



Photo: Hodgejr/Dreamstime.com

# [ Underwater: Rising Seas, Chronic Floods, and the Implications for U.S. Coastal Real Estate



Photo: Will Brown

# Encroaching Tides

How Sea Level Rise and Tidal Flooding Threaten U.S. East and Gulf Coast Communities over the Next 30 Years



Union of Concerned Scientists

Union of Concerned Scientists

EXECUTIVE SUMMARY

## The US Military on the Front Lines of Rising Seas

*Growing Exposure to Coastal Flooding at East and Gulf Coast Military Bases*

**KEY FINDINGS**  
The US Armed Forces depend on critical coastal bases to carry out their vital mission to protect the military from threats to its security. However, 26 of 222 military and defense bases in the East and Gulf coasts are at risk of flooding by the end of the century. If the worst case scenario is realized, many of these sites in the United States face growing exposure to rising seas and storm surge. The resulting risk of being less able to respond to crises, including natural disasters, is a threat to the national security.

The Department of Defense (DOD) oversees more than 2,000 military installations in the United States. One of its primary missions is to protect the military from threats to its security. However, 26 of 222 military and defense bases in the East and Gulf coasts are at risk of flooding by the end of the century. If the worst case scenario is realized, many of these sites in the United States face growing exposure to rising seas and storm surge. The resulting risk of being less able to respond to crises, including natural disasters, is a threat to the national security.

Coastal flooding is a major risk to national security. Such installations have historically been well protected. But sea level rise, increased tidal flooding, and heightened storm surge is increasing the risk. These threats of rising seas are already impacting operations at certain coastal installations that are key to the United States' defense.

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Photo courtesy of the US Navy. Photo by the US Navy.

## When Rising Seas Hit Home

*Hard Choices Ahead for Hundreds of US Coastal Communities*



Union of Concerned Scientists

# Underwater

*Rising Seas, Chronic Floods, and the Implications for US Coastal Real Estate*



Union of Concerned Scientists

# [ Defining Chronic Inundation



Photo: Emily Michot/The Miami Herald via AP

# [ Chronic Inundation and Sea Level Rise

Today



With Future  
Sea Level Rise



- A. High tide level
- B. Chronic flooding level
- C. Permanent inundation zone (underwater with each high tide)
- D. Chronic inundation zone (underwater 26 times or more a year)

# [ Mapping Chronic Inundation

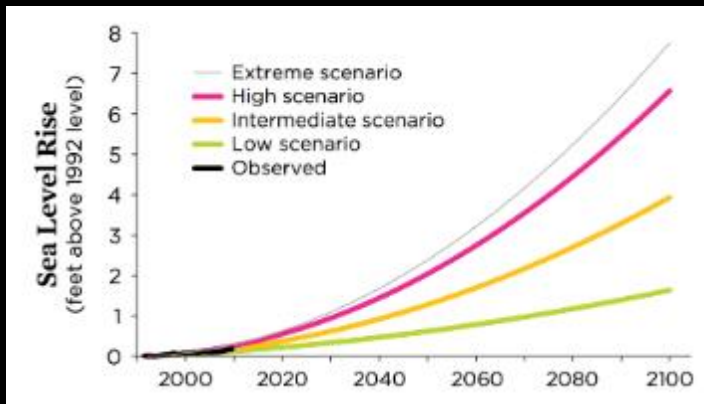
## 1. Tide gauge records



## 2. Digital Elevation Models



## 3. Sea level rise projections



# [ Chronic inundation grows over time

2035 (intermediate)



2100 (intermediate)

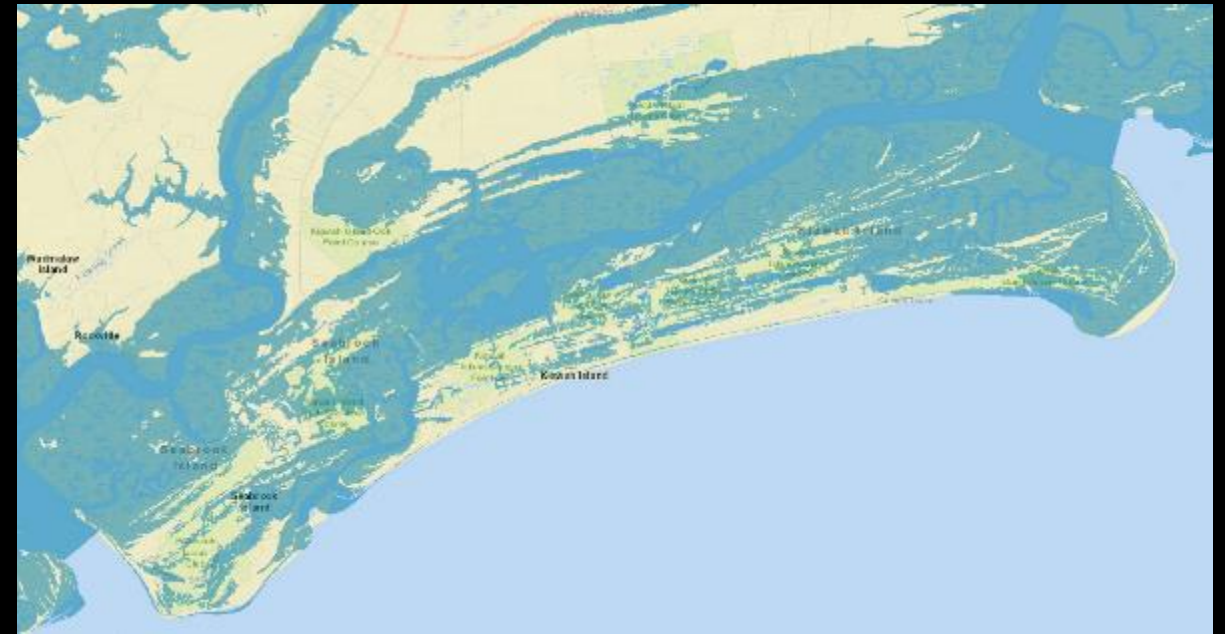


# [ Wetland areas

2035 (intermediate)

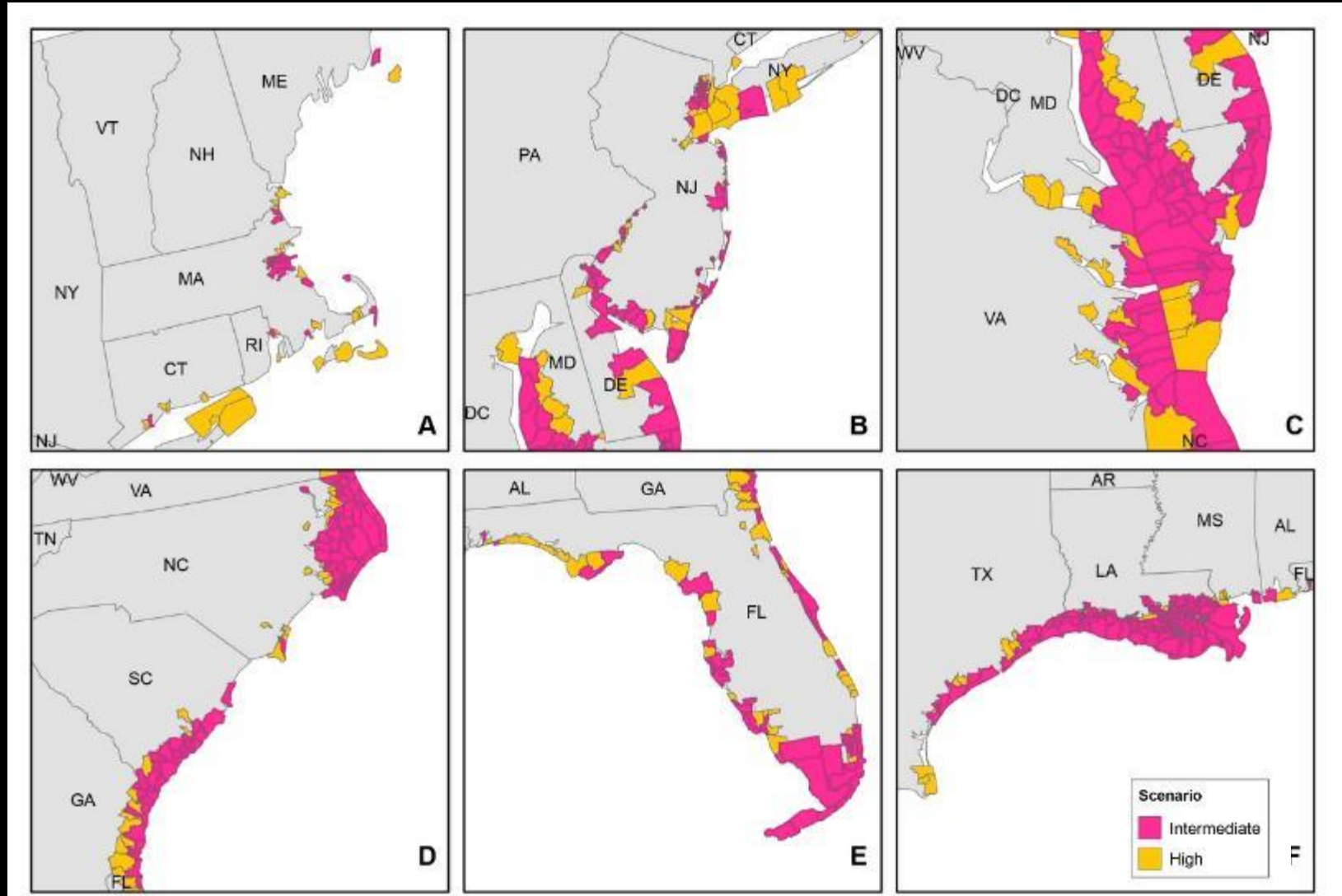


2060 (intermediate)





# Chronic inundation in 2100: 490-668 Communities



[What does this mean for coastal property?

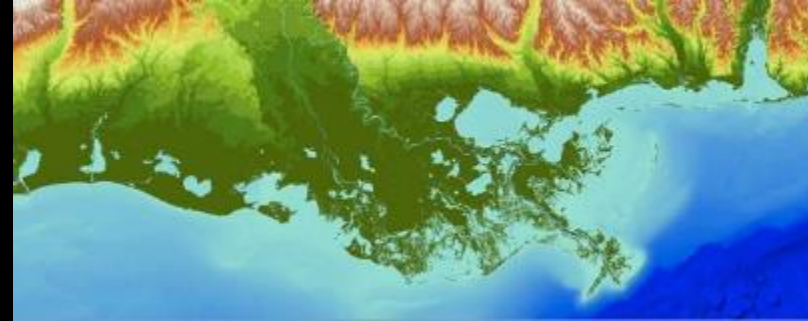


# [ Mapping Chronic Inundation

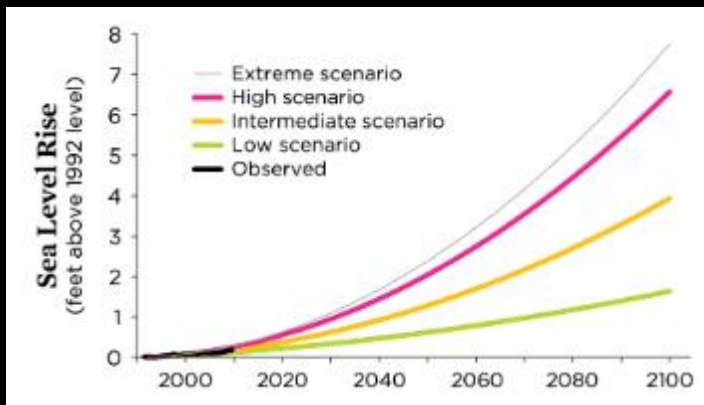
## 1. Tide gauge records



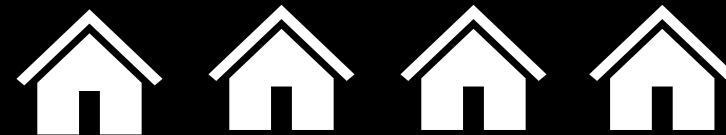
## 2. Digital Elevation Models



## 3. Sea level rise projections

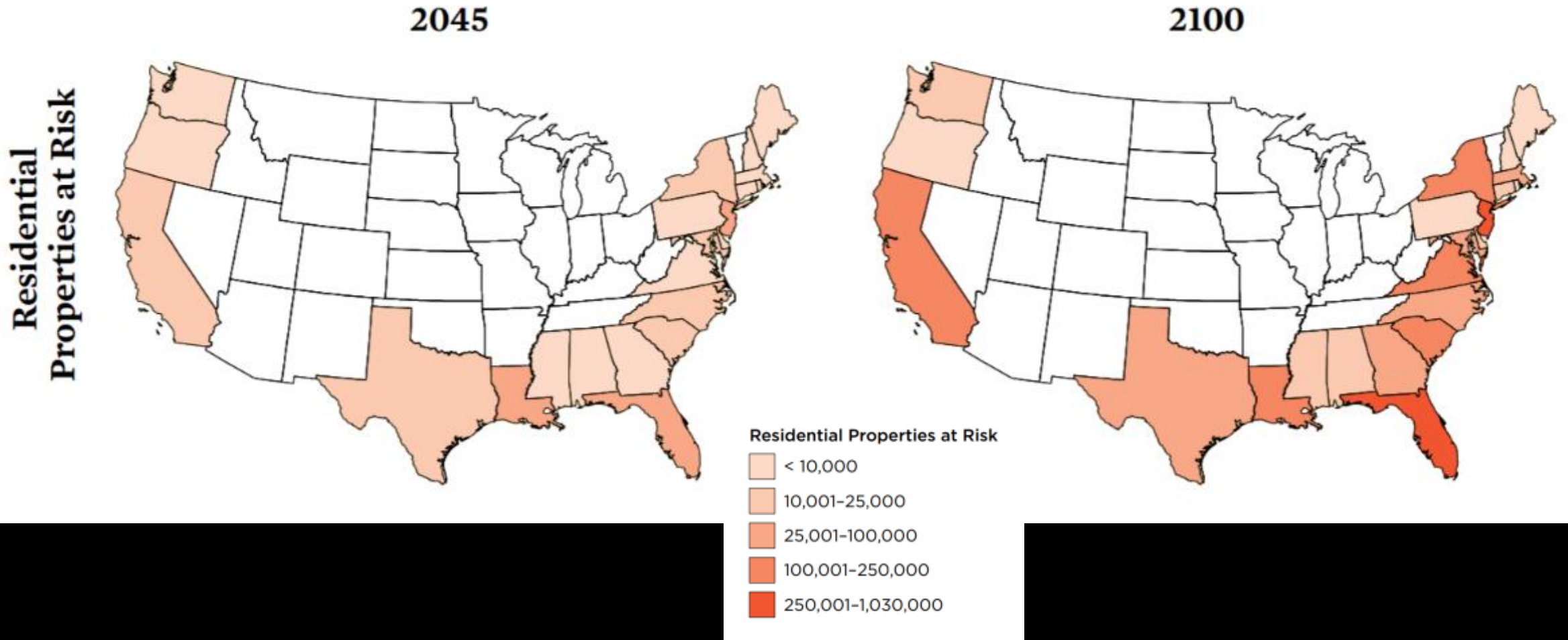


## 4. Property data from Zillow



# [ Homes at risk

## A National Overview



# [ Value at risk

## A National Overview

Current Value  
of Properties at Risk

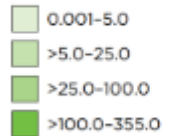
2045



2100

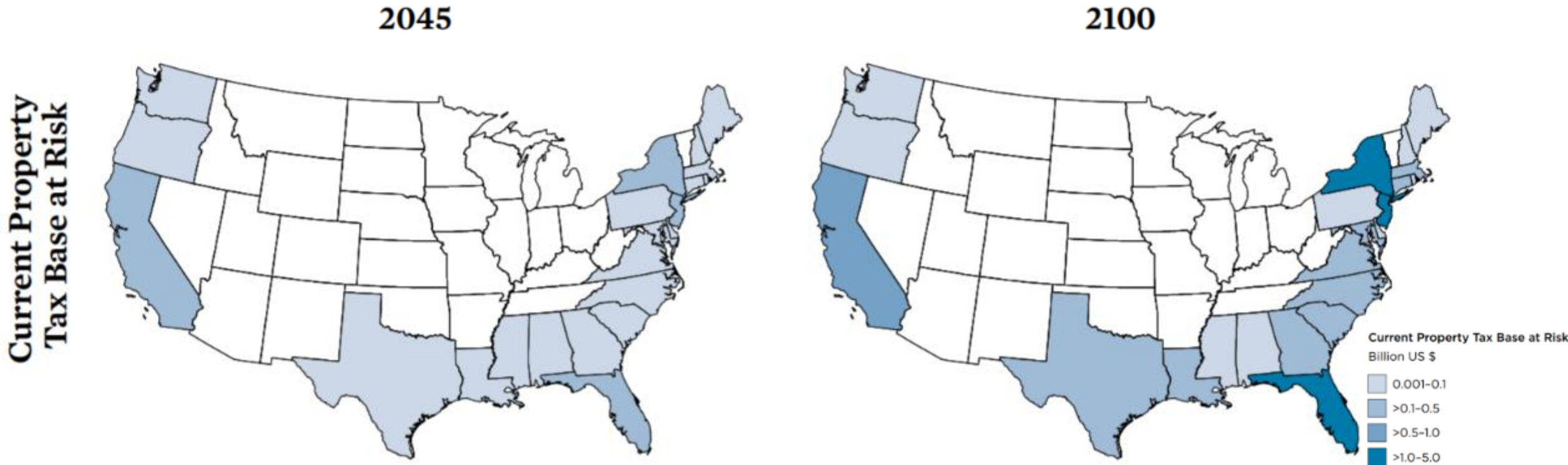


Current Value of Properties at Risk  
Billion US \$

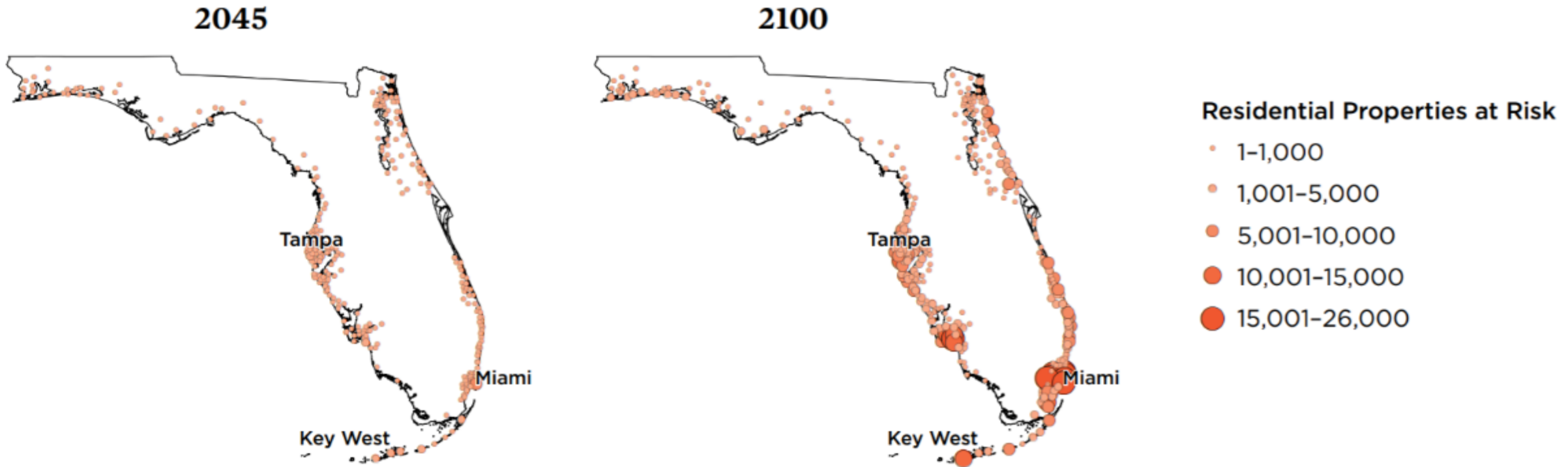


# [ Tax base at risk

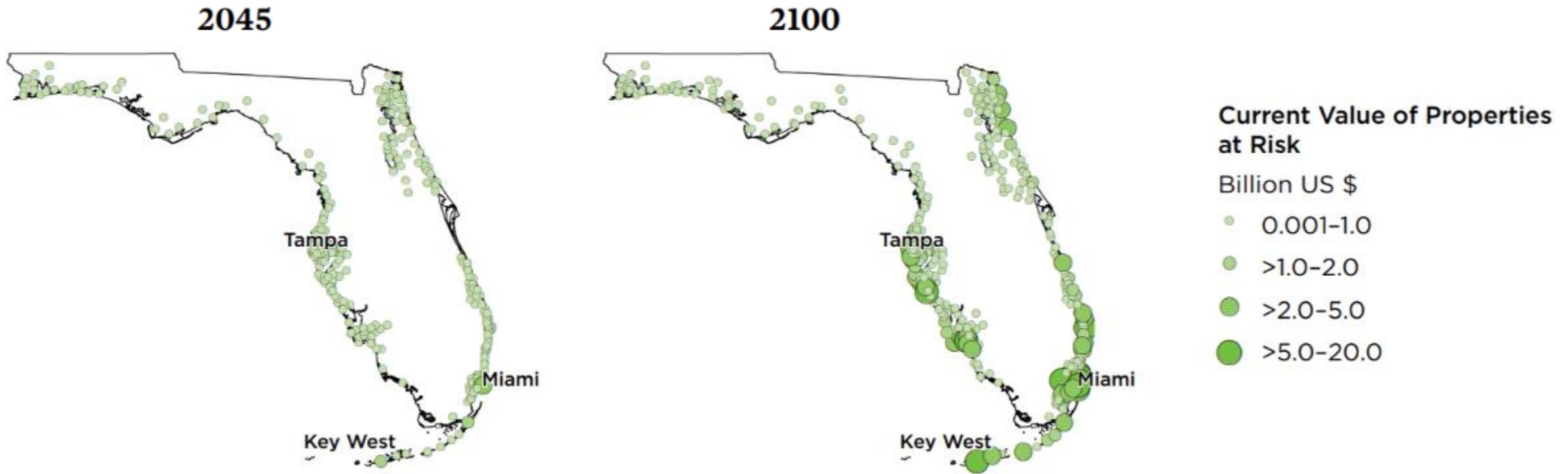
## A National Overview



# [ Acute exposure in Florida: Homes at risk

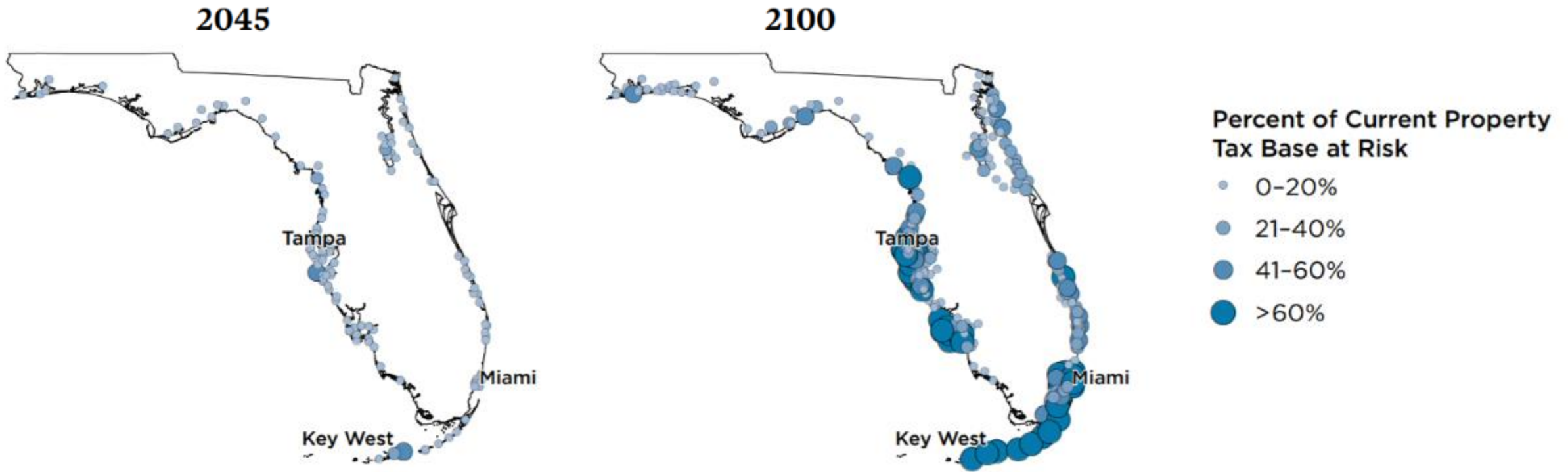


# [ Acute exposure in Florida: Value at risk

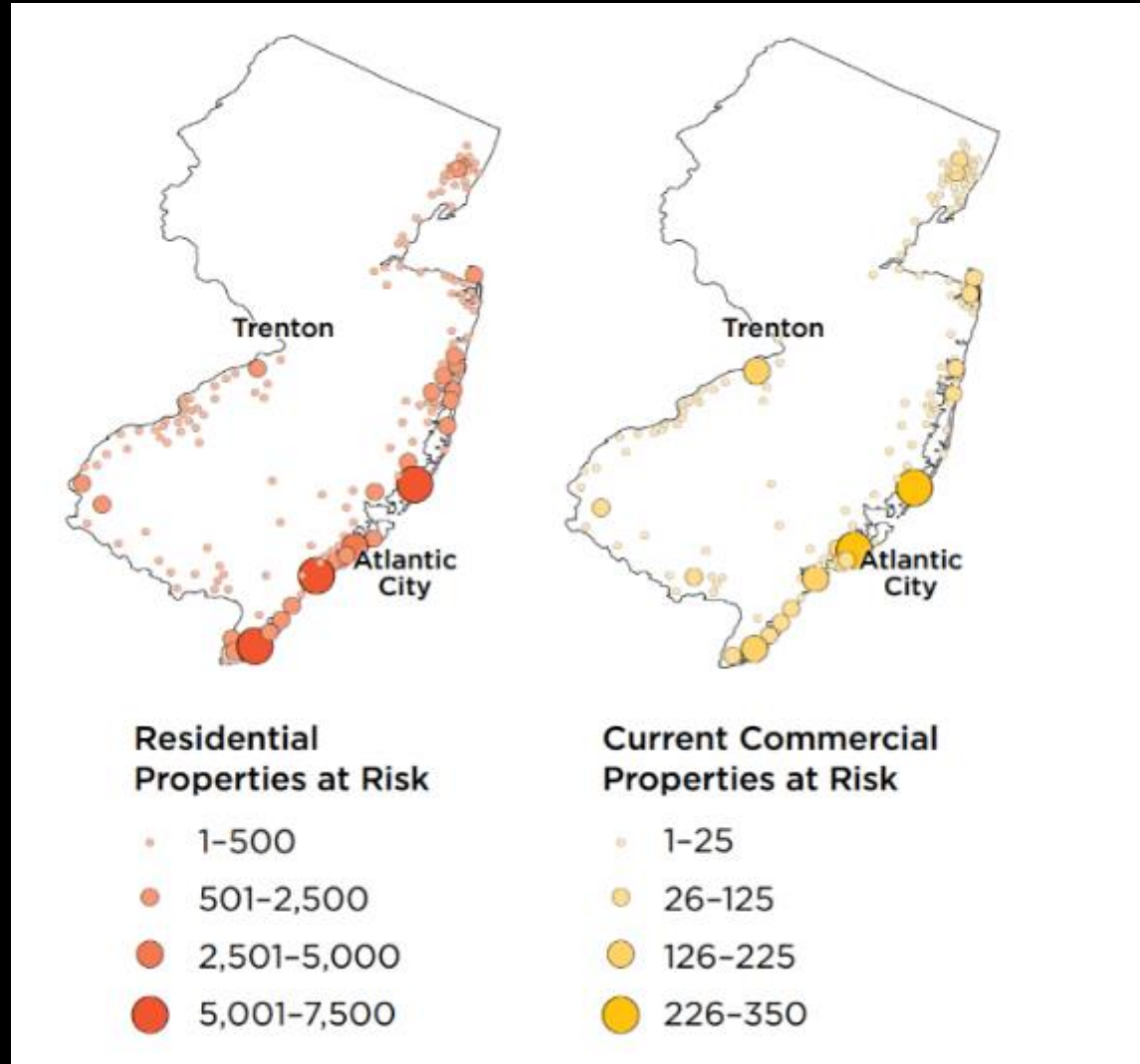




# [ Acute exposure in Florida: Tax base at risk



# [ Snapshot of homes and businesses at risk (2045)



# [ Snapshot of densely populated places at risk (2045)

## California



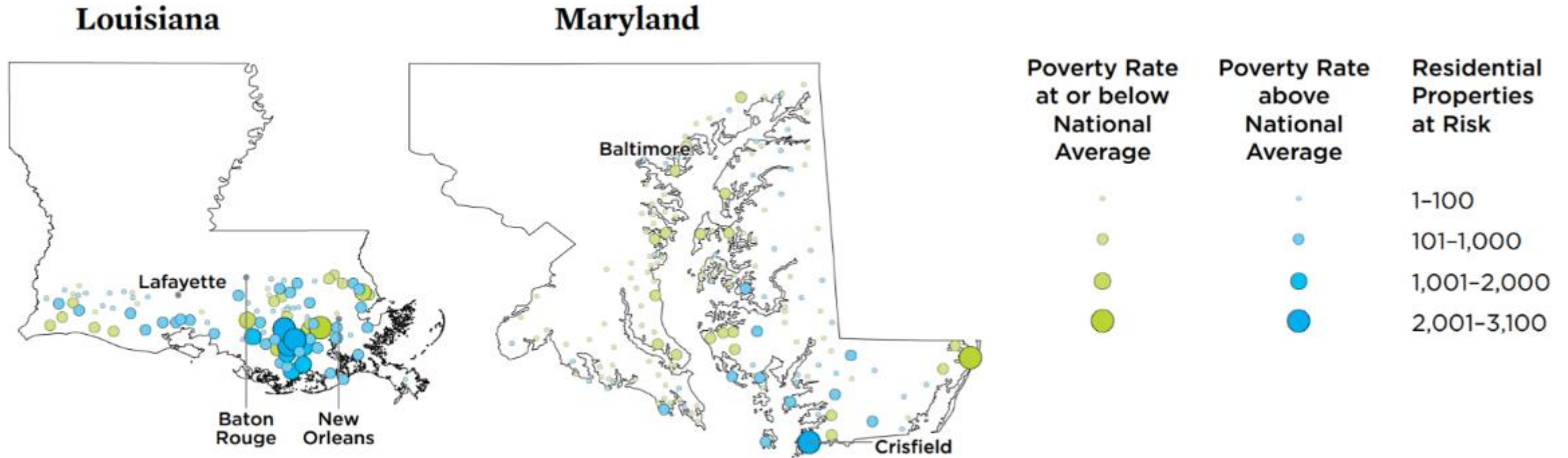
## New York



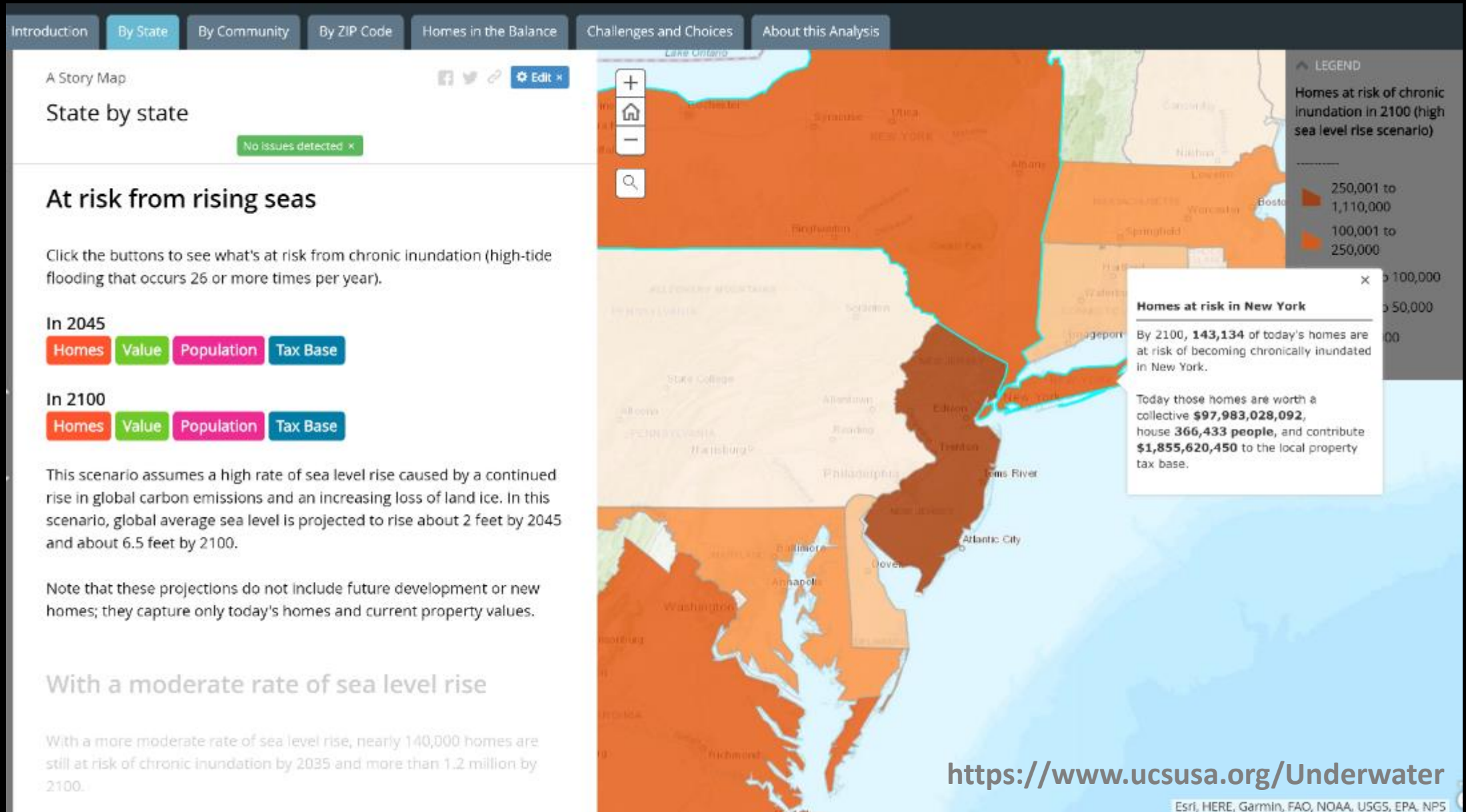
Current Population  
Living in At-Risk  
Properties

- 1-500
- 501-1,000
- 1,001-2,500
- 2,501-5,000
- 5,001-11,000

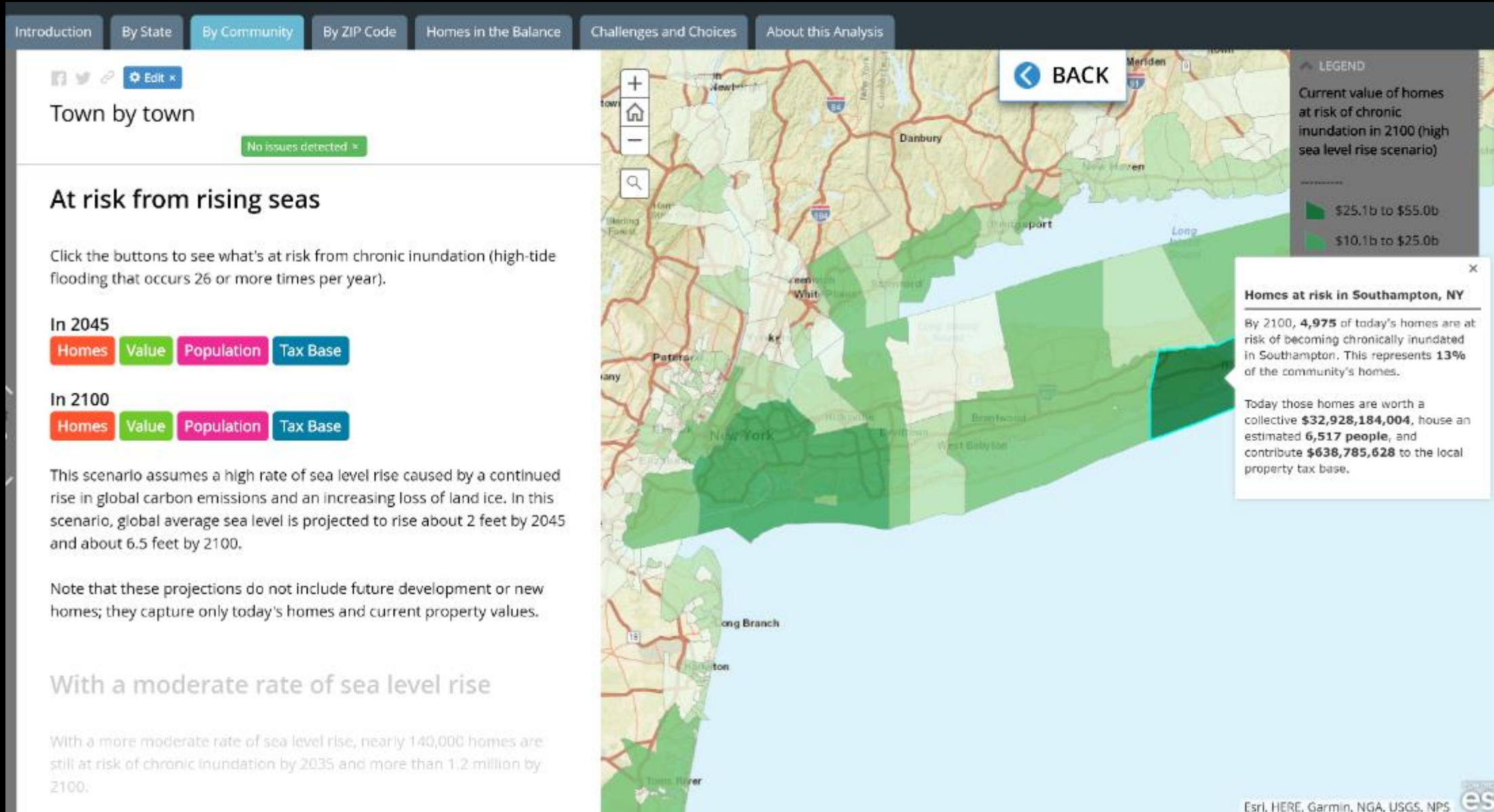
# [ Snapshot of the chronic flooding and poverty intersection (2045)



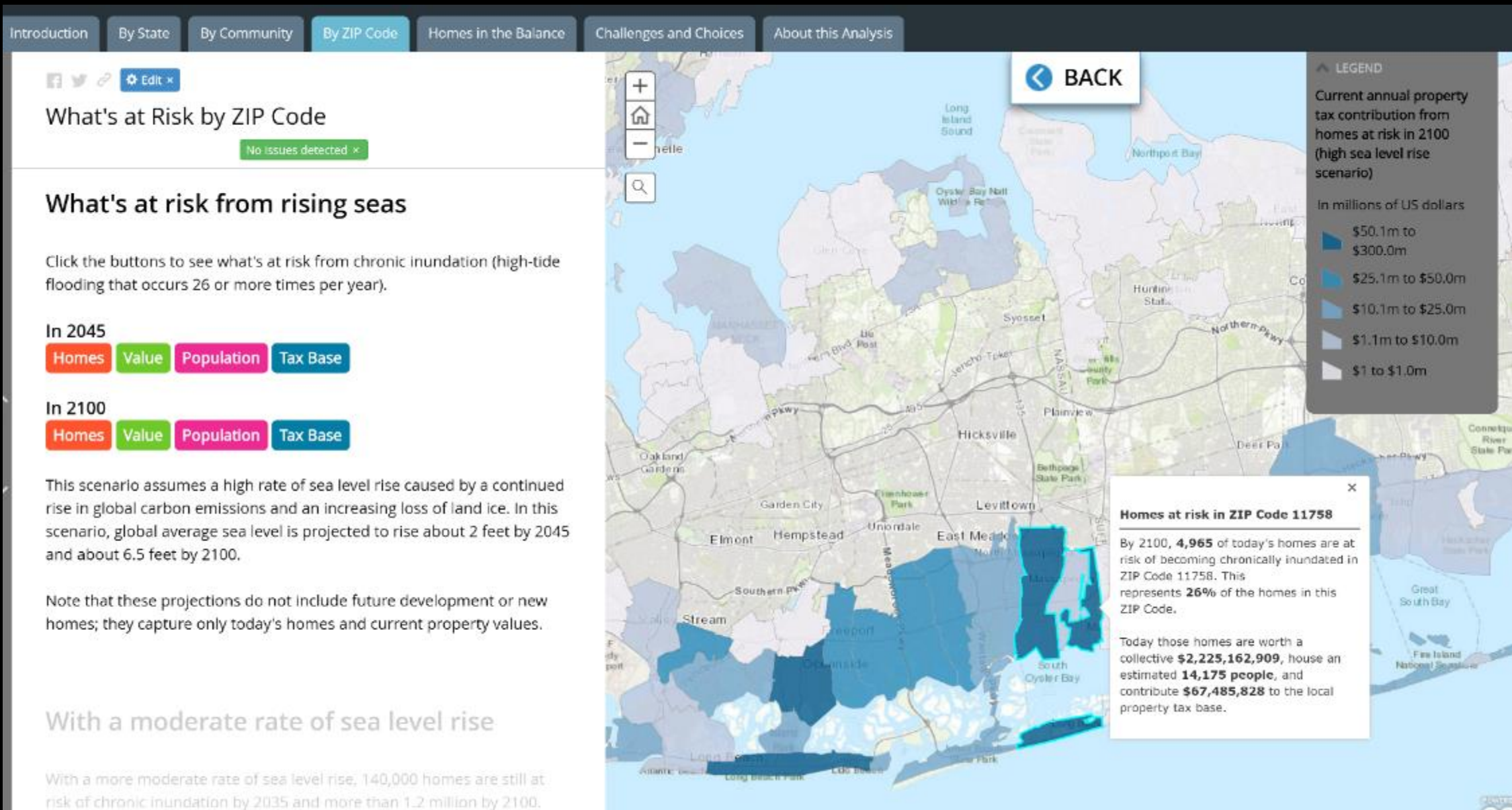
# [ Interactive map: state-level results



# [ Interactive map: community-level results



# [ Interactive map: ZIP code-level results



# [ Interactive map: difference between scenarios

