1985-102

THE OPPOSITE END OF THE SPECTRUM--MANAGING NONGAME SPECIES THAT ARE PROSPERING

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Abstract: Over 300 million blackbirds and starlings congregate in hundreds of roosting sites in the southeastern United States each winter. Public concern has been expressed about these birds because of associated human and livestock health hazards, agricultural damage to sprouting and ripening crops and feedlots, nuisance problems in and near urban areas, and other hazards such as aircraft strikes. This situation prompted the establishment of a U. S. Fish and Wildlife Service field research station in Bowling Green, Kentucky to identify the nature and magnitude of a multiplicity of economic, health, safety, and nuisance problems caused by these birds and to develop safe and effective methods of alleviating these problems. Most of this research effort can be categorized into (1) problem definition studies; (2) control oriented ecological studies; and (3) development of control methods technology.

Initial research studies defined the magnitude of the human health risks and agricultural problems caused by these birds. A blackbird-starling banding program was also initiated to determine the origins and migration routes of the involved problem species. Bird behavioral studies have begun to shed light on starling feeding patterns and the methodology of blackbird-starling roost site selection. Control studies involving both lethal and nonlethal means have been directed at the source of the problem in livestock feeding areas and nuisance and health hazards associated with winter roosts.

INTRODUCTION

The land-use changes that have occurred over the last century in the eastern and north central forest regions of the United States have influenced the populations of birds that inhabit these regions. Robbins (1979) and Whitcomb et al. (1981) presented evidence that many avian species that are dependent on extensive forest systems have declined in recent years. They attributed this decline to the decrease and fragmentation of forests within the breeding range of the birds. Conversely, other species have benefited from the disappearance of large forests. Members of the Icteridae, particularly the red-winged blackbird (Agelaius phoeniceus), common grackle (Quiscalus quiscula), and brown-headed cowbird (Molothrus ater), have prospered in the agricultural land that replaced the forests. Starling (Sturnus vulgaris) populations have also increased since their introduction as a

result of this environment. The literature contains numerous references to competition between these species and other songbirds. The most notable examples of this have been the cowbird parasitism of many forest songbird nests and starling competition with native hole-nesting species.

In addition to conflicts with other birds, blackbirds and starlings have become a concern to the human residents of the southeastern United States in recent years. During the winter months more than 300 million of these birds congregate in hundreds of roosts in the southeastern states (Meanley and Royall 1977). These birds have the potential to create human and livestock health hazards, to damage sprouting and ripening crops and feedlots, to create nuisance problems in and near urban areas, and to pose other hazards such as to aircraft.

As a result of this situation and of public concern a U. S. Fish and Wildlife Service field station was established at Bowling Green, Kentucky in 1977 to conduct research on the blackbird-starling winter roost problems. The studies at this station can be classified into (1) problem definition; (2) behavior and ecology of winter roosting birds; and (3) control methods development.

PROBLEM DEFINITION STUDIES

Human Health

The human respiratory disease, histoplasmosis, is often associated with roosting blackbirds and starlings (Furcolow et al. 1961, Powell et al. 1973, Latham et al. 1980, Chick et al. 1981). A total of 3 Fish and Wildlife Service contracts were initiated to learn more about the association of bird roosts and human exposure to histoplasmosis. The first with the Kentucky Department for Human Resources was established to determine the incidence of the disease in humans in relation to distance from bird roosts. A contract study was also initiated with the University of Louisville to determine how the disease organism grows and is distributed in its environment. The third Service contract was established with the Public Health Service's Centers for Disease Control to determine the length of time (years) for a roost to become positive for histoplasmosis, and to prepare a report on histoplasmosis that would describe the disease organism, the role of blackbird-starling roosts in its epidemiology and occurrence, and recommended methods for disease control.

Chick et al. (1981) tested 70 roost sites in Kentucky and found one-third of them to harbor Histoplasma capsulatum. In an evaluation of over 7000 persons living in proximity to H. capsulatum positive and negative sites, it was determined that those living near positive sites had a significantly higher skin test reaction rate (and presumably were at a somewhat higher health risk) than those living near negative sites.

Ecological studies on the growth of H. capsulatum revealed that temperature and humidity have a major influence on determining the geographic distributions of the fungus. Cronholm and Monroe (1983, unpubl. final rep., FWS Contract #14-15-009-77-039, Ecology of Histoplasma capsulatum in Bird Roosts, University of Louisville, Louisville, Kentucky) found H. capsulatum spores in non-bird roost forested areas

but they felt that the environmental conditions in mature bird roosts (mostly the high nitrogen levels from the bird fecal material) promoted a much greater growth of the fungus than did nonroost soil. They found that high (40°C) as well as lower (15°C) temperatures, high hydrogen ion concentration in the soil (pH<6.6), and low relative humidity inhibited spore formation.

The results of the Public Health Service study supports the current belief that only roosts occupied by birds for 3 or more years (rarely 2) become infected with H. capsulatum. The report from this study, when when published, will provide the most recent information on this disease relative to bird roosts. At present, saturating the soil with formaldehyde is the only way to decontaminate a positive roost site (U. S. Department of Health, Education, and Welfare, undated).

Agricultural

Economic losses that winter roosting blackbirds and starlings cause to agriculture in the Southeast were assessed in local and statewide surveys. Objective surveys were conducted in sprouting and ripening corn (Stickley et al. 1978, Heisterberg 1983), sprouting wheat (Stickley et al. 1977, Dolbeer et al. 1978/1979), and in livestock feeding areas (Glahn 1983). In addition to these surveys, studies were designed to measure the effect of feeding livestock feed that was contaminated with starling fecal matter (Glahn and Stone 1984) and to determine the role of starlings as vectors of transmissible gastroenteritis (TGE) to swine (Gough et al. 1979).

Results of crop surveys revealed that, like most bird damage in other parts of the country, overall losses were minor (<1% of the crop damaged) compared with the total crop produced and other losses from insects or weather. Heavy damage was usually sustained by relatively few farmers and those fields nearest to a roost usually received the most damage. Starlings were almost always responsible for damage to sprouting wheat, whereas, blackbird species damaged corn. An analysis of bird depredations at a number of feedlots in 6 Tennessee counties revealed that starlings were again responsible for most of the damage (Glahn 1983). Several factors that contributed to bird damage in livestock feeding areas were identified. Severe bird damage usually occurred during severe weather (snow, ice, and low temperatures), near large winter roosts, and at feeding operations where a constant supply of feed was available (Glahn, in preparation). Feeding high levels of starling fecal matter in livestock feed did not appear to have any adverse effect on weight gain or feed rejection by calves and swine fed the contaminated ration (Glahn and Stone 1984). It was determined during the TGE study that starlings can serve as vectors of TGE to swine under conditions where they forage in hoglots (Gough et al. 1979).

BEHAVIORAL AND ECOLOGICAL STUDIES

Migratory Patterns

Over 20,000 blackbirds and starlings in Kentucky and Tennessee have been banded by Kentucky Field Station personnel. The objective of this banding program is to supplement existing banding data that will ultimately reveal the movements and migratory patterns of these birds. This

information is needed so that effective management strategies can be employed. An analysis of existing band recoveries reveals that the majority of redwings, grackles, cowbirds, and starlings wintering in any particular state come from a broad area of the species' breeding range. Most blackbirds breed in northern regions, but Monroe and Cronholm (1977) determined that nearly half of the wintering starlings in Kentucky were local breeding birds and the others originated from areas to the northeast. Wintering grackles in Tennessee and Kentucky were shown to originate in the states to the northwest, north, and northeast, primarily in the Great Lakes region and Upper Mississippi River Valley (Monroe and Cronholm 1977, Meanley and Dolbeer 1978). Meanley (1971) calculated that 84% of the wintering blackbirds in Arkansas, Louisiana, Mississippi, and Texas came from northern areas. Most of these birds came from the 12 northcentral states extending from Ohio westward to the Dakotas and Kansas. A few originated from northwestern and the Rocky Mountain states as well as the five bordering Provinces of Canada.

Roosting Populations

Each winter, more than 100 major roosts in the Southeast contain a million or more blackbirds and starlings (Meanley and Royall 1977). Overall, the species composition of these roosts was reported as 30% red-winged blackbirds, 29% grackles, 23% starlings, and 18% cowbirds. A few rusty blackbirds (Euphagus carolinus) and robins (Turdus migratorius) were also found roosting with the above species. It has been demonstrated that the species composition of a particular roost varies with the roost location and time of winter. At a roost in western Tennessee, Dolbeer et al. (1978) showed that the percent composition of common grackles, red-winged blackbirds, and starlings fluctuated dramatically over the length of the roost season from November to March. Likewise total population counts varied with peak numbers occurring in February. Roosting populations are obviously not very stable. A 32% nightly turnover rate among roosting blackbirds and starlings was calculated from a telemetry study in 9 different winter roosts in Arkansas, Kentucky and Tennessee (Heisterberg et al. 1984). The amount of roost interchange was influenced by unstable weather conditions as nightly turnover increased during periods with snow, ice, and below average temperatures.

We are currently attempting to answer some fundamental questions on roost formation. We hope to identify bird behavioral and roost vegetative characteristics that will give clues as to how and why the birds choose particular winter roost sites. Information of this type is needed for encouraging birds to use sites where they will cause minimal problems. Initial findings reveal that blackbirds and starlings actually seem to prefer to roost in urban areas and in sites at or near those previously occupied (Heisterberg, unpublised data).

CONTROL METHODS DEVELOPMENT

Control-oriented research studies initiated by the Kentucky Field Station have been directed at the source of the problems in livestock feeding areas and at the nuisance and health hazards associated with winter roosts.

Reducing Feedlot Damage

Starlicide® Complete (Ralston Purina Co., St. Louis, Mo.), a slow acting toxicant bait for starlings, was evaluated to determine its effectiveness for reducing bird damage in southeastern feedlots (Stickley 1979). (Use of tradenamed products does not imply endorsement of commercial products by the United States Government.) Its use in feedlots is recommended as part of an overall program for reducing bird damage at livestock feeding areas. To further enhance effective use of Starlicide, baiting strategies were developed by Glahn (1982). He recommended a period of prebaiting with untreated bait during the baiting regime and the use of bait containers to facilitate bait placement and retrieval during inclement weather.

Starlicide baits have also been used to bait preroost congregating areas near roost sites (Knittle et al. 1980). Although large numbers of starlings can be killed with this approach, research is still needed to determine if feedlot damage can be reduced by killing starlings at the roost site and to determine if environmental and nontarget hazards are associated with this use.

Management practices that limit the availability of grain products to starlings are also effective in reducing damage at livestock feeding areas (Twedt and Glahn 1982). Barriers that separate the feed from the birds and use of feed forms (e.g. larger pellet sizes) that are unpalatable or unattractive to birds have been shown to be effective.

Health and Nuisance Problems

Blackbirds and starlings often roost near humans. Urban-suburban roosts comprised nearly 50% of all roosts reported in the Southeast during a 1980 national roost survey (Stickley, unpublished data). In Tennessee, 80% of the roosts located were established at urban-suburban sites. The health hazards and nuisance problems that result have received increased research effort.

New techniques for frightening the birds out of the roosts have been explored. These include the use of chemical repellents and helium-filled balloons. Although roost dispersal can solve some of these problems (Mott 1980), dispersal is not the complete answer especially in a community with a perennial roost problem. In this situation dispersal may only shift the roost from site to site thereby increasing nuisance problems and the threat of health problems with histoplasmosis. For this situation, lethal control would probably be a more desirable alternative. The only chemical registered for this use is the industrial surfactant, PA-14 (Lefebvre and Seubert 1970). However, as currently used, very rigid weather conditions are needed during roost treatments for effective results to occur. At least 1.3 cm of rainfall shortly after treatment followed by temperatures at 5°C or lower are required. Unfortunately, these conditions occur infrequently and unpredictably in the problem areas. To overcome these weather factors, a PA-14 delivery system that eliminates the need for rainfall and aerial application was designed and tested. It consists of an arrangement of overhead sprinklers, irrigation pipe, and a proportioning valve that allows PA-14 to be metered into water pumped from a fire hydrant. Water sufficient to thoroughly wet the birds is applied after the

PA-14 is put on. The system is ideally suited for urban sites because a fire hydrant is usually nearby and PA-14 is relatively nontoxic except to some aquatic organisms.

Studies with the PA-14 sprinkler system will be continued to define the impact of large roost kills on the foraging populations of blackbirds and starlings and also to determine the effect of these kills on the formation of roosts in urban situation in subsequent years.

CONCLUSIONS

Land-use changes that have taken place over the last century have no doubt benefited populations of blackbirds and starlings. In the Southeast, bird-man conflicts have increased in recent years because these birds roost in large wintering concentrations (frequently in urban areas) and closely associate with agriculture. U. S. Fish and Wildlife research studies are underway that address the problems caused by these birds. Progress has been made in determining the impact these birds have on agriculture and on the health and welfare of the human populations in the Southeast. Ecological studies are being conducted to determine origin and migration routes and behavioral patterns of these birds. Control technology involving both lethal and nonlethal methods have been developed to minimize problems in livestock feeding areas and nuisance and health hazards associated with winter roosts.

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