CEAP Conservation Effects Assessment Project

Watershed Assessment Studies

Introduction

The Farm Security and Rural Investment Act, also known as the 2002 Farm Bill, increased funding substantially for existing conservation programs and created funding for a new one—the Conservation Security Program. The Natural Resources Conservation Service (NRCS) and the Agricultural Research Service (ARS) have joined with other USDA and Federal agencies to initiate studies that will quantify the environmental benefits of conservation practices implemented through these programs on retired and working cropland, grazing land, agro-forest land and wetlands. A national assessment and watershed studies comprise CEAP. The national assessment will track environmental benefits over time on a national scale. In selected regions of the country, watershed studies will provide more detailed assessments of environmental effects and benefits, a framework for evaluating and improving the performance of the national assessment models, and additional research on conservation practices and their expected effects at the watershed scale. Estimating environmental benefits of 2002 Farm Bill programs will allow policymakers and program managers to improve implementation of existing programs and design new programs to meet the goals of Congress more effectively.

CEAP involves many federal agencies besides NRCS and ARS. They include Farm Service Agency (FSA), National Agricultural Statistics Service (NASS), Cooperative State Research Education and Extension Service (CSREES), Economic Research Service (ERS), U.S. Geological Survey (USGS), U.S. Environmental Protection Agency (EPA) and Office of Risk Assessment and Cost Benefit Analysis (ORACBA).

Vision and Overall Approach

The vision for the watershed studies is a core body of scientific assessments at a scale that will help Farm Bill policy-makers and program managers optimize the conservation investments needed to meet our nation's environmental needs, as well as food and fiber production needs.

The watershed assessment studies will complement the national assessment, provide additional field and watershed data, and develop a set of regionalized models for future national assessments. ARS and NRCS will lead the effort for watershed assessment studies, and will collaborate with the ORACBA, CSREES, FSA, and other agencies.

Objectives

Below are the five objectives for the CEAP watershed assessment studies:

1. Assess water quality, soil quality, and water conservation effects and benefits of conservation practices at the watershed scale, and begin investigations into how to quantify wildlife and air quality benefits beyond the edge of the farm field. Assessments will include estimates of uncertainties (or ranges in values of benefits) associated with achieving targeted improvements, such as water quality standards. Practice costs and cost efficiencies will also be evaluated as part of the watershed assessment. Some watersheds will address all resource concerns, while others will be focused primarily on one or two resource concerns.

2. Develop a set of regional watershed assessment models that can be used to address benefits of conservation practices and other environmental issues in the major agricultural regions of the nation and for use in future national assessments.
3. Develop water quality, soil quality, and water conservation databases that can be used to evaluate effects of conservation practices, and to compile air quality and wildlife habitat data for future assessment. These databases will be used periodically to validate and enhance the Hydrologic Unit Model for the United States (HUMUS) and Soil and Water Assessment Tool (SWAT) models used in the national assessment and to validate and verify the regionalized models.
4. Develop indicators or performance measures for documenting water quality, soil quality, air quality, and aquatic and terrestrial habitat benefits from implementing conservation practices at selected watersheds.
5. Expand research on the effects of conservation practices at the watershed scale for different soils, climates, topography, farming practices, cropping systems, and other land uses.

Relationship to Farm Bill Conservation Programs

CEAP covers most of the conservation practices implemented through the Environmental Quality Incentives Program (EQIP), Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), Wildlife Habitat Incentives Program (WHIP), and NRCS Conservation Technical Assistance. Conservation practices or best management practices (BMPs) that will be emphasized include the NRCS Core 4 practices (conservation buffers, nutrient management, pest management, and tillage management) plus irrigation management practices, manure management practices, establishment of wildlife habitat, and wetland protection and restoration. Environmental benefits will be estimated for each of the five resource concerns (in priority order) that conservation programs are designed to address:

- Water quality (nutrient, pesticide, and sediment delivery to lakes, rivers, and streams)
- Soil quality (including soil erosion and carbon storage)
- Water conservation (including flood and drought protection)
- Air quality (including particulates and odors)
- Wildlife habitat (including aquatic and terrestrial habitats)

Benefits will be estimated separately for the four agricultural land use categories (in priority order) to which most conservation practices apply:

- Croplands, including croplands enrolled in CRP
- Grazing lands
- Wetlands
- Agro-forestry lands

It is not intended that estimates of benefits for the watershed assessment studies be aggregated to represent national-level estimates, since many more watersheds would be needed to properly represent the various environmental and resource base characteristics in the country. Rather, the results of the watershed studies will be used to improve the performance of the national assessment models and to demonstrate that a richer set of benefits can be identified and measured when assessed at a finer scale.

Three Categories of Watersheds

Below are the three categories of watershed studies that will be conducted as part of CEAP:

ARS Benchmark Research watersheds: In these 12 research watersheds, ARS already has long-term conservation effects research projects in progress. Most of these watersheds have associated water and soil quality monitoring data covering several years. This group of watersheds may be expanded during

the course of the project, depending on the availability of funding. Development of regional watershed models will be associated primarily with these research watersheds. The land use on the ARS Benchmark watersheds is primarily agricultural cropland that is rainfed. These watersheds, selected in 2003, became fully operational in 2004.

Special Emphasis watersheds: Eight watersheds were selected to address specific resource concerns such as manure management for animal feeding operations and water use on irrigated cropland. Other issues of concern that may be addressed are drainage management practices, declining surface or ground water supplies, flood control structures or reservoirs, wetland construction and rehabilitation, or other special land use activities that relate to the management and operation of primarily cropland (irrigated and rainfed) watersheds.

Competitive Grants watersheds: These watersheds are selected through the CSREES Water Quality Initiative Competitive Grants Program. Four watersheds were awarded these grants in FY 2004, and additional ones will be solicited in FY 2005. This program sponsors a collection of watershed case studies that will explicitly investigate the linkages among various conservation and land management practices as implemented over space and time and the resultant effects on water quality. The ultimate goal of the program is to understand how to optimally locate and schedule the implementation of conservation practices within a watershed to achieve locally defined water quality and other environmental goals. The program also will describe the economic and social factors that facilitate or impede implementation of conservation practices.

Questions to be addressed by CEAP Watersheds

All three categories of watersheds will address all or a portion of the following questions:

1. *What are the measurable effects of agricultural conservation and management practices on ground and/or surface water quality and other environmental effects at the watershed scale?*
2. *Within the hydrologic and geomorphic setting of a watershed, how does the timing and location of a suite of conservation practices affect water quality and other environmental effects?*
3. *What is the appropriate time scale to expect changes in surface or ground water conditions, and other environmental effects from conservation practices?*
4. *What are the risks and uncertainties associated with achieving these water quality and other environmental effects from conservation practices? What social and economic factors facilitate or impede implementation of conservation practices within the study watershed?*
6. *What are the relationships among agricultural conservation and management practices implemented in a given watershed with respect to their impact on water quality and other environmental effects? Are the effects additive? Multiplicative? Contradictory? Independent?*
7. *What is the optimal collection and placement of conservation management practices in a watershed to achieve water quality and other environmental goals?*

These watershed studies will demonstrate that an optimal collection and placement of conservation practices can achieve specific water quality and other environmental goals.

Deliverables

The four primary deliverables for the watershed assessment studies are:

1. Watershed Database for the National Assessment. Deliver a comprehensive database on conservation practices related to water quality, soil quality, and water conservation benefits for specific agricultural fields and watersheds (December 2005, 2006, 2007). Specific data (part of objective 1) plus indicator or performance measurement data (part of objective 5) related to soil quality, carbon sequestration, air quality, and wildlife habitat will also be included in the database for some of the watershed studies (December 2007 and 2008).
2. Watershed Assessment of Conservation Practices. Watershed analysis techniques will be used to determine the cost-effectiveness and the threshold of conservation practices needed to achieve specified targeted improvements in water quality, soil quality, and water conservation (December 2005-water quality benefits, and December 2007 and 2008-all three environmental benefits). Additional assessments will be delivered in terms of carbon sequestration, air quality, and wildlife habitat benefits for some of the watershed studies (December 2007 and 2008).
3. Assessment of Uncertainties for Achieving Environmental Benefits. Deliver estimates of uncertainties for costs and benefits that was achieved for targeted improvements in water quality, soil quality, and water conservation (December 2005- water quality benefits, and December 2007 and 2008- all three environmental benefits). Deliver additional information on uncertainties for carbon sequestration, air quality, and wildlife habitat benefits for some of the watershed studies (December 2007 and 2008).
4. A Set of Regionalized Watershed Models for Future National Assessments. A revised set of models will be developed that can be used to assess water quality, soil quality, and water conservation benefits associated with conservation practices on a regional basis, as well as track sources of water quality benefits within the watershed. These regionalized models will be capable of assessing soil carbon sequestration, air quality, and wildlife habitat benefits for future Farm Bill assessments.

Reporting of Watershed Assessment Activities

NRCS, ARS, and CSREES will sponsor forums throughout the project to obtain comments and suggestions from other agencies, academic institutions, and the public on the CEAP approach and findings. Information about CEAP Watershed Assessment studies will also be provided through presentations at professional society meetings and will be posted on the NRCS, ARS, and CSREES websites.

The project will extend through the life of the 2002 Farm Bill, and has the following reporting requirements:

1. First annual progress report in 2005. This report will include national conservation effects estimates for 2002, 2003 and 2004. It will also include a summary of the watershed assessment initiatives and any available results.
2. Second annual progress report by December 2006. This report will extend annual estimates to include 2005. Revised benefits from the 2002-2004 national assessment components also will be included. Revised estimates will result from improvements in conservation effects modeling capabilities. Results from a subset of the watershed assessment studies should be included in this report.
3. Third annual progress report by December 2007. This report will extend annual estimates to include 2006. Results for additional watershed assessment studies will be included.

4. Fourth annual progress report by December 2008. This report will extend annual estimates to include 2007. Results for all the watershed assessment studies will be included.

Development of Regionalized Watershed Assessment Models

One of CEAP's goals is to develop a set of USDA Watershed Assessment Models that can address environmental quality assessments for specific regions of the nation. Although the USDA Watershed Assessment Model will be designed to primarily address the watershed scales, the set of regionalized models will be able to evaluate conservation-planning measures at the field scale on a preliminary assessment basis as requested by USDA agencies such as NRCS and FSA. Presently, current technologies have not been integrated into a unified tool for application by action agencies.

The specific technologies are:

1. Revised Universal Soil Loss Equation (RUSLE2) - For erosion control planning at the field scale, the RUSLE 2 version has been developed to evaluate water erosion from individual fields.
2. Annualized Agricultural Non-Point Source (AnnAGNPS) - For erosion, nutrient, and pesticide source accounting information at a watershed scale, the AnnAGNPS model has been developed to integrate watershed information with field scale information resulting from RUSLE to provide a watershed analysis.
3. SWAT - At the larger watershed and basin scales, the Soil and Water Assessment Tool (SWAT) has been developed to evaluate the impacts of conservation measures on pollutants, along with the information needed for defining water quality benefits and effects, e.g. reductions in total maximum daily loads (TMDLs).
4. Stream Models. For stream restoration at the stream corridor scale, the Conservation Channel Evolution Pollutant Transport System (CONCEPTS) can be utilized. At the entire watershed stream network scale, the National Center for Computational Hydroscience and Engineering -1, 2, or 3 dimensional models (CCHE1D, 2D, or 3D) have been developed to address those issues.
5. Other Models. The EPA and USGS models, including Hydrologic Simulation Program Fortran (HSPF) and Spatially Referenced Regressions on Watershed Attributes (SPARROW) need to be used more fully for detailed hydrologic processes.

The integration of these technologies into a unified USDA Watershed Assessment Model will allow USDA to perform watershed analyses of conservation practices beyond water quality impacts. In addition, this model, which will have regional components, will reduce the current confusion among users over the selection of appropriate inputs and modifications required to effectively use various models.

Modules will address soil quality and water conservation issues using the Object Modeling System (OMS) technology. A short-term goal of this proposal would be to use these tools for applications at the watershed scale using SWAT, which can then point to subwatersheds that can be further studied with AnnAGNPS. Application of AnnAGNPS can then point to individual fields for analysis using either RUSLE-within-AnnAGNPS or the stand-alone version of RUSLE. At this point, OMS will provide an opportunity to conduct comparative analysis of soil quality and water conservation parameters that represent a particular field or subwatershed that are important to a particular region of the country. The analysis of channels can also be performed when no channel evolution concerns exist, using AnnAGNPS or SWAT. When problems are present as a result of channel processes, then the CCHE1D model can be used to study the watershed-wide stream network and point to problem reaches that can be further studied for stream restoration issues using CONCEPTS or CCHE2D or CCHE3D.

Benefits of Watershed Assessment Studies

CEAP provides a comprehensive quantitative assessment of the impact of certain 2002 Farm Bill conservation programs on the status of the Nation's natural resources, the quality of the environment, or social and economic benefits and effects that accrue to rural communities and the Nation from implementing conservation programs. Congressional and program decision-makers need to know the optimal balance among environmental benefits and effects, program costs, and food and fiber production. With an expanded role for research in watersheds, a long-term effort to determine the effectiveness of conservation programs can be implemented. This will enable assessment of current programs, changes that may be affected in future farm bills, and comparisons of the benefits and effects from alternative management practices that may be considered under these programs.

A long-term initiative to evaluate Farm Bill conservation programs in research watersheds will provide the following benefits and effects:

1. Provide quantitative assessment of individual conservation practices on a watershed scale for both on- and off-site benefits and effects to water quality and water quantity, air quality, soil quality, and aquatic and terrestrial wildlife habitats. This will quantify the effect of a given practice for its contribution to output by the national assessment model in CEAP.
2. Provide validated models that will be useful at the watershed and regional scales.
3. Provide watershed scale validation data for the national/regional models that are assembled for use in the CEAP national assessment including:
    a. Developing an analysis of variations in regional sensitivities to model input data (e.g., land use or climate) resolution;
    b. Developing estimates of model error at the national, regional, and small watershed scales;
    c. Determining model accuracy estimates by comparing predicted water quality improvements with actual water quality trends at the national, regional, and small watershed scales; and
    d. Providing initial data for soil quality, carbon sequestration, air quality and wildlife habitat assessments at the national, regional, and small watershed scales.
4. Determine the threshold at which conservation practices can be shown to have measurable benefits and effects within a watershed through sensitivity and uncertainty analysis of the number of acres enrolled versus total acres in watershed.
5. Determine where in the watershed the optimized cost-effectiveness occurs from deploying a conservation practice(s) to achieve a targeted reduction in pollutants.
6. Quantify the net cumulative effects of conservation practices within a watershed.
7. Quantify economic and environmental benefits and effects to rural communities and the nation that are derived from USDA conservation programs.
8. Demonstrate conservation practices and programs to the public using the watershed research system.

Watershed Assessment Studies Team and Functions

The functions and teams listed below apply to the twelve ARS Benchmark Research watersheds shown in Table 1. Some will also apply to the eight Special Emphasis watersheds in Table 2, as well as CSREES competitive grants watersheds.

1. Data Management. The ARS team will collect information on the number and type of conservation practices implemented on paired or nested watersheds within the initial 12 ARS benchmark watersheds. The team will track progress in implementing the various conservation programs initially for water quality, soil quality, water conservation effects/benefits, and economic data being incorporated into the watersheds databases. In the future, the team will monitor data collection activities for air quality and wildlife habitat benefits on some of the watersheds. The team will also determine the data management procedures/protocols to be used, recommend minimal database requirements, and monitor progress made in enhancing the data management standards for all the ARS watershed locations.

2. Watershed Design for Determining Environmental Effects. This team will be primarily responsible for designing methods to expand water quality, soil quality, and water conservation effects/benefits of conservation practice research on the 12 ARS benchmark watersheds. The team will identify dominant conservation practices to be assessed in various settings through collaboration with NRCS representatives and local watershed committees. Also, the team will assess methodologies, including economic surveys, that can be used to assess the environmental effects/benefits associated with conservation practices, estimated cost thresholds for adoption targets, and an assessment of practice cost-efficiencies for single and multiple conservation practices. Initial emphasis will be placed on coordinating existing watershed activities, defining modifications in existing project plans, and determining methods for collecting additional data relative to single and multiple conservation practices.

3. Model Validation, Evaluation and Uncertainty Analysis. There are four aspects to this team effort: 1) Develop ARS model validation standards for systematic quantification of uncertainty in model predictions resulting from calibration parameter identification and ranges of input data resolution and quality; 2) Use the standard to validate SWAT/APEX and AnnAGNPS and the regionalized models developed by the Model Development and Regionalization Team; 3) Evaluate the watershed models SWAT/APEX and AnnAGNPS with the purpose of making recommendations for refinements and upgrades by the Model Development and Regionalization Team; and 4) Link REMM and CONCEPTS to the SWAT/APEX and AnnAGNPS models.

4. Economic Analysis. This team will develop methods to determine the likelihood that combinations and placements of conservation practices will prevent exceeding threshold water quality criteria on the 12 ARS benchmark watersheds. Similar methods will be developed to address soil quality, air quality, water conservation, and wildlife habitat criteria at a later date. Methods will be developed for estimating the cost-effectiveness and cost thresholds for adoption of these combinations and placements of practices estimating uncertainty bounds associated with predictions of exceeding water quality criteria. Various economic models and approaches will be used to determine the cost-effectiveness and cost thresholds estimates. The team will also compare the magnitude of uncertainty bounds observed, beginning with 5 ARS watersheds and expanding to all 12 ARS benchmark watersheds. The team will ultimately develop analyses for estimating the regional uncertainty that might be associated with the NRCS National Assessment.

5. Model Development and Regionalization. The purpose of this team is to develop watershed models to provide state-of-the-art modeling capabilities for estimating regional conservation effects. ARS will

use the Object Modeling System (OMS) to assist with the development of these regionalized models for future national assessments (FY 2008 Farm Bill activities). These regional models will be designed to address only the essential processes of importance to a particular region of the United States. Also, these regionalized models will provide the opportunity to focus on specific environmental effects and benefits (water quality, soil quality, water conservation, air quality, and wildlife habitat benefits) of importance to a particular watershed. Models, including Water Erosion Prediction Project (WEPP), Wind Erosion Prediction System (WEPS), SWAT, AnnAGNPS, REMM, CONCEPTS, RUSLE2, HSPF, and various economic models, as appropriate, will be considered by this team. Working versions of the regionalized watersheds models will likely become available in 2007 and beyond for further refinement, validation, and verification.

6. Data Quality and Assurance. A team of watershed scientists will determine how to proceed in collecting uniform data, as much as possible, on water quality, soil quality, water conservation, air quality, and wildlife habitat benefits for the initial and final assessment being conducted by the twelve ARS benchmark watersheds. This team will determine how best to collect data using standardized protocols related to environmental effects/benefits and economic surveys being assessed by the Risk Assessment and Economic Analysis team. This team also will identify the methods/procedures used for data collection, as well as document the quality assurance and quality control methods used in the laboratory analysis of soil and water data.

CEAP Watershed Locations

See the following map for names and locations of CEAP Watershed Assessment Studies as of FY 2004. Please note that the map only displays the general locations of the watersheds because the watershed boundaries shown on this map are at the 8-digit Hydrologic Unit Code resolution, which average over 700 square miles in drainage area. The CEAP watersheds are generally focused on assessing the effects of conservation treatments in much smaller watershed drainage areas.

Contact Information

See Tables 1 and 2 for contact information for watershed leaders and coordinators. For more information, please also see the CEAP website at **http://www.nrcs.usda.gov/technical/nri/ceap/index.html**.

Table 1. ARS Benchmark Research Watersheds: contributions toward the CEAP watershed assessment studies (FY03—FY07)

Location	ARS Research Unit and Potential Cooperators	Watershed	ARS Contact Person	NRCS State Watershed Coordinator for CEAP ARS Wshds.	Resource Priorities*	Assessment Activity	Water Quality Measurements
Tifton, GA	Southeast Watershed Research , University of Georgia, & USGS	Little River	**Tim Strickland** tstrickland@ars.usda.gov	**Anthony Burns** anthony.burns@ga.usda.gov	WQ, S, W	P, 0, M, T, N,V,D	N, P, Pe, DO, T, S
Ames, IA	Agricultural Land Management Iowa State Univ., USGS, & EPA	South Fork, Iowa River Basin	**Mike Burkart** burkart@nstl.gov	**Hal Cosby** hal.cosby@ia.usda.gov	WQ, S, A, WH	P, V, D	N, P, S, B, Pa
Ames, IA	Soil and Water Quality, Iowa State Univ., & USGS	Walnut Creek	**Dan Jaynes** jaynes@nstl.gov		WQ, S	P, M, V, D	N, P, S
West Lafayette, IN	National Soil Erosion Research Laboratory, Purdue Univ., & American Clean Water Foundation	St. Joseph River	**Chi-hua Huang** chihua@purdue.edu	**Susan McLoud** susan.mcloud@in.usda.gov	WQ, S	P, M, V, D	N, P, S, Pe
Columbia, MO	Cropping Systems and Water Quality, University of Missouri, Com Growers, & American Clean Water Foundation	Mark Twain (including Goodwater Creek)	**John Sadler** sadlerj@missouri.edu	**Robert E. Ball** bob.ball@mo.usda.gov	WQ, WH, S	P, V, D	N, P, S, B, Pe
Oxford, MS	Channel and Watershed Processes, U. S. Army Corps of Engineers, University of Mississippi -NCHE	Goodwin Creek & Yalobusha	**Carlos Alonso** calonso@ars.usda.gov	**Al Garner** al.garner@ms.usda.gov	WQ, S	P, O, M, V, D	N, P, S,Pa
Oxford, MS	Upland Erosion Processes Research , U. S. Army Corps of Engineers, & EPA	Yalobusha	**Matt Romkens** mromkens@ars.usda.gov		WQ, S, WH	P, O, V, D	N, P, S, B, DO, T
Oxford, MS	Water Quality and Ecological Processes, USGS, Mississippi State Univ., etc.	Beasley	**Martin Locke** mlocke@ars.usda.gov		WQ, S, WH	P, O, M, V, D	N, P, S, B,DO,Pa,Pe, T
Columbus, OH	Soil Drainage Research Ohio State Univ., & American Clean Water Foundation	Upper Big Walnut Creek	**Norm Fausey** fausey.1@osu.edu	**Wes Beery** wes.beery@oh.usda.gov	WQ, S	P, V, D	N, P, S, Pe
El Reno, OK	Great Plains Agroclimate and Natural Resources Research, Oklahoma State University, NRCS, NOAA, USGS & other possible cooperators	Upper Washita River	**Jean Steiner** jsteiner@grl.ars.usda.gov	**Ken Matlock** kenneth.matlock@ok.usda.gov		P, V, D	N, P, S
University Park, PA	Pasture Systems and Watershed Management Research Laboratory, Cornell University, & EPA	Town Brook, NY	**Ray Bryant** rbb13@psu.edu	**Gary Lamont** gary.lamont@ny.usda.gov	WQ, S	P, M, V, D	N, P, S
Temple, TX	Natural Resources Systems Research , Texas A&M, NRCS, USGS & Other possible cooperators	Leon River	**Clarence Richardson** crichardson@spa.ars.usda.gov	**Tim Dybala** bybala@brc.tamus.edu	WQ, S, W	M, O, T, N, V	N, P, S, Pa

Code for resource priority

WQ = water quality
W = water conservation
S[1/] = soil quality
A[2/] = air quality
WH[3/] = aquatic and terrestrial wildlife habitat

Code for activity

P = assess single conservation practices
O = optimize location of conservation practices
M = model development
T = determine threshold required to measure benefit
N = determine net cumulative effect of practice
V = develop and provide watershed data sets for validation of models
D = demonstrate benefits of conservation practices and programs
E = economic benefits from conservation programs

Code for water quality measurements

S = sediments
N = nitrate-nitrogen
P = phosphorus
DO = dissolved oxygen
T = temperature
Pa[3/] = pathogens
Pe[3/] = pesticides
B[4/] =biotic

* Databases will not be available at the same time to conduct watershed assessments.

[1/] Includes primary measurements and estimates of soil erosion by water and annual carbon sequestration, although watershed science and methodologies still need to be developed to assess, evaluate, or model some other aspects of soil quality or carbon sequestration.

[2/] Includes primarily estimates of particulate matter, pesticides, ammonia, and nitrous oxide emissions to the atmosphere, although watershed science and methodologies still need to be developed to assess, evaluate, or model some other aspects of air quality emissions.

[3/] Includes primarily biotic measurements in stream channels.

[4/] Methods for analysis and interpretation of some pathogens, pesticides, and biotic indicators are not well defined.

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ARS Benchmark Research Watersheds

	Watershed name
GA	Little River
IA	South Fork, Iowa River
IA	Walnut Creek
IN	St. Joseph River
MO	Mark Twain
NY	Town Brook
OH	Upper Big Walnut Creek
OK	Upper Washita River
MS	Goodwin Creek
MS	Beasley Lake
MS	Yalobusha River
TX	Upper Leon River

Competitive Grants Watersheds

	Watershed name	Research Lead
IA	Three watersheds (Walnut Creek, South Fork Iowa River, Sny Magill)	(Iowa St. U.)
UT	Little Bear River	(Utah St. U.)
OH	Rock Creek	(Heidelberg College)
ID	Paradise Creek	(U. of Idaho)

Special Emphasis Watersheds

	Watershed name
CA	Stemple Creek
ID	Upper Snake Rock Creek
KS	Cheney Lake
MD	Choptank River
OH	Maumee River (Upper Auglaize R.)
MI	Maumee River (Upper Tiffin R.)
OR	Upper Klamath Lakes
TX	North Bosque River

Note: CEAP Watershed locations are plotted as 8-digit Hydrologic Unit Code Watershed boundaries for general locations only.

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12 ARS Benchmark Research Watersheds

Wshd. Location	ARS Research Unit and Potential Cooperators	Watershed Name	Contact Person	Location	Phone	FAX	Voice Com	eMail

Table 1A. ARS Benchmark Research Watershed contacts.

GA	Southeast Watershed Research , University of Missouri, & USGS	**Little River**	**Tim Strickland**	Tifton, GA	(229) 386-3664			tstrickland@tifton.usda.gov
		NRCS Coordinator, GA	**Anthony Burns**, State Resource Conservationist	Stephens Federal Building, 355 E. Hancock Ave, Athens, Georgia 30601-2769	(706) 546-2114	(706) 546-2275	9021-2009	anthony.burns@ga.usda.gov
IA	Agricultural Land Management Iowa State Univ., USGS, & EPA	**South Fork, Iowa River**	**Mike Burkart**	Ames, IA	(515) 294-5809			burkart@nstl.gov
	Soil and Water Quality, Iowa State Univ., & USGS	**Walnut Creek**	**Dan Jaynes**	Ames, IA	(515) 294-8243			jaynes@nstl.gov
		NRCS Coordinator, IA	**Hal Cosby**, Technology Exchange Facilitator	National Soil Tilth Lab, 2150 Pammel Dr., Ames, IA 50011	(515) 294-9922	(515) 294-8125	345-7345	hal.cosby@ia.nrcs.usda.gov
IN	National Soil Erosion Research Laboratory, Purdue Univ., & American Clean Water Foundation	**St. Joseph River**	**Chi-hua Huang**	West Lafayette, IN	(765) 494-6143			chihua@purdue.edu
		NRCS Coordinator, IN	**Susan McLoud**, Soil Conservationist	6013 Lakeside Dr., Indianapolis, IN 46278	(317) 290-3200, x359			susan.mcloud@in.usda.gov
MO	Cropping Systems and Water Quality University of Missouri, Com Growers, & American Clean Water Foundation	**Mark Twain** (including Goodwater Creek)	**John Sadler**	Columbia, MO	(573) 884-1971			sadlerj@missouri.edu
		NRCS Coordinator, MO	**Robert E. Ball**, Assistant State Conservationist (WQ)	601 Business Loop 70W, Ste. 250, Columbia, MO 65203	(573) 876-0912	(573) 876-0900	9034-1363	bob.ball@mo.usda.gov
MS	Channel and Watershed Processes, U. S. Army Corps of Engineers, University of Mississippi -NCHE	**Goodwin Creek**	**Carlos Alonso**	Oxford, MS	(662) 232-2969			calonso@msa-oxford.ars.usda.gov
	Upland Erosion Processes Research , U. S. Army Corps of Engineers, & EPA	**Yalobusha**	**Matt Romkens**	Oxford, MS	(662) 232-2940			mromkens@msa-oxford.ars.usda.gov
	Water Quality and Ecological Processes, USGS, Mississippi State Univ., etc.	**Beasley**	**Martin Locke**	Oxford, MS	(662) 232-2908			mlocke@ars.usda.gov
		NRCS Coordinator, MS	**Delmer Stamps** State Resource Conservationist	100 W. Capitol St., Suite 1321, Jackson, MS 39269	(601) 965-5209, Ext. 235	(601) 965-4940	9000-865-1955	delmer.stamps@ms.usda.gov

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12 ARS Benchmark Research Watersheds

Wshd. Location	ARS Research Unit and Potential Cooperators	Watershed Name	Contact Person	Location	Phone	FAX	Voice Com	eMail
OH	Soil Drainage Research Ohio State Univ., & American Clean Water Foundation	**Upper Big Walnut Creek**	**Norm Fausey**	Columbus, OH	(614) 292-9806			fausey.1@osu.edu
		NRCS Coordinator, OH	**Wes Beery**, Resource Conservationist	200 N. High St., Columbus, OH 43215	(614) 255-2494	(614) 255-2549	345-5350	wes.beery@oh.usda.gov
PA	Pasture Systems and Watershed Management Research Laboratory, Cornell University, & EPA	**Town Brook** Watershed & Cannonsville Reservoir Basin, NY	**Ray Bryant**	University Park, PA	(814) 863-0923			rbb13@psu.edu ray.bryant@ars.usda.gov
		NRCS Coordinator, NY	**Gary Lamont**	44 West St., Walton, NY 13856	(607) 865-6713		9015-1225	gary.lamont@ny.usda.gov
OK	Great Plains Agroclimate and Natural Resources Research, Oklahoma State University, NRCS, NOAA, USGS & other possible cooperators	**Upper Washita River**	**Jean Steiner**	El Reno, OK	(405) 262-5291			jsteiner@grl.ars.usda.gov
		NRCS Coordinator, OK	**Ken Matlock**, State Agronomist	Suite 206, 100 USDA, Stillwater, OK 74074	(405) 742-1241	(405) 742-1201	9037-1241	kenneth.matlock@ok.usda.gov
TX	Natural Resources Systems Research , Texas A&M, NRCS, USGS & Other possible cooperators	**Leon River**	**Clarence Richardson**	Temple, TX	(254) 770-6500			crichardson@spa.ars.usda.gov
		NRCS Coordinator, TX	**Tim Dybala**, Water Resources Assessment Team	808 Blackland Road Temple, TX 76502-6712	(254) 770-6677	(254) 774-6145		dybala@brc.tamus.edu
ARS	National Program Staff		Dale Bucks	ARS, Beltsville, MD	(301) 504-7034			dab@ars.usda.gov
			Mark Weltz	ARS, Beltsville, MD	(301) 504-6246			maw@ars.usda.gov
NRCS	NHQ, CEAP Core Team		Tom Drewes, CEAP Watersheds Coordinator	NRCS, RIAD, GWCC, Beltsville, MD	(301) 504-2365			tom.drewes@usda.gov
			VACANT, CEAP Team Leader	NRCS, RIAD, GWCC, Beltsville, M	(301) 504-2340			

Table 2. Special Emphasis Watersheds contacts.

Watershed Name	State	State Contact	email	Mailing Address	NRCS Coordinator(s)	Watershed Leader(s)	Special Emphasis Issues
Stemple Creek	**CA**	Charles W. Bell, State Conservationist (530) 792-5600, (530) 792-5665	Chuck.bell@ca.usda.gov	USDA Lyng Service Center, 430 G Street #4164, Davis, CA 95616-4164	**Luana Kiger, (**530) 792-5661 luana.kiger@ca.usda.gov	Field Contact: **Charlette Sanders**, (707) 794-1242 Charlette.sanders@ca.usda.gov Watershed Leader: **Vern Finney**, (530) 792-5665 vern.finney@ca.usda.gov	Dairy manure management and riparian restoration
Upper Snake Rock	**ID**	Richard Sims, State Conservationist (208) 378-5701	Richard.sims@id.usda.gov	Room 109 , 3793 N 3600 E , KIMBERLY, ID, 83341-5076	**John Kendrick, (**208) 378-5729 John.kendrick@id.usda.gov Mark Weltz, (301) 504-6246 maw@ars.usda.gov	**Dale Westermann**, (208) 423-6565 dtw@nwisrl.ars.usda.gov	Irrigation management
Cheney Lake	**KS**	Harold Klaege, State Conservationist (785) 823-4565	Harold.klaege@ks.usda.gov	USDA-NRCS, 760 South Broadway, Salina, KS 67401	**James Krueger,** (785) 823-4541 James.Krueger@ks.usda.gov Shawna Carter, (785) 823-4545 shawna.carter@ks.usda.gov Michael Marshall, (785) 823-4508 Michael.marshall@ks.usda.gov Fred Theurer, (301) 869-7195 fred.theurer@verizon.net	**Lisa J. French**, (620) 665-0231 Lisa.french@ks.nacdnet.net	Wildlife habitat and beef cattle manure management
Choptank River	**MD**	David Doss, State Conservationist (410) 757-0861	David.doss@md.usda.gov	USDA-NRCS, John Hanson Business Center, 339 Busch's Frontage Road, Suite 301, Annapolis, MD 21401	**Mark Waggoner, (**443) 482-2927 Mark.Waggoner@md.usda.gov Cathleen Hapeman, (301) 504-6511 hapemanc@ba.ars.usda.gov Mark Weltz, (301) 504-6246 maw@ars.usda.gov	**Laura McConnell,** (301) 504-6511 mcconnel@ba.ars.usda.gov **Gregory McCarty,** (301) 504-6511 mccartyg@ba.ars.usda.gov	Poultry manure management
Maumee River Upper Tiffin	**MI**	John Bricker, State Conservationist (517) 324-5277	John.bricker@mi.usda.gov	3001 Coolidge Road, Suite 250, East Lansing, Michigan 48823	**Kevin Wickey, (**517) 324-5279 Kevin.wickey@mi.usda.gov Fred Theurer, (301) 869-7195 fred.theurer@verizon.net	**Ruth Shaffer**, (517) 324-5239 Ruth.Shaffer@mi.usda.gov	Dairy manure management and subsurface drainage
Maumee River, Upper Auglaize	**OH**	Kevin Brown, State Conservationist (614) 255-2475 John Wilson, Acting (937) 642-5871, x105	Kevin.brown@oh.usda.gov John.wilson@oh.usda.gov	USDA-NRCS State Office, 200 North High Street, Room 522, Columbus, OH 43215	**Jim Stafford,** (614) 255-2466 jim.stafford@oh.usda.gov Fred Theurer, (301) 869-7195 fred.theurer@verizon.net	**Steve Davis**, (419) 222-0614 Steve.davis@oh.usda.gov	Subsurface drainage
Upper Klamath Lake	**OR**	Bob Graham, State Conservationist (503) 414-3200	Bob.graham@or.usda.gov	USDA-NRCS, 101 SW Main Street, Suite 1300, Portland, Oregon 97204-3221	**Terry Nelson,** (503) 414-3014 Terry.nelson@or.usda.gov Tom Makowski, (503) 414-3106 tom.makowski@or.usda.gov	**Kevin Conroy**, (541) 883-6932 Kevin.conroy@or.usda.gov	Irrigation management
North Bosque	**TX**	Larry Butler, State Conservationist Norman Bade, SRC, (254) 742-9881	Larry.butler@tx.usda.gov norman.bade@tx.usda.gov	USDA-NRCS, 101 South Main, Temple, TX 76501	**Tim Dybala, (**254) 770-6677 dybala@brc.tamus.edu Mark Weltz, (301) 504-6246 maw@ars.usda.gov	**Paul Dyke**, TAES, (254) 774-6059 dyke@brc.tamus.edu	Dairy manure management and reservoir water quality

Table 3. Competitive Grants Watersheds contacts and information.

Watershed Name	State	Watershed Leader	Mailing Address	Phone	email		NRCS contact
Paradise Creek HUC= 17060108023	**ID**	**Jan Boll**, **Assistant Professor** Department of Biological and Agricultural Engineering	University of Idaho, Moscow, ID 83844	(208) 885-7324	jboll@uidaho.edu	The project will focus on the cumulative effects of conservation practices in a small portion of the watershed. The project will consider total suspended solids and sediment issues. Landowner decisions to adopt conservation practices will be evaluated. Strong outreach component.	**John Kendrick,** (208) 378-5729, John.kendrick@id.usda.gov
Three Midwest Watersheds	**IA**	**Catherine Kling,** Professor of Economics, Center for Agricultural and Rural Development, 568D Heady Hall	Iowa State University, Ames, Iowa 50011	(515) 294-5767	ckling@iastate.edu	Three watersheds represent different physiographic provinces and land uses. Work complements ongoing work in Iowa (e.g., Walnut Creek). The project will implement a SWAT model for the three watersheds. Sny Magill – HUC 07060003 Bloody Run (Sny's control) - HUC 07060001 South Fork - HUC 07080207 Walnut Creek - HUC 07100008 Squaw Creek (Walnut Creek control) – HUC 07080105	**Hal Cosby,** (515) 294-9922, hal.cosby@ia.nrcs.usda.gov
Rock Creek HUC= 0410001109020	**OH**	**Peter Richards,** Senior Research Scientist and Director of the Water Quality Lab	Heidelberg College, 310 East Market Street. Tiffin, OH	(419) 448-2240	prichard@heidelberg.edu	The project will investigate how the location of conservation practices and the timing of their implementation impact water quality. The project will use AnnAGNPS to model water quality.	**Jim Stafford**, (614) 255-2466 jim.stafford@oh.usda.go
Little Bear Creek HUC= 16010203	**UT**	**Nancy M. Mesner**, Specialist-Watershed, Geography and Earth Resources	Utah State University, Logan UT 84322	(435) 797-2465	nancym@ext.usu.edu	Key water quality issue is excess phosphorous. Watershed includes a wide array of land uses that impact water quality. Team includes engineering, social, economic, physical/biological.	**Kerry Goodrich**, (801) 524-4568 Kerry.goodrich@ut.usda.gov
CSREES Competitive Grants Program Contacts							
		Mary Ann Rozum	CSREES, Washington, DC	(202) 401-4533	mrozum@csrees.usda.gov	fax: 202-401-1706	
		Lisa Duriancik	CSREES, Washington, DC	(202) 401-4141	lduriancik@csrees.usda.gov	fax: 202-401-1706	