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Authors

Avery, Michael L.
Tillman, Eric A.
Humphrey, John S.

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Effigies for Dispersing Urban Crow Roosts

Michael L. Avery, Eric A. Tillman, and John S. Humphrey

USDA Wildlife Services, National Wildlife Research Center, Florida Field Station, Gainesville, Florida

ABSTRACT: The use of real and artificial effigies has proven to be an effective alternative to pyrotechnics and other traditional methods for the dispersal of nuisance vulture roosts. During the winters of 2005-2006 and 2006-2007, we applied the same principles of effigy use to a large urban crow roost in the Lancaster, PA area. The initial deployment of effigies occurred in November 2005 in a wooded area where approximately 10,000 birds had already congregated to the detriment of nearby businesses. By December, as the roost grew to approximately 40,000 birds, we successively moved the birds to a series of alternate sites along a wooded creek. In January, the crows split into smaller roosting aggregations and began to disperse. In October 2006, before wintering crows arrived, we installed effigies in wooded areas where the crows had settled the previous year. Although preferred roost habitat in 2005-2006, these areas were used only sparingly by crows throughout the second winter. Instead, crow roosting activity was focused in downtown Lancaster. At wooded sites where 5,000-10,000 birds did settle, we installed additional effigies and the birds responded by leaving. During November-December 2007, we provided technical assistance to a citizen-based crow management effort that successfully incorporated the use of artificial crow effigies with other harassment to move the roost (30,000 to 40,000 birds) to a site acceptable to the community. We conclude that crow effigies (carcasses, taxidermic mounts, or artificial models) are useful components of roost dispersal efforts and can possibly be used in other applications, such as crop damage management.

KEY WORDS: American crow, bird roosts, *Corvus brachyrhynchos*, *Corvus ossifragus*, effigy, fish crow, Pennsylvania, roost dispersal, winter roost

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INTRODUCTION

Various species of birds, including corvids, roost in urban settings around the world (e.g., Gyllin et al. 1977, Peh and Sohdi 2002). In the United States, congregations of crows numbering in the tens of thousands have been documented for many years (Emlen 1938). Reportedly, a recent tendency is for crow roosts to form in urban/suburban areas as opposed to rural sites (Gorenzel and Salmon 1995). This phenomenon might reflect increasing constriction of suitable rural habitat for roosting crows as the human population expands and impinges increasingly on wildlife habitats. Or, this could be a response to the relative safety of urban areas in contrast to regular persecution of crows by shooting that occurs in rural locales (Knight et al. 1987). Regardless of the cause, roosting aggregations comprising thousands of crows have become familiar in towns and cities across the country (Gorenzel et al. 2000).

For the past several years, wintering crows have roosted in and around the city of Lancaster, PA. It is not clear when the Lancaster roost became officially established, but Gorenzel et al. (2000) record it as existing 1-10 years. There is evidence, however, that crows have roosted in the vicinity of Lancaster for many years: "We have now a formidable 'Crow Roost' on the Conestoga, in this county, about 6 miles south of Lancaster City..." (Rathvon 1869).

Today, the Lancaster area is a matrix of residential communities, farmland, shopping centers, and industrial and light commercial development. In winter, crows use all of these areas for staging and/or roosting. The objectives of our investigation were to document the size and composition of the Lancaster winter roost and to evaluate the effectiveness of various management practices for dispersing the roost. Throughout, we emphasized the use of effigies as a new technique for crow roost management.

The use of effigies to affect crow behavior is not a new idea. For example, Marzluff and Angell (2005:141) state: "Dead crows are often hung on fences or from trees near fields. This can be effective for months, because crows readily associate death and danger with places where their brethren have died." This statement is not supported with references, however.

For crop protection, the effectiveness of effigies was assessed against carrion crows (*Corvus corone*) by Naef-Daenzer (1983:92): "Distress calls proved to be a very effective method to keep carrion crows from sprouting corn fields, while suspended bodies of dead crows had no scaring effect." Conversely, for reducing corvid depredations at California least tern (*Sterna antillarum browni*) colonies, Caffrey (1995:18) reported that "... crow carcasses work so well at Venice Beach at keeping live crows out of the nesting area that I strongly recommend we pursue this means of non-lethal intervention at sites plagued by crows." Thus, there is divergent information as to whether or not crow effigies or carcasses actually are effective in disrupting crow behavior. Furthermore, until now, no study that we are aware of has investigated the use of effigies for purposes of roost dispersal.

During the course of our research project, we were not the only ones interacting with the Lancaster crows. Faculty and students from Franklin and Marshall College and Pennsylvania State University conducted their own crow research studies concurrent with ours. In addition, a community-based crow harassment effort was organized and conducted by local citizens, the "Crow Coalition". Also, individual homeowners and businesses frequently harassed crows impinging on their properties.

STUDY AREA

Lancaster (population 56,000 in the 2000 U.S. census) is in the Piedmont region of southeastern PA, approx-

imately 95 km west of Philadelphia and 32 km north of the Maryland border. The Piedmont, the principal agricultural area of the state, is an area of gently rolling topography that formerly supported extensive hardwood forests interspersed with agriculture. Today, the region is experiencing rapid development, particularly in the Philadelphia area. The conversion of forest and agricultural lands to residential use and the resulting need for roads, power lines, and other infrastructure is likely to continue to fragment undeveloped areas throughout the region.

ROOST SITES

Roost sites used by crows in the Lancaster area changed within a given season and also varied from year to year. In general, crows used well-lighted areas in close proximity to stores, businesses, shopping malls, and parking lots. Crows roosted in trees, on roofs, and on the ground. During the winter of 2006-2007, roosting activity focused on downtown Lancaster and included the top level of a parking garage.

METHODS

Effigy Use

We employed 3 types of effigies: carcasses of recently killed American crows *Corvus brachyrhynchos* and fish crows *C. ossifragus*, taxidermic preparations of American crow carcasses, and artificial crow models sold commercially for decorative displays (<http://www.proppersource.com>). At one site, for a limited time, we installed a taxidermic preparation of a common raven *Corvus corax*. We presented each effigy by suspending it upside down from a prominent branch near the top of a centrally located roost tree. We shot an arrow with the leader line over the desired branch and the pulled the effigy into place using a waxed twine so that it hung freely and was clearly visible. We supplemented the effigies with laser harassment (Gorenzel et al. 2002) and distress calls (Gorenzel and Salmon 1993), if we determined that birds were reluctant to abandon a site due to the presence of effigies alone.

In 2005-2006, effigy deployment started after crow roosting had become established in a woodlot near a shopping mall. Subsequently, the location of the roost shifted during the winter in response to harassment efforts. In 2006-2007, our principal effort was to determine the effectiveness of a pre-emptive harassment program that featured placement of crow effigies in all the roost sites that we documented in the Lancaster area throughout the 2005-2006 winter season. Crows roosted mainly in downtown Lancaster during 2006-2007, and downtown roost

harassment was organized and performed by the Crow Coalition. A smaller number of crows also used the wooded area along Little Conestoga Creek adjacent to a truck depot, which is where we concentrated our effigy evaluations. At roosts where we installed effigies we estimated the areal extent of the roost site using images from Google Earth®.

In 2007-2008, we did not deploy effigies ourselves. Rather, we provided technical assistance and advice to the Crow Coalition, and they opted to obtain artificial effigies on their own. They installed them according to their assessment of how the effigies best fit into the on-going community-based harassment program.

Counting and Trapping

Each year, we counted crows exiting roost sites in the morning. We arrived approximately 30-40 minutes prior to local sunrise, and we enumerated individuals and groups of birds as they departed. The counts lasted approximately one hour or until the departure ended. We captured crows in modified Australian crow traps in Lancaster and in Harrisburg, approximately 65 km away. Some of the American crows we captured were used in a telemetry study conducted by researchers from Pennsylvania State University. The others were banded and released on site.

RESULTS

Responses to Effigies

In 2005 and 2006, we installed effigies in several locations where crows congregated. We employed varying numbers of effigies for various periods of time depending on the responses of the crows (Table 1). We used carcasses, taxidermic effigies, and artificial effigies throughout as we detected no differences in responses of crows to the 3 types. Typically, crows returning to the roost in late afternoon and encountering the hanging effigy reacted in several ways. The rate of calling noticeably increased and attracted other crows to the effigy location. Some birds flew back and forth over the effigy site. Birds sometimes perched nearby and continued to call. Those that perched seldom stayed more than a minute or two before moving on. These reactions were repeated many times during a given afternoon as more groups of crows returned to the roost and encountered the effigy anew. At the larger roost sites (>1 ha), with large numbers of crows (>10,000), the birds eventually settled in trees distant from the effigy. Occasionally, after dark, some crows returned to trees close to the effigies. These sites required multiple effigy installations and reinforcement with other stimuli before the birds

Table 1. Dispersal of winter crow roosts in the vicinity of Lancaster, PA during November - December 2005 and 2006.

Roost ^a	Area (ha) ^b	Effigies	Initial Count	Nights Using...			Final Count
				Effigies	Distress Call	Laser	
PCW05	6	5	30,000	28	10	6	0
MEN05	1	2	11,000	7	0	0	0
GRN05	0.9	1	5,000	7	0	0	0
UPS05	1.5	2	33,000	10	1	1	3,000
YTE06	3	2	25,000	17	9	6	0
YTW06	2.3	4	4,000	23	0	0	0

^a PCW05: 40° 4.35' N, 76° 20.62' W
 MEN05: 40° 4.28' N, 76° 20.90' W
 GRN05: 40° 4.78' N, 76° 20.48' W

UPS05: 40° 5.48' N, 76° 20.98' W
 YTE06: 40° 4.98' N, 76° 20.70' W
 YTW06: 40° 4.95' N, 76° 20.90' W

^b Areas estimated using Google Earth® images

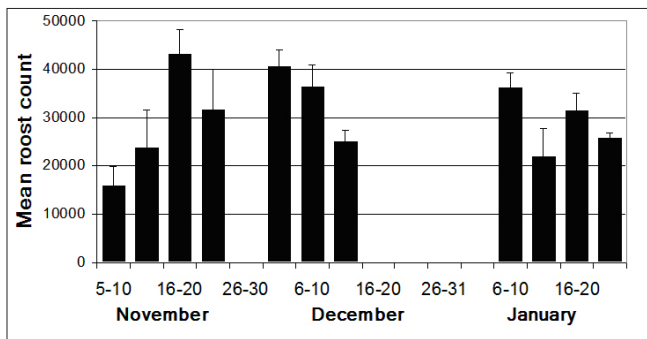


Figure 1. Mean daily counts of crows exiting roosts in Lancaster, PA during November and December 2005 and January 2006. The roost location shifted as the season progressed. Counts depicted here represent morning departures from the main roost during each week. We conducted no counts during the last week of November or during the last 2 weeks of December. Capped vertical bars denote one standard error.

abandoned them. At sites approximately 1 ha in area with <10,000 crows, the initial effigy installation was sufficient to induce abandonment.

During the 2007-2008 season, all roost dispersal efforts were conducted by Crow Coalition members. We provided technical assistance and advice on the use of effigies, but we did not deploy them ourselves. Through the use of pyrotechnics and installation of 17 artificial effigies in the Lancaster area, by mid-December the Crow Coalition had moved the roost to a site acceptable to the community, and minimal additional harassment was needed.

Roost Departure Counts

In 2005-2006, although the location and distribution of the crow population roosting in the Lancaster area was variable throughout the November-January study period, the number of birds appeared to remain reasonably constant (Figure 1). For example, our morning roost exit count on 9 November 2005 was 22,700, and our count on 29 January 2006 was 25,700. The morning counts ranged as high as 55,000 birds; the median roost count for this time period was 29,800 birds.

In 2006-2007, roost activity was primarily in downtown Lancaster and we did not monitor the size of the roosting population there. We did record the crows exiting a smaller roost adjacent to a trucking depot where we installed effigies (YTE06, YTW06; Table 1). The number of crows recorded during morning exit counts at the roost site increased through late October and early November, and then declined steadily (Figure 2). There was a noticeable decrease following installation of the raven effigy at the YTE06 site on 2 December. Community dispersal of the downtown Lancaster roost commenced on 11 December and continued until 21 December. We monitored the harassment activity through 15 December. In response to these dispersal efforts, the large downtown roost split into several smaller aggregations that dispersed throughout the greater Lancaster area.

Trapping

Despite using decoy birds of both species, our use of modified Australian crow traps resulted in an overwhelm-

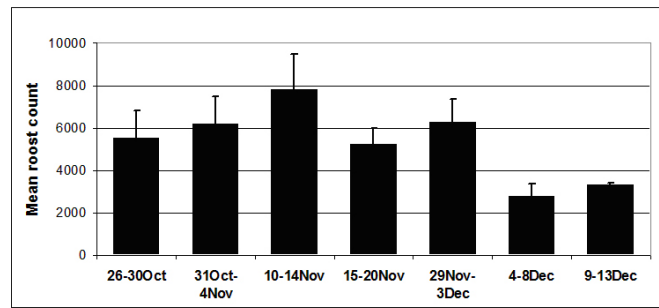


Figure 2. Mean daily counts of crows exiting a secondary roost near Lancaster, PA during October-December 2006. The main roost this season was in downtown Lancaster. Capped bars denote plus and minus one standard error.

ing proportion of fish crows being captured relative to American crows (Table 2). Furthermore, the majority of trapped crows were classified as hatching year.

It is not known whether the species and age distributions of the captured birds reflect biases in the capture method or are proportional to those in the local populations.

DISCUSSION

Crows are notoriously observant and wary of changes in their environment. They respond to effigies with alarm, which is manifested by increased rates of calling, swirling flight, tentative perching, and eventual departure from the vicinity of the effigy. The reaction of crows to effigies seems to be characterized by “out of sight, out of mind.” When it gets dark or the effigy is not visible for some other reason, crows act as if it is not there. Our strategy has been to display effigies where they were illuminated to the extent possible by ambient lighting. Any means to raise the crows’ awareness of the effigy in the roost will likely create a more effective stimulus. The raven effigy we employed at one site was probably so effective because its large size made it very prominent and difficult to miss.

It has been suggested that urban roosting crows select brightly-lit sites possibly because of increased visibility for detecting owls or other nocturnal predators (Johnson 2005). To date, there is no definitive test of this idea. Gorenzel and Salmon (1995) noted higher levels of ambient illumination at roost trees compared to non-roost trees, but this variable did not emerge as an important predictor in their logistic regression model for roost tree selection. Peh and Sodhi (2002) reported similar findings in a stepwise discriminant analysis of factors affecting roost site selection of house crows *Corvus splendens*. Our impression in Lancaster was that every place where large numbers of crows roosted was well-lit, but we were not able to quantify the level of illumination, especially at the heights the birds were perched. These days, it seems likely that all urban or suburban areas with mixed residential and commercial activity will have high levels of nighttime illumination for human security and safety reasons. Thus, it will be challenging to identify a non-illuminated urban or suburban site to use as a basis for comparison to the illuminated sites where crows roost.

Proper timing is critical for effective management of crow roosts. Early detection and deployment of harass-

Table 2. Numbers of fish crows and American crows, and the percentages that were hatching year (HY) birds, captured in Pennsylvania with decoy traps during November-December, 2005-2007. Birds were banded and released at the capture sites.

Year	Fish Crows		American Crows	
	Total	HY (%)	Total	HY (%)
2005	42	90.1	20	65.0
2006	352	86.1	11	63.6
2007	207	69.6	15	86.7
Total	601	80.1	46	71.7

ment tactics will prevent numbers from building up and will prevent birds from establishing a secure roost from which they will be difficult to disperse. For the Lancaster area, roost formation likely starts in mid-October. Aggressive efforts, including the deployment of effigies, at that time should prevent the first arriving migrant birds from establishing a roost where they are not wanted. By steering the first birds away from specific locations, it should be possible to influence their ultimate selection of a roost site. This approach presupposes that there is a place where thousands of roosting crows can be tolerated by the community, and also that there are sufficient personnel available to apply the level of consistent harassment pressure necessary to affect the crows' behavior. Based on the experience in 2007-2008, each of these conditions appears to be satisfied.

The evaluation of effigy use for crow roost management was challenged by our inability to control all of the potentially confounding factors in the study area. We had no control of crow harassment activities that occurred throughout the greater Lancaster area. Our work was superimposed on other management and research activities. The extent to which these independent activities affected our evaluation is not known. In addition, this research was not conducted on independent sets of birds. Although we varied the location of our assessments as needed in response to the movements of the birds, we were essentially dealing with a single population. This fact limits our ability to draw inferences regarding the general effectiveness or applicability of our findings.

MANAGEMENT IMPLICATIONS

Except for the raven effigy, each of the effigies we used in 2006 was artificial. We are confident, therefore, that effigies can be used successfully by anyone who has access to these decorative bird effigies. The recent success of the Crow Coalition in Lancaster attests to this. With an artificial effigy, there is no need to acquire a permit from the USFWS that would be necessary if the effigy was the carcass of an actual bird. This makes the technique freely available to the public. Although our findings support the use of effigies as a roost dispersal tool, we do not advocate relying solely on effigies for roost dispersal. When crow aggregations are relatively small, then effigies might suffice, but for large roosts it is likely that reinforcement with additional methods such as pyrotechnics or distress calls will be needed.

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