Wildlife Services

Protecting People
Protecting Agriculture
Protecting Wildlife

National Wildlife Research Center

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Reducing Wildlife Hazards to 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. Army
- U.S. Marine Corp
- U.S. Dept. of Navy
- National Association of State Aviation Officials
- North Carolina Division of Aviation
- Auburn University
- North Carolina State University
- Michigan State University
- Indiana State University
- Purdue University
- Mississippi State University
- Oklahoma State University
- National Center for Atmospheric Research

Groups Affected by These Problems

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

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, OH, 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 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 create an attractant to wildlife in the vicinity of an airport. NWRC scientists conduct research to provide guidance to the FAA regarding mitigation of wildlife-aircraft strike hazards. NWRC research is focused on understanding the nature of wildlife hazards on and near 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 and Expertise to Wildlife Challenges

Wildlife Habitat Management and Other Land-Use Studies— Habitat management is fundamental in reducing wildlife use of airfields. NWRC scientists have studied vegetation types and vegetation management practices 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. NWRC scientists also are evaluating wildlife use of various agricultural crops to determine whether some may be safe for planting on and near airports.

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. Researchers suggest that stormwater ponds be located as far away as possible from other water resources, but recommend a minimum of one kilometer of separation between a planned stormwater facility and other water resources. Currently, NWRC scientists and university colleagues are modeling bird use of stormwater ponds that are characteristic of facilities found near certificated airports. This research will aid in the design of new airport facilities.

Bird Movements On and Near Airports— Biologists quantify bird movements in relation to airport locations and aircraft flight patterns to better understand wildlife strike risks. Researchers studying neck-collared Canada geese near John F. Kennedy International Airport in New York found that individual birds remained within five kilometers of their original marking location more than 90 percent of the time. In addition, 78 percent of locations used by the marked geese were within eight kilometers of the airport, indicating that site-specific management of Canada geese within eight kilometers of the airport will likely reduce the risk of goose strikes. NWRC scientists are also studying the movements of raptors such as bald eagles, osprey, red-tailed hawks, and vultures 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.

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 visual capabilities 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 detection and avoidance behaviors related to vehicle approach using vehicle-based lighting treatments. Studies show that vehicle lighting (varied by pulse frequency) can be used to enhance a bird's abilities to detect and avoid approaching ground-based vehicles and aircraft. Researchers also found that the response of a species to an approaching vehicle depends not only on its visual capacity but also on its innate response to predators. For example, with a reduced ability to visually track an object, brown-headed cowbirds were especially alert to an approaching vehicle under specific vehicle-lighting treatments, which might also cause them to flush earlier to reduce the risk of predation, according to researchers. In contrast, mourning doves—with wider fields of vision and an ability to detect more-distant objects—maintained position, possibly relying on cover for safety.

Evaluating Avian Radar— Recently, the Federal Aviation Administration (FAA) provided NWRC researchers with funding to evaluate the effectiveness of avian radars at airports. The effort brings together experts in wildlife biology, ornithology, radar engineering, and system integration from government, industry, and academia to evaluate the MERLIN Avian Radar System by DeTect, Inc.—one of several radar systems used to detect birds at and near airports. The assessment effort is part of the FAA's overall investigation into the effectiveness of commercially available avian radar detection systems at U.S. civil airports when used in conjunction with other known wildlife management and control techniques. Though it is well established that radar can detect wild birds, there is little published information concerning the accuracy and detection capabilities related to range, altitude, target size, and effects of weather for avian radar systems. NWRC researchers are leading the effort involving experts from the National Center for Atmospheric Research and several universities. Efforts involve 1) a technical evaluation of the candidate radar system, including sensor components and associated data delivery systems, 2) field evaluations of system accuracy using remote controlled aircraft and wild birds, 3) an assessment of the integration of radar technology with other, more traditional aspects of wildlife hazard management at airports, and 4) a behavioral study on the potential effects of radar energy on bird behavior. Information gathered from these studies might contribute to the development of future wildlife hazard mitigation guidelines as part of an integrated wildlife hazard management approach at civilian and military airports across the country.

Selected Publications:

BERNHARDT, G. E., B. F. BLACKWELL, T. L. DEVAULT, AND L. KUTSCHBACH-BROHL. 2010. Fatal injuries to birds from collisions with aircraft reveal anti-predator behaviours. Ibis 152:830-834.

BERNHARDT, G. E., L. KUTSCHBACH-BROHL, B. E. WASHBURN, R. B. CHIPMAN, and L. C. FRANCOEUR. 2010. Temporal variation in terrestrial invertebrate consumption by laughing gulls in New York. American Midland Naturalist 163:442-454.

BLACKWELL, B. F., T. L. DEVAULT, AND E. FERNANDEZ-JURICIC. 2009. Wildlife collisions with aircraft: a missing component of land-use planning for airports. Landscape and Urban Planning 93:1-9.

BLACKWELL, B. F., E. FERNANDEZ-JURICIC, T. W. SEAMANS, AND T. DOLAN. 2009. Avian visual system configuration and behavioural response to object approach. Animal Behaviour 77:673-684.

BLACKWELL, B. F., AND T. W. SEAMANS. 2009. Enhancing the perceived threat of vehicle approach to deer. Journal of Wildlife Management 73:128-135.

DEVAULT, T. L., J. E. KUBEL, O. E. RHODES JR., AND R. A. DOLBEER. 2009. Habitat and bird communities at small airports in the midwestern USA. Proceedings of the Wildlife Damage Management Conference 13:137-145.

GLISTA, D. J., T. L. DEVAULT, AND J. A. DEWOODY. 2009. A review of mitigation measures for reducing wildlife mortality on roadways. Landscape and Urban Planning 91:1-7.

KEIRN, G., J. CEPEK, B.F. BLACKWELL, AND T.L. DEVAULT. 2010. On a quest for safer skies. The Wildlife Professional Summer 2010:52-55.

KUTSCHBACH-BROHL, L., B. E. WASHBURN, G. E. BERNHARDT, R. B. CHIPMAN, AND L. C. FRANCOEUR. 2010. Arthropods of a semi-natural grassland in an urban environment: the John F. Kennedy International Airport, New York. Journal of Insect Conservation 14:347-358.

SEAMANS, T. W., S. E. CLEMONS, AND A. L. GOSSER. 2009. Observations of neck-collared Canada geese near John F. Kennedy International Airport, New York. Human-Wildlife Conflicts 3:22-250.

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 studied the movement patterns of birds, such as bald eagles, osprey, and Canada geese. Researchers studying radio-collared and neck-collared Canada geese found that individual birds remained within five kilometers of their original marking location more than 90 percent of the time.
- 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 and partners are evaluating the effectiveness of commercially available avian radar detection systems at U.S. civil airports when used in conjunction with other known wildlife management and control techniques.

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