

The Friends of Nachusa Grasslands 2018 Scientific Research Project Grant Report

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2018 grant amount: \$3,000

Research Project Topic: To examine the impacts of different land uses/land cover types on amount and distribution of soil organic carbon and its fractions in Nachusa Grasslands.

Research Project Purpose: This research will provide insight on the best land management techniques for increasing the health and quality of the soil.

Research Project Outcomes to date: Soil aggregate sizes using the mean weight density have been largest in prairie, followed by woodland, savannah, and wetland. Aggregates are likely smaller in savannah than woodland due to it being intensively farmed prior to 2008. Soil carbon content has been trending towards being higher in soil with larger aggregates in prairie remnants. Soil bulk density and moisture content increase with depth, but results have only been significant between moisture content at 0-10 cm depths and 20-30 cm depths.

Describe how the grant funds you have received from the Friends of Nachusa Grasslands have been used in regard to the above topic, purpose, and/or outcomes: Grant funds have been strictly used based on the research proposal. Specifically, the grant funds was used to purchase a soil bulk density sampler, telescoping auger, lab equipment and reagents for Walkley-Black soil carbon analysis, sieves for separation of soil aggregates by size, and to employ undergraduate biology students as research assistants for wet sieving and Walkley-Black titrations.

Describe how your project has benefited the work and goals of Nachusa Grasslands: This work will provide insight into the best methods of land management for different land uses, the effect of bison on soil, and a timeline of soil quality on remnants of different ages. Aggregate size distribution is important for increasing infiltration and reducing erosion and carbon content is an important factor to a functioning ecosystem that cascades up all trophic levels.

Describe how your findings can be applied to challenges in management practices for restoration effectiveness and species of concern: Finding could be useful in determining which remnant prairie would provide optimal growing conditions for endangered plant species.

Please list presentations/posters you have given on your research:

1. Xiaoyong Chen and Mary Carrington. 2018. Quantifying soil organic carbon fractions under land use types in Nachusa Grasslands. A poster presentation displayed at the 2018 Nachusa Science Symposium.
2. Xiaoyong Chen, Mary Carrington and Scott Carlock. 2019. Soil aggregate stability and size distribution under different land uses in Nachusa Grasslands, Northern Illinois. A poster presentation displayed at 2019 Governors State University Research Day.
3. Reni Truhtcheva Owikoti, Diana Acosta, Markeia Scruggs and Xiaoyong Chen. 2019. Assessment of soil particle size distribution under four land covers in Nachusa Grasslands of Northern Illinois. A post presentation displayed at 2019 Governors State University Research Day.

Have you submitted manuscripts to scientific journals? If so, which ones? If not, do you anticipate doing so? (Please keep us informed on publications.) One manuscript is in preparation. We plan to submit this manuscript to the journal of ‘Soil Science’ or the journal of ‘Transactions of the Illinois State Academy of Science’.

Optional: Offer suggestions for improving the application and award process for future Friends of Nachusa Grasslands Scientific Research Grants:

1. Encouraging the scientists to submit for a long-term (saying three years) research proposal.
2. Supporting collaboration research proposals.
3. Giving priority to the applicants who have widely share their research results form the Nachusa Grassland Research Projects in publics, such as publishing articles in peer-reviewed journals, giving oral/poster presentations in regional, national and international conferences etc.