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Healthy People. Healthy Communities.

Hazard Vulnerability Assessment:

Tool and web application











What is it?

- A geospatial tool that allows coastal managers, planners, and researchers to better understand our vulnerabilities to coastal hazards.

The Basics

It's an open source, stand alone, geospatial tool.

- There are 4 components.
- Produces ESRI compatible datasets that rank areas with a vulnerability of 1 (low) to 5 (high).
- Requires GIS skills, data downloads, and data creation to generate products.
- Web application to view results.

The 4 components

- **Storm Surge**
- **Shoreline Change**
- **Flooding**
- **Social / Economic vulnerability.**

Component #1
Storm surge

Hurricane Hugo
September 1989

Photo courtesy of Wally Jenkins, SCDNR

Component #1
Storm surge

Hurricane Matthew
October 2016

Photo courtesy of SCDHEC - OCRM


Component #1
Storm surge
Hurricane Matthew
October 2016
Photo courtesy of SCDHEC - OCRM


Component #2
Shoreline Change
(erosion)
Photo courtesy of SCDHEC - OCRM

Component #2 Shoreline Change (erosion)

Photo courtesy of SCDHEC - OCRM

Component #3 Flooding

Photo courtesy of SCDHEC - OCRM

Component #3 Flooding

Photo courtesy of SCDHEC - OCRM

Component #4
Social / Economic Vulnerability

Photo courtesy of SCDHEC - OCRM

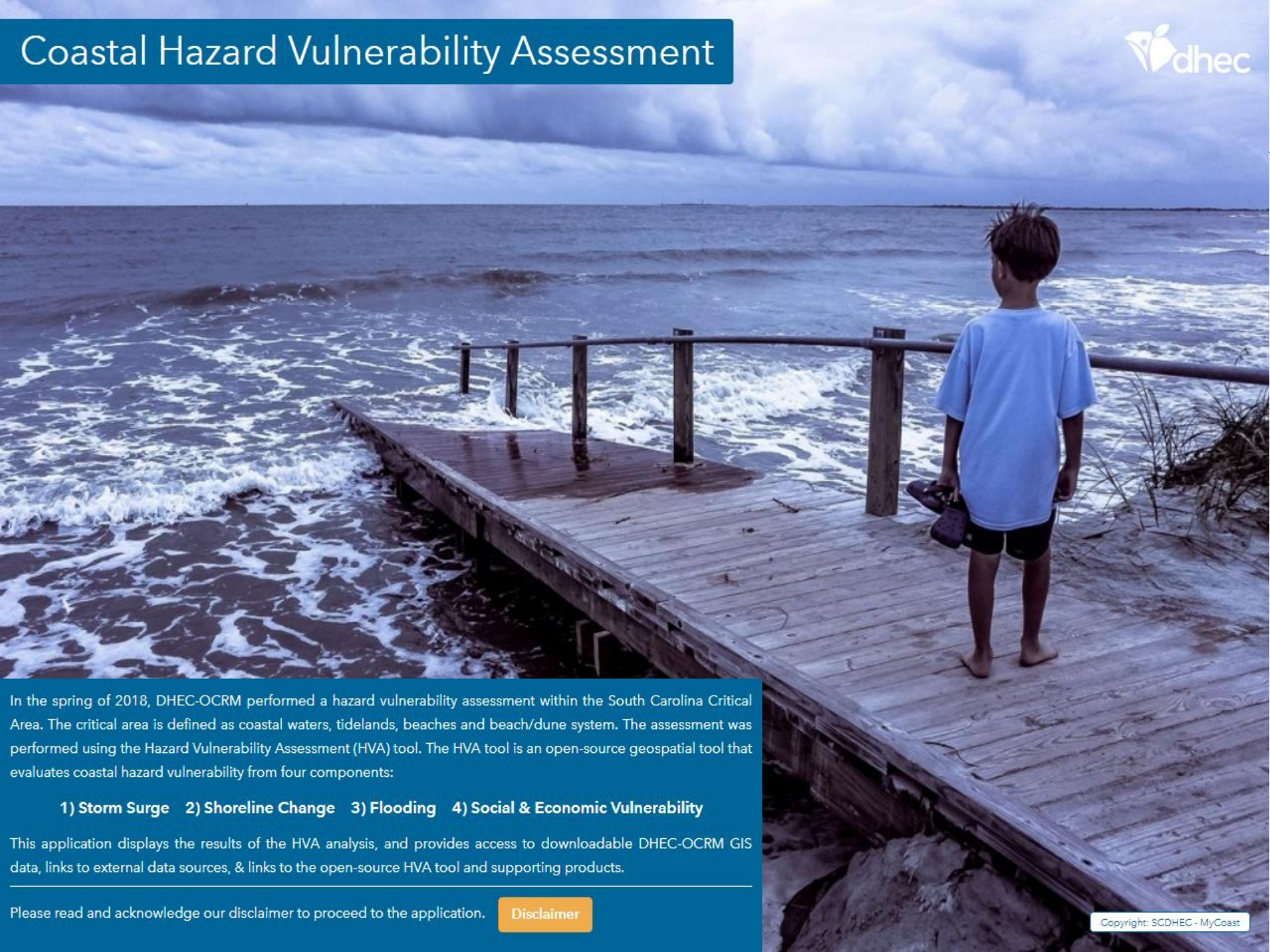
The 4 components and Sources

- **Storm Surge** (SLOSH from NOAA)
- **Shoreline Change** (DHEC OCRM)
- **Flooding** (FEMA Q3/DFIRMs)
- **Social / Economic vulnerability**
  (SoVI® from University of South Carolina, Hazards and Vulnerability Research Institute)

Final Products: Ranked 1 - 5

- **Shoreline Change**
  - **Rate, Temporal, and Spatial variation**
- **Inundation**
  - **Flood and storm surge**
- **Inundation + SoVI**
  - **Flood, storm surge, and social / economic vulnerability**

Coastal Hazard Vulnerability Assessment



In the spring of 2018, DHEC-OCRM performed a hazard vulnerability assessment within the South Carolina Critical Area. The critical area is defined as coastal waters, tidelands, beaches and beach/dune system. The assessment was performed using the Hazard Vulnerability Assessment (HVA) tool. The HVA tool is an open-source geospatial tool that evaluates coastal hazard vulnerability from four components:

1) Storm Surge 2) Shoreline Change 3) Flooding 4) Social & Economic Vulnerability

This application displays the results of the HVA analysis, and provides access to downloadable DHEC-OCRM GIS data, links to external data sources, & links to the open-source HVA tool and supporting products.

Please read and acknowledge our disclaimer to proceed to the application. Disclaimer

Coastal Hazard Vulnerability Assessment

Search ▾ Downloads & Links ▾ ?

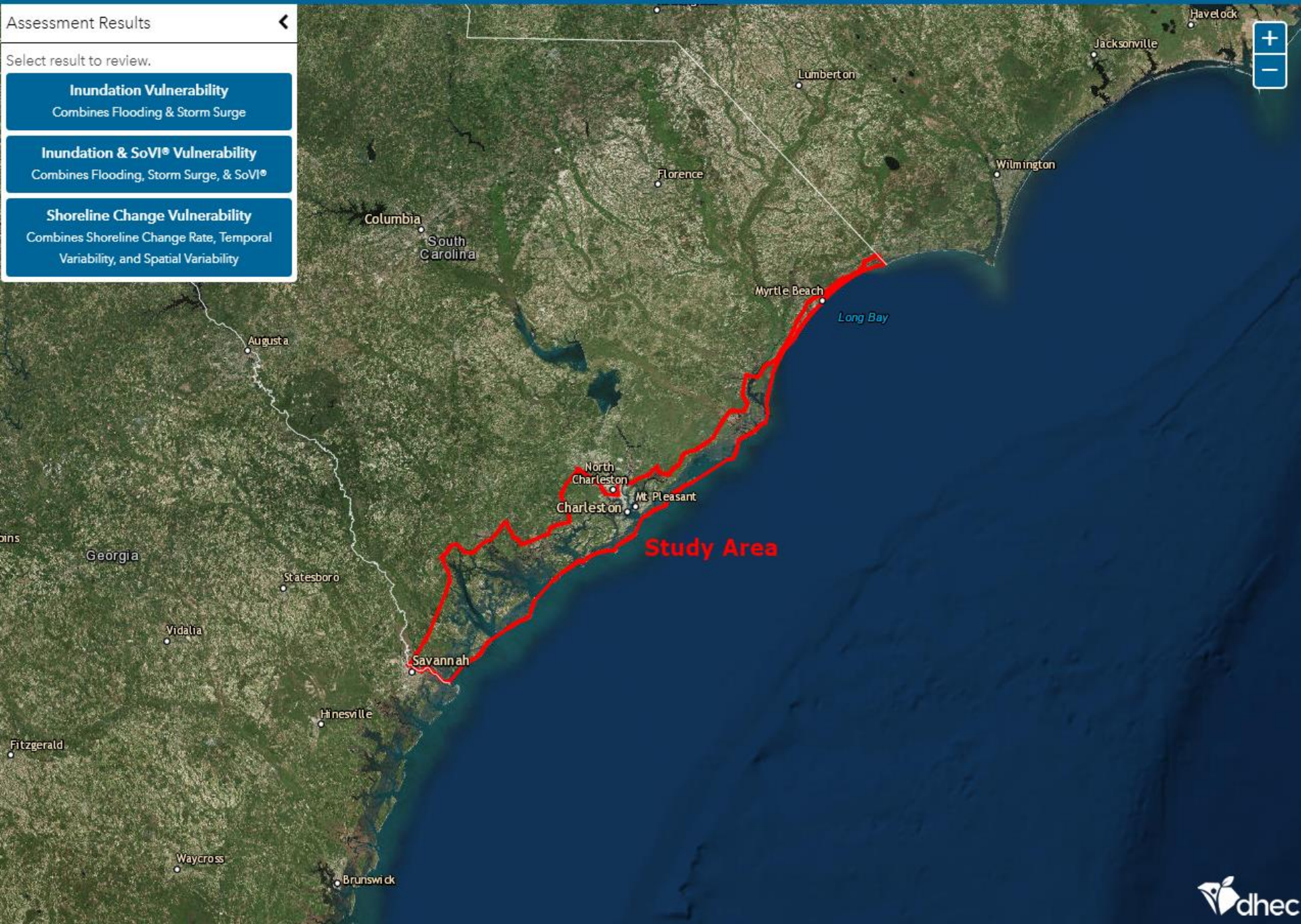
Assessment Results

Select result to review.

Inundation Vulnerability
Combines Flooding & Storm Surge

Inundation & SoVI® Vulnerability
Combines Flooding, Storm Surge, & SoVI®

Shoreline Change Vulnerability
Combines Shoreline Change Rate, Temporal Variability, and Spatial Variability



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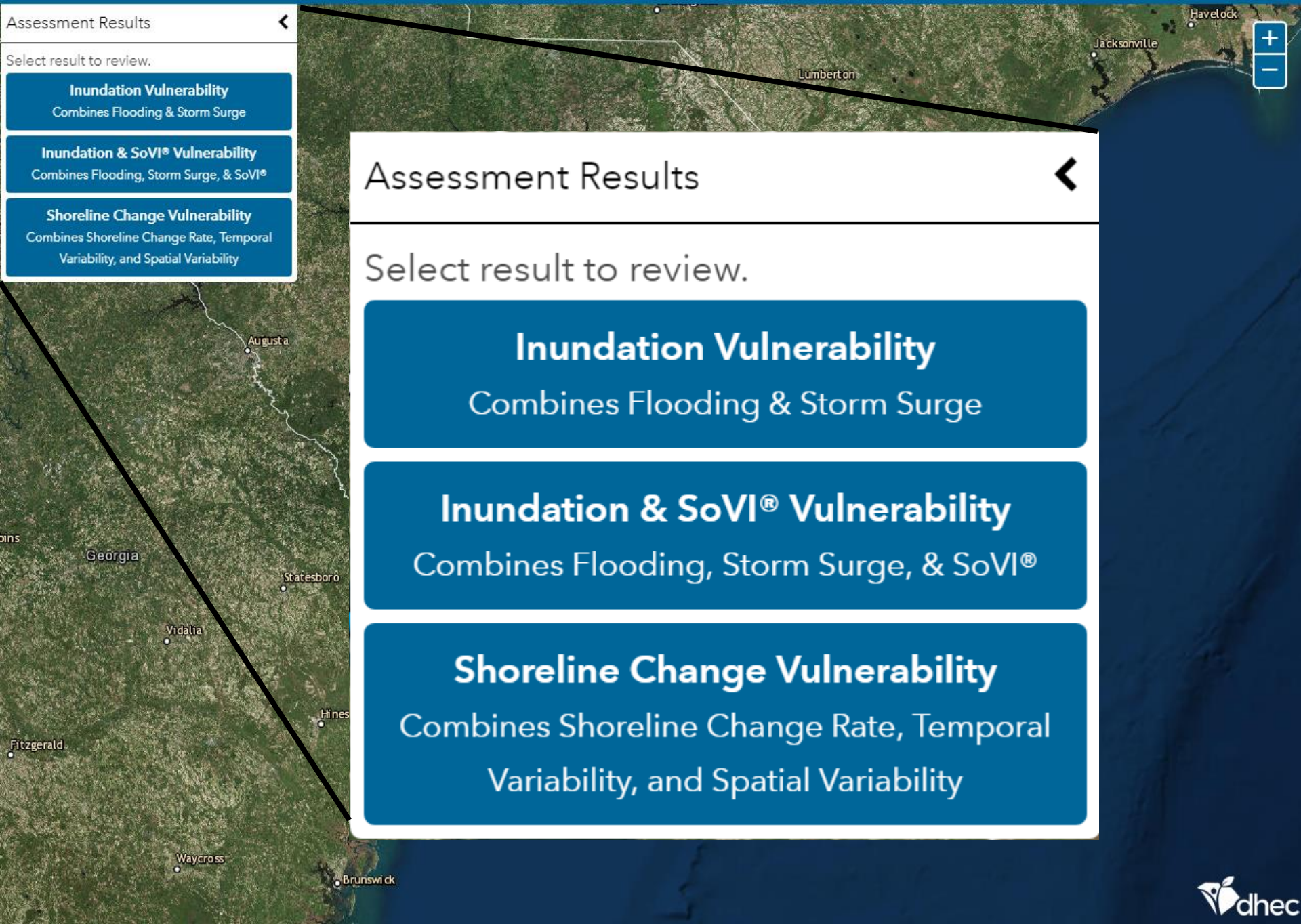

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Inundation Vulnerability

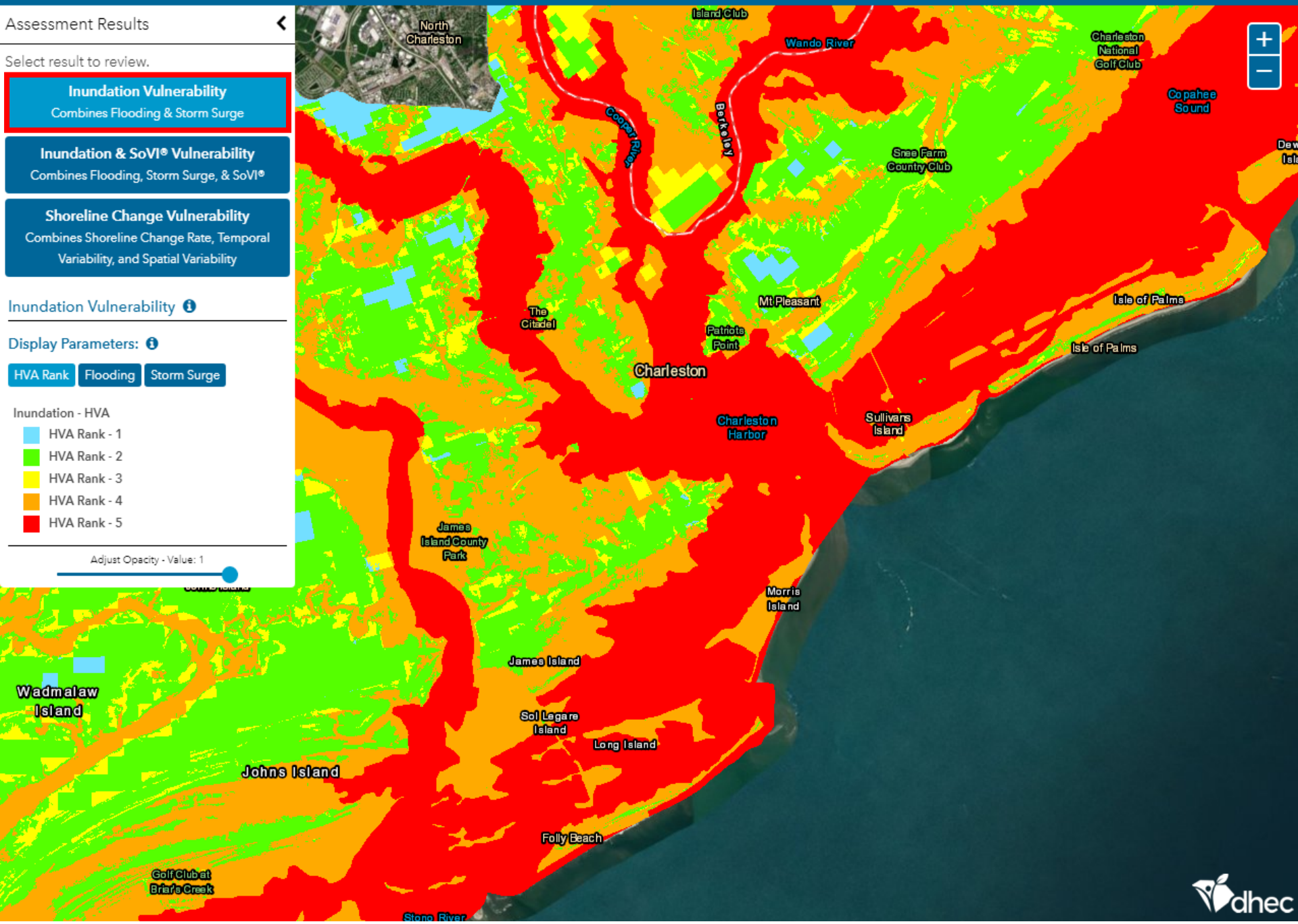
Display Parameters:

HVA Rank | Flooding | Storm Surge

Inundation - HVA

- HVA Rank - 1
- HVA Rank - 2
- HVA Rank - 3
- HVA Rank - 4
- HVA Rank - 5

Adjust Opacity - Value: 1



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Combines Shoreline Change Rate, Temporal Variability, and Spatial Variability

Inundation & SoVI® Vulnerability

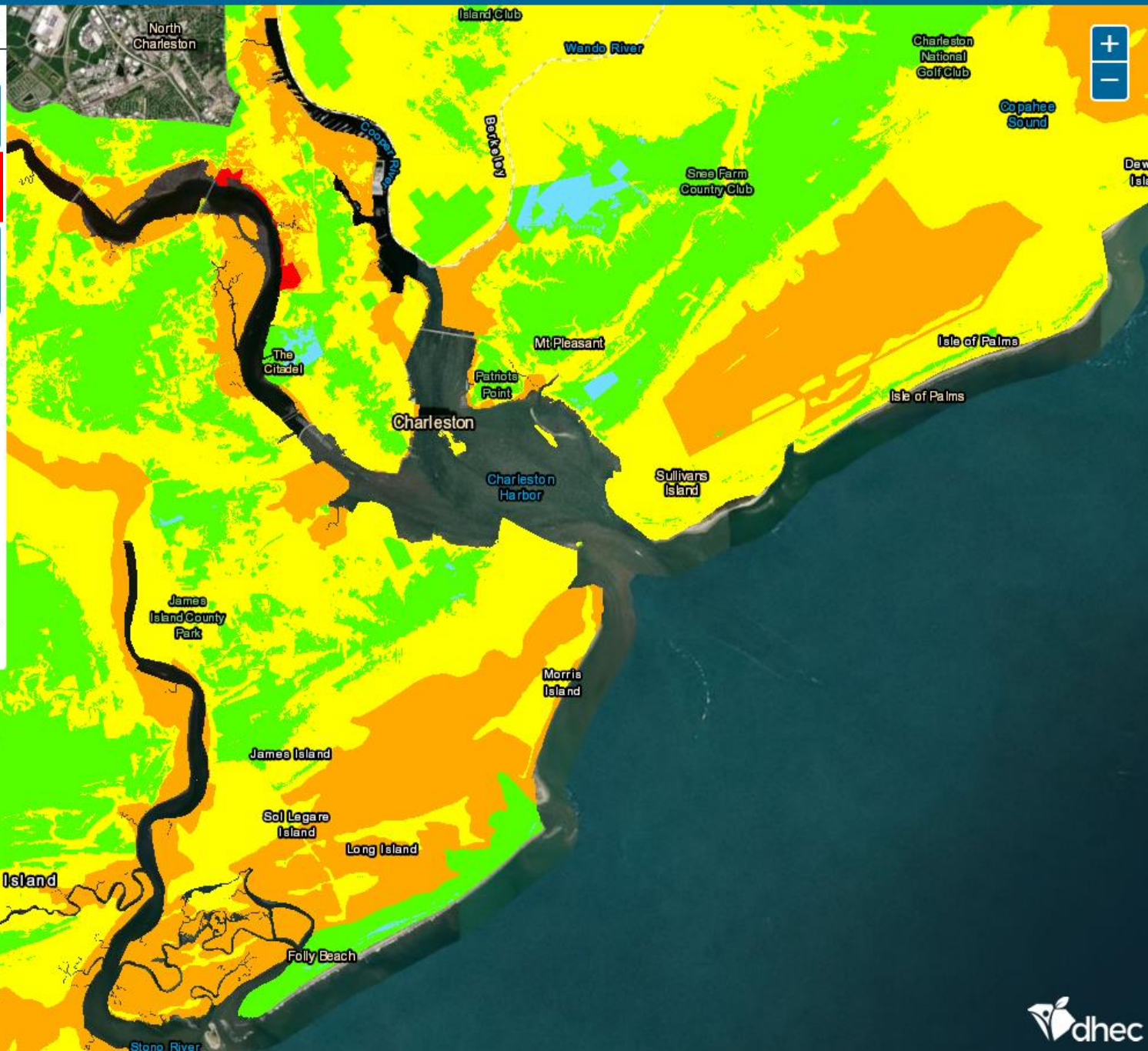
Display Parameters:

HVA Rank | Inundation Rank | SoVI®

Inundation and SoVI - HVA

- HVA Rank - 1
- HVA Rank - 2
- HVA Rank - 3
- HVA Rank - 4
- HVA Rank - 5

Adjust Opacity - Value: 1



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Shoreline Change Vulnerability

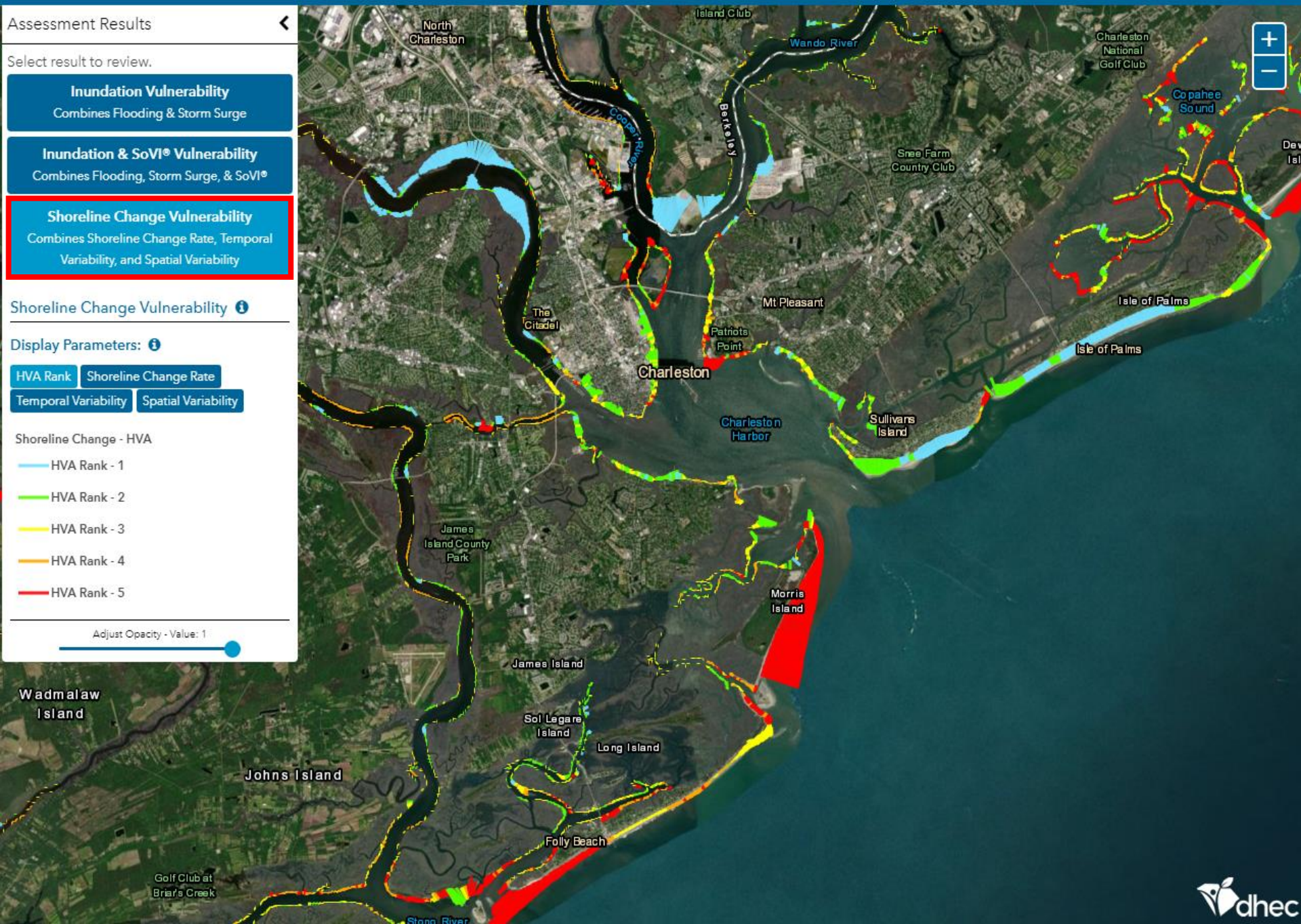
Display Parameters:

HVA Rank | Shoreline Change Rate | Temporal Variability | Spatial Variability

Shoreline Change - HVA

- HVA Rank - 1
- HVA Rank - 2
- HVA Rank - 3
- HVA Rank - 4
- HVA Rank - 5

Adjust Opacity - Value: 1



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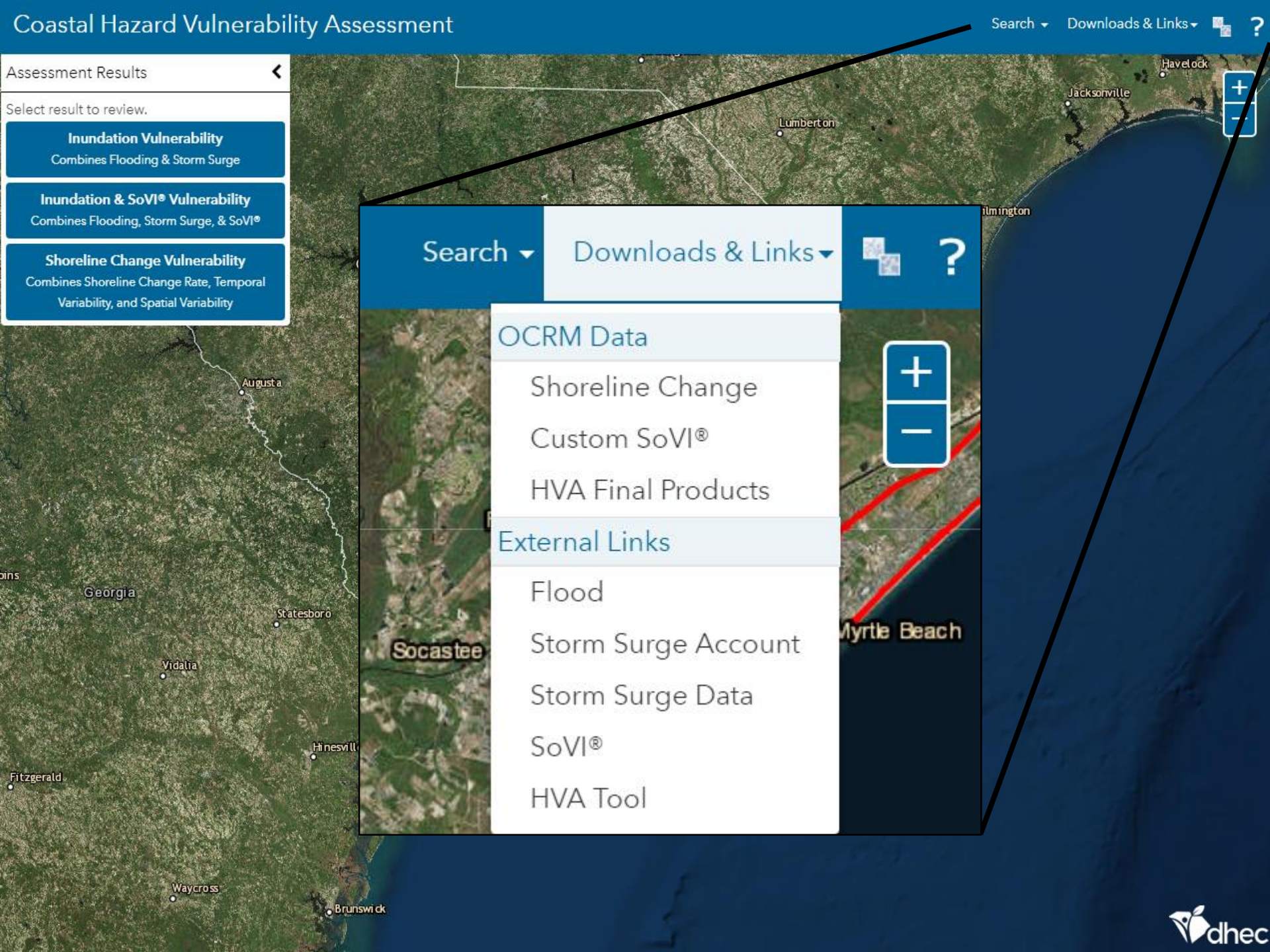
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Jacksonville
Lumberton
Augusta
Georgia
Statesboro
Vidalia
Fitzgerald
Waycross
Brunswick
Socastee
Myrtle Beach
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How is this tool useful?

- **Pre-disaster planning**
  - Emergency routes, shelters
  - Predict areas likely to be most susceptible to hazards
- **Redevelopment planning**
  - Predict areas likely to need assistance with recovery
- **Community Rating System (CRS)**
- **More informed planning**
  - Identify areas best suited for restoration
  - Shellfish, wetlands
  - Identify areas for alternative shoreline stabilizations
  - Guide development siting

Contacts and Links

- Presenters: Jessica Boynton and Landon Knapp
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  - 843-953-2033; 843-953-5044

- Web Application link: https://gis.dhec.sc.gov/hva/#

Contact Us

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Healthy People. Healthy Communities.

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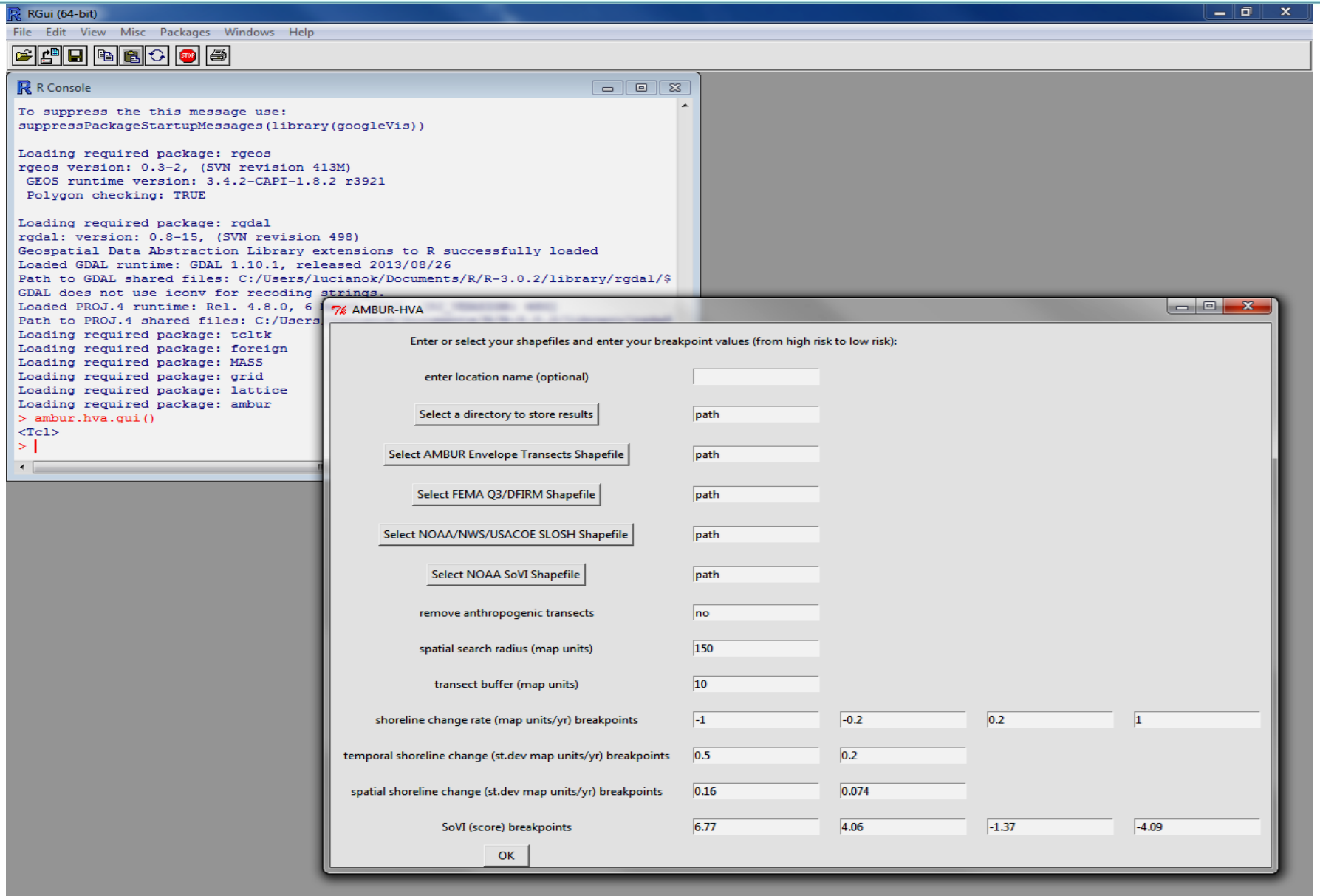
How are the components ranked?

Parameter Ranking	SLOSH Category	Flood Zone Category	SoVI scores	SCR (m/yr)	SCR Temporal Variability	SCR Spatial Variability
5 (highest)	1	V, VE, Open Water	> 6.77	< -1	> 0.5	> 0.16
4	2	A, AE, AH	4.06 to 6.77	-0.2 to -1		
3	3	B	-1.37 to 4.06	-0.2 to 0.2	0.2 to 0.5	0.074 to 0.16
2	4	C, X, X500	-4.09 to -1.37	0.2 to 1		
1 (lowest)	5	D, 0.2 PCT ANNUAL CHANCE FLOOD HAZARD	< -4.09	> 1	< 0.2	< 0.074

How is shoreline change ranked?

HVA Ranking	Subrank 1: Shoreline Change Rate (m/yr)	Subrank 2: SCR Temporal Variability	Subrank 3: SCR Spatial Variability
5 (most risk)	Erosion >1 Erosion 0.2–1	Low–High If High	Low–High If High
4	Erosion 0.2–1 Erosion 0.2–1 Erosion 0.2–1 No Sig Change	If High If Med or Low If Med or Low If High	If Med or Low If High If Med or Low If High
3	No Sig Change No Sig Change No Sig Change Accretion 0.2–1	If High If Med or Low If Med or Low If High	If Med or Low If High If Med or Low If High
2	Accretion 0.2–1 Accretion 0.2–1 Accretion 0.2–1 Accretion >1	If High If Med or Low If Med or Low If High	If Med or Low If High If Med or Low If High
1 (least risk)	Accretion >1 Accretion >1 Accretion >1	If High If Med or Low If Med or Low	If Med or Low If High If Med or Low

What does the tool look like?



How to get raw HVA values for the final products?

Inundation: Flooding + Storm surge

HVA Rank	HVA raw scores
5	> 3.18
4	2.47 to 3.18
3	1.77 to 2.47
2	1.06 to 1.77
1	< 1.06

# of component = 2 (Flood + Surge)
Flooding HVA value = 3
Storm surge HVA value = 2
Inundation HVA raw value = 1.22

$$\left(\sqrt{3 * 2}\right) / 2 = 1.22$$

Sqrt (HVA rank parameter 1 * HVA rank parameter 2) / # of parameters