BIRD DAMAGE TO SPROUTING CORN IN THE UNITED STATES

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
Special Scientific Report—Wildlife No. 173

UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife

BIRD DAMAGE TO SPROUTING CORN IN THE UNITED STATES

C. P. Stone and D. F. Mott

Denver Wildlife Research Center
Division of Wildlife Research

Special Scientific Report--Wildlife No. 173
Washington, D.C. · 1973

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 65 cents
Stock Number 2410-00378

CONTENTS

ABSTRACT

Results of a questionnaire returned by 337 wildlife and agricultural specialists in 25 States indicated that losses of corn sprouts to birds in 1971 may have been a $6 million, and possibly a $49 million problem. The southeastern and mid-Atlantic States were experiencing the most serious problems, and common grackles (Quiscalus quiscula) appeared to be the most important species involved. Shooting, poisoning, and the use of repellents and exploders were the most common methods used in alleviating the problem. Most respondents recognized that corn sprout pulling was related to breeding and loafing cover for birds and to various agricultural practices.

INTRODUCTION

The most logical first step in problem solving is defining the problem. For animal damage problems, which are sometimes rather extensive and often ill-defined, one initial approach is use of questionnaires directed to individuals who are closely concerned with the damage. Questionnaires are limited by biases and subjectivity of recipients and by inadequacy of questions asked, but do provide a starting point. On the basis of questionnaires sent to individuals in 25 corn-growing States, we have attempted to determine the importance of bird damage to sprouting corn. We hope that information gathered in this preliminary study will lead to more precise studies of the importance of sprout pulling by birds and to better methods of alleviating the problem.

METHODS

Questionnaires and letters of transmittal (Appendices I-III) were mailed to agricultural and wildlife specialists in 25 States that accounted for 92.7 percent of the national acreage in 1971. Mailings were made 3 April 1972, with a follow-up for nonrespondents on 2 June 1972. Return envelopes and small maps of each respective State were included. We contacted biologists of the Division of Wildlife Services, U.S. Fish and Wildlife Service, biologists of State game and fish agencies, State Agricultural Experiment Stations, Wildlife Extension Specialists, and some research biologists in the U.S. Fish and Wildlife Service. All people who were contacted replied, although some forwarded their questionnaires to agricultural or university personnel with a better knowledge of the problem for their State. Some questionnaires were answered after several individuals conferred about the problem. Specialists in Tennessee were not formally surveyed by questionnaire; locations of known sprout pulling problems were provided by Division of Wildlife Services biologist K. M. Garner. Statewide information for North Carolina is based completely upon responses of county agents.

A nearly identical questionnaire was sent to USDA county agents in five of the States (Illinois, Kentucky, Maryland, North Carolina, and South Dakota). These particular States were selected to include both the major corn belt States and the more marginal corn-growing areas and because cooperators in the five States agreed to contact the county agents.

Both State and county recipients were asked to rate the importance of bird damage to sprouting corn in their particular area, to indicate bird species involved, to suggest possible reasons for the problem (or lack of it), to list the current control practices together with opinions of frequency of use and effectiveness for each, and to note sprout pulling problems in other crops. They were also asked to provide any damage estimates that they might have, and those responding to statewide questionnaires were asked to record on a map counties in which the problem was known to occur.

Most of the questions directed to State and county specialists were closed rather than entirely open-ended, with a listing of possible responses. However, ample room for comments was provided, and respondents often answered questions in more detail than required, particularly when the answers applied to the entire State. We believe that the independent responses received from two to six respondents in each State provided a fairly complete and accurate indication of the corn sprout pulling problem in each State.

RESULTS

Statewide Responses

Opinions of the specialists as to the importance of damage differed somewhat within some States (Table 1), but if mean ratings are taken, there were no States in which bird damage to sprouting corn was considered "serious." Damage was moderate in Delaware, Georgia, Kentucky, New Jersey, North Carolina, South Carolina, and Virginia. These seven States produced 5,473,000 acres of grain corn in 1971, 8.58 percent of the national total. Damage to sprouting corn was rated slight to moderate in Idaho, Michigan, New York, and Oregon. These four States produced 2,057,000 acres of grain corn in 1971, 3.22 percent of the national total. Damage in Florida, Illinois, Indiana, Iowa, Maryland, Minnesota, Missouri, Nebraska, Ohio, Pennsylvania, South Dakota, and Wisconsin was rated slight. These 12 States produced 51,615,000 acres of grain corn in 1971, 80.88 percent of the national total. Damage to sprouting corn in Kansas and North Dakota was nearly nonexistent.

Common grackles (Quiscalus quiscula) were rated most important in five States (Delaware, Georgia, Kentucky, New Jersey, and Virginia) of the seven reporting moderate damage. Red-winged blackbirds (Agelaius phoeniceus) were considered most important in South Carolina, with grackles second, and crows (Corvus brachyrhynchos) were thought to be most important in North Carolina. However, statewide information for North Carolina was based on responses of county agents, some of whom were not familiar with grackles, so the importance of that species may have been underrated. In States where pheasants (Phasianus colchicus) were considered the most important species (Idaho, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, Oregon, Pennsylvania, South Dakota, and Wisconsin), a very common comment was that pheasant populations are now too low to do much damage. Idaho, Oregon, and Michigan reportedly had areas of high pheasant density, and damage was also rated higher in these States. Red-winged blackbirds were apparently the most important species in sprout pulling damage in South Carolina, New York, and Maryland.

Counties with known sprout pulling damage (Fig. 1) were most numerous in mid-Atlantic and southeastern States, in general agreement with damage ratings of State specialists. An exception was Georgia, where the respondents did not note specific damage areas.

Reported methods of preventing sprout pulling of corn were quite diverse within most States. Many respondents did not answer questions about most frequently and successfully used methods, however; common responses were "don't

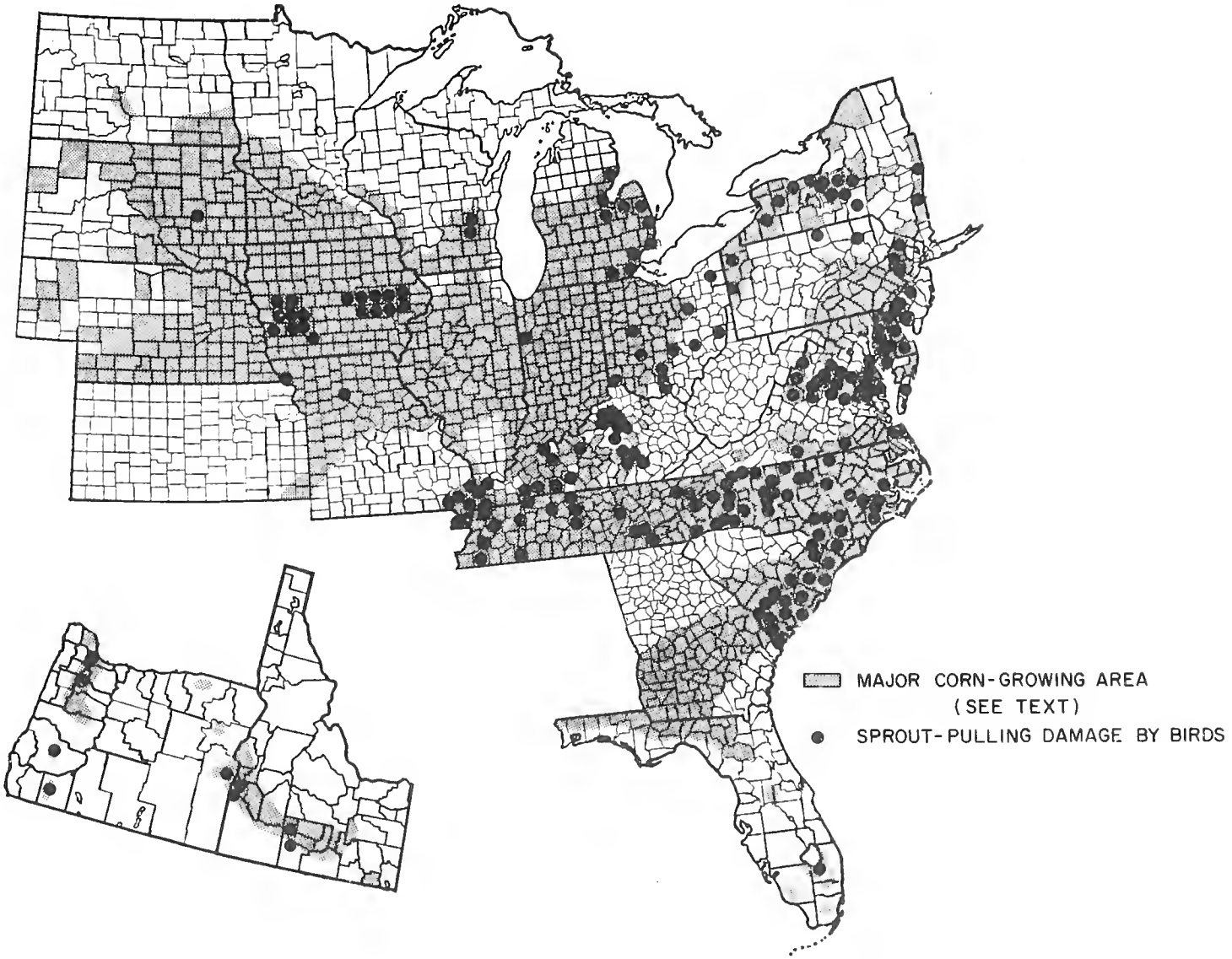

Fig. 1. Major corn-growing areas and counties with known sprout pulling by birds according to State specialists.

know," or "nothing works." It is recognized that nonrespondents may have answered differently than respondents. A summary of the information from those who did respond to the two questions (Table 2) suggests that repellents and shooting were the most commonly used methods, although poisoning, use of exploders, and replanting of fields were also common. Repellents, shooting, and feeding of an alternative food were considered equally successful methods of alleviating or compensating for sprout pulling, with replanting and use of exploders rated second.

The materials used as "bird repellents" were diverse and varied greatly from State to State. The chemicals mentioned can be divided into two major groups: those that probably have some repellent activity and those that are primarily toxicants. Chemicals in the first group included coal tar, turpentine, kerosene, cresol, wood oil, thiram, captan, graphite, copper oxalate, and red lead oxide. The toxic chemicals mentioned as "repellents" were lindane, strychnine, phorate, disulfoton, dieldrin, and Isotox[1]. In addition, many specialists mentioned a number of proprietary formulations containing mixtures of chemicals from both groups. Twenty-five percent of the respondents listed poisons and toxic "repellent" materials as the most frequently used damage control measures.

The questions about possible reasons for sprout pulling damage (or lack of it) were usually answered by "lots (or lack) of birds" or "areas near good nesting cover or near roosting areas." These answers probably resulted partly from the way in which the questions were asked. Many specialists did note the close association of certain agricultural practices with a sprout pulling problem (or lack of it), however, including timing of planting in relation to bird migration, planting of other crops, depth of planting, coordinating of planting with other farmers, and clean farming practices. The texture of soil in which corn is planted was also considered important by some. Many believed that the current practice of no-till farming resulted in increased damage because exposed seeds or seed rows attracted birds. In addition to agricultural factors, weather conditions, dispersal of birds during the breeding season, and existence of naturally available alternative foods were mentioned.

Respondents usually rated bird damage to other sprouting crops as of slight importance. Damage to sprouting wheat in Michigan and Oregon, to grain sorghum in Kentucky and New Jersey, to winter grains and peas in Delaware, to soybeans in Kentucky, to peanuts in Virginia, and to several truck crops in Idaho were all rated of moderate importance. Species other than blackbirds were usually involved in such damage.

County Agent Responses

Results of questionnaires submitted to county agents in the five States (Table 3) corresponded in general with results of statewide opinions about the importance of damage in each area. Over 90 percent of responding county agents

---

[1] Use of trade names does not imply endorsement of commercial products by the Federal Government.

in Illinois and South Dakota reported that consumption of sprouting corn by birds was a nonexistent or slight problem. Over 40 percent of Agents in Kentucky and North Carolina rated the problem as moderate to severe. Maryland county agents tended to rate the problem more highly than statewide experts, with 46 percent responding that the problem was moderate or severe. Ratings given by respondents for individual counties in each of the five States are shown in Fig. 2.

There was a considerable discrepancy between county agents and Statewide experts as to which species were most involved in damage in the five States. In general, county agents believed crows to be much more involved in sprout damage and grackles much less involved (Table 4). County agents also tended to implicate red-winged blackbirds to a greater extent. It might be argued that county agents are closer to the problem and that their information is thus more reliable than that of State experts. On the other hand, some seemed unsure of the word "grackle" on questionnaires, inserted "large blackbird" or some other descriptive term, and often questioned the involvement of grackles and starlings (Sturnus vulgaris). Grackles are called "crow blackbirds" by local people in many areas. Persons responding to statewide questionnaires were generally much more certain of species involved, usually numbering them in order of importance.

Methods of preventing or compensating for sprout damage in the five States were again diverse, according to county agent responses (Table 5). Replanting, which is a compensatory measure, was most commonly reported in Illinois, with shooting, a preventive measure, a close second. Shooting and scarecrows were much used in Kentucky; shooting and decoy food, in South Dakota; and repellents, shooting, and scarecrows, in North Carolina. County agents in Maryland recorded repellents, exploders, and deep planting most frequently.

Direct questions about frequency and success of methods used were not answered any more often by county agents than by statewide specialists. Those that did answer thought that repellents (12.6 percent) and shooting (9.1 percent) were most frequently used (Table 6); this result compares closely with the frequency with which repellents (30.0 percent) and shooting (30.8 percent) were reported as "methods used" on returned forms (Table 5). The few county agents in each State who replied to the question of "most successful" method believed repellents to be more successful than shooting by a wide margin (Table 7), and agents in Maryland and North Carolina were especially enthusiastic.

Relation of Bird Density to Corn Sprout Pulling

Corn sprout pulling by birds is not well correlated with densities of breeding birds, at least on a gross scale. A comparison of breeding densities of common grackles and pheasants (Figs. 3 and 4) with major corn-growing areas and reported sprout pulling problems (Fig. 1), indicated that many areas with both high breeding densities and considerable corn production apparently had no sprout pulling problems. Southern Minnesota, north-central Iowa, and southern Illinois are examples. On the other hand, sprout pulling in Delaware, New Jersey, Maryland, northern Virginia, southeastern Missouri,

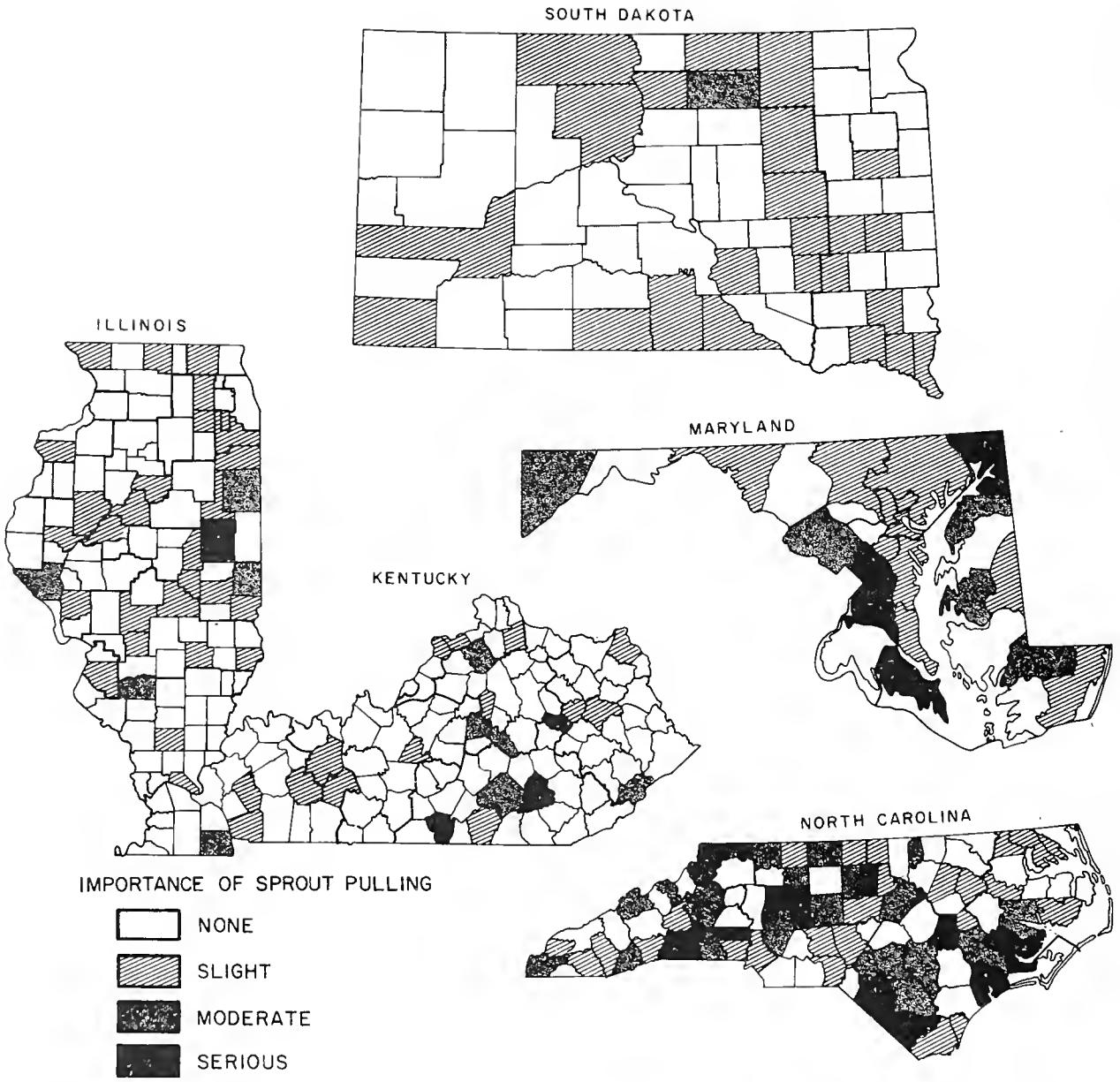

Fig. 2. Importance of corn sprout pulling by birds in five States according to USDA County Agents.

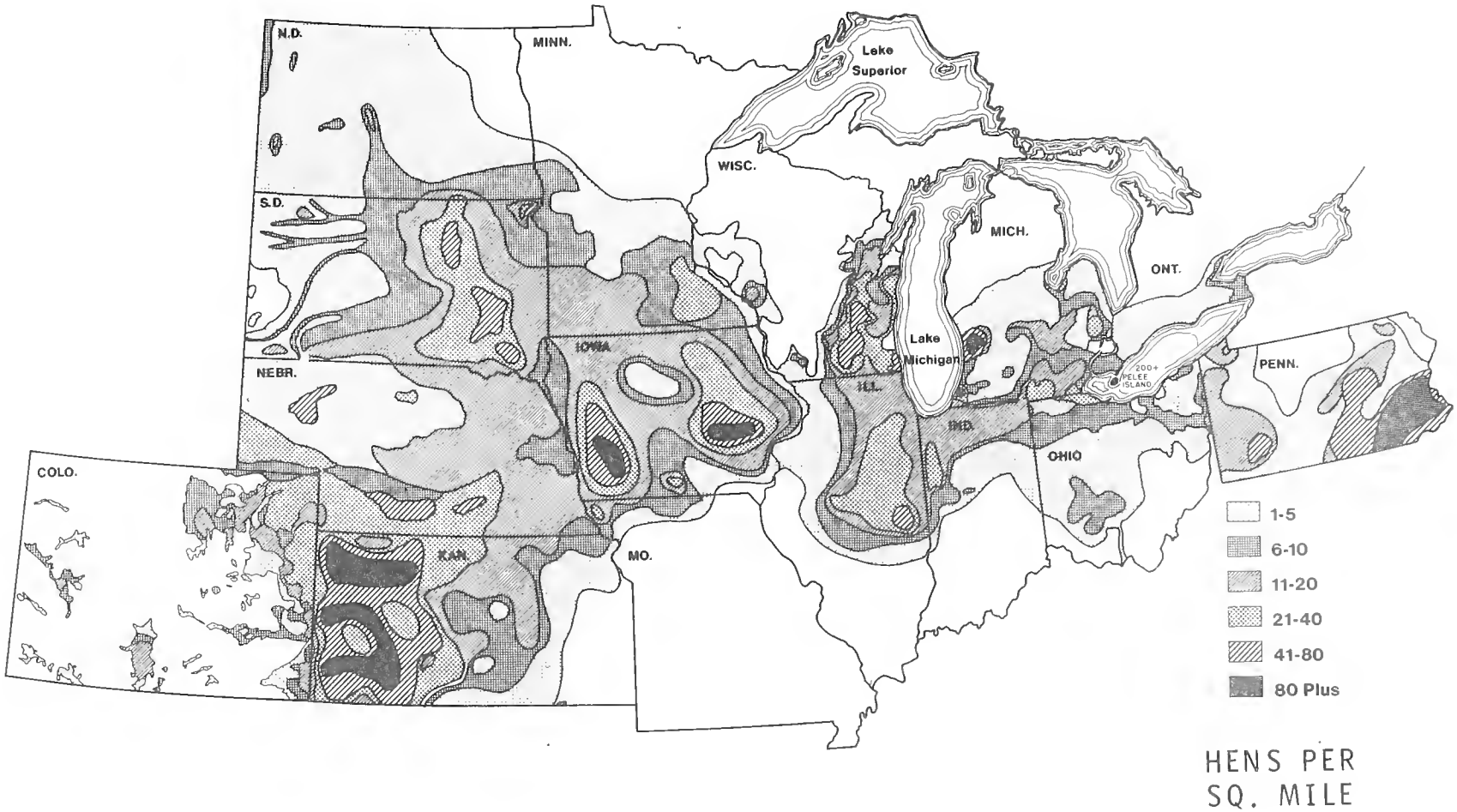

Fig. Breeding density of hen pheasants in 1971 (courtesy Midwest Pheasant Council of International Association of Game and Fish Commissioners).

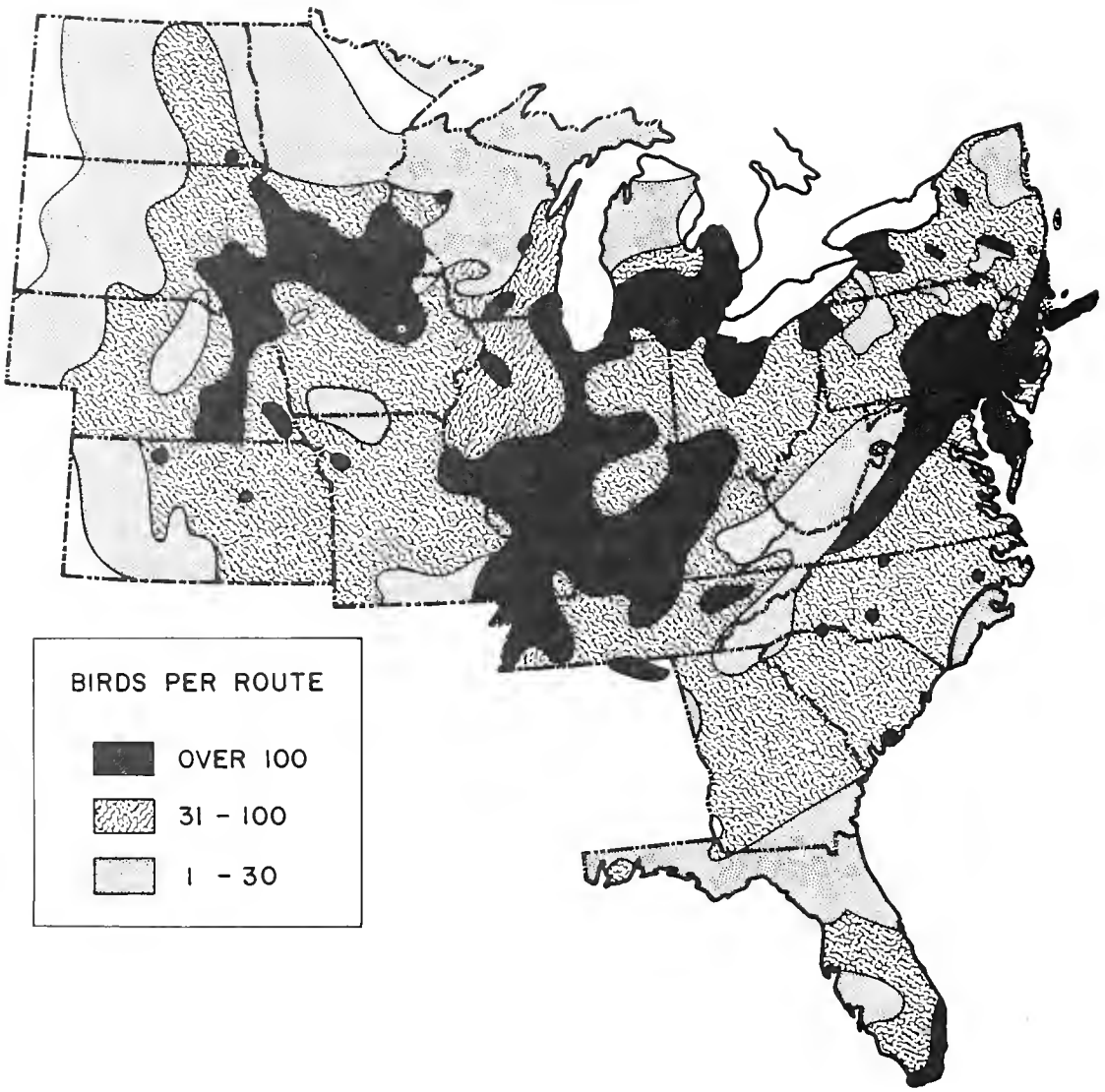

Fig. 4. Numbers of common grackles counted on breeding bird survey routes in 1969 (courtesy Migratory Bird Populations Station, U.S. Fish and Wildlife Service).

western Kentucky, and western Tennessee seems to be associated with high numbers of breeding grackles. Large numbers of pheasants are possibly now associated with sprout pulling only in southeastern Pennsylvania and southeastern Wisconsin. However, a past relationship between high pheasant populations and sprout damage was reported for Iowa. Pheasant density data for many of the States surveyed were not available. As suggested by the respondents, many factors other than bird density determine whether sprout pulling by birds is an important problem.

Economic Importance of Sprout Pulling

Little quantitative information about economic losses was obtained in this survey. A summary of answers from recipients of statewide and county questionnaires to the question about loss estimates is presented in Table 8. Estimates of losses in individual fields were the most numerous, and figures as high as 50 percent were not uncommon. Losses on the order of 5-10 percent may be common in some counties.

We have used the information on statewide damage to estimate the importance of sprout pulling by birds on a national basis. If moderate damage is in the neighborhood of 2 percent of total acreage (based on 2.5 percent in Delaware, 2.2 percent in South Carolina, and 1.6 percent in Virginia), 109,460 acres may have been lost in the seven States with moderate damage. With no replanting, about 6.8 million bushels (based on a mean 62 bu/acre yield) or $10 million (at $1.50/bu) would have been lost in the seven States. If all acres were replanted and produced average yields, replanting costs in the seven States would have amounted to approximately $1.6 million (based on $14.50/acre replanting costs; information from Santee National Wildlife Refuge personnel, South Carolina). In actual practice, yields are lower in replanted fields and sprout pulling may again occur. Thus, total losses in the seven States were probably in excess of the $1.6 million figure.

Similar analyses of losses in States with slight and with slight to moderate damage suggested that 258,075 acres or about 23.6 million bushels (based on a mean 92 bu/acre yield) and 30,855 acres or about 2.1 million bushels (based on a mean 70 bu/acre yield) may have been lost. These figures are considerably less reliable than those for the States with moderate damage, since they are based on rather arbitrary 1.5 and 0.5 percent damage figures for the two categories. Maryland, a State with a slight rating, may have lost as much as 1 percent of the acreage to sprout pulling, according to one specialist. However, many States that were rated slight are known to have low pheasant populations, large corn acreages, and large fields with less edge per unit area, and sprout pulling within these States probably involves far less than 1 percent of the total acreage. Based on the calculated acres lost, replanting costs might have been about $3.7 million and $447,000 for the States rated slight and slight to moderate. Total losses in the 25 States would have been about 32.5 million bushels, or about $48.8 million, based on potential corn loss without replanting, and about $5.8 million if the total acreage lost had been replanted.

CONCLUSIONS

The results of this questionnaire study suggest that southeastern and mid-Atlantic states are currently experiencing the most important sprout pulling problems in the United States. Common grackles, red-winged blackbirds, and crows are the chief species involved in these States, and damage is probably most serious when plant emergence and large flocks of these species coincide. Idaho and Oregon are the major States in which pheasant damage is a problem, probably because of fairly high pheasant populations, small fields with considerable edge, and low acreages of corn. Many of the techniques currently used to alleviate damage have been recommended for decades, and shooting, poisoning, exploders, and repellents of various sorts are probably used with about equal frequency nationwide. Noncultural techniques seem to be used more often in some States than others; for example, repellents are favored in Maryland and North Carolina by a wide margin, while decoy feeding is much used in South Dakota. Attitudes about most successful ways to prevent damage are similarly variable, but most respondents chose repellents, shooting, or decoy feeding. Many respondents knew of no effective method to prevent damage. Since most individuals did not respond to questions about most common and most effective damage control, results may not accurately reflect methods used.

Most of the respondents recognized the ecological-cultural causes of sprout pulling damage. Bird damage to sprouting corn was associated with: fields near nesting or roosting areas; fields planted at the wrong time with respect to bird migrations; lack of alternative foods, or enough other corn; seeds not planted deeply enough; and plantings on loose soils or during cool moist conditions. Research to develop sophisticated (nonlethal) repellents to be applied during the 5- to 10-day period of maximum seed and sprout vulnerability, alteration of cultural practices, and increased consideration of ecological variables (including availability of alternative foods) should help to alleviate sprout pulling by birds. Quantitative surveys of bird damage to sprouting corn would also seem in order, particularly in areas in which damage was reported in this questionnaire survey.

ACKNOWLEDGMENTS

We are indebted to the hundreds of biologists, teachers, agricultural experiment station directors, wildlife specialists, and U.S. Department of Agriculture county agents who took the time to fill out questionnaires. Naming all would be impossible, but Donald T. Harke and Kenneth M. Garner of the Division of Wildlife Services, U.S. Fish and Widllife Service; John L. Schmidt, Wildlife Extension Specialist, South Dakota Cooperative Extension Service; Robert D. Walker, Specialist in Natural Resources, University of Illinois; Philip Granett, Research Professor, Rutgers University and other members of the Northeast Experiment Station's Regional Research Committee; W. P. Eggborn and K. Brady, Virginia Department of Agriculture and Commerce; and Robert T. Mitchell, Division of Research, U.S. Fish and Wildlife Service, deserve special thanks. Joseph L. Guarino, Edward W. Schafer, Jr., W. C. Royall, Jr., and Ann H. Jones of the Denver Center read the manuscript critically, and we are grateful for their suggestions.

TABLE 1.--Importance and extent of bird damage to sprouting corn in 25 states according to 78 agricultural and wildlife specialists.

State	1971 Grain Corn Acreages[1]	Number of Responses	Importance of Damage				Bird Species Involved[2]
			Serious	Moderate	Slight	None	
Delaware	200,000	3	1	1	1		Grackles, redwings (pheasants)
Florida	353,000	3		1	2		Grackles, redwings (sandhill cranes, meadowlarks)
Georgia	1,532,000	3		2	1		Grackles, redwings, starlings, crows
Idaho	29,000	6	2	1	3		Pheasants
Illinois	10,170,000	4			2	2	Pheasants, crows, redwings, grackles
Indiana	5,509,000	4			2	2	Pheasants
Iowa	11,570,000	3			2	1	Pheasants
Kansas	1,311,000	3			1	2	Pheasants
Kentucky	1,226,000	4		4			Grackles, redwings, crows (starlings, geese)
Maryland	500,000	3		1	1	1	Redwings, grackles (crows, pigeons, starlings)
Michigan	1,700,000	4		2	2		Pheasants, grackles, crows, redwings
Minnesota	5,725,000	2			1	1	Pheasants, grackles, crows
Missouri	3,092,000	3			3		Crows, grackles, pheasants, redwings, starlings
Nebraska	5,356,000	2			1	1	Pheasants
New Jersey	80,000	5		4	1		Grackles, redwings, crows, starlings, pigeons, cowbirds

(See footnotes at end of table)

TABLE 1 - Continued

State	1971 Grain Corn Acreages[1]	Number of Responses	Importance of Damage				Bird Species Involved[2]
			Serious	Moderate	Slight	None	
New York	316,000	2		1	1		Redwings, grackles, crows, starlings, pheasants
North Carolina	1,520,000			1[3]			Crows, redwings, grackles, starlings (mourning doves, bobwhite quail)
North Dakota	172,000	3			1	2	Redwings
Ohio	3,526,000	2			2		Grackles, redwings, crows
Oregon	12,000	4		2	1	1	Pheasants, crows
Pennsylvania	1,036,000	3		1	2		Pheasants, grackles, crows, redwings
South Carolina	454,000	3		3			Redwings, grackles, crows (starlings, cardinals)
South Dakota	2,679,000	3		1	2		Pheasants, redwings
Virginia	461,000	3		3			Grackles, redwings, crows (pigeons)
Wisconsin	2,099,000	3		1	1	1	Pheasants, redwings, crows, grackles (pigeons, starlings)
Totals	60,628,000	78	3	29	33	14	

[1] U.S. Department of Agriculture. 1972. Crop Production: 1971 Annual Summary, Statistical Reporting Service, Washington. 26 pp. + 56 pages of tables.

[2] Most important species listed first; those with minor involvement in parenthesis.

[3] Rated by the authors on the basis of other comparable states and data from USDA county agents.

TABLE 2.--Most frequently and successfully used methods of alleviating or compensating for bird damage to sprouting corn in 25 states according to 78 agricultural and wildlife specialists.

Method	Most Frequent		Most Successful	
	No.[1]	Percent[1]	No.	Percent
Repellents	8	19.5	5	17.2
Shooting birds	7	17.1	5	17.2
Poisoning birds	6	14.6	3	10.3
Exploders	6	14.6	4	13.8
Replanting	6	14.6	4	13.8
Scarecrows	3	7.3	0	0.0
Deep planting	3	7.3	1	3.4
Decoy feeding	2	4.9	5	17.2
Not planting	0	0.0	2	6.9
Totals	41	99.9	29	99.8

[1] Number and percent of specialists reporting method as "most frequent" or "most successful."

TABLE 3.--Importance of corn sprout pulling by birds in 259 counties in five states according to county agents.

Importance	Illinois (55)[1]		Kentucky (69)		Maryland (17)		North Carolina (69)		South Dakota (49)		Total (259)	
	No.[2]	Percent[2]	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Severe	1	1.8	9	13.0	3	17.6	14	20.3	0	0.0	27	10.4
Moderate	4	7.3	18	26.1	5	29.4	24	34.8	1	2.0	52	20.1
Slight	31	56.4	35	50.7	8	47.1	26	37.7	23	46.9	123	47.5
None	19	34.5	7	10.1	1	5.9	5	7.2	25	51.0	57	22.0

[1] Number of respondents per state.
[2] Number and percent of county agents responding.

TABLE 4.--Bird species involved in corn sprout pulling damage in 259 counties in five states according to county agents.

Species	Illinois (55)[1]		Kentucky (69)		Maryland (17)		North Carolina (69)		South Dakota (49)		Total (259)	
	No.[2]	Percent[2]	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Crow	27	49.1	50	72.5	11	64.7	41	59.4			129	49.8
Red-winged blackbird	11	20.0	32	46.4	8	47.1	40	58.0	10	20.4	101	39.0
Common grackle	9	16.4	13	20.6	9	52.9	39	56.5	3	6.1	73	28.2
Pheasant	17	30.9			2	11.8			27	55.1	46	17.8
Blackbird[3]	5	9.1	5	7.9	1	5.9	1	1.4	1	2.0	13	5.0
Starling	6	10.9	15	21.7	2	11.8	8	11.6	1	2.0	32	12.4
Other[4]			1	1.6			6	8.7			7	2.7

[1] Number of respondents per state.
[2] Number and percent of county agents responding. Most reported more than one species.
[3] Unidentified "blackbird."
[4] Bobwhite (Colinus virginianus), mourning dove (Zenaidura macroura), rock dove (Columba livia), brown thrasher (Toxostoma rufum), and brown-headed cowbird (Molothrus ater).

TABLE 5.--Methods used in preventing or compensating for bird damage to sprouting corn in 259 counties in five states, according to county agents.

Method	Illinois (55)[1]		Kentucky (69)		Maryland (17)		North Carolina (69)		South Dakota (49)		Total (259)	
	No.[2]	Percent[2]	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Shooting birds	8	14.5	28	40.6	5	29.4	31	44.9	8	16.3	80	30.9
Repellents	1	1.8	20	29.0	9	52.9	46	66.7	2	4.1	78	30.1
Scarecrows	5	9.1	29	42.0	2	11.8	28	40.6	2	4.1	66	25.5
Replanting	10	18.2	15	21.7	5	29.4	10	14.5	5	10.2	45	17.4
Poisoning birds	4	7.3	11	15.9	1	5.9	26	37.7	2	4.1	44	17.0
Deep planting	3	5.5	8	11.6	6	35.3	12	17.4	1	2.0	30	11.6
Exploders	4	7.3	5	7.3	7	41.2	11	15.9	3	6.1	30	11.6
Decoy food	3	5.5					1	1.4	8	16.3	12	4.6
Early planting			1	1.5			9	13.0			10	3.9
Not planting	1	1.8	1	1.5	1	5.9	4	5.8	1	2.0	8	3.1
Late planting					1	5.9					1	0.4

[1] Number of respondents per state.
[2] Number and percent of county agents responding. Most listed more than one method.

TABLE 6.--Most frequently used method for preventing or compensating for bird damage to sprouting corn in 259 counties in five states, according to county agents.

Method	Illinois (55)[1]		Kentucky (69)		Maryland (17)		North Carolina (69)		South Dakota (49)		Total (259)	
	No.[2]	Percent[2]	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Repellents			5	7.3	6	35.3	22	31.9			33	12.7
Shooting birds	1	1.8	9	13.0	1	5.9	10	14.5	2	4.1	23	8.9
Scarecrows			7	10.1			3	4.3			10	3.9
Deep planting	2	3.6	2	2.9	2	11.8	4	5.8			10	3.9
Poisoning birds	2	3.6	2	2.9			5	7.2			9	3.5
Replanting	1	1.8	5	7.3					1	2.0	7	2.7
Decoy food	1	1.8							4	8.2	5	1.9
Early planting							1	1.4			1	0.4
Exploders	1	1.8							1	2.0	2	0.8
Not planting	1	1.8									1	0.4
Late planting					2	11.8					2	0.8
Totals	9	16.4	30	43.5	11	64.7	45	65.2	8	16.3	103	39.8

[1] Number of respondents per state.
[2] Number and percent of county agents responding. Most did not know.

TABLE 7.--Most successfully used method for preventing or compensating for bird damage to sprouting corn in 259 counties in five states, according to county agents.

Method	Illinois (55)[1]		Kentucky (69)		Maryland (17)		North Carolina (69)		South Dakota (49)		Total (259)	
	No.[2]	Percent[2]	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Repellents			4	5.8	4	23.5	17	24.6			25	9.9
Shooting birds	2	3.6	3	4.3	1	5.9	3	4.3	1	2.0	10	3.9
Decoy food									6	12.2	6	2.3
Poisoning birds	1	1.8	2	2.9			3	4.3			6	2.3
Replanting			1	1.5	2	11.8			1	2.0	4	1.5
Exploders							2	2.9	1	2.0	3	1.2
Scarecrows			3	4.3							3	1.2
Deep planting	1	1.8	1	1.5	1	5.9					3	1.2
Early planting							1	1.4			1	0.4
Totals	4	7.3	14	20.3	8	47.1	26	37.7	9	18.4	61	23.5

[1] Number of respondents per state.

[2] Number and percent of county agents responding. Most did not know or believed that nothing was successful.

TABLE 8.--Estimated extent or value of damage to sprouting corn caused by birds in 12 states.

State	1971 Grain Corn Acreage	Losses to Birds Estimated by		
		Field	County	State
Delaware	200,000	---	---	< 2.5% replanted
Georgia	1,532,000	---	---	$6-10,000 (sandhill cranes)
Illinois	10,170,000	Up to 20%, but usually 0-5%	1. < 0.1% 2. < 1% 3. < 1% 4. 10% (Dry years)	
Kentucky	1,226,000	1. 5% in 20+ fields 2. 30-acre field 75% destroyed 3. Some garden corn 100% 4. Some 40-50% 5. 50-acre field 100% destroyed 6. 5 acres replanted 7. 200 acres 50% destroyed	1. 4-6% 2. 5-10%	---
Maryland	500,000	1. Some > 50%	---	1% average year Some years worse
New Jersey	80,000	1. 0-3%	---	---
North Carolina	1,520,000	1. Some fields 50% 2. 25-50% at times 3. 50% in some cases 4. 0-100% 5. Several fields 50% 6. Some fields replanted 2-3 times	1. At least 15% some years 2. 5% 3. 1-2% 4. 10-20% 5. 5-8% 6. 15-20%, replant; 50% acreage affected to some degree 7. 5-10% 8. 10% replant 9. 10% or more	

TABLE 8 - Continued

State	1971 Grain Corn Acreage	Losses to Birds Estimated by		
		Field	County	State
Oregon	12,000	---	1. 20 acres each year 2. 25 complaints/year 3. 15 complaints/year in two other counties combined	At least 5%; 15% in some areas
Pennsylvania	1,036,000	Replanted 8 acres 3 times one year	---	---
South Carolina	454,000	---	---	10,000 acres replanted yearly on coastal plain (2.2%)
South Dakota	2,679,000	More than 50% on some field borders	1. 1,200 acres replanted 1 year 2. 5,000 acres affected; 1,500 acres lost 3. One 25-acre field replanted	---
Virginia	461,000	Up to 25% in some	---	$484,000[1] (1.6%)[2]

[1] Based on $1.00/bu loss.

[2] Projected acres lost in 25 counties ÷ total state acreage. Data courtesy K. Brady and W. P. Eggborn, Virginia Department of Agriculture and Commerce.

APPENDIX I

QUESTIONNAIRE ABOUT PULLING OF CORN SPROUTS BY BIRDS

Denver Wildlife Research Center
Building 16, Federal Center
Denver, Colorado 80225

1. Do you think corn sprout pulling by birds in your county is:

   a. A serious problem? _____
   b. A moderate problem? _____
   c. Slight problem? _____
   d. No problem? _____

   Comments _____
_____
_____

2. What bird species are most involved in corn sprout pulling in your state?

   a. Red-winged blackbirds? _____
   b. Pheasants? _____
   c. Grackles? _____
   d. Crows? _____
   e. Other? Which? _____

   Comments _____
_____
_____

3. Where does your information about corn sprout pulling by birds originate?

   a. Farmer complaints made to me? _____
   b. Personal observations? _____
   c. Complaints of farmer groups _____
   d. Other? What? _____

   Comments _____
_____
_____

4. Why do you think corn sprout pulling is a problem where it is in your state:

   a. Lots of birds? _____
   b. Agricultural practices? What? _____
   c. Don't know _____
   d. Other? _____

   Comments _____
_____
_____

5. Why do you think corn sprout pulling by birds is not a problem in some areas?

   a. Lack of birds? _____
   b. Agricultural practices and timing? What? _____
   c. Other? What? _____

6. Do you know of attempts to prevent corn sprout pulling by birds in your county? If so, which?

   a. Shooting of offending birds? _____
   b. Poisoning? _____
   c. Exploders? _____
   d. Scarecrows? _____
   e. Repellents? Which? _____
   f. Not planting? _____
   g. Replanting? _____
   h. Deep planting? _____
   i. Other? What? _____

   Comments _____
_____
_____

7. Which of the above methods is:

   a. Most frequent? _____
   b. Most successful? _____
   c. Don't know? _____

   Comments _____
_____
_____

8. Do you have any loss figures on a state or county or field basis for corn sprout losses to birds. If so, please give details including species of bird involved, if possible. Use reverse side of sheet if needed.

   Comments _____
_____
_____

9. If you are aware of complaints about sprout pulling in crops other than corn in your county, please complete the following:

	Crop	Bird Species	Importance of Problem*
1.			
2.			
3.			
4.			

* Serious, moderate, slight

Name	Affiliation	Questions Answered (if more than one person completes form)

APPENDIX II

United States Department of the Interior
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
BUILDING 16, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

April 3, 1972

Dear _____:

Information on the extent and distribution of agricultural losses to birds is difficult to obtain. Yet unless we know just how important bird damage is, research and management priorities cannot be properly established. In addition, accurate knowledge about possible markets for products useful in solving bird problems is especially valuable to private industry.

If you would take the time to complete the attached questionnaire and map about Bird Damage to Sprouting Corn in your state, our knowledge about one bird problem would be much increased. Even if you cannot respond to all 11 questions, please complete what you can. If you believe that someone else in your state could add to the information, please do not hesitate to consult with him or forward the questionnaire. We would ask that those who answer questions give name and affiliation, however. We hope to combine all material from all major corn-producing states, so the results should be as complete as possible. With this in mind, please take sufficient time to answer as many questions as you can.

Thank you for your cooperation.

Sincerely,

Charles P. Stone
Research Biologist
Section of Birds, DRC

APPENDIX III

United States Department of the Interior
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
BUILDING 16, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

June 2, 1972

Dear _____:

Approximately two months ago, we mailed you a questionnaire about the problem of bird damage to sprouting corn in your State. Just in case the questionnaire did not reach you or it has been mislaid, another copy is enclosed. Would you please take the time to fill it out now?

We have had about 65 percent return to date, but there are some important gaps in our knowledge. Preliminary analyses suggest that the problem may be more important in southern states and that states with large acreages of corn may have minimal sprout pulling. Personnel from 5 states are sending modified questionnaires to County Extension Agents in each county to obtain more complete information.

Even if you do not think there is much of a problem in your State, or cannot answer many of the questions, please let us know so that the survey can be as complete as possible. We appreciate any effort you can put forth to determine the extent of sprout pulling in corn.

Sincerely,

Charles P. Stone
Research Biologist
Section of Birds

Enclosure

U. S. GOVERNMENT PRINTING OFFICE : 1974 O - 530-410

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of this department of natural resources.

The Department works to assure the wisest choice in managing all our resources so that each shall make its full contribution to a better United States now and in the future.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
WASHINGTON, D. C. 20240

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR
INT 423

U.S.MAIL