Decades of quail research—plus some new findings—offer clues about the decline of this once-common game bird.

What Happened to Bobwhite?

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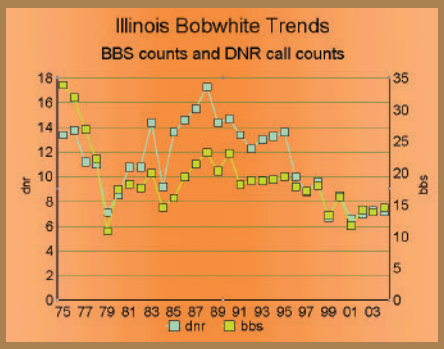
Since the 1960s, declines in northern bobwhite (*Colinus virginianus*) abundances have been observed at local, regional and national scales. Often, populations of quail are down or absent even where seemingly suitable habitat is available. The factors underlying these trends are not entirely clear and are worrisome to upland game and quail biologists.

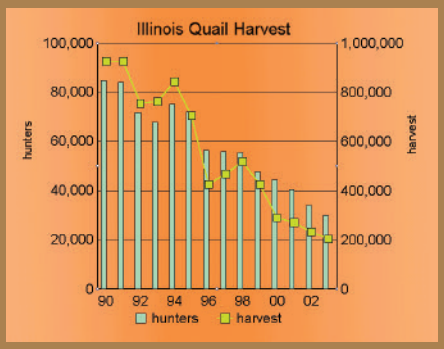
Since 1999, the Illinois Natural History Survey and the University of Illinois have been studying quail population and nesting ecology at Jim Edgar Panther Creek State Fish and Wildlife Area (JEPC) to help determine why quail populations are declining.

Located in Cass County, JEPC is a 26-square-mile tract managed by the Department of Natural Resources (DNR). It is one of the largest wildlife areas in the state and is comprised of 6,000 acres of timberland, 1,270 acres of warm-season grasses, 822 acres of cool-season grasses and 3,600 acres of farmland. The site is divided into three management units: open (harvest allowed for the entire statewide season), controlled (moderately restricted harvest) and quail (highly restricted

Researchers from the Illinois Natural History Survey have been studying populations and nesting ecology of quail in west-central Illinois.

Figures 1 and 2. Years of data provide an overview of quail populations and harvest rates.





harvest). In addition to a rich assortment of other wildlife, JEPC supports 87 species of breeding birds, including one of the largest populations of quail in west-central Illinois.

Long-term research conducted by Drs. J. L. Roseberry and W. D. Klimstra (Southern Illinois University) established a rich base of information about the nesting, brooding and overwinter requirements of quail in Illinois. Even with this knowledge base, however, Illinois has experienced an estimated 2 percent annual decrease in quail numbers from 1966 to 2004 based on results from the U.S. Fish and Wildlife Service's Breeding Bird Survey (BBS).

Quail captured in live traps were measured, banded and fitted with radio transmitters.

Data from the BBS surveys and DNR call counts illustrates the decline (see Figure 1). After a severe winter in 1978, quail experienced a drastic population reduction (a phenomena long observed in this species), rebounded somewhat in the late 1980s, only to experience declines ever since.

This decline in the population has occurred despite the fact that numbers of quail taken during the hunting season has been on the decline since the early 1990s (see Figure 2).

Without doubt, a major cause of the population decline is habitat loss. Until the 1960s, Illinois farms tended to be small and diverse. The landscape was dominated by grass pastures and small, diversified crop fields that were divided by fencerows and tree lines—a matrix that favored quail production. During the 1960s and 1970s, the advent of large-scale monoculture farming of corn and soybeans drastically altered the Illinois landscape. Today, quail and many other species of grassland birds are relegated to small remnants of habitat surrounded by large expanses of agricultural or urban land.

Current Research

The study objective was to gather information land managers can use to make informed choices about land-use options regarding bobwhite quail. To estimate quail abundances during the breeding and non-breeding (covey) seasons and characterize differences in abundances associated with habitat and land use, quail were live-trapped year-round.

Quail are inconspicuous creatures and not always easy to find. With the assistance of hunters and DNR staff, locations of coveys were scouted out and traps placed accordingly. During the covey season birds were trapped using corn-baited funnel traps. Decoy traps were used during the breeding season using captive quail hens. As a result of these efforts, since 1999, 174 quail have been fitted with radio-transmitters.

Transmitters allow the bird's movements to be tracked. The locations of the quail are recorded and loaded into a

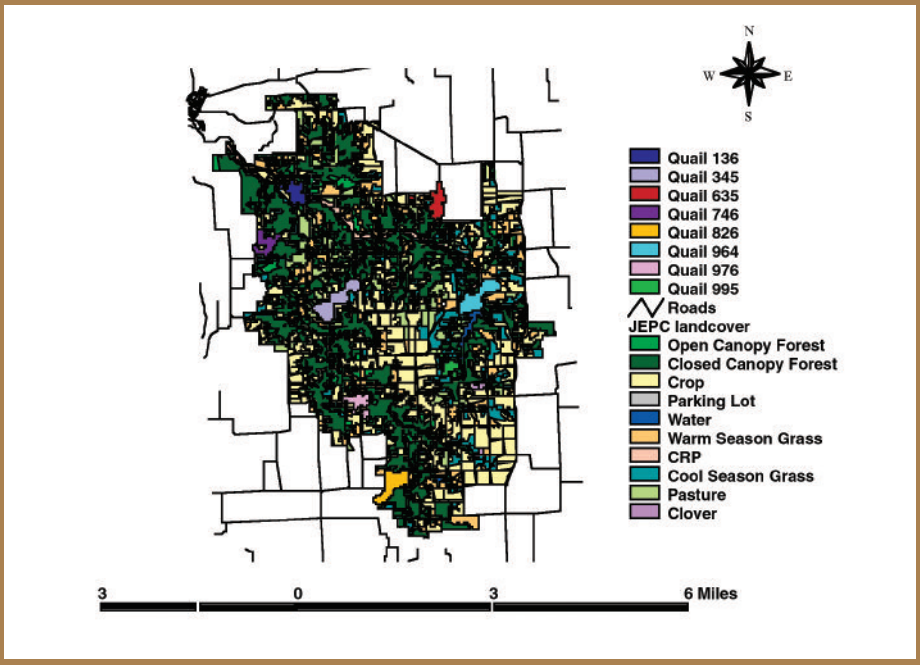


Figure 3. Information collected by the research team has been used to develop maps identifying the home range of each bird.

GIS program, allowing for the creation of home range maps (see Figure 3).

Telemetry data is used to determine habitat selection and preference via analysis that compares the amount of a particular habitat type in a quail's home range with the amount available at JEPC. Results show that during the breeding season quail show a strong preference for warm-season grass fields consisting primarily of big bluestem, little bluestem, Indian grass and switch grass. A weaker preference is shown for areas with some cropland and open canopy forested cover.

During the covey season, results show that quail strongly select for areas with ample warm-season grasses, cropland, open canopy forest and pasture. They show no preference or avoidance of closed canopy forest and a very strong avoidance of cool-season grasses.

The median home range size of quail in JEPC during breeding season is 130 acres (0.2 square miles) and 66 acres (0.1 square miles) during the covey season. The median home range in the ecosystem management area (northwestern section of quail unit) was 55 acres, compared with 150 acres in traditionally managed areas (open and controlled units). The larger home range size in the traditionally managed areas show that quail must travel farther to find adequate forage and cover than they do in the ecosystem-managed areas.

In addition to studying quail habitat preference, nesting ecology has been studied. By tracking collared birds, 35 nests have been located and monitored. Of these nests, 16 successfully hatched young, 13 were destroyed by predators, five were abandoned by the incubating bird and one was run over by farm equipment and destroyed. Based on preliminary analysis, nesting quail seem to prefer nest sites within fields of warm-season grass. Trees or shrubs were present within 100 yards of all nests.

Increasingly, land managers are faced with difficult decisions regarding demands on public lands. From this study, guidelines have been developed to assist land managers in making informed decisions about restoring grassland habitat for quail and other grassland-dependent species.

Results of the study of northern bobwhite habitat preferences indicates the following management guidelines.

- Warm-season grasses are essential.
- To maintain fields of warm-season grass with multiple forb species, infrequent, small-scale prescribed burns are recommended to control build-up of ground litter and prevent vegetation from becoming too dense.
- Quail at JEPC seem to prefer grassy fields with access to nearly bare ground for travel lanes, especially during the brood-rearing season.
- A grassland-savanna-shrub matrix appears to be highly beneficial to quail—and many species of non-game birds—in west-central Illinois.
- A mix of habitats within close proximity of one another is essential to provide quail with cover suitable for foraging, nesting and brood rearing, evading predators, and protection against severe weather conditions.

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Fitting quail with radio transmitters allows scientists to track movements and determine habitat preferences.