

**EVALUATING THE EFFECTIVENESS OF ACOPIAN BIRDSAVERS
TO DETER OR PREVENT BIRD-GLASS COLLISIONS¹**

Daniel Klem, Jr.
Department of Biology
Muhlenberg College
Telephone: 484-664-3259
FAX: 484-664-3509
Email: klem@muhlenberg.edu

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ABSTRACT

A field experiment replicating windows installed in commercial and residential dwellings was used to evaluate the ability of Acopian BirdSavers to deter bird-window collisions. Acopian BirdSavers consist of vertically hung olive-colored 3.175 mm (0.125 in) parachute cord spaced 8.9 cm (3.5 in) and 10.8 cm (4.25 in) apart as two separate treatments, and were 94% and 91%, respectively, effective in significantly preventing bird strikes compared to 15% avoidance (85% strike) rate at a conventional unaltered clear glass window (control). These results reveal that BirdSavers are a highly effective means of preventing bird-window collisions, and their use should be enthusiastically encouraged.

INTRODUCTION

Recent descriptive summaries (Klem 2009a, 2009b, 2010) provide published peer-reviewed scientific evidence that clear and reflective windows are invisible, indiscriminate, unintended, and unwanted fatal hazards and a major source of human-associated avian mortality for specific species and birds in general. This study evaluates the level of protection Acopian BirdSavers provide free-flying wild birds from collisions with windows.

METHODS

Our field experiment was conducted on a 2-ha open rural area of mowed pasture bordered by second growth deciduous forest and shrubs in Henningsville, Berks County, Pennsylvania, USA (40° 27' 53" N, 075° 40' 07" W). The experimental design was reported previously (Klem 1989, 1990, 2009a), and consists of wood-framed structure replicating the installation of sheet glass windows on the first level (ground) of commercial and residential buildings and those installed as noise and protective barriers. All windows were placed in the same habitat oriented in the same direction 1 m (3.3 ft) from a tree-shrub edge facing an open field (Figure 1). Each window measured 1.2 m (4.0 ft) wide by 0.9 m (3.0 ft) high and was mounted 1.2 m (4.0 ft) above ground. Plastic mesh trays were placed under each window to catch casualties. Three window units were studied in the experiment, and were separated by 2.4 m (8.0 ft). A single platform feeder measuring 61.0 cm (24.0 in) on a side and 1.2 m (4.0 ft) above ground mounted on crossed wooden-legs centered and placed 10 m (33.0 ft) in front of each window to simulate a feeding station at a rural commercial or residential building. Feed consisted of 1:1 mixture of black-oil sunflower seeds and white proso millet. All feeders were kept full throughout the experiment. No window type was positioned at the same location on consecutive days, and each window tested was randomly assigned and moved to a new location daily. Windows were minimally checked and changed daily 30 min before last light, and for most days windows were also checked in the morning and at varying times throughout the day. In an attempt to observe active avoidance of experimental treatments

17 periods consisting of 63.5 hours of continuous observation of all treatments were conducted over 16 days (22, 26 February, 18, 21, 22, 26, 27, 28, 29 March, and 4, 8, 9, 11, 15, 18, 22 April). The flights of individual birds moving from the tray feeders toward the windows were recorded and assessed as an active avoidance if a bird changed direction and passed around or over a window. Windows were covered with opaque tarps and not monitored during inclement weather such as high winds, rain, or snow.



Figure 1. Wooden-framed experimental structure with treatments (window types) in rural Henningsville, Berks County, Pennsylvania, USA.

The parameter (criterion) measured was the number of detectable bird strikes. A strike was recorded when either dead or injured birds were found beneath a window, or when fluid or a blood smear, feather, or body smudge was found on the glass. The data are likely incomplete and conservative because a previous study where continuous monitoring occurred found that without continuous monitoring 25% of strikes went undetected, leaving no evidence of a collision (Klem 2009a). Predators and scavengers also are known to remove the dead and injured collision victims (Klem et al. 2004), making specimens unavailable for detection and collection. The length of the experiment was determined by the number of recorded strikes required to statistically evaluate the differences between treatments. The experimental period occurred during non-breeding and migratory periods (some species), but previous studies indicate no seasonal differences in the ability of birds to avoid windows (Klem 1989).

The experiment was conducted over 68 days from 9 February to 22 April 2011 and tested clear glass control (**Control**) and two spacing variations of preventive treatments known as Acopian BirdSavers: (1) a reflective (mirror) glass pane covered with 3.175 mm (0.125 in) parachute cord spaced 8.9 cm (3.5 in) from the center of one cord to the center of the next (**S-3M**), and (2) a clear glass pane covered with 3.175 mm (0.125 in) parachute cord spaced 10.8 cm (4.25 in) from the center of one cord to the center of the next (**S-4C**). The cords were olive-colored, hung vertically in columns and uniformly covered the entire pane except where the cords ended 5.1 cm (2 in) from the bottom of the window frame.

I used SPSS (SPSS Inc. 2006) for all statistical analyses. Chi-square (χ^2) goodness-of-fit was used to evaluate experimental results: number of strikes per treatment (window type) compared to a uniform distribution of strikes across all treatments. Test results were considered statistically significant when $P < 0.05$.

RESULTS

A total of 81 strikes were recorded in the experiment; 22 (27%) were fatal. The total number of strikes differed significantly across all windows, with 69 (85%) at the clear glass control, 7 (9%) at S-4C, and 5 (6%) at S-3M ($\chi^2 = 98.07$, $df = 2$, $P < 0.001$; Figure 1). One Northern Cardinal (*Cardinalis cardinalis*) died striking S-4C, and all 21 other fatalities occurred at the clear glass control and were: 1 Mourning Dove (*Zenaida macroura*), 1 Black-capped Chickadee (*Poecile atricapillus*), 3 Northern Cardinal, 1 Purple Finch (*Carpodacus purpureus*), 1 White-throated Sparrow (*Zonotrichia albicollis*), and 14 Dark-eyed Junco (*Junco hyemalis*).

The flight paths of 28 individual birds flying from bird feeders toward the experimental windows were recorded during 63.5 hours of continuous observation over 16 days. Of 6 individuals flying toward the clear glass control, 4 (67%) moved to avoid and 2 (33%) hit the window. Of 12 individuals flying toward S-4C, 11 (92%) moved to avoid and 1 (8%) hit the window. Of 10 individuals flying toward S-3M, all 10 (100%) moved to avoid the window.

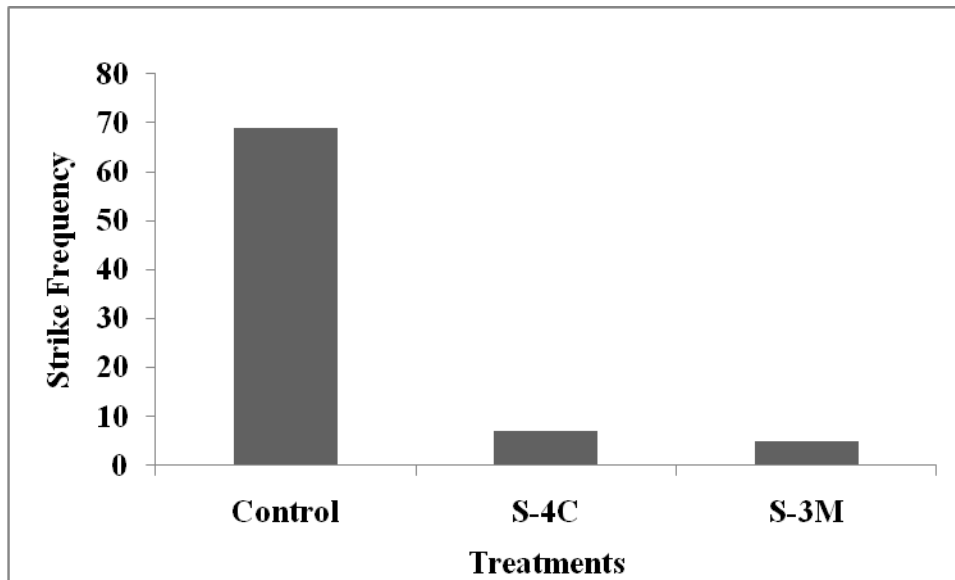


Figure 2. Bar graph of the number of total bird collisions at each window type (see text for detail).

DISCUSSION

The results of this experiment provide exceptionally strong quantitative evidence that BirdSavers are an effective means of transforming windows into obstacles that free-flying birds will see and avoid. The results of this study documenting the successful deterrence of bird-window collisions using pattern elements (3.175 mm [0.125 in] olive-colored parachute cord spaced 8.9 cm [3.5 in] and 10.8 cm [4.25 in] apart) further validate previous experiments where vertically oriented elements of various size separated by 10 cm (4 in) or less were an effective means of preventing bird kills at windows (Klem 1990, 2009a).

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