EFFECTS OF AERIAL LINES ON RED-WINGED BLACKBIRD NESTING SUCCESS

William H. Clark, Department of Biological Sciences, Stevens Hall, North Dakota State University, Fargo, ND 58105 USA
E-mail: William.Clark@ndsu.nodak.edu

George M. Linz, USDA/APHIS, Wildlife Service, National Wildlife Research Center, 2110 Miriam Circle, Suite B., Bismarck, ND 58501 USA
E-mail: George.M.Linz@aphis.usda.gov

William J. Bleier, Department of Biological Sciences, Stevens Hall, North Dakota State University, Fargo, ND 58105 USA
E-mail: William.Bleier@ndsu.nodak.edu

Abstract

Crop damage attributed to foraging red-winged blackbirds continues to be a problem in localized areas of the United States. Therefore, new methods that are both environmentally and public friendly need to be developed for repelling blackbirds. One such method that is more humane and less hazardous than the chemical control is the use of aerial lines to repel birds. The purpose of this study was to evaluate the effect of aerial lines on the reproductive effort of nesting red-winged blackbirds and to determine the spacing, type, and size of aerial lines that are most effective. Maximum likelihood estimates for the probability of daily nest survival were obtained for 6 experimental groups: (1) sham, (2) control, (3) 15-cm spaced monofilament, (4) 30-cm spaced monofilament, (5) 15-cm spaced FireLine®, and (6) 30-cm spaced FireLine®. Three models were created for the data collected. Of the models, only one was significantly different (Model 1) from the others (Model 2 and 3), and for this reason we can conclude that aerial lines (0.878) have an significantly different probability of daily nest survival then the controls (0.931). Because the other two models (Model 2 and 3) did not differ from one another, we concluded there seems to be no difference between line spacing and no decision could be made on line type.

Introduction

The red-winged blackbird (RWBL) is one of the most abundant birds in all of North America (Dolbeer 1980, Beletsky 1996). During the breeding season, both male and female RWBLs eat aquatic insects; however, males will also feed in upland areas. During the nonbreeding season, their diet consists of a preponderance of plant matter (Beletsky 1996). For this reason, RWBL damage to crops continues to be a problem in localized areas of the United States. In addition to economic losses, bird damage may intensify conflicts between agricultural interests and the enforcement of laws protecting wildlife (Stone et al. 1984, Tipton et al. 1989). When chemicals are shown to be environmentally harmful or when public unease grows over the mass killing of wildlife, new methods of repelling RWBLs need to be evaluated (Aguero 1990). A more humane and less hazardous technique is the use of aerial lines to repel birds. Although the use of lines is not a new technique (McAtee and Piper 1936), applications have been preformed largely on aquatic sites. Overall aerial lines have shown promise in reducing bird damage at both agriculture and aquaculture facilities.

The purpose of the study was to determine if the presence of aerial lines in nesting territories affects reproductive effort of RWBLs and also to determine the spacing, type, and size of aerial lines that serve as an effective deterrent for highly motivated (territorial) RWBLs. In order to evaluate the effectiveness of aerial lines, this project was designed to maximize the amount of contact individuals had with aerial lines. To accomplish this goal, individual nests were targeted because a female RWBL will visit her nest during nestling feeding an average of 8-12 times per hour for approximately 9 days (Patterson 1991).

Materials and Methods

Field Site. During the spring of 2003, six roadside ditches were chosen in the vicinity of Pingree, North Dakota. Our study area, which is in the Southern Drift Plain of North Dakota, is dominated by agricultural crops and wetlands. The major crops are small grains, soybeans, and sunflower. Due to large amount of wetlands in the Southern Drift Plain, breeding RWBLs are numerous. Roadside ditches were selected based on the following parameters: percent of cattail (>75%), width of ditch (>3m), length of ditch (>30m) and presence of male territorial RWBLs (>6).

Treatments. Either FireLine® (fishing line) (4.5 kg test) or monofilament line (fishing line) (4.5 kg test) was strung horizontally between two vertical wooden poles, which were placed within the bird's territory (Figure 1). The poles were 6 meters apart, and the height of the lowest line was just above the height of the vegetation. Lines were tied to one pole and then secured to the other pole with a metal clip. Consequently, if a bird collided with one of the lines, the line would come loose from the clip and the bird would not be injured. Six different "treatments" were tested. One treatment served as a sham, that is, there was no treatment at all, other than two strands of flagging tied to two cattail stalks that were 6 meters apart. In a second treatment (control), two wooden poles spaced 6 meters apart were placed within a territory. Four additional treatments included poles spaced at 6 meters with monofilament line or FireLine® strung between the poles. One of these treatments had 15-cm spacing between each line, and another one had 30-cm spacing between lines (Figure 1).

Data Collected. The reproductive effort of individuals was evaluated with nest checks that occurred at three-day intervals. During these checks, data on number of eggs, hatch date, number of nestlings, and number of individuals fledged were collected. We used Program MARK (White and Burnham 1999) to estimate a daily survival rate for focal nests and provide information on differences in nest success among treatment groups.

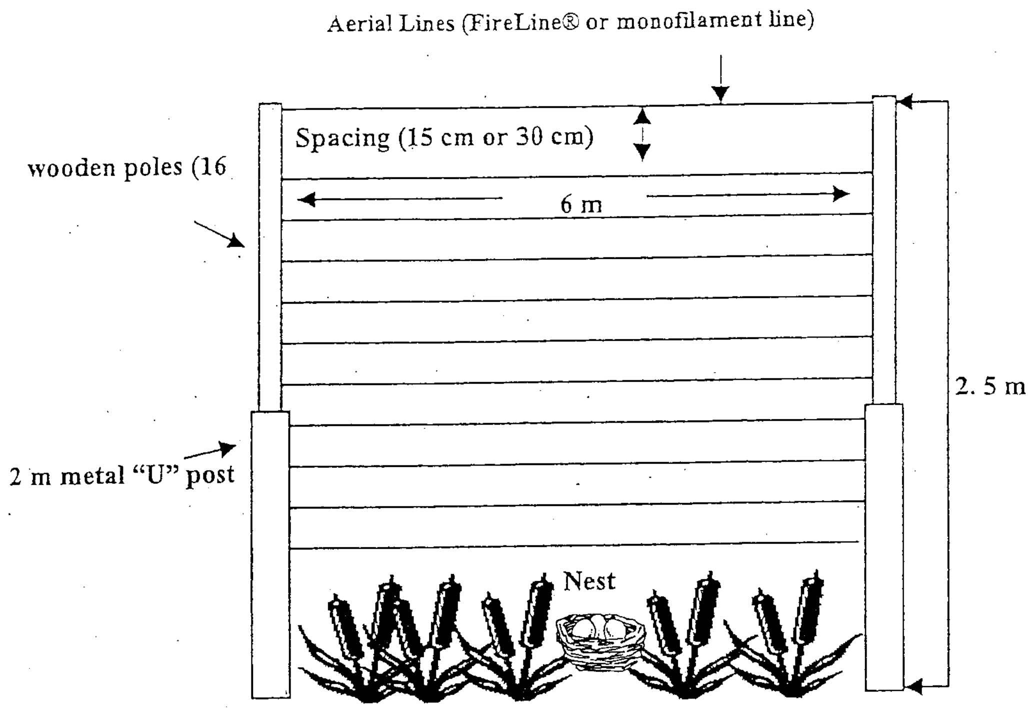

Figure 1. Diagram (not to scale) of an experimental plot.

Results and Discussion

A total of 36 focal nests was observed in this study: 6 nests in each of the 6 treatments. Three models were designed and program MARK was used to estimate the nest daily survival. The delta AIC value of 0 represents the best model, but models with delta AIC less than 2 are not significantly different. Model 1 compares the nest daily survival probability for all treatments tested (Figure 2). Model 1 is not the best model to explain the most difference in daily nest survival (Figure 2).

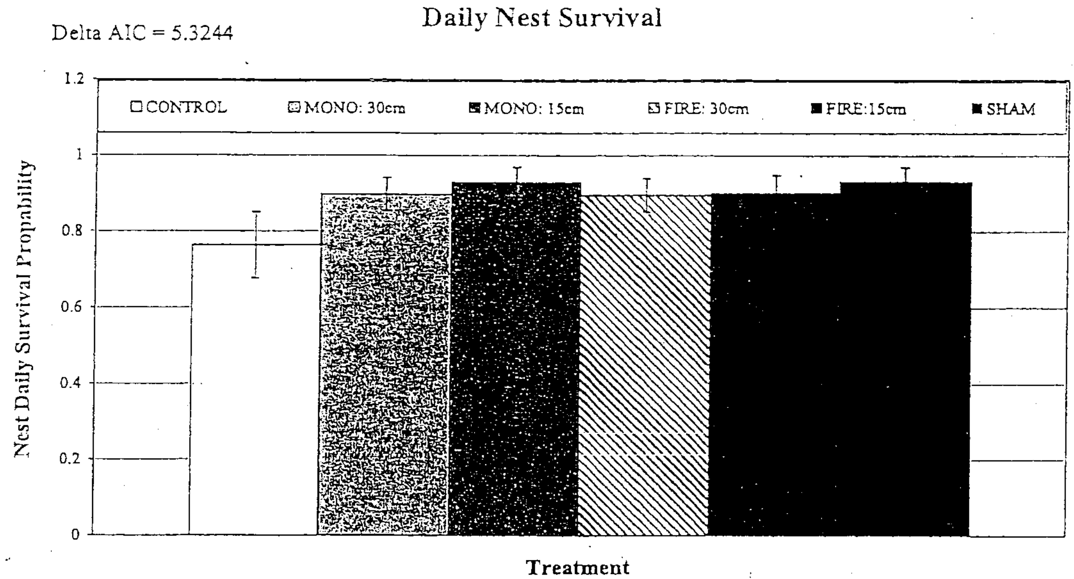

Figure 2. Comparison of the probability of daily nest surviving versus the treatment type. The delta AIC value is well over 2 suggesting that this is not the best model for the data collected.

Program MARK designed Model 2 which compares daily survival rate of FireLine® (15 cm and 30 cm), monofilament line (15 cm and 30 cm) and Controls (Sham and Control)(Figure 3). This model disregards line spacing and lumps the two control types together. This figure and delta AIC value (1.1490) shows that there is a significant difference between Model 1 and Model 2. By lumping line size and controls, we design a better model to explain the data.

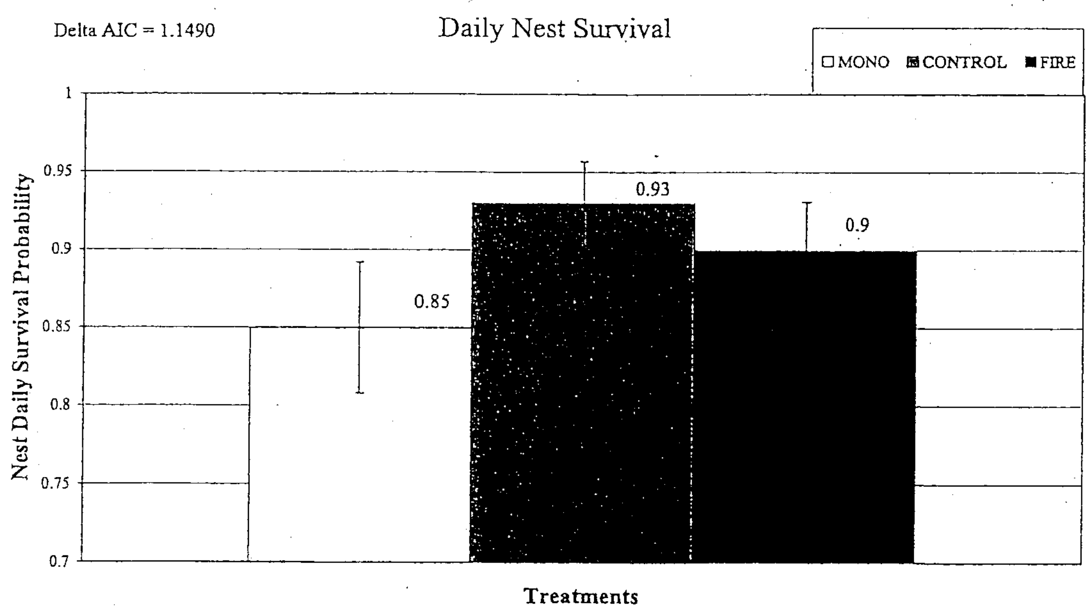

Figure 3. Comparison of the different nest daily survival probabilities independent of line spacing. The delta AIC value is less than 2 suggesting this is a good model for the data collected.

Next, a model was designed that compares aerial lines (FireLine® and monofilament line (15 cm and 30 cm) and Control (Sham and Control) (Figure 4). This model lumps the line treatments together and compares that condition to the controls. According to the delta AIC values for this model, it was the best model for the data. The delta AIC value was not larger than 2, thus no decision could be made on the difference between Model 2 and 3. Furthermore, all that could be derived from these results was that daily nest survival was lower in both models for those plots with aerial lines present.

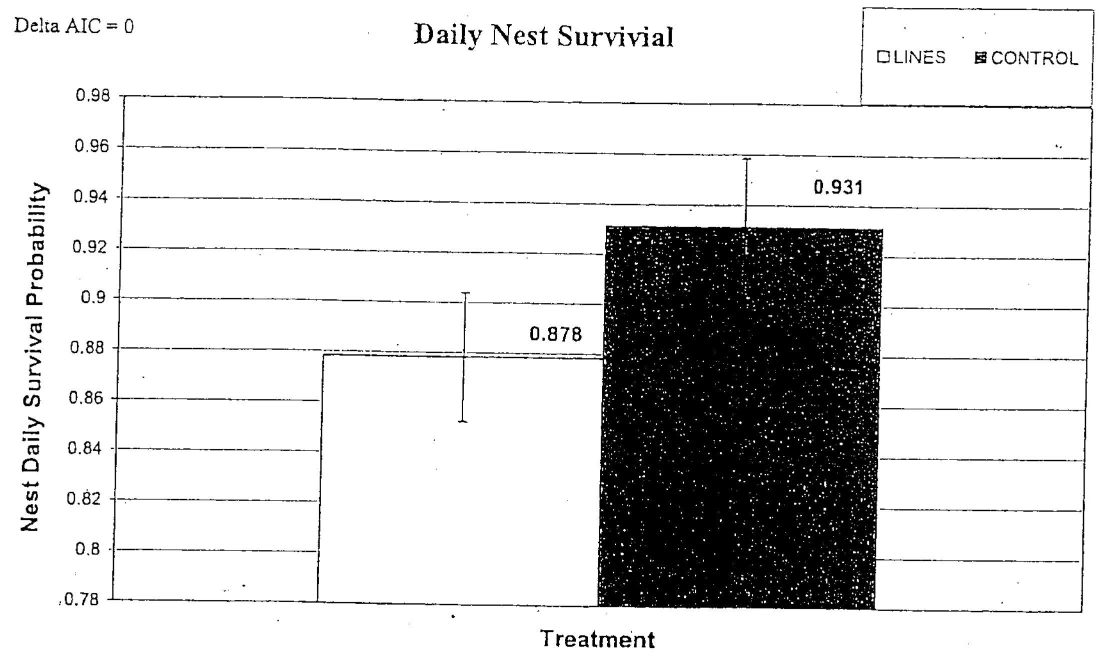

Figure 4. Comparison showing the daily nest survival probability of aerial line and control treatments collectively. The delta AIC value is zero suggesting this is the best model for the data collected.

Conclusions

Together, North Dakota, South Dakota and Minnesota lose approximately 20 million dollars a year to crop predation by RWBLs (USDA 1997). This research is being conducted to evaluate a new technique to reduce sunflower depredation by RWBLs. The use of this technique may be feasible on parts of large fields and for small high-value fields. Fields in which the sunflower heads are normally bagged may now have an alternative technique that requires less effort. Our preliminary data suggest that aerial lines might affect fecundity by decreasing the daily survival rate of nests. In 2004, further research will be done to evaluate the use of this technique to protect sunflower.

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