

NIST National Construction Safety Team Investigation of Hurricane Maria

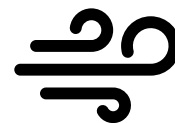
NCST Advisory Committee Meeting – March 2024

Concluding Remarks and Next Steps

Joseph Main

Next Steps for Hurricane Maria Program

- Integration of data and findings from the 7 technical projects is central to report completion
- Initial reports from the NWIRP Research Study planned for joint release with NCST reports
- One or more additional reports from NWIRP Research Study planned for subsequent publication; will include later waves of data collection and consider Hurricane Fiona



Hazard Characterization



Critical Buildings



Emergency Communications



Morbidity and Mortality



Recovery of Business and Supply Chain



Recovery of Social Functions



Recovery of Infrastructure

Created by Adrian Coquet from the Neuen Project

Created by Rodrigo Pereira from Neuen Project

Created by Agency 'regalati' from Neuen Project

Created by Matthias Hartmann from Neuen Project

NCST Data Collection Status: *Completed (Sept. 2023)*

Hazard Characterization

Wind Tunnel Testing of Topographic Models

University of Florida

Meteorological Data for Wind Field Model

Applied Research Associates

Field Measurements of Winds on Cell Towers (2 years)

University of Florida / WeatherFlow

Data on rainfall, storm surge, flooding and landslides

Public Response to Emergency Communications

Information Provider Interviews

Horsley Witten

Household Surveys

Horsley Witten

Public Messages for Qualitative Content Analysis

Household Interviews

Horsley Witten

Performance of Critical Buildings

Facility Evaluations: 5 hospitals, 5 shelters

Phase 1: Document collection and review

Phase 2: Site visits and interviews

Stantec Consulting

Wind Tunnel Testing of Two Hospitals

University of Florida

Morbidity & Mortality

Verbal Autopsy and Social Environmental Survey

GW-UPR

Integrated Database of Deaths in Puerto Rico

GW-UPR

Medical Records and Hospital Functions Review

GW-UPR

Spatial and Temporal Data for Analysis of Deaths

GW-UPR

NWIRP Data Collection Status: *Nearing Completion*

Recovery of Social Functions

Wave 1 School and
Hospital Surveys

Horsley Witten



Wave 2 School and
Hospital Surveys

Horsley Witten

Expected Completion by March 2024

Interviews with School
and Hospital
Administrators

Horsley Witten

*Expected Completion by
March 2024*

Recovery of Business and Supply Chains

Interviews of Shipping and
Transportation
Representatives

Horsley Witten



Surveys of Small and
Medium-Sized
Manufacturers and
Retail/Service Businesses

Horsley Witten



Recovery of Infrastructure Systems

Satellite Remote-
Sensing Data
on Tree Canopy Cover



Structured Interviews
on Infrastructure
Dependencies

Horsley Witten

*Expected Completion by
Summer 2024*

Aerial Imagery
of Cell Towers



Transportation
Incident Database

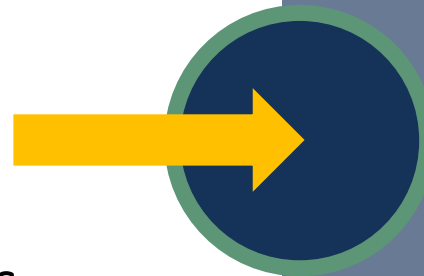


- Completed data collections and analyses are informing NCST Investigation
- Remaining data collections (e.g., Wave 2 school & hospital surveys) planned for publication after NCST investigation reports

Next Steps: Completing Reports

Plan in place for report organization, writing, review, and publication – in collaboration with NIST Disaster & Failure Studies and Champlain Towers South Team, including:

- Outline of report volumes
- Identification of publication series
- Contract for report preparation (solicitation posting imminent)



Completing reports

Publishing datasets, models, and other products

Implementation, including communication and outreach for broadest dissemination

Planned HM NCST Report Hierarchy

Level 1: Investigation Summary

NCSTAR 4

Overarching Summary Report:

- Principal findings
- Recommendations

Level 2: Project Reports

NCSTAR 4-1

Hazard Characterization

NCSTAR 4-2

Performance of Critical Buildings

NCSTAR 4-3

Public Response to Emergency Communications

NCSTAR 4-4

Morbidity and Mortality

Level 3: Supporting Documents

Examples:

Appendix to NCSTAR 4-1

NCSTAR 4-1A

NCST GCR 4-1A

NCSTAR: NCST Act Report
GCR: Grant/Contract Report

- Ongoing coordination with NIST Library in preparation for curation and publication of datasets
- First published HM dataset: hurricane wind-field model



- NIST experts engaged to develop video products to communicate draft findings and recommendations

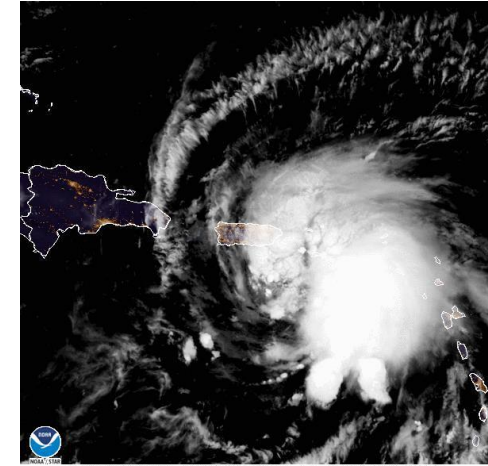


Hurricane Fiona Progress: *Data Collection and Analysis*

Observations from Hurricane Fiona expected to provide context, inform recommendations from the HM Investigation

Team has begun assessing Hurricane Fiona by:

- Developing wind-field model
- Comparing rainfall accumulations between Hurricanes Maria and Fiona
- Incorporating Hurricane Fiona-related questions in hospital and shelter interviews for the *Critical Buildings Project*
- Collecting data on impacts of Hurricane Fiona in the Wave 2 Survey of Schools and Hospitals for *Recovery of Social Functions Project*; expected to conclude March 2024

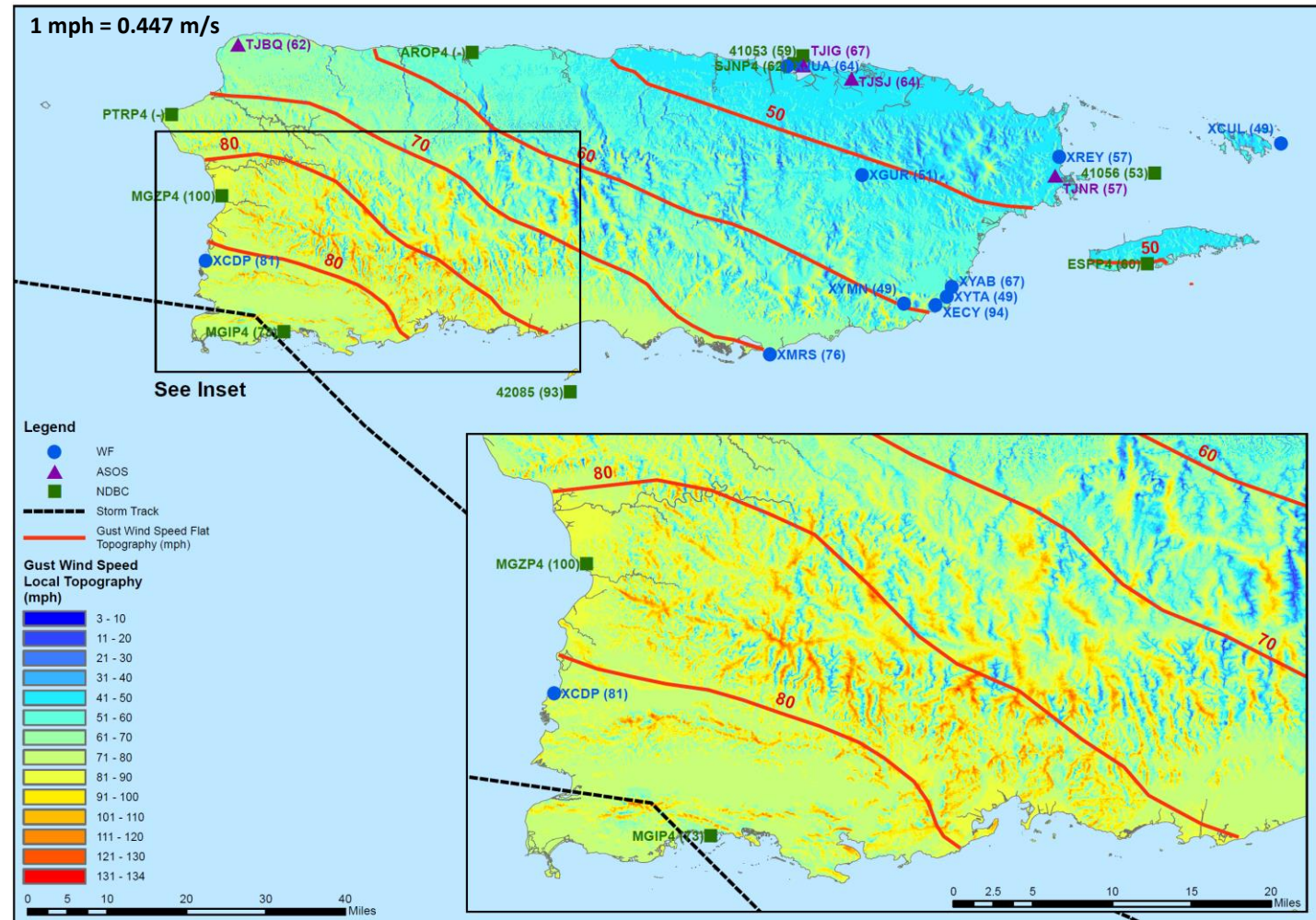


18 Sep 2022 06:30Z - NOAA/NESDIS/STAR - PR - GEOCOLOR Composite

Hurricane Fiona

Hurricane Fiona Progress: *Wind-Field Modeling*

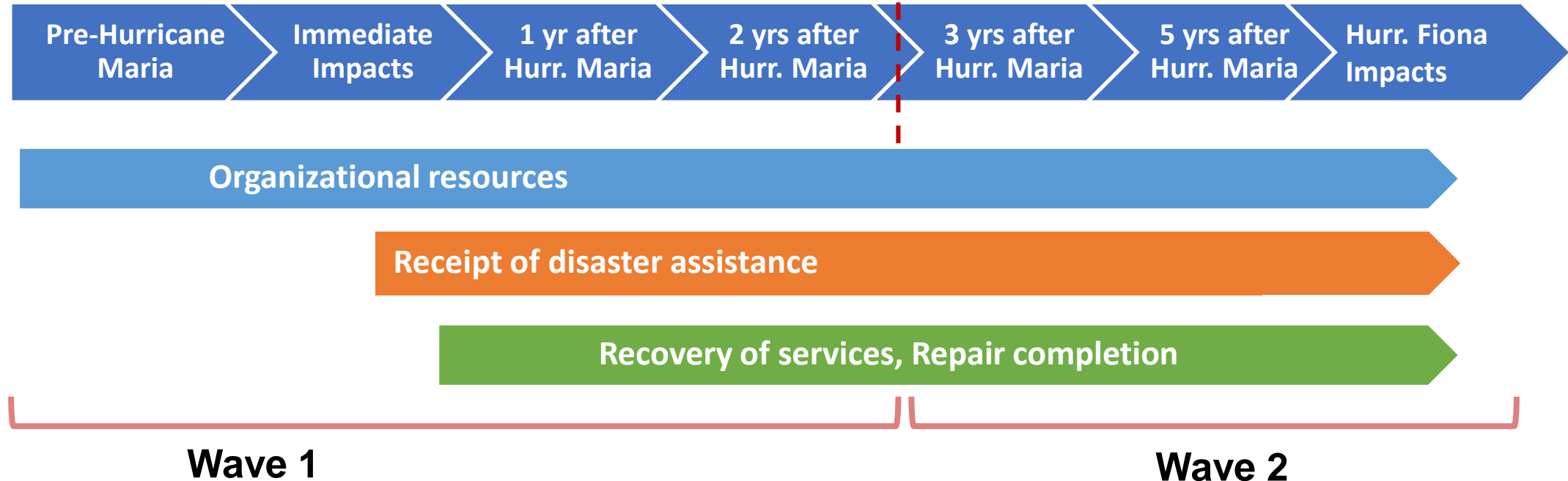
- Initial Hurricane Fiona wind-field model developed, using improved model-fitting procedures developed as part of HM investigation:
 - Automation procedure for optimization of model fitting to observed data
 - Incorporation of available surface-level meteorological observations, including measurements from cell towers instrumented by NIST and other WeatherFlow stations
- Model provides time histories of wind speed and direction across Puerto Rico during Hurricane Fiona



Hurricane Fiona Progress: Wave 2 Survey of School and Hospital Recovery



Created by Matthias Hartmann
from Nour Project



Wave 1

Wave 1 - assessing initial impacts of Hurricane Maria and tracking recovery progress for schools and hospital services; these data and analyses will inform NCST Investigation and be included in first set of reports

Wave 2

Wave 2 - tracking recovery progress and capturing initial impacts of **Hurricane Fiona** on schools and hospital services; these data and analyses will be part of second set of NWIRP reports

Data Collection Progress:

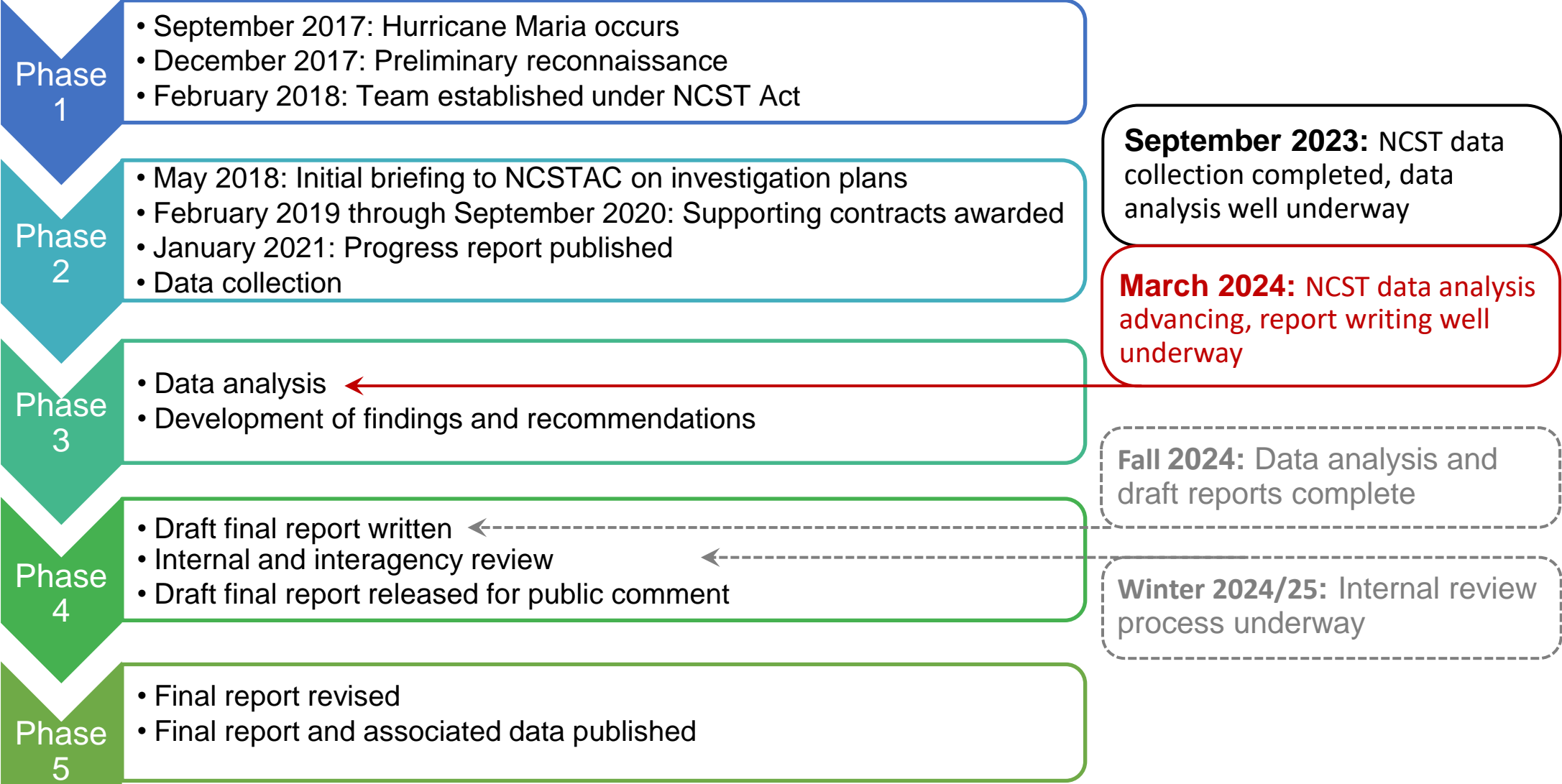
- School Surveys: 128 completed
- Hospital Surveys: 8 completed
- Target with attrition is n=132

Hurricane Fiona Progress: *Allocation of Funds*

Since the Disaster Relief Supplemental Appropriation Act passed in December 2022, the Team has allocated funds for:

- Additional staffing to support rainfall analysis for Hurricane Fiona, qualitative interview coding and analysis for recovery projects, and data analysis across NCST and NWIRP projects
- Contractor support for development of Hurricane Fiona wind-field model
- Continuation of wind measurements on cell towers in Yabucoa
- Additional contractor support for survey and interview data collection related to Hurricane Fiona
- New contract to support preparation of NCST and NWIRP reports

Expected Timeline: March 2024 Update



Next Steps: Draft Final Report

- Continue comprehensive analysis of collected data, including cross-project integration of data for further analysis
- Develop of draft findings and recommendations
- Complete draft report volumes by project
- Complete integrated investigation summary report
- Internal and interagency review

Questions?

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www.nist.gov/topics/disaster-failure-studies/hurricane-maria