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Status review of the Black-billed Magpie (*Pica hudsonia*) in Nebraska

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Prepared by

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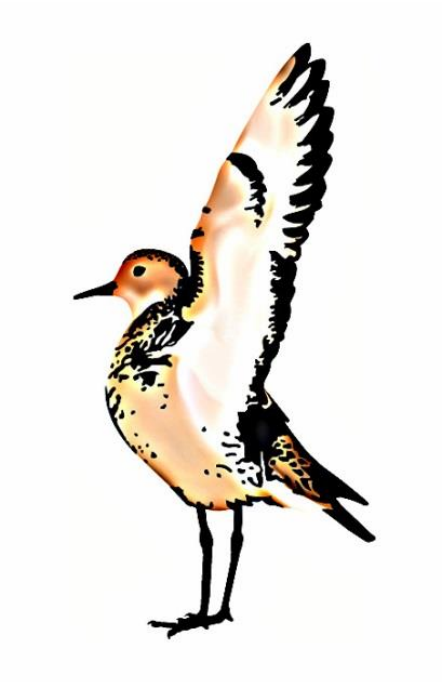

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The Black-billed Magpie (*Pica hudsonia*) is a conspicuous and easily-identifiable member of the corvid family (Corvidae) that inhabits open country. In Nebraska, Black-billed Magpies have apparently declined in recent years and are now no longer found in many areas of their former range (Mollhoff 2013). I conducted a literature and data review of existing resources and, here, I summarize the status of the Black-billed Magpie over time, with emphasis on changes in distribution and abundance over time. The document is focused on Nebraska, but some information and analyses from nearby states is included to provide a broader context. I also summarize information on possible causes of recent Black-billed Magpies declines in Nebraska and the Great Plains. Finally, I make conclusions about the species' status and provide recommendations about future management, monitoring and research.

BLACK-BILLED MAGPIE STATUS REVIEW

Statewide and regional bird occurrence summaries

Historically, Black-billed Magpies were apparently found statewide, but their range was reduced to western Nebraska by the early 1900s (Bruner et al. 1904). Rapp et al. (1958) noted it was common only in the western part of the state, but Black-billed Magpies apparently re-occupied portions of their former range by the end of the 20th Century, when their range included most of Nebraska with the exception of the southeast (Sharpe et al. 2001, Ducey 1988; Mollhoff 2001). A review of regional and local annotated bird lists supports this history. Black-billed Magpies were a common summer resident, which "breeds here", in Logan County in the early part of the 20th Century (Glandon and Glandon 1934). It was described as only a rare winter visitor in Gage County by Fiala (1970). Black-billed Magpies were a fairly common to common permanent resident in the Lake McConaughy area (Rosche 1994, Brown et al. 1996), although Brown et al. (1996) noted "summer populations have declined in recent years". Rosche (1982) noted it was fairly common to very common in northwestern Nebraska. In the Rainwater Basin of south-central Nebraska, Jorgensen (2012) considered it a casual resident, but remarked it was formerly rare or uncommon, but had decreased during the previous two decades.

Breeding Bird Atlases

Breeding Bird Atlases (BBA) are projects in which volunteers and professionals use a standardized methods to survey discrete areas, called blocks, in a specific geographic area, usually a state. Two BBA projects have been completed in Nebraska, one in which data were collected 1986-1900 (Mollhoff 2001) and a second in which data were collected 2006-2012 (Mollhoff 2016). During the first Nebraska BBA, Black-billed Magpies were found over most of Nebraska, with the exception of the southeast (Mollhoff 2001). However, Mollhoff (2016) noted that Black-billed Magpies had "declined precipitously" between the first and second Nebraska BBAs. During the first BBA (Mollhoff 2001), Black-billed Magpies were observed in 34% of atlas blocks, but were observed in only 8% of atlas blocks during the second BBA (Mollhoff 2016). During the second BBA, Black-billed Magpie distribution covered much of the same area as the first BBA, but was patchy and the distribution was reduced overall. Black-billed Magpie reports were clustered in the Pine Ridge, North and South Platte River valleys, Wildcat Hills, along the Nebraska-Kansas border, central Platte River from approximately Kearney to Central City, the Norfolk area, and near the Valley-Sherman County line (Mollhoff 2016).

Colorado published its first BBA in 1998 (Kingery 1998) and recently completed its second (Wickersham, *In Press*). Colorado BBA data and summarizations are available online (cobreedingbirdatlasii.org), including graphics showing comparisons of where a species was recorded during the first and second Colorado BBAs. Visual analysis of this graphic of Black-billed Magpie shows that the species has remained stable or even increased over much of Colorado, but was reported in fewer BBA blocks in the eastern plains during the second Colorado BBA compared to the first iteration (Figure1).

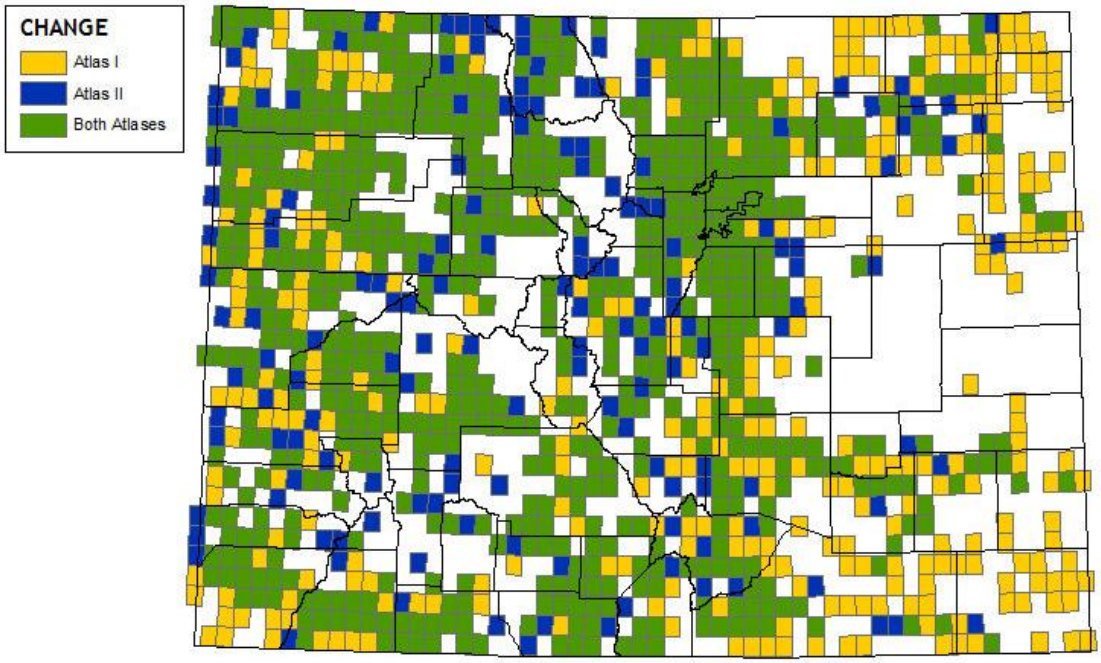

Figure 1. Results from the first and second Colorado Breeding Bird Atlases showing individual blocks where Black-billed Magpies were recorded during the first, second and both BBA projects. The graphic shows many blocks in the eastern plains where Black-billed Magpies were only recorded during the first BBA project. Graphic available at: cobreedingbirdatlasii.org/species-maps.php.

Breeding Bird Survey data

The Breeding Bird Survey (BBS) is a monitoring program started in 1966 to determine long-term trends in avian populations in the United States and Canada. Volunteer observers conduct road-based surveys following a standardized protocol. Black-billed Magpies have experienced a -0.66% (95% C.I.; -0.26, -1.07) annual decline in the United States 1966-2013 (Sauer et al. 2014). Black-billed Magpies have declined in Nebraska, South Dakota, Kansas and North Dakota, but increased in abundance in Montana, Wyoming and Minnesota (Figures 2-4). In Nebraska, Black-billed Magpies are estimated to have declined by 8.91% (95% C.I.; -6.73, -11.03) annually during the period 1966-2013 (Sauer et al. 2014). The decline for Nebraska is larger than any other state or region in which the BBS provides an estimate (Sauer et al. 2014). BBS trend data for Kansas (-5.65, 95% C.I.; -2.97, -9.78), South Dakota (-6.46, 95% C.I.; -4.20, -8.61) and the Central Mixed Grass Prairie Bird Conservation Region (-7.31, 95% C.I.; -5.31, -9.40) are similar, although the latter region includes much of central Nebraska. Out of the 140 species that Sauer et al. (2014) provide trend estimates, only one other species, the Brewer's Sparrow (*Spizella breweri*) has declined more sharply (-13.53%) in Nebraska.

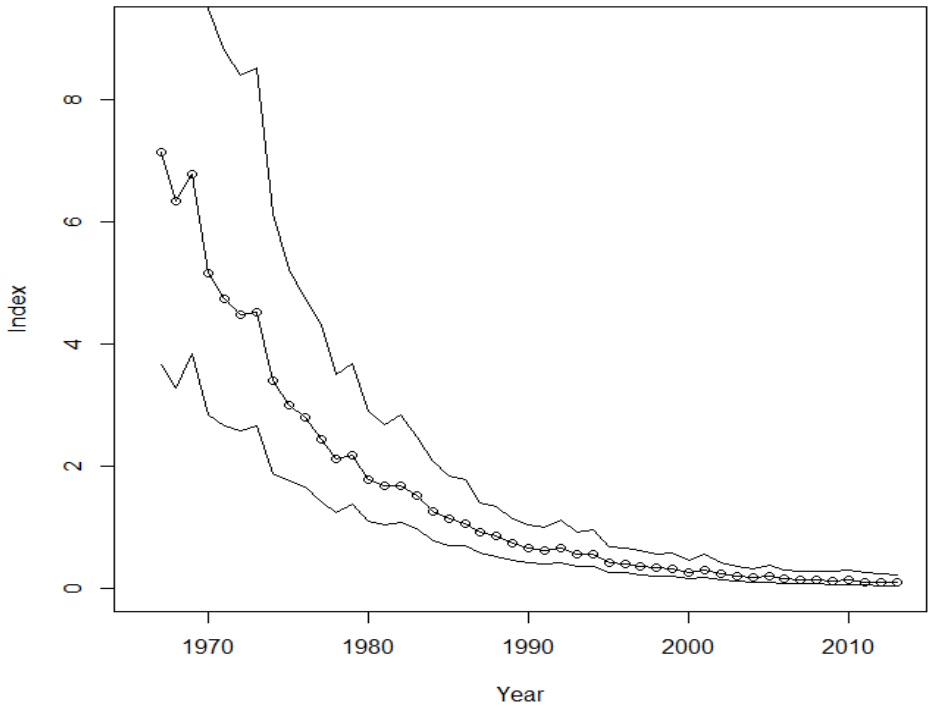

Figure 2. Breeding Bird Survey trend data for Black-billed Magpie in Nebraska (Sauer et al. 2014). Dotted center line represent mean estimate and solid lines represent 95% confidence intervals.

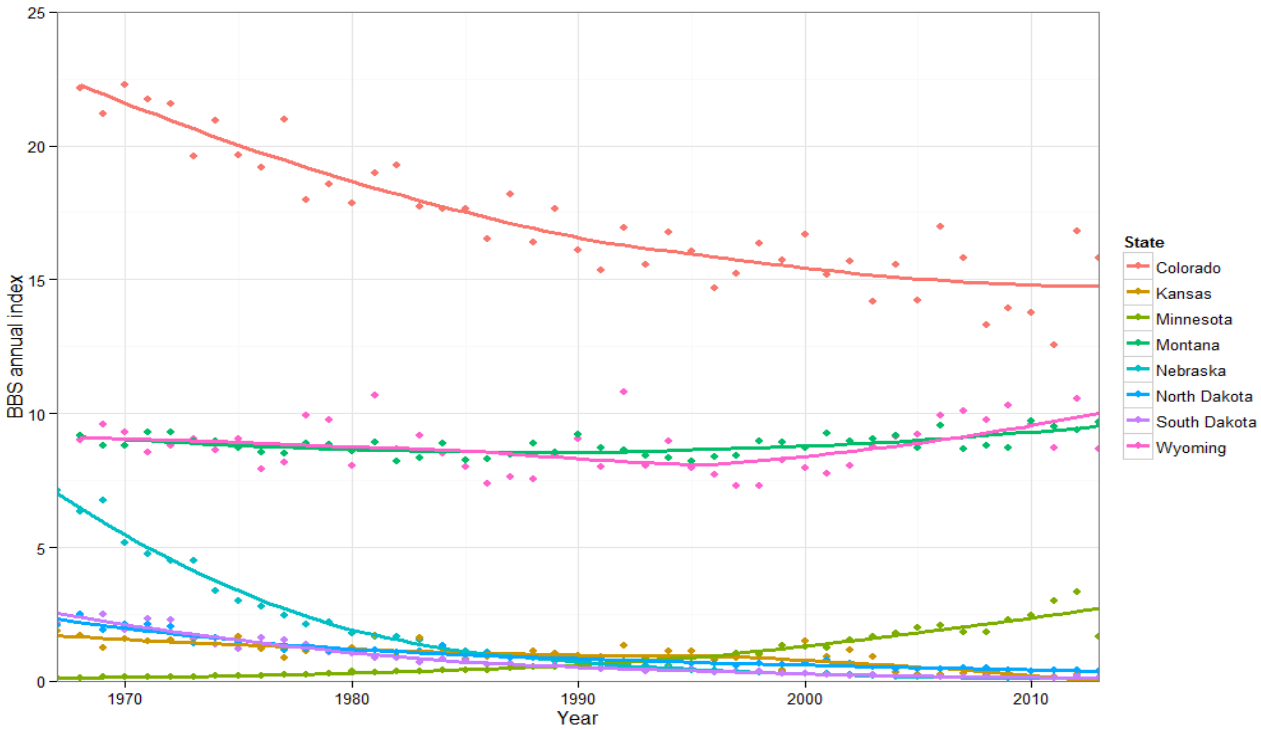

Figure 3. Breeding Bird Survey (BBS) relative abundance and trend analysis for Black-billed Magpie in Nebraska and selected states 1967-2013 (Sauer et al. 2014). Points represent mean values and trend line created using locally weighted scatterplot (LOESS) smoothing.

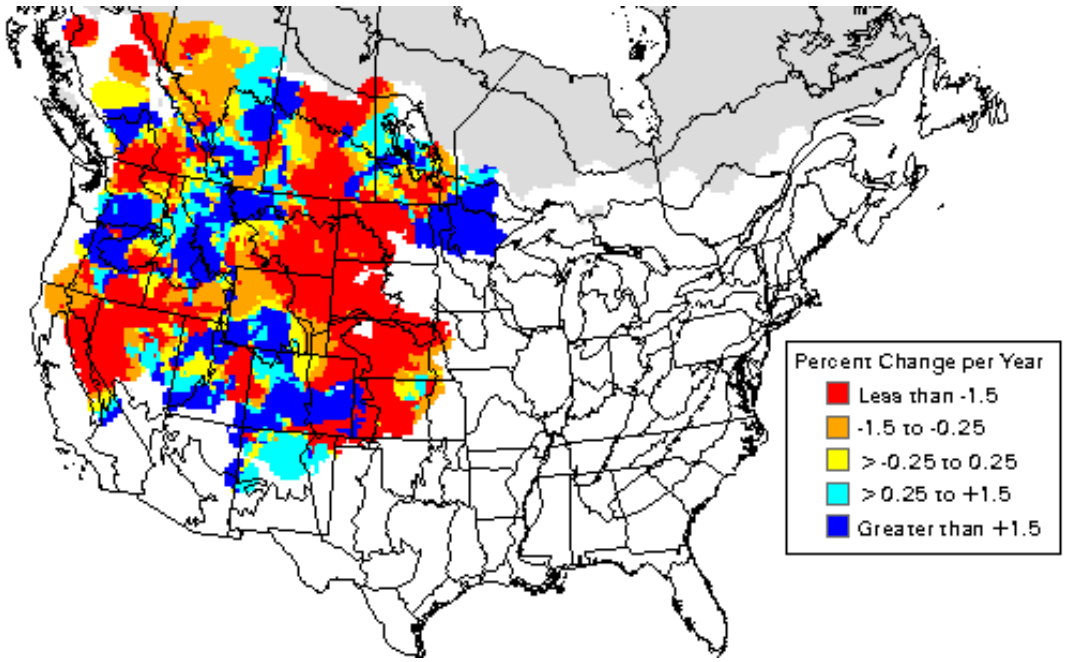

Figure 4. Breeding Bird Survey (BBS) trend map for Black-billed Magpie (Sauer et al. 2014). Graphic shows general declines in the Great Plains, but increases elsewhere in the Intermountain West and northern Minnesota. Graphic available at: www.mbr-pwrc.usgs.gov/bbs/tr2013/tr04920.htm.

Christmas Bird Count data

Christmas Bird Counts (CBCs) are local events, coordinated nationally by the Audubon Society, where volunteer observers count all the birds within a 15-mile diameter circle during a 24-hour period in the latter part of December or early January. Nebraska's first CBC was conducted in 1908 but it was not until the 1940s that CBCs were conducted annually and with a standardized format. I downloaded CBC data from the National Audubon Society (2016) to construct data sets. The first set includes data for Nebraska and selected nearby states and the second set includes data for selected CBCs conducted in Nebraska. I only used the number of Black-billed Magpies counted per party hour so that data were comparable between CBCs even though survey effort was different. For CBCs in Nebraska, I specifically located data for active CBCs with at least 7 years of data and where Black-billed Magpies were recorded regularly for > 5 years. I used the two data sets to construct graphics showing changes in the number of Black-billed Magpies recorded per party hour by year. I used locally weighted scatterplot (LOESS) smoothing to show general trends for statewide and individual CBCs.

More Black-billed Magpies have been recorded on CBCs in Colorado, Wyoming and Montana compared to CBCs in other all states considered (Figure 5). In Nebraska, the number of Black-billed Magpies recorded per party hour statewide showed stable or declining trends from 1985 into the late 1990s to around 2000, but sharp declines since (Figure 6). A review of changes in the number of magpies recorded per party hour on individual CBCs shows changes occurred during differently temporal periods, but all CBCs experienced sharp declines by the early 2000s. Since 2005, no CBC in Nebraska has recorded more than one magpie per party hour.

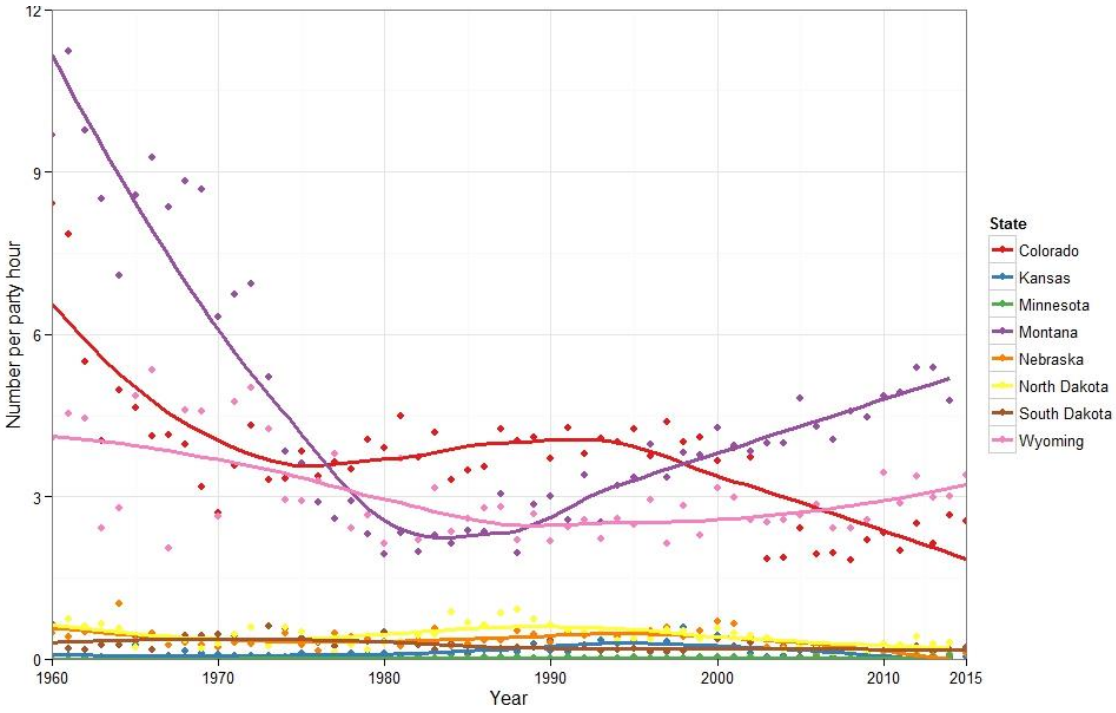

Figure 5. Number of Black-billed Magpies detected per party hour on Christmas Bird Counts (CBCs) for selected states 1960-2015. Points represent reported values and trend line created using locally weighted scatterplot (LOESS) smoothing.

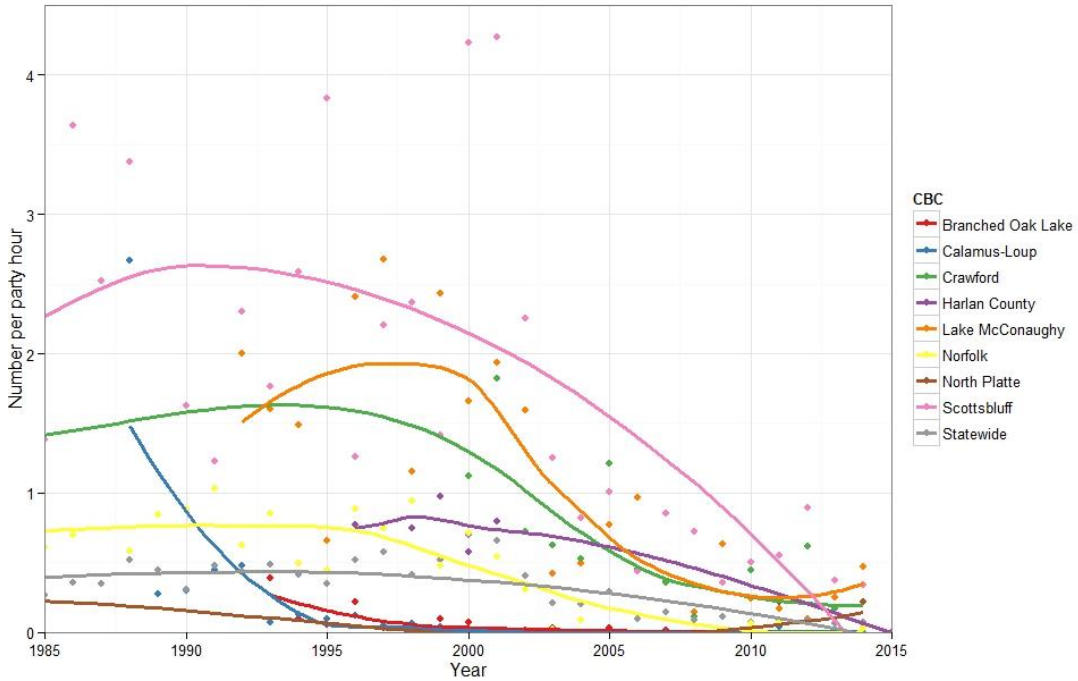

Figure 6. Number of Black-billed Magpies detected per party hour on selected Christmas Bird Counts (CBCs) in Nebraska 1985-2014. Not all CBCs were conducted in all years. "Statewide" is a composite of all CBCs. Points represent reported values and trend line created using locally weighted scatterplot (LOESS) smoothing.

POSSIBLE CAUSES OF BLACK-BILLED MAGPIE DECLINE

A review of existing information resources shows the abundance of Black-billed Magpie has changed over time in Nebraska and adjacent states, but declines have been sharp and notable during the 21st Century. Below, I evaluate possible causes of the observed declines.

Changes in habitat

Habitat fragmentation due to agriculture or urbanization can negatively impact Black-billed Magpies, particularly in areas lacking wooded riparian corridors (Trost 1999). Since many areas of Nebraska are dominated by agriculture (Hiller et al. 2009), habitats have been lost in some areas due to conversion to agriculture and landscapes in general have become increasingly fragmented. Other areas of Nebraska, however, such as the Sandhills, have not undergone extensive conversion to agriculture. Available information suggests declines in magpie numbers are uniform throughout Nebraska rather than linked to specific areas where habitat changes are notable. Thus, despite the significance of habitat loss to some local magpie populations, habitat loss in itself would seem to require additional causal factors to explain the general decline in magpie numbers.

Shooting and trapping

Even though Black-billed Magpies are protected under the Migratory Bird Treaty Act, they can be lethally controlled without a federal permit because of an existing Depredation Order (50 CFR 21.34). In Nebraska, Black-billed Magpies are classified as nuisance birds by the Nebraska Game and Parks Commission (Title 163, Chapter 4, Wildlife Regulations, Section 007, Nuisance Birds, Sub-part 007.02). The agency may issue a no-fee permit to control Black-billed Magpies "found committing or about to commit depredation or predation upon ornamental or shade trees, agricultural crops, livestock or wildlife" or "when concentrated in such numbers or manner as to constitute a health hazard or nuisance". However, the Nebraska Game and Parks Commission (NGPC) has not issued any permits for the take of Black-billed Magpie during the past ten years (NGPC staff, personal communication). USDA-APHIS-Wildlife Service, the federal agency that responds to and manages wildlife nuisance issues, has also not lethally taken any magpies as part of their depredation efforts during the past ten years (Tim Veenendaal, USDA-APHIS-Wildlife Service, personal communication).

Famphur

Famphur, also known as Warbex, is an organophosphorus insecticide used to control parasites in livestock (Eisler 1994). Famphur is administered orally through diet, by injection or by dermal pour-on application (Eisler 1994). Famphur ingestion by birds and other organism is fatal (Henry 1985, Eisler 1994). Famphur was commonly used on cattle and, because Black-billed Magpies will glean ectoparasites from cattle (Henny et al. 1985), they were particularly vulnerable to ingesting toxic levels. Famphur was recommended for use to control livestock parasites in 1970 and the first Black-billed Magpie mortalities due to Famphur were reported by 1973 (Henny et al. 1985). Famphur was cancelled for use in 1989 and its use likely rapidly decreased as existing supplies were exhausted (Tim Creger, Nebraska Department of Agriculture, personal communication). Thus, even though the use of Famphur

may have resulted in Black-billed Magpie mortality and caused declines in numbers, its relatively brief period of use is probably not a relevant factor in more recent declines.

West Nile Virus

West Nile Virus (WNV) is a mosquito-borne virus that arrived in North American from the Eastern Hemisphere in 1999 (McLean 2006). Birds are susceptible to WNV and as the virus spread across North America in the early 2000s it caused substantial avian mortality (McLean 2006). Corvids (*Corvidae*), including Black-billed Magpies, are particularly vulnerable to WNV, and the disease caused declines in many bird species' populations (LaDeau 2007). WNV incidence in humans is high in the Great Plains compared to other parts of the United States (Figure 7). The darkly-shaded area of high human WNV occurrence in Figure 7 approximately corresponds to the area where Black-billed Magpies have experienced the greatest declines (see Figure 4, above). The pattern of heterogeneous WNV incidence in the United States (Figure 7) appears to be associated with variations in temperature and precipitation that affect breeding habitats of *Culex* species of mosquitos, which transmit the virus (Hahn et al. 2015).

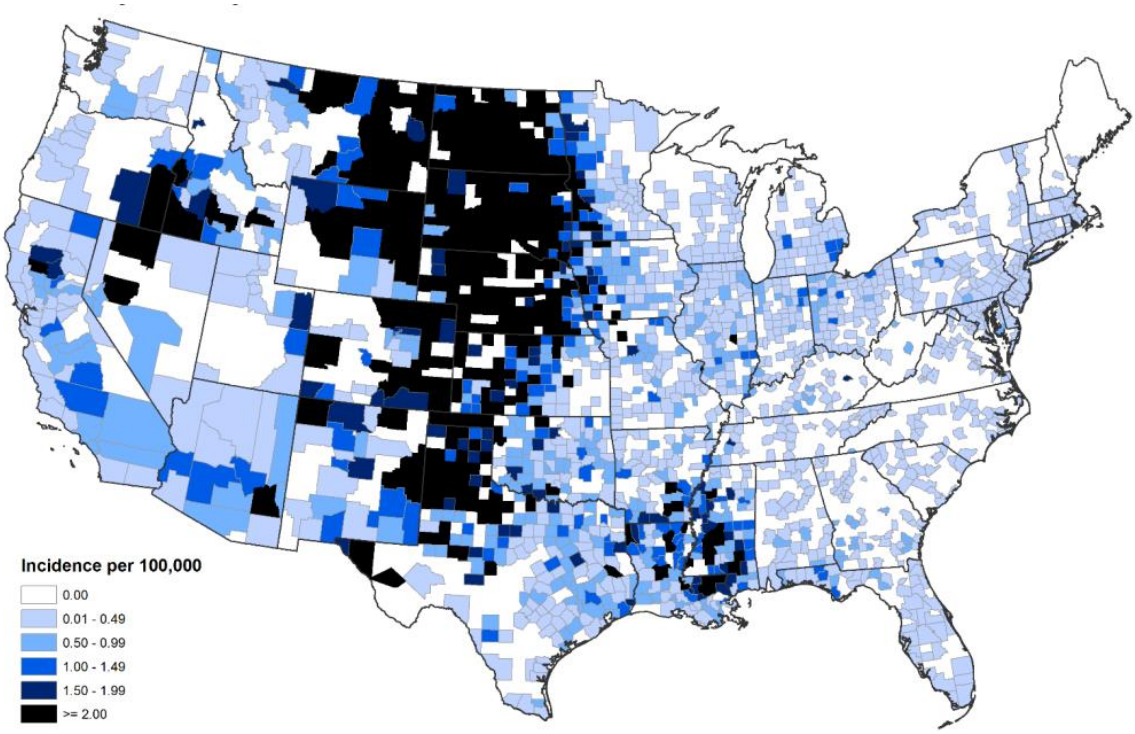

Figure 7. Average annual incidence of West Nile virus neuroinvasive disease reported to CDC by county, 1999-2015. Source: ArboNET, Arboviral Diseases Branch, Centers for Disease Control and Prevention. http://www.cdc.gov/westnile/resources/pdfs/data/7-wnv-neuro-incidence-by-county-map_1999-2015_07072016.pdf.

Neonicotinoids

Neonicotinoids are insecticides developed in the 1980s and 1990s and are now widely used in agriculture. Black-billed Magpies are opportunistic scavengers and hoarders and they do consume insects including ground beetles and caterpillars (Trost 1999). Although neonicotinoid use has been associated with declines in insectivorous birds (Hallmann et al. 2014), no studies were located that have specifically shown any association between neonicotinoid use and Black-billed Magpie declines.

Fox Squirrels

Trost (1999) noted that introduced fox squirrels (*Sciurus niger*) preyed upon Black-billed Magpie eggs and young, thereby reducing local productivity. Although the Fox squirrel range has probably expanded westward in Nebraska since settlement by European Americans, the range has also been sympatric with much of the Black-billed Magpie's range for decades, if not longer. Thus, the presence of fox squirrels does not appear to be associated with recent declines in Black-billed Magpies.

CONCLUSIONS

The abundance and distribution of Black-billed Magpies in Nebraska have changed since settlement by European Americans. Nevertheless, the species has largely been a fixture of the state's avifauna since the late 1800s, especially in the western half of the state, despite long-term general declines since the mid-1960s. Some information suggests that Black-billed Magpies increased in certain localized areas during the latter part of the 20th century, but declines have been rapid and widespread since the early 2000s. Magpies are now absent in many areas inhabited throughout the 20th Century. Even in regions where Black-billed Magpies still occur regularly, their abundance is reduced. Similar declines have been observed in adjacent areas of nearby states and generally throughout the Great Plains, although in some areas away from the Great Plains, Black-billed Magpie abundance has remained stable or numbers have actually increased.

As noted by Mollhoff (2013), recent Black-billed Magpie declines in Nebraska coincided with the arrival of West Nile Virus (WNV). Corvids are known to be susceptible to WNV and even among Corvids, Black-billed Magpies appear especially susceptible; in a laboratory study, 100% (n = 3) of Black-billed Magpies infected with the virus died (McLean 2006). However, WNV has been present throughout the continent for some time and the lack of declines (and even increases) in Black-billed Magpie numbers in some areas prompted questions as to whether WNV could be the singular cause of declines observed in Nebraska and the Great Plains. Information from the CDC that shows WNV incidence is not uniform throughout North America and that incidence is actually highest in the Great Plains does suggest that WNV may indeed be the likely principal cause of recent general Black-billed Magpie declines in Nebraska and the Great Plains.

OUTLOOK and RECOMMENDATIONS

Black-billed Magpies continue to decline in Nebraska, and additional monitoring of populations through traditional programs (BBS, CBCs) should continue. I agree with Mollhoff (2016) that magpies remaining in the state occur in isolated pockets; these pockets should be investigated to determine where they occur and reasons for their persistence. Unfortunately, unless magpie populations in Nebraska and the Great Plains naturally develop resistance to WNV, if that is indeed the cause of recent declines, it appears there are no specific management actions that can be undertaken which will have a positive impact and reverse declines. Nevertheless, additional research should focus on why Black-billed Magpies in Nebraska and on the Great Plains experience increased exposure to WNV. If current trends continue, it is conceivable Black-billed Magpies could become extirpated from Nebraska at some point in the future. Thus, it appears reasonable and prudent for the U.S. Fish and Wildlife Service to consider removing the species from their current Depredation Order or reducing the geographic area of the Depredation Order to exclude Nebraska and possibly other states in the Great Plains. Additionally, the Nebraska Game and Parks Commission should consider removing the species as a "nuisance bird" under their regulations.

ACKNOWLEDGEMENT

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