Literature Review:

To many, mosquitos are nothing more than a seasonal annoyance. However, mosquitos are important for their role in the transmission of human diseases. For example, the species *Aedes albopictus* is notable in North America for its ability to spread the West Nile Virus and its association with human inhabited urbanized environments (Rochlin et al. 2013). As the environment changes in response to global warming, it is likely that the ranges of mosquitos like *Aedes albopictus* will change. In fact, findings by Rochlin et al. suggest that an increase in winter time temperatures and urbanization is associated with an expanded range of *Ae. albopictus* (Rochlin et al. 2013). This expanded range puts an increased number of people at risk for contracting mosquito-borne diseases and thus sheds light on the importance of understanding the patterns of where mosquitos can be found in North America.

One theory for understanding patterns in mosquito species richness is the latitudinal diversity gradient (LDG). In a study of shore fishes in the tropical eastern pacific, evidence was found of latitudinal gradients in species richness where the number of species peaks at the center of various domains. Other than the mid-domain effect, the average temperature was another significant predictor of fauna LDGs, and both factors were found to have a larger affect for species with larger ranges (Mora et al. 2005). In order to explore the relationships between species richness in shore fishes and LDGs, Mora et al. accounted for spatial auto-correlation in their models and found that spatial regression models were more effective than trend surface analyses. The authors of the study note however, that all different forms of multiple regressions used (ordinary, ridge regression, and multiple spatial) supported the general conclusions that the mid-domain effect and environmental factors were important for LDGs (Mora et al. 2005). While mosquitos are not necessarily similar to shore fish in the tropical eastern pacific, the factors that impacted LDGs in the Mora et al. study could warrant investigation for mosquito populations in North America.

Unlike the work performed by Mora et al., a study that focused on the geometric constraints of species richness in African birds incorporated methods for simulating the ranges of various bird species (Jetz and Rahbek 2001). The reason for the species range simulation is because Jetz and Rahbek wanted to better capture how species richness patterns in the absence of confounding factors is not likely to be uniform and how species ranges expand in two dimensions. Under the two dimensional geometric constraints model proposed by Jetz and Rahbek, species richness appeared to be the highest in the central region of Africa with gradual decreases toward the edges of the continent. Overall, the authors note that while examining species richness gradients in latitudinal bands is a common practice, it can be misleading when applied to continents because it fails to take into account area effects (Jetz and Rahbek 2001). While the latitudinal bands method of study for LDGs is not suitable for the mosquito data at hand, the geometric as well as geographic constraints under Jetz and Rahbek’s model for species richness is perhaps worth further consideration.