The Future of Freshwater:

integrating novel technology and community engagement to improve water quality in the Cape Fear River Basin

Kerry L Mapes

Socio-Environmental Analysis Laboratory

Department of Earth and Ocean Sciences

University of North Carolina Wilmington

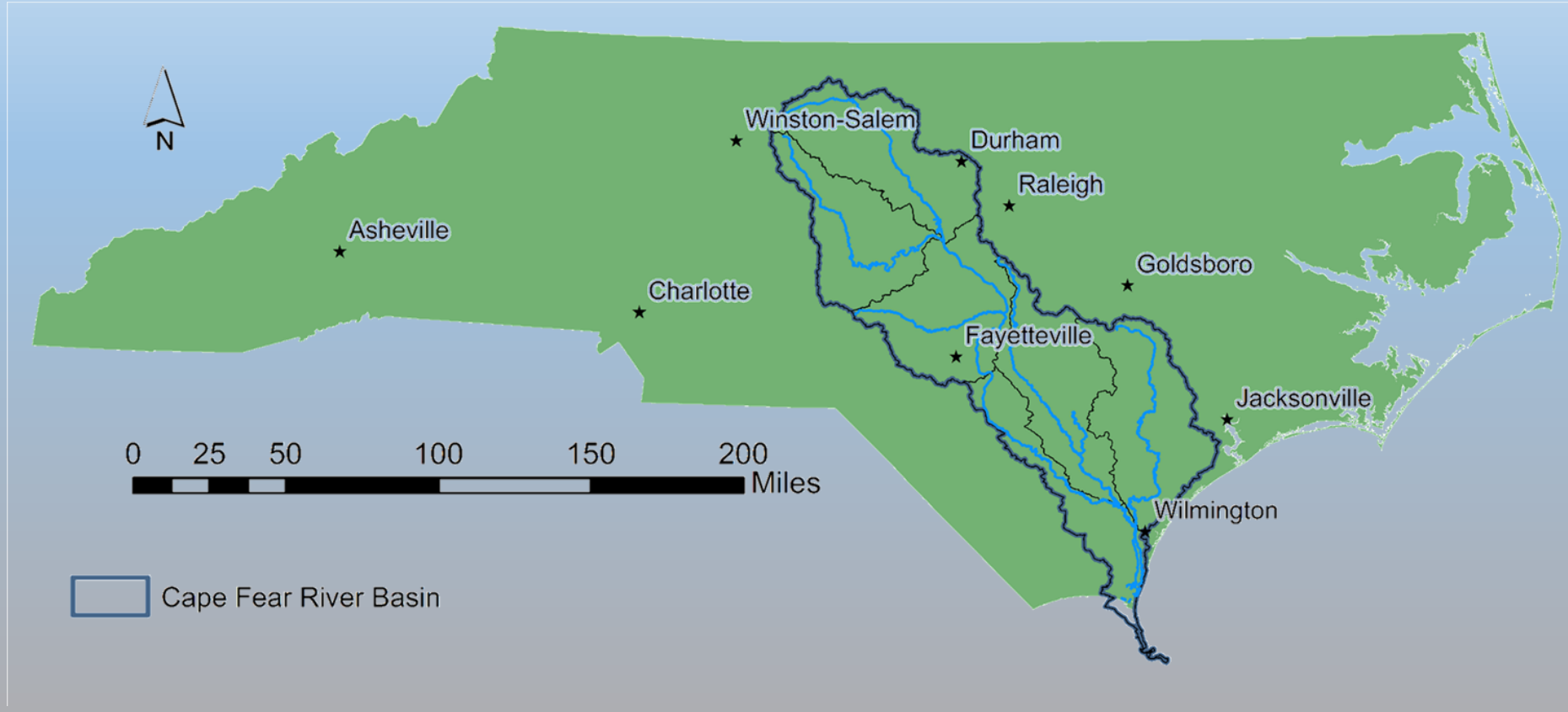
Cape Fear River Basin

North Carolina's largest river basin at **9,178 mi²**

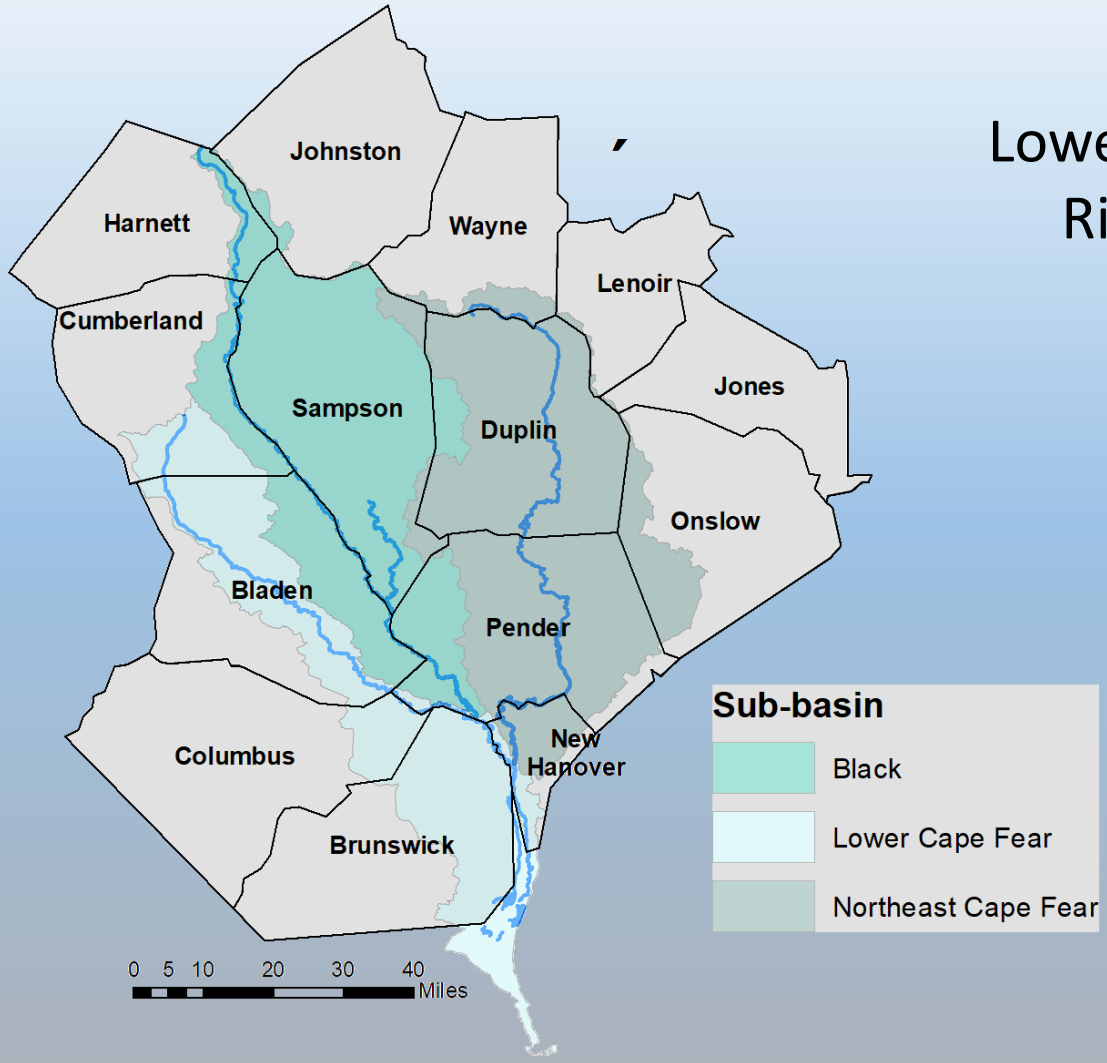
Population greater than **2 million people**

Supports **marshes, swamps, tidal creeks, and estuaries**

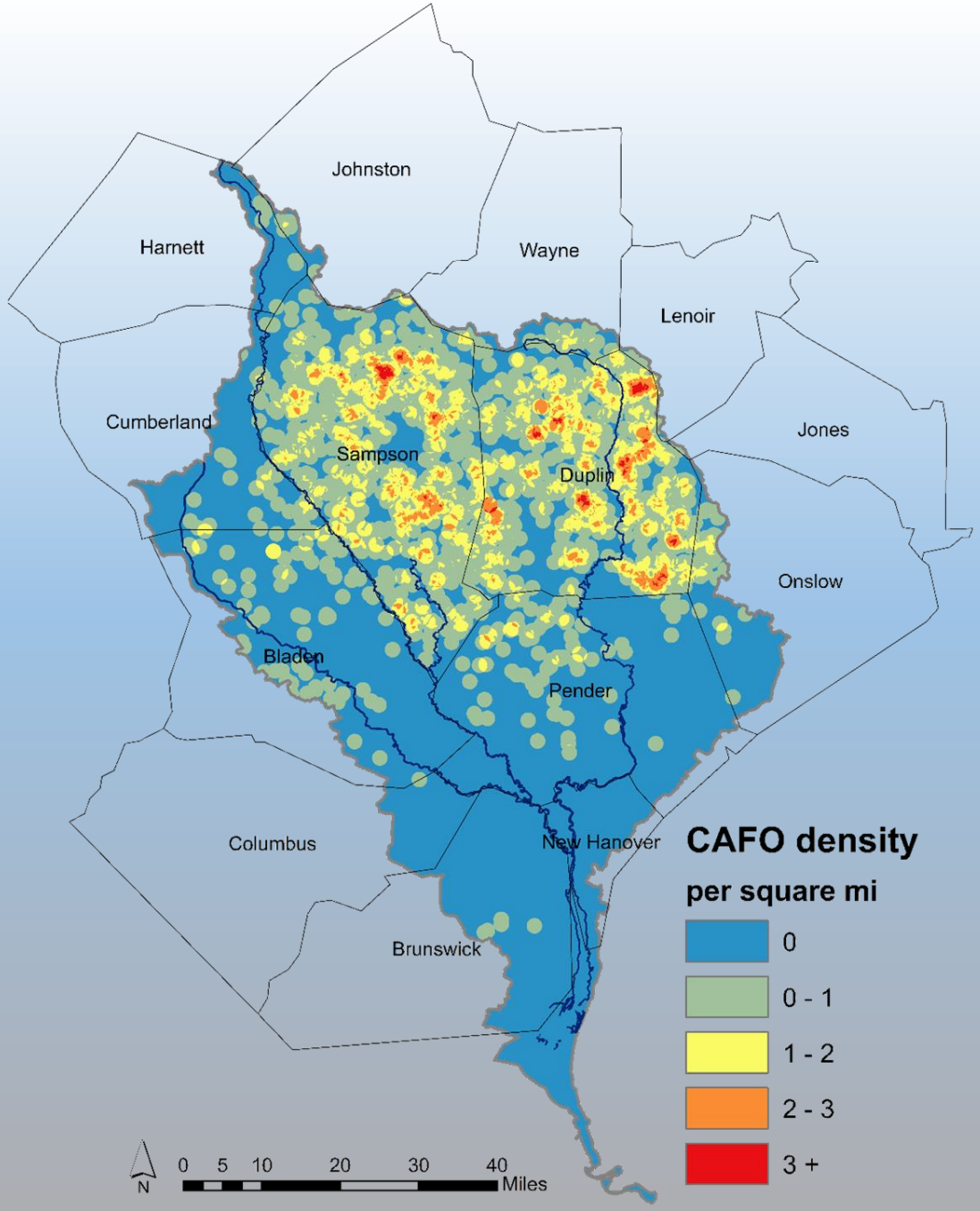
Over **300 miles** of impaired streams



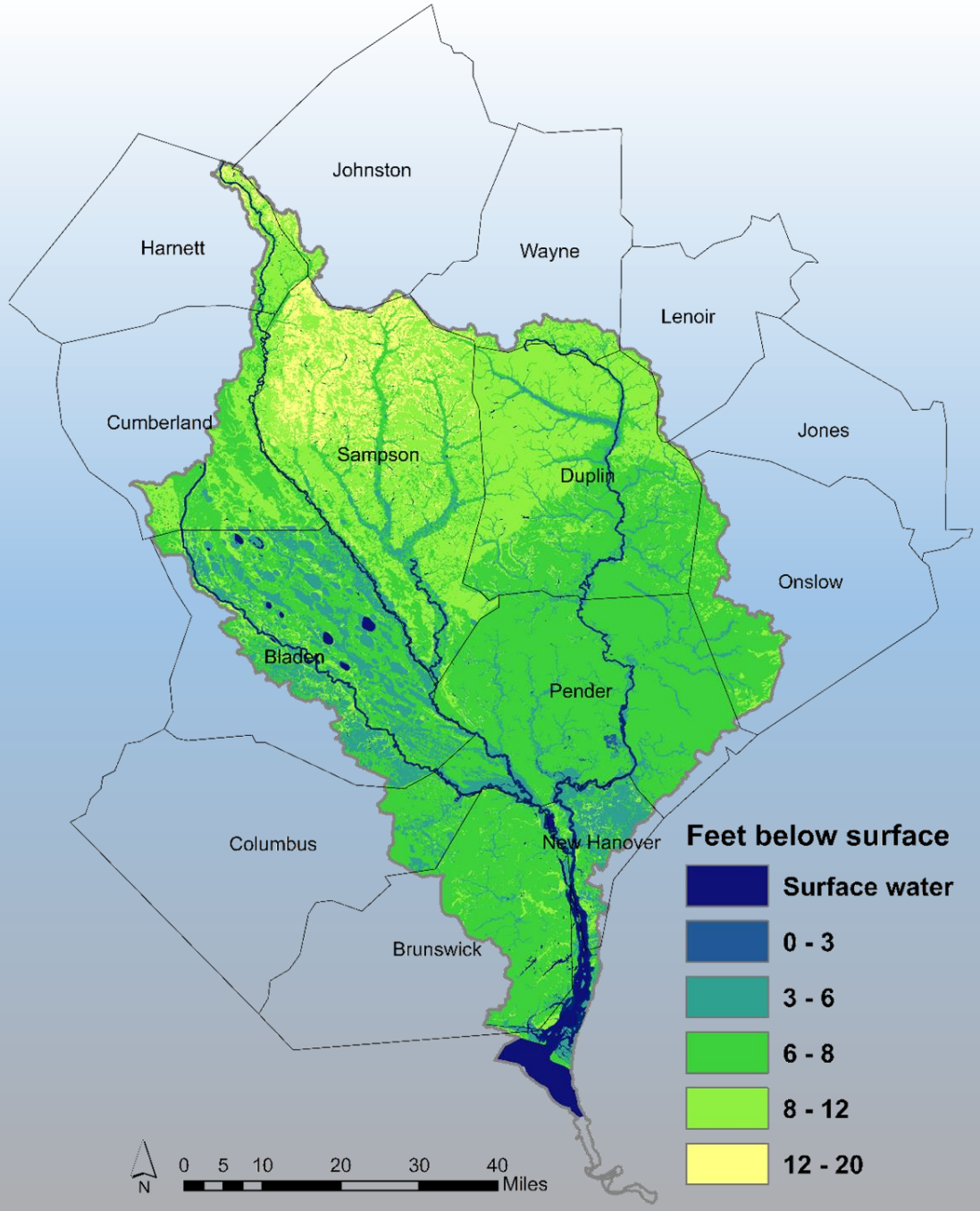
Lower Cape Fear River Basin



- 4,436 mi^2
- 14 counties

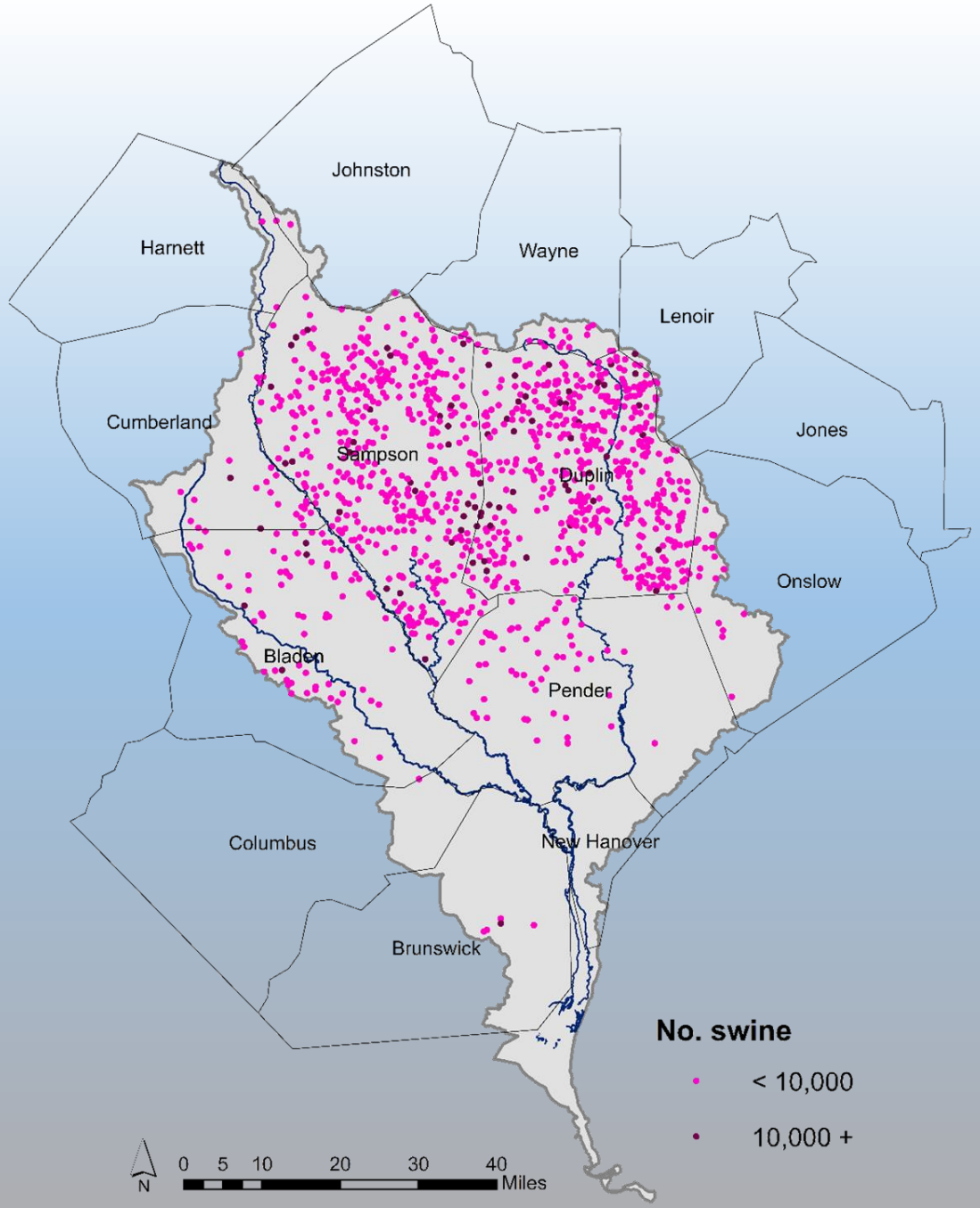


The Lower Cape Fear River Basin has some of the highest densities of concentrated animal feeding operations (CAFO) in the country.



USGS

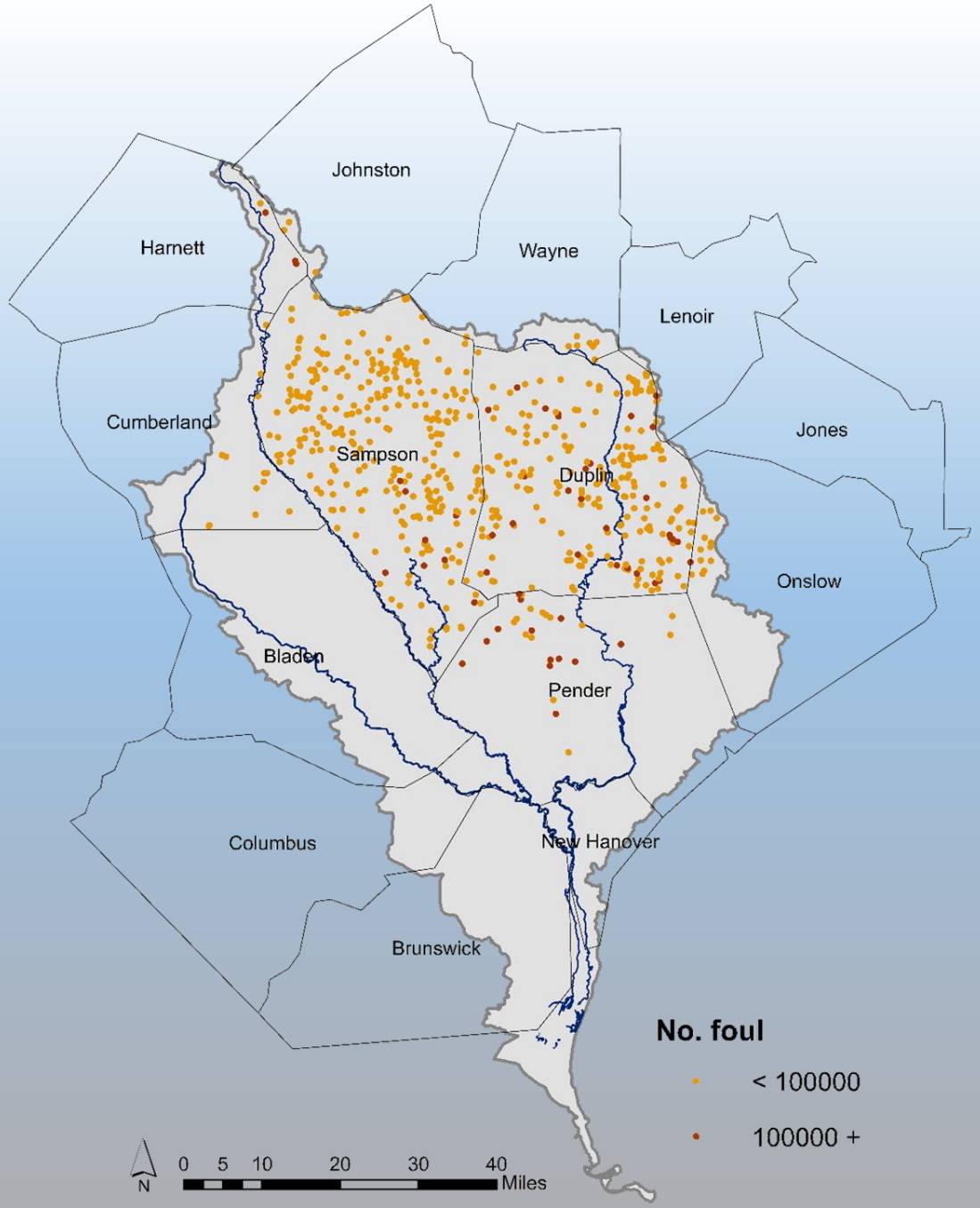
Our regionally high water table is easily contaminated.



NCDEQ

We know where swine CAFO are located due to state permits.

Data can be easily downloaded for certain types of research, but getting access to properties for comprehensive studies is not likely.



We have a good idea where poultry operations are located, but this data is not publicly available so they are harder to study.

EWG-Waterkeeper Alliance

Difficulty in researching CAFO or interacting with farmers is compounded by:

- Insulation of the industry and lack of access to property
- Tense relationships between farmers and activist environmental groups
- University Institutional Review Board policies and protocol for social research
- Large number of agencies and government bodies
- Compiling and formatting data for use with geographic information systems is time-consuming

M.S. thesis research in progress:

Modeling water quality near concentrated animal feeding operations, Lower Cape Fear River Basin

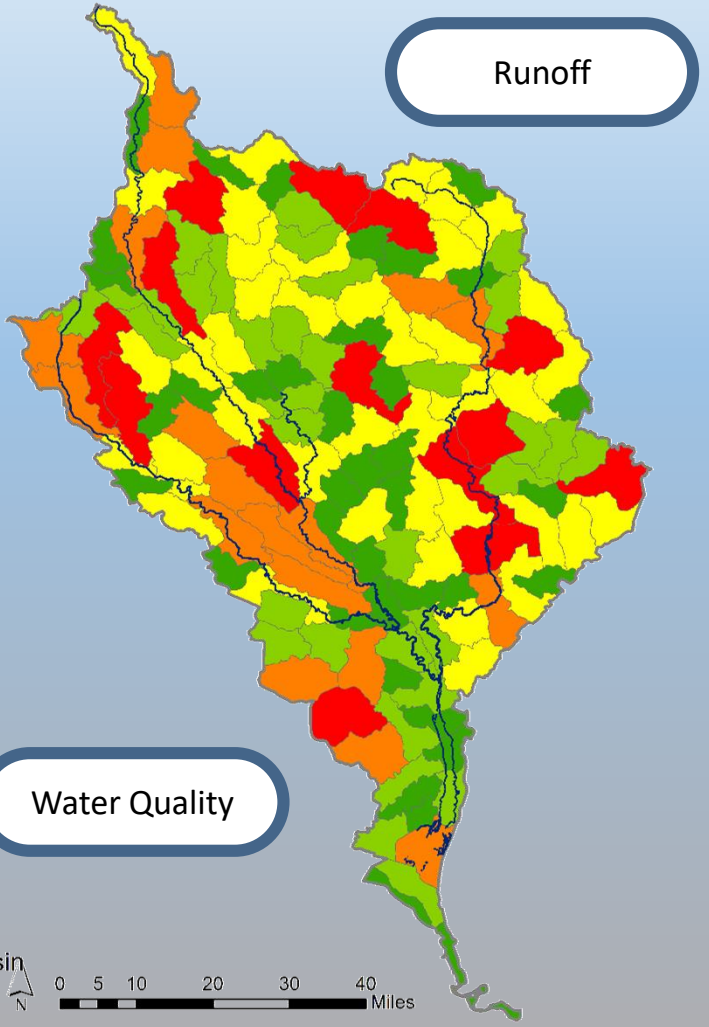
Soil & Water Assessment Tool | SWAT

One of the most widely used hydrologic tools that can estimate land use impacts on water quality in large, complex watersheds

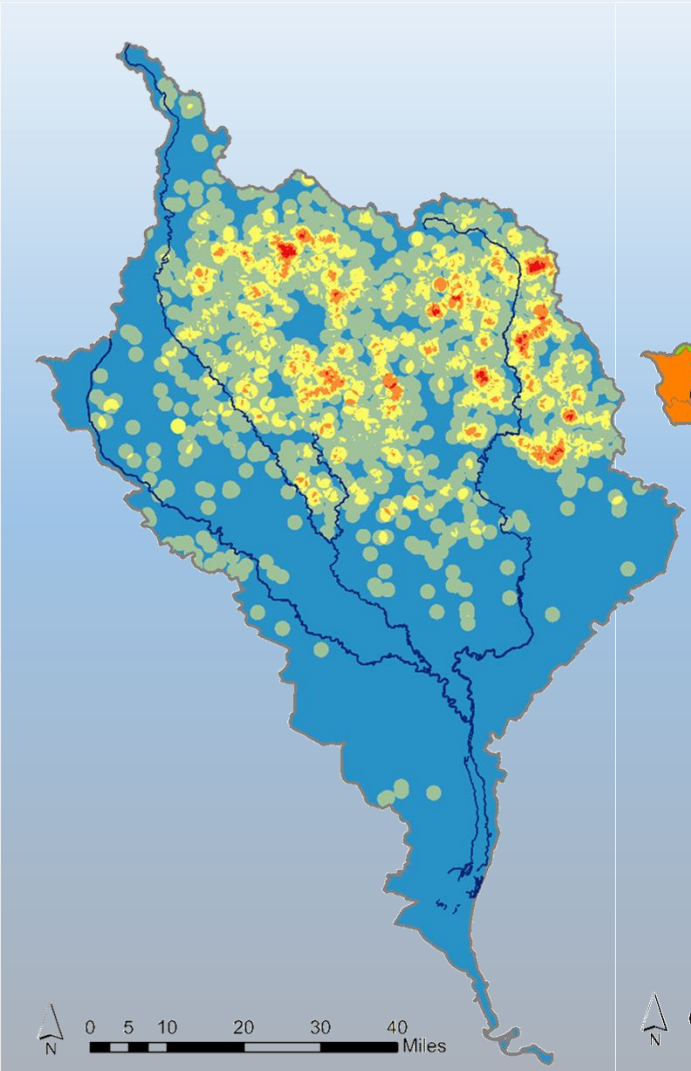
- Land use
- Topography
- Soil
- Water quality
- Precipitation

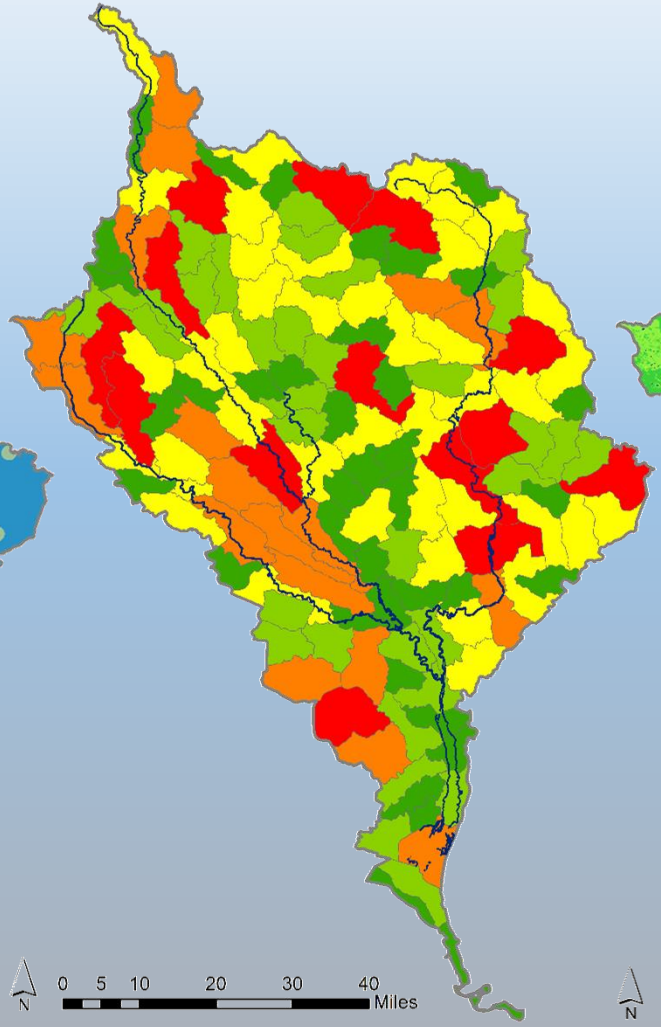
Runoff

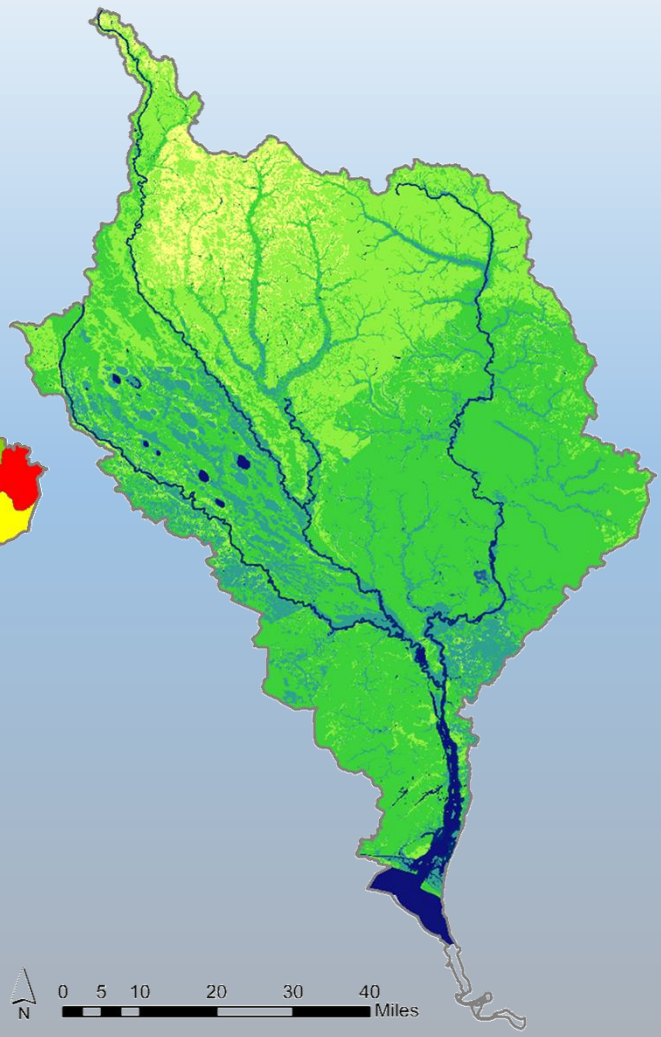
Water Quality

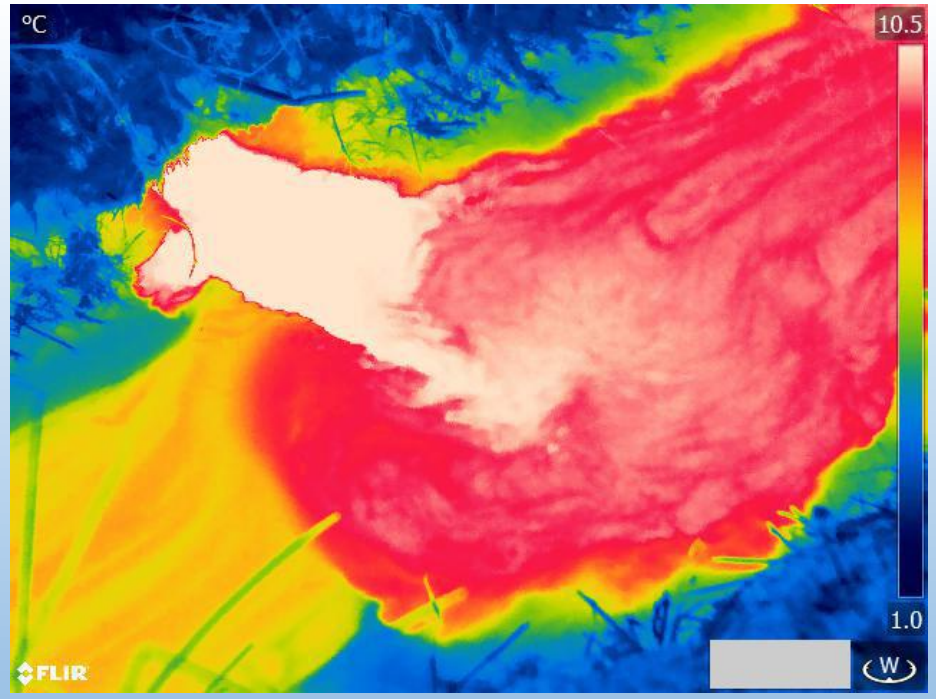


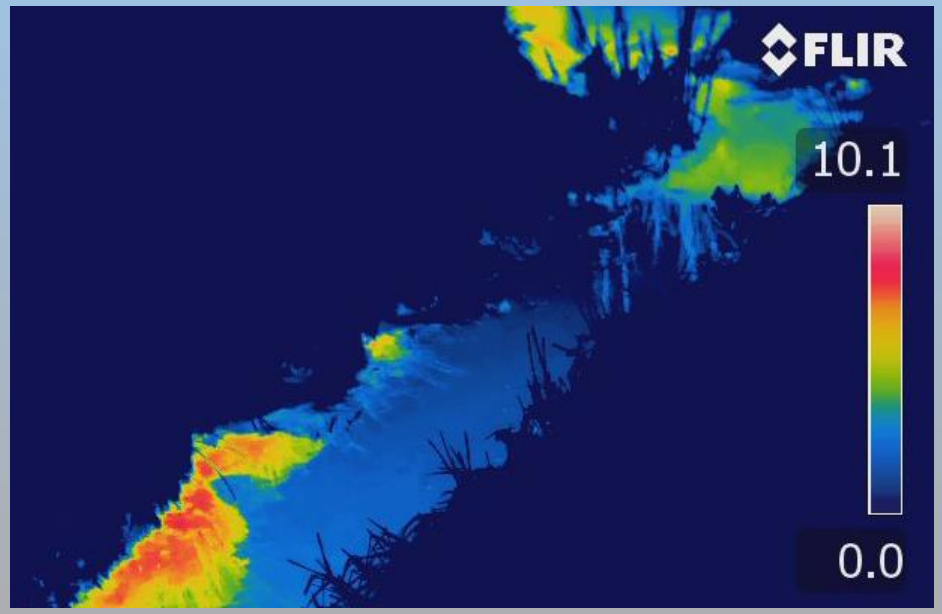
What is the spatial relationship between CAFO density, water table depth, and water quality?











Images curtesy USGS

Future research prospects:

Handheld and UAV-based thermal imaging of shallow groundwater discharge in agricultural watersheds of the Cape Fear River Basin

Ongoing community engagement focus:

How can we learn what drives farmers' decision-making processes and apply it in new and creative ways that ultimately improve water quality in the Cape Fear River Basin?

“…I don’t think any of em are having runoff.”

“Nobody. Nobody as far as I know. Nobody tells me about the quality of water in [my local] creek, or the Cape Fear River. We don’t get anything about things like that.”

“We want to be, and we’re trying to be, environmentally friendly, but yet do our part to help feed the world *and* take care of the environment. And really when you try to do all three of those things it’s a big challenge. It’s hard to stay productive, good to the environment, and still be financially sound.”

The future of clean water in the Cape Fear River Basin depends on cooperation and collaboration.

Questions?