

Coastal Flooding and Inundation Information and Services at Climate Timescales to Reduce Risk and Improve Resilience



NOAA RESPONSE TO THE SCIENCE ADVISORY BOARD'S REVIEW OF THE COASTAL INUNDATION AT CLIMATE TIMESCALES WHITE PAPER

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TO: NOAA's Science Advisory Board

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Coastal Inundation at Climate Timescales Overview

In April 2020, the NOAA Climate Team agreed to champion the drafting of a white paper detailing the creation of coastal inundation products at climate timescales. Representatives from every Line Office at NOAA then wrote the strategy for developing a capability to produce and deliver authoritative, easily accessible data and products complemented by tools, applications, and decision-support services that are nationally consistent and that enable all communities to advance the resilience of the Nation to coastal inundation now and in the future.

The Review

In May 2021, the NOAA's Weather, Water, and Climate Board invited the Climate Working Group (CWG), a sanctioned working group of NOAA's Science Advisory Board (SAB), to provide a review of the white paper. In September 2021, the Review Team presented that review to the SAB Members. SAB Members accepted the recommendations and added points for NOAA's consideration; the package was forwarded to Dr. Richard Spinrad as Under Secretary of Commerce for Oceans and Atmosphere.

NOAA's response to that review follows.

Response to the Recommendations

NOAA is grateful for, and agrees with, the recommendations. Moreover, with appreciation for the CWG's/SAB's thorough and timely review, the recommendations were incorporated in full into the White Paper and will also inform the development of the Implementation Plan.

CWG Recommendation #1

NOAA's Aspirational Vision. Clearly state the aspirational vision at the beginning of the document. This statement should include the need, the type of tools to be developed, NOAA's capacity, and how the initiative fits with the focus of several other federal agencies in planning for a more dynamic coast.

NOAA Response. Agreed. The text has been updated to clearly articulate the vision including, working with Federal and other partners to provide a national foundation of regional and local climate timescale coastal inundation information and services that will provide off-the-shelf, publicly accessible information that is sufficiently refined to be directly relevant to place-based decision making; and enable a private-sector marketplace of value-added information. Decision-support services will be offered equitably to all U.S. coastal states and territories through creation of, and support for, communities of practice and extension networks that increase local capacity.

CWG Recommendation #1 // Action #1. Review and revise the opening statement of the document to clearly state the aspirational vision as it engages NOAA's commitment to protect life and property and NOAA's unique mandate to provide forecast information. This statement should address the timeframe and extent of the need, the type of tools to be developed, and NOAA's current capacity and additional needs. It should also address how the information to be provided by the initiative supports the efforts of other federal agencies in building the capacity of all communities to adapt to an increasingly dynamic coast.

NOAA Response. Agreed. The introductory text was updated and expanded to address the concerns identified above.

CWG Recommendation #1 // Action #2. The research plan should consider the Emergency Management Cycle (Figure 3) as an appropriate way to frame the need of NOAA's coastal inundation tools in homeland security sectors. This would also link the well-developed framework on how tools address different timelines in capabilities with the need by users from just before and after a flooding event to long-term mitigation. Forecasting exposure and consequences at immediate and climate timescales is critical to addressing the disaster cycle, and this may provide users with tools that address real problems by following the collaborative design process, which like co-production engages decision makers in the design (Figure 3).

NOAA Response. NOAA agrees that there are lessons to be learned from the emergency management community in terms of "framing the need of NOAA's coastal inundation tools". However, learning from just the emergency management cycle leads to a "reactive" approach to coastal inundation threats. The models and approaches in the whitepaper allow for a more "proactive" approach to identify, anticipate, and plan for future coastal inundation risks.

CWG Recommendation #2

Scale-appropriate Decision-making Information. Include a research plan on developing multi-scale inundation products or user-accessible downscaling tools for translating proposed coastal inundation forecasts into scale-appropriate decision-making information.

NOAA Response. Agreed. The text has been revised to better describe the scale of information to be produced and implementation planning will include downscaled approaches, e.g., "Information will be produced on a scale that is relevant to local decision making, which could include down to the parcel level in those cases where the following three criteria are met: (a) there exists a demonstrated user need, (b) NOAA believes there is sufficient scientific skill that allows for communication of information at this scale, and (c) information is able to be delivered at this scale on a national basis."

CWG Recommendation #2 // Action #1. The research plan needs to develop scalable approaches for translating NOAA coastal inundation forecast products into usable, scale-appropriate information for decision makers and communities. These

approaches could build on dynamic downscaling models such as those developed by the U.S. Geological Survey's (USGS) Coastal Storm Modeling System (CoSMoS) program (Figure 4). Statistical downscaling approaches could also be used to downscale coarse inundation forecast products when informed by existing high resolution inundation products such as Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps or satellite-derived inundation extents for coastal areas.

NOAA Response. NOAA agrees that it is important to detail how scale-appropriate information for decision makers and communities will be developed, which NOAA will undertake as part of the Implementation Plan process.

CWG Recommendation #3

Usability by Underserved Communities. Include a discussion of how the overall design of the suite of observations, models, tools, and products will provide off-the-shelf, public options that are sufficiently refined and tailored to be directly usable by under-resourced and underserved communities.

NOAA Response. Agree. The text has been revised to better describe that the publicly available products should be sufficiently refined to be directly relevant to place-based decision making, including the following statement, "Beyond improvements to data access, the service delivery components of this proposed capability will ensure that all users, especially socially and economically vulnerable populations, have access to training to support their understanding and application of this information. This enhanced understanding will empower users to apply this information to their decision making and engage within the ongoing co-development process."

CWG Recommendation #3 // Action #1. The goals of citizen science need further consideration and elaboration in the main body of the document. There is no mention of citizen science outside of Table 4.1. Pages 15-16 of the document contain a discussion of decision makers which may be a place for expanded discussion of needs of underserved communities and strategies, including co-production of knowledge, to meet those needs.

NOAA Response. Agreed. The text has been revised to better indicate the

role of Citizen Science in the main body of the document.

CWG Recommendation #3 // Action #2. More detail on strategies and goals in meeting these needs should also be reflected in detailed objectives presented in Appendix C. For example, the discussion of Integrated, Centralized, and Operational Infrastructure objectives (pg. 55) envisions a “one stop” web-based “shop” for coastal inundation as a 10-year goal. As currently described, the shop is intended “to provide users and partners baseline data and decision-support information, thus enabling value-added information and services.” In this defining statement, it is important to address how NOAA will provide usable information, tools, and products for those unable to afford value-added services.

NOAA Response. NOAA agrees that it is important to detail how the actions called for in the White Paper will be implemented, which NOAA will undertake as part of the implementation planning process to follow.

CWG Recommendation #3 // Action #3. Current threats, losses, and needs are particularly acute in historically underserved communities and major federal initiatives to increase resilience (e.g., FEMA Building Resilient Infrastructure and Communities (BRIC)) are already underway. To better support the resilience of these historically underserved communities, NOAA should consider accelerating the 10-year timeframe suggested for “developing a coastal inundation partner engagement framework and capacity” (pg. 54).

NOAA Response. Agreed. All of the 5- and 10-year goals will be prioritized during implementation planning and could be accelerated, pending sufficient resources and the state of the science. Recently received funding from the Infrastructure Investment and Jobs Act (IIJA) have enabled NOAA to start on the subseasonal to annual component of the work.

CWG Recommendation #3 // Action #4. Developing citizen science capacity, with recognition of the constraints on under-resourced communities should be integrated into detailed objectives in Appendix C, where it might be related to topics including monitoring, building understanding of local needs, and developing partnerships and trusted relationships.

NOAA Response. Agreed. The text has been revised to better incorporate

Citizen Science in the Detailed Development Objectives (Appendix A). This and other strategies will be further defined in the Implementation Plan.

CWG Recommendation #4

Coordination Necessary for Success. Consider including, and begin planning for, the extensive coordination that will be necessary for this effort to be a success. This will include both internal, cross-line office [*sic*] coordination and external, interagency coordination.

NOAA Response. Agreed. The text has been revised to include statements about the need to work with Federal and other partners and added a new recommendation to “Convene Federal Collaboration and Pursue Partnerships focused on advancing a whole-of-government approach to coordinate coastal inundation research and service delivery, using existing interagency fora and connections between Federal and non-Federal partners, including local governments, NGOs, private-sector enterprises, and academic institutions.”

CWG Recommendation #4 // Action #1. Include a section of the document with two sub-sections: (1) Internal NOAA cross-line office [*sic*] coordination and (2) External coordination across federal agencies. This section could describe the initial thoughts on the ‘who’ and ‘how’ to coordinate tool development, product development, and product delivery and outreach. NOAA has some fantastic resources that should be tapped for this effort; product delivery should meet the needs of fellow federal agencies that can facilitate the engagement with the communities of practice.

NOAA Response. NOAA agrees that it is important to detail how the actions called for in the White Paper will be implemented and the leads for each action, which NOAA will undertake as part of the implementation planning process.

SAB Additional Point #1. This is an urgent topic that provides NOAA an excellent opportunity to exercise leadership in national security. It is critical for NOAA to collaborate successfully across the federal government, with state and local municipalities, and in other sectors to assist the Nation’s coastal communities to

prepare, adapt, respond, and “build back better” in the face of climate change, sea level rise, and other factors that cause inundation.

NOAA Response. Agreed. The text has been revised to state the need to pursue partnerships focused on advancing a whole-of-government approach to coordinate coastal inundation research and service delivery, using existing interagency fora and connections between Federal and non-Federal partners, including local governments, NGOs, private-sector enterprises, and academic institutions.

SAB Additional Point #2. The White Paper did an excellent job of addressing water issues associated with inundation, but would benefit from the additional consideration of geomorphological and ecological responses caused by inundation and their consequences; this is a specific opportunity for the White Paper to address the broader interdependencies among federal agencies and clearly outline essential partnerships for the success of this initiative in addressing challenges caused by inundation.

NOAA Response. Agreed. The text has been revised to detail the partnership with the U.S. Geological Survey to produce coastal hazards outlooks of ocean driven changes in coastal morphology and to include more references to coastal habitat and other ecological impacts and natural and nature-based adaptation solutions.

SAB Additional Point #3. Success of this effort is contingent on NOAA’s leadership and broad participation of collaborating agencies and entities. It is critical that NOAA show this leadership by clearly defining the standards and requirements, stipulating that all relevant data be open and available through open Application Programming Interfaces, and that relevant software tools are open source for all its work in this area.

NOAA Response. Agreed. The White Paper states the need to “develop data services in multiple formats that support open source and proprietary applications.”

SAB Additional Point #4. The review could have benefitted from more directly linking the recommendations to the White Paper. For example, there are clear

disconnects between the review report recommendation to provide scale-appropriate decision-making information and the “boots on the ground” approach described in the White Paper. Aligning the scale at which information is provided with the scale at which it is most useful to communities is a challenge that must be acknowledged and confronted.

NOAA Response. Agreed. The text has been revised to better describe the scale of information to be produced, including down to the parcel level in those cases where the following three criteria are met: (a) there exists a demonstrated user need, (b) NOAA believes there is sufficient scientific skill that allows for communication of information at this scale, and (c) information is able to be delivered at this scale on a national basis.

SAB Additional Point #5. It is critical to continue including the Great Lakes when addressing coastal inundation issues, but it is important to recognize the Great Lakes face some different issues than seacoast communities.

NOAA Response. Agreed. The White Paper includes the Great Lakes when addressing coastal inundation issues and points out in the development objectives that Great Lakes appropriate approaches and technologies are needed to develop Great Lake flood products. Recently received funding from the Infrastructure Investment and Jobs Act (IIJA) have enabled NOAA to start on the subseasonal to annual component of the work, inclusive of the Great Lakes.

SAB Additional Point #6. The SAB understands that the majority of the White Paper was developed during a period when addressing diversity, equity, and inclusion was less important than it is today. We support the current priority to ensure NOAA climate products and services will include a focus on underserved, unserved, and vulnerable populations.

NOAA Response. Agreed. The text has been revised to include more focus on underserved, unserved, and vulnerable populations, e.g. highlighted in the Executive Summary, “Beyond improvements to data access, the service delivery components of this proposed capability will ensure that all users, especially socially and economically vulnerable populations, have access to training to support their understanding and application of this information.”