

To: Science for Disaster Reduction
From: Real-Time Flood Inundation Mapping Working Group
CC: Integrated Water Resources Science and Services Consortium

Date: December 31, 2019

Subject: Federal Coordination for Real-Time Flood Inundation Mapping

Federal, state, local, and/or tribal users of real-time flood inundation mapping products produced by Federal government agencies immediately prior to, during, and after a flood event have expressed uncertainty about which products to use when. As a result, Science for Disaster Reduction (SDR) launched a Real-time Flood Inundation Mapping Working Group (RTFIMWG) on March 25, 2019 to coordinate flood inundation mapping across federal agencies. Mark Osler, Senior Advisor for Coastal Inundation and Resilience for the National Oceanic and Atmospheric Administration's (NOAA) National Ocean Service was named to chair the workgroup. Mary Erickson, Vice-Chair of the SDR and Deputy Director of NOAA's National Weather Service, charged the RTFIMWG with the following:

1. Reach a common understanding regarding each agency's missions and boundaries, the tools they have currently, where and when these tools can be applied, the decision space those tools are trying to influence, and the tools that are in development; and
2. Use this common understanding to communicate a holistic real-time flood inundation mapping products story leveraging product interoperability, providing guidance to users about which products to use when, and identifying new technologies and procedures for inundation mapping.

Building on prior work by the Integrated Water Resources Science and Services (IWRSS) Consortium,¹ the RTFIMWG addressed each of these charges in two phases:

- **Phase I:** The RTFIMWG completed "Show and Share" presentations by the federal agencies represented by its members (Appendix A), reviewing and referring to the IWRSS Flood Inundation Mapping (FIM) Requirement and Design documents² as needed. During this first phase, members learned about what each agency can do regarding real-time flood inundation mapping, what they have appropriations to deliver, the likely future trajectory and integration of opportunities, and the associated geographic locations for all of the above.
- **Phase II:** The RTFIMWG determined its deliverables for the SDR and developed them based on the aforementioned Show and Share presentations.

¹ Integrated Water Resources Science and Services (IWRSS)," U.S. Army Corps of Engineers: Hydrologic Engineering Center, U.S. Army, accessed October 3, 2019, https://www.nws.noaa.gov/oh/nwc/IWRSS_ROADMAP_FINAL.pdf.

² IWRSS Consortium: National Oceanic and Atmospheric Administration, U.S. Army Corps of Engineers, U.S. Geological Survey, *Design for the National Flood Inundation Mapping Services*, September 30, 2015.

Deliverable 1 (Appendix B) is an infographic that summarizes what information agencies are producing prior, during, and following a flood event

Deliverable 2 is this high-level memo, which provides the following recommendations from the RTFIMWG's members' collaboration since March 2019:

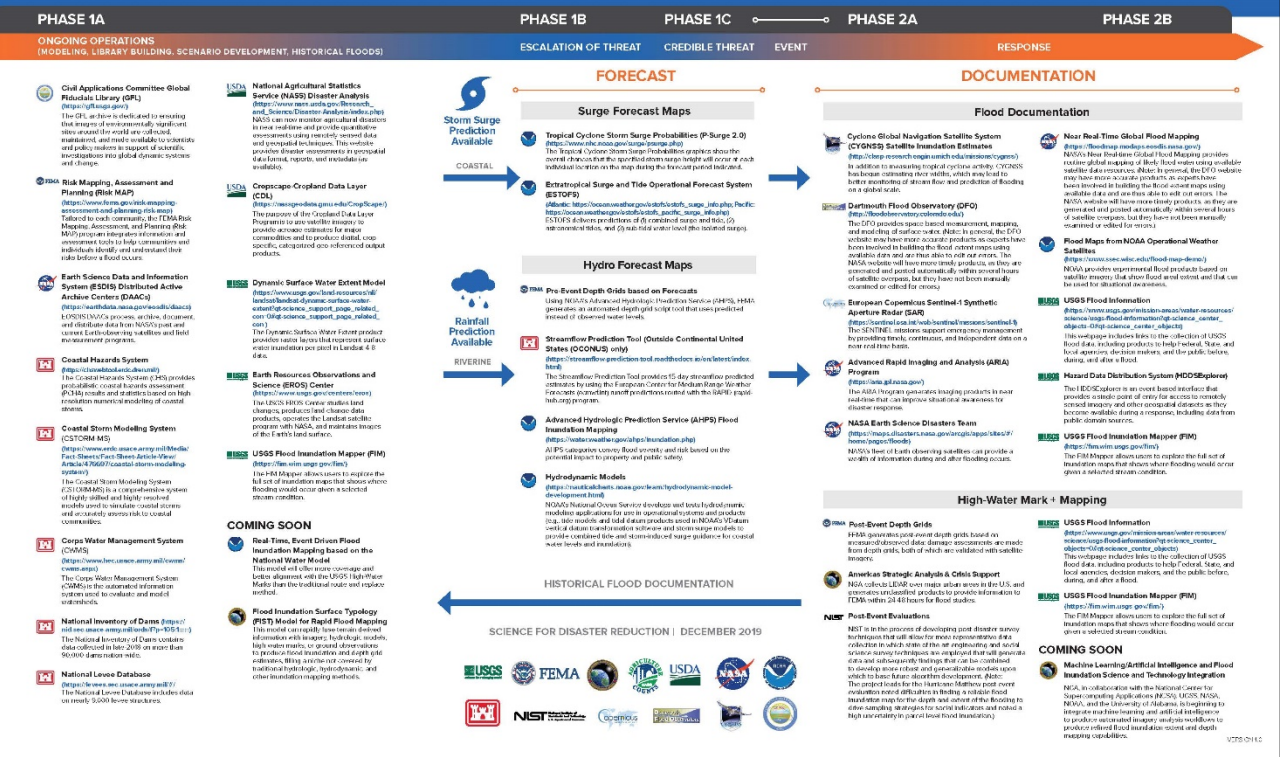
- **Recommendation:** The RTFIMWG recommends that IWRSS identify an “umpire” to provide guidance on the best federal flood inundation information available across the entire timescale of an event.
- **Recommendation:** The RTFIMWG recommends that IWRSS establish a clear standard operating procedure (SOP) that outlines which map(s) to use when, where, and how; determines who is responsible for producing the map(s); and better defines how these decisions are made, from the identification of the threat through response and recover.
- **Recommendation:** The RTFIMWG recommends that IWRSS establish a physical and administrative location where agencies can examine, adjudicate and authorize the mapping information that is most suitable for a given use case.
- **Recommendation:** The RTFIMWG recommends that IWRSS include the information from the SOP infographic and update it as needed to reflect future changes, such as shifts toward Integrated Water Prediction per the Coordinated Ocean Observations and Research Act of 2019.
- **Recommendation:** The RTFIMWG recommends that IWRSS determine and add further detail on the decision-making timeline within the SOP. Such detail may reflect decisions made at certain time or day marks (e.g., 48 to 72 hours or 2 to 3 days before an event).
- **Recommendation:** RTFIMWG members' federal agencies should continue discussions about agency mission requirements, funding opportunities, and product interoperability to determine the appropriate type of governance or protocol required for interagency collaboration of FIM resources during a flood event.

Appendix A: SDR RTFIMWG Members

ROLE	NAME
Working Group Chair	<ul style="list-style-type: none"> ● Mark Osler, Working Group Chair; Senior Advisor for Coastal Inundation and Resilience, National Ocean Service, NOAA
Steering Committee Members	<ul style="list-style-type: none"> ● Kevin Dobbs, National Geospatial-Intelligence Agency (NGA) ● Mary Erickson, Deputy Director, National Weather Service, National Ocean and Atmospheric Administration (NOAA) ● Keith Flowers, Chief, River and Estuarine Engineering Branch at Engineer Research and Development Center, U.S. Army Corps of Engineers (USACE) ● Marie Pepler, Federal Agency Liaison and National U.S. Geological Survey (USGS) Flood Inundation Mapping Coordinator, Office of Surface Water, USGS ● Chris Vaughan, Geospatial Information Officer, Federal Emergency Management Agency (FEMA)
Working Group Members	<ul style="list-style-type: none"> ● David Alexander, Senior Science Advisor for Resilience, Science and Technology Directorate, Department of Homeland Security (DHS) ● Ken Buell, Director, Emergency Response and Recovery, Infrastructure Security & Energy Restoration (ISER) Division, Cybersecurity, Energy Security, and Emergency Response (CESER), U.S. Department of Energy (DOE) ● Claire Boryan, Geographer, Spatial Analysis Research Section, Research and Development Division, National Agricultural Statistics Service, U.S. Department of Agriculture (USDA) ● Edward P. Clark, Director, National Water Center, National Weather Service, NOAA ● Mitch Goldberg, Program Scientist, Joint Polar Satellite System (JPSS), NOAA ● Laura Furgione, Chief, Office of Program, Performance, and Stakeholder Integration, U.S. Census Bureau ● Andy Hait, Economist, International Trade Management Division, U.S. Census Bureau ● Robert Mason, Extreme Hydrologic Event Coordinator, USGS ● Daniel Opstal, USGS ● Avery Sandborn, Spatial Analyst, National Agricultural Statistics Service, USDA ● Robert Shankman, Geographic Information System (GIS) Branch Chief and GeoHealth Program Manager, U.S. Department of Health & Human Services ● Jason Sheeley, Chief, Modeling, Mapping and Consequences (MMC) Mapping Branch, USACE ● Chip Walker, Special Assistant to Associate Director for Economic Programs, U.S. Census Bureau ● Scott Weaver, Director, National Windstorm Impact Reduction Program, National Institute of Standards and Technology (NIST)

Appendix B: Infographic

What is Available and When: Real-time Flood Inundation Mapping Products



Appendix C: Resources

Coordinated Ocean Observations and Research Act, S.914, 116th Congress, 1st Session, 2019,
<https://www.congress.gov/bill/116th-congress/senate-bill/914>.

Integrated Water Resources Science and Services Consortium: National Oceanic and Atmospheric Administration, U.S. Army Corps of Engineers, U.S. Geological Survey. *Design for the National Flood Inundation Mapping Services*, September 30, 2015.

U.S. Army Corps of Engineers: Hydrologic Engineering Center, U.S. Army. “Integrated Water Resources Science and Services (IWRSS),”
<https://www.hec.usace.army.mil/misc/IWRSS/>. (accessed October 3, 2019).

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service. *National Weather Service Instruction 10-603: National Hurricane Center and Central Pacific Hurricane Center Hurricane Liaison Team*, (August 16, 2018),
<https://www.nws.noaa.gov/directives/sym/pd01006003curr.pdf>.