

THE 2003-2008 SUMMARY OF THE NORTH AMERICAN BREEDING BIRD SURVEY¹

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Abstract. Data from the North American Breeding Bird Survey were used to estimate continental and regional changes in bird populations for the 6-yr period 2003-2008 and the 2-yr period 2007-2008. These short-term changes were placed in the context of population trends estimated over the 1966-2008 interval. Across the entire survey area, a higher proportion of species exhibited positive growth during 2003-2008 (64%) than during the long-term (46%) or the more recent 2-yr-term (39%). The 2003-2008 growth occurred relatively evenly across the Western, Central, and Eastern BBS regions, with 59%, 66%, and 61% of all species increasing, respectively. We additionally evaluated the proportion of species with positive trend estimates in each of 12 life-history based groupings at continental and regional levels. Survey-wide, birds in the grassland guild demonstrated the lowest proportion of positive trends over the entire survey period (21% increasing), with significant declines occurring in both the Eastern and Western regions (5% increasing and 18% increasing, respectively). Birds in the wetland breeding guild exhibited the greatest proportion of positive trends, with a significant number of increasing species (between 77-90%) occurring in all three BBS regions during 2003-2008.

Key Words: North American Breeding Bird Survey, population trends, roadside surveys, species group analysis.

RESUMEN DEL CONTEO DE AVES REPRODUCTORAS (BBS) DE NORTEAMÉRICA DESDE 2003 Y 2008

Resumen. Datos del Cuento de Aves Reproductoras (BBS) de Norteamérica fueron utilizado para estimar los cambios continental y regional en las poblaciones de aves en el periodo de 6 años 2003-2008 y el periodo de dos años 2007-2008. Estos cambios a corto plazo fueron situados en el contexto de las tendencias poblacionales estimadas en el intervalo 1966-2008. En la escala continental, una mayor proporción de las especies mostraron un crecimiento positivo durante 2003-2008 (64%) que en el periodo de largo plazo (46%) o en el período más reciente de 2 años (39%). El crecimiento de 2003-2008 se ocurrió de manera relativamente uniforme a través de las regiones Oeste, Central y Este del BBS, con el 59%, 66% y el 61% de las especies aumentando, respectivamente. Además, evaluamos la proporción de especies con tendencias positivas en las escalas continental y regional para 12 grupos de especies que comparten características de historia de vida. En la escala continental, las aves de pradera mostraron el porcentaje más bajo de especies con tendencias positivas (21% aumentando) con declives significativos detectado en las regiones Este y Oeste del BBS (5% aumentando y 18% aumentando, respectivamente). Aves que se reproducen en humedales mostraron la mayor porcentaje de las tendencias positivas, con un número significativo de especies con tendencias positivas (77-90%) detectado en las tres regiones del BBS durante 2003-2008.

Palabras clave: Cuento de Aves Reproductoras de Norteamérica, tendencias poblacionales, conteos en carreteras, análisis por grupos de especies.

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INTRODUCTION

Initiated in 1966, the North American Breeding Bird Survey (BBS) is the primary source of standardized population data for breeding birds in the U.S. and Canada. For most avian breeding species in North America, it is the only available source for long-term population trend estimates and relative abundance measures at large geographic scales. The BBS was initiated by the U.S. Fish and Wildlife Service and Canadian Wildlife Service and is currently administered by the U.S. Geological Survey (USGS) and Canadian Wildlife Service (CWS). In 2007, Mexico's National Commission for the Knowledge and Use of Biodiversity (CONABIO) partnered with the USGS and CWS to expand the BBS into Mexico. A sampling framework, including hundreds of new routes, is currently in development across the northern tier of Mexican states, putting the survey closer to its goal of making the BBS a fully North American program.

This summary presents continent-wide estimates of population trends for 422 bird species and four species groups [Western/Clark's Grebe (*Aechmophorus clarkii/A. occidentalis*), Willow/Alder Flycatcher (*Empidonax traillii/E. alnorum*), Pacific-slope/Cordilleran Flycatcher (*Empidonax difficilis/E. occidentalis*), and Yellow-bellied/Red-naped/Red-breasted Sapsucker (*Sphyrapicus varius/S. nuchalis/S. ruber*)] for the period 1966-2008. Although these four groupings currently consist of taxonomically distinct species (AOU 1998), each was viewed as a single taxon when the BBS was initiated and early data collected from areas of sympatry cannot be discriminated adequately to permit contemporary range-wide species-level analyses. In this report we discuss the 6-yr trends, 2003-2008, and 2-yr trends, 2007-2008, within the context of long-term changes estimated over the 1966-2008 interval. Detailed analyses and discussion of population changes for individual species within specific regions, states, provinces, territories, and physiographic strata are beyond the scope of this summary. Also included in this summary are the continental and regional trends for 12 groups of birds sharing similar life-history traits. Analyses of group trends can provide insight into the broad temporal and geographic patterns of population trends, especially when viewed in the

context of previous BBS summaries (Pardieck and Sauer 2007, 2000; Peterjohn and Sauer 1993; Peterjohn et al. 1994, 1996).

METHODS

The BBS consists of over 4600 active survey routes randomly located across the continental United States, Canada, and northern Mexico [See the North American Breeding Bird Survey web site (www.pwrc.usgs.gov/bbs/) for maps depicting the approximate locations of these routes]. Since 1994, the number of routes surveyed in the United States and Canada has remained relatively constant at about 3000 routes. A total of 2980 routes were sampled in 2003, 2995 in 2004, 3059 in 2005, 3058 in 2006, 3111 in 2007, and 3022 in 2008.

The BBS methodology is described briefly here; see Robbins et al. (1986) for a detailed description. The BBS is a roadside survey program consisting of 39.4-km (24.5-mi) routes, with stops placed at 0.8-km (0.5-mi) intervals for a total of 50 stops. Routes are randomly established on suitable roads and surveyed once per year during the height of the breeding season (June for most of the U.S. and Canada). At each stop, a skilled amateur or professional ornithologist records all birds seen within a 0.4-km (0.25-mi) radius and every bird heard, during a 3-min point count. For each species, the sum of the counts from the 50 points is used as an index to abundance along the route for that year.

ESTIMATION OF POPULATION TREND

Population change was estimated using a hierarchical log-linear model fit to BBS data with Markov chain Monte Carlo (MCMC) methods. Hierarchical models provide a natural framework for accommodating differences in quality of information among regions and the MCMC procedure provides a convenient tool for estimating composite results. The hierarchical model analysis was first described by Link and Sauer (2002) and we note that this report is the inaugural summary report using this analysis. Sauer and Link (2010) conducted a comprehensive comparative analysis of BBS data using hierarchical model and route regression results, and we refer readers to that evaluation for details of both the analytical method, its implementation for BBS data, and the similarity of results

from the two approaches.

Analyses of BBS data produce a single composite estimate of population change, or trend (an interval-specific geometric mean of proportional changes in population size), presented as mean percentage change per year (Link and Sauer 1998). In the hierarchical model, composite trends are functions of the model's parameters and hyperparameters, combined using abundance weights reflecting the typical magnitude of counts on routes in the survey area. We estimated trends at the scale of the entire survey area and separately for Eastern, Central, and Western BBS regions (Bystrak 1981), for the interval 1966–2008, noting that the survey did not begin until 1968 in some parts of the survey area. Alaska, northern Canada (territories and northern portions of most provinces), Newfoundland, and northern Mexico were excluded from the analyses because of insufficient data to estimate long-term trends.

As the analysis was conducted using Bayesian methods, estimates of parameters and their credible (Bayesian confidence) intervals are taken from the Posterior Distribution of the parameters; for mean change, we used the 2.5 and the 97.5 percentiles of the distribution as our estimate of the composite change and its 95% credible (Bayesian confidence) intervals. We used width of the interval to measure precision of the results and considered an estimate to be imprecise if the half-width of the credible interval was larger than 3%/yr change for the species (Sauer et al. 2003). Although the magnitude of a trend estimate may be quite large, if the credible interval includes zero the trend is not considered significantly different from zero. See the BBS Analysis and Summary Website (<http://www.mbr-pwrc.usgs.gov/bbs.html>) for additional discussion about trend quality and precision. As in earlier BBS summaries (Pardieck and Sauer 2007), we have incorporated an overall Trend Quality (TQ) score to identify trends that contain certain deficiencies. TQ is a ranked score ranging from 1-3; we categorized each species' results into TQ1: acceptable, TQ2: use with caution, or TQ3: possibly questionable based on (1) precision [CI not small enough to exclude 0 for a 3%/yr change = TQ2, or not small enough to exclude 0 for a 5 %/yr change= TQ3]; (2) sample size [N routes < 15 = TQ2, or N routes < 5 = TQ3]; and

(3) Relative Abundance [annual index in final year <1 = TQ2, or annual index in final year <0.1 = TQ3]. Overall TQ value was determined based on the largest concern level in any of the criteria.

Sample size was determined as the number of routes on which the species was encountered during any year of the survey. This quantity is larger than the sample size presented in earlier reports, which was based on the number of routes providing acceptable data for the route regression analysis. Because the interval-specific trends are calculated directly from the composite indices, rather than in a separate analysis as was presented in earlier reports, we do not provide separate sample sizes for interval results.

SUMMARIES FOR GROUPS OF SPECIES

We estimate the median percentage of species having increasing populations for each region and time period. Because the collection of species in our analyses tends to vary greatly in quality of information, we used a hierarchical model similar to that described by Sauer and Link (2002), but assuming a lognormal distribution of counts (Sauer and Link 2010). This procedure provides a group estimate of the proportion of species exhibiting positive trends, incorporating uncertainty in estimates of variances of trend for individual species. As with the estimation of the individual species trends, we estimated the Posterior Distribution of the mean change using Bayesian methods; the 2.5 and 97.5 percentiles of the posterior distribution being our estimate of the composite change and its 95% credible (Bayesian confidence) interval. We considered a group trend to be significant if the 95% credible interval did not overlap 50%.

BBS trend results are summarized for all species collectively as well as 12 groups of species in five life-history categories: all species, breeding habitat (grassland, successional/scrub, wetland/open water, woodland, and urban habitats), nest type (cavity, open cup), migration (short-distance, permanent resident, and neotropical), and nest location (ground/low, midstory/canopy). Composition of the species groups are described in Peterjohn and Sauer (1993) but have been revised as per the seventh edition of the American Ornithologists' Union Check-list of North American Birds (AOU 1998) and subsequent supplements.

We note several constraints among the

comparisons presented. Data from the intervals are not independent, as the subintervals are contained within the longer interval. Consequently, we did not formally test for differences among intervals, and merely note differences among point estimates. All tests of the species group analyses address the null hypothesis that the percentage of increasing species does not differ from 50% within an interval. Sample sizes and precision of estimates differ among regions and time periods. Readers are cautioned that the underlying species groups in each guild can differ among regions. See the BBS Analysis and Summary Website (www.mbr-pwrc.usgs.gov/bbs) for additional discussion about species-group results for time periods and regions.

RESULTS

Among the the 426 species that we provide continent level trend estimates for, 216 (51%) exhibited significant long-term population change (Table 1, Appendix 1). Of these, 85 (39%) experienced population growth and 131 (61%) showed an overall decline. The majority of these significant long-term trend estimates had high trend quality; 144 (67%) species had TQ=1, 57 (26%) species had TQ = 2, and 15 (7%) species had TQ = 3. Continental trend estimates from the more recent 2-yr interval were similar, with 31% of all species exhibiting significant population growth and 69% experiencing significant population loss. This pattern was reversed during 2003-2008, when 66% of species showed significant positive trends and only 34% exhibited significant declines.

The results of the group analyses represent the trend and precision estimates of all constituent species in aggregate, thereby providing a more

refined assessment of the proportion of species exhibiting increasing trends. Of the 12 life-history groups in each of the three BBS regions during 1966-2008, only 6 saw significantly more than half of their constituent species undergo population increase while 17 saw significantly more species decline. Results during 2007-2008 mirrored this long-term pattern (0 groups with >50% of species increasing vs. 7 with overall losses) but contrasted the 2003-2008 results where 13 groups saw significantly more species increase and none experienced a significantly greater proportion of declines.

At the survey-wide level, 46% of all species exhibited positive trend estimates during 1966-2008, with the greatest proportion of increases occurring in the Central region (58%; Fig. 1A).

All regions, but especially Western and Eastern, demonstrated appreciable gains during 2003-2008, with 64% of all species showing positive trends survey-wide. The proportion of species increasing survey-wide in the more recent 2-yr interval, however, fell to 39% due to declining populations in all regions.

The grassland bird guild contained the lowest number of species exhibiting increasing long-term trends of any group over the entire survey area (21%, Fig. 1B). The Eastern region reached a significant low point during 1966-2008 with just 5% of grassland species experiencing population growth. Grassland bird trends improved in all regions during 2003-2008 with the proportion of positive trend estimates ranging from 25% in the Eastern region to 57% in the Central region; this apparent tendency for increase, however, was not significant. Percentages dropped in all regions in the 2007-2008 interval but these declines also were not significant.

Wetland species exhibited the greatest significant proportions of positive trend estimates in

TABLE 1. Summary of Trend Quality (TQ) values for 1966-2008. Total number of species trends (N) in each trend category as well as their significance ($P < 0.05$) and direction are presented. The TQ values are defined as follows: 1 = acceptable, 2 = use with caution, 3 = possibly questionable.

Trend Quality	N	Number of Significant Trends	Number of Significant Trends: Increasing	Number of Significant Trends: Decreasing
All	426	216	85	131
1	250	144	46	98
2	124	57	33	24
3	52	15	6	9

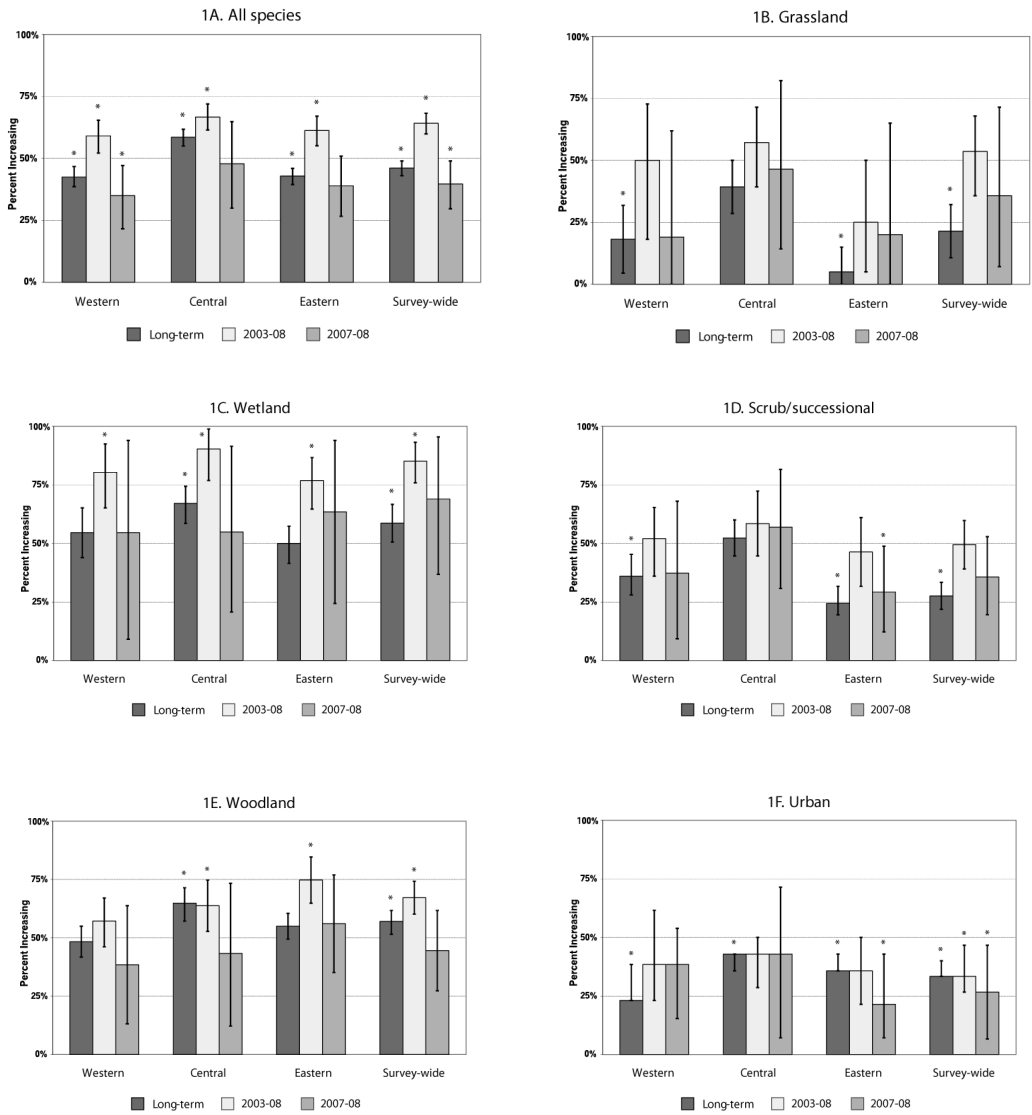


FIGURE 1 (A-M). The percentages of species, with credible intervals, having positive trend estimates during 1966-2008, 2003-2008, and 2007-2008, shown by species group. Trend is considered significant ($P < 0.05$) if the credible interval does not overlap 50% (indicated by *).

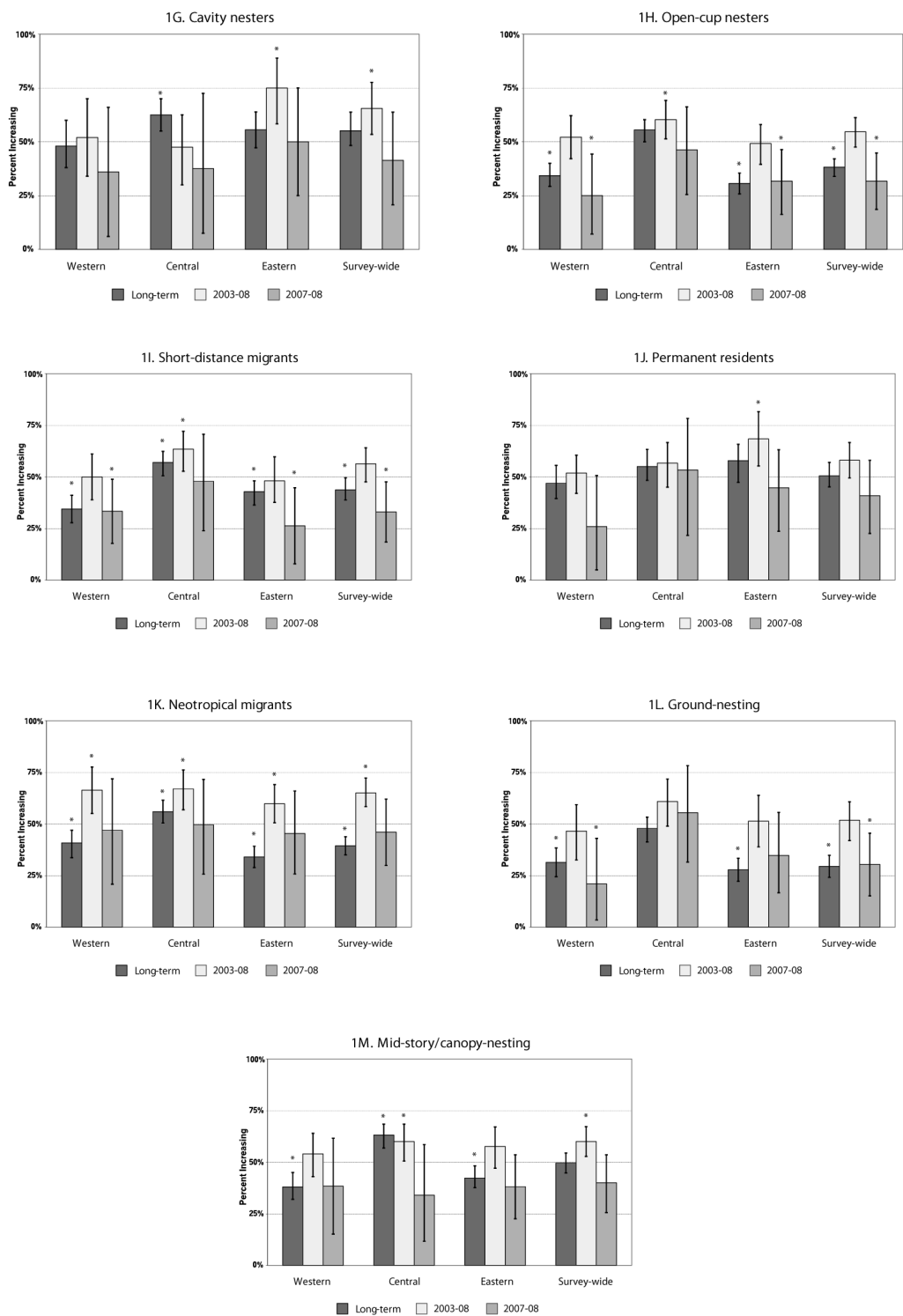


FIGURE 1 (A-M). Continued.

the Western, Central, and Eastern BBS regions with 80%, 90%, and 76% of species increasing, respectively, during 2003-2008 (Fig. 1C). Survey-wide, more wetland species demonstrated increase over the long-term (58%) than not, a result that appears to be driven by a significant and relatively high proportion of increases in the Central region (67%). Compared to the long-term, wetland birds apparently fared well during 2007-2008, with all regional percentages exceeding, although not significantly different from, 50%.

Scrub/successional species, on the other hand, continued to fare poorly over the long-term and a significantly low proportion of species experienced population growth across all regions (27%, Fig. 1D). The 2003-2008 time period appeared more favorable for this guild survey-wide (49% positive trends), but neither this, nor any of the regional values from this period, are distinguishable from 50%. The 29% of increases witnessed in the Eastern region during 2007-2008 is the only regional result statistically distinguishable from 50%, and it is similar to the long-term results for this region (24%).

During 2003-2008, a significant number of woodland birds exhibited increasing trends survey-wide (67%), and this was greater than the proportion observed over the long-term (57%; Fig. 1E). This result appears to be driven by significant gains made in the Eastern region during 2003-2008 (74% increasing trends). The 63% of species with increasing long-term trends from the Central region remained nearly unchanged and significantly high in the 2003-2008 period (64%). In contrast, the proportions of woodland birds with increasing trends in all regions during the 2-yr time interval, and also those from the Western region during the two longer intervals, were indistinguishable from 50%.

Urban bird populations showed a significant tendency for decline in all regions during 1966-2008 (Fig. 1F). During that period, the 42% of increasing trends in the Central region balanced out the low 23% seen in the Western region, yielding a survey-wide estimate of just 33% of urban birds increasing survey-wide. Regional estimate from the 2003-2008 period are not distinguishable from 50% but the continent-wide result of 33% is significant and equivalent to the 1966-2008 estimate. Each region exhibited a

greater number of declines than increases during the 2-yr interval, although only the survey-wide results (26% increasing trends) and Eastern region results (21% increasing trends) were significant.

Cavity nesting birds fared relatively well with proportions of increasing species either equal to or significantly greater than 50% in all regions and time periods (Fig 1G). For instance, 65% of cavity nesting birds showed positive trend estimates across the entire survey area during 2003-2008, including a significantly high proportion of gains in the Eastern region (75% species increasing). During 1966-2008, only the Central region demonstrated a significant proportion of increasing species (62%).

Over the long-term and across the survey, significantly more open-cup nesting species experienced population declines than increases (38%; Fig. 1H). This declining pattern was evident in Western (34% increasing trends) and Eastern (30% increasing trends) BBS regions but not in the Central region where results were indistinguishable from 50%. A similar pattern was seen during the 2-yr interval where only 25% of Western species and 31% of Eastern species exhibited increasing trends. In contrast, during 2003-2008, only the Central region demonstrated a significant result with 60% of species showing increasing trends.

Short-distance migrants did not fare especially well over the long-term and only 43% of species exhibited positive trends survey-wide (Fig. 1I). This appears to be due in large part to the significantly low proportion of population increases in the Western and Eastern regions (34% and 30%, respectively), relative to the significant number of long-term increases seen in the Central region (56%). The tendency for decline in the West and East was similarly reflected in the 2-yr interval, although the proportions were lower (33% and 26%, respectively), thus dropping the survey-wide estimate to 33% of species increasing during the period. Short-distance migrants experienced their strongest increases in the Central region during both 1966-2008 (56% increasing trends) and 2003-2008 (63% increasing trends), although the result from the later interval was not statistically significant.

During the long-term and more recent 2-yr periods, increases in permanent residents did not

differ significantly from 50% in any region (Fig. 1J). Results from the 6-yr period were similar with exception of the Eastern region, where a significant number of species (68%) showed positive population trends. Noteworthy is that, although 1966-2008 and 2003-2008 results from the East and West are not statistically significant, the credible intervals are relatively short and suggest that a nearly even proportion of species experienced gains and losses.

Significantly fewer than 50% of neotropical migrant species exhibited increasing population trends in the Western (40%) and Eastern (34%) regions over the long-term (Fig. 1K). In contrast, neotropical migrants were significantly more likely to experience population growth in the Central region during that period (55% species increasing). All regions surpassed that proportion during 2003-2008 with a significant percentage of species in both the Western and Central regions (66%) and in the Eastern region (59%) experiencing positive trends, yielding an overall increase of 64% positive trends survey-wide. No such pattern could be discerned during the 2-yr period because regional results were not statistically distinguishable from 50%.

The ground nesting bird guild was amongst the groups most likely to experience declines (Fig. 1L). Many of the long-term declines were severe, as evidenced in the significantly low proportion of positive trends from Western (31%) and Eastern regions (27%) and the low 29% of increases demonstrated survey-wide. The 2003-2008 interval portrays a more positive picture with 46%, 60%, and 51% of ground nesters increasing, respectively, in the Western, Central, and Eastern regions. However, no significant deviations from 50% were detected for any region during this period. Declines were again apparent in the more recent 2-yr interval but only the results from the Western region were statistically significant, where only 20% of species experienced increasing population trends.

During 1966-2008, mid-story and canopy-nesting birds fared relatively well in the Central BBS region (63% increasing trends). Populations, however, experienced significantly fewer increases in the Western (38%) and Eastern (42%) regions (Fig. 1M). These opposing proportions likely account for the survey-wide result being indistinguishable from 50%, despite having a

narrow credible interval. Western and Eastern regional results were equivocal and not significant during 2003-2008, but populations in the Central region demonstrated a significant tendency for increase during this period (60% increasing trends). More mid-story and canopy-nesting birds experienced population declines than increases in all BBS regions during the 2-yr interval but these results were not significant.

DISCUSSION

The 2-yr and 6-yr trends provide general indication of how populations fluctuated during these intervals. These trends show temporal and spatial heterogeneity and thus should be viewed with caution and only interpreted within the context of the long-term trend results. Although the majority of significant long-term trend estimates had high trend quality (Table 1), the quality of the shorter interval trend estimates varies considerably among regions and species. Any analysis of BBS data should carefully consider the possible limitations of the data and potential trend quality issues. Additionally, the BBS is not designed to determine causal factors of population changes. Therefore, we were unable to identify specific factors responsible for the various temporal and regional patterns evident in this analysis. Nevertheless, it can be instructive to examine the overall patterns within the context of previous analyses to identify general tendencies that could provide insight for future research and conservation efforts.

The 2007-2008 period was relatively poor for most species across the survey, producing one of the lowest proportions of positive 2-yr trends (39%) ever reported in the BBS. Trends are rarely exactly zero, so when considering combined trends for life-history guilds, if a group were essentially stable, one would expect 50% of constituent species to have increasing trends and 50% to have decreasing trends simply by chance. In 2007-2008, all groups with results deviating significantly from 50% had 2/3 or more of their constituent species in population decline. Three guilds (open-cup nesters, short-distance migrants, and ground or low nesting birds) experienced greater declines in the Western region and 4 (successional or scrub, urban, open-cup nesters, and short-distance migrants) experienced greater decline in the East. Results

from the Central region suggest that conditions in that portion of the continent generally favored stability more so than did conditions in the West and East.

Although the causes of such declines cannot be divined from analysis of BBS data alone, it is possible that extreme weather patterns during 2007-2008 may have played a role. Mild El Niño – Southern Oscillation (ENSO) conditions developed in early Autumn 2006 (Arguez 2007), as indicated by a warming of the sea surface in the eastern and central tropical Pacific Ocean (Larkin and Harrison 2002). These warmed waters had cooled by early winter, changing wind patterns, and yielding relatively cool and dry winter conditions in the Western region, cool and wet conditions in the Central region, and warm and dry conditions over much of the Eastern region. The 2007 BBS field season met with drier than average summer conditions in the Western and Eastern BBS regions, including 41% of the contiguous U.S. in moderate to extreme drought (Levinson and Lawrimore 2008). Portions of the Central region, however, received record amounts of precipitation during this time. As the Pacific surface waters progressed to a hypercooling phase in autumn 2007 (Peterson and Baringer 2009), a strong La Niña produced relatively cool winter conditions in the Western and north-Central regions, warm and dry winter conditions in the southeast, and notably warm and wet conditions in the northeast. These conditions prevailed in the 2008 BBS field season, with below normal summer precipitation confined to the Western region and the South-East.

North American land bird population changes have been correlated to earlier ENSO events (Morrison and Bolger 2002; Sillett et al. 2000; Nott et al. 2002) and previous BBS summary reports have noted increases in Western bird populations and/or reductions in regional migrant groups in the subsequent 2-yr periods (Peterjohn et al. 1994, Pardieck and Sauer 2000, Pardieck and Sauer 2007). Comparison between El Niño and La Niña is complicated given that ‘typical’ weather patterns represent average effects, and actual effects can vary considerably depending on the time of year of occurrence (Ropelewski and Halpert 1986). Also, other substantial atmospheric and oceanic phenomena,

such as the Pacific/North American “teleconnection” pattern and the North Atlantic Oscillation (Wallace and Gutzler 1981, Nott et al. 2002), are likely influencing bird populations as well. During 2007-2008, amongst the three resident/migratory guilds, short-distance migrants in the Western and Eastern regions and permanent residents in the West experienced the greatest proportion of declines. Neotropical migrants, on the other hand, were relatively stable across all regions, suggesting that winter weather patterns may have been an important factor contributing to declines in birds wintering in the United States. The relationship between land bird populations and large-scale atmospheric and oceanic patterns deserves additional study.

The pattern of trends in the 2007-2008 period was similar to that seen in the 1966-2008 trends. Over the long-term, a species was 1.5 times more likely to exhibit a significant decline than a significant increase (Appendix 1). Life-history groups during this time were also nearly three times more likely to contain a significantly greater proportion of species with negative trends (Figs. 1A-M). Only six of the 23 regional life-history groups that deviated significantly from 50% did so in the positive direction, and all six occurred in the Central region.

Overall, the tendency during the 2003-2008 period was for all species to experience significant range-wide population gains. All 13 of the regional life-history groups with results that deviated significantly from 50% during this period were positively oriented. This is a departure from the pattern seen in the previous two BBS summary reports, where mid-term and long-term results demonstrated proportions of increasing species that were both similar to one another and lower than the 2-yr term results (Pardieck and Sauer 2000, Pardieck and Sauer 2007). Whether or not the period of general decline during 2007-2008 reflects a meaningful biological correction following the 2003-2008 growth spell is uncertain but worthy of further evaluation.

Most grassland bird species have experienced steep long-term continent-wide declines and only 5% of Eastern and 21% of Western populations demonstrated positive growth during 1966-2008 (Fig. 1B). The fact that the 6-yr

and 2-yr percentages were generally larger than the long-term percentages in the Eastern and Central regions is encouraging and, despite many having credible intervals that span 50%, this is still indicative of progress and suggestive that conditions may have improved for grassland birds in recent years. Scrub/successional species also have declined dramatically in some areas so increases during the 6-yr and 2-yr intervals, relative to the long-term, were of special interest (Fig. 1D). Unfortunately, estimates during these intervals were comparatively imprecise and additional years of favorable population change will be needed before a reversal in the long-term declines would become apparent.

Wetland and woodland species exhibited the greatest overall number of increasing trends amongst the habitat groupings (Figs. 1C, E). Within the 2003-2008 period of growth, the Eastern region experienced the fewest number of wetland-breeding population gains, but even this proportion was above 75%. Woodland birds, on the other hand, experienced their greatest proportional increases in the Eastern region during both the 6-yr (74%) and 2-yr (56%) terms, with fewer gains observed in the Central region than might have been expected. The survey-wide long-term trend of the wetland group was slightly lower than that reported in the previous BBS summary, while the woodland group value was slightly higher.

Detailed analyses of regional patterns of population trends within individual species are beyond the scope of this paper. Species-specific trend and relative abundance data, as well as additional information regarding the survey are available at the North American Breeding Bird Survey home page (<http://www.pwrc.usgs.gov/BBS/>).

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APPENDIX 1.. Long-term (1966-2008) trends, 6-yr (2003-2008) trends, and 2-yr (2007-2008) trends for all species detected on BBS routes, 1966-2008. For the three intervals, we present trend (average % change/y) and 95% credible (Bayesian confidence) intervals. Trend is considered significant ($P < 0.05$) if the credible interval does not include zero (indicated by *). For the long-term trends, sample size (N of routes) and TQ-values are also provided. Species names based on AOU (1998).

Species	1966-2008				2003-2008		2007-2008	
	TQ	N	Trend	Credible Interval	Trend	Credible Interval	Trend	Credible Interval
Black-bellied Whistling-Duck	2	101	7.9 *	3.7, 11.6	15.9 *	5.0, 27.6	80.7 *	24.8, 187.4
Fulvous Whistling-Duck	2	43	2.6	-2.1, 7.1	12.2 *	1.3, 29.2	24.0	-26.0, 158.5
Canada Goose	2	2585	11.8 *	9.3, 16.5	14.4 *	7.3, 24.1	16.9	-11.0, 77.0
Mute Swan	3	93	4.1	-0.8, 10.1	5.2	-13.4, 40.5	8.9	-62.3, 346.0
Wood Duck	2	2117	2.8	-0.1, 3.6	5.0 *	2.0, 8.8	5.4	-7.8, 26.3
Gadwall	1	703	2.6 *	1.5, 3.5	5.3 *	0.5, 10.6	2.4	-19.5, 27.4
American Wigeon	1	547	-3.5 *	-5.4, -2.3	-1.6	-5.8, 2.9	-19.2	-38.4, 1.5
American Black Duck	2	548	0.3	-2.3, 3.2	1.0	-4.9, 7.9	2.2	-25.8, 39.4
Mallard	1	3146	-0.1	-0.9, 0.6	1.4	-1.3, 4.2	2.0	-10.7, 15.8
Mottled Duck	1	107	-3.3 *	-5.2, -1.3	-1.5	-8.0, 4.6	0.8	-29.0, 33.0
Blue-winged Teal	3	1211	-0.3	-20.7, 1.0	6.0	-0.1, 13.2	-13.3	-35.1, 16.3
Cinnamon Teal	3	465	-2.3 *	-21.5, -0.5	0.1	-8.2, 8.5	-14.7	-55.7, 23.5
Northern Shoveler	1	640	1.2	-0.9, 2.5	6.4	-0.3, 13.8	-18.0	-43.0, 14.8
Northern Pintail	1	719	-3.5 *	-6.3, -1.1	-2.3	-11.1, 12.2	-35.1	-61.0, 28.2
Green-winged Teal	2	759	-0.4	-2.3, 1.1	2.9	-3.4, 13.3	9.0	-25.5, 73.6
Canvasback	3	280	-1.2	-12.4, 1.4	0.9	-8.5, 14.2	-11.4	-53.5, 66.3
Redhead	2	417	-0.4	-4.4, 1.7	2.2	-6.2, 13.0	-12.6	-47.5, 34.0
Ring-necked Duck	3	445	3.6	-1.9, 8.9	9.3 *	2.5, 18.9	0.3	-54.8, 42.8
Lesser Scaup	2	470	-3.0 *	-8.0, -1.0	1.4	-7.6, 10.5	-4.9	-38.3, 54.2
Bufflehead	2	225	2.6	-0.5, 4.5	5.0 *	0.2, 11.3	6.8	-16.2, 41.5
Common Goldeneye	3	303	1.1	-10.1, 4.5	6.6 *	0.1, 16.3	17.2	-16.1, 78.9
Barrow's Goldeneye	2	95	-1.6	-4.7, 0.7	-0.1	-7.5, 9.7	-3.5	-41.4, 37.2
Hooded Merganser	3	376	5.2 *	0.5, 8.5	6.6	-3.2, 13.6	5.3	-32.4, 43.0
Common Merganser	3	821	-1.0	-10.1, 1.1	2.0	-1.3, 7.1	3.1	-12.3, 31.5
Red-breasted Merganser	3	75	-6.3	-27.7, 2.6	3.4	-19.2, 46.3	3.5	-83.0, 448.4
Ruddy Duck	2	429	0.5	-3.0, 3.4	3.0	-6.9, 24.2	-1.9	-41.6, 141.3
Chukar	2	163	0.2	-2.8, 2.4	0.5	-11.1, 11.0	-20.2	-58.3, 24.9
Gray Partridge	2	434	-0.6	-2.5, 0.6	-0.2	-7.1, 6.2	-11.5	-48.3, 20.4
Ring-necked Pheasant	1	1807	-0.2	-0.7, 0.3	1.9	-0.3, 4.2	5.9	-4.3, 16.9
Ruffed Grouse	2	1166	1.0	-0.7, 2.4	5.1	-0.2, 11.3	5.2	-21.2, 38.6
Sage Grouse	2	149	-3.9 *	-7.7, -1.0	-0.3	-10.1, 12.4	-10.4	-57.0, 58.1
Blue Grouse	2	230	-1.2	-2.6, 0.3	0.3	-3.6, 7.6	-1.1	-18.8, 31.5
Sharp-tailed Grouse	2	292	-0.1	-2.5, 1.5	4.8	-1.6, 12.9	9.1	-56.9, 60.6
Greater Prairie-Chicken	3	95	4.3	-1.0, 9.1	19.8 *	4.3, 56.0	41.6	-24.2, 393.6
Wild Turkey	2	1963	9.1 *	7.6, 10.1	13.9 *	10.1, 17.6	19.6 *	4.0, 39.0
Mountain Quail	1	180	-0.3	-2.1, 1.1	-8.3 *	-13.7, -3.1	5.7	-17.2, 35.0
Scaled Quail	1	206	-2.0 *	-3.3, -0.9	-5.9 *	-10.9, -0.7	-35.2 *	-50.4, -15.7
California Quail	1	418	1.2 *	0.3, 2.0	-2.2	-5.3, 1.0	7.4	-7.4, 24.5
Gambel's Quail	3	143	0.0	-11.9, 1.6	-0.1	-4.9, 5.1	-9.0	-29.6, 18.3
Northern Bobwhite	1	1912	-3.7 *	-4.0, -3.5	-5.5 *	-6.7, -4.3	-7.3 *	-12.7, -1.4
Common Loon	1	781	0.8	-0.6, 2.0	1.6	-0.3, 3.4	2.0	-6.1, 11.2
Pied-billed Grebe	2	1025	-0.3	-3.3, 1.4	8.9 *	0.3, 18.8	-12.5	-42.6, 30.3
Horned Grebe	2	172	-2.5 *	-4.4, -0.8	-1.7	-10.1, 7.1	-14.9	-50.6, 24.5
Red-necked Grebe	2	182	0.4	-1.0, 2.1	1.7	-2.1, 8.3	0.1	-22.2, 28.5

APPENDIX 1. Continued.

Species	1966-2008				2003-2008		2007-2008	
	TQ	N	Trend	Credible Interval	Trend	Credible Interval	Trend	Credible Interval
Eared Grebe	3	281	-0.4	-11.5, 3.6	7.6	-7.1, 32.6	-12.1	-87.2, 117.3
Western/Clark's Grebe	2	239	-0.5	-5.9, 3.0	6.0	-5.2, 29.3	20.0	-28.3, 189.0
American White Pelican	2	371	6.0 *	1.4, 11.1	14.9 *	3.9, 31.2	3.5	-51.1, 106.0
Brown Pelican	3	58	6.5 *	1.2, 11.9	10.0	-6.3, 44.4	5.5	-57.8, 328.3
Double-crested Cormorant	1	1076	5.3 *	2.4, 8.2	8.9 *	0.2, 18.9	17.3	-24.1, 67.2
Pelagic Cormorant	3	20	-5.4	-12.1, 0.9	-3.9	-19.2, 16.6	-8.3	-75.9, 114.0
Anhinga	2	208	0.2	-1.2, 1.4	-0.1	-6.9, 4.9	-1.1	-24.7, 23.0
American Bittern	2	1079	-0.6	-2.9, 0.9	8.3 *	2.8, 15.4	4.9	-28.3, 44.2
Least Bittern	2	148	-0.3	-2.9, 2.4	1.4	-7.7, 9.5	-0.3	-32.4, 44.4
Great Blue Heron	2	3300	1.2 *	0.8, 1.5	2.5 *	1.2, 4.2	5.3	-0.6, 13.2
Great Egret	1	950	3.1 *	1.8, 4.5	5.5 *	1.4, 10.9	7.0	-9.5, 27.6
Snowy Egret	1	471	1.9	-1.2, 4.1	5.0	-3.7, 16.4	5.6	-27.1, 58.3
Little Blue Heron	1	632	-0.6	-1.6, 0.5	-1.4	-9.1, 2.6	-6.0	-22.2, 11.5
Tricolored Heron	1	180	-0.2	-1.9, 1.4	1.8	-3.2, 9.3	2.7	-21.5, 42.0
Cattle Egret	1	803	0.3	-1.1, 1.3	2.8	-0.3, 6.3	8.3	-6.4, 29.5
Green Heron	2	2184	-1.4 *	-1.7, -1.1	-0.7	-2.0, 0.7	-0.9	-7.2, 5.6
Black-crowned Night-Heron	2	766	-0.1	-2.4, 1.9	4.0	-2.4, 13.6	11.6	-18.6, 70.5
Yellow-crowned Night-Heron	2	381	-0.6	-2.6, 1.1	-0.1	-8.8, 6.5	-1.9	-34.3, 35.7
White Ibis	1	285	5.8 *	3.4, 7.8	8.8	-3.1, 20.9	7.8	-34.1, 86.8
Glossy Ibis	2	93	2.0	-2.4, 5.6	4.9	-16.0, 16.5	7.4	-48.1, 130.9
White-faced Ibis	3	164	5.0	-1.7, 13.1	30.7 *	5.5, 78.1	15.0	-89.8, 507.1
Roseate Spoonbill	2	58	8.8 *	5.0, 12.7	8.3	-7.3, 20.5	9.8	-33.3, 79.5
Wood Stork	3	138	1.8	-10.8, 6.8	-0.6	-29.8, 30.1	21.9	-34.0, 464.1
Black Vulture	1	910	4.3 *	2.9, 5.2	6.2 *	3.3, 8.9	8.4	-4.9, 22.5
Turkey Vulture	1	3104	2.3 *	1.9, 2.7	3.6 *	2.6, 4.7	4.9	-0.4, 10.3
Osprey	2	931	2.8 *	1.7, 3.8	4.3 *	2.2, 6.3	2.5	-6.5, 11.6
Swallow-tailed Kite	2	109	6.0 *	4.4, 7.6	5.2	-3.2, 11.0	10.7	-10.2, 42.3
White-tailed Kite	2	130	-0.3	-2.1, 1.1	1.5	-4.6, 9.3	-12.3	-46.4, 22.2
Mississippi Kite	2	383	0.2	-1.1, 1.4	3.7 *	0.5, 7.4	7.2	-8.2, 26.1
Bald Eagle	2	686	5.1 *	3.6, 6.3	8.7 *	5.2, 12.0	6.3	-9.7, 22.0
Northern Harrier	2	1790	-0.7 *	-1.4, -0.2	1.3	-0.6, 3.3	0.9	-8.9, 12.1
Sharp-shinned Hawk	3	1236	1.2	-2.7, 2.3	2.9	-0.3, 6.0	-1.7	-17.0, 14.9
Cooper's Hawk	3	1839	2.4 *	0.3, 3.1	6.4 *	4.1, 8.7	10.7 *	0.5, 22.9
Northern Goshawk	3	404	-0.2	-3.5, 1.6	-1.5	-10.0, 6.1	-1.3	-32.5, 39.7
Harris's Hawk	2	69	-1.8 *	-3.6, -0.1	-0.3	-7.3, 7.9	8.6	-18.8, 59.6
Red-shouldered Hawk	2	1493	3.0 *	2.6, 3.4	3.6 *	2.0, 5.3	4.3	-3.2, 12.5
Broad-winged Hawk	2	1419	1.1 *	0.2, 1.9	0.7	-1.6, 2.6	2.0	-7.3, 12.1
Swainson's Hawk	2	1076	0.4	-0.1, 0.9	1.6 *	0.2, 3.2	1.7	-5.1, 9.2
Red-tailed Hawk	2	3893	1.8 *	1.5, 2.0	2.2 *	1.4, 3.0	1.4	-2.7, 5.4
Ferruginous Hawk	2	467	1.5 *	0.4, 2.5	3.2 *	0.2, 6.8	4.6	-9.4, 22.3
Golden Eagle	2	646	0.2	-1.0, 0.9	0.7	-2.1, 3.4	-2.6	-16.6, 10.8
Crested Caracara	2	96	7.4 *	5.8, 9.2	14.7 *	7.1, 25.5	36.3 *	3.6, 97.4
American Kestrel	2	3348	-1.4 *	-2.3, -0.9	-0.7	-1.8, 0.6	-3.1	-8.4, 2.9
Merlin	3	504	2.7 *	0.7, 4.2	5.6 *	1.4, 9.9	0.3	-19.1, 20.8
Peregrine Falcon	3	128	2.0	-9.7, 7.0	7.0	-9.3, 21.7	-11.2	-63.0, 59.8
Prairie Falcon	3	533	1.1	-0.1, 2.2	2.3	-2.1, 7.9	-2.8	-25.7, 21.3
Clapper Rail	2	71	-1.1	-3.7, 1.4	1.8	-4.3, 8.5	5.5	-19.2, 47.2
King Rail	2	84	-4.7 *	-7.7, -1.8	-3.6	-15.5, 13.0	-9.0	-54.9, 65.4

APPENDIX 1. Continued.

Species	1966-2008				2003-2008		2007-2008	
	TQ	N	Trend	Credible Interval	Trend	Credible Interval	Trend	Credible Interval
Virginia Rail	3	368	0.6	-4.6, 2.8	4.8	-3.3, 13.9	8.0	-35.5, 60.4
Sora	2	970	0.1	-8.3, 1.5	15.7 *	9.6, 23.0	-15.2	-36.8, 14.7
Purple Gallinule	2	52	-1.8	-5.1, 1.4	-0.4	-13.7, 15.3	3.4	-43.2, 115.8
Common Moorhen	2	257	-0.8	-2.5, 1.0	-2.0	-8.6, 4.4	-10.2	-35.0, 20.8
American Coot	1	997	0.0	-2.9, 2.1	18.3 *	7.1, 37.0	-7.7	-42.9, 66.4
Sandhill Crane	1	622	5.7 *	3.9, 6.9	9.6 *	6.2, 13.4	16.0 *	1.3, 35.4
Killdeer	1	3954	-1.1 *	-1.7, -0.9	0.4	-0.3, 1.2	-0.8	-4.3, 2.8
Mountain Plover	2	80	-2.9 *	-6.1, -0.4	-0.4	-15.6, 12.4	-1.9	-38.8, 61.2
Black-necked Stilt	1	262	3.1 *	0.8, 5.4	5.1	-3.8, 13.7	10.9	-20.9, 57.6
American Avocet	1	444	0.4	-2.2, 2.6	2.0	-4.5, 8.5	-3.0	-28.4, 31.9
Greater Yellowlegs	2	89	1.6	-4.2, 4.6	-1.8	-13.9, 8.1	-10.5	-49.7, 46.2
Lesser Yellowlegs	2	126	-4.9 *	-7.7, -2.6	-3.1	-9.7, 5.3	-4.2	-35.7, 36.7
Solitary Sandpiper	3	96	-1.7	-9.4, 1.9	0.0	-11.4, 10.7	5.7	-35.2, 69.4
Willet	1	476	-0.7	-1.5, 0.0	1.3	-1.4, 4.8	0.8	-12.5, 17.9
Spotted Sandpiper	2	1778	-1.4 *	-2.0, -0.8	-0.5	-2.2, 1.7	0.3	-7.8, 10.1
Upland Sandpiper	1	971	0.6	0.0, 1.2	1.1	-1.4, 3.2	2.3	-7.8, 13.1
Long-billed Curlew	1	420	0.1	-1.1, 1.1	1.8	-1.2, 4.9	4.8	-9.4, 22.1
Marbled Godwit	1	318	-0.1	-0.9, 0.7	2.0	-1.1, 5.8	9.1	-4.9, 31.7
Wilson's Snipe	1	1648	0.3	-0.4, 0.8	4.8 *	2.4, 7.4	-0.5	-10.9, 11.4
American Woodcock	3	594	-1.8 *	-3.2, -0.7	-0.8	-6.9, 5.0	1.5	-21.4, 34.0
Wilson's Phalarope	2	557	0.0	-3.6, 5.5	9.9 *	0.8, 53.1	20.3	-20.6, 550.4
Laughing Gull	1	193	4.8 *	2.6, 6.7	5.4	-1.8, 13.0	8.9	-20.9, 61.7
Franklin's Gull	2	343	-3.6 *	-9.1, -1.6	-1.6	-10.9, 8.8	-8.7	-58.7, 46.5
Ring-billed Gull	2	1179	4.6 *	0.2, 8.0	7.8 *	1.2, 16.2	3.5	-25.0, 42.6
California Gull	2	388	-0.4	-3.6, 4.4	8.3	-3.0, 42.3	19.6	-28.5, 301.4
Herring Gull	2	624	-2.7 *	-6.7, -0.2	-2.2	-6.1, 1.9	-0.6	-16.0, 21.1
Western Gull	2	25	-1.9	-4.8, 2.0	0.1	-10.7, 13.0	0.9	-42.1, 84.9
Glaucous-winged Gull	1	54	1.5	-1.2, 4.1	2.1	-5.7, 12.6	-0.7	-41.9, 43.2
Great Black-backed Gull	1	150	-1.9 *	-3.7, -0.2	1.1	-4.7, 9.1	-6.7	-46.0, 24.4
Gull-billed Tern	3	36	1.8	-5.0, 8.8	6.5	-10.0, 19.6	1.6	-63.7, 54.6
Caspian Tern	3	213	1.2	-6.3, 4.1	6.8	-5.3, 23.2	2.3	-57.6, 95.0
Royal Tern	2	62	-1.5	-5.0, 1.5	-0.6	-8.2, 7.7	-4.9	-43.6, 37.5
Common Tern	2	258	-0.1	-4.2, 5.1	-1.8	-13.6, 12.9	2.3	-40.2, 101.5
Forster's Tern	3	268	-1.4	-10.6, 1.5	1.5	-10.2, 12.6	2.1	-39.4, 59.8
Least Tern	2	148	-3.9	-9.0, 0.2	-2.0	-12.2, 15.4	-1.9	-46.5, 70.1
Black Tern	3	532	-3.8 *	-17.1, -1.7	-1.1	-9.5, 9.4	-23.4	-56.3, 24.9
Black Skimmer	2	62	-3.6	-8.7, 1.3	2.7	-8.1, 19.1	5.2	-39.3, 110.4
Rock Pigeon	1	3237	-0.7 *	-1.1, -0.3	-0.1	-1.5, 1.4	-1.9	-8.2, 5.4
Band-tailed Pigeon	1	318	-2.8 *	-7.2, -1.4	2.6	-1.7, 8.9	15.7	-6.8, 51.4
Eurasian Collared-Dove	3	842	41.8 *	35.1, 46.7	31.5 *	25.4, 37.8	39.8 *	21.2, 59.7
White-winged Dove	1	252	1.2	-0.9, 2.6	3.7 *	0.2, 8.8	3.7	-11.6, 27.9
Mourning Dove	1	4088	-0.3 *	-0.5, -0.2	-1.0 *	-1.5, -0.5	-7.4 *	-9.6, -5.2
Inca Dove	2	181	2.8 *	1.3, 4.1	0.1	-5.2, 4.6	-13.1	-31.0, 7.6
Common Ground-Dove	1	304	-0.6	-1.4, 0.1	-0.5	-4.7, 2.4	1.6	-14.4, 16.9
Black-billed Cuckoo	3	1645	-3.0 *	-13.7, -1.6	-2.8	-6.8, 1.6	-11.8	-27.9, 8.3
Yellow-billed Cuckoo	1	2250	-1.4 *	-1.7, -1.2	-1.5 *	-2.7, -0.3	-0.2	-6.0, 5.9
Greater Roadrunner	2	462	0.6	-0.1, 1.4	1.1	-2.5, 4.9	1.9	-15.2, 21.4
Groove-billed Ani	2	22	-1.1	-5.2, 3.3	1.1	-17.3, 32.0	95.9	-26.3, 1308.8

APPENDIX 1. Continued.

Species	1966-2008				2003-2008		2007-2008	
	TQ	N	Trend	Credible Interval	Trend	Credible Interval	Trend	Credible Interval
Barn Owl	3	171	2.6	-1.4, 5.4	10.3	-10.1, 25.8	17.5	-37.1, 115.4
Western Screech-Owl	3	103	-1.9	-8.8, 2.3	3.6	-9.7, 19.8	9.1	-33.9, 129.9
Eastern Screech-Owl	3	607	-0.9	-3.6, 0.3	0.9	-8.4, 8.2	4.2	-26.0, 45.6
Great Horned Owl	2	2436	-0.8 *	-2.0, -0.1	0.8	-2.8, 4.8	-0.5	-19.0, 20.1
Northern Pygmy-Owl	3	222	0.8	-3.6, 3.0	6.3	-2.1, 16.4	5.5	-31.3, 58.8
Burrowing Owl	2	568	-1.0	-2.7, 0.0	-0.2	-4.6, 4.4	1.6	-14.3, 21.5
Barred Owl	2	1407	1.5 *	0.2, 2.1	2.5 *	0.2, 4.6	-2.3	-12.8, 7.9
Short-eared Owl	3	434	-2.6	-14.0, 0.0	6.8	-6.8, 23.9	42.9	-26.4, 208.6
Lesser Nighthawk	3	191	1.6	-0.2, 3.2	1.5	-1.7, 4.6	1.5	-11.9, 17.8
Common Nighthawk	3	2438	-1.9 *	-16.5, -1.4	-1.6 *	-3.2, -0.1	-3.9	-11.4, 3.1
Common Poorwill	2	327	-0.3	-2.2, 1.6	-1.6	-12.7, 6.3	4.6	-24.3, 56.1
Chuck-will's-widow	1	727	-2.0 *	-2.3, -1.6	-1.8 *	-3.2, -0.5	-3.2	-9.2, 3.1
Whip-poor-will	2	825	-2.2 *	-7.7, -1.4	-0.2	-2.8, 2.6	-1.4	-13.4, 13.0
Black Swift	2	119	-6.1 *	-9.8, -2.5	-4.3	-14.8, 11.0	-4.4	-50.1, 89.4
Chimney Swift	1	2451	-2.0 *	-2.2, -1.8	-2.3 *	-3.1, -1.6	1.2	-2.6, 4.9
Vaux's Swift	2	256	-1.0	-3.5, 0.5	-0.7	-6.2, 4.1	0.5	-19.7, 29.4
White-throated Swift	1	369	-1.2	-4.2, 1.7	1.2	-6.9, 14.7	-0.4	-35.9, 73.9
Ruby-throated Hummingbird	2	2195	1.9 *	1.6, 2.2	1.3 *	0.1, 2.4	-0.6	-6.2, 5.0
Black-chinned Hummingbird	2	408	0.9	-0.1, 1.9	3.1	-0.3, 7.1	9.1	-4.4, 30.4
Anna's Hummingbird	2	207	1.7 *	0.9, 2.5	1.1	-3.0, 4.0	-0.5	-15.4, 14.7
Costa's Hummingbird	2	94	-0.6	-5.3, 2.8	-0.9	-12.4, 10.7	6.9	-39.7, 96.8
Calliope Hummingbird	2	210	0.0	-1.2, 1.1	1.7	-2.3, 6.4	-10.4	-31.7, 7.5
Broad-tailed Hummingbird	1	286	-0.8 *	-1.5, -0.2	0.9	-1.2, 3.4	2.6	-6.8, 13.4
Rufous Hummingbird	1	338	-2.2 *	-2.8, -1.5	-2.0	-4.2, 0.4	0.5	-9.0, 14.0
Allen's Hummingbird	1	55	-4.0 *	-5.6, -2.4	-3.9	-9.2, 2.7	-6.6	-33.5, 20.2
Belted Kingfisher	2	2911	-1.4 *	-2.0, -1.0	-2.2 *	-3.5, -1.0	-2.1	-8.1, 3.9
Lewis's Woodpecker	3	191	-2.1	-9.8, 0.6	3.1	-3.4, 13.5	7.9	-26.2, 60.1
Red-headed Woodpecker	1	1746	-2.7 *	-3.2, -2.4	-2.0 *	-3.5, -0.6	-5.4	-12.3, 1.6
Acorn Woodpecker	1	197	0.2	-0.5, 1.0	-0.9	-4.1, 2.3	0.5	-13.5, 16.6
Gila Woodpecker	1	42	-1.3	-2.9, 0.2	-0.6	-4.0, 3.0	0.7	-14.8, 19.5
Golden-fronted Woodpecker	1	101	-0.8	-1.6, 0.1	-1.5	-4.8, 1.3	1.1	-10.7, 17.9
Red-bellied Woodpecker	1	1918	1.0 *	0.9, 1.2	0.3	-0.4, 0.9	-0.1	-3.0, 2.8
Yellow-bellied Sapsucker	1	988	0.2	-3.1, 1.5	3.3 *	1.0, 5.9	0.7	-9.0, 12.6
Yellow-bel/Red-ncpd/ Red-brst Sapsucker	1	1586	0.7	-1.0, 1.6	2.9 *	0.9, 5.0	0.2	-8.3, 10.2
Red-naped Sapsucker	1	375	1.7 *	0.7, 2.7	0.8	-3.7, 5.4	-5.8	-25.0, 17.8
Red-breasted Sapsucker	1	266	0.5	-1.5, 1.9	0.7	-4.6, 6.0	-1.4	-23.1, 27.7
Williamson's Sapsucker	2	171	0.1	-1.8, 1.9	-1.0	-8.2, 5.4	-5.2	-31.6, 27.5
Ladder-backed Woodpecker	1	304	-0.1	-0.7, 0.5	0.5	-1.7, 2.7	1.2	-8.9, 12.2
Nuttall's Woodpecker	1	123	1.2 *	0.4, 2.1	3.2	-0.6, 7.7	11.3	-7.7, 37.3
Downy Woodpecker	1	3284	0.3	0.0, 0.5	0.0	-0.8, 0.8	0.4	-3.4, 4.3
Hairy Woodpecker	2	3136	1.1 *	0.6, 1.5	1.4 *	0.2, 2.5	-0.4	-6.2, 5.3
Red-cockaded Woodpecker	2	61	-4.5 *	-7.7, -1.6	-3.6	-17.1, 7.3	0.5	-40.7, 86.2
White-headed Woodpecker	2	114	0.9	-0.3, 2.0	2.1	-1.5, 7.1	4.6	-12.8, 30.6
American Three-toed Woodpecker	3	138	2.6	-1.4, 5.8	5.3	-3.7, 13.1	4.0	-37.0, 42.3
Black-backed Woodpecker	3	247	-1.0	-4.4, 1.4	6.0	-2.2, 16.0	-2.1	-39.0, 45.1
Gilded Flicker	1	34	-1.7	-3.9, 0.4	-0.8	-5.3, 6.0	3.6	-15.3, 47.7
Northern Flicker	1	3909	-1.5 *	-1.7, -1.2	-1.2 *	-2.1, -0.4	-5.2 *	-9.2, -1.0

APPENDIX 1. Continued.

Species	1966-2008				2003-2008		2007-2008	
	TQ	N	Trend	Credible Interval	Trend	Credible Interval	Trend	Credible Interval
Pileated Woodpecker	2	2449	1.2 *	0.7, 1.6	1.4 *	0.3, 2.4	-2.6	-6.8, 1.8
Olive-sided Flycatcher	1	1184	-3.6 *	-4.8, -2.9	-2.0 *	-3.5, -0.2	-4.4	-12.0, 3.8
Western Wood-Pewee	1	1205	-1.7 *	-2.5, -1.2	0.0	-1.3, 1.4	-0.6	-6.1, 5.3
Eastern Wood-Pewee	1	2393	-1.4 *	-1.6, -1.3	-0.8 *	-1.4, -0.1	-2.0	-5.1, 1.2
Yellow-bellied Flycatcher	1	423	2.0	-0.3, 4.0	-0.4	-4.5, 3.9	0.9	-14.7, 23.3
Acadian Flycatcher	1	1246	-0.5 *	-0.8, -0.2	0.1	-0.9, 1.1	0.6	-4.1, 5.4
Alder Flycatcher	1	1248	-0.9	-1.7, 0.0	-1.6	-3.2, 0.0	-1.5	-8.3, 6.1
Willow Flycatcher	1	1739	-1.5 *	-2.1, -1.1	-1.4 *	-2.8, -0.1	-1.9	-8.9, 4.4
Willow/Alder Flycatcher	1	2371	-1.0 *	-1.8, -0.3	-1.8 *	-3.0, -0.6	-1.9	-7.2, 3.8
Least Flycatcher	1	1695	-1.5 *	-2.0, -1.0	-2.0 *	-3.5, -0.6	-3.8	-10.2, 2.6
Hammond's Flycatcher	1	460	1.2 *	0.3, 2.0	2.2	-0.6, 5.4	9.4	-4.5, 29.4
Gray Flycatcher	1	242	3.0 *	1.0, 4.3	3.5 *	0.3, 6.9	1.5	-14.1, 16.4
Dusky Flycatcher	1	561	-0.2	-1.4, 0.9	0.1	-3.3, 3.6	-1.3	-16.8, 16.7
Cordilleran/Pacific-slope Flycatcher	1	638	-0.8 *	-4.2, -0.2	-1.4	-4.2, 1.3	-8.5	-19.9, 3.9
Black Phoebe	2	241	2.4 *	1.2, 3.4	0.4	-3.5, 4.4	-5.8	-21.8, 12.7
Eastern Phoebe	1	2423	0.7	-0.4, 1.3	4.3 *	3.2, 5.6	6.7 *	1.6, 13.2
Say's Phoebe	2	956	1.1 *	0.5, 1.6	1.5	-0.4, 3.2	0.3	-7.3, 8.7
Vermilion Flycatcher	2	112	0.1	-1.6, 1.5	0.2	-4.6, 5.2	2.8	-15.4, 30.3
Ash-throated Flycatcher	1	672	1.0 *	0.4, 1.6	0.3	-1.6, 1.8	1.3	-5.9, 8.5
Great Crested Flycatcher	1	2508	0.1	-0.1, 0.2	0.1	-0.6, 0.8	-0.7	-4.1, 2.8
Brown-crested Flycatcher	1	89	4.0 *	2.5, 5.3	2.3	-3.3, 6.5	-0.6	-21.0, 19.5
Couch's Kingbird	2	36	12.6 *	9.0, 15.9	12.0 *	2.0, 20.7	0.7	-37.6, 34.4
Cassin's Kingbird	1	263	0.1	-1.1, 1.2	1.2	-1.6, 4.3	0.5	-12.8, 15.5
Western Kingbird	1	1543	0.7 *	0.3, 1.0	1.5 *	0.1, 3.0	3.4	-3.0, 10.5
Eastern Kingbird	1	3238	-1.0 *	-1.2, -0.8	-1.5 *	-2.3, -0.6	-4.6 *	-8.5, -0.5
Scissor-tailed Flycatcher	1	402	-0.6 *	-1.0, -0.2	-2.2 *	-3.8, -0.6	-6.6	-13.7, 0.7
Loggerhead Shrike	1	1961	-3.0 *	-3.4, -2.7	-3.0 *	-4.6, -1.6	-0.5	-7.2, 7.0
White-eyed Vireo	1	1402	0.8 *	0.6, 1.0	3.8 *	2.8, 4.9	7.5 *	3.0, 12.3
Bell's Vireo	1	489	0.0	-1.8, 0.9	4.2 *	1.3, 7.8	8.5	-4.7, 26.2
Gray Vireo	2	93	1.7	-1.4, 4.7	3.8	-2.3, 10.6	20.6	-6.7, 71.0
Yellow-throated Vireo	2	1736	1.0 *	0.7, 1.3	2.5 *	1.4, 3.8	2.5	-3.2, 8.5
Plumbeous Vireo	1	262	-2.7 *	-6.0, -0.1	2.2	-0.4, 5.6	3.5	-7.8, 18.5
Cassin's Vireo	1	440	1.4 *	0.7, 2.0	1.6	-1.2, 4.3	4.8	-7.9, 18.7
Blue-headed Vireo	1	1050	3.3 *	2.1, 4.3	4.7 *	2.5, 7.1	9.2	-0.4, 21.6
Hutton's Vireo	2	221	1.8 *	0.9, 2.8	0.3	-3.5, 3.9	5.0	-12.0, 25.4
Warbling Vireo	1	2692	0.9 *	0.4, 1.3	1.7 *	0.6, 3.0	3.6	-2.0, 9.8
Philadelphia Vireo	1	387	1.2	-1.7, 3.8	4.2 *	0.5, 8.4	-1.6	-26.4, 16.0
Red-eyed Vireo	1	2974	0.9 *	0.7, 1.2	0.7	0.0, 1.5	-0.2	-3.4, 3.3
Gray Jay	1	684	-0.7	-2.4, 0.6	-0.6	-3.7, 2.7	-6.9	-24.2, 6.2
Steller's Jay	1	612	0.0	-0.4, 0.4	-0.1	-1.5, 1.4	-4.4	-11.1, 2.5
Blue Jay	1	2869	-0.7	-0.8, -0.6	-1.2 *	-1.7, -0.7	-1.9	-4.1, 0.4
Green Jay	2	27	7.1 *	3.8, 11.0	7.8	-3.9, 18.4	5.7	-36.8, 59.1
Western Scrub-Jay	1	473	-0.4	-0.9, 0.1	-2.5 *	-4.8, -0.2	-5.9	-15.8, 4.7
Pinyon Jay	1	287	-3.9 *	-5.9, -2.1	-2.9	-7.2, 1.7	-2.6	-23.5, 21.5
Clark's Nutcracker	2	395	0.3	-1.5, 1.5	-2.7	-7.1, 1.9	-8.0	-25.2, 14.1
Black-billed Magpie	1	1021	-0.6 *	-1.0, -0.2	-1.8 *	-3.5, -0.3	-3.2	-9.6, 3.1
Yellow-billed Magpie	1	44	-1.3 *	-2.5, -0.1	-8.9 *	-14.8, -3.2	7.3	-19.4, 44.6
American Crow	1	3832	0.3 *	0.1, 0.5	-1.4 *	-1.8, -0.9	-0.9	-3.0, 1.3

APPENDIX 1. Continued.

Species	1966-2008				2003-2008		2007-2008	
	TQ	N	Trend	Credible Interval	Trend	Credible Interval	Trend	Credible Interval
Northwestern Crow	2	47	0.6	-4.5, 2.8	0.3	-5.5, 3.8	0.3	-19.2, 21.8
Fish Crow	1	750	0.7 *	0.2, 1.3	1.4	-1.0, 3.9	-0.4	-12.6, 11.7
Chihuahuan Raven	1	172	1.2	-0.2, 2.4	-0.1	-6.7, 4.0	-4.3	-27.8, 13.9
Common Raven	1	2255	2.7 *	1.9, 3.3	4.5 *	3.1, 6.0	3.9	-2.8, 10.8
Horned Lark	1	2494	-2.4 *	-2.8, -1.9	-1.2	-2.3, 0.0	0.1	-5.3, 5.8
Purple Martin	1	2227	-0.3	-3.2, 0.3	1.3 *	0.1, 2.6	1.1	-4.9, 7.3
Tree Swallow	1	2855	-0.9 *	-1.4, -0.4	1.1	0.0, 2.2	0.2	-4.5, 5.3
Violet-green Swallow	1	917	-0.1	-0.8, 0.4	0.0	-1.9, 1.8	-6.5	-17.1, 3.0
Northern Rough-winged Swallow	1	3045	-0.2	-0.9, 0.2	1.4	-0.3, 3.3	1.0	-7.1, 10.4
Bank Swallow	1	1781	-5.3 *	-7.2, -2.1	1.5	-24.3, 71.2	-1.4	-90.7, 1100.7
Cliff Swallow	1	2798	0.9 *	0.2, 1.5	5.4 *	3.4, 7.7	6.2	-3.3, 15.4
Cave Swallow	3	90	25.5 *	19.1, 31.8	27.3	-3.2, 51.7	70.1	-18.5, 292.7
Barn Swallow	1	4019	-1.2 *	-1.5, -1.1	-0.1	-0.7, 0.6	-4.4 *	-7.3, -1.5
Carolina Chickadee	1	1245	0.1	-0.1, 0.3	-0.3	-1.3, 0.7	1.1	-3.3, 5.8
Black-capped Chickadee	1	2198	0.9 *	0.5, 1.3	-1.4	-2.6, 0.1	-2.5	-9.0, 3.6
Mountain Chickadee	1	560	-1.0 *	-1.8, -0.5	-3.0 *	-5.0, -1.2	-9.4 *	-17.9, -0.8
Chestnut-backed Chickadee	1	228	-1.2 *	-2.3, -0.3	-2.9	-7.9, 1.1	4.0	-15.2, 27.6
Boreal Chickadee	2	335	-0.3	-3.1, 1.2	-1.7	-10.9, 4.9	-5.3	-32.6, 23.0
Tufted Titmouse	1	1913	1.1 *	0.9, 1.3	0.7	-0.1, 1.5	6.5 *	2.6, 10.6
Oak Titmouse	1	146	-1.5 *	-2.3, -0.7	-0.8	-4.4, 3.2	2.8	-13.8, 24.7
Juniper Titmouse	2	168	0.2	-1.3, 1.9	2.8	-2.1, 9.3	5.9	-22.1, 43.5
Verdin	1	188	-2.1 *	-3.4, -0.8	-0.4	-4.2, 3.6	1.1	-15.1, 21.0
Bushtit	1	460	-0.9	-2.5, 0.4	-3.2	-9.4, 3.0	-15.6	-39.2, 14.6
Red-breasted Nuthatch	1	1601	1.5 *	0.7, 2.2	-0.5	-4.0, 1.9	-2.9	-12.2, 8.7
White-breasted Nuthatch	2	2541	1.9 *	1.5, 2.2	1.9 *	0.6, 3.1	-6.8 *	-12.1, -1.4
Pygmy Nuthatch	1	244	-0.5	-2.4, 1.3	-0.1	-4.7, 6.9	-8.9	-29.7, 21.3
Brown-headed Nuthatch	1	458	-0.5	-1.1, 0.1	1.3	-0.9, 3.9	2.8	-7.5, 15.4
Brown Creeper	3	1042	0.9	0.0, 20.7	1.1	-4.7, 19.2	-0.6	-55.2, 91.9
Cactus Wren	1	239	-1.6 *	-2.6, -0.6	1.1	-2.0, 4.5	-5.6	-18.5, 9.4
Rock Wren	1	920	-0.9 *	-1.6, -0.3	-1.3	-8.4, 1.8	2.9	-9.2, 18.6
Canyon Wren	2	340	-0.4	-2.9, 1.1	2.4	-2.4, 9.0	-1.4	-25.1, 25.2
Carolina Wren	1	1661	1.4 *	1.2, 1.6	2.5 *	1.6, 3.4	-3.2	-6.9, 0.6
Bewick's Wren	1	921	-0.5	-1.1, 0.1	-1.5	-3.7, 0.6	-4.3	-13.4, 5.8
House Wren	1	2887	0.2	0.0, 0.4	0.9 *	0.1, 1.7	1.9	-1.6, 5.6
Winter Wren	1	1101	0.9	0.0, 1.8	-3.7 *	-5.9, -1.6	-8.4	-17.3, 0.8
Sedge Wren	1	635	1.5	-0.8, 2.5	4.0 *	0.5, 7.6	-9.1	-23.0, 6.6
Marsh Wren	1	703	2.0	-0.2, 3.2	4.6	-0.4, 9.6	5.6	-15.5, 32.0
American Dipper	3	210	-0.1	-1.8, 1.2	1.0	-3.3, 5.0	-1.4	-22.1, 16.6
Golden-crowned Kinglet	1	1007	-0.6	-2.9, 0.7	-0.9	-4.0, 2.4	2.0	-16.9, 19.8
Ruby-crowned Kinglet	1	1105	0.1	-1.1, 1.2	-3.1 *	-5.4, -0.8	-1.1	-11.6, 9.8
Blue-gray Gnatcatcher	1	2051	1.1 *	0.8, 2.3	0.9	-0.4, 2.8	3.0	-4.1, 13.0
Black-tailed Gnatcatcher	1	118	-0.6	-2.7, 1.4	-0.7	-8.1, 5.3	17.1	-11.3, 62.3
Eastern Bluebird	1	2405	1.9 *	1.7, 2.2	1.7 *	0.7, 2.8	0.2	-4.9, 5.3
Western Bluebird	1	446	0.8	-0.2, 1.5	1.7	-1.1, 4.6	2.2	-12.0, 16.1
Mountain Bluebird	1	821	-0.7 *	-1.5, -0.1	0.7	-1.2, 2.5	-1.1	-9.6, 8.1
Townsend's Solitaire	2	501	1.1	0.0, 1.9	2.9	-0.4, 5.7	6.0	-5.9, 21.6
Veery	1	1371	-0.8 *	-1.4, -0.1	-1.2	-2.3, 0.0	-6.8 *	-11.7, -1.8
Swainson's Thrush	1	1191	-0.9 *	-1.8, -0.3	-1.1	-2.3, 0.1	-4.8	-10.5, 1.0

APPENDIX 1. Continued.

Species	1966-2008				2003-2008		2007-2008	
	TQ	N	Trend	Credible Interval	Trend	Credible Interval	Trend	Credible Interval
Hermit Thrush	1	1497	0.9	0.0, 1.9	1.4	-0.1, 4.0	-5.0	-12.1, 4.5
Wood Thrush	1	2055	-1.8 *	-2.1, -1.5	0.3	-0.5, 1.1	-1.0	-4.7, 3.0
American Robin	1	3895	0.2 *	0.1, 0.3	-0.2	-0.6, 0.2	-1.9 *	-3.6, -0.1
Varied Thrush	1	279	-2.2 *	-3.3, -1.4	-2.9	-6.2, 0.3	-8.5	-22.8, 7.7
Wrentit	1	165	-0.8 *	-1.3, -0.2	-2.4	-5.1, 0.0	-7.7	-19.1, 4.7
Gray Catbird	1	2771	-0.2 *	-0.3, -0.1	0.8 *	0.3, 1.4	1.0	-1.7, 3.7
Northern Mockingbird	1	2576	-0.6 *	-0.7, -0.4	-1.4 *	-2.1, -0.7	-3.1 *	-6.1, -0.1
Sage Thrasher	1	440	-0.7	-1.7, 0.2	0.7	-2.2, 4.0	2.4	-10.6, 19.6
Brown Thrasher	1	2649	-1.1 *	-1.2, -0.9	-0.4	-1.0, 0.2	-0.8	-3.8, 2.3
Long-billed Thrasher	2	37	7.1 *	4.5, 9.6	8.6 *	1.8, 15.2	-0.8	-47.6, 31.6
Bendire's Thrasher	2	75	-4.8 *	-7.2, -2.7	-4.6	-12.1, 2.8	-4.6	-38.0, 34.9
Curve-billed Thrasher	1	215	-1.3 *	-2.4, -0.3	-1.2	-4.1, 1.5	-6.2	-17.2, 5.0
California Thrasher	1	100	-1.9 *	-2.9, -0.9	-2.5	-7.2, 0.9	0.4	-15.6, 26.1
Crissal Thrasher	2	85	0.9	-1.0, 2.8	2.0	-3.7, 8.7	2.4	-19.8, 35.3
Le Conte's Thrasher	2	54	-2.6 *	-4.9, -0.5	-1.3	-16.0, 12.8	5.7	-43.3, 113.6
European Starling	1	3965	-1.2 *	-1.5, -1.1	-1.1 *	-1.7, -0.5	0.1	-2.8, 2.9
Sprague's Pipit	1	223	-3.0 *	-4.5, -1.7	-3.9	-11.3, 3.2	-10.5	-34.0, 22.6
Cedar Waxwing	1	2571	0.1	-1.2, 0.8	-0.3	-1.8, 1.3	6.6	-0.9, 15.2
Phainopepla	1	187	-0.3	-1.9, 1.3	-0.3	-7.3, 7.1	-4.4	-31.6, 33.6
Blue-winged Warbler	2	695	0.1	-0.5, 0.8	0.1	-2.5, 3.0	1.5	-9.3, 14.9
Golden-winged Warbler	2	434	-2.4 *	-3.4, -1.5	0.2	-5.1, 5.7	-0.8	-25.0, 27.0
Tennessee Warbler	1	580	-0.3	-2.6, 1.6	4.1	-4.6, 12.1	-4.5	-33.5, 36.6
Orange-crowned Warbler	1	714	-0.9 *	-1.6, -0.1	-0.1	-3.0, 2.8	5.6	-7.5, 23.4
Nashville Warbler	1	1063	0.3	-0.5, 1.1	1.4	-0.7, 3.4	9.3	-0.5, 19.6
Virginia's Warbler	1	126	-0.4	-1.9, 0.8	-0.3	-3.3, 3.1	-0.2	-14.0, 16.4
Lucy's Warbler	1	61	0.0	-1.3, 1.4	0.8	-4.1, 6.1	12.1	-8.6, 50.1
Northern Parula	1	1542	1.0 *	0.6, 1.4	3.0 *	1.8, 4.3	2.2	-3.0, 7.8
Yellow Warbler	1	3196	-0.3	-0.6, 0.0	-0.2	-1.2, 0.6	-1.4	-5.5, 2.5
Chestnut-sided Warbler	1	1123	-1.6 *	-2.4, -0.9	0.4	-0.7, 1.5	-0.9	-6.6, 4.5
Magnolia Warbler	1	839	1.8	-0.6, 2.9	2.0 *	0.4, 3.8	4.0	-3.5, 12.6
Cape May Warbler	1	403	-3.2 *	-6.0, -0.7	4.4	-1.0, 11.2	1.1	-23.2, 32.4
Black-throated Blue Warbler	2	649	2.4 *	1.1, 3.6	4.2 *	1.8, 7.3	1.5	-8.4, 14.0
Yellow-rumped Warbler	1	1591	0.1	-0.5, 0.6	0.4	-0.8, 1.8	-0.3	-5.9, 5.9
Black-throated Gray Warbler	1	373	-1.0 *	-2.1, -0.2	-0.2	-3.6, 3.2	0.6	-13.9, 18.2
Black-throated Green Warbler	1	963	1.1 *	0.1, 2.0	-0.2	-2.3, 1.8	-3.8	-14.5, 5.1
Townsend's Warbler	1	261	0.1	-0.8, 0.9	-1.1	-4.2, 1.4	0.2	-10.4, 12.2
Hermit Warbler	1	158	0.0	-0.9, 0.8	-1.6	-5.1, 0.9	-0.1	-11.9, 14.5
Blackburnian Warbler	1	734	1.0 *	0.1, 2.1	1.2	-0.7, 3.0	-0.7	-8.7, 7.9
Yellow-throated Warbler	2	783	1.1 *	0.5, 1.7	1.5	-0.5, 3.4	-0.6	-9.5, 8.8
Grace's Warbler	1	63	-2.1 *	-3.9, -0.5	-0.7	-5.0, 3.7	5.7	-14.2, 34.4
Pine Warbler	1	1282	1.4 *	1.1, 1.8	3.2 *	1.7, 4.7	-2.2	-8.3, 4.2
Prairie Warbler	1	1076	-2.2 *	-2.5, -1.8	-1.0	-2.6, 0.5	-2.8	-10.8, 5.5
Palm Warbler	2	190	-2.6	-5.5, 0.0	2.2	-4.0, 10.3	-2.7	-31.4, 37.8
Bay-breasted Warbler	1	353	0.3	-1.9, 2.5	-2.7	-11.2, 5.1	-11.9	-51.8, 22.1
Blackpoll Warbler	3	227	-6.3 *	-17.1, -1.0	-5.5	-13.4, 1.0	-3.1	-32.4, 30.6
Cerulean Warbler	2	426	-3.2 *	-4.2, -2.3	-4.6 *	-9.4, -0.9	-8.9	-25.5, 7.8
Black-and-white Warbler	1	1662	0.0	-0.7, 0.6	1.2	-0.4, 2.7	0.1	-7.1, 7.5
American Redstart	1	1915	0.0	-0.5, 0.7	0.9	-0.6, 2.8	1.8	-5.9, 10.6

APPENDIX 1. Continued.

Species	1966-2008				2003-2008		2007-2008	
	TQ	N	Trend	Credible Interval	Trend	Credible Interval	Trend	Credible Interval
Prothonotary Warbler	1	680	-1.2 *	-1.7, -0.7	0.0	-2.3, 2.3	-5.5	-16.0, 5.1
Worm-eating Warbler	2	589	0.7	-0.2, 1.5	2.0	-0.9, 4.8	1.2	-10.8, 14.0
Swainson's Warbler	2	252	1.0	-0.6, 2.5	4.6	-0.6, 12.9	2.5	-23.3, 46.2
Ovenbird	1	1873	0.1	-0.3, 0.5	0.6	-0.2, 1.6	-0.4	-4.6, 3.9
Northern Waterthrush	1	954	1.1 *	0.2, 1.9	0.2	-2.6, 3.0	3.9	-7.8, 19.4
Louisiana Waterthrush	2	888	0.5	-0.1, 1.0	1.6	-0.5, 3.6	3.2	-5.4, 13.2
Kentucky Warbler	1	988	-0.7 *	-1.1, -0.2	0.3	-1.5, 2.2	-5.9	-14.5, 2.6
Connecticut Warbler	1	221	-1.0	-3.2, 2.2	-0.5	-7.3, 7.2	2.1	-24.4, 43.4
Mourning Warbler	1	813	-1.6 *	-2.7, -0.7	-1.0	-2.6, 0.8	-1.0	-8.2, 6.9
MacGillivray's Warbler	3	614	-0.8	-17.6, 0.0	0.3	-1.7, 2.5	0.7	-8.2, 11.7
Common Yellowthroat	1	3545	-0.9 *	-1.2, -0.7	-0.6 *	-1.0, -0.1	-1.4	-3.6, 0.9
Hooded Warbler	1	925	2.0 *	1.5, 2.5	4.6 *	2.5, 6.8	9.0	-0.4, 19.7
Wilson's Warbler	1	890	-2.6 *	-3.8, -1.8	-1.6	-3.7, 0.5	-2.7	-12.3, 8.0
Canada Warbler	2	717	-2.2 *	-3.4, -1.2	-0.8	-5.1, 4.4	0.9	-20.6, 29.1
Yellow-breasted Chat	1	1884	-1.3	-4.0, 1.5	0.8	-0.1, 1.6	1.6	-2.3, 5.5
Hepatic Tanager	2	49	3.4 *	1.6, 5.3	4.4	-1.1, 10.5	-6.2	-30.3, 19.4
Summer Tanager	1	1160	0.0	-0.2, 0.3	0.7	-0.2, 1.7	-1.0	-5.2, 3.4
Scarlet Tanager	1	1711	0.0	-0.2, 0.3	0.7	-0.3, 1.8	-0.1	-5.1, 4.9
Western Tanager	1	912	1.3 *	0.9, 1.7	2.1 *	0.9, 3.4	-0.1	-5.6, 6.1
Olive Sparrow	1	33	3.4 *	1.3, 5.5	15.4 *	6.0, 25.8	22.4	-10.5, 67.8
Green-tailed Towhee	1	434	-0.4	-1.2, 0.2	0.4	-2.0, 3.0	-1.9	-11.7, 10.8
Spotted Towhee	1	956	0.1	-0.3, 0.4	0.0	-1.3, 1.3	0.5	-5.4, 6.9
Eastern Towhee	1	1965	-1.4 *	-1.6, -1.3	-0.8 *	-1.4, -0.2	-3.2 *	-6.1, -0.4
Canyon Towhee	1	172	-1.0 *	-2.0, -0.1	-0.2	-3.3, 3.4	3.5	-10.1, 23.2
California Towhee	1	145	-0.2	-0.8, 0.3	-0.4	-2.9, 2.0	2.9	-8.3, 17.0
Abert's Towhee	1	34	2.2	-0.2, 4.6	2.8	-3.6, 10.7	2.2	-25.2, 39.3
Cassin's Sparrow	1	326	-1.1	-3.7, 0.1	2.9	-0.9, 7.4	-4.7	-22.3, 15.6
Bachman's Sparrow	2	258	-3.0 *	-4.3, -2.1	-2.5	-5.8, 1.2	-3.0	-18.8, 16.5
Rufous-crowned Sparrow	1	184	-0.8	-2.1, 0.6	-0.6	-5.6, 4.7	-1.9	-23.3, 25.1
Chipping Sparrow	1	3536	-0.2	-0.6, 0.0	0.6	-0.1, 1.3	-2.2	-5.2, 0.9
Clay-colored Sparrow	1	781	-1.3 *	-1.8, -0.9	0.6	-0.8, 2.0	0.5	-5.9, 7.0
Brewer's Sparrow	1	655	-0.6	-1.5, 0.3	0.2	-4.5, 5.0	-1.2	-21.8, 24.0
Field Sparrow	3	2118	-2.3 *	-14.8, -2.1	0.1	-0.8, 1.1	0.5	-4.0, 5.2
Black-chinned Sparrow	1	92	-2.5	-4.7, 0.0	0.6	-7.7, 12.0	-8.3	-43.0, 42.4
Vesper Sparrow	1	2170	-0.9 *	-1.3, -0.5	0.4	-0.8, 1.6	-0.2	-5.7, 5.7
Lark Sparrow	1	1532	-1.1 *	-1.6, -0.7	0.3	-1.1, 2.0	0.3	-6.4, 7.6
Black-throated Sparrow	1	425	-1.6 *	-2.6, -0.4	-1.3	-10.6, 4.8	-1.7	-16.6, 34.2
Sage Sparrow	1	367	0.2	-1.6, 2.1	0.2	-6.2, 4.1	0.9	-23.8, 22.7
Lark Bunting	1	524	-4.5 *	-6.8, -2.7	-12.3 *	-19.2, -3.3	-40.8 *	-59.7, -10.6
Savannah Sparrow	1	2192	-1.0 *	-1.4, -0.7	-0.2	-1.3, 1.0	1.5	-3.7, 7.3
Grasshopper Sparrow	1	2096	-2.7 *	-3.9, -2.1	-1.2	-3.0, 0.6	-2.5	-10.5, 6.2
Baird's Sparrow	1	199	-2.7 *	-4.3, -1.2	6.6	-2.2, 17.8	6.7	-30.8, 70.6
Le Conte's Sparrow	1	346	-1.0	-2.6, 0.7	3.8	-2.8, 11.1	-12.6	-42.4, 23.3
Henslow's Sparrow	3	354	-0.6	-2.3, 0.8	8.0	-0.9, 15.1	10.7	-15.4, 48.5
Nelson's Sharp-tailed Sparrow	2	183	1.6	-2.9, 3.8	3.1	-3.0, 8.6	-0.4	-26.2, 26.6
Seaside Sparrow	2	35	3.9	-1.7, 8.2	5.2	-13.5, 20.0	19.7	-40.1, 176.8
Fox Sparrow	1	416	1.4	-1.3, 4.4	0.6	-2.1, 3.5	2.2	-9.4, 16.9
Song Sparrow	1	3152	-0.5 *	-0.7, -0.4	0.2	-0.3, 0.8	-2.0	-4.3, 0.5

APPENDIX 1. Continued.

Species	1966-2008				2003-2008		2007-2008	
	TQ	N	Trend	Credible Interval	Trend	Credible Interval	Trend	Credible Interval
Lincoln's Sparrow	1	800	-1.4	-3.3, 0.2	0.9	-2.5, 4.6	-15.5 *	-29.3, -0.2
Swamp Sparrow	1	1153	0.9	-0.6, 2.0	0.8	-1.1, 2.6	-2.4	-10.6, 6.3
White-throated Sparrow	1	976	-0.3	-1.0, 0.2	-0.2	-1.3, 1.1	-11.6 *	-16.2, -6.4
White-crowned Sparrow	1	496	-1.0 *	-1.7, -0.3	0.2	-1.9, 2.7	2.7	-7.2, 15.7
Dark-eyed Junco	1	1514	-1.1 *	-1.7, -0.5	-1.3	-4.0, 1.2	-12.0	-23.6, 0.0
McCown's Longspur	1	106	-5.1 *	-8.1, -2.4	-2.2	-10.0, 5.3	-5.6	-47.3, 27.0
Chestnut-collared Longspur	1	207	-4.3 *	-5.3, -3.2	-2.9	-6.7, 1.7	-8.4	-26.2, 12.4
Northern Cardinal	1	2306	0.3 *	0.2, 0.4	0.2	-0.2, 0.6	-2.1 *	-4.0, -0.1
Pyrrhuloxia	1	127	-0.8	-1.8, 0.2	0.2	-3.1, 3.6	1.9	-11.5, 18.7
Rose-breasted Grosbeak	1	1641	-0.6 *	-1.0, -0.3	0.4	-1.1, 1.8	-0.3	-7.1, 6.8
Black-headed Grosbeak	1	929	0.9 *	0.6, 1.3	2.2 *	0.9, 3.6	3.2	-2.7, 9.7
Blue Grosbeak	1	1590	0.7 *	0.4, 0.9	1.8 *	0.9, 2.8	-0.6	-4.9, 4.0
Lazuli Bunting	1	743	-0.5	-1.2, 0.1	1.7	-0.3, 5.2	4.1	-5.7, 22.4
Indigo Bunting	1	2419	-0.5 *	-0.6, -0.4	-0.6 *	-1.1, -0.2	-1.1	-3.2, 1.0
Painted Bunting	1	448	-0.3	-0.9, 0.3	0.9	-1.1, 3.0	2.6	-7.1, 13.4
Dickcissel	1	1230	-0.8 *	-1.3, -0.3	-1.0	-2.8, 0.8	-11.8 *	-19.7, -3.4
Bobolink	1	1533	-2.1 *	-3.3, -1.7	-1.8 *	-3.4, -0.3	-2.8	-9.7, 4.2
Red-winged Blackbird	1	4094	-0.9 *	-1.1, -0.7	-0.7	-1.4, 0.0	1.2	-1.7, 4.5
Tricolored Blackbird	3	78	1.4	-5.5, 4.3	-2.1	-11.3, 12.0	-3.4	-51.2, 78.5
Eastern Meadowlark	1	2428	-3.2 *	-3.7, -3.0	-2.7 *	-3.5, -1.9	-2.0	-5.8, 1.8
Western Meadowlark	1	2001	-1.1 *	-1.3, -0.8	-1.1 *	-1.8, -0.3	0.4	-3.2, 4.1
Yellow-headed Blackbird	1	998	-0.1	-1.2, 0.8	0.6	-4.7, 6.2	3.4	-18.7, 33.4
Rusty Blackbird	3	219	-6.3 *	-11.7, -1.5	-2.0	-11.8, 13.2	-8.0	-57.1, 79.2
Brewer's Blackbird	1	1561	-2.1 *	-2.6, -1.7	-1.2	-2.2, 0.1	-0.8	-7.0, 5.0
Great-tailed Grackle	1	478	2.8 *	1.1, 4.0	4.6 *	0.1, 9.5	5.1	-14.3, 29.9
Boat-tailed Grackle	1	174	-0.2	-1.5, 1.2	0.3	-4.2, 4.8	-3.5	-22.8, 17.7
Common Grackle	1	3201	-1.6 *	-1.7, -1.4	-2.3 *	-3.0, -1.6	-3.9 *	-7.1, -0.6
Bronzed Cowbird	1	106	0.2	-1.9, 2.3	7.6	-1.3, 19.7	25.7	-12.3, 100.6
Brown-headed Cowbird	1	4159	-0.7 *	-0.9, -0.5	0.9	0.0, 1.8	0.1	-4.2, 4.6
Orchard Oriole	1	1925	-0.8 *	-1.1, -0.6	1.5 *	0.3, 2.7	3.2	-2.5, 9.1
Hooded Oriole	2	133	-0.6	-2.9, 1.4	1.8	-3.2, 7.1	-1.7	-24.6, 23.9
Bullock's Oriole	1	1025	-0.5	-1.0, 0.0	1.9 *	0.5, 3.5	3.3	-3.2, 10.5
Baltimore Oriole	1	2171	-1.1 *	-1.5, -0.7	0.6	-0.3, 1.5	2.4	-2.0, 7.1
Scott's Oriole	1	218	-0.3	-1.6, 0.8	0.1	-3.7, 3.5	-2.8	-17.8, 14.9
Pine Grosbeak	2	236	-2.1	-6.7, 0.0	0.3	-7.5, 9.1	-14.2	-48.2, 29.4
Purple Finch	1	1338	-1.1 *	-2.2, -0.4	0.7	-1.2, 2.7	3.9	-4.9, 13.7
Cassin's Finch	1	454	-2.5 *	-3.7, -1.3	0.5	-2.9, 4.1	-2.3	-17.1, 13.8
House Finch	1	2893	0.4	0.0, 0.9	-1.4	-3.4, 1.1	-5.5	-13.5, 6.4
Red Crossbill	2	782	-0.2	-7.3, 2.2	5.0	-4.7, 17.5	5.6	-39.1, 87.2
White-winged Crossbill	3	344	6.1	-2.1, 13.1	6.4	-27.1, 112.5	-72.2	-100.0, 253.4
Pine Siskin	1	1351	-2.8 *	-4.4, -1.6	3.2	-2.3, 8.9	-6.9	-28.1, 20.0
Lesser Goldfinch	1	519	0.4	-0.6, 2.4	0.3	-5.2, 20.2	-5.4	-26.9, 141.4
Lawrence's Goldfinch	1	82	-0.1	-3.0, 2.2	3.2	-5.3, 15.4	-1.5	-40.4, 54.8
American Goldfinch	1	3187	0.1	-0.1, 0.3	-1.1 *	-1.9, -0.3	-9.5 *	-12.7, -6.1
Evening Grosbeak	3	980	-5.2 *	-20.5, -3.2	0.3	-5.0, 6.2	14.1	-11.8, 49.0
House Sparrow	1	3613	-3.6 *	-3.9, -3.4	-4.6 *	-5.4, -3.9	-6.6 *	-10.1, -3.2
Eurasian Tree Sparrow	2	37	7.4 *	5.2, 9.7	7.2 *	0.1, 13.2	5.9	-25.2, 38.1