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Wildlife Services
NWRC
National Wildlife Research Center

Protecting Agriculture

In the United States, wildlife damage to agricultural resources is significant. A survey conducted by the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) reported that wildlife damage to U.S. agriculture, including field crops, vegetables, fruit, nuts, and livestock, totaled $944 million during 2001. According to other more recent studies, predators—such as coyotes, wolves, bears, and cougars—are responsible for more than $127 million in livestock losses annually; and the catfish aquaculture industry experiences nearly $25 million in losses annually due to cormorants alone.

The USDA Animal and Plant Health Inspection Service's Wildlife Services (WS) program provides Federal leadership and expertise to help reduce wildlife damage to the food crop, livestock, and aquaculture industries. The National Wildlife Research Center (NWRC) is the research arm of the WS program. Its scientists develop new tools and techniques for reducing wildlife damage to agriculture.

Food Crops

Birds cause severe damage to a variety of agricultural crops, including sunflowers, rice, corn, winter wheat, fruits, and nuts. Field crops are especially vulnerable to bird damage as they serve as a "buffet" for migrating birds providing a high-energy, relatively easy food source.

Abundant red-winged blackbirds often feed on sunflower crops in the Midwest. (Photo by APHIS–WS–NWRC)

Sunflower and rice crops are a favorite of blackbirds, sustaining yearly losses of $5–13 million. Discouraging blackbirds from foraging in favored sunflower fields is difficult; however, repellents can be effective if alternative foraging sites are readily available. NWRC scientists recently completed efficacy studies in which blackbirds were offered oilseed and confectionary sunflower treated with an anthraquinone-based repellent. Compared to untreated field sites, scientists observed less sunflower damage and more sunflower yield within confectionary sunflower fields treated with the repellent. Though the anthraquinone-based repellent proved effective, additional field studies are needed to identify practical and effective methods for applying the repellent to ripening sunflower heads.

Other successful NWRC methods for reducing blackbird damage include the application of a registered cattail herbicide to reduce blackbird roosting sites and the establishment of wildlife conservation sunflower plots. Cattail marshes located next to sunflower fields create perfect roosting sites for blackbirds. By thinning select marshes with the herbicide glyphosate, WS biologists make these roosts less attractive, thus dispersing large concentrations of blackbirds away from sunflower production areas. Wildlife conservation sunflower plots (or lure crops) involve planting a small field of sunflower or other crop to attract the birds away from the commercial sunflower field. The goal is to keep the birds in the lure crop as long as possible to reduce the time spent in nearby commercial sunflower fields.

Farmers can continue to spray registered repellents and harass birds in their commercial fields to encourage the birds to feed in the lure crops.

Rodents continue to impact crop production and livelihoods of farmers in the United States and around the world. Roof, Norway, and Polynesian rats, voles, and other rodents cause damage to seed (i.e., corn, rice, and soybean), vegetable, and fruit crops. They directly consume plants, cause product blemishes that result in a loss of market quality, and enable secondary infections by insects and disease. Chemical approaches, like rodenticides and other toxicants, are important tools for reducing damage; however, they can pose hazards to non-target animals and the environment.

Voles eat out the lower, fleshy "heart" of the artichoke vegetable, making them unmarketable. (Photo by APHIS–WS–NWRC)

NWRC works to reduce or eliminate these hazards, as well as develop and register effective, alternative approaches for managing wildlife damage. For example, NWRC researchers found that adding an anthraquinone repellent to rodenticide baits successfully reduces consumption of the baits by Canada geese and ring-necked pheasants. These findings could aid in the development of new bait formulations that reduce the ingestion of rodenticides by these and other non-target wildlife species.

Free-ranging populations of feral swine (also called wild pigs) exist in at least 39 states. Some experts estimate the number of feral swine in the United States at more than 4 million, with the largest populations located in California, Florida, Hawaii, and Texas. Foraging, rooting, digging, and trampling by feral swine in pastures and agriculture crops result in millions of dollars in damages each year in the United States. Feral swine are also efficient predators of young livestock and other small animals, and transmit disease to domestic livestock. NWRC scientists are studying the potential costs associated with *E. coli* contaminations to vegetable crops caused by feral swine.

Invasive feral swine impact resources through their destructive feeding behavior, competition with native wildlife, and impacts to domestic animal agriculture. (Photo by APHIS–WS–NWRC)

Developing effective methods and tools for managing feral swine populations is essential to protect agriculture and livestock from feral swine damage. NWRC scientists are evaluating fencing to prevent feral swine damage and to quickly contain feral swine during disease outbreaks. Scientists are also evaluating feeders specifically for feral swine to deliver vaccines or toxicants.

Livestock

The development of new tools to reduce livestock predation and to protect public safety is a high priority for the WS program. Livestock predation costs producers approximately $127 million each year. NWRC uses a multi-disciplinary approach to study

predator ecology and the impact of predators and predator removal on ecosystems. Such studies are fundamental to conducting responsible predator management. In addition, NWRC researchers also: investigate alternative, nonlethal tools and techniques to reduce livestock predation; research improved methods for capturing predators and for monitoring their behaviors and movements; and develop more selective lethal management techniques.

In field studies, NWRC researchers demonstrated that surgical sterilization of alpha (dominant) coyotes reduced sheep predation by an average of 87 percent relative to predation by non-sterilized coyotes. The sterilized coyotes continued to maintain territories and pair bonds similar to non-sterilized coyotes. In subsequent computer simulation models, the sterilization of coyotes (regardless of sex or social status) appeared to offer the largest and most lasting impact on coyote populations compared to more traditional management strategies. Scientists hypothesized that sterilized coyotes are less likely to kill livestock because they do not have the increased energy requirements associated with producing, feeding and rearing pups. Although sterilization is initially labor and cost intensive as a management tool, it may be an economically feasible option for coyotes in certain areas because of the long-lasting effects of reduced livestock predation.

In an effort to reduce disease transmission between deer and livestock, NWRC researchers investigated the use of livestock protection dogs to keep deer away from cattle feed and water sources. (Photo by APHIS–WS–NWRC)

Livestock producers are often confronted with the challenge of reducing the transmission of diseases from wildlife to livestock. For example, in the Great Lakes Region of the United States, white-tailed deer have served as a wildlife reservoir for the disease bovine tuberculosis. Bovine tuberculosis is a contagious, bacterial disease that leads to weight loss and death in cattle and deer. In 2008, NWRC scientists and collaborators evaluated the effectiveness of livestock protection dogs (LPDs) for excluding white-tailed deer from livestock pastures. The findings showed LPDs are particularly effective at protecting cattle and concentrated cattle feed from deer. Data showed only 3 cases where deer came within 5 meters of cattle in protected pastures compared to 79 cases in unprotected pastures. Based on observation data, total time spent by deer in LDP-protected pastures was far less (5 minutes) compared to unprotected pastures (425 minutes). Researchers also recorded only 2 events where deer consumed hay in protected pastures, compared to 303 events in unprotected pastures. The results support that LPDs may reduce potential for disease transmission from deer to cattle in small pasture settings.

Aquaculture

In the past 30 years, populations of fish-eating birds, such as cormorants, herons, and pelicans, have increased dramatically, causing substantial economic impacts to aquaculture production in the southeastern United States. For the aquaculture industry, the costs associated with bird

damage and damage prevention are conservatively in the tens of millions of dollars annually. NWRC's research helps to determine the impact of fish-eating birds on aquaculture production and to develop methods to reduce depredation of southeastern catfish, baitfish, and crawfish industries. Current NWRC research is aimed at gaining information about the abundance, distribution, and foraging behavior of fish-eating birds, the economic impacts associated with their foraging activities, and the diseases they transmit at aquaculture facilities.

NWRC's research helps to determine the impact of fish-eating birds on aquaculture production and to develop methods to reduce depredation of catfish, baitfish, and crawfish industries. (Photo by NASA)

Recent NWRC studies documented that cormorants use catfish ponds extensively during January through April each year, with the greatest economic damage occurring in February and March. During the study, between 1,347 and 1,775 metric tons of catfish were consumed by cormorants in the Delta region of Mississippi, resulting in losses to the catfish industry of $10.3 to $13.7 million annually.

In collaboration with university parasitologists at Mississippi State University, NWRC scientists described the life cycle of the species of trematode infecting catfish in the southeastern United States and confirmed that American white pelicans serve as host for this parasite. The trematode has been estimated to cause as much as a 10 percent annual economic loss to the catfish industry. This research demonstrated that American white pelicans can transmit this disease among catfish ponds, but that double-crested cormorants, great blue herons, and great egrets did not appear to serve as hosts for this trematode. NWRC scientists also identified an introduced species of snail that is an intermediate host for the parasite. These studies underscore the importance of preventing pelican use of aquaculture facilities and understanding the biology and epidemiology of the disease organism to aid in treatment and prevention.

Additional Information

For more information, please contact:
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You may also call NWRC at (970) 266-6000 or visit our Web site at http://www.aphis.usda.gov/wildlife_damage/nwrc/.