



consider that these landscapes cover two-thirds of agricultural land in the U.S. — some 588 million acres in all — including rangeland, pastureland, grazed forestland, native and naturalized pasture, hayland, and grazed cropland.

Especially challenging is the grazing lands environment in the western United States. There, the ecology and use of rangelands are intertwined for non-federal and federal lands when it comes to invasive species, wildlife habitat, grazing enterprises, water quality, and water quantity issues. Management at many levels transcends ownership boundaries.

The interplay of climate, topography, organisms, and parent material yield a succession of plant communities over time on the thousands of soils on U.S. landscapes, influenced by management and periodic disturbances such as fire. We have the tools to tease out the effects, but they are not all in one place.

The National Resources Inventory — which NRCS conducts to track changes in erosion, land use, and other resource conditions over time — has been a valuable tool for broadly assessing the benefits of conservation practices. CEAP is an evolutionary step in this national assessment effort, bringing additional scientific rigor in the quest to accurately determine how grazing land practices benefit distinct elements of the environment. NRCS is attempting to relate these benefits to those related to soils, water, air, plants, and animals.

Among the scientific questions being asked are:

- Can we define our knowledge about the impact on the hydrologic cycle from conservation practices on rangeland, and pastureland?
- What do we know about the impact of conservation practices on soil quality, plant communities and community dynamics, wildlife habitat populations and conditions at landscape and ecoregion scales?
- What do we know, and what can we recommend concerning the effects of grazing lands conservation practices on carbon sequestration for rangelands, pasturelands, and grazed forest?

Building the science partnership. The CEAP grazing lands assessment will engage scientists from a diverse array of federal, university, and other organizations.

In December 2006, more than 40 grazing lands scientists met in Beltsville, Maryland, to discuss the state of the science, to consider how their activities might support the CEAP effort, and to scope out the contents of a landmark synthesis of findings from the current scientific literature on long term effects of conservation practices upon rangeland, pastureland, and grazable woodland. This synthesis will allow better documentation of both gross and subtle effects of conservation practices over time, point out promising research areas, and lend itself to adaptive management.

Most of the participants at the scoping meeting were rangeland and pastureland scientists from the Agricultural Research Service (ARS). The National Aeronautics and Space Administration, Colorado State University, and the Long Term Ecological Network were also represented. Breakout sessions resulted in solid proposals for the structure and format of the proposed literature synthesis and rangeland hydrology modeling.

A spinoff of the December meeting will be held at the Society for Range Management's 2007 International Meeting in Reno, Nevada, in February. This meeting will include rangeland scientists from land grant universities and other organizations who want to be engaged in the CEAP effort.

The CEAP grazing lands coordinator is also consulting with NRCS program managers to assess how the CEAP grazing lands assessment relates to other activities relevant to the conservation planning process.

Work plan. The CEAP grazing lands work plan is underway and will be completed in 2007.

Advisory group. The CEAP grazing lands component has begun to assemble an advisory group drawn from scientists at ARS, the U.S. Geological Survey, and land grant universities in Colorado, Oregon, Pennsylvania, Texas, and Arizona. Other members will be solicited from non-governmental organizations and user groups.

## Cropland

### Farmer Survey Findings Included in Interim Report

The CEAP cropland national assessment's interim report — now undergoing internal NRCS peer review — includes a summary of findings from the first two years (2003, 2004) of the CEAP farmer survey. The farmer survey provides a unique, statistically valid snapshot of farming and conservation practices and conservation program participation rates on cultivated land in the conterminous United States.

National Resources Inventory sample points selected to serve as representative

fields provided the statistical framework for the survey. The National Agricultural Statistics Service interviewed the farm operators who managed the fields where those sample points are located. Each farm operator was asked to provide three consecutive years of detailed information, such as program participation, cropping history, irrigation use, tillage techniques, pesticide and fertilizer rates and application methods, pest management practices, crop rotation plans, and other farming activities.



The statistical design of the survey and the three years of data collected at each point in the survey provide a good view of “cropping systems” being employed. The summary report will show the range of farming and conservation practices associated with these cropping systems.

The summary findings are further disaggregated by geographic region and specific categories of farming practices, such as irrigation and tillage type. Field characteristics at the national level will be summarized to highlight, for example, proximity to waterways, subsurface or surface drainage, evidence of gully erosion, and other relevant field charac-

teristics. Farmer characteristics and operator attitudes toward wildlife will also be summarized at the national level.

All results presented in the interim report for the 2003-2004 sample are preliminary. The final CEAP cropland report – which is scheduled for completion in 2008 – will cover all 4 years (2003 – 2006) of the CEAP farmer survey.

## Wildlife

### Grounded in Diverse Partnerships

Given the great diversity of fish and wildlife potentially affected by conservation practices, and the heterogeneity of landscapes and conservation practices associated with them, the wildlife component of the CEAP national assessment relies heavily on regional partnerships and collaboration to meet its objectives. Here are four examples:

**The Great Plains GIS Partnership** ( $G^2P^2$ ) is a collaborative effort between the Playa Lakes Joint Venture, Rainwater Basin Joint Venture, U.S. Fish and Wildlife Service, and Central Platte Natural Resources District.  $G^2P^2$  was formed to enhance the application of GIS (geographic information system) technology in landscape level planning for wildlife conservation. NRCS, the Playa Lakes Joint Venture, and the Farm Service Agency are leveraging  $G^2P^2$  GIS technology and landscape habitat modeling resources for CEAP to obtain scientifically credible estimates of the effects of USDA conservation programs (Conservation Reserve Program and Wetlands Reserve Program) and practices on avian fauna in the Central Mixed-grass Prairie region of the Great Plains (delineated in red on map below).



**NatureServe** is a national organization affiliated with a network of state natural heritage programs. In cooperation with USDA and Missouri state partners, NatureServe is conducting a pilot project in Missouri to develop and evaluate methods for assessing benefits of conservation practices on rare or at-risk fish and wildlife species. Digital data layers such as NatureServe's species occurrence data and GAP analysis data are being used to correlate known conservation practices (from digital records of practices applied in Missouri) with natural-heritage program records for target species. This pilot effort will provide recommendations for conducting national level assessments.

**Mississippi State University** and NRCS are assessing the effects of Conservation Reserve Program practice CP33 (habitat buffers) on northern bobwhite and grassland. Specific objectives are to (1) provide annual statistically valid density estimates of these birds on fields enrolled in the CP33 practice at state, Bird Conservation Region, and national levels; (2) provide a measure of how buffer size affects bird use; and (3) evaluate through modeling the effect of local landscape context on bird population response. The project is scheduled to run through 2008.

**Wildlife Society Bulletin Special Issue.** The November 2006 issue of the Wildlife Society Bulletin (Vol. 34, No. 4) includes a special section on federal farm bill contributions to wildlife conservation. The 13 articles in this section indirectly contribute to the CEAP wildlife component's efforts to document the fish and wildlife benefits of conservation practices. This special issue documents some of the substantial benefits that waterfowl and other waterbirds, forest-dwelling land birds, grassland birds, aquatic biota, butterflies, northern bobwhites, sage-grouse, and other wildlife are realizing through farm bill programs.

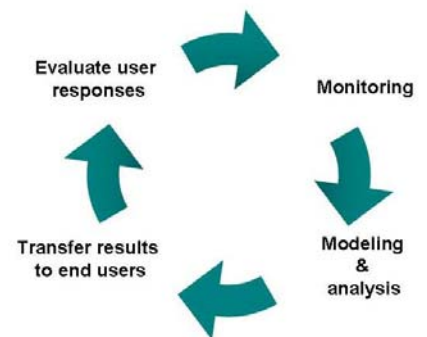
### Assessing Aquatic Biota

The CEAP wildlife component is expanding emphasis on assessments that document the response of fish and other aquatic biota to conservation practices. Watch for details in future issues of *CEAP Highlights*.

## Wetlands

### Toward A National Adaptive Management Approach

NRCS, the U. S. Geological Survey (USGS), the Farm Service Agency, and the U. S. Fish and Wildlife Service are building on the collaborative CEAP regional wetlands investigations in the Prairie Pothole Region (PPR) and the Lower Mississippi Valley (LMV) to develop monitoring and analytical tools that are regionally specific but that can be integrated for use within a national adaptive management framework. The adaptive management approach is a continuous feedback cycle, wherein the results of research, monitoring and data collection, modeling and assessment are given to conservation stakeholders for practical application. The stakeholders, in turn, identify needs for further scientific investigation.



These investigations enable the variation in the regional landscapes to be modeled across time and space, with and without the presence of conservation practices, in a more robust manner than was previously possible. The two regional investigations are part of the national USGS Integrated Landscape Monitoring Initiative. One of the goals of this initiative is to produce comparable landscape monitoring tools in the two regions by leveraging internal USGS resources.

The PPR and LMV regional investigations will focus on developing a monitoring tool that emphasizes the use of remote sensing data to quantify ecosystem services such as nutrient removal or loading reduction, carbon sequestration rates or potential, reduction in greenhouse gas emissions, habitat quality and population sustainability, surface water storage, aquifer recharge, and floodwater attenuation. Other ecosystem process

## Watershed Assessments

models under development through the investigations will be used to interpret what the estimates mean spatially and temporally, and enable differentiation between effects caused by different drivers such as climate or implementation of conservation practices and programs. Incorporating the temporal and spatial component will allow identification of factors contributing to the variation in ecosystem service estimates. The collaborative project will also investigate cost, frequency, and necessary resolution of monitoring to produce a range of results.

Products from the two regional investigations will provide templates for testing in other CEAP regional assessment areas to eventually structure the monitoring and analytical/modeling components of the national adaptive management approach for wetlands. The two investigations are currently in early development with the PPR investigation about a year ahead of the one in the LMV. The investigations are expected to require 4 to 5 years to produce the entire suite of desired products, but preliminary products from the PPR investigation will be available later this calendar year.

### Assessing The Impact of Ephemeral Gully Erosion

CEAP Special Emphasis Watershed assessment studies in Cheney Lake Watershed, Kansas, and the Upper Auglaize River Watershed in Ohio are contributing to a growing body of evidence that ephemeral gully erosion is a significant natural resource issue. Findings from the Cheney Lake study suggest that ephemeral gullies may be responsible for as much as 35 percent of the sediment load to the local reservoir.

Ephemeral gully erosion is caused by concentrated flow in small channels that form as the erosion process intensifies beyond sheet and rill erosion. Unlike sheet and rill erosion, which occurs as a result of the impact of raindrops and water flowing on the soil surface, ephemeral gully erosion occurs as a result of concentrated flow of surface runoff along defined channels. The channels are shallow enough to be filled with soil by subsequent tillage.



Ephemeral gully in the Cheney Lake Watershed.

A variety of structural practices -- such as grassed waterways, terraces, and other vegetative barriers -- are recommended by NRCS in conservation planning to address ephemeral gully erosion. We do not, however, have the field tools to quantify in a scientifically defensible manner this type of erosion or the effectiveness of structural or nonstructural conservation practices. There are few models that account for and specifically predict ephemeral gully erosion, and we do not have a systematic way to determine the extent of the ephemeral gully erosion problems on a field, in a watershed, or on a national basis.

NRCS technology leaders are organizing a team to undertake an initial assessment of the national scope of ephemeral gully erosion using existing data from the NRI, CEAP, the NRCS Performance Results System, watershed studies, and other sources. This assessment will provide direction for the development of ephemeral gully technology and its inclusion into NRCS tools and models.

The team is also working with the Agricultural Research Service (ARS) to expedite ephemeral gully research that will result in technology that NRCS can include in field and watershed models. ARS's National Agricultural Library has agreed to provide a bibliography on the latest international research on the issue.

CEAP, through its watershed assessment studies, will focus on measuring and modeling occurrences and effects of ephemeral gully erosion and thereby provide researchers with valuable real-world data.

## 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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*CEAP Highlights* is issued quarterly by the Resources Inventory and Assessment Division