Kearney Foundation Fellowship
Final Report Summary - Due August 31, 2010

Fellowship Recipient's Name: J. Aapris Frisbie

Project Title: Soil organic carbon storage along an elevational transect in the White Mountains, Inyo County, eastern California

Mentor Professor's Name: R.C. Graham

Reporting Period: 5/27/10 – 8/31/10
****

Your report should include the following information:

1. Project objectives and status: (*Include objectives and summary of progress. Show key figures or tables if appropriate).*

2. Describe the major challenges and opportunities or other pertinent information important in the overall achievement of your project.

Kearney Foundation Fellowship Final Report Summary

The research objectives of this project were to analyze the characteristics of soils along an arid elevational transect in the White Mountains of Inyo County, CA to predict the effects of climate change on soil organic carbon sequestration. We chose fourteen sites along the elevational transect to represent the varying temperature and precipitation that determines the vegetation type and density that contributes to organic carbon storage at each elevation. Organic carbon was quantified using dry combustion and soil bulk density.

Results indicate that while organic carbon is stored both underneath and in the interspaces between vegetation, there is significantly more soil carbon sequestration occurring directly underneath vegetation than in the accompanying areas. Interestingly, the most overall carbon storage was not found at elevations with the highest vegetative density, but at the site with the sparsest, approximately 3800 m in elevation in the alpine grassland. This can be attributed to the fact that there is homogeneous sequestration of carbon relative to the high, localized regions of carbon storage directly underneath shrubs and trees at lower elevations with higher vegetative density. Another factor contributing to the higher overall carbon storage at the alpine grassland site is the climate at this particular elevation, where the temperature is warm enough to encourage grassland vegetative growth but cold enough to significantly decrease microbial decomposition. Although there is not as much vegetative input into the soil at 3800 m because the temperature is too cold to encourage growth of shrubs and trees, the alpine grass that does contribute to soil organic carbon was hardly decomposed, rendering greater overall carbon storage at this site.

Results also indicate that the amount of carbon dioxide emissions may increase as a result of increased soil temperature and a subsequent increase in microbial decomposition of organic matter inherent with global climate change.

The major challenges encountered during the execution of this research which contains some importance to the study's overall success are the discontinuity in parent material along the transect as well as the lack of quantification between vegetation and carbon storage. The parent material consists of granite, phyllite, and felsic metavolcanic bedrock which prevents this study from being a true bio-climosequence, and may render the results of this study inconclusive. The relative percentages of shrub and interspace across the entire transect was also not quantified, so the amount of carbon storage across the landscape as a whole is not reflected in this study; rather, only localized regions of carbon storage within the landscape have been quantified.