

Student Researcher: Tyler Elliott; Advisor: Dr. Tara Kulkarni, P.E.  
David Crawford School of Engineering, Norwich University

## Introduction

211,152 tons of Municipal Solid Waste (MSW) was generated in Vermont in 2016, 36% of which was recycled. The VT statewide goal is to increase MWS diversion rates to 50% by 2022. Innovative ways to Reduce-Recycle-Reuse plastic waste will be needed for a healthier environment.

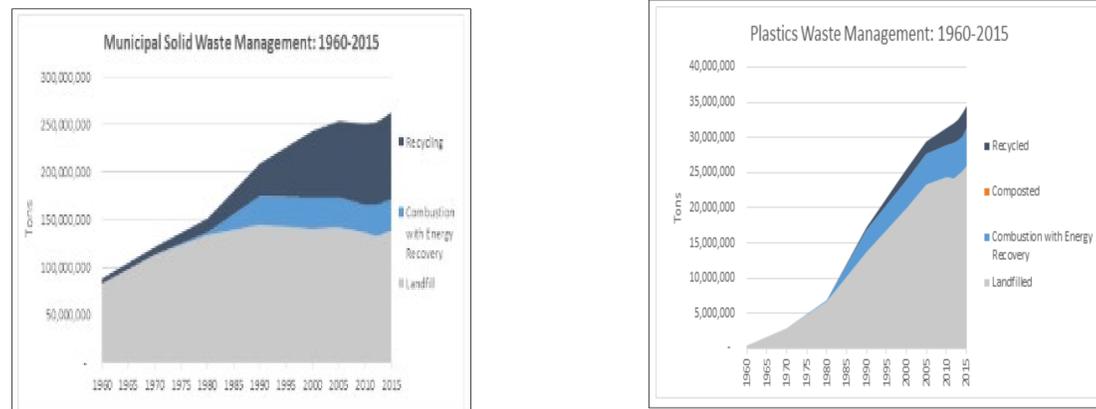


Figure 1. MSW and Plastic management history.

## Action Taken

The lab samples were prepared with basic chemistry equipment of glass graduated cylinders and glass beakers shown in figure 01. The samples were placed in their specific exposure condition and sampled every 7 days for the 35 day test period. The device used to measure pH and salinity was a Vernier LabQuest 2 tablet with a Tris-Compatible Flat pH Sensor and Salinity Sensor.

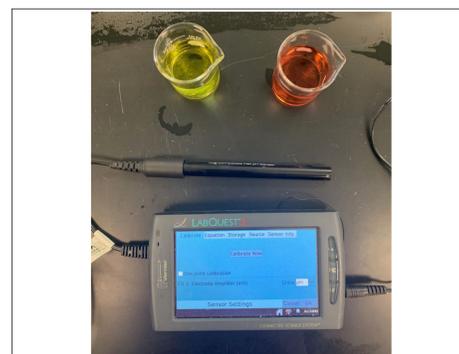
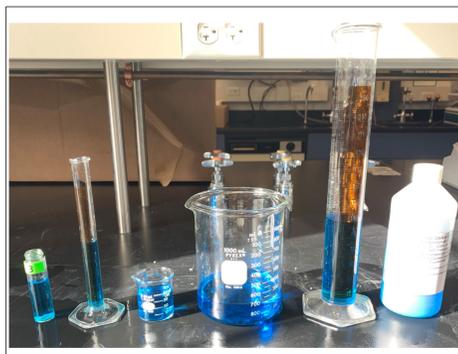


Figure 2. Laboratory set up and testing calibration.

## Results

The plastics did not show any sign of significant deterioration from the varying acidity, salinity, temperature, and UV radiation conditions. The measurements were more related to the exposure condition than the plastic type. The salinity average increased by ~37% while the pH average decreased ~3%. The left block in Figure 3 shows the average percent change of pH and salinity by plastic type. The right block of Figure 3 shows the average percent change of pH and salinity by exposure condition for PET. The graphs for each plastic type all show similar trends.



Figure 3. AVG % change by plastic type and exposure condition for PET .

## Discussion/Recommendation

The next step in this research is to test the samples with a gas or liquid chromatography–mass spectrometry. This will help determine the specific contaminate compounds with their respective concentrations.

## Acknowledgments

Norwich University Undergraduate Research Program

## References

- ASCE
- EPA
- State of Vermont
- Canusa Hershman Recycling Company