

Working Draft

**Work Plan**  
for the  
**Wildlife Component**

**Conservation Effects Assessment Project (CEAP)**  
**National Assessment**



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## Executive Summary

The wildlife component of the Conservation Effects Assessment Project (CEAP) National Assessment is an effort to quantify the effects of conservation practices and programs on fish and wildlife and their habitats in landscapes influenced by agriculture in the United States. The wildlife component complements the CEAP cropland component by addressing fish and wildlife population responses and habitat issues that are not obtainable through its sampling and modeling framework. Fish and wildlife are affected by conservation actions taken on a variety of landscapes. Therefore, the wildlife component focuses on wildlife species or groups that inhabit a variety of agricultural landscapes and links to other CEAP components (wetlands and grazing lands) to the extent possible. The myriad effects of the many conservation practices on innumerable fish and wildlife species and communities are virtually impossible to comprehensively quantify. Therefore, the wildlife component operates under some basic principles to document those effects that are reasonably quantifiable. These principles include working collaboratively with others already engaged in relevant assessments, leveraging the use of existing data to the extent possible, identifying critical data gaps and stimulating actions to fill them, and focusing assessments on regional scales.

Working in partnership with the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA), The Wildlife Society led an effort to summarize effects of USDA conservation programs and practices previously documented in the literature. This effort resulted in the production of one literature synthesis volume based on conservation programs (Haufler 2005) and another volume based on groups of conservation practices (Haufler 2007). These documents provide a baseline of understanding upon which additional assessment efforts can build.

Under a contribution agreement with NRCS, the Association of Fish and Wildlife Agencies is assisting with conducting workshops and otherwise engaging state fish and wildlife agencies and others in identifying on-going relevant assessment activity and recognizing and prioritizing remaining assessment needs at the regional level. Specific wildlife component projects are then able to target data gaps and meet outstanding assessment needs identified by the fish and wildlife conservation community. Assessment actions and projects initiated and funded by the wildlife component are complemented by numerous other on-going and related activities that can be used to help explain conservation practice effects on fish and wildlife. Assessments funded by the wildlife component and related activities are briefly described in this work plan. As new insights and understanding is generated from these efforts, assessment priorities are expected to shift. Therefore, this work plan is intended to serve as a living document that is regularly updated to adapt to emerging assessment needs in the future.

## **Introduction**

The U.S Department of Agriculture (USDA) is engaged in an effort to quantify the environmental benefits of agricultural conservation practices. This Conservation Effects Assessment Project (CEAP) comprises several components, including a National Assessment that contains the cropland, wetlands, wildlife, and grazing lands components; and a series of watershed assessment studies that complement the National Assessment components through focused investigations conducted in select watersheds around the country (Mausbach and Dedrick 2004, Duriancik et al. 2008). The purpose of CEAP is to enhance the technical information necessary to better address the Nation's environmental and conservation goals related to agricultural policy, programs, and activities.

The CEAP wildlife component was established to develop approaches to assess and document the fish and wildlife benefits of USDA conservation programs and practices. In 2004, a diverse inter-organizational task force was assembled to provide input to this effort. Whereas the approach of the cropland component focuses on the use of existing physical effects process models applied to a sample of cropland and Conservation Reserve Program (CRP) field sites throughout the country to estimate soil and water related benefits nationwide, the approach taken by the wildlife component relies on assembling and coordinating a wide array of assessment activities already underway and targeting additional effort to fill high-priority data gaps. Priority is given to making use of existing natural resource information and data and applying them in ways that help document specific effects of conservation practices on fish and wildlife resources. Although this effort is titled the wildlife component, it attempts to capture and document, to the extent possible, effects of conservation practices on a wide spectrum of aquatic and terrestrial fauna potentially affected by agricultural activities. This work plan lays out the framework under which the wildlife component operates. It is intended to be a living document, subject to regular modification and refinement as additional activities are identified and initiated and as funds become available.

As they are implemented, elements of the wildlife component are intended to generate outcomes that will enable stakeholders to gain an appreciation of fish and wildlife benefits achieved. Results should inform USDA's efforts to tailor conservation programs and practices to increase their effectiveness in addressing fish and wildlife conservation needs in agricultural landscapes.

### ***Agricultural conservation programs and wildlife***

The reliance of the majority of fish and wildlife resources in the United States on private lands has long been recognized (Hall 1946). Over 75% of the land base in the conterminous United States is in private ownership. Nearly 20% of the total land area is under cultivation and more than one-third comprises private grazing lands. These land base attributes highlight the importance of private land management to the welfare of fish and wildlife resources in agricultural landscapes and beyond.

Agricultural practices and farm policy have long affected the welfare of fish and wildlife communities in much of the United States (Gerard 1995). Impacts associated with conversion of natural habitats to crop and livestock agricultural production has historically been a primary cause of natural ecosystem degradation and fish and wildlife habitat loss (Noss et al. 1995, Tewksbury et al. 2002). New technologies involving agrichemicals, precision farming equipment, and crop genetics are enabling production to intensify on lands currently under cultivation (Cassman et al. 2005). These technological advances, in combination with government price supports for commodity crops, make it profitable in some areas to place new lands such as native prairie into agricultural production (House 2005, Johnson 2005, Stephens 2006, Brady 2007). These advances can place further stress on biodiversity, potentially damaging ecosystem services associated with native biota, such as pollination (Kremen et al. 2002). At the same time, advances in our understanding of ecological principles and conservation practices have provided insight on how agricultural producers can integrate fish and wildlife habitat considerations into their land management activities (Cassman et al. 2005). Producers and conservationists are finding new ways to work cooperatively with the land to generate both agricultural and natural resource “commodities,” including productive fish and wildlife habitats (DeVore 2002, Imhoff 2003).

The Conservation Title of the 1985 Food Security Act (Farm Bill) opened a new era of conservation (Myers 1988, Heimlich et al. 1998). In response, the wildlife conservation community has increasingly become focused on the opportunity that USDA conservation programs and practices offer to benefit fish and wildlife habitats and populations in the United States. Wildlife agencies and groups have been involved in the legislative process to enhance the fish and wildlife conservation potential in farm bills that reauthorized and expanded the 1985 conservation provisions (1990, 1996, 2002, and 2008 Farm Bills). Many studies have been conducted to document the value of these conservation programs to wildlife resources (Heard et al. 2000, Allen 2004, Haufler 2005). Numerous special sessions have been held at wildlife conservation community venues such as the North American Wildlife and Natural Resources Conference and The Wildlife Society annual conferences to highlight wildlife conservation accomplishments and opportunities provided by the Farm Bill. State fish and wildlife agencies and non-governmental conservation organizations are assisting with delivery of conservation programs to enhance fish and wildlife habitat on private lands throughout the country. Many of these entities have entered into formal agreements with USDA to assist in program implementation.

### **CEAP Wildlife Component Objectives**

The primary objective of the CEAP wildlife component is to quantify the effects of agricultural conservation practices on fish and wildlife resources on landscapes influenced by agriculture in the United States. The wildlife component is intended to complement other components of CEAP. Initial focus of the wildlife component was placed on documenting fish and wildlife benefits derived from conservation practices applied in and around croplands, including lands enrolled in the CRP, followed by

documenting wildlife effects associated with other land uses. The wildlife component objectives are:

Short-term:

- Develop and implement approaches for estimating fish and wildlife effects associated with conservation practices applied in cropland settings (including CRP).

Longer-term:

- Develop and implement approaches for estimating fish and wildlife effects associated with conservation practices on wetlands, grazing lands, and forestlands.
- Develop and implement approaches to extending water quality benefits measured by the cropland component to effects on aquatic organisms.



The **Wildlife component** seeks to assess the effects, to the extent possible, of conservation practices on important terrestrial and aquatic species. This includes terrestrial vertebrates and invertebrates in upland settings as well as fish and other aquatic organisms directly or indirectly affected by agricultural practices.

While the highest priority is placed on addressing cropland and CRP enrollments, work to develop approaches to address other land uses are proceeding without waiting for the cropland objective to be completely met. In effect, work in all land types is proceeding simultaneously, where feasible. Efforts are also underway to integrate approaches to capturing fish and wildlife benefits into the CEAP wetlands and grazing lands components.

### Developing an Approach

In 2004, an initial task force was established to develop an approach for the CEAP wildlife component. This group consisted of individuals from numerous organizations that are interested in or had been previously involved with efforts to quantify the fish and wildlife benefits of USDA conservation programs. Output from two workshops—one in January 2004 in Washington, D.C., and another in June 2004 in Fort Collins, Colorado—helped lay the foundation for the wildlife component approach. Individuals from the following Federal partner agencies were involved with initial scoping activities:

Natural Resources Conservation Service (NRCS): Resources Inventory and Assessment Division, Ecological Sciences Division, Easement Programs Division, Wildlife Habitat Management Institute (now the Agricultural Wildlife Conservation Center), National Resources Inventory and Analysis Institute

Farm Service Agency (FSA): Conservation and Environmental Programs Division, Economics and Policy Analysis Staff

Cooperative State Research, Education and Extension Service: Natural Resources and Environment

Agricultural Research Service: National Sedimentation Laboratory  
Economic Research Service

U.S. Geological Survey: Biological Resources Division  
U.S. Fish and Wildlife Service: Division of Bird Habitat Conservation, Habitat and  
Population Evaluation Team, Partners for Fish and Wildlife Program  
U.S. Environmental Protection Agency

The interest and resources of numerous other individuals and entities have been involved with and are connected to the component in many ways. Individuals representing other Federal agencies, non-governmental organizations (e.g., Association of Fish and Wildlife Agencies, American Fisheries Society, Audubon, Defenders of Wildlife, Ducks Unlimited, North American Waterfowl Management Plan joint ventures, Pheasants Forever, Quail Unlimited, NatureServe, The Nature Conservancy, The Wildlife Society, Trout Unlimited, Wildlife Management Institute, and others), universities and other academic institutions, and state fish and wildlife agencies have provided input to and assistance with planning and carrying out wildlife component activities. The intent of working with this diverse group of primarily fish and wildlife scientists and managers is to capture the on-going work in this active field and to encourage others to become engaged as specific action items are identified.

### ***What do we mean by “effects?”***

For purposes of the wildlife component, documented “effects” of practices on fish and wildlife may include any of the following attributes that are quantified in a scientifically based, technically credible way:

1. documented ***habitat use*** by target species or groups
2. changes in ***habitat quality*** for target species or groups
3. target species ***population response***

Documented habitat use is generally described as the occurrence of an organism in a habitat, regardless of its health or breeding status. While documenting use of habitats by target species is informative, it is limited without additional information on how the habitat supports the survival and reproduction of the species in the area. Additionally, fish and wildlife use of local habitats associated with conservation practices may be difficult to predict due to the effects of landscape condition, local weather patterns, regional population status, and other factors. Quantifying population response is the most powerful measure of effects, yet it is not always possible to tie population changes to practice effects because of the great many extraneous factors that affect species population dynamics. The most reliable predictor of effects may be quantification of the change in habitat quality for target species associated with implementation of conservation practices, validated with habitat use data. A focus on habitat quality is useful in predicting the potential for habitats to provide the conditions necessary for target species to survive and reproduce. The approach of the wildlife component attempts to compile documentation of each of these categories of effect, wherever feasible and to the extent possible.

Efforts have been made to develop indicators of ecosystem services (National Research Council 2000, The Heinz Center 2002). There is continued interest in developing aggregate ecological indicators to gauge the health of the environment, similar to the way well-established economic indicators track the state of the U.S. economy (Meyerson et al. 2005). While such indicators may be attractive for use in assessing effects of certain conservation actions, they have not been developed to the point where they provide much promise for use in the CEAP wildlife component in the near-term. Therefore, the majority of the effort focuses on quantifying effects of common practices and conservation systems on fish and wildlife species or species groups for which documentation is available or obtainable in the near future.

Considerable attention has been placed by a variety of wildlife conservation interests to set strategic habitat and population objectives for priority species or groups. Examples include plans developed by joint ventures established by the North American Waterfowl Management Plan beginning in the mid-1980s (U.S. Fish and Wildlife Service 1986). These joint ventures have expanded to adopt all-bird conservation objectives, which have ties to specific plans developed for waterbirds (Kushlan et al. 2002), shorebirds (Brown et al. 2001), land birds (Rich et al. 2004), northern bobwhites (<http://www.bobwhiteconservation.org>) and other bird species integrated through the efforts of the North American Bird Conservation Initiative (NABCI, <http://www.nabci-us.org/main2.html>). Similar planning efforts are evolving for non-bird species. The Eastern Brook Trout Joint Venture (Schwaab et al. 2005) associated with the emerging National Fish Habitat Initiative and National Fish Habitat Action Plan (<http://www.fishhabitat.org>) is developing a conservation plan for this at-risk fish species. Where possible, conservation effects documented through the CEAP wildlife component will be set within the context of habitat and population objectives established by various elements of the fish and wildlife conservation community. This provides the opportunity to go beyond documenting habitat use, shifts in habitat quality, or changes in populations by conveying meaning to such changes with respect to established national or regional goals for target species. Water quality metrics associated with land treatment practices may have little use without some sense of what such metrics mean for the health of receiving water bodies (Soil and Water Conservation Society 2006). Likewise, documented fish and wildlife effects viewed in the context of specific habitat and population objectives are much more useful than providing simple metrics without an understanding of what these metrics mean for target species.

## **Literature Review**

As with other CEAP components, the first step in developing the approach for the wildlife component involved examining the current literature on fish and wildlife effects and establishing the state of our knowledge in this area. The Water Quality Information Center at the USDA National Agricultural Library (NAL) compiled a 2-volume annotated bibliography on the effects of conservation practices on fish and wildlife. The citations and abstracts included provide information on how conservation programs and practices designed to improve fish and wildlife habitat, as well as those intended for other

purposes (e.g., water quality improvement), affect various aquatic and terrestrial species. The bibliography is available at the NAL website at <http://www.nal.usda.gov/wqic/ceap/ceap07.shtml>.

As noted above and as illustrated by the NAL bibliography, much effort has been made to study the wildlife response to USDA conservation programs. A milestone of compiling and synthesizing this work is the comprehensive literature review conducted by Heard et al. (2000). Since the production of that work in 2000, considerable additional study has been done by a variety of investigators. Expanded implementation of programs such as the Wildlife Habitat Incentives Program (WHIP) and the Environmental Quality Incentives Program (EQIP) has greatly extended the accomplishments of these programs beyond where they were in 2000. The execution of new conservation programs authorized by the 2002 Farm Bill has also resulted in considerable additional habitat accomplishments. Therefore, a new effort was initiated to review the published literature and update the state of our understanding of the fish and wildlife benefits derived from conservation programs and practices.

In 2005, NRCS and FSA entered into an agreement with The Wildlife Society (TWS - <http://www.wildlife.org>) to synthesize the current literature regarding fish and wildlife response to conservation programs and practices. This effort was conducted in two phases. Phase I provided an update of the 2000 program-based literature review developed by Heard et al. (2000), and Phase II synthesized the literature describing the fish and wildlife benefits of specific conservation practices. Phase I of this effort, the program-based literature review update, was finalized in November 2005 (Haufler 2005 - <http://www.nrcs.usda.gov/technical/nri/ceap/fwbenefit.html>).

### ***Phase I (program-based) literature synthesis primary findings***

- Most data are from studies conducted on bird response to the CRP.
- Small wetlands in crop fields protected by Swampbuster continue to be critical to waterfowl productivity (Brady 2005, Reynolds 2005).
- Many grassland bird populations have benefited from the change in land use from cropland to grass cover associated with the nearly 20 million acres of CRP in the Great Plains states (Johnson 2005).
- CRP habitat in the Midwest likely contributes to the population growth and stability for some, but not all, grassland wildlife species (Farrand and Ryan 2005).
- Grassland bird production on individual CRP contract fields depends on the cover composition and disturbance from haying and grazing (Johnson 2005).
- Southeastern CRP grasslands managed through burning provide greater vegetation structure and wildlife habitat value than similar sites managed by mowing (Burger 2005).
- While habitat for some grassland bird species is improved the year after (emergency) haying (e.g., horned lark, chestnut-collared longspur, lark bunting), many more species' habitat quality declines (Johnson 2005).

- From 1992–2003, the presence of upland nesting cover provided by CRP in the upper Midwest resulted in the production of 25.7 million additional upland nesting ducks in the Prairie Pothole Region (Reynolds 2005).
- Studies show positive wildlife response to CRP in the Midwest, but results are complicated by the diversity of vegetation condition and landscape patterns (Farrand and Ryan 2005).
- Continued permanent loss of native grasslands using new technologies and genetically modified crops potentially offsets temporary wildlife habitat gains from CRP in the Great Plains (Brady 2005, Johnson 2005).
- For many species, landscape conditions surrounding specific habitats provided by conservation enrollments or practices (CRP or Continuous CRP buffers) may have a greater influence on habitat suitability than local habitat conditions (Clark and Reeder 2005, Farrand and Ryan 2005).
- Small mammal, herptofauna, and invertebrate use and diversity in conservation buffers are generally positively correlated with the width of the buffer (Clark and Reeder 2005).
- Wildlife use of grassland habitats established with exotic forage grasses in the Southeast is low (Burger 2005).
- Mid-contract management of CRP sites in the Southeast is important for improving wildlife habitat value (Burger 2005).
- Field borders in the Southeast have been shown to benefit northern bobwhite and other species (Burger 2005).
- High bird use has been documented in many upland buffer habitats, yet nest success is low due to the effectiveness at which predators are able to search linear buffer habitats for nests (Clark and Reeder 2005).
- Few papers have been published on the Conservation Reserve Enhancement Program (CREP), although some studies are currently underway. Additional monitoring is needed (Allen 2005).
- Several studies have documented greater wildlife response to restored wetland complexes enrolled in the Wetlands Reserve Program (WRP) than expected, and numerous unpublished reports imply increasing value of this program for wetland wildlife (Rewa 2005).
- There are few published data on the wildlife value of WHIP, EQIP, the Grassland Reserve Program, or the Conservation Security Program (Berkland and Rewa 2005, Gray et al. 2005, Henry 2005, Wood and Williams 2005). However, the potential for practices funded by these programs to benefit wildlife is substantial.

The Phase II (practice-based) review was completed in September 2007 (Haufler 2007 - <http://www.nrcs.usda.gov/technical/nri/ceap/fwresponse.html>). This review entailed compiling relevant literature into sections that relate to major habitat types affected and the primary conservation practices applied in these habitats. This approach is useful in evaluating the fish and wildlife benefits of certain conservation practices, regardless of the structure of the programs that support them. This literature synthesis provides useful background for considering effects of individual conservation practices or systems. Primary findings of the Phase II practice-based literature review can be summarized as follows:

## ***Phase II (practice-based) literature synthesis primary findings***

- Wildlife consideration in planning practices is key to achieving wildlife benefits.
- Wildlife response to grass establishment is significant, but variable by species, cover, management, etc.
- Linear practices: High wildlife use but low reproductive success. With proper planning and management, they can result in substantial landscape biodiversity benefits.
- Wetland establishment practices are associated with substantial wildlife benefit.
- Aquatic practices shown to benefit, but landscape factors must be considered.
- Overall, effects of individual practices depends on many factors

### ***Cropland conservation practices (Brady 2007)***

- Agricultural intensification has historically negatively impacted grassland, wetland and forestland wildlife. Soil and water conservation practices provide some habitat on cropland landscapes.
- Little has been published documenting specific effects of most soil and water conservation practices on terrestrial wildlife habitat. However, conservation practices that reduce soil erosion and sediment delivery or that otherwise improve the quality of runoff water play significant roles in improving aquatic habitat quality.
- Conservation tillage has been documented to benefit some species (beneficial insects, invertebrate food sources for birds and mammals).
- No-till provides greater wildlife benefit than more intensive tillage systems (nesting, winter food and cover).
- Grassed waterways are used for bird nesting (and re-nesting disturbance of other habitats), but nest success is low due to predation and mowing.
- Grass-backed terraces provide some nesting cover and add to biodiversity in cropland systems.
- Filter strips and field borders are shown to increase wildlife use of crop fields.
- Woody hedgerows were shown to provide nesting and winter cover for birds, but may have negative effects on grassland-obligate species due to fragmentation effects.
- Landscape effects (species-specific, spatial, and temporal) confound generalizations on the value of individual practices.

### ***Grassland establishment practices (Jones-Farrand et al. 2007)***

- Change from cropland to grass land use has had a positive influence on grassland wildlife. Grassland bird benefits have been documented; effects on other wildlife are largely unknown.
- Wildlife response to grassland establishment is a multi-scale phenomenon dependent upon vegetation structure and composition within the planting, practice-level factors such as size and shape of the field, and its landscape context, as well as temporal factors such as season and succession.

- Grassland succession makes management an important aspect of wildlife habitat conditions.
- Benefits for a particular species of any management scenario will depend, in part, on the management of surrounding sites, and may benefit additional species but exclude others. Thus, the benefits of grassland establishment and management are location- and species-specific.

***Buffers and linear practices (Clark and Reeder 2007)***

- Linear practices such as filter strips, grassed waterways, buffers, contour strips, riparian buffers, windbreaks and shelterbelts were originally designed to reduce soil erosion and improved water quality.
- Most often grasses, or mixtures of grasses and forbs, are used in linear practices, although establishment of trees and shrubs is encouraged in some practices.
- Lands enrolled in linear practices have increased in recent years. Most wildlife studies focus heavily on benefits to birds and do not address broader ecological communities.
- The small area and high edge-area ratios limit the usefulness of these practices for wildlife.
- Buffer width, vegetative composition and structure, and landscape context all affect wildlife communities.
- Positive effects are associated with longer and wider buffers, buffers associated with or connecting other habitat practices such as blocks of cover or food plots, and with practices that are grouped on the landscape.
- With careful planning and management, applying linear practices widely within an agricultural landscape could be expected to have positive wildlife benefits compared with continued intensive row cropping.

***Grassland conservation practices (Haufler and Ganguli (2007)***

- Rangeland conservation practices (prescribed grazing, prescribed burning, range planting, and restoration of declining habitats) can provide wildlife benefits.
- Prescribed grazing has been shown to produce both positive and negative responses by wildlife.
- Prescribed burning has also been shown to have both positive and negative effects, but benefits generally outweigh detriments.
- Range planting and restoration of declining habitats have been shown to benefit wildlife, but determining appropriate comparisons can be problematic. Undisturbed grassland ecosystems have greater heterogeneity and diversity, making comparisons between managed and “native” ecosystem conditions complex.
- Additional practices including fencing, brush management, tree planting and shelterbelts, and pest management can all be used to improve wildlife habitat, although each can also cause problems for wildlife in certain situations.
- Bird responses to practices have received the greatest attention. Even for birds, considerable information is lacking including effects of practices on many species, effects of surrounding landscape factors on wildlife responses, and responses in reproductive rates or survival rates to various practices.

- Grassland ecosystems and wildlife are considered among the most at risk, and rangeland practices can be used to maintain, enhance, and restore needed plant communities and habitat conditions.

***Wetland establishment practices (Rewa 2007)***

- Efforts to establish wetlands through restoration and creation actions have increased in recent decades.
- The majority of published studies describe bird response to wetland restoration, with most reporting bird communities in restored wetlands to be similar to those of natural reference wetlands.
- Studies indicate that invertebrates and amphibians generally respond quickly to and colonize newly established wetland habitats.
- Key factors reported as correlated with wildlife species richness include wetland size, availability of nearby wetlands habitats, diversity of water depths and vegetation, wetland age, and maintenance and management.
- Knowledge gaps include the need for studies on biota other than birds and long-term monitoring of wetland condition and wildlife response over time.

***Effects of conservation practices on aquatic habitats and biota (Knight and Boyer 2007)***

- Landscape management affects the condition of aquatic communities at the watershed scale.
- Land clearing, leveling, draining, tilling, fertilizing, and harvesting together create prolonged perturbations manifested in the ecological and physical conditions of streams and rivers.
- Physical damage due to channelization, erosion, sedimentation, and altered hydrology coupled with inputs of excess nutrients, pesticide contamination, and riparian clearing cumulatively diminish the quality of aquatic habitats.
- Primary conservation goals in agricultural watersheds have been to (a) control non-point source pollutants such as nutrients, sediments, and pesticides; (b) maintain adequate water supplies for crop and animal production; and (c) maintain stream/river channel stability.
- Little monitoring of aquatic biota response to stream restoration and other conservation practices has been done.
- Stream bank vegetation establishment has been documented to improve aquatic habitat.
- Clearing and snagging to remove wood from streams has a negative impact on stream habitat quality and diversity.
- Dams and stream diversions reduce habitat quality and quantity for stream biota.
- Fish passage, stream habitat restoration, and livestock use exclusion practices have been shown to improve aquatic habitat quality.
- Grassed waterways, riparian forest buffers, and other buffer practices designed to improve water quality have been shown to benefit aquatic habitat condition.

- The complexities of effects of various conservation practices and systems on fish and macroinvertebrates, coupled with landscape management diversity, leaves many questions unanswered.

### *Data gaps and information needs*

Within both the program-based and practice-based literature review efforts, key data gaps and information needs were identified. For purposes of informing the CEAP Wildlife component, literature review authors identified the following data gaps and information needs:

- While wildlife values of CRP lands have been documented, long-term studies are needed to track changes in habitat values over time. Wildlife benefits of CRP documented in the 1990s may no longer apply today due to changes in local cover conditions, shifts in enrollments, and landscape-scale changes in land use.
- Studies are needed to assess the wildlife use of CRP and similar habitats during the non-breeding season (e.g., winter and migration habitats). There is a particular need to examine non-breeding winter use of CRP and other grassland practices in the Southeast.
- Better information is needed on the effect of landscape attributes on wildlife use of CRP habitats and the effect of habitat patch size on grassland bird response.
- Studies at greater spatial and temporal scales to address the complexities of grassland bird abundances and nesting success on CRP lands are needed.
- The effects of haying CRP fields on reproductive success of nesting birds during the season of harvest are largely unknown.
- Better information is needed on how non-avian wildlife species respond to CRP habitats on local and landscape scales.
- Comparisons of abundance and reproductive success of grassland species in native prairie versus CRP habitats are needed.
- Further evidence of wildlife population-level change attributable to the availability of CRP grasslands at regional scales is needed.
- A better understanding of the influence of local wildlife responses to sites enrolled in any of the programs on local and regional population dynamics is needed.
- Better understanding of reproduction and survival of all wildlife species in conservation buffers and similar strip habitats is needed.
- The effect of buffer width on use and reproductive potential of birds and other highly mobile species remains largely unknown.
- Better understanding of how conservation buffers influence movement of wildlife in fragmented agricultural landscapes is needed.
- The effect of WRP restored wetlands on local and regional population dynamics of wetland birds, amphibians, and other wetland wildlife is poorly understood.
- An assessment of how continued conversion of native prairie grasslands to agricultural production may be offsetting grassland habitat benefits achieved through programs such as CRP and GRP is needed.

- EQIP projects specifically targeted to benefit fish and wildlife resources need to be tracked and assessed for their effectiveness in benefiting targeted species.
- Umbrella practices, such as the Upland Wildlife Habitat Management practice, cover a broad range of upland habitat manipulation actions to improve habitat quality for wildlife species that vary among sites, frequently integrating many types of practices applied to the planning unit. Better information is needed on how these broad practices actually change habitat conditions and what benefits to individual species or species groups are achieved.
- Better documentation of aquatic community response to dam removal and other stream restoration practices supported by WHIP and EQIP is needed.
- Better documentation of aquatic biota response to land treatment conservation practices at local and watershed scales is needed.
- Is measured change in habitat quality suitable for tracking wildlife benefits, regardless of actual species response?
- Once practices are installed, how does habitat quality change over the life of the practice, with or without active management?

Although considerable advancements have been made, these information needs illustrate some of the questions that remain. There are more than 160 conservation practices in the NRCS Field Office Technical Guide. Many of these practices have the potential to affect the multidimensional and dynamic suite of fish and wildlife resources inhabiting agricultural landscapes and beyond. The indefinite ways that these practices, applied in various landscape settings, affect fish and wildlife present a severe logistical challenge for comprehensively quantifying effects. While virtually any land management action taken has some effect on the biological community, some practices are more likely to have a greater effect on this community than others. For practical purposes, we have grouped the common practices most likely to affect fish and wildlife habitat potential by major landscape category where they are typically applied (Table 1). Where feasible, CEAP wildlife component emphasis is placed on quantifying the effects of these primary practices on fish and wildlife.

**Table 1. Broad landscape categories and common conservation practices (NRCS practice code) most likely to affect fish and wildlife habitats.** Description of practices and standards for implementation are provided in the NRCS electronic Field Office Technical Guide (<http://www.nrcs.usda.gov/technical/efotg/index.html>).

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Active cropland

- Conservation Crop Rotation (328)
- Cover Crop (340)
- Drainage Water Management (554)
- Forage Harvest Management (511)
- Residue Management, Mulch Till (345)
- Residue Management, No-Till/Strip Till/Direct Seed (329)
- Residue Management, Ridge Till (346)
- Residue Management, Seasonal (344)

## Buffers and strip habitats

- Alley Cropping (311)
- Contour Buffer Strips (332)
- Cross Wind Trap Strips (589C)
- Field Border (386)
- Filter Strip (393)
- Grassed Waterway (412)
- Hedgerow Planting (422)
- Herbaceous Wind Barriers (603)
- Riparian Forest Buffer (391)
- Riparian Herbaceous Cover (390)
- Vegetative Barriers (601)
- Windbreak/Shelterbelt Establishment (380)
- Windbreak/Shelterbelt Renovation (650)

## Established herbaceous habitat

- Conservation Cover (327)

## Wetlands and lentic aquatic habitats

- Constructed Wetland (656)
- Dam (402)
- Dike (356)
- Fishpond Management (399)
- Pond (378)
- Shallow Water Development and Management (646)
- Structure for Water Control (587)
- Wetland Creation (658)
- Wetland Enhancement (659)
- Wetland Restoration (657)
- Wetland Wildlife Habitat Management (644)
- “Swampbuster” wetland protection

## Streams and lotic aquatic habitats

- Channel Bank Vegetation (322)
- Fish Passage (396)
- Stream Crossing (578)
- Stream Habitat Improvement and Management (395)
- Streambank and Shoreline Protection (580)

## Grazing lands

- Brush Management (314)
- Prescribed Grazing (528)
- Range Planting (550)

## Forestland

- Forest Stand Improvement (666)

### Multiple category practices

- Early Successional Habitat Development/Management (647)
  - Mine Shaft and Adit Closing (457)
  - Nutrient Management (590)
  - Pest Management (595)
  - Prescribed Burning (338)
  - Restoration and Management of Declining Habitats (643)
  - Silvopasture Establishment (381)
  - Tree/Shrub Establishment (612)
  - Upland Wildlife Habitat Management (645)
  - Wildlife Watering Facility (648)
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Practices are generally applied as part of Resource Management Systems (RMS), whereby multiple practices are used to address the various natural resource concerns on a planning unit (USDA NRCS 2003). Practices may be applied progressively, depending upon the producer's ability to implement the conservation plan in which they are prescribed, and may influence resource concerns or be affected by conditions outside the planning area. The effects of individual practices on fish and wildlife resources, therefore, vary substantially among landscapes, land uses, and RMS settings where they are applied.

Individual conservation practices are planned and applied through the use of Conservation Practice Standards, which provide the basic criteria and considerations used in the planning process. Specific characteristics of individual practices may vary from site to site in order to meet site-specific natural resource planning objectives. This variability and the influence of local and regional landscape conditions makes it challenging to accurately predict the aggregate effects of various conservation practices on fish and wildlife.

### Assessment Approach

The primary approach to assessing the effects of conservation programs and practices on fish and wildlife is to work collaboratively with others to capture the work already completed or underway in this arena, and to identify critical data gaps and stimulate action to fill them. This involves acknowledging and assembling assessments conducted by NRCS and other federal agencies, universities and other academic institutions, state and local government

#### Assessment Principles

- Work collaboratively with others engaged in relevant assessments
- Leverage the use of existing data to the extent possible
- Identify critical data gaps and stimulate action to fill them
- Based on regional assessment priorities

entities, and non-governmental organizations.

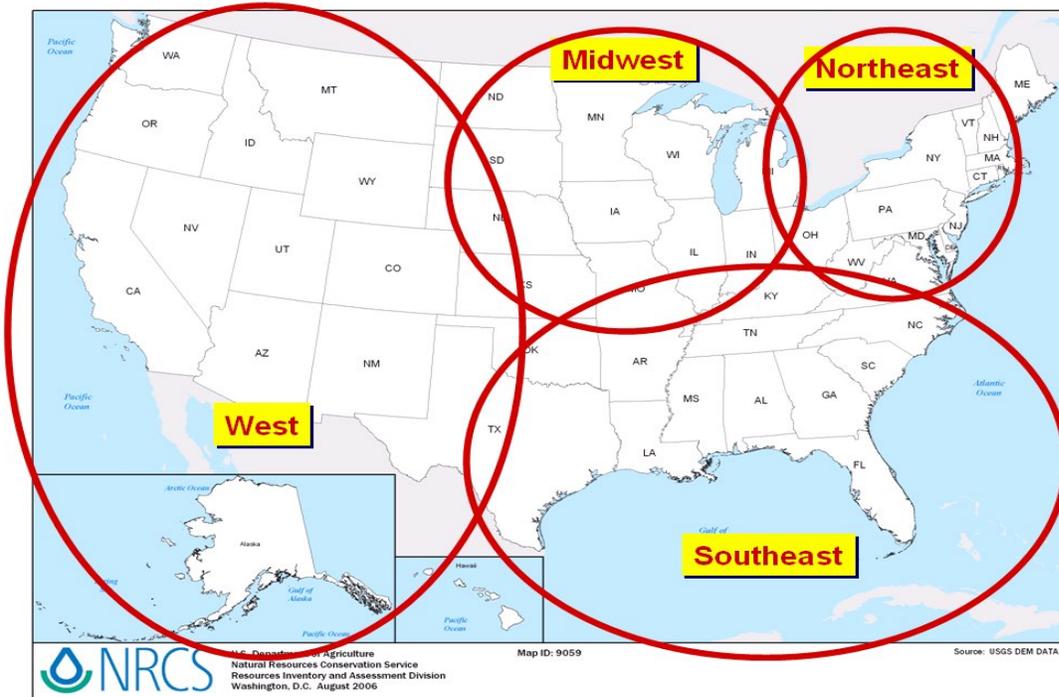
Since funding for fish and wildlife-specific assessments pursuant to CEAP are limited, the highest priority identified for the wildlife component is to gather existing fish and wildlife information and relate it to conservation practices to the extent possible. There is a substantial amount of work already underway to assess the fish and wildlife habitat benefits of the Farm Bill by a variety of organizations. The wildlife component seeks to leverage these projects to help meet the objectives of CEAP.

Since fish and wildlife resources, agricultural landscapes, and conservation programs and practices vary greatly across the country, much of the effort to assess wildlife response is best approached at the regional level. This approach aligns closely with the recommendations of the CEAP Blue Ribbon Panel on regionalization of CEAP efforts (Soil and Water Conservation Society 2006). Regional groups have been engaged to help set priorities and define approaches targeted toward prominent fish and wildlife species or groups in each region and the dominant conservation programs and practices applied there. In some instances, such as the Southeast Quail Study Group's efforts to better understand the plight of the northern bobwhite, this work has been underway for several years. In other cases, more effort is needed to identify priorities and initiate evaluations.

Under a contribution agreement with NRCS, the Association of Fish and Wildlife Agencies is assisting with engaging state fish and wildlife agencies and others at the regional level. Regional workshops have been conducted at various meetings of regional associations of fish and wildlife agencies to identify on-going assessment efforts and associated priorities for meeting future needs (Fig. 1). With consideration of assessment needs identified by the literature reviews presented above, these efforts have generated a preliminary list of high priority assessment needs for each of four broad geographic regions generally aligned with regional associations of fish and wildlife agencies (Table 2). While there are many other needs, this list represents a starting point for the highest priorities perceived by the fish and wildlife conservation community upon which to focus additional assessments associated with the CEAP wildlife component. The list of regional priorities is treated as a dynamic register, subject to regular update as other priorities are identified and refined. Additional input from the conservation community is being sought to continually refine assessment priorities.

Some of the priorities identified in Table 2 are being addressed by various efforts either directly or indirectly related to CEAP. Efforts to address remaining priorities will be undertaken as projects to address these needs are identified and as funding becomes available in the future.

**Figure 1. Regions employed by the CEAP wildlife component roughly align with regional associations of fish and wildlife agencies. Regions overlap because fish and wildlife agencies in many states belong to more than one regional association.**



Regional associations of fish and wildlife agencies include the Midwest Association of Fish and Wildlife Agencies (<http://mafwa.iafwa.org/>), Southeastern Association of Fish and Wildlife Agencies (<http://www.seafwa.org>), Northeast Association of Fish and Wildlife Agencies (<http://www.neafwa.org>), and Western Association of Fish and Wildlife Agencies. (<http://www.wafwa.org>)

**Table 2. Preliminary regional CEAP wildlife component assessment priorities identified through regional workshops and surveys of state agency Farm Bill and private lands coordinators.**

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

\*Partially addressed by current CEAP wildlife component funded project(s).

## Specific Assessments

The CEAP wildlife component includes key activities intended to quantify the effects of conservation practices and programs on fish and wildlife. Most of these are related to work that is already underway or planned for the near future. Whereas some are national in scope, the majority of actions planned are focused at the regional scale to address priorities identified by regional work groups. Table 3 presents various assessment projects funded through the CEAP wildlife component and initiated in fiscal years 2004–2008 to address high priority assessment needs, including practice type and region, species assessed, assessment topic, and project status. Additional information describing each of these assessment efforts is provided in the following pages, by partner project lead.

**Table 3. Assessment projects conducted in partnership with the CEAP wildlife component.**

<b>Project Lead</b>	<b>Year Initiated</b>	<b>Practice type(s) addressed/Region</b>	<b>Wildlife focus</b>	<b>Assessment topic</b>	<b>Status</b>
The Wildlife Society (described above)	2004	All/National	All	Literature synthesis of documented effects of conservation programs and practices on fish and wildlife	Program-based synthesis complete 11/2005, Practice-based synthesis complete 9/2007
NatureServe	2005	All practice types, with emphasis on pasture and hay planting/ Midwest	At-risk terrestrial and aquatic species	Using NatureServe information to assess conservation practice effects on at-risk species: Missouri Pilot	Final report complete 2/2007, CEAP science note complete 6/2007
University of Northern Colorado	2005	Conservation cover, CRP enrollments/ Midwest, South, East	Grassland nesting birds	Grassland bird response to CRP-related land use changes: Using NRI and Breeding Bird Survey data to assess landscape-level bird response	Final report complete 2/2007, CEAP conservation insight released 2/2009
University of Missouri	2006	Wetland restoration, WRP enrollments/ Midwest	Wetland birds, amphibians	Assessing wildlife habitat value on restored wetlands in Missouri through analysis of WRP ecological monitoring data	Interim report complete 9/2007, CEAP conservation insight released 2/2008
Playa Lakes Joint Venture (BCR19)	2006	Conservation cover, wetland restoration, CRP & WRP/Great Plains	Grassland dependent birds, waterfowl	Estimated contributions of CRP and WRP habitats toward conservation goals of priority grassland birds in the Mixed-grass Prairie region and WRP contributions to waterfowl conservation in the Rainwater Basin	Final reports complete (CRP-12/2007, WRP-6/2008). CRP conservation insight released 7/2008; WRP conservation insight released 9/2008.
Mississippi State University	2006	Upland buffers/ Southeast, Midwest	Northern bobwhite, songbirds	National evaluation of wildlife benefits of CRP practice CP33 (Habitat Buffers for Upland Birds)	Interim reports complete 12/2006, 10/2007, 2/2009; final report due 6/2009
University of Massachusetts-Amherst	2006	Early successional habitats/Northeast	Scrub-shrub birds	Assessing the benefits of conservation practices for scrub-shrub birds in New	Literature review complete 9/2007, final report due 9/2009

				England	
The Nature Conservancy	2007, 2008	Soil and water practices applied to cropland/ Upper Midwest	Freshwater aquatic biota	Integration of cropland component water quality output with aquatic biota data and models to make inference on the effects of practices on Midwestern stream ecosystems.	Initial assessment led to 2008 follow-up study, results expected 2010
Missouri Resource Assessment Partnership at the University of Missouri	2007	Upland, riparian, and in-stream practices/ Midwest	Freshwater aquatic biota	Use of Aquatic GAP species predicted distributions and practice application data to assess practice effects on aquatic biota in the Missouri River Basin	Multi-year effort, Final report due 9/2010
University of Nebraska-Lincoln	2007	Conservation cover, CRP enrollments/ Midwest	Northern bobwhite, ring-necked pheasant	Use of rural mail carrier wildlife surveys to assess benefits of Farm Bill programs in the Great Plains	Final report due 12/2009
Pennsylvania State University	2007	Fish passage, dam removal/ Northeast	Freshwater aquatics	Evaluating biological effects of dam removal on streams in PA	Final report due 5/2009
USGS National Wetlands Research Center	2007	Wetland restoration/ West	Waterfowl, shorebirds	Use of Doppler weather radar to determine bird use of WRP restored wetlands in California	Final report due 9/2010
American Bird Conservancy, Intermountain West Joint Venture	2008	Conservation cover (CRP), wetland restoration (WRP), prescribed grazing/West	Prairie grouse, land birds, waterfowl	Assessing priority bird response to wetland and upland practices in the Great Basin Bird Conservation Region (BCR9)	HABS model for BCR9 under development, results due 5/2010
Ducks Unlimited	2008	Wetland restoration (WRP), Conservation cover (CRP)/Midwest	Mallards	Assessing the contribution of WRP and CRP enrollments to mallard migration habitats in the Mississippi and Central Flyways	Pilot effort initiated in 2008, Four-year full implementation phase planned beginning in 2009
Playa Lakes Joint Venture (BCR18)	2008	Conservation cover (CRP), rangeland practices (EQIP) restoration/Great Plains	Grassland dependent birds	Estimated contributions of CRP and EQIP enrollments toward conservation goals of priority grassland birds in the Short-grass Prairie region (BCR18)	Results due 8/2009
USGS Upper Midwest Environmental Science Center	2008	Wetland restoration (WRP), Conservation cover (CRP)/Midwest	Amphibians, wetland birds	Assessing WRP and CRP contributions to amphibian and wetland bird conservation in Iowa	Project initiated in Iowa, broader Midwest assessment planned beginning in 2009
Oregon NRCS (Wood River Special Emphasis Watershed)	2008	Prescribed grazing, stream restoration/West	Aquatic biota	Assessing effects of prescribed grazing and stream restoration on aquatic biota in the Wood River watershed (Klamath),	Aquatic habitat and biota monitoring planned for 2008, to follow up 2003 "before" practice

				Oregon	monitoring. Results due 5/2009
Utah State University	2008	Fish passage, stream restoration/ West	Freshwater aquatic biota (flannelmouth and bluehead sucker, roundtail chub)	Use of stream and fish monitoring data to assess the effects of NRCS stream restoration practices on priority fish species in the San Rafael River, Utah	Results due 12/2010
Montana NRCS, Blackfoot Challenge	2008	Fish passage, stream restoration/ West	Aquatic biota (bull trout, west slope cutthroat trout)	Use of archived aquatic monitoring data to assess effects of NRCS stream restoration practices on stream biota in Montana	Results due 6/2010
University of Maryland	2008	Conservation cover (CRP)/East	Northern bobwhite, grassland birds	Assessing local and landscape factors associated with quail and grassland bird use of CRP enrollments in eastern Maryland and Delaware	Landscape analysis initiated, to expand previous study, results due 5/2009
Purdue University	2008	Wetland restoration/ Midwest	Swamp sparrow	Assessing bird population recruitment in WRP wetlands in Wisconsin	Project to complete previously initiated study, results due 5/2009
Virginia Tech	2008	Conservation cover/East	Insects, grassland birds, small mammals	Assessing wildlife response to grassland management for biofuels production	Results due 12/2009

### *NatureServe Missouri pilot*

NatureServe is a national organization affiliated with a network of state natural heritage programs. In cooperation with USDA and Missouri state partners, NatureServe conducted a pilot project in Missouri to develop and evaluate methods for assessing benefits of conservation practices on at-risk fish and wildlife species. Missouri was selected for this pilot in order to integrate and leverage previous work by Missouri NRCS and NatureServe (funded by the Environmental Defense Center for Conservation Incentives). The key objective was to demonstrate processes that can both evaluate the benefits of previously installed conservation practices as well as help prioritize Farm Bill program allocations. Both objectives of USDA require models that link biological element (e.g., wildlife habitat) compatibility with conservation practices such that application of practices can be predicted to have beneficial, neutral, or negative effects.

Overlays of multiple data layers (e.g., NatureServe species occurrence data) were used to correlate known conservation practices (from digitized applied practices in Missouri) with at-risk wildlife habitat and species occurrence. This pilot project was completed in 2007. NatureServe's final report and a CEAP science note that summarizes the project are available on the CEAP website at

(<http://www.nrcs.usda.gov/technical/NRI/ceap/library.html>). The results from this pilot project contributed to the initiation of the effort by the Missouri Resource Assessment Partnership to assess the effects of conservation practices on aquatic biota throughout the Missouri Basin, described below.

### ***University of Northern Colorado***

This work links NRCS National Resource Inventory (NRI - <http://www.nrcs.usda.gov/TECHNICAL/NRI/>) land use/land cover data and USGS North American Breeding Bird Survey (BBS - <http://www.pwrc.usgs.gov/bbs/>) data to estimate grassland breeding bird response to land use, including lands enrolled in the Conservation Reserve Program. The approach involved assessing the species richness of grassland nesting birds, neotropical migratory birds, and all birds in response to land use in the vicinity of BBS survey routes throughout the central and eastern United States. Previous studies have used BBS trend data and land use information derived from NRI data to correlate northern bobwhite population trends with land use in the Midwest (Veech 2006). This project expands this approach by analyzing existing NRI and BBS data to assess grassland bird species richness metrics associated with lands enrolled in the CRP at local (BBS-route level) and landscape (Bird Conservation Region) scales. This assessment was completed in 2007; a CEAP conservation insight describing the findings is available on the CEAP website (<http://www.nrcs.usda.gov/technical/NRI/ceap/library.html>).

### ***University of Missouri***

Through a partnership between USDA NRCS and the Missouri Department of Conservation, ecological and compliance monitoring data were collected on approximately 600 separate Wetlands Reserve Program (WRP) easements throughout Missouri during 2003–2005. Through a cooperative agreement with the University of Missouri, these data were analyzed to characterize the effect of WRP wetland restoration on the habitat quality of six indicator bird species. This phase of the project was completed in 2007; a CEAP conservation insight summarizing the findings is available on the CEAP website (<http://www.nrcs.usda.gov/technical/NRI/ceap/library.html>). A second phase of the project involves documenting wildlife response to various wetlands restoration strategies (i.e., minimal hydrology restoration, naturalistic hydrology restoration, and maximum hydrology restoration) through monitoring of amphibian metamorphs in a complex of WRP easements.

### ***Playa Lakes Joint Venture (BCR19)***

The Great Plains GIS Partnership (G<sup>2</sup>P<sup>2</sup>) is a collaborative effort between the Playa Lakes Joint Venture, Rainwater Basin Joint Venture, U.S. Fish and Wildlife Service, and the Central Platte Natural Resources District. G<sup>2</sup>P<sup>2</sup> was formed to improve cooperation and communication, reduce redundancy, and accelerate the application of GIS technology towards landscape level planning for wildlife conservation. NRCS entered into a contribution agreement with the Playa Lakes Joint Venture (PLJV) to engage the

expertise at G<sup>2</sup>P<sup>2</sup> to develop a collaborative assessment of the effects of the Conservation Reserve Program on priority birds in the Central Mixed-grass Prairie Bird Conservation Region (BCR19) and the effects of the Wetlands Reserve Program on migrating waterfowl in the Rainwater Basin of Nebraska. This agreement enabled CEAP to leverage existing GIS technology and landscape habitat modeling resources of G<sup>2</sup>P<sup>2</sup> to obtain scientifically credible estimates of habitat contributions for priority bird species in the Great Plains attributable to USDA conservation programs. The CRP assessment was completed in 2007 and the WRP assessment was completed in 2008. Final assessment reports and CEAP conservation insights that summarize project findings for both assessments are available on the CEAP website (<http://www.nrcs.usda.gov/technical/NRI/ceap/library.html>).

### *Mississippi State University*

As part of implementing the upland habitat buffers CRP practice (CRP practice code CP33), state agencies are required to monitor northern bobwhite and other bird response to establishment of this practice. Most states are using standard protocols developed to monitor northern bobwhite response to applied CP33 buffer practices (Burger et al. 2004). The purpose of this project is to assemble and analyze state-generated monitoring data to assess the effects of this practice on bobwhites and grassland birds at state, Bird Conservation Region (BCR), and species range-wide spatial scales. Specific objectives are to (1) provide annual statistically-valid density estimates of northern bobwhite (and other birds) on fields enrolled in the CP33 buffer practice at state, regional (BCR), and national levels; (2) provide a measure of relative effect size of the CP33 practice; and (3) evaluate through modeling approaches the effect of local landscape context on bird population response. The project is scheduled to take place over a 3-year period.

### *New England scrub-shrub bird assessment*

Scrub-shrub nesting birds in the Northeast have experienced significant population declines in recent decades. USDA conservation programs such as WHIP, CREP, WRP and CRP are being used to provide grassland and scrub-shrub habitats in the Northeast to help address these population declines and provide habitat for other wildlife that use early successional habitats. Wildlife biologists in the Northeast associated with the CEAP Wildlife component have identified a need to assess the benefits that early successional habitats developed through Farm Bill programs in New England are providing to scrub-shrub nesting birds. This project attempts to analyze a variety of existing data sets on scrub-shrub bird response to habitat development in New England and conduct additional analyses of bird monitoring, land use, and conservation program enrollment data to illustrate how scrub-shrub habitats on USDA program enrollment lands affect scrub-shrub bird populations. The assessment involves three primary phases: 1) a detailed literature synthesis to describe the current state or our understanding of wildlife response to early-successional habitat development in New England (completed in 2007, and available on the CEAP website at <http://www.nrcs.usda.gov/technical/NRI/ceap/library.html>); 2) synthesis and analysis of existing vegetation and bird response data sets previously collected by the U.S. Forest

Service's Northern Research Station in scrub-shrub habitats including silvicultural openings, powerline rights-of-way, reclaimed scrublands, scrub oak barrens, and beaver impoundments; and 3) an assessment of scrub-shrub bird response to USDA program enrollments in New England using implications from literature and data synthesis elements and analysis of data from the North American Breeding Bird Survey and American Woodcock Singing-ground Survey. The project is scheduled to take place over a 3-year period.

### ***The Nature Conservancy***

Through the efforts of its scientists and associates, The Nature Conservancy (TNC) has been studying the effects of various agricultural practices on stream biota in several watersheds in the Midwest (Rankin and Armitage 2004). From October 2006 through December 2008, NRCS shared a position with TNC under an Intergovernmental Personnel Act (IPA) agreement. This arrangement enabled an NRCS employee to be assigned to one of TNC's Midwest offices to leverage on-going assessment work and seek other opportunities to assess aquatic biota response to conservation practices. Through the IPA and with the support of CEAP funding, TNC aquatic ecologists developed recommendations for using soil and water quality model output from the CEAP cropland component to make inferences on stream habitat quality and aquatic biota. From this initial effort, current work is underway by TNC ecologists to implement those initial recommendations. Specifically, the goal of this effort is to integrate water quality data generated from Soil and Water Assessment Tool (SWAT) modeling with aquatic habitat models, existing stream fish survey data, and fish community index of biotic integrity (IBI) data to better predict the effects of conservation practices applied on cropland to aquatic biota associated with agricultural watersheds. The project will explore integrating the SWAT model with the Physical Habitat Simulation Model (PHABSIM) and Stream Segment and Stream Network Temperature model to assess the impact of terrestrial conservation practices on aquatic habitat. Results will be used to meet the objectives of the CEAP wildlife component and facilitate development of tools to increase benefits of conservation practices to aquatic biota and habitats.

### ***Missouri Resource Assessment Partnership at the University of Missouri***

This project builds the science base necessary for conducting a comprehensive assessment of the effects of various agricultural conservation practices on aquatic biota at broad geographic scales. Focusing on the Missouri River Basin, geospatial data sources related to specific stressors that affect the condition of aquatic biota are being assembled and integrated into a seamless data layer for the upper and lower Missouri River Basins. Stream reach-specific stressor metrics for 5-10 stressors in the Upper Missouri Basin are being developed to complement stressor metrics previously developed for the Lower Missouri Basin. Conservation practices most influential to stream biota will be selected for integration with stream-reach scale fish species predicted distribution models being developed in the basin by other members of the biological science community. Aquatic species will be assigned to guilds representing life history strategies for use in developing matrices used to predict the effects of practices on aquatic biota. Following matrix

development, geospatial biological information with combined with NRCS practice application information to conduct a comprehensive assessment of the effects of practices on aquatic biota in the Missouri River Basin. This work is expected to be carried out over a 4-year period.

### ***University of Nebraska-Lincoln***

Despite considerable investment in habitat restoration, regional estimates of many wildlife populations continue to show declines. The critical gap in the current research is connecting regional population indices with changes in land use in order to reconcile small scale benefits with large scale trends, document the efficacy of past decision making and guide future land enrollment decisions. Archived data from long-term surveys, in the form of state game surveys or breeding bird surveys, has the potential to show changes in state-wide population trends as Farm Bill programs became established. This project focuses on pheasant populations and other target species in Nebraska, using Nebraska to model the process for other states and regions. Specific objectives are to 1) develop a list of target wildlife species that (a) have existing long-term survey data in Nebraska and (b) are biologically, socially, and politically relevant for trend analysis, and 2) to use legacy datasets to detect influences of Farm Bill programs. The primary expected outcome is an assessment of the influences of Farm Bill programs on state-wide wildlife populations in Nebraska. The longer-term outcome is the development of sets of models and protocols that other states or regions can use to examine similar data sets.

### ***Pennsylvania State University***

Removal of aging dams on streams is becoming an important stream restoration conservation practice in eastern states. Many of these projects are funded by diverse partnerships, including USDA program involvement. Benefits to stream biota have been listed among the primary purposes of dam removal, yet few attempts have been made to comprehensively assess and quantify these benefits. Approximately 70 dams have been removed from Pennsylvania streams, with many more planned for the near future. A variety of ecological data have been collected on many dam removal sites in Pennsylvania. This project is intended to 1) generate a comprehensive literature review of the effects of dam removals on stream ecosystems and their biota in Pennsylvania and the Northeast; 2) identify and inventory data currently available in Pennsylvania regarding effects of dam removals on stream geomorphology, physical habitat, and aquatic biota; 3) create a database of available information regarding dam removals in Pennsylvania with an emphasis on biological monitoring; 4) synthesize current information to evaluate the effects of dam removals on aquatic biota on a statewide basis; and 5) provide recommendations for future monitoring of dam removal projects.

### ***USGS National Wetlands Research Center***

The USGS National Wetlands Research Center (NWRC) is a nationally and internationally recognized leader in the field of migratory bird and wetland science. NWRC scientists are currently involved in using emerging Doppler weather radar technology to estimate migratory bird habitat use and density patterns. They are also

involved in a collaborative national effort with others to foster radar-related wildlife research and software development across the country. Through its Agricultural Wildlife Conservation Center, NRCS has entered into an interagency agreement with USGS-NWRC to gather data and conduct analyses of USDA program wetlands by migratory birds, with an initial focus on the Central Valley of California where the opportunity to analyze archived NOAA Doppler weather radar data and Wetlands Reserve Program restored wetlands is high. This project will also result in the development of tools that aid in restoration planning within a landscape context, assessment of use of WRP sites by migratory birds (e.g., use during pre- and post- restoration phases, where data are available), and advancement of technology for using Doppler weather radar data to understand bird-WRP habitat relations. The effort is expected to be carried out over a 3-year period.

### ***American Bird Conservancy***

American Bird Conservancy (ABC), in partnership with the Intermountain West Joint Venture (IWJV), is conducting an assessment of the effects of conservation practices implemented through USDA conservation programs (CRP, WRP, EQIP) on priority bird species and their habitats in the Great Basin Bird Conservation Region, with a focus on eastern Washington and Oregon. Bird population response to changes in habitat condition and land use conversion associated with CRP enrollments and EQIP conservation practices will be assessed through the development and use of a Hierarchical All Bird System (HABS) database, whereby changes in bird species-specific carrying capacities associated with conservation actions are tracked by state-level segments of bird conservation regions and placed in context of established bird population objectives. Investigators are consulting with the Playa Lakes Joint Venture (PLJV) regarding development and use of HABS, which was originally developed by PLJV. Effects of WRP enrollments in southern Oregon and northeastern California on migrating waterfowl will be assessed through the use of bioenergetics models (e.g., TRUOMET) to quantify non-breeding waterfowl population-habitat relationships.

### ***Ducks Unlimited***

Through a contribution agreement with NRCS, Ducks Unlimited is spearheading a collaborative assessment of the effects of USDA conservation programs and practices on migrating waterfowl in the Mississippi and Central Flyways. This effort links with a broad coalition of waterfowl scientists and managers to explore the use of recently developed and emerging satellite telemetry and geospatial analysis tools to track movements and habitat use of mid-continent mallards. The goal of these efforts is to use the spatial precision of GPS-derived waterfowl positions, in conjunction with geospatial environmental databases, to model factors affecting waterfowl distribution and movement throughout the annual cycle at various scales, to test key planning assumptions and reduce uncertainties of the North American Waterfowl Management Plan, and evaluate the use of habitat provided through major conservation programs. This agreement leverages these efforts to build the science base necessary to produce information and products that contribute to the findings of the Wildlife Component of CEAP.

Collaboration with other project partners through this agreement will lay the technical and logistical groundwork for conducting a long-term, large-scale study to assess distribution and movements of the mid-continent population of mallards and determine the contribution of various conservation programs and practices, including USDA conservation programs, to mallard conservation.

***Playa Lakes Joint Venture (BCR18)***

This effort extends the approach developed by the Playa Lakes Joint Venture (PLJV) and the Great Plains Geographic Information System Partnership (G<sup>2</sup>P<sup>2</sup>) described above for the Mixed-grass Prairie Bird Conservation Region (BCR19) to conduct an assessment in the Shortgrass Prairie Bird Conservation Region (BCR 18). Specifically, PLJV is conducting an analysis in portions of Colorado, New Mexico, Nebraska, Kansas, Oklahoma and Texas to assess the effects of conservation practices applied under the Conservation Reserve Program (CRP) and evaluate the potential of assessing the effects of practices applied through the Environmental Quality Incentives Program (EQIP) and other programs on bird species of concern. The assessment is being conducted to estimate the contribution of these USDA conservation programs in meeting established priority bird habitat objects in the short-grass prairies of the Great Plains.

***USGS Upper Midwest Environmental Science Center***

Through an interagency agreement with NRCS, the USGS Upper Midwest Environmental Science Center (UMESC) is conducting a cooperative effort that will complement work previously conducted by UMESC in Iowa and USGS work in progress in the upper Midwest. This effort is investigating effects of wetland restoration and other conservation practices on amphibians and birds in upper Midwestern agricultural landscapes. USDA and USGS have expended considerable effort to restore and document ecosystem services associated with wetlands in agricultural settings. This effort capitalizes on the resources of both organizations to document the ecological effects of those investments. This effort will establish the framework for conducting analyses of effects of habitat development associated with the Wetlands Reserve Program (WRP) and Conservation Reserve Program (CRP) on wildlife, with a focus on amphibians and birds, in the upper Midwest. Analyses include geospatial analysis using remote sensing and Geographic Information System (GIS) tools; intensive and extensive biological sampling; and geospatial, hydrologic, and biological modeling. Output from this effort will be used to inform the CEAP wildlife component, as well as assist in the development of tools for use in maximizing wildlife value of USDA program wetlands and other habitats.

***Oregon NRCS (Wood River special emphasis watershed)***

The NRCS in Oregon is working with Oregon State University, the Klamath Basin Rangeland Trust and other partners to conduct CEAP special emphasis watershed studies

in the Wood River basin. Part of this work involves monitoring stream habitat and fish response to stream restoration, irrigation management, and grazing management practices. The CEAP wildlife component is contributing to this effort, primarily to support aquatic habitat and biota monitoring in several stream reaches 5 years post-conservation practice establishment.

### ***Utah State University***

This project evaluates existing and newly acquired data to help NRCS predict and evaluate the geomorphic response of the San Rafael River to conservation practices implemented to improve aquatic, riparian, and floodplain function, fish habitat, and natural flow regimes. Initially, investigators will (1) describe the geomorphic history of the lower San Rafael River, including the rate and magnitude of channel narrowing that has degraded native fish habitat and disconnected the river from much of its floodplain; (2) describe the history of changing water flows, sediment delivery, and non-native riparian vegetation invasion and describe the mechanisms by which these factors have caused channel narrowing; and (3) identify appropriate metrics to evaluate stream corridor (riparian, wetlands, floodplain, and channel) response to tamarisk removal and restoration of native riparian vegetation. This investigation will incorporate analyses of aerial photographs, USGS stream gage records, stratigraphy of sediments, and analysis of tree-ring characteristics of buried tamarisk to determine the timing and elevations of initial establishment and the rate of subsequent floodplain accretion. These data will be used to evaluate the effects of tamarisk removal on channel restoration, water quantity, and water quality and contribute to the design of stream habitat improvements for aquatic species of concern.

### ***Blackfoot Challenge***

Fisheries and aquatic habitat data associated with stream restoration and other conservation practices collected by the Blackfoot Challenge and its partners in the Blackfoot River Watershed over the past 20 years offer a unique opportunity to assess effects of NRCS practices on stream aquatic biota. CEAP wildlife component funding was added to a pre-existing contribution agreement between the Blackfoot Challenge and the Montana office of NRCS to support a synthesis of existing aquatic monitoring data from the Blackfoot River Watershed and support additional ecological monitoring. The synthesis is intended to 1) document temporal changes in land use, fish populations, and aquatic habitat quality in the Blackfoot River watershed over the past 20 years; 2) document measured effects of specific types of conservation actions (e.g., fish screens, riparian restoration, addition of large wood, grazing management) on salmonids of the Blackfoot River watershed and relate those effects to relevant USDA conservation practices (e.g., Fish Passage, Prescribed Grazing, Riparian Forest Buffer, Stream Habitat Improvement and Management, etc.); 3) assess the contributions of various partner entities toward meeting aquatic habitat restoration objectives in the Blackfoot River

watershed; and 4) assess the applicability of the documented effects of conservation actions taken in the Blackfoot River watershed on aquatic biota to other stream systems in Montana.

### ***University of Maryland***

This study aims to document the effects of landscape attributes on the bird use of Conservation Reserve Program (CRP) land in the mid-Atlantic Region, with a focus in eastern Maryland and Delaware. Investigators at the University of Maryland are conducting a spatial analysis of bird response to landscape attributes from digital CRP enrollment data and 2001 National Land Cover data. This analysis will be combined with field-level data collected during a previous study. Special emphasis will be on the response of northern bobwhites to CRP and landscape attributes. This project will document habitat use of CRP land by target species of conservation concern (northern bobwhite, and grassland and early successional bird species) and the role that landscape factors play in habitat value. Management recommendations designed to improve habitat quality of lands enrolled in the CRP in the mid-Atlantic region will also be developed.

### ***Purdue University***

Despite a significant investment of time and resources by local, state, and Federal partners to restore wetland habitats, relatively few studies have documented the wildlife response to restoration activities. In particular, there is a need to evaluate demographic rates and reproductive success to determine whether restored habitats are capable of sustaining healthy animal populations. To address this knowledge gap, this project will measure wetland attributes and evaluate marsh bird reproductive success at a set of restored and natural marshes using the swamp sparrow as a representative marsh bird species. Restored marshes are former agricultural lands that have been restored under the Wetlands Reserve Program. The project involves the use of likelihood-based methods to quantify daily nest survival rates and to model relationships among daily nest survival rates, nest defense behavior, and wetland characteristics. Subject wetlands will be categorized as demographic sources or sinks in an effort to understand how individual wetlands influence avian population dynamics at landscape scales.

### ***Virginia Tech***

There is emerging interest in the utilization of native, warm-season grasses such as switch grass, both as drought-tolerant summer forage and in biomass applications ranging from direct combustion to the generation of cellulosic ethanol. Although many assume that these plantings will represent better wildlife habitat than the areas they replace, traditional models for assessing wildlife value have assumed only periodic management on restored acreages with no removal of material. This pilot project will evaluate the wildlife habitat impact of three grassland management systems. Specifically, seed rain and the abundance and diversity of insects and small mammals in three warm-season

grass fields under different management regimes will be measured. The result of this strategy will be an unreplicated pilot examination of the wildlife implications of warm-season grass management strategies.

### **Related On-going Activities**

There are number of activities that, although not directly funded through the Wildlife component, relate directly to filling the needs and data gaps identified. Some of these efforts are briefly described as follows:

***CEAP Cropland Component - National Agricultural Statistics Service (NASS) Producer Survey*** <http://www.nrcs.usda.gov/technical/nri/ceap/surveys.html>

The 2003-2006 landowner survey conducted by the National Agricultural Statistics Service (NASS) in support of the CEAP Cropland Component contained six questions related to how landowners perceive wildlife on their lands and how they view wildlife response to practices they have installed. While the data generated from these questions are not equivalent to empirical data derived from quantitative wildlife assessments, they are useful to identify which conservation practices are being used by producers to enhance wildlife habitat and how wildlife use of these practices is viewed by producers. Survey information will provide a better understanding on whether producers make special accommodations for wildlife or plan and configure conservation practices with wildlife in mind.

The purpose of these questions is to obtain information about the on-site effects of conservation practices on wildlife habitat.

Questions include:

1. Have you modified or added any conservation practice SPECIFICALLY to improve the quality of fish or wildlife habitat? If yes, indicate what practices were installed or modified.
2. For the field practices indicated in the previous questions, will you manage the cover for wildlife purposes?
3. Have you seen changes in wildlife numbers because of these conservation practices? If so, what changes ? (choices are provided for common, easily recognized species)
4. How desirable do you consider the following wildlife on your property? (choices are provided for common species)
5. To what extent are wildlife habitat considerations included in discussions you have with NRCS or other conservationists? (four choices)
6. Question designed to elicit the respondent's attitude toward wildlife in relation to their operation.

Results of questions 1 and 2 can be used to help identify the conservation practices that are being used by producers to enhance wildlife habitat in and around cropland fields.

Practices identified by landowners as important for wildlife habitat enhancement can then be targeted for evaluation and quantification as part of the CEAP wildlife component.

Results of question 3 provide estimates, from the landowners' perspective, of the on-site wildlife benefits derived from conservation practices they have installed specifically for wildlife enhancement purposes in and around cropland fields included in the NASS survey.

Results from question 4 can be used to help identify important wildlife species or groups to feature in quantitative evaluations of wildlife benefits achieved through conservation programs and practices.

Results from questions 5 and 6 are useful in estimating the extent to which practices are planned to address and/or enhance wildlife habitat. Some practices may provide significant benefits to wildlife only where wildlife habitat needs are considered in planning, whereas others may provide significant benefits regardless of whether or not wildlife habitat needs were considered. By combining this information with the outcome of other quantitative studies to assess the wildlife benefits of various conservation practices, results from these questions will help identify the extent to which on-site wildlife benefits can be attained.

### ***CEAP Wetlands Component - Biodiversity results***

NRCS is working with a variety of partner agencies and groups to develop methods for reporting changes in wetland ecosystem services resulting from conservation practices (e.g., wetland restoration) supported by USDA conservation programs. The objective of this effort is to provide one-time regional measures of wetland ecosystem services "before" and "after" implementing wetland conservation practices. It also involves development of predictive wetland functional condition models to periodically assess changes in wetland ecosystem services nationally. Ecosystem services to be modeled include those related to water quality, sediment deposition, flood storage, carbon sequestration, and biodiversity.

Initial regional modeling efforts in the Prairie Pothole Region of the northern Great Plains and in the Mississippi Alluvial Valley show promise for developing a standardized approach capable of capturing the change in wetland ecosystem services associated with conservation practices while controlling for climatic variation and the resulting shifts in wetland biotic and abiotic conditions. These initial efforts are expected to yield biodiversity elements (e.g., modeling of local amphibian populations and waterbird habitat potential) useful in describing the wildlife response to wetland restoration and other practices. This and other output from the CEAP wetlands component assessments are expected to contribute significantly to the wildlife component objectives of quantifying wildlife benefits to conservation practices.

<http://www.nrcs.usda.gov/technical/nri/ceap/wetlands.html>

### ***CEAP Grazing Lands Component***

The CEAP Grazing Lands Component is intended to quantify the environmental effects of conservation practices used on pastureland and rangeland. Whereas the wildlife component seeks to assess fish and wildlife effects on all habitat types in agricultural landscapes (some of these efforts will be on grazing lands), elements of the grazing lands component are likely to directly or indirectly capture fish and wildlife habitat elements within the suite of ecological services influenced by conservation practices applied to pasture and rangeland. Close coordination between the wildlife and grazing lands components will ensure that opportunities to quantify the effects of conservation practices on fish and wildlife in grazing land settings are explored and exploited.

<http://www.nrcs.usda.gov/technical/nri/ceap/grazing.html>

### ***CEAP Watershed studies***

A number of assessments are underway to document environmental benefits of conservation practices applied at watershed scales. These include Agricultural Research Service Benchmark Watershed studies (Richardson et al. 2008), studies funded through competitive research grants by the Cooperative State Research, Education, and Extension Service, and special emphasis watersheds sponsored by NRCS. Details on these watershed studies are available on the CEAP website at

<http://www.nrcs.usda.gov/technical/nri/ceap/watershed.html>. While the majority of these watershed assessments focus on soil and water resource concerns to complement the CEAP National Assessment's cropland component, some include aspects that address fish and wildlife response to conservation practices. Wherever applicable, these efforts will inform the wildlife component and help meet its objectives.

### ***Farm Service Agency (FSA) CRP assessments***

FSA supported a number of specific regional projects to assess wildlife responses to CRP. These assessments included landscape-scale estimates of the benefits of CRP to populations of upland nesting ducks, ring-necked pheasants, northern bobwhites, grassland-nesting birds in the upper Midwest, and sage-grouse in Washington. Final reports generated from these assessments reveal substantial benefits of CRP to these target bird populations and are available on the CEAP website

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

### ***Mississippi State University Bobwhite Restoration Project studies***

The goal of the NRCS-Mississippi State University Bobwhite Restoration Project is to develop technology that assists NRCS field staff in future planning and to support research and demonstration projects that, within the context of the Northern Bobwhite Conservation Initiative (NBCI) habitat and population goals, evaluate the efficacy of NRCS conservation practices in restoration of northern bobwhite habitat and populations.

Support for this project is provided through a Grants-in-Aid program from the NRCS Agriculture Wildlife Conservation Center that provides funding to institutions designing and implementing research and demonstration projects that specifically evaluate the efficacy of NRCS conservation practices and resource management systems deployed in a manner that achieves the habitat goals of the NBCI. Grants are to support evaluation of, and not implementation of, conservation practices and initiatives designed to accomplish the goals of the NBCI. In fiscal year 2004, 11 separate projects conducted at institutions throughout the southeastern United States were funded through this effort (see <https://hdclel.cfr.msstate.edu/nbci/default.html> for a description of individual projects).

### ***Utah State University Sage-grouse Restoration Project***

NRCS initiative and Congressional directives have targeted NRCS conservation work on improving habitat quality for the sage-grouse on western working lands in recent years. To support this effort, NRCS is working with Utah State University to support projects that evaluate NRCS' ability to provide the technical assistance necessary to help prevent this species from further population declines. Conservation practices (e.g., prescribed grazing, water development, brush management, prescribed burning) are being evaluated for their effect on sage-grouse habitat and, where needed, new technology is being developed for practices that enhance and restore sage-grouse habitat. This project will provide current information on the role of existing conservation practices and technologies relative to conserving sage-grouse and other sagebrush obligate species. The Sage-grouse Restoration Project includes a grants-in-aid program that provides funds for the design and implementation of research and demonstration projects that evaluate and communicate the effectiveness of 2002 Farm Bill conservation practices and technology in restoring or enhancing sage-grouse habitat on private lands. Specific projects are described at <http://www.sgrp.usu.edu/>.

### ***State Wildlife Action Plans***

In order to receive funds from the State Wildlife Grants program administered by the U.S. Fish and Wildlife Service, each state was required to produce a Comprehensive Wildlife Conservation Strategy (State Wildlife Action Plan) by October 2005 (see [http://www.teaming.com/state\\_wildlife\\_strategies.htm](http://www.teaming.com/state_wildlife_strategies.htm)). These strategies identify priority wildlife species and habitat areas, assess threats to their survival, and identify actions to conserve them over the long term. State fish and wildlife agencies developed these strategies by engaging a broad array of partners, including other government agencies, conservation groups, private landowners, and the general public. States are required to develop plans for monitoring species of greatest conservation need, and their habitats, to determine the effectiveness of conservation actions, and for adapting these conservation actions to respond appropriately to new information and changing conditions. Monitoring components of these plans that have relevance to the CEAP wildlife component objectives will be considered and captured in outcomes where feasible.

### ***Audubon's Birds and Agriculture Program***

This is a broad-based program aimed at exploring the impacts of agricultural production practices on birds, demonstrating how production systems and conservation programs can be used to make working lands more hospitable to birds, and in increasing the agriculture community's awareness of how it can support bird populations and habitats as it produces food and fiber. One of the program's specific objectives is to document the impact of agricultural production systems and conservation practices on bird populations on working lands. Where applicable, outcomes from this effort will be incorporated into assessment efforts of the CEAP wildlife component.

<http://www.audubon.org/bird/pdf/BirdsAndAgriculture.pdf>

### ***NRCS Agricultural Wildlife Conservation Center findings***

Prior to its reorganization in 2004, NRCS operated a number of discipline-specific science and technology institutes designed primarily to develop technical materials needed by NRCS field conservation planners. Several of these institutes (Wildlife Habitat Management Institute, Wetland Science Institute, Watershed Science Institute) were involved in studies that assessed fish and wildlife response to conservation practices in order to develop more effective approaches to addressing fish and wildlife needs in conservation planning and practice implementation. The former Wildlife Habitat Management Institute has been reconstituted as the Agricultural Wildlife Conservation Center (AWCC - <http://www.whmi.nrcs.usda.gov/>), and continues this work through competitive grants to organizations and institutions involved in wildlife technology development. Although these projects are primarily directed at technology development, many have generated and will continue to produce useful information documenting fish and wildlife response to the practices studied. Examples of the information gathered through these efforts include the response of grassland birds, northern bobwhites and butterflies to field borders and other buffer practices; changes in stream fish assemblages following riparian buffer establishment; response of amphibians and other wildlife to wetland restoration and associated microtopography development; and response of upland nesting birds to various vegetation management regimes on lands enrolled in CRP. An example of current AWCC coordination with CEAP is the effort with USGS-NWRC to use Doppler weather data to assess bird use of restored wetlands, described above. Information gathered from technology development projects that relates to assessing how fish and wildlife responds to conservation practices will be compiled and included in CEAP wildlife component reporting where applicable.

### **Anticipated Outcomes**

Fish and wildlife resources that are potentially affected by USDA programs and conservation practices consist of thousands of taxa on a wide diversity of habitats. The multi-dimensional effects of the variety of conservation practices across the spectrum of fish and wildlife species affected are extremely difficult to condense into simple national or

aggregate measures of benefit. Therefore, prominent species that have been sufficiently studied and for which conservation practices are likely important habitat factors are the initial primary targets of the CEAP wildlife component. Some of these species, such as prairie-nesting ducks, may be suitable for regional modeling capable of quantifying population response to conservation programs. As the various wildlife component regional assessments are completed, CEAP science notes and conservation insights will be developed by NRCS to make findings accessible to conservation planners, fish and wildlife community partners, and other stakeholders.

This work plan provides the basic structure of the CEAP Wildlife component. While future funding to address high priority assessment needs is anticipated, the outlook on out-year budgets remains uncertain. While NRCS intends to pursue funding support for these efforts in the future, effective implementation of the CEAP wildlife component will continue to rely on the data and human resources of partner agencies and organizations. Periodic accomplishment reports and fish and wildlife outcome products are anticipated, along with regular updates to this work plan. Future assessment projects will be identified through on-going communication with regional groups and initiated through appropriate administrative instruments (e.g., contribution agreements, interagency agreements, cooperative agreements within the Cooperative Ecosystem Studies Units network, etc.). As additional CEAP wildlife component-funded assessments are initiated and other related efforts are identified, this work plan will be updated to include these activities.

The intent of the CEAP wildlife component is to remain flexible enough to respond to changes in assessment priorities and developing technologies useful in accurately assessing the effects of current and future conservation programs and practices on fish and wildlife resources.

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