

The N-EWN Knowledge Series

A Continuing Education Series about Engineering With Nature®

Scaling Multi-Benefit Nature-Based Solution Projects: Case Study Examples from The Nature Conservancy



Cameron Adams
*Climate Adaptation and
Marine Policy Advisor*



Ashby Worley
*Georgia Coastal Climate
Adaptation Director*



Tharran Hobson
*Southern Illinois Program
Director*

The Nature Conservancy

The Nature Conservancy is a global conservation organization dedicated to conserving the lands and waters on which all life depends. Guided by science, TNC works to scale innovative solutions to the world's toughest challenges so that nature and people can thrive together. This mission includes extensive efforts to scale natural infrastructure solutions through policy action and on-the-ground project work, frequently in collaboration with diverse partners across multiple sectors. This Knowledge Seminar will give an overview of TNC's efforts to scale the use of natural infrastructure solutions. Presenters will detail two case studies of innovative projects from Georgia and Illinois and discuss the extensive co-benefits the projects are providing to people and nature. The information presented in the Knowledge Seminar will offer a template for how implementing partners can work across sectors to scale effective, innovative natural infrastructure solutions.

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May 15
12:30pm ET

Cameron Adams, Ashby Worley, and Tharran Hobson; The Nature Conservancy

Scaling multi-benefit nature-based solutions projects:
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**1 Continuing Education
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<https://n-ewn.org/resources/n-ewn-knowledge-seminars/>

Presented by:



Questions? Please contact:
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sparis@limno.com

Scaling Multi-Benefit Nature-Based Solution Projects: Case Study Examples from The Nature Conservancy

May 15, 2025

Cameron Adams

Image credit: Carlton Ward Jr./TNC



TNC: Background and Focus

- *Mission: protect the lands & waters on which all life depends*
- Chapters representing all 50 states
- Natural infrastructure expertise across science, conservation, and policy



Our Approach

- **Model: science-backed, collaborative approach**
- **Rely on deep connection to the communities and environments we serve**
- **Major goal: support paradigm shift towards full embrace of natural infrastructure**



Partnership and Innovation

- Longstanding partners of EWN
- New members of N-EWN
- *Case studies: scaling multi-benefit NBS projects*



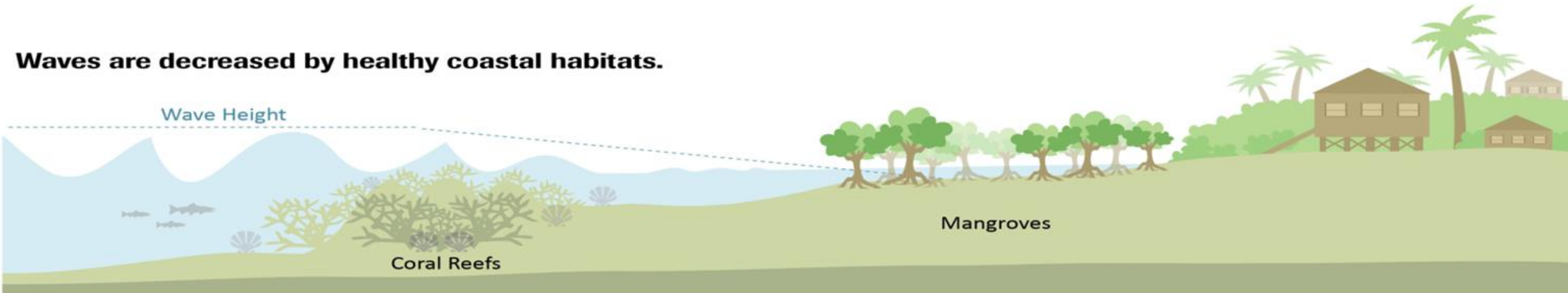


Ashby Nix Worley, CFM
Coastal Climate Adaptation Director
The Nature Conservancy
Georgia Chapter

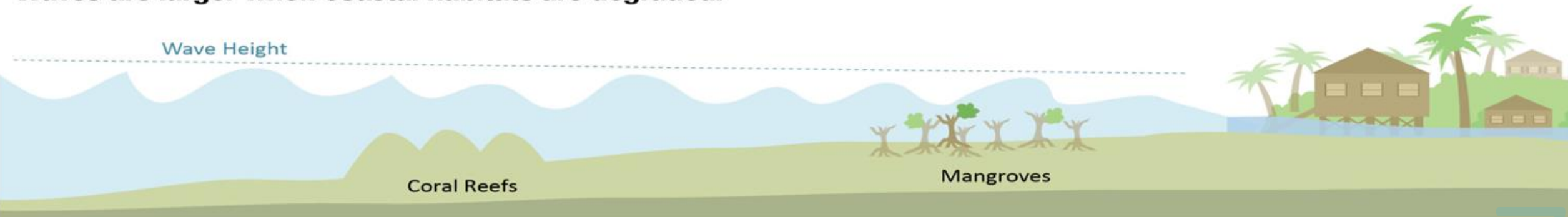
Assessing the Socio-Economic Value of Salt Marsh Ecosystems for Climate Resilience Financing in Georgia

Natural infrastructure protects and provides numerous co-benefits for coastal communities

Waves are decreased by healthy coastal habitats.



Waves are larger when coastal habitats are degraded.



Quantified Benefits of Natural Infrastructure

CORAL REEFS

FL reefs provide \$675 M in flood-protection benefits every year

MANGROVES

Protect the global economy from over \$65 bn in damage each year.

SALT MARSHES

In Hurricane Sandy reduced losses up to 30% in some areas



Insurable natural assets in Hawaii, Mexico, Caribbean



What about Salt Marshes?

Coral Reef Insurance in Cancún, Mexico

Funding Source: State Government of Quintana Roo

Policy Holder: Coastal Zone Management Trust

Assets Covered: Reef & Beach

Maximum Payout*: \$1.9 million

100 – 130 knots for 40% payout

130 – 160 knots for 80% payout

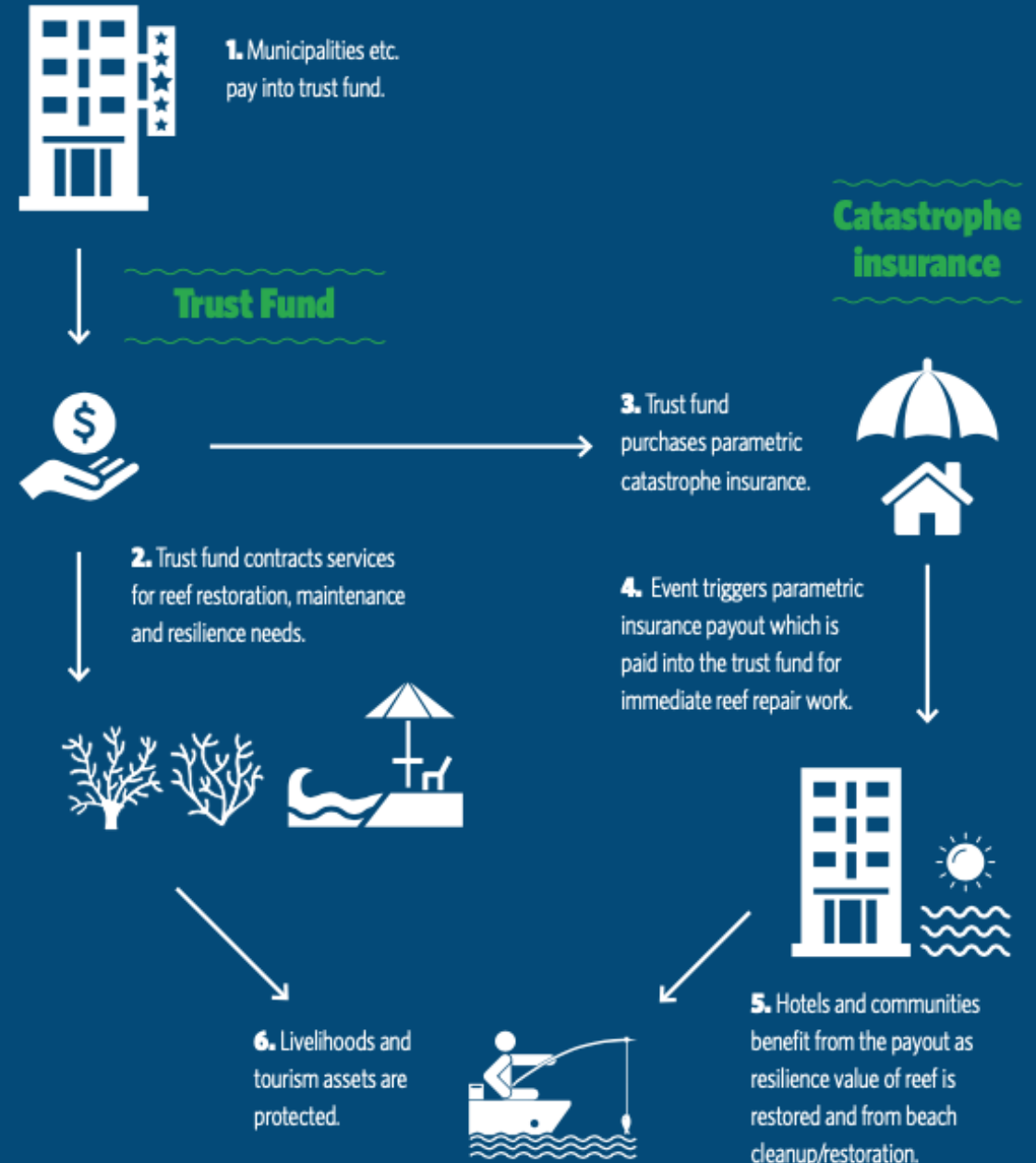
160 knots+ for 100% payout

Repair Mechanism: Reef brigades

Coverage Type: Parametric

*Payout limits and schedule is from the 2019 policy

Hotels pay to municipalities



Hurricane Delta, October 2020 – A Proven Case



Hurricane Delta triggered a 40% payout – approximately \$850,000 USD – on the parametric insurance policy.



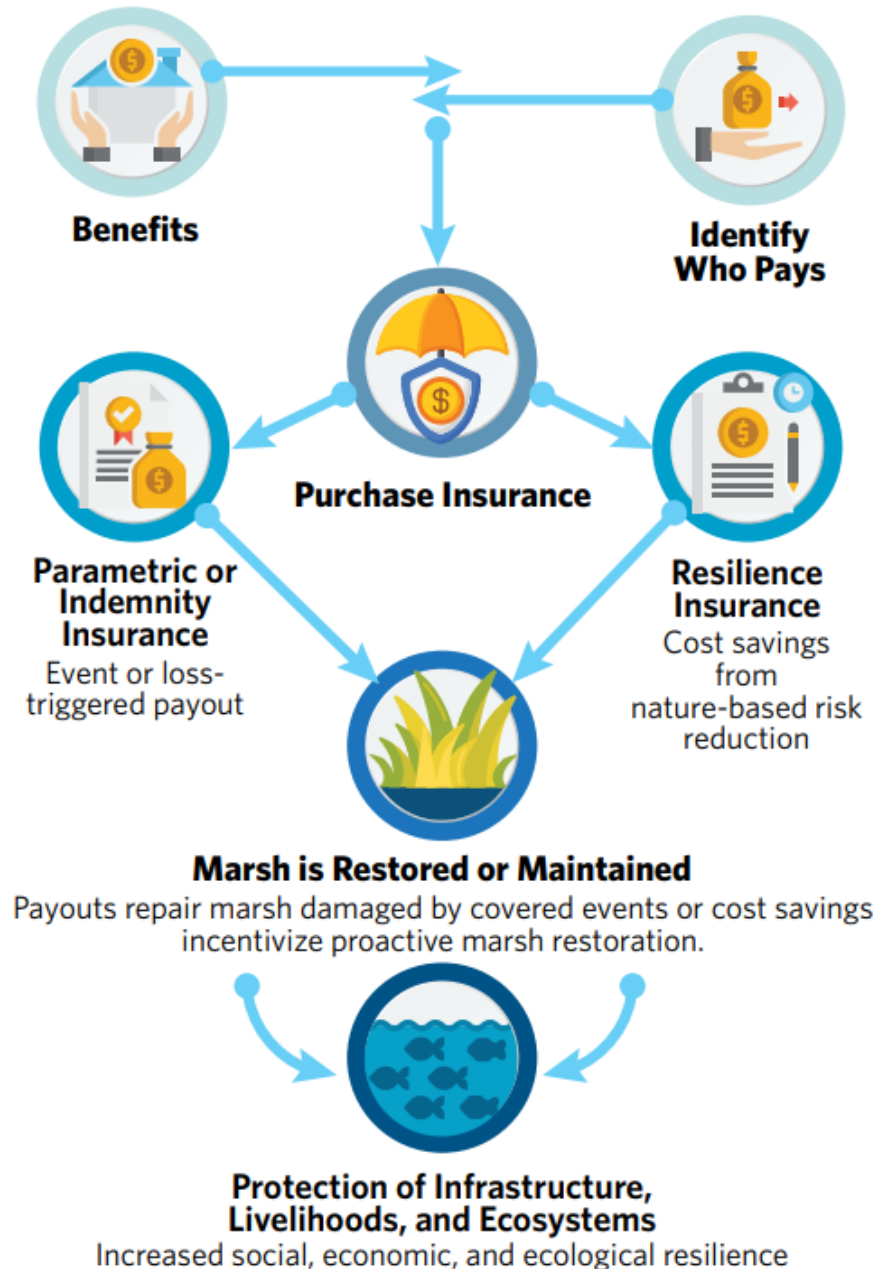
Salt Marsh Valuation for Flood Risk Reduction Study

1. How does the presence of coastal salt marsh affect the water level (flood depth) during coastal storms?

2. What value do coastal marshes provide in terms of flood risk reduction, and who benefits from the presence of marshes during coastal storms?

3. Are coastal marshes an insurable natural asset, and if so, what types of insurance mechanisms may be most feasible?

GENERAL FRAMEWORK



Project Team

University of Georgia



Matt Bilsie



Yukiko Hashida



The Nature Conservancy



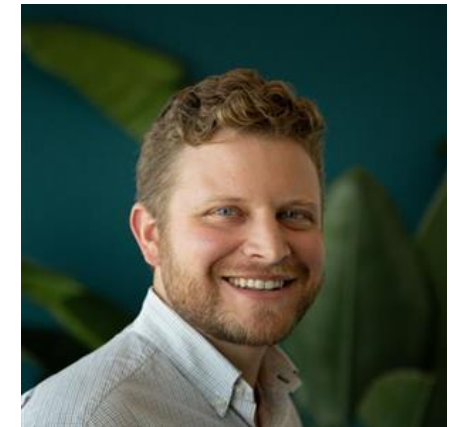
Ashby Worley



Liz Fly



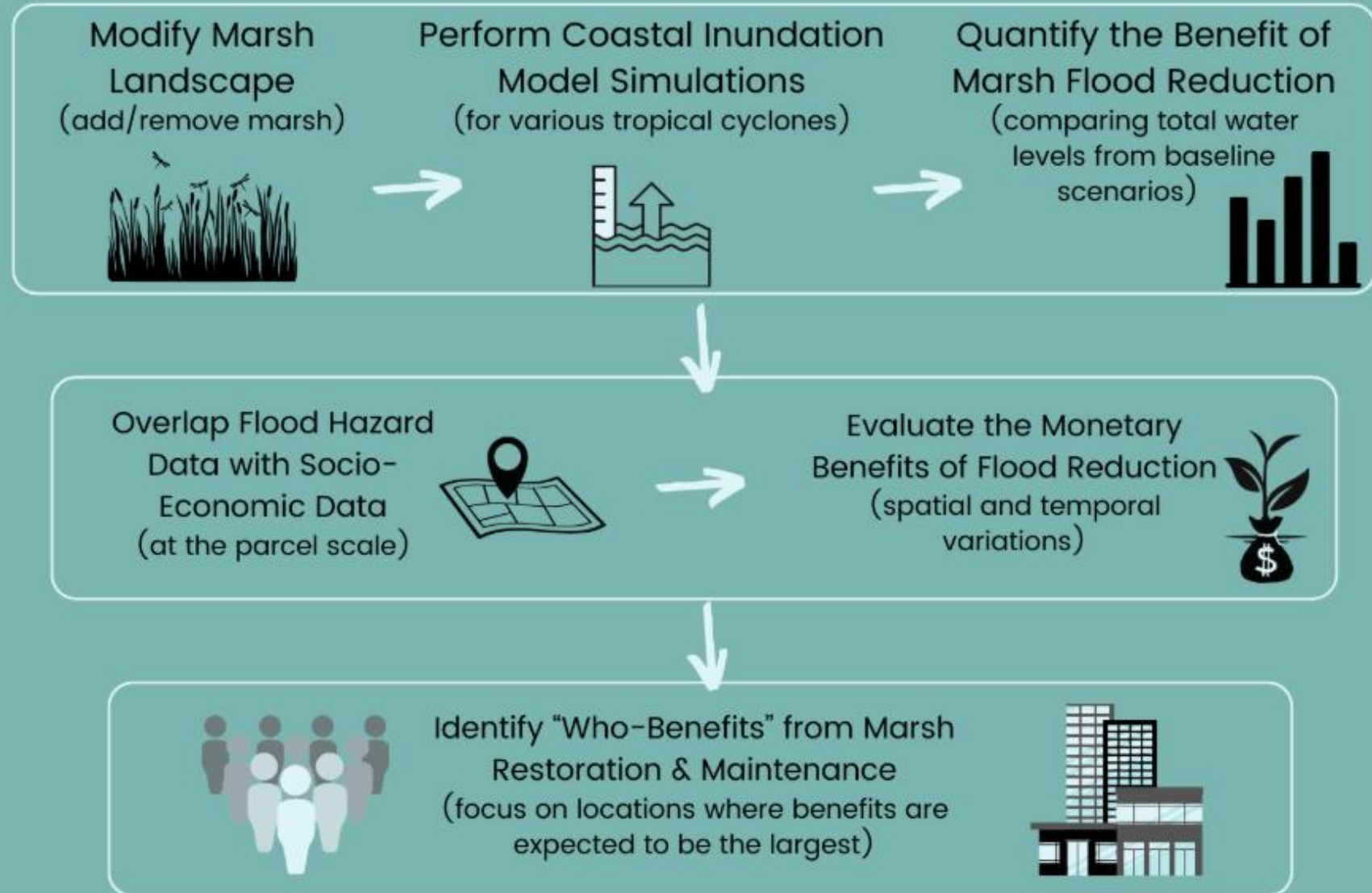
Mary Conley



Eric Roberts

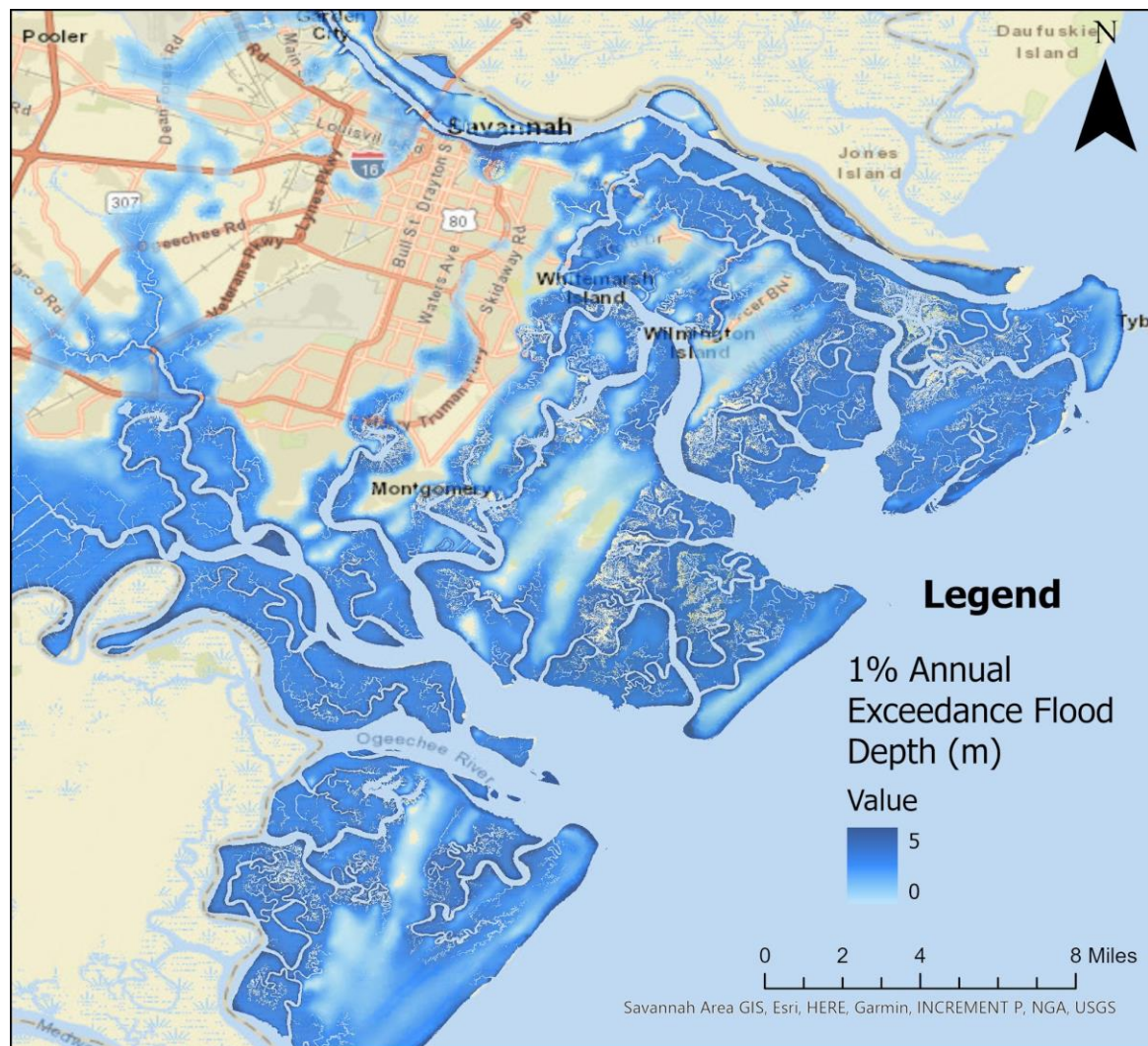
Methods

VISION FOR STORM MODELING & SOCIO-ECONOMIC ANALYSIS PROCESS

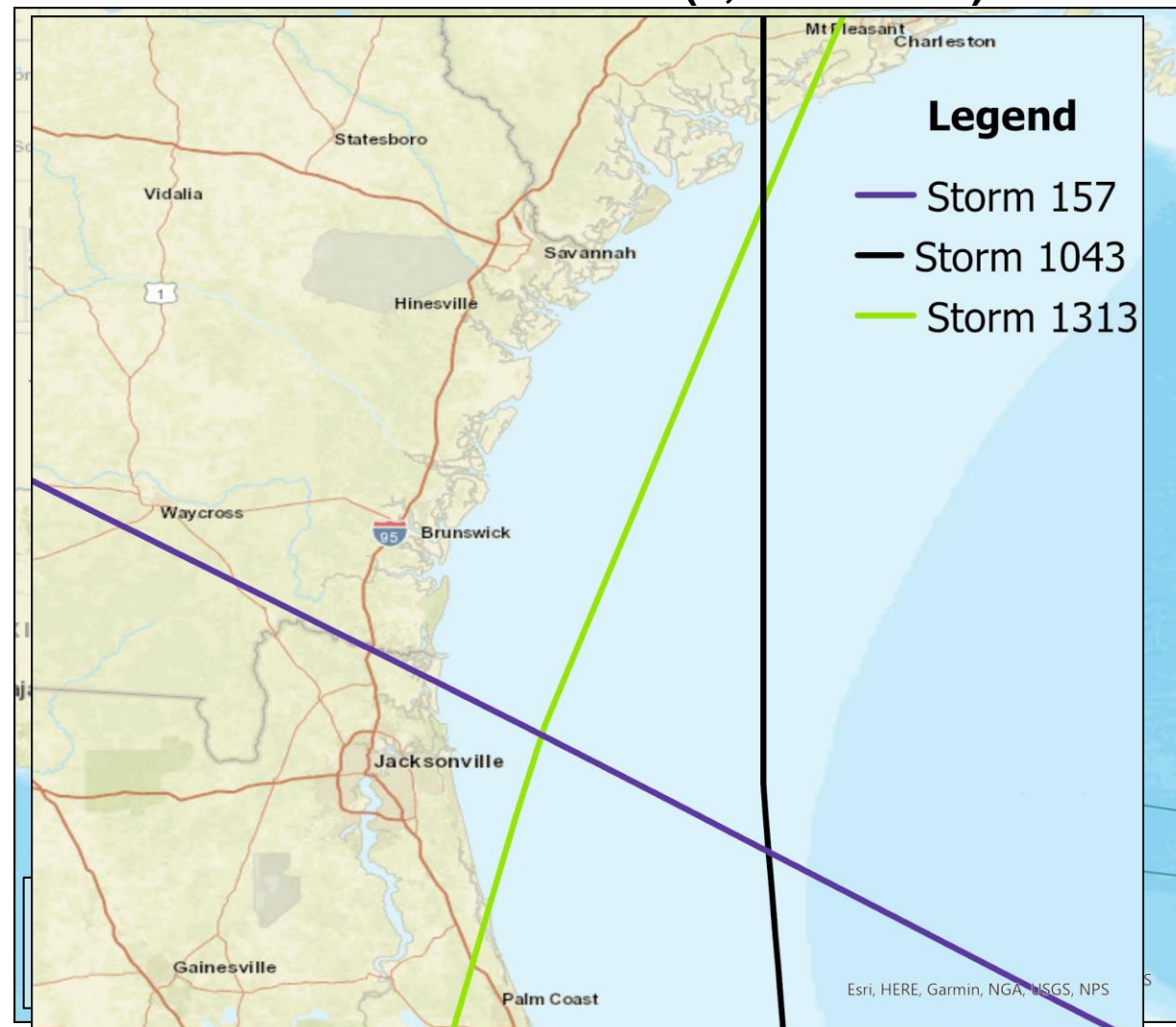


Modeling Storm Surge Flooding

1% Annual Flood Event (100 year flood)

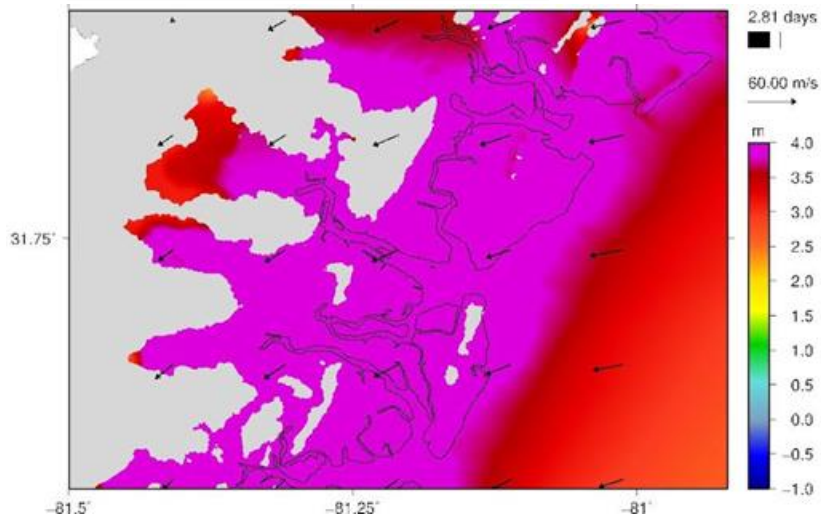


SACS Storm Tracks (1,700 events)

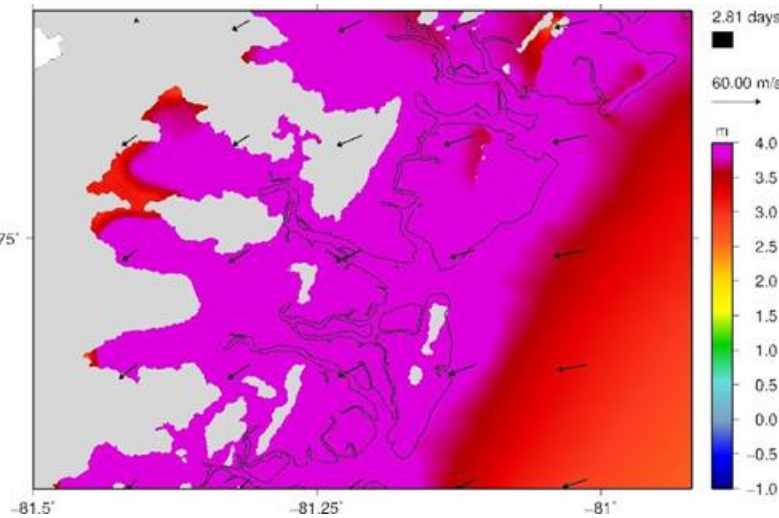


Snapshot of Water Levels Storm 1313

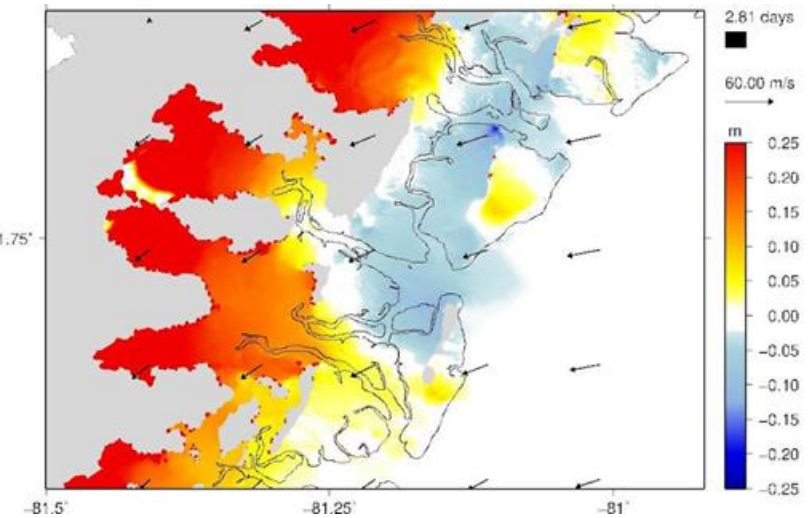
Without Marsh



With Marsh



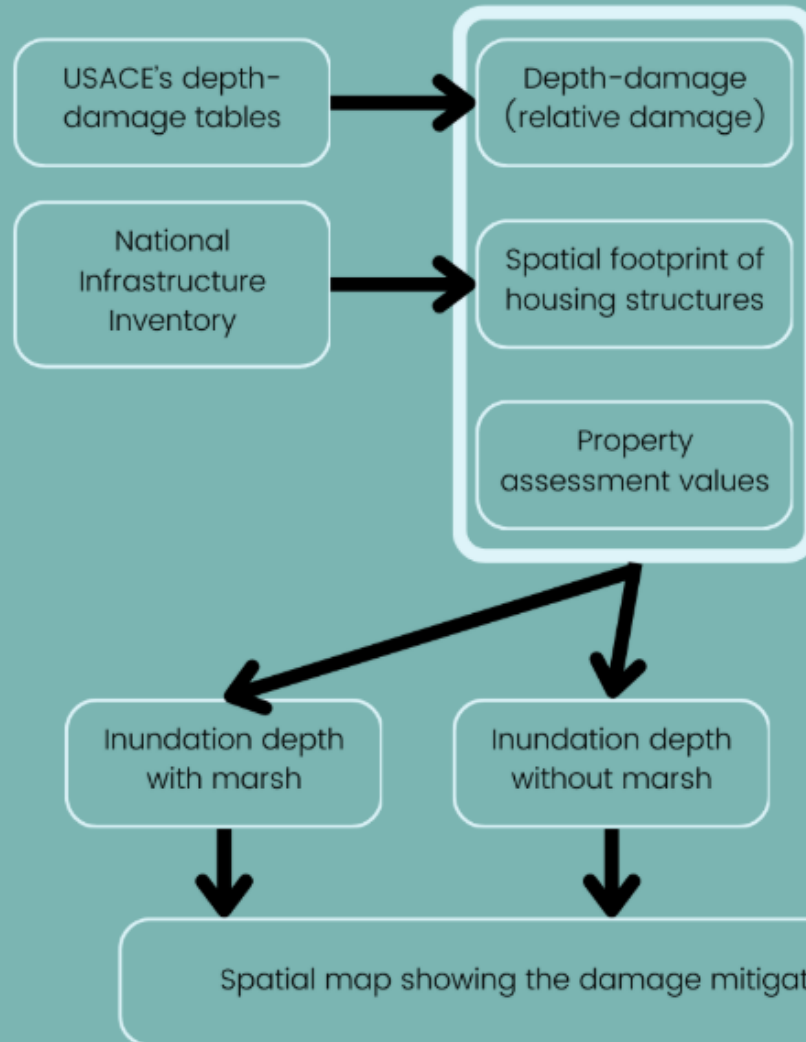
Difference



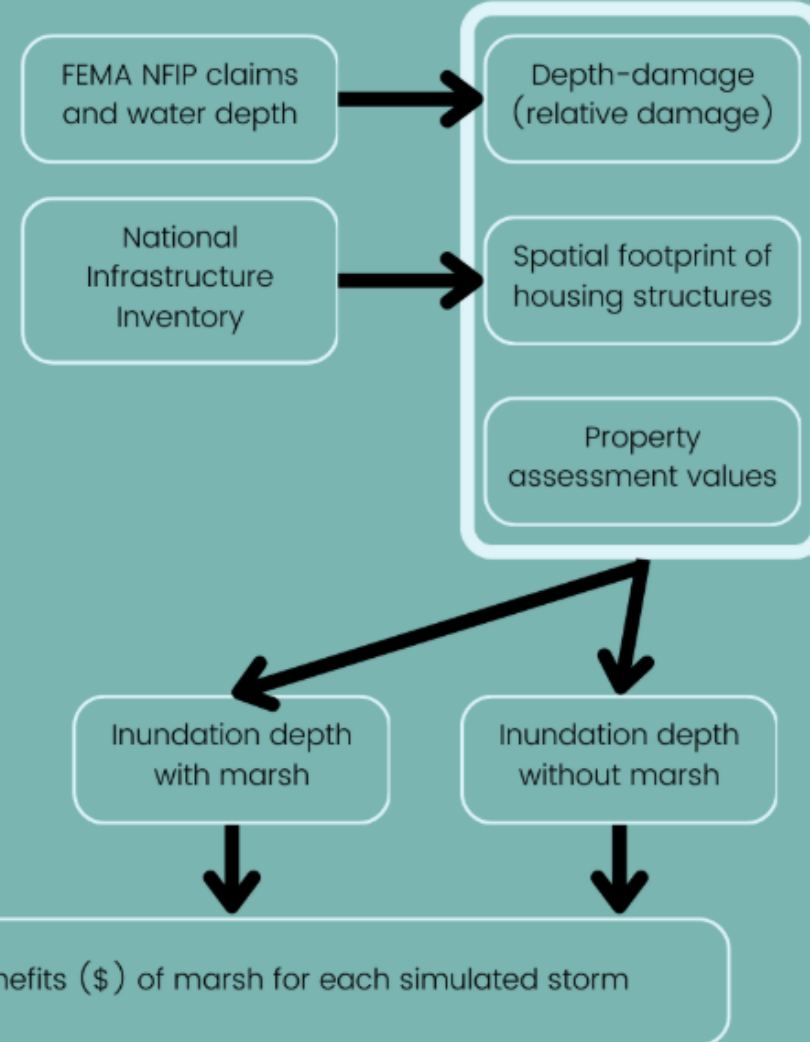
Red = Marsh Reduction
Blue = Marsh Increase

ECONOMIC MODEL

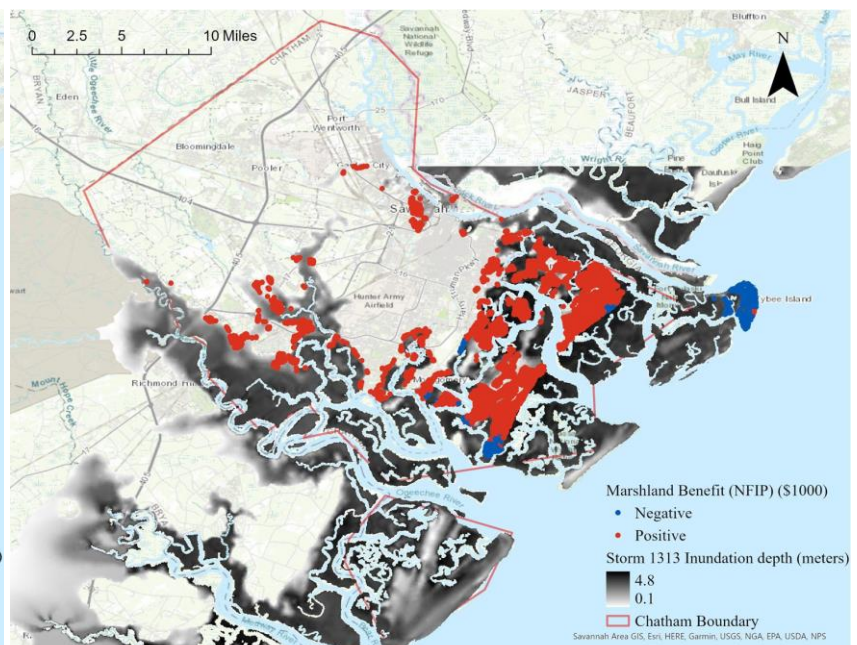
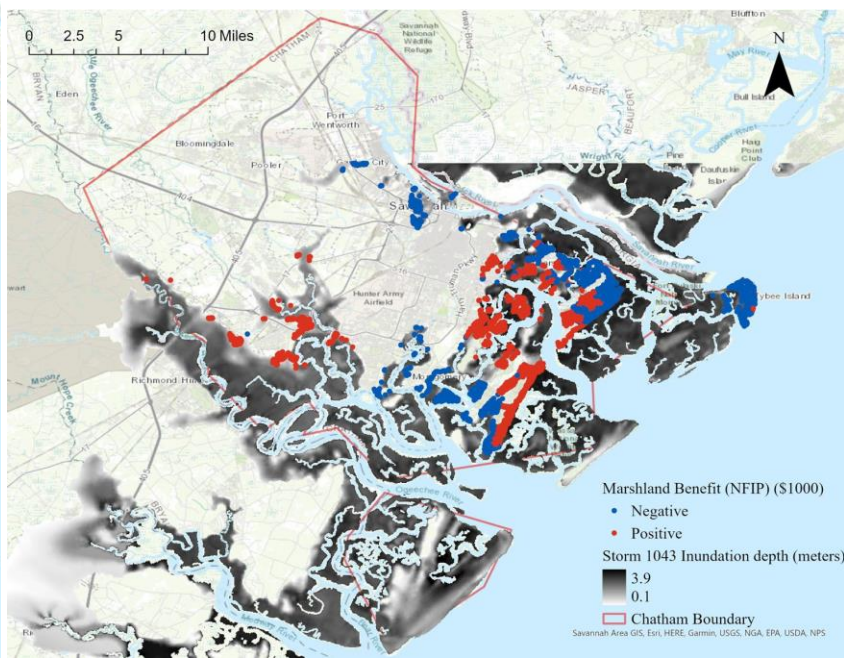
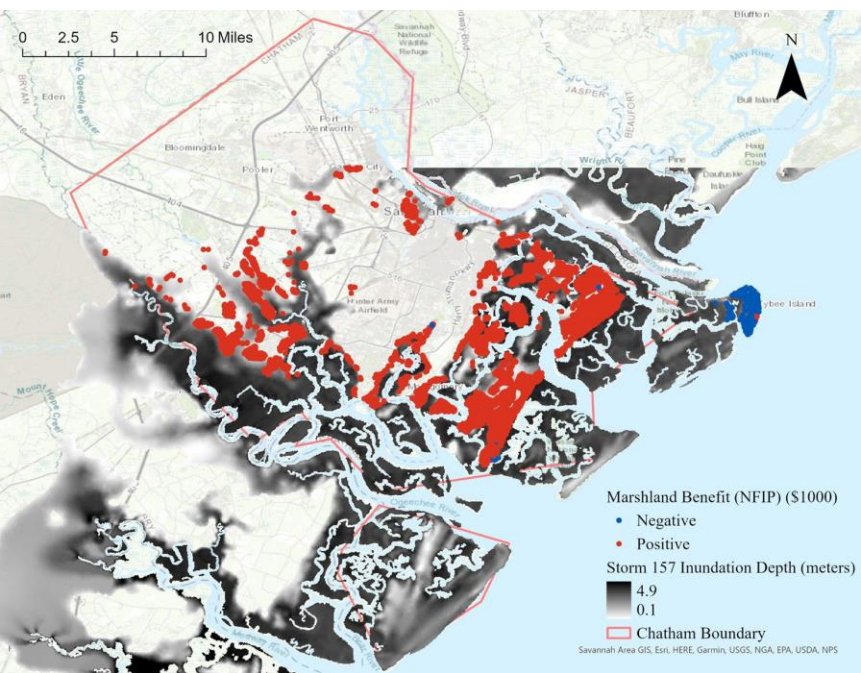
Approach 1: USACE Assumption



Approach 2: NFIP Claim



Socio-Economic Analysis Results





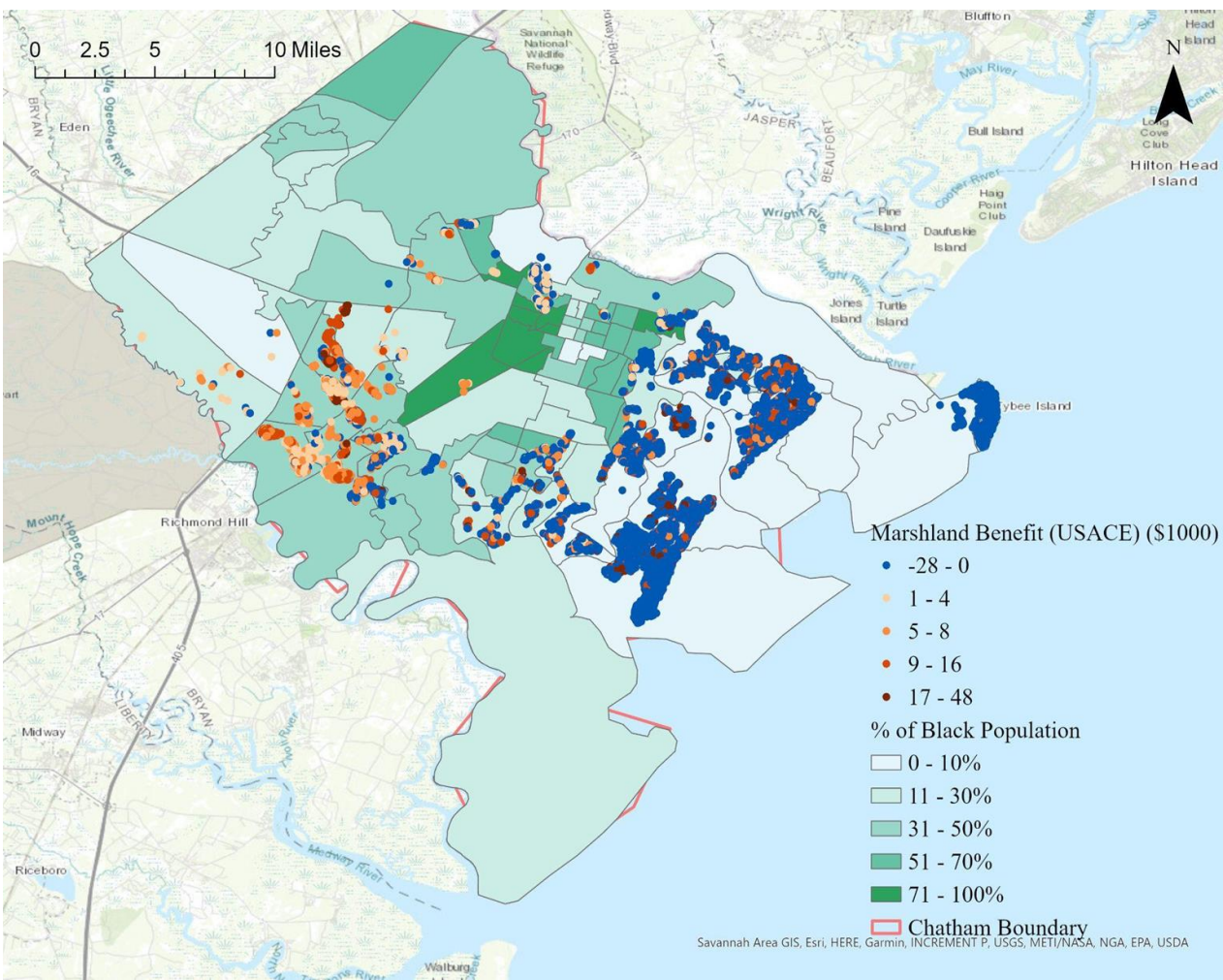
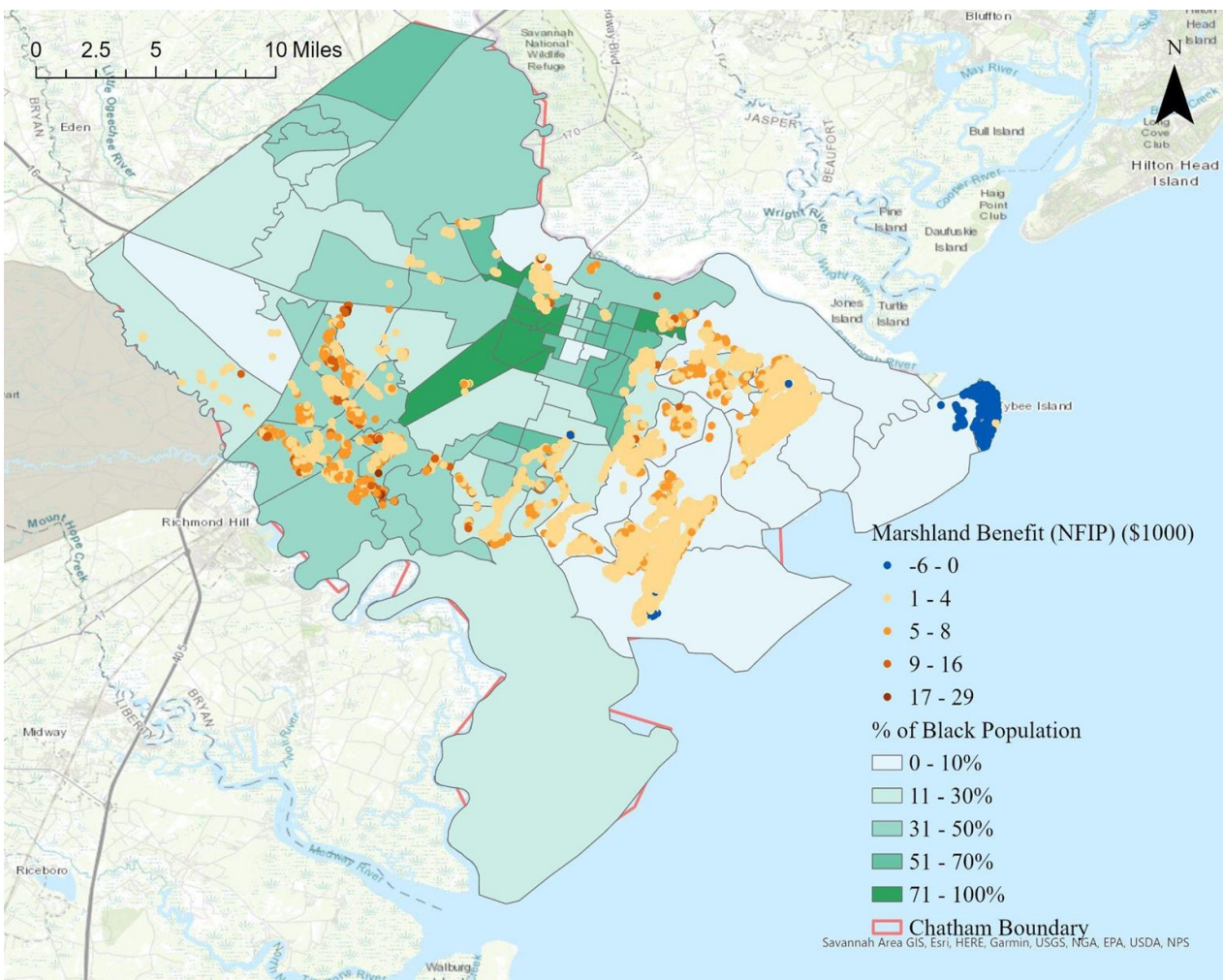
Results: In aggregate

	NFIP	USACE
Aggregate (\$1,000)	30,227	40,964
Average per household (\$1,000)	1.94	2.65

The total benefits across all properties and the average benefits per household provided by salt marshes in Chatham County, Georgia, are based on the synthetic storm track 0157.

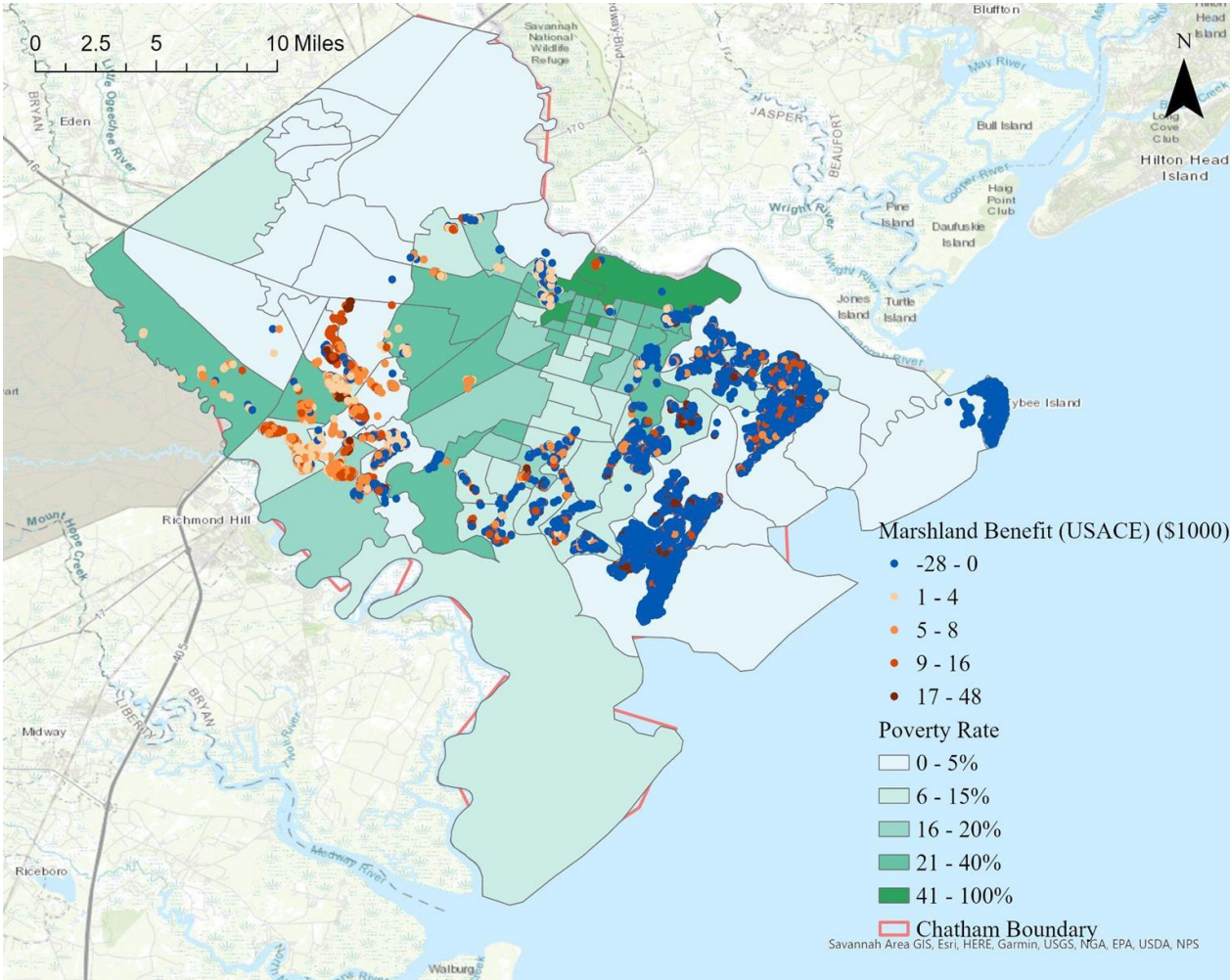
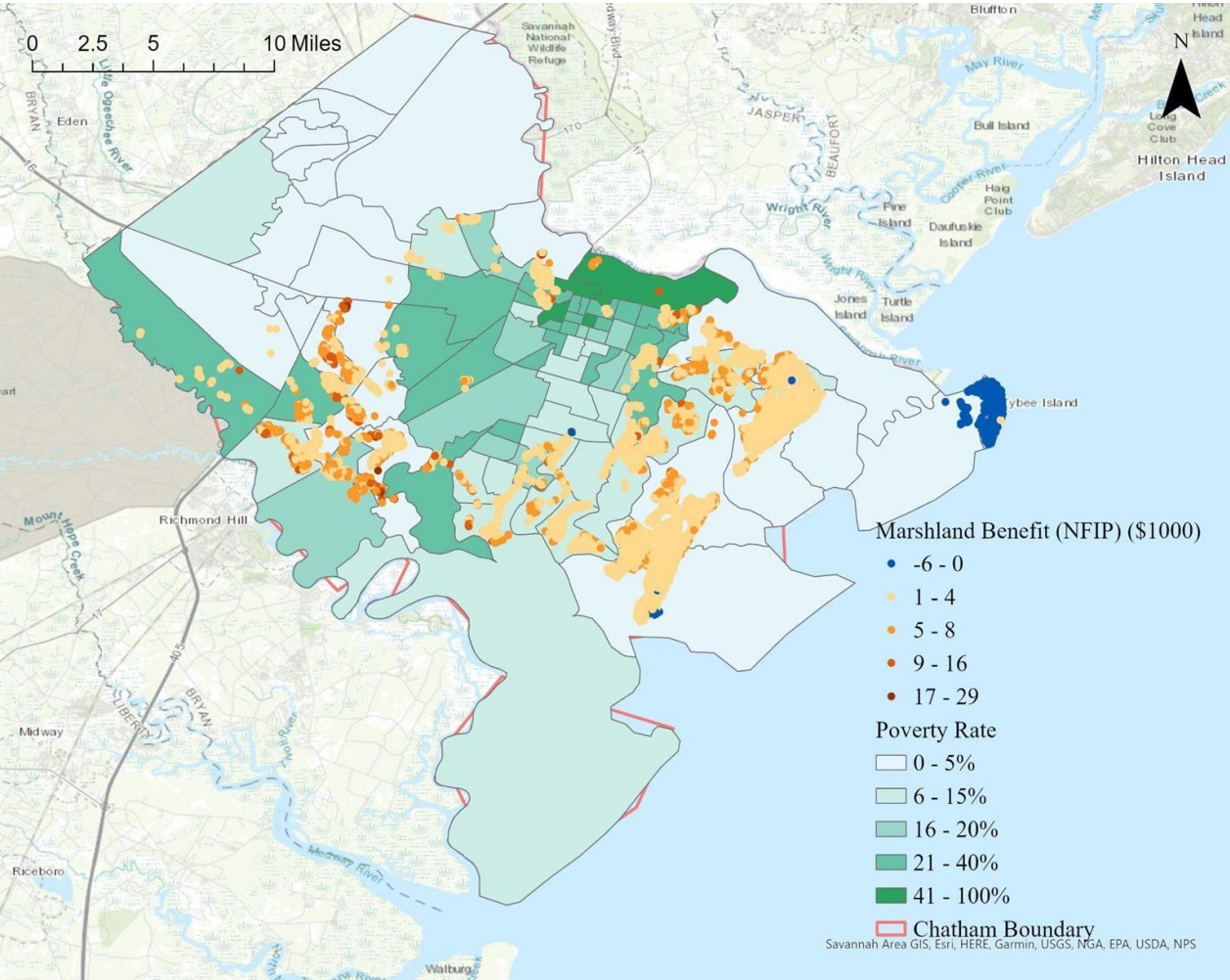
Result: Marsh Benefit and Socioeconomic Factors

The distribution of net benefits varies with the racial composition, specifically the percentage of the Black population in census tracts, in Chatham County for storm tract 0157, using the NFIP-derived depth-damage function (left) and the USACE depth-damage function (right).



Result: Marsh Benefit and Socioeconomic Factors

The difference in net benefits across communities with varying poverty levels in Chatham County for storm tract 0157, using the NFIP-derived depth-damage function (left) and the USACE depth-damage function (right).



Natural Asset Insurance

(also known as “Salt Marsh Insurance”)

Facilitates the **repair of an ecosystem after it is damaged** to speed its recovery and maintain or enhance the benefits the ecosystem already provides people and biodiversity.

Insurance in action:

If applied to salt marsh, this approach could result in a payout if a hurricane were to damage or destroy salt marsh.

Resilience Insurance

Incentivizes the **restoration of a degraded ecosystem**, thereby reinstating its ability to reduce risk and to provide other benefits or services to people and nature.

Insurance in action:

If applied to salt marsh, this approach could incentivize the restoration of degraded marsh before a storm to reduce the risk of future coastal flooding.

What Does This Mean for Insuring Salt Marsh?

- Salt marsh is a public good that benefits a broader community
- Salt marsh does protect homes, but not necessarily all the time, nor protect everyone. Salt marsh's ability to reduce water levels is storm-dependent and is not a one-size fits all approach to water level attenuation. In many instances, the presence of salt marsh reduces flooding. However, that is not always the case.
- Salt marshes may be an insurable asset by natural asset or resilience insurance mechanisms, based on precedent set in Hawaii and elsewhere to insure coral reefs, though additional work (including legal, regulatory analysis, engaging policy holders and insurers, etc) is required and insurance laws and regulations can vary state to state.

Learn more at www.climate-resilience-financing.com



QUESTIONS?

Ashby Nix Worley

Ashby.Worley@tnc.org

This work was supported by Georgia Sea Grant and Marine Extension Award #NA22OAR4170116. All views, opinions, findings, conclusions, and recommendations expressed in this material are those of the author(s) and do not necessarily reflect the opinions of the University of Georgia Sea Grant College Program, National Oceanic and Atmospheric Administration, or the United States Department of Commerce

The Nature
Conservancy



Protecting nature. Preserving life.

PHOTO: SJRWMD

DOGTOOTH BEND MAXIMIZING CHANNEL STABILITY AND ECOSYSTEM RESTORATION

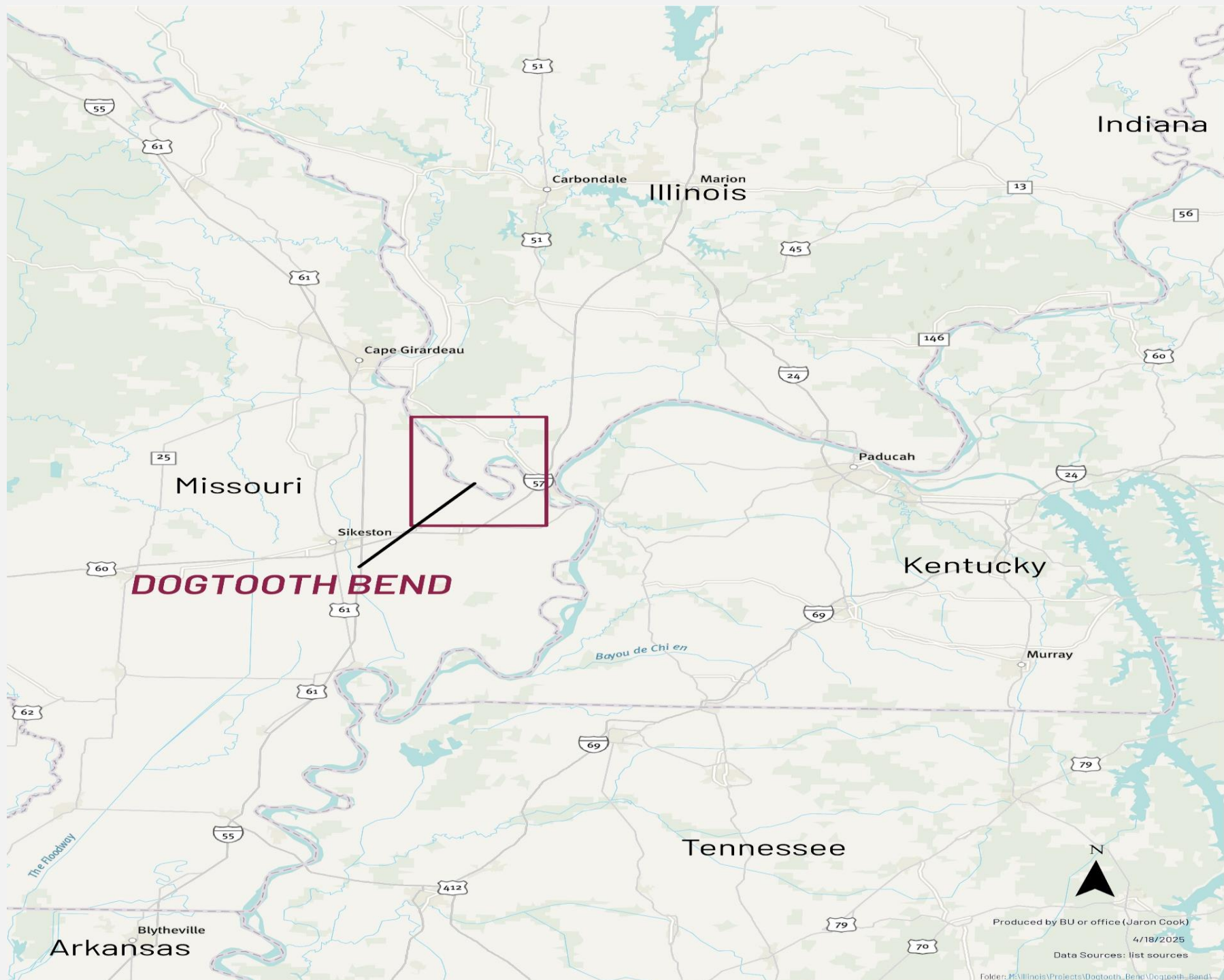
Engineering With Nature

Tharran Hobson- Southern Illinois Program Director for The Nature Conservancy

thobson@tnc.org

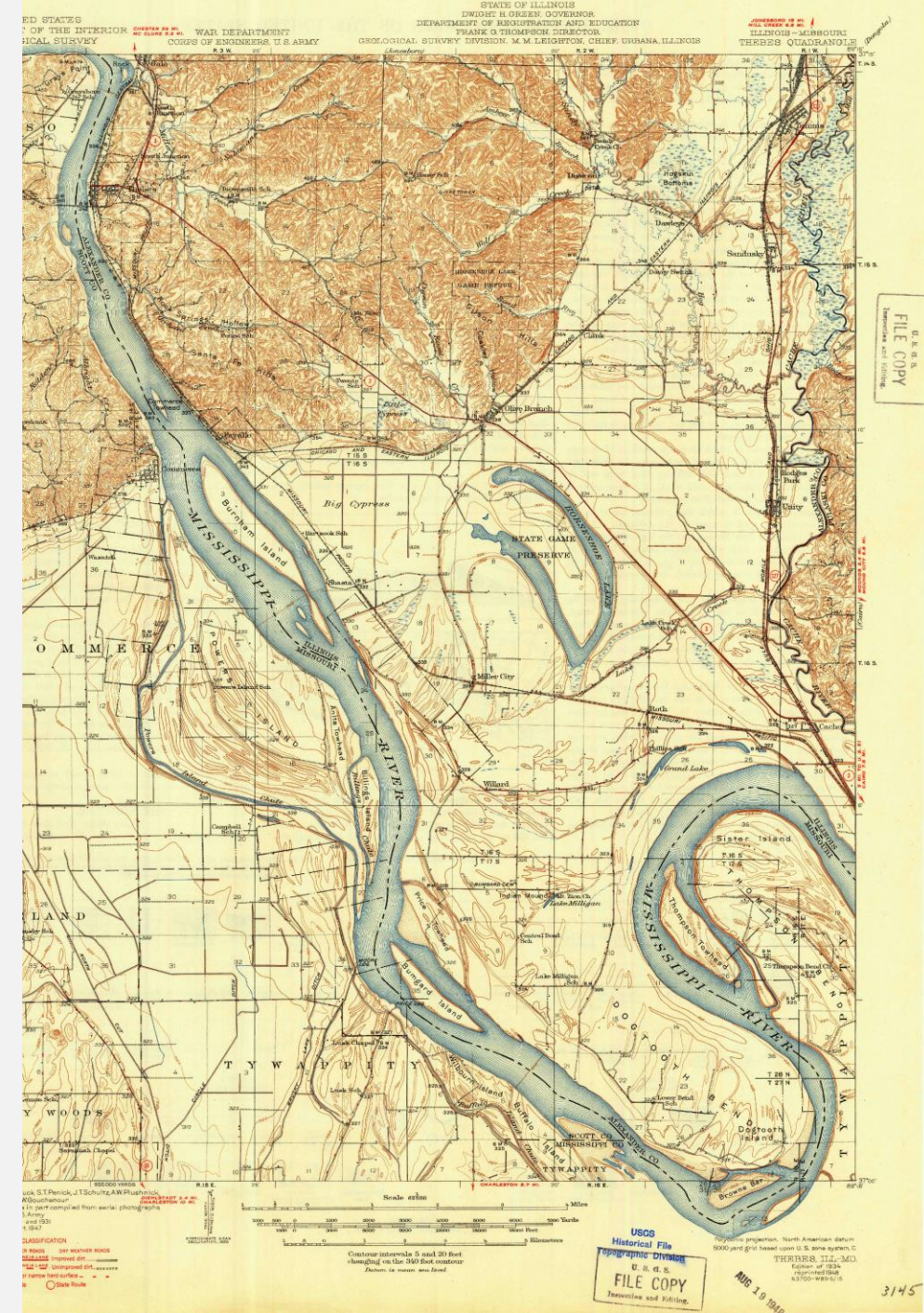
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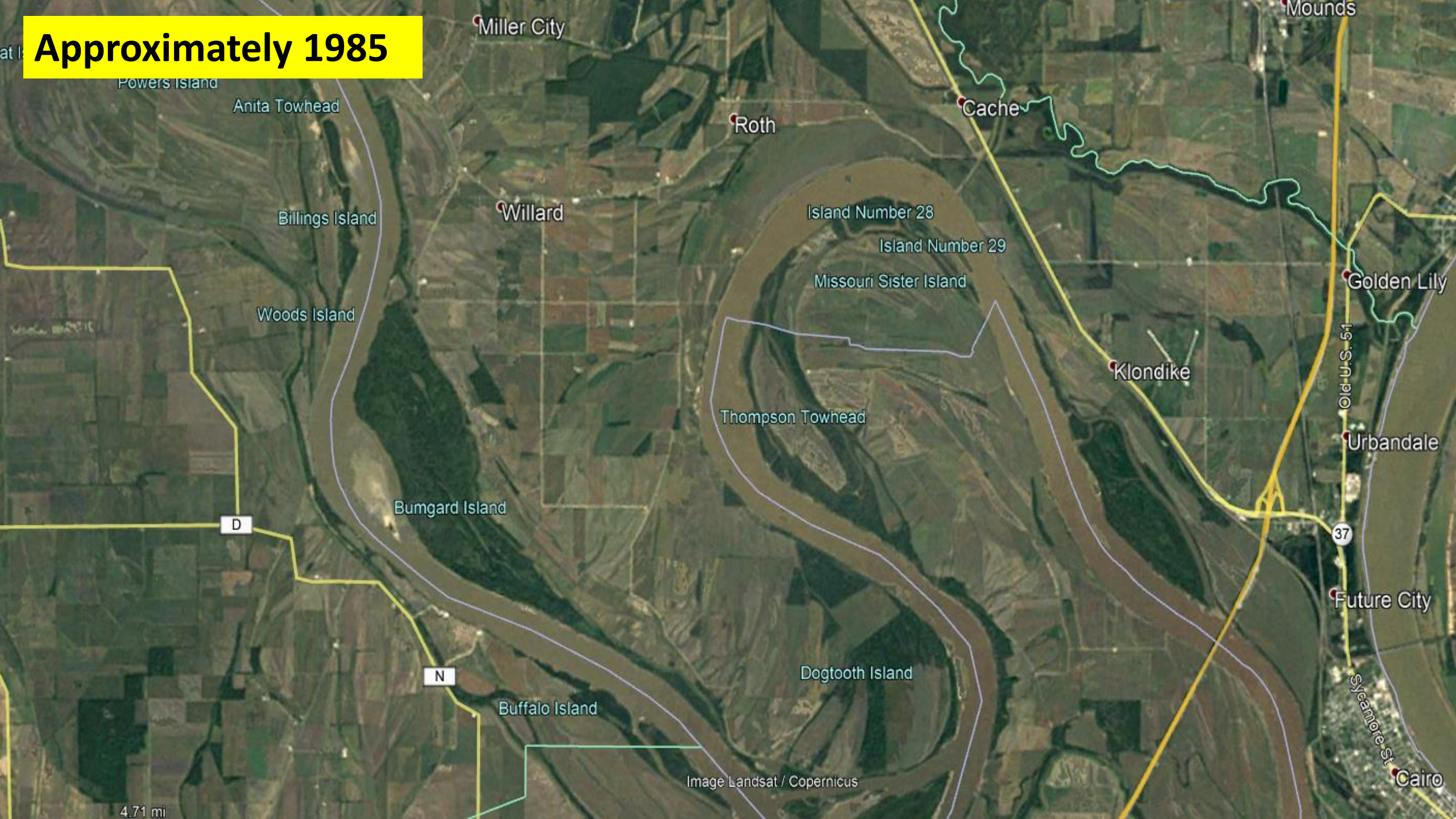


DOGTOOTH BEND – ALEXANDER COUNTY ILLINOIS

- Land conversion beginning in 1840s
- Historically a complex of wetlands, floodplain lakes, and bottomland hardwood forest, cypress/tupelo slough, cane thickets
- Non-federal levee enrolled in the USACE's PL84-99 program
- Levee breaches in 1993, 2011, 2016, 2017 and 2019...becoming more frequent
- Major breach Jan 2016, inundated entire peninsula as well as several dozen residences in Olive Branch and Miller City; \$7.32M in damages
- Roads repeatedly being washed out and rebuilt in same fashion
- Repetitive crop loss
- Concerns over channel cut off, navigation impacts; during major flood events over 30% Mississippi River volume going through breach and across peninsula



Approximately 1985



May 16th, 2019



September 23rd, 2019



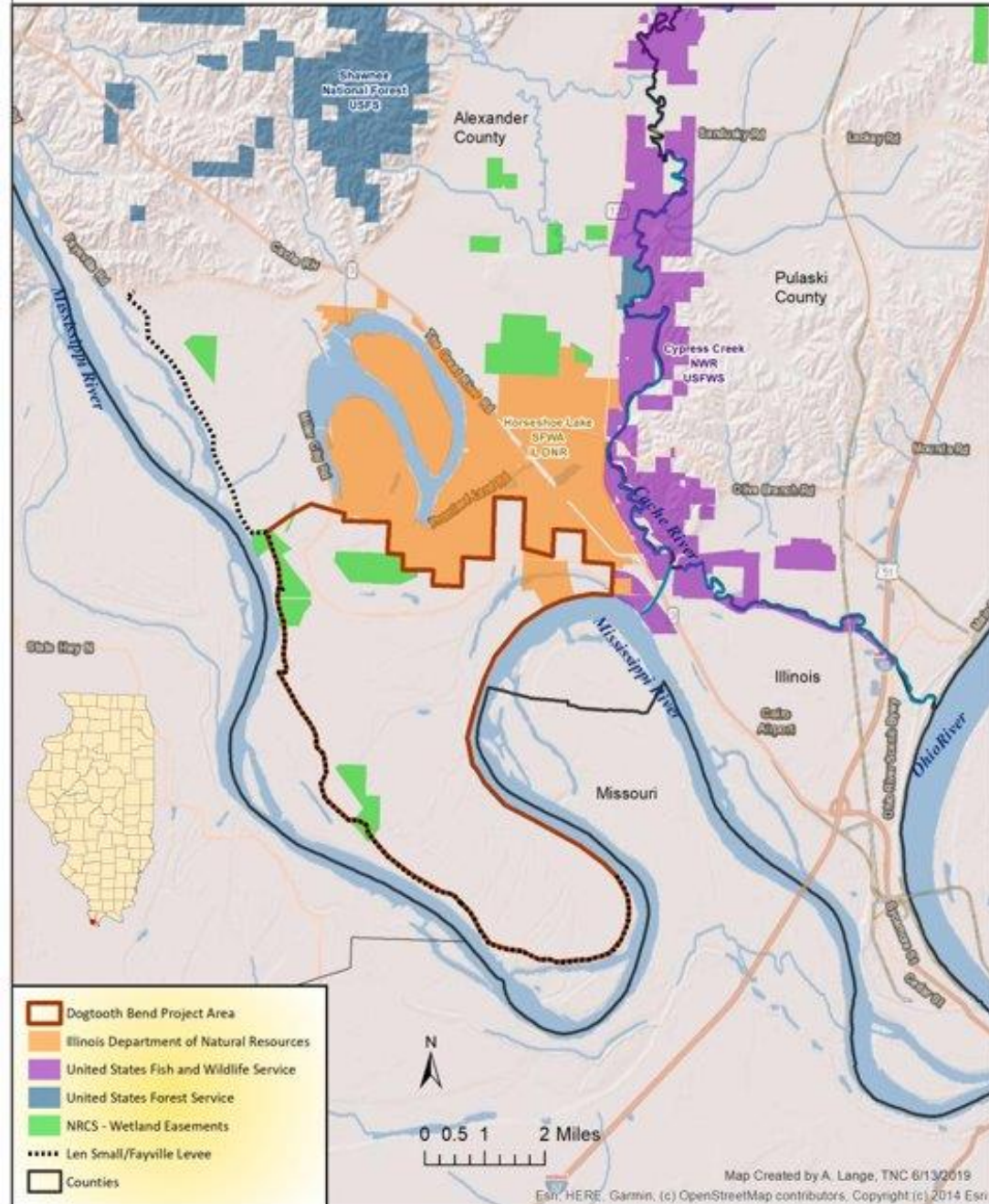
April 4, 2025





DOGTOOTH BEND BY THE NUMBERS

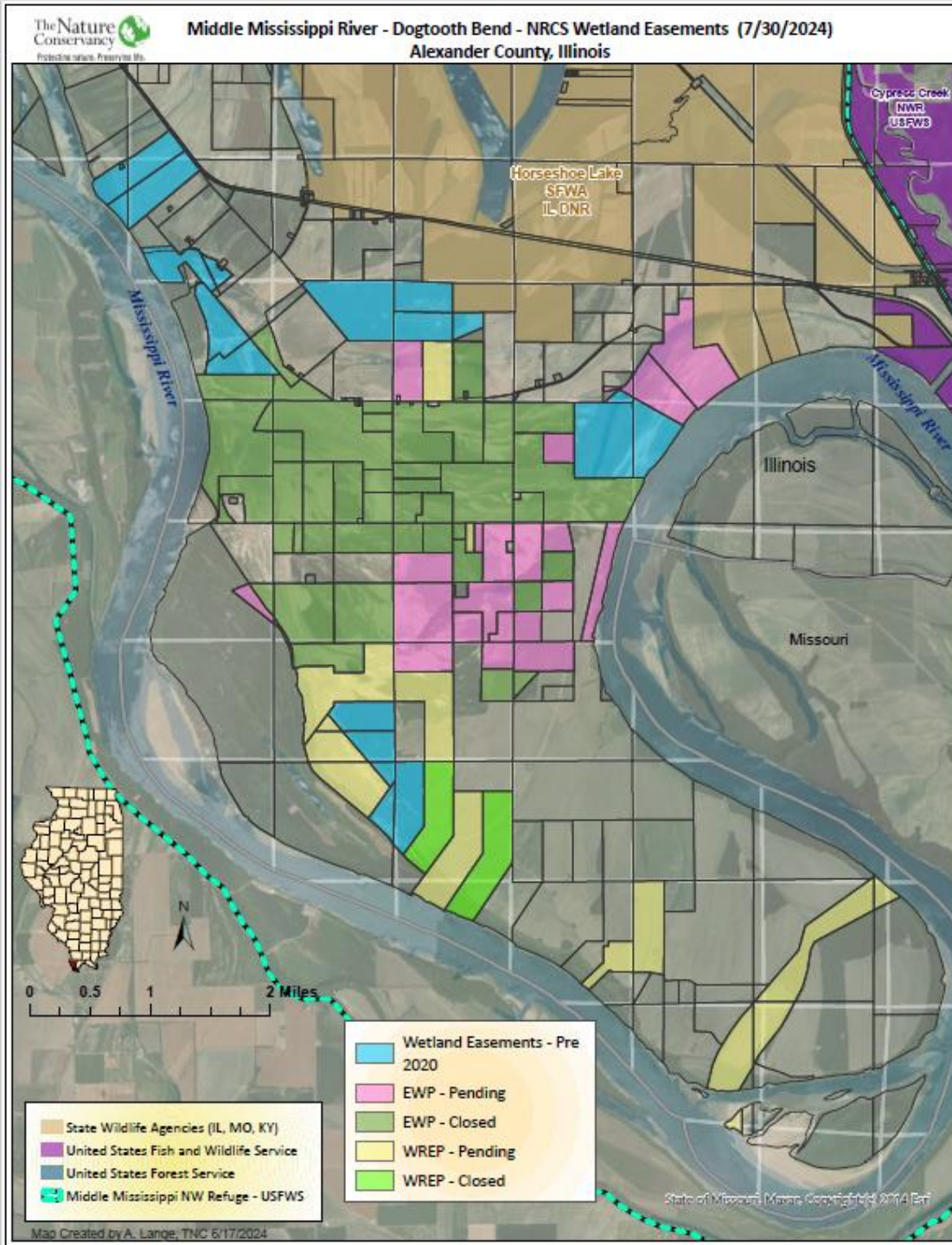
- 17,000 acres within levee
- Adjacent to 15,000 acres in public conservation land
- \$30 million of federal funds have been committed to purchase easements in the area (2019-2025) using NRCS Emergency Wetland Protection Program (EWP) and Wetland Reserve Enhancement Partnership (WREP) programs
- Anticipating planting 1.6 million trees during restoration



NRCS EASEMENTS

Total NRCS enrollment to date is over 7,500 acres of enrolled or pending NRCS easements in the project area, broken down below by program & acres:

- 1,453 - Existing Pre 2020 NRCS Easements – (Various WRP, WRE, EWP programs)
- 3,101 - Closed EWP Easements
- 310 – Closed WREP Easements (TNC Sponsored program)
- 1,385 – Pending EWP Easements
- 1,331 – Pending WREP Easements





TNC & DU ACQUISITION

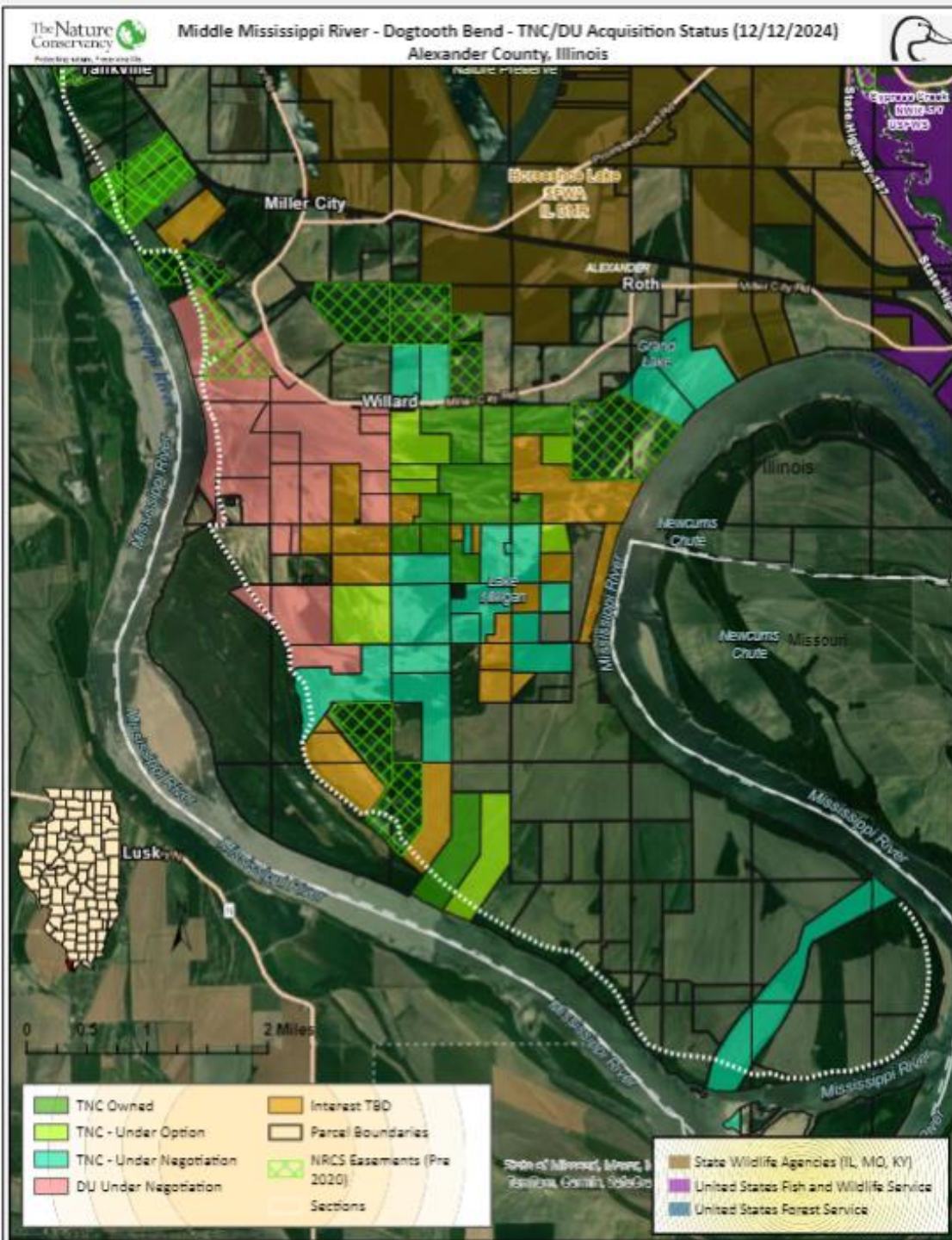
To date, TNC has acquired **1,400 ac**, with options to purchase an additional **587.56 ac** in 2025:

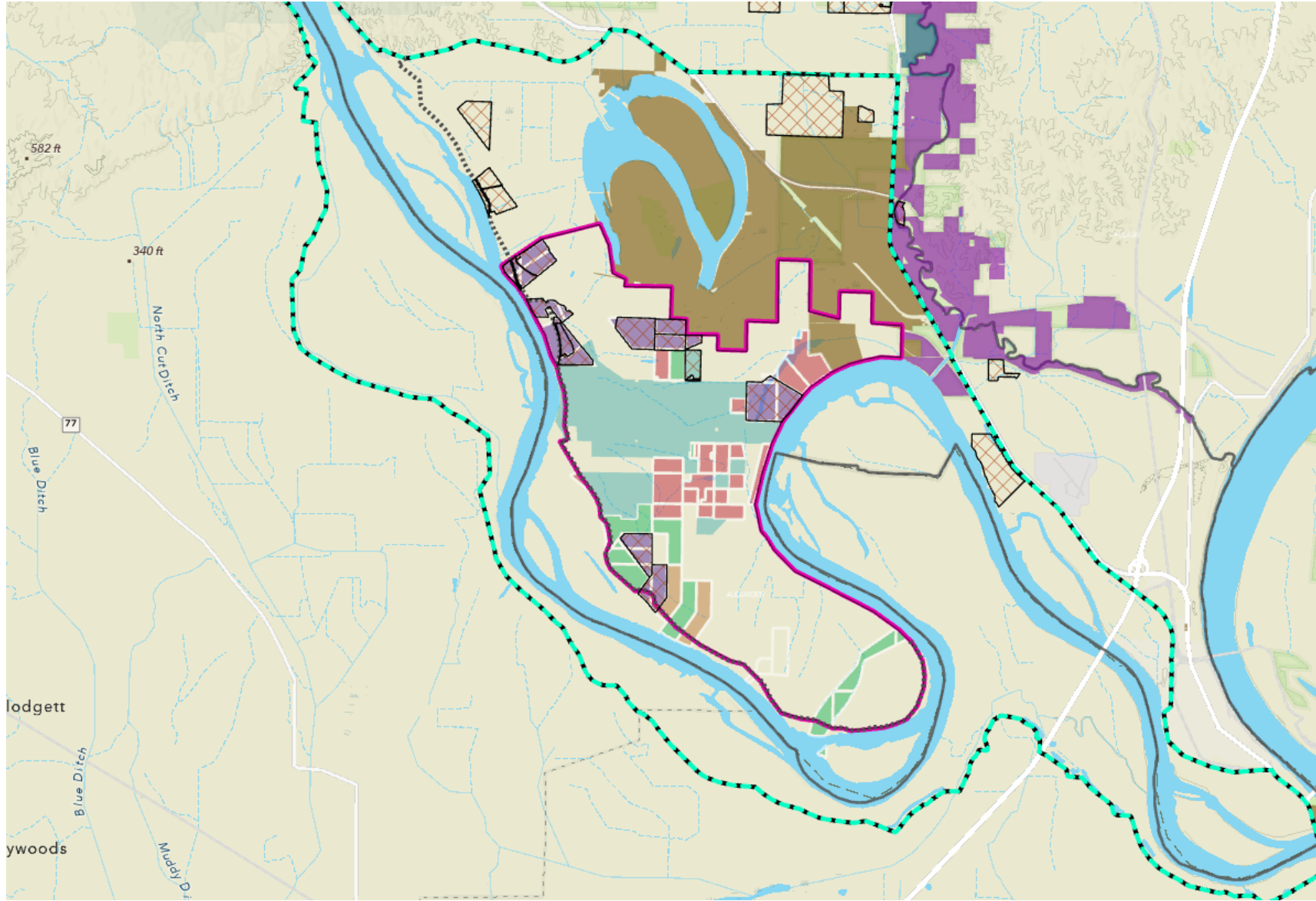
- Jan- 176.68 ac
- Feb- 335.88 ac
- Apr- 75.00 ac

DU is working to acquire **1500 ac**

Additional **2300 ac** in easement enrollment process where landowners have expressed interest in selling

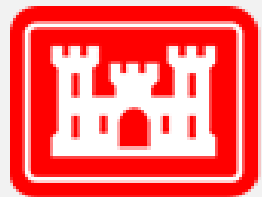
*Purchase of residual value of lands subject to NRCS easements; and will eventually be transferred to USFWS in Middle Mississippi Refuge system







PARTNER INVOLVEMENT



**US Army Corps
of Engineers®**



OVERALL RESTORATION PRINCIPLES



The duration, flow rates, preferential flow paths and velocities of frequent flood flows will need to be considered when restoration planning.



Long-term owners of land must be able to operate and maintain any restoration measures and not be hindered by complex maintenance requirements.



Benefits to federal or state listed threatened and endangered species in the area must be considered during planning.



Consideration of larger scale ecological goals since DNR – Horseshoe Lake State Conservation Area, the US Fish & Wildlife Service’s Cypress Creek National Wildlife Refuge, and existing WRP and ACEP easement are close.

OVERALL RESTORATION PRINCIPLES



Extensive pre-historic occupation in Dogtooth Bend, therefore restoration measures must by law consider any effects on cultural resources in the area.



Consider all existing laws, permits, easements, right-of-way, and infrastructure.



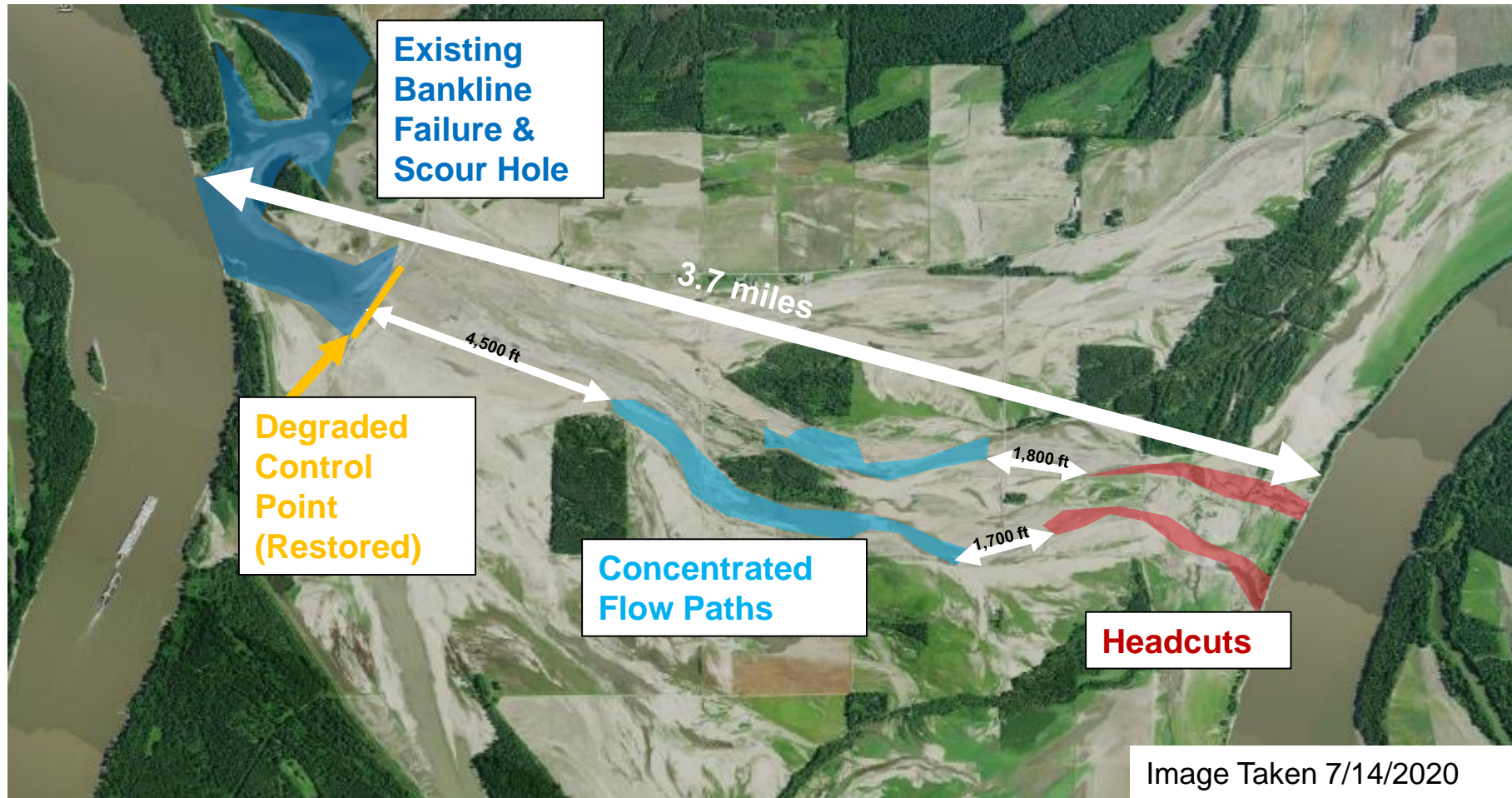
USCOE's need to protect the navigational channel.

ENGINEERING CONCEPTS FOR RESTORATION

- Site specific recommendation for engineering practices
 - Based on flow, velocity and hydrologic parameters
 - Follow NRCS Wetland Restoration Practice Standard
 - Utilize on-site surveys, post-flood LiDAR and other Science-based tools.
- Below-grade Excavation-type wetlands only
 - No above-grade dikes, levees or dams
 - Spoil areas will meet all federal and state requirements

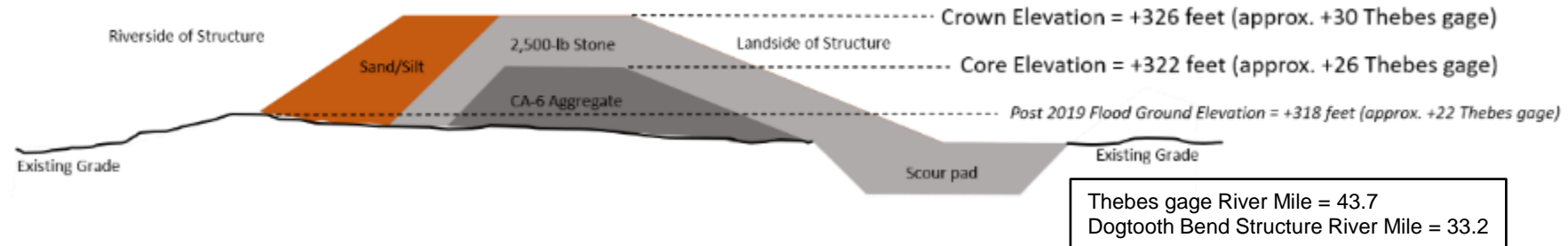


DOGTOTH BEND CHANNEL CUTOFF CONCERNS





DOGTOOTH BEND EMERGENCY OVERFLOW STRUCTURE



Final structure alignment



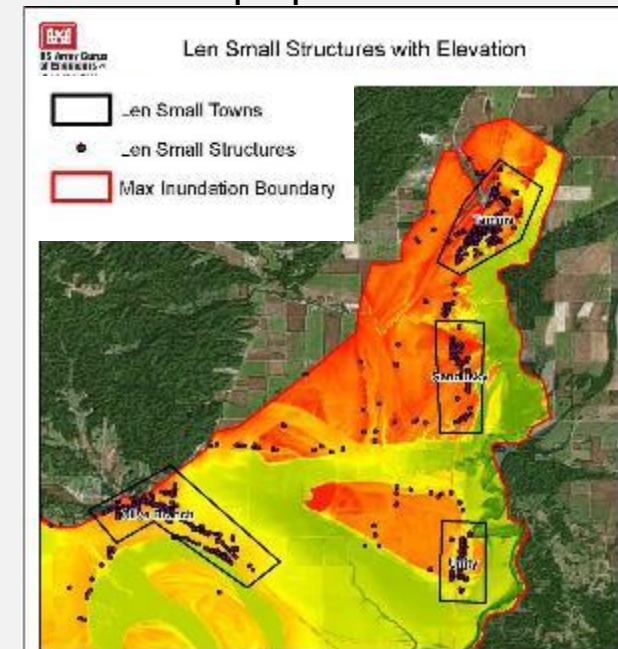
Photo from March 3, 2021 site visit. Stage at Thebes +23.75

POC: Brad Krischel

USACE NONSTRUCTURAL PROJECT CONSIDERATIONS

- (1) Acquisition of land or interests in land.
- (2) Removal of structures, including manufactured homes, for salvage and/or reuse purposes.
- (3) Demolition and removal of structures, including utility connections and related items.
- (4) Debris removal and debris reduction.
- (5) Removal, protection, and/or relocation of highways, roads, utilities, cemeteries, and railroads.
- (6) Construction to promote, enhance, control, or modify water flows into, out of, through, or around the nonstructural project area.
- (7) Nonstructural habitat restoration, to include select planting of native and desirable plant species, native species nesting site enhancements, etc. (restoration of floodplains and floodways).
- (8) Total or partial removal or razing of existing reaches of levee, to include removal of bank protection structures and riprap.
- (9) Protection/floodproofing of essential structures and facilities.

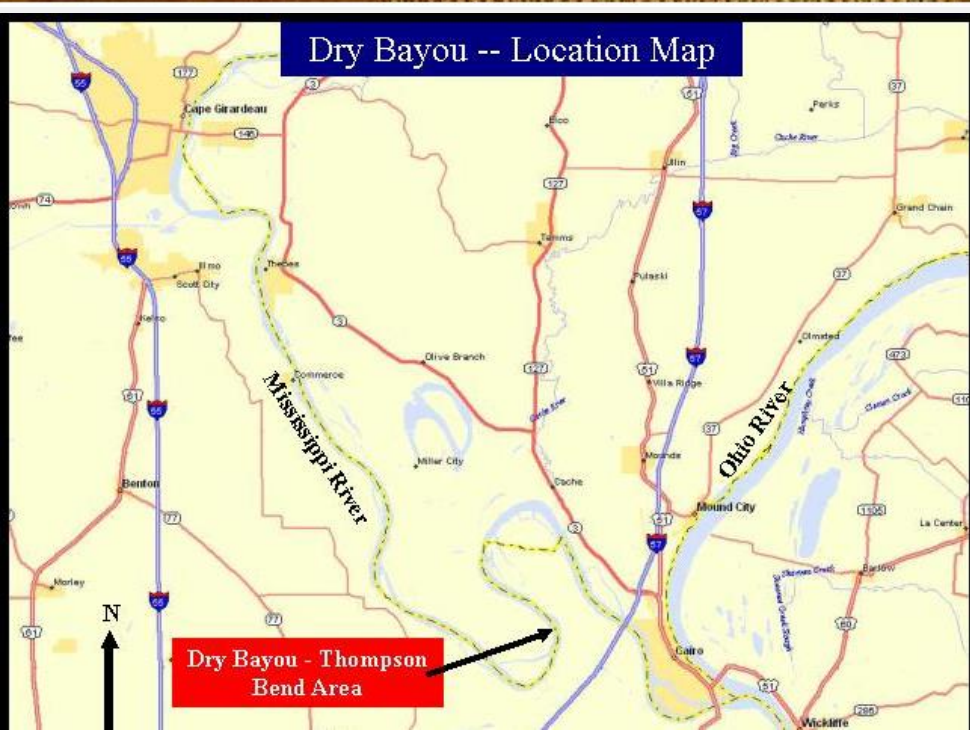
Figure 3. Len Small Back Water by Flood Interval





DRY BAYOU – THOMPSON BEND

- 1940s – extensive land clearing for agricultural purposes
- 1980 – start of efforts to avert cutoff using tree screen / riparian buffer plantings
- 600 ac / 275,000 trees planted along riparian zone of river bend
- Efforts have been successful at maintaining river channel
- Additional co-benefits associated with sizeable tree planting



USACE LOWER
MISS. COMP
STUDY

Where are the other “Dogtooth Bends”??



USACE has asked for specific locations to
consider for measures



How can we help identify areas for proactive
efforts to improve channel stability, using
nature based solutions??

THANK YOU!



Tharran Hobson, Southern
Illinois Program Director



thobson@tnc.org

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