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Research Paper

Noise, avian abundance, and productivity at banding stations across the Continental United States

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ABSTRACT. Noise is an increasingly common component of the natural world, due in large part to human activity. Anthropogenic noise negatively impacts abundance, health, and reproduction in many songbird populations. A few studies have reported altered abundance at larger scales. But whether continental trends are being detected at banding stations, which also offer data on productivity and survivorship, is unknown. Further, it is not known whether localized trends correlate with population trends observed at larger scales. We used breeding season data from 1160 constant-effort banding stations (Monitoring Avian Productivity and Survivorship; MAPS) and a spatially explicit noise model to determine whether abundance and productivity were related to mean noise level or spatial heterogeneity (SD) in noise within a 1-km station radius for 72 passerine species. We also determined whether particular life history traits were predictive of noise responses, and compared continental results to those from local studies. Increasing mean noise level was associated with declines in abundance for 27.1% of species and productivity in 22.1% species. Increasing heterogeneity was associated with declines in abundance for 14.3% species and productivity in 14.7% species. The relationship between noise and abundance was not correlated with the relationship between noise and productivity, and acoustic and life history traits were not related to noise responses. Continental results were similar to localized data in 43.1% and 21.4% of species for abundance and productivity, respectively. Although some patterns differed between the local and continental scale, our results indicate that the MAPS banding dataset is capable of detecting noise-associated impacts on abundance and productivity. This is currently the only large-scale dataset capable of quantifying the relationship between noise and productivity in the continental USA, although other datasets exist elsewhere that may also contribute to our understanding of noise impacts at the larger scale.

Bruit, abondance et productivité des oiseaux aux stations de baguage des États-Unis continentaux

RÉSUMÉ. Le bruit est une composante de plus en plus courante du monde naturel et causé en grande partie par l'activité humaine. Le bruit d'origine anthropique a un impact négatif sur l'abondance, la santé et la reproduction de nombreuses populations d'oiseaux chanteurs. Quelques études ont fait état d'une diminution d'abondance à plus grande échelle. On ignore si des tendances continentales sont détectées aux stations de baguage, lesquelles fournissent également des données sur la productivité et la survie. De plus, on ne sait pas si les tendances locales sont corrélées aux tendances de populations observées à plus grande échelle. Nous avons utilisé les données en saison de reproduction issues de 1160 stations de baguage à effort constant (programme « Monitoring Avian Productivity and Survivorship »; MAPS) et un modèle de bruit spatialement explicite pour déterminer si l'abondance et la productivité étaient liées au niveau de bruit moyen ou à l'hétérogénéité spatiale (SD) du bruit dans un rayon d'1 km de la station pour 72 espèces de passereaux. Nous avons également déterminé si des traits particuliers du cycle de vie étaient prédictifs des réactions au bruit, et nous avons comparé les résultats continentaux à ceux d'études locales. L'augmentation du niveau de bruit moyen a été associée à une diminution de l'abondance chez 27,1 % des espèces et de la productivité chez 22,1 % des espèces. Une hétérogénéité croissante a été associée à des baisses d'abondance chez 14,3 % des espèces et des baisses de productivité chez 14,7 % des espèces. La relation entre le bruit et l'abondance n'a pas été corrélée avec la relation entre le bruit et la productivité, et les caractéristiques acoustiques et du cycle de vie n'ont pas été liées aux réactions au bruit. Les résultats à l'échelle continentale étaient similaires aux données à l'échelle locale chez 43,1 % et 21,4 % des espèces pour l'abondance et la productivité, respectivement. Bien que certaines tendances diffèrent aux échelles locale et continentale, nos résultats indiquent que l'ensemble de données de baguage MAPS a la capacité de détecter les impacts du bruit sur l'abondance et la productivité. Il s'agit actuellement du seul ensemble de données à grande échelle permettant de quantifier la relation entre le bruit et la productivité aux États-Unis continentaux, bien qu'il existe d'autres jeux de données qui pourraient également contribuer à notre compréhension des impacts du bruit à plus grande échelle.

Key Words: *anthropogenic; bird; demographic; MAPS; population; scale*

INTRODUCTION

Human population growth and development have resulted in a rapid and widespread increase in noise levels (Buxton et al. 2017). In many animals, noise pollution alters acoustic communication, abundance, and migratory behaviors (Reijnen and Foppen 1995, Slabbekoorn and Peet 2003, Shannon et al. 2016). Songbirds are especially sensitive to anthropogenic noise because their mating and territory defense rely on acoustic communication (Francis et al. 2011). In particular, occupancy and abundance often decline when noise levels increase (Bayne et al. 2008, McClure et al. 2013).

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Noise aversion may even outweigh the effects of land cover when songbirds are selecting places to breed (Kleist et al. 2017). A handful of studies also suggest that ambient noise impacts fitness through reduced pairing (Habib et al. 2007) and reproductive success (Halfwerk et al. 2011). Consequently, increasing anthropogenic noise may threaten songbird persistence (Barber et al. 2010). Throughout this paper we use the term "noise" to refer specifically to ambient sound levels at a location, whether environmental or anthropogenic in origin.

Most noise studies on abundance and productivity occur at small spatial extents (< 50 km²; e.g., Francis et al. 2009, McClure et al. 2013, Proppe et al. 2013). Intensive local studies provide fine-scale detail that can account for potentially confounding localized processes such as interspecific competition (Schoener 1983), legacy effects (Cuddington 2011), density-dependent processes (Haldane 1956) and source-sink dynamics (Pulliam 1988). However, these processes often differ geographically, which limits the generalizability of results gained from local studies. For example, negative impacts of noise on reproductive success have been documented in Great Tits (*Parus major*; Halfwerk et al. 2011) and House Sparrows (*Passer domesticus*; Schroeder et al. 2012), but recent studies did not detect negative impacts on productivity in either species (Meillère et al. 2015, Halfwerk et al. 2016).

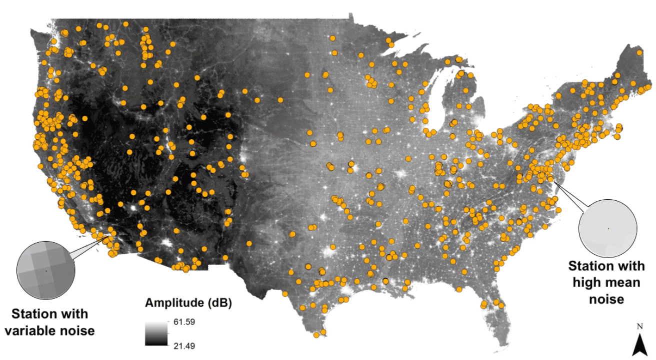
Increasing the spatial extent of a study often comes at a cost to fine-scale detail, but access to larger datasets can reveal trends not immediately visible at smaller scales (Rahbek 2005). For example, juvenile and adult male American Redstart (*Setophaga ruticilla*) distributions are negatively correlated at small scales because of territoriality, but positively correlated at larger scales because of similar habitat requirements (Sherry and Holmes 1988). Four studies have examined the effect of noise on songbird abundance and occurrence at the continental scale, although all were using large-scale datasets to determine whether vocal pitch or particular life history traits were related to abundance and presence in noisy and urbanized areas (Hu and Cardoso 2009, Cardoso 2014, Francis 2015, Moiron et al. 2015). These studies relied on many sources of localized abundance data or published reports describing urban tolerance. Although all four studies documented declines in abundance or occurrence of some species near noise sources and in cities, the importance of vocal pitch differed between studies (discussed in Cardoso et al. 2018). Clearly, a combination of data sources, from both localized and large-scales studies, is needed to best understand the impact of anthropogenic noise on songbird persistence.

The Institute of Bird Populations has been developing a large-scale dataset that could provide additional information on noise impacts at the continental level. The MAPS (Monitoring Avian Productivity and Survivorship) program has been tracking avian demographics, including abundance, productivity, and survivorship during the breeding season at banding stations since 1989. This ongoing program has expanded to over 1200 stations, more than 2 million bird captures, and over 230 publications on avian demographics and vital rates. Effort is standardized across all MAPS stations so that data can be compared across time and space. To our knowledge, this is the only large-scale dataset that also provides information on productivity in North America, although similar datasets exist elsewhere (e.g., Eglington et al. 2015). Quantifying productivity provides a measure of birth rates in a population, and is often strongly tied to population trends (Sallabanks et al. 2000).

Two additional datasets provide information about noise and urbanization at each MAPS banding station. First, the United States National Park Service (NPS) has developed a geospatial sound model that uses 109 natural and anthropogenic factors associated with ambient noise levels (Mennitt et al. 2014) to predict the L_{50} dBA at a 270 m resolution for the a typical summer day from 2003 to 2013 across the entire continental United States (CONUS). Second, the United States Geological Survey (USGS) produced CONUS land cover maps in 2001, 2006, and 2011 that include habitat classifications and a measure of development at 30 m resolution (Homer et al. 2015).

We assessed the relationship between model-predicted noise levels and the abundance and productivity of 72 passerine species by computing the weighted mean of noise within 1 km of each banding station (Fig. 1). Visual investigation of noise data revealed that a number of MAPS stations had high levels of noise heterogeneity within the 1 km radius. To determine whether this noise pattern impacted species differently than uniformly high or low noise levels, we assessed the impact of noise heterogeneity on abundance and productivity. Species were selected because they were among the 30 most commonly captured at MAPS stations or because localized data on noise impacts were available. Local studies included 49 species, seven which were also among the 30 most common species. After controlling for the effects of location, time, development, and habitat, we determined whether noise was an important predictor of abundance or productivity for each species. We also calculated whether the directional associations of noise with abundance and productivity were correlated, such that knowing the relationship of noise with one measure facilitated a predictive understanding of the other. Finally, we determined whether the relationship with noise was predicted by particular life history traits, and we compared continental data to local data to determine the level of agreement between these two scales.

Fig. 1. Map of noise predictions for the continental United States produced by the United States National Park Service overlaid with the location of each Monitoring Avian Productivity and Survivorship (MAPS) banding station (yellow circles) located within the region. The expanded view of two MAPS stations are provided as examples of the two noise variables used for the analysis: mean noise level and the heterogeneity of noise.



METHODS

Datasets

Data on avian demographics from 1989 to 2016 was provided by The Institute of Bird Populations MAPS banding program. Each participating station consists of ten 12-m mist nets located on an area approximately 8 ha in size that is contained within a contiguous landscape of > 20 ha. Mist nets are opened for six hours (beginning at dawn) on one day in a 10-day period. Based on the latitude of the station, six to ten 10-day periods are run consecutively during the breeding season (May–August) each year. Age, sex, and reproductive status are recorded for each bird, and a metal USGS band is attached to the tarsus before release to facilitate the collection of recapture data.

The United States National Park Service used 109 natural and anthropogenic factors associated with ambient noise levels (Mennitt et al. 2014) to predict the L_{50} dBA at a 270 m resolution for the entire continental United States. Noise predictions were tested at 319 acoustic monitoring sites within 216 national parks and 34 urban locations in 28 unique cities spanning the continental United States. The model explained 71.74% of the noise variance across all sites. Anthropogenic sources increased the noise level predicted by biophysical processes alone in 78% of the landmass. The model is limited to a single noise measure per pixel, calculated for a typical summer day from 2003 to 2013.

The USGS periodically produces a 30-m resolution layer of habitat classifications and development levels as part of the National Land Cover Database (NLCD). We used 2001 data because this was the year closest to the median year of bird captures available in the MAPS dataset. For our analysis we incorporated two measures of development and seven measures of habitat to control for their effect on bird demographics. Development variables in the NLCD were derived from the percent cover of impervious surfaces, which is a strong predictor of the impact urbanization has on songbirds (Melles et al. 2003, McClure et al. 2015), and the type and quantity of human structures (Homer et al. 2012). We combined open (< 20% anthropogenic cover) and low (20–49%) development into a single category and mid (50–79%) and high (80–100%) development into a second category. Habitat variables included the proportion of land covered by water, wetlands, forest, herbaceous, shrubland, barren, and planted/cultivated.

To determine whether life history traits were predictive of noise-associated changes in abundance and productivity, we categorized bird species into several guilds based on (1) song frequency, (2) breeding habitat, (3) diet, (4) nest location, and (5) migratory behavior. Vocal frequencies were derived from two to eight high-quality songs for each species housed on Thayer Birding Software (Birds of North America, Gold Edition). Because multiple elements of song frequency have been implicated in noise response and can be modulated independently, we measured peak frequency, bandwidth (25%–75% summed energy), lowest frequency (5% of summed energy), lowest quartile (25% of summed energy), and highest frequency (95% of summed energy) in Raven Pro (V1.4, Ithaca, NY). For species lacking a song, the most common call was utilized. All other life history traits were collected from the Cornell Lab of Ornithology's website (https://www.allaboutbirds.org/news/). Breeding habitat classifications included: grassland, forest, open woodland, scrub, and town. Birds were classified as insectivores or noninsectivores based on the primary components of their diet. Nest location was classified as cavity, ground, shrub, or tree. For migration, species were categorized as nonmigrants, migratory, or partial migrants. Species were categorized as partial migrants when range maps indicated that populations were resident in 25–50% of their range, but otherwise migratory.

To eliminate the potential for implicit bias, we evaluated regional studies for inclusion in our study during September of 2016, prior to initiating the processing of banding data. We established two a priori criteria for inclusion. First, each study must have occurred within the North American region where both MAPS and noise data were available, or examined species commonly found within this region. Second, each study must have included directional results for abundance or productivity in relation to noise or proximity to noise-producing sources, e.g., roads or oil wells. Although the majority of the literature on anthropogenic noise addresses behavioral responses in songbirds, we identified 13 suitable studies using multiple subsets and variants of the search terms; songbird, noise, abundance, reproduction, and productivity in Web of Science and Google Scholar (Appendix 1). Many of these studies examined multiple species, resulting in local demographic information for 49 species. Abundance data was available for 44 species, and productivity was available for 16 species. Of these species, 11 had data on both abundance and productivity.

Data processing

For each species, abundance was calculated as the number of adults captured per 600 net hours, and productivity was the ratio of juveniles (AGE code 4 or 2) to adults (all other AGE codes, except 0 and 9 where age is unknown; DeSante and Kaschube 2009). Although effort was standardized, we cannot assume that capture rates were equal across all sites. However, there are no indications that noise alters capture rates in a systematic fashion when birds are on the breeding grounds (although it may impact site selection during migration, when birds are actively selecting stopover sites; McClure et al. 2017). This information, along with our large sample size, should overcome any potential spurious associations based on differences in site-based capture rates. Survivorship was not analyzed because birds are often recaptured long after they were initially banded, and at sites with noise levels and surface characteristics that are quite different from the original banding location. Thus, a myriad of factors beyond the particular characteristics at the site of origin are likely to impact survivorship. For any given species, only stations within that species' range (breeding status code B, U, O, and T) were included (DeSante et al. 2015). A minority of MAPS stations are operated more than once per 10-day period. For such stations we only included captures during the first sampling subperiod (code A) to standardize effort across all stations. Because MAPS regulations suggest that data from locations < 1 km from the banding station's center are not independent (DeSante et al. 2015) and breeding birds are unlikely to venture > 1 km from their breeding territory, we calculated the mean noise level within a 1 km radius of each MAPS station. The mean was linearly weighted to increase the influence of more central pixels by dividing the noise level in each pixel by the distance between that pixel and the station center, and then averaging the results for all pixels. To evaluate spatial heterogeneity we calculated the standard deviation of noise levels in all pixels contained within the 1 km radius. Although heterogeneity can be measured in many ways, we chose standard deviation because it is used regularly in the literature (e.g., Yang et al. 2015, Khan et al. 2019), is easy to interpret, and effectively creates a standard measure of variability comparable across sites with high and low mean noise levels.

Habitat and development variables were calculated as the proportion of all pixels within a 1 km radius surrounding each station. We used a principal component analysis on the development and habitat variables to obtain a set of uncorrelated variables for inclusion as predictors in regression models. We retained eight principal components that accounted for > 80% of the variation (Appendix 2). Each component was given a relevant name based on the top one to three contributing variables. In the order of explanatory power, these components increased with "development" (PC1; 20.08% variance explained), "wetland" (PC2; 11.75%), "shrub" (PC3; 10.78%), "barren" (PC4; 9.22%), "marsh" (PC5; 8.15%), "grassland" (PC6; 7.49%), "water" (PC7; 7.46%), and "urban" (PC8; 6.84%).

Statistical analysis

For each of 72 species of interest, we fitted two generalized additive mixed-effects models (GAMMs): one with abundance as the response variable, and one with productivity. Abundance models were Poisson or quasi-Poisson (quasi-Poisson, in cases where the overdispersion parameter estimate exceeded 2) GAMMs with log link functions (Hastie and Tibshirani 1990, Zuur et al. 2009, Wood 2017). Predictors included the weighted mean noise level, the standard deviation of the noise level, the eight habitat and development principal components, and location (2-dimensional smooth term; thin-plate regression spline with basis of dimension 16; Wood 2017). An offset (logarithm of net-hours) accounted for differential survey effort between stations and years (Zuur et al. 2009). Productivity models were Poisson or quasi-Poisson GAMMs with log link functions (Zuur et al. 2009). The response variable in these models was the count of juvenile birds, with an offset (logarithm of the count of adult birds), so we effectively modeled the number of juveniles per adult (Zuur et al. 2009). Candidate predictors were the same as for abundance models. Year (smooth term; thin-plate regression spline with basis of dimension 5) was included as an additional predictor in all models to account for nonmonotonic patterns over time in a variety of factors, including land use changes. All models also included a random effect of station. Although these GAMM models detected counts, rather than yielding absolute bird abundance or productivity estimates, species-specific modeling and inclusion of covariates related to location, habitat, and time should still allow reliable assessment of noise effects on indices of abundance and productivity (Dunn and Ralph 2004). We used variance inflation factors to confirm the absence of problematic multicollinearity between predictors (particularly noise and development/habitat PCs; Dormann et al. 2013). Four candidate models were considered for abundance and productivity of each species, including (a) both noise variables, (b) mean noise only, (c) heterogeneity of noise only, and (d) no noise variables. Habitat, development, and spatial predictors were retained in all candidate models to control for their effects on abundance or productivity. Best models for each species and response variable were selected using AIC (or QIC, for quasi-Poisson models). Where best models included a noise term, but the AIC/QIC improvement relative to the next-best model without the noise term was below 2 (ΔAIC/QIC < 2), it was noted by labeling the effect as "weak"; (Appendix 3; Burnham and Anderson 2002, Burnham and Anderson 2004). Model fitting was carried out in R version 3.6.1 (R Core Team 2019) using package mgcv (Wood 2011, 2017).

To investigate the relationship between noise-associated changes in abundance and productivity, we plotted and modeled the productivity regression coefficients as a function of the abundance coefficients. Separate models were fitted for weighted mean noise levels and noise heterogeneity coefficients. Although top abundance and productivity models excluded noise terms for some species, those terms were included here to produce effect sizes for all species. To account for uncertainty in the GAMM coefficient estimates used as input to these models relating abundance and productivity results, we used measurement error models, using the standard error of the estimates as the measurement error standard deviations (McElreath 2020). Models were fitted in R using package brms (Bürkner 2018). To assess the relationship between the abundance and productivity noise-effect coefficients, we examined 95% credible intervals for the abundance coefficients in the measurement error models, and additionally compared each model to its intercept-only version via leave-one-out cross-validation (brms function loo(); Vehtari et al. 2017).

To investigate relationships between noise responses and life history traits, we fitted a measurement error model (using standard errors in the GAMM coefficient estimates as the measurement errors, as above) for each noise coefficient (abundance and productivity, weighted mean noise and noise standard deviation) as a function of the suite of vocal and life history traits described above. These included peak frequency, bandwidth, lowest frequency, lowest quartile, highest frequency, habitat, insectivory, nesting, and migration. Models were fitted with horseshoe shrinkage priors (Piironen and Vehtari 2017) in R package brms (Bürkner 2018), and the best model for each noise coefficient was selected after examining model output (estimates and credible intervals), considering output from projection predictive forward variable selection (using R package projpred; Piironen et al. 2019), and as verification, leave-one-out cross-validation scores for the top models identified by the variable selection.

To determine whether regional noise impacts were similar to our landscape results, we compared the directional effect (+, 0, -) of increased noise on abundance and productivity across scales and noted the percentage of cases demonstrating agreement, and vice versa.

RESULTS

Continental models for abundance and productivity

The distribution of model-predicted noise levels at MAPS stations (mean = 37.7, SD = 5.1, range = 23.9–54.8, *n* = 47,048) was similar to that of the full NPS dataset (mean = 35.6, SD =

5.3, range = 20.1–67.0, n = 183,300,975). Our best species-specific landscape models retained a negative relationship between the weighted mean of noise and abundance in 19 species (27.1%), a positive relationship in 19 species (27.1%), and no clear statistical relationship in 32 species (45.8%; Table 1, species-specific effect sizes and model rankings can be found in Appendix 3 and 4, respectively). As spatial heterogeneity in noise increased, abundance decreased in 10 species (14.3%), increased in 27 species (38.6%), and had no clear statistical relationship in 33 species (47.1%). MAPS data was insufficient to build continental-scale abundance models for two species (Golden-cheeked Warbler [*Setophaga chrysoparia*] and Tennessee Warbler [*Leiothlypis peregrina*]) and these species were not used in the calculation of percentages above (n = 70). Productivity was negatively related to increasing mean noise levels in 15 species (22.1%), positively related in 15 species (22.1%), and not statistically related in 38 species (55.8%). Productivity and noise heterogeneity were negatively related in 10 species (14.7%), positively related in 22 species (32.4%), and not statistically related in 36 species (52.9%). MAPS data was insufficient to build continental-scale productivity models for four species (Golden-cheeked Warbler, Tennessee Warbler, Eastern Meadowlark [*Sturnella magna*], and White-crowned Sparrow [*Zonotrichia leucophrys*]) and these species were not used in the calculation of percentages above (n = 68). Model failures in these species resulted from low capture numbers, which was primarily due to a narrow geographic range, breeding primarily outside the continental United States, or the inability to capture juvenile grassland species with MAPS protocols.

In 16 species, no changes in abundance and productivity attributable to the weighted mean of noise were identified. Noise heterogeneity had no detectable association in 19 species. Measurement error models indicated no correlation between coefficients for effects of weighted mean noise on abundance and productivity (estimated slope coefficient (with shrinkage) was 0.00, and the intercept-only model was the best model, with a leave-one-out information criteria (LOOIC) difference of just 0.02; Figure 2). The corresponding results for the effects of noise spatial heterogeneity were similar (estimated slope coefficient 0.00 with shrinkage; full model LOOIC was lower than the intercept-only model, but only by 0.03; Figure 3). Neither acoustic nor life history traits improved on the intercept-only model for mean or heterogeneity of noise in abundance or productivity (estimated slope coefficient 0.00 with shrinkage; LOOIC intercept-only model lowest or within 0.13 of all other models; Appendix 5).

Principal components related to habitat and development were retained in all candidate models to control for the expected effects of these conditions rather than undertaking an explicit assessment of their contribution. However, 44 of 70 abundance models contained significant principal component predictors ($p < 0.05$) and 25 of 68 productivity models also contained principal component predictors (Table 1). In contrast, one or more noise terms were retained in 58 abundance models and 38 productivity models. Although beyond the scope of this report, information about the relative impact of habitat and development on particular species can be gleaned from these results (Appendix 3).

Fig. 2. Model coefficients for the effects of weighted mean noise level on the abundance and productivity of individual species (Δ Abundance or Productivity/Decibel[dBA SPL]). Coefficients, and their associated standard errors, were derived from species-specific models that predicted the relationship between mean noise level and the demographic trait. Error bars indicate 95% confidence intervals. Inset provides an expanded view of species near the origin.

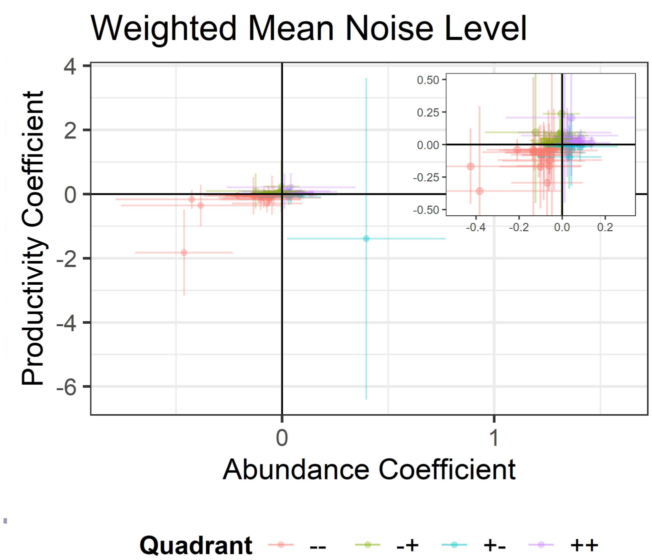
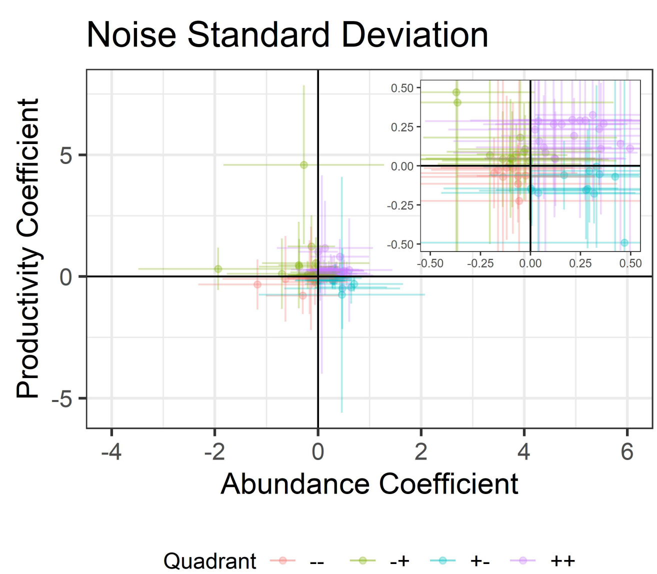


Fig. 3. Model coefficients for the effects of noise standard deviation (SD) on the abundance and productivity of individual species (Δ Abundance or Productivity/SD Unit). Coefficients, and their associated standard errors, were derived from species-specific models that predicted the relationship between noise heterogeneity and the demographic trait. Error bars indicate 95% confidence intervals. Inset provides an expanded view of species near the origin.



Erratum: Insets were added to Figures 2 and 3 (PDF version) to improve comprehensibility and replaced those in the original publication on 4 August 2020.

Table 1. Results from top models depicting the impact of noise level (mean) and heterogeneity (sd) on abundance and productivity for each species. Where available, local results and agreement with Monitoring Avian Productivity and Survivorship (MAPS) continental scale results are presented. For ease of reading, effects are presented as positive (+), negative (-), or no effect (0). Principal components significant at $p < 0.05$ are included as positive (no sign) or negative (-) effects. Numerical effect sizes can be found in Appendix 4. See Appendix 3 for scientific species names. Where data from multiple local studies is presented, numbered superscripts refer to study superscripts found in Appendix 1.

Species	Abundance					Productivity				
	MAPS (*mean*)	MAPS (*sd*)	Local (*mean*)	Agree: MAPS/ local	Principle components	MAPS (*mean*)	MAPS (*sd*)	Local (*mean*)	Agree: MAPS/ local	Principle components
Acadian Flycatcher	0	0	0	Yes	marsh	0	−			wetland, −urban
American Goldfinch	+	−			wetland, −barren, −marsh	0	0			
American Redstart	−	+			−shrub, −water	−	0			
American Robin	+	0	−	Opposite	development, shrub	+	0			wetland
Ash-throated Flycatcher	0	−			shrub, −barren, −marsh	0	0	−	No	
Audubon's Warbler	0	+			−development	0	0			
Bewick's Wren	+	0			development, wetland, shrub, urban	0	0			
Black-headed Grosbeak	0	+	−	No	wetland, −barren	+	+	−	Opposite	
Black-capped Chickadee	+	0	0	No	development	0	−			
Black-chinned Hummingbird	+	0	+	Yes	development	0	0	+	No	shrub
Bobolink	+	0	−	Opposite	wetland, −shrub, −barren, marsh, grassland, −water	0	0	−	No	
Bushtit	+	−	+	Yes	development, wetland, −water, −urban	0	0	+	No	development, marsh
Carolina Wren	+	0	0	No	−shrub	+	−			development, −urban
Cassin's Finch	0	0	+	No		0	−			
Cassin's Vireo	−	0	−	Yes		−	+			
Cedar Waxwing	+	+	−	Opposite	wetland	+	+			
Chipping Sparrow	−	+	0[5], −[9]	Partial		0	+	0	Yes	
Common Yellowthroat	+	0			wetland	0	0			wetland
Dark-eyed Junco	0	0	0	Yes	−development, −wetland, −grassland	−	0			water
Dusky Flycatcher	−	0	−	Yes		−	0			
Eastern Bluebird	0	−				0	−	−	No	
Eastern Meadowlark	+	−	−	Opposite		INS	INS	−		
Evening Grosbeak	0	+	0	Yes		+	−			
Golden-crowned Kinglet	0	+	0	Yes		0	0			water
Golden-cheeked Warbler	INS	INS				INS	INS	0		
Gray Flycatcher	−	+	−	Yes		+	−	+	Yes	
Great Crested Flycatcher	−	0	0	No	development	0	+			
Gray Catbird	0	+			development, wetland, −barren, water	0	+			development
Hammond's Flycatcher	0	+				−	+			
Hermit Thrush	−	+				−	0			
House Finch	+	0	+	Yes	development, wetland, shrub, −barren, grassland	0	+	+	No	
House Sparrow	0	0			development	0	+	0[10], −[13]	Partial	
House Wren	0	0			wetland, −barren	+	0			wetland, −urban
Indigo Bunting	0	+				0	+			−wetland
Lazuli Bunting	0	0	0	Yes	shrub, −barren, −marsh	0	+			−grassland
Least Flycatcher	−	0	−	Yes		0	0			
Lincoln's Sparrow	−	0				−	0			
MacGillivray's Warbler	0	+	0	Yes	−development, −wetland	+	0			
Magnolia Warbler	−	0				0	0			−development, wetland
Mountain Chickadee	0	+	−	No	marsh, water	0	0			development, marsh
Mourning Dove	0	0	−	No	development	0	0	−	No	
Mrytle Warbler	−	0	−	Yes		−	+			development
Nashville Warbler	−	0			−wetland, marsh	−	+			
Northern Cardinal	0	−			development	+	0			
Orange-crowned Warbler	+	−				0	+			
Ovenbird	−	+	0[1], 0[6]	No	−wetland	0	+			
Pine Siskin	0	0	0	Yes	development, −wetland, barren, urban	−	0			
Red-breasted Nuthatch	−	+	−[9], −[12]	Yes	marsh	0	+			
Red-eyed Vireo	−	+	−[1], 0[12]	Partial	−development, marsh	+	+			

(con'd)

Ruby-crowned Kinglet	+	0	−	Opposite		0	0			
Rufous Hummingbird	0	0				−	−			wetland, −grassland
Scarlet Tanager	−	−	0	No		0	0			
Song Sparrow	0	+			development, wetland	0	0			marsh
Spotted Towhee	0	0	−	No	−barren, −marsh	0	0			barren, marsh
Swainson's Thrush	0	0				+	0			wetland, −urban
Tennessee Warbler	INS	INS	0			INS	INS			
Townsend's Solitaire	0	+	0	Yes	urban	−	+			
Townsend's Warbler	0	+	−	No		−	+			
Warbling Vireo	−	+			−wetland	0	0			
Western Bluebird	0	−			development, −grassland	+	0	0	No	−grassland
Western Scrub Jay	+	+	−	Opposite	shrub, −barren	0	+			
Western Tanager	0	+	−[5], −[9], −[12]	No	−development	+	0	−[5]	Opposite	
White-breasted Nuthatch	+	0	−	Opposite		−	0			
White-crowned Sparrow	0	+	0	Yes		INS	INS	−		
White-eyed Vireo	+	0			−water	−	+			shrub
White-throated Sparrow	0	−	−[1], 0[12]	Partial	marsh	0	+			
Wilson's Warbler	−	+				0	−			−development, −shrub, −urban
Wood Thrush	+	0	0	No	−grassland	+	0			
Wrentit	0	0			development, wetland, shrub, barren, marsh, −grassland	0	−			water
Yellow Warbler	+	0	−[9], 0[12]	No	wetland	0	0			water
Yellow-billed Cuckoo	0	+	−	No	wetland, shrub	+	0			
Yellow-breasted Chat	−	+				0	0			−shrub

Comparison of continental and local studies

Results from local studies were only compared to our continental results for the weighted mean of noise because each local study used the mean to quantify noise, rather than a measure of spatial heterogeneity. For abundance, data at both scales was available for 51 cases, which included 43 of the 44 available unique species (one continental model failed) and eight cases where multiple local studies were available on a species (two studies in six species, three in one species; Table 1). The directional effect of noise across multiple local studies was congruent for three of these species (42.9%). The directional effects of noise on abundance were congruent between scales in 22 of 51 comparisons (43.1%), although the trend was reversed (i.e., + to - or vice versa) in only seven studies (13.7%). One local, multispecies study assessed noise impacts during migration (McClure et al. 2013), a time period that may exert different pressures than during the breeding season when MAPS data was collected. However, removing this study did not improve agreement (10 of 29 cases; 34.5%).

For productivity, data at both scales was available for 14 cases, which included 13 of the 16 available unique species (three continental models failed) and one case where an additional local study was available on a species (Table 1). The directional effect of noise between studies was not congruent in this species. The directional effects of noise on productivity between spatial scales was congruent in only 3 of 14 cases (21.4%), although the trend was reversed for only two species (14.2%).

DISCUSSION

Changes in abundance associated with mean noise levels predicted from the NPS noise model were detected in 38 of 70 (54.2%) of the species analyzed with MAPS banding data, being distributed equally between positive and negative relationships. Published, localized studies detected noise-associated impacts on species abundance in 58.8% (30/51) of species. Our results indicate that MAPS banding station data detects noise-associated changes in abundance at a similar rate to localized studies and is a useful tool for assessing the impacts of noise on songbird abundance. Fewer noise-associated changes were detected for productivity (30/68 [44.2%] compared to 12/16 [75.0%] locally). This likely stems from the fact that productivity is impacted by multiple reproductive variables, e.g., fecundity, number of broods, or postfledging survival. Publication skew could also contribute, because local studies are more likely to be conducted on populations where a trend is suspected a priori (Møller and Jennions 2001). It is also plausible that noise is not related to productivity in the majority of species at the continental scale because lowered abundance in noisy areas reduces competition for habitat and foraging resources (Francis et al. 2011). As a result, smaller populations may continue to be proportionally as productive as larger populations. However, if productivity does not increase when abundance decreases, it is likely that populations in noisy areas will remain small or decrease in size over time. Of the 20 species that became less common as mean noise levels increased, only two also had positive productivity (Gray Flycatcher [*Empidonax wrightii*] and Red-eyed Vireo [*Vireo olivaceus*]).

Perhaps one of the primary benefits of MAPS banding data is the ability to compare noise-associated changes in abundance and productivity simultaneously across a large number of sites and years. In our results, the relationship with noise in one population parameter did not consistently predict the direction of the other. In general, ecologists do not expect abundance and productivity to be correlated, largely because of density-dependent processes (Van Horne 1983, Murdoch 1994). However, in the presence of an external stressor, such as noise or urbanization, it is plausible that both processes could be reduced in parallel by a reduction in fitness that directly impacts habitat selection and the production of offspring simultaneously (Bock and Jones 2004). Our results indicate that the interaction between noise and population demographics is more complex, and that monitoring long-term changes using both measures in tandem might be the most useful for predicting population persistence in noisy areas.

For example, abundance and productivity both increased with mean noise level across MAPS stations in four species: the American Robin (*Turdus migratorius*), Carolina Wren

(*Thryothorus ludovicianus*), Cedar Waxwing (*Bombycilla cedrorum*), and Wood Thrush (*Hylocichla mustelina*). Although Wood Thrush populations have declined generally (Rushing et al. 2016), all of these species are common in human-dominated systems in North America, and their ability to capitalize on noisy habitats vacated by many other species may partially underlie their synanthropic success (e.g., Goodwin and Shriver 2011). Conversely, because abundance and productivity both declined as noise level increased, we might predict that the American Redstart, Cassin's Vireo (*Vireo cassinii*), Dusky Flycatcher (*Empidonax oberholseri*), Hermit Thrush (*Catharus guttatus*), Lincoln's Sparrow (*Melospiza lincolnii*), Yellow-rumped Warbler (*Setophaga coronata*), and Nashville Warbler (*Leiothlypis ruficapilla*) will decline if noise continues to become more pervasive. Species such as the American Goldfinch (*Spinus tristis*), Black-capped Chickadee (*Poecile atricapillus*), and House Finch (*Haemorhous mexicanus*) might increase gradually because their abundance increased in noise, while productivity was unaffected. However, species like the Chipping Sparrow (*Spizella passerina*), Great Crested Flycatcher, (*Myiarchus crinitus*), and Least Flycatcher (*Empidonax minimus*) might slowly decrease because of declining abundance in noise, even though productivity is stable.

In addition to providing multiple demographic measures, data from banding stations is unaffected by some of the confounding variables that typically plague noise studies. Specifically, banding data is robust to the problem of observer detectability. Variation in aural abilities between observers can limit comparisons from aural surveys, a primary method for assessing abundance in avian studies (Faanes and Bystrak 1981). Ambient noise level is also known to impact detectability (Simons et al. 2009), making it difficult to compare data across studies unless similar methodology allows for statistical corrections (e.g., Buckland et al. 1993). Barring the presence of a point source of noise physically located near a mist net, there is little reason to believe that ambient noise has any impact on the likelihood of capturing resident birds that are present on the breeding or winter grounds. Further, having a bird in hand, where photographs, previous bands, and expert help can be utilized, reduces error and variability in identification and counts between observers.

Several studies have investigated whether particular life history traits underlie differential species responses to noise. In our analysis, neither acoustic traits, nor a suite of guilds defined by life history traits were predictive. The lack of any effect was somewhat surprising given recent literature on the subject that has implicated vocal frequency, diet, and nesting as traits related to noise responses (Hu and Cardoso 2009, Cardoso 2014, Francis 2015). However, in each of these published studies, life history traits were compiled for several hundred species, often selected to cover a range of variation in vocal features and life history traits. Despite their extent, some results from these large-scale studies are still conflicting (Moiron et al. 2015). Our study included 72 species that were selected because they were commonly captured in mist nests at MAPS stations or because continental data could be compared to data from local studies. Because our primary objective was to evaluate the viability of detecting noise-associated changes in MAPS data, we made no attempt to capture a range of vocal or life history traits. Thus, variation in some traits was low. For example, only four species of grassland birds were included in our analysis, and very few of our species were not insectivores. Further, noise in our study was not constricted to low-frequency sources, which may reduce the role of vocal frequency often seen in urban adaptation (Halfwerk and Slabbekoorn 2009). Although a more explicit study of life history traits across species captured at MAPS stations could be valuable, we suggest that our results should be limited to evaluating the contribution of MAPS data for detecting noise-associated patterns in bird abundance and productivity.

Although mean noise level is the most common unit used to assess the impacts of noise, spatially heterogeneous acoustic habitats may impact birds differently (Gill et al. 2015). Acoustic niches, for example, could be more diverse when noise levels vary across space. As a result, birds with both philic and phobic reactions to noise might inhabit the same general area. In keeping with this hypothesis, 85.7% of species increased or remained stable as noise heterogeneity increased, while only 72.9% did so as mean noise level increased. Although our effects sizes are small, the skew toward more positive relationships with noise heterogeneity (Figs. 2 and 3) may provide an acoustic example of the intermediate disturbance hypothesis, which predicts that the highest number of species will thrive when habitats are neither uniformly pristine nor highly degraded (Connell 1978). At minimum, the negative relationship with spatially heterogeneous noise is less prominent than that of a uniform increase in noise. This suggests that banding stations with elevated noise levels on only a portion of their localized habitats may support more diverse songbird communities than those completely inundated by elevated noise levels. Perhaps this is not surprising given that localized noise sources, such as rivers, have been on the landscape for much of geologic history. Another possibility is that these communities are experiencing a release from predation by noise averse predators (Francis et al. 2009, Barber et al. 2010), without incurring the full costs associated with uniformly increased noise levels. Clearly, a better understanding of the spatial extent at which noise impacts songbirds is needed. More generally, studies of animal ecology must continue to move away from interpretations based solely on averages. Variability in many sensory cues, habitat characteristics, temporal patterns, and even life-history traits may impact populations differently.

Combining results from the continental-scale MAPS banding database with localized studies may also be important for interpreting noise impacts. Congruent results from the two spatial extents might provide confidence for widespread species-specific management techniques. One example is the Red-breasted Nuthatch (*Sitta canadensis*), where abundance was negatively associated with noise in two localized studies and in our continental assessment. Taken together, these results indicate that noise mitigation will likely be needed to maintain healthy population levels in this species. Conversely, the abundance of the Western Tanager (*Piranga ludoviciana*) was negatively impacted in multiple regional studies, but not in our continental model. In this case, the fine-grain detail of localized studies may have detected patterns not present or detectable in MAPS data, and localized or general noise-mitigation might still be recommended for species management. Finally, the MAPS dataset detected no relationship between noise and productivity in House Sparrows, a pattern that is supported in one localized study (Meillère et al. 2015), but not in another (Schroeder et al. 2012). The lack of an outcome at the larger spatial extent might reduce concern that noise is impacting this species, despite the more variable localized results.

Determining the impact of noise on populations dynamics in particular species is critical as we prioritize mitigation objectives for songbirds. Extrapolating solely from local studies may lead to misguided management because of the presence of differential local and landscape level processes. Given that broad meta-analyses to date have been unable to consistently predict noise impacts based on a single set of life-history traits, large scale datasets capable of determining patterns of change directly for individual species may be a valuable tool for assessing noise impacts. Our results suggest that MAPS data can be used to detect noise-related changes at the continental level. The value of this dataset is enhanced by the ability to incorporate habitat and development variables alongside noise terms to assess patterns in multiple population parameters, including, abundance, productivity, and perhaps eventually survivorship. In our models, over a quarter of the species surveyed experienced declines in abundance or productivity beyond what could be attributed to other variables, highlighting the importance of noise mitigation for maintaining songbird diversity. Because the direction of noise-associated changes was not correlated between abundance and productivity, and continental and localized results were not consistently congruent, best management practices should strive to incorporate multiple demographic measurements from multiple scales. Agreement across scales and population parameters may reveal which species are most and least sensitive to noise. Future attempts to model noise over time, or take standardized noise measurements at MAPS stations, might increase the sensitivity of this dataset. However, the current MAPS dataset can be used to derive continental, noise-associated trends for any bird species that is regularly captured in mist nets, adding a new tool for biologists seeking to understand and manage songbird populations in an age of increasing noise levels.

Data Availability Statement

Data (allspecies_final.csv) that supports the findings of this study is available online in the OSF public repository (https://osf.io/cka9z/). R code for single species model analysis is available in Appendix 6 and code for the measurement error models is in Appendix 7.

Responses to this article can be read online at:
http://www.ace-eco.org/issues/responses.php/1633

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LITERATURE CITED

Barber, J. R., K. R. Crooks, and K. M. Fristrup. 2010. The costs of chronic noise exposure for terrestrial organisms. *Trends in Ecology & Evolution* 25:180-189. https://doi.org/10.1016/j.tree.2009.08.002

Bayne, E. M., L. Habib, and S. Boutin. 2008. Impacts of chronic anthropogenic noise from energy-sector activity on abundance of songbirds in the boreal forest. *Conservation Biology* 22:1186-1193. https://doi.org/10.1111/j.1523-1739.2008.00973.x

Bock, C. E., and Z. F. Jones. 2004. Avian habitat evaluation: should counting birds count? *Frontiers in Ecology and the Environment* 2:403-410. https://doi.org/10.1890/1540-9295(2004)002[0403:ahescb]2.0.co;2

Buckland, S. T., D. R. Anderson, K. P. Burnham, and J. L. Laake. 1993. *Distance sampling: estimating abundance of biological populations*. Chapman & Hall, London, UK.

Bürkner, P.-C. 2018. Advanced Bayesian multilevel modeling with the R package brms. *R Journal* 10:395-411. https://doi.org/10.32614/RJ-2018-017

Burnham, K. P., and D. R. Anderson. 2002. *Model selection and multimodel inference.* Springer Verlag, New York, New York, USA. https://doi.org/10.1007/b97636

Burnham, K. P., and D. R. Anderson. 2004. Multimodel inference: understanding AIC and BIC in model selection. *Sociological Methods and Research* 33(2):261-304. https://doi.org/10.1177/0049124104268644

Buxton, R. T., M. F. McKenna, D. Mennitt, K. Fristrup, K. Crooks, L. Angeloni, and G. Wittemyer. 2017. Noise pollution is pervasive in U.S. protected areas. *Science* 356:531-533. https://doi.org/10.1126/science.aah4783

Cardoso, G. C. 2014. Nesting and acoustic ecology, but not phylogeny, influence passerine urban tolerance. *Global Change Biology* 20:803-810. https://doi.org/10.1111/gcb.12410

Cardoso, G. C., Y. Hu, and C. D. Francis. 2018. The comparative evidence for urban species sorting by anthropogenic noise. *Royal Society Open Science* 5:172059. https://doi.org/10.1098/rsos.172059

Connell, J. H. 1978. Diversity in tropical rain forests and coral reefs. *Science* 199:1302-1310. https://doi.org/10.1126/science.199.4335.1302

Cuddington, K. 2011. Legacy effects: the persistent impact of ecological interactions. *Biological Theory* 6:203-210. https://doi.org/10.1007/s13752-012-0027-5

DeSante, D. F., and D. R. Kaschube. 2009. The monitoring avian productivity and survivorship (MAPS) program 2004, 2005, and 2006 report. *Bird Populations* 9:86-169.

DeSante, D. F., D. R. Kaschube, and J. F. Saracco. 2015. *Vital rates of North American landbirds.* The Institute for Bird Populations, Petaluma, California, USA.

Dormann, C. F., J. Elith, S. Bacher, C. Buchmann, G. Carl, G. Carré, J. R. G. Marquéz, B. Gruber, B. Lafourcade, P. J. Leitão, T. Münkemüller, C. McClean, P. E. Osborne, B. Reineking, B. Schröder, A. K. Skidmore, D. Zurell, and S. Lautenbach. 2013. Collinearity: a review of methods to deal with it and a simulation study evaluating their performance. *Ecography* 36:27-46. https://doi.org/10.1111/j.1600-0587.2012.07348.x

Dunn, E. H., and C. J. Ralph. 2004. The use of mist nets as a tool for bird population monitoring. *Studies in Avian Biology* 29:1-6.

Eglington, S. M., R. Julliard, G. Gargallo, H. P. van der Jeugd, J. W. Pearce-Higgins, S. R. Baillie, and R. A. Robinson. 2015. Latitudinal gradients in the productivity of European migrant warblers have not shifted northwards during a period of climate change. *Global Ecology and Biogeography* 24:427-436. https://doi.org/10.1111/geb.12267

Faanes, C. A., and D. Bystrak. 1981. The role of observer bias in the North American Breeding Bird Survey. *Studies in Avian Biology* 6:353-359.

Francis, C. D. 2015. Vocal traits and diet explain avian sensitivities to anthropogenic noise. *Global Change Biology* 21:1809-1820. https://doi.org/10.1111/gcb.12862

Francis, C. D., C. P. Ortega, and A. Cruz. 2009. Noise pollution changes avian communities and species interactions. *Current Biology* 19:1415-1419. https://doi.org/10.1016/j.cub.2009.06.052

Francis, C. D., J. Paritsis, C. P. Ortega, and A. Cruz. 2011. Landscape patterns of avian habitat use and nest success are affected by chronic gas well compressor noise. *Landscape Ecology* 26:1269-1280. https://doi.org/10.1007/s10980-011-9609-z

Gill, S. A., J. R. Job, K. Myers, K. Naghshineh, and M. J. Vonhof. 2015. Toward a broader characterization of anthropogenic noise and its effects on wildlife. *Behavioral Ecology* 26:328-333. https://doi.org/10.1093/beheco/aru219

Goodwin, S. E., and W. G. Shriver. 2011. Effects of traffic noise on occupancy patterns of forest birds. *Conservation Biology* 25:406-411. https://doi.org/10.1111/j.1523-1739.2010.01602.x

Habib, L., E. M. Bayne, and S. Boutin. 2007. Chronic industrial noise affects pairing success and age structure of ovenbirds *Seiurus aurocapilla*. *Journal of Applied Ecology* 44:176-184. https://doi.org/10.1111/j.1365-2664.2006.01234.x

Haldane, J. B. S. 1956. The relation between density regulation and natural selection. *Proceedings of the Royal Society of London B: Biological Sciences* 145:306-308. https://doi.org/10.1098/rspb.1956.0039

Halfwerk, W., C. Both, and H. Slabbekoorn. 2016. Noise affects nest-box choice of 2 competing songbird species, but not their reproduction. *Behavioral Ecology* 27:1592-1600. https://doi.org/10.1093/beheco/arw095

Halfwerk, W., L. J. M. Holleman, C. M. Lessells, and H. Slabbekoorn. 2011. Negative impact of traffic noise on avian reproductive success. *Journal of Applied Ecology* 48:210-219. https://doi.org/10.1111/j.1365-2664.2010.01914.x

Halfwerk, W., and H. Slabbekoorn. 2009. A behavioural mechanism explaining noise-dependent frequency use in urban birdsong. *Animal Behaviour* 78:1301-1307. https://doi.org/10.1016/j.anbehav.2009.09.015

Hastie, T. J., and R. J. Tibshirani. 1990. *Generalized additive models.* Chapman & Hall/CRC Press, Boca Raton, Florida, USA.

Homer, C., J. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. Herold, J. Wickham, and K. Megown. 2015. Completion of the 2011 National land cover database for the conterminous United States - representing a decade of land cover change information. *Photogrammetric Engineering & Remote Sensing* 81:345-354.

Homer, C. H., J. A. Fry, and C. A. Barnes. 2012. *The National Land Cover Database, U.S. Geological Survey Fact Sheet 2012-3020.* U.S. Department of the Interior, Washington, D.C., USA.

Hu, Y., and G. C. Cardoso. 2009. Are bird species that vocalize at higher frequencies preadapted to inhabit noisy urban areas? *Behavioral Ecology* 20:1268-1273. https://doi.org/10.1093/beheco/arp131

Khan, I., S. U. Khan, M. Zhao, and A. A. Khan. 2019. Exploring the spatial heterogeneity of individual preferences for integrated river basin management: an example of Heihe river basin. *Environmental Science and Pollution Research* 26:6911-6921. https://doi.org/10.1007/s11356-019-04178-2

Kleist, N. J., R. P. Guralnick, A. Cruz, and C. D. Francis. 2017. Sound settlement: noise surpasses land cover in explaining breeding habitat selection of secondary cavity-nesting birds. *Ecological Applications* 27:260-273. https://doi.org/10.1002/eap.1437

McClure, C. J. W., A. C. Korte, J. A. Heath, and J. R. Barber. 2015. Pavement and riparian forest shape the bird community along an urban river corridor. *Global Ecology and Conservation* 4:291-310. https://doi.org/10.1016/j.gecco.2015.07.004

McClure, C. J. W., H. E. Ware, J. D. Carlisle, and J. R. Barber. 2017. Noise from a phantom road experiment alters the age structure of a community of migrating birds. *Animal Conservation* 20:164-172. https://doi.org/10.1111/acv.12302

McClure, C. J., H. E. Ware, J. Carlisle, G. Kaltenecker, and J. R. Barber. 2013. An experimental investigation into the effects of traffic noise on distributions of birds: avoiding the phantom road. *Proceedings of the Royal Society of London B: Biological Sciences* 280:20132290. https://doi.org/10.1098/rspb.2013.2290

McElreath, R. 2020. *Statistical rethinking: a Bayesian course with examples in R and Stan.* CRC Press/Taylor & Francis Group, Boca Raton, Florida, USA.

Meillère, A., F. Brischoux, C. Parenteau, and F. Angelier. 2015. Influence of urbanization on body size, condition, and physiology in an urban exploiter: a multi-component approach. *PLoS ONE* 10:e0135685. https://doi.org/10.1371/journal.pone.0135685

Melles, S., S. Glenn, and K. Martin. 2003. Urban bird diversity and landscape complexity: species-environment associations along a multiscale habitat gradient. *Conservation Ecology* 7(1):5. https://doi.org/10.5751/ES-00478-070105

Mennitt, D., K. Sherrill, and K. Fristrup. 2014. A geospatial model of ambient sound pressure levels in the contiguous United States. *Journal of the Acoustical Society of America* 135 (5):2746-2764. https://doi.org/10.1121/1.4870481

Moiron, M., C. González-Lagos, H. Slabbekoorn, and D. Sol. 2015. Singing in the city: high song frequencies are no guarantee for urban success in birds. *Behavioral Ecology* 26:843-850. https://doi.org/10.1093/beheco/arv026

Møller, A. P., and M. D. Jennions. 2001. Testing and adjusting for publication bias. *Trends in Ecology & Evolution* 16:580-586. https://doi.org/10.1016/S0169-5347(01)02235-2

Murdoch, W. W. 1994. Population regulation in theory and practice. *Ecology* 75:271-287. https://doi.org/10.2307/1939533

Piironen, J., M. Paasiniemi, A. Vehtari, J. Gabry, P.-C. Bürkner, and M. Colombo. 2019. *projpred: Projection predictive feature selection*. R package.

Piironen, J., and A. Vehtari. 2017. Sparsity information and regularization in the horseshoe and other shrinkage priors. *Electronic Journal of Statistics* 11:5018-5051. https://doi.org/10.1214/17-EJS1337SI

Proppe, D. S., C. B. Sturdy, and C. C. St Clair. 2013. Anthropogenic noise decreases urban songbird diversity and may contribute to homogenization. *Global Change Biology* 19:1075-1084. https://doi.org/10.1111/gcb.12098

Pulliam, H. R. 1988. Sources, sinks, and population regulation. *American Naturalist* 132:652-661. https://doi.org/10.1086/284880

R Core Team. 2019. *R: A language and environment for statistical computing.* R Foundation for Statistical Computing, Vienna, Austria. [online] URL: https://www.R-project.org/

Rahbek, C. 2005. The role of spatial scale and the perception of large-scale species-richness patterns. *Ecology Letters* 8:224-239. https://doi.org/10.1111/j.1461-0248.2004.00701.x

Reijnen, R., and R. Foppen. 1995. The effects of car traffic on breeding bird populations in woodland. IV. Influence of population size on the reduction of density close to a highway. *Journal of Applied Ecology* 32:481-491. https://doi.org/10.2307/2404646

Rushing, C. S., T. B. Ryder, and P. P. Marra. 2016. Quantifying drivers of population dynamics for a migratory bird throughout the annual cycle. *Proceedings of the Royal Society B: Biological Sciences* 283(1823):20152846. https://doi.org/10.1098/rspb.2015.2846

Sallabanks, R., E. B. Arnett, and J. M. Marzluff. 2000. An evaluation of research on the effects of timber harvest on bird populations. *Wildlife Society Bulletin (1973-2006)* 28:1144-1155.

Schoener, T. W. 1983. Field experiments on interspecific competition. *American Naturalist* 122:240-285. https://doi.org/10.1086/284133

Schroeder, J., S. Nakagawa, I. R. Cleasby, and T. Burke. 2012. Passerine birds breeding under chronic noise experience reduced fitness. *PLoS ONE* 7:e39200. https://doi.org/10.1371/journal.pone.0039200

Shannon, G., M. F. McKenna, L. M. Angeloni, K. R. Crooks, K. M. Fristrup, E. Brown, K. A. Warner, M. D. Nelson, C. White, J. Briggs, S. McFarland, and G. Wittemyer. 2016. A synthesis of two decades of research documenting the effects of noise on wildlife. *Biological Reviews* 91:982-1005. https://doi.org/10.1111/brv.12207

Sherry, T. W., and R. T. Holmes. 1988. Habitat selection by breeding American Redstarts in response to a dominant competitor, the Least Flycatcher. *Auk* 105:350-364. https://doi.org/10.2307/4087501

Simons, T. R., K. H. Pollock, J. M. Wettroth, M. W. Alldredge, K. Pacifici, and J. Brewster. 2009. Sources of measurement error, misclassification error, and bias in auditory avian point count data. Pages 237-254 *in* D. L. Thomson, E. G. Cooch, and M. J. Conroy, editors. *Modeling demographic processes in marked populations.* Springer, New York, New York, USA. https://doi.org/10.1007/978-0-387-78151-8_10

Slabbekoorn, H., and M. Peet. 2003. Ecology: birds sing at a higher pitch in urban noise. *Nature* 424:267. https://doi.org/10.1038/424267a

Van Horne, B. 1983. Density as a misleading indicator of habitat quality. *Journal of Wildlife Management* 47:893-901. https://doi.org/10.2307/3808148

Vehtari, A., A. Gelman, and J. S. Gabry. 2017. Practical Bayesian model evaluation using leave-one-out cross-validation and WAIC. *Statistics and Computing* 27:1413-1432. https://doi.org/10.1007/s11222-016-9696-4

Wood, S. N. 2011. Fast stable restricted maximum likelihood and marginal likelihood estimation of semiparametric generalized linear models. *Journal of the Royal Statistical Society (B)* 73 (1):3-36. https://doi.org/10.1111/j.1467-9868.2010.00749.x

Wood, S. N. 2017. *Generalized additive models: an introduction with R.* CRC Press/Taylor & Francis Group, Boca Raton, Florida, USA.

Yang, Z., X. Liu, M. Zhou, D. Ai, G. Wang, Y. Wang, C. Chu, and J. T. Lundholm. 2015. The effect of environmental heterogeneity on species richness depends on community position along the environmental gradient. *Scientific Reports* 5:15723. https://doi.org/10.1038/srep15723

Zuur, A. F., E. N. Ieno, N. Walker, A. A. Saveliev, and G. M. Smith. 2009. *Mixed effects models and extensions in ecology with R.* Springer Verlag, New York, New York, USA. https://doi.org/10.1007/978-0-387-87458-6

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Appendix 1 | Regional studies selected for continental comparisons

	Species	Demographic measure	Directional effect of noise
[1] Bayne et al. 2008, *Conservation Biology*	Ovenbird	Abundance	None
	Red-Eyed Vireo	Abundance	Negative
	Tennessee Warbler	Abundance	None
	White-Throated Sparrow	Abundance	Negative
	Yellow-rumped Warbler	Abundance	Negative
[2] Dietz et al. 2013, *The Wilson Journal of Ornithology*	White-crowned Sparrow	Productivity	Negative
[3] Forman et al. 2002, *Environmental Management*	Bobolink	Abundance, Productivity	Negative
	Easten Meadow Lark	Abundance, Productivity	Negative
[4] Francis et al. 2011, *Landscape Ecology*	Gray Flycatcher	Abundance, Productivity	Negative, Postive
	Western Scrub-Jay	Abundance	Negative
[5] Francis et al. 2011, *PloS One*	Black-headed Grosbeak	Abundance, Productivity	Negative
	Black-Chinned Hummingbird	Abundance, Productivity	Positive
	Bushtit	Abundance, Productivity	Positive
	Chipping Sparrow	Abundance, Productivity	Neutral
	House Finch	Abundance, Productivity	Positive
	Mourning Dove	Abundance, Productivity	Negative
	Western Tanager	Abundance, Productivity	Negative
[6] Goodwin and Shriver 2011, *Conservation Biology*	Acadian Flycatcher	Abundance	None
	Carolina Wren	Abundance	None
	Great Crested Flycatcher	Abundance	None
	Ovenbird	Abundance	None
	Scarlet Tanager	Abundance	None
	White Breasted Nuthatch	Abundance	Negative
	Wood Thrush	Abundance	None
	Yellow-Billed Cuckoo	Abundance	Negative
[7] Kight and Swaddle 2012, *Ecological Applications*	Eastern Bluebird	Productivity	Negative
[8] Lackey et al, 2012, *Ornithological Monographs*	Golden-Cheeked Warbler	Productivity	None
[9] McClure et al. 2013, *Proceedings of the Royal Society B*	American Robin	Abundance	Negative
	Cassin's Finch	Abundance	Positive
	Cassin's Vireo	Abundance	Negative
	Cedar Waxwing	Abundance	Negative
	Chipping Sparrow	Abundance	Negative
	Dark-eyed Junco	Abundance	Neutral
	Dusky Flycatcher	Abundance	Negative
	Evening Grosbeak	Abandance	Neutral
	Golden Crowned Kinglet	Abandance	Neutral
	Lazuli Bunting	Abundance	Neutral
	Macgillivray's Warbler	Abundance	Neutral
	Mountain Chickadee	Abundance	Negative
	Pine Sisken	Abundance	Neutral
	Red-Breasted Nuthatch	Abundance	Negative
	Ruby-Crowned Kinglet	Abundance	Negative
	Spotted Towhee	Abundance	Negative
	Townsend's Solitaire	Abundance	Neutral
	Townsend's Warbler	Abundance	Negative
	Western Tanager	Abundance	Negative
	White-crowned Sparrow	Abundance	Neutral
	Yellow Warbler	Abundance	Negative
	Yellow-rumped Warbler	Abundance	Neutral
[10] Meillere et al. 2015, *Biology Letters*	House Sparrow	Productivity	None
[11] Mulholland 2016 - Dissertation Cal Poly	Western Bluebird	Productivity	None
	Ash-throated Flycatcher	Productivity	Negative
[12] Proppe et al. 2013, *Global Change BiologyAppen*	Black-capped Chickadee	Abundance	None
	Least Flycatcher	Abundance	Negative
	Red-Breasted Nuthatch	Abundance	Negative
	Red-Eyed Vireo	Abundance	None
	Western Tanager	Abundance	Negative
	White-Throated Sparrow	Abundance	None
	Yellow Warbler	Abundance	None
[13] Schroeder et al. 2012, *Plos One*	House Sparrow	Productivity	Negative

† Superscripts correspond with notations in Table 1

Appendix 2 | Results from principal components analysis. Component names are deduced from up to three of the strongest contributors, which are bolded.

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9	PC10	PC11
Percent variance explained	20.08	11.75	10.78	9.22	8.15	7.49	7.46	6.84	6.37	6.02	5.85
Cumulative variance explained	20.08	31.83	42.60	51.82	59.97	67.47	74.92	81.77	88.14	94.15	100.00
Dominant terms	Development	Wetland	Shrub	Barren	Marsh	Grassland	Water	Urban	NA	NA	NA
Developed: Open/Low	**0.60**	-0.34	0.04	0.05	0.00	0.04	-0.03	**-0.72**	NA	NA	NA
Developed: Mid/High	**0.59**	-0.33	0.08	0.14	0.03	-0.10	-0.07	**0.61**	NA	NA	NA
Cultivated	0.19	0.20	-0.26	**-0.62**	-0.57	0.06	0.15	-0.04	NA	NA	NA
Water	0.17	**0.31**	-0.29	**0.44**	0.12	0.22	**0.71**	-0.03	NA	NA	NA
Wetlands	0.16	**0.51**	-0.30	0.04	**0.41**	-0.27	**-0.47**	-0.16	NA	NA	NA
Herbaceous	0.06	0.15	**0.46**	-0.24	**0.33**	**0.73**	-0.08	-0.01	NA	NA	NA
Barren	0.01	0.21	0.05	**0.55**	**-0.60**	**0.32**	-0.43	-0.01	NA	NA	NA
Shrubland	-0.10	0.16	**0.68**	0.13	-0.15	**-0.45**	0.22	-0.20	NA	NA	NA
Forest	**-0.44**	**-0.53**	-0.27	0.14	0.05	0.14	-0.04	-0.19	NA	NA	NA

Appendix 3:
Tables with best models for individual bird species

Note: Models for the Golden-cheeked Warbler (*Setophaga chrysoparia*) and Tennessee Warbler (*Leiothlypis peregrina*) could not be fitted, as stated in the main text.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.6054	0.3132	-8.3175	< 0.0001
Noise Standard Deviation	-0.0160	0.2096	-0.0762	0.9393
PC 1	-0.3465	0.2204	-1.5720	0.1162
PC 2	0.3556	0.1567	2.2696	0.0234
PC 3	0.0741	0.2932	0.2526	0.8006
PC 4	-0.1644	0.1642	-1.0011	0.3169
PC 5	0.0868	0.1801	0.4818	0.6300
PC 6	0.1050	0.3005	0.3495	0.7268
PC 7	0.2130	0.1528	1.3936	0.1637
PC 8	-0.8047	0.3873	-2.0775	0.0380
B. smooth terms	**edf**	**Ref.df**	**F-value**	**p-value**
Location Smooth	73.4369	249.0000	0.7489	< 0.0001
Year Smooth	0.0007	19.0000	0.0000	0.3630
Station Random Effect	0.0001	7.0000	0.0000	0.8370

Table A3.1: Best productivity model for the Acadian Flycatcher (*Empidonax virescens*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.8182	0.2129	-27.3236	< 0.0001
PC 1	0.1128	0.0926	1.2189	0.2230
PC 2	0.1211	0.1220	0.9933	0.3207
PC 3	-0.0489	0.2944	-0.1660	0.8682
PC 4	-0.1536	0.1439	-1.0678	0.2857
PC 5	0.3898	0.1645	2.3701	0.0179
PC 6	0.4306	0.2533	1.7002	0.0892
PC 7	-0.2547	0.1586	-1.6061	0.1084
PC 8	0.1965	0.1273	1.5433	0.1229
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	15.3216	19.0000	3580.1975	< 0.0001
Year Smooth	4.5580	7.0000	51.6030	0.0057
Station Random Effect	197.5729	257.0000	9.0390	< 0.0001

Table A3.2: Best abundance model for the Acadian Flycatcher (*Empidonax virescens*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.4605	0.4377	-12.4746	< 0.0001
PC 1	-0.0294	0.2727	-0.1077	0.9142
PC 2	-0.0476	0.3322	-0.1432	0.8861
PC 3	0.0263	0.3658	0.0719	0.9427
PC 4	0.2151	0.3093	0.6954	0.4869
PC 5	0.0735	0.3913	0.1877	0.8511
PC 6	-0.3887	0.3792	-1.0252	0.3054
PC 7	0.1133	0.3527	0.3211	0.7482
PC 8	0.0440	0.4541	0.0969	0.9228
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	140.6609	424.0000	0.5737	< 0.0001
Year Smooth	3.8026	19.0000	123.6690	0.0822
Station Random Effect	5.9106	7.0000	45.6381	0.0585

Table A3.3: Best productivity model for the American Goldfinch (*Spinus tristis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.3278	1.1690	-5.4131	< 0.0001
Noise Level	0.0231	0.0304	0.7576	0.4487
Noise Standard Deviation	-0.1615	0.1671	-0.9661	0.3341
PC 1	0.1727	0.0905	1.9072	0.0566
PC 2	0.2258	0.0794	2.8441	0.0045
PC 3	0.1506	0.1053	1.4303	0.1527
PC 4	-0.2066	0.0650	-3.1805	0.0015
PC 5	-0.2447	0.0804	-3.0427	0.0024
PC 6	0.1136	0.0906	1.2540	0.2099
PC 7	0.1356	0.0775	1.7487	0.0804
PC 8	-0.0539	0.1058	-0.5090	0.6108
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	12.4968	19.0000	5169.9010	< 0.0001
Year Smooth	5.9262	7.0000	522.0755	< 0.0001
Station Random Effect	346.3808	429.0000	12.5333	< 0.0001

Table A3.4: Best abundance model for the American Goldfinch (*Spinus tristis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	1.2183	1.9011	0.6409	0.5218
Noise Level	-0.0803	0.0504	-1.5927	0.1115
PC 1	0.0304	0.1688	0.1798	0.8573
PC 2	-0.2137	0.1107	-1.9302	0.0539
PC 3	-0.0203	0.2268	-0.0894	0.9288
PC 4	0.0264	0.1167	0.2266	0.8208
PC 5	0.1184	0.1434	0.8254	0.4093
PC 6	0.0006	0.2495	0.0026	0.9980
PC 7	0.1096	0.1290	0.8493	0.3959
PC 8	0.2311	0.2448	0.9441	0.3453
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	71.3130	258.0000	1.0426	< 0.0001
Year Smooth	1.8607	19.0000	3.1724	0.0631
Station Random Effect	1.7293	7.0000	1.5247	0.1378

Table A3.5: Best productivity model for the American Redstart (*Setophaga ruticilla*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.3482	1.8305	-1.8291	0.0675
Noise Level	-0.0957	0.0473	-2.0216	0.0433
Noise Standard Deviation	0.5576	0.2594	2.1497	0.0317
PC 1	0.1551	0.1573	0.9858	0.3243
PC 2	-0.2293	0.1199	-1.9119	0.0560
PC 3	-0.6612	0.2301	-2.8731	0.0041
PC 4	0.1547	0.1257	1.2312	0.2184
PC 5	0.1730	0.1550	1.1163	0.2644
PC 6	0.4227	0.2245	1.8828	0.0599
PC 7	-0.2754	0.1356	-2.0310	0.0424
PC 8	0.2093	0.2234	0.9371	0.3488
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	10.8871	19.0000	2557.0681	0.0058
Year Smooth	5.2537	7.0000	103.8002	< 0.0001
Station Random Effect	206.6827	272.0000	10.3051	< 0.0001

Table A3.6: Best abundance model for the American Redstart (*Setophaga ruticilla*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.3731	0.7286	-4.6295	< 0.0001
Noise Level	0.0522	0.0198	2.6306	0.0086
PC 1	0.0379	0.0598	0.6334	0.5265
PC 2	0.1401	0.0452	3.1016	0.0019
PC 3	0.1095	0.0592	1.8503	0.0644
PC 4	-0.0127	0.0456	-0.2794	0.7800
PC 5	-0.0606	0.0562	-1.0773	0.2814
PC 6	-0.1283	0.0659	-1.9467	0.0517
PC 7	0.0903	0.0556	1.6227	0.1047
PC 8	-0.0481	0.0726	-0.6617	0.5082
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	307.6078	607.0000	2.6698	< 0.0001
Year Smooth	5.4690	19.0000	38.4965	0.0348
Station Random Effect	5.9820	7.0000	12.3412	0.0361

Table A3.7: Best productivity model for the American Robin (*Turdus migratorius*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.7230	0.7946	-7.2026	< 0.0001
Noise Level	0.0116	0.0214	0.5419	0.5879
PC 1	0.2202	0.0614	3.5828	0.0003
PC 2	0.0123	0.0441	0.2795	0.7799
PC 3	-0.1303	0.0568	-2.2952	0.0218
PC 4	-0.0652	0.0447	-1.4590	0.1446
PC 5	-0.0957	0.0548	-1.7483	0.0805
PC 6	-0.0219	0.0604	-0.3631	0.7166
PC 7	-0.0199	0.0550	-0.3614	0.7178
PC 8	-0.0849	0.0679	-1.2495	0.2115
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	14.5356	19.0000	4729.4167	< 0.0001
Year Smooth	5.6922	7.0000	173.0054	< 0.0001
Station Random Effect	506.6956	637.0000	8.5346	< 0.0001

Table A3.8: Best abundance model for the American Robin (*Turdus migratorius*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.6963	0.3776	-7.1402	< 0.0001
PC 1	0.2097	0.1791	1.1706	0.2422
PC 2	0.1713	0.1998	0.8576	0.3915
PC 3	0.0040	0.1332	0.0300	0.9761
PC 4	0.1157	0.1138	1.0166	0.3098
PC 5	0.0110	0.1121	0.0984	0.9216
PC 6	-0.0816	0.1243	-0.6560	0.5121
PC 7	0.1390	0.1792	0.7754	0.4384
PC 8	0.0549	0.2342	0.2345	0.8147
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	55.3676	148.0000	0.8702	< 0.0001
Year Smooth	0.0004	19.0000	0.0000	0.7308
Station Random Effect	5.6358	7.0000	5.3877	0.0392

Table A3.9: Best productivity model for the Ash-throated Flycatcher (*Myiarchus cinerascens*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.0511	0.2915	-20.7570	< 0.0001
Noise Standard Deviation	-0.2026	0.1934	-1.0479	0.2949
PC 1	-0.0118	0.1203	-0.0977	0.9222
PC 2	0.0609	0.1425	0.4274	0.6692
PC 3	0.2494	0.0919	2.7154	0.0067
PC 4	-0.2344	0.0870	-2.6949	0.0072
PC 5	-0.2046	0.0829	-2.4669	0.0138
PC 6	-0.0044	0.0863	-0.0510	0.9593
PC 7	-0.0768	0.1312	-0.5855	0.5583
PC 8	0.1848	0.1605	1.1513	0.2499
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	11.8523	19.0000	74.0664	0.3836
Year Smooth	2.1086	7.0000	1.6268	0.3635
Station Random Effect	101.8911	149.0000	3.6268	< 0.0001

Table A3.10: Best abundance model for the Ash-throated Flycatcher (*Myiarchus cinerascens*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.3428	0.3130	-4.2896	< 0.0001
PC 1	0.2268	0.4113	0.5516	0.5813
PC 2	-0.0367	0.2851	-0.1287	0.8976
PC 3	0.0756	0.2027	0.3729	0.7093
PC 4	0.2694	0.3561	0.7567	0.4494
PC 5	0.3612	0.3212	1.1242	0.2611
PC 6	0.1017	0.3067	0.3318	0.7401
PC 7	-0.0366	0.4325	-0.0847	0.9325
PC 8	0.9056	0.9846	0.9198	0.3579
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	68.1433	194.0000	2.3328	< 0.0001
Year Smooth	5.3469	19.0000	14.1368	0.3694
Station Random Effect	4.8053	7.0000	13.1307	< 0.0001

Table A3.11: Best productivity model for the Audubon's Warbler (*Setophaga coronata auduboni*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.1749	0.2760	-22.3736	< 0.0001
Noise Standard Deviation	0.4229	0.2122	1.9927	0.0464
PC 1	-0.5592	0.2361	-2.3685	0.0180
PC 2	-0.1569	0.1680	-0.9338	0.3505
PC 3	-0.1914	0.1223	-1.5657	0.1176
PC 4	-0.0749	0.1790	-0.4182	0.6759
PC 5	0.0359	0.1686	0.2127	0.8316
PC 6	-0.0379	0.1834	-0.2066	0.8364
PC 7	-0.2844	0.2367	-1.2014	0.2297
PC 8	-0.0390	0.4898	-0.0797	0.9365
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	11.1191	19.0000	1767.6669	0.0016
Year Smooth	4.6043	7.0000	43.4057	< 0.0001
Station Random Effect	153.7531	194.0000	9.1552	< 0.0001

Table A3.12: Best abundance model for the Audubon's Warbler (*Setophaga coronata auduboni*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.1873	0.1012	-1.8505	0.0644
Noise Standard Deviation	-0.1769	0.0955	-1.8513	0.0643
PC 1	0.0603	0.0326	1.8484	0.0647
PC 2	0.0271	0.0412	0.6575	0.5109
PC 3	-0.0277	0.0577	-0.4809	0.6306
PC 4	-0.0650	0.0420	-1.5469	0.1221
PC 5	0.0127	0.0532	0.2380	0.8119
PC 6	0.0837	0.0574	1.4574	0.1452
PC 7	0.0056	0.0478	0.1162	0.9075
PC 8	-0.0227	0.0593	-0.3826	0.7021
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	134.6444	331.0000	1.4308	< 0.0001
Year Smooth	10.0831	19.0000	29.4261	< 0.0001
Station Random Effect	0.0014	7.0000	0.0001	0.4870

Table A3.13: Best productivity model for the Black-capped Chickadee (*Poecile atricapillus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-7.0465	0.9919	-7.1038	< 0.0001
Noise Level	0.0459	0.0265	1.7322	0.0834
PC 1	0.1359	0.0690	1.9702	0.0489
PC 2	0.1119	0.0572	1.9558	0.0506
PC 3	0.0096	0.0848	0.1127	0.9103
PC 4	-0.0772	0.0541	-1.4276	0.1535
PC 5	-0.0352	0.0683	-0.5153	0.6064
PC 6	-0.1204	0.0831	-1.4481	0.1477
PC 7	-0.0249	0.0648	-0.3835	0.7014
PC 8	-0.0127	0.0788	-0.1608	0.8722
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	14.9680	19.0000	1042.2007	< 0.0001
Year Smooth	3.9038	7.0000	82.2930	< 0.0001
Station Random Effect	263.4399	347.0000	5.5480	< 0.0001

Table A3.14: Best abundance model for the Black-capped Chickadee (*Poecile atricapillus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.0586	0.2002	-10.2847	< 0.0001
PC 1	0.1545	0.1100	1.4040	0.1610
PC 2	-0.0253	0.1437	-0.1761	0.8603
PC 3	0.2652	0.1041	2.5482	0.0112
PC 4	0.1897	0.1373	1.3816	0.1678
PC 5	0.2162	0.1295	1.6702	0.0956
PC 6	-0.0167	0.1118	-0.1495	0.8813
PC 7	0.0870	0.1916	0.4541	0.6500
PC 8	0.0482	0.1754	0.2750	0.7834
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	22.5160	128.0000	0.2599	0.0055
Year Smooth	5.1232	19.0000	2.5231	0.0019
Station Random Effect	5.4445	7.0000	5.2407	0.0003

Table A3.15: Best productivity model for the Black-chinned Hummingbird (*Archilochus alexandri*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-7.9847	1.4577	-5.4776	< 0.0001
Noise Level	0.0304	0.0397	0.7672	0.4431
PC 1	0.2863	0.1425	2.0089	0.0448
PC 2	0.2334	0.1387	1.6829	0.0927
PC 3	0.1414	0.0996	1.4192	0.1561
PC 4	-0.1509	0.1103	-1.3677	0.1717
PC 5	-0.0919	0.1092	-0.8417	0.4001
PC 6	-0.0481	0.1066	-0.4508	0.6522
PC 7	0.1518	0.1583	0.9591	0.3377
PC 8	-0.0054	0.1736	-0.0308	0.9754
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	10.8660	19.0000	112.8999	0.0027
Year Smooth	4.6568	7.0000	17.6253	< 0.0001
Station Random Effect	88.4969	149.0000	2.7157	< 0.0001

Table A3.16: Best abundance model for the Black-chinned Hummingbird (*Archilochus alexandri*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	0.0423	0.0894	0.4730	0.6363
PC 1	0.0561	0.0451	1.2436	0.2139
PC 2	0.0448	0.0516	0.8679	0.3856
PC 3	-0.0146	0.0411	-0.3546	0.7229
PC 4	0.0441	0.0350	1.2601	0.2079
PC 5	0.0546	0.0373	1.4617	0.1441
PC 6	0.0223	0.0360	0.6182	0.5366
PC 7	-0.0719	0.0438	-1.6422	0.1008
PC 8	-0.0918	0.0578	-1.5899	0.1121
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	75.8113	222.0000	0.8799	< 0.0001
Year Smooth	8.3592	19.0000	10.7069	0.0001
Station Random Effect	0.0011	7.0000	0.0000	0.7215

Table A3.17: Best productivity model for the Bewick's Wren (*Thryomanes bewickii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-7.2381	1.1159	-6.4866	< 0.0001
Noise Level	0.0359	0.0301	1.1924	0.2333
PC 1	0.4829	0.0991	4.8717	< 0.0001
PC 2	0.5611	0.0878	6.3939	< 0.0001
PC 3	0.2051	0.0771	2.6583	0.0079
PC 4	-0.1392	0.0735	-1.8942	0.0584
PC 5	0.0286	0.0767	0.3729	0.7093
PC 6	-0.0979	0.0751	-1.3047	0.1922
PC 7	0.0060	0.0996	0.0604	0.9518
PC 8	-0.2243	0.0961	-2.3336	0.0197
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.6171	19.0000	1291.7416	0.0064
Year Smooth	6.3564	7.0000	50.2081	0.0035
Station Random Effect	190.2886	246.0000	6.3088	< 0.0001

Table A3.18: Best abundance model for the Bewick's Wren (*Thryomanes bewickii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.5978	1.2746	-2.8225	0.0048
Noise Level	0.0402	0.0365	1.1031	0.2701
Noise Standard Deviation	0.2941	0.1724	1.7056	0.0883
PC 1	0.0092	0.1225	0.0749	0.9403
PC 2	-0.1386	0.0977	-1.4193	0.1560
PC 3	0.1209	0.0854	1.4161	0.1569
PC 4	-0.0382	0.1013	-0.3772	0.7061
PC 5	0.0696	0.1125	0.6189	0.5361
PC 6	-0.0656	0.1016	-0.6455	0.5187
PC 7	0.0146	0.1505	0.0972	0.9226
PC 8	0.0552	0.2425	0.2278	0.8199
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	147.4505	336.0000	1.8884	< 0.0001
Year Smooth	8.7913	19.0000	126.5078	0.0001
Station Random Effect	4.3344	7.0000	9.6514	0.0044

Table A3.19: Best productivity model for the Black-headed Grosbeak (*Pheucticus melanocephalus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.6345	0.1587	-35.5058	< 0.0001
Noise Standard Deviation	0.2087	0.1492	1.3990	0.1619
PC 1	-0.0236	0.0786	-0.3004	0.7639
PC 2	0.2273	0.0807	2.8155	0.0049
PC 3	0.1081	0.0697	1.5498	0.1213
PC 4	-0.2049	0.0787	-2.6021	0.0093
PC 5	-0.0296	0.0858	-0.3443	0.7306
PC 6	-0.0164	0.0811	-0.2020	0.8399
PC 7	-0.0212	0.1187	-0.1786	0.8583
PC 8	-0.2684	0.1986	-1.3511	0.1768
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	5.6946	19.0000	501.6604	0.0354
Year Smooth	4.9862	7.0000	49.4116	0.0001
Station Random Effect	284.4565	339.0000	9.7032	< 0.0001

Table A3.20: Best abundance model for the Black-headed Grosbeak (*Pheucticus melanocephalus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	241.9885	849.1624	0.2850	0.7767
PC 1	5.8962	78.0746	0.0755	0.9401
PC 2	344.0676	731.9009	0.4701	0.6400
PC 3	760.4124	1812.7817	0.4195	0.6764
PC 4	85.5022	247.2369	0.3458	0.7307
PC 5	-172.8094	414.9852	-0.4164	0.6786
PC 6	-493.8407	1187.9236	-0.4157	0.6792
PC 7	224.7659	536.4689	0.4190	0.6768
PC 8	-83.1538	179.9530	-0.4621	0.6458
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	2.6753	11.0000	0.5260	0.0573
Year Smooth	0.0000	12.0000	0.0000	1.0000
Station Random Effect	2.4670	7.0000	1.5394	0.0150

Table A3.21: Best productivity model for the Bobolink (*Dolichonyx oryzivorus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-61.6408	17.3759	-3.5475	0.0006
Noise Level	0.3970	0.1865	2.1292	0.0356
PC 1	5.3710	3.4004	1.5795	0.1173
PC 2	-9.9407	4.4909	-2.2135	0.0291
PC 3	-45.2715	17.1151	-2.6451	0.0094
PC 4	-8.3728	2.7242	-3.0736	0.0027
PC 5	9.7500	3.4113	2.8581	0.0052
PC 6	31.3942	11.9804	2.6205	0.0101
PC 7	-14.0158	5.6204	-2.4937	0.0142
PC 8	-0.6568	2.4184	-0.2716	0.7865
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0000	15.0000	0.0000	0.1009
Year Smooth	1.3381	7.0000	1.6193	0.0006
Station Random Effect	0.0124	13.0000	0.0014	0.1532

Table A3.22: Best abundance model for the Bobolink (*Dolichonyx oryzivorus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.1415	0.0832	-1.7000	0.0896
PC 1	0.0873	0.0407	2.1454	0.0322
PC 2	0.0783	0.0504	1.5531	0.1208
PC 3	-0.0572	0.0469	-1.2189	0.2233
PC 4	-0.0488	0.0395	-1.2353	0.2171
PC 5	0.1060	0.0424	2.5017	0.0126
PC 6	0.0787	0.0449	1.7538	0.0799
PC 7	0.0210	0.0512	0.4099	0.6820
PC 8	0.0278	0.0525	0.5301	0.5962
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	37.7975	191.0000	0.3895	< 0.0001
Year Smooth	5.2956	19.0000	8.3461	< 0.0001
Station Random Effect	4.5758	7.0000	4.6005	0.0131

Table A3.23: Best productivity model for the Bushtit (*Psaltriparus minimus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.3768	1.1303	-7.4112	< 0.0001
Noise Level	0.0684	0.0312	2.1926	0.0285
Noise Standard Deviation	-0.1036	0.1795	-0.5771	0.5640
PC 1	0.2336	0.0989	2.3619	0.0183
PC 2	0.2296	0.0892	2.5735	0.0102
PC 3	0.1533	0.0858	1.7868	0.0742
PC 4	-0.0796	0.0813	-0.9792	0.3276
PC 5	-0.0371	0.0870	-0.4261	0.6701
PC 6	-0.1292	0.0919	-1.4053	0.1601
PC 7	-0.2308	0.1139	-2.0263	0.0429
PC 8	-0.2197	0.1025	-2.1446	0.0321
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	9.3771	19.0000	78.1211	0.0150
Year Smooth	2.9076	7.0000	23.0472	0.0002
Station Random Effect	136.9324	205.0000	3.3576	< 0.0001

Table A3.24: Best abundance model for the Bushtit (*Psaltriparus minimus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.4361	1.2832	-2.6777	0.0077
Noise Standard Deviation	-0.2245	0.4662	-0.4816	0.6303
PC 1	-0.4102	0.5143	-0.7975	0.4256
PC 2	-1.2898	0.8106	-1.5912	0.1123
PC 3	0.3199	0.6629	0.4825	0.6297
PC 4	-2.8095	2.0674	-1.3589	0.1749
PC 5	3.5520	1.9252	1.8451	0.0657
PC 6	-2.0730	1.0577	-1.9599	0.0507
PC 7	0.5724	1.7781	0.3219	0.7477
PC 8	-0.7182	1.3832	-0.5192	0.6039
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	26.5768	80.0000	0.5908	0.0020
Year Smooth	0.0004	19.0000	0.0000	0.9825
Station Random Effect	4.5409	7.0000	4.2274	0.0158

Table A3.25: Best productivity model for the Cassin's Finch (*Haemorhous cassinii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.5465	0.3422	-19.1321	< 0.0001
PC 1	0.3351	0.3712	0.9029	0.3668
PC 2	-0.4436	0.3098	-1.4322	0.1524
PC 3	0.0436	0.2310	0.1887	0.8504
PC 4	-0.0458	0.5648	-0.0811	0.9354
PC 5	0.7401	0.5583	1.3257	0.1852
PC 6	-0.5035	0.3503	-1.4374	0.1509
PC 7	0.2221	0.5686	0.3906	0.6962
PC 8	0.0186	0.9722	0.0192	0.9847
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	8.8941	19.0000	119.6817	0.0174
Year Smooth	3.9498	7.0000	3.5014	0.0035
Station Random Effect	56.9732	85.0000	3.5740	< 0.0001

Table A3.26: Best abundance model for the Cassin's Finch (*Haemorhous cassinii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.5683	0.7437	-2.1088	0.0351
Noise Level	0.0286	0.0184	1.5566	0.1197
Noise Standard Deviation	-0.1584	0.1130	-1.4025	0.1609
PC 1	-0.1938	0.0690	-2.8063	0.0051
PC 2	0.0139	0.0563	0.2473	0.8047
PC 3	-0.0697	0.0882	-0.7905	0.4293
PC 4	-0.0126	0.0642	-0.1957	0.8449
PC 5	-0.0067	0.0732	-0.0915	0.9271
PC 6	0.0965	0.0782	1.2348	0.2170
PC 7	-0.0973	0.0654	-1.4867	0.1373
PC 8	-0.2501	0.1030	-2.4289	0.0152
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	143.4443	332.0000	1.3249	< 0.0001
Year Smooth	5.5145	19.0000	10.3885	0.0025
Station Random Effect	1.6470	7.0000	3.2895	0.0063

Table A3.27: Best productivity model for the Carolina Wren (*Thryothorus ludovicianus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.5026	0.9000	-9.4472	< 0.0001
Noise Level	0.0759	0.0225	3.3729	0.0008
PC 1	0.1038	0.0711	1.4595	0.1445
PC 2	0.1131	0.0638	1.7725	0.0764
PC 3	-0.3183	0.1162	-2.7392	0.0062
PC 4	0.0567	0.0807	0.7021	0.4827
PC 5	-0.0184	0.0918	-0.2007	0.8410
PC 6	0.1792	0.0943	1.9001	0.0575
PC 7	-0.0515	0.0828	-0.6225	0.5336
PC 8	-0.1126	0.0824	-1.3665	0.1719
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	12.2227	19.0000	1506.1239	< 0.0001
Year Smooth	5.6918	7.0000	78.4667	< 0.0001
Station Random Effect	264.6517	366.0000	3.9928	< 0.0001

Table A3.28: Best abundance model for the Carolina Wren (*Thryothorus ludovicianus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	2.8389	5.7203	0.4963	0.6199
Noise Level	-0.2942	0.1374	-2.1417	0.0327
Noise Standard Deviation	0.8211	0.3571	2.2995	0.0219
PC 1	-7.2553	5.6719	-1.2792	0.2014
PC 2	3.5619	3.2105	1.1095	0.2677
PC 3	-1.1850	0.8750	-1.3543	0.1762
PC 4	-1.7115	1.3297	-1.2872	0.1986
PC 5	0.9505	0.6820	1.3937	0.1640
PC 6	1.3344	1.3052	1.0224	0.3071
PC 7	1.0495	0.8561	1.2259	0.2208
PC 8	-11.5740	7.4724	-1.5489	0.1220
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	41.7476	129.0000	0.9929	< 0.0001
Year Smooth	6.3003	19.0000	15.8998	0.1600
Station Random Effect	1.6528	7.0000	0.5214	0.2043

Table A3.29: Best productivity model for the Cassin's Vireo (*Vireo cassinii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-4.5487	2.9299	-1.5525	0.1208
Noise Level	-0.0706	0.0829	-0.8514	0.3947
PC 1	-0.1157	0.3035	-0.3811	0.7032
PC 2	-0.0338	0.1952	-0.1730	0.8627
PC 3	0.1723	0.1649	1.0450	0.2962
PC 4	-0.1234	0.1968	-0.6270	0.5308
PC 5	-0.0202	0.1998	-0.1012	0.9194
PC 6	-0.1801	0.1815	-0.9919	0.3214
PC 7	-0.4093	0.2960	-1.3827	0.1670
PC 8	-0.4566	0.5082	-0.8984	0.3691
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	4.3253	19.0000	75.2618	0.3160
Year Smooth	4.0510	7.0000	10.2045	0.0001
Station Random Effect	116.4088	146.0000	8.2133	< 0.0001

Table A3.30: Best abundance model for the Cassin's Vireo (*Vireo cassinii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.2426	3.5839	-1.7419	0.0818
Noise Level	0.0548	0.0945	0.5805	0.5617
Noise Standard Deviation	0.1575	0.5742	0.2742	0.7840
PC 1	-0.2935	0.3832	-0.7661	0.4438
PC 2	0.1534	0.2735	0.5608	0.5751
PC 3	0.1695	0.2980	0.5689	0.5696
PC 4	-0.0470	0.2094	-0.2244	0.8225
PC 5	-0.0233	0.2797	-0.0834	0.9335
PC 6	0.2029	0.3428	0.5920	0.5540
PC 7	0.0556	0.2467	0.2254	0.8217
PC 8	-0.0624	0.6243	-0.0999	0.9204
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	108.8276	284.0000	0.7956	< 0.0001
Year Smooth	0.0023	19.0000	0.0001	0.6026
Station Random Effect	4.3043	7.0000	18.0158	0.0956

Table A3.31: Best productivity model for the Cedar Waxwing (*Bombycilla cedrorum*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.8835	1.5092	-4.5611	< 0.0001
Noise Level	0.0238	0.0403	0.5897	0.5555
Noise Standard Deviation	0.0436	0.2136	0.2040	0.8384
PC 1	0.0630	0.1181	0.5334	0.5938
PC 2	0.2728	0.0891	3.0608	0.0022
PC 3	0.0504	0.1270	0.3968	0.6915
PC 4	-0.0523	0.0798	-0.6554	0.5122
PC 5	0.0511	0.1046	0.4888	0.6250
PC 6	0.1410	0.1343	1.0505	0.2936
PC 7	-0.0541	0.0955	-0.5664	0.5712
PC 8	0.1476	0.1469	1.0048	0.3151
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	10.8692	19.0000	1070.3742	0.0004
Year Smooth	3.9320	7.0000	99.4260	< 0.0001
Station Random Effect	210.4918	284.0000	5.6006	< 0.0001

Table A3.32: Best abundance model for the Cedar Waxwing (*Bombycilla cedrorum*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.8152	0.2633	-6.8932	< 0.0001
Noise Standard Deviation	0.1101	0.2096	0.5254	0.5994
PC 1	-0.0261	0.2181	-0.1199	0.9046
PC 2	-0.0327	0.1599	-0.2044	0.8381
PC 3	0.1414	0.1017	1.3897	0.1649
PC 4	-0.2262	0.1461	-1.5488	0.1217
PC 5	0.0685	0.1453	0.4714	0.6374
PC 6	0.0753	0.1499	0.5024	0.6155
PC 7	0.0026	0.1784	0.0144	0.9885
PC 8	-0.2438	0.3749	-0.6503	0.5156
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	100.3499	294.0000	0.8624	< 0.0001
Year Smooth	0.0004	19.0000	0.0000	1.0000
Station Random Effect	4.3460	7.0000	3.9805	0.2584

Table A3.33: Best productivity model for the Chipping Sparrow (*Spizella passerina*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-4.7767	1.5386	-3.1046	0.0019
Noise Level	-0.0579	0.0429	-1.3494	0.1773
Noise Standard Deviation	0.3523	0.2037	1.7300	0.0837
PC 1	-0.2199	0.1844	-1.1927	0.2331
PC 2	-0.0508	0.1343	-0.3781	0.7054
PC 3	0.1205	0.1154	1.0443	0.2964
PC 4	-0.0663	0.1164	-0.5701	0.5687
PC 5	0.0493	0.1218	0.4050	0.6855
PC 6	0.2667	0.1381	1.9313	0.0535
PC 7	0.1031	0.1516	0.6798	0.4967
PC 8	0.0634	0.3245	0.1954	0.8451
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	3.3000	19.0000	115.5005	0.1835
Year Smooth	4.8780	7.0000	74.0300	< 0.0001
Station Random Effect	245.6036	313.0000	8.5210	< 0.0001

Table A3.34: Best abundance model for the Chipping Sparrow (*Spizella passerina*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.5023	0.0509	-29.4905	< 0.0001
PC 1	0.0427	0.0407	1.0482	0.2946
PC 2	0.1201	0.0435	2.7610	0.0058
PC 3	-0.0597	0.0625	-0.9556	0.3394
PC 4	-0.0039	0.0370	-0.1054	0.9161
PC 5	0.0259	0.0424	0.6108	0.5414
PC 6	0.0029	0.0570	0.0502	0.9600
PC 7	-0.0647	0.0397	-1.6290	0.1034
PC 8	0.0182	0.0779	0.2337	0.8153
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	196.4300	589.0000	1.4030	< 0.0001
Year Smooth	12.8385	19.0000	264.7959	< 0.0001
Station Random Effect	4.6787	7.0000	2.8846	0.3412

Table A3.35: Best productivity model for the Common Yellowthroat (*Geothlypis trichas*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.2324	1.0356	-6.0180	< 0.0001
Noise Level	0.0246	0.0270	0.9116	0.3620
PC 1	0.0881	0.0835	1.0550	0.2915
PC 2	0.2965	0.0707	4.1941	< 0.0001
PC 3	0.0797	0.0954	0.8361	0.4031
PC 4	-0.0710	0.0613	-1.1594	0.2464
PC 5	-0.0701	0.0697	-1.0066	0.3142
PC 6	0.0306	0.0833	0.3680	0.7129
PC 7	0.0382	0.0683	0.5594	0.5759
PC 8	0.0919	0.1089	0.8436	0.3989
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.1816	19.0000	30975.2207	< 0.0001
Year Smooth	6.1323	7.0000	1614.8061	< 0.0001
Station Random Effect	513.7181	608.0000	17.2780	< 0.0001

Table A3.36: Best abundance model for the Common Yellowthroat (*Geothlypis trichas*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	0.8116	1.4555	0.5576	0.5772
Noise Level	-0.0396	0.0415	-0.9546	0.3399
PC 1	0.1964	0.1807	1.0869	0.2773
PC 2	-0.1623	0.1507	-1.0765	0.2819
PC 3	0.0534	0.1206	0.4427	0.6581
PC 4	-0.4297	0.2722	-1.5785	0.1147
PC 5	0.5889	0.3240	1.8173	0.0694
PC 6	-0.3108	0.1999	-1.5544	0.1203
PC 7	0.7529	0.2551	2.9508	0.0032
PC 8	0.1370	0.3321	0.4126	0.6799
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	87.3808	166.0000	4.8069	< 0.0001
Year Smooth	1.5232	19.0000	13.5513	0.0592
Station Random Effect	4.1431	7.0000	10.0300	0.0002

Table A3.37: Best productivity model for the Dark-eyed Junco (*Junco hyemalis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.5723	0.1962	-28.4078	< 0.0001
PC 1	-0.6625	0.2017	-3.2848	0.0010
PC 2	-0.5440	0.1931	-2.8164	0.0049
PC 3	-0.2985	0.1707	-1.7484	0.0805
PC 4	-0.3588	0.2853	-1.2576	0.2087
PC 5	0.5446	0.3487	1.5619	0.1185
PC 6	-0.5210	0.2387	-2.1829	0.0292
PC 7	-0.4009	0.3236	-1.2390	0.2155
PC 8	-0.1320	0.4350	-0.3034	0.7616
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	8.7611	19.0000	8632.7063	0.0007
Year Smooth	4.1625	7.0000	80.8565	< 0.0001
Station Random Effect	148.2819	186.0000	12.8068	< 0.0001

Table A3.38: Best abundance model for the Dark-eyed Junco (*Junco hyemalis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.1962	2.4734	-0.4836	0.6288
Noise Level	-0.0416	0.0727	-0.5717	0.5677
PC 1	-0.2133	0.4730	-0.4509	0.6521
PC 2	0.0129	0.3045	0.0424	0.9662
PC 3	-0.1553	0.1713	-0.9063	0.3650
PC 4	0.1478	0.3015	0.4902	0.6241
PC 5	0.3208	0.2524	1.2708	0.2041
PC 6	0.2181	0.2133	1.0224	0.3068
PC 7	-0.0591	0.3036	-0.1948	0.8456
PC 8	-0.4577	0.8653	-0.5290	0.5969
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	46.6119	174.0000	0.7285	< 0.0001
Year Smooth	0.0019	19.0000	0.0001	0.6193
Station Random Effect	0.0012	7.0000	0.0001	0.5061

Table A3.39: Best productivity model for the Dusky Flycatcher (*Empidonax oberholseri*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.6109	2.3117	-1.5620	0.1185
Noise Level	-0.0735	0.0673	-1.0925	0.2748
PC 1	-0.2475	0.2661	-0.9302	0.3524
PC 2	-0.2639	0.2016	-1.3090	0.1907
PC 3	0.1465	0.1503	0.9742	0.3301
PC 4	-0.0026	0.2111	-0.0123	0.9902
PC 5	-0.0516	0.1823	-0.2830	0.7772
PC 6	-0.1897	0.1919	-0.9887	0.3230
PC 7	-0.0185	0.3109	-0.0595	0.9526
PC 8	0.0709	0.5260	0.1348	0.8928
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	6.1217	19.0000	760.8768	0.1128
Year Smooth	1.7281	7.0000	6.9451	0.0008
Station Random Effect	140.6265	176.0000	10.7241	< 0.0001

Table A3.40: Best abundance model for the Dusky Flycatcher (*Empidonax oberholseri*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	0.2517	0.3271	0.7695	0.4422
Noise Standard Deviation	-0.7839	0.3766	-2.0813	0.0382
PC 1	-0.0791	0.2787	-0.2836	0.7769
PC 2	0.1828	0.2052	0.8909	0.3737
PC 3	0.2305	0.1362	1.6927	0.0915
PC 4	0.1135	0.1688	0.6724	0.5019
PC 5	-0.0620	0.2204	-0.2811	0.7788
PC 6	0.0085	0.1727	0.0491	0.9608
PC 7	0.0381	0.1481	0.2571	0.7972
PC 8	-0.2513	0.4443	-0.5656	0.5721
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	38.6779	122.0000	0.8640	< 0.0001
Year Smooth	0.0002	19.0000	0.0000	0.7764
Station Random Effect	1.4025	7.0000	1.1520	0.0644

Table A3.41: Best productivity model for the Eastern Bluebird (*Sialia sialis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.9718	0.3563	-19.5662	< 0.0001
Noise Standard Deviation	-0.2963	0.3573	-0.8293	0.4071
PC 1	0.2960	0.3056	0.9684	0.3331
PC 2	0.0955	0.2236	0.4272	0.6693
PC 3	0.1264	0.1811	0.6981	0.4852
PC 4	0.0292	0.2249	0.1298	0.8968
PC 5	-0.1168	0.2707	-0.4315	0.6662
PC 6	0.1156	0.2161	0.5351	0.5927
PC 7	0.0696	0.1939	0.3588	0.7198
PC 8	0.0447	0.4955	0.0903	0.9281
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0003	19.0000	0.0000	0.7622
Year Smooth	5.3904	7.0000	14.8540	0.0085
Station Random Effect	100.6254	142.0000	2.8797	< 0.0001

Table A3.42: Best abundance model for the Eastern Bluebird (*Sialia sialis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2972.7913	61676288.1524	-0.0000	1.0000
Noise Level	0.6374	0.4846	1.3155	0.1903
Noise Standard Deviation	-0.2319	0.9485	-0.2445	0.8072
PC 1	572.0390	12277144.3986	0.0000	1.0000
PC 2	-819.1095	17366174.7207	-0.0000	1.0000
PC 3	-3322.2675	69808776.8317	-0.0000	1.0000
PC 4	-523.2120	10931472.7711	-0.0000	1.0000
PC 5	649.8152	13670888.4804	0.0000	1.0000
PC 6	2331.5805	48967916.2447	0.0000	1.0000
PC 7	-1097.7646	23107693.2602	-0.0000	1.0000
PC 8	220.6682	4913826.2778	0.0000	1.0000
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0000	15.0000	0.0000	0.1222
Year Smooth	0.0000	7.0000	0.0000	0.5340
Station Random Effect	3.3106	15.0000	0.4425	0.0327

Table A3.43: Best abundance model for the Eastern Meadowlark (*Sturnella magna*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.5060	9.8321	-0.8651	0.3879
Noise Level	0.2070	0.2235	0.9263	0.3553
Noise Standard Deviation	-0.4910	0.8288	-0.5925	0.5542
PC 1	1.7284	11.8125	0.1463	0.8838
PC 2	-1.2648	6.7869	-0.1864	0.8523
PC 3	0.4197	1.8143	0.2313	0.8173
PC 4	-1.2980	2.8948	-0.4484	0.6543
PC 5	2.3741	2.1446	1.1070	0.2695
PC 6	-1.3798	3.0971	-0.4455	0.6564
PC 7	0.7407	1.8055	0.4102	0.6820
PC 8	3.5497	16.8204	0.2110	0.8331
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.4441	58.0000	0.6277	< 0.0001
Year Smooth	0.0001	19.0000	0.0000	0.6218
Station Random Effect	0.0000	7.0000	0.0000	1.0000

Table A3.44: Best productivity model for the Evening Grosbeak (*Coccothraustes vespertinus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-7.6580	6.5219	-1.1742	0.2406
Noise Standard Deviation	0.4699	0.5605	0.8384	0.4020
PC 1	0.5929	11.8231	0.0502	0.9600
PC 2	-1.2578	6.7572	-0.1861	0.8524
PC 3	0.5714	1.7883	0.3195	0.7494
PC 4	0.5402	2.5070	0.2155	0.8294
PC 5	-0.1425	1.1389	-0.1251	0.9005
PC 6	-0.1953	2.8658	-0.0681	0.9457
PC 7	-0.3825	1.4461	-0.2645	0.7914
PC 8	2.1182	15.8795	0.1334	0.8939
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0012	19.0000	0.0000	0.8365
Year Smooth	5.5842	7.0000	19.4798	< 0.0001
Station Random Effect	45.5433	61.0000	7.7654	< 0.0001

Table A3.45: Best abundance model for the Evening Grosbeak (*Coccothraustes vespertinus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.9585	1.6813	-3.5441	0.0004
Noise Standard Deviation	1.0216	1.7252	0.5922	0.5539
PC 1	-0.1685	0.8455	-0.1994	0.8420
PC 2	0.2537	0.8307	0.3054	0.7602
PC 3	0.2254	0.8466	0.2663	0.7901
PC 4	-0.1467	1.1013	-0.1332	0.8941
PC 5	0.3846	1.2851	0.2993	0.7648
PC 6	-0.3905	0.9912	-0.3939	0.6937
PC 7	0.5423	0.9002	0.6024	0.5471
PC 8	-0.6178	1.7002	-0.3634	0.7164
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	105.2900	261.0000	0.3022	0.9917
Year Smooth	0.0000	19.0000	0.0000	1.0000
Station Random Effect	6.6562	7.0000	81.8866	0.3197

Table A3.46: Best productivity model for the Great Crested Flycatcher (*Myiarchus crinitus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.1106	1.2350	-4.1380	< 0.0001
Noise Level	-0.0479	0.0312	-1.5329	0.1254
PC 1	0.2517	0.0895	2.8107	0.0050
PC 2	0.1454	0.0793	1.8343	0.0667
PC 3	0.0631	0.1375	0.4586	0.6466
PC 4	0.1091	0.1016	1.0736	0.2831
PC 5	-0.1393	0.1155	-1.2063	0.2278
PC 6	0.2013	0.1049	1.9191	0.0551
PC 7	-0.0392	0.0920	-0.4256	0.6704
PC 8	0.0139	0.0942	0.1479	0.8824
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	10.8623	19.0000	77.0680	< 0.0001
Year Smooth	0.0008	7.0000	0.0000	0.8331
Station Random Effect	168.0046	272.0000	2.2700	< 0.0001

Table A3.47: Best abundance model for the Great Crested Flycatcher (*Myiarchus crinitus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.8355	0.4623	-1.8073	0.0712
PC 1	-1.0513	0.4999	-2.1030	0.0359
PC 2	0.2179	0.4007	0.5437	0.5868
PC 3	0.1258	0.3140	0.4008	0.6887
PC 4	0.0010	0.4563	0.0021	0.9983
PC 5	-0.5405	0.5340	-1.0122	0.3119
PC 6	-0.3590	0.4527	-0.7931	0.4280
PC 7	0.9127	0.3654	2.4978	0.0128
PC 8	-1.8630	0.8824	-2.1112	0.0352
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	46.1816	117.0000	2.5648	< 0.0001
Year Smooth	2.1210	19.0000	3.1654	0.2438
Station Random Effect	4.2618	7.0000	9.2539	< 0.0001

Table A3.48: Best productivity model for the Golden-crowned Kinglet (*Regulus satrapa*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-7.4683	0.4529	-16.4884	< 0.0001
Noise Standard Deviation	0.6425	0.3475	1.8487	0.0647
PC 1	0.1183	0.4118	0.2872	0.7740
PC 2	-0.2743	0.2894	-0.9478	0.3434
PC 3	-0.2361	0.2720	-0.8678	0.3856
PC 4	0.2053	0.3143	0.6531	0.5137
PC 5	-0.1312	0.3391	-0.3871	0.6988
PC 6	-0.3887	0.3549	-1.0953	0.2735
PC 7	0.0019	0.2724	0.0068	0.9946
PC 8	-0.0088	0.8371	-0.0105	0.9917
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.8307	19.0000	1354.6830	0.0002
Year Smooth	4.3945	7.0000	7.4189	< 0.0001
Station Random Effect	94.9795	138.0000	6.5432	< 0.0001

Table A3.49: Best abundance model for the Golden-crowned Kinglet (*Regulus satrapa*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.6069	0.1368	-11.7450	< 0.0001
Noise Standard Deviation	0.1922	0.1211	1.5878	0.1125
PC 1	0.0843	0.0409	2.0608	0.0395
PC 2	0.0379	0.0532	0.7128	0.4761
PC 3	0.1388	0.0935	1.4839	0.1380
PC 4	-0.1065	0.0608	-1.7516	0.0800
PC 5	0.0308	0.0736	0.4187	0.6755
PC 6	0.0095	0.0794	0.1201	0.9044
PC 7	0.0947	0.0653	1.4502	0.1472
PC 8	-0.0617	0.0615	-1.0023	0.3163
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	166.4613	387.0000	2.8805	< 0.0001
Year Smooth	4.8990	19.0000	68.1787	0.0146
Station Random Effect	1.1626	7.0000	4.1632	0.0679

Table A3.50: Best productivity model for the Gray Catbird (*Dumetella carolinensis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-4.9919	0.1876	-26.6020	< 0.0001
Noise Standard Deviation	0.2173	0.1823	1.1921	0.2333
PC 1	0.2967	0.0649	4.5699	< 0.0001
PC 2	0.2130	0.0840	2.5353	0.0113
PC 3	0.2540	0.1321	1.9231	0.0546
PC 4	-0.3250	0.1004	-3.2363	0.0012
PC 5	0.0183	0.1166	0.1567	0.8755
PC 6	0.0631	0.1229	0.5131	0.6079
PC 7	0.2366	0.1015	2.3312	0.0198
PC 8	-0.0015	0.1095	-0.0133	0.9894
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	14.8522	19.0000	33031.6034	< 0.0001
Year Smooth	5.0077	7.0000	482.4494	< 0.0001
Station Random Effect	324.9407	395.0000	16.5162	< 0.0001

Table A3.51: Best abundance model for the Gray Catbird (*Dumetella carolinensis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1977.5077	28085588.9940	-0.0001	0.9999
Noise Level	0.0949	0.2724	0.3485	0.7281
Noise Standard Deviation	-0.7480	2.4219	-0.3088	0.7580
PC 1	-3472.4891	49450410.5066	-0.0001	0.9999
PC 2	1944.1071	27692425.1635	0.0001	0.9999
PC 3	-527.1750	7516880.1482	-0.0001	0.9999
PC 4	-763.5831	10891359.2795	-0.0001	0.9999
PC 5	-169.3485	2431859.7519	-0.0001	0.9999
PC 6	753.8032	10724774.1527	0.0001	0.9999
PC 7	416.7894	5941793.3038	0.0001	0.9999
PC 8	-4472.2331	63707666.5731	-0.0001	0.9999
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0000	32.0000	0.0000	0.6983
Year Smooth	3.8706	19.0000	1.0754	0.0001
Station Random Effect	1.9745	7.0000	0.4765	0.1707

Table A3.52: Best productivity model for the Gray Flycatcher (*Empidonax wrightii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-4.0092	3.5361	-1.1338	0.2574
Noise Level	-0.1243	0.1169	-1.0628	0.2884
Noise Standard Deviation	0.4627	0.8058	0.5743	0.5660
PC 1	-1.2021	1.1739	-1.0241	0.3063
PC 2	0.7951	1.0198	0.7796	0.4360
PC 3	-0.2671	0.5958	-0.4482	0.6542
PC 4	-0.1850	0.7343	-0.2519	0.8012
PC 5	0.2691	0.3217	0.8366	0.4032
PC 6	0.5565	0.6093	0.9132	0.3615
PC 7	0.1474	1.2433	0.1185	0.9057
PC 8	-1.0044	2.1619	-0.4646	0.6424
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	1.6134	19.0000	4.4547	0.0597
Year Smooth	3.1822	7.0000	0.7765	0.2196
Station Random Effect	23.8302	40.0000	1.9369	< 0.0001

Table A3.53: Best abundance model for the Gray Flycatcher (*Empidonax wrightii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	0.1298	5.6856	0.0228	0.9818
Noise Level	-0.1256	0.1498	-0.8386	0.4019
Noise Standard Deviation	0.1106	0.4053	0.2729	0.7850
PC 1	-2.1137	3.6469	-0.5796	0.5624
PC 2	0.0757	2.0637	0.0367	0.9707
PC 3	-0.3813	0.6068	-0.6284	0.5299
PC 4	-2.1069	1.1642	-1.8098	0.0707
PC 5	1.1211	0.9213	1.2168	0.2240
PC 6	-0.7511	0.9705	-0.7739	0.4392
PC 7	0.0779	0.9792	0.0795	0.9366
PC 8	-2.7226	4.9174	-0.5537	0.5800
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	60.8421	140.0000	2.9254	< 0.0001
Year Smooth	0.0010	19.0000	0.0000	0.6960
Station Random Effect	4.6296	7.0000	3.7084	0.0869

Table A3.54: Best productivity model for the Hammond's Flycatcher (*Empidonax hammondii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.9246	0.3218	-21.5211	< 0.0001
Noise Standard Deviation	0.4976	0.2575	1.9326	0.0534
PC 1	-0.3397	0.2443	-1.3902	0.1647
PC 2	0.0202	0.2074	0.0974	0.9224
PC 3	0.0730	0.1684	0.4337	0.6646
PC 4	-0.0409	0.2405	-0.1699	0.8651
PC 5	0.2038	0.2243	0.9088	0.3636
PC 6	-0.2940	0.2196	-1.3393	0.1807
PC 7	-0.4467	0.2960	-1.5090	0.1315
PC 8	-0.0996	0.7208	-0.1381	0.8902
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	5.6307	19.0000	400.2779	0.0002
Year Smooth	3.6186	7.0000	15.0644	< 0.0001
Station Random Effect	113.6663	148.0000	5.3190	< 0.0001

Table A3.55: Best abundance model for the Hammond's Flycatcher (*Empidonax hammondii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	0.9433	2.2089	0.4270	0.6695
Noise Level	-0.0787	0.0633	-1.2437	0.2139
PC 1	0.0470	0.2470	0.1903	0.8491
PC 2	-0.0225	0.1757	-0.1281	0.8981
PC 3	-0.1219	0.1571	-0.7757	0.4381
PC 4	-0.0738	0.1858	-0.3970	0.6915
PC 5	0.1731	0.1884	0.9188	0.3584
PC 6	0.2305	0.2121	1.0872	0.2772
PC 7	0.0991	0.1490	0.6653	0.5060
PC 8	-0.5199	0.4613	-1.1270	0.2600
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	74.9000	228.0000	0.7392	< 0.0001
Year Smooth	5.5922	19.0000	14.0722	< 0.0001
Station Random Effect	0.5521	7.0000	0.3357	0.1795

Table A3.56: Best productivity model for the Hermit Thrush (*Catharus guttatus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.2609	2.3848	-1.3674	0.1716
Noise Level	-0.0987	0.0695	-1.4201	0.1557
Noise Standard Deviation	0.0391	0.2822	0.1386	0.8898
PC 1	-0.0687	0.1905	-0.3608	0.7183
PC 2	-0.2417	0.1421	-1.7006	0.0892
PC 3	-0.1177	0.1603	-0.7340	0.4630
PC 4	0.0703	0.1787	0.3934	0.6941
PC 5	0.2639	0.1813	1.4552	0.1457
PC 6	0.1892	0.2241	0.8444	0.3985
PC 7	0.0329	0.1522	0.2164	0.8287
PC 8	0.1984	0.3752	0.5288	0.5970
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	12.7934	19.0000	1578.6367	0.0011
Year Smooth	2.2617	7.0000	2.9104	0.2369
Station Random Effect	187.8392	246.0000	5.6911	< 0.0001

Table A3.57: Best abundance model for the Hermit Thrush (*Catharus guttatus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.5561	0.2440	-2.2795	0.0230
Noise Standard Deviation	0.1813	0.1829	0.9913	0.3219
PC 1	0.1246	0.0901	1.3827	0.1673
PC 2	0.0048	0.1022	0.0471	0.9624
PC 3	0.0016	0.0735	0.0220	0.9824
PC 4	-0.0255	0.0839	-0.3036	0.7615
PC 5	0.1793	0.1035	1.7324	0.0837
PC 6	0.0014	0.0853	0.0160	0.9872
PC 7	-0.0172	0.1098	-0.1568	0.8755
PC 8	0.0120	0.0833	0.1442	0.8854
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	90.3872	205.0000	2.4188	< 0.0001
Year Smooth	0.0003	19.0000	0.0000	1.0000
Station Random Effect	0.0004	7.0000	0.0000	0.4120

Table A3.58: Best productivity model for the House Finch (*Haemorhous mexicanus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.2585	1.2772	-6.4661	< 0.0001
Noise Level	0.0280	0.0339	0.8242	0.4100
PC 1	0.5837	0.1257	4.6437	< 0.0001
PC 2	0.5201	0.1254	4.1463	< 0.0001
PC 3	0.3322	0.1084	3.0647	0.0022
PC 4	-0.3046	0.0916	-3.3241	0.0009
PC 5	-0.1073	0.1076	-0.9975	0.3187
PC 6	-0.2256	0.1072	-2.1058	0.0354
PC 7	0.0384	0.1265	0.3031	0.7618
PC 8	0.1939	0.1135	1.7093	0.0876
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	2.8036	19.0000	113.1749	0.0066
Year Smooth	5.9394	7.0000	537.7151	< 0.0001
Station Random Effect	182.5558	241.0000	9.0364	< 0.0001

Table A3.59: Best abundance model for the House Finch (*Haemorhous mexicanus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.0424	0.7859	-2.5988	0.0106
Noise Standard Deviation	0.5559	0.5273	1.0543	0.2940
PC 1	0.0535	0.2703	0.1979	0.8434
PC 2	-0.1928	0.3423	-0.5632	0.5744
PC 3	0.1696	0.3159	0.5370	0.5923
PC 4	-0.3313	0.2649	-1.2508	0.2136
PC 5	-0.0790	0.3750	-0.2105	0.8336
PC 6	0.3095	0.4779	0.6477	0.5185
PC 7	0.1313	0.4711	0.2788	0.7809
PC 8	0.0263	0.1794	0.1465	0.8838
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.7906	57.0000	0.6624	0.0001
Year Smooth	0.0000	19.0000	0.0000	0.9938
Station Random Effect	0.8481	7.0000	2.2571	0.0424

Table A3.60: Best productivity model for the House Sparrow (*Passer domesticus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.0697	0.4143	-19.4800	< 0.0001
PC 1	0.5308	0.2067	2.5679	0.0105
PC 2	0.1055	0.2475	0.4263	0.6700
PC 3	0.1046	0.2567	0.4076	0.6837
PC 4	-0.2542	0.1970	-1.2899	0.1976
PC 5	-0.3191	0.2798	-1.1406	0.2545
PC 6	0.0170	0.3882	0.0437	0.9651
PC 7	0.1143	0.2529	0.4520	0.6514
PC 8	0.0721	0.1753	0.4113	0.6810
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0004	19.0000	0.0000	0.5679
Year Smooth	4.6763	7.0000	11.5020	0.3038
Station Random Effect	53.2272	68.0000	5.6859	< 0.0001

Table A3.61: Best abundance model for the House Sparrow (*Passer domesticus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.5330	0.6730	-2.2780	0.0229
Noise Level	0.0187	0.0180	1.0394	0.2988
PC 1	0.0431	0.0780	0.5526	0.5806
PC 2	0.1531	0.0602	2.5432	0.0111
PC 3	0.0110	0.0479	0.2305	0.8178
PC 4	-0.0050	0.0574	-0.0864	0.9312
PC 5	0.0251	0.0652	0.3857	0.6998
PC 6	0.0195	0.0534	0.3652	0.7151
PC 7	-0.0982	0.0648	-1.5167	0.1296
PC 8	-0.2473	0.1217	-2.0315	0.0424
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	120.6938	315.0000	2.0014	< 0.0001
Year Smooth	4.1641	19.0000	14.2159	0.0194
Station Random Effect	0.3552	7.0000	0.2239	0.2448

Table A3.62: Best productivity model for the House Wren (*Troglodytes aedon*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.1583	0.1244	-49.4988	< 0.0001
PC 1	0.0993	0.0990	1.0034	0.3157
PC 2	0.3390	0.1050	3.2289	0.0013
PC 3	0.0610	0.1026	0.5945	0.5522
PC 4	-0.3261	0.0990	-3.2938	0.0010
PC 5	0.0850	0.1179	0.7213	0.4708
PC 6	0.0681	0.1068	0.6374	0.5239
PC 7	0.2232	0.1156	1.9301	0.0537
PC 8	-0.1306	0.1841	-0.7094	0.4781
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	10.8154	19.0000	2972.3615	0.1970
Year Smooth	3.2325	7.0000	286.4170	0.0001
Station Random Effect	311.4291	390.0000	8.3659	< 0.0001

Table A3.63: Best abundance model for the House Wren (*Troglodytes aedon*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.7423	0.2196	-12.4869	< 0.0001
Noise Standard Deviation	0.0490	0.1887	0.2598	0.7950
PC 1	-0.1292	0.0981	-1.3171	0.1880
PC 2	-0.2683	0.1099	-2.4412	0.0147
PC 3	-0.0924	0.2116	-0.4370	0.6622
PC 4	-0.1370	0.1468	-0.9332	0.3508
PC 5	0.2497	0.1630	1.5319	0.1257
PC 6	-0.0749	0.1659	-0.4516	0.6516
PC 7	0.1195	0.1449	0.8247	0.4096
PC 8	-0.0430	0.1871	-0.2299	0.8182
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	107.6952	369.0000	0.5919	< 0.0001
Year Smooth	9.8512	19.0000	18.9718	< 0.0001
Station Random Effect	5.5957	7.0000	7.8887	0.0003

Table A3.64: Best productivity model for the Indigo Bunting (*Passerina cyanea*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.5185	0.1761	-31.3297	< 0.0001
Noise Standard Deviation	0.1192	0.1742	0.6843	0.4938
PC 1	0.0187	0.0767	0.2435	0.8076
PC 2	0.0157	0.0872	0.1803	0.8570
PC 3	-0.2282	0.1514	-1.5071	0.1319
PC 4	-0.2115	0.1112	-1.9011	0.0574
PC 5	0.1016	0.1254	0.8102	0.4179
PC 6	-0.0829	0.1255	-0.6601	0.5092
PC 7	0.1133	0.1102	1.0277	0.3042
PC 8	-0.1573	0.1607	-0.9794	0.3275
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	12.8156	19.0000	1544.5176	< 0.0001
Year Smooth	5.4171	7.0000	92.1541	< 0.0001
Station Random Effect	286.0567	375.0000	7.1383	< 0.0001

Table A3.65: Best abundance model for the Indigo Bunting (*Passerina cyanea*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.3337	0.2439	-9.5674	< 0.0001
Noise Standard Deviation	0.2320	0.2097	1.1062	0.2689
PC 1	-0.0647	0.1247	-0.5187	0.6041
PC 2	-0.2385	0.1379	-1.7301	0.0840
PC 3	0.1044	0.1086	0.9608	0.3369
PC 4	-0.1672	0.1370	-1.2204	0.2226
PC 5	0.0203	0.1211	0.1678	0.8668
PC 6	-0.2486	0.1264	-1.9672	0.0495
PC 7	-0.0961	0.2321	-0.4141	0.6789
PC 8	0.1147	0.3511	0.3268	0.7439
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	87.1417	227.0000	1.3944	< 0.0001
Year Smooth	1.6605	19.0000	40.5738	0.0028
Station Random Effect	1.0217	7.0000	1.0753	0.1250

Table A3.66: Best productivity model for the Lazuli Bunting (*Passerina amoena*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.3314	0.1365	-46.3813	< 0.0001
PC 1	-0.0590	0.1349	-0.4373	0.6619
PC 2	0.0489	0.1271	0.3845	0.7006
PC 3	0.3363	0.1030	3.2660	0.0011
PC 4	-0.3855	0.1126	-3.4232	0.0006
PC 5	-0.2219	0.1112	-1.9961	0.0461
PC 6	0.0010	0.1165	0.0087	0.9931
PC 7	-0.0655	0.1697	-0.3862	0.6994
PC 8	-0.0264	0.3594	-0.0734	0.9415
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	4.3696	19.0000	140.3974	0.3490
Year Smooth	5.5901	7.0000	23.2137	< 0.0001
Station Random Effect	185.1872	241.0000	6.8078	< 0.0001

Table A3.67: Best abundance model for the Lazuli Bunting (*Passerina amoena*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.2694	0.3490	-6.5023	< 0.0001
PC 1	-0.3451	0.3151	-1.0953	0.2743
PC 2	-0.0407	0.2848	-0.1430	0.8864
PC 3	-0.4802	0.3868	-1.2414	0.2154
PC 4	-0.1933	0.4095	-0.4720	0.6373
PC 5	0.3802	0.5136	0.7403	0.4597
PC 6	0.2687	0.4565	0.5886	0.5566
PC 7	-0.3132	0.3524	-0.8889	0.3747
PC 8	1.0459	0.8352	1.2523	0.2114
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	20.0315	106.0000	0.2732	0.0210
Year Smooth	1.6296	19.0000	0.4901	0.1358
Station Random Effect	4.3473	7.0000	3.0040	0.0356

Table A3.68: Best productivity model for the Least Flycatcher (*Empidonax minimus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.9064	2.8208	-1.0303	0.3031
Noise Level	-0.1091	0.0761	-1.4350	0.1516
PC 1	0.2488	0.2502	0.9945	0.3202
PC 2	-0.0537	0.1917	-0.2803	0.7793
PC 3	-0.3773	0.2491	-1.5148	0.1302
PC 4	-0.3562	0.2706	-1.3167	0.1883
PC 5	0.3116	0.3411	0.9136	0.3612
PC 6	0.1126	0.2722	0.4136	0.6793
PC 7	0.0645	0.2303	0.2803	0.7793
PC 8	-0.1474	0.3758	-0.3923	0.6949
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	9.5493	19.0000	150.9727	0.0008
Year Smooth	5.0032	7.0000	5.2464	0.0826
Station Random Effect	69.0704	110.0000	3.0388	< 0.0001

Table A3.69: Best abundance model for the Least Flycatcher (*Empidonax minimus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	2.0993	1.7615	1.1918	0.2337
Noise Level	-0.1194	0.0523	-2.2848	0.0226
PC 1	0.0441	0.2126	0.2074	0.8358
PC 2	-0.5771	0.3461	-1.6671	0.0959
PC 3	0.3960	0.3094	1.2799	0.2010
PC 4	-0.6791	0.5604	-1.2118	0.2260
PC 5	0.1924	0.3465	0.5552	0.5789
PC 6	-0.2579	0.3171	-0.8132	0.4164
PC 7	-0.5691	0.8415	-0.6762	0.4991
PC 8	-0.2408	0.4057	-0.5936	0.5530
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	23.9046	108.0000	0.8536	< 0.0001
Year Smooth	1.8226	19.0000	4.2375	0.0080
Station Random Effect	1.7810	7.0000	0.8392	0.0747

Table A3.70: Best productivity model for the Lincoln's Sparrow (*Melospiza lincolnii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.9772	4.1559	-0.9570	0.3387
Noise Level	-0.0577	0.1210	-0.4766	0.6337
PC 1	-0.1414	0.4788	-0.2953	0.7678
PC 2	-0.6071	0.3437	-1.7663	0.0776
PC 3	-0.4235	0.2472	-1.7131	0.0869
PC 4	-0.3325	0.5196	-0.6399	0.5224
PC 5	-0.2118	0.6579	-0.3219	0.7476
PC 6	-0.1298	0.4122	-0.3148	0.7530
PC 7	-0.2470	0.5941	-0.4159	0.6776
PC 8	0.9012	0.9793	0.9203	0.3576
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	11.5120	19.0000	22262.5235	0.0008
Year Smooth	4.4842	7.0000	10.3767	0.2003
Station Random Effect	96.0500	125.0000	13.6719	< 0.0001

Table A3.71: Best abundance model for the Lincoln's Sparrow (*Melospiza lincolnii*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.6233	0.8939	-1.8159	0.0708
PC 1	-1.6246	0.7460	-2.1778	0.0306
PC 2	1.2203	0.3738	3.2643	0.0013
PC 3	1.4342	0.7702	1.8622	0.0640
PC 4	-0.4467	0.4311	-1.0361	0.3014
PC 5	0.6230	0.4799	1.2983	0.1956
PC 6	0.6847	1.0861	0.6304	0.5291
PC 7	0.2566	0.3685	0.6964	0.4869
PC 8	0.1637	1.5808	0.1036	0.9176
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	4.0766	54.0000	0.1329	0.0458
Year Smooth	1.7566	19.0000	0.7422	0.0062
Station Random Effect	3.8855	7.0000	1.4187	0.0590

Table A3.72: Best productivity model for the Magnolia Warbler (*Setophaga magnolia*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.6439	3.7065	-0.7133	0.4761
Noise Level	-0.1013	0.0948	-1.0688	0.2858
PC 1	-0.2503	0.2888	-0.8668	0.3866
PC 2	0.0027	0.2894	0.0094	0.9925
PC 3	-0.5147	0.7755	-0.6638	0.5072
PC 4	0.5345	0.4447	1.2019	0.2301
PC 5	-0.1516	0.5564	-0.2725	0.7853
PC 6	-0.7959	1.1051	-0.7201	0.4718
PC 7	-0.0731	0.3160	-0.2312	0.8173
PC 8	0.1135	0.3072	0.3695	0.7120
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	1.7185	19.0000	46.4217	0.0031
Year Smooth	3.4054	7.0000	18.7662	0.0313
Station Random Effect	38.2189	54.0000	5.3567	< 0.0001

Table A3.73: Best abundance model for the Magnolia Warbler (*Setophaga magnolia*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.2028	1.2425	-2.5778	0.0100
Noise Level	0.0464	0.0355	1.3076	0.1912
PC 1	-0.3785	0.2541	-1.4898	0.1365
PC 2	0.2489	0.1590	1.5659	0.1176
PC 3	-0.0588	0.0908	-0.6478	0.5172
PC 4	-0.0616	0.1297	-0.4749	0.6349
PC 5	0.1151	0.1410	0.8167	0.4142
PC 6	0.2146	0.1396	1.5379	0.1242
PC 7	0.0982	0.1634	0.6013	0.5477
PC 8	-0.4226	0.4379	-0.9650	0.3347
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	95.4481	254.0000	1.9754	< 0.0001
Year Smooth	11.2501	19.0000	132.8603	0.0250
Station Random Effect	0.9349	7.0000	4.0141	0.0003

Table A3.74: Best productivity model for the MacGillivray's Warbler (*Geothlypis tolmiei*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.5341	0.2119	-26.1164	< 0.0001
Noise Standard Deviation	0.1247	0.1764	0.7068	0.4797
PC 1	-0.7184	0.1583	-4.5397	< 0.0001
PC 2	-0.3905	0.1243	-3.1409	0.0017
PC 3	-0.0336	0.0943	-0.3564	0.7215
PC 4	-0.0484	0.1219	-0.3973	0.6912
PC 5	-0.0852	0.1303	-0.6539	0.5132
PC 6	-0.1409	0.1398	-1.0080	0.3135
PC 7	0.0196	0.1689	0.1160	0.9077
PC 8	-0.4244	0.3861	-1.0993	0.2718
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.6829	19.0000	5475.7041	0.1054
Year Smooth	4.1927	7.0000	158.7050	< 0.0001
Station Random Effect	199.3198	257.0000	15.4350	< 0.0001

Table A3.75: Best abundance model for the MacGillivray's Warbler (*Geothlypis tolmiei*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.7497	0.2831	-2.6483	0.0083
PC 1	0.3468	0.1514	2.2899	0.0223
PC 2	-0.3001	0.2130	-1.4091	0.1592
PC 3	0.2052	0.1488	1.3791	0.1683
PC 4	-0.0665	0.5083	-0.1309	0.8959
PC 5	1.1355	0.5224	2.1735	0.0301
PC 6	-0.4434	0.2977	-1.4897	0.1367
PC 7	0.1979	0.4598	0.4304	0.6670
PC 8	0.2352	0.4055	0.5800	0.5621
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	17.6297	114.0000	0.2361	0.0157
Year Smooth	1.8575	19.0000	1.6164	0.0006
Station Random Effect	4.6064	7.0000	1.6495	0.0492

Table A3.76: Best productivity model for the Mountain Chickadee (*Poecile gambeli*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.6374	0.3523	-18.8427	< 0.0001
Noise Standard Deviation	0.2769	0.2246	1.2332	0.2177
PC 1	-0.2667	0.2993	-0.8911	0.3730
PC 2	-0.3780	0.2282	-1.6566	0.0978
PC 3	-0.0223	0.1657	-0.1344	0.8931
PC 4	-0.7567	0.4173	-1.8130	0.0701
PC 5	1.4532	0.4285	3.3914	0.0007
PC 6	-0.2529	0.2700	-0.9365	0.3492
PC 7	0.8012	0.3800	2.1085	0.0352
PC 8	-0.7984	0.7932	-1.0065	0.3144
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.2785	19.0000	307.3745	0.0032
Year Smooth	5.0776	7.0000	8.0810	0.0001
Station Random Effect	80.1339	124.0000	4.4030	< 0.0001

Table A3.77: Best abundance model for the Mountain Chickadee (*Poecile gambeli*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.5032	0.6954	-5.0379	< 0.0001
PC 1	-0.0045	0.3807	-0.0117	0.9907
PC 2	-0.2250	0.4977	-0.4520	0.6517
PC 3	-0.4373	0.5352	-0.8171	0.4147
PC 4	0.3907	0.3887	1.0053	0.3158
PC 5	-0.5794	0.5082	-1.1402	0.2554
PC 6	-0.2315	0.6992	-0.3311	0.7409
PC 7	0.5587	0.4443	1.2577	0.2098
PC 8	-0.1948	0.9280	-0.2099	0.8339
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	68.1619	161.0000	0.4253	0.4342
Year Smooth	1.4339	19.0000	10.6970	0.4666
Station Random Effect	3.2982	7.0000	41.3259	0.2773

Table A3.78: Best productivity model for the Mourning Dove (*Zenaida macroura*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.1137	0.1307	-62.1015	< 0.0001
PC 1	0.2782	0.0776	3.5825	0.0003
PC 2	0.0808	0.0919	0.8789	0.3796
PC 3	0.1124	0.0802	1.4003	0.1616
PC 4	-0.0049	0.0781	-0.0633	0.9496
PC 5	-0.0553	0.0896	-0.6174	0.5371
PC 6	-0.0596	0.0967	-0.6160	0.5380
PC 7	-0.0044	0.0980	-0.0451	0.9641
PC 8	-0.1109	0.1559	-0.7109	0.4772
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.8477	19.0000	0.3361	0.3323
Year Smooth	4.2480	7.0000	4.3005	0.0981
Station Random Effect	117.8810	208.0000	1.4896	< 0.0001

Table A3.79: Best abundance model for the Mourning Dove (*Zenaida macroura*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	58.6599	22.1184	2.6521	0.0088
Noise Level	-1.8245	0.6696	-2.7248	0.0072
Noise Standard Deviation	4.5938	1.6340	2.8114	0.0056
PC 1	3.1338	1.5265	2.0530	0.0418
PC 2	0.2659	0.8654	0.3072	0.7591
PC 3	-1.3325	3.0434	-0.4378	0.6621
PC 4	-1.7530	1.1902	-1.4729	0.1428
PC 5	2.0334	1.1592	1.7542	0.0814
PC 6	4.7180	2.9664	1.5905	0.1138
PC 7	-1.7542	1.3512	-1.2982	0.1962
PC 8	5.1242	2.2152	2.3132	0.0220
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0001	43.0000	0.0000	0.2885
Year Smooth	0.0000	19.0000	0.0000	1.0000
Station Random Effect	3.3687	7.0000	1.7089	0.0072

Table A3.80: Best productivity model for the Myrtle Warbler (*Setophaga coronata coronata*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	10.1253	4.2203	2.3992	0.0170
Noise Level	-0.4617	0.1148	-4.0227	0.0001
PC 1	0.3251	0.3357	0.9683	0.3336
PC 2	-0.2815	0.3208	-0.8775	0.3808
PC 3	-0.6062	0.7308	-0.8296	0.4073
PC 4	-0.0040	0.4376	-0.0092	0.9927
PC 5	0.2805	0.5371	0.5221	0.6019
PC 6	0.9188	0.9607	0.9564	0.3395
PC 7	-0.2699	0.2508	-1.0763	0.2826
PC 8	-0.0495	0.6385	-0.0776	0.9382
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	4.3065	19.0000	6.3119	0.3729
Year Smooth	0.9376	7.0000	6.5967	0.0002
Station Random Effect	28.5464	46.0000	2.8940	< 0.0001

Table A3.81: Best abundance model for the Myrtle Warbler (*Setophaga coronata coronata*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	4.6831	3.3955	1.3792	0.1683
Noise Level	-0.1643	0.0955	-1.7198	0.0860
Noise Standard Deviation	0.2902	0.3122	0.9294	0.3530
PC 1	0.1893	0.2813	0.6729	0.5013
PC 2	-0.2445	0.2194	-1.1145	0.2655
PC 3	-0.0634	0.2139	-0.2964	0.7670
PC 4	-0.2941	0.2559	-1.1492	0.2509
PC 5	0.4100	0.3955	1.0367	0.3003
PC 6	0.0854	0.2866	0.2979	0.7659
PC 7	0.0699	0.3328	0.2102	0.8336
PC 8	-1.0212	0.5968	-1.7110	0.0876
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	56.0398	127.0000	4.1218	< 0.0001
Year Smooth	0.0003	19.0000	0.0000	0.9962
Station Random Effect	3.7514	7.0000	6.6571	0.0097

Table A3.82: Best productivity model for the Nashville Warbler (*Oreothlypis ruficapilla*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.9409	2.7016	-1.4587	0.1449
Noise Level	-0.0601	0.0749	-0.8026	0.4224
PC 1	0.0751	0.2127	0.3532	0.7240
PC 2	-0.3242	0.1568	-2.0673	0.0389
PC 3	0.1844	0.1814	1.0167	0.3095
PC 4	0.0560	0.1542	0.3630	0.7167
PC 5	0.4031	0.1956	2.0602	0.0396
PC 6	-0.1514	0.2163	-0.6997	0.4843
PC 7	0.0146	0.1950	0.0750	0.9403
PC 8	0.6066	0.4854	1.2497	0.2117
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	8.1910	19.0000	308.8057	0.0502
Year Smooth	4.8342	7.0000	10.8257	0.0020
Station Random Effect	100.5714	143.0000	5.1745	< 0.0001

Table A3.83: Best abundance model for the Nashville Warbler (*Oreothlypis ruficapilla*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.3137	0.6376	-3.6287	0.0003
Noise Level	0.0260	0.0159	1.6296	0.1033
PC 1	-0.0176	0.0476	-0.3689	0.7123
PC 2	0.0353	0.0426	0.8294	0.4070
PC 3	0.0641	0.0619	1.0356	0.3005
PC 4	-0.0539	0.0573	-0.9408	0.3469
PC 5	0.0196	0.0647	0.3031	0.7619
PC 6	-0.0177	0.0565	-0.3125	0.7547
PC 7	0.0649	0.0565	1.1498	0.2503
PC 8	-0.0636	0.0616	-1.0326	0.3019
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	188.5597	449.0000	1.6840	< 0.0001
Year Smooth	7.4274	19.0000	24.1008	0.0002
Station Random Effect	5.7339	7.0000	20.7779	< 0.0001

Table A3.84: Best productivity model for the Northern Cardinal (*Cardinalis cardinalis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-4.6378	0.0929	-49.9066	< 0.0001
Noise Standard Deviation	-0.0708	0.0981	-0.7220	0.4704
PC 1	0.2483	0.0352	7.0476	< 0.0001
PC 2	0.0254	0.0433	0.5878	0.5567
PC 3	-0.1094	0.0694	-1.5773	0.1148
PC 4	-0.0176	0.0562	-0.3136	0.7538
PC 5	-0.0847	0.0632	-1.3416	0.1798
PC 6	-0.0860	0.0593	-1.4501	0.1471
PC 7	0.1073	0.0548	1.9582	0.0503
PC 8	-0.1400	0.0579	-2.4186	0.0156
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.1513	19.0000	4901.6289	< 0.0001
Year Smooth	4.3820	7.0000	37.0642	0.0009
Station Random Effect	362.3280	450.0000	8.0568	< 0.0001

Table A3.85: Best abundance model for the Northern Cardinal (*Cardinalis cardinalis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.0994	0.2061	-5.3343	< 0.0001
Noise Standard Deviation	0.0473	0.1900	0.2490	0.8034
PC 1	-0.1443	0.0986	-1.4627	0.1439
PC 2	0.0650	0.1209	0.5376	0.5910
PC 3	-0.0943	0.1172	-0.8049	0.4211
PC 4	-0.1603	0.0985	-1.6278	0.1039
PC 5	-0.1383	0.1315	-1.0513	0.2934
PC 6	0.1222	0.1371	0.8912	0.3730
PC 7	0.0204	0.1348	0.1514	0.8797
PC 8	-0.2018	0.2426	-0.8316	0.4059
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	82.7266	189.0000	2.5531	< 0.0001
Year Smooth	10.1667	19.0000	72.5568	0.0182
Station Random Effect	3.9339	7.0000	7.6642	0.0356

Table A3.86: Best productivity model for the Orange-crowned Warbler (*Oreothlypis celata*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.8759	1.1066	-8.0208	< 0.0001
Noise Level	0.0872	0.0306	2.8494	0.0044
Noise Standard Deviation	-0.1001	0.2115	-0.4732	0.6361
PC 1	-0.1872	0.1283	-1.4594	0.1446
PC 2	0.0597	0.1234	0.4842	0.6283
PC 3	0.0338	0.1077	0.3140	0.7536
PC 4	0.1134	0.1087	1.0433	0.2969
PC 5	0.0675	0.1389	0.4858	0.6272
PC 6	-0.1052	0.1315	-0.8002	0.4237
PC 7	-0.0294	0.1599	-0.1842	0.8539
PC 8	-0.2225	0.2838	-0.7841	0.4331
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	1.3608	19.0000	110.1914	0.0617
Year Smooth	5.1321	7.0000	84.1395	< 0.0001
Station Random Effect	164.7677	203.0000	9.9069	< 0.0001

Table A3.87: Best abundance model for the Orange-crowned Warbler (*Oreothlypis celata*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.8929	0.2746	-6.8924	< 0.0001
Noise Standard Deviation	0.2657	0.1572	1.6903	0.0912
PC 1	-0.1105	0.0752	-1.4691	0.1420
PC 2	-0.1721	0.0952	-1.8066	0.0710
PC 3	-0.4388	0.2800	-1.5670	0.1173
PC 4	0.0398	0.1302	0.3056	0.7599
PC 5	0.0367	0.1589	0.2310	0.8173
PC 6	-0.2429	0.3023	-0.8034	0.4218
PC 7	-0.0438	0.1314	-0.3337	0.7387
PC 8	0.1275	0.1286	0.9909	0.3219
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	130.6412	318.0000	1.6946	< 0.0001
Year Smooth	3.2576	19.0000	11.4096	0.0175
Station Random Effect	3.2032	7.0000	15.5396	< 0.0001

Table A3.88: Best productivity model for the Ovenbird (*Seiurus aurocapilla*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.8779	1.2203	-2.3583	0.0184
Noise Level	-0.0709	0.0300	-2.3650	0.0181
Noise Standard Deviation	0.1550	0.1649	0.9400	0.3473
PC 1	-0.1765	0.0938	-1.8816	0.0600
PC 2	-0.2940	0.1016	-2.8942	0.0038
PC 3	0.0191	0.2734	0.0697	0.9444
PC 4	-0.0559	0.0977	-0.5727	0.5669
PC 5	0.1616	0.1140	1.4179	0.1564
PC 6	0.0947	0.2217	0.4272	0.6692
PC 7	-0.1346	0.1187	-1.1344	0.2567
PC 8	-0.0431	0.1033	-0.4166	0.6770
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	15.1305	19.0000	2766.3287	< 0.0001
Year Smooth	5.0687	7.0000	47.8087	0.0001
Station Random Effect	251.0550	329.0000	7.1589	< 0.0001

Table A3.89: Best abundance model for the Ovenbird (*Seiurus aurocapilla*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	1.2309	3.3499	0.3674	0.7134
Noise Level	-0.0825	0.0969	-0.8511	0.3950
PC 1	0.3732	0.4021	0.9283	0.3535
PC 2	0.0992	0.2771	0.3581	0.7203
PC 3	0.1594	0.2236	0.7131	0.4760
PC 4	0.1487	0.3900	0.3811	0.7032
PC 5	0.2507	0.3618	0.6930	0.4885
PC 6	-0.1172	0.2556	-0.4583	0.6469
PC 7	0.0078	0.3063	0.0256	0.9796
PC 8	-0.1937	0.7763	-0.2495	0.8030
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	50.8367	157.0000	0.8125	< 0.0001
Year Smooth	5.0387	19.0000	4.7697	0.1010
Station Random Effect	6.3952	7.0000	12.3406	0.0006

Table A3.90: Best productivity model for the Pine Siskin (*Spinus pinus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.9610	0.2260	-26.3752	< 0.0001
PC 1	0.6357	0.3092	2.0559	0.0399
PC 2	-0.7055	0.2219	-3.1791	0.0015
PC 3	0.2774	0.1604	1.7290	0.0840
PC 4	0.7665	0.2564	2.9900	0.0028
PC 5	0.4265	0.2354	1.8115	0.0702
PC 6	-0.3417	0.1940	-1.7616	0.0783
PC 7	-0.4206	0.2511	-1.6749	0.0941
PC 8	1.7618	0.6102	2.8875	0.0039
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	9.9008	19.0000	126.4948	0.1462
Year Smooth	5.7352	7.0000	19.3483	< 0.0001
Station Random Effect	112.4495	166.0000	3.6217	< 0.0001

Table A3.91: Best abundance model for the Pine Siskin (*Spinus pinus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.3606	0.3525	-3.8602	0.0001
Noise Standard Deviation	0.2423	0.2232	1.0854	0.2781
PC 1	-0.1990	0.2932	-0.6788	0.4975
PC 2	-0.1906	0.2231	-0.8542	0.3933
PC 3	0.0500	0.1619	0.3085	0.7578
PC 4	0.3468	0.3174	1.0929	0.2748
PC 5	0.1341	0.3487	0.3845	0.7007
PC 6	-0.0406	0.2275	-0.1784	0.8585
PC 7	0.1497	0.2339	0.6400	0.5224
PC 8	-0.2806	0.5404	-0.5192	0.6038
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	52.6359	180.0000	0.6721	< 0.0001
Year Smooth	4.8422	19.0000	2.6268	0.0599
Station Random Effect	1.9140	7.0000	1.6819	0.0176

Table A3.92: Best productivity model for the Red-breasted Nuthatch (*Sitta canadensis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.0317	1.4887	-2.0365	0.0418
Noise Level	-0.1285	0.0439	-2.9274	0.0035
Noise Standard Deviation	0.5041	0.1954	2.5798	0.0100
PC 1	-0.0547	0.1515	-0.3612	0.7180
PC 2	-0.1281	0.1124	-1.1396	0.2546
PC 3	-0.1776	0.1075	-1.6525	0.0986
PC 4	-0.0421	0.1660	-0.2538	0.7997
PC 5	0.5623	0.1892	2.9716	0.0030
PC 6	0.0131	0.1443	0.0908	0.9277
PC 7	-0.0594	0.1414	-0.4204	0.6742
PC 8	-0.0022	0.2943	-0.0076	0.9939
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	1.4012	19.0000	0.6237	0.3604
Year Smooth	6.2264	7.0000	15.0518	< 0.0001
Station Random Effect	131.5414	195.0000	3.2410	< 0.0001

Table A3.93: Best abundance model for the Red-breasted Nuthatch (*Sitta canadensis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.3188	1.0963	-3.0273	0.0027
PC 1	-0.2990	0.8248	-0.3625	0.7172
PC 2	-0.8040	0.8737	-0.9203	0.3582
PC 3	0.3738	0.5742	0.6509	0.5156
PC 4	-1.3038	1.6947	-0.7693	0.4423
PC 5	2.7917	2.1608	1.2920	0.1974
PC 6	-0.9824	1.1654	-0.8429	0.3999
PC 7	0.8947	1.4728	0.6075	0.5440
PC 8	-0.9044	1.8349	-0.4929	0.6224
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	25.8915	81.0000	1.9307	< 0.0001
Year Smooth	1.5697	19.0000	2.3045	0.0591
Station Random Effect	4.7945	7.0000	8.0258	0.0001

Table A3.94: Best productivity model for the Ruby-crowned Kinglet (*Regulus calendula*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-7.3439	3.6606	-2.0062	0.0451
Noise Level	0.0115	0.1076	0.1065	0.9152
PC 1	-0.6824	0.4277	-1.5954	0.1110
PC 2	0.5094	0.2767	1.8409	0.0660
PC 3	-0.0425	0.2123	-0.2004	0.8412
PC 4	-0.2535	0.2626	-0.9654	0.3346
PC 5	0.2088	0.3314	0.6301	0.5288
PC 6	-0.2690	0.3432	-0.7839	0.4333
PC 7	-0.2304	0.3384	-0.6808	0.4962
PC 8	-0.5516	1.1046	-0.4993	0.6177
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.8484	19.0000	3.9138	0.1781
Year Smooth	5.6430	7.0000	28.5318	< 0.0001
Station Random Effect	65.1373	81.0000	9.8695	< 0.0001

Table A3.95: Best abundance model for the Ruby-crowned Kinglet (*Regulus calendula*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-4.3790	1.8105	-2.4187	0.0157
Noise Level	0.0168	0.0443	0.3784	0.7052
Noise Standard Deviation	0.3250	0.2759	1.1783	0.2388
PC 1	-0.3899	0.2257	-1.7277	0.0842
PC 2	0.0728	0.1713	0.4248	0.6710
PC 3	-0.3914	0.3356	-1.1663	0.2436
PC 4	0.0722	0.1685	0.4286	0.6683
PC 5	0.0456	0.1933	0.2357	0.8137
PC 6	0.3586	0.2929	1.2245	0.2209
PC 7	-0.0470	0.1811	-0.2598	0.7950
PC 8	-0.4567	0.3605	-1.2670	0.2053
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	159.8349	437.0000	0.6054	< 0.0001
Year Smooth	9.7350	19.0000	14.4904	0.1531
Station Random Effect	5.1152	7.0000	7.3138	0.0151

Table A3.96: Best productivity model for the Red-eyed Vireo (*Vireo olivaceus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.7876	0.9902	-5.8449	< 0.0001
Noise Level	-0.0055	0.0252	-0.2196	0.8262
Noise Standard Deviation	0.3111	0.1434	2.1695	0.0301
PC 1	-0.1688	0.0786	-2.1475	0.0318
PC 2	-0.1100	0.0670	-1.6413	0.1008
PC 3	-0.2414	0.1285	-1.8782	0.0604
PC 4	0.1448	0.0854	1.6951	0.0901
PC 5	0.2553	0.0978	2.6097	0.0091
PC 6	-0.0248	0.1169	-0.2118	0.8323
PC 7	-0.0186	0.0848	-0.2192	0.8265
PC 8	0.0013	0.0939	0.0141	0.9887
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	11.8426	19.0000	436.1807	0.0083
Year Smooth	4.4853	7.0000	49.9088	< 0.0001
Station Random Effect	337.7243	440.0000	6.5305	< 0.0001

Table A3.97: Best abundance model for the Red-eyed Vireo (*Vireo olivaceus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.1031	1.8774	-0.0549	0.9562
Noise Level	-0.0153	0.0515	-0.2972	0.7664
Noise Standard Deviation	-0.1737	0.2510	-0.6920	0.4891
PC 1	-0.2490	0.2301	-1.0819	0.2796
PC 2	0.2931	0.1462	2.0042	0.0454
PC 3	-0.2156	0.1743	-1.2365	0.2166
PC 4	0.1487	0.1493	0.9966	0.3193
PC 5	-0.3093	0.1748	-1.7690	0.0773
PC 6	-0.7808	0.2958	-2.6394	0.0085
PC 7	0.0083	0.1689	0.0493	0.9607
PC 8	-0.5969	0.4316	-1.3830	0.1670
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	46.9424	124.0000	1.8257	< 0.0001
Year Smooth	8.1167	19.0000	36.1522	0.0017
Station Random Effect	0.0440	7.0000	0.0061	0.3389

Table A3.98: Best productivity model for the Rufous Hummingbird (*Selasphorus rufus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.6264	0.1366	-41.2015	< 0.0001
PC 1	0.0348	0.1743	0.1998	0.8417
PC 2	-0.2080	0.1410	-1.4756	0.1403
PC 3	0.1117	0.1343	0.8314	0.4059
PC 4	0.1091	0.1345	0.8111	0.4174
PC 5	-0.0646	0.1469	-0.4399	0.6601
PC 6	-0.3158	0.1834	-1.7222	0.0852
PC 7	0.0601	0.1722	0.3492	0.7270
PC 8	0.2897	0.4640	0.6243	0.5325
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	8.5769	19.0000	165.4871	0.0150
Year Smooth	5.2671	7.0000	18.4449	< 0.0001
Station Random Effect	92.3668	139.0000	3.8574	< 0.0001

Table A3.99: Best abundance model for the Rufous Hummingbird (*Selasphorus rufus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.7821	2.0679	-1.8290	0.0678
PC 1	-0.1069	0.6877	-0.1555	0.8765
PC 2	-0.0375	0.8162	-0.0460	0.9634
PC 3	-0.4498	2.4828	-0.1812	0.8563
PC 4	-0.8354	0.8462	-0.9871	0.3239
PC 5	0.4943	0.9692	0.5101	0.6102
PC 6	1.4105	2.1112	0.6681	0.5043
PC 7	-0.5916	1.0214	-0.5793	0.5626
PC 8	-0.0256	1.1842	-0.0216	0.9827
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	92.6425	199.0000	0.6598	0.0007
Year Smooth	4.5153	19.0000	18.6423	0.3141
Station Random Effect	1.3363	7.0000	1.8350	0.2540

Table A3.100: Best productivity model for the Scarlet Tanager (*Piranga olivacea*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-4.9601	1.4352	-3.4560	0.0006
Noise Level	-0.0391	0.0339	-1.1538	0.2487
Noise Standard Deviation	-0.3710	0.1964	-1.8887	0.0591
PC 1	-0.1434	0.1431	-1.0021	0.3164
PC 2	-0.1472	0.1523	-0.9662	0.3341
PC 3	-0.0609	0.4634	-0.1315	0.8954
PC 4	0.0471	0.1748	0.2697	0.7874
PC 5	0.1269	0.2088	0.6077	0.5434
PC 6	0.1340	0.4449	0.3011	0.7634
PC 7	-0.0498	0.1967	-0.2534	0.8000
PC 8	-0.0392	0.1381	-0.2837	0.7767
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	9.9117	19.0000	16.7628	0.0626
Year Smooth	0.8590	7.0000	1.9617	0.0165
Station Random Effect	125.4142	210.0000	2.3140	< 0.0001

Table A3.101: Best abundance model for the Scarlet Tanager (*Piranga olivacea*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.4620	0.0338	-13.6707	< 0.0001
PC 1	0.0185	0.0250	0.7382	0.4604
PC 2	0.0190	0.0279	0.6816	0.4956
PC 3	-0.0568	0.0355	-1.6015	0.1094
PC 4	-0.0318	0.0284	-1.1220	0.2619
PC 5	0.0687	0.0347	1.9786	0.0479
PC 6	-0.0044	0.0404	-0.1092	0.9131
PC 7	-0.0299	0.0318	-0.9405	0.3471
PC 8	-0.0212	0.0475	-0.4459	0.6557
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	221.6294	501.0000	2.8792	< 0.0001
Year Smooth	12.2336	19.0000	99.0189	0.0001
Station Random Effect	0.8993	7.0000	3.5169	0.0286

Table A3.102: Best productivity model for the Song Sparrow (*Melospiza melodia*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-4.9705	0.1582	-31.4288	< 0.0001
Noise Standard Deviation	0.3443	0.1517	2.2696	0.0233
PC 1	0.2476	0.0573	4.3251	< 0.0001
PC 2	0.2925	0.0684	4.2775	< 0.0001
PC 3	-0.0538	0.0822	-0.6544	0.5129
PC 4	-0.0543	0.0614	-0.8838	0.3769
PC 5	0.0246	0.0755	0.3258	0.7446
PC 6	-0.1522	0.0845	-1.8015	0.0717
PC 7	0.0054	0.0749	0.0715	0.9430
PC 8	-0.1360	0.1040	-1.3079	0.1910
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.4235	19.0000	17438.8744	0.0008
Year Smooth	6.5783	7.0000	1325.2390	< 0.0001
Station Random Effect	462.0270	537.0000	15.0428	< 0.0001

Table A3.103: Best abundance model for the Song Sparrow (*Melospiza melodia*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.8795	0.0766	-11.4791	< 0.0001
PC 1	0.0357	0.0553	0.6453	0.5188
PC 2	-0.0081	0.0634	-0.1277	0.8984
PC 3	-0.0023	0.0554	-0.0418	0.9667
PC 4	0.1800	0.0567	3.1717	0.0016
PC 5	0.1724	0.0636	2.7130	0.0068
PC 6	-0.0894	0.0604	-1.4811	0.1388
PC 7	-0.0569	0.0752	-0.7570	0.4492
PC 8	-0.0344	0.1421	-0.2422	0.8087
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	96.5385	231.0000	1.5137	< 0.0001
Year Smooth	8.3228	19.0000	24.2075	0.0009
Station Random Effect	3.0302	7.0000	3.5802	0.0097

Table A3.104: Best productivity model for the Spotted Towhee (*Pipilo maculatus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.5179	0.1296	-42.5655	< 0.0001
PC 1	0.1514	0.0998	1.5180	0.1292
PC 2	0.2132	0.1098	1.9417	0.0523
PC 3	0.1607	0.0968	1.6613	0.0968
PC 4	-0.2725	0.0997	-2.7326	0.0063
PC 5	-0.2340	0.1091	-2.1442	0.0321
PC 6	0.0553	0.1037	0.5330	0.5941
PC 7	-0.0112	0.1424	-0.0789	0.9371
PC 8	-0.1483	0.2645	-0.5607	0.5751
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	8.3816	19.0000	3577.8848	0.0033
Year Smooth	5.3978	7.0000	59.6013	0.0228
Station Random Effect	219.8740	253.0000	9.8830	< 0.0001

Table A3.105: Best abundance model for the Spotted Towhee (*Pipilo maculatus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.5261	1.2473	-2.8268	0.0048
Noise Level	0.0262	0.0343	0.7634	0.4453
PC 1	-0.2562	0.1345	-1.9050	0.0569
PC 2	0.3297	0.0869	3.7932	0.0002
PC 3	-0.1140	0.1051	-1.0844	0.2783
PC 4	-0.0290	0.0916	-0.3161	0.7520
PC 5	0.1789	0.1048	1.7062	0.0881
PC 6	0.1753	0.1054	1.6637	0.0963
PC 7	-0.0109	0.1031	-0.1056	0.9159
PC 8	-0.7317	0.2231	-3.2798	0.0011
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	114.4531	297.0000	2.5796	< 0.0001
Year Smooth	8.1588	19.0000	38.5036	0.1043
Station Random Effect	6.8096	7.0000	18.9283	0.0035

Table A3.106: Best productivity model for the Swainson's Thrush (*Catharus ustulatus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-4.5971	0.0935	-49.1437	< 0.0001
PC 1	-0.0505	0.0899	-0.5623	0.5740
PC 2	-0.1435	0.0875	-1.6408	0.1010
PC 3	-0.1396	0.0995	-1.4036	0.1606
PC 4	0.1015	0.0851	1.1927	0.2331
PC 5	0.1633	0.0962	1.6971	0.0898
PC 6	0.0006	0.1037	0.0063	0.9950
PC 7	0.0189	0.1018	0.1852	0.8531
PC 8	0.1454	0.2299	0.6322	0.5273
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	16.3055	19.0000	49696.0184	< 0.0001
Year Smooth	3.3826	7.0000	105.3056	< 0.0001
Station Random Effect	226.0497	292.0000	15.4334	< 0.0001

Table A3.107: Best abundance model for the Swainson's Thrush (*Catharus ustulatus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-19.4998	26.7243	-0.7297	0.4672
Noise Level	-0.0587	0.2876	-0.2040	0.8388
Noise Standard Deviation	0.2681	1.0622	0.2524	0.8012
PC 1	-5.9392	7.2985	-0.8138	0.4176
PC 2	-6.2567	9.0408	-0.6921	0.4904
PC 3	6.9049	10.5445	0.6548	0.5140
PC 4	18.1785	26.8155	0.6779	0.4993
PC 5	19.4381	23.9317	0.8122	0.4184
PC 6	-0.8402	2.5095	-0.3348	0.7384
PC 7	-2.5565	6.6066	-0.3870	0.6995
PC 8	-1.4840	6.1840	-0.2400	0.8108
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	12.5627	46.0000	0.3080	0.2506
Year Smooth	1.2056	19.0000	0.1120	0.3819
Station Random Effect	0.1249	7.0000	0.0088	0.4987

Table A3.108: Best productivity model for the Townsend's Solitaire (*Myadestes townsendi*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-9.2530	1.6160	-5.7258	< 0.0001
Noise Standard Deviation	0.6039	0.4194	1.4398	0.1503
PC 1	0.8327	0.6279	1.3263	0.1851
PC 2	-1.1717	0.6697	-1.7497	0.0805
PC 3	0.7224	0.6592	1.0960	0.2734
PC 4	0.9401	1.7056	0.5512	0.5816
PC 5	1.1912	1.4819	0.8039	0.4217
PC 6	-0.4497	0.4918	-0.9143	0.3608
PC 7	0.3005	0.9146	0.3286	0.7425
PC 8	3.2303	1.5124	2.1358	0.0330
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	5.4441	19.0000	2.1846	0.3619
Year Smooth	0.4945	7.0000	0.0732	0.3396
Station Random Effect	29.5461	61.0000	0.8155	0.0007

Table A3.109: Best abundance model for the Townsend's Solitaire (*Myadestes townsendi*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	6.4376	13.3176	0.4834	0.6292
Noise Level	-0.3582	0.3263	-1.0980	0.2730
Noise Standard Deviation	1.1764	0.9687	1.2144	0.2255
PC 1	-5.7519	10.9903	-0.5234	0.6011
PC 2	3.5773	6.2433	0.5730	0.5671
PC 3	-1.6402	1.6747	-0.9794	0.3281
PC 4	-1.6770	2.5976	-0.6456	0.5190
PC 5	0.1870	1.2545	0.1491	0.8816
PC 6	0.4076	2.5961	0.1570	0.8753
PC 7	1.8077	1.4105	1.2816	0.2009
PC 8	-3.4752	16.4894	-0.2108	0.8332
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	5.1857	31.0000	0.6496	< 0.0001
Year Smooth	4.3481	19.0000	2.2009	0.0410
Station Random Effect	2.1582	7.0000	5.7985	< 0.0001

Table A3.110: Best productivity model for the Townsend's Warbler (*Setophaga townsendi*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.9989	1.2818	-7.0206	< 0.0001
Noise Standard Deviation	0.1366	0.4650	0.2938	0.7690
PC 1	-3.0628	2.2303	-1.3733	0.1702
PC 2	0.2351	1.3783	0.1706	0.8646
PC 3	-0.0318	0.3711	-0.0857	0.9317
PC 4	0.2339	0.6570	0.3560	0.7220
PC 5	-0.0843	0.8217	-0.1026	0.9183
PC 6	1.1610	0.7033	1.6508	0.0993
PC 7	0.3909	0.4082	0.9574	0.3387
PC 8	-3.4977	3.6735	-0.9521	0.3414
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	11.3837	19.0000	88.9604	0.0010
Year Smooth	4.8972	7.0000	10.2192	< 0.0001
Station Random Effect	13.3808	38.0000	2.6032	< 0.0001

Table A3.111: Best abundance model for the Townsend's Warbler (*Setophaga townsendi*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.7312	0.1124	-24.3070	< 0.0001
PC 1	-0.0075	0.1067	-0.0700	0.9442
PC 2	0.0235	0.0996	0.2360	0.8134
PC 3	-0.1259	0.0872	-1.4442	0.1488
PC 4	-0.0849	0.1131	-0.7512	0.4526
PC 5	0.2074	0.1298	1.5977	0.1103
PC 6	0.0772	0.1118	0.6900	0.4903
PC 7	0.1984	0.1190	1.6670	0.0957
PC 8	-0.2896	0.2735	-1.0590	0.2897
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	99.7835	360.0000	0.8811	< 0.0001
Year Smooth	10.1708	19.0000	25.7076	0.0257
Station Random Effect	1.6555	7.0000	1.1432	0.0451

Table A3.112: Best productivity model for the Warbling Vireo (*Vireo gilvus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.9069	1.1482	-2.5317	0.0114
Noise Level	-0.0828	0.0332	-2.4919	0.0128
Noise Standard Deviation	0.2944	0.1471	2.0015	0.0454
PC 1	-0.0590	0.1121	-0.5260	0.5989
PC 2	-0.2455	0.0753	-3.2619	0.0011
PC 3	0.0046	0.0665	0.0685	0.9454
PC 4	0.0318	0.0693	0.4585	0.6466
PC 5	-0.0731	0.0785	-0.9317	0.3516
PC 6	-0.0596	0.0795	-0.7498	0.4534
PC 7	0.0364	0.0881	0.4133	0.6794
PC 8	0.1677	0.2301	0.7289	0.4661
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	7.9826	19.0000	382.9377	0.1564
Year Smooth	3.4419	7.0000	11.2999	0.0249
Station Random Effect	281.9414	361.0000	9.2574	< 0.0001

Table A3.113: Best abundance model for the Warbling Vireo (*Vireo gilvus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.9886	1.5129	-0.6534	0.5137
Noise Level	-0.0162	0.0398	-0.4069	0.6842
PC 1	0.1949	0.1294	1.5060	0.1325
PC 2	0.1849	0.1051	1.7589	0.0790
PC 3	0.1179	0.1045	1.1279	0.2597
PC 4	0.1170	0.1508	0.7758	0.4381
PC 5	-0.2917	0.1825	-1.5980	0.1105
PC 6	0.0954	0.1361	0.7012	0.4834
PC 7	-0.1562	0.1447	-1.0794	0.2808
PC 8	0.1191	0.1612	0.7391	0.4601
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	93.4962	291.0000	0.5148	< 0.0001
Year Smooth	0.0004	19.0000	0.0000	0.5721
Station Random Effect	1.5168	7.0000	0.9737	0.2442

Table A3.114: Best productivity model for the White-breasted Nuthatch (*Sitta carolinensis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.8815	1.3480	-6.5888	< 0.0001
Noise Level	0.0420	0.0351	1.1944	0.2324
PC 1	0.0025	0.1038	0.0238	0.9810
PC 2	0.0461	0.0784	0.5871	0.5572
PC 3	0.0764	0.0867	0.8808	0.3785
PC 4	-0.0181	0.1133	-0.1599	0.8730
PC 5	-0.0012	0.1361	-0.0085	0.9932
PC 6	0.0509	0.0999	0.5100	0.6101
PC 7	0.1477	0.1053	1.4035	0.1606
PC 8	-0.1605	0.1154	-1.3906	0.1644
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	9.5619	19.0000	76.9712	< 0.0001
Year Smooth	2.4944	7.0000	25.6628	< 0.0001
Station Random Effect	206.6127	339.0000	1.8534	< 0.0001

Table A3.115: Best abundance model for the White-breasted Nuthatch (*Sitta carolinensis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.1209	1.2338	-6.5819	< 0.0001
Noise Standard Deviation	0.3087	0.9149	0.3375	0.7360
PC 1	1.3044	1.3451	0.9697	0.3329
PC 2	-1.0761	0.9374	-1.1480	0.2519
PC 3	0.8044	0.4835	1.6637	0.0972
PC 4	1.5727	1.2159	1.2934	0.1969
PC 5	0.8924	0.9703	0.9198	0.3584
PC 6	-0.2170	0.9355	-0.2320	0.8167
PC 7	-0.0007	1.2976	-0.0005	0.9996
PC 8	4.9846	4.3721	1.1401	0.2551
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0000	19.0000	0.0000	0.9136
Year Smooth	0.0004	7.0000	0.0000	0.5430
Station Random Effect	11.6486	20.0000	2.4616	< 0.0001

Table A3.116: Best abundance model for the White-crowned Sparrow (*Zonotrichia leucophrys*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.2890	2.3336	-1.4094	0.1611
Noise Level	0.0694	0.0684	1.0146	0.3122
PC 1	0.0686	0.3709	0.1850	0.8535
PC 2	0.3671	0.2023	1.8150	0.0718
PC 3	0.0395	0.2005	0.1970	0.8441
PC 4	-0.1296	0.2314	-0.5601	0.5764
PC 5	0.0416	0.1364	0.3052	0.7607
PC 6	-0.3727	0.1835	-2.0313	0.0443
PC 7	-0.2685	0.3529	-0.7608	0.4481
PC 8	0.9051	0.7802	1.1601	0.2481
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0004	34.0000	0.0000	0.1209
Year Smooth	4.1351	19.0000	1.0693	0.0001
Station Random Effect	0.0000	7.0000	0.0000	1.0000

Table A3.117: Best productivity model for the Western Bluebird (*Sialia mexicana*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.9412	0.5631	-10.5502	< 0.0001
Noise Standard Deviation	-1.1724	0.5748	-2.0395	0.0421
PC 1	0.9621	0.3748	2.5671	0.0106
PC 2	-0.1795	0.2459	-0.7298	0.4659
PC 3	0.3933	0.2161	1.8201	0.0695
PC 4	-0.0647	0.2459	-0.2632	0.7925
PC 5	0.0660	0.1929	0.3422	0.7324
PC 6	-0.5090	0.2328	-2.1863	0.0294
PC 7	-0.5776	0.3740	-1.5443	0.1233
PC 8	1.3740	0.9253	1.4849	0.1384
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	1.3985	19.0000	3.1992	0.0580
Year Smooth	2.0950	7.0000	4.8361	0.0334
Station Random Effect	25.1865	39.0000	2.7892	< 0.0001

Table A3.118: Best abundance model for the Western Bluebird (*Sialia mexicana*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.3187	0.3985	-5.8179	< 0.0001
Noise Standard Deviation	0.2665	0.2107	1.2650	0.2068
PC 1	0.0469	0.1188	0.3947	0.6933
PC 2	-0.2794	0.2489	-1.1222	0.2626
PC 3	0.3041	0.1884	1.6146	0.1074
PC 4	0.2178	0.1199	1.8171	0.0701
PC 5	-0.4322	0.2215	-1.9513	0.0519
PC 6	0.1698	0.1938	0.8761	0.3816
PC 7	0.4670	0.2402	1.9441	0.0527
PC 8	-0.2683	0.2051	-1.3080	0.1918
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	10.4454	119.0000	0.0905	0.3514
Year Smooth	3.0656	19.0000	0.8128	0.0062
Station Random Effect	2.0312	7.0000	1.1672	0.0231

Table A3.119: Best productivity model for the Western Scrub-Jay (*Aphelocoma californica*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-8.5727	1.0421	-8.2260	< 0.0001
Noise Level	0.0355	0.0281	1.2617	0.2074
Noise Standard Deviation	0.1155	0.1751	0.6598	0.5096
PC 1	0.1653	0.1039	1.5915	0.1118
PC 2	0.0066	0.1124	0.0588	0.9531
PC 3	0.1697	0.0843	2.0135	0.0444
PC 4	-0.2264	0.0823	-2.7490	0.0061
PC 5	-0.0130	0.0954	-0.1363	0.8916
PC 6	0.1111	0.0930	1.1947	0.2325
PC 7	-0.2176	0.1281	-1.6989	0.0897
PC 8	-0.2603	0.1598	-1.6286	0.1037
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0003	19.0000	0.0000	0.8736
Year Smooth	0.0010	7.0000	0.0001	0.5418
Station Random Effect	80.2528	129.0000	2.2458	< 0.0001

Table A3.120: Best abundance model for the Western Scrub-Jay (*Aphelocoma californica*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.0253	2.0596	-2.4399	0.0148
Noise Level	0.0849	0.0592	1.4344	0.1517
PC 1	-0.2706	0.2110	-1.2827	0.1998
PC 2	0.1041	0.1728	0.6025	0.5470
PC 3	-0.1394	0.1391	-1.0019	0.3166
PC 4	-0.2267	0.2032	-1.1161	0.2646
PC 5	0.2768	0.2321	1.1928	0.2331
PC 6	-0.0400	0.1888	-0.2117	0.8324
PC 7	0.4216	0.3032	1.3905	0.1646
PC 8	-0.4597	0.3855	-1.1926	0.2332
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	106.1816	276.0000	1.2605	< 0.0001
Year Smooth	9.4893	19.0000	101.5618	0.0066
Station Random Effect	6.3415	7.0000	10.0046	< 0.0001

Table A3.121: Best productivity model for the Western Tanager (*Piranga ludoviciana*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.1426	0.1870	-32.8461	< 0.0001
Noise Standard Deviation	0.2729	0.1663	1.6407	0.1010
PC 1	-0.2117	0.1072	-1.9742	0.0485
PC 2	-0.1026	0.1044	-0.9820	0.3262
PC 3	0.0241	0.0850	0.2836	0.7767
PC 4	-0.0480	0.1131	-0.4247	0.6711
PC 5	0.0142	0.1093	0.1303	0.8963
PC 6	-0.0168	0.1100	-0.1529	0.8785
PC 7	-0.0809	0.1667	-0.4853	0.6275
PC 8	0.1342	0.2585	0.5189	0.6039
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	10.5284	19.0000	201.1588	0.0226
Year Smooth	5.3334	7.0000	48.8426	< 0.0001
Station Random Effect	196.3052	275.0000	6.4981	< 0.0001

Table A3.122: Best abundance model for the Western Tanager (*Piranga ludoviciana*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	0.8922	1.1108	0.8032	0.4220
Noise Level	-0.0626	0.0276	-2.2705	0.0233
Noise Standard Deviation	0.2701	0.1673	1.6148	0.1066
PC 1	0.1043	0.1419	0.7350	0.4625
PC 2	-0.0656	0.1029	-0.6377	0.5238
PC 3	0.2398	0.0977	2.4542	0.0143
PC 4	0.0216	0.0938	0.2305	0.8178
PC 5	0.1625	0.1117	1.4540	0.1462
PC 6	0.1163	0.1027	1.1326	0.2576
PC 7	0.1787	0.1040	1.7185	0.0859
PC 8	0.3199	0.2611	1.2255	0.2206
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	89.4823	245.0000	1.7630	< 0.0001
Year Smooth	1.8783	19.0000	26.3486	< 0.0001
Station Random Effect	4.2974	7.0000	24.5457	< 0.0001

Table A3.123: Best productivity model for the White-eyed Vireo (*Vireo griseus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.5775	1.6463	-3.9953	0.0001
Noise Level	0.0269	0.0410	0.6566	0.5115
PC 1	-0.3005	0.1588	-1.8931	0.0585
PC 2	0.1389	0.1279	1.0862	0.2775
PC 3	-0.3465	0.1818	-1.9059	0.0568
PC 4	0.0137	0.1521	0.0902	0.9281
PC 5	-0.0039	0.1817	-0.0217	0.9827
PC 6	0.2126	0.1705	1.2463	0.2128
PC 7	-0.3512	0.1620	-2.1678	0.0303
PC 8	-0.1194	0.2414	-0.4945	0.6210
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	4.4890	19.0000	3081.1293	< 0.0001
Year Smooth	4.5324	7.0000	108.4404	< 0.0001
Station Random Effect	209.9784	258.0000	7.6952	< 0.0001

Table A3.124: Best abundance model for the White-eyed Vireo (*Vireo griseus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.8035	0.2136	-8.4439	< 0.0001
Noise Standard Deviation	-0.1473	0.1901	-0.7748	0.4386
PC 1	-0.4171	0.1076	-3.8766	0.0001
PC 2	-0.0583	0.1136	-0.5133	0.6078
PC 3	-0.3685	0.1338	-2.7547	0.0059
PC 4	0.0092	0.1169	0.0785	0.9374
PC 5	0.0215	0.1488	0.1444	0.8852
PC 6	0.2193	0.1523	1.4399	0.1501
PC 7	0.1533	0.1618	0.9469	0.3438
PC 8	-0.9138	0.2849	-3.2072	0.0014
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	113.8732	235.0000	3.5792	< 0.0001
Year Smooth	8.7288	19.0000	391.9643	0.0003
Station Random Effect	1.4231	7.0000	6.8090	0.0255

Table A3.125: Best productivity model for the Wilson's Warbler (*Cardellina pusilla*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.7064	1.5457	-2.3979	0.0166
Noise Level	-0.0408	0.0438	-0.9326	0.3511
Noise Standard Deviation	0.2853	0.1823	1.5653	0.1177
PC 1	0.1302	0.1399	0.9307	0.3521
PC 2	0.0684	0.0969	0.7062	0.4801
PC 3	-0.0494	0.1055	-0.4680	0.6398
PC 4	-0.0504	0.0969	-0.5201	0.6030
PC 5	-0.0002	0.1159	-0.0021	0.9983
PC 6	-0.2077	0.1178	-1.7634	0.0780
PC 7	-0.0182	0.1396	-0.1302	0.8964
PC 8	-0.1653	0.2683	-0.6161	0.5379
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	12.0896	19.0000	2066.2913	0.0015
Year Smooth	4.6708	7.0000	41.6297	< 0.0001
Station Random Effect	181.7727	238.0000	9.3733	< 0.0001

Table A3.126: Best abundance model for the Wilson's Warbler (*Cardellina pusilla*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.1867	1.1024	-2.8908	0.0039
Noise Level	0.0260	0.0269	0.9668	0.3338
PC 1	0.0128	0.0918	0.1390	0.8895
PC 2	-0.1177	0.1007	-1.1683	0.2428
PC 3	-0.4947	0.2954	-1.6750	0.0941
PC 4	-0.1151	0.1465	-0.7857	0.4322
PC 5	0.0631	0.1682	0.3751	0.7076
PC 6	-0.0404	0.2891	-0.1398	0.8888
PC 7	0.1082	0.1346	0.8036	0.4218
PC 8	0.0162	0.0868	0.1865	0.8521
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	143.3546	322.0000	2.2492	< 0.0001
Year Smooth	0.0013	19.0000	0.0001	0.4622
Station Random Effect	0.0020	7.0000	0.0001	0.6323

Table A3.127: Best productivity model for the Wood Thrush (*Hylocichla mustelina*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-7.3228	1.4044	-5.2141	< 0.0001
Noise Level	0.0597	0.0345	1.7278	0.0841
PC 1	-0.1518	0.1171	-1.2963	0.1950
PC 2	-0.1316	0.1321	-0.9963	0.3192
PC 3	0.2008	0.3731	0.5383	0.5904
PC 4	-0.1823	0.1580	-1.1534	0.2489
PC 5	0.0382	0.1769	0.2157	0.8293
PC 6	-0.7247	0.3248	-2.2313	0.0258
PC 7	0.2429	0.1638	1.4824	0.1384
PC 8	0.0002	0.1086	0.0021	0.9983
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	11.8349	19.0000	1938.3552	< 0.0001
Year Smooth	4.1841	7.0000	90.5011	0.0003
Station Random Effect	260.8676	331.0000	9.9771	< 0.0001

Table A3.128: Best abundance model for the Wood Thrush (*Hylocichla mustelina*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-0.1044	0.1503	-0.6946	0.4876
Noise Standard Deviation	-0.1149	0.1236	-0.9297	0.3529
PC 1	-0.0852	0.0578	-1.4742	0.1409
PC 2	-0.0494	0.0634	-0.7790	0.4363
PC 3	-0.0961	0.0759	-1.2661	0.2059
PC 4	0.1484	0.0829	1.7898	0.0740
PC 5	0.0706	0.0892	0.7916	0.4289
PC 6	-0.1442	0.0798	-1.8071	0.0712
PC 7	0.1393	0.0702	1.9823	0.0479
PC 8	0.0633	0.1291	0.4905	0.6239
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	26.7173	104.0000	0.7804	< 0.0001
Year Smooth	2.8340	19.0000	2.4774	0.0009
Station Random Effect	3.4833	7.0000	2.4644	0.0400

Table A3.129: Best productivity model for the Wrentit (*Chamaea fasciata*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.3753	0.1684	-31.9123	< 0.0001
PC 1	0.4008	0.1028	3.8996	0.0001
PC 2	0.3993	0.1236	3.2310	0.0013
PC 3	0.2884	0.1063	2.7132	0.0068
PC 4	0.5443	0.1356	4.0156	0.0001
PC 5	0.3265	0.1552	2.1035	0.0357
PC 6	-0.4395	0.1292	-3.4009	0.0007
PC 7	-0.1766	0.1571	-1.1243	0.2612
PC 8	-0.3247	0.2822	-1.1506	0.2502
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	0.0004	19.0000	0.0000	0.9437
Year Smooth	1.0409	7.0000	21.8140	0.0317
Station Random Effect	93.3017	113.0000	10.8136	< 0.0001

Table A3.130: Best abundance model for the Wrentit (*Chamaea fasciata*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.1225	0.6255	-3.3934	0.0009
Noise Standard Deviation	0.3182	0.4379	0.7268	0.4684
PC 1	-0.0500	0.1728	-0.2891	0.7729
PC 2	-0.0337	0.2191	-0.1539	0.8779
PC 3	-0.5025	0.6382	-0.7874	0.4322
PC 4	0.1204	0.3509	0.3430	0.7320
PC 5	-0.0525	0.4231	-0.1242	0.9013
PC 6	0.3984	0.6658	0.5983	0.5504
PC 7	-0.0998	0.2342	-0.4263	0.6705
PC 8	0.0618	0.3703	0.1669	0.8677
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	7.0137	40.0000	0.3427	0.0047
Year Smooth	2.7148	19.0000	0.6054	0.1354
Station Random Effect	0.0002	7.0000	0.0000	0.4998

Table A3.131: Best productivity model for the White-throated Sparrow (*Zonotrichia albicollis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-3.4544	1.0421	-3.3147	0.0010
Noise Standard Deviation	-1.9385	0.7727	-2.5088	0.0127
PC 1	0.0998	0.2513	0.3973	0.6914
PC 2	-0.0043	0.3488	-0.0125	0.9901
PC 3	0.7942	0.9063	0.8763	0.3816
PC 4	-0.6124	0.5344	-1.1461	0.2527
PC 5	1.8959	0.6362	2.9801	0.0031
PC 6	1.9252	1.1532	1.6695	0.0961
PC 7	-0.2542	0.3575	-0.7110	0.4776
PC 8	0.2279	0.3949	0.5770	0.5644
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	1.7211	19.0000	207.5074	0.0245
Year Smooth	5.8443	7.0000	81.1486	< 0.0001
Station Random Effect	36.0342	46.0000	8.3351	< 0.0001

Table A3.132: Best abundance model for the White-throated Sparrow (*Zonotrichia albicollis*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-2.2308	0.1059	-21.0628	< 0.0001
PC 1	-0.3164	0.1545	-2.0487	0.0407
PC 2	0.1598	0.1121	1.4258	0.1542
PC 3	-0.1941	0.0868	-2.2361	0.0255
PC 4	0.0325	0.0839	0.3875	0.6985
PC 5	0.0634	0.0666	0.9522	0.3412
PC 6	0.0271	0.0911	0.2974	0.7662
PC 7	-0.0584	0.0945	-0.6179	0.5367
PC 8	-0.2770	0.2826	-0.9804	0.3271
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	88.4922	304.0000	0.6415	< 0.0001
Year Smooth	4.9473	19.0000	76.2308	< 0.0001
Station Random Effect	4.7569	7.0000	8.9024	0.0001

Table A3.133: Best productivity model for the Yellow-breasted Chat (*Icteria virens*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-5.2072	1.7948	-2.9013	0.0038
Noise Level	-0.0214	0.0479	-0.4463	0.6554
Noise Standard Deviation	0.3429	0.2765	1.2402	0.2150
PC 1	-0.1331	0.1730	-0.7693	0.4418
PC 2	0.1221	0.1322	0.9237	0.3557
PC 3	0.1821	0.1281	1.4218	0.1552
PC 4	-0.0153	0.1125	-0.1356	0.8921
PC 5	0.0291	0.1089	0.2669	0.7896
PC 6	0.0840	0.1293	0.6498	0.5159
PC 7	0.0205	0.1339	0.1529	0.8785
PC 8	-0.3616	0.3292	-1.0983	0.2722
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	12.6001	19.0000	15420.6455	0.0002
Year Smooth	3.8755	7.0000	1245.6819	< 0.0001
Station Random Effect	258.1030	311.0000	16.0151	< 0.0001

Table A3.134: Best abundance model for the Yellow-breasted Chat (*Icteria virens*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: strong.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-15.2637	16.4868	-0.9258	0.3550
Noise Level	0.2373	0.4018	0.5905	0.5551
PC 1	-0.4568	2.1180	-0.2157	0.8293
PC 2	0.4461	1.6418	0.2717	0.7860
PC 3	0.6672	0.7684	0.8682	0.3857
PC 4	-0.7352	2.6011	-0.2827	0.7776
PC 5	-0.0844	2.8470	-0.0296	0.9764
PC 6	-0.4196	1.6551	-0.2535	0.8000
PC 7	0.2495	2.3231	0.1074	0.9145
PC 8	-1.3928	2.9762	-0.4680	0.6400
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	48.1320	198.0000	0.1652	0.9898
Year Smooth	0.0001	19.0000	0.0000	1.0000
Station Random Effect	4.9260	7.0000	13.5999	0.2927

Table A3.135: Best productivity model for the Yellow-billed Cuckoo (*Coccyzus americanus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-7.2793	0.2024	-35.9673	< 0.0001
Noise Standard Deviation	0.0747	0.2300	0.3246	0.7455
PC 1	0.0565	0.0916	0.6172	0.5372
PC 2	0.2505	0.0940	2.6656	0.0078
PC 3	0.2176	0.1086	2.0042	0.0452
PC 4	-0.1537	0.1299	-1.1831	0.2369
PC 5	-0.0547	0.1393	-0.3923	0.6949
PC 6	-0.0120	0.1025	-0.1169	0.9069
PC 7	0.0338	0.1313	0.2575	0.7968
PC 8	0.0054	0.1390	0.0390	0.9689
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	6.5639	19.0000	30.9373	0.0007
Year Smooth	2.4364	7.0000	4.8120	0.0063
Station Random Effect	121.8483	207.0000	2.0653	< 0.0001

Table A3.136: Best abundance model for the Yellow-billed Cuckoo (*Coccyzus americanus*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-1.6743	0.0672	-24.9337	< 0.0001
PC 1	-0.0733	0.0588	-1.2468	0.2126
PC 2	0.0148	0.0565	0.2619	0.7934
PC 3	0.0658	0.0554	1.1887	0.2347
PC 4	-0.0084	0.0487	-0.1718	0.8636
PC 5	0.0030	0.0566	0.0536	0.9572
PC 6	-0.1000	0.0654	-1.5285	0.1265
PC 7	0.1793	0.0516	3.4784	0.0005
PC 8	-0.0189	0.1380	-0.1370	0.8910
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	136.5441	402.0000	1.5130	< 0.0001
Year Smooth	10.0492	19.0000	61.5396	0.0369
Station Random Effect	5.5344	7.0000	25.8853	< 0.0001

Table A3.137: Best productivity model for the Yellow Warbler (*Setophaga petechia*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

A. parametric coefficients	Estimate	Std. Error	t-value	p-value
Intercept	-6.5718	1.3732	-4.7856	< 0.0001
Noise Level	0.0369	0.0375	0.9834	0.3255
PC 1	0.1892	0.1192	1.5875	0.1125
PC 2	0.2634	0.0917	2.8739	0.0041
PC 3	0.0984	0.0914	1.0766	0.2817
PC 4	-0.1026	0.0765	-1.3412	0.1800
PC 5	-0.1027	0.0881	-1.1654	0.2439
PC 6	-0.0613	0.0962	-0.6374	0.5239
PC 7	0.1399	0.0886	1.5791	0.1144
PC 8	-0.0164	0.2064	-0.0793	0.9368
B. smooth terms	edf	Ref.df	F-value	p-value
Location Smooth	13.2391	19.0000	34498.6745	< 0.0001
Year Smooth	6.0438	7.0000	911.2041	< 0.0001
Station Random Effect	344.2253	417.0000	13.5456	< 0.0001

Table A3.138: Best abundance model for the Yellow Warbler (*Setophaga petechia*). The model was a quasi-Poisson GAMM with log link function. Based on AIC/QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

Appendix 4:
Model selection tables for individual bird species

Note: Models for the Golden-cheeked Warbler (*Setophaga chrysoparia*) and Tennessee Warbler (*Leiothlypis peregrina*) could not be fitted, as stated in the main text.

Abundance Models

name	QIC	delta QIC	Akaike weight
No Noise Terms	5458.77	0.00	0.59
No Mean Noise Term	5460.58	1.82	0.24
No Noise Variability Term	5462.05	3.29	0.11
Full Model	5463.23	4.47	0.06

Table A4.1: Model selection information for the abundance model for the Acadian Flycatcher (*Empidonax virescens*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	6493.34	0.00	0.43
No Noise Variability Term	6494.32	0.98	0.26
No Mean Noise Term	6495.03	1.70	0.18
No Noise Terms	6495.82	2.48	0.12

Table A4.2: Model selection information for the abundance model for the American Goldfinch (*Spinus tristis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	4151.80	0.00	0.59
No Mean Noise Term	4153.19	1.39	0.30
No Noise Variability Term	4156.10	4.30	0.07
No Noise Terms	4157.02	5.23	0.04

Table A4.3: Model selection information for the abundance model for the American Redstart (*Setophaga ruticilla*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	11975.09	0.00	0.29
Full Model	11975.23	0.14	0.27
No Noise Terms	11975.53	0.44	0.23
No Mean Noise Term	11975.75	0.66	0.21

Table A4.4: Model selection information for the abundance model for the American Robin (*Turdus migratorius*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	2209.29	0.00	0.50
Full Model	2210.47	1.18	0.28
No Noise Terms	2211.78	2.48	0.15
No Noise Variability Term	2213.12	3.83	0.07

Table A4.5: Model selection information for the abundance model for the Ash-throated Flycatcher (*Myiarchus cinerascens*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	4294.39	0.00	0.38
Full Model	4295.36	0.97	0.23
No Noise Terms	4295.69	1.29	0.20
No Noise Variability Term	4295.82	1.43	0.19

Table A4.6: Model selection information for the abundance model for the Audubon's Warbler (*Setophaga coronata auduboni*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	6287.74	0.00	0.48
Full Model	6289.14	1.40	0.24
No Noise Terms	6289.70	1.96	0.18
No Mean Noise Term	6290.68	2.94	0.11

Table A4.7: Model selection information for the abundance model for the Black-capped Chickadee (*Poecile atricapillus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	2048.61	0.00	0.29
No Noise Terms	2048.79	0.19	0.27
Full Model	2049.00	0.40	0.24
No Mean Noise Term	2049.30	0.69	0.21

Table A4.8: Model selection information for the abundance model for the Black-chinned Hummingbird (*Archilochus alexandri*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	4467.89	0.00	0.28
No Noise Terms	4468.10	0.20	0.25
Full Model	4468.17	0.28	0.24
No Mean Noise Term	4468.22	0.33	0.23

Table A4.9: Model selection information for the abundance model for the Bewick's Wren (*Thryomanes bewickii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	6231.16	0.00	0.41
Full Model	6232.30	1.14	0.23
No Noise Terms	6232.38	1.22	0.22
No Noise Variability Term	6233.34	2.18	0.14

Table A4.10: Model selection information for the abundance model for the Black-headed Grosbeak (*Pheucticus melanocephalus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	229.20	0.00	0.38
No Noise Terms	230.16	0.96	0.24
Full Model	230.49	1.29	0.20
No Mean Noise Term	230.76	1.56	0.18

Table A4.11: Model selection information for the abundance model for the Bobolink (*Dolichonyx oryzivorus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	2371.25	0.00	0.29
No Mean Noise Term	2371.31	0.06	0.28
No Noise Terms	2371.80	0.55	0.22
No Noise Variability Term	2371.96	0.71	0.20

Table A4.12: Model selection information for the abundance model for the Bushtit (*Psaltriparus minimus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	1712.41	0.00	0.31
No Mean Noise Term	1712.63	0.22	0.28
No Noise Variability Term	1713.02	0.61	0.23
Full Model	1713.47	1.06	0.18

Table A4.13: Model selection information for the abundance model for the Cassin's Finch (*Haemorhous cassinii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	6604.88	0.00	0.35
Full Model	6605.01	0.13	0.33
No Mean Noise Term	6606.38	1.50	0.16
No Noise Terms	6606.43	1.55	0.16

Table A4.14: Model selection information for the abundance model for the Carolina Wren (*Thryothorus ludovicianus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	3114.19	0.00	0.68
Full Model	3116.35	2.15	0.23
No Noise Terms	3118.97	4.77	0.06
No Mean Noise Term	3121.06	6.86	0.02

Table A4.15: Model selection information for the abundance model for the Cassin's Vireo (*Vireo cassinii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	4027.51	0.00	0.28
No Noise Variability Term	4027.63	0.12	0.26
No Mean Noise Term	4027.76	0.25	0.25
No Noise Terms	4028.05	0.54	0.21

Table A4.16: Model selection information for the abundance model for the Cedar Waxwing (*Bombycilla cedrorum*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	4953.61	0.00	0.41
No Mean Noise Term	4954.46	0.85	0.27
No Noise Terms	4954.98	1.37	0.20
No Noise Variability Term	4956.00	2.39	0.12

Table A4.17: Model selection information for the abundance model for the Chipping Sparrow (*Spizella passerina*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	9302.44	0.00	0.29
Full Model	9302.66	0.22	0.26
No Noise Terms	9302.90	0.46	0.23
No Mean Noise Term	9303.09	0.66	0.21

Table A4.18: Model selection information for the abundance model for the Common Yellowthroat (*Geothlypis trichas*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	4574.84	0.00	0.44
No Mean Noise Term	4575.63	0.79	0.30
Full Model	4577.20	2.36	0.14
No Noise Variability Term	4577.47	2.63	0.12

Table A4.19: Model selection information for the abundance model for the Dark-eyed Junco (*Junco hyemalis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	3310.22	0.00	0.35
Full Model	3310.47	0.26	0.30
No Noise Terms	3311.36	1.14	0.20
No Mean Noise Term	3311.81	1.60	0.16

Table A4.20: Model selection information for the abundance model for the Dusky Flycatcher (*Empidonax oberholseri*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	1929.70	0.00	0.54
Full Model	1930.13	0.43	0.43
No Noise Terms	1936.51	6.81	0.02
No Noise Variability Term	1936.92	7.22	0.01

Table A4.21: Model selection information for the abundance model for the Eastern Bluebird (*Sialia sialis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	-1863.59	0.00	1.00
No Mean Noise Term	-961.44	902.15	0.00
Full Model	25.18	1888.77	0.00
No Noise Terms	299.09	2162.67	0.00

Table A4.22: Model selection information for the abundance model for the Eastern Meadowlark (*Sturnella magna*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	922.03	0.00	0.37
Full Model	922.14	0.11	0.35
No Noise Variability Term	923.84	1.81	0.15
No Noise Terms	924.01	1.98	0.14

Table A4.23: Model selection information for the abundance model for the Evening Grosbeak (*Coccothraustes vespertinus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	4151.57	0.00	0.46
Full Model	4151.66	0.09	0.44
No Noise Terms	4155.76	4.19	0.06
No Mean Noise Term	4155.90	4.33	0.05

Table A4.24: Model selection information for the abundance model for the Great Crested Flycatcher (*Myiarchus crinitus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	3166.93	0.00	0.53
Full Model	3167.28	0.35	0.44
No Noise Terms	3173.79	6.86	0.02
No Noise Variability Term	3174.83	7.90	0.01

Table A4.25: Model selection information for the abundance model for the Golden-crowned Kinglet (*Regulus satrapa*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	6420.42	0.00	0.60
No Noise Variability Term	6421.45	1.03	0.36
Full Model	6426.48	6.06	0.03
No Noise Terms	6427.34	6.92	0.02

Table A4.26: Model selection information for the abundance model for the Gray Catbird (*Dumetella carolinensis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	643.51	0.00	0.48
No Noise Terms	644.87	1.35	0.25
No Mean Noise Term	645.56	2.05	0.17
No Noise Variability Term	646.75	3.23	0.10

Table A4.27: Model selection information for the abundance model for the Gray Flycatcher (*Empidonax wrightii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	3281.26	0.00	0.39
Full Model	3281.97	0.70	0.28
No Noise Terms	3282.87	1.61	0.18
No Noise Variability Term	3283.11	1.84	0.16

Table A4.28: Model selection information for the abundance model for the Hammond's Flycatcher (*Empidonax hammondii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	4715.19	0.00	0.49
No Noise Variability Term	4715.58	0.38	0.40
No Noise Terms	4719.31	4.12	0.06
No Mean Noise Term	4719.74	4.55	0.05

Table A4.29: Model selection information for the abundance model for the Hermit Thrush (*Catharus guttatus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	3072.36	0.00	0.29
No Noise Terms	3072.50	0.14	0.27
Full Model	3072.87	0.51	0.23
No Mean Noise Term	3073.01	0.64	0.21

Table A4.30: Model selection information for the abundance model for the House Finch (*Haemorhous mexicanus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	843.31	0.00	0.32
No Mean Noise Term	843.92	0.61	0.24
Full Model	844.00	0.69	0.23
No Noise Variability Term	844.05	0.74	0.22

Table A4.31: Model selection information for the abundance model for the House Sparrow (*Passer domesticus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	5665.85	0.00	0.31
No Mean Noise Term	5665.96	0.11	0.29
No Noise Variability Term	5666.68	0.83	0.20
Full Model	5666.75	0.90	0.20

Table A4.32: Model selection information for the abundance model for the House Wren (*Troglodytes aedon*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	5847.38	0.00	0.57
No Noise Terms	5847.94	0.56	0.43

Table A4.33: Model selection information for the abundance model for the Indigo Bunting (*Passerina cyanea*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	3381.88	0.00	0.48
No Mean Noise Term	3382.00	0.12	0.46
No Noise Variability Term	3387.31	5.43	0.03
Full Model	3387.55	5.67	0.03

Table A4.34: Model selection information for the abundance model for the Lazuli Bunting (*Passerina amoena*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	1575.87	0.00	0.37
No Noise Terms	1576.08	0.22	0.33
Full Model	1577.66	1.79	0.15
No Mean Noise Term	1577.72	1.86	0.15

Table A4.35: Model selection information for the abundance model for the Least Flycatcher (*Empidonax minimus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	2664.05	0.00	0.30
No Noise Terms	2664.12	0.07	0.29
Full Model	2664.74	0.69	0.21
No Mean Noise Term	2664.79	0.73	0.21

Table A4.36: Model selection information for the abundance model for the Lincoln's Sparrow (*Melospiza lincolnii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	884.08	0.00	0.40
Full Model	884.12	0.04	0.39
No Mean Noise Term	885.92	1.84	0.16
No Noise Terms	887.88	3.80	0.06

Table A4.37: Model selection information for the abundance model for the Magnolia Warbler (*Setophaga magnolia*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	5614.97	0.00	0.27
No Noise Terms	5615.11	0.14	0.26
Full Model	5615.18	0.21	0.25
No Noise Variability Term	5615.37	0.40	0.22

Table A4.38: Model selection information for the abundance model for the MacGillivray's Warbler (*Geothlypis tolmiei*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	3035.09	0.00	0.34
No Noise Terms	3035.30	0.21	0.30
Full Model	3036.10	1.01	0.20
No Noise Variability Term	3036.58	1.48	0.16

Table A4.39: Model selection information for the abundance model for the Mountain Chickadee (*Poecile gambeli*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	2079.11	0.00	0.33
No Noise Variability Term	2079.74	0.64	0.24
No Mean Noise Term	2079.80	0.69	0.23
Full Model	2080.17	1.06	0.19

Table A4.40: Model selection information for the abundance model for the Mourning Dove (*Zenaida macroura*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	695.49	0.00	0.86
Full Model	699.19	3.71	0.14
No Mean Noise Term	726.06	30.58	0.00
No Noise Terms	729.09	33.61	0.00

Table A4.41: Model selection information for the abundance model for the Myrtle Warbler (*Setophaga coronata coronata*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	2418.43	0.00	0.29
No Noise Terms	2418.51	0.08	0.27
Full Model	2418.86	0.43	0.23
No Mean Noise Term	2419.05	0.63	0.21

Table A4.42: Model selection information for the abundance model for the Nashville Warbler (*Oreothlypis ruficapilla*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	9974.57	0.00	0.57
No Noise Terms	9975.28	0.72	0.40
Full Model	9981.77	7.21	0.02
No Noise Variability Term	9982.56	8.00	0.01

Table A4.43: Model selection information for the abundance model for the Northern Cardinal (*Cardinalis cardinalis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	3324.69	0.00	0.42
No Noise Variability Term	3325.62	0.93	0.27
No Noise Terms	3326.63	1.94	0.16
No Mean Noise Term	3326.77	2.08	0.15

Table A4.44: Model selection information for the abundance model for the Orange-crowned Warbler (*Oreothlypis celata*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	6715.55	0.00	0.61
No Noise Variability Term	6716.71	1.16	0.34
No Mean Noise Term	6721.23	5.68	0.04
No Noise Terms	6722.46	6.91	0.02

Table A4.45: Model selection information for the abundance model for the Ovenbird (*Seiurus aurocapilla*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	2463.75	0.00	0.29
No Noise Variability Term	2464.06	0.30	0.25
Full Model	2464.20	0.45	0.23
No Mean Noise Term	2464.29	0.54	0.22

Table A4.46: Model selection information for the abundance model for the Pine Siskin (*Spinus pinus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	3752.59	0.00	1.00
No Noise Variability Term	3771.26	18.68	0.00
No Mean Noise Term	3772.56	19.98	0.00
No Noise Terms	3778.45	25.87	0.00

Table A4.47: Model selection information for the abundance model for the Red-breasted Nuthatch (*Sitta canadensis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	1586.90	0.00	0.51
No Noise Terms	1588.34	1.43	0.25
Full Model	1589.20	2.30	0.16
No Mean Noise Term	1590.85	3.94	0.07

Table A4.48: Model selection information for the abundance model for the Ruby-crowned Kinglet (*Regulus calendula*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	7920.33	0.00	0.48
No Mean Noise Term	7920.40	0.07	0.46
No Noise Terms	7926.03	5.70	0.03
No Noise Variability Term	7926.10	5.77	0.03

Table A4.49: Model selection information for the abundance model for the Red-eyed Vireo (*Vireo olivaceus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Noise Terms	2390.60	0.00	0.28
No Mean Noise Term	2390.68	0.07	0.26
No Noise Variability Term	2390.89	0.28	0.24
Full Model	2391.04	0.43	0.22

Table A4.50: Model selection information for the abundance model for the Rufous Hummingbird (*Selasphorus rufus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	3710.43	0.00	0.81
No Noise Variability Term	3714.78	4.35	0.09
No Mean Noise Term	3715.08	4.65	0.08
No Noise Terms	3718.66	8.23	0.01

Table A4.51: Model selection information for the abundance model for the Scarlet Tanager (*Piranga olivacea*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	9455.69	0.00	0.36
Full Model	9455.73	0.04	0.35
No Noise Terms	9457.49	1.80	0.15
No Noise Variability Term	9457.61	1.92	0.14

Table A4.52: Model selection information for the abundance model for the Song Sparrow (*Melospiza melodia*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	5325.28	0.00	0.34
No Mean Noise Term	5325.63	0.35	0.28
No Noise Variability Term	5326.22	0.94	0.21
Full Model	5326.63	1.35	0.17

Table A4.53: Model selection information for the abundance model for the Spotted Towhee (*Pipilo maculatus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	5524.35	0.00	0.33
No Mean Noise Term	5524.47	0.13	0.31
No Noise Variability Term	5525.50	1.16	0.19
Full Model	5525.63	1.29	0.17

Table A4.54: Model selection information for the abundance model for the Swainson's Thrush (*Catharus ustulatus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	865.08	0.00	0.97
Full Model	871.95	6.86	0.03
No Noise Terms	877.24	12.15	0.00
No Noise Variability Term	879.19	14.10	0.00

Table A4.55: Model selection information for the abundance model for the Townsend's Solitaire (*Myadestes townsendi*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	1305.16	0.00	0.51
No Noise Terms	1305.25	0.08	0.48
Full Model	1313.06	7.89	0.01
No Noise Variability Term	1322.69	17.53	0.00

Table A4.56: Model selection information for the abundance model for the Townsend's Warbler (*Setophaga townsendi*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	6577.93	0.00	0.40
No Mean Noise Term	6578.39	0.46	0.31
No Noise Terms	6579.84	1.91	0.15
No Noise Variability Term	6580.02	2.09	0.14

Table A4.57: Model selection information for the abundance model for the Warbling Vireo (*Vireo gilvus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	4344.52	0.00	0.58
No Noise Terms	4346.59	2.06	0.21
Full Model	4347.12	2.60	0.16
No Mean Noise Term	4349.15	4.63	0.06

Table A4.58: Model selection information for the abundance model for the White-breasted Nuthatch (*Sitta carolinensis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	263.59	0.00	0.31
Full Model	263.90	0.31	0.27
No Noise Terms	264.20	0.61	0.23
No Noise Variability Term	264.55	0.96	0.19

Table A4.59: Model selection information for the abundance model for the White-crowned Sparrow (*Zonotrichia leucophrys*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	679.61	0.00	0.50
Full Model	680.13	0.52	0.39
No Noise Variability Term	684.05	4.44	0.05
No Noise Terms	684.12	4.51	0.05

Table A4.60: Model selection information for the abundance model for the Western Bluebird (*Sialia mexicana*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
Full Model	1784.68	0.00	0.53
No Noise Variability Term	1785.35	0.66	0.38
No Mean Noise Term	1789.35	4.67	0.05
No Noise Terms	1789.90	5.22	0.04

Table A4.61: Model selection information for the abundance model for the Western Scrub-Jay (*Aphelocoma californica*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	4407.47	0.00	0.31
Full Model	4407.80	0.33	0.26
No Noise Terms	4408.04	0.57	0.23
No Noise Variability Term	4408.39	0.92	0.20

Table A4.62: Model selection information for the abundance model for the Western Tanager (*Piranga ludoviciana*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	4131.96	0.00	0.49
Full Model	4132.05	0.09	0.47
No Mean Noise Term	4137.67	5.71	0.03
No Noise Terms	4141.01	9.05	0.01

Table A4.63: Model selection information for the abundance model for the White-eyed Vireo (*Vireo griseus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	3990.06	0.00	0.28
No Noise Variability Term	3990.28	0.22	0.25
No Mean Noise Term	3990.33	0.28	0.24
No Noise Terms	3990.36	0.30	0.24

Table A4.64: Model selection information for the abundance model for the Wilson's Warbler (*Cardellina pusilla*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	5554.55	0.00	0.46
Full Model	5555.48	0.92	0.29
No Noise Terms	5556.96	2.41	0.14
No Mean Noise Term	5557.39	2.83	0.11

Table A4.65: Model selection information for the abundance model for the Wood Thrush (*Hylocichla mustelina*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	1853.90	0.00	0.30
No Noise Variability Term	1854.19	0.29	0.26
No Mean Noise Term	1854.25	0.35	0.25
Full Model	1854.75	0.86	0.19

Table A4.66: Model selection information for the abundance model for the Wrentit (*Chamaea fasciata*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	703.62	0.00	0.43
Full Model	703.86	0.24	0.38
No Noise Variability Term	705.56	1.94	0.16
No Noise Terms	709.59	5.97	0.02

Table A4.67: Model selection information for the abundance model for the White-throated Sparrow (*Zonotrichia albicollis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	4792.71	0.00	0.51
No Mean Noise Term	4794.37	1.66	0.22
No Noise Variability Term	4795.27	2.56	0.14
No Noise Terms	4795.64	2.93	0.12

Table A4.68: Model selection information for the abundance model for the Yellow-breasted Chat (*Icteria virens*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	3157.60	0.00	0.29
No Noise Terms	3157.97	0.37	0.24
Full Model	3157.99	0.39	0.24
No Noise Variability Term	3158.19	0.59	0.22

Table A4.69: Model selection information for the abundance model for the Yellow-billed Cuckoo (*Coccyzus americanus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	6259.08	0.00	0.32
Full Model	6259.28	0.20	0.29
No Mean Noise Term	6260.04	0.96	0.20
No Noise Terms	6260.18	1.10	0.19

Table A4.70: Model selection information for the abundance model for the Yellow Warbler (*Setophaga petechia*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of abundance was: weak; support for including the standard deviation of noise was: none.

Productivity Models

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	1843.32	0.00	0.47
No Noise Terms	1844.53	1.21	0.26
Full Model	1845.77	2.44	0.14
No Noise Variability Term	1845.91	2.59	0.13

Table A4.71: Model selection information for the productivity model for the Acadian Flycatcher (*Empidonax virescens*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	1536.66	0.00	0.34
No Mean Noise Term	1537.36	0.69	0.24
No Noise Variability Term	1537.36	0.70	0.24
Full Model	1538.06	1.40	0.17

Table A4.72: Model selection information for the productivity model for the American Goldfinch (*Spinus tristis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	1422.97	0.00	0.53
Full Model	1423.55	0.57	0.40
No Noise Terms	1428.07	5.09	0.04
No Mean Noise Term	1428.77	5.80	0.03

Table A4.73: Model selection information for the productivity model for the American Redstart (*Setophaga ruticilla*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	5457.13	0.00	0.61
Full Model	5459.03	1.90	0.24
No Noise Terms	5460.80	3.68	0.10
No Mean Noise Term	5461.89	4.76	0.06

Table A4.74: Model selection information for the productivity model for the American Robin (*Turdus migratorius*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	942.14	0.00	0.43
No Noise Variability Term	942.58	0.43	0.35
No Mean Noise Term	944.55	2.41	0.13
Full Model	945.21	3.07	0.09

Table A4.75: Model selection information for the productivity model for the Ash-throated Flycatcher (*Myiarchus cinerascens*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	1400.59	0.00	0.31
No Mean Noise Term	1400.98	0.39	0.26
No Noise Variability Term	1401.14	0.54	0.24
Full Model	1401.52	0.93	0.20

Table A4.76: Model selection information for the productivity model for the Audubon's Warbler (*Setophaga coronata auduboni*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	2762.70	0.00	0.37
Full Model	2762.88	0.18	0.34
No Noise Terms	2764.42	1.72	0.16
No Noise Variability Term	2764.77	2.07	0.13

Table A4.77: Model selection information for the productivity model for the Black-capped Chickadee (*Poecile atricapillus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Noise Terms	650.00	0.00	0.38
No Mean Noise Term	650.58	0.59	0.29
No Noise Variability Term	651.19	1.19	0.21
Full Model	652.32	2.33	0.12

Table A4.78: Model selection information for the productivity model for the Black-chinned Hummingbird (*Archilochus alexandri*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	1752.30	0.00	0.34
No Noise Variability Term	1752.93	0.63	0.25
No Mean Noise Term	1753.00	0.70	0.24
Full Model	1753.74	1.44	0.17

Table A4.79: Model selection information for the productivity model for the Bewick's Wren (*Thryomanes bewickii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	2527.20	0.00	0.33
No Noise Variability Term	2527.37	0.17	0.30
No Mean Noise Term	2528.00	0.80	0.22
No Noise Terms	2528.87	1.67	0.14

Table A4.80: Model selection information for the productivity model for the Black-headed Grosbeak (*Pheucticus melanocephalus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	129.96	0.00	0.36
No Mean Noise Term	130.44	0.48	0.28
Full Model	131.15	1.19	0.20
No Noise Variability Term	131.44	1.49	0.17

Table A4.81: Model selection information for the productivity model for the Bobolink (*Dolichonyx oryzivorus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	1090.93	0.00	0.37
No Noise Variability Term	1091.64	0.71	0.26
No Mean Noise Term	1091.92	0.99	0.22
Full Model	1092.66	1.73	0.15

Table A4.82: Model selection information for the productivity model for the Bushtit (*Psaltriparus minimus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	487.58	0.00	0.32
Full Model	488.19	0.61	0.23
No Noise Terms	488.24	0.66	0.23
No Noise Variability Term	488.34	0.76	0.22

Table A4.83: Model selection information for the productivity model for the Cassin's Finch (*Haemorhous cassinii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	2880.80	0.00	0.27
No Mean Noise Term	2880.80	0.01	0.27
No Noise Terms	2881.17	0.37	0.23
No Noise Variability Term	2881.19	0.40	0.22

Table A4.84: Model selection information for the productivity model for the Carolina Wren (*Thryothorus ludovicianus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
Full Model	916.74	0.00	0.97
No Noise Variability Term	924.10	7.36	0.02
No Noise Terms	926.61	9.86	0.01
No Mean Noise Term	933.22	16.48	0.00

Table A4.85: Model selection information for the productivity model for the Cassin's Vireo (*Vireo cassinii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
Full Model	1136.37	0.00	0.91
No Mean Noise Term	1141.74	5.37	0.06
No Noise Terms	1143.86	7.49	0.02
No Noise Variability Term	1148.07	11.70	0.00

Table A4.86: Model selection information for the productivity model for the Cedar Waxwing (*Bombycilla cedrorum*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	1623.25	0.00	0.34
No Noise Terms	1623.46	0.21	0.30
Full Model	1624.39	1.14	0.19
No Noise Variability Term	1624.59	1.34	0.17

Table A4.87: Model selection information for the productivity model for the Chipping Sparrow (*Spizella passerina*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	4399.42	0.00	0.42
No Mean Noise Term	4399.44	0.02	0.41
Full Model	4402.53	3.12	0.09
No Noise Variability Term	4402.70	3.28	0.08

Table A4.88: Model selection information for the productivity model for the Common Yellowthroat (*Geothlypis trichas*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	1968.43	0.00	0.30
No Noise Terms	1968.60	0.18	0.27
Full Model	1968.91	0.49	0.23
No Mean Noise Term	1969.24	0.81	0.20

Table A4.89: Model selection information for the productivity model for the Dark-eyed Junco (*Junco hyemalis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	1154.26	0.00	0.37
Full Model	1155.08	0.82	0.24
No Noise Terms	1155.10	0.85	0.24
No Mean Noise Term	1156.03	1.77	0.15

Table A4.90: Model selection information for the productivity model for the Dusky Flycatcher (*Empidonax oberholseri*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	592.17	0.00	0.48
Full Model	593.05	0.88	0.31
No Noise Terms	594.94	2.78	0.12
No Noise Variability Term	595.53	3.37	0.09

Table A4.91: Model selection information for the productivity model for the Eastern Bluebird (*Sialia sialis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
Full Model	227.66	0.00	0.89
No Mean Noise Term	232.86	5.20	0.07
No Noise Variability Term	234.27	6.61	0.03
No Noise Terms	236.23	8.57	0.01

Table A4.92: Model selection information for the productivity model for the Evening Grosbeak (*Coccothraustes vespertinus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	539.42	0.00	0.46
Full Model	540.11	0.69	0.33
No Noise Terms	542.03	2.61	0.13
No Noise Variability Term	542.80	3.37	0.09

Table A4.93: Model selection information for the productivity model for the Great Crested Flycatcher (*Myiarchus crinitus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Noise Terms	714.71	0.00	0.31
No Mean Noise Term	715.00	0.29	0.27
No Noise Variability Term	715.38	0.67	0.22
Full Model	715.70	0.99	0.19

Table A4.94: Model selection information for the productivity model for the Golden-crowned Kinglet (*Regulus satrapa*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	3931.07	0.00	0.43
Full Model	3931.37	0.29	0.37
No Noise Terms	3933.67	2.59	0.12
No Noise Variability Term	3934.20	3.12	0.09

Table A4.95: Model selection information for the productivity model for the Gray Catbird (*Dumetella carolinensis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	16.17	0.00	1.00
No Noise Terms	76.11	59.94	0.00
No Noise Variability Term	164.10	147.93	0.00
Full Model	167.18	151.01	0.00

Table A4.96: Model selection information for the productivity model for the Gray Flycatcher (*Empidonax wrightii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
Full Model	1047.18	0.00	0.30
No Noise Variability Term	1047.33	0.15	0.28
No Mean Noise Term	1047.88	0.70	0.21
No Noise Terms	1047.95	0.77	0.21

Table A4.97: Model selection information for the productivity model for the Hammond's Flycatcher (*Empidonax hammondii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	1490.97	0.00	0.65
Full Model	1493.03	2.06	0.23
No Noise Terms	1494.94	3.97	0.09
No Mean Noise Term	1497.45	6.48	0.03

Table A4.98: Model selection information for the productivity model for the Hermit Thrush (*Catharus guttatus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	1076.49	0.00	0.29
No Noise Terms	1076.66	0.18	0.27
Full Model	1076.99	0.50	0.23
No Noise Variability Term	1077.21	0.72	0.21

Table A4.99: Model selection information for the productivity model for the House Finch (*Haemorhous mexicanus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	201.90	0.00	0.36
Full Model	202.45	0.55	0.27
No Noise Variability Term	202.58	0.68	0.25
No Noise Terms	204.08	2.18	0.12

Table A4.100: Model selection information for the productivity model for the House Sparrow (*Passer domesticus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	2258.03	0.00	0.37
No Noise Terms	2258.72	0.69	0.26
Full Model	2259.14	1.12	0.21
No Mean Noise Term	2259.82	1.80	0.15

Table A4.101: Model selection information for the productivity model for the House Wren (*Troglodytes aedon*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	2544.97	0.00	0.38
Full Model	2545.43	0.45	0.30
No Noise Terms	2546.51	1.53	0.18
No Noise Variability Term	2546.87	1.90	0.15

Table A4.102: Model selection information for the productivity model for the Indigo Bunting (*Passerina cyanea*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	1589.59	0.00	0.34
Full Model	1589.88	0.29	0.29
No Noise Terms	1590.68	1.09	0.20
No Noise Variability Term	1590.87	1.28	0.18

Table A4.103: Model selection information for the productivity model for the Lazuli Bunting (*Passerina amoena*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	531.84	0.00	0.58
No Noise Variability Term	532.56	0.72	0.41
Full Model	541.15	9.31	0.01
No Mean Noise Term	541.25	9.40	0.01

Table A4.104: Model selection information for the productivity model for the Least Flycatcher (*Empidonax minimus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	1175.64	0.00	0.44
Full Model	1175.96	0.33	0.37
No Mean Noise Term	1178.02	2.38	0.13
No Noise Terms	1179.53	3.89	0.06

Table A4.105: Model selection information for the productivity model for the Lincoln's Sparrow (*Melospiza lincolnii*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	365.84	0.00	0.52
No Mean Noise Term	366.19	0.35	0.44
No Noise Variability Term	371.61	5.77	0.03
Full Model	373.75	7.91	0.01

Table A4.106: Model selection information for the productivity model for the Magnolia Warbler (*Setophaga magnolia*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	2963.47	0.00	0.47
Full Model	2963.48	0.00	0.47
No Mean Noise Term	2968.44	4.97	0.04
No Noise Terms	2970.49	7.02	0.01

Table A4.107: Model selection information for the productivity model for the MacGillivray's Warbler (*Geothlypis tolmiei*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	844.93	0.00	0.47
No Mean Noise Term	845.40	0.47	0.37
Full Model	848.25	3.32	0.09
No Noise Variability Term	848.59	3.66	0.07

Table A4.108: Model selection information for the productivity model for the Mountain Chickadee (*Poecile gambeli*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	369.68	0.00	0.35
No Mean Noise Term	370.42	0.75	0.24
No Noise Variability Term	370.44	0.76	0.24
Full Model	371.19	1.51	0.17

Table A4.109: Model selection information for the productivity model for the Mourning Dove (*Zenaida macroura*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	163.34	0.00	1.00
No Noise Variability Term	177.48	14.15	0.00
No Mean Noise Term	193.23	29.89	0.00
No Noise Terms	194.86	31.52	0.00

Table A4.110: Model selection information for the productivity model for the Myrtle Warbler (*Setophaga coronata coronata*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
Full Model	844.90	0.00	0.39
No Noise Variability Term	844.93	0.03	0.38
No Mean Noise Term	847.24	2.34	0.12
No Noise Terms	847.50	2.61	0.11

Table A4.111: Model selection information for the productivity model for the Nashville Warbler (*Oreothlypis ruficapilla*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	4618.19	0.00	0.50
Full Model	4618.27	0.08	0.48
No Noise Terms	4625.73	7.54	0.01
No Mean Noise Term	4625.85	7.66	0.01

Table A4.112: Model selection information for the productivity model for the Northern Cardinal (*Cardinalis cardinalis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	1661.56	0.00	0.30
No Noise Terms	1661.69	0.14	0.28
No Noise Variability Term	1662.26	0.70	0.21
Full Model	1662.31	0.76	0.21

Table A4.113: Model selection information for the productivity model for the Orange-crowned Warbler (*Oreothlypis celata*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	3068.95	0.00	0.52
Full Model	3069.94	0.99	0.32
No Noise Terms	3072.34	3.39	0.10
No Noise Variability Term	3073.32	4.37	0.06

Table A4.114: Model selection information for the productivity model for the Ovenbird (*Seiurus aurocapilla*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	730.25	0.00	0.30
No Noise Terms	730.43	0.18	0.28
Full Model	730.77	0.52	0.23
No Mean Noise Term	731.19	0.94	0.19

Table A4.115: Model selection information for the productivity model for the Pine Siskin (*Spinus pinus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	1144.90	0.00	0.43
No Noise Terms	1146.08	1.19	0.24
Full Model	1146.25	1.35	0.22
No Noise Variability Term	1147.72	2.82	0.11

Table A4.116: Model selection information for the productivity model for the Red-breasted Nuthatch (*Sitta canadensis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	493.59	0.00	0.32
No Mean Noise Term	494.09	0.50	0.25
No Noise Variability Term	494.35	0.76	0.22
Full Model	494.53	0.95	0.20

Table A4.117: Model selection information for the productivity model for the Ruby-crowned Kinglet (*Regulus calendula*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	2493.06	0.00	0.58
No Mean Noise Term	2493.79	0.73	0.40
No Noise Variability Term	2501.88	8.82	0.01
No Noise Terms	2502.65	9.59	0.00

Table A4.118: Model selection information for the productivity model for the Red-eyed Vireo (*Vireo olivaceus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
Full Model	1031.74	0.00	0.34
No Mean Noise Term	1032.01	0.27	0.29
No Noise Terms	1032.83	1.09	0.19
No Noise Variability Term	1033.03	1.29	0.18

Table A4.119: Model selection information for the productivity model for the Rufous Hummingbird (*Selasphorus rufus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	819.92	0.00	0.32
No Mean Noise Term	820.39	0.47	0.25
No Noise Variability Term	820.51	0.59	0.24
Full Model	820.98	1.06	0.19

Table A4.120: Model selection information for the productivity model for the Scarlet Tanager (*Piranga olivacea*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	4868.38	0.00	0.36
No Noise Variability Term	4869.11	0.73	0.25
No Mean Noise Term	4869.28	0.90	0.23
Full Model	4870.11	1.73	0.15

Table A4.121: Model selection information for the productivity model for the Song Sparrow (*Melospiza melodia*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	2116.10	0.00	0.31
No Mean Noise Term	2116.44	0.34	0.26
No Noise Variability Term	2116.68	0.58	0.23
Full Model	2117.01	0.91	0.20

Table A4.122: Model selection information for the productivity model for the Spotted Towhee (*Pipilo maculatus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	3042.85	0.00	0.96
No Noise Terms	3049.92	7.06	0.03
Full Model	3051.22	8.37	0.01
No Mean Noise Term	3057.06	14.21	0.00

Table A4.123: Model selection information for the productivity model for the Swainson's Thrush (*Catharus ustulatus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	153.32	0.00	0.48
No Mean Noise Term	154.09	0.77	0.33
No Noise Variability Term	155.76	2.44	0.14
No Noise Terms	158.14	4.82	0.04

Table A4.124: Model selection information for the productivity model for the Townsend's Solitaire (*Myadestes townsendi*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
Full Model	391.61	0.00	0.29
No Mean Noise Term	391.80	0.18	0.27
No Noise Terms	391.95	0.33	0.25
No Noise Variability Term	392.38	0.77	0.20

Table A4.125: Model selection information for the productivity model for the Townsend's Warbler (*Setophaga townsendi*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	2349.02	0.00	0.45
No Mean Noise Term	2349.50	0.48	0.36
Full Model	2351.77	2.75	0.11
No Noise Variability Term	2352.52	3.49	0.08

Table A4.126: Model selection information for the productivity model for the Warbling Vireo (*Vireo gilvus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	1166.87	0.00	0.44
Full Model	1167.23	0.36	0.37
No Noise Terms	1169.83	2.96	0.10
No Mean Noise Term	1170.16	3.29	0.09

Table A4.127: Model selection information for the productivity model for the White-breasted Nuthatch (*Sitta carolinensis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	257.58	0.00	0.37
Full Model	258.04	0.46	0.29
No Noise Terms	258.71	1.13	0.21
No Mean Noise Term	259.58	2.00	0.13

Table A4.128: Model selection information for the productivity model for the Western Bluebird (*Sialia mexicana*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	499.78	0.00	0.58
Full Model	500.59	0.81	0.39
No Noise Terms	506.22	6.43	0.02
No Noise Variability Term	507.64	7.85	0.01

Table A4.129: Model selection information for the productivity model for the Western Scrub-Jay (*Aphelocoma californica*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	1909.26	0.00	0.31
Full Model	1909.53	0.27	0.27
No Mean Noise Term	1909.86	0.60	0.23
No Noise Terms	1910.13	0.87	0.20

Table A4.130: Model selection information for the productivity model for the Western Tanager (*Piranga ludoviciana*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: weak; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
Full Model	2398.76	0.00	0.97
No Noise Variability Term	2407.17	8.41	0.01
No Mean Noise Term	2407.82	9.06	0.01
No Noise Terms	2414.32	15.57	0.00

Table A4.131: Model selection information for the productivity model for the White-eyed Vireo (*Vireo griseus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: strong.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	2165.74	0.00	0.26
Full Model	2165.81	0.07	0.25
No Noise Variability Term	2165.83	0.09	0.25
No Noise Terms	2165.96	0.22	0.23

Table A4.132: Model selection information for the productivity model for the Wilson's Warbler (*Cardellina pusilla*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	3185.32	0.00	0.50
Full Model	3186.78	1.46	0.24
No Noise Terms	3187.38	2.06	0.18
No Mean Noise Term	3188.82	3.51	0.09

Table A4.133: Model selection information for the productivity model for the Wood Thrush (*Hylocichla mustelina*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	815.31	0.00	0.29
No Noise Terms	815.49	0.19	0.26
Full Model	815.73	0.42	0.23
No Noise Variability Term	815.83	0.52	0.22

Table A4.134: Model selection information for the productivity model for the Wrentit (*Chamaea fasciata*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Mean Noise Term	279.48	0.00	0.42
No Noise Terms	280.79	1.30	0.22
Full Model	280.98	1.49	0.20
No Noise Variability Term	281.54	2.05	0.15

Table A4.135: Model selection information for the productivity model for the White-throated Sparrow (*Zonotrichia albicollis*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: weak.

name	QIC	delta QIC	Akaike weight
No Noise Terms	2300.70	0.00	0.32
No Noise Variability Term	2301.09	0.39	0.26
No Mean Noise Term	2301.33	0.63	0.23
Full Model	2301.66	0.96	0.19

Table A4.136: Model selection information for the productivity model for the Yellow-breasted Chat (*Icteria virens*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Variability Term	335.49	0.00	0.47
Full Model	336.51	1.02	0.28
No Noise Terms	337.76	2.28	0.15
No Mean Noise Term	338.80	3.31	0.09

Table A4.137: Model selection information for the productivity model for the Yellow-billed Cuckoo (*Coccyzus americanus*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: strong; support for including the standard deviation of noise was: none.

name	QIC	delta QIC	Akaike weight
No Noise Terms	3126.09	0.00	0.31
No Mean Noise Term	3126.61	0.52	0.24
Full Model	3126.75	0.65	0.22
No Noise Variability Term	3126.76	0.67	0.22

Table A4.138: Model selection information for the productivity model for the Yellow Warbler (*Setophaga petechia*). The model was a quasi-Poisson GAMM with log link function. Based on QIC, support for including the noise level as a predictor of productivity was: none; support for including the standard deviation of noise was: none.

Appendix 5

Tables for measurement error models

Description

The tables below present the full models for:

1. Productivity coefficients as a function of abundance coefficients (weighted mean noise level)

2. Productivity coefficients as a function of abundance coefficients (noise standard deviation)

3. Productivity coefficients as a function of song acoustic characteristics and life-history traits (weighted mean noise level)

4. Productivity coefficients as a function of song acoustic characteristics and life-history traits (noise standard deviation)

In all cases, all model selection criteria examined indicated that the best model was the intercept-only model (with no predictors). In each table, “CI (low)” and “CI (high)” indicate the lower and upper bounds of 95% credible intervals around the estimates. (Note: in most cases the shrinkage prior has resulted in slope parameter estimates that are approximately zero.)

Table 1: Model coefficients for measurement error model to predict productivity regression coefficients as a function of abundance regression coefficients, for effects of weighted mean noise level.

Term	Estimate	Standard Error	CI (low)	CI (high)
Intercept	0.0099	0.0039	0.0022	0.0175
Abundance	0.0000	0.0000	0.0000	0.0000

Table 2: Model coefficients for measurement error model to predict productivity regression coefficients as a function of abundance regression coefficients, for effects of noise standard deviation.

Term	Estimate	Standard Error	CI (low)	CI (high)
Intercept	0.0089	0.021	-0.0324	0.0498
Abundance	0.0000	0.000	0.0000	0.0000

Table 3: Model coefficients for measurement error model to predict productivity regression coefficients as a function of song acoustic characteristics and life-history traits, for effects of weighted mean noise level.

Term	Estimate	Standard Error	CI (low)	CI (high)
Intercept	0.0109	0.0038	0.0034	0.0184
Freq5	0.0000	0.0000	0.0000	0.0000
Freq95	0.0000	0.0000	0.0000	0.0000
IQR.BW	0.0000	0.0000	0.0000	0.0000
Peak	0.0000	0.0000	0.0000	0.0000
Q3	0.0000	0.0000	0.0000	0.0000
HabitatGrassland	0.0000	0.0000	0.0000	0.0000
HabitatOpenWoodland	0.0000	0.0000	0.0000	0.0000
HabitatScrub	0.0000	0.0000	0.0000	0.0000
HabitatTown	0.0000	0.0000	0.0000	0.0000
Insectsyes	0.0000	0.0000	0.0000	0.0000
NestingGround	0.0000	0.0000	0.0000	0.0000
NestingShrub	0.0000	0.0000	0.0000	0.0000
NestingTree	0.0000	0.0000	0.0000	0.0000
MigrationNonMMigrator	0.0000	0.0000	0.0000	0.0000
MigrationPartialMigrator	0.0000	0.0000	0.0000	0.0000

Table 4: Model coefficients for measurement error model to predict productivity regression coefficients as a function of song acoustic characteristics and life-history traits, for effects of noise standard deviation.

Term	Estimate	Standard Error	CI (low)	CI (high)
Intercept	0.0073	0.0213	-0.0344	0.0488
Freq5	0.0000	0.0000	0.0000	0.0000
Freq95	0.0000	0.0000	0.0000	0.0000
IQR.BW	0.0000	0.0000	0.0000	0.0000
Peak	0.0000	0.0000	0.0000	0.0000
Q3	0.0000	0.0000	0.0000	0.0000
HabitatGrassland	0.0000	0.0000	0.0000	0.0000
HabitatOpenWoodland	0.0000	0.0000	0.0000	0.0000
HabitatScrub	0.0000	0.0000	0.0000	0.0000
HabitatTown	0.0000	0.0000	0.0000	0.0000
Insectsyes	0.0000	0.0000	0.0000	0.0000
NestingGround	0.0000	0.0000	0.0000	0.0000
NestingShrub	0.0000	0.0000	0.0000	0.0000
NestingTree	0.0000	0.0000	0.0000	0.0000
MigrationNonMMigrator	0.0000	0.0000	0.0000	0.0000
MigrationPartialMigrator	0.0000	0.0000	0.0000	0.0000

Table 5: Model coefficients for measurement error model to predict abundance regression coefficients as a function of song acoustic characteristics and life-history traits, for effects of weighted mean noise level.

Term	Estimate	Standard Error	CI (low)	CI (high)
Intercept	0.0073	0.0213	-0.0344	0.0488
Freq5	0.0000	0.0000	0.0000	0.0000
Freq95	0.0000	0.0000	0.0000	0.0000
IQR.BW	0.0000	0.0000	0.0000	0.0000
Peak	0.0000	0.0000	0.0000	0.0000
Q3	0.0000	0.0000	0.0000	0.0000
HabitatGrassland	0.0000	0.0000	0.0000	0.0000
HabitatOpenWoodland	0.0000	0.0000	0.0000	0.0000
HabitatScrub	0.0000	0.0000	0.0000	0.0000
HabitatTown	0.0000	0.0000	0.0000	0.0000
Insectsyes	0.0000	0.0000	0.0000	0.0000
NestingGround	0.0000	0.0000	0.0000	0.0000
NestingShrub	0.0000	0.0000	0.0000	0.0000
NestingTree	0.0000	0.0000	0.0000	0.0000
MigrationNonMMigrator	0.0000	0.0000	0.0000	0.0000
MigrationPartialMigrator	0.0000	0.0000	0.0000	0.0000

Table 6: Model coefficients for measurement error model to predict abundance regression coefficients as a function of song acoustic characteristics and life-history traits, for effects of noise standard deviation.

Term	Estimate	Standard Error	CI (low)	CI (high)
Intercept	0.0866	0.0251	0.0377	0.1364
Freq5	0.0000	0.0000	0.0000	0.0000
Freq95	0.0000	0.0000	0.0000	0.0000
IQR.BW	0.0000	0.0000	0.0000	0.0000
Peak	0.0000	0.0000	0.0000	0.0000
Q3	0.0000	0.0000	0.0000	0.0000
HabitatGrassland	0.0000	0.0000	0.0000	0.0000
HabitatOpenWoodland	0.0000	0.0000	0.0000	0.0000
HabitatScrub	0.0000	0.0000	0.0000	0.0000
HabitatTown	0.0000	0.0000	0.0000	0.0000
Insectsyes	0.0000	0.0000	0.0000	0.0000
NestingGround	0.0000	0.0000	0.0000	0.0000
NestingShrub	0.0000	0.0000	0.0000	0.0000
NestingTree	0.0000	0.0000	0.0000	0.0000
MigrationNonMMigrator	0.0000	0.0000	0.0000	0.0000
MigrationPartialMigrator	0.0000	0.0000	0.0000	0.0000

Appendix 6. R code to develop and analyze noise models for a single species

Please click here to download file 'appendix6.rmd'.

Appendix 7. R code for the measurement error models.

Please click here to download file 'appendix7.rnw'.