The goal of this study is to identify locations within Lake Champlain that are prone to slumping based on key factors. A slump is a sediment body displaced by a mass-wasting event, whose original stratification is preserved, although may be contorted in places. They can occur both on land and in aquatic environments. Their presence can be observed by remote sensing instruments such as a seismic reflection profiler or side-scan sonar.

Slumps occur when the resistive component of a sediment body is no longer able to maintain the shear stress pulling it downwards. This imbalance can occur due to over steepening of a slope, over saturation or under saturation of sediments in relation to adjacent units (due to seasonal flows or groundwater sapping, among other factors), easily disturbed underlying sediments, increased shear force from overlying sediments, and environmental factors, such as earthquakes, large storm waves, or erosion. The trigger for mass wasting is rarely a singular factor, but rather is a combination of preceding causes.

This study weighs slope, flow accumulation, and the shear force of water on the sediments to determine areas of high likelihood of slumping within Lake Champlain.

Slump Analysis Results

This study was not very comprehensive and thus the results essentially mimic the probability of slumping seen in the slope factor analysis. This was due to the weight of the slope in the MCE along with the overall extent of slope zones in comparison to the narrow zones of flow accumulation and force in relation to the extent of the lake. On the other hand, this study is an accurate assessment of Lake Champlain slumping because all slumps observed in the lake did originate in steeper areas.

To fully assess slope stability within Lake Champlain, further studies should consider inflow from Champlain Basin rivers, proximity to coastlines as an indicator for dramatic changes in pore saturation, and thickness of sediments in each area below the surface.