Coastal Storm Induced Erosion Predictions

for FEMA's FIS Coastal Hazard Risk Mapping

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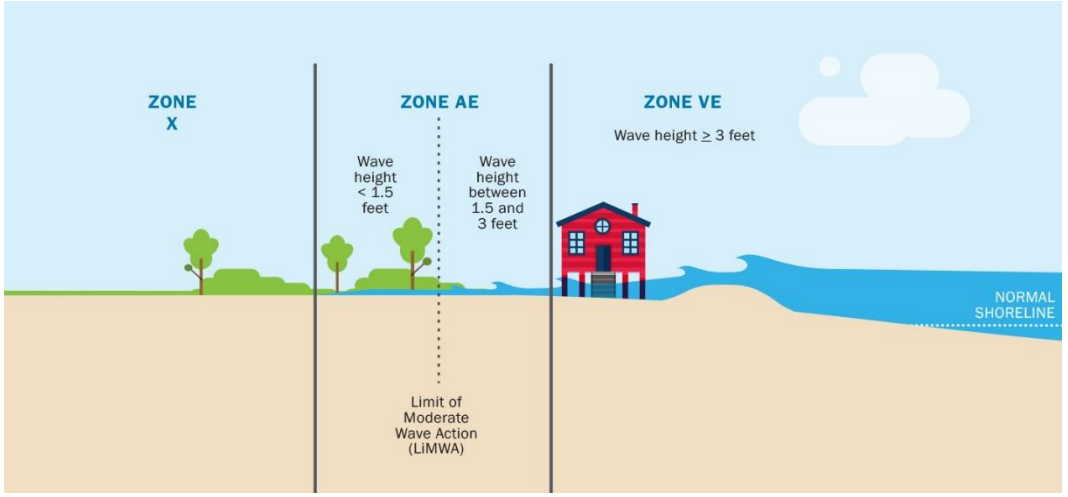
Risk MAP Vision and Coastal Mapping

1. Address gaps in data
2. Align increased awareness with reductions in vulnerability
3. Support community-level mitigation planning
4. Improve management of Risk MAP resources through tech
5. Improve information sharing between programs

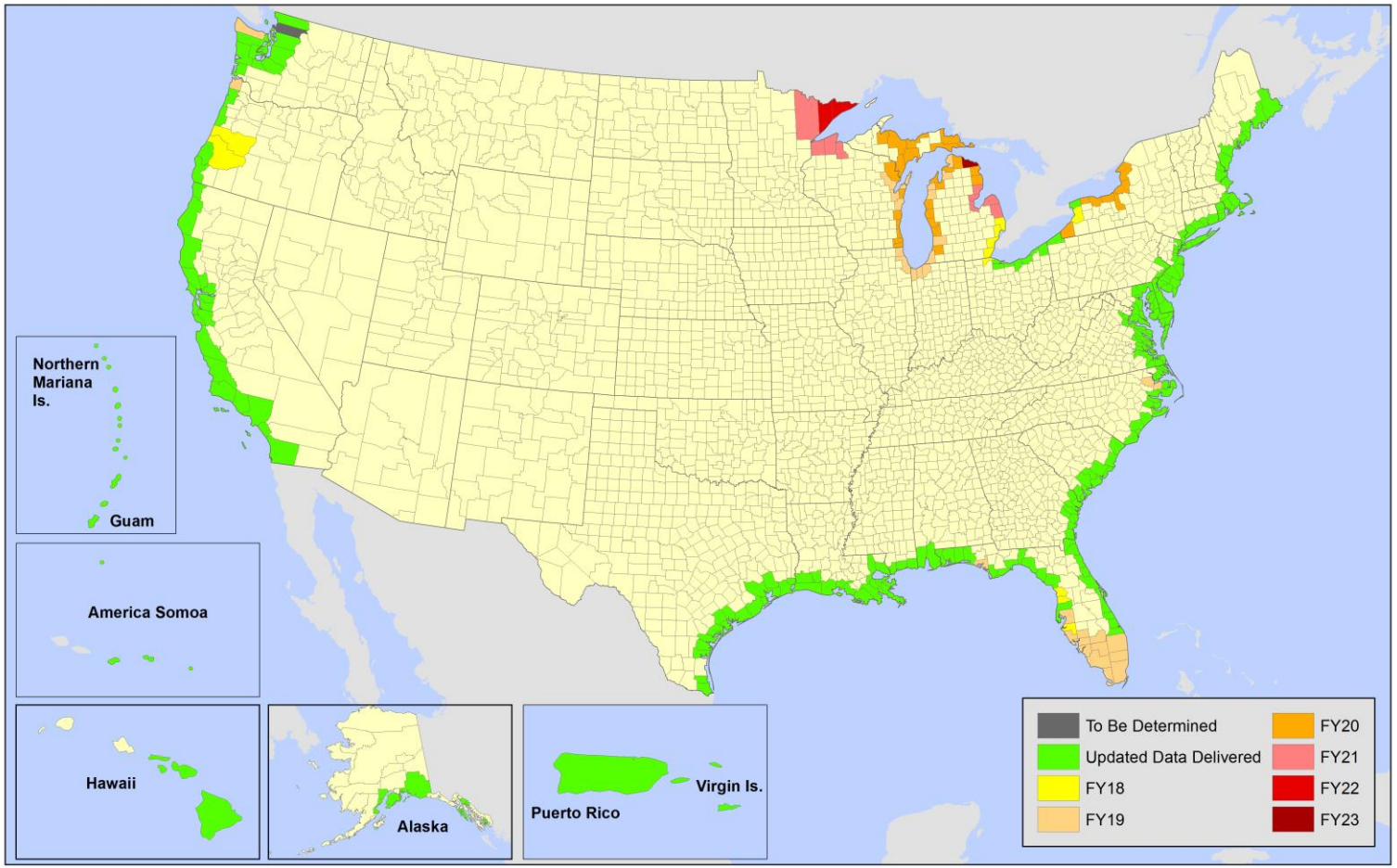
Risk MAP Goals

Coastal Mapping



FEMA's Investment in Coastal Mapping

Schedule of Coastal Counties Receiving Updated Mapping Data as of July 2018

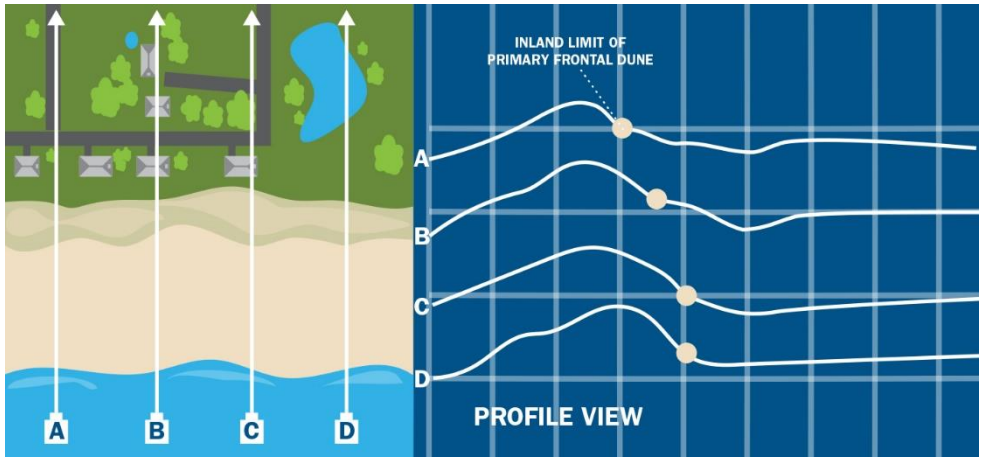


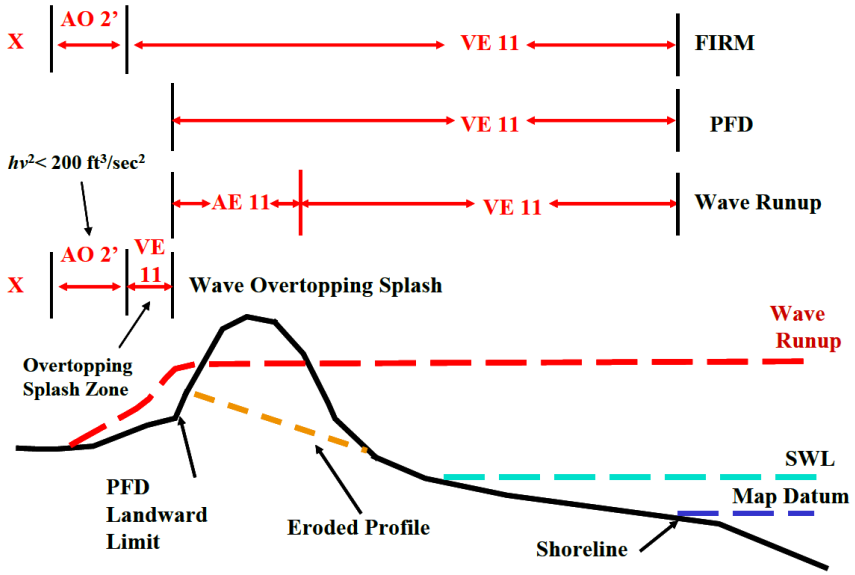
FEMA

Updated mapping data consist of both preliminary Flood Insurance Rate Maps (FIRMs) and other non-regulatory products delivered to the county by FEMA.
Data are tracked by fiscal year (FY), October through September.
Data are updated quarterly and therefore subject to change.
For more information, please call 1-877-FEMA MAP (1-877-336-2627), email FEMAMapSpecialist@riskmapcds.com, or visit https://www.fema.gov/coastal-flood-risks

RiskMAP
Increasing Resilience Together

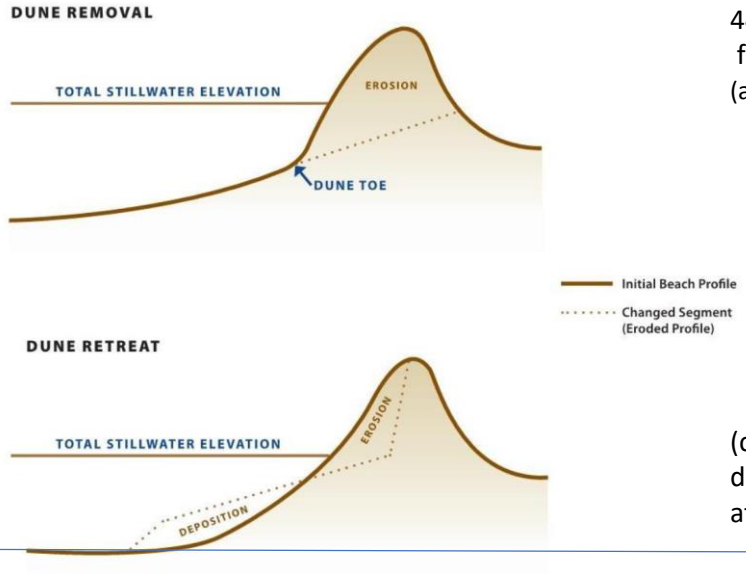
Risk Identification





The coastal program uses non-hazard based risk identification where the present methodology did not fully capture the risk (e.g. Primary Frontal Dunes, 30 ft splash zones, geometric erosional profile)

FEMA's Coastal Erosion, the Primary Frontal Dune and the Code of Federal Regulations



44 CFR 65.11 Evaluation of sand dunes in mapping coastal flood hazard areas.

(a) General conditions. For purposes of the NFIP, FEMA will consider storm-induced dune erosion potential in its determination of coastal flood hazards and risk mapping efforts. The criterion to be used in the evaluation of dune erosion will apply to primary frontal dunes as defined in Sec. 59.1, but does not apply to artificially designed and constructed dunes that are not well-established with long-standing vegetative cover, such as the placement of sand materials in a dune-like formation. (b) Evaluation criterion. Primary frontal dunes will not be considered as effective barriers to base flood storm surges and associated wave action where the cross-sectional area of the primary frontal dune, as measured perpendicular to the shoreline and above the 100-year stillwater flood elevation and seaward of the dune crest, is equal to, or less than, 540 square feet.

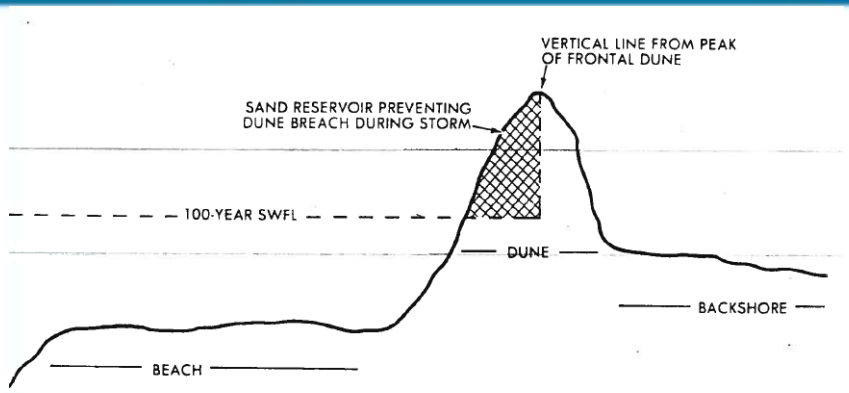
(c) Exceptions. Exceptions to the evaluation criterion may be granted where it can be demonstrated through authoritative historical documentation that the primary frontal dunes at a specific site withstood previous base flood storm surges and associated wave action.

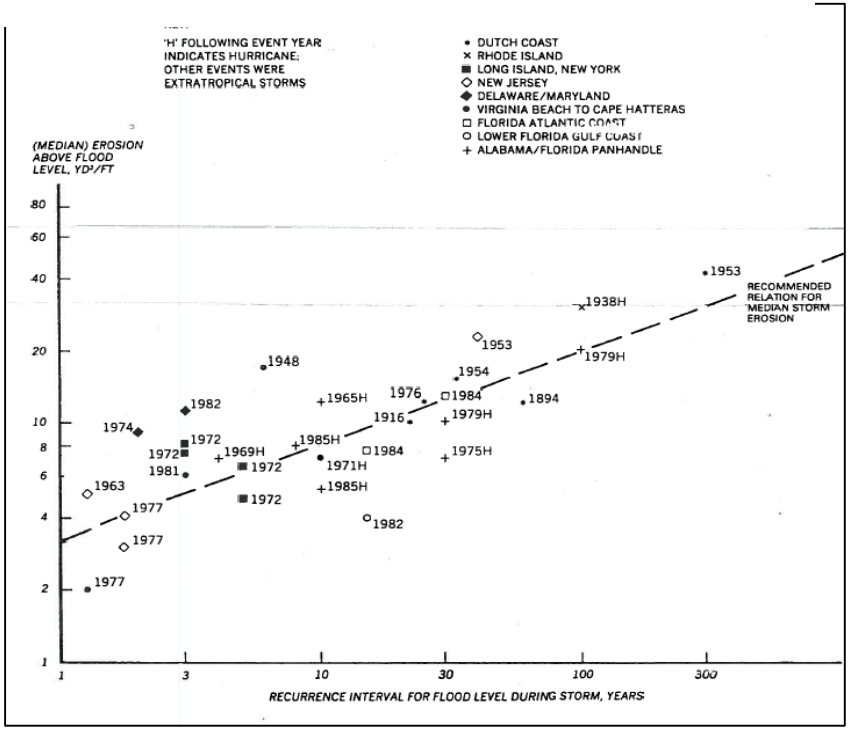
44 CFR 59.1 Definitions

Coastal high hazard area means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

Primary frontal dune (PFD) means a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the PFD occurs as the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

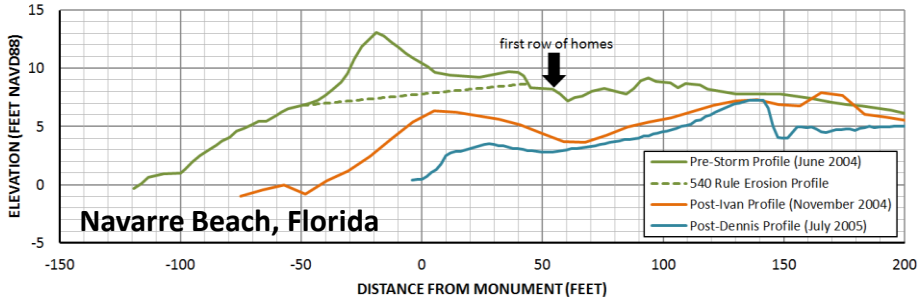
A Brief History of Storm Induced Erosion and the Primary Frontal Dune



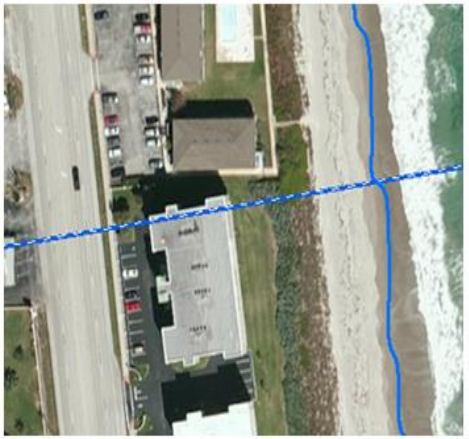


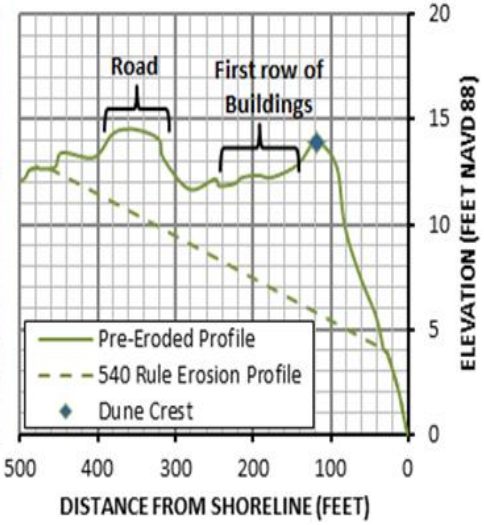
- **1968** – NFIP created
- **1970s – 1980s** - Coastal FIRMs used inconsistent methodology
- **1980s** – several major storms highlighted how FIRMs understated risk, especially erosion
- **1986** - *'Assessment of Current Procedures Used for the Identification for Coastal High Hazard Zones (V-Zones)'*
  - PFD should be V-Zone
  - 540 sq ft is found to be the median cross-section of the eroded dune above the 1-percent-annual-chance Stillwater
  - Geometric method recommended
- **1988** – Codified in the CFR
- **2015** – Clarified wave setup should be included

‘540 Rule’ – Median Matters

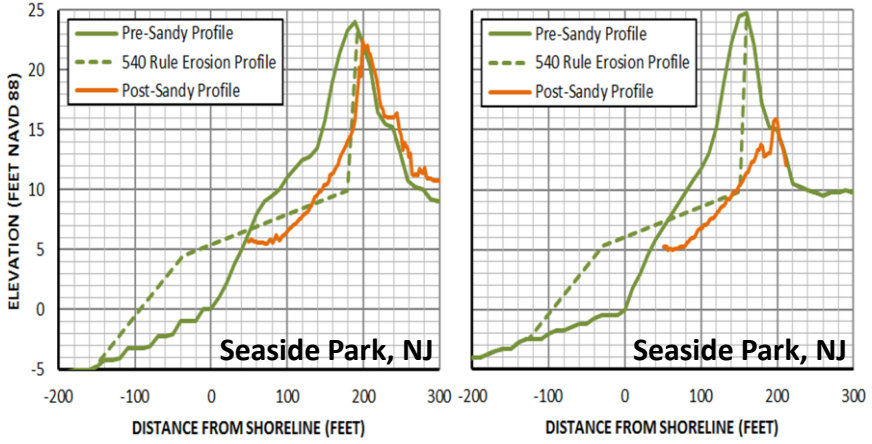


Underestimation of Erosion





Overestimation of Erosion



Erosion methodology codified in 44 CFR 65.11 is not always technically sound or defensible.

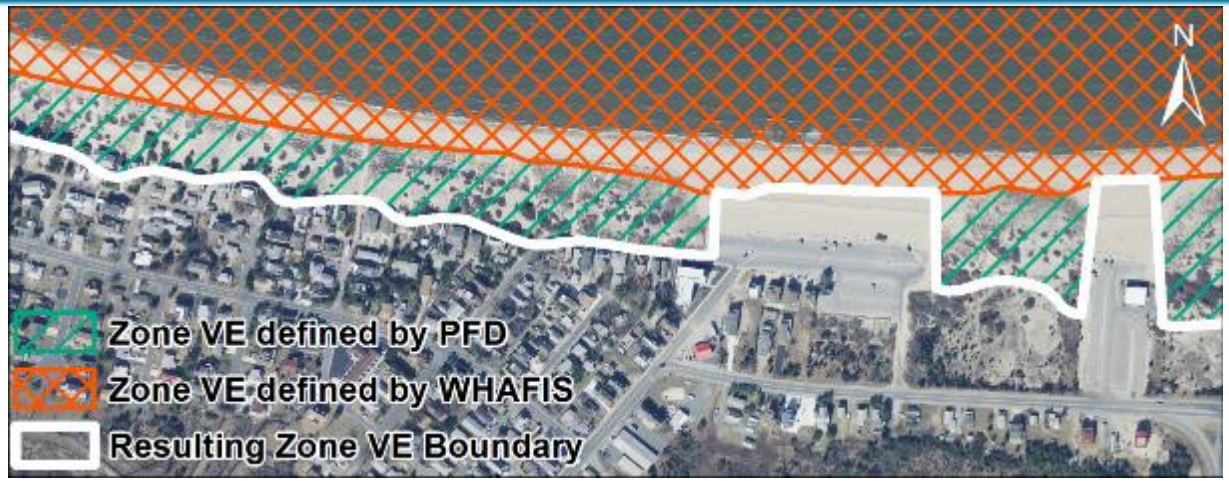
Other Complications…

- Multiple Events in the Same Season
- Storm Duration and Speed
- Lack of Erosion in Surge Modeling
- Long-term Erosion Impacts

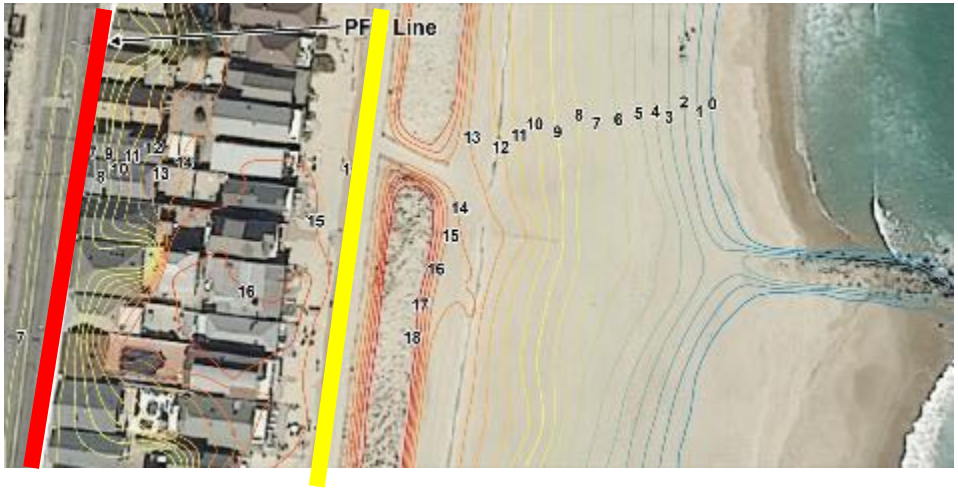
Hunting Island, SC shoreline change (2006 – 2012) relative to preliminary flood mapping and Primary Frontal Dune delineation (red).

Primary Frontal Dune Issues

Encroachment on the Dune



Dune Gaps and Mapping



Elevations & Overuse of Letters of Map Revisions

44 CFR 59.1 Definitions

Primary frontal dune (PFD) means a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the PFD occurs as the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

PFD Designation

'PFD' due to alterations in dune

Transitioning to the Future

FEMA has set bold strategic goals over the course of the past year and we must evolve to meet the mission

2018–2022

Strategic Plan

Helping People. Together.

FEMA Mission: **Helping people before, during, and after disasters.**

Moonshots

STRATEGIC GOALS

I. BUILD A CULTURE OF PREPAREDNESS

OBJECTIVES

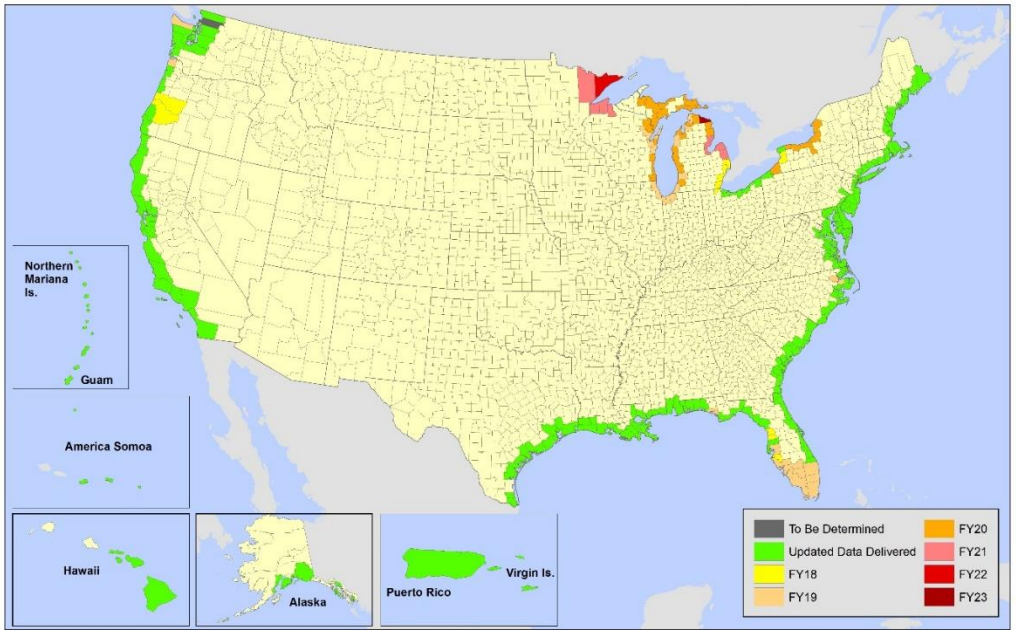
- 1.1 Incentivize investments that reduce risk, including pre-disaster mitigation, and reduce disaster costs at all levels
- 1.2 Close the insurance gap
- 1.3 Help people prepare for disasters
- 1.4 Better learn from past disasters, improve continuously, and innovate

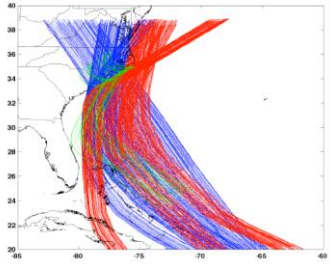
Risk Rating Redesign

DELIVERING RATES THAT:	USING POLICY FORMS THAT:
ARE FAIR	ARE SIMPLE
ARE CLEAR	ALIGN WITH INDUSTRY
USE CURRENT TECHNOLOGY & DATA	PROVIDE CHOICE

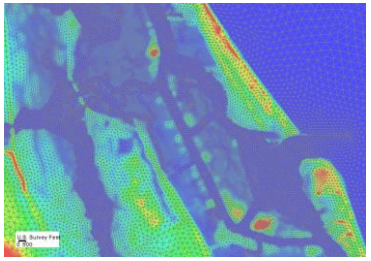
FEMA Vision:
A prepared and resilient Nation.

So where do we go from here?



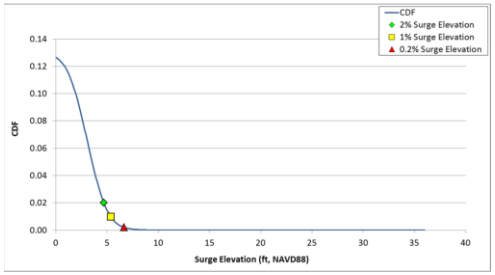


Databases of storms

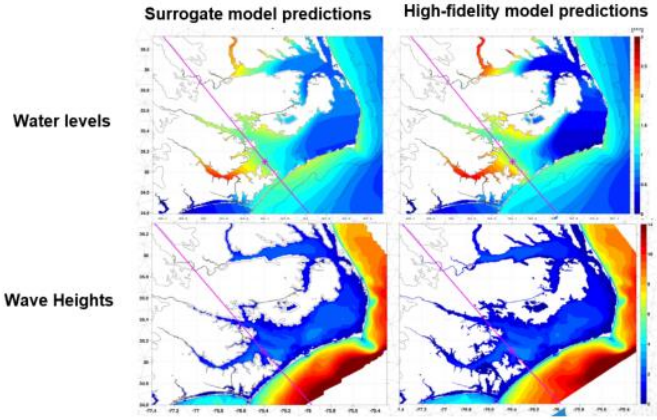


Meshes, meshes and more meshes

Land use, DEMs, transect layout



'Statistics'



AdcircLite-NC: Blanton and Kennedy

"Models and methods used by FEMA will evolve with the state of the science" - Bellomo and Crowell, 2010

Questions, Comments or Suggestions?

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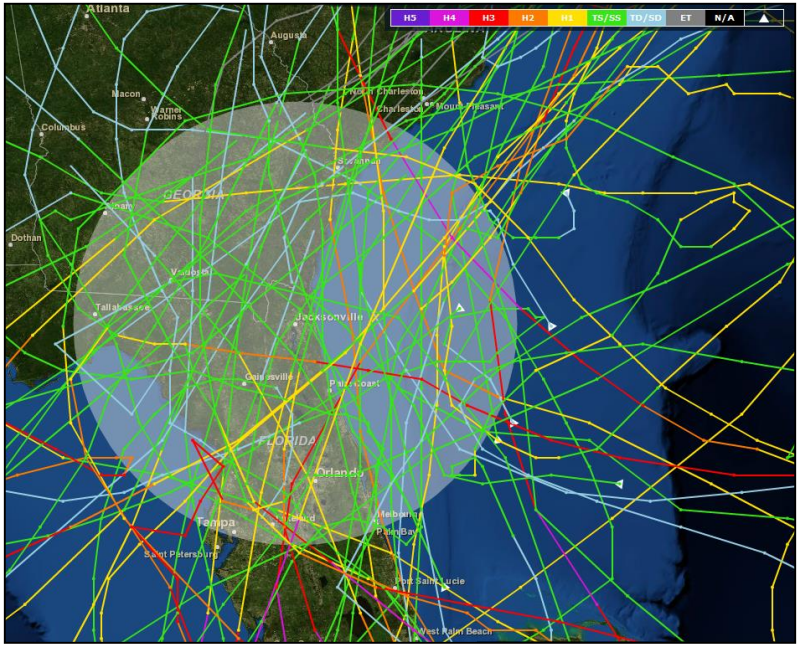

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