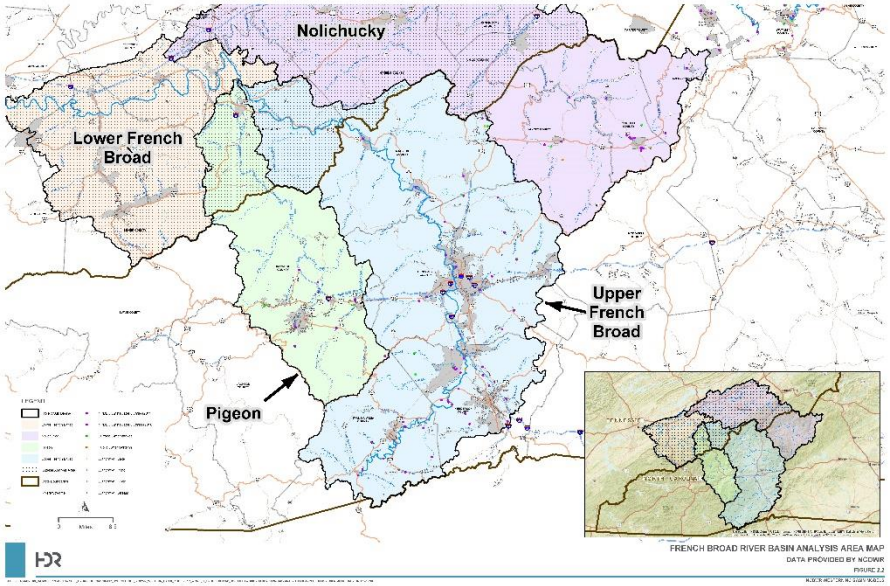
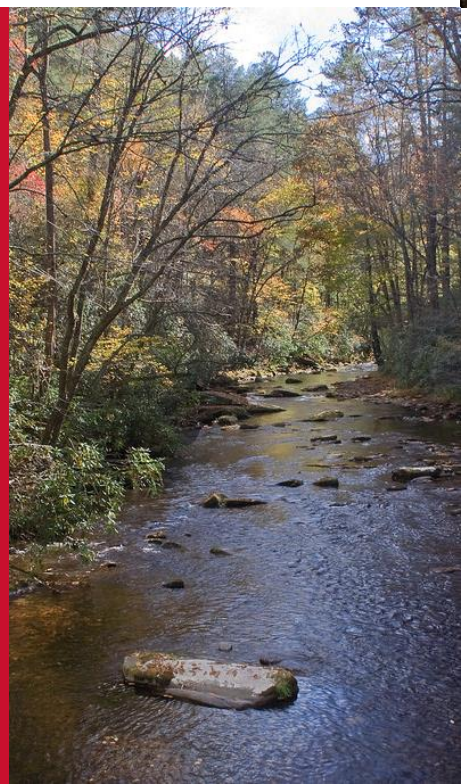




French Broad Hydrologic Model Stakeholder Kick-off Meeting

Data Collection Overview

April 11, 2018

Data Collection Overview

Withdrawals and Returns

Step 1: Data Collection

- Collect Water Withdrawal and Discharge Data
  - Identify applicable water users
  - Collect withdrawal & return data for users
  - Enter data into MS Excel database
  - Quality control reviews of data
  - Collect geographic information on withdrawal and return points
- Data Sources
  - NCDWR
    - Local Water Supply Plan database
    - NCDWR Water Withdrawal and Transfer database
    - NCDWR NPDES database
  - Individual users (where information missing)
- Data Timeline
  - 1930 to 2017

Step 2: Data Processing

- "Hindcasting" forecasts of historic water use for withdrawals and returns where historic information is not available.
  - Water / Wastewater Utilities
    - Population hindcasts and annual growth rates
    - Per capita use rates
  - Industrial
    - Gross Domestic Product hindcasting
    - Determine industry startups and closures
  - Power Generation
    - Historic power generation/water consumption hindcasting
    - Determine facility startups and closures
  - Agriculture / Irrigation
    - Historic precipitation/climate
    - Historic agriculture production
  - Quality control reviews of hindcasting forecasts

Step 3: Documentation

- Deliverables
  - Withdrawal and discharge database as a time series for HydroLogics' use in historical adjustments to streamflows
  - Monthly patterns for all nodes
  - Summary memo of water withdrawal & return data and hindcasting methodology
- Schedule:
  - Data: 3 months (expected end of May)
  - Memo: 1 month (expected end of June)
- Next Steps:
  - Data used by HydroLogics to develop inflow dataset - historical record of unimpaired (natural) river flow
  - Additional data includes reservoir operational rules, storage, etc.

French Broad Data Review

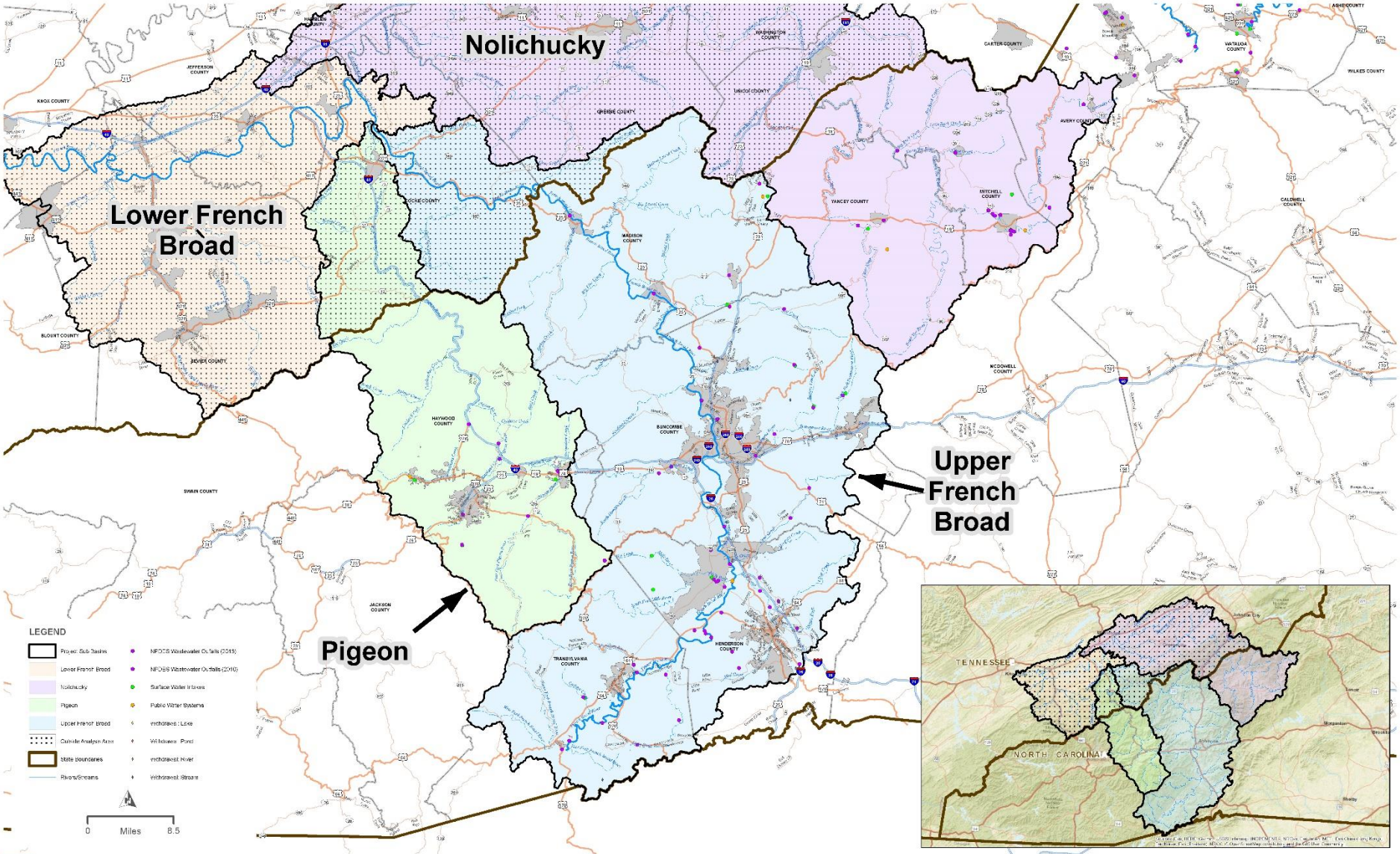
Current Status

French Broad River Basin

- Upper French Broad
  - 31 withdrawal nodes
  - 47 return nodes
  - 55 public water/wastewater utilities
  - 2 power nodes
  - 15 industrial nodes
  - 6 agriculture/irrigation nodes

- Nolichucky
  - 13 withdrawal nodes
  - 11 return nodes
  - 11 public water/wastewater utilities
  - 12 industrial nodes
  - 1 agriculture/irrigation node

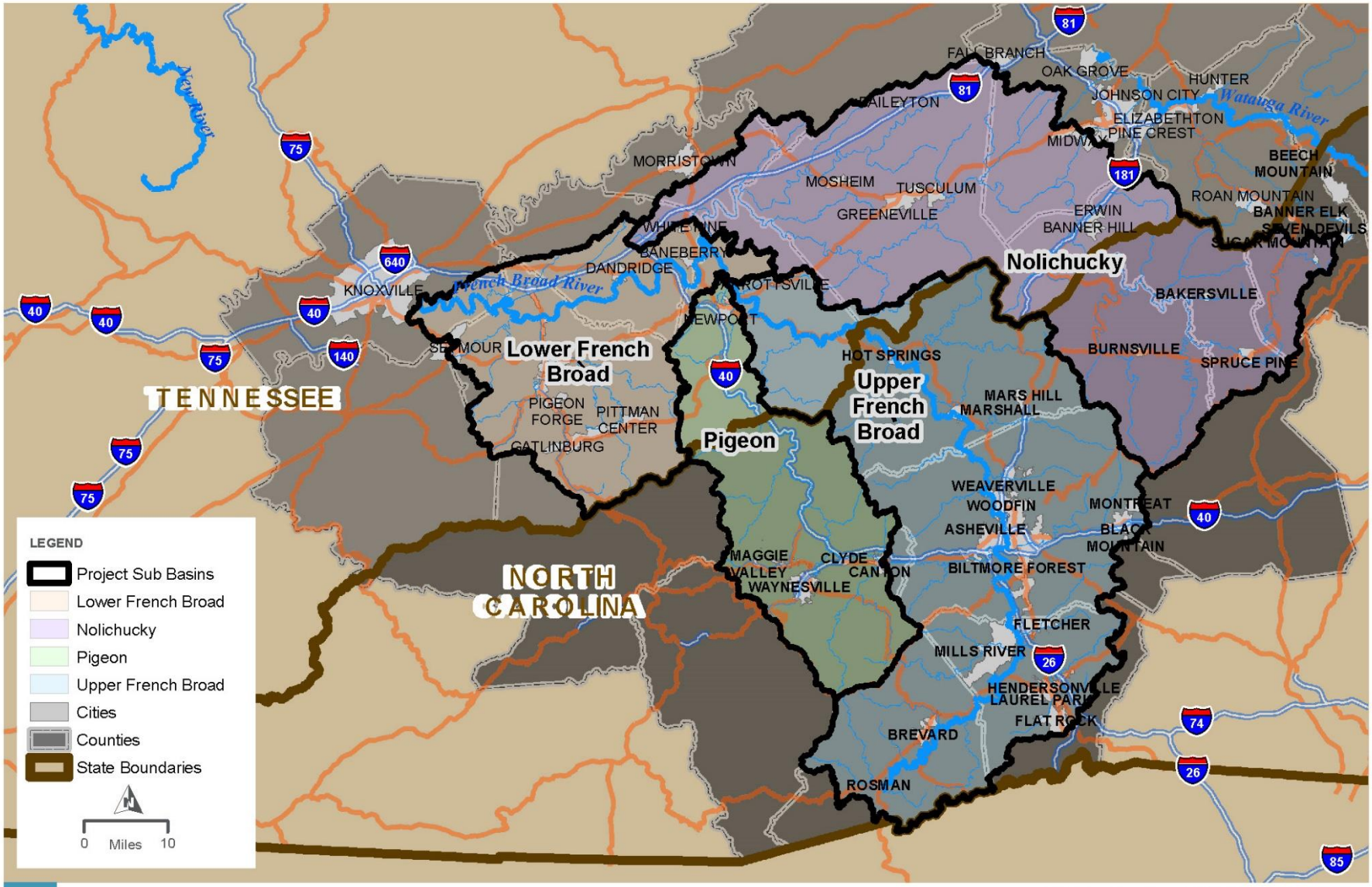
- Pigeon
  - 9 withdrawal nodes
  - 11 return nodes
  - 14 public water/wastewater utilities
  - 1 power node
  - 5 industrial nodes



FRENCH BROAD RIVER BASIN ANALYSIS AREA MAP

DATA PROVIDED BY NCDWR

FIGURE 2.2



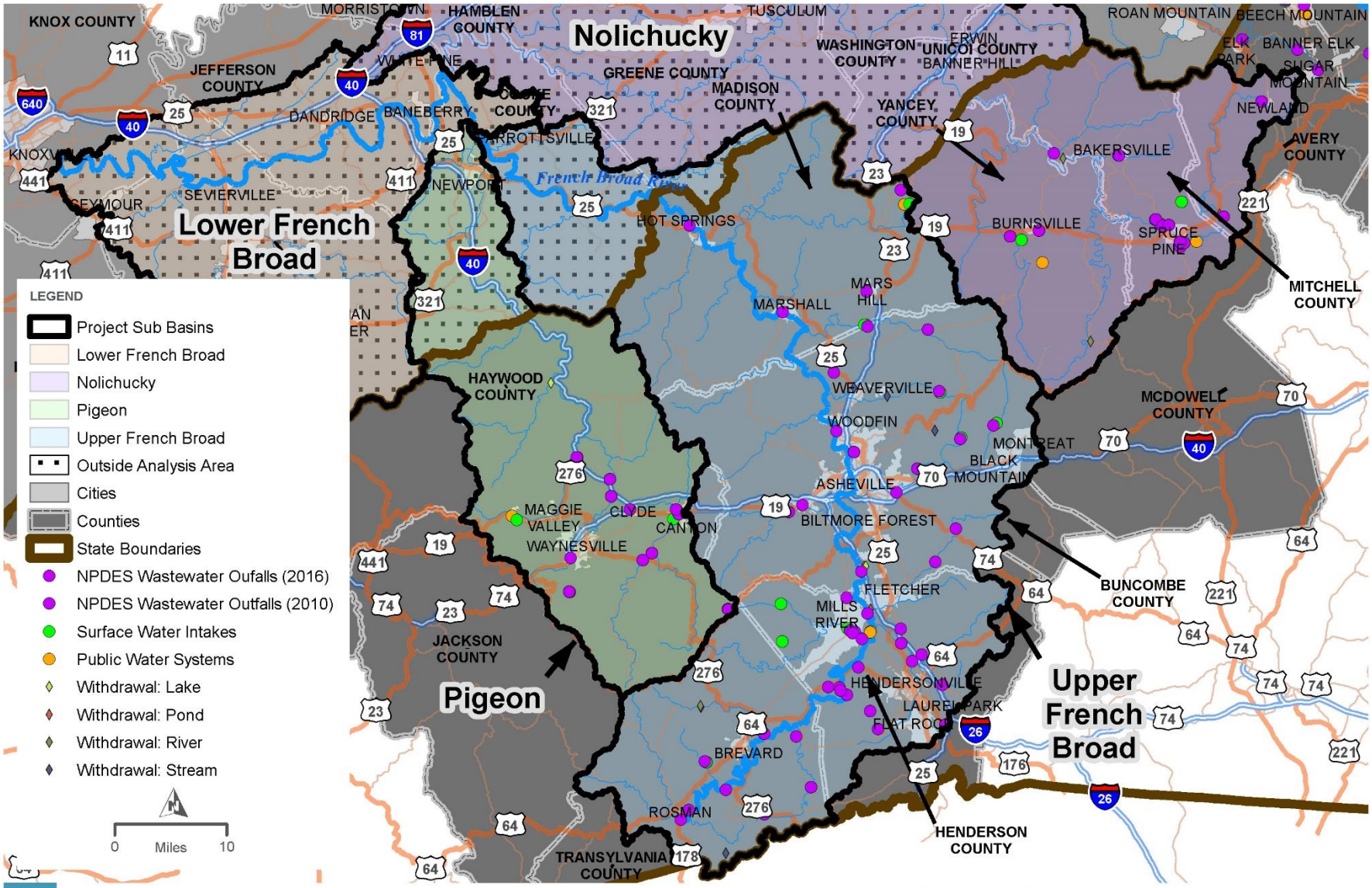
HDR

FRENCH BROAD RIVER BASIN

PROJECT AREA MAP

FIGURE 2

NCDWR WESTERN NC BASIN MODELS

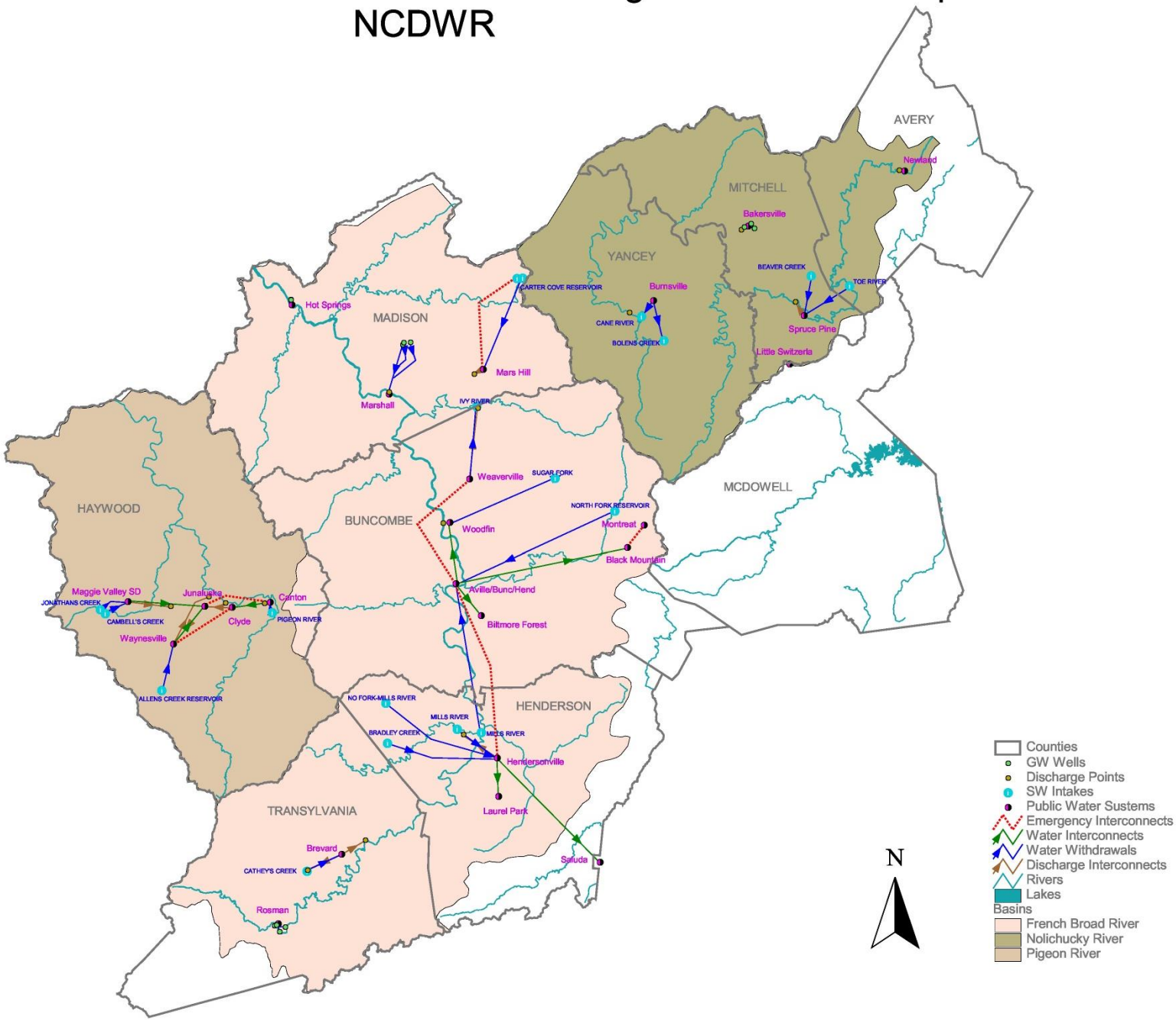


FRENCH BROAD RIVER BASIN ANALYSIS AREA MAP

DATA PROVIDED BY NCDWR

FIGURE 2.1

French Broad River Basin Water and Discharge Interconnect Map
NCDWR



Questions???

Jonathan Williams, PE, LEED AP BD+C
South Atlantic Water Resources Manager; Associate

HDR
301 North Main Street, Suite 2030
Winston-Salem, NC 27101
D 336.955.8253 **M** 704.493.8792
jonathan.williams@hdrinc.com
hdrinc.com/follow-us