

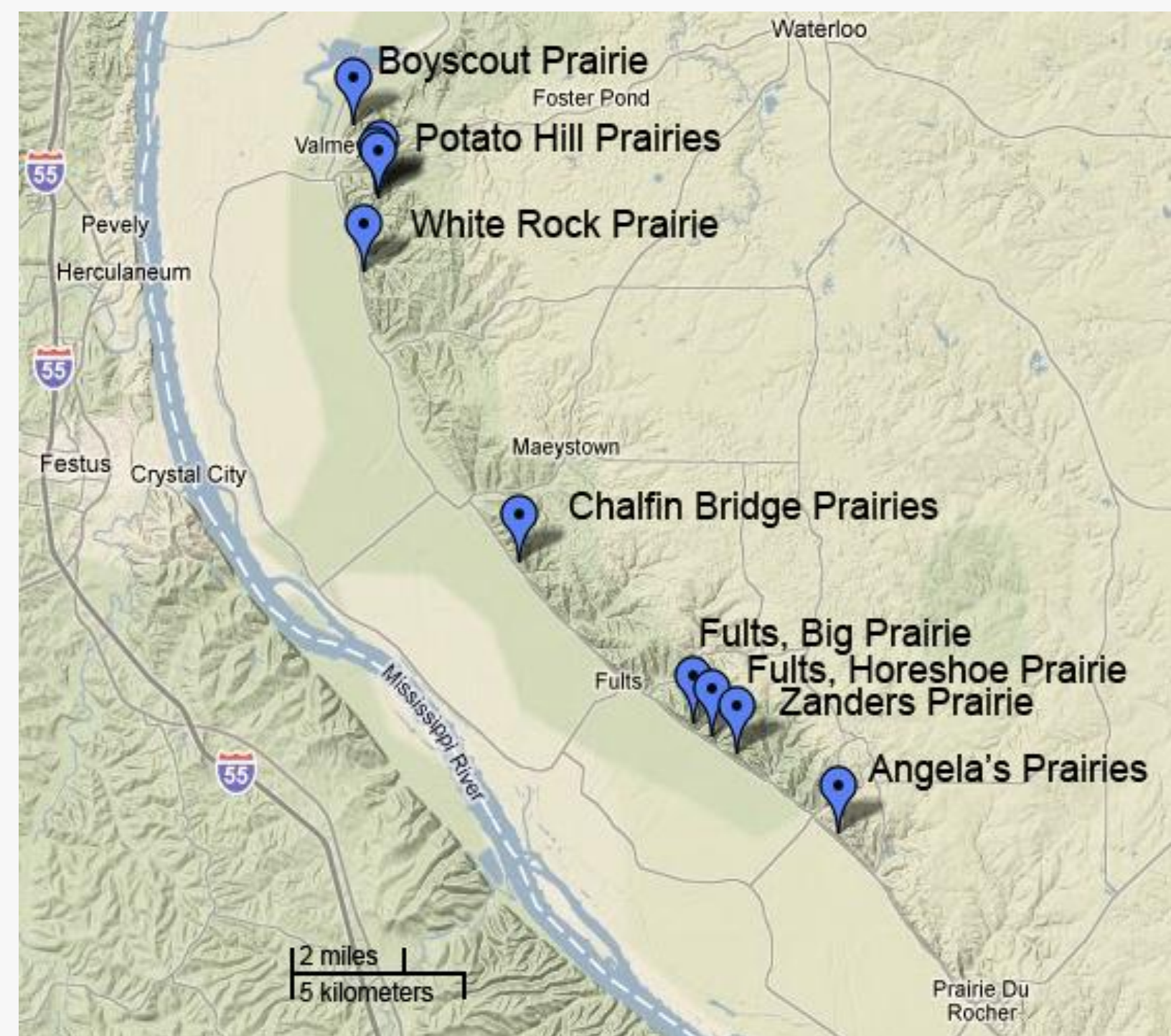
SOIL MICROBIAL ECOLOGY OF REMNANT HILL PRAIRIES IN THE GREAT RIVERS CONFLUENCE AREA: INVASION AND EDGE EFFECTS

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Introduction and Objective

The confluence area of the Illinois, Mississippi, and Missouri rivers contains native hill prairies. These prairies are unique in that they are found on dry, steep slopes on the tops of bluffs. They are also surrounded by forest habitats and often have woody shrub species encroaching in from the edges of the prairie. We wanted to test whether bacteria-plant interactions are linked with shrub encroachment at both high-quality prairies and low-quality, degraded prairies.

Study Sites



Hill prairies sites were located in a riparian corridor in Monroe County, IL



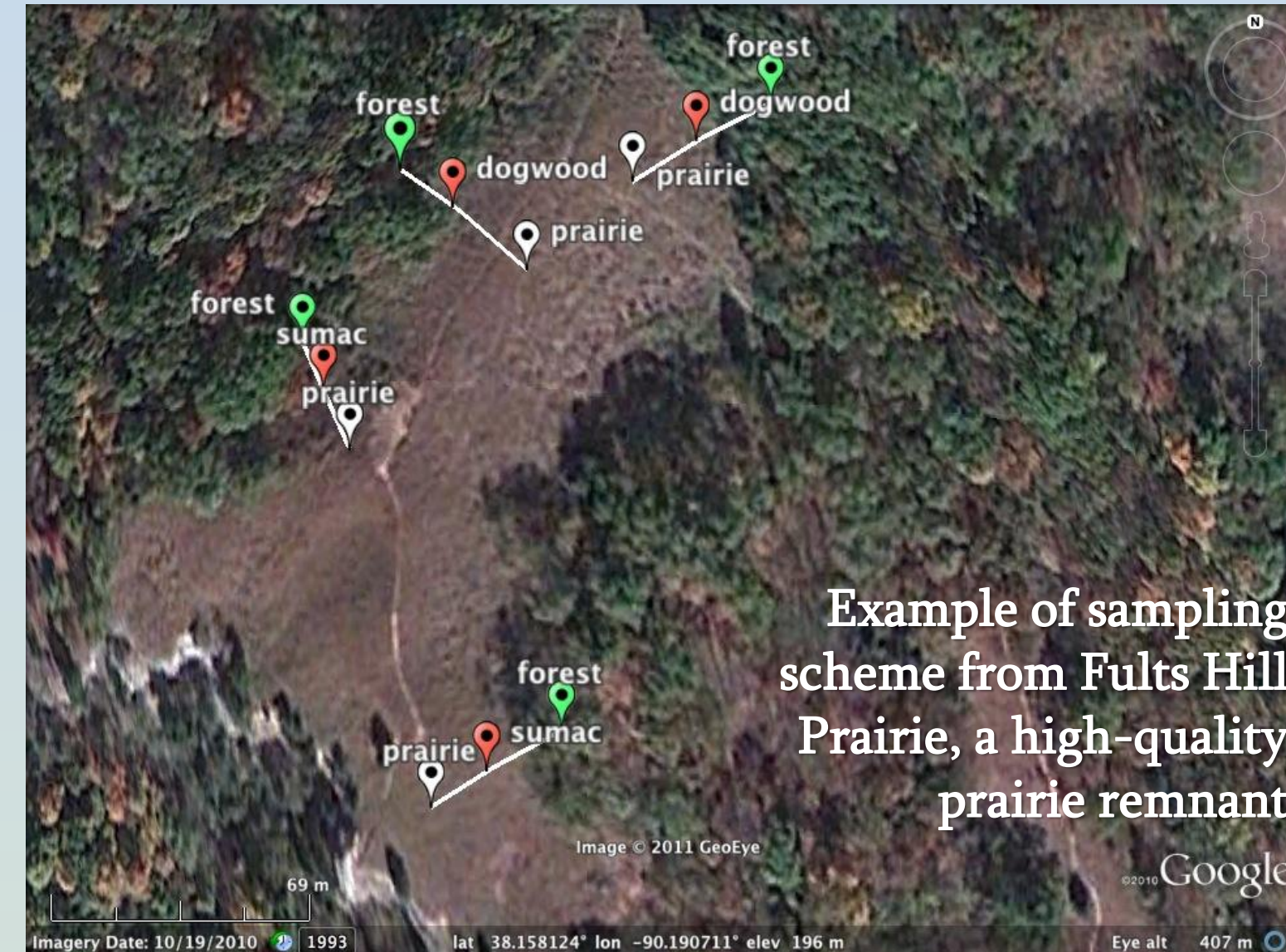
Angela's Prairie, a high-quality prairie remnant



White Rock Prairie, a low-quality prairie remnant

Sample Collection

Soil samples were collected along at least four transect lines at each of eleven hill prairie remnants. For each transect, one soil core was collected inside the prairie, one from the shrub-encroached edge, and one from the surrounding forest.



Example of sampling scheme from Fults Hill Prairie, a high-quality prairie remnant



Using a corer to sample soil bacterial communities



The forest end of a transect



Hill prairie soil core



The prairie end of a transect

Data Analysis

Bacterial DNA was extracted from soil cores, and a DNA “fingerprinting” approach was used to characterize bacterial community composition. Differences in bacterial communities among prairie remnants and habitat types were summarized using non-metric Multi-Dimensional Scaling (MDS) plots.

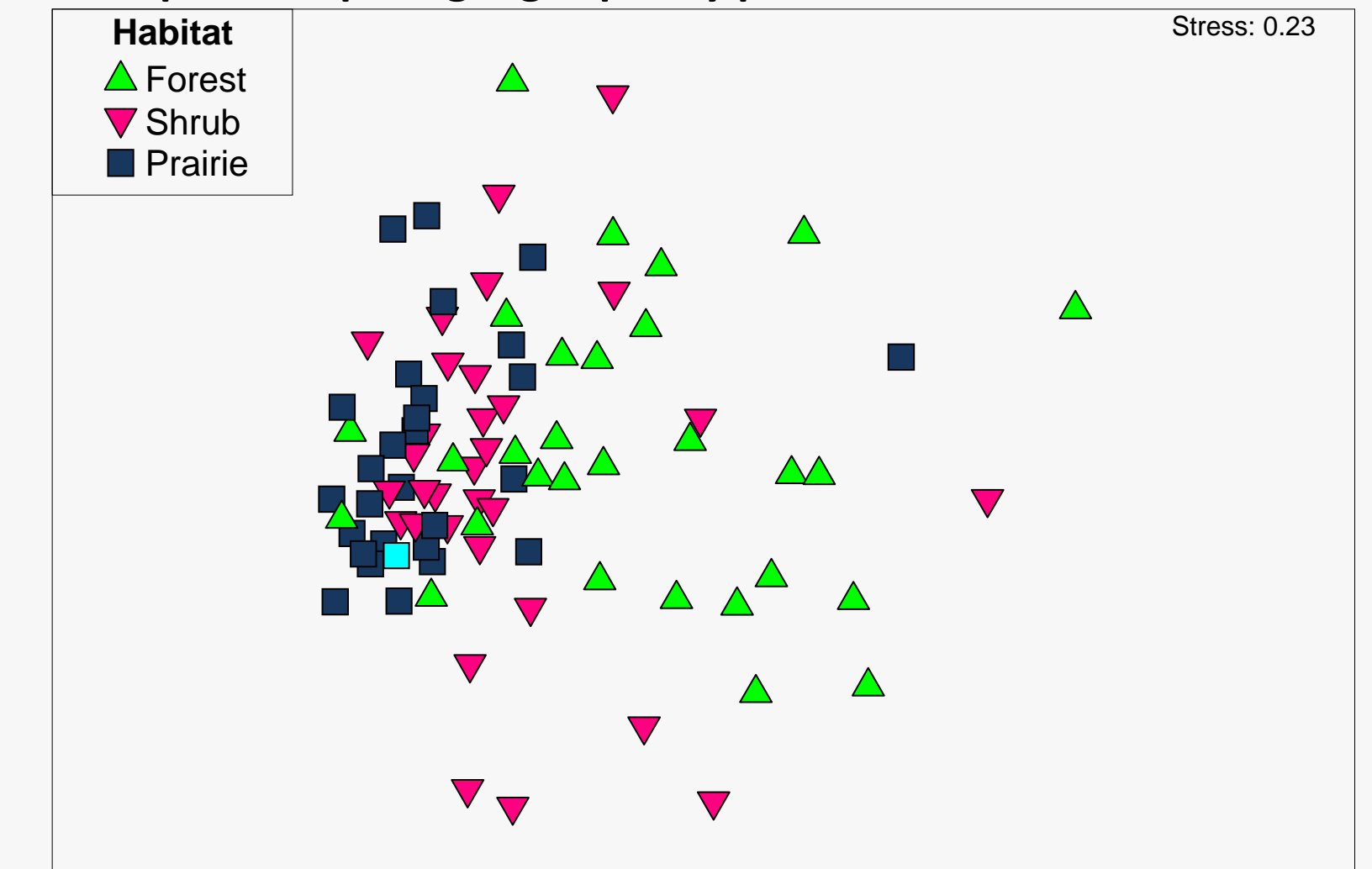
Acknowledgments

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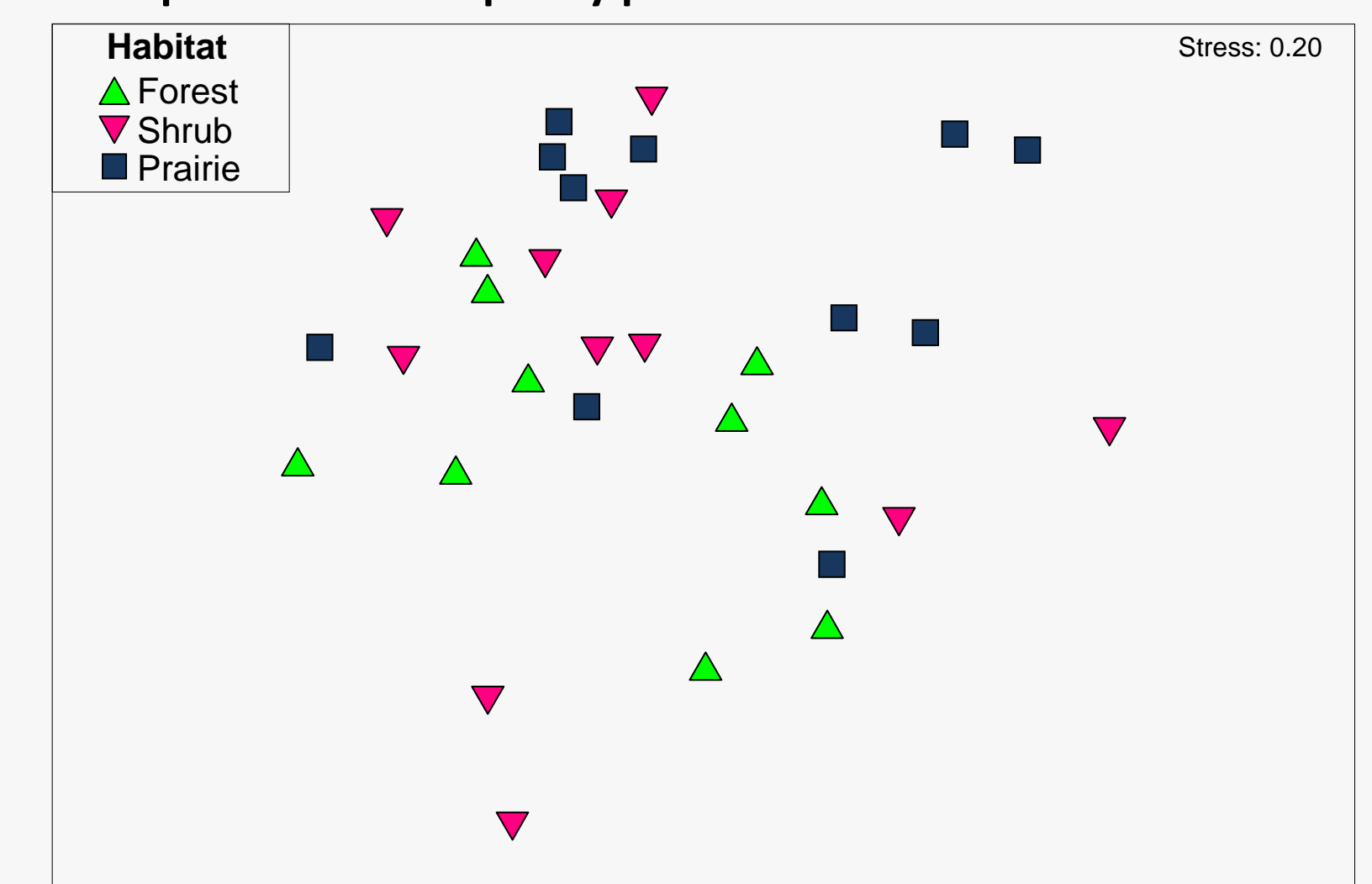
Results

MDS plot comparing high-quality prairie bacterial communities



- Prairie bacterial communities are distinct from forest
 - ANOSIM $R=0.271$, $p<.001$
- Strong similarity among high-quality prairie samples
 - Average similarity=27.64%
- No distinction between edge and prairie communities
 - ANOSIM $R=0.028$, $p=.080$

MDS plot of all low-quality prairie bacterial communities



- In degraded, low-quality prairies, there is little distinction between prairie, edge, or forest bacterial communities
 - ANOSIM $R=0.021$, $p=.279$

Implications

- Forest bacterial communities are distinct from those of hill prairie soils.
- There is a bacterial community common to all high quality hill prairies, unlike low quality prairies.
- This community may help prevent encroachment of woody shrubs.