

Wildlife Services

Protecting People
Protecting Agriculture
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National Wildlife Research Center

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Reducing Blackbird and Starling Conflicts



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Major Cooperators

- Gowan Company
- Kansas Feedlot Association
- Louisiana Blackbird Committee
- Louisiana Rice Producers Association
- Louisiana Rice Research Board
- Louisiana State University, Louisiana Rice Research Station
- Michigan State University
- Missouri Rice Research and Merchandising Council
- National Sunflower Association
- North Dakota State University
- North Dakota Department of Agriculture
- Ohio Dairy Association
- Ohio State University
- Syngenta Crop Protection
- USA Rice Federation

Groups Affected By These Problems

- Consumers and producers of sunflower, rice, corn, dairy, meat, and other products
- Feedlot Owners Association
- National and State Fruit Grower Associations
- National Sunflower Association
- North Dakota Department of Agriculture
- North Dakota Game and Fish Department
- Processors, manufacturers, suppliers, and sellers of sunflower, rice, fruit, corn, dairy, and meat
- South Dakota Department of Agriculture
- South Dakota Game, Fish and Parks
- South Dakota Oilseed Council
- Utility companies

National Wildlife Research Center Scientists Address the Concerns of Farmers, and Feedlot, Dairy and Urban Area Managers

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. NWRC's field station in Bismarck, North Dakota, evaluates and develops methods for managing national blackbird damage to sunflower, rice, and corn in the Great Plains. The field station also leads research on national problems involving bird damage to fruit crops; Canada goose damage to sprouting crops; European starling damage and diseases in urban areas, feedlots and dairies; and woodpecker damage to utility structures and buildings.

Blackbirds and European starlings damage grain crops and eat livestock feed, resulting in significant economic losses to agricultural producers. Cedar waxwings and robins damage blueberries, cherries, grapes, and apples causing millions of dollars in damage to these high-value crops. NWRC scientists are studying ways to refine current damage abatement methods and develop new methods for reducing damage. Additionally, researchers are looking for nonlethal methods to expand capabilities to target specific problem-causing birds. Red-winged blackbirds, common grackles, yellow-headed blackbirds, and brown-headed cowbirds cause an estimated \$20 million worth of damage to newly planted and ripening rice in Arkansas, California, Louisiana, Missouri, and Texas; \$15 million worth of sunflower in North Dakota and South Dakota; and \$35 million worth of ripening and newly-planted corn nationally. Some individual rice and sunflower growers report 100 percent losses due to bird depredation. Birds, especially European starlings, cedar waxwings, and robins, cause \$41 million in damage in the leading fruit growing states of California, Michigan, New Jersey, New York, North Carolina, Pennsylvania, and Washington.

NWRC scientists routinely work with producers, commodity groups, research boards, universities, and local, State and Federal agencies to develop safer and more effective methods to reduce bird depredation on seeded and ripening sunflower, corn, rice, and fruit crops to improve profitability for growers. To develop new methods and tools, NWRC scientists conduct multifaceted studies involving the use of both captive and free-ranging birds to determine the status of blackbird populations in the sunflower-, corn- and rice-growing states and fruit-eating birds in apple-, grape-, blueberry- and cherry-growing states; estimate the economic impacts of birds on the crops; evaluate and develop nonlethal repellants for deterring birds; and improve the effectiveness and safety of avicides for reducing depredating populations.

Applying Science and Expertise to Wildlife Challenges

Blackbird Population Management Modeling—DRC-1339 is a slow-acting avicide used to reduce local populations of European starlings, blackbirds and other birds. It is difficult to accurately estimate the number of birds killed with DRC-1339 because carcass searches and other types of counts are not accurate predictors of take at staging area bait sites. To improve mortality estimates associated with current linear models and DRC-1339 use, NWRC scientists developed a semi-mechanistic model that combines mechanistic modeling of environmental and biophysical processes with statistical modeling of DRC-1339 toxicities, avian physical and physiological traits, and foraging behavior. The scientists used simulated baiting scenarios in Missouri and Louisiana to compare take between the two models. Compared to the linear model, the semi-mechanistic model estimates ranged from



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5 percent higher to 59 percent lower, depending on the species and gender compositions of the blackbird flocks. On average, the new model's estimates were 24 percent lower than the linear model. Unlike the linear model, the new model accounts for the effects of meteorological and environmental conditions that likely influence feeding rates at DRC-1339 bait sites. NWRC researchers believe that the semi-mechanistic model represents a more scientifically rigorous approach than the linear model toward estimating take that can be applied to all staging area bait applications regardless of region or time of year.

European Starlings' Role in the Spread of Salmonella—

Characterizing and mitigating diseases introduced by wildlife to concentrated animal feeding operations (CAFO) can reduce the spread of microorganisms throughout the environment while increasing agricultural productivity. To better understand the disease risks associated with bird use of CAFO, NWRC scientists assessed the capacity of European starlings to spread *Salmonella enterica* to cattle, their feed, and water. Scientists found that *Salmonella enterica* contamination of cattle feed troughs and water troughs increased as more starlings entered feed troughs, indicating that starlings are a source of *S. enterica* contamination in CAFO. Thus, employment of starling management tools such as population control, habitat management, exclusionary devices, and bird repellants may reduce the amplification and spread of this disease within livestock production systems.

Ultraviolet Cues Used in Blackbird Food Selection—

Although it has long been known that birds use ultraviolet (UV) wavelengths for mate selection, researchers have now learned that UV wavelengths also influence bird feeding behavior and food selection. While UV wavelengths are invisible to humans, NWRC researchers found that birds exposed to an UV-absorbent, post-ingestive repellent subsequently avoided UV-absorbent and UV-reflective food. In studies with captive red-winged blackbirds, researchers learned that blackbirds shift preferences for both familiar and unfamiliar flavors based on their feeding experiences and rely on visual cues to avoid food previously paired with negative consequences. The researchers hope to use these findings to improve our understanding and management of bird damage to agriculture.

European Starlings May Move Pathogens Among Feedlots—

NWRC and North Dakota State University scientists monitored site use and movements of European starlings during the winter at two concentrated animal feeding operations (CAFO) in central Kansas. Their research investigated the possible role of starlings in pathogen transmission at CAFO. Few birds (9 percent) moved between feedlots. Starlings rarely completely abandoned the feedlot where they were first captured, but 40 percent of the birds temporarily visited other feedlots. The furthest distance a bird was detected from its original capture site was 42 miles/68 kilometers. Scientists speculate that the limited frequency of time spent at non-capture-site feedlots may lower, but not eliminate, the potential risk of starlings spreading pathogens among feedlots. Researchers still recommend management strategies to reduce starling populations within feedlots and, thereby, the subsequent risk of the birds spreading pathogens to other feedlots.

Anthraquinone to Alleviate Non-Target Take From Rodenticides—Rodenticides, such as zinc phosphide, are often used to control rodent populations that cause damage in croplands and rangelands. Zinc phosphide breaks down rapidly after ingestion and poses little risk to predators and scavengers that might consume treated rodents; however, birds that directly consume the rodenticide bait may be at risk. In an effort to reduce nontarget hazards to birds during rodent control efforts, NWRC researchers evaluated whether the addition of the registered goose repellent anthraquinone to rodenticide baits would prevent consumption of the baits by certain birds. Anthraquinone, which occurs naturally in some plants, produces a laxative effect when eaten. In addition, anthraquinone absorbs near-ultraviolet light that is visible to most birds. This color cue may facilitate the repellency effect in birds. In studies involving captive birds, NWRC researchers treated 2 percent zinc phosphide baits typically used in rodenticide applications with 2 to 2.5 percent anthraquinone (Arkion® Life Sciences). No mortality or signs of zinc phosphide toxicosis were observed among the 20 Canada geese, 24 horned larks, and 47 ring-necked pheasants that were offered the repellent-treated zinc phosphide baits. Although some geese and pheasants initially sampled treated baits, all birds survived and subsequently avoided treated baits throughout the remainder of the study. However, anthraquinone may affect consumption of repellent-treated rodenticide baits by target species such as black-tailed prairie dogs. Supplemental performance testing and field efficacy studies are necessary for further development of a combined bird-repellent rodenticide bait.

Selected Publications:

CARLSON, J. C., A. B. FRANKLIN, D. R. HYATT, S. E. PETTIT, and G. M. LINZ. 2011. The role of starlings in the spread of *Salmonella* within concentrated animal feeding operations. *J. Applied Ecology* 48:479–486.

FORCEY, G. M., W. E. THOGMARTIN, G. M. LINZ, and W. J. BLEIER. 2011. Land use and climate influences on waterbirds in the prairie potholes. *Journal of Biogeography* 38:1694–1707.

GAUKLER, S. M., H. J. HOMAN, G. M. LINZ, and W. J. BLEIER. 2012. Use of feedlots and roost sites by radio-tagged European starlings. *Human-Wildlife Interactions* 6:30–37.

HOMAN, H. J., R. S. STAHL, and G. M. LINZ. 2013. Comparison of two models for estimating mortality from baitings with Compound DRC-1339 Concentrate avicide. *Crop Protection* 45:1-5.

LINZ, G. M., J. B. WINTER, and W. J. BLEIER. 2012. Evaluation of elevated bait trays for attracting blackbirds (Icteridae) in North Dakota. *Crop Protection* 41:30–34.

WERNER, S. J., S. K. TUPPER, J. C. CARLSON, S. E. PETTIT, J. W. ELLIS, and G. M. LINZ. 2012. The role of a generalized ultraviolet cue for blackbird food selection. *Physiology & Animal Behavior* 106:597–601.

WERNER, S., S. K. TUPPER, S. E. PETTIT, J. C. CARLSON, and G. M. LINZ. 2011. Anthraquinone repellent to reduce non-target take of non-target birds from zinc phosphide rodenticide applications. *Applied Animal Behavior Science* 135:146–153.

WERNER, S. J., G. M. LINZ, J. C. CARLSON, S. E. PETTIT, S. K. TUPPER, and M. M. SANTAR. 2011. Anthraquinone-based bird repellent for sunflower crops. *Applied Animal Behaviour Science* 129:162–169.

Major Research Accomplishments:

- WS research discovered that ultra-violet vision in birds was important for food selection and could be used in the development of bird repellents to protect crops.
- WS developed a model to estimate the avicide DRC-1339's effectiveness and impact on blackbird populations.
- WS determined that combining anthraquinone with rodenticide bait helps to prevent the consumption of bait by non-target bird species, such as Canada geese, ring-necked pheasants, and horned larks.
- WS and North Dakota State University scientists found that managing starling populations might be a strategy for reducing the spread of disease within livestock production systems.