Wildlife Services

Protecting People
Protecting Agriculture
Protecting Wildlife

National Wildlife Research Center

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New Technologies to Deter Wildlife from Airports and Aircraft

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Major Cooperators

- Federal Aviation Administration
- Airports across the United States
- Airline Pilots Association
- Port Authority of New York and New Jersey
- National Park Service
- U.S. Air Force Bird Air Strike Hazard (BASH) Team at Kirtland Air Force Base
- U.S. Air Force
- U.S. Marine Corp
- U.S. Dept. of Navy
- National Association of State Aviation Officials
- North Carolina Division of Aviation
- California State University at Long Beach
- Auburn University
- North Carolina State University
- Michigan State University
- Indiana State University
- Purdue University

Groups Affected by This Problem

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

NWRC 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 acceptable methods, tools, and techniques. The NWRC field station in Sandusky, OH, is dedicated to providing a scientific foundation for WS and Federal Aviation Administration (FAA) programs that reduce wildlife hazards at airports. Subsequently, the scientists work closely with WS airport programs throughout that nation and the FAA.

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 serve as an attractant to wildlife in the vicinity of an airport. NWRC scientists conduct research to provide guidance to the FAA regarding mitigating bird-aircraft strike hazards. NWRC research is focused on understanding the nature of wildlife hazards at airports, developing management 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 & Expertise to Wildlife Challenges

Wildlife Habitat Management and Other Land-Use Studies On and Near Airports—Habitat management is fundamental to reducing wildlife use of airfields. NWRC scientists have studied vegetation types and vegetation management practices at airports to identify strategies for making areas on and near airports less attractive to wildlife. For example, researchers examined the foraging preferences of Canada geese among commercially available turfgrasses and are providing recommendations to airport officials across the United States about vegetation types that do not attract grazing geese.

Safe management of stormwater runoff on and near airports is another focus of research. NWRC scientists and WS biologists have developed models of bird use of stormwater-detention ponds and identified factors that discourage birds from using these facilities, particularly within airport approach/departure zones. This research will aid in the design of new airport facilities.

NWRC scientists also are studying waste management facilities and trash-transfer stations near airports to determine which features of these facilities make them attractive to wildlife. Proper design and management of waste-management facilities could reduce their attractiveness to wildlife and thus decrease potential hazards to aviation.

Wildlife Deterrents and Repellents—NWRC scientists investigated the use of gull effigies (e.g., replicas or taxidermic specimens) for dispersing gulls from landfills and other locations near airfields. Gulls were successfully repelled by effigies at loafing areas, but not at feeding and nesting locations. When other bird management techniques, such as pyrotechnics, were used in conjunction with effigies, gulls were successfully repelled from all areas. Scientists conclude that effigies can serve as an additional non-lethal tool for dispersing gulls from airfields, landfills, and other locations where large congregations of gulls are not desirable.

Further efforts are underway to evaluate the effectiveness of overhead grids, shock strips, and other scare devices as non-lethal bird deterrents. Early results are promising, and data are being collected regarding flock responses to these management tools.

Bird Movements On and Near Airports—Using traditional marking techniques and satellite telemetry technologies, NWRC scientists are studying the movements of large birds like bald eagles, osprey, and Canada geese around commercial and military airports. These studies provide detailed information on daily and seasonal bird movements,

the timing of bird activities and altitudes at which birds fly. By analyzing the airspace used by both birds and aircraft, researchers are able to quantify the risk birds pose to civil and military flight operations. In one study involving 300 marked Canada geese (10 with satellite transmitters), NWRC scientists observed that 1) resident Canada geese pose a hazard to safe aircraft operations, 2) harassment programs can move geese within a large area but do not necessarily reduce the hazard, and 3) a goose removal program eliminated problematic geese and reduced goose-aircraft collisions. This research provides essential information to the development of management strategies for effective wildlife hazard management on and near airports.

Exploiting Wildlife Anti-Predation Behaviors and Visual Ecology to Reduce Hazards to Aviation—By understanding factors that control wildlife responses to predation events, scientists can better discern the mechanisms that underlie responses of wildlife to different types of human activities, such as aviation. For example, variations in animal vision and other sensory systems may shed light on how animals detect and avoid threats from approaching aircraft, other vehicles, wind turbines and communication towers. NWRC scientists, along with university and private partners, are working to enhance animal avoidance behaviors related to vehicle approach and vehicle-based lighting treatments.

Keeping Earthworms Off Runways— Earthworms are an attractant to birds, such as gulls, blackbirds, and starlings. These birds, in turn, can pose a severe threat to aviation safety. When worms emerge from underground after heavy rains, they often crawl onto airport runways where they attract foraging flocks of birds. In September 2004 at Calgary International Airport, two large passenger aircraft incurred significant damage when they struck gulls during takeoff. Investigations showed the gulls had been attracted to the airport to feed on earthworms that had crawled onto the runways. Furthermore, the earthworms themselves can create slippery conditions for aircraft rolling over them on runways.

NWRC scientists are evaluating the use of physical and chemical barriers to prevent earthworms from moving onto runways where they would be attractive to foraging birds. Preliminary results indicate that a combination of chemical and physical irritants might be most effective in keeping earthworms off runways.

Selected Publications:

Blackwell, B. F., L. M. Schafer, D. A. Helon, and M. A. Linnell. 2008. Bird use of stormwater-management ponds: decreasing avian attractants on airports. Landscape and Urban Planning 86:162–170.

Blackwell, B. F., and S. E. Wright. 2006. Collisions of red-tailed hawks (Buteo jamaicensis), turkey (Cathartes aura), and black vultures (Coragyps atratus) with aircraft: implications for bird strike reduction. Journal of Raptor Research 40:76-80.

DeVault, T. L., J. E. Kubel, D. G. Glista, and O. E. Rhodes, Jr. 2008. Mammalian hazards at small airports in Indiana: impact of perimeter fencing. Human-Wildlife Conflicts 2:240-247.

Schafer, L. M., B. F. Blackwell, and M. A. Linnell. 2007. Quantifying risk associated with potential bird-aircraft collisions. In Proceedings of the International Conference on Ecology and Transportation. Eds. C. L. Irwin, D. Nelson, and K.P. McDermott. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC. Pp. 56–63.

Seamans, T. W. and K. C. VerCauteren. 2006. Evaluation of ElectroBraid fencing as a white-tailed deer barrier. Wildlife Society Bulletin 34:8-15.

Seamans, T. W., S. C. Barras, G. E. Bernhardt, B. F. Blackwell, and J. D. Cepek. 2007. Comparison of 2 vegetation-height management practices for wildlife control at airports. Human-Wildlife Conflicts 1:97–105.

Seamans, T. W., S. C. Barras, and G. E. Bernhardt. 2007. Evaluation of two perch deterrents for starlings, blackbirds and pigeons. International Journal of Pest Management 53:45–51.

Seamans, T. W., and D. A. Helon. 2008. Evaluation of an electric mat as a white-tailed deer (Odocoileus virginianus) barrier. International Journal of Pest Management 54:89–94.

Washburn, B. E., S. C. Barras, and T. W. Seamans. 2007. Foraging preferences of captive Canada geese related to turfgrass mixtures. Human-Wildlife Conflicts 1:214-223.

Washburn, B. E., and T. W. Seamans. 2007. Wildlife responses to vegetation height management in cool-season grasslands. Rangeland Ecology and Management 60:319–323.

Washburn, B. E., R. B. Chipman, and L. C. Franceour. 2006. Evaluation of bird response to propane exploders in an airport environment. Proceedings of Vertebrate Pest Conference 22:212–215.

Major Research Accomplishments:

- WS established the efficacy of an endophyte-infected tall fescue variety and Zoysiagrass (warm season grasses native to China, Japan and other parts of Southeast Asia) in reducing foraging by Canada geese.
- WS and academic colleagues partnered in an on-going research effort to develop new guidance on the design of stormwater-management facilities on and near airports to reduce use by wildlife.
- WS validated the use of gull effigies to disperse gulls from areas around landfills and other locations near airfields.
- WS studied the bird-aircraft strike risk posed by breeding and migrating birds, such as bald eagles, osprey, and Canada geese.
- WS partnered with colleagues in academia and private industry to develop and patent devices that enhance wildlife avoidance behaviors in response to approaching vehicles (e.g., aircraft).
- WS evaluated the use of physical and chemical barriers to prevent earthworms from moving onto runways where they would be attractive to foraging birds.

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