September 2003

BLACKBIRD AND STARLING STRIKES TO CIVIL AIRCRAFT IN THE UNITED STATES, 1990-2001

Scott C. Barras
USDA/APHIS/WS National Wildlife Research Center

Sandra E. Wright
U. S. Department of Agriculture, National Wildlife Research Center, 6100 Columbus Avenue, Sandusky, OH 44870

Thomas E. Seamans
USDA/APHIS/WS National Wildlife Research Center, thomas.w.seamans@aphis.usda.gov

Follow this and additional works at: https://digitalcommons.unl.edu/icwdm_usdanwrc

Part of the Environmental Sciences Commons

https://digitalcommons.unl.edu/icwdm_usdanwrc/200
BLACKBIRD AND STARLING STRIKES TO CIVIL AIRCRAFT IN THE UNITED STATES, 1990-2001

SCOTT C. BARRAS, U. S. Department of Agriculture, National Wildlife Research Center, P. O. Box 6099, Mississippi State, MS 39762

Sandra E. Wright, U. S. Department of Agriculture, National Wildlife Research Center, 6100 Columbus Avenue, Sandusky, OH 44870

Thomas W. Seamans, U. S. Department of Agriculture, National Wildlife Research Center, 6100 Columbus Avenue, Sandusky, OH 44870

Caused some of the most devastating aircraft accidents related to bird strikes in the United States and Europe. To determine the annual number of strikes involving blackbirds and starlings were reported to the FAA from 46 states and the District of Columbia. The annual number of strikes increased, 1990-2001. Most strikes occurred during daylight from late spring to early fall. Damage was reported for only 5.9% of the strikes involving blackbirds and starlings, but reported costs totaled $1,607,317. Recommended management strategies for reducing strikes with blackbirds and starlings in the airport environment include removal and pruning of woody vegetation to reduce or remove suitable roosting areas, exclusion of perches, and exclusion of small grain agriculture.

Key words: Aircraft, airport, bird strike, blackbirds, European starling, Icteridae.

METHODS

Strikes involving blackbirds and starlings were reported sometimes by group, such as “blackbird,” and sometimes by the exact species involved. We extracted all records of strikes involving these groups and by individual species listed in Table 1. We assimilated information on date, location, species, cost of repairs, damage, number struck, and time of day for each reported strike. We calculated descriptive statistics using Microsoft Excel and SAS statistical software (SAS 1990) to illustrate patterns of bird strikes involving blackbirds and starlings and to illustrate trends in bird strikes that involved these species.
Table 1. Number of strikes to blackbirds and starlings reported to the FAA National Wildlife Strike Database, 1990-2001.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackbirds</td>
<td>57</td>
<td>70</td>
<td>72</td>
<td>77</td>
<td>61</td>
<td>71</td>
<td>55</td>
<td>63</td>
<td>81</td>
<td>43</td>
<td>57</td>
<td>52</td>
<td>759</td>
</tr>
<tr>
<td>Boat-tailed grackle (Quiscalus major)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Bobolink (Dolichonyx oryzivorus)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Brewer's blackbird (Euphagus cyanocephalus)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Brown-headed cowbird (Molothrus ater)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>Common grackle (Quiscalus quiscula)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td>European starlings (Sturnus vulgaris)</td>
<td>44</td>
<td>49</td>
<td>57</td>
<td>57</td>
<td>60</td>
<td>48</td>
<td>64</td>
<td>76</td>
<td>77</td>
<td>95</td>
<td>133</td>
<td>92</td>
<td>852</td>
</tr>
<tr>
<td>Grackles</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>10</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>33</td>
<td>800</td>
</tr>
<tr>
<td>Great-tailed grackle (Quiscalus mexicanus)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Red-winged blackbird (Agelaius phoeniceus)</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>Yellow-headed blackbird (Xanthocephalus xanthocephalus)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>122</td>
<td>134</td>
<td>139</td>
<td>123</td>
<td>121</td>
<td>127</td>
<td>155</td>
<td>170</td>
<td>145</td>
<td>205</td>
<td>160</td>
<td>1704</td>
</tr>
</tbody>
</table>

RESULTS

During 1990-2001, 1,704 strikes involving blackbirds and starlings were reported to the FAA National Wildlife Strike Database. Strikes involving these species were reported from 46 states and the District of Columbia (Table 2). The number of reported blackbird and starling strikes increased, 1990-2001 ($t = 4.01; df = 11; P = 0.003$), nearly doubling during the 11 years (Fig. 1). Meanwhile, there was no statistical increase in the number of airports reporting blackbird and starling strikes, 1990-2001 ($t = 1.59; df = 11; P = 0.143$). However, the number of strikes reported and number of facilities reporting strikes over time were positively correlated ($r = 0.77, P = 0.003$).

Most strikes occurred from late spring through early fall, though strikes were reported for each month (Fig. 2). Mean monthly strike rate was essentially constant from November to April, but beginning in May, increased more than 5-fold and peaked in August (Table 3). Most (72% of total reported strikes, 84.4% of strikes where time was reported) reported strikes occurred during the day (Fig. 3), although strikes were reported for dawn, dusk, and night categories as well.

Strikes were reported to involve 9 species of blackbirds, cowbirds, and starlings (Table 1). Half (50%)
of the strikes involved European starlings. Unfortunately, few blackbirds involved in strikes were identified to species; 44.5% were simply identified as blackbirds. This category likely included starlings and various blackbird species such as red-winged blackbirds (Agelaius phoeniceus), common grackles (Quiscalus quiscula), and brown-headed cowbirds (Molothrus ater). Most reported strikes involved single birds (62.9% of strikes where data were submitted on bird number), 31.5% involved 2-10 birds, 4.9% involved 11-100 birds, and few (< 1%) involved >100 individuals (Fig. 4).

Information on damage was reported for 83.1% of reported blackbird and starling strikes (Table 4). In most cases where damage status was reported (77.2%), no damage was observed. Only 5.9% of all reported blackbird and starling strikes cited at least some aircraft damage. Costs associated with strikes to blackbirds and starlings were reported for only 34 of 1704 reported strikes. Reported costs totaled $1,607,317 for 1990-2001, of which $1,145,727 was reported as repair costs and $461,590 in other costs. Total costs averaged $47,274.03 per damaging strike when costs were reported.

DISCUSSION

Our analyses demonstrated that the number of reported strikes to blackbirds and starlings increased, 1990-2001. This increase reflected general increases in total wildlife strikes (Cleary et al. 2002). Observed increases in reported strikes might be attributed to a combination of factors that are not mutually exclusive. First, bird strike reporting rates, usually 15-25%, might have increased because of increased awareness of the bird strike problem (Dolbeer 2000). Second, the increased number of blackbird and starling strikes might be due in part to increased use by aircraft of airspace also used by an extremely large population of birds (Dolbeer 2000). The number of aircraft operations during this period increased (Dolbeer 2000). Although populations of the most abundant species of blackbirds (red-winged blackbirds, common grackles, brown-headed cowbirds) and starlings remain large (Dolbeer 2003), they are not increasing (Sauer et al. 2002) simultaneous with increases in air traffic.
ability of insects and seeds, which are important foods to blackbirds during summer (Dolbeer 1994), may be greater in late summer and early fall in airport grasslands than other times when birds are flocked. Also, agricultural crops are often grown near airports (Cleary and Dolbeer 1999), and this period of increased strikes coincides with the ripening of cereal grains in some parts of the United States. The combination of naïve immature individuals, formation of flocks, availability of food in airport grasslands, and attractive agricultural feeding habitats surrounding airports during late summer might explain increased strikes to blackbirds during this period.

Diurnal strike patterns observed in these analyses reflected the diurnal habits of these species (Bent 1965). However, we expected more strikes during crepuscular periods, given the roosting habits of blackbirds and starlings and daily movements of flocks between roosts and feeding areas (Bent 1965, Lyon and Caccamise 1981, Dolbeer 1984).

Inferences about the strike patterns of individual species are difficult to develop, and may not be reliable. Many of the species are quite similar in appearance, and the voluntary nature of strike reporting subjects the data to species-specific reporting bias (Barras and Dolbeer 2000). Most of the strikes were reported by non-biologists (Cleary et al. 2002), such as mechanics and pilots, who did not recover and examine the bird carcasses or might have mis-identified them. Blackbirds, as a general category, almost certainly included some starting strikes. Thus, sound inferences may be limited to the use of the broad category “blackbirds and starlings.” Interestingly, most of the strikes that involved these flocking birds were reported as strikes to single birds. This result might indicate that their carcasses are difficult to find because of their small size (40-120 g), or that reports might have been completed incorrectly and incidents involving multiple birds were reported as a single strike. In cases of reports from maintenance crews, organic matter remaining following a jet engine ingestion of these birds would have left few clues to the number of birds involved. Typically, only a small sample of tissue is submitted to the FAA for species identification purposes.

As predicted by Dolbeer et al. (2000), the frequency and cost of damaging strikes that involved blackbirds and starlings were relatively low compared to overall wildlife strike means (Cleary et al. 2002). However, strikes involving blackbirds and starlings have resulted in some of the most catastrophic bird strike incidents worldwide (Thorpe 1996, 1998; Cleary and Dolbeer 1999). Many of these catastrophic incidents were not included in this analysis because they happened prior to the development of the national FAA database or they happened overseas, outside of the jurisdiction of the FAA. The occasional damaging effect that these small birds have on aircraft might be due to the high density of their bodies relative to other birds (Scamans et al. 1995) and their flocking behavior (Dolbeer 1984). These factors, combined with their large population sizes (Dolbeer 1990, Dolbeer 2003), may enhance the severity of the hazard for damaging strikes.

**MANAGEMENT IMPLICATIONS**

Management of blackbirds and starlings often involves exclusion netting for area protection (Feare and Swannack 1978, Feare and Wadsworth 1981, Dolbeer 1994, Johnson and Glahn 1994), which might have application for airport buildings. Airfield vegetation management, especially removal and pruning of woody vegetation to reduce or remove suitable roosting areas (Wright 1967, Good and Johnson 1978, Lyon and Caccamise 1981, Dolbeer 1984), is generally recommended. Perch exclusion also has been recommended on airport structures such as signs, fences, buildings, and antennae through placement of wire strands and specialized
barbed products (Lefebvre and Mott 1987, Johnson and Glahn 1994). Management of food resources also might reduce blackbird and starling use of airports. On-site options include application of insecticides to reduce invertebrate populations on airport grasslands. Off-site, land use practices such as cereal grain agriculture should be prohibited within established regulatory distances (Cleary and Dolbeer 1999).

FUTURE RESEARCH

We recommend research to determine if insecticide application might reduce bird use of airport grasslands. We also recommend studies to determine the reliance of blackbirds and starlings on perches such as fences, signs, light fixtures, and building ledges, and studies of the efficacy of exclusion devices for reducing use of airfield structures by different species.

ACKNOWLEDGMENTS

This study was supported by the USDA National Wildlife Research Center and FAA. Opinions expressed in this study do not necessarily reflect current FAA policy decisions governing the control of wildlife on or near airports. We thank E. Cleary, B. Pogiali, and L. Smith for valuable logistical assistance. We also thank R. Dolbeer and L. Schafer for helping to improve earlier versions of this manuscript.

LITERATURE CITED


MAKING MANAGEMENT


