



# Article Integrating Spatiotemporal Epidemiology, Eco-Phylogenetics, and Distributional Ecology to Assess West Nile Disease Risk in Horses

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Abstract: Mosquito-borne West Nile virus (WNV) is the causative agent of West Nile disease in humans, horses, and some bird species. Since the initial introduction of WNV to the United States (US), approximately 30,000 horses have been impacted by West Nile neurologic disease and hundreds of additional horses are infected each year. Research describing the drivers of West Nile disease in horses is greatly needed to better anticipate the spatial and temporal extent of disease risk, improve disease surveillance, and alleviate future economic impacts to the equine industry and private horse owners. To help meet this need, we integrated techniques from spatiotemporal epidemiology, ecophylogenetics, and distributional ecology to assess West Nile disease risk in horses throughout the contiguous US. Our integrated approach considered horse abundance and virus exposure, vector and host distributions, and a variety of extrinsic climatic, socio-economic, and environmental risk factors. Birds are WNV reservoir hosts, and therefore we quantified avian host community dynamics across the continental US to show intra-annual variability in host phylogenetic structure and demonstrate host phylodiversity as a mechanism for virus amplification in time and virus dilution in space. We identified drought as a potential amplifier of virus transmission and demonstrated the importance of accounting for spatial non-stationarity when quantifying interaction between disease risk and meteorological influences such as temperature and precipitation. Our results delineated the timing and location of several areas at high risk of West Nile disease and can be used to prioritize vaccination programs and optimize virus surveillance and monitoring.

**Keywords:** West Nile virus; horses; equine; mosquito; eco-phylogenetics; avian reservoir; spatial non-stationarity; disease biogeography; Bayesian



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## 1. Introduction

Mosquito-borne West Nile virus (WNV) is the causative agent of West Nile disease in humans, horses, and some bird species [1-3]. The virus is a member of the Flaviviridae family and belongs to the same sero-group as the arthropod-borne viruses (arboviruses) Japanese encephalitis virus, Usutu virus, Murray Valley encephalitis virus, and St. Louis encephalitis virus [4–7]. WNV is the most common cause of neuroinvasive arboviral disease in the contiguous US: the average human incidence was recently estimated by Curren et al. [8] to be 0.44 cases/100,000 persons and we [9] calculated estimates approximately 10% higher at 0.48 cases/100,000 after accounting for uneven reporting and environmental risk factors. Less is known about risk factors contributing to WNV infection of horses. In the years immediately following the 1999 US introduction of WNV, equine WNV vaccines were rapidly developed and licensed [10,11]: however, despite the initial post-invasion push to reduce what can be substantial economic impacts to horse owners, there has yet to be a large-scale, comprehensive analysis of equine West Nile disease (WND) in the US [12–14]. Research describing the abiotic and biotic drivers of equine WND is needed to anticipate the spatial and temporal distribution of disease risk, improve disease surveillance, and avoid economic impacts to the agricultural industry and private horse owners.

Since introduction in 1999, WNV has infected more than 27,000 horses in the US, with mortality rates estimated between 30 and 50% and neurologic symptoms that include stumbling, aimless wandering, convulsions, inability to swallow, impaired vision, teeth grinding, hind limb weakness, paralysis, and coma [15–19]. Due to research funding reductions over the past decade, there have been calls to designate WND as a neglected disease, but given its recent US introduction, WND is generally considered an emerging disease in the US and a re-emerging disease globally [14,20–22].

WNV was originally described from Uganda in 1937 [23] and then subsequently identified at locations throughout Africa, Asia, and Europe over the next half-century, though the virus was not considered a serious equine health or economic issue until the mid-1990s [14,24]. Prior to the mid-1990s, equine seropositivity rates as high as 54% were reported from Northern Africa (1950s) and isolated horse epizootics with mortality were documented in Europe (1962–1963). Because such epizootics were infrequent, WNV was not perceived as major threat to agriculture [24,25]. Perceptions changed in the 1990s when virus reemergence resulted in a marked increase in the number and severity of equine WNV infections worldwide and coincided with virus introduction and spread in the Western Hemisphere [26–29]. A 1996 outbreak in Morocco affected 94 horses, of which 45% died; 58% equine seroprevalence was estimated in herds near Tuscany (Italy) in 1998 after 14 horses from the region displayed neurologic symptoms; 75 horses were infected in Israel between 1998 and 2000, of which 20% died; and France confirmed 76 infected horses in 2000 after more than 130 displayed signs of disease [24,30,31]. In the Western Hemisphere, 20 horses were infected in New York during the year of initial virus introduction (1999), with 63 more confirmed equine cases across the Northeastern US in 2000 [32,33]. Between 2000 and 2005, WNV rapidly spread across the Western Hemisphere with serologic evidence or confirmed neurologic disease reported in horses from all states in the contiguous US as well as Canada, the Caribbean, Mexico, Central America, and South America [28,34,35]. Given the extraordinary rapidity with which WNV can move across large distances and impact agriculture, the equine industry, and private horse owners, studies to elucidate the drivers of enzootic transmission are urgently needed to assess prevailing risk and to forecast future disease outbreaks.

Although WNV readily infects horses, they are "dead-end" hosts [36] that do not contribute to forward transmission. The virus is maintained in cycles involving ornithophilic mosquito vectors (primarily species within the genus *Culex*) and avian reservoir host species [2]. Thus, we applied a disease biogeography approach to analyze spatiotemporal relationships among four major WNV system components: (1) horse hosts, (2) mosquito vectors, (3) avian reservoir hosts, and (4) extrinsic climatic, socio-economic, and environmental factors. Disease biogeography leverages quantitative methods common to distributional ecology to investigate infectious disease from an integrated ecological and epidemiological perspective [37,38]. Our aim was to assess equine WND risk from the ecological-epidemiology perspective that risk is dependent on prevailing rates of equine WNV infection and the location-specific exposure of horses to WNV, as well as the complex network of biotic and abiotic environmental factors that mediate reservoir and vector spatiotemporal distributions. To this end, we estimated the "absolute" and "relative" risk of equine WND, where absolute risk was defined as the total number of cases predicted for a given time, location, and horse population (abundance) and relative risk was the ratio of absolute risk to the expected case number based on disease rates for the larger US over the period of record.

We place our analysis within the disease biogeography paradigm because our framework was derived from human epidemiology methods with risk estimates contingent on (horse) population incidence and disease exposure rather than environmental suitability, occurrence probability, or abundance as is standard for niche models [38–41]. This distinction is important to understand technical aspects of model statistical implementation and is central to interpreting WNV ecology. In contrast to pathogens such as avian influenza virus that may be transmitted by both environmental and avian reservoirs [42–44], free WNV (outside of host or vector bodies) is not known to significantly contribute to disease propagation, and therefore the geographic distribution of WNV is likely little restricted by abiotic environmental conditions beyond those that shape host and vector species occurrence. Stated differently, the WNV "niche" is better described by host and vector availability, competency, and community assembly than it is by the climate or edaphic conditions external to these organisms. Because WNV nidality was assumed to be a reflection of highly-mobile avian host availability [45], we adopted a modern niche concept [46] that expanded on inclusion of the abiotic environment (Grinnellian niche), pathogen interactions with hosts and vectors (Eltonian niche), and the pathogen's fundamental niche (Hutchinsonian niche) to quantify shifts in virus distributions due to access and transport by competent avian hosts [41,47].

Avian species in the Order Passeriformes serve as the principal WNV reservoirs [48–52]. Passeriformes (perching birds) are the largest and most diverse clade of birds in the world, show variable WNV competence, and exhibit a wide range of long-distance and local dispersal behaviors making selection of any one species as a representative or archetypal virus reservoir problematic [53,54]. Further complicating analysis, pathogen hosts do not function in isolation and are instead embedded in a local community with interacting organisms (hosts and non-hosts) that is, in turn, nested within a larger host metacommunity at the landscape scale. The nested, hierarchical structure of pathogen–host interactions gives rise to cross-scale dynamics that influence prevalence at the local scale (county-scale) and transmission processes at the landscape scale (continental-scale) as communities are bridged by reservoir migration and dispersal [55,56]. Techniques from phylogenetic community ecology (eco-phylogenetics) have potential to untangle cross-scale transmission dynamics in the WNV system. Eco-phylogenetics represent the merger of community ecology with phylogenetics and are increasingly being used to investigate host–parasite and disease systems [57–59].

Although predicting risk of disease transmission in multi-host systems is an outstanding challenge in infectious disease ecology, an improved understanding of the evolutionary and phylogenetic aspects of host community assembly and composition may help garner insight into virus dilution and amplification effects at the community and landscape scales [56,59]. Virus dilution and amplification effects in relation to host diversity have been proposed to shape WNV transmission [60–64]. Our objective was to explain WND biogeography and to assess horse WND risk across the US by integrating spatiotemporal epidemiology, eco-phylogenetics, and distributional ecology.

## 2. Materials and Methods

## 2.1. Study Area and Disease Data

Our study area encompassed the contiguous US which includes a geographic extent greater than 9.8 million km<sup>2</sup>. Equine WND incidence data were acquired from the Centers for Disease Control and Prevention (CDC) [65] as a text file. Tabulated data provided the number of confirmed horse WND cases reported within each US county between 2009 and 2018. We used the reported case onset date to aggregate case counts to occurrence month. Cases documented between 2009 and 2017 were used for model training and those reported in 2018 were partitioned for out-of-sample model validation.

#### 2.2. Virus Surveillance

The number of sentinel animal, avian, and mosquito WNV detections reported to the CDC were also obtained for the study period (CDC, 2019). ArboNET is a passive surveillance system. It is dependent on clinicians considering the diagnosis of an arboviral disease and obtaining the appropriate diagnostic test, and reporting of laboratory-confirmed cases to public health authorities. Diagnosis and reporting are incomplete, and the incidence of arboviral diseases is underestimated. We combined these virus detection reports and then aggregated to the county and month of detection to create a WNV surveillance covariate.

To help account for variation in county surveillance and reporting, we generalized (spatial and temporally smoothed) the WNV surveillance covariate by estimating virus detection probability for each county and month using the following formula,

$$p_{st}^{v} \sim \text{binomial}(\pi_{st}^{v})$$
$$\text{logit}(\pi_{st}^{v}) = \xi_{s}^{v} + \gamma_{t}^{v}$$
(1)

where the probability of virus detection  $(p_{st}^v)$  in county *s* and time *t* (month of year) followed a binomial likelihood with a mean  $\pi_{st}^v$  and a response variable coded as,

$$p_{st}^{v} = \begin{cases} 1, & \text{if virus detected in county, and} \\ 0, & \text{otherwise.} \end{cases}$$

The  $\xi_s^v$  term shown in Equation (1) symbolizes a spatial covariate constructed using a Besag–York–Mollié (BYM) configuration (Besag et al., 1991) that included scaling between structured and unstructured BYM components to improve estimates [66–69]. The  $\xi_s^v$  covariate quantified spatial dependencies between counties based on a neighborhood graph (adjacency matrix), which we constructed using the spdep package [70], with contiguity based on a "queen" configuration (only one adjoining point needed to define a neighbor). We found that the 3109 counties in the US had between 1 and 14 neighbors, with an average of 5.78 adjoining neighbors per county. This same neighborhood graph was also used for disease modeling decribed in Section 2.6. A monthly time trend ( $\gamma_t^v$ ) was added using a first-order (one time-step) random walk (curvilinear response) defined as  $\gamma_t = \gamma_{t-1} + \Delta \gamma_t$ , with the current time step based on the prior step plus an incremental  $\Delta \gamma_t$ , where  $\Delta \gamma_t = \mathcal{N}(0, \sigma^2)$  and included an enforced sum to zero constraint (centered on zero).

#### 2.3. Climate Data

Mean monthly maximum temperature and total precipitation data for the US (2009–2018) were acquired from the PRISM Climate Group at a 4 km grid resolution [71] using the prism package [72]. Monthly mean temperature and precipitation estimates were then averaged by county.

Weekly drought indices reporting the areal proportion of each county subject to six different drought stages were obtained from the US DroughtMonitor (https://droughtmonitor. unl.edu/) (accessed on 2 July 2021) and averaged to monthly values. The US Drought Monitor produces categorical drought stages based on a combination of metrics: the Palmer Drought Severity Index, NOAA's Climate Prediction Center Soil Moisture Model percentiles, USGS Weekly Streamflow percentiles, Standardized Precipitation Index, and expert opinion. Arranged from the least to most dry stage, the reported drought levels included No Drought, Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought.

## 2.4. Avian Host Occurrence, Prevalence, and Phylogenetic Data

Several model covariates were developed to evaluate relationships between avian WNV host species and equine WND occurrence. To develop avian covariates, we cross-referenced US occurrences of Order Passeriformes (perching birds) documented in the Cornell Lab of Ornithology eBird database [73] with those species analyzed by Jetz et al. [74] and archived in the Global Phylogeny of Birds (https://birdtree.org/) (accessed on 2 July 2021). We further cross-referenced the species common to both eBird (US occurrences only) and the Jetz et al. [74] phylogeny to the avian host competency database published by Tolsá et al. [54]. The Tolsá et al. [54] database reported estimated WNV host competency (molecular prevalence) for approximately half (163) of the 303 Passeriform species available from eBird and also represented in the global bird phylogeny.

We cloned the entire eBird database to the USDA SCINet High-Performance Computing System (https://scinet.usda.gov/) (accessed on 15 July 2021), extracted individual bird occurrences using the auk package [75], and then spatially and temporally matched occurrences by US County to produce a database indicating the presence or absence of each species in each county (3109) during each month of the year (January–December). To qualify as a presence, we required that a minimum of two species-specific observations be documented by eBird for a given county and month. We next constructed avian community matrices and calculated county-level species richness (number of unique species) under two different species pool assumptions: a "dynamic" species pool and a "static" species pool assumption. We use the term "dynamic" to refer to a species pool that varies intra-annually (monthly) such that the pool includes only those avian species present during a given month. By comparison, we use the term "static" to describe a species pool inclusive of all avian species observed during the combined months May–August, which define the primary WND outbreak season in the US [76,77].

Eco-phylogenetic analysis was conducted by first extracting 1000 bootstrap replicate trees from the Global Phylogeny of Birds using tools available at the https://birdtree. org/ (accessed on 12 July 2021) website. The tool facilitated the process of trimming the full, time-calibrated phylogeny to our Passeriform species pool (303 species) before sampling this subset from a pseudo-posterior distribution [74]. We then downloaded and summarized the replicate trees through construction of a maximum clade credibility tree using TreeAnnotator (http://beast.community/treeannotator) (accessed on 12 July 2021) and the BEAST 2 package [78]. We used the resulting consensus tree, our eBird based avian community matrices, and the picante package [79] to calculate mean phylogenetic distance (branch lengths between species), mean nearest taxon distance, which describes the average genetic distance between nearest neighbors (sister species) within a community [57], mean pairwise distance (average phylogenetic distance among co-occurring species pairs in a community, see Cadotte and Davies [80]), and evolutionary distinctiveness or the degree of a species' isolation on the phylogeny [81]. As previously described for species richness, each phylodiversity metric was calculated under two different species pool assumptions: a monthly varying dynamic species pool and a static species pool representing the WND outbreak season of May-August. Each phylodiversity metric was compared to a null model derived from 999 random permutations of consensus tree tips and nationwide species pools (static and dynamic versions) to determine statistical importance and the degree of deviation from species pool averages.

Dynamic and static versions of avian host WNV molecular prevalence were estimated by matching species-specific prevalence estimates [54] to the corresponding bird species occurring in each county by month (dynamic) and during the peak outbreak season (static) before averaging across species (county-level mean community prevalence). Because avian host community composition varies through time (e.g., due to migration), averaging dynamic and static molecular prevalence by county produced estimates for mean host community prevalence that fluctuated intra-annually.

## 2.5. Land Cover and Human Demographic Information

To characterize typical land use and elevation by county, we obtained remote sensing data (GeoTiff format) from the Global 1 km Consensus Land Cover data set [82] and the Earth Environment Digital Elevation Model [83]. The land cover data set indicated the proportion of twelve different land cover types at a 1 km<sup>2</sup> resolution. We aggregated elevation and land cover information to the county-level based on the mean elevation and the mean land cover proportion in each county. Descriptors for each land cover type are provided in the Results section and can be reviewed at the Earth Environment website http://www.earthenv.org/ (accessed on 15 July 2021).

County-level data reflecting human population density, median household income, and the percent of the population in poverty were obtained from the US Census Bureau (https://www.census.gov/) (accessed on 10 July 2021)and the Small Area Income and Poverty Estimates (SAIPE) Program within the US Census Bureau [84] using the censusapi package [85].

All data were scaled and centered for ease of post-modeling interpretation. Multicollinearity between candidate covariates was assessed using collinearity diagnostics for independent variables [86] as facilitated by the perturb package [87]. High multicollinearity between several covariates required that multiple model versions be constructed and evaluated. This iterative process is described further below.

#### 2.6. Disease Model

Bayesian epidemiological models were constructed to estimate WND relative risk and disease caseloads for horses located in the conterminous US. Our statistical model was of the form,

$$O_{st}|r_{st} \sim Poisson(\mu_{st}) \tag{2}$$

$$\mu_{st} = E_{st} r_{st} \tag{3}$$

$$log(\mu_{st}) = log(E_{st}) + log(r_{st}), \tag{4}$$

where the number of horse WND cases ( $O_{st}$ ) was conditional on relative risk ( $r_{st}$ ) and followed a Poisson distribution with a mean  $\mu_{st}$  (Equation (2)).  $E_{st}$  is the expected disease case counts in each US County s (s = 1, 2, 3, ..., 3109) during each month t(t = January, February, March, ..., December) between the years 2009 and 2017. Veterinarian reported WNV horse infections were obtained from the CDC as non-negative integers without any accompanying information describing the age, physical condition, or ownership of horses. Standardization by specific risk groups is the preferred method to estimate expected disease cases [88]. However, lacking detailed horse information, we calculated expected counts ( $E_{st}$ ) by multiplying the average rate for the period of record by the number of horses in each county (s).

Rearranging Equation (4) allowed for estimation of log risk using a number of random (non-linear) spatial and temporal effects as well as several fixed (linear) covariates of interest as potential risk indicators. The log-risk linear predictor can be represented as,

$$log(r_{st}) = \alpha + \beta_x \cdot X_{st} + \zeta^{SVC} + \xi_s + \varphi_t + \gamma_t + \delta_{st}$$
(5)

$$\zeta^{SVC} = \sum_{k}^{m} f\left(\xi_{s}^{k} SVC_{st}^{k}\right) \tag{6}$$

where  $\alpha$  is an intercept approximating mean WND risk and the  $\beta$  ( $\beta = \beta_1, ..., \beta_x$ ) terms signify coefficients implemented as fixed covariates ( $X_{st}$ ). The  $\zeta^{SVC}$  shown in Equation (5)

stands for spatially varying coefficients (SVC) and is detailed in Equation (6), where the  $f(\cdot)$  represents statistical functions included to assess temperature and precipitation as spatially variable disease indicators. Because relationships between WND and climate were assumed to vary by location, climate covariates were designed to provide location-specific coefficient estimates. That is, rather than estimating a single coefficient that reflects the association of WND to temperature nationwide, the model instead provided a separate, "local" coefficient for WND–temperature correspondence in each US County. The  $SVC_{st}^k$  term in  $f(\cdot)$  represents temperature (k = 1) or precipitation (k = 2) at location *s* and time *t* with local coefficients that vary according to the latent Gaussian spatial process  $\zeta_s^k$ . The spatial effect  $\zeta_s^k$  utilized a Besag formulation (Besag et al., 1991) to approximate a Gaussian Markov random field with individual counties considered conditionally independent unless adjoining as neighbors (sharing at least one connecting point along geographic boundaries).

In addition to the spatial covariates used to estimate SVCs, a separate spatial effect  $(\xi_s)$  was included to quantify model latencies (errors) due to unmeasured or unmodeled variables, spatial autocorrelation, and other data biases. The statistical implementation for  $\xi_s$  was comparable to that of  $\xi_s^k$  but incorporated a BYM configuration (Besag et al., 1991) with scaling between components [66–69] as described for WNV surveillance in Section 2.2. A zero mean constraint (centering on zero) was also enforced in  $\xi_s$  to help reduce confounding between covariates. A zero mean constraint was not used for  $\xi_s^k$  because doing so might have unintentionally altered the magnitudes of SVC estimates.

Beyond the spatial covariates described above, the model included spatiotemporal effects to account for ordered time ( $\gamma_t$ ), unstructured time ( $\varphi_t$ ), and space–time interaction  $(\delta_{st})$ . Ordered time  $(\gamma_t, \text{Equation (5)})$  was specified using a first-order random walk as used in Section 2.2 to temporally smooth virus detection estimates. Unstructured time ( $\varphi_t$ , Equation (5)) and space-time interaction ( $\delta_{st}$ , Equation (5)) were modeled as independent and identically distributed random effects with months (time steps) used as variable levels for unstructured time and county-month combinations used as variable groups for space-time interaction. The random walk helped identify within year time trends, the unstructured time effect captured temporal variation outside of the ordered time trend, and space-time interaction helped detect locations that departed from average risk trends for the study period. Because our model exhibited high-dimensionality, we applied Integrated Laplace Approximation using the INLA package as an alternative to computationally demanding Markov chain Monte Carlo methods [89–91]. Spatiotemporal effects were specified with weakly informative Penalizing Complexity priors [69,92] having parameters  $p_1 = 1$  and  $p_2 = 0.001$  with enforced zero mean constraints to help reduce confounding. All fixed effects were assigned vague zero mean normal priors with a 0.0001 precision.

#### 2.7. Model Selection, Consensus, and Validation

A total of 39 climatic, phylogenetic, and environmental variables were assessed as potential equine WND risk indicators. To avoid multicolinearity among variables, a consensus modeling approach was adopted such that 12 different models were iteratively constructed using data years 2009 to 2017 before application of model averaging [93,94]. As previously described, collinearity diagnostics for independent variables [86] were applied to ensure that the variable combinations specific to individual models posed a low risk of multicolinearity. Comparison of the 12 candidate models revealed that marginal likelihoods and Watanabe-Akaike information criteria (WAIC) among the top 7 models fell within 1% of each other. Therefore, each model was assigned even weighting during model averaging (mean consensus). Because correlative relationships among input covariates and between the covariates and estimated risk were potentially informative from a systems perspective, we visualized all correlative relationships concurrently through network analysis [95,96]. Model validation was conducted through comparison of averaged model estimates to cases reported in 2018 (out-of-sample) using Brier [97] and logarithmic [98] scores. To accomplish this, model predicted 1-case exceedance probabilities for equine WND cases were compared to the county and month-specific case counts reported in 2018. Network analyses conducted during initial covariate selection and model development were then repeated following model validation to concurrently assess relationships between estimated WND risk and the original input covariates. A list of covariates specific to each model and maps depicting 1-case exceedance probabilities in relation to 2018 reported cases are provided in Appendix A (see Figures A1 and A2).

#### 3. Results

Network analysis revealed graph structure (network graph topology) among disease risk indicators (graph nodes) such that covariates from similar groups (e.g., climate, host phylogenetics, land cover) were positioned in relatively close proximity whereas covariates from different groups were at distance (Figure 1). For example, avian species richness (Richness) exhibited strong negative correlation to virus molecular prevalence (Figure 1 [left graph]) and a robust positive correlation to phylogenetic distance (Figure 1 [right graph]), yet these three variables were clustered (grouped) together with other avian community covariates (e.g., nearest taxon, pairwise taxa) due to overall similarity. In a comparable manner, covariates reflecting different drought stages were clustered (Figure 1, right side of both graphs) as were those for land cover (Figure 1, bottom center of both graphs). Estimated risk occupied a graph position nearest virus covariates (prevalence and surveillance) and avian host factors suggesting stronger correlative relationships to these indicators than to land cover or climate variables.



**Figure 1.** Network—correlation correlation graph. Networks display negative (**left**) and positive (**right**) correlations among evaluated input covariates and model estimated risk (larger text, upper left in each graph). Network nodes are labeled to indicate model covariate name and are sized to reflect the absolute magnitude of average Pearson linear correlation (r). Graph edges (lines) are color coded to indicate polarity (blue = negative, red = positive) with widths sized according to legend at bottom to signify absolute magnitude of pairwise correlation (range = -1 to +1). Graph structure among node positions (groups, clusters, or nestedness) approximate average connectivity ("node comunities").

Spatial and temporal smoothing of reported WNV detections from sentinel animal, bird, and mosquito surveillance produced monthly, county-specific estimates for WNV detection probability in the US (Figure 2). The WNV surveillance covariate was found to be an important predictor of WND risk with increased virus detection probability corresponding to increased disease risk (Table 1).

We identified 303 Passeriform species common to both the Cornell Lab of Ornithology eBird database [73] and the Global Phylogeny of Birds [74]. Metadata symbolized with the

maximum clade credibility tree show the proportion of US Counties where each species has been observed and documented by the eBird database (Figure 3). The tree also indicates the species-specific WNV molecular prevalence as estimated by Tolsá et al. [54]. Figure A3 provided with Appendix A lists species names, the proportion of occupied counties, and prevalence for each tree tip.



**Figure 2.** WNV detection probability. WNV surveillance covariate estimated from virus detections reported to the CDC. Mapped counties are color coded according to legend at bottom to indicate WNV detection probability (converted to percent chance). Darker tones indicate an elevated chance of virus detection whereas lighter tones represent a lesser chance of detection. Covariate construction is detailed in Section 2.2.

Covariate	Mean	SD	2.5 Q	97.5 Q
WNV Surveillance	0.14	0.03	0.09	0.20
Human Population Density	-0.03	0.03	-0.09	0.02
Median Household Income	-0.12	0.04	-0.19	-0.05
Population in Poverty (%)	-0.02	0.03	-0.05	0.01
Evergreen/Deciduous Needleleaf Trees	-0.09	0.05	-0.20	0.01
Evergreen Broadleaf Trees	-0.01	0.05	-0.10	0.09
Deciduous Broadleaf Trees	-0.16	0.10	-0.35	0.04
Mixed/Other Trees	-0.20	0.09	-0.38	-0.02
Shrubs	0.05	0.06	-0.07	0.16
Herbaceous Vegetation	0.02	0.08	-0.14	0.18
Cultivated and Managed Vegetation	0.02	0.10	-0.19	0.22
Regularly Flooded Vegetation	0.02	0.05	-0.08	0.11
Urban/Built-Up	-0.12	0.05	-0.21	-0.03
Snow/Ice	-0.02	0.02	-0.07	0.02
Barren	0.07	0.03	0.01	0.13
Open Water	-0.16	0.05	-0.25	-0.06
Elevation	-0.11	0.08	-0.26	0.05

**Table 1.** Estimated coefficients for equine WND. Mean, standard deviation (SD) and 95% Credible Intervals. Coefficients are on the log scale with covariates judged to be significant based on credible intervals shown in bold text.



**Figure 3.** Phylogenetic tree for WNV avian hosts. Phylogenetic tree for 303 Passeriform species. Rectangular boxes near tree tips are color coded according to the legend at top right (Proportion) to indicate the proportion of US Counties where each species has been documented to occur. Rectangles coded as dark red indicate the species occurs in a high proportion of counties whereas lighter, yellow rectangles indicate relatively lower proportions. Circles surrounding tree tips correspond to legend at bottom right (Prevalence) and signify species-specific WNV molecular prevalence. Tree tips without circles indicate that prevalence information was not available at time of analysis. Figure A3 provided with Appendix A lists species names, proportion of occupied counties, and prevalence values for each tree tip.

Combining avian host phylogenetics (Figure 3) with bird occurrence and community composition information allowed for the estimation and mapping of several phylodiversity metrics and average host community WNV prevalence. Figure 4 illustrates the phylogenetic distance metric as a representative example of these results. However, outcomes for all phylodiversity and prevalence metrics are provided in Appendix A as maps (see, Figures A4–A15). As exemplified by phylogenetic distance (Figure 4), estimating community phylogenetic composition from a temporally dynamic perspective indicated that average relatedness varied considerably throughout the year.

The strength and importance of avian host community metrics in estimating WND risk differed by adopted species pool and the specific composition measure (Figure 5). Coefficient estimates for species richness, phylogenetic distance, mean nearest taxon distance, evolutionary distinctiveness, mean pairwise taxa distance, and molecular prevalence are shown under both the dynamic and static species pool assumptions. Coefficients estimated under the dynamic and static assumptions exhibited contrasting polarity (positive or negative signs) within the same covariate and showed differing influence with respect to predictive power. The static implementations of mean nearest taxon distance, evolutionary distinctiveness, and molecular prevalence were determined not to be statistically significant



based on 95% credible intervals, nor were either the static or dynamic versions of mean nearest taxa distance. All other covariates were found to be important indicators of WND risk (Figure 5).

**Figure 4.** Dynamic and static avian phylogenetic distance. Phylogenetic distance covariate under assumption of dynamic (monthly) and static (seasonal) species pools. Dynamic version is shown as a monthly varying time-series surrounding the larger map at center, which represents static phylogenetic distance (May–August). Mapped values have been scaled and centered to highlight locations subject to relative phylogenetic clustering with blue colors (higher than expected relatedness, lower mean genetic distances) and phylogenetic over-dispersion with red colors (lower than expected relatedness, higher mean genetic distances).

Initial inclusion of temperature and precipitation climate variables as fixed model covariates (Models 1–4, see Figure A1) indicated that both covariates were not significant as judged by 95% Credible Intervals including the value 0 (zero). However, temperature and precipitation were found to be important when added as spatially varying coefficients (Models 5–12, see Figure A1). The relative influence ("effect sizes") of temperature and precipitation covariates varied by location and are mapped by US County (Figure 6).

Drought indices were found to be statistically significant in estimating WND risk and produced coefficients with polarity that differed by drought category and intensity (Figure 7). The number of WND cases increased as the proportion of land classified as No Drought (0), Severe Drought (3), and Extreme Drought (4) increased. Conversely, WND cases decreased as land proportions in the Abnormally Dry (1), Moderate Drought (2), and Exceptional Drought (5) categories increased, indicating that drought thresholds are important in understanding WND risk.



**Figure 5.** Avian host community composition, phylodiversity, and WNV prevalence posterior distributions. Vertical axis at left lists covariate names and horizontal axis provides numeric range of coefficient estimates. Distributions are color coded to indicate if the estimate corresponds to a dynamic (monthly varying) or static (season-based, May–August) avian species pool. Dashed vertical line intersects zero on horizontal axis to judge credible intervals and covariate polarity. The static implementations of mean nearest taxon distance, evolutionary distinctiveness, and molecular prevalence were determined not to be statistically significant based on 95% credible intervals. Neither the static or dynamic versions of mean nearest taxa distance were significant. All other other covariates were important indicators of WND risk.

WNV surveillance, median household income, and four land cover types were statistically important indicators of WND risk (Table 1). WNV surveillance and the proportion of Barren land cover in a county exhibited positive correlation to increased WND cases whereas other significant variables showed a negative correspondence to WND. Among covariates negatively associated with WND was median household income. Coefficients estimated for median household income indicated that as average income increased within a county, risk of WND in horses proportionality decreased.

The annual median case rate for equine WND across all US Counties was approximately 3.88 (1.83, 6.67 CI) cases/100,000 horses. However, the distribution of WND risk exhibited a temporal trend that sharply increased between the months of June and August (Figure 8) and showed considerable spatial heterogeneity throughout the year (Figures 9 and A16). Spatial and temporal trends aligned to indicate July–October as months of highest disease risk with time periods before and after showing markedly decreased disease rates (Figures 9 and A16). The spatiotemporal distributions of estimated case counts were comparable to those shown for relative risk and are illustrated in Appendix A (see Figures A17 and A18).



**Figure 6.** Spatially varying coefficients (SVCs) for climate. Maps show SVCs for temperature (**top**) and precipitation (**bottom**) by US County. Mapped colors correspond to legend at bottom and are scaled to show relative change (%) in equine WND cases with respect to the median case rate of 3.88 (1.83, 6.67 CI) cases/100,000 horses. Warm colors (reds) highlight locations where above average temperature (per 0.62 °C anomaly) and precipitation (per 31.52 mm anomaly) correlate to increased WND cases. Cooler colors (blues) indicate locations where above average temperature and precipitation correlate with decreased WND cases. Areas shown in white signify locations with little change in WND cases as temperature or precipitation increase.



**Figure 7.** Relationship of drought to equine WND. Vertical axis at left lists US Drought Monitor categories arranged (**top** to **bottom**) from the least to most dry stage. Horizontal axis is scaled to show relative change (%) in equine WND cases with respect to the median case rate of 3.88 (1.83, 6.67 CI) cases/100,000 horses, which is represented by the dashed vertical line intersecting zero. Point symbols in main plot area represent the mean coefficient estimate for each drought category with a corresponding line defining the 95% CI.



**Figure 8.** Temporal distribution of equine WND relative risk. Vertical axis at left describes model estimated log-risk (absolute risk, case counts on the log scale) and corresponds to smooth curve reflecting intra-annual changes in case intensity. Light gray lines surrounding smooth curve demarcate the estimated 95% CI. Horizontal gray line intersecting 0 (zero) on the left vertical axis represents the US annual median case rate of 3.88 (1.83, 6.67 CI) cases/100,000 horses. Horizontal axis at bottom lists the month of year. Bar chart in background corresponds to right vertical axis providing monthly standardized incidence rates (SIR).

**Figure 9.** Spatiotemporal distribution of equine WND relative risk. Maps depict the spatial and temporal distribution of model estimated WND relative risk by US County for the months July–October. Column aligned at center displays the Contiguous US with lateral columns providing closer views of locations demarcated on US map at top center. Maps are color coded according to legend at bottom such that darker tones signify increased risk and lighter tones represent relatively lower risk. A relative risk value of 1 indicates that model predicted cases were comparable to the expectation given the number of horses in the county, values below 1 highlight counties with relatively low risk, and values above 1 suggest increased risk (higher than expected given the horse population).

Relative Risk

[0.0 - 0.2)

[0.2 - 0.8]

[0.8 - 1.0) [1.0 - 1.2)

[1.2 - 1.8)[1.8 - 2.0) 15 of 34

Julv

August

September

October

### 4. Discussion

As expected, equine WND risk was not uniformly distributed across the US nor was it constant throughout the year. Nationwide risk patterns generally indicated that few locations were free of any disease risk during the July-October period, which was identified as the time of highest risk (Figure 8). However, several multi-county regions exhibited particularly elevated risk (Figure 9) during this timeframe. High-risk clusters (relative risk ratio > 1.0) were identified in Central Pennsylvania, Eastern Iowa, West Texas, Central Montana, Coastal South Atlantic States, Northwest Minnesota, Eastern Washington, the Idaho-Oregon border, and along the central Gulf coast in a region centered on Lower Louisiana. Clusters in Central Pennsylvania and Lower Louisiana were the first high-risk, multi-county areas to emerge following the start of the outbreak season and remained as the most persistent risk areas as summer transitioned to the fall season. Interestingly, the Louisiana and Pennsylvania clusters underlie migratory flight paths linking the Gulf Coast to the Northeastern US that were previously identified as routes of WNV transport by terrestrial bird (non-waterfowl) species [45]. In addition to high-risk clusters, a number of relatively isolated areas (1–2 adjoining counties) showed disproportionately high relative risk based on the associated horse population. For example, individual counties in Colorado, North Dakota, and California displayed risk twice as high as expected (relative

risk ratio  $\ge$ 2.0). Being a population contingent measure, the variability observed in risk distribution suggested that, although WNV has been detected throughout the US, environmental conditions at some times and locations are more conducive to disease propagation than are conditions at other times and locations.

Our analysis revealed that risk spatial and temporal heterogeneity was associated with a number of virus, avian host, and climatic factors. Perhaps the most intuitive indicator of disease was detection of the WNV itself, which was found to be the strongest risk correlate during network analysis (Figure 1) and a robust risk indicator through spatiotemporal modeling (Figure 2). When mapped as a time-series, virus detection probability suggested a general shift from south-to-north during the onset of summer (May–June), a majority coverage of the US during the height of summer (June-September), and a north-to-south recession associated with the beginning of winter (October–November). During the coldest months of year (November-April), highest virus occurrence probabilities were predominantly restricted to southern portions of the US and coastal areas. The apparent annual movement by WNV aligned with seasonal turnover in the US such that virus detection likelihood increased along a latitudinal gradient as temperatures warmed. Exceptions to this latitudinal pattern were identified along the Atlantic and Pacific Coasts where relatively high virus detection probabilities persisted throughout the winter months. We interpret these aberrations from the prevailing pattern to be linked to thermal buffering of coastal areas by oceans. Thermal buffering moderates low-temperature extremes in coastal areas, among other effects, to provide winter refuge for birds (potential reservoirs) that might otherwise migrate [99,100]. However, it is also possible that managed water and sewage systems in some coastal locations facilitate mosquito overwintering [101].

Considering the large geographic extent of our study area, temperature and precipitation were presumed to exhibit spatial non-stationarity with respect to disease risk and were modeled as spatially varying coefficients (SVC). Spatial non-stationarity describes ecological relationships that vary by geographic location or across spatial scales [102,103]. As an example of non-stationarity in a disease system, Olson et al. [104] found that precipitation was correlated to elevated malaria incidence in upland areas of the Amazon basin where water availability was a limiting factor for mosquito habitat. However, precipitation was negatively correlated with malaria in wetlands, where additional rainfall washed out existing mosquito habitats adequate for reproduction. Just as precipitation showed contrasting effects on malaria incidence for upland and wetland locations in the Amazon, we anticipated that precipitation's influence on WND risk would vary by location due to flexible responses by WNV vectors [105] and underlying heterogeneity in prevailing environmental conditions throughout the US. For example, we assumed that increased rainfall would affect WNV enzootic transmission in arid and semi-arid locations such as the Sonoran and Chihuahuan deserts differently than it would in water abundant regions like those found in the Southeast.

Precipitation coefficients exhibited a spatial distribution (Figure 6) with increased precipitation corresponding to elevated WND risk across the northernmost western states, the Northeast, and the majority of Mid-Atlantic states. Increased precipitation was correlated with decreased disease risk in states laying immediately west of the Mississippi flow way, the Southeast, and California. Temperature has been previously linked to WND outbreaks in the US [106–108]. The resulting pattern shown for temperature coefficients (Figure 6) indicated that increasing temperature was correlated with increased WND risk across the Midwest, the Florida peninsula, Texas, and the Dakotas but negatively associated with WND in the Upper Midwest, non-coastal western states, the extreme Northeast, and the states of Mississippi, Alabama, and Georgia. Although the regional patterning shown by mapped temperature and precipitation results (Figure 6) differed with respect to each other, both largely tracked recognized US regional climatic boundaries [109].

Drought demonstrated a dynamic relationship to WND in that non-drought conditions were associated with increased risk, but abnormal dryness and moderate drought had a suppressive effect on disease (Figure 7). As drought intensity increased beyond moderate levels to reach the severe and extreme stages, disease risk sharply increased before once again diminishing to have a negative disease influence during periods of exceptional drought. The dynamic, non-linear correspondence between drought and WND as drought conditions intensified may be indicative of shifts in vector and host availability. Although moderate drought conditions may reduce host and vector water access, severe drought levels may exacerbate the situation sufficiently to instigate vector and host aggregation at the few remaining water sources. As drying conditions further intensify to be classified at the exceptional level, water becomes so rare as to be a limiting factor for virus transmission. Drought and other weather extremes may promote pathogen transmission by concentrating vector and host populations in relatively small areas [107,110,111]. Mosquito vector and avian host aggregation in response to drought has been found to amplify both WNV and St. Louis encephalitis virus in the Southeastern US [112]. Alternating periods of drought and drought-rebound have also been proposed as a mechanism driving WNV epidemics [113,114]. In the drought and drought-rebound scenarios, drought first produces elevated WNV prevalence during vector and host aggregation at limited water sources, and then drought-rebound facilitates virus geographic spread as vectors and hosts disperse to take advantage of newly available habitat created through augmented precipitation.

Network analysis of the WNV enzootic system indicated that WND risk was more closely associated with avian host phylogenetic community structure than climatic, land cover, or human demographic factors (Figure 1). Phylogenetic community structure is an indicator of disease pressure [115–118] and may have implications for WNV transmission. If avian species traits connected to virus transmission are evolutionary conserved, assemblages composed of species with high phylogenetic relatedness may provide greater opportunity for virus sharing, host switching, and spillover. Phylogenetic conservatism postulates that the degree of similarity among species traits, behaviors, and niches is correlated to the degree of relatedness between those species [119]. From this perspective, over-dispersion (lower than expected relatedness among co-occurring species) may be evidence of competitively structured communities whereas phylogenetic clustering (higher than expected relatedness among co-occurring species) may be indicative of environmental filtering [57]. That is, areas of over-dispersion identified by our analysis may signify the occurrence of avian assemblages with greater diversity in terms of both species richness and physiological traits than is expected based on a random draw from the species pool. By comparison, clustered communities might represent assemblages with greater relatedness and more comparable environmental tolerances, physiological characteristics, and life histories than random. Because birds are highly mobile, the general pattern shown by host eco-phylogenetic metrics in our study was one of relative phylogenetic over-dispersion in more southerly and coastal US locations during cooler months (November-March) with comparative clustering across the majority of mid-western and western states. This pattern changed during warmer months (April-October) to show less overall clustering and greater over-dispersion nationwide (Figures 4 and A4–A15). The spatiotemporal transitions observed between areas of over-dispersion and clustering tracked seasonal bird migration patterns in the US. During winter months, many passerine species relocate to either southern portions of the US or its thermally buffered coasts to avoid low-temperature extremes and ground-covering snowfall, whereas, non-migratory species in the clade typically possess metabolic traits that make them resistant to winter climate [120]. Thus, winter onset increases species richness at overwintering grounds in the south and along coasts (i.e., migratory bird influx) while concurrently filtering non-migratory species by cold-tolerance capacity (environmental filtering). The reverse process occurs as warmer spring and summer seasons approach, resulting in increased richness and trait diversity over the terrestrial US as a whole. In support of this interpretation, network analysis

(Figure 1) and mapped community metrics (Figure 4 vs. Figure A4) show strong, positive correlation between species richness and phylogenetic distance.

When applied as WND predictive measures (Figure 5), species richness, phylogenetic distance, and mean nearest taxon were found to positively correlate to outbreak season timing (Dynamic versions exhibit positive polarity), but negatively associate with disease risk spatial distributions during the primary season (Static versions exhibit negative polarity). This signified that avian community composition temporally trended towards becoming less-related (more diverse, more phylogenetically distant) as WND risk increased moving into the outbreak season, but as diversity increased at a geographic location, concomitant disease risk proportionately decreased. In broader ecological terms, return migration from overwintering areas in the spring increased avian diversity across major portions of the US and migration timing largely coincided with the onset of the West Nile outbreak season; however, although the timing of these events was similar, locations with elevated diversity experienced lower WNV transmission rates than did less-diverse locations. Unlike phylogenetic relatedness measures, host (dynamic) molecular prevalence was negatively correlated to outbreak season timing, suggesting that average community virus competency decreased as host diversity and disease risk increased. Molecular prevalence estimated using a seasonal species pool (Static version) was not a statistically important predictor of WND risk, but consistent with other host metrics, exhibited an opposite polarity than that for the monthly varying species pool. The dynamic and static varieties of evolutionary distinctiveness and mean pairwise taxa were weak or insignificant disease risk indicators. However, it is worth noting that these measures showed contrasting polarity to species richness, phylogenetic distance, and Mean nearest taxon, which matches the expectation given that these measures may reflect host species competition [121]. In its totality, our analysis of host eco-phylogenetics suggested that avian species diversity is strongly associated with species migration, amplifies WNV prevalence in the time dimension, and effectively dilutes the virus in geographic space.

Our study faced two major data limitations. First, the ArboNET data that served as a basis for analysis were voluntarily provided to the CDC by counties. As voluntary data, case counts and virus detections were subject to county-level surveillance, collection, and reporting biases. Although our temporally and spatially-explicit model framework aided in accounting for many data biases, it was likely not perfect. Second, data reflecting equine WNV vaccination practices are not systematically collected in the US and were therefore not available for model inclusion. We suspect that vaccination practices may explain some of the WND variation revealed in our study, but controlling for this variation is problematic in the absence of detailed vaccination information. We did choose to assess the influence of household income as a potential proxy of vaccination, under the hypothesis that horses located in relatively high income areas might be more protected from WND due to owners being able to afford more consistent vaccination. Although we found that WND risk decreased in areas with increased income (Table 1), the linkage between household income and horse vaccination rates remains speculative in the absence of additional data.

## 5. Conclusions

Since initial invasion by WNV in 1999, approximately 30,000 horses in the US have been affected by neurologic disease and hundreds more are infected by the virus each year. Because of this, research elucidating the drivers of equine WND is greatly needed to better anticipate the spatial and temporal distribution of disease risk, improve disease surveillance, and avoid future economic impacts to the equine industry and private horse owners. To help meet this need, we applied a disease biogeography perspective and evaluated spatiotemporal relationships among four components of the WNV system: horse hosts, mosquito vectors, avian reservoirs, and climatic and demographic factors. Our findings pinpointed the timing and location of several high-risk WND areas throughout the US and can be used to prioritize virus surveillance and monitoring. Our analysis identified drought as a potential mechanism for virus amplification and demonstrated the importance of accounting for spatial non-stationarity when quantifying interaction between disease risk and meteorological influences such as temperature and precipitation. We also quantified avian host community dynamics across a massive geographic scale to show intra-annual variability in host phylogenetic structure and demonstrate host phylodiversity as a mechanism for virus amplification in time and virus dilution in space. Lastly, we encourage other researchers to expand on our methods for improved understanding of disease systems and to work towards fuller integration of spatiotemporal epidemiology, eco-phylogenetics, and distributional ecology.

**Author Contributions:** D.P.C.P., L.L.R., A.M.P.-M., L.W.C. and K.A.H. conceived the study concept; J.M.H. led and B.L.M., K.I.Y., A.R.H. and D.P. contributed to design of the methodology and data analysis. All authors have read and agreed to the published version of the manuscript.

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**Data Availability Statement:** All disease occurrence and environmental data used in this study are freely available and can be accessed using the hyperlinks provided in Materials and Methods. Derived covariates for West Nile virus detection probability and avian host community phylogenetics are provided in the Appendix A.

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Conflicts of Interest: The authors declare no conflict of interest.

## Abbreviations

The following abbreviations are used in this manuscript:

- CDC Centers for Disease Control and Prevention
- RR Relative Risk
- SIR Standardized Incidence Rate
- SVC Spatially varying coefficients
- US United States of America
- WNV West Nile virus
- WND West Nile disease

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PPT (non-SVC)         PPT (SVC)
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Extreme Drought         Exceptional Drought         Image: Constraint of the sector of
Exceptional Drought       Image: Constraint of the sector of
Fvergreen/Deciduous Needleleaf Trees       Image: Constraint of the second
Evergreen Broadleaf Trees       Image: Constraint of the second sec
Deciduous Broadleaf Trees       Image: Constraint of the second sec
Mixed/Other Trees       Image: Constraint of the second seco
Shrubs       Image: Constraint of the system o
Herbaceous Vegetation       Image: Constraint of the second
Cultivated and Managed Vegetation       Image: College and Col
Regularly Flooded Vegetation         Image: Constraint of the second
Urban/Built-up       Image: Constraint of the second
Snow/Ice     Image: Constraint of the second s
Barren     Image: Constraint of the second sec
Open Water     Image: Constraint of the second
Elevation     Image: Constraint of the second
Evolutionary Distinctivness (D)     Image: Constraint of the second
Evolutionary Distinctivness (S)
Mean Pairwise Taxa (D)
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Kean Nearest Taxon (D)
T Mean Nearest Taxon (S)
Species Richness (D)
Species Richness (S)
E Human Population Density
Median Houshold Income
Image: Transmission of the second

## Appendix A. Tables and Figures

**Figure A1.** Evaluated model covariates. Covariates are listed by category in the first column. Columns following covariate name correspond to twelve models constructed to evaluate covariates (numbered 1–12) and are shaded by row to indicate covariate inclusion. The abbreviation SVC when listed with a covariate name indicates implementation as a Spatially Varying Coefficient, parenthetical listing of (D) signifies the covariate was added under assumption of a dynamic species pool (monthly varying), and parenthetical (S) indicates use of a static pool (seasonal, months May–August). Models 5–12 included climate SVC covariates and were subjected to model averaging to derive mean consensus estimates of WND risk.



**Figure A2.** Model validation. Top row depicts out-of-sample, model predicted 1-case exceedance probability for the months July, August, September, and October 2018. Bottom row depicts locations of actual 1-case exceedance as reported to the CDC.

	Acridotheres cristatellus	0.000322	NA	102	Helmitheros vermiyorum	0.405018	0.000000	203	Bycnonotus cafer	0.001287	NA
2	Acridotheres tristis	0.000322	0.000000	102	Hirundo rustica	0.999035	0.018350	203		0.001237	NA
3	Agelaius phoeniceus	0.998070	0.076436	104	Hylocichla mustelina	0.690897	0.065725	205	Pygochelidon cyanoleuca	0.000322	NA
4	Agelaius tricolor	0.027662	0.010956	105	Icteria virens	0.756192	0.074419	206	Pyrocephalus rubinus	0.110968	0.050000
5	Aimophila ruficeps	0.076874	0.075257	106	lcterus bullockii	0.229977	0.022887	207	Pytilia melba	0.000322	NA
6	Alauda arvensis	0.000322	NA	107	Icterus cucullatus	0.050177	0.033333	208	Quiscalus major	0.071727	0.019898
7	Ammodramus savannarum	0.724670	0.000000	108	Icterus galbula	0.793181	0.047351	209	Quiscalus mexicanus	0.290769	0.222373
8	Amphispiza bilineata	0.086523	NA	109	Icterus graduacauda	0.014152	NA	210	Quiscalus quiscula	0.936314	0.113762
9	Anthus cervinus	0.002573	NA	110	Icterus gularis	0.003538	0.050000	211	Ramphocelus carbo	0.000322	NA
10	Anthus rubescens	0.763268	NA	111	Icterus icterus	0.000643	NA	212	Regulus calendula	0.967192	0.000000
11	Anthus spragueii	0.083307	NA	112	Icterus parisorum	0.045995	NA 0.150515	213	Regulus satrapa Readathraupic coloopo	0.880026	0.000000
12		0.040200	NA	113	Ictorus pustulatus	0.000903	0.130313 NA	214	Rioaria rinaria	0.001930	0.000000
14	Aphelocoma insularis	0.003000	NA	114	Icterus spurius	0.856224	0.009404	215	Salningtes obsoletus	0.704870	0.000000
15	Arremonons rufivirgatus	0.000322	0.075000	116	Icterus wagleri	0.0003224	NA	210	Savornis nigricans	0.093599	0.000000
16	Auriparus flaviceps	0.052107	0.033333	117	lunco hvemalis	0.953040	0.000000	218	Sayornis nigreens	0.887102	0.013991
17	Baeolophus atricristatus	0.045352	NA	118	Junco phaeonotus	0.003216	NA	219	Sayornis saya	0.275008	NA
18	Baeolophus bicolor	0.699260	0.034233	119	Lamprotornis caudatus	0.000322	0.000000	220	Seiurus aurocapilla	0.692184	0.036250
19	Baeolophus inornatus	0.017691	NA	120	Lanius ludovicianus	0.566098	0.102124	221	Serinus serinus	0.000322	0.000000
20	Baeolophus ridgwayi	0.044387	NA	121	Legatus leucophaius	0.000643	NA	222	Setophaga ruticilla	0.844645	0.006232
21	Baeolophus wollweberi	0.005790	NA	122	Leucosticte atrata	0.027983	NA	223	Sialia currucoides	0.224831	NA
22	Basileuterus culicivorus	0.001287	NA	123	Leucosticte australis	0.016082	NA	224	Sialia mexicana	0.122547	NA
23	Basileuterus rufifrons	0.001930	NA	124	Leucosticte tephrocotis	0.064329	NA	225	Sialia sialis	0.889353	0.061689
24	Bombycilla cedrorum	0.982309	0.031842	125	Limnothlypis swainsonii	0.186234	0.000000	226	Sicalis flaveola	0.003538	0.000000
25	Bombycilla garrulus	0.109682	NA	126	Lonchura malacca	0.001287	NA	227	Sitta canadensis	0.866517	0.000000
26	Calamospiza melanocorys	0.170794	0.000000	127	Lonchura punctulata	0.020907	0.025809	228	Sitta carolinensis	0.873593	0.033280
27	Calcarius lapponicus	0.448054	NA	128	Loxia curvirostra	0.343840	0.000000	229	Sitta pusilla	0.235445	0.000000
28	Calcarius ornatus	0.111933	NA	129	Luxia leucoptera	0.141525	NA	230	Sitta pygmaea	0.083950	NA NA
29	calcarius pictus	0.0000042	NA NA	130	Melospiza georgiana	0.84/218	0.00/058	231	Spinualis Zella	0.00128/	INA 0.000000
30	Calocitta formosa	0.000043	NA NA	131	Melospiza illicollill Melospiza melodia	0.000000	0.01258/	232	Spized amenualia Spizella atrogularic	0.004/80	0.000000
31	Camptostoma imberbe	0.000322	NΔ	132	Mimus gilvus	0.000333	0.027231	233	Spizella au ogularis Spizella breweri	0.148601	NΔ
32	Campylorhynchus brunneicanillus	0.045995	0.000000	13/	Mimus gundlachii	0.001287	NA	234	Spizella pallida	0.500161	0.050000
34	Cardellina rubrifrons	0.007076	0.000000	135	Mimus polyglottos	0.841428	0.123759	236	Spizella passerina	0.995497	0.009147
35	Cardinalis cardinalis	0.855902	0.273664	136	Mitrephanes phaeocercus	0.000965	NA	237	Spizella pusilla	0.839820	0.009147
36	Cardinalis sinuatus	0.059183	0.100000	137	Mniotilta varia	0.834030	0.049031	238	Spizella wortheni	0.000322	NA
37	Carduelis carduelis	0.017369	0.000000	138	Molothrus aeneus	0.069797	0.100000	239	Sporophila lineola	0.000322	NA
38	Catharus bicknelli	0.017691	0.000000	139	Molothrus ater	0.998392	0.068381	240	Sporophila torqueola	0.000322	0.100000
39	Catharus fuscescens	0.556127	0.000000	140	Molothrus bonariensis	0.010293	0.000000	241	Stelgidopteryx serripennis	0.972982	0.000000
40	Catharus guttatus	0.892892	0.023405	141	Motacilla alba	0.002895	0.000000	242	Sturnella magna	0.812802	0.050000
41	Catharus minimus	0.497909	0.017709	142	Myadestes townsendi	0.220328	NA	243	Sturnella neglecta	0.465101	NA
42	Catharus ustulatus	0.846574	0.018430	143	Myiarchus cinerascens	0.183017	0.019603	244	Sturnus vulgaris	0.998070	0.108583
43	Catherpes mexicanus	0.125442	NA	144	Myiarchus crinitus	0.832422	0.011297	245	Tachycineta bicolor	0.958508	0.005517
44	Certhia americana	0.824/02	NA	145	Mylarchus nuttingi	0.000643	NA	246	Tachycineta cyaneoviridis	0.000322	NA
45	Chamaea fasciata	0.022837	NA 0.000000	146	Mylarchus sagrae	0.000965	NA 0.000007	247	Tachycineta thalassina	0.143454	NA
40	Cinclus movisanus	0.005520	0.000000	147	Myjarchus tuberculler	0.009649	0.066667	248		0.002573	NA NA
47	Cistothorus palustris	0.053325	0.01/150	140	Myjahorus miniatus	0.001321	0.030873 NA	249		0.000643	0.118/11/
49	Cistothorus platensis	0.465745	NA	150	Myioborus nictus	0.017369	NA	251	Thrvomanes bewickii	0.218077	0.067323
50	Coccothraustes vespertinus	0.326472	NA	151	Mviodynastes luteiventris	0.004503	NA	252	Thrvothorus Iudovicianus	0.756835	0.119619
51	Coereba flaveola	0.001287	0.075000	152	Nucifraga columbiana	0.095851	NA	253	Tiaris olivaceus	0.000322	0.100000
52	Contopus caribaeus	0.000322	NA	153	Oenanthe oenanthe	0.005146	0.000000	254	Toxostoma bendirei	0.008363	NA
53	Contopus cooperi	0.567707	0.000000	154	Oporornis agilis	0.193953	0.000000	255	Toxostoma crissale	0.020907	NA
54	Contopus pertinax	0.007076	NA	155	Oreoscoptes montanus	0.138630	NA	256	Toxostoma curvirostre	0.070119	NA
EE	Contract and Market and	0 170473	0.000000	156	Pachyramphus aglaiae	0.001608	0.000000	257	Toxostoma lecontei	0.005468	NA
55	Contopus sordidulus	0.170475	0.000000								
56	Contopus sordidulus Contopus virens	0.799614	0.008023	157	Parus major	0.001287	0.254411	258	Toxostoma longirostre	0.017047	0.100000
56 57	Contopus soralaulus Contopus virens Corvus albus	0.799614 0.000643	0.008023 NA	157 158	Parus major Passer domesticus	0.001287 0.994854	0.254411 0.140432	258 259	Toxostoma longirostre Toxostoma redivivum	0.017047 0.016726	0.100000 0.231996
56 57 58	Contopus sordidulus Contopus virens Corvus albus Corvus brachyrhynchos	0.799614 0.000643 0.983274	0.008023 NA 0.243132	157 158 159	Parus major Passer domesticus Passer montanus	0.001287 0.994854 0.046317	0.254411 0.140432 0.017445	258 259 260	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum	0.017047 0.016726 0.889675	0.100000 0.231996 0.060414
56 57 58 59	Contopus sordiaulus Contopus virens Corvus albus Corvus brachyrhynchos Corvus caurinus	0.799614 0.000643 0.983274 0.001930	0.008023 NA 0.243132 NA	157 158 159 160	Parus major Passer domesticus Passer montanus Passerculus sandwichensis	0.001287 0.994854 0.046317 0.939852	0.254411 0.140432 0.017445 0.000000	258 259 260 261	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum Troglodytes aedon Trodoversimilie	0.017047 0.016726 0.889675 0.969444	0.100000 0.231996 0.060414 0.039365
56 57 58 59 60	Contopus soraidulus Contopus virens Corvus albus Corvus brachyrhynchos Corvus caurinus Corvus corax	0.799614 0.000643 0.983274 0.001930 0.400129	0.008023 NA 0.243132 NA 0.023299	157 158 159 160 161	Parus major Passer domesticus Passer montanus Passerculus sandwichensis Passerella iliaca Passeria amogan	0.001287 0.994854 0.046317 0.939852 0.779672	0.254411 0.140432 0.017445 0.000000 0.000000	258 259 260 261 262	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum Troglodytes aedon Turdus assimilis Turdus gravi	0.017047 0.016726 0.889675 0.969444 0.000643	0.100000 0.231996 0.060414 0.039365 NA
56 57 58 59 60 61	Contopus sortiouus Contopus virens Corvus albus Corvus dubus Corvus corvus Corvus corvus Corvus corax Corvus corax Corvus corpotoleucus Corvus corpotoleucus	0.799614 0.000643 0.983274 0.001930 0.400129 0.063364	0.008023 NA 0.243132 NA 0.023299 NA	157 158 159 160 161 162	Parus major Passer domesticus Passer untanus Passerculus sandwichensis Passerella iliaca Passerina amoena Passerina carrulaa	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270	258 259 260 261 262 263 264	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum Troglodytes aedon Turdus assimilis Turdus grayi Turdus grayi	0.017047 0.016726 0.889675 0.969444 0.000643 0.009328 0.000322	0.100000 0.231996 0.060414 0.039365 NA 0.107327
56 57 58 59 60 61 62 63	Contopus sortidulus Contopus virens Corvus albus Corvus brachyrhynchos Corvus caurinus Corvus corax Corvus cryptoleucus Corvus imparatus Corvus simparatus	0.799614 0.000643 0.983274 0.001930 0.400129 0.063364 0.000965 0.436475	0.008023 NA 0.243132 NA 0.023299 NA NA 0.084481	157 158 159 160 161 162 163 164	Parus major Passer domesticus Passer montanus Passerculus sandwichensis Passerella iliaca Passerina amoena Passerina caerulea Passerina caris	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221 0.273078	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000	258 259 260 261 262 263 264 265	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum Troglodytes aedon Turdus assimilis Turdus grayi Turdus lilacus Turdus miratorius	0.017047 0.016726 0.889675 0.969444 0.000643 0.009328 0.000322 0.999357	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400
56 57 58 59 60 61 62 63 64	Contopus sorialaulus Contopus virens Corvus albus Corvus aurinus Corvus corax Corvus corax Corvus corax Corvus ryptoleucus Corvus ossifragus Corvus ossifragus Corvus ossifragus	0.799614 0.000643 0.983274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643	0.008023 NA 0.243132 NA 0.023299 NA NA 0.084481 NA	157 158 159 160 161 162 163 164 165	Parus major Passer domesticus Passer nontanus Passerculus sandwichensis Passeria amoena Passerina amoena Passerina carulea Passerina ciris Passerina cuanea	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221 0.273078 0.877131	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.033245	258 259 260 261 262 263 264 265 266	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum Troglodytes aedon Turdus assimilis Turdus argayi Turdus grayi Turdus iliacus Turdus migratorius Turdus olumbeus	0.017047 0.016726 0.889675 0.969444 0.000643 0.009328 0.000322 0.999357 0.000965	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.100000
53 56 57 58 59 60 61 62 63 64 65	Contopus sorialouus Contopus virens Corvus albus Corvus durhynchos Corvus corrinus Corvus corax Corvus corax Corvus orpatoleucus Corvus inparatus Corvus ossifragus Corvus splendens Corvos tistat	0.799614 0.000643 0.983274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.925378	0.008023 NA 0.243132 NA 0.023299 NA NA 0.084481 NA 0.103597	157 158 159 160 161 162 163 164 165 166	Parus major Passer domesticus Passer montanus Passer enolanus Passeriala iliaca Passeria amoena Passerina carulea Passerina crisa Passerina cyanea Passerina cyanea	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.033245 NA	258 259 260 261 262 263 264 265 266 267	Toxostoma longirostre Toxostoma redvivum Toxostoma redvivum Troglodytes aedon Turdus grayi Turdus grayi Turdus grayi Turdus gratorius Turdus plumbeus Turdus plumbeus Turdus gratogalitaus	0.017047 0.016726 0.889675 0.969444 0.000643 0.009328 0.000322 0.999357 0.000965 0.003216	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.100000 NA
56 57 58 59 60 61 62 63 64 65 66	Concopus soraioulus Contopus virens Corvus albus Corvus cardnyrhynchos Corvus cardnyrhynchos Corvus cryptoleucus Corvus cryptoleucus Corvus ossifragus Corvus ossifragus Corvus solita cristata Cyanocitta cristata	0.799614 0.000643 0.983274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.925378 0.112898	0.008023 NA 0.243132 NA 0.023299 NA NA 0.084481 NA 0.103597 NA	157 158 159 160 161 162 163 164 165 166 167	Parus major Passer domesticus Passer motanus Passer culus sandwichensis Passerela iliaca Passerina amoena Passerina culea Passerina culta Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.033245 NA NA	258 259 260 261 262 263 264 265 266 266 267 268	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum Troglodytes aedon Turdus agsimilis Turdus gravi Turdus gravi Turdus migratorius Turdus plumbeus Turdus nufopaillatus Tyranus caudifasciatus	0.017047 0.016726 0.889675 0.969444 0.000643 0.009328 0.000322 0.999357 0.000965 0.003216 0.000322	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.100000 NA 0.100000
53 56 57 58 59 60 61 62 63 64 65 66 67	Contopus soraioulus Contopus virens Corvus albus Corvus aurinus Corvus corax Corvus corax Corvus corax Corvus orpatous Corvus sosifragus Corvus sosifragus Corvus sosifragus Corvus sosifragus Corvus splendens Cyanocitta stelleri Cyanocomps parellina	0.799614 0.799614 0.000643 0.983274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.925378 0.112898 0.000643	0.008023 NA 0.243132 NA 0.023299 NA NA 0.084481 NA 0.103597 NA 0.019395	157 158 159 160 161 162 163 164 165 166 167 168	Parus major Passer domesticus Passer montanus Passer culus sandwichensis Passerial ailaca Passerina caerulea Passerina carulea Passerina vensicolor Perisoreus canadensis Petrocheildon fulva	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.108073	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.03245 NA NA NA 0.033333	258 259 260 261 262 263 264 265 266 266 266 266 268 269	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum Troglodytes aedon Turdus asimilis Turdus grayi Turdus grayi Turdus migratorius Turdus nugratorius Turdus rufopalliatus Tyrannus caudifasciatus Tyrannus cauchii	0.017047 0.016726 0.889675 0.969444 0.000643 0.009328 0.000322 0.999357 0.000925 0.003216 0.000322 0.003220	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.100000 NA
53 56 57 58 59 60 61 62 63 64 65 66 67 68	Contopus sorialoulus Contopus virens Corvus albus Corvus aurinus Corvus corax Corvus corax Corvus corax Corvus corax Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus oplendens Cyanocita stelleri Cyanocota yncas	0.799614 0.000643 0.983274 0.001930 0.400129 0.400129 0.403364 0.000965 0.436475 0.000643 0.925378 0.112898 0.112898 0.000643	0.008023 NA 0.243132 NA 0.023299 NA NA 0.084481 NA 0.103597 NA 0.013395 0.000000	157 158 159 160 161 162 163 164 165 166 167 168 169	Parus major Passer domesticus Passer notanus Passer culus sandwichensis Passerela iliaca Passerina amoena Passerina culua Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon futva Petrochelidon pyrthonota	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.108073 0.937601	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.03245 NA NA 0.033333 NA	258 259 260 261 262 263 264 265 266 267 268 269 270	Toxostoma longirostre Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Tordya sasimilis Turdus grayi Turdus grayi Tyrannus caudifasciatus Tyrannus causifis	0.017047 0.016726 0.889675 0.969444 0.000643 0.009328 0.009322 0.999357 0.000965 0.003216 0.000322 0.31200 0.004181	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.100000 NA 0.100000 NA NA
56 57 58 59 60 61 62 63 64 65 66 67 68 69	Contopus soraiouus Contopus virens Corvus albus Corvus cardnyrhynchos Corvus carachyrhynchos Corvus corax Corvus corax Corvus corax Corvus syntee Corvus syntee Corvus solitagus Corvus solitagus Corvus sellendens Cyanocitta cristata Cyanocitta cristata Cyanocitta cristata Cyanocitta cristata Cyanocompas parellina Cyanocompas parellina Cyanocompas parellina	0.799614 0.000643 0.983274 0.001930 0.400129 0.400129 0.4063364 0.00065 0.436475 0.000643 0.000643 0.112898 0.000643 0.000223 0.0000322	0.008023 NA 0.243132 NA 0.023299 NA NA 0.035299 NA 0.103597 NA 0.0103597 NA 0.0103597 NA	157 158 159 160 161 162 163 164 165 166 167 168 169 170	Parus major Passer domesticus Passer motanus Passer motanus Passer nulus sandwichensis Passerina ilica Passerina careulea Passerina ciris Passerina cyanea Passerina cyanea Pass	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.108073 0.937601 0.006433	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.033245 NA NA 0.033333 NA NA	258 259 260 261 262 263 264 265 266 267 268 269 270 271	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum Troglodytes aedon Turdus grayi Turdus grayi Turdus grayi Turdus grayi Turdus ngratorius Turdus pulmbeus Turdus rufopallatus Tyrannus couchii Tyrannus couchii Tyrannus costoriis Tyrannus dominicensis	0.017047 0.016726 0.889675 0.969444 0.000643 0.009328 0.009322 0.999357 0.000965 0.003216 0.000322 0.031200 0.004181 0.021229	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.100000 NA 0.100000 NA NA NA NA
556 57 58 59 60 61 62 63 64 65 66 67 68 69 70	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus oryptoleucus Corvus sosifragus Corvus sosifragus Corvus sosifragus Corvus sosifragus Corvus splendens Cyanocitta stelleri Cyanocitta stelleri Cyanocorras yncas Dacris cayana Dolichonyx oryzivorus	0.799614 0.799614 0.000643 0.983274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.925378 0.112898 0.000643 0.012223 0.000643 0.012223 0.000643 0.01223 0.000643 0.01288 0.000643 0.025378 0.01288 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000663 0.000643 0.000643 0.000643 0.000643 0.000663 0.00065 0.000663 0.00065 0.000663 0.00065 0.0006 0.0	0.008023 NA 0.243132 NA 0.023299 NA NA 0.0323299 NA 0.03597 NA 0.103597 NA 0.103597 NA 0.0103597 NA 0.010395 0.000000 NA 0.042607	157 158 159 160 161 162 163 164 165 166 167 168 169 170 171	Parus major Passer domesticus Passer montanus Passer culus sandwichensis Passeria amoena Passerina aerulea Passerina curisa Passerina versicolor Perisoreus canadensis Petrochelidon fulva Petrochelidon fulva Petrochelidon pyrrhonota Peucedramus teniatus Phainopepla nitens	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.108073 0.108073 0.937601 0.096433 0.006433	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.033245 NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 268 269 270 271 271	Toxostoma longirostre Toxostoma redivivum Toxostoma rufum Troglodytes aedon Turdus gravji Turdus gravji Turdus migratorius Turdus plumbeus Turdus rufopalilatus Tyrannus candifasciatus Tyrannus cauchii Tyrannus crassirostris Tyrannus forficatus	0.017047 0.016726 0.889675 0.969444 0.000643 0.009328 0.009328 0.009327 0.000965 0.003216 0.003226 0.031200 0.004181 0.021229 0.264715	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.00000 0.123400 0.100000 NA 0.100000 NA NA NA NA NA
555 566 577 588 599 600 61 62 63 64 65 66 67 688 699 700 711	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus curinus Corvus corax Corvus corax Corvus corax Corvus coratus Corvus cosifragus Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus cosifragus Corvus cosifragus Corvus cosifragus Corvus cosifragus Corvus cosifragus Corvus cosifragus Corvus cosifragus Corvus cosifragus Corvus cosifragus Cyanocotras parellina Cyanocotras yncas Dachs cayana Dolichonyx orzivorus Dumetella carolinensis	0.799614 0.000643 0.883274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.000643 0.000643 0.000643 0.000222 0.619813 0.92234091	0.008023 NA 0.243132 NA 0.023299 NA NA 0.03597 NA 0.019395 0.000000 NA 0.019395 0.000000 NA	157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172	Parus major Passer domesticus Passer notanus Passer culta sandwichensis Passercial itaca Passerina amoena Passerina cunta Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon pyrthonota Petrochelidon pyrthonota	0.001287 0.994854 0.046317 0.339852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.108073 0.034095 0.0006433 0.000643	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.033245 NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 266 266 267 270 271 272 273	Toxostoma longirostre Toxostoma redvivvum Toxostoma redvivvum Toroglodytes aedon Turdus grayi Turdus grayi Turdus iliacus Turdus ungratorius Turdus plumbeus Turdus suplumbeus Turdus suplumbeus Tyransus caudifasciatus Tyrannus caudifasciatus Tyrannus causifirstis Tyrannus casifirstis Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus	0.017047 0.017047 0.889675 0.969444 0.000643 0.009328 0.009328 0.000322 0.999357 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.0004181 0.0021229 0.264715 0.032165	0.100000 0.231996 0.060414 0.033365 NA 0.107327 0.000000 0.123400 0.100000 NA NA NA NA NA NA NA 0.100000
555 566 577 588 599 600 61 62 63 64 65 666 677 688 699 700 711 722 72	Concopus soraioulus Contopus virens Corvus albus Corvus caurinus Corvus caurinus Corvus corax Corvus corax Corvus corax Corvus ossifragus Corvus ossifragus Corvus solita cristata Cyanocitta cristata Cyanocitta cristata Cyanocitta cristata Cyanocompas parellina Cyanocorax yncas Dacins cayana Dolichonyx oryzivorus Dumetella carolinensis Elaenia albiceps Emberta nusilla	0.799614 0.000643 0.883274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.000643 0.000643 0.000643 0.000643 0.000223 0.000322 0.00322	0.008023 0.008023 NA 0.243132 NA 0.023299 NA 0.023299 NA 0.034481 NA 0.03597 NA 0.019395 0.000000 NA 0.042607 0.097336 NA	157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172	Parus major Passer domesticus Passer notanus Passer notanus Passer notanus Passerina itaca Passerina amoena Passerina carulea Passerina cis Passerina cyanea Passerina cyanea Pa	0.001287 0.994854 0.046317 0.939852 0.779672 0.208106 0.746221 0.273078 0.877131 0.0746221 0.074523 0.084593 0.084593 0.084593 0.008433 0.034095 0.000643 0.031544 0.031544	0.254411 0.140432 0.017445 0.000000 0.000000 0.019270 0.020000 0.019270 0.020000 0.033245 NA NA NA NA NA NA NA NA NA O.063681 0.003324	2558 2559 260 261 262 263 264 265 266 265 266 267 268 269 270 271 272 273 273	Toxostoma longirostre Toxostoma redvivvum Toxostoma redvivvum Toxostoma rufum Turdus gravi Turdus gravi Tyrannus couchi Tyrannus couchi Tyrannus couchi Tyrannus dominicensis Tyrannus forficatus Tyrannus forficatus Tyrannus savana Tyrannus savana	0.017047 0.016726 0.889675 0.969444 0.000643 0.000328 0.000322 0.000322 0.0003216 0.000322 0.0003216 0.0003216 0.0004181 0.021229 0.264715 0.0264715	0.100000 0.231996 0.060414 0.039365 NA 0.039365 NA 0.039365 NA 0.10327 0.000000 0.123400 0.123400 0.120400 NA NA NA NA NA NA 0.100000 0.000000 0.0000000
555 566 577 588 599 600 61 62 63 64 65 66 667 688 699 700 711 722 733 74	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus organetus Corvus spendens Corvus spendens Cyanocitta stelleri Cyanocitta stelleri Cyanocitta stelleri Cyanocoras parellina Cyanocoras yncas Dacris cayana Dolichonyx oryzivorus Dumtetella carolinensis Eleenia albiceps Emberiza pusilia Emberiza rustica	0.799614 0.000643 0.883274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.436475 0.000643 0.025378 0.012223 0.000322 0.619813 0.924091 0.000322 0.000322	0.008023 NA 0.008023 NA 0.023299 NA 0.023299 NA 0.035297 NA 0.035397 NA 0.035397 NA 0.035397 NA 0.03950 0.090305 NA 0.042607 0.097336 NA NA NA NA NA NA NA NA NA NA NA NA NA	1577715 1588 159916 1601 1611 1622 1633 1644 1655 1666 1677 1688 1699 1700 1711 1722 1733 1744	Parus major Passer domesticus Passer montanus Passer culuus sandwichensis Passerulus sandwichensis Passerina amoena Passerina culue Passerina culue Passerina culue Passerina culue Passerina versicolor Persoreus canadensis Petrochelidon fulva Petrochelidon fulva Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrnopalan Pheucticus udvoicianus Pheucticus udvoicianus Pheucticus melanocephalus Phyliorcomis thorealis	0.001287 0.994854 0.046317 0.339852 0.776672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.108073 0.0397601 0.006433 0.039601 0.0006433 0.030643 0.030643 0.030643 0.000643	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.019270 0.020000 0.033345 NA NA NA NA NA NA NA NA NA NA NA NA NA	2558 2559 260 261 262 263 264 265 266 265 266 269 270 271 272 273 273 275 275 276	Toxostoma longirostre Toxostoma redvivvum Toxostoma redvivvum Torodus sakon Turdus gravi Turdus gravi Turdus migratorius Turdus migratorius Turdus rudopalilatus Turdus rudopalilatus Tyranus caudifasciatus Tyrannus caudifasciatus Tyrannus cothii Tyrannus cothii Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus tyrannus Tyrannus tyrannus	0.017047 0.016726 0.889675 0.969444 0.000643 0.009322 0.009328 0.000322 0.003226 0.003226 0.000322 0.003220 0.003226 0.003226 0.003226 0.003226 0.003226 0.003226 0.00326 0.00326 0.00326 0.00326 0.00326 0.00326 0.00326 0.00326 0.00327 0.00326 0.00326 0.00326 0.00327 0.00326 0.00327 0.00326 0.00327 0.004187 0.00327 0.00218 0.	0.100000 0.231996 0.066414 0.039365 NA 0.107327 0.000000 0.123400 0.100000 NA 0.100000 NA NA NA NA NA NA NA 0.100000 0.000000 0.000000 0.023870
555 566 577 588 599 601 612 623 645 666 667 670 701 712 733 744 755	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus curinus Corvus corax Corvus corax Corvus corax Corvus coratus Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus ossifragus Corvus splendens Cyanocitta cristata Cyanocitta cristata Cyanocitta stelleri Cyanocitta stelleri Cyanocortas parellina Cyanocorax yncas Dachis cayana Dolichonyx orzivorus Dumetella carolinensis Elaenia albiceps Emberiza rustica Emberiza rustica	0.799614 0.000643 0.883274 0.001930 0.400129 0.400129 0.400129 0.436475 0.000643 0.002965 0.436475 0.000643 0.025378 0.112898 0.000643 0.012223 0.619813 0.9200422 0.000322 0.000322 0.000322	0.008023 0.008023 NA 0.243132 NA 0.023299 NA 0.08481 NA 0.03597 NA 0.013395 0.000000 NA 0.013395 0.000000 NA 0.042607 0.097336 NA NA NA NA NA NA NA NA NA NA	1577158 15991600 1611162 1633164 1655166 16666167 166761 16686 1699177 1770 1771 1772 1775 1766 1775 17667	Parus major Passer domesticus Passer motanus Passer culus sandwichensis Passerciulus sandwichensis Passerina amoena Passerina cultara Passerina cultara Passerina cultara Passerina cultara Passerina versicolor Perisoreus canadensis Petrochelidon pyrthonota Petrochelidon pyrthonota Phyloscopus borealis Phylloscopus borealis	0.001287 0.994854 0.046317 0.939852 0.779672 0.278106 0.278106 0.746221 0.273078 0.877131 0.012866 0.084593 0.0184593 0.0184593 0.008439 0.000643 0.0301544 0.219041 0.000322 0.000322	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.000000 0.019270 0.020000 0.033245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 273 274 275 276 277	Toxostoma longirostre Toxostoma redvivvem Toxostoma redvivvem Toxostoma redvivvem Tordba stasimilis Turdus gravi Turdus siliacus Turdus sulgatorius Turdus plumbeus Turdus sulpaliatus Tyransus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caustris Tyrannus caustris Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus melancholicus Tyrannus yenticalis Tyrannus verticalis	0.017047 0.016726 0.889675 0.969444 0.000643 0.009322 0.009322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.000322 0.000324 0.000324 0.000324 0.000324 0.000324 0.000324 0.00034 0.0000000000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.1023400 0.123400 NA 0.100000 NA NA NA NA NA NA NA NA NA NA NA NA NA
555 575 595 600 611 622 633 644 655 666 677 688 699 700 711 722 733 744 755 766	Concopus soraioulus Contopus virens Corvus albus Corvus cardnyrhynchos Corvus cardnyrhynchos Corvus corax Corvus corax Corvus corax Corvus osifragus Corvus osifragus Corvus osifragus Corvus solita cristata Cyanocita cristata Cyanocita cristata Cyanocita cristata Cyanocompas parellina Cyanocorax yncas Dacins cayana Dolichonyx oryzivorus Dumetella carolinensis Elaenia albiceps Emberiza pusilla Emberiza rustica Empidonax alhorum	0.799614 0.000643 0.001930 0.001930 0.001930 0.000935 0.000955 0.0363475 0.000643 0.000643 0.000643 0.000643 0.000643 0.0000322 0.000322 0.000322 0.000322 0.000322 0.000322	0.008023 0.008023 NA 0.243132 NA 0.023299 NA NA 0.033597 NA 0.0133597 NA 0.0133597 NA 0.0133597 NA 0.0133597 NA 0.0133597 NA 0.013357 0.002000 NA 0.013357 0.042607 0.00000 0.042607 0.00000 0.042607 0.00000 0.00000 0.042607 0.000000 0.000000 0.042607 0.000000 0.000000 0.042607 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.00000000	157715 1588 1599 1600 1611 1622 1633 1644 165516 1666 1667 1668 1699 1700 1771 1772 1733 1744 1755 1766 1777	Parus major Passer domesticus Passer notanus Passer notanus Passer notanus Passer notanus Passerina itaca Passerina amoena Passerina carulea Passerina cyanea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Perioreus canadensis Petrochelidon fulva Petrochelidon fulva Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon superioreus Phanlogepla nitens Pheucticus Indovicianus Pheucticus Indovicianus Phylloscopus borealis Phylloscopus tonartus	0.001287 0.994854 0.046317 0.39852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.087733 0.038075 0.000643 0.000643 0.030095 0.000643 0.031041 0.031544 0.213041 0.000322 0.000322	0.254411 0.140432 0.007445 0.000000 0.000000 0.000000 0.000000 0.000000	258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 277 2778	Toxostoma longirostre Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toroglodytes aedon Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus gravi Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus savana Tyrannus savana Tyrannus veciferans Tyrannus veciferans	0.017047 0.016726 0.889675 0.069444 0.000328 0.000322 0.099357 0.000963 0.003220 0.000322 0.000935 0.003220 0.000322 0.0003216 0.003120 0.004181 0.002129 0.032165 0.00328 0.00328 0.047893 0.437440 0.043643 0.001608	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.123400 0.123400 0.123400 NA 0.100000 NA NA NA NA NA NA 0.1000000 0.000000 NA NA NA NA 0.159040 0.023870 NA NA
555 556 559 600 611 622 633 644 655 666 677 688 699 700 711 722 733 744 755 766 777	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus symparatus Corvus sosifragus Corvus sosifragus Corvus splendens Cyanocitta cristata Cyanocitta cristata Cyanocitta cristata Cyanocitta cristata Cyanocitta cristata Cyanocorras yncas Dachis cayana Dolichonyx oryzivorus Dumetella carolinensis Elaenia albiceps Emberiza pusilia Emberiza rustica Empidonax difficilis Empidonax difficilis	0.799614 0.005643 0.883274 0.001930 0.001930 0.001930 0.00965 0.436475 0.000643 0.009653 0.102223 0.0025378 0.112898 0.000643 0.00222 0.00322 0.000322 0.000322 0.000322 0.000322 0.391444 0.055645 0.3605664	0.008023 0.008023 NA 0.243132 NA 0.023299 NA NA 0.032597 NA 0.019395 0.000000 NA 0.019395 0.000000 NA NA NA NA 0.023299 NA NA 0.033597 NA 0.019395 0.000020 NA NA 0.033597 NA NA 0.019395 0.009020 NA NA 0.019395 NA 0.019395 NA 0.023299 NA NA NA 0.033597 NA NA 0.033597 NA 0.033597 NA 0.043132 NA NA 0.033597 NA 0.043132 NA 0.033597 NA 0.033597 NA 0.043132 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.033597 NA 0.0042607 NA 0.000000 NA NA NA 0.0050000 NA NA 0.0050000 NA NA NA 0.0050000 NA NA NA NA NA 0.00507 NA NA NA NA NA NA NA NA NA NA	1577158 15991600161 1611161161161 1611161161161 161116116	Parus major Paser domesticus Passer notanus Passer notanus Passer culus sandwichensis Passerila ailiaca Passerina aerulea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon fulva Petrochelidon fulva Petrochelidon fulva Petrochelidon fulva Petrochelidon fulva Petrochelidon fulva Petrochelidon fulva Petrochelidon fulva Petrochelidon fulva Pheucticus schysopelus Pheucticus schysopelus Pheucticus schysopelus Pheuticus schalus Pheuticus melanocephalus Phylloscopus fuscatus Phylloscopus fuscatus Phylloscopus fuscatus Phyllas hudsnoita	0.001287 0.994854 0.046317 0.393852 0.779672 0.208106 0.746221 0.273078 0.837131 0.012866 0.084593 0.1084593 0.1086433 0.036443 0.036443 0.030544 0.219041 0.000622 0.000622 0.000322	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.033345 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 268 266 267 270 271 272 273 274 275 276 277 278 279 279 278	Toxostoma longirostre Toxostoma redvivvim Toxostoma redvivvim Torostoma rufum Tirodus assimilis Turdus gravi Turdus migratorius Turdus migratorius Turdus migratorius Turdus rufopalilatus Turdus rufopalilatus Tyranus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus consinto Tyrannus consinto Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus tyrannus Tyrannus tyrannus Tyrannus verticalis Tyrannus otefarans Uranginthus bengalus	0.017047 0.016726 0.889675 0.069444 0.000932 0.0000932 0.0000932 0.0000932 0.0000932 0.0000932 0.0000932 0.0000932 0.000000 0.00000000000000000000000000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.100000 NA 0.123400 0.100000 NA NA NA NA NA NA NA NA NA NA NA NA NA
535 566 577 588 599 600 611 622 633 644 655 666 677 711 722 733 744 755 766 777 778	Contopus soraioulus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus coratus Corvus ossifragus Corvus sosifragus Corvus sosifragus Corvus solendens Cyanocitta cristata Cyanocitta cristata Cyanocitta stelleri Cyanocitta stelleri Cyanocorta parellina Cyanocorax nncas Dachis cayana Dachis cayana Dachis cayana Dalichonyx orzivorus Dumetella carolinensis Elaenia albiceps Emberiza rustica Empidonax alnorum Empidonax fluvirens	0.799614 0.000643 0.983274 0.001930 0.400129 0.003364 0.000965 0.436475 0.000643 0.000643 0.000643 0.000643 0.000642 0.000642 0.000632 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322	0.008023 NA 0.243132 NA 0.023299 NA NA 0.084481 NA 0.084481 NA 0.0103507 0.084481 NA 0.0103507 0.097336 NA NA NA NA NA NA NA NA NA NA NA NA NA	1577178 1588179 1600116111611162 16111611162 1	Parus major Passer domesticus Passer notanus Passer culus sandwichensis Passerciulus sandwichensis Passerina amoena Passerina amoena Passerina cyanea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon pyrthonota Petrochelidon pyrthonota Pheucticus udovicianus Pheucticus udovicianus Phyloscopus borealis Phylloscopus torealis Phylloscopus inornatus Pica nutalii	0.001287 0.994854 0.046317 0.338852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.108073 0.036433 0.000643 0.000643 0.000322 0.000322 0.000322 0.000322	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.0019270 0.020000 0.03245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 270 279 279 280	Toxostoma longirostre Toxostoma redvivvem Toxostoma redvivvem Toxostoma redvivvem Toroglodytes aedon Turdus gravi Turdus siliacus Turdus siliacus Turdus sulpumbeus Turdus sulpumbeus Turdus sulpumbeus Turdus sulpumbeus Tyransus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus melancholicus Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Uraeginthus bengalus Vermivora chrysoptera	0.017047 0.016726 0.889675 0.069444 0.000643 0.0009328 0.000322 0.00322 0.003220 0.003220 0.003220 0.003220 0.003220 0.003220 0.004181 0.002129 0.264715 0.02125 0.02125 0.03126 0.03126 0.03275 0.03275 0.03275 0.03126 0.03126 0.03126 0.03126 0.03126 0.031265 0.031265 0.033265 0.033265 0.033265 0.033265 0.033935 0.03395 0.035955 0.035955 0.035955 0.0359555 0.03555555 0.03555	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 NA 0.100000 NA NA NA NA NA 0.100000 0.03370 NA NA NA NA NA NA NA NA NA NA NA NA NA
33         56           57         57           58         59           60         61           62         63           64         65           66         67           68         69           700         711           72         733           744         755           776         777           78         79	Concopus soraidouus Contopus sirrens Corrus albus Corrus trachyrhynchos Corrus cravinus Corrus corax Corrus corax Corrus cryptoleucus Corrus osifragus Corrus osifragus Corrus osifragus Corrus sellendens Cyanocita cristata Cyanocita cristata Cyanocita cristata Cyanocita cristata Cyanocorrax yncas Dacins cayana Dolichonyx orzivorus Dumetella carolinensis Elaenia albiceps Emberiza pusilla Emberiar ustica Empidonax alnorum Empidonax flaviventris Empidonax flaviventris	0.799614 0.000643 0.883274 0.001930 0.400129 0.063364 0.000965 0.00326 0.000643 0.000643 0.000643 0.000643 0.00022 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.00000	0.008023 NA 0.0243132 NA 0.02329 NA NA 0.03239 NA 0.034381 NA 0.03597 NA 0.034381 NA 0.034381 NA 0.034385 0.00000 0.000000 NA 0.000000 NA	1577158 1599160 1600167 1611162 163166 1666167 1667168 1666167 1669 1699 1700 1711 1712 173 174417 1775 1776 1776 1777 1788 1799180 1800	Parus major Passer domesticus Passer notanus Passer notanus Passer notanus Passer notanus Passerina itaca Passerina amoena Passerina carulea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon fulva Petrochelidon fulva Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon superiore Pheucticus Indovicianus Pheucticus Indovicianus Phylloscopus borealis Phylloscopus tonatus Pica nuttalii Picola enucleator	0.001287 0.994854 0.046317 0.393852 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.0188593 0.018873 0.012866 0.006433 0.034095 0.000643 0.81544 0.0006433 0.81544 0.0006322 0.14098 0.000322	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.03245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 268 268 269 270 271 272 273 274 275 276 277 277 278 277 278 279 280 281	Toxostoma longirostre Toxostoma redvivum Toxostoma redvivum Toxostoma rufum Torugiodytes aedon Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus primeratorius Turdus primeratorius Turdus primeratorius Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus savana Tyrannus savana Tyrannus verticalis Tyrannus reagalus	0.017047 0.016726 0.889675 0.069444 0.000643 0.0009328 0.0009328 0.0009328 0.000932 0.000322 0.003216 0.000322 0.003216 0.000322 0.03216 0.000323 0.0024715 0.0009328 0.032165 0.00328 0.032165 0.003216 0.003216 0.00328 0.032165 0.00328 0.032165 0.00328 0.032165 0.00328 0.032165 0.00328 0.032165 0.03215 0.032165 0.0325 0.0325 0.0325 0.0325 0.0325 0.0325 0.0355 0.03555 0.03555 0.03555 0.035555 0.035555 0.035555 0.035555 0.035555 0.035555 0.035555 0.035555 0.035555 0.035555 0.035555 0.035555 0.0355555 0.035555555555	0.100000 0.231996 0.060414 0.033365 NA 0.107327 0.000000 0.123400 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 566 577 588 599 600 61 62 63 64 65 666 67 688 69 9 700 711 722 733 744 755 767 777 778 800	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus symparatus Corvus sosifragus Corvus splendens Cyanocitta cristata Cyanocitta cristata Cyanocorta speellina Cyanocorras parellina Cyanocorras yncas Doaris cayana Dolichonyx oryzivorus Dumetella carolinensis Eleneia albiceps Emberiza pusilia Emberizan zustica Empidonax difficilis Empidonax fulvifrons Empidonax fulvifrons	0.799614 0.000643 0.883274 0.001930 0.400129 0.663364 0.000965 0.436475 0.436475 0.000643 0.000643 0.000643 0.000643 0.000643 0.000322 0.613813 0.000322 0.000322 0.391444 0.0592645 0.3605664 0.001508	0.008023 0.008023 NA 0.243132 NA 0.023299 NA NA 0.03299 NA NA 0.03597 NA 0.019395 0.000000 NA 0.042607 0.09736 NA NA NA 0.019395 NA 0.019395 0.000000 NA NA NA NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA NA NA NA NA NA NA NA NA NA	1577 1588 1599 1600 1611 1621 1631 1641 1652 1666 1677 1688 1666 1667 1668 1667 1668 1666 1677 1771 1772 1773 1774 1775 1776 1776 1777 1788 1799 1709 1701 1775 1776 1777 1777 1777 1777 1777 177	Parus major Passer motanus Passer motanus Passer culus sandwichensis Passerculus sandwichensis Passerelia ilica Passerina amoena Passerina culea Passerina cyanea Passerina cyanea Percochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon visiona Petrochelidon visiona Petrochelidon visiona Petrochelidon visiona Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon visiona Pheuticus ukovicianus Pheuticus ukovicianus Phylloscopus fucatus Phylloscopus fucatus Phylloscopus fucatus Pincola enucleator Pipilo chioruus	0.001287 0.094854 0.046317 0.079672 0.208106 0.0779672 0.208106 0.0746221 0.273078 0.0877131 0.012866 0.084593 0.012846 0.084593 0.00643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000322 0.000549 0.000322 0.000549 0.000322 0.000549 0.000322 0.000549 0.000549 0.000322 0.000549 0.00055555555555555555555555	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.0019270 0.020000 0.032345 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 270 270 277 273 274 277 277 277 277 277 277 277 277 277	Toxostoma longirostre Toxostoma redvivvum Toxostoma redvivvum Torostoma rufum Turdus gravi Turdus gravi Turdus milisaus Turdus miliacus Turdus miliacus Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus gravi Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus tyrannus Tyrannus tyrannus	0.017047 0.016726 0.89675 0.969444 0.009328 0.000643 0.000322 0.999357 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.43740 0.000323 0.43740 0.000365 0.000365 0.000365	0.100000 0.231996 0.660414 0.033955 NA 0.107327 0.000000 0.123400 0.123400 0.123400 0.123400 0.123400 0.123400 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 566 577 588 599 600 611 622 633 644 655 666 677 688 699 700 711 722 733 744 755 767 799 800 811 811 811 811 811 811 811	Contopus soraiouus Contopus virens Corvus albus Corvus cavinythynchos Corvus cavinythynchos Corvus corax Corvus corax Corvus cyptoleucus Corvus cyptoleucus Corvus splendens Corvus splendens Cyanocita cristata Cyanocita tetileri Cyanocita stelleri Cyanocita stelleri Cyanocita stelleri Cyanocita syna Dalichonyx oryzivorus Dachis cayana Dolichonyx oryzivorus Dumetella carolinensis Elaenia albiceps Emberiza pusilla Emberiza rustica Empidonax difficilis Empidonax difficilis Empidonax Mariyentris Empidonax Mariyentis Empidonax Indiventis Empidonax Indiventis Empidonax Indiventis Empidonax Indiventis Empidonax Indiventis Empidonax minimus	0.799614 0.000643 0.883274 0.001930 0.400129 0.063364 0.00965 0.4356475 0.000643 0.0925378 0.112898 0.112898 0.000543 0.001222 0.003322 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.000565 0.00056	0.008023 NA 0.0243132 NA 0.023299 NA NA 0.034491 NA 0.034491 NA 0.034491 NA 0.039305 0.042607 0.097336 NA NA NA NA NA 0.000000 0.000000 0.0400000	15771588 1599160 1611162 1611162 1611162 1611162 1611162 1611162 1611162 161116 16116 161116	Parus major Passer notanus Passer notanus Passer notanus Passer notanus Passer notanus Passerina ilica Passerina amoena Passerina cyanea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon pyrthonota Petrochelidon pyrthonota Pheucticus udovicianus Pheucticus udovicianus Pheucticus udovicianus Phylloscopus borealis Phylloscopus inornatus Pica nutalli Pinicola enucleator Pipilo enyrthrophthalmus	0.001287 0.094854 0.046317 0.393852 0.779672 0.208106 0.7746221 0.0746221 0.0746221 0.012866 0.084593 0.0370601 0.006433 0.0330601 0.006433 0.0006433 0.0006433 0.0006433 0.0006432 0.0006432 0.000322 0.000322 0.000322 0.000322 0.000322 0.140956 0.124156 0.124156 0.124156 0.124156	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.0019270 0.020000 0.03245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 268 269 270 277 278 277 277 278 277 277 278 277 277	Toxostoma longirostre Toxostoma redvivvem Toxostoma redvivvem Toxostoma redvivvem Toroglodytes aedon Turdus gravi Turdus gravi Turdus siliacus Turdus ungratorius Turdus plumbeus Turdus suplembeus Turdus suplembeus Turdus suplembeus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus melancholicus Tyrannus yerticalis Tyrannus verticalis Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyra	0.017047 0.016726 0.89675 0.969444 0.009328 0.000643 0.009328 0.0009328 0.0009328 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.003216 0.003216 0.002326 0.002326 0.009328 0.437490 0.053043 0.053043 0.053043 0.053043 0.053043 0.053043 0.053947 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000965 0.0004181 0.000971 0.0000971 0.0000971 0.0000971 0.00000000000000000000000000000000000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 NA 0.100000 NA NA NA NA 0.100000 0.000000 NA NA NA NA NA NA NA NA NA NA NA NA NA
555 557 588 599 600 611 622 633 644 655 666 667 677 711 722 733 744 755 766 777 777 788 800 811 822 825 779 800 811 822 825 777 777 788 777 777 777 777 777 777 77	Concopus soraidoulus Contopus sirrens Corrus albus Corrus trachyrhynchos Corrus craurinus Corrus corax Corrus corax Corrus cryptoleucus Corrus osifragus Corrus osifragus Corrus solita cristata Cyanocitta cristata Cyanocitta cristata Cyanocitta cristata Cyanocompa parellina Cyanocorax yncas Dolichonyx orzivorus Dometella carolinensis Elaenia albiceps Emberiza pusilla Emberiza pusilla Emberian custica Empidonax flaviventris Empidonax flaviventris Empidonax fummondi Empidonax fummondi Empidonax fummondi Empidonax fummondi Empidonax fummondi Empidonax cidentalis	0.799614 0.000643 0.883274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.0025645 0.000643 0.000322 0.00032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.000032 0.0000000000	0.008023 0.008023 NA 0.0243132 NA 0.023299 NA NA 0.034381 NA 0.03597 NA 0.034381 NA 0.034381 NA 0.034381 NA 0.034385 0.00000 0.000000 0.0000000 NA 0.0000000 NA 0.0000000 NA 0.0000000 NA 0.0000000 NA 0.0000000 NA 0.0000000 NA 0.0000000 NA 0.0000000 NA 0.0000000 NA 0.0000000 NA NA NA NA NA NA NA NA NA NA	1577 1588 1599 1600 1611 1622 1633 1662 1663 1667 1668 1669 1701 1772 1773 1774 1774 1777 1779 1779 1779 1800 1811 1812 1822 1833	Parus major Passer domesticus Passer notanus Passer notanus Passer culus sandwichensis Passerina itaca Passerina itaca Passerina carulea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon fulva Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon soprino gryshol Pheucticus Indovicianus Pheucticus Indovicianus Pheucticus Indovicianus Phylloscopus borealis Phylloscopus Ionantus Pica nuttalli Piciola enucleator Pipilo chiorrurs Pipilo naculeator	0.001287 0.994854 0.994854 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.108265 0.084593 0.1012866 0.084593 0.012866 0.006433 0.034095 0.006433 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000642 0.000322 0.144098 0.000322 0.124156 0.124156 0.124156	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.03245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 266 266 266 266 266 266 270 271 272 273 274 275 276 277 277 277 277 277 277 277 277 277	Toxostoma longirostre Toxostoma redivivum Toxostoma redivivum Toxostoma redivivum Torusostoma rufum Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus plumbeus Turdus plumbeus Turdus plumbeus Turdus rufogaliatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dorinicensis Tyrannus forficatus Tyrannus savana Tyrannus savana Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Vermivora chrysoptera Vidua chalybeata Vidua macroura Vidua butusa Vireo altioquus	0.017047 0.016726 0.889675 0.069444 0.000643 0.0009328 0.0009328 0.0009328 0.000955 0.000965 0.003216 0.003216 0.003120 0.003120 0.003120 0.003120 0.003120 0.003120 0.003120 0.003120 0.003218 0.003218 0.00328 0.00955 0.000965 0.0000965 0.000965 0.000965 0.000965 0.000097 0.000097 0.000097 0.000097 0.000097 0.000097 0.000095 0.000965 0.000972 0.000097 0.000097 0.000097 0.000097 0.000097 0.000097 0.00000 0.00000 0.00000 0.000000 0.000000	0.100000 0.231996 0.060414 0.033365 NA 0.107327 0.000000 0.123400 NA NA NA NA NA NA NA NA NA NA NA NA NA
555 557 588 599 600 611 622 633 644 655 666 677 711 722 733 747 755 766 777 777 788 800 811 822 830 801 822 833 822 833 823 833 833 833 833 833	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus symparatus Corvus symparatus Corvus sosifragus Corvus splendens Cyanocitta cristata Cyanocitta cristata Cyanocitta cristata Cyanocitta stelleri Cyanocitta stelleri Cyanocorras yncas Dachis cayana Dolichonyx oryzivorus Dumetella carolinensis Elaenia albiceps Emberiza pusilia Emberiza rustica Empidonax difficilis Empidonax fulvirens Empidonax fulvirens Empidonax minimus Empidonax cidentalis Empidonax cidentalis Empidonax cidentalis	0.799614 0.000643 0.883274 0.001930 0.400129 0.663364 0.000965 0.436475 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000322 0.000322 0.000322 0.391444 0.053645 0.000322 0.391444 0.3605664 0.00156845 0.36056645 0.00156845 0.36056645 0.00156845 0.36056645 0.00156845 0.36056645 0.00156845 0.3605645 0.00156845 0.3605645 0.00156845 0.3605645 0.00156845 0.3605645 0.00156845 0.3605645 0.00156845 0.3605645 0.00156845 0.3605645 0.00156845 0.3605645 0.00156845 0.3605645 0.00156845 0.3605665 0.36056656 0.36056656 0.36056656656656656656656656656656656656656	0.008023 0.008023 NA 0.243132 NA 0.023299 NA NA 0.032597 NA 0.03557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.0133557 NA 0.000000 NA 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.00000000	1577 1588 1599 1600 1611 1622 1633 1664 1665 1666 1667 1667 1668 1669 1700 1711 1722 1733 1744 1797 1777 1777 1777 1777 1777 1777	Parus major Passer notanus Passer motanus Passer culus sandwichensis Passerculus sandwichensis Passerelia litaca Passerina amoena Passerina cyaneta Passerina cyaneta Passerina cyaneta Passerina cyaneta Passerina versicolor Perisoreus canadensis Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon setta pilo Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Pheuctics ubrovicianus Phylioscopus inornatus Pica hudsonia Pica hudsonia Pica hudsonia Pica hudsonia Pica hudsonia Pipilo chrurus Pipilo chrurus Pipilo enythrophthalmus Pipilo macuatus	0.001287 0.094854 0.046317 0.398852 0.779672 0.208106 0.746221 0.273078 0.877131 0.0746221 0.012866 0.084593 0.012866 0.084593 0.006433 0.034095 0.0006433 0.0006433 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000543 0.024156 0.21457 0.21577 0.215777 0.215777777777777777777777777777777777777	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.0019270 0.020000 0.032345 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 266 266 266 266 266 266 266 266 266	Toxostoma longirostre Toxostoma redivivum Toxostoma redivivum Toxostoma redivivum Torudus asismilis Turdus grayi Turdus grayi Turdus lidacus Turdus ungratorius Turdus plumbeus Turdus suplambeus Turdus suplambeus Turdus suplambeus Turdus suplambeus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus verticalis Tyrannus tyrannus tyrannus verticalis Tyrannus tyrannus	0.017047 0.016726 0.89675 0.969444 0.009528 0.000643 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.000322 0.00094181 0.0003216 0.003216 0.0009328 0.437440 0.063043 0.001608 0.033246 0.000955 0.000948 0.000955 0.0004181 0.000955 0.0004181 0.000957 0.000957 0.000957 0.000957 0.000957 0.000957 0.000957 0.000957 0.000957 0.000957 0.000957 0.000957 0.000055 0.0004181 0.000055 0.0004181 0.000055 0.0004181 0.000055 0.0004181 0.000055 0.0004181 0.000055 0.0004181 0.000957 0.000055 0.0004181 0.000055 0.0004181 0.000055 0.0005	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.123400 0.123400 0.123400 0.123400 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 56 57 58 59 60 61 62 63 64 65 66 67 70 77 78 79 77 78 79 80 81 82 83 84 84 82 83 84 84 85 85 85 85 85 85 85 85 85 85	Concopus soraioulus Contopus sirrens Corrus albus Corrus carachyrthynchos Corrus carachyrthynchos Corrus craachyrthynchos Corrus cyrptoleucus Corrus cyrptoleucus Corrus Corrus cyrptoleucus Corrus C	0.799614 0.000643 0.883274 0.001930 0.400129 0.400129 0.400129 0.400130 0.400129 0.400130 0.400129 0.4	0.008023 NA 0.0243132 NA 0.023299 NA NA 0.034481 NA 0.034481 NA 0.034481 NA 0.034481 NA 0.039736 0.042607 NA 0.042607 NA 0.042607 NA 0.042607 NA 0.009000 NA 0.000000 0.000000 NA 0.000000 NA	1577 1588 1599 1600 1611 1622 1633 1641 1652 1666 1667 1666 1667 1700 1711 1772 1766 1770 1777 1777 1777 1779 1800 1811 1812 1833 1844 1855 1835 1835 1835 1835 1835 1835 1835	Parus major Passer domesticus Passer domesticus Passer dunanus Passer culus sandwichensis Passerina itaca Passerina itaca Passerina carulea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon fulva Petrochelidon fulva Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon gyrchonta Petrochelidon purhonota Petrochelidon purhonota Petrochelidon purhonota Petrochelidon purhonota Petrochelidon purhonota Petrochelidon purhonota Petrochelidon purhonota Petrochelidon purhonota Petrochelidon purhonota Pheucticus udovicianus Pheucticus ludovicianus Phylloscopus fuoratus Phylloscopus fuoratus Pipilo envictoratus Pipilo envictoratus	0.001287 0.094854 0.094854 0.079672 0.208106 0.779672 0.208106 0.0746221 0.0746221 0.0746221 0.0746221 0.012866 0.084593 0.108073 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006432 0.0000322 0.0000322 0.140498 0.021456 0.024156 0.12415	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.0019270 0.020000 0.03245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 270 271 272 273 274 273 274 273 274 277 278 279 270 277 278 279 280 281 282 283 284 285 288 284 285 286 201 271 271 271 271 275 275 275 275 275 275 275 275 275 275	Toxostoma longirostre Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Torostoma redvivum Torods assimilis Turdus gravi Turdus siliacus Turdus sulgatus Turdus sulgatus Turdus sulgatus Turdus sulgatus Tyransus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus melancholicus Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrana tricapilia Tvidus chalybeata Vidus ablubeata Vidus ablubeata	0.017047 0.016726 0.89675 0.969444 0.009328 0.000643 0.009328 0.0009328 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.0032165 0.000328 0.024783 0.032165 0.00328 0.047893 0.037440 0.050438 0.047893 0.037440 0.050954 0.000965 0.0004181 0.000965 0.0004181 0.053947 0.053947 0.000971 0.020264 0.031197 0.25442 0.001971	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 NA 0.100000 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 566 577 588 599 600 611 622 633 644 656 667 688 699 700 717 728 737 744 757 777 788 799 800 811 822 833 844 852 853 854 855 855 855 855 855 855 855	Contopus soraioulus Contopus virens Corvus albus Corvus albus Corvus carvinus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus osifragus Corvus solitar cristata Cyanocita cristata Cyanocita cristata Cyanocita cristata Cyanocorax praes Dacinis cayana Dolichonyx orgzivorus Dumetella carolinensis Elaenia albiceps Emberiza pusilla Emberiza pusilla Emberiza rustica Empidonax floriticii Empidonax floriticii Empidonax floriticii Empidonax floriticii Empidonax fuivientris Empidonax fuivientris Empidonax fuivientris Empidonax fuivientris Empidonax fuivientris Empidonax fuivientris Empidonax cicidentalis Empidonax ruilii Empidonax ruilii	0.79961a 0.000643 0.883274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.0223378 0.000643 0.000643 0.000322 0.00032 0.000032 0.000032 0.000032 0.000032 0.	0.008023 0.008023 NA 0.0243132 NA 0.023299 NA NA 0.03597 NA 0.034381 NA 0.034381 NA 0.034381 NA 0.034381 NA 0.034387 NA 0.0444387 NA 0.034387 NA 0.034387 NA 0.034387 NA 0.034387 NA 0.034387 NA 0.034387 NA 0.034387 NA 0.034387 NA 0.034387 NA NA 0.044487 NA NA NA NA NA NA NA NA NA NA	1577 1588 1599 1600 1611 1622 1633 1606 1611 1622 1633 1666 1677 1666 1677 1767 1777 1777	Parus major Passer domesticus Passer domesticus Passer duranus Passer culus sandwichensis Passerula iliaca Passerina amoena Passerina carulea Passerina cris Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon fulva Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon solito Pheuticus Indovicianus Pheuticus Indovicianus Pheuticus Indovicianus Pheuticus Indovicianus Pheuticus Indoviciana Pica nuttalli Pinicola enucleator Pipilo crythrophthalmus Pipilo agaita di petrophitalana Piranga Ilava Piranga Ilava	0.001287 0.994854 0.994854 0.779672 0.208106 0.746221 0.273078 0.877131 0.012866 0.084593 0.1012866 0.084593 0.012866 0.084593 0.018873 0.337601 0.006433 0.0006433 0.000643 0.000632 0.000322 0.124156 0.024157 0.340946 0.0021872 0.202157 0.2021570	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.03245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 266 265 266 267 270 271 277 278 279 270 277 277 277 277 277 277 277 277 277	Toxostoma longirostre Toxostoma redivivum Toxostoma redivivum Toxostoma redivivum Torostoma rufum Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus plumbeus Turdus plumbeus Turdus plumbeus Turdus supolitatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus savana Tyrannus savana Tyrannus veciferans Tyrannus veciferans Tyrannus veciferans Uraegintus benglus Vermivora chrysoptera Vidua macroura Vidua satus Vireo atlicapulla Vireo atlicapulla Vireo atlicapulla	0.017047 0.016726 0.889675 0.069444 0.000643 0.0009328 0.0009328 0.0009328 0.000955 0.000965 0.000322 0.003216 0.000322 0.032165 0.000322 0.032165 0.003216 0.003216 0.003216 0.003216 0.003216 0.003216 0.003216 0.003216 0.003216 0.003216 0.003216 0.000321 0.0004181 0.000322 0.0004181 0.000322 0.0004181 0.000322 0.0004181 0.000322 0.0004181 0.000322 0.0004181 0.000322 0.000322 0.0004181 0.000322 0.0004181 0.000322 0.0004181 0.000322 0.000322 0.0004181 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.0004181 0.000322 0.0004181 0.000322 0.0004181 0.000322 0.0004181 0.000322 0.0004181 0.0004	0.100000 0.231996 0.060414 0.033365 NA 0.107327 0.000000 0.123400 0.123400 0.123400 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 56 57 58 59 60 61 62 63 64 65 66 67 70 71 72 76 68 86 69 97 70 71 72 75 76 88 88 88 88 88 88 88 88 87 88 88	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus synatus Corvus sosifragus Corvus splendens Cyanocitta cristata Cyanocitta cristata Cyanocitta stelleri Cyanocorras parellina Cyanocorras yncas Dolichonyx oryzivorus Dumetella carolinensis Eleneia albiceps Emberiza pusilia Emberiza nusita Empidonax difficilis Empidonax filiciis Empidonax filiciis Empidonax minimus Empidonax minimus Empidonax minimus Empidonax virescens Empidonax virescens Empidonax virescens Empidonax virescens Empidonax virescens Empidonax virescens Empidonax virescens Empidonax virescens Empidonax virescens Empidonax puberula	0.799614 0.000643 0.883274 0.001930 0.400129 0.063364 0.000965 0.33647 0.000543 0.0025378 0.112898 0.000643 0.001222 0.00322 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.00032 0.0003 0.00003 0.00003 0.00003 0.00003 0.0000000000	0.008023 NA 0.0243132 NA 0.0243132 NA 0.023299 NA 0.034307 NA 0.034481 0.034481 0.03507 NA 0.03907 0.03507 NA 0.03907 0.042607 0.042607 0.042607 0.042607 NA NA NA NA NA NA NA 0.000000 0.000000 0.0400000 NA 0.000000 NA 0.040000 NA 0.0400000 NA 0.0000000 NA 0.0400000 NA 0.0400000 NA 0.0000000 NA 0.0400000 NA 0.0000000 NA 0.0000000 NA 0.0400000 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.02329 NA 0.023200 NA 0.02320 NA 0.02329 NA 0.02320 NA 0.02320 NA 0.02320 NA 0.02320 NA 0.02220 NA 0.02220 NA 0.02220 NA 0.02220 NA 0.00220 NA 0.00220 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.00000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 0.0000 NA 0.000000 NA 0.000000 0.0000 NA 0.000000 0.00000 NA 0.000000 0.00000 0.00000 0.00000 0.000000	1577 1588 1599 1600 1611 1622 1666 1666 1666 1666 1666	Parus major Passer notanus Passer notanus Passer notanus Passer notanus Passer notanus Passer notanus Passerina ilica Passerina amoena Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon pyrthonota Petrochelidon pyrthonota Phylioscopus inornatus Phylioscopus inornatus Pica hudsonia Pica hudsonia Pica nuttalii Pinicola enucleator Pipilo chorruus Pipilo chorruus Pipilo maculatus Piranga Idoviciana Piranapa olivacea Piranapa olivacea	0.001287 0.094854 0.094854 0.0795672 0.208106 0.7795672 0.208106 0.745621 0.273078 0.377057 0.374521 0.0745221 0.074523 0.374507 0.006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000543 0.024456 0.044456 0.024456 0.024456 0.04456 0.024456 0.04456 0.024456 0.024456 0.024456 0.024456 0.04457 0.02456 0.024456 0.02456 0.02456 0.02456 0.02456 0.02456 0.02456 0.02456 0.02456 0.02456 0.02456 0.02456 0.02456 0.024556 0.024556 0.024556 0.024556 0.024556 0.024556 0.024556 0.024556 0.024556 0.024556 0.024556 0.024556 0.024556 0.024556 0.024557 0.024557 0.024557 0.02457 0.02457 0.0245777 0.024577777 0.024577777 0.0245777777777777777777777777777777777777	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.00327 0.020000 0.032245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 270 270 277 278 278 279 270 277 278 279 270 277 278 279 280 277 279 280 283 284 283 284 285 286 287 279 270 280 270 270 271 277 278 270 270 270 270 270 270 270 270 270 270	Toxostoma longirostre Toxostoma redvivvem Toxostoma redvivvem Toxostoma redvivvem Toroglodytes aedon Turdus grayi Turdus grayi Turdus grayi Turdus grayi Turdus grayi Turdus suplembeus Turdus suplembeus Turdus suplembeus Turdus suplembeus Turdus suplembeus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus melancholicus Tyrannus verticalis Tyrannus verticalis Tyrann	0.017047 0.016726 0.89675 0.969444 0.009528 0.000643 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.000952 0.000952 0.000322 0.000322 0.000322 0.000322 0.000322 0.003216 0.003216 0.003232 0.003245 0.000323 0.003246 0.000951 0.000951 0.000264 0.000951 0.000264 0.000951 0.000264 0.00025 0.000951 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.00025 0.000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.123400 0.123400 0.123400 0.123400 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 53 53 57 58 59 59 59 60 61 62 63 64 65 66 66 67 70 71 71 73 74 74 75 77 78 81 82 83 83 84 85 86 87 88 88 88 88 88 88 88 88 88	Concopus soraioulus Contopus virens Corvus labus Corvus carachyrthynchos Corvus crachyrthynchos Corvus crachyrthynchos Corvus crachyrthynchos Corvus cryptoleucus Corvus cryptoleucus Corvus splendens Corvus splendens Cyanocita cristata Cyanocita cristata Cyanocita cristata Dalchonyx oryzivorus Dumetella carolinensis Elaenia albiceps Emberiza pusilla Emberiza pusilla Emberiza rustica Empidonax dinfficilis Empidonax findivientris Empidonax chivifrons Empidonax crialilii Empidonax crialilii Empidonax virescens Empidonax vire	0.799614 0.000643 0.883274 0.001930 0.400129 0.400129 0.400129 0.400129 0.400136 0.400129 0.400136 0.400129 0.400149 0.4	0.008023 NA 0.243132 NA 0.023299 NA NA 0.03299 NA 0.03299 NA 0.034481 NA 0.034481 NA 0.034481 NA 0.034305 NA 0.042607 NA 0.042607 NA NA NA NA NA NA NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA NA 0.000000 NA NA NA NA NA NA NA NA NA NA NA NA NA	1577 1588 1599 1599 1600 1611 1622 1633 1644 1655 1644 1655 1644 1655 1668 1699 1700 1707 1772 1773 1774 1775 1776 1777 1779 1800 1818 1818 1818 1818 1818 1818 181	Parus major Passer domesticus Passer domesticus Passer culus sandwichensis Passer culus sandwichensis Passerina itaca Passerina itaca Passerina carulea Passerina cris Passerina cris Passerina cris Passerina cris Passerina versicolor Perisoreus canadensis Petrochelidon fulva Petrochelidon prythonota Petrochelidon prythonota Pheucticus ulanocephalus Pheucticus landovicianus Phylloscopus fuorantus Phylloscopus fuorantus Pipilo enythrophthalmus Pipilo enythrophthalmus Pipilo enythrophthalmus Pipilo apudoviciana Piranga Iduoviciana Piranga Iduoviciana Piranga culohuratus	0.001287 0.094854 0.094854 0.079672 0.208106 0.779672 0.208106 0.0746221 0.0746221 0.0746221 0.0746221 0.0746221 0.012866 0.084593 0.0108073 0.000643 0.034095 0.000643 0.034095 0.000643 0.031544 0.031544 0.031544 0.000643 0.000322 0.14156 0.219041 0.000322 0.14156 0.124156 0.124156 0.124156 0.124156 0.124156 0.241562 0.241572 0.20050 0.26613094 0.220650 0.661309 0.629114	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.03245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 270 270 277 277 277 277 277 277 277 27	Toxostoma longirostre Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toruds assimilis Turdus gravi Turdus gravi Turdus gravi Turdus plumbeus Turdus plumbeus Turdus plumbeus Tyransus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus gentrifastus Tyrannus dominicensis Tyrannus melancholicus Tyrannus melancholicus Tyrannus savana Tyrannus savana Tyrannus verticalis Tyrannus verticalis Tyranus verticalis Tyrans tricapilia Vidua cablybeata Vidua cablybeata Vidua cablybeata Vidua cablybeata Vidua cablybeata Vidua cablybeata Vidua cablybeata Vidua cablybeata Vireo altiloquus Vireo altiloquus Vireo falvifonis Vireo flaviviridis Vireo flaviviridis Vireo flaviviridis	0.017047 0.016726 0.889675 0.969444 0.009328 0.000643 0.009328 0.0009328 0.0009328 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.001608 0.003216 0.00328 0.032165 0.00328 0.032165 0.00328 0.037440 0.063043 0.063043 0.061608 0.047893 0.037440 0.063043 0.001608 0.047893 0.037440 0.063043 0.000965 0.004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000922 0.0004181 0.000928 0.0004181 0.000928 0.0004181 0.000928 0.000042 0.0000000000000000000000000000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 NA 0.1000000 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 56 57 58 59 90 61 62 63 64 65 66 66 67 70 71 71 73 74 75 76 77 78 80 81 82 83 84 85 86 85 88 88 88 88 88 88 88 88 88	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus ymparatus Corvus solitar Corvus solitar Corvus solitar Corvus splendens Corvus splendens Cyanocita cristata Cyanocita cristata Cyanocita cristata Cyanocita cristata Cyanocita cristata Cyanocompa parellina Cyanocompa parellina Elempia albiceps Emberica rustica Empidonax cocidentalis Empidonax vorienolis Empidonax virescens Empidonax viresce	0.799614 0.000643 0.883274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000643 0.925378 0.000643 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.331444 0.360566 0.001608 0.33163 0.331443 0.35545 0.331444 0.360566 0.001608 0.33163 0.331443 0.035845 0.332036 0.313123 0.03324 0.33483 0.035845 0.331444 0.332036 0.313123 0.031344 0.332036 0.313123 0.03545 0.331444 0.332036 0.313123 0.031344 0.332036 0.313123 0.03545 0.313123 0.031344 0.332036 0.313123 0.03545 0.331444 0.332036 0.313123 0.031344 0.33483 0.332036 0.313123 0.035745 0.33483 0.332036 0.33483 0.332036 0.33483 0.332036 0.3320 0.002220 0.002220 0.002222 0.002220 0.002220 0.002220	0.008023 0.008023 NA 0.0243132 NA NA 0.032399 NA NA 0.03597 NA 0.034481 NA 0.034381 NA 0.034367 0.000000 0.097335 NA NA NA NA NA 0.000000 0.000000 0.000000 0.000000 0.000000 NA NA 0.000000 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA NA 0.000000 NA NA NA NA NA NA NA NA NA NA	1577 1588 1599 1600 1611 1622 1633 1644 1655 1666 1677 1702 1773 1766 1677 1777 1772 1773 1776 1777 1777 1775 1776 1777 1779 1800 1811 1777 1785 1888 1854 1855 1857 1877 1878 1877 1877 1877 1877	Parus major Passer domesticus Passer notanus Passer notanus Passer notanus Passer notanus Passer na motena Passerina itaca Passerina carulea Passerina ciris Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Persoreus canadensis Petrochelidon fulva Petrochelidon fulva Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon gryrhonta Petrochelidon fulva Petrochelidon fulva Petrochelidon superiori Pheuticus Indyovicianus Pheuticus Indyovicianus Pheuticus Indyovicianus Phylloscopus Iomatus Pinicola enucleator Pipilo chlorrurs Pipilo chlorrurs Pipilo anduclatus Pipilo angulatus Piranga Idudviciana Piranga Iudoviciana Piranga pivacea Piranga pubra	0.001287 0.094854 0.046317 0.394854 0.0779672 0.208106 0.3746221 0.273078 0.3746221 0.273078 0.377131 0.012866 0.084593 0.012866 0.084593 0.034095 0.000643 0.034095 0.000643 0.0300643 0.000322 0.000643 0.000645	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.033245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 2600 261 262 263 264 265 266 267 277 278 276 277 277 277 277 277 277 277 277 277	Toxostoma longirostre Toxostoma redvivvum Toxostoma redvivvum Torostoma rufum Torostoma rufum Turdus gravi Turdus gravi Turdus migratorius Turdus migratorius Turdus migratorius Turdus rufopallatus Turdus rufopallatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus crassirostris Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus oficiatus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus vociferans Tyrannus vociferans Uraegintus bengalus Virena talioquus Vireo attioalis Vireo attioalis Vireo attioalis Vireo attioalis Vireo attioalis Vireo favirons Vireo favirons Vireo favirons Vireo favirons Vireo givus	0.017047 0.016726 0.898675 0.999444 0.000643 0.009328 0.000322 0.999357 0.000322 0.0003216 0.000322 0.0003216 0.000322 0.003120 0.004181 0.001229 0.264715 0.031200 0.004181 0.00322 0.031200 0.0437440 0.00323 0.0437440 0.00355 0.043744 0.000955 0.043741 0.000955 0.0004181 0.0004181 0.000457 0.000951 0.0004181 0.0004181 0.000457 0.0004181 0.000457 0.00057 0.00	0.100000 0.231996 0.060414 0.033365 NA 0.107327 0.000000 0.123400 0.1000000 NA NA NA NA NA NA NA NA NA 0.100000 0.023870 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 56 57 58 59 90 00 61 62 63 64 45 66 67 70 71 71 72 74 75 76 77 78 80 81 82 83 84 85 87 99 90 90 90 90 90 90 90 90 90	Contopus soraiouus Contopus virens Corvus albus Corvus cavinythynchos Corvus cavinythynchos Corvus corax Corvus corax Corvus cyptoleucus Corvus cyptoleucus Corvus splendens Corvus splendens Cyanocita cristata Cyanocita cristata Cyanocita stelleri Cyanocita stelleri Cyanocita stelleri Cyanocita stelleri Cyanocita stelleri Cyanocita stelleri Dachis cayana Dolichonyx oryzivorus Dumetella carolinensis Elaenia albiceps Emberiza pusilla Emberiza rustica Empidonax difficilis Empidonax difficilis Empidonax difficilis Empidonax difficilis Empidonax difficilis Empidonax difficilis Empidonax difficilis Empidonax virescens Empidonax coldentalis Ermida troglodytes Euphagus carolinus	0.799614 0.000643 0.883274 0.001930 0.400129 0.063364 0.000965 0.400543 0.000543 0.0025378 0.112898 0.000543 0.001222 0.00322 0.000322 0.000322 0.393144 0.055645 0.360566 0.312323 0.001698 0.31232 0.001222 0.001222 0.00032 0.00032 0.00003 0.00003 0.00003 0.00003 0.0000000000	0.008023 NA 0.028132 NA 0.023192 NA NA 0.032491 NA 0.034481 NA 0.034481 NA 0.030305 0.042607 0.097336 NA NA 0.042607 0.042607 0.042607 0.042607 0.042607 0.042607 0.042607 0.042607 0.042607 NA NA NA 0.000000 0.000000 0.000000 0.000000 0.000000	1577 1588 1599 1600 1611 1622 1633 1644 1655 1666 1677 1702 1702 1702 1702 1702 1702 1702 17	Parus major Passer domesticus Passer motanus Passer motanus Passer motanus Passer motanus Passeria liaca Passerina amoena Passerina cyanea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Persoreus canadensis Petrochelidon futva Petrochelidon pyrthonota Petrochelidon pyrthonota Pheucticus ubavicianus Pheucticus ubavicianus Pheucticus ubavicianus Phylloscopus inornatus Pipilo chorrurus Pipilo chorrurus Pipilo nencietato Pipilo anuclatus Piranga bidentat Piranga flava Piranga pilvacea Piranga pilvacea Piranga pilvacea Piranga sulphuratus Pietorophenax nivalis	0.001287 0.094854 0.094854 0.0795672 0.208106 0.7795672 0.208106 0.779577 0.208106 0.745271 0.273078 0.877131 0.012866 0.084593 0.0006433 0.018073 0.034095 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.000643 0.0000643 0.0000643 0.0000643 0.0000643 0.0000643 0.000	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.003245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 262 263 264 265 266 267 270 271 273 273 274 277 273 277 277 277 277 277 277 277 277	Toxostoma longirostre Toxostoma redvivvem Toxostoma redvivvem Toxostoma redvivvem Toroglodytes aedon Turdus grayi Turdus grayi Turdus grayi Turdus grayi Turdus plumbeus Turdus plumbeus Turdus suplembeus Turdus suplembeus Turdus suplembeus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus suplembeus Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyranus verticalis Tyranus verticalis Tyranus verticalis Tyranus verticalis Tyranus verticalis Tyranus verticalis Tyranus verticalis Tyranus verticalis Tyranus verticalis Tyrens tyrans Viceo athopus Viceo athopus Viceo athopus Viceo tasisniti Vireo tasisniti Vireo tasisniti Vireo favoviridis Vireo flavoviridis Vireo fiseus	0.017047 0.016726 0.89675 0.969444 0.009528 0.000643 0.0009328 0.0009328 0.0009328 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.003226 0.003226 0.031207 0.031200 0.0004181 0.0264715 0.032342 0.00955 0.000951 0.000957 0.0000957 0.000050 0.000184 0.000050 0.000184 0.000050 0.00000000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 0.123400 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 53 53 57 58 59 59 59 600 611 622 633 644 655 666 677 700 700 711 744 755 766 777 788 800 801 802 803 804 803 804 805 805 805 805 805 805 805 805	Contopus sorialoulus Contopus sorialoulus Corvus albus Corvus albus Corvus caurinus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corpationes Corvus corpationes Corvus contra cristata Corvus contra cristata Cyanocita cristata Cyanocita cristata Cyanocorax yncas Dacinis cayana Dolichonyx oryzivorus Dumetella carolinensis Elaenia albiceps Emberiza pusilla Emberiza rustica Empidonax flaviventris Empidonax flaviventris Empidonax flaviventris Empidonax fulficilis Empidonax fulficilis Empidonax rusitis Empidonax rusitis Eritis rusitis Estrilad rusipota Estrilad rusiones Estrilad rusitis Empidonax colientalis	0.79961a 0.090643 0.883274 0.001930 0.400129 0.400129 0.400129 0.400129 0.400129 0.400129 0.400149 0.400149 0.400419 0.400419 0.400419 0.400419 0.400419 0.436475 0.000643 0.436475 0.4364	0.008023 0.008023 NA 0.0243132 NA NA 0.032399 NA NA 0.03597 NA 0.03597 NA 0.03597 NA 0.044481 NA 0.03597 NA 0.044481 NA 0.03528 0.00000 NA 0.000000 NA NA NA NA NA NA NA NA NA NA	1577 1588 1599 1600 1611 1612 1621 1621 1621 1621 1621	Parus major Passer domesticus Passer notanus Passer notanus Passer culus sandwichensis Passerulus sandwichensis Passerina itaca Passerina arculea Passerina cultara Passerina cultara Passerina cultara Passerina ersicolor Perisoreus canadensis Petrochelidon fulva Petrochelidon pyrchonta Petrochelidon pyrchonta Pheucitus ludovicianus Pheucitus Indovicianus Phylloscopus forcatus Phylloscopus forcatus Phylloscopus forcatus Pipilo erythrophthalmus Pipilo erythrophthalmus Pipilo erythrophthalmus Pipilaraga Ideviciana Piranga Iudoviciana Piranga Iudoviciana Piranga Iudoviciana Piranga Iudoviciana Piranga rubra Pitangus sulphuratus Pietcrophenax nivalis Pioceus melanocephalus	0.001287 0.094854 0.094854 0.079672 0.208106 0.779672 0.208106 0.0746221 0.0746221 0.0746221 0.0746221 0.0746221 0.074620 0.084593 0.1012866 0.084593 0.0084593 0.008433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.000643 0.211904 0.000322 0.144098 0.124156 0.	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.019270 0.03245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 260 261 262 263 264 265 266 266 267 270 271 273 273 274 275 276 277 277 277 277 277 277 277 277 277	Toxostoma longirostre Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toroglodytes aedon Turdus gravi Turdus gravi Turdus gravi Turdus gravi Turdus plumbeus Turdus plumbeus Turdus suplatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus melancholicus Tyrannus savana Tyrannus savana Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyrannus verticalis Tyranus verticalis	0.017047 0.016726 0.89675 0.969444 0.000643 0.0009328 0.000643 0.0009328 0.0009322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000328 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.0009932 0.000995 0.000932 0.000955 0.0000000000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 NA 0.1000000 NA NA NA 0.100000 NA NA NA 0.100000 0.023870 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 35 37 37 37 37 37 58 59 59 59 59 59 59 59 59 59 59	Contopus sorialoulus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus osifragus Corvus osifragus Corvus solidadens Corvus splendens Cyanocita cristata Cyanocita cristata Cyanocita cristata Cyanocita cristata Cyanocorax yncas Deanis cayana Dolichonyx orzivorus Dometella carolinensis Elaenia albiceps Emberiza pusilia Emberiza rustica Emberiza pusilia Emberiza pusilia Emberiza rustica Empidonax difficilis Empidonax flaviventris Empidonax flaviventris Empidonax flaviventris Empidonax ruiliti Empidonax cocidentalis Empidonax ruiliti Empidonax ruiliti Empidonax ruitescens Empidonax virescens Empidonax miescens Empidonax miescens Empidonax trigliti Eremojohila alpestris Ertithaus rusocula Estrilda melpoda Estrilda roglodytes Euphagus cyanocephalus Euphagus carolinus	0.799614 0.000643 0.883274 0.001930 0.400129 0.400129 0.400129 0.400129 0.400129 0.4356475 0.000643 0.0252378 0.000643 0.000322 0.613813 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.0131483 0.035645 0.0314848 0.032036 0.000322 0.00032 0.0003 0.00003 0.00003 0.00003 0.00003 0.00000000	0.008023 0.008023 NA 0.0243132 NA 0.023239 NA NA 0.03597 NA 0.034481 NA 0.03597 NA 0.034481 NA 0.03597 NA 0.034481 NA 0.034507 0.00000 0.040000 0.000000 0.000000 NA NA NA NA 0.000000 NA NA NA NA NA NA NA NA NA NA	1577 1588 1599 1600 1611 1621 1621 1631 1641 1651 1667 1677 1688 1666 1677 1688 1666 1677 1771 1771	Parus major Passer notanus Passer notanus Passer notanus Passer culus sandwichensis Passerela liaca Passerina amoena Passerina cyanea Passerina cyanea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Persoreus canadensis Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon pyrrhonota Petrochelidon sensitiva Phanioopeja nitens Pheucticus udivoricianus Pheucticus udivoricianus Pheucticus udivoricianus Pheucticus udivoricianus Pheucticus catus Phylloscopus torealis Phylloscopus inornatus Pijola onucleator Pijola onucleator Pijola onucleator Pipilo chorrus Pipilo enythrophthalmus Pipilo marus Piranga ludoviciana Piranga pidava Piranga pidava P	0.001287 0.094854 0.046317 0.034854 0.0779672 0.208106 0.0779672 0.208106 0.0746221 0.273078 0.0746221 0.012866 0.084593 0.010484593 0.006433 0.000643 0.000643 0.000643 0.124156 0.024157 0.02167 0.02167 0.02167 0.001287 0.0001287	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.032345 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 260 261 262 263 264 265 266 267 270 271 273 273 274 275 276 277 278 277 278 280 270 277 278 280 283 288 288 288 288 288 288 288 288 288	Toxostoma longirostre Toxostoma redivivum Toxostoma redivivum Toxostoma redivivum Torudas asismilis Turdus grayi Turdus grayi Turdus migratorius Turdus migratorius Turdus migratorius Turdus grayi Turdus grayi Turdus grayi Tyranus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus crassirostris Tyrannus crassirostris Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyranus Tyrannus tyranus Tyranus tyranus Tyrannus tyranus Tyranus tyranus Tyranus tyranus Tyranus tyranus Tyranus tyranus Tyranus tyranus Tyranus tyranus Tyranus tyranus Tyranus tyranus Tyranus tyranus Tyranus Tyranus tyranus T	0.017047 0.016726 0.89675 0.969444 0.000642 0.000642 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.0009328 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.0009329 0.000951 0.000265 0.0004181 0.000265 0.000951 0.000952 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000262 0.000951 0.000510 0.000510 0.000510 0.000510 0.000510 0.000520 0.000510 0.000510 0.000510 0.000520 0.000510 0.00050 0.000510 0.00050 0.000510 0.00050 0.000510 0.00050 0.00050 0.000510 0.00050 0.000050 0.00000000	0.100000 0.231996 0.660414 0.039365 NA 0.107327 0.000000 0.123400 0.123400 0.123400 0.123400 0.123400 0.123400 0.123400 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 35 35 35 57 58 59 59 60 61 62 63 64 65 66 66 67 70 77 77 77 77 77 77 77 77 7	Contopus soraiouus Contopus soraiouus Corvus albus Corvus albus Corvus cavrinus Corvus corax Corvus corax Corvus corax Corvus cyptoleucus Corvus sylendens Corvus sylendens Corv	0.799614 0.000643 0.883274 0.001930 0.400129 0.400129 0.400129 0.400129 0.400129 0.400129 0.400149 0.436475 0.000643 0.435475 0.000528 0.000322 0.000322 0.000322 0.331448 0.632036 0.631963 0.000322 0.000322 0.000322 0.000322	0.008023 NA 0.028132 NA 0.02329 NA NA 0.034381 NA 0.034361 NA 0.034461 NA 0.039736 NA 0.042607 NA 0.042607 NA NA 0.000000 0.000000 0.000000 0.000000 NA NA 0.000000 0.000000 NA NA 0.000000 0.000000 NA NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA NA 0.000000 NA NA NA NA NA NA NA NA NA NA	1577 1588 1599 1600 1611 1622 1633 1642 1655 1666 1667 1668 1669 1700 1700 1701 1733 1747 1757 1766 1699 1700 1777 1777 1777 1777 1777 1777 17	Parus major Passer notanus Passer notanus Passer notanus Passer notanus Passer notanus Passer notanus Passer na moena Passerina amoena Passerina cyanea Passerina cyanea Passerina cyanea Passerina cyanea Passerina versicolor Perisoreus canadensis Petrochelidon pyrthonota Petrochelidon pyrthonota Pheucticus talovicanus Pheucticus udavicianus Pheucticus udavicianus Phylloscoup torealis Phylloscoup torealis Phylloscoup torealis Phylloscoup torealis Pipilo dinorturus Pipilo enverurus Pipilo enverurus Pipilo enverurus Pipilo dinaculatus Piranga loivacea Piranga rubra Piranga pilybena pilybena Piranga pilybena pyrtus Pietorophenax nivalis Pioceus curullatus Pioceus curulatus	0.001287 0.094854 0.094854 0.079672 0.208106 0.779672 0.208106 0.0746221 0.012866 0.084593 0.0074623 0.0037601 0.006433 0.034095 0.0006433 0.034095 0.0006433 0.034095 0.0006433 0.219041 0.00322 0.000322 0.000322 0.124156 0.12415	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.003245 0.019270 0.020000 0.032452 0.033333 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 260 261 263 264 265 266 266 266 266 270 272 273 274 275 276 277 277 277 277 277 277 277 277 277	Toxostoma longirostre Toxostoma redvivvem Toxostoma redvivvem Toxostoma redvivvem Toroglodytes aedon Turdus gravi Turdus gravi Turdus gravi Turdus sulgatorius Turdus plumbeus Turdus plumbeus Turdus sulfasciatus Tyrannus cuudifasciatus Tyrannus cuudifasciatus Tyrannus cuudifasciatus Tyrannus cuudifasciatus Tyrannus dorninicensis Tyrannus dorninicensis Tyrannus dorninicensis Tyrannus dorninicensis Tyrannus dorninicensis Tyrannus dorninicensis Tyrannus verticilis Tyrannus verticilis Tyrannus verticilis Tyrannus verticilis Tyrannus verticilis Tyrannus verticilis Tyrannus verticilis Tyranus verticilis Tyranus verticilis Tyranus verticilis Tyrans ellioquus Vieto a chysoptera Vidua chubeata Viteo atricapilla Vireo atricapilla Vireo atricapilla Vireo flavifrons Vireo flavifrons Vireo flavifrons Vireo flavifrons Vireo flavifrons Vireo flavifrons Vireo flavifrons Vireo glivus Vireo glivus Vireo glivus Vireo plinadelphicus Vireo plinadelphicus	0.017047 0.016726 0.89675 0.969444 0.009328 0.000643 0.0009328 0.0009328 0.0009328 0.000322 0.009328 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.00322 0.00322 0.00322 0.00322 0.00322 0.00322 0.00322 0.00322 0.00322 0.00322 0.00955 0.000481 0.000955 0.000481 0.000957 0.0000957 0.0000957 0.0000957 0.0000957 0.0000957 0.0000957 0.0000957 0.0000957 0.00000000000000000000000000000000000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 0.123400 NA 0.100000 NA NA NA NA NA 0.100000 0.000000 0.159040 0.159040 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 35 35 35 57 58 58 59 59 59 59 59 59 59 59 59 59	Contopus sorialoulus Contopus sorialoulus Corvus albus Corvus albus Corvus carvinus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus solfragus Corvus sol	0.79961a 0.79961a 0.009643 0.883274 0.001930 0.400129 0.063364 0.009965 0.400129 0.00325 0.000643 0.000643 0.000643 0.000643 0.000643 0.000643 0.000222 0.000322 0.000322 0.000322 0.000322 0.000322 0.00324 0.000322 0.003248 0.331434 0.6336566 0.001608 0.005645 0.000522 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0032 0.0054 0.0054 0.0054 0.0054 0.0054 0.0054 0.0054 0.0054 0.0054 0.0054 0.0054 0.00	0.008023 0.008023 NA 0.0243132 NA NA 0.032399 NA NA 0.03597 NA 0.03597 NA 0.034381 NA 0.03597 NA 0.034381 NA 0.034385 NA 0.044481 NA 0.034305 NA 0.044381 NA 0.034305 NA NA NA NA NA NA 0.044382 NA NA 0.032589 NA 0.000000 NA NA NA NA NA NA NA NA NA NA	1577 1588 1600 1611 1621 1631 1631 1631 1631 1631 1631	Parus major Passer domesticus Passer notanus Passer notanus Passer culus sandwichensis Passerulus sandwichensis Passerina itaca Passerina carulea Passerina creatica Passerina creatica Passerina creatica Passerina creatica Passerina versicolor Persoreus canadensis Petrochelidon fulva Petrochelidon prythonota Petrochelidon prythonota Petrochelidon prythonota Petrochelidon prythonota Petrochelidon prythonota Petrochelidon prythonota Petrochelidon prythonota Petrochelidon prythonota Petrochelidon prythonota Petrochelidon prythonota Pheuciticus ludovicianus Pheuciticus Indovicianus Pheuciticus Indovicianus Phylloscopus fiorantus Phylloscopus forantus Pica nutalii Pinicola enucleator Pipilo erythrophthalmus Pipilo erythrophthalmus Pipilo erythrophthalmus Pipilo anguloviciana Piranga Iudoviciana Piranga Iudoviciana Pirangu Iudoviciana Pirangu Iudoviciana Pirangu Iudoviciana Pirangu Iudoviciana Pirangu Iudoviciana Pirangu Iudoviciana Pirangu Iudoviciana Pirangu Piceus pulenax nivalis Ploceus vitellinus Ploceus vitellinus Polioptila carulea Polioptila carulea	0.001287 0.094854 0.094854 0.079672 0.208106 0.779672 0.208106 0.0746221 0.0746221 0.0746221 0.0746221 0.0746221 0.0746221 0.074620 0.074520 0.0084593 0.0084593 0.008433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006433 0.0006432 0.000643 0.000643 0.021872 0.220650 0.0221872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.021872 0.220650 0.228344 0.000643 0.021872 0.220650 0.021872 0.220650 0.228344 0.000287 0.000643	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.033245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 260 260 263 264 266 266 266 266 267 270 271 277 277 277 277 277 277 277 277 277	Toxostoma longirostre Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Turdus gravi Tyranus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus melancholicus Tyrannus savana Tyrannus verticalis Tyrannus Sengalus Verem voice forans Urdua chalybeata Vidua chalybeata Vidua chalybeata Vidua chalybeata Vidua chalybeata Vireo alticajulia Vireo cassinii Vireo flavviridis Vireo gravs Vireo glivus Vireo grivus Vireo glivus Vireo grivus Vireo plutaeli Vireo gravs Vireo plutaeli Vireo gravs Vireo plutaeli Vireo gravs Vireo plutaeli Vireo grava Vireo glivus Vi	0.017047 0.016726 0.889675 0.989444 0.000643 0.009328 0.0009328 0.0009328 0.0009328 0.0009328 0.0009326 0.0009326 0.0009326 0.0009326 0.0009326 0.0009326 0.0009327 0.0009327 0.0009327 0.0009327 0.0009327 0.0009327 0.0009328 0.0009327 0.0009328 0.0009328 0.0009328 0.0009327 0.00009327 0.0000937 0.0009327 0.000937 0.000937 0.0000937 0.0000937 0.0	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 NA 0.123400 NA 0.100000 NA NA NA NA NA NA NA NA NA NA NA NA NA
33 35 36 37 38 37 38 37 38 37 38 39 30 30 37 37 37 37 47 47 47 47 47 47 47 47 47 4	Contopus soraidouus Contopus virens Corvus albus Corvus albus Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus corax Corvus operatus Corvus operatus Corvus Corvus operatus Corvus Corvus Corvus operatus Corvus Co	0.799614 0.00643 0.883274 0.001930 0.400129 0.063364 0.000965 0.436475 0.000543 0.002537 0.0025378 0.112898 0.0025378 0.012223 0.00322 0.000322 0.00032	0.008023 NA 0.0243132 NA 0.0243132 NA 0.023299 NA 0.034307 NA 0.034481 NA 0.034481 NA 0.03907 0.042607 0.097336 NA 0.042607 0.042607 0.042607 NA NA NA NA NA 0.000000 0.000000 0.000000 NA 0.040000 NA 0.040000 NA NA NA NA NA NA NA NA NA NA NA NA NA	$\begin{array}{c} 1577\\ 1588\\ 1599\\ 1600\\ 1611\\ 1622\\ 1630\\ 1611\\ 1622\\ 1630\\ 1611\\ 1622\\ 1630\\ 1610\\$	Parus major Passer notanus Passer notanus Passer notanus Passer notanus Passer notanus Passer notanus Passer notanus Passer na moena Passer na amoena Passer na vena Passer na vena Petrochelidon pyrrhonota Petrochelidon pyrrhonota Pheuctics ukovicianus Pheuctics ukovicianus Pheuctics ukovicianus Phylioscopus torealis Phylioscopus inornatus Pica hudsonia Pica hudsonia Pica nutalii Pino an encleator Pipilo chorrus Pipilo chorrus Pipilo andeviana Piranga taloviciana Piranga loviacea Piranga sulphuratus Piectophenax nivalis Pioceus vetulinus Piolosptila californica Polioptila californica Poliptila Polipti	0.001287 0.094854 0.094854 0.0795672 0.208106 0.7795672 0.208106 0.0745221 0.273078 0.3745211 0.0745271 0.012866 0.084593 0.012876 0.0034095 0.000433 0.034095 0.000433 0.000433 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000322 0.000543 0.0214156 0.024156 0.024156 0.024156 0.024156 0.024156 0.024156 0.024156 0.024156 0.024157 0.000543 0.022065 0.000543 0.022065 0.000543 0.022065 0.000543 0.022065 0.000543 0.000543 0.022065 0.000543 0.000545 0.000543 0.000545 0.000543 0.000545 0.000	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.03245 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 260 260 263 264 266 266 266 266 266 266 270 270 277 277 277 277 277 277 277 277	Toxostoma longirostre Toxostoma redivivum Toxostoma redivivum Toxostoma redivivum Toroglodytes aedon Turdus grayi Turdus grayi Turdus grayi Turdus grayi Turdus plumbeus Turdus plumbeus Turdus grayi Turdus grayi Tyranus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus dominicensis Tyrannus yeaticatus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyrannus Tyrannus tyranus Tyrannus tyranus Tyrannus tyranus Tyrannus tyranus Tyrannus tyranus Tyrannus tyranus Tyrannus tyranus Tyrannus verticalis Tyrannus tyranus Tyrannus verticalis Tyrannus tyranus Tyrannus tyranus Tyrannus verticalis Tyrannus tyranus Tyrannus tyranus Tyrannus tyranus Tyrannus tyranus Tyranus tyranus	0.017047 0.016726 0.89675 0.969444 0.009528 0.000642 0.0009328 0.000952 0.000952 0.000952 0.000325 0.000322 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.000325 0.00035 0.00005 0.00005 0.00005 0.00005 0.00005 0.00005 0.00005005 0.00005 0.00005000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 NA NA NA NA NA NA NA NA NA NA NA NA NA
35 56 57 58 59 600 61 62 63 64 65 66 67 70 71 72 73 75 76 68 69 97 70 77 77 77 77 78 88 81 82 82 84 85 99 90 91 93 94 93 94 95 95 95 95 95 95 95 95 95 95	Contopus soraiouus Contopus soraiouus Corvus labus Corvus cadyrhynchos Corvus cadyrhynchos Corvus crachyrhynchos Corvus corax Corvus corax Corvus syptoleucus Corvus syptoleucus Corvus syptoleucus Corvus sylendens Corvus sylende	0.799614 0.000643 0.883274 0.001930 0.400129 0.400129 0.400129 0.400129 0.400129 0.400129 0.400129 0.400129 0.400129 0.400129 0.436475505000000000000000000000000000000000	0.008023 NA 0.0243132 NA NA NA NA 0.03239 NA NA 0.03597 NA 0.03597 NA 0.034431 NA 0.03597 NA 0.03936 NA 0.042607 NA NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA 0.000000 NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA 0.000000 NA NA NA NA 0.000000 NA NA NA NA NA NA NA NA NA NA	$\begin{array}{c} 1577\\ 1588\\ 1599\\ 1600\\ 1620\\ 1620\\ 1721\\ 1722\\$	Parus major Passer domesticus Passer notanus Passer notanus Passer culus sandwichensis Passer la liaca Passerina amoena Passerina cultara Passerina cultara Petrochelidon futva Petrochelidon pyrthonota Petrochelidon pyrthonota Pheucticus uldovicianus Pheucticus uldovicianus Phylloscopus torealis Phylloscopus torealis Phy	0.001287 0.094854 0.094854 0.079672 0.208106 0.779672 0.208106 0.0746221 0.012866 0.084593 0.012866 0.084593 0.012867 0.006433 0.034095 0.0006433 0.034095 0.000643 0.03100 0.000643 0.219041 0.000643 0.219041 0.000643 0.219041 0.000643 0.219041 0.000322 0.000322 0.000322 0.220650 0.661306 0.6211872 0.220650 0.661306 0.6211872 0.220650 0.661306 0.6211872 0.220650 0.661306 0.6211872 0.220650 0.661306 0.6211872 0.000643 0.0221872 0.000643 0.02201872 0.000643 0.02201872 0.000643 0.02201872 0.000643 0.02201872 0.000643 0.02201872 0.0001287 0.020050 0.62110 0.0001287 0.000128	0.254411 0.140432 0.017445 0.000000 0.000000 0.000000 0.019270 0.020000 0.032452 NA NA NA NA NA NA NA NA NA NA NA NA NA	258 259 260 261 263 264 265 266 267 270 270 270 270 277 278 276 277 278 277 278 277 278 277 278 277 278 277 278 277 278 280 270 277 278 280 270 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 277 277 278 280 280 277 277 278 280 277 279 280 280 277 279 280 280 290 290 290 290 290 290 290 290 290 29	Toxostoma longirostre Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toxostoma redvivum Toroglodytes aedon Turdus grayi Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus caudifasciatus Tyrannus dominicensis Tyrannus dominicensis Tyrannus dentificatus Tyrannus melancholicus Tyrannus verticalis Tivea plutybeata Vifeu achalybeata Vifeu atricapilia Vifeo atricapilia Vifeo flavifrons Vifeo flavifrons Vifeo flavifrons Vifeo glivus Vifeo glivus Vifeo glivus Vifeo glivus Vifeo glivus Vifeo plutoni Vifeo	0.017047 0.016726 0.89675 0.969444 0.009328 0.000643 0.009328 0.0009328 0.0009328 0.000322 0.009328 0.000322 0.000322 0.000322 0.003212 0.00322 0.00322 0.00322 0.00322 0.004181 0.024715 0.032126 0.032126 0.009328 0.037440 0.009328 0.00955 0.000488 0.000957 0.0000957 0.0000957 0.0000957 0.0000957 0.0000957 0.00000000000000000000000000000000000	0.100000 0.231996 0.060414 0.039365 NA 0.107327 0.000000 NA 0.100000 NA NA NA NA NA 0.100000 NA NA NA NA NA NA NA NA NA NA NA NA NA
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**Figure A3.** Detailed metadata for WNV avian host phylogenetic tree (Figure 3). Columns list the tree tip number (Tip), species name (Species), the proportion of occupied counties (Proportion), and estimated WNV prevalence for each avian species.



**Figure A4.** Dynamic avian host species richness. Species richness covariate under assumption of a dynamic species pool (monthly varying). Maps are color coded according to legend at bottom with darker tones indicating higher species richness.



**Figure A5.** Static avian host species richness. Species richness covariate under assumption of a static species pool (May–August). Map is color coded according to legend at bottom with darker tones indicating higher species richness.

Feb Mar Jan Apr Jul Aug May Jun Sep Oct Dec Nov **Phylogenetic Distance** -4 -3 -2 -1 0 1 2 3 4

**Figure A6.** Dynamic avian phylogenetic distance. Phylogenetic distance covariate (sum of branch lengths) under assumption of a dynamic species pool (monthly varying). Mapped values have been centered to highlight locations subject to relative phylogenetic clustering (higher than expected relatedness, blue colors) and dispersion (lower than expected relatedness, red colors).



**Figure A7.** Static avian phylogenetic distance. Phylogenetic distance covariate (sum of branch lengths) under assumption of a static species pool (May–August). Mapped values have been centered to highlight locations subject to relative phylogenetic clustering (higher than expected relatedness, blue colors) and dispersion (lower than expected relatedness, red colors).

Jan

May

Sep

Feb Mar Apr Apr Jun Jul Aug Oct Nov Dec



**Mean Nearest Taxon** 

-6 -4 -2 0 2 4 6



**Figure A9.** Static avian mean nearest taxon distance. Mean nearest taxon covariate under assumption of a static species pool (May–August). Covariate reflects average genetic distance between nearest neighbors (sister species) within a community. Mapped values have been centered to highlight locations subject to relative phylogenetic clustering (higher than expected relatedness, blue colors) and dispersion (lower than expected relatedness, red colors).



**Figure A10.** Dynamic avian evolutionary distinctiveness. Evolutionary distinctiveness covariate under assumption of a dynamic species pool (monthly varying). Covariate reflects degree of species isolation on the phylogeny or the average distance of a species to all other species in the community. Mapped counties are color coded according to legend at bottom to indicate increased evolutionary distinctiveness with darker tones.



**Figure A11.** Static avian evolutionary distinctiveness. Evolutionary distinctiveness covariate under assumption of a static species pool (May–August). Covariate reflects degree of species isolation on the phylogeny or the average distance of a species to all other species in the community. Mapped counties are color coded according to legend at bottom to indicate increased evolutionary distinctiveness with darker tones.



**Figure A12.** Dynamic avian mean pairwise taxa distance. Mean pairwise taxa covariate under assumption of a dynamic species pool (monthly varying). Covariate reflects average phylogenetic distance among co-occurring species pairs in a community. Mapped values have been centered to highlight locations subject to relative phylogenetic clustering (higher than expected relatedness, blue colors) and dispersion (lower than expected relatedness, red colors).



**Figure A13.** Static avian mean pairwise taxa distance. Mean pairwise taxa covariate under assumption of a static species pool (May–August). Covariate reflects average phylogenetic distance among co-occurring species pairs in a community. Mapped values have been centered to highlight locations subject to relative phylogenetic clustering (higher than expected relatedness, blue colors) and dispersion (lower than expected relatedness, red colors).



**Figure A14.** Dynamic avian WNV mean molecular prevalence. Molecular prevalence covariate under assumption of a dynamic species pool (monthly varying). Covariate reflects avian community average WNV prevalence based on estimates reported by Tolsá et al. [54]. Mapped counties are color coded according to legend at bottom to indicate increased WNV prevalence with darker tones.



**Figure A15.** Static avian WNV mean molecular prevalence. Molecular prevalence covariate under assumption of a static species pool (May–August). Covariate reflects avian community average WNV prevalence based on estimates reported by Tolsá et al. [54]. Mapped counties are color coded according to legend at bottom to indicate increased WNV prevalence with darker tones.



**Figure A16.** Spatiotemporal distribution of equine WND relative risk. Maps depict the spatial and temporal distribution of model estimated WND relative risk by US County and month of year. Maps are color coded according to legend at bottom such that darker tones signify increased risk and lighter tones represent relatively lower risk. A relative risk value of 1 indicates that model predicted cases were comparable to the expectation given the number of horses in the county, values below 1 highlight counties with relatively low risk, and values above 1 suggest increased risk (higher than expected given the horse population).



**Figure A17.** Estimated equine WND case counts. Maps depict the spatial and temporal distribution of model estimated WND cases by US County and month of year. Maps are color coded according to legend at bottom such that darker tones signify increased case loads and lighter tones represent relatively lower case counts.



**Figure A18.** Estimated equine WND case counts. Maps depict the spatial and temporal distribution of model estimated WND cases by US County for select months during the peak WND outbreak season. Maps are color coded according to legend at bottom such that darker tones signify increased case loads and lighter tones represent relatively lower case counts. Case counts for all months of the year are provided with Appendix A (see Figure A17).

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