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Black-billed Magpie (*Pica hudsonia*) Winter Populations in Kansas from 1949 to 2015 Based on Christmas Bird Count Data

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ABSTRACT

The Black-billed Magpie (*Pica hudsonia*) winter population, based on 67 years of Kansas Christmas Bird Count data, has experienced a dramatic decrease since 2002, which is associated with the arrival of West Nile Virus. The continued decline of the population may be associated with 1) a particularly virulent strain of the virus; 2) non-vectoral transmission due to the social nature of magpies; 3) loss of habitat due to energy exploration and production (oil, gas, and wind); or 4) the magpie is retracting its range as a result of regional temperature changes.

INTRODUCTION

The Black-billed Magpie (*Pica hudsonia*) is a permanent resident of the western U.S. from east-central California, eastward to western Oklahoma and Kansas, northeast into Canada and northwest to southwestern Alaska, where it inhabits open woodlands, especially along riparian areas (Trost 1999). Kansas is along the southeastern edge of its range (Trost 1999, Thompson et al. 2011). The Black-billed Magpie was first reported as a winter resident of central and western Kansas during the 19th Century, with the earliest records of breeding ca. 1873 or 1874 (Thompson *et al*. 2011). The breeding range expanded from southwest to northeast in Kansas during the 20th Century (Thompson and Ely 1992, Thompson *et al*. 2011). The species was first reported to be nesting in Oklahoma in 1919, in Cimarron County, and has since become a resident of the Oklahoma panhandle (Sutton 1967, Baumgartner and Baumgartner 1992, Dole 2004), though winter populations are scarce within the panhandle (Reinking pers. comm.).

Corvids, especially the American Crow (*Corvus brachyrynchos*), were some of the first avian species known to be affected by West Nile Virus (WNV) in North America (Eidson *et al*. 2001, Caffrey *et al*. 2003, Caffrey *et al*. 2005). The first reported

noticeable decline of the Black-billed Magpie, a corvid, in Kansas was during the 2008-2009 Christmas Bird Count (CBC) season when numbers dropped below 100 for the third consecutive year (Young *et al.* 2009). Young et al. (2010) further commented that the number exceeded 600 individuals in 2000 and 2001, but dropped to 300 by 2002, and only 36 individuals were recorded during the 2009-2010 CBC period. Thompson and Young (2012) speculated that WNV, which first appeared in Kansas during August of 2002 (Hegeman 2002, Kansas Department Health and Environment 2015), had a negative impact on the magpie population and they never rebounded since its decline. Numbers continued to decline after the initial outbreak of WNV, with only 24 individuals observed during the 2013-2014 CBC's, the lowest number this century (Young *et al.* 2014), and 26 recorded during the 2014-2015 CBC's, the second lowest number of individuals reported during a CBC period (Young et al. 2015). Young *et al.* (2015) also reported a decrease in the number of counts reporting magpies.

As a result of the decline we attempt to ascertain the status of the wintering population of Black-billed Magpies in Kansas using CBC data from 1949 to the 2015-2016 count period.

METHODS

We collected data from the Kansas Ornithological Society Bulletins which has published the results of CBC data annually from 1950 to 2016 (http://www.ksbirds.org/kos/bulletin/Bulletin.htm). For each year a running total of individuals was recorded based on magpie sightings per location, total number of counts, observers, and observation hours. This collective total was then used to calculate averages based on the number of individuals per party-hour. For maps, we plotted the approximate location of counts to indicate physiographic provinces (Thompson *et al.* 2011, Young *et al.* 2015) where magpies have been observed. To determine the main wintering range we chose counts recording magpies in at least 15 years from 1949-2015. We then analyzed those counts over the entire span to ascertain the magpie status within the core of its wintering range.

RESULTS

From 1949 through 2015, with the exception of six years (1949, 1952, 1956-1957, 1960, and 1962), the Black-billed Magpie was recorded on at least one CBC count each year (Figure 1). The number of magpies wintering in Kansas increased during 1970's and early 1980's, peaked from 1987 through 2001, before undergoing a dramatic decline, which has continued in this decade (Figure 1). As expected, the percentage of counts finding Black-billed Magpies shows a similar pattern of increase and decrease during the aforementioned time-frame (Figure 2). To determine if patterns could be different as a result of effort, we determined the number of magpies per party-hours, and this too showed the same general pattern of decline (Figure 3). We eliminated data prior to 1955 due to inconsistencies in reporting of observational hours. While the wintering population has never been terribly large (range 0-913 and avg. 190.2 per year), the conspicuous plumage and distinctive calls, generally allow the bird to be observed in small numbers on an

annual basis (Figure 4).

A total 53 different counts recorded magpies during this 67 year period, within a majority of the Kansas physiographic provinces (Figure 5). They were most frequently observed in Hays (51 yrs, 76% of the time period); Dodge City (45 yrs, 67%), Cimarron National Grassland (CNG, 42 yrs, 63%), and Garden City (33 yrs, 49%), while all other counts recorded them in 27 years or fewer (Table 1). The count with the greatest total number of individuals observed for the entire time period was Garden City (2,523), followed by CNG (2,405), Dodge City (1,550), and Syracuse (1,260), with all other counts having fewer than 1,000 recorded (Table 1). Fifteen counts had observations of magpies during at least 15 years from 1949-2015. Using these counts we were able to determine the main winter grounds, primarily in western Kansas within the High Plains and associated Arkansas River Lowlands, and the Smoky Hills physiographic provinces (Figure 6).

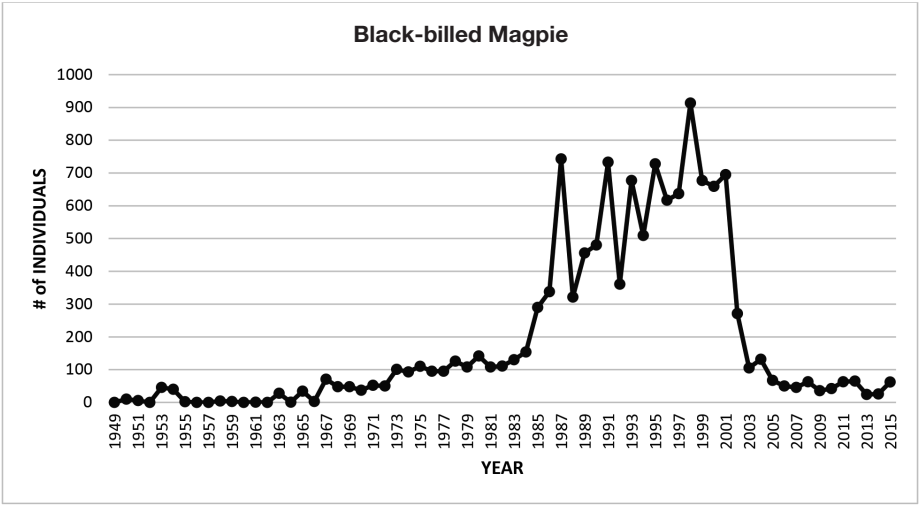

Figure 1. Total number of Black-billed Magpies recorded during CBC's from 1949 to 2015.

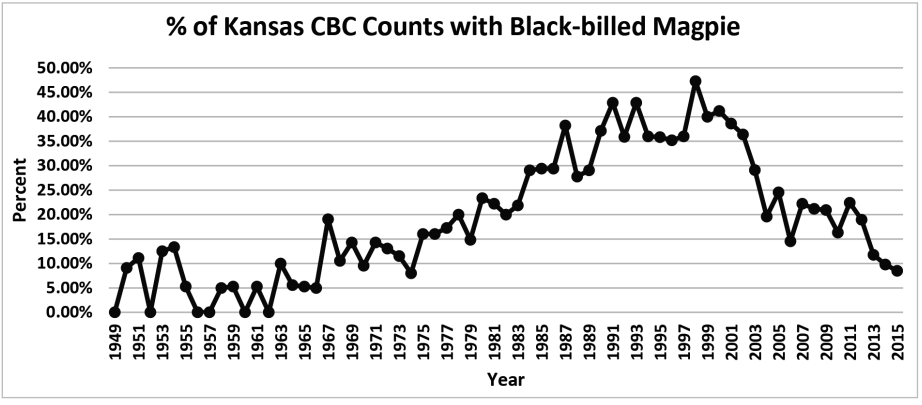

Figure 2. Percent of Kansas CBC's where Black-billed Magpies were reported from 1949 through 2015.

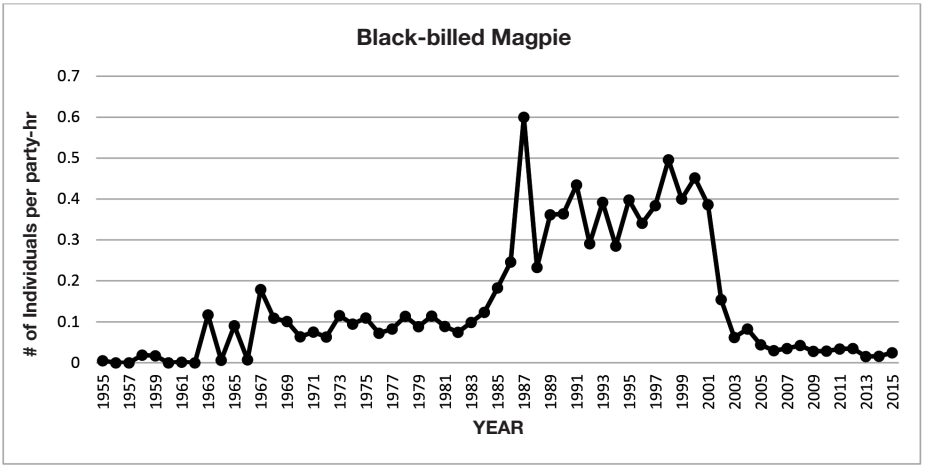

Figure 3. Number of Black-billed Magpies per party-hour observed on Kansas CBC's from 1955 through 2015.

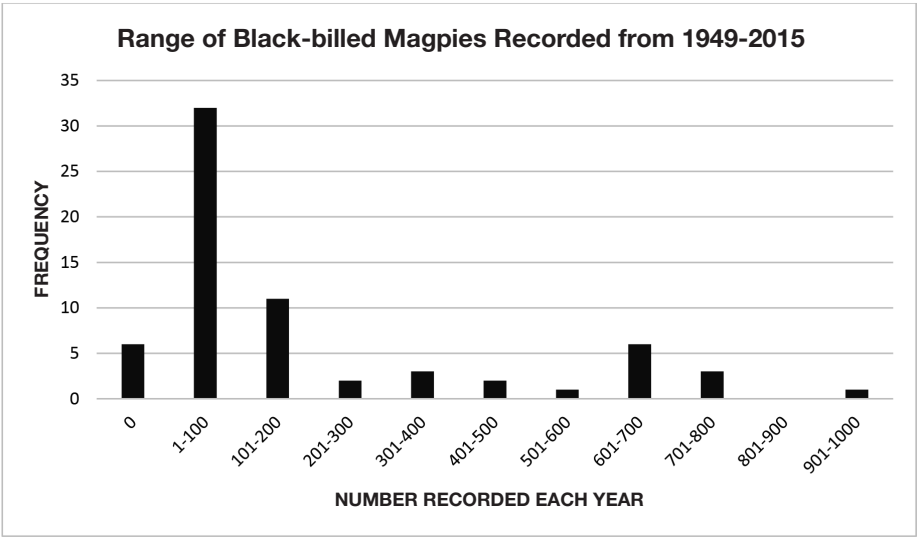

Figure 4. Histogram showing the range in the numbers of Black-billed Magpies recorded from 1949 through 2015 on Kansas CBC's.

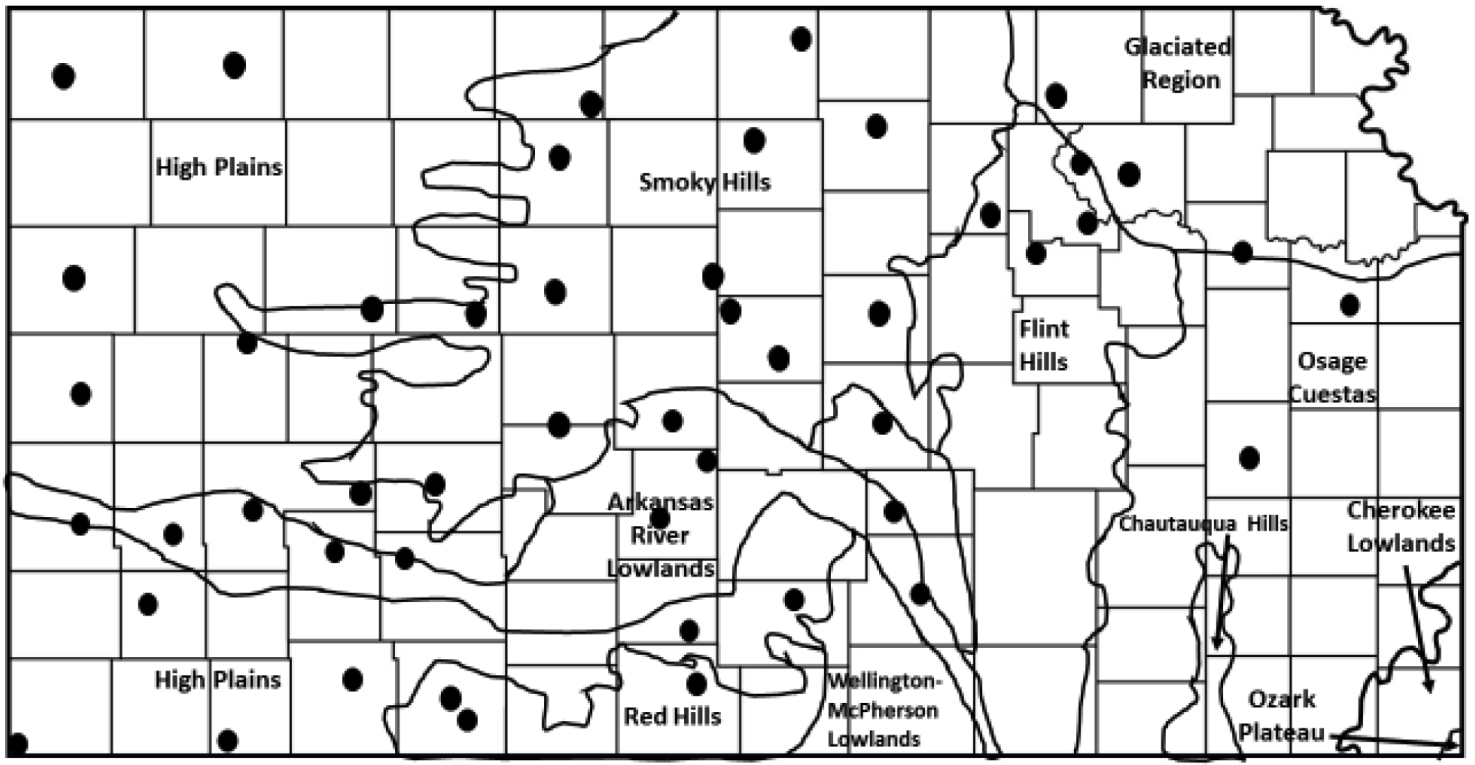

Figure 5. Approximate location of CBC's reporting Black-billed Magpies in Kansas from 1949 through 2015.

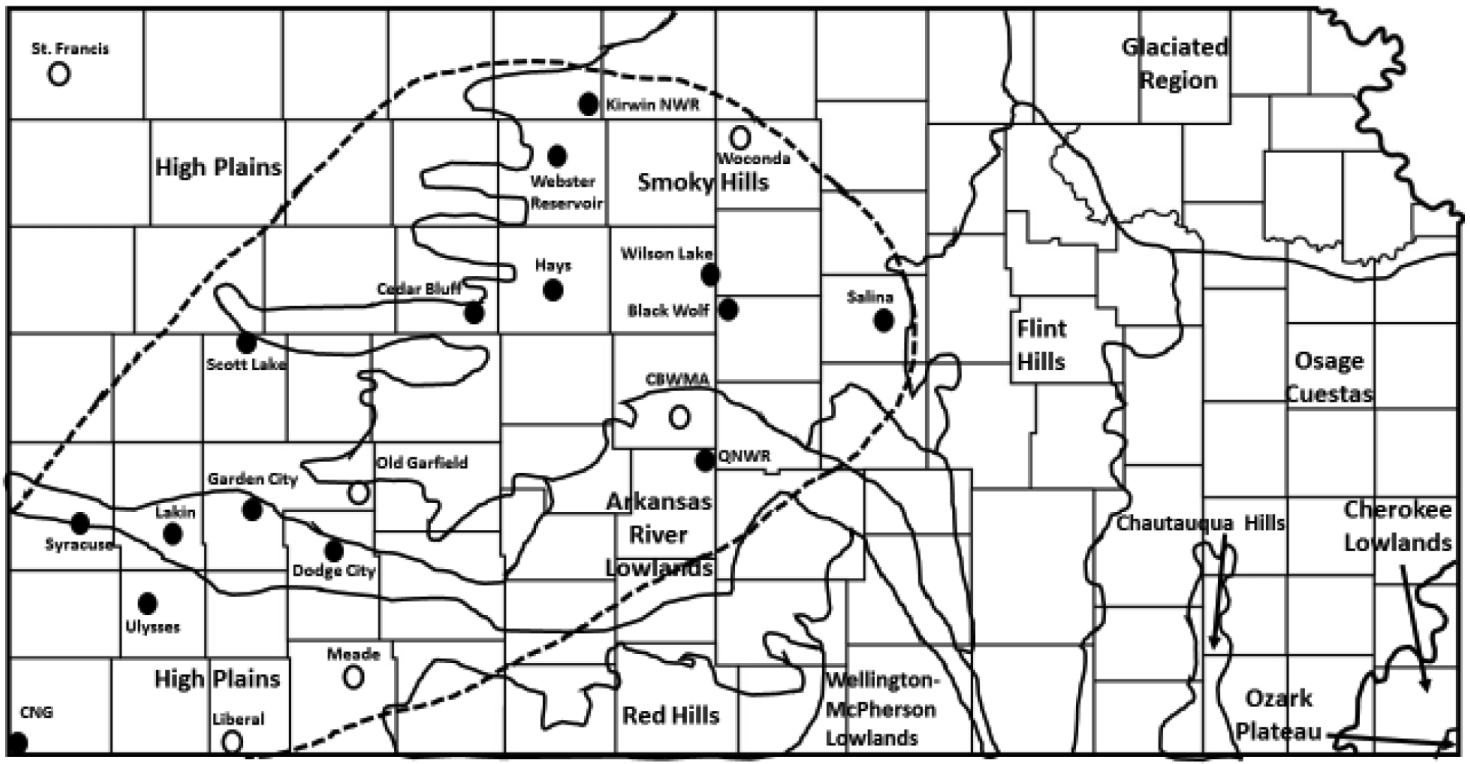

Figure 6. Core wintering area (dashed line) for Black-billed Magpies based on Kansas CBC data. Solid circles represent 15 counts with at least 15 years of data, and open circles represent counts with at least 10 years of data between 1949 and 2015 (Table 1).

Table 1. Kansas CBC's recording Black-billed Magpies greater than 10 years (15%) from 1949 through 2015.

		Black-billed Magpie		
Count	County	# of Years	% Years (# Counts)	# Individuals
Black Wolf	Ellsworth	15	68.2 (22)	60
Cedar Bluff	Trego	18	90 (20)	495
CBWMA*	Barton	13	30 (44)	29
CNG*	Morton	42	96 (44)	2405
Dodge City	Ford	45	100	1550
Garden City	Finney	33	100	2523
Hays	Ellis	51	80 (64)	573
Kirwin	Phillips	17	94.4 (18)	920
Lakin	Kearny	17	85 (20)	489
Liberal	Seward	10	71.4 (14)	57
Meade	Meade	11	46 (24)	47
Old Garfield	Finney	10	67 (15)	31
QNWR*	Stafford	20	44.4 (45)	119
St. Francis	Cheyenne	10	83.3 (12)	121
Salina	Saline	17	45 (38)	41
Scott Lake	Scott	27	84.4 (32)	598
Syracuse	Hamilton	18	90 (20)	1260
Ulysses	Grant	18	100	365
Waconda Lake	Mitchell	12	52.2 (23)	176
Webster Reservoir	Rooks	22	92 (24)	397
Wilson Reservoir	Russell	25	64.1 (39)	116

*** CBWMA = Cheyenne Bottoms Wildlife Management Area, CNG = Cimarron National Grasslands, QNWR = Quivira National Wildlife Refuge.**

DISCUSSION

The WNV made it to New York in 1999, though the circumstances surrounding how, remain unresolved (Peterson *et al*. 2004). In Stillwater, Oklahoma, an American Crow population declined by 40-60% in the first two years of the WNV outbreak in 2002 (Caffrey et al. 2003, Peterson *et al*. 2004). This corresponds to the sudden decline of the Black-billed Magpie in Kansas (this study) and the drop of corvids noticed when the outbreak first began on the east coast (Eidson *et al*. 2001, Bonter and Hochachka 2003).

Breeding Bird Survey data from Kansas also indicates a decline of 5.65 percent per year from 1966-2013 with a substantial decline of 17.42 percent per year from 2003-2013 (Sauer *et al*. 2014), which coincides with our data for the winter decline. However, overall population declines in North America are small for the same respective periods, -0.66 and -0.86 respectively (Sauer *et al*. 2014).

Other species known to be impacted by the WNV: Black-capped Chickadee (*Poecile atricapillus*); Carolina Chickadee (*Poecile carolinensis*); and Tufted Titmouse (*Baeolophus bicolor*) were shown to decline at the same time the magpie did in Kansas, but have shown signs of populations rebounding (Young *et al*. 2014). However, the Black-billed Magpie continued to decline. Herewith we offer four hypothesis that might explain the current trend in Kansas.

First, the North American strain of WNV seems particularly virulent for birds (Peterson *et al*. 2004) and thus might be more persistent in a population over a longer period of time (George *et al*. 2015), resulting in a prolonged population decline. This may be especially apparent along the periphery of its range. Secondly, as an arthropod-borne virus (arbovirus) transmission is usually through mosquitoes, however, it can be transferred via direct bird-to-bird contact (non-vectoral) (Komar *et al*. 2003). Birds that feed on carrion or perhaps have social behavioral tendencies, like magpies (or other corvids), may transmit the virus by direct contact (Peterson *et al*. 2004), resulting in continued exposure to the virus, and subsequent continued decline of the population.

Third, we also hypothesize that potential anthropogenic effects such as increased gas and oil exploration, or the increase in wind energy production in western Kansas might be decreasing habitat in western Kansas. While this is possible, the species is relatively tolerant of humans (Trost 1999), and most fossil fuel exploration and wind turbine placement is located on uplands, or lowlands, usually away from riparian habitat, their main breeding habitat.

Lastly, an alternative hypothesis might be associated with Kansas being on the periphery of the Black-billed Magpie's range, thus, the magpie might be experiencing a retraction of its range due to global climate change. Magpies may be restricted in their range by high temperatures and humidity along its eastern edge of its range (Bock and Lepthien 1975, Hayworth and Weathers 1984). Both temperature and precipitation have been shown to increase in Kansas corresponding with global climate change (Burnette *et al*. 2010, Rhamani *et al*. 2013, Rhamani 2014). While the WNV might be the initial reason for the drastic decline of the Black-billed Magpie in Kansas in winter, increases in regional temperature and moisture levels, a result of global climate changes, may be the reason the species hasn't rebounded within the southeastern edge of its range. Abiotic factors are

known to limit species' distribution on a regional scale, while biological factors work on a local scale (Soberon 2007, Manthey *et al.* 2015); temperature changes have been shown to cause avifaunal changes in distribution on a regional scale (Peterson *et al.* 2015).

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LITERATURE CITED

Baumgartner, F.M., and A.M. Baumgartner. 1992. Oklahoma Bird Life. Univ. Oklahoma Press, Norman, Oklahoma. 443 pp.

Bock, C.E., and L.W. Lepthien. 1975. Distribution and Abundance of the Black-billed Magpie (*Pica pica*) in North America. Great Basin Naturalist 35:269–272.

Bonter, D., and W.M. Hochachka. 2003. Declines of Chickadees and Corvids: Possible Impacts of West Nile Virus. Pages 22–25 in American Birds: The 103rd Christmas Bird Count, 2002–2003. (25 August 2008; *www.audubon.org/Bird/cbc/103rdsummary.html*).

Burnette, D.J., D.W. Stahle, and C.J. Mock. 2010. Daily-Mean Temperature Reconstructed for Kansas from Early Instrumental and Modern Observations. Journal of Climate 23:1308-1333.

Caffrey, C., S.C.R. Smith, and T.J. Weston. 2005. West Nile Virus Devastates an American Crow Population. Condor 107: 128–132.

Caffrey, C., T.J. Weston, and S.C.R. Smith. 2003. High Mortality among Marked Crows Subsequent to the Arrival of West Nile Virus. Wildl. Soc. Bull. 31:870-872.

Dole, J.M. 2004. Black-billed Magpie (*Pica hudsonia*). In Oklahoma Breeding Bird Atlas, D.L. Reinking, ed. George M. Sutton Avian Research Center. University of Oklahoma Press, Norman, Oklahoma. 272-273 pp.

Eidson, M., N. Komar, F. Sorhage, R. Nelson, T. Talbot, F. Mostashari, R. McLean, and West Nile Virus Avian Mortality Surveillance Group. 2001. Crow Deaths as a Sentinel Surveillance System for West Nile Virus in the Northeastern United States, 1999. Emerging Infectious Diseases 7:615-620.

George, T.L., R.J. Harrigan, J.A. LaManna, D.F. DeSante, J.F. Saracco, and T.B. Smith. 2015. Persistent Impacts of West Nile Virus on North American Bird Populations. Proc. Natl. Acad. Science 112(46):14290-14295.

Hayworth, A.M., and W.W. Weathers. 1984. Temperature Regulation and Climatic Adaptation in Black-billed and Yellow-billed Magpies. Condor 86(1): 19–26.

Hegeman, R. 2002. Kansas Reports First Case of Virus. West Nile: Horse in Cowley County Has Died From Mosquito-borne Illness; KDHE is Investigating. The Topeka Capital Journal. Web page: http://cjonline.com/stories/080902/kan_virus.shtml#.VvMni-IrK70. Accessed 23 March 2016.

Kansas Department of Health and Environment. 2015. Arboviral Disease Surveillance in Kansas. Web page: http://www.kdheks.gov/epi/arboviral_disease.htm. Accessed 23 March 2016.

Komar, N., S. Langevin, S. Hinten, N. Nemeth, E. Edwards, D. Hettler, B. Davis, R. Bowen, and M. Bunning. 2003. Experimental Infection of North American Birds with the New York Strain of West Nile Virus. Emerging Infectious Diseases 9:311-322.

Manthey, J.D., L.P. Campbell, E.E. Saupe, J. Soberon, C.M. Hensz, C.E. Myers, H.L. Owens, K. Ingenloff, A.T. Peterson, N. Barve, A. Lira-Noriega, V. Barve. 2015. A Test of Niche Centrality as a Determinant of Population Trends and Conservation Status in Threatened and Endangered North American Birds. Endangered Species Research 26:201-208, doi: 10.3354/esr00646.

Peterson, A.T., N. Komar, O. Komar, A. Navarro-Siguenza, M.B. Robbins, and E. Martinez-Meyer. 2004. West Nile Virus in the New World: Potential Impacts on Bird Species. Bird Conservation International 14:215-232.

Peterson, A.T., A.G. Navarro-Siguenza, E. Martinez-Meyer, A. P. Cuervo-Robayo, H. Berlanga, and J. Soberon. 2015. Twentieth Century Turnover of Mexican Endemic Avifaunas: Landscape Change Versus Climate Drivers. Science Advances 15 May 2015; 1:1-5, doi: 10.1126/sciadv.1400071.

Rhamani, V. 2014. Assessing Impacts of Climate Change on Kansas Water Resources: Rainfall Trends and Risk Analysis of Water Control Structures. PhD Dissertation, Kanas State University, Manhattan, Kansas. 123 pp.

Rhamani, V., S.L. Hutchinson, J.M.S. Hutchinson, and A. Anandhi. 2013. Extreme Daily Rainfall Event Distribution Patterns in Kansas. Journal Hydrologic Engineering 19(4):707-716.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2014. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015 USGS Patuxent Wildlife Research Center, Laurel, MD*

Soberon, J. 2007. Grinellian and Eltonian Niches and Geographic Distribution of Species. Ecology Letters 10(12):1115-1123.

Sutton, G.M. 1967. Oklahoma Birds: Their Ecology and Distribution, with Comments on the Avifauna of the Southern Great Plains. Univ. of Oklahoma Press, Norman. 674 pp.

Thompson, M.C., and C.A. Ely. 1992. Birds in Kansas, Vol. 2. Univ. Kansas Mus. Nat. Hist., Public Education Series No. 12. Lawrence, Kansas. 424 pp.

Thompson, M.C., C.A. Ely, B. Gress, C. Otte, S.T. Patti, D. Seibel, and E.A. Young. 2011. Birds of Kansas. Univ. Press of Kansas, Lawrence, Kansas. 528 pp.

Thompson, M. C., and E. A. Young. 2012. The Winter Bird Count for 2011-2012. Kansas Ornith. Soc. Bull. 63(1):1-26.

Trost, Charles H. 1999. Black-billed Magpie (*Pica hudsonia*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online:http://bna.birds.cornell.edu/bna/species/389. doi:10.2173/bna.389

Young, E. A., J. Gabriele, and E. Agpalo. 2010. The Winter Count for 2009-2010. Kansas Ornith. Soc. Bull. 61(1):1-20.

Young, E. A., M. C. Thompson, and E. Agpalo. 2009. The Winter Count for 2008. Kansas Ornith. Soc. Bull. 60(1):1-20.

Young, E. A., M. C. Thompson, A. Whiles, A. Greer, and C. Otte. 2015. The Winter Bird Count for 2014-2015. Kansas Ornith. Soc. Bull. 66(1):1-28.

Young, E. A., M. C. Thompson, A. Whiles, and C. Otte. 2014. The Winter Bird Count for 2013-2014. Kansas Ornith. Soc. Bull. 65(1):1-22.

MANUSCRIPTS NEEDED

The KOS Bulletin is the official peer-reviewed journal of the Kansas Ornithological Society, which is published quarterly. The KOS Bulletin is devoted to the field study of birds in Kansas, although other suitable materials can be published. Featured articles, and short notes of scientific or general interest are solicited; potential authors are encouraged to submit any materials that contribute to the understanding of birds in Kansas, including details for documentation of unusual or rare species. Authors are encouraged to review the "Instructions to Authors" in the June 2007 issue of the KOS Bulletin (58[2]:24) or on the KOS webpage (http://ksbirds.org/kos/Bulletin_Instructions.htm) prior to submitting manuscripts for review, or contact: Eugene A. Young, Editor KOS Bulletin, Northern Oklahoma College, 1220 E. Grand, PO Box 310, Tonkawa, OK 74653-310; 580-628-6482 (work phone); Eugene.Young@noc.edu, youngg6264@yahoo.com.

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