real-time integration of model ensembles, probabilities, scenarios, and certainty into the NWS forecast process to inform IDSS. We are excited at the prospect of spearheading the provision of *quantitative* IDSS - taking IDSS to the next level by objectively linking environmental forecast data to forecast impacts by combining the probability of a weather hazard with critical user thresholds to objectively define the probability of an impact. For example, what is the probability that snowfall rates will exceed plow capabilities?

None of this is accomplished without investment in the people of WPC. We are redoubling our efforts and focus on Diversity and Inclusion, expand employee professional development opportunities, and support a hybrid work environment that promotes flexibility without sacrificing mission excellence.

Goals and Objectives

The *Roadmap* is organized into three overarching goals and subsequent objectives. The three goals come directly from the 2019-2022 NWS Strategic Plan - fostering a clear linkage to the NWS strategy, as well as elucidating how WPC 'fits in' to the overall NWS strategy. The *Roadmap* is also directly aligned with the 2022 NCEP Strategic Implementation Plan, with call-outs to relevant and specific NCEP Implementation Plan activities. The following is a summary of the goals and their high-level activities to be completed during the next five years.

Goal 1: Reduce the impacts of weather, water, and climate events by transforming the way people receive, understand, and act on information.

WPC plays a critical role in this objective - both in the provision of meteorological forecast information and increasingly the provision of national IDSS. Consistent with the NWS strategy, WPC will play a stronger role in forecast generation via the Collaborative Forecast Process (CFP - see Insert Box 1), empowering local forecast offices to shift attention to local IDSS. WPC will increasingly work within a probabilistic framework, leading the real-time integration of model ensembles, probabilities, scenarios, and certainty into the NWS forecast process. WPC will further work towards more objective and quantitative IDSS.

Related NCEP Implementation Plan Activities in Goal 1 include:

- Improve the accuracy, consistency, and accessibility of NCEP analysis and forecast products and services
- Deepen the CFP approach across Centers and with other NOAA/NWS partners
- Be a leader in probabilistic forecast methods and social science in communication of products and services to customers

BOX 1: The Collaborative Forecast Process

The Collaborative Forecast Process (CFP) leverages expertise and resources across the NWS field structure to create the best actionable forecast and IDSS. The CFP has the following attributes:

- Repeatable process with defined techniques, technology and procedures that create accurate and consistent forecasts
- All process participants are heard
- The process has a known timeframe
- Predicated on a common starting point
- Predicated on a common operating picture
- The Regional Operations Centers are a key process facilitator, but not a component in the forecast process
- All will live within the constraints and use the final CFP product as their own



Objective 1.1: Better Information for Better Decisions

Serve as the nation's first alert for major rain storms, winter storms, and extreme temperature events.

- Establish a consistent Hazards-based forecast informed by the National Blend of Models and other probabilistic information out to 7-days.
 - Based on calibrated probability of impact
 - Supported by feature-based post-processing and collaborative software and protocols
- Extend Outlook information to at least 7 days, including the Excessive Rainfall Outlook and the Winter Storm Outlook.
- Extend the daily National Forecast Chart out to 7 days, using objective first-guess fields.
- Leveraging ensembles, extend probabilistic daily temperature and precipitation forecasts out to 10 days to bridge the weather -- sub-seasonal forecast gap.

Increase the accuracy, consistency, and relevance of quantitative precipitation forecasts (QPFs) to users.

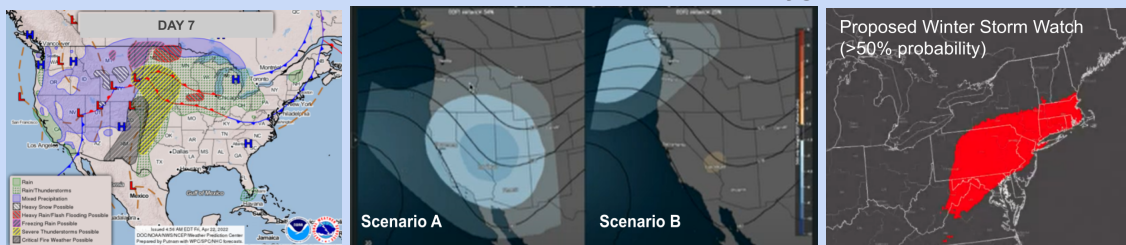
- Operationally implement the QPF CFP - achieving 'one event, one forecast'.
- Partner with the National Water Center and local Weather Forecast Offices to provide calibrated probabilities of impactful rainfall events in support of collaborative Flood Watches.
 - Supported by feature-based post-processing of timing, intensity, and certainty of precipitation
 - Supported by collaborative software and protocols

Increase the accuracy, consistency, and relevance of winter weather forecasts to users.

- Operationally implement the Winter CFP - achieving 'one event, one forecast'.
- Establish WPC's leadership role in collaborative Winter Storm Outlooks and Winter Storm Watches based on calibrated probability of impact.
 - Supported by feature-based post-processing of timing, intensity, and certainty of events
 - Collaborative software and protocols
- Partner with the Storm Prediction Center on winter weather mesoscale discussions and graphics as part of a national met watch for hazardous winter weather events.

BOX 2: Example WPC Product Evolutions

- **Redesign the Day 4-7 Hazards product to objectively tie meteorological hazards to relevant probabilistic exceedance thresholds.**
 - Extend the daily National Forecast Chart from day 1 to day 7, using objective probabilistic first-guess fields for a daily synthesis of impactful weather.
- **Modernize WPC medium range 500mb and Surface prog charts with ensemble cluster analysis.**
 - WPC medium range forecasters to develop expertise in the interpretation and description of alternative scenarios, especially as it relates to hazards/impacts.
- **Issue probabilistic and collaborated Winter Storm Watch polygons via Hazard Services.**



Serve as the foundation of the Nation's Weather Story through exceptional surface analysis, daily forecast charts, and storm summary information.

Lead collaborative inland hazard messaging for inland tropical cyclones, and serve as the official back-up of the National Hurricane Center.

- Strive for a transparent 'handoff' between the NHC and WPC for inland tropical systems.
- Maintain a cadre of tropical experts at WPC, ready to backup NHC at a moment's notice.

Eliminate any and all products and services which do not align with validated customer requirements or are redundant; Aggressively leverage automation to provide skillful starting points and streamline labor-intensive work.

Objective 1.2: Timely and Consistent Messaging

Lead the Day 1-7 Collaborative Forecast Process for rain storms, winter storms, and temperature extremes, to deliver one consistent NWS forecast from national to local scales.

- Monitor the National Blend of Models and collaborate interventions when and where it matters most.
- Frequently evaluate verification and hone expertise through training and research.
- Execute a visiting forecaster exchange to build mutual trust and understanding.

Galvanize partners and media around consistent, coordinated messaging through the use of Key Messages for major rain storms, winter storms, and extreme temperature events.

Leverage the media's unique capabilities to reach the public.

- Engage media partners on real-time events threatening lives and property.
- Better serve media through expanded access to KML, Shapefile, and other GIS-enabled file formats.
- Offer media detailed training on the Center's services.

Support an active social media presence to quickly inform the public of impending weather hazards.

Objective 1.3: Transformative Impact-Based Decision Support Services (IDSS)

Connect forecasts, outlooks and watches to decisions made by core partners to ensure effective preparedness and response, especially for rain storms, winter storms, and extreme temperature events.

- Develop & execute IDSS playbooks for extreme rainfall, winter storms, and extreme temperature events.
- Emphasize expert interpretation, consultation, and communication of forecasts and their impacts.

Provide foundational data and expertise in support of IDSS at local, regional, and national scales.

- Invest in 'off-season' training of IDSS enablers (WFOs, RFCs) and Emergency Management, State officials, Media, and other users of WPC forecast information.

Foster enhanced service to historically underserved and vulnerable communities.

- Partner with NWS field offices and NOAA programs to build relationships with historically underserved and vulnerable communities with focused engagement.
- Raise real-time awareness of the overlap of real-time weather hazards with social vulnerabilities via datasets and tools, such as the CDC vulnerability index.
- Double the number of Spanish language translation products.

Anticipate and respond to evolving partner and customer requirements and needs.

- Engage partners and customers regularly to provide product and service updates, solicit feedback, and identify lessons learned. Use forums such as stakeholder surveys, stakeholder workshops, and through various R2O engagements.
- Learn critical operational thresholds of users; formalize these as DSS thresholds through the Impacts Management System.

Provide specialized decision support services to OCONUS and International partners.

- Provide OCONUS partners specialized tools and services, such as the Galvez-Davison Index, Winter Storm Severity Index, and Hazard outlooks.
- Provide USAID first alerts for hazardous weather in the Caribbean, Central and South American via the International Desk.

Goal 2: Harness cutting-edge science, technology, and engineering to provide the best observations, forecasts, and warnings.

The co-location of operations and development is a unique strategic strength for WPC. The synergy of innovative ideas with practical operational reality results in operational meteorological advances. A key WPC advance is specialized post-processing in areas of extreme rainfall, winter storms, and temperature extremes. WPC is committed to supporting IDSS for these phenomena in a probabilistic framework, aligned with the FACETS paradigm (see BOX 3). As artificial intelligence (AI) techniques advance, WPC will exploit AI not to replace the forecaster, but rather to assist the forecaster. Finally, as part of a larger, multi-year NWS challenge, we need to improve the health of our information technology, as world-class operations and R2O *requires* world-class IT.

Related NCEP Implementation Plan Activities in Goal 2 include:

- Leverage testbeds/proving grounds to improve collaboration with R&D partners and accelerate R2O
- Modernization of NCEP websites: consistency between Centers, efficiency for hosting, & better accessibility
- Build towards full backup capability for all operational systems
- Evaluate requirements for optimal level of world-class IT services for employees

BOX 3: Forecasting a Continuum of Environmental Threats (FACETS)

FACETS
FACETS is an effective, modern, impact-based hazards paradigm

Use Probabilistic Impact Information to Drive Messaging

- Outlooks raise awareness and guides Watch issuance collaboration
- Watches issued at moderate probability of event or impact
- Warnings issued at high probability of event or impact

Impact-Based Decision Support

The FACETS paradigm modernizes high-impact weather forecasting and communication processes by adapting it to evolving technology, with particular emphasis on a probabilistic framework, products and services guided by social science, and data and services that are frequently updated. WPC’s probabilistic hazard information is foundational for this framework.

Objective 2.1: Research to Operations and Operations to Research (R2O/O2R)

Lead the evolution of probabilistic hazard information serving as the foundation for IDSS.

- Continue development of probabilistic rainfall, winter storm, and temperature information in support of a FACETS paradigm.
- Lead training on probabilistic approaches, visualizations, and services, such as the use of objective ensemble clusters as a proxy for alternative scenarios.

Elevate the role of the Hydrometeorological Testbed in testing, evaluating, and demonstrating innovations for extreme rainfall, winter storms, and temperature extremes.

- Leverage the NOAA JTTI, EPIC, and Precipitation Prediction Grand Challenge initiatives (see Insert Box 4).
- Develop and implement methods to quantify and convey forecaster confidence and uncertainty.

Enhance and extend forecast skill for high-impact weather, especially precipitation, by facilitating interactions among academia, researchers, stakeholders, and operational forecasters.

- Facilitate the exchange of operational needs and experiences with researchers (O2R).

Incorporate social science best practices into interactive product and service design.


- Foster deep and interactive exchange with users in developing new services (co-develop).
- Apply risk communication best practices to effectively communicate uncertainty.

Objective 2.2: Advanced Models

Elevate WPC's role in guiding the development of new Unified Forecast System components, in collaboration with EMC and the UFS community.

- Consistent with the Precipitation Prediction Grand Challenge initiative, champion DOUBLING the historical rate of improvement of the skill of precipitation forecasts (from 15% per decade to 30% per decade), effectively adding 2 days of lead time to community decision makers for extreme precipitation and temperature events.
- Be THE trusted partner EMC turns to for evaluation and testing of operational precipitation advances.
 - Connect forecasters with model developers via shadow shifts and exchanges
 - Actively participate in UFS community forums

BOX 4: Precipitation Prediction Grand Challenge



What is the Precipitation Prediction Grand Challenge?

Provide more accurate, reliable, and timely precipitation forecasts across timescales, from mesoscale weather, through week 3-4, S2S, to S2D through the development and application of a seamless, fully coupled Earth System prediction model.

The impacts of extreme precipitation are deadly, damaging, and increasing with a warming climate. The PPGC is a multi-year NOAA Research-to-Operations strategy to provide more accurate, reliable, and timely precipitation forecasts from hours to seasons. Emphasis is placed on addressing the challenge across the value chain, from research and observations, to models and post processing, culminating in actionable services for communities.

Establish WPC's role in specialized post processing for rain storms, winter storms, and temperature extremes.

- Extract unique information from ensembles, such as precipitation rate, timing, feature tracks, and probability of extremes.
- Place forecasts in a climatological context for NWS field offices and the weather enterprise.

Spearhead the provision of quantitative IDSS.

- Explore correlating specific observed weather to observed impacts to predict impacts (e.g., predictive analytics), in support of quantitative IDSS.
 - Initially focus on using the Winter Storm Severity Index to objectively link forecasts to impacts
 - Partner with DOTs, CDC, other Agencies, and the private sector to gather relevant impact datasets
 - Leverage the NWS IDSS Management System

Energize collaborative NBM development with MDL, serving as the center of excellence for testing and transferring approaches for the best probabilistic Blended Model precipitation forecasts

- Be THE trusted partner MDL turns to for specialized post-processing of precipitation elements.
 - Serve NBM specialized precipitation fields
 - Provide operational viewpoint applied toward the development and testing of approaches going directly into NBM.
- Connect developers via shadow shifts and exchanges.

Objective 2.3: Systems, Technologies, and Tools

Incorporate predictive analytics, artificial intelligence, and automation to combine forecast information with impacts information and focus forecaster time and energy when and where it matters most.

- Explore AI-powered first-guess frontal analyses, rainfall, winter storm, and temperature forecasts
- Utilize tools that expose NBM targets-of-opportunity.

Complete the operational transition to the NWS AWIPS platform.

- By 2024, initially transition rainfall and medium range desks to the AWIPS platform.
- By 2026, address all operational and development aspects including back-up, pre-deployment software testing, maintenance and support arrangements, pre-and post-processing and monitoring, and storage for post-analysis.
- By 2026, establish AWIPS Hazard Services for Outlooks and collaborative Watches.

Improve internal IT processes.

- Explore what is most effectively run on the Compute Farm, on WCOSS, and on a public cloud; execute any necessary shifts in the compute platform.
- Implement a more rigorous software development process, including version control and comprehensive documentation.

Establish world-class IT infrastructure to support provision of world-class services.

- Exploit enterprise cloud services, with a goal to effectively double compute capacity every 3 years.
- Increase the level of expert System Administration support to WPC through virtual machine experts, cloud experts, GIS experts, and network experts.

Establish comprehensive back-up capability for the Center's products and services.

- Explore early adoption of cloud platforms as a partial solution.

Improve the user's web experience.

- Re-imagine the WPC website based on the vision of a seamless NWS suite of National precipitation and hazards forecasts and probabilistic services out to 10 days.
- Modernize the WPC website to be user-friendly, mobile-friendly, and informed by social science.
- Serve NWS offices and the Weather-Enterprise with innovative web-based tools beyond those available in AWIPS and other commercial partners.

Goal 3: Evolve the NWS to excel in the face of change through investment in our people, partnerships, and organizational performance.

WPC will be the meteorological engine of the NWS, powering IDSS throughout the NWS. Maintaining our meteorological and scientific expertise is a priority, as we can not be complacent in this responsibility. The success of WPC in this endeavor is through its people. We strive to create a culture where WPC employees are comfortable to be themselves, feel valued, are motivated to contribute to the best of their ability, and have opportunities to grow. This includes a culture of mutual trust, teamwork, commitment, and service to others. We extend this ethos beyond our boundaries, to build the NWS forecast together with our peers shift-after-shift, and build collaborative partnerships with peer organizations and our stakeholders year-after-year.

Related NCEP Implementation Plan Activities in Goal 3 include:

- Develop NCEP leadership development programs consistent across all centers to grow leaders at the supervisor, manager and director levels
- Develop/pilot improved work models to improve employee health and retention
- Improve and grow science and operation partnerships with internal NOAA offices, U.S. interagency organizations, and with international bilateral and multilateral entities
- Address staffing, service and functional gaps across all NCEP Centers

Objective 3.1: Diversity & Inclusion

Cultivate a culture that is inclusive and respects individuals for who they are and the different perspectives, experiences, and skills they bring to the workplace.

- Provide training and experiences for building expertise in teamwork, conflict management, and effective interpersonal communications.
- Strengthen the Center culture of mutual trust, teamwork, commitment, and service to others. Achieve an atmosphere where feedback and respectful challenging of each other to do even better is embraced.
- Ensure psychological safety. Encourage openness and an atmosphere of healthy debate where everyone can share their ideas and perspectives without fear of retribution. Ensure employees can be their authentic self.
- Enforce zero tolerance for racism, sexism, bullying, and microaggression within the workplace.

Attract and retain a workforce of the nation's best meteorological experts that reflects the diversity of the people we serve.

- Provide opportunities for building familiarity and interest among candidates *before* a vacancy is available through forecast shadow experiences, internships, details, and testbed engagements.
- Redouble outreach efforts to traditionally underserved communities.
 - Establish regular interactions with Historically Black Colleges and Universities (HBCU) and Minority Serving Institutions (MSIs) and women in STEM to build relationships and familiarity with WPC
 - Ensure distribution of job opportunities among HBCU, MSIs, and women in STEM to increase the diversity of candidate pools.
- Achieve 100% compliance of NWS and NCEP Diverse Hiring Panel Guidance - including assembling diverse hiring panels for all recruitments and competitive training opportunities.
- Establish 'Stay Interviews'.

Recognize and reward efforts to foster a diverse and inclusive workplace.

Build team cohesion among forecasters, developers, managers, and support staff.

- Rejuvenate shadow shifts among forecast, development, management, contract, and affiliate staff.
- Establish details in the development branch and HMT and vice-versa.
- Create opportunities for informal socialization among team members.

BOX 5: The Lapenta Student Internship Program



In recognition of the many contributions of Dr. William (Bill) Lapenta to advance NOAA science and services, the [Lapenta Student Internship Program](#) pairs current students with work in areas that will provide robust research and/or operational experience. WPC has hosted over 15 students, several of which are now NWS employees, as part of developing the next generation of meteorologists.

Objective 3.2: Workforce for the Future

Transition the forecaster to higher-order decision making in the forecast process to focus forecaster interventions to NBM when and where it matters most.

- Be THE NBM precipitation and temperature experts - developing deep understanding of the strengths and weaknesses of NBM to target value-added adjustments.

Double down on meteorological training to ensure sustained expertise.

- Train in the generation and use of probability distribution information, including its application to forecast uncertainty and forecaster confidence.
- Train in the latest model and post-processing techniques and data.
- Train in new analysis, precipitation, and predictability science.

Develop a cadre of WPC Emergency Response Specialists to perform the highest level of decision support (e.g., FEMA, DHS, White House).

Promote opportunities to position employees for leadership and management roles within the Center, NCEP, NWS, NOAA, and elsewhere.

- On an annual basis ensure at least 70% of WPC employees attend a major conference or workshop.
- Encourage and support employees to pursue detail opportunities.

Strengthen leadership and management by enhancing coaching, mentoring, and accountability.

- Aggressively pursue opportunities for staff participation in CLASS, FEI, and other leadership courses.
- Execute the bi-annual WPC management survey in a fully transparent and accountable manner.

Embrace schedule flexibility where possible while retaining security and effectiveness.

- Embrace and support a hybrid work environment that is equitable to the degree possible, and that maximizes the benefits of in-person engagement alongside the flexibility of telework.

Recognize and reward efforts to advance science and technology infusion, IDSS, teamwork, innovation, and challenging the status quo.

Objective 3.3: Organizational Alignment

Solidify WPC's national brand recognition for rain storms, winter storms, and temperature extremes.

Lead the Collaborative Forecast Process to improve the quality, consistency and accuracy of forecasts, reduce duplication of effort, and drive greater integration across the NWS.

Leverage the expertise and capabilities of the National Water Center, National Operations Center, and Regional Operations Centers to execute the WPC operational mission.

Expand development partnerships with the National Water Center, Meteorological Development Lab, and Environmental Model Center to sustain extreme rainfall, winter storm, and extreme temperature forecast improvements.

- Launch a regular forecast shadowing and exchange program with the NWC, MDL, and EMC.

Foster an even deeper relationship with FEMA, USACE, CDC, FHWA, NRC, DOE and other Federal Agencies at the national and regional levels.

Advance WPC team cohesion through shadow shifts, testbed participation, and in-depth onboarding.

Address Center structural deficiencies to match workload to workforce.

- Establish an Information Technology Officer, dedicated web support, and dedicated GIS support.
- Improve the employee-to-supervisor ratio to enhance employee mentoring and coaching.
- Address service gaps and staffing needs through a combination of reorganization, responsible automation, and staffing investment.

Acknowledgements

The roadmap benefited from direct support from the NCEP Office of the Director, and feedback from over 15 operational units across the NWS. The roadmap also benefited from extensive feedback from recent stakeholder engagements. Finally, the WPC 'core team' spent countless hours incorporating staff ideas, debating, and developing the roadmap. The core team was:

Amy Campbell
Gregory Carbin
Clarissa Gibson
Kathryn Gilbert
Bryan Jackson
Mark Klein
Alex Lamers
James Nelson

Lara Pagano
Frank Pereira
Allison Santorelli
Cody Snell
Zack Taylor
John Ten Hoeve
Bruce Veenhuis