Fish and Wildlife Technology Findings

One-Page Summaries

Summarized and compiled by Iowa State University Extension Wildlife Programs for the Natural Resources Conservation Service Agricultural Wildlife Conservation Center as part of a CESU cooperative agreement

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Cover: NRCS photos by Lynn Betts

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The Agricultural Wildlife Conservation Center

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) strengthened its technology development for fish and wildlife conservation in 1996, when the agency established the Wildlife Habitat Management Institute (WHMI). NRCS renamed and reopened WHMI as the Agricultural Wildlife Conservation Center (AWCC) in 2006. The AWCC continues to offer annual competitive grants for conservation partners, including research institutions and others, to improve fish and wildlife conservation technology. More than $21 million has been used in technology projects over the past 12 years to develop, test, and transfer wildlife conservation technology to local NRCS field offices in order to take full advantage of the most recent science available.

One-Page Summaries

The one-page summaries in this document have been issued by the AWCC to provide summary information and provide a broad overview of new technology to assist NRCS field offices and conservation partners as they work with landowners in protecting their soil, water, and wildlife resources. More complete information is available online from the AWCC on each project (http://www.whmi.nrcs.usda.gov). The AWCC will continue to complete one-page summaries of projects as new technology is developed.

NRCS photos by Lynn Betts

Technology Development Projects

Technology development projects were undertaken with one objective in mind: using highly respected fish and wildlife scientists to develop the best information possible on fish and wildlife habitat needs on private lands and transfer that information to NRCS field offices and others in a form that they can easily use as they work with private landowners in comprehensive conservation planning.

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Light disking enhances early successional habitat with negligible erosion

Disking is widely accepted as an important tool in creating early successional habitat for bobwhite quail and other grassland birds.

That is because the disturbance and bare soil it creates allows annual plants to grow and attract the insects that young chicks need. Typically open at ground level with little litter accumulation, the disked areas are easy for young bobwhites to feed in, and the broad-leaved forb canopy provides protection from predators.

Conservation Reserve Program (CRP) fields, including dense cool- or warm-season grass plantings, broomsedge, abandoned pastures, and old fields succeeding to brush, are likely candidates for improvement with disking.

Conservationists, however, have concerns about soil erosion caused by disking. A study by Mississippi State University (MSU) concluded erosion is negligible if the proper techniques are used.

"Rotational strip disking is a cost-effective way to enhance habitat for bobwhite quail, and it can be done with minimal erosion," says Dr. Wes Burger, Associate Professor of Wildlife Ecology at MSU.

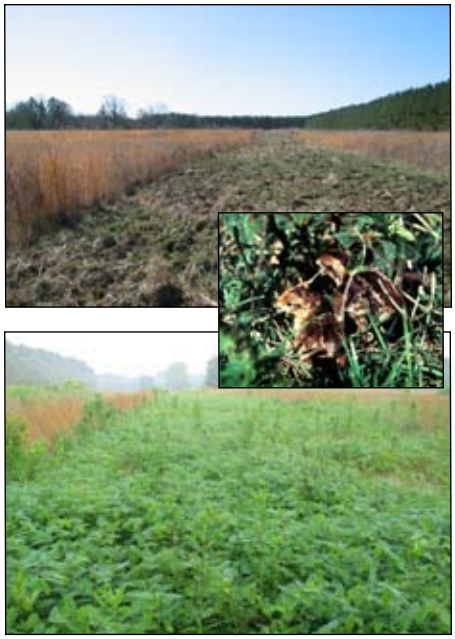
Burger's research with U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) biologist Pat Graham in Missouri and Mississippi showed that light disking (1–2 passes 3–5 inches deep) can effectively stimulate germination of annual plants. Strip disking on the contour created minimal erosion (0.01–0.17 ton/acre) with erosion rates well below T-levels. Burger cautions that specific guidelines for strip disking on highly erodible land or CRP land must be formulated by the NRCS.

In Mississippi, the guidelines for disking these lands are:

- Strips must be disked light enough to provide for a minimum of 30 percent residue on the soil surface after disking operations are complete.
- Disking should be done in strips no wider than 30 feet on the least erosive parts of fields, along field contours as near as practical.
- Disked strips should be separated by undisked strips twice the width of the disked area.
- Strips may be disked from late October through late March. Strips disked in late fall may be seeded to a winter cover crop suited for wildlife.
- Fall disking tends to stimulate germination of ragweed and legumes; spring disking encourages annual grasses such as foxtail.
- Light disking should be done on a 2- to 3-year cycle. Rotate and/or alternate the location of the lightly disked strips each year. Continue this rotation, disking strips every 2nd to 3rd year.
- Depending on the erosion index of a field, 14 percent to 33 percent of the field may be disked in any year. Widths between strips varies from 60 feet to 180 feet.

Incorporating the disked strips as firebreaks into a prescribed fire program can lead to even more diversity of desirable annual plants, according to Ed Hackett, a biologist with the NRCS Agricultural Wildlife Conservation Center (AWCC).

The study was aided by a grant from the AWCC. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.



Photos by Wes Burger, MSU

Enhanced habitat quality by strip disking (*top*); Vegetation response to disking (*bottom*); Northern bobwhite chick (*inset*)

Summary of:

Agricultural Wildlife Conservation Center
Project # 68–7482–8–375

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Delay hay cuttings to allow birds to successfully fledge young

Earlier and more frequent cuttings of hay in the Northeast can be devastating to grassland songbirds.

A University of Vermont study comparing nesting success of grassland birds for various management techniques on working haylands found that the majority of grassland habitat was cut during the breeding season, and this early cut haying caused almost all Savannah sparrow and bobolink nests to fail.

"But the birds re-nest, and we found late-hayed fields to be high-quality reserves for late-nesting birds like bobolinks that were displaced from fields that were cut earlier," says researcher Noah Perlut.

Grassland bird populations in the Northeast have dropped dramatically—some species by as much as 80 percent—over the past 40 years. The loss of agricultural land and resulting smaller patches of farm fields surrounded by woodlands has led to habitat ill-suited to grassland birds.

The problems for grassland birds have been compounded as remaining grasslands have been cut early and often for hay production.

The Vermont research shows a strong correlation between the degree of management intensity and the birth and survival rates of two species of grassland birds, the Savannah sparrow and the bobolink. Fields cut early in the nesting season (prior to June 12) show low birth and survival rates, whereas fields cut after August 1 show much greater birth rates and survival rates.

Grazed fields and fields cut during the middle of the breeding season, mid-June to mid–July, show intermediate values. These data strongly suggest that for bobolinks and Savannah sparrows, early cut fields are unlikely to support viable populations in the long term, but grazed fields and fields cut later in the nesting season might enable populations to sustain themselves over time.

Timing is everything

For Savannah sparrows, the earliest observed fledging date was June 5, and the latest was August 10 (although fledging can occur as late as August 23 in other management-type fields). For bobolinks, the earliest fledging date observed was June 11, and the latest was July 28.

Although the timing of cutting is critical to the nesting success of grassland birds, many farmers have limited flexibility in their ability to delay cutting because of reduced forage quality.

Delayed second cuts

There may be opportunities for farmers to cut hay early in the season (before May 31) and delay their second cut by 65 days. This allows 14 days for regrowth, 42 days for a nesting cycle, and 9 days for young to develop flight capabilities. This strategy may be used where farmers need some amount of high-quality forage, but are interested in higher production volume but lower quality late hay for dry cows or horses.

Influenced by this research, the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Vermont offers monetary incentives for delayed second cuttings through the Environmental Quality Incentives Program, according to Charlie Rewa, a biologist with the NRCS who facilitated the study for the NRCS.

Funding for the project was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC). The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Noah Perlut and Allan Strong, University of Vermont

Vermont dairyland landscape; (*insets*) (*left*) Savannah sparrow nest; (*right*) Savannah sparrow

Summary of:

Agricultural Wildlife Conservation Center
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Escape ramps in water troughs help bats, birds, and other wildlife

Most livestock tanks, ponds, and troughs have not been designed, installed, or maintained with wildlife in mind.

However, those watering devices established for livestock can double as a vital water source for bats, birds, and other wildlife that help ranchers maintain healthy rangelands.

They can be safe for wildlife and maximize water quality for cattle if a few guidelines are followed that may include making minor, inexpensive changes to the watering devices.

Dan Taylor, a conservation specialist with Bat Conservation International (BCI), says a survey of western water troughs found that fewer than 10 percent had functioning wildlife escape structures, more than half had obstructions over the water, and many had no water in them or had water levels well below the rim.

Those issues may seem minor to some, but they are all important to bats. That is because bats must drink "on the wing" over open water at night.

Much like airplanes need clear approaches to runways, bats need an unobstructed "swoop zone" to scoop up a drink of water and fly away safely. Obstructions like wire fences, posts, and brace bars on water tanks discourage bats from trying to take a drink, and when they do, can knock them down into the water.

If they are knocked into the water and there is no way to crawl out, the bats drown, fouling the water for cattle and losing a valuable insect-eating friend of ranchers.

Piling rocks, leaving logs in a tank, or using a ramp that does not extend to the bottom of the tank usually is not very effective in saving bats and other wildlife.

Taylor says an escape ramp is easy and inexpensive to build and can virtually eliminate wildlife mortality in water troughs. An effective structure should:

- Extend down into the water and meet the inside wall of the trough so animals swimming along the perimeter will find the structure, rather than becoming trapped behind or beneath it or missing it entirely
- Reach to the bottom of the trough, so it will be effective even if water levels drop sharply
- Be firmly secured to the trough rim so it will not be knocked loose by livestock or other animals
- Be built of graspable, long-lasting materials such as painted or coated metal grating, roughened fiberglass, concrete, rock and mortar, or high strength plastic composites
- Have a slope no steeper than 45 degrees so animals can climb out without slipping back into the water
- Be located to cause minimal interference with livestock

A fully illustrated, 16-page handbook entitled *Water for Wildlife* was developed by BCI. According to Wendell Gilgert, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Portland, Oregon, the guidelines were developed for ranchers, but also apply east of the Mississippi River.

Funding and leadership support for the project was provided by the Offield Family Foundation, the National Fish and Wildlife Foundation, and the NRCS Agricultural Wildlife Conservation Center (AWCC). The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Merlin Tuttle, BCI

Bats watering in livestock trough (*top*); Bat using escape ramp (*bottom*)

Summary of:

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Field borders: important habitat for birds in intensive agricultural lands

Field borders have substantial conservation potential in the Mississippi Alluvial Valley as much-needed winter habitat for grassland birds, according to a study by Mississippi State University (MSU).

Researchers looked at bird use and nesting survival in newly established herbaceous field borders on six farms in Sunflower County. In 2002, the borders were planted with native warm-season grasses, partridge pea, and kobe lespedeza amid row crop fields and wooded fence rows that contained drainage ditches.

Bird use of field margins was compared between fields with wide borders (60–120 feet), narrow borders (20–30 feet), and no borders.

"We found four times as many birds in the winter in wide buffers as we did in nonbuffered fields," says Dr. Wes Burger of MSU. "During the breeding season, we also found more species in buffered fields than unbuffered. No dickcissels, a species of concern in Mississippi, were found in the nonbuffered field edges. But, we found 434 nests in the field borders, nearly all of them in wide borders, and 19 percent of them were dickcissel. This suggests field borders may provide crucial nesting habitat for ground-foraging grassland birds."

Birds nested much more in wide borders (60–120 feet wide) than in narrow borders (30 feet or less). No nests were found within transect line areas in fields without borders.

Overall, nesting success within field borders was low, at 22 percent. While there was only a small percentage of birds nesting in narrow borders, success rate of those nests in narrow borders was about 8 percent higher than in wide borders.

Previous studies have shown field borders to benefit northern bobwhite populations, but the bobwhite population base in Sunflower County was not large enough to detect any population trends over the 3-year study.

"Narrow field borders are certainly a large improvement over nonbordered field margins. However, this research also delineated the substantial advancements possible with increased widths," Burger says. "Results indicate that field borders intended as nesting habitat need to be greater than 30 feet wide. We recommend farm-scale management regimes to encompass a variety of wide and narrow field borders. Use wider borders as much as possible, wherever it fits into the crop production system, but, also incorporate narrow borders throughout the entire farm to increase total percentage of the landscape in grassland habitat and increase usable space."

The study provides more science to help improve conservation programs to continue to benefit wildlife as well as agricultural producers in this intensively farmed valley, according to Ed Hackett, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), who facilitated the study for the NRCS.

Funding for the project was provided by Delta Wildlife, the U.S. Environmental Protection Agency, and the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Philip Barbour, NRCS and Steve Dinsmore

Dr. Wes Burger in a field border with native vegetation; dickcissel (*inset*).

Summary of:

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Hawk habitat on grazed rangelands reconfirmed at the Zumwalt Prairie

If privately owned rangelands in a large remnant of native prairie are grazed for 25 years with good grazing management, will grassland raptor nesting populations and their habitat remain stable?

That is one of the questions Oregon State University (OSU) researchers posed as they re-created a 1979 study of hawks and hawk habitat at the Zumwalt Prairie in northeastern Oregon.

In 1979, OSU student Marcy Cottrell Houle documented a very dense concentration of hawks on private rangelands that are part of the prairie. Two of the hawks found at the Zumwalt Prairie, ferruginous and Swainson's, are species of national conservation concern.

In the original study, Cottrell Houle determined the high concentration of red-tailed, ferruginous, and Swainson's hawks was most likely due to an abundance of Belding's ground squirrels.

In her book *The Prairie Keepers*, Houle attributed the high numbers of raptors to the "good condition" of grasslands of the Zumwalt that supported high prey populations and suitable nest substrates (trees and rock outcrops). She credited good range management practices by local landowners, who she said maintained the prairie in good to excellent condition.

"We had a rare opportunity to compare findings in a 2003 to 2006 study with those in 1979," says Dr. Patricia Kennedy of Oregon State University. "This second snapshot more than 25 years later found that territory occupancy of the three hawk species on the Zumwalt has been stable. The majority of hawks have nesting territories in the northern portion of the prairie, the area with the most nesting substrates in the most remote portion of this landscape."

The grasslands are diverse, dominated by bunch grasses, perennial forbs, and very few shrubs. Isolated patches of tall shrubs and trees, primarily aspen, occur in mesic sites; conifer forests are found on the steeper north-facing slopes.

The most recent study, aided by the cooperation of 28 landowners, found that aspen are the preferred nesting substrates for hawks at Zumwalt. However, aspen have declined by 20 percent since 1979. Ponderosa pine and large shrubs such as hawthorns have increased by 62 percent and 67 percent, respectively. Use of hawthorn and ponderosa pine as nest substrates has increased since 1979.

Research results indicate the three species may be shifting their use of nesting substrates, perhaps in response to these landscape changes.

"Grassland raptors, as well as other grassland birds, have been in decline across North America for decades," says Kathryn Boyer, a fisheries biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Portland, Oregon, who facilitated the study. "This study helps us offer grazing program recommendations that benefit raptors."

Funding for the 4-year study was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC), The Nature Conservancy's Northeast Oregon Office, and the Eastern Oregon Agricultural Research Center of OSU. The Oregon Department of Fish and Wildlife provided logistical support. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Terry Sohl

Ferruginous hawk (*top left*); Red-tailed hawk (*bottom left*); Swainson's hawk (*right*)

Photo by Andrea Lueders

Nesting habit in Aspen, CO

Summary of:

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Diverse plantings in wider filter strips attractive to songbirds

Songbird use of grass filter strips increases as buffers become wider, a study by Iowa State University (ISU) shows. ISU researchers looked at 39 filter strips in southwestern Minnesota ranging from 20 to 450 feet in width.

"We found that wide filter strips had more birds and greater diversity of species," says Nicole Davros, now with the University of Illinois at Urbana-Champaign. "Consistent with other strip-cover studies, we also found high bird use, but reduced nesting success in filter strips compared to large blocks of grassland."

Another conclusion of the study was that filter strips planted with native and nonnative mixes produced similar characteristics of plant stands such as vegetation height and coverage by grasses and broad-leafed plants. Regardless of initial planting mixture, grassland songbirds preferred sites with tall vegetation and some residual standing dead vegetation.

Researchers also discovered that filter strips with surrounding grasslands and a reduced number of habitat edges were most attractive to grassland songbirds.

The filter strips, observed in 2003 and 2004, were at least 3 years old. Cool-season grasses dominated 14 strips, 13 were dominated by switchgrass, and 12 sites had diversified mixtures of native grasses and forbs.

Common cool-season grasses were smooth bromegrass, reed canarygrass, and quackgrass. Canada wild rye, Indiangrass, and big and little bluestem were common native grasses found; alfalfa, sweet cover, and Canada thistle were forbs found most often.

Songbirds accounted for 19 of the 24 bird species observed in the filter strips. Red-winged blackbirds, common yellowthroats, song sparrows, and sedge wrens were most often sighted.

Researchers found 238 nests of 14 songbird species—11 songbird species accounted for 90 percent of the nests. Red-winged blackbirds dominated with 65 percent of the nests, followed by song sparrows, sedge wrens, and common yellowthroats. Fourteen ring-necked pheasant and eight mallard nests were found; 29 percent of the pheasant nests were successful, and 25 percent of the mallard nests were successful. Predation was the cause of all failed gamebird nests, and the primary cause of songbird nest failure.

Apparent nest success was 20 percent for red-winged blackbirds and 37 percent for other songbirds.

Biologists in the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) are encouraging landowners and conservationists interested in seeing and hearing more grassland songbirds to consider using wider buffer strips.

According to Dr. Bill Hohman, a biologist with the NRCS in Fort Worth, Texas, results in this study are consistent with other research on wildlife use of buffers showing that wider buffers with tall stands of grassland forbs are preferred by songbirds and butterflies alike.

Funding for the project was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC). The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Nicole Davros, University of Illinois

Wider filter strips beneficial to songbirds (*top*); Dickcissel nest (*bottom left*); Sedge wren nest (*bottom right*)

Summary of:

Agricultural Wildlife Conservation Center Project # 68–7482–2–51

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Landscape surrounding grass fields important to grassland birds

The landscape surrounding a grassland field appears to play a much more important role in determining grassland bird use of a field than the type of grass or management within the field.

That is a primary conclusion of a study conducted on 13 national wildlife refuges in the Northeastern United States from Virginia to Maine.

Researchers sought to establish information about grassland bird species distribution and habitat use, determine how vegetation structure and composition affect grassland bird use, and compare warm- and cool-season grass plantings, as well as effects of fire versus mowing as management techniques.

"We found that 86 percent of the variation in bird density was explained by where the grassland field was in context with the surrounding landscape, rather than management treatments within the field," says Laura Mitchell of the U.S. Fish and Wildlife Service (USFWS).

Birds were surveyed each year between May 15 and July 15 from 2001 to 2003.

Dominant grassland birds on refuge fields were bobolinks, grasshopper sparrows, and Savannah sparrows.

"We also found that grassland blocks in the Northeast appear to be able to provide good habitat for grassland obligate breeding birds. We found an abundance of birds and diversity in species. Evidence suggests that bird density and productivity in northeastern grasslands may be as good or better than in the Midwest," Mitchell adds.

Of the 13 refuges studied, the best for grassland birds appeared to be the refuges in the St. Lawrence, Lower Great Lakes Plains, and Allegheny Plateau.

Other key findings:

- Planted warm-season grass fields did not attract a higher density of obligate grassland birds than cool-season grass or fallow fields.
- Mowing cool-season grass/fallow fields may have been the only treatment to increase grassland breeding bird density, but the effect was short-lived.
- Mowing cool-season fallow fields may have decreased the percentage of native plants in the fields.
- Burning increased the percentage of native grass species over time.

One year after treatment, vegetation height and density appeared relatively unchanged by all treatments.

Two years after treatment, breeding bird density may have begun to decrease in cool-season and fallow fields that were mowed and warm-season fields that were burned.

The study shows how important the surrounding landscape of a field is to breeding grassland birds and offers management insights for land managers and conservation agencies, according to Charlie Rewa, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Beltsville, Maryland, who facilitated the study for the NRCS.

The U.S. Geological Survey Patuxent Wildlife Research Center is conducting additional data analysis.

Funding for the project was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC). The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Charlie Rewa, NRCS

Using prescribed fire on grass fields

Summary of:

Agricultural Wildlife Conservation Center
Project # 67–7482–1–663

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Restoring longleaf pine forests with birds in mind

As thousands of acres of forest are restored with assistance from a variety of conservation programs, the value of restored stands for birds and other wildlife is a consideration.

The opportunity for bird habitat was assessed by the University of Georgia after changes in the U.S. Department of Agriculture (USDA) Conservation Reserve Program (CRP) in 1998 established a National Longleaf Pine Conservation Priority Area (CPA). The CPA encourages landowners to reestablish longleaf pine habitat by converting old agricultural fields to longleaf pine stands. Nearly three-fourths of the counties in Georgia are included in the area.

The restored pine plantings can be managed in such a way that could provide significant habitat for grassland and shrub-scrub birds.

Researchers assessed the initial vegetative and avian response to the conversion of 41 crop fields to young stands of longleaf pine in Georgia. The fields had been entered into the program for 1 to 2 years.

"Restoring longleaf pine ecosystems on old agricultural fields involves more than just planting trees," says Dr. John Carroll of the Warnell School of Forest Resources at the University of Georgia. "Many years of succession will be required to mimic the animal and plant communities originally present in these areas. However, it is possible that wildlife communities could respond relatively quickly and positively to management implemented by the National Longleaf Pine CPA," he adds.

Four important and declining grassland species were detected during the study; 10 shrub-scrub species were detected in 2001, and 15 were detected in 2002. Of the 30 nonearly successional/shrub-scrub species detected in the 2-year study, 13 have had significant population declines.

Shrub-scrub species tended to occur more in the longleaf pine fields than grassland species, but declining grassland species were found in more than 25 percent of the fields.

Vegetative structure was important to both grassland and shrub-scrub species.

Recommendations

The Longleaf Pine CPA offers enormous opportunities for the reestablishment of critical habitat for a large number of grassland and shrub-scrub songbirds. However, there are a number of challenges and management opportunities to make it better.

- Ground vegetation management is critical to restoring the value of these stands to birds. Control of agricultural pasture plants such as bahiagrass and bermudagrass is critical to allow native vegetation to compete.
- Planting strips of native forbs and grasses is important in those areas where seed banks are minimal.
- Complete ground vegetation control should be discouraged unless it is a precursor to the planting of native ground vegetation.
- Larger fields were beneficial to some grassland species in this landscape matrix of open and forested habitats. Larger field sizes should be encouraged.

More detailed information on the study is available online in a USDA Natural Resources Conservation Service (NRCS) technical note, according to Ed Hackett, biologist with the NRCS Agricultural Wildlife Conservation Center (AWCC), which funded the study. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Dot Paul, NRCS

Longleaf pine in grass stage

Summary of:

Agricultural Wildlife Conservation Center
Project # 68–7482–1–775

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Survey abandoned mines for bat use before closing

Abandoned underground mines provide important roosting habitat for more than half of the 47 bat species in the United States.

Bats use mines for rearing young in the summer, hibernating, gathering for social activities such as courtship and mating, night roosting, and for crucial rest stops during spring and fall migrations.

The process of determining whether bats are using a specific mine is not simple, but it can be reliably accomplished by following some basic guidelines, according to specialists at Bat Conservation International (BCI).

Under an agreement with funding from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC), BCI developed recommendations for conducting internal and external mine surveys and bat consideration guidelines for mine closures. More complete recommendations are contained in a cooperatively published leaflet entitled *Bats and Mines—Evaluating Abandoned Mines for Bats and Recommendations for Survey and Closure*.

Before a field assessment, it is important to define what will be protected as significant habitat. The assessment begins with a preliminary survey to describe all mine openings and record all information that can be gathered at each opening without underground entry. These data should include entrance dimensions; elevation relative to other openings; airflow direction and temperature; ambient air temperature; obstacles such as rocks, vegetation, limbs, trash, portal, or headframe timbers in the opening; potential hazards; estimated vertical or horizontal depth; presence of internal complexity such as drifts, crosscuts, raises, winzes, or stopes; and observations of any wildlife or wildlife signs. If a mine cannot be eliminated as wildlife habitat by the initial survey, an external and/or internal survey is warranted.

Internal surveys—the only way to detect hibernating bats—are preferred to external surveys, which are valuable only when bats are present. Internal surveys are the most reliable and least labor-intensive survey for evaluating roost presence and quality.

An internal survey should cover most of the mine before concluding that neither bats nor bat signs are present. Generally, if bat use of a mine is significant, bats or evidence of bats will be seen well before the entire mine has been evaluated.

Anyone entering an abandoned mine must have appropriate training and experience. It is seldom possible to examine all areas of a large, complex mine, but also seldom necessary.

If no evidence of bats is apparent, but the mine has potentially important inaccessible areas or authorities will not permit internal evaluation, additional external observations at entrances may be required.

External surveys are useful when combined with internal surveys at large, complex mines. External surveys alone may not detect use of a mine for hibernation, migratory, and reproductive use.

Survey information is used to help determine the importance of a mine to bats and to make informed decisions such as whether a mine should be closed and feasibility of using bat gates, according to Ed Hackett, a wildlife biologist with the AWCC. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Merlin Tuttle, BCI

BCI founder Merlin Tuttle (*top right*) and Bob Doepker conducting bat census in mine; Townsend's big-eared bat (*bottom*)

Summary of:

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Bird use found similar in warm- and cool-season grass filter strips

An Iowa State University (ISU) study of filter strips in southeastern Iowa confirms earlier research that shows grassland birds use both warm- and cool-season grass buffers. ISU researchers surveyed 33 filter strips in 2001 and 2002 and found "no significant differences in grassland bird response" to warm- or cool-season grass plantings.

Twenty filter strips had been planted with cool-season mixtures of bromegrass, orchardgrass, timothy, alfalfa, or clover. Thirteen filter strips were planted with switchgrass. All had been established at least 3 years.

"The vegetation of the warm-season plantings generally had more vertical density, more forbs, and more species richness," says John Henningsen, a biologist at the Wyoming Game and Fish Department. "But that did not translate to more grassland birds or nests in warm-season strip plantings. On average, species numbers and nests were similar in both types of plantings."

Henningsen and Dr. Louis Best found 634 nests of 11 bird species, averaging 3.1 nests per acre across all filter strips studied. Only 27 percent of the nests were successfully hatched. Causes of nest failure included depredation (62%), abandonment (6%), machinery damage (4%), and weather (5%).

Red-winged blackbirds were by far the most abundant species (54%) found nesting in the filter strips, followed by common yellowthroat (11%), dickcissel (9%), and song sparrow (9%).

Researchers also compared effects of nearby woody vegetation on bird nesting and use on the 13 strips with adjacent trees or shrubs. They found no differences in nest success in the filter strips adjacent to woody vegetation. They did find, however, that red-winged blackbirds and dickcissels strongly avoided the filter strips with wooded edges.

Bird response to buffer widths was not addressed in the study, but researchers suggested added width might be beneficial to sedge wrens, eastern meadowlarks, Savannah sparrows, and birds of conservation interest that have minimum habitat size requirements. Added buffer width might also be beneficial to nesting success of all bird species.

This study and others have shown bird use of buffer strips may be more dependent on structure and variety of plants than on whether cool- or warm-season grasses are present, notes Dr. Bill Hohman, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Fort Worth, Texas.

Hohman facilitated the study for the NRCS. He recommends additional long-term studies be conducted between planting types to determine if differences in their attractiveness or productivity for wildlife develop as stands mature.

The study was a cooperative project of the NRCS Agricultural Wildlife Conservation Center (AWCC), formerly the Wildlife Habitat Management Institute, in cooperation with the National Fish and Wildlife Foundation.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photos by Lynn Betts

Cool-season grass filter strip (*top*); Warm-season grass filter strip (*bottom*)

Summary of:

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Decision support tools available to help plan for grassland birds

Newly developed grassland bird habitat models show that management actions incorporating both local and landscape (regional) habitat improvements have the greatest chance of success.

Developed by the University of Montana for nine grassland species within the Prairie Pothole Region of the Northern Great Plains, the models will enable managers and conservationists to establish regional strategies to implement local habitat plans for priority songbirds.

"We can use the models to produce maps that identify landscapes with the capability of attracting the highest densities of priority songbirds," says Dr. Frank Quamen, who developed the models as part of a doctoral study at the University of Montana.

"Or we can produce habitat-based maps that predict bird responses to management. For instance, we can use favorable characteristics of existing priority landscapes to reconstruct and restore fragmented landscapes in a way that we mimic those with favorable characteristics."

More than 95 percent of the 952 sites in western Minnesota and northwestern Iowa observed to develop the model were on privately owned lands. On those sites, birds were surveyed, vegetation was measured, and landscape features were quantified.

Species models were developed for bobolink, clay-colored sparrow, dickcissel, grasshopper sparrow, horned lark, LeConte's sparrow, Savannah sparrow, sedge wren, and western meadowlark.

The models allow managers to vary any of eight attributes identified as important to enhance habitat for a particular species and then see predicted densities of those species on GIS maps.

The study shows that conserving or restoring large grasslands (from 120 acres to 7,900 acres, depending on species), removing trees from the landscape, or both, will increase densities of seven of those nine species. At local scales, individual fields that vary in structure and vegetative composition are likely to attract the most diverse array of species.

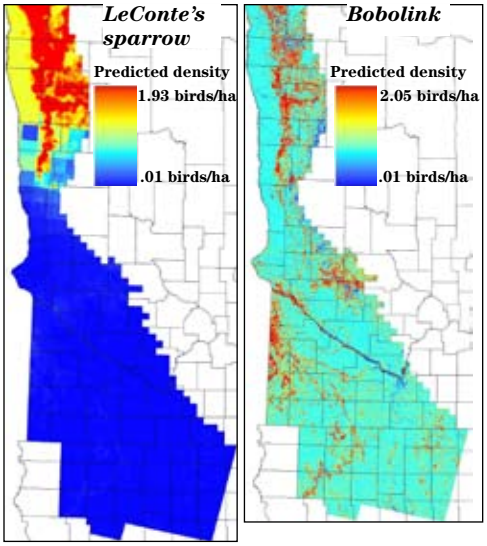
The study was the first to show experimentally that grassland songbirds avoid woody edges in otherwise suitable habitat. The spring following tree removal, the four most common species redistributed themselves in the treeless grasslands.

Land managers and conservationists now have a decision support tool for grassland bird conservation across the prairie pothole region.

They can identify which landscapes are most capable of providing habitat for species of interest, then manage vegetation locally to meet that species' needs, as well as overlay the models with spatial data to evaluate the effects of U.S. Department of Agriculture (USDA) programs, notes Dr. Bill Hohman, a biologist with the USDA Natural Resources Conservation Service (NRCS) in Fort Worth, Texas. Hohman facilitated the study for the NRCS.

The study was funded cooperatively by the NRCS, the Nature Conservancy, U.S. Fish and Wildlife Service (USFWS), natural resource agencies in Minnesota and Iowa, and fish and game departments in Montana, South Dakota, and North Dakota.

Primary funding came from the NRCS Agricultural Wildlife Conservation Center (AWCC). The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.



Maps above compare predicted densities for LeConte's sparrow (*left*) and bobolink (*right*)

Summary of:

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Use basic forest management to benefit bats, friends of the forest

Many of the same basic forestry practices that improve forest health and productivity can also maintain or enhance habitat for bats.

"Almost all North American bats rely on forests for survival," says Dan Taylor, a conservation specialist with Bat Conservation International (BCI).

"At the same time, bats are vital to healthy forest ecosystems. But they have long been neglected in forest management planning. Just a little tweaking of sound forestry practices with bats in mind can help them thrive and carry out their role in the ecosystem," says Taylor.

That role is as primary predators of night-flying insects. All but three of the 45 species of bats found in the United States and Canada feed solely on insects, including many destructive agricultural and forest pests. The other species feed on pollen and nectar and play an important role in pollination and seed dispersal in southwestern deserts.

Bats devour insects; a single little brown myotis, a common forest resident, can consume 1,000 mosquito-sized insects in just an hour.

A colony of 150 big brown bats, which often roost in tree cavities, can eat enough cucumber beetles each summer to eliminate as many as 33 million of their rootworm larvae. The 20 million Mexican free-tailed bats at Bracken Cave, Texas, eat about 200 tons of insects nightly.

More than half of American bat species are thought to be in decline or are endangered, with their reliance on forest habitat paramount.

Bats require three basic habitats: resources for roosting, foraging, and drinking. More than half roost in dead and dying trees (snags), especially beneath loose bark; in tree cavities and hollows; or in crevices left by lightning strikes.

The most important action forest landowners can take to maintain bat populations is to provide a continuous supply of potential roost trees. These include snags in various stages of deterioration (especially those in early stages of decay), hollow trees, and the green and dying trees that can provide future snags.

Since bats forage along forest edges, over streamside riparian areas, along forest roads and trails, and in natural forest gaps or harvest-created openings, those are priority areas for maintaining snag trees.

Prescribed fire and thinning are usually helpful to bats because they open flight space and increase plant growth on the forest floor that favors their insect prey.

Maintaining riparian zones in managed forests is critical for forest health, and the mix of vegetation and water is often the most important habitat for bats. In the absence of natural ponds, creating ponds within an open area in a forest will help bats as well as many other wildlife species.

With more than half the nonindustrial forest lands in the United States privately owned, forest landowners play a vital role in wildlife stewardship, according to Ed Hackett, a wildlife biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC). The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

The AWCC and National Fish and Wildlife Foundation gave financial and editorial support to BCI to develop a publication entitled *Forest Management and Bats*.

Photo by Darren Miller

Snag tree left for bats (*top*); Water supply for bats (*bottom*)

Summary of:

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Naturally vegetated buffers work for wildlife and water quality

Naturally vegetated buffers can protect water quality and establish habitat for wildlife. That's the take-home message from a study by North Carolina State University (NCSU).

The study found that increasing the width of a streamside buffer by simply allowing natural revegetation removed most nitrate from swine waste effluent in shallow ground water. The study also found that in North Carolina, specific vegetation is not needed to make riparian habitat suitable for wildlife.

Not all agricultural systems would need as wide of buffer as was needed in this study because the amount of nitrate from swine effluent moving from the agricultural field into the buffer was greater than normal rates. However, most of the nitrate in the shallow ground water was removed through denitrification within the buffer area.

Shallow ground water nitrate-nitrogen was reduced following buffer widening to 100 feet, by 95 percent on the east side of the stream and 93 percent on the west side of the stream. Prior to buffer widening, reductions observed were 35 percent in the eastern buffer zone and 53 percent in the western buffer zone.

Wildlife habitat

For the wildlife portion of the study, three sites were evaluated for their habitat potential: a multistage riparian area, a shrub buffer zone, and a planted forest buffer. All three sites were located in the Middle Coastal Plain of North Carolina.

Common species such as cane, goldenrod, horseweed, and dogfennel (*Eupatorium capillifolium*) were observed in all three buffers. Other species, such as sericea lespedeza, Chinese privet, and Japanese honeysuckle, were detected in one buffer and not present in the other two. Species richness for the planted buffer and shrub buffer was 30 and 37 species, respectively. Species richness for the multistage buffer was 63 species.

"The types of vegetation present at each site undoubtedly played a major role in determining the bird community found within each," says NCSU Extension Wildlife Specialist Chris Moorman.

The vegetation composition at the multistage buffer incorporated characteristics of grassland, shrub, and woodland into a single streamside area. As a result, the area was occupied by a wide range of bird species ranging from grassland to shrub and woodland species.

Vegetation present at this site was volunteer. Restoration of the riparian habitat involved simply allowing native vegetation to recolonize the area. This suggests that vegetative plantings of species suitable for surviving in riparian conditions need not necessarily be planted for the area to act as a functional streamside zone. The large trees along the streambank, although sparse, effectively supported woodland species.

The information offers valuable insight to U.S. Department (USDA) Natural Resources Conservation Service (NRCS) in working with landowners, according to Ed Hackett, a biologist with the NRCS Agricultural Wildlife Conservation Center (AWCC).

The study was aided by a grant from the AWCC in cooperation with the former Watershed Science Institute. The AWCC is a fish and wildlife technology development center located in Madison, Mississippi.

Multistage buffer with no planting (*top*); Shrub buffer (*middle*); Forest riparian buffer (*bottom*)

Summary of:

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Frogs and fish respond to wetlands restored with microtopography

Many of the sloughs, oxbows, and other wetland features of forested land in the Mississippi River Alluvial Valley (MAV) have been drained over time.

Now these wetlands are being restored through the U.S. Department of Agriculture (USDA) Wetlands Reserve Program (WRP). Arkansas, Louisiana, and Mississippi lead the Nation in land enrolled in the WRP.

Early on, WRP restorations were made by planting trees, with little attention paid to restoring the hydrology of the wetland. More recently, microtopographic features have been incorporated in the wetlands.

Microtopography and macrotopography features—oxbows, sloughs, pools, and managed moist soils areas—were re-created with the intent to restore wetlands features that are valuable to amphibians, fish, and waterfowl.

A study was done by the University of Arkansas at Pine Bluff (UAPB), U.S. Geological Survey (USGS), and Louisiana State University (LSU) AgCenter to determine whether micro and macrotopography were effective habitat restoration strategies and, if so, what characteristics these sites should have to support diverse frog and fish communities.

Researchers sampled breeding frog use of more than 30 restored wetlands in the White River Basin of Arkansas and other wetlands, as well as fish use of six other wetlands.

They found that micro and macrotopography can be rapidly utilized by flood plain fish and amphibians.

They also found that while certain types of wetlands supported higher richness of frogs, no single wetland type was good for all species.

"Landowners or managers who want a diversity of amphibians and fish should consider developing a complex of wetlands of various sizes, depths, and flood lengths that support diverse wetland plant communities," says Dr. Ed Buckner of UAPB, who helped supervise the study. "The wetlands would also be more effective if surrounded by forests," he says.

Findings suggested that fish communities in pool habitats of WRP-created wetlands with micro/macrotopography rapidly became rich and diverse, but fish species composition changed as wetlands aged.

From a fisheries perspective, it is important to include deeper areas to ensure connectivity to the river and provide refuge. "However, since some species of amphibians cannot coexist with fish, a diversity of wetland types can be helpful," says Dr. Sammy King of LSU.

Finally, actively managing water levels can create soil and water conditions that aid germination and growth of desired plant species, control problem vegetation, stimulate invertebrate production, and make resources available for target species. Water control structures should be placed where water circulation will be maximized, facilitating nutrient cycling and helping to reduce the risk of disease outbreaks.

Study results are important to the USDA Natural Resources Conservation Service (NRCS) field offices as the Agency restores wetlands, according to Ed Hackett, a biologist with the NRCS Agricultural Wildlife Conservation Center (AWCC) who facilitated the study for the NRCS. Funding was provided by the AWCC. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Lynn Betts

Complex wetlands are the goal of WRP

Summary of:

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Corridor Handbook and case study can help plan watershed scale wildlife projects

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has developed, tested, and incorporated a comprehensive, watershed-scale wildlife habitat planning tool into the agency's National Biology Handbook.

The Conservation Corridor Planning at the Landscape Level: Managing for Wildlife Habitat (Corridor Handbook) was developed and then tested in the Henry's Fork Watershed of the Snake River in Idaho by Utah State University (USU) in partnership with the former NRCS Watershed Science Institute and Wildlife Habitat Management Institute.

Corridors valuable to wildlife

Riparian corridors of woody and herbaceous vegetation occurring along the edges of streams and rivers are used by more than 70 percent of all terrestrial wildlife species during some part of their life cycle.

But those corridors are declining, and the remnant fragments or patches of relatively large undisturbed habitat are becoming less common, smaller, and increasingly isolated.

How corridors are arranged and connected within the larger landscape context determine their wildlife value. The Corridor Handbook emphasizes planning, designing, and managing corridors to optimize multiple benefits.

"The handbook is designed for NRCS conservationists and partners as a planning tool," says Dr. Craig Johnson, who led the corridor project on behalf of USU. "It emphasizes partnerships and cooperation in planning to realize a shared vision of land, water, and wildlife conservation among farmers, ranchers, developers, conservation organizations, local communities, and local, State, and Federal agencies."

Lower Henry's Fork Case Study

Partnerships and cooperation among many of those committed to land, water, and wildlife conservation are already a reality in the Henry's Fork watershed.

A 40-mile reach of the lower Henry's Fork flows through privately owned ranch land and productive winter wheat, barley, and potato farms. Like many watersheds with few residents, breathtaking scenery, world-class fishing, and other recreational opportunities, the Henry's Fork is experiencing increased development pressure.

The Henry's Fork Watershed Council and Agricultural Corridor Project used the Corridor Handbook as a process for people interested in the future of the watershed to define and work toward common goals.

They targeted stream corridors and farmlands for protection, prioritizing those that support waterfowl flyways and wildlife migration corridors, cottonwood forests, open space, and scenic recreational experiences.

The conclusion of the Henry's Fork test was that the principles and methodology of the Corridor Handbook provide the procedures and tools necessary for successful wildlife planning on a watershed scale.

Both the handbook and case study offer insight for NRCS field planners, according to Hank Henry and Ed Hackett, biologists with the NRCS who helped facilitate the projects.

Hackett is with the NRCS Agricultural Wildlife Conservation Center (AWCC), formerly the Wildlife Habitat Management Institute, which funded the project. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Craig Johnson, USU

Fishing Henry's Fork

Summary of:

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Grassland birds colonize restored CRP grasslands, return each year to breed

Grassland birds will quickly begin to use newly planted Conservation Reserve Program (CRP) grass fields to breed and nest and will return each year to native coastal grasslands if they are burned or otherwise managed. That is one of the conclusions of a 7-year study on 12 CRP fields established on former cropland at the Chester River Field Research Center at Chino Farms in Maryland. The U.S. Department of Agriculture (USDA) CRP provides technical and financial assistance to eligible farmers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner

Five mixtures of native warm-season grasses with various growth form heights were established in a replicated, experimental design on 225 contiguous acres of CRP in 1998.

After 6 years, plant species richness increased to 261; about 40 percent were exotics.

"Grassland birds are among the most threatened of bird groups because of their required habitat," says Douglas Gill of the University of Maryland. "We're learning how to best restore coastal grasslands to be effective habitat for grassland birds."

As soon as the CRP grasslands began growing, several grassland obligate bird species with recent histories of serious population decline promptly colonized them. Researchers found horned lark, killdeer, grasshopper sparrow, field sparrow, and dickcissel use of the fields.

The primary focal species chosen for detailed study was the grasshopper sparrow, which was formerly more common in the Northeast. A comprehensive banding program resulted in more than 2,000 grasshopper sparrows, as well as dickcissels, being marked for future study in the first 7 years. In 2004 alone, 1,435 birds of 49 species were banded. Other birds caught, but not banded, included northern bobwhite, common grackle, northern flicker, and ruby-throated hummingbird.

"The migratory grasshopper sparrow has successfully established a sustained breeding population at the center, and has returned as a dominant breeding species every year in late April," Gill says.

"Both adult grasshopper sparrows and, remarkably, juveniles have been returning to the center as breeding adults at unprecedented high rates," Gill adds. "Predictably, adults return to the same territories held in previous years, but they will shift to new locations if habitat is overgrown."

The high annual return rate—60 percent for adult males, 40 percent for adult females, and 15 percent for hatch-year young—was based more on physical vegetation structure than on species composition. Researchers also found high densities of grasshopper sparrows the year after prescribed burns or herbicide treatment of grasses.

The study offers guidelines for managing native grass stands in the Mid-Atlantic Region to maximize habitat quality for grassland obligate nesting birds, according to Charlie Rewa, a biologist with the USDA Natural Resources Conservation Service (NRCS) in Beltsville, Maryland, who facilitated the study for the NRCS.

The 7-year study was supported by the Sears Foundation. Funding for 2002 and 2004 research was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC), formerly the Wildlife Habitat Management Institute. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Doug Gill, UMD

CRP field established in native grass; Grasshopper sparrow (*inset*)

Summary of:

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Buffers may need to be much wider to help nesting birds

If conservation buffers are meant to be truly valuable to birds, they may need to be much wider than many existing buffers, a study at the U.S. Geological Survey (USGS) Patuxent Wildlife Research Center and U.S. Department of Agriculture (USDA) Agricultural Research Center (ARS) near Beltsville, Maryland, suggests.

Researchers found little difference in numbers or species of birds in newly established buffers that were 50 feet wide and those that were twice that wide.

"The data were too variable, and too few birds were observed to draw any conclusions," says Matthew Perry of USGS. "We found bird use, but no nesting in either the 50- or 100-foot-wide grass strips. When we observed buffers on a limited basis in strips 130 feet to more than 200 feet wide, however, we found nesting pairs in most of those buffers."

Perry says there were actually more birds sighted in the 50-foot-wide strips (187 individuals) than in the 100-foot-wide strips (151 individuals).

While the study was inconclusive on bird use of buffers at more narrow buffer widths, researchers believe related observations did produce evidence that there is a minimum width for buffers—about 150 feet—that two grassland obligate species will accept as nesting habitat.

"The restricted number and distribution of our study sites, confined to a small part of the Maryland coastal plain, leads to an expectation for nesting of the grasshopper sparrow and eastern meadowlark in wider buffers," Perry says.

"If our range had been extended farther north or west, we would have encountered more species, and more sites might have allowed us to compare very sparsely distributed birds like vesper sparrow and dickcissel."

Perry says many of the typical grassland species may not have established populations in the buffers because they were newly established.

Charlie Rewa, a biologist with the USDA Natural Resources Conservation Service (NRCS) in Beltsville, Maryland, who facilitated the study, indicated the limited study didn't provide enough information to advise field conservationists on minimum buffer widths needed to attract grassland birds.

It did, however, lead to a second study in Maryland. NRCS is developing management recommendations from that study on an interim basis.

Funding for the project was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC), formerly the Wildlife Habitat Management Institute.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Narrow buffer (100 ft) (*top*); Wide buffer (150 ft) (*bottom*)

Summary of:

Agricultural Wildlife Conservation Center
Project # 67–7482–0–585

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Natural Heritage data links conservation practice benefits to rare, at-risk species

A pilot project in Missouri by NatureServe holds promise that existing data sets can be used to assess effects of conservation practices on at-risk species.

While NatureServe researchers found the lack of comprehensive geospatial digital data on conservation practices makes it difficult to quantify practice effects on wildlife, they also found that Natural Heritage data on species occurrence and geospatial models for predicting species distribution show promise in linking conservation practices and at-risk species.

If the Missouri pilot practice-to-species relationships data can be shown to apply nationwide, 89 percent of conservation practices nationwide have positive, neutral, or mixed effects on most land-based wildlife species, and 79 percent have expected positive or neutral effects on most aquatic species.

Many of these species, especially those listed as threatened or endangered, have severely restricted ranges, and their habitat requirements and rarity of occurrence present special challenges in quantifying how and where conservation practices affect them.

The pilot area studied was Spring River Watershed in southwestern Missouri. The most precise of four data sets used to examine terrestrial species occurrence was the Missouri Natural Heritage Program occurrence records.

Georeferenced data on conservation practice locations consisted of digitized common land units (CLUs) containing conservation practices applied from 2002 to 2005. Though many more practices have been applied in Missouri, data from these 4 years were all that were available for spatial analysis.

Results from this pilot indicate that conservation effects assessments could be conducted at watershed, State, regional, and national scales.

However, a primary constraint is the lack of digital data on where practices have been applied on the landscape.

Recommendations for future analyses using the Missouri pilot approach developed include:

- Species-practice matrices should be refined and regionalized to accurately fit the scale of future analyses.
- It is essential to have more comprehensive geospatial data on where conservation practices have been applied on the landscape, along with information on the plant materials used, specifications, management regimes, etc.

This project directly supported the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Conservation Effects Assessment Project (CEAP), a multiagency effort to scientifically quantify the environmental benefits of conservation practices used by private landowners, according to Charlie Rewa, a biologist with the NRCS in Beltsville, Maryland. Rewa facilitated the study for the NRCS.

The work was carried out in cooperation with Missouri NRCS, the Missouri Resource Assessment Partnership at the University of Missouri, and the Missouri Department of Conservation. Funding was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC is a fish and wildlife technology development center for the NRCS located in Mississippi.

NRCS photo by Lynn Betts

Small stream in pastureland

Summary of:

Agricultural Wildlife Conservation Center
Project # 68–3A75–5–146

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Early successional birds overwinter in restored native grasses in the Southeast

University of Georgia (UGA) researchers have found some notable differences in bird abundance between areas in the Southeast that have been restored with native grasses and those that have not.

"Native warm-season grasses—switchgrass, big bluestem, little bluestem, Indiangrass, and eastern gammagrass and others—have been nearly removed from the Southeastern United States," says Dr. Sara Schweitzer of the Warnell School of Forestry at UGA.

"Over time, the native grassland and grassland savanna habitat has been replaced with a mosaic of cultivated pastureland, cropland, pine plantations, and mixed pine-hardwood forests," she adds. "Most southeastern pastures are now planted in exotic cool- and warm-season grass species such as fescue, bermuda, and bahia."

Dr. Schweitzer supervised graduate research by Angela McMellen that monitored bird use of restored (planted) native grasses in comparison to the exotic grasses that have replaced them.

Researchers monitored the impact on birds in both summer and winter in fields planted with a mixture of big bluestem, little bluestem, Indiangrass, and switchgrass to replace vegetation dominated by Johnsongrass, fescue, and bahia.

By the end of the second season, planted restoration sites had more than 50 percent native grass cover, with taller distinct bunches of grass and higher vegetation diversity than exotic grass pastures.

Native grass sites also had less shrub cover than the exotic grass pastures.

Native grass restoration sites supported more bird species, in greater numbers, during the winter.

Twice as many overwintering birds were found in old agricultural fields replanted to native grasses as in exotic control pastures. The bird community in native grass sites was also more diverse. In forest opening fields, differences were even more pronounced, with more than twice as many birds and more species found in native grasses.

However, during the breeding season, bird numbers and species diversity were similar in native and exotic fields.

Researchers concluded that in the forest-dominated landscape of the Southeast, where early successional habitat is in short supply, patches of native warm-season grasses should be encouraged.

Specifically, they recommended that:

- Local seed sources should be developed through the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Plant Materials Program.
- Landowners should be encouraged to plant road sides, logging decks, fallow fields, and field borders to native grasses.
- Native warm-season grass establishment workshops should be developed for landowners.

The information will be helpful to U.S. Department of Agriculture (USDA) NRCS offices in planning and using conservation measures with landowners, according to Ed Hackett, a biologist with the NRCS Agricultural Wildlife Conservation Center (AWCC).

The study was aided by a grant from the AWCC, a fish and wildlife technology center, located in Madison, Mississippi.

NRCS photo by Lynn Betts

Native grasses and forbs

Summary of:

Agricultural Wildlife Conservation Center
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Leaflets provides information about food, cover, and other habitat needs for wildlife

The ground cover requirement for northern bobwhite includes as much as 70 percent open ground. That is to allow movement of small chicks and is only needed at that time of the quail's life cycle. The habitat is one of several included in the diverse needs of this popular bird.

It prefers shrubby or woody cover, such as American plum and dogwood, as protection from predators and adverse winter weather, but tall grasses and weed patches also serve as loafing cover.

The northern bobwhite eats a variety of food, from grasshoppers and flies to berries, soybeans, and ragweed seeds.

Find this and much more about the bobwhite's habitat needs in a leaflet produced cooperatively by the Wildlife Habitat Council and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC).

The leaflet is one of 34 that summarizes habitat needs for important fish and wildlife species or groups in the United States.

"We tried to include as much critical information as we could in a brief summary format," says Bob Johnson of the Wildlife Habitat Council.

Each leaflet includes general information on the species; its range; important food, water, and cover needs; and habitat management options and suggestions. The leaflet also has information on conservation practices that provides helpful habitat and lists conservation programs that provide financial assistance.

Among the species or wildlife groups with leaflets are American elk, American kestrel, amphibians and reptiles, bats, bobwhite quail, bog turtle, bull trout, butterflies, cutthroat trout, eastern bluebird, eastern cottontail, grassland nesting birds, greater prairie chicken, invasive species, lesser prairie chicken, long-billed curlew, mountain plover, mourning dove, mule deer, native freshwater mussels, pollinators, prairie dog, rainbow trout, and ring-necked pheasant. Others include ruby-throated hummingbird, sage grouse, shorebirds, shrub-scrub birds, sharp-tailed grouse, swift fox, wading birds, wetland mammals, wild turkey, and wood duck.

The series also includes a dozen leaflets that explain the value, management, and assistance available to create or maintain specific habitats. Those habitat types include temporarily flooded wetlands, ecologically isolated wetlands, warm-water streams, warm-season grasses and wildlife, riparian systems, nesting structures, integrated pest management and wildlife, forests for fish and wildlife, farm pond ecosystems, early successional habitat, disturbance in habitat management, and cropped wetlands and wildlife.

The leaflets are excellent references for landowners or conservationists who want information about select fish or wildlife and their habitats, according to Bill Hohman, a biologist with the NRCS in Fort Worth, Texas. Hohman facilitated the leaflet development for the NRCS and says the individual leaflets can be viewed and printed from the AWCC Web site.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Roger Hill

NRCS photo by Lynn Betts

Northern bobwhite (*top*); Riparian buffer (*bottom*)

Summary of:

Agricultural Wildlife Conservation Center
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Amphibians and reptiles declining: habitat management guidelines available

Frogs, turtles, snakes, and other amphibians and reptiles are in decline in the United States and worldwide, largely because of the loss or degradation of habitat.

Often misunderstood and feared, reptiles and amphibians have been dubbed the aquatic "canary of the coal mine" because they reveal subtle declines in environmental health.

Large habitat areas that once provided varied habitats "herps" need at different times of the year have become fragmented, and new barriers, such as highways, become great risks. For example, a new road can keep a snake from reaching its hibernation den or a salamander from getting to its breeding pond.

A series of regional habitat management guidelines are available to resource managers and private landowners who may not have thought about the perils facing herps, but have a strong desire or feel the obligation to help protect reptiles and amphibians.

Amphibians and reptiles are commonly referred to as cold-blooded; but the fact is, they often do not have cold blood, and some prefer to be warmer than humans. They acquire heat and cold from their environment.

"That's one reason it's very difficult to make national guidelines for herp habitats," says Randy Gray, former National Biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and a member of Partners in Amphibian and Reptile Conservation (PARC).

Accordingly, PARC has published Southeast, Northeast, Northwest, and Midwest regional guidelines, with a Southwest guide due in 2009. The guides use the best science available to present practical management ideas and recommendations to landowners and managers to help stem the decline of herp species.

Among the recommendations that apply to habitat management across the country:

- Keep or establish natural vegetation along ponds, streams, wetlands, and crop fields to protect the land and provide food and cover for wildlife.
- Large habitat areas are more valuable to herps than a series of small areas. Keep from fragmenting large areas into small, isolated patches.
- Establish well-vegetated corridors to connect patches of habitat, so herps can travel from one to another with protection.
- Protect and restore wetlands, including seasonal wetlands, some of the most important habitat to amphibians.
- Establish native vegetation in buffer zones around wetlands.
- Leave logs, snags, and other woody debris.
- Leave protective vegetation 50 to 75 feet wide along streams to guard against streambank erosion and provide cover for many herps.
- Do not clear-cut forest, and manage forestland for a diversity of plant habitat with understory.

A number of groups and agencies cooperated in developing and funding a project to print the regional guidelines, according to Ed Hackett, a biologist with the NRCS Agricultural Wildlife Conservation Center (AWCC). One of the PARC partners, the AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Lynn Betts

Red-eared slider

Summary of:

Agricultural Wildlife Conservation Center Project Unnumbered

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Agricultural wetlands in the Willamette Valley offer important shorebird habitat

Agricultural wetlands, particularly those found in clusters, benefit shorebirds during most winters in the Willamette River Valley of western Oregon.

The area is an important wintering area for waterfowl and shorebirds, many of which have declining populations.

A study by the U.S. Geological Survey (USGS) of wintering shorebirds in the Willamette Valley found that while channelization, dam construction, and drained prairie lands have all contributed to losing many of the valley's wetlands, agricultural wetlands are still widespread and receive high shorebird use.

Persistent shorebird habitat is abundant and evenly distributed on low-lying grass seed and vegetable farmlands in years with average rainfall. Arable lowlands with native hydric soils may need to be enhanced to provide wet areas for shorebirds during dry winters.

"For 3 years, we used a combination of radio telemetry, soil invertebrate sampling, and ground surveys to map flooded and saturated land, quantify food sources available to birds, and track habitat use by wintering populations of dunlin and killdeer," says Dr. Oriane Taft.

Taft's graduate research was supervised by Dr. Susan Haig, Professor of Wildlife Biology, Department of Fisheries and Wildlife at Oregon State University.

"We tried to correlate the degree to which dunlin and killdeer use of an area was related to the area of wet habitat; percent of open, exposed soil; and abundance of invertebrates," Taft says. "One important finding was that groups of wetlands that tend to pond together are especially valuable to shorebirds."

Other study findings include:

- Invertebrate foods preferred by shorebirds are abundant in agricultural wetlands.
- Shorebirds rely on multiple wetlands during their winter residence.
- Shorebirds are attracted to areas where agricultural wetlands are clustered.
- Wet, exposed farmland with high invertebrate abundance is most attractive.

The research indicates that since shorebirds are attracted to clusters of wetlands, Willamette Valley sites that are located nearby such sites may be most valuable for enhancement.

Shorebirds prefer mostly bare ground for foraging in the winter, but unprotected soil can often lead to soil erosion and runoff. That erosion can be controlled with conservation tillage and leaving residual straw from seed harvest in the field, researchers suggest. That also increases shorebird food abundance.

Farmers interested in enhancing land for shorebirds should consider enlisting in U.S. Department of Agriculture (USDA) conservation programs that enhance wildlife habitat, suggests Dr. Bill Hohman, a biologist with the USDA Natural Resources Conservation Service (NRCS) in Fort Worth, Texas. Hohman facilitated the shorebird study for the NRCS and concurred with research recommendations.

Funding for the project was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC) in partnership with the USGS and other State and Federal agencies. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Gary Kramer

Wintering waterbirds such as this killdeer benefit from native hydric soils

Summary of:

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CRP grasslands attract more diverse grassland bird populations

Has the U.S. Department of Agriculture's (USDA) Conservation Reserve Program (CRP) had a positive effect on grassland bird diversity and species richness? The answer is yes, in many regions, according to a study by the University of Northern Colorado (UNC).

Dr. Joseph Veech of UNC linked land use and cover data of the USDA Natural Resources Conservation Service (NRCS) National Resources Inventory with the U.S. Geological Survey North American Breeding Bird Survey data to estimate grassland breeding bird responses to land use changes, including CRP, over time.

"I found CRP land had a significantly positive effect on local grassland bird diversity in 6 of the 16 bird conservation regions I studied," Veech says. "That is, breeding bird survey routes in landscapes with a higher percentage of CRP land tended to have a higher percentage of the regional species pool represented on the route."

Veech found no negative effects of CRP for grassland breeding birds in any of the 16 regions analyzed.

"The higher percentages of CRP and positive effects in bird survey routes indicates CRP is being implemented in regions of the United States—the Midwest, Southeast, and western and northern Great Plains—where it may have greatest benefit to grassland birds," Veech says.

In two of the six bird regions, CRP land had a significantly positive effect on local diversity of all bird species, and in two bird regions, the CRP had a significantly positive effect on local diversity of neotropical migrants.

"The CRP may be having a positive effect on local bird diversity in other bird conservation regions, but the multiple regression models used were not able to detect it," Veech says. "We will continue to use other techniques other than regression to detect differences. I used routes with at least 5 years of data to eliminate the year effect of observing birds, but these initial results are promising enough that I plan to examine the extent to which grassland birds are recorded every year, and how that relates to the proportion of CRP land in the landscape," Veech adds.

The analysis was made from bird conservation regions 11, 12, 13, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30. The Western United States was not included because there is less CRP land, and land cover data were not available in areas with substantial Federal land. Regions 14, 20, 31, 35, 36, and 37 were not analyzed because they did not contain enough breeding bird survey routes.

The study was done in support of the wildlife component of the Conservation Effects Assessment Project (CEAP) being used by USDA to evaluate its conservation programs.

The study contributes to the measurement of the value of USDA conservation programs, according to Charlie Rewa, a biologist with the NRCS in Beltsville, Maryland, who facilitated the study for the NRCS.

The study was funded by the NRCS Agricultural Wildlife Conservation Center (AWCC) through the Rocky Mountain Cooperative Ecosystems Study Unit.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Lynn Betts

CRP native grass around prairie pothole

Summary of:

Agricultural Wildlife Conservation Center Project # 68–3A75–4–106 (CEAP)

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Off-stream dugout livestock watering ponds offer habitat for Topeka shiner

The Topeka shiner is an endangered fish found in smaller streams of the Missouri River Basin. Topeka shiners have also been found in off-channel flood plain wetlands, side-channels, and oxbows that are seasonally connected to stream channels during times of high runoff.

Researchers at South Dakota State University have found that Topeka shiners can also benefit from dugout ponds that have been built in flood plains near small streams to provide water for livestock.

"We wanted to find out if dugout ponds constructed near streams could function as off-channel habitat similar to natural oxbows and flood plain wetlands," says Charles Berry, Jr., leader of the South Dakota Cooperative Fish and Wildlife Research Unit, U.S. Geological Survey (USGS). "Could Topeka shiners and other fish enter created dugouts that were hydrologically connected to the stream during a flood and avoid being trapped when flooding recedes?"

Under Berry's supervision, graduate student Sheila Thomson sampled 20 existing and 2 newly constructed dugouts along Six Mile Creek in Brookings County, South Dakota, from 2003 to 2005. She sampled dugouts that varied in age and location in the stream corridor to determine if fish were present. She found fish, including Topeka shiners, indicating that dugouts can provide a refuge for stream fishes as well as habitat for reproduction and rearing of young.

Specific findings were:

- Fish numbers and species were similar in dugouts (22 species) and the stream (20 species).
- Fish inhabited 14 of 20 dugouts; 7 of 20 dugouts contained Topeka shiners. Three dugouts contained Topeka shiners each year of the study, and two dugouts contained Topeka shiners during each of seven sampling seasons.
- Highest Topeka shiner abundance was in two dugouts that were frequently flooded, but remained disconnected throughout the study and were within a 50-foot riparian zone of the stream.
- Fish were more likely found in dugouts that were seasonally disconnected from the stream, but close and frequently flooded.
- Fish presence was positively correlated to dissolved oxygen concentration.
- Fish predators, such as black bullhead and sunfishes, coexisted with Topeka shiners.

"This study showed that stream fishes reproduce and survive in dugouts," Berry says, "and that landowners can improve fish habitat in general if the dugouts have adequate habitat."

"This information helps planners consider fish conservation, as well as livestock production needs, when determining where to install dugouts," says Kathryn Boyer, a fisheries biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Portland, Oregon, who facilitated the study.

Funding for the study was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC), the U.S. Fish and Wildlife Service's Partners Program, South Dakota State University, and the USGS.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Sheila Thomson

Topeka shiner (*top*); Dugout for watering livestock and providing fish habitat (*bottom*)

Summary of:

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More butterfly species in wide buffer strips with tall, native grasses

If more species of butterflies in filter strips and other grass buffers is a goal, make the buffers wider and plant tall native grasses and broad-leaf plants. That is a key finding of a southwestern Minnesota study on butterfly use of conservation buffers.

Researchers determined habitat-sensitive butterflies, such as the great spangled fritillary, responded positively to added buffer width and preferred native over nonnative grasses. Wider buffers did not necessarily mean finding more butterflies of some species, however.

"We did find more habitat-sensitive butterflies like the regal fritillary—those that have specific habitat requirements and are often found in natural areas—in wider buffers," says Dr. Diane Debinski, an associate professor at Iowa State University (ISU) in Ames, Iowa. "But wider buffers did not produce more monarch or eastern tailed-blue butterflies and others that are tolerant of habitat disturbances."

Debinski was one of three ISU researchers who looked at butterfly use of 49 filter strips in 5 southwestern Minnesota counties in 2002 and 2003. Katy Reeder, an ISU graduate student, conducted the work. The filter strips varied in width from 59 to 548 feet.

Over the course of the 2 summers, 1,789 individual butterflies of 29 species were observed.

Vegetation varied from diverse native mixes of switchgrass, Canada wild rye, Indiangrass, and big and little bluestem to native monocultures of switchgrass to nonnative mixes, including smooth bromegrass and reed canarygrass, as well as legumes such as alfalfa and sweet clover.

In a separate analysis, researchers found fewer butterflies in filters as the amount of land surrounding the filters was developed with roads and urban uses.

Researchers cautioned that the study did not provide enough information on butterfly reproduction and mortality in strip-cover habitat to assert that filter strips provide quality habitat. Nevertheless, there are implications for managing filter strips to benefit butterflies. Among them:

- Even narrow filter strips are used by butterflies.
- Planting native species will result in more species of butterflies.
- Increasing the vegetation height and vertical density may increase the richness of habitat-sensitive butterfly species.
- Plant wide strips of warm-season grasses and forbs for the best results—flowering plants and nectar availability may support more species and butterflies overall.

Finding a greater diversity and abundance of butterfly species in wider buffers with tall plant structure is consistent with bird use of buffers, according to Dr. Bill Hohman, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Fort Worth, Texas. Hohman facilitated the butterfly study for NRCS and concurred with research recommendations.

Funding for the project was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC), formerly the Wildlife Habitat Management Institute. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Jen Vogel

Regal fritillary

Summary of:

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What bobwhites want: research results from 11 projects across the quail range

In an effort to help restore northern bobwhite quail populations to 1980 levels, the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC) led the Bobwhite Restoration Project, a cooperative research project designed to develop and evaluate the technology needed to establish or manage quail habitat across its range. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

The AWCC enlisted the Department of Wildlife and Fisheries at Mississippi State University (MSU) to coordinate 11 research projects among 9 universities, with projects in Arkansas, Florida, Illinois, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, and Texas.

"Our goal was to identify practices that have potential to accomplish multiple conservation objectives—to address the economic needs of producers and at the same time enhance habitat quality for bobwhite and other early successional species," says Dr. Wes Burger, principal investigator for the project from MSU.

Among the findings from the 11 projects:

- A study of rangelands in South Florida by the Tall Timbers Research Station, the University of Georgia, and University of Florida found that quail populations could be doubled in as little as 2 years by using summer fire and roller drum chopping as needed.
- Quail populations almost doubled on farms where as little as 2 to 3 percent of the cropland edge was allowed to go fallow and field border size and shape affect quail numbers, a North Carolina State University study found.
- The message from a University of Tennessee study comparing various habitat treatments was that active management is required to maintain early successional habitat. Fire and heavy disking are often successful, herbicides may be required, and mowing is least effective.
- Research in Mississippi by Iowa State University and MSU shows a cumulative effect from applying buffers that connect larger blocks of grassland habitat. Farms with buffers alone supported twice as many quail as conventional farms. A farm with buffers and blocks supported four times as many. The study found that narrow buffers were better than no buffers at all, and wide buffers were better than narrow buffers.
- Studies by Texas Tech and Texas A&M Universities show quail benefit from some, but not too much, woody cover, and that deferred grazing practices helped both cattle and quail.
- A survey by the Missouri Department of Conservation found that landowners were very interested in bobwhite and were willing to implement some, but not all conservation practices needed to restore bobwhite populations.

"We wanted to have answers come out of these projects on how we can do a better job helping landowners produce fish and wildlife," says Pete Heard, AWCC Director.

"When our district conservationists make recommendations to landowners, they need to be heeled with the best information science can provide."

Major funding for the research project was provided by the AWCC.

NRCS photo by Lynn Betts

Northern bobwhite in flight

Summary of:

Agricultural Wildlife Conservation Center Project # 68–7482–3–121

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Field border size and shape make a difference for northern bobwhite

A North Carolina State University (NCSU) study found that quail populations may be increased in agricultural landscapes with relatively little amounts of land dedicated to early successional habitat.

The study of linear and block field borders on 24 farms found that quail populations almost doubled on farms where 2 to 3 percent of the cropland edge was allowed to go fallow. It also found that blocks of fallow habitat (1/4 acre to 6 acres in size) produced twice the number of quail as narrow (10-foot wide) linear field borders.

"We were trying to come up with ways to fine tune the practice of field borders so that we can be more efficient in the way we put field borders on the landscape," says Dr. Christopher Moorman, associate professor at NCSU.

In North Carolina and in the Southeast, many of the plants that naturally volunteer on fallowed ground provide exceptional cover and food for quail, so researchers felt there was no need to do any special planting in the field borders to get a quail response.

"We create field borders by allowing croplands to go fallow, and once you abandon them, they come back in native grasses, a diversity of herbaceous plants like goldenrod and sometimes a mixture of shrubs," Moorman explains.

The study lasted for 3 years, beginning in 2004, which was a pretreatment year. Moorman and graduate student Jason Riddle sampled summer quail populations through point counts from mid-May through the end of June and then returned to all the farms in October and November and listened for coveys.

"I was surprised that we were able to see the dramatic quail increase that we did on farms in agriculture-dominated landscapes and farms with nonlinear borders, with as little as 2 to 3 percent of the total row crop area converted to field borders," Riddle says.

Ideally, the researchers say field borders would comprise 5 to 10 percent of the landscape. However, block habitats increased quail numbers by 30 percent even in areas that were not connected to other habitats.

"If you wanted to design your field borders in a way that best benefits quail, you'd want block habitats of fallow vegetation in landscapes dominated by cropland," Moorman says.

"This is a simple thing farmers can do at very low expense, and they can have maybe double the number of quail they had before they implemented this practice," he adds, "and that's a big contribution to quail populations if applied over a very large area."

Although their 24 research sites were conducted in southeastern North Carolina, Moorman and Riddle feel confident that the results will apply to much of the quail range, especially the Southeast where agricultural crop production dominates.

The results add to the science available on bobwhites, says Dr. Wes Burger of Mississippi State University (MSU), who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC), which funded the study. The AWCC is a fish and wildlife technology development center located in Madison, Mississippi.

NRCS photos by Lynn Betts

Block field border (*top*); Linear field border (*bottom*)

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Woody cover and deferred grazing make habitat for quail in Texas High Plains

In the High Plains of Texas, percent woody cover and visual obstruction to a height of about two and a half feet are critical predictors of bobwhite quail abundance, a study by Texas Tech University shows.

Researchers examined practices used in the U.S. Department of Agriculture's (USDA) Environmental Quality Incentives Program (EQIP) for their usefulness to quail on eight study sites in Bailey, Cochran, Hockley, and Yoakum Counties in Texas. Five sites were treated with brush management, three with prescribed grazing.

"We estimated quail abundance on each study site and an adjacent control site using call counts from 2005 to 2007," says Dr. Brad Dabbert, Associate Professor in the Department of Natural Resources Management at Texas Tech. "We also went out on those areas and looked at habitat features including percent woody cover, percent forbs, percent grasses, and percent bare ground. And we examined visual obstruction, which is how well the habitat obstructs the view of quail predators."

What they found surprised Dabbert. "Generally, if you look at the scientific quail and brush management literature, most of it indicates quail need from 5 to 20 percent woody cover in the environment. So we thought on a lot of these sites we might have too much woody cover. What we ended up finding was that woody cover was the number one important variable for the presence and abundance of quail," Dabbert said. "If you got below about 10 percent woody cover, populations pretty much didn't exist. But the site with about 40 percent woody cover had the highest quail populations of any of the sites we examined."

The second most important factor was visual obstruction, whether it was grassy and weedy cover or woody cover. "You needed visual obstruction, approaching 3 feet off the ground. The better a habitat area was able to obscure the vision of predators, the more quail we had on those sites," Dabbert adds.

"EQIP's incentives for prescribed grazing, brush management, and prescribed burning can be a powerful tool for encouraging proper grazing management. And it can help increase the acreage of suitable habitat for northern bobwhite in the High Plains, where rangeland provides the most potential for adding usable habitat," Dabbert says.

"We recommend, when implementing the prescribed grazing practice here, that stocking rates and deferment periods be tailored so that visual obstruction is established and maintained at a height of 16 inches or more to help northern bobwhites."

Brush needs to be controlled, the study indicates, but at least 10 percent brush cover is needed. In contrast to brush management (removal), range planting and prescribed grazing may be more useful tools for providing quail with the necessary mix of woody and grass components, the study concludes.

The results add to the science available on bobwhites, says Dr. Wes Burger of Mississippi State University (MSU), who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the USDA Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC), which funded the study. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photos by Lynn Betts

Measuring visual obstruction; Dog on point (*inset*)

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Quadruple northern bobwhite numbers with buffers that connect block habitats

Research in Mississippi by Iowa State University (ISU) and Mississippi State University (MSU) shows a cumulative positive effect for quail from applying buffers that connect larger blocks of grassland habitat.

Researchers compared quail and songbird populations in strips of switchgrass to filter strips planted to a more diverse mixture of Indiangrass, big bluestem, little bluestem, and other grasses and forbs. They also studied responses to various filter strip widths.

"Farms with buffers alone supported twice as many quail as nearby conventional farms," says Dr. Wes Burger, professor and principal investigator for the project at MSU. "We found a farm with buffers and blocks supported four times as many. The study also found that narrow buffers were better than no buffers at all, and wide buffers were better than narrow buffers."

They also confirmed that more diverse plantings produced a greater diversity of birds.

"We use nesting survival as an indication of the habitat quality for the wildlife species that are inhabiting these particular habitat treatments," says Ross Conover of ISU.

"The conservation buffers had lower nesting survival than early successional block habitat, but it's important to note here that we witnessed approximately 30 percent nesting survival in our conservation buffer habitats."

As shown in other studies, buffer widths make a difference for quail and songbirds. "When we compared 90-foot-wide buffers to 120- and 180-foot-wide buffers, we found the wider buffers increased nesting density," Conover says.

"The bottom line here is increased width and diversity of conservation buffers is going to drastically increase the overall wildlife benefit received from those buffers."

And, when filter strips are combined on a farm with larger blocks of habitat, even more wildlife gains can be made, especially for quail.

"We've seen that in wide open agricultural landscapes in the Delta, we expect about one covey per 125 acres in the fall. In landscapes where buffers are implemented, we can double that population to about one covey per 70 acres. And on a landscape where comprehensive conservation is implemented across the property, we can produce about one covey per 29 acres. So buffers double the population, comprehensive conservation across the property doubles it again," Burger says.

Burger was somewhat surprised at how quickly the buffers were colonized by grassland species like dickcissel and bobwhite. "It's amazing when you go into an agricultural landscape and you create a little bit of habitat by installing upland habitat buffers, how quickly they respond," Burger says.

The results add to the science available on bobwhites, says Burger, who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCD) Agricultural Wildlife Conservation Center (AWCC), which funded the study. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photos by Lynn Betts

Block habitats (*top*); Buffer connecting block habitat (*bottom*)

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More songbirds and quail with prescribed fire and strip disking in Arkansas

A comparison of managed and nonmanaged landscapes in Arkansas shows landscapes with managed habitats support more quail and songbirds.

The comparisons by Arkansas State University (ASU) and Arkansas Tech University also show a greater diversity of songbirds in managed landscapes.

"We conducted point counts in 2005 to 2007 at 68 points in Fulton County and 60 points in Searcy County on land set aside by the Arkansas Fish and Game Commission for use as demonstration areas," says Dr. James Bednarz of the Department of Biological Sciences at ASU. "Half of the points in each area were in managed areas and half were in reference areas. We also established two Breeding Bird Survey (BBS) routes in both counties. The BBS data allowed us to examine landscape-level responses by birds to management. We also radio-tagged quail to determine habitat use in the managed area of Fulton County."

Dr. Bednarz, Dr. Chris Kellner, Richard Baxter, and Kevin Labrum found significantly higher densities (more than 50% higher) of all songbirds in managed areas (.4 birds/acre) than reference areas (.25 birds/acre) in Fulton County during 2005. Birds classified as early successional species also had significantly higher densities in managed areas in 2005 (.07 birds/acre) than reference areas (.02 birds/acre). In 2006, managed areas again supported significantly higher total birds, 1.7 birds per acre, than reference areas at 1.3 birds per acre. Early-successional species were also more abundant in managed areas (.44 birds/acre) than in reference areas (.07 birds/acre) in Fulton County in 2006, although this last trend was not significant.

In Searcy County, densities of all birds and early successional birds were not statistically different in managed areas compared to reference areas in both years.

Quail were detected more frequently on the managed area routes compared to the reference area routes each year. Species diversity was also slightly greater on the Fulton and Searcy county managed BBS routes.

"We documented 1,992 radio-tagged quail locations in 2005 and 2006. Our telemetry data suggested that areas with prescribed burns were higher quality habitat than unburned areas," Baxter says.

The response by quail and other birds was more pronounced in Fulton County than Searcy County, and this may be due to the fact that a greater proportion of the Fulton County focal area has been managed (>20%) compared to the Searcy County focal area (<10%). Prescribed burning and strip disking were the most beneficial practices for quail and songbirds. There was also a noticeable positive response by some songbirds, especially prairie warblers and yellow-breasted chats, to thinning and burning of woodlands.

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NRCS photo by Lynn Betts

Conducting prescribed burn

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Burning, disking evaluated as bobwhite management in South Carolina

Management techniques can and do affect the plant composition and structure in early successional quail and songbird habitat, a study in South Carolina confirms.

The study of early successional habitats, field borders, perennial hedgerows, and native warm-season grasses on 14 fields across 250 acres on the Nemours Plantation in the coastal plains found that forb cover was increased on all areas treated.

"Forb cover was greater than grass cover in all treatment plots whether burned or disked and regardless of frequency," says Ernie Wiggers of the Nemours Wildlife Foundation.

The mean percent cover for forbs ranged from 49 percent to 71 percent and was highest in winter disking treatments conducted every 2 or 3 years. The mean percent cover for grass species ranged much lower, (16–40%), and was highest in treatment plots that were burned annually. Mean percent cover for bare ground was lowest, at or below 11 percent across all treatments, but was highest in treatment plots that were disked annually in winter or summer.

Researchers found the best timing for disking to prevent woody stem growth was in the spring, every 1 or 2 years. Frequency of disking had more to do with its value than timing.

Agricultural pest plants or otherwise undesirable species including crotalaria and dewberry were more dominant than desirable species in many treatment plots. Desirable plant species included grasses such as broomsedge and bluestems and seed producing forbs including ragweed and partridge pea. Broomsedge and other native grasses responded best to plots burned in winter and spring every 2 or 3 years. Ragweed and partridge pea were not widespread. Where they occurred in the seed bank, these forages responded best in plots disked in the winter.

Existing seed bank critical

The research confirmed that successful establishment of early successional habitat relies heavily on the existing seed bank. "Managers may want to evaluate their seed bank by first disking a test strip at different times of the fall and winter to observe resulting plant species," says Greg Yarrow of Clemson University. "To get quality habitat, you may have to eradicate undesirable species and plant desirable species if they don't exist in the seed bank."

Songbird nest searches resulted in 75 nests, primarily from shrub nesters. Field borders and hedgerows accounted for 61 percent of the nests but made up only 15 percent of the available field habitat. Only 11 bobwhite nests were found, but 951 telemetry locations showed ditch lines, food plots, and hedgerows were used by bobwhites more than field borders and native grasses.

Partners in the study include the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in South Carolina, the South Carolina Department of Natural Resources, and Clemson University.

The results add to the science available on bobwhites, says Dr. Wes Burger of Mississippi State University (MSU), who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the NRCS Agricultural Wildlife Conservation Center (AWCC), which funded the study. The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Lynn Betts

Prescribed fire in grass

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Spray tall fescue in the fall to stimulate native warm-season grasses for quail

High-quality quail habitats are dominated by plants that provide protective cover, nutritious food sources and allow travel, feeding, and loafing within and under the cover.

"Tall fescue fails that test on at least two counts," says Dr. Craig Harper, associate professor and Extension wildlife specialist at the University of Tennessee (UT). "Its dense structure near the ground and deep thatch layer limits mobility of quail chicks and ground-feeding songbirds. The dense growth and thatch also suppress germination of desirable forbs that provide food resources."

Harper was the principal investigator on a UT study that compared herbicide and disking treatments to eradicate tall fescue.

Research treatments

The study evaluated two herbicides —glyphosate and imazapic—that were applied in the spring and fall, with and without disking in the season after application. The treatments were applied in three fields across Tennessee. Prior to herbicide application, fields were prepared for spraying by haying or grazing to remove all debris from the field. The tall fescue was allowed to regrow 6 to12 inches before applying herbicides.

"Fall applications of glyphosate and imazapic, with and without disking, provided greater reduction in tall fescue coverage than spring applications, with and without disking," says John Gruchy, a biologist with the Mississippi Department of Wildlife, Fisheries and Parks, who helped carry out the study. "Disking following fall herbicide applications did not further reduce tall fescue coverage."

By the second growing season after treatment, coverage of native warm-season grasses increased after fall herbicide applications, with or without disking, and after spring herbicide treatments. Forb coverage increased dramatically following all treatments.

Food resources for northern bobwhite were increased following all treatments. Forb coverage, both desirable and undesirable, tended to decrease in the second year after treatment. The structural characteristics of the field improved dramatically following eradication of tall fescue. The openness at ground level was increased following all treatments, especially the disking treatments. Vertical structure was increased following all treatments except for spring sprayings, which did not kill tall fescue as well as the fall spraying treatments.

Recommendations

"We recommend spraying tall fescue in the fall with two quarts per acre of a glyphosate herbicide," says Harper. "If undesirable grasses are expected to become a problem, apply imazapic at a rate of 6 to 8 ounces per acre in April before undesirable plants emerge."

Harper says if desirable plants do not emerge from the seedbank by the second growing season following spraying, it may be necessary to plant a mixture of native grasses and forbs.

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NRCS photo by Lynn Betts

Dr. Craig Harper of UT stands in a disk strip

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Northern bobwhite chicks survive better in restored habitat, Arkansas study shows

Research in Arkansas comparing unrestored fescue fields with areas restored for bobwhite quail brood use discovered mixed results.

"We looked at two restored areas and two adjacent unrestored areas in Searcy and Fulton Counties in Arkansas between spring of 2005 and summer of 2007," says Dr. Chris Kellner of Arkansas Tech University. "We found that the habitats used by broods did not differ between restored areas and nonrestored areas."

"We also found that chicks grew substantially faster in nonrestored areas, where arthropod biomass was significantly greater than in the restored areas," says Dr. James Bednarz of Arkansas State University. "We also found that chicks moved more slowly in unrestored areas, which may indicate better habitat for foraging."

On the other hand, researchers also found bobwhite chicks that used restored habitat in Fulton County survived better than chicks that used unrestored areas in both Searcy and Fulton Counties.

Management activities for restoration included burning, disking, eradication of fescue with herbicides, planting native warm-season grasses, fencing borders of pastures, and land clearing.

Quail followed with radiotelemetry

Researchers captured 90 bobwhites and fitted them with transmitters to locate nests and follow broods. All chicks were individually marked; missing chicks were assumed to have died. Broods were monitored intensively to assess habitat use and movement patterns.

Habitats that bobwhite broods used were characterized, and comparisons were made among habitat used by broods, nesting habitat, and random locations that researchers assumed were not used by bobwhite broods. Nesting habitat in fescue fields consisted of dense stands of tall fescue with little bare ground and few forbs. Habitat that broods used supported more forbs, shorter and not particularly dense grass with more open ground.

Researchers also developed a discriminant function model to determine how effective the management activity was in producing nesting and brood rearing habitat. "We found the best management included activities that created some bare ground, promoted development of forbs, and also supported a variety of grass species," Kellner says. "For example, a combination of disking, burning, fescue eradication, and planting of native grasses produced a habitat structure that was similar to habitats used by bobwhite broods."

However, broods in Searcy County seldom used restored habitat, even when such habitat was adjacent to the brood's home range. Quail tended to leave managed areas at the beginning of the breeding season and seldom returned.

The results add to the science available on bobwhites, says Dr. Wes Burger of Mississippi State University (MSU), who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC), which funded the study.

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NRCS photo by Lynn Betts

Northern bobwhite

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Summer fire, rollerdrum chopping could double Florida rangeland quail numbers

The dry prairie in South Florida is some of the best remaining quail and grassland habitat in the Southeastern United States, but years of winter burning have significantly degraded the prairie as habitat, as well as forage for cattle.

Saw palmetto, a native evergreen shrub, dominates in many areas, reducing quality of grasslands for quail, songbirds, and cattle.

"Historical accounts suggest that saw palmetto likely only composed 20 percent of the vegetative community of the dry prairie, and our work suggests that conditions for many grassland and Savannah bird species can be improved if managers strive to attain this natural level," says James Martin, a researcher at the Tall Timbers Research Station. "These habitats are meant to be disturbed— it's a fire-driven ecosystem."

Old habits of land management are changing and show promise for better habitat and cattle production, says Dr. Bill Palmer, Director of Game Bird Research at the Tall Timbers Research Station.

"By using rollerdrum chopping, an U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)-supported practice, and fire in the summertime rather than winter, we are seeing increases in bobwhite quail populations, an increase in winter bird use and an increase in forage production for cattle," Palmer says.

The Florida study looked at Bachman's sparrow, eastern meadowlark, and grasshopper sparrow. They also radio-collared about 120 bobwhites a year and followed their movements.

The combination of radio telemetry and songbird point counts gave researchers data on bird abundance on numerous properties with varying vegetation throughout southern Florida for 2 years.

They found few songbirds and quail where palmetto dominated. Conversely, birds were more abundant at sites with higher percentages of grasses and forbs in the ground cover, conditions associated with more frequent use of prescribed fire.

"Our research has shown we have an opportunity to double or even triple quail populations with relatively little change in management. It's mostly a matter of a change in season of disturbance, whether it's fire or roller chopping. We'd like to see a 2-year fire frequency," Palmer says.

"We've seen that very quickly—in a matter of a couple of years, you can see an increase in quail populations using these practices."

NRCS programs, such as the Environmental Quality Incentive Program (EQIP) targeted to Florida's dry prairie, can directly benefit quail and improve conditions for numerous grassland bird species and likely improve foraging conditions for cattle, Palmer says.

He recommends EQIP practices that include active management scenarios on remnant prairie patches that mimic natural disturbances and shift the plant community more towards herbaceous instead of shrub species.

The results add to the science available on bobwhites, says Dr. Wes Burger of Mississippi State University (MSU), who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the NRCS Agricultural Wildlife Conservation Center (AWCC), which funded the study.

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Northern bobwhite covey rise

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Sculpt brush, graze rangelands in Texas Rolling Plains to benefit bobwhites

Even in the Rolling Plains of northwestern Texas, considered one of the last bastions for viable northern bobwhite populations, quail are declining about 3.5 percent annually.

Brush management, one of the practices offered by U.S. Department of Agriculture (USDA) Farm Bill programs meant to improve grazing lands for both cattle and quail, was evaluated by Texas A&M University from 2005 to 2007.

Researchers evaluated bobwhite response to brush management practices of the USDA Environmental Quality Incentives Program (EQIP) at intervals 2 to 4 years after the practice was implemented. They used paired control-treatment plots in three counties to assess impacts of mesquite and prickly pear cacti control on bobwhite abundance.

Researchers used spring call counts to estimate breeding capital and simulated nests to evaluate impacts on nesting habitat. An array of vegetation measures (nest site availability, forb species richness, etc.) were monitored to assess floristic impacts of brush management as it relates to quail habitat.

"Our results showed that 3 to 5 years after treatment, brush management tended to increase call-counts," says Dr. Dale Rollins with Texas A&M University in San Angelo, Texas. "On sites where we monitored more than 12 paired plots, brush management increased call counts by an average of 29 percent over control sites. Bobwhite abundance tended to become progressively greater on treated areas over the 3 years of our study."

Treatments positively affected breeding capital, but it remains to be seen whether the increase in breeding capital parlays into greater quail densities during the fall hunting season.

Brush control has been a common practice in the Rolling Plains, with mesquite, juniper, and prickly pear being the species most commonly targeted for control.

While large-scale control of mesquite, juniper, and prickly pear is detrimental to quail, strategic brush control, or sculpting, can have significant benefits.

"Ideally, we'd like to know how much brush on a 200-acre basis is optimal for quail. I would say that's anywhere from 10 percent canopy cover on the low end to 25 to 30 percent on the high end," Rollins says.

Quail can spend most of the day in a good loafing cover, a bush or brush of some kind Rollins calls a quail house. "I have two rules of thumb as I talk to a landowner," Rollins says. "One that a quail hunter can appreciate is that you ought to be able to see your bird dogs most of the time. The other is you ought to be able to throw a softball in the air from one quail house to another. So that gives you an idea of what a sculpted landscape should look like for optimal quail habitat."

The results add to the science available on bobwhites, says Dr. Wes Burger of Mississippi State University (MSU), who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the USDA Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC), which funded the study.

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NRCS District Conservationist providing technical assistance

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Farmers will use some, not all, practices to help quail, Missouri survey shows

A large majority of landowners want bobwhite quail on their property, and they recognize that habitat management is the solution to quail restoration, a landowner survey by the Missouri Department of Conservation (MDC) indicates.

A smaller percentage of landowners, however, were willing to use prescribed quail-friendly practices.

"Much of the potential success of large-scale northern bobwhite restoration depends on private landowners working together to restore habitat on multiple, contiguous farms," says Dr. Tom Dailey of the MDC. "So we wanted to get a better idea of what it will take to engage landowners to manage habitat for quail."

The MDC analyzed responses from 735 northern Missouri landowners—20 percent were full-time farmers, 24 percent farmed part-time, 36 percent were landlords, and 20 percent were recreational owners who did not use the land for farming.

Reasons landowners gave for hesitating to manage land for bobwhite quail were that they did not:

- like the (weedy, unmowed) habitats or practices (use of prescribed fire)
- have the expertise or equipment to implement the practice
- have the labor or money
- want strangers knocking on their door asking to hunt
- like contracts or the requirements involved

On the other hand, of the more than 80 percent of landowners who wanted to see quail on their land, nearly half showed interest in quail habitat restoration. The top priority for these landowners was knowing that management is, in fact, increasing quail numbers.

These landowners fit a profile: row crop income was not important; positive experience with government conservation programs; willing to use quail-friendly management (fire, disking, native plants, etc.); money and time less of a constraint; attended habitat workshops; allowed quail hunting; male; some college education; and owned land for just a few years.

Many of the landowners had participated in conservation programs. The two most used programs were the U.S. Department of Agriculture's (USDA) Conservation Reserve Program and programs of Missouri Soil and Water Conservation Districts. Across all programs, 76 percent rated their experiences as "good."

"Overall responses from this study confirm the need for aggressive restoration programs with conservation agencies and organizations collaborating. Landowner needs are complex, so multiple strategies must be used to craft programs that are effective, socially acceptable and economically attractive," Dailey says.

The study gave the USDA Natural Resources Conservation Service (NRCS) a better understanding of landowner needs and desires, and why they might adopt certain practices, according to Pat Graham, retired NRCS state biologist in Missouri.

The survey was one of 11 projects coordinated across the quail range by Mississippi State University and funded by the NRCS Agricultural Wildlife Conservation Center (AWCC) as part of the Bobwhite Restoration Project. The University of Missouri and Quail Unlimited also participated.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Lynn Betts

NRCS employee discussing northern bobwhite with landowner

Summary of:

One in a series of summaries from the NRCS Bobwhite Restoration Project, Agricultural Wildlife Conservation Center Project # 68–7482–3–121

For more information, see:

USDA/NRCS Bobwhite Restoration Project online at
http://www.cfr.msstate.edu/nbci

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Managing CRP fields increases bobwhite numbers, Illinois study shows

Managed U.S. Department of Agriculture (USDA) Conservation Reserve Program (CRP) fields had more use by bobwhites and other grassland songbirds during the breeding season than non-managed fields, according to a Southern Illinois University (SIU) study.

The study found that more than 93 percent of the original CRP plantings in Illinois were seeded to exotic cool-season grasses, primarily tall fescue. Low bobwhite abundance and poor brood rearing conditions in Illinois have been linked to a high percentage of fields planted to fescue.

The study did not establish a link between northern bobwhite abundance and the amount of CRP acreage.

"It appears that the decline in bobwhite numbers is not correlated with the amount of CRP, but it may be related to the quality of these grass stands," says Dr. Donald Sparling, Associate Director of the Cooperative Wildlife Research Laboratory at SIU.

The SIU study evaluated the effectiveness of three commonly used farm management practices to increase bird use, improve habitat conditions for bobwhites, increase arthropod availability, and increase foraging efficiency of imprinted bobwhite chicks.

Thirty fields were treated—10 with strip disking and 20 with a strip herbicide application of glyphosate and ammonium sulfate—in October 2005 to 2006. Ten select herbicide sprayed strips were then drill planted with 87 percent Korean lespedeza and 13 percent partridge pea in April 2006 to 2007.

"We expected to see an increase in the use of managed fields by bobwhite broods and select grassland songbirds during the breeding season due to a predicted increase in arthropod abundance and more desirable early successional vegetation conditions," says graduate student Douglas Osborne.

The herbicide treatments were relatively effective at decreasing exotic grass cover, but disking was ineffective at decreasing grass cover and increasing bare ground for more than one growing season.

"Bobwhite abundance in sprayed and spray/seed fields was nearly six-fold greater compared to disked and untreated fields in 2006 and 2007," Sparling says.

"In general, imprinted bobwhites consumed more arthropods in spray and seeded fields than any other treatment type."

Avian relative abundance and species richness responded positively with all three treatments during the first 2 years of the study, but species diversity decreased across all treatment types from 2006 to 2007.

"We believe CRP management has the potential to create more desirable habitat conditions for quail and other grassland birds," Sparling says, "but the effectiveness of CRP management depends on the acceptance and cooperation of landowners."

The results add to the science available on bobwhites, says Dr. Wes Burger of Mississippi State University (MSU), who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the USDA Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC), which funded the study.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Lynn Betts

Northern bobwhite hen on the nest

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Fire, heavy disking, other management maintain bobwhite habitat in Tennessee

Early successional habitat, the plant communities often found in fields and forest openings, require disking, burning, or some other form of management to keep the grass and forb plant community from becoming a forest plant community.

"The quality of early successional habitat is determined by the types of plants that are present and the structure of the vegetation at the ground level," says Dr. Craig Harper, associate professor and Extension wildlife specialist at the University of Tennessee (UT).

"Many species, including quail, thrive in early successional habitats made up of a diverse mixture of native grasses for nesting substrate, forbs to provide food, and shrubs for escape cover. Such plant communities are open at ground level with a dense canopy of vegetation at about waist high that allows small wildlife to move about easily without being exposed to predators or extreme weather conditions," he adds.

Harper's research on management options has led him to a number of conclusions on managing for quail.

- Prescribed burning removes litter, improves ground level vegetation structure, and stimulates desirable plants in the seedbank.
- Disking improves habitat structure and composition by incorporating litter, reducing ground level vegetation density, and stimulating desirable forbs.
- The effects of disking and burning vary greatly based on the timing and frequency of disturbance and the local seedbank.
- Mowing (or bush hogging) is the least desirable practice for managing early successional habitats because it creates dense thatch at the ground level, reduces cover, and is not effective in controlling tree saplings.
- Herbicides are particularly useful for controlling undesirable plants in early successional habitats.

Harper has a number of recommendations for landowners wanting to see more quail on their land.

- Burning during spring (March) on a shorter rotation (2–3 years) in larger blocks (50–100 acres) will promote a greater density of warm-season grasses ideal for grassland song birds.
- Burning in September or spraying herbicides may be necessary in some years to control woody succession. Disking areas during the fall/winter (October–February) on a 3-year rotation will create better brood-rearing and feeding cover for bobwhites.
- Breaking fields into smaller management units (5–10 acres) will create a more diverse array of cover types for a greater variety of species. Desirable shrubs provide important cover and should be protected.

It is critical that landowners think beyond their property boundaries and partner with neighbors to conserve, sustain, and increase populations of early successional wildlife, Harper concludes.

The results add to the science available on bobwhites, says Dr. Wes Burger of Mississippi State University (MSU), who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC), which funded the study.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Craig Harper, UT

Early successional habitat

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Farm Bill conservation practices improve northern bobwhite habitat

Plant composition and structure resulting from establishing conservation practices with U.S. Department of Agriculture's (USDA Farm Bill funding improves habitat for bobwhite quail in nearly all cases, a study by Clemson University indicates.

The study established, demonstrated, and evaluated practices funded by the Wildlife Habitat Incentives Program, including filter strips, field borders, forest stand improvements, forest openings, prescribed burning, hedgerow planting, riparian forest buffers, and native warm-season grass plantings.

"These practices have a tremendous potential to improve wildlife habitat," says Dr. Greg Yarrow of Clemson University.

Yarrow established the practices using USDA Natural Resources Conservation Service (NRCS) guidelines at the 2300-acre Pee Dee Research and Education Center outside of Florence, South Carolina, then evaluated them against control sites. The evaluation was made based on habitat requirements for the northern bobwhite quail.

A major recommendation of the study was to use a mixture of planted and unplanted (fallow) sites to establish native, early successional habitat. "Planting ensures a desirable mixture of native plants, while fallow areas are less costly to landowners," Yarrow explains.

"It will also be important to use herbicides, disking, or fire to maintain habitats, and for the NRCS to be flexible in establishment and maintenance guidelines to allow for local conditions."

Highlights of the study include:

- Planted and fallow filter strips and field borders provided habitat for bobwhite quail.
- Forest stand improvements and forest openings in combination with prescribed burning provided the greatest benefit to bobwhites.
- Riparian forest buffers were slow to establish but eventually developed over time.
- Hedgerow plantings were also slow to develop and control of invasive weeds was a problem.
- Controlling invasive weeds was key to establishing and maintaining native warm-season grasses.

A landowner survey was also conducted in 2007. Results included:

- Most were familiar with Farm Bill wildlife conservation practices.
- A majority had signed up for programs and were satisfied.
- Those who signed up heard about programs through newspapers or mailings.
- Those who signed up were motivated by other landowners who participated, demonstrated, or passed along knowledge of programs and practices.
- Those who had not signed up indicated they would be more inclined to participate if smaller parcels of land could be signed up under the same contract, more technical assistance was available, and there were fewer restrictions.

The results add to the science available on bobwhites, says Dr. Wes Burger of Mississippi State University (MSU), who coordinated 11 studies across the quail range, and Ed Hackett, a biologist with the (NRCS) Agricultural Wildlife Conservation Center (AWCC), which funded the study.

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Field border (*top*); Prescribed burning (*bottom*)

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Grassed waterways are habitat for birds, snakes

Grassed waterways, even those that are narrow, are habitat for both birds and one of their predators—snakes. That is one conclusion of a study of 33 grassed waterways in southeastern Iowa in the summers of 2002 and 2003 by Iowa State University (ISU) researchers Tricia Knoot and Dr. Louis Best.

The study focused on songbirds and snakes because the decline of grassland birds is well documented, and 10 of the 27 snake species found in Iowa are listed as endangered, threatened, or of special concern.

Best and Knoot recorded 27 different species of birds using the waterways, and five species of snakes. Red-winged blackbirds were most abundant among the birds, at 54 percent of the total numbers found, followed by barn swallows (12%), dickcissels (9%), ring-necked pheasants (5%) and song sparrows (4%).

The waterways varied from 20 to 80 feet wide, and averaged 42 feet in width.

"We found that bird and snake use of waterways was influenced by characteristics of both the site and surrounding area, and responses to these characteristics varied among species," Knoot says.

"Meadowlarks liked wider waterways, for instance, while indigo buntings preferred narrow waterways. Barn swallows, indigo buntings, and red-winged blackbirds were found more often in waterways near farmsteads, but meadowlarks and ring-necked pheasants stayed farther away," she adds.

Eight of the 27 bird species observed during surveys also nested in the waterways. Three-fourths of the 106 nests found were red-winged blackbird nests. Only 21 percent of the nests were successful—nearly 80 percent of the failures were due to predation.

Snakes were present in about 80 percent of the grassed waterways. The brown snake and two species of garter snake were found most often. They were more plentiful in wider waterways. While some birds and snakes used waterways as narrow as 20 feet, some species were strongly associated with wider grassed waterways.

The study found landscape-level factors—the amount of grass in the surrounding landscape and distance to wooded habitat—to be very important to snake populations in grassed waterways. The amount of litter cover was also important to snakes.

The study suggests that maximizing widths, increasing forbs, and limiting early summer disturbance in waterways may enhance habitat for some wildlife species.

According to Dr. Bill Hohman, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Fort Worth, Texas, the study adds to understanding of wildlife uses of buffers in agriculturally dominated landscapes of the Midwest.

Hohman facilitated the study for the NRCS and agrees with researcher recommendations that emphasize minimizing any early summer disturbance in waterways.

Funding for the project was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC), formerly the Wildlife Habitat Management Institute.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Tricia Knoot, ISU researcher

Grassed waterway (*top*); Smooth green snake (*bottom*)

Summary of:

Agricultural Wildlife Conservation Center
Project # 68–7482–2–27

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Grass filter strips provide good breeding and wintering habitat for birds

Conservationists should continue to encourage landowners to install grass filter strips because they provide good breeding and wintering bird habitat. That recommendation was made in a report by researchers at the University of Maryland (UM) after a study of bird use of 87 grass filter strips in Maryland from 2004 to 2007.

The filter strips were enrolled in the Conservation Reserve Program (CRP) or the Conservation Reserve Enhancement Program (CREP) of the U.S. Department of Agriculture (USDA). Researchers studied bird use and nesting in warm- and cool-season grass filter strips bordering crop fields.

"In general, both warm- and cool-season grass filter strips provide better habitat for birds than crop field edges without filter strips. Filter strips should not be too dense and they should be managed to encourage plant species diversity," says Peter Blank of UM.

The researchers also conducted an experiment in 13 filter strips to determine the effect of mowing in late summer or fall on wintering birds. They mowed a section of each filter strip and left another section unmowed. Bird density and species richness were dramatically higher in the unmowed sections. "There were hardly any birds in the mowed sections at all. Mowing before the winter made the filter strips practically useless to wintering birds," Blank says.

Other findings included:

- Fifty-six bird species were observed using filter strips during summer and 22 species during winter.
- Grassland bird density was higher in warm-season compared to cool-season grass filter strips.
- Cool-season grass filter strips dominated by orchardgrass tended to have fewer birds.
- Generalists and successional/scrub species were the dominant bird guilds using filter strips. Most filter strips were too narrow to support grassland-dependent birds.
- Nine bird species were found nesting in filter strips; the majority of nests were in forbs and shrubs.

Among the recommendations researchers made for bird habitat:

- Conservation agencies should continue to promote the planting of filter strips. Planting warm-season grasses will likely provide better habitat for grassland birds.
- When mowing is necessary, mow in late winter or early spring to provide additional habitat for wintering birds.
- Encourage plant species and structural diversity and discourage monocultures by maintaining a mixture of grasses, forbs, and shrubs. Avoid planting highly competitive orchardgrass; it can often dominate other plants.
- Install wide filter strips (>200 feet) to create better bird habitat.

The study shows CREP and CRP are beneficial to wildlife and offers very good information for land managers and conservation agencies, according to Charlie Rewa, a biologist with the USDA Natural Resources Conservation Service (NRCS) in Beltsville, Maryland, who facilitated the study for the NRCS.

Funding was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Beth Olsen

Photo by Jared Parks

Filter strips used in Farm Bill programs

Summary of:

Agricultural Wildlife Conservation Center
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Riparian areas critical for migratory birds, other wildlife in the Great Basin

The Great Basin, the entire area of drainage between the Rocky and Sierra Nevada mountain ranges, contains the largest of the four United States deserts. It encompasses about 200,000 square miles of Nevada and seven other States.

"In the Great Basin, riparian areas represent an oasis of biodiversity within a vast sea of arid uplands," says Josiane Bonneau of the Wildlife Habitat Council (WHC).

Bonneau and other WHC staffers made an assessment of the wildlife and habitat found in the Great Basin, including threats to the riparian ecosystem that supports many of them.

"These riparian areas are essential habitat for bird species of the arid and semiarid west, including upland birds, waders, shorebirds, raptors, and passerines," Bonneau says. "Nearly all species of birds in the Great Basin depend on wetland or riparian habitats during some phase of their life cycle."

According to one estimate, more than half of the 134 species that breed regularly in the Great Basin are associated with riparian areas.

The majority of bird species found in Great Basin riparian areas are not year-round residents, but rather summer residents, winter residents, or migrants.

Because of their water and plant availability, riparian areas provide important stopping points for neotropical migratory birds passing through the desert.

The destruction of riparian areas is viewed as the most important factor in the decline of western land bird species.

Perhaps more than any other group, amphibians are dependent on riparian areas because they require slow moving or standing water in which to lay their eggs. While little data are available on the effects of riparian habitat loss on amphibian populations in the Great Basin, conservationists are concerned because as a class, amphibians may be the most threatened group of animals worldwide and are useful as indicator species of aquatic health.

As part of the assessment, the WHC developed *Riparian Areas of the Great Basin: A Management Guide for Landowners.* The publication analyzes threats to riparian habitats and wildlife in the Great Basin and offers guidelines for landowners to restore degraded riparian areas.

Those guidelines include assessing current land and water conditions, including ground cover, then using best management practices to correct problems found in the assessment.

Establishing a riparian buffer is a central component of any riparian restoration project. A healthy riparian buffer protects the stream from influxes of pollution and sediment and protects upland areas by managing stream flow during floods. Plants are critical for stream stabilization and provide food and shelter for wildlife.

The guide offers a good overview of the value of riparian areas to wildlife and the dangers of habitat loss and points out management practices that lead to long-term protection of the areas, according to Charlie Rewa, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Beltsville, Maryland. Funding for the overview was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Ron Nichols

Riparian area in arid Great Basin

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Reforest near large existing forests to benefit birds

As thousands of acres of forest are restored with assistance from a variety of conservation programs, the value of restored stands for birds and other wildlife is a consideration.

In the Lower Mississippi Valley alone, more than 300,000 acres of agricultural land have been reforested in the last 10 years.

A study by the U.S. Geological Survey (USGS) Patuxent Wildlife Research Center and the University of Georgia shows the location of a restored forest may be critical for bird populations. Researchers looked at bird colonization and productivity associated with reforested sites between 2 and 15 years post-planting in Louisiana and Mississippi.

They compared smaller, isolated reforestation tracts with restored sites adjacent to existing mature forests. They found that:

- Small, isolated forests were likely population "sinks" for birds.
- Reforestation adjacent to existing forest increased forest area and added to interior core.
- Reforestation near mature forest attracted more shrub-scrub birds which had better nest success and were likely "source" populations.
- Older or taller reforestation sites appeared to be more effective as buffers of detrimental edge effects than are tracts dominated by grasses and forbs.

Researchers found grassland birds (red-winged blackbird and dickcissel) were more abundant on isolated reforested tracts whereas shrub-scrub birds (yellow-breasted chat and indigo bunting) were more abundant on reforested sites that were adjacent to forest. Grassland birds tended to have low (14–18%) nest success, whereas, shrub-scrub birds had higher nesting success (25–37%). Nesting success for most shrub-scrub species was sufficient to maintain their populations on these sites. Thus, reforested tracts are likely population sources for shrub-scrub birds.

"Because reforestation appears to buffer detrimental effects of habitat edges, we recommend restoration adjacent to existing forests," says Dr. Daniel Twedt of USGS. "Similarly, because parasitism appears to decrease with distance from forest edge, placement of reforestation near large forest tracts is more beneficial than restoration near small forest patches."

Managers should encourage rapid succession from colonizing grassland birds towards shrub-scrub and forest birds. Restoration near existing forest stimulates colonization by shrub-scrub birds, but development of vertical forest structure within reforested sites is essential for attracting forest birds.

Twedt says including a high proportion (30–50%) of fast-growing, early successional tree species along with the traditional mix of slow-growing, heavy-seeded species will encourage colonization by high priority forest birds.

A technical note is available from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) with more detailed information, including what to plant and how to manage new tree plantings, according to Ed Hackett, a biologist with the NRCS Agricultural Wildlife Conservation Center (AWCC, which funded the study.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Lynn Betts

Reforestation area on Wetland Reserve Program site

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SVAP2: check small stream health with updated tool from NRCS

Conservationists now have a more accurate tool to help landowners check the health of streams on their property. SVAP2, an updated version of the Stream Visual Assessment Protocol (SVAP), can be used to evaluate the physical condition and habitat quality of any stream shallow enough to sample without the use of a boat.

Conservationists with basic training in aquatic biology and hydrology can use the tool successfully, according to Kathryn Boyer, fisheries biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Portland, Oregon. Boyer led a multidisciplinary workgroup to revise the first SVAP to better meet the stream corridor assessment needs of NRCS.

SVAP was originally intended for use only with landowners, but SVAP2 is expected to be used more broadly to help with overall conservation planning, establish eligibility for Farm Bill programs, evaluate trends instream and riparian conditions, and identifying other problems or concerns.

Boyer explains that the assessment is a good "first look" at physical, chemical, and biological conditions of wadeable streams, their riparian areas, and in stream habitats.

As is the case with SVAP, the NRCS is encouraging each State office to modify SVAP2 for local conditions and to include it in its Field Office Technical Guide.

SVAP2 offers guidance on what to look for to complete a worksheet in which scores of 0 to 10 are assigned for up to 16 elements that contribute to stream health.

The elements with abbreviated primary assessment topics are:

- **Channel condition—is the** down-cutting or deposition of material?
- **Hydrologic alteration—is** natural stream flow variation, including bank full, overbank, and low flows?
- **Bank condition—**are banks stable, or eroding?
- **Riparian area quantity—**are the length and width of the vegetated transitional area between the stream and uplands?
- **Riparian area quality—**what are the species and ages of the vegetation?
- **Canopy cover—**how much of the stream is shaded?
- **Water appearance—**is turbidity high (cloudy) or low (clear)?
- **Nutrient enrichment—**is water clear, or greenish with algal growth or strong ammonia odor?
- **Manure or human waste—** do livestock have access to the stream, or is animal or human waste discharged into the stream?
- **Pools—**is there a mix of shallow and deep pools of water?
- **Barriers to movement—**are there structures or water management practices being used that limit the ability of fish to swim upstream?
- **Aquatic invertebrate habitat—**are substrates varied, free of sediment, abundant, and stable?
- **Fish habitat complexity—**is there a variety of water depths and velocities? Is there wood, large rocks, undercut banks, or other features that offer cover?
- **Aquatic invertebrates—**which types of aquatic "bugs", crayfish, snails, or mussels are present?
- **Riffle embeddedness—**are bottom gravels and rocks buried by silt?
- **Salinity—**are salt levels high?

Partial funding for SVAP2 came from the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

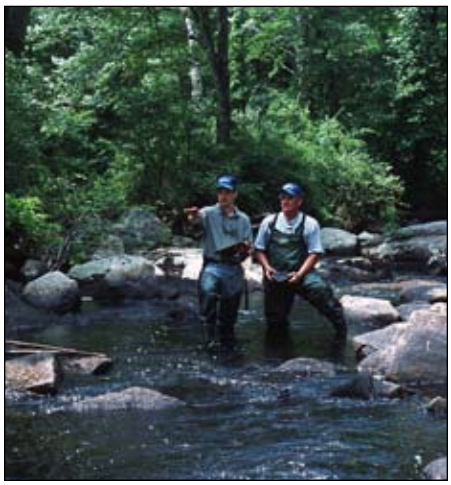

Photo by Paul Fusco

Checking small stream

Summary of:

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Make more use of bats in integrated pest management

It is a shame that many people are afraid of bats—or at the least, are uncomfortable with them.

Contrary to popular misconceptions, bats are not blind, do not become entangled in human hair, and seldom transmit diseases to other animals or humans.

But more importantly, bats are primary predators of beetles, moths, leafhoppers, and other insects that cost farmers and foresters billions of dollars every year. They also devour mosquitoes in backyards.

Like birds, bats consume enormous quantities of insects. Mexican free-tailed bats living in central Texas caves eat about two million pounds of insects nightly, including many costly pests.

Even small colonies of bats—just 150 big brown bats—can eat enough cucumber beetles each summer to protect farmers from 33 million of these beetles' root worm larvae, pests that cost American farmers an estimated one billion dollars each year.

Other facts from Bat Conservation International (BCI) on these allies of the American farmer:

- One little brown myotis bat can catch more than 1,000 mosquito-sized insects in just one hour. A nursing mother eats more than her own body weight nightly.
- One Georgia pecan grower was losing 30 percent of his crop to hickory shuckworms and other pests, but for 2 years after installing bat houses, he has seen no further crop damage. One of his bat houses hosts a colony of more than 2,000 bats.
- Many garden pests can hear bats from more than 100 feet away and will avoid areas where bats are present.
- A red bat that eats even 100 moths may prevent egg-laying that could otherwise produce 25,000 new caterpillars that could attack crops.
- Silver-haired bats and many other bat species help keep countless forest insects in check.
- Pallid bats benefit ranchers by eating large numbers of grasshoppers and crickets.
- The hoary bat often feeds on sugarcane leafhoppers, a serious pest in Hawaii.

The most important threat to bats is loss of natural roosts. To help reduce insect pests, provide alternative homes for bats. That includes building bat houses, working with highway departments to create roosts under bridges, and reducing disturbance to bat roosts in caves and mines.

Natural habitat can be enhanced by providing clean, open water in ponds or lakes, maintaining hedge rows and windbreaks, and preserving areas along forest edges, as well as old trees.

Helping bats by enhancing habitat and survival is a way to incorporate them more fully into an integrated pest management system, according to Ed Hackett, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC). The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

The AWCC funded a cooperative project with BCI that produced a leaflet *Incorporating Bats Into Integrated Pest Management.* This article was written based on that leaflet.

The AWCC offers a grants program to research institutions and others to develop fish and wildlife conservation technology.

NRCS photo by Lynn Betts

Bats leaving Bracken Cave in central Texas

Summary of:

Agricultural Wildlife Conservation Center
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Reduced yields at field edges can make CRP grass buffers an economic option

Corn and soybean producers know they are likely to have lower crop yields on field edges than in the middle of fields.

Those yield reductions come from a combination of factors including compaction from traffic on field edges; increased weed and insect pressure; and competition with adjacent vegetation for sunlight, water, and nutrients.

Conservationists asked researchers from Mississippi State University (MSU) to more closely measure yield drops at field edges and compare yield losses by type of edge. MSU researchers also were asked to compare the economics of growing corn and soybeans to the field edge with the economics of enrolling field edges in grass buffers with the U.S. Department of Agriculture's (USDA) Conservation Reserve Program (CRP).

Researchers Wes Burger, Philip Barbour, and Steve Martin estimated average yields for 104 corn and 56 soybean fields in Mississippi with three different types of field margins and compared the estimates to yields from the field interiors.

The three field margin types adjacent to the crop evaluated were row crop, herbaceous (pasture, idle fields, grass, etc.), and woody (forests, hedgerows, etc.) plant communities.

The researchers used GPS-referenced yield monitors to estimate dry yield in the first four combine header swaths (each swath 24 feet) next to the edge, as well as the field interior.

They found corn yield was more influenced by proximity to edge and edge type than soybean yield. Corn yield was substantially reduced (13–38%) immediately adjacent to all types of plant communities relative to yield from the field interior.

As expected, greatest yield reductions occurred next to wooded field margins. Soybean yield was only moderately reduced (6–14%) immediately adjacent to all types of plant communities, relative to interior field yield. Both corn and soybean yields were only slightly reduced by the third (48–73 ft) and fourth (74–96 ft) combine swaths adjacent to all types of plant communities.

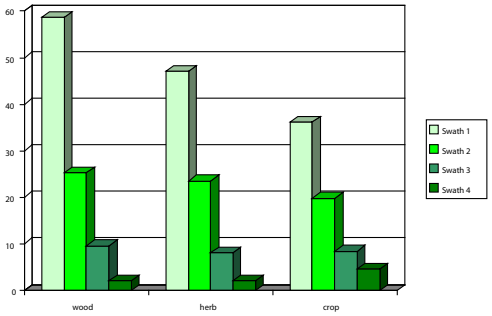
To compare economics of no use of field borders with the use of CRP buffers, researchers constructed partial budgets to develop break-even analyses on profitability with and without CP33-type buffers.

The break-even analyses showed that a number of factors influenced whether or not CRP CP33—Upland Wildlife Habitat Buffers were more profitable than cropping field edges. The most important factors included the type of plant community adjacent to the crop, expected yield reduction and crop yield, county soil rental rates, and expected commodity prices.

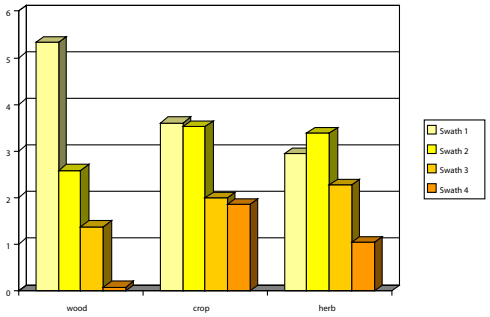
On average, if soil rental rates are $59 per acre, production costs are $320 per acre, corn price is $4 per bushel, and expected yield is less than 150 bushels per acre, it would be economically beneficial to enroll up to 30 feet in CP33. If expected yields were below 125 bushels per acre, it may be economically beneficial to enroll 60 feet in a buffer. In soybeans, assuming $150 per acre production costs and $8 per bushel commodity price, CP33 buffers 30 to 100 feet wide could be more profitable than cropping if expected yields were less than 32 bushels per acre.

The study was aided by a grant from the USDA Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.



Mean corn yield reduction (bushels per acre less than field interior mean) on field edges next to wood, crop, or herbaceous plants.



Mean soybean yield reduction (bushels per acre less than field interior mean) on field edges next to wood, crop, or herbaceous plants.

Summary of:

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MARIS—a wealth of lake and stream information with a single Internet click

If a multistate pilot project gets continued support, fish population data, winter kill information, lake depths, and more, information on lakes and streams all over the country will be available from a single point of contact on the Internet.

The project, the Multistate Aquatic Resources Information System (MARIS), has 10 States using a common, Internet-based application to make selected fish population survey data available from Ohio, Illinois, Iowa, Wisconsin, Michigan, Minnesota, Pennsylvania, Maryland, New York, and Wyoming.

These States have each developed their own statewide fisheries survey database containing information, including relative or absolute abundance of fish species, lake morphometry, location, and water chemistry in lakes and streams, and will share this information through MARIS.

"MARIS isn't a centralized database," explains MARIS coordinator Andrew Loftus. "State agencies will maintain control over their data, updates, and additions. What makes MARIS valuable is the ability to access data sets from multiple states with one simple query process."

Users may access MARIS on the Internet at http://www.marisdata.org.

Loftus says the MARIS databases have tables on lake and stream information including name, location, maximum depth, area, shore length, winter kill, and public access.

The core of the databases contains updated lake and stream survey catch information including date of sampling, catch numbers and weight, gear used and species caught. An additional component provides water chemistry data including alkalinity, conductivity, pH, water temperature, and secchi depth, if that information was collected with fish sampling.

Data extend back to the 1970s in most cases and to the early 1900s in some cases, providing valuable historic species occurrence and range data. Loftus expects the MARIS system to provide more standardized geo-referenced data in the future.

"It's been a really good State-Federal partnership," Loftus says. "State resource agencies gather and supply information, and Federal agencies supply core funding for coordination, computer hardware, system planning and programming support."

State agencies involved include the Department of Natural Resources of Illinois, Iowa, Maryland, Michigan, Minnesota, and Wisconsin; Illinois Natural History Survey; New York Department of Environmental Conservation; Ohio Division of Wildlife; Wyoming Fish and Game, and Pennsylvania Fish and Boat Commission.

Other organizations participating include the Conservation Management Institute at Virginia Tech, Penn State Institute for the Environment, Geographic Modeling Systems Lab/ National Center for Supercomputing Applications at the University of Illinois, American Fisheries Society, U.S. Department of Agriculture (USDA) Forest Service, USDA Natural Resources Conservation Service (NRCS), U.S. Fish and Wildlife Service, Multistate Conservation Grant Program, U.S. Geologic Survey (USGS), and the USGS National Biological Information Infrastructure.

The project was funded by NRCS Agricultural Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Lynn Betts

Collecting water quality data

Summary of:

Agricultural Wildlife Conservation Center Project, unnumbered

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High-density, short-duration grazing good for trout as well as cattle

It turns out the increased streamside vegetation that results from rotating a herd of cattle through small pastures for periods of 10 to 21 days may be as important for trout as it is for cattle.

A first-of-its-kind study by Colorado State University (CSU) shows rangeland riparian sites with intensive prescribed grazing management had more riparian vegetation, higher input of terrestrial (land-based) insect and other invertebrate prey, higher use of these prey by trout, and higher trout biomass compared to sites with season-long grazing.

The study also suggests that insects and other terrestrial invertebrates that come from riparian vegetation and fall, crawl, or blow into streams may play a key role in supporting trout.

"During the summers of 2004 and 2005, we compared riparian areas in five streams in Wyoming using season-long continuous grazing with five paired streams using prescribed grazing, where riparian areas were grazed heavily, but for only a short time," says Ph.D. student Carl Saunders of the Department of Fish, Wildlife, and Conservation Biology at CSU. For example, one 110-acre prescribed grazing site was grazed by 400 cow-calf pairs for only 10 days after 310 days of rest as part of a larger rotational system.

"Trout biomass was more than twice as high in streams under high-density, short-duration grazing compared to those under season-long grazing. Fish densities were similar, but fish on prescribed grazing sites averaged 1.3 inches longer and about twice the weight," Saunders explains.

Those trout consumed about twice as much terrestrial invertebrate biomass throughout the summer as trout in streams within pastures with continuous, season-long grazing. In August, when trout fed most on terrestrial invertebrates, trout in streams with riparian zones under prescribed grazing had three to five times more terrestrial invertebrate biomass in their afternoon diets than did those under season-long grazing.

"We know terrestrial invertebrates are important to trout because they made up 57 percent of their diet, on average, during the summer," Saunders says. "We also found that trout in riparian sites of prescribed grazing systems consumed nearly five times as much aquatic invertebrates as those in season-long grazing pastures. The aquatic invertebrates feed mostly on dead leaves that fall into the stream."

While riparian zones under both grazing systems had similar plant species numbers, vegetative biomass above ground was three times greater, and overhead cover was two times greater at sites managed under high density short-duration grazing.

Most efforts to sustain trout in rangeland streams have focused on instream habitat, but this study indicates potential to improve both land-based and aquatic prey for trout by using sound grazing systems, according to Kathryn Boyer, a fisheries biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Portland, Oregon. Boyer and Wendell Gilgert facilitated the study for the NRCS.

Funding for the 3-year study was provided by the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Carl Saunders, CSU

High density, short duration grazing

Summary of:

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Wetland and grassland birds benefit from the Farmable Wetlands Program

In 2001, the Farmable Wetlands Program (FWP), an option under the continuous sign-up U.S. Department of Agriculture (USDA) Conservation Reserve Program, was created to restore small, mostly temporary wetlands on land under cultivation.

The FWP, a voluntary program, is aimed at assisting landowners who want to restore small, shallow wetlands that have been drained for agricultural use.

The program has been used across the United States, but particularly in the tallgrass prairie region of Iowa and Minnesota, where less than one percent of native prairies and pothole wetlands remain.

In support of the USDA Natural Resources Conservation Service (NRCS) in Iowa and its conservation partners, the NRCS Wildlife Habitat Management Institute, now the Agricultural Wildlife Conservation Center (AWCC), asked Iowa State University (ISU) researchers in the Department of Natural Resource Ecology and Management to assess the Agency's success in reestablishing wetland functions to FWP restorations.

Researchers assessed plant and animal responses to varying hydrologic and vegetative treatments, project sizes, and surrounding land uses.

Researchers monitored aquatic invertebrates because they are good barometers of restored wetland functions. They chose to study grassland birds as wildlife indicators of restoration success because bird declines associated with land use changes in the upper Midwest are well documented.

The study was conducted on 48 FWP sites and 12 unrestored wetlands in north-central Iowa.

High bird use of FWP wetlands

Bird abundance, species richness, and conservation value were higher at FWP sites than in unrestored basins. During the study, of 51 bird species observed, red-winged blackbirds were by far the most abundant recorded, but species of conservation concern including grasshopper sparrow, dickcissel, sedge wren, Savannah sparrow, and bobolink, were also commonly observed.

Bird abundance and species richness were positively related to size of site and flooding duration.

The invertebrate community was characteristically simple—relatively few were captured; species typically found in temporary wetlands were conspicuously absent.

Management recommendations

"Resource managers should encourage landowners to maximize the size of FWP restorations within program limitations, research past drainage histories and seek to restore original hydrology to the greatest extent feasible," says Ryan Harr, wildlife biologist at ISU. "They should also consider seedings that will provide diverse structure and cover types for wetland and grassland birds." Harr also says sites located in landscapes with existing wetlands and perennial herbaceous cover are likely to be most beneficial to wetland and grassland wildlife populations.

The results and recommendations are useful to the NRCS as the Agency strives to restore wetland functions, according to Dr. William Hohman, a biologist with the NRCS in Fort Worth, Texas, who facilitated the study.

Primary funding for the project was provided by the AWCC.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Ryan Harr, ISU

Small restored wetland

Summary of:

Agricultural Wildlife Conservation Center
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Juvenile salmon, other fish benefit from enhanced wetlands in flood plains

Flood plain wetlands are often structurally enhanced for waterfowl and wildlife habitat, but new information from a study by Oregon State University indicates they can be managed to benefit salmon and other fish species, as well.

Freshwater emergent wetlands—those isolated low areas within flood plains that are temporarily connected to rivers when rivers overflow their banks—appear to be important habitat for juvenile coho salmon.

"We compared two enhanced emergent wetlands, two unenhanced emergent wetlands, and two oxbow habitats in the Chehalis River flood plain in southwestern Washington," says Julie Henning. "Coho salmon was the dominant salmonid at all sites, and enhanced wetlands had significantly more numbers of coho yearlings than unenhanced wetlands.

Henning conducted research in 2003 and 2004 as part of a Master's thesis. "We found that agricultural landscapes with rehabilitated emergent wetlands can offer valuable rearing habitat to riverine species, including coho salmon," she says.

In all study sites, fish emigration was possible during winter flooding when the wetlands were connected to the tributaries. The enhanced wetlands, however, kept water levels higher for a longer period, allowing fish to feed, grow, and in some cases, spawn. In the enhanced wetlands, drainage ditches were blocked, levees were constructed, and water control structures were installed to create a defined outlet that connected the wetland to an adjacent tributary of the Chehalis River.

"Survival of young salmon was dependent on their ability to leave the wetland before dissolved oxygen concentrations and water quality decreased, or fish were stranded," Henning says. "Patterns suggested young salmon emigrated as conditions declined if an outlet was built into the wetland design for them."

Henning and fellow researchers found 18 fish species using the wetlands. Nearly all were native; oxbow and enhanced wetlands had about twice as many species as the unenhanced wetlands.

While coho salmon dominated oxbow wetlands, enhanced wetlands were dominated by other nongame native species. "Enhanced wetlands appear to be able to fulfill a niche for native nongame fishes that beaver ponds and oxbows are not providing," Henning says.

According to Kathryn Boyer, a fisheries biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Portland, Oregon, fish will find their way into the quiet waters of emergent wetlands during high river flows. In addition, juvenile coho salmon and other native fish often prefer these habitats for rearing and feeding. However, they must also be able to get out of the wetland and back to the river when the wetland waters recede to avoid stranding and death. In wetlands with water control structures, an outlet pipe with adequate flow is critical to allow them to leave the wetland and reenter the river as habitat conditions decline with the onset of warmer temperatures.

Funding for the study was provided by the U.S. Environmental Protection Agency, the Washington Department of Fish and Wildlife, and the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Enhanced wetland with water control structure

Summary of:

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Combination of CRP and rangeland may be best for lesser prairie-chickens

Since the late 1800s, the lesser prairie-chicken has seen a reduction in its range of about 92 percent and a resulting population decline of about 97 percent.

That reduction is continuing throughout most of its range—but not in western Kansas, where the lesser prairie-chicken is actually expanding its range.

The expansion coincided with the maturation of U.S. Department of Agriculture (USDA) Conservation Reserve Program (CRP) grasslands. There are only small remnants of sand sagebrush in west central Kansas, and wildlife biologists think CRP may be providing critical habitat for prairie-chickens in this area because it appears to offer greater cover height and structural diversity than most of the remaining native rangelands in this area.

A recent study by Colorado State University found that lesser prairie-chickens prefer the taller, denser vegetation of CRP grasslands to rangelands as nesting cover, especially if the grasses are near patches interseeded with forbs.

Researchers captured 71 female prairie-chickens on all known leks in a 135,850-acre area in southwestern Gove County, Kansas, in March and April of 2002 and 2003. They fitted each female with a battery-powered radio transmitter necklace, and then released it.

Then they located the radio-collared females by homing daily, up until July 31, to determine habitat use. They found and monitored 59 nests, as well as 27 broods of successfully hatched chicks.

"Out of 60 nests we found and monitored in Gove County, 42 (70%) were located in CRP," says researcher Tammy Fields. "We located 22 in grass-dominated CRP, 19 in existing CRP interseeded with forbs, 16 in rangeland, and 2 in cropland."

In contrast, broods were found more frequently in rangelands. Broods tended to select heterogeneous areas that were characterized by grassy cover interspersed with patches of forbs. Forbs provide an invertebrate food base for the chicks and grass may provide escape cover.

Additionally, hens with broods were frequently located in swales, low lying moist areas, and areas with moderate amounts of bare ground. Low lying areas may have protected broods from drought, and moderate amounts of bare ground may have helped broods move to avoid predators.

These findings suggest that a mosaic of habitat types may be the most beneficial to prairie chickens. CRP fields may be providing nesting and escape cover, while rangelands may be providing grassy cover interspersed with patches of forbs desired by broods.

A variety of methods can be implemented to increase forbs on portions of CRP fields and rangelands, according to Wendell Gilgert, a wildlife biologist with the USDA Natural Resources Conservation Service (NRCS) in Portland, Oregon, who facilitated the study for the NRCS. They include interseeding, prescription grazing, mowing, strip disking, and burning.

Project funding was provided by Kansas Wildlife and Parks and the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Gary Kramer

Lesser prairie-chicken

Summary of:

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Crop residues offer food, cover for birds and small mammals

A literature search of the effects of cropland tillage on wildlife habitat found that conservation tillage systems—known for their ability to reduce soil erosion and energy consumption, and improve water quality—also offer food and cover for wildlife.

For instance, significantly more species of birds nest in no-till corn fields than in conventionally tilled fields because of food availability, amount and height of cover, and less disturbance.

The literature search by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Wildlife Habitat Management Institute—now the Agricultural Wildlife Conservation Center (AWCC)—led to development of two summaries: *Conservation Tillage Systems and Wildlife*, and *Conservation Tillage and Terrestrial Wildlife*.

The summaries are now available online from the AWCC at http://www.whmi.nrcs.usda.gov/technical/literature.html.

Research literature indicates four major factors of tillage systems affect wildlife habitat and populations in cropland settings:

- Amount and height of cover provided by crop residue
- Availability of wildlife food in crop residue
- Timing and frequency of disturbance (equipment passes)
- Toxicity of pesticides (direct and indirect effects)

Residue increases wildlife cover

The general rule is that the greater the amount of crop residue a tillage practice leaves on the surface, particularly standing residue, the better the practice is for birds and small mammals, according to Ed Hackett, a biologist with the NRCS, who facilitated the study for the AWCC.

Highlights of the literature search include the following:

- Diversity and density of nesting birds diminishes as amount and structure of soil surface residue decreases. No-till appears to be the only tillage system that reduces disturbance enough to have a positive influence on nesting birds, not because the nesting habitat quality is high, but because the low frequency of disturbance gives birds that attempt to nest in these fields an opportunity to do so successfully.
- Ring-necked pheasant, grasshopper sparrow, and meadowlark nest mostly in no-till when nesting in corn and soybean croplands.
- Increased residue amounts tend to increase diversity rather than density of small mammals.
- Increased residues seem to increase diversity of beneficial insects.
- In the northern prairies, waterfowl production was 3.8 times greater on no-till small grain farms than on conventional tillage farms.
- Attracting nesting birds to the residues left by conservation tillage may be an ecological trap, because of the timing and frequency of equipment passes

The literature search was undertaken by AWCC to assist NRCS field office personnel as they work with farmers and ranchers to conserve natural resources on agricultural lands.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Roger Hill

Northern bobwhite

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Native fish, amphibians use drainage channels in grass seed lands of Oregon

Although the historic flood plain habitats of lowland streams and rivers in the Upper Willamette River Basin have been altered to improve agricultural drainage, many native fish continue to use those areas.

Those drainage channels and seasonal streams are providing the food and habitat some native fish and amphibians need to grow and reproduce, a study by Oregon State University (OSU) shows, and could do even more if managed with fish in mind.

"The Upper Willamette Basin is primarily managed for grass seed production because rye grass does well where heavy winter rains and poorly drained soils are common," says Randall Colvin. "Our study showed that seasonal drainages of grass seed farms provide important late fall to early spring habitats for native fish and amphibians."

As part of a Master's thesis, Colvin sampled fish and amphibian species at 22 sites from December 2002 to May 2003, and 12 sites from December 2003 to May 2004.

He found 14 species of fish and 5 species of amphibians over the two field seasons; about 99 percent of them were native to the Willamette Basin. This is significant because the ratio of native to nonnative fish in the main stem of the Willamette is about 1:1; farm "streams" are thus providing winter refuge for native fish that are well adapted to life in seasonal streams. Two of the species found––Chinook salmon and Oregon chub—are federally listed as threatened and endangered species, respectively.

The study has implications for grass seed farmers in the Willamette Basin, and perhaps other farmers in the Pacific Northwest. Knowing the potential agricultural drainages have as winter habitat for fish and amphibians, conservation practices can be employed to protect these habitats. These include maintaining physical connections between the drainage channels and the main river channels to allow fish to migrate to tributaries during the winter and employing practices that improve fish passage, maintain streamside vegetation, and enhance wetlands. Among Colvin's findings:

- Fish use of seasonal stream habitats was limited by how far tributaries were from perennial water.
- Seasonal stream habitat provided insect and other invertebrate food for fish residing there during the winter and spring.
- Unlike some perennial stream systems, a low number of land-based invertebrates found in the diets of these fish suggest terrestrial prey were not an important winter food source.
- Water velocity and habitat complexity of the drainages also affected the types of fish, frogs and salamanders found in these working lands.

The study results can be used to guide managers of agricultural drainage networks to benefit fish in the Pacific Northwest, according to Kathryn Boyer, a fisheries biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Portland, Oregon, who facilitated the study for the NRCS.

Funding for the 4-year study was provided by the Oregon Seed Council, USDA Agricultural Research Service, and NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photos by Stephen Griffith, ARS

Grass seed production field; Drainage channel for grass seed field (*inset*)

Summary of:

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Ranchettes spell trouble for conservation of native species

Privately owned ranches in the Mountain West are being sold and subdivided into ranchettes at a breathtaking pace, and the consequences for native plants and wildlife could be dire, according to a recent study along the Colorado Front Range.

In what is believed to be the first study of its kind, researchers at Colorado State University compared plant and wildlife communities across livestock ranches, nature reserves, and exurban developments.

Exurban developments, commonly known as ranchettes, are low-density residential developments with houses on lots from 10 to 40 acres, built beyond incorporated city limits.

Researchers concluded the human disturbances that come with subdividing ranches into small acreages ultimately produce ecosystems with more nonnative plants, fewer birds of conservation concern, more generalist bird species, and fewer native predators.

"We found that a host of so-called 'human-adapted' species, such as the black-billed magpie, European starling, and domestic dogs and cats, had population sizes that were up to 15 times greater on ranchettes than either ranches or nature reserves," says Jeremy Maestas, one of the researchers who is now the State Biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Oregon.

This and other studies also show:

- In general, exurban developments favor common bird species able to cope with human disturbances at the expense of other species of higher conservation concern.
- Dogs and cats harass and kill wildlife and can lead to the local extinction of some species.
- There are fewer native predators such as bobcats, coyotes and foxes on ranchettes than undeveloped lands.
- Songbird nesting success can be reduced on ranchettes compared to intact ranch lands.

The studies suggest the long-term result of continued land conversion to exurban development could be an increasing number of conservation problems as desirable species of both plants and animals begin to show population declines and less desirable species start colonizing new areas, according to the researchers.

Protecting intact working ranches will be critical in efforts to protect the natural heritage of the West, adds Wendell Gilgert, a wildlife biologist with NRCS, who facilitated the study for NRCS.

Funding for the project was provided by the Western Center for Integrated Resource Management at Colorado State University and the NRCS Agricultural Wildlife Conservation Center (AWCC), formerly the Wildlife Habitat Management Institute.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Jeremy Maestas, NRCS

Ranchette on former rangeland

Summary of:

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Manage utility rights-of-way for effective wildlife habitat

Utility rights-of-way can be managed as effective wildlife habitat, if a few guidelines are followed, according to the Wildlife Habitat Council (WHC).

As part of an agreement with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Agricultural Wildlife Conservation Center (AWCC). The WHC has recommended the use of specific best management practices to utility managers.

"All vegetative management plans for rights-of-way should include habitat management surveys, plan for control of invasive species, and recommend use of native plant species," says Robert Johnson, WHC President.

Johnson says surveys should be conducted, not only to be aware of the general condition and components of the land, but also to identify any animal or plant species that need particular attention.

Invasive plant species are one of the greatest threats to the world's biodiversity, and regardless of the integrated vegetation management plan adopted by a utility company for a right of way, control of invasive species should always be part of management strategies, Johnson says.

Native plants provide a beautiful, hardy, drought resistant, low-maintenance landscape. Once established, they save time and money by eliminating or significantly reducing the need for fertilizers, pesticides, water, and maintenance.

Native plants also provide shelter and food for wildlife. Native plants attract a variety of birds and butterflies, as well as other beneficial insects and wildlife by providing diverse habitats and food sources.

Among the WHC recommendations for specific ecosystems are:

Grassland:

- Avoid fragmenting grasslands with the addition of roads, buildings, tree corridors, or row crops.
- Where grasslands are bordered by forested tracts, develop a feathered edge between the forest and the grassland.
- If mowing is necessary to maintain the grassland stage, it should only be done during September to March.
- Woody cover should be kept to a maximum of 5 percent.

Shrubland:

- Selectively use herbicides to control tall-growing species in order to maintain a shrub community of 12 feet or less in height. Prune afterwards.
- When corridors are first cleared, avoid a clearing and grubbing operation in which all vegetation is cut down and soil and roots are disturbed. Leave shrubs and preferred low growing trees. Trees cut down during clearing or maintenance activities should be placed along the corridor edge to form brush piles. Log piles are also of wildlife value.

Wetland:

- Consult with agencies before altering any wetland area.
- Diversify vegetative cover to obtain vegetation of different heights and types.
- Create or maintain a wetland with some open areas.
- Do not discourage beavers. Beaver sites typically show a higher richness in wildlife.

Funding for guideline development was provided by the AWCC.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Stephen Genua

Utility right-of-way

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Similar wildlife value found in clustered, dispersed housing developments

When farm and ranch land beyond city limits is subdivided for large lot housing developments, plant and wildlife communities dramatically change. The change includes shifts to more nonnative plants and wildlife species adapted to humans.

It has been widely assumed that grouping or clustering houses closely together and leaving the remaining area protected as an open space easement lessens development impacts on the landscape.

That assumption was tested by Colorado State University (CSU) researchers in a comparison of traditional large lot development, clustered development, and undeveloped land in Boulder County, Colorado. In a study completed in 2005, they compared wildlife conservation values based on densities of songbirds, nest density, and success of ground-nesting birds, presence of mammals, and composition and coverage of native versus nonnative plant species.

"We found the plant and wildlife species of clustered developments were more similar to that of dispersed housing developments than to undeveloped areas," says Richard Knight, a professor in the Land Stewardship Department of CSU.

"Native species ground cover percentage in undeveloped land was nearly twice that of either dispersed or clustered developments. We also found 12 native plant species in undeveloped land that weren't found in either of the other two areas."

Researchers also found similar numbers of successful ground nests in dispersed and clustered developments, but when combined, they produced fewer than half as many nests as the undeveloped land.

Common grackle, European starling, American robin, red-winged blackbird, and mourning dove were among the generalist bird species with highest densities in clustered and dispersed housing developments. In contrast, birds with highest densities in undeveloped land were western meadowlark, grasshopper sparrow, lark sparrow, vesper sparrow, and others of conservation concern. Most mammal differences were not significant.

Clustered developments averaged less than 200 acres of easement outlots, which included some horse and cattle grazing.

"The conservation value of clustering may have been much higher if the protected outlots had been larger and contained a higher percentage of native plant species," says Knight. "Closer proximity to humans and lack of native plants made the clustered developments more closely mirror dispersed developments."

Clustering homes closer together and away from sensitive areas, larger outlots, native landscaping, contiguous open spaces, and few roads could all benefit species of conservation concern, according to Wendell Gilgert, a wildlife biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Portland, Oregon, who facilitated the study for the NRCS.

The project was done in cooperation with the Open Space and Mountain Parks Department of the city of Boulder. Funding was provided by CSU and the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Jeremy Maestas, NRCS

Dispersed house on rangeland

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Burning and disking Midwestern flood plains benefit ground nesting birds

Disking midwestern flood plains dominated by reed canarygrass or invasive woody plants can increase their conservation value to ground-nesting birds, a study by Iowa State University (ISU) indicates.

Riparian areas, those transitional habitats situated between dry upland and primarily aquatic habitats, have been a major focus for the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) and its conservation partners in the Midwest since the 1990s.

The Agency has used a suite of programs to restore or maintain riparian ecosystems since that time, including establishing long-term wetland easements on thousands of acres of flood plains.

NRCS partnered with ISU researchers and managers from the Iowa Department of Natural Resources and U.S. Fish and Wildlife Service to assess wildlife responses to management of riparian easements. Specifically, researchers assessed plant, insect, and breeding bird responses to burning and disking fields on the Iowa River flood plain.

In 2001 and 2002, researchers selected 50 fields in the flood plain, from 20 to more than 100 acres in size. Included were 30 wet sites, primarily dominated by reed canarygrass, and 20 mesic (moderate moisture) sites with established stands of native grasses and forbs.

Effects of burning on vegetation were short-lived, disappearing by the second growing season. Disking substantially altered vegetation structure and composition by decreasing coverage of grasses, woody plants, litter, and standing dead vegetation.

"Disking produced increased coverage of forbs and total plant species richness," says Thomas Benson, who conducted graduate research on the project. Vegetation density was decreased by disking in wet fields and total vegetation cover was increased by disking in mesic fields.

Changes in insect numbers were related to burning and disking effects on vegetation characteristics, especially forage coverage and plant species richness. Increased insect food resulting from disking was associated with increases in the abundance of all birds and overall bird conservation value in wet, but not mesic fields.

"Management of midwestern riparian areas is needed to maintain their attractiveness and productivity for ground-nesting birds," says Dr. Bill Hohman, a biologist with the NRCS.

A disturbance cycle of 3 to 4 years is recommended for established herbaceous plant communities. More frequent disturbances may be necessary in fields with newly established plantings, extensive coverage of aggressive invasive plants such as reed canarygrass, or at risk of rapid encroachment by woody plants.

Disking of diverse stands of native grasses and forbs is not recommended; however, disking reed canarygrass-dominated sites to thin plant density, encourage broad-leafed plants, and control woody invasion will enhance use of treated sites and adjacent habitat by some species of conservation interest.

The Iowa River Corridor study was aided by a grant from the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

NRCS photo by Lynn Betts

Prescribed burning

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Habitat patches for grassland birds: size matters

While it is difficult to determine the minimum size of a grassland patch a bird species needs to thrive and reproduce, biologists know size matters to a number of species.

A study by the U.S. Geological Survey (USGS) Northern Prairie Wildlife Research Center documented relative grassland patch sizes preferred by 16 species.

"Some species use habitat patches regardless of size, but others don't," says USGS research scientist Dr. Douglas Johnson. "The area requirements and factors that determine which habitats they select are not well understood."

Johnson examined evidence of minimum area requirements for grassland birds in nine counties in eastern Montana, North and South Dakota, and western Minnesota.

Lark bunting was typically found in large grassland patches in counties where they were observed. Northern harrier was encountered in large patches—more than 247 acres—more often than expected. Clay-colored sparrow and Baird's sparrow responded positively to field size. Bobolink and sedge wren also showed some tendency to favor larger patches. LeConte's sparrow showed no clear preference for large patches.

Some species showed inconsistent responses to patch size. Density of Savannah sparrow was positively related to field size in northeastern Montana, but negatively related in western South Dakota. Common yellowthroat favored smaller grasslands in western North Dakota, but larger patches in western Minnesota. The response of grasshopper sparrow to field size was weak overall, but also varied regionally. Grasshopper sparrow showed the reverse pattern, preferring larger fields in western counties, but smaller fields in eastern regions.

Two species, mourning dove and brown-headed cowbird, showed a weak tendency toward small patches.

In addition to the northern harrier, five other species were detected only occasionally, but seemed to prefer larger patches. They were the sharp-tailed grouse, willet, marbled godwit, upland sandpiper, and Wilson's phalarope.

The study indicates maintaining and grouping CRP lands in larger than 40-acre blocks will be most beneficial to grassland birds, says Dr. Bill Hohman, a biologist with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) in Fort Worth, Texas.

Hohman facilitated the study, which was aided by a grant from the NRCS Agricultural Wildlife Conservation Center (AWCC).

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Dave Menke, USFWS

Common yellowthroat

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More pheasants in landscapes with large CRP blocks, computer model predicts

Simulated pheasant populations are three times higher in Iowa landscapes with large U.S. Department of Agriculture (USDA) Conservation Reserve Program (CRP) blocks than in landscapes with only buffer habitats, a computer model developed by Iowa State University (ISU) shows.

Previous studies showed that although hens commonly nested in roadsides, grassed waterways, and along the margins of wetlands, the centers of large blocks of cover were especially attractive nesting sites.

Cover at the nest was residual cover from the previous year or rapidly growing cool-season vegetation. Nest success was greater among hens nesting in undisturbed cover, in blocks larger than 40 acres, and in landscapes where several similar blocks were located nearby.

Nest success averaged 62 percent in undisturbed blocks of habitat such as CRP and 45 percent in small, linear, or disturbed habitats. Nest losses occurred primarily by mammalian predators, but avian predators, farm operations, weather, and abandonment also contributed to nest losses.

A computer model was developed to show locations of each hen and brood on a geographic information system map and simulate survival and reproduction of each hen on landscapes the size of a township.

The computer compared simulated pheasant populations on a township without CRP, one with CRP buffers only, and a township with whole field CRP. Simulated populations on a buffers-only township increased slightly (5%) over the township with no CRP because of increased edge and smaller patches. Simulated populations in a township with whole field CRP increased 53 percent over a township with no CRP due to less edge and larger patches. The model also shows pheasant populations can recover more quickly from harsh winters and wet springs if they have large blocks of grass available.

"We studied areas where the proportion of the landscape covered with perennial grassland ranges from as low as two percent, where the habitat is only along roadside ditches, to areas with more than 25 percent of grassland with many fields enrolled in CRP," says ISU professor Dr. William Clark.

"Survival and reproduction of pheasants was reduced when winters were snowy and cold, and springs were wet and cool. After snowy winters, it took simulated pheasant populations at least 3 years to recover to previous levels in landscapes with less than 10 percent grassland. In landscapes with about 25 percent grassland the population recovered within 1 to 2 years."

Simulated pheasant populations were only one-third as high when grassland was confined to linear buffers compared to when the landscape contained larger blocks with less linear edge along crop fields.

The study was funded by the Iowa Department of Natural Resources with financial contributions from ISU.

The NRCS Wildlife Habitat Management Institute (WHMI), (now the Agricultural Wildlife Conservation Center (AWCC), supported use of the model and produced a summary of the modeling research that was published as a Wildlife Habitat Management Note to make the information more readily available to NRCS field offices.

The AWCC, located in Madison, Mississippi, is a fish and wildlife technology development center.

Photo by Jeff Vanuga

Ring-necked pheasant

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