

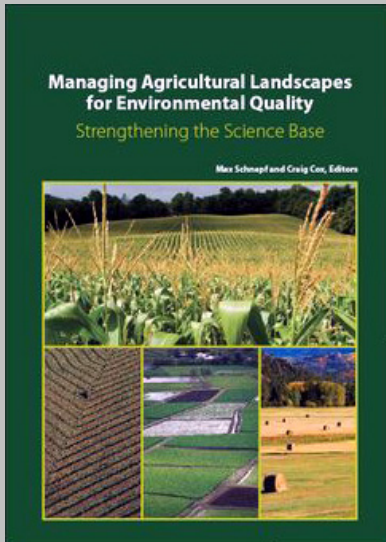


United States Department of Agriculture  
Natural Resources Conservation Service  
Helping People Help the Land

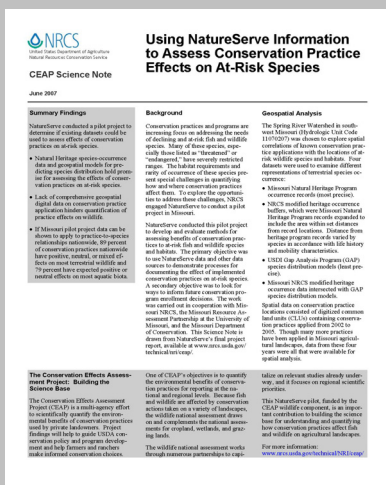
# Conservation Effects Assessment Project CEAP Highlights

August 2007

## New Releases!



Proceedings of the October 2006 technical workshop *Managing Agricultural Landscapes for Environmental Quality* are now available from the Soil and Water Conservation Society. This workshop brought together leading scientists engaged in assessing the environmental effects of conservation practices.



This *CEAP Science Note* from the wildlife national assessment now is available on the CEAP website at <http://www.nrcs.usda.gov/technical/nri/ceap/wildlife.html>.

## Assessing Conservation's Effects on Wildlife

The quality of fish and wildlife habitat is greatly influenced by agricultural activities on privately owned and operated croplands, grazing lands, wetlands, and forest lands, which make up about 70 percent of the total area of the conterminous United States.

Applied across this agricultural landscape are more than 160 different kinds of conservation practices described in NRCS field office technical guides. Comprehensively quantifying the effects of these practices on wildlife habitat is a major scientific challenge because any given practice can affect different species in different ways. For example, planting trees for windbreaks and shelterbelts can attract species that thrive in diverse habitat but disturb species that require open grassland.

CEAP relies on partnerships with the fish and wildlife conservation community to focus its efforts on the most important practices and programs and the fish and wildlife resources likely to be affected by them. In partnership with the Association of Fish and Wildlife Agencies, CEAP scientists are assessing data gaps and setting priorities for quantifying the effects of key conservation practices on high priority species and habitats at broad regional scales (Table 1).

To date, CEAP has initiated 10 wildlife assessment projects (Table 2). In each of these projects, we seek to leverage resources of partners and use existing monitoring data to draw inferences on how conservation practices affect various fish and wildlife species or groups. More detailed information on these projects is available on the CEAP website at <http://www.nrcs.usda.gov/technical/nri/ceap/wildlife.html>.

While many of these assessment efforts

are just now getting underway, some have generated noteworthy findings. Two such projects are highlighted here.

### NatureServe Missouri Pilot.

NatureServe, which leads a nationwide network of natural heritage programs, conducted this pilot project to develop and evaluate geospatial methods for assessing benefits of conservation practices to at-risk fish and wildlife species and habitats.

Major findings from this pilot project include:

- Conservation effects assessments can be conducted at several spatial scales, including watershed, state, regional, and national scales. Standard methods can be developed to evaluate impacts of past and current applications of conservation practices.
- Further research is needed to develop procedures for quantifying the extent of practice effects beyond simple designations of positive, neutral, and negative effect.
- A primary constraint to predicting the effects of applied practices on at-risk species is the lack of geospatial data on where practices have been applied on the landscape.
- Type of vegetation established by individual practices greatly influences the expected effect on a particular species. Unfortunately, the spatial practice data that do exist offer little insight on how practices were applied beyond basic practice standards.
- Predictors of at-risk aquatic species occurrence are less variable than predictors for terrestrial species by virtue of their focus on streams and other aquatic habitats.

- If Missouri pilot project data can be shown to apply nationwide, 89 percent of conservation practices nationwide have positive, neutral, or mixed effects on most terrestrial wildlife, and 79 percent have positive or neutral effects on most aquatic biota.

Additional details are available from the final project report and the new *CEAP Science Note* posted on the CEAP website.

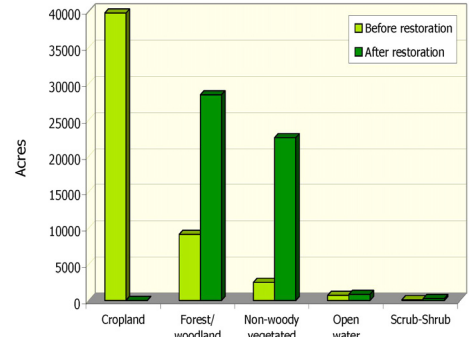
**Wetlands Reserve Program (WRP) Ecological Monitoring.** Quantifying the habitat value of wetlands restored through WRP is the purpose of an ecological monitoring project funded by the Missouri Department of Conservation and NRCS. The monitoring, which was conducted fiscal years 2004 through 2006 at 594 WRP easement sites in Missouri, collected data on post-restoration wetland classification and habitat variables for input into habitat

suitability index (HSI) models for several wildlife species. HSI scores rank habitat from unsuitable (0.0) to optimal (1.0). Easements were visited 3 to 12 years after restoration.

Change in land cover or “habitat succession” was examined by contrasting conditions before and after restoration. Analysis of these data shows a clear change from largely agricultural cropland cover to herbaceous or forested wetland vegetation (Figure 1).

Three HSI models for species associated with non-forested habitats, and three for species associated with forested habitats, were selected to quantify wildlife habitat values. Indicator species for non-forested habitats were mallard, least bittern, and lesser yellowlegs; those for forested habitats were mallard (winter habitat model developed specifically for bottomland hardwood forested wetlands), wood duck, and prothonotary warbler.

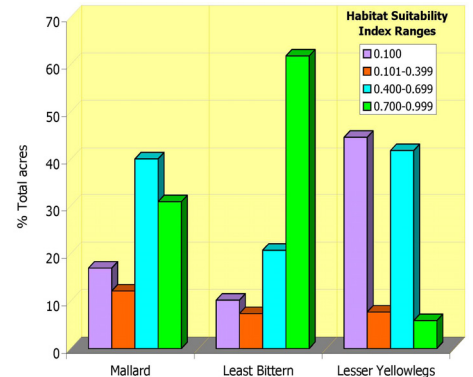
Post-restoration HSI scores appear markedly higher than the pre-restoration score (0.1) for all non-forest models (Figure 2) and two of the three forest models (Figure 3). The magnitude of the increase in habitat quality was greatest for species associated with emergent-herbaceous (non-forest) habitats, which develop faster than forest habitats, and often are an early precursor of forested wetlands. These findings indicate that WRP in Missouri is contributing substantially to wetland wildlife conservation.



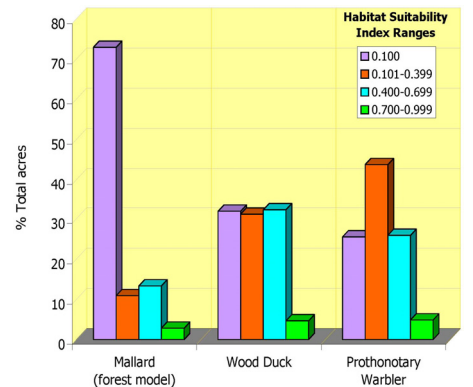
**Figure 1.** Land-cover status before (light green) and after (dark green) restoration of 52,200 acres of WRP easements in Missouri.

**Table 1. Regional priorities identified for CEAP wildlife assessments**

Region	Priorities
<b>Northeast</b>	<ul style="list-style-type: none"> <li>• Fish response to stream restoration, dam removal and fish passage practices</li> <li>• Wildlife response to early successional habitat establishment</li> <li>• Riparian buffers – terrestrial and aquatic biota response</li> <li>• Aquatic community response to upland conservation practices</li> <li>• Terrestrial and aquatic species response to forestry practices</li> </ul>
<b>Southeast</b>	<ul style="list-style-type: none"> <li>• Range-wide northern bobwhite response to CP-33 upland habitat buffers</li> <li>• Wetland wildlife habitat quality changes associated with WRP wetland restoration</li> <li>• Wildlife response to rangeland treatments</li> <li>• Fish response to stream restoration and riparian buffer practices</li> <li>• Wildlife benefits of mid-contract management of CRP pine plantations</li> <li>• Wildlife response to improved pasture treatments</li> </ul>
<b>Midwest</b>	<ul style="list-style-type: none"> <li>• Waterfowl response to CRP contract enrollments in the Prairie Pothole Region</li> <li>• Non-game and non-bird response to wetland restoration and buffers</li> <li>• Wetland wildlife habitat quality changes associated with WRP wetland restoration</li> <li>• Landscape-level bird response to cropland and CRP land use</li> <li>• Effects of upland conservation practices on stream biota</li> <li>• Effects of on-going prairie conversion on wildlife</li> <li>• Effects of various seeding mixtures and mid-contract CRP management on wildlife</li> <li>• Rotational grazing effects on upland wildlife (common EQIP practice)</li> <li>• Shorebird and herpetofauna response to wetland restoration and microtopography practices</li> </ul>
<b>West</b>	<ul style="list-style-type: none"> <li>• Fisheries (salmonids and others) response to stream restoration, buffers, and upland practices</li> <li>• Long-term Great Plains wildlife trend linkages to CRP enrollment</li> <li>• Habitat quality for grassland birds associated with WRP and CRP enrollments in the Great Plains</li> <li>• Prairie grouse, pronghorn and quail response to rangeland practices</li> <li>• Response of shrub-steppe species to conservation practices</li> <li>• Wildlife response to wildlife water developments</li> </ul>



**Figure 2.** Post-restoration non-forested habitat values from 17,200 acres of former cropland enrolled in WRP in Missouri.



**Figure 3.** Post-restoration forest habitat values from 15,900 acres of former cropland enrolled in WRP in Missouri.

**Table 2. Wildlife assessment projects initiated through partnerships fostered by CEAP.**

Project Lead	Practice type	Wildlife focus	Assessment topic
NatureServe*	All practice types, with emphasis on pasture and hay planting	At-risk terrestrial and aquatic species	Using NatureServe information to assess conservation practice effects on at-risk species: Missouri Pilot
University of Northern Colorado*	Conservation cover, CRP (Conservation Reserve Program) enrollments	Grassland nesting birds, neotropical migratory birds	Grassland bird response to CRP-related land use changes: Using National Resources Inventory and Breeding Bird Survey data to assess landscape-level bird response
USGS National Wetlands Research Center*	Wetland restoration	Waterfowl, shorebirds	Use of Doppler weather radar to determine bird use of Wetlands Reserve Program restored wetlands in California
Mississippi State University	Upland buffers	Northern bobwhite, songbirds	National evaluation of wildlife benefits of CRP practice CP33 (Habitat Buffers for Upland Birds)
University of Massachusetts-Amherst	Early successional habitat development	Scrub-shrub nesting birds	Assessing the benefits of conservation practices to scrub-shrub birds in New England
University of Nebraska-Lincoln	Conservation cover, CRP enrollments	Northern bobwhite, ring-necked pheasant	Use of rural mail carrier wildlife surveys to assess benefits of Farm Bill programs
Pennsylvania State University	Fish passage/ dam removal	Freshwater aquatic biota	Evaluating biological effects of dam removal on streams in Pennsylvania
Playa Lakes Joint Venture	Conservation cover, wetland restoration, CRP and WRP enrollments	Grassland dependent birds	Estimating accomplishments of CRP and WRP toward conservation goals of priority mixed-grass prairie birds
The Nature Conservancy	Soil and water practices applied to cropland	Freshwater aquatic biota	Development of a freshwater aquatic health indicator for use with CEAP cropland modeling output
University of Missouri	Wetland restoration	Wetland birds, amphibians	Assessing the effectiveness of the WRP in Missouri through analysis of ecological monitoring data

\*Funding support provided by the NRCS Agricultural Wildlife Conservation Center

### The Agricultural Wildlife Conservation Center Connection

The NRCS Agricultural Wildlife Conservation Center is an important source of data for CEAP wildlife assessments. The center sponsors competitive grants to organizations and institutions involved in development of conservation technology benefiting wildlife (see [www.whmi.nrcs.usda.gov/](http://www.whmi.nrcs.usda.gov/)).

Although these projects are primarily directed at developing technology to assist conservation planners, many have generated data useful to researchers assessing how fish and wildlife respond to conservation practices.

#### Visit the CEAP website!

<http://www.nrcs.usda.gov/technical/NRI/ceap/>.

## Grazing Lands National Assessment

### ARS Contributions in the Northeast

The Agricultural Research Service (ARS) -- the principal research arm of CEAP -- has a major role in planning the CEAP national assessment for grazing lands as well as supporting resource inventory and technology applications crucial to grazing lands conservation. Here are a few highlights:

- ARS in Pennsylvania played a major role in development of the NRCS Pasture Condition Score process, now used nationally to evaluate that land type.

- ARS worked with NRCS to develop the National Resources Inventory data collection protocol for pastureland. This new data stream is critical to the NRCS CEAP national assessment for grazing lands and for other modeling applications. It will also clarify for the first time the relative extent of dominant pastureland species and should provide

insight on soil nitrogen and phosphorus levels.

ARS labs in such locations as Tucson, AZ, Boise, ID, Cheyenne, WY, Coshoc-ton, OH, Albany, CA, Reno, NV, and University Park, PA, are helping to meet a variety of NRCS research needs pertaining to grazing lands.

### Strategy for Literature Synthesis

NRCS, ARS, and NASA (National Aeronautics and Space Administration) scientists met in Albany, CA, in August to review the strategy for the CEAP synthesis of scientific literature on grazing lands and to organize the next steps toward the target completion date of December 2009.

Writing teams will be organized around the highest priority NRCS conservation practices – prescribed grazing, prescribed burning, brush management, rangeland planting, riparian herbaceous cover, upland wildlife habitat management, and pest management.



Addressed, by region, will be the impacts of these practices on several resource concerns -- soil, water, air, plants, animals, landscape, and economic and social (including ecosystem services). The synthesis will determine if the purported benefits of the various practices are supported by research, describe the responsible mechanisms and management protocols influencing these outcomes, and identify modifications to current practices or provide alternative practices.

## Watershed Assessment Studies

### CEAP Synthesis Study

The National Integrated Water Quality Program of the USDA Cooperative State Research, Education, and Extension Service (CSREES) and NRCS will be jointly funding a National CEAP Synthesis Study. The synthesis will focus primarily on findings from the 13 CSREES Competitive Grant Watersheds but will also include related lessons learned from other watershed assessment studies.

The goal of this synthesis is to extend the knowledge base that can be used to evaluate impacts of conservation practices and programs on water resources, improve the management of agricultural landscapes to achieve environmental goals, and inform policy decisions. It will be a centerpiece of efforts to begin translating the knowledge gained from CEAP studies into practice on the landscape. Since 2004, CSREES and NRCS have partnered to fund the 13 watershed projects through a competitive grants program established to evaluate the effects of conservation practices on water quality at the watershed scale. These watershed projects included analysis of social and economic factors.

The CEAP synthesis study is expected to be completed in 2012 and will generate several products during the course of the project. For more information on the CEAP Synthesis Study and on the CSREES role in CEAP, visit [www.csrees.usda.gov/nea/nrc/in\\_focus/water\\_if\\_ceap.html](http://www.csrees.usda.gov/nea/nrc/in_focus/water_if_ceap.html).

### Status of Special Emphasis Watershed (SEW) Projects

Most of the NRCS SEWs are scheduled to complete their field work and develop

preliminary draft reports by the end of 2007. These reports will undergo a scientific peer review process, and final reports should be ready for release in the spring of 2008.

The Wood River and Sprague River Watershed projects (OR) have funding in place to conduct fieldwork for another year. Jobos Bay (PR) is expected to be at least a three-year funded project. Another tropical watershed – most likely in Hawaii – is under consideration.

### Computer Modeling in the SEWs

Computer modeling studies will be utilized in most of the 11 SEWs to help expand our understanding of the environmental effects and benefits of conservation practices relative to the specific resource concerns within each watershed. A practical benefit of modeling is the ability to conduct simulations for various combinations of conservation practices and thus compare alternative management scenarios. The principal models associated with the SEWs include the Annualized Agricultural Non-point Source (AnnAGNPS), Soil and Water Assessment Tool (SWAT), and Agricultural Policy/Environmental eXtender (APEX) models under development by USDA's Agricultural Research Service, and the MIKE SHE model which is commercially distributed by the Danish Hydraulic Institute (DHI).

The AnnAGNPS model is a continuous-simulation, pollutant loading model for estimating (1) quantities and distribution of water; (2) sediment by particle size class and source of erosion; and (3) chemicals such as nitrogen, phosphorus, organic carbon, and pesticides. Pollutant loads are generated from land areas (cells) and routed daily through stream systems. The environmental effects of special land use components such as feedlots, gullies, field ponds, and point sources can be studied with AnnAGNPS. AnnAGNPS will be applied in the Cheney Lake (KS), Stemple Creek (CA), Upper Auglaize (OH) and Upper Snake-Rock (ID) SEWs.

SWAT is a river basin scale model used to quantify the impact of land management practices in large, complex watersheds and to conduct agricultural management scenario comparisons. SWAT will be evaluated at the Leon River (TX), Jobos Bay (PR), and Upper Snake-Rock (ID) SEWs. In the Leon River SEW, the model's simulation

accuracy is evaluated using hydrologic and nutrient load data collected from the watershed, which drains into Lake Belton.

The APEX model is a tool for managing whole farms or small watersheds to obtain maximum production efficiency and maintain environmental quality. The whole-farm-management capabilities of APEX allow evaluation of interactions between fields for surface flow, sediment deposition, nutrient and pesticide transport, and subsurface flow with environmental effects from terrace systems, grass waterways, strip cropping, buffer strips/vegetated filter strips, crop rotations, fertilizer, irrigation, liming, furrowing, drainage, and waste management (feed yards, dairies with or without lagoons). APEX will be utilized for studying the environmental effects and benefits of conservation practices within the Leon River and North Bosque SEWs in Texas.

MIKE SHE is an integrated surface and groundwater model that can simulate the entire land phase of the hydrologic cycle. The MIKE SHE modeling system is designed to simulate surface and groundwater movement and their interactions, and the associated point and non-point source water quality conditions for watersheds of any size. MIKE SHE will be applied to the Sprague River SEW and the study will rely on field-scale monitoring to calibrate and validate the model. Model output will be used to help understand the effects of conservation practices to increase irrigation efficiencies, restore wetland and riparian areas, and improve forest and rangeland health.

### ARS Research Updates

Below are updates from the Agricultural Research Service's Cropping Systems and Water Quality Research Unit. For more information, contact Research Leader E. John Sadler ([John.Sadler@ars.usda.gov](mailto:John.Sadler@ars.usda.gov)).

Watershed data system. The CEAP research team is beta-testing STEWARDS (Sustaining the Earth's Watersheds Agricultural Research Data System), a web-based system which organizes and documents soil, water, climate, land-management, and socio-economic data from multiple agricultural watersheds across the U.S. and allows users to search, download, visualize, and explore data. When released to the public,

STEWARDS will facilitate retrieval of ARS long-term data for hydrological studies, model calibration and validation, and conservation planning and assessment. It was developed by ARS researchers and staff from El Reno, OK, Columbia, MO, Beltsville, MD, Ames, IA, and Fort Collins, CO.

**Modeling.** SWAT has been calibrated and validated for the Leon (TX), Little (GA), Town Brook (PA), Mahantango (PA), Cedar Creek (OH), South Fork (IA), and Walnut Creek (IA) watersheds. Input data sets will be uploaded to STEWARDS. Work has begun in the Ft. Cobb reservoir (OK) and Goodwater Creek Experimental Watershed (MO). Testing of the landscape version of SWAT has begun in the Little River (GA) watershed, and a linkage between SWAT and Riparian Ecosystem Management Model (REMM) has been completed by Canadian collaborators. SWAT-APEX integration has been completed for the Leon (TX). AnnAGNPS has been calibrated and validated for the Beasley, Goodwin, and Yalobusha watersheds (MS), but a calibration could not be obtained for Walnut Creek (IA).

**Prototype Regionalized Watershed Model.** Necessary components for the prototype regionalized watershed model -- in key process areas such as water balance, nutrient cycling, soil erosion, and plant growth and development -- were extracted from legacy models such as Root Zone Water Quality Model (RZWQM), Water Erosion Prediction Project (WEPP), Precipitation Runoff Modeling System (PRMS), and the European watershed model J2000. In addition, new structural linkages to components of the Conservation Channel Evolution and Pollutant Transport System (CONCEPTS) and REMM models were investigated. Linkage to the CONCEPTS and REMM models will enhance the ability of the prototype regionalized watershed model to improve simulations of the dynamics of water and sediment transport in channels and riparian areas, respectively.

### Canada's WEBS Project

The Watershed Evaluation of Beneficial Management Practices (WEBS) measures the water quality and economic impacts of selected BMPs at a micro-watershed (@300 ha or 741 ac.) scale. It is addressing the many compounding variables that occur in watersheds as the

result of applying a suite of BMPs. The goal is to extrapolate WEB's findings to larger watersheds using appropriate modeling techniques.

The seven WEBS study sites have a significant amount of baseline data on conditions and trends. The range of BMPs being evaluated at each site varies and includes land conversion, riparian buffer strip enhancement, management of live-stock access to water, and nutrient management.

WEBS is a national project led by Agriculture and Agri-Food Canada

(AAFC). It is funded primarily by AAFC's Greencover Canada Program, and by Ducks Unlimited Canada.

WEBS is proposing to host a North American CEAP conference, to include Mexico. The conference would highlight CEAP type approaches and modeling applications and techniques being used by all three countries and the potential for collaboration and expansion of the work to cover the North American continent. For more information, visit [www.agr.gc.ca/env/greencover-verdir](http://www.agr.gc.ca/env/greencover-verdir).

## Wetlands National Assessment

### SWCS Conference Presentations

Below is a synopsis of CEAP wetlands presentations made at the 2007 Annual Conference of the Soil and Water Conservation Society in Tampa, FL, July 21 – 24.

*Using Science as the Underpinning for Sound National Wetlands Conservation Decisions* – an overview of the primary CEAP wetlands goals and activities underway to address those goals, including the five CEAP-Wetlands regional studies. (Presenter: Diane Eckles, Coordinator for CEAP Wetlands National Assessment)

*An Ecological Approach to Quantifying the Effects of Conservation Practices on Ecosystem Services Provided by Wetlands and Associated Uplands: CEAP-Wetlands* -- the ecological structure of the CEAP wetlands component as it applies to several of the objectives, including regional studies, development of a national wetlands monitoring framework, and literature synthesis currently underway. (Presenter: Diane Eckles, Coordinator for CEAP Wetlands National Assessment)

*The Prairie Pothole Regional Assessment: Results of a Survey to Estimate Ecosystem Services Derived from USDA Conservation Reserve (CRP) and Wetlands Reserve Program (WRP) Lands* -- an overview of the study design and preliminary results of the first CEAP-wetlands regional study were presented. Preliminary results focused on ecosystem services measured across an alteration gradient comprising hydrologic and land use alterations across the region. The preliminary results are being published in a peer-reviewed USGS scientific investigation report that will be available on the CEAP website in the

fall of 2007. The report will also be distributed throughout NRCS. (Presenter: Dr. Robert Gleason, U. S. Geological Survey Northern Prairie Wildlife Research Center)

*Influences of Conservation Practices on Ecosystem Services Provided by Playa Wetlands in the High Plains* -- an overview of the CEAP wetlands regional study initiated in 2006 to document the effects of conservation practices and programs on the services provided by playas in the High Plains. Playa ecosystems represent a critical habitat type for numerous species, particularly in the Southern High Plains, due to the presence of intensive agricultural activities. They are also the source of recharge to the Ogallala aquifer, which is the source of water for agricultural, domestic and industrial uses. The CEAP wetlands regional study will quantify aquifer recharge and habitat quality services across the agricultural alteration gradient of the High Plains, including wetlands restored through application of conservation practices on CRP and WRP lands. The study plan for the regional study is available on the CEAP wetlands web page. (Presenter: Dr. Loren Smith, U. S. Geological Survey Cooperative Fish and Wildlife Research Unit, Oklahoma State University)

*The Impact of the Wetlands Reserve Program on California Wetlands* -- an overview of the historical and current context in which wetlands conservation operates within California, specifically via the Wetlands Reserve Program, and the status of the newly initiated CEAP wetlands regional investigation in the Central Valley. This regional study, like other CEAP regional investigations, is selecting sample sites across the

agricultural alteration gradient. Sites that represent historic native wetland communities will be very rare because of the extensive hydrologic alterations and manipulations that exist in the Valley. One of the goals of this study will be to determine differences relative to hydrologic management, which is so important to ensuring functioning wetlands throughout the Valley. A draft study plan is nearing completion, with data collection to begin in the fall of 2007. (Presenter: Dr. Walter Duffy, U. S. Geological Survey Cooperative Fish Research Unit, Humboldt State University)

*Ecological Functions of Conservation Wetlands – Coastal Plain and Piedmont Regions* -- highlighted some of the information included in the CEAP wetlands literature synthesis for the Coastal Plain and Piedmont Regions, a collaboration among NRCS, regional scientists with federal agencies and universities, and the Ecological Society of America. Highlighted in this presentation was a summary of practices applied between 2000 and September 2006, associated with restoring, creating or enhancing wetlands, managing wetlands for wetland wildlife, or establishing forested buffers.

This manuscript is currently in review within NRCS. Publication of the synthesis is currently targeted for late 2008. (Presenter: Dr. Richard Lowrance, U. S. Department of Agriculture, Agricultural Research Service)

*Conservation Practice Effects on Wetland Ecosystem Services in the Lower Mississippi Valley* -- an overview of the Mississippi Alluvial Valley regional study, including preliminary results from initial field sampling in Louisiana and Arkansas for specific ecosystem services, such as habitat quality for fall migrants, soil organic and vegetation carbon sequestration, and nutrient pollutant reduction via denitrification. In addition, results produced by another collaborator on the study, the U. S. Fish and Wildlife Service Lower Mississippi Alluvial Valley Joint Venture, showed hydrology and waterfowl energetics data quantifying the importance of wetlands restored through the Wetlands Reserve Program in the Valley. The report on the preliminary results will be available before the end of the year on the CEAP web site. Data collection is scheduled to continue in calendar year 2008, expanding into Mississippi. (Presenter:

Dr. Stephen Faulkner, U. S. Geological Survey National Wetlands Research Center)

*The Mid-Atlantic Wetland Conservation Effects Assessment Project: Ecosystem Services, Conservation Practices and Synergistic Modeling* -- an overview of the challenges facing the wetlands study in the Mid-Atlantic Coastal Flats and Rolling Coastal Plain Regions -- numerous wetland classes, a diverse array of conservation practices implemented, and the lack of research focused on agricultural wetlands. Wetland services important to the condition and functioning of Chesapeake Bay and Pamlico-Albemarle Sound will feature prominently in the study.

Complementing the Mid-Atlantic regional study will be a Choptank River Watershed Landscape study that builds on the ARS Choptank River Benchmark Watershed Study. The landscape study will focus on quantifying wetland ecosystem services such as reduction of pollutants in surface and ground waters, determining the role of conservation practices applied to restore wetlands in the headwaters of the watershed, and investigating the ecosystem functioning and services linkages between headwater wetlands and tributary systems to the Choptank. The study will also investigate the use of remote sensing data to quantify changes in ecosystem services and the development of a landscape model. (Presenters: Dr. Megan Weiner Lang and Dr. Mark Walbridge, U. S. Department of Agriculture, Agricultural Research Service)

*Beyond CEAP: Integrating Delivery of Concurrent Goods and Services Attributable to Conservation Programs into Models for Decision Makers to Evaluate Ecological Change* -- an overview of investigations underway to develop and validate regionally specific, spatially and temporally robust integrated landscape models and investigate a variety of remote sensing data applications to capture model input variables. Products from these investigations will be used to construct the national wetlands monitoring framework. The framework is being developed as part of the USDA National Resources Inventory umbrella of tools used to routinely provide conservation stakeholders with science-based information on wetland ecosystem services and condition. (Presenter: Dr. Ned "Chip" Euliss, U. S. Geological Survey Northern Prairie Wildlife Research Center)

## CEAP

### ***Building the Science Base for Conservation***

Science based conservation is the key to managing agricultural landscapes for environmental quality. The Conservation Effects Assessment Project (CEAP) is a multi-agency effort to scientifically quantify the environmental benefits of conservation practices used by private landowners participating in U.S. Department of Agriculture (USDA) and other conservation programs. Project findings will guide USDA conservation policy and program development and help farmers and ranchers to make informed conservation choices.

The three principal components of CEAP — the national assessment, the watershed assessment studies, and the bibliographies and literature reviews — contribute to the evolving process of building the science base for conservation. That process includes research, monitoring and data collection, modeling, and assessment.

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