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THE PASSENGER PIGEON
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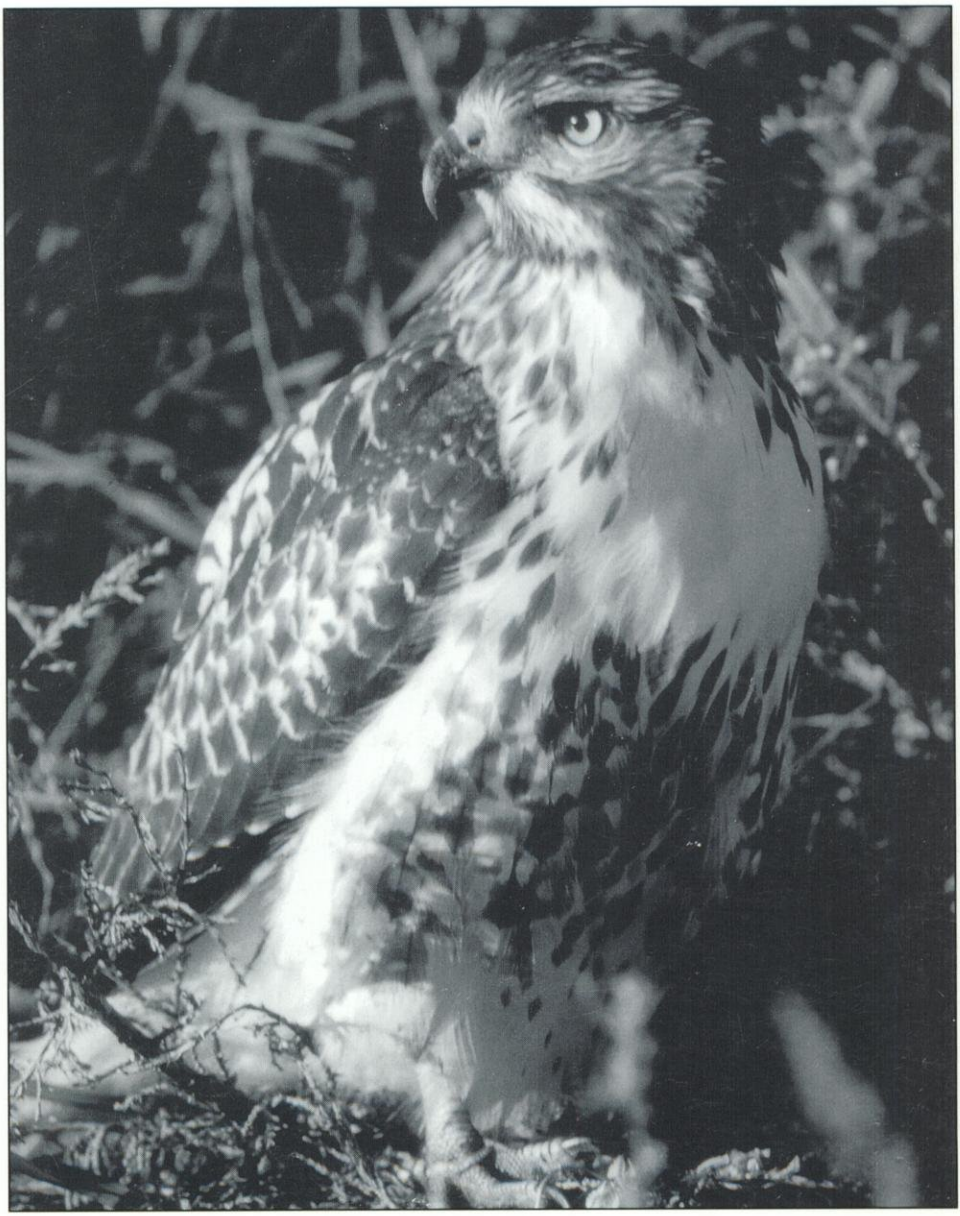

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Send all manuscripts and correspondence to the Editor; information for "Seasonal Field-Notes" should be sent to the Associate Editor or the appropriate Field-Note Compiler. Manuscripts that deal with information on birds in the State of Wisconsin, with ornithological topics of interest to WSO members, or with activities of the WSO will be considered for publication. All manuscripts submitted for possible publication should be typewritten, double-spaced, and on only one side of page-numbered typing paper. Illustrations should be submitted as photographs or good-quality drawings. Keep in mind that illustrations must remain legible when reduced to fit on a journal page. All English and scientific names of birds mentioned in manuscripts should follow *The A.O.U. Checklist of North American Birds (6th Edition)*. Use issues after Vol. 50, No. 1, 1988, as a general guide to style.

A Tribute to Willing Service

If you read the *Passenger Pigeon* from cover to cover, you will notice the names of quite a few individuals that do the work of the Wisconsin Society for Ornithology. The staff which creates the Pigeon is listed on the inside of the front cover, and the officers and committee chairs of WSO are given on the inside of the back cover. I'm sure that many of you know some of these people quite well, but some of them do their work very quietly behind the scenes and do not get to meet the members of WSO often.

Becky Isenring does a terrific job as editor of the *Passenger Pigeon* and you get to see her work with every issue, so I hope her name to familiar to you, if not her face. As the editor of our journal, she sits on the WSO Board of Directors as an officer. She is also serving WSO as co-chair of the Honey Creek Committee. This committee manages the 300 acre property that WSO owns in Sauk County, and recommends to the Board actions that should be taken there. It is a pleasure to have Becky as the Pigeon editor, a board member, and serving on the Honey Creek Committee. She does each of these jobs well and cheerfully. Becky, we thank you for all the time and effort you devote to WSO.

Daryl Tessen serves as the Associate Editor of the Pigeon, receiving reports from our members, organizing them, and getting them sent on to the Field-note Compilers in a timely fashion. WSO is fortunate to have someone with Daryl's talent for organization of so much paperwork. He also serves on the Board of Directors, was the editor of everyone's favorite book, *Wisconsin's Favorite Bird Haunts,* found the Regional Coordinators for the Wisconsin Breeding Bird Atlas, and is currently the coordinator for the state's Breeding Bird Survey. We are delighted that Daryl has been so devoted to WSO for so many years, and that he is now retired back to Wisconsin. Thank you, Daryl for many years of jobs well done.

Becky and Daryl are the more visible members of the Pigeon staff. The next five people also contribute a great deal of time and effort to make our publication one of the best. Cary Anne Reich has served as the Art Editor for the Pigeon since 1990, blending just the right combination of photos and original art work. Her taste and talent help to give the Pigeon its professional look. Cary, we greatly appreciate your assistance in making the Pigeon look so good.

For some of our members, the most important section of the Pigeon each issue is "Seasonal Field-Notes." Four members do the formidable task of summarizing each season in an accurate, clear, and informative way, while managing to stay creative with their presentation year after year. Laura Erickson is the newest Field-note Compiler. She took on the job of spring

compiler in 1993. Although Laura lives in Duluth she is a long time member of WSO. In addition to being the spring Field-note Compiler, Laura is the author of *For the Birds, An Uncommon Guide,* and is serving as the treasurer for the 1996 WSO Convention in Superior. Laura, we thank you for your willingness to take on the task of a field-note compiler, and hope you enjoy the work for many years.

The summer and autumn Field-note Compilers have both been doing this job since 1982. Tom Soulen, who covers the summer season, lives in Minnesota also, but he grew up and went to college in Wisconsin, and still enjoys birding the Badger state when his responsibilities as a college professor allow him to do so. Mark Peterson covers the autumn season from his home in Caroline, Wisconsin between his nursing job and traveling all over the state to look for birds. Tom and Mark, we are extremely grateful that you both have been willing to continue as Field-note Compilers for so many years.

Serving just slightly longer than Tom and Mark, Ken Lange has been doing the winter field-notes since 1981. How any of these three manage to still be creative after so many year's of talking about the same season is beyond me, but they do and do it well. Ken is the other co-chair of the Honey Creek Committee, and just retired this spring from his work at Devil's Lake State Park. Ken, a very special thanks for all those years of telling us about each winter season.

The Board of Directors, as well as the members, of WSO are very grateful that these seven individuals are, and have been, willing to give so much of their time and talent to making our journal so excellent. I hope they know that even if we don't say "thank you" very often, we appreciate them with each issue of the Pigeon that we receive.

There are lots more people on the inside of the back cover that need to be thanked for their work for WSO also, but I will save all but three of them until later. I want to say a special thank you to Mark Korducki for managing the Hotline this winter. The winter of 1995–96 has been a very busy one for rare and unusual bird sightings in Wisconsin. I know it has kept Mark very busy, and he has handled the task of keeping us all informed about what birds were where went very well. It is exciting to have so many unusual birds to try to see, but it also calls for extra effort for the person running the Hotline. Mark, we are most appreciative of accurate and timely information. Thank you.

The last two individuals that I wish to thank for their work for WSO at this time are Mark and Margie Amato, the Bookstore managers. Mark and Margie took on the task of running the Bookstore when Chuck Gilmore decided he could no longer do it in 1992. They cheerfully and enthusiastically devoted themselves, and good portion of their home, to the job of storing and managing the contents of the Bookstore. They also undertook the process of computerizing the bookkeeping for the Bookstore. I hope many of you have had the chance to meet them each year at convention as they operated the Bookstore. It has been a delight to have Mark and Margie

on the Board of Directors, with Mark's quiet wisdom and Margie's infectious enthusiasm. We wish them much happiness as they move back to New Mexico, but they will be missed.

President

Blue Jay *by Robert A. Kleppin*

The Breeding Bird Survey in Wisconsin: 1966–1991

Wisconsin has 70 federal Breeding Bird Survey (BBS) routes on which observers have monitored birds since 1966. We report the results of trends determined from Wisconsin BBS data for the 26-year period 1966–91 and the 10-year period 1982–91. Observers recorded 212 of 233 Wisconsin breeding species, and half (117) of the breeding species were adequately sampled. Of those species adequately sampled, 41 (35%) were increasing and 24 (21%) were decreasing. Decreasing species included a disproportionately large number of grassland species and short-distance migrants. Many inadequately sampled species will require special monitoring efforts before their trends can be determined.

by Samuel D. Robbins, David W. Sample, Paul W. Rasmussen, and Michael J. Mossman

At 4:45 A.M., on June 4, 1966, Daryl Tessen stood beside his car on a Winnebago County road west of Appleton, clipboard in hand, and duly recorded a Song Sparrow and Savannah Sparrow singing in the semi-darkness of that early hour. Within the next four days, at the same magic moment 30 minutes before sunrise, Mary Donald was similarly poised in Buffalo County, Ann Baumgartner was afield in Portage County, and the senior author had eyes and ears tuned in at a spot in Polk County near Dresser.

Thus did a host of eager volunteers launch Wisconsin's part of the U.S. Fish and Wildlife Service's (USFWS) North American Breeding Bird Survey (BBS)–a continent-wide system for monitoring summer bird populations. By early July in that year, Wisconsin observers had completed 50 roadside routes following BBS guidelines and tallied 42,530 individual birds.

Most of the same observers were back at the same locations in 1967, joined by enough additional counters to complete 62 of the state's 70

assigned routes. Over the 26-year-long history of the survey considered in this paper, Wisconsin cooperators expended over 7000 person-hours in tallying 1,532,005 birds of 220 species.

Efforts such as these have produced critical information on the abundance, distribution, and trends of Wisconsin's breeding bird populations. Summaries of Wisconsin BBS results through the first 5, 10, and 15 years (Robbins 1971, 1977, 1982) helped refine the known breeding ranges for such species as Turkey Vulture, Sandhill Crane, Alder Flycatcher, and LeConte's Sparrow. *Wisconsin Birdlife* (Robbins 1991) used BBS data to map summer densities of 75 common species in 8 biogeographical regions of the state.

BBS trend data are used routinely by the Wisconsin Department of Natural Resources (WDNR) to help determine whether species are endangered, threatened, or of special concern. The data have also helped in describing the significance of particular habitats for breeding birds (Mossman and Hoffman 1989) and in suggesting regional management priorities for individual species (Nat. Wildl. Fed. 1991). Wisconsin data are integral to continent-wide analyses and have helped BBS gain wide recognition as an indispensable source for measuring changes in breeding bird populations.

In this paper we discuss important considerations for interpreting BBS data and use these data to describe population fluctuations in Wisconsin's summer birds between 1966 and 1991. We show which species have increased or decreased, consider the statistical significance of these trends, identify other fluctuations that appear to be more complex, and compare some trends with those of adjacent states and larger regions. Where the data are too scanty to permit reliable trend analysis, we point to other evidence suggesting trends that may warrant further study. Although we suggest causes for some trends, especially short-term fluctuations, we feel that the important task of identifying probable causes deserves a careful, separate analysis.

Methods

When the USFWS began the BBS in 1966, it established 70 permanent roadside routes in a stratified-random pattern across Wisconsin (Fig. 1). Each route is 24.5 miles long, comprising 50 stations located at 0.5-mile intervals. At each station the observer stands for 3 minutes, recording all birds seen or heard within 0.25 mile. Each route is run once each year between 1 June and 4 July, beginning 30 minutes before sunrise and ending within 4.5 hours. Routes were placed avoiding state and federal highways to minimize traffic interference, but on some routes traffic noise subsequently increased to such an extent that they could be run only on weekends. In 4 extreme cases, routes were changed: Routes 27 and 30 in 1979, Route 18 in 1990, and Route 67 in 1991. In each case 10 or fewer stations were changed, and the overall effects on the count data seem to be insignificant.

We used several methods to analyze BBS data for individual species. The simplest analysis involved simply

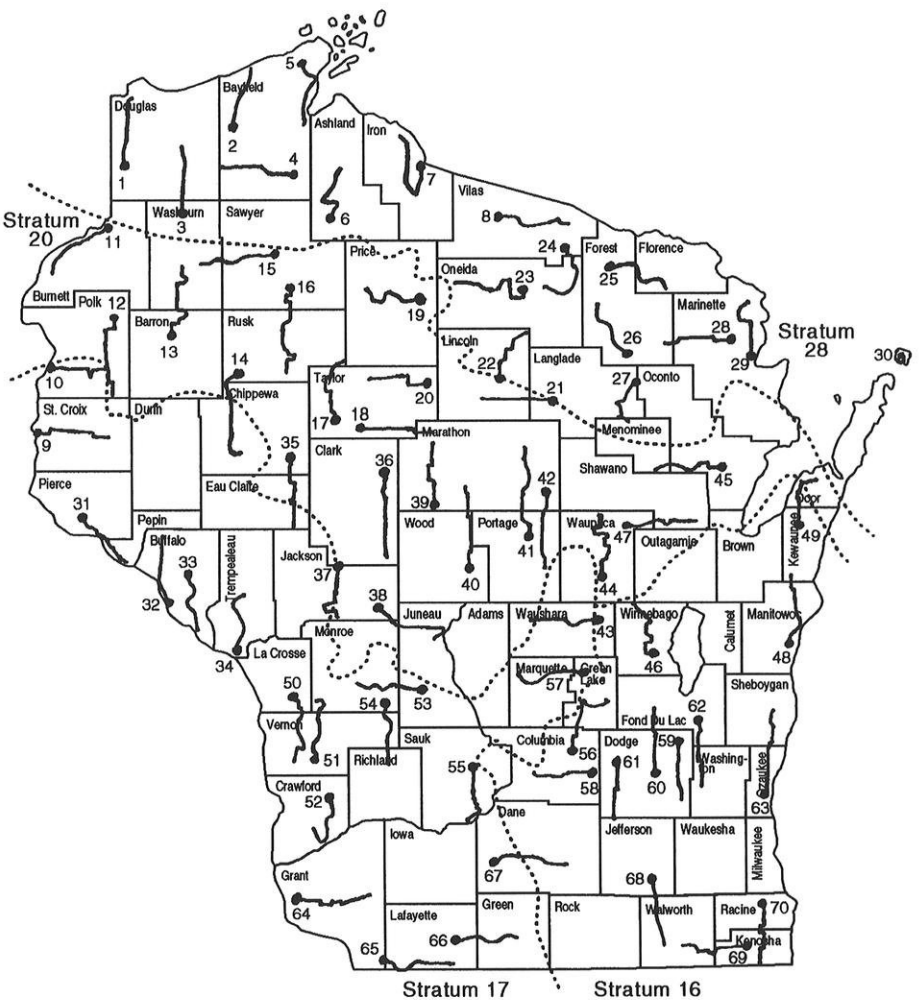

Figure 1. Wisconsin BBS routes, stratum boundaries, and counties. Strata in Wisconsin are: 16 = Great Lakes Plain; 17 = Wisconsin Driftless Area; 20 = Great Lakes Transition; 28 = Spruce-Hardwood Forest)

eyeballing a species' numbers from a given route, over time. For instance, on Route 9 (St. Croix County), the total number of Western Meadowlarks averaged over 100 per year between 1966 and 1978, then dropped to 80 in 1981, 45 in 1985, and 28 in 1989. By comparing this with results from other routes, we could determine if the decline was local or widespread. As another example, a striking increase in Sandhill Cranes on Route 47 (Waupaca County) was evident by their absence between 1966 and 1972, followed by 2–8 individuals recorded annually between 1973 and 1980, and 25–50 birds annually between 1982 and

1991. This technique was useful in evaluating local trends, and in helping elucidate the details of statewide or regional trends. However, it was generally too cumbersome for determining statewide trends.

Another simple method of disclosing a species' statewide population trend was to look for changes in the annual number of routes on which it was recorded. For example, Sandhill Cranes were found on 4 routes in 1967, 10 routes in 1977, 20 routes in 1987, and 21 routes in 1991. In the same years Western Meadowlarks occurred on 51, 51, 39 and 33 routes, respectively. The trends are obvious. However, this technique was less useful when trends were not so marked, nor did it distinguish changes in abundance from changes in range, or account for the fact that in any given year, one or more routes may not have been run.

A third type of trend analysis involved the year-by-year comparison, for a given species, of the average number of individuals recorded per route, statewide. We refer to this as the "annual average count." For example, in 1966, 50 routes were completed and 1623 Western Meadowlarks were recorded, for an average of 32.5 individuals per route. In 1991, 66 routes were run and 269 Western Meadowlarks were counted, for an average of 4.1 individuals per route. A graph of these averages for all years represents the species' population trend for 1966–1991. This method adjusted for the fact that a different number of routes was run from year to year, by averaging, but it sometimes provided a spurious picture, especially in species such as Cliff Swallow, where a large proportion of birds occurred on just one or a few routes, when these routes did not happen to be run in a particular year or set of years.

More sophisticated analytical techniques were used to estimate population trends and their significance more precisely and quantitatively than the simple methods mentioned above; these helped distinguish long-term trends from annual or short-term population fluctuations, and helped account for biases or random "noise" that may obscure the true trends. For example, consider a hypothetical situation in which the actual breeding-bird community along a particular route was exactly the same in 2 successive years. Due simply to the effects of random events, we would not expect the 2 years' counts to be identical. Each count was really only a sample of the birds present: many individuals must have been silent or hidden from view during each 3-minute count period, and distant birds may have been heard only if they happened to face the observer when singing. Add to this the probable effects of different survey date, weather conditions, and breeding phenology from year to year; the different capabilities of different observers; and possible improvements or declines in individual observers' abilities with increasing experience and age—and the difficulties in distinguishing real trends from "random" or short-term fluctuations become apparent.

The primary analytical technique we relied on for our estimate of statewide trends was that used and provided to us by USFWS, and described in detail by Geissler and Sauer (1990). As a first step in this standard

"route regression" analysis, USFWS eliminated data from 78 Wisconsin annual surveys that were: 1) run after the 4 July deadline, 2) delayed in starting or ending hours, 3) shortened by unforeseen road construction, 4) run under unacceptable weather conditions such as rain or strong winds, or 5) run by observers whose data suggested pronounced hearing loss.

The second step was to calculate population change estimates for each species on each route in a way that took observer differences into account. The population change can be expressed as percent annual change, so that, for example, a negative 5% annual population change means that the population decreased by 5% each year. For each species, the trend estimates for individual routes were then combined, adjusting for three important factors that varied among routes: the relative abundance of the species on the route, the geographic area represented by the route, and the variance of the trend estimate for the route. Thus, a route with 200 individuals of a species had more effect on the statewide trend estimate than did a route with 5 individuals of that species. Similarly, routes that represented larger geographic areas (i.e., areas where relatively few routes had been established) had more effect on the overall estimate than did routes that represented smaller areas. Finally, routes with more precise trend estimates weighed more heavily on the overall estimate than did those with imprecise estimates. Important features of this method are that it could be used when routes were not run in every year, it accounted for differences among observers, it adjusted for the relative abundance of a species among routes, and it allowed data from different states or regions to be combined or directly compared.

Each trend estimate, expressed as percent annual change, was tested statistically to determine if the trend was significantly different from zero (that is, if the population was not stable). The smaller the probability value (P-value) of the test, the less likely it was that the population was stable. We consider trends with P-values between 0.10 and 0.05 to be significant, those with P-values between 0.05 and 0.01 to be highly significant and those with P-values less than 0.01 to be very highly significant. In the cases of our previous examples, this method resulted in an estimated 9.0% annual decline in Western Meadowlarks for the period 1966–91 and an estimated 10.7% annual increase for Sandhill Cranes, and both trends had very highly significant P-values. In comparison, the Yellow-bellied Flycatcher exhibited an average 1.6% annual increase over the same period, but the numbers reported were so small and variable from year to year, that the P-value was high and the trend considered not significant. BBS routes simply did not intersect much Yellow-bellied Flycatcher habitat, and thus estimated the population trend of this species imprecisely. To help interpret the scanty data on Yellow-bellied Flycatcher and other species we looked at BBS data analyzed by exactly the same method for a larger region that sampled much more habitat, for instance, the eastern U.S., or the adjacent state of Minnesota, or

physiographic regions (called "strata" by BBS) that include parts of Wisconsin (Fig. 2). In this case, the larger regional trends appeared to be either stable or increasing significantly, which provides some assurance against alarm for the future of this species, at least regionally.

Because the route-regression method expresses trend as a single, easily interpreted estimate, with a significance test, it provided a convenient summary of population change. Yet even this sophisticated technique has its limitations, for the single estimate of trend may conceal important population changes in species that exhibit population cycles, abrupt population changes, or slower changes in trend (see James et al. 1990). To guard against this, we examined Wisconsin BBS data in more detail by the first three methods described above. Especially useful were the statewide annual average counts for each species plotted over time. Because BBS routes in Wisconsin are well distributed and because the route completion record for Wisconsin was so high (routes rarely had two or more consecutive years of missing data), these plots are probably good approximations of true trends in most cases, and are relatively free from potential biases such as those described by James et al. (1990). The plots did not take into account differences among observers, however.

We attempted to evaluate whether BBS adequately sampled each species seen on BBS routes in Wisconsin. Traditionally, this has been done using only the number of routes on which a species has been seen (for example, species recorded on more than 14 routes were considered adequately sampled). But this procedure ignores differences in variability among species that affect the probability of detecting significant trends. For instance, a species such as the Sedge Wren that exhibited large year-to-year variability in abundance on the same route would require a larger number of routes to detect a significant trend than would a species such as the Song Sparrow that was seen in similar numbers in consecutive years on the same route. Another situation that makes statewide trends difficult to detect is when the trend estimates themselves vary considerably among routes, for instance, if a species is increasing in one part of the state, but decreasing elsewhere. For these reasons, we used an alternative method to determine if BBS adequately samples species.

Sauer and Droege (pers. comm.) used estimates of variability from 1966–91 Wisconsin BBS data to estimate the number of routes on which each species must be seen to detect a 2% annual change over a 25-year period at $\alpha = 0.10$. We considered a species to have been adequately sampled by the BBS if it was recorded on at least that number of routes (calculated by Sauer and Droege) in Wisconsin during 1966–91 (we refer to this as strict sample adequacy). We also considered 28 additional species to be adequately sampled because they exhibited significant ($P < 0.10$) BBS population trends during 1966–91, and they had been recorded on at least 14 routes (interpreted sample adequacy). These additional species exhibited greater % annual change than the

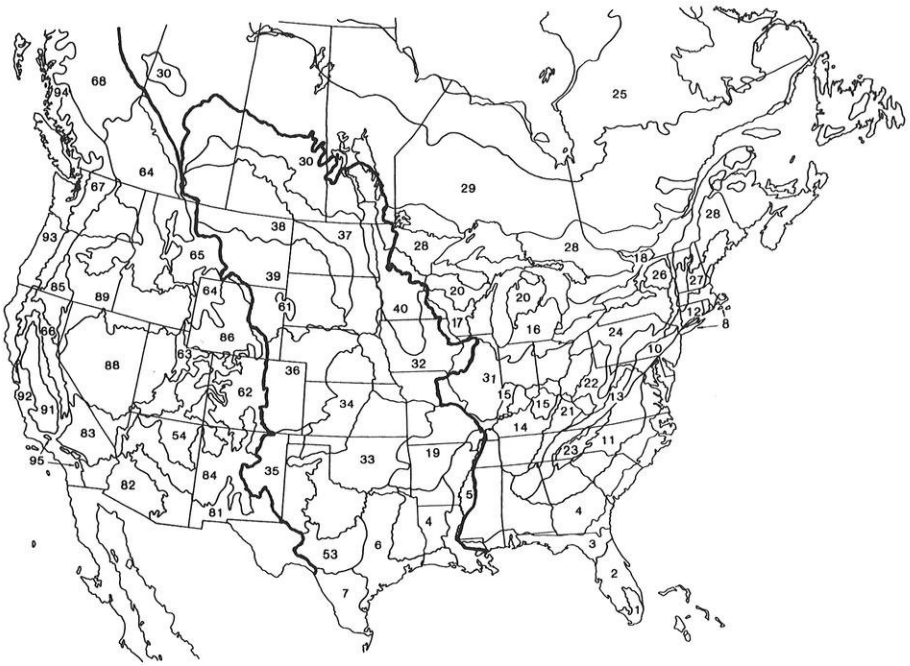

Figure 2. Physiographic stratification of North America as used in BBS analyses. Heavy lines delimit Eastern, Central, and Western analysis regions (Robbins et al. 1986). Strata in Wisconsin are: 16 = Great Lakes Plain; 17 = Wisconsin Driftless Area; 20 = Great Lakes Transition; 28 = Spruce-Hardwood Forest)

2% per year criterion specified by Sauer and Droege. Some relatively abundant species were not adequately sampled by this criterion, because the variance associated with the trend estimate was large. On the other hand, there were a few species that were adequately sampled by the Sauer and Droege criterion, but which, because they prefer habitat infrequently encountered on BBS routes, have typically variable geographical distribution, or tend to be detected poorly during the time most BBS routes are run, we believe were not sampled well enough that we can safely extrapolate from BBS results to the statewide population.

Results

Route completion record—The total number of BBS routes run each year in Wisconsin varied from 50 (in 1966, the first year of the survey) to 68 of the possible 70 routes. On average, 91% of Wisconsin BBS routes were run each year during the 1966–91 period. After eliminating data from routes that had problems (poor weather, run too late in the year, started too late in the day, shortened due to road construction, etc.), data were still available, on average, from 86.6% of the possible 70 routes in each year. Completion was poorest in the first five years of BBS (1966–

70), especially in the northernmost stratum (Spruce-Hardwood Forest, Fig. 1), when 79% of all possible routes in that stratum were run (64% after eliminating routes with problems), compared to 84% in the rest of the state (76% after eliminating routes with problems).

Many observers ran the same route for long periods of consecutive years. Three observers (Daryl Tessen, Jerome Rosso, and Mary Donald) each ran the same route for all 26 years. Nine routes, including the above three, were run for 20 or more consecutive years by the same observer (two routes each for Charles Kemper, Mary Donald, and Daryl Tessen). Twenty-two routes were run for 15 or more consecutive years by the same observer, and there were 50 instances in which the same observer ran a route for 10 or more consecutive years. Contributing to the high completion record also were the efforts of last-minute replacements pressed into service when sickness and weather upsets prevented primary observers from getting afield. For example, the senior author has run 34 of the state's 70 routes at one time or another.

Species list and classifications—We consider the list of Wisconsin breeding birds to comprise the 233 species for which breeding has been positively documented in the state (Robbins 1991), and for which breeding was known or suspected during 1966–91, based on Wisconsin Society for Ornithology (WSO) records. Table 1 lists the 220 species recorded on Wisconsin BBS routes during this period, including 212 (91%) breeding species along with 8 (Swainson's Hawk, Rough-legged Hawk, Lesser Yellowlegs, Solitary Sandpiper, Philadelphia Vireo, Blackpoll Warbler, Bay-breasted Warbler, and White-crowned Sparrow) that probably did not breed. An additional 21 breeding species were not recorded on BBS routes (Table 2). Species names follow revisions up to and including the fortieth supplement to the American Ornithologists' Union (AOU) checklist of North American birds (AOU 1995).

We classified species by abundance, primary breeding habitat, and migration distance (Table 1). The abundance categories we used are those presented in Robbins (1991). Of the 233 breeding species, 5% are considered abundant, 30% common, 21% fairly common, 15% uncommon, and 30% rare. The primary breeding habitat classification was based on our own experience throughout Wisconsin. We used published range maps and descriptions (e.g., AOU 1983, DeGraaf and Rappole 1995) to determine migration distance: *long distance*—all of winter range is south of the U.S.-Mexico border; *moderate*—substantial parts of winter range lie both north and south of border; *short*—90% of winter range is north of border; *resident*—substantial part of population remains in Wisconsin over winter.

Sample adequacy—Sample adequacy results (Table 1) represent our "interpreted" version of the Sauer and Droege results. Note that Sauer and Droege did not include in their analyses three species with taxonomic problems during part of the 1966–91 time period (Alder and Willow Flycatchers) or elsewhere in

Table 1. Wisconsin BBS results, abundance, distribution, breeding habitat, and migration distance.

Key to Table 1.

Column headings:

N: number of routes of occurrence.

% annual change: BBS trend estimate, expressed as % annual change.

Eastern region: direction and significance level of trend results for the Eastern region; C = Central region results; for 2 species with the center of their range in the central U.S., we report results for the Central region rather than for the Eastern region.

Continent: direction and significance level of trend results for the Continental region.

Sample adequacy: A = Adequate; I = Inadequate; * = Interpreted adequacy

Mean # routes on which seen: average # of routes per year on which the species was seen.

Mean # birds per route: average # of birds counted per route per year; in each year the denominator is the # of routes with acceptable data for that year.

Abundance: A = Abundant; C = Common; F = Fairly common; U = Uncommon; R = Rare; = Not breeding in Wisconsin

Distribution: Found primarily in *N*orthern, *S*outhern, *E*astern, *W*estern, or *C*entral parts of Wisconsin; Blank indicates found throughout Wisconsin.

Breeding habitat: E = edge or generalized; F = forest; G = grassland; U = urban/farmstead; W = wetland

Migration distance: L = Long distance—all of winter range is south of U.S.-Mexico border; M = Moderate—Substantial parts of winter range lie both north and south of border; S = Short—90% of winter range is north of border; R = Resident—Substantial part of population remains in Wisconsin over winter.

Symbols used in multiple columns:

Significance level: *** : $P < 0.01$
** : $0.01 \leq P < 0.05$
* : $0.05 \leq P < 0.10$
: $P \geq 0.10$

Direction of trend: + : increasing
− : decreasing

(continued)

Table 1. *Continued*

Species	1966–1991 N	1966–1991 % Annual Change	1982–1991 N	1982–1991 % Annual Change	Eastern Region	Continent	Sample Adequacy	Mean # Routes on Which Seen	Mean # Birds per Route	Abundance	Distribution	Breeding Habitat	Migration Distance
Common Loon	28	−0.1	26	−0.2	+*	+***	A	10.9	0.49	U	N	W	S
Pied-billed Grebe	33	0.4	21	−1.9		−*	A	5.3	0.15	C		W	M
Horned Grebe	1	.	0	.			I*	0.0	0.00	R	C	W	S
Double-crested Cormorant	12	7.1	12	−4.1	+***	+***	I	1.7	0.18	U		W	S
American Bittern	48	−2.1	37	1.8		−*	I	9.9	0.37	C		W	M
Least Bittern	6	1.0	4	−2.2 ***			I	0.4	0.01	C		W	M
Great Blue Heron	70	2.8 ***	70	2.5	+***	+**	A	32.1	1.46	F		W	M
Great Egret	18	2.3 **	13	3.4 *			A*	2.4	0.09	U		W	M
Cattle Egret	2	0.0	0	.		+***	I	0.1	0.00	U	E	G	M
Green-backed Heron	67	2.3	60	−4.1			I	22.2	0.76	C		W	M
Black-crowned Night-Heron	15	1.0	10	−12.7			I*	1.5	0.05	C	C	W	M
Canada Goose	48	7.1 ***	43	16.4 **	+***	+***	A*	5.6	0.93	U		W	S
Wood Duck	67	5.4 ***	59	1.7	+***	+***	A*	15.0	0.75	C		W	S
Green-winged Teal	9	−2.9 ***	6	−12.4 ***			I	0.6	0.02	U	N	W	S
American Black Duck	16	−5.5 *	4	−3.2			A*	1.2	0.06	F	N	W	S
Mallard	69	2.6	67	3.1	+***		I	30.7	4.52	C		W	S
Northern Pintail	13	−1.2 **	4	−1.4		−*	I	0.9	0.02	U	C	W	M
Blue-winged Teal	50	−2.6 **	39	−2.8			A	12.7	0.94	C		W	M
Northern Shoveler	6	0.2	0	.	+**		I	0.3	0.01	U	C	W	M
Gadwall	3	−0.9 *	0	.	+***	+***	I	0.2	0.00	U	C	W	M
American Wigeon	2	.	0	.	+***		I*	0.1	0.00	R		W	M
Redhead	2	.	1	.		+***	I*	0.1	0.02	F	C	W	M
Ring-necked Duck	7	−2.5	3	−13.3 ***			I	0.7	0.03	F	N	W	M
Lesser Scaup	5	−0.5	1	.			I	0.3	0.01	R	C	W	M
Common Goldeneye	1	.	1	.			I*	0.1	0.00	R	N	W	S

(continued)

Species	1966–1991 N	1966–1991 % Annual Change	1982–1991 N	1982–1991 % Annual Change	Eastern Region	Continent	Sample Adequacy	Mean # Routes on Which Seen	Mean # Birds per Route	Abundance	Distribution	Breeding Habitat	Migration Distance
Hooded Merganser	17	0.9	11	3.6			I	1.5	0.06	F		W	S
Common Merganser	13	1.5	9	10.1 **			I	0.7	0.01	U	N	W	S
Red-breasted Merganser	2	−9.4 **	2	.			I	0.8	0.10	U	N	W	S
Ruddy Duck	2	.	0	.		+**	I*	0.1	0.00	U	C	W	M
Turkey Vulture	30	6.3 ***	25	12.9 ***			A*	3.7	0.13	U		E	M
Osprey	24	2.1 *	18	9.1 **	+***	+**	A	2.0	0.04	U	N	W	L
Bald Eagle	11	2.1 ***	11	2.5	+***	+***	A	0.9	0.01	U	N	W	S
Northern Harrier	55	1.7	47	3.5			A	11.1	0.27	C		G	M
Sharp-shinned Hawk	27	0.6	19	1.9			A	1.4	0.03	U	N	F	M
Cooper's Hawk	33	0.3	21	3.4 **			A	2.6	0.05	U		F	M
Northern Goshawk	8	−0.7	3	−3.3 **			I	0.3	0.00	U	N	F	S
Red-shouldered Hawk	21	−0.8	3	1.3		+*	I	1.7	0.03	U		F	S
Broad-winged Hawk	44	2.1 *	39	1.2			A*	10.2	0.24	C	N	F	L
Swainson's Hawk	1	.	1	.			I	0.0	0.00				
Red-tailed Hawk	67	3.8 ***	62	2.7	+***	+***	A	23.0	0.70	C		E	R
Rough-legged Hawk	1	.	0	.			I	0.0	0.0	R			
American Kestrel	68	2.6 ***	64	2.0			A	26.2	0.90	C		G	M
Merlin	1	.	0	.	+*	+*	I*	0.0	0.00	R	N	E	M
Gray Partridge	16	−0.9	9	3.5	−*		A	1.8	0.06	F	S	E	R
Ring-necked Pheasant	53	−2.9 **	44	−2.7	−*	−**	A*	24.3	3.08	C	S	G	R
Ruffed Grouse	54	0.3	43	2.4 *			A	10.1	0.31	C		F	R
Greater Prairie-Chicken	2	4.6 **	2	37.0 ***	+***		I	0.5	0.03	U	C	G	R
Sharp-tailed Grouse	4	2.4	1	.	+*		I	0.6	0.02	U	N	G	R
Wild Turkey	12	5.2 ***	12	22.5 **	+*	+**	A	0.8	0.03	F	S	F	R
Northern Bobwhite	40	5.5 **	31	2.7	−***	−***	A*	12.7	1.35	F	S	E	R

(continued)

Table 1. *Continued*

Species	1966–1991 N	1966–1991 % Annual Change	1982–1991 N	1982–1991 % Annual Change	Eastern Region	Continent	Sample Adequacy	Mean # Routes on Which Seen	Mean # Birds per Route	Abundance	Distribution	Breeding Habitat	Migration Distance
King Rail	1	.	0	.	−*		I*	0.0	0.00	U	S	W	S
Virginia Rail	16	−1.2 ***	7	−0.6			A*	1.0	0.02	F		W	M
Sora	45	−1.5 *	29	−1.7		−**	A	7.0	0.19	C		W	M
Common Moorhen	5	−4.0 **	3	−2.4 **			I	0.5	0.01	F	S	W	M
American Coot	17	0.0	6	2.2 *	−***		A	1.9	0.07	C		W	M
Sandhill Crane	37	10.7 ***	37	8.2 ***	+***	+***	A*	10.0	0.95	U		W	M
Killdeer	69	1.9 ***	68	−0.2			A	55.0	9.22	C		G	M
Lesser Yellowlegs	1	.	0	.			I	0.0	0.0	R			
Solitary Sandpiper	2	.	0	.			I	0.0	0.0	R			
Spotted Sandpiper	53	−2.9 ***	37	−2.6			A	10.4	0.31	C		W	M
Upland Sandpiper	42	−1.7	30	−2.7		+***	A	13.7	0.85	F		G	L
Common Snipe	57	−1.2	43	−5.7 **			I	15.5	0.71	F		W	M
American Woodcock	32	−0.7	16	2.1			A	1.9	0.05	F		E	S
Wilson's Phalarope	5	−2.1	2	.	−***		I	0.3	0.01	U	C	W	L
Ring-billed Gull	15	3.8 **	14	7.3 *	+***	+**	A*	2.8	2.52	C	E	W	M
Herring Gull	18	−2.8	15	11.3			I	4.0	3.84	C	E	W	M
Caspian Tern	1	.	1	.			I*	0.9	0.09	U	E	W	M
Common Tern	2	.	1	.	−***		I*	1.0	0.23	U	N	W	M
Forster's Tern	5	19.2	3	−8.2	+***	+*	I	0.8	0.14	U	E	W	M
Black Tern	37	−1.7	18	0.5	−**	−**	I	10.0	0.81	C		W	L
Rock Dove	66	2.6 *	64	−0.6	+**	+**	A*	44.2	20.41	C		U	R
Mourning Dove	70	1.7	67	6.0 ***			A	53.5	17.35	C		E	S
Black-billed Cuckoo	70	−1.1	69	6.1 ***			A	34.6	1.62	F		E	L
Yellow-billed Cuckoo	64	−0.2	56	0.4	−***	−***	A	17.6	0.60	F		F	L
Eastern Screech-Owl	8	2.2 *	6	1.3			I	0.4	0.01	F	S	E	R

(continued)

Species	1966–1991 N	1966–1991 % Annual Change	1982–1991 N	1982–1991 % Annual Change	Eastern Region	Continent	Sample Adequacy	Mean # Routes on Which Seen	Mean # Birds per Route	Abundance	Distribution	Breeding Habitat	Migration Distance
Great Horned Owl	50	0.1	36	−3.5	+*		I	5.2	0.11	C		E	R
Barred Owl	51	0.3	37	−0.1	+*		A	6.5	0.15	F		F	R
Long-eared Owl	3	−0.7 **	0	.			I	0.1	0.00	U		F	R
Short-eared Owl	3	0.7 ***	0	.			I	0.1	0.00	R		G	R
Northern Saw-whet Owl	4	0.2	0	.			I	0.2	0.00	U		F	R
Common Nighthawk	36	1.6	24	5.7 ***	−***		I	5.4	0.19	F		G	L
Whip-poor-will	36	1.7	24	−6.9 **	−*		I	6.9	0.17	F		F	L
Chimney Swift	70	1.0	68	0.2	−**		A	41.7	4.58	C		U	L
Ruby-throated Hummingbird	67	0.7	54	0.2			A	13.5	0.29	F		E	L
Belted Kingfisher	70	−0.2	69	−4.6 ***	−**	−*	A	22.5	0.56	F		W	M
Red-headed Woodpecker	66	−3.6 ***	62	−9.8 ***	−***	−***	A	36.5	2.76	C		E	S
Red-bellied Woodpecker	45	4.3 ***	41	11.5 ***			A	14.5	0.78	F		F	R
Yellow-bellied Sapsucker	50	0.5	44	1.0			?	18.4	1.03	F	N	F	M
Downy Woodpecker	70	0.7	69	0.2			A	38.5	1.63	C		F	R
Hairy Woodpecker	70	1.6 *	66	−1.4	+**	+**	A	27.8	0.88	C		F	R
Black-backed Woodpecker	4	0.3	3	0.6		+**	I	0.2	0.00	U	N	F	R
Northern Flicker	70	−3.4 ***	70	−2.5 ***	−***	−***	A	58.0	5.37	C		E	S
Pileated Woodpecker	57	3.4 ***	52	5.0 *	+***	+**	A	18.8	0.60	U		F	R
Olive-sided Flycatcher	27	0.2	16	1.5		−***	A	2.8	0.07	U	N	F	L
Eastern Wood-Pewee	70	−0.3	70	0.5	−***	−***	A	51.2	4.25	C		F	L
Yellow-bellied Flycatcher	18	1.6	13	6.2	+***	+***	I	2.5	0.06	U	N	F	L
Acadian Flycatcher	4	1.5	3	−9.7 *			I	0.4	0.01	U	S	F	L
Alder Flycatcher	57	.	48	4.0 *			A*	16.8	0.92	F	N	E	L
Willow Flycatcher	48	.	43	3.5 **			A*	15.8	0.70	F	S	E	L
Least Flycatcher	70	−2.5 ***	67	−1.0	−***		A	38.5	4.74	C		F	L

(continued)

Table 1. *Continued*

Species	1966–1991 N	1966–1991 % Annual Change	1982–1991 N	1982–1991 % Annual Change	Eastern Region	Continent	Sample Adequacy	Mean # Routes on Which Seen	Mean # Birds per Route	Abundance	Distribution	Breeding Habitat	Migration Distance
Eastern Phoebe	70	1.0	65	5.1 ***			A	42.1	2.16	F		E	M
Great Crested Flycatcher	70	0.3	70	0.8			A	55.3	5.93	C		F	L
Western Kingbird	2	−0.8	1	.	−**	+**	I	0.1	0.00	R	W	E	L
Eastern Kingbird	70	0.0	70	0.5			A	52.1	4.24	C		E	L
Horned Lark	58	0.6	55	2.4			A	35.0	4.66	C		G	S
Purple Martin	67	−3.4 *	61	−9.0 ***			A*	37.6	6.15	C		U	L
Tree Swallow	70	4.0 **	69	−1.7		+**	A*	50.0	10.78	C		E	M
Northern Rough-winged Swallow	67	1.7	58	0.9	+***		I	25.2	1.83	F		E	M
Bank Swallow	66	0.7	56	−5.2			I	26.7	6.97	C		E	L
Cliff Swallow	69	0.1	69	−5.9 **			I	39.3	18.19	C		U	L
Barn Swallow	70	1.5 **	70	−1.7			A	57.7	19.16	C		U	L
Gray Jay	6	−0.4	4	2.0			I	1.0	0.03	U	N	F	R
Blue Jay	70	0.1	70	−1.9 **	−***	−***	A	60.0	14.04	C		F	R
American Crow	70	1.3 **	70	0.9	+**	+*	A	60.6	40.46	A		E	R
Common Raven	37	3.3 **	36	1.3	+***	+***	A*	17.7	1.58	F	N	F	R
Black-capped Chickadee	70	2.4 **	70	0.1	+***	+***	A	47.2	4.98	C		F	R
Boreal Chickadee	4	−1.7	1	.	−***	−***	I	0.5	0.01	U	N	F	R
Tufted Titmouse	20	−0.2	8	−1.4	+**		I	3.0	0.08	U	S	F	R
Red-breasted Nuthatch	36	3.6 **	33	.	+***	+***	A*	12.8	0.61	F	N	F	R
White-breasted Nuthatch	70	−0.1	70	−2.0	+***	+***	I	39.5	2.28	C		F	R
Brown Creeper	20	1.0	15	−2.1			A	3.2	0.08	U	N	F	S
Carolina Wren	3	0.0	0	.	+**	+*	I	0.1	0.00	R	S	E	R
Bewick's Wren	1	.	0	.	−***		I*	0.0	0.00	R	S	E	M
House Wren	70	0.3	70	2.3 **		+***	A	56.8	9.84	C		E	M
Winter Wren	31	4.0 **	25	5.6 **			A*	11.6	0.59	U	N	F	S

(continued)

Species	1966–1991 N	1966–1991 % Annual Change	1982–1991 N	1982–1991 % Annual Change	Eastern Region	Continent	Sample Adequacy	Mean # Routes on Which Seen	Mean # Birds per Route	Abundance	Distribution	Breeding Habitat	Migration Distance
Sedge Wren	65	0.5	58	5.5	+**	+*	I	31.7	3.14	C		W	M
Marsh Wren	35	−1.6	22	−3.5			I	6.5	0.34	C		W	M
Golden-crowned Kinglet	15	−0.1	9	−1.2	+**		I	2.8	0.07	U	N	F	S
Ruby-crowned Kinglet	20	0.3	15	3.2	−**	−*	I	3.5	0.10	U	N	F	M
Blue-gray Gnatcatcher	26	10.2 *	24	13.5 **	+*		A*	3.4	0.10	U	S	F	M
Eastern Bluebird	69	1.6	68	17.5 ***	+***	+***	I	35.0	2.08	F		G	M
Veery	61	−2.5 ***	51	−2.7 **	−*	−**	A	35.3	6.30	C	N	F	L
Swainson's Thrush	12	−0.4	8	5.0			I	1.1	0.02	U	N	F	L
Hermit Thrush	32	1.8 *	28	1.0	+**	+**	A*	14.8	2.20	F	N	F	M
Wood Thrush	69	−0.4	64	−2.5	−***	−***	I	32.8	1.62	U	S	F	L
American Robin	70	1.1 **	70	1.5 ***	+**	+**	A	60.6	46.74	A		E	M
Gray Catbird	70	−0.7	70	0.2			A	57.3	7.74	C		E	M
Northern Mockingbird	5	0.5	3	−0.3	−**	−**	I	0.2	0.00	R	S	E	S
Brown Thrasher	70	−0.7	69	−0.7	−***	−***	A	54.4	4.49	C		E	S
Cedar Waxwing	69	0.6	69	−3.6 **	+***	+***	A	45.6	6.74	C		E	M
Loggerhead Shrike	8	−5.1 **	1	.	−***	−***	I	0.7	0.01	U	W	G	M
European Starling	70	−1.2 *	69	−2.1	−***	−**	A	57.3	68.87	A		U	R
White-eyed Vireo	1	.	1	.			I*	0.0	0.00	R	S	E	M
Bell's Vireo	6	−1.1 *	2	−6.7 ***		−**	I	0.6	0.01	U	S	G	L
Solitary Vireo	20	3.3	17	−2.7	+***	+***	I	6.2	0.22	U	N	F	M
Yellow-throated Vireo	67	1.1	60	0.8	+*		A	25.7	0.82	F		F	L
Warbling Vireo	69	−2.7 ***	67	0.8		+***	A	48.0	3.37	C		E	L
Philadelphia Vireo	2	.	0	.			I	0.1	0.00				
Red-eyed Vireo	70	1.8 **	70	1.5 *	+***	+***	A	53.8	15.23	A		F	L
Blue-winged Warbler	28	3.9	16	11.6 *			I	5.3	0.16	U	S	E	L

(continued)

Table 1. *Continued*

Species	1966–1991 N	1966–1991 % Annual Change	1982–1991 N	1982–1991 % Annual Change	Eastern Region	Continent	Sample Adequacy	Mean # Routes on Which Seen	Mean # Birds per Route	Abundance	Distribution	Breeding Habitat	Migration Distance
Golden-winged Warbler	50	−3.9 ***	36	−1.0	−***	−***	A	16.5	0.88	F	N	E	L
Tennessee Warbler	4	1.9	3	0.3			I	0.2	0.00	R	N	F	L
Nashville Warbler	41	1.7	35	−5.9 ***			I	21.7	2.85	C	N	F	L
Northern Parula	23	−1.7	19	−7.9	+**		A	6.7	0.25	U	N	F	L
Yellow Warbler	70	0.3	70	5.6 ***	+***	+*	A	49.7	4.77	C		E	L
Chestnut-sided Warbler	59	−0.1	49	2.4 *			A	28.2	5.39	C	N	E	L
Magnolia Warbler	20	4.6 **	19	7.2	+***	+***	A*	4.4	0.18	U	N	F	L
Cape May Warbler	12	0.7	7	−0.8	+*	+*	I	1.3	0.03	U	N	F	L
Black-throated Blue Warbler	7	3.2 *	7	−5.8			I	1.0	0.02	U	N	F	L
Yellow-rumped Warbler	29	2.8 **	25	1.6	+**	+**	A*	11.5	0.94	F	N	F	M
Black-throated Green Warbler	24	0.1	22	−0.6			I	12.5	1.13	F	N	F	L
Blackburnian Warbler	24	−3.1 **	19	−1.4			A	9.3	0.42	F	N	F	L
Pine Warbler	34	4.0 **	30	11.5 ***	+***	+***	A*	11.2	0.49	F	N	F	M
Palm Warbler	5	1.4	4	−1.8			I	0.7	0.01	U	N	F	M
Bay-breasted Warbler	5	0.6	2	6.4			I	0.4	0.01				
Blackpoll Warbler	1	.	1	.			I	0.1	0.00				
Cerulean Warbler	16	1.2 *	8	4.8	−***	−***	A	1.1	0.02	A	S	F	L
Black-and-white Warbler	46	0.1	41	1.9 *			I	21.0	1.32	C	N	F	M
American Redstart	67	0.5	58	2.5			A	30.6	2.10	C		F	L
Prothonotary Warbler	1	.	0	.			I	0.0	0.00	F	S	F	L
Worm-eating Warbler	1	.	0	.			I*	0.0	0.00	R	S	F	L
Ovenbird	66	0.4	62	1.0			A	41.8	13.34	A		F	L
Northern Waterthrush	30	−0.7	21	−1.5			A	6.2	0.19	U	N	F	L
Louisiana Waterthrush	4	−0.1	0	.			I	0.2	0.00	U	S	F	L
Kentucky Warbler	1	.	1	.			I*	0.0	0.00	U	S	F	L

(continued)

Species	1966–1991 N	1966–1991 % Annual Change	1982–1991 N	1982–1991 % Annual Change	Eastern Region	Continent	Sample Adequacy	Mean # Routes on Which Seen	Mean # Birds per Route	Abundance	Distribution	Breeding Habitat	Migration Distance
Connecticut Warbler	18	7.5 **	14	14.4 **			A*	3.4	0.17	U	N	F	L
Mourning Warbler	50	4.6 ***	46	3.5 ***			A	25.4	2.57	F	N	E	L
Common Yellowthroat	70	0.5	70	−0.7			A	60.2	17.82	C		E	M
Wilson's Warbler	5	0.0	2	.			I	0.3	0.01	R	N	E	L
Canada Warbler	28	−0.6	21	−1.0			I	7.1	0.24	F	N	F	L
Yellow-breasted Chat	8	0.2	4	3.0 *			I	0.3	0.01	U	S	E	L
Scarlet Tanager	70	0.7	67	2.9			A	37.3	2.28	F		F	L
Northern Cardinal	59	2.7 ***	56	4.2 **			A	33.0	5.00	C		E	R
Rose-breasted Grosbeak	70	0.0	70	0.7			A	56.2	8.34	C		F	L
Indigo Bunting	70	0.1	70	−1.3			A	58.5	12.17	C		E	L
Dickcissel	54	−8.0	44	16.2 **	C−**	−***	I	20.2	3.43	C	S	G	L
Eastern Towhee	69	−2.9 **	63	0.0	−***	−***	A	33.1	2.53	F		E	M
Chipping Sparrow	70	1.3 *	70	1.6 *			A	58.6	12.96	C		E	M
Clay-colored Sparrow	54	−1.6	42	0.5		−**	I	26.5	2.31	F	N	G	M
Field Sparrow	68	−3.3 ***	61	−0.3	−***	−***	A	38.5	5.19	C		G	S
Vesper Sparrow	67	−4.7 ***	62	−3.8 **	−***		A	44.3	7.88	C		G	M
Lark Sparrow	5	−0.5	3	.	C−***	−***	I	0.6	0.01	U	W	G	M
Savannah Sparrow	68	−1.9 ***	65	1.6 *	−***		A	51.3	27.10	A		G	M
Grasshopper Sparrow	61	−10.1 ***	44	−0.4	−***	−***	A*	21.7	1.62	F		G	M
Henslow's Sparrow	49	−0.1	29	−7.5 *	−***	−**	I	7.2	0.21	U		G	S
Le Conte's Sparrow	15	−8.4	8	9.5			I	1.7	0.06	U	N	W	S
Song Sparrow	70	0.2	70	2.1 ***	−*	−**	A	60.5	31.59	A		E	S
Lincoln's Sparrow	12	0.3	10	8.7 ***		+**	I	1.3	0.03	U	N	W	M
Swamp Sparrow	64	1.2	57	−3.3			I	28.9	1.85	C		W	M
White-throated Sparrow	40	0.1	35	−2.4	−**	−**	A	20.4	3.58	F	N	E	S

(continued)

Table 1. *Continued*

Species	1966–1991 N	1966–1991 % Annual Change	1982–1991 N	1982–1991 % Annual Change	Eastern Region	Continent	Sample Adequacy	Mean # Routes on Which Seen	Mean # Birds per Route	Abundance	Distribution	Breeding Habitat	Migration Distance
White-crowned Sparrow	1	.	1	.	−***	−**	I	0.0	0.00				
Dark-eyed Junco	11	7.1	7	9.0			I	2.3	0.09	U	N	F	S
Bobolink	66	−2.9 ***	63	−4.3 ***		−**	A	52.0	15.11	C		G	L
Red-winged Blackbird	70	−0.2	70	−3.5 ***	−***	−**	A	60.3	146.76	A		E	S
Eastern Meadowlark	65	−2.2 ***	62	−0.5	−***	−***	A	50.3	14.26	C		G	S
Western Meadowlark	65	−9.0 ***	60	−9.6 ***	−***		A	44.5	16.46	C		G	S
Yellow-headed Blackbird	27	5.7 **	18	9.9		+**	A*	6.2	0.61	F		W	M
Brewer's Blackbird	57	0.2	50	−5.0 ***	+**		A	24.4	3.72	F	N	G	M
Common Grackle	70	1.0	70	−4.2 ***	−***	−***	A	56.9	52.33	A		E	S
Brown-headed Cowbird	70	−3.2 ***	70	1.8	−***	−*	A	59.2	18.81	C		E	S
Orchard Oriole	18	0.4	10	−3.7 *		−**	A	1.4	0.03	U	S	G	L
Baltimore Oriole	70	0.0	70	−0.6			A	55.2	6.61	C		E	L
Purple Finch	36	2.0 **	33	1.8	−*		A	18.1	1.07	F	N	F	S
House Finch	14	3.8 ***	14	15.7 ***	+***		A*	0.8	0.03	U	S	U	R
Red Crossbill	23	−0.5	8	−4.4 **			I	1.7	0.17	R	N	F	S
White-winged Crossbill	6	0.7	3	19.2			I	0.4	0.04	R	N	F	S
Pine Siskin	23	0.2	16	−6.2			I	2.5	0.15	U	N	F	S
American Goldfinch	70	0.1	70	−0.5	−***	−**	A	59.4	12.19	C		E	S
Evening Grosbeak	21	1.9	17	−7.3 *			I	3.7	0.22	U	N	F	S
House Sparrow	67	0.0	65	−1.5 *	−***	−***	A	52.0	91.66	A		U	R

their range (Yellow-bellied Sapsucker). Based on comparisons with other species of similar distribution and representation on BBS routes, we considered these flycatchers to be adequately sampled, but considered the status of the sapsucker to be uncertain.

Of the 233 species breeding in Wisconsin, 117 (50%) were adequately sampled by BBS. Among the 115 inadequately sampled species (not including the Yellow-bellied Sapsucker) are the 21 (18%) that were not seen on BBS routes (Table 2). The percentage of adequately sampled species increased with abundance (Table 3), for example, no rare species were sampled adequately but all abundant species were. There was relatively little difference in this percentage among migration distance categories (Table 4), that is, about half of the species in each of the 4 migration distance categories were sampled adequately. The percentage of adequately sampled species also varied among breeding habitats (Table 5), with 70% or more of edge/generalist and urban/farmstead species adequately sampled, 50–60% of forest and grassland species adequately sampled, and only 27% of wetland species adequately sampled. This pattern reflects the frequency with which these habitats are accessed by roads, as well as the relative rarity of some forest, grassland, and wetland species.

Table 2. Species that bred in Wisconsin during 1966–91 but were not recorded on any BBS routes.

Species
Red-necked Grebe
Eared Grebe
Western Grebe
Snowy Egret
Yellow-crowned Night-Heron
Trumpeter Swan
Mute Swan
Canvasback
Peregrine Falcon
Spruce Grouse
Yellow Rail
American Avocet
Piping Plover
Little Gull
Bonaparte's Gull
Common Barn Owl
Great Gray Owl
Yellow-throated Warbler
Hooded Warbler
Blue Grosbeak
Sharp-tailed Sparrow

The species that were inadequately sampled by the Sauer and Droege criterion included 15 species that were relatively common and seen on many routes: American Bittern, Green Heron, Mallard, Black Tern, Northern Rough-winged Swallow, White-breasted Nuthatch, Sedge Wren, Eastern Bluebird, Wood Thrush, Nashville Warbler, Black-throated Green Warbler, Black-and-White Warbler, Dickcissel, Clay-colored Sparrow, and Swamp Sparrow. These species were apparently considered inadequately sampled because the variance of the trend estimate was relatively large. In general, we were unable to determine whether the large variances of the trend estimates for these species were due primarily to large year-to-year variability on the same routes, or to variability among trend estimates on different routes.

Species most commonly seen on Wisconsin BBS routes—We used annual average counts over the 26-year period to rank species seen in greatest numbers on Wisconsin BBS routes

Table 3. 1966–91 population trends by abundance category. Alder and Willow Flycatchers are not included in the trend categories—both are considered fairly common (i.e., there are 115 adequately sampled species with trends and 31 adequately sampled fairly common species with trends).

Abundance Category	# Species	Adequately Sampled	Trends (adequately sampled species only) Significant Increase	Significant Decrease	Not Significant
Abundant	11	11 (100%)	4 (36%)	2 (18%)	5 (45%)
Common	70	53 (76%)	13 (25%)	16 (30%)	24 (45%)
Fairly common	48	33 (69%)	12 (39%)	6 (19%)	13 (42%)
Uncommon	35	20 (30%)	12 (60%)	0 (0%)	8 (40%)
Rare	69	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total	233	117 (50%)	41 (36%)	24 (21%)	50 (43%)

Table 4. 1966–91 population trends by migration distance. Alder and Willow Flycatchers (long distance migrants) are not included in the trend categories (i.e., there are 115 adequately sampled species with trends and 36 adequately sampled long distance migrants with trends).

Migration Distance	# Species	Adequately Sampled	Trends (adequately sampled species only) Significant Increase	Significant Decrease	Not Significant
Long	67	38 (57%)	8 (22%)	7 (20%)	21 (58%)
Moderate	77	35 (45%)	15 (43%)	8 (23%)	12 (34%)
Short	51	23 (45%)	5 (22%)	7 (30%)	11 (48%)
Resident	38	21 (55%)	13 (62%)	2 (10%)	6 (29%)
Total	233	117 (50%)	41 (36%)	24 (21%)	50 (43%)

Table 5. 1966–91 population trends by breeding habitat. Alder and Willow Flycatchers (edge/generalists) are not included in the trend categories (i.e., there are 115 adequately sampled species with trends and 36 adequately sampled edge/generalists with trends).

Primary Breeding Habitat	# Species	Adequately Sampled	Trends (adequately sampled species only) Significant Increase	Significant Decrease	Not Significant
Forest	78	39 (50%)	18 (46%)	3 (8%)	18 (46%)
Edge/generalist	52	38 (73%)	9 (25%)	6 (17%)	21 (58%)
Grassland	27	15 (56%)	2 (13%)	8 (53%)	5 (33%)
Urban/farmstead	10	7 (70%)	3 (43%)	2 (29%)	2 (29%)
Wetland	66	18 (27%)	9 (50%)	5 (28%)	4 (22%)
Total	233	117 (50%)	41 (36%)	24 (21%)	50 (43%)

(Table 6). We also ranked species based on annual average counts for the first 5-year period (1966–91) and the last 6-year period (1986–91). Three additional species were in the top 25 during one of these periods.

Table 6. The 25 species seen in greatest numbers on Wisconsin BBS routes during 1966–91, 1966–70, and 1986–91. The 1966–91 average count is the average of annual average counts for the 26-year period.

Species	1966–91 Average Count	1966–91 Rank	1966–70 Rank	1986–91 Rank
Red-winged Blackbird	146.8	1	1	1
House Sparrow	91.7	2	2	2
European Starling	68.9	3	3	3
Common Grackle	52.3	4	4	5
American Robin	46.7	5	5	4
American Crow	40.5	6	6	6
Song Sparrow	31.6	7	7	7
Savannah Sparrow	27.1	8	9	8
Rock Dove	20.4	9	15	9
Barn Swallow	19.2	10	16	10
Brown-headed Cowbird	18.8	11	10	14
Cliff Swallow	18.2	12	12	22
Common Yellowthroat	17.8	13	13	12
Mourning Dove	17.3	14	17	11
Western Meadowlark	16.5	15	8	43
Red-eyed Vireo	15.2	16	19	15
Bobolink	15.1	17	11	25
Eastern Meadowlark	14.3	18	14	19
Blue Jay	14.0	19	20	16
Ovenbird	13.3	20	22	17
Chipping Sparrow	13.0	21	26	13
American Goldfinch	12.2	22	18	18
Indigo Bunting	12.2	23	23	20
Tree Swallow	10.8	24	34	21
House Wren	9.8	25	25	23
Killdeer	9.2	26	37	24
Vesper Sparrow	7.9	28	21	35
Bank Swallow	7.0	30	24	31

Red-winged Blackbird, House Sparrow, and European Starling were seen in greatest numbers in all periods. There were only minor changes over time in the ranking of the fourth through seventh species. But Western Meadowlark, which ranked 8 during 1966–70, dropped to 43 during 1986–91. Bobolink and Vesper Sparrow also dropped dramatically in their ranks. All three of these declining species are grassland species. Rock Dove, Barn Swallow, Mourning Dove, and Chipping sparrow increased several ranks from 1966–70 to 1986–91. These most noticeably increasing species, like many of the other species seen in greatest numbers, are edge/generalist or urban/farmstead species. The only forest species on the list are the Red-eyed Vireo and Ovenbird.

Patterns in population trends—We have already pointed out that a single trend statistic cannot represent all of the varieties of population change that may occur. In examining plots of annual average counts we noted several patterns of change that each appeared to characterize several species; however, these pat-

terns graded into one another and were not completely distinct. In addition, there were many species that did not fall into any obvious category. Nevertheless, a description of these patterns, with plots for representative species, can indicate the variety of population change possible. It may also focus attention on common causes leading to population change in groups of species.

At the broadest level, patterns of population change fell into three groups: those species for which change was in the same direction for the entire period, those for which the trend direction varied, and those without any apparent trend. Species with increasing or decreasing trend through the entire period included some species in which the trend appeared constant, and others in which the trend varied, but without changing direction. For instance, the American Robin (Fig. 8) and Red-eyed Vireo (Fig. 9) maintained consistent upward trends, while the Turkey Vulture (Fig. 3) and Red-bellied Woodpecker (Fig. 5) appeared to increase faster later in the period. Similarly, the Vesper Sparrow (Fig. 12) and Western Meadowlark (Fig. 13) displayed consistent downward trends, while the Black Tern (Fig. 5) and Field Sparrow (Fig. 12) decreased more sharply early in the period. A number of species exhibited a sharp drop in the mid 1970s. The Eastern Towhee (Fig. 11) was an example of such a species without much evidence of later recovery, and the Song Sparrow (Fig. 12) showed a similar drop followed by an apparent quick recovery. Another group of species showed trends of different directions for periods of several years each. The Eastern Bluebird (Fig. 8) decreased until the late 1970s, then increased strongly; the Red-headed Woodpecker (Fig. 5) increased until the early 1980s, and then decreased. Some species appeared to shift abruptly from one stable level to another (e.g., Rock Dove, Fig. 5). The Ruffed Grouse (Fig. 4) was an example of a species that exhibited population cycles, although, because BBS routes are run after drumming is completed in Wisconsin, the BBS does not provide the best evidence for this. Finally, the Sedge Wren (Fig. 8) was an example of a species that maintained a stable population, but with considerable annual variability.

Of these patterns, perhaps the most interesting were those in which the direction of trend appeared to change during the period. Because it is difficult to make objective decisions about such changes from plots of annual average counts, we compared 1982–91 trends with 1966–80 trends for those species with significant ($P < 0.05$) trends in the earlier period (Robbins 1982). Three species had 1966–80 decreases followed by 1982–91 increases (Eastern Phoebe, Eastern Bluebird, and Song Sparrow). Three species with increases in 1966–80 had decreases in 1982–91 (Red-winged Blackbird, Common Grackle, and Red-headed Woodpecker). Six species had 1966–80 decreases followed by stability in 1982–91 (Warbling Vireo, Golden-winged Warbler, Eastern Towhee, Field Sparrow, Grasshopper Sparrow, and Eastern Meadowlark). Although we do not have an objective procedure to identify species with late 1970s dips, we noted this pattern

in plots of annual average counts for several species, including: Yellow Warbler, Indigo Bunting, Eastern Towhee, Savannah Sparrow, Song Sparrow, White-throated Sparrow, Eastern Meadowlark, and Brown-headed Cowbird.

Population trends for groups of species—We examined 1966–91 population trends among groups of species classified by characteristics such as abundance, migration distance, and breeding habitat. Comparisons among groups could be made on the basis of all Wisconsin breeding species, or of all species that were adequately sampled. This is an important distinction because we know much more about trends in species that were adequately sampled. Adequately sampled species with trends that were not significant were at least undergoing less than the 2% per year change specified by Sauer and Droege for determining sample adequacy. We do not know if inadequately sampled species may actually have exhibited biologically important population trends that were in excess of 2% per year. Among the inadequately sampled species, declines are suspected for the American Bittern, Red-shouldered Hawk, Whip-poor-will, Northern Cliff Swallow, Loggerhead Shrike, Dickcissel, Henslow's Sparrow, and Evening Grosbeak. Note that some of these species did experience significant declines for the 1982–91 period, or, in one case, for the 1966–91 period (Loggerhead Shrike, seen on only 9 routes). An increase is suspected for the Double-crested Cormorant.

We calculated the percentage of adequately sampled species within each group that were increasing ($P < 0.10$), decreasing ($P < 0.10$), or stable ($P \geq 0.10$). In some cases these percentages were quite different from the percentages of all breeding species in the group that were increasing, decreasing, or stable. For instance, because wetland birds as a group tended to be inadequately sampled, the percentage of all wetland birds that were decreasing was small compared to other habitats, but when only adequately sampled species were considered, this percentage was much higher compared to other habitats. Percentages mentioned in the text below are for the adequately sampled species only. Although we considered Willow and Alder Flycatchers to be adequately sampled, no 1966–91 trends were computed for these species because they were not separately identified before 1973. We have not included these two species in the following discussion, so that the number of adequately sampled species with 1966–91 trends was 115. Note also that there were 12 inadequately sampled species with significant trends. All of these species were observed on less than 15 routes between 1966 and 1991. They include the Green-winged Teal, Pintail, Gadwall, Red-breasted Merganser, Prairie Chicken, Moorhen, Eastern Screech Owl, Long-eared Owl, Short-eared Owl, Loggerhead Shrike, Bell's Vireo, and Black-throated Blue Warbler. Because these species were seen on so few routes, they are included in the column labeled "inadequately sampled species" in Tables 3, 4, and 5.

Patterns in population trends rel-

Table 7. Adequately sampled species by migration and trend category.

Long-distance Migrants		
Increasing	Decreasing	Stable
Osprey	Least Flycatcher	Upland Sandpiper
Broad-winged Hawk	Purple Martin	Black-billed Cuckoo
Barn Swallow	Veery	Yellow-billed Cuckoo
Red-eyed Vireo	Warbling Vireo	Chimney Swift
Magnolia Warbler	Golden-winged Warbler	Ruby-throated Hummingbird
Cerulean Warbler	Blackburnian Warbler	Olive-sided Flycatcher
Connecticut Warbler	Bobolink	Eastern Wood-Pewee
Mourning Warbler		Great Crested Flycatcher
		Eastern Kingbird
		Yellow-throated Vireo
		Northern Parula
		Yellow Warbler
		Chestnut-sided Warbler
		American Redstart
		Ovenbird
		Northern Waterthrush
		Scarlet Tanager
		Rose-breasted Grosbeak
		Indigo Bunting
		Orchard Oriole
		Baltimore Oriole
Moderate-distance Migrants		
Increasing	Decreasing	Stable
Great Blue Heron	Blue-winged Teal	Pied-billed Grebe
Great Egret	Virginia Rail	Northern Harrier
Turkey Vulture	Sora	Sharp-shinned Hawk
American Kestrel	Spotted Sandpiper	Cooper's Hawk
Sandhill Crane	Eastern Towhee	American Coot
Killdeer	Vesper Sparrow	Belted Kingfisher
Ring-billed Gull	Savannah Sparrow	Eastern Phoebe
Tree Swallow	Grasshopper Sparrow	House Wren
Blue-gray Gnatcatcher		Gray Catbird
Hermit Thrush		Cedar Waxwing
American Robin		Common Yellowthroat
Yellow-rumped Warbler		Brewer's Blackbird
Pine Warbler		
Chipping Sparrow		
Yellow-headed Blackbird		
Short-distance Migrants		
Increasing	Decreasing	Stable
Canada Goose	American Black Duck	Common Loon
Wood Duck	Red-headed Woodpecker	American Woodcock
Bald Eagle	Northern Flicker	Mourning Dove
Winter Wren	Field Sparrow	Horned Lark
Purple Finch	Eastern Meadowlark	Brown Creeper
	Western Meadowlark	Brown Thrasher
	Brown-headed Cowbird	Song Sparrow
		White-throated Sparrow
		Red-winged Blackbird
		Common Grackle
		American Goldfinch

(continued)

Table 7. *Continued*

Residents		
Increasing	Decreasing	Stable
Red-tailed Hawk	Ring-necked Pheasant	Gray Partridge
Wild Turkey	European Starling	Ruffed Grouse
Northern Bobwhite		Barred Owl
Rock Dove		Downy Woodpecker
Red-bellied Woodpecker		Blue Jay
Hairy Woodpecker		House Sparrow
Pileated Woodpecker		
American Crow		
Common Raven		
Black-capped Chickadee		
Red-breasted Nuthatch		
Northern Cardinal		
House Finch		

ative to abundance categories were difficult to assess because of the strong relationship between abundance and sample adequacy (Table 3). No rare species were adequately sampled, and only 20% of uncommon species were adequately sampled, so our knowledge of population trends for these two groups is poor. Abundant, common, and fairly common species showed similar patterns in population trends, with 42–45% of adequately sampled species stable (no significant trend), and a slightly larger percentage of increasing than decreasing species (abundant and fairly common), or approximately equal percentages of increasing and decreasing species (common).

Of the four migration distance categories, the resident species had the largest percentage of increasing species (62%) and the smallest percentage of decreasing species (10%—Table 4; lists of species in Table 7). Long distance migrants had the largest percentage (58%) of stable species, and approximately equal percentages of increasing and decreasing species. Short distance migrants had the highest percentage (30%) of decreasing species.

Among the five breeding habitat categories, grassland species had the largest percentage of decreasing species (53%—Table 5; lists of species in Table 8) and the smallest percentage of increasing species (13%). They stood out as being in the most trouble among the habitat groups. All the other habitat groups had larger percentages of increasing than decreasing species. Forest species had the smallest percentage of decreasing species (8%) and equal percentages of increasing and stable species (46%). Edge/generalist species had an especially large percentage of stable species (58%). Although wetland species appeared to be in good shape (50% of adequately sampled species were increasing), it is important to remember that our information on wetland species as a group is poor, because only 27% of them were adequately sampled.

Overall, increasing species were represented by 45 (20%) of all spe-

Table 8. Adequately sampled species by breeding habitat and trend category.

Forest		
Increasing	Decreasing	Stable
Broad-winged Hawk	Least Flycatcher	Sharp-shinned Hawk
Wild Turkey	Veery	Cooper's Hawk
Red-bellied Woodpecker	Blackburnian Warbler	Ruffed Grouse
Hairy Woodpecker		Yellow-billed Cuckoo
Pileated Woodpecker		Barred Owl
Common Raven		Downy Woodpecker
Black-capped Chickadee		Olive-sided Flycatcher
Red-breasted Nuthatch		Eastern Wood-Pewee
Winter Wren		Great Crested Flycatcher
Blue-gray Gnatcatcher		Blue Jay
Hermit Thrush		Brown Creeper
Red-eyed Vireo		Yellow-throated Vireo
Magnolia Warbler		Northern Parula
Yellow-rumped Warbler		American Redstart
Pine Warbler		Ovenbird
Cerulean Warbler		Northern Waterthrush
Connecticut Warbler		Scarlet Tanager
Purple Finch		Rose-breasted Grosbeak

Edge/generalist		
Increasing	Decreasing	Stable
Turkey Vulture	Red-headed Woodpecker	Gray Partridge
Red-tailed Hawk	Northern Flicker	American Woodcock
Northern Bobwhite	Warbling Vireo	Mourning Dove
Tree Swallow	Golden-winged Warbler	Black-billed Cuckoo
American Crow	Eastern Towhee	Ruby-throated Hummingbird
American Robin	Brown-headed Cowbird	Eastern Phoebe
Mourning Warbler		Eastern Kingbird
Northern Cardinal		House Wren
Chipping Sparrow		Gray Catbird
		Brown Thrasher
		Cedar Waxwing
		Yellow Warbler
		Chestnut-sided Warbler
		Common Yellowthroat
		Indigo Bunting
		Song Sparrow
		White-throated Sparrow
		Red-winged Blackbird
		Common Grackle
		Baltimore Oriole
		American Goldfinch

Grassland		
Increasing	Decreasing	Stable
American Kestrel	Ring-necked Pheasant	Northern Harrier
Killdeer	Field Sparrow	Upland Sandpiper
	Vesper Sparrow	Horned Lark
	Savannah Sparrow	Brewer's Blackbird
	Grasshopper Sparrow	Orchard Oriole
	Bobolink	
	Eastern Meadowlark	
	Western Meadowlark	

(continued)

Table 8. *Continued*

Urban/farmstead		
Increasing	Decreasing	Stable
Rock Dove	Purple Martin	Chimney Swift
Barn Swallow	European Starling	House Sparrow
House Finch		
Wetland		
Increasing	Decreasing	Stable
Great Blue Heron	American Black Duck	Common Loon
Great Egret	Blue-winged Teal	Pied-billed Grebe
Canada Goose	Virginia Rail	American Coot
Wood Duck	Sora	Belted Kingfisher
Osprey	Spotted Sandpiper	
Bald Eagle		
Sandhill Crane		
Ring-billed Gull		
Yellow-headed Blackbird		

cies recorded on the BBS, or 41 (35%) of those species adequately sampled; they included disproportionately many species of wetland, forest, and urban/farmstead habitats, and resident species. Species that increased at a mean annual rate over 6% were Canada Goose, Turkey Vulture, Sandhill Crane, Blue-gray Gnatcatcher, and Connecticut Warbler. Decreasing species included 32 (15%) of all BBS species, and 24 (21%) of those adequately sampled, with disproportionate numbers of grassland species and short-distance migrants. Species that declined at a rate greater than 6% per year were Grasshopper Sparrow and Western Meadowlark.

Trends in Wisconsin vs trends in Eastern and Continental Regions—We emphasize comparison of trends for Wisconsin with trends for the Eastern region, because the center of the breeding range for most Wisconsin breeding birds is in the Eastern region rather than elsewhere in the continent. Trends for the Eastern and Continental regions for Wisconsin breeding birds were generally similar to one another. Because of the larger sample sizes, more Wisconsin breeding birds were adequately sampled in the Eastern region as a whole than in Wisconsin alone. Forty-six of the 115 species that were inadequately sampled in Wisconsin were adequately sampled in the Eastern region. However, 17 species were adequately sampled in Wisconsin but not in the Eastern region, apparently because of increased variability region-wide, despite larger sample sizes. These were mostly wetland birds or birds whose range was centered in the northern or north-central U.S. and Canada.

Of the 117 species adequately sampled by the BBS in Wisconsin, 61 had the same trend for Wisconsin as for the Eastern region (Table 9). Twenty-two species increased for both areas. Twelve (55%) of these increasing species were forest spe-

Table 9. Species with the same trend in Wisconsin and the Eastern region. Includes only species that are adequately sampled in both regions.

a) Increasing Species

Species	Habitat	Migration Distance
Great Blue Heron	wetland	moderate
Canada Goose	wetland	short
Wood Duck	wetland	short
Osprey	wetland	long
Bald Eagle	wetland	short
Red-tailed Hawk	edge/generalist	resident
Wild Turkey	forest	resident
Sandhill Crane	wetland	moderate
Rock Dove	urban/farmstead	resident
Hairy Woodpecker	forest	resident
Pileated Woodpecker	forest	resident
American Crow	edge/generalist	resident
Common Raven	forest	resident
Black-capped Chickadee	forest	resident
Red-breasted Nuthatch	forest	resident
Blue-gray Gnatcatcher	forest	moderate
Hermit Thrush	forest	moderate
American Robin	edge/generalist	moderate
Red-eyed Vireo	forest	long
Magnolia Warbler	forest	long
Yellow-rumped Warbler	forest	moderate
Pine Warbler	forest	moderate

b) Decreasing Species

Species	Habitat	Migration Distance
Red-headed Woodpecker	edge/generalist	short
Northern Flicker	edge/generalist	short
Least Flycatcher	forest	long
Veery	forest	long
European Starling	urban/farmstead	resident
Golden-winged Warbler	edge/generalist	long
Eastern Towhee	edge/generalist	moderate
Field Sparrow	grassland	short
Vesper Sparrow	grassland	moderate
Savannah Sparrow	grassland	moderate
Grasshopper Sparrow	grassland	moderate
Eastern Meadowlark	grassland	short
Western Meadowlark	grassland	short
Brown-headed Cowbird	edge/generalist	short

c) Stable Species

Species	Habitat	Migration Distance
Pied-billed Grebe	wetland	moderate
Northern Harrier	grassland	moderate
Sharp-shinned Hawk	forest	moderate
Cooper's Hawk	forest	moderate
American Woodcock	edge/generalist	short
Mourning Dove	edge/generalist	short
Ruby-throated Hummingbird	edge/generalist	long
Downy Woodpecker	forest	resident
Eastern Phoebe	edge/generalist	moderate

(continued)

Table 9. *Continued*

c) Stable Species

Species	Habitat	Migration Distance
Great Crested Flycatcher	forest	long
Eastern Kingbird	edge/generalist	long
Horned Lark	grassland	short
Brown Creeper	forest	short
House Wren	edge/generalist	moderate
Gray Catbird	edge/generalist	moderate
Chestnut-sided Warbler	edge/generalist	long
American Redstart	forest	long
Ovenbird	forest	long
Northern Waterthrush	forest	long
Common Yellowthroat	edge/generalist	moderate
Scarlet Tanager	forest	long
Rose-breasted Grosbeak	forest	long
Indigo Bunting	edge/generalist	long
Orchard Oriole	grassland	long
Baltimore Oriole	edge/generalist	long

cies, and 6 (27%) of them were wetland species (Table 9a). In terms of migration distance, 9 (41%) were residents, and 7 (32%) were moderate distance migrants. Fourteen species decreased for both areas. Six (43%) of the 14 were grassland species, and 5 (36%) were edge/generalists (Table 9b). Six (43%) of the 14 were short distance migrants. An additional 25 species were stable for both areas. Eleven (44%) of these were edge/generalists, and 10 (40%) were forest species. Twenty (70%) of the 25 stable species were long or moderate distance migrants (Table 9c).

Of the 117 species adequately sampled in Wisconsin, 56 had Wisconsin trends that differed from their Eastern region trends (Table 10). Seventeen of them were inadequately sampled in the Eastern region, so we do not have good information on their trends in the entire region. Twenty-six of them did better in Wisconsin than in the Eastern region. Thirteen increased in Wisconsin and decreased or were stable in the Eastern region. Of these, 6 (46%) were edge/generalists and 4 (31%) were forest species (Table 10a). Species that had relatively large increasing trends for Wisconsin but were stable or decreasing in the Eastern region were the Northern Bobwhite, Turkey Vulture, Tree Swallow, and Mourning Warbler. Thirteen were stable in Wisconsin and decreasing in the Eastern region. Of these, 6 (46%) were edge/generalists and short distance migrants (Table 10b).

Thirteen species did worse in Wisconsin than in the Eastern region. Seven decreased in Wisconsin and were stable in the Eastern region (Table 10c). Species that had relatively large decreasing trends for Wisconsin but were stable in the Eastern region were the Spotted Sandpiper, Purple Martin, Warbling Vireo, and Blackburnian Warbler. The Bobolink decreased in Wisconsin and continentally, but was stable

Table 10. Species with different trends in Wisconsin and the Eastern region. Includes only species that are adequately sampled in both regions.

a) Increasing in Wisconsin, Decreasing or Stable in the Eastern Region

Species	Habitat	Migration Distance
Turkey Vulture	edge/generalist	moderate
Broad-winged Hawk	forest	long
American Kestrel	grassland	moderate
Northern Bobwhite	edge/generalist	resident
Killdeer	grassland	moderate
Red-bellied Woodpecker	forest	resident
Tree Swallow	edge/generalist	moderate
Barn Swallow	urban/farmstead	long
Cerulean Warbler	forest	long
Mourning Warbler	edge/generalist	long
Northern Cardinal	edge/generalist	resident
Chipping Sparrow	edge/generalist	moderate
Purple Finch	forest	short

b) Stable in Wisconsin, Decreasing in the Eastern Region

Species	Habitat	Migration Distance
American Coot	wetland	moderate
Yellow-billed Cuckoo	forest	long
Chimney Swift	urban/farmstead	long
Belted Kingfisher	wetland	moderate
Eastern Wood-Pewee	forest	long
Blue Jay	forest	resident
Brown Thrasher	edge/generalist	short
Song Sparrow	edge/generalist	short
White-throated Sparrow	edge/generalist	short
Red-winged Blackbird	edge/generalist	short
Common Grackle	edge/generalist	short
American Goldfinch	edge/generalist	short
House Sparrow	urban/farmstead	resident

c) Decreasing in Wisconsin, Stable in the Eastern Region

Species	Habitat	Migration Distance
Virginia Rail	wetland	moderate
Sora	wetland	moderate
Spotted Sandpiper	wetland	moderate
Purple Martin	urban/farmstead	long
Warbling Vireo	edge/generalist	long
Blackburnian Warbler	forest	long
Bobolink	grassland	long

d) Stable in Wisconsin, Increasing in the Eastern Region

Species	Habitat	Migration Distance
Common Loon	wetland	short
Barred Owl	forest	resident
Cedar Waxwing	edge/generalist	moderate
Yellow-throated Vireo	forest	long
Northern Parula	forest	long
Yellow Warbler	forest	long

in the Eastern region. Six species were stable in Wisconsin and increased in the Eastern region (Table 10d).

***Species accounts**—General comments*

The following species accounts include discussions of trends for all species seen on Wisconsin BBS routes during 1966–91. Trend statistics for the 1966–91 (long-term) and 1982–91 (short-term) periods are contained in Table 1, along with additional information on each species. To avoid repetition, we do not refer to Table 1 in the species accounts. We consider trends to be significant (significantly different from zero) when $P < 0.10$. Unless indicated otherwise, trends noted in the species accounts refer to the period 1966–91, and are statistically significant. The letter I in parentheses after a species heading indicates that the species is inadequately sampled by BBS in Wisconsin, and that we may not be able to draw conclusions about trends for such species. When we report annual average counts (average individuals per route for a year) in species accounts, they are in terms of all Wisconsin routes that were run for that year. For those species with a plot of annual average counts, the figure is listed immediately after the species name.

Common Loon The 28 routes that reported loons all lie north of a line connecting Polk, Chippewa, Taylor, Wood, Waupaca, Menominee and Door counties. Twenty to 35 individuals were recorded annually on 8–13 routes. The pattern varied little throughout the 1966–91 span. On only one route did loons disappear after 1985, and on only one route (in Taylor county) did birds show up regularly (since 1987) where they had not been found previously. Wisconsin, Minnesota, and Michigan trends (1966–91) were not significant, but there was an increase continent-wide and in the Eastern region.

Pied-billed Grebe Although this diminutive diver was recorded on 33 of 70 routes, it was recorded in four or more years on only 17. Rarely were more than 3 individuals noted on any route in any year. Thus, BBS results may not provide a good estimate of the statewide trend for this common species, even though it was adequately sampled based on the Sauer and Droege criterion. BBS trend estimates indicate that the Wisconsin population was stable, however the population may have dipped during 1973–84. A slight drop after 1985 may correlate with 1982–91 declines in Iowa and Minnesota, and nonsignificant declines in Michigan and Ontario. Continental populations declined both long-term and short-term.

Horned Grebe (I) One record: Polk County (1984). Wisconsin is outside its normal breeding range.

Double-crested Cormorant (I) First recorded in 1970, noted annually on 1–2 routes during 1978–84 and on 4–6 routes during 1985–91. The 12 routes on which it was recorded are in western (Burnett, Polk, St. Croix, Grant), central (Taylor, Marathon, Wood, Dodge, Columbia), and eastern Wisconsin (Door, Kewaunee, Winnebago). These data reflect the increasing trend that resulted in removing the cormorant from the Wisconsin endangered species list in 1979. The 1966–91 trend was upward

in Minnesota and the Eastern, Central, and Continental regions.

American Bittern (I) Most of the 48 routes that recorded this damp meadow dweller are in the northern and central counties. There were no BBS records in the southwest. Five routes in southern and southeastern counties that used to produce this species had none after 1985. In a typical year, American Bitterns were detected on 10–14 routes. There appears to have been a gradual but steady decline from 1970 until the late 1980s. Apparently, only the increase to 54 birds in 1991 prevented this species from showing a significant 1966–91 decline. We believe that the 1971–1988 drop may represent a biologically important decrease, and that American Bittern populations bear close watching. Decreases were detected in Minnesota, Michigan, and the Central and Continental regions.

Least Bittern (I) On the route that skirts the Bear Bluff marshes in Jackson County, observers detected single individuals six times. It was found on 5 other routes (Bayfield, Polk, Winnebago, Columbia, Dane), all as one-time occurrences. All are within the expected normal range for this species. The Least Bittern showed no significant trends in the Eastern or Continental regions.

Great Blue Heron (Fig. 3) There is nothing spectacular about this species' steady, significant increase of 2.8% per year. It was reported on every route, not because active heronries were abundant and widespread throughout the state, but because birds frequently wander ten miles or more in search of food. The range was statewide even in the first ten years of BBS, and the increase seems to have occurred rather uniformly across the state. The annual average count rose steadily from about 1.0 (1966–1978) to about 2.75 (1990–1991). Increases were also reported in BBS results continentwide, including the Eastern region and all neighboring states except Minnesota, where the trend was stable.

Great Egret "Insufficient data" was the judgment on this species in the 15-year BBS summary (Robbins 1982). Although the Great Egret showed a significant annual increase of 2.3% over the 26-year period (1966–91), the "insufficient data" label may still belong. Of the 18 routes on which egrets were noted, only 5 recorded birds more than twice. These 5 routes were close to known nesting colonies in St. Croix, Buffalo, Outagamie and Dodge counties and do not tell us much about the strength of these colonies. The Great Egret was stable in the Eastern region. It increased significantly in Minnesota (both 1966–91 and 1982–91), although samples were small.

Cattle Egret (I) Two BBS records: Dodge (1972) and Winnebago (1978) counties. Uncommon summer resident.

Green Heron (I) When Gromme (1963) mapped the Wisconsin range, he drew the northernmost limit from Polk through Portage and Oconto counties. The fact that there were BBS sightings on all but 4 routes (Douglas, Bayfield, Vilas, Door counties) may attest to a modest range extension subsequently, although the population trend was not significant and annual averages stabilized

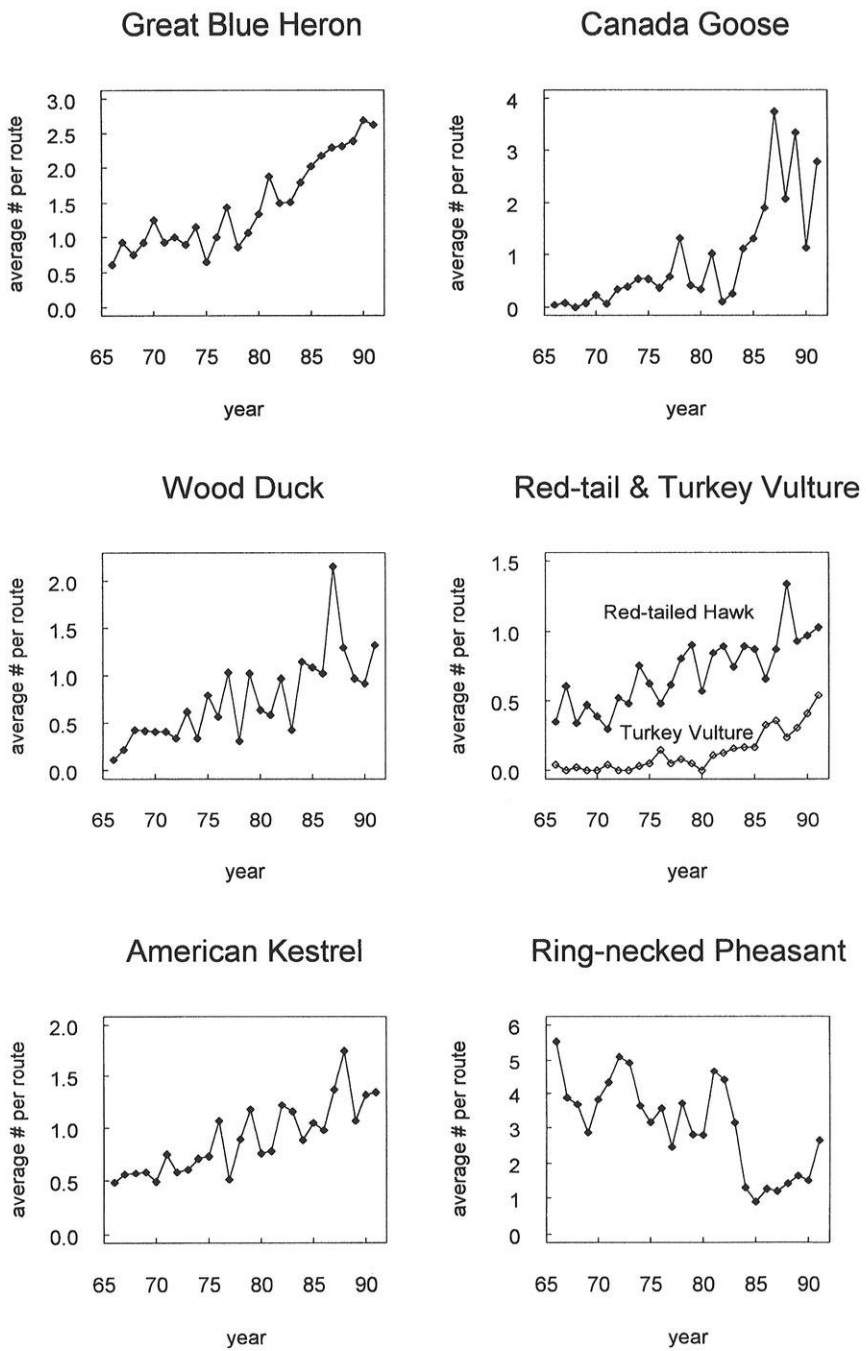

Figure 3. Annual average counts for Great Blue Heron, Canada Goose, Wood Duck, Turkey Vulture, Red-tailed Hawk, American Kestrel, and Ring-necked Pheasant.

or even decreased after 1980. Annual totals fluctuated between 40 and 60 individuals on 20–25 routes, with only slight variations outside those limits. In Wisconsin, as well as in all neighboring states and the Eastern and Continental regions, the Green Heron held its own during 1966–91. There were declines during 1982–91 in the Eastern and Central regions, however.

Black-crowned Night Heron (I) A total of 85 individuals was recorded on 15 routes. On only 4 routes were birds found on more than one occasion: in St. Croix, Winnebago and Dodge counties. Data from neighboring states were also based on very small samples. Continental and Eastern region populations appeared stable. For such a colonial breeder, the BBS is obviously the wrong instrument to monitor statewide trends.

Canada Goose (Fig. 3) Between 1966 and 1970 Canadas were found on only 3 routes, mainly near established nesting flocks in Burnett and Juneau counties. Modest gains were recorded in the 1970s, not by a buildup of numbers in established areas, but by small flocks appearing in new territory, e.g., on 14 new BBS routes. Another 23 routes had their first Canadas in the 1980s, expanding the summer range to all parts of Wisconsin except the forested portions of the northwest and northeast. Even in 1991, Canada Geese appeared on 4 new BBS routes. The increasing trend, for both 1966–91 and 1982–91, matches well the pattern demonstrated throughout the Eastern and Central United States. Much of the increase and spread represents the reintroduction and expansion of the giant race *maxima*, thought to be extinct until 1962 and more residential than migratory in its habits.

Wood Duck (Fig. 3) Although most of Wisconsin's breeding ducks are declining or barely holding their own, the Wood Duck showed a substantial increase throughout the 26-year BBS history. One wishes that BBS data had been gathered back in the mid 1930s, drought years when this species was virtually extirpated from the state. Presumably the 1966–91 increase was in part an extension of the gains that followed the reintroduction of captive birds in the 1930s. Through 1975 the Woodie had been recorded on 42 routes. Another 25 routes were added by 1991. Much of the increase was due to increasing numbers on certain routes. The population increase, however, may not be statewide. It has not shown up on BBS routes in the western coulee region, dominated by the Mississippi River and its tributaries. Perhaps this is because BBS routes bypass the best Wood Duck habitat, which tends to be away from roads. BBS results showed strong increases in the Eastern region (1966–91 and 1982–91) and in the Continental region (1966–91).

Green-winged Teal (I) Absent from the southernmost and northernmost counties. The 9 routes reporting this species range from Polk and Burnett counties in the west to Oconto and Door counties in the east. No route had birds more than three years. Despite its small sample, Green-winged Teal showed declines in Wisconsin (1966–91, 1982–91) and the Eastern region (1982–91). The main nesting range lies west of Wisconsin, e.g., in

the Central region, where populations appeared stable.

American Black Duck If BBS data were precise for waterfowl, one might infer that this species is close to being extirpated as a Wisconsin breeding species. After 1976 this duck was recorded no more than once per year. Between 1966 and 1977 numbers were small, because BBS routes avoid the best waterfowl habitat. Even so, it is noteworthy that 73 individuals were counted in 1966–1977 compared with only 10 during 1978–91; the decline was significant in Wisconsin. The situation may not be as drastic as the sparse BBS data indicate, but Bellrose (1976) traced a population decline throughout this species' winter range back to at least 1955. BBS trend figures for neighboring states and the Eastern and Continental regions suggest stable summer populations.

Mallard Based on BBS data this duck has a statewide distribution. Even in the northern forested region, the Mallard was found on all but one route (Forest County). While statewide annual averages fluctuated widely from 2 to 8 birds per route (a nonsignificant 2.6% average annual increase), the annual percentage of routes of occurrence increased from about 35–40% in the early years of BBS, to about 55–65% during 1988–91. Illinois, Michigan, Ontario and the Eastern region showed increases. The WDNR Spring Duck Survey is conducted annually in early May and is the main source of information on statewide duck population size; it shows a statewide increase in Mallard populations from 1973–92 and from 1983–92 (Gatti, unpublished data; see also Gatti 1988).

Northern Pintail (I), *Northern Shoveler* (I), *Gadwall* (I), American Wigeon (I) These four dabblers migrate through Wisconsin between wintering grounds along the Atlantic Coast and breeding grounds in the Dakotas and Canadian prairie provinces, with only a few remaining here to breed (Bellrose 1976). There were but 6 BBS records for Shoveler (1972–80), 3 for Gadwall (1975, 1984), 2 for American Wigeon (1966, 1978), and 20 for Pintail (13 routes, 1967–89). Most observations were of 1 or 2 individuals. Pintail populations were stable in the Eastern and Central regions but declined continentally. Shoveler, Gadwall, and Wigeon populations increased in the Eastern region, and Gadwall populations increased continentally.

Blue-winged Teal The usual pattern was for 40–60 individuals to be found on 10–16 routes each year. Birds were recorded on 50 routes, but 12 of these represented one-time sightings. During 1985–91, Blue-wings disappeared from 5 routes where they had been frequently found and appeared in 5 areas where they had not been detected previously. This may reflect changes in habitat. The significant annual decrease of 2.6% is also reflected in an apparent decline in the annual proportion of routes of occurrence. Blue-winged Teal also declined in Iowa. For both 1966–91 and 1982–91 a decline was indicated for the Central region, while the Eastern and Continental region populations were stable. WDNR Spring Duck Surveys show a decline in Bluewings from 1973–92 (Gatti unpublished data; see also Gatti 1988).

Redhead (I), *Ring-necked Duck* (I), *Lesser Scaup* (I), *Common Goldeneye* (I), *Ruddy Duck* (I) These diving ducks nest only sparingly in Wisconsin, mostly in areas untouched by BBS routes. Redheads were reported 3 times (1969, 1979, 1986); Lesser Scaups 8 times (5 routes, 1966–86); and Ruddy Ducks 4 times (1967, 1968, 1973). These ducks breed mainly west of Wisconsin. The Common Goldeneye, nesting primarily to the north, was reported on the Washington Island route in 1972, 1980 and 1985. Of these divers, only the Ring-necked nests extensively in the state. The 14 BBS observations were confined to 7 routes in northern Wisconsin, south to Polk, Barron, and Marathon counties. The Continental and regional Ring-necked populations were stable.

Hooded Merganser (I) This is too secretive a bird to be found annually on any one route. But of the 17 routes recording Hoodies, 14 represented sightings in 2–6 years. These were scattered across the northern and central counties, south to Pierce, Juneau, and Waupaca plus a lone record in Columbia. The largest annual total of individuals was 11.

Common Merganser (I), *Red-breasted Merganser* (I) Bellrose (1976) estimated Wisconsin's share of the breeding population for these two species combined at 800. Red-breasts were recorded regularly on one Door County route (Washington Island), and once in Marinette County. Common Mergansers were detected on 13 northern routes, 9 representing one-time sightings; the largest total of individuals for a year was 3.

Turkey Vulture (Fig. 3) This scavenger has been increasing in the Midwest, northeastern states, and eastern Canada since at least the 1940s (Mossman 1991, Robbins 1991, Mossman and Hartman 1992). Our Midwest BBS data confirm this widespread increase, which appears greatest in Wisconsin, Minnesota, Ontario, and the Wisconsin Driftless Area. In Wisconsin its increase was significant and was among the most pronounced of any bird species (6.3% for 1966–91, and 12.9% for 1982–91). The increase since 1966 in the number of routes of occurrence is also noteworthy. Through 1975 it was a rarity on any BBS route. Individuals appeared on 9 routes for the first time between 1976 and 1980, 9 more during 1981–85, and an additional 8 between 1986 and 1991. Overall, Turkey Vultures were recorded on 0–5 routes annually prior to 1984, and on 6–11 routes each subsequent year. Only in the extreme northwestern and southeastern regions did they go unreported. Turkey Vulture populations also increased in Minnesota, Michigan, and Ontario, but were stable in the Eastern and Continental regions.

Osprey This fish-eater was noted on 24 of the state's routes, but on only 8 of these was it found more than one year. The data, scanty as they are, agree with the more extensive data gathered by the WDNR that led to the 1989 downgrading of the Osprey from endangered to threatened status. During 1985–91, first BBS sightings were made on routes in Burnett, Polk, Barron, Taylor, Oneida, Vilas, Jackson, Wood and Waupaca counties. The estimated annual Wisconsin increases of 2.1% for 66–91 and 9.1% for 82–91 were sig-

nificant. Increases were also detected in Ontario, the Eastern region, and continent-wide.

Bald Eagle None were found on BBS routes until 1975. After 1980 1–2 birds (statewide) were noted annually, on a total of 12 routes south to Polk, Washburn, Price, Oneida and Oconto counties, with one-time sightings in Buffalo (1989) and Wood (1983) counties. Although few BBS routes intersect Bald Eagle territories, the annual increase of 2.1% for Wisconsin is highly significant, and fits the pattern of population gains that led to the recent transfer of this species from endangered to threatened status. Wisconsin's gains were similar to increases in Michigan, Ontario, and the Eastern and Continental regions.

Northern Harrier Harriers were observed most consistently in Curtis' (1959) Tension Zone (Polk, Chippewa, Wood, Waupaca, and Outagamie counties). Of the 15 routes that did not record this species, 9 were in southwestern counties, and 4 in the northeast. This was due more to lack of suitable habitat than to range limitations. In most years, 15–25 individuals were seen on 10–15 routes. The number of routes with harriers and the total individuals observed may have increased slightly after the early 1970s, but the Wisconsin trend was not significant. No significant change was noted in the Eastern and Western regions, but declines were reported in Minnesota and the Central region.

Sharp-shinned Hawk, Cooper's Hawk The 27 routes on which the Sharp-shinned was noted were primarily north of Monroe, Green Lake, and Winnebago counties, but no route reported one more than four years. Cooper's Hawk observations came from 33 routes, mainly in the southern two-thirds of the state. On only one route was this species found in more than five years. Wisconsin's accipiters are not well-monitored by BBS because of their secretive nature and woodland haunts, and possible misidentifications between female Sharp-shinned Hawks and male Cooper's Hawks (Rosenfield et al. 1991). Estimates for Wisconsin and regional populations of Sharpshins showed nonsignificant increases. Increasing trends for Cooper's were significant for 1982–91 in Wisconsin, the Wisconsin Driftless Area, and Central region, and for 1966–91 in Michigan. Wisconsin's Cooper's Hawks—state-listed as Threatened in 1979—made a remarkable recovery during the 1970s and 1980s, and they were delisted in 1989 (Robbins 1991, Rosenfield and Anderson 1983).

Northern Goshawk (I) Goshawks were found too rarely on BBS routes to indicate a Wisconsin trend, but the large samples in the spruce-hardwoods stratum, Eastern region, and continent indicated a stable overall population.

Red-shouldered Hawk (I) In Wisconsin, BBS data suggest a continuing decline for this state-threatened species. During the 16-year period 1966–81, Redshoulders were recorded on 20 routes. In contrast, during 1982–91, the species occurred on only 3 routes in Jackson, Waupaca, and Dodge counties. The Red-shouldered Hawk is endangered, threatened, or of special concern status in most midwestern states (Castrale 1991). In Wisconsin and many areas of the Midwest, popula-

tions are now too low and localized to permit adequate monitoring by BBS. These data suggest that the species deserves its state-threatened status, and that additional population monitoring is needed. Populations were stable in the Eastern region and increased in the Continental region.

Broad-winged Hawk This woodland buteo exhibited a significant increase in Wisconsin, with a peak apparent during 1978–85. Despite a recent, significant decline in Minnesota, it appeared to be stable or slightly increasing in the Midwest and over larger regions. It has special concern status in midwestern states at the western edge of its breeding range, and in Indiana, presumably due to its dependence on large, relatively mature, upland forest. In forested sections of northern Wisconsin this species is common, widespread, and fairly generalized in its habitat selection. Most of the 26 routes missing this species were located in the southern counties and along the Mississippi River.

Swainson's Hawk (I) One record in Buffalo County (1974). Wisconsin is outside its normal breeding range.

Red-tailed Hawk (Fig. 3) Red-tails prefer a mosaic of open and forested habitats. They were seen on all but 3 Wisconsin BBS routes. The routes on which they were not seen are in forested portions of Vilas (2 routes) and Forest counties. In recent years, Red-tails averaged 1–3 birds per year on routes in the southern half of Wisconsin, but less than 1 per year on routes in the northern half of the state. Statewide annual averages increased steadily from 0.35–0.6 during 1966–70 to 0.9–1.3 during 1987–91. The percentage of routes run on which Red-tails occurred increased from about 30% to almost 50% over the same period. Red-tails appeared to increase throughout the state, except in the northernmost counties, where they were stable. The estimated trend was a highly significant 3.8% annual increase. This reflects a more widespread increase in almost all regions, strata, and states.

Rough-legged Hawk (I) One found in Waupaca County (1980). Wisconsin is outside its normal breeding range.

American Kestrel (Fig. 3) This cavity-nester occurred on 68 routes. Although statewide in distribution, it was least abundant in routes in the northern and central forested counties. It increased in abundance fairly steadily in Wisconsin, from an average of 0.55 birds per route (1966–70) to 1.35 birds per route (1986–91)—a significant average annual increase of 2.6%. The percent of routes run on which Kestrels occurred also increased from approximately 30% to around 55%. Increases also occurred during 1966–91 in the Central region, from 1982–91 in Illinois and the Eastern region, and for both periods in Iowa. There were no significant decreases in any region or period.

Merlin (I) This species is here at the southern fringe of its range. It has increased in northern Wisconsin in recent years, but not to the point where it can be monitored by BBS. The only bird observed during 1966–91 was in Price county in 1974.

Gray Partridge This introduced species was recorded on 16 routes (an average of only 1.8 routes per year), mostly in the southwest and eastern

parts of the state. Because of its poorly detectable vocalizations, spotty distribution, and uncommon status, it is probably not monitored well by the BBS, although technically it is adequately sampled. The average annual count was low and variable, ranging from 0.0 to 0.2. The trend for Wisconsin was a nonsignificant decrease. BBS data indicated decreases in Minnesota (1966–91 and 1982–91) and an increase in Iowa. In the Eastern region, partridge declined during 1966–91, even though they experienced an increase during 1982–91.

Ring-necked Pheasant (Fig. 3) Populations of this bird, which occurred on 53 routes (an average of 24.4 routes per year) were variable but stable from 1966 to 1981. There were apparent highs in 1972, 1973, and 1981 and valleys in 1969 and 1977. From the 1981 high of 4.7 birds per route (293 individuals), counts crashed to a low of 0.9 birds per route (53 individuals) in 1985. Brewer et al. (1991) reported a severe decline in Michigan during 1981–85 as well. After 1985, the counts increased to 2.6 birds per route in 1991. The percentage of routes run on which pheasants were observed followed roughly the same pattern as the number of individuals recorded, especially after 1981. The trends for Wisconsin were a decline from 1966–91 and stable from 1982–91. Evidence for a regional recovery in the latter decade can be deduced from the fact that declines from 1966–91 are paired with increases from 1982–91 in Michigan and the Eastern region. Declines also occurred in Iowa, Ontario, and the Continental region (1966–91) and in the Central and Western regions (1982–91); an increase occurred from 1982–91 in Illinois. WDNR pheasant survey data show a long-term decline in Pheasant populations from the 1940's to the mid 1980's followed by a leveling-off (WDNR 1987).

Ruffed Grouse (Fig. 4) Grouse rarely drum in June, when most BBS routes are run. Although observers detected this species on 54 routes, the number of routes in any given year varied only from 3 to 16. A more appropriate roadside survey, focused on the April 20— May 10 drumming period, has been conducted annually since 1964 by WDNR (Kubisiak and Dhuey 1995). Data from the 2 surveys roughly correspond, and indicate cyclic population peaks in 1972, 1978, and 1988–89. The 1966–91 trend appeared stable in Wisconsin and regionally.

Greater Prairie-Chicken (I) The spread of intensive agriculture and oldfield succession have resulted in the loss of chickens from most of their native range in the state. They are restricted largely to a few areas in the state, most of which are specially managed for them. This species occurred on only 2 BBS routes (routes 36 and 40) in west-central Wisconsin. Because of its extremely localized distribution and early breeding phenology, the prairie chicken is not adequately monitored by the BBS in Wisconsin, nor anywhere else in its range. A total of 52 individuals were counted during 1966–91; 33 of these in the years 1989–91, mainly in Clark county. The only areas with large enough samples for calculation of reliable trends were the Central and Conti-

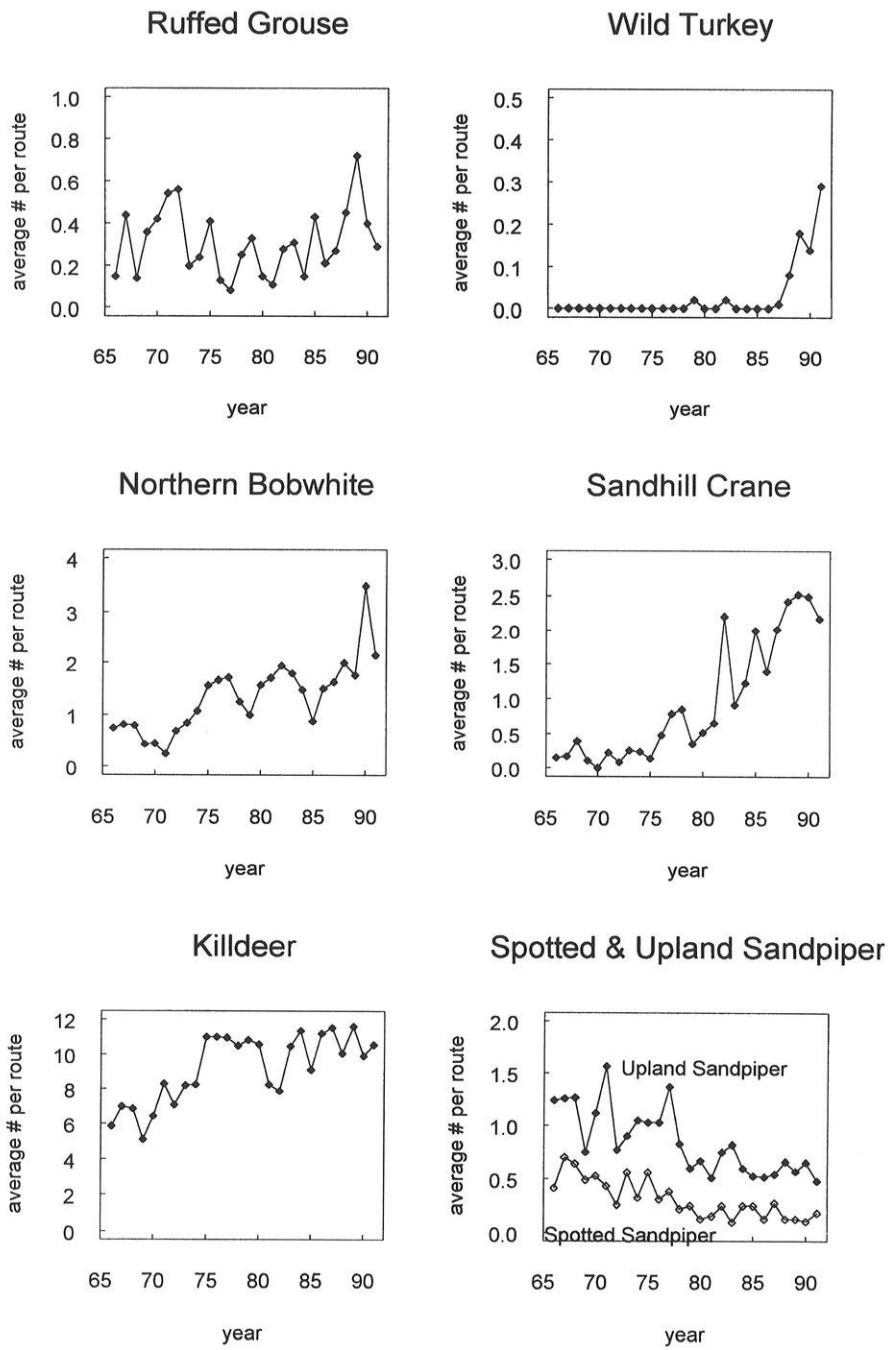

Figure 4. Annual average counts during 1966–91 for Ruffed Grouse, Wild Turkey, Northern Bobwhite, Sandhill Crane, Killdeer, Spotted Sandpiper, and Upland Sandpiper.

nental regions, which both showed stable populations during 1966–91 and 1982–91.

WDNR surveys have monitored the major booming grounds in the state (including most of the booming grounds on private, unmanaged lands) and provide our best estimate of population trends. These data show periodic highs and lows in the population since 1950. Since the most recent highs of over 1,000 individuals in 1981 and 1982, the population has leveled off at between 500 and 700 birds up until 1993 (Keir 1995). Current numbers at Buena Vista Grasslands Prairie Chicken Management Area, which holds the largest single population, are above or compatible with figures from the late 50's to the mid 70's.

Sharp-tailed Grouse (I) No survey adequately monitors the statewide population, which includes dancing grounds not only on managed public lands but also widely scattered on a variety of privately owned, unmanaged lands. A total of only 26 individuals were recorded on 4 BBS routes in the northcentral and northwest parts of the state; after 1980 it was only observed on route 17 in Taylor and Rusk counties. Populations appeared to be stable in the Central region, where most of the routes with sharp-tails are located, and continentally. As forest succession and agricultural intensification proceed, this species continues to become reduced in range and abundance, and may eventually thrive only on areas managed specially for it (Gregg 1987).

The only populations that are currently being monitored well are those on specially managed lands. The abundance of birds on these areas appears to be relatively stable (ranging from 177 to 225 birds), with the exception of a high of 339 birds in 1991 (Gregg 1993).

Wild Turkey (Fig. 4) This species—formerly extirpated in Wisconsin and neighboring states—increased and spread substantially as a result of Midwestern reintroductions, especially after 1970. Non-BBS sightings began to be reported annually in Wisconsin in 1976. Single individuals were first reported on BBS routes in 1979 and 1982 in Juneau county. Turkeys now breed well north of their known historic range, although most records are from the main part of the species range in the southwestern counties. The 1991 total of 18 individuals on 6 routes even included a bird in Marinette County. The story is similar for neighboring states. Wisconsin, Minnesota, Iowa, Illinois, and Michigan all reported average annual increases of 6–22% during 1982–91. The Eastern and Continental regions showed increases as well.

Northern Bobwhite (Fig. 4) Central Wisconsin is at the northern limit of this quail's range. It was recorded on 40 routes, an average of 13 per year. Of these routes, 14 recorded only 1–2 birds from 1966 to 1991, while 7 routes in the southcentral and southwest parts of the state recorded over 100. The trend in average annual counts appeared to be an overall increase with periodic small decreases. The periodic decreases gave the appearance of a cyclic trend, with highs in 1967–68, 1977, 1982, 1988, and 1991. Low years occurred in 1971, 1979, and 1985. Both the lows and highs were successively higher

through the period. Bobwhites are very sensitive to harsh winter weather in this part of their range (Robbins et al., 1986; Robbins 1991; Brewer et al., 1991), and the lows correspond to periods when Dumke's winter severity index was high for three years in a row (Schantz and Petersen 1993). The exception was 1982, in which both the population and the severity index were high. The WDNR statewide Bobwhite whistling count survey also showed a correspondence of high winter severity indices and low Bobwhite populations (Schantz and Petersen 1993). The WDNR data also indicate that populations are recovering from a severe decline that occurred between 1950 and 1963.

In Wisconsin the overall population trend during 1966–91 was an increase. The Wisconsin Driftless Area also had an increase. However, the Eastern, Central, and Continental regions all had declines for both 1966–91 and 1982–91.

King Rail (I) One noted in Jackson County in 1970. Northern fringe of range.

Virginia Rail Virginia Rail information is sparse. While there were detections on 16 routes, over half of these were one-time records, and no route reported Virginias in more than 3 of the 26 years. Nevertheless, the 1966–91 Wisconsin trend was a decline. The Virginia Rail decreased in Minnesota, the Central region, and continentally during 1982–91; 1966–91 trends were stable in other states and regions.

Sora Soras were recorded on 45 routes. On 11 of the 45, birds were noted only once. A clue that helps explain the annual decline of 1.5% may be seen in data from 4 southern Wisconsin routes that frequently had birds in the 1960s and 1970s, but were rail-less after 1978 (Racine), 1978 (Kenosha), 1983 (Dodge), and 1986 (Dodge). If a similar loss of local populations is occurring in the northern and central parts of the state, it is not evident–yet. The Sora exhibited a similar decline in Iowa, the Central region, and continentally, but there was no significant trend for the Eastern region.

Common Moorhen (I), American Coot The chance that a BBS route would include the cattail or bulrush marsh habitats preferred by these swimmers is slim. The odds that a Common Moorhen, with its secretive habits, will reveal its presence within a 3-minute look-and-listen period is even slimmer. The Moorhen was detected on only 5 routes in the southeast, north to Dodge and Winnebago counties. Coots are more conspicuous and they have a wider range, having been recorded on 17 routes north to Polk, Chippewa, Waupaca and Oconto counties. On 8 of the 17, none were observed after 1980, although the 1966–91 trend was not significant (annual change = 0.0). Moorhens, found on 10 occasions before 1980, were detected only 3 times thereafter, and experienced short-term and long-term declines. Samples for neighboring states were small, but generally indicated declines. In the Eastern region a decline was detected for the Coot during 1966–91, and for the Moorhen during 1982–91. Moorhens also declined continentally during 1982–91.

Sandhill Crane (Fig. 4) Between 1976 and 1991 this species showed a spectacular increase—both in popu-

lation and in range—resulting in an annual increase of 10.7% for 1966–91. Previous to 1976, the typical annual pattern consisted of observations of 6–12 individuals on 3–4 routes concentrated in small pockets in Burnett and Marinette counties and a larger, central region extending from Necedah to Omro. Birds appeared for the first time on 11 new routes between 1976 and 1982, and another 12 new routes between 1987 and 1991, at which time cranes were recorded as far south as Sauk, Dane and Green counties, and north to Barron, Price and Ashland counties. Comparable increases were documented during both periods for Minnesota and Michigan and for the Eastern, Central, and Continental regions.

Killdeer (Fig. 4) This widespread species occurred on 69 routes. The trend during 1966–91 was an increase of 1.9% per year. This increase occurred primarily during the first half of the period, when the average number of individuals per route rose steadily from 6.3 (1966–70) to 10.8 (1976–80). Robbins et al. (1986) noted that this species had increases in more states and provinces than any other species between 1966 and 1979. Increasing trends also occurred during 1966–91 in Iowa, Michigan, and Illinois. From 1966–91, only Ontario and the Western region had declines, while from 1982–91, Ontario and the Central, Western, and Continental regions all had declines.

Lesser Yellowlegs (I) Door County (1968). Early fall migrant.

Solitary Sandpiper (I) Juneau County (1966, 1969). Probably early fall migrants.

Spotted Sandpiper (Fig. 4) Most BBS sightings were of 1 or 2 individuals on a route, rarely 3 or 4. The 2.9% annual decrease relates primarily to a decline in the number of routes on which this species was reported. The average annual number of routes of occurrence dropped from 12.2 during the first 13 years of BBS, to 8.6 during the second 13-year period. The drop was general in all parts of the state where the bird was found, but was most pronounced in the southern counties. No changes were detected in neighboring states or in any of the North American regions for 1966–91; however, there was a decline in the Eastern region during 1982–91.

Upland Sandpiper (Fig. 4) Although it was recorded on 42 routes, rarely were more than two individuals found on any one route. Two Lake Michigan area routes were exceptional: 49 (Kewaunee-Door) and 63 (Ozaukee-Sheboygan counties). These often produced 20 or more individuals. Throughout the 1970s over 50% of the state's BBS Upland Sandpipers occurred on these 2 routes. During the 1980s the percentage dropped to 40—not because birds elsewhere were increasing, but because numbers on these 2 routes decreased from 40–60 birds (1970–1977) to 15–25 (1982–1991). While small numbers were maintained over most of Wisconsin, a pronounced decline occurred in the eastern counties. The statewide annual decline of 1.7% was not significant. Populations in the Central and Continental regions increased during 1966–91 and 1982–91. Stable populations were reported in neighboring states,

except for Michigan, where there was an increase.

Common Snipe (I) The total number of snipe observed in a year on Wisconsin BBS routes typically varied between 30 and 55, but with highs of 88 (1973) and 122 (1975) and a low of 10 (1988). These annual totals were heavily influenced by the results of one route in Taylor County, whose annual total fluctuated from 3 to 21. Totals on most other routes rarely exceeded 5. The two high years were also years of a wider-than-usual distribution: in contrast to the usual listing on 9–18 routes per year, birds were found on 25 (1973) and 28 (1975) routes. The 26-year trend for snipe in Wisconsin was stable, but the data suggest a declining population after the mid-70s, with a 5.7% annual decrease for 1982–91. An alarming aspect of the decline is the disappearance after 1985 on 10 routes that reported Common Snipe in the 1975–1984 period. No significant changes are reported from the Eastern and Central regions for 1966–91. However, there have been declines in most regions during 1982–91.

American Woodcock The 32 routes that listed this species are well scattered throughout the state, but on no route was the species reported more than five times. This bird is largely silent in June, especially after dawn. Although technically adequately sampled, apparently because of low variability among years or across routes, the annual totals of 0–8 individuals on 0–4 routes do not provide much basis for extrapolating to the Woodcock population of the state. Trends for Wisconsin were not significant for either period; Eastern and Continental region trends were stable.

A more sensitive indicator of trends is the Woodcock Singing-ground Survey coordinated by the USFWS, run annually in northeastern North America since 1968. This is based on permanent roadside routes, 3.6 miles long, with 10 stops at which observers listen for displaying males, shortly after sunset during early May. Based on data from 109 Wisconsin routes, the population of breeding males declined significantly during 1968–91, at the average annual rate of −1.6% (Straw 1991). Declines were also found for Ohio, Indiana, and the Eastern region, and nonsignificant declines occurred in several other eastern and midwestern states, although most populations appear to have stabilized during the past decade.

Wilson's Phalarope (I) Recorded on 8 occasions on 5 eastern routes (Waupaca, Winnebago, Fond du Lac, Ozaukee, Racine). Populations declined in the Eastern (1966–91) and Central (1982–91) regions.

Ring-billed Gull (A), Herring Gull (I) Betweeen 1966 and 1981, 99% of the Ring-bills and 98% of the Herrings on Wisconsin BBS routes were reported from Washington Island in Door County. After 1981, these percentages dropped to 47% for Ring-bills, and to 77% for Herring Gulls. Because this route was run by six different observers (1966–91), and because many of the gulls were viewed from long distance, numbers reported as "Herring" or "Ring-billed" varied markedly. Nevertheless, the pattern of declining Herring Gull numbers and stable but variable Ring-bill numbers on

this route was evident. After 1981, both gull species, and especially the Ring-bill, were seen on more routes and in increasing numbers on other routes. The Ring-bill was seen on only 6 routes during 1966–81, but on 14 during 1982–91. The Herring Gull was seen on 10 routes during 1966–81, and on 15 during 1982–91. A significant increase for Ring-bills was documented for Wisconsin (both periods) as well as Michigan (both periods), Ontario (1966–91), and the Eastern and Continental regions (1966–91). Its westward spread through the Great Lakes is obvious. The Herring Gull was inadequately sampled in Wisconsin, but appeared to be stable in neighboring states and regions, although declining in the Central region (both periods).

Caspian Tern, Common Tern, Forster's Tern (I) BBS is a poor monitoring tool for statewide populations of these uncommon colonial waterbirds. The Washington Island route produced the only BBS Caspian Terns, with 0–21 individuals noted off and on during 1967–89. It is not known if these birds nested in the area, or wandered across Lake Michigan. Common Terns were seen only on the Washington Island route (1967–85) and on one route in Winnebago County (1967–80). Annual totals peaked at 117 in 1970, then declined, with none seen after 1985. Forster's Terns were reported regularly after 1976 only in Winnebago County, augmented by one-time observations in Door (1974), Dodge (1975), St. Croix (1986), and Kewaunee (1989). Annual totals rose from 0 (1966–70), to 1–4 (1972–78), to 7–29 (1982–89). Forster's Tern increased in the Eastern region and continentally.

Black Tern (I; Fig. 5) Although these terns were observed on BBS routes in all parts of Wisconsin except the extreme southwestern corner, they showed up on scarcely half (37) of the state's routes. Suitable marshy habitat is usually avoided by roads and thus by BBS routes. Even so, Robbins (1977) pointed to a sharp decline between 1966 (4 birds per route per year) and 1975 (1 bird per route per year). While these minimal numbers were maintained after 1975, the annual number of routes of occurrence dwindled from 12–16 through 1981, to 5–7 after 1986. Birds appeared on no new routes after 1983. The 1.7% average annual drop in numbers is not significant, possibly due in part to highly variable counts on individual routes. We feel the decrease is real, even in areas of the state where apparently suitable habitat remains. Declines were detected in Minnesota and the Eastern, Central, and Continental regions during 1966–91. Populations declined in Minnesota and the Central region during 1982–91 also, but increased Continent-wide.

Rock Dove (Fig. 5) When the BBS started in 1966, the counting of "pigeons" was debated. How could one be sure that the birds sunning themselves atop a silo had not been hand-raised by a farmer? How wild are the "pigeons" one can hand-feed in a city park? The counting of Rock Doves was not condoned or encouraged on Christmas Bird Counts until 1973. It is now widely practiced on both CBC and BBS on the assumption that nearly all Rock Doves are wild. The annual average of 20.4

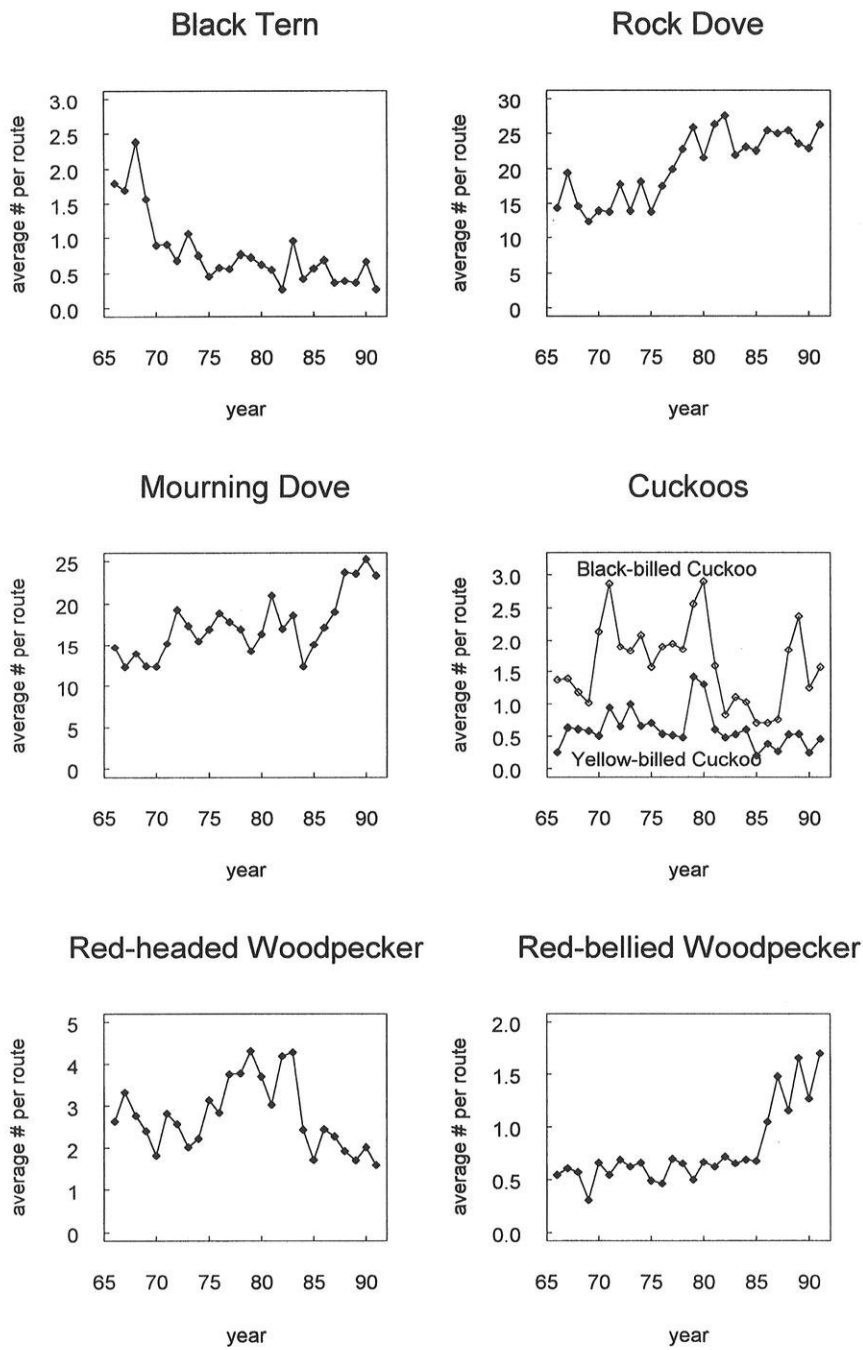

Figure 5. Annual average counts during 1966–91 for Black Tern, Rock Dove, Mourning Dove, Black-billed Cuckoo, Yellow-billed Cuckoo, Red-headed Woodpecker, and Red-bellied Woodpecker.

birds per route, on a total of 66 routes, ranks the Rock Dove among the 10 most numerous species. A slight northward range extension in the 1980s was indicated by first sightings in Burnett, Douglas, Bayfield, Rusk, Lincoln and Langlade counties. The bird was still missing on routes in Iron, Oneida, Forest, and Marinette counties as of 1991. Between 1966 and 1976 the number of doves per route per year was relatively level at 14–18. A sudden jump occurred between 1976 and 1979, followed by another leveling off at 24–29 from 1979 on. No reason for the sudden gain is apparent, but it resulted in an increase of 2.6% for 1966–91. Other trends include increases in the Eastern and Continental regions, and short-term declines in Minnesota and Illinois.

Mourning Dove (Fig. 5) Robbins (1982) indicated that the 1980 BBS population totals were 17% above those of 1966, and that doves had spread to the extent that they then occurred on nearly all the state's 70 routes. These trends continued through the 1980s. On the northernmost routes, however, observations were intermittent rather than regular. Annual totals averaged 12–15 birds per route per year (1966–1970) and increased to 14–21 (1971–1983). A pronounced dip occurred in 1984 and 1985, perhaps influenced by the harsh winter of 1983–1984, followed by a strong recovery that hiked the annual average to 23–25 during 1988–1991. The largest increases occurred in east-central and northeastern Wisconsin. The average annual increase was estimated at 6.0% from 1982 to 1991 (significant), and 1.7% from 1966 to 1991 (not significant). Those who would cite these figures to agitate for an open season for Mourning Doves in Wisconsin should recall that this species is still uncommon in northern Wisconsin because we are at the northern fringe of this species' range. No significant long-term population changes were detected for the states considered here; however, the Eastern region and some neighboring states saw increases during 1982–91.

Black-billed Cuckoo, Yellow-billed Cuckoo (Fig. 5) Black-billed Cuckoo was one of the most widely distributed birds in the Wisconsin BBS, having been recorded on all 70 routes, but most abundantly in the north. The Yellow-billed Cuckoo was also widely distributed—found on 64 routes, but regularly only in the southern half of the state. The Yellow-bill was less than half as abundant as the black-bill: it occurred on only half as many routes annually, and the average number of individuals per route was just 37% the value for the black-bill. Neither species showed a significant population trend in Wisconsin for the period 1966–91. Despite a 2.2% annual decrease in the Great Lakes Plain, the black-bill showed no clear regional trends. However, yellow-bill populations declined in Iowa, Illinois, Michigan, the Eastern and Central regions, and continent-wide.

Breeding season populations of both cuckoos are characteristically erratic from year to year throughout their respective ranges (e.g., Brewer et al. 1991). Several authors have described these fluctuations as cyclic, but without presenting data to support a true periodicity. Wisconsin

BBS data strongly suggest an 8- to 9-year cycle over the 26-year period 1966–91, with peaks for both species in 1971–73, 1979–80, and 1988–89. Interestingly, 1966–79 BBS data also showed peaks in the Eastern and Central regions and continent-wide, in 1971–72 and 1978–79 for the black-bill, and in 1973 and 1979 for the yellow-bill. In addition, Black-billed Cuckoo populations peaked in 1979 in Michigan and Iowa, and yellow-bill populations peaked in 1978 in Iowa and during 1977–80 in southwestern Michigan (Dinsmore et al. 1984, Brewer et al. 1991).

Owls, general Most owls are poorly sampled by the BBS because of their nocturnal activities and a decline in calling frequency before June. They are likely to be detected only during the first 5 stops of a given route. Only the Great Horned and Barred Owls have been noted in numbers that permit estimation of trends.

Eastern Screech Owl (I) The 8 routes reporting this species were scattered throughout the southern two-thirds of the state.

Great Horned Owl (I) Populations of this widespread species were generally considered stable in Wisconsin, regionally, and continent-wide, based on BBS, CBC, and subjective reports; however, declines occurred on the BBS during the period 1982–91 in 4 of 5 neighboring states and provinces, 2 of 4 strata that include Wisconsin, and in Central, Western, and Continental regions.

Barred Owl In Wisconsin this species is less abundant and widespread than the Great Horned Owl, preferring large tracts of relatively mature forest. However, it was detected more frequently than the latter on the BBS because it is comparatively more vocal and diurnal, and breeds later in spring. The 51 routes reporting this hooter were well distributed throughout the state. Its population appeared to be fairly stable in Wisconsin, regionally, and continent-wide, although declines occurred during 1982–91 in Illinois, Ontario, and the Central region.

Long-eared Owl (I) Three records from east-central counties during 1972–74. This species occurs over a much wider area, but is poorly detected by the BBS.

Short-eared Owl (I) Data are scanty on this crepuscular and uncommon species, which is inadequately monitored by the BBS. In some years it may be completely absent from Wisconsin during the breeding season; in years when it is present birds are often concentrated in very limited areas (probably related to high densities of its preferred prey—small mammals). It was recorded on only 3 routes in Wisconsin (Forest, Langlade, and Dane counties), all prior to 1982. Declines occurred in the Western region (1966–91 and 1982–91), where Short-eareds reach their highest densities, and in the Continental region (1982–91).

Northern Saw-whet Owl (I) This owl is notoriously secretive and difficult to monitor throughout its range. It was reported from just 4 BBS routes in Wisconsin, and from only 32 routes continent-wide. In Wisconsin, as elsewhere in the Great Lakes area, it is undoubtedly a more common breeder than verified records suggest, and its status and trends remain uncertain (Swengel and Swengel 1992, Robbins 1991).

Common Nighthawk (I) Over 90% of

the Nighthawk records on the Wisconsin BBS were made in the first 50 minutes of the running of each route, which includes the semi-darkness of the first 5 stops. Although this species was noted at least once on 36 routes, it was regular on only 3 widely separated routes in Burnett, Waupaca and Ozaukee counties. Most of Wisconsin's routes simply do not pass through Common Nighthawk habitat at the time of day that the birds are flying and calling. Annual average numbers of birds per route seemed to reach a peak in the early 1970s, a low in the late 1970s, and then another peak at the end of the period. The significant increasing trend of 5.7% for 1982–91 may be attributed to a doubling of the Burnett County annual total and the additions of 1 or 2 new areas. This species may be better monitored by the Wisconsin checklist project, which measured a highly significant decline in reporting frequency between 1983 and 1991 (Rolley 1992). No long-term trends were evident for the Central region but there was a long-term decline in the Eastern region. Declines also occurred during 1982–91 in the Central and Continental regions.

Whip-poor-will (I) In Wisconsin, only 3–19 individuals of this nocturnal species, which prefers extensive, shrubby, open-canopied forest, were counted annually. The BBS detected no significant 1966–91 trends in Wisconsin or any other Great Lakes state or stratum, or larger region, except for slight declines in Illinois and the Eastern region. However, declines occurred during 1982–91 for Wisconsin, the continent, and several regions and strata, and nonsignificant declines were detected in other regions. This decline is further substantiated by a highly significant decrease in reporting frequency in the Wisconsin checklist project during 1983–91 (Rolley 1992).

Chimney Swift The heavily urbanized portion of the swift population in Wisconsin was unmeasured by BBS because the 70 randomly placed routes happen to miss the major cities. Yet the fact that this skillful flyer was recorded on all routes underscores its use of rural and small-town habitat and natural cavities. Populations were relatively small (3.5–6.5 individuals per route per year), but stable. Long-term numbers also remained stable in Iowa, Minnesota and Michigan, while modest declines were detected in Illinois, Ontario, and in the Eastern region for both periods. The period 1982–91 also saw declines in the Central and Continental regions.

Ruby-throated Hummingbird Although this tiny forest, edge, and residential bird was found on 67 routes, on only 4 of these did detection occur in 12 or more years. The largest tally for a route in any one year was 5. Based on these small numbers, no significant population changes were detected in Wisconsin. There was a hint of possible increase in numbers of birds (0.7% per year), and in the number of routes of occurrence. But who can say that this is due to an actual population increase rather than sheer luck, improved observer awareness, or the expanded use of hummingbird feeders that happen to be located along BBS routes? Aside from a decrease in Illinois and an increase in Michigan, other neighboring states and regions

showed no significant changes during 1966–91.

Belted Kingfisher Kingfishers were found on all routes. Typically no more than 1 or 2 birds were tallied on a given route in a year. According to BBS data, the statewide population appears to have increased gradually between 1966 and 1989, but this was followed by 2 years of low numbers, resulting in a decline for the 1982–91 period and a relatively stable long-term trend. The recent decline was not restricted to any one region of the state. BBS results from neighboring states indicated stable populations, except for a long-term decrease in Ontario, short-term decrease in Minnesota, and an increase in Illinois in both periods. Declines were detected in the Eastern region in both periods and continent-wide during 1966–91. The situation bears watching.

Woodpeckers, general Population trends of Wisconsin woodpeckers showed an interesting pattern. Yellow-bellied Sapsucker, and Red-bellied, Downy, Hairy, and Pileated Woodpeckers increased; these are primarily forest-dwelling, arboreal species, and only the sapsucker is migratory. On the other hand, Red-headed Woodpecker and Northern Flicker declined; these are primarily migratory species of woodland and more open habitats and feed primarily by flycatching or on the ground.

Red-headed Woodpecker (Fig. 5) No Wisconsin species showed a more consistent decline over the past decade throughout the Midwest and larger regions than did the Red-headed Woodpecker. In Wisconsin, the Red-headed Woodpecker showed a slight increase during 1966–79 (Robbins et al. 1986), but this was followed by a clear decline averaging 10% per year during 1982–91. This resulted in an overall decline of 4% per year over the entire 26-year period. The percentage of Wisconsin routes of occurrence declined from highs of about 75% in 1972 and 1982, to a low of 44% in 1991. On several routes in southwestern counties, this species was still reported annually at the end of the period; but routes that formerly tallied 20–40 individuals per year produced only 10–15. Eight routes that formerly had this woodpecker regularly listed none after 1987, and observations on northeastern routes became scarce.

The picture was very similar for nearly all states, regions, and strata, as well as continent-wide: annual declines of 2–9% over the 26-year period, brought about mainly by 5–14% annual declines during the last decade. Populations declined most rapidly in the Great Lakes Plain, Wisconsin Driftless Area, Wisconsin, Minnesota, and Michigan.

Red-bellied Woodpecker (Fig. 5) For 20 years this bird showed a fairly constant pattern: 16–46 individuals found on 7–18 routes per year, primarily in western and central counties, north to Polk County. Occasionally a Red-belly would be found on a new route, but this was not enough to suggest a range extension. Then from 1986 through 1991 the total numbers of individuals doubled, with 12 routes reporting their first individuals. The location of these 12 routes, however, suggests consolidation of range rather than expansion. Prior to BBS, this species extended its range northward pri-

marily along river valleys, but more recently it seems to have spread primarily into new areas between the valleys. This species was still absent from BBS routes in the northernmost and easternmost parts of the state in 1991. Wisconsin trends were increases for both 1966–91 and 1982–91. Most nearby states and the Eastern and Continental regions saw increases during 1966–91. The 1982–91 period also saw an increase in Michigan, Illinois, and in the Eastern and Continental regions.

Yellow-bellied Sapsucker Of the 50 routes that recorded this species, 14 had records for only 1–2 years. The remaining 36 routes are all located north of a line connecting Trempealeau, Juneau, Waupaca, and Oconto counties. Sapsuckers experienced a nonsignificant, slightly increasing trend in Wisconsin during 1966–91, and increases in Michigan (1966–91) and the Eastern region (1982–91).

Downy Woodpecker, Hairy Woodpecker (Fig 6.) Both species were noted on all routes, but in small numbers. Downies averaged 1.6 (0.6–2.5) individuals per route per year, while Hairies averaged 0.9 (0.4–1.6). These woodpeckers are normally rather quiet through June when BBS routes are covered. Birds heard drilling are sometimes called "dairy" woodpeckers, because they cannot be identified with certainty as either Hairy or Downy. The trend for Hairies was an increase, while the Downy experienced an apparent, but nonsignificant, increase. The annual number of routes reporting these species also increased between 1966 and 1991. During 1966–91 there was an increase for both species in Minnesota, for the Downy in Illinois and Michigan, and for the Hairy Woodpecker in Ontario and the Eastern and Continental regions.

Black-backed Woodpecker (I) Only sightings of single birds occurred in Burnett, Ashland, Lincoln and Oneida counties. Populations in neighboring states were equally sparse. Northern Wisconsin is on the southern fringe of the normal summer range.

Northern Flicker (Fig. 6) Between 1966 and 1969, annual totals for this conspicuous species exceeded the combined totals of all other woodpeckers. But the number of Flickers found in 1969 dropped substantially from those of 1968, and a steady decline ensued. Annual averages of 6.5 individuals per route in 1969 declined to 4.0 by 1991. This species was found on all 70 routes, and was still reported on over 90% of the routes run each year at the end of the period. The decline was evident in all parts of the state. Comparable long-term decreases were significant in all neighboring states and the Eastern and Continental regions. Some of these areas also experienced short-term declines.

Pileated Woodpecker (Fig. 6) From 1966 through 1977, populations appeared stable. A typical year would result in 15–25 individuals tallied on 9–15 routes. A modest but steady increase ensued from 1978 on. In 1991 the score was 87 individuals on 31 routes. Of 13 routes that had their first Pileateds in the 1978–1991 interval, 7 were in northern areas where birds were probably present previously. The other 6 were in central Wisconsin (Green Lake-Oconto counties) that may point to a limited range extension. The Wisconsin in-

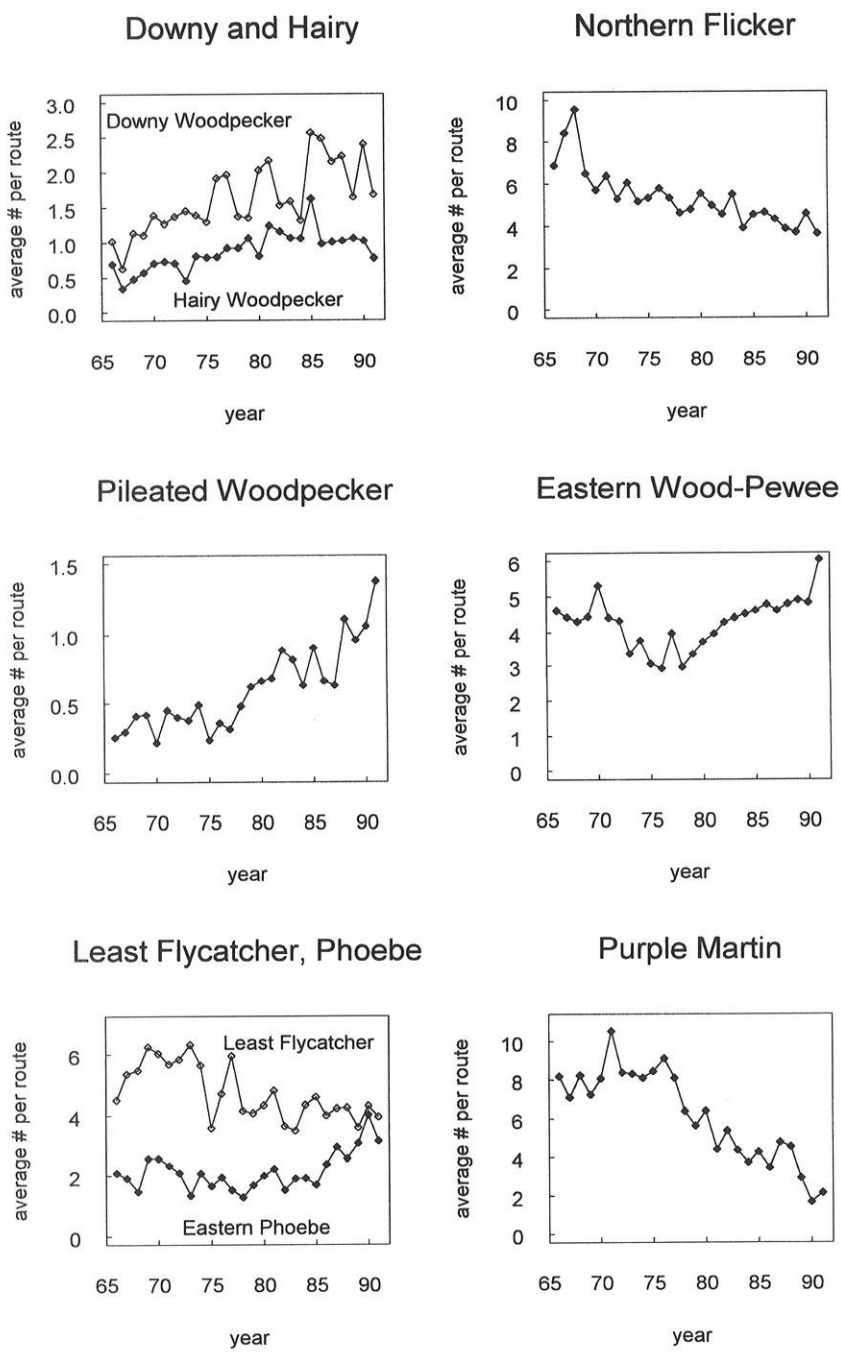

Figure 6. Annual average counts during 1966–91 for Downy Woodpecker, Hairy Woodpecker, Northern Flicker, Pileated Woodpecker, Eastern Wood-Pewee, Least Flycatcher, Eastern Phoebe, and Purple Martin.

crease was significant for both 1966–91 and 1982–91. Increases were also reported from Minnesota and Michigan (both periods), Illinois, and the Eastern and Continental regions.

Olive-sided Flycatcher Although this stately bog-dweller was recorded on 27 routes, 10 sightings represented reports of probable late spring transients. Any Olive-sided seen between 1 and 10 June can be a migrant, and late stragglers can persist beyond 15 June. On the 17 routes where presumably resident birds were reported, 8 listed this species only once or twice. Because this species typically nests in northern bogs, it is not surprising that only 6 routes recorded birds in 5 or more years. Routes representing summer residency are all north of Burnett, Sawyer, Taylor, Langlade, and Door counties. Wisconsin and neighboring states exhibited no significant trends, although declines were detected in Ontario (1966–91) and continent-wide for both time periods. The continental decrease apparently resulted mostly from declines in the Western region; however, nonsignificant declines also occurred in the Eastern region.

Eastern Wood-Pewee (Fig. 6) This is among the most widespread of Wisconsin's forest breeders, recorded on all 70 BBS routes, at an average of 51 routes per year. It showed no overall population trend, although it apparently declined during the first decade of BBS, and then increased. Because pewees tend to prefer oaks over maples (Bond 1957, Mossman and Lange 1982, Robbins 1991), they may decrease in the many areas where forestry practices and succession are favoring the latter.

This species is likewise widespread and common in most eastern and midwestern states, leading most observers to agree subjectively that it is in no trouble. However, Eastern Wood-Pewee populations in fact underwent declines according to the BBS, during either 1966–91 or 1982–91, continent-wide, in all 3 regions, the Spruce Hardwood Forest stratum, and in Minnesota and Illinois. In terms of abundance and population trend, Wisconsin and Michigan appear to have among the healthiest pewee populations in the Midwest.

Yellow-bellied Flycatcher (I) This species typically breeds in the interior of lowland conifer forests that have a sphagnum ground layer, and so is poorly sampled by the BBS. The senior author does not recall ever seeing this secretive empidonax on a Wisconsin route, yet has detected its unobtrusive song on 12 occasions. It was reported on 18 routes, all in northern Wisconsin—0–11 individuals on a total of 0–5 routes per year. This inadequate sample is compromised further by the likelihood that BBS includes late spring migrants as well as summer residents. However, regional populations appear to be stable or increasing. Significant average annual increases of 2.7–7.5% were detected for Ontario, the northern spruce-hardwoods stratum, the Eastern region, and continent-wide.

Acadian Flycatcher (I) This bird is inadequately sampled in Wisconsin because of its relative rarity and its association with the interior of large tracts of southern hardwood forest. It was found on only 4 routes (Door, Waupaca, Crawford, Lafayette counties), and in most years none were

recorded. Thus, we put little stock in the statistically significant downward trend indicated for 1982–91. The Acadian showed no significant or marked trend in the Eastern region or continent-wide, and it apparently expanded its range or increased its population density elsewhere near the northern edge of its breeding range in Minnesota (Janssen 1987), and Ohio (Peterjohn 1989). However, Acadian populations declined in Illinois during 1966–91. Recent Wisconsin population trends remain uncertain, and the species' Threatened status, special habitat needs, and limited distribution warrant additional monitoring.

Willow Flycatcher, Alder Flycatcher BBS data covered only the 1973–1991 period. Prior to 1973, the two species were lumped as "Traill's Flycatcher." Appraisal of BBS data is further complicated by the late-spring migration schedule of both species, occasionally extending to 10 June. The northern-oriented Alder was found regularly on most routes south to Polk, Jackson, Green Lake and Fond du Lac counties, plus one isolated spot in Walworth county. The southern-oriented Willow was present on most routes north to Buffalo, Eau Claire, Waupaca and Kewaunee counties. The 10 routes where both species were often reported are all within or close to the Tension Zone. The number of routes on which either Willows or Alders were found increased only slightly since 1973. However, the average number of individuals per route per year doubled from about 1 to 2, for both species. This represented annual increases of 3.5% for the Willow, and 4.0% for the Alder, during 1982–91. Over the same period, Alders experienced declines in Minnesota and the Central region, and an increase in Michigan. The Willow increased in the Central region and declined in Michigan.

Least Flycatcher (Fig. 6) This flycatcher breeds commonly in northern forests, forest edge, and sometimes park-like habitats, and also occurs locally in southern Wisconsin. It was recorded on every BBS route, with a total of 207–356 individuals found on an average of 38 routes per year. During 1966–91, the BBS detected a 2.5% average annual decline in Wisconsin, and declines were also detected in the Eastern region, Great Lakes Transition and Spruce-Hardwood Forest strata, and Minnesota. Populations in other adjacent states and the Central region experienced nonsignificant declines; however a concurrent increase in the Western region mitigated the more easterly declines so that the continent-wide decline was not significant.

Eastern Phoebe (Fig. 6) BBS data showed Phoebe population peaks during about 1969–71, 1980–81, and 1990–91, with lows in 1968, 1977–78, and 1982–85. These highs and lows were apparent both in terms of individuals recorded per route, and routes of occurrence. Robbins et al. (1986) pointed to the severe winters of 1976–77 and 1977–78 in the southern U.S. as the cause of the severe regional decline of this species during those years. In Wisconsin, recovery after the most recent low point resulted in a short-term increase of 5.1% per year, which is consistent with similar recoveries in most adjacent states and the Eastern

and Continental regions. The long-term trend was a slight, nonsignificant increase in Wisconsin, with an increase in Minnesota and a decrease in Iowa.

Great Crested Flycatcher This species prefers open-canopied hardwood and mixed hardwood-coniferous forests and edges, and areas with scattered trees. Its generalized habitat-distribution results in a good BBS sample: it occurred on all Wisconsin routes, with an average of 55 routes per year, and was the most commonly recorded flycatcher (6 individuals per route per year). It appeared to be maintaining fairly stable breeding populations in Wisconsin, the Midwest, and continentwide, although there were declines in Illinois from 1966–91 and in the Spruce-Hardwood Forest stratum and the Eastern region during 1982–91.

Western Kingbird (I) Two records: Buffalo (1967) and Monroe (1987) counties. Wisconsin is outside its normal breeding range.

Eastern Kingbird Although annual averages varied between 3.0 and 5.3 birds per route, the average annual change was calculated as 0.0%. All 70 routes recorded this bird, with a fairly even statewide distribution. Populations declined in Iowa and Illinois (1966–91), and in Ontario, Michigan, and the Eastern region (1982–91).

Horned Lark Although BBS routes are run relatively late in the Horned Lark's breeding season (first nest attempts may be completed before many surveys are conducted), the BBS is apparently a suitable monitoring technique because the species is so common. Larks were recorded on 58 routes, being absent mainly from routes in northern counties. The average number of individuals per route varied from 2.7 (1968) to 6.5 (1989), with an unusually high 11.5 in 1976; 80% of the 1976 count was recorded on 2 routes in intensively agricultural Dodge and Fond du Lac counties. Larks nest on bare ground, including plowed or disked fields. Trends in Wisconsin for both 1966–91 and 1982–91 were nonsignificant increases. Regional and continental populations were stable. Declines were measured in Iowa (1966–91) and Ontario (1982–91).

Purple Martin (Fig. 6) Although populations of this species were stable continentally, they declined in the upper Midwest. BBS figures from most neighboring states show declines for 1966–91 and/or 1982–91. Wisconsin too? Yes, for both periods. A decline was not noticeable between 1966 and 1977, during which time Purple Martins averaged 7–11 per route per year, with individuals found on 65–70% of the state's routes. But a steady decline set in thereafter, bringing annual averages down from 9.1 in 1976 to 2.1 in 1991. The estimated annual changes were −3.4% for 66–91 and −9.1% for 82–91. Between 1975 and 1985 martins disappeared from 12 routes where they had previously been found. It was in the southern and eastern regions of the state that the decline was most pronounced. Prolonged cold spells wiped out production at several nesting colonies in the 1980s, undoubtedly contributing to the recent decline.

Tree Swallow (Fig. 7) While this swallow was found on all BBS routes, its distribution throughout the state

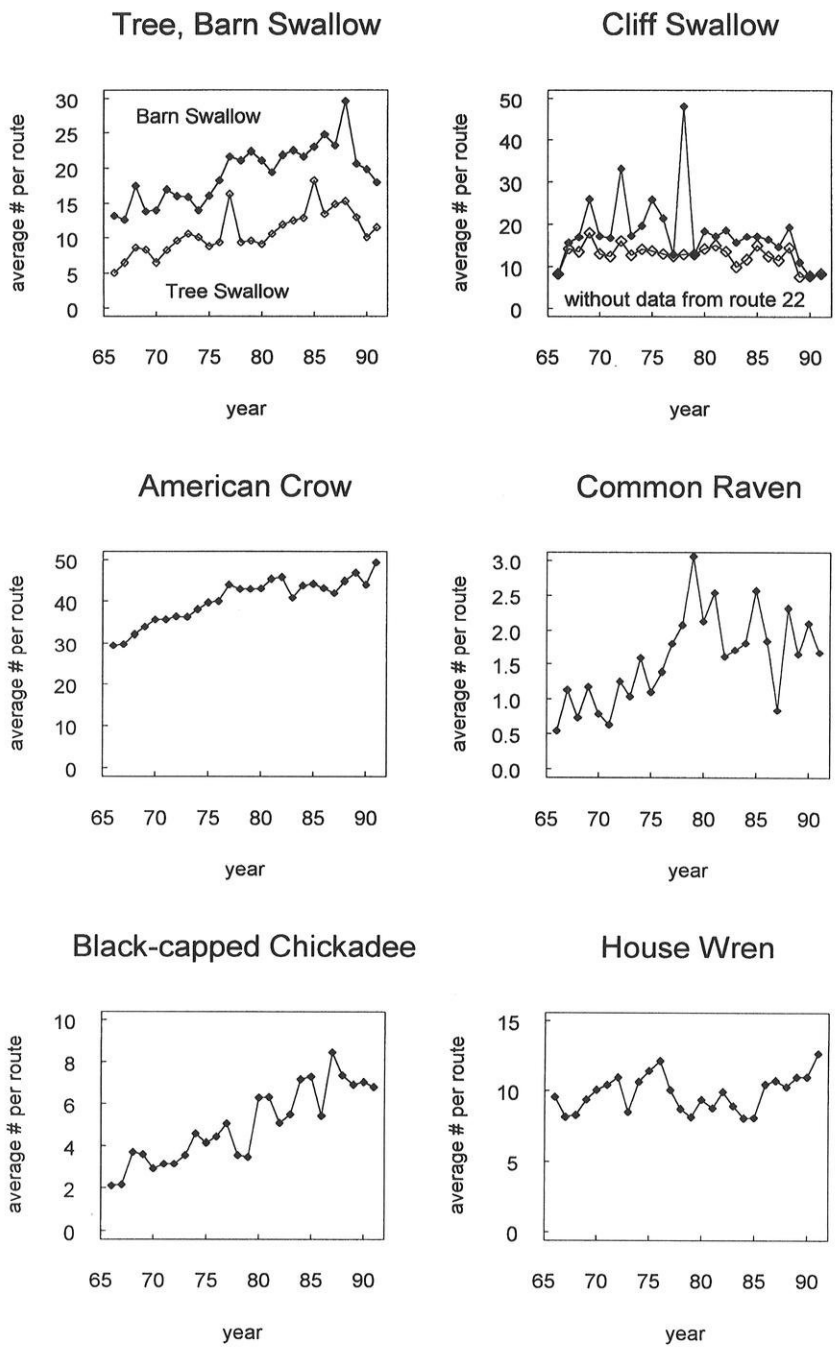

Figure 7. Annual average counts during 1966–91 for Tree Swallow, Barn Swallow, Cliff Swallow, American Crow, Common Raven, Black-capped Chickadee, and House Wren.

was uneven. In the southern and southwestern counties, numbers rarely exceeded 3 per route per year. On many of the northern routes, counts exceeded 30 birds. Yet the significant average annual gain of 4.0% reported for the state as a whole appeared to come from 14 routes in central and east central Wisconsin—from Oconto County, west to Jackson and Wood counties, and south to Dane and Jefferson counties. Numbers in other parts of the state held their own. The statewide increase was gradual but steady through the mid 80's, then numbers declined slightly. Populations were stable or increasing in most neighboring states and increased continent-wide, but a decline was evident in Michigan and the Eastern region during 1982–91.

Northern Rough-winged Swallow (I) This species has been generally regarded as the least numerous swallow in Wisconsin. Not once did the state's annual BBS total exceed 200. While distribution was statewide, numbers north of the Tension Zone were very small. Three routes in Bayfield, Iron, and Taylor counties never recorded Rough-wings. Six of the seven routes that listed over 20 individuals in a given year cross streams in western Wisconsin where this species is most numerous. There was a modest but nonsignificant 1.7% annual increase statewide, from 1.3 birds per route per year during the first five years to 2.5 during the last five years. Long-term increases were reported for Iowa, Illinois, Michigan (both periods), and the Eastern region. In Minnesota, close to the northern fringe of this species' range, a short-term decline was detected.

Bank Swallow (I) While this colonial breeder was noted on 66 routes, on over half of these it was found on just 1–2 stops per year. Annual fluctuations on individual routes were striking, even on the 9 routes that recorded Bank Swallows annually. On route 46, for instance, the same observer had annual totals of 34, 175, 106, 36, and 72 during the 1986–90 period. Many local counts were probably affected by changes in the suitability of particular breeding colony sites, e.g., with the development and subsequent abandonment of gravel pits, or the erosion of cutbanks along rivers and roadways. Yet the overall trend for Wisconsin was stable. There is a suggestion of a decline in that the annual percentage of routes of occurrence decreased from 47–58% each year during 1966–72, to 32–46% each year thereafter. No significant changes were reported in neighboring states except in Iowa, where a sizable drop was detected during 1982–91. The Eastern and Continental regions had similar short-term declines.

Northern Cliff Swallow (I; Fig. 7) How much would trend analysis figures be affected if one route featured one of those famous farm structures that attracts a thousand nesting pairs of these colonial birds? A Lincoln County route (22) includes such a structure: a huge poultry brooder house on which the senior author once counted over 800 nests. The number of birds reported at this stop was the number the observer estimated seeing in flight during the 3-minute observation period. Numbers on that entire route varied from 30 (1977) to 2309 (1978); variability such

as this helps to explain why this species is inadequately sampled in Wisconsin. Year in and year out, totals for this Lincoln County route represented 20–60% of the statewide totals. Deleting route 22 from the statewide totals removes some extreme fluctuations, but supports the same conclusion that there was a pronounced decline in the 1982–91 interval. The huge colony on route 22 dispersed during this period, but the decline was much more widespread, reflecting reduced numbers (but not disappearance) across 22 routes in the northern and central counties. On the other hand, the annual percentage of routes on which the Cliff Swallow was found increased slightly from an average of 60% during the first decade of the BBS to an average of 68% during 1982–91. Thus, BBS data suggest that the statewide population declined and dispersed during 1966–91. BBS results showed long-term gains in Iowa, Illinois, Michigan, and Ontario. Short-term declines were detected in the Eastern region and Ontario.

Barn Swallow (Fig. 7) Few species were as evenly distributed throughout Wisconsin as was this swallow. Even in the northern forests there were enough openings that BBS observers counted 10 or more individuals per year on most routes. The exception was an Iron County route—the only one to have missed this swallow entirely. The 1966–91 Wisconsin trend was a small but significant increase of 1.5% per year, but the annual averages suggest that the increase occurred mostly during 1975–77 and 1984–86, and that a decline occurred after a peak in 1988. Although stable populations were maintained between 1966 and 1991 (except for an increase in Illinois), short-term declines were evident in all neighboring states and the Eastern and Continental regions.

Gray Jay (I) Found repeatedly on routes in Ashland, Vilas, Oneida and Forest counties, with a single report in Douglas (1978). This is one of several species poorly sampled by BBS because of their restriction to relatively large conifer swamps and bogs during the breeding season. With a total of only 0–6 Gray Jays recorded on 0–3 routes per year, BBS provided little statewide trend information. Samples were also small in Minnesota and Michigan, however, in all three states as well as Eastern and Western regions and continent-wide the 1966–91 trend was downward, though this was significant only in Minnesota.

Blue Jay Blue Jays were found on 98–100% of the state's routes almost every year, with annual totals sometimes exceeding 1000. Yet there was considerable fluctuation, with annual averages varying from 10 to 17 birds per route and a temporary dip during 1979–80. The combination of an unusual peak in 1983 and a slight decline in 1991 probably accounted for the significant 1982–91 decrease. On the whole the Blue Jay population appeared stable in Wisconsin, as it did in most neighboring states. But in the Eastern and Continental regions numbers dropped significantly—both long-term and short-term.

American Crow (Fig. 7) This species and the American Robin share the distinction of having been found on every BBS route every year they were run. Annual averages started out at 30 individuals per route, then climbed steadily to 50 by 1991. The 1.3% annual increase (66–91) was significant, and matches similar increases in Min-

nesota, Michigan and the Eastern, Central, and Continental regions. During 1982–91, Michigan and the Eastern region also had an increase, while Iowa had a decline.

Common Raven (Fig. 7) Between 1966 and 1970 Ravens were detected on 24 of 70 routes, and averaged between 0.5 and 1.2 individuals per route per year statewide. By 1980 these northern scavengers had been found on an additional 10 routes, south to St. Croix, Eau Claire, Jackson, Waupaca and Door counties. This may represent either a range extension or an increase in peripheral southern populations. The average number of birds per route per year rose to 2.0–3.0 during the same interval. Although these averages leveled off after 1981, the 1966–91 annual increase of 3.3% was highly significant. The Eastern and Continental regions and Ontario also registered comparable increases, long-term and short-term; increases also occurred in Minnesota (long-term) and Michigan (short-term).

Black-capped Chickadee (Fig. 7) Robbins (1991) showed the summer range to be statewide, with numbers north of the Tension Zone roughly four times those to the south. Chickadees were observed on all BBS routes; annually on 80–90% of them. From 1966 through 1973 the annual average was 2–4 birds per route. Between 1973 and 1987, the average climbed steadily and leveled off at about 7—an overall annual increase of 2.4%. Substantial increases were also detected during 1966–91 in Minnesota, Michigan, and Ontario and for both periods in Illinois and in the Eastern and Continental regions.

Boreal Chickadee (I) In 18 of the 26 years of BBS, this northern rarity went unrecorded. One to 4 individuals were occasionally found on 4 routes in northeastern Wisconsin in Lincoln, Oneida, Forest and Florence counties. Declines were detected in the Eastern and Continental regions.

Tufted Titmouse (I) Increases occurred in Iowa and continent-wide (1982–91), and in Michigan and the Eastern region (both periods). Although this species' range expanded northward in historic times (e.g., Robbins 1991, Brewer et al. 1991)), BBS data suggest that this did not continue, at least in Wisconsin, after 1966. Titmice were detected on only 20 of the state's routes, and half of these represent isolated, single observations. On only 2 routes, in Grant and Lafayette counties, was this species found regularly. Occasional BBS sightings as far north as Burnett, Eau Claire, Marathon, and Langlade counties suggested possible temporary northward range extensions, but none of these took hold. The largest total for any year was 14 individuals.

Red-breasted Nuthatch From 1966 through 1979, the average number of individuals per route held relatively steady at 0.1–0.7 per year, with birds noted on 27 routes. A striking increase occurred after 1979 on, but with wide variations between .2 and 2 birds per route. The 1966–91 annual increase of 3.6% was significant. This included an increase or expansion of the more isolated marginal populations in southern Wisconsin, for after 1980 birds occurred on 9 new routes, south to Monroe, Sauk and Waushara counties. Increases occurred in the Eastern, Central, Western, and Continental regions.

White-breasted Nuthatch (I) This bark-gleaner was reported on all 70 routes,

but each year it went unrecorded on 20–56% of the routes. According to BBS data, it was four times more abundant in the southwestern counties than in the northeast (Robbins 1991). No trend was identified in Wisconsin, although the annual percent routes of occurrence rose from roughly 50 to 75 over the period. Illinois, Minnesota, Michigan, and the Eastern, Central, and Continental regions showed long-term increases.

Brown Creeper This is a difficult species to detect on a BBS roadside route. Both song and call note are extremely high-pitched with little carrying power, and protective coloration makes the bird difficult to see except when it flies from one tree to another. Furthermore, interior forest habitat attracts this species more readily than does forest edge. Small wonder that Brown Creepers were found on only 20 routes, 9 of which were single-year sightings. Most observations were in the 6 northeastern counties of Vilas, Oneida, Forest, Florence, Marinette, and Oconto. Scattered sightings were made in the northwestern region and south to Trempealeau, Jackson and Waupaca counties. On 5 routes 3–6 individuals were noted in a single year on rare occasions, but on all other routes annual totals were of only 1–2 birds. Although the data suggested a 1% average annual increase, it was not significant. Populations appeared to be stable in neighboring states and larger regions.

Carolina Wren (I), *Bewick's Wren* (I) Wisconsin lies north of the main breeding range of these two wrens. BBS records for the Carolina were limited to one-time sightings in Racine (1966), La Crosse (1979), and Pierce (1974) counties. The same Pierce County route produced the state's lone BBS record for Bewick's in 1966. Robbins et al. (1986) pointed to drastic population drops for both species following severe winter weather in the southern United States, 1976–78. The Carolina subsequently recovered in a limited way in the Eastern region and exhibited increases in BBS data from neighboring states and the Eastern and Continental regions, especially during 1982–91. The Bewick's did not recover, and not only has it apparently been extirpated from Wisconsin since 1979 (Robbins 1991), but it is seriously endangered in several other eastern states.

House Wren (Fig. 7) Not only was this aggressive little songster noted on all routes, but it was found on 92–97% of the routes nearly every year. Robbins et al. (1986) included western Wisconsin in that portion of North America where this species is most numerous. The average number of House Wrens per route per year increased from about 9 to 12 through 1976, then dropped to 8–10 through 1985. The dip during 1977–85 may have resulted in part from a "winterkill" in the southeastern U.S. in 1976–77 (Robbins et al. 1986). A substantial increase followed, rising to 12.5 in 1991. The long-term population growth in Wisconsin of 0.3% per year was not significant, but the short-term annual rise of 2.3% was. Apparently, the Wisconsin population fluctuations were not associated with appearances or disappearances in particular areas of the state, although there appeared to be decreases in northwestern Wisconsin. The increase during 1982–91 was widespread, and was significant in Illinois, Michigan and the Eastern, Central, Western, and Continental regions. Long-term in-

creases were noted in Iowa and the Central and Continental regions.

Winter Wren (Fig. 8) If ever a species' detectability were subject to observer differences, this magnificent singer would be a strong candidate. Most—if not all BBS records—are based on song. Some of the trills in this song are so high-pitched that they escape the detection of even the most sensitive ears; average ears will miss much of this song. The effects of observer differences may be indicated by 3 routes on which the number of winter wrens "changed" from 0 to 3–10 per year with a change in observers. Nevertheless, the significant 4.0% (1966–91) and 5.6% (1982–91) annual gains reported by BBS for Wisconsin were adjusted for observer differences. The Winter Wren was recorded on 31 routes, and was found regularly on 20—all in the northern and eastern counties, south to Washburn, Taylor, Lincoln, Menominee and Door. Changes in neighboring states were slight or undetectable in the 1966–91 period, but there were gains between 1982 and 1991 in Michigan, Ontario, and the Eastern and Continental regions.

Sedge Wren (I; Fig. 8) The densest populations of this species on North American BBS routes occur in Minnesota, Wisconsin, and Manitoba. Sedge wrens occurred on 65 routes in the state—an average of 32 per year. It was absent only from routes in northern counties. The year-to-year average density of individuals on all routes was quite variable, as were the numbers of individuals recorded on individual routes. Even with this high annual variability, the 5-year averages for number of individuals per route remained relatively constant, ranging from 3.02 (1971–75 and 1976–80) to 3.66 (1981–85). A large decline during 1976–79 may have been related to severe winter weather. Routes 17, 18, 36, 44, and 46—stretching from Rusk to Winnebago counties—were noteworthy because they often contributed up to 1/3 to 1/2 of the total individuals in a particular year. The population trend in Wisconsin was stable for both 1966–91 and 1982–91. In Minnesota there was a long-term increase, but a short-term decrease. The only state with a long-term decline was Michigan. Increases were recorded in the Eastern and Continental regions (1966–91) and Iowa (1982–91).

Although the sedge wren occurred on many routes each year, it was inadequately monitored by the BBS. Reasons for this are possibly related to the variability mentioned above, which in turn is related to its localized distribution, preference for vulnerable wet meadow habitats, and flexible breeding schedule (Brewer et al. 1991). In some cases it may establish territories in early May, while in others it will move around and delay nesting until late June or July (Gibbs and Melvin 1992), which may make it less likely to be detected on BBS routes.

Marsh Wren (I) Although this species breeds statewide, 19 northern Wisconsin BBS routes did not record it. As with the rails and many other marsh birds, the BBS is not effective in measuring population trends. Although Marsh Wrens were detected on 35 routes, they were regular on only 4, irregular on 13, and recorded only once or twice on the other 17. The possibility of a decrease was suggested by a drop in the annual percent routes of occurrence from 10–19% (1966–1971) to 4–10% (1986–1991) and by a non-

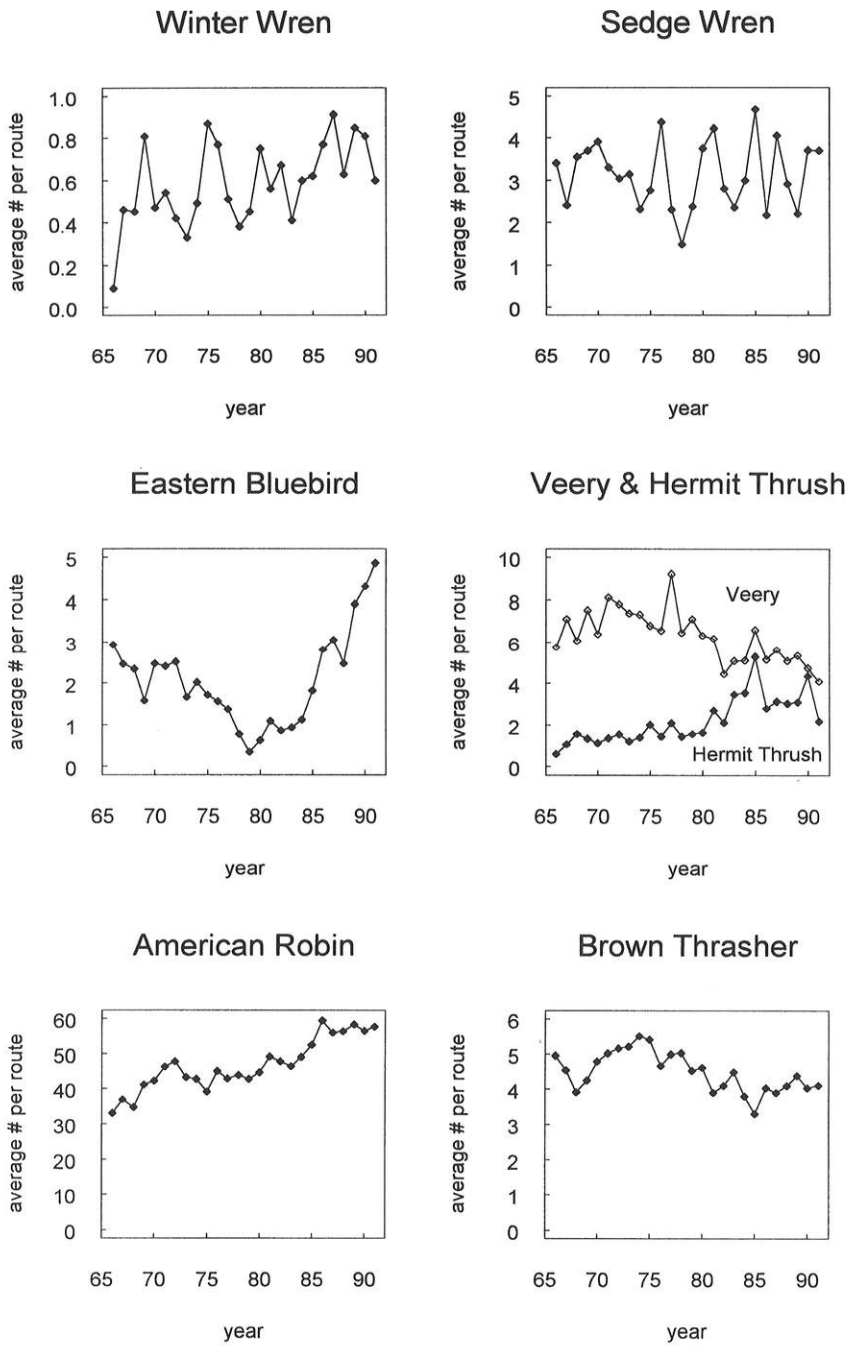

Figure 8. Annual average counts during 1966–91 for Winter Wren, Sedge Wren, Eastern Bluebird, Veery, Hermit Thrush, American Robin, and Brown Thrasher.

significant decline of 3.5% per year during 1982–91. More data are needed to determine whether this species is declining in Wisconsin. An average annual 15.6% decline was reported for 1982–91 in Minnesota, based on data from 29 routes.

Golden-crowned Kinglet (I), *Ruby-crowned Kinglet* (I) Both kinglets were reported only sparingly on BBS routes, almost exclusively in the two northernmost tiers of counties. Golden-crowns were found on 15 routes (no more than 6 annually). Ruby-crowns were noted on 20 routes, with a maximum of 7 in 1976 and 1987. There was no evidence for trends or range changes. For the Golden-crown there was an increase in Minnesota (1982–91), and in both periods for Michigan and the Eastern region. During 1966–91, the Ruby-crown increased in Michigan and the Central region, and decreased in Minnesota, Ontario, and the Eastern and Continental regions.

Blue-gray Gnatcatcher Between 1966 and 1976 this species was recorded on only 4 routes in Pierce, Eau Claire, Oconto and Columbia counties, with annual totals for all routes never exceeding 4. During that period birds were widely scattered, mostly in the larger tracts of forest in southern and central counties (e.g., Mossman and Lange 1982), and so BBS routes failed to pick them up frequently. Between 1977 and 1991 gnatcatchers became more widespread, appearing on at least one new route nearly every year. By 1991 birds had been found on 26 routes, and fairly regularly on 12 of these. The gains occurred in a diagonal swath from southwestern to northeastern Wisconsin. Sightings occurred north to Burnett and Marinette counties. The large annual gains of 10.2% (1966–1991) and 13.5% (1982–1991) for Wisconsin were significant. Neighboring states with sufficient sample sizes had stable populations, but increases occurred in the Eastern region during both periods.

Eastern Bluebird (I; Fig. 8) Is that a misprint—a whopping average annual increase of 17.5% from 1982 to 1991? No, that is for real. The recovery of the Bluebird was one of the great success stories of the 1980s. A serious decline was already in progress when BBS began, apparently due to severe weather in southern U.S. wintering grounds in 1958, along with competition from Starlings and House Sparrows for nest sites (Robbins et al. 1986). When Wisconsin's part of the BBS began in 1966, Bluebirds were found on 76% of the routes run, with an average of 2.9 birds per route. The decline that followed was gradual through 1976, then numbers dropped dramatically following severe winters in 1976 and 1977. In 1979 birds were found on only 20% of the routes run, with a paltry total of 21 individuals (0.35 per route). But a movement to erect Bluebird houses had begun, spearheaded nationally by members of the North American Bluebird Society, and statewide by members of the Northeast Audubon Society and the Bluebird Restoration Association of Wisconsin. BBS numbers grew slightly through 1984, then zoomed upward. The 307 individuals found on 81% of the routes run (4.9 per route statewide) in 1991 roughly doubled the highest counts during the 1960s. The only route that failed to record this species is in a heavily forested section of Ashland County. Increases were evident during 1982–91 in all neighboring states, and in the Eastern, Central,

and Continental regions during both periods.

Veery (Fig. 8) If one were to take out of context the single statistic that annual counts dwindled from 583 individuals (9.3 per route) in 1977 to 259 (4.1 per route) in 1991, one might surmise that Wisconsin lost over half its Veeries in the past 15 years. That is stretching things a bit, as the 1977 total was unusually high. Nonetheless, the statewide average annual decline of 2.5% during 1966–91 was highly significant—from a general peak of 8.1 birds per route in 1971 to 4.1 in 1991. Veeries were found on 61 of the state's routes, the absences being in the southernmost counties and areas along the Mississippi River north to Pierce County. On 44 of the 61 routes, birds were present each year, although numbers decreased on nearly all of these routes. In Ontario and the Eastern and Continental regions declines were detected during both periods.

Swainson's Thrush (I) In Wisconsin, Swainson's Thrushes breed only as far south as the Menominee Reservation. They were found on 8 routes as summer residents but on none regularly. On 4 other routes observers noted apparent migrants lingering into early June. Numbers were too small for reliable estimation of population trends.

Hermit Thrush (Fig. 8) The breeding range extends south to Polk, Eau Claire, Jackson, Sauk, Langlade, and Oconto counties; however, breeding populations near this range limit are often very scattered. BBS records occurred only as far south as Jackson, Marathon, Waupaca and Door counties but not with regularity as they did farther north. Annual averages from the 32 routes that recorded the Hermit Thrush reflect a significant average annual population gain of 1.8%. The gradual increase was not due to range expansion, but to small increases throughout the northern counties. Of the 21 routes that consistently held Hermits, 2 experienced decreases, 6 maintained roughly even populations, and 13 showed increases. Michigan and the Eastern and Continental regions experienced increases during both periods.

Wood Thrush (I) This was the only one of the brown-backed thrushes to have a statewide summer distribution. It was found on every Wisconsin BBS route except one in Marathon County that featured many more cornstalks than trees, and although in most years the species occurred on over half of the routes run, the annual average was generally 1–2 birds per route. In only a few instances did the individuals on any one route exceed 6 per year, and only 2 routes tallied this species every year. Wood Thrush populations may be suffering continentally, as indicated by approximate 2% annual declines in the Eastern, Central, and Continental regions, and steeper declines in Michigan and Ontario. It is uncertain whether this decline reached Wisconsin by 1991: the overall trend was stable, with a temporary decrease in the late 1970s, and another slight decrease perhaps at the end of the period. The average decline of 2.5% per year during 1982–91 was nonsignificant but—considering regional trends—suggests careful monitoring in the future.

American Robin (Fig. 8) This is still one of the five most numerous birds on the state's BBS routes, as it was during the first years of the survey (Robbins 1971). It was recorded in double or triple digits each year on every route. Figure 8 portrays a steady climb from 33

individuals per route in 1966 to 58 in 1991. Small wonder that the average annual increases of 1.1% (1966–1991) and 1.5% (1982–1991) were significant. Wisconsin's long-term increase was matched by gains in all neighboring states and the Eastern, Central, and Continental regions.

Gray Catbird In 1966 this species was found on 93% of the routes run. In only 5 of the ensuing 25 years did the percentage drop below that level. An average of 6–10 individuals per route per year was also maintained through the years, and both long-term and short-term trend statistics suggest a stable Wisconsin population. There was considerable geographic variation in counts, however. Northern Wisconsin routes averaged 2–5 individuals per route per year, while counts in the Western Coulee region averaged 20–30. Robbins et al. (1986) identified western Wisconsin as the region of highest density west of the Appalachians. For both periods, populations were stable or increasing in neighboring states, declining in Ontario, and stable in the Eastern, Central, and Continental regions.

Northern Mockingbird (I) While this southern mimic has extended its range north through New England, no such range extension is evident in Wisconsin. There were but 5 one-time BBS sightings: Lafayette (1972), Waupaca (1978), Marathon (1984), Portage (1985), and Wood (1990) counties. During 1966–91 declines took place in much of the Eastern and Central regions especially after prolonged winter cold in 1976–78, while populations in neighboring states were stable or decreasing. Most populations were stable or increasing during 1982–91.

Brown Thrasher (Fig. 8) A slight increase probably occurred until the mid 1970s, followed by a decline, but this was not identified by the trend analysis, which indicated a nonsignificant average annual change of −0.7% for both periods. But declines were significant for Iowa and for 3 of 4 physiographic strata that include parts of Wisconsin (1966–91), and for Michigan and the Eastern and Continental regions (both periods). In the early 1970s Brown Thrashers were found on all routes, averaging 4.8–5.5 individuals per route per year. In the late 1980s birds were still being found on all routes, but the average had slipped to 3.9–4.4.

Cedar Waxwing Since migrant waxwings normally do not reach Wisconsin until the last days of May, and a substantial number of routes are run between June 1 and 10, BBS figures reflect migrants rather than breeders. Robbins (1991) showed that numbers on the central and northern routes were double those of the southern counties. This suggests the possibility that the southern individuals are setting up summer residency, while migrants are still present in the north. The range was statewide, as 69 routes have recorded this species. In a typical year about 400–550 individuals were recorded on 40–50 routes (5–8 birds per route). Although this rose to an average of 640 birds (9–10 birds per route) during 1989–91, the long-term trend was stable and the short-term trend was a decline. This is a species for which the annual averages may be misleading, because they do not account for observer effects. Long-term increases were detected in Iowa, Illinois, Michigan, and the Eastern and Continental regions. Wisconsin's short-term decline was mirrored in Minnesota.

Loggerhead Shrike (I) When Daryl Tessen spotted one in Waupaca County in 1991, it marked the first BBS sighting of this species since 1983. Between 1967 and 1980 birds were reported on 1 or 2 routes per year nearly every year, but this is a far cry from what might have been noted had BBS been functioning in the 1940s. What few data BBS produced since 1966 supports the 1979 WDNR decision to place this species on the state's list of endangered species. The only neighboring states that have measurable populations both show declines: Iowa (1966–91) and Illinois (1982–91). While this remains a fairly common species in the southern states, long-term trends are downward in the Eastern, Central, and Western regions.

European Starling With annual totals sometimes exceeding 5000 individuals, this species ranks ahead of the Common Grackle, American Robin, and American Crow and behind the Red-winged Blackbird and House Sparrow on the list of the state's most abundant roadside species. The population is strongly concentrated in the southeastern counties where individual routes often had 100–300 individuals per year (Robbins 1991). A single route in the northern forests, by contrast, typically listed 0–40 individuals per year. Starlings were found on all routes, but it was not until 1975 that an Ashland County route recorded its first, and 1982 that a first was recorded on the Burnett County route. The detection of population trends is complicated by the fact that young of the year make a conspicuous appearance during the time BBS routes are run. If a route is run before the emergence of young, numbers may be limited; the same route, run one week later, may produce twice as many individuals. The plot of annual counts showed no apparent pattern, with values fluctuating between 44 and 90. However, the trend analysis measured an average 1.2% annual decline. Declines were also measured in Michigan, Ontario, and the Eastern and Continental regions.

White-eyed Vireo (I) One record: Green County (1988). Wisconsin is outside its normal breeding range.

Bell's Vireo (I) This is another species inadequately monitored by the BBS, because of its rarity, clustered distribution, and relatively soft song. It was noted on only 6 routes, in west-central and southwestern counties, and never on more than 2 routes per year. Four of the 6 routes recorded the bird in only 1–2 years. Declines were recorded for the Central and Continental regions for both 1966–91 and 1982–91. Populations appeared stable in Iowa and Illinois, where sample sizes were larger than Wisconsin's.

Solitary Vireo (I) One need only glance at this species' normal summer range as depicted in a field guide to realize that Wisconsin's contribution to the overall trend analysis is slight. Figures for the Eastern region showed an average annual increase of 4.1%, based on results from 555 routes during 1966–91. Only 20 of these routes lie in Wisconsin—all in the northern forests. Trends were also positive for the Central, Western, and Continental regions. The usual Wisconsin pattern showed 9–23 birds on 5–10 routes per year. This pattern did not change after 1970, when coverage of the northern routes became reasonably complete. Estimated trends for Wisconsin were not significant. The range in the northern Wisconsin counties has not changed perceptibly.

Yellow-throated Vireo Although they share some of the same deciduous woodland habitat, Red-eyed Vireos often outnumbered Yellow-throateds 20 to 1 in total individuals seen each year on BBS routes. Yellow-throateds were recorded on all but 3 routes, but were found only occasionally on routes north of Polk, Washburn, Rusk, Taylor, Langlade and Oconto counties. The largest number ever recorded on any Wisconsin route in any one year was 6. Annual totals appeared to increase ever so slightly, but the annual increase of 1.1% was not significant. Increases were detected for both periods in Illinois, Michigan, and the Eastern region.

Warbling Vireo (Fig. 9) This species was found regularly throughout the period on 50 BBS routes, and was regular on an additional 7 until 1980. On the remaining 13 routes, birds were found sporadically in small numbers. The distribution was statewide, but with low numbers in the northern and eastern counties. On 17 of the 50 "regular" routes, numbers decreased; on most of the rest they remained relatively stable. Only a few routes in the southernmost counties showed increases. Robbins (1982) pointed to a steady decline during 1970–80, most pronounced in the western region between Polk and Buffalo counties. The annual 2.7% decline from 1966 to 1991 was highly significant. Populations declined in Illinois and the Eastern region (1982–91), and Michigan (1966–91), but increased continent-wide (1966–91).

Philadelphia Vireo One record: Iron (1976). Wisconsin is outside its normal breeding range.

Red-eyed Vireo Figure 9 depicts a slow but steady increase: from 8–15 individuals per route per year (1966–75) to 15–20 (1982–91). The long-term statewide annual increase was 1.8%. The increase, of course, mostly reflects populations in the deciduous and mixed forests of northern Wisconsin, where this is one of the most common species. It is a far cry from the 40–80 individuals per route per year in the north to the 1–5 individuals typically found on southern routes. Not only was this persistent singer noted on all routes, but it was reported on 83–94% of routes run each year, being occasionally missed on some southern routes. Michigan, Ontario, and the Eastern and Continental regions registered long-term and short-term increases. Increases were noted in Minnesota (1982–91), while numbers dwindled in Illinois (both periods) and Iowa (1982–91).

Warblers, General To interpret the warbler data accurately, it is important to remember that only two species—Yellow and Common Yellowthroat—have statewide distribution. It is nearly so for the Ovenbird and American Redstart, but observations on the southernmost routes are scant. Results from species of both central and northern Wisconsin (Golden-winged, Nashville, Chestnut-sided, Pine, Mourning) came largely from 35–45 routes. We relied mainly on 24 northern routes for data on 8 species (Northern Parula, Magnolia, Yellow-rumped, Black-throated Green, Blackburnian, Northern Waterthrush, Connecticut, and Canada). The only southern warblers that bred in southern and central counties in sufficient numbers to yield reliable data were the Blue-winged and Cerulean.

Blue-winged Warbler (I; Fig. 9) This southerner was found on 2–9 routes per year, mostly in the southwestern

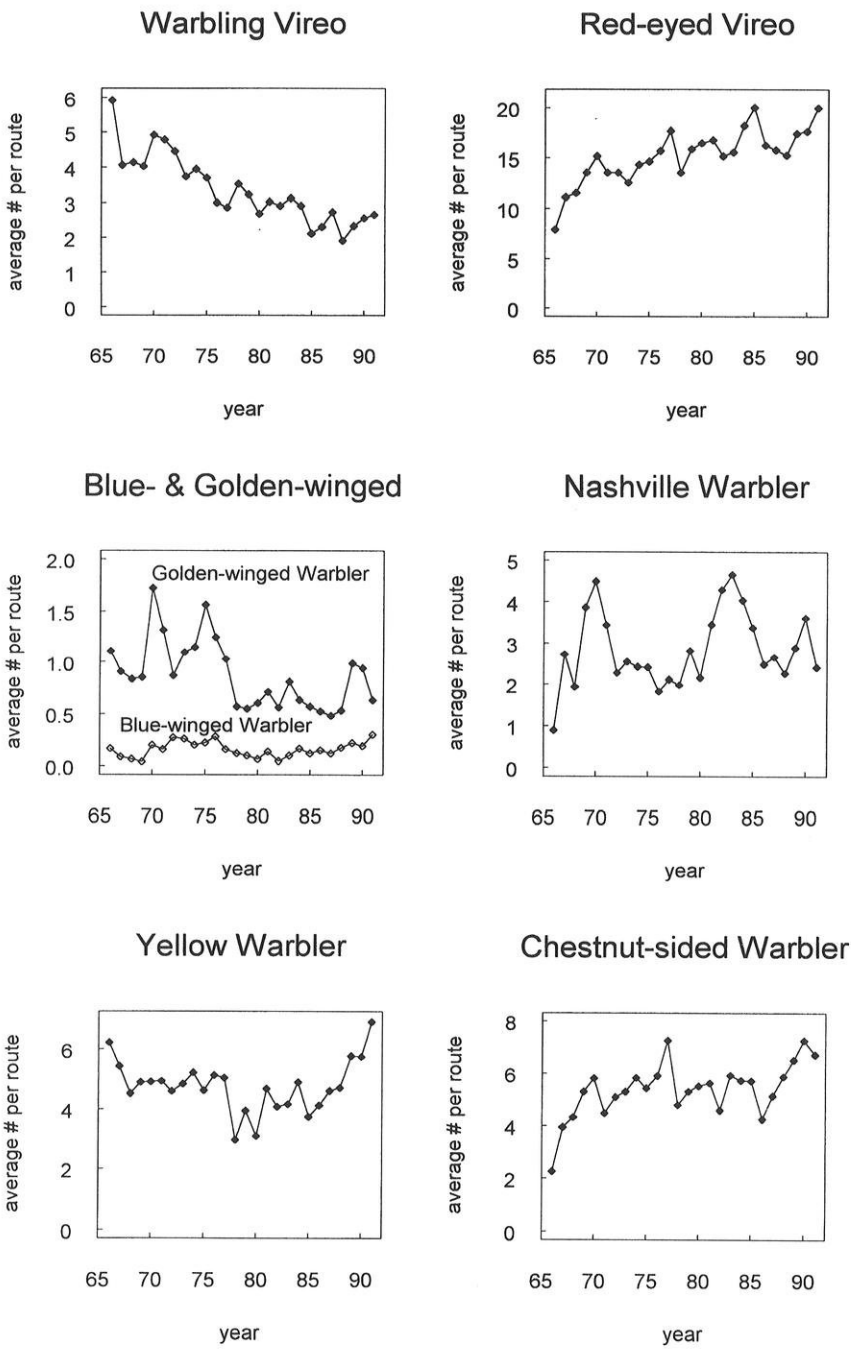

Figure 9. Annual average counts during 1966–91 for Warbling Vireo, Red-eyed Vireo, Blue-winged Warbler, Golden-winged Warbler, Nashville Warbler, Yellow Warbler, and Chestnut-sided Warbler.

counties, and almost never north of the tension zone. Among the 28 routes that recorded Blue-wings, there were one-time sightings as far north as St. Croix, Jackson, Clark, Waushara, Waupaca and Washington counties. The scarcity of this species was indicated by the fact that no Wisconsin BBS route has recorded it every year. The Wisconsin population appeared to peak during the early 1970s and again toward the end of the period, the latter increase being reflected in an 11.6% annual gain during 1982–91. There was a long-term increase and short-term decline in Michigan, but samples in other neighboring states were too small for comparison with Wisconsin. Short-term declines were also measured in Eastern and Continental regions. A long-term increase occurred in the Great Lakes Plain stratum.

Golden-winged Warbler (Fig. 9) Observations were made on 50 routes. On 14 of these, birds were noted only once or twice, offering little evidence of population trends. On another 14 routes, however, observations were made nearly every year. Of these 14, 8 changed in numbers very little, 6 decreased, and none increased. There was a statewide average decline of 3.9% per year—a very highly significant loss. The 1976–1980 interval was the period of most pronounced decrease, followed by a leveling off through 1988 and then possibly a period of limited recovery which was restricted to the central and northern counties. South of a line connecting Polk, Jackson, Clark, and Oconto counties, there was only one BBS sight record after 1983. During 1966–91, Blue-winged Warblers apparently expanded northward and eventually displaced Golden-wings in areas of overlap in some areas of eastern North America (Gill 1980, Brewer et al. 1991), and at least locally in Wisconsin (Mossman and Lange 1982). Samples from most neighboring states were too small to offer meaningful comparisons. Populations declined in Michigan and the Eastern and Continental regions and the Great Lakes Plain and Great Lakes Transition strata, but increased in Ontario.

Tennessee Warbler (I) Six records, from Bayfield (1987), Ashland (1986), Door (1976), and Iron (1977, 1984, 1986) counties. One was in early June, possibly a late spring migrant. The others were in late June or early July. Summer residents or vagrants? The data are too skimpy to warrant a judgment for a species normally nesting in Canada.

Nashville Warbler (I; Fig. 9) Nashvilles were numerous in the spruce-tamarack bogs in the northern counties, where individuals per route per year often total 20–35. They were also attracted to the jackpines in the central counties, often numbering 10–15 per route per year. Annual average counts showed a curious sequence of ups and downs, featuring highs in 1969–71, 1982–84, and 1989–90. The drop after 1984 resulted in a decline of 5.9% per year for the 1982–91 period. The nonsignificant 1966–91 average increase of 1.7%, however, implies that this species has probably held its own overall. These results came from 41 routes, all in northern and central counties, including 27 that recorded this species regularly. Further examination of these 27 routes shows that the routes in the northwest held their own or increased in numbers, while most of the northeastern routes showed a decline. Noticeable also on single routes is a pattern of unusual year-to-year variation, for example route with 47 individuals one year

had but 27 the previous year and 28 the ensuing year, all with the same observer. Michigan and the Eastern and Continental regions reported short-term declines, while the only significant long-term trend was an increase in the Central region.

Northern Parula Although this species summers throughout the southeastern U.S., its presence in Wisconsin is limited to the northern forested region (especially in its favored spruce-fir habitat) where it was recorded on 23 routes, 8 of them on a regular basis. The percent route occurrence was variable throughout the period. Annual totals varied between 15 and 25 individuals between 1967 and 1984, with a high of 32 in 1985. After 1986 totals dropped to 11–12 per year. Estimated short-term and long-term declines were not significant. Long-term increases occurred in Ontario, the Spruce-Hardwood Forest stratum, and the Eastern region.

Yellow Warbler (Fig. 9) This species and the Common Yellowthroat are the only warblers that were represented on all 70 BBS routes. In the 15-year BBS summary, Robbins (1982) noted stable populations of Yellows from 1966 through 1977, with 4.5–5.5 individuals per route in most years, followed by a sudden drop to 3.0–4.0 during 1978–80. He commented: "This songster will bear watching." We can now see that the drop was temporary, with an increase to 4.0–5.0 birds per route per year from 1981 to 1988 continuing to 7.0 by 1991. Wisconsin's long-term population trend was stable, with a 5.6% average annual increase during 1982–91. Michigan and Illinois experienced long-term gains, as did the Eastern and Continental regions. A decline occurred in Iowa. Most adjacent states and regions had stable or increasing short-term populations.

Chestnut-sided Warbler (Fig. 9) In the interval between Kumlien and Hollister (1903) and Schorger (1931), this species withdrew from most of southern Wisconsin as a summer resident. A continuation of this trend can be traced in BBS results. Among the 59 routes that included this species, 12 had occasional sightings in the 1960s and 1970s but listed none after 1982. South of a line connecting St. Croix, Eau Claire, Jackson, Wood, Waushara and Manitowoc counties, only 4 routes had this species in the last 10 years of the period. In the northern half of the state, however, populations remained stable. On 34 routes where this species was consistently present, 9 showed gains, 8 showed losses, and 17 were essentially unchanged. Wisconsin populations were stable for 1966–91, but gained 2.4% per year during 1982–91, the gain probably due to modest increases on 8 routes in the northwestern counties. Chestnut-sided Warbler populations were generally stable in North America. The only other apparent trend in our regions of consideration was a long-term increase in the Great Lakes Transition stratum.

Magnolia Warbler All observations came from 20 routes in the northernmost counties. Two routes supplied over half (158) of the total of 292 individuals observed over the 26-year period. Unfortunately these 2 routes experienced frequent changes in observers, and lacked coverage in 10 and 8 years respectively. But whereas these factors cast some doubt on the reliability of the estimated 4.6% long-term annual increase, it is consistent with measured increases in the Eastern and

Central regions and Spruce-Hardwood Forest stratum.

Cape May Warbler (I) This high-pitched singer and high-branch nester was recorded on 12 of the northernmost routes from Douglas to Forest counties, but it was noted in 5 or more years on only 3 routes. Each year, 0–9 birds were detected on 0–5 routes. The Cape May is poorly sampled by the BBS in Wisconsin because it is uncommon, has a relatively weak song, and prefers balsam-spruce forest which is scattered and often far from roads. Both the Eastern and Continental regions had long-term gains but short-term declines. Michigan and Minnesota also experienced short-term declines, though their samples were not much larger than Wisconsin's.

Black-throated Blue Warbler (I) With the exception of one out-of-place sighting in Rusk County (1988), all records were from 7 routes in 6 northeastern counties (Ashland to Forest). Annual totals increased from 0 during 1966–72 to a maximum of 5 in 1991. Although considered inadequately sampled, its 3.2% average annual increase was significant. No other states, regions, or strata showed a significant trend, except for a short-term decline based on a small sample in Minnesota.

Yellow-rumped Warbler (Fig. 10) Most observations came from the 24 northern forest routes. Scattered occasional sightings in Polk, Eau Claire, Jackson, Waupaca, and Oconto counties brought to 29 the number of routes that listed this species. Annual statewide averages increased from 0.3–0.6 individuals per route in the late 1960s to 1.0–1.3 per route by the late 1980s, representing an average annual gain of 2.8%. Comparable increases were calculated for Michigan, the Eastern and Continental regions, and Spruce-Hardwood Forest stratum, despite a decline in the Central region.

Black-throated Green Warbler (I) Aside from 3 isolated extralimital sightings that were probably late migrants, a total of 1768 individuals was counted during 1966–91, on forested northern routes. The annual average number of birds per route varied between 0.4 and 1.7. Although these averages appeared to decrease through the period, the trend analysis indicated a stable population. No real changes were identified elsewhere, except for a short-term decline in the Spruce-Hardwood Forest stratum.

Blackburnian Warbler This resident of tall conifers in the northern counties in summer, and the tropics in winter, did not fare well in Wisconsin. It occurred on 24 routes, peaking at 0.8 birds per route around 1971 before dropping to about 0.2 per route in the late 1980s. No Wisconsin route showed a 26-year increase, but 7 showed noticeable decreases. Wisconsin's estimated annual decrease of 3.1% was not matched elsewhere. Several other states, strata, and regions experienced short-term increases.

Pine Warbler (Fig. 10) The North American summer range is distinctive, with a huge gap between populations of the northern Great Lakes area and those in the southeastern states. The winter range is unique also, for a warbler, with virtually all birds confined to the southern U.S. Considering this bird's dependence on pine trees, it is understandable that Wisconsin's BBS records were confined to 34 routes in the northern and central counties. Birds were found annually on 15 of these routes, and in only 1–3 years on 12 of them. Annual average number of

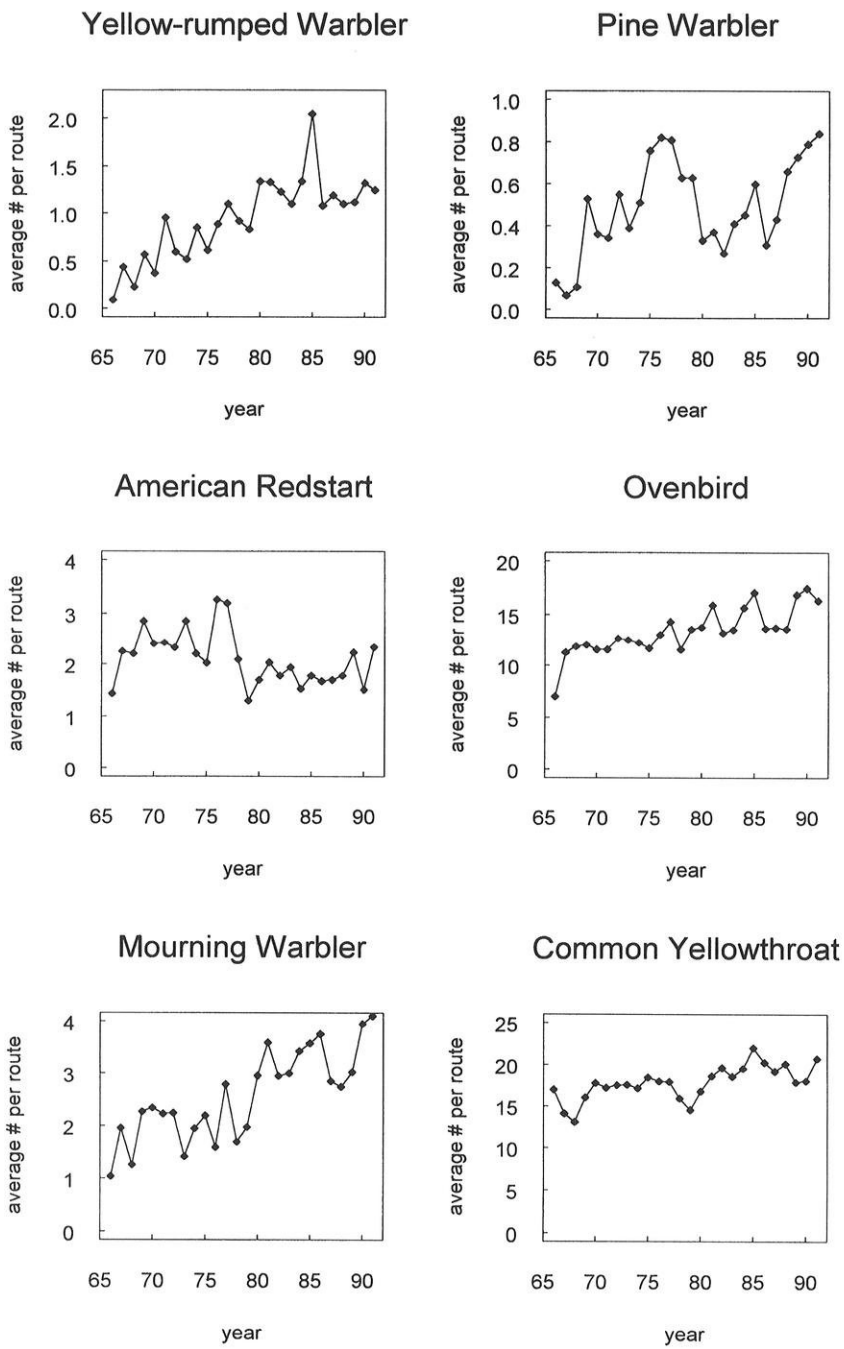

Figure 10. Annual average counts during 1966–91 for Yellow-rumped Warbler, Pine Warbler, American Redstart, Ovenbird, Mourning Warbler, and Common Yellowthroat.

birds per route increased 8-fold between 1966 and 1977, then declined until about 1982 and increased steadily thereafter, to an overall maximum of 53 individuals in 1991. The average annual increases were 4.0% during 1966–91 and 11.5% during 1982–91. Gains also occurred during both periods in Minnesota, the Eastern and Continental regions, and Spruce-Hardwood Forest stratum.

Palm Warbler (I) This species breeds in open black-spruce bogs, which are scattered in northern Wisconsin and usually not near roads. On only one Oneida County route was this bird found with any regularity, but single sightings were recorded in Douglas (1974, 1991), Price (1971), Ashland (1986), and Vilas (1990) counties. Samples were also small rangewide. During 1966–91 it occurred on 75 routes in North America and exhibited generally stable population trends.

Bay-breasted Warbler, Blackpoll Warbler (I) Although Bay-breasts were detected 9 times, and Blackpolls 3 times, several were surely late spring migrants. Only in Iron County, where Bay-breasts were noted 4 times in late June, is there the likelihood of summer residency. In the Eastern and Continental regions, Bay-breast populations were stable long-term and decreased short-term.

Cerulean Warbler This species' breeding range includes the southern half of Wisconsin with a western bulge north to Polk and Barron counties and an eastern bulge north to Oconto and Door counties (Robbins 1991). The Cerulean's rarity, and its occurrence primarily in the interiors of large forested tracts, is indicated by the fact that 38 Wisconsin routes lie within this range, yet it was recorded on only 16. Only routes in Pierce and Juneau counties listed the bird 3 or more times. Although the 26-year total for all Wisconsin routes was only 31 individuals, the species was considered adequately sampled, with an estimated long-term increase of 1.2% per year. But this is not characteristic of its trend rangewide, for it suffered long-term declines in the Eastern, Central, and Continental regions.

Black-and-White Warbler (I) The nesting range extends across Canada from Alberta to Newfoundland, and south through the U.S. to Georgia and Texas. But in Wisconsin it is limited to the northern and central counties, with a bulge southward to Sauk County. Most BBS records came from 26 routes, south to Polk, Washburn, Chippewa, Jackson, Wood, Waupaca, Oconto and Door counties, where birds were noted nearly every year. There were also 12 routes with occasional sightings and 8 on the fringe of the breeding range that recorded this warbler once or twice. The pattern for a typical year was a total of 70–100 individuals on 20–25 routes. Deviations from this pattern were minor after 1970, until annual average counts appeared to increase slightly in the 1980s. Populations in Wisconsin were stable during 1966–91 but exhibited a significant increase of 1.9% per year during 1982–91. Michigan, Ontario, and the Spruce-Hardwood Forest stratum showed long-term gains, but populations appeared stable regionally and continent-wide.

American Redstart (Fig. 10) Although this flashy flutterer is more conspicuous in appearance than most warblers, and was recorded on all but 3 routes, only once was it found on more than 35 routes in a single year (40 in 1983). Wisconsin populations were stable for

both periods, although the plot of annual average counts suggests a decline. If this decline was real, it continued a trend that predated the start of BBS in 1966. Schorger (1931) referred to this species as an abundant nester in Dane County, second in numbers only to the Yellow Warbler, whereas now it must be considered rare. Population trends elsewhere were various but mostly downward, i.e., long-term declines in Minnesota and Ontario, short-term declines in the Eastern and Continental regions and Spruce-Hardwood Forest stratum; and short- and long-term increases, respectively, in the Great Lakes Transition and Wisconsin Driftless Area strata.

Prothonotary Warbler (I) One record: Pierce County (1977). Wisconsin BBS routes do not touch suitable riverine habitat for this southerner, which is common along the Mississippi River.

Worm-eating Warbler (I) One record: Lafayette County (1969). Southern Wisconsin is on the northern edge of this forest interior species' normal summer range.

Ovenbird (Fig. 10) Next to the Common Yellowthroat, this is Wisconsin's most numerous warbler, or at least the noisiest. It was not unusual for a day's total to exceed 70 individuals on some of the northern routes. Ovenbirds were less abundant southward, and were absent on 4 of the southernmost routes; yet observers found them on at least 60% of the routes run each year after 1966. An average of 12–18 birds per route per year was held fairly consistently, and the measured trend was stable. Populations in the Eastern and Continental regions were also stable, with increases noted in Michigan and two strata, and a decline noted in the Central region.

Northern Waterthrush This is one of the least numerous of the northern forest warblers, because the preferred stagnant wooded swamp habitat is uncommon and usually far from the hard-surfaced roads on which BBS routes were established. The 30 routes on which this species was found include a few central Wisconsin locations as well as most northern routes, but annual totals included only 1–31 individuals on 1–11 routes. On only 6 routes was this species reported 10 or more times, and no route had it every year. With the exception of increases in Minnesota and the Great Lakes Plain, and a short-term decline in the Spruce-Hardwood Forest stratum, no population changes were reported for Wisconsin or neighboring states or regions.

Louisiana Waterthrush (I) Three records: Jackson (1967, 1972) and Juneau (1974) counties. The wooded streams in the western counties that attract this southerner do not have BBS routes nearby.

Kentucky Warbler (I) One record: Walworth County (1982). Wisconsin lies at the northern range limit of this warbler, which here is a forest interior specialist.

Connecticut Warbler Over 70% of the birds reported were on 3 routes that touch the jackpine barrens in Burnett and Douglas counties. On these routes birds were found every year with numbers gradually increasing. It also occurred on 15 other routes, all in forested northern areas, but these observations were few and far between, and on only 2 was it found in more than 3 years. The large increases reported by BBS were significant—perhaps in part because the 3 key routes had consistent coverage. However, samples in most neighboring states

were too small to detect significant trends. No trends were discernible in other areas, except for an increase in the Spruce-Hardwood Forest stratum. Continent-wide, Connecticuts were found on only 107 routes.

Mourning Warbler (Fig. 10) BBS results showed highly significant average annual increases of 4.6% (1966–1991) and 3.5% (1982–1991). Discounting as belated migrants one-time records from 3 southern counties, these figures came from 29 routes with annual observations and another 21 with occasional sightings. Of the 29, 7 showed obvious gains, 2 experienced losses, and 20 maintained relatively stable numbers. The annual average counts grew from 1.0–2.8 birds per route during 1966–79 to 4.0 during 1990–91. The Great Lakes Plain and Transition strata showed long-term increases, while Ontario, Spruce-Hardwood Forest stratum, and Eastern and Continental regions had short-term declines.

Common Yellowthroat (Fig. 10) Not only was this black-masked warbler found on all routes, but in almost every year it was found on 98–100% of the routes run. A total of 1303 individuals was counted in 1991, and the overall average of 17.8 birds per route ranked this bird as the thirteenth most numerous on Wisconsin BBS routes. Although there were no significant trends estimated for Wisconsin, Yellowthroats did seem to decline temporarily in the late 1970s. During 1966–91, Yellowthroats decreased in Iowa and Ontario, and increased in Michigan and two strata. The Eastern, Central, and Continental regions, and most adjacent states, showed short-term declines.

Wilson's Warbler (I) Five records, presumably spring migrants lingering in the northern counties into early June.

Canada Warbler (I) This species was found on all 24 northern forest routes, where it favors the dense moist understory of the lowland conifer and mixed forests. There were also one-time reports in Polk, Jackson, Waupaca, and Oconto counties. There was a hint of a possible decline in the average annual counts, and 6 routes that recorded Canadas frequently prior to 1986 had none thereafter. However, the BBS analysis estimated only a slight nonsignificant decline. Declines were measured for Michigan and the Eastern and Continental regions (1982–91).

Yellow-breasted Chat (I) This rare and very vocal denizen of upland and lowland brush and woods edge is at the northern edge of its range in Wisconsin and was only recorded on 8 widely scattered routes: north to Trempealeau and Juneau, east to Waupaca and Kenosha. Most were one-time sightings, and we do not believe the significant increase detected on the BBS necessarily reflects a statewide trend. Illinois reported significant declines during both periods.

Summer Tanager (I) One record: Grant County (1976). Wisconsin is outside its normal breeding range.

Scarlet Tanager (Fig. 11) This species breeds statewide and was found on all routes. But populations were not large, for it averaged 2.2 individuals per route per year overall. Rarely did the annual average count exceed 3 birds per route, and only 20 routes recorded 10 or more in any one year. It was reported on an average of 37 routes per year—usually 55–70% of routes run in a given year. In all these respects its abundance was similar to that of an-

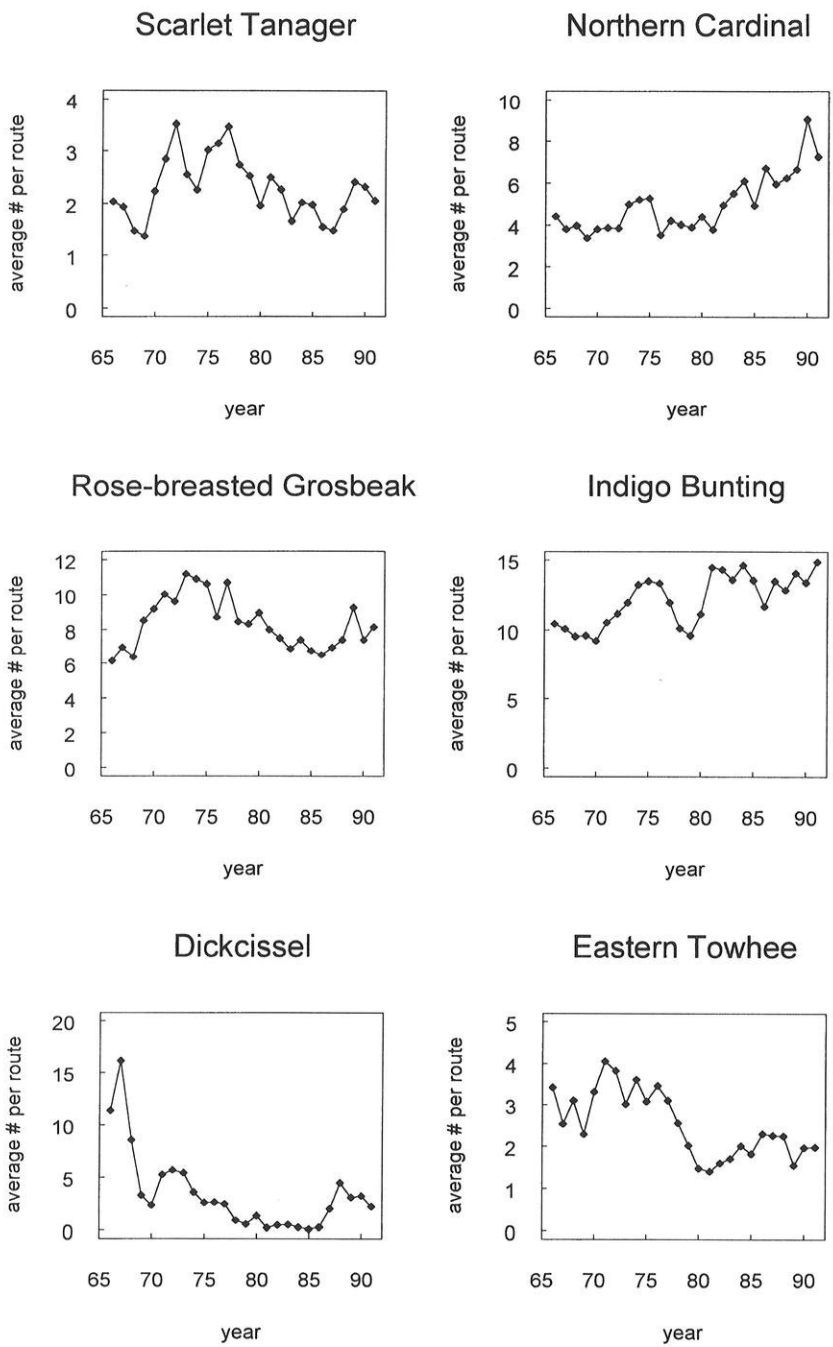

Figure 11. Annual average counts during 1966–91 for Scarlet Tanager, Northern Cardinal, Rose-breasted Grosbeak, Indigo Bunting, Dickcissel, and Eastern Towhee.

other widespread species, the White-breasted Nuthatch. The "stable" long-term and short-term trends estimated for Wisconsin may conceal a complex pattern of population change as suggested by the annual average counts: a major population peak appeared to occur in the mid 1970s, followed perhaps by a minor one around 1989. Increases occurred in Michigan and the Great Lakes Transition stratum in both periods, while declines occurred in Ontario long-term and in the Spruce-Hardwood Forest stratum short-term.

Northern Cardinal (Fig. 11) Robbins' 15-year BBS summary (1982) reported birds on 49 routes, with populations stable. After 1981, however, Cardinals appeared on 10 additional routes, representing a range extension north to Douglas, Sawyer, Price, Lincoln and Forest counties. The 11 routes that did not list this species all lie farther north and east. On another 26 routes, numbers were noticeably higher in the 1982–1991 interval than in the previous 15 years. What had been an annual average of 4–6 individuals per route during 1966–81 rose to 6–9 thereafter, with an exceptional high of 11 in 1990. There was a highly significant long-term gain of 2.7% per year, and a short-term gain of 4.2% per year. Long-term increases occurred in Minnesota, Michigan, the Great Lakes Plain and especially the Great Lakes Transition stratum. Apparently because the population increase is occurring primarily at the northern fringe of the Cardinal's range, regional and continental populations showed no significant changes.

Rose-breasted Grosbeak (Fig. 11) Common, widespread, stable. Not only was this familiar bird of the deciduous forest, parks, and residential areas found on all 70 routes, but it was noted consistently on all but 8. Although long-term and short-term trends were stable, the annual average counts suggest a pattern of change similar to that noted for the Scarlet Tanager, with peaks in the early 1970s and around 1989. The apparent decline in the late 1970s and early 1980s may have occurred mostly in the northern and northwestern counties where 12 routes produced noticeably fewer numbers in the 1980s than in the previous 15 years, compared with evident increases on only 4 routes statewide. Illinois, Michigan, the Spruce-Hardwood Forest stratum, and the Eastern and Continental regions all experienced declines during 1982–91. Illinois and the Wisconsin Driftless area had long-term gains.

Indigo Bunting (Fig. 11) It is a rare day when an observer runs a BBS route in Wisconsin and records none of these vigorous songsters. On only 3 routes was this familiar roadside species missed in more than three years. While the annual average counts varied only between 9 and 15 after 1973, the numbers on individual routes often varied widely. A route that tallied 10 one year may produce 27 the next, or just 1. The sudden dip in the number of birds per route during 1978–79 resembles the pattern in many species that winter in the southeastern U.S., and may be winter weather-related. Michigan, Ontario and the Great Lakes Plain had long-term increases. While 1982–91 figures showed widespread state and regional declines, Wisconsin's population appeared stable.

Dickcissel (I; Fig 11) This species has been known for widely erratic and fluctuating populations both nationwide (Robbins et al. 1986) and in Wisconsin

(Kumlien and Hollister 1903; Taber 1947). The most pronounced recent peaks in Wisconsin were in 1964 (Emlen and Wiens 1965) and 1967, the year after the BBS started. In 1967, 873 birds were recorded on 38 BBS routes. After this peak, the population dropped precipitously through the late 1970s, finally bottoming out at 5 individuals counted in 1985 statewide! The annual average count declined from 10 (1966–70) to 0.4 (1981–85); and the percent of routes run on which dickcissels occurred went from about 50–60% in the late 1960s to approximately 5–20% in the early 1980s. After the mid 1980s there was a slight recovery in the population; the 279 individuals (4.5 per route) recorded in 1988 was the highest since 1974.

The population trend in Wisconsin during 1966–91 was −8.0%, but not significant, due to the increase after 1985. There were declines in dickcissel populations from 1966–91 for Iowa, the Eastern, Central, and Continental regions, and for several physiographic strata. However, there were no declines during 1982–91; in fact, increases were recorded for this period in Wisconsin, Iowa, Michigan, and the Great Lakes Plain and Wisconsin Driftless Area—evidence that the late 1980s increase was widespread.

Eastern Towhee (Fig. 11) "The 1980 figures were but half those of 1976," wrote Robbins (1982) in his 15-year BBS report, pointing to a sudden 5-year decline after 10 years of stable populations. This was seen as part of a noticeable drop throughout the eastern U.S. in the 1970s (Robbins et al. 1986). It is now evident that 1980–81 was the end of a population decline that was followed by a stable period. The 1986–91 annual average of 2.1 birds per route was well below the 1966–75 average of 3.3. Towhees were recorded on every route except one in Dodge County, with one-time reports on another Dodge County route and one in Marathon County. The annual proportion of routes of occurrence declined from about 65% to 45% during 1966–91. The species disappeared from 4 routes in 1979–80, and from another 11 by 1986. But on 19 of 20 routes that listed this species consistently, numbers of birds held up well. Wisconsin's average annual decline of 2.9% per year was larger than that of any neighboring states, where populations were stable. Decreases were detected for the Eastern and Continental regions over both periods.

Chipping Sparrow This widely distributed species was found on all 70 routes—an average of 59 routes per year. It increased steadily after 1966; the annual average count went from 10 (1966–70) to over 18 (1986–91). The percent of routes run on which chippies occurred rose from an already high figure of 90–95% during 1966–70, to 98–100% during 1983–91. The population in Wisconsin increased in both periods. It also increased in both periods in Iowa and Illinois, and long-term only in Michigan. Both Brewer et al. (1991) and Robbins (1991) note that increases in residential development have been related to increases in the chipping sparrow population.

Clay-colored Sparrow (I) This species reaches the southern (and close to the eastern) limit of its range in Wisconsin. It occurred on a total of 54 routes, an average of 26 routes per year, mainly in the northern two-thirds of the state. Numbers fluctuated greatly over the 26-year period, which is part of the reason that Clay-coloreds were not

adequately sampled by BBS. With the exception of an extreme peak in 1974, the annual average count during 1966–1982 appeared to drop slightly overall, with a possible increase subsequently. The 1986–91 average of 3.4 individuals per route is the highest of any 5-year period. The percent of routes run on which this species occurred reached its lowest points in 1986 and 1990, indicating that during the period of slight increase in abundance there may have also been some reduction in range. The Wisconsin trend was stable for both periods. The only significant trends were long-term declines in the Western and Continental regions (1966–91).

Field Sparrow (Fig. 12) This species was recorded on all but 2 routes, and occurred on 58–70% of all routes run in almost any given year. Any changes in abundance were thus not related in any consistent way with a change in distribution. The number of individuals counted declined steadily during 1966–80 then recovered somewhat. The population trend for 1966–91 in Wisconsin was a decline. Declines for both 1966–91 and 1982–91 were reported from Illinois, Michigan, and the Eastern, Central, and Continental regions.

Vesper Sparrow (Fig. 12) With its loud, clear song, the Vesper Sparrow is probably monitored by the BBS better than most grassland sparrows. It is unusual among grassland sparrows in that it is attracted to plowed fields, such as corn and soybeans, for nesting habitat. It occurred on an average of 44 routes per year and a total of 67 routes overall. It was not recorded on 3 routes in Ashland, Forest, and Taylor counties. The percent of routes run each year on which it was seen decreased slightly overall from about 80% to 70%. The annual average counts declined from highs of 13.3 (1966) and 11.4 (1971) to 5.1 (1985) and 5. (1987). The decline was significant in Wisconsin for both 1966–91 and 1982–91. Declines for both periods also occurred in Michigan and the Eastern region, and for 1966–91 in Minnesota. Vesper Sparrows increased in Iowa in both periods, and in the Western region during 1982–91; thus this species appeared to fare better in the western part of its range than in the eastern, while the overall continental population remained stable.

Lark Sparrow (I) This uncommon sparrow has an uncanny ability to find widely dispersed areas of suitable bare sandy exposures. It occurred repeatedly on BBS routes in Jackson, Sauk, Marquette and Menominee counties, yet numbers were so small that birds at these locations were missed more often than they were found. Both the range and population of Lark Sparrows decreased substantially prior to 1966 (Robbins 1991), and now BBS data are too sparse for reliable trend analysis in Wisconsin. But Lark Sparrows declined in the Central and Continental regions during both periods and in the Western region during 1982–91.

Savannah Sparrow (Fig. 12) The only other sparrow that approached this widespread species in abundance was the Song Sparrow. Savannah Sparrows were recorded on 68 routes, with an average of 51 routes per year. The population, as measured by the annual average counts, was stable or possibly increasing until it suffered a decrease in the late 1970s. After 1980 a recovery occurred; the total number of individuals counted in 1991 (1,938 birds—30.8 per route) was the highest since

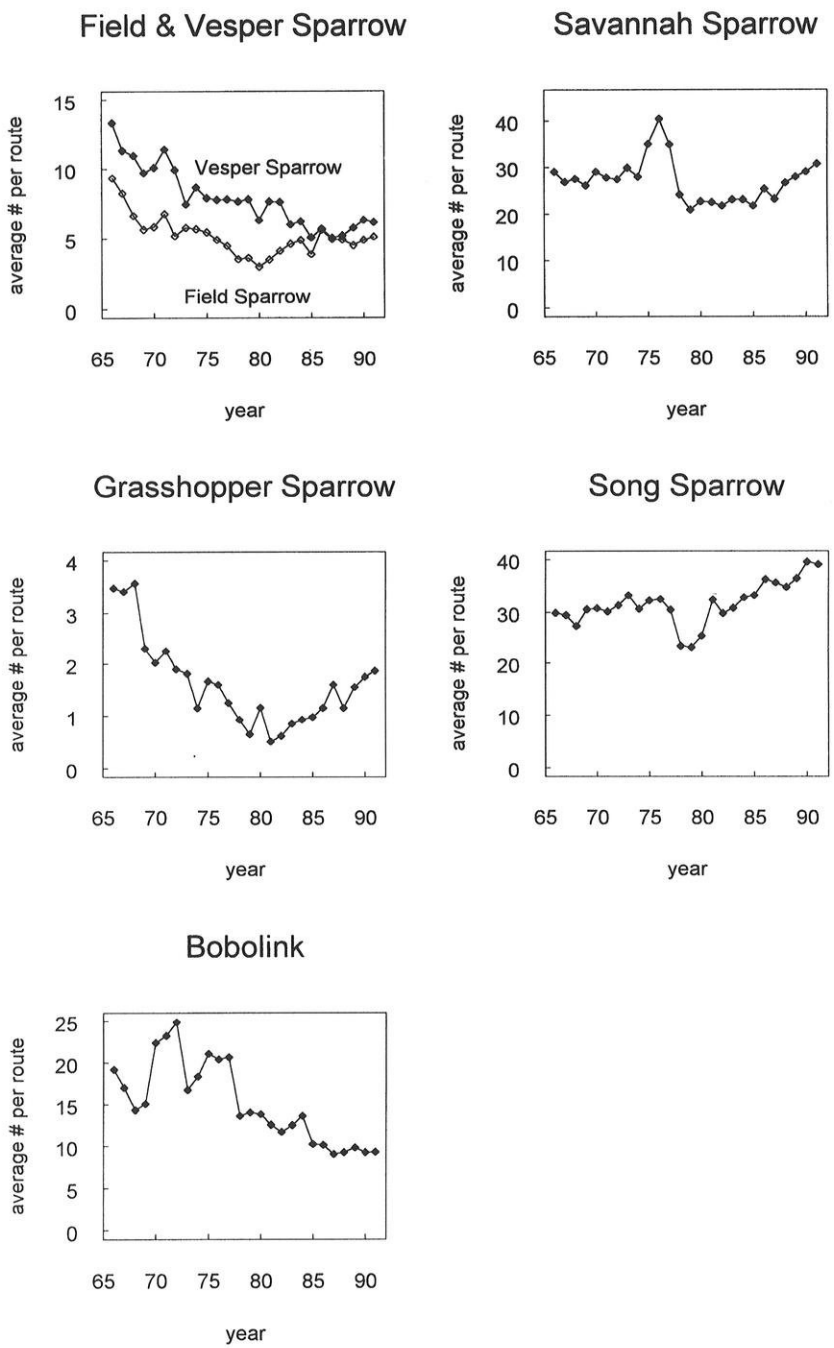

Figure 12. Annual average counts during 1966–91 for Field Sparrow, Vesper Sparrow, Savannah Sparrow, Grasshopper Sparrow, Song Sparrow, and Bobolink.

1977. As with several other short-distance migrants, the dropoff in 1978 and 1979 probably resulted from severe winter weather in 1976–78. In Wisconsin, the long-term decline and short-term increase were both significant. Populations declined for both periods in Illinois and the Eastern region and over the short-term continent-wide. Increases occurred in Iowa and the Western region.

Because this species can be difficult to hear, and because it can also be very difficult to estimate numbers at a given site when there are a large number of individuals singing, the annual average counts were probably affected by observer differences and may therefore be misleading. The number of stops at which Savannah Sparrows were present (i.e., frequency) remained essentially stable over time but with a slight decrease in the late 70's and early 80's followed by a recovery. The effects of observer differences are probably reduced—but not eliminated—by looking at the number of stops instead of the number of individuals. The trend estimate, which takes observer differences into account, is thus a more reliable figure to use than annual average counts.

Grasshopper Sparrow (Fig. 12) This species is relatively difficult to detect by sight and sound, and has become rather uncommon in the state. For these reasons it may not be well-monitored by the BBS. While it was recorded on a total of 61 routes (an average of 22 routes per year), it was noted only once or twice on 11 routes. These 11 routes, plus the 9 that did not record Grasshoppers, are in the northern and central counties. This species underwent a drastic decline in numbers from a peak number of 184 individuals (3.4 per route) in 1967 to a low in 1981, when only 32 individuals (0.5 per route) were counted. The numbers appeared to increase thereafter, and the total number of individuals in 1991 was 117 (1.9 per route), the highest total since 1972. However, this apparent recovery was largely due to changes in observers on 4 routes in the last decade, and illustrates the potential for observer differences to strongly affect annual average counts, especially for species which (like the Grasshopper Sparrow) have an uneven distribution and a song that is difficult to detect, especially with increasing age of the observer. The trend estimate was more reliable than annual average counts in this case and depicted a 10% decline during 1966–91. The 1982–91 trend was still slightly downward but no longer significant.

Similar trends occurred regionally. Long-term declines were also reported from Illinois, Minnesota, Iowa, and the Eastern, Central, Western, and Continental regions. However, during 1982–91 the Western region was the only state or physiographic region to register a decline, with the Eastern region reporting an increase; this provides evidence that the population may have stabilized.

Henslow's Sparrow (I) Because its song is soft and difficult to hear and because it is an uncommon bird with an irregular and localized distribution, the Henslow's Sparrow was inadequately monitored by the BBS. Differences in observer ability may have had an important effect on results as well (Robbins 1982). Although it occurred on a total of 49 routes (mostly in the southern three-quarters of the state), the annual number of routes it occurred on averaged only 7. The total

number of birds recorded per year was low, ranging from 2 to 33. With the exception of three peak years (1966, 1974, and 1976), the annual average counts slowly decreased. Numbers were consistently low after 1985, ranging from 2 to 7 individuals per year. The peak of 29 birds in 1966 was due to a single route that had 41% of all birds seen in that year; the peak of 28 birds in 1973 was due to larger than usual numbers of birds on 3 routes; and the peak in 1976 (33 birds) was relatively evenly spread across routes. The decline in numbers was significant in Wisconsin only for the years 1982–91. Declines were registered for both periods for the Great Lakes Plain and the Eastern and Continental regions, for Michigan during 1966–91 only, and for the Wisconsin Driftless Area during 1982–91.

Le Conte's Sparrow (I) A total of 99 of these shy birds was detected on 15 routes. Aside from routes in Jackson, Clark and Marathon counties, all were in northern Wisconsin. The broad, level grass and sedge meadows preferred by this sparrow are not plentiful in the northern counties. But there are several reasons for suspecting that this species is more widespread and numerous than these records indicate. First, the Le Conte's begins its morning song period while it is still dark, and ends most of its singing by 6:30 A.M. Approximately 6 of every 7 Wisconsin BBS records fall in the first 2.5 hours of a particular count. If favorable habitat is found in the last 1.5 hours of a count, any Le Conte's present are likely to escape detection. Second, nearly all detections are auditory because this sparrow usually sings from hidden perches. The song has little carrying power, and is probably unknown to the average BBS counter. Obviously the data were too sparse to yield reliable trend estimates, either for Wisconsin or for neighboring states. There were short-term increases in the Eastern, Central, Western, and Continental regions.

Song Sparrow (Fig. 12) Year in and year out this was one of the 10 most numerous species on the BBS. Its distribution was statewide, being found on all routes in 23 out of 26 years. From 1966 through 1977 populations were relatively stable, maintaining an average of 27–33 individuals per route per year. Averages dipped to 24 in 1978 and 1979 probably in response to the severe winters of 1977 and 1978 in the southern states. A notable increase followed, to 39 birds per route during 1990–91, resulting in the 1982–91 population gain of 2.1% per year. The 1982–91 period also saw increases in Iowa, Illinois, Michigan, and the Eastern region. Over the 1966–91 span, populations maintained stable levels in Wisconsin and in all its neighboring states; however, decreases occurred in the Eastern and Continental regions.

Lincoln's Sparrow (I) The 12 routes listing this species were in northern counties south to Polk, Taylor and Oneida. Its favored boggy habitat with stunted shrubs, spruces, or tamaracks is not well covered by BBS. Its numbers were so small that annual totals never exceeded 10 and no route listed it more than 6 times. A short-term decline in the Eastern region was nonsignificant. The continental population showed a long-term increase.

Swamp Sparrow (I) This denizen of wet meadows, marshes, and shrub swamps was recorded on 64 routes in Wisconsin, an average of 29 per year. Because of its general restriction to

wetland habitats, the great majority of its breeding habitat was missed by BBS routes. But even considering this, we are uncertain why this fairly common species was considered inadequately sampled by the BBS; it may be due to conflicting trends among routes or high variability among years on the same routes. The annual average counts were variable, but showed an overall increase from 1.8 (1966–70) to 2.5 (1986–91). The annual percentage of routes of occurrence steadily increased from roughly 35–40% (1966–70) to around 55% (1986–91). While some authors stated that Swamp Sparrows probably underwent a period of population decline in midwestern states as agriculture developed and wetlands were drained (Brewer et al. 1991; Robbins 1991), Wisconsin populations appear to have increased overall since 1966 as measured by the BBS, although the trend was nonsignificant. Increases occurred in Iowa, Michigan, and the Great Lakes Transition (1966–91), and in Minnesota (both periods). The only significant decline was registered for the Great Lakes Plain (1982–91).

White-throated Sparrow Every year on the BBS, 90–99% of White-throats were recorded among 20 routes from Washburn, Taylor, Langlade and Marinette counties northward. They were consistently found on each of the 20 routes. The other birds were scattered individuals found irregularly on another 20 routes south to Polk, Jackson, Wood, Waupaca and Manitowoc counties. There was a brief drop in numbers in 1978 and 1979, probably due to severe winter weather. On the whole, BBS populations remained stable in Wisconsin as well as in Minnesota and Michigan throughout the 1966–1991 period. Declines were noted in the Eastern and Continental regions and Spruce-Hardwood Forest stratum for both periods. Minnesota saw an increase during 1982–91.

White-crowned Sparrow One record: Rusk (1985). Late spring migrant.

Dark-eyed Junco (I) Juncos occurred on 1–4 routes per year. Birds were frequently found on routes in Douglas, Ashland, Iron, Vilas, Oneida and Florence counties, and occasionally south to Sawyer and Rusk counties—11 routes in all. But with annual statewide totals rarely exceeding 10, trend analysis was not possible. Although some states and regions showed various increases or decreases, the Eastern region and Continental trends were stable.

Bobolink (Fig. 12) This hay-loving species has a statewide distribution and occurred on 66 routes, with an average of 52 routes per year. After an apparent increase in the late 1960s, the number of individuals per route dropped markedly. After 1987 the population appeared to remain steady at around 10 birds per route. The percent of routes run on which Bobolinks were seen slowly declined as well, from about 90% (1966–73) to roughly 80% (1987–91). The Wisconsin population trend was a decline during 1966–91 and 1982–91. The decline for this species was alarmingly widespread, for example during both periods in several physiographic strata, most neighboring states, and the Central and Continental regions. The Eastern region experienced a short-term decline.

Red-winged Blackbird, Common Grackle (Fig. 13) These species have much in common. They share the same winter range, spring and fall migration schedule, nesting timetable, and statewide

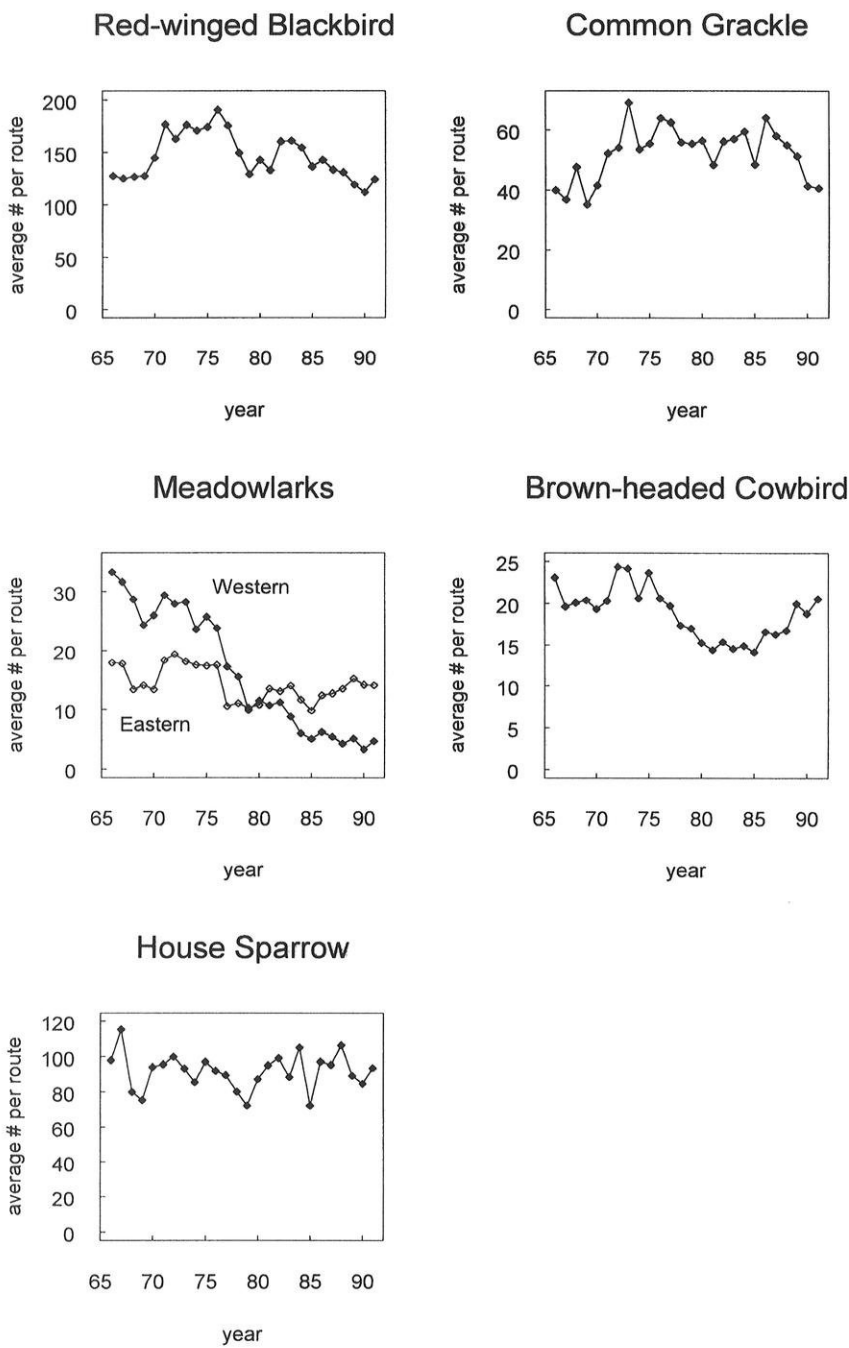

Figure 13. Annual average counts during 1966–91 for Red-winged Blackbird, Common Grackle, Eastern Meadowlark, Western Meadowlark, Brown-headed Cowbird, and House Sparrow.

summer distribution. Both were regularly found on all 70 routes—by the dozens on the northern routes, by the hundreds on the southern runs. For both species, annual average counts increased from 1966 until the mid 1970s. Subsequently, Grackle averages remained fairly stable until the mid 1980s, after which they declined to the levels of the late 1960s. Red-winged Blackbird averages dropped sharply in the late 1970s, and after a slight increase in the early 1980s, declined steadily. Both species had stable trends for 1966–91, and declines for 1982–91. Most neighboring states and the Eastern and Continental regions experienced short-term losses. The 1977–1979 drop appears to coincide with hard winters and a major winter population control program carried on by governmental agencies in the Eastern region.

Eastern Meadowlark (Fig. 13) This species had a wide distribution in the state, with records from 65 routes and an average of 50 routes per year. It was absent only from routes in some northern counties. Easterns have a loud song that carries well; they are well-monitored by the BBS. Their populations fluctuated widely between 13 and 19 birds per route per year, but peaking during 1971–75, then plummeting between 1976 and 1977, probably in response to the severe winter weather in the southern U.S. that year. After 1980 the population recovered somewhat to an average of 14 birds per route during 1986–91. Overall, the severe drop from 1976–77 appeared to separate two periods of stable, though variable, populations.

The population loss for Easterns was significant during 1966–91, but not during 1982–91. A recent stabilization of the population in the upper Midwest was evidenced by the fact that while all states and provinces adjacent to Wisconsin had declines during 1966–91, the only state to register a decline during 1982–91 was Michigan, and Illinois even had an increase during this period. The Eastern and Continental regions had significant declines during both periods, while populations in the Central region declined significantly during 1982–91 only. Thus, the apparent recovery in the upper Midwest was not reflected in larger regions.

Western Meadowlark (Fig. 13) Once considered one of the 10 most common species in the state (Robbins 1971), this bird occurred on all but 5 routes in the northernmost counties between 1966 and 1991. This fact is more impressive when one realizes that it was not recorded in Wisconsin until the late 1800's (Lanyon 1953). The rapid rise of Westerns was short-lived, however; after the inception of the BBS, the population of Westerns has declined steadily and severely. The annual average counts dropped from 30 (1966–70) to 5 (1986–1991), while the percent of routes of occurrence also declined from about 85% to about 55%. The population decline was significant for both 1966–91 and 1982–91 in Wisconsin, Minnesota, Michigan, and the Eastern and Western regions. Short-term increases occurred in Illinois, Iowa and the Central region. The fact that the population was stable (1966–91) or increasing in the Central region (which holds the highest populations of Westerns) as well as stable continentally, indicates that the decline in Wisconsin is part of a phenomenon limited to the recently-invaded

periphery of the range, and may in fact be a range retraction.

Yellow-headed Blackbird The 15-year Wisconsin BBS summary (Robbins 1982) described a steady rise in numbers for this species from 1966 to 1977, followed by a dip. The addition of 1982–91 data makes it clear that the 1977 peak of 128 individuals on 11 routes was far higher than any year before or after. Although the long-term trend for Wisconsin was an increase, there was considerable variation in annual average counts, and the exceptional peak in 1977 makes population change difficult to assess. The routes on which the Yellowhead was recorded fall in a relatively narrow northwest-southeast band from Douglas to Kenosha counties. Routes in the northeastern and southwestern counties missed this species entirely. This western bird was recorded only sparingly in Illinois, Michigan and Ontario. No long-term change was reported for Minnesota or Iowa. In Minnesota and the Central region a decline was detected for the 1982–1991 period, while increases occurred in the Western region in both periods and in the Continental region during 1966–91.

Brewer's Blackbird Although recorded on 57 routes, this species' stronghold was the northwestern and central counties. It was almost never found in the south; its presence in the mostly forested northeast was spotty and irregular. Annual average counts fluctuated between 2.5 and 4.5, with a conspicuous exception of 5.8 in 1981. But that one-year bulge does not explain the significant annual average decline during 1982–91 measured at 5.2%. This species was absent in 1989–91 on 10 routes that formerly recorded it regularly. Increases occurred long-term in Minnesota, Ontario, the Great Lakes Transition stratum, and the Central and Eastern regions, and short-term in Michigan. The Continental region showed a short-term decline, probably as a result of declines (in both periods) in the Western region, where Brewer's Blackbirds are most abundant.

Brown-headed Cowbird (Fig. 13) On 5 northern routes this blackbird was missed occasionally. On the other 65 routes birds were recorded annually–often in large numbers. The annual average counts held roughly stable at about 20 from 1966 through 1971, then increased somewhat before declining steadily to about 15 by 1981, then increased again to restore the average to 20 by 1989. Despite this recent upswing, Wisconsin's 1966–91 loss of 3.2% per year was highly significant. Over the 1966–91 interval, 24 routes showed apparent decreases, while 6 showed gains. A conspicuous decline was noticeable in the Spruce-Hardwood Forest stratum, long-term and short-term. Long-term decreases were noted in Minnesota, Michigan, and the Eastern and Continental regions. Increases were detected in Illinois (both periods), Iowa (1982–91), and the Central region (1982–91).

Orchard Oriole This uncommon bird was recorded on only 18 routes—an average of 1.4 routes per year. All but 2 of the sightings were west and south of a line from St. Croix Falls south to Reedsburg and east to Racine. The number of individuals recorded was low, ranging from 0 to 4 except in 1987 when 7 were observed. Although the period 1986–91 saw the highest 5-year annual average count, the population trend in Wisconsin was stable for 1966–91 and declining for 1982–91. There were increases in Minnesota and Mich-

igan, (1966–91), and in Iowa (1982–91). Long-term decreases were documented in Iowa and the Central and Continental regions.

Baltimore Oriole Estimated trends suggest a stable statewide population, although the annual average counts indicate a population peak in the 1970s followed by a decline. Declines were reported over the short-term in Minnesota, the Spruce-Hardwood Forest stratum, and the Eastern region, and for both periods in Ontario. Birds increased in Illinois during 1966–91.

Purple Finch This songster was detected on 36 routes, the southernmost located in Barron, Chippewa, Clark, Wood, Waupaca and Kewaunee counties. But on only 7 routes was it detected every year. In typical years 60–80 individuals were found on 16–20 routes. Except for some sudden peaks such as in 1972 and 1986, numbers varied little, but increased gradually throughout the 1966–91 period, and the 2.0% annual increase was significant. This was atypical for surrounding areas. Although a short-term increase occurred in the Great Lakes Transition stratum, all other trends were downward, i.e., for both periods in the Eastern region and Spruce-Hardwood Forest stratum, and short-term in the Central and Continental regions.

House Finch When the BBS began in 1966, there was probably no House Finch within 500 miles of Wisconsin. Nor would there be until 1971 when Illinois recorded its first observation, and 1972 when Ohio and Michigan had their firsts and Wisconsin had a hypothetical sighting. Wisconsin had its first positive observation in 1983, its first nesting in 1986, and its first BBS report in 1988. By 1991 it had been located on one-fifth of the state's routes, north to Wood, Waupaca and Oconto counties. Even with just four years' presence, the House Finch measured short- and long-term increases in Wisconsin, as it did in all other states, strata, and the Eastern and Continental regions. The explosive 73% annual increase noted during 1982–91 in Michigan seems destined to follow in Wisconsin.

Red Crossbill (I) There was a three-year stretch, 1972–1974, when the total (140) for this species exceeded that for the other 23 years of the BBS combined (138). Such is the erratic nature of this pine cone-lover. Of the 23 routes that noted this species, only 4 in the northwestern counties listed it 5 or more times. A second area that attracted Red Crossbills was the dry jack pine area of Eau Claire and Jackson counties. Most other BBS records were one-time sightings. This species was inadequately sampled by BBS in Wisconsin, although a short-term decline was detected. This species' erratic, mobile nature and flexible breeding schedule makes it difficult to monitor, and it is not surprising that estimated state and stratum trends were few and various. More useful are calculations of trends made over larger areas such as the Eastern and Continental regions: these had stable trends for both periods.

White-winged Crossbill (I) This unpredictable wanderer was recorded on an Ashland County route 5 times, raising the speculation of possible nesting in the spruce and tamarack bogs there. Elsewhere there were occasional reports in Douglas (1969,1977), Bayfield (1987), Burnett (1977), Price (1988), and Juneau (1969,1974) counties.

Pine Siskin (I) So uncommon and irregular is this finch during the breeding season that there is no single

location where it can be found in summer with any regularity. Birds have been recorded on 23 routes—nearly all in the northernmost counties. Yet no route recorded birds more than 7 times, and on 10 routes, siskins were detected only once. In 5 instances flocks of 15–35 individuals were noted, suggesting the presence of transitory flocks rather than nesting pairs. With annual totals ranging from 0 to 41 individuals, the presence of a single flock can introject significant "noise" into the data. Thus, although this species was reported in 23 years, numbers were too small and variable to yield reliable trend data. Samples in neighboring states were also small, but in the entire Eastern region, where this species was noted on over 200 routes, a pronounced short-term decline was indicated. Declines were also estimated for the Central region (1982–91) and Minnesota (1966–91).

American Goldfinch Because the "wild canary" does not settle down to nest until July, birds are still active and noisy—readily detected by eye and ear—during June when most BBS routes are run. Each year Goldfinches occurred on 90–100% of the routes run.

Populations of this widespread species declined on BBS routes from an average of 13 birds per route (1966–70) to a low of 9.3 (1976–80), and back up to 14 per route (1986–91); however, the overall trend was stable. In 1991 the annual total reached 1000 individuals for the first time, earning for this species a place in the 20 most abundant birds on BBS routes in the state that year. Goldfinches were reported on all routes, with an average of 59 routes per year. Declines occurred during 1966–91 in the Eastern and Continental regions, during 1982–91 in Minnesota, and for both periods in Iowa. The only increase was for the Great Lakes Plain, during 1966–91.

Evening Grosbeak (I) Beginning in 1968 this species was found on 1–7 BBS routes each year. Reports came from 21 routes, all in the northern forested region. But on only 10 of these were birds detected in more than 2 years. Typical years had totals of 9–20 individuals recorded on 3–5 routes. There was a broad peak apparent between 1979 and 1983 when 3 of the annual totals reached 39–43 individuals on 4–7 routes. The Evening Grosbeak declined in many areas, including Wisconsin and the Eastern region during 1982–91, and in Michigan, the Spruce-Hardwood Forest stratum, and Central region during both periods. Although it seemed to suffer widespread declines throughout eastern and central North America, the Continental trends were nonsignificant, possibly because of the mitigating effect of nonsignificant increases in the Western region. This species may warrant some concern.

House Sparrow (Fig 13.) Next to the Red-winged Blackbird, the House Sparrow was the most numerous species on Wisconsin's BBS, sometimes totaling over 300 individuals per year on some southern routes. This abundance diminished rapidly toward the northern forested regions. Most of the northernmost routes missed the species in certain years, and 3 routes (Ashland, Iron, Marinette counties) failed to record a House Sparrow. Statewide, the usual annual pattern was for birds to be found on 50–55 routes, with an average of 85–105 individuals per route. Although the long-term trend was stable, the short-term trend was downward. The House Sparrow is one

of the most clearly declining species measured by the BBS, with decreases measured in almost all states, strata, and regions considered here—most of them for both periods. The decline is so apparent not because it is large (less than 5% per year in almost all areas), but because the species is so well sampled.

Discussion

Possible causes of population trends—Temple (1988) identified 3 major categories of causes for long-term population declines in birds: changes in availability of breeding habitat, surplus or inadequate reproduction, and overwinter mortality (including migration hazards). Here we will briefly examine the roles or potential roles these categories have played in population increases or decreases detected on Wisconsin BBS routes. In what follows we will restrict our discussion mainly to adequately sampled species that had a significant trend during 1966–91; however, we will also include a few species with significant trends during only 1982–91 and a few of the species that were stable but poorly or inadequately sampled or rare (e.g., wetland species, endangered species). There are certainly other species that could be mentioned as well. Much of this discussion is speculative in nature; we lack data that establish definitive causes behind BBS population trends (see James and McCulloch 1995). It is likely that for most birds with significant trends a number of factors operated in concert to produce changes in numbers.

CHANGES IN BREEDING HABITAT AVAILABILITY AND QUALITY

Our landscape is constantly changing in response to land management, succession, changes in climate, and the patterns of natural agents such as windstorms, rain, and fire. All changes affect the habitats of Wisconsin breeding bird populations, locally encouraging some species while discouraging others, according to their respective habitat preferences—for example, when a particular woodlot is logged, when a cornfield is retired into a set-aside program, or when a low meadow remains flooded throughout a particularly wet summer. Thus, the pattern of bird habitats and breeding populations is spatially and temporally dynamic. In the following discussion we attempt to distinguish long-term, widespread trends in habitat quality and quantity from those that are more local or short-term, for it is the longer-term changes that are more likely to affect the sorts of bird population trends identified by the BBS.

Trends in forest habitat and forestry practices. We hesitate to discuss this issue without a careful analysis of the effects of various forestry practices on populations of individual bird species and information on trends in the uses of these practices. However, some relationships seem worth mentioning here. Forest acreage has increased in recent decades in central and southern Wisconsin (Hahn 1985, Raile 1985a) as grassland and abandoned farmland has succeeded to oldfield and ultimately forest and as more land has been planted to conifers. Statewide, the average age of forest stands has also increased (Raile 1985b). These trends probably benefitted a number of increasing bird species including Broad-winged Hawk, Hairy, Red-bellied, and Pileated Woodpecker, Raven, Chickadee, Red-breasted Nuthatch, Winter Wren, Blue-gray Gnatcatcher, Hermit

Thrush, Red-eyed Vireo, Magnolia, Yellow-rumped, and Cerulean Warbler, and Purple Finch. Declining species that apparently responded negatively to the succession of brushlands into forest include Golden-winged Warbler, Eastern Towhee, and Vesper and Field Sparrow.

Populations of species such as Mourning and Chestnut-sided Warblers that are common in early stages of forest succession in northern Wisconsin, and so benefit from even-aged forest management (e.g., clearcutting), did well during 1966–91. Forestry practices and other factors that have discouraged the occurrence of mature conifers such as hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*) may be partly responsible for the decline in Blackburnian Warbler populations.

The increase and subsequent decline in Red-headed Woodpecker may be associated with the spread of Dutch elm disease during the 1960s and 1970s and the subsequent collapse of dead elms—a favorite nesting substrate. The collapse of dead elms may also have helped cause declines in Flicker and Starling populations, while the loss of live elms may have contributed to a decline in the Warbling Vireo, which nested commonly in elms. The Baltimore Oriole, which also favored elms for nesting, apparently maintained stable statewide populations by shifting to a variety of other nest substrates (Mossman and Lange 1982); however, its short-term regional decline may have been related to the elm problem.

Wetland loss. Wetland acreage in Wisconsin has continued to decrease since the 1960's (Petersen et al. 1982; WDNR 1989). Declining species probably affected by loss of wetlands included Blue-winged Teal, Ring-necked Pheasant, and Virginia and Sora Rails. Other wetland species not adequately sampled by the BBS have probably also been affected, including American Bittern, Common Moorhen, Common Snipe, Black Tern, and Black-crowned Night-Heron.

Urbanization. As the human population in the state has increased, so has the acreage devoted to urban and suburban development. As natural habitats have been disturbed or removed due to development, many birds dependent on those habitats may have declined or been extirpated locally. However, species whose statewide increases were probably related to increased residential and urban developments include American Robin, Chipping Sparrow, Killdeer, House Wren, Rock Dove, Crow, Northern Cardinal, Mourning Dove, and House Finch.

Agricultural Land Use Changes. Major changes in agricultural land use which began in the 1950's continued into the 1990's. The most dramatic changes included the conversion of pasture, grass hay, and small grains to rowcrops (corn and soybeans) and alfalfa hay (Sample 1989). Pasture acreage alone declined by almost 50% from 1964 to 1992. Along with these changes came clean farming and the removal of fencerows, large trees, and small uncultivated areas. Grassland species were most severely impacted by these changes in land use. While some species increased in response to these changes (e.g., Canada Goose, Killdeer, and Rock Dove), a majority declined: Ring-necked Pheasant, Loggerhead Shrike, Bobolink, Eastern and Western Meadowlark, and Field, Vesper, Savan-

nah, and Grasshopper Sparrow. Clean farming and hedgerow removal may have contributed to declines in species such as Red-headed Woodpecker, Northern Flicker, and Warbling Vireo.

Opposing the trend towards less grassland nesting habitat was the Conservation Reserve Program (CRP) which has, since 1986, resulted in the establishment of more than 700,000 acres of grassy habitat in the state (USDA 1995). Fields enrolled in this program remain uncultivated for at least 10 years. Some grassland species, including Dickcissel and Savannah Sparrow, showed increases during 1982–1991 that may be related to increased habitat provided by the CRP.

Fragmentation. Almost all types of Wisconsin habitats have been subject to fragmentation, including forests, wetlands, and grasslands. Fragmentation affects birds directly by reducing habitat size and by simplifying habitat structure and composition, and indirectly by changing relationships between breeding birds and other species, nest predators, and nest parasites (Johnson and Temple 1986). These complex effects on habitat quality and reproductive rates may not always be reflected in population counts such as BBS, for example, if surplus individuals produced in "source" areas emigrate into the poorly suitable, fragmented habitats ("sinks"). Similarly, the effects of fragmentation on a statewide population may not appear until some years after the fragmentation occurs, for example, when fragmentation or other factors eventually begin to affect the source populations, or where habitat debilitation is a slow, progressive process. Fragmentation can also be hard to separate from other related factors such as urbanization, agricultural and forest land use changes, and wetland loss. Nevertheless, we feel that fragmentation has been a major factor in the population changes of some species, some of which, like the American Redstart and Black-and-White Warbler, suffered their major declines prior to the BBS period. Forest species whose 1966–91 declines may have been caused at least in part by fragmentation include Least Flycatcher, Veery, and Blackburnian Warbler. Declining grassland species that may have suffered from fragmentation include Grasshopper and Henslow's Sparrow, Bobolink, and Eastern Meadowlark (Herkert 1994), and Western Meadowlark. Some increasing species that probably benefitted from habitat fragmentation include Red-tailed Hawk, Northern Bobwhite, Mourning Dove, Crow, House Wren, American Robin, Yellow and Mourning Warbler, Chipping and Song Sparrow, and Northern Cardinal.

Habitat management. Private and public wildlife management efforts are often directed at increasing the populations of particular species—often game or endangered species such as pheasants, grouse, terns, and ducks. Activities regularly involve the establishment and maintenance of appropriate habitat such as grassy upland cover, young aspen, or marshy impoundments, but have also included activities such as predator control and artificial nest-site programs. Birds whose BBS population increases have possibly been related to nest platform or box construction are Great Blue Heron, Great Egret, Wood Duck, Osprey, American Kestrel, and Eastern Bluebird.

SURPLUS OR INADEQUATE REPRODUCTION

Toxic chemicals/Pesticides. A number of raptor species that suffered population declines during the DDT era experienced increases after that chemical was banned in 1972; these birds include Turkey Vulture, Bald Eagle, Osprey, Broad-winged Hawk, Cooper's Hawk, and American Kestrel. The species that were most affected by DDT were those whose prey (e.g., songbirds) are typically insectivorous rather than herbivorous species (e.g., grouse, hares, voles) (Evans 1982). Effects of current chemical use on birds remain poorly known, but a number of declining species may be affected by practices such as spraying for spruce budworm or Gypsy moths in forests (Blackburnian and Nashville Warbler) and application of agricultural pesticides (Ring-necked Pheasant, Vesper Sparrow, and possibly other grassland species, such as Loggerhead Shrike) (see Gard and Hooper 1995, Rotenberry et al. 1995).

Predation. Predation is believed to be the major cause of nest failure for grassland birds (Frawley 1989) and undoubtedly played a role in the decline in some of these species. Predation probably also had impacts on other declining species. General increases in predator populations since the mid-1950's are thought to be related to reduced fur prices, reduced persecution of predators, and fragmentation-related changes in habitat in Wisconsin landscapes such as creation of travel corridors and increased access to the interior of habitat patches (Petersen et al. 1988; Thompson et al. 1993).

Parasitism. Cowbird parasitism has been established as a major threat to a number of breeding passerines (Robinson et al. 1993). Habitat fragmentation has allowed Cowbirds to expand and gain access to habitats previously inaccessible to them. Declining species known to be frequent Cowbird hosts include Veery, Warbling Vireo, Eastern Towhee, Vesper and Field Sparrow, and Eastern Meadowlark (Ehrlich et al. 1988).

Competition. While the role of competition for nesting sites and other resources with other species is suspected as a factor in the declines of a number of species, we lack the ability to establish a certain causal relationship. Species thought to have suffered from competition during 1966–91 include Black Duck (competition with the Mallard; hybridization may also play a role here), Purple Martin (Starling, House Sparrow), Golden-winged Warbler (Blue-winged Warbler), Red-headed Woodpecker (Starling), Northern Flicker (Starling), and possibly Western Meadowlark (Eastern Meadowlark) and House Sparrow (House Finch).

Food resources. The impacts of changes in food resources on bird population changes are not well-known. As one example, the opportunistic Ring-billed Gull increased in part by making use of extensive human-related changes in food resources including garbage dumps, malls and fast-food restaurants, and invertebrates in freshly-plowed rowcrop fields (Brewer et al. 1991). There is also some evidence that insect outbreaks (e.g., spruce budworm, gypsy moth, tent caterpillar) can be related to population increases in forest species (Rotenberry et al. 1995). An example of population fluctuation in response to insect outbreaks may be found in the two cuckoo species, both stable in Wisconsin from 1966–91. The cuckoos have been described as responding elsewhere to

outbreaks of their tent caterpillar prey (Dinsmore et al. 1984; Brewer et al. 1991). In Wisconsin the apparently cyclic population highs documented around 1971, 1980, and 1989 (Fig. 5) corresponded fairly well with years of high populations of forest tent caterpillars (*Malacosoma americanum*), eastern tent caterpillars (*M. disstria*), and/or fall webworms (*Hyphantria cunea*), as recorded by WDNR foresters (e.g., WDNR 1992).

Weather. Periods of prolonged cool and/or wet weather during the spring and summer has been suggested as contributing to the declines of a number of species, including Purple Martin, Ring-necked Pheasant, and Eastern Bluebird (Brewer et al. 1991, Petersen et al. 1988).

Agricultural Practices. Two major changes in agricultural practices undoubtedly had a negative effect on the nesting productivity of grassland birds: hay mowing and rowcrop cultivation. Modern alfalfa hay varieties are harvested much earlier and more frequently than grass hays were (Sample 1989), with the result that many grassland bird nest attempts fail (Frawley 1989). Because all of the declining grassland species are known to nest in alfalfa, nest losses to mowing may have been a significant factor in their downward population trends. Intensive cultivation of rowcrops probably resulted in the destruction of many Vesper Sparrow nests (Rodenhouse and Best 1983).

Persecution and Hunting. A number of increasing species have probably been favored by reduced persecution and hunting, even though mortality due to persecution (e.g., shooting) may have slowed or ceased long before the beginning of the BBS; these include Turkey Vulture, Osprey, and Red-tailed Hawk. The role of hunting in relation to declines in game species (e.g., Blue-winged Teal) is unclear.

Introductions. Introductions of species played a role in increases for some species. These include the Turkey and possibly the Wood Duck, a native species whose population was augmented with introductions in the 1930's.

OVERWINTER MORTALITY. The biggest gap in our knowledge of factors that may contribute to population changes involves events on the wintering grounds. In some cases, overwinter mortality rates may have been the driving force behind a given species' population trend.

Pesticides. The extent to which declining bird species have been affected in recent years by exposure to toxic chemicals on the wintering grounds is not well known. Pesticide use is suspected to have affected at least one species negatively (Purple Martin), and there is good evidence that Dickcissel populations have been recently impacted by pesticide use in Venezuela (Basili and Temple 1995). This is a topic that demands further study.

Land Use changes. Land use changes in the wintering grounds, whether in the southern U.S., central America, or South America, may have had either a positive or negative effect on migratory birds that breed in Wisconsin. Among the declining species possibly affected by loss of quality wintering habitat are Blue-winged Teal, Black Tern, Loggerhead Shrike (Brooks and Temple 1990), Veery, and possibly Bobolink. Too little is known about this important topic (see Sherry and Holmes 1993).

Competition. Competition for increasingly scarce habitat on wintering

grounds may have contributed to the decline of some migratory species. An example is the Loggerhead Shrike, which must compete for winter habitat with resident Shrikes in the southern U.S. (Brooks and Temple 1990).

Weather. Weather, especially harsh winter weather, has been associated with declines in a number of species, including Pheasant, Northern Bobwhite, Kestrel, Northern Flicker, Starling, Eastern Bluebird, Field Sparrow, Bobolink, and Eastern and Western Meadowlark (see Robbins 1982, Brewer et al. 1991). Several species (e.g., Yellow Warbler, Indigo Bunting, and Song Sparrow) with stable overall trends apparently experienced short-term dips in their populations due to the hard winters of 1976–78 in the southern U.S. Conversely, mild winters probably contributed to increased populations for some of these species. Migration hazards such as severe storms and collisions with human-made structures have also been implicated as negatively affecting birds.

Blackbird Control. Icterids such as Red-winged Blackbird, Common Grackle, and Brown-headed Cowbird suffered population losses that were aided by large-scale control efforts in the 1970s (Robbins et al. 1986).

OTHER FACTORS

Population Shifts and Range Expansions/contractions. Several species underwent range changes during 1966–91, and some of these changes influenced BBS population trends. Examples of increasing species with expanded ranges were Canada Goose, Turkey Vulture, Sandhill Crane, Northern Cardinal, and House Finch. During the BBS era, while Turkey Vulture populations increased in Wisconsin, they declined in some areas near the center of the species' range in the southeastern U.S. Mossman (1991) speculated that this northward population shift resulted in part from a decline in suitable breeding habitat in the Southeast.

Some geographical population shifts may have been related to weather; for example, it has been suggested that temporary increases in Dickcissel abundance in the upper Midwest were possibly related to shifts out of the center of the breeding range (Kansas) due to drought conditions (Brewer et al. 1991).

Sample adequacy—Species that were inadequately sampled by BBS have one or more of the following characteristics: they are rare, occur in habitats not often encountered on BBS routes (e.g., wetland or forest interior), behave in ways that make them unlikely to be encountered during BBS sampling (e.g., nocturnal, colonial, secretive, unusual breeding time, etc.), exhibit substantial year to year variability, or exhibit substantial variability in the direction of trends among different routes. The first three characteristics all lead to low probabilities of encounter and small sample sizes. Monitoring species with these characteristics will probably require special purpose surveys. Species that fall into the last two categories may be relatively abundant and frequently seen or heard during BBS surveys, but because of their variability are difficult to sample adequately.

Other monitoring tools currently available include the Wisconsin Breeding Bird Atlas, the Wisconsin checklist project (WCP), and various WDNR surveys. The Breeding Bird Atlas is a multi-year project to determine the

distribution and relative abundance of the breeding birds of Wisconsin. Data from the initial survey period (1995–2000) will provide baseline data against which possible future data may be compared. Because the atlas project is based on a systematic sample of survey blocks covering the entire state, and because all habitats within the sampled blocks will be surveyed, it will provide much more complete coverage of the state and its habitats than does BBS. On the other hand, bird abundance data from the atlas project will be less quantitative than are BBS data, and future surveys will be conducted at much longer intervals, if they are conducted at all. The atlas project will probably be best suited to documenting changes in breeding status and range. It may provide the best information available for birds of rare or inaccessible habitats, and for birds whose behavior makes them unlikely to be encountered on BBS routes.

The WCP was initiated in 1982 by the WSO as a "research project to assess the value of weekly lists of bird species observed by society members for collecting information about Wisconsin's bird species" (Rolley 1992). Temple and Temple (1986) showed that there were significant correlations between the frequency of occurrence on WCP checklists and other indices of bird abundance. Nevertheless, some possible biases associated with checklists, due to factors such as changes in the regional distribution of observers or changes in the average ability or activity of observers, are not well understood. The WCP provides valuable supplementary information on trends, and may provide the best available information for some species whose habitat is not often encountered on BBS routes or whose breeding phenology, nocturnal or crepuscular habits, or other life history characteristics prevent them from being recorded frequently on BBS routes.

The WDNR conducts a number of surveys of birds, including primarily game birds and some endangered or threatened species. Species for which surveys currently exist include: Common Loon, Red-necked Grebe, Trumpeter and Mute Swan, Canada Goose, breeding ducks, Bald Eagle, Osprey, Peregrine Falcon, Ruffed Grouse, Prairie Chicken, Sharp-tailed Grouse, Northern Bobwhite, Gray Partridge, Ring-necked Pheasant, Wild Turkey, Piping Plover, American Woodcock, Caspian Tern, Forster's Tern, Common Tern, Loggerhead Shrike, Kirtland's Warbler, and several other nongame species. For most of these species, the WDNR surveys provide the best available trend information on Wisconsin populations.

Summary

Wisconsin has 70 federal Breeding Bird Survey (BBS) routes, each comprising 50 roadside stops at which a cooperator records all birds seen or heard during 3-min observation periods, once each breeding season. The route completion record for Wisconsin is among the best in the continent, with 87% of all possible surveys during the years 1966–91 available for data analysis. Coverage was poorest in the northern counties, especially early in the period. We analyzed these data by several techniques to determine and illustrate population trends for the 26-year period of 1966–91 and the 10-year period of 1982–91, and compared Wisconsin trends with those of larger

regions and adjacent states and provinces.

Of 233 species known or suspected of breeding in Wisconsin during 1966–91, 212 (91%) were recorded on BBS routes, along with 8 nonbreeders. The most common species were Red-winged Blackbird, House Sparrow, European Starling, American Robin, Common Grackle, and American Crow. Half (117) of the 233 breeding species were adequately sampled by the BBS. The percentage of species that were adequately sampled was fairly constant among 4 categories of migration distance, but varied according to breeding habitat: 70–73% of generalist, edge, and urban/farmstead species; 56% of grassland species, 50% of forest species, and 27% of wetland species.

Increasing species were represented by 45 (20%) of all species recorded on the BBS, or 41 (35%) of those species adequately sampled; they included disproportionately many species of wetland, forest, and urban/farmstead habitats, and resident species. Species that increased at a mean annual rate over 6% were Canada Goose, Turkey Vulture, Sandhill Crane, Blue-gray Gnatcatcher, and Connecticut Warbler. Of the 45 increasing species, 25 showed similar trends in the Eastern continental region, suggest that Wisconsin's gains were part of a more widespread trend. Decreasing species included 32 (15%) of all BBS species, and 24 (21%) of those adequately sampled, with disproportionate numbers of grassland and short-distance migrants. Species that declined at a rate greater than 6% per year were Grasshopper Sparrow and Western Meadowlark. Eleven declining species also showed declines in the Eastern region.

Patterns other than significant linear trends also occurred, for example: populations of several species such as Eastern Bluebird and Song Sparrow declined during the late 1970s, then recovered to varying degrees; Red-headed Woodpecker and other species exhibited population increases followed by decreases; species such as Ruffed Grouse and cuckoos showed periodic fluctuations that suggested population cycles. Probable causes of trends include a large variety of factors, including the elimination of organochlorine pesticides in North America, habitat changes in wintering and breeding areas, interspecific competition, short-term weather conditions, and prey cycles.

The efforts of BBS volunteers have made this program an invaluable tool for monitoring populations of at least half of Wisconsin's breeding bird species. Populations of some inadequately sampled species are monitored well by other programs in Wisconsin, or by the BBS over larger regions, but some species—especially those of wetland and forest interior habitats—are still in need of special monitoring efforts in the state.

Acknowledgements

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Grackle *by Robert A. Kleppin*

The Fall Season: 1995

by Mark S. Peterson

The fall of 1995 probably will not be remembered, except that it started what would become one of the longest, coldest, and snowiest winters this century in at least the northern half of the state. Those birds that either could not find a good reliable source of food or the means to migrate out of the state were already struggling to find food by the time the fall season ended.

August was a rainy and warm month. Berner reported 18.4″ of rain in Rosholt, Hale reported 8.9″ in Lake Mills, and the Lukes reported 4.6″ in Egg Harbor during the month. A low temperature of 41 was reported at Crandon on the 22nd, and a high of 99 was reported in Lone Rock on the 11th, and in Madison on the 12th.

September was not as wet, but it became much cooler after the middle of the month. Ashman reported 16 warblers on the 19th, and 15 on the 23rd. Snow flurries were reported in Caroline on the 22nd, while about 4″ of snow fell in the Hurley area. The growing season ended in most of the state on the 23rd with lows in the mid to upper 20's. A high of 92 was reported in Lone Rock on the 4th with a low of 23 in Black River Falls and Rib Mountain on the 23rd.

October was again a wet month. On the 8th Ashman reported large numbers of Winter Wrens, kinglets, Hermit Thrushes, Yellow-rumped Warblers, and sparrows. On the 21st snow was reported in the amounts of 7″ in Saxon and Hurley, 5″ in Eagle River, and about 1/4″ in Caroline.

November became cold rather quickly and stayed that way throughout. The beginning of a major winter finch and northern owl invasion was apparent by the end of the month. Those who wanted tracking-snow for deer hunting found it arriving just before the gun hunting season and lingering through the end. A big snow fell on the 26th and 27th, with 10″ in Green Bay, 11″ in Appleton, and 13″ in Oshkosh. Shawano Lake was 90% frozen over on the 12th, with 6″ of ice on the Marion Pond in Waupaca County by the 25th. It was −3 in Caroline and Lena on the 29th.

A total of 289 species were found in the state during the 1995 fall season. Rarities, some of which lingered, while most others did not, included the following: a Red-throated Loon in Oconto County, Eared Grebes in Kewaunee and Manitowoc Counties, Western Grebes in Douglas and Ozaukee Counties, White Pelicans in Columbia, Dodge, La Crosse, Marathon, Oconto, and Winnebago Counties, Snowy Egrets in Brown County, a Little Blue Heron in Brown County, Trumpeter Swans in Burnett, Dane, Jefferson, Marathon, and Pierce Counties, Greater White-fronted Geese in Grant County, a Ross' Goose in Eau Claire County, a King Eider in Kewaunee County, Harlequin Ducks in Manitowoc and Milwaukee Counties, Barrow's Goldeneyes in Marathon and Ozaukee Counties, Swainson's Hawks in Oconto and Ozaukee Counties, Golden Eagles in Burnett, Grant, Langlade, Monroe, and Oconto Counties, a Spruce Grouse in Forest County, Yellow Rails in Grant and Milwaukee Counties, King Rail in Kenosha County, American Avocets in Manitowoc, Milwaukee, and Monroe Counties, Willet in Dane County, Whimbrel in Manitowoc County, Hudsonian Godwit in Oconto County, Marbled Godwit in Oconto County, Western Sandpipers in Brown, Manitowoc, and Oconto Counties, Purple Sandpiper in Sheboygan County, Buff-breasted Sandpipers in Columbia, Dane, Ozaukee, Portage, and Racine Counties, Little Gulls in Oneida County, Mew Gull in Ozaukee County, Thayer's Gulls in Manitowoc and Sheboygan Counties, an Iceland Gull in Manitowoc County, Lesser Black-backed Gull in Dane County, Great Black-backed Gulls in Kewaunee, Manitowoc, Milwaukee, and Sheboygan Counties, Boreal Owls in Sheboygan County, Rufous Hummingbird in Columbia County, Selasporous Sp. hummingbird in Milwaukee County, Carolina Wrens in Dane, Jefferson, and Richland Counties, a Townsend's Solitaire in Grant County, Bell's Vireos in Richland and Winnebago Counties, Worm-eating Warbler in Racine County, Spotted Towhee in Shawano County, Sharp-tailed Sparrows in Brown, Burnett, and Milwaukee Counties, and Smith's Longspur in Milwaukee County.

Reports
(1 August–30 November 1995)

Red-throated Loon.—Reported by the Smiths in Oconto County on 12 November.

Common Loon.—Reported at the beginning of the period south to Barron and Oneida Counties. Verch found 49 in Ashland and Bayfield Counties on 3 October. Found at the end of the period in Washington County by Domagalski.

Pied-billed Grebe.—Found at the beginning of the period in scattered areas throughout the state. Tessen found 60 in Waupaca County on 1 October. Reported at the end of the period in Walworth and Winnebago Counties.

Horned Grebe.—First reported by J. Hansen in Brown County on 13 September. Verch found 145 in Ashland and Bayfield Counties on 3 October. Last reported by Ashman in Dane County on 19 November.

Red-necked Grebe.—Found at the beginning of the period in Burnett and Winnebago Counties. Ziebell found 8 in Winnebago County on 16 September. Last reported by Robbins in Ozaukee County on 26 October.

Eared Grebe.—Reported by Tessen in Manitowoc County on 2 October and by Regan in Kewaunee County on 23 October.

Western Grebe.—Reported by Johnson in Douglas County on 16 September and by Green in Ozaukee County on 18 October.

White Pelican.—Reported at the beginning of the period in Brown County by Tessen. Thiessen found 89 in La Crosse County on 20 October. Last reported by Uttech in Columbia County on 6 November. Also found during the period in Dodge, Marathon, Oconto, and Winnebago Counties.

Double-crested Cormorant.—Reported at the beginning of the period in scattered areas south to Ozaukee County. Tessen found over 5000 in Brown County on 2 September. Found at the end of the period in Brown, Ozaukee, and Winnebago Counties.

American Bittern.—Found at the beginning of the period south to Winnebago County. Ziebell found 4 in Winnebago County on 30 September. Last reported by Hoffman in Kenosha County on 24 November.

Least Bittern.—Reported from the beginning of the period to 16 September in Winnebago County by Ziebell.

Great Blue Heron.—Found throughout the state at the beginning of the period. Ziebell found 20 in Winnebago County on 16 September. Reported at the end of the period in Ozaukee County by Uttech.

Great Egret.—Reported at the beginning of the period in Brown, Oconto, and Winnebago Counties. Ziebell found 82 in Winnebago County on 16 September. Last reported by Thiessen in La Crosse County on 20 October.

Snowy Egret.—Found at the beginning of the period in Brown County by J. Hansen and Tessen. Several observers reported a maximum of 6 in Brown County between the beginning of the period and 16 September. Last reported by Berger in Sheboygan County on 2 November.

Little Blue Heron.—A white-phased individual was reported in Brown County on 10 August by Erdman, on 24 August and 14 September by Tessen, and on 1 September by Uttech.

Cattle Egret.—Reported at the beginning of the period in Brown County by J. Hansen and Tessen. Tessen found 5 in Brown County on 1 August. Last reported by Wood in Milwaukee County on 28 October.

Green Heron.—Found throughout the state at the beginning of the period. Ziebell found 6 in Winnebago County on 30 September. Last reported by Reardon in Forest County on 12 October.

Black-crowned Night-Heron.—Reported at the beginning of the period north to Marathon, Oconto, and Door Counties. Ziebell found 60 in Winnebago County on 30 September. Last reported by Uttech in Milwaukee and Ozaukee Counties on 30 November.

Tundra Swan.—First reported by Regan in Kewaunee County on 9 September. Berger found 1542 in Sheboygan County on 4 November. Found at the end of the period in Dane, Ozaukee, and Sheboygan Counties.

Trumpeter Swan.—Reported at the beginning of the period in Burnett and Marathon Counties. Robbins found 5 in Dane County on 10 November. Reported at the end of the period in Burnett County by Hoefler.

Mute Swan.—Found at the beginning of the period in Ashland, Bayfield, Dane, and Washington Counties. The La Valleys found 7 in Douglas County on 29 November. Found at the end of the period in Dane, Douglas, Portage, and Shawano Counties.

Greater White-fronted Goose.—McKay found 26 in Grant County on 25 October.

Snow Goose.—Reported at the beginning of the period in Winnebago County by Ziebell. Parsons found 120 in Walworth County on 8 November. Found at the end of the period in Ozaukee and Winnebago Counties.

Ross' Goose.—Reported by Polk in Eau Claire County from 16 to 22 October. This record was accepted by the Records Committee. See "By the Wayside."

Canada Goose.—Found throughout the state during the period. Volkert reported over 150,000 in Horicon Marsh in early November.

Wood Duck.—Found throughout the state at the beginning of the period. Ziebell found 100 in Winnebago County on 30 September. Reported at the end of the period in Waupaca County by the Petersons.

Green-winged Teal.—Reported at the beginning of the period south to Dane and Ozaukee Counties. Ziebell found 412 in Winnebago County on 16 September. Last reported by Ziebell in Winnebago County on 12 November.

American Black Duck.—Reported at the beginning of the period south to Portage, Winnebago, and Sheboygan Counties. Verch found 51 in Ashland and Bayfield Counties on 24 November. Found in scattered areas throughout the state at the end of the period.

Mallard.—Found throughout the state during the period. Volkert reported over 5000 in Horicon Marsh in late October.

Northern Pintail.—First reported by Ashman in Dane County on 3 September. Ziebell found 40 in Winnebago County on 16 September. Last reported by Ziebell in Winnebago County on 26 November.

Blue-winged Teal.—Found throughout the state at the beginning of the period. Ziebell found 1500 in Winnebago County on 16 September. Last reported by Thiessen in Crawford County on 7 November.

Northern Shoveler.—Reported at the beginning of the period in Barron, Marathon, and Ozaukee Counties. Ziebell found 366 in Winnebago County on 11 November. Found at the end of the period in Dane and Winnebago Counties.

Gadwall.—Reported at the beginning of the period in Brown and Winnebago Counties. Ashman found 40 in Dane County on 5 November. Found at the end of the period in Brown, Dane, Milwaukee, and Winnebago Counties.

American Wigeon.—Found at the beginning of the period in Dane and Douglas Counties. Ziebell found 700 in Winnebago County on 16 September. Reported at the end of the period in Dane and Vilas Counties.

Canvasback.—Reported at the beginning of the period in Marathon County by Ott. Ziebell found 100 in Winnebago County on 31 October. Found at the end of the period in Dane, Ozaukee, Vilas, and Washington Counties.

Redhead.—Found at the beginning of the period in Barron and Winnebago Counties. Ziebell found 26 in Winnebago County on 16 September. Reported at the end of the period in Dane, Ozaukee, Vilas, and Washington Counties.

Ring-necked Duck.—Found at the beginning of the period south to Columbia and Dodge Counties. Verch found 10 in Ashland and Bayfield Counties on 26 September. Reported at the end of the period in Dane County by Ashman and Burcar.

Greater Scaup.—Reported at the beginning of the period in Manitowoc County by Sontag. Tessen found 800 in Manitowoc County on 15 October. Reported at the end of the period in Door, Manitowoc, Milwaukee, Oconto, Ozaukee, and Sheboygan Counties.

Lesser Scaup.—Found at the beginning of the period in Dodge, Manitowoc, and Washington Counties. Tessen found 500 in Manitowoc County on 2 October. Reported at the end of the period north to Winnebago and Brown Counties.

King Eider.—Reported by several observers at Algoma Harbor in Kewaunee County from 18 to 23 November. Accepted by the Records Committee. See "By the Wayside."

Harlequin Duck.—Reported on 29 October in Manitowoc County by Sontag, and in Milwaukee County from 8 to 24 November by Boldt and on 18 November by Bontly, Gustafson, and Strelka.

Oldsquaw.—First reported on 21 October in Ozaukee County by Uttech. Uttech found over 500 in Ozaukee County on 22 October. Reported at the end of the period by Uttech in Ozaukee County.

Black Scoter.—First reported by Tessen in Ozaukee County on 2 October, when he found 20. Last reported by Green in Ozaukee County on 22 November.

Surf Scoter.—First reported by Verch in Ashland and Bayfield Counties on 26 September. Verch found 15 in Ashland and Bayfield Counties on 3 October. Last reported by Boldt in Milwaukee County on 24 November.

White-winged Scoter.—First reported by Stover in Door County on 27 August. Regan found 8 in Kewaunee County on 23 October. Last reported by Verch in Ashland and Bayfield Counties on 27 November.

Common Goldeneye.—Reported at the beginning of the period in Door County by the Lukes. Berner found 270 in Portage County on 30 November. Reported at the end of the period north to Oconto and Door Counties.

Barrow's Goldeneye.—Ott reported that one was shot by a hunter in Marathon County on 27 October. Also reported by several observers in Ozaukee County from 11 to 22 November. Accepted by the Records Committee. See "By the Wayside."

Bufflehead.—First reported by the Fishers in Oneida County on 16 September. Domagalski found 675 in Milwaukee County on 5 November. Found at the end of the period north to Door and Oconto Counties.

Hooded Merganser.—Found at the beginning of the period south to Barron, Portage, and Manitowoc Counties. Goff found 100 in Barron County on 31 October. Reported at the end of the period north to Winnebago and Brown Counties.

Common Merganser.—Reported at the beginning of the period in Vilas County by the Drings. Ziebell found 2400 in Winnebago County on 13 November. Found at the end of the period in scattered areas throughout the state.

Red-breasted Merganser.—Found at the beginning of the period in Ashland, Bayfield, Door, and Manitowoc Counties. Uttech found thousands in Ozaukee County on 3 November. Reported at the end of the period north to Door County.

Ruddy Duck.—Found at the beginning of the period in Dane, Ozaukee, and Winnebago Counties. Tessen found 550 in Winnebago County on 10 November. Found at the end of the period in Dane, Milwaukee, Ozaukee, and Washington Counties.

Turkey Vulture.—Found throughout the state at the beginning of the period. Cowart found 40 in Ozaukee County on 15 October. Reported at the end of the period in Lafayette County by McDaniel.

Osprey.—Reported at the beginning of the period south to Dane and Manitowoc Counties. Cowart found 6 in Ozaukee County on 7 October. Last reported by Uttech in Ozaukee County on 15 November.

Bald Eagle.—Found at the beginning of the period south to Pierce and Outagamie Counties. Hoefler found 29 in Burnett County on 6 November. Found in scattered areas throughout the state at the end of the period.

Northern Harrier.—Found in scattered areas throughout the state at the beginning of the period. Cowart found 125 in Ozaukee County on 15 October. Reported at the end of the period in Monroe, Washington, and Winnebago Counties.

Sharp-shinned Hawk.—Found in scattered areas throughout the state during the period. Berger reported 2343 in Sheboygan County on 15 October.

Cooper's Hawk.—Found throughout the state at the beginning of the period. Cowart found 23 in Ozaukee County on 15 October. Reported at the end of the period north to Marathon County.

Northern Goshawk.—Reported at the beginning of the period in Door County by the Lukes. Cowart found 8 in Ozaukee County on 15 October. Found at the end of the period in Door and Douglas Counties.

Red-shouldered Hawk.—Found at the beginning of the period in Dunn, Outagamie, Portage, and Vilas Counties. Tessen found 3 in Ozaukee County on 15 October. Last reported by Domagalski in Ozaukee County on 11 November.

Broad-winged Hawk.—Reported at the beginning of the period south to Dane County. 127 were found at Little Suamico Ornithological Station on 22 September. Last reported by the Lukes in Door County on 18 October.

Swainson's Hawk.—Reported on October 12 at Little Suamico Ornithological Station and on 15 October in Ozaukee County by Baade, Cohen, and Cowart.

Red-tailed Hawk.—Found at the beginning of the period throughout the state. Berger found 524 in Sheboygan County on 15 October. Reported at the end of the period north to Burnett, Douglas, Clark, Marathon, Oconto, and Door Counties.

Rough-legged Hawk.—First reported by the LaValleys in Douglas County on 26 August. Berger found 13 in Sheboygan County on 11 November. Found in scattered areas throughout the state at the end of the period.

Golden Eagle.—First reported on 14 October at Little Suamico Ornithological Station and in Langlade County by Klapste. Last reported on 30 November in Monroe County by Kuecherer. Mandernack reported a total of 23 from 16 October to 14 November at Eagle Valley in Grant County.

American Kestrel.—Found throughout the state at the beginning of the period. Cowart found 75 in Ozaukee County on 14 October. Reported at the end of the period north to Burnett, Clark, and Door Counties.

Merlin.—An injured individual was found in Lincoln County on 5 August. It was banded and released 3 weeks later by Gibson. Cowart and Domagalski found 479 in Ozaukee County on 14 October. This was a one day inland record for North America. Last reported by Diehl in Milwaukee County on 17 November.

Peregrine Falcon.—Reported at the beginning of the period in Dane County by Ashman. Berger found 20 in Sheboygan County on 1 October. Last reported by Robbins in Ozaukee County on 26 October.

Gray Partridge.—Reported during the period in Brown, Dodge, Door, Kenosha, Kewaunee, and Winnebago Counties.

Ring-necked Pheasant.—Found during the period north to Burnett, Oneida, Oconto, and Door Counties. Richter found a maximum of 4 in Monroe County and Ziebell found 4 in Winnebago County on 16 September.

Spruce Grouse.—Reported by Reardon in Forest County on 4 November.

Ruffed Grouse.—Reported during the period south to Richland and Dane Counties. Berner found 10 in Portage County on 21 August.

Greater Prairie-Chicken.—Reported during the period in Clark, Marathon, and Portage Counties. Berner found 78 in Portage County on 12 November.

Sharp-tailed Grouse.—Reported during the period in Burnett and Douglas Counties.

Wild Turkey.—Reported during the period north to Burnett, Shawano, and Door Counties. Duerksen found 48 in Richland County on 28 November.

Northern Bobwhite.—Found during the period in Dane, Kenosha, Richland, and Washburn Counties. Duerksen found 10 in Richland County on 29 November.

Yellow Rail.—Reported by Williams in Grant County on 27 September and Diehl reported an injured one in Milwaukee County on 2 October.

King Rail.—Reported by Hoffman in Kenosha County on 16 September.

Virginia Rail.—Reported at the beginning of the period in Dane, Oconto and Winnebago Counties. Ziebell found 4 in

Winnebago County on 16 September. Last reported by Diehl in Milwaukee County on 14 October.

Sora.—Found at the beginning of the period in Brown, Burnett, Dane, Douglas, Waukesha, and Winnebago Counties. Ziebell found 46 in Winnebago County on 16 September. Last reported by Ashman in Dane County on 8 October.

Common Moorhen.—Reported at the beginning of the period in Brown, Dane, and Winnebago Counties. Ziebell found 24 in Winnebago County on 16 September. Last reported by Burcar in Columbia County on 30 October.

American Coot.—Reported at the beginning of the period in Barron, Brown, Dane, Douglas, and Winnebago Counties. Ashman found 5000 in Dane County on 14 November. Reported at the end of the period north to Marathon and Winnebago Counties.

Sandhill Crane.—Found throughout the state at the beginning of the period. Parsons found 722 in Walworth County on 7 November. Last reported by Hoefler in Burnett County on 28 November.

Black-bellied Plover.—First reported by Johnson in Douglas County on 2 August. Hoffman found 26 in Kenosha County on 16 September. Last reported by Sontag in Manitowoc County on 4 November.

American Golden Plover.—First reported by Robbins in Dane County on 12 August. Uttech found over 140 in Ozaukee County on 31 August. Last reported on 11 October in Dane County by Ashman and Burcar.

Semipalmated Plover.—Found at the beginning of the period in Dane, Ozaukee, and Washington Counties. Regan found 23 in Brown County on 4 August. Last reported in Dane County by Ashman on 11 October.

Killdeer.—Found throughout the state at the beginning of the period. Berner found 260 in Portage County on 27 August. Last reported by Uttech in Ozaukee County on 30 November.

American Avocet.—Reported in Monroe County by Kuecherer on 12 October, with 7 present on 14 October, by Sontag in Manitowoc County on 24 October, and by Tessen in Milwaukee County on 25 October.

Greater Yellowlegs.—Reported at the beginning of the period in Columbia, Dane, Douglas, Outagamie, and Ozaukee Counties. Diehl found 8 in Milwaukee County on 12 September. Last reported by Boldt in Milwaukee County on 8 November.

Lesser Yellowlegs.—Reported at the beginning of the period in scattered areas throughout the state. Ashman found 50 in Dane County on 13 August. Last reported on 2 November in Dane County by Burcar and in Burnett County by Hoefler.

Solitary Sandpiper.—Found in scattered areas throughout the state at the beginning of the period. Ashman found 7 in Dane County on 18 August. Last reported on 8 October in Dane County by Ashman.

Willet.—Reported in Dane County on 9 August by Ashman and E. Hansen.

Spotted Sandpiper.—Reported throughout the state at the beginning of the period. Sontag found 9 in Manitowoc County on 21 August. Last reported by Sontag in Manitowoc County on 13 October.

Upland Sandpiper.—Found at the beginning of the period in Burnett County by Hoefler. Last reported by Hoffman in Kenosha County on 16 September.

Whimbrel.—Reported by Tessen in Manitowoc County on 12 August.

Hudsonian Godwit.—Reported at Little Suamico Ornithological Station on 28 September.

Marbled Godwit.—Reported by the Smiths in Oconto County on 30 August and 24 September.

Ruddy Turnstone.—First reported by Uttech in Ozaukee County on 7 August. Hoffman found 7 in Kenosha County on 16 Sep-

tember. Last reported by Hasseleu in Washburn County on 27 October.

Red Knot.—Reported by Wood in Ozaukee County on 27 August and 4 September and by Regan in Brown County on 1 September.

Sanderling.—First reported by Burcar in Dane County on 11 August. Domagalski found 59 in Milwaukee County on 21 September. Last reported on 29 October by Sontag in Manitowoc County and by Domagalski in Ozaukee County.

Semipalmated Sandpiper.—Found at the beginning of the period in Dane, Marathon, Milwaukee, Outagamie, Ozaukee, and Washington Counties. Diehl found 20 in Milwaukee County on 9 August. Last reported by Sontag in Manitowoc County on 13 October.

Western Sandpiper.—Reported by Erdman in Brown County on 10 August, by Tessen in Manitowoc County on 27 August, by the Smiths in Oconto County on 10 September, and by Sontag in Manitowoc County on 16 October.

Least Sandpiper.—Reported at the beginning of the period in Dane, Milwaukee, Oconto, Outagamie, Ozaukee, and Washington Counties. Ashman found 40 in Dane County on 29 August. Last reported by Burcar in Dane County on 2 November.

White-rumped Sandpiper.—First reported by Tessen in Dane County on 3 August. The Smiths found 5 in Oconto County on 30 August. Last reported by Tessen in Sheboygan County on 23 November.

Baird's Sandpiper.—First reported by Tessen in Outagamie County on 6 August. Burcar found 6 in Dane County on 1 September. Last reported by Gustafson in Milwaukee County on 20 October.

Pectoral Sandpiper.—Found at the beginning of the period in Dane, Outagamie, and Washington Counties. Ashman found 50 in Dane County on 15 September. Last reported by Gustafson in Milwaukee County on 7 November.

Purple Sandpiper.—Reported by Sontag in Sheboygan County on 12 November. This record was accepted by the Records Committee. See "By the Wayside."

Dunlin.—First reported by Sontag in Manitowoc County on 15 September. Sontag found 58 in Manitowoc County on 23 October. Last reported by Sontag in Manitowoc County on 19 November.

Stilt Sandpiper.—Found at the beginning of the period in Dane and Washington Counties. Pike found 8 in Columbia County on 9 August. Last reported by Ashman in Dane County on 11 October.

Buff-breasted Sandpiper.—First reported by Tessen in Dane County on 3 August. Pike found 6 in Columbia County on 4 August. Last reported on 2 September in Portage County by Berner and in Racine County by Wood.

Short-billed Dowitcher.—Reported at the beginning of the period in Dane County by Ashman, Burcar, and Robbins. Tessen found 5 in Dane County on 3 August. Last reported by Tessen in Manitowoc County on 15 September.

Long-billed Dowitcher.—First reported by Uttech in Ozaukee County on 14 August. Ashman found 5 in Dane County on 14 October. Last reported by Gustafson in Milwaukee County on 3 November.

Common Snipe.—Found in scattered areas throughout the state at the beginning of the period. Ziebell found 14 in Winnebago County on 30 September. Last reported in Dane County by Ashman on 13 November.

American Woodcock.—Found at the beginning of the period south to Ozaukee and Washington Counties. Last reported by Hoffman in Kenosha County on 25 November.

Wilson's Phalarope.—First reported by Ashman in Dane County on 2 August. Last reported by Ziebell when he found 3 in Winnebago County on 16 September.

Franklin's Gull.—First reported on 2 October when 5 were found at Little Suamico

Ornithological Station. Last reported by Burcar in Dane County on 7 November.

Little Gull.—The Fishers found 5 in with some Bonaparte's Gulls at Planting Ground Lake in Oneida County on 9 August.

Bonaparte's Gull.—Reported at the beginning of the period in Manitowoc, Milwaukee, Oconto, Oneida, Ozaukee, and Sheboygan Counties. Gustafson found 1000 in Milwaukee County on 4 November. Found at the end of the period in Manitowoc, Milwaukee,and Ozaukee Counties.

Mew Gull.—Found by Uttech at Port Washington Harbor in Ozaukee County on 22 November. This record was accepted by the Records Committee. See "By the Wayside."

Ring-billed Gull.—Found throughout the state during the period. Ziebell found 1010 in Winnebago County on 2 August.

Herring Gull.—Reported throughout the state during the period. Sontag found 367 in Manitowoc County on 25 October.

Thayer's Gull.—Reported by Tessen in Sheboygan County on 3 November. He found 3 in Manitowoc County on 21 November.

Iceland Gull.—Reported by Tessen in Manitowoc County on 21 November.

Lesser Black-backed Gull.—Reported in Dane County by Brown on 4 October, by Robbins on 24 October and 22 November, and by E. Hansen on 22 November. See "By the Wayside."

Glaucous Gull.—First reported by the Brassers in Sheboygan County on 30 September. Sontag found 3 in Manitowoc County on 26 November. Found at the end of the period in Brown and Manitowoc Counties.

Western × Glaucous-winged Gull Hybrid.—Reported by Idzikowski in Milwaukee County on 22 November.

Great Black-backed Gull.—First reported by Bontly in Milwaukee County on 8 October. Last reported by Mueller in Manitowoc County on 26 November. Also found in Kewaunee and Sheboygan Counties.

Caspian Tern.—Found at the beginning of the period in Brown, Door, Manitowoc, Milwaukee, Oconto, Ozaukee, Sheboygan, and Winnebago Counties. Tessen found 125 in Manitowoc County on 6 August. Last reported by Sontag in Manitowoc County on 6 October.

Common Tern.—Reported at the beginning of the period in Ashland, Bayfield, Douglas, Manitowoc, Milwaukee, Oconto, and Winnebago Counties. The Smiths found 71 in Oconto County on 6 August. Last reported by Verch in Ashland and Bayfield Counties on 3 October.

Forster's Tern.—Found at the beginning of the period in Manitowoc and Winnebago Counties. Ziebell found 32 in Winnebago County on 16 September. Last reported on 2 October in Ozaukee County by Tessen and in Winnebago County by Ziebell.

Black Tern.—Reported at the beginning of the period in scattered areas throughout the state. Domagalski found 27 in Washington County on 1 August. Last reported by Hoffman in Kenosha County on 16 September.

Rock Dove.—Found throughout the state during the period. Hoffman found 366 in Kenosha County on 24 November.

Mourning Dove.—Found throughout the state during the period. Ziebell found 264 in Winnebago County on 16 September.

Black-billed Cuckoo.—Reported at the beginning of the period in Barron, Dane, Dodge, and Door Counties. Last reported by Diehl in Milwaukee County on 7 October.

Yellow-billed Cuckoo.—Reported at the beginning of the period in Door and Outagamie Counties. Last reported by Anderson and Petznick in Outagamie County on 18 August.

Eastern Screech-Owl.—Reported during the period in Brown, Dane, Iowa, Lafayette, Milwaukee, Monroe, Ozaukee, Richland, Washington, and Winnebago Counties.

Great Horned Owl.—Found throughout the state during the period.

Snowy Owl.—First reported by Gibson in Shawano County on 1 November. This bird had been hit by a pick-up truck and died 4 days later. Found at the end of the period in Ashland, Bayfield, Clark, Douglas, and Shawano Counties.

Barred Owl.—Reported throughout the state during the period.

Long-eared Owl.—Reported by Berner in Portage County on 8 August and 6 October, by Bruce in Winnebago County on 19 October, and by Uttech in Ozaukee County on 25 October.

Short-eared Owl.—First reported by Hoefler in Burnett County on 19 September. Gustafson found 5 in Milwaukee County on 26 October. Last reported by Decker in Clark County on 16 November.

Boreal Owl.—Berger reported that individuals were banded at Cedar Grove Ornithological Station in Ozaukee County on 21 and 24 November.

Northern Saw-whet Owl.—First reported on 23 September in Oconto County at Little Suamico Ornithological Station. On 16 October 58 were banded at Woodland Dunes in Manitowoc County and over 100 were banded in Oconto County. Last reported by Diehl in Milwaukee County on 26 November.

Common Nighthawk.—Reported at the beginning of the period south to Dane County. Ott found over 1000 in Marathon County on 26 August. Last reported by Bruce in Winnebago County on 10 October.

Whip-poor-will.—Reported at the beginning of the period in Burnett County by Hoefler. Last reported at Little Suamico Ornithological Station on 7 October.

Chimney Swift.—Found throughout the state at the beginning of the period. Erdman found over 500 in Oconto County on 22 August. Last reported on 7 October in Ozaukee County by Domagalski and Gustafson.

Ruby-throated Hummingbird.—Reported at the beginning of the period throughout the state. Verch found 11 in Ashland and Bayfield Counties on 11 August. Last reported by Robbins in Dane County on 25 November.

Rufous Hummingbird.—Reported in Columbia County by several observers from 1 to 3 August. These reports were accepted by the Records Committee. See "By the Wayside."

Selasphorous Sp. Hummingbird.—One was reported in Milwaukee County between 15 October and 21 November by Diehl and Korducki. These reports were also accepted by the Records Committee. See "By the Wayside."

Belted Kingfisher.—Reported throughout the state at the beginning of the period. Berner found 4 in Portage County on 19 September. Found at the end of the period north to Pierce and Shawano Counties.

Red-headed Woodpecker.—Found in scattered areas throughout the state at the beginning of the period. Berner found 8 in Portage County on 19 August. Reported at the end of the period in Lafayette and Monroe Counties.

Red-bellied Woodpecker.—Reported during the period north to Burnett, Washburn, Langlade, Oconto, and Door Counties. Ashman found 6 in Dane County on 23 September.

Yellow-bellied Sapsucker.—Found at the beginning of the period south to Portage County. Tessen found 20 in Ozaukee County on 2 October. Reported at the end of the period in Dane County by Ashman.

Downy Woodpecker.—Reported throughout the state during the period. The Smiths found 14 in Oconto County on 22 October.

Hairy Woodpecker.—Found throughout the state during the period. The Smiths found 9 in Oconto County on 12 November.

Northern Flicker.—Reported throughout the state at the beginning of the period. Tessen found 25 in Ozaukee County on 2 October. Found at the end of the period in Lafayette and Washington Counties.

Pileated Woodpecker.—Found during the period south to Grant, Iowa, and Dane Counties.

Olive-sided Flycatcher.—Reported at the beginning of the period in Vilas County by the Drings. Berger found 3 in Sheboygan County on 30 August. Last reported by Sontag in Manitowoc County on September 27.

Eastern Wood-Pewee.—Found throughout the state at the beginning of the period. Berner found 14 in Portage County on 11 August. Last reported by Nussbaum in Winnebago County on 3 October.

Yellow-bellied Flycatcher.—First reported by Tessen in Outagamie County on 1 August. 4 were found at Little Suamico Ornithological Station on 27 August. Last reported at Little Suamico Ornithological Station on 21 September.

Acadian Flycatcher.—Found at the beginning of the period in Columbia, Dane, Portage, and Washington Counties. Last reported by Parsons in Walworth County on 5 October.

Alder Flycatcher.—Reported at the beginning of the period in Douglas, Oconto, Oneida, Portage, Shawano, and Washington Counties. The Smiths found 5 in Oconto County on 6 August. Last reported by Tessen in Brown County on 15 September.

Willow Flycatcher.—Reported at the beginning of the period in Dane, Jefferson, Ozaukee, and Washington Counties. Last reported by Burcar in Dane County on 25 September.

Least Flycatcher.—Reported at the beginning of the period south to Portage and Brown Counties. Berner found 5 in Portage County on 8 August. Last reported in Dane County by Ashman and Robbins on 3 October.

Eastern Phoebe.—Reported at the beginning of the period south to Dane and Ozaukee Counties. Berner found 12 in Portage County on 20 September. Last reported by Bontly in Milwaukee County on 6 November.

Great Crested Flycatcher.—Found throughout the state at the beginning of the period. Berner found 7 in Portage County on 2 August. Last reported by Domagalski in Ozaukee County on 8 October.

Eastern Kingbird.—Reported throughout the state at the beginning of the period. The Smiths found 25 in Oconto County on 6 August. Last reported by Hoffman in Kenosha County on 27 September.

Horned Lark.—Found in scattered areas throughout the state at the beginning of the period. Hoffman found 17 in Kenosha County on 27 September. Reported at the end of the period north to Burnett, Clark, and Brown Counties.

Purple Martin.—Found throughout the state at the beginning of the period. Sontag found 225 in Manitowoc County on 20 August. Last reported by Hoefler in Burnett County on 24 October.

Tree Swallow.—Reported throughout the state at the beginning of the period. Ziebell found 4010 in Winnebago County on 10 August. Last reported by Hoefler in Burnett County on 16 October.

Northern Rough-winged Swallow.—Found in scattered areas throughout the state at the beginning of the period. Ashman found 3 in Dane County on 18 August and Sontag found 3 in Manitowoc County on 13 September. Last reported by J. Hansen in Brown County on 23 September.

Bank Swallow.—Reported at the beginning of the period in Barron, Brown, Dane, Langlade, Manitowoc, and Vilas Counties. Last reported by Ott in Marathon County on 24 September.

Cliff Swallow.—Reported throughout the state at the beginning of the period. Goff found over 1000 in Barron County on 13 September. Last reported on 1 October in Mar-

athon County by Ott, in Winnebago County by Tessen, and Ozaukee County by Domagalski and Gustafson.

Barn Swallow.—Found throughout the state at the beginning of the period. Ziebell found 400 in Winnebago County on 7 August. Last reported by Ott in Marathon County on 12 October.

Gray Jay.—Reported during the period in Douglas, Forest, Langlade, Oneida, and Vilas Counties.

Blue Jay.—Found throughout the state during the period. Berner found 204 in Portage County on 20 September.

American Crow.—Reported throughout the state during the period. Berner found 170 in Portage County on 19 August.

Common Raven.—Found during the period south to Monroe and Sheboygan Counties. The Fishers found 12 in Oneida County on 25 October.

Black-capped Chickadee.—Found throughout the state during the period. Ashman found 35 in Dane County on 11 September and Berner found 35 in Portage County on 26 November.

Boreal Chickadee.—Reported by Gustafson in Forest County on 16 August and by Tessen in Forest County on 11 October.

Tufted Titmouse.—Reported during the period in Chippewa, Dane, Grant, Iowa, Jefferson, Monroe, and Richland Counties.

Red-breasted Nuthatch.—Reported at the beginning of the period south to Dane and Milwaukee Counties. Berner found 30 in Portage County on 17 November. Found throughout the state at the end of the period.

White-breasted Nuthatch.—Found throughout the state during the period. Berner found 6 in Portage County on 5 September.

Brown Creeper.—Reported at the beginning of the period south to Portage and Outagamie Counties. The Smiths found 8 in Oconto County on 3 October. Found in scattered areas throughout the state at the end of the period.

Carolina Wren.—Reported from the beginning of the period to November 20 in Richland County by Duerksen, on 27 August and 19 November in Dane County by Ashman, on 10 September in Dane County by E. Hansen, and in Jefferson County on 8 October by Hale.

House Wren.—Found throughout the state at the beginning of the period. Domagalski found 37 in Washington County on 1 August. Last reported by Uttech in Ozaukee County on 19 October.

Winter Wren.—Reported at the beginning of the period in Douglas and Portage Counties. Ashman found 17 in Dane County on 8 October. Last reported by Berner in Portage County on 6 November.

Sedge Wren.—Found at the beginning of the period south to Dane County. The Smiths found 16 in Oconto County on 6 August. Last reported by Hoefler in Burnett County on 20 October.

Marsh Wren.—Found in scattered areas throughout the state at the beginning of the period. Ziebell found 24 in Winnebago County on 16 September. Last reported by Ziebell in Winnebago County on 3 November.

Golden-crowned Kinglet.—Reported at the beginning of the period in Douglas and Oneida Counties. The Smiths found 60 in Oconto County on 8 October. Found at the end of the period in Dane, Jefferson, Manitowoc, Washington, and Winnebago Counties.

Ruby-crowned Kinglet.—Reported at the beginning of the period in Douglas County by the LaValleys. Tessen found 25 in Winnebago County on 9 October. Last reported by Thiessen in Dane County on 12 November.

Blue-gray Gnatcatcher.—Found at the beginning of the period in Dane, Manitowoc, Richland, Washington, and Winnebago Counties. Domagalski found 7 in Washington

County on 5 August. Last reported by Parsons in Walworth County on 3 October.

Eastern Bluebird.—Found throughout the state at the beginning of the period. 75 were found at Little Suamico Ornithological Station on 16 October. Last reported by Bruce in Winnebago County on 9 November.

Townsend's Solitaire.—Reported by McKay in Grant County on 11 October.

Veery.—Found in scattered areas throughout the state at the beginning of the period. 3 were found at Little Suamico Ornithological Station on 20 August and Sontag found 3 in Manitowoc County on 28 September. Last reported by Bontly in Milwaukee County on 12 October.

Gray-cheeked Thrush.—First reported by Tessen in Brown County on 27 August. 10 were found at Little Suamico Ornithological Station on 18 October. Last reported at Little Suamico Ornithological Station on 27 October.

Swainson's Thrush.—Reported at the beginning of the period in Douglas County by the LaValleys. The UWM Field Station Staff found 36 in Ozaukee County on 16 September. Last reported at Little Suamico Ornithological Station on 28 October.

Hermit Thrush.—Reported at the beginning of the period south to Barron and Marathon Counties. Domagalski found 87 in Ozaukee County on 15 October. Last reported by Bontly in Milwaukee County on 25 November.

Wood Thrush.—Found at the beginning of the period throughout the state. The UWM Field Station Staff found 4 in Ozaukee County on 16 September. Last reported by Burcar in Dane County on 13 October.

American Robin.—Found throughout the state at the beginning of the period. Parsons found 106 in Walworth County on 22 October. Reported at the end of the period north to Barron and Outagamie Counties.

Gray Catbird.—Found throughout the state at the beginning of the period. Ashman found 19 in Dane County on 4 September. Last reported by Bontly in Milwaukee County on 25 October.

Brown Thrasher.—Reported in scattered areas throughout the state at the beginning of the period. Ashman found 6 in Dane County on 23 September. Last reported by Ashman in Dane County on 5 November.

Water Pipit.—First reported on 14 September in Dane County by E. Hansen and in Douglas County by Johnson. Uttech found over 100 in Ozaukee County on 31 October. Last reported by Thiessen in Dane County on 12 November.

Bohemian Waxwing.—First reported by the Smiths in Oconto County on 20 November. Verch found 59 in Ashland and Bayfield Counties on 22 November. Found at the end of the period in Ashland, Bayfield, Door, and Douglas Counties.

Cedar Waxwing.—Found throughout the state at the beginning of the period. Duerksen found 200 in Richland County on 23 September. Reported at the end of the period north to Barron, Marathon, and Langlade Counties.

Northern Shrike.—First reported by J. Hansen in Brown County on 12 October. J. Hansen found 4 in Brown County on 23 November. Found throughout the state at the end of the period.

European Starling.—Found throughout the state during the period. Ziebell found 1020 in Winnebago County on 16 September.

Bell's Vireo.—Reported by Duerksen in Richland County on 12 August and by Bruce in Winnebago County on 31 August.

Solitary Vireo.—Reported at the beginning of the period in Barron, Langlade, and Vilas Counties. Sontag found 4 in Manitowoc County on 6 October. Last reported by Domagalski in Ozaukee County on 22 October.

Yellow-throated Vireo.—Found at the beginning of the period in Dane, Monroe, Portage, and Washington Counties. Berner found 4 in Portage County on 8 September.

Last reported by the Smiths in Oconto County on 10 October.

Warbling Vireo.—Found throughout the state at the beginning of the period. Tessen found 35 in Brown County on 27 August. Last reported by J. Hansen in Brown County on 21 September.

Philadelphia Vireo.—Reported at the beginning of the period in Vilas County by the Drings. Tessen found 4 in Ozaukee County on 16 September. Last reported by Berner in Portage County on 15 October.

Red-eyed Vireo.—Found throughout the state at the beginning of the period. Berner found 15 in Portage County on 22 August. Last reported by Wierzbicki in Brown County on 23 October.

Blue-winged Warbler.—Reported at the beginning of the period in Portage County by Berner. Pike found 3 in Dane County on 7 August and Berner found 3 in Portage County on 4 September. Last reported on 11 September in Dane County by Robbins, in Portage County by Berner and in Washington County by Domagalski.

Golden-winged Warbler.—Reported at the beginning of the period in Barron County by Goff. Ashman found 3 in Dane County on 11 September. Last reported by Zehner in Milwaukee County on 26 September.

Lawrence's Warbler.—Reported at Little Suamico Ornithological Station on 1 September.

Tennessee Warbler.—Reported at the beginning of the period in Dane, Douglas, and Vilas Counties. The UWM Field Station Staff found 86 in Ozaukee County on 9 September. Last reported by Bontly in Milwaukee County on 18 October.

Orange-crowned Warbler.—First reported by Duerksen in Richland County on 29 August. Last reported by Thiessen in Dane County on 12 November.

Nashville Warbler.—Reported at the beginning of the period south to Clark and Brown Counties. Ashman found 15 in Dane County on 3 October. Last reported by Tessen in Outagamie County on 20 October.

Northern Parula.—Reported at the beginning of the period in Door and Vilas Counties. Ashman found 3 in Dane County on 19 September. Last reported on 30 September in Sheboygan County by the Brassers and in Washington County by Domgalski.

Yellow Warbler.—Found throughout the state at the beginning of the period. The Smiths found 7 in Oconto County on 6 August. Last reported by Richter in Monroe County on 16 October.

Chestnut-sided Warbler.—Reported at the beginning of the period south to Washington County. Berner found 5 in Portage County on 22 August. Last reported by Goff in Barron County on 7 October.

Magnolia Warbler.—Found at the beginning of the period in Douglas, Langlade, and Vilas Counties. 17 were found at Little Suamico Ornithological Station on 21 September. Last reported by the Kuhns in Sheboygan County on 18 October.

Cape May Warbler.—Reported at the beginning of the period in Vilas County by the Drings. Tessen found 7 in Brown County on 27 August. Last reported by Richter in Monroe County on 10 October.

Black-throated Blue Warbler.—First reported by Tessen in Brown County on 27 August. Hoffman found 3 in Kenosha County on 16 September and 3 were found at Little Suamico Ornithological Station on 22 September. Last reported on 22 October by Domagalski in Ozaukee and Milwaukee Counties.

Yellow-rumped Warbler.—Reported at the beginning of the period south to Portage County. Berner found 100 in Portage County on 27 September. Last reported by Bontly in Milwaukee County on 25 November.

Black-throated Green Warbler.—Found at the beginning of the period in Door, Douglas, Marathon, and Vilas Counties. 11 were found at Little Suamico Ornithological Station on 18 September. Last reported by Berner in Portage County on 26 October.

Blackburnian Warbler.—Reported at the beginning of the period in Vilas County by the Drings. Last reported by Tessen in Outagamie County on 1 October.

Pine Warbler.—Found at the beginning of the period in Barron, Door, Portage, and Washburn Counties. Last reported by Ashman in Dane County on 7 October.

Palm Warbler.—Reported at the beginning of the period in Oneida, Vilas, and Washburn Counties. Tessen found 10 in Brown County on 15 September and Ashman found 10 in Dane County on 19 September. Last reported by Thiessen in Dane County on 12 November.

Bay-breasted Warbler.—First reported by Berner in Portage County on 8 August. Berner found 13 in Portage County on 21 September. Last reported by Sontag in Manitowoc County on 6 October.

Blackpoll Warbler.—First reported by Berner in Portage County on 22 August. 31 were found at Little Suamico Ornithological Station on 31 August. Last reported by Domagalski in Ozaukee County on 15 October.

Cerulean Warbler.—Reported at the beginning of the period in Dane County by Ashman. Last reported on 9 September in Ozaukee County by Mueller and by the UWM Field Station Staff.

Black-and-white Warbler.—Reported at the beginning of the period in Ashland, Bayfield, Door, Douglas, Oneida, and Vilas Counties. 5 were found at Little Suamico Ornithological Station on 18 September. Last reported by Harriman in Winnebago County on 9 October.

American Redstart.—Found throughout the state at the beginning of the period. Ashman found 24 in Dane County on 4 September. Last reported on 15 October in Ozaukee County by Domagalski, Tessen, and Uttech.

Worm-eating Warbler.—Reported by Hoffman in Kenosha County on 27 September.

Ovenbird.—Reported at the beginning of the period south to Dane County. Sontag found 9 in Manitowoc County on 1 September. Last reported by Zehner in Milwaukee County on 31 October.

Northern Waterthrush.—Reported at the beginning of the period in Brown, Douglas, Langlade, and Oconto Counties. Berner found 3 in Portage County on 10 September and Ashman found 3 in Dane County on 17 September. Last reported by the Petersons in Shawano County on 2 October.

Louisiana Waterthrush.—Reported by Pike in Sauk County on 9 August and by Sontag in Manitowoc County on 13 and 21 September.

Connecticut Warbler.—Found at the beginning of the period in Ashland and Bayfield Counties by Verch. 3 were found at Little Suamico Ornithological Station on 5 September. Last reported by Ott in Marathon County on 24 September.

Mourning Warbler.—Reported at the beginning of the period in Douglas, Oconto, Portage, and Vilas Counties. The UWM Field Station Staff found 8 in Ozaukee County on 9 September. Last reported by Sontag in Manitowoc County on 27 September.

Common Yellowthroat.—Found throughout the state at the beginning of the period. 10 were found at Little Suamico Ornithological Station on 14 September. Last reported by Uttech in Ozaukee County on 25 November.

Wilson's Warbler.—First reported by Berner in Portage County on 22 August. Berner found 3 in Portage County on 26 August. Last reported by J. Peterson in Ozaukee County on 26 October.

Canada Warbler.—Reported at the beginning of the period in Douglas County by the LaValleys. Hoffman found 5 in Kenosha County on 16 September. Last reported in Ozaukee County on 23 September by Mueller and the UWM Field Station Staff.

Scarlet Tanager.—Found throughout the state at the beginning of the period. Berner found 11 in Portage County on 4 August.

Last reported by Tessen in Winnebago County on 7 October.

Northern Cardinal.—Reported during the period north to Douglas, Langlade, Oconto, and Door Counties. Hoffman found 13 in Kenosha County on 24 November.

Rose-breasted Grosbeak.—Found throughout the state at the beginning of the period. Tessen found 30 in Outagamie on 21 September. Last reported by Uttech in Ozaukee County on 14 October.

Indigo Bunting.—Found throughout the state at the beginning of the period. The Smiths found 39 in Oconto County on 6 August. Last reported by Domagalski in Milwaukee County on 21 October.

Dickcissel.—Reported at the beginning of the period in Burnett, Columbia, Dane, Monroe, and Ozaukee Counties. Kuecherer reported a maximum of 50 at Ft. McCoy in Monroe County. Last reported on 18 August in Monroe County by Kuecherer and in Walworth County by Parsons.

Rufous-sided Towhee.—Found throughout the state at the beginning of the period. Parsons found 4 in Walworth County on 4 August. Reported at the end of the period in Door and Shawano Counties. The Ackleys had one of the spotted race coming to a feeder near Shawano from late October to the end of the period.

American Tree Sparrow.—First reported by Tessen in Waupaca County on 24 September. The Drings found over 35 in Vilas County on 22 October. Found at the end of the period north to Barron, Langlade, Oconto, and Door Counties.

Chipping Sparrow.—Found throughout the state at the beginning of the period. Berner found 80 in Portage County on 17 September. Last reported by Haseleu in Washington County on 16 November.

Clay-colored Sparrow.—Reported at the beginning of the period south to Portage and Brown Counties. Berner found 7 in Portage County on 4 September. Last reported by Tessen in Outagamie County on 22 October.

Field Sparrow.—Found at the beginning of the period north to Burnett, Langlade, and Door Counties. Berner found 12 in Portage County on 24 September. Last reported by Ashman in Dane County on 12 November.

Vesper Sparrow.—Found throughout the state at the beginning of the period. Berner found 5 in Portage County on 16 September. Last reported by Uttech in Ozaukee County on 26 October.

Lark Sparrow.—Reported from the beginning of the period to 18 August in Monroe County by Kuecherer.

Savannah Sparrow.—Found throughout the state at the beginning of the period. Burcar found 41 in Dane County on 16 October. Last reported by Uttech in Ozaukee County on 14 November.

Grasshopper Sparrow.—Reported at the beginning of the period in Barron, Columbia, Door, Langlade, Portage, and Shawano Counties. Last reported by the Lukes in Door County on 3 August.

Henslow's Sparrow.—Reported by Duerksen in Richland County on 6 August.

LeConte's Sparrow.—Reported from 1 to 6 August in Oconto County by the Smiths, on 16 August in Oneida County by Gustafson, and on 24 August in Portage County by Berner.

Sharp-tailed Sparrow.—First reported on 10 August in Burnett County by Hoefler. Last reported on 14 October in Milwaukee County by Domagalski, Frank, and Uttech. Also reported from Brown County.

Fox Sparrow.—First reported by the Smiths in Oconto County on 22 September. Berner found 37 in Portage County on 26 October. Reported at the end of the period in Ashland and Bayfield Counties by Verch.

Song Sparrow.—Found throughout the state at the beginning of the period. The Smiths found 67 in Oconto County on 6 August. Reported at the end of the period in Dane and Walworth Counties.

Lincoln's Sparrow.—Reported at the beginning of the period south to Barron and Langlade Counties. Berner found 6 in Portage County on 21 September. Last reported by Uttech in Ozaukee County on 21 October.

Swamp Sparrow.—Found throughout the state at the beginning of the period. Ziebell found 40 in Winnebago County on 16 September. Reported at the end of the period in Dane County by Ashman.

White-throated Sparrow.—Reported at the beginning of the period south to Marathon and Clark Counties. Ashman found 100 in Dane County on 15 October. Reported at the end of the period north to Oconto County.

White-crowned Sparrow.—First reported on 16 September in Dane County by Ashman and in Douglas County by Johnson. The Petersons found 47 in Shawano County on 8 October. Last reported by Frank on 12 November in Ozaukee County.

Harris' Sparrow.—First reported on 30 September in Douglas County by Johnson and the LaValleys. Pickering found 5 in Langlade County on 4 October. Last reported by Berner in Portage County on 15 October.

Dark-eyed Junco.—Reported at the beginning of the period in Vilas County by the Drings. Hoffman found over 300 in Kenosha County on 24 November. Found throughout the state at the end of the period.

Lapland Longspur.—First reported by Tessen in Brown County on 14 September. Ziebell found 20 in Winnebago County on 3 November. Reported at the end of the period in Columbia, Dane, Outagamie, and Winnebago Counties.

Smith's Longspur.—Reported by Hughes and O'Brien in Milwaukee County on 14 October. These reports were accepted by the Records Committee. See "By the Wayside."

Snow Bunting.—First reported in late September in Douglas County by Johnson. Decker found 1200 in Clark County on 29 November. Found throughout the state at the end of the period.

Bobolink.—Reported at the beginning of the period north to Barron, Langlade, and Oconto Counties. The Smiths found 21 in Oconto County on 6 August. Last reported by Robbins in Dane County on 11 September.

Red-winged Blackbird.—Found throughout the state at the beginning of the period. Berner found over 15000 in Portage County on 9 October. Found at the end of the period in Ozaukee County by Uttech.

Eastern Meadowlark.—Reported throughout the state at the beginning of the period. Ziebell found 26 in Winnebago County on 29 September. Found at the end of the period in Outagamie and Winnebago Counties.

Western Meadowlark.—Reported at the beginning of the period in Dane and Portage Counties. Last reported by Burcar in Dane and Iowa Counties on 16 October.

Yellow-headed Blackbird.—Found at the beginning of the period in Barron, Dane, Douglas, Washington, and Winnebago Counties. Last reported by Tessen in Brown County on 29 September.

Rusty Blackbird.—First reported by Pickering in Langlade County on 12 September. 400 were seen at Little Suamico Ornithological Station on 14 November. Last reported by Tessen in Outagamie County on 27 November.

Brewer's Blackbird.—Reported at the beginning of the period south to Portage and Winnebago Counties. Duerksen found 400 in Richland County on 2 October. Last reported by Hoffman in Kenosha County on 24 November.

Common Grackle.—Found throughout the state at the beginning of the period. Ziebell found 1000 in Winnebago County on 28 October. Last reported on 25 November in Sheboygan County by the Brassers and in Winnebago County by Harriman.

Brown-headed Cowbird.—Reported throughout the state at the beginning of the period. Parsons found 300 in Walworth County on 7 November. Last reported by

Hoffman in Kenosha County on 24 November.

Northern Oriole.—Found throughout the state at the beginning of the period. Hoffman found 8 in Kenosha County on 16 September. Last reported by Hoffman in Kenosha County on 27 September.

Pine Grosbeak.—First reported by Gibson in Langlade County on 1 November. Lydermann reported a maximum of 9 in November in Langlade County. Reported at the end of the period south to Lincoln and Door Counties.

Purple Finch.—Reported at the beginning of the period south to Barron, Marathon, Oconto, and Door Counties. Kuecherer found a maximum of 25 in Monroe County. Found throughout the state at the end of the period.

House Finch.—Found throughout the state during the period. Cahow reported over 140 in Chippewa County on 24 November.

Red Crossbill.—First reported by Gustafson in Forest County on 16 August. Berner found 35 in Portage County on 5 November. Found at the end of the period in Douglas, Menominee, and Portage Counties.

White-winged Crossbill.—First reported by Gustafson in Forest County on 16 August. Berner found 23 in Portage County on 26 November. Found at the end of the period in Douglas and Portage Counties.

Common Redpoll.—First reported by Berner in Portage County on 29 October. Berner found 110 in Portage County on 29 November. Reported at the end of the period in scattered areas throughout the state.

Pine Siskin.—Reported at the beginning of the period in Ashland, Barron, Bayfield, Burnett, Outagamie, and Vilas Counties. Berner found 120 in Portage County on 10 November. Found throughout the state at the end of the period.

American Goldfinch.—Found throughout the state during the period. 350 were found at Little Suamico Ornithological Station on 4 November.

Evening Grosbeak.—Reported at the beginning of the period in Ashland, Bayfield, Douglas, Lincoln, Oneida, and Vilas Counties. The Fishers found 40 in Oneida County on 13 August and Tessen found 40 in Menominee County on 29 November. Found in scattered areas throughout the state at the end of the period.

House Sparrow.—Found throughout the state during the period, Ziebell found 230 in Winnebago County on 16 September.

Contributors

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Northern Falcon *by Robert A. Kleppin*

"By the Wayside"

Rare bird observations include Ross' Goose, Eider sp., King Eider, Barrow's Goldeneye, Purple Sandpiper, Mew Gull, Lesser Black-backed Gull, Selasphorus hummingbird, Rufous Hummingbird, and Smith's Longspur.

Ross' Goose (*Chen rossii*)

16 to 22 October 1995, Eau Claire County.—I found a Ross' Goose on 16 October 1995 at a pond northwest of Eau Claire in an area known locally as the "Truax Prairie." The Ross' Goose was with 3 Snow Geese and 200–300 Canada Geese, and Mallards on other days. Like the Snow Geese, the Ross' Goose was white with black primaries and pink legs and bill, but it was considerably smaller, appearing only somewhat larger than a Mallard. It was also proportioned differently than the Snow Geese, having shorter, thinner legs, a relatively shorter and thicker neck, a smaller, rounder head with a more vertical forehead, and a very short, stubby bill with a slightly concave culmen. The bill lacked the black "grinning patch" of the Snow Geese, having instead a thin black line at the juncture of the upper and lower mandibles. The base of the bill, on the upper mandible, was greenish to the nostrils. On Tuesday the 17th the geese were in the pasture west of the pond and were closer to my parking spot than on any other day. At that distance, about 150 feet, through my scope, I could see the prominent "warts" in the greenish area on the bill. These so-called warts actually looked more like irregular wavy interconnected lumps or lumpy ridges of different sizes. For the most part the Ross' Goose stayed near the Snow Geese, which were always together, in the water or in the surrounding pasture, though occasionally it would wander off on its own among the Canada Geese. When feeding in the grass, it displayed head movements that were noticeably quicker and more delicate than those of the other geese. The Ross' Goose was present through Sunday 22 October; the next day a rainy cold front moved through, taking most of the geese, including the Ross' and Snow Geese, with it.—*Janine Polk, Eau Claire, WI 54701.*

Eider Sp. (*Somateria sp.*)

18 November 1995, Algoma Harbor, Kewaunee County.—My initial thought was a Mallard swimming in

with a large flock of Bufflehead, but I soon noticed a slanted profile to the head. Since I was supposed to be working at this point, I was only able to spend a few minutes observing the duck. I noted the following features through binoculars at about 30 feet: A dark brown body, lighter brown neck and head. The neck was noticeably thick. When I saw the head and bill, I knew this had to be an eider. The bill was long, grayish, with some feathering from the cheek area extending into the bill. The upper portion of the bill extended back towards the eye. The head was large, with a fairly straight downward slant from the forehead through the bill. The head was rather plain except for a light crescent just above the eye. I returned to Algoma about noon, hoping to get a longer, more detailed look at the Eider. Unfortunately, the duck was not in the harbor. I soon located it north of the harbor, out fairly deep. Even at a distance of 200 yards, the duck looked solidly built. I again noted the dark body, thick neck and large sloped head. The bill was held parallel to the water. The duck was diving frequently, often staying under quite long. I could not find the eider after 18 November.—*John Regan, Green Bay, WI 54303.*

King Eider (*Somateria spectabilis*)

21 November 1995, Algoma Harbor, Kewaunee County.—I arrived about 11:00 A.M. on a cold windy day at Algoma Harbor. Parking the car in the lot near the river/harbor flushed a flock of Goldeneyes and Bufflehead. Almost immediately I discovered the female King Eider had been near this group. It became nervous and commenced swimming and bathing out of the river, into the harbor, eventually leaving the harbor around the south breakwater. It never reappeared. This was a soft, darker brown squat, chunky duck. There was a distinct eye-ring, with the head (forehead) extending upward markedly, not as gradually as the Common Eider. There was extensive feathering above the bill, towards the eye. The brown sides were marked with crescent shapes, in contrast to more evenly barred Common Eider flanks.—*Daryl D. Tessen, Appleton, WI 54911.*

Barrow's Goldeneye (*Bucephala islandica*)

22 November 1995, Virmond Park, Ozaukee County.—It was very similar to the loose raft of Common Goldeneyes it was with. The bird was perhaps marginally smaller than the commons, at times I thought the "Barrows" bill looked slightly smaller. The bird's head was almost always pulled down in a resting position and the crown at times appeared less peaked, but this was not always readily apparent. The Barrow's had white sides, breast, and neck. It was black at the stern and had a black head and bill. There was a white crescent slightly below the eye, between the bill and the eye. The biggest difference between this bird and the Common Goldeneyes was the back patterning: the "Barrows" had a clean, bold black horizontal line where the black and white patterned back met the clean white sides. There was a "comma," fairly bold, of vertical black extending

down from the black line onto the sides, just behind the neck. The back was patterned with a row of rounded, clean white rectangles above the black side-line. There were also 2 white horizontal streaks on the folded wing between the row of white shapes on the back and the black/white demarcation line on the side.—*Scott Diehl, Muskego, WI 53150.*

Purple Sandpiper (*Calidris maritima*)

12 November 1995, south of North Point Park, Sheboygan County.—A single individual was found about one quarter mile south of the North Point limestone outcropping in an area where vegetation had recently washed on shore. The bird was actively feeding in these accumulated mats in the immediate area where 3 Dunlin were also feeding, making comparisons uncommonly easy. The "long" two-toned bill, which was thicker and orangish-flesh colored at the base and dark at the tip, immediately distinguished the bird from the similar-sized Dunlins. It is assumed that this bill color combination also distinguished the bird from the rarer Rock Sandpiper, which is reported to have a bill that is yellow-greenish appearing at its base. The leg color was a yellow-orange in contrast with the dark leg color of the Dunlin. The streaking on the sides seemed more apparent than the previous Purple Sandpipers I have seen in both Sheboygan and Manitowoc. Although the bird initially appeared dark, it gave the appearance that it was not completely in the winter plumage as the eye ring was rather difficult to secure as a field mark. The feathering on the back gave almost a streaked appearance as the dark feathers were bordered by a "dirty" white suggesting further that the bird was not in full winter dress. During the entire period of observation of about 15 minutes, the bird was engaged in feeding activity close to, but never crossing the paths of, the Dunlin as they also engaged in their feeding activity. The bird was not observed to fly, but it did jump into the air and spread its wings revealing the wing stripe extending well into the primaries. The tail feather pattern, however, was not critically observed.—*Charles Sontag, Manitowoc, WI 54220.*

Mew Gull (*Larus canus*)

22 November 1995, Port Washington Harbor, Ozaukee County.—It was seen from the bluff overlooking the harbor and was swimming with a flock of Ring-billed Gulls in the open water north of the breakwall. During a fast scan of the flock, this gull stood out instantly because its mantle was darker than the Ring-billed Gulls and its head was much more heavily marked with the winter streaks. When I zoomed to 45× I could also clearly see the very prominent tertial crescent, a softer, more rounded head shape, dark eyes and a passerine-like bill, which was yellowish with possibly some smudges near the tip. Unlike the reports I wrote last year, this bird did not ride with its tail and primaries higher out of the water than the Ring-billed Gulls, and its primaries were not crossed. The bill looked somewhat comparable to those on a few Bonaparte's Gulls which were nearby, except that it was

yellowish, not black.—*Tom Uttech, Saukville, WI 53080.*

Lesser Black-backed Gull (*Larus fuscus*)

4 October 1995, Stricker's Pond, Dane County.—The bird was about one and one-third times larger than the Ring-billed Gulls floating about 20 yards from it to the north. It was much smaller than the Canada Geese with which it was most closely associating at the time; the length of the bird from breast to the tail end was less than two-thirds the same length of the geese. The bird had a much stockier build than the Ring-billed Gulls, it rode higher in the water, had a larger, thicker bill and a thick neck and body. The bill was yellow, heavier, and thicker than the bill of the Ring-billed Gulls and the lower mandible had a dull red oblong spot near the front to approximately one-third of the way back from the tip of the mandible. The head and breast of the bird were snow white in color, but the mantle was very dark. The intense blue - black color of the mantle was what drew my eye to the bird at first scan of the birds on the pond. The wings were long and the tips were crossed at the back of the bird extending beyond the tail of the bird. There were large white spots on the tips of the primaries. There was a smudge of dark around the eyes of the bird and brownish vertical streaking on the back of the neck and the nape of the bird. I was too far away to clearly see the color of the eye. The Lesser Black-backed Gull took to the air. It circled low at first in a tight circle, then gained altitude flying to the south and then west, just above me. As I watched, the gull gave me excellent looks at its upper and undersides at many angles. The mantle was dark blue-black across the entire upper wing surface, but at the tips the color was even darker yet. The trailing edge of the upper wing surface was a stunning white in contrast. The bird was missing two primaries of the left wing. The bird, very clearly, had yellow legs, not pink ones.—*Susanne Brown, Middleton, WI 53562.*

Selasphorus Hummingbird (*Selasphorus sp.*)

14 November 1995, Milwaukee County.—The hummingbird was in view for my entire visit as it roosted in a dogwood bush 3 feet from the window. It was very tame and allowed us to approach the window to view it at close range. The back was a uniform emerald green, which appeared vibrant in the bright sunlight. This color was darker on the wings. The throat was flecked with dark feathers where the gorget would be on an adult male. A rusty wash was quite prominent along the flanks and beneath the wings. Otherwise, the underparts were dirty white. As the hummingbird fluffed and preened 3 feet from the window, I had an excellent look at the tail. The out retrices were tipped with white. The center of each tail feather was a brilliant rufous. More than likely, this was a Rufous Hummingbird, but female and young male Selasphorus are virtually indistinguishable in the field.—*Mark Korducki, Milwaukee, WI 53213.*

RUFOUS HUMMINGBIRD (*Selasphorus rufus*)

2 August 1995, Poynette, Columbia County.—The Tomlinsons were waiting for me when I arrived at 8:00 A.M., and had seven hummingbird feeders amply supplied with sugar water. At first there were no hummers in sight. Eventually we saw three ruby-throats: one very white-breasted one we took to be an adult female, at least one with a faint grayish wash we took to be an immature, and eventually an adult male. Three times I caught glimpses of a brown-backed hummer, but the ruby-throats chased it away before it had a turn at the feeders. Becky kept hearing a high-pitched chattering she had associated with the rufous, but my failing ears could not pick up the sound. After a 30 minute wait, the rufous rewarded us with splendid views, both at a feeder and a nearby perch in some shrubbery. We were 15–18 feet away, using 8× binoculars. When viewed in profile position, the folded wings and a limited crown area were iridescent green. The rest of the upperparts (back of head, back, and tail) were a rich bronze red. This color extended to include the flanks. When the bird faced us and turned its head, the flame-red gorget stood out brilliantly. Just below the gorget a narrow white band extended across the breast and curled up toward the nape. The eye was dark, but in certain positions a tiny white spot was visible just behind the eye. In size and shape the Rufous was similar to the Ruby-throats with which it interacted frequently.—*Sam Robbins, Madison, WI 53705.*

1 August 1995, Poynette, Columbia County.—On July 31, at 4:30 P.M., a storm came through our area. Two inches of rain fell in an hour and a half, and there were strong winds from the southwest. We first sighted the Rufous Hummingbird at 2:00 P.M. on 1 August at the hummingbird feeder on the north side of the house. He fought often with the male Ruby-throated Hummingbirds here and was even chased by a phoebe. On this day the ruby-throats were much more aggressive than the rufous. On August 2nd the rufous was to the feeders by 4:35 A.M. He chose a feeder set back into the lilac bushes, which he defended vigorously. The bird did spend most of its time preening. By late morning the ruby-throats stayed away from his feeder. He used the mist water from our bird bath often. I saw the rufous fly through the mist 11 times on that day. While the rufous kept all the ruby-throats away from his feeder, he was very aggressive with the males chasing them for several minutes at a time. He was still seen at the feeder at 8:16 P.M. on 3 August. The rufous was first seen at 5:40 A.M. chasing a male ruby-throated. It visited all 7 feeders on that day. The bird was seen peeking into various windows throughout the day. It saw about 4 feet away as I changed the sugar water in the hummingbird feeders. It was seen chasing flying insects around. Even while he was away from his chosen feeder, the ruby-throats would not use it. It again spent much of its time preening on 4 August. It was feeding heavily at 5:34 A.M. He would just sit at the feeder and eat. Just before 6:00 A.M. it began to flit to many different perches in the li-

lacs. At 6:00 A.M., exactly, it headed northeast across the field. Within an hour after this, the ruby-throats were using the feeder the rufous had claimed. During the entire time it was here, the weather was cloudy, rainy and very humid. The day it left the sun came out. The Rufous Hummingbird was coppery red on its back and sides. Its wings were green-gray-green most of the time, but when they caught the light, they were iridescent green. The bird's throat, gorget, was bright red-orange with a lime green edge when the light caught it right. It had a white chest with the coppery-red coming down onto its flanks. A white band just below the gorget went almost all the way around its throat, ending at the nape. The tail came to a point and was coppery-red. A small white dot just behind the eye was easy to see when it sat in profile to us. Its flight call was very distinct with a loud high-pitched buzzy chatter. It seemed kind of a cross between a bumble bee and a Cedar Waxwing.—*Becki Tomlinson, Poynette, WI 53955.*

SMITH'S LONGSPUR (*Calcarius pictus*)

14 October 1995, Harbor Island, Milwaukee.—This bird was about the same size as a House Sparrow, but slimmer and less bulky. There was a dark triangular patch on the face, similar to, but not as striking as, a basic-plumaged Lapland Longspur. The mantle had alternating dark and buff stripes. The wings were darker brown, not rufous, with the median secondary coverts broadly tipped in white. The greater secondary coverts were also tipped in white, although less obviously. The underparts were evenly dingy buff, not white, with some darker streaking on the sides and flanks. The tail was dark with two entirely white outer rectrices, like a junco. The call, given frequently while the bird was in flight, was a high, dry rattle, consisting of 5–6 notes. No other calls were given.—*Robert D. Hughes, Chicago, IL 60613.*

WSO Records Committee Report—Fall 1995

by Jim Frank

The WSO Records Committee reviewed 26 records of 15 species for the Fall 1995 season. Of these, 19 were accepted. In addition, there was one older record reviewed and accepted. All contributors of records were notified by postcard in the case of accepted records and by personal letter in the case of records not accepted.

Accepted

Ross' Goose—

#95–028 *Eau Claire Co.,* 16–22 October 1995, Polk (photo)

Reported and noted on photographic evidence were a small white goose with black primaries. It was slightly larger than a Mallard, but smaller then the adjacent Snow Geese. The stubby, pink bill lacked the black "grin patch" of the Snow Geese. The head profile was rounder than that of the Snow Geese.

King Eider—

#95–030 *Kewaunee Co.,* 11–18 November 1995, Regan (identified as Eider sp.); 19, 21, 23 November 1995, Hansen; 20 November 1995, Uttech; 21 November 1995, Tessen; 22 November 1995, Harriman.

Documentation as an eider was based on the size noted as larger than associated goldeneye, scaup, and mergansers, and a "warm," "soft," dark brown overall body color. The strongly sloped forehead to beak profile was also a significant field mark. Identification as a female King Eider was based on a light eyering and trailing light eyeline (though some Common Eiders may exhibit this), the slight rise in the forehead portion of the otherwise flat, sloping beak-forehead profile (though again some subspecies of Common Eiders also have this trait), the forward extension of cheek feathering into the base of the beak (again a trait of the Common Eider as well), and the protrusion of the featherless beak markedly up toward the eye (yet again a characteristic of Common Eiders to varying degrees). The only consistent differentiation in the literature revolves around the appearance of the beak commissure

("gape line") and position of the nostril relative to the forward extension of the cheek feathering. This bird was noted to have a pale area of feathering at the forward extension of the cheek feathering. In addition the beak commissure line appeared to *curve* up as it extended caudally (noted to be *straight* in Common Eiders though often inconspicuous). Perhaps most importantly, the cranial extension of the cheek feathering stopped decidedly short of the nostril opening in the beak (it would reach right up to the lower edge of the nostril in Common Eiders). Though some observers noted the darker brown flank markings to be more crescent-shaped than barred, these shapes are apparently variable, again depending on the subspecies of Common Eider. Observers should be prepared to accept some sightings of eiders in female and juvenile plumages as unidentified eider species if the birds are seen at a distance or in poor lighting. This report is the fourth consecutive late fall sighting of a King Eider on Wisconsin's Lake Michigan shoreline.

Barrow's Goldeneye—

#95–031 *Ozaukee Co.*, 11, 18 November 1995, Wood; 22 November 1995, Diehl.

Noted was the extension of black from the back farther down the flanks on the Barrow's Goldeneye compared to the Common Goldeneye. Only white dots were left on the scapulars of this bird instead of broad white patches. The black also cut deeply between the white breast and white flanks.

With further observation, the crescent-shaped, white facial spot was noted. Also reported was the shorter, stubbier, black bill of the Barrow's Goldeneye relative to the Common Goldeneyes surrounding it.

(This is the second consecutive late fall/early winter report from this location.)

Purple Sandpiper—

#95–033 *Sheboygan Co.*, 12 November 1995, Sontag.

In direct comparison to 3 similarly-sized Dunlin, the long "two-toned bill"—orange at the base, dark at the tip—was noted, as were the yellow-orange legs. The bird was generally dark in color with a fair amount of lighter streaking on the back. A faint eyering was discernible. (A Purple Sandpiper has been seen at this site in 5 of the past 6 fall seasons.)

Mew Gull—

#95–034 *Ozaukee Co.*, 22 November 1995, Uttech.

In a flock of Ring-billed Gulls, this bird stood out because its mantle was darker gray and its head was more heavily streaked. It also had a white tertial crescent, the head was more rounded, it had dark eyes, and a small yellow bill void of the black ring.

Lesser Black-backed Gull—

#95–036 *Dane Co.*, 4 October 1995, Brown.

This gull was larger and stockier than nearby Ring-billed Gulls. The yellow bill was larger and thicker than that of the ring-bills with a red gonydeal spot. An otherwise white plumage was sharply contrasted by the "blue-black" mantle. This mantle color contrasted with the still darker black primaries. The legs were yellow.

Rufous Hummingbird—

#95–039 *Columbia Co.,* 1 August 1995, Robbins; 2 August 1995, Tomlinson; 3 August 1995, Burcar, Tessen.

This bird was Ruby-throated Hummingbird-sized with green wings and crown, but a bronze or orange-brown nape, back, tail and flanks. The throat gorget was orange-red instead of red. Several observers noted a higher pitched buzz from this bird in contrast to the buzz/hum from the Ruby-throated Hummingbirds.

Selasphorus hummingbird (sp.)—

#95–046 *Milwaukee Co.,* 14 November 1995, Korducki; 17, 18, 21 November 1995, Diehl.

This hummingbird had a green back, darker green wings, but rusty flanks. The throat was white with a flecking of dark feathers. The tail feathers had extensive rufous color centrally on each feather. Immature and female Allen's and Rufous Hummingbirds are considered indistinguishable in the field and perhaps even in hand. This bird was captured for transport to California for release in a more appropriate wintering area than Wisconsin.

Smith's Longspur—

#95–042 *Milwaukee Co.,* 14 October 1995, O'Brien, Hughes.

Initially observed flushed, in flight, the *increased white in the outer tail feathers and white wrist marks* were noted. At rest, 25 feet away, the overall light brown coloration was seen. Dark streaking on the crown was broken by a central white streak and edged laterally by a buffy superciliary streak. A buffy auricular patch was edged by darker brown, a buffy whisker was also noted with a darker malar streak in front of it. A buffy breast, lightly streaked with brown, contrasted with a darker streaked back. *No chestnut tones were apparent.* The greater and lesser wing coverts were tan, but the *median coverts were extensively white.* The *edge* of the greater coverts was also white. The flight feathers were dark brown, edged in buff. The central tail feathers were dark brown as well. The bill was shorter and thicker than a Savannah Sparrow's, straw-colored, but dark-tipped. Also reported was the slightly *faster, "drier"* rattle of the Smith's Longspur compared to the Lapland Longspur's call.

This is the fourth state record in the past 55 years.

Not Accepted

Brant—

#95–029 *Winnebago Co.,* 4 October 1995.

Two flocks of birds totalling about 40–50 individuals were described as smaller and shorter necked than Canada Geese, with no white noted on the faces. The underbellies were light. Also reported was a shorter, harsher honk than a Canada Goose. The description though extremely intriguing, is unfortunately very brief. It would be very helpful to know what color the head and neck were and how far down the neck or upper breast the anticipated black color was. Without that distinction, a case could be made for smaller races of Canada Geese seen at a distance. A predominantly white tail compared to a Canada Goose would also be expected in the description of a Brant.

Ptarmigan (sp.)—

#95–032 *Ozaukee Co.,* 3 November 1995.

Seen at the side of the road in car headlights and then in flight, this very brief look included notations of a grouse-like bird with a white head, neck, breast, belly, and tail. The wings and back were mottled brown/gray.

Though the extent of the white brings to mind a ptarmigan, a couple of points in the description raise questions about this possibility. Both Rock and Willow Ptarmigan have black tails in contrast to the white tail reported in this bird. In addition, the White-tailed Ptarmigan maintains white wings in all plumages; this bird had brown/gray wings. It would seem more likely to suspect a partial albino Gray Partridge or Ruffed Grouse given the limited view of this bird and the Harrington Beach location. The observer considered a Rock Dove as well, but the flight pattern was grouse-like.

Iceland Gull—

#95–035 *Ozaukee Co.,* 24 November 1995.

This very white gull was about the same size as an adjacent Herring Gull, though possibly? just a little bit smaller. The bill was noted to be yellow with a black tip, the legs pink. Also mentioned, (though the observer wasn't certain of it) there may have been a grayish color to an unspecified area of the wings.

Glaucous Gulls, though normally much larger than Herring Gulls, can approach the size of larger Herring Gulls, necessitating a closer look than just overall size in medium, white gulls. The bill of an Iceland Gull is relatively small for its head (1/2 the length of the head). That of a Glaucous Gull is decidedly larger (the same length as its head). Unfortunately this distinction was not noted in this bird. In general, the base of the bill on a second year Iceland Gull should be pinkish or beige, not the yellow reported on this individual. Though this bird was most likely an Iceland Gull, a more complete description is needed of the bill size and shape to be certain of the identification given the slight inconsistencies in the size and plumage exhibited by this bird.

Western Gull—

#95–037 *Manitowoc Co.,* 26 November 1995.

This slate-gray-backed (not black-backed) gull was the same size as adjacent Herring Gulls. The yellow bill was considered the same size as Herring Gulls with larger bills nearby (the variation in Herring Gull bill size was noted by the observer in this block of birds). Small white primary mirrors were noted in the resting wing (the wings were not observed extended or in flight). Also reported were pink legs.

A couple of commonly held assumptions about Great Black-backed Gulls are not necessarily true. Though they are generally larger than Herring Gulls, female Great Black-backed Gulls can be the size of large Herring Gulls. In addition, the black mantle may in fact be charcoal-gray, contrasting with the black primary tips. Also worth mentioning, the eye color though written to be light in field guides, can also appear very dark in many photographs and in the field unless the bird is at very close range, in good light. This bird

didn't give the observer enough of a look to report a color for its iris.

Since the wing was not seen in extension or in flight, neither the size of the mirrors in the first and second primaries nor the white inroads (or lack of it) into the primary tips as seen in Slaty-backed Gulls was discernible. Also of note is that the width of the bill tip of a Western Gull is commonly reported as noticeably greater than that of the rest of the bill, a characteristic not described in this bird.

With increased reports of dark-backed gulls in this plumage, close attention to the wing tips may be the only reliable way to distinguish Great Black-backed, Western, and Slaty-backed Gulls. With the advent of Great Black-backed Gull nesting in northeastern Wisconsin, the possibility of hybridization with Herring Gulls has even been pondered.

White-winged Junco—
#95–041 *Outagamie Co.*, 26 October 1995.

This Dark-eyed Junco was described as having a black head, back, and wings, with 2 white wingbars. The outer tail feathers were noted to be white. Though the bird did have white wingbars, this trait has been occasionally noted in other junco subspecies. The Black Hills subspecies would have a couple of other characteristics not noted in this bird. The White-winged Junco subspecies would be paler grey than what we typically see in Dark-eyed Juncos instead of the "black" coloration reported in this bird. In addition, instead of having the white limited to the outer two tail feathers on each side, the white-winged subspecies should typically exhibit three if not four outer white tail feathers. The white in this bird's tail wasn't reported to be more extensive than usual.

Decision Deferred

Boreal Owl—
#95–038 *Sheboygan Co.*, 21, 24 November 1995.

Decision on the reports of this species is awaiting submission of photographs of the birds as no written documentation has been received. The identification is presumed to be accurate, but procedure necessitates written or photographic evidence for acceptance.

Accepted Historical Record

Prairie Falcon—
Racine Co., 16 October 1990, DeBoer.

Initially suspected of being an approaching Peregrine Falcon, the bird banked to reveal unexpected characteristics. The head did not have the dark hooding of a Peregrine. Instead a very light coloration was noted. Most importantly, the black axillaries were seen. As the bird came closer, light facial markings including a light brown moustache was evident. The back and wings were sandy brown.

This is the fifth accepted sight record for Wisconsin. One additional trapping of a Prairie Falcon was clouded by the possibility of it being an escaped falconer's bird. This species remains on the hypothetical list for the state.

Jim Frank
WSO Records Committee chair

Great Horned Owl *by Robert A. Kleppin*

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Jim Frank has been one of WSO's most active contributors to Seasonal Field-Notes. He now assists WSO by compiling and summarizing the annual May Day Counts, Big Day Counts and Migration Day Counts and is the Records Committee Chair. He is a veterinarian in Milwaukee with an interest in avian medicine.

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Samuel D. Robbins is one of Wisconsin's most active ornithologists. He has served WSO in many capacities, including President and Editor, and he has received WSO's Silver Passenger Pigeon Award. He is author of the book *Wisconsin Birdlife.*

David W. Sample is grassland community ecologist for the Wisconsin Department of Natural Resources' Bureau of Integrated Science Services. He conducts research on issues related to grassland bird ecology and habitat management, agricultural ecosystems, and private lands wildlife.

Nesting Pheasant *by Robert A. Kleppin*

50 Years Ago in *The Passenger Pigeon*

Even 50 years ago, things always weren't what they seemed. In the lead article in this issue, Frank Kozlik concluded that "this study indicates that DDT concentrations of 1 pound and 2 pounds per acre have no apparent adverse effect upon birds. This substantiates findings of Fish and Wildlife Service technicians which indicated a DDT concentration of 5 pounds per acre before any dead birds were found. Properly applied, light concentrations of DDT should give good insect kills without harmful effect to birds."

Kozlik's study was done in the Nicolet Forest in Oconto County where red and jack pine plantations were aerially sprayed with DDT to control the Saratoga frog hopper, a spittle insect. Birds in the sprayed plots included Great Crested Flycatcher, Black-capped Chickadee, Blue Jay, Ovenbird, Field Sparrow, Eastern Kingbird, Connecticut Warbler (in jack pine), Rufous-sided Towhee, Chipping Sparrow, American Goldfinch, Cedar Waxwing, Red-eyed Vireo, and Northern Waterthrush.

One of the article's references is a 1946 paper by Richard Pough who had just authored the Audubon Bird Guide, Eastern Land Birds. The title of this paper was "Effect on forest birds of DDT used for gypsy moth control in Pennsylvania." 50 years later, Wisconsin is spraying for gypsy moth. In 1996, more than 35,000 acres will be sprayed at 38 sites in 16 counties. Although DDT is no longer in our control arsenal, will we discover some day in the future that the biological control method being used, spraying with the bacterium "Bacillus thuringiensis var. kurstaki," has a real ecological downside? (Excerpts from Volume 8, 1946)

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