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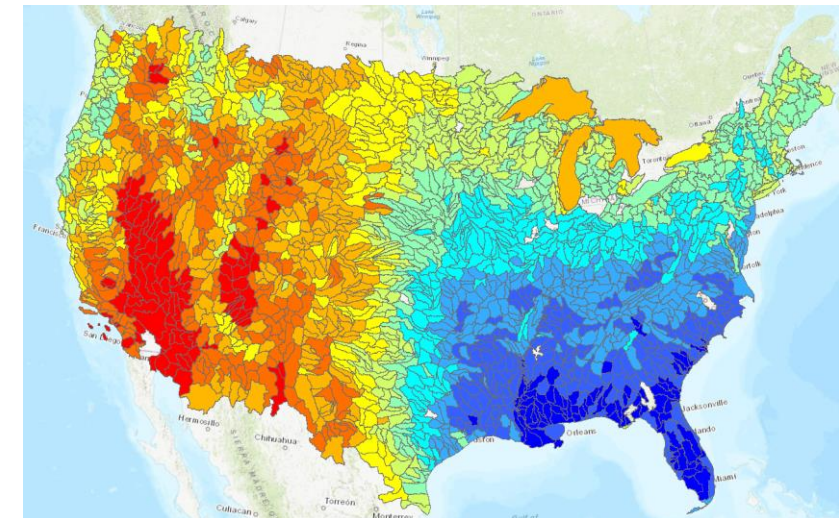
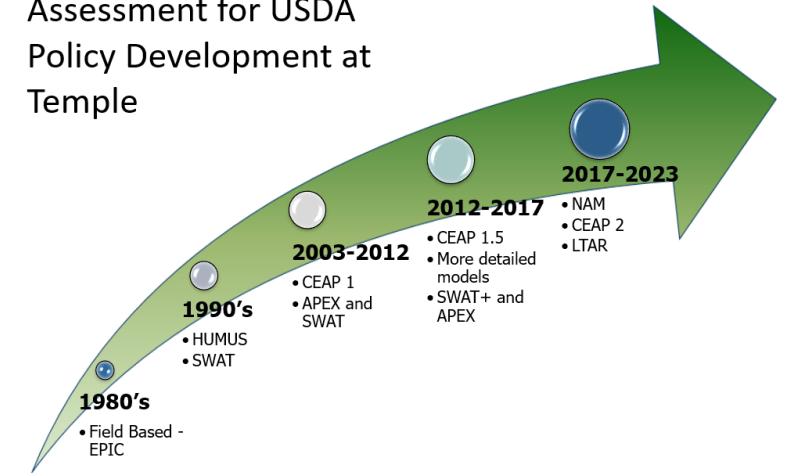
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NAM - THE NATIONAL AGRO- ECOSYSTEMS MODEL

INTRODUCTION

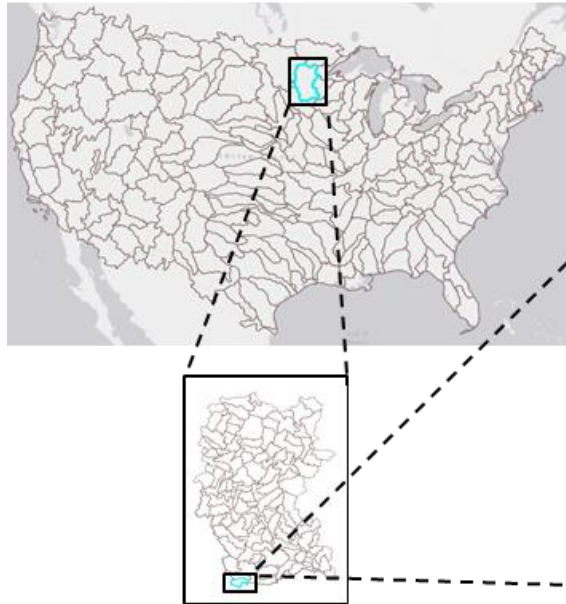
- A highly detailed national modeling framework developed to predict the effects of agriculture on the environment.
- Joint ARS/NRCS/Texas A&M effort
- Scope - Contiguous US
- Developed to support LTAR and CEAP II
- Conservation Effects Assessment Project (CEAP)
 - 2002 Farm Bill - significant increase in conservation funding
 - CEAP developed to guide and evaluate conservation programs
 - Survey current conservation
 - Estimate the benefits for water quality using models

History of Conservation Assessment for USDA Policy Development at Temple

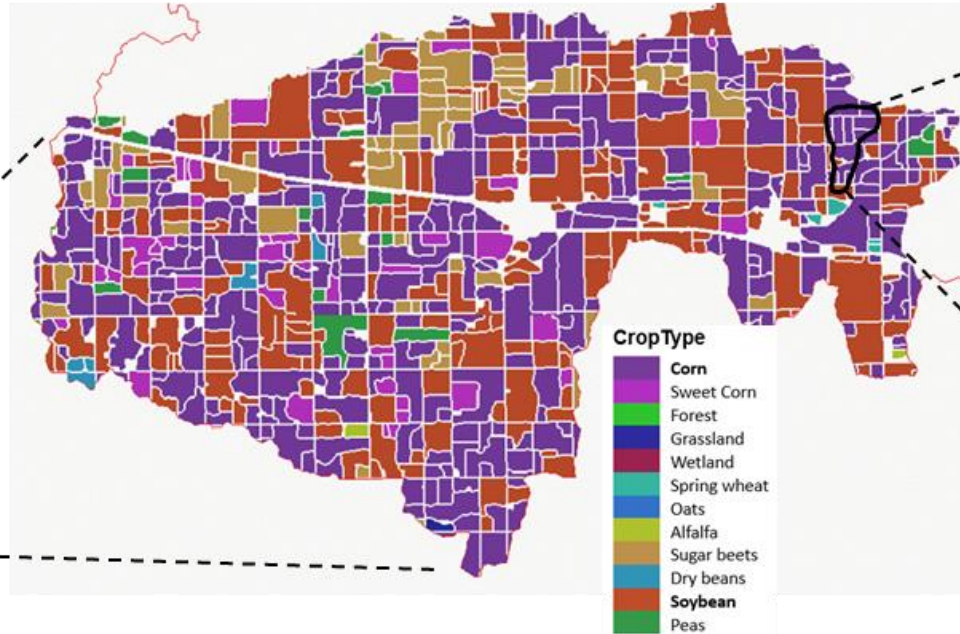


NAM SCALE AND SCOPE

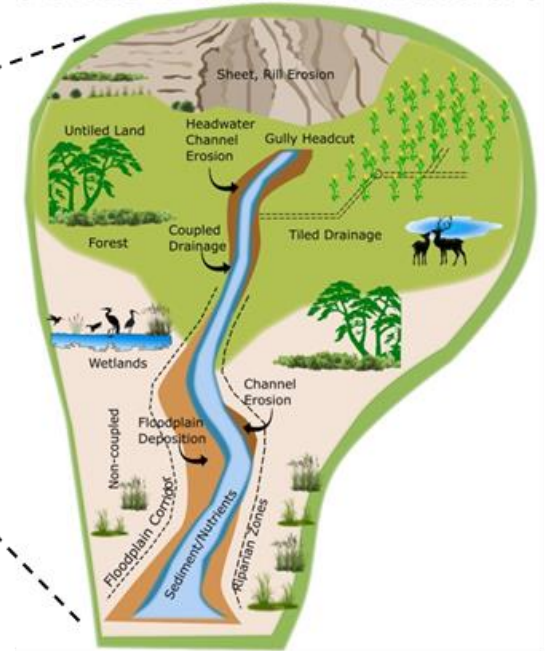
National Extent



Field Based Computational Units

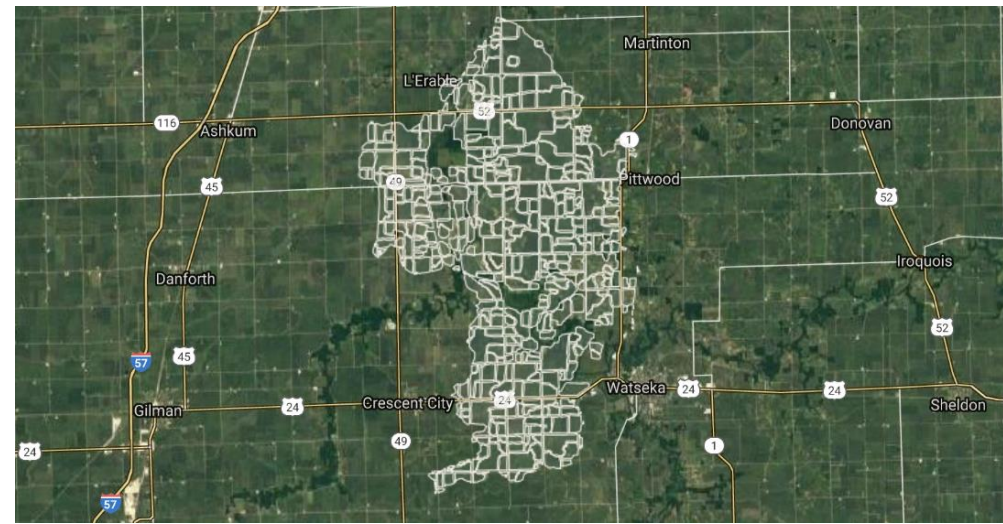


Process Based Simulation



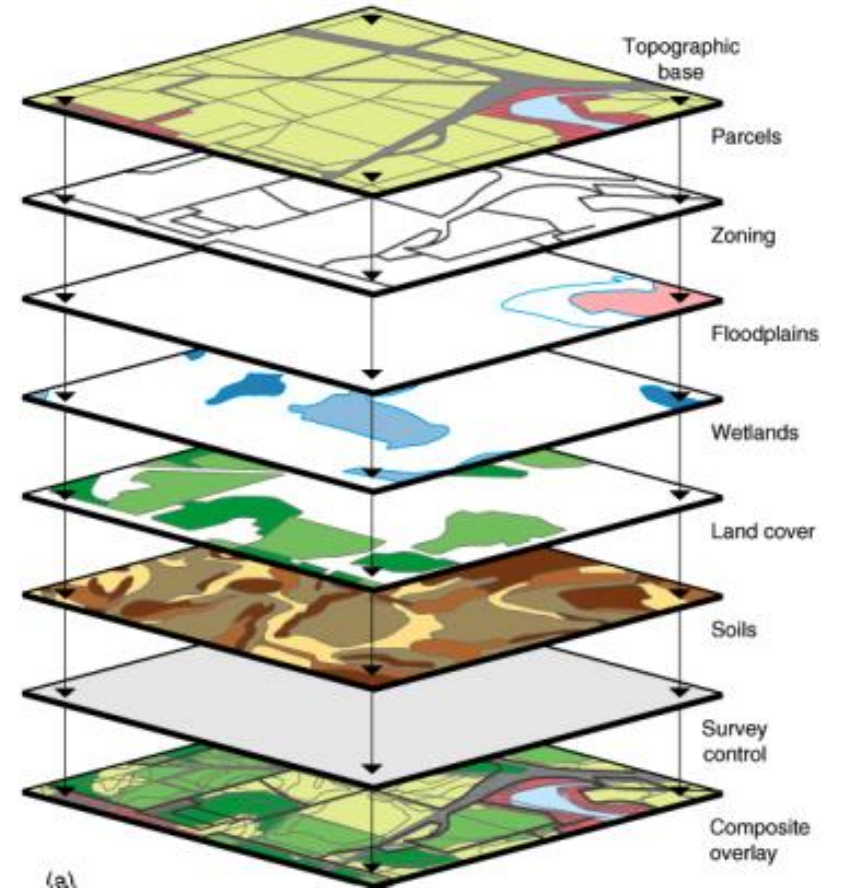
CROPLAND HRUS

- Field map of U.S. derived from satellite data
- 4.2 million fields with an average size of 20-30 ha
- Derived from Yan and Roy (2016)









INPUT DATA

- Changes with each version
- Automated processing for ingestion into NAM where possible
- Selected Sources:
 - Topography – NED
 - Soils – SSURGO
 - Landcover - NLCD
 - Crop rotation – CDL
 - Management templates - NRCS
 - Irrigation & Fertilization - Ag Census
 - Conservation Practices – Ag Census, Survey, Google Earth

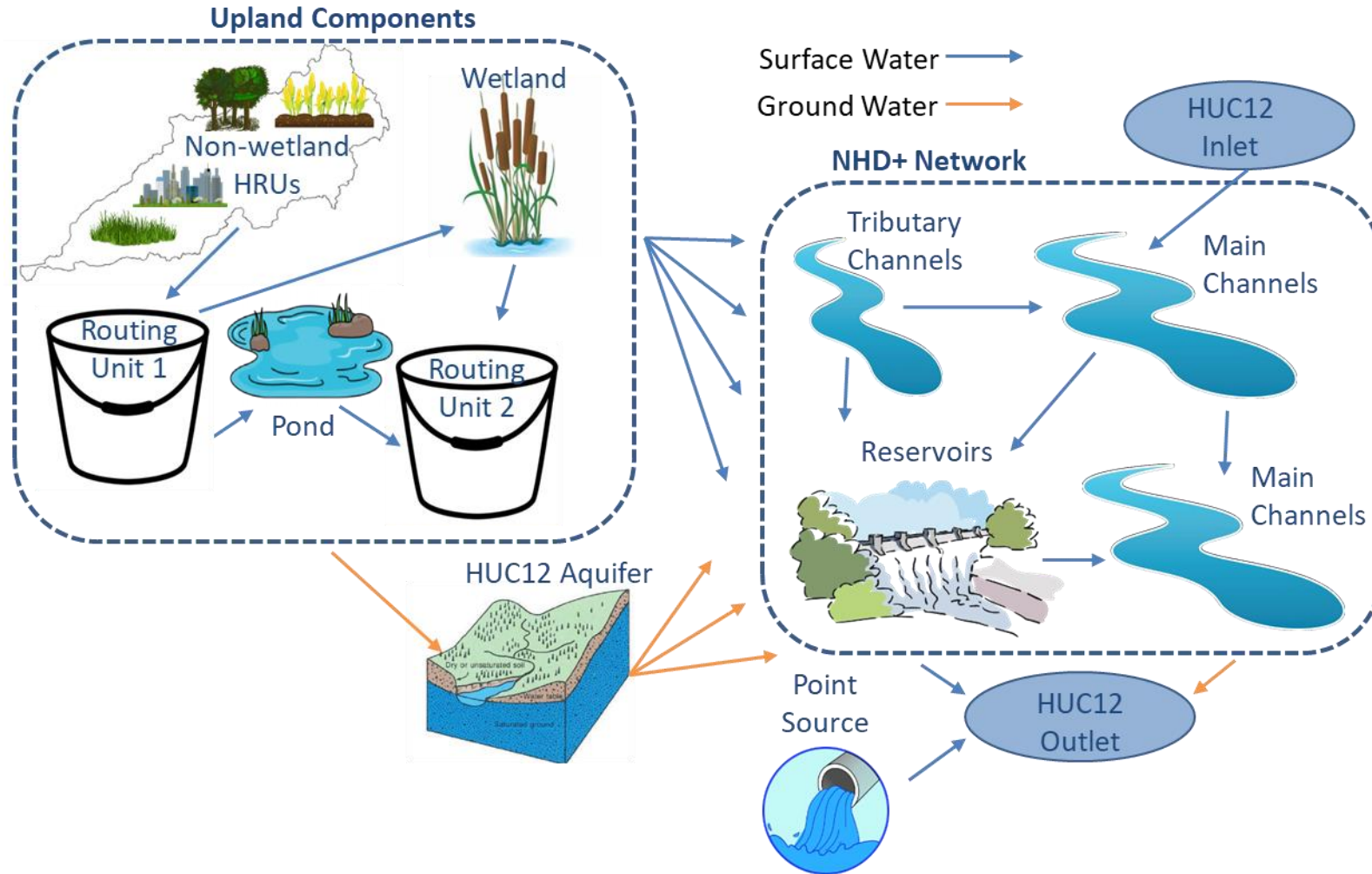


CONSERVATION PRACTICES

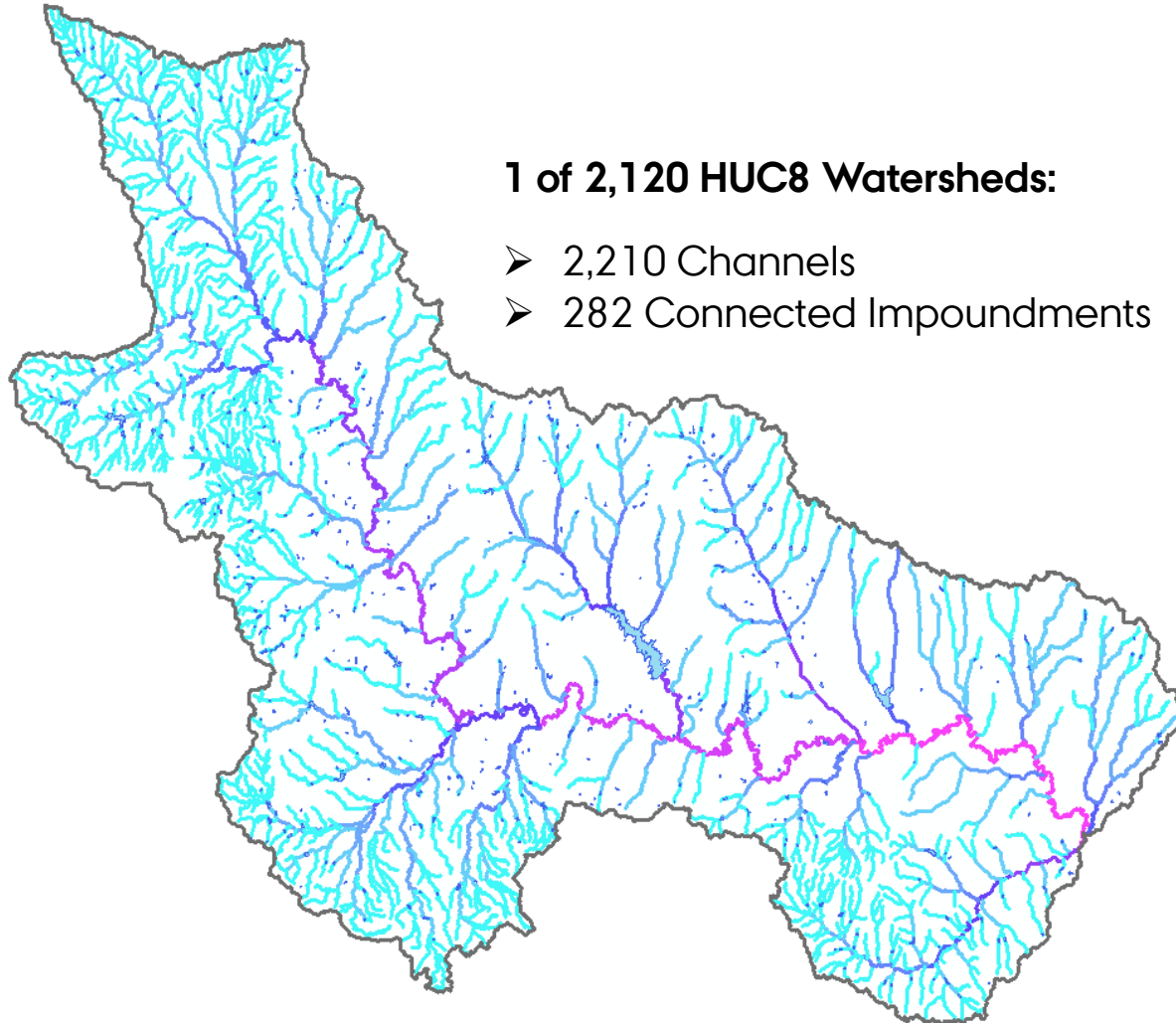
- US Agricultural Census
 - Cover Crops
- Survey
 - Tillage Intensity (CTIC)
 - Structural Practices CEAP Survey
- Google Earth
 - 13,500 fields surveyed
 - Multi-year imagery
 - Details Published in JAWRA

<p>Terraces</p>  <p>Roughly parallel lines, running cross slope, sometimes accompanied by shadows. Terraces follow contour lines and are usually accompanied by contour planting. The distance between terraces is related to field slope. Terraces are permanent and are generally visible in multiple past images.</p>	<p>Waterways</p>  <ul style="list-style-type: none">• Strips of grass following field drainage. usually they have a strong color contrast as compared to the crop area. Waterways generally appear green, but may vary depending on season. Waterways are generally visible in past images.	<p>Filter Strip/Field Borders</p>  <p>A strip of grass that borders one or more sides of a field, a stream. The strip or border is generally uniform in thickness and much wider than a waterway. The filter strips are almost always a shade of green in one or more past images.</p>
<p>Contour Planting</p>  <p>The implement marks follow contour lines and share the same patterns as seen on topographical maps. Practice is most often associated with terraces, but may be found singularly.</p>	<p>Center Pivot Irrigation</p>  <p>Very clear and distinct lines that form a circular pattern. Most fields with a center pivot are fully circular, but half and quarter coverages are common. The center pivot itself is often visible.</p>	<p>Strip Crops</p>  <p>Crops grown in alternating strips, which can be easily distinguished from aerial photography due to the contrast may not be present in past images, so the most recent image is used to make the final determination.</p>

NAM CONFIGURATION



STREAMS AND OTHER WATER BODIES

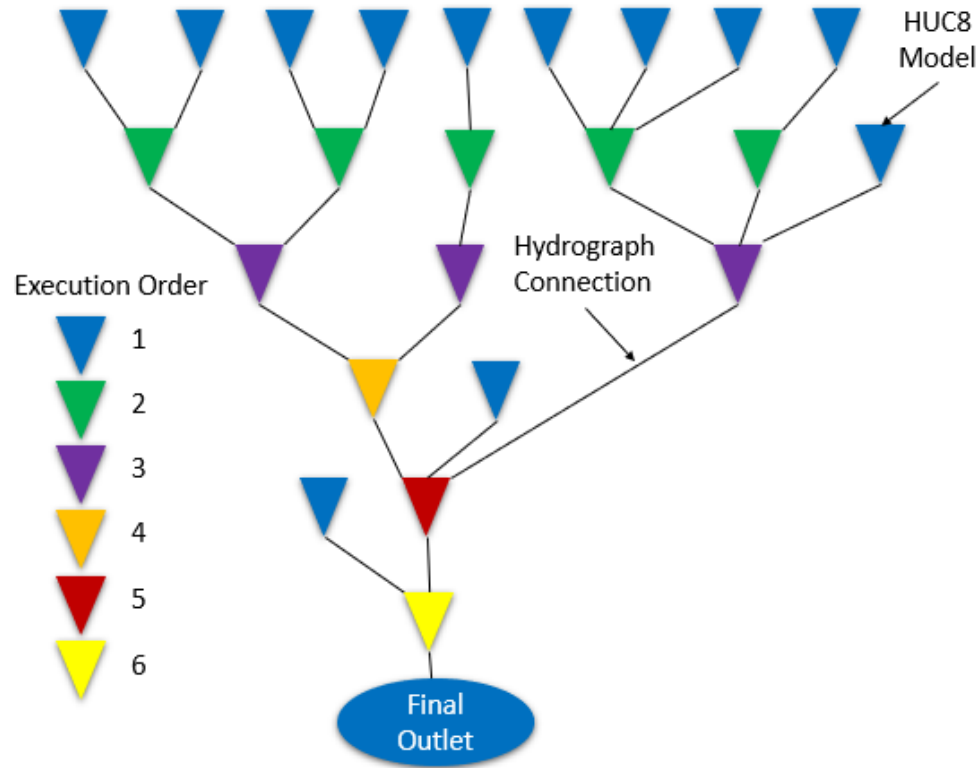


1 of 2,120 HUC8 Watersheds:

- 2,210 Channels
- 282 Connected Impoundments

- National Hydrography Dataset (NHDPlus Version 2)
 - 3 million digitized reaches
- Waterbodies
 - Lakes/Reservoirs
 - PL-566 Structures (Watershed Protection and Flood Prevention Act)
 - Farm Ponds

RUNNING THE MODEL

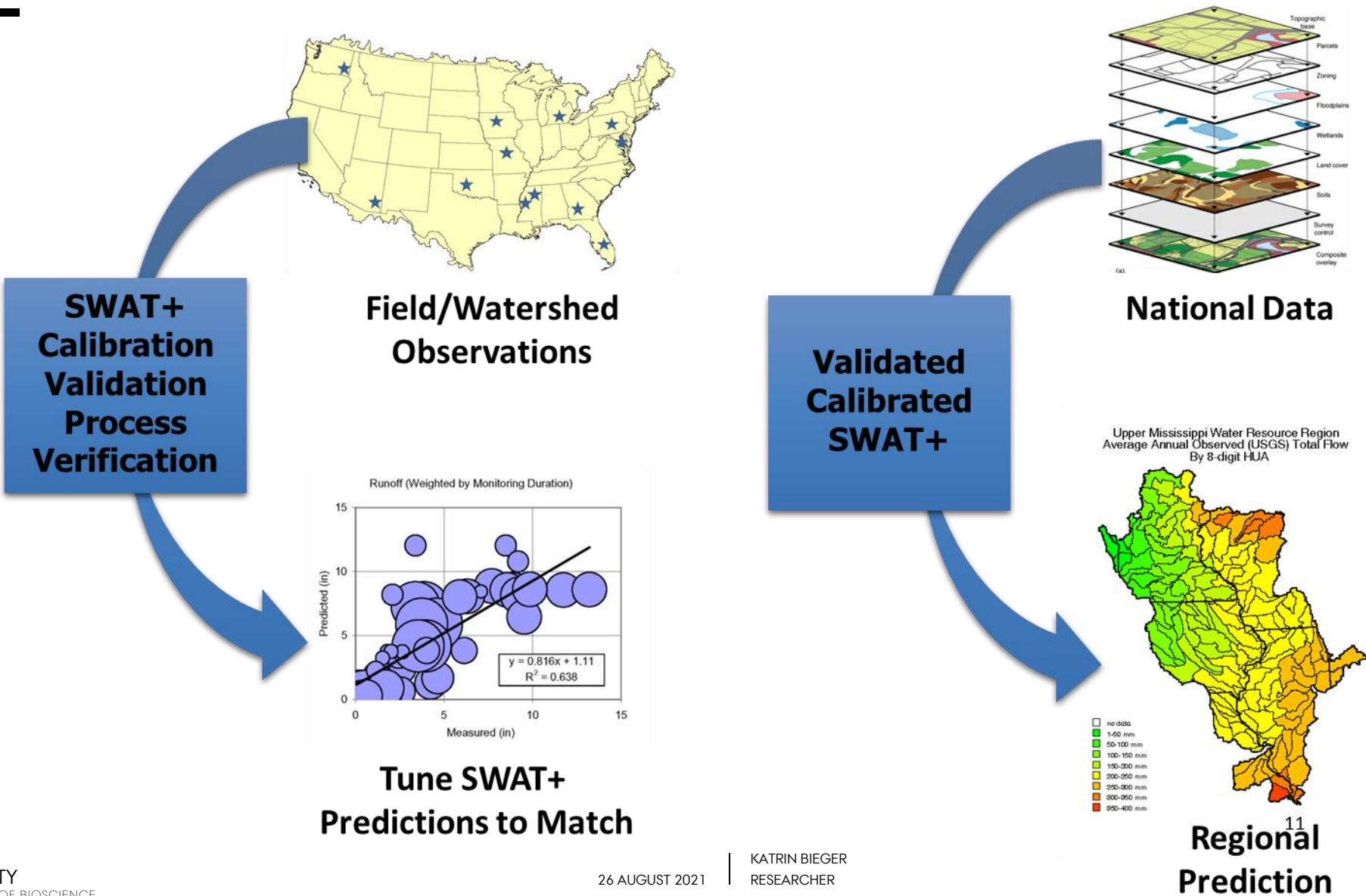


- Break US Model into HUC8 Chunks
 - Allows subsets to be shared
 - Execute Asynchronously

Calibration:

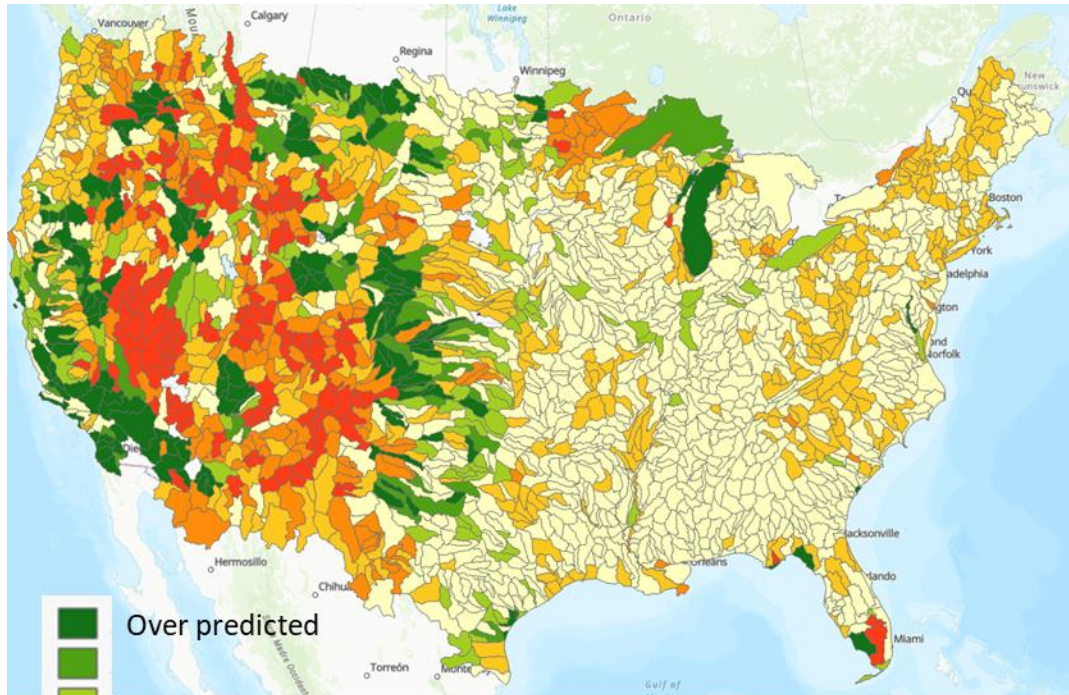
- Soft calibration of water budget and crop yields
- Hard calibration of streamflow, sediment and nutrient loads at USGS gages

INCORPORATING LOCAL DATA

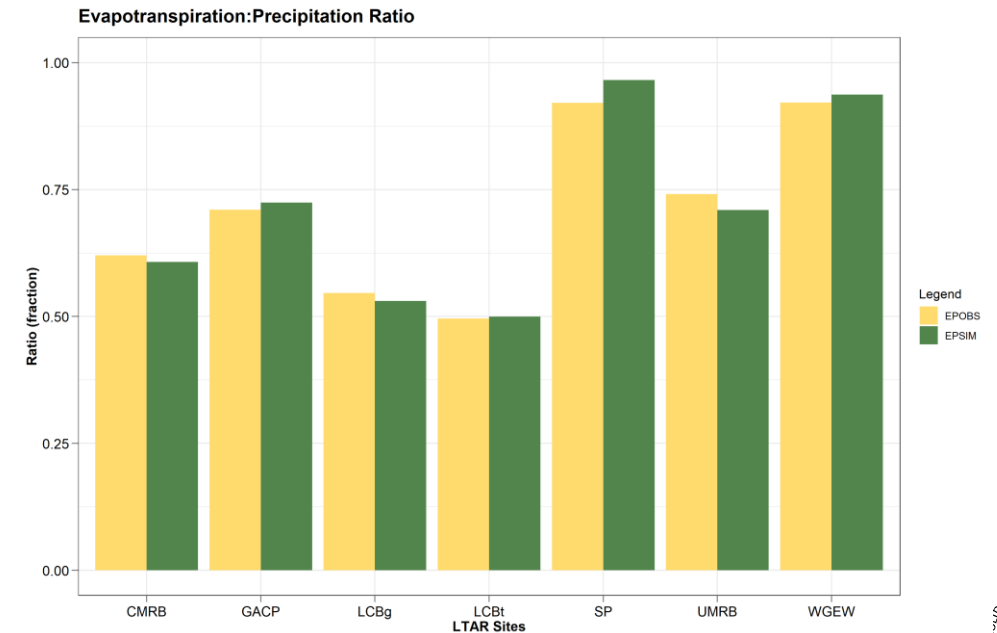


WATER BALANCE CALIBRATION

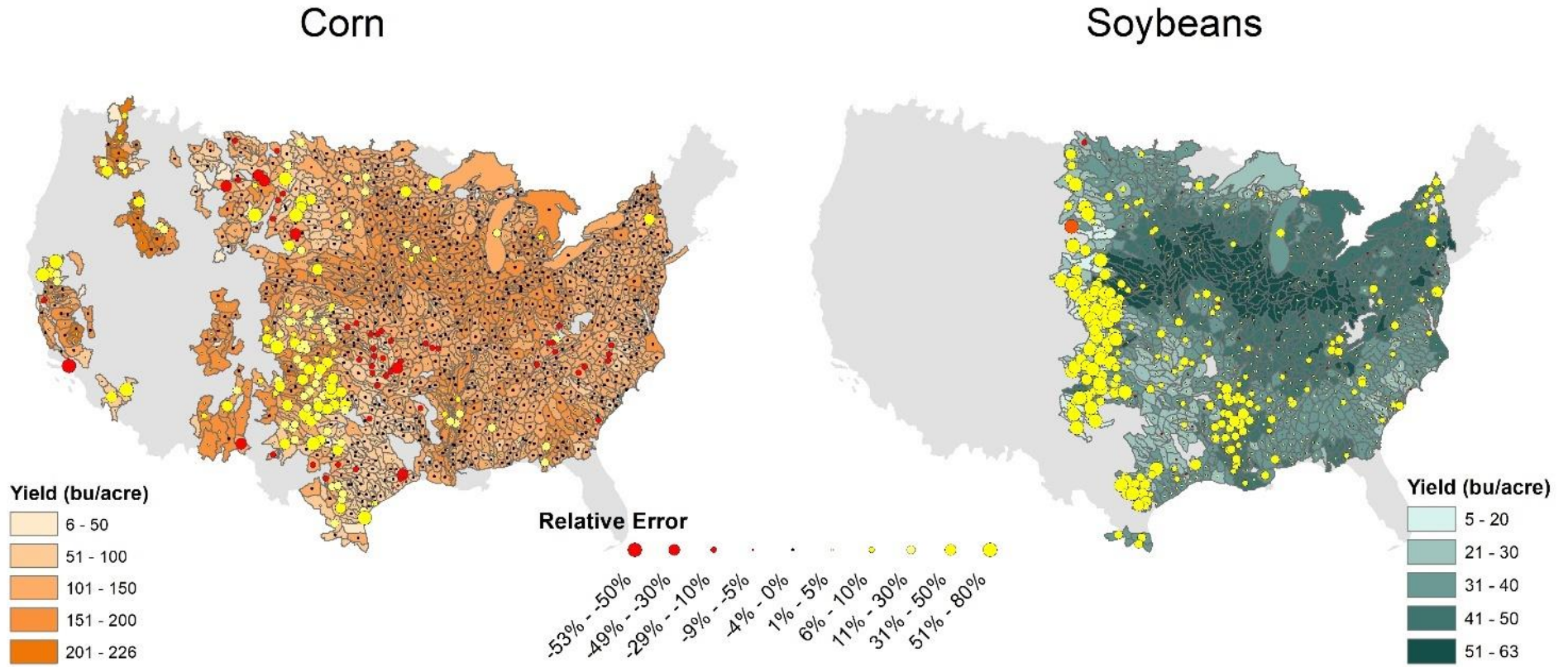
- Previous Calibration
- Further refined using alternate Weather (PRISM+NEXRAD) in Western US



ET @ LTAR sites



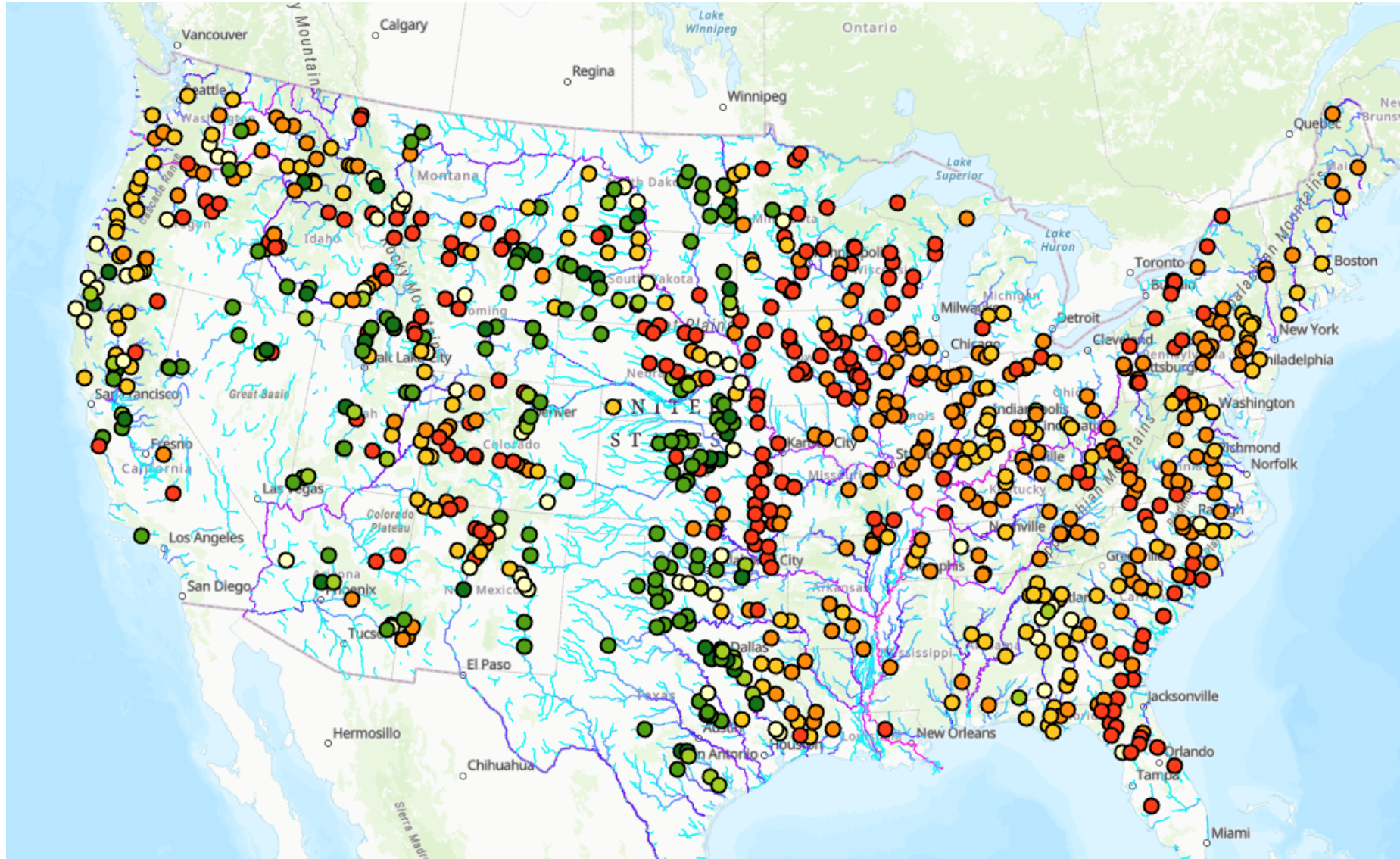
CROP YIELD CALIBRATION



PREDICTED STREAMFLOW



HARD CALIBRATION





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