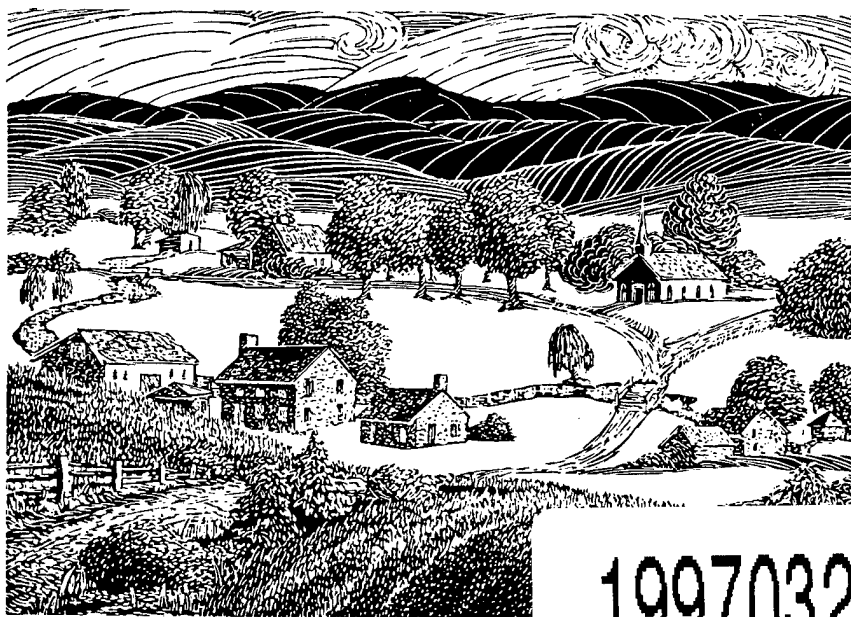

Biological Report 90(8)
August 1990

North American Breeding Bird Survey Annual Summary, 1989



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**North American Breeding Bird Survey
Annual Summary, 1989**

By

Sam Droege and John R. Sauer

U.S. Department of the Interior
Fish and Wildlife Service
Washington, D.C. 20240

Contents

	Page
Introduction	1
Methods	1
Estimation of Population Trends	1
Regions of Analysis	2
Long-term Trends	2
Results and Discussion	2
Acknowledgments	7
References	7
Appendix A. Bird Species Composition by Guilds	8
Appendix B. Short- and Long-term Population Trends	10
Appendix C. Population Trends (1988–89) for North American Birds	16

North American Breeding Bird Survey Annual Summary, 1989

by

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Introduction

The North American Breeding Bird Survey (BBS) is run by approximately 2,000 skilled amateur ornithologists and is coordinated cooperatively by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service. Since 1966, BBS cooperators have been collecting standardized information on North American bird populations. The BBS is a roadside survey, comprised of permanent routes that are surveyed yearly. Each route is 39.4 km (24.5 miles) long and consists of 50 stops spaced 0.8 km (0.5 mile) apart. All birds heard or seen during a 3-min observation period at each stop are recorded, and, for each species, the sum of the counts on individual stops is used as an index of species density on the route. Survey routes occur throughout the continental United States and most of Canada (see map in Droege and Sauer 1989).

Here, we present the population changes of the 251 bird species reported on the 50 or more BBS routes in the survey region during 1988 and 1989. Population trends for 1966–89 are presented for comparison. The direction and significance of population changes between the years for the 306 species occurring on 10 or more routes within States and Provinces are summarized in Appendix B. The pattern of population changes for selected species is

graphically summarized on maps by physiographic stratum (Droege and Sauer 1989). Detailed State, provincial, and physiographic strata changes are available to interested readers.

Methods

Estimation of Population Trends

The route-regression method was used to estimate population changes between 1988 and 1989 for all breeding bird species. We used only data from routes that were run by the same observer in both years. Population changes for each species were estimated on each acceptable route as a ratio ($\text{count} + 0.5$ in 1989/ $\text{count} + 0.5$ in 1988). Population changes for physiographic strata within States or Provinces were then estimated as weighted averages of the route population changes, with weightings of densities of birds on the route. State, provincial, stratum, and larger region estimates were calculated by weighting the stratum within State or Province estimates by their component land areas. The population change estimates (or trends) are presented as a percent change per year. Variances of regional trend estimates were found by bootstrapping the route data (Efron 1982), and statistical significance was assessed using Z-statistics.

Regions of Analysis

Because of space limitations, we present trend estimates only at the level of the entire survey region in the United States and Canada for each species, along with associated sample sizes of number of routes and the statistical significance of the trends. Because trends based on small sample sizes tend to be unreliable, we restricted our analysis to those species for which trends could be estimated on 50 or more routes.

State and provincial trends are summarized for each species as increasing (trend > 0.0 , $P > 0.05$), significantly increasing (trend > 0.0 , $P < 0.05$), decreasing (trend < 0.0 , $P > 0.05$), or significantly decreasing (trend < 0.0 , $P < 0.05$). These summaries allow the reader to assess the consistency of the survey-wide trend estimates among the States and Provinces. We summarized State or provincial results for species that were observed on 10 or more routes in the region.

To examine regional patterns of bird population change, we determined the proportion of bird species with increasing populations for the entire survey region and for each BBS Region (Eastern, Central, and Western; See Robbins et al. 1986 for region descriptions). Previously, we included only those species that were observed on more than 50 routes for the entire survey results, but on more than 25 routes in each BBS region. The null hypothesis that the proportion of increasing species in the regions was not different from 0.5 was tested using Z-statistics. This analysis permits the identification of regions with a disproportionate number of decreasing (or increasing) species.

As in last year's summary (Droege and Sauer 1989), we also estimated the proportion of species that were increasing (at the continental level) by guild. On the basis of breeding habitat, nest type, and migrancy status, we categorized species into 16 guilds: grassland, wetland, woodland, deciduous forest, coniferous forest, and urban habitats; primary cavity, secondary cavity, ground, open-cup passerine, and scrub nesting birds; waterfowl; all hunted species; permanent residents; Neotropical migrants, and short-distance migrants. (See Appendix A for a listing of the American Ornithologists' Union numbers [American Ornithologists' Union 1983] of species in each guild.) We then used Z-statistics to test the null hypothesis that the proportion of species with increasing trends in any guild was not different from 0.5. We used this analysis to search for regions and species groups with unusual numbers of increasing or decreasing species. We provide results from 1986–87 and 1987–88 for comparison with the 1988–89 results.

Long-term Trends

The 2-year trends presented here tend to be variable and reflect both measurement error and yearly changes in pop-

ulation size. We also conducted a preliminary analysis of long-term (1966–89) population trends to provide a context for evaluating the recent trends discussed in this report. Route-regression methods were also used for the long-term analyses, but route trends were estimated using a linear regression of the log-transformed counts on year, with observer effects included as covariables. The slope of the year variable, when back-transformed, provides the estimate of route trend for a species. (See Geissler and Sauer (1990) for more information on route-regression procedures and Sauer and Droege (1990a) for discussion of the statistical issues involved in the estimation of population trends from roadside surveys.) A more complete analysis of long-term trends is in preparation and should be available by 1992.

Results and Discussion

Breeding Bird Survey volunteers ran 2,085 routes in 1988 and 2,097 routes in 1989. Of these, 1,344 routes were run by the same competent observer in both years. Sufficient data exist to analyze trends for 251 species (Appendix B). Overall, significantly more than half (60.5%; $P < 0.01$) of the bird species had negative point estimates of population change (decreases in population size) between 1988 and 1989 throughout the survey range. Across North America, 99 species showed increasing population statistics on BBS routes; 17 of these increases (17%) were statistically significant ($P < 0.05$). Of the 152 species with negative estimates of population change, 46 (30%) were significant.

The pattern of species decline was repeated regionally when the continent was partitioned into Eastern, Central, and Western regions (Fig. 1). Declines were most severe in the Central region, where only 33% of the species increased in population between 1988 and 1989. The summer's widespread declines in this region and the others contrast sharply with the relative stability shown for 1986–87 and 1987–88 (Fig. 1). During the earlier intervals more than 50% of the species had increasing populations.

The pattern of population changes at the guild level was also one of widespread declines (Fig. 1). Hunted species, permanent residents, Neotropical migrants, open-cup nesters, waterfowl, woodland nesters, deciduous forest nesters, and urban nesters (see Fig. 2 for an interesting pattern in house sparrow numbers) all showed significant declines throughout the continent. While Eastern populations on the whole fared better than Central and Western regions, there were widespread declines in the overlapping groups of woodland nesters, deciduous forest nesters, Neotropical migrants, and open-cup nesters (Fig. 1). Evidence from a recent analysis of Neotropical migrant trends indicates that Eastern populations have declined in recent years, but Western populations have not been declining

(Robbins et al. 1989; Sauer and Droege 1990b).

In the Central region, grassland, woodland, and deciduous forest nesters had significantly more declines than increases, as did permanent residents, Neotropical migrants, and both open-cup and ground nesters (Fig. 1). Only the secondary cavity nesting guild had more species with increases than decreases (53%). Declines in many of the remaining guilds approached statistical significance.

In the Western region, grassland and urban nesters, plus permanent residents, declined significantly (Fig. 1). As in the other regions, the majority of the remaining guilds had more declines than increases.

A number of species display strong geographic patterns in their population trends. We mapped some of those patterns by physiographic stratum to illustrate the variation among species (Fig. 2). The northern bobwhite (*Colinus virginianus*), for example, declined in most physiographic strata; this represents a continuation in the long-term decline of this species (Droege and Sauer 1990; Appendix A). Alternatively, the eastern bluebird (*Sialia sialis*) increased over much of its range between 1988 and 1989, which also corresponds to its recent (post-1978) population trends (Sauer and Droege 1990c).

Because of space limitations, we do not present trends

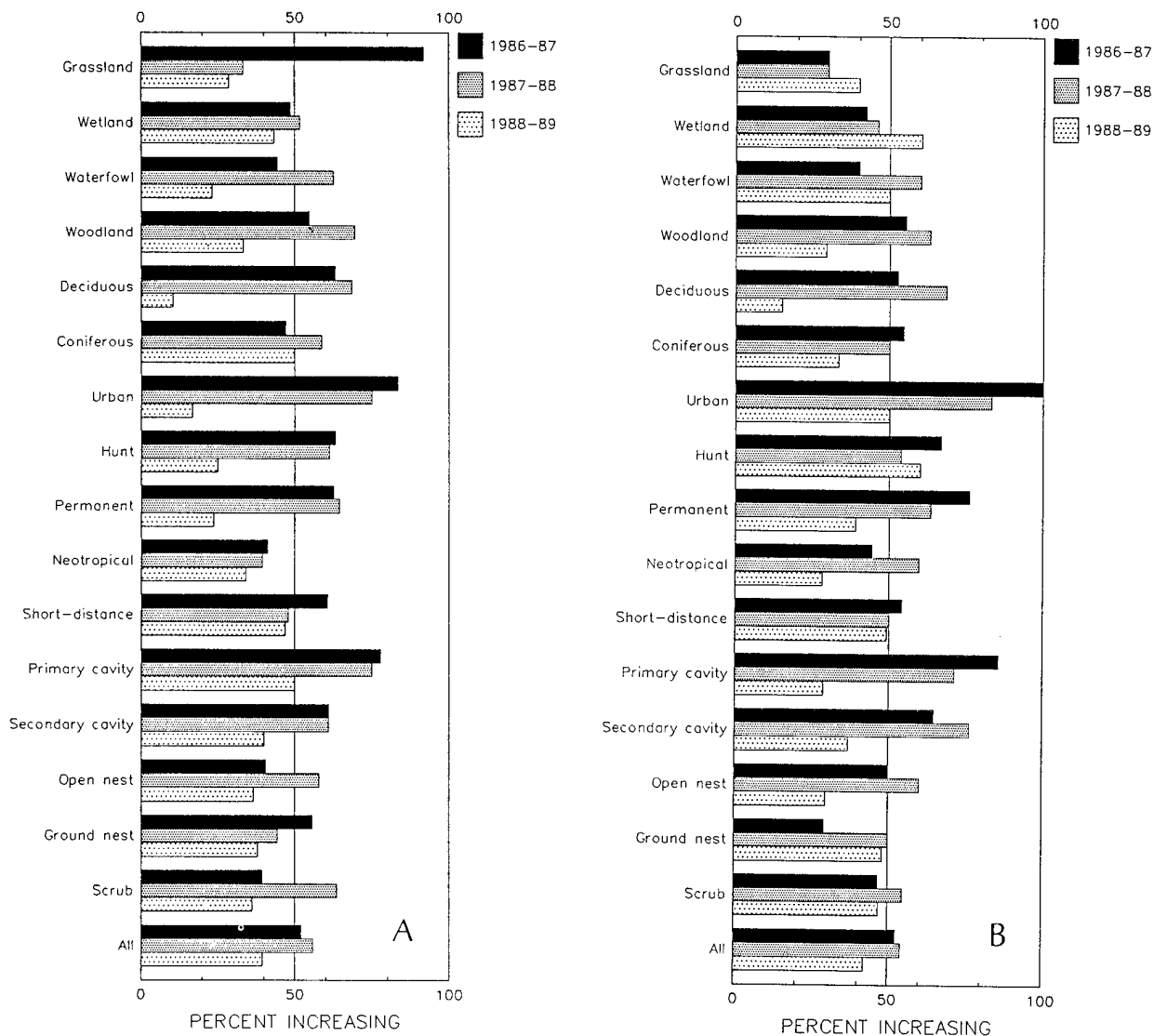


Fig. 1. The proportion of species within guilds that had increasing population trends during 3 periods (1986-87, 1987-88, 1988-89). A. Continental. B. Eastern.

for each State and Province. Instead, we summarize State and provincial results in Appendix C, which contains information on the direction and statistical significance of population trends for each species that occurred on 10 or more routes in any State or Province. Appendix C can be used to determine the proportion of increasing species within any State or Province and also provides detailed information on population changes for each species.

The repeated theme in this year's analysis of population trends is that of population decline. Some areas and groups of species are not declining. However, such regions are in the minority. Declines seemingly cross most geographic and species boundaries, leading us to suspect that the cause was continental in scope and indiscriminate

in effect. In the 1988 annual summary, we could not demonstrate an association between an index of drought severity and proportion of increasing species, but we presented anecdotal evidence that suggested that the 1988 drought caused some changes in bird distribution between 1987 and 1988 (Droege and Sauer 1989).

It is possible that the severe drought of 1988 resulted in widespread nesting failure, which in turn led to depressed populations in 1989. We examined this possibility by using our drought index for 1988 by State, which categorized relative drought as none, moderate, or severe based on the Palmer drought index (Droege and Sauer 1989). We then found the mean proportion of increasing species among States in each category and compared these

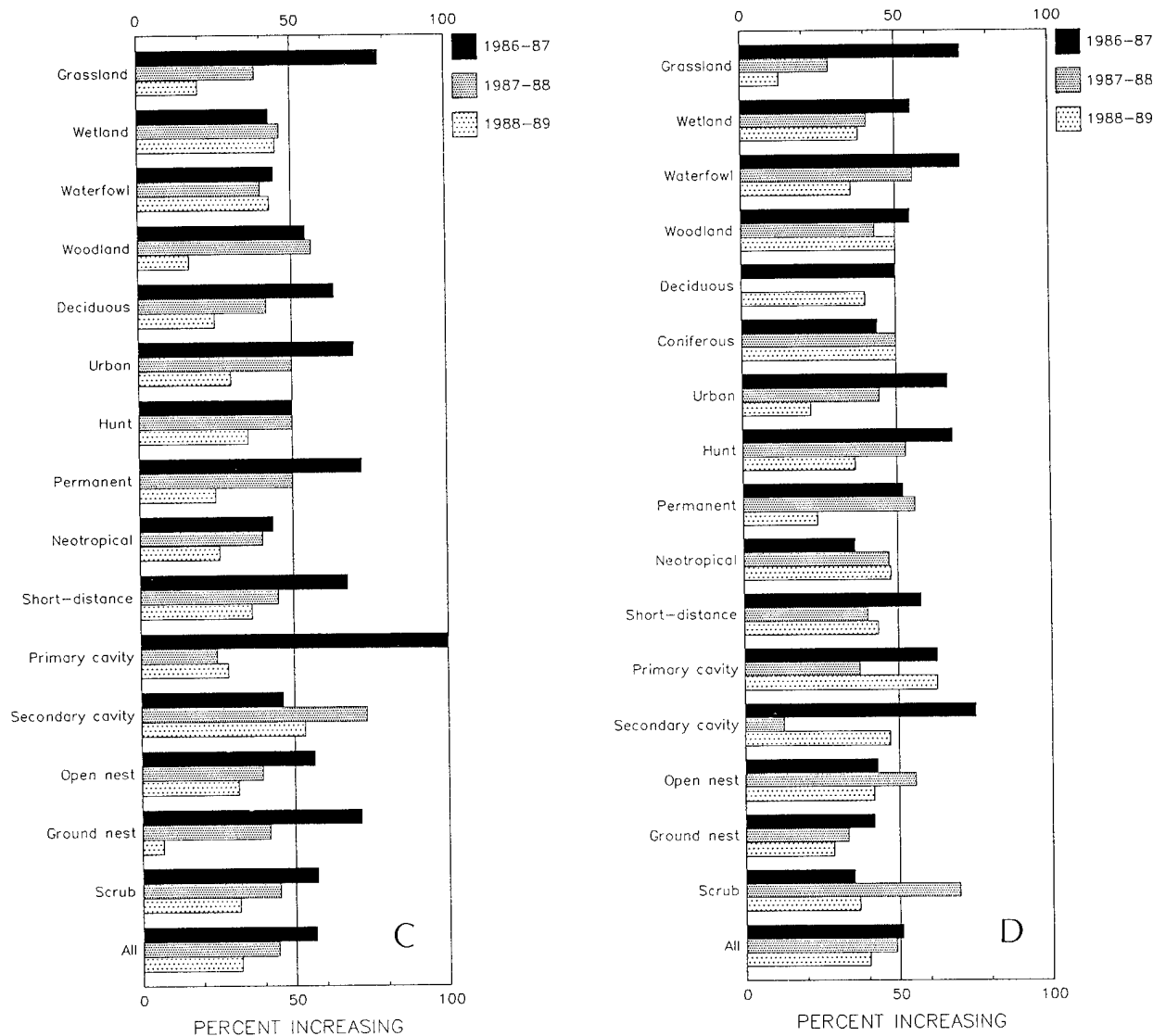


Fig. 1. Continued. C. Central. D. Western.

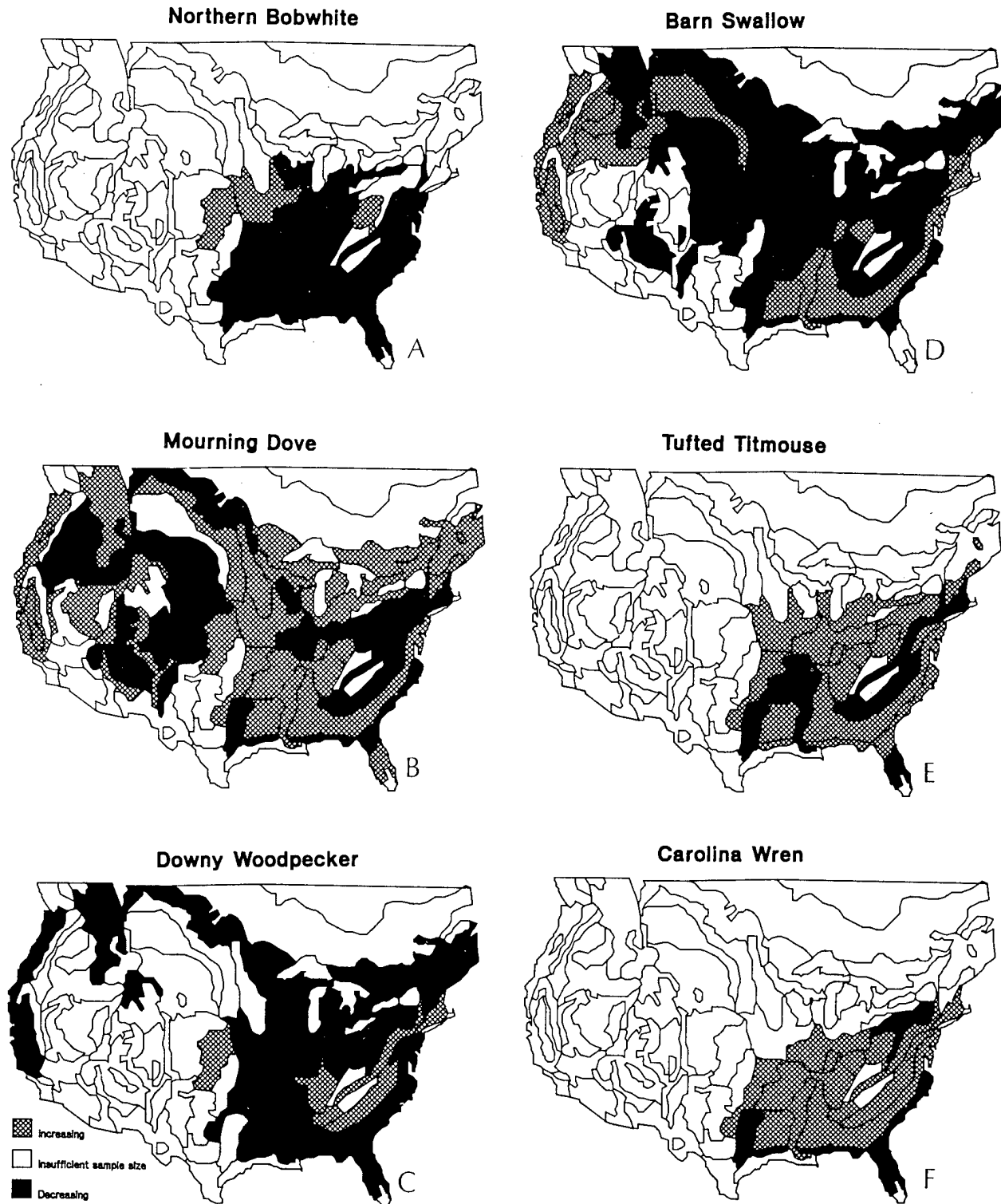


Fig. 2. Maps showing the estimated population changes (1988–89) for species by physiographic region. *Solid* areas had population decreases; *cross-hatched* areas had increases; *blank* areas had insufficient sample size. A. Northern bobwhite. B. Mourning dove. C. Downy woodpecker. D. Barn swallow. E. Tufted titmouse. F. Carolina wren. See Appendix A of Robbins et al. (1986) for scientific names of bird species.

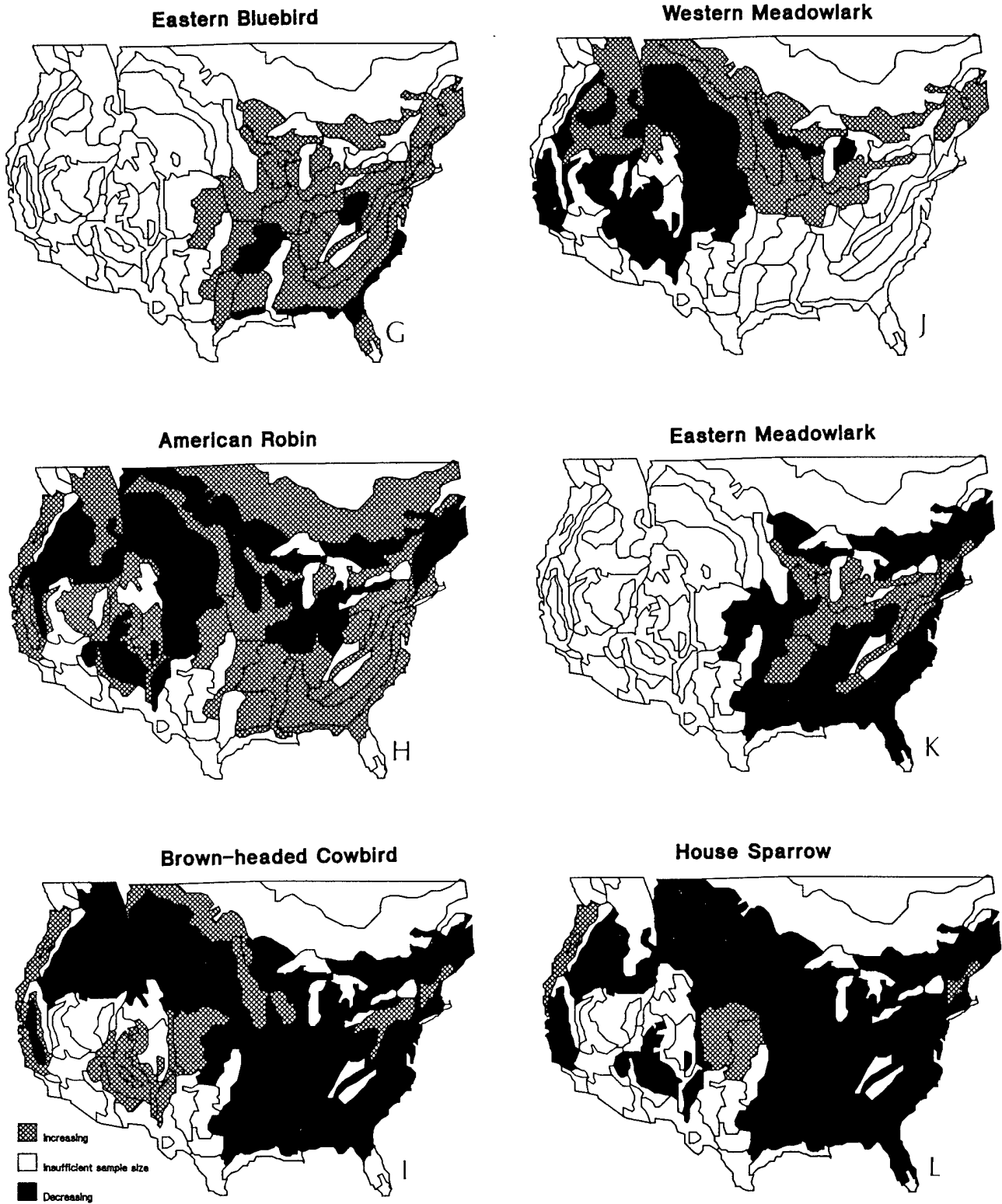


Fig. 2. *Continued.* G. Eastern bluebird. H. American robin. I. Brown-headed cowbird. J. Western meadowlark. K. Eastern meadowlark. L. House sparrow.

among the drought categories. Among States experiencing severe drought in 1988, 46.5% of the species increased between 1988 and 1989, but among States experiencing moderate or no drought in 1988, 42.7% of the species increased between 1988 and 1989. This analysis provides no evidence that severity of drought influenced population changes. However, categorization of drought by State is probably too large a scale to adequately assess the relations between drought and population change. Categorizing the drought status of individual routes and assessing population changes on the routes would provide a more powerful test of the relation between drought and population change. We will use these methods to further investigate the relation between drought and bird population changes.

Acknowledgments

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Appendix A. Bird Species Composition by Guilds

We summarize bird species by their American Ornithologists' Union numbers (American Ornithologists' Union 1983).

Grassland nesting 2881, 3091, 3050, 3080, 2610, 2640, 4740, 7000, 6040, 5760, 5780, 5400, 6050, 5420, 5450, 5460, 5470, 5390, 5380, 4940, 5010, 5011.

Wetland nesting 70, 60, 30, 20, 40, 12, 1200, 1180, 1900, 1910, 1940, 1960, 1970, 2000, 2010, 2020, 2030, 1870, 1880, 1780, 1770, 1782, 1720, 1440, 1390, 1330, 1340, 1320, 1430, 1400, 1410, 1420, 1350, 1370, 1470, 1460, 1500, 1490, 1550, 1630, 1660, 1650, 1510, 1520, 1530, 1310, 1290, 1300, 1670, 3640, 3520, 2150, 2160, 2080, 2120, 2140, 2180, 2190, 2210, 2070, 2060, 2730, 2260, 2250, 2580, 2630, 2300, 590, 600, 530, 510, 700, 690, 770, 4663, 4664, 7240, 7250, 6370, 6750, 6760, 5480, 5490, 5830, 5840, 4970, 5090.

Waterfowl 1780, 1770, 1720, 1440, 1390, 1330, 1340, 1320, 1430, 1400, 1410, 1420, 1350, 1370, 1470, 1460, 1500, 1490, 1550, 1630, 1660, 1650, 1510, 1520, 1530, 1310, 1290, 1300, 1670, 2180, 2190, 2210.

Woodland nesting 3320, 3330, 3340, 3390, 3430, 2980, 2970, 3000, 3100, 3120, 3880, 3870, 3690, 3680, 4160, 4170, 4021, 4100, 4090, 4020, 4030, 4040, 3930, 3950, 4050, 4610, 4650, 4670, 4680, 4640, 4520, 4840, 4780, 4910, 7280, 7270, 7300, 7290, 7260, 7220, 7480, 7540, 7560, 7570, 7580, 7590, 7550, 7630, 6290, 6280, 6260, 6240, 6480, 6570, 6500, 6540, 6550, 6680, 6690, 6670, 6620, 6630, 6640, 6710, 6600, 6610, 6580, 6360, 6870, 6370, 6390, 6380, 6740, 6760, 6770, 6560, 6840, 6900, 6880, 6556, 6100, 6080, 6070, 5150, 5170, 5180, 5210, 5220, 5330, 5140.

Deciduous forest nesting 3390, 3430, 3000, 3100, 3880, 3870, 4650, 4670, 7270, 7560, 6280, 6260, 6240, 6580, 6360, 6870, 6370, 6380, 6770, 6840, 6080.

Coniferous forest nesting 2980, 2970, 3690, 4040, 3950, 4680, 4840, 4780, 4910, 7280, 7300, 7290, 7480, 7540, 7570, 7630, 6500, 6550, 6680, 6690, 6620, 6640, 6710, 6600, 6610, 6560, 6556, 6070, 5150, 5170, 5180, 5210, 5220, 5330, 5140.

Urban nesting 3131, 3153, 3160, 4770, 4880, 4900, 7610, 7030, 4930, 5930, 5810, 5190, 6882.

Hunted 1780, 1770, 1720, 1440, 1390, 1330, 1340, 1320, 1430, 1400, 1410, 1420, 1350, 1370, 1470, 1460, 1500, 1490, 1550, 1540, 1630, 1660, 1650, 1510, 1520, 1530, 1512, 1310, 1290, 1300, 1670, 2881, 2882, 3091, 2980, 2970, 3000, 3090, 3050, 3070, 3080, 3100, 2890, 2950, 2940, 2920, 2110, 2080, 2120, 2140, 2190, 2210, 2060, 2300, 2280, 3120, 3190, 3160, 3180.

Permanent resident 3350, 3620, 2881, 2882, 3091, 2980, 2970, 3000, 3090, 3050, 3070, 3080, 3100, 2890, 2950, 2940, 2920, 3131, 3153, 3210, 3200, 3750, 3680, 4070, 4110, 3960, 3970, 3940, 3930, 3980, 3950, 3990, 4050, 4840, 4780, 4810, 4820, 4750, 4760, 4860, 7350, 7360, 7370, 7380, 7400, 7410, 7340, 7330, 7320, 7310, 7460, 7430, 7300, 7290, 7130, 7170, 7180, 7010, 7420, 7030, 7060, 7070, 7100, 7120, 7110, 5930, 5940, 5910, 5920, 5110, 6882, 6883.

Neotropical migrant 1780, 1770, 3640, 3270, 3290, 3430, 3420, 2610, 2240, 580, 590, 740, 770, 3880, 3870, 4210, 4200, 4160, 4170, 4230, 4240, 4280, 4590, 4620, 4610, 4630, 4650, 4663, 4664, 4660, 4670, 4680, 4690, 4689, 4691, 4640, 4540, 4520, 4470, 4440, 4430, 6110, 6150, 6170, 6160, 6120, 6121, 6130, 7510, 7560, 7570, 7580, 7550, 6310, 6330, 6290, 6280, 6270, 6260, 6240, 6410, 6420, 6470, 6450, 6480, 6520, 6590, 6570, 6500, 6540, 6670, 6620, 6630, 6730, 6600, 6610, 6580, 6360, 6870, 6370, 6390, 6380, 6740, 6750, 6760, 6770, 6780, 6790, 6810, 6840, 6850, 6860, 6830, 6100, 6080, 6070, 5950, 5960, 5970, 5990, 5980, 6000, 6010, 6040, 4940, 5060, 5050, 5080, 5070, 5040.

Short-distance migrant 3260, 3250, 3520, 3310, 3320, 3330, 3390, 3370, 3490, 3600, 3570, 2120, 2190, 2210, 2060, 2730, 2300, 2280, 580, 600, 550, 540, 530, 510, 490, 440, 470, 3120, 3160, 4021, 3900, 4080, 4060, 4020, 4030, 4040, 4130, 4120, 4140, 4560, 4740, 6140, 4770, 4920, 4910, 4880, 4890, 4900, 7280, 7270, 7260, 7150, 7190, 7220, 7240, 7250, 7480, 7490, 7660, 7670, 7680, 7540, 7590, 7610, 7630, 7020, 7050, 7080, 6180, 6190, 6200, 6220, 4930, 6550, 6710, 6560, 5870, 5780, 5630, 5400, 5730, 5740, 5420, 5470, 5480, 5490, 5850, 5810, 5840, 5580, 5540, 5670, 5679, 5390, 5380, 4980, 5010, 5011, 5090, 5100, 5110, 4950, 5170, 5180, 5330, 5300, 5310, 5290, 5140.

Primary cavity nesting 4021, 4080, 4060, 4070, 4110, 4100, 4090, 4020, 4030, 4040, 3960, 3970, 3940, 3930, 3950, 3990, 4010, 4000, 4130, 4120, 4140, 4050.

Secondary cavity nesting 1770, 1440, 1510, 1520, 1530, 1310, 1290, 3600, 3730, 3732, 3790, 3680, 4540, 4520, 4530, 6110, 6140, 6150, 7350, 7360, 7380, 7400, 7410, 7330, 7320, 7310, 7280, 7270, 7300, 7290, 7210, 7660, 7670, 7680, 4930, 6430, 6370, 6882, 6883.

Open-cup nesting passerine 4590, 4600, 4620, 4610, 4630, 4650, 4663, 4664, 4660, 4670, 4680, 4690, 4691, 4580, 4560, 4570, 4710, 4461, 4480, 4470, 4440, 4450, 4430, 6121, 6130, 4840, 4780, 4770, 4810, 4820, 4920, 4910, 4880, 4890, 4900, 4870, 4860, 7510, 7520, 7540, 7570, 7580, 7550, 7610, 7630, 7420, 7040, 7030, 7020, 7050, 7060, 7080, 7070, 7100, 7120, 7110, 6180, 6190, 6200, 6220, 6310, 6330, 6300, 6340, 6290, 6280, 6320, 6270, 6260, 6240, 6230, 6520, 6590, 6570, 6500, 6540, 6550, 6650, 6670, 6620, 6630, 6640, 6710, 6730, 6600, 6610, 6580, 6870, 6380, 6800, 6560, 6840, 6830, 6510, 6090, 6100, 6080, 6070, 5930, 5940, 5950, 5960, 5970, 5990, 5980, 6000, 6010, 5910, 5920, 5600, 5650, 5730, 5740, 4980, 5000, 5090, 5139, 5130, 5110, 5150, 5170, 5180, 5190, 5210, 5220, 5280, 5330, 5300, 5310, 5290, 5140.

Ground nesting 4740, 7000, 6410, 6420, 6470, 6460, 6450, 6440, 6720, 6360, 6390, 6740, 6750, 6760, 6770, 6780, 6790, 6850, 6860, 6900, 6880, 5870, 5750, 5760, 5780, 5400, 6050, 5420, 5450, 5460, 5470, 5480, 5850, 5830, 5580, 5670, 5679, 5708, 5390, 5380, 4940, 5010, 5011.

Scrub nesting 2960, 2890, 2930, 2950, 2940, 2920, 2280, 3190, 3160, 3210, 3200, 3180, 4270, 4280, 4290, 4310, 4300, 4330, 4340, 4663, 4664, 4660, 4691, 4810, 7460, 7430, 7190, 7420, 7040, 7020, 7050, 7060, 7070, 7100, 7120, 7110, 6190, 6200, 6310, 6330, 6300, 6340, 6410, 6420, 6470, 6450, 6520, 6590, 6650, 6730, 6780, 6790, 6800, 6810, 6850, 6830, 5930, 5940, 5970, 5990, 5980, 6000, 6010, 5860, 5921, 5870, 5910, 5920, 5750, 5610, 5620, 5630, 5650, 5730, 5740, 5580, 5570, 5540, 5060, 5190.

Appendix B. Two-year and Long-term Population Trends

Two-year and long-term (1966–89) population trends for bird species that were seen on 50 or more BBS routes in 1988–89. For both long- and short-term trends, we present percent change per year, sample size (in *N* of routes),

statistical significance (* = $P < 0.05$, ** = $P < 0.01$), and relative abundance (the average count on BBS routes over the interval).¹

Species	Trend							
	1988–89				1966–89			
	Change per year (%)	Signifi- cance	<i>N</i>	Relative abun- dance	Change per year (%)	Signifi- cance	<i>N</i>	Relative abun- dance
Common loon	-7.1		103	1.2	2.2	**	409	.9
Pied-billed grebe	-35.3	*	98	.5	-1.1		519	.3
Double-crested cormorant	63.6	**	102	1.8	7.3	**	376	.7
American bittern	3.6		116	.9	-1.3		657	.5
Great blue heron	8.1		717	1.2	1.7	*	1813	.8
Great egret	87.6		164	5.7	-.8		435	2.3
Snowy egret	134.1		62	2.2	4.4		226	1.4
Little blue heron	-12.7		125	2.8	-1.8		388	1.7
Cattle egret	-.7		174	41.7	3.1	**	428	13.7
Green-backed heron	-8.5		523	.9	-.5		1490	.8
Black-crowned night-heron	4.4		64	.3	.2		414	.2
White ibis	-24.6		58	6.1	1.1		149	4.3
Canada goose	-.5		299	4.7	6.2	*	769	2.4
Wood duck	-36.7	**	308	.6	3.2	**	1133	.3
American green-winged teal	-23.3		65	.6	2.6		349	.3
Mallard	-6.5		631	6.3	.3		1625	5.1
Northern pintail	51.3	*	83	1.0	-6.4	**	429	2.0
Blue-winged teal	-28.7	**	147	2.4	.4		700	1.7
Cinnamon teal	-19.1	**	77	1.5	10.2		244	.6
Northern shoveler	-25.6		70	1.6	-.2		313	1.1
Gadwall	17.0		90	2.7	3.1	**	302	1.5
American wigeon	85.2		63	1.7	.3		264	1.2
Lesser scaup	-5.1		53	3.4	4.2	*	220	1.8
Common merganser	-6.1		95	.5	1.4		340	.3
Black vulture	1.6		153	2.5	3.3	*	471	1.3
Turkey vulture	9.1		592	3.1	.4		1499	2.2
Osprey	-16.7		92	.4	2.5		403	.2
Northern harrier	-21.3	**	236	.7	-.9		947	.5
Sharp-shinned hawk	25.0	*	67	.1	.3		478	.0
Cooper's hawk	-13.7		85	.1	.1		625	.0
Red-shouldered hawk	-20.3	**	230	.8	2.3	*	807	.4
Broad-winged hawk	-2.8		157	.3	1.1		846	.2
Swainson's hawk	12.6		178	1.3	1.0		531	.8
Red-tailed hawk	-5.8		822	1.1	1.7	**	2159	.8
Ferruginous hawk	13.5		59	.4	.5		196	.2
Golden eagle	10.0		72	.3	-.6		296	.2
American kestrel	.6		683	1.1	.7		2030	.9

¹See Appendix A of Robbins et al. 1986 for scientific names of bird species.

Species	Trend							
	1988-89				1966-89			
	Change per year (%)	Signifi- cance	N	Relative abun- dance	Change per year (%)	Signifi- cance	N	Relative abun- dance
Gray partridge	-22.4		85	1.1	2.7		267	.5
Ring-necked pheasant	-13.9	**	434	9.6	-1.1		1145	7.7
Ruffed grouse	-10.0		97	.5	-1.1		610	.3
Wild turkey	-12.5		153	.5	2.0	*	436	.2
Northern bobwhite	-13.9	**	565	22.8	-2.3	**	1235	22.3
California quail	-1.8		105	4.6	-.5		248	3.1
Sora	-29.8	**	106	.7	-2.3		460	.6
American coot	-40.0	**	122	4.6	.2		531	2.2
Sandhill crane	-4.9		91	1.4	4.9	*	202	1.3
Killdeer	-1.7		1139	6.0	.5		2451	5.7
American avocet	27.1		57	1.8	-1.0		205	.9
Willet	-10.3		70	1.7	.7		236	1.5
Spotted sandpiper	-9.7		210	.9	-.4		1049	.6
Upland sandpiper	9.5		169	3.9	3.7	**	613	1.8
Long-billed curlew	.8		55	3.9	-.8		186	1.6
Common snipe	5.3		285	3.1	1.3		888	2.7
Wilson's phalarope	-.5		84	2.3	1.6		302	1.3
Ring-billed gull	40.7		176	11.7	6.1	*	566	4.6
California gull	59.3		50	4.7	-16.4		197	3.4
Herring gull	1.2		107	14.8	-2.0		412	8.3
Black tern	21.6		64	1.9	-5.4	**	325	1.9
Rock dove	-15.8	**	852	6.5	1.7	**	2020	5.0
Band-tailed pigeon	44.5		56	2.3	-1.5		177	2.0
Mourning dove	6.7	**	1254	30.0	.1		2479	29.3
Common ground dove	12.5		76	2.8	-4.3	**	181	1.8
Black-billed cuckoo	-18.7	**	326	1.4	2.0		1187	.7
Yellow-billed cuckoo	-15.8	**	644	4.2	-1.4	**	1540	4.1
Greater roadrunner	20.7		52	1.0	.5		246	.6
Great horned owl	12.0		307	.4	.6		1329	.2
Burrowing owl	-10.0		66	.8	-1.1		320	.7
Barred owl	-12.6		172	.3	1.1	*	762	.1
Common nighthawk	-11.3	*	428	2.8	.1		1425	2.3
Chuck-will's-widow	-8.6		199	1.8	-1.0		484	1.7
Whip-poor-will	-6.1		113	.6	-.7		563	.3
Chimney swift	-11.9	**	799	8.4	-.7		1680	6.1
Ruby-throated hummingbird	-6.0		366	.6	1.6		1304	.3
Rufous hummingbird	-.3		58	1.9	-2.6		167	1.5
Red-naped sapsucker	23.0		58	1.4	22.4	**	103	.3
Belted kingfisher	-2.1		524	.4	-.8		1884	.4
Red-headed woodpecker	-5.2		434	2.4	-1.2		1142	2.1
Acorn woodpecker	9.7		51	10.3	1.0		136	5.3
Red-bellied woodpecker	3.0		601	7.4	.3		1141	5.5
Yellow-bellied sapsucker	-40.1	**	183	2.3	-3.4	**	751	1.1
Downy woodpecker	-14.5	**	861	1.8	.4		2043	1.1
Hairy woodpecker	-3.8		583	.6	1.1	*	1844	.4
Red-shafted flicker	14.5	*	263	3.4	-.8		608	2.4
Yellow-shafted flicker	8.2		866	2.6	-3.0	**	1909	2.8
Pileated woodpecker	-16.6	**	565	1.2	1.3	*	1355	.8
Olive-sided flycatcher	-11.1		194	1.9	-3.7	**	680	1.7
Western wood-pewee	9.1	*	223	4.6	-.6		572	3.4
Eastern wood-pewee	-8.8	**	751	3.8	-1.4	**	1605	2.7

Species	Trend							
	1988-89				1966-89			
	Change per year (%)	Signifi- cance	N	Relative abun- dance	Change per year (%)	Signifi- cance	N	Relative abun- dance
Acadian flycatcher	-10.5	**	320	2.3	.4		778	1.4
Alder flycatcher	-5.7		233	6.4	11.2	**	698	4.2
Willow flycatcher	1.8		397	2.1	4.9	**	981	1.2
Least flycatcher	-10.8	*	365	4.8	-.4		1038	3.5
Hammond's flycatcher	11.1		74	3.6	.6		190	2.6
Dusky flycatcher	14.6		96	2.3	1.1		235	1.8
Western flycatcher	-6.9		108	3.4	1.5		308	2.1
Black phoebe	-5.8		52	1.5	4.9	**	149	.4
Eastern phoebe	7.7	*	651	2.4	-.2		1513	1.4
Say's phoebe	-9.2		145	1.1	.5		413	.9
Ash-throated flycatcher	2.6		129	5.0	2.6	**	337	4.1
Great crested flycatcher	3.0		810	4.0	.2		1679	3.4
Western kingbird	6.7		320	7.7	1.7	*	837	5.9
Eastern kingbird	-2.8		984	5.5	-.5		2077	4.2
Scissor-tail flycatcher	-4.3		85	13.9	-.4		233	10.0
Horned lark	-4.7		582	32.4	-.6		1564	28.1
Purple martin	-2.7		585	6.1	.9		1487	4.3
Tree swallow	-.7		585	6.5	1.8	*	1518	4.8
Violet-green swallow	43.6	*	183	7.0	.3		452	5.6
Northern rough-winged swallow	-19.6	**	670	2.5	1.8		1900	1.7
Bank swallow	-36.0	**	285	4.3	.2		1165	4.5
Cliff swallow	-2.7		555	26.4	1.4		1527	18.2
Barn swallow	-11.0	**	1215	14.8	1.2	*	2472	13.7
Gray jay	10.8		67	2.6	-2.3		311	3.4
Steller's jay	-.7		126	4.8	.2		293	3.2
Blue jay	-2.4		933	9.5	-1.7	**	1841	8.7
Scrub jay	4.5		107	5.1	1.4	*	250	3.5
Clark's nutcracker	-9.4		53	1.7	2.1		152	1.1
Black-billed magpie	12.0		200	6.5	-2.5	**	484	6.5
American crow	-2.1		1141	24.1	.8		2365	19.1
Fish crow	-7.0		189	5.4	3.9	**	406	3.2
Common raven	-2.3		400	6.3	3.3	**	1036	4.7
Black-capped chickadee	-4.2		580	4.2	2.2	**	1323	2.6
Carolina chickadee	-6.2		416	7.4	-.3		803	5.6
Mountain chickadee	-3.7		106	3.7	.1		261	3.0
Chestnut-backed chickadee	-8.5		61	4.1	-1.0		122	5.2
Plain titmouse	-2.5		65	3.6	-1.7		163	2.4
Tufted titmouse	9.7	**	629	10.0	.1		1187	6.4
Common bushtit	-37.6	**	75	3.2	-1.2		233	1.5
Red-breasted nuthatch	9.0		285	2.6	1.9	**	782	1.6
White-breasted nuthatch	-6.8		617	1.5	2.4	**	1500	.8
Brown-headed nuthatch	-23.1	**	128	2.3	-1.4		270	1.9
Brown creeper	-7.8		131	.6	2.0		510	.3
Rock wren	-13.8		143	1.9	-1.6		459	1.8
Carolina wren	4.7		509	10.9	.5		990	8.5
Bewick's wren	-7.5		147	5.1	.2		549	2.2
House wren	.7		768	6.8	1.3	**	1733	4.2
Winter wren	23.9	**	209	12.2	1.8		591	5.5
Sedge wren	-23.0	**	94	1.3	1.3		344	.7
Marsh wren	9.9		90	1.0	1.7		360	.5
Golden-crowned kinglet	2.5		146	3.0	-1.2		478	1.7

Species	Trend						
	1988-89				1966-89		
	Change per year (%)	Signifi- cance	N	Relative abun- dance	Change per year (%)	Signifi- cance	Relative abun- dance
Ruby-crowned kinglet	18.9		161	7.5	-1.6		588
Blue-gray gnatcatcher	.3		458	2.8	.8		1114
Eastern bluebird	17.5	**	698	5.1	.9		1469
Western bluebird	12.0		71	2.2	-2.2		214
Mountain bluebird	11.5		131	2.2	-.5		357
Townsend's solitaire	-8.1		69	.8	3.5		205
Veery	-5.1		335	5.7	-.9		874
Swainson's thrush	-5.3		192	23.2	.7		640
Hermit thrush	12.7		289	6.2	2.0		817
Wood thrush	-4.3		663	5.1	-2.1	**	1394
American robin	.0		1172	31.6	1.1	*	2370
Wrentit	-10.8		52	8.3	-.9		113
Gray catbird	3.5		796	3.3	-.3		1793
Northern mockingbird	-2.0		705	21.2	-1.2	**	1529
Sage thrasher	-2.6		76	13.4	1.7		201
Brown thrasher	3.1		803	4.0	-1.2	*	1778
Cedar waxwing	22.8	**	616	5.6	3.0	**	1429
Loggerhead shrike	-7.9		406	2.2	-3.7	**	1230
European starling	-3.3		1220	35.9	-1.0	*	2505
White-eyed vireo	1.5		394	4.9	-.4		872
Solitary vireo	13.9		279	2.0	2.9	**	844
Yellow-throated vireo	2.7		417	1.1	-2.2		1100
Warbling vireo	1.1		648	4.3	1.4	**	1596
Red-eyed vireo	-2.4		826	13.0	1.5	**	1857
Blue-winged warbler	17.8		161	.8	-.2		449
Golden-winged warbler	34.1	**	73	.5	-2.0	**	303
Tennessee warbler	-26.1		53	4.2	4.6		307
Orange-crowned warbler	43.5	**	118	3.1	-.5		307
Nashville warbler	6.0		211	8.3	2.7		624
Northern parula	-10.4	**	296	1.7	1.4	*	869
Yellow warbler	-.4		793	5.5	1.0	*	1969
Chestnut-sided warbler	-2.6		275	6.3	-.7		723
Magnolia warbler	1.0		127	8.2	2.8	**	480
Black-throated blue warbler	-33.0	**	100	.6	.0		393
Myrtle warbler	4.2		179	11.8	2.2	*	527
Black-throated gray warbler	3.9		67	2.6	3.1	**	173
Black-throated green warbler	24.0	*	200	3.2	-.7		577
Blackburnian warbler	-8.4		129	1.9	1.2		469
Yellow-throated warbler	-3.5		134	.8	.3		440
Pine warbler	-4.5		336	4.8	2.0	**	711
Prairie warbler	-7.0		284	1.9	-2.5	**	701
Cerulean warbler	-23.4	*	83	.5	-3.2	**	278
Black-and-white warbler	17.6	*	344	1.9	1.1		1028
American redstart	-13.4	*	393	4.3	-.2		1184
Prothonotary warbler	-13.3	*	148	1.4	-.1		422
Worm-eating warbler	-.1		118	.4	.3		346
Ovenbird	5.1		472	9.2	.6		1157
Northern waterthrush	5.4		156	2.1	1.5		561
Louisiana waterthrush	-10.1		175	.5	.4		555
Kentucky warbler	-11.6	*	233	1.5	-.7		617
Mourning warbler	-1.9		153	5.0	1.1		495

Species	Trend							
	1988-89				1966-89			
	Change per year (%)	Signifi- cance	N	Relative abun- dance	Change per year (%)	Signifi- cance	N	Relative abun- dance
MacGillivray's warbler	-5.6		108	3.3	-.7		279	3.1
Common yellowthroat	-6.9	**	1042	7.9	-.4		2177	7.4
Audubon's warbler	7.3		131	6.2	.2		340	4.0
Hooded warbler	-5.9		206	2.1	1.9		543	1.2
Wilson's warbler	-1.7		125	1.9	1.4		487	2.3
Canada warbler	-10.4		120	1.1	-1.0		457	1.3
Yellow-breasted chat	-6.9	**	475	4.5	-.8		1163	3.1
Summer tanager	-7.4	*	307	3.9	.0		713	2.3
Scarlet tanager	-9.2	**	496	1.9	.7		1150	1.3
Western tanager	6.5		162	5.1	-.4		426	3.6
Northern cardinal	-3.6	*	780	26.0	-.4		1473	22.0
Rose-breasted grosbeak	-4.6		431	3.1	.4		1053	2.3
Black-headed grosbeak	12.5	*	200	3.3	-.4		456	2.1
Blue grosbeak	-1.4		415	3.7	2.1	**	926	2.5
Lazuli bunting	5.4		143	2.0	.0		381	1.3
Indigo bunting	-3.9	**	783	17.1	-.5		1607	10.3
Painted bunting	-10.3		80	5.5	-3.6	**	245	5.2
Dickcissel	3.4		323	14.9	-1.9	**	748	13.0
Green-tailed towhee	1.6		62	3.8	.4		179	3.2
Rufous-sided towhee	-3.1		832	7.6	-2.1	**	1790	6.0
Brown towhee	-14.2		78	3.8	-.9		190	3.2
Bachman's sparrow	-2.9		50	1.2	-1.2		195	.7
Cassin's sparrow	-5.6		57	23.1	-3.3	**	155	16.6
Chipping sparrow	.2		953	9.1	.0		2107	7.4
Clay-colored sparrow	-3.5		126	9.8	-1.6	*	374	6.4
Brewer's sparrow	-8.6		113	11.8	-3.5	*	305	8.0
Field sparrow	.6		662	6.3	-3.5	**	1457	5.6
Vesper sparrow	-4.5		464	12.4	-1.0		1340	7.4
Lark sparrow	4.8		276	5.0	-3.6	**	829	4.5
Black-throated sparrow	-29.3	**	55	10.4	-4.4	*	200	13.6
Lark bunting	-6.1		103	61.9	-3.9	*	298	33.8
Savannah sparrow	-3.4		498	8.4	-.7		1286	7.6
Grasshopper sparrow	.6		462	4.7	-4.4	**	1330	3.5
Song sparrow	-1.2		858	12.6	-1.1	*	1900	10.1
Lincoln's sparrow	-10.7		101	2.4	5.1	*	369	3.7
Swamp sparrow	7.7		234	1.9	.7		716	2.2
White-throated sparrow	11.0		191	36.1	-1.1		575	32.5
White-crowned sparrow	3.4		80	5.8	-2.1	**	248	6.3
Slate-colored junco	3.9		140	16.9	-.8		494	14.0
Oregon junco	.9		138	11.9	-1.0		319	9.8
Bobolink	-11.8		419	6.0	-.8		1040	5.9
Red-winged blackbird	-6.0	*	1256	54.8	-.7		2540	56.3
Eastern meadowlark	-10.0	**	781	19.1	-2.0	**	1624	19.8
Western meadowlark	-8.1	**	486	53.9	-.7		1195	48.2
Yellow-headed blackbird	.5		187	14.5	3.6	*	547	8.6
Brewer's blackbird	-9.8	*	370	20.8	-1.0		892	18.1
Great-tailed grackle	58.5		64	14.6	27.3	**	168	9.0
Common grackle	-3.3		1005	35.9	-1.2	**	2006	35.6
Brown-headed cowbird	-10.2	**	1252	16.5	-.8		2542	13.2
Orchard oriole	-5.3		538	3.1	-1.5	**	1194	3.2
Bullock's oriole	-.5		214	2.3	-1.0		545	1.9

Species	Trend						
	1988-89			1966-89			
	Change per year (%)	Signifi- cance	<i>N</i>	Relative abun- dance	Change per year (%)	Signifi- cance	Relative abun- dance
Baltimore oriole	2.5		639	4.6	.8		1478
Purple finch	-1.6		289	2.5	-.7		862
Cassin's finch	13.9		71	2.5	2.0		206
House finch	-.9		551	8.1	-1.0		1058
Red crossbill	5.1		91	4.2	1.2		379
Pine siskin	-27.6		216	7.3	.3		701
Lesser goldfinch	15.5		89	2.7	-1.8		264
American goldfinch	-3.3		903	6.7	-1.3	*	1963
Evening grosbeak	-17.0		150	4.0	-.5		510
House sparrow	-16.5	**	1118	34.5	-1.2	*	2349

Appendix C. Population Trends (1988–89) for North American Birds

Each column represents a State or Province. States are divided into similar groups for comparative purposes. Empty cells in this table indicate that either the species does not exist in that region during summer or occurred on fewer than 10 BBS routes. For example, in column one, labeled using the postal code for Connecticut (CT), the first entry is a minus (–) in the mallard row, indicating a nonsignificant decline in mallard populations between 1988 and 1989 in that State. The next species listed is

killdeer, which also has a nonsignificant decline (–). Listings for Connecticut continue on subsequent pages of this appendix. The postal codes for a State or Province are always read from top to bottom in the heading. Codes for the States are 2 letters while codes for the Provinces are 3 (i.e., QUE, ONT, BRC, ALB, MAN, SAS). The first five columns represent data for Connecticut, Maine, Massachusetts, New Hampshire, and Quebec.

Species	State/Province																			
	Q					O					B					AM S				
	CMMNU	MNNPO	IMMNW	KNTVW	AFGLM	AKMOT	IINS	ACNUW	RCIOW	LANA	TEAHE	DJYAH	NINTI	YCNV	LLAAS	RSOKX	LAED	ZOMTY	CADRA	BND S
Common loon	–		–						+											
Pied-billed grebe			▲																	
Double-crested cormorant					–															
Anhinga			+		+															–
American bittern																				
Great blue heron	+	▼	–	+	+	▲	+	+	+	+	+	+	+	+	+	+	+	+	+	▼
Great egret					+	+	+	+	+	+										
Snowy egret					▲															
Little blue heron					+	+	+	+	+	+										
Tricolored heron					+															
Cattle egret					+	–	–	–	–	–										
Green-backed heron	+	–	–	–	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–	–
Black-crowned night-heron																				
Yellow-crowned night-heron					–															
White ibis					▼	+														
Wood stork					+															
Canada goose	–	+	+	+	+	+	+	+	+	+										+
Wood duck		+	–	▼	–	–	–	–	–	–										
Mallard	–	+	+	+	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–	–
Northern pintail																				
Blue-winged teal																				
Cinnamon teal																				
Northern shoveler																				
Gadwall																				
American wigeon																				
Lesser scaup																				
Common merganser																				
Black vulture	–																			
Turkey vulture	+	+	–	+	–	–	–	–	–	–										
Osprey																				
American swallow-tailed kite																				
Black-shouldered kite																				
Northern harrier																				
Cooper's hawk																				
Red-shouldered hawk	–																			
Broad-winged hawk		–																		

Legend

- ▼ = Significant decline
- = Nonsignificant decline
- ▲ = Significant increase
- +

State/Province

[illegible]

Legend

- ▼ = Significant decline
- = Nonsignificant decline
▲ = Significant increase
+ = Nonsignificant increase

[illegible]

Legend
▼ = Significant decline
- = Nonsignificant decline
▲ = Significant increase
+ = Nonsignificant increase

State/Province

	Q						O						B						AM S	
	CMMNU	MNNPO	IIMNW	KNTVW	AFGLM	AKMOT	IINS	ACNUW	RCIOW	LANA										
Species	TEAHE	DJYAH	NINTI	YCNV	LLAAS	RSOKX	LAED	ZOMTY	CADRA	BND										
Wrenit									-											
Gray catbird	- + - - +	▼ - + - +	- ▲ + - +	▼ - + - -	- +	▲ +	▼ + +		+ ▼											
Northern mockingbird	- - -	+ - - - ▲	+	▲ ▼ + + +	- - ▲ + +	+ + + + -	+													
Sage thrasher																				
Brown thrasher		- ▲ + - -	- + + - +	- ▼ - - -	+ - + - -	+ + + +	- + + -													
Curve-billed thrasher							▼													
California thrasher																				
Cedar waxwing	+ + + + +	- + + + +	- + + + ▲	- ▼ +			▼													
Phainopepla																				
Loggerhead shrike				+	+	- - + +	▲ - ▼ ▲ ▼	-	- - -	+										
European starling	+ ▲ - + +	- + ▼ + -	+ + - + +	- - - - +	- - + - +	+ - - + -	+ - - -	+	-	- + +	▼	+ - + -								
White-eyed vireo		▼	-	+																
Bell's vireo																				
Solitary vireo	+ ▼	+ -	▼ +							▲ +	+									
Yellow-throated vireo	+	+	+ + +	+ + + +	- - + +	+ + +	▼	-												
Hutton's vireo																				
Warbling vireo	+ - ▼	- ▼ + ▲	+ + + - +	- + +																
Philadelphia vireo	-																			
Red-eyed vireo	- - - - ▲	▼ - - ▼ -	- + - - +	- + - - ▼	+ + - - +	+ - - -														
Blue-winged warbler	+	+ - + +																		
Golden-winged warbler		+	+	▲																
Tennessee warbler	-		-																	
Orange-crowned warbler																				
Nashville warbler	+ + +	+	+ + - +																	
Northern parula	-	- ▼																		
Yellow warbler	+ + + + -	+ + + - ▲	+ + - - +	▼ - +																
Chestnut-sided warbler	- - + - -	- -	+ + - +																	
Magnolia warbler	▼ +	+	▼																	
Black-throated blue warbler	- ▼	+ -	-																	
Myrtle warbler	+ ▼ -	-	+ - - -																	
Black-throated gray warbler																				
Townsend's warbler																				
Hermit warbler																				
Black-throated green warbler	+ - ▼ ▲	+ ▼	+ +																	
Blackburnian warbler	- -	+ +	-																	
Yellow-throated warbler																				
Pine warbler	+	+	+																	
Prairie warbler	+	- ▲ + -																		
Cerulean warbler		- ▼																		
Black-and-white warbler	+ - - - +	+ ▲ +	▲ - ▲ +																	
American redstart	+ ▼ - + -	+ + +	- - - -																	
Prothonotary warbler		+																		
Worm-eating warbler		- -																		
Ovenbird	+ - ▼ - +	+ - + +	▲ + + ▲																	
Northern waterthrush	- ▲	+	▲ -																	
Louisiana waterthrush		- -																		
Kentucky warbler		▼ - - -																		
Mourning warbler		+	+ ▼ + -																	
MacGillivray's warbler																				
Common yellowthroat	- - - - -	+ + + - -	▼ + - - ▼	▼ - - - -	- + - + -	▼ + -	- - - +													

Legend

- ▼ = Significant decline
- = Nonsignificant decline
▲ = Significant increase
+ = Nonsignificant increase

State/Province

Species	Q										O										B										AM		S													
	CMMNU					MNNPO					IMMNW					KNTVW					AFGLM					AKMOT					IINS					ACNUW					RCIOW					LANA
	TEA	HE	DJ	YAH	NINT	I	YCNA	V	LLA	AS	RSOK	X	LAED	ZOMTY	CADRA	BND	S																													
Audubon's warbler																																														
Hooded warbler						+		+																				+++	+		+															
Wilson's warbler																													++	-																
Canada warbler	-	-				-	-			+																																				
Yellow-breasted chat						-	-	-	-																				+																	
Summer tanager						+			+																																					
Scarlet tanager	-	-	+	+		-	-	+	+	+	+	+																																		
Western tanager																																														
Northern cardinal	-		+	+		+	+	+	+		-	+	-																																	
Pyrthuloxia																																														
Rose-breasted grosbeak	-	-	-	+	+																																									
Black-headed grosbeak																																														
Blue grosbeak																																														
Lazuli bunting																																														
Indigo bunting	-		+	+		-	+	+	+	+	+	+																																		
Painted bunting																																														
Dickcissel																																														
Green-tailed towhee																																														
Rufous-sided towhee	+																																													
Brown towhee																																														
Bachman's sparrow																																														
Cassin's sparrow																																														
Rufous-crowned sparrow																																														
Chipping sparrow	-	+	-	+	+	+	+	+	+	+	+	+																																		
Clay-colored sparrow																																														
Brewer's sparrow																																														
Field sparrow	-																																													
Vesper sparrow																																														
Lark sparrow																																														
Black-throated sparrow																																														
Sage sparrow																																														
Lark bunting																																														
Savannah sparrow	+																																													
Baird's sparrow																																														
Grasshopper sparrow																																														
Fox sparrow																																														
Song sparrow	+	+	+	+	+	+	+	+	+	+	+	+																																		
Lincoln's sparrow																																														
Swamp sparrow	-																																													
White-throated sparrow	-	-	+																																											
White-crowned sparrow																																														
Slate-colored junco	+																																													
Oregon junco																																														
Chestnut-collared longspur																																														
Bobolink	+	-	-	+		+	+	+	+	+	+	+																																		
Red-winged blackbird	+	+	+	+	+	+	+	+	+	+	+	+																																		
Tricolored blackbird																																														
Eastern meadowlark	-	-																																												
Western meadowlark																																														
Yellow-headed blackbird																																														

Legend

▼ = Significant decline
 - = Nonsignificant decline
 ▲ = Significant increase
 + = Nonsignificant increase

State/Province

Species	Q										O										B										AM		S
	CMMNU										IMMNW										ACNUW										LANA		
	TEAHE	DJYAH	NINTI	YCNV	LLAAS	RSOKX	LAED	ZOMTY	CADRA	BND	TEAHE	DJYAH	NINTI	YCNV	LLAAS	RSOKX	LAED	ZOMTY	CADRA	BND	TEAHE	DJYAH	NINTI	YCNV	LLAAS	RSOKX	LAED	ZOMTY	CADRA	BND			
Brewer's blackbird				▲	+																												
Great-tailed grackle																																	
Boat-tailed grackle																																	
Common grackle	+	+	-	▼	+	+	+	+	-																								
Bronzed cowbird																																	
Brown-headed cowbird	-	▲	-	+	+																												
Orchard oriole																																	
Bullock's oriole																																	
Baltimore oriole	+	-	-	-	-																												
Scott's oriole																																	
Purple finch	+	-	-																														
Cassin's finch																																	
House finch	+	-	+	▲	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Red crossbill																																	
Pine siskin	▲																																
Lesser goldfinch																																	
Lawrence's goldfinch																																	
American goldfinch	+	▲	▲	+	+																												
Evening grosbeak																																	
House sparrow	-	+	+	+	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	

Legend

- ▼ = Significant decline
 - = Nonsignificant decline
 ▲ = Significant increase
 + = Nonsignificant increase

Droege, Sam, and John R. Sauer. 1990. **North American Breeding Bird Survey Annual Summary, 1989**. U.S. Fish Wildl. Serv., *Biol. Rep.* 90(8). 22 pp.

Population changes between 1988 and 1989 are estimated from North American Breeding Bird Survey data for 251 bird species. Of these species, 60.5% had negative point estimates of trend. Population trends are summarized by State and within guilds of species to evaluate regional consistency of population changes within and among species. Declines are widespread among both regions and groups of species, and although the drought of 1988 has been suggested as a possible cause of the declines, we could not document a relation between drought intensity and population changes. Long-term (1966-89) trends are also presented for comparison with the 1988-89 population changes.

Key words: North American Breeding Bird Survey, population trends, roadside survey, volunteers.

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NOTE: The mention of trade names does not constitute endorsement or recommendation for use by the Federal Government.

TAKE PRIDE *in America*



U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE



As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.