

# ***Phragmites* Invasion: Habitat Suitability and Decision Support in the Great Lakes Coastal Zone**

**Kurt P. Kowalski<sup>1</sup>, Martha. L. Carlson Mazur<sup>2</sup>,  
and David M. Galbraith<sup>3</sup>**

<sup>1</sup>U.S. Geological Survey, Great Lakes Science Center, Ann Arbor, MI, USA

<sup>2</sup>Boston College, Chestnut Hill, MA, USA

<sup>3</sup>U.S. Fish and Wildlife Service, Albuquerque, NM, USA

# Mapping



**Component 1:** Map of the current *Phragmites* distribution along the U.S. Great Lakes coastal zone (10-km inland buffer)





# Modeling

## Phragmites Mapping

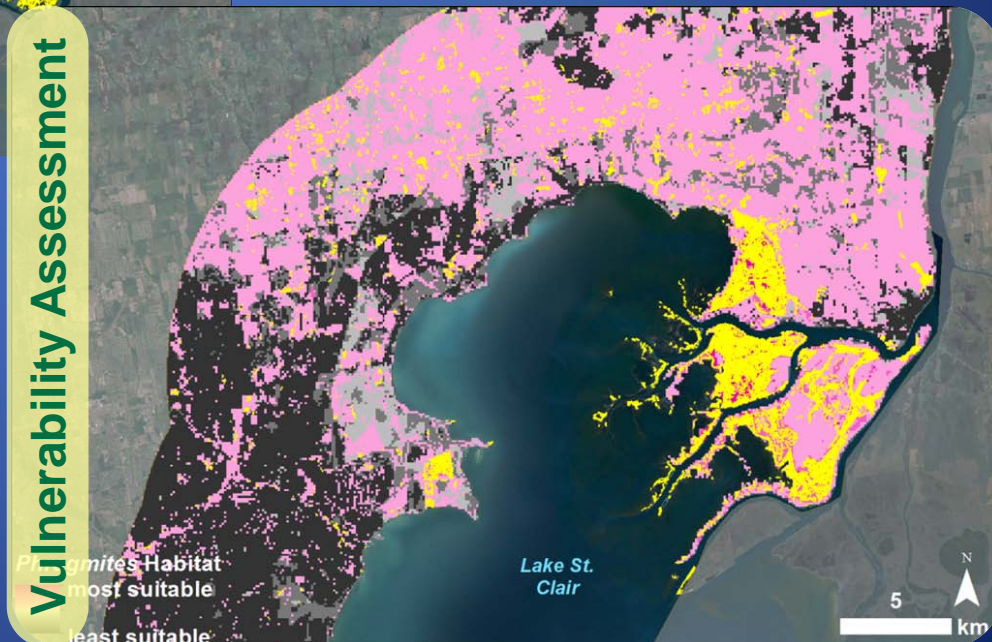


**Component 1:** Map of the current *Phragmites* distribution along the U.S. Great Lakes coastal zone (10-km inland buffer)



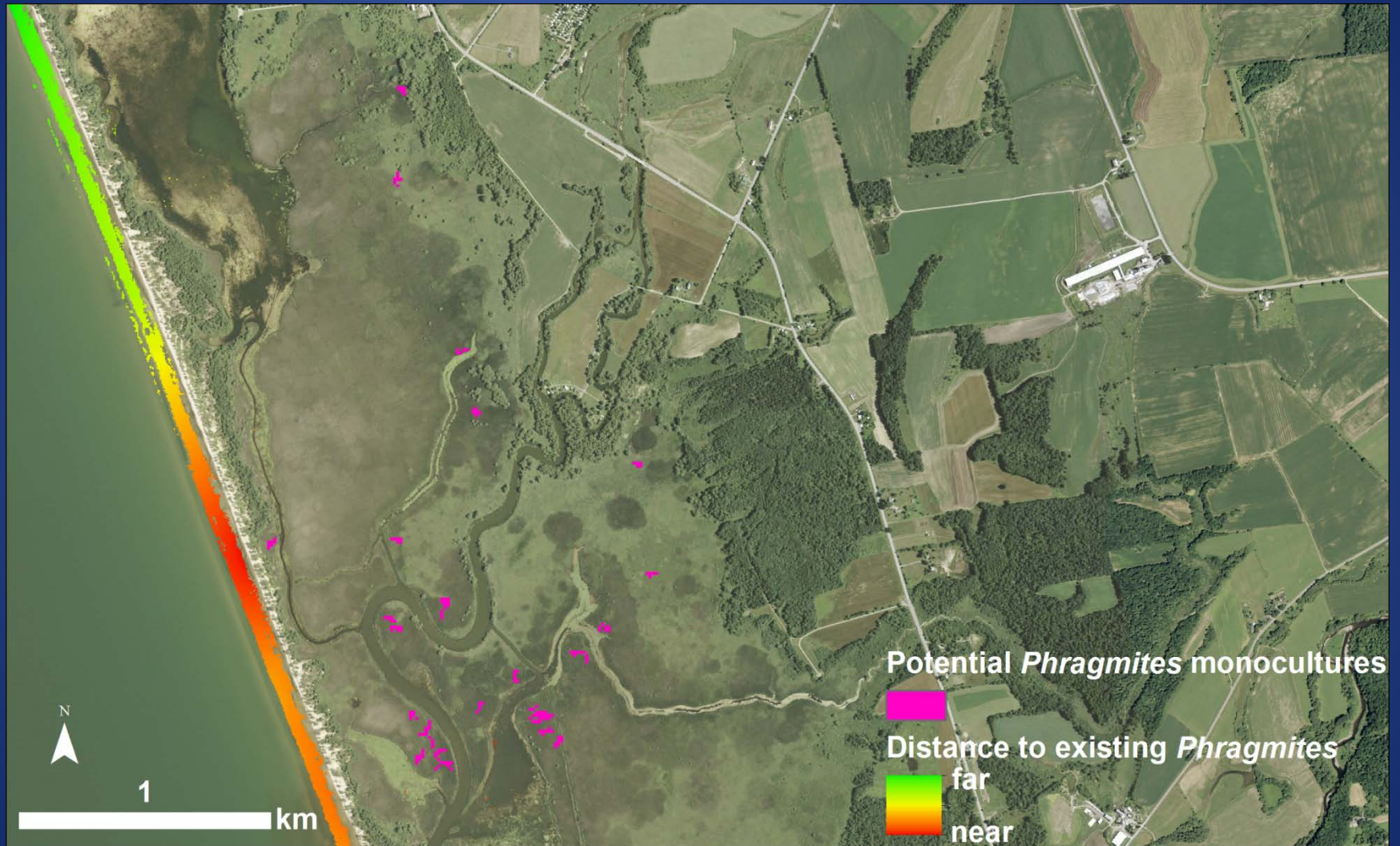
**Component 2:** Assessment of areas vulnerable to *Phragmites* expansion (habitat suitability)

## Vulnerability Assessment





# Reduced Lake Level Corridors



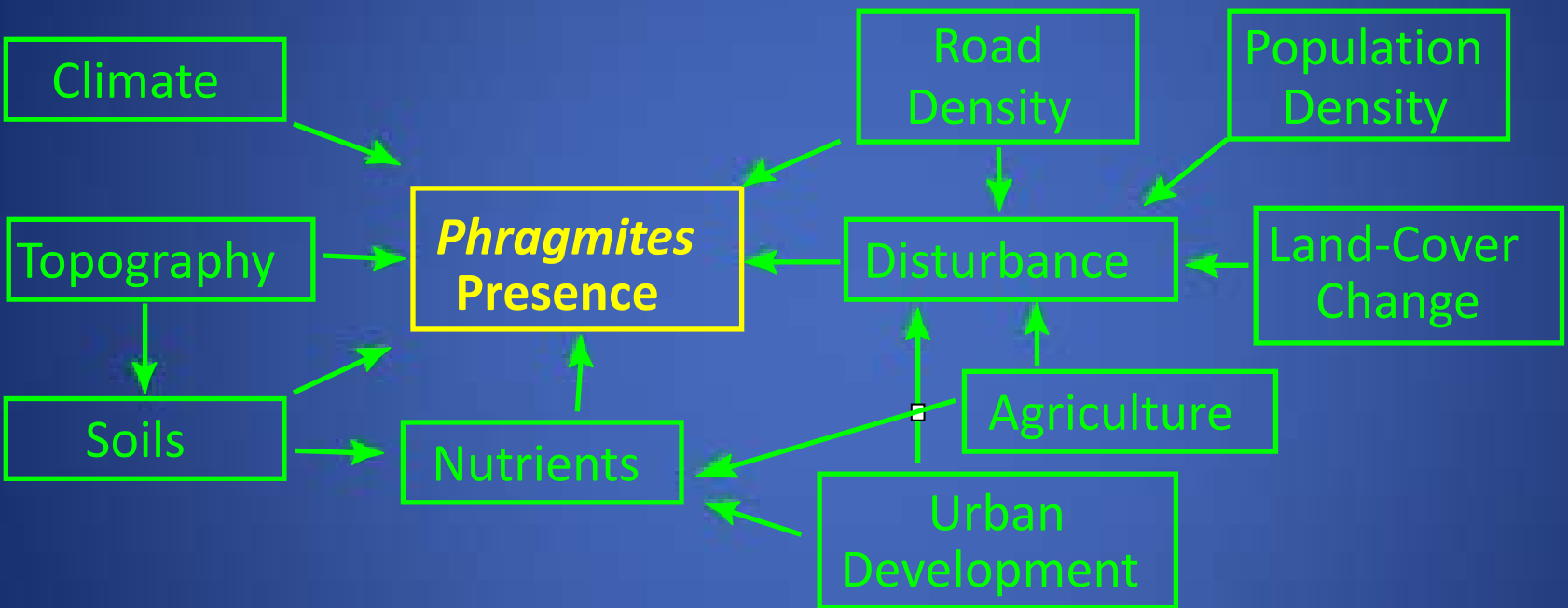


# Research Questions

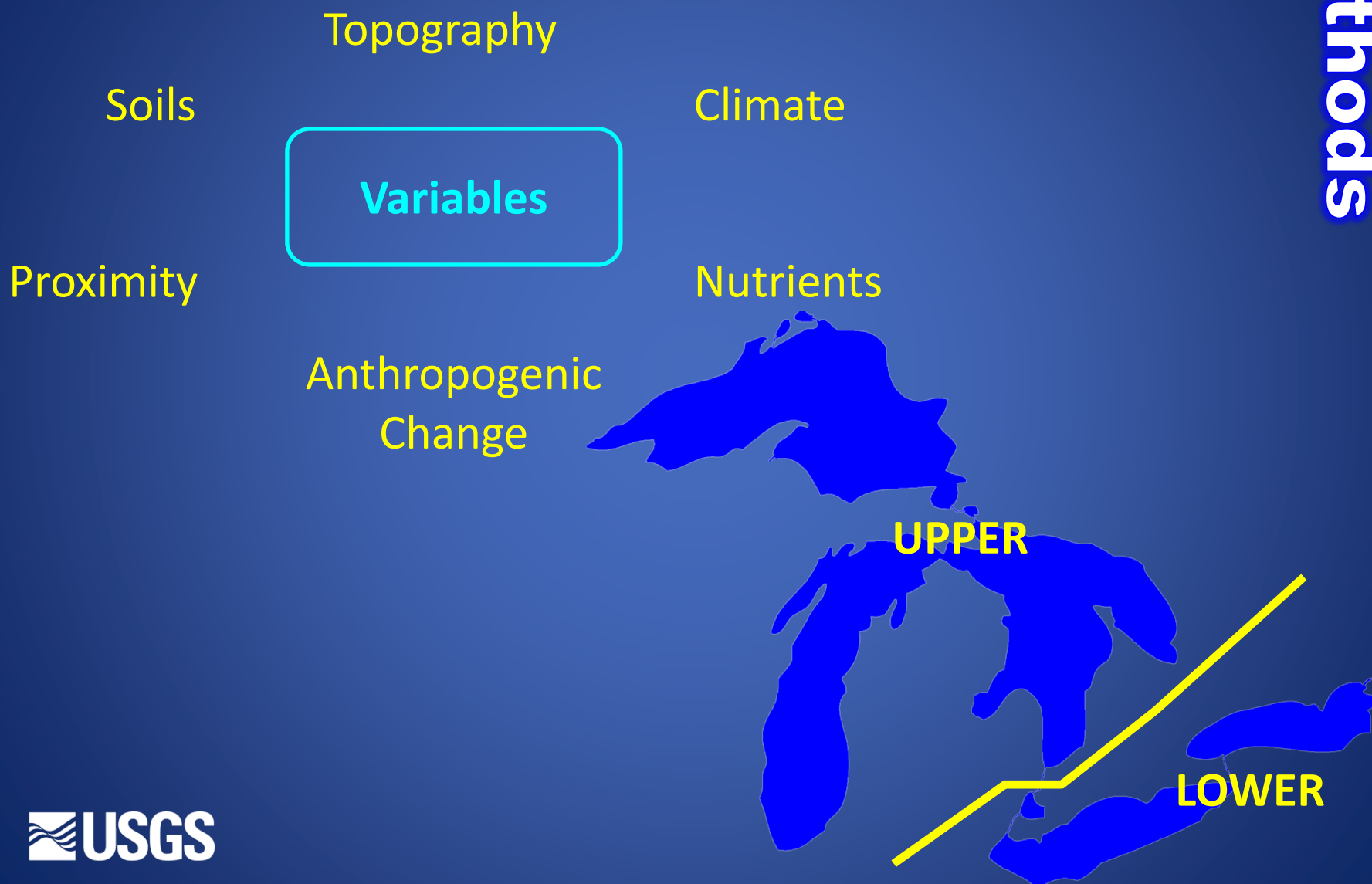
1. What are the major large-scale drivers influencing *Phragmites* distribution in the Great Lakes coastal zone?

2. What are the areas most vulnerable to future *Phragmites* invasion and expansion?

# Conceptual Model



## Boosted Regression Trees





# Research Questions

1. What are the major large-scale drivers influencing *Phragmites* distribution in the Great Lakes coastal zone?

2. What are the areas most vulnerable to future *Phragmites* invasion and expansion?



## Top Predictors (Rel. Influence)

Topography (16.9)

Proximity to Development (11.2)

Soil Hydrologic Group (8.2)

Road Density (8.1)

Proximity to Agriculture (7.5)





# Research Questions

1. What are the major large-scale drivers influencing *Phragmites* distribution in the Great Lakes coastal zone?

2. What are the areas most vulnerable to future *Phragmites* invasion and expansion?



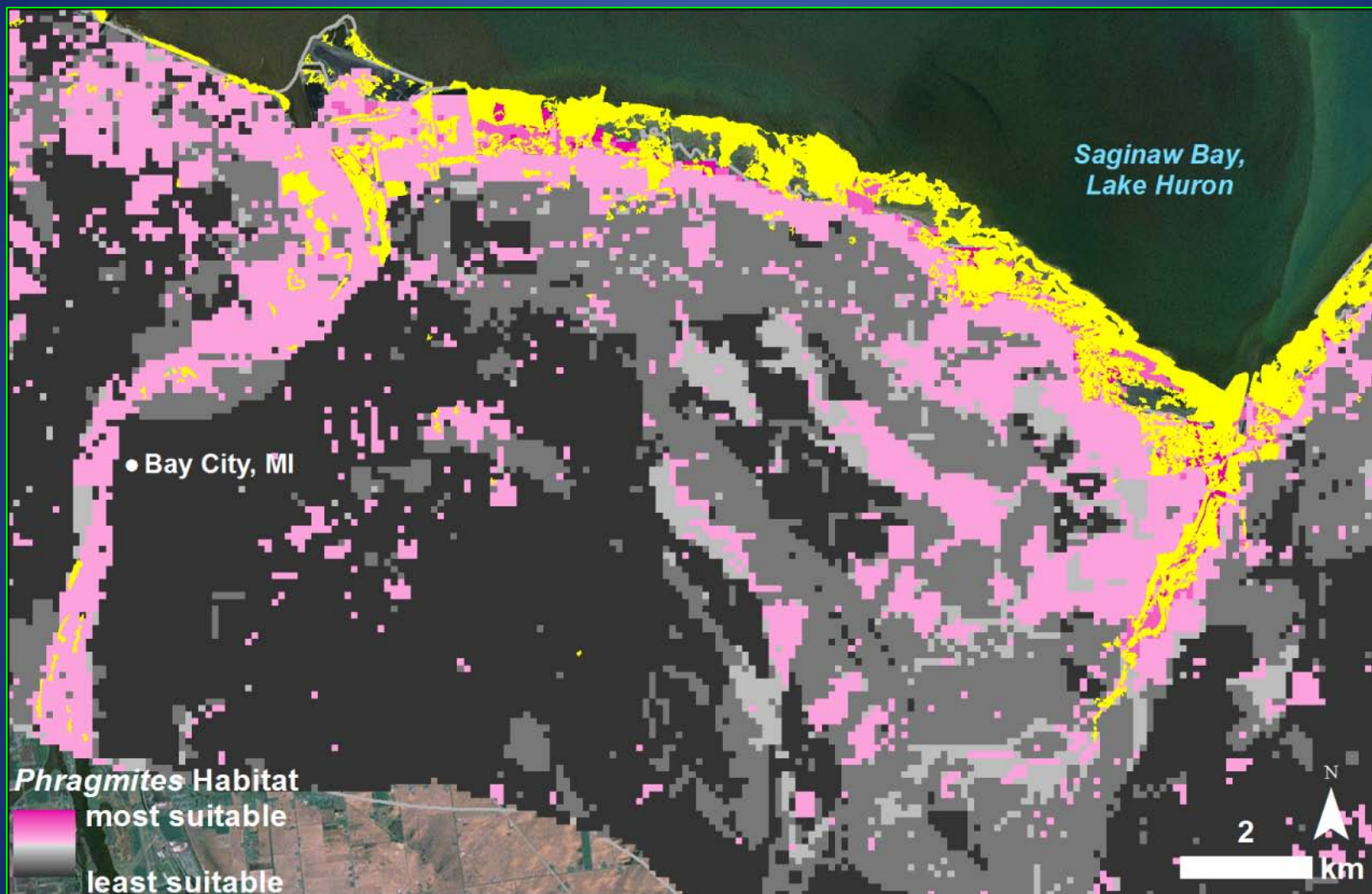
## Existing *Phragmites* stands...





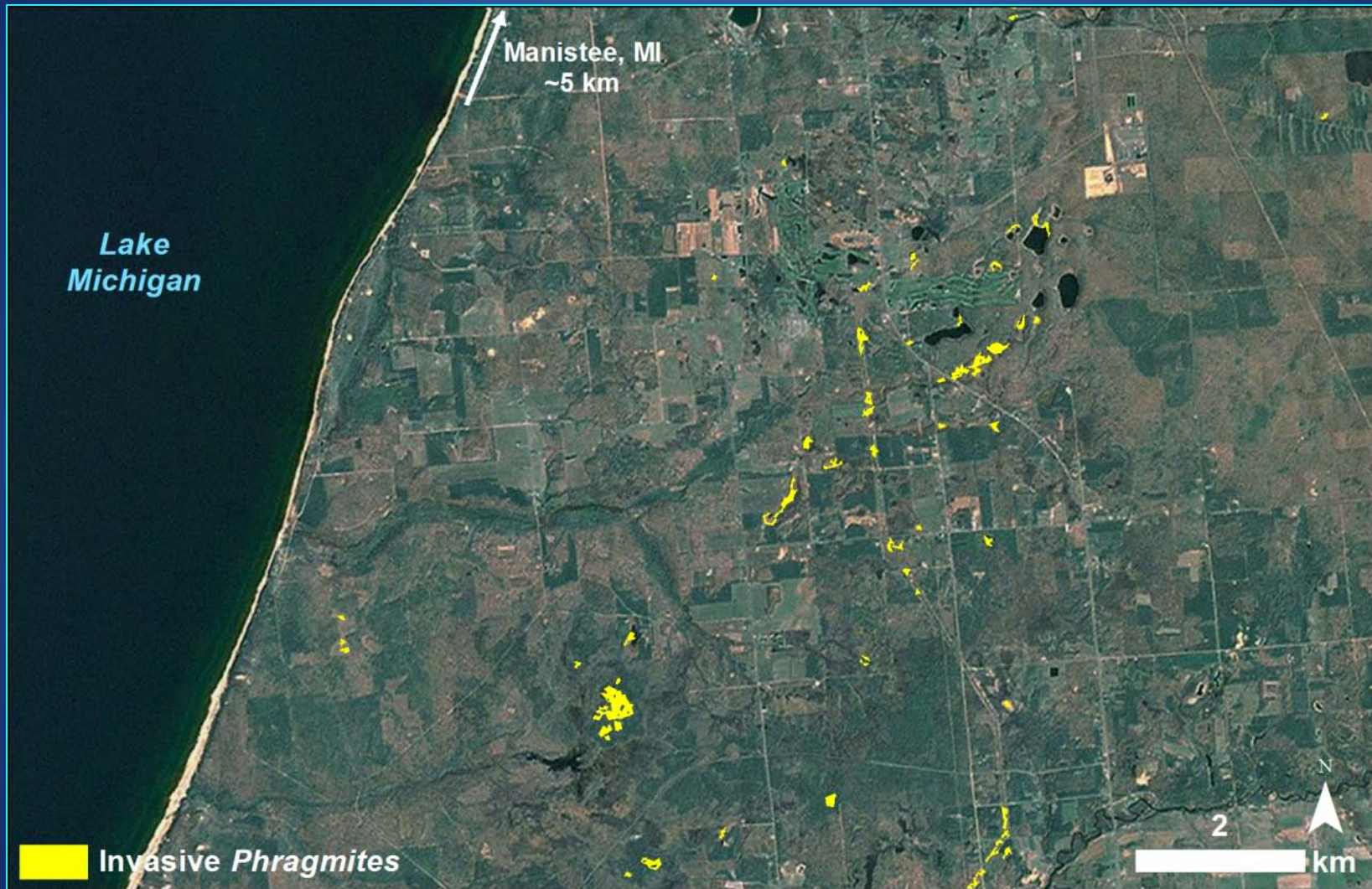
# Results

...and habitat suitability index

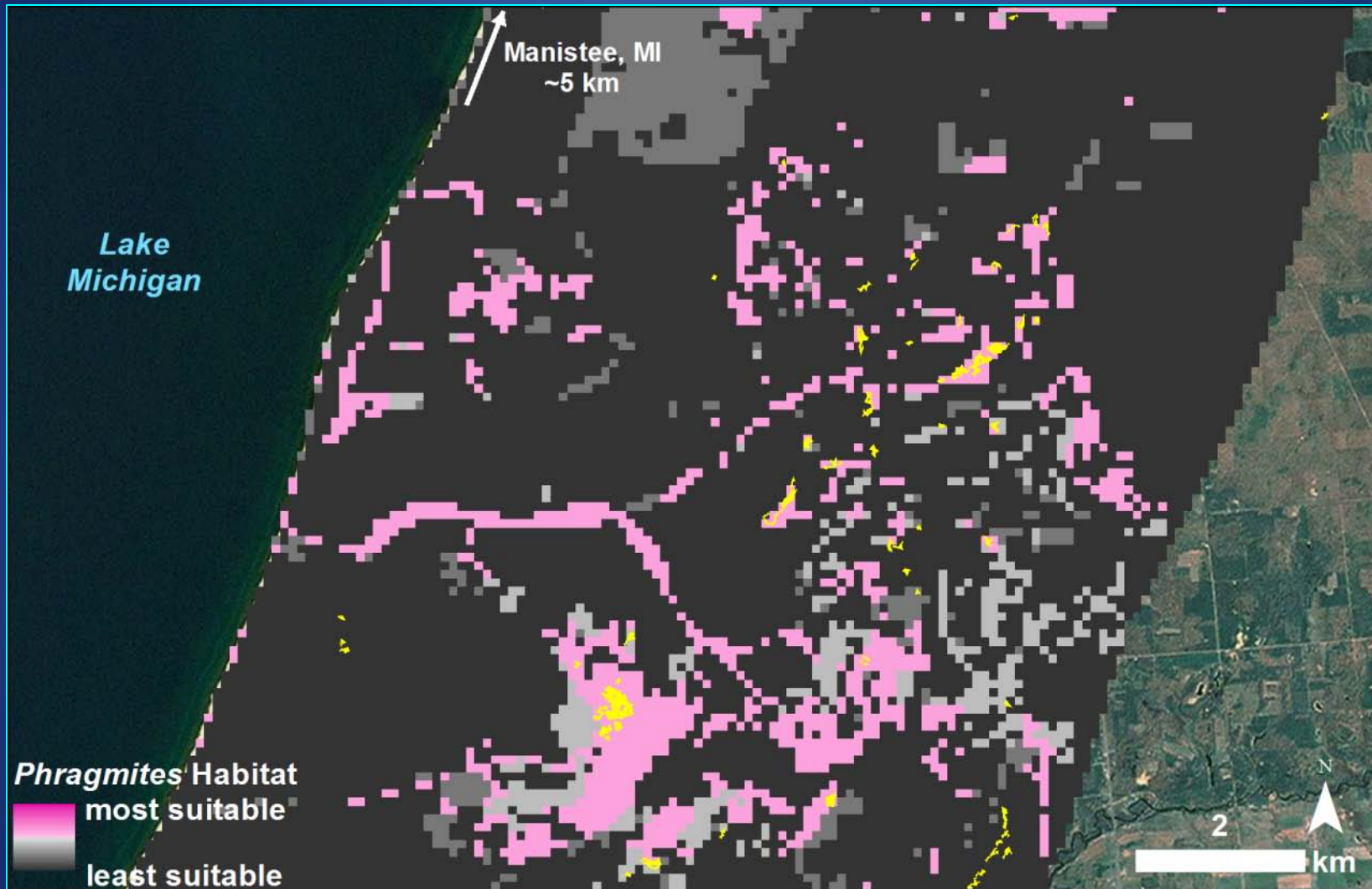




## Existing *Phragmites* stands...



...and habitat suitability index



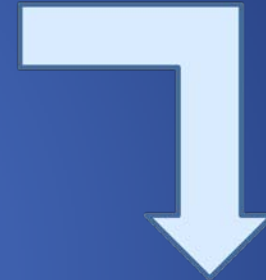
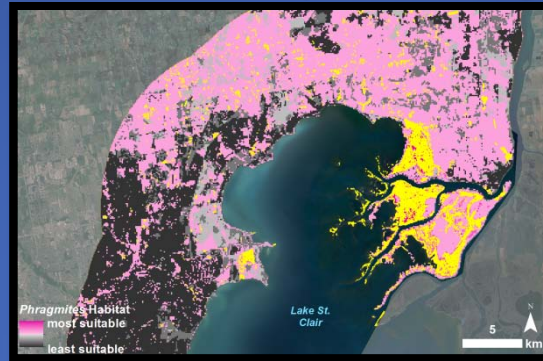


# Decision Support for *Phragmites* control

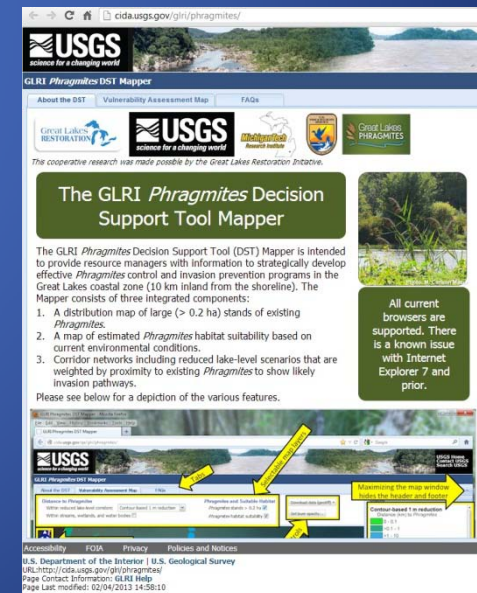
## *Phragmites* Distribution



## Vulnerability Modeling



## Decision Support Tool



URL: <http://cida.usgs.gov/glri/phragmites/>

## Funding provided by:



## Many thanks to:

Richard Powell, Kirk Scarborough, David Bennion, Jean Adams, Dale Robertson, David Saad, Brian Huberty, Christine Geddes Joseph, Lacey Mason, Nicholas Danz, Tom Hollenhorst, Jana Stewart, David Blodgett, Howard Reeves, Lori Fuller, Rebecca Mataosky, Charlene Sylvester, Calvin Lawrence



Acknowledgments





## Things to cover in DST demo

- Layout
  - Header and footer don't change
  - Tabs across top
  - Main viewing window to left
  - Context sensitive legend and information window to right
- About the DST
  - Short abstract
  - Highlight of features
- FAQs
  - Series of links to text further down page
  - Text contains links to word definitions or other projects
  - Contains extensive background information to help the user understand how the data were derived, known limitations, and context of the work.
- Vulnerability Assessment Map
  - Map in middle with features along sides (zoom, background, context map)
  - Selectable layers across top
    - Mapped Phragmites stands >0.2 ha
      - Note Legend reflects recent data selection
      - Info panel provides summary and links to supporting info



- Selectable layers across top
  - Mapped Phragmites stands >0.2 ha
    - Note Legend reflects recent data selection
    - Info panel provides summary and links to supporting info
  - Phragmites habitat suitability layer
    - Provisional because data not available for full release yet
    - Shows results of HSI modeling
  - Distance to Phragmites (move map to St. Clair delta)
    - Not covered earlier in presentation, but this tool allowed us to present results from an analysis of the areas that may become vulnerable to Phragmites expansion under two low water-level scenarios possible given climate change model results (50cm below 2009 mean annual average and 1m below 2009 average).
  - Drop down box gives ability to show
    - No reduction (default)
    - Lidar-based 50 cm reduction
      - Shows areas that may be exposed
      - Precise, but limited to areas with lidar data
    - Lidar-based 1 m reduction
      - Limited coverage of lidar data
    - Contour-based 1 m reduction
      - Based on historic soundings
      - Less precise but give representation of possibilities

- Contour-based 1 m reduction
  - Based on historic soundings
  - Less precise but give representation of possibilities
- Within streams, wetlands, and water bodies
  - Recognizes pathways for invasion
  - Distance to existing Phragmites
- Download data drop down box
  - Can see layers available for download
  - Whole data sets are downloaded
- Set layer opacity