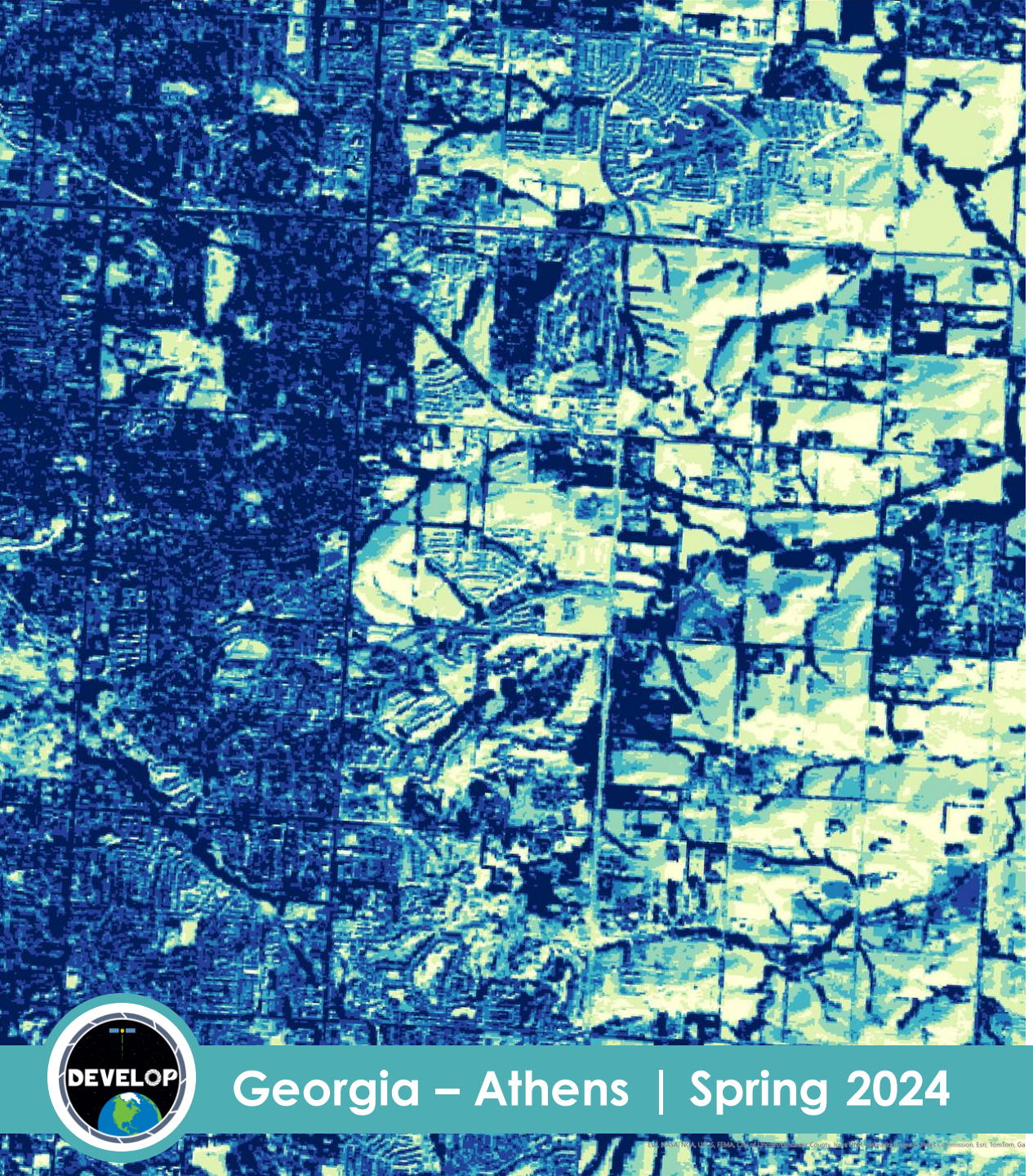

National Aeronautics and Space Administration

PLATTE RIVER BASIN WATER RESOURCES

Assessing Urban Flood Vulnerability to Select Restoration Sites for Urban Woods and Prairies in the Great Plains

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DEVELOP

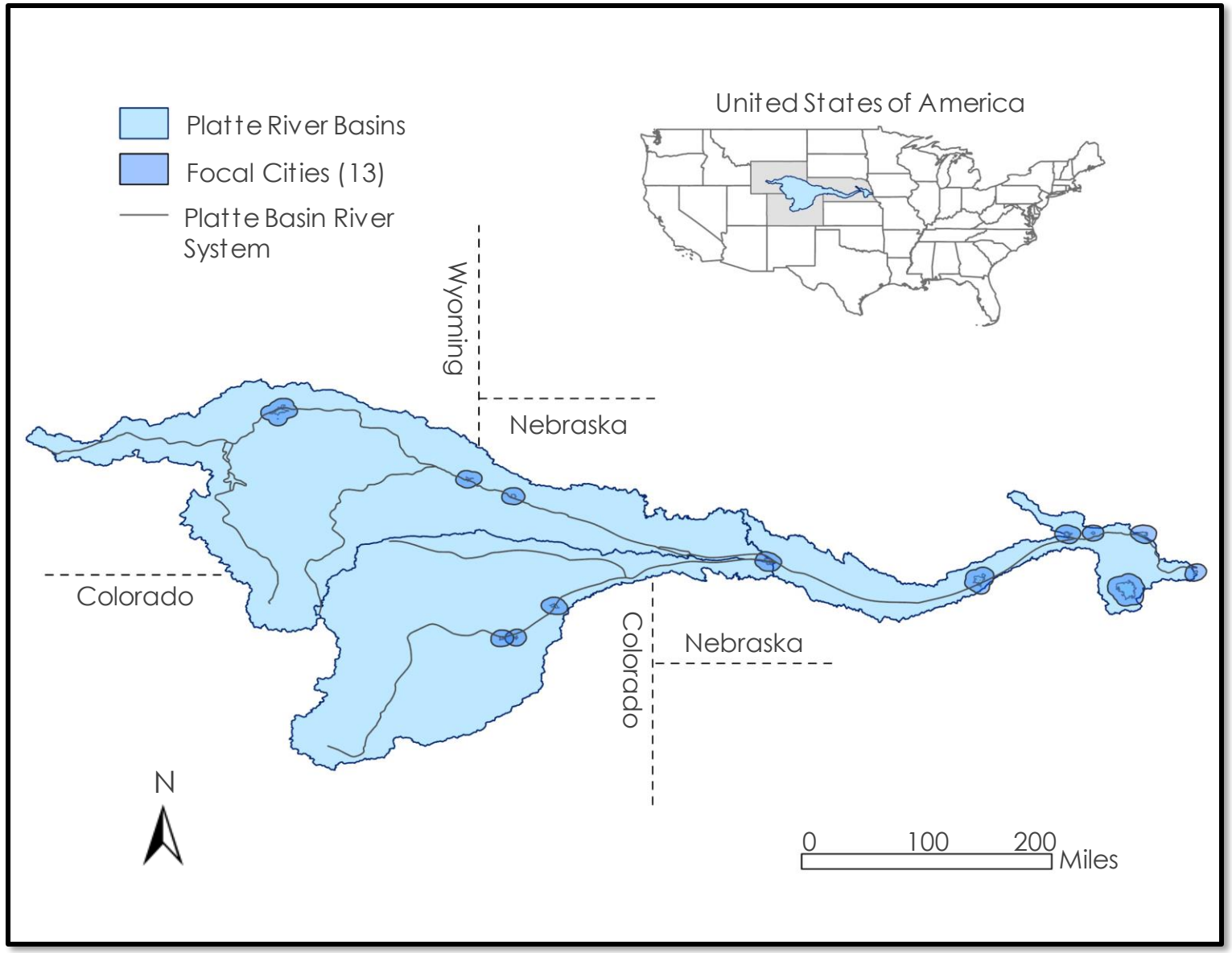
Georgia – Athens | Spring 2024

Study Area

Platte River Basin

(Wyoming, Colorado, and Nebraska, USA)

Focal cities



Community Concerns

- Community Vulnerability
- Urban Flooding
- Green Infrastructure
- Habitat Fragmentation

Image Credit: Nebraska National Guard

Image Credit: Wikimedia Commons/Hanyou23

Image Credit: National Audubon Society

Image Credit: Becky Matsubara

Partner

Audubon Great Plains

"To **protect birds** and the **places** they need, today and tomorrow. Audubon works throughout the Americas using **science**, **advocacy**, **education**, and on-the-ground **conservation**."

Land use change
Floodplain mapping

Focused **restoration** work through the **Urban Woods and Prairies** (UWP) **Initiative**

Image Credit: National Audubon Society

Image Credit: National Audubon Society

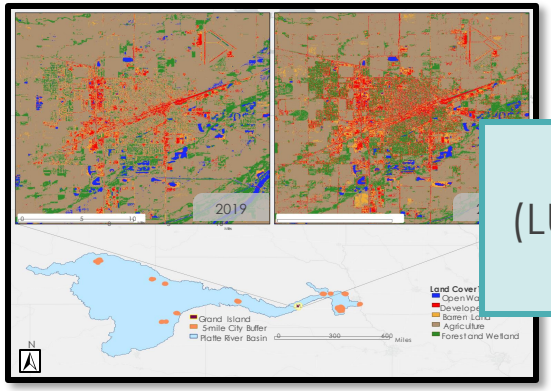
Objectives

Objective

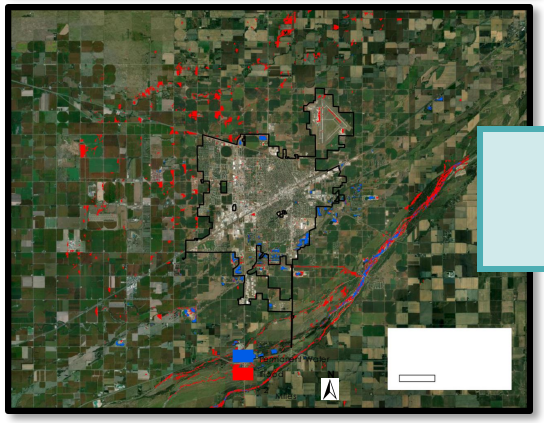
Provide scientific guidance for restoration work our partner will conduct.

Image Credit: Steve Hillebrand, USFWS

End products



Land Use Land Cover (LULC) 10-year time series (2013 – 2023)



30m Flood Risk Map

Earth Observations

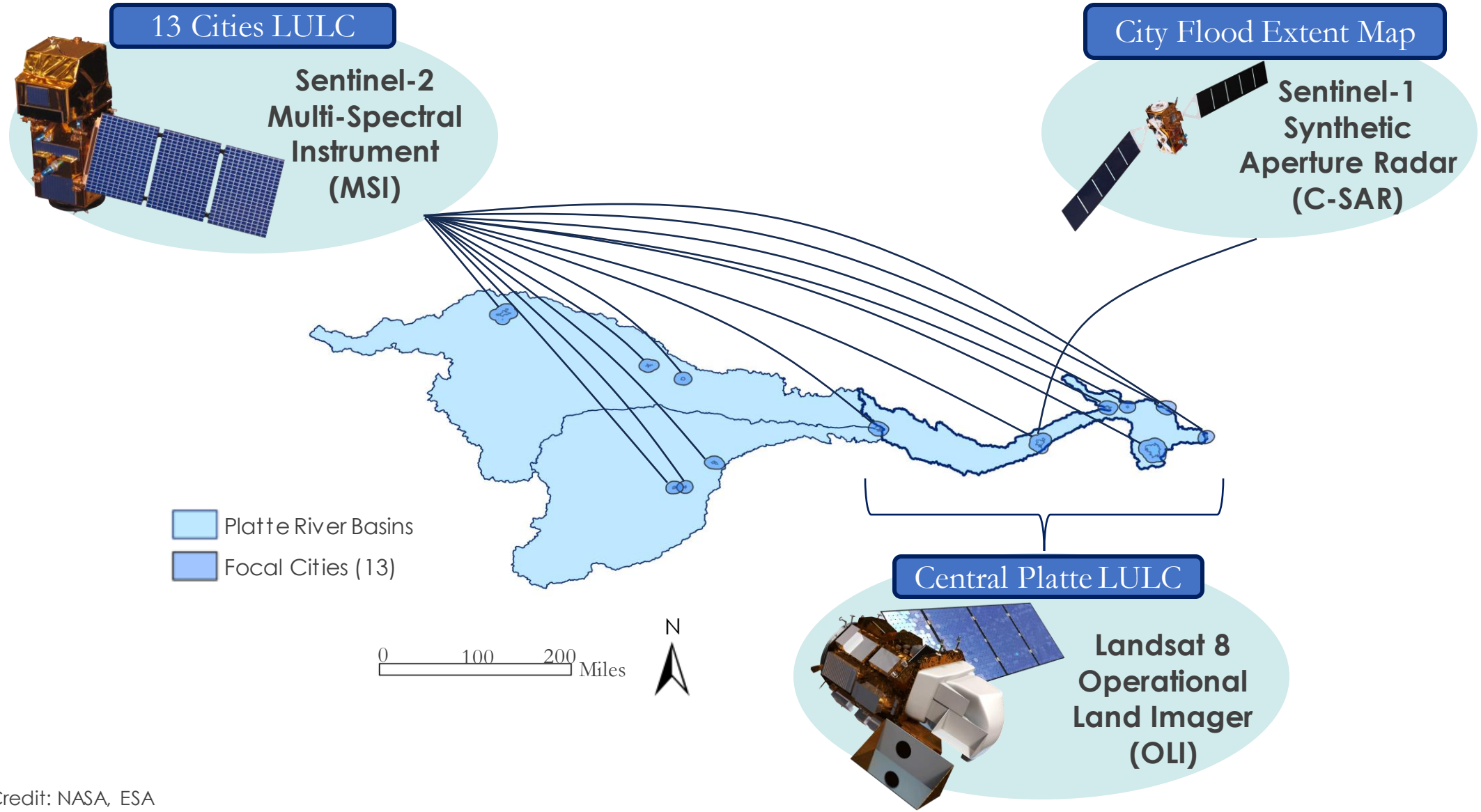
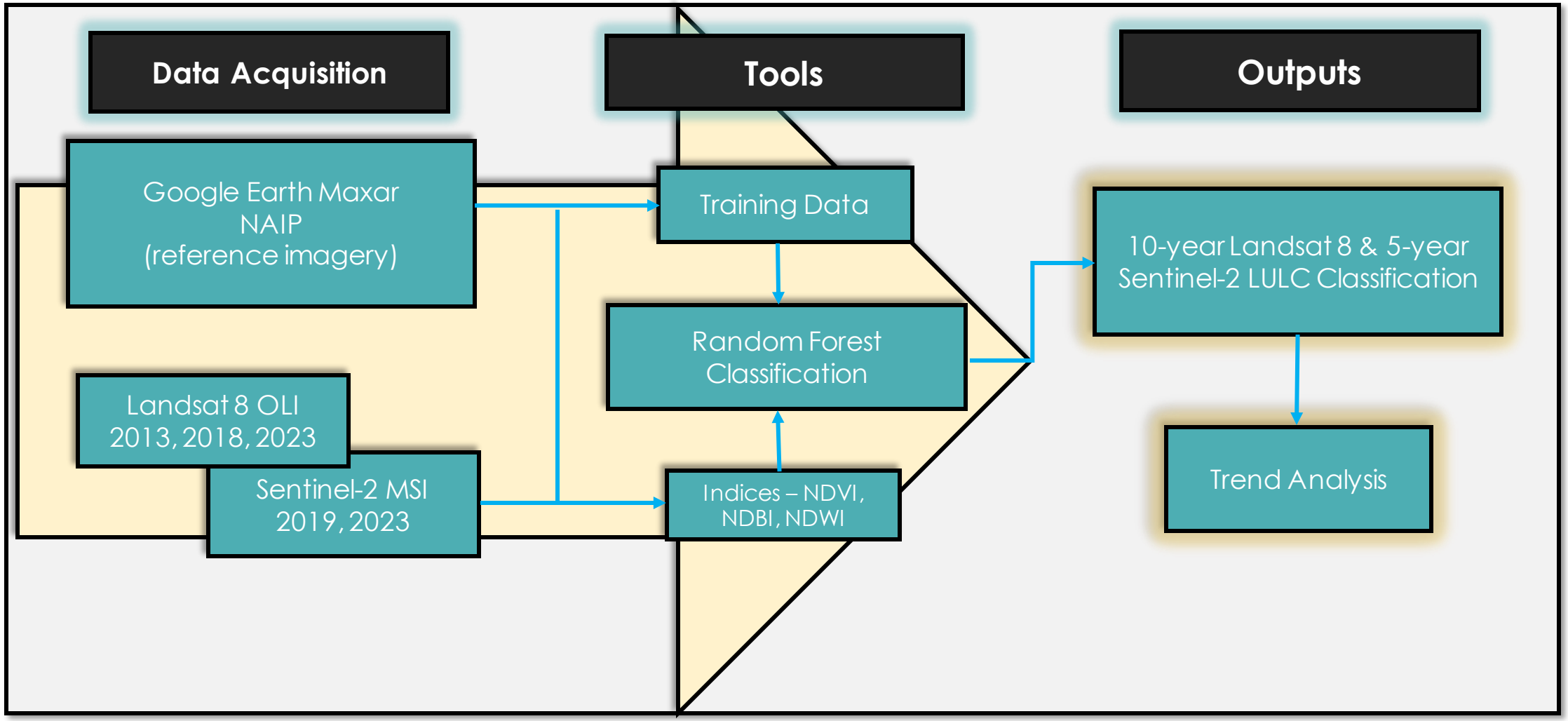


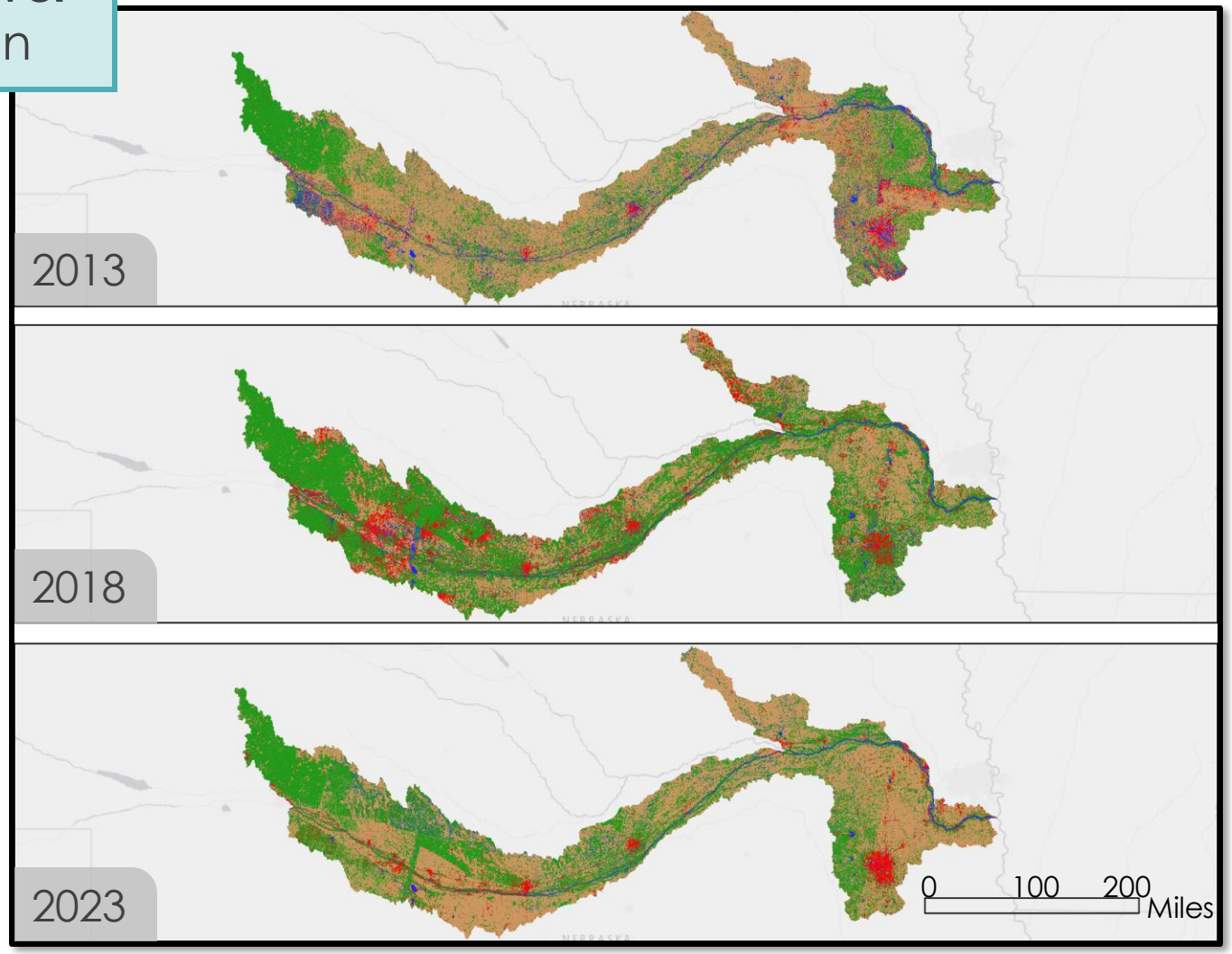
Image Credit: NASA, ESA

Methods – LULC



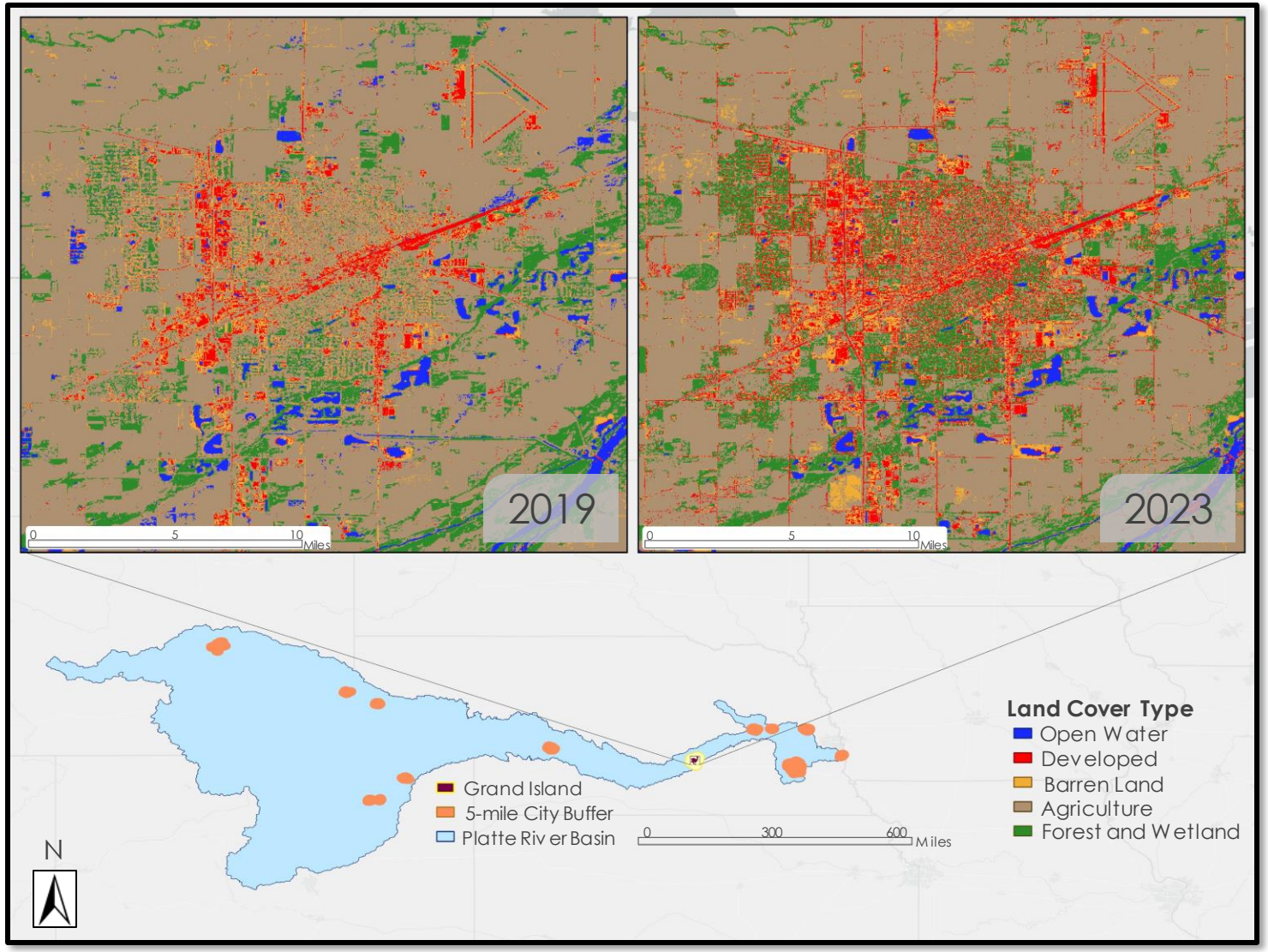
Results – LULC Time Series (Landsat 8)

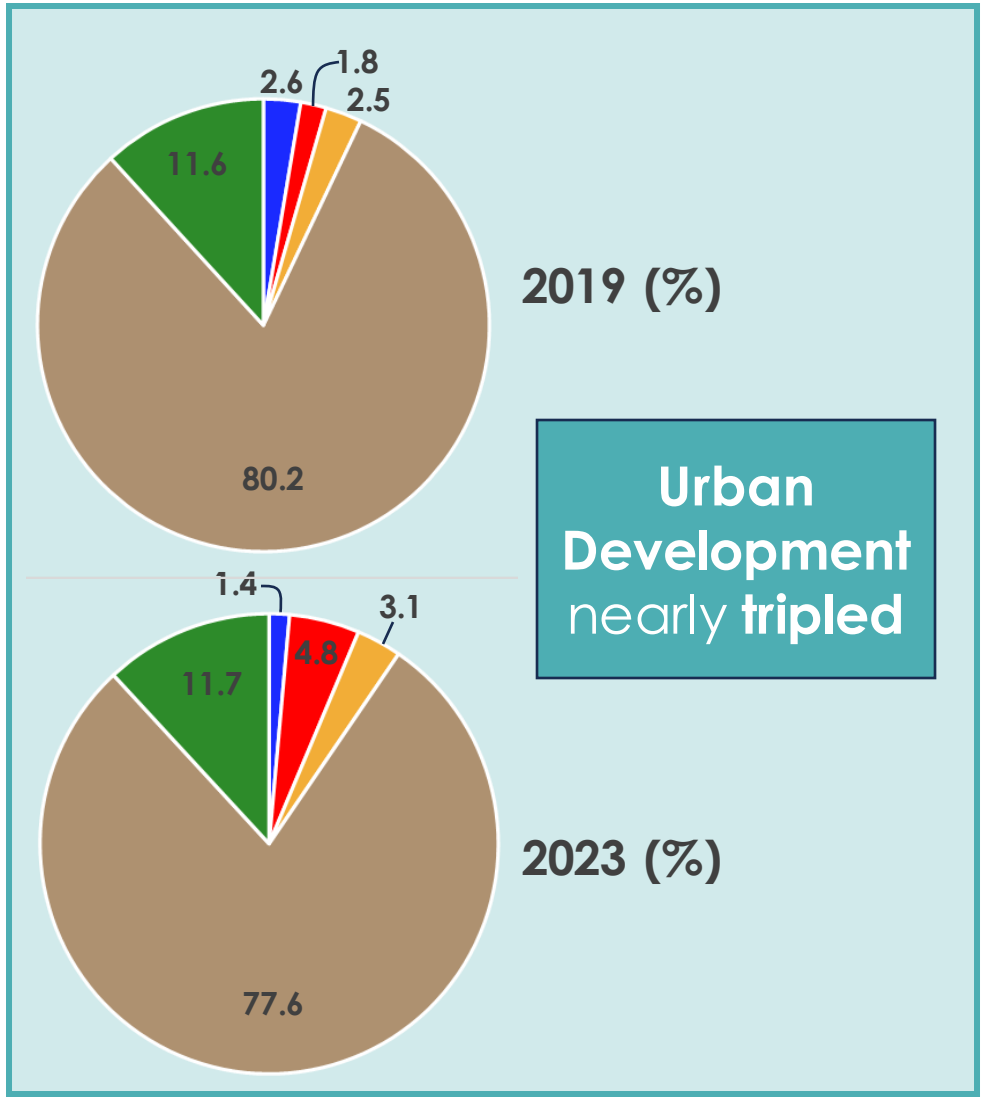
Land Use Land Cover
Central Platte Basin



Basemap credit: ESRI, HERE, Garmin, USGS, EPA, NPS

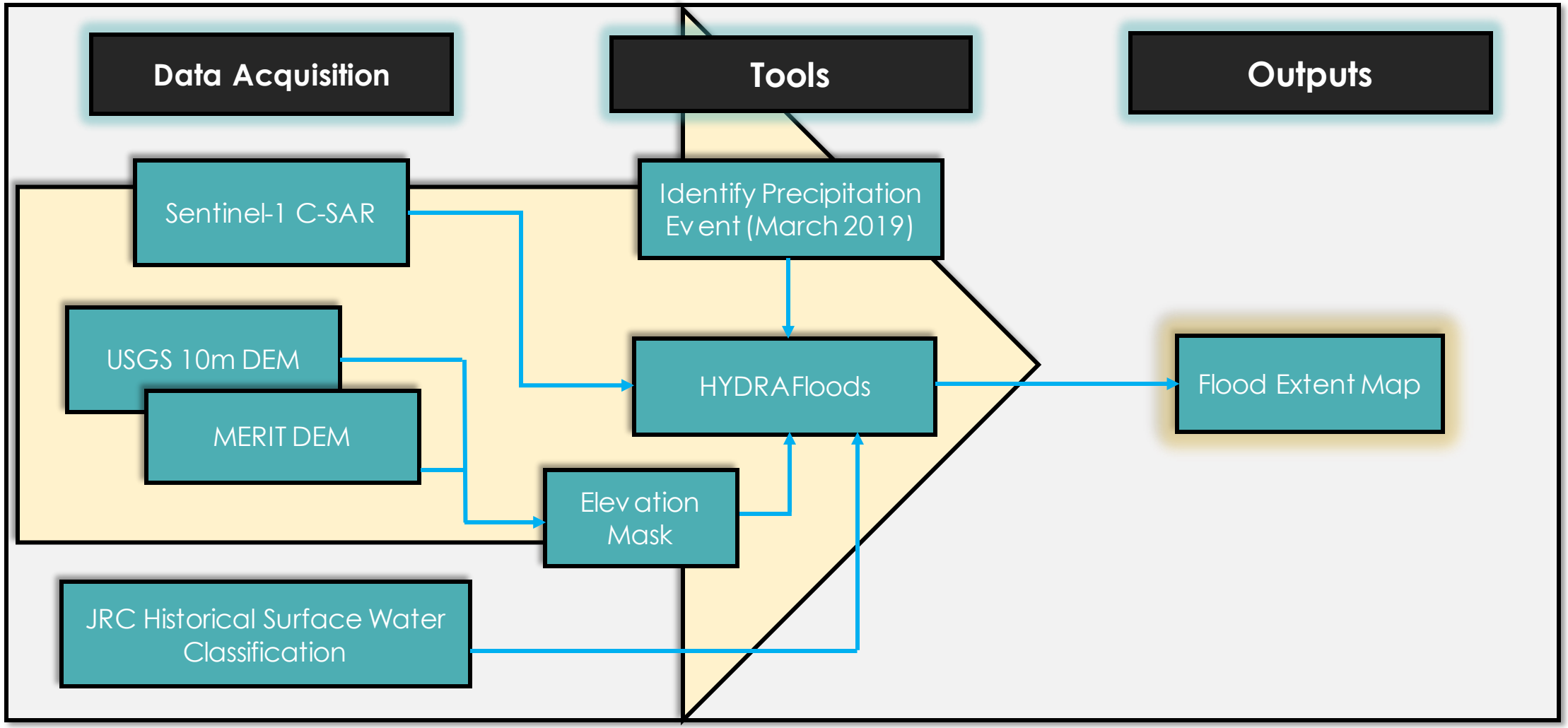
Results – LULC Change Detection (Sentinel-2)





Basemap credit: South Dakota Game Fish and Parks, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

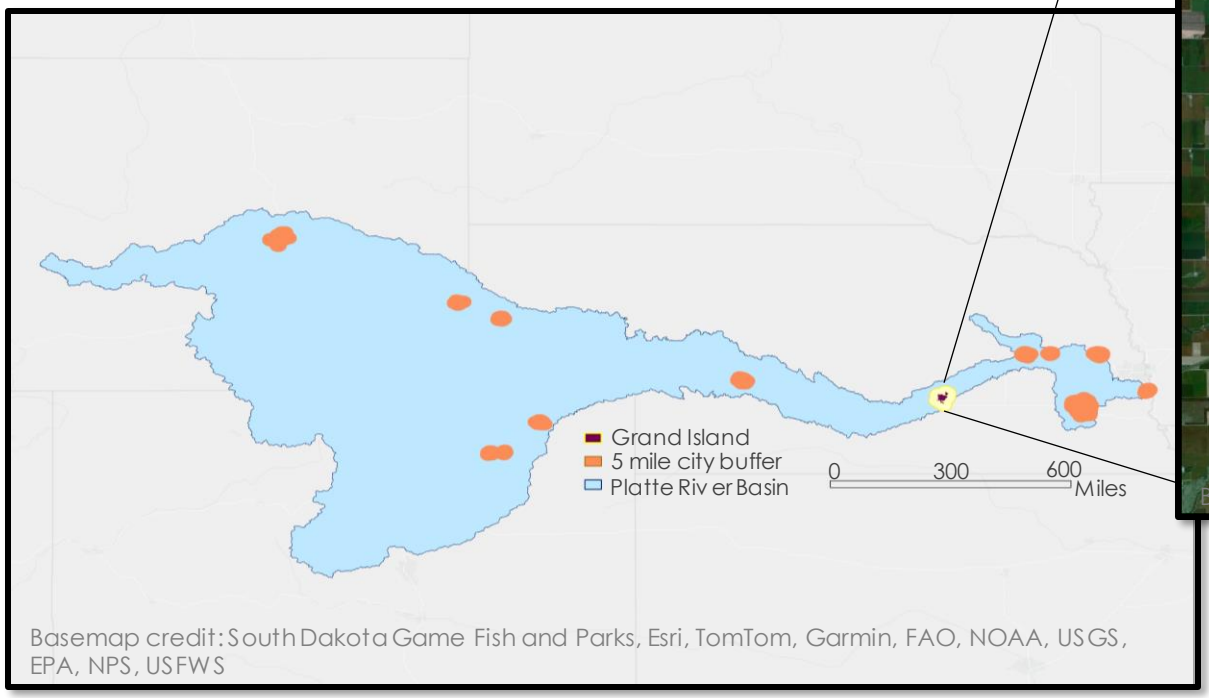
Methods – Flood Extent

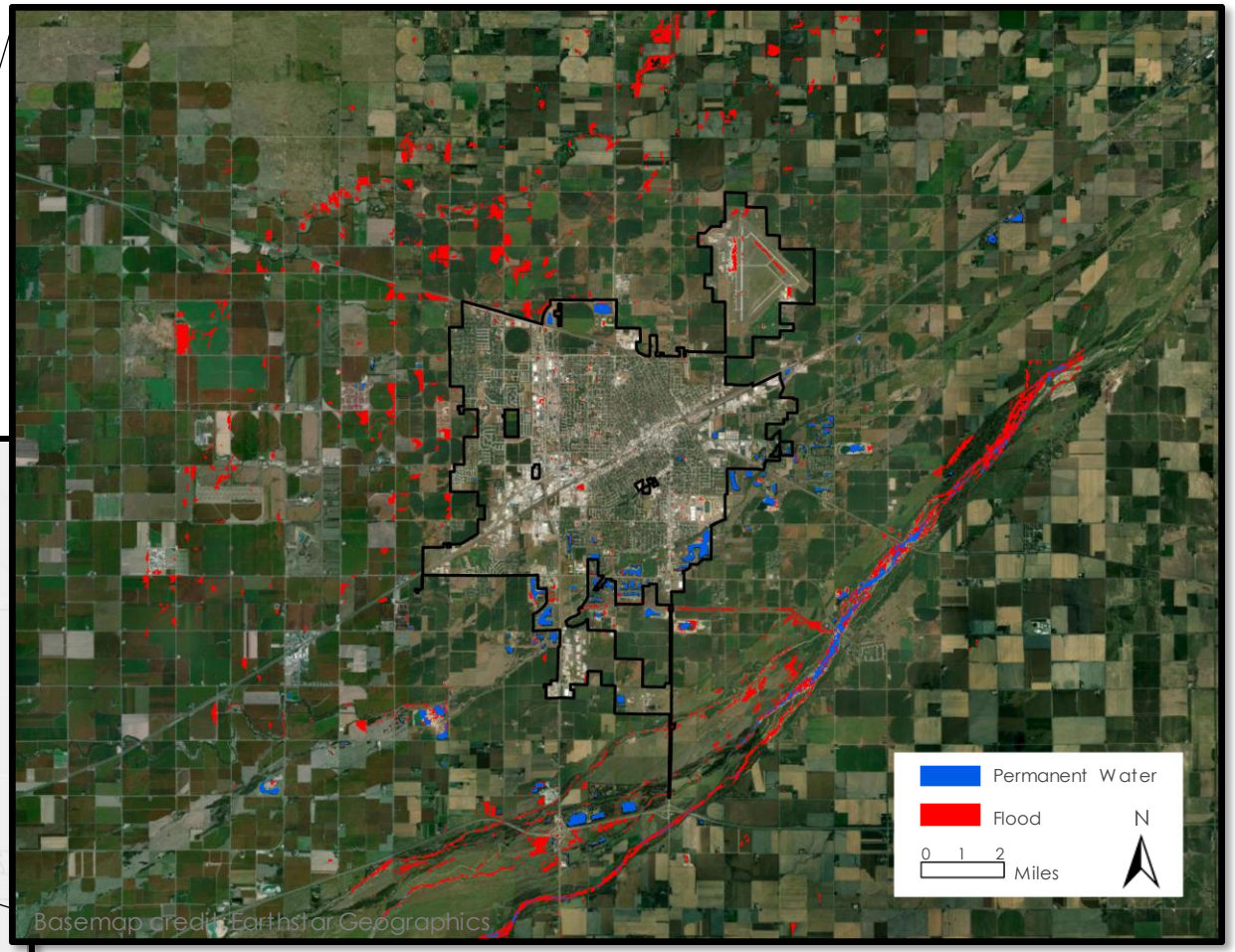


Results – Flood Extent

Flood Extent, 30 m
Grand Island, NE
March 1 – 21, 2019

Capturing March 14th, 2019 flood event





Limitations

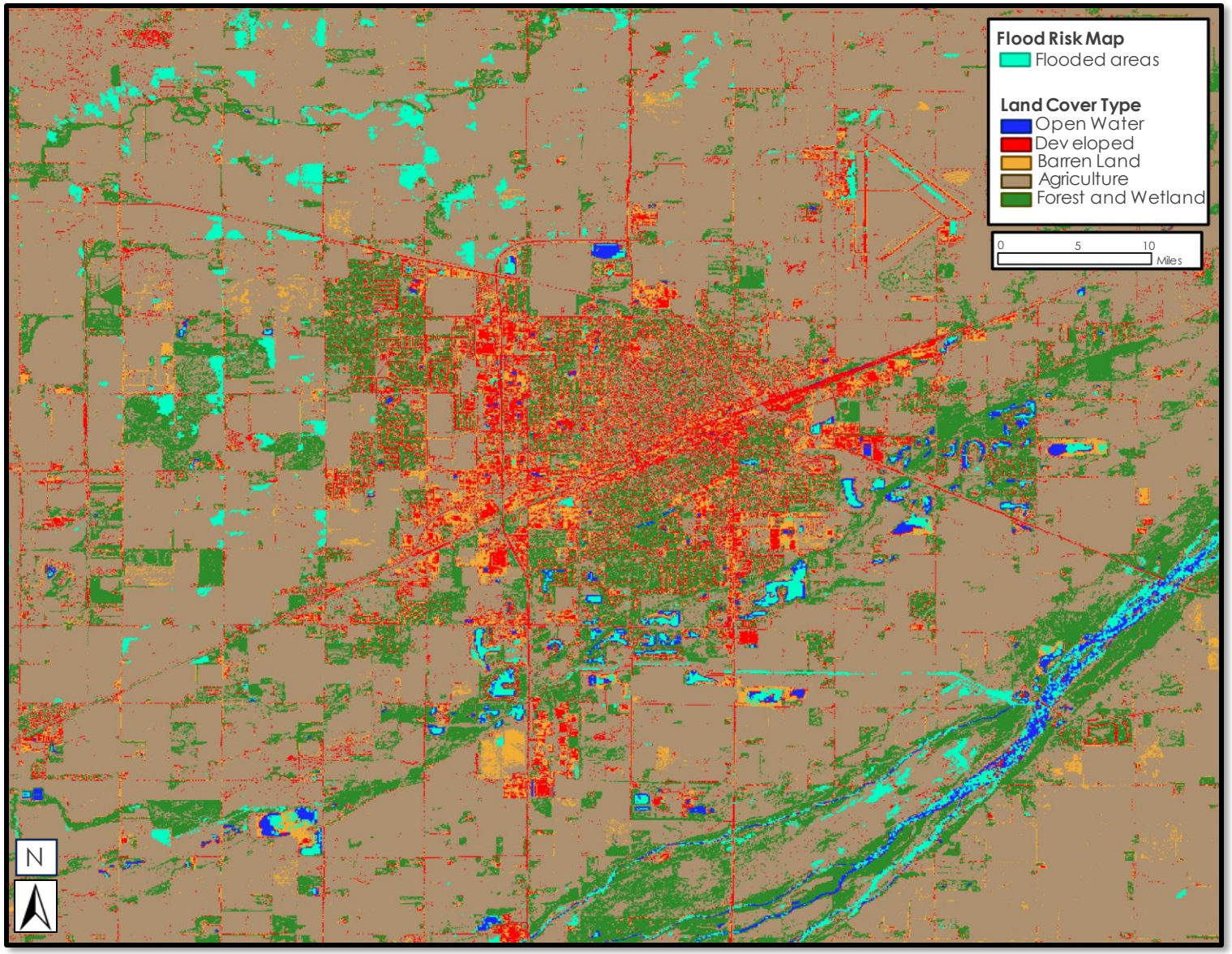
Image Credit: Lindsay Vivian, USFWS

- **Size** of the basin introduced difficulties
- Our reduced area of interest highlights **priority cities**
- Limited **field verification** for flood events
- **Limited availability** of Sentinel-1 images for HYDRAFloods
- **Satellite imagery resolution** made wetland classification difficult

Conclusions

- Combination of classifications and flood risk map identifies possible restoration sites (depicted in Grand Island)

- High-resolution ML classifications in targeted cities aid in understanding the relationship between urban growth, wetland delineation, and other LULC variables



Future Work

Image Credit: Tom Koerner, USFWS

- Fine-tuning classification
- Complete HYDRAFloods for other cities
- Mask wetlands in land classification using SAR, LiDAR, or National Wetland Inventory datasets
- Urban Growth Model

Acknowledgments

- Audubon Great Plains
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- DEVELOP Georgia – Athens
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  - Megan Rich, Center Lead
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