

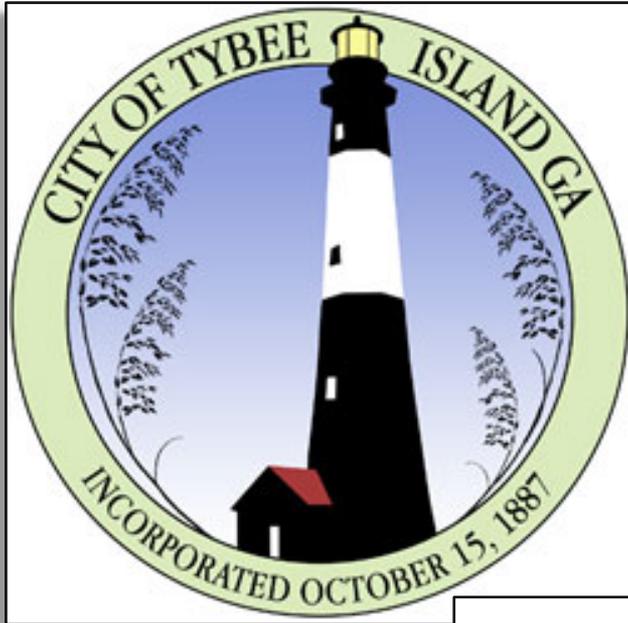


INCREASED TIDAL FLOODING IN COASTAL GEORGIA:
*ASSESSING THE BARRIERS AND VALUE OF ACQUIRING AND
RELOCATING PROPERTY*

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Nuisance Flood Events Are Significantly Increasing Around the U.S.

What is nuisance flooding?

Flooding which causes public inconvenience.

What are the impacts of nuisance flooding?

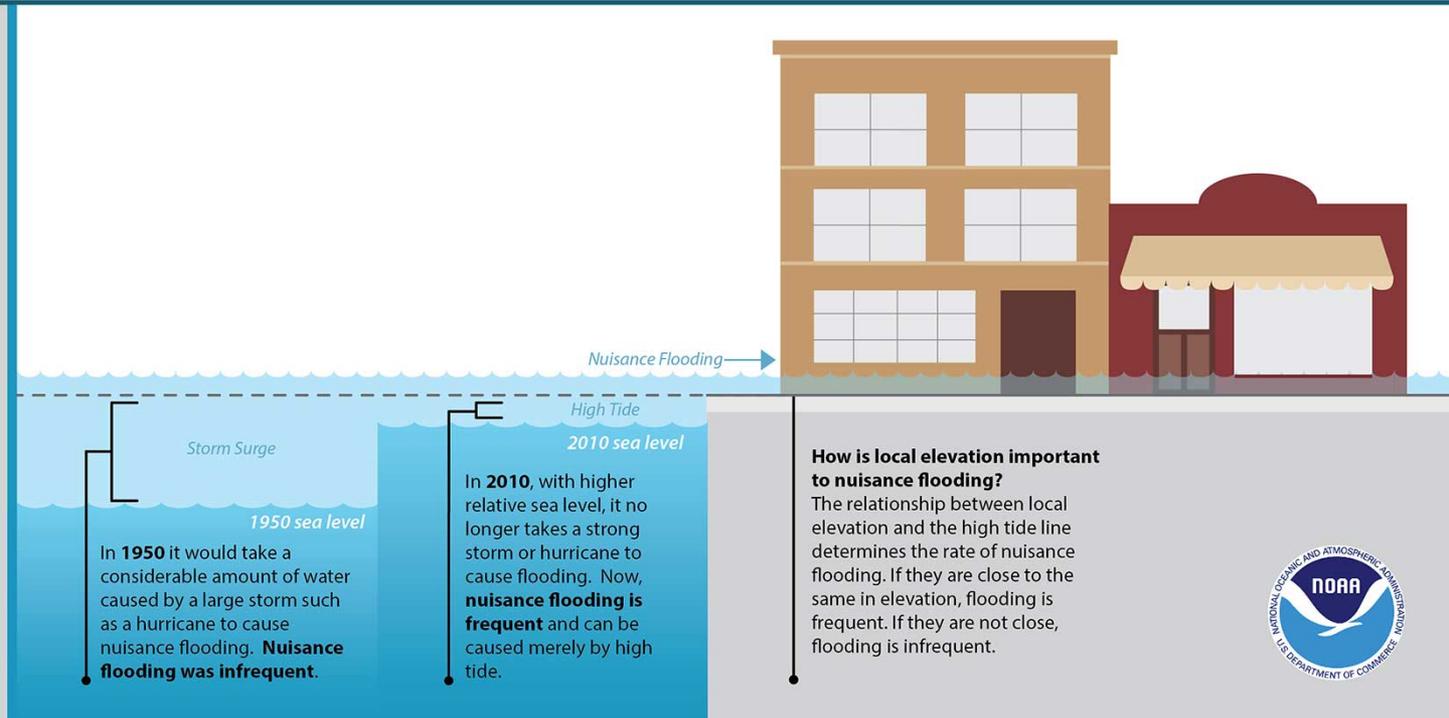
Frequent road closures, overwhelmed storm drains, and deterioration of infrastructure such as roads and rail.

Where is this happening?

Nuisance flooding is increasing around the coastal U.S., with more rapid acceleration along the East and Gulf Coasts.

Why is this happening?

Nuisance flooding is increasing due to climate-related sea level rise and land subsidence (sinking) combined with loss of natural coastal barriers.



Top ten U.S. areas with an increase nuisance flooding*

	“Nuisance level”: Meters above mean higher high water mark	Average nuisance flood days, 1957-1963	Average nuisance flood days, 2007-2013	Percent Increase
Annapolis, Md.	0.29	3.8	39.3	925
Baltimore, Md.	0.41	1.3	13.1	922
Atlantic City, N.J.	0.43	3.1	24.6	682
Philadelphia, Pa.	0.49	1.6	12.0	650
Sandy Hook, N.J.	0.45	3.3	23.9	626
Port Isabel, Texas	0.34	2.1	13.9	547
Charleston, S.C.	0.38	4.6	23.3	409
Washington, D.C.	0.31	6.3	29.7	373
San Francisco, Calif.	0.35	2.0	9.3	364
Norfolk, Va.	0.53	1.7	7.3	325

* More than one flood on average between 1957-1963, and for nuisance levels above 0.25 meters.

NOAA: ‘Nuisance flooding’ an increasing problem as coastal sea levels rise

Study looks at more than 60 years of coastal water level and local elevation data changes

July 28, 2014 (Updated information added 10/31/2014)

So-called “nuisance flooding” -- which causes public inconveniences such as frequent road closures, overwhelmed storm drains, and compromised infrastructure -- has increased on all three U.S. coasts, between 300 and 925 percent since the 1960s, according to a new NOAA technical report.

Of the 45 locations analyzed, eight of the top 10 U.S. cities that have seen an increase in nuisance flooding are on the East Coast.

The report, [Sea Level Rise and Nuisance Flood Frequency Changes around the United States](#), finds Annapolis and Baltimore, Maryland, lead the list with an increase in number of flood days of more than 920 percent since 1960. Port Isabel, Texas, along the Gulf coast, showed an increase of 547 percent, and nuisance flood days in San Francisco, California increased 364 percent.



Annapolis, Maryland, pictured here in 2012, saw the greatest increase in nuisance flooding in a recent NOAA study. (Credit: With permission from Amy McGovern.)

“Achieving resilience requires understanding environmental threats and vulnerabilities to combat issues like sea level rise,” says Holly Bamford, Ph.D., NOAA assistant administrator of the National Ocean Service. “The nuisance flood study provides the kind of actionable environmental intelligence that can guide coastal resilience efforts.”

“As relative sea level increases, it no longer takes a strong storm or a hurricane to cause flooding,” said William Sweet, Ph.D., oceanographer at NOAA’s [Center for Operational Oceanographic Products and Services \(CO-OPS\)](#) and the report’s lead author. “Flooding now occurs with high tides in many locations due to climate-related sea level rise, land subsidence and the loss of natural barriers. The effects of rising sea levels along most of the continental U.S. coastline are only going to become more noticeable and much more severe in the coming decades, probably more so than any other climate-change related factor.”

The study was conducted by scientists at CO-OPS, who looked at data from 45 [NOAA water level gauges](#) with long data records around the country and compared that to reports of number of days of nuisance floods.

The extent of nuisance flooding depends on multiple factors, including topography and land cover. The study defines nuisance flooding as a daily rise in water level above the minor flooding threshold set locally by NOAA’s National Weather Service, and focused on coastal areas at or below these levels that are especially susceptible to flooding.

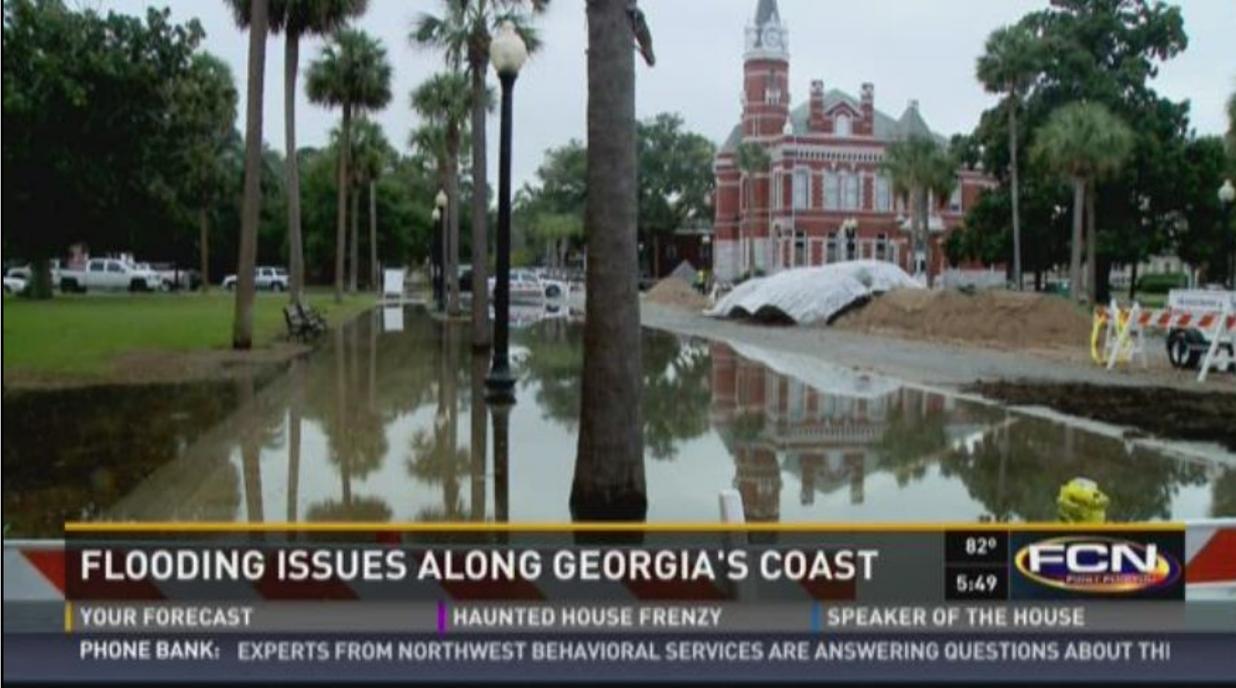
The report concludes that any acceleration in sea level rise that is predicted to occur this century will further intensify nuisance flooding impacts over time, and will further reduce the time between flood events.

The report provides critical NOAA environmental data that can help coastal communities assess flooding risk, develop ways to mitigate and adapt to the effects of sea level rise, and improve coastal resiliency in the face of climate- and weather-induced changes.

NOAA’s mission is to understand and predict changes in the Earth’s environment, from the depths of the ocean to the surface of the sun, and to conserve and manage our coastal and marine resources. Join us on [Twitter](#), [Facebook](#) and our other [social media](#) channels.



Nuisance flooding events have increased around the U.S., but especially off the East Coast. Click graphic for high resolution PDF. (Credit: NOAA)



Tybee Island, Georgia

Sea Level Rise Adaptation Plan



Because the future rate of sea level rise is uncertain, federal agencies currently suggest that local adaptation plans should consider a range of sea level rise scenarios. This plan considers potential impacts and adaptation options for sea level rise up to 3 feet on Tybee Island.



Figure 0-2. Tybee Sea Level Rise Adaptation Plan Flooding

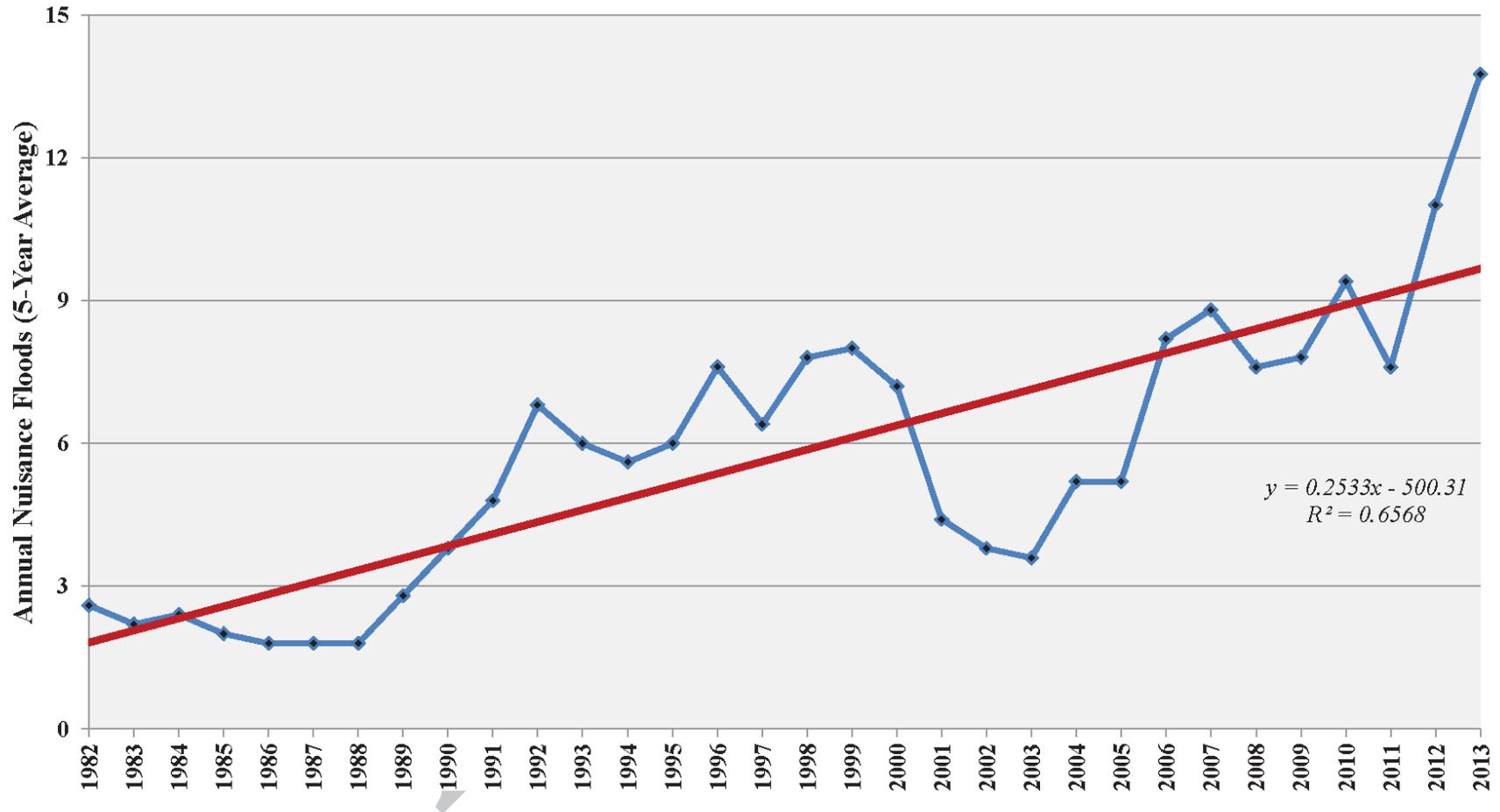
Tybee Island, Georgia Sea Level Rise Adaptation Plan

Mapped the Tybee Island's high spring tide events.

Tybee Island, GA
Approximate Annual "King Tide" Extent
(One Foot of Sea Level Rise)



Figure 2.4: Nuisance flooding at Tybee Island, Georgia from 1980-2015. Values represent the annualized average of tide events that exceed 9.2 feet above Mean Lower-Low Water (MLLW), or 1.7 feet above Mean Higher-High Water (MHHW), over a rolling 5-year period at NOAA's Fort Pulaski tide gauge. Listed years represent the mid-point of a given 5-year period. For example, 1982 covers the 5-year period from 1980-1984, while 2013 covers the 5-year period from 2011-2015.





Project Goals

- Examine costs and benefits to local governments of promoting acquisition, renovation, or relocation of residences exposed to significant flood risk.
- Examine the legal, policy, and political barriers to conducting these activities.
- Evaluate the benefits of these activities through FEMA's Community Rating System (CRS).

Adaptation Strategies

- Acquisition repeatedly flooded structures.
 - FEMA defined “Repetitive Loss Properties”
- Elevation of vulnerable properties out of the flood zone
 - Requires more individualized analysis

Barriers

- Opposition to government acquisition of property
- “Takings” concerns
- Cost vs. benefits
- Local confusion about the process



OMB No. 1660-0022
Expires: December 31, 2016

National Flood Insurance Program
Community Rating System

Coordinator's Manual

FIA-15/2013



Hazard Mitigation Assistance Guidance

Hazard Mitigation Grant Program, Pre-Disaster Mitigation
Program, and Flood Mitigation Assistance Program

February 27, 2015



Federal Emergency Management Agency
Department of Homeland Security
500 C Street, S.W.
Washington, DC 20472

FEMA Hazard Mitigation

- Federal funds administered through State Hazard Mitigation Officer
 - Georgia Emergency Management Administration (GEMA)
- Funds local and state efforts to improve local resilience
- Generally funds 75% of activity costs
- CRS credits reduced by 75% if used

Community Rating System

- Established in 1990 to reward communities exceeding minimum NFIP standards
- Awards credits in 4 broad categories:
 - Public information
 - Flood mapping and regulation
 - **Flood damage reduction**
 - Flood preparedness

Community Rating System

Table 1:

How much discount property owners in your community can get

Rate Class	Discount		Credit Points Required
	SFHA*	Non-SFHA**	
1	45%	10%	4,500 +
2	40%	10%	4,000 - 4,499
3	35%	10%	3,500 - 3,999
4	30%	10%	3,000 - 3,499
5	25%	10%	2,500 - 2,999
6	20%	10%	2,000 - 2,499
7	15%	5%	1,500 - 1,999
8	10%	5%	1,000 - 1,499
9	5%	5%	500 - 999
10	0%	0%	0 - 499

* Special Flood Hazard Area

** Preferred Risk Policies are available only in B,C, and X Zones for properties that are shown to have a minimal risk of flood damage. The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies. Although they are in SFHAs, Zones AR and A99 are limited to a 5% discount. Premium reductions are subject to change.

CRS Property Acquisition:

- **bAR (Buildings Acquired or Relocated)**: based on the number of buildings in the regulated floodplain acquired or relocated in relation to the number of buildings in the Special Flood Hazard Areas (SFHA) (bSF)
- **bRL (Buildings on the Repetitive Loss List) = 2 x bAR**
- **bSRL (Buildings on the Severe Repetitive Loss List) = 3 x bAR**
- **bCF (Critical Facilities) = 2 x bAR**
- **bVZ (Buildings Located in the V Zone or the Coastal A Zone or LiMWA) = 1.5 x bAR**

CRS Property Acquisition:

Option 1:

$$\text{CRS Credits} = (\text{bAR} \times 3) + (\text{bRL} \times 6) + (\text{bSRL} \times 9) + (\text{bCF} \times 6) + (\text{bVZ} \times 4.5)$$

Maximum credits allowed under Option 1 is 190.

Option 2:

$$\text{CRS Credits} = \frac{((\text{bAR} + (\text{bRL} \times 2) + (\text{bSRL} \times 3) + (\text{bCF} \times 2) + (\text{bVZ} \times 1.5))}{(\text{bSF} + \text{bAR} + \text{bRL} + \text{bSRL} + \text{bCF} + \text{bVZ})} \times 1,900$$

Option 1:

$$9 \text{ bRL} \times 6 = \mathbf{54 \text{ CRS Credits}}$$

Option 2:

$$\frac{9 \text{ bRL} \times 2}{3,445 \text{ bSF}} \times 1,900 = \mathbf{9.9 \text{ Credits}}$$

Value of a CRS Credit

<p>City of Tybee Island:</p> <p>Class 7 = \$518,500</p> <p>Class 5 = \$864,167 (EST)</p> <p>\$172,833.33 per class</p>	<p><u>54 points</u> = 11%</p> <p>500 points per class</p> <p>.11 x \$172,833.33 =</p> <p>\$18,666</p> <p>.03 x \$172,833.33 =</p> <p>\$4,667</p> <p><i>(reduced by 75%)</i></p>
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Costs to Tybee Island

(Assessed Value – Exemptions) x Millage Rate = Property Tax Bill							
	Avg Home Price	\$376,500	Assessed value	\$150,600		Avg Tax Bill:	\$5,003 *
	Rep. Loss Props	9	4.044 Tybee millage rate			Tybee Prop. Tax	\$609
			33.218 total millage rate				
		2015	2014		2013	2012	2011
<i>Impacted</i>	Real Tax Revenues	\$1,679,695	\$1,712,803		\$1,657,287	\$1,635,516	\$2,497,576
	Hotel/Motel	\$2,787,679	\$2,258,446		\$2,128,838	\$2,503,426	\$1,766,822
<i>Not Impacted</i>	Other Prop. Taxes	\$247,591	\$242,195		\$142,293	\$143,511	\$2,497,576
	Other Excise Taxes	\$842,297	\$1,371,530		\$1,501,138	\$1,126,550	\$1,863,154
	Sales Taxes	\$2,123,728	\$2,560,106		\$2,540,816	\$2,699,283	\$1,006,685
	Licenses and Fees	\$522,187	\$454,197		\$417,727	\$386,862	\$260,335
	Services Charges	\$3,227,299	\$3,039,900		\$2,712,067	\$3,349,050	\$3,431,600
	Other Revenues	\$991,984	\$899,261		\$1,079,547	\$1,318,868	\$1,255,146
	Total Revenues	\$12,422,460	\$12,538,438		\$12,179,713	\$13,163,066	\$14,578,894

Tybee Property Tax \$609 x 9 =
\$5,481 annually

Value of Acquisition

\$18,666 annual CRS flood insurance savings

- \$5,481 annual lost property tax revenue

\$13,185 public value

Value of Acquisition Using Federal Hazard Mitigation Funds

\$4,667 annual CRS flood insurance
savings

- \$5,481 annual lost property tax revenue

(\$815) public value

Median home value = \$376,500

$$\begin{aligned} & \$367,500 \times 9 = \\ & \quad \$3,303,075 \end{aligned}$$

At \$13,185 per year, at 3% interest,
payback period is **over 400 years!**

Other Reasons to Mitigate

- 13 Counties in Georgia have completed acquisitions under the HGMP.
- Cobb County case study.

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