

# ARS CEAP Watershed Assessment Studies (WAS): Plans for Determining Environmental Effects



**Agricultural Research Service**

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

# ARS 12 Benchmark Watershed Assessment Studies (WAS) 2003-2007





# 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.

# Resource Concerns & Land Use Categories for WAS

## Resource Concerns

### Initially:

- Water Quality
- Water Conservation
- Ecosystems
- Soil Quality

### Later:

- Air Quality

## Land Use Categories

### Initially:

- Rainfed Cropland

### Later:

- Irrigated cropland
- Grazinglands
- Agro-forestry Lands



# 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

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

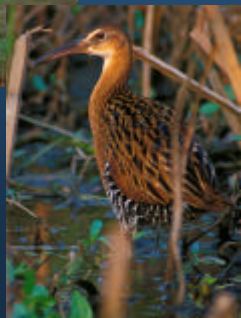
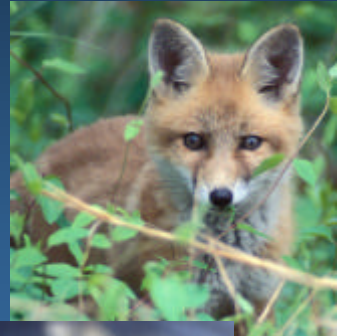


- Aggregate stability
- Available water holding capacity
- Carbon mineralization potential
- Microbial biomass carbon
- Nitrogen and mineralization potential
- Phosphorus
- Electrical conductivity
- Microbial activity and diversity





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



	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

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



	Buffers	Channel	Drainage	Manure	Nutrient	Pest	Tillage	Land Conversion & Range
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	●		●		●	●	●	●





- What are the measurable effects of CPs on environmental indicators at the watershed scale?
- How does the location of CPs affect environmental responses?
- What is the appropriate time scale to expect changes in environmental effects?
- What are the environmental effects of multiple CPs.  
(+ - \* ?)
- What are the optimal combinations and location of CPs to achieve environmental goals?
- What are the risks and uncertainties associated with achieving these environmental effects?
- What social and economic factors facilitate or impede implementation of CPs within watersheds?

