

First-Year Research in Earth Sciences: Dunes

Conference Presentation: Swineford, Jacob T., Nichole DeVries, Joshua DeVries, Jonathan D. Gorter, John T. Spykman and Jacob J. Santucci (2014). “Impacts of three autumn storms on a Lake Michigan foredune.” Annual Meeting of the Michigan Academy of Science, Arts, and Letters, Oakland University (Rochester, MI), 28 February 2014; poster.

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 run-up on the beach and foredune. We used sand traps and erosion pins to measure sand transport and surface changes. We mapped wave run-up 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 run-up onto the foredune, causing deposition in the first few rows of erosion pins. Wrack lines indicate wave run-up as much as twenty meters beyond the pre-storm shoreline. The combined effects of the three autumn storms suggest that storms are responsible for the majority of change to Great Lakes foredunes.