

HIGHLIGHTS: THE 2019 GLAM QUESTIONNAIRE

FOR SHORELINE PROPERTY OWNERS ON LAKE ONTARIO AND THE ST. LAWRENCE RIVER

October, 2020



Anonymous Respondent:
Monroe County, New York

P. Brennan: Monroe
County, New York

Anonymous Respondent:
Prince Edward County, Ontario

T. & B. Crist.: Orleans County,
New York

D. Olivier & S. Wells: Leeds and
Grenville United Counties,
Ontario

Water levels across the Great Lakes were very high throughout 2019, approaching or exceeding record-high levels at various times throughout the year. On Lake Ontario and the upper St. Lawrence River, water levels in both June and July of 2019 exceeded previous record-highs contributing to significant impacts for shoreline property owners. The International Joint Commission's (IJC's) Great Lakes – St. Lawrence River Adaptive Management (GLAM) Committee, a sub-committee of the International Lake Ontario St. Lawrence River Board, implemented an online self-reporting questionnaire in September 2019 for shoreline property owners to describe how they were impacted by the high water levels. The questionnaire is similar to a previous version utilized by the GLAM Committee following 2017 high water levels on Lake Ontario and the St. Lawrence River and reported on earlier in 2018 (https://ijc.org/sites/default/files/2019-08/Final_QuestionnaireFactSheet_20190815.pdf). This document provides a general summary of the questionnaire responses received.

The GLAM Committee will use responses received for the 2019 version of the questionnaire along with those from the 2017 version as part of ongoing efforts to:

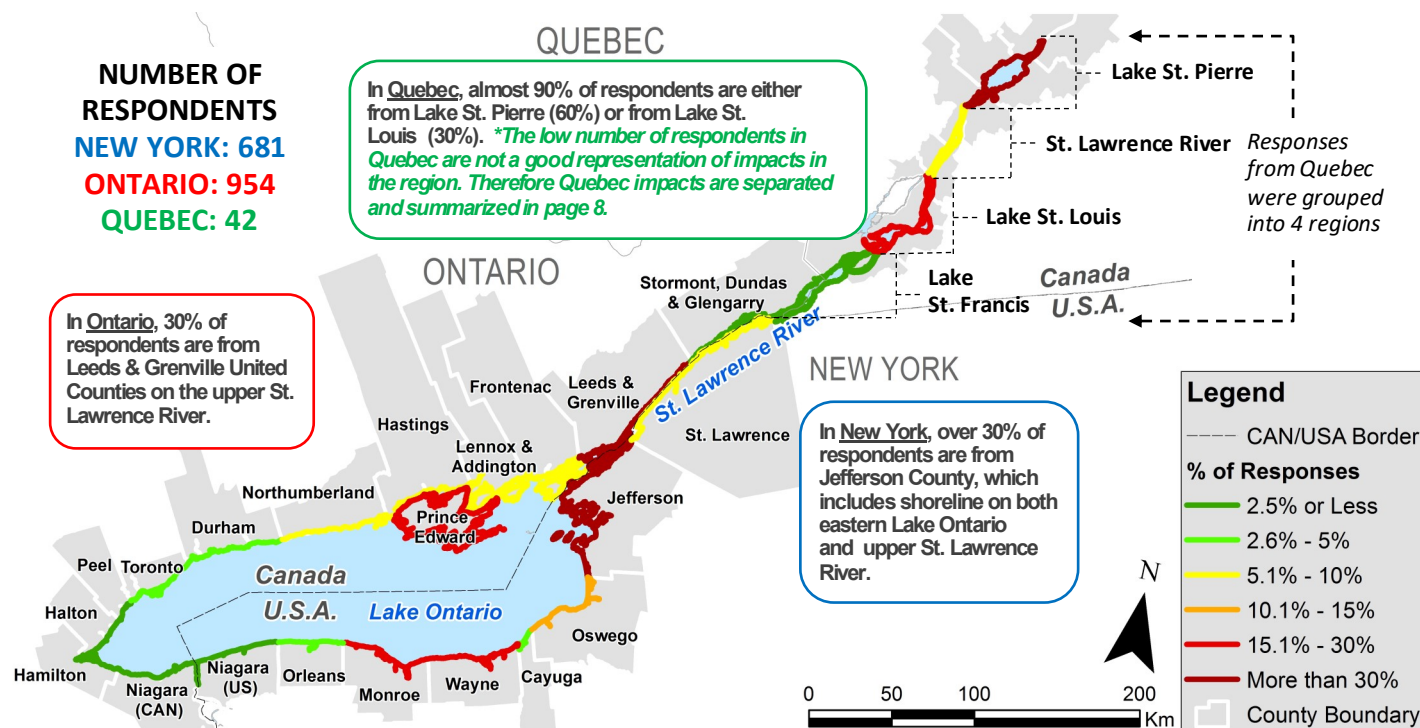
1. Develop a further understanding of the impacts high water levels had on shoreline property owners; and
2. Improve water level impact assessment models used in the Lake Ontario—St. Lawrence River Study (LOSLRS) with reported impacts.

The 2019 questionnaire was designed as an online, self-reporting approach and was advertised to shoreline residents along the Great Lakes – St. Lawrence River shoreline. The results from this questionnaire reflect the responses of those who completed the questionnaire AND ARE NOT a complete representation of impacts across the broader shoreline. This summary uses questionnaire responses for 2019 impacts submitted up to January 31, 2020.

The IJC and GLAM Committee were granted permission by respondents for use of photos and quotes in this summary.

Where did Questionnaire Responses Come From?

There were **1677 valid responses¹** to the questionnaire reporting on high water impacts from 2019.



Percentages of responses for each county are relative to the total number for each respective province or state (e.g. approximately 18.8% of New York respondents are from Monroe County).

¹ Only valid responses were used for reporting. These are questionnaires that were completed for 2019 impacts and have a valid street address for verification.

FLOODING IMPACTS

FOR NEW YORK AND ONTARIO

Where was Flooding Reported?

Flooding impacts were commonly reported along the Lake Ontario and St. Lawrence River shoreline. Approximately 70% of all respondents from New York and Ontario reported some degree of flooding due to high water levels in 2019.

In New York, the individual counties with the highest percentage of its respondents reporting flooding were Oswego County, Monroe County and Cayuga County at 84%, 82% and 74% respectively.

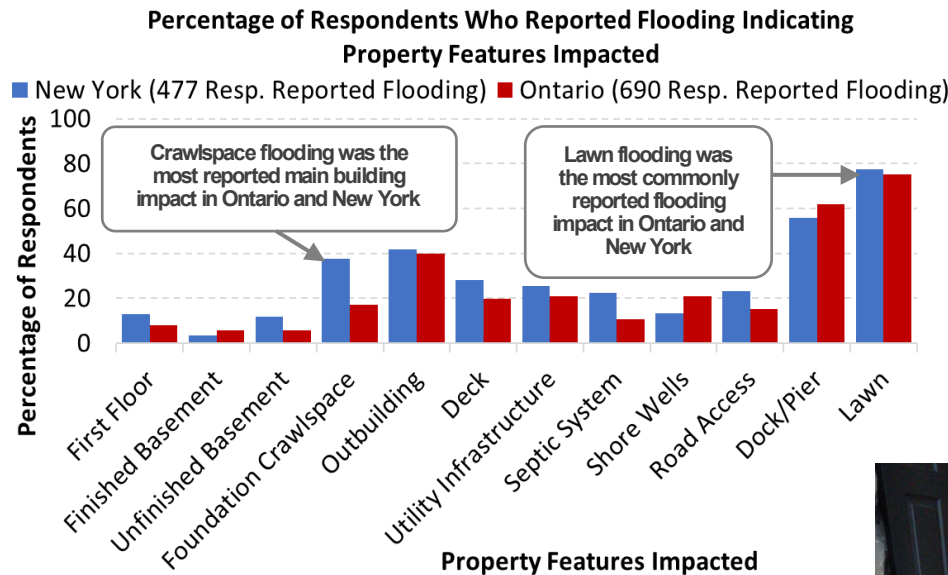
In Ontario, Hastings County had the highest percentage of respondents indicating flooding impacts (83%). The cities of Toronto and Hamilton along with Lennox and Addington County, Prince Edward County and Leeds & Grenville United Counties all had over 70% of respondents reporting flooding impacts.



Percentages are respondents that reported flooding relative to the total number of respondents for each respective county/municipality. The total number of responses for each county/municipality are included in brackets on the map. (e.g. more than 80% of the 128 responses from Monroe County reported flooding impacts.)

"Being on the Eastern Shore of lake Ontario, the wind has significant impact on water levels. Sandy Pond water heights can raise as much as 2-3 feet with 3-5 foot wave action on top of that. So when you have the static height of the lake (pond) 3 foot higher than it should be, it is a disaster costing people the use of their property and all kinds of damage." Respondent from Oswego County

What was Impacted by Flooding?



Respondents were asked to identify types of property features impacted by flooding. Lawn flooding was the most commonly reported impact by New York and Ontario respondents (over 75%). Over 60% of respondents from Ontario and 55% from New York reported dock(s)/pier(s) impacts followed by 40% of respondents from New York and Ontario reporting outbuilding impacts. First floor flooding was a metric used to measure flooding impacts in earlier IJC studies. First floor flooding was reported by 13% of respondents from New York and 8% of respondents from Ontario.



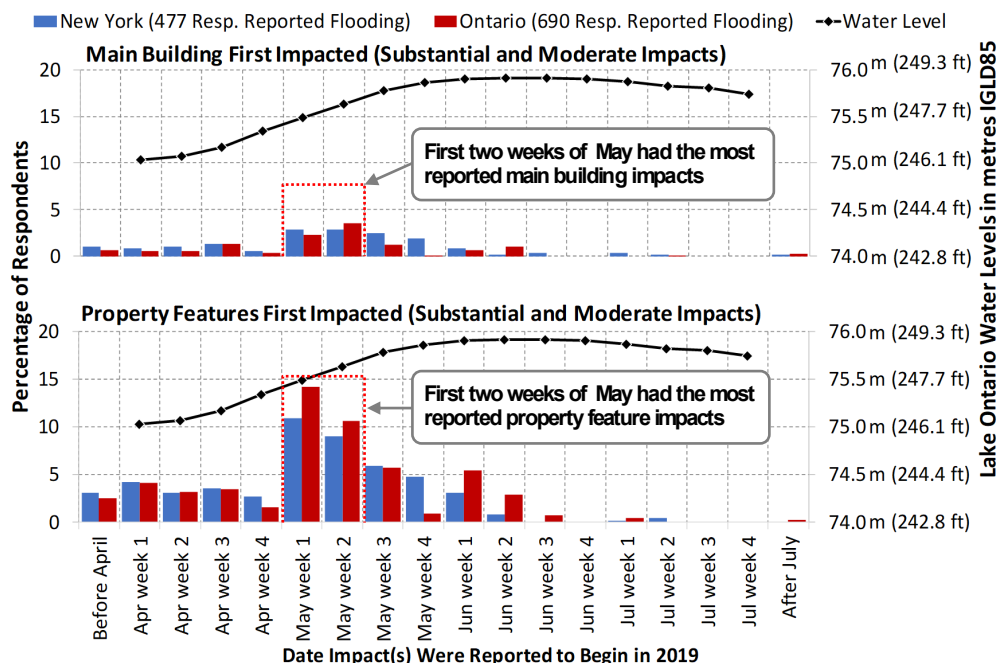
"Flood waters on 3 sides surrounding house, outbuilding and sheds [and] had 3ft. water levels [with] wave action pulverising dock." Respondent from Prince Edward County

FLOODING IMPACTS CONTINUED

FOR NEW YORK AND ONTARIO

When did Flooding Begin?

Respondents identified which month and week their property feature(s) started to flood. While some flooding impacts in New York and Ontario began prior to April 2019, the most commonly reported weeks when flooding began for both buildings and other property features were the first two weeks of May when water levels averaged 75.49m (247.7 ft) International Great Lakes Datum 1985 (IGLD 85) and 75.63m (248.1 ft) IGLD 85 respectively on Lake Ontario. Almost all respondents (95%) across all regions indicated that their flooding impacts were the result of high still water levels (as opposed to short-term wave and storm events).

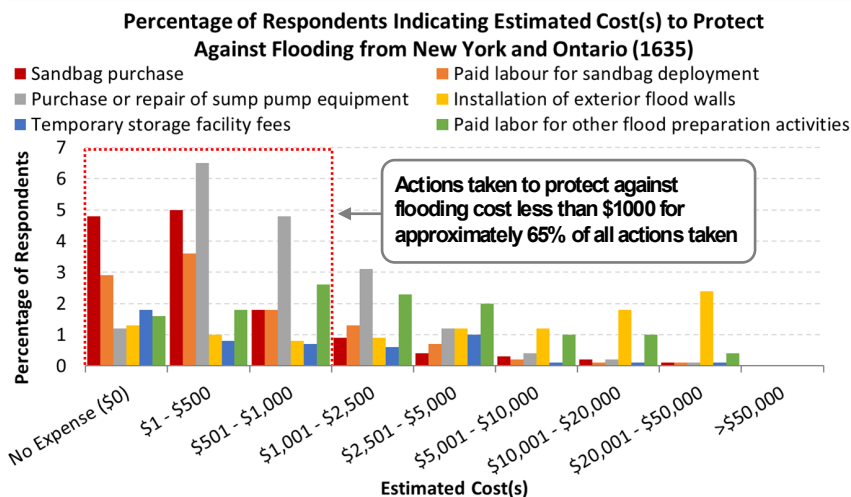


"[Had] 6 inches of water over entire ground floor of house. Happened twice this year." Respondent from Jefferson County

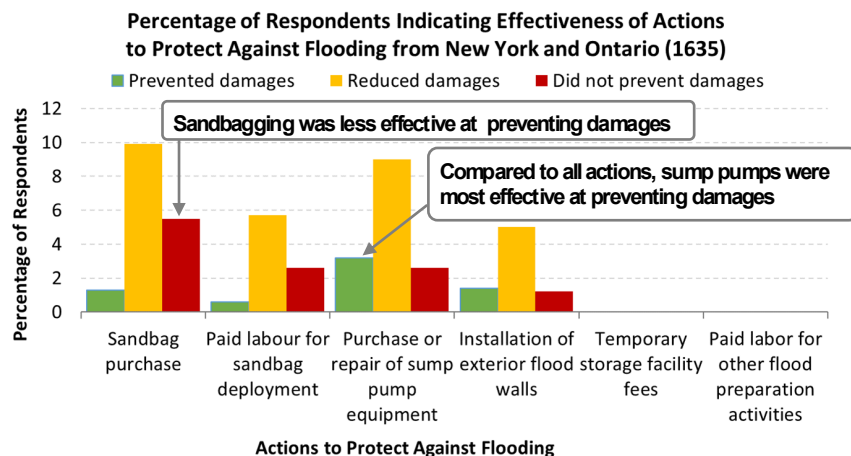
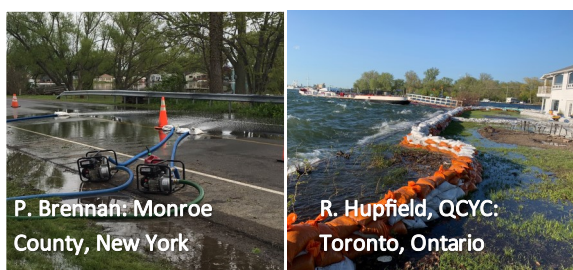
**note: Impacts include Lake Ontario and upper St. Lawrence River, however, due to multiple changes in elevation on the St. Lawrence River only Lake Ontario water levels are shown as a reference for conditions those weeks.*

What Actions were Taken to Reduce Flood Impacts?

The majority of actions taken to reduce flood impacts were reported to cost less than \$1000. Sandbagging purchases and sump pump repair and purchasing were the two most commonly reported actions taken to protect against flooding. Most reported that these actions reduced impacts but did not fully prevent damages. Purchasing or repairing sump pumps for operation was the action reported to be most effective to protect against flooding at a commonly reported cost of \$2500 or less. Installation of exterior floodwalls ranged from no expense to \$50,000+. This could be due to a variety of materials used for wall construction and depending on whether or not it was a temporary or permanent structure.



"The consistently high lake level affects the ground water level, resulting in continuous sump pump operation going on 5 months now in order to prevent basement flooding." Respondent from Durham Region



EROSION IMPACTS

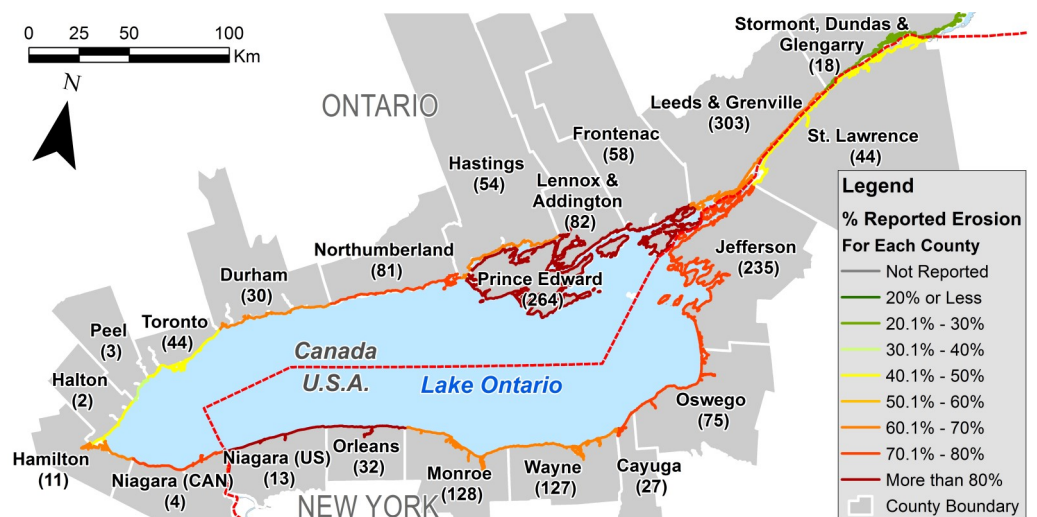
FOR NEW YORK AND ONTARIO

Where was Erosion Reported?

Erosion impacts were commonly reported along the Lake Ontario and St. Lawrence River shoreline. Approximately 70% of respondents from New York and Ontario reported erosion impacts.

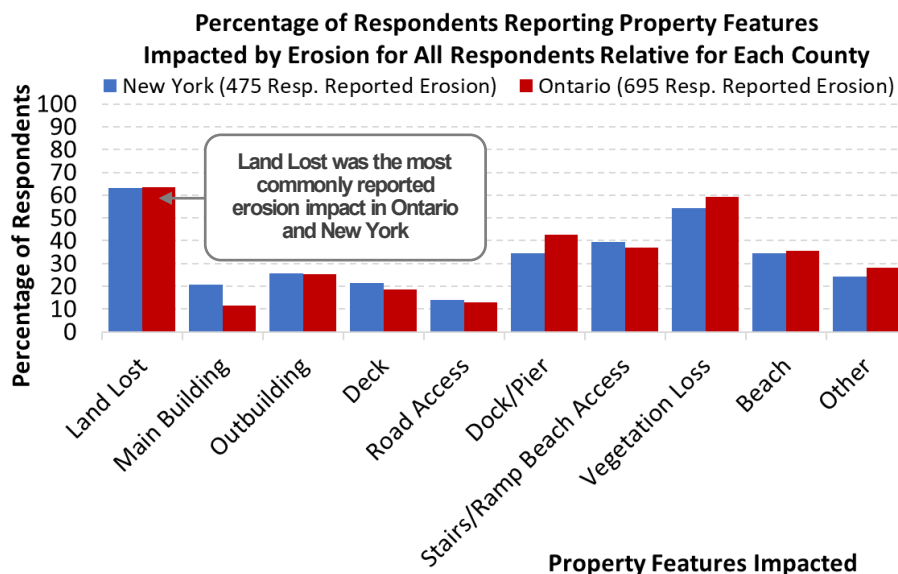
In New York, the counties with the highest percentage of its respondents reporting erosion were Niagara County and Orleans County at 100% and 88% respectively as well as just over 70% of respondents from Jefferson County, Oswego County and Cayuga County on the eastern shoreline of Lake Ontario.

In Ontario, the counties/regions with the highest percentage of its respondents reporting erosion were Prince Edward County and Frontenac County at 86% as well as approximately 75% from both Northumberland County and Niagara Region.



"Property is on a cliff about 40 ft above water level. High winds and water contributed to a section of our property sliding into the lake taking along with it a very large maple tree" **Respondent from Niagara County (US)**

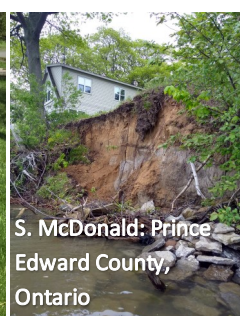
What was Impacted by Erosion?



For both New York and Ontario, approximately 90% of respondents reporting erosion impacts indicated they lost land and about 80% of respondents reported vegetation loss. Erosion impacts to main buildings were less commonly reported but approximately 30% of respondents from New York and 15% of respondents from Ontario reported such impacts.

"Presently we are looking at next steps for repair and reinforcement of the cottage structure. Cement footings are cracked and sinking, and the cottage structure is leaning noticeably. Further, consideration for reinforcement of the shoreline-adding more rock. The patio stone walk-way down to sand beach is no longer level due to undermining."

Respondent from Lennox and Addington County



SHORE PROTECTION IMPACTS

FOR NEW YORK AND ONTARIO

Where were Shore Protection Damages Reported?

Impacts to existing shoreline protection structures were less commonly reported when compared to flooding and erosion impacts. Approximately 40% of respondents from New York and 30% of respondents from Ontario reported damage to shore protection structures due to high water levels.

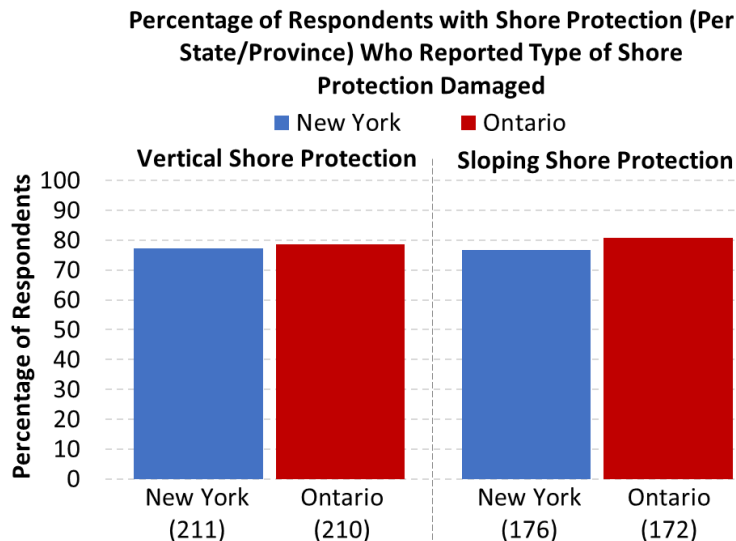
In New York, 69% of Niagara County respondents and 53% of Orleans County reported shore protection damage. Other counties were all less than 50%.

In Ontario, less than half of the respondents from all counties, regions or municipalities reported shore protection damage with Durham Region reporting the highest percentage at 47%.



"Stone shoreline protection wall collapsed (about 15 ft) [as well as a] small amount of erosion on lawn." Respondent from Niagara Region (CAN)

What Types of Shore Protection Structures were Impacted?



*Number in brackets represents number of respondents with that shore protection type from each respective State/Province

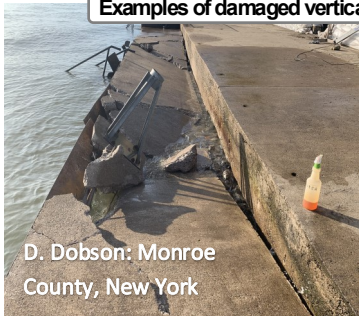
Of the respondents that have existing shoreline protection structures, most reported some damage to structures. Respondents reported damage for vertical or sloping structures or both if it applied.

For both New York and Ontario, just under 80% of respondents with vertical shore protection structures reported damage to those structures. About 80% of respondents from Ontario and just over 75% of respondents from New York with sloping shore protection structures reported damage to those structures.

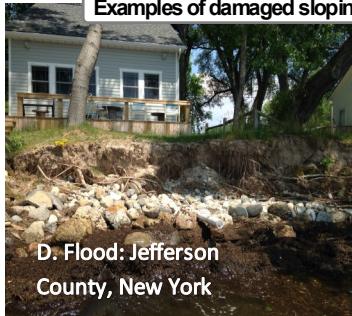
Age of the structures damaged (not shown) varied widely in both Ontario and New York. Interestingly, newer sloping shore protection structures built in the last 10 years had the highest percentage of respondents reporting damage in both New York and Ontario.

"Existing retaining structure [both] wall and boulders collapsed and need to be replaced." Respondent from Wayne County

Examples of damaged vertical shore protection structures



Examples of damaged sloping shore protection structures



OTHER IMPACTS

FOR NEW YORK AND ONTARIO

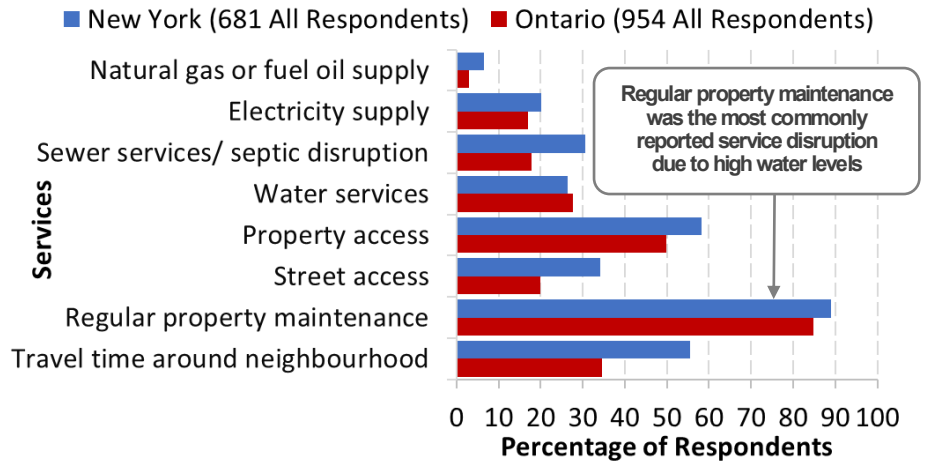
What Service Interruptions did Property Owners Experience?

A range of service interruptions were experienced by shoreline property owners as a result of high water levels. Almost 90% of respondents from New York and 85% from Ontario reported regular property maintenance as the most interrupted service due to high water levels. In general, accessibility such as property and street access as well as travel time around neighbourhoods (including town or village) were more commonly reported disruptions as opposed to municipal supply services such as water, sewer, gas and electricity supplies.

A respondent from Cayuga County reported that they could not use their crawl space, dock and boat nor do landscaping maintenance and lost property value.



Percentage of Respondents Reporting Impacts to Services Due to High Water Levels Relative to Each Province/State



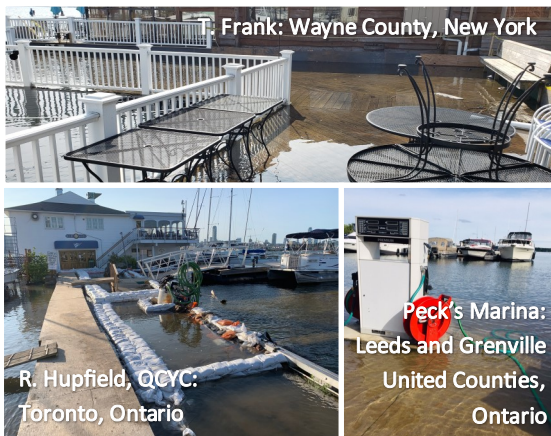
How were Businesses Impacted?

Approximately 6% of respondents to the questionnaire from New York and 10% of respondents from Ontario identified themselves as business owners. The sample size from Quebec was too small to report.

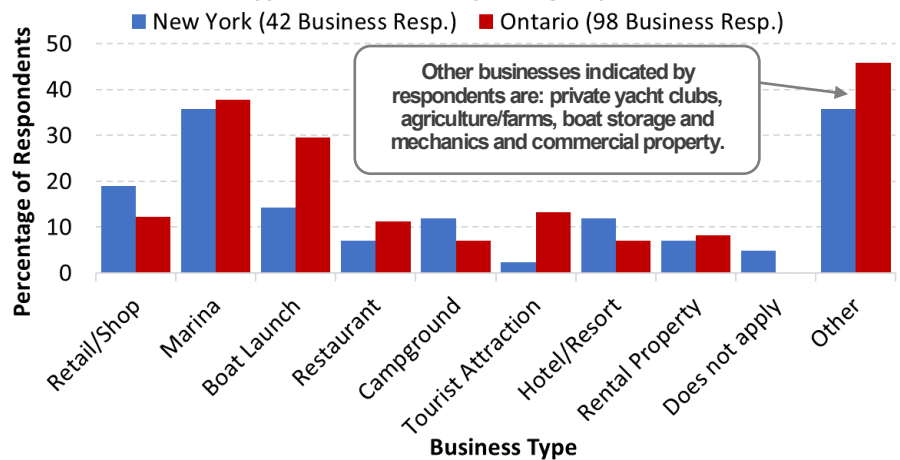
In New York, 35% of the businesses were marinas and another 35% were in the other business category. About 25% of business owners reported a loss of income between 25-50% while 10% of business owners reported 100% loss of income.

In Ontario, 45% of business respondents selected other business category and 38% marinas. About 25% of business owners reported a loss of income between 10-25% while 3% of business owners reported 100% loss of income.

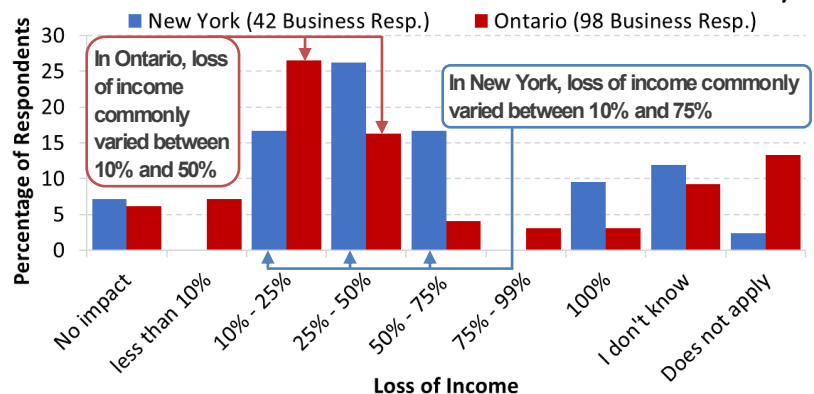
"Early season rentals were cancelled due to access [and] severe ground and lake water flooding around property. 30% or more [of] season revenues lost due to high water." Respondent from Toronto



Type of Business Reporting Impacts



Percentage of Business Owners Reporting Loss of Income for Their Business Relative to Number of Business Owners for Each Province/State



"Loss of revenue due to people not using their boats. [The] boats stayed in storage and never moved." Respondent from St. Lawrence County

ADAPTIVE ACTIONS FOR NEW YORK AND ONTARIO

What Adaptive Actions Have Respondents Taken to Protect Against High Water Levels?

Respondents were asked whether they took actions to protect against high water levels prior to the 2019 high water event and to indicate the effectiveness of those actions.

Approximately half of all respondents from New York and Ontario reported taking protective actions against high water levels. Over 60% of respondents that took action reported it reduced damages. A quarter of respondents that took action reported that their actions did not prevent impacts whereas 15% of them reported it prevented damages. The most common action was installing shore protection with 28% of respondents taking that action and 18% reporting it reduced damages.

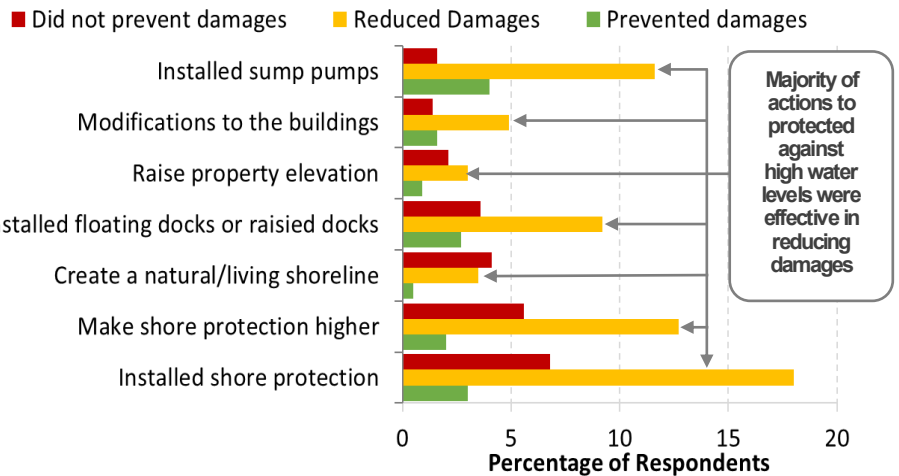
"We are installing additional gabions on the 1/3 of our shoreline not previously protected to the cost of \$15,000."

Respondent from Prince Edward County

"In the process of raising docks and elevation now." **Respondent from Wayne County**

Actions to Protect Against High Water Levels

Percentage of Respondents Reporting Effectiveness of Actions to Protect Against High Water Levels Relative to Respondents in New York and Ontario that Took Action (857)



What Actions are Respondents Planning on Taking in the Future to Protect Against High Water Levels?

In New York, 38% of respondents indicated they will make shore protection higher to protect against high water levels, 34% said they would use an "other" option and 33% said they will install shore protection.

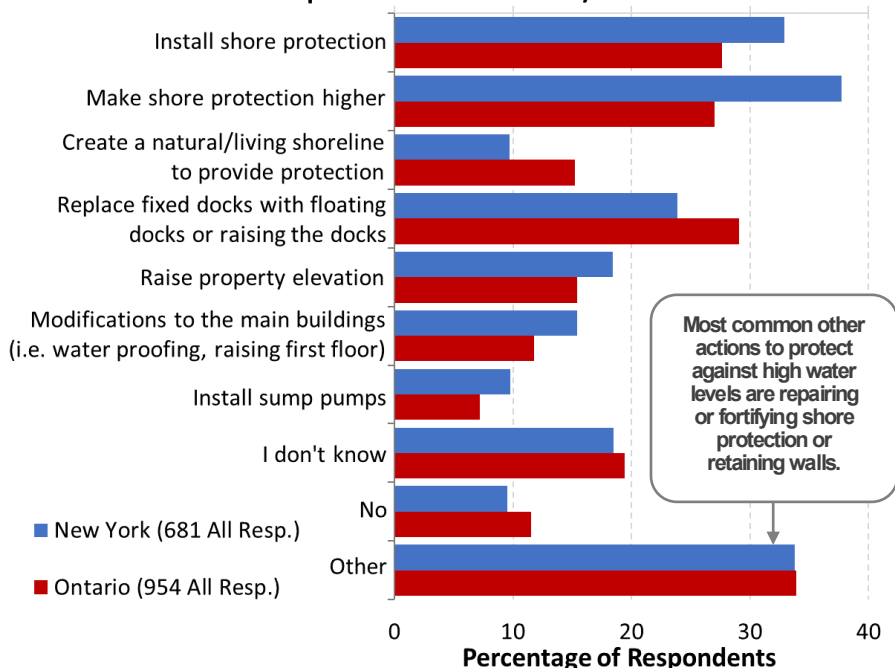
In Ontario, 34% of respondents indicated they will use an "other" option to protect against high water levels, 29% said they would use an "other" option and 33% said they will install shore protection.

"We are getting estimates to install shore protection, raise the building or relocate the building on the property." **Respondent from Wayne County**

"[We are] building up and adding rocks for additional shoreline protection against waves." **Respondent from Toronto**

Actions to Protect Against High Water Levels

Percentage of Respondents Planning on Taking Adaptive Actions To Prevent Impacts from High Water Levels in the Future Relative to All Respondents for Each State/Prov.



IMPACTS IN QUEBEC

What Type of Impacts were Reported in Quebec?

There were 42 valid questionnaire responses received from Quebec, a relatively small number given the size of the study area.

The most commonly reported high water levels impact in Quebec was erosion. 50% of the 42 respondents from Quebec reported some degree of erosion impacts due to high water levels. 45% of the respondents reported impacts to their land and 45% reported impacts to property features (i.e. docks, lawns, etc...) excluding the main building.

Just under 30% of the 42 respondents reported flooding impacts due to high water levels. Approximately 15% of the respondents reported flooding impacts to the main building.

Over 20% of respondents have shore protection and approximately 16% of respondents reported shore protection damage due to high water levels.

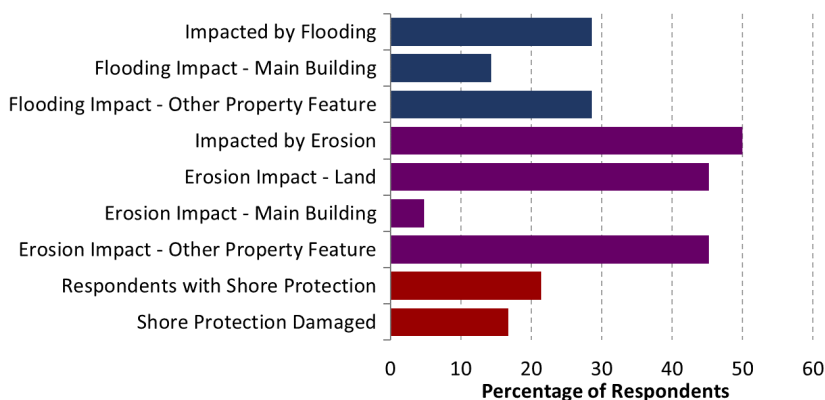
A range of service interruptions were experienced by shoreline property owners as a result of high water levels. Just over 65% of respondents reported impacts to regular property maintenance. In general, accessibility such as property and street access as well as travel time around neighbourhoods (including town or village) were more commonly reported disruptions.



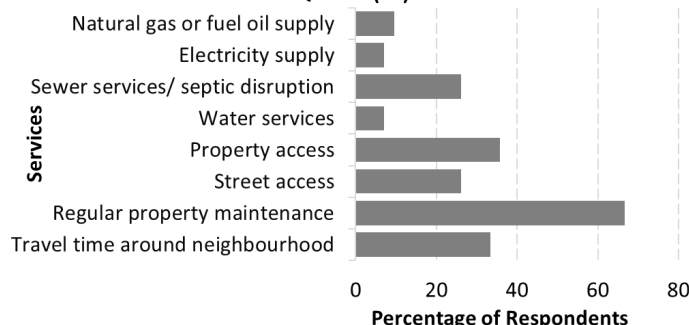
Anonymous Respondent:
St. Pierre Region, Quebec

"Bridge on main highway was closed for 4-5 days. This caused great disruption to our area."
Respondent from St. Louis Region in Quebec

Percentage of Respondents from Quebec (42 Respondents Total) Reporting High Water Impacts



Percentage of Respondents Reporting Impacts to Services Due to High Water Levels Relative to All Respondents in Quebec (42)



What Actions were Taken to Reduce Flood Impacts in Quebec?

The majority of actions taken to protect against flooding in Quebec cost \$500 or less. Purchasing or repairing sump pump equipment and sandbags were the most common actions taken. All respondents that took action reported it either prevented or reduced damages (not shown in graph).

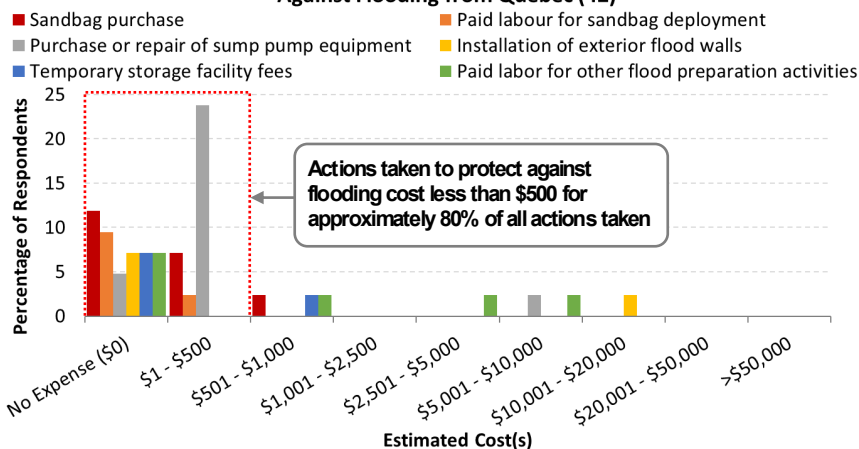
"Complete disaster, uprooted my family (14 YO and 11 YO) for 41 days of evacuation. Missed weeks of work trying to protect our home."



Anonymous Respondent:
St. Lawrence Region, Quebec

Respondent from St. Lawrence River Region in Quebec

Percentage of Respondents Indicating Estimated Cost(s) to Protect Against Flooding from Quebec (42)



Actions taken to protect against flooding cost less than \$500 for approximately 80% of all actions taken

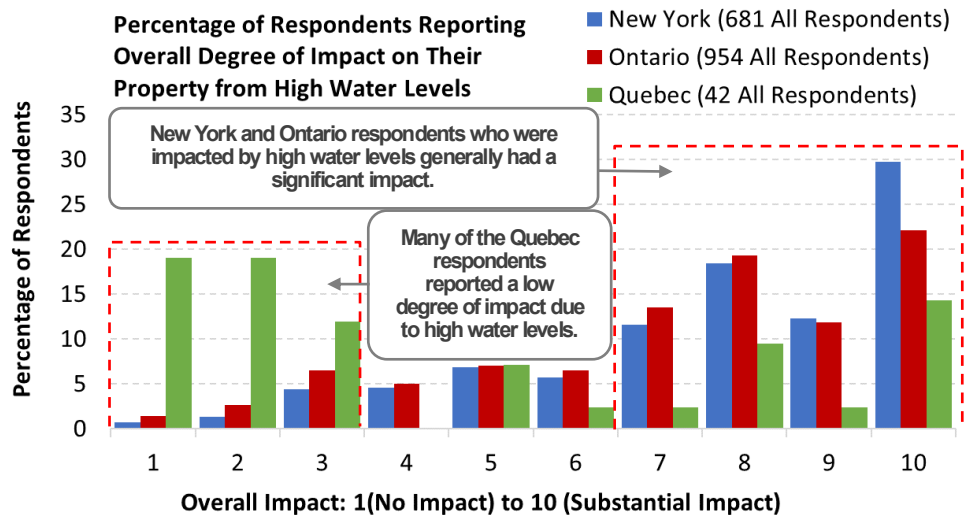
The overall number of responses from Quebec was fairly low making it difficult to broadly characterize the extent of impacts along the St. Lawrence River. Further highlights of 2017 and 2019 high water impacts for the lower St. Lawrence can be found on the International Lake Ontario - St. Lawrence River Board website (<https://ijc.org/en/loslr/watershed/2017-and-2019-high-water-events>) as well as in various media articles (e.g. <https://www.tvanouvelles.ca/2019/04/23/inondations-les-images-captées-par-l'helicoptère-tva-nouvelles> - French only).

OVERALL IMPACTS

Overall, How were Respondents Affected?

Respondents were asked to rank the overall impacts of high water levels (1 = no impact, 10 = substantial). Approximately 30% of all respondents from New York, 22% from Ontario and 15% from Quebec reported at 10 for substantially impacted. Approximately three quarters of all respondents from New York and Ontario reported a 6 or greater for degree of impact, indicating a high overall impact.

Approximately 50% of respondents from Quebec reported 3 or less indicating a low overall impact.



[There was] thousands of dollars [in] damage to our property and contents [in addition to] emotional, financial and stress related impact to our health. Respondent from Hastings County

"The stress levels are as high as the water levels. How can one measure that impact? My enjoyment of my property has been voided by the water levels. [There is] no outside BBQ, swimming, fishing, or even permitting dog to swim." Respondent from Jefferson County

Additional Respondent Photos Showing Various Impacts Due to High Water Levels in 2019



Anonymous Respondent: Leeds & Grenville United Counties, Ontario



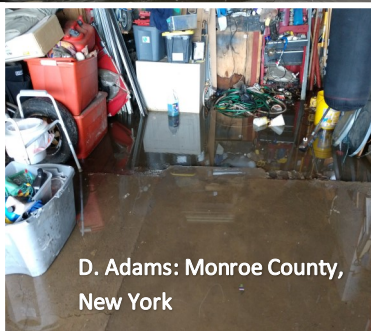
T. Cradell: Oswego County, New York



P. Evans: Lennox & Addington County, Ontario



S. Youmans: Oswego County, New York



D. Adams: Monroe County, New York



Anonymous Respondent: Monroe County, New York

If you have any feedback, contact us at:

GLAM@IJC.ORG or

https://ijc.org/en/contact/contact_the_great_lakes_adaptive

