Assessing Shoreline Recession Rate for Lake Ontario

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The purpose of this report is to compare GPS and aerial photography methods for assessing shoreline recession rates for the bluffs of Lake Ontario.

Introduction

The main mandate of the Ganaraska Region Conservation Authority is to monitor, conserve, restore and manage water, land and natural habitats through programs within 7 municipalities. The research done for this report will be part of a four part shoreline management plan. This report will be used in the natural hazards section of this plan. This research is important not only for the management plan but will also be used to determine the accuracy of equipment to assess shoreline recession rates. The research resulted in an average annual shoreline recession rate for a section of Lake Ontario. Figure 1 below displays this section of Lake Ontario. This information will be used to inform land owners of the environmental effects of shoreline recession. Figure 2 displays a photo of each of the sites visited for this report.

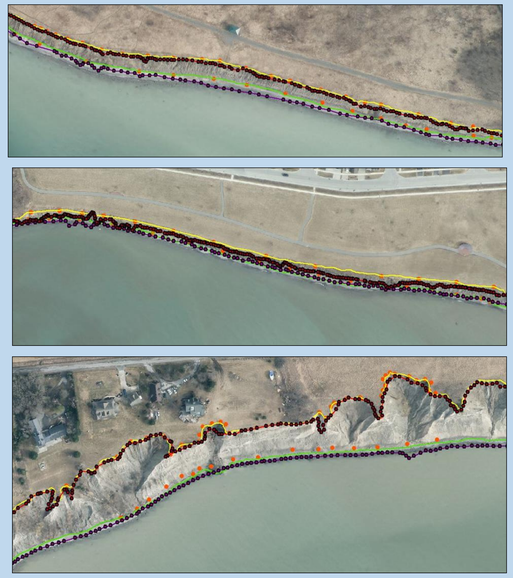
Figure 1: Jurisdiction of the Ganaraska Region Conservation Authority with the East and West Boundary of the study area indicated. Inset is a photo of the GPS unit being used at site 3

Figure 2: Site 1 (top right), Site 2(left) and Site 3 (bottom right)

Methods

This project entailed gathering the years of aerial photography from Ganaraska Region Conservation Authority (GRCA) that were needed to assess the shoreline recession rates. The aerial photographs of 2005 and 2014 are used for this study. Using a 9 year difference in the photographs would display a more distinct change along the shoreline. Unfortunately GRCA did not have ground surveys for the years we have chosen. The three different sites that were visited displayed varying rates of recession. These sites were measured along Lake Ontario in October 2015. A site visit was conducted at all three locations with Ganaraska Region Conservation Authority. A GPS unit was used to verify the current shoreline location. The 2005 and 2014 photographs of the shoreline were outlined in ArcMAP and the NEAR_DIS tool was used to calculate an average recession rate. Figure 3 shows the tracing of the shoreline in ArcMAP for the three sites.

Figure 3: ArcMAP traces of the crest and toe of the shoreline bluffs. Site 1-3 in descending order



Findings

The GIS analysis calculated a toe shoreline recession rate of 27 cm/year and a crest recession rate of 23 m/year. It should be noted that this is an average for a section of Lake Ontario . There will be areas of higher and lower recession rates in comparison to the average we found. The accuracy of the equipment could not be determined because of the lack of data that GRCA has for the shorelines. Although with the data that was available it was determined that the GPS method is more accurate.

Recommendations

- Complete a yearly ground survey to accompany the aerial photography.
- Until then, we suggest that both GPS and aerial photography be used in tandem to attain the most accurate shoreline recession rates.

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