Human–Wildlife Interactions 7(1):10-15, Spring 2013

Commentary

Rethinking airport land-cover paradigms: agriculture, grass, and wildlife hazards

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The various habitats that compose airport property, particularly undeveloped lands, inherently contribute in some measure to attraction of wildlife and, subsequently, the risk of wildlife–aircraft collisions. Many airports control large tracts of land outside air-operations areas for safety and security and to mitigate noise pollution. In the contiguous United States, the average size of airports that are approved for regularly scheduled passenger traffic (i. e., certificated) by the Federal Aviation Administration (FAA) is 761 ha (DeVault et al. 2012). Although airports operate under numerous constraints when selecting land covers (Federal Aviation Administration 2012), turf grasses (managed, domesticated grass varieties) and other herbaceous plants are common and widespread. Depending on airport type, 39 to 50% of airport properties in the contiguous United States are covered by grasses (DeVault et al. 2009, 2012), most of which is mowed periodically but not harvested for hay. Many interpret airport grasslands, especially when maintained at about 15 to 25 cm in height by mowing, as the safest possible land cover with regard to its degree of attractiveness to bird species that are hazardous to aircraft (Seamans et al. 2007). However, this assumption has not been addressed adequately (Blackwell et al. 2013), and, in the absence of reliable data on alternatives, the widespread use of such grasslands as a land cover has become standard practice at airports.

Grass-dominated plant communities (e.g., managed turf grass) can attract wildlife, such as Canada geese (*Branta canadensis*), gulls (*Larus* spp.), and large flocks of European starlings (*Sturnus vulgaris*), which are hazardous to aircraft (Dolbeer and Wright 2009, DeVault et al. 2011, Washburn and Seamans, in press), and mowing does not necessarily confer an enhanced level of aircraft safety with regard to wildlife relative to unmowed grassland at airports (Seamans et al. 2007, Blackwell et al. 2013). Further, mowing is a maintenance expense that also produces greenhouse gases, counteracting recent industry initiatives to improve environmental sustainability at airports (McAllister 2009, Infanger 2010). In addition, mowing often attracts hazardous species, such as cattle egrets (*Bubulcus ibis*), European starlings, and raptors that feed in the wake of the mowers. Given the economic and environmental drawbacks of maintaining large expanses of grass, it could be advantageous for some airports to consider land-cover alternatives, especially outside air-operations areas, if these land covers also reduced use by wildlife species that are hazardous to aircraft (Blackwell et al. 2009, Martin et al. 2011, DeVault et al. 2012; see also Blackwell et al. 2013, Martin et al., in press). With support from the FAA, we are investigating wildlife use of several alternative land covers, such as photovoltaic solar arrays, biofuel crops (e.g., switchgrass [*Panicum virgatum*]), native tall-grass prairie mixtures, and more traditional agricultural crops (e.g., soybeans). We are comparing wildlife communities associated with these land covers to those occupying existing airfield grasslands typically found at airports (e.g., see U.S. Department of Agriculture 2012). Our goal is to evaluate the feasibility of using alternative land covers at airports and to provide airport managers and biologists with regionally-appropriate and safe land-cover options.

We recognize that wildlife frequently pose serious risks to aircraft and that safety is the primary concern for airports (Dolbeer et al. 2012; DeVault et al., in press). Aviation safety should not be compromised because of other interests at the airport, including agricultural production for economic gain and wildlife conservation (Federal Aviation Administration 2006; DeVault et al. 2012; Blackwell et al. 2013; Martin et al., in press). Our research is focused on identifying land covers that will not increase wildlife hazards relative to existing airfield grasslands and adjacent areas, and, ideally, to identify land covers that result in reduced wildlife hazards. Several recent research efforts into alternative land covers at airports demonstrate the viability of our approach. For example, Linnell et al. (2009) found that areas of a Hawaiian airport covered by wedelia (*Wedelia trilobata*), a hardy, low-growing plant in the sunflower family (Asteraceae), harbored fewer insects, rodents, and individuals of several granivorous bird species compared to control plots composed primarily of grasses. Schmidt et al. (in press) found that in western Ohio, native warm-season grasslands were similar to airfield grasslands with regard to their use by birds that are hazardous to aviation. Also, DeVault et al. (unpublished data) compared bird use of photovoltaic solar arrays to that of existing airport grasslands in three states and concluded that the presence of photovoltaic solar arrays did not increase risk of damaging wildlife strikes.

Despite our emphasis on aviation safety and the promising results from early field studies, a great deal of consternation with our research goals and approach has been conveyed, as, for example, in a recent newsletter from Embry-Riddle Aeronautical University (2013). Much of the opposition appears related to FAA guidance discouraging all types of agriculture at U.S. airports because of the potential to attract wildlife (Federal Aviation Administration 2007). However, these regulations allow for exceptions when "the airport has no financial alternative to agricultural crops to produce income necessary to maintain the viability of the airport" (Federal Aviation Administration 2007). In such cases, airports can lease their properties for agriculture (allowable crop types are unspecified), as long as "minimum distances" between edges of agricultural fields and certain airport features are observed. These distances vary, depending on the size and type of aircraft using the airport, and they range from 38 to 175 m for runway centerlines, 91 to 305 m for runway ends, 14 to 59 m for taxiway centerlines, and 12 to 51 m for apron edges (Federal Aviation Administration 1989; see also Federal Aviation Administration 2012). We note that these regulations are applicable only to those airports that are certificated by or that otherwise receive funding from the FAA; there are thousands of small airports and landing strips in the United States that operate under no restrictions with regard to land use (Dolbeer et al. 2008, DeVault et al. 2012). Also, these regulations provide no restrictions for agricultural production on private land adjacent to airports, which, in some cases, is closer to air-operations areas than airport property where agricultural production is discouraged.

Given the nature of the regulations described above (and the costs associated with mowing grassland areas), it is not surprising that agriculture is common at U.S. airports. Moreover, with the current lack of information and specific recommendations concerning types of agriculture suitable for airports, crops often are planted that are known attractants to hazardous wildlife species (Cerkal et al. 2009; Figure 1). For example, DeVault et al. (2009) studied bird communities and land covers at 10 small airports in Indiana and found that a corn-soybean rotation was the second most common land cover overall (20% of area), following only

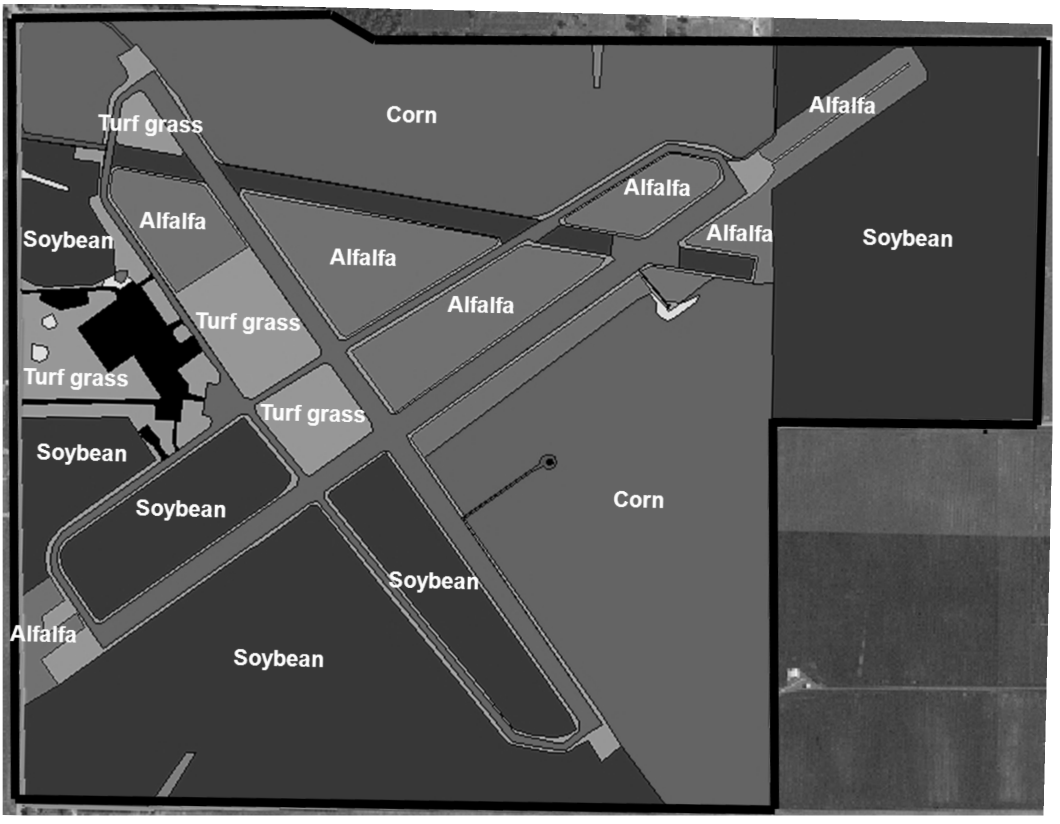

Figure 1. Land cover at a small (general aviation) airport in Indiana, studied by DeVault et al. (2009). The bold line indicates the perimeter of the airport property.

short (mowed) grass (40%). Wheat and other small grains, which are attractive to many species that are hazardous at airports, also are commonly grown at U.S. airports (T. L. DeVault, personal observation).

Critics of our research program are concerned that agriculture and other alternative land covers will attract birds hazardous to aviation and thereby adversely affect aviation safety; they suggest that conducting research on this topic opens an area of inquiry best left alone. However, as stated above, this position ignores current practice at many airports and seems to imply that the default land cover at airports (i.e., managed grasslands) offers the least attractive land cover for wildlife. Virtually all land covers present at an airport (even pavement and roofs; e.g., Dwyer et al. 1996) can attract wildlife, and grasslands are no exception. For example, turf grass is a highly selected habitat type, and some grass species provide a preferred forage for Canada geese (Mowbray et al. 2002, Washburn and Seamans 2012), the bird species that has caused more damaging strikes to civil aircraft in the United States than any other (Dolbeer et al. 2012). We contend that airfields and adjacent airport properties should be managed to reduce the presence of land covers that are attractive to the most hazardous wildlife species (i.e., those most likely to cause aircraft damage when strikes occur; Dolbeer and Wright 2009, DeVault et al. 2011).

There are numerous agricultural crops and other alternative land covers that could be evaluated for use in airport environments. For example, Sterner et al. (1984) identified 28 crops for which there were no records of bird use. Given the variety of options available, it seems likely that land covers can be identified that are not attractive to the most hazardous wildlife species and, thus, have potential for use within airport environments (Linnell et al. 2009, Blackwell et al. 2009, DeVault et al. 2012). Further, if suitable alternative land covers can be identified that do not increase, or even reduce, wildlife hazards, policies can be put in place to prohibit (i.e., no waivers granted) growing of crops that are known attractants, including certain grain crops.

We agree that there is a place for turf grass in airport management and that some grass species are better choices than others (Washburn and Seamans 2012, in press), especially within and adjacent to air-operations areas and other critical locations with specific safety requirements (Federal Aviation Administration 2012). However, we maintain that at many airports there is an overreliance on grass (especially managed turf grass) as a land cover (see Bormann et al. 2001 for a similar discussion of residential and industrial lawns), and we question the level of safety that grass provides from a wildlife perspective relative to other land covers that might be deployed in some situations based on geographic location and proximity to air-operations areas. The recent newsletter from Embry-Riddle Aeronautical University (2013) notes that although the FAA is currently considering revising its advisory circular on hazardous wildlife attractants (Federal Aviation Administration 2007), "no mention is made of changing the policy guidance regarding agriculture on airports in the draft changes" (Embry-Riddle Aeronautical University 2013). However, the FAA has recognized that airports continue to question options for safe land covers outside air-operations areas and is collaborating with our research group to answer these questions. The revision of the FAA advisory circular (Federal Aviation Administration 2007) does not provide new guidance on agriculture, because the research that might provide such information is currently in progress. The draft document does not advise against research directed at this question. Further, in addition to the FAA sponsoring research on this topic, the U.S. Department of Defense is pursuing research and demonstration projects on alternative land covers and habitat management practices for airfield environments that will reduce wildlife hazards to aircraft (Strategic Environmental Research and Development Program [SERDP]-Environmental Security Technology Certification Program [ESTCP] 2013).

We suggest that 1 reason for the preponderance of grass at airports, as well as the prevalence of agriculture that attracts hazardous wildlife, is the lack of science-based recommendations on safe alternative land covers. However, the editorial in the Embry-Riddle Aeronautical University newsletter opposes investigation into alternative land covers, stating, "Why spend tax money researching airports as agriculture sites…have they never heard of risk?" (2013). As we stated above, simply planting grass and mowing it may not equate to risk reduction. By failing to investigate candidate land-cover options that might prove safe and, in some cases, return revenue to airports, airport wildlife management falls short in 2 critical ways. First, such a failure propounds as fact the sweeping dogma that all agriculture on airports is unsafe. Second, this approach of deriding research champions the perception of safety in merely what is familiar, but does not necessarily lower the risk of damaging strikes.

Our research is intended to provide updated information so that airport managers and biologists can make informed decisions about land management at airports. We encourage discussions among professionals from a diversity of disciplines (e.g., wildlife management, aviation safety, landscape architecture, and civil engineering) as we work toward innovative land-cover solutions at airports.

Acknowledgments

L. Clark, E. Poggiali, M. E. Tobin, and J. R. Weller provided helpful comments on the manuscript. We thank the FAA, U.S. Department of Agriculture, and Mississippi State University for funding our research on alternative land covers at airports. Opinions expressed in this study do not necessarily reflect current FAA policy decisions governing the control of wildlife on or near airports.

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