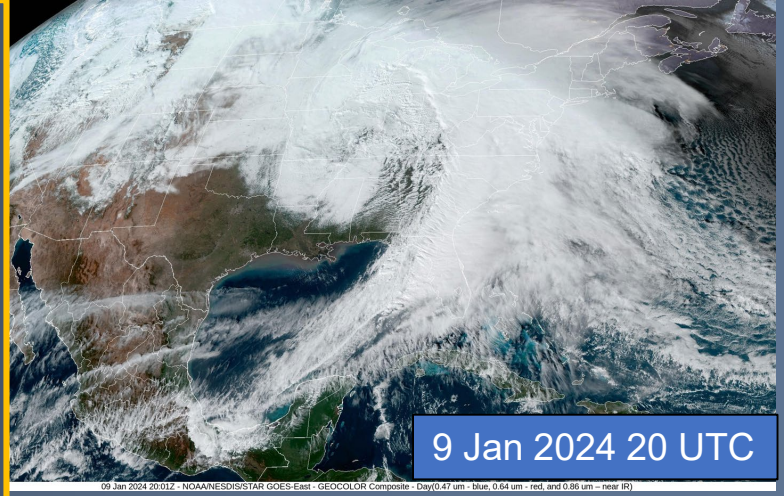
From Prototype to Operational Decision Support Services
Five Years of Coastal Total Water Level Forecasting in Eastern Region of the National Weather Service



Laurie G. Hogan, Hydrologic Services Division, NWS ER HQ
And a group of excellent folks in ER and beyond

For the AMS 2024

Global Systems Laboratory

What Is Total Water Level (TWL)?

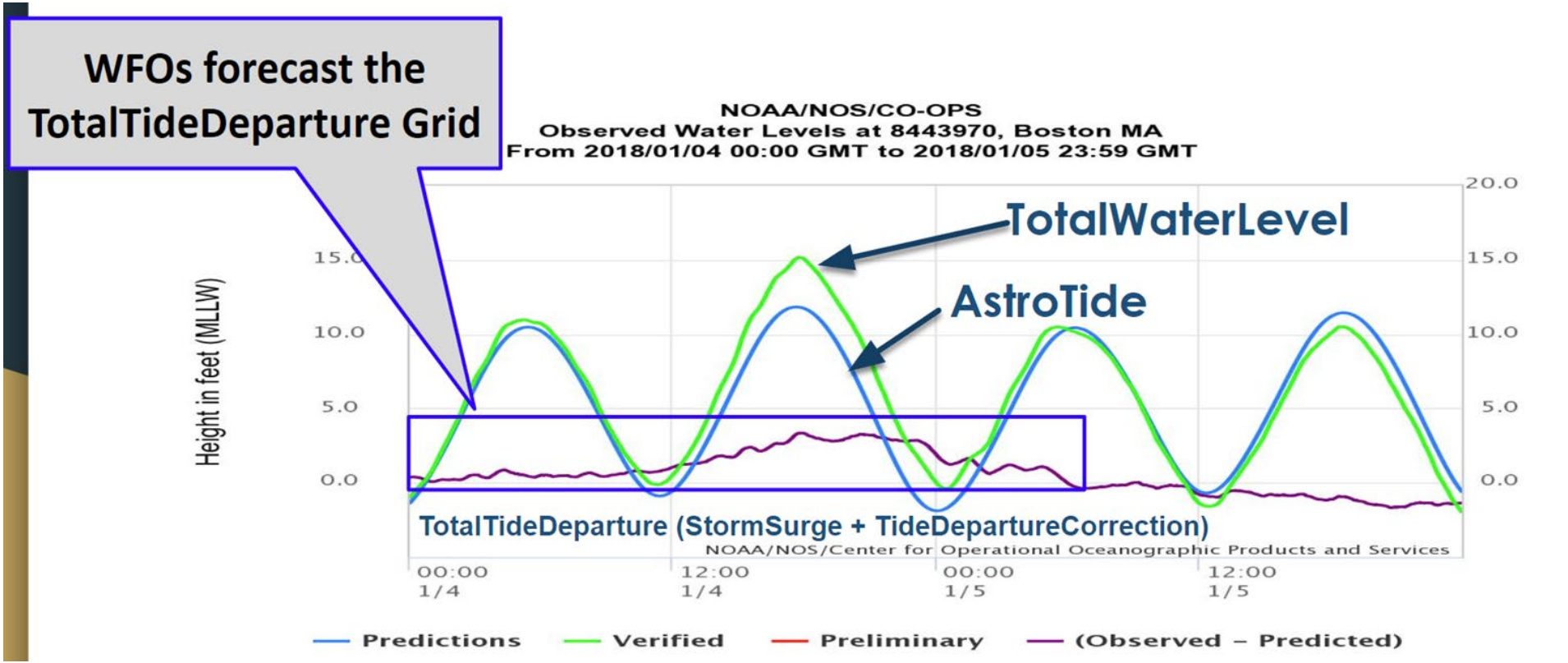
TWL - Water depth that produces flooding/inundation/impacts at the coast

Photo Credit: William K. Clark.


Photo Credit: MyCoast.org.


Photo Credit: WFO BOX.

What Is Being Forecast and How?



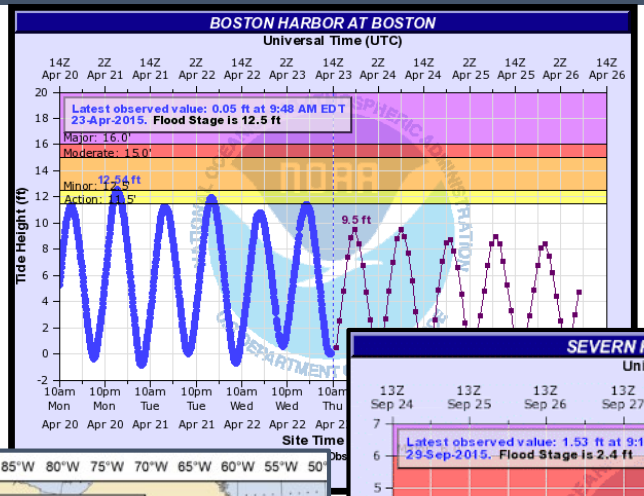
ProtoType to Official Forecasts

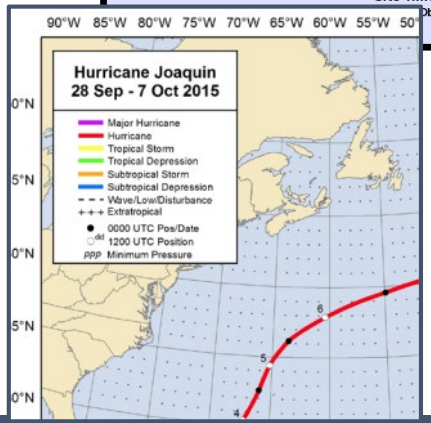
Prototype Weather Forecast Offices

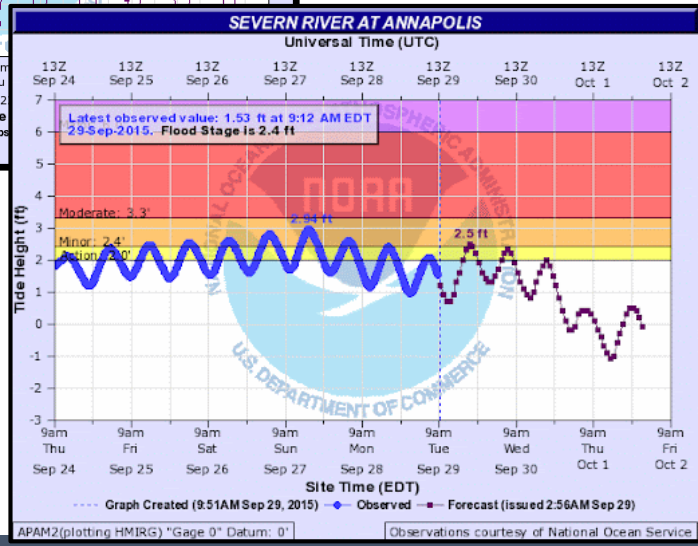
- Boston/Taunton/Norton
- Wakefield VA
- Baltimore/Washington DC

October 2017

- All ER Coastal WFOs producing daily forecasts (hydrographs) continually.
- TWL Support Team
  - Team of field/regional experts







2018-2020: Early Lessons Learned

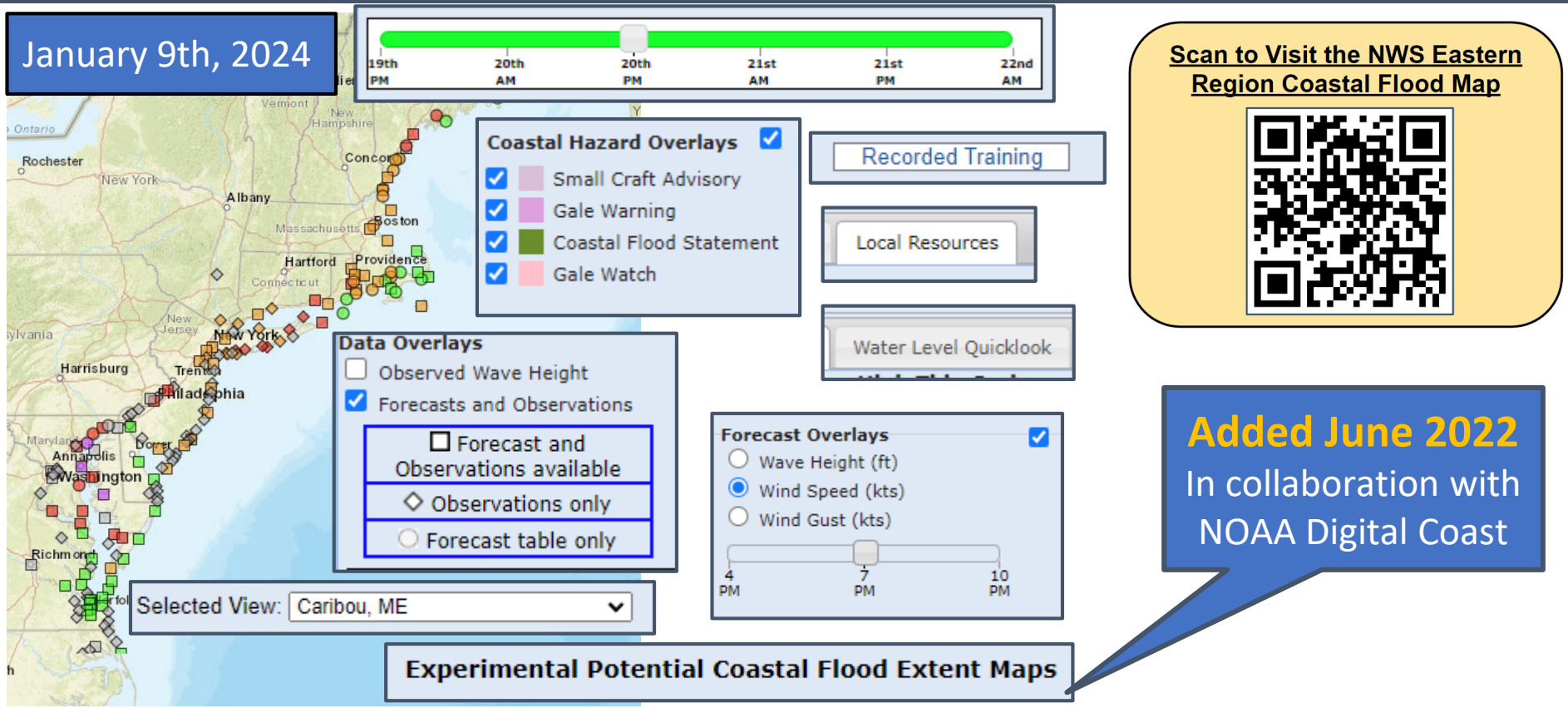
```
////////////////////////////////////
 HOURLY TWL VERIFICATION DATA
////////////////////////////////////

TIDE
2020-04-12-0400Z
                      CHTS1    FPKG1
           Observed    7.1      8.9
            Anomaly   +0.7     +0.9
 ==================================
 TWL Forecast Verification
 ==================================
 2020-04-11-2335Z     0.0      -0.1
 2020-04-11-2313Z     0.0      -0.1
 2020-04-11-1316Z    +0.2       0.0
 2020-04-11-0924Z     0.0       0.0
 2020-04-11-0920Z     0.0       0.0
 2020-04-11-0150Z     0.0       0.0
 ----------------------------------
```

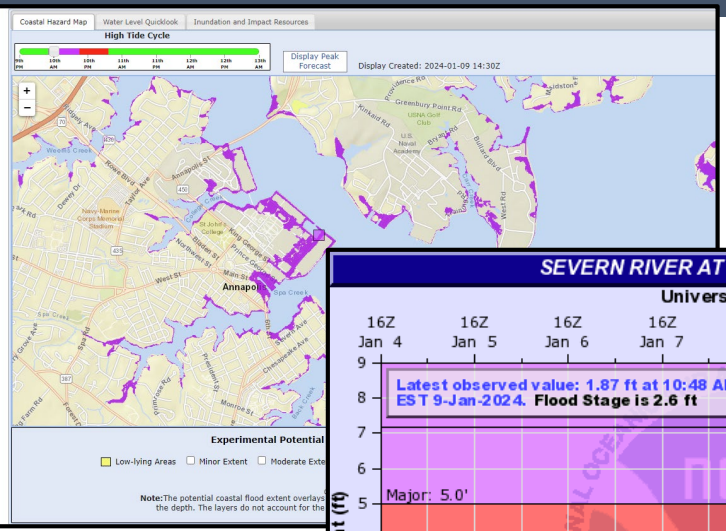
```
Model Verification
==================================
----------------------------------
 ETSS
----------------------------------
2020-04-12 00Z      -0.8     -1.0
2020-04-11 18Z      -0.9     -1.0
2020-04-11 12Z      -0.9     -1.0
2020-04-11 06Z      -0.9     -1.0
2020-04-11 00Z      -0.9     -1.0
2020-04-10 18Z      -0.9     -1.0
----------------------------------
 ESTOFS
----------------------------------
2020-04-11 18Z      -1.3     -1.3
2020-04-11 12Z      -1.2     -1.3
2020-04-11 06Z      -1.3     -1.3
2020-04-11 00Z      -1.3     -1.3
2020-04-10 18Z      -1.3     -1.4
2020-04-10 12Z      -1.4     -1.4
```

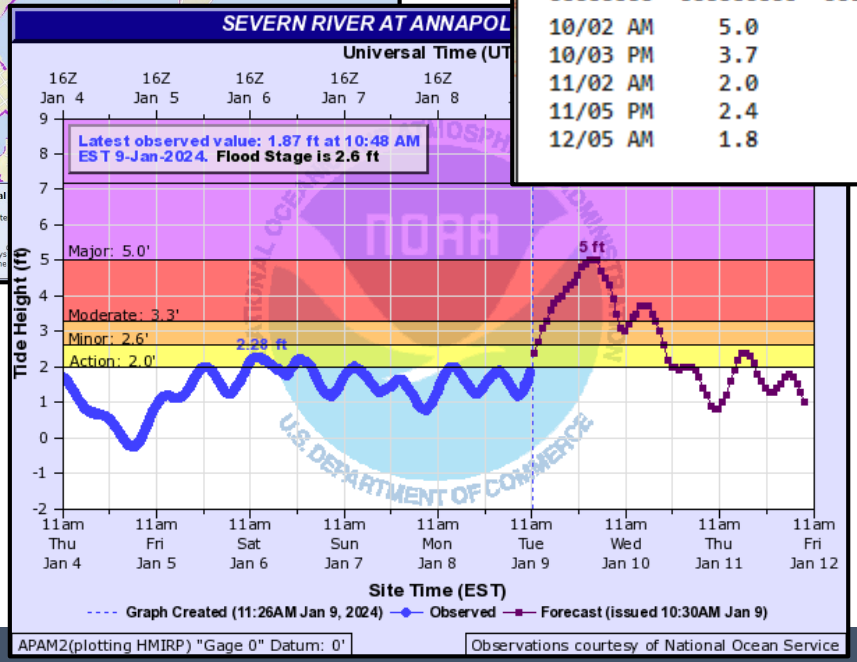
Pick 1… Observed anomaly, TWL verification, and model bias

March 2021 – Coastal Flood Webpage



Authoritative Forecasts - Local Impacts





Issued: 1030 AM EST Tue Jan 9 2024
Severn River at Annapolis
MLLW Categories - Minor 2.6 ft, Moderate 3.3 ft, Major 6.0 ft
MHHW Categories - Minor 1.2 ft, Moderate 1.9 ft, Major 4.6 ft

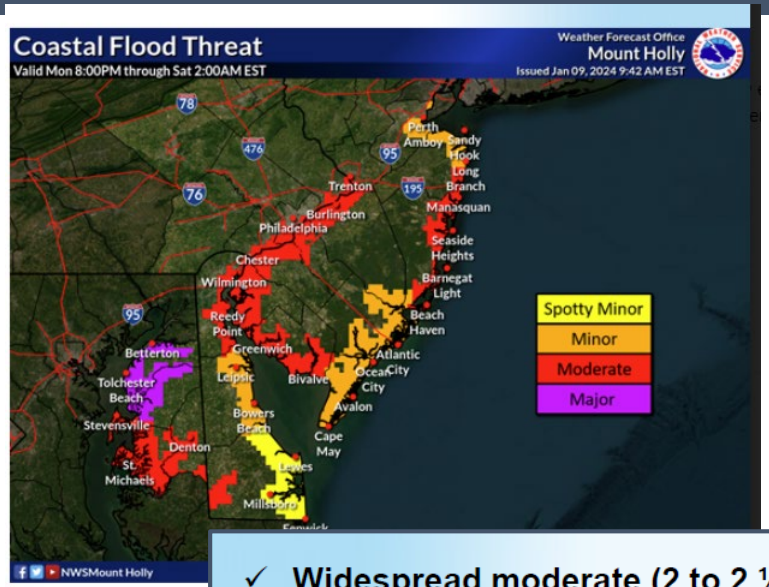
Day/Time	Total Tide ft MLLW	Total Tide ft MHHW	Departure from Norm ft	Waves ft	Flood Impact
10/02 AM	5.0	3.6	4.6	3.0	Major
10/03 PM	3.7	2.3	2.9	1.0	Moderate
11/02 AM	2.0	0.6	1.7	0.5	None
11/05 PM	2.4	1.0	1.3	0.5	None
12/05 AM	1.8	0.4	1.3	0.5	None

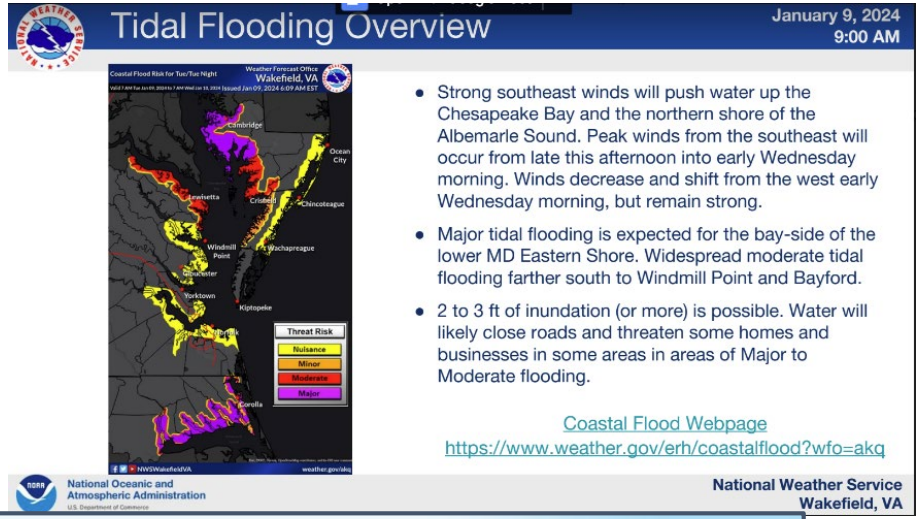
Sample User Feedback

“ Saves me from having to visit multiple sources for the complete picture.”

“The inundation mapping piece is a home run.”

2024 -Impact-Based Decision Support Services (IDSS)

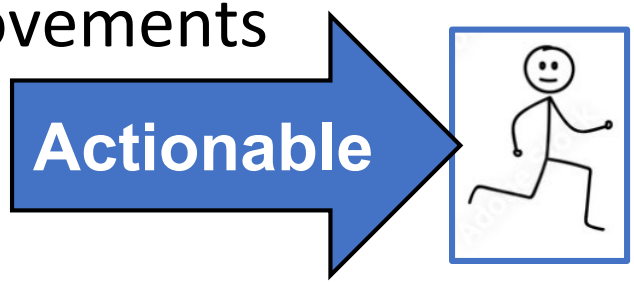




- ✓ **Widespread moderate (2 to 2 ½ ft inundation above ground) coastal flooding** for vulnerable coastal communities along Jamaica Bay, southern and eastern coastal of Long Island, and southeastern coastal CT during the Saturday morning high tide.
  - ✓ **Locally major (around 3 ft inundation above ground) coastal flooding is possible along the south shore bays and ocean front of Queens and Long Island**.
    - ✓ Elsewhere widespread minor to moderate coastal flooding, including up tidally affected rivers as well.

Future Work and Direction

- Continued collaborations with modelers
  - So extremely valuable!!
  - Incorporation of new models, new improvements
  - Challenging areas - back bays with shallow bathymetry
- Continued improvements to forecaster training
  - Training team developed curriculum
- Verification to support forecast improvements
  - NWS MDL leadership
- Improving Impact-Based Messaging



Thank You! / Questions?

laurie.hogan@noaa.gov

Scan to Visit the NWS Eastern Region Coastal Flood Map