

Sand Dune Rehabilitation Studies in Point Pelee National Park, Ontario, Canada

Janis E. Dale*, Dept. of Geology, University of Regina, 3737 Wascana Parkway, Regina, SK. S4S 0A2
janis.dale@uregina.ca

and

Mary-Louise Byrne, Dept. of Geography and Environmental Studies, Wilfrid Laurier University, Waterloo, ON. N2L 3C5

A study was initiated in 2009 to characterize the dune-forming processes in Point Pelee National Park on the north shore of Lake Erie, Ontario. A large section of dunes had been removed to form asphalt-covered parking lots between 1951 and 1953 at Northwest Beach. Boardwalks, parking bumpers and a comfort station were installed in the 1970s. One of the parking lots, with its comfort station and bumpers was removed in fall 2007 and spring 2008 when it was discovered that the dunes of Point Pelee are an important ecological habitat for the Five-lined Skink (*Eumeces fasciatus*), the only indigenous lizard in Ontario. In order to address the skink's endangered status as of April 2007, to create a more natural park, and to reduce human impact, Parks Canada is rehabilitating and re-establishing the dunes in the former parking lot.

Ongoing field studies are providing a better understanding of the modern aeolian processes currently at work in the Park. Detailed seasonal surveying of the former parking lot and adjacent dune sites are being conducted using a Leica dual frequency, real time, kinematic Global Positioning System which measures vertical and horizontal accuracy to 1 cm. ArcGIS and Surfer mapping software are being used to identify areas of accretion and erosion, and to calculate the volume and rate of sand transported. Sedimentological study of the sands, including measurement of grain size and moisture content, are providing data on the sediment most susceptible to movement and deposition.

Results to date suggest that there has been little to no onshore or alongshore movement of sediment into the former parking lot area, and thus little short-term re-establishment of the dunes. Even in areas of sparse plant cover and during periods of strong winds (up to 90 km/hr), limited sediment transport was observed on- or cross-shore during the 2009 spring and summer seasonal surveys in either the intact or former dune areas. Small amounts of sand were observed moving onshore in fall 2009 but were trapped in wetted areas on the beach. The high water table and moisture contents of the sand may be contributing to stabilization of the surface and low sand transport rates. There was evidence of winter transport of sand. Sediment incorporated in the ice foot from accretion during freeze-up, ice push and wave action was observed to melt out or sublimate from the ice, accumulating on the surface of the ice foot. Subsequent winds from the west blew the material landward up the beach, forming sand shadows around exposed vegetation. Southwest winds deposited the snow drifts with incorporated sediment as discrete layers or dispersed throughout. In the few areas where the main beach ridge had been breached by walking paths or old blow outs, sand was transported into the former parking lot sites. Small amounts of aeolian sand and snow created a narrow plume roughly the same width as the breach. The maximum width of a breach was 3 m narrowing towards the landward edge of the old parking lot. This pattern of sand movement was most obvious in the southern section of the old parking lot. Much less sediment was observed in the northern section, where fewer breaches in the beach ridge reduced the opportunity for movement as did the frozen substrate surface. Nowhere else was the surface observed to be

frozen. The northern section of the parking lot was the wettest of the sites. Standing water at the surface had frozen, and subsequently been covered by snow negating the chance of erosion. No transport of sand was observed moving into or within the natural undisturbed area of dunes which was covered by snow.

The results to date suggest that the bulk of sediment transport is in the lake, moving alongshore towards the end of the Point Pelee spit, with little onshore translation of material. Sand transport of any consequence only occurred in the winter, but the actual amount was very low and unlikely to make any significant contribution to the reformation of the dunes. Little change in the shape and elevation of the old parking lots was noted in the GPS surveys by early winter 2010. Thus it appears likely that the dunes will have to be reformed and vegetated manually to ensure their re-establishment in the former parking lot areas.