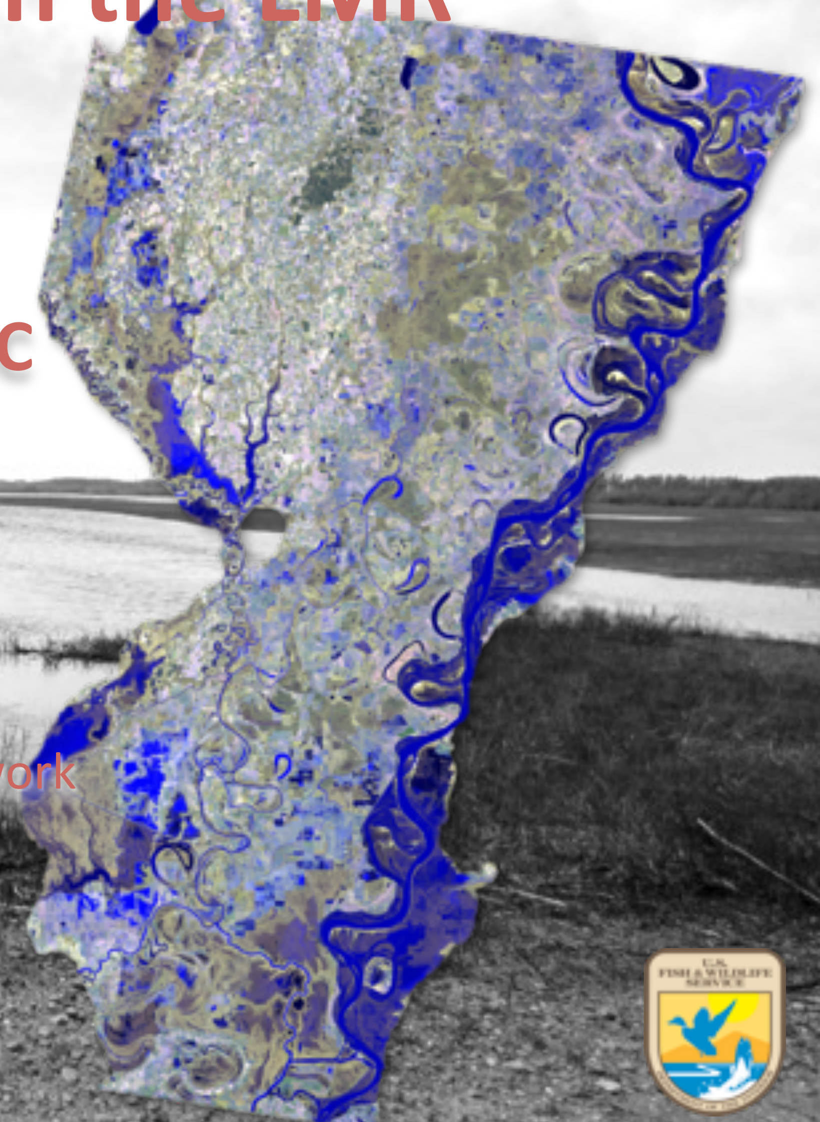
Floodplain inundation in the GCPO and alligator gar spawning in the LMR

Yvonne Allen

Aquatic Habitat Analyst

Gulf Coastal Plains and Ozarks LCC

USFWS Baton Rouge, LA



*A presentation to the Floodplain Science Network

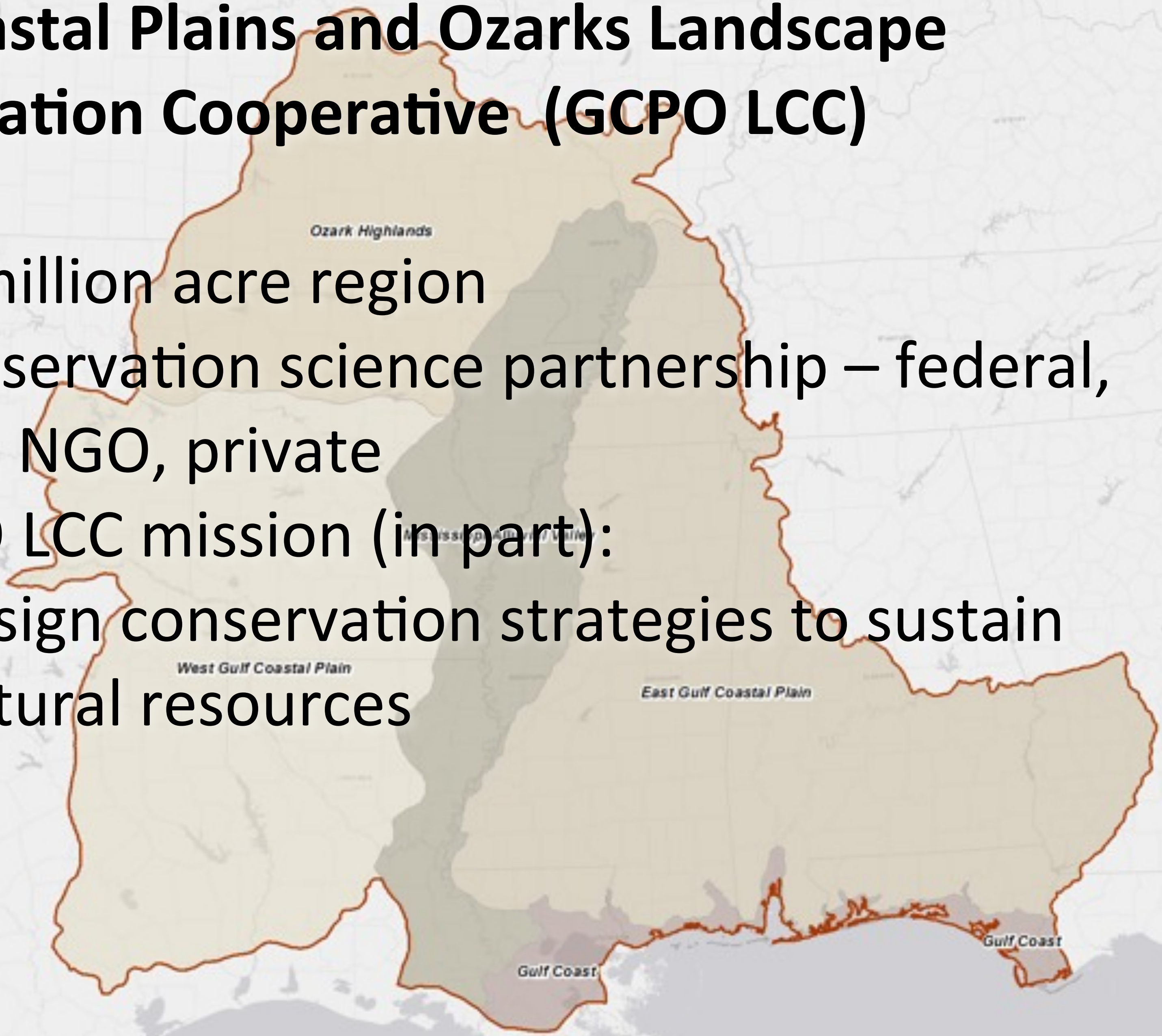
14 July 2015

Outline

- Introduction to the GCPO and aquatic assessment
- Estimating inundation frequency
- Quick inundation frequency virtual tour
- Relating IF to ground conditions
- IF Application: Alligator gar spawning HSI
- IF Development: Connectivity with mainstem
- *Lagniappe: Thermal Conditions at the confluence of the Ohio and MMR*

Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative (GCPO LCC)

- 180 million acre region
- A conservation science partnership – federal, state, NGO, private
- GCPO LCC mission (in part):
    - design conservation strategies to sustain natural resources



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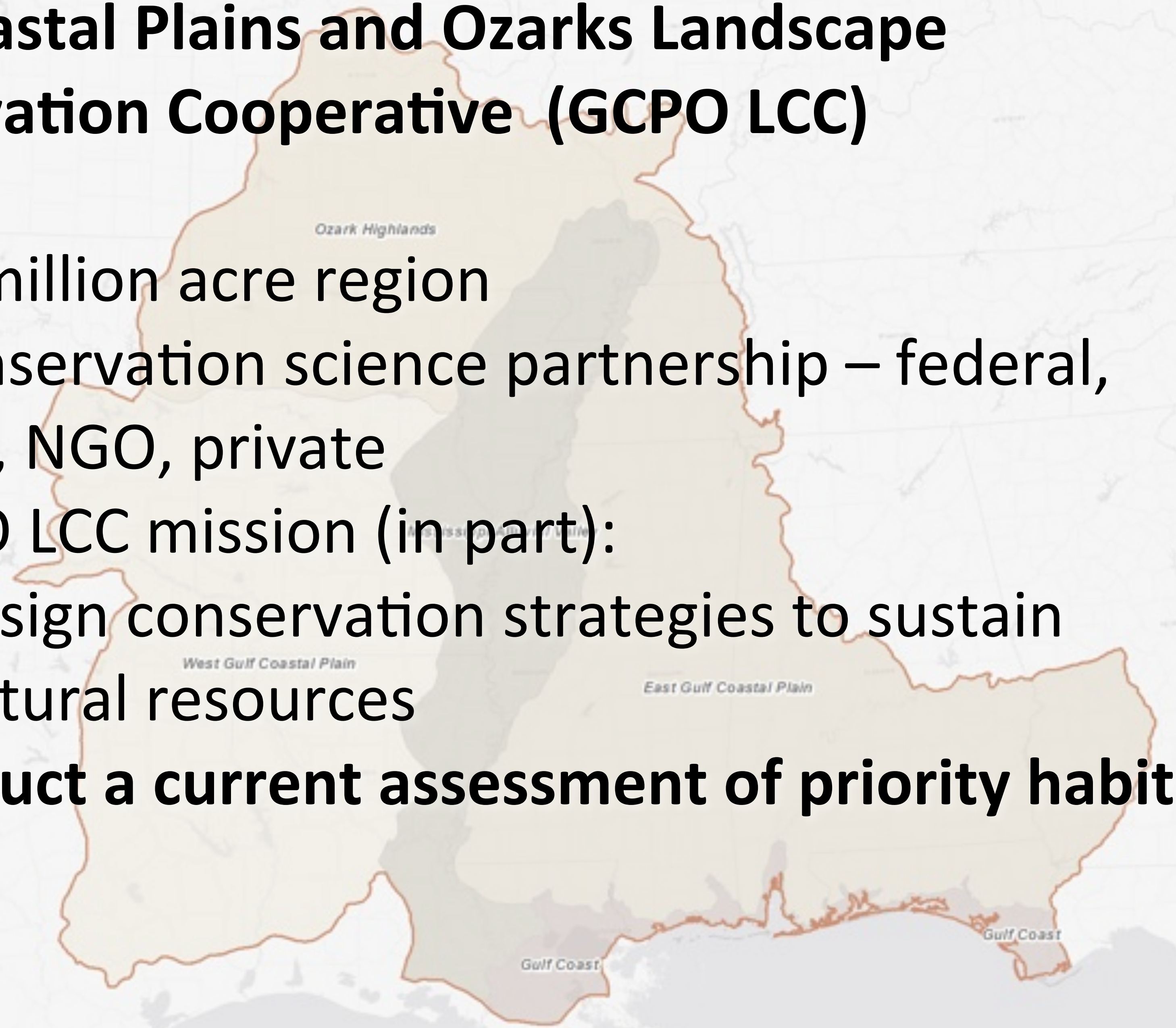
- **Conduct a current assessment of priority habitats**



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- **Condition**
  - Water Quality
  - Substrate

Floodplain functions...

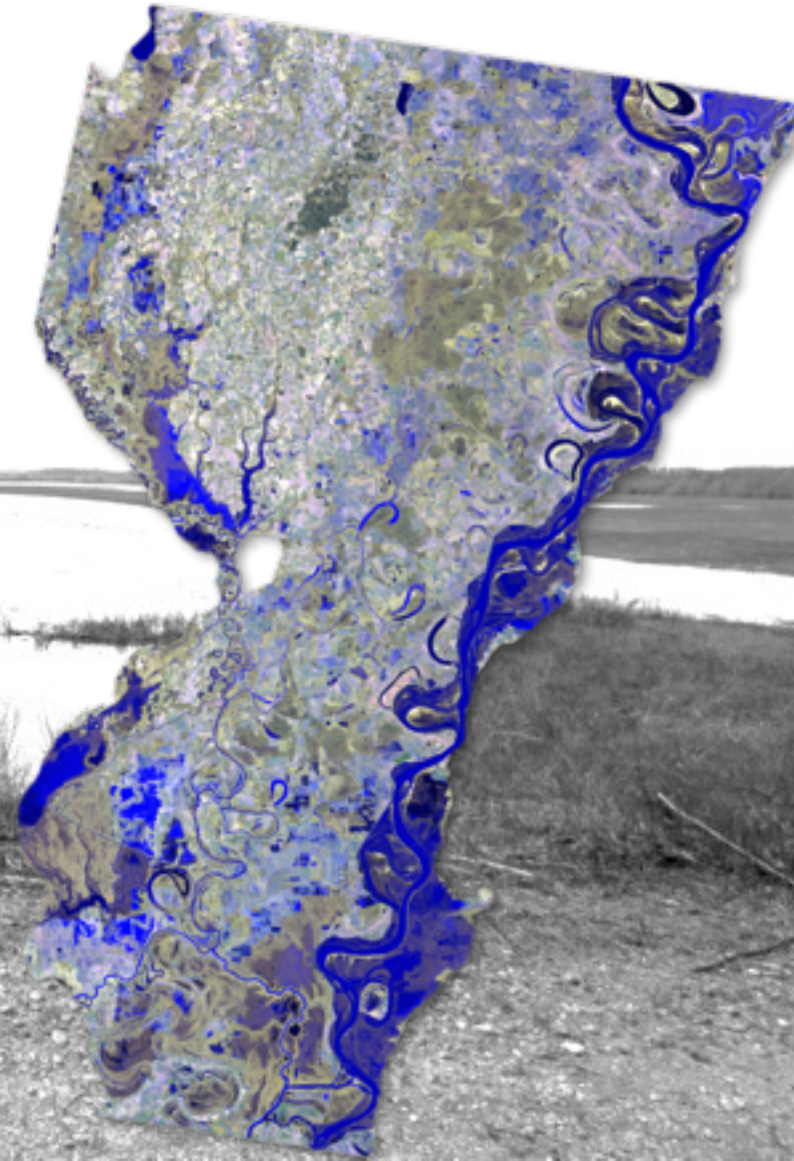
- habitat for aquatic species
- habitat for terrestrial species
- nutrient cycling
- flood risk reduction

Inundation frequency is an important driver of floodplain function

Methodology to Assess Floodplain Inundation:

- Repeated observation of inundation extent using satellite imagery

- USGS Climate Data Records Landsat 5 and 7 (1984-2011)



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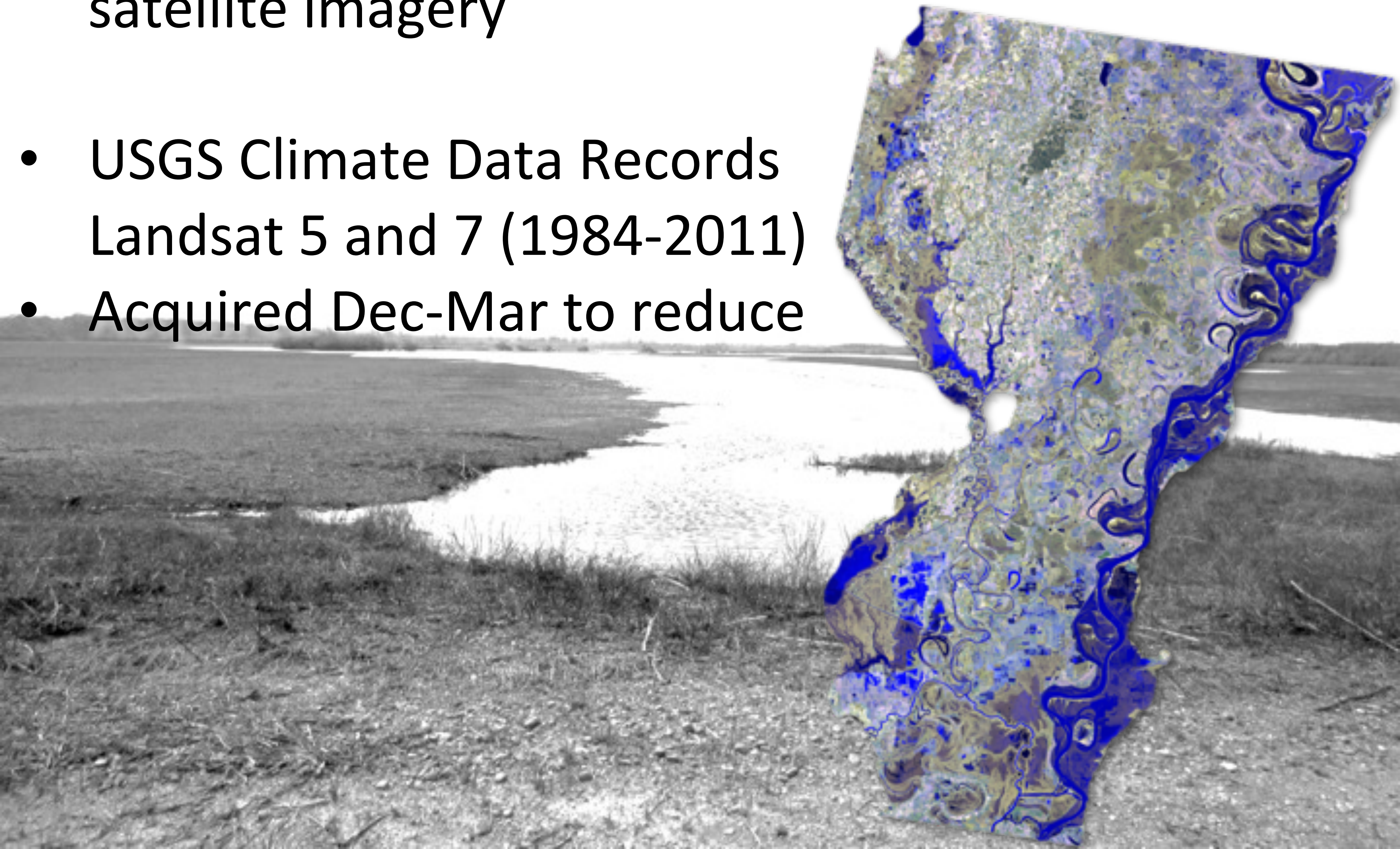

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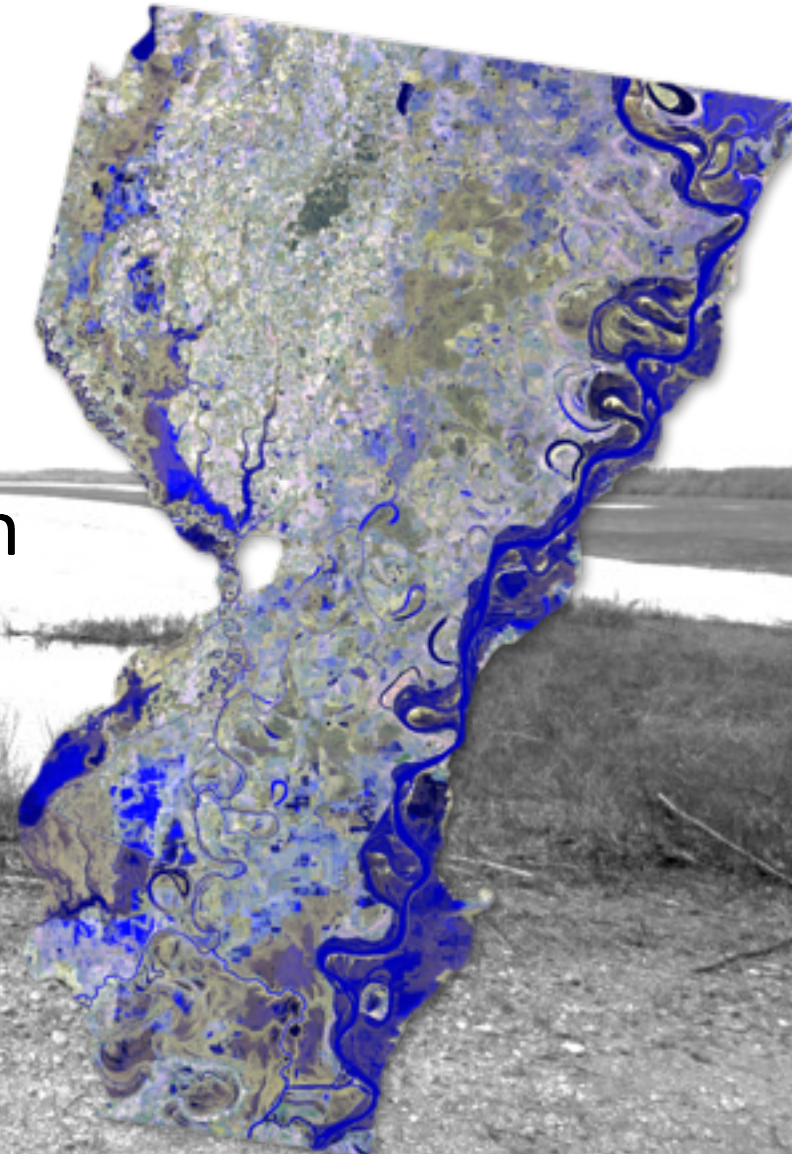
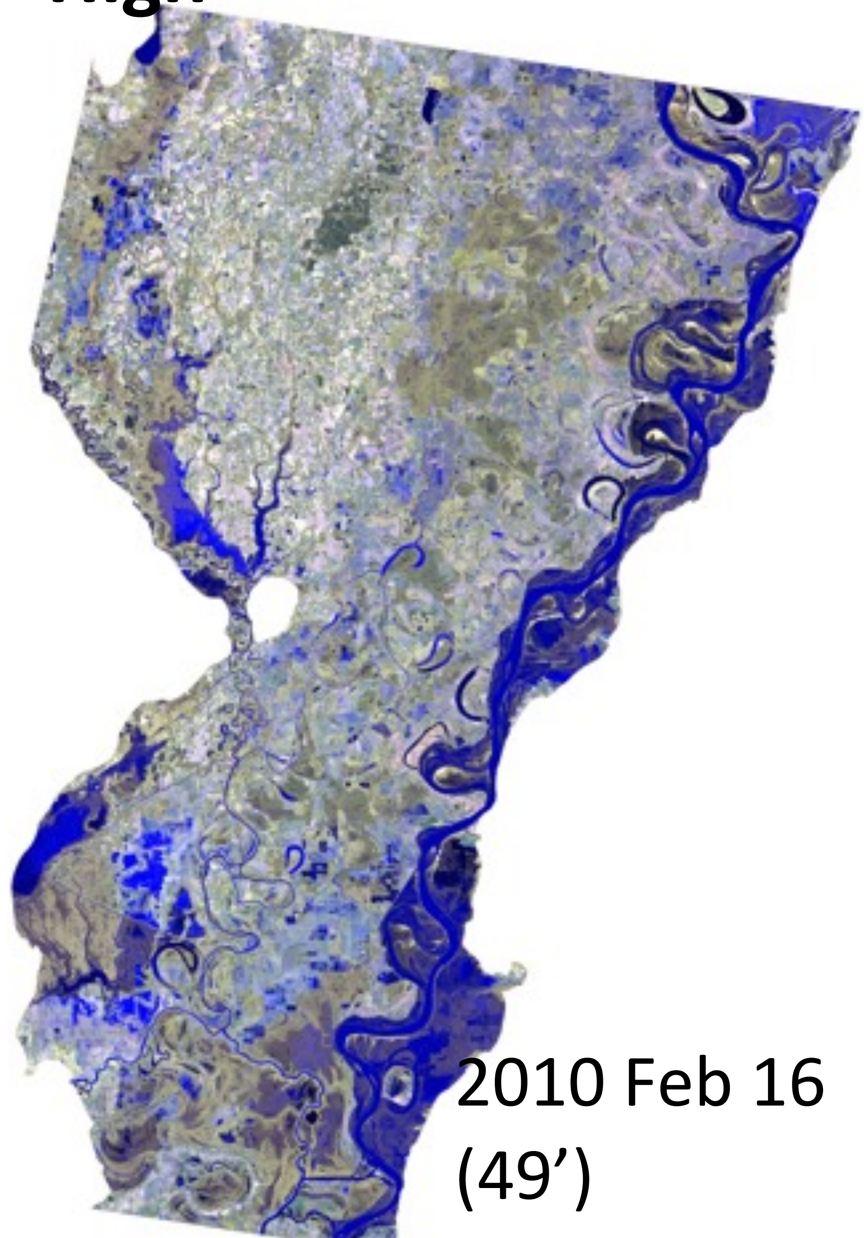


A Variety of Hydrologic Conditions...

Low **High**

2000 Feb 05
(10’)



2010 Feb 16
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Spatial Distribution and Frequency of Inundation

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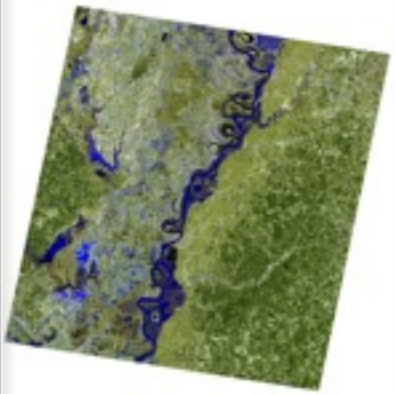

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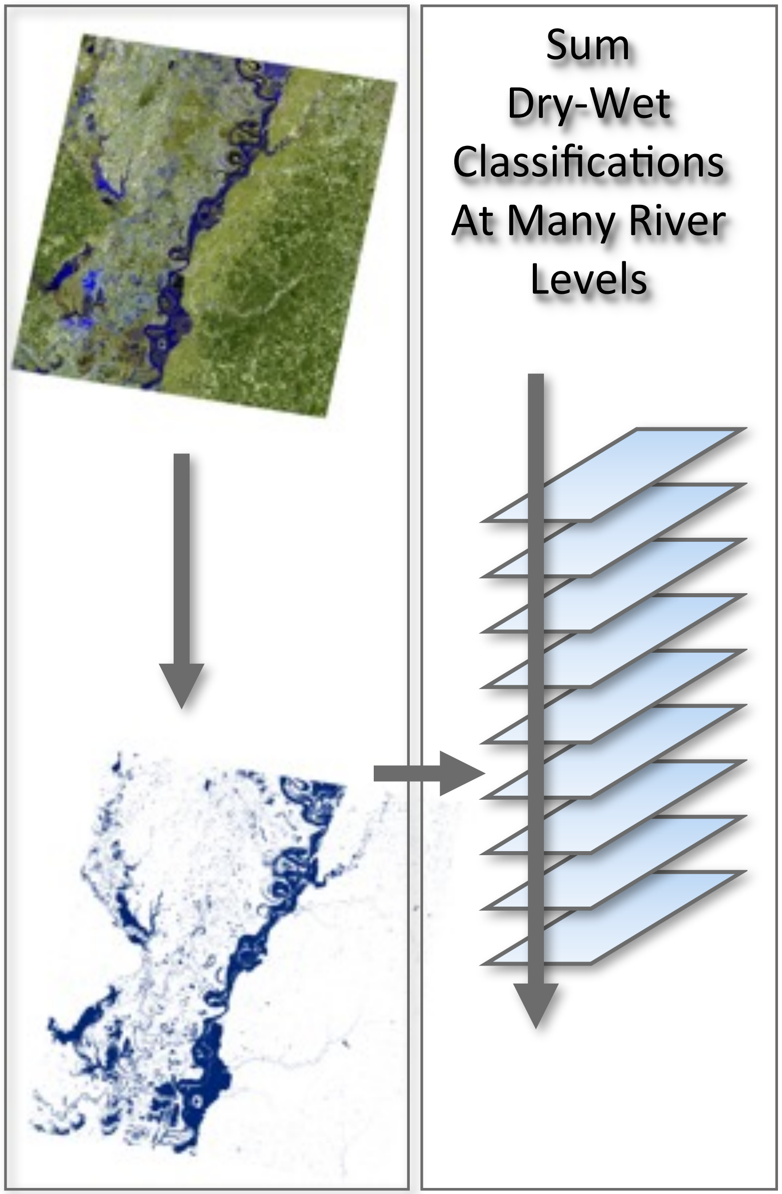

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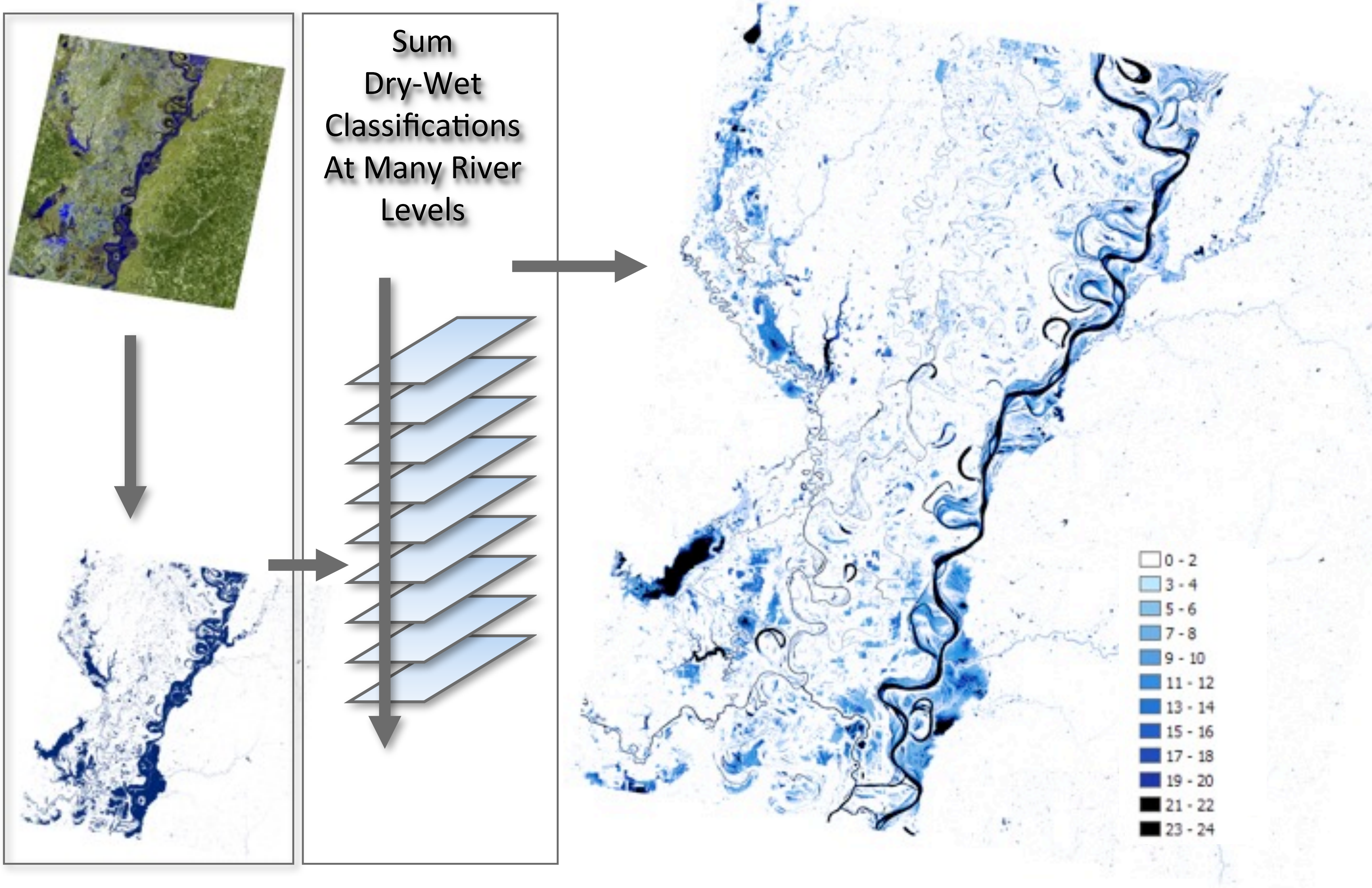

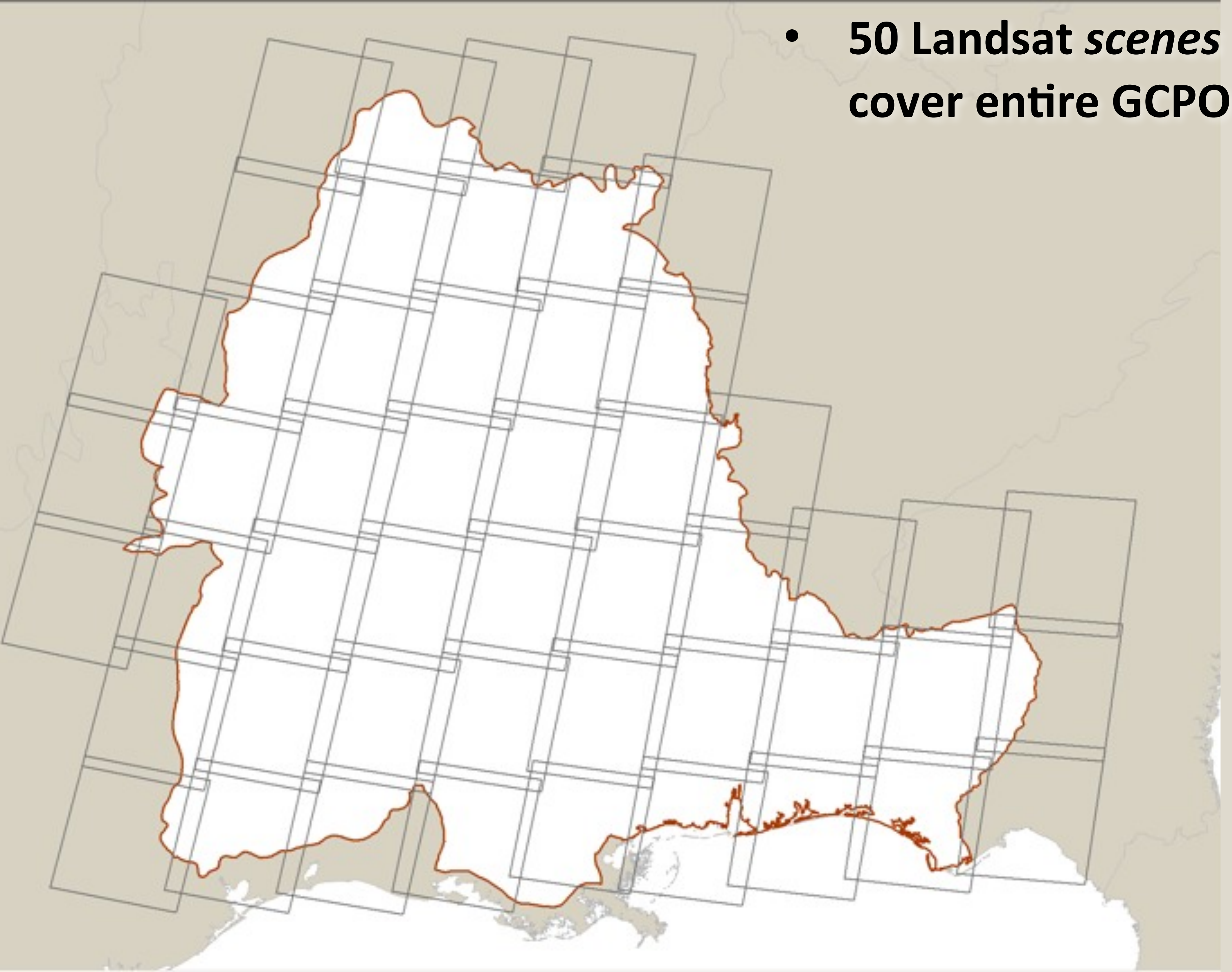

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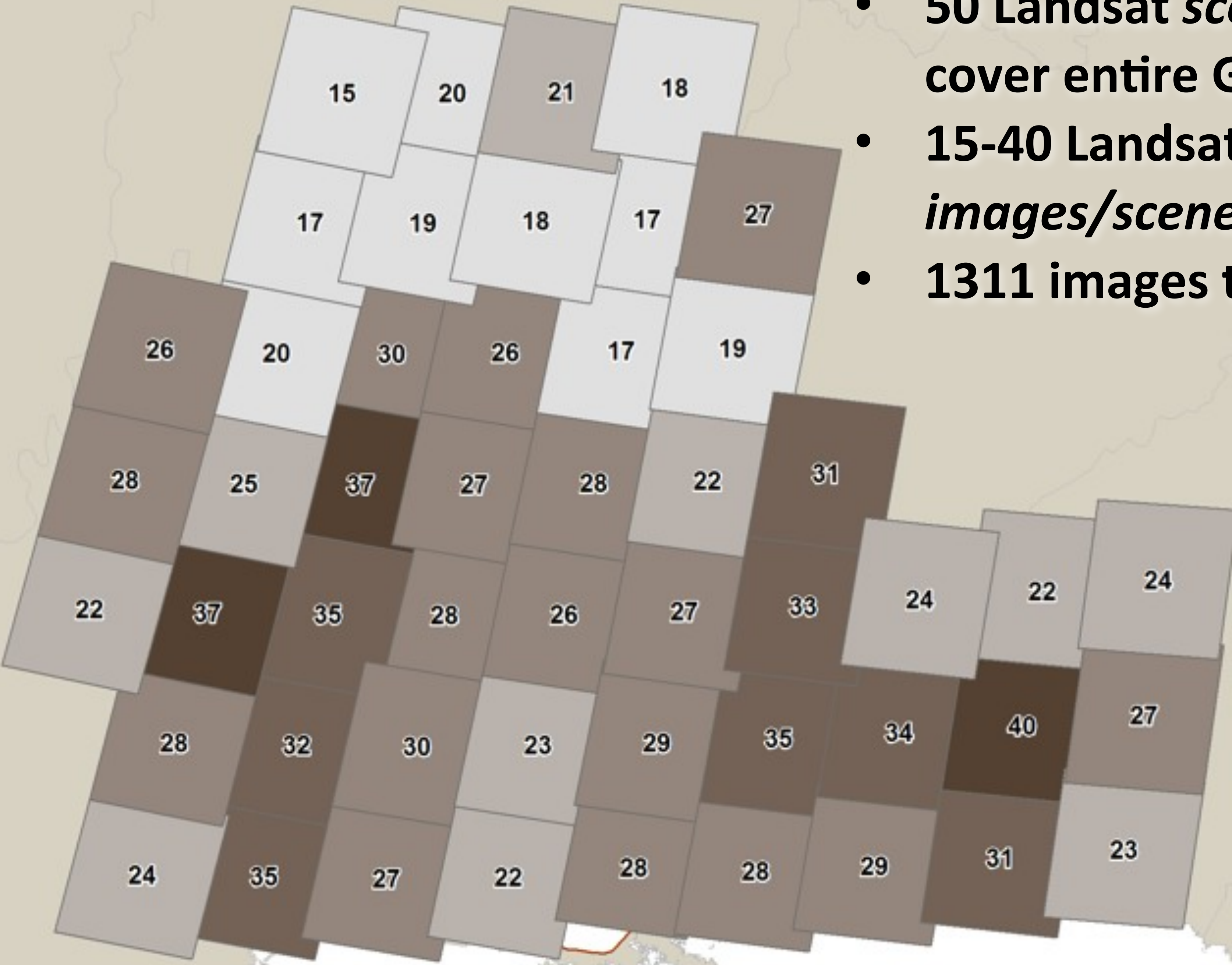
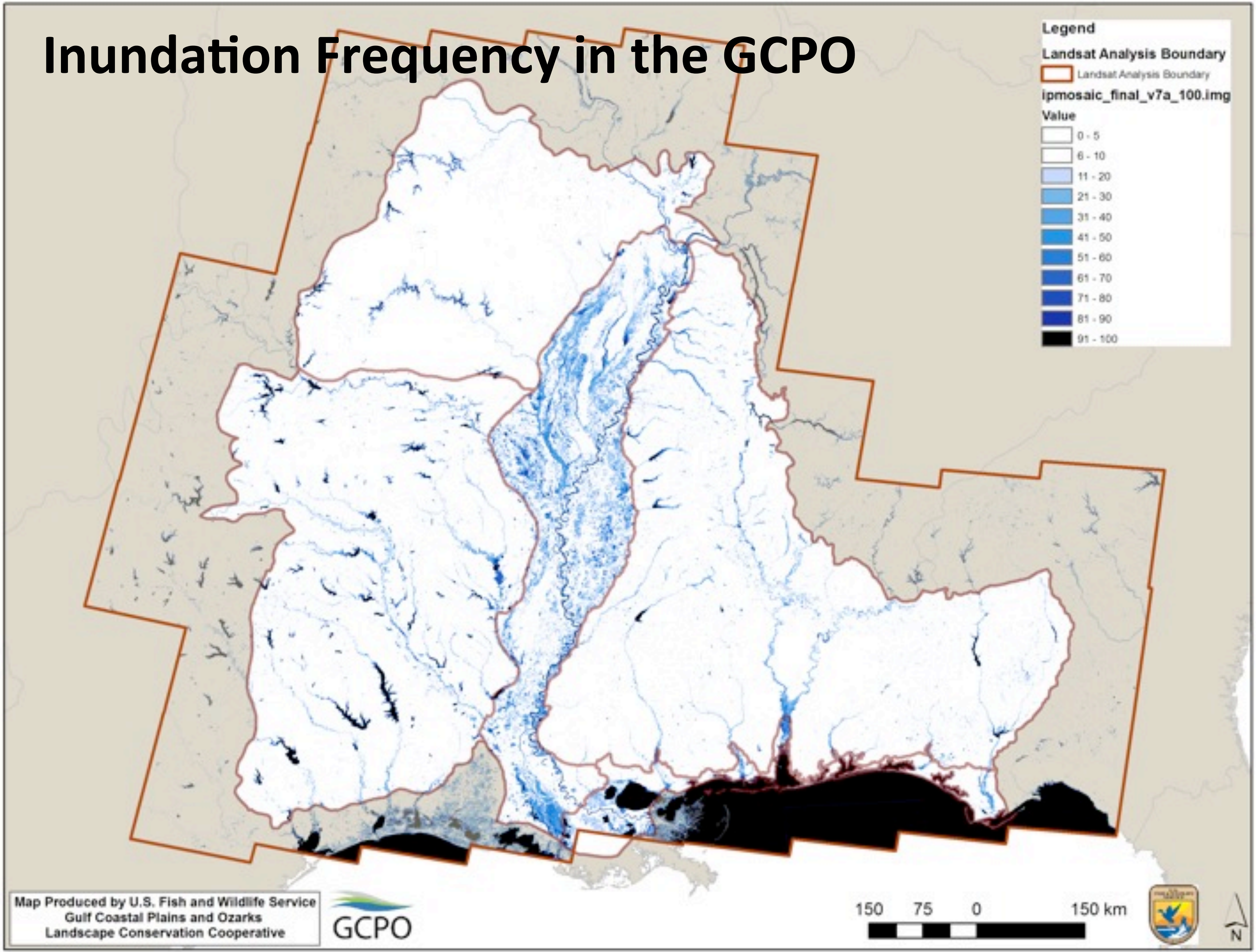
- **1311 images total**



Inundation Frequency in the GCPO



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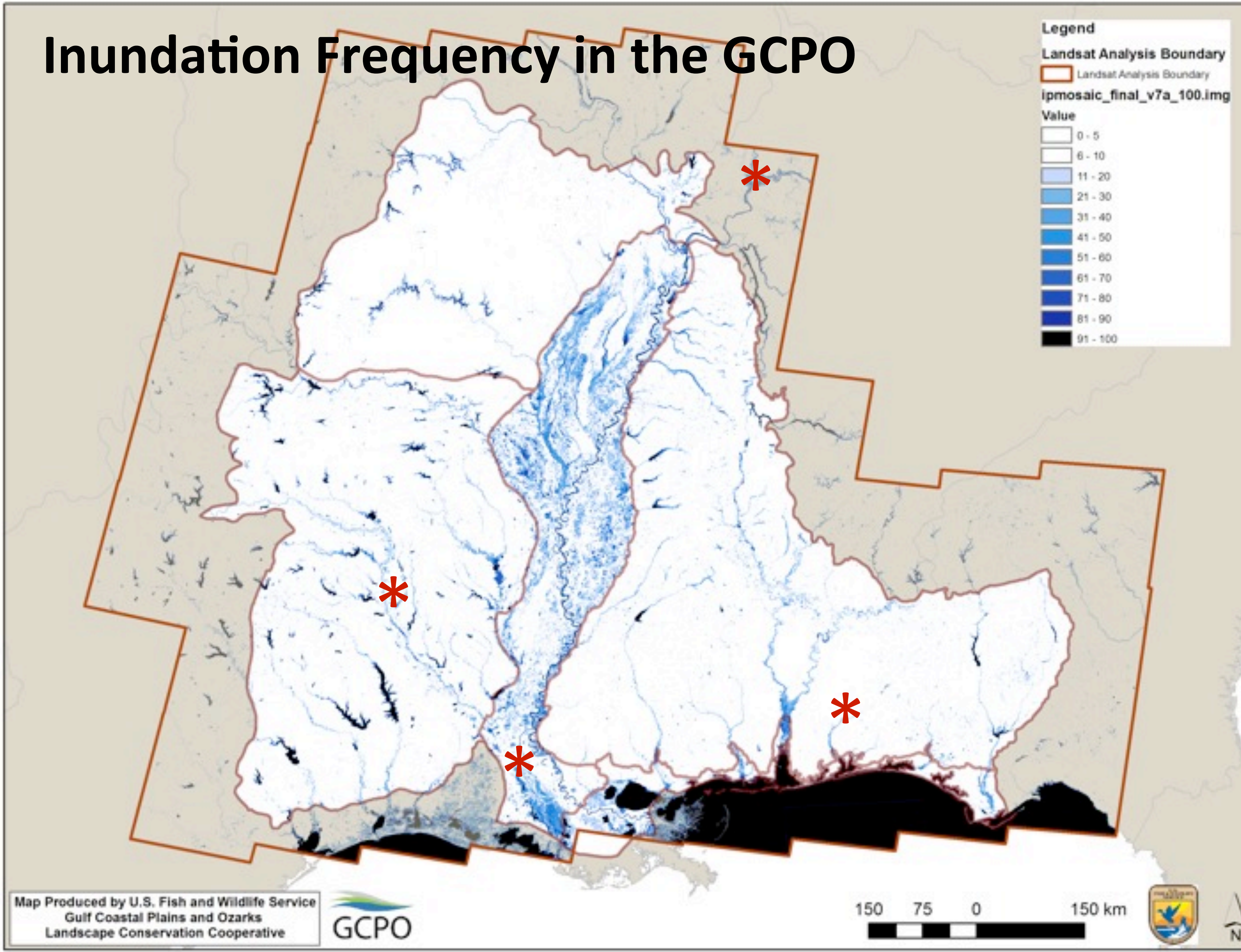
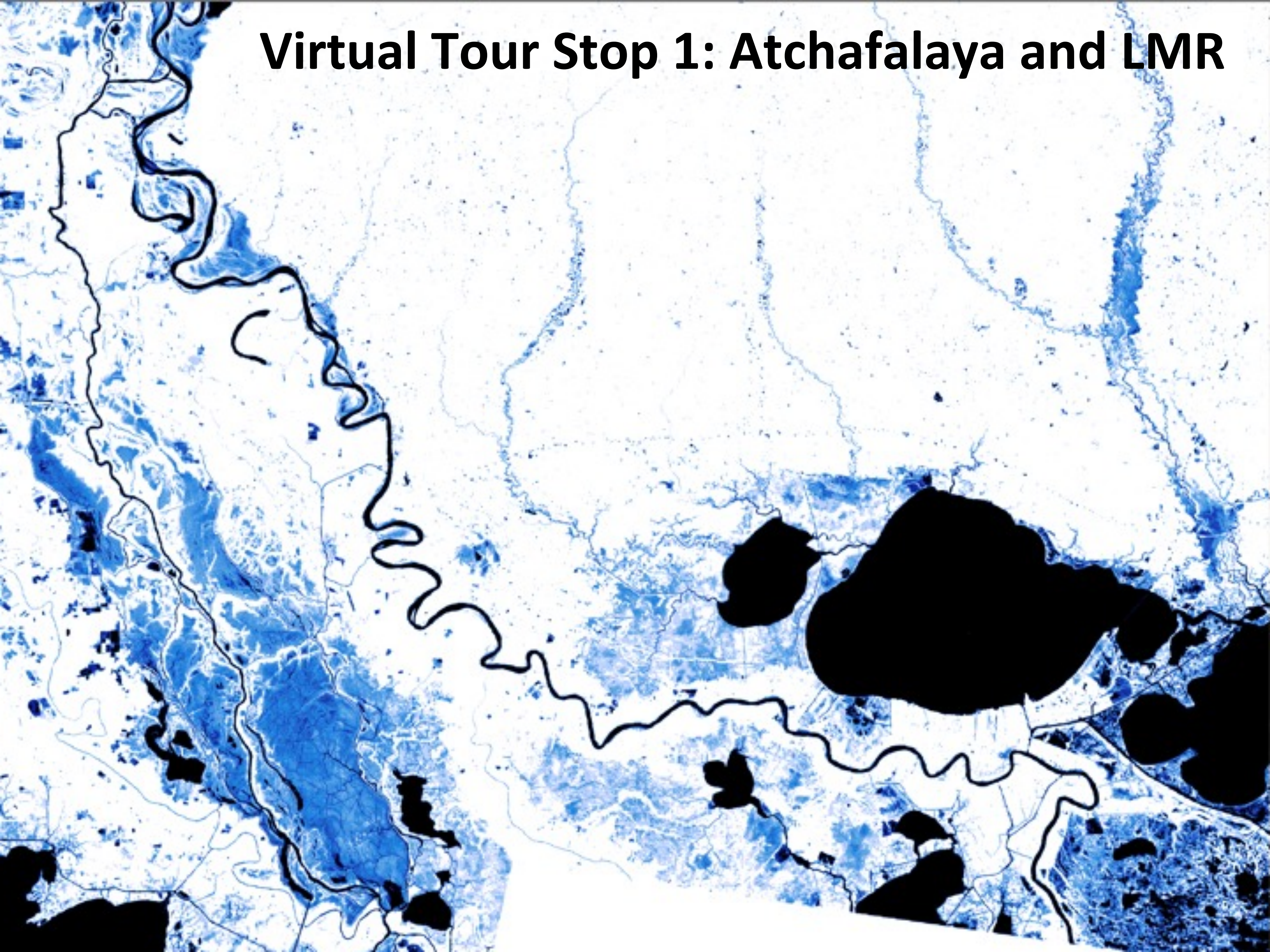
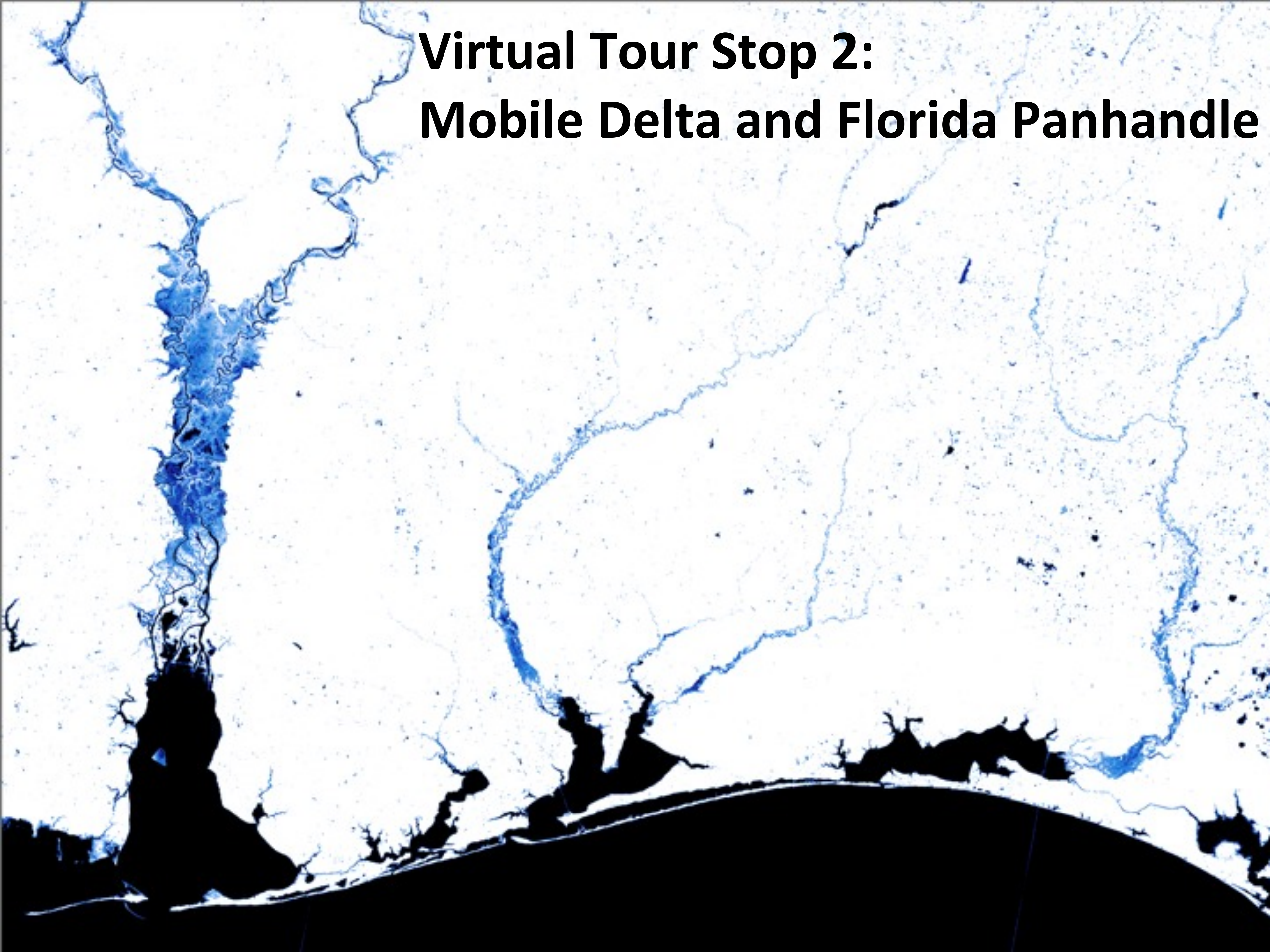


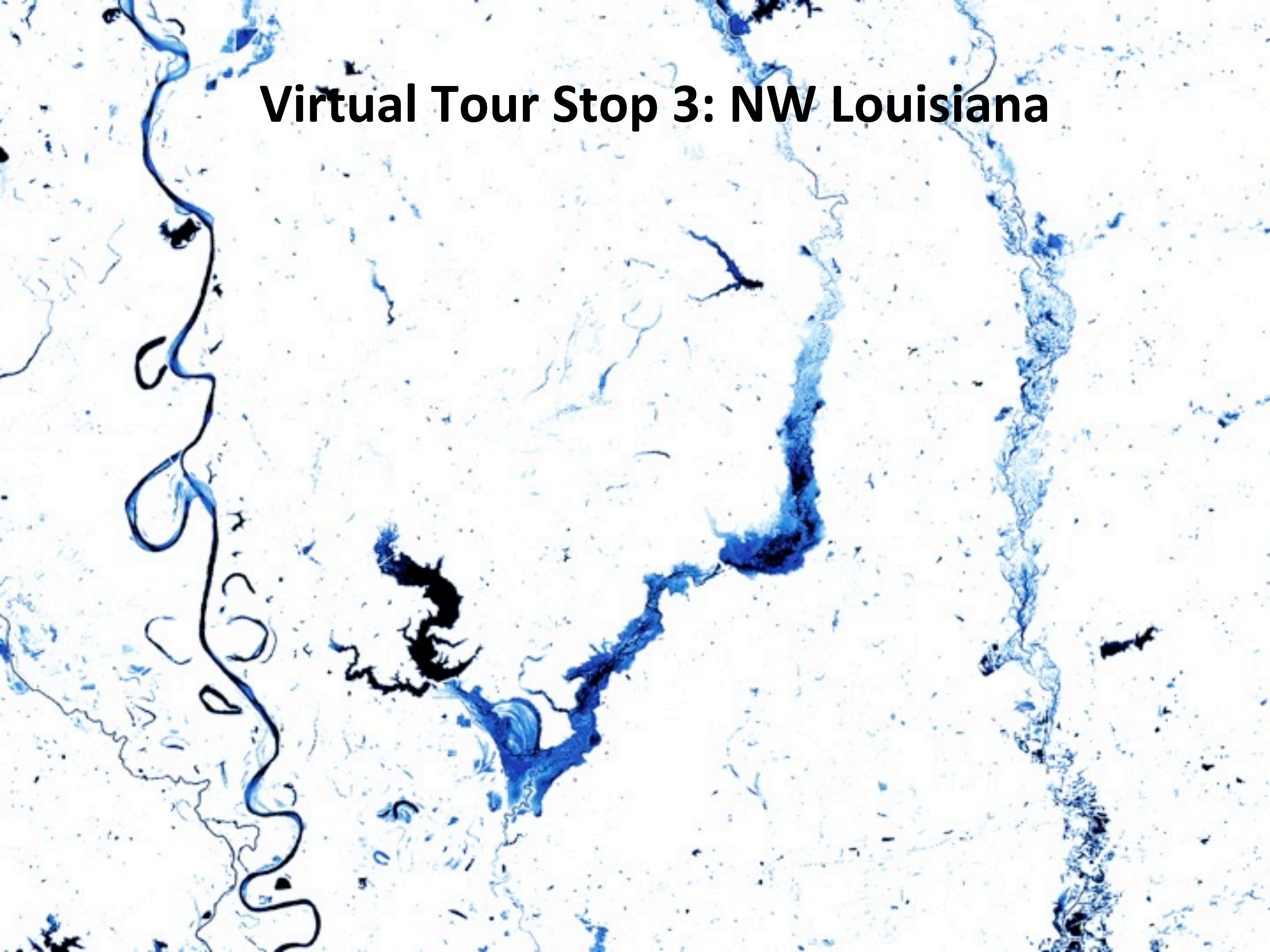
Virtual Tour Stop 1: Atchafalaya and LMR



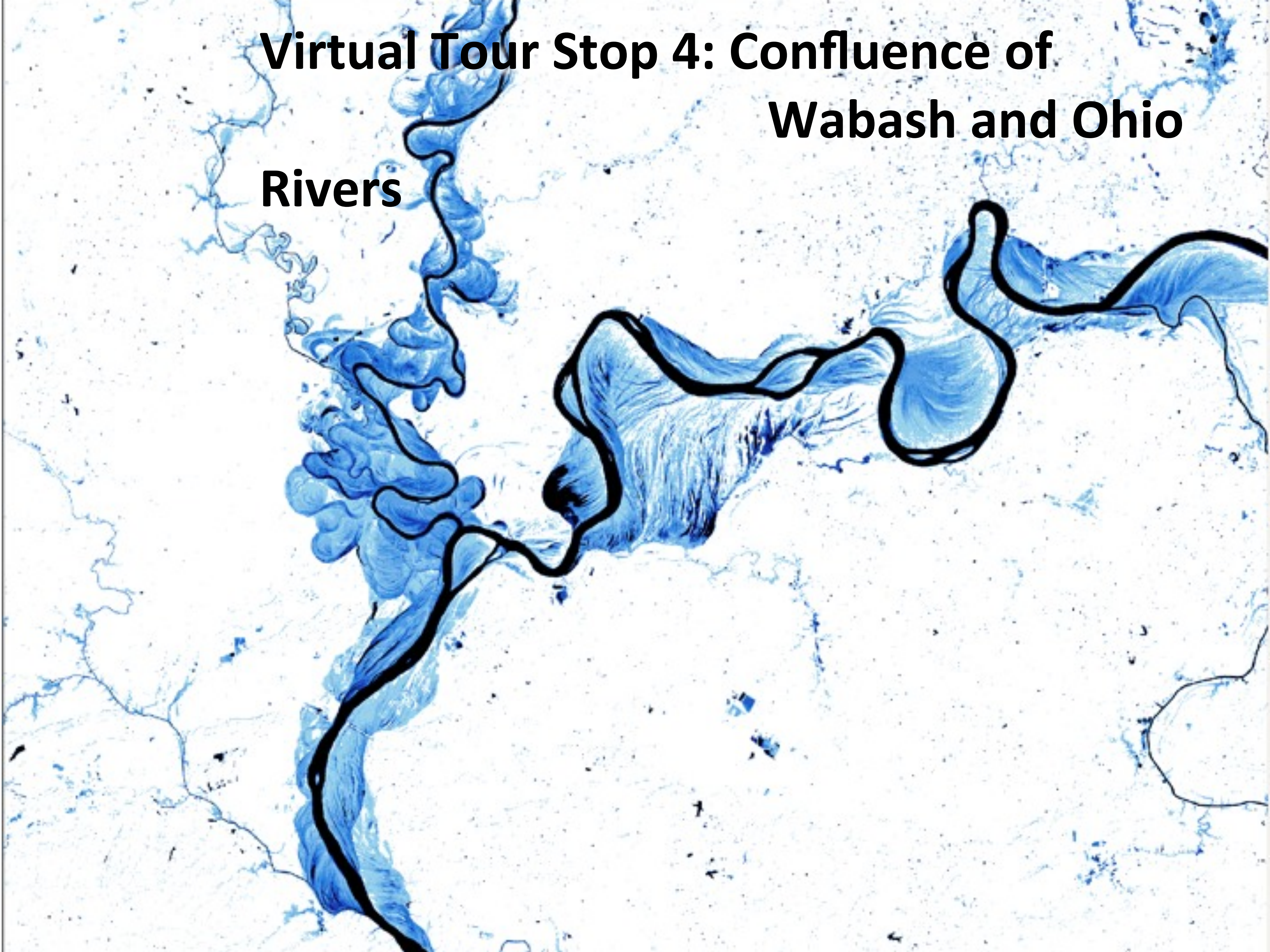
Virtual Tour Stop 2: Mobile Delta and Florida Panhandle



Virtual Tour Stop 3: NW Louisiana



Virtual Tour Stop 4: Confluence of Wabash and Ohio Rivers



Application: Alligator Gar Spawning in the Lower Mississippi River

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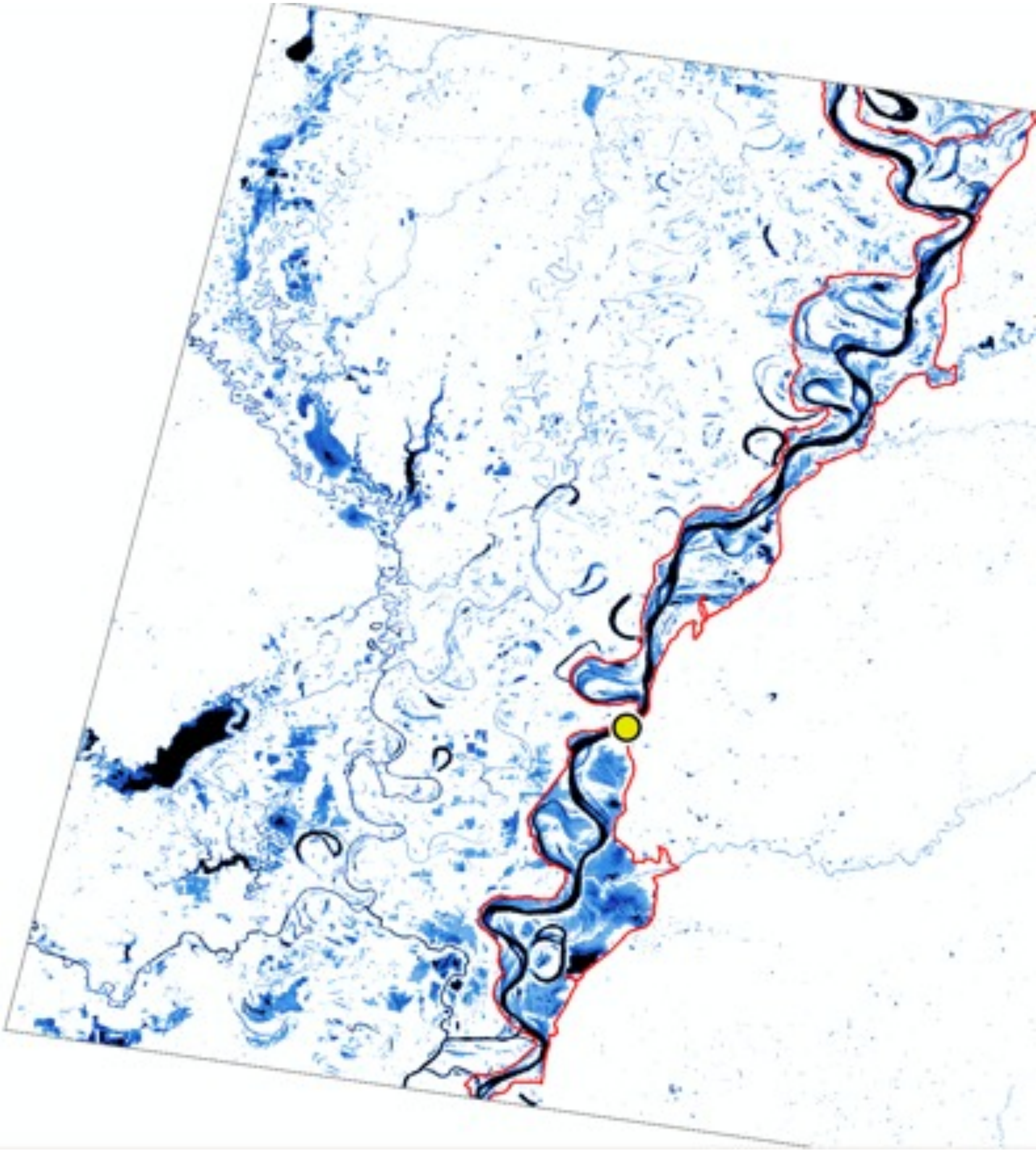

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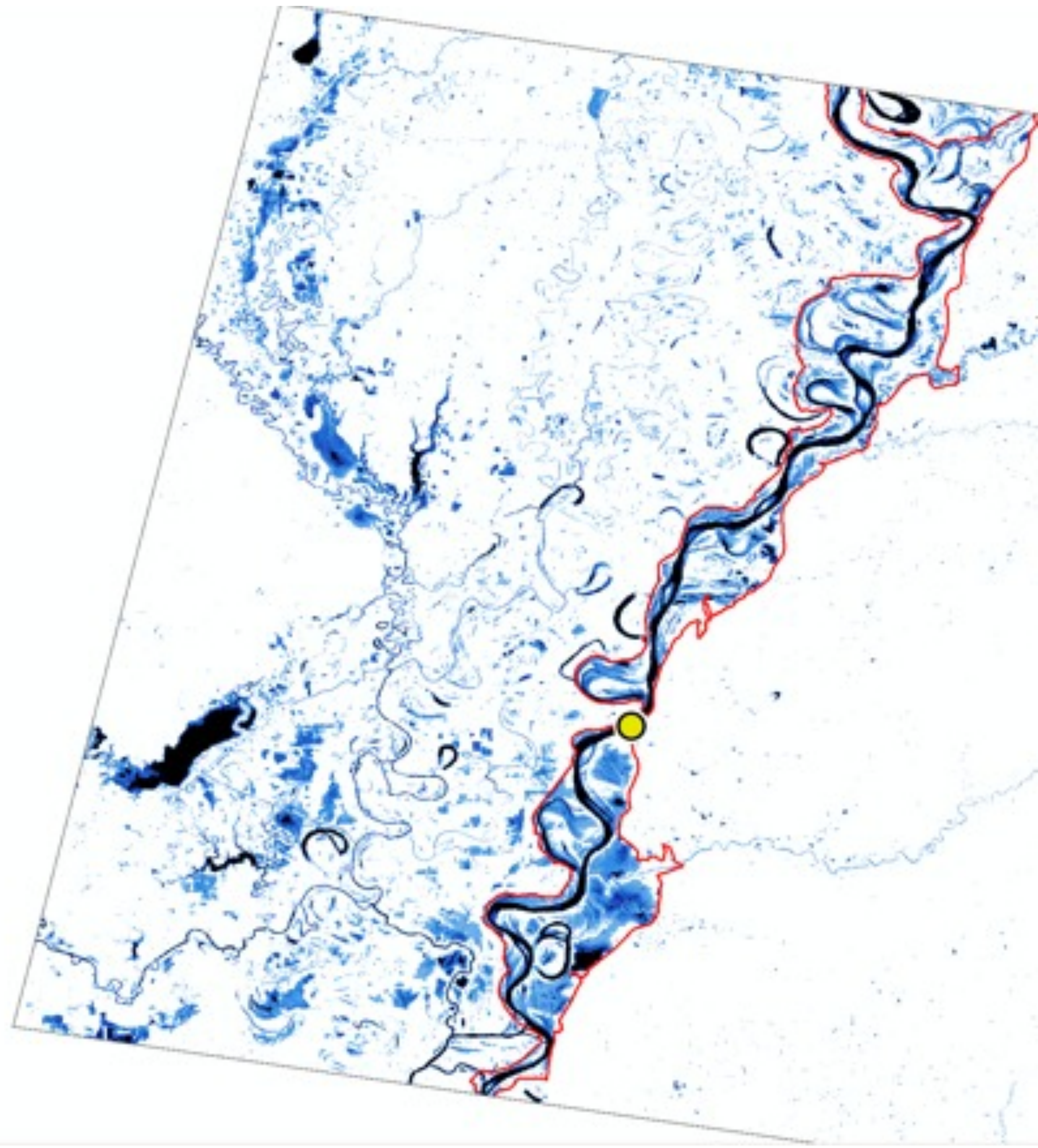

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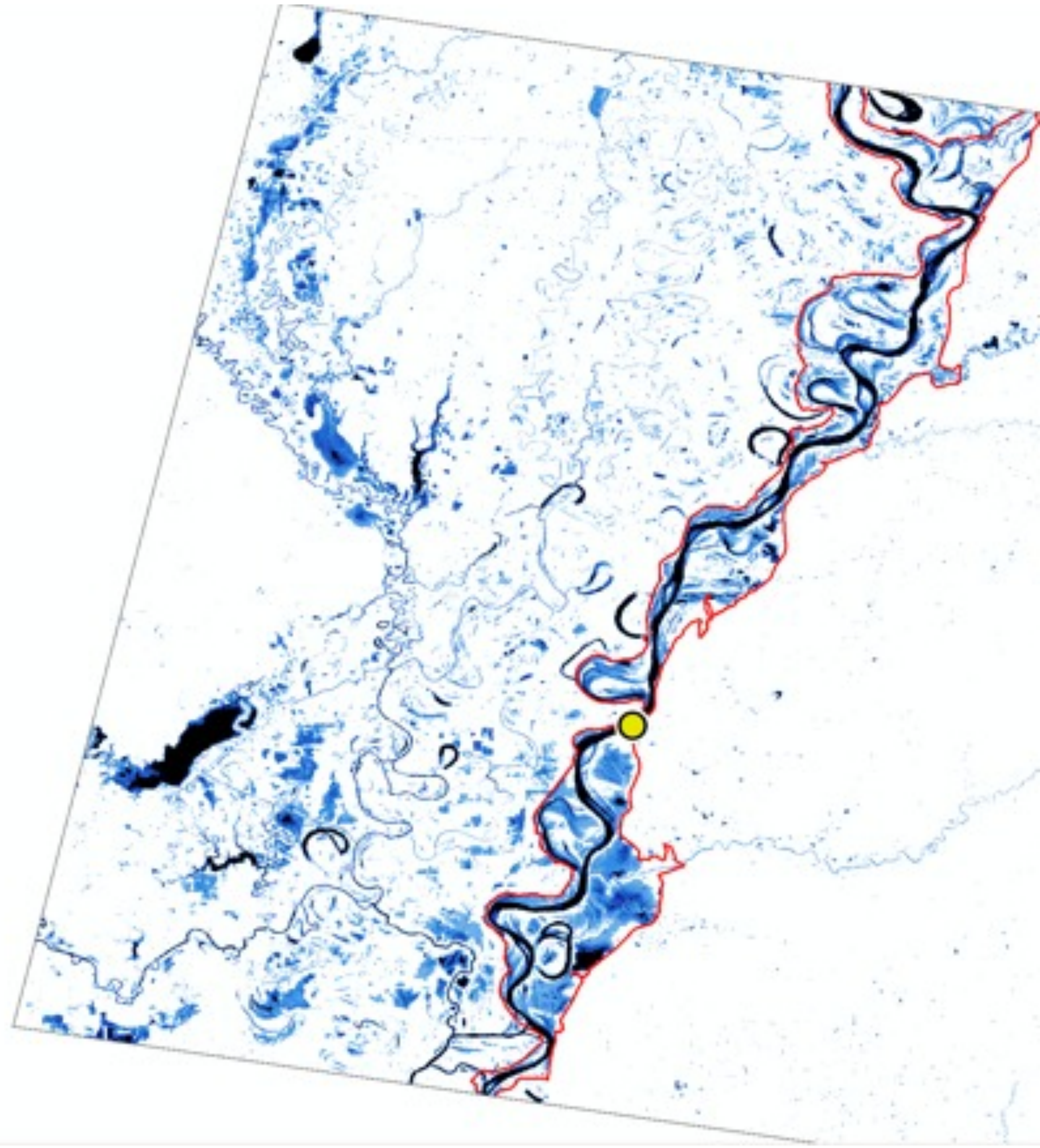

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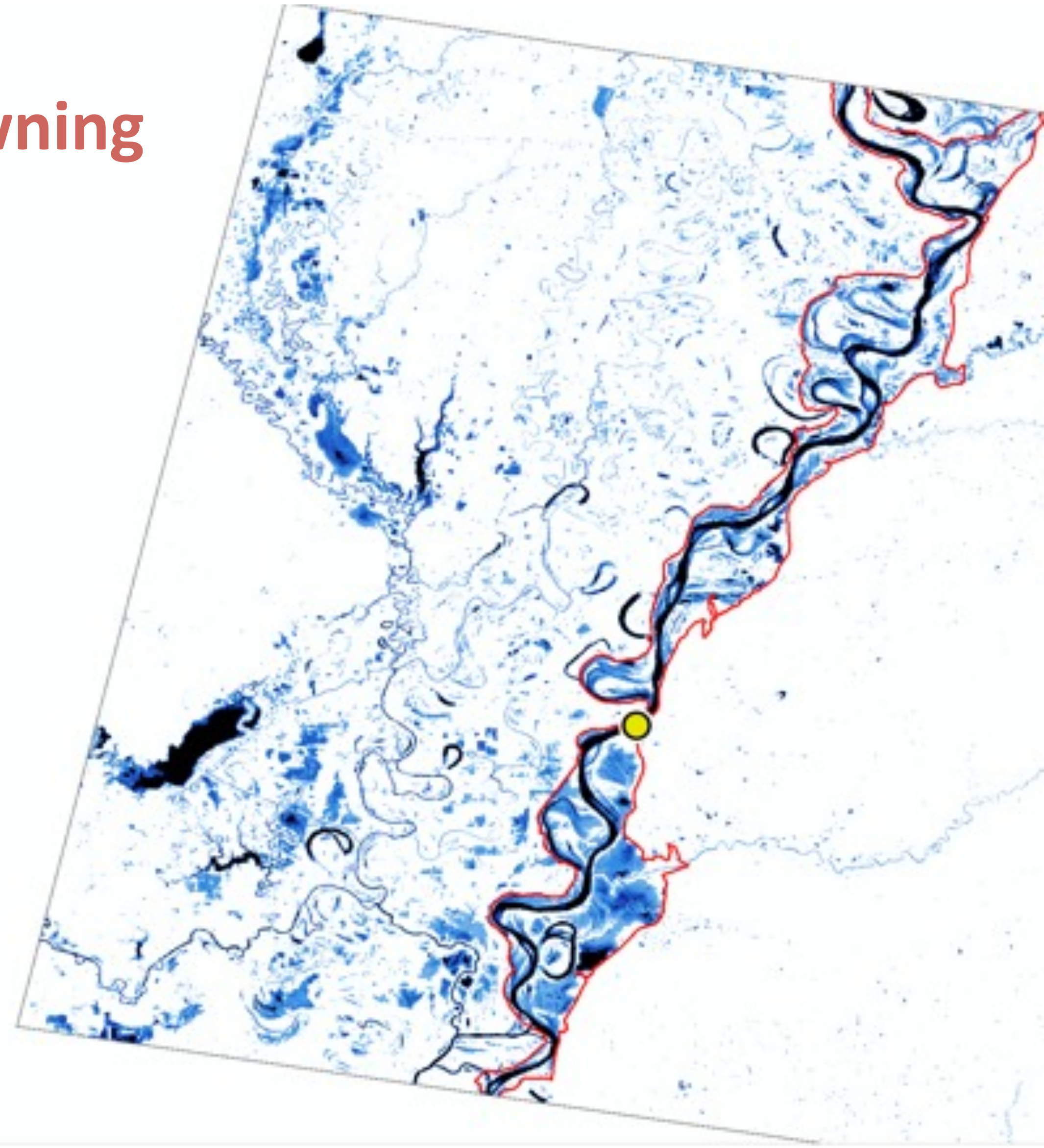

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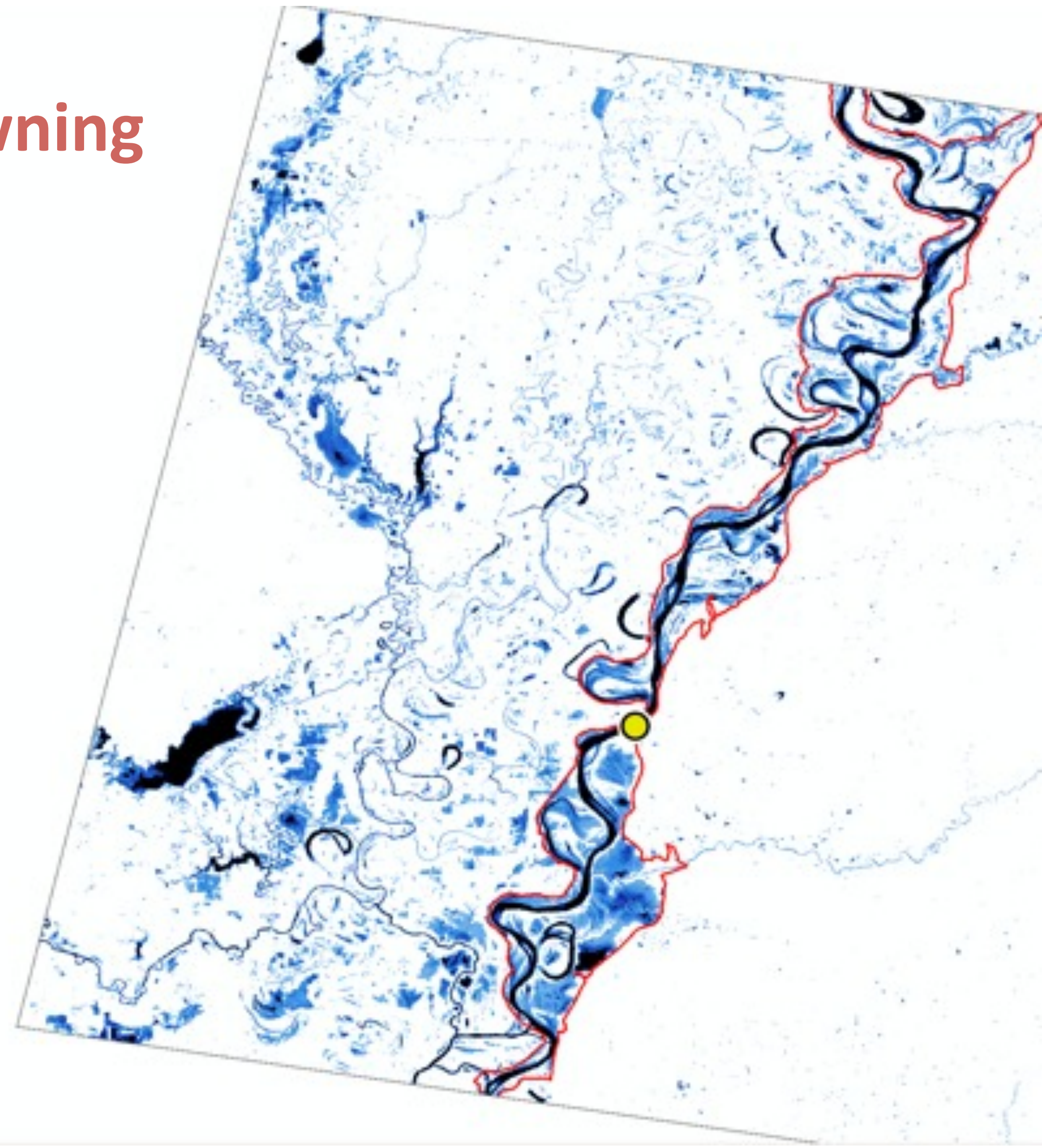

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- ➢ **Where?** Path 23 Row 38

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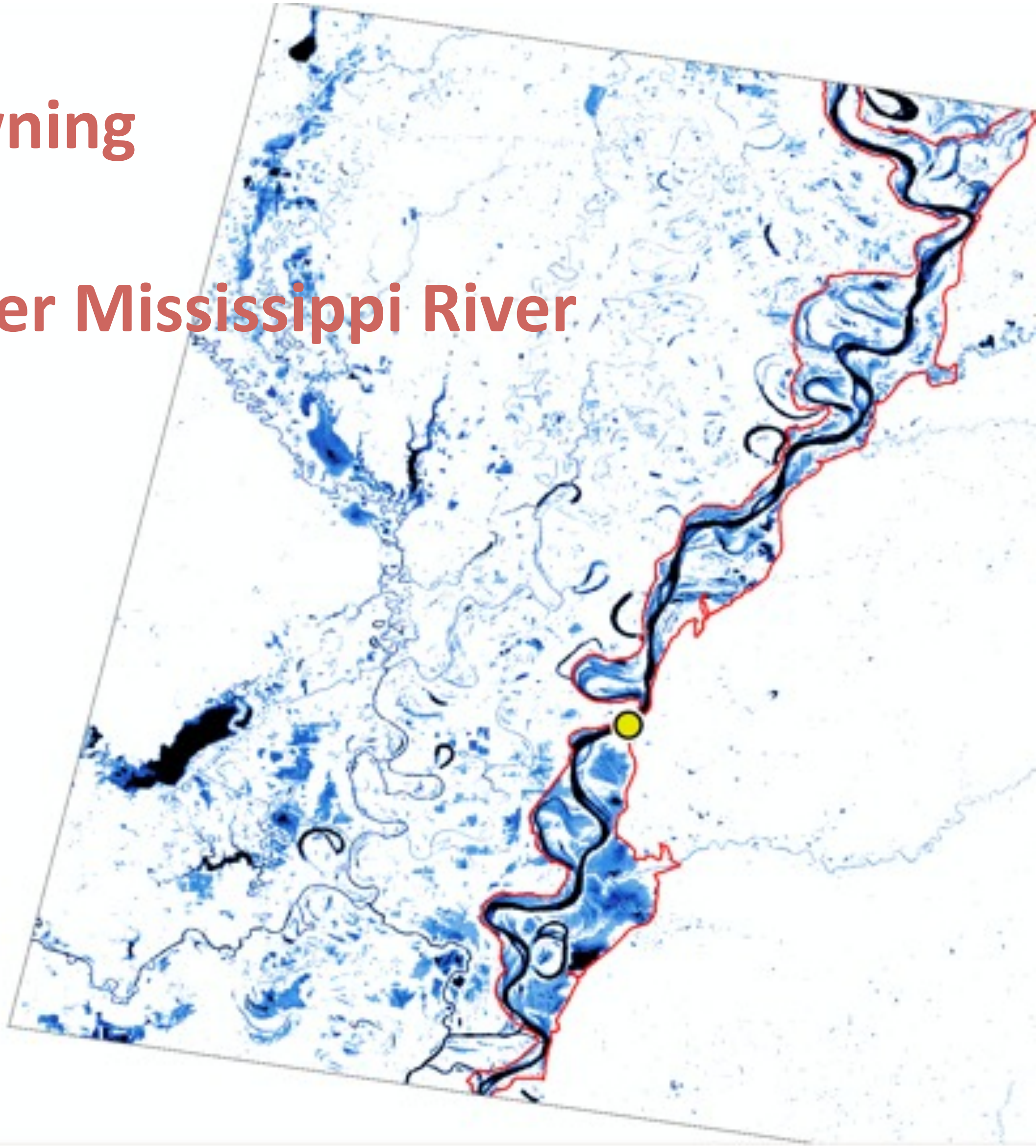

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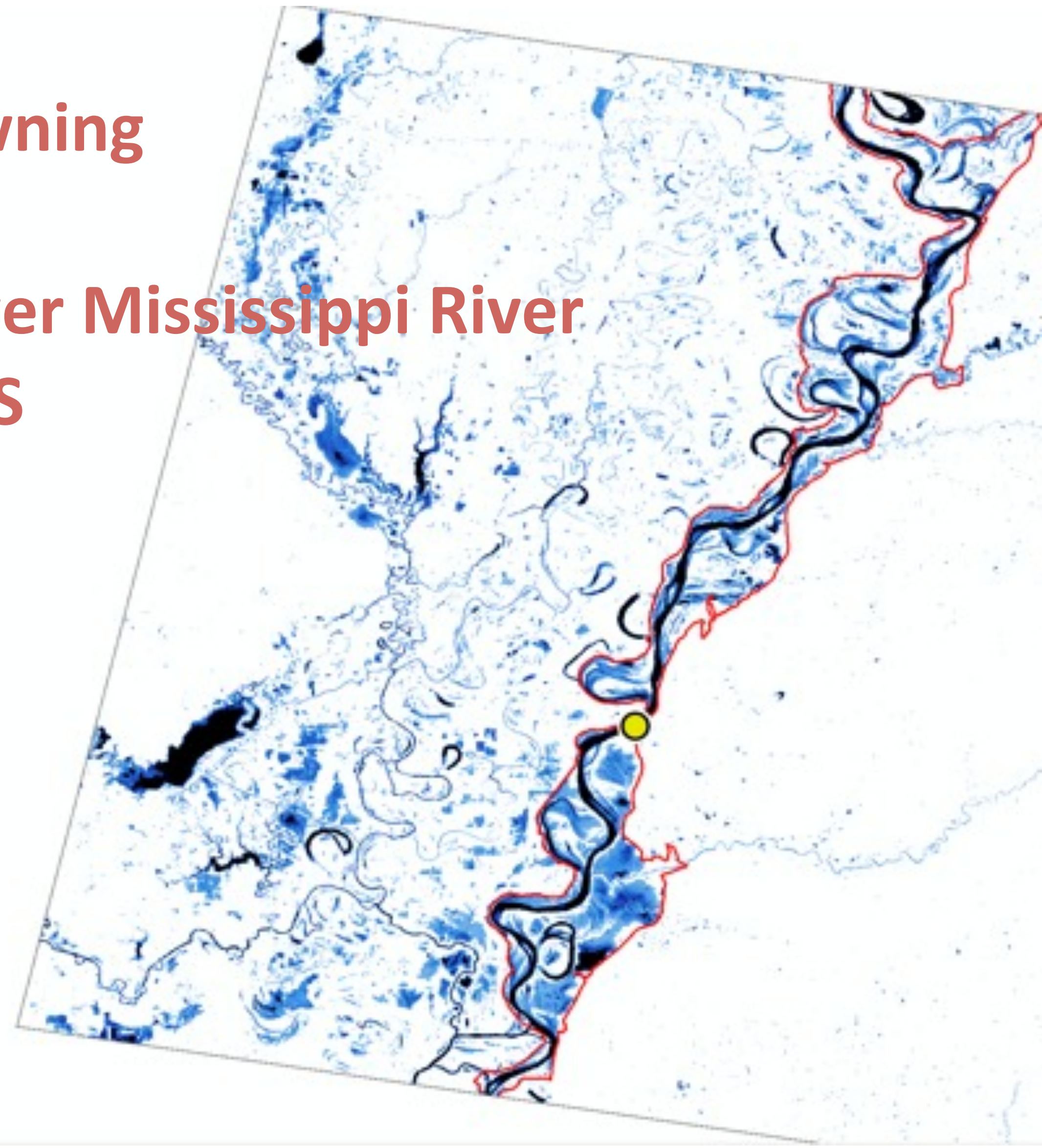

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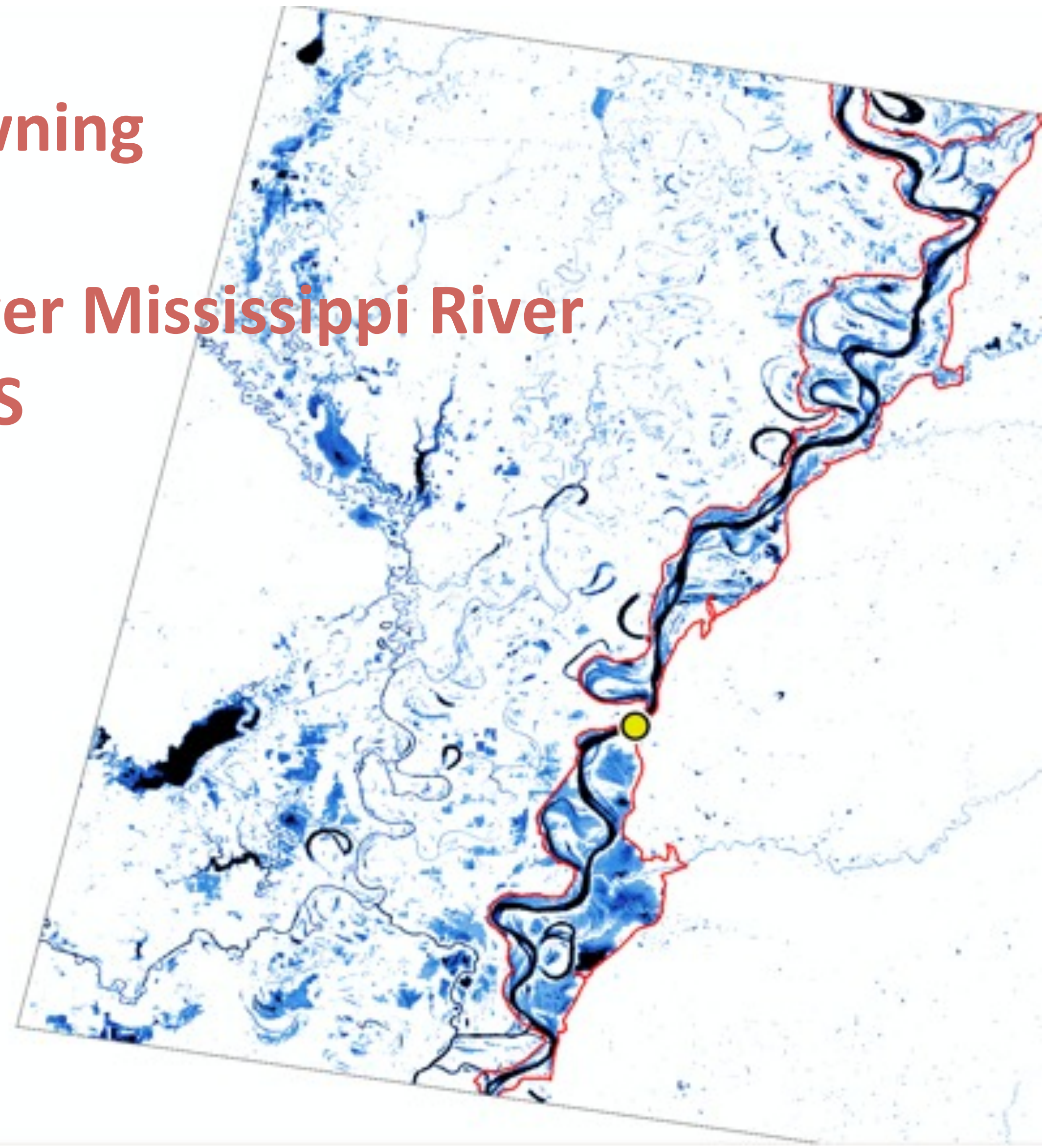

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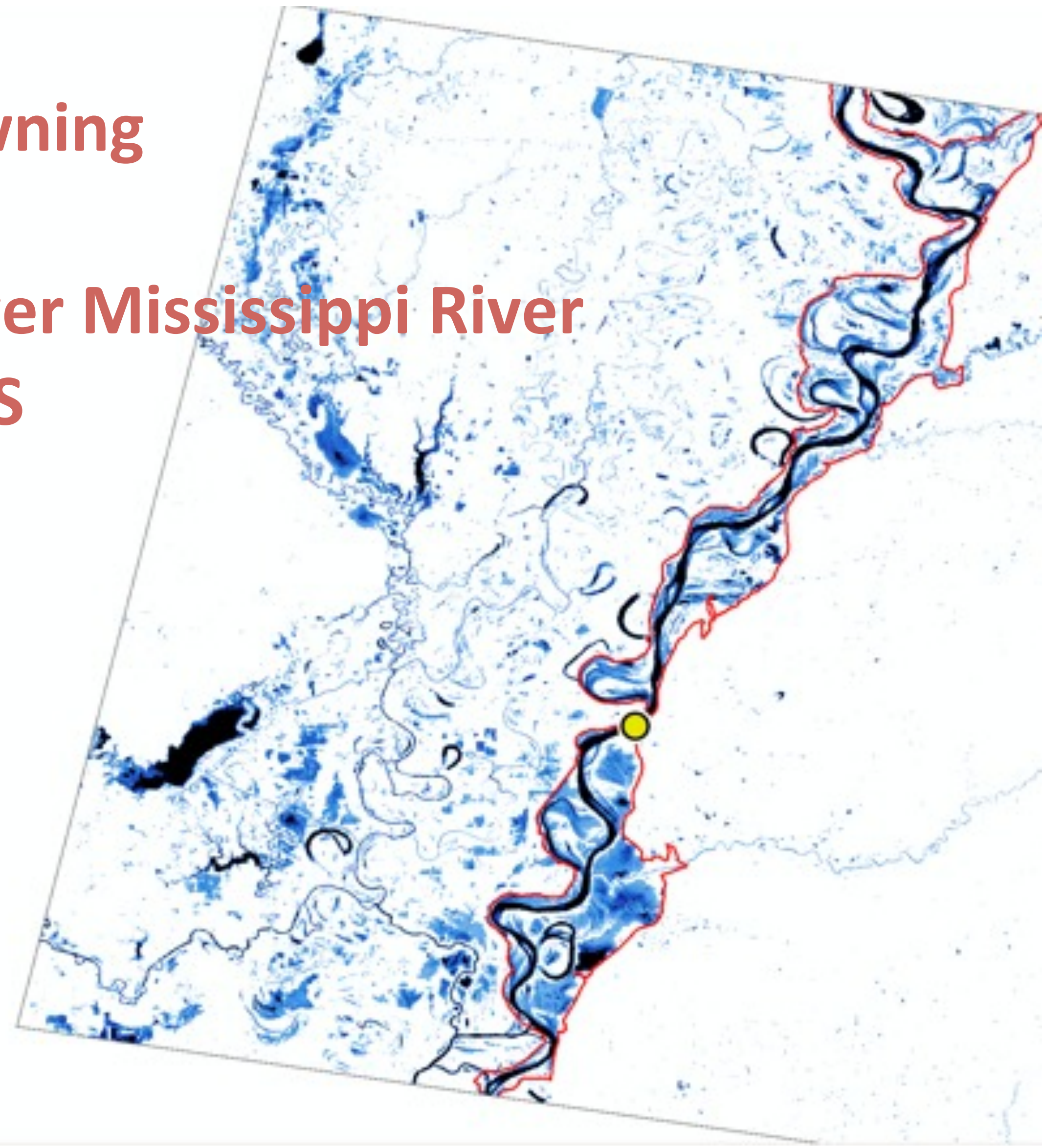
➢ How often? 50% of time



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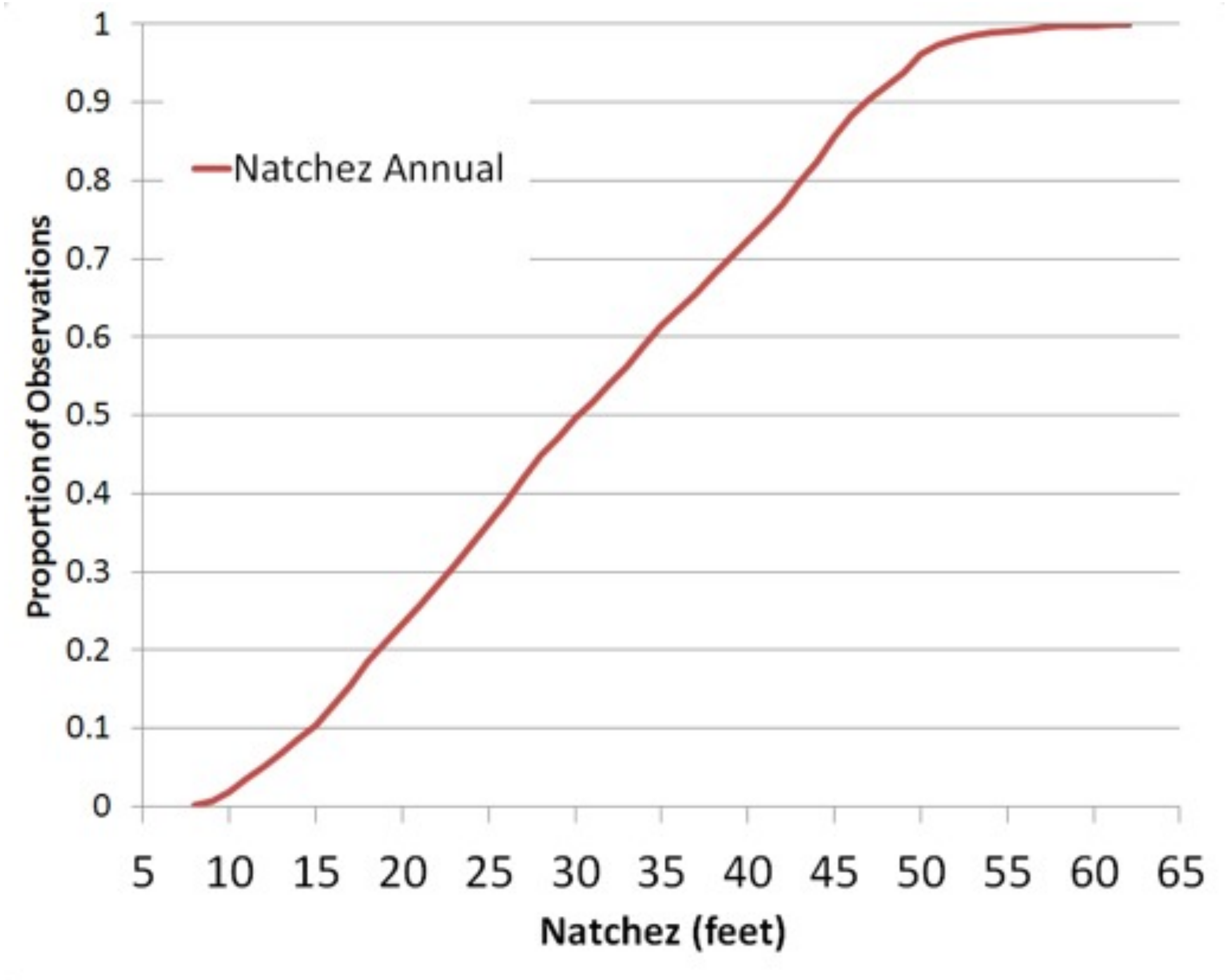

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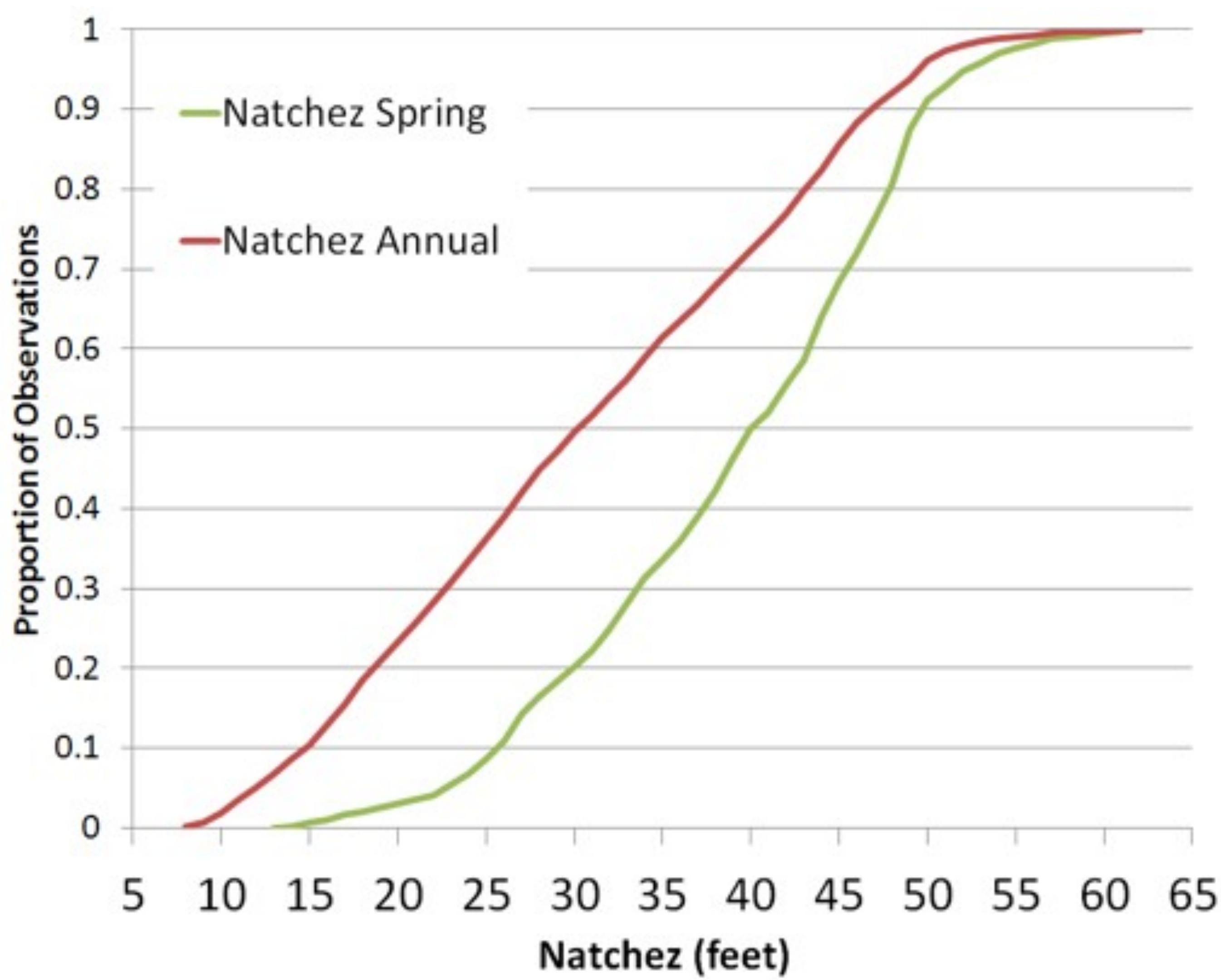

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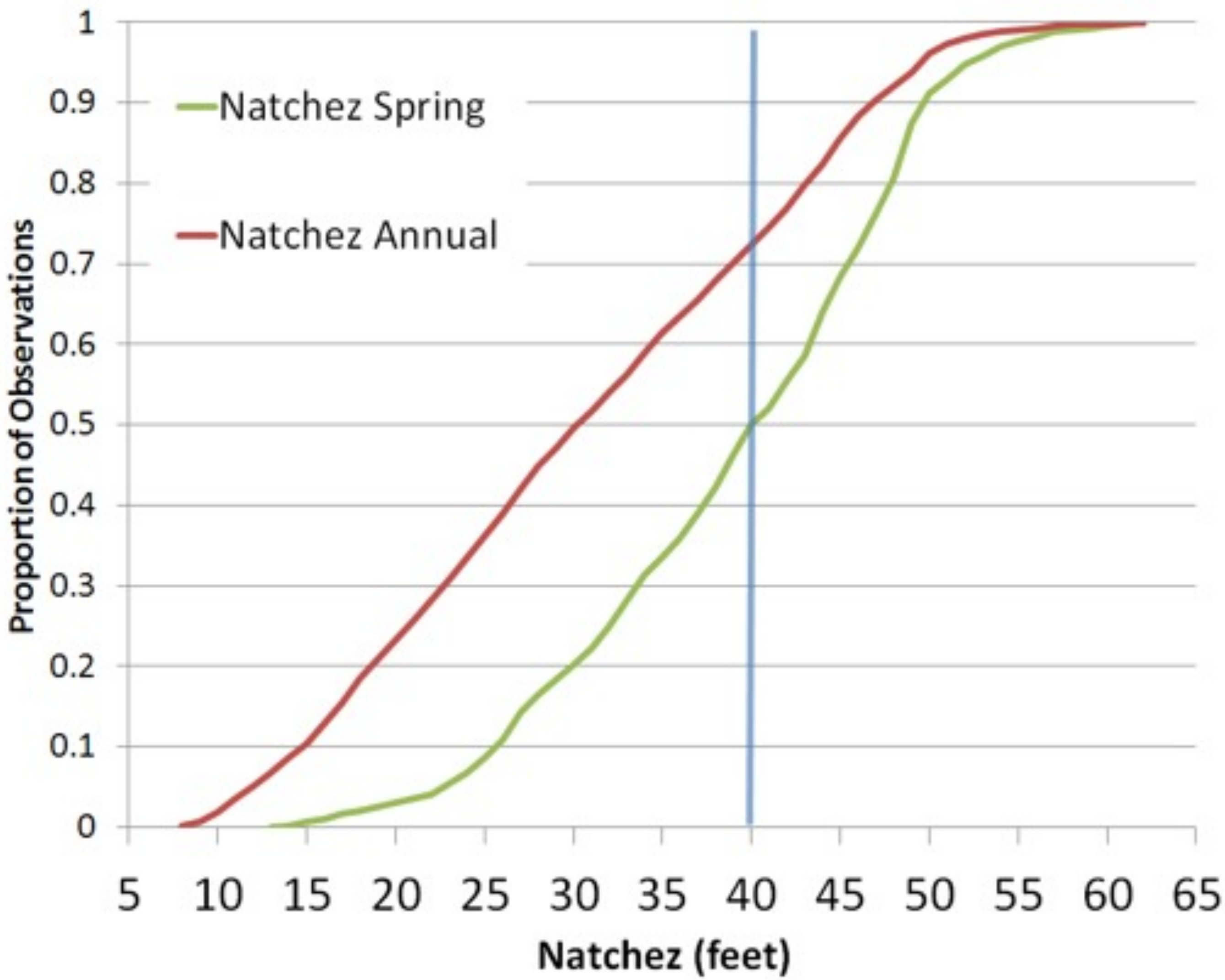

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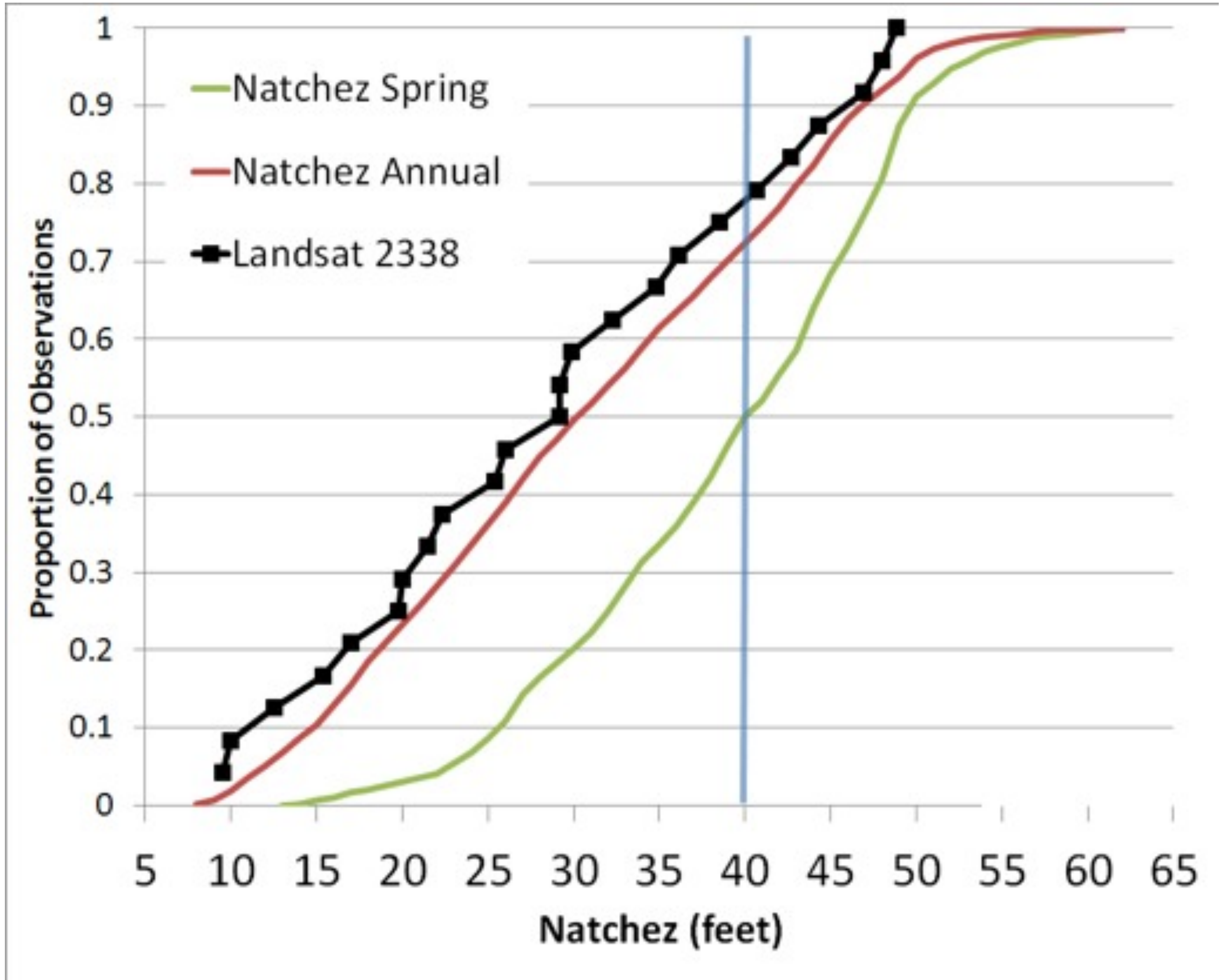

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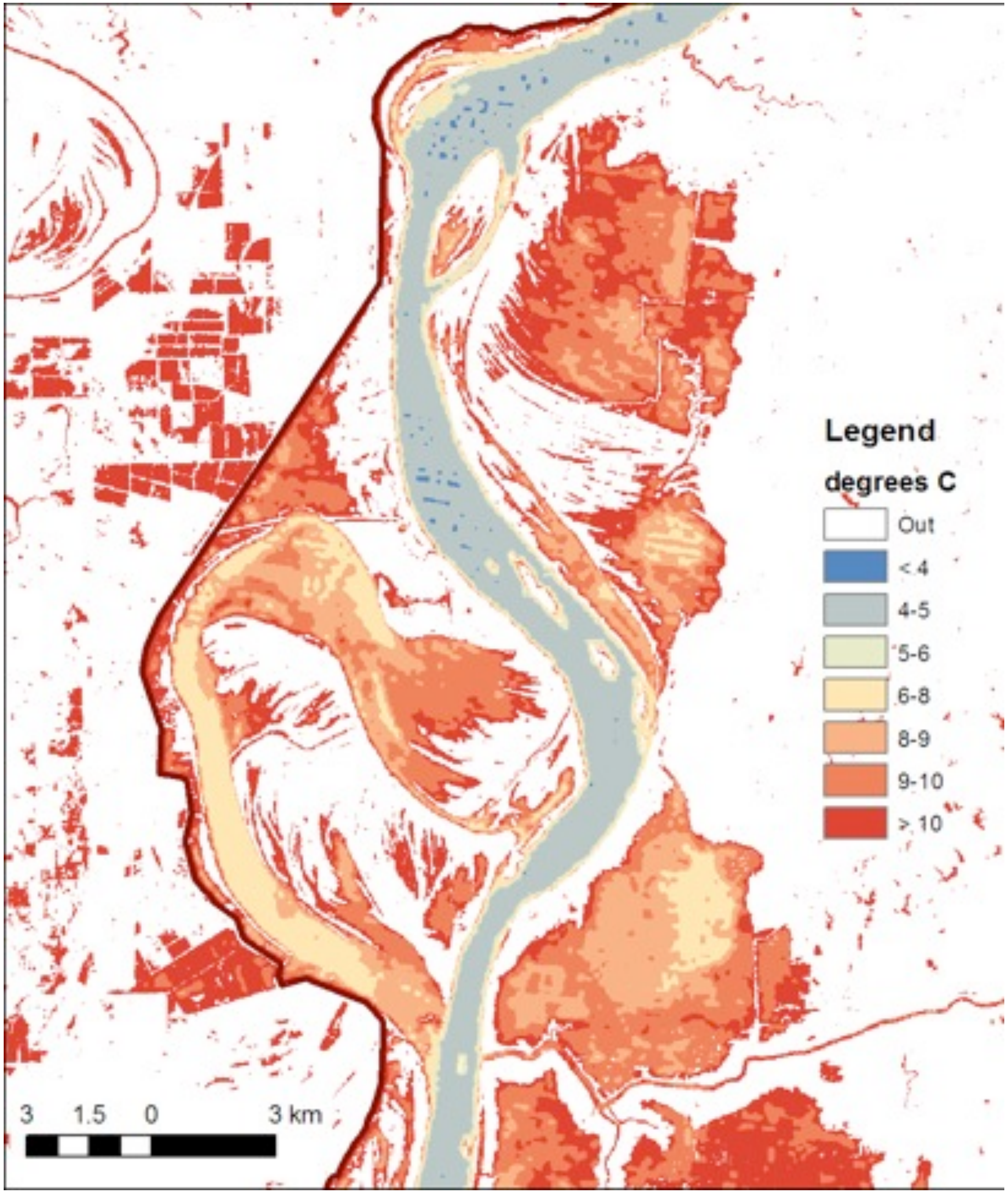
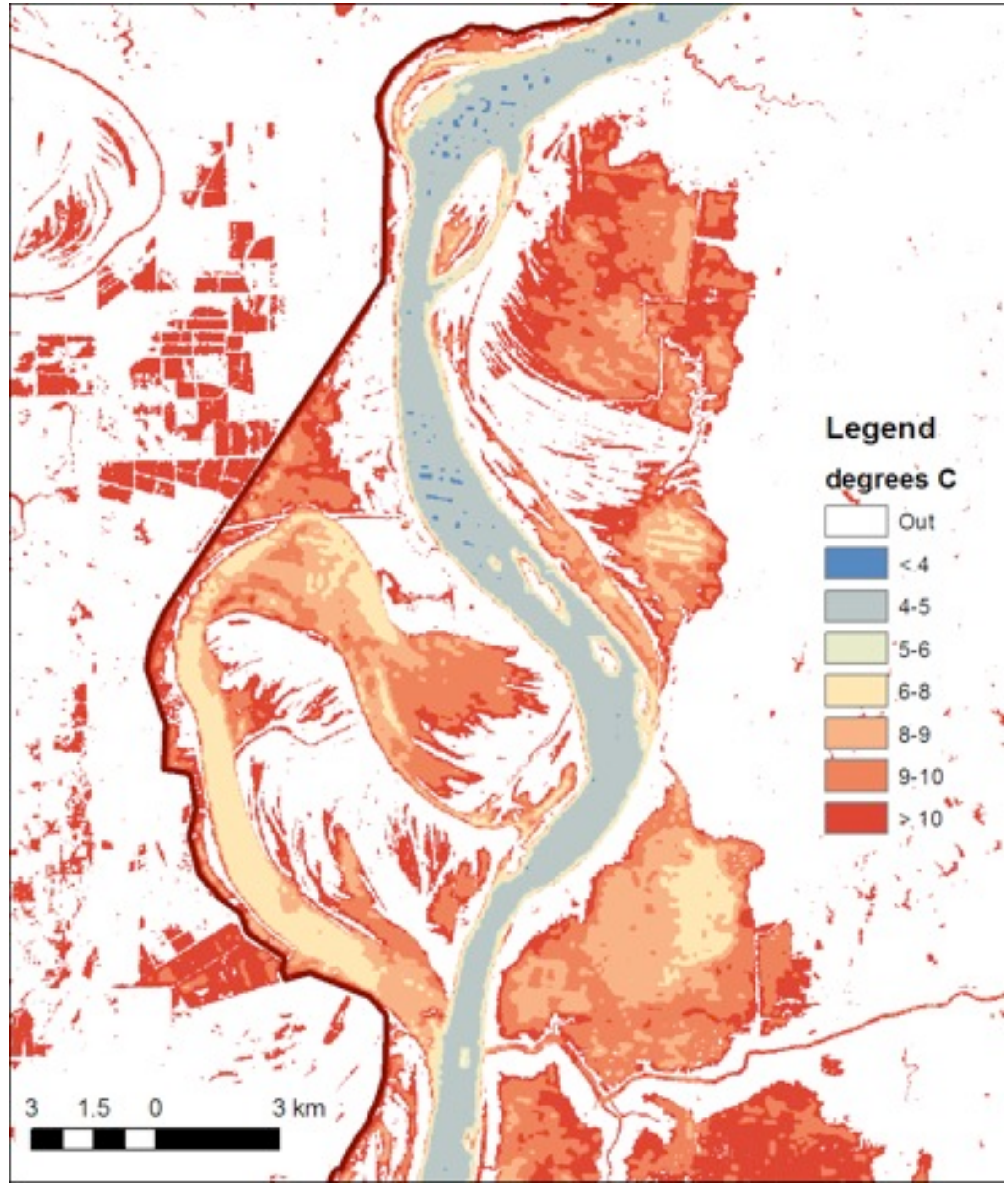


Legend
degrees C
Out
< 4
4-5
5-6
6-8
8-9
9-10
> 10
3 1.5 0 3 km

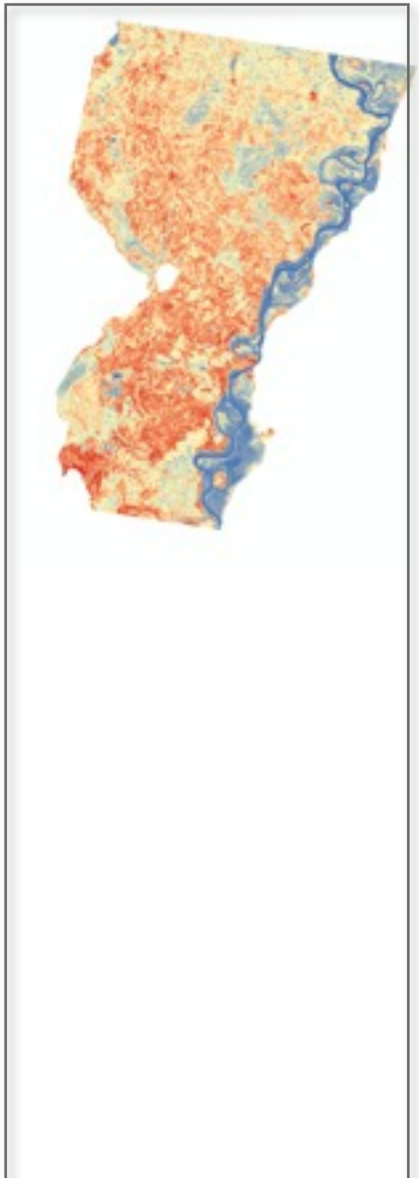
Thermal Conditions: Mainstem Mississippi River is cold in the spring!

Landsat: 4 Mar 2010
Natchez= 40.6’

Find thermal refuge from the river...



Thermal Conditions:
Temperature Difference from the River



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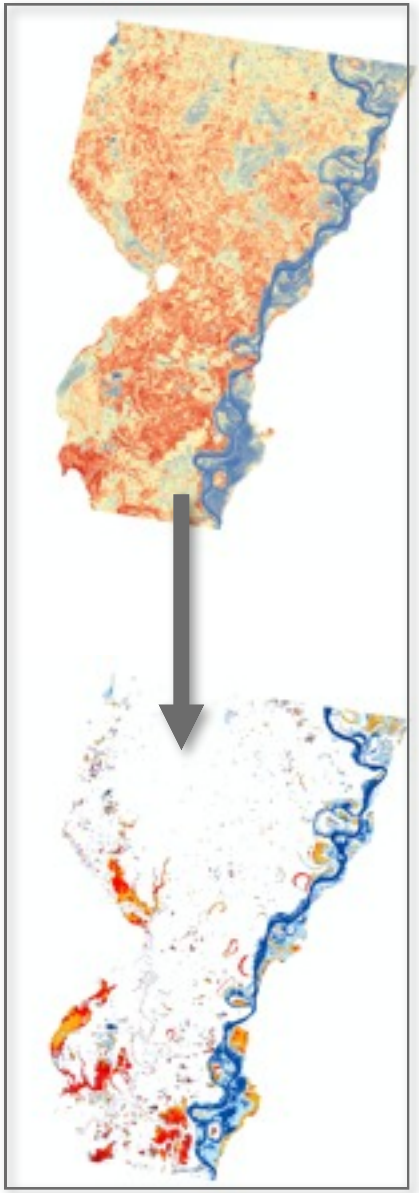

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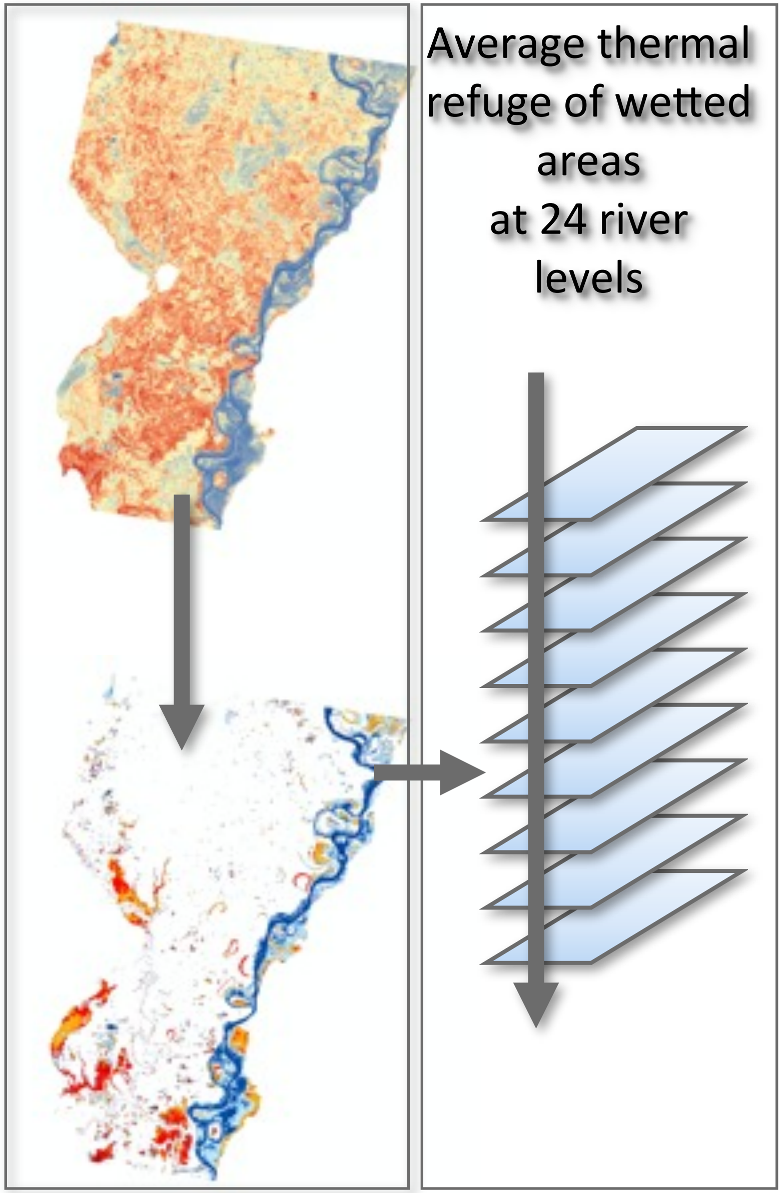

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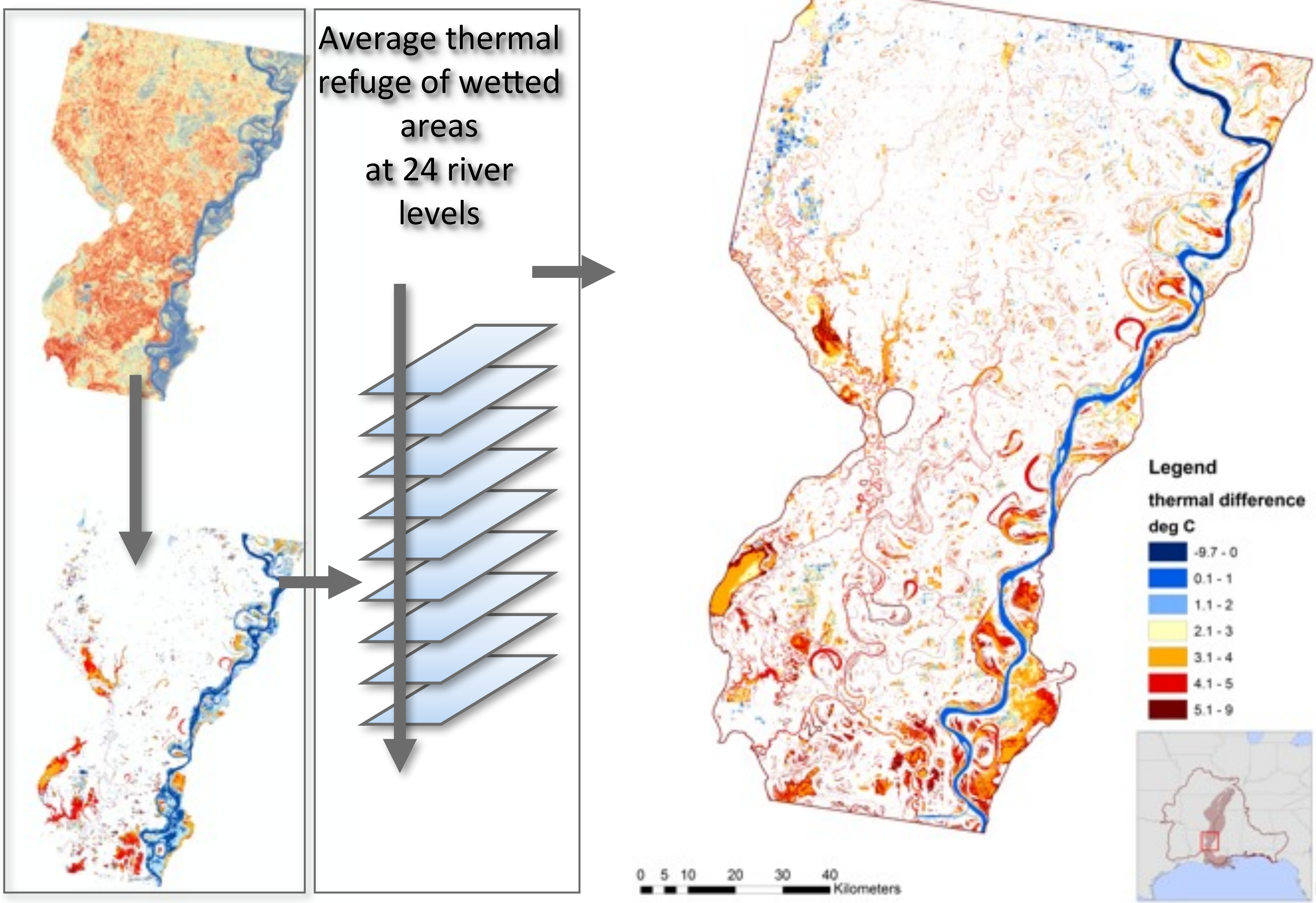

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Physical Structure:

Alligator Gar Spawning Habitat Suitability

Inundation Frequency

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Temperature

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Inundation Frequency

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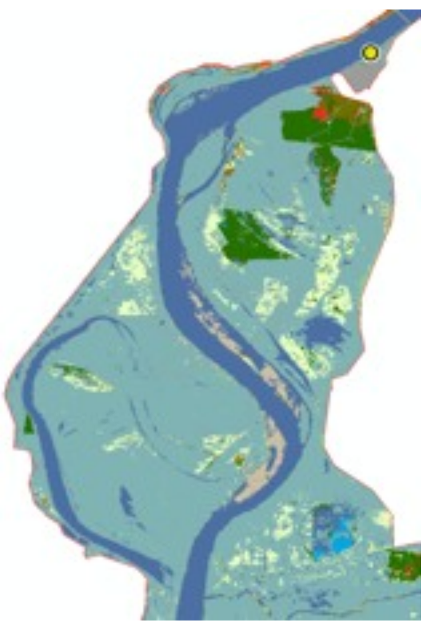
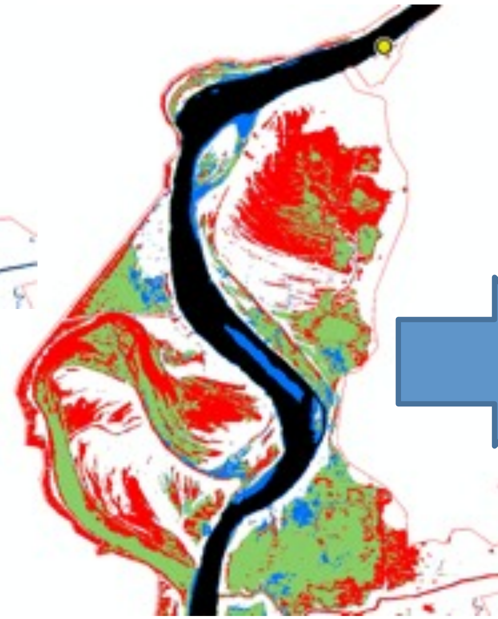


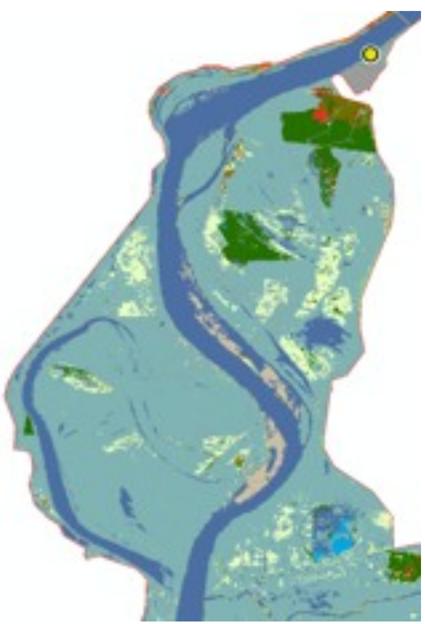
Vegetation Type

Alligator Gar Spawning Habitat Suitability

Inundation Frequency



Temperature



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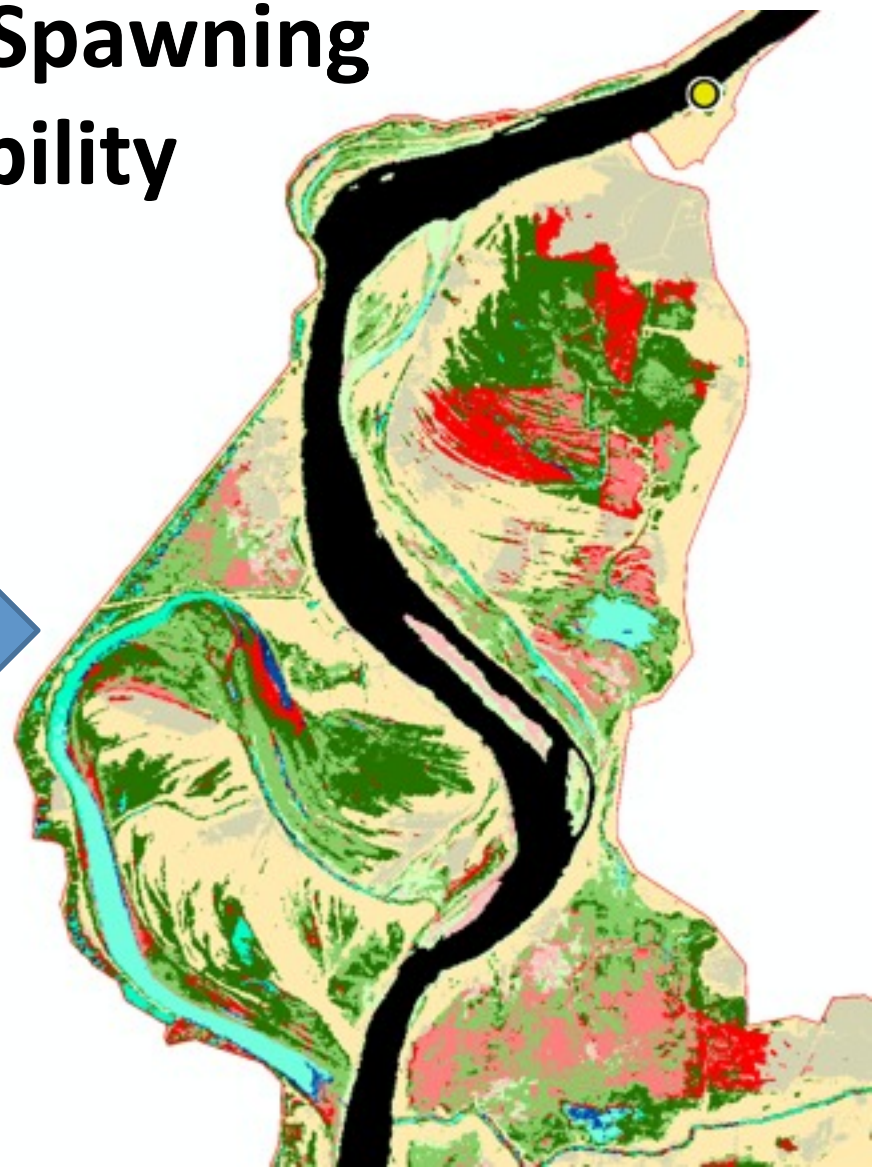

GCPO CPA

http://gcpolcc.databasin.org

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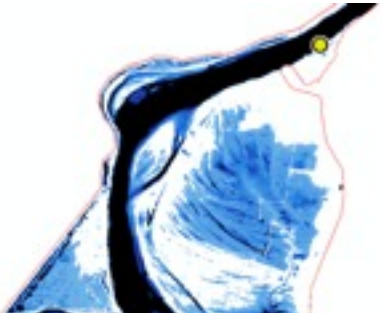

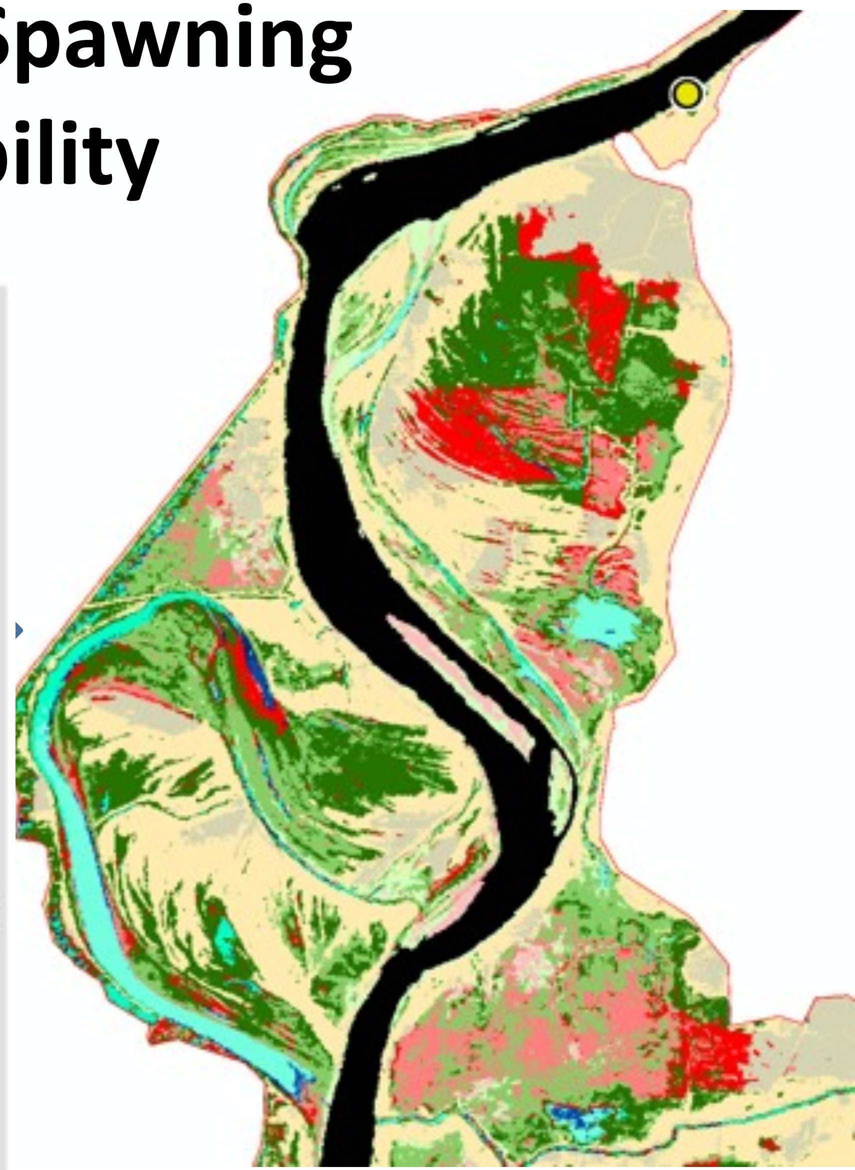

Vegetation Type

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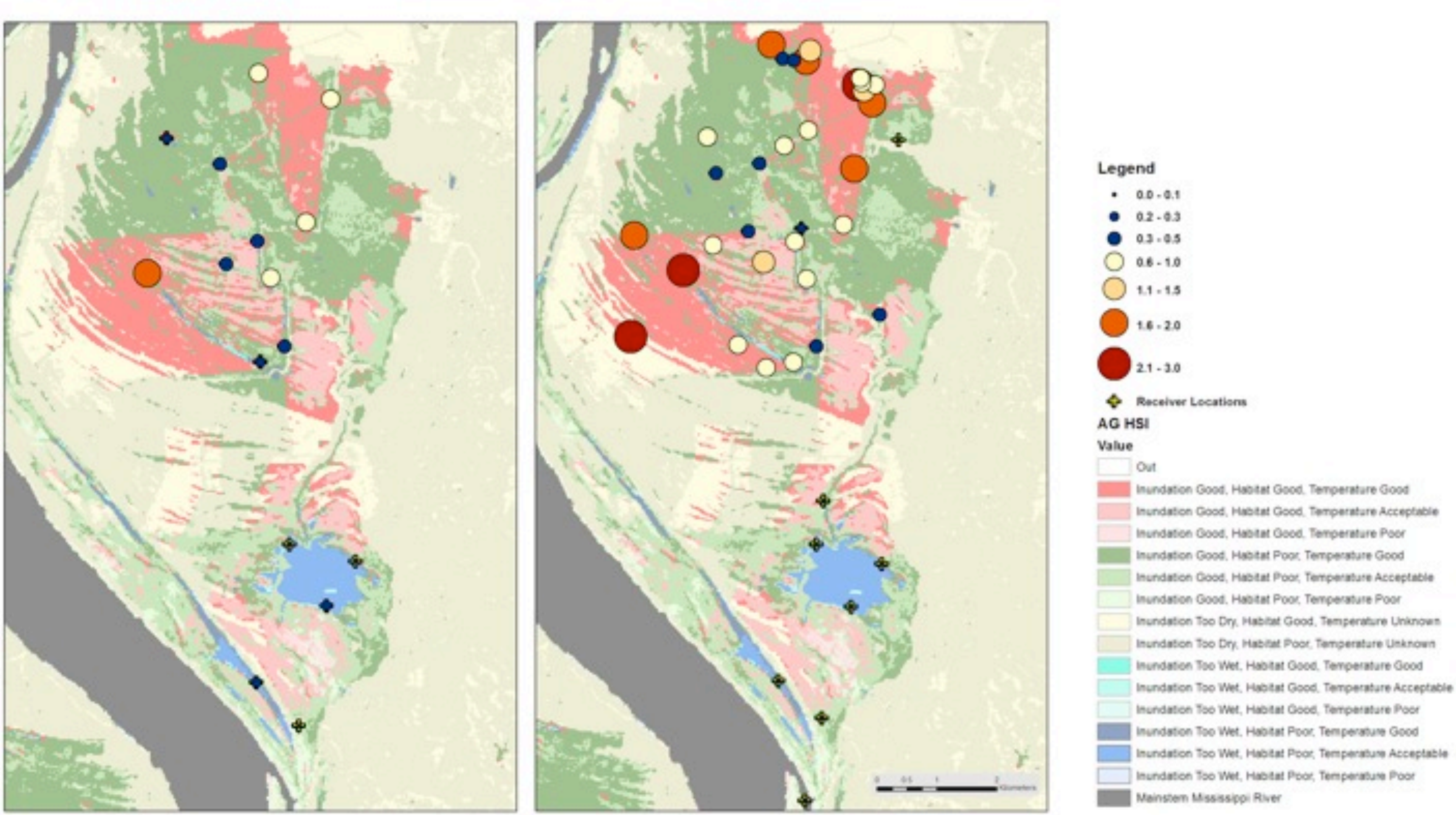
Alligator Gar Spawning Habitat Suitability

22 Mar – 10 Apr 2012 **1 May - 31 May 2013**

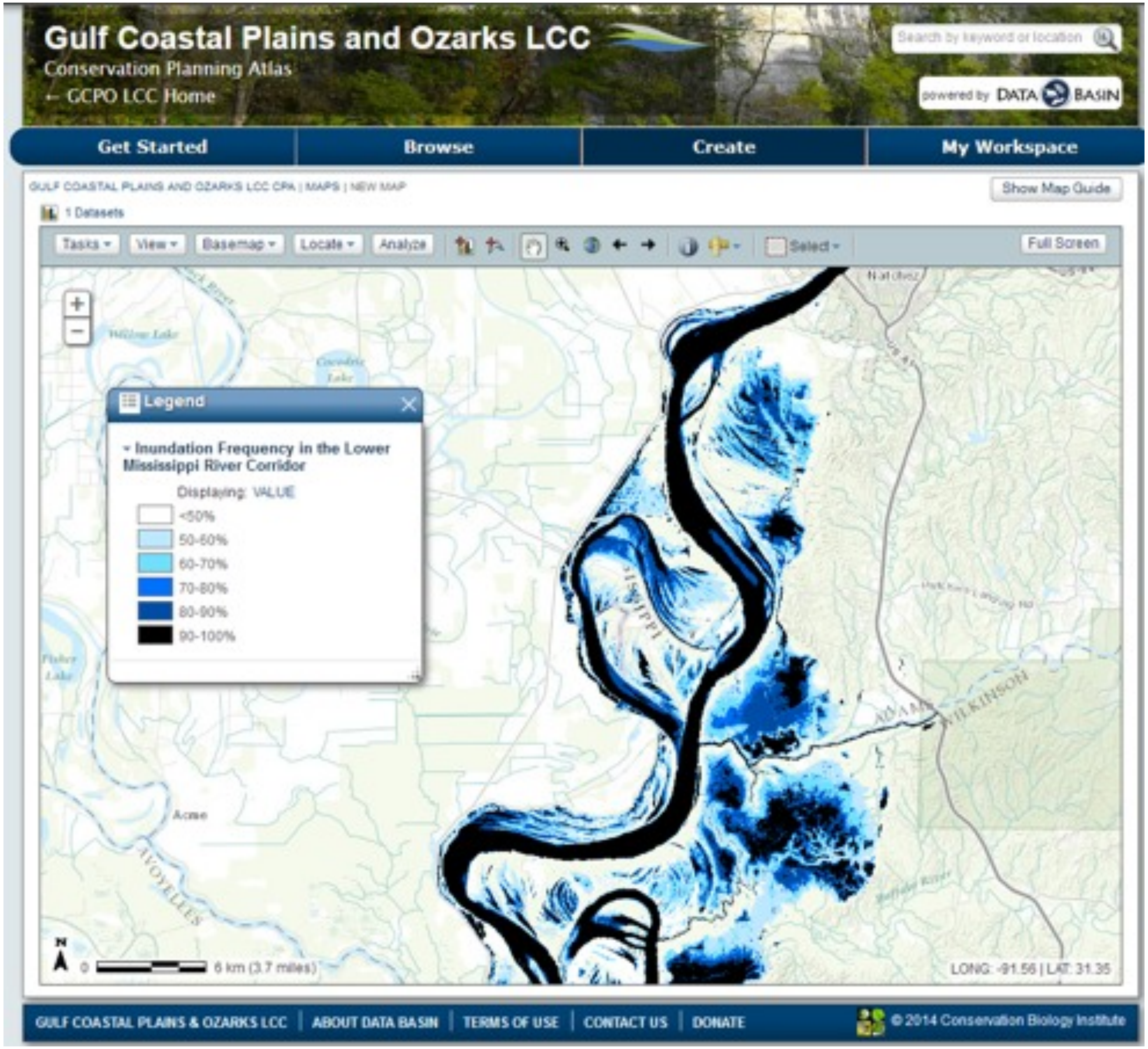


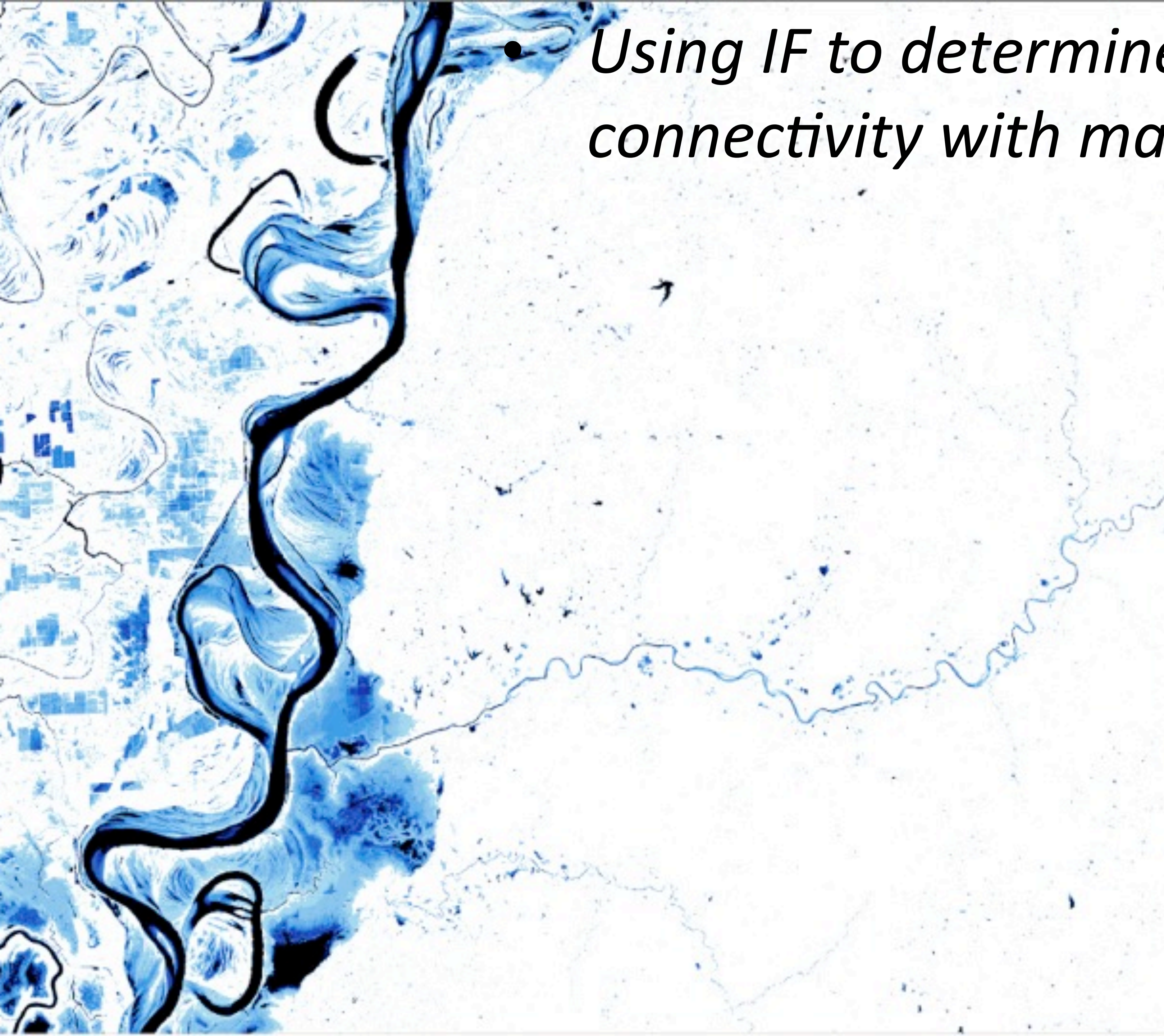
Spawning!   22 April 2014

Physical Structure: Low vegetation, low/no canopy

Miss River = 15^{o}C Floodplain = 24^{o}C

GCPO LCC Conservation Planning Atlas
http://gcpolcc.databasin.org/





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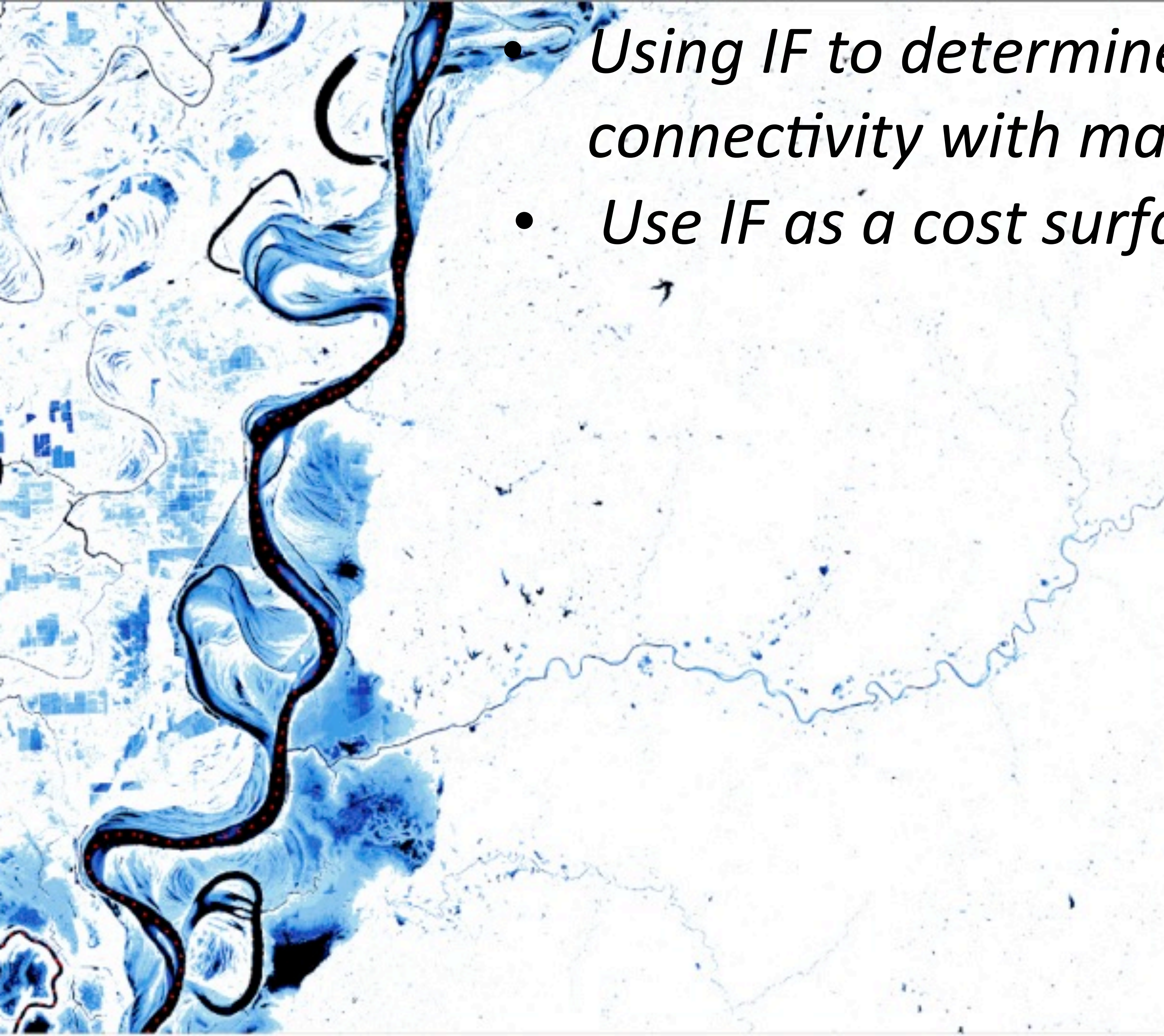
- *Use IF as a cost surface*



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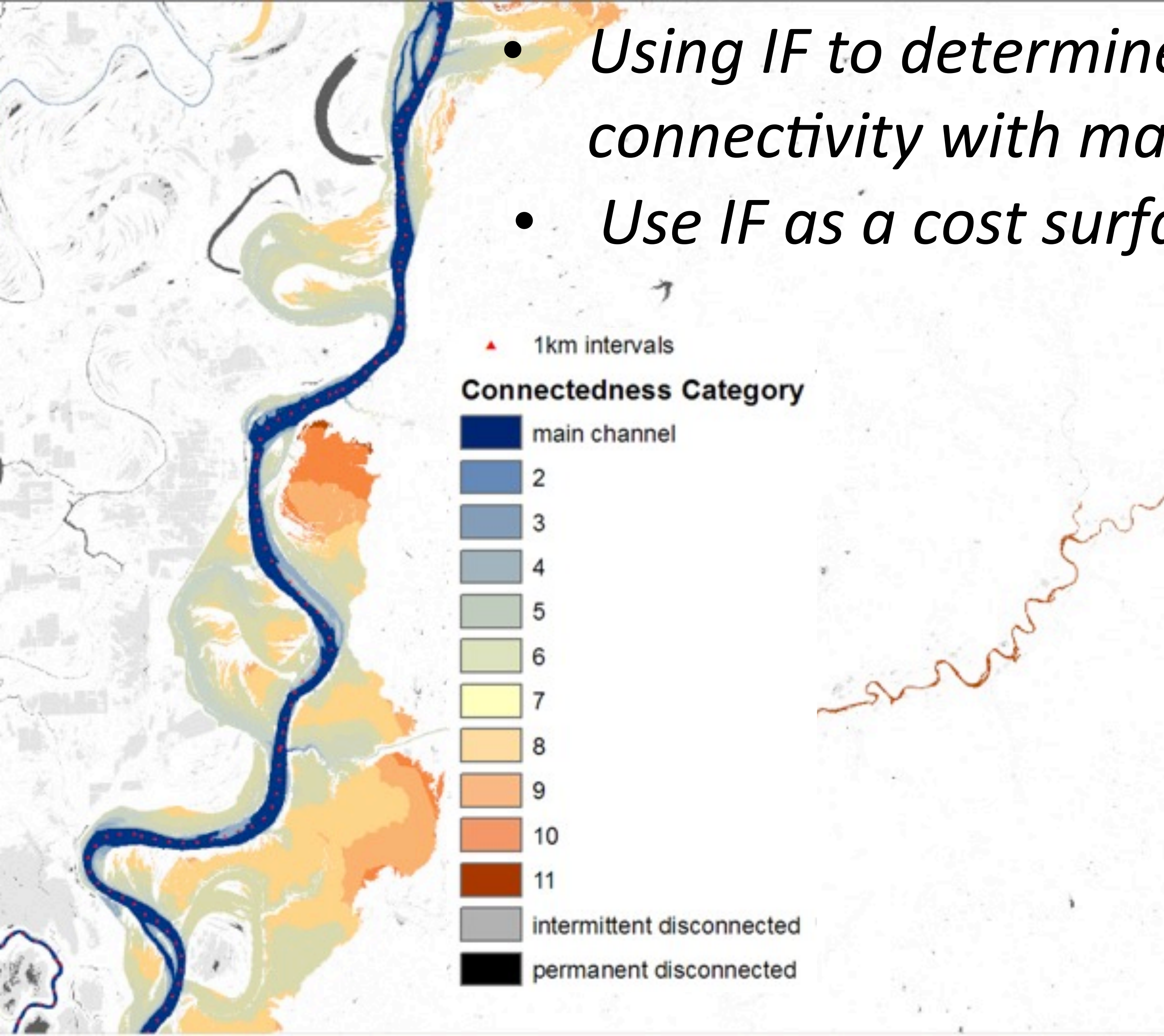

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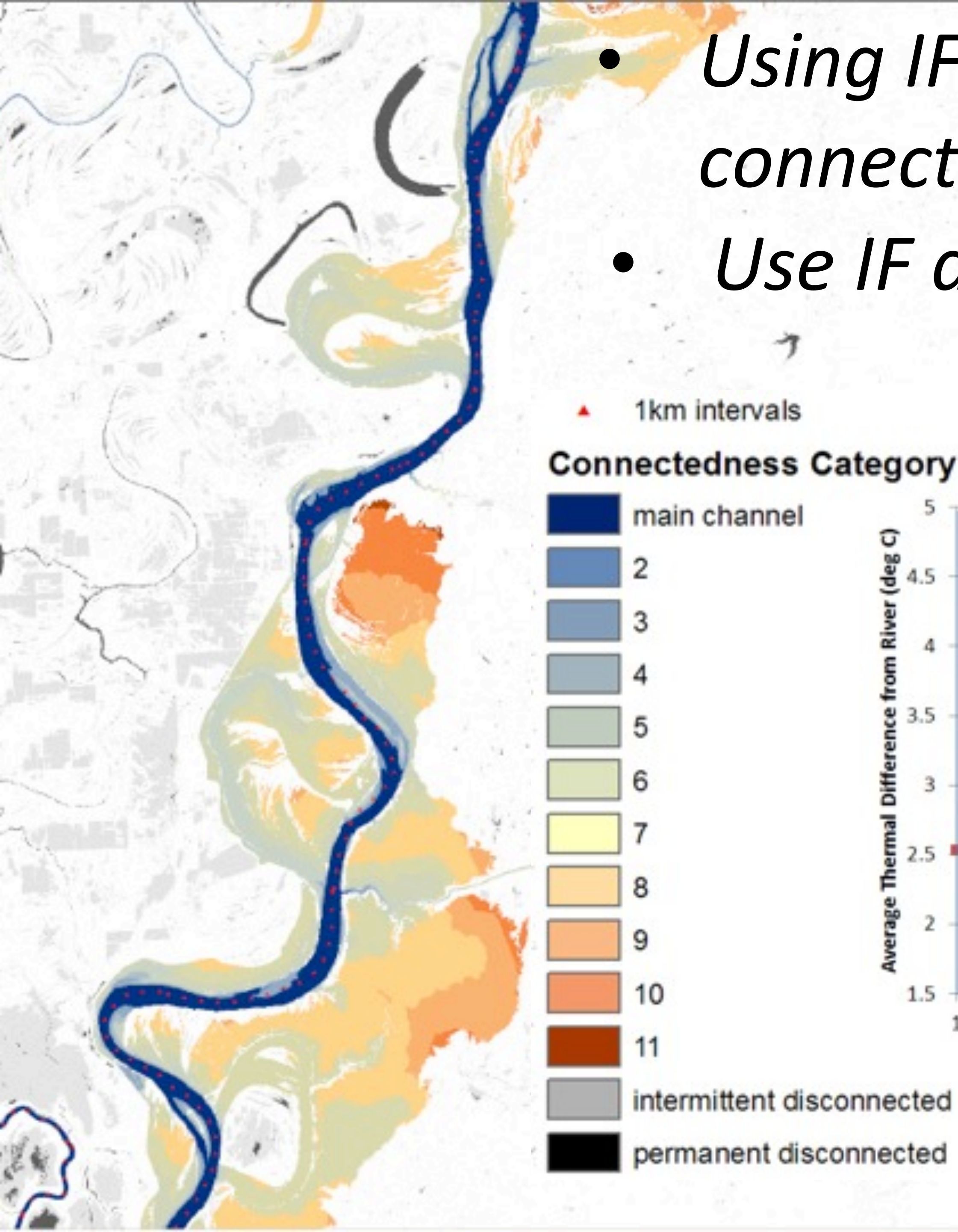

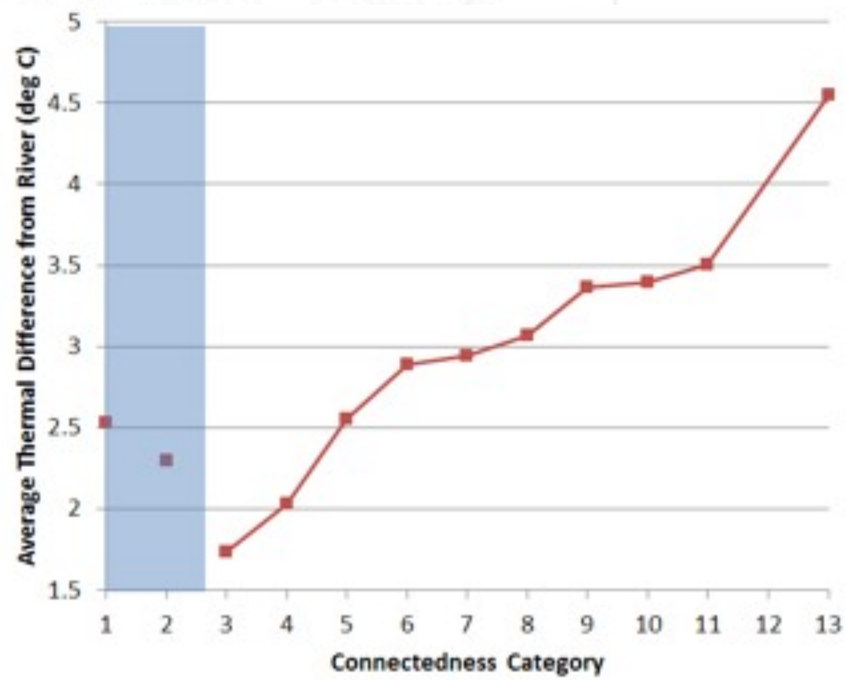

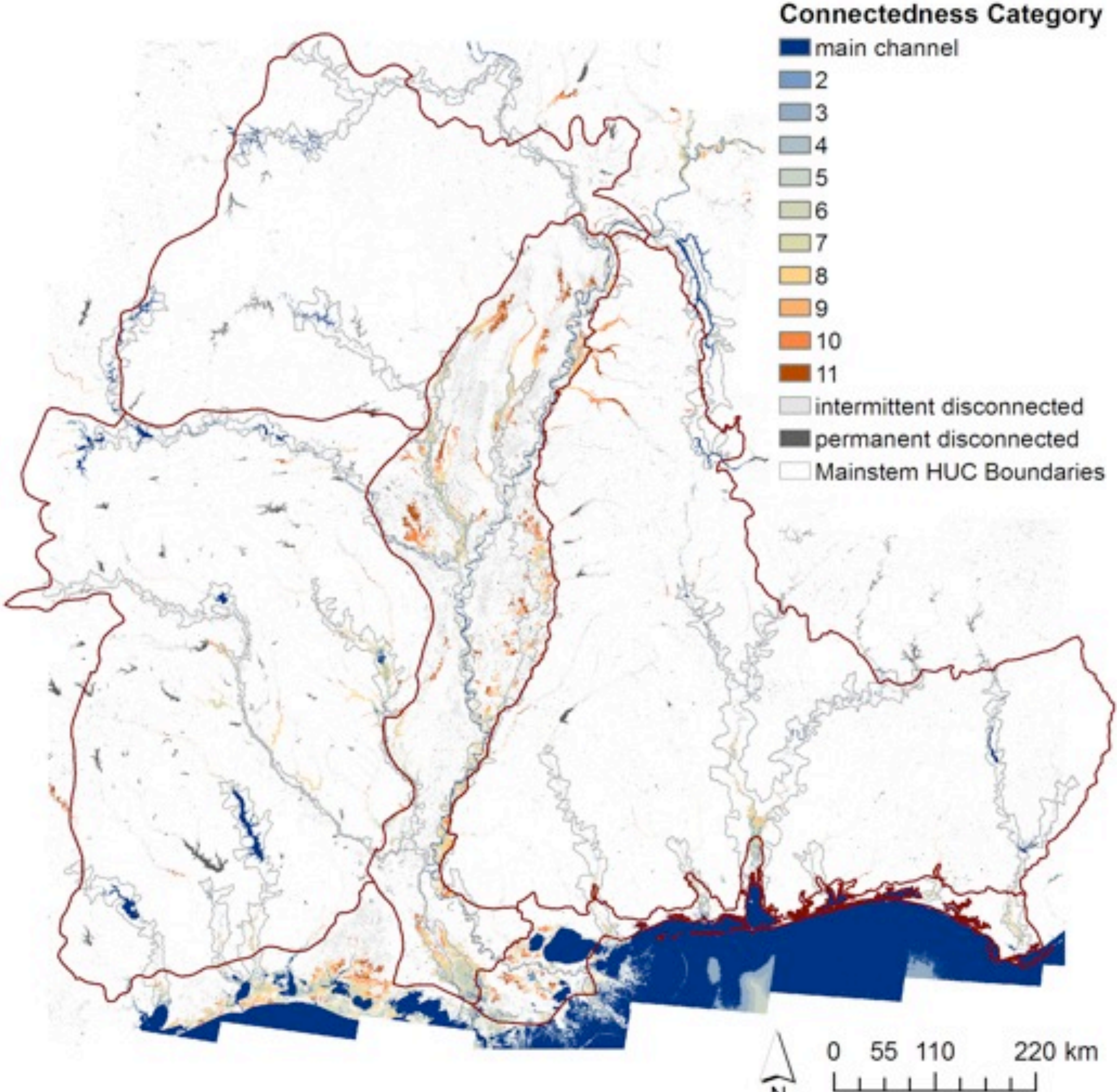

Connectedness Category
main channel
2
3
4
5
6
7
8
9
10
11
intermittent disconnected
permanent disconnected
Mainstem HUC Boundaries
N
0 55 110 220 km

Conclusions:

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  - Connectivity
  - ID of secondary channels

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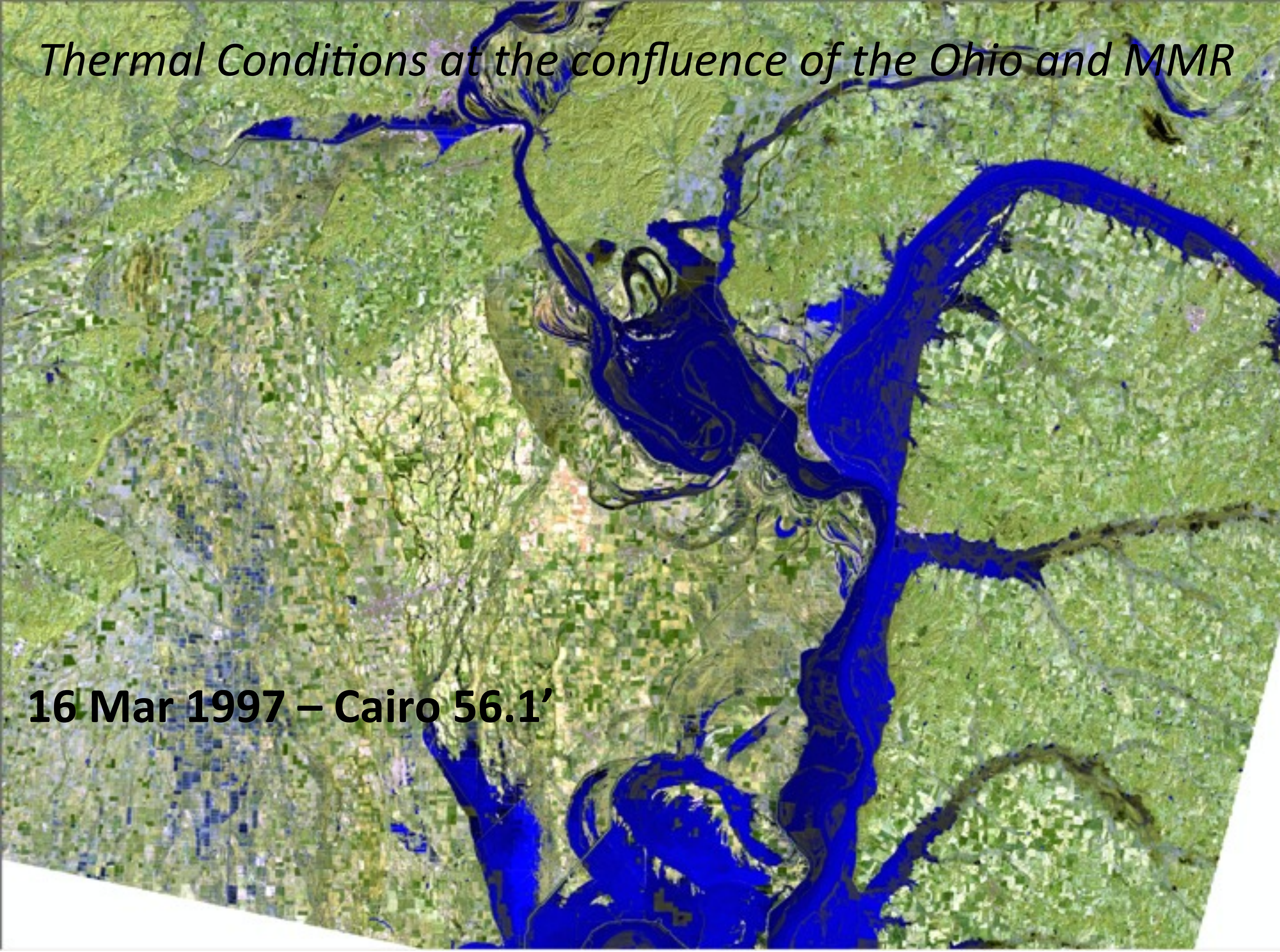
Thermal Conditions at the confluence of the Ohio and MMR
16 Mar 1997 – Cairo 56.1’

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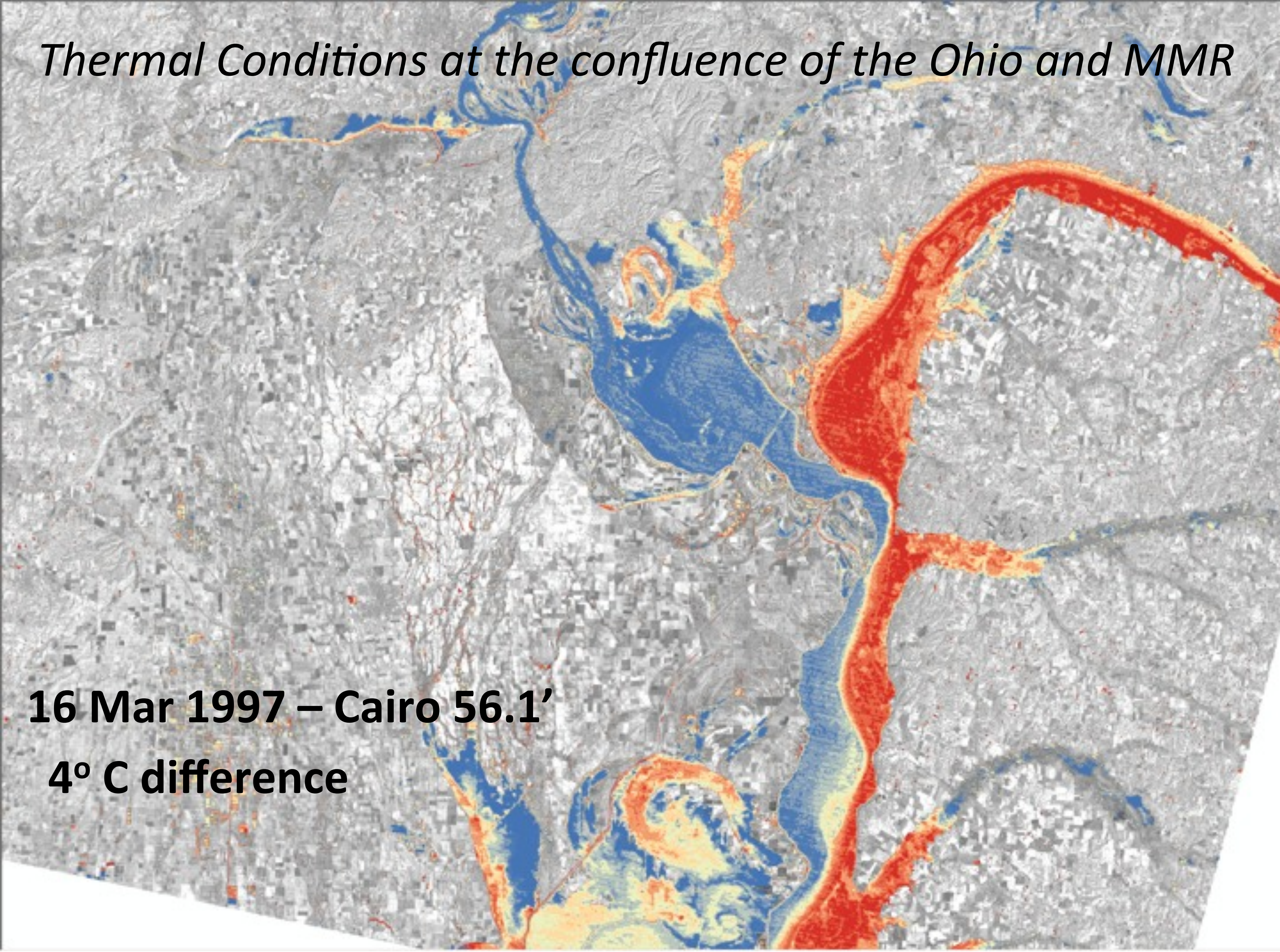
Thermal Conditions at the confluence of the Ohio and MMR
16 Mar 1997 – Cairo 56.1’
4o C difference

Questions?

1. GCPO and aquatic assessment
2. Estimating IF
3. Relating IF to ground conditions
4. Alligator gar spawning HSI in the LMR
   - IF + thermal + landcover
5. Connectivity with mainstem using IF
6. Thermal conditions at the confluence of the Ohio and MMR

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GCPO LCC Conservation Planning Atlas – Gar HSI in LMR
http://gcpolcc.databasin.org/

GCPO LCC website
http://gcpolcc.org/