




# EISWG Review and Recommendations to NOAA of “Report to Congress – Hurricane Forecast Improvement Program”

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Presented by EISWG HFIP Task Team  
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# Committee Charge, Weather Act Requirement, & Response

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**Committee Charge:** Provide advice on (1) prioritizing initiatives, (2) existing or new technologies or techniques, and (3) identifying opportunities to improve communications and partnerships.

**Weather Act, Title 101, Sec 104:** (a) NOAA, in collaboration with the weather industry and academia, shall maintain a project to improve hurricane forecasting, (b) that the goal will have 3 focus areas, and (c) NOAA shall develop a plan that details the research, development and technology transfer, as well as the resources and timelines, necessary...

**“HFIP Report”** - *Report to Congress, Hurricane Forecast Improvement Program. 2019. 15 pages.*

- “Necessarily Complex” - 1 goal, 3 focus areas, 5 challenges, 4 new metrics, 6 key strategies, each with 3-4 priorities and 4-5 objectives (see report Appendix 1 for summary bullets)

**“HFIP Plan”** - *Hurricane Forecast Improvement Program Five-Year Plan. 2019-2024. 83 pages.*

- Subtitle: *Proposed Framework for Addressing Section 104 of the Weather Research and Forecasting Innovation Act of 2017*

# Subject Matter Experts - Broaden Task Team Expertise

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- **Julie L. Demuth**, Ph.D. Project Scientist II – Mesoscale and Microscale Meteorology Laboratory, National Center for Atmospheric Research (EISWG member as of August 2020)
- **James D. Doyle**, Ph.D., Senior Scientist ST, Marine Meteorology Division, U.S. Naval Research Laboratory
- **Kerry A. Emanuel**, Ph.D., Professor of Atmospheric Science, Massachusetts Institute of Technology
- **Michael Lindell**, Ph.D., Emeritus Professor, Texas A&M University; Affiliate Professor, University of Washington Department of Urban Design & Planning; Affiliate Professor, Boise State University Department of Geosciences; Affiliate Professor, Oregon State University School of Civil & Construction Engineering
- **Rick Luettich**, Ph.D., Professor and Director, Institute of Marine Sciences, College of Arts and Sciences, The University of North Carolina at Chapel Hill
- **Lynn K. (Nick) Shay**, Ph.D., Associate Dean of Research and Professor, Department of Ocean Sciences, Meteorology and Physical Oceanography Program, Upper Ocean Dynamics Laboratory/WERA Operations, Rosenstiel School of Marine and Atmospheric Science, University of Miami

***SME's Provided Independent Written Reviews, Participated in Virtual Interviews, and Reviewed Draft Report***

# Review Structure – 6 Sections

1. Is the HFIP report responsive to the Congressional request (c), “**details the specific ... activities, as well as corresponding resources and timelines, necessary** to achieve the goal”, overall?
2. Is the HFIP report responsive to the specific focus identified in (b)(1), “improving the prediction of **rapid intensification and track** of hurricanes”?
3. Is the HFIP report responsive to the specific focus identified in (b)(2), “improving the **forecast and communication of storm surges** from hurricanes”?
4. Is the HFIP report responsive to the specific focus identified in (b)(3), “**incorporating risk communication research** to create more effective watch and warning products”?
5. Expanding Partnerships and Collaboration to Accelerate Progress
6. Review Summary

*Footnote: Indexing above follows indexing in The Weather Act, Title I, Sec. 104.*

## Section 1: Response to (c) Overall Project Plan

Findings: The primary role of HFIP since 2009 has been to identify and rapidly transition promising research to operations. The HFIP Report describes an expanded scope prompted by the Weather Act goals without a change in budget.

Recommendations: To address The Weather Act Title I, Sec. 104 (c), the expanded scope must be mapped to necessary resources and timelines.

## Section 2: Response to (b)(1), Rapid Intensification & Track

Findings: Forecasting intensity change remains a coupled atmosphere-ocean modeling challenge that includes still uncertain physics and the need for continually-improved data assimilation. The Hurricane Analysis and Forecast System (HAFS) provides an environment for testing new developments.

Recommendations: Expand participation through dedicated science campaigns that cross the atmosphere-ocean interface to improve model physics and data assimilation, and increase the use of probabilistic forecasts to quantify uncertainty. Continue HAFS development and entrain more external researchers.

## Section 3: Response to (b)(2), Forecast & Communication of Storm Surges

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Findings: HFIP ties storm surge improvements to advances in the hurricane forecasts that drive the storm surge models, not to the surge models themselves. NOAA-supported social science research has led to successful storm surge warning products, yet gaps remain in current communications strategies.

Recommendations: Communicating storm-surge risk should be prioritized, account for uncertainty from multiple sources, and address diversities of human perception, behavior, and needs. Evaluation and improvement of operational storm surge models should also be prioritized.

## Section 4: Response to (b)(3), Risk Communication Research for Watch/Warning Products

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Findings: HFIP notes the marked improvements from social/behavioral research on storm-surge flood maps and provides general plans to incorporate social/behavioral research on a suite of products, but the report lacks detail on how the advances will be achieved. Quantitative measures of success for risk communication research are lacking.

Recommendations: Severe weather can evoke subsequent hazards; watch and warning products need to address risk from multiple threats. Developing a strategic plan for social and behavioral research with milestones and metrics should be a high priority to ensure forecasts and forecast products address diverse societal needs and impacts.



## Section 5: Expanding Partnerships and Collaboration

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*Findings:* The need for improved hurricane forecasts is urgent. Physical, social and behavioral sciences, as well as observation and modeling technology, are advancing across government, academic and industry sectors, while NOAA budgets are increasingly constrained. Broader coordination, internally across OAR, NWS and NOS, and externally across government, academic and industry sectors, will be required to support targeted research motivated by operational needs.

*Recommendations:* Increase internal coordination across OAR, NWS and NOS, and expand science and technology partnerships to achieve Weather Act goals.

## 6. Review Summary

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- Congress has articulated the critical goal of improving hurricane forecasts and warnings to save lives, property and livelihoods – NOAA research establishes the growing urgency.
- NOAA responded with the *HFIP Report* based on an *HFIP Plan* prepared by 20 NOAA experts.
- EISWG HFIP Task Team & six distinguished Subject Matter Experts reviewed the *Report*.
- The *Review* identifies and commends HFIP for its critical role - that of rapidly transitioning promising research to operations.
- The *Review* finds that structural and financial limitations of HFIP must be addressed, and critical gaps filled, to more rapidly address the urgent goal of the Weather Act.
- The *Review* recommends that NOAA continue to support HFIP plus:
  - (1) invest in additional physical, social and behavioral science research, motivated and targeted by an expanded set of success metrics,
  - (2) leverage scientific and technological advances enabled by other line offices, testbeds, agencies, organizations and industry,
  - (3) entrain a broader network of expert personnel external to NOAA for convergent research and workforce development.

# Questions?

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