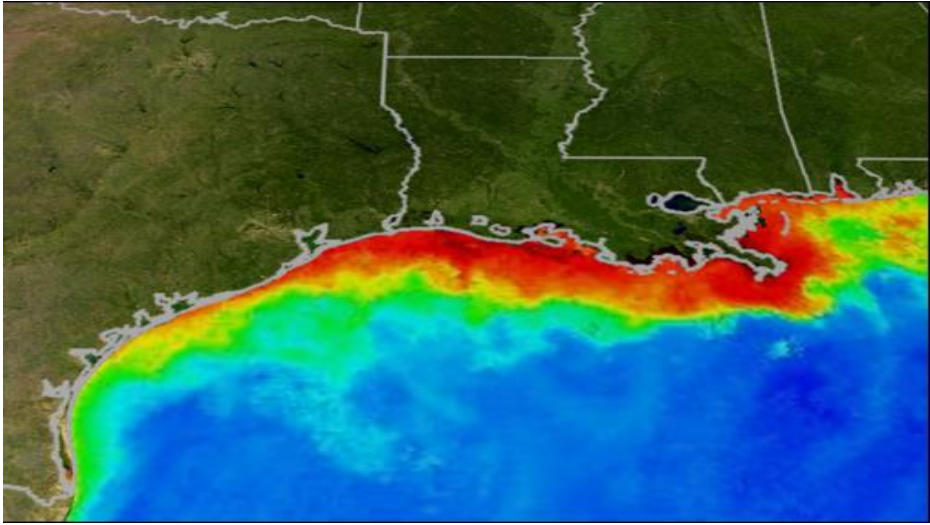# Science to Guide Floodplain Protection & Restoration in the Mississippi River Basin
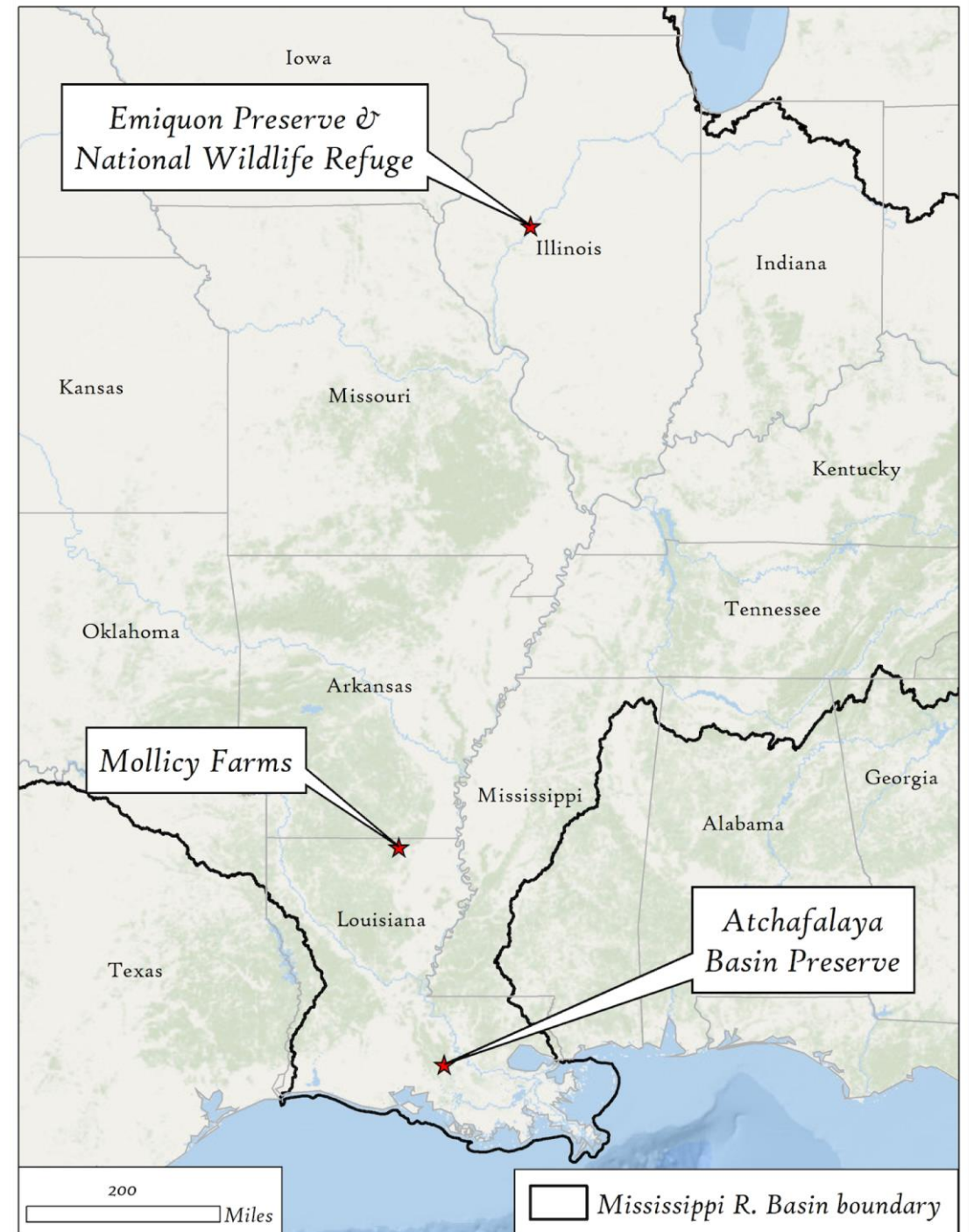
Jeff Walk presenting the work of Kris Johnson

Prairie State Conservation Coalition
February 2020

The Nature Conservancy

Multiple Benefits of Floodplains

Successful Floodplain Projects

Floodplain Prioritization

How do we scale up?

Where to invest?

US Floodplain Analysis

NEW US model

- LISFLOOD-FP routes flows through channels delineated by HydroSHEDS

- Regionalized flood frequency analysis

- 10 return periods from 5 to 1000 yrs

- Explicit representation of USACE NLD

- Validated with FEMA and USGS data *(Wing et al. 2017)*

SSBN Expert Data

Flood Depths (m)
- 0.1
- 0.5
- 1
- 2
- >3

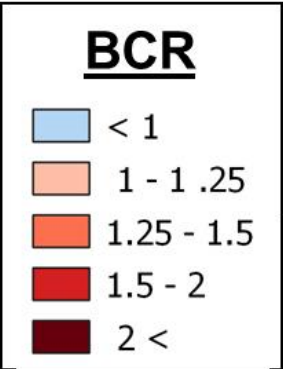San Francisco

US Floodplain Analysis
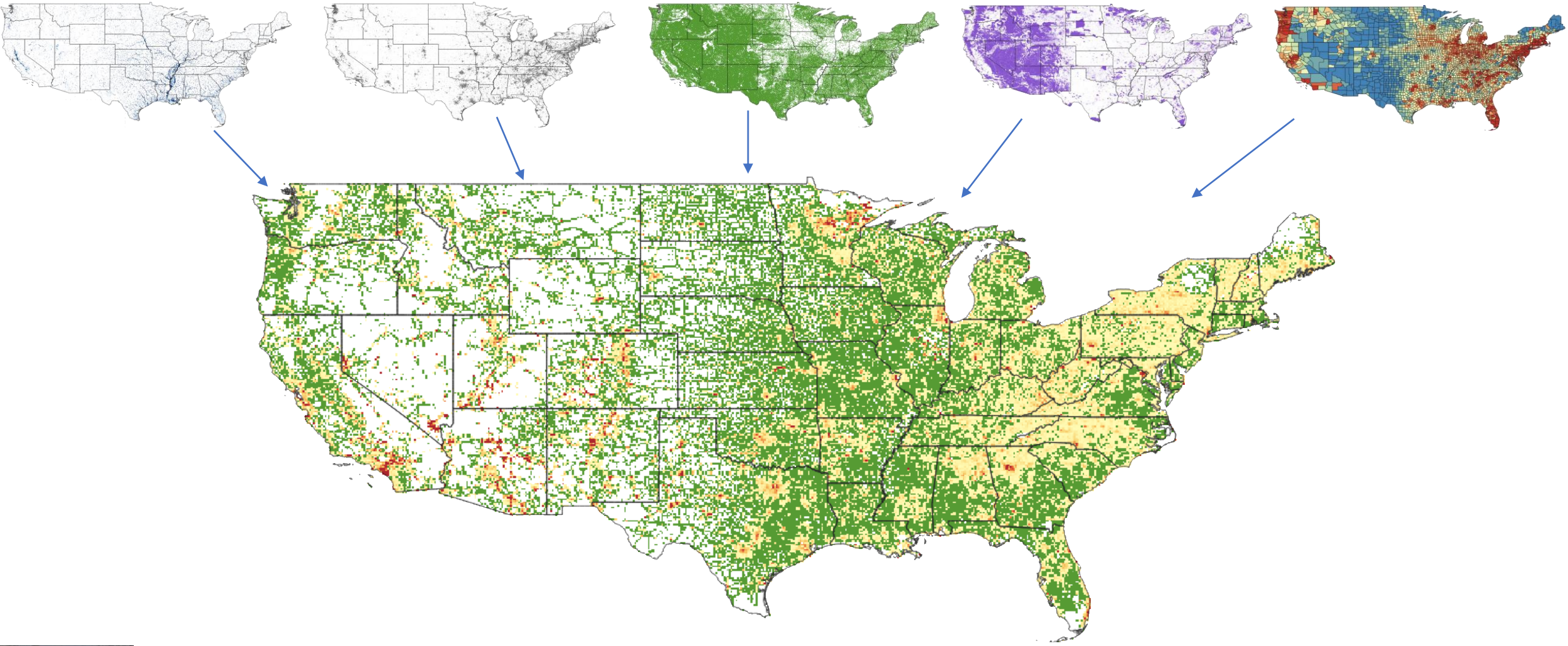
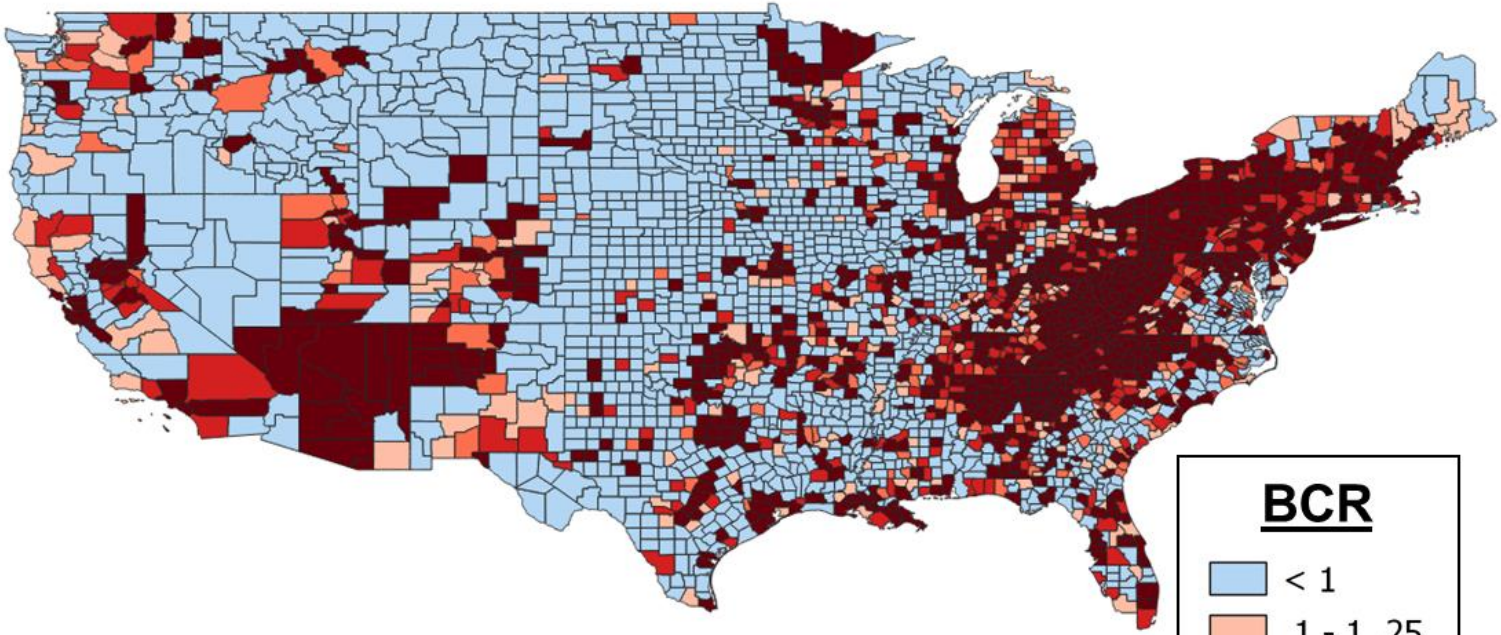# US Floodplain Analysis

41 million people at risk

$5 TRILLION exposed

Wing et al 2018

US Floodplain Analysis

BCR

▨	< 1
▨	1 - 1 .25
▨	1.25 - 1.5
▨	1.5 - 2
▨	2 <
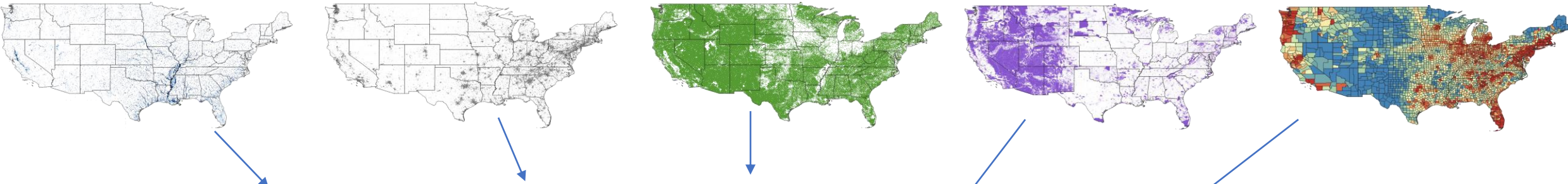
US Floodplain Analysis
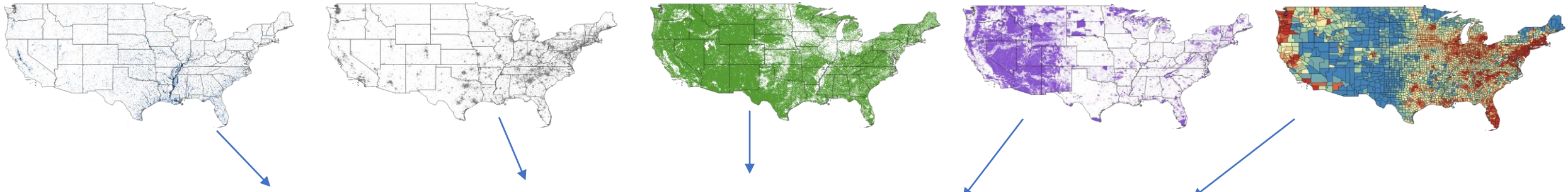
54,000 km² natural area in 100-year floodplain

avoided flood damages by 2070
>5x acquisition cost

Johnson et al. *Nature Sustainability* 2019

BCR
	< 1
	1 - 1.25
	1.25 - 1.5
	1.5 - 2
	2 <

University of BRISTOL
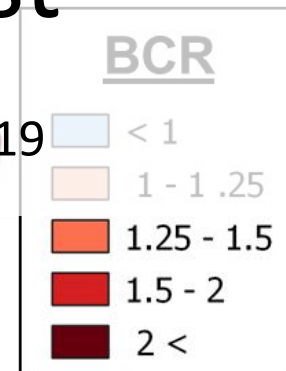
FLOODPLAIN PRIORITIZATION TOOL

Identify places in the Mississippi River Basin where restoration or conservation would have the greatest impact on the overall health of this river system.

Photo credit: Byron Jorjorian

LEARN MORE

FPTool.org

Freshwater Network - Mississippi River Basin Floodplain Tool

The Floodplains Prioritization Tool (FP Tool) is designed to identify critical opportunities for floodplain protection and restoration in the Mississippi River Basin. Use the selector widgets below to specify criteria related to water quality, wildlife habitat, and human exposure to flood risk. The map on the right will change in response to your selections to identify sites meeting these criteria and identify those geographies where floodplain restoration or conservation is likely to have the greatest positive impact on the health of this river system.

Identify Floodplain Units

Select Flood Frequency

| 1-in-5-year | 1-in-100-year | 1-in-500-year |

View Floodplains By Watershed   Zoom in to Activate

| HUC-8 | HUC-12 | Catchment |

Select Management Action

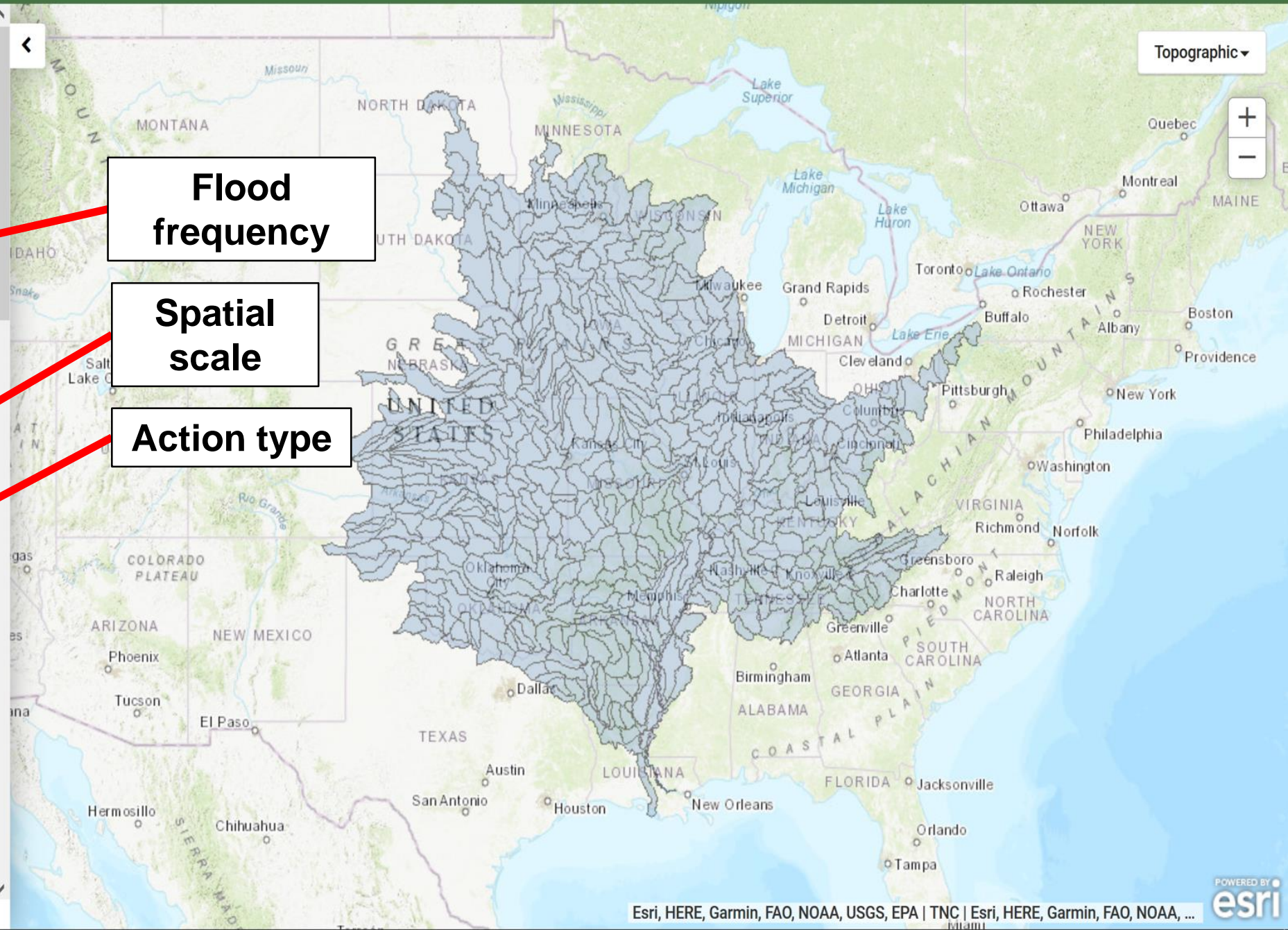| Protection | Restoration |

Filter Floodplain Units

⌄ Available Floodplain Area

☐ Available floodplain area for given flood frequency and management action   0 to > 40,000 acres
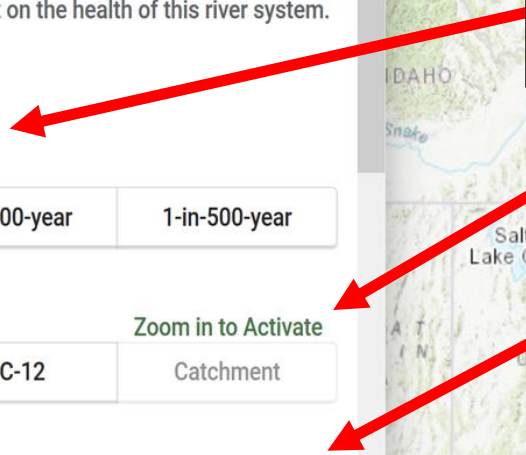
⌄ Nutrients

☐ Local Nutrient Loading

Flood frequency

Spatial scale

Action type

Topographic ▾

Identify Floodplain Units

Select Flood Frequency

| 1-in-5-year | 1-in-100-year | 1-in-500-year |

View Floodplains By Watershed

Zoom in to Activate

| HUC-8 | **HUC-12** | Catchment |

Select Management Action

| Protection | **Restoration** |

Filter Floodplain Units | Save and Share | Reset Filters |

⌄ **Available Floodplain Area**

☑ Available floodplain area for given flood frequency and management action

505 to **> 2,500** acres

⌄ **Nutrients**

☐ Local Nutrient Loading (Nitrogen and Phosphorus)

50 to 100 %

☐ Nutrient loading to Gulf of Mexico (nitrogen and phosphorus)

51 to 100 %

☐ Growing degree days

50 to 100

Switch spatial scale

Topographic ▾

Esri, HERE, Garmin, FAO, USGS, NGA, EPA, NPS | TNC

Freshwater Network - Mississippi River Basin Floodplain Tool

Filter Floodplain Units

[Save and Share] [Reset Filters]

∨ Available Floodplain Area

☑ Available floodplain area for given flood frequency and management action ⓘ

502 to > 2,500 acres

∨ Nutrients

☐ Local Nutrient Loading (Nitrogen and Phosphorus) ⓘ

0 to 100 %

☐ Nutrient loading to Gulf of Mexico (nitrogen and phosphorus) ⓘ
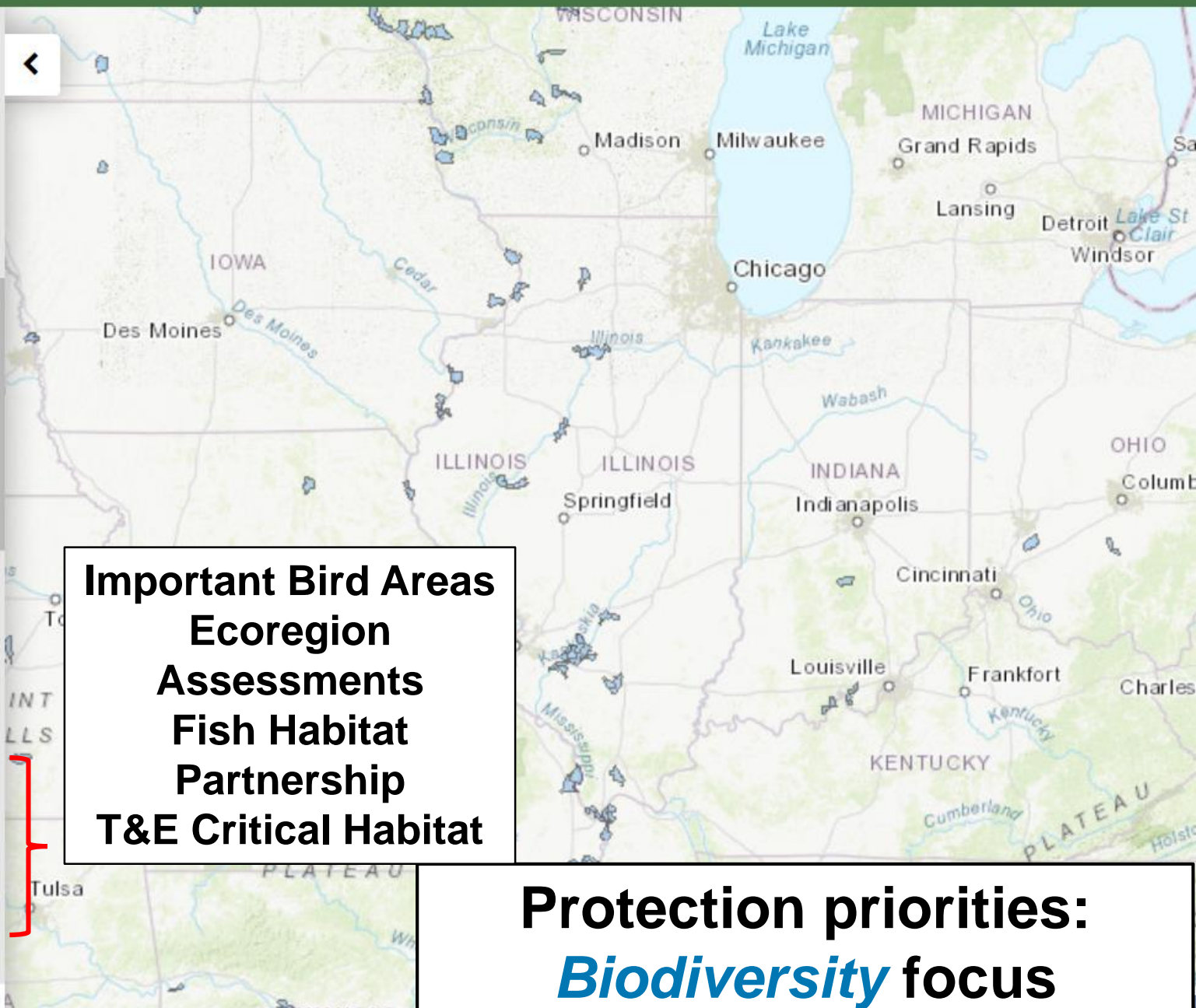
0 to 100 %

☐ Growing degree days ⓘ

0 to 100

∨ Habitat

☑ Important Bird Areas ⓘ ◉ Present ○ Absent

☑ Nature Conservancy Ecoregional Assessment Units ⓘ ◉ Present ○ Absent

Important Bird Areas
Ecoregion Assessments
Fish Habitat Partnership
T&E Critical Habitat
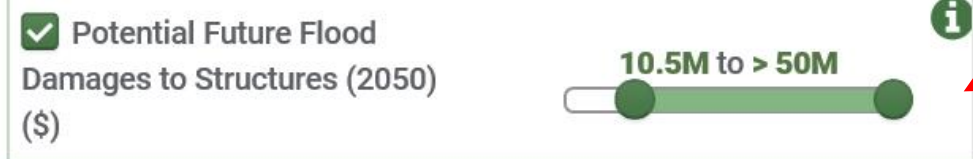
**Protection priorities:
Biodiversity focus**

Freshwater Network - Mississippi River Basin Floodplain Tool

Identify Floodplain Units

Select Flood Frequency

| 1-in-5-year | 1-in-100-year | 1-in-500-year |

View Floodplains By Watershed

Zoom in to Activate

| HUC-8 | HUC-12 | Catchment |

Select Management Action

| Protection | Restoration |

Filter Floodplain Units

| Save and Share | Reset Filters |

∨ **Available Floodplain Area**

☑ Available floodplain area for given flood frequency and management action

2,490 to > 2,500 acres

∨ **Nutrients**

☐ Local Nutrient Loading (Nitrogen and Phosphorus)

0 to 100 %

Name | Old Channel Big Bureau Creek-Big Bureau Creek

Watershed area (acres) | 21,074.19

Floodplain (100-year) in forest or wetland (acres) | 3,748.47

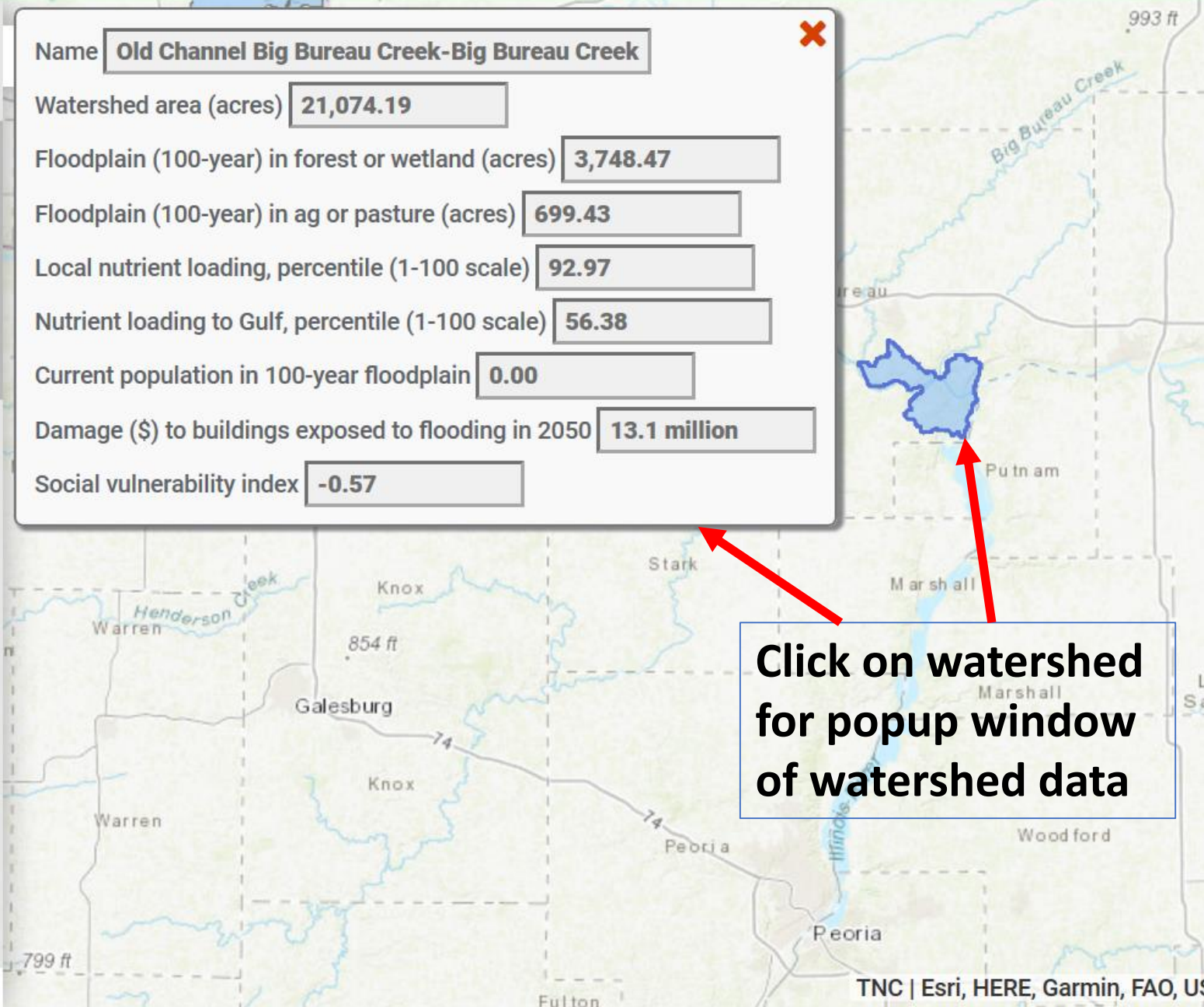Floodplain (100-year) in ag or pasture (acres) | 699.43

Local nutrient loading, percentile (1-100 scale) | 92.97

Nutrient loading to Gulf, percentile (1-100 scale) | 56.38

Current population in 100-year floodplain | 0.00

Damage ($) to buildings exposed to flooding in 2050 | 13.1 million

Social vulnerability index | -0.57

Click on watershed for popup window of watershed data

TNC | Esri, HERE, Garmin, FAO, US

Coming Soon to the Floodplain Protection Tool!

- Estimated Crop Loss From Flooding
- Areas Resilient to Climate Change
- More Levees Accounted for in Model
- Carbon Sequestration Potential
- Updated Nutrient Data

Thank You!

✉ **kjohnson@tnc.org**

🐦 **@KrisAJohnson**

Atchafalaya River, LA