The purpose of this assignment is to give you hands-on experience conducting a constrained ordination and variance decomposition of a multivariate data set. As such, you will not be expected to analyze the data set from every possible angle and using every possible analytical procedure discussed in class. Rather, the purpose of this project is to give you some basic experience in how some of these techniques work and how R can be used to do the analysis. The specific assignment (but substitute with your dataset as appropriate), is as follows:

1) Use CCA/RDA to extract (if possible) major gradients in the Lepidopteran community explainable by a set of landscape, patch, and plot environmental variables in the coastal pine barrens community of the Camp Edwards Training Area of the Massachusetts Military Reservation on Cape Cod, Massachusetts.

2) Evaluate the performance of CCA/RDA in meeting objective 1. Specifically, evaluate the strength of the relationship between the measured environmental variables and the moth community patterns. For example, evaluate the eigenvalues, species-environment correlations, percent of species variance explained by the canonical eigenvalues, and evaluate the statistical significance of these relationships. In addition, describe the canonical gradients in ecological terms (e.g., based on the canonical coefficients and/or intra- and inter-set correlations) and discuss the relationship among species, sites, and environmental variables based on an interpretation of the triplot.

3) Identify the limitations in this data set pertaining to the use and/or misuse of CCA/RDA for meeting objective 1. For example, evaluate this data set for adherence to unimodal assumptions of CCA or linear assumptions of RDA and sample-to-variable ratio considerations, and suggest possible solutions or strategies that might be employed to counter or deal with any shortcomings.

4) Decompose the variance in the moth community explainable independently and jointly by environmental variables and space (i.e., terms of a second-order spatial polynomial). Specifically, create a Venn diagram depicting the components of this two-level partition.

IMPORTANT!!!!! It is not necessary for you to actually do every possible analysis in order to meet the above objectives. It IS important that you recognize the things that should be done and would be done if you had unlimited time and all the necessary statistical procedures implemented in R. If you feel that it would be appropriate to analyze the data set in a particular manner but either do not have the R tools to do so or the extra time to do it, then simply outline what you would do.

Prepare a 20-30 minute oral or 3-4 page written (to be determined in class) presentation of your findings. Be concise in your reporting and be sure to address each of the questions above. The quality of visual aids (e.g., tables and figures) will not be a consideration in your grade, so focus on the content. All members of the group must participate equally in the report and a single grade will be assigned to all members in a group.