

THE INFLUENCE OF CLIMATE, CATTLE DENSITY,  
AND LAKE MORPHOLOGY ON *SPORORMIELLA*  
ABUNDANCES IN MODERN LAKE SEDIMENTS IN THE  
U.S. GREAT PLAINS

by

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## Abstract

*Sporormiella*, a genus of coprophilous fungus, is increasingly used as a qualitative proxy for megafaunal density. Decreased spore abundances in late-Pleistocene and Holocene sediments are thought to signal prehistoric megafaunal population declines and extinctions. However, much remains unknown regarding the dispersal, deposition, and preservation of *Sporormiella*, hindering interpretation. Here we investigate the effects of climate, basin characteristics, and cattle density on the representation of *Sporormiella* in modern lake sediments. We collected surface sediment samples from 24 lakes in a west-east transect across South Dakota, Minnesota, and Wisconsin to test whether *Sporormiella* abundances varied along a precipitation gradient and areas of varying grazing intensity. Pollen and spores were counted from samples taken at the margin and the deepest point of each lake. Unlike other pollen types, relative abundances and concentrations of *Sporormiella* spores were uncorrelated between lake-center and lake-margin samples. For lake-margin samples, *Sporormiella* relative abundances positively correlated with basin variables, i.e. shoreline proximity, lake depth, and lake area. The positive relationship between shoreline proximity and *Sporormiella* abundances differs from prior reports that *Sporormiella* concentrations decrease away from shoreline. For lake-center samples, *Sporormiella* relative abundances were negatively correlated with precipitation and positively correlated with temperature. County-scale cattle density is positively correlated with *Sporormiella* relative abundance for lake-margin samples in a multiple regression model with shoreline proximity as another predictor, suggesting a highly localized signal of megaherbivore density on *Sporormiella*.

These results suggest that *Sporormiella* representation in lake sediments is controlled by multiple factors, including but not limited to megaherbivore density.

## Introduction

At the end of the Pleistocene, over 90 genera of the world's megafauna (animals weighing > 44 kg) went extinct on all continents except Africa (Koch and Barnosky, 2006), with additional extinctions on Madagascar and Pacific islands during the Holocene (Burney et al., 2003; Wood et al., 2011). Paleoecologists have long debated the cause (Martin and Klein, 1984; Koch and Barnosky, 2006) and consequences (Owen-Smith, 1987; Robinson et al., 2005; Gill et al., 2009) of the late-Quaternary megafaunal extinctions. *Sporormiella*, a genus of coprophilous fungi, has increasingly been used as a proxy for megaherbivore population declines during the late Pleistocene and Holocene (Davis, 1987; Burney et al., 2003; Robinson et al., 2005; Davis and Shafer, 2006; Raper and Bush, 2009; Gill et al., 2009; Wood et al., 2011) and for the introduction of domesticated megaherbivores (Davis, 1987; van Geel et al., 2003; Davis and Shafer, 2006; van Geel et al., 2008). Spores of the fungus have been found on the dung of a wide range of extinct and extant megaherbivores including mammoth, bison, cattle and moose, as well as smaller mammals such as rabbit, porcupine and avian herbivores (Ahmed and Cain, 1972; Mead et al., 1986; Mol et al., 2001; Richardson, 2001; van Geel et al., 2008; Wood et al., 2011). In North American records, *Sporormiella* abundances tend to be high in late-Pleistocene sediments, low during the Holocene, and then high again after European settlement (Davis, 1987; Robinson et al., 2001; Gill et al., 2009; Cordova et al., 2011). However, *Sporormiella* spores are sometimes absent at currently grazed sites (Davis, 1987; Davis and Shafer, 2006; Raper and Bush, 2009; Cordova et al., 2011) and it is also poorly understood why *Sporormiella* abundances are relatively low in

Holocene sediments despite the survival of large herbivores and known *Sporormiella* hosts such as bison, elk, and deer.

There is thus a need to understand the ecological and taphonomic processes that govern the representation of *Sporormiella* spores in sedimentary archives. *Sporormiella*'s life cycle requires passage through the herbivore digestive system in order to fruit. Its spores are then excreted in dung and transported to vegetation where they can be consumed once again, continuing the cycle. Alternatively, spores might be deposited in lake sediments or elsewhere on the landscape where they then lie dormant. Spores fruit in chains within a spore-bearing cell called an ascus, but asci often burst and *Sporormiella* spores usually are found in sediments as disaggregated individual cells, rather than as chains. It is unlikely that spores disperse far from their source because of the positioning of *Sporormiella* and its dung source near the ground, where wind transport is ineffective (van Geel et al., 2003; Davis and Shafer, 2006). *Sporormiella* presence/abundance in lake sediments thus has been attributed to deposition by slopewash and short-distance aerial transport from dung in the watershed (Davis et al., 1977; van Geel et al., 2003; van Geel et al., 2008). In modern fungal communities, fungi abundance and diversity is affected by climatic factors, such as precipitation (moisture availability) and temperature (Yocom and Wicklow, 1980; Wicklow and Angel, 1983; Richardson, 2001; Masunga et al., 2006). There is a need to clarify the importance and relative contributions of these variables, climatic, morphologic, and land use controls, to better interpret *Sporormiella* in terrestrial and lacustrine records.

An increasing number of studies are relating *Sporormiella* abundances in contemporary sediments to herbivore abundance and grazing history, using soil and leaf-litter

samples (Blackford and Innes, 2006; Graf and Chmura, 2006; Cordova et al., 2011) and modern and historic lake sediments (Davis and Shafer, 2006; Raper and Bush, 2009). These studies conclude that *Sporormiella* is an indicator of highly localized grazing and, in historic sediments, is often but not always present in high abundance when herbivores are present. Graf and Chmura (2006), for example, successfully used coprophilous fungi as indicators of grazed versus ungrazed plots. *Sporormiella* was also present in dung of moa and avian herbivores from New Zealand and *Sporormiella* abundances in soil cores appears to track their decline (Wood et al., 2011). *Sporormiella* abundance has been linked to the nearby density of megaherbivores in historic sediments, (Raper and Bush, 2009), but the scale at which cattle density controls *Sporormiella* representation remains unclear. Raper and Bush (2009) showed that high *Sporormiella* abundances are associated with nearby grazing cattle, but also reported within-lake variations in *Sporormiella* concentrations. They found that *Sporormiella* concentrations rapidly decreased within the first 20 m from shore, presumably due to the limited dispersal capability of *Sporormiella*. Given these findings, Raper and Bush (2009) proposed an alternate hypothesis for the late-Pleistocene and Holocene *Sporormiella* declines, i.e. that they may have been caused by rising lake levels that increased the distance between the cored location and the *Sporormiella* source area.

There remains a need to investigate whether *Sporormiella* abundances are controlled by factors such as climate that operate at regional and larger scales. Using a collection of 24 lakes from an east-west transect across the northern Great Plains of the United States, we investigate the relative importance of a collection of climatic, morphologic, and land use

variables on the representation of *Sporormiella* within and across lake basins. We then discuss the implications for interpretation of *Sporormiella* in the modern and fossil record.

## **Methods**

### *Study Area*

The Great Plains is characterized by a steep and relatively uniform precipitation gradient (Fig. 1), with drier conditions to the west, resulting in a gradual change in vegetation from eastern deciduous forests, dominated by *Quercus* (oak), *Ulmus* (elm), *Fraxinus* (ash), *Populus* (poplar), *Acer* (maple), and *Betula* (birch) changing westwards to tallgrass and shortgrass prairie and finally a shrub steppe (McAndrews and Wright, 1969). The gradual and consistent change in precipitation and the resulting change in vegetation makes the Great Plains a classic area for gradient analyses of the effect of moisture-related climatic factors on ecological processes, both present (Epstein et al., 1996; Lane et al., 1998; Bradford et al., 2006) and past (Grimm, 2001; Clark et al., 2001; Nelson and Hu, 2005).

The variation in cattle density and pasture extent across the Great Plains further enhances this region as a place to study the controls on *Sporormiella* representation (Fig. 1). Moving from west to east there is a rapid increase from pasture to cropland (Fig. 1), but the county-level cattle density shows a different pattern, with distinct clusters of high cattle density in eastern South Dakota and the Driftless Area of southwestern Wisconsin. Free-range grazing is most prominent in South Dakota, while in Wisconsin dairy farming and feedlot enclosures are the primary form of cattle rearing.

### *Field Methods*

We sampled 24 lakes across a west-east transect through southern South Dakota, Minnesota, and Wisconsin (Fig. 1) to investigate the impact of aridity, basin morphology, and land use variables on the abundances of *Sporormiella*. Sample sites were chosen using GoogleEarth, road atlases, and field observation and were based primarily on accessibility (proximity to access roads), size, and spacing along the transect.

Two surface samples were collected at each lake: one from near the lake margin (10 to 50 m from the margin depending on accessibility) and the other from the lake ‘center’, defined here as the deepest part of the basin. At some lakes we took multiple samples if we did not collect sufficient sediment in the first attempt. Water depth was measured using a Secchi disk. The top 5 to 10 cm of sediment were collected using a Hongve gravity sampler. Amount of sediment retrieved (depth in cm) was recorded, and samples were described and stored in coolers with ice. Spatial coordinates of each sampling point were taken using a handheld GPS unit. At each site the presence or absence of cattle, pigs, geese, or other potential coprophilous fungal hosts were noted, and when present, their abundance was estimated qualitatively. The presence and abundance of tree types, aquatic plants, and herbs were estimated at each site using an identification guide (Symonds, 1958). Conductivity was also measured at each lake using a conductivity meter.

### *Pollen Analysis*

In the lab, pollen and spores were extracted from the sediment using protocols modified from methods described by Faegri and Iversen (1989). 10 mL of sediment was processed for each

sample (20 mL for highly flocculent samples). Three *Lycopodium* tablets (stored in a calcium carbonate base) of known concentration (18583 spores per tablet, 3 tablets =  $55749 \pm 2292$  spores added per sample) were added to each sample, and carbonates were removed by boiling in 10% HCl. Humic acids were removed by boiling in a 10% KOH solution. Samples were sieved using 160  $\mu\text{m}$  mesh screen to remove organics and large sand grains. Samples were then boiled in a 48% HF solution to remove sand and clay, and subsequently boiled in 10% HCl to remove siliceous clumps formed during silica digestion. Samples were then boiled in a 9:1 acetic anhydride:sulfuric acid mixture to remove most organic matter, and then rinsed with Tertiary Butyl Alcohol to remove water. Slides were prepared using silicone oil (Faegri and Iversen, 1989).

For each sample, we performed a pollen count of at least 350 grains (arboreal plants, herbs, aquatics, and fungi), identifying pollen types as well as *Sporormiella* and other coprophilous fungi. Modern reference materials and keys from Kapp (2000) and Doveri (2007) were used to identify pollen and fungal spores, respectively. Though rare, when *Sporormiella* was present in chains, spores were counted individually. Asci, the *Sporormiella* spore-bearing cells, were counted separately from spores and were excluded from the percent abundance and concentration data. Percent abundances were calculated relative to a sum consisting of all pollen and fungal types. Pollen and fungal concentrations were calculated by multiplying the ratio of counted pollen to counted *Lycopodium* by the known concentration of *Lycopodium* spores (Stockmarr, 1971).

### *Other Data Sources and Statistical Analyses*

We obtained climatic data from WorldClim (Hijmans et al., 2005), which consists of climatic averages calculated from weather station data for 1960 to 1990 AD. We compiled county-level cattle density data from the USDA National Agricultural Statistics Survey (<http://quickstats.nass.usda.gov/>), by collecting the number of total beef and milk cows per county, reported at the end of 2007. We then divided this by county area, resulting in individual cows/acre/county. We gathered lake depth and area from the Department of Natural Resources websites for each state. Information on the proportion of land area used as cropland and pasture is from the Global Agricultural Lands in the Year 2000 dataset (Ramankutty et al., 2008). We used the “extract values to points” function in ArcGIS version 9.1 by ESRI to assign the climatic and land use values to the lat/lon coordinates for each lake. This function uses bilinear interpolation to interpolate a value from the center of the grid cell to each target point. Because *Sporormiella* is thought to be a highly local indicator of grazing, the climatic and land use data at each point are the most relevant for these analyses.

We used multiple linear regression models to assess the relative importance of climate, county-level herbivore density, land use, and basin characteristics as predictors of the percent abundance and concentration of *Sporormiella*. We used a stepwise multiple linear regression model (StepAIC, specifying that the direction = “both”, in R version 2.10.1) which uses a combination of forward variable selection and backward elimination, assessing whether variables should be added or dropped after each stage of selection. Variable selection is based on the Akaike Information Criteria (AIC) measure of the goodness of fit of the

model to the data. We square-root transformed the *Sporormiella* relative abundance and concentration data because it resulted in a more normal distribution. Normality was assessed based on inspection of histograms of distributions and Quantile-Quantile plots. The following potential predictor variables were included in the models: mean annual precipitation (MAP), mean annual temperature (MAT), precipitation of the wettest month, precipitation of the driest month, temperature of the warmest month, temperature of the coldest month, land use (percent pasture, based on raster data at a spatial scale of about 10 km), lake type (dammed vs. natural), cattle per acre by county, lake area, lake maximum depth, and distance to shore (for the margin samples). We calculated a multiple linear regression model for each *Sporormiella*-related response variable (margin concentration, margin percent abundance, center concentration, center percent abundance). We then assessed statistical significance and variance explained by the models using p-values,  $r^2$ , and adjusted  $r^2$  values (which downweight  $r^2$  values for models with more predictor variables). To reduce the effects of collinearity among climatic variables we ran an annual model which included MAP and MAT as climatic variables and a seasonal model which included precipitation of the wettest/driest months and temperature of the warmest/coldest months as alternatives to the annual climatic data.

## **Results**

### *General Trends*

Consistent with previous studies of the abundance of *Sporormiella* in historic sediments (Davis and Shafer, 2006; Cordova et al., 2011), percent abundances of *Sporormiella* in the

surface sediments are high at many sites. Percentages reach >4% of the pollen sum in the margin samples and >3% in the center samples, mainly in the SD and MN sites in the middle of the transect (Figs. 1, 2). We also found asci, the spore-bearing cells containing many chains of *Sporormiella* (Fig. 2). Some asci were full of spores while others appeared to have burst and were empty. Asci were more common in lake-margin samples; two of the 24 sites contained eight asci. Asci appeared to be more common in samples with high *Sporormiella* abundances (Fig. 2), but the relationship is not strong. Of the two sites with eight asci, one had 0.86% *Sporormiella* while the other had 4.85% *Sporormiella*.

The following coprophilous fungi were also present in our samples: *Podospora*-type, and *Coprinus*-type, as well as fungi within the order Sordariales, some of which are coprophilous (Fig. 2). We also identified *Chaetomium*, a cellulose decomposer, which is sometimes found on dung when mixed with straw (Van Geel et al., 2003). Non-coprophilous fungal types identified include *Fusarium*, a common tree fungus, *Neurospora*, *Aureobasidium*-type, *Panaeolus*, *Pleospora*, and *Ustilina*. All other fungal spores not exhibiting defining features were counted but not identified to type. There is no significant correlation between *Sporormiella* percent abundance and the percent abundance of the other coprophilous types (*Podospora*- and *Coprinus*-type) in the margin or center samples (margin:  $r^2 = 0.0078$ ,  $p = 0.683$ ; center:  $r^2 = 0.109$   $p = 0.115$ ) Other pollen taxa show the expected east to west trends, with the percent abundance of arboreal taxa increasing to the east and the non-arboreal taxa declining in abundance. Among non-arboreal types there is a west-to-east transition from high percentages of *Artemisia* to *Ambrosia* and finally to *Poaceae*. *Ambrosia* abundances are highest in the middle of the transect, reaching up to 40% of the total pollen

sum. Some western sites have a high percentage of *Pinus* which is likely due to long distance dispersal from the Black Hills because these sites are predominantly grassland. To the east, *Pinus* and *Quercus* abundances gradually increase, which is the expected trend for these taxa (McAndrews and Wright, 1969).

#### *Lake-Center vs. Lake-Margin Samples and Percentage vs. Concentration Data*

The relative abundance and concentration of *Sporormiella* are uncorrelated between lake-margin and lake-center samples (Fig. 3). The lack of a correlation between lake-margin and lake-center concentrations is not a general phenomenon, because other taxa (*Quercus*, *Pinus*, and *Ambrosia*) reveal strong positive correlations (Fig. 3). Although *Sporormiella* lake-center percentages appear to be higher than lake-margin percentages in the west (Fig. 2), the means across the entire transect are similar (lake-margin mean = 1.21%, lake-center mean = 1.24%).

The lake-margin samples were taken at varying distances from shore (Fig. 4). When *Sporormiella* concentrations are regressed against distance to shore there is a strong positive relationship ( $p = 0.008$ ,  $r^2 = 0.279$ ; Fig. 4) and relative abundances reveal the same general trend, but more weakly ( $p = 0.059$ ,  $r^2 = 0.153$ ; Fig. 4). This result is somewhat surprising given the limited dispersal capability of *Sporormiella* and given that Raper and Bush (2009) reported the opposite relationship, i.e. that *Sporormiella* concentrations decreased with increasing distance to shore.

#### *Climatic, Land-Use, and Basin Predictors of Sporormiella Abundance*

MAP was significantly negatively correlated to *Sporormiella* percent abundance in lake-center samples, but no climate variables were significantly correlated to *Sporormiella* percentages in lake-margin samples (Fig. 5). *Sporormiella* abundance is not correlated with county-level cattle density data (USDA NASS data) in linear regression models where cattle density is the only potential predictor (Fig. 6).

In the multiple-regression analyses, precipitation of the driest month is the strongest predictor of lake-center *Sporormiella* percentages (Table 2), consistent with the simple linear regression results. Distance to shore is a significant predictor variable for both margin-percent and margin-concentration response variables ( $p = 0.034$ ,  $p = 0.008$ , respectively). Cattle per acre is also a significant predictor variable for the margin-percent model ( $p = 0.047$ ). No significant predictors were found for the center concentration data. Overall, there is less unexplained variance in the relative abundance data than in the concentration data (center:  $r^2 = 0.5926$  vs. no significant predictors; margin:  $r^2_{\text{lake-center}} = 0.5156$  vs.  $r^2_{\text{lake-margin}} = 0.3101$ ; Table 2).

## **Discussion**

### *Climatic Controls on Sporormiella Abundance*

Our results reveal several apparent correlations between climate and *Sporormiella* representation. The negative correlation between center percent abundance data and seasonal and annual precipitation (Fig. 5, Table 2) is somewhat surprising given that moisture is important in modern fungal community diversity (Richardson, 2001); fungal diversity is higher in cool, moist conditions (Wicklowsky and Angel, 1983). However, climatic preferences

vary among fungal taxa (Richardson, 2001). The negative relationship between relative abundances and precipitation may be in part due to the higher influx of arboreal pollen in the east, which drives down the relative abundance of *Sporormiella*. This interpretation is supported by the apparent lack of correlation between *Sporormiella* lake-center concentrations and MAP.

#### *Megaherbivore Controls on Sporormiella Abundance*

County-level cattle density was a significant predictor of *Sporormiella* abundances, but only for the lake-margin relative abundance data and only when cattle density was included with distance-to-shore in a multiple linear regression model. This suggests that megaherbivore density is a significant influence on *Sporormiella* abundances, but that this effect can be obscured by other factors. One such factor is differences in cattle husbandry within the Great Plains and the use of county-level agricultural statistics in this analysis. The trends of *Sporormiella* abundance along the transect roughly track the transition from pasture to cropland (Figs. 1b, 2), with higher percentages of *Sporormiella* in the western areas with more pasture. These areas are presumably more widely grazed than eastern sites where cattle are predominantly kept in fenced-in feedlots. Clearly, information about local cattle densities around each lake would be preferable, but this information is difficult to obtain given the large range areas involved, the regional trend towards increasing absentee land ownership, and the difficulty of obtaining historical data over the several decades represented by these samples. We attempted on-site observations of cattle density, but are not confident in this as a measure of recent herbivore density.

*Basin Controls on Sporormiella Abundance: Within- and Across-Lake Variation*

The basin morphologic characteristics (lake depth, area, and basin type) are not strong predictor variables for *Sporormiella* variation. Similarly, differences in margin versus center sample data are not explained by these characteristics. One challenge is that some of these predictor variables are correlated across the transect (e.g. the frequency of dams increases to the west, pasture is more abundant to the west, etc.).

Our analyses suggest that the within-lake variations of *Sporormiella* are higher than for other pollen types. The data show no relationship between the lake-margin and lake-center abundances of *Sporormiella*, for both percent abundance and concentration data (Fig. 3). Conversely, similar analyses of key arboreal and non-arboreal taxa (*Pinus*, *Quercus*, and *Ambrosia*) reveal strong positive linear relationships between lake-margin and lake-center data (relative abundance: *Pinus*:  $p < 0.001$ ,  $r^2 = 0.511$ ; *Quercus*:  $p = 8.4 \times 10^{-10}$ ,  $r^2 = 0.8255$ ; *Ambrosia*:  $p = 0.005$ ,  $r^2 = 0.308$ ; concentration: *Pinus*:  $p < 0.001$ ,  $r^2 = 0.47$ ; *Quercus*:  $p = 9.83 \times 10^{-9}$ ,  $r^2 = 0.782$ ; *Ambrosia*:  $p = 6.25 \times 10^{-5}$ ,  $r^2 = 0.525$ ; Fig. 3). Therefore we should be cautious in our interpretation of these data due to the various factors that influence its variability. Overall, various regression models explained less of the variation in the concentration data than in the relative abundance data. Pollen concentrations are strongly influenced by sedimentation rate and can vary by a factor of up to ten in a small lake basin (Davis et al., 1973). This result is consistent with other reports that for heterogenous multi-lake datasets, relative abundances will be less noisy than concentration data ( Davis et al., 1973).

### *Comparison with Raper and Bush*

Raper and Bush (2009) sampled 15 lakes in ungrazed and grazed landscapes in central Florida, to test the relationship between *Sporormiella* concentration and local cattle density. They found that *Sporormiella* concentrations were greater in margin sediments where cattle grazed and *Sporormiella* was absent in the center samples of all lakes where cattle were absent. They also found that *Sporormiella* concentrations decreased within the first 20 m from shore.

The most striking difference between the Raper and Bush study and this study is a strong positive linear relationship between distance to shore and *Sporormiella* concentrations reported here (Fig. 4). Although the reason for this discrepancy is not known with certainty, there are some likely possibilities. The decrease in *Sporormiella* abundances reported by Raper and Bush (2009) is entirely limited to samples collected at the shoreline versus samples collected 20m from shore; no trend in *Sporormiella* abundances is apparent at distances beyond 20m (Fig. 5 in Raper and Bush, 2009). Similarly, both this data and the data from Raper and Bush (2009) show no significant relationship between *Sporormiella* concentrations between nearshore and center-lake samples for datasets collected across many lakes (Figs. 3, 8 in Raper and Bush, 2009), which is not surprising given that high variation in pollen concentrations within lakes is common (Davis et al., 1973). It would be valuable to collect samples at smaller intervals across a lake to assess the variability in *Sporormiella* concentration as well as percent abundance.

It remains puzzling, however, that *Sporormiella* abundance and concentration within the lake-margin samples apparently increase toward the center of lakes. One possibility is that larger lakes may exhibit more sediment focusing and hence concentrate *Sporormiella* in the larger lakes. Another possibility is that lake size is in some way related to grazing intensity, in a manner not revealed by the county-level cattle-density data used here. However, our data does not reveal a significant lake area effect.

Raper and Bush hypothesized that climatic changes that produced rising lake level could be responsible for the late-Pleistocene *Sporormiella* declines, by increasing the distance from the lake center to the *Sporormiella* source. Our failure to replicate their reported negative relationship between *Sporormiella* concentration and distance to shore suggests that this effect of shoreline position on *Sporormiella* abundances may be limited to very short distances, i.e. within 20m of shoreline. However, our finding that center percent abundance of *Sporormiella* decreases with increasing precipitation (Fig. 5) may support the Raper and Bush hypothesis via another mechanism, i.e. decreased aridity might increase the influx of arboreal pollen types and thereby drive down the relative abundances of *Sporormiella*. This mechanism should affect the relative abundance data only, not *Sporormiella* concentrations, so the reality of apparent declines in *Sporormiella* relative abundances should be checked against trends in concentration data (Gill et al., 2009). Our paper generally supports the conclusions by others that *Sporormiella* is a highly localized signal. Raper and Bush (2009) emphasize the importance of the immediate presence of grazing cattle along the shoreline on their results. They conclude that their results, combined with those of previous studies (Davis and Shafer, 2006; Graf and Chmura (2006); Blackford

and Innes, 2006) and evidence for the limited dispersal of *Sporormiella*, supports the argument that *Sporormiella* is a highly localized signal of grazing. Davis and Shafer (2006) argue that *Sporormiella* is abundant in historic sediments and archaeological sites where livestock were once abundant. Graf and Chmura (2006) reveal that coprophilous fungi are in highest abundance in manured/grazed landscapes, while Blackford and Innes (2006) found similar results in grazed woodland environments. Thus it is apparent, based on the evidence from past studies, and the results here, that *Sporormiella* is indeed a local indicator of herbivore presence/abundance.

## **Conclusions**

This study shows that *Sporormiella* representation in lake sediments is influenced by multiple factors, including but not limited to megaherbivore densities. Other key factors include aridity (mainly through its effect on the abundances of other pollen types) and proximity to shoreline. Within-lake variations for *Sporormiella* are higher than for other pollen types, confirming prior reports that *Sporormiella* dispersal is highly localized. The reason for the surprising finding that *Sporormiella* abundances increased with increasing distance to shore is not well understood, but may be caused by between-lake variations in sediment focusing and between-lake variations in local grazing intensity. The results of this study point to the need for continued research into the factors controlling *Sporormiella*, and aid in the interpretation of the widely observed *Sporormiella* declines in late Pleistocene and Holocene sediments. A key step forward would be additional regional-scale analyses paired with more local-scale data on megaherbivore density.

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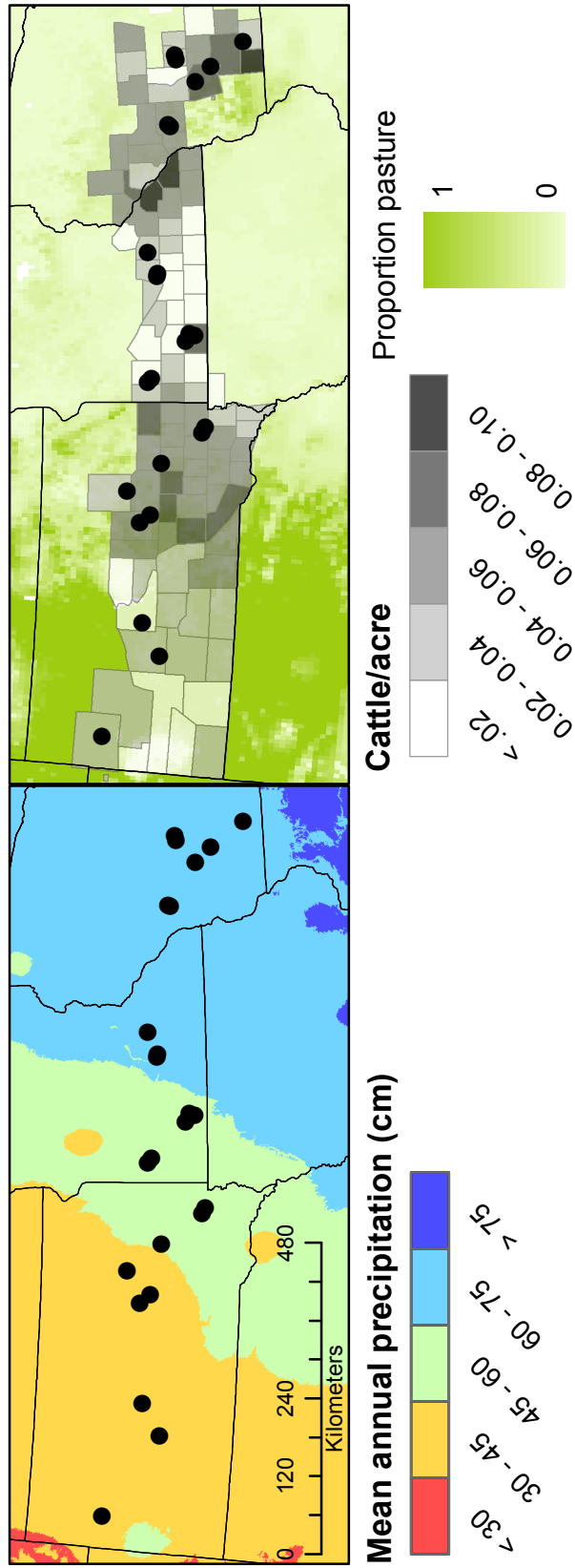


Figure 1. (a) Site locations overlying mean annual precipitation from WorldClim (Hijmans et al., 2005).  
(b) Site locations overlying cattle/acre by county (USDA NASS) and the proportion of land used as pasture (Ramankutty et al., 2008).

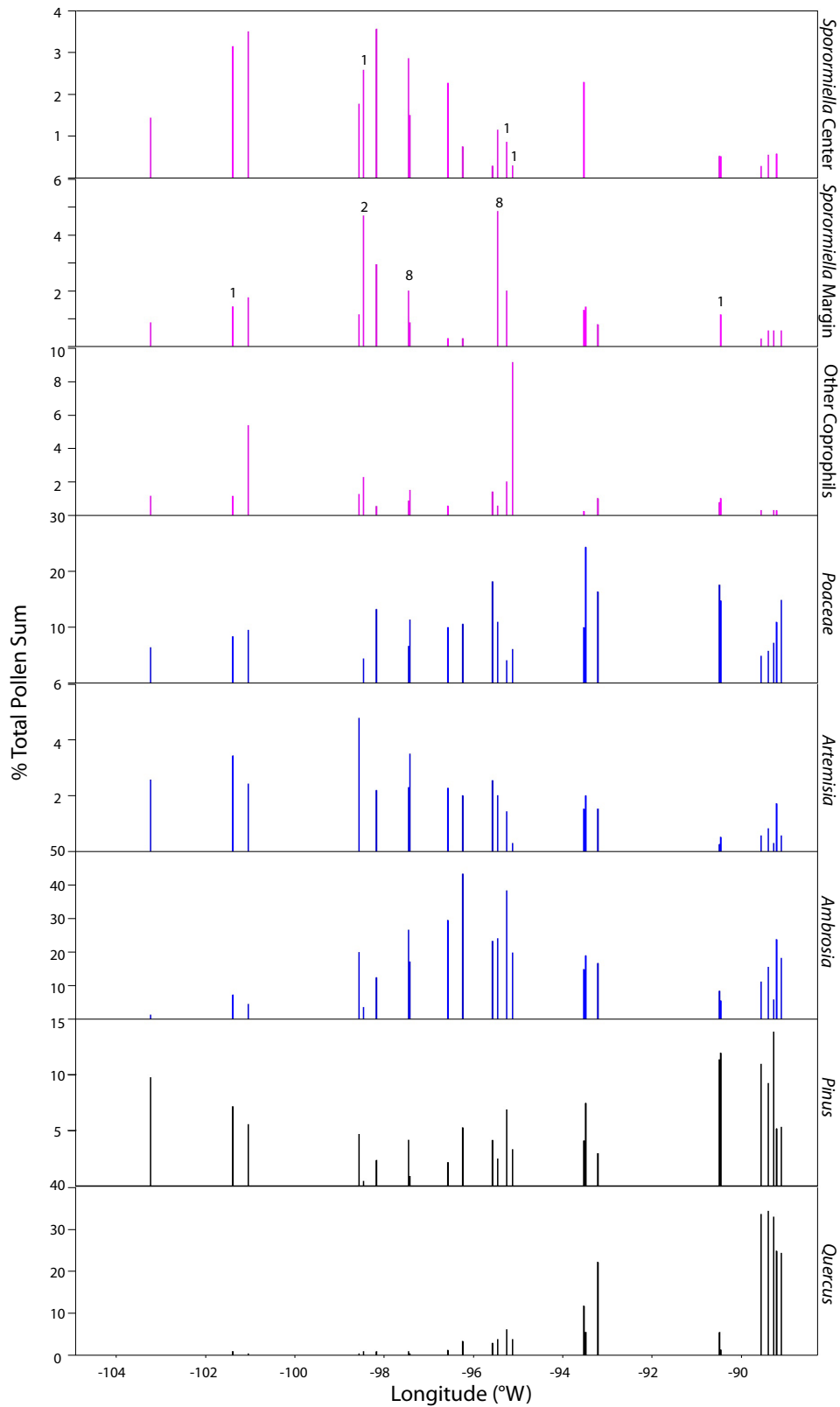


Figure 2. Distribution of pollen and spore types across the transect. All data is for lake-center samples, except for *Sporormiella*, which also has lake-margin data shown. Number of asci are noted in the *Sporormiella* panels above the samples in which they were present.

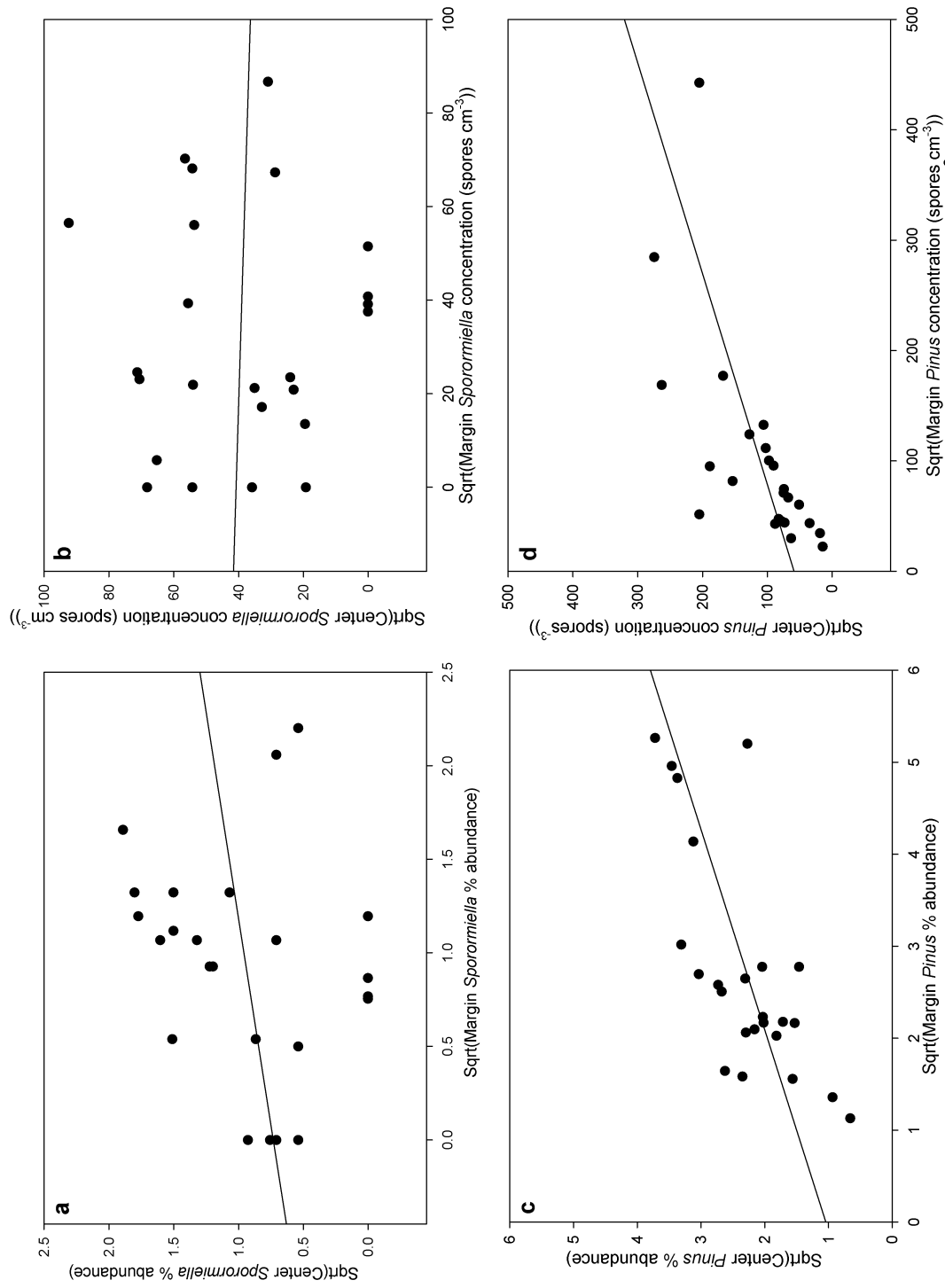


Figure 3. The relationship between lake-margin and lake-center *Sporormiella* percent abundance ((a)  $p = 0.291$ ,  $r^2 = 0.0506$ ) and concentration ((b)  $p = 0.841$ ,  $r^2 = 0.00187$ ) and between lake-margin and lake-center *Pinus* abundances ((c)  $p < 0.001$ ,  $r^2 = 0.511$ ) and concentrations ((d)  $p < 0.001$ ,  $r^2 = 0.47$ ). *Sporormiella* abundances, unlike *Pinus*, show no significant correlation between lake-margin and lake-center samples.

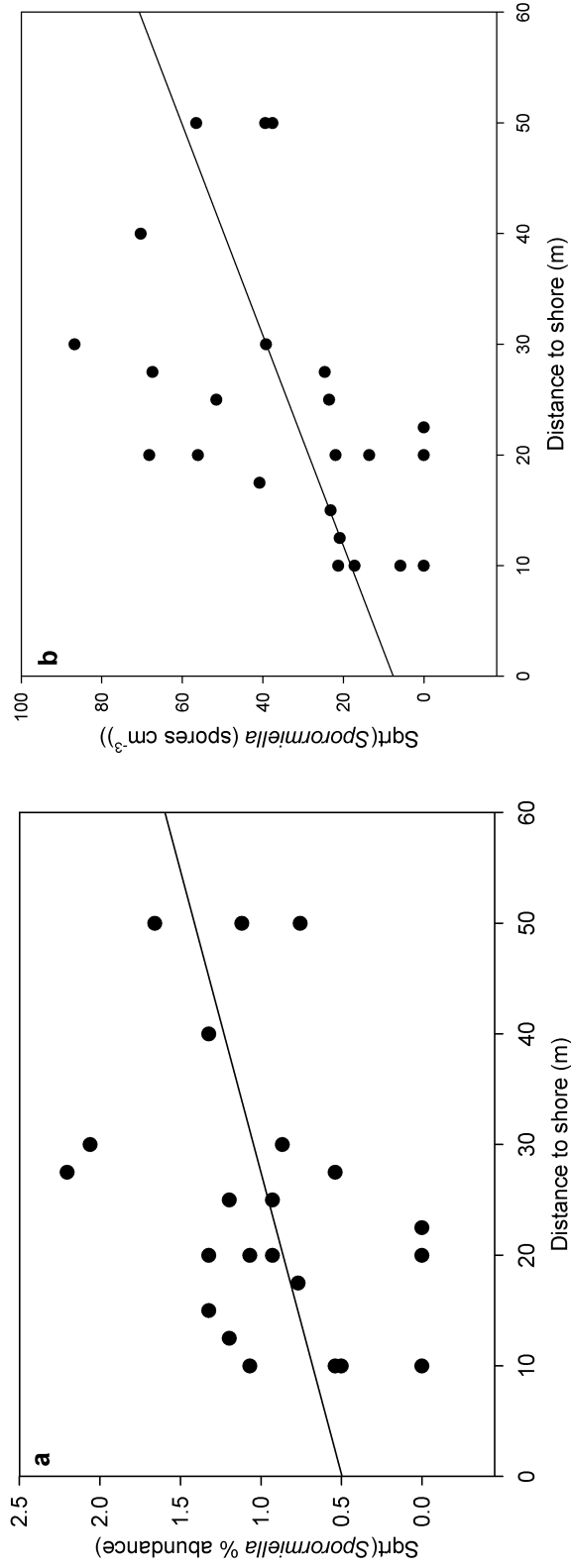


Figure 4. The relationship between *Sporormiella* representation (% abundance) and concentration:  $p = 0.008$ ,  $r^2 = 0.279$  (b) and distance to shore (m):  $p = 0.0059$ ,  $r^2 = 0.153$  (a).

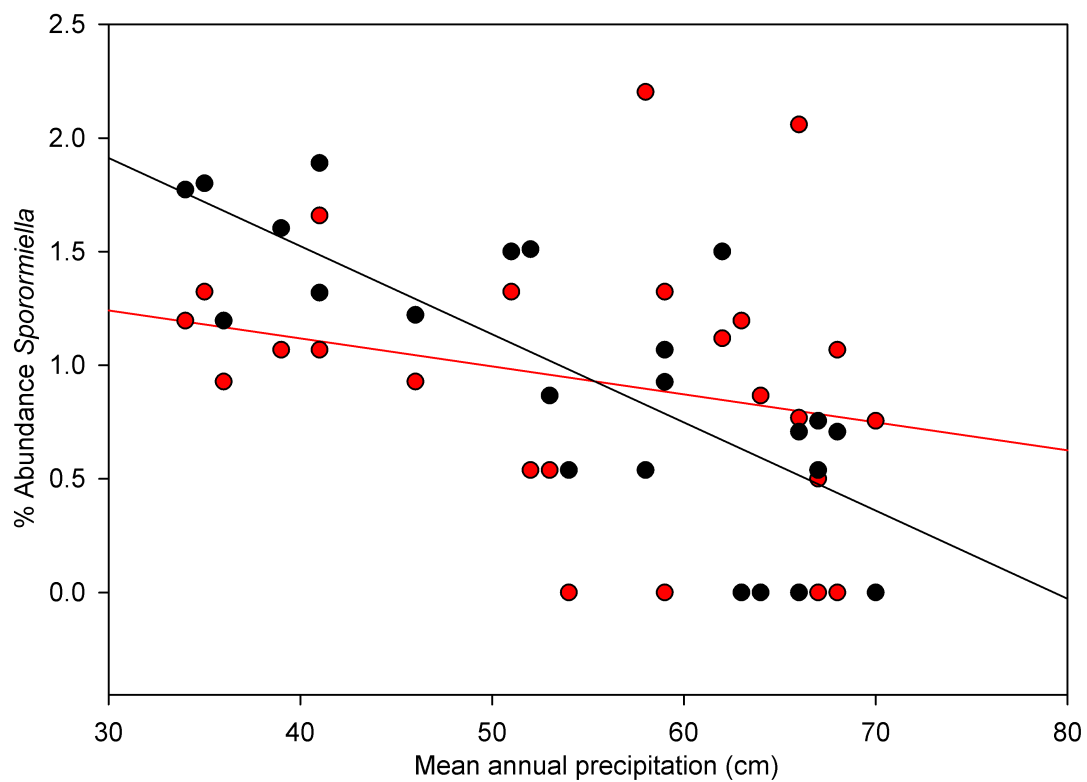


Figure 5. Percent abundance of *Sporormiella* regressed against MAP. The red line represents the lake-margin samples ( $p = 0.244$ ,  $r^2 = 0.0612$ ) and the black line represents the lake-center samples ( $p < 0.001$ ,  $r^2 = 0.60$ ).

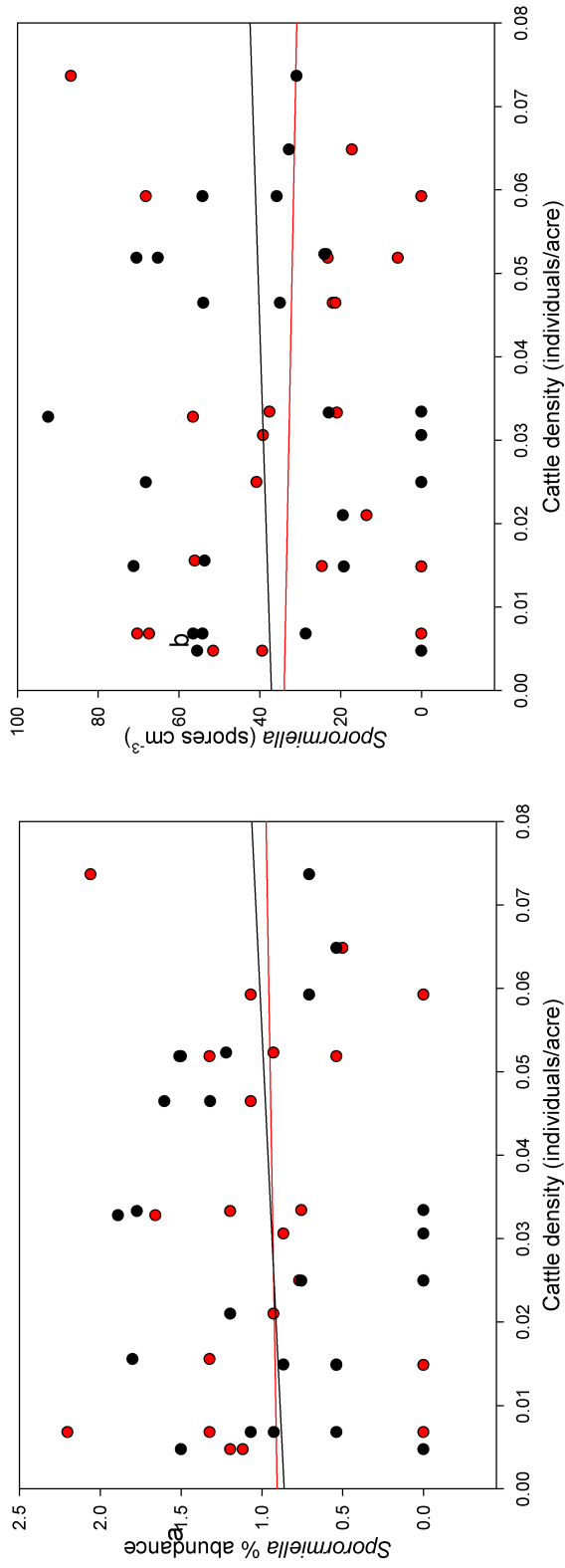


Figure 6. County-scale cattle density and % abundance *Sporormiella* (a) and concentration (b). The red represents lake-margin data and the black represents lake-center data. Percent abundance is not related to cattle/acre (margin:  $p = 0.886$ ,  $r^2 = 0.001$ ; center:  $p = 0.679$ ,  $r^2 = 0.008$ ) and neither is concentration (margin:  $p = 0.879$ ,  $r^2 = 0.001$ ; center:  $p = 0.802$ ,  $r^2 = 0.003$ ).

<b>Id</b>	<b>Site</b>	<b>County/ State</b>	<b>State</b>	<b>Lat/Long</b>	<b>Basin Type</b>	<b>Max. Depth (m)</b>	<b>Area (acres)</b>
1	Newell	Butte	SD	N44.501, W103.2317	Dam	9.75	183
2	Waggoner	Haakon	SD	N44.043, W101.3858	Dam	5.49	107
3	Hayes	Stanley	SD	N44.2159, W101.0043	Dam	6.7	73.7
4	Jones	Hand	SD	N44.2812, W98.5645	Dam	4.57	100.5
5	Rose Hill	Hand	SD	N44.1844, W98.4611	Dam	2.84	33.8
6	Dudley	Spink	SD	N44.4006, W98.1738	Dam	41.77	301
7	Carthage	Miner	SD	N44.1031, W97.4230	Dam	7.3	203
8	Lost	Minnehaha	SD	N43.3435, W97.0454	Natural	1.83	163
9	Wall	Minnehaha	SD	N43.3152, W96.5735	Natural	7.32	207
10	Goose	Lyon	MN	N44.2254, W96.0231	Natural	2.73	148.96
11	Clear	Lyon	MN	N44.1933, W95.5716	Natural	3.35	65.76
12	Boot	Jackson	MN	N43.4105, W95.0452	Natural	Unknown	Unknown
13	Independence	Jackson	MN	N43.4546, W95.0246	Natural	3.05	96.5
14	Timber	Jackson	MN	N43.4915, W95.1227	Natural	2.44	198
15	George	Blue Earth	MN	N44.1358, W93.5210	Natural	8.54	80
16	Duck	Blue Earth	MN	N44.1253, W93.4852	Natural	7.62	290.41
17	Dudley	Rice	MN	N44.2109, W93.2216	Natural	18.29	61.18
18	Perch	Monroe	WI	N43.5636, W90.4757	Dam	3.05	35
19	Angelo	Monroe	WI	N43.5807, W90.4626	Dam	2.44	39
20	Virginia	Sauk	WI	N43.3152, W89.5548	Natural	4.57	35
21	Fish	Dane	WI	N43.1713, W89.3921	Natural	18.9	199
22	Emery	Marquette	WI	N43.4717, W89.2659	Natural	2.13	32
23	Kilby	Marquette	WI	N43.4813, W89.2114	Natural	8.84	44
24	Gibbs	Rock	WI	N42.4659, W89.1052	Natural	7.01	73

Table 1. Compilation of site descriptions. Id numbers are referenced in the text.

Model	Response Variable	Predictor Variables	<i>p</i> value	R <sup>2</sup> (model)	Adjusted R <sup>2</sup>	Regression Equations
1	Center Percent Abundance	Precip. of driest month	1.75x10 <sup>-5</sup>	0.5926	0.5732	$y = -0.078x + 2.34$
2	Center Concentration	None				
3	Margin Percent Abundance	Distance to shore Cattle per acre	0.0340 0.0470	0.5156	0.334	$y = 0.02x_1 + 12.4x_2 + 6.63$
4	Margin Concentration	Distance to shore	0.0077	0.3101	0.2411	$y = 1.17x - 8.59$

Table 2. Results of the multiple linear regression models. Predictor variables that were not significant are not shown. The *p* values,  $r^2$ , adjusted  $r^2$ , and equations for the models are noted. For Model 3,  $x_1$  represents distance to shore and  $x_2$  represents cattle per acre.

## APPENDIX I

### Additional Datasets

Pollen count sheets - Margin samples.....	30
Pollen count sheets - Center samples.....	74
Climate, grazing, and site variables used for regression models.....	118
Table of host species for <i>Sporormiella</i> .....	124

<b>Pollen and Spore Counts Lake- Margin Samples</b>	<b>Longitude</b>	<b>Abies balsamea</b>	<b>Picea glauca</b>	<b>Picea mariana</b>	<b>Picea undiff</b>
NEW-1M	-103.2334	0	0	0	0
WAG-1M	-101.3917	0	0	0	1
HAY-1M	-101.043	0	0	0	1
JON-1M	-98.5645	0	0	0	0.5
ROS-1M	-98.4611	0	0	0	0
DUD-1M	-98.1738	0	0	0	1
CAR-1M	-97.4237	0	0	0	0.5
LOS-1M	-97.452	0	0	0	1
WAL-1M	-96.5732	0	0	0	1
GOO-1M	-96.241	0	0	0	0.5
CLE-1M	-95.5716	0	0	0	1
BOO-1M	-95.458	0	0	0	1
IND-1M	-95.253	0	0	0	0
TIM-1M	-95.1251	0	0	0	0
GEO-1M	-93.529	0	0	0	2
DUC-1M	-93.4854	0	0	0	0
DUL-1M	-93.2145	0	0	0	0
PER-1M	-90.488	0	0	0	1
ANG-1M	-90.4629	0	0	0	0
VIR-1M	-89.5557	0	0	0	0
FIS-1M	-89.396	0	0	0	0
EME-1M	-89.274	0	0	0	3
KIL-1M	-89.2113	0	0	0	0
GIB-1	-89.1049	0	0	0	0.5
<b>% Abundance</b>					
NEW-1M	-103.2334	0.00	0.00	0.00	0.00
WAG-1M	-101.3917	0.00	0.00	0.00	0.29
HAY-1M	-101.043	0.00	0.00	0.00	0.25
JON-1M	-98.5645	0.00	0.00	0.00	0.14
ROS-1M	-98.4611	0.00	0.00	0.00	0.00
DUD-1M	-98.1738	0.00	0.00	0.00	0.27
CAR-1M	-97.4237	0.00	0.00	0.00	0.14
LOS-1M	-97.452	0.00	0.00	0.00	0.29
WAL-1M	-96.5732	0.00	0.00	0.00	0.29
GOO-1M	-96.241	0.00	0.00	0.00	0.14
CLE-1M	-95.5716	0.00	0.00	0.00	0.29
BOO-1M	-95.458	0.00	0.00	0.00	0.29
IND-1M	-95.253	0.00	0.00	0.00	0.00
TIM-1M	-95.1251	0.00	0.00	0.00	0.00
GEO-1M	-93.529	0.00	0.00	0.00	0.52
DUC-1M	-93.4854	0.00	0.00	0.00	0.00
DUL-1M	-93.2145	0.00	0.00	0.00	0.00
PER-1M	-90.488	0.00	0.00	0.00	0.25
ANG-1M	-90.4629	0.00	0.00	0.00	0.00
VIR-1M	-89.5557	0.00	0.00	0.00	0.00
FIS-1M	-89.396	0.00	0.00	0.00	0.00
EME-1M	-89.274	0.00	0.00	0.00	0.86
KIL-1M	-89.2113	0.00	0.00	0.00	0.00
GIB-1	-89.1049	0.00	0.00	0.00	0.14

<b>CONCENTRATION</b>	<b>Longitude</b>	<b>Abies balsamea</b>	<b>Picea glauca</b>	<b>Picea mariana</b>	<b>Picea undiff</b>
NEW-1M	-103.23	0.00	0.00	0.00	0.00
WAG-1M	-101.39	0.00	0.00	0.00	87.11
HAY-1M	-101.04	0.00	0.00	0.00	449.59
JON-1M	-98.56	0.00	0.00	0.00	60.07
ROS-1M	-98.46	0.00	0.00	0.00	0.00
DUD-1M	-98.17	0.00	0.00	0.00	290.36
CAR-1M	-97.42	0.00	0.00	0.00	92.30
LOS-1M	-97.45	0.00	0.00	0.00	76.37
WAL-1M	-96.57	0.00	0.00	0.00	33.62
GOO-1M	-96.24	0.00	0.00	0.00	302.98
CLE-1M	-95.57	0.00	0.00	0.00	111.95
BOO-1M	-95.46	0.00	0.00	0.00	266.74
IND-1M	-95.25	0.00	0.00	0.00	0.00
TIM-1M	-95.13	0.00	0.00	0.00	0.00
GEO-1M	-93.53	0.00	0.00	0.00	619.43
DUC-1M	-93.49	0.00	0.00	0.00	0.00
DUL-1M	-93.21	0.00	0.00	0.00	0.00
PER-1M	-90.49	0.00	0.00	0.00	339.93
ANG-1M	-90.46	0.00	0.00	0.00	0.00
VIR-1M	-89.56	0.00	0.00	0.00	0.00
FIS-1M	-89.40	0.00	0.00	0.00	0.00
EME-1M	-89.27	0.00	0.00	0.00	2496.22
KIL-1M	-89.21	0.00	0.00	0.00	0.00
GIB-1	-89.10	0.00	0.00	0.00	352.84

<b>Pinus banksiana/ resinosa</b>	<b>Pinus strobus</b>	<b>Pinus undiff</b>	<b>Acer negundo</b>	<b>Acer pennsylvanicum</b>	<b>Acer rubrum</b>
0	0	60			
0	0	22			
0	0	10			
0	0	15.5			
0	0	4.5			
0	0	17.5			
0	0	6.5			
0	0	27			
0	0	27			
0	0	15			
0	0	17.5			2
0	0	8.5			
0	0	9.5			
0	0	14.5			
0	0	18	1		
0	0	23.5			
0	0	18			
0	0	92.5			1
0	0	86.5			
0	0	33.5			
0	0	25.5			1
0	0	97.5			
0	0	95			
0	0	25			
<b>% Abundance</b>					
0.00	0.00	17.14	0.00	0.00	0.00
0.00	0.00	6.29	0.00	0.00	0.00
0.00	0.00	2.51	0.00	0.00	0.00
0.00	0.00	4.43	0.00	0.00	0.00
0.00	0.00	1.29	0.00	0.00	0.00
0.00	0.00	4.69	0.00	0.00	0.00
0.00	0.00	1.86	0.00	0.00	0.00
0.00	0.00	7.71	0.00	0.00	0.00
0.00	0.00	7.71	0.00	0.00	0.00
0.00	0.00	4.29	0.00	0.00	0.00
0.00	0.00	5.00	0.00	0.00	0.57
0.00	0.00	2.43	0.00	0.00	0.00
0.00	0.00	2.71	0.00	0.00	0.00
0.00	0.00	4.14	0.00	0.00	0.00
0.00	0.00	4.71	0.26	0.00	0.00
0.00	0.00	6.71	0.00	0.00	0.00
0.00	0.00	4.75	0.00	0.00	0.00
0.00	0.00	23.33	0.00	0.00	0.25
0.00	0.00	24.71	0.00	0.00	0.00
0.00	0.00	9.12	0.00	0.00	0.00
0.00	0.00	7.29	0.00	0.00	0.29
0.00	0.00	27.86	0.00	0.00	0.00
0.00	0.00	27.14	0.00	0.00	0.00
0.00	0.00	7.02	0.00	0.00	0.00

<b>Pinus banksiana/ resinosa</b>	<b>Pinus strobus</b>	<b>Pinus undiff</b>	<b>Acer negundo</b>	<b>Acer pennsylvanicum</b>	<b>Acer rubrum</b>
0.00	0.00	3663.68	0.00	0.00	0.00
0.00	0.00	1916.37	0.00	0.00	0.00
0.00	0.00	4495.89	0.00	0.00	0.00
0.00	0.00	1862.30	0.00	0.00	0.00
0.00	0.00	506.81	0.00	0.00	0.00
0.00	0.00	5081.29	0.00	0.00	0.00
0.00	0.00	1199.90	0.00	0.00	0.00
0.00	0.00	2061.95	0.00	0.00	0.00
0.00	0.00	907.85	0.00	0.00	0.00
0.00	0.00	9089.51	0.00	0.00	0.00
0.00	0.00	1959.05	0.00	0.00	223.89
0.00	0.00	2267.30	0.00	0.00	0.00
0.00	0.00	6703.99	0.00	0.00	0.00
0.00	0.00	10104.51	0.00	0.00	0.00
0.00	0.00	5574.90	309.72	0.00	0.00
0.00	0.00	12477.16	0.00	0.00	0.00
0.00	0.00	9206.26	0.00	0.00	0.00
0.00	0.00	31443.80	0.00	0.00	339.93
0.00	0.00	100464.34	0.00	0.00	0.00
0.00	0.00	9881.44	0.00	0.00	0.00
0.00	0.00	15452.17	0.00	0.00	605.97
0.00	0.00	81127.28	0.00	0.00	0.00
0.00	0.00	196153.89	0.00	0.00	0.00
0.00	0.00	17642.09	0.00	0.00	0.00

Acer saccharinum	Acer saccharum	Acer undiff	Alnus crispa	Alnus rugosa	Alnus undiff
		1			
		2			
	1	1			
		2			1
	1	5			
		1		1	
	2				1
	3	7			
	9	3			1
	5	4	8	2	
	2	2	1	15	59
	1	2	1		
	1	1			
		2	2		32
	1	3		1	2
	1	2			1
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.29	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.54	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.29	0.29	0.00	0.00	0.00
0.00	0.00	0.57	0.00	0.00	0.00
0.00	0.00	0.57	0.00	0.00	0.29
0.00	0.29	1.43	0.00	0.00	0.00
0.00	0.00	0.29	0.00	0.29	0.00
0.00	0.57	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.29
0.00	0.79	1.83	0.00	0.00	0.00
0.00	2.57	0.86	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.26
0.00	1.26	1.01	2.02	0.50	0.00
0.00	0.57	0.57	0.29	4.29	16.86
0.00	0.27	0.54	0.27	0.00	0.00
0.00	0.29	0.29	0.00	0.00	0.00
0.00	0.00	0.57	0.57	0.00	9.14
0.00	0.29	0.86	0.00	0.29	0.57
0.00	0.28	0.56	0.00	0.00	0.28

<b>Acer saccharinum</b>	<b>Acer saccharum</b>	<b>Acer undiff</b>	<b>Alnus crispa</b>	<b>Alnus rugosa</b>	<b>Alnus undiff</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	87.11	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	580.72	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	76.37	76.37	0.00	0.00	0.00
0.00	0.00	67.25	0.00	0.00	0.00
0.00	0.00	1211.93	0.00	0.00	605.97
0.00	111.95	559.73	0.00	0.00	0.00
0.00	0.00	266.74	0.00	266.74	0.00
0.00	1411.37	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	696.86
0.00	929.15	2168.02	0.00	0.00	0.00
0.00	4778.49	1592.83	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	511.46
0.00	1699.66	1359.73	2719.46	679.87	0.00
0.00	2322.88	2322.88	1161.44	17421.56	68524.81
0.00	294.97	589.94	294.97	0.00	0.00
0.00	605.97	605.97	0.00	0.00	0.00
0.00	0.00	1664.15	1664.15	0.00	26626.39
0.00	2064.78	6194.33	0.00	2064.78	4129.56
0.00	705.68	1411.37	0.00	0.00	705.68

<b>Betula</b>	<b>Carya</b>	<b>Castanea</b>	<b>Celtis</b>	<b>Cornus</b>	<b>Corylus</b>
		2			
1	1			2	
1	2				
				3	
2				1	
2	1				2
2	3				1
2					
6					2
1				4	
3	4				7
2	4			1	
2	3				
6	4				2
1	10			6	1
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.57	0.00	0.00	0.00	0.00
0.29	0.29	0.00	0.57	0.00	0.00
0.29	0.57	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.86	0.00	0.00
0.57	0.00	0.00	0.29	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.52	0.26	0.00	0.00	0.00	0.52
0.57	0.86	0.00	0.00	0.00	0.29
0.53	0.00	0.00	0.00	0.00	0.00
1.51	0.00	0.00	0.00	0.00	0.50
0.29	0.00	0.00	1.14	0.00	0.00
0.82	1.09	0.00	0.00	1.90	0.00
0.57	1.14	0.00	0.29	0.00	0.00
0.57	0.86	0.00	0.00	0.00	0.00
1.71	1.14	0.00	0.00	0.00	0.57
0.28	2.81	0.00	0.00	1.69	0.28

<b>Betula</b>	<b>Carya</b>	<b>Castanea</b>	<b>Celtis</b>	<b>Cornus</b>	<b>Corylus</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	152.74	0.00	0.00	0.00	0.00
33.62	33.62	0.00	67.25	0.00	0.00
605.97	1211.93	0.00	0.00	0.00	0.00
0.00	0.00	0.00	335.84	0.00	0.00
533.48	0.00	0.00	266.74	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
619.43	309.72	0.00	0.00	0.00	619.43
1061.89	1592.83	0.00	0.00	0.00	530.94
1022.92	0.00	0.00	0.00	0.00	0.00
2039.60	0.00	0.00	0.00	0.00	679.87
1161.44	0.00	0.00	4645.75	0.00	0.00
884.90	1179.87	0.00	0.00	2064.78	0.00
1211.93	2423.87	0.00	605.97	0.00	0.00
1664.15	2496.22	0.00	0.00	0.00	0.00
12388.67	8259.11	0.00	0.00	0.00	4129.56
705.68	7056.84	0.00	0.00	4234.10	705.68

Cupressaceae/ Taxaceae	Fagus grandifolia	Fraxinus americana	Fraxinus nigra/ quadrangulata	Fraxinus pennsylvanica	Ilex
			1		
			3		
		2			
		1	1		
		2	2		
		1	9		
		1	12		
			1		
		2	5		
		1	4		
			8		
		1			
		7	12		
		1	2		
	1	1	1		
			1		
		1	2		
			1		
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.29	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.86	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.54	0.00	0.00	0.00
0.00	0.00	0.29	0.29	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.57	0.57	0.00	0.00
0.00	0.00	0.29	2.57	0.00	0.00
0.00	0.00	0.29	3.43	0.00	0.00
0.00	0.00	0.00	0.29	0.00	0.00
0.00	0.00	0.57	1.43	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.26	1.05	0.00	0.00
0.00	0.00	0.00	2.29	0.00	0.00
0.00	0.00	0.26	0.00	0.00	0.00
0.00	0.00	1.77	3.03	0.00	0.00
0.00	0.00	0.29	0.57	0.00	0.00
0.00	0.27	0.27	0.27	0.00	0.00
0.00	0.00	0.00	0.29	0.00	0.00
0.00	0.00	0.29	0.57	0.00	0.00
0.00	0.00	0.00	0.29	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00



Juglans cinerea	Juglans nigra	Larix	Liquidambar	Morus	Myrica
	1				
	1				
			1		
2	1				
	2				
	1				
	1				
	2				
1	1		1		
1	2				
	1				
	4		8		
	3				
1					
1	6		1		
<b>% Abundance</b>					
0.00	0.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.25	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.27	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.57	0.29	0.00	0.00	0.00	0.00
0.00	0.57	0.00	0.00	0.00	0.00
0.00	0.29	0.00	0.00	0.00	0.00
0.00	0.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.57	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.26	0.26	0.26	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.25	0.50	0.00	0.00	0.00	0.00
0.00	0.29	0.00	0.00	0.00	0.00
0.00	1.09	2.18	0.00	0.00	0.00
0.00	0.86	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.29	0.00	0.00	0.00	0.00	0.00
0.28	1.69	0.28	0.00	0.00	0.00

<b>Juglans cinerea</b>	<b>Juglans nigra</b>	<b>Larix</b>	<b>Liquidambar</b>	<b>Morus</b>	<b>Myrica</b>
0.00	61.06	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	449.59	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	290.36	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
152.74	76.37	0.00	0.00	0.00	0.00
0.00	67.25	0.00	0.00	0.00	0.00
0.00	605.97	0.00	0.00	0.00	0.00
0.00	111.95	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	1411.37	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
309.72	309.72	309.72	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
339.93	679.87	0.00	0.00	0.00	0.00
0.00	1161.44	0.00	0.00	0.00	0.00
0.00	1179.87	2359.75	0.00	0.00	0.00
0.00	1817.90	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
2064.78	0.00	0.00	0.00	0.00	0.00
705.68	4234.10	705.68	0.00	0.00	0.00

<b>Ostrya/ Carpinus</b>	<b>Platanus</b>	<b>Populus</b>	<b>Prunus</b>	<b>Quercus</b>	<b>Rhamnus</b>
				2	
				3	
				6	
				2	
				7	
				1	
				15	
				13	
				17	
				18	
				7	
				2	
2		2		60	
				13	
4				66	
8				20	
				34	
1		3		120	
				59	
				74	
2				69	
2		1		86	
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.57	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.86	0.00
0.00	0.00	0.00	0.00	1.71	0.00
0.00	0.00	0.00	0.00	0.54	0.00
0.00	0.00	0.00	0.00	2.00	0.00
0.00	0.00	0.00	0.00	0.29	0.00
0.00	0.00	0.00	0.00	4.29	0.00
0.00	0.00	0.00	0.00	3.71	0.00
0.00	0.00	0.00	0.00	4.86	0.00
0.00	0.00	0.00	0.00	5.14	0.00
0.00	0.00	0.00	0.00	2.00	0.00
0.00	0.00	0.00	0.00	0.57	0.00
0.52	0.00	0.52	0.00	15.71	0.00
0.00	0.00	0.00	0.00	3.71	0.00
1.06	0.00	0.00	0.00	17.41	0.00
2.02	0.00	0.00	0.00	5.04	0.00
0.00	0.00	0.00	0.00	9.71	0.00
0.27	0.00	0.82	0.00	32.65	0.00
0.00	0.00	0.00	0.00	16.86	0.00
0.00	0.00	0.00	0.00	21.14	0.00
0.57	0.00	0.00	0.00	19.71	0.00
0.56	0.00	0.28	0.00	24.16	0.00

<b>Ostrya/ Carpinus</b>	<b>Platanus</b>	<b>Populus</b>	<b>Prunus</b>	<b>Quercus</b>	<b>Rhamnus</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	174.22	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	360.45	0.00
0.00	0.00	0.00	0.00	675.75	0.00
0.00	0.00	0.00	0.00	580.72	0.00
0.00	0.00	0.00	0.00	1292.20	0.00
0.00	0.00	0.00	0.00	76.37	0.00
0.00	0.00	0.00	0.00	504.36	0.00
0.00	0.00	0.00	0.00	7877.58	0.00
0.00	0.00	0.00	0.00	1903.08	0.00
0.00	0.00	0.00	0.00	4801.35	0.00
0.00	0.00	0.00	0.00	4939.78	0.00
0.00	0.00	0.00	0.00	1393.73	0.00
619.43	0.00	619.43	0.00	18583.00	0.00
0.00	0.00	0.00	0.00	6902.26	0.00
2045.83	0.00	0.00	0.00	33756.28	0.00
2719.46	0.00	0.00	0.00	6798.66	0.00
0.00	0.00	0.00	0.00	39488.88	0.00
294.97	0.00	884.90	0.00	35396.19	0.00
0.00	0.00	0.00	0.00	35752.08	0.00
0.00	0.00	0.00	0.00	61573.52	0.00
4129.56	0.00	0.00	0.00	142469.67	0.00
1411.37	0.00	705.68	0.00	60688.78	0.00

<b>Rhus glabra</b>	<b>Salix</b>	<b>Sambucus</b>	<b>Tilia</b>	<b>Tsuga</b>	<b>Ulmus</b>
					1
	4				1
	1				
	5				
	5			1	8
	5				
	2				4
	9				11
	2				2
	12				20
	1				2
	3			1	2
	2				
	11			8	10
	2			2	2
	3			1	5
	8			2	3
					2
	16				10
	1				5
	7				5
	19				3
	6			1	10
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.29
0.00	1.14	0.00	0.00	0.00	0.29
0.00	0.25	0.00	0.00	0.00	0.00
0.00	1.43	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	1.34	0.00	0.00	0.27	2.14
0.00	1.43	0.00	0.00	0.00	0.00
0.00	0.57	0.00	0.00	0.00	1.14
0.00	2.57	0.00	0.00	0.00	3.14
0.00	0.57	0.00	0.00	0.00	0.57
0.00	3.43	0.00	0.00	0.00	5.71
0.00	0.29	0.00	0.00	0.00	0.57
0.00	0.86	0.00	0.29	0.00	0.57
0.00	0.57	0.00	0.00	0.00	0.00
0.00	2.88	0.00	2.09	0.00	2.62
0.00	0.57	0.00	0.57	0.00	0.57
0.00	0.79	0.00	0.26	0.00	1.32
0.00	2.02	0.00	0.50	0.00	0.76
0.00	0.00	0.00	0.00	0.00	0.57
0.00	4.35	0.00	0.00	0.00	2.72
0.00	0.29	0.00	0.00	0.00	1.43
0.00	2.00	0.00	0.00	0.00	1.43
0.00	5.43	0.00	0.00	0.00	0.86
0.00	1.69	0.00	0.28	0.00	2.81

<b>Rhus glabra</b>	<b>Salix</b>	<b>Sambucus</b>	<b>Tilia</b>	<b>Tsuga</b>	<b>Ulmus</b>
0.00	0.00	0.00	0.00	0.00	61.06
0.00	348.43	0.00	0.00	0.00	87.11
0.00	449.59	0.00	0.00	0.00	0.00
0.00	600.74	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	1451.80	0.00	0.00	290.36	2322.88
0.00	923.00	0.00	0.00	0.00	0.00
0.00	152.74	0.00	0.00	0.00	305.47
0.00	302.62	0.00	0.00	0.00	369.87
0.00	1211.93	0.00	0.00	0.00	1211.93
0.00	1343.35	0.00	0.00	0.00	2238.92
0.00	266.74	0.00	0.00	0.00	533.48
0.00	2117.05	0.00	705.68	0.00	1411.37
0.00	1393.73	0.00	0.00	0.00	0.00
0.00	3406.88	0.00	2477.73	0.00	3097.17
0.00	1061.89	0.00	1061.89	0.00	1061.89
0.00	1534.38	0.00	511.46	0.00	2557.29
0.00	2719.46	0.00	679.87	0.00	1019.80
0.00	0.00	0.00	0.00	0.00	2322.88
0.00	4719.49	0.00	0.00	0.00	2949.68
0.00	605.97	0.00	0.00	0.00	3029.84
0.00	5824.52	0.00	0.00	0.00	4160.37
0.00	39230.78	0.00	0.00	0.00	6194.33
0.00	4234.10	0.00	705.68	0.00	7056.84

<b>Viburnum</b>	<b>Triporate undiff</b>	<b>Alisma-type</b>	<b>Ambrosia</b>	<b>Artemisia</b>	<b>Asteraceae</b>
			11	17	8
			33	14	6
			24	13	3
	1		102	11	10
			137	15	9
	1		43	12	10
			44	11	7
			55	4	6
	1		74	9	4
	5		101	4	2
	1		72	8	3
			56	4	
			97	8	3
	1		88	5	3
	5		51	3	5
			64	6	3
	8		14	10	11
			23	2	4
	4		21		2
	3		57		2
	3		29	1	3
	2		16		1
	16		46	1	2
	3		51		1
<b>% Abundance</b>					
0.00	0.00	0.00	3.14	4.86	2.29
0.00	0.00	0.00	9.43	4.00	1.71
0.00	0.00	0.00	6.02	3.26	0.75
0.00	0.29	0.00	29.14	3.14	2.86
0.00	0.00	0.00	39.14	4.29	2.57
0.00	0.27	0.00	11.51	3.21	2.68
0.00	0.00	0.00	12.57	3.14	2.00
0.00	0.00	0.00	15.71	1.14	1.71
0.00	0.29	0.00	21.14	2.57	1.14
0.00	1.43	0.00	28.86	1.14	0.57
0.00	0.29	0.00	20.57	2.29	0.86
0.00	0.00	0.00	16.00	1.14	0.00
0.00	0.00	0.00	27.71	2.29	0.86
0.00	0.29	0.00	25.14	1.43	0.86
0.00	1.31	0.00	13.35	0.79	1.31
0.00	0.00	0.00	18.29	1.71	0.86
0.00	2.11	0.00	3.69	2.64	2.90
0.00	0.00	0.00	5.80	0.50	1.01
0.00	1.14	0.00	6.00	0.00	0.57
0.00	0.82	0.00	15.51	0.00	0.54
0.00	0.86	0.00	8.29	0.29	0.86
0.00	0.57	0.00	4.57	0.00	0.29
0.00	4.57	0.00	13.14	0.29	0.57
0.00	0.84	0.00	14.33	0.00	0.28

<b>Viburnum</b>	<b>Triporate undiff</b>	<b>Alisma-type</b>	<b>Ambrosia</b>	<b>Artemisia</b>	<b>Asteraceae</b>
0.00	0.00	0.00	671.67	1038.04	488.49
0.00	0.00	0.00	2874.56	1219.51	522.65
0.00	0.00	0.00	10790.13	5844.65	1348.77
0.00	120.15	0.00	12255.17	1321.64	1201.49
0.00	0.00	0.00	15429.52	1689.36	1013.62
0.00	290.36	0.00	12485.45	3484.31	2903.59
0.00	0.00	0.00	8122.37	2030.59	1292.20
0.00	0.00	0.00	4200.27	305.47	458.21
0.00	33.62	0.00	2488.19	302.62	134.50
0.00	3029.84	0.00	61202.71	2423.87	1211.93
0.00	111.95	0.00	8060.10	895.57	335.84
0.00	0.00	0.00	14937.53	1066.97	0.00
0.00	0.00	0.00	68451.30	5645.47	2117.05
0.00	696.86	0.00	61323.90	3484.31	2090.59
0.00	1548.58	0.00	15795.55	929.15	1548.58
0.00	0.00	0.00	33980.34	3185.66	1592.83
0.00	4091.67	0.00	7160.42	5114.59	5626.05
0.00	0.00	0.00	7818.46	679.87	1359.73
0.00	4645.75	0.00	24390.19	0.00	2322.88
0.00	884.90	0.00	16813.19	0.00	589.94
0.00	1817.90	0.00	17573.05	605.97	1817.90
0.00	1664.15	0.00	13313.19	0.00	832.07
0.00	33036.44	0.00	94979.78	2064.78	4129.56
0.00	2117.05	0.00	35989.86	0.00	705.68

Balsaminaceae	Brassicaceae	Campanulaceae	Humulus	Chenopodiaceae
			1	40
	1			44
				69
				37
				42
				24
				38
	3			30
				39
	1			37
	1			18
	1			16
	13			31
				30
				19
	11			13
				3
	47			2
				2
				5
				3
				1
				5
				8
<b>% Abundance</b>				
0.00	0.00	0.00	0.29	11.43
0.00	0.29	0.00	0.00	12.57
0.00	0.00	0.00	0.00	17.29
0.00	0.00	0.00	0.00	10.57
0.00	0.00	0.00	0.00	12.00
0.00	0.00	0.00	0.00	6.43
0.00	0.00	0.00	0.00	10.86
0.00	0.86	0.00	0.00	8.57
0.00	0.00	0.00	0.00	11.14
0.00	0.29	0.00	0.00	10.57
0.00	0.29	0.00	0.00	5.14
0.00	0.29	0.00	0.00	4.57
0.00	3.71	0.00	0.00	8.86
0.00	0.00	0.00	0.00	8.57
0.00	0.00	0.00	0.00	4.97
0.00	3.14	0.00	0.00	3.71
0.00	0.00	0.00	0.00	0.79
0.00	11.85	0.00	0.00	0.50
0.00	0.00	0.00	0.00	0.57
0.00	0.00	0.00	0.00	1.36
0.00	0.00	0.00	0.00	0.86
0.00	0.00	0.00	0.00	0.29
0.00	0.00	0.00	0.00	1.43
0.00	0.00	0.00	0.00	2.25

<b>Balsaminaceae</b>	<b>Brassicaceae</b>	<b>Campanulaceae</b>	<b>Humulus</b>	<b>Chenopodiaceae</b>
0.00	0.00	0.00	61.06	2442.45
0.00	87.11	0.00	0.00	3832.74
0.00	0.00	0.00	0.00	31021.62
0.00	0.00	0.00	0.00	4445.50
0.00	0.00	0.00	0.00	4730.22
0.00	0.00	0.00	0.00	6968.63
0.00	0.00	0.00	0.00	7014.77
0.00	229.11	0.00	0.00	2291.05
0.00	0.00	0.00	0.00	1311.35
0.00	605.97	0.00	0.00	22420.79
0.00	111.95	0.00	0.00	2015.02
0.00	266.74	0.00	0.00	4267.87
0.00	9173.89	0.00	0.00	21876.19
0.00	0.00	0.00	0.00	20905.88
0.00	0.00	0.00	0.00	5884.62
0.00	5840.37	0.00	0.00	6902.26
0.00	0.00	0.00	0.00	1534.38
0.00	15976.85	0.00	0.00	679.87
0.00	0.00	0.00	0.00	2322.88
0.00	0.00	0.00	0.00	1474.84
0.00	0.00	0.00	0.00	1817.90
0.00	0.00	0.00	0.00	832.07
0.00	0.00	0.00	0.00	10323.89
0.00	0.00	0.00	0.00	5645.47

Cyperaceae	Eleagnaceae	Ericaceae	Gentianaceae	Fagaceae	Galium
2					
	8				
2					
2					
6					
2					
10					
3					1
8					
4					
1					
1					
1					
1					
2					
2					
1					
<b>% Abundance</b>					
0.57	0.00	0.00	0.00	0.00	0.00
0.00	2.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.57	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.54	0.00	0.00	0.00	0.00	0.00
1.71	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.57	0.00	0.00	0.00	0.00	0.00
2.86	0.00	0.00	0.00	0.00	0.00
0.86	0.00	0.00	0.00	0.00	0.29
2.29	0.00	0.00	0.00	0.00	0.00
1.14	0.00	0.00	0.00	0.00	0.00
0.29	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.29	0.00	0.00	0.00	0.00	0.00
0.26	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.29	0.00	0.00	0.00	0.00	0.00
0.54	0.00	0.00	0.00	0.00	0.00
0.57	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.28	0.00	0.00	0.00	0.00	0.00

<b>Cyperaceae</b>	<b>Eleagnaceae</b>	<b>Ericaceae</b>	<b>Gentianaceae</b>	<b>Fagaceae</b>	<b>Galium</b>
122.12	0.00	0.00	0.00	0.00	0.00
0.00	696.86	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
240.30	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
580.72	0.00	0.00	0.00	0.00	0.00
1107.60	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
67.25	0.00	0.00	0.00	0.00	0.00
6059.67	0.00	0.00	0.00	0.00	0.00
335.84	0.00	0.00	0.00	0.00	111.95
2133.93	0.00	0.00	0.00	0.00	0.00
2822.73	0.00	0.00	0.00	0.00	0.00
696.86	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
530.94	0.00	0.00	0.00	0.00	0.00
511.46	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1161.44	0.00	0.00	0.00	0.00	0.00
589.94	0.00	0.00	0.00	0.00	0.00
1211.93	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
705.68	0.00	0.00	0.00	0.00	0.00



<b>Geum</b>	<b>Melilotus</b>	<b>Dalea</b>	<b>Fabaceae</b>	<b>Iva</b>	<b>Monotropa</b>
0.00	122.12	0.00	0.00	0.00	0.00
0.00	0.00	0.00	174.22	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	120.15	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	290.36	0.00	871.08	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	33.62	0.00	0.00	0.00	0.00
0.00	0.00	0.00	605.97	0.00	0.00
0.00	0.00	0.00	223.89	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	309.72	0.00	0.00
0.00	0.00	0.00	2123.77	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	339.93	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	294.97	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	832.07	0.00	0.00
0.00	0.00	0.00	2064.78	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

Oxalis	Poaceae	Plantago	Polygonaceae	Potentilla	Ranunculaceae
	44				
	28				
	31				1
	29				1
	30				
	90				
	42				
	24	4	1		2
	64				
	47	4			1
	37				
	26	1			
	25	6			6
	32				
	54	1			1
	28	7	1		5
	34				
	23	10			15
	42				
	25	1			
	9				
	19				
	26				1
	41				1
<b>% Abundance</b>					
0.00	12.57	0.00	0.00	0.00	0.00
0.00	8.00	0.00	0.00	0.00	0.00
0.00	7.77	0.00	0.00	0.00	0.25
0.00	8.29	0.00	0.00	0.00	0.29
0.00	8.57	0.00	0.00	0.00	0.00
0.00	24.10	0.00	0.00	0.00	0.00
0.00	12.00	0.00	0.00	0.00	0.00
0.00	6.86	1.14	0.29	0.00	0.57
0.00	18.29	0.00	0.00	0.00	0.00
0.00	13.43	1.14	0.00	0.00	0.29
0.00	10.57	0.00	0.00	0.00	0.00
0.00	7.43	0.29	0.00	0.00	0.00
0.00	7.14	1.71	0.00	0.00	1.71
0.00	9.14	0.00	0.00	0.00	0.00
0.00	14.14	0.26	0.00	0.00	0.26
0.00	8.00	2.00	0.29	0.00	1.43
0.00	8.97	0.00	0.00	0.00	0.00
0.00	5.80	2.52	0.00	0.00	3.78
0.00	12.00	0.00	0.00	0.00	0.00
0.00	6.80	0.27	0.00	0.00	0.00
0.00	2.57	0.00	0.00	0.00	0.00
0.00	5.43	0.00	0.00	0.00	0.00
0.00	7.43	0.00	0.00	0.00	0.29
0.00	11.52	0.00	0.00	0.00	0.28

<b>Oxalis</b>	<b>Poaceae</b>	<b>Plantago</b>	<b>Polygonaceae</b>	<b>Potentilla</b>	<b>Ranunculaceae</b>
0.00	2686.70	0.00	0.00	0.00	0.00
0.00	2439.02	0.00	0.00	0.00	0.00
0.00	13937.25	0.00	0.00	0.00	449.59
0.00	3484.31	0.00	0.00	0.00	120.15
0.00	3378.73	0.00	0.00	0.00	0.00
0.00	26132.34	0.00	0.00	0.00	0.00
0.00	7753.17	0.00	0.00	0.00	0.00
0.00	1832.84	305.47	76.37	0.00	152.74
0.00	2151.95	0.00	0.00	0.00	0.00
0.00	28480.47	2423.87	0.00	0.00	605.97
0.00	4141.99	0.00	0.00	0.00	0.00
0.00	6935.28	266.74	0.00	0.00	0.00
0.00	17642.09	4234.10	0.00	0.00	4234.10
0.00	22299.60	0.00	0.00	0.00	0.00
0.00	16724.70	309.72	0.00	0.00	309.72
0.00	14866.40	3716.60	530.94	0.00	2654.71
0.00	17389.60	0.00	0.00	0.00	0.00
0.00	7818.46	3399.33	0.00	0.00	5098.99
0.00	48780.38	0.00	0.00	0.00	0.00
0.00	7374.21	294.97	0.00	0.00	0.00
0.00	5453.71	0.00	0.00	0.00	0.00
0.00	15809.42	0.00	0.00	0.00	0.00
0.00	53684.22	0.00	0.00	0.00	2064.78
0.00	28933.03	0.00	0.00	0.00	705.68

Roseaceae	Rumex	Sagittaria	Saxifragaceae	Salsola	Sarcobatus
				1	1
1	2				
	2				
1	1				
2					
	4			1	
	2				1
1					
	1				
				1	
	1				
			2		
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.25
0.00	0.00	0.00	0.00	0.00	0.00
0.29	0.57	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.57	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.29	0.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.57	0.00	0.00	0.00	0.00	0.00
0.00	1.14	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.29
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.57	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.26
0.00	0.00	0.00	0.00	0.00	0.00
0.29	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.29
0.00	0.29	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.56	0.00

<b>Roseaceae</b>	<b>Rumex</b>	<b>Sagittaria</b>	<b>Saxifragaceae</b>	<b>Salsola</b>	<b>Sarcobatus</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	449.59	449.59
0.00	0.00	0.00	0.00	0.00	0.00
112.62	225.25	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	369.20	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
33.62	33.62	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
223.89	0.00	0.00	0.00	0.00	0.00
0.00	1066.97	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	705.68	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	1061.89	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	511.46
0.00	0.00	0.00	0.00	0.00	0.00
1161.44	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	605.97	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	832.07	0.00
0.00	2064.78	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1411.37	0.00	0.00





Vaccinium	Sphaeralcea	Malvacea	Violaceae	Myrsinaceae	Myriophyllum
			1		
					1
					1
					1
					4
					3
					29
					46
<b>% Abundance</b>					
0.00	0.00	0.00	0.29	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.29
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.29
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.26
0.00	0.00	0.00	0.00	0.00	1.14
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.76
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	8.29
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	12.92

<b>Vaccinium</b>	<b>Sphaeralcea</b>	<b>Malvacea</b>	<b>Violaceae</b>	<b>Myrsinaceae</b>	<b>Myriophyllum</b>
0.00	0.00	0.00	61.06	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	112.62
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	33.62
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	309.72
0.00	0.00	0.00	0.00	0.00	2123.77
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1019.80
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	17573.05
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	32461.44



<b>Planera</b>	<b>Nuphar</b>	<b>Nymphaea</b>	<b>Potamogeton</b>	<b>Sparganium</b>	<b>Triglochin</b>
0.00	0.00	0.00	0.00	122.12	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	449.59	1798.35	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	871.08	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	229.11	0.00	0.00
0.00	0.00	0.00	0.00	33.62	0.00
0.00	0.00	0.00	0.00	1817.90	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	696.86	696.86	0.00
0.00	0.00	0.00	0.00	1858.30	0.00
0.00	0.00	0.00	1061.89	1592.83	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	339.93	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	705.68	0.00

<b>Typha</b>	<b>Equisetum</b>	<b>Botrychium</b>	<b>Dryopteris</b>	<b>Isoetes</b>	<b>Pediastrum</b>
53	1				
34					
62					
10					
15	1				
51	9	2			23
6					
78	1				89
23	1				
40		2			
21	2				
2	1				
22					94
40		2			187
20	3	6			10
45					122
6		8			20
2					
11	4	1			19
106					
1	1				
	1	1			
1	3	7			1
<b>% Abundance</b>					
15.14	0.29	0.00	0.00	0.00	0.00
9.71	0.00	0.00	0.00	0.00	0.00
15.54	0.00	0.00	0.00	0.00	0.00
2.86	0.00	0.00	0.00	0.00	0.00
4.29	0.29	0.00	0.00	0.00	0.00
13.65	2.41	0.54	0.00	0.00	6.16
1.71	0.00	0.00	0.00	0.00	0.00
22.29	0.29	0.00	0.00	0.00	25.43
6.57	0.29	0.00	0.00	0.00	0.00
11.43	0.00	0.57	0.00	0.00	0.00
6.00	0.57	0.00	0.00	0.00	0.00
0.57	0.29	0.00	0.00	0.00	0.00
6.29	0.00	0.00	0.00	0.00	26.86
11.43	0.00	0.57	0.00	0.00	53.43
5.24	0.79	1.57	0.00	0.00	2.62
12.86	0.00	0.00	0.00	0.00	34.86
1.58	0.00	2.11	0.00	0.00	5.28
0.50	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
2.99	1.09	0.27	0.00	0.00	5.17
30.29	0.00	0.00	0.00	0.00	0.00
0.29	0.29	0.00	0.00	0.00	0.00
0.00	0.29	0.29	0.00	0.00	0.00
0.28	0.84	1.97	0.00	0.00	0.28

<b>Typha</b>	<b>Equisetum</b>	<b>Botrychium</b>	<b>Dryopteris</b>	<b>Isoetes</b>	<b>Pediastrum</b>
3236.25	61.06	0.00	0.00	0.00	0.00
2961.67	0.00	0.00	0.00	0.00	0.00
27874.50	0.00	0.00	0.00	0.00	0.00
1201.49	0.00	0.00	0.00	0.00	0.00
1689.36	112.62	0.00	0.00	0.00	0.00
14808.33	2613.23	580.72	0.00	0.00	6678.27
1107.60	0.00	0.00	0.00	0.00	0.00
5956.74	76.37	0.00	0.00	0.00	6796.80
773.36	33.62	0.00	0.00	0.00	0.00
24238.70	0.00	1211.93	0.00	0.00	0.00
2350.86	223.89	0.00	0.00	0.00	0.00
533.48	266.74	0.00	0.00	0.00	0.00
15525.04	0.00	0.00	0.00	0.00	66334.25
27874.50	0.00	1393.73	0.00	0.00	130313.29
6194.33	929.15	1858.30	0.00	0.00	3097.17
23892.43	0.00	0.00	0.00	0.00	64775.03
3068.75	0.00	4091.67	0.00	0.00	10229.17
679.87	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
3244.65	1179.87	294.97	0.00	0.00	5604.40
64232.54	0.00	0.00	0.00	0.00	0.00
832.07	832.07	0.00	0.00	0.00	0.00
0.00	2064.78	2064.78	0.00	0.00	0.00
705.68	2117.05	4939.78	0.00	0.00	705.68



<b>Menyanthaceae</b>	<b>Osmunda</b>	<b>Polypodium</b>	<b>Pteridum</b>	<b>Fern undiff</b>	<b>Moss spore</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	449.59
0.00	0.00	0.00	0.00	120.15	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1161.44
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	76.37
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	605.97	0.00
0.00	0.00	0.00	0.00	111.95	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	705.68
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1548.58	619.43
0.00	530.94	0.00	0.00	0.00	3716.60
0.00	0.00	0.00	0.00	0.00	0.00
339.93	0.00	0.00	0.00	0.00	1019.80
0.00	0.00	0.00	0.00	10452.94	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	605.97	0.00
0.00	0.00	0.00	0.00	832.07	0.00
0.00	0.00	0.00	0.00	4129.56	6194.33
0.00	0.00	0.00	0.00	0.00	0.00

Sphagnum	Black mold	Coprinus	Fungi undiff	Aureobasidium/ Delitschia	Chaetomium
			85		
		7	110	6	
		10	144		1
			91	4	
			60	4	
			46		2
			155		
		6	59		
			21	2	
			23		
			64	2	
			145	4	
		5	58		
		16	73	2	
		2	30	4	
			42		
		1	124	2	
			40		
			44		
			14		
			37		
		5	39	2	
			9		
		1	3		
<b>% Abundance</b>					
0.00	0.00	0.00	24.29	0.00	0.00
0.00	0.00	2.00	31.43	1.71	0.00
0.00	0.00	2.51	36.09	0.00	0.25
0.00	0.00	0.00	26.00	1.14	0.00
0.00	0.00	0.00	17.14	1.14	0.00
0.00	0.00	0.00	12.32	0.00	0.54
0.00	0.00	0.00	44.29	0.00	0.00
0.00	0.00	1.71	16.86	0.00	0.00
0.00	0.00	0.00	6.00	0.57	0.00
0.00	0.00	0.00	6.57	0.00	0.00
0.00	0.00	0.00	18.29	0.57	0.00
0.00	0.00	0.00	41.43	1.14	0.00
0.00	0.00	1.43	16.57	0.00	0.00
0.00	0.00	4.57	20.86	0.57	0.00
0.00	0.00	0.52	7.85	1.05	0.00
0.00	0.00	0.00	12.00	0.00	0.00
0.00	0.00	0.26	32.72	0.53	0.00
0.00	0.00	0.00	10.09	0.00	0.00
0.00	0.00	0.00	12.57	0.00	0.00
0.00	0.00	0.00	3.81	0.00	0.00
0.00	0.00	0.00	10.57	0.00	0.00
0.00	0.00	1.43	11.14	0.57	0.00
0.00	0.00	0.00	2.57	0.00	0.00
0.00	0.00	0.28	0.84	0.00	0.00

<b>Sphagnum</b>	<b>Black mold</b>	<b>Coprinus</b>	<b>Fungi undiff</b>	<b>Aureobasidium/ Delitschia</b>	<b>Chaetomium</b>
0.00	0.00	0.00	5190.21	0.00	0.00
0.00	0.00	609.75	9581.86	522.65	0.00
0.00	0.00	4495.89	64740.77	0.00	449.59
0.00	0.00	0.00	10933.53	480.59	0.00
0.00	0.00	0.00	6757.45	450.50	0.00
0.00	0.00	0.00	13356.53	0.00	580.72
0.00	0.00	0.00	28612.90	0.00	0.00
0.00	0.00	458.21	4505.74	0.00	0.00
0.00	0.00	0.00	706.11	67.25	0.00
0.00	0.00	0.00	13937.25	0.00	0.00
0.00	0.00	0.00	7164.53	223.89	0.00
0.00	0.00	0.00	38677.54	1066.97	0.00
0.00	0.00	3528.42	40929.65	0.00	0.00
0.00	0.00	11149.80	50870.96	1393.73	0.00
0.00	0.00	619.43	9291.50	1238.87	0.00
0.00	0.00	0.00	22299.60	0.00	0.00
0.00	0.00	511.46	63420.88	1022.92	0.00
0.00	0.00	0.00	13597.32	0.00	0.00
0.00	0.00	0.00	51103.25	0.00	0.00
0.00	0.00	0.00	4129.56	0.00	0.00
0.00	0.00	0.00	22420.79	0.00	0.00
0.00	0.00	4160.37	32450.91	1664.15	0.00
0.00	0.00	0.00	18583.00	0.00	0.00
0.00	0.00	705.68	2117.05	0.00	0.00



<b>Torula</b>	<b>Panaeolus</b>	<b>Podospora</b>	<b>Pleospora</b>	<b>Tetraploa</b>	<b>Fusarium</b>
0.00	0.00	0.00	0.00	0.00	244.25
0.00	174.22	87.11	0.00	0.00	522.65
0.00	0.00	0.00	0.00	0.00	0.00
120.15	0.00	480.59	240.30	0.00	360.45
0.00	0.00	0.00	0.00	0.00	1013.62
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	184.60	0.00	0.00	369.20
76.37	0.00	305.47	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	134.50
0.00	0.00	0.00	0.00	0.00	1211.93
0.00	0.00	0.00	0.00	0.00	1119.46
0.00	0.00	1333.71	0.00	0.00	4534.61
0.00	0.00	2117.05	0.00	0.00	705.68
0.00	0.00	0.00	0.00	0.00	696.86
0.00	0.00	0.00	0.00	0.00	0.00
1061.89	0.00	1592.83	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	7671.88
0.00	0.00	0.00	339.93	0.00	0.00
0.00	0.00	0.00	0.00	0.00	3484.31
0.00	0.00	0.00	0.00	0.00	294.97
0.00	0.00	605.97	0.00	0.00	605.97
0.00	0.00	832.07	0.00	0.00	2496.22
0.00	0.00	0.00	0.00	0.00	4129.56
0.00	0.00	0.00	0.00	0.00	0.00

Ustulina	Neurospora	Sporormiella	unidentifiable/ degraded	Sporormiella asci
		3	14	
		5	11	
		7	14	
		4	13	
		4	10	
		11	24	
		3	13	7
		7	20	
		1	25	
		1	19	
		0	11	
		17	7	6
		7	26	
		0	37	
1		5	29	
		5	32	
1		3	37	
	3	0	35	
		4	17	1
		1	37	
		2	19	
		2	26	
		0	30	
	1	2	23	
<b>% Abundance</b>				
0.00	0.00	0.86	4.00	
0.00	0.00	1.43	3.14	
0.00	0.00	1.75	3.51	
0.00	0.00	1.14	3.71	
0.00	0.00	1.14	2.86	
0.00	0.00	2.95	6.43	
0.00	0.00	0.86	3.71	
0.00	0.00	2.00	5.71	
0.00	0.00	0.29	7.14	
0.00	0.00	0.29	5.43	
0.00	0.00	0.00	3.14	
0.00	0.00	4.86	2.00	
0.00	0.00	2.00	7.43	
0.00	0.00	0.00	10.57	
0.26	0.00	1.31	7.59	
0.00	0.00	1.43	9.14	
0.26	0.00	0.79	9.76	
0.00	0.76	0.00	8.83	
0.00	0.00	1.14	4.86	
0.00	0.00	0.27	10.07	
0.00	0.00	0.57	5.43	
0.00	0.00	0.57	7.43	
0.00	0.00	0.00	8.57	
0.00	0.28	0.56	6.46	

<b>Ustulina</b>	<b>Neurospora</b>	<b>Sporormiella</b>	<b>unidentifiable/ degraded</b>	<b>Sporormiella asci</b>
0.00	0.00	183.18	854.86	
0.00	0.00	435.54	958.19	
0.00	0.00	3147.12	6294.24	
0.00	0.00	480.59	1561.93	
0.00	0.00	450.50	1126.24	
0.00	0.00	3193.95	6968.63	
0.00	0.00	553.80	2399.79	
0.00	0.00	534.58	1527.37	
0.00	0.00	33.62	840.61	
0.00	0.00	605.97	11513.38	
0.00	0.00	0.00	1231.40	
0.00	0.00	4534.61	1867.19	
0.00	0.00	4939.78	18347.77	
0.00	0.00	0.00	25783.91	
309.72	0.00	1548.58	8981.78	
0.00	0.00	2654.71	16990.17	
511.46	0.00	1534.38	18923.97	
0.00	1019.80	0.00	11897.65	
0.00	0.00	4645.75	19744.44	
0.00	0.00	294.97	10913.83	
0.00	0.00	1211.93	11513.38	
0.00	0.00	1664.15	21633.94	
0.00	0.00	0.00	61943.33	
0.00	705.68	1411.37	16230.72	

<b>Pollen and Spore Count Sheets Lake- Center Samples</b>	<b>Longitude</b>	<b>Abies balsamea</b>	<b>Picea glauca</b>	<b>Picea mariana</b>	<b>Picea undiff</b>
NEW-1C	-103.2334	0	0	0	0
WAG-1C	-101.3917	0	0	0	2.5
HAY-1C	-101.043	0	0	0	1
JON-1C	-98.5645	0	0	0	0
ROS-1C	-98.4611	0	0	0	0
DUD-1C	-98.1738	0	0	0	1
CAR-1C	-97.4237	0	0	0	0
LOS-1C	-97.452	0	0	0	0
WAL-1C	-96.5732	0	0	0	1
GOO-1C	-96.241	0	0	0	0
CLE-1C	-95.5716	0	0	0	1
BOO-1C	-95.458	0	0	0	2
IND-1C	-95.253	0	0	0	2
TIM-1C	-95.1251	0	0	0	1
GEO-1C	-93.529	0	0	0	1
DUC-1C	-93.4854	0	1	2	0
DUL-1C	-93.2145	0	0	0	0
PER-1C	-90.488	0	0	0	0
ANG-1C	-90.4629	0	0	0	0
VIR-1C	-89.5557	0	0	0	0
FIS-1C	-89.396	0	0	0	2
EME-1C	-89.274	0	0	0	2
KIL-1C	-89.2113	0	0	0	0
GIB-4	-89.1049	0	0	0	0.5
<b>% Abundance</b>					
NEW-1C	-103.2334	0.00	0.00	0.00	0.00
WAG-1C	-101.3917	0.00	0.00	0.00	0.71
HAY-1C	-101.043	0.00	0.00	0.00	0.27
JON-1C	-98.5645	0.00	0.00	0.00	0.00
ROS-1C	-98.4611	0.00	0.00	0.00	0.00
DUD-1C	-98.1738	0.00	0.00	0.00	0.27
CAR-1C	-97.4237	0.00	0.00	0.00	0.00
LOS-1C	-97.452	0.00	0.00	0.00	0.00
WAL-1C	-96.5732	0.00	0.00	0.00	0.29
GOO-1C	-96.241	0.00	0.00	0.00	0.00
CLE-1C	-95.5716	0.00	0.00	0.00	0.29
BOO-1C	-95.458	0.00	0.00	0.00	0.57
IND-1C	-95.253	0.00	0.00	0.00	0.57
TIM-1C	-95.1251	0.00	0.00	0.00	0.29
GEO-1C	-93.529	0.00	0.00	0.00	0.25
DUC-1C	-93.4854	0.00	0.29	0.57	0.00
DUL-1C	-93.2145	0.00	0.00	0.00	0.00
PER-1C	-90.488	0.00	0.00	0.00	0.00
ANG-1C	-90.4629	0.00	0.00	0.00	0.00
VIR-1C	-89.5557	0.00	0.00	0.00	0.00
FIS-1C	-89.396	0.00	0.00	0.00	0.54
EME-1C	-89.274	0.00	0.00	0.00	0.57
KIL-1C	-89.2113	0.00	0.00	0.00	0.00
GIB-4	-89.1049	0.00	0.00	0.00	0.00

<b>CONCENTRATION</b>		<b>Abies</b>	<b>Picea glauca</b>	<b>Picea</b>	<b>Picea undiff</b>
NEW-1C	-103.2334	0.00	0.00	0.00	0.00
WAG-1C	-101.3917	0.00	0.00	0.00	119.33
HAY-1C	-101.043	0.00	0.00	0.00	221.23
JON-1C	-98.5645	0.00	0.00	0.00	0.00
ROS-1C	-98.4611	0.00	0.00	0.00	0.00
DUD-1C	-98.1738	0.00	0.00	0.00	655.87
CAR-1C	-97.4237	0.00	0.00	0.00	0.00
LOS-1C	-97.452	0.00	0.00	0.00	0.00
WAL-1C	-96.5732	0.00	0.00	0.00	530.94
GOO-1C	-96.241	0.00	0.00	0.00	0.00
CLE-1C	-95.5716	0.00	0.00	0.00	366.77
BOO-1C	-95.458	0.00	0.00	0.00	1592.83
IND-1C	-95.253	0.00	0.00	0.00	1956.11
TIM-1C	-95.1251	0.00	0.00	0.00	819.84
GEO-1C	-93.529	0.00	0.00	0.00	342.02
DUC-1C	-93.4854	0.00	401.07	802.14	0.00
DUL-1C	-93.2145	0.00	0.00	0.00	0.00
PER-1C	-90.488	0.00	0.00	0.00	0.00
ANG-1C	-90.4629	0.00	0.00	0.00	0.00
VIR-1C	-89.5557	0.00	0.00	0.00	0.00
FIS-1C	-89.396	0.00	0.00	0.00	952.97
EME-1C	-89.274	0.00	0.00	0.00	3097.17
KIL-1C	-89.2113	0.00	0.00	0.00	0.00
GIB-4	-89.1049	0.00	0.00	0.00	293.42

<b>Pinus banksiana/ resinosa</b>	<b>Pinus strobus</b>	<b>Pinus undiff</b>	<b>Acer negundo</b>	<b>Acer pennsylvanicum</b>	<b>Acer rubrum</b>
0	0	34			
0	0	25			
0	0	20.5			
0	0	18.5			
0	0	1.5			
0	0	8.5			
0	0	3.5			
0	0	14.5			
0	0	7.5			
0	0	21			
0	0	14.5			
0	0	8.5			
0	0	24			
0	0	11.5			
0	0	16	1	1	
0	0	26			
0	0	11.5	1		
0	0	44			
0	0	47			
0	0	39			1
0	0	34			
0	0	48.5			
0	0	18			
0	0	19			
<b>% Abundance</b>					
0.00	0.00	9.71	0.00	0.00	0.00
0.00	0.00	7.14	0.00	0.00	0.00
0.00	0.00	5.50	0.00	0.00	0.00
0.00	0.00	4.65	0.00	0.00	0.00
0.00	0.00	0.43	0.00	0.00	0.00
0.00	0.00	2.33	0.00	0.00	0.00
0.00	0.00	0.87	0.00	0.00	0.00
0.00	0.00	4.14	0.00	0.00	0.00
0.00	0.00	2.14	0.00	0.00	0.00
0.00	0.00	5.25	0.00	0.00	0.00
0.00	0.00	4.14	0.00	0.00	0.00
0.00	0.00	2.43	0.00	0.00	0.00
0.00	0.00	6.86	0.00	0.00	0.00
0.00	0.00	3.29	0.00	0.00	0.00
0.00	0.00	4.06	0.25	0.25	0.00
0.00	0.00	7.43	0.00	0.00	0.00
0.00	0.00	2.93	0.25	0.00	0.00
0.00	0.00	11.34	0.00	0.00	0.00
0.00	0.00	11.93	0.00	0.00	0.00
0.00	0.00	10.92	0.00	0.00	0.28
0.00	0.00	9.19	0.00	0.00	0.00
0.00	0.00	13.86	0.00	0.00	0.00
0.00	0.00	5.14	0.00	0.00	0.00
0.00	0.00	5.02	0.00	0.00	0.00

<b>Pinus</b>	<b>Pinus</b>	<b>Pinus undiff</b>	<b>Acer</b>	<b>Acer</b>	<b>Acer rubrum</b>
0.00	0.00	2561.44	0.00	0.00	0.00
0.00	0.00	1193.26	0.00	0.00	0.00
0.00	0.00	4535.14	0.00	0.00	0.00
0.00	0.00	7696.69	0.00	0.00	0.00
0.00	0.00	203.96	0.00	0.00	0.00
0.00	0.00	5574.90	0.00	0.00	0.00
0.00	0.00	335.26	0.00	0.00	0.00
0.00	0.00	5987.86	0.00	0.00	0.00
0.00	0.00	3982.07	0.00	0.00	0.00
0.00	0.00	35476.64	0.00	0.00	0.00
0.00	0.00	5318.16	0.00	0.00	0.00
0.00	0.00	6769.52	0.00	0.00	0.00
0.00	0.00	23473.26	0.00	0.00	0.00
0.00	0.00	9428.14	0.00	0.00	0.00
0.00	0.00	5472.29	342.02	342.02	0.00
0.00	0.00	10427.87	0.00	0.00	0.00
0.00	0.00	8115.36	705.68	0.00	0.00
0.00	0.00	28194.90	0.00	0.00	0.00
0.00	0.00	68952.71	0.00	0.00	0.00
0.00	0.00	41811.75	0.00	0.00	1072.10
0.00	0.00	16200.56	0.00	0.00	0.00
0.00	0.00	75106.29	0.00	0.00	0.00
0.00	0.00	41811.75	0.00	0.00	0.00
0.00	0.00	11149.80	0.00	0.00	0.00

Acer saccharinum	Acer saccharum	Acer undiff	Alnus crispa	Alnus rugosa	Alnus undiff
		1			
		2			
	1	1			
	2				1
		1			
		2	2	2	
		2			
		3			
	1	6		1	
	1	1			
		1	3		2
			16	9	12
	2	6	1	1	14
	1				2
		2		1	9
	1	2			6
		1			
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.29	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.55	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.29	0.29	0.00	0.00	0.00
0.00	0.57	0.00	0.00	0.00	0.29
0.00	0.00	0.25	0.00	0.00	0.00
0.00	0.00	0.57	0.57	0.57	0.00
0.00	0.00	0.57	0.00	0.00	0.00
0.00	0.00	0.86	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.25	1.52	0.00	0.25	0.00
0.00	0.29	0.29	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.51
0.00	0.00	0.26	0.77	0.00	3.09
0.00	0.00	0.00	4.06	2.28	3.55
0.00	0.56	1.68	0.28	0.28	0.56
0.00	0.27	0.00	0.00	0.00	0.00
0.00	0.00	0.57	0.00	0.29	2.57
0.00	0.29	0.57	0.00	0.00	1.71
0.00	0.28	0.56	0.00	0.00	1.67

<b>Acer</b>	<b>Acer</b>	<b>Acer undiff</b>	<b>Alnus crispa</b>	<b>Alnus rugosa</b>	<b>Alnus undiff</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	47.73	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1311.74	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	412.96	412.96	0.00	0.00	0.00
0.00	1061.89	0.00	0.00	0.00	530.94
0.00	0.00	1689.36	0.00	0.00	0.00
0.00	0.00	733.54	733.54	733.54	0.00
0.00	0.00	1592.83	0.00	0.00	0.00
0.00	0.00	2934.16	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	342.02	2052.11	0.00	342.02	0.00
0.00	401.07	401.07	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	1411.37
0.00	0.00	640.79	1922.38	0.00	7689.52
0.00	0.00	0.00	23473.26	13203.71	20539.11
0.00	2144.19	6432.58	1072.10	1072.10	2144.19
0.00	476.49	0.00	0.00	0.00	0.00
0.00	0.00	3097.17	0.00	1548.58	13937.25
0.00	2322.88	4645.75	0.00	0.00	13937.25
0.00	0.00	586.83	0.00	0.00	0.00

Betula	Carya	Castanea	Celtis	Cornus	Corylus	Cupressaceae /Taxaceae
					1	
1						
1						
			3			
1						
	1					
	1					
	1		1		1	
1	2					
1						1
	5				2	
	2					
3	4					
5					4	
4					3	
1	6					
12			2		1	
6	1	1		2	2	
1	8				1	
2	8			3	1	
<b>% Abundance</b>						
0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.29	0.00
0.27	0.00	0.00	0.00	0.00	0.00	0.00
0.25	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.82	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.29	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.29	0.00	0.00	0.00	0.00	0.00
0.00	0.25	0.00	0.00	0.00	0.00	0.00
0.00	0.29	0.00	0.29	0.00	0.29	0.00
0.29	0.57	0.00	0.00	0.00	0.00	0.00
0.29	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.29	0.00
0.00	1.27	0.00	0.00	0.00	0.51	0.00
0.00	0.57	0.00	0.00	0.00	0.00	0.00
0.76	1.02	0.00	0.00	0.00	0.00	0.00
1.29	0.00	0.00	0.00	0.00	1.03	0.00
1.02	0.00	0.00	0.00	0.00	0.76	0.00
0.28	1.68	0.00	0.00	0.00	0.00	0.00
3.24	0.00	0.00	0.54	0.00	0.27	0.00
1.71	0.29	0.29	0.00	0.57	0.57	0.00
0.29	2.29	0.00	0.00	0.00	0.29	0.00
0.28	2.23	0.00	0.00	0.00	0.28	0.00

<b>Betula</b>	<b>Carya</b>	<b>Castanea</b>	<b>Celtis</b>	<b>Cornus</b>	<b>Corylus</b>	<b>Cupressaceae</b>
0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	47.73	0.00
221.23	0.00	0.00	0.00	0.00	0.00	0.00
416.04	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1967.61	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00
412.96	0.00	0.00	0.00	0.00	0.00	0.00
0.00	530.94	0.00	0.00	0.00	0.00	0.00
0.00	1689.36	0.00	0.00	0.00	0.00	0.00
0.00	366.77	0.00	366.77	0.00	366.77	0.00
796.41	1592.83	0.00	0.00	0.00	0.00	0.00
978.05	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	819.84	0.00
0.00	1710.09	0.00	0.00	0.00	684.04	0.00
0.00	802.14	0.00	0.00	0.00	0.00	0.00
2117.05	2822.73	0.00	0.00	0.00	0.00	0.00
3203.97	0.00	0.00	0.00	0.00	2563.17	0.00
5868.32	0.00	0.00	0.00	0.00	4401.24	0.00
1072.10	6432.58	0.00	0.00	0.00	0.00	0.00
5717.85	0.00	0.00	952.97	0.00	476.49	0.00
9291.50	1548.58	1548.58	0.00	3097.17	3097.17	0.00
2322.88	18583.00	0.00	0.00	0.00	2322.88	0.00
1173.66	4694.65	0.00	0.00	1760.49	586.83	0.00

<b>Fagus grandifolia</b>	<b>Fraxinus americana</b>	<b>Fraxinus nigra/ quadrangulata</b>	<b>Fraxinus pennsylvanica</b>	<b>Ilex</b>	<b>Juglans cinerea</b>
		1			
		1			
		1			
	1	3			
		1			
		5			
	2	1			
1	3	8	1		
	2	9	1		1
	1	5			
	1	5			
	4	12			1
	1	2			
		4			2
		4			
		3			
	1	2			
		1			1
	1	1			1
					1
		2			1
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.29	0.00	0.00	0.00
0.00	0.00	0.27	0.00	0.00	0.00
0.00	0.00	0.25	0.00	0.00	0.00
0.00	0.29	0.86	0.00	0.00	0.00
0.00	0.00	0.27	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1.43	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.50	0.25	0.00	0.00	0.00
0.29	0.86	2.29	0.29	0.00	0.00
0.00	0.57	2.57	0.29	0.00	0.29
0.00	0.29	1.43	0.00	0.00	0.00
0.00	0.29	1.43	0.00	0.00	0.00
0.00	1.02	3.05	0.00	0.00	0.25
0.00	0.29	0.57	0.00	0.00	0.00
0.00	0.00	1.02	0.00	0.00	0.51
0.00	0.00	1.03	0.00	0.00	0.00
0.00	0.00	0.76	0.00	0.00	0.00
0.00	0.28	0.56	0.00	0.00	0.00
0.00	0.00	0.27	0.00	0.00	0.27
0.00	0.29	0.29	0.00	0.00	0.29
0.00	0.00	0.00	0.00	0.00	0.29
0.00	0.00	0.00	0.00	0.00	0.28

<b>Fagus</b>	<b>Fraxinus</b>	<b>Fraxinus nigra/</b>	<b>Fraxinus</b>	<b>Ilex</b>	<b>Juglans</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	47.73	0.00	0.00	0.00
0.00	0.00	221.23	0.00	0.00	0.00
0.00	0.00	416.04	0.00	0.00	0.00
0.00	135.97	407.92	0.00	0.00	0.00
0.00	0.00	655.87	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	2064.78	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	3378.73	1689.36	0.00	0.00	0.00
366.77	1100.31	2934.16	366.77	0.00	0.00
0.00	1592.83	7167.73	796.41	0.00	796.41
0.00	978.05	4890.26	0.00	0.00	0.00
0.00	819.84	4099.19	0.00	0.00	0.00
0.00	1368.07	4104.22	0.00	0.00	342.02
0.00	401.07	802.14	0.00	0.00	0.00
0.00	0.00	2822.73	0.00	0.00	1411.37
0.00	0.00	2563.17	0.00	0.00	0.00
0.00	0.00	4401.24	0.00	0.00	0.00
0.00	1072.10	2144.19	0.00	0.00	0.00
0.00	0.00	476.49	0.00	0.00	476.49
0.00	1548.58	1548.58	0.00	0.00	1548.58
0.00	0.00	0.00	0.00	0.00	2322.88
0.00	0.00	1173.66	0.00	0.00	586.83

Juglans nigra	Larix	Liquidambar	Morus	Myrica	Ostrya/ Carpinus
1					
	1				1
1					2
2					
1					
4	1				2
1					1
3					9
					1
					4
2	1				4
3					6
2					
2	2				
3					1
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.25	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.27	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.25
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.25	0.00	0.00	0.00	0.00	0.50
0.00	0.00	0.00	0.00	0.00	0.00
0.57	0.00	0.00	0.00	0.00	0.00
0.29	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1.02	0.25	0.00	0.00	0.00	0.51
0.29	0.00	0.00	0.00	0.00	0.29
0.76	0.00	0.00	0.00	0.00	2.29
0.00	0.00	0.00	0.00	0.00	0.26
0.00	0.00	0.00	0.00	0.00	1.02
0.56	0.28	0.00	0.00	0.00	1.12
0.81	0.00	0.00	0.00	0.00	1.62
0.57	0.57	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

<b>Juglans nigra</b>	<b>Larix</b>	<b>Liquidambar</b>	<b>Morus</b>	<b>Myrica</b>	<b>Ostrya/</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
416.04	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	655.87	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	95.79
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1689.36	0.00	0.00	0.00	0.00	3378.73
0.00	0.00	0.00	0.00	0.00	0.00
1592.83	0.00	0.00	0.00	0.00	0.00
978.05	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1368.07	342.02	0.00	0.00	0.00	684.04
401.07	0.00	0.00	0.00	0.00	401.07
2117.05	0.00	0.00	0.00	0.00	6351.15
0.00	0.00	0.00	0.00	0.00	640.79
0.00	0.00	0.00	0.00	0.00	5868.32
2144.19	1072.10	0.00	0.00	0.00	4288.38
1429.46	0.00	0.00	0.00	0.00	2858.92
3097.17	3097.17	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1760.49	0.00	0.00	0.00	0.00	586.83

Platanus	Populus	Prunus	Quercus	Rhamnus	Rhus glabra
			3		
			1		
			1		
			3		
			3		
			1		
			3		
			4		
			13		
			10		
	1		13		
			21		
			13		
	1		46		
			19		
			87		
			21		
			5		
			120		
			127		
			116		
		1	87		
		1	87		
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.86	0.00	0.00
0.00	0.00	0.00	0.27	0.00	0.00
0.00	0.00	0.00	0.25	0.00	0.00
0.00	0.00	0.00	0.86	0.00	0.00
0.00	0.00	0.00	0.82	0.00	0.00
0.00	0.00	0.00	0.25	0.00	0.00
0.00	0.00	0.00	0.86	0.00	0.00
0.00	0.00	0.00	1.14	0.00	0.00
0.00	0.00	0.00	3.25	0.00	0.00
0.00	0.00	0.00	2.86	0.00	0.00
0.00	0.29	0.00	3.71	0.00	0.00
0.00	0.00	0.00	6.00	0.00	0.00
0.00	0.00	0.00	3.71	0.00	0.00
0.00	0.25	0.00	11.68	0.00	0.00
0.00	0.00	0.00	5.43	0.00	0.00
0.00	0.00	0.00	22.17	0.00	0.00
0.00	0.00	0.00	5.41	0.00	0.00
0.00	0.00	0.00	1.27	0.00	0.00
0.00	0.00	0.00	33.61	0.00	0.00
0.00	0.00	0.00	34.32	0.00	0.00
0.00	0.00	0.00	33.14	0.00	0.00
0.00	0.29	0.00	24.86	0.00	0.00
0.00	0.28	0.00	24.27	0.00	0.00

<b>Platanus</b>	<b>Populus</b>	<b>Prunus</b>	<b>Quercus</b>	<b>Rhamnus</b>	<b>Rhus glabra</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	143.19	0.00	0.00
0.00	0.00	0.00	221.23	0.00	0.00
0.00	0.00	0.00	416.04	0.00	0.00
0.00	0.00	0.00	407.92	0.00	0.00
0.00	0.00	0.00	1967.61	0.00	0.00
0.00	0.00	0.00	95.79	0.00	0.00
0.00	0.00	0.00	1238.87	0.00	0.00
0.00	0.00	0.00	2123.77	0.00	0.00
0.00	0.00	0.00	21961.73	0.00	0.00
0.00	0.00	0.00	3667.70	0.00	0.00
0.00	796.41	0.00	10353.39	0.00	0.00
0.00	0.00	0.00	20539.11	0.00	0.00
0.00	0.00	0.00	10657.90	0.00	0.00
0.00	342.02	0.00	15732.85	0.00	0.00
0.00	0.00	0.00	7620.37	0.00	0.00
0.00	0.00	0.00	61394.47	0.00	0.00
0.00	0.00	0.00	13456.66	0.00	0.00
0.00	0.00	0.00	7335.39	0.00	0.00
0.00	0.00	0.00	128651.54	0.00	0.00
0.00	0.00	0.00	60513.87	0.00	0.00
0.00	0.00	0.00	179635.67	0.00	0.00
0.00	2322.88	0.00	202090.13	0.00	0.00
0.00	586.83	0.00	51054.35	0.00	0.00

Salix	Sambucus	Tilia	Tsuga	Ulmus	Viburnum
3					
2					
4					
4					1
				1	5
3					
	1			1	
1					
					2
7			2		3
5					3
5			1		4
2					1
4			8		7
4			2		
8			7		12
2					1
5					
6					6
8					7
9					6
1			1		7
5					8
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.86	0.00	0.00	0.00	0.00	0.00
0.54	0.00	0.00	0.00	0.00	0.00
1.01	0.00	0.00	0.00	0.00	0.00
1.14	0.00	0.00	0.00	0.00	0.29
0.00	0.00	0.00	0.00	0.27	1.37
0.75	0.00	0.00	0.00	0.00	0.00
0.00	0.29	0.00	0.00	0.29	0.00
0.29	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.50
2.00	0.00	0.57	0.00	0.00	0.86
1.43	0.00	0.00	0.00	0.00	0.86
1.43	0.00	0.29	0.00	0.00	1.14
0.57	0.00	0.00	0.00	0.00	0.29
1.02	0.00	2.03	0.00	0.00	1.78
1.14	0.00	0.57	0.00	0.00	0.00
2.04	0.00	1.78	0.00	0.00	3.06
0.52	0.00	0.00	0.00	0.00	0.26
1.27	0.00	0.00	0.00	0.00	0.00
1.68	0.00	0.00	0.00	0.00	1.68
2.16	0.00	0.00	0.00	0.00	1.89
2.57	0.00	0.00	0.00	0.00	1.71
0.29	0.00	0.29	0.00	0.00	2.00
0.28	0.00	0.28	0.00	0.00	1.95

<b>Salix</b>	<b>Sambucus</b>	<b>Tilia</b>	<b>Tsuga</b>	<b>Ulmus</b>	<b>Viburnum</b>
0.00	0.00	0.00	0.00	0.00	0.00
143.19	0.00	0.00	0.00	0.00	0.00
442.45	0.00	0.00	0.00	0.00	0.00
1664.15	0.00	0.00	0.00	0.00	0.00
543.89	0.00	0.00	0.00	135.97	0.00
0.00	0.00	0.00	655.87	3279.35	0.00
287.37	0.00	0.00	0.00	0.00	0.00
0.00	412.96	0.00	412.96	0.00	412.96
530.94	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	3378.73	0.00
2567.39	0.00	733.54	0.00	1100.31	0.00
3982.07	0.00	0.00	0.00	2389.24	0.00
4890.26	0.00	978.05	0.00	3912.21	0.00
1639.68	0.00	0.00	0.00	819.84	0.00
1368.07	0.00	2736.15	0.00	2394.13	0.00
1604.29	0.00	802.14	0.00	0.00	0.00
5645.47	0.00	4939.78	0.00	8468.20	0.00
1281.59	0.00	0.00	0.00	640.79	0.00
7335.39	0.00	0.00	0.00	0.00	0.00
6432.58	0.00	0.00	0.00	6432.58	0.00
3811.90	0.00	0.00	0.00	3335.41	0.00
13937.25	0.00	0.00	0.00	9291.50	0.00
2322.88	0.00	2322.88	0.00	16260.13	0.00
2934.16	0.00	0.00	0.00	4694.65	0.00

<b>Triporate undiff</b>	<b>Alisma-type</b>	<b>Ambrosia</b>	<b>Artemisia</b>	<b>Asteraceae</b>	<b>Balsaminaceae</b>
		4	9	1	
		25	12	2	
		16	9	1	
		79	19	12	
		12		6	
1		45	8	4	
		68	14	6	
		93	8	8	
3		104	8	9	
5		173	8	3	
1		82	9	3	
2		84	7	6	
2		134	5	7	
3		69	1	3	
4		58	6	8	
		66	7	3	
1		65	6	4	
		32	1	9	
		21	2	5	
12		39	2	5	
3		57	3	4	
10		20	1	4	
9		83	6		
2		65	2	2	
<b>% Abundance</b>					
0.00	0.00	1.14	2.57	0.29	0.00
0.00	0.00	7.14	3.43	0.57	0.00
0.00	0.00	4.30	2.42	0.27	0.00
0.00	0.00	19.87	4.78	3.02	0.00
0.00	0.00	3.43	0.00	1.71	0.00
0.27	0.00	12.31	2.19	1.09	0.00
0.00	0.00	16.98	3.50	1.50	0.00
0.00	0.00	26.57	2.29	2.29	0.00
0.86	0.00	29.71	2.29	2.57	0.00
1.25	0.00	43.25	2.00	0.75	0.00
0.29	0.00	23.43	2.57	0.86	0.00
0.57	0.00	24.00	2.00	1.71	0.00
0.57	0.00	38.29	1.43	2.00	0.00
0.86	0.00	19.71	0.29	0.86	0.00
1.02	0.00	14.72	1.52	2.03	0.00
0.00	0.00	18.86	2.00	0.86	0.00
0.25	0.00	16.56	1.53	1.02	0.00
0.00	0.00	8.25	0.26	2.32	0.00
0.00	0.00	5.33	0.51	1.27	0.00
3.36	0.00	10.92	0.56	1.40	0.00
0.81	0.00	15.41	0.81	1.08	0.00
2.86	0.00	5.71	0.29	1.14	0.00
2.57	0.00	23.71	1.71	0.00	0.00
2.51	0.00	23.15	1.67	0.00	0.00

<b>Triporate</b>	<b>Alisma-type</b>	<b>Ambrosia</b>	<b>Artemisia</b>	<b>Asteraceae</b>	<b>Balsaminaceae</b>
0.00	0.00	301.35	678.03	75.34	0.00
0.00	0.00	1193.26	572.76	95.46	0.00
0.00	0.00	3539.62	1991.04	221.23	0.00
0.00	0.00	32866.95	7904.71	4992.45	0.00
0.00	0.00	1631.68	0.00	815.84	0.00
655.87	0.00	29514.18	5246.96	2623.48	0.00
0.00	0.00	6513.63	1341.04	574.73	0.00
0.00	0.00	38404.87	3303.64	3303.64	0.00
1592.83	0.00	55218.06	4247.54	4778.49	0.00
8446.82	0.00	292259.91	13514.91	5068.09	0.00
366.77	0.00	30075.12	3300.93	1100.31	0.00
1592.83	0.00	66898.80	5574.90	4778.49	0.00
1956.11	0.00	131059.05	4890.26	6846.37	0.00
2459.51	0.00	56568.84	819.84	2459.51	0.00
1368.07	0.00	19837.07	2052.11	2736.15	0.00
0.00	0.00	26470.75	2807.50	1203.22	0.00
705.68	0.00	45869.43	4234.10	2822.73	0.00
0.00	0.00	20505.38	640.79	5767.14	0.00
0.00	0.00	30808.66	2934.16	7335.39	0.00
12865.15	0.00	41811.75	2144.19	5360.48	0.00
1429.46	0.00	27159.77	1429.46	1905.95	0.00
15485.83	0.00	30971.67	1548.58	6194.33	0.00
20905.88	0.00	192798.63	13937.25	0.00	0.00
1173.66	0.00	38144.05	1173.66	1173.66	0.00

<b>Brassicaceae</b>	<b>Campanulaceae</b>	<b>Humulus</b>	<b>Chenopodiaceae</b>	<b>Cyperaceae</b>
			46	1
			26	1
3			33	1
2			48	1
			17	2
			51	3
2			55	
10			43	
			36	4
			26	3
2			37	3
4			30	2
			42	1
			29	3
			16	1
20			16	2
1			15	1
36			2	1
27			3	
			2	1
			5	
2			6	6
			8	2
			6	1
<b>% Abundance</b>				
0.00	0.00	0.00	13.14	0.29
0.00	0.00	0.00	7.43	0.29
0.81	0.00	0.00	8.86	0.27
0.50	0.00	0.00	12.08	0.25
0.00	0.00	0.00	4.86	0.57
0.00	0.00	0.00	13.95	0.82
0.50	0.00	0.00	13.73	0.00
2.86	0.00	0.00	12.29	0.00
0.00	0.00	0.00	10.29	1.14
0.00	0.00	0.00	6.50	0.75
0.57	0.00	0.00	10.57	0.86
1.14	0.00	0.00	8.57	0.57
0.00	0.00	0.00	12.00	0.29
0.00	0.00	0.00	8.29	0.86
0.00	0.00	0.00	4.06	0.25
5.71	0.00	0.00	4.57	0.57
0.25	0.00	0.00	3.82	0.25
9.28	0.00	0.00	0.52	0.26
6.85	0.00	0.00	0.76	0.00
0.00	0.00	0.00	0.56	0.28
0.00	0.00	0.00	1.35	0.00
0.57	0.00	0.00	1.71	1.71
0.00	0.00	0.00	2.29	0.57
0.00	0.00	0.00	2.23	0.56

<b>Brassicaceae</b>	<b>Campanulaceae</b>	<b>Humulus</b>	<b>Chenopodiaceae</b>	<b>Cyperaceae</b>
0.00	0.00	0.00	3465.48	75.34
0.00	0.00	0.00	1240.99	47.73
663.68	0.00	0.00	7300.46	221.23
832.07	0.00	0.00	19969.79	416.04
0.00	0.00	0.00	2311.54	271.95
0.00	0.00	0.00	33449.40	1967.61
191.58	0.00	0.00	5268.38	0.00
4129.56	0.00	0.00	17757.09	0.00
0.00	0.00	0.00	19113.94	2123.77
0.00	0.00	0.00	43923.45	5068.09
733.54	0.00	0.00	13570.48	1100.31
3185.66	0.00	0.00	23892.43	1592.83
0.00	0.00	0.00	41078.21	978.05
0.00	0.00	0.00	23775.31	2459.51
0.00	0.00	0.00	5472.29	342.02
8021.44	0.00	0.00	6417.15	802.14
705.68	0.00	0.00	10585.25	705.68
23068.55	0.00	0.00	1281.59	640.79
39611.13	0.00	0.00	4401.24	0.00
0.00	0.00	0.00	2144.19	1072.10
0.00	0.00	0.00	2382.44	0.00
3097.17	0.00	0.00	9291.50	9291.50
0.00	0.00	0.00	18583.00	4645.75
0.00	0.00	0.00	3520.99	586.83



<b>Eleagnaceae</b>	<b>Ericaceae</b>	<b>Gentianaceae</b>	<b>Fagaceae</b>	<b>Galium</b>	<b>Geum</b>
0.00	0.00	0.00	0.00	0.00	0.00
47.73	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
135.97	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	191.58
0.00	0.00	0.00	0.00	412.96	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	684.04	0.00
0.00	0.00	0.00	401.07	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1072.10	0.00
0.00	476.49	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1548.58	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

Melilotus	Dalea	Fabaceae	Iva	Monotropa	Oxalis
			1		
1					
2			2		
1					
			1		
			2		
			2		
			2		
1			3		
			1		
			3		
			1		
			1		
			1		
			1		
<b>% Abundance</b>					
0.00	0.00	0.29	0.00	0.00	0.00
0.29	0.00	0.00	0.00	0.00	0.00
0.54	0.00	0.54	0.00	0.00	0.00
0.25	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.29	0.00	0.00	0.00
0.00	0.00	0.55	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.57	0.00	0.00	0.00
0.00	0.00	0.50	0.00	0.00	0.00
0.29	0.00	0.86	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.25	0.00	0.00	0.00
0.00	0.00	0.77	0.00	0.00	0.00
0.00	0.00	0.25	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.27	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

<b>Melilotus</b>	<b>Dalea</b>	<b>Fabaceae</b>	<b>Iva</b>	<b>Monotropa</b>	<b>Oxalis</b>
0.00	0.00	75.34	0.00	0.00	0.00
47.73	0.00	0.00	0.00	0.00	0.00
442.45	0.00	442.45	0.00	0.00	0.00
416.04	0.00	0.00	0.00	0.00	0.00
0.00	0.00	135.97	0.00	0.00	0.00
0.00	0.00	1311.74	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	1061.89	0.00	0.00	0.00
0.00	0.00	3378.73	0.00	0.00	0.00
366.77	0.00	1100.31	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	705.68	0.00	0.00	0.00
0.00	0.00	1922.38	0.00	0.00	0.00
0.00	0.00	1467.08	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	476.49	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	586.83	0.00	0.00	0.00

Poaceae	Plantago	Polygonaceae	Potentilla	Ranunculaceae	Roseaceae
22	1				1
29					
35	2				
	41	4			
15					
48					
45				1	
23					
35					
42	3				
64	2			2	
38					
14					1
21	1			2	
39				1	
85	2			2	
64	7				
68	1			8	
58				15	1
17					
21	5			2	
25	1			1	
38	1			2	
53	1				
<b>% Abundance</b>					
6.29	0.29	0.00	0.00	0.00	0.29
8.29	0.00	0.00	0.00	0.00	0.00
9.40	0.54	0.00	0.00	0.00	0.00
0.00	10.31	1.01	0.00	0.00	0.00
4.29	0.00	0.00	0.00	0.00	0.00
13.13	0.00	0.00	0.00	0.00	0.00
11.24	0.00	0.00	0.00	0.25	0.00
6.57	0.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	0.00	0.00
10.50	0.75	0.00	0.00	0.00	0.00
18.29	0.57	0.00	0.00	0.57	0.00
10.86	0.00	0.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	0.00	0.29
6.00	0.29	0.00	0.00	0.57	0.00
9.90	0.00	0.00	0.00	0.25	0.00
24.29	0.57	0.00	0.00	0.57	0.00
16.31	1.78	0.00	0.00	0.00	0.00
17.53	0.26	0.00	0.00	2.06	0.00
14.72	0.00	0.00	0.00	3.81	0.25
4.76	0.00	0.00	0.00	0.00	0.00
5.68	1.35	0.00	0.00	0.54	0.00
7.14	0.29	0.00	0.00	0.29	0.00
10.86	0.29	0.00	0.00	0.57	0.00
10.60	0.28	0.00	0.00	0.56	0.00

Poaceae	Plantago	Polygonaceae	Potentilla	Ranunculaceae	Roseaceae
1657.40	75.34	0.00	0.00	0.00	75.34
1384.18	0.00	0.00	0.00	0.00	0.00
7742.92	442.45	0.00	0.00	0.00	0.00
0.00	17057.53	1664.15	0.00	0.00	0.00
2039.60	0.00	0.00	0.00	0.00	0.00
31481.79	0.00	0.00	0.00	0.00	0.00
4310.49	0.00	0.00	0.00	95.79	0.00
9497.98	0.00	0.00	0.00	0.00	0.00
18583.00	0.00	0.00	0.00	0.00	0.00
70953.27	5068.09	0.00	0.00	0.00	0.00
23473.26	733.54	0.00	0.00	733.54	0.00
30263.74	0.00	0.00	0.00	0.00	0.00
13692.74	0.00	0.00	0.00	0.00	978.05
17216.60	819.84	0.00	0.00	1639.68	0.00
13338.72	0.00	0.00	0.00	342.02	0.00
34091.12	802.14	0.00	0.00	802.14	0.00
45163.75	4939.78	0.00	0.00	0.00	0.00
43573.93	640.79	0.00	0.00	5126.34	0.00
85090.58	0.00	0.00	0.00	22006.18	1467.08
18225.63	0.00	0.00	0.00	0.00	0.00
10006.23	2382.44	0.00	0.00	952.97	0.00
38714.58	1548.58	0.00	0.00	1548.58	0.00
88269.25	2322.88	0.00	0.00	4645.75	0.00
31102.07	586.83	0.00	0.00	0.00	0.00



<b>Rumex</b>	<b>Sagittaria</b>	<b>Saxifragaceae</b>	<b>Salsola</b>	<b>Sarcobatus</b>	<b>Stachys</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	221.23	0.00	0.00
0.00	0.00	0.00	0.00	832.07	1664.15
135.97	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	574.73	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	530.94	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
2389.24	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
401.07	0.00	0.00	401.07	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1281.59	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
2322.88	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00









Nuphar	Nymphaea	Potamogeton	Sparganium	Triglochin	Typha
					28
					24
		2			31
		2			12
					5
		1	1		17
			1		27
		1			6
					1
					44
				2	3
				1	5
					28
					37
				7	34
		1	1		12
		1	2		3
			3		4
			3		
			1		6
			1		6
					28
					14
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	8.00
0.00	0.00	0.00	0.00	0.00	6.86
0.00	0.00	0.54	0.00	0.00	8.32
0.00	0.00	0.50	0.00	0.00	3.02
0.00	0.00	0.00	0.00	0.00	1.43
0.00	0.00	0.27	0.27	0.00	4.65
0.00	0.00	0.00	0.25	0.00	6.74
0.00	0.00	0.29	0.00	0.00	1.71
0.00	0.00	0.00	0.00	0.00	0.29
0.00	0.00	0.00	0.00	0.00	11.00
0.00	0.00	0.00	0.57	0.00	0.86
0.00	0.00	0.00	0.29	0.00	1.43
0.00	0.00	0.00	0.00	0.00	8.00
0.00	0.00	0.00	0.00	0.00	10.57
0.00	0.00	0.00	1.78	0.00	8.63
0.00	0.00	0.29	0.29	0.00	3.43
0.00	0.00	0.25	0.51	0.00	0.76
0.00	0.00	0.00	0.77	0.00	1.03
0.00	0.00	0.00	0.76	0.00	0.00
0.00	0.00	0.00	0.28	0.00	1.68
0.00	0.00	0.00	0.27	0.00	1.62
0.00	0.00	0.00	0.00	0.00	8.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00

<b>Nuphar</b>	<b>Nymphaea</b>	<b>Potamogeton</b>	<b>Sparganium</b>	<b>Triglochin</b>	<b>Typha</b>
0.00	0.00	0.00	0.00	0.00	2109.42
0.00	0.00	0.00	0.00	0.00	1145.53
0.00	0.00	442.45	0.00	0.00	6858.01
0.00	0.00	832.07	0.00	0.00	4992.45
0.00	0.00	0.00	0.00	0.00	679.87
0.00	0.00	655.87	655.87	0.00	11149.80
0.00	0.00	0.00	95.79	0.00	2586.29
0.00	0.00	412.96	0.00	0.00	2477.73
0.00	0.00	0.00	0.00	0.00	530.94
0.00	0.00	0.00	0.00	0.00	74332.00
0.00	0.00	0.00	733.54	0.00	1100.31
0.00	0.00	0.00	796.41	0.00	3982.07
0.00	0.00	0.00	0.00	0.00	27385.47
0.00	0.00	0.00	0.00	0.00	30334.01
0.00	0.00	0.00	2394.13	0.00	11628.63
0.00	0.00	401.07	401.07	0.00	4812.86
0.00	0.00	705.68	1411.37	0.00	2117.05
0.00	0.00	0.00	1922.38	0.00	2563.17
0.00	0.00	0.00	4401.24	0.00	0.00
0.00	0.00	0.00	1072.10	0.00	6432.58
0.00	0.00	0.00	476.49	0.00	2858.92
0.00	0.00	0.00	0.00	0.00	43360.33
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	8215.64

<b>Equisetum</b>	<b>Botrychium</b>	<b>Dryopteris</b>	<b>Isoetes</b>	<b>Pediastrum</b>	<b>Menyanthaceae</b>
				22	
5	2			33	
				148	
1	3			250	
3	6			50	
	2			223	
				263	
16	3			6	
				134	
	4			4	
	8			1	
	1			45	
	1			27	
4	1				
20				2	
1	8			14	
<b>% Abundance</b>					
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	5.91	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
1.37	0.55	0.00	0.00	9.03	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	42.29	0.00
0.29	0.86	0.00	0.00	71.43	0.00
0.75	1.50	0.00	0.00	12.50	0.00
0.00	0.57	0.00	0.00	63.71	0.00
0.00	0.00	0.00	0.00	75.14	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
4.06	0.76	0.00	0.00	1.52	0.00
0.00	0.00	0.00	0.00	38.29	0.00
0.00	1.02	0.00	0.00	1.02	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.25	0.00
0.00	2.24	0.00	0.00	12.61	0.00
0.00	0.27	0.00	0.00	7.30	0.00
1.14	0.29	0.00	0.00	0.00	0.00
5.71	0.00	0.00	0.00	0.57	0.00
5.58	0.00	0.00	0.00	0.56	0.00

<b>Equisetum</b>	<b>Botrychium</b>	<b>Dryopteris</b>	<b>Isoetes</b>	<b>Pediastrum</b>	<b>Menyanthaceae</b>
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	4866.98	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
3279.35	1311.74	0.00	0.00	21643.73	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	61117.42	0.00
530.94	1592.83	0.00	0.00	132735.71	0.00
5068.09	10136.18	0.00	0.00	84468.18	0.00
0.00	733.54	0.00	0.00	81789.65	0.00
0.00	0.00	0.00	0.00	209456.96	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
5472.29	1026.06	0.00	0.00	2052.11	0.00
0.00	0.00	0.00	0.00	53743.64	0.00
0.00	2822.73	0.00	0.00	2822.73	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1467.08	0.00
0.00	8576.77	0.00	0.00	48244.33	0.00
0.00	476.49	0.00	0.00	12865.15	0.00
6194.33	1548.58	0.00	0.00	0.00	0.00
46457.50	0.00	0.00	0.00	4645.75	0.00
586.83	4694.65	0.00	0.00	8215.64	0.00

Osmunda	Polypodium	Pteridum	Fern undiff	Moss spore	Sphagnum
			1	1	
				6	
				3	
				1	
				3	
				1	
				5	
			1	1	
			1	2	
			6	4	
			1	1	
			1	1	
			2		
			3	2	
<b>% Abundance</b>					
0.00	0.00	0.00	0.29	0.29	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.61	0.00
0.00	0.00	0.00	0.00	0.75	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.27	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.86	0.00
0.00	0.00	0.00	0.00	0.29	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1.43	0.00
0.00	0.00	0.00	0.29	0.29	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.29	0.57	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	1.55	1.03	0.00
0.00	0.00	0.00	0.25	0.25	0.00
0.00	0.00	0.00	0.28	0.28	0.00
0.00	0.00	0.00	0.54	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.86	0.57	0.00
0.00	0.00	0.00	0.84	0.56	0.00

<b>Osmunda</b>	<b>Polypodium</b>	<b>Pteridum</b>	<b>Fern undiff</b>	<b>Moss spore</b>	<b>Sphagnum</b>
0.00	0.00	0.00	75.34	75.34	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1327.36	0.00
0.00	0.00	0.00	0.00	1248.11	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	655.87	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1238.87	0.00
0.00	0.00	0.00	0.00	530.94	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	1833.85	0.00
0.00	0.00	0.00	796.41	796.41	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	401.07	802.14	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	3844.76	2563.17	0.00
0.00	0.00	0.00	1467.08	1467.08	0.00
0.00	0.00	0.00	1072.10	1072.10	0.00
0.00	0.00	0.00	952.97	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	6968.63	4645.75	0.00
0.00	0.00	0.00	0.00	0.00	0.00

Black mold	Coprinus	Fungi undiff	Aureobasidium/ Delitschia	Chaetomium	Torula
	2	148	14		
		155	6	2	
	20	161			
		116	4	2	
	1	239		3	
	1	114	5		
	4	119	4	1	
		92	2		
	2	90			1
		13			
	3	48			1
		72	2		
	6	41			
	32	98			
		44			
		30			1
	4	25	2		
	2	76	8	1	
	2	81	4		1
	1	28			
		13			
	1	7			
		15			
		9			
<b>% Abundance</b>					
0.00	0.57	42.29	4.00	0.00	0.00
0.00	0.00	44.29	1.71	0.57	0.00
0.00	5.37	43.22	0.00	0.00	0.00
0.00	0.00	29.18	1.01	0.50	0.00
0.00	0.29	68.29	0.00	0.86	0.00
0.00	0.27	31.19	1.37	0.00	0.00
0.00	1.00	29.71	1.00	0.25	0.00
0.00	0.00	26.29	0.57	0.00	0.00
0.00	0.57	25.71	0.00	0.00	0.29
0.00	0.00	3.25	0.00	0.00	0.00
0.00	0.86	13.71	0.00	0.00	0.29
0.00	0.00	20.57	0.57	0.00	0.00
0.00	1.71	11.71	0.00	0.00	0.00
0.00	9.14	28.00	0.00	0.00	0.00
0.00	0.00	11.17	0.00	0.00	0.00
0.00	0.00	8.57	0.00	0.00	0.29
0.00	1.02	6.37	0.51	0.00	0.00
0.00	0.52	19.59	2.06	0.26	0.00
0.00	0.51	20.56	1.02	0.00	0.25
0.00	0.28	7.84	0.00	0.00	0.00
0.00	0.00	3.51	0.00	0.00	0.00
0.00	0.29	2.00	0.00	0.00	0.00
0.00	0.00	4.29	0.00	0.00	0.00
0.00	0.00	4.18	0.00	0.00	0.00

<b>Black mold</b>	<b>Coprinus</b>	<b>Fungi undiff</b>	<b>Aureobasidium/</b>	<b>Chaetomium</b>	<b>Torula</b>
0.00	150.67	11149.80	1054.71	0.00	0.00
0.00	0.00	7398.20	286.38	95.46	0.00
0.00	4424.52	35617.42	0.00	0.00	0.00
0.00	0.00	48260.33	1664.15	832.07	0.00
0.00	135.97	32497.59	0.00	407.92	0.00
0.00	655.87	74769.25	3279.35	0.00	0.00
0.00	383.15	11398.85	383.15	95.79	0.00
0.00	0.00	37991.91	825.91	0.00	0.00
0.00	1061.89	47784.86	0.00	0.00	530.94
0.00	0.00	21961.73	0.00	0.00	0.00
0.00	1100.31	17604.95	0.00	0.00	366.77
0.00	0.00	57341.83	1592.83	0.00	0.00
0.00	5868.32	40100.16	0.00	0.00	0.00
0.00	26234.82	80344.15	0.00	0.00	0.00
0.00	0.00	15048.81	0.00	0.00	0.00
0.00	0.00	12032.16	0.00	0.00	401.07
0.00	2822.73	17642.09	1411.37	0.00	0.00
0.00	1281.59	48700.28	5126.34	640.79	0.00
0.00	2934.16	118833.39	5868.32	0.00	1467.08
0.00	1072.10	30018.69	0.00	0.00	0.00
0.00	0.00	6194.33	0.00	0.00	0.00
0.00	1548.58	10840.08	0.00	0.00	0.00
0.00	0.00	34843.13	0.00	0.00	0.00
0.00	0.00	5281.48	0.00	0.00	0.00

Panaeolus	Podospora	Pleospora	Tetraploa	Fusarium	Ustulina
	2			1	
	2			2	
	3				
	4			8	
	1				
	1			2	
	3			1	
				1	
	2				
	2			6	
	1			1	
	1			3	
				2	1
				1	
		3			
	2	4		1	
		1			
	1	1		2	
				2	
<b>% Abundance</b>					
0.00	0.57	0.00	0.00	0.29	0.00
0.00	0.57	0.00	0.00	0.57	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.75	0.00	0.00	0.00	0.00
0.00	1.14	0.00	0.00	2.29	0.00
0.00	0.27	0.00	0.00	0.00	0.00
0.00	0.25	0.00	0.00	0.50	0.00
0.00	0.86	0.00	0.00	0.29	0.00
0.00	0.00	0.00	0.00	0.29	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.57	0.00	0.00	0.00	0.00
0.00	0.57	0.00	0.00	1.71	0.00
0.00	0.29	0.00	0.00	0.29	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.25	0.00	0.00	0.76	0.00
0.00	0.00	0.00	0.00	0.57	0.29
0.00	0.00	0.00	0.00	0.25	0.00
0.00	0.00	0.77	0.00	0.00	0.00
0.00	0.51	1.02	0.00	0.25	0.00
0.00	0.00	0.28	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.29	0.29	0.00	0.57	0.00
0.00	0.28	0.28	0.00	0.56	0.00

<b>Panaeolus</b>	<b>Podospora</b>	<b>Pleospora</b>	<b>Tetraploa</b>	<b>Fusarium</b>	<b>Ustulina</b>
0.00	150.67	0.00	0.00	75.34	0.00
0.00	95.46	0.00	0.00	95.46	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	1248.11	0.00	0.00	0.00	0.00
0.00	543.89	0.00	0.00	1087.79	0.00
0.00	655.87	0.00	0.00	0.00	0.00
0.00	95.79	0.00	0.00	191.58	0.00
0.00	1238.87	0.00	0.00	412.96	0.00
0.00	0.00	0.00	0.00	530.94	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	733.54	0.00	0.00	0.00	0.00
0.00	1592.83	0.00	0.00	4778.49	0.00
0.00	978.05	0.00	0.00	978.05	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	342.02	0.00	0.00	1026.06	0.00
0.00	0.00	0.00	0.00	802.14	401.07
0.00	0.00	0.00	0.00	705.68	0.00
0.00	0.00	1922.38	0.00	0.00	0.00
0.00	2934.16	5868.32	0.00	1467.08	0.00
0.00	0.00	1072.10	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00
0.00	2322.88	2322.88	0.00	4645.75	0.00
0.00	0.00	0.00	0.00	1173.66	0.00

<b>Neurospora</b>	<b>Sporormiella</b>	<b>unidentifiable/ degraded</b>	<b>Sporormiella asci</b>
	5	30	
	11	15	
	13	14	
	7	10	
3	9	12	1
	13	19	
1	6	27	
	10	21	
	8	28	
	3	28	
1	1	21	
	4	29	
	3	15	
	1	15	1
	9	18	1
	0	32	
	0	34	
	2	17	
1	2	26	
	1	32	
	2	28	
	0	19	
	2	24	
	0	25	
<b>% Abundance</b>			
0.00	1.43	8.57	
0.00	3.14	4.29	
0.00	3.49	3.76	
0.00	1.76	2.52	
0.86	2.57	3.43	
0.00	3.56	5.20	
0.25	1.50	6.74	
0.00	2.86	6.00	
0.00	2.29	8.00	
0.00	0.75	7.00	
0.29	0.29	6.00	
0.00	1.14	8.29	
0.00	0.86	4.29	
0.00	0.29	4.29	
0.00	2.28	4.57	
0.00	0.00	9.14	
0.00	0.00	8.66	
0.00	0.52	4.38	
0.25	0.51	6.60	
0.00	0.28	8.96	
0.00	0.54	7.57	
0.00	0.00	5.43	
0.00	0.57	6.86	
0.00	0.56	6.69	

<b>Neurospora</b>	<b>Sporormiella</b>	<b>unidentifiable/</b>	<b>Sporormiella asci</b>
0.00	376.68	2260.09	
0.00	525.03	715.95	
0.00	2875.94	3097.17	
0.00	2912.26	4160.37	
407.92	1223.76	1631.68	
0.00	8526.32	12461.54	
95.79	574.73	2586.29	
0.00	4129.56	8672.07	
0.00	4247.54	14866.40	
0.00	5068.09	47302.18	
366.77	366.77	7702.16	
0.00	3185.66	23096.01	
0.00	2934.16	14670.79	
0.00	819.84	12297.57	
0.00	3078.17	6156.33	
0.00	0.00	12834.30	
0.00	0.00	23993.24	
0.00	1281.59	10893.48	
1467.08	2934.16	38144.05	
0.00	1072.10	34307.08	
0.00	952.97	13341.64	
0.00	0.00	29423.08	
0.00	4645.75	55749.00	
0.00	0.00	14670.79	

<b>Site ID</b>	<b>Lake</b>	<b>County</b>	<b>State</b>	<b>Margin Concentration</b>	<b>Margin Concentration (square root transformed)</b>
1	Newell	Butte	SD	183.18	13.53
2	Waggoner	Haakon	SD	435.54	20.87
3	Hayes	Stanley	SD	3147.12	56.10
4	Jones	Hand	SD	480.59	21.92
5	Rose Hill	Hand	SD	2960.12	54.41
6	Dudley	Spink	SD	3193.95	56.52
7	Carthage	Miner	SD	553.80	23.53
8	Lost	Minnehaha	SD	534.58	23.12
9	Wall	Minnehaha	SD	33.62	5.80
10	Goose	Lyon	MN	605.97	24.62
11	Clear	Lyon	MN	0.00	0.00
12	Boot	Jackson	MN	4534.61	67.34
13	Independence	Jackson	MN	4939.78	70.28
14	Timber	Jackson	MN	0.00	0.00
15	George	Blue Earth	MN	1548.58	39.35
16	Duck	Blue Earth	MN	2654.71	51.52
17	Dudley	Rice	MN	1534.38	39.17
18	Perch	Monroe	WI	0.00	0.00
19	Angelo	Monroe	WI	4645.75	68.16
20	Virginia	Sauk	WI	294.97	17.17
21	Fish	Dane	WI	7521.69	86.73
22	Emery	Marquette	WI	1664.15	40.79
23	Kilby	Marquette	WI	0.00	0.00
24	Gibbs	Rock	WI	1411.37	37.57

Site ID	Margin Percent Abundance	Margin Percent Abundance (square root transformed)	Center Concentration	Center Concentration (square root transformed)	Center Percent Abundance
1	0.86	0.93	376.68	19.41	1.43
2	1.43	1.20	525.03	22.91	3.14
3	1.75	1.32	2875.94	53.63	3.24
4	1.14	1.07	2912.26	53.97	1.74
5	4.50	2.12	2666.81	51.64	5.25
6	2.75	1.66	8526.32	92.34	3.57
7	0.86	0.93	574.73	23.97	1.49
8	1.75	1.32	4967.73	70.48	2.25
9	0.29	0.54	4247.54	65.17	2.28
10	0.29	0.54	5068.09	71.19	0.75
11	0.00	0.00	366.77	19.15	0.29
12	4.85	2.20	819.84	28.63	0.29
13	1.75	1.32	3185.66	56.44	1.14
14	0.00	0.00	4332.82	65.82	3.75
15	1.25	1.12	3078.17	55.48	2.25
16	1.43	1.20	0.00	0.00	0.00
17	0.75	0.87	0.00	0.00	0.00
18	0.00	0.00	1281.59	35.80	0.50
19	1.14	1.07	2934.16	54.17	0.50
20	0.25	0.50	1072.10	32.74	0.29
21	4.24	2.06	952.97	30.87	0.50
22	0.59	0.77	0.00	0.00	0.00
23	0.00	0.00	4645.75	68.16	0.57
24	0.57	0.75	0.00	0.00	0.00

Site ID	Center Percent Abundance (square root transformed)	Cattle/acre/county	Percent Pasture	Basin type	Lake area (acres)
1	1.20	0.02	0.88	Dam	183.00
2	1.77	0.03	0.63	Dam	107.00
3	1.80	0.02	0.70	Dam	73.70
4	1.32	0.05	0.24	Dam	100.50
5	2.29	0.05	0.26	Dam	33.80
6	1.89	0.03	0.23	Dam	301.00
7	1.22	0.05	0.10	Dam	203.00
8	1.50	0.05	0.15	Natural	163.00
9	1.51	0.05	0.08	Natural	207.00
10	0.87	0.01	0.04	Natural	148.96
11	0.54	0.01	0.05	Natural	65.76
12	0.54	0.01	0.02	Natural	Unknown
13	1.07	0.01	0.03	Natural	96.50
14	1.94	0.01	0.02	Natural	198.00
15	1.50	0.00	0.01	Natural	80.00
16	0.00	0.00	0.01	Natural	290.41
17	0.00	0.03	0.11	Natural	61.18
18	0.71	0.06	0.23	Dam	35.00
19	0.71	0.06	0.08	Dam	39.00
20	0.54	0.06	0.12	Natural	35.00
21	0.71	0.07	0.09	Natural	199.00
22	0.00	0.03	0.04	Natural	32.00
23	0.75	0.03	0.04	Natural	44.00
24	0.00	0.03	0.04	Natural	73.00

Site ID	Lake depth (m)	Distance to shore (m)	Mean annual precipitation (cm)	Precipitation of the driest month (mm)
1	9.75	20.00	36.00	10.00
2	5.49	12.50	34.00	8.00
3	6.70	20.00	35.00	8.00
4	4.57	20.00	41.00	9.00
5	2.84	10.00	39.00	9.00
6	41.77	50.00	41.00	9.00
7	7.30	25.00	46.00	12.00
8	1.83	15.00	51.00	13.00
9	7.32	10.00	52.00	13.00
10	2.73	27.50	53.00	14.00
11	3.35	22.50	54.00	15.00
12	Unknown	27.50	58.00	15.00
13	3.05	40.00	59.00	15.00
14	2.44	20.00	59.00	15.00
15	8.54	50.00	62.00	19.00
16	7.62	25.00	63.00	19.00
17	18.29	30.00	64.00	21.00
18	3.05	10.00	68.00	23.00
19	2.44	20.00	68.00	23.00
20	4.57	10.00	67.00	25.00
21	18.90	30.00	66.00	25.00
22	2.13	17.50	66.00	26.00
23	8.84	10.00	67.00	27.00
24	7.01	50.00	70.00	28.00

<b>Site ID</b>	<b>Precipitation of the wettest month (mm)</b>	<b>Mean annual temperature (celsius)</b>	<b>Temperature of the warmest month (celsius)</b>	<b>Temperature of the coldest month (celsius)</b>
1	83.00	7.30	30.50	-14.10
2	77.00	8.70	32.70	-13.40
3	77.00	8.40	32.10	-14.00
4	78.00	7.00	30.70	-16.30
5	81.00	7.20	30.40	-15.90
6	84.00	6.80	30.40	-17.30
7	93.00	7.30	30.20	-16.30
8	97.00	7.30	29.80	-16.20
9	98.00	7.30	29.60	-16.10
10	96.00	6.70	28.90	-16.20
11	96.00	6.70	28.90	-16.20
12	104.00	6.80	28.80	-16.50
13	103.00	6.80	28.90	-16.60
14	101.00	6.70	28.90	-16.90
15	107.00	6.70	28.50	-17.20
16	107.00	6.60	28.40	-17.30
17	107.00	6.50	28.50	-17.60
18	105.00	6.80	28.50	-16.30
19	106.00	6.70	28.60	-16.40
20	103.00	7.20	28.30	-15.10
21	101.00	7.60	28.20	-14.30
22	100.00	7.10	28.00	-15.10
23	101.00	7.00	28.10	-15.00
24	101.00	7.90	28.40	-13.40

## **Expanded Description of data for MLR models**

### **Cattle per acre**

This data was compiled from the United States Department of Agriculture National Agricultural Statistics Service. Using the Quick Stats 1.0 program, we gathered cattle inventory data for each county along the transect. The data is based on the 2007 Agricultural Census. We then divided the total number of cows by county area, resulting in cattle individuals per acre per county.

### **Percent Pasture**

We obtained this dataset from the Socioeconomic Data and Applications Center. Data is provided in a raster format, at a 5" or 0.08333 degree decimal grid size. The raster values represent proportion of land used as pasture (land used for grazing) in the year 2000. This data was compiled using agricultural inventory data and land cover datasets.

### **Basin Type**

This is a qualitative description of basin type according the SD, MN, and WI DNR websites.

### **Lake area and depth**

This data was also compiled from the SD, MN, and WI DNR websites.

### **Distance to shore**

This is an estimate of distance to shore for the margin samples. These distances were reassessed using the sampling GPS points in GoogleEarth.

### **Bioclimatic Data**

This data includes mean annual precipitation, mean annual temperature, precipitation of the wettest month, precipitation of the driest month, temperature of the warmest month, and temperature of the coldest month. Seasonal precipitation variables are measured in mm and mean annual precipitation is in cm. All temperature data is measured in celsius. These variables were compiled from WorldClim which provides global climate raster datasets at a one km<sup>2</sup> grid resolution. The raster datasets were developed using average monthly climate data from weather stations around the world.

All of the response variables (center-percent, center-concentration, margin-percent, and margin-concentration) were square root transformed.

Host Species	<i>Sporormiella</i> Species	Relative/Absolute/Presence-Absence Abundance*	Reference(s)
Sheep	<i>S. australis</i>	Relative, Presence-Absence	Richardson, 2001; Ahmed and Cain, 1972
	<i>S. alloiomera</i>	Presence-Absence	Ahmed and Cain, 1972
	<i>S. capybarae</i>		
	<i>S. cymatomera</i>		
	<i>S. grandispora</i>		
	<i>S. intermedia</i>	Relative, Presence-Absence, Relative	Richardson, 2001; Ahmed and Cain, 1972; Parker, 1979
	<i>S. leporina</i>		Ahmed and Cain, 1972
	<i>S. longisporopsis</i>		
	<i>S. megalospora</i>		
	<i>S. minima</i>		Richardson, 2001; Ahmed and Cain, 1972; Parker, 1979; Wicklow et al., 1980
	<i>S. ovina</i>		Ahmed and Cain, 1972
	<i>S. pulchella</i>		
	<i>S. pyriformis</i>		
	<i>S. septenaria</i>		
	<i>S. tetramera</i>		
Deer	<i>S. australis</i>	Relative, Presence-Absence	Richardson, 2001; Ahmed and Cain, 1972
	<i>S. americana</i>	Presence-Absence	Ahmed and Cain, 1972
	<i>S. chaetomioides</i>		
	<i>S. corynespora</i>		
	<i>S. cylindrospora</i>		
	<i>S. dakotensis</i>		
	<i>S. dubia</i>		
	<i>S. grandispora</i>		
	<i>S. heptamera</i>		
	<i>S. intermedia</i>	Relative, Presence-Absence, Relative	Richardson, 2001; Ahmed and Cain, 1972; Parker, 1979
	<i>S. lageniformis</i>	Presence-Absence, Relative	Ahmed and Cain, 1972; Parker, 1979
	<i>S. leporina</i>		Ahmed and Cain, 1972
	<i>S. longispora</i>		
	<i>S. minima</i>		Richardson, 2001; Ahmed and Cain, 1972; Parker, 1979
	<i>S. minipascua</i>		Ahmed and Cain, 1972
<i>S. muskokensis</i>			
<i>S. pilosa</i>			
<i>S. pilosella</i>			
<i>S. pulchella</i>			
<i>S. vexans</i>			

Host Species	<i>Sporormiella</i> Species	Relative/Absolute/Presence-Absence Abundance*	Reference(s)
Cattle	<i>S. americana</i>	Presence-Absence	
	<i>S. australis</i>	Relative, Presence-Absence	Richardson, 2001; Ahmed and Cain, 1972
	<i>S. anisomera</i>		Ahmed and Cain, 1972
	<i>S. borealis</i>		
	<i>S. calomera</i>		
	<i>S. capybarae</i>		
	<i>S. chaetomioides</i>		
	<i>S. cylindrospora</i>		
	<i>S. cymatomera</i>		
	<i>S. decamera</i>		
	<i>S. dubia</i>		
	<i>S. euryspora</i>		
	<i>S. grandispora</i>		
	<i>S. heptamera</i>		
	<i>S. herculea</i>		
	<i>S. intermedia</i>		Richardson, 2001; Ahmed and Cain, 1972
	<i>S. irregularis</i>		Ahmed and Cain, 1972
	<i>S. kansensis</i>		
	<i>S. lageniformis</i>		
	<i>S. leporina</i>		
	<i>S. longisporopsis</i>		
	<i>S. megalospora</i>		
	<i>S. minima</i>	Relative, Presence-Absence, Relative	Richardson, 2001; Ahmed and Cain, 1972; Parker, 1979
<i>S. nigropurpurea</i>		Ahmed and Cain, 1972	
<i>S. octonalis</i>			
<i>S. pascua</i>			
<i>S. pilosella</i>			
<i>S. pulchella</i>			
<i>S. pyriformis</i>			
<i>S. septenaria</i>			
<i>S. teretispora</i>			
<i>S. tetramera</i>			
Rabbit	<i>S. undiff</i>	Absolute	Raper and Bush, 2009
	<i>S. affinis</i>	Presence-Absence	Ahmed and Cain, 1972
	<i>S. americana</i>		
	<i>S. antarctica</i>		
	<i>S. australis</i>	Relative, Presence-Absence	Richardson, 2001; Ahmed and Cain, 1972
	<i>S. bipartis</i>		Ahmed and Cain, 1972
	<i>S. calomera</i>		
	<i>S. commutata</i>		
	<i>S. corynespora</i>		

Host Species	<i>Sporormiella</i> Species	Relative/Absolute/Presence-Absence Abundance*	Reference(s)
	<i>S. cymatomera</i>		
	<i>S. dakotensis</i>		
	<i>S. dubia</i>		
	<i>S. grandispora</i>		
	<i>S. heptamera</i>		
	<i>S. insignis</i>		
	<i>S. intermedia</i>	Relative, Presence-Absence, Relative	Richardson, 2001; Ahmed and Cain, 1972; Parker, 1979
	<i>S. lageniformis</i>	Presence-Absence, Relative	Ahmed and Cain, 1972; Parker, 1979
	<i>S. lata</i>		Ahmed and Cain, 1972
	<i>S. leporina</i>		
	<i>S. longispora</i>		
	<i>S. longisporopsis</i>		
	<i>S. megalospora</i>		
	<i>S. minima</i>		Richardson, 2001; Ahmed and Cain, 1972; Parker, 1979; Wicklow et al., 1980
	<i>S. minimoides</i>		Ahmed and Cain, 1972
	<i>S. muskokensis</i>		
	<i>S. octomera</i>		
	<i>S. octonalis</i>		
	<i>S. ontariensis</i>		
	<i>S. pentamera</i>		
	<i>S. pilosa</i>		
	<i>S. pilosella</i>		
	<i>S. platymera</i>		
	<i>S. pulchella</i>		
	<i>S. septenaria</i>		
	<i>S. splendens</i>		
	<i>S. subtilis</i>		
	<i>S. teretispora</i>	Presence-Absence; Relative	Ahmed and Cain, 1972; Parker, 1979
	<i>S. tetramera</i>		Ahmed and Cain, 1972
	<i>S. trogospora</i>		
<b>Hare</b>	<i>S. australis</i>	Relative	Richardson, 2001
	<i>S. intermedia</i>		Richardson, 2001
	<i>S. minima</i>		Richardson, 2001
	<i>S. octonalis</i>		Ahmed and Cain, 1972
<b>Grouse</b>	<i>S. australis</i>	Relative	Richardson, 2001
	<i>S. intermedia</i>		Richardson, 2001
	<i>S. minima</i>		Richardson, 2001
	<i>S. octomera</i>		Ahmed and Cain, 1972
<b>Moose</b>	<i>S. alloiomera</i>	Presence-Absence	

Host Species	<i>Sporormiella</i> Species	Relative/Absolute/Presence-Absence Abundance*	Reference(s)
	<i>S. australis</i>		
	<i>S. cylindrospora</i>		
	<i>S. cymatomera</i>		
	<i>S. dakotensis</i>		
	<i>S. decamera</i>		
	<i>S. dubia</i>		
	<i>S. heptamera</i>		
	<i>S. intermedia</i>		
	<i>S. lageniformis</i>		
	<i>S. leporina</i>		
	<i>S. longispora</i>		
	<i>S. megalospora</i>		
	<i>S. minima</i>		
	<i>S. muskokensis</i>		
	<i>S. octomera</i>		
	<i>S. pilosella</i>		
	<i>S. tetramera</i>		
	<i>S. vexans</i>		
<b>Goat</b>	<i>S. americana</i>		
	<i>S. australis</i>		
	<i>S. capybarae</i>		
	<i>S. dubia</i>		
	<i>S. inaequalis</i>		
	<i>S. intermedia</i>		
	<i>S. longispora</i>		
	<i>S. longisporopsis</i>		
	<i>S. minima</i>		
	<i>S. octomera</i>		
	<i>S. pulchella</i>		
	<i>S. schadospora</i>		
	<i>S. septenaria</i>		
	<i>S. systemospora</i>		
	<i>S. tetramera</i>		
<b>Donkey</b>	<i>S. anisomera</i>		
	<i>S. australis</i>		
	<i>S. capybarae</i>		
	<i>S. dubia</i>		
	<i>S. herculea</i>		
	<i>S. intermedia</i>		
	<i>S. leporina</i>		
	<i>S. longispora</i>		
	<i>S. longisporopsis</i>		
	<i>S. pilosa</i>		
	<i>S. schadospora</i>		
	<i>S. septenaria</i>		

Host Species	<i>Sporormiella</i> Species	Relative/Absolute/Presence-Absence Abundance*	Reference(s)
	<i>S. subtilis</i>		
	<i>S. systemospora</i>		
	<i>S. teretispora</i>		
<b>Goose</b>	<i>S. antarctica</i>		
	<i>S. ontariensis</i>		
	<i>S. ovina</i>		
<b>Horse</b>	<i>S. teretispora</i>		
	<i>S. antarctica</i>		
	<i>S. australis</i>		
	<i>S. cylindrospora</i>		
	<i>S. cymatamera</i>		
	<i>S. dodecamera</i>		
	<i>S. dubia</i>		
	<i>S. grandispora</i>		
	<i>S. heptamera</i>		
	<i>S. herculea</i>		
	<i>S. intermedia</i>	Presence-Absence; Relative	Ahmed and Cain, 1972; Parker, 1979
	<i>S. kansensis</i>		Ahmed and Cain, 1972; Parker, 1979
	<i>S. lageniformis</i>	Presence-Absence; Relative	Ahmed and Cain, 1972
	<i>S. leporina</i>		
	<i>S. megalospora</i>		
	<i>S. minima</i>	Presence-Absence, Relative	Ahmed and Cain, 1972, Parker, 1979
	<i>S. octomera</i>		Ahmed and Cain, 1972
<i>S. pilosa</i>			
<i>S. teretispora</i>	Presence-Absence; Relative	Ahmed and Cain, 1972; Parker, 1979	
<i>S. tetramera</i>		Ahmed and Cain, 1972	
<i>S. vexans</i>			
<b>Porcupine</b>	<i>S. australis</i>		
	<i>S. dakotensis</i>		
	<i>S. dubia</i>		
	<i>S. intermedia</i>		
	<i>S. lageniformis</i>		
	<i>S. lata</i>		
	<i>S. leporina</i>		
	<i>S. muskokensis</i>		
	<i>S. octomera</i>		
	<i>S. ontariensis</i>		
	<i>S. pilosa</i>		
	<i>S. pilosella</i>		
	<i>S. pulchella</i>		
<i>S. schadospora</i>			
<i>S. splendens</i>			

Host Species	<i>Sporormiella</i> Species	Relative/Absolute/Presence-Absence Abundance*	Reference(s)
<b>Rodent</b>	<i>S. subtilis</i>		
	<i>S. capybarae</i>		
	<i>S. longisporopsis</i>		
	<i>S. pilosa</i>		
	<i>S. schadospora</i>		
	<i>S. teretispora</i>		
<b>Elk</b>	<i>S. vexans</i>		
	<i>S. cylindrospora</i>		
	<i>S. decamera</i>		
	<i>S. octomera</i>		
	<i>S. octonalis</i>		
	<i>S. septenaria</i>		
	<i>S. trogospora</i>		
<b>Caribou</b>	<i>S. vexans</i>		
	<i>S. intermedia</i>		
<b>Partridge</b>	<i>S. polymera</i>		
	<i>S. intermedia</i>		
<b>Wolf</b>	<i>S. lageniformis</i>		
	<i>S. leporina</i>		
	<i>S. muskokensis</i>		
	<i>S. octomera</i>		
	<i>S. octonalis</i>		
	<i>S. subtilis</i>		
	<i>S. vexans</i>		
	<i>S. intermedia</i>		
<b>Carnivore</b>	<i>S. minimoides</i>		
	<i>S. leporina</i>		
	<i>S. megalospora</i>		
	<i>S. minima</i>		
<b>Fox</b>	<i>S. minima</i>		
	<i>S. minimoides</i>		
	<i>S. minima</i>		
<b>Bear</b>	<i>S. minima</i>		
	<i>S. ontariensis</i>		
<b>Woolly Mammoth</b>	<i>S. undiff</i>		Van Geel et al., 2008; Mol et al., 2001
<b>Mammoth Coprolites</b>	<i>S. undiff</i>		Davis, 1987

Host Species	<i>Sporormiella</i> Species	Relative/Absolute/Presence-Absence Abundance*	Reference(s)
		*This column describes the type of dataset and how <i>Sporormiella</i> was evaluated in each study. Relative = <i>Sporormiella</i> abundance relative to other fungal types. Absolute = absolute presence and abundance of <i>Sporormiella</i> . Presence-Absence indicates whether <i>Sporormiella</i> was present.	

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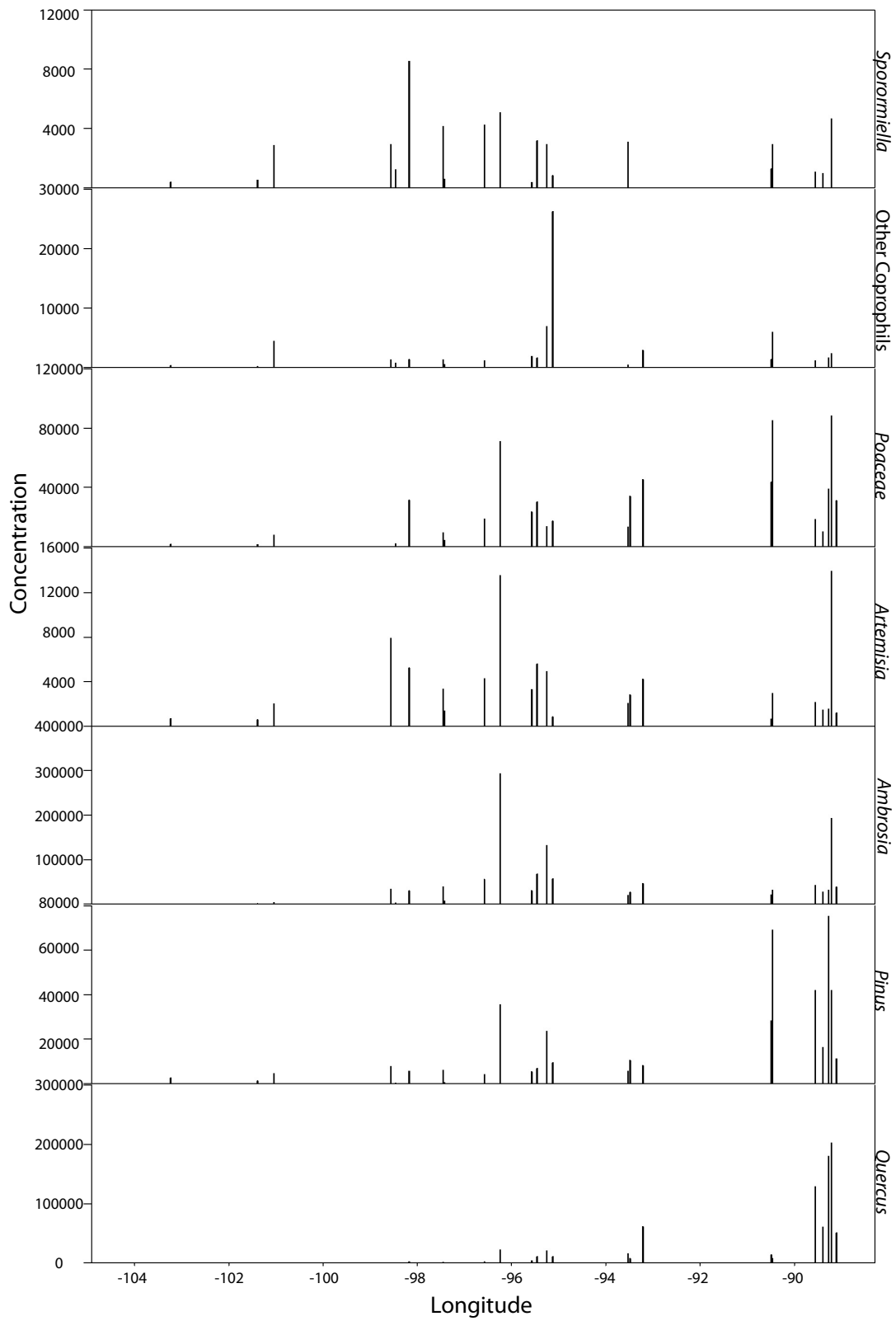
Richardson, M.J. 2001. Diversity and occurrence of coprophilous fungi. *Mycological Research*, v. 105, no. 4, pp. 387-402.

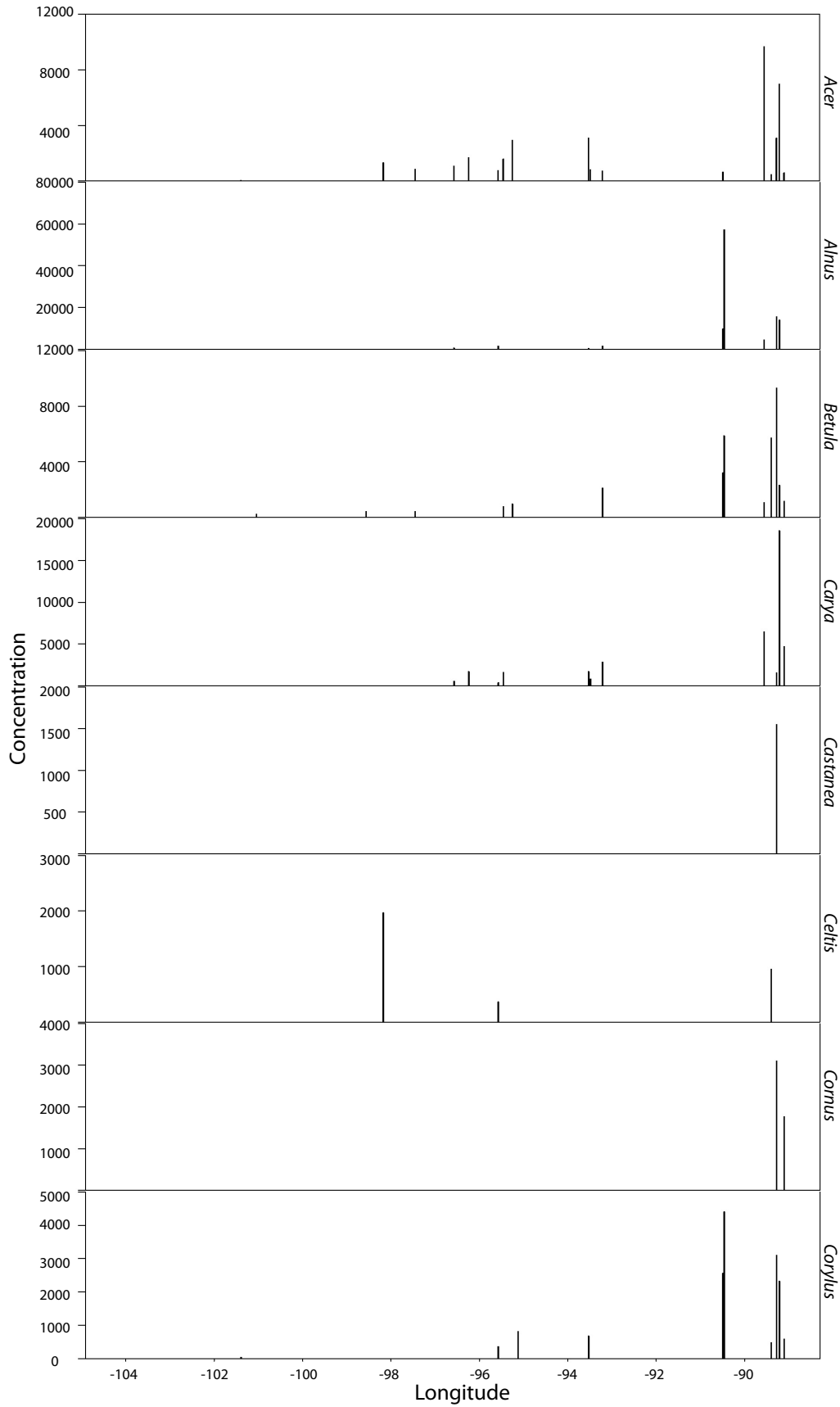
van Geel, B., Aptroot, A., Baittinger, C., Birks, H.H., Bull, I.D., Cross, H.B., Evershed, R.P., Gravendeel, B., Kompanje, E.J.O., Kuperus, P., Mol, D., Nierop, K.G.J., Pals, J.P., Tikhonov, A.N., van Reenen, G., van Tienderen, P.H. 2008. The ecological implications of a Yakutian mammoth's last meal. *Quaternary Research*, v. 69, pp. 361-376.

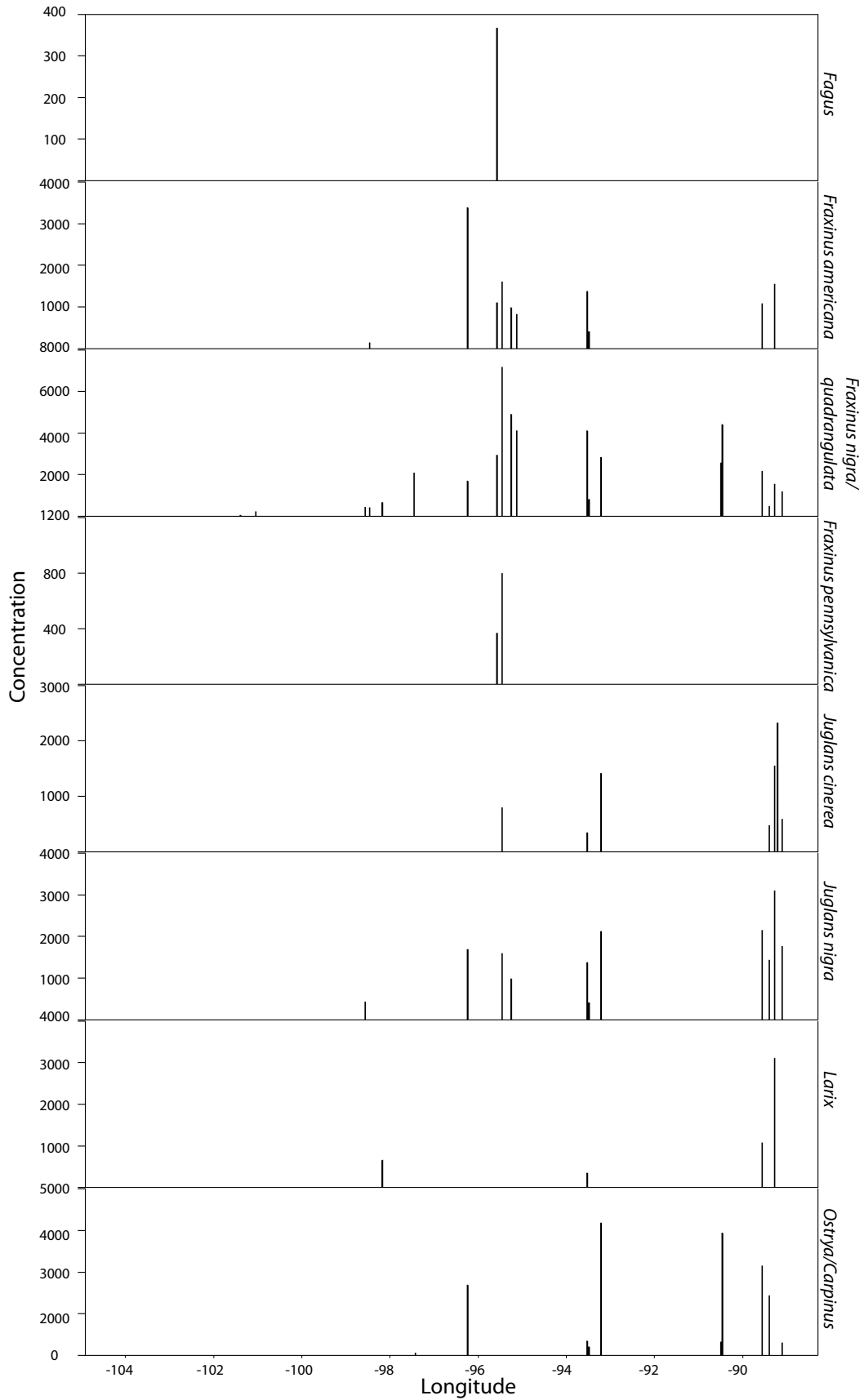
Wicklow, D.T., Angel, S.K., and Lussenhop, J. 1980. Fungal Community Expression in Lagomorph Versus Ruminant Feces. *Mycologia*, v. 72, no. 5, pp. 1015-1021.

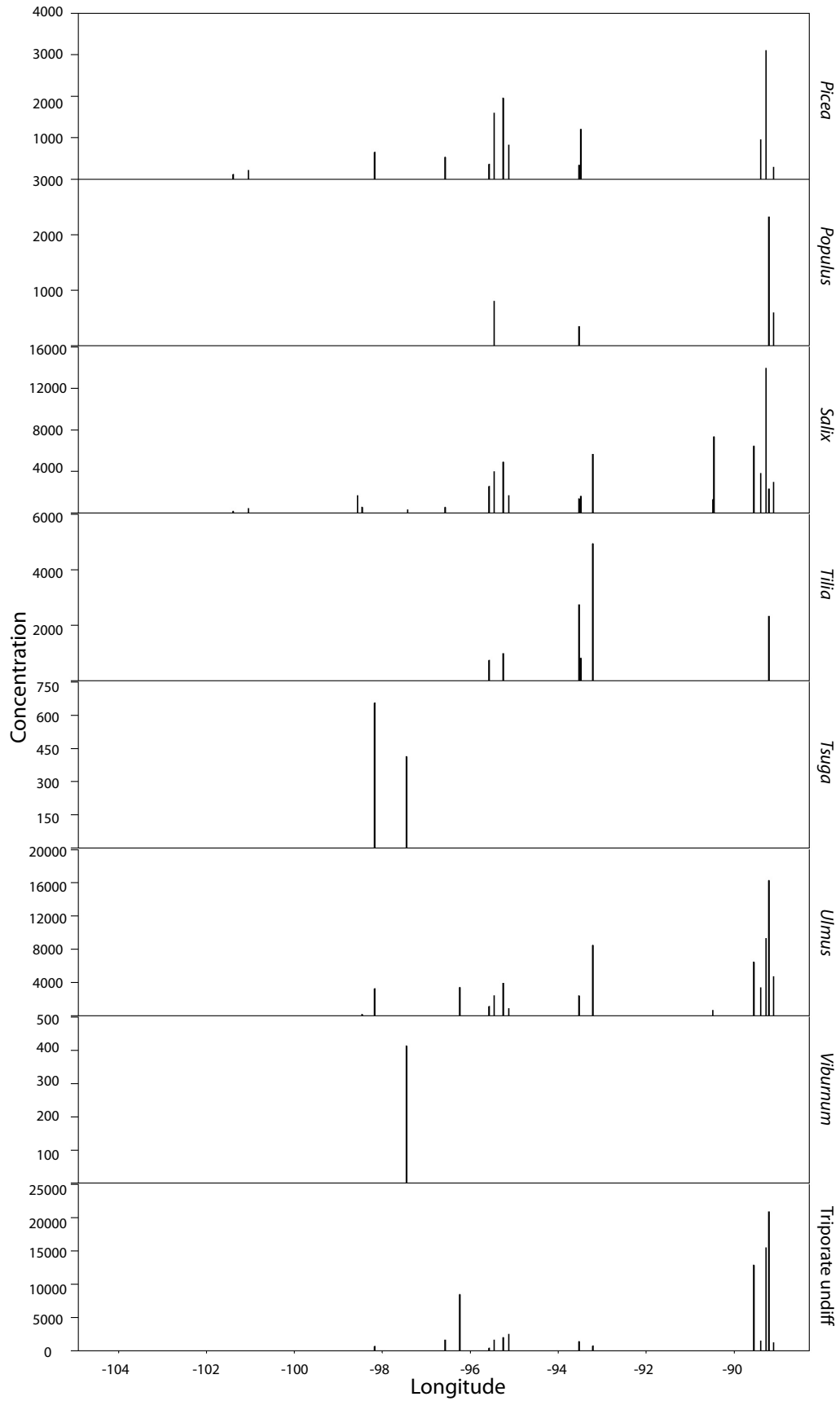
**APPENDIX II**  
**Additional Figures and Analyses**

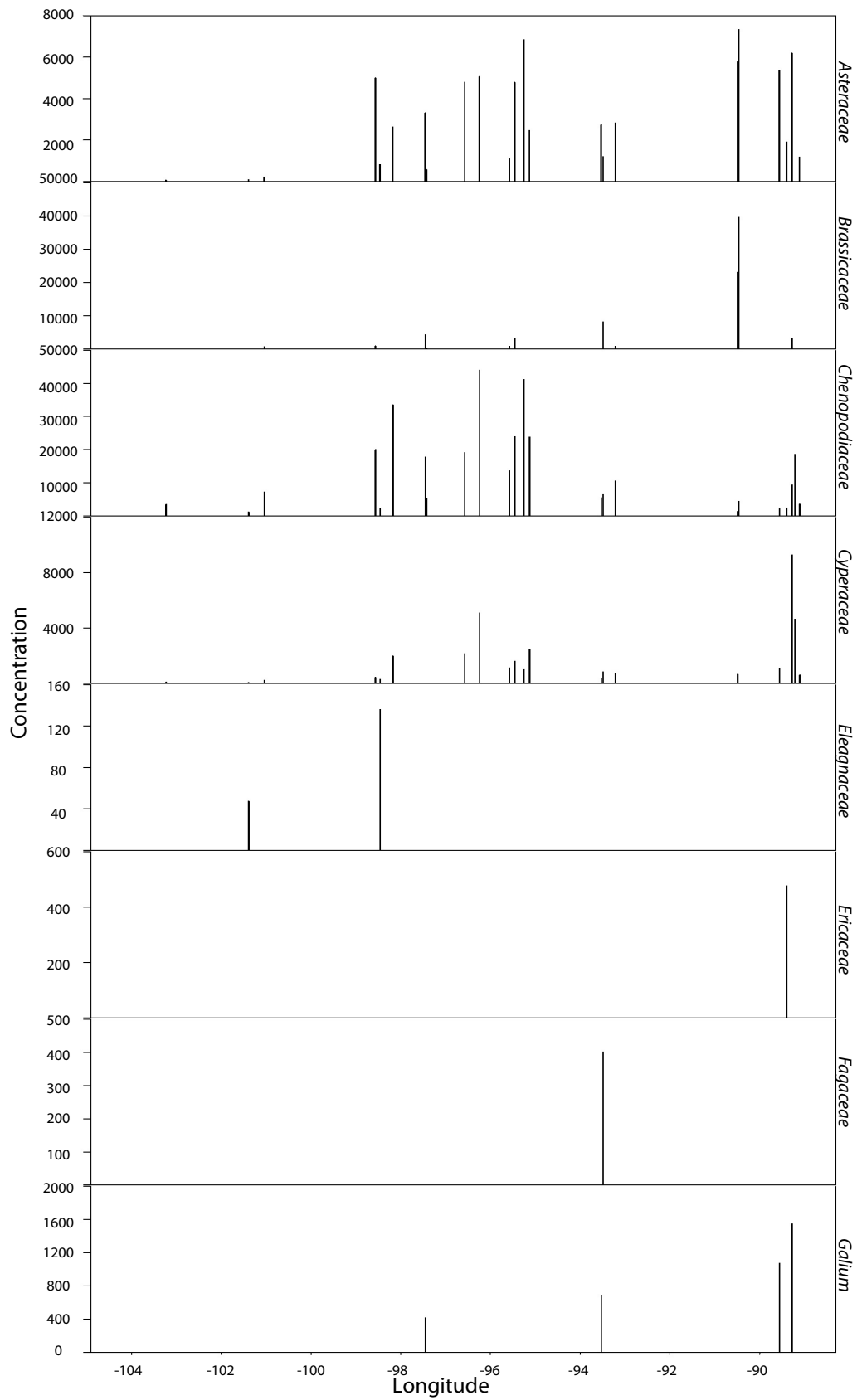
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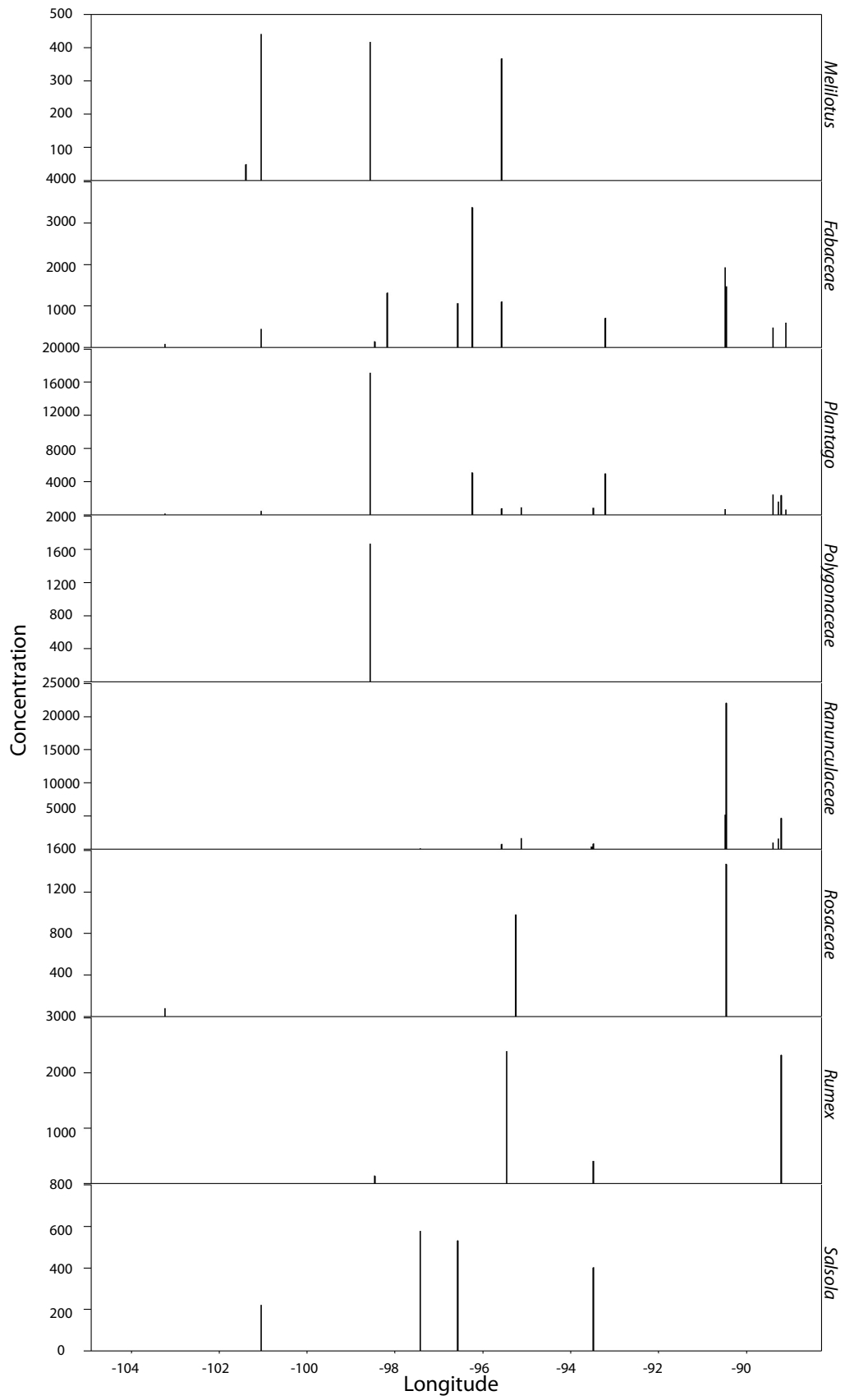


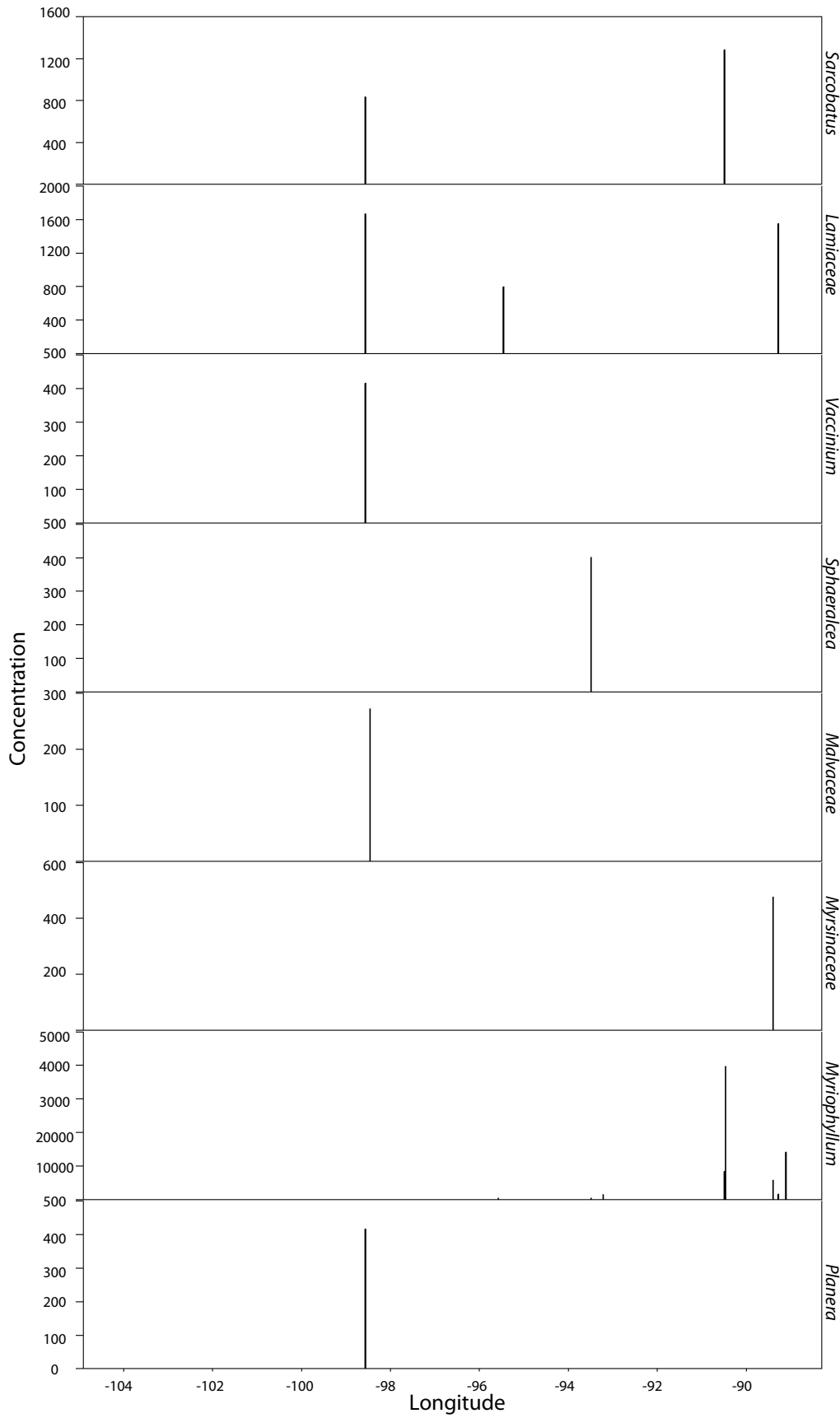


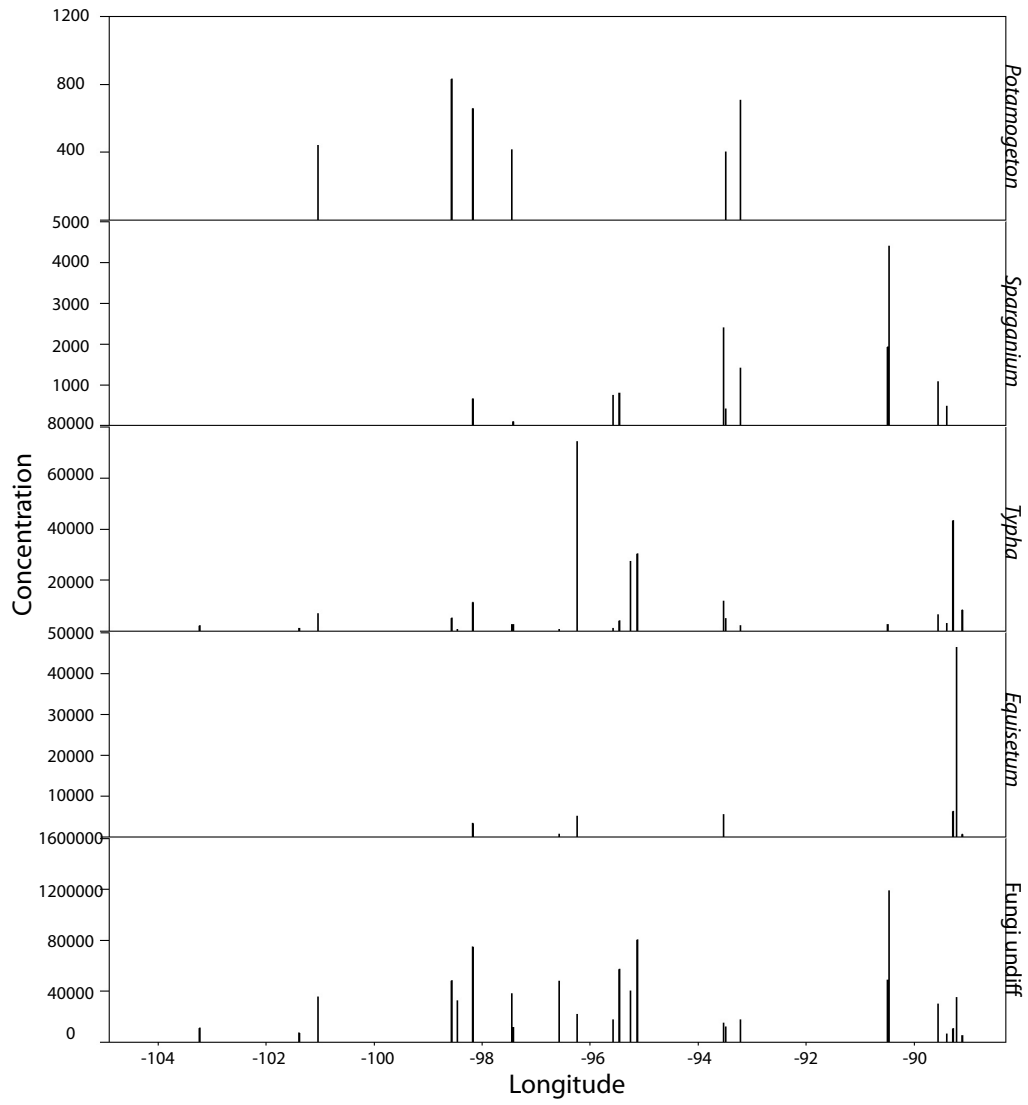


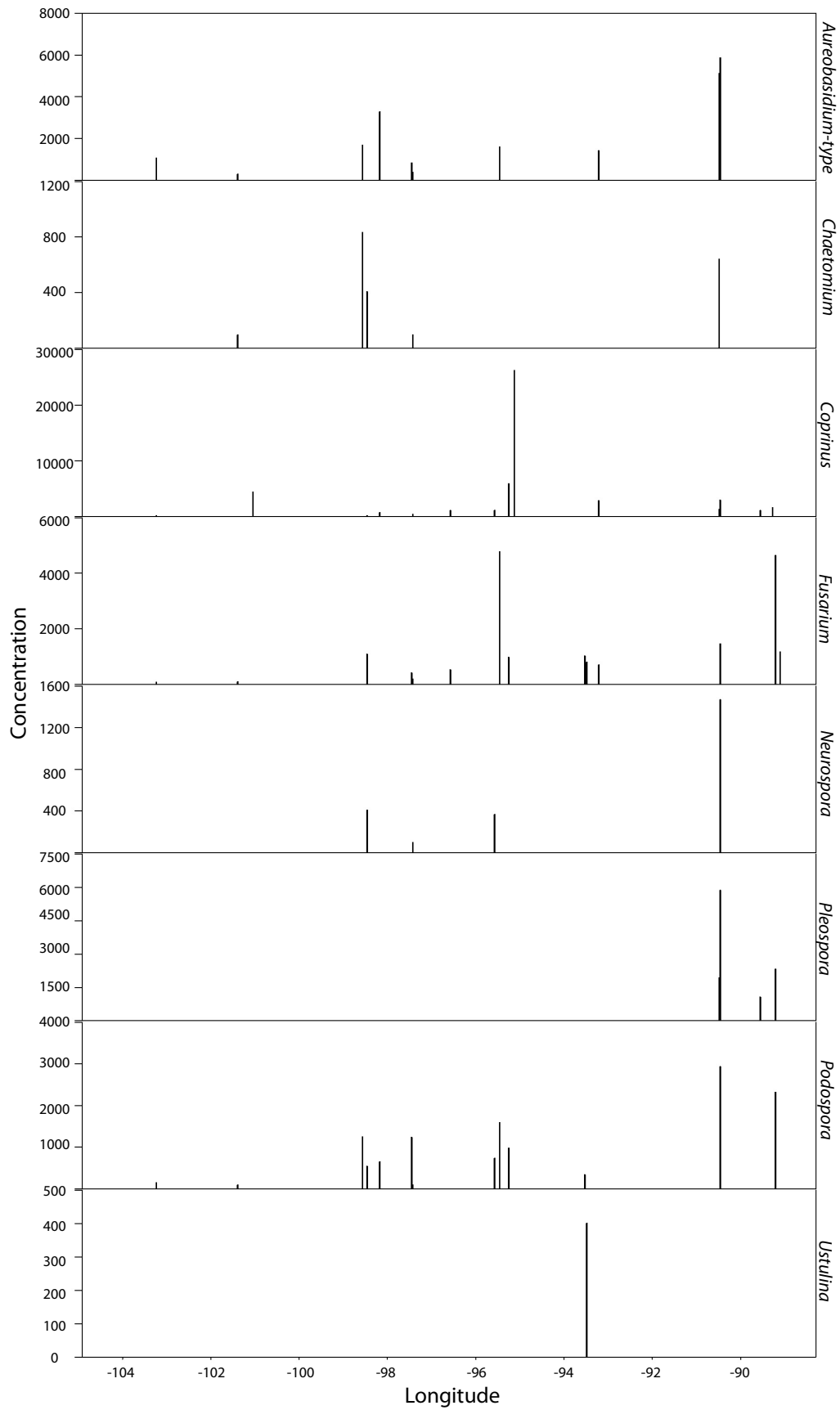


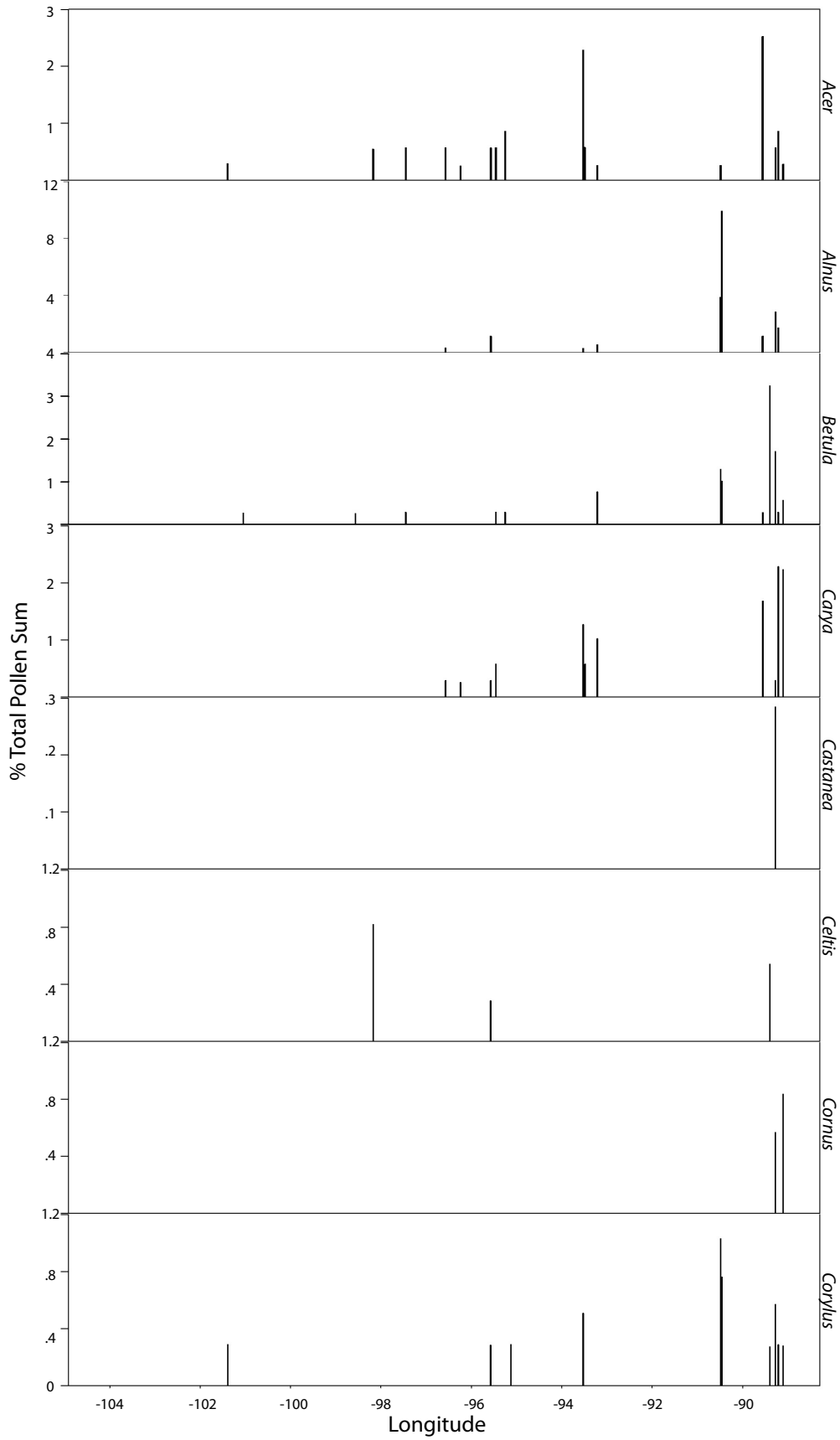


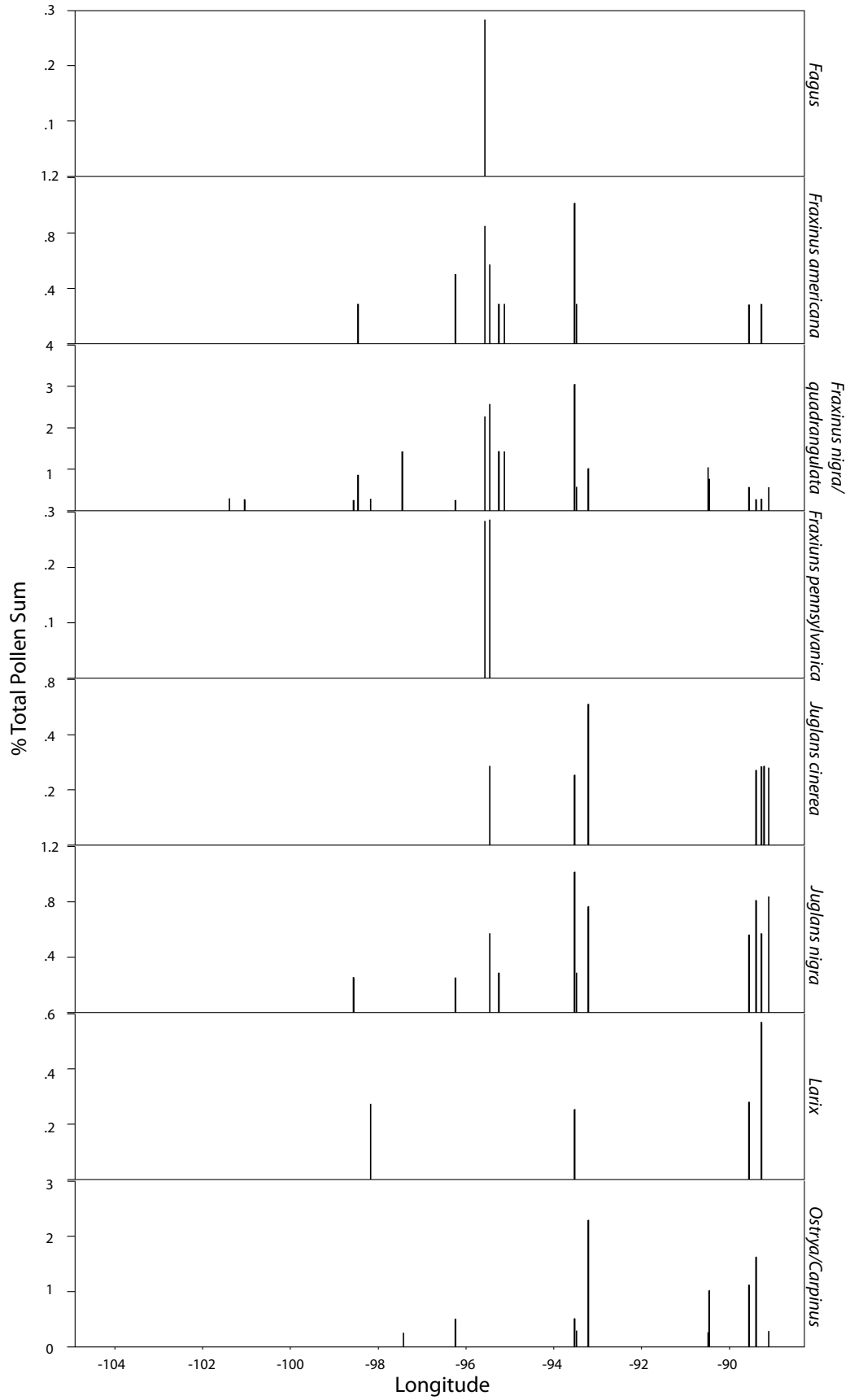


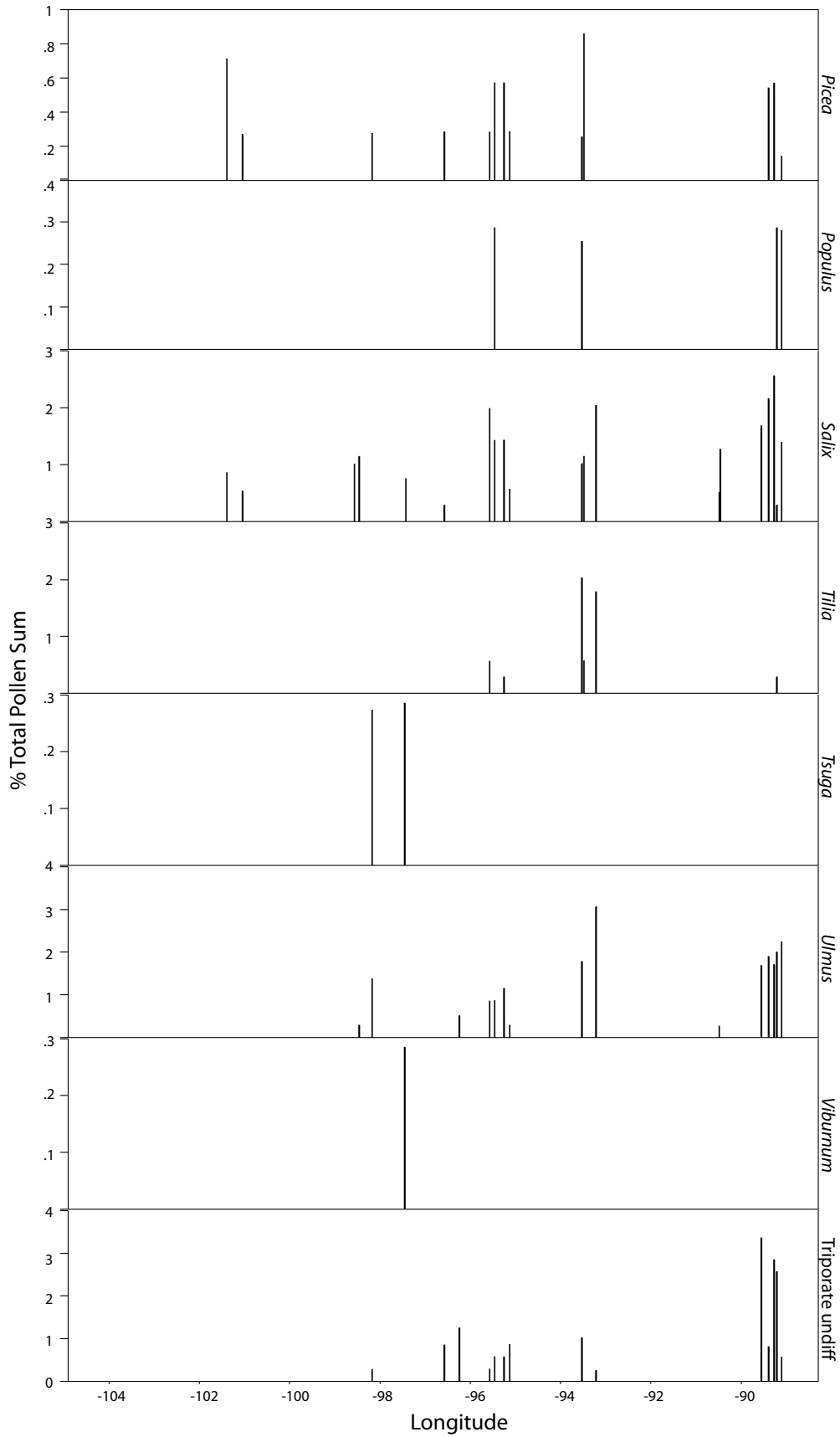


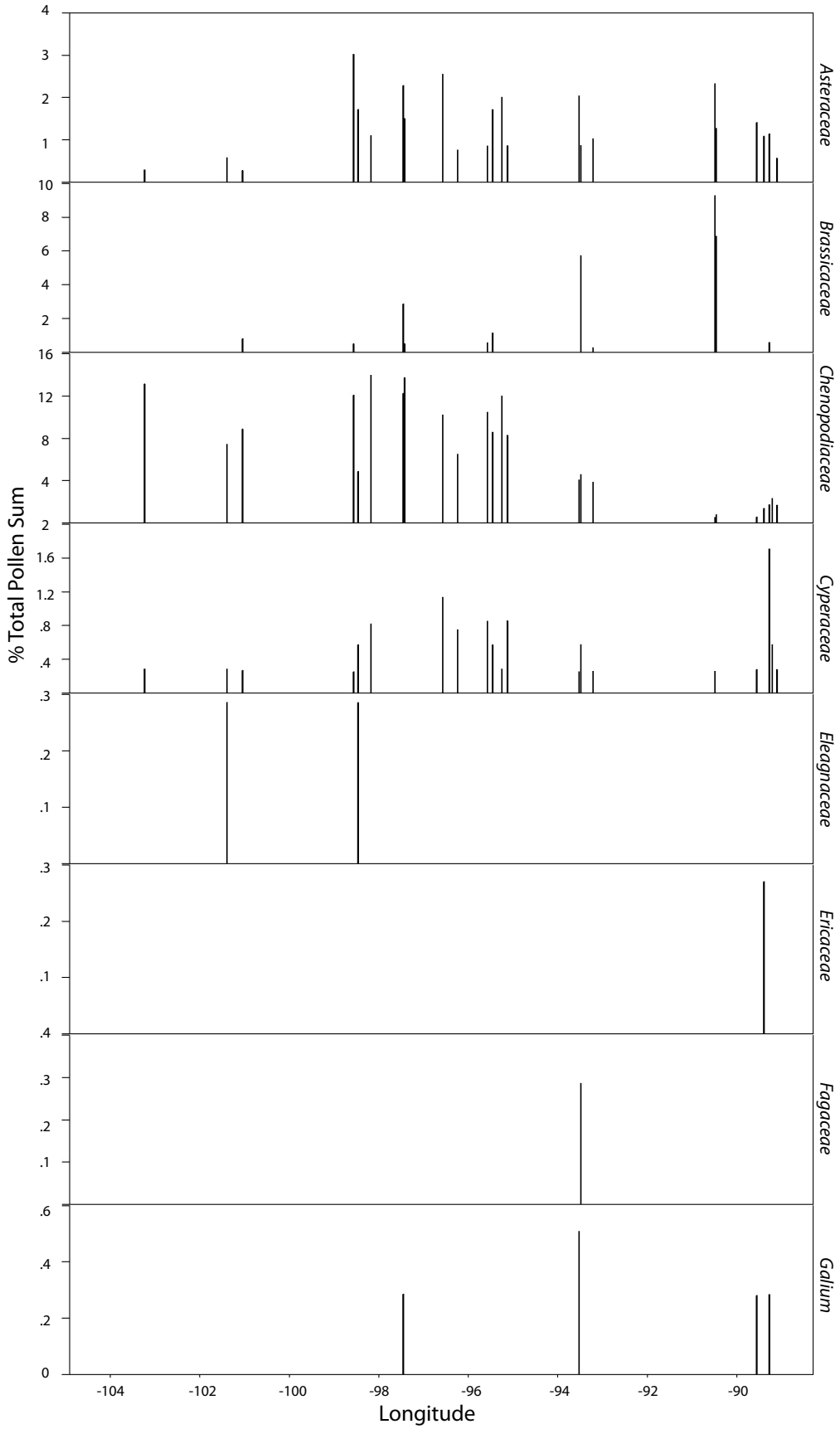


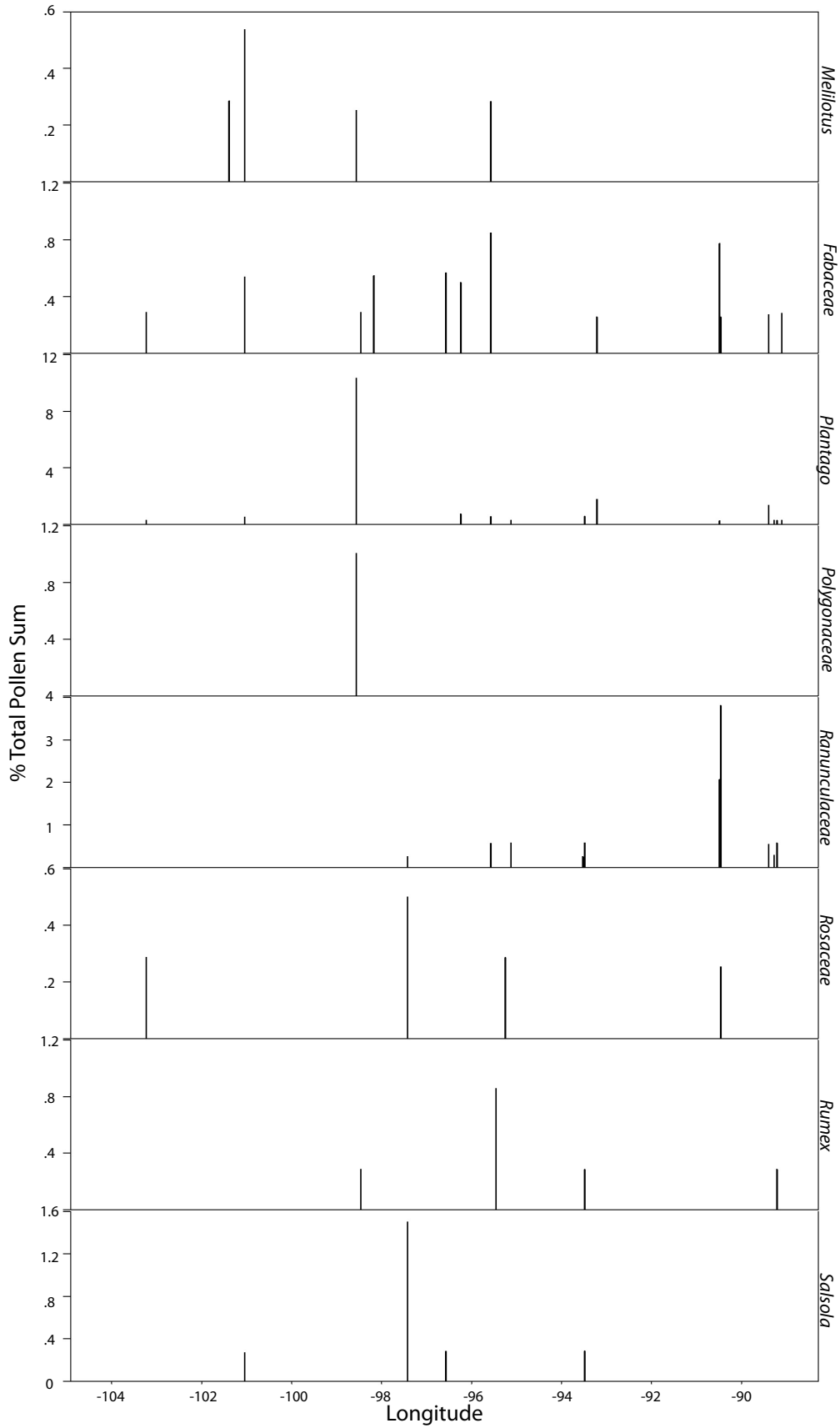


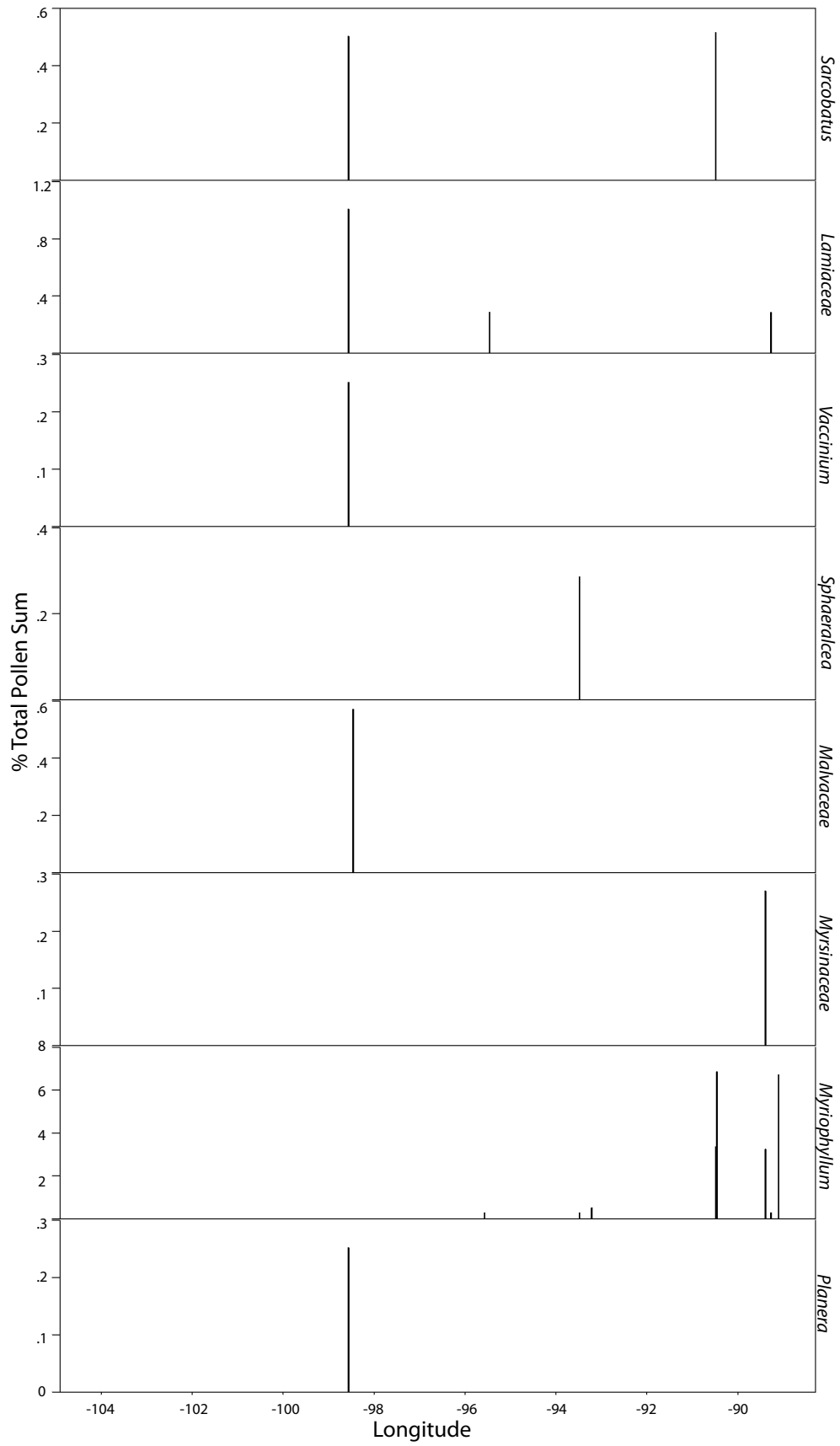


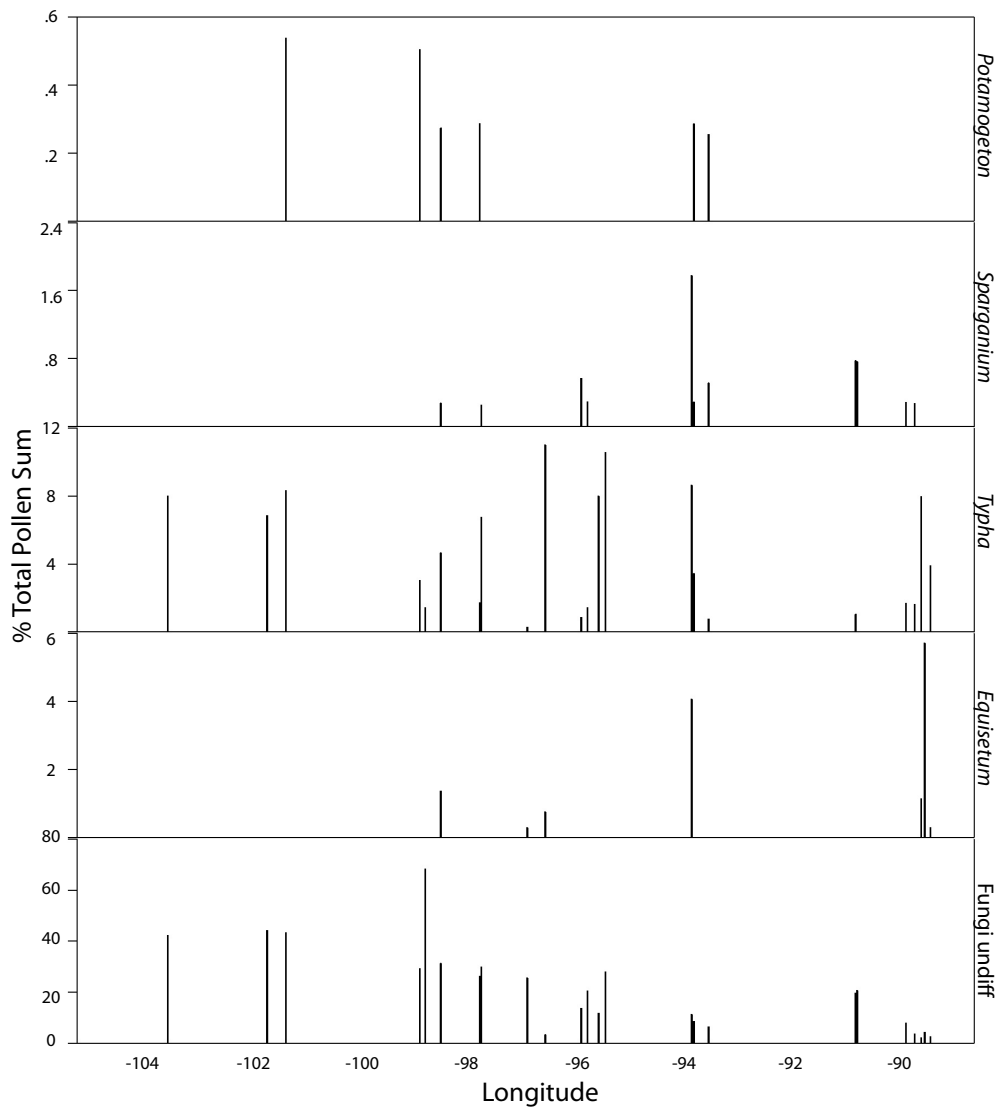


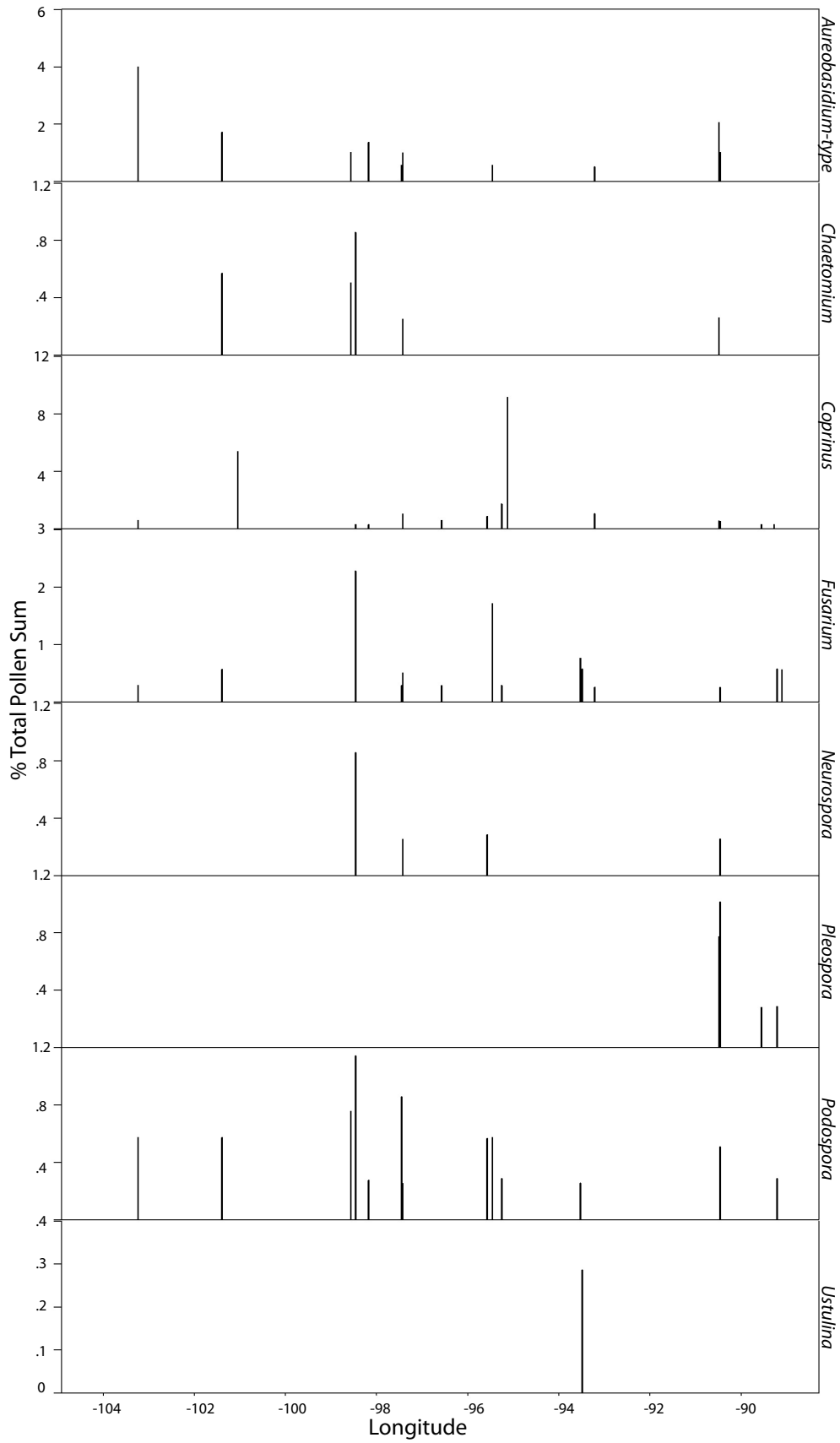












**FINAL MODEL**

Model	Response Variable	Predictor Variables	p value	R <sup>2</sup> (model)	Adjusted R <sup>2</sup>	Regression Equations
1	Center Percent Abundance	Precip. of driest month	1.75x10 <sup>-5</sup>	0.5926	0.5732	y = -0.078x + 2.34
2	Center Concentration	None				
3	Margin Percent Abundance	Distance to shore Cattle per acre	0.0340 0.0470	0.5156	0.334	y = 0.02x <sub>1</sub> + 12.4x <sub>2</sub> + 6.63
4	Margin Concentration	Distance to shore	0.0077	0.3101	0.2411	y = 1.17x - 8.59

The Final Model is the model referenced in the manuscript. It includes the following predictor variables: mean annual precipitation (MAP), precipitation of the wettest month, precipitation of the driest month, mean annual temperature (MAT), temperature of the warmest month, temperature of the coldest month, cattle per acre, lake area, lake depth, distance to shore (for the margin samples), land use (percent pasture), and basin type (natural vs. dam). The p, r<sup>2</sup>, and adjusted r<sup>2</sup> values for the models are included in the table.

**ANNUAL MODEL**

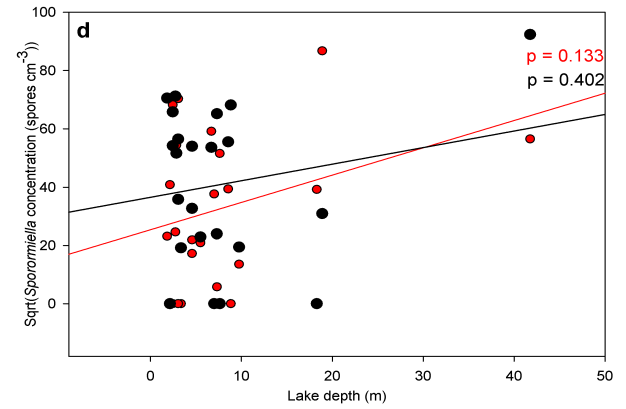
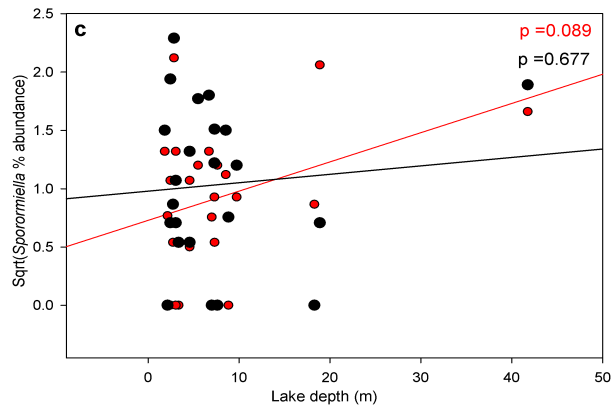
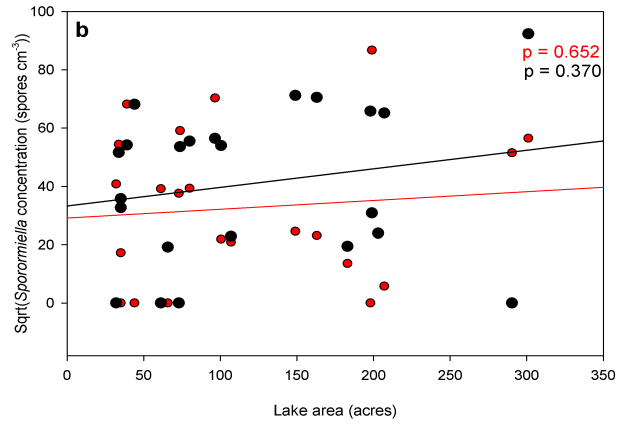
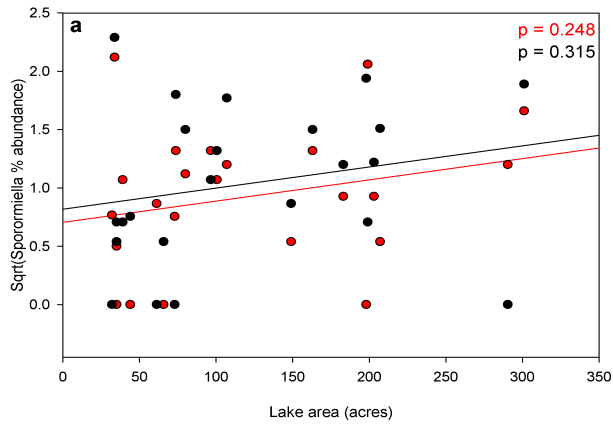
Model	Response Variable	Predictor Variables	p value	R <sup>2</sup> (model)	Adjusted R <sup>2</sup> (model)	Regression Equations
5	Center Percent Abundance	MAP	0.00876	0.5759	0.3779	y = -0.05x + 3.84
6	Center Concentration	MAP	0.03925	0.1978	0.1176	y = -1.43x + 130.6
7	Margin Percent Abundance	Distance to shore MAP Cattle per acre	0.00973 0.01026 0.02230	0.4418	0.3537	y = 0.03x <sub>1</sub> - 0.02x <sub>2</sub> + 13.6x <sub>3</sub> + 1.21
8	Margin Concentration	Distance to shore	0.00771	0.3101	0.2411	y = 1.17x - 8.59

The annual model includes all variables except the seasonal climatic variables.

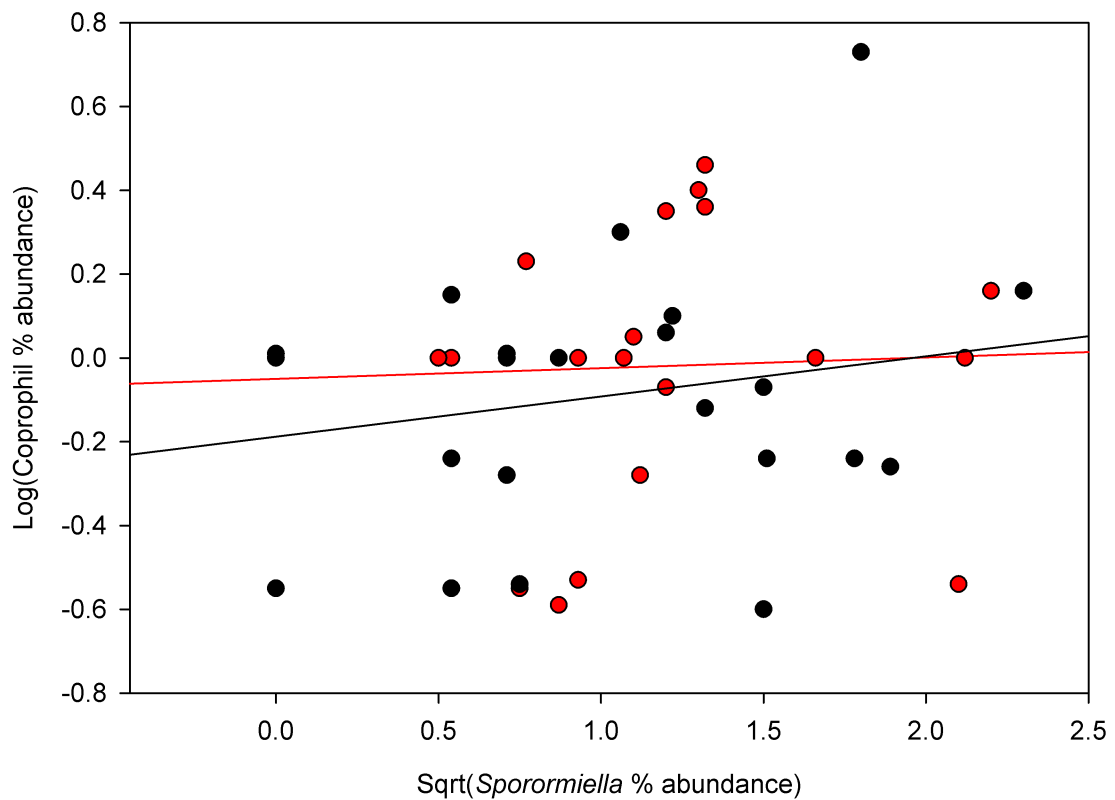
**SEASONAL MODEL**

Model	Response Variable	Predictor Variables	p value	R <sup>2</sup> (model)	Adjusted R <sup>2</sup> (model)	Regression Equations
9	Center Percent Abundance	Precip. of driest month	1.75 x 10 <sup>-5</sup>	0.5926	0.5732	y = -0.08x + 2.34
10	Center Concentration	Precip. of driest month	0.0195	0.2459	0.1705	y = -2.36x + 88.6
11	Margin Percent	Distance to shore Precip. of wettest month	0.0156 0.0250	0.3927	0.2968	y = -0.03x + 2.42
12	Margin Concentration	Distance to shore	0.0077	0.3101	0.2411	y = 1.17x - 8.59

The seasonal model includes all variables except the annual climatic variables.



The relationship between % *Sporormiella* and lake area (a, b) and lake depth (c, d). Red represents lake-margin samples and black represents lake-center samples. *Sporormiella* and lake area and lake depth are not related. p values are indicated in the upper right corner of each plot.



The relationship between the percent abundance of *Sporormiella* and other coprophilous fungi. Red represents the lake-margin samples and black represents the lake-center samples. Both datasets were transformed resulting in a more normal distribution. *Sporormiella* and coprophil percent abundance is unrelated at the lake-margin ( $p = 0.81$ ,  $r^2 = 0.003$ ) and at the lake-center ( $p = 0.343$ ,  $r^2 = 0.043$ ).