White Paper: Influence of Waterfowl on Water Quality at Marion County Lake

Jess Jurczak, Kristen Kimbrell, Kirsten Prindle, Nathan Ryan

As part of the Natural Resources and Environmental Science capstone class, our team sought to better understand the influence of the migrating Canada geese on the water quality of Marion County Lake. We focused on their contribution of nutrients, notably phosphorus, to the lake. Phosphorus is essential for the growth of cyanobacteria. Cyanobacteria are a toxic form of algae that grows on many of the lakes across Kansas during the summer months when temperatures are higher. The presence of cyanobacteria can cause entire lakes to be shut down, eliminating a source of recreation and impacting the local economy, as well as have detrimental, even fatal, health effects on organisms in contact with the blooms.

Canada geese annually migrate in massive flocks often numbering in the thousands or tens of thousands. These geese are not only a nuisance for lake-dwellers, but they can have an enormous impact on nutrient dynamics within freshwater systems. Phosphorus contributions by geese are difficult to determine, but they are often underestimated. Geese can even be the primary source of phosphorus, as they are in many lakes across the world. We hypothesize that the geese at Marion County Lake are major contributors of phosphorus.

To determine the concentrations of nutrients being leached into the water by the geese, we completed a fecal leaching experiment. Feces collected from Marion County Lake was mixed with water containing active microbial populations. The total phosphorus and total nitrogen concentrations are shown in **Figure 1** for the initial water concentrations, the concentrations leached into the water immediately, and the concentrations leached after a one week period.

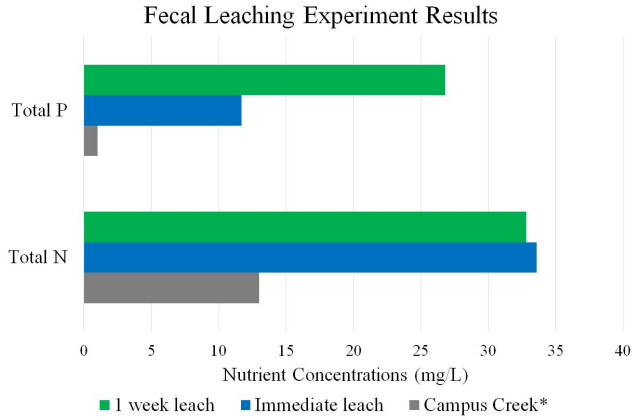

Figure 1. Results from Feces Leaching experiment using water from Campus Creek in Manhattan

Having identified the issues with the excess levels of nutrients in the lake water as a result of the geese population, our team was tasked to develop a potential solution to remove these nutrients. Among our considerations are natural treatment systems that would not disrupt lake recreation. The most viable option our team suggests is the implementation of a floating waterbed treatment system. Floating waterbeds are buoyant foam matts that hold vegetation allowing nutrients to absorbed by their roots. **Figure 2** shows an example of a commercial floating waterbed treatment system called a "Beemat." Floating waterbeds are known to have high removal efficiencies, can be easily assembled, and are cost effective. Floating waterbeds can be tethered in place in areas with water depths of 5 feet or less, away from any recreation activities.

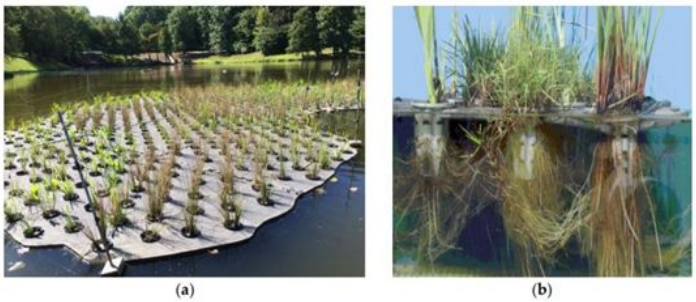

Figure 2. A surface view (a) and a cross-sectional view (b) of the "Beemat," a floating waterbed treatment system