**Klem collisions solutions testing protocol**

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Our field experiments were conducted on a 2-ha area of mowed pasture bordered by second growth deciduous forest and shrubs in Henningsville, Berks County, Pennsylvania, USA (40u 279 530 N, 075u 409 070 W). The basic design of the

two field experiments was the same as reported previously (Klem 1989, 1990, 2009b), consisting of wood-framed picture windows, simulating those in houses. All windows were placed in the same habitat facing the same direction along the edge of trees and open field (Klem 1989: fig. 1). Each window measured 1.2 m wide 3 0.9 m high, and was mounted 1.2 m above ground. Plastic mesh trays were placed under each window to catch casualties. Three window units were used in the first experiment and four in the second; all windows in both experiments were separated by 2.4 m. Simulating a feeding station at a commercial building or residential home, a single platform feeder measuring 30.5 cm on a side and 1.2 m above ground mounted on crossed wooden-legs were centered and placed 10 m in front of each window. Feed consisted of a 1:1 mixture of black-oil sunflower and white proso millet. All feeders were kept full throughout each experiment. Controls and treatments were randomly assigned daily to a new position with the exception that no treatment or control was permitted in the same position on consecutive days. Windows were checked each day 30 min after first light and checked and changed daily 30 min before last light. In an attempt to observe active avoidance of treatments, all windows in the second experiment were monitored during multiple- hour continuous periods totaling 63.5 hrs over 16 days (22, 26 Feb, 18, 21, 22, 26, 27, 28, 29 Mar, and 4, 8, 9, 11, 15, 18, 22 Apr 2011). The observer was positioned 20 m from and in the middle of the window units in a camouflaged blind behind the platform feeders. 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.

The parameter measured in the experiments 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. As in previous studies of similar design (Klem 1989, 1990, 2009b; Klem et al. 2004), the data are likely to be incomplete and conservative because some strikes may not have

left evidence of a collision. Additionally, predators and scavengers are known to remove some injured or dead birds (Klem 1981, 2009b; Klem et al. 2004; Hager et al. 2012).

Our field design can accommodate a maximum of four window units; two experiments were required to test the effectiveness of the preventive methods studied. The first experiment was conducted over 75 days from 3 October–18 December 2010, and compared clear (seethrough) and reflective (mirrored) glass controls and an ORNILUX Mikado window offering UV signals as a see-through pane simulating installation

in a corridor between buildings, as a noise barrier along roadways, or as glass walls around zoo enclosures or building atria.

The second experiment was conducted over 68 days from 9 February–22 April 2011, and tested the clear glass control, ORNILUX Mikado pane covering a recessed non-reflective black wooden board simulating a window that covered a darkened room, and two vertically striped spacing variations of preventive treatments known as

Acopian BirdSavers: (1) a clear glass pane covered with 3.175 mm parachute cord spaced 10.8 cm from the center of one cord to the center of the next, and (2) a reflective (mirror) glass pane covered with 3.175 mm parachute cord spaced 8.9 cm from the center of one cord to the center of the next.

Our experimental protocol was approved by our Institutional Animal Care and Use Committee (IACUC), and birds killed during the study were salvaged under state and federal permits. Chisquare goodness-of-fit was used to compare the frequency of strikes among treatments in the two experiments, and test results were considered statistically significant when P , 0.05 (Siegel 1956). We used SPSS (SPSS 2010) for all statistical analyses of the experiments.