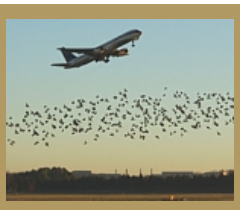
Wildlife Services

Protecting People
Protecting Agriculture
Protecting Wildlife

FY 2015

Reducing Wildlife Hazards to Aircraft and Other Vehicles



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Groups Affected by This Problem:

- Airline passengers, pilots, crews, owners, and administrators
- Aircraft and engine manufacturers
- Insurance underwriters
- Military pilots and aircrews
- Residents near airports

Major Cooperators:

- Airline Pilots Association
- Airports across the United States
- Bird Strike Committee USA
- Federal Aviation Administration
- Indiana State University
- Mississippi State University
- National Association of State Aviation Officials
- North Carolina Division of Aviation
- North Carolina State University
- Port Authority of New York and New Jersey
- Purdue University
- University of Georgia
- U.S. Air Force
- U.S. Air Force Bird Air Strike Hazard (BASH) Team at Kirtland Air Force Base
- U.S. Army
- U.S. Fish and Wildlife Service
- U.S. Marine Corps
- U.S. Navy

National Wildlife Research Center Scientists Study Wildlife Hazards On and Near Airports

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research organization devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and socially responsible methods, tools, and techniques. The NWRC field station in Sandusky, Ohio, is dedicated to providing a scientific foundation for WS and Federal Aviation Administration (FAA) programs that reduce wildlife collisions with aircraft. Consequently, the scientists work closely with WS airport programs throughout the nation, the FAA, and the U.S. Department of Defense.

To be certified for commercial passenger traffic by the FAA, many U.S. airports are required to develop and implement a wildlife hazard management plan. The FAA strongly discourages any management practice that might create a significant attractant to wildlife hazardous to aircraft in the vicinity of an airport. NWRC scientists conduct research to provide guidance to the FAA, WS, and the general public regarding mitigation of wildlife-aircraft strike hazards. More specifically, NWRC research is focused on understanding the nature of wildlife hazards on and near airports; developing management methods and tools to reduce those hazards; and providing WS, airport personnel, and the FAA with information on the latest strategies for controlling wildlife hazards.

Applying Science and Expertise to Wildlife Challenges

Alternative Land Uses at Airports. — The average commercial airport in the contiguous United States is approximately 2,000 acres. About 39 percent of that area is covered by grasses. However, few studies have evaluated the economics and safety of these grasses relative to other types of land cover. Managed turf grasses are expensive to maintain and can attract wildlife hazardous to aircraft, such as Canada geese, gulls, and large flocks of European starlings. Land cover that attracts fewer wildlife and generates income instead of consuming airport resources might provide an alternative to turf grasses on some portions of airport properties. NWRC researchers and collaborators recently studied the ways birds respond to photovoltaic solar arrays on airports and adjacent airport grasslands in Arizona, Colorado, and Ohio to determine whether photovoltaic solar arrays increase the risk of bird-aircraft collisions. Although researchers observed more birds in the areas with solar arrays than in the grasslands, those observed represented fewer and less hazardous species than those in the grasslands. The results suggest that even though birds were found in areas with solar arrays, the number and type of birds there do not necessarily increase the risk of bird-aircraft collisions and do not conflict with safety regulations concerning wildlife at airports. Solar arrays could play a major role in efforts to design and operate "greener"-and safer-airports.

Animal Detection and Response to Vehicle Approach. — Vehicle collisions with animals are a costly problem. Little is known, however, about what goes wrong from an animal's perspective when it collides with an automobile, boat, or aircraft. For an animal to avoid a vehicle on a collision course, it must successfully detect the vehicle, recognize it as a threat, and take appropriate evasive action. This means there are sensory, cognitive processing, and behavioral hurdles that must be overcome to successfully avoid an oncoming vehicle. Failure at any point can result in a collision. Birds primarily rely on antipredator behaviors to avoid vehicles. Unfortunately, modern automobiles and aircraft are much faster than natural predators. Birds may be ill-equipped in terms of being able to become alert and respond to these vehicles in time to avoid collision, given the vehicles' speed. To better understand animal responses to approaching vehicles, NWRC researchers conducted several experiments looking at flight initiation distances (FIDs)-that is, the distances at which an animal starts moving away from disturbing stimuli such as predators, humans, or other threats. In field and video playback experiments with white-tailed deer, brown-headed cowbirds, and turkey vultures, NWRC researchers found that escape behaviours (FID responses) generally appeared to be based on distance from the vehicle rather than time available for escape. These findings suggest that the animals' escape responses are successful only up to a certain threshold speed, and that it is more difficult for them to avoid vehicles approaching at high speeds. Researchers are planning more studies aimed at better understanding how animals detect and respond to high-speed vehicles. They also hope to explore ways to help animals avoid collisions by making vehicles appear closer with special lights or other visual cues.

Helicopters and Bird Strikes. — Although helicopters are commonly used in military operations, no assessment of wildlife strikes to military helicopters had been conducted until recently, when NWRC researchers launched the first scientific analysis of this phenomenon. The analysis included data from all four military branches and the FAA's National Wildlife Strike Database for civil airports. Analysis showed the number of bird strikes to helicopters was highest during fall and lowest during winter. Also, raptors and vultures were commonly associated with the most damaging helicopter strikes. The analysis indicated that temporal patterns of wildlife-helicopter strikes were similar to those for fixed-wing aircraft, but that the spatial patterns were different. Almost half of the reported strikes to helicopters occurred while the aircraft was en route (not taking off or landing), whereas the frequency of strikes for fixed-wing aircraft was lowest during this time. Larks, perching birds, doves, and pigeons were the birds most frequently struck by military helicopters. This difference in the patterns of bird strikes depending on aircraft type warrants further study to determine where solutions exist. As with fixed winged aircraft, bird strikes to helicopters are costly, with the average cost of a damaging strike ranging from $12,000 to $337,000 per incident. Bird strikes to civil and military helicopters resulted in 61 human injuries and 11 lives lost since 1990.

Mammal Strikes at U.S. Airports. — Wildlife collisions with U.S. civil aircraft cost more than $900 million each year, with mammals 5 times more likely to cause damage than other wildlife. NWRC researchers examined mammal collisions with aircraft at all airports in the FAA National Wildlife Strike Database from 1990 to 2010 to characterize these incidents by airport types (i.e., general aviation (GA) airports and Part-139 certificated (certified) airports). Certified airports had more than twice as many incidents as GA airports. These incidents occurred most frequently during October and at night. More damaging aircraft incidents occurred at GA airports and were usually caused by deer. Researchers note the frequency of incidents coincides with species relative abundance and behavior. Species considered most hazardous to aircraft included mule deer, white-tailed deer, and domestic dog (relative hazard scores = 100, 89, and 78, respectively). Researchers recommend that airports located in areas with high deer populations install additional exclusion devices. By prioritizing management activities by species, airports can reduce mammalian risks to U.S. civil aircraft.

Selected Publications:

Blackwell, B.F., T.W. Seamans, T.L. DeVault. 2014. White-tailed deer response to vehicle approach: Evidence of unclear and present danger. PLoS ONE 9(10):e109988. doi: 10.1371/journal.pone.0109988.

DeVault, T.L., B.F. Blackwell, T.W. Seamans, S.L. Lima, and E. Fernandez-Juricic. 2015. Speed kills: ineffective avian escape responses to oncoming vehicles. Proceedings of the Royal Society B 282:20142188. doi: 10.1098/rspb.2014.2188.

DeVault, T.L., T.W. Seamans, J.A. Schmidt, J.L. Belant, B.F. Blackwell, N. Mooers, L.A. Tyson, and L. VanPelt. 2014. Bird use of solar photovoltaic installations at US airports: Implications for aviation safety. Landscape and Urban Planning 122:122-128. doi:10.1016/j.landurbplan.2013.11.017.

Schwarz, K.B., J.L. Belant, J.A. Martin, T.L. DeVault, and G.Wang. 2014. Behavioral traits and airport type affect mammal incidents with U.S. civil aircraft. Environmental Management 54:908-918. doi: 10.1007/s00267-014-0345-4.

Washburn, B.E., P.J. Cisar, and T.L. DeVault. 2014. Wildlife strikes with military rotary-wing aircraft during flight operations within the United States. Wildlife Society Bulletin 38(2):311-320. doi: 10.1002/wsb.409.

Major Research Accomplishments:

- WS research determined that photovoltaic solar arrays could serve as an alternative land use at airports and do not increase the risk of bird-aircraft collisions nor conflict with safety regulations concerning wildlife at airports.
- To better understand animal responses to approaching vehicles, WS researchers conducted several experiments looking at flight initiation distances (FIDs)--that is, the distances at which an animal starts moving away from disturbing stimuli such as predators, humans, or other threats. FID responses appeared to be based on distance from the vehicle rather than time available for escape.
- WS experts conducted the first assessment of wildlife strikes to military helicopters which indicated approximately half of the reported strikes occurred while helicopters were en route (not taking off or landing). Strikes were most likely to occur in the fall, with the most damaging strikes involving raptors and vultures.
- Wildlife collisions with U.S. civil aircraft cost more than $900 million each year, with mammals 5 times more likely to cause damage than other wildlife. WS analysis showed deer to be the most damaging mammal species.