

**SPATIAL VARIATION OF BLUFF RECESSION RATES  
ALONG THE WISCONSIN COASTLINE OF LAKE**

**SUPERIOR** by  
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**ABSTRACT**

Bluff materials, morphology, and recession rates and beach materials and morphology are characterized at 28 sites along the Wisconsin coastline of Lake Superior. Bluffs composed of fat clay, sandy clay, clayey sand, sand and gravel, and sandstone, and ranging in height from 1.1 to 37.3 m are included. Beach composition at the sites varied from sand to a mix of sand and cobbles to cobbles and boulders, and beach slopes ranged between 3 and 14°. Bluff-crest recession rates between 1966 and 1998, measured using aerial photographs, ranged from 0.07 to 0.57 m/yr. Field measurements of wave runup were used to verify which of five previously published wave runup estimation methods best predicted runup at the study sites. A new index accounting for the magnitude and duration of waves impacting the bluff, termed cumulative wave impact height (CWIH), is proposed to explain spatial variability of recession rates. CWIH was hindcast at sites for the 1966-1998 epoch. The average yearly CWIH ( ) for 1966-1998 is compared to recession rates from the same period. Recession rates are observed increase with increasing at sites throughout the study area. The CWIH index performs best when comparing bluffs of similar material and height. The correlations show bluff recession is linked to CWIH but also indicate other factors and processes, in addition to wave attack at the toe, are promoting recession.