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# Breeding Bird Survey Summary from Mammoth Cave National Park, 1995 - 2012

Steve Kistler

## Abstract

Breeding bird surveys are used by ornithologists to study the variations in bird populations across the United States and Canada. Initiated in 1966, the surveys were originally created by Chandler Robbins and colleagues to study the effects of pesticide use on bird populations.

Today, these data are used to monitor changes in avian populations due to habitat loss, habitat fragmentation, land-use changes, and chemical contamination. The administration of these surveys is jointly run by the US Geological Survey and the Canadian Wildlife Service. Almost fifty years of continuous surveying also provides excellent baseline data which can be used to determine the effects of man-made and natural environmental disasters, such as storms and oil spills.

## Methodology

Today, there are approximately 4100 survey routes across the United States and Canada. Each survey route is run one day each year, during the time of year when breeding birds are singing on territory. In Kentucky, this period occurs between late May and late June.

Each route consists of fifty 3-minute stops, during which the observer records all birds heard or seen. No human calls or recording devices may be used to attract or disturb birds. The observer begins the route 30 minutes before local sunrise and stops at the same locations every year. Typically a route will take between four and five hours to complete.

## Data handling

Raw data is entered in to the North American Breeding Bird Survey website, found at <https://www.pwrc.usgs.gov/BBS/>. Biologists at Patuxent Wildlife research Center in Maryland and at their Canadian counterpart post this information online for ornithologists to utilize.

## Bird Study in Mammoth Cave N.P.

The large area of undisturbed habitat in Mammoth Cave National Park has been a favorite study site for Kentucky birders since the park's inception in 1941. Ornithologist Robert Mengel published *Birds of Kentucky* in 1965, the first book devoted entirely to the state's bird populations. Mengel, a professor at Western Kentucky University, devoted many years studying the birds of the Mammoth Cave region.

BBS data collection began in the park in 1966, when the first route in the park cut through the road from Lincoln to Brownsville on the north side of the Green River.

BBS routes run entirely within the boundaries of the park were initiated by the author in 1995. The first route established consists of fifty stops south of the Green River, and is simply known as the Mammoth Cave route.

A second route entirely north of the river was established with 33 stops in 1995. Known as Mammoth Cave North, it was expanded to include 50 stops in 2007. Due to difficult terrain and uncertain access to

gated roads, all 50 stops have rarely been surveyed. For most of the years of this route's existence, it has consisted of thirty-three stops only.

## Results

Data has not been collected consistently from the Mammoth Cave North Route over the years, so it will not be included in this summary. An informal review of Mammoth Cave North data reveals that it is very similar to data from the Mammoth Cave route throughout their shared history.

During the past eighteen years, fifty-six species of breeding birds have been recorded during BBS surveys. Other known breeders in the park have not been recorded on either route, either due to the fact that they are present in limited numbers, or that our routes do not pass through their preferred nesting sites. These include bald eagles, green herons, cerulean warblers, and others. A few species which are common in the open country outside the park may occur in very low numbers but not be observed using the BBS format.

The top ten most common breeding birds in the park are, in decreasing order, American crow (*Corvus brachyrhynchos*), red-eyed vireo (*Vireo olivaceus*), blue jay (*Cyanocitta cristata*), wood thrush (*Hylocichla mustelina*), scarlet tanager (*Piranga olivacea*), tufted titmouse (*Baeolophus bicolor*), ovenbird (*Seiurus aurocapilla*), Kentucky warbler (*Oporornis formosus*), Eastern wood-peewee (*Contopus virens*), and northern cardinal (*Cardinalis cardinalis*).

Table 1 shows the number of individuals of these species recorded each year from the fifty stops on the Mammoth Cave Route.

## Population trends

The breeding bird surveys are most useful to determine increasing or decreasing bird populations. They are sampling methods only, and they do not purport to produce

actual counts of the number of breeding birds in an area.

The data suggests that some populations fluctuate wildly within short periods of time. The author believes that most of these fluctuations are caused by vagaries of the sampling methods. Observations indicate that bird activity correlates strongly with weather conditions. A cool cloudy morning will produce fewer numbers of birds than a warm, sunny one. The morning following a cool rain event lasting more than one day may produce a flush of activity, as birds get out, feed, and resume nesting activities.

After forty-six years of continuous sampling, the BBS is valuable to us today as a source of long term population trends. The following four figures show population trends among groups of interest within the park.

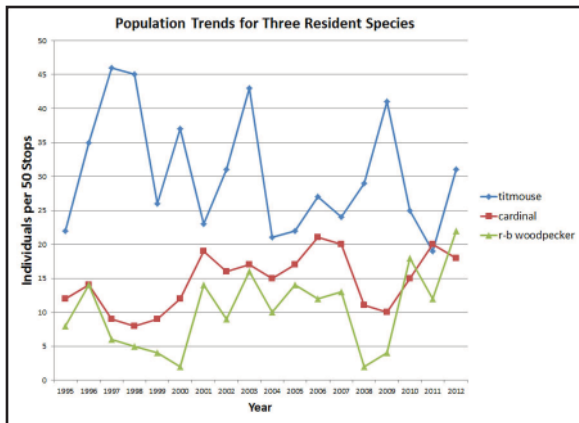
Figure 1 shows the population trends for three common year-round park residents: tufted titmouse, red-bellied woodpecker, and northern cardinal. The wild fluctuations are typical for most of the bird species surveyed. Small passerines typically live three to five years, and variations in food sources or weather can affect them in the short term. The dip shown for all three species in 2008 correlates with the presence of seventeen-year cicada hatch. The insects were loud, and observers could not hear bird songs as well as they normally would. If anything, these trends move slightly upward, meaning the populations of these species in the park are stable or increasing somewhat.

Figure 2 shows the population trends for three common summer residents: red-eyed vireo, scarlet tanager, and ovenbird. These species typify most of the birds we see here in the park: those that only spend part of the year in Kentucky. The three species depicted here are neotropical migrants, i.e. they spend October through March in Central and South America. All of these live and nest in eastern deciduous

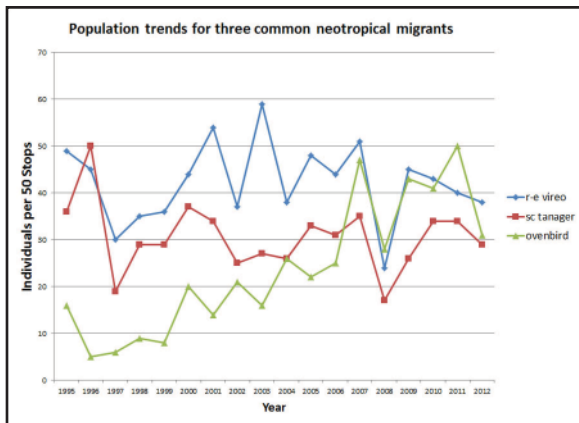
**Table 1:** These numbers represent the total number of individuals of the top ten species recorded on the Mammoth Cave Breeding Bird Survey route between 1995 and 2012.

**Ten Most Common Mammoth Cave National Park Breeding birds, 1995 - 2012**

Year	American crow	Red-eyed vireo	Blue jay	Wood thrush	Scarlet tanager	Tufted titmouse	Ovenbird	KY warbler	Eastern wood-peewee	Northern cardinal
1995	51	49	52	29	36	22	16	12	14	12
1996	51	45	29	25	50	35	5	25	5	14
1997	90	30	32	33	19	46	6	20	12	9
1998	71	35	26	20	29	45	9	25	13	8
1999	104	36	72	38	29	26	8	20	21	9
2000	53	44	27	23	37	37	20	22	20	12
2001	61	54	37	28	34	23	14	26	20	19
2002	85	37	40	33	25	31	21	28	20	16
2003	90	59	43	23	27	43	16	15	16	17
2004	53	38	19	27	26	21	26	28	21	15
2005	39	48	32	35	33	22	22	36	18	17
2006	77	44	35	29	31	27	25	29	12	21
2007	45	51	33	51	35	24	47	29	16	20
2008	8	24	14	26	17	29	28	10	17	11
2009	84	45	11	35	26	41	43	31	21	10
2010	39	43	21	43	34	25	41	18	26	15
2011	34	40	31	24	34	19	50	21	14	20
2012	24	38	17	34	29	31	31	14	16	18
<b>TOTAL</b>	<b>1059</b>	<b>760</b>	<b>571</b>	<b>556</b>	<b>551</b>	<b>547</b>	<b>428</b>	<b>409</b>	<b>302</b>	<b>263</b>



**Figure 1:** Populations trends for three year-round resident species.



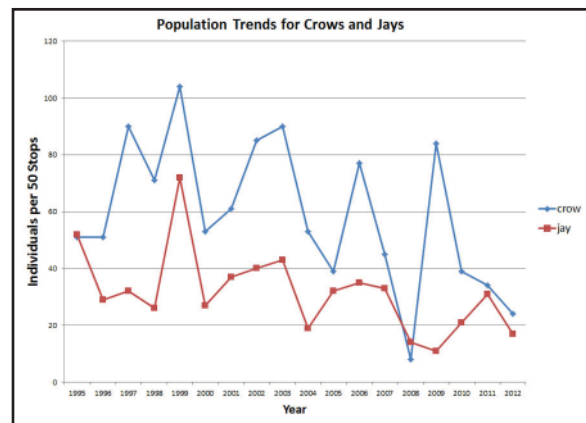
**Figure 2:** Population trends for three breeding bird species which winter in the tropics.

forests. Despite continuous logging and land development, habitat is still available in North America. Ornithologists and conservationists are concerned about habitat destruction in Latin America, where wide expanses of land are being deforested. So far, habitat loss has not affected these populations in the Mammoth Cave area. If anything, ovenbird numbers have increased steadily over the survey period. All three of these species were difficult to detect during the noisy spring of 2008.

Figure 3 shows the population trends for crows and blue jays. Starting about the year 2000, these species were subject to infection by West Nile virus, and they suffered

widespread mortality across their ranges. Populations in the park fluctuate as do all other species, but their trend lines seem to be decreasing. Crows are often detected by their loud calls, which is reflected by their low numbers during the spring of 2008.

Figure 4 shows the population trend for wood thrushes. These birds are of great concern to ornithologists, as their numbers in the U.S. have declined almost fifty percent since surveys began in 1966. While their temperate habitat remains sufficient, they have suffered heavy habitat loss in their tropical homes. Mammoth Cave National Park is a haven for wood thrushes; their population densities are as high here as in almost any location in their U.S. range. Populations are stable.



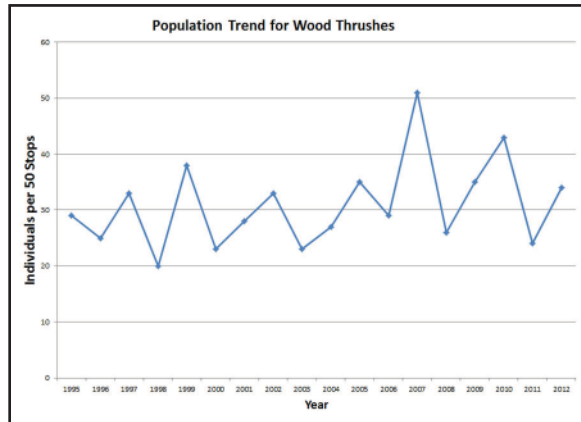
**Figure 3:** Population trends for two species reduced nationally by West Nile virus.

### Conclusions

Breeding Bird Surveys are valuable for their ability to track long-range trends in bird populations. Bird numbers fluctuate greatly on an annual basis, but trends which are observed over longer periods are of higher significance to ornithologists.

Bird populations at Mammoth Cave National Park have been stable for the past eighteen breeding seasons. The park is a sanctuary for woodland species, such as ovenbirds, scarlet tanagers, and wood

thrushes. Without interference from roads, development, and edge effects, these species continue to thrive in the park.



**Figure 4:** Population trends for wood thrushes at Mammoth Cave.