ARS CEAP Watershed Assessment Studies (WAS): Elements of Watershed Research Design

USDA ARS

Agricultural Research Service

the in-house research arm of the U.S. Department of Agriculture

Roles of ARS Benchmark Watersheds in CEAP

- Assess individual conservation practices and cumulative effects of multiple practices
- Support and improve the national model of water-quality effects
- Support development of regional models.
- Provide access for research collaboration
- Provide public demonstration of conservation practices and programs.

Objectives of WAS

- Implement a system to compile and manage water, soil, management and economic data from all watersheds.

- Measure water quality, water quantity, soil and ecosystem effects of conservation practices.

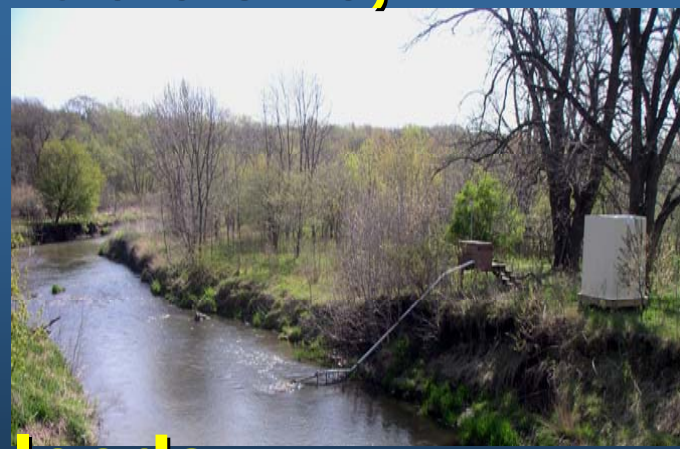
- Quantify uncertainties of predicted effects.

- Develop planning tools for selection and placement of conservation practices.

- Develop and verify regional watershed models to quantify environmental effects.

Water Quality Measures

- Dissolved Oxygen
- Nitrogen (nitrate, total, organic)
- Phosphorus (total, dissolved, available?)
- Sediment (concentration, particle size, suspended, bed)
- Pathogens (*E. Coli*)
- Pesticides
- Annual, event, and seasonal loads
- Temperature



Water Management Measures

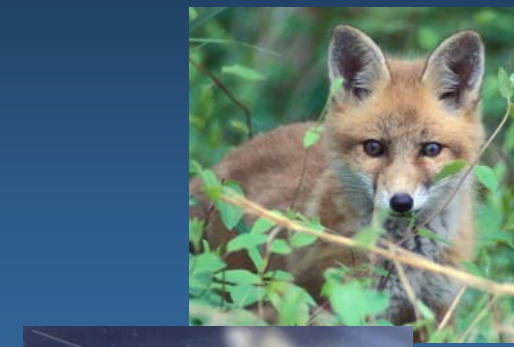
- Baseflow and runoff discharge
- Artificial drainage discharge
- Temporal discharge variability
- Precipitation/discharge relationships
- Soil moisture distribution
- Groundwater recharge

Soil Quality Measures

- Aggregate stability
- Available water holding capacity
- Carbon mineralization potential
- Microbial biomass carbon
- Nitrogen and mineralization potential
- Phosphorus
- Electrical conductivity
- Microbial activity and diversity

Ecosystem Measures

- Community structure
- Species diversity
- Habitat quality
- Native vegetation cover
- Patchiness index
- Species richness
- Soil flora and fauna





Measurements

	Water Quality	Water Conservation	Soil	Ecosystem	Economic
S. Fork Iowa River, IA	●	●	●		●
Walnut Creek, IA	●	●			●
Mark Twain Reservoir, MO	●	●	●		●
Upper Washita River, OK	●	●	●	●	
Goodwin Creek, MS	●	●	●	●	
Yalobusha River, MS	●	●	●		
Beasley Lake, MS	●	●	●	●	
Leon River, TX	●	●	●		
Little River, GA	●	●	●		
Town Brook, NY	●	●	●		●
St Joseph River, IN	●		●		●
Upper Big Walnut Creek, OH	●	●	●	●	●

Conservation Practice Categories Emphasized

- conservation buffers
- channel management
- drainage management
- manure management
- nutrient management
- pest management
- tillage management
- land conversion and range

Conservation Practices

Anticipated Interaction with Teams

- Data Management
  - list of variables
  - database and metadata structure
  - OCIO support
- Model Validation, Evaluation, and Uncertainty
  - data access
  - modeling support for each watershed
- Economic Analysis
  - analysis in selected watershed
  - long-term plans
- Data Quality and Assurance
  - identify standard methods and QA/QC practices