Converting Water Information to Water Intelligence

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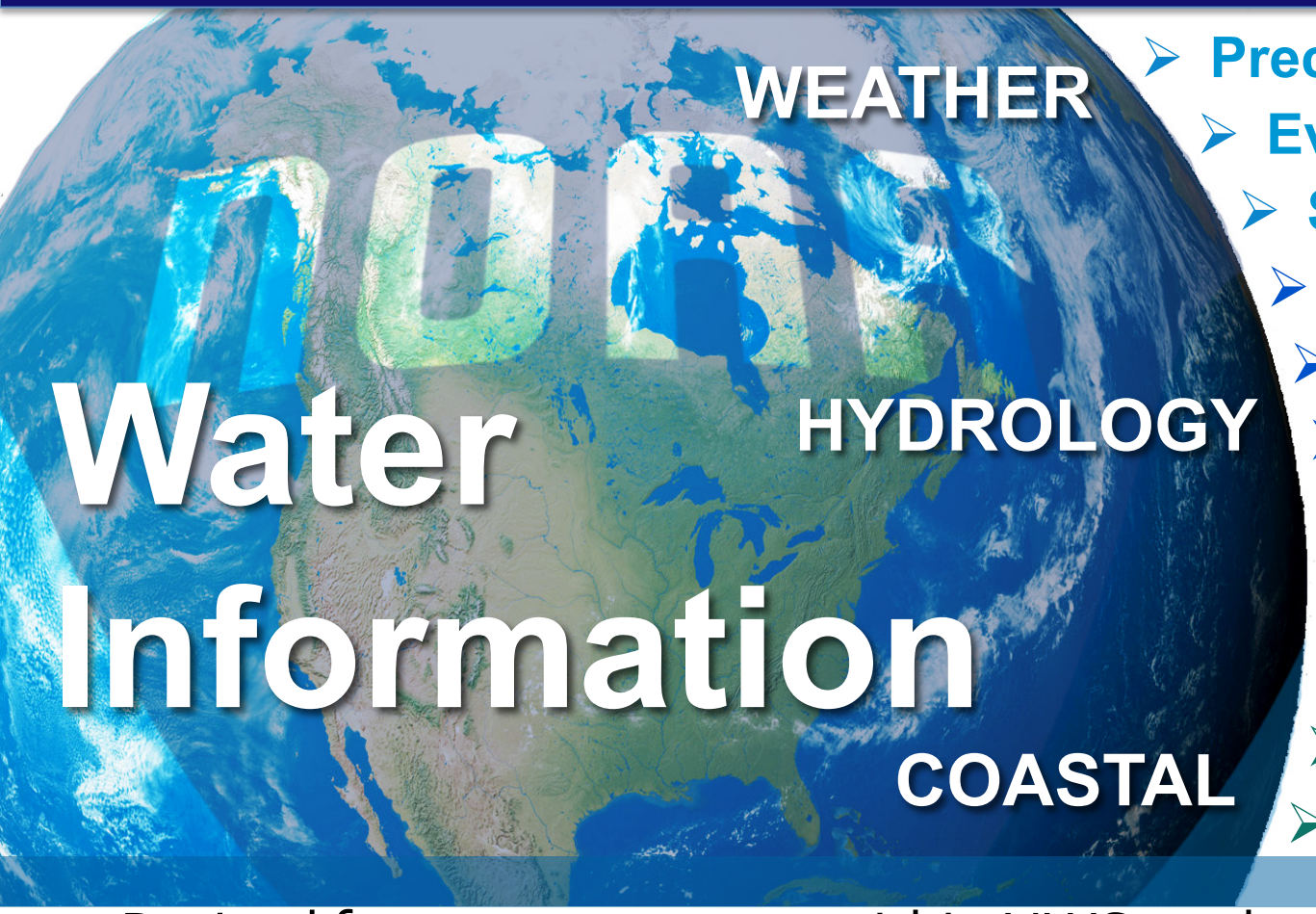
Water Information



- Precipitation
- Evaporation
- Snowmelt
- Runoff
- Channel Flow
- River Flooding
- Flash Flooding
- Drought
- Storm Surge
- Tides
- Sea Level Rise

- Derived from many sources within NWS, and across NOAA
- A variety of different formats, different spatial resolutions, and developed for different applications
- Information is an ingredient to intelligence

What are the criteria for Water *Intelligence*?

Timely, Actionable, and Credible

- NOAA Administrator Dr. Kathryn Sullivan, Nov 2014

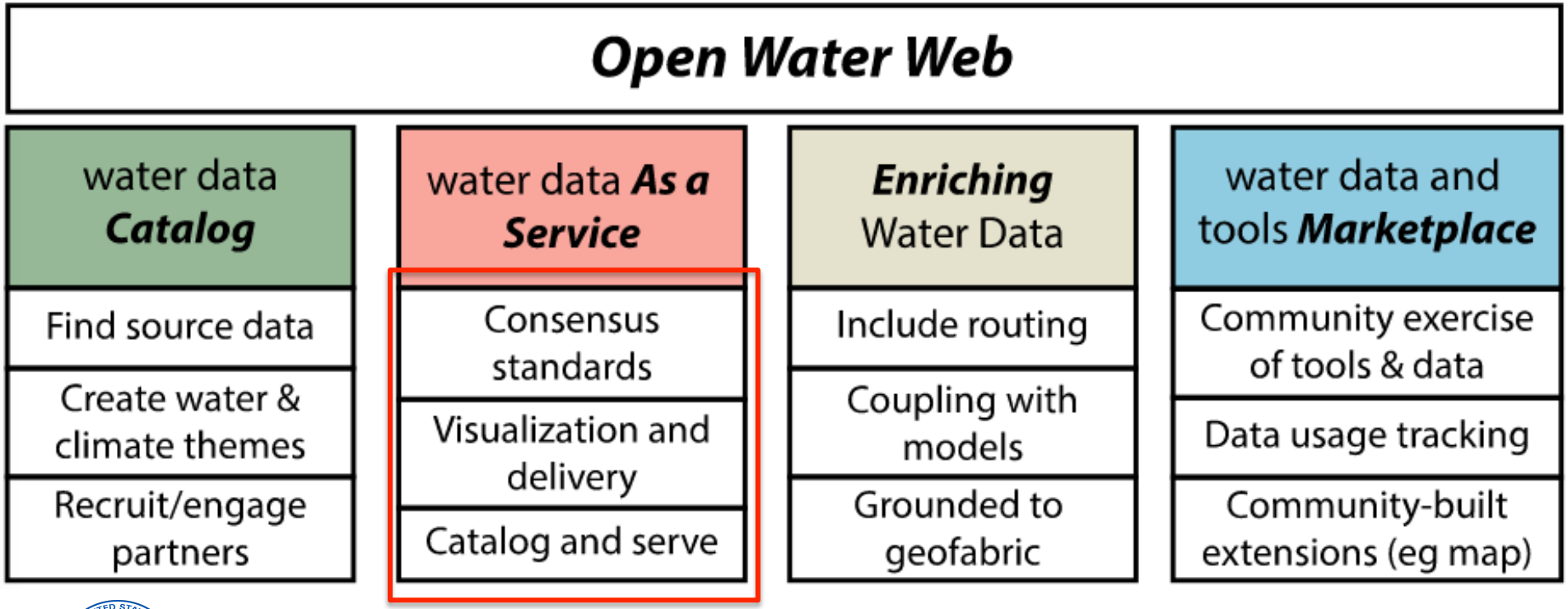
Accessible through data services, in machine readable formats using a common data model

- Executive Order 13642, May 2014

Capable of being integrated with partner's decision systems, thus necessitating a common geospatial framework

- ACWI Subcommittee on Spatial Water Data

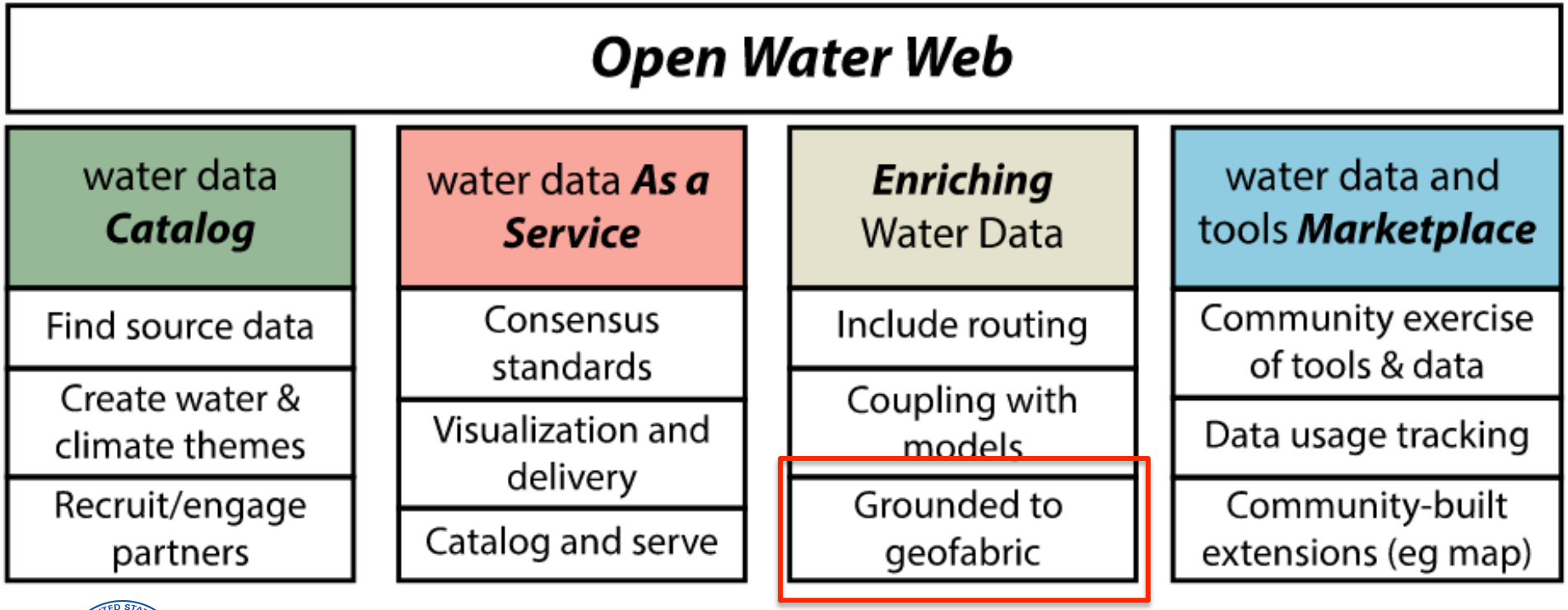
Water Intelligence: Accessible



- For time-series community is focused on WaterML2.0
- SOAP and RESTful data services
- For geospatial data, CF-netCDF
- Bolstered by the NSF investments in EarthCube and hydro-informatic community, and through collaboration with the academic community

Reference: Subcommittee on Spatial Water Data: www.acwi.gov/spatial/owdi

Water Intelligence: Accessible



- National Hydrography Data Set (NHD) Plus version 2 (NHDPlusV2)
- USGS assembled a national seamless data set in March 2015.

NHDPlusV2 available: ftp://ec2-54-227-241-43.compute-1.amazonaws.com/NHDplus/NHDPlusV21/Data/NationalData/

Water Intelligence: Geofabric

NHDPlusV2 River and Stream with Order > 3

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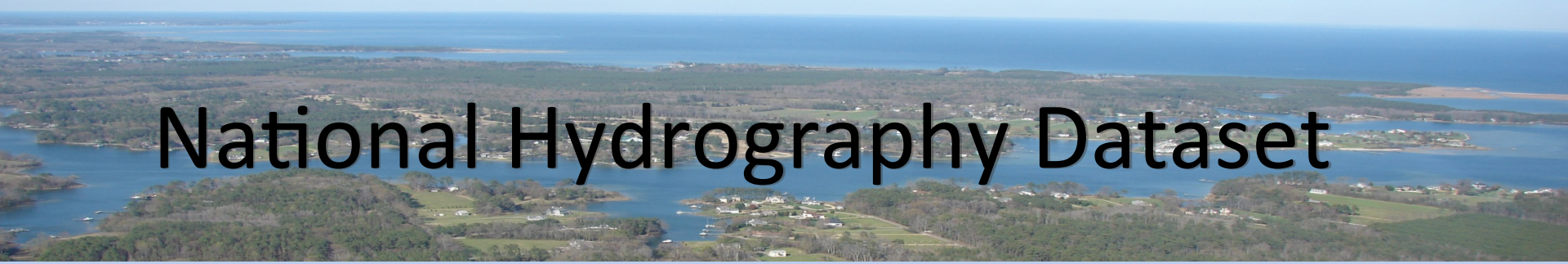


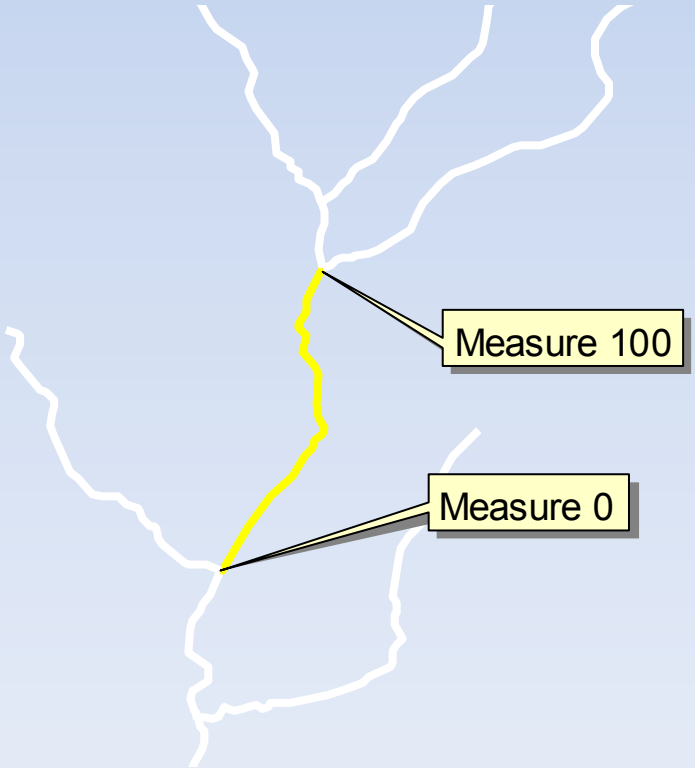
National Hydrography Dataset

- **The "National Framework" Dataset for Hydrography**
- **Origins in the Cartography of the USGS Quad Maps**
- **Stream Network ("blue lines") & Waterbodies**
- **Stable (nearly permanent) Reachcode Identifiers on Stream Network and Waterbody Features**
- **Flow Relationships & Ordered Geometry**

From Cindy McKay, Horizon System Corporation

National Hydrography Dataset

Addressing Linear Reaches



- **Each linear reach is one addressable unit - a 'street'**
- **Each reach is assigned a unique Reachcode –**

  the 'street name'
- **Addresses are proportional**

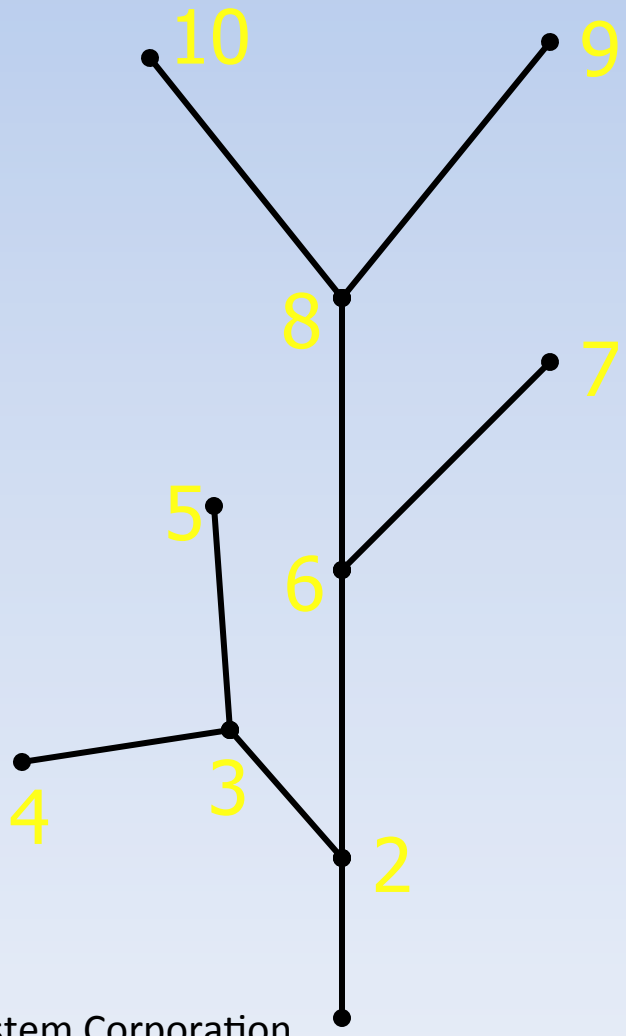
  'street' numbers 0-100
  from bottom to top

From Cindy McKay, Horizon System Corporation

National Hydrography Dataset

From node/To node

- Set of nationally unique identifiers for the node endpoints of the flowlines.
- Nodes are conceptual.
- Compact Numbers



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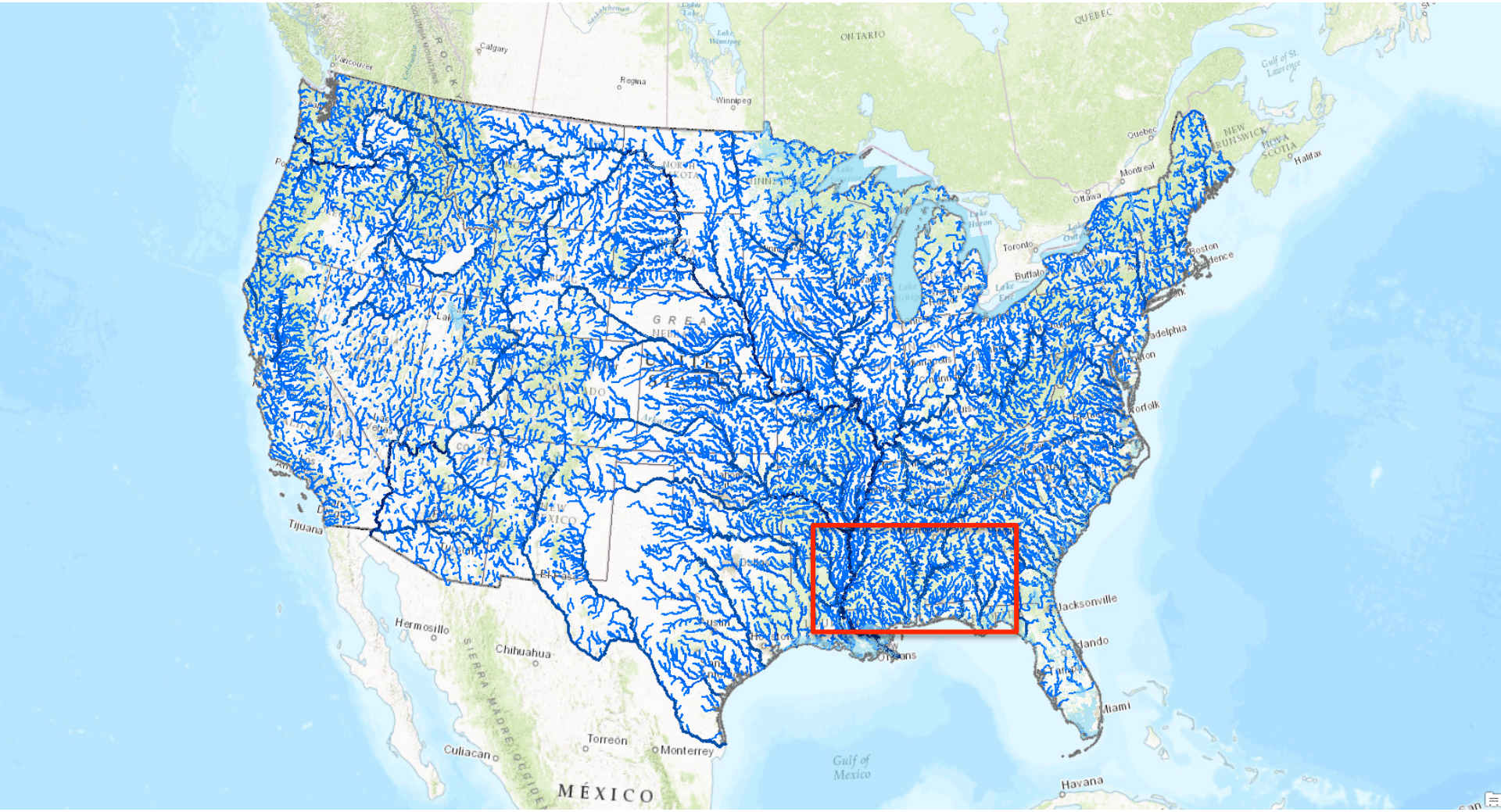
Water Intelligence: Geofabric

NHDPlusV2 River and Stream with Order > 3



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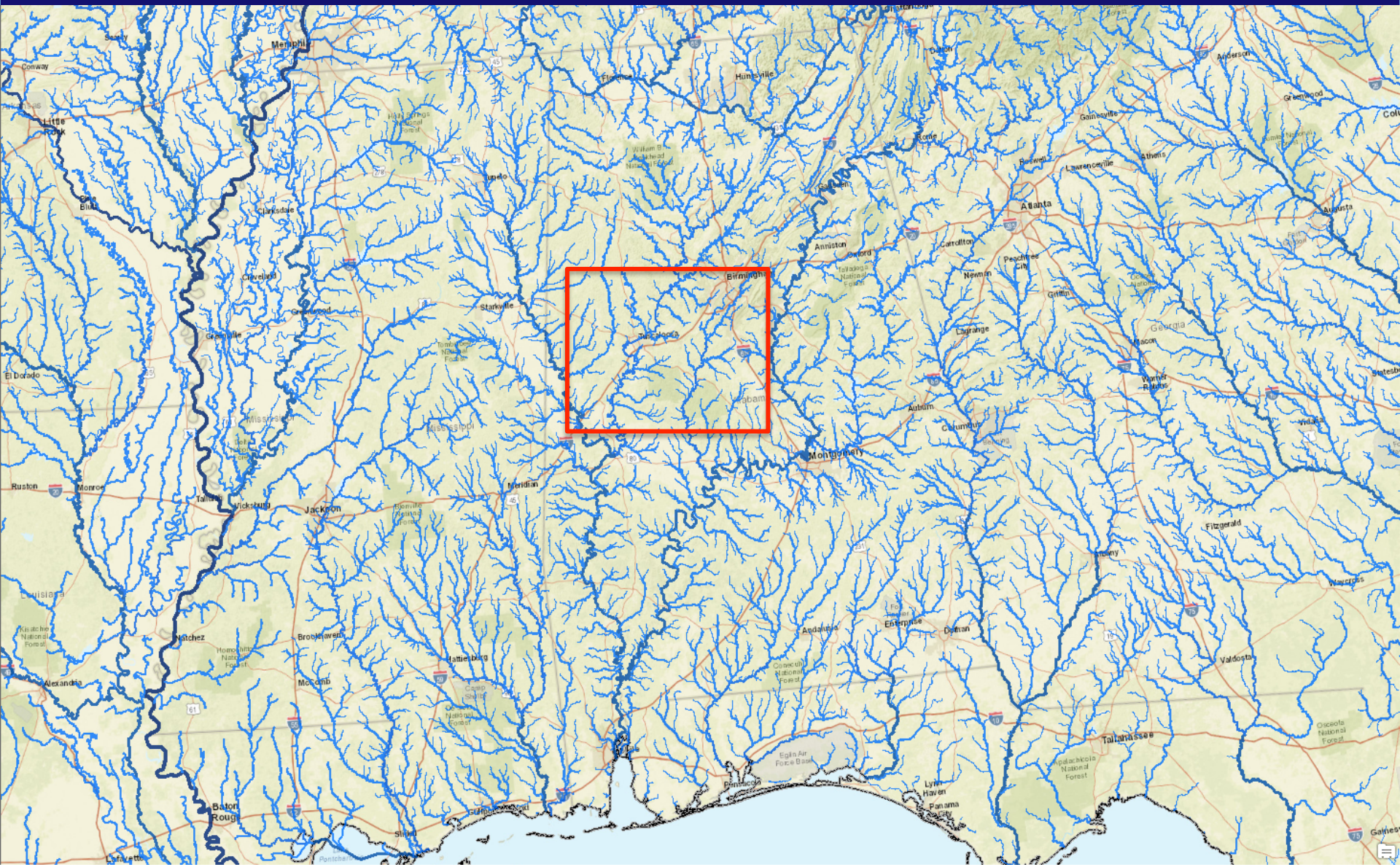
Water Intelligence: Geofabric



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Water Intelligence: Geofabric

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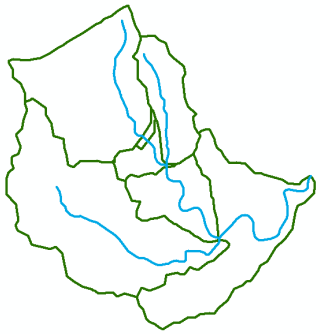
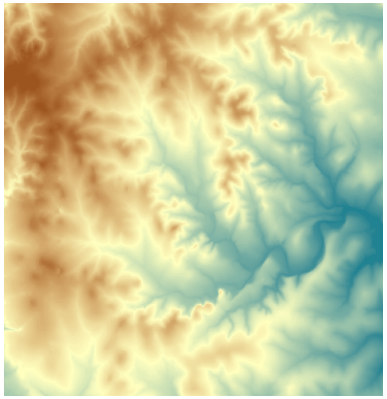
Flood Inundation Mapping – NHDPlus-HAND Method

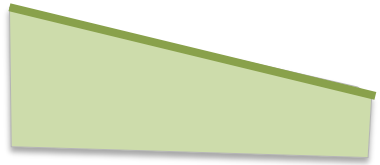


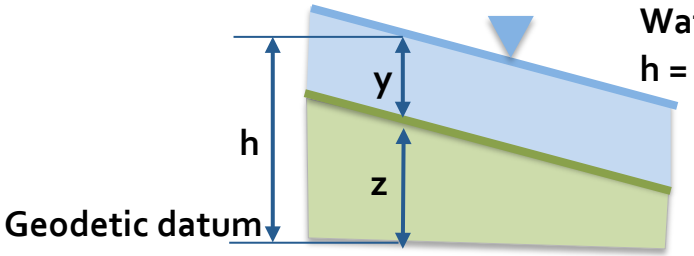
NHDPlus

Catchments and Flowlines

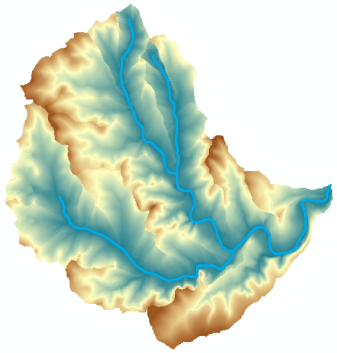


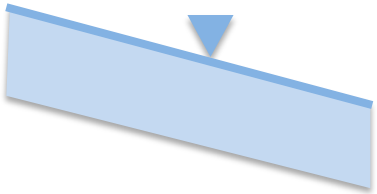
Digital Elevation Model





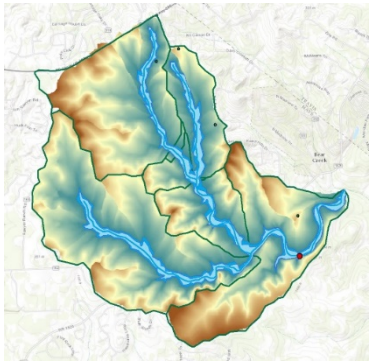
Water surface elevation
h = z + y





Height Above Nearest Drainage (HAND)

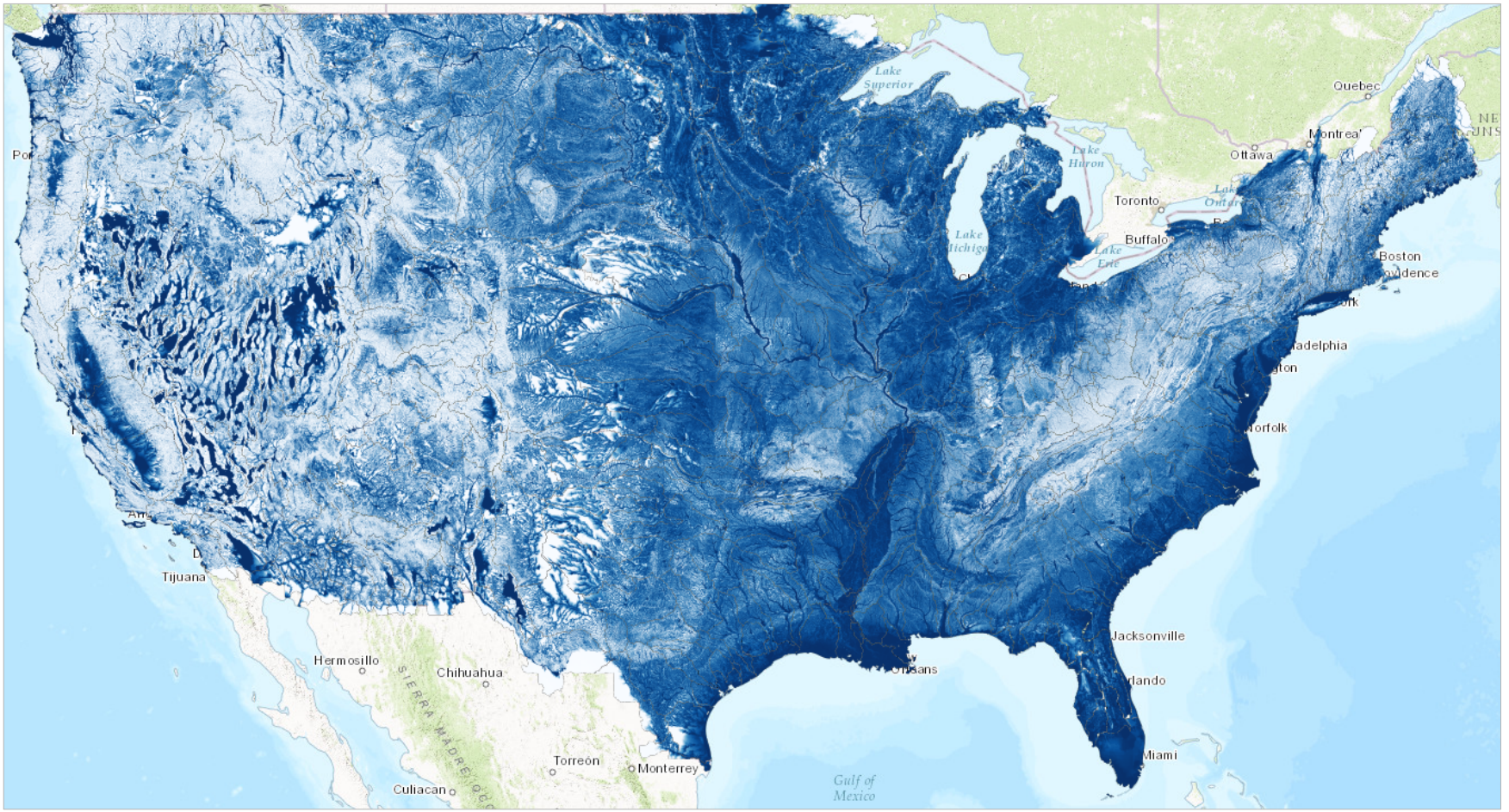
(relative elevation of land surface cell above cell in NHDPlus stream to which it flows)



Inundation map

Height above drainage < 15 ft)

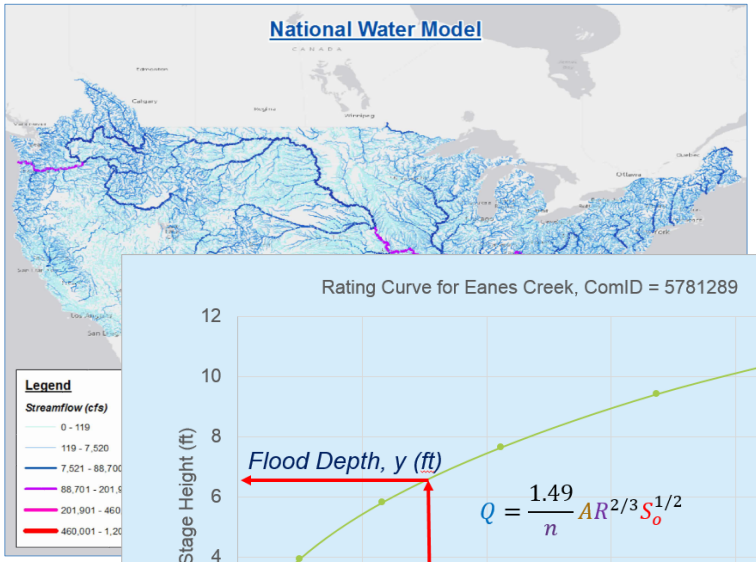
Height Above Nearest Drainage for Continental US



Source: Yan Liu and Hu Hao, University of Illinois at Urbana-Champaign

http://www.arcgis.com/home/webmap/viewer.html?webmap=70cf384091d347719e424c0e47ec9a7a

Model agnostic method for Flood Extent Mapping



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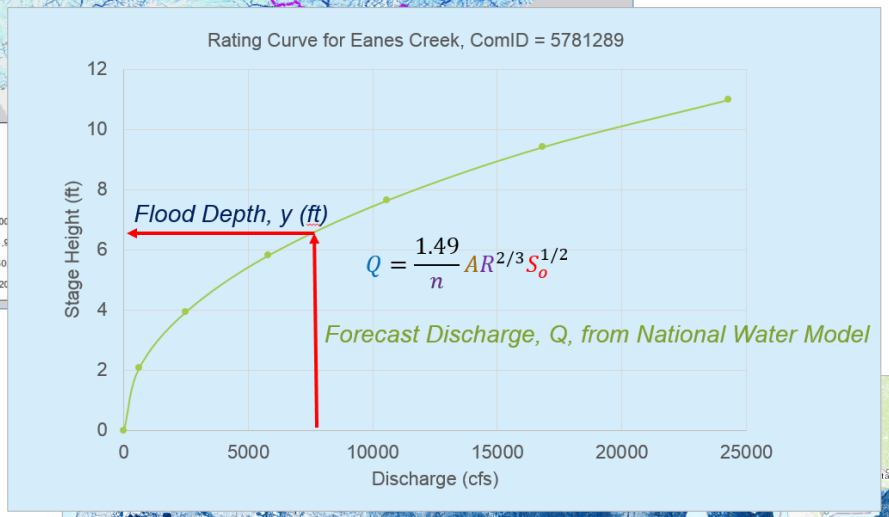

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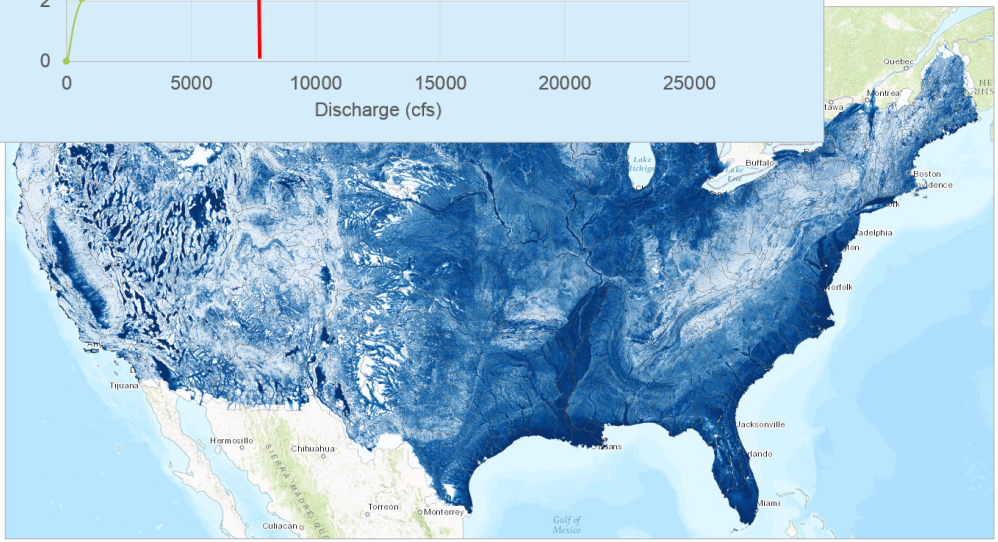

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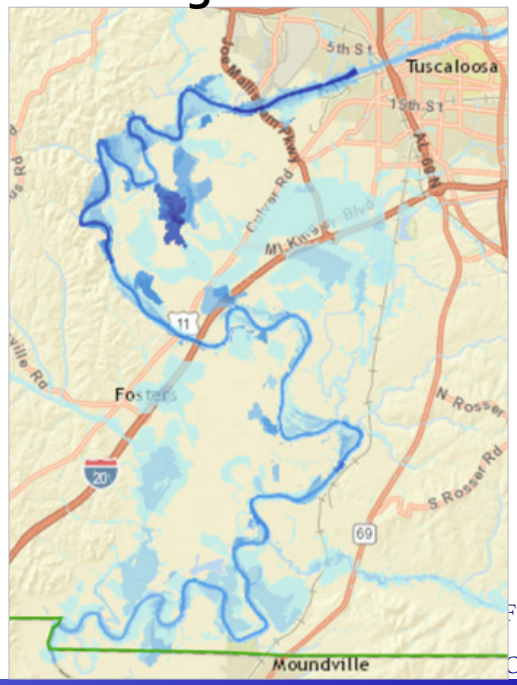


1. Forecast discharge with, official River Forecast Center forecast, or National Water Model guidance

2. Convert discharge to depth using real or synthetic rating curve

3. Convert depth to inundation using HAND

Tuscaloosa County Address Points

80986 Address Points
2526 Building Campsites
619 Mobile Homes
81,605 Total

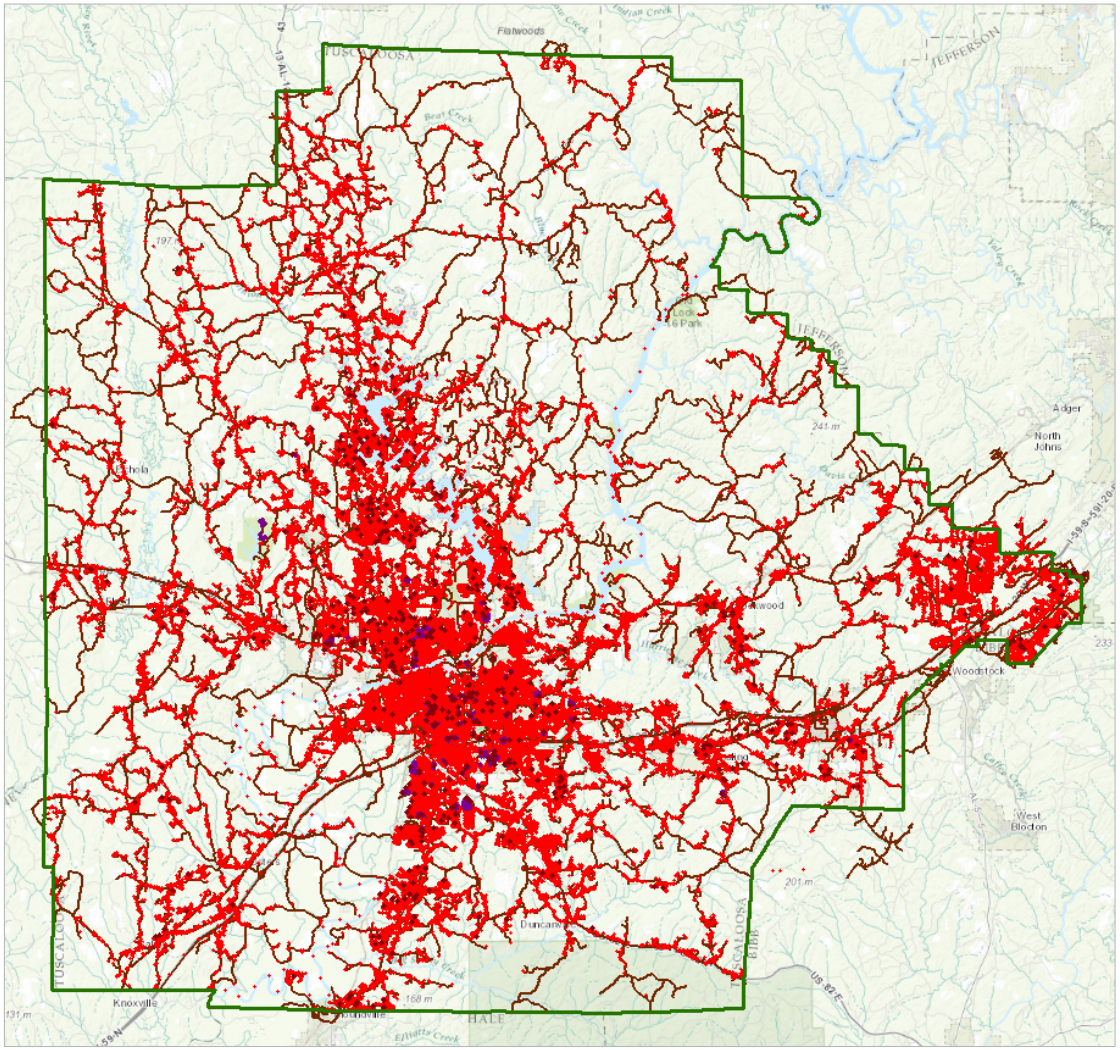
TuscaloosaCo_Subdivisions_Mobile_Home_Parks

TuscaloosaCo_Lot_Building_Campsite_Numbers

TuscaloosaCo_Address_Points

TuscaloosaCo_Roads

National Water Center



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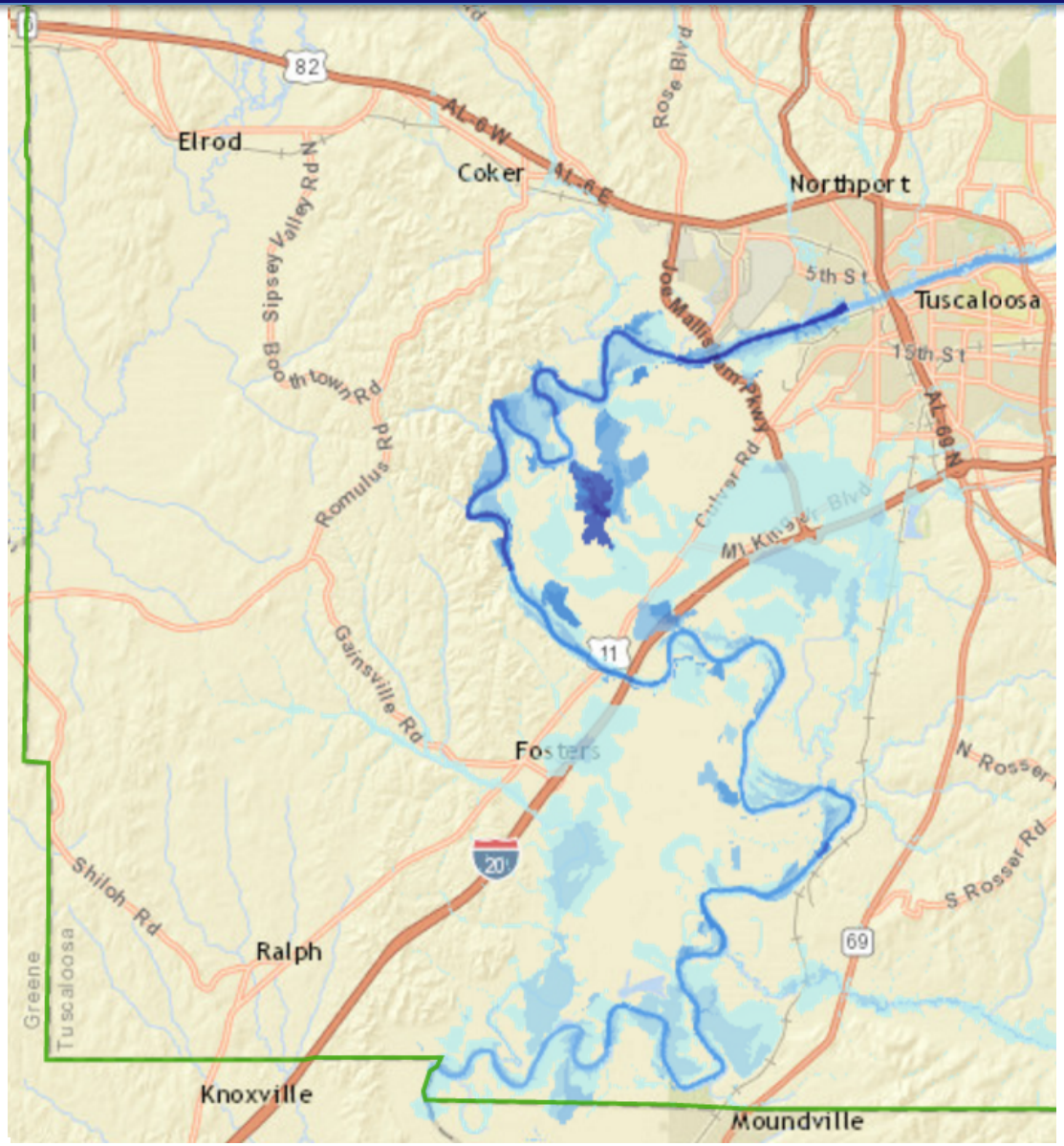
Flood Mapping Computed with HAND



Normal Conditions

Start to Rise

Main Flooding

Start to Recede

Returning to Normal

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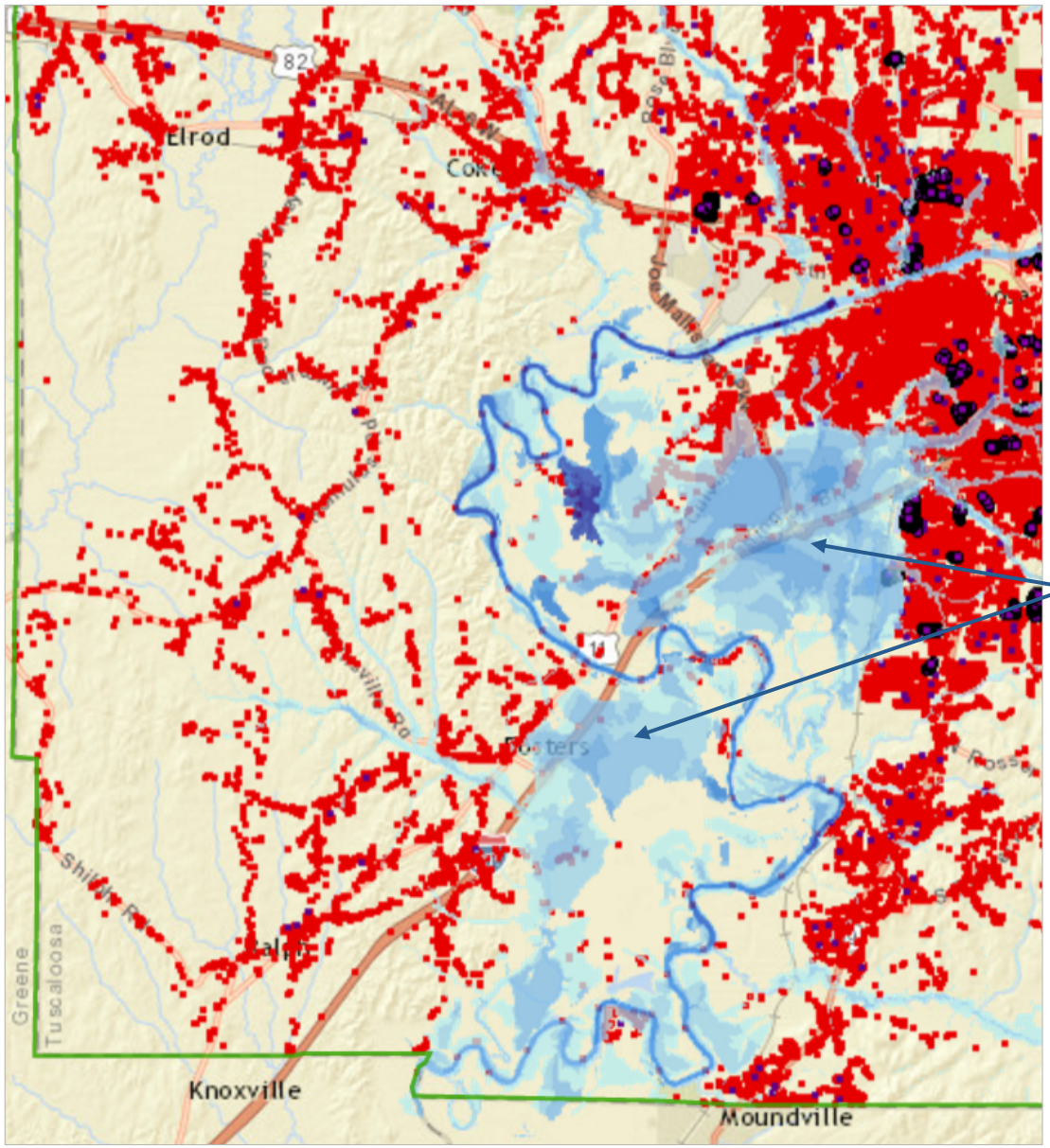
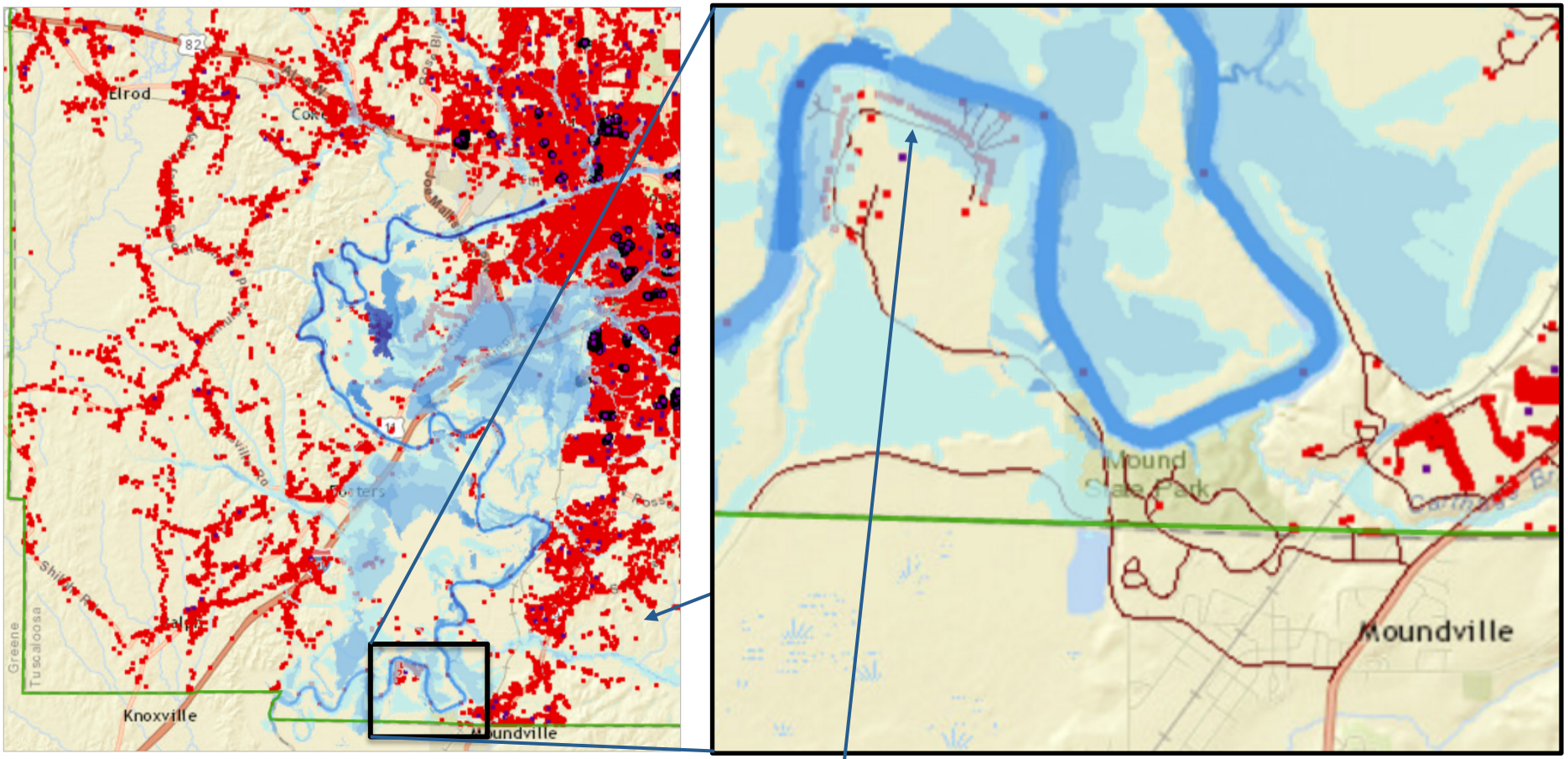
Address Points and Flooding



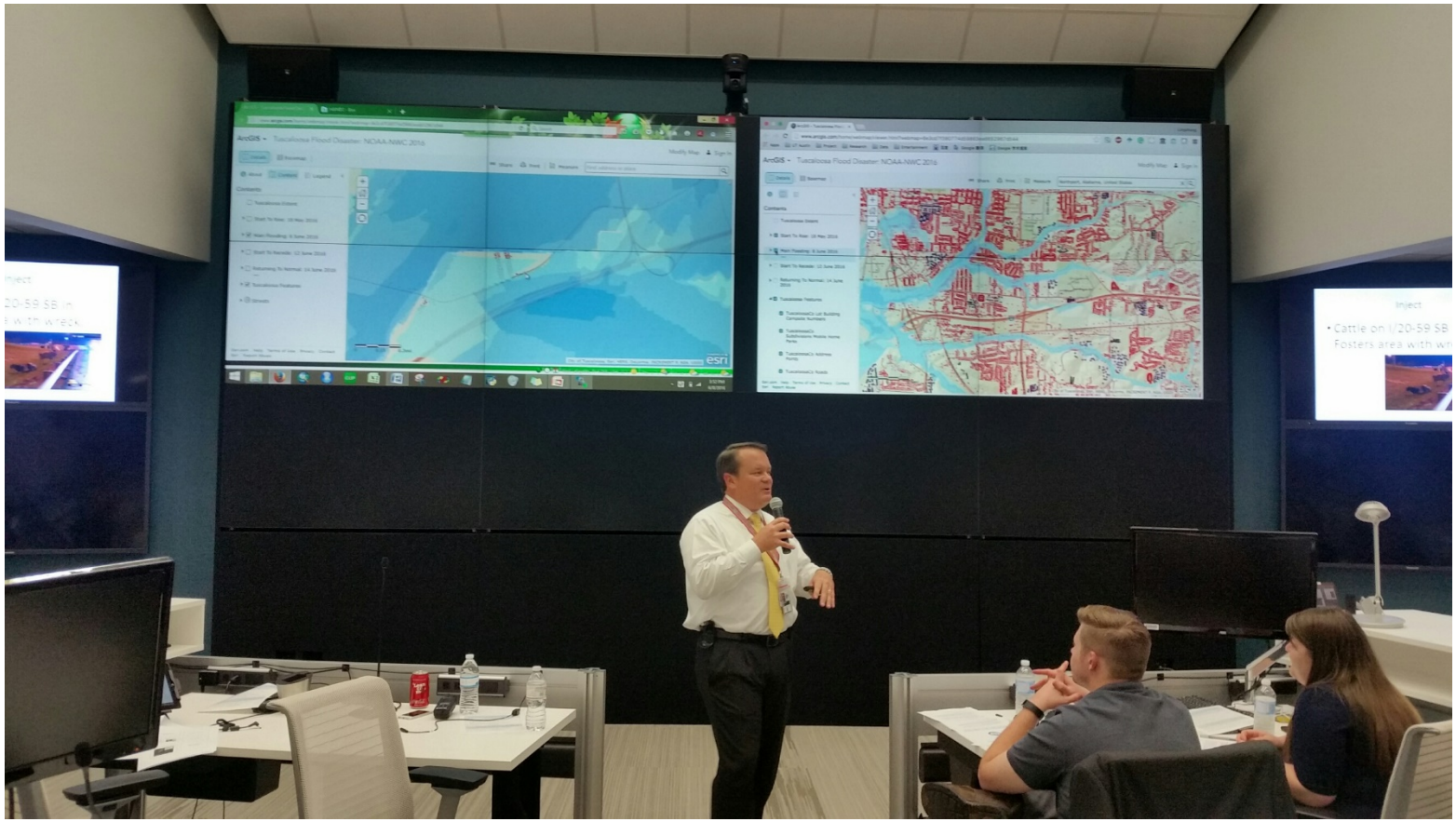
People don't live in flooded area

Area of Concern in Moundville

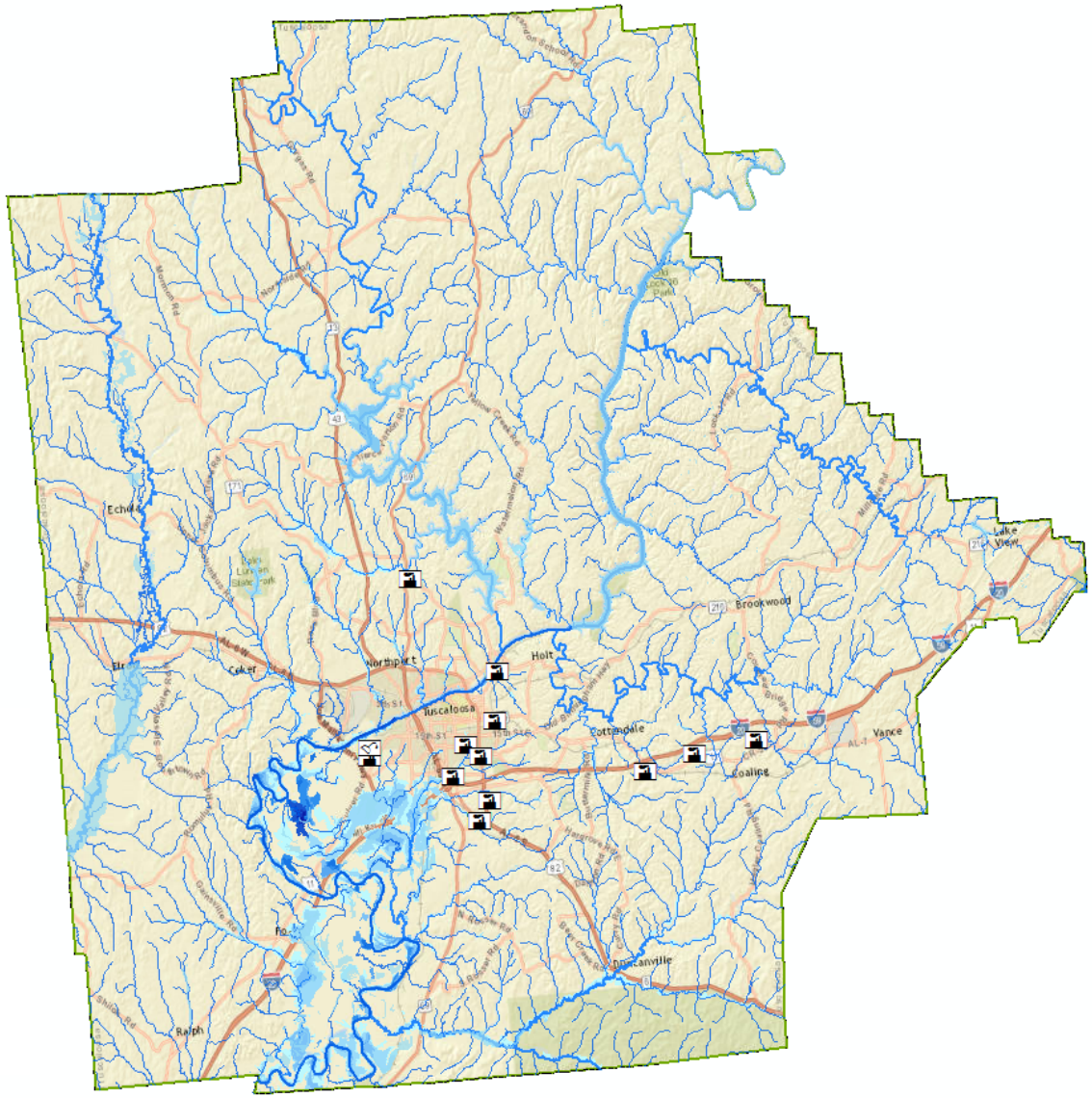


People trapped by floodwaters

Flood Emergency Response Exercise for Tuscaloosa County



Flood Impact Intelligence



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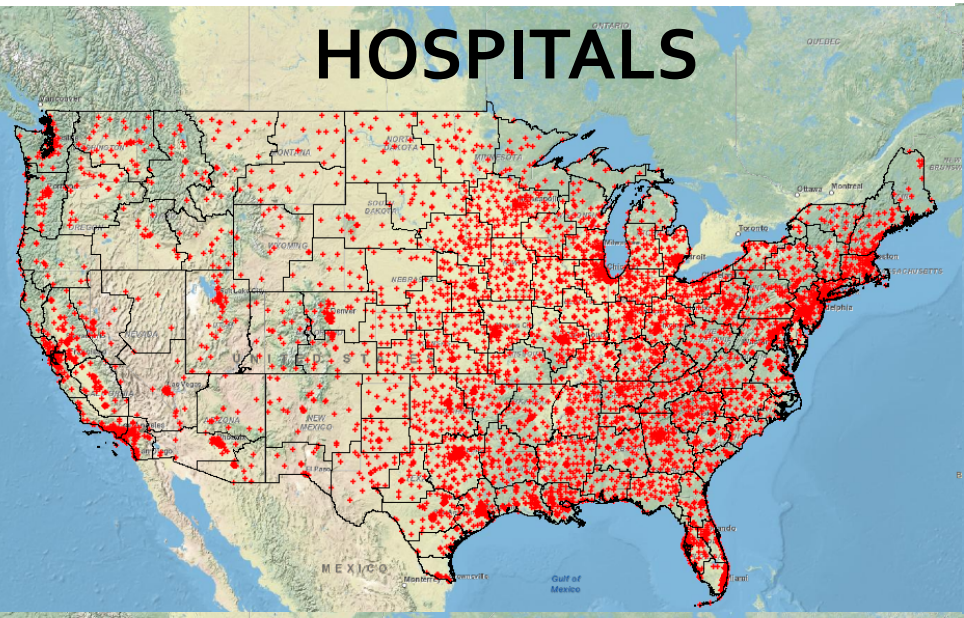
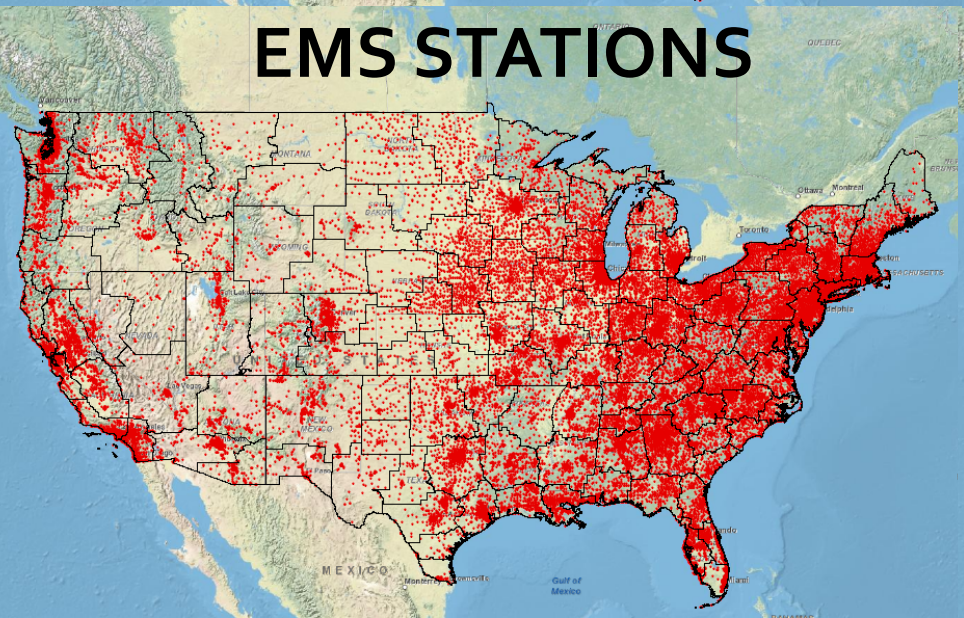
NATIONAL INFRASTRUCTURE

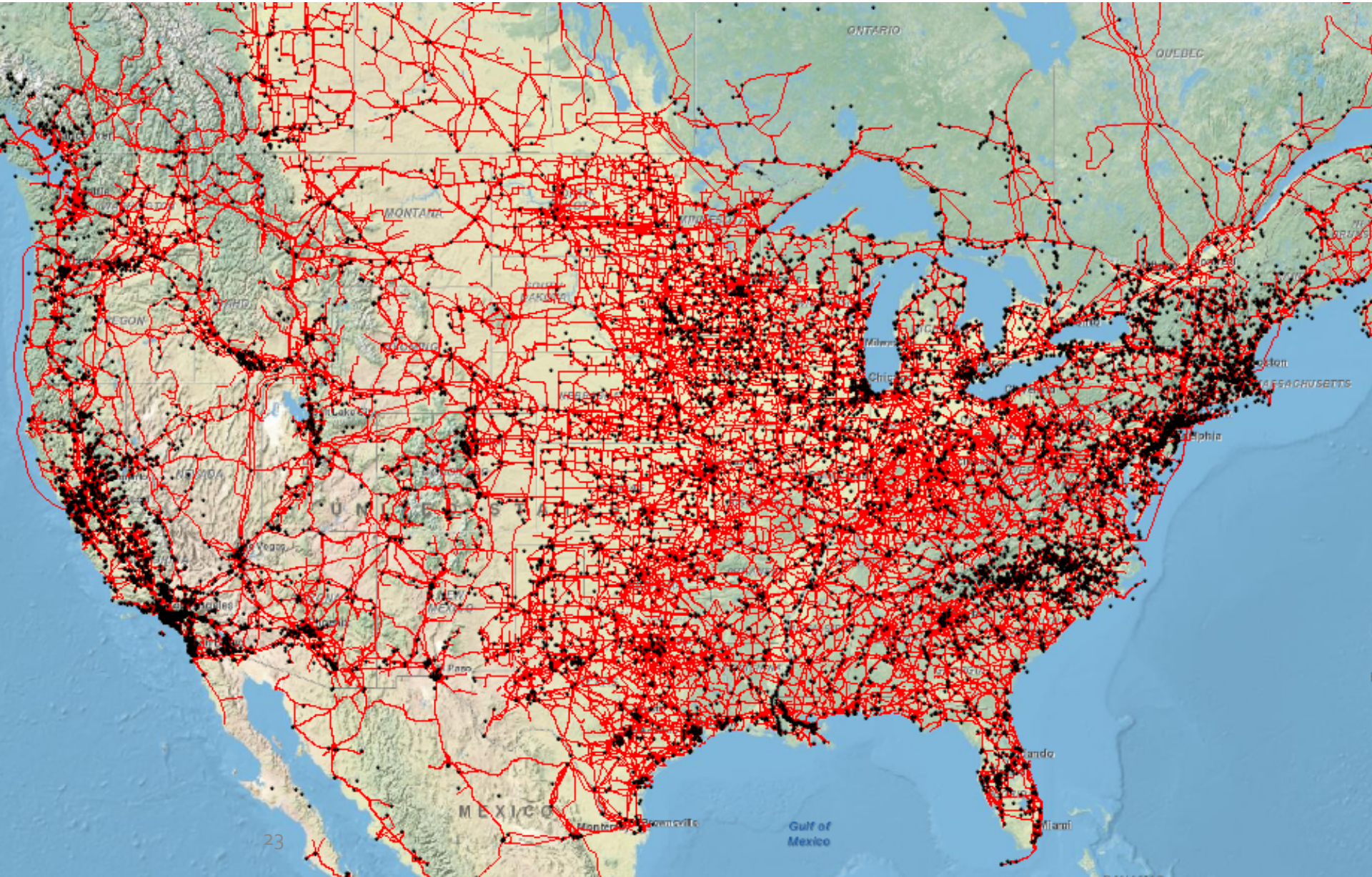
Emergency Services





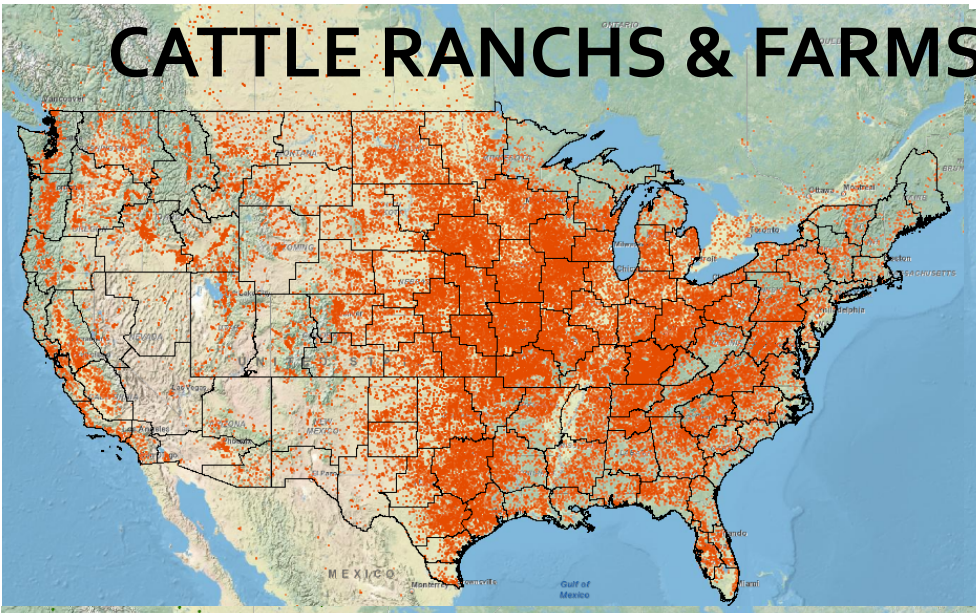
NATIONAL INFRASTRUCTURE

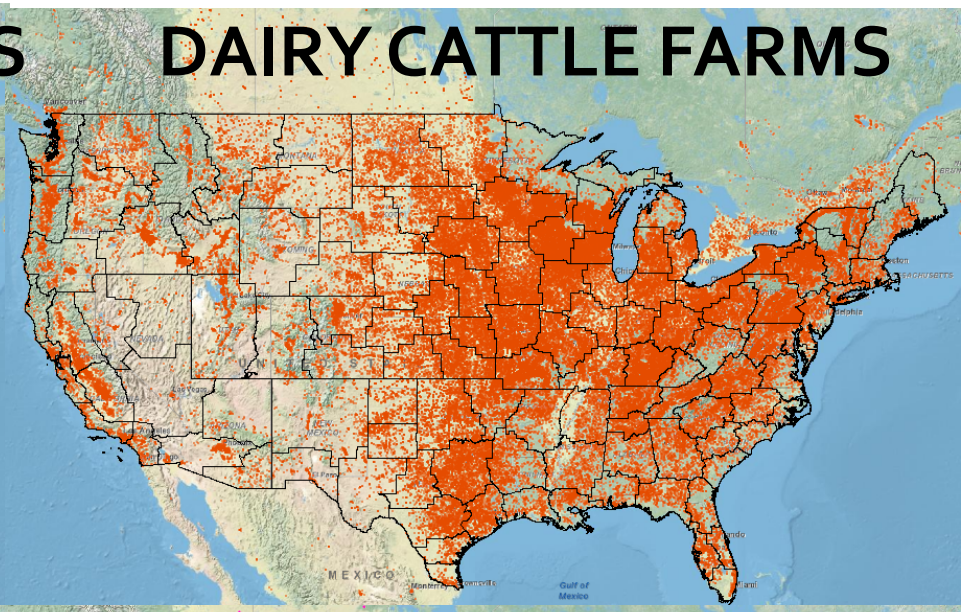
Electric Power Grid

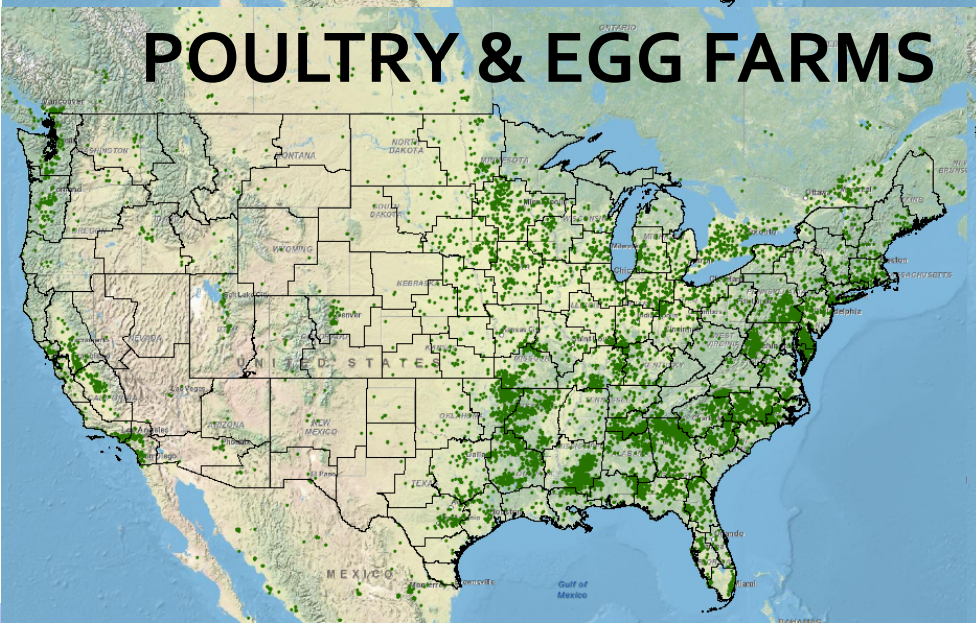


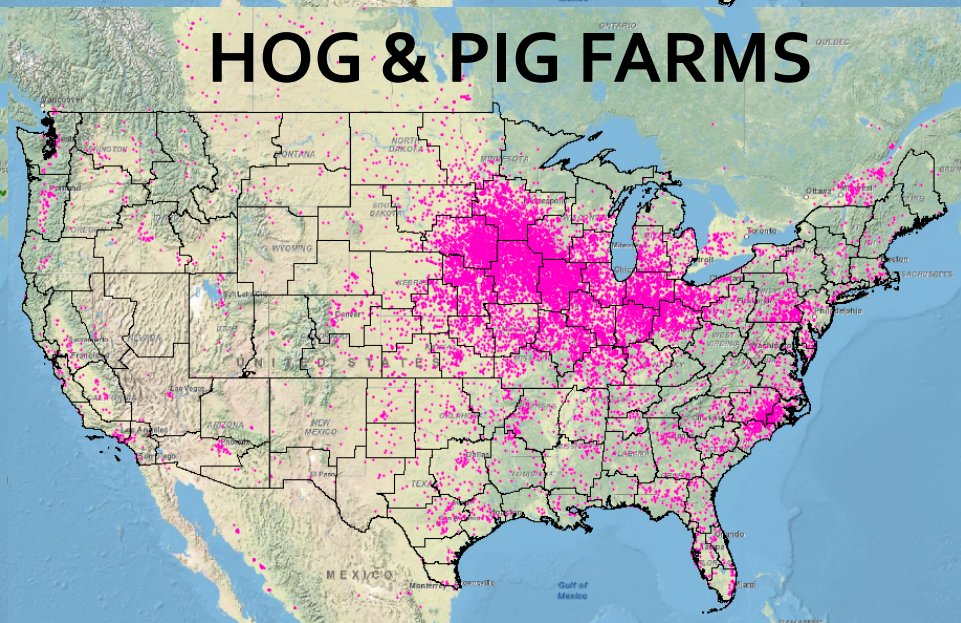
NATIONAL INFRASTRUCTURE

Livestock



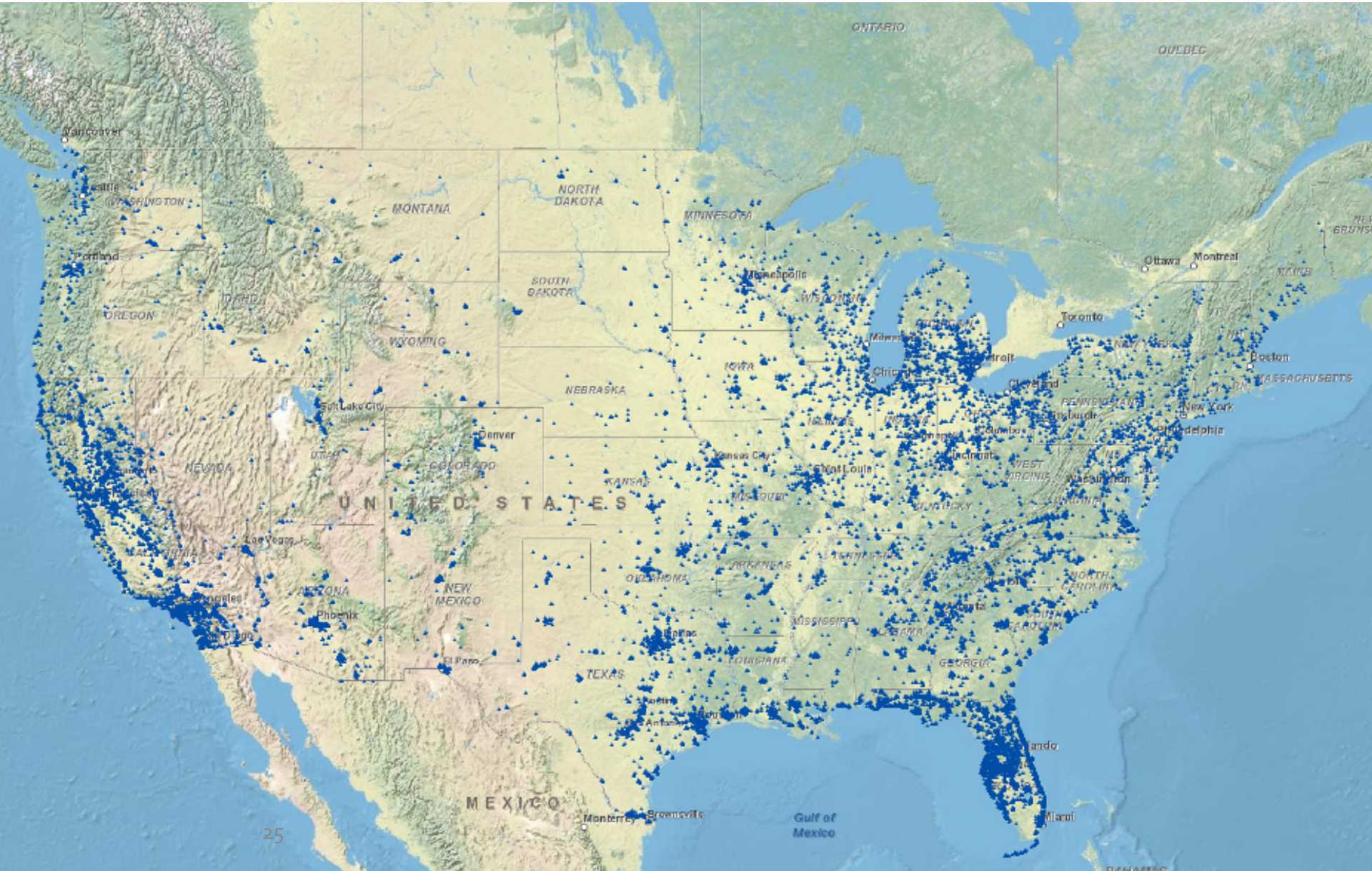






NATIONAL INFRASTRUCTURE

Mobile Home Parks



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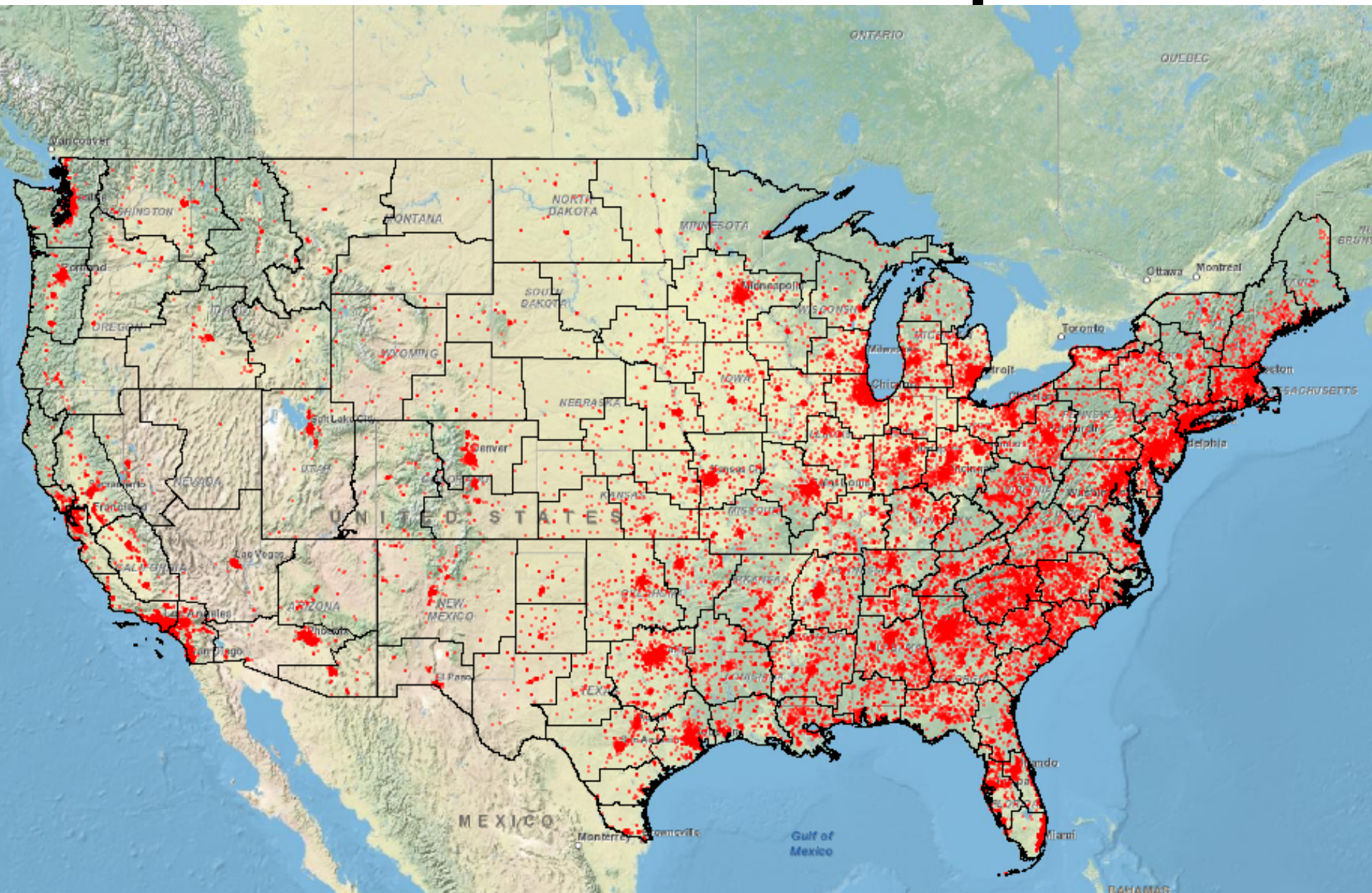
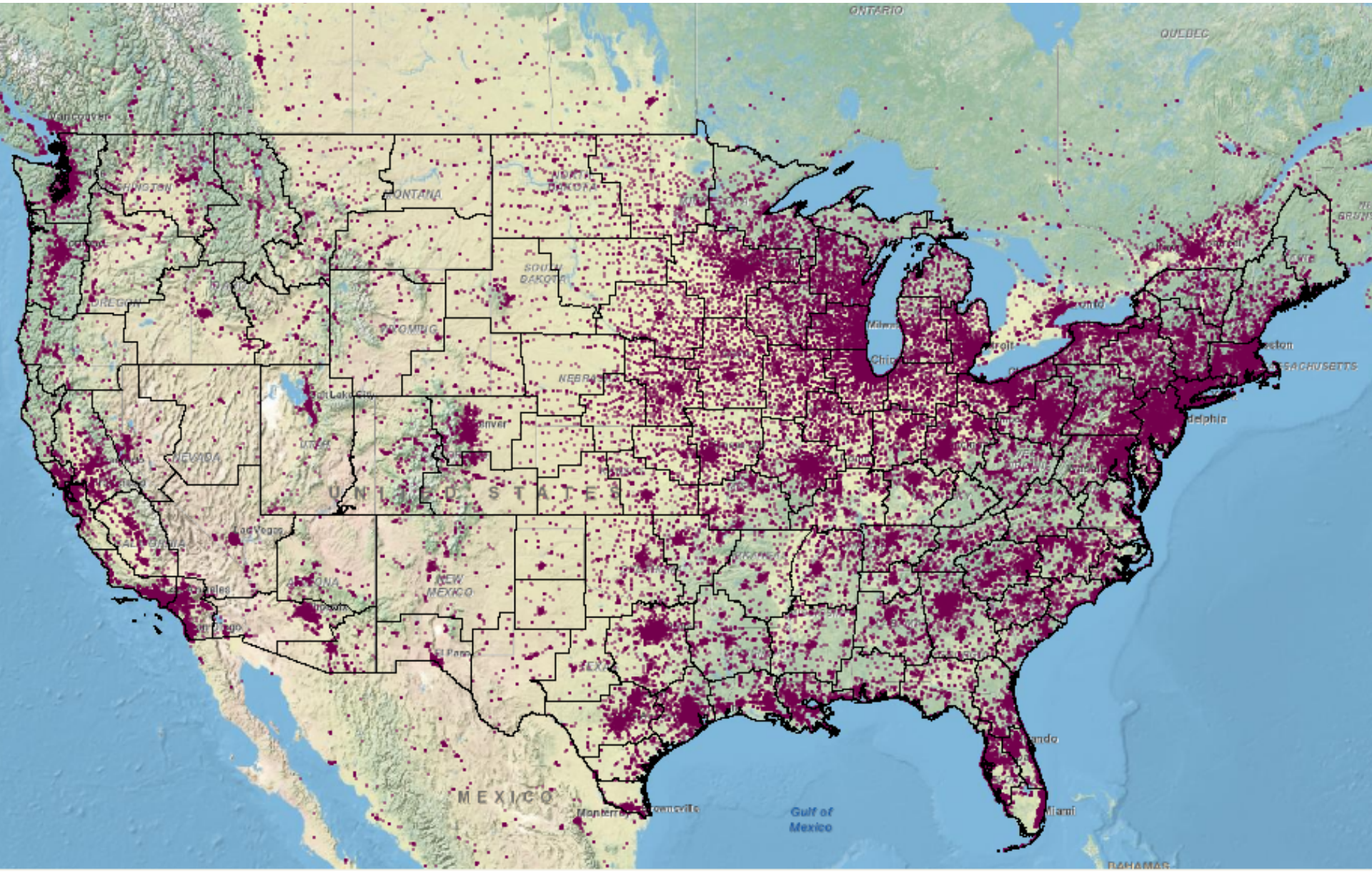
Places of Worship



NATIONAL INFRASTRUCTURE

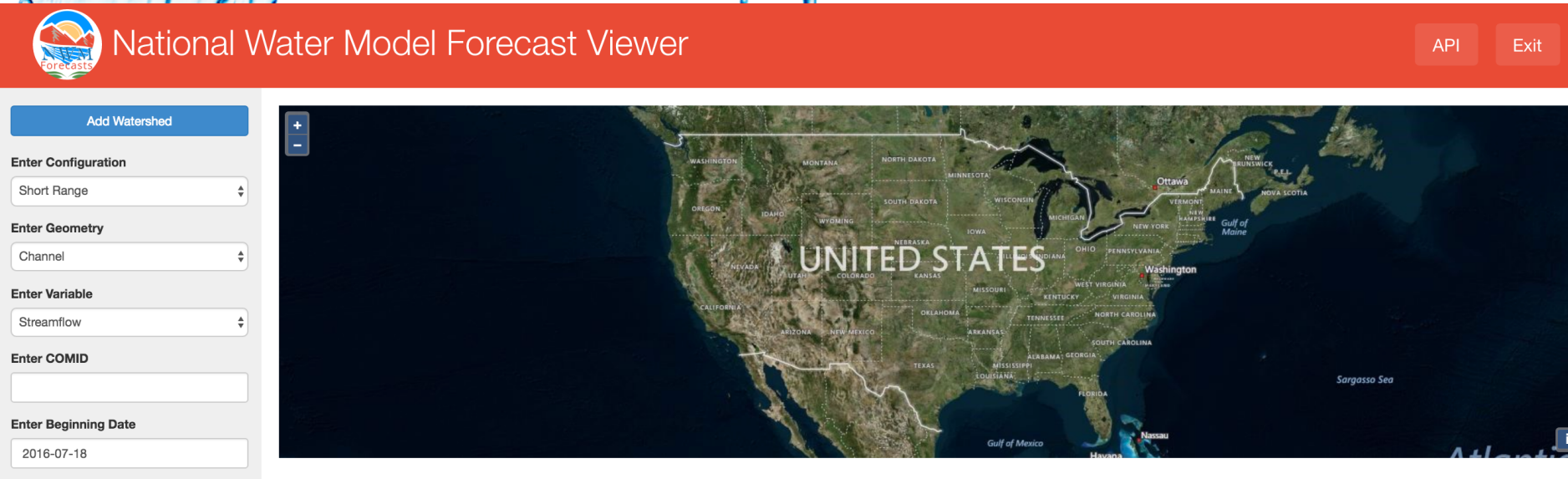
Drinking Establishments



Inspiring Water Intelligence: Tethys a collaborative portal

Tethys Platform

Tethys Platform has been designed to lower the barrier to water resources web app development. Convey your models and data as interactive web apps.



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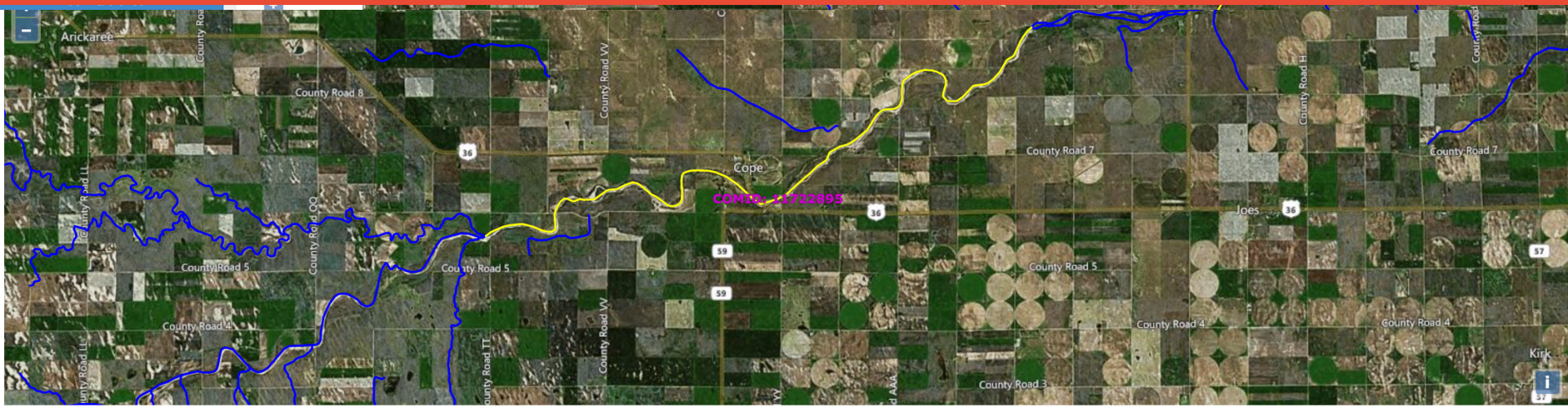
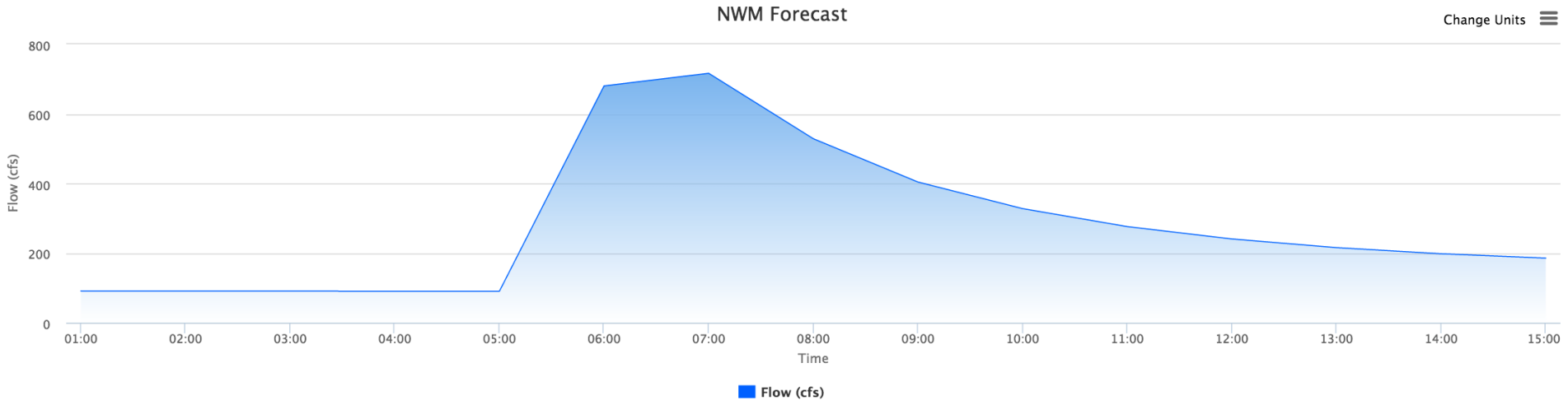
Inspiring Water Intelligence: Tethys a collaborative portal

National Water Model Forecast Viewer

API Exit





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Summary

- Water Intelligence benefits from the adoption of data standards and an embrace of data services
- Geospatially linked through a common geofabric
- Flood Inundation and extent is paramount
- Water *Intelligence* is built from water *Information* integrated with infrastructure and socio-economic data.
- A community effort, Government, Academia and private sectors engagement is key

Questions

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205-347-1360