Monitoring the state-endangered Common Raven (*Corvus corax*) in southeastern Kentucky

John J. Cox and Jeffery L. Larkin

University of Kentucky
Department of Forestry
215 T.P. Cooper Bldg.
Lexington, KY 40546-0073
(859) 257-9507 (office)
(859) 323-1031 (fax)
coyote1701@yahoo.com

Abstract

In the eastern U.S., direct killing by humans and the loss of forest habitat and large mammals during the late 19th and early 20th centuries caused the extirpation of ravens in all but the most inaccessible and rugged portions of the Appalachian Mountains. Remnant raven populations in these areas have since served as a source of individuals that have successfully colonized portions of its former range. However, in many areas that appear suitable for its recovery, such as the Cumberland Plateau of Kentucky, the raven has yet to reestablish. We speculate as to what factors may be responsible for the failure of ravens to repopulate eastern Kentucky and outline our plan to assess its status in this region.

Resumen

En el este de los Estados Unidos, la perdida de bosque de hábitat y las matanzas de mamíferos grandes durante los siglos 19 y 20 causaron el exterminio de cuervos en todas las regiones de la cordillera Apalachian excepto las zonas menos accesibles. Las poblaciones remantes de cuervos han servido como una fuente de individuos que han colonizado porciones de su dominio anterior. Sin embargo, en áreas que parecen ideales para su recuperación, como la planicie de Cumberland, el cuervo no ha logrado reestablecerse. Especulamos sobre las razones del fracaso de los cuervos de volver a establecerse en el oriente de Kentucky y presentamos nuestro plan para analizar el estado actual de esta región.

The common raven, *Corvus corax,* is the largest-bodied passerine and one of the most globally widespread bird species (Boarman and Heinrich 1999). Although the raven once ranged throughout much of North America (Wilmore 1977), persecution by humans and the loss of forest habitat during the last two centuries reduced raven abundance and restricted its distribution to rugged and remote portions of its range (Wilmore 1977). In the eastern United States, the more inaccessible portions of the Appalachian Mountains served as the last stronghold of the raven during the early twentieth century. Raven Rock, Raven's Window, and Raven Gap are just a few of the dozens of place names attached to natural features throughout the eastern U.S. that commemorate the former more widespread occurrence of its animal namesake.

The common raven occurred throughout Kentucky during early European settlement, but it was most notably abundant in the mixed-mesophytic forests of the southeastern Cumberland Mountains and Cliff Section of the Cumberland Plateau (Mengel 1965; Palmer-Ball 1996). Although Mengel (1965) suggested that the raven was extirpated from Kentucky by the late 1950's, ravens have been occasionally observed in several locations in southeastern Kentucky since 1970 (Croft 1970; Davis et al. 1980; Heilbrun 1983; Smith and Davis 1979; Stamm 1981). However, it wasn't until the mid-1980s that ravens were found to nest in this region (Fowler et al. 1985). More recently and nearly 50 km northwest, ravens have been observed nesting in cliffs created by surface mining (Larkin et al. 1999; Cox et al. 2003), a phenomenon also documented in Pennsylvania (Brauning 1992).

Elsewhere in North America during the past two decades, the raven has recolonized portions of its former range (Kilham 1989; Saemann 1989) and increased in abundance (Buckelew and Hall 1994; Boarman and Berry 1995). Raven recovery has been attributed to factors that include an increase in older forests, behavioral adaptations to human landscapes, and increases in large herbivore populations that have provided more road-killed carrion (Buckelew and Hall 1994; Boarman and Heinrich 1999).

Although source populations exist in Tennessee, Virginia, and West Virginia (Buckelew and Hall 1994; Nicholson 1997), the raven has yet to recolonize greater than 95% of eastern Kentucky even though they are capable of dispersing hundreds of kilometers (Heinrich 2000). Moreover, limited recolonization has occurred despite regional trends that should favor its recovery such as increased forest cover, exponentially higher numbers of white-tailed deer, *Odocoileus virginianus*, and resultant roadkill than in past decades, and a regional decline in human population. Areas such as the Red River Gorge, Breaks Interstate Park, Big South Fork, and other cliffy sites in the Cumberland Plateau appear to have an abundance of suitable nesting sites for the raven. Further, a growing reintroduced elk, *Cervus elaphus,* population that likely exceeds 3000, as well as an established coyote population in southeastern Kentucky (Cox 2003) have provided the raven with an additional food resource and the means by which to exploit it, respectively. Unlike portions of the western U.S., predation does not cause significant mortality of elk in Kentucky (Larkin 2001; Cox 2003; Seward 2003). However, elk that succumb to meningeal worm infection, are killed by automobiles, or harvested by hunters should provide a consistent year-round source of carrion for the raven. In fact, ravens at one locale have been observed scavenging on both elk (Cox et al. 2003) and white-tailed deer (A. Miller, pers. comm., University of Kentucky). These facts suggest that the availability of nesting sites and food are not limiting factors to raven recolonization of the region.

Sensitivity to human disturbance and low survival of fledglings are two other factors that may be impeding raven recovery in the eastern U.S. Although the raven has adapted to and often thrives in human disturbed areas in the western U.S. (Boarman and Berry 1995, Knight et al. 1993, White and Tanner-White 1988), its eastern counterpart may be less tolerant of human activity. This could explain why the raven inhabits rugged, high elevation areas and its reluctance to expand into or

inability to survive in what appears to be otherwise suitable low-elevation habitat.

Research on the raven in the central and southern Appalachians, however, is scant due to the difficulty of locating and monitoring the species in rugged, relatively roadless terrain. In order to obtain a baseline estimate of abundance and distribution of the common raven in southeastern Kentucky, we plan to conduct a multiyear survey of the most rugged and roadless areas in this region. Our survey will include Cumberland, Pine, and Black Mountains that are parallel to and traverse most of the length of the Kentucky-Virginia border. We will conduct visual count surveys (Marquiss et al. 1978) as well as playback calls to elicit vocal responses from ravens that may occupy these areas. Because ravens frequent and often benefit from human-altered landscapes in the western U.S. (Boarman 1993), we also plan to survey active landfills in this area to determine if they are being used by the species. Once our survey is completed, we will evaluate the potential for future research intended to characterize demography, habitat use patterns, attributes of active nest sites, and food habits. Future studies should also examine fledgling survival and dispersal patterns to determine the fate of those individuals born in Kentucky.

We hope that our research will at minimum be able to begin to document population trends of ravens within the region and to better understand what factors allow this elusive corvid to persist in this region of the state and not others. These research efforts will assist wildlife agencies in identifying suitable habitat appropriate for reintroduction of ravens if repatriation of the species to portions of its former range becomes a management priority. Finally, given the continued large-scale surface mining and recent increase in logging in eastern Kentucky (Kentucky Environmental Quality Commission 2001), our efforts may provide insight into how such extractive activities affect the ecology and recovery of the common raven.

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