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# BIRD DAMAGE TO RIPENING FIELD CORN IN THE UNITED STATES, 1971

By

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Results of the second nationwide survey of bird damage to field corn are reported in this paper. An initial survey, conducted in 1970, showed that birds damaged an average of 0.112 bushel per acre and that the mean loss amounted to 6,225,421 bushels (Stone et al. 1972). The purpose of the second survey was to determine whether the distribution and intensity of damage was consistent from year to year in the States involved and on a national basis.

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## METHODS

The 1971 survey of bird damage to field corn was conducted under an interagency agreement between the Fish and Wildlife Service of the U.S. Department of the Interior and the Statistical Reporting Service (SRS) of the U.S. Department of Agriculture. The sampling frame employed by the SRS during the final preharvest portion of their annual Objective Yield Survey for corn was used to estimate bird damage. Fields were sampled as in the initial damage survey (Stone et al. 1972:102), and the mathematically generated table developed by De Grazio et al. (1969a:992) was again used to convert field data to weight of corn lost. It appears that damage may be somewhat underestimated because of a bias in the table, and this is now being determined. Data for 1971 were subjected to a nested analysis of variance rather than determining means and confidence intervals for each State as in the initial survey. The 19 States appraised in 1971 accounted for 95.46 percent of the field corn produced in the United States in 1971 (Statistical Reporting Service 1972).

## RESULTS AND DISCUSSION

The mean direct corn loss to birds for the 19 States was estimated to be  $0.1149 \pm 0.0394$  bushels per acre, or 4,501,159 to 9,199,057 bushels (95 percent confidence intervals). The mean loss of 6,850,108 bushels was 10.03 percent above the estimated loss of 6,225,421 bushels for 1970, but the 1971 figure represents a 6.49 percent increase in corn acreage surveyed. Birds directly damaged 0.13 percent of the corn produced in the 19 States in 1971, as compared with 0.16 percent of the production in the 24 States surveyed in 1970. Thus, bird damage was quite consistent nationally in the 2 years.

Some indication of bird damage at the State level can be obtained by comparing the percentages of counties, fields, and ears damaged in each State with the means for all States (table 1). Bird damage in Maryland, Wisconsin, Pennsylvania, and Ohio was higher than average in all three categories (counties, fields, and ears) by this analysis and Kentucky, Virginia, Michigan, and Colorado showed higher-than-average damage in one or two categories. Pennsylvania, Maryland, Michigan, and Ohio showed the highest bushels per acre losses (table 2). A nested analysis of variance indicated that there were significant differences among States in bushels per acre lost to birds ( $p < 0.005$ ), but Duncan's multiple range test indicated that mean losses in many States were not significantly different (table 2).

The greatest total losses occurred in States with large acreages of corn and relatively intense damage. Ohio, Pennsylvania, Michigan, and Minnesota were particularly high in this regard, accounting for 38.1 percent of the total bushels lost. It is noteworthy that Iowa and Illinois accounted for 36.5 percent of the total acreage grown in 1971, but received only 6.0 percent of the total damage.

Red-winged blackbirds (Agelaius phoeniceus) are responsible for most damage to ripening corn in South Dakota (De Grazio et al. 1969b:131), Michigan (Cardinell and Hayne 1944:1), Ohio (Giltz and Stockdale 1960:13), Virginia and other coastal States (Meanley 1961:93), New York (C. P. Stone et al., Denver Wildl. Res. Ctr, unpublished ms) and probably most other States as well (Hayne 1946).

The geographic distribution of bird damage to corn in 1971 is shown in figure 1, which records counties that contained at least one survey field and those in which at least some bird damage occurred. Damage distribution in 1971 was similar to that in 1970 (Stone et al. 1972).

Bird damage to corn is relatively minor on the average because most fields are not damaged. In this regard, an analysis of the distribution of different loss intensities is especially revealing (tables 3 and 4). In 1970 and 1971, 87.7 and 90.7 percent of all fields surveyed had not been damaged by birds. However, substantial numbers of corn growers, particularly in the

States of New York, Maryland, Mississippi, and Pennsylvania are apparently experiencing serious bird problems. Smaller percentages of growers in Indiana, Michigan, Ohio, Texas, Virginia, and Wisconsin were in high-loss categories, but the large amount of corn in most of these States means many individual farmers were affected by severe losses. Up to 21 bushels per acre were lost to birds in some fields.

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Table 1.--Damage patterns in 19 major corn-producing states in 1971.

State	Corn acreage (thousands)	Counties		Fields		Corn ears	
		Number surveyed	% with damage	Number surveyed	% with damage	Number examined	% with damage
Colorado	406	16	43.75	96	13.54	3,031	1.19
Delaware	200	3	33.33	81	4.94	2,357	0.47
Georgia	1,532	51	1.96	84	1.19	2,227	0.05
Illinois	10,170	79	6.33	209	2.87	7,552	0.24
Indiana	5,509	76	6.58	171	2.92	5,881	0.12
Iowa	11,570	96	7.29	213	4.23	7,925	0.37
Kansas	1,311	43	6.98	122	2.46	3,848	0.08
Kentucky	1,226	53	26.41	120	15.00	3,295	1.88
Maryland	500	20	70.00	87	26.44	2,728	5.17
Michigan	1,700	40	20.00	105	10.48	3,293	1.25
Minnesota	5,725	54	31.48	175	13.14	6,287	1.03
Missouri	3,092	58	3.45	150	1.33	4,747	0.19
Nebraska	5,356	59	3.39	177	1.13	5,766	0.07
North Carolina	1,520	57	14.03	148	6.08	4,641	0.67
Ohio	3,526	63	36.51	150	22.00	4,909	2.40
Pennsylvania	1,036	35	42.86	111	28.83	3,283	3.84
South Dakota	2,679	37	13.51	98	7.14	2,394	0.75
Virginia	461	44	13.64	87	8.75	2,478	1.33
Wisconsin	2,099	44	38.64	118	22.03	4,381	3.93
Totals and means	59,618	928	17.35	2,502	9.39	81,023	1.14

Table 2.--Mean corn losses to birds in 19 major corn producing states, 1971.

State	No. Fields Surveyed	Mean Intensity of Loss* (Bu/Acre)	Mean Total Loss** (Bu)
Pennsylvania	111	0.6279	650,504
Maryland	87	0.5264	263,200
Michigan	105	0.3371	573,070
Ohio	150	0.2635	929,101
Wisconsin	118	0.1737	364,596
Virginia	87	0.1307	60,253
Kentucky	120	0.0916	20,702
Minnesota	175	0.0793	453,993
North Carolina	148	0.0674	102,448
Colorado	96	0.0630	25,578
Delaware	81	0.0557	11,140
Missouri	150	0.0365	112,858
South Dakota	98	0.0277	74,208
Indiana	171	0.0248	136,623
Illinois	209	0.0231	234,927
Kansas	122	0.0172	22,549
Iowa	213	0.0153	177,021
Nebraska	177	0.0012	6,427
Georgia	84	0.0003	460
Totals and Means	2,502	0.1149	6,850,108

\* Means spanned by the same vertical line are not significantly different at the 5 percent level.

\*\* Product of mean bushel per acre loss and total acres grown in each state.

Table 3.--Intensities of corn losses to birds in 24 major corn-producing states, 1970.

State	No. Fields Surveyed	Percent Fields with Bu/A Losses of					
		0	> 0-0.5	0.5-1.0	1.0-2.0	2.0-3.0	3.0+
Alabama	61	90.16	6.56	1.64			1.64
Florida	79	100.00					
Georgia	105	97.14	0.95		0.95		0.95
Illinois	187	92.51	3.74	1.60	1.60		0.53
Indiana	147	89.11	4.08	2.04		2.04	2.72
Iowa	197	98.98	1.01				
Kansas	112	96.43	0.89		0.89	0.89	0.89
Kentucky	110	81.82	6.36	6.36	1.82	1.82	1.82
Maryland	79	77.21	7.59	5.06	8.86		1.27
Michigan	116	75.00	14.65	4.31	0.86	2.59	2.59
Minnesota	158	91.14	3.80	1.90	1.90	0.63	0.63
Mississippi	73	71.23	15.07	1.37	4.11	1.37	6.85
Missouri	150	96.67	2.67	0.67			
Nebraska	169	98.22	0.59	0.59	0.59		
New York	75	58.67	12.00	12.00	1.33	5.33	10.67
North Carolina	143	95.10	1.40	2.10	1.40		
Ohio	133	80.45	9.02	3.76	3.01	3.01	0.75
Pennsylvania	121	65.29	13.22	4.13	4.96	1.65	10.74
South Carolina	95	83.16	12.63	2.11	1.05	1.05	
South Dakota	105	81.90	14.29	1.90	0.95	0.95	
Tennessee	91	80.22	10.99	7.69			1.10
Texas	128	95.31			0.78	0.78	3.13
Virginia	73	87.67	1.37	4.11	4.11		2.74
Wisconsin	133	84.96	6.77	0.75	3.01	2.25	2.25
Totals and Means	2,840	87.71	5.57	2.31	1.58	0.95	1.82

Table 4.--Intensities of corn losses to birds in 19 major corn-producing states, 1971.

State	No. Fields Surveyed	Percent Fields with Bu/A Losses of					
		0	> 0-0.5	0.5-1.0	1.0-2.0	2.0-3.0	3.0+
Colorado	96	86.46	8.33	3.13	2.08		
Delaware	81	95.06		2.47	2.47		
Georgia	84	98.81	1.19				
Illinois	209	97.13	1.43	0.96		0.48	
Indiana	171	97.08	2.34				0.58
Iowa	213	95.77	3.29	0.47	0.47		
Kansas	122	97.54	1.64			0.82	
Kentucky	120	85.00	7.50	3.33	4.17		
Maryland	87	73.56	6.90	6.90	4.60		8.05
Michigan	105	89.52	5.71	0.95	0.95	0.95	1.91
Minnesota	175	86.86	7.43	3.43	1.71	0.57	
Missouri	150	98.67			0.67		0.67
Nebraska	177	98.87	1.13				
North Carolina	148	93.92	1.35	1.35	2.70	0.68	
Ohio	150	78.00	14.67	2.67	0.67	1.33	2.67
Pennsylvania	111	71.17	9.91	7.21	3.60	1.80	6.31
South Dakota	98	92.86	5.10	1.02	1.02		
Virginia	87	91.95			5.75	2.30	
Wisconsin	118	77.97	11.02	6.78	2.54	0.85	0.85
Totals and Means	2,502	90.65	4.56	1.92	1.48	0.48	0.92

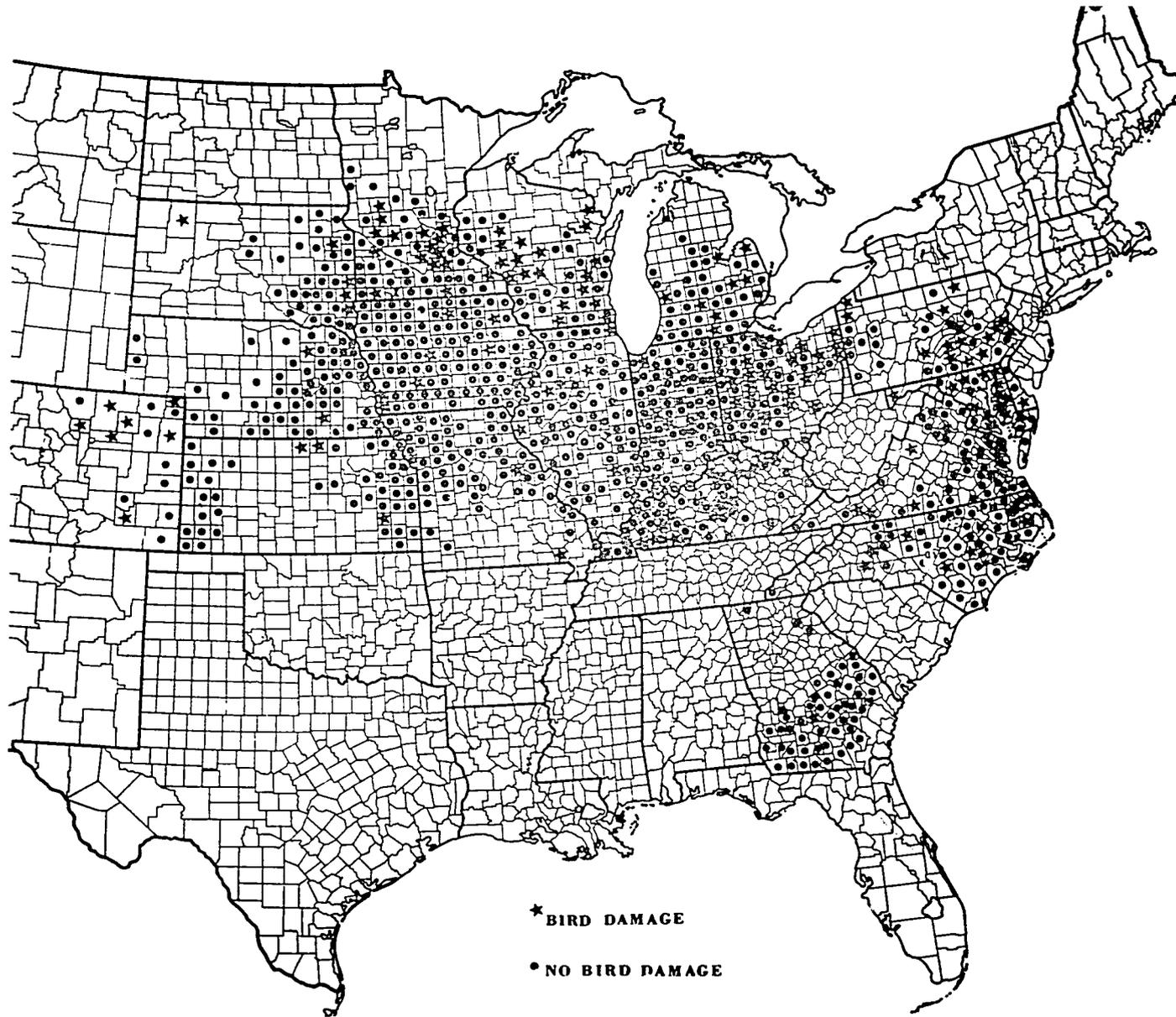


Figure 1.--Distribution of bird damage to corn in 1971 survey (by counties).