ConwayCorp

US Army Corps of Engineers®
Little Rock District

USDA United States Department of Agriculture

Brewer Lake Watershed Management Plan

BLACK & VEATCH | WOOLPERT

A BLACK & VEATCH AND WOOLPERT JOINT VENTURE

Watershed Management Plan

- Iterative plan to protect and improve water quality
- Collaborative effort to address water quality concerns
- Path to identify funding for water quality projects and ways to cost effectively reduce treatment inputs

Why are we developing a Plan?

- Elevated nutrients in Brewer Lake are causing water treatment issues

- Assess the status and trends of the Brewer Lake Watershed with an emphasis on water quality issues
- Prioritize sub-catchments exhibiting signs of degradation,
- Compile potential management actions to address degradation
- Provide supporting information for EPA 319 proposals
- Plan is available on Conway Corp web site

What the Plan is NOT

- Not something to require changes to your land
- Not going to force different management practices

What the Plan IS

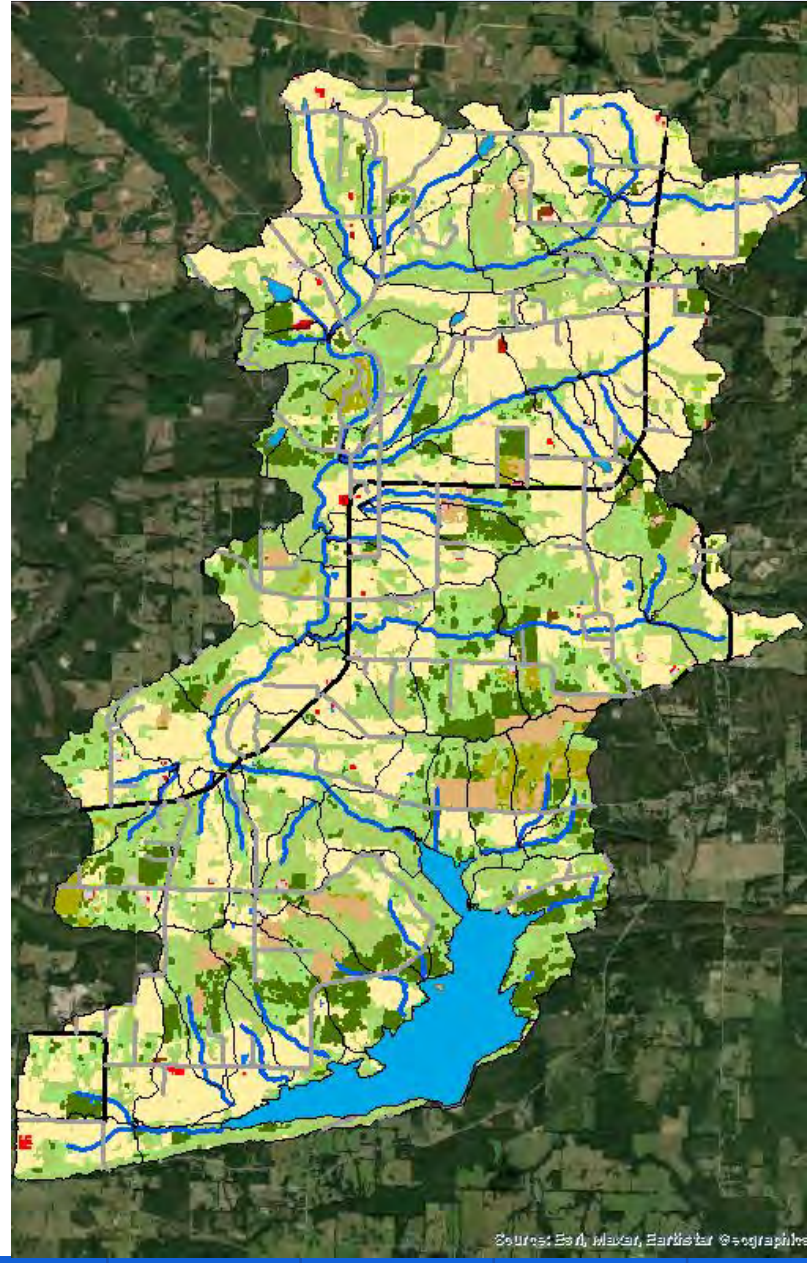
- A plan to collaboratively reduce nutrients
- A path to cost effectively identify where to target reduction efforts
- A tool to help preserve the water quality in Brewer Lake

Regional Work

- This isn’t a new type of planning work
- Work has been done nationally and in Arkansas
  - Buffalo River Watershed
  - Cache River
  - Kings River
  - Strawberry River
  - Frog Bayou
  - Lee Creek
  - Illinois River

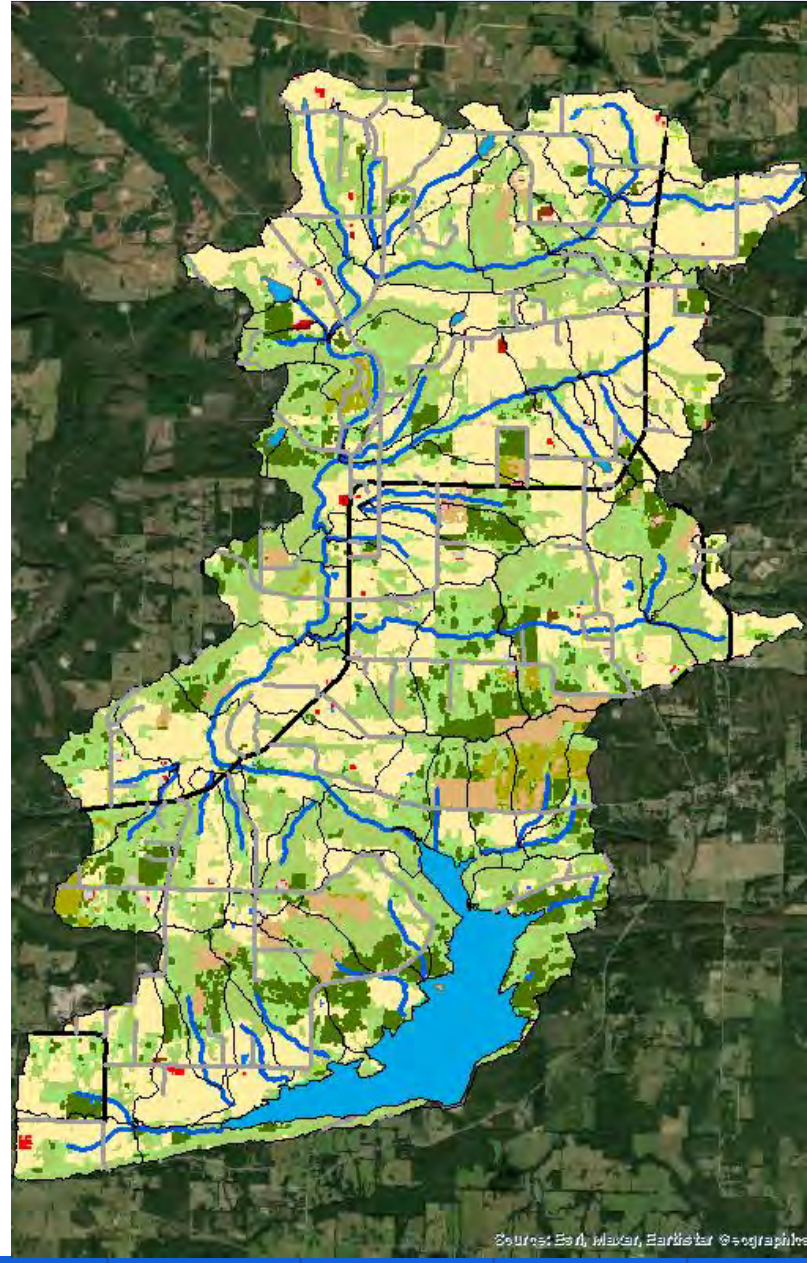
Watershed Background

- Brewer Lake formed in 1983
- Watershed is 36 square miles

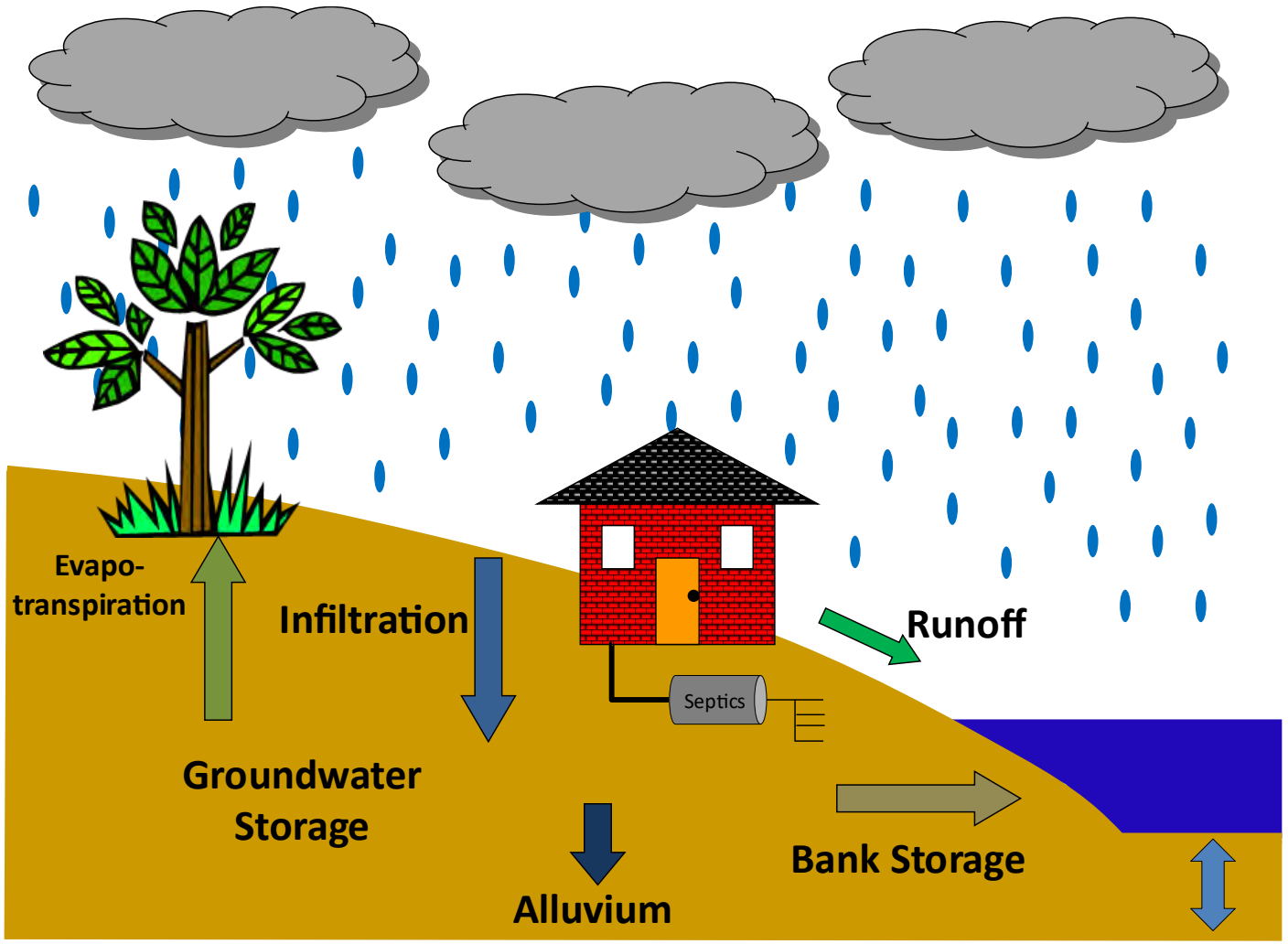


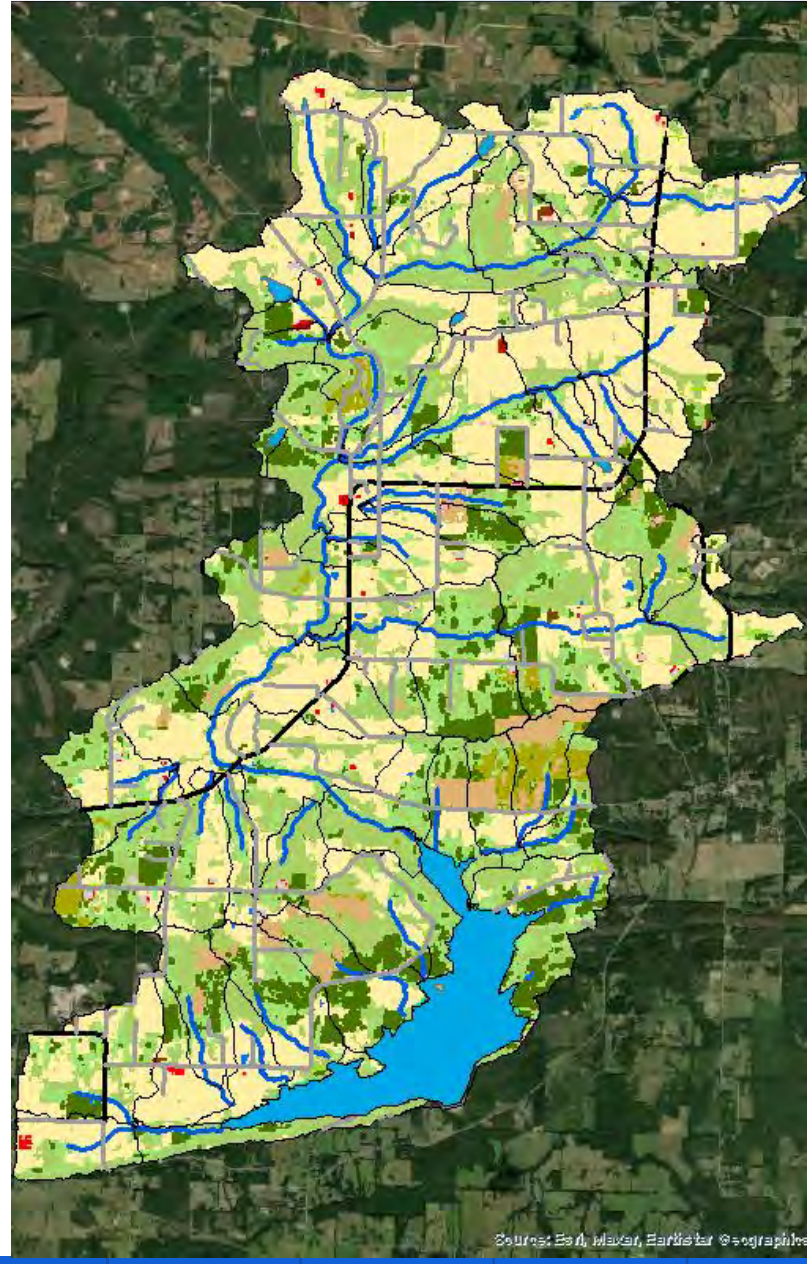
Modeling

- Watershed model developed using land use, soils, slope
- Divided watershed into sub-catchments
- Use meteorology data to predict runoff, infiltration and evaporation
- Nitrogen, phosphorus and sediment all simulated
- Model calibrated to past monitoring data



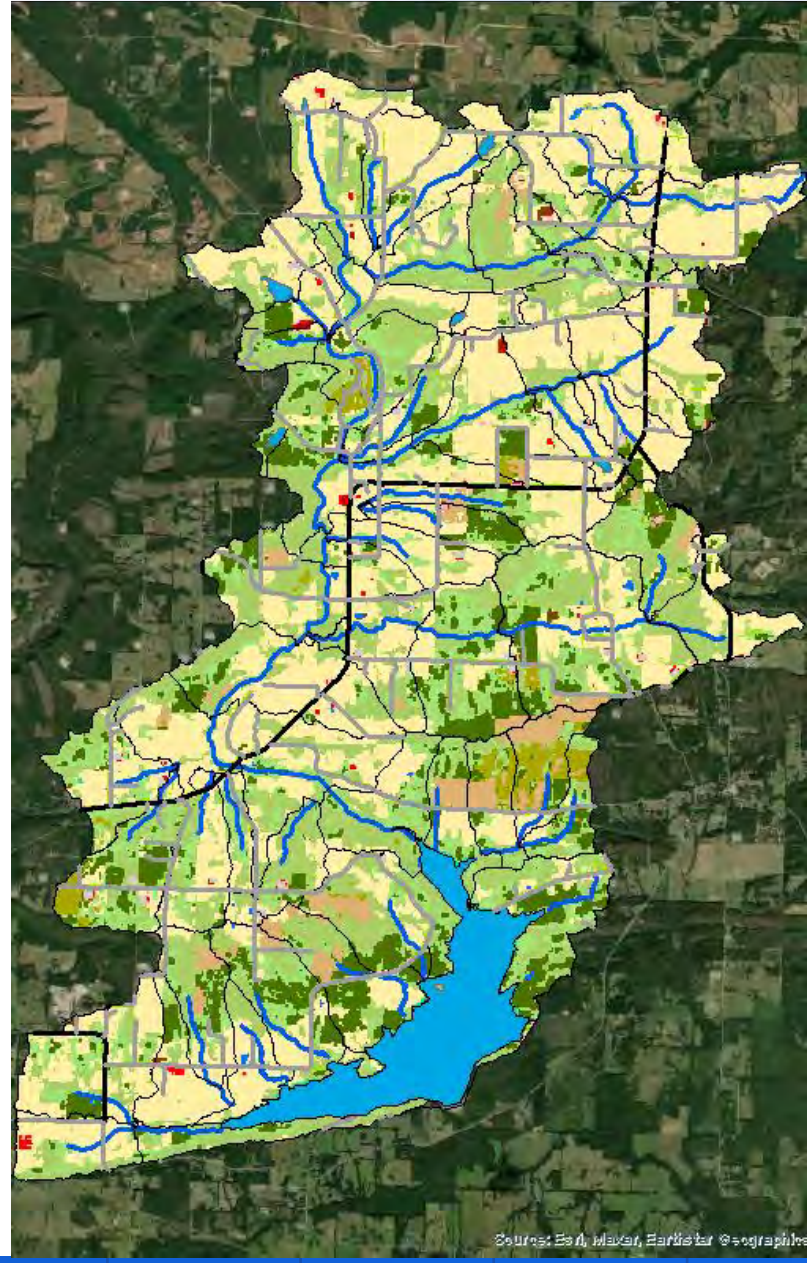
Modeling


Evapo-
transpiration
Infiltration
Runoff
Septics
Groundwater
Storage
Alluvium
Bank Storage



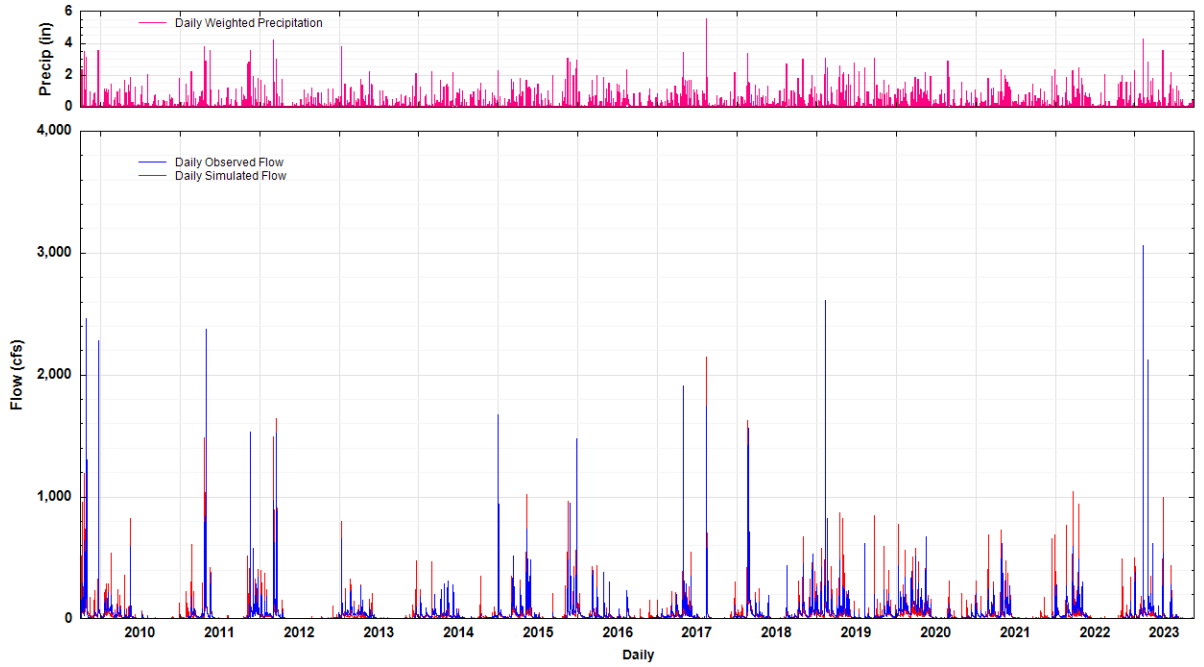
Modeling

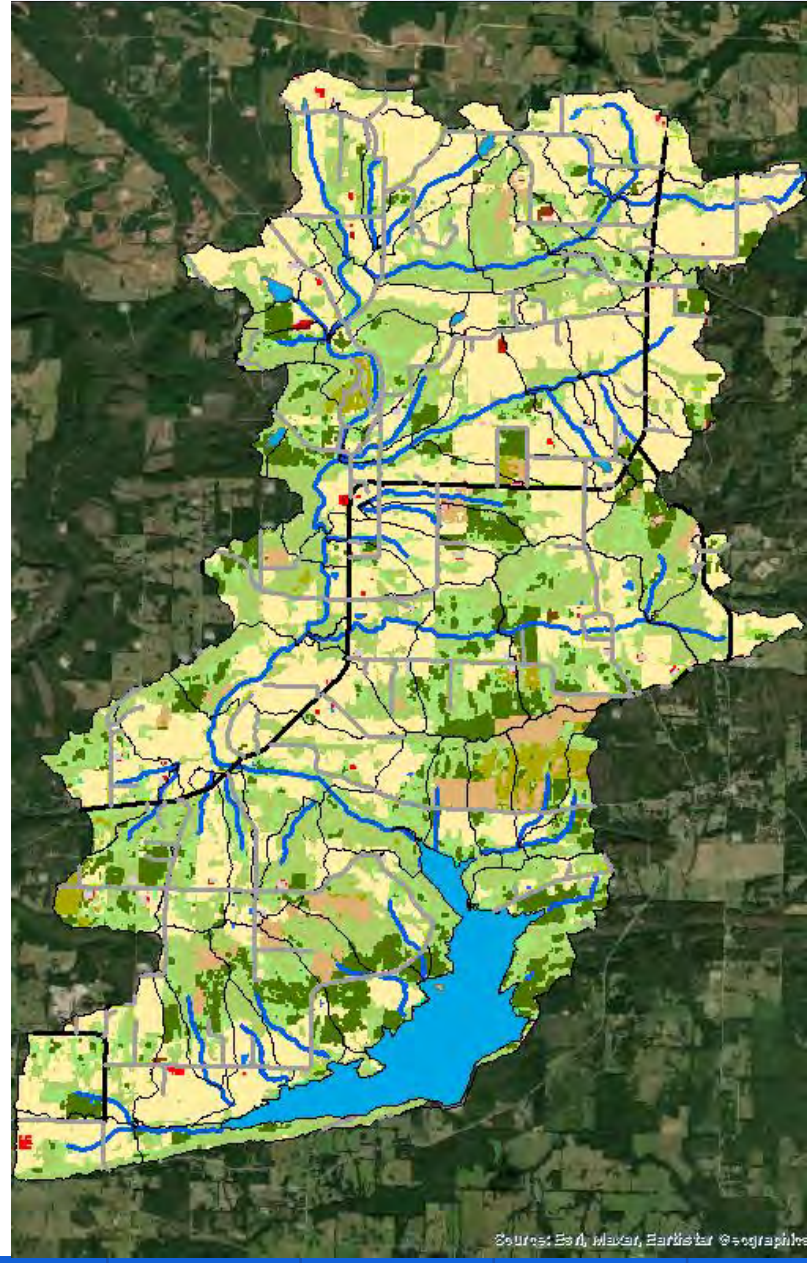
- Watershed model developed using land use, soils, slope
- Use meteorology data to predict runoff, infiltration and evaporation
- Nitrogen, phosphorus and sediment all simulated
  - Different buildup/washoff on all land uses
  - Manure application
  - Septic systems
- Model calibrated to past monitoring data



Hydrology Calibration

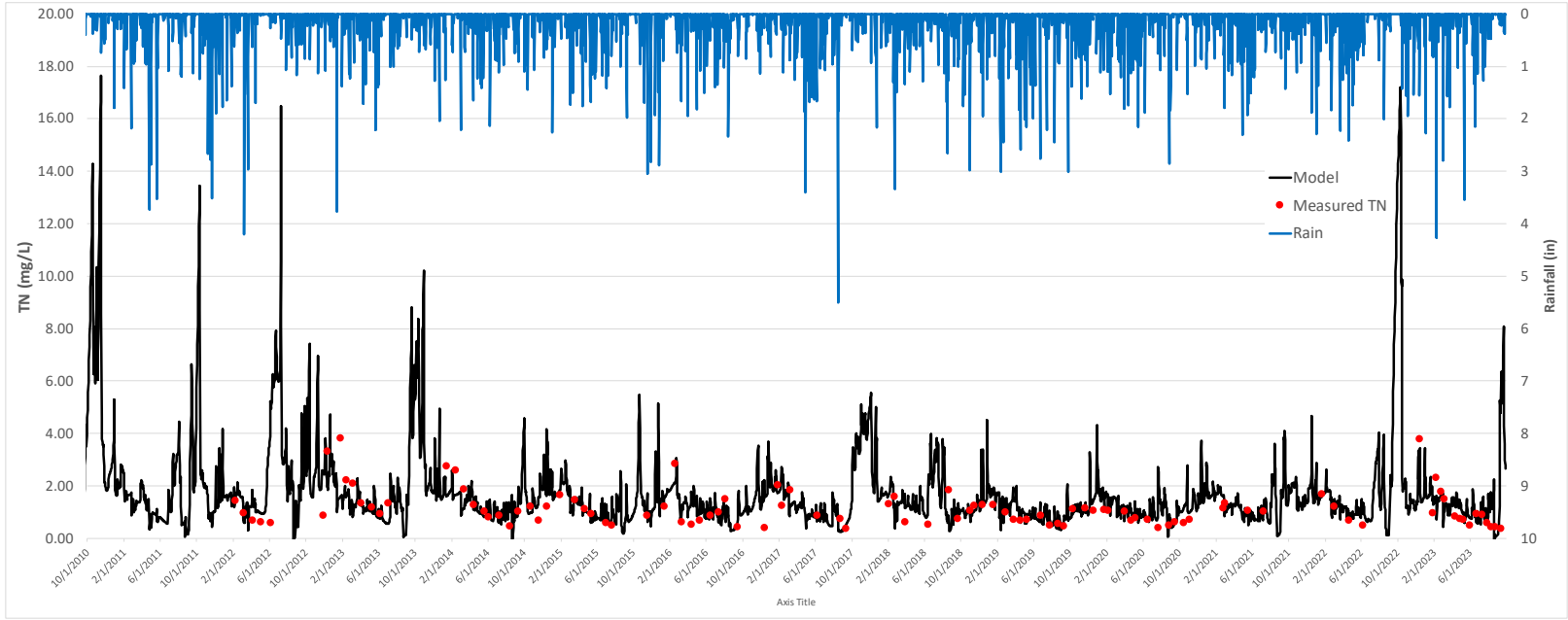
- Model calibrated to measured stream flows at USGS gage
- Model parameters adjusted to match flow conditions

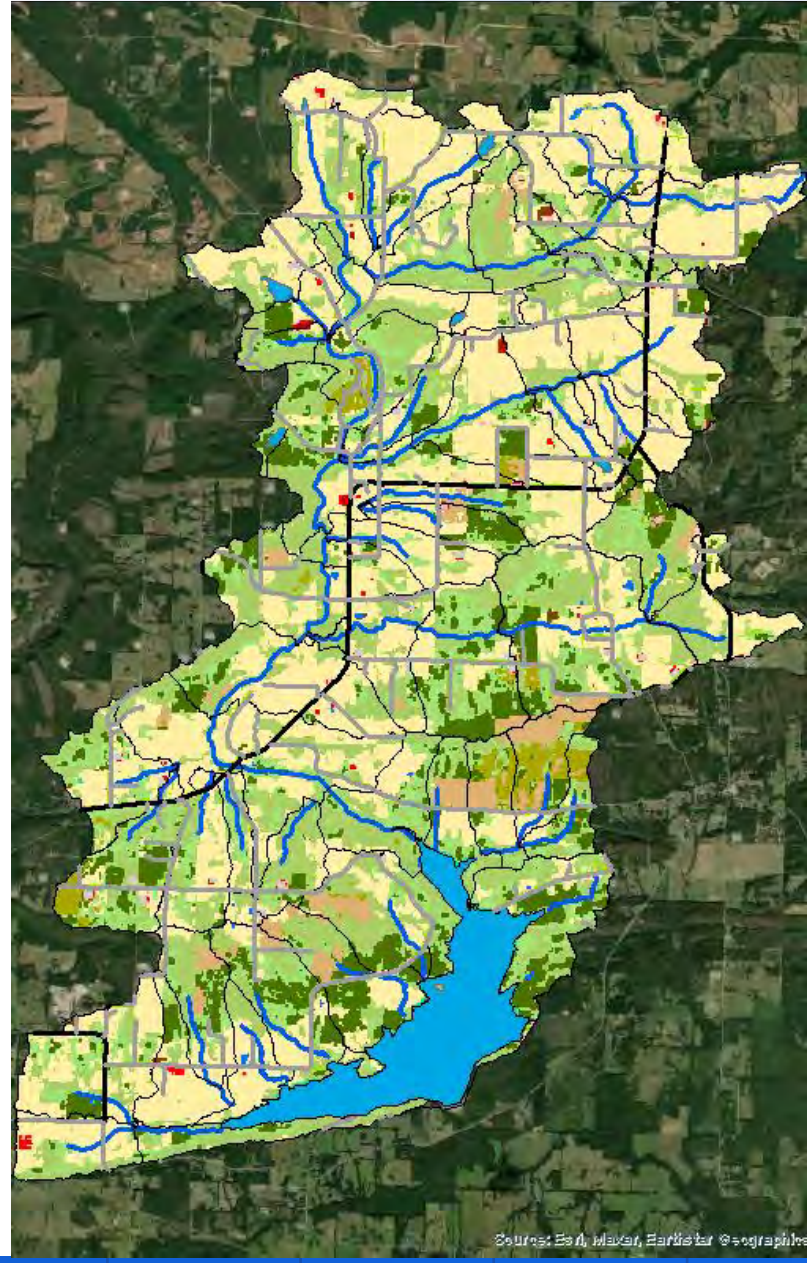




Nutrient Calibration

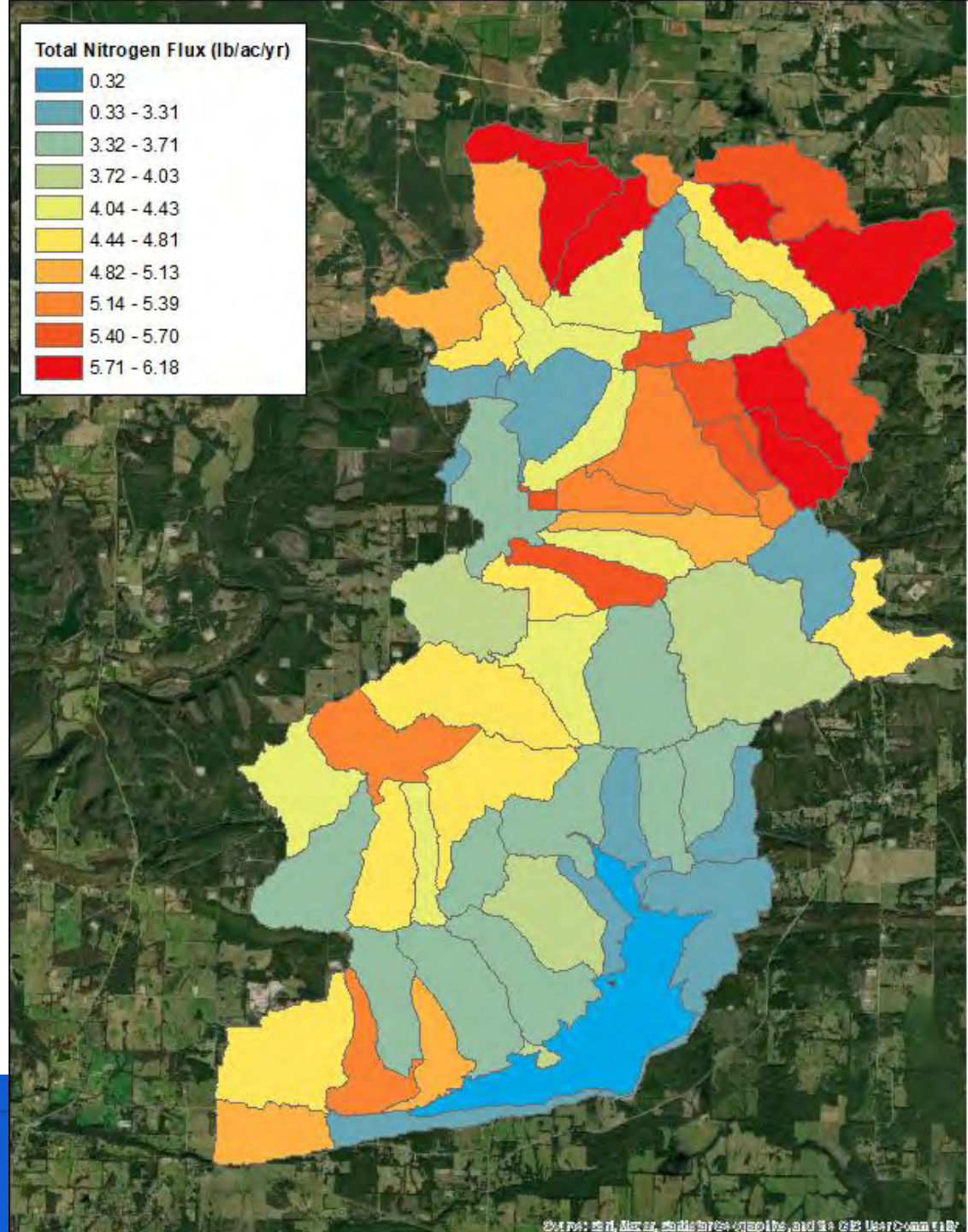
- Nutrient buildup/washoff adjusted by land use
  - Used literature data to make sure values made sense
- Compared with measurements from the USGS gage





Nutrient Results

- Modeled results show areas with higher nutrient load (lbs/year) or flux (lbs/acre/year)
  - Similar analyses were done for sediment and phosphorus
- Modeling results are used to focus management efforts
- Model results also provide information on how long it takes to flow to the lake from each catchment



Best Management Practices

- Techniques and guidelines to protect water quality
- Overall – conserving valuable resources and protecting Brewer Lake (drinking water source), which reduces cost long-term
- Model indicated key pollutant sources:
  - Sediment – gravel roads, eroding streambanks, disturbed land
  - Nitrogen – manure-amended pastures, failing septic systems
  - Phosphorus – manure, sediment-bound erosion, septic systems

BMP Management

- Techniques and guidelines to protect water quality
- Overall – conserving valuable resources and protecting Brewer Lake (drinking water source), which reduces cost long-term
- Model indicated key pollutant sources:
  - Sediment – gravel roads, eroding streambanks, disturbed land
  - Nitrogen – manure-amended pastures, failing septic systems
  - Phosphorus – manure, sediment-bound erosion, septic systems
- BMP Categories
  - **Pasture Management** –pasture lands as key sediment and nutrient inputs sources
  - **Stream Corridor Management** – assume action within stream corridors may provide better alignment
  - **Pasture and Stream Corridor Management** – Combines both strategies into a single, more effective scenario

Pasture Management

- Prescribed and Rotational Grazing
- Alternative Pasture Water Sources
- Silvopasture Establishment
- Pasture Planting and Management/Heavy Use Area Revegetation
- Nutrient Management Plans
- Farm, Water Quality, and Conservation Plans
- Fertilizer Application Technology

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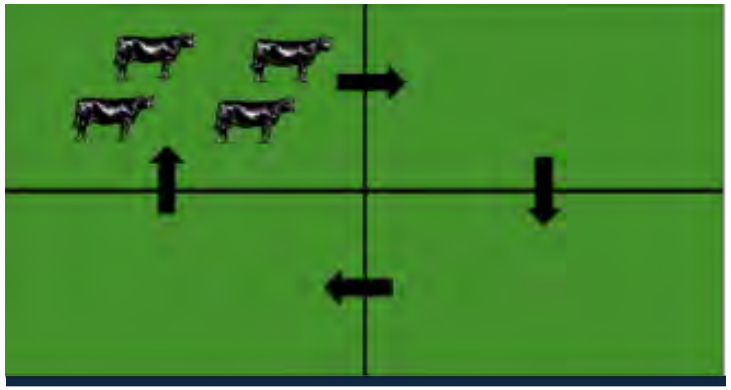
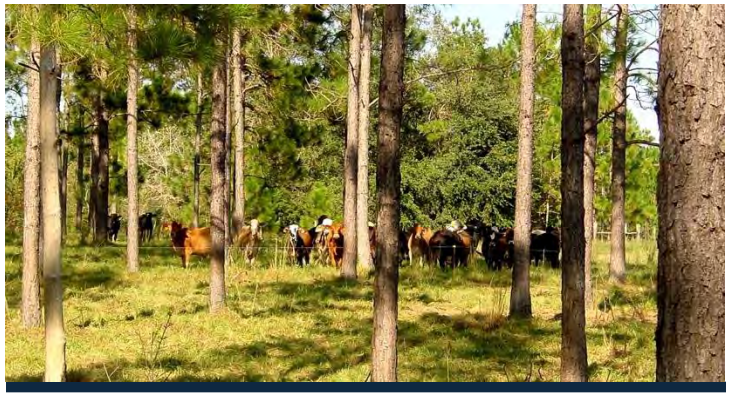


Rotational Grazing

Alternative Pasture Water Sources



Silvopasture

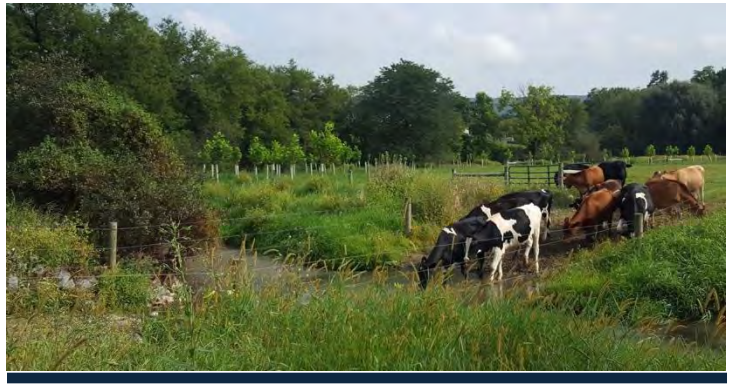
Fertilizer Application Technology

Stream Corridor Management

- Riparian Buffers and Buffer Zones
- Livestock Stream Access Control and Exclusion Fencing
- Streambank Restoration and Stabilization
- Filter Strips of Native Plants
- Grassed Waterways
- Farm Pond and Sediment Basins

Streambank Restoration and Buffer Zone

Grassed Waterway and Filter Strips



Livestock Exclusion Fencing

Sediment Basin

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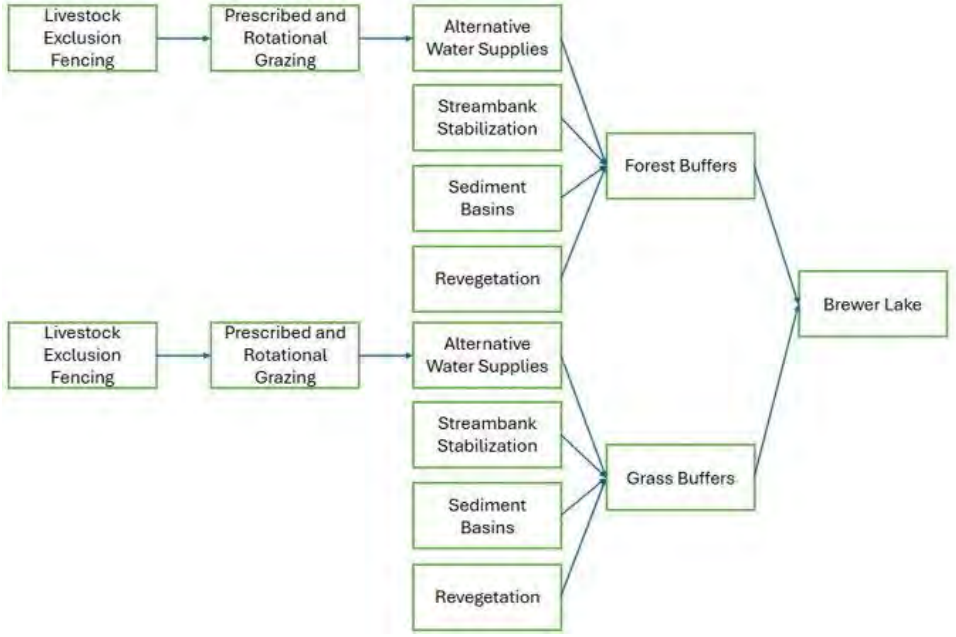
Pollutant Load Estimation Tool (PLET)

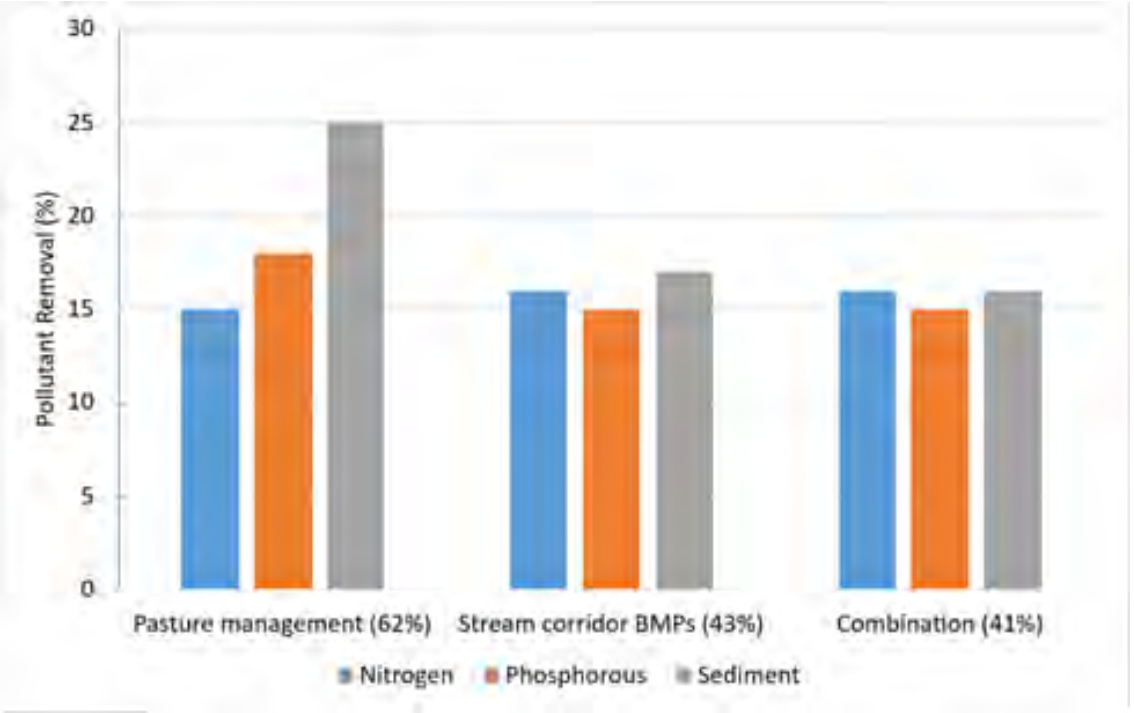
- EPA tool for estimating BMP impacts
- Users can input information about the watershed or use default values suggested by the EPA
  - Land use
  - Animal populations
  - Septic systems
  - Rainfall data
  - Soil types
- Users can create different scenarios with different extents of BMPs to estimate pollutant removal
- Goal for watershed = 15% reduction in sediment and nutrients



Relationship of Practices Used in All-Practices Scenario

PLET Scenarios

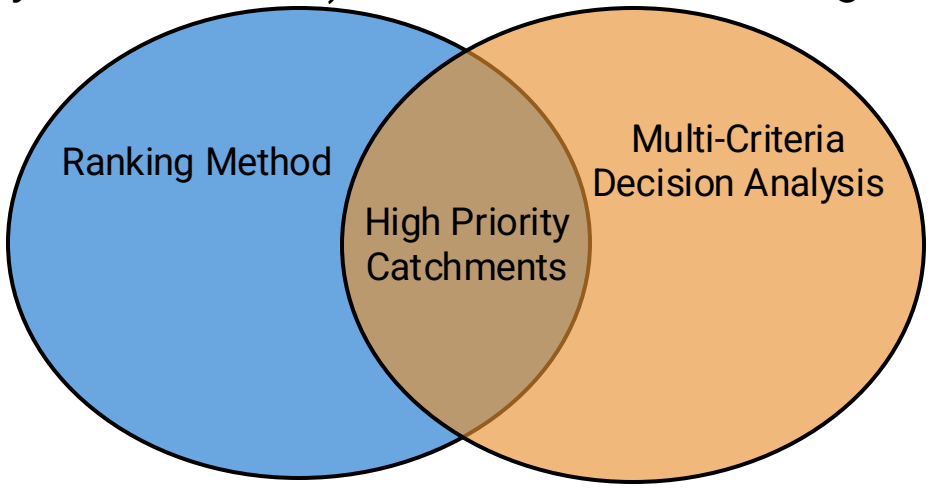
- Three scenarios were created
  - Cattle-focused practices
  - Stream-focused practices
  - Combination scenario
- Extent of each scenario was adjusted until the desired 15% removal was achieved
  - "Area" does not refer to how large the practice is, just how many acres are treated by the practice
  - Cattle-focused practices required treating 62% of the watershed
  - Stream-focused practices required treating 43% of the watershed
  - Combination scenario required treating 41% of the watershed



Catchment Prioritization

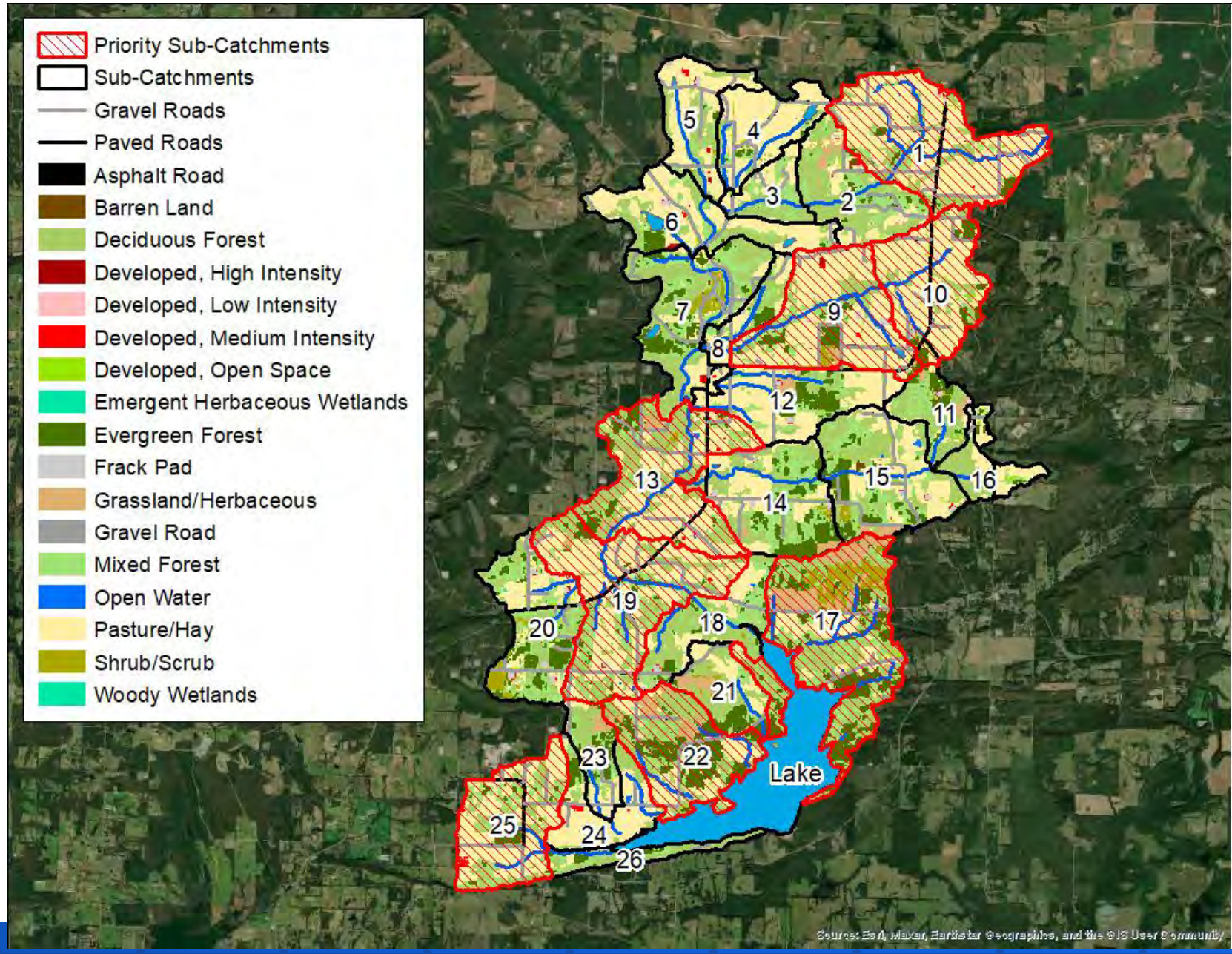
- Combine modeled load and feasibility of implementation to target high-return catchments
- Ranking Method
  - Separate ranks for Pollutant (TN, TP, Sediment) flux and BMP implementation feasibility
  - Subcatchments with high pollutant flux and feasibility identified to prioritize

- Multi-Criteria Decision Analysis
  - Systematic process in operations research for making complex choices by evaluating multiple conflicting criteria (quality, risk, benefits) to rank or select among alternatives



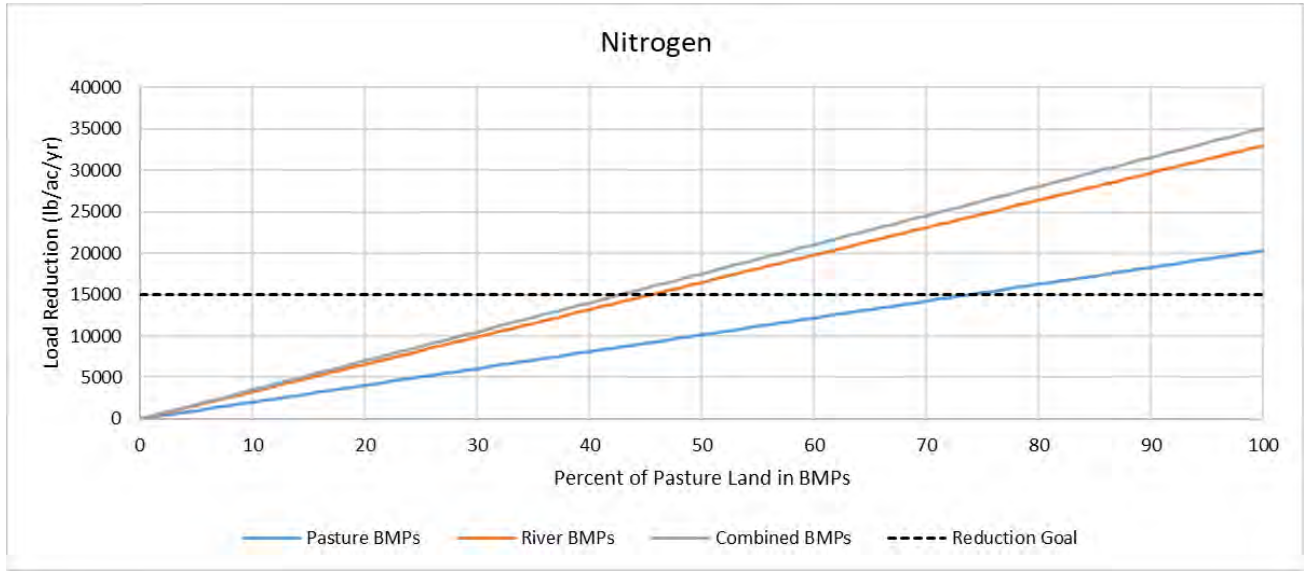
Catchment Prioritization

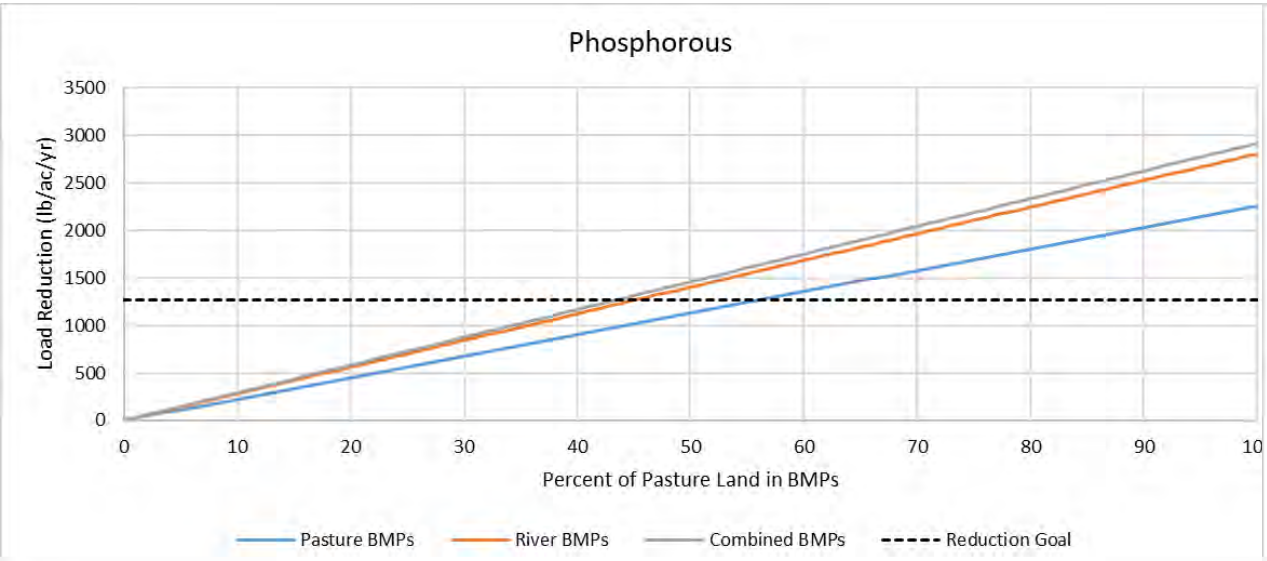
- Prioritized sub-catchments include:
  - 1 and 19: Highest loads
  - 9, 10, and 13: Higher loads with key land use
  - 17, 22, and 25: Proximity to Brewer Lake, higher loads and feasibility

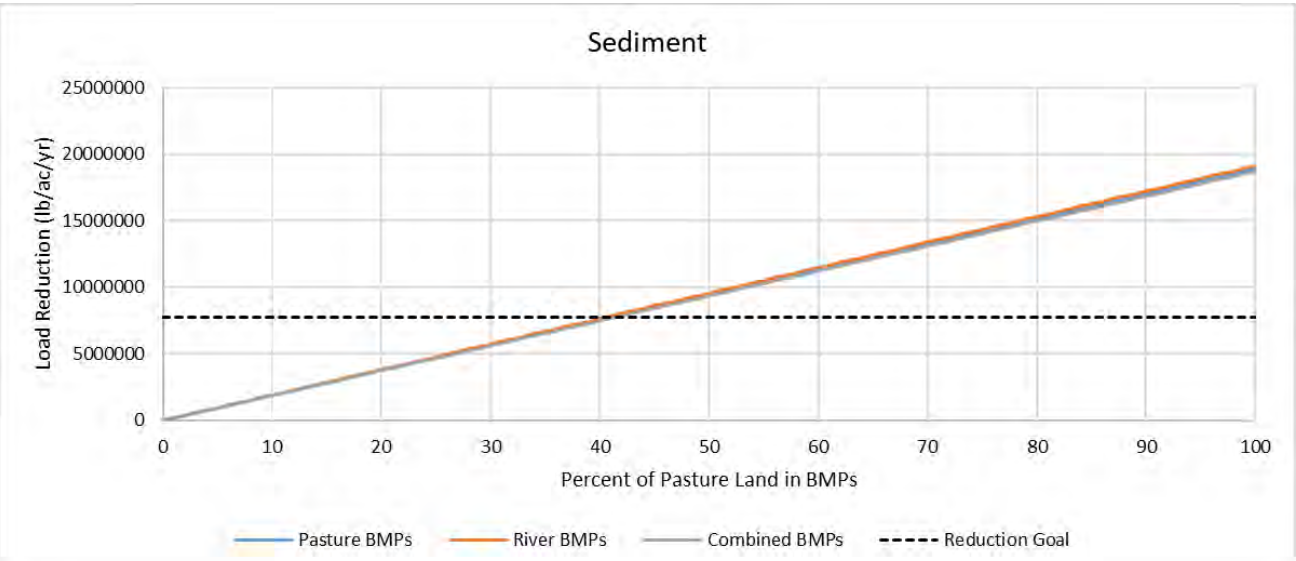


15% nutrient and sediment reduction is achievable

- Targeted BMPs reduce costs and land impacts
- Combined BMP strategies are most effective
- Focused action protects Brewer Lake long-term







Executing the Management Plan

- The Brewer Lake Watershed Management Plan sets a goal of reducing nitrogen, phosphorus, and sediment delivery to Brewer Lake by 15%
- Implementation is structured as a phased, 10-year effort (2026–2036)
- A 5-year review will ensure progress and adaptability
- Success depends on
  - Technical expertise
  - Strategic investment
  - Local partnerships
  - Adaptive management

Stakeholder Involvement & Outreach

- Stakeholder engagement is the foundation of the plan
- Outreach is conducted through the
  - Conway Corp website
  - Public meetings
  - Ongoing, open communication
- Early and continuous involvement of landowners, agencies, and the public is critical for effective implementation

Project Coordination & Leadership

- Conway Corporation acts as the central coordinator, overseeing budgeting, stakeholder engagement, and reporting
- The U.S. Army Corps of Engineers provides technical support
- Additional partners may include
  - NRCS
  - Conservation District
  - University of Central Arkansas
  - Arkansas Department of Health
  - Arkansas Department of Agriculture

Monitoring & Adaptive Management

- Monitoring is essential for tracking water quality improvements and guiding adaptive management
- Existing programs provide baseline data
- Additional monitoring will focus on nutrients, sediment, and biological indicators
- Annual reviews and a comprehensive five-year assessment will evaluate BMP effectiveness and inform strategy adjustments

Implementation Priorities & Timeline

- Implementation begins in eight priority sub-catchments identified through modeling and multi-criteria analysis
- Actions are phased over 10 years, with early years focused on planning, outreach, and baseline monitoring, followed by BMP installation and ongoing evaluation
- Progress is measured by pollutant reductions, improved acres, and enhanced community engagement

Best Management Practices (BMPs)

- Agricultural BMPs:
  - Rotational grazing
  - Livestock exclusion fencing
  - Pasture planting
  - Nutrient management
  - Poultry litter upgrades
- Riparian/stream BMPs:
  - Buffer installation
  - Streambank stabilization
  - Silvopasture establishment
- Septic system inspections, road and stormwater improvements, and watershed education programs are also included

Funding & Resource Allocation

- Implementation relies on a flexible funding strategy,
- Potential funding sources include
  - EPA section 319 grants
  - State cost-share programs
  - USDA and NRCS
  - Local contributions
- Structural BMPs (e.g., streambank stabilization) require higher upfront investment, while education and monitoring need ongoing support
- Aligning BMPs with appropriate funding sources is key to long-term success

Long-Term Success & Adaptive Management

- The plan’s success depends on sustained momentum, transparent communication, and adaptive management
- Regular monitoring, stakeholder engagement, and strategy adjustments ensure continued progress toward water quality goals
- The plan provides a clear framework for action
- Ongoing commitment and collaboration are essential for protecting Brewer Lake as a reliable water source and ecological resource

Thank You!