DISPERSING BLACKBIRD-STARLING ROOSTS WITH HELIUM-FILLED BALLOONS

by Donald F. Mott*

Abstract: Large (120 cm diameter) helium-filled balloons (2-10 per ha of roost) tethered about 8 m above the vegetation were effective in dispersing blackbirds and starlings from roosting sites. Bird population estimates before, during, and after balloon exposure showed that the balloons frightened the birds and caused most of them to abandon the roost. Roosting bird numbers at each of 5 test roost sites (0.3 to 1.7 ha) were reduced an average of 82% (min-max 47-100%) during 3 to 4 evenings of balloon exposure. Winds >16 km/h during the study made it difficult to keep the balloons aloft and not entangled in roost vegetation. Winds of less intensity, however, were probably beneficial since they increased balloon movement. These tests demonstrated that helium-filled balloons would be a useful addition to the list of devices used to scare blackbirds and starlings from objectionable roost sites.

INTRODUCTION

During the winter months (December-February) more than 300 million blackbirds (Icterinae) and European starlings (Sturnus vulgaris) congregate in hundreds of roosts in the southeastern United States. Many of these roosts are established in urban/suburban areas where their presence is objectionable because of health and nuisance problems. Booth (unpublished, 1971) and Mott (1980) demonstrated that these birds could be relocated by using a variety of auditory frightening devices including pyrotechnics and broadcasted avian distress calls. Use of these dispersal devices is labor intensive, however, and purchasing pyrotechnic devices and equipment for broadcasting distress calls is costly. Costs for some pyrotechnics have almost tripled since the Mott (1980) study. "Noise bombs", one of the more effective and commonly used pyrotechnics, is no longer available (M. Hyde, pers. comm.).

Bird's instinctive fear of objects above them has been exploited in developing some frightening devices. Hydrogen-filled balloons and raptor-mimicking kites suspended from helium-filled balloons have been successfully used to frighten birds from several agricultural crops that receive bird damage (Feare 1974, Conover 1982, 1984, Hothem and DeHaven 1982). The use of balloons alone for roost dispersal, however, has not been thoroughly investigated. Kalmbach (1945) reported that hydrogen-filled toy balloons were successful in frightening starlings from trees and buildings in Washington, D. C. No other reference to the use of balloons for roost dispersal was found in a search of the published literature. A few reports in the files of the U. S. Fish and Wildlife Service show mixed results on the effectiveness of helium-filled balloons for roost dispersal. In a cursory evaluation Larsen and Mott (unpublished, 1969) found that balloons frightened starlings in a holly (Ilex sp.) roost in Oregon; whereas, Stone (unpublished, 1971) observed that about 5000 birds, mostly red-winged blackbirds (Agelaius phoeniceus), did not appear to be frightened by balloons on the 2 nights they were used in a coniferous cemetary roost in Colorado.

The following study was designed to determine if blackbirds and starlings could be dispersed from winter roosts by deploying helium-filled balloons within the roosting area.

I appreciate the assistance of U.S. Fish and Wildlife Service personnel Frank Boyd, Doug Hall, James Glahn, Jon Heisterberg, Allen Stickley, Jr.,

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Table 1. Roost site characteristics, test periods and number of balloons used to disperse birds in Kentucky and Tennessee.

Location	Roost Size (ha)	Roost Habitat	Test Period	No. Balloons Used per Night
Lawrenceburg, TN	0.9	Hardwoods, briars, honeysuckle	1-3 Feb 1983	2-4
Bowling Green, KY (Yuma Drive)	0.8	Cedars	28 Feb-2 Mar 1983	5
Munfordville, KY	0.8	Cedars, hardwoods	21-25 Feb 1984	5-7
Bowling Green, KY (Russellville Road)	0.3	Scotch pine	5-9 Mar 1984	3
Louisville, KY	1.7	Hardwoods, yew, holly, briars	15-18 Jan 1985	6

and Dan Twedt who helped in various ways during the field evaluations. Sandra Silvey typed the manuscript. Reference to commercial products does not imply endorsement by the U. S. Government.

METHODS

During the winters of 1983-1985, the effectiveness of helium-filled balloons for dispersing large roosting congregations of blackbirds and starlings was evaluated. Five test roosts ranging in size from 0.3 to 1.7 ha were located in Bowling Green, Munfordville, and Louisville, Kentucky and Lawrenceburg, Tennessee (Table 1).

Large spherical rubber balloons (Catalog No. AB5.5, Weathermeasure Corp., Sacramento, CA) of 4 colors (white, yellow, red, and blue) were tested. These balloons were inflated with 100% helium (except at Lawrenceburg, TN a helium:compressed air mixture at an approximate 3:1 ratio was used) to a diameter of about 120 cm (4 ft) and placed along the edges of roosts or within the roosts where bird concentrations were highest. The balloons (2-10 per ha of roost) were tethered about 8 m above the roost vegetation with 45 kg test nylon line attached with a swivel to a wooden dowel plug in the balloon. The height of the roost vegetation at the 5 sites ranged from 5 to 15 m. The balloons were deployed during late afternoon just before the birds arrived at the roost. After dark they were removed and placed under cover, usually in a nearby building.

Estimates of the number of birds using each roost were usually made the day before the balloons were first set out. Counts were also made at least once during the balloon exposure period and again when the test was completed. Numbers were estimated by 1 or 2 observers by counting birds on flightlines as they entered or exited the roost (Arbib 1972). The species composition of the roosting population was also determined at each roost at the start of the test by randomly identifying (with binoculars) a minimum of

Table 2. Estimated number of birds in roosts before and after balloon dispersal.

Location	Bird Numbers Pre-dispersal	(Species Composition)	Post-dispersal	Percent Reduction
Lawrenceburg, TN	97,000	(60% BB[a], 23% CG[b] 17% ST[c])	51,000	47
Bowling Green, KY (Yuma Drive)	178,000	(52% CG, 32% BB[d] 13% ST, 3% RB)	26,000	85
Munfordville, KY	125,000	(74% CG, 16% BB 10% ST)	0	100
Bowling Green, KY (Russellville Rd)	85,000	(67% CG, 21% BB 12% ST)	16,200	81
Louisville, KY	157,000	(44% CG, 42% ST 12% BB, 2% RB)	5,000	97

[a] BB = Blackbirds, including red-winged and rusty blackbirds (Euphagus carolinus) and brown-headed cowbirds
[b] CG = Common grackles
[c] ST = European starlings
[d] RB = American robins

138 individuals as they entered each roost.

RESULTS

Population estimates before, during, and after balloon exposure showed that the balloons frightened the arriving birds and caused most of them to eventually abandon the roost. From 85,000 to 178,000 birds using each of the 5 test roost sites were reduced an average of 82% (min-max 47-100%) during the 3 to 4 evenings of balloon exposure (Table 2). The effects of the balloons at each site follows.

Lawrenceburg, Tennessee

During 1-3 February 1983 a roost population at this 0.9 ha site containing an estimated 97,000 birds was reduced by 47% during 3 consecutive evenings that 2-4 balloons were deployed. During this test, winds gusting to 16 km/h necessitated positioning the balloons 30 m from the roost vegetation that was composed of deciduous hardwoods with an understory of honeysuckle (Lonicera sp.) and briars (Rosaceae). On the 3rd evening of the test, an attempt was made to move the balloons closer to the roost as the birds were arriving. Because of the winds, 3 of 4 balloons were punctured on the roost vegetation. At this site, birds were noticeably frightened by the balloons and avoided areas closest to them. The use of 1/4 compressed air in balloons at this site was believed to contribute to their instability during wind gusts. Perhaps more birds could have been dispersed from this site if the balloons could have been positioned closer to the roost. This test site was part of a complex of 4 active roosts in Lawrenceburg in late January 1983. The other 3 roosts were located from 0.4 km to 1 km distant, and

probably facilitated the dispersal of birds from this site.

Bowling Green, Kentucky (Yuma Drive)

An estimated population of 178,000 birds at this 0.8 ha roost near the south edge of Bowling Green was reduced 85% over the 3 evenings that 5 balloons were exposed (28 February-2 March 1983). The test area was part of a 13 ha stand of cedars (Juniperus virginiana). Most of the birds roosted in the 0.8 ha test site which was bordered by 19 residences. Winds during the test were calmer (<13 km/h) than at Lawrenceburg, TN and thus the balloons were placed within the roost vegetation. Only 26,000 birds continued to roost in the test area after 3 evenings; whereas, 85,000 birds had moved to another portion of the cedar stand about 300 m north of the treated area. Although birds had roosted at this test site in previous winters, the roost had formed only 10 days before the test was initiated.

Munfordville, Kentucky

All the estimated 125,000 blackbirds and starlings roosting at this 0.8 ha site on the west edge of town were relocated after 4 evenings of exposure to 5-7 balloons (21-25 February 1984). This roost site (60 x 120 m), composed of a mixture of hardwoods and cedars, was part of a 1.8 ha stand of roost habitat. At the time of the test, birds roosted only in the south part of the stand. Birds had roosted at this site since November. Balloons were positioned along the edge of the roost to prevent the tether line from becoming entangled in the 15-m high roost trees. However, balloons still could not be flown 1 evening (24 February) because of strong winds (>24 km/h). After the complete dispersal of these birds no other roosts formed in the Munfordville area. A roost was reported forming at Horse Cave, KY, about 10 km south of Munfordville, within a few days of the dispersal which suggests some of these birds may have moved there from Munfordville.

Bowling Green, Kentucky (Russellville Road)

An estimated population of 85,000 birds roosting in 0.3 ha (20 x 130 m) of 5-m high Scotch pine (Pinus sylvestris) in the southwest edge of Bowling Green was reduced by 81% after 4 evenings (5-9 March 1984) of balloon exposure. This roost was reported to have first formed at this site about 1 January 1984. Two balloons were tethered on 1 side and 1 balloon was located on the opposite side of this roost. Because of 24 km/h winds balloons could not be flown on the evening of 8 March and 16 km/h winds on 10 March precluded continuation of the test to that date. Dispersed birds from this roost did not form another consolidated roost nearby but appeared as scattered flocks in evergreen vegetation throughout the community.

Louisville, Kentucky

From 15-18 January 1985 an estimated roost population of 157,000 birds occupying a 1.7 ha site on the edge of a residential area on the east side of Louisville (Jct. Hubbards Lane and Westport Road) was reduced by 97% after 4 nights of balloon exposure. Six balloons were deployed on the edge and within the habitat of deciduous hardwood saplings (9 m) interspersed with holly, yew (Taxus sp.), and briars. A few 16-m tall conifers (Pinaceae) on the north end of the roost were also being used by the birds. The roost, occupying an area 120 x 450 m, was composed of 3 adjacent but distinct parts (0.3, 0.2, and 1.2 ha). Access lanes (3-6 m wide) in the center of the 0.2 and 1.2 ha portions facilitated placement of the balloons near concentrations of roosting birds. The birds were reported to have roosted at this site since late December. Robins (Turdus migratorius) roosted at this site in previous years but this was the first time blackbirds and starlings in any numbers used it. After the first night of balloon exposure a roost began forming in evergreens in residential areas 100 m north (across Westport

Road) and east of the test roost. On succeeding nights of dispersal the concentration of birds north of Westport Road increased as the population within the test roost decreased. After 4 nights only 5000 birds remained in the original roost. Most of the dispersed birds remained at this new location in spite of being harassed by the residents. A check of the area a few weeks after the balloon test revealed that most birds still roosted there. Winds during the test were <16 km/h, within tolerable limits for balloons.

DISCUSSION

Helium-filled balloons reduced bird numbers at 5 test roosts an average of 82% from pre-treatment counts. Birds avoided those areas nearest to the balloons. The overall effect, however, was not as dramatic as observed with the use of pyrotechnics (Mott 1980). When using pyrotechnics, birds gathered in large flocks outside the roost, milled about until sunset, and then entered the roost. This was seldom observed during this test as the balloons appeared to have more subtle effects. As might be expected, birds established new roosts (when habitat was available) closer to the test areas than when using pyrotechnics. Roosting birds at Louisville and Bowling Green (Yuma Drive) moved only 100-300 m. The measure of success of a dispersal program depends on where birds relocate because new roosts can also be a problem. Although most birds at the Bowling Green (Yuma Drive) site were moved only 300 m from their previous location, they were in a less objectionable location since they were further from the residences. At Louisville, birds moved closer to surrounding residences which was undesirable.

No attempt was made to determine the species-specific effectiveness of the balloons. Common grackles (Quiscalus quiscula) were the most numerous blackbird at 4 of the 5 roosts (Table 2). Red-winged blackbirds and brown-headed cowbirds (Molothrus ater) predominated at Lawrenceburg, TN where the lowest percentage of birds were dispersed. The lower dispersal percentage at this site, however, was attributed to the lack of adequate balloon coverage of the roost rather than the species composition.

The effect of balloon colors was, likewise, not determined. At Louisville, however, the white balloons did not seem to be as visible because of overcast skies and snow cover.

The configuration of a roost influences the effectiveness of using balloons. Because of wind problems, rectangular roosts with a width of less than 100 m should be easier to disperse than larger or square-shaped roosts. In small roosts or roosts with access lanes, balloons can be tethered so that most areas are covered and the tether line will not become entangled in the vegetation. In larger roosts with limited access, dispersal may be more difficult to achieve.

Small portable strobe lights each weighing 270 g (Catalog No. 02142, Forestry Suppliers, Inc., Jackson, MS) were attached to tether lines of all balloons (at the plug) on 1 night each at 2 sites [Munfordville and Bowling Green (Russellville Road)]. Although balloons carried the strobes without difficulty, they did not appear to enhance the frightening effects. Strobes did not show up well until after dark when all birds were already in the roost.

The period of the winter when the balloon dispersal effort took place could have influenced the ease with which birds were dispersed. Roosts in January are believed to be more stable and more difficult to disperse than in March when northward migration is near. In this study, however, birds appeared to be dispersed as easily in mid-January (Louisville) as in early March (Bowling Green).

Temperatures during balloon deployment ranged from -7 to 21°C. Temperature variation did not have a noticeable effect on flying the balloons.

More helium, however, was required to fill balloons to the desired size on cold days. High winds (>16 km/h) made it almost impossible to keep the balloons aloft and not entangled in roost vegetation. Winds of <16 km/h probably were beneficial, since balloon movement was increased. It was observed that the scaring effect of the balloons could be noticeably increased by retrieving the tether line and then releasing it so that the balloon rose rapidly into the air. This procedure was tried with several of the balloons at Louisville and birds in the vicinity of a released balloon were noticeably frightened.

Helium gas usually had to be added to the balloons after 2 days to maintain their lift. Although compressed air could be substituted for a part of the helium, it is not recommended because buoyancy is reduced, particularly in winds. After the initial experience with balloons partially filled with compressed air at Lawrenceburg, compressed air was not used at any other test site.

A nearby building was available at 4 of the 5 test sites to store balloons when not in use. Unless balloons are deflated after each day's use, a place to store them is essential to protect them from unpredictable winds and potential vandals. Balloons were left out 1 night at Bowling Green (Yuma Drive) and vandals destroyed 4 of the 5 in use. Transporting inflated balloons in a vehicle is difficult.

The cost of the balloons, helium and miscellaneous materials ranged from $93.00 at the Bowling Green (Russellville Road) site (3 balloons) to $208.00 at Munfordville (7 balloons). (Losses from vandalism and balloon breakage are not included.) Balloons cost $16.00 each and were initially filled with $8.00 worth of helium. Other minor costs included tether line, swivels, stakes, and helium gas for refills. Labor costs (based on 3 hours per night at $3.35 per hour) amounted to $30.00 to $40.00 additional per site. In these tests only 1 individual was needed to set out and retrieve the balloons each evening. Thus, labor costs for dispersal with balloons would be less than with pyrotechnics and recorded distress calls. A comparison of the overall cost for balloon dispersal with more traditional methods using pyrotechnic devices is difficult to make because of a scarcity of cost estimates for dispersing roosts with similar size bird populations. Some information, however, is available from the dispersal studies of Booth (unpublished, 1971) and Mott (1980). Based on current prices for available pyrotechnics and labor (minimum wage) used in these studies, balloon dispersal costs were less especially considering that most balloons are reuseable. Also, in the Booth study broadcasted avian alarm and distress calls were used in combination with the pyrotechnics.

These tests demonstrated that helium-filled balloons would be a useful addition to the list of devices used to scare blackbirds and starlings from objectionable winter roost sites. These relatively inexpensive devices (both cost and labor) could be used by themselves at smaller roosts or in combination with other frightening devices at larger roosts to facilitate dispersal efforts.

LITERATURE CITED

ARBIB, R. 1972. On the art of estimating numbers. Am. Birds 26(4): 706-712, 814.

CONOVER, M. R. 1982. Behavioral techniques to reduce bird damage to blueberries: Methiocarb and a hawk kite predator model. Wildl. Soc. Bull. 10:211-216.

_____. 1984. Comparative effectiveness of Avitrol, exploders, and hawk-kites in reducing blackbird damage to corn. J. Wildl. Manage. 48:109-116.

FEARE, C. J. 1974. Ecological studies of the rook (Corvus frugilegus L.) in north-east Scotland. Damage

and its control. J. Appl. Ecol. 11: 897-914.

HOTHEM, R. L., AND R. W. DEHAVEN. 1982. Raptor-mimicking kites for reducing bird damage to wine grapes. Proc. Vertebr. Pest Conf. 10:171-178.

KALMBACH, E. R. 1945. Suggestions for combating objectionable roosts of birds with special reference to those of starlings. USDI Wildlife Leaflet No. 172. Washington, D.C.

MOTT, D. F. 1980. Dispersing blackbirds and starlings from objectionable roost sites. Proc. Vertebr. Pest Conf. 9:38-42.