Assessing and Adapting to Coastal Risk

NROC Virtual Networking Session
April 1, 2020

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— June 12, 2018: CRMC Adopts Shoreline Change (Beach) SAMP —

Beach SAMP Documents (PDF)

- Chapter 1 — Introduction
- Chapter 2 — Trends and Status: Current and Future Impact of Coastal Hazards in Rhode Island
- Chapter 3 — Assessing Coastal Hazard Risk
- Chapter 4 — Rhode Island's Exposure to Coastal Hazards
- Chapter 5 — RI CRMC Coastal Hazard Application Guidance
- Chapter 6 — State and Municipal Considerations
- Chapter 7 — Adaptation Strategies and Techniques for Coastal Properties

- Beach SAMP is a **guidance document** to support regulatory changes at RI Coastal Resources Management Council (CRMC)
- **APPROVED** June 12, 2018 by CRMC Council

CRMC
Coastal Resources Management Council

www.beachsamp.org

The University of Rhode Island
Graduate School of Oceanography
Coastal Resources Center

Coastal Hazards

1. Sea Level Rise
2. Erosion
3. Storm Surge

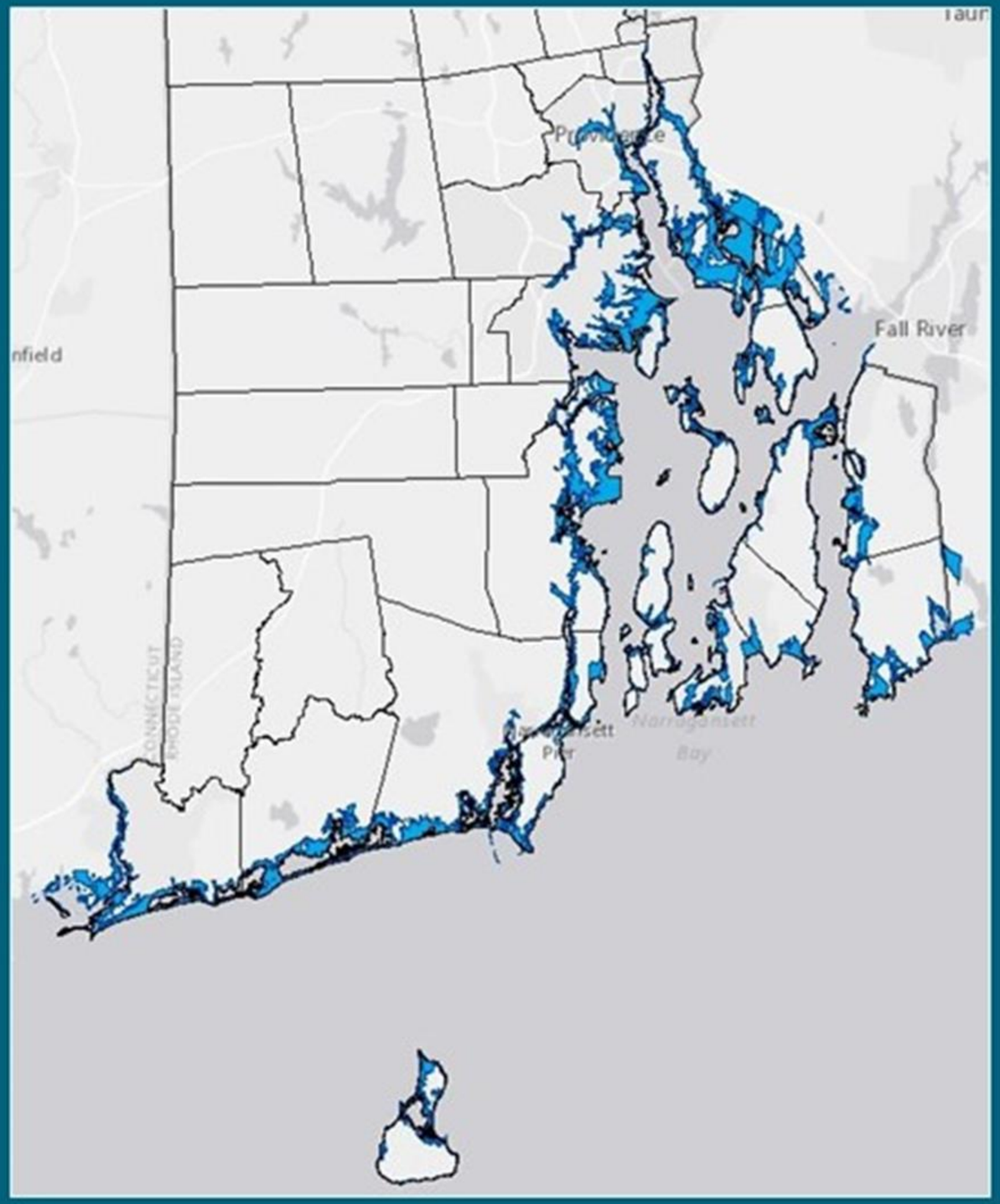
Shoreline Change SAMP Planning Boundary

7-feet of sea level rise

+

100-year return period storm

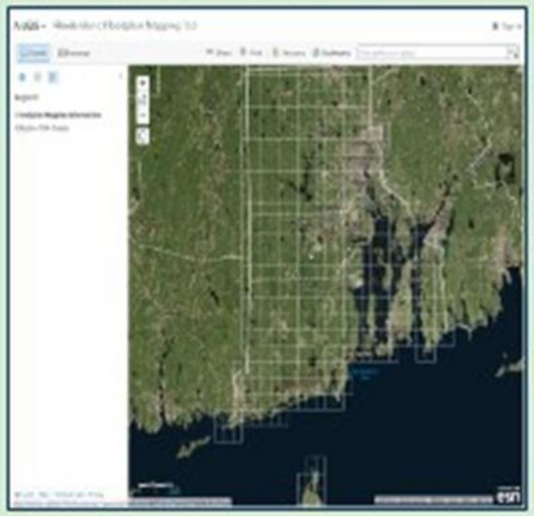
(similar to 1954 Hurricane Carol)



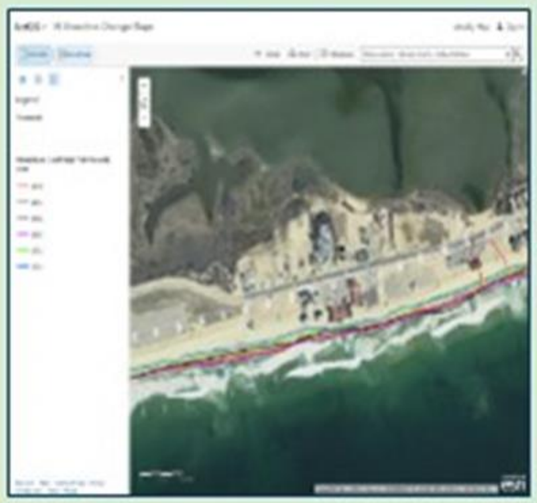
Rhode Island's MAPPING TOOLBOX

Past and Present

1. RIEMA Floodplain Mapping Tool



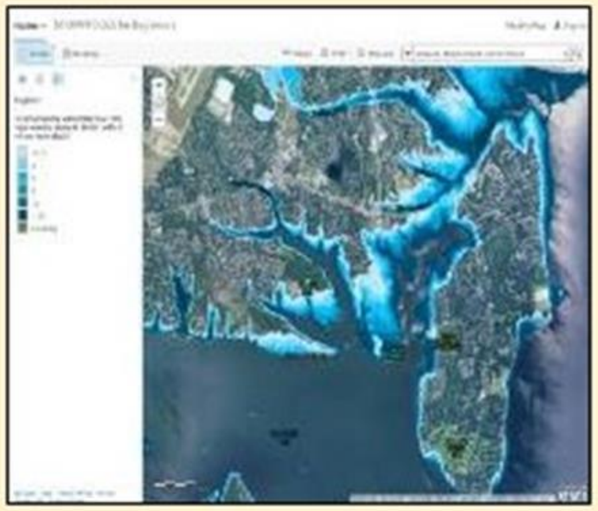
2. Coastal Erosion



Slide courtesy T. Crean, URI CRC

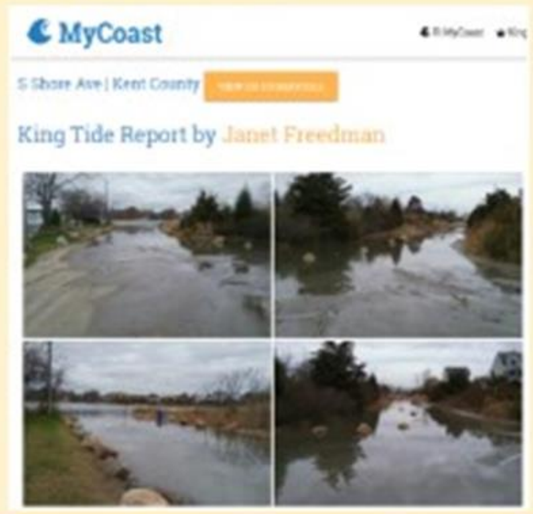
Future

3. STORMTOOLS



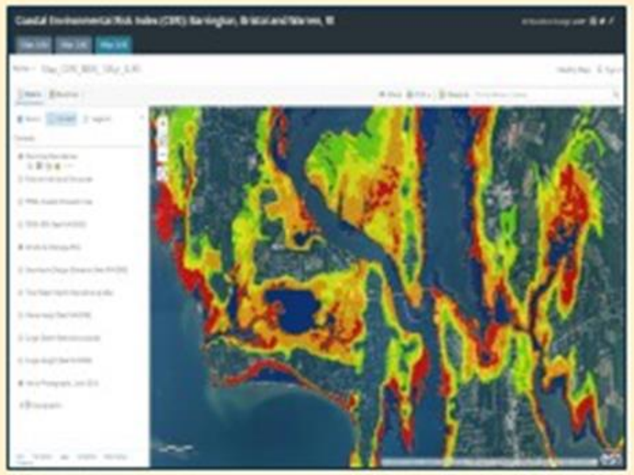
4. SLAMM

5. MyCoast

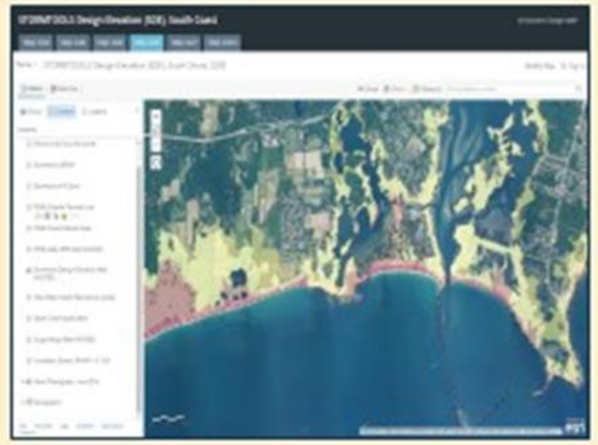


Future

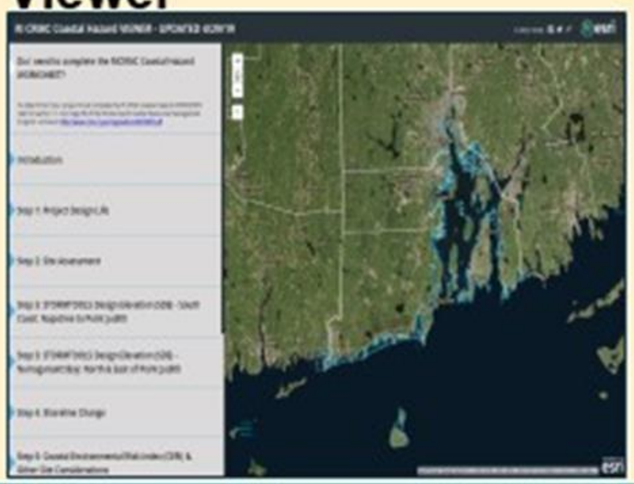
6. Coastal Environmental



7. STORMTOOLS Design Elevation



8. RICRMC Coastal Hazard Viewer



CHAPTER 5

RI CRMC Coastal Hazard Application Guidance

5.1 Overview of Process

The steps presented below provide guidance for applicants to address Coastal Hazards for selected projects in the design and permitting process for the Rhode Island Coastal Resources Management Council (CRMC).

STEP 1: PROJECT DESIGN LIFE	In this step, the applicant will choose an appropriate design life, or lifespan, for the project, and identify a projected sea level for the project site based on the selected design life.
STEP 2: SITE ASSESSMENT & BASE FLOOD ELEVATION	In this step the applicant will review specified maps and tools to assess the exposure and potential risk from coastal hazards at the project site.
STEP 3: LARGE PROJECTS	This step is for Large Projects and Subdivisions only. If not such a project, this step may be skipped.
STEP 4: DESIGN EVALUATION	The applicant will identify, document, and assess the feasibility of design techniques that could serve to avoid or minimize risk of losses.
STEP 5: SUBMIT AN APPLICATION	The applicant will submit the permit application and include the assessment from the previous steps in the application package to the CRMC.

RI CRMC Permit Application Requirement

Applicants will complete a coastal hazard risk assessment process as part of their application package to CRMC

RI Coastal Resources Management Council

...to preserve, protect, develop, and restore coastal resources for all Rhode Islanders

RI CRMC | News | Topics | Wind Energy | Publications | Regulations | Applications | Coastal Hazard Application | Maps | About CRMC | Contact Us | Permit Database

Coastal Hazard Application

Welcome to the RICRMC Coastal Hazard Application WORKSHEET and ONLINE VIEWER!

Please download and print the **RICRMC Coastal Hazard Application WORKSHEET from the link below**, and use the **ONLINE VIEWER** to access the maps and other information required for completion of the **WORKSHEET**.

Coastal Hazard Application Worksheet (PDF)
Coastal Hazards Application – Interactive Form (PDF)

Coastal Hazards Application Online Viewer

The list of projects below must complete the RICRMC Coastal Hazard Application WORKSHEET to be filed in addition to and with your standard CRMC application (*http://www.crmc.ri.gov/applicationforms.html*).

Any of the following **new projects**, including tear downs and rebuilds, located on a coastal feature or within the 200-foot contiguous area:

1. construction of new residential buildings as defined in § 1.1.2;
2. construction of new commercial and industrial structures as defined in § 1.1.2;
3. construction of new beach pavilions as defined in § 1.1.2;
4. construction of any new private or public roadway, regardless of length;
5. construction of any new infrastructure project subject to §§ 1.3.1(F), (H), and (M); and
6. construction of any new subdivisions with six (6) or more lots, any portion of which is within 200 feet of a shoreline feature.

Any of the following **modifications to existing projects**, including tear downs and rebuilds, located on a coastal feature or within the 200-foot contiguous area:

1. any expansion of existing commercial structures over tidal waters;
2. any expansion greater than 600 square feet to existing residential, commercial, industrial or beach pavilion structures;
3. second story additions greater than 600 square feet to any existing residential, commercial, industrial or beach pavilion structures; and
4. any modification to existing residential, commercial, industrial or beach pavilion structures when such structures are located within the CRMC minimum setback specified by §

www.crmc.ri.gov/coastalhazardapp.html

RI CRMC COASTAL HAZARD WORKSHEET

APPLICANT NAME: _____

PROJECT SITE ADDRESS: _____

Please refer to the RI Shoreline Change Special Area Management Plan, Chapter 5 for background and descriptions of the steps outlined below. http://www.crmc.ri.gov/samp_beach/SAMP_Beach.pdf

STEP 1. PROJECT DESIGN LIFE

___A. Indicate FEMA FIRM base flood elevation (BFE) for the project location, available from FEMA, or the municipal building official.

___B. Using the CRMC Shoreline Change maps, indicate the transect number closest to your site, and erosion rate listed for that transect. http://www.crmc.ri.gov/maps/maps_shorechange.html.

Transect Number:

Erosion Rate:

___C. How long do you want your project to last? Identify the expected design life for the project (CRMC recommends a **minimum of 30 years**)

___D. Add the number of years you identified in 1C to the current year. (For example, if you are completing this form in the year 2020, and you want your project to last 30 years, your design life year will be 2050.)

___E. **CIRCLE** the sea level rise (SLR) projection from the Table 1. that matches or comes closest to project design life.

Year	2020	2030	2040	2050	2060	2070	2080	2090	2100
SLR	1.05	1.67	2.33	3.25	4.20	5.35	6.69	8.14	9.61

Table 1E. Sea Level Rise (SLR) Projections (Feb. 2017). NOAA High Curve, 83% Confidence Interval. Newport, RI Tide Gauge. All values are expressed in feet relative to NAVD88. http://www.corpsclimate.us/ccaceslcurves.cfm

NOTE: The STORMTOOLS sea level rise scenarios depict how high the water will be above the average height of the daily high tide over the 19-year period between 1983 and 2001. There have been between 4 and 5 inches of sea level rise in Rhode Island since then. The higher modeled water level accounts for the uncertainties in ice sheet and ocean dynamics.

STEP 2. SITE ASSESSMENT

___A. Open *RICRMC Coastal Hazard Mapping Tool* https://arcg.is/qTSqz. Following the tutorial along the left side of the screen, enter the project site address and turn on the sea level layer closest to the number you circled in 1E.

___B. **CIRCLE** the STORMTOOLS SLR map layer closest to the SLR value you circled in Step 1E above. If the value falls between the available STORMTOOLS SLR map layers, round off to the closest sea level rise (SLR) number.

1ft 2ft 3ft 5ft 7ft 10ft 12ft

___C. Does the STORMTOOLS SLR map layer you circled above expose your project site to future tidal inundation? **CIRCLE YES or NO**

YES NO

___D. List any **roads or access routes** that are potentially inundated from SLR and storms. To do this, ZOOM OUT from your project location, change BASEMAP on the viewer to "street view" – see Step 2A.

STEP 3. STORMTOOLS DESIGN ELEVATION (SDE)

___A. Based on the project location, CIRCLE the SDE Viewer for your site, and open the corresponding tab in Mapping Tool:

South Coast SDE Viewer: Napatree to Point Judith	Narragansett Bay SDE Viewer: North & East of Point Judith

___B. Follow the tutorial included along the left panels of the viewer to enter the address of your project site. Select the tab across the top that corresponds to the sea level rise projection you identified in STEP 1E.

___C. Click on the map at project site to identify **STORMTOOLS Design Elevation (SDE)** from the pop up box. **Enter the SDE value here:**

RI CRMC COASTAL HAZARD WORKSHEET

STEP 4. SHORELINE CHANGE

___A. Setbacks are required per RI Coastal Resources Management Program (RICRMP), Section 1.1.9. Indicate the annual shoreline change rate value from STEP 1B, and the design life selected in STEP 1C above. Enter values in 4C below.

___B. **CIRCLE** the Projected Erosion Rate that corresponds to the design life you identified above.

Year	2050	2060	2070	2080	2090	2100
Projected Future Erosion Multiplier	1.34	1.45	1.57	1.70	1.84	2.00

Table 4B. Projected Shoreline Change Rate multipliers. (Oakley et al., 2016)

___C. **COMPLETE EROSION SETBACK CALCULATION:**

Historic shoreline change rate, STEP 1B		Design Life, STEP 1C		Projected Future Erosion Multiplier, STEP 4B		Erosion Setback (ft) 1B x 1C x 4B
	X		X		=	

NOTE: A minimum setback of 50-feet is required, but a greater setback may be necessary and/or desirable based on this analysis.

STEP 5. CERI & OTHER SITE CONSIDERATIONS

___A. If you live in a community where a Coastal Environmental Risk Index (CERI) has been completed (Barrington, Bristol, Charlestown, Narragansett, South Kingstown, Warren, Warwick, Westerly), CIRCLE the level of projected damage to your location, as indicated on the map that corresponds to the design life identified in STEP 1.

CERI Level:	Moderate	High	Severe	Extreme	Inundated by 2100	Not applicable

___B. Consider and discuss with your design consultant other forces or factors that might impact the development, such as coastal habitats, shoreline features, public access, wastewater, storm water, depth to water table/groundwater dynamics, saltwater intrusion, or other issues not listed above. In addition, pressure from rising sea levels will result in rising subsurface groundwater levels ultimately effecting wells and septic systems.

STEP 6. LARGE PROJECTS

This step is for Large Projects and Subdivisions only, six (6) or more units, as defined by RI CRMP Section 1.1.6.I(1)(f). This step may be skipped for other projects.

___A. Use the Sea Level Affecting Marshes Model (SLAMM) Maps to assess potential impacts to large projects and subdivisions from salt marsh migration resulting from projected sea level rise. CRMC SLAMM maps can be accessed here: http://www.crmc.ri.gov/maps/maps_slamm.html. The CRMC recommends using the 5-foot SLR projection within SLAMM to assess future potential project impacts on migrating marshes. Does the SLAMM map that corresponds to the design life you identified in STEP 1 expose your project site to future salt marsh migration? **CIRCLE YES or NO**

YES NO

STEP 7: DESIGN EVALUATION

___A. Using Chapter 7 of the RI Shoreline Change SAMP as a guide, investigate mitigation options for the exposure identified above and include that in the final application.

This fully completed Coastal Hazard Application Guidance worksheet must accompany the application. If you are a design or engineering professional, please sign here that you have discussed the findings of this worksheet with the Owner.

DESIGN/ENGINEER SIGNATURE: _____ DATE: _____

OWNER'S SIGNATURE: _____ DATE: _____

Coastal Hazard VIEWER

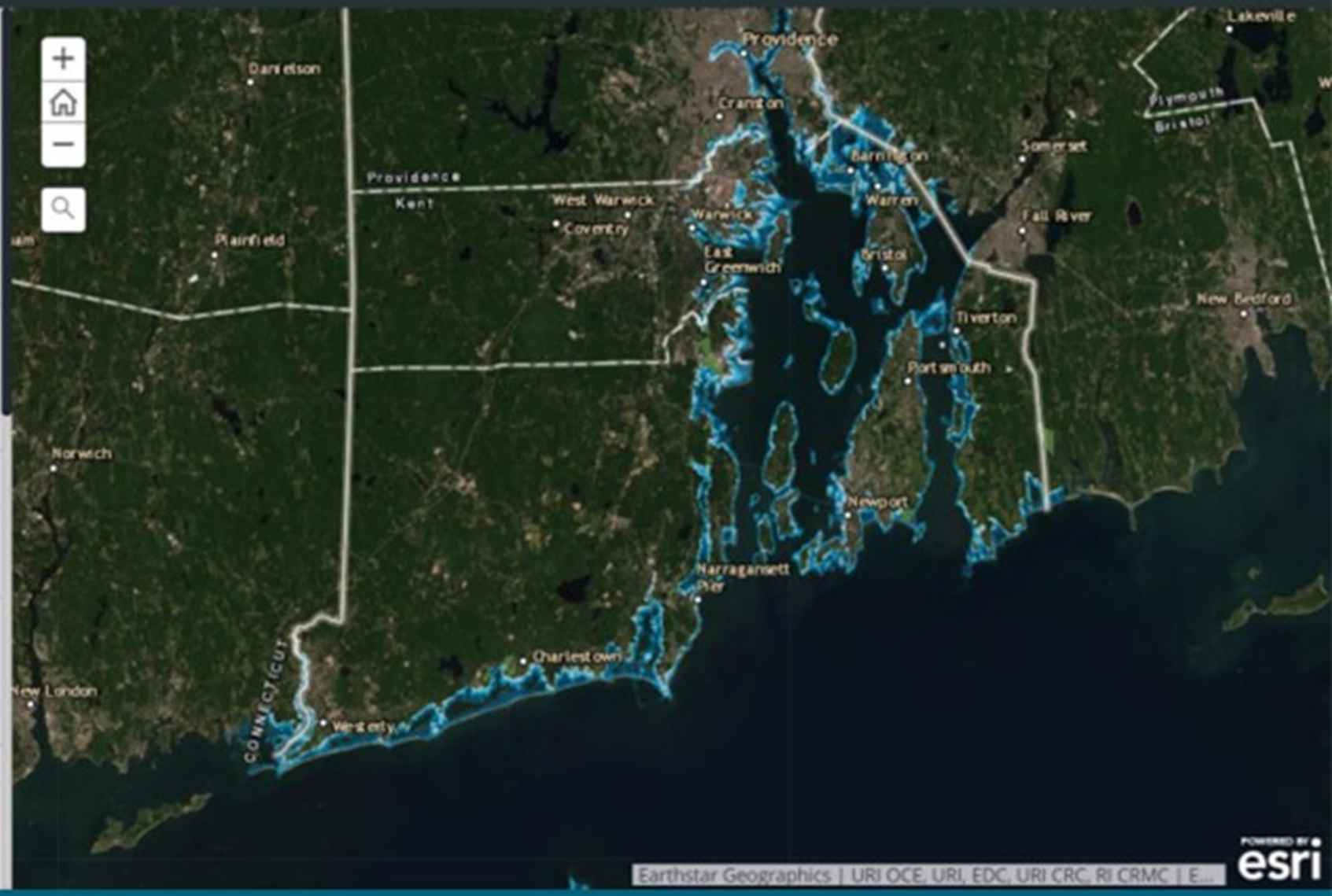
RI CRMC Coastal Hazard VIEWER - UPDATED 4/29/19

A story map

Do I need to complete the RICRMC Coastal Hazard WORKSHEET?

To determine if your project must complete the RI CRMC Coastal Hazard WORKSHEET, refer to Section 1.1.6 (i), Page 59 of the Rhode Island Coastal Resources Management Program, online at:
http://www.crmc.ri.gov/regulations/RICRMP.pdf

- Introduction
- Step 1: Project Design Life
- Step 2: Site Assessment
- Step 3: STORMTOOLS Design Elevation (SDE) - South Coast: Napatree to Point Judith



Shoreline Adaptation, Inventory and Design Project

Address the impacts of coastal hazards such as erosion, flooding, loss of habitats and shoreline public access.

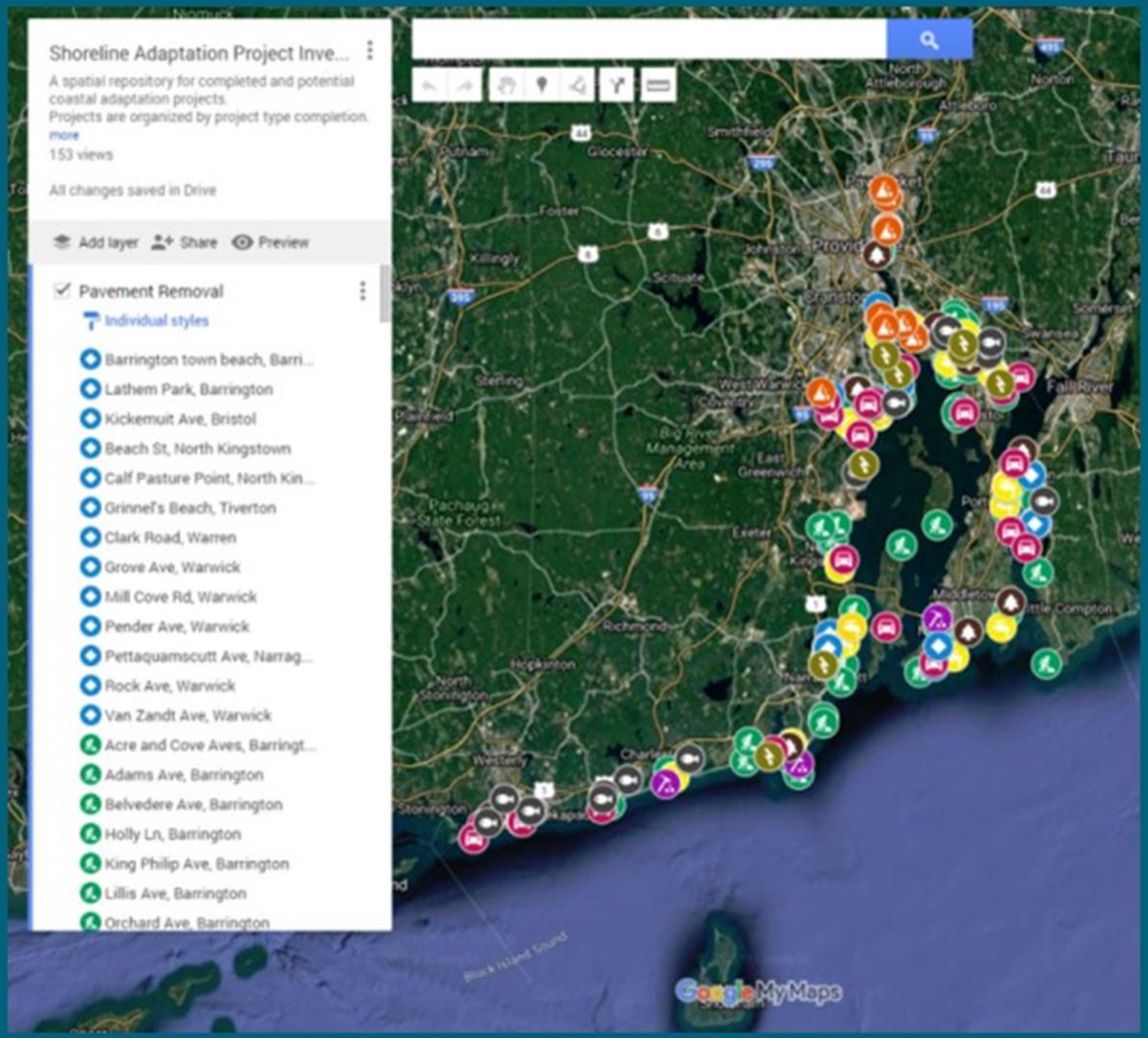
Improve the resilience and safety of our shoreline while increasing the benefits of natural systems.

- Multiple benefits
  - Public safety
  - Natural habitat enhancement
  - Public shoreline access
  - Water quality improvement
  - Shoreline protection

Shoreline Adaptation, Inventory and Design Project

Maps projects by category:

- Pavement Removal
- Stormwater Management
- Structure Removal
- Natural Feature Restoration
- Road Relocation / Limit Vehicle Access
- Bank Re-Grading / Stabilization
- Culvert Redesign
- Utility Removal / Relocation



PAVEMENT REMOVAL

These projects often occur at the ends of roads along the shoreline where tidal flooding has eroded and damaged the existing pavement.

Clark Road, Warren

BEFORE

AFTER

BEFORE

AFTER

STORMWATER MANAGEMENT

These projects address shoreline impacts of stormwater runoff from upland areas and can include practices such as vegetated swales and bioretention areas.

BEFORE

AFTER

STRUCTURE REMOVAL

- These projects may include removal of structures or parts of structures (such as foundations) that have been damaged by coastal flooding and storm surge, or the relocation of at-risk structures farther inland.

ROAD RELOCATION / LIMIT VEHICLE ACCESS

These projects may include closure of frequently flooded road sections to vehicular traffic and rerouting or relocation of vehicular access.

BANK RE-GRADING / STABILIZATION

These projects address shoreline erosion through activities such as re-grading steep slopes and reinforcing banks with biodegradable materials and vegetation.

BEFORE

DURING

AFTER

Coastal Resilience and Adaptation

Coastal resilience means building the ability of individuals, communities, infrastructure, and the environment to "bounce back" after hazardous events such as hurricanes, coastal storms, and flooding. A community that is more informed and prepared will have a greater opportunity to rebound quickly from weather and climate-related events– communities should understand their vulnerability from coastal hazards, reduce their risk and determine the value of nature-based solutions.

The ability to rebound more quickly can reduce negative human health, environmental, and economic impacts. Resilience is our ability to prevent a short-term hazard event from turning into a long-term community-wide disaster.

Shoreline Adaptation Projects

CRMC, partners launch Shoreline Adaptation Inventory and Design program

View the Project Overview Webinar video on YouTube

PDF of webinar Power Point presentation (PDF)

View the Google Map Shoreline Adaptation Inventory

Nominate a project site using the online Jot form

Fact Sheet – Shoreline Adaptation Inventory and Design Project (PDF)

Information from the Insurance Institute for Business and Home Safety

Fortified Home: A systems-based, incremental approach for creating stronger, safer homes.

What is FORTIFIED? (PDF)
FORTIFIED Home – Hurricane Program (PDF)

Open For Business-EZ is a free business continuity tool designed to help with planning for any type of business interruption to quickly re-open and resume operations following a disaster.

www.crmc.ri.gov/coastalresilience.html

Thank You!

cchaffee@crmc.ri.gov

Photo: Nag Marsh, Prudence Island (Daisy Durant, NBNERR)