FYRES: Dunes Research Report: Swineford, Jacob T., Joshua K. DeVries, Nichole DeVries, Jonathan D. Gorter, Jacob Santucci, and John T. Spykman (2014). "The Impacts of Three Autumn Storms on a Lake Michigan Foredune." FYRES: Dunes Research Report #10. Grand Rapids (MI): Department of Geology, Geography and Environmental Studies, Calvin College. 14 p.

Abstract: Although studies have analyzed the effects of storms on sand transport and foredune development, few studies have targeted Great Lakes dunes. We investigated how autumn storms affected a foredune in Hoffmaster State Park, Michigan. Our study objectives were to analyze the nature of several autumn storms, measure erosion and deposition on the foredune, and measure effects of wave runup on the beach and foredune. We used sand traps and erosion pins to measure sand transport and surface changes. We mapped wave runup and vegetation change with GPS. Wind measurements were recorded with an on-site anemometer tower. During a two-week period, we documented three different storms with varying wind speeds and precipitation. During one storm, winds reached up to 15 m/s, causing erosion on the upper windward face of the foredune. All three storms showed wave runup onto the foredune, causing deposition in the first few rows of erosion pins. Wrack lines indicate wave runup as much as twenty meters beyond the pre-storm shoreline. Our study shows that the characteristics of autumn storms affect the amount and locations of foredune changes.