Developing an Effective Management Plan for Starlings Roosting in Downtown Omaha, Nebraska

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ABSTRACT European starlings (*Sturnus vulgaris*) began roosting in downtown Omaha, Nebraska during the fall of 2004 causing significant financial loss and threats to human health and safety. Property owners exhausted a variety of nonlethal methods to deter roosting starlings before contacting U.S. Department of Agriculture Animal and Plant Health Inspection Service Wildlife Services in January 2005. We developed an integrated wildlife damage management plan that incorporated local population reduction through the use of the avicide DRC-1339®, trapping, hazing, and habitat modification. Strong working relationships developed as we provided technical assistance to the city of Omaha, building managers, and property owners who experienced starling damage. We used radio telemetry on 57 starlings during the winter of 2005–2006, and attached leg bands and colored leg streamers to 4,900 starlings from 2005–2010 to accurately pinpoint feeding, roosting, and staging sites in a 45 km (28 mi) radius of downtown Omaha. Over the last 6 winters, we encountered greater than 400 banded starlings, providing insight on starling movement important to the development of an effective management plan for starlings that roost in downtown Omaha, Nebraska.

KEY WORDS DRC-1339, European starling, invasive species, *Sturnus vulgaris,* urban roost.

The European starling (*Sturnus vulgaris*) is a nonnative invasive species that is not protected by federal (*i.e.,* Migratory Bird Treaty Act) or state law. Starlings were introduced into New York City's Central Park in 1890–91 (Bump and Robbins 1966). In just 100 years, starlings have colonized the United States, expanded into Canada and Mexico, and have become one of the most common birds in North America (Feare 1984).

Starlings are extremely adaptable and are found in a variety of habitats: rural farm areas, cattle feedlots, open fields, and urban areas. Starlings consume a variety of foods ranging from seeds to fruits to insects and other items including livestock rations, and food in garbage is an important food base for wintering starlings (Johnson and Glahn 1994).

Starlings are gregarious in nature forming large flocks in the fall and use a communal roosting site throughout the winter. During the fall of 2004, thousands of starlings began roosting in downtown Omaha, Nebraska, causing significant financial loss and threats to human health and safety. Approximately 25,000 starlings roosted in downtown Omaha during the winter of 2005–2006 leaving the buildings and pedestrian walkways covered in excrement. In roost areas, windows became covered in slime and droppings accumulated several inches deep on ledges. Not only was the sight and odor offensive, but the droppings also posed a human health and safety hazard. The build-up of excrement raised concerns about diseases such as histoplasmosis, a serious respiratory disease that can be transmitted to humans by inhaling airborne *Histoplasma capsulatum* spores. The occurrence of *H. capsulatum* is associated with large quantities of excrement that has come in contact with soil (Stickley and Weeks 1985). As a precaution, the pedestrian walkways had to be power-washed daily for sanitary purposes and to prevent droppings from being tracked into buildings. Cleanup and maintenance increased substantially; furthermore, there was concern that the acidic nature of the droppings would lead to a decrease in the life of the buildings.

A variety of nonlethal methods were employed to disperse the starling roosts from downtown Omaha. These included playing bird distress calls and

hanging owl effigies and streamers from the building ledges. These methods proved less than satisfactory and damage continued as thousands of starlings returned nightly throughout the winter of 2004–2005. USDA APHIS Wildlife Services was contacted to resolve this issue and develop an integrated wildlife damage management plan. In this paper we summarize our efforts to record starling roosting behavior as part of developing this plan.

METHODS

Telemetry and Banding

We radio-tagged starlings from December 2005–March 2006. The radio-tagged starlings were captured at a variety of sites within 7 km (4 mi) of downtown Omaha. Starlings were tracked using two trucks with mounted dual 6-element yagi antennas attached to scanning receivers. A fixed-wing aircraft with two 4-element yagi antennas mounted on the aircraft was also used on several days. Additional starlings captured in traps between December 2005 and December 2010 were banded with U.S. Fish and Wildlife Service (USFWS) aluminum bands and fit with colored leg streamers. Streamer color was specific to each banding location. Known feeding, staging, and roosting locations were monitored for starlings with transmitters or colored streamers. All radio-tagged and banded starlings were released at the site of capture.

Trapping

We used modified Australian crow traps and drop-in decoy traps to capture starlings at feeding and staging sites. All trapped starlings were checked for USFWS bands and band numbers were recorded before the banded starlings were released. Starlings not banded were euthanized using approved American Veterinary Medical Association methods.

DRC-1339

After exhausting several nonlethal methods, the decision was made to attempt lethal control through the use of the avicide DRC-1339® to reduce the downtown population. DRC-1339 is an ingested toxicant that causes uremic poisoning resulting in a nonviolent mortality; it is also one of the most extensively studied chemicals (USDA 1995, 1997). A formal Risk Assessment (USDA 1997) determined that, when used in accordance with agency and label guidelines, DRC-1339 poses little or no risk of secondary poisoning. We pre-baited DRC-1339 application sites with untreated bait for several days to monitor for nontarget species. Per label directions, if nontarget species that could consume treated bait were observed, then the use of DRC-1339 was postponed or not applied.

We worked with property owners to mitigate starling damage through habitat and structural modifications and hazing. We held several informative meetings with the city of Omaha, building managers, and property owners.

RESULTS AND DISCUSSION

We radio-tagged 57 starlings and tracked them between December 2005 and March 2006. The majority of time was spent tracking starling movements, determining habits, and locating feeding areas near Omaha and Council Bluffs, Iowa. Telemetry allowed the starlings to be monitored as they went about their daily routine. We located a large roost under a bridge within 7 km (4 mi) of downtown Omaha that was used nightly by approximately 30,000 starlings. Four radio-tagged starlings were detected moving between this satellite roost and roosts in downtown Omaha. The farthest we tracked a radio-tagged starling was to a feedlot 24 km (15 mi) straight-line distance northeast of downtown Omaha. A number of the radio-tagged starlings staged and fed morning and evening at two large grain-handling facilities in Council Bluffs and a food processing facility in Omaha. Telemetry data identified the feeding and staging sites starlings from the downtown area used and these became a high priority for DRC-1339 applications.

We banded 4,900 starlings between December 2005 and December 2010 within 29 km (18 mi) of downtown Omaha. As of April 2011, 28 of the 4,900 banded starlings were recovered and reported to the Bird Banding Laboratory (BBL) accounting for a 0.57% recovery rate. Four of the 28 bands were recovered more than 80 km (50 mi) from Omaha in Wisconsin, Minnesota, Iowa, and Ontario. These BBL data provide information on the regional movement of starlings that may migrate into Nebraska and overwinter in Omaha.

We encountered more than 400 (8%) of our banded starlings. Most were either recovered after DRC-1339 applications or recaptured in traps. A high percentage of starlings were encountered at the banding site

within the same season (winter). Some starlings were habitually recaptured and three were each caught 12 times in a 2-month period. Of the 400+ encountered bands, 75 were significant in that they were encountered at a different location than the banding site or in a different season (or both). Of these 75, 31 were encountered within the same season at a different location, and 11 were encountered in a different season at a different location. Another 34 were encountered in a different season at the banding site; 30 were encountered the next season, 2 were recaptured two seasons after banding, and 2 were encountered three seasons after banding. We used these banding data to detect starling movement between feeding, staging, and roosting sites.

Twelve starlings banded during the fall of 2009–2010 at a feedlot 29 km (18 mi) southwest of downtown Omaha were later encountered throughout the winter at three additional feeding sites. Two of these starlings had moved 45 km (28 mi) northeast across Omaha to another feedlot where they were recaptured, 5 were recovered 19 km (12 mi) to the west at a feedlot, and 5 were recaptured 18 km (11 mi) to the northwest in Omaha at a food processing plant. Our banding data demonstrate that starlings will readily move among feeding sites throughout the winter.

Colored leg streamers were easily sighted using binoculars and additional starling movements could be documented without having to capture the banded bird. During the winter of 2005–2006, 2 starlings with colored leg streamers were sighted at a large roost 35km (22 mi) straight-line distance northwest from downtown Omaha. Colored leg streamers made banded starlings more noticeable, thus also increasing band recovery rates after DRC-1339 applications.

Population reduction through DRC-1339 applications and trapping was evident at feeding, roosting, and staging sites. The downtown roosting starling population that numbered 25,000 during the winter of 2005–2006 has been reduced and maintained at approximately 3,000 birds for the last four winters. The large auxiliary roost used by 30,000 starlings during the winter of 2005–2006 was reduced each of the following winters with roosting populations peaking at 15,000 during the winter of 2006–2007; 10,000 during the winter of 2007–2008; 0 during the winter of 2008–2009; 0 during the winter of 2009–2010; and 500 during the winter of 2010–2011. Two large grain handling facilities in Council Bluffs that served as staging and feeding sites for thousands of starlings roosting in downtown Omaha have remained virtually starling-free since the winter of 2005–2006.

ADDITIONAL MANAGEMENT

USDA APHIS Wildlife Services became the face of the project as we provided technical assistance and biological information about starlings, responded to media requests, and addressed any issues concerning starling management. The project centered on developing strong working relationships with individuals experiencing starling damage in downtown Omaha. Main areas used by roosting starlings were building ledges, exterior air vents, and landscaping. In some situations, ledges and air vents could be permanently netted to prevent future starling damage and roosting sites. We investigated possible solutions, collected the contact information of a netting installation company, and provided this information to building managers. Since the winter of 2005–2006, exclusionary netting has been installed over air vents on two buildings, eliminating future roosting sites and damage. An additional building heavily damaged during the winter of 2010–2011 plans to install exclusionary netting.

Meetings with the city of Omaha were held to discuss how starlings use the landscape in downtown Omaha. Starlings use trees in the downtown park as a roosting site each August and September. The buildup of excrement under the trees causes severe damage and threatens human health and safety. In September 2008, a number of trees were removed and pruned as part of the park's renovation plan. This work was beneficial in cleaning up the park and eliminated two additional starling roosts.

Another tool we promoted to deter starlings from roosting in downtown Omaha was hazing with pyrotechnics and lasers. We provided affected businesses with an informative document that explained pyrotechnic suppliers, safety equipment, permit information, and the proper use and maintenance of equipment. Pyrotechnics are highly effective but can attract unwanted attention from the public due to the noise they make. Throughout the project, we responded to media and public requests concerning pyrotechnic use and importance. We also investigated other hazing tools, successfully hazed starlings with green lasers

during field trials, and provided this information to affected businesses.

CONCLUSION

Through a variety of tools and resources, we successfully developed an integrated wildlife damage management plan that effectively reduced the roosting population of starlings in downtown Omaha. A combination of lethal and nonlethal methods significantly reduced financial loss and threats to human health and safety associated with the starlings. Through public education, community relations, and working with additional cooperators, we positively influenced public perception highlighting the program's benefits to the public and downtown Omaha.

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