Application for Case Study, STAT 450

My Master of Soil Science thesis is examining the long term impacts of biosolids application on grassland plant communities and soil health. The field experiment was established in 2002 at the OK Ranch, Jesmond, BC. The experiment was laid out in a randomized complete block design with two treatments replicated in each of four blocks: (i) no biosolids (control) and (ii) single application of biosolids at 20 dry Mg ha-1. Blocks (exclosures) were 50 m x 50 m and protected from cattle grazing by fencing. Fourteen years after the application, sustained increases in forage production are evident in the biosolids treatment.

The experimental blocks were sampled in 2002 for plant species composition (Newman et al. 2014) prior to the biosolids application, and for 4 consecutive years following application (2003-2006). In June of 2016, plant species composition was sampled again. This consisted of visual assessments of percent cover by species, as well as percent cover of exposed soil and microbiotic crust.

In 2016, soil samples were also collected in April, June, August and October to analyze the stability of different soil aggregate size classes (6-2mm, 1- 2mm, and 1-0.25mm). Mean weight diameter (MWD) of aggregates was also determined, a parameter that gives the weighted average size of stable aggregate present in the soil. A larger MWD value generally means that the soil structure consists of larger stable aggregates which has positive implications for soil productivity.

One hypothesis that I am testing is that the single biosolids application contributed to overall improved soil structure by providing a food source for microbial activity, which enhance soil structure by forming soil aggregates. In turn, improvements to soil structure can increase the water and nutrient holding capacity of the soil and thus the plant species composition. First, I would like to test if the biosolids treatment affected the plant species composition. Then, I would like to statistically analyze if the aggregate mean weight diameter was impacted by treatment; and how the aggregate stability fluctuates throughout the growing season.

Thanks for your consideration and please contact me for further information.