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SUGGESTIONS FOR COMBATING OBJECTIONABLE ROOSTS OF BIRDS
WITH SPECIAL REFERENCE TO THOSE OF STARLINGS 1/

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THE ROOSTING HABIT

Not all the economic relations of birds are based on their feeding habits, however important, because sometimes species possessing commendable food habits have other traits that make them highly objectionable locally or for limited periods. A frequent cause of objection has been the habit of certain species of roosting in shade trees in residential areas or on buildings in metropolitan sections where the resultant noise and filth may constitute a nuisance, and where the presence of large aggregations of the birds may even reduce real estate values.

1/ This leaflet supersedes Wildlife Leaflet BS-81, issued in February 1937 by the Bureau of Biological Survey under the Department of Agriculture; it does not include measures for removing roosts of ravens, crows, buzzards, and other species in agricultural or sparsely settled sections, where traps, firearms, and other destructive devices may be safely used to prevent depredations upon crops or livestock.

The European starling (*Sturnus vulgaris*) became established on this continent through several importations by private individuals before 1900 (Kalmbach and Gabrielson, 1921) after which its introduction was made illegal by the Lacey Act. Of several attempts to establish the species here, those of 1890 and 1891 into Central Park, New York City, appear to be those from which originated the birds now scattered over the Eastern and Midwestern States and southern Canada. During the first 6 years after its importation the bird, as a breeder, did not spread beyond the limits of Greater New York. Since then, however, its progress has been more rapid. By 1910 its breeding range included the greater part of Connecticut and Rhode Island, the southern part of Massachusetts, the lower Hudson River Valley, most of New Jersey, and a limited area in eastern Pennsylvania. By 1930, it bred regularly from southern Ontario and southern Wisconsin to Missouri, Arkansas, and the northern parts of the Gulf Coast States, and during 1936 it was reported breeding in Minnesota, Iowa, and eastern Kansas. In 1938 the breeding range included eastern South Dakota, Nebraska, and Kansas, and a few areas in North Dakota.

In its native home the starling is migratory and shifts seasonally from its breeding grounds in northern Europe and Siberia to its winter home in France, the Mediterranean countries, and eastward. In North America the birds have developed in a relatively few years a seasonal drift or migration that has carried them far beyond the limits of their breeding range (Cooke, 1928). Although this movement is not effected with the precision of time or route exhibited by some of our native species, it constitutes a migration and a population shift that has an important bearing on the matter of roost establishment and roost control. During the nonbreeding season the starling has been found commonly throughout Oklahoma and Texas. It has also been recorded in eastern New Mexico and Colorado and at isolated points in Montana, Wyoming, Utah, and Nevada.

Despite certain objectionable habits that have become unduly emphasized by its great increase in numbers, the starling is recognized as one of the most effective bird enemies of ground-inhabiting insects in the Eastern States (Kalmbach and Gabrielson, 1921 and Kalmbach, 1928). Equaling or excelling many of our native birds in this respect, it includes in its diet such pests as the clover-leaf weevil, the Japanese beetle, May beetles, cutworms, and grasshoppers. Its liking for cherries and other fruits and garden truck, however, has been to its discredit wherever it is overabundant. Objections also have been raised to its usurping the nesting sites of native birds and to its congregating in enormous roosts.

AVOIDANCE AND PREVENTION MEASURES

It is becoming widely recognized that damage by wildlife to farm crops may be evaded or prevented by changing harvesting or cultural practices, instead of attempting to kill all real or potential offenders.

This principle may be applied under many conditions where roosting birds become troublesome and it has in its favor a degree of permanence not contingent with other measures, and it is often economical despite the initial cost. It has particular application to certain species, as starlings, vagrant pigeons ^{3/}, and English sparrows that frequently become nuisances through roosting about buildings.

Screening

Where starlings, pigeons, or English sparrows become a nuisance because of the filth and the noise accompanying their roosting in towers, belfries, ventilators, and other enclosed places, the simple expedient of putting galvanized poultry netting over all entrances is the most effective, permanent, and often the cheapest means of relief. To exclude starlings and English sparrows, the netting should be of a mesh not greater than 1 inch. For exposed situations a screen that has been galvanized after weaving will not only be more permanent than a cheaper screen but it will be less likely to leave a rust stain on white stone or woodwork with which it may come in contact.

Wire netting also may be used to exclude these birds from ledges beneath eaves or from other parts of buildings. Starlings and pigeons usually select ledges or window frames immediately beneath overhanging eaves or other projecting parts that afford shelter from rain or snow. Most of the birds will, therefore, be found at the level of or above the top-story windows. When the situation is not complicated by irregular contours or projections, a single strip of netting extending the length of the building from the edge of the overhanging eaves to the bottom of the top-story window usually puts an end to the starling nuisance on that property (fig. 1,A). This screen, installed smoothly and tightly, is not unsightly, and on buildings 8 to 10 stories tall is scarcely visible from the street. If the netting tends to obstruct the light entering the upper-story windows, the period of this inconvenience may be reduced by removing it when the roosting season has passed, or if the birds have definitely established themselves elsewhere, the screen may sometimes be taken down without the ledges being reoccupied.

As in the screening of steeples or ventilators to exclude starlings and English sparrows, the wire netting should be of a mesh no larger than 1 inch. Cotton-cord netting of the type used for fish seines also may be employed. Although light, easy to install, and not subject to rusting, it deteriorates rapidly and should be removed and stored as soon as the seasonal need has passed. If untreated and exposed to the action of rain, frost, sun, and wind, this netting will seldom last more than 2 seasons. If tarred, a treatment that will add approximately 20 percent to the cost,

^{3/} The problem of control of vagrant pigeons is discussed at greater length in Wildlife Leaflet BS-143, Suggestions for the Control of Vagrant Domestic Pigeons, which may be obtained upon request from the Fish and Wildlife Service, U. S. Department of the Interior.

it will wear longer. Untreated netting of 1-inch-square mesh made of No. 9 cotton cord costs approximately 2 cents a square foot, exclusive of marginal ropes or other rigging needed for hanging. Poultry wire of 1-inch mesh, galvanized before weaving, costs approximately 3 cents a square foot, and it will average in weight about a pound to 10 square feet. Screen that is galvanized after weaving is more expensive.

Eliminating Roosting Ledges

Since starlings and pigeons often seek roosting ledges immediately below overhanging eaves, cornices, or other structural features, some buildings, by reason of their design, are less likely to be occupied than are others. In fact some modern buildings that lack projecting ledges, deepset windows, or bold-relief ornamentation are wholly immune to the nuisance of roosting birds. Conspicuous examples of these may be found in the centers of large roosting areas in eastern cities. On the other hand, probably no type of architecture lends itself to the needs of roosting birds better than the classic Grecian, with its deeply carved pediments, sheltered porticoes, and abundant columns, from the simple Doric to the highly ornate Corinthian. From such structures the elimination of roosting ledges or nooks is well nigh impossible.

Building of more simple design, where an individual ledge or two or the heads of a small group of columns serve as the sole roosting sites, may be permanently protected against roosting birds by installing boards or blocks that will substitute for the flat surface on these ledges a slope on which the birds cannot stand (fig. 1, B). These sloping blocks, triangular in cross section, may be made of wood, cement, or other weather-resisting material, and should incline at least 30 degrees from the horizontal (45 degrees is preferable). They should be securely attached to the building, and the sloping surface should be smooth and close fitting so as to leave no foothold for the birds. Wooden plugs driven into the mortar-filled cracks between bricks or stones can be used for attaching wooden blocks, and metal dowels (nails) set tightly into holes drilled into stone or concrete will anchor those of cement. Local building codes should be conformed to in the installation.

This method of discouraging roosting birds, by no means new, was used many years ago in Philadelphia at the entrance to a large bank, where a builder installed sloping pieces of plate glass on the tops of columns to prevent pigeons from roosting there. In the city of Washington it has been employed effectively above the entrance to several buildings formerly used as roosts by both pigeons and starlings. If the blocks do not slope more than 45 degrees from the horizontal, their presence cannot be detected from below except when the observer is a considerable distance away, and if painted to conform to the color of the building, they are scarcely discernible.

Trimming Trees

Where birds roost in such rapid-growing trees as sycamores or soft maples, a severe trimming of the trees often will discourage them. Roosting starlings usually occupy the topmost or outermost branches, and they appear partial to slender twigs that bend and sometimes break under the weight of their massed formations. When these twigs are removed by close pruning, the birds usually forsake the trimmed tree for others more to their liking. A few years ago in Washington, this treatment caused a large aggregation of starlings to leave a group of sycamore trees. In subsequent years, however, the trimmed trees sent forth a mass of small branches that again made them acceptable as roosting places. This measure of prevention, therefore, may be good for only one season.

FRIGHTENING MEASURES

Although frightening measures often are of temporary or uncertain effect and have the tendency merely to shift the nuisance elsewhere, nevertheless, applied at the right time and manner, they frequently drive roosting birds to places where they are much less objectionable. It sometimes happens that removing birds from one tree or a group of trees, or from above the entrance of a building, will do away with most of the trouble.

Attempts to move objectionable roosts under a variety of conditions show that success depends much on the promptness with which frightening operations are undertaken. If roosting birds are unmolested until large numbers become firmly established, the difficulty of dislodging them becomes far greater. In areas where starlings or blackbirds are likely to gather, property owners can save time and effort by vigilantly watching for the first indication of roosting on their premises and by immediately taking energetic action against the birds.

Frightening measures range from aggressive action with powder and shot, to be restricted to species not protected by law, to the more harmless procedures of noisemaking or tree shaking that may be employed where more drastic action is neither practicable nor desirable or where protected species are involved.

Shooting

Shooting with powder and shot is the most effective frightening procedure known. It has limitations, however, in that it cannot be employed against protected species without Federal permit, it cannot be used safely in certain metropolitan sections, and it may even be prohibited by law or by police regulations. In any event this method should have the sanction of local authorities before being resorted to.

A word of caution is needed if shooting is to be employed against roosts containing several species some of which may be protected by State or Federal law. When robins, purple martins, or other desirable native species congregate with starlings, grackles, or English sparrows, extreme care should be taken not to endanger them. The various species usually

arrive at roosts in separate groups and often occupy certain trees, a factor that aids in making gunfire selective.

Shooting has been resorted to most frequently at tree roosts in suburban sections or in residential parts of cities, but also on more or less open plazas about public buildings. Particularly effective work of this kind has been done in discouraging starlings from roosting on the Pennsylvania State capitol building at Harrisburg.

Success in shooting as a frightening measure depends much on the procedure followed and in persistency at keeping it up until the birds leave. Desultory firing, two or three times a week, will not bring satisfactory results. There are times when 1 or 2 nights of shooting will cause the birds to move; at other times repetition for 5 or 6, or even more, successive nights is needed. Above all, firing should begin when the first birds arrive early in the evening, and it should be kept up until after dark. It is not necessary to kill many birds, as benefits are derived from the frightening effects both of the gunfire and the casualties that are visible to members of the flock. At tree roosts the endeavor should be to prevent incoming birds from alighting in their favorite trees and to keep the whole assemblage on the move. If local conditions prevent the use of shot, blank cartridges may be discharged. Though not so effective as the shot shells, the blanks can be used with some effect when conditions warrant.

In country where starlings and blackbirds are numerous and where late in summer there are several tree roosts within a radius of 20 miles, the usual effect of eradicating one roost is to cause its members to join another nearby. If the presence of the birds is still objectionable the process will have to be repeated in the hope that they will eventually select an unobjectionable site.

Miscellaneous Procedures

In places where gunfire is impracticable or prohibited, the discharge of Roman candles among roosting birds has brought satisfactory results. These tactics are useful mainly at tree roosts but they cannot be employed about buildings because of the fire hazard. As with gunfire, shooting with Roman candles should be started early in the evening and kept up on successive nights until the birds move out.

An ingeniously constructed noisemaking apparatus, known as a flash gun, has proved helpful in deterring starlings from roosting in places of limited size, as at entrances or beneath the porticoes of buildings. The flash gun, suspended on a flexible spring, explodes periodically a mixture of acetylene gas and air. This causes the gun to bob up and down and rotate. A light reflecting from bright metal also aids in frightening the birds. These flash guns have sold at about \$35 apiece. 4/

4/ A list of dealers in pyrotechnic supplies and flash guns may be obtained from the Fish and Wildlife Service, U. S. Department of the Interior.

In some large cities fire hose has been drafted into the battle against roosting birds with varied success. There is no question but that birds can be dislodged at least temporarily by such deluges, but since persistence is needed to effect lasting benefits, one often finds the birds outlasting the fire fighters, who may have more important calls for their services.

Noisemaking, including the ringing of bells or the rattling of pebbles in cans suspended in treetops and operated by means of strings, has been used with only moderate success at long-established roosts.

A frightening procedure that is in no way objectionable to residents who might complain of noise-producing activities is available in a simple arrangement of ropes for shaking the treetops while the birds are gathering in the evening or after they have assembled for the night. This scheme works best in elms, soft maples, or other trees that have a number of nearly parallel upright branches. These are joined about midway of their length with short sections of rope, from the middle points of which other ropes are tied that lead to the ground. Under some conditions several of these lead ropes may be so joined that a pull on a single one will shake the whole treetop (fig. 1, C). Such an arrangement is particularly helpful when birds attempt to adopt a few trees in a private doorway as their nightly abode.

Another perfectly silent frightening procedure that has been used in Washington (Kalmbach, 1932) to dislodge starlings from trees and buildings involves the use of hydrogen-filled toy balloons, raised and lowered by strings in the hands of workers patrolling the streets, or swaying in the breeze on long strings attached to a building. This inoffensive method has worked to advantage in the vicinity of hotels, where frightening by noisy measures would be objectionable.

Despite the fact that the installation of lights in roosting trees and about building ledges has been resorted to, these are of little effect when used without other measures of alarm. This is particularly true at roosts in business sections where starlings and English sparrows often spend the nights in the glare of thousands of lights. In Washington the birds have been seen actually sitting on light bulbs. Aggregations of lights, of course, materially raise the temperature, a condition that a starling might well relish on a cold winter night. An attempt to frighten starlings from a public building by training powerful searchlights upon it was wholly ineffective.

A frightening measure that has served well in keeping starlings and pigeons from occupying the ledges and ornamental capitals of one of the never public buildings in Washington was the simple expedient of shooting pebbles with a slingshot. The merit of this procedure, however, rested as

much on the persistence with which the building was patrolled by the two men assigned to the task as on the method itself. Although this building was used as a roost by thousands of starlings and a few pigeons during the winter of 1934-35, the following year, when it was patrolled, it remained free of birds except for a few persistent pigeons. Daily, from about 3:30 p.m. until dark the building was constantly patrolled by the men, who fired a pebble or two whenever birds threatened to alight. With this vigilance on the part of two members of the janitorial force an expensive job of cleaning the sides and colonnades of the building was avoided.

An air rifle shooting "BB" shot might well be substituted in places where more accurate aim is called for or where large pebbles might break the windows. Such a procedure, promptly applied, discouraged a group of starlings in Washington attempting to avail themselves of the south portico of the White House during the winter of 1935-36. Effective results were obtained a few years earlier at another public building by men who patrolled the roof and frightened birds away from the eaves by lashing them with "cat-o-nine-tail" whips made of long strands of wire.

REDUCTION OF STARLING NUMBERS

Wholesale destruction of the starling population as a means of reducing the nuisance of objectionable roosts has been suggested, but its practicability has yet to be demonstrated. In the present state of our knowledge and experience the benefits accruing from attempts at wholesale destruction appear to be restricted chiefly to the immediate vicinity of the roosts attacked. Whether such a program would be economically sound can be demonstrated only by experimental attempts in a well-defined migration route. For those who wish to control starlings at favorable spots where local benefits might accrue, the following suggestions are presented:

Shooting

The use of the shotgun as a means of killing starlings, in distinction to its employment as a frightening measure, is worthy of consideration under conditions where it is practicable and seems called for. Emphasis is placed on the caution given on page 7 regarding the safeguarding of species protected by Federal or State law that may be roosting with starlings. From the very nature of things, however, shooting to kill cannot be resorted to in the business sections of large cities where the birds roost on the sides or beneath the eaves of buildings or where the practice may be seriously objected to, even when the birds are gathered in trees in thickly settled residential areas. This state of affairs materially interferes with any widespread or concerted attempt to reduce the number of starlings in some sections of the East, where late in fall and throughout winter a high percentage of the starling population roosts regularly in such environment.

On the other hand, late in summer and early in fall, starlings roost in groves in rural sections where the obstacles mentioned are not encountered. Hicks demonstrated in Ohio that shooting may be carried out consistently and with marked advantage throughout much of the fall and winter. It apparently is possible to attack a higher percentage of the starling population by gunfire there than farther east, where many of the aggregations are in large cities. In the East, particularly in and about Philadelphia, Wilmington, Baltimore, and Washington, shooting that could be effective and persistent enough to make a material reduction in the starling population, would be difficult and dangerous, and objectionable to many residents, or actually contrary to law. In downtown Baltimore, however, the police have resorted at times to shooting, largely as a frightening measure, and the birds killed were turned over to the needy for food. A similar procedure was followed in Wilmington, where the police roped off certain residential streets and shot the birds, which were later used for food.

Shooting at birds with intent to kill is most effective and economical after the leaves have fallen. Not only do leaves obstruct and deflect the shot, but they also obscure the concentrations from the shooter. Furthermore, starlings congregate in more compact masses when the trees are bare and the temperatures low, when more birds may be felled by a single discharge.

Shooting at roosts is most effective on the first attempt, but it may be repeated with good results at intervals of a week or more. Shooting on successive nights has the effect of scattering the birds and thus of reducing the number killed. Unless large and dense concentrations can be attacked, the cost per bird killed, in labor and ammunition, mounts rapidly. Under what appeared to be very favorable conditions, Hicks in Ohio was able to kill, in 14 well-spaced attempts, more than 4,000 birds at an ammunition cost of \$1.34 a thousand.

In these activities the use of double-barreled 12-gauge guns, the shells loaded with No. 7 1/2 or No. 8 shot, has been found effective, and the whole procedure can be made more decisive by the employment of several men who shoot in unison on prearranged signals. In marked distinction from the shooting done to frighten starlings from roosts, efforts made to kill large numbers should not be begun early in the evening, but well after dark, when the birds are settled for the night.

It appears questionable whether the nuisance of large metropolitan roosts can be alleviated by shooting at distant rural roosts, for many of these birds may never join the urban aggregations. From what is known of the pronounced homing instincts of roosting starlings, it is conceivable that extensive roosts in rural sections may be eliminated without materially affecting the number of individuals that comprise the objectionable city roosts. Furthermore, in areas in the Middle Atlantic States, where the large urban roosts more or less immune to

attack by gunfire constitute a high percentage of the total starling population, the possibility of making an effective reduction in the total number by attacking merely the rural roosts becomes doubtful. There is also the chance that continued attack on rural roosts may cause the scattered remaining birds to join the ranks of those roosting in the cities, where they are more or less immune to attack, thus aggravating the starling nuisance in metropolitan sections.

Trapping

When the ground is covered with snow and at any time when food is scarce, starlings, as well as vagrant pigeons, and English sparrows, may be trapped to advantage.^{5/} This method is of value to the individual who desires to reduce the size of objectionable flocks that daily consume food put out to attract other species. It also may have utility in a larger program where, under favorable conditions, a number of traps may be operated simultaneously by volunteer or paid workers with the hope of reducing the starling population over a greater area.

Starlings are to a large extent ground feeders, and therefore traps that take advantage of this habit will work to best advantage. The simple ash-sifter type of trap, 3 or 4 feet square, propped on a 1-foot stick that is jerked away by means of a pull cord, will serve to capture a small flock that is accustomed to feed in a definite area. The funnel type of self-operating trap used extensively in the trapping of English sparrows also will do well if built with a sufficiently large opening at the apex of the funnel.

Australian crow trap.--More ambitious programs of starling control, however, call for traps large enough to capture 100 to 200 birds without undue crowding. To this end a modification of the Australian crow trap, used in this country for capturing crows, white-necked ravens, and magpies, may be employed. This trap is simple in principle, the birds entering it between the slats of a ladderlike opening extending down the center of the V-shaped top (fig. 1, D). Once inside, they endeavor to make their escape by going to the closed outer walls rather than to the openings in the middle of the inward-sloping roof.

There is no set rule with respect to the dimensions of such a starling trap, except that it is highly desirable to have it tall enough to permit the operator to capture and remove the imprisoned birds without discomfort. A trap 10 feet square and 6 feet high at the outer corners, with the slatted entrance across the middle 4-1/2 feet from the ground, will be satisfactory. The sides of the ladderlike opening should be 18 inches apart and the slats spaced at 4-inch intervals. Two wires should

^{5/} Traps for English sparrows are described in Wildlife Research and Management Leaflet BS-121, and methods for trapping vagrant domestic pigeons are discussed in Wildlife Leaflet BS-143, copies of each of which may be obtained upon request from the Fish and Wildlife Service, U. S. Department of the Interior, Washington, D. C.

be stretched lengthwise of the ladder so as to make the size of each of the apertures through which the birds enter about 4 by 6 inches. In addition, one or two pieces of stiff wire about 8 inches long may be attached to each of the slats, so that their ends, hanging downward, will tend to obstruct attempts of the birds to fly upward through the openings. At the ends of the ladder the space up to the first slat should be covered with wire screen or a board, to prevent the birds from escaping by clambering up the end wall of the cage. A number of perches should be installed lengthwise of the trap and at a height at least equal to that of the ladder, so that birds flying from one side to the other will tend to pass by the openings rather than to fly up through them. A door should be built in one corner to permit access to the interior for the removal of captured birds.

The materials for the trap frame can usually be obtained at little cost. The wire poultry netting used should be of 1-inch mesh. A knock-down trap that can be readily shifted from one place to another can be constructed at some extra expense for material and labor. This movable trap has each of the four sides, the two parts of the top, and the ladder constructed as separate units--the sections being fastened together with screws.

Operation of trap.--The trap should be placed in a locality well populated with starlings that come there regularly to feed. The vicinity of city dumps, poultry yards, stables, and pastures where livestock is being fed will be found advantageous. Elsewhere some prebaiting will have to be done to accustom the birds to feeding in the area.

Table scraps, overripe fruit, stale bread, and almost any kind of inoffensive garbage will serve as bait. Grain also may be used, although as a rule it is less attractive to starlings than the garbage suggested. The bait should be placed not only beneath the top opening but also next to the outer walls of the trap. A few crusts of bread laid on top of the trap, next to the ladder, will lure wary individuals to the openings, where they can see the bait within. When removing captured birds, several should be left in the trap from day to day as decoys.

During the winter of 1935-36 a trap on the ground of the National Soldiers' Home in Washington, D. C., similar to the one described, captured more than 1,500 starlings in a period of 2-1/2 months. On each of several unusually cold days catches of more than 100 were made. The birds captured were largely from flocks on their way to or from an enormous roost a few miles away in the business section of the city. Because of these large numbers passing, the results obtained were probably better than would ordinarily be the case.

Most of the birds captured were banded and released, and it is of interest to note that, of 1,269 starlings so tagged, not one returned to the trap for a second visit. Whether these birds merely avoided the trap or whether they shunned the entire vicinity could not be ascertained.

It at least reaffirms the conclusion, reached in earlier experimental work, that starlings react quickly when frightened or handled. The success of frightening measures in roost eradication rests on this reaction.

Capturing at Enclosed Roosts

During the winter months, particularly in northern sections, starlings, as well as pigeons and English sparrows, often use barn lofts, belfries, ventilators, church towers, and other enclosed places for nightly shelter. Small enclosures may harbor only a few individuals, but in centers of starling abundance individual towers may shelter thousands. To some of these the birds may travel 15 to 20 miles daily from their feeding grounds.

These concentrations present a convenient opportunity for local control. If the enclosures are readily accessible, the operators may visit them at night and capture many of the birds by hand or with nets. Often the openings through which the birds enter may be quietly and quickly closed after dark by a netting pulled or dropped across them, and then the birds can be captured at leisure during the night. If blocking the openings leaves the enclosures fairly tight, fumigation or gassing, as described below, may be resorted to.

In some cities a number of well-populated towers or other enclosed places may lend themselves to this means of reducing the numbers of starlings; in others, suitable structures may be scarce or absent. In Washington more than 4,100 starlings were captured in one of the city's church towers during the winter of 1927-28. A second tower yielded nearly 400 during the following winter, but since then the towers have been torn down, and as there are no other readily accessible well-populated enclosures there, that method of starling control could not be continued to advantage.

In other large eastern cities, where most of the roosting starlings are found, even in the coldest weather, on ledges or beneath open porticoes, capture by hand is impossible. Failure of this method in some cities, however, should not discourage its employment elsewhere. Hicks, working in southern Ohio over a period of 8 winters, captured nearly 40,000 starlings in the course of 90 nightly visitations to towers, cupolas, and other enclosures.

Gassing

The war-time use of toxic gases has suggested the possibility of using them as killing agencies in the control of troublesome birds and other animals. Even though there is little to demonstrate its practicability, the idea of suddenly and completely eliminating large flocks or roosting aggregations by a single application of toxic gas is too captivating not to have its advocates. Some experimental work has been

devoted to determining the possibilities as well as the hazards in bird control by gassing.

More than a decade ago the Biological Survey conducted a series of experiments in cooperation with the Chemical Warfare Service of the War Department to ascertain the economy, safety, and utility for the purpose of six toxic gases commonly used in warfare. It was found that when gas clouds of sufficient size or concentrations to kill birds quickly were released to the whim of the winds and allowed to drift, they also constituted a hazard to livestock and even to human beings. Not only is such gassing hazardous but there is always the possibility of its being rendered ineffective through the birds taking alarm and moving out or by fitful air currents shifting the toxic cloud to one side or another.

Where starlings, pigeons, and English sparrows roost in lofts, bell-fries, porticoes, or other wholly or partly enclosed places, even in dense vines on the sides of buildings, however, successful fumigation may be possible, and experimental tests have been made under these conditions with hydrocyanic acid gas. During the winter of 1935-36 the liquid form of this fumigant was experimented with on starlings in the vicinity of Washington, D. C., and as in previous years calcium-cyanide dust, which produces hydrocyanic-acid gas when released in a humid atmosphere, also was used in similar experiments.

In the tests with liquid cyanide, two methods of application were studied. One involved discharge through an atomizing nozzle; nitrogen, under a pressure of about 200 pounds to the square inch, propelling the cyanide in a fine spray, which volatilized rapidly and formed a dense gas cloud. Release of the gas was controlled and directed through valve manipulation and by use of a bamboo pole to the end of which the spray nozzle and its connecting hose lines were attached. A height of more than 30 feet was reached with the liquid spray and the gas cloud itself rose to even greater heights in a calm atmosphere. Another method involved the use of nozzles capable of throwing a fine spray, installed directly on a pipe line of liquid cyanide, the pressure on which was maintained at about 100 pounds to the square inch. With this equipment volatilization was less rapid and not so complete, and, on the whole, the procedure was less effective.

The experiments were first conducted with caged starlings placed at various distances from the nozzles and under various atmospheric conditions. Later, the liquid hydrogen cyanide-nitrogen spray was used at night against starlings roosting in tall but partly enclosed porticoes as well as against others roosting in exposed defoliated trees.

Under conditions prevailing during the winter months about the porticoes and tall colonnades of public buildings in Washington it was found that even on relatively calm nights the air movements were sufficient to disperse and dilute the gas clouds to a point where asphyxiation of the birds on ledges 50 to 60 feet above the ground was irregular and uncertain. Under the most favorable conditions the cost of labor and materials was

out of all proportion to the results obtained.

Although starlings roosting under porticoes and in other partially sheltered places often remain undisturbed by gassing operations, those in exposed trees readily take alarm when the hissing nozzle of the gas jet is brought within "firing distance." This reaction of the roosting birds constituted an important obstacle and completely nullified attempts at gassing in trees in Washington, where starlings roost in dense concentrations both before and after the leaves fall.

It was demonstrated earlier and again verified in the winter of 1935-36 that in well-protected porticoes and under ideal atmospheric conditions starlings may be gassed with calcium-cyanide dust propelled as a cloud by an electrically driven blower. The cost of materials, equipment, and labor, however, coupled with the element of uncertainty of success, makes even this relatively more successful operation of doubtful utility.

Where starlings or English sparrows established objectionable roosts in vines growing on the sides of buildings, success in gassing was achieved with calcium-cyanide dust propelled by hand- or power-operated guns, with hose and tubing of sufficient length to reach the birds. 6/ The hand-operated dusters employed in fumigation against insects are useful in cases where starlings are not roosting too high. After all nearby windows have been tightly closed, a dust cloud may be released near the ground and close to the building. This produces a column of hydrocyanic-acid gas that will slowly rise, passing up the side of the building, and penetrating all the spaces between the overlapping leaves beneath which the birds roost. By using extensions to the tubing higher roosting spots can be reached, but for heights above 50 feet a power-operated machine will be needed. A period of a minute or more may elapse between the time the dust cloud is released and the time the first birds begin to drop. Under the conditions described, there is little doubt that a liquid-cyanide spray also would be effective.

Within enclosures that are reasonably tight and where the birds roost at points so inaccessible as to prevent capture by hand or with nets, as in tall church spires or ventilators, it may be possible to fumigate with liquid cyanide, calcium-cyanide dust, or even with the gas generated by the action of dilute sulphuric acid on sodium or calcium cyanide, as is done in household insect fumigation. 7/

6/ A list of dealers in calcium-cyanide dust and dust guns may be had by addressing the Fish and Wildlife Service, U. S. Department of the Interior, Washington, D. C.

7/ Directions for household insect fumigation with hydrocyanic-acid gas will be found in Farmers' Bulletin 1670, obtainable at 5 cents a copy from the Superintendent of Documents, Washington, D. C.

Caution.--It must be constantly remembered in any attempt at fumigation, however, that hydrocyanic-acid gas is a most deadly poison; it should not be used except by competent and experienced workers. For this reason its handling must not be entrusted to others who may wish to employ it in the control of birds. If occasions arise where fumigation appears called for, either professional fumigators should be hired or the advice and guidance of experienced workers obtained. Furthermore, in some municipalities, fumigation with hydrocyanic-acid gas is permitted only under the strictest regulation, and this should be respected at all times.

Poisoning

Just as the idea of killing large numbers of birds with lethal gas has caught the fancy of some persons, so have the possibilities of poisoning at roosts attracted the attention of others. These advocates, however, do not realize that birds do not come to their nightly gatherings for the purpose of feeding. As a matter of fact most of the birds that enter the roost have full stomachs, the result of their afternoon meals, and in the morning their first impulse is to get started on the flight back to their favorite feeding grounds, which may be as far away as 15 or 20 miles.

Furthermore, throughout late summer and early fall, starlings get most of their food from grasshoppers and wild fruits, items that are certain to serve as strong counter attractions to any poisoned baits that might be exposed. Even late in fall and during fair, open days in winter the birds are reluctant to leave the food supply they find in their favorite hayfields, pastures, and barnyards. During periods of severe weather when the ground is covered with snow, city dumps and garbage-disposal grounds become attractive to the resourceful, omnivorous starlings. Even the average back yard then has something in store for them. Under such conditions and at a multitude of localities where aggregations of variable size are accustomed to feed, there is no doubt that starlings could be poisoned. With the exception of relatively few places, as garbage dumps and the like, however, the feeding grounds of starlings are so varied and so numerous that to reach the bulk of the nomadic flocks would call for the distribution of poison at many places. This exposure of poisoned bait would constitute a hazard to other birds, especially during the dearth of food in winter.

The fluctuating population of large metropolitan starling roosts apparently cannot be materially, economically, and safely reduced by poisoning campaigns conducted over the feeding range of the birds, widespread as it is over the surrounding country.

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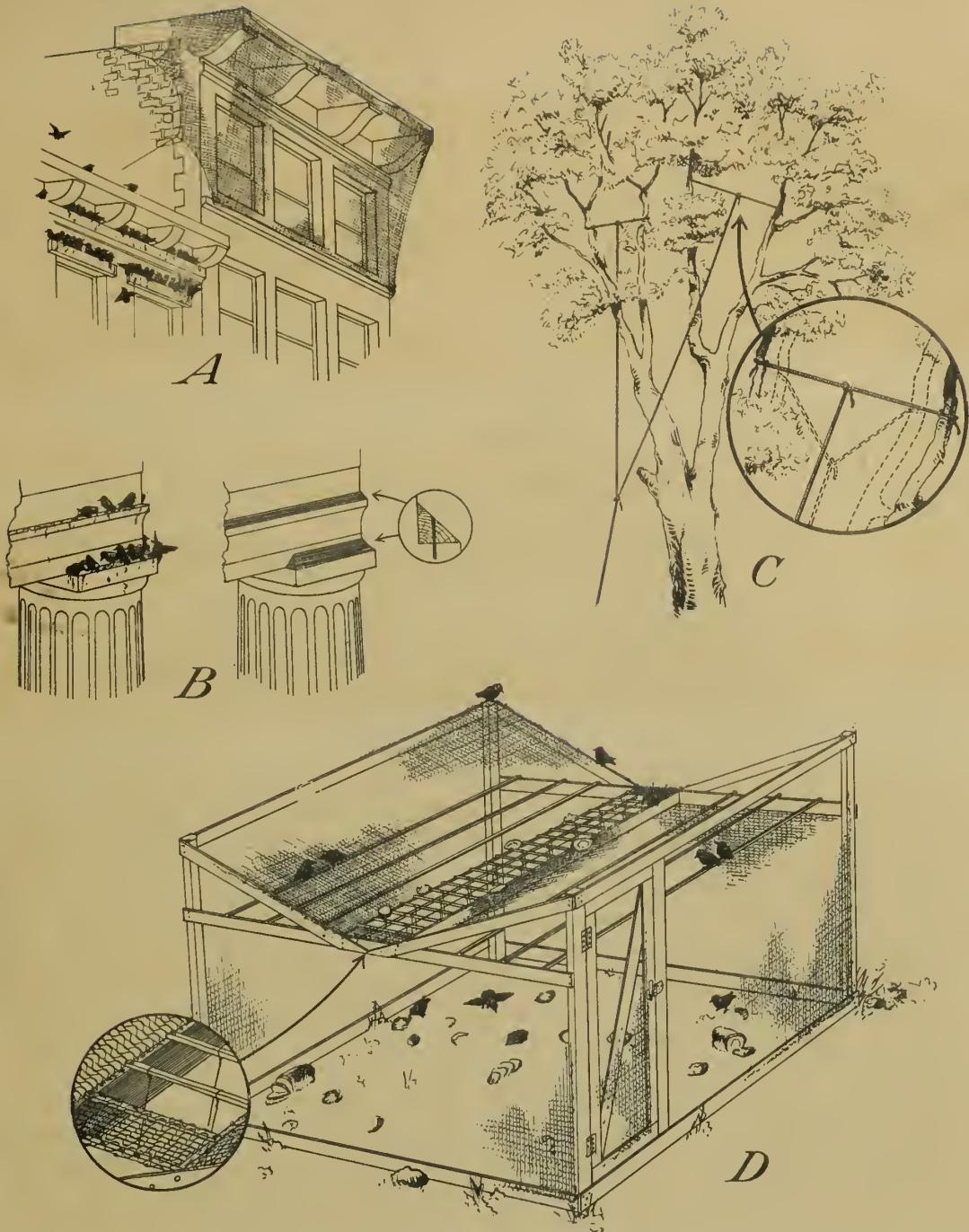


FIGURE 1.--DEVICES FOR COMBATING ROOSTS OF STARLINGS AND OTHER BIRDS

- A. Screening to protect sheltered ledges; B, sloping surfaces of wood or concrete to eliminate footholds on narrow ledges; C, ropes for dislodging roosts by shaking treetops; D, baited trap at daytime feeding grounds. The trap is equipped with a slatted top entrance, inside perches to deter captive birds from perching on the entrance slats and escaping, and a door of convenient height for the operator. Baits are placed to attract birds to the entrance and thence to other baits exposed on the ground inside. A satisfactory trap may be 10 feet square and 6 feet high at the corners, with openings and perches about $4\frac{1}{2}$ feet above ground.

