



Observations, Conclusions and Questions Remaining re Spring 2013 Extreme Weather Events in the Upper Trent River Watershed.

FINAL REPORT – SEPTEMBER 20, 2013

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Executive Summary

On April 18-19, 2013, heavy rain fell across the upper Trent River basin when the ground was still frozen resulting in extensive flooding and ice damage. On April 29, 2013 the Coalition distributed a survey to its Member associations to obtain feedback on the April 18-19 event with a view to identifying 'lessons learned' and possible approaches that might mitigate damage from similar events in the future. On May 20 to 22, while the survey was still in the field, a second heavy rain fell when storage lakes were already at or beyond their full capacity. This time the basin was unfrozen and there was little if any damage. Comparing the April & May heavy rain events it is concluded that the snowmelt and frozen basin had a substantial influence on the April 18/19 event resulting in an unprecedented volume of water entering the reservoir and flow-through lakes in a short space of time and overwhelming the water management system's limited capacity and causing extensive flooding.

It is noted that the TSW dams on the reservoir lakes were not designed primarily as a flood control system and the capacity of the TSW infrastructure to mitigate against flooding, particularly in spring when the reservoirs are filling, is far less than previously realized by most people. As a result it is concluded that Parks Canada's Trent Severn Waterway frontline water management staff are to be congratulated for their efforts to manage this unprecedented situation to the best of their ability with limited resources.

Based on its survey responses, and additional information from a variety of sources, the Coalition has made a number of observations in this report relating to:

- Damage caused by rising water levels on frozen lakes;
- Damage caused by extremely high flow rates such as erosion and silting;
- The lack of storage capacity once the spring freshet begins;
- The limited discharge capacity of key control structures;
- The TSW having insufficient information to understand the local consequences of some of its actions;
- A serious public communications failure on the part of the TSW.

The Coalition has also identified a number of approaches to help mitigate against future extreme weather events, including:

- The conduct of a formal review into the Spring 2013 extreme weather events;
- The need for data to be compiled on flood zones;
- Better planning for extreme weather events by all levels of government and by the water management agency (the TSW) as part of an integrated approach to water management at the watershed level;
- An opportunity to draw upon the expertise available from Conservation Authorities;
- A need for the TSW website to be updated with regard to water levels and water management advisories;
- The need for the TSW to have access to a modern water management model capable of simulating extreme events and balancing competing priorities: the model needs to be sophisticated enough to allow constraint-based data from individual lake associations to define preferred water levels during the navigation season and document flood impact levels;
- The need for better public education on water management issues.

Introduction

On April 18-19, 2013, the upper Trent River basin received 50 to 75 mm of rain from a storm system centred over Lake Kawagama. This precipitation occurred with some snow still on the ground and some or most of the ground and lakes frozen. It also occurred at a time when the Trent Severn Waterway (TSW) had started the annual filling of the reservoir lakes in the Trent-Severn Waterway (TSW) system. The result was extensive flooding which left part of the village of Minden inundated for about three weeks, flooding on a number of the reservoir and flow-through lakes, extreme flows in many rivers, and damage resulting from ice, high water levels, and high flow-rates. The flooding occurred on both the Gull and Burnt River systems. Preliminary estimates of damage are in excess of \$4 million, of which over \$1 million was to public infrastructure such as roads, bridges and culverts.

On April 29, 2013 the Coalition distributed a survey to its Member associations to obtain feedback on the April 18-19 event with a view to identifying 'lessons learned' and possible solutions that might mitigate damage from similar events in the future. (see Appendices 1 - 3).

On May 20 to 22, while the survey was still in the field, a similar amount of rain or more fell on the basin at a time when storage lakes were at or beyond their full capacity. (Environment Canada reported 88mm of rain at their Haliburton gauge station for the period May 20-22). This time the basin was unfrozen and there was no snow on the ground. This rainfall event was handled with substantially less increase in lake levels and no inundation of Minden.

In addition to engaging CEWF Member associations, the Coalition liaised with local MP Barry Devolin, the TSW, the Ontario Ministry of Natural Resources (MNR), the County of Haliburton, Municipal government officials, and a number of other agencies, organizations and individuals.

On August 8, 2013 MP Barry Devolin announced that the Trent-Severn Waterway had engaged AECOM to conduct a review of the flood event on the Gull River and water management decisions taken by the Trent Severn Waterway staff before, during and after the floods along the Gull River this past spring. Previously, the Coalition had submitted suggestions for the scope of such a review (available at www.cewf.ca). Regrettably AECOM's 'Scope of Work' is limited to a review of the actions of the TSW before and during the event comparing those actions with their responsibilities. There is no indication that the review will examine the physical capacity of the system to mitigate floods nor does it address any physical and operational changes that might help reduce risk in the future. The Coalition awaits AECOM's findings with interest but is concerned that the scope of the review may be too limited to serve the broader public interest in terms of learning lessons from the flood and proposing solutions for the future.

This document provides a summary of the Coalition's observations, conclusions and questions remaining with regard to the Spring 2013 extreme weather events as they relate to water management of the upper Trent River watershed - lying upstream of the through-waterway or canal. The summary uses data available as of September 14, 2013.

Note: The Coalition has refrained from commenting directly on the flooding in Minden and has focused on the effect of the storms on the watershed in general and the Reservoir and Flow-Through (RaFT) lakes in particular. Nonetheless CEWF is fully committed to supporting the efforts of Haliburton County, the Municipality of Minden Hills as well as the Ontario and federal governments in seeking improvements in the water management challenges facing all property owners in the Trent River watershed.

General Observations

Precipitation (Rainfall)

According to Environment Canada data for Haliburton:

- April had 195% of the average rainfall (137.1mm vs. 70.2 average)
- May had 137% of the average (127.0mm vs. 92.8 average)
- June had 172% of the average (148.9mm vs. 86.8 average)
- For the 3 months combined the rainfall was 168% of the average
- Each month experienced at least one heavy rain event: April 18-19 had 46.9mm; May 20-22 had 88.2 mm; June 27th had 44mm

The Environment Canada data probably underestimate the level of precipitation at some locations in the watershed where unofficial reports suggest that local rainfall was as much as 50% in excess of the amount recorded at the Haliburton station.

Water Flows and Reservoir Storage Volumes

According to the TSW, inflows into the Gull River system peaked at just over 250 cubic metres per second (m³/s) in late April; this compares with peak flows of 100 to 150 m³/s in 2008, 2009 and 2012. At the end of April the total volume of water storage in the Haliburton reservoirs was 46,000 hectare-metres (ha-m), 10.9% higher than the average maximum storage volume, and it remained above average until mid-May. By way of comparison, on April 8th the water storage volume was close to the average for that date of about 30,000 ha-m.

Comparative Data

Comparing the April and May events allows us to assess the influence of the snowmelt and frozen basin in the April 18/19 event. It is also worth noting that the June flooding in Alberta (http://en.wikipedia.org/wiki/2013_Alberta_floods) also occurred when the ground was saturated with snowmelt resulting in unprecedented water levels and flow-rates on the Bow and Elbow River systems. The increase in extreme weather events was further noted when Toronto experienced flooding following heavy rains on July 8, 2013 and St. Stephen, New Brunswick was inundated on July 26, 2013.

Media Coverage

There was extensive local print media coverage of the April event – CEWF tracked about 80 articles between April 18 and May 31. CBC's Ontario Morning program also interviewed Barb Reid (Minden Hills Reeve), Jewell Cunningham (Director, Ontario Waterways, Parks Canada), and Chris Riddle (CEWF). While the media did report contacts with the TSW, for their part the TSW issued no public water level alerts or advisories on their own website nor did they respond to an offer from CEWF to relay information to CEWF Members.

TSW Water Level Data

With a few exceptions, such as the Hawk lakes, as of mid-April the reservoir lakes were filling normally and water levels were typical for the time of year. After April 19, unusually high water levels persisted on many reservoir and some flow-through lakes, especially in the Gull River watershed for two months. For reservoir lakes these could be monitored on the TSW website at http://www.pc.gc.ca/lhn-nhs/on/trentsevern/visit/ne-wl/trent_e.asp. In several instances the water levels went 'off the charts'. Unfortunately water level data were not publically available from the TSW for the flow-through lakes.

Composite Observations from the Coalition’s Survey of Member Associations

The Coalition received responses to its questionnaire from 27 of the 33 lakes, or groups of lakes, that the Coalition seeks to represent. Collectively these associations reflect the interests of over 10,000 waterfront property owners (see Appendix 4). These responses documented specific flood events, damage to public and private property, concerns with dam safety and operations, the response of public agencies, and communications issues. In addition the Coalition received many photographs and a number of compelling personal narratives.

The April 18-19 rain event led to three general types of property damage: (1) flooding and washouts on many roads, especially in and around culverts that could not handle the volume of water; (2) ice damage of shoreline structures due to lake levels rising to unprecedented high levels while the winter ice-sheet was still in place thus allowing the ice to damage docks and related infrastructure that is normally well above the waterline at ice-out; (3) over-bank flooding of lakes and rivers combined with high flow rates on some lakes and rivers resulting in flooded homes and out-buildings, swamped septic systems, shoreline erosion.

Ice Damage

Based on the number of lakes affected (15 of 27 reporting), the most widespread damage was due to ice.

Flood Damage to Public Infrastructure

Eleven lake associations noted damage to public infrastructure – mainly road and culverts washed out. It was reported in the local press that there was over \$1 million in road and related damage: (\$170,000 for Haliburton County roads; \$800,000 for Minden Hills; \$253,000 for Dysart et al; \$54,000 for Algonquin Highlands; and only minimal damage in Highlands East).

Flood Damage to Private Infrastructure & Property

A number of private roads and culverts were damaged. For example the Gregory Road causeway on Loon Lake was breached when the water level differential between the upstream and downstream sides became too great due to the recently installed culvert being unable to handle the flow. An extended section of Minnow Drive on Kennisis Lake was washed out and cost residents \$7,000 to repair. The causeway to Shuyler’s Island on Horseshoe Lake was flooded for some three weeks with considerable erosion reported.

Most flood damage reported was to shoreline outbuildings. However on a few lakes there was major flooding of cottage residences. Broadly speaking four lakes reported major flood damage, eight reported significant flood damage, and another four lakes reported minor damage. Details are given below under ‘individual lake association responses.

County and Municipal Response

With very few exceptions, Coalition Members reported prompt action by local government that was praised as being exemplary in several instances. Special mention was made of the prompt attention to road repairs in instances where residents were trapped by wash-outs. The value of Haliburton County’s ‘flood central’ website was noted as were the frequent updates by Minden Hills.

Federal and Provincial Agency Response

The water management agency for the watershed is the federal Trent-Severn Waterway, an agency of Parks Canada. A few dams are owned and operated by the Ontario Ministry of

Natural Resources in conjunction with the TSW. The region lacks a Conservation Authority.

Responses from CEWF Members were mixed for the TSW. Several noted that TSW staff worked hard to provide the best possible water management actions under unprecedented conditions with limited resources. On Loon Lake, where the causeway was breached, there was praise for the prompt action of the TSW. Other CEWF Members reported a general lack of confidence in the TSW.

With regard to communications there was widespread and scathing criticism of the TSW for a lack of any public communications. It was noted that several individuals were able to talk to and obtain information by phone from TSW staff who were generally helpful. However it was noted that had the information provided to individuals by phone been posted on the TSW website it could have reached a much wider audience. The TSW's statement that MNR was responsible for issuing flood advisories and alerts was a surprise to many and the MNR notices were not easy to find. However it was lake-specific water management information that was most needed and this could only come from the TSW. For example, multiple log removals at certain dams resulted in very high flow rates downstream with no warning. Similarly the decision to sandbag certain dams, causing upstream flooding in order to save property downstream, was not communicated to the public.

Dam Safety

Only four CEWF Members noted significant concerns re dam safety. These related to the Kennisis, Big Hawk, Mississagua and Jack's Lake dams. The lack of dam safety information from the TSW was however a more general concern.

Conclusions & Lessons Learned

Heavy rain falling on frozen ground

Comparing the April & May heavy rain events suggests a substantial influence of the snowmelt and frozen basin in the April 18/19 event. The April rain came at a time when the ground was still frozen in many places resulting in the rapid run-off of rainwater from the land into the lakes and rivers. In addition there was continuing run-off of snowmelt in most areas: this had already caused lake levels to rise significantly in the preceding week. The net effect was an unprecedented volume of water entering the reservoir and flow-through lakes overwhelming the water management system's limited capacity and resulting in extensive flooding.

Rising water levels on frozen lakes

Compounding the situation in late April, many lakes were still frozen and the combination of shifting ice sheets and unusually high water levels resulted in significant ice damage to docks and other shoreline infrastructure. In addition, there were many road and culvert washouts – although most roads were made passable in record time by the affected municipalities.

Timing

Had the April rains come ten days earlier the system would have had greater capacity to handle the inflow, although with more snow on the ground the volume of run-off would likely have been even greater and the flooding could have been just as severe. When more rain did come in late May, the system, although full, was much better able to handle the run-off as the ground was no longer frozen and the influx of water was moderated accordingly. However, it is important to note that in both months the rainfall was excessive and close to twice the monthly average.

Loss of storage capacity once freshet begins

The TSW's goal is to fill the reservoir lakes by early May in order to ensure sufficient water for that canal operations when the season opens on the Victoria Day weekend while maximizing the length of the navigation season on the reservoir lakes. Allowance is made for the spring freshet based on snow measurements and long-range weather forecasts, however there is very limited ability to handle unpredicted heavy rains during the freshet. The TSW dams on the reservoir lakes were not designed primarily as a flood control system and the capacity of the TSW infrastructure to mitigate against flooding, particularly in spring when the reservoirs are filling, is far less than previously realized by most people.

Limited discharge capacity of key control structures

That water levels on several RaFT lakes on the Gull system remained outside their normal operating ranges for more than a month after the April storm is indicative of the severity of the flow constraints in, and south of, Minden, and illustrates an inability of the system to recover from a single extreme event in a timely manner. This has been apparent for many years during the fall 'rush to flush' when the TSW abandons equal percent drawdown in order to achieve winter-set levels on the reservoir lakes in time for trout spawning – achieving the winter-set levels can take 6 or more weeks.

Integrated approach to water management needed

Improvements to the water management system and infrastructure are required if we are to be able to better manage extreme weather events: however it will be important not to solve one problem (flooding) by creating another (e.g. lack of navigation due to not being able to fill the reservoirs in dry years like 2010 and 2012): there needs to be an *integrated* approach to water management at the watershed level for all seasons for all years. "Extreme weather" is

understood to include both heavy rainfall and extended periods of drought, with the potential for increased forest fire activity. Upgrading infrastructure and emergency procedures to cope with an increase in the number and severity of 'natural' disasters will challenge all levels of government.

Balancing competing priorities demands a modern water management model

Water management of the Trent River watershed requires balancing several, often competing, priorities. The present TSW operational system is incapable of meeting all the water management priorities even in an 'average' year, especially for the reservoir and flow-through lakes, and quickly exceeds its control parameters during extreme weather events. A constraint-based model should be used to optimize water management decisions so as to accommodate as many priorities as possible and to allow for the simulation of extreme weather events.

Insufficient information available to TSW

Trent Severn Waterway frontline water management staff should be congratulated for their efforts to manage these unprecedented situations to the best of their ability with limited resources. However it became clear during the response to the 2013 flooding that TSW staff have insufficient information about the reservoir and flow-through lakes for them to understand the consequence of certain flood mitigation actions. For example they do not have information with regard to upstream flooding that will result if they sandbag Horseshoe Lake dam etc. There is a need for flood impact vs. water level data – possibly as 'constraint' data linked to the CEWF Preferred Water Levels initiative. Such data needs to be part of the operational water management model used by the TSW and could take the form of 'no damage' curves that indicate the level or flow-rate above which damage will be sustained.

Communications failure

Shoreline property owners on the reservoir and flow-through lakes and inter-connecting waterways were poorly served by Parks Canada and MNR in terms of communications relating to water management decisions by the TSW and flood alerts by the MNR. In contrast, residents within the area covered by Kawartha Conservation Authority had ready access to considerably more information because communications responsibilities appear to have been more clearly defined.

Trent-Severn Waterway management needs to rethink its approach to public communications with regard to its water management decisions because their performance was an abject failure in the following regard:

- No water management or public safety advisories or alerts were posted on their website to alert the public to high water levels and flow rates resulting from their water management decisions;
- Information on water levels became unavailable when water levels went 'off the charts' on the website;
- Staff were tasked with responding to phone calls repeating similar information to multiple callers who were lucky enough to get through, when they could have been posting information on the website for all to read;
- An offer to distribute water management information by CEWF was not answered;
- Decisions to make multiple log changes at certain dams were made with no advance warning to those affected by the extreme flow-rates down stream;
- Decisions to sandbag certain dams and flood upstream homes were made with no advance notice to residents who are generally ineligible for flood damage compensation.

TSW website requires update

The water levels page on the TSW website needs to be updated annually to indicate the multi-year extreme high and low water levels. It was out of date at the beginning of 2013 and there have been many new ‘highs’ since then that will need to be updated by 2014. In addition the water management page of the website needs to be used more frequently to post water management alerts and advisories.

Compile data on flood zones

The 2013 flooding has been well documented by local observers and data from individual lakes with areas at risk of flooding should be used to compile information on flood-prone zones (e.g. Horseshoe Lake – Shuyler’s Island). The compiled data could then inform local authorities with regard to road and culvert construction as well as building approvals.

Assess long-term damage from high flow-rates

There needs to be an assessment of damage due to high flow rates on rivers – e.g. erosion plus silting (e.g. on Gull Lake) and remedial action taken where appropriate.

Value of formal review

The formal review of the Spring floods proposed by local MP Barry Devolin and announced on August 8, 2013 will be useful if it focuses on identifying actions which can be taken to mitigate flooding in the future while continuing to satisfy the need to fill the reservoir lakes in order to meet system-wide water demands. To do this 4 tasks are envisaged:

- Task 1. Document and analyze the runoff events of April 18/19 and May 20/22, 2013
- Task 2. Document the water management response to the flood inflow
- Task 3. Examine the physical characteristics of the Gull and Burnt systems and their capacity for flood mitigation.
- Task 4. Evaluate and prioritize physical and operational changes which can be made to water management to minimize the risk of future flood events.

Opportunity for partnership with Conservation Authority

Although the proposed inclusion of the Gull and Burnt river sub-watersheds in the region administered by the Kawartha Conservation Authority was rejected when the KCA was established in 1979, CEWF believes there is merit in considering a pilot project whereby Haliburton County enters into a service agreement with the KCA for the provision of certain stewardship initiatives as well as floodplain mapping, flood forecasting and low water response planning.

Avoiding surprises through education

Finally it is evident that the TSW has very limited capacity once the freshet has started to handle extreme weather events: this was not generally understood by the public and meant that the events following the April 18-19 rains came as a complete surprise to many leading to undue criticism of the TSW and other public agencies. This is yet another example of the need for improved communications and education with regard to water management of the upper Trent River watershed.

Questions Remaining

A number of questions were submitted to the TSW in May 2013, the answers to which may require updating of some of the above conclusions (see Appendix 5). We hope to have these available in time for the final version of this report.

Next Steps

The Coalition is awaiting AECOM's Report on the flood event which is due to be released by the end of September 2013 and plans to compare their conclusions with those of the Coalition.

The Coalition is urging the TSW to adopt changes to their water management model that will allow constraint-based data from individual lake associations to define preferred water levels during the navigation season. This approach will be provided to the TSW's Water Management Advisory Council and will make reference to the updated flood impact data resulting from the 2013 events.

The Coalition is seeking the results of dam safety reviews and urging that funds be approved in order to bring the TSW infrastructure up to acceptable standards to ensure public health and safety.

Severe floods have left Canadian cities with cleanup costs soaring into the billions. But as freakish weather becomes the norm, it is reigniting a debate on whether municipalities should hope for the best or plan for the worst.... Governments must now decide if their peace of mind is worth the steep price of prevention.

Globe & Mail July 20, 2013.

Appendix 1. Individual Lake Association Responses

The following are summaries of lake-specific information provided to CEWF by Member associations (in alphabetical order). Minor editing has been performed for style and individual names have been removed to protect privacy. A selection of photographs submitted is included as Appendix 2.

Big Bob Lake (South Side):

(Big) Bob Lake had no damage due to the April flooding. We asked to have a log removed until after our ice melted and this was done. We are currently suffering high water as a result of the May 22 rains. Hopefully this will right itself. As a result of the May 22 rains water is pouring over the top of the dam.

Boshkung Lake

The Sunday following the 3" of April rain our lake levels hit historic highs - about 12-14 inches higher than previous high water. The rain caused major and minor washouts on private roads around the lake, the road under which Buckslides runs was completely destroyed. There are many other culvert issues and washouts being dealt with around the lake. Damage to Boat houses, docks and shorelines is extensive, this was caused both by water and ice going out, now it is an ongoing erosion issue. The Buttermilk dam is understood to be sound but there is an expectation that proper inspections will be done when the levels allow. The response of the TSW was good in our estimation, they contacted us and told us the water was going to come up and that it would come over our Dam, being flow-through for all three branches of the Gull water shed, it was inevitable that we would get higher than it was following the rain. I believe that the lakes were being back-filled as always when this storm hit and considering the speed with which it happened (essentially over night) I do not know how much more the TSW could have done. I am sure a re-configured model would assist however, even that could not account for 3" of unforecast rain. On the Thursday night and Friday morning, the gully on the south side of one property was running higher than the adjacent property owner had ever seen it, and that is all melt, rain, and run-off, absolutely nothing to do with anything controllable. Someone who has been on this same property for 50 years, personally and their family for another 30 before that, reported that no one has seen it like it ran that day.

Canning Lake

Canning Lake was not affected by the recent flooding. Water levels were slightly higher, by about 6 inches, for the time of year, in comparison to any other year in recent memory.

Crystal Lake

The main issue was that there was still ice on the lake when the water began to rise. The logs were once again put in the dam somewhat early due to the low moisture in the snow during late winter. This had the affect of causing significant dock damage as the rising ice lifted many shore docks of their footings. In addition, with the water being so high during one particular high wind event, large chunks of ice came up on the shores and damages docks. It is generally understood that the Trent makes decisions related to log installation in the spring based on the amount of moisture in the snow pack and that it is necessary to begin putting logs in the dam early if the snow pack warrants it. This seems to be happening more regularly in the past few years. We appreciate that Trent is trying to minimize damage while at the same time capturing the water for the summer months. With so much rainfall in April it seemed impossible to keep the lakes from over filling. There were 4 logs out of Crystal and it was still over full. As the Crystal Lake dam recently underwent structural upgrades we are not overly concerned with the

structure failing. In addition, Trent staff removed 4 logs and kept them out until the water level stabilized. I assume this had the affect of relieving pressure on the dam.

Drag & Spruce Lakes

There were no major damage reports although there was some flooding of boathouse structures, and ice damage to dock structures due to record high water. There were many reports of 'floating docks', shoreline flooding, etc. Water level peak for April 2013 = 2.65 m; historical average for April = 2.2 m (which equates to the 'full' lake level); historical maximum = 2.97 m, May 6 1914 (per Parks Canada spreadsheet); Note - the historical maximum per the Parks Canada graph = 2.5 m (correct for more recent times). In summary, although this was a significant event for Drag Lake, the water levels were not historically unprecedented, nor significantly damaging to shoreline property.

Esson – Rowbotham Lakes

High water levels but no major damage reports.

Glamor Lake

We had the highest recorded lake level in April 2013 with some low level flooding. The Association had no notice of any flood damage to buildings with some minor shore/lot clean up required. The ice movement with the high water did destroy 5 dock/shoreline placements with extensive damage to each of these docks. One replacement is known to have cost just under \$2,000. Two systems have not been replaced/repared as of this date but each of these are estimated to be at least \$2,000 each. There were various minor repairs required to stairs and docks but all were easily repaired to our knowledge. Infrastructure - minimal comment here as most was secure throughout. Only one road (Alsop) drew a few comments but they were as much related to the “different” winter – mild, wet, late March wet snow – than the result of the high water. State of dams – no concerns expressed at all. Public Agency Response – again no concerns here, but as noted we did not experience any major issues requiring their intervention.

Gull Lake

Members of the Gull Lake Cottager’s Association have reported that the high water levels this spring caused damage to the shoreline and docks, and flooded boat houses and cottages. The association conducted a survey of the impact of both the high water levels in the spring and unusually low water levels in the fall. E-mails from members highlighted multiple issues relating to difficulties installing docks, damaged docks, shoreline erosion, ability to use their boats, flooded and damaged boathouses and flooded cottages. Here are a few excerpts: “my boat house was flooded with 2 feet of water; boat house now has very severe lean; garage doors broken on doors by wave action; silt has altered the bottom covering my water intake; debris and docks littered my property; extensive amount of cleanup after litter left on the beach; dock removed from footings; extensive amount of silt, water is now shallower and expect to have difficulty later in the season with boating. Our beach is a swamp.”

In addition, a new large sand/silt bar has been formed at the east side of the Gull River inflow to Gull Lake. It starts 70 feet from shore and is about 40 feet wide, over 300 feet long and 2 to 3 feet deep. Since it is mostly silt with a sand covering it is very dangerous to people walking in the water until it solidifies. One person had to be rescued when they were trapped in the silt in their hip waders! Summer boating will be impacted significantly due to the shallow waters over the sandbar.

Another member described going into Minden during the flooding. “A State of Emergency was declared in Minden yesterday and people from at least 4 streets in town have been asked to evacuate. We went to town this afternoon and the water is everywhere. There is water on Bobcaygeon Rd. from the river to Deep Bay Rd. Rotary Park is under about a foot of water. The LCBO and Beer Store lots are under water, mostly from the creeks flowing down from Bat Lake, as Water St is still above water. The houses on the other side of the river have water up to their doorsteps At least a dozen docks have floated by, and more are coming (we saw them in town).”

The GLCA has raised funds as part of the flood relief effort. At the same time frustration was expressed at the association meeting that flood relief funding was only available for full time residents and not seasonal residents as well.

This year’s issues may have been the marriage of ‘perfect storm’ conditions, however frustration has been building over the last few years concerning how the water levels have been managed. At the GLCA annual meeting, members passed several resolutions to create some initial forward progress in water level management.

- The GLCA asks the CEWF to advise the TSW that the Preferred water level range on Gull Lake is from 2.15 m in the Spring (early June) to 1.75 m in the fall (mid-September). All levels are expressed relative to the TSW datum at Moore Falls dam.
- Knowing that some flood storage may be necessary in the Spring, recognize that levels above 2.15 m cause inconvenience, and above 2.4 m cause infrastructure damage
- Further, Levels below 1.75 m in the fall cause boat and property access problems and water supply problems. At levels below 1.65 m, these problems become substantially more severe.

Haliburton/Oblong Lakes

Haliburton Lake residents and cottagers experienced unprecedented high water levels and ice damage this year. Low lying properties were flooded and shore lines eroded into the lake. A large number of docks, cribs and shoreline reported damage due to high water levels and ice slow. For the first time high water levels crested over retaining walls of the Fort Irwin Marina and flooded a large portion of the parking lot. Marina owners reported that they were set back one month for putting boats into the water. Road culverts were washed out trapping residence from entering their properties and permanent residences were trapped from leaving their homes/cottages. Roads department reacted quickly; this was acknowledged to Reeve Murray Fearrey at HLCA AGM held on May 18th. Navigation to South Bay bridge and Oblong Lake bridge were impassable due to high water levels. Navigation markers could not be placed in time for May long weekend. Oblong dam stood up to the high water levels but HLCA is concerned that it may have sustained structural damage. HLCA submitted Preferred Water Level proposal to TSW and would like to see its approval.

Halls and Hawk Lakes

Serious flooding took place on Halls Lake and along the section of the Kennisis River that flows from Big Hawk Lake to Halls Lake. Most of the water damage was focused in three main areas: along Cadge Road; the western section of Halls Lake Road; and along Old Mill Road beginning about 500 meters from the entrance to Elvin Johnson Park to halfway across the causeway to the Island.

The flooding along Cadge Road was caused by the failure of a dam on Big Brother Lake to the north of Halls Lake. A wall of water was released and flowed across Little Hawk Lake Road (County Road 13) causing significant damage to the private lanes along Cadge Road. Extensive repairs by Algonquin Highlands Township staff were required to the culverts at the entrances to these private lanes. Elvin Johnson Park on Halls Lake was completely inundated with water and its rafts floated out into Halls Lake, near the mouth of the Kennisis River. The extent of damage to the Park is not yet clear. The culvert near the intersection of Braeloch Road on the south side of Halls Lake was washed out and had to be replaced by Township staff. Similar washouts occurred in numerous locations including at Big Hawk Lake Landing. Docks, boathouses and low lying cottages for about 500 meters west of the intersection of Cadge Road and Old Mill Road suffered varying degrees of water damage. Four or five cottage properties close to the entrance to Elvin Johnson Park also suffered extensive water damage. Many docks and waterfront structures all around Halls Lake were submerged and suffered a range of damage. There was also damage to docks and cottages along the southeast shore of Big Hawk Lake just upstream from the bridge. It is clear the dams at Buttermilk Falls (between Halls Lake and Lake Boshkong), Big Hawk Lake (the Log Chute) and at Lake Nunikani were under severe pressure from historically high water levels. The Buttermilk Falls Dam was overtopped on several occasions. The overtopping of the dam on Big Brother Lake that caused extensive damage along Cadge Road is of on-going concern. There is a general concern that all TSW dams are in need of significant upgrading and/or extensive maintenance and have suffered from both capital and operating budget cuts at the federal level.

There is a general level of satisfaction with the flood response on the part of the County of Haliburton and the Township of Algonquin Highlands. However, there is a lack of confidence with the TSW. In fact, there is a lot of “loose talk” that TSW water management actions before, during and after the flooding contributed significantly to the cause of the flooding. The TSW did in fact raise water levels on Halls and the Hawk Lakes in late winter and, without access to information about the overall water management context within which those decisions were made, many are drawing some pretty harsh conclusions about TSW water management actions before, during as well as after the April flood event. There is also a lot of speculation going on about the impact of aging, out of date and sub-standard TSW dam infrastructure being a significant contributing factor. For example, there have been media reports speculating that TSW concern about the potential failure of the Kennisis Lake dam resulted in that lake being held at a lower level than other reservoir lakes thereby exacerbating the flooding conditions downstream. The links being drawn between infrastructure under-investment and the TSW’s capacity to manage water levels throughout the system, is leading to some tough questions being asked about the federal government budget cuts to Parks Canada.

There is also widespread frustration being expressed about the Ontario government’s Ontario Disaster Relief Assistance Program (ODRAP). Eligibility requirements for coverage are under scrutiny with even area MPPs and MPs calling for a review of the program. A key element of the concerns being expressed, from the perspective of Lake Associations, is the exclusion of seasonal property owners from coverage under the program.

There's a general level of satisfaction with the amount and timeliness of flood related communication from both the County of Haliburton and the Township of Algonquin Highlands. The same cannot be said in relation to the TSW. Many are upset about the lack of advanced warning from the TSW about log in/log out decisions and their potential impact on shoreline property owners. There is a serious concern about the timeliness of the Province's role in assisting people to deal with the consequences of the flood. Many people needed immediate assistance but the disbursement of funds to those who need it most is nowhere in sight.

Horseshoe Lake

The HLPOA provided a table of 21 separate responses to the questionnaire. It was noted that overall local roads were flooded for extended period, including Shuylers Island road access which was impassable for 18 days. Reynolds road shifted in two locations, one impassable. Many basements were flooded, there was much shoreline erosion, structural damage and inundation of septic systems. There were two reports of buildings shifting. The following extended personal account provides a considerable amount of detailed information that relates to many of the shoreline property owners.

I was told by Chad Buckner at TSW that Horseshoe Lake reached 137% capacity. We toured the lake and took Barb Reid and Barry Devolin around it by boat. Unfortunately Barry did not take the tour until water had dropped more than a foot from the high point. Barb saw it at its peak minus about 2". We estimated that between 75 – 100 properties had been obviously flooded and knew there would be more with flooded basements that we could not see. We could not tell how many had damage from the flooding as some did not have basements nor finished crawl spaces. Many out buildings were closer to the lake than the main building and thus, more affected.

Shuylers Island Road was flooded with 29" of water and impassable by car from Sunday April 21st to Friday May 9th. On May 9th there was still some water on the road. The road bed is not in good shape and I believe the flooding has eroded the bed and means that it will flood sooner in future. The road bed needs to be built up and proper protection from erosion created along both sides. There are collapsed culverts and one place at least where you can see the water through the road from above in the middle of the road. Additionally, the rest of the island roads did not fair well with the rain and need work to build proper drainage as they become soft and almost impassable in the spring. Road: The flood waters also came across about 200' of road immediately behind my home at 1175 Shuylers Island Road and water completely divided the island in two between my home and the neighbours when the flood waters were at their height. This part of the road was under water for about a week and a half and also suffered damage. We had water in our basement which we pumped out twice daily. We also have damage to our stone landscaping at the lakefront but, as the water is still high have not been able to fully evaluate what it will take to repair.

I am only concerned about the dam because I heard Chris Windover of the MNR say that there had been some concern about the 12 mile dam - if this ever broke we would be in serious trouble.

I am very happy with the information provided by the municipality. Having a call first thing on Sat 20th from Barb Reid and a visit from the fire dept to let us know what was about to happen was a good start. The ongoing press releases on the municipal and county website were helpful. However, the information we were not getting that we needed was what TSW was doing with the dams on a day to day basis. We were sitting in the house watching the water rise and coming at us from both sides of the house and then dividing the island in two between ours and the next property (giving us water on 3 sides) and we did not know if they were putting logs in or out of the dam and whether water was expected to rise or fall. I believe it was the first Wednesday that they put the last 3 logs into the dam, after sandbagging the dam, and the water rose about a foot quite quickly. There was no notification and this was a pretty terrifying thing to watch as we did not know when it would stop. On the first Thursday the water was so close to the house from the back that we knew that a very minor increase in water would completely flood the parking area of the house and ruin the generator. The township did not know if the crest had passed Horseshoe and if they were going to raise the water further. I called TSW and Barry Devolin's office to try to get information which did not come in a timely manner. We paid to

have an electrician come out to the island by boat to disconnect and raise both our generator and our neighbours.

I believe that TSW's lack of communication to the municipality and lack of timely communication to the public traumatized an already traumatized group of people needlessly. All it would have taken was a communication posting on a website every time they made a decision and we all would have been better able to cope. These communications needed to not only say what they were doing but explain the rationale. I would have felt very differently about the last 3 logs going in the dam if I had known they were trying to prevent an ecological disaster at the sewage treatment plant.

I was lucky that I got to speak to Chad Buckner at TSW 3 times during the week of the rising water. Because of my calls to Barry Devolin and to TSW Chad called me. However, even though this was nice it was always after the fact and not giving forward going information. It was also a waste of his time spending hours calling people instead of working on the flood problem to resolve it. A simple bulletin on a website or a note sent to the municipality for the municipality to communicate would have sufficed and gotten more information to more people in much less time. I repeatedly emphasized this message. The TSW needs a communication plan going forward that informs those of us who live on the lake chain about their actions at the dams on a daily basis. The flood emergency situation only served to illustrate how much we are affected by the actions of the TSW and thus, I believe this communication is necessary on an ongoing basis NOT just in times of crisis. In times of crisis they also need a disaster communication plan that increases the frequency of these communications and relays the rationale to everyone as well. In all cases the communication needs to have information about their actions at the dams and rationale for taking them. When I was speaking to Chad Buckner after the crest had passed he was relaying the fact that it was good to come to Minden the night of the town hall meeting. He said it made the situation more real to him when he got to meet the people affected. Up until that time, he said the numbers were just that ... numbers on a gauge. He now realized what the numbers meant to the people who could not go back to their homes. During the course of that conversation he made a comment about meeting an elderly gentleman whose private road was flooded and he could not get home. I realized as he spoke that he did not understand that he was speaking to someone whose home had become water access due to 29" of water on the causeway. When I mentioned this to him, his reaction was "really? 29"". What this tells me is that the TSW do not understand the relationship between water level on their gauges and the property that surrounds the water system. They do not know how many properties are being flooded when their figures say Horseshoe Lake is at 110%, nor do they know how many more will be flooded at 137%. How can they make decisions about the best plan of action when they do not know which lakes have more properties that are sensitive to a water rise of 10%? They cannot possibly know which reservoir is the best to keep at what level. When they made the decision to flood Horseshoe Lake and spare the town I do not believe they knew that they were making a decision to double the number of properties affected by the flood. They were totally concentrating on Minden village and not the homes and cottages on the lakes. This cannot continue. While I have heard Jewel Cunningham say that this is not a flood prevention system, they store water in the system and should know the implications, as they let the water level rise and fall, to the surrounding properties. It is totally unacceptable that they only know the level on a gauge and not how this interacts with the land. This is true of normal times but even more true of crisis times. They simply have to begin to better understand the relationship between the lakes, dams and surrounding properties. I strongly recommend that the lake associations band together and hire Ulinks to coordinate a mapping project that will identify the relative elevation of every property on every lake in the system. While this may seem like a large task I am told that a simple app on your iphone or ipod can give this data to you and it could be centrally collected.

People who do not have access to the app could get a neighbour or a volunteer recruited by Ulinks to do it for them.

Questions: Who makes the call as to whether they flood Minden, Horseshoe, Kennisis etc?

When a purposeful decision is being made to damage properties should there be someone at a higher level of government involved in the decision making? What are the guiding principles to help this person make this call in a way that ensures that the most homes and human life is saved? Certainly the question of infrastructure in town is one of the principles but, could more water have been put through the dam without increasing this threat? They actually decreased the flow and the sewage plant was already surviving the flow they decreased? Why, when asked at the town hall meeting, about communication was the answer "it is not our job"?

Certainly it may not be their job to communicate with the public but, it is their job to communicate to someone who can communicate to the public. Why was the municipality also not getting the information? It appears that they do not think that what they do to the dams affects the people who live here. That is unacceptable.

Jack's Lake

There was very little flooding. Eels Creek was in flood and there was extensive damage at Apsley. Jack's Creek was normal or a little below normal for this time of year and the lake is still not up to the level expected for this time of year. Very little damage to public infrastructure (roads, culverts etc). Re private property damage: there was some damage as the ice went out due to the wind from the east this year. This is unusual as the ice usually goes out with a wind from the west.

Regarding the dam, there is a leak just to the south of the (unused) east spillway and water can be seen pouring through a wide crack that runs from the bedrock to the top. Eventually this crack will widen and the flow increase. There is a second crack near the west opening, another major crack that runs across the dam and 6 other cracks along the dam. There is substantial undercutting near the main flow area of the dam which suggests that the base is eroded badly on the lake side. The dam was constructed in the early 1930s as a make work project in the depression years.

Kashagawigamog Lake

Lake Kashagawigamog is a flow through lake and normally experiences less severe water level fluctuations than many other lakes in the Haliburton catchment area. For the most part the water level fluctuation is in the 2 to 2 1/2 foot range. As a result most people do not take precautions beyond these ranges. This includes the built heights of docks and decks above the normal high water line, storage of boats, docks and other personal items. This year the water level rose to a height approximately 6 to 8 inches above the norm. Due to the late Spring, the ice was fairly solid at breakup. The result was a surprising amount of damage. Many docks and stored items were at or below water level, resulting in lifting, moving and/or experiencing ice damage. A variety of flotsam including several docks floated by. The association President, and long time lake resident, indicated that the water levels in the past have exceeded this year's levels but not for many years. The difficulties experienced by the residents of Lake Kashagawigamog as compared to the problems of towns like Minden were annoying but relatively minor. At the 2012 CEWF meeting of Members, the representative of Parks Canada spoke of their decision to load the lakes beyond their historic levels in an effort to respond to the complaints of various lake associations regarding low water levels. The representative from Canning Lake suggested that they were setting a very dangerous precedent in that the inconvenience of low Fall water levels pales in comparison to the possible damage inflicted by unpredictable Spring weather. His comments were dismissed but this years events have proven to be prophetic. This is not a

criticism of Parks Canada as they are reacting to lake association pressures and using historical data as their guide. With the growing unpredictability of weather patterns they may have to revisit their decision. We as a Lake Association very much appreciate the difficult work that the CEWF is undertaking on our behalf and thank you for your ongoing efforts.

Kennisis Lake

There was very little flood damage given that Kennisis is a headwater lake and that the water level only rose some 5" above the top of the dam - thanks in part to the removal of an unprecedented 5.5 logs by TSW immediately after the April storm in order to protect the integrity of the dam which is in need of replacement based upon its gravel footing and significant leakage and seepage. There was significant public and private road damage with culverts washed out and sections of roadway washed out. For example Minnow Drive repairs cost the 14 property owners a total of \$7.2K. The most extensive damage however was to docks and other shoreline infrastructure due to rising water levels while ice was still on the lake (ice out date April 28th).

Kushog Lake

The story on Kushog is similar to the other headwater lakes that were 'sacrificed' to relieve the flooding in Minden. But we had already exceeded the previous record high when the flood event occurred. So our level went even higher than before for a week, came down for a day or so, and then went back up to the previous historic high level. This can be seen on the TSW online water levels chart. Roads were washed out (both private and public), boathouses and crib docks rearranged, basements flooded - all the problems that you would expect when the water is almost 2 feet above capacity. Our only concern with the Buckslide Dam was that there were too many logs in. The County Warden (and our Algonquin Highlands Reeve) did a terrific job of keeping us informed. Even when we knew that we had to suffer and that nothing could really be done to fix the situation in the short term, at least we knew that she was working on our behalf. Our recent Secchi disc testing shows water clarity to be about a foot less than previous tests conducted at this time of year. [Editor comment: something mentioned by other lakes as being due to increased turbidity resulting from the flood-waters].

Little Glamor Lake

Was not affected.

Loon Lake

On April 19, 2013, at approximately 1:30 PM, the Gregory Lane, a private road, was breached in multiple locations by waters from Loon Lake and the Burnt River. There were three road breaches of significance. The first large breach was approximately 20 feet long by about five feet deep, occurring on the north end of the Gregory Lane causeway and resulted in closure of the Gregory Lane. Another large breach occurred across the road south of the large culvert, followed by another breach about 100 feet further to the south. A large pipe arch culvert (4180mm span x 2970mm height) had recently been installed by the road owner in the fall of 2012. The consulting engineer was Greer-Galloway of Peterborough and the contractor was Fowler Construction. On discovering the first large breach, the Trent Severn Waterway Control Engineer was immediately notified, as was Emergency Services Haliburton. High waters on Loon Lake caused flooding of cottage properties adjacent to the mouth of the Burnt River. There was reported damage to drywall and baseboards in the basement of one cottage under construction and some damage to the flooring and insulation of another nearby cottage. There are two Trent Severn Waterway dams associated with the waters of Loon Lake. The one dam controls water from Long and Miskwabi lakes while the other dam controls the integrated waters

from those lakes as well as Loon Lake. At the time of the breaching and flooding, the following is known: the Loon Lake dam was operating at less than one half capacity (reported by the TSW); a differential in water levels of approximately 15 inches existed from the East side (high) to the West side (low) of the causeway adjacent to the large culvert on the Gregory Lane; the Long/Miskwabi lake dam was substantially throttled, with only 1 1/2 stop logs removed (reported by the TSW). (Local TSW staff had reported the evening before the breach that there was a tree stump stuck in the dam that had to be removed in order to operate the dam); the ice had not yet gone from Loon Lake; there was a reported rainfall in the area (Bancroft weather station) of 29.5mm. Before, during, and after the breaching, the Trent Severn Waterway staff were very cooperative in communicating their activities as well as stop log information. They were helpful in mitigating the flooding conditions. They also readily provided data obtained from the electronic level sensors located at the dams. And they have indicated their willingness to participate in post flood debriefing exercises. During the flooding incident, the Municipality of Dysart Fire Department readily shared information on its state of readiness to respond, should its services be required. As of the writing of this report, there are no known formal investigations underway or scheduled by any agencies or the owner of the road regarding the causes of the flooding or future possible preventive measures. A verbal and written inquiry to the local Ministry of Natural Resources office has been made regarding it's possible future involvement in debriefing activities but a response has not yet been received.

Maple, Beech & Cameron Lakes

Although Maple, Beech, Cameron Lake Association members did not entail the extent of water damage experienced by the village of Minden, there was still considerable loss of docks, small boats such as paddle boats lost and submerged septic beds. One resident reported a shoreline deck was moved 150 feet and totally destroyed. Most members of the association realize that the rain storm that took place on April 18-19 was an abnormality, however questions still arise as to why the TSW did not release water earlier from the Gull River reservoir lakes which were already near capacity to allow breather space in case such an event was to occur. In other words proper monitoring of water levels which are particularly critical during the spring melt was lacking. Although accurate depth readings of MBC's chain of 5 flow-through lakes has never been taken during spring run off, long time residents have stated that they have never experienced water levels as high as what they experienced this past spring.

Miskwabi Lake

The Miskwabi Area Community Association represents property owners in the neighborhood of Miskwabi, Long, Negaunee and Wenona Lakes in Dysart et al. Our area was very fortunate during the recent flooding. Although the lake waters are extremely high, which might lead to erosion issues, we have not experienced flooding of any consequence. Some docks received ice damage and some are partly covered with water but otherwise we have heard of no damage. There were some minor inconveniences regarding access but again by no means excessive

Mississagua, Catchacoma, Beaver & Gold Lakes (Cavendish Ratepayers Association)

Five lakes are controlled by the Mississagua Dam including Mississagua, Catchacoma, Beaver, and Gold. Together these lakes are the single largest reservoir storage on the TSW and outflow directly down the Mississagua River to Lower Buchhorn Lake just below the Buckhorn Dam and Lock. The area appears to have received only about half the precipitation which fell further north in Haliburton. The spring thaw was also a bit further along and the ice was off or almost off our lakes at the time of the rain. The result was that although levels rose sharply they did not go

above the 25 year maximum. The Mississagua dam has three spillways only one of which is operating with a total of 8 logs. There was extensive flooding on the Mississagua River below the dam as a result of very high flows. Immediately following the storm the TSW removed 7 of the 8 logs from the operating spillway. Our dam is designed with a very long wing that is about 8 or 10 cms above the full level. When this wall is overtopped the level is sort of self regulating and apparently removes pressure from the dam. On April 17 our level at the dam was 2.21 m compared to the average for the date of 2.08 and the 'full' level of 2.44. The level peaked on April 28 at 2.64 or 20 cms above full. By early May the level declined to below full and all logs were replaced. The result was very limited shoreline flooding well within the range of experience on our lakes. No reports were received of exceptional ice damage. The high water on the Mississagua River did cause some damage and major inconvenience for residents on that flow through channel.

The association is very concerned about the state of the Mississagua dam. It is known that a dam safety review was completed in 2012 but no results have been made available. Significant leakage can be seen through the dam walls outside of the spillways. Some members report that the dam is hollowed out in the sections that leak. We were surprised that 7 logs were removed at the peak flow because with the wing we might have expected TSW to just let the flow take its course with little additional increase in level. We wonder if there was any concern with the strength of the dam and if that is why the logs were removed.

The association shares the concern of others that TSW and MNR need to be clear on who is going to talk to the public in areas not covered by Conservation Authorities. This was not handled well.

Two of the last 4 years 2010 and 2012 have seen prolonged periods of drought in spring and summer. The Association supports the filling of the reservoirs by early May. We recognize that the canal has first call on water in low flow seasons and the only hope we have for summer levels to be maintained is to have full reservoirs. This means the reservoirs can not provide flood control in late spring. We fear the upcoming review of the flood events may result in directives to not fill the reservoir in order to maintain a margin for flood control. We believe that based on the experience in 2010 and 2012 this would only create another major series of problems.

Moore Lake

Extensive shoreline flooding but unaware of any cottage, road or property damage.

Mountain Lake

This report summarizes information voluntarily submitted by May 31st to our the MLPOA which set up a dedicated email address for reporting.

The flooding on Mountain Lake after the April 18th rains and snow-pack melt exceeded historical high water levels for the Horseshoe-Mountain Lake water body, likely by 0.6 to 0.75 m. Consequently a number of properties around this lake were flooded to the extent that:

- access and evacuation at some properties had to be achieved by boat;
- crawlspaces and residential living spaces were inundated and ruined by standing water;
- foundations of residential homes and cottages may be compromised;
- shoreline boat houses and contents were damaged by shifting ice and high water;
- docks were severely damaged and/or floated away;
- garden sheds were flooded;
- holding tanks and septic systems were flooded;
- physical property stored outside was severely damaged or ruined by sitting in water;
- natural berms and embankments were severely eroded and undercut, and tree roots

- exposed;
- trees and bushes were submerged in water and stressed (so may not survive).

Dollar values for damages are 'gestimated' in the following reports for the more significant losses (these being in the order of tens of thousands of dollars per property); other reports do not quantify the losses but are the order of thousands of dollars per property Few losses at Mountain Lake are likely to be covered by insurance or disaster relief funds.

Flooding occurred at properties accessed by Highway 35, Mountain View Drive, Fairfield Bay Drive, Judge Jordan Road, and Bonis Lane.

The Judge Jordan Road boat launch and picnic area was inundated. The concrete storage shed at this site, now owned by MLPOA, was inundated and some contents (tables, bbqs, picnic supplies) have been compromised if not ruined. As the ground was soft after being flooded, the turn-around has since become rutted by vehicles and trailers.

Inundation of Cottage Living Spaces: Fairfield Bay Drive, east end: road totally submerged necessitating access/evacuations by boat for: 1146 Fairfield Bay Drive; 1135 Fairfield Bay Drive; 1140 Fairfield Bay Drive; 1182 Mountain View Drive.

Inundation of non-living Spaces (e.g., crawlspaces) and outbuildings (garages, sheds, boat houses): 1018 Fairfield Bay Drive; 1106 Fairfield Bay Drive; 1108 Fairfield Bay Drive; 1112 Fairfield Bay Drive; 1116 Fairfield Bay Drive; 1135 Fairfield Bay Drive; 1140 Fairfield Bay Drive; 1149 Fairfield Bay Drive; 14314 Hwy 35; 1195 Sapling Road; 1099 Judge Jordan Road.

Damage to Docks and Structures: 13918 Hwy 35; 1220 Sapling Road
Property Erosion: 1103 Judge Jordan Road; 1195 Sapling Road

Commentary on the Adequacy and Timeliness of Information from Public Agencies: "Totally inadequate"; "No daily reports from Parks Canada about further impacts of dam operations for flood management, particularly after the May long weekend when people did not expect the water level to rise again."

MLPOA Disclaimer: Properties other than those mentioned above may have been inundated and owners may have suffered expensive damages that have not been reported to MLPOA.

Two Individual stories from Mountain Lake:

1. As a resident of Mountain Lake I have witnessed some scary things in the last week or so, due to the high water levels. Last week when the winds were very high and the water levels the same I witnessed numerous docks floating toward us from the north end of the lake, some of which ended up smashing in to our shore line and breaking apart. There were even deck chairs and furniture on some of them a lot of which has been lost. I also had emergency calls from my neighbours for me to come and help them rescue their docks which were being taken apart by the waves and the fact that the water had come up over their docks. In six years of living here I have never seen anything like this panic. I can also add that due to the high water my dock has been partially pulled apart and I'm hoping that when the water gets to a reasonable level I can get to it and repair it, if that is still possible. Lets just hope that Mother Nature does not throw the poor TSW another curve, because we couldn't take the results.

2. The flood started, according to Ministry of Municipal Affairs and Housing website, on April 18, 2013. I was not aware of the flooding until a cottage neighbour, directly behind me on Mountain Lake, called me on Sunday April 21st, 2013 to inform me that the water level had come up drastically overnight and that the water level was almost to the bottom of the door of my cottage which is roughly 2 feet 9 inches off the ground. By then she informed me that she was leaving her cottage by boat. A state of emergency was called for Minden on April 20th. There was no warning that I am aware of for cottagers in the Minden area. Since cottagers are seasonal they do not have the advantage of being at their places to see what is going on at all times. The flood occurred without warning and by the time I knew about the situation it was too late to take any action or even make an attempt to protect my property and/or belongings.

April 24th, 2013, my son travelled from Barrie to the cottage at 1146 Fairfield Bay Drive, Mountain Lake to see what he could do, if anything, to save some belongings. The Fairfield Bay Drive was completely under water and blocked off. He was able to drive around on Mountainview Drive to gain some access. He was not able to drive all the way into the cottage but had to stop the car up the hill about 100 yards from the property. He waded into the property using chest waders. By this time, the entire property and surrounding properties were completely submerged with water that was approximately 3 feet high. Inside the cottage there was about 5 inches of water.

April 26th, 2013, a group of four of us went back to the property with an SUV and trailer. The same scenario of trying to get to the cottage property was played out on this day, except the water was down about 4 inches. We had to move around the property with chest waders and there was still about 1 inch of water in the cottage. We put furnishings and appliances up on wood boxes, which we made in the garage at home, before we left. We parked our aluminum boat at the back door, floating I might add, and removed rugs and small items to float out to the SUV and trailer parked up the road. We also removed a water pump, lawn mower, chain saw, and various other items from the sheds on the property. These items were all completely submerged in water at the time of removal. The large wood deck at the front of my cottage, the wood steps at the back of the cottage, the wood steps at the side of the cottage along with two picnic tables and a dock were all floating around the property or out in the lake. Very fortunately, a kind neighbour had secured both my large wood front deck and back wooden steps to trees around the property, with ropes, to prevent them from floating away. We were able to tie off the remaining set of steps and one picnic table to trees on the property to prevent them from floating out into the lake. We used a boat to retrieve a second picnic table from out in the lake and tied that to a tree. Part of the dock was never found.

May 5th, 2013, I went back to the property to review the damage. I once again had to park 100 yards up the road and walk into the property with chest waders. The water was now out of the cottage, but the property was still flooded at a level of about 2 feet.

May 11th and 12th 2013, I went back to the property. By now I was able to drive in by way of Fairfield Bay Drive and into the driveway at my property. The ground was very wet and muddy but I could move around with a pair of rubber boots. Inside the cottage the mould was now visible and growing up the walls in every room, to a height of about 2 feet in some areas. A neighbour helped me to move around some furnishings on May 11th so that I could start removing the mouldy drywall and soaking wet insulation. I worked alone on May 11th and made a trip to the dump with my trailer. On May 12th, I returned to the cottage, with my son, who helped me remove more drywall and insulation. Another trip was made to the dump.

May 18th, 19th, 20th, 2013, myself and four other family members did more work on cleaning up the property. We put all the decking and outside stairs back in place so we could get in and out of the cottage. We also cleaned up all the debris from around the property such as branches and logs that had floated in during the flood. Inside the cottage, we ripped apart the kitchen and

bathroom to access the mouldy walls that were behind the counters, appliances and shower stall. All the flooring was removed, which included laminate flooring throughout the whole cottage except the bathroom which was vinyl flooring. Many more trips were made to the dump. May 25th, and 26th, 2013, myself and one other family member spent two days cleaning and removing any visible mould off of any wood and vapour barrier, behind the removed drywall, using a bleach/water solution. A dehumidifier was set up to remove moisture to bolster the drying process. The sheds were cleared out and fans were set up to dry them. Any wet and damaged items from the sheds were taken to the dump.

Consequences of the flood:

- The shoreline in front of the cottage is eroded. When I step off the deck at the front of the cottage I now need a second step down whereas one step was adequate before. Tree roots are exposed that were not visible before the flood.
- This property has been in the family since 1963. There has never been a time in those 50 years when the property was flooded to the extent that chest waders were required to move around or that the original cabin was damaged from flood waters. Over the course of 2008, 2009, 2010, 2011, and 2012 I added an addition to the cabin which included raising the cottage by 18 inches. The cottage was literally just completed in 2012. Now the cottage is unbelievably damaged from flood waters. It is quite devastating both emotionally and financially. The costs to repair this damage rest with me.
- There is no flood insurance in Canada.
- ODRAP will not cover losses for cottages. Seasonal property owners pay property taxes just like everyone else.
- Our lake and other lakes in this watershed were backed up to try and reduce the damage caused to the Town of Minden and yet there is no disaster relief funding for cottages that have sustained damage in order to protect the Town.

Percy Lake

The monitored water level on Percy peaked at 2.4m or 0.1m above the historic high. A normal peak is below 2.1m. As of May 26th, and before most cottagers have put boats into the still cold waters, the boat launch area seems unaffected although the protective cable-tied logs at the mouth of the dam has been broken. To get to Percy lake it is necessary to drive around Haliburton lake. There were 3-4 partial wash-outs on Haliburton Lake road [roughly between Ross Lake and East Lake], and a complete washout between MacDonald Court and Ross Lake Road. In a quick water survey it was noticed that 3 crib shore docks shifted/broke; one floating dock with a torn-away float; and three metal leg shore docks crushed/bent that will need to be repaired. The unusually high water level refloated many [20-100] dead logs that had accumulated on the undeveloped southern shores. They are barely visible on calm water and very difficult to see in chop. The cold weather has kept many boaters off the water so far so there have not had accidents and the some logs were re-snagged as the level receded [or went over the unprotected dam]. But the recent rain has again raised the lake level and dislodged some previously snagged logs which are now headed across the lake to the dam. The first indication that there was an access problem came from e-mails from the semi-permanent residents, subsequently the web site and twitter account of the roads dept. was helpful. By Mon-Tues after the storm temporary fixes were in place and access was possible. Public agencies provided adequate and timely information.

Redstone Lake

Several respondents reported that water levels were above 30-year historic high levels. Some observed that this situation occurred while there was still ice on the lake. There was an

acknowledgement that this was an unprecedented natural event.

However one respondent said that attempting to pass the flooding as an unexpected event and a total surprise is an excuse by authorities who knew that the lakes were at capacity or very high and had been high for some time. He said that the authorities must have known 4-5 days ahead of the storm that there would be a significant amount of rain, they knew that the ground was frozen and unable to absorb the rain, and they had the computer models and the expertise, supposedly, to predict with some accuracy, that there was a significant risk that flooding could happen. Yet there was no warning. This respondent stressed that there should at least be a public inquiry.

One respondent described sandbagging, operating 3 pumps working around the clock, vacuuming water from the basement floor, wearing boots as a fashion item, and barely able to save a new furnace and most of the items in the basement. His first communication on April 20th described a desperate situation as Redstone rose 35 cms overnight and breached his point property. He was told by Parks Canada that the rate of increase for Redstone would continue to rise.

A respondent made reference to major wash-outs on both sides of their Bay, the washout of their causeway, and that people were stranded with the roads being impassable. Another respondent described the only damage he witnessed as caused by stormwater runoff, and referred to damage at the boat access ramp on Redstone Lake Road which was badly rutted due to high volumes of rainfall runoff. However he stated that, although he doesn't know when the municipality made repairs, the ramp area was in perfect shape when he put his boat. The final comment was from a respondent who commented on the deleterious impact of the continuing high water levels on the littoral portion of our shoreline. He said that trees which are still under water will be severely stressed, and soil and sand on the rocky portion of our shore line indicates that the very high level this year has contributed to significant erosion.

Nearly all respondents reported experiencing more waterfront damage this year than at any other time, and some stated that they can't begin the necessary repairs and restoration work until the water is warmer and the lake levels are down or in some cases until the Fall. The most common damage was to docks with reports of the force of high water ripping cribs, anchored floating docks being moved 25 ft or more, chains broken and anchors lost, etc. Some said that this is the first time such extensive damage has occurred in decades.

There were no concerns expressed about the state of Redstone's dams, but there were a few observations as to what was happening around the dams during the high water event. Some respondents observed lake water levels relative to the top of the dam wall, monitored the number of logs taken out, and made interpretations as to what was happening and likely to happen during the event. Others expressed that their biggest concern is the on-going management of water levels throughout the year. People leave their docks floating during the winter. Because the logs are put back into the dams before the ice is melted, this allows the ice sheet to move as the water rises and results in dock moorings being ripped from the shore or from the submerged anchors. It was suggested that it would be helpful to the people with floating docks for the logs to be put in place later in the spring to save the docks and to only put the logs back in either once the ice has melted or shortly before an anticipated high rainfall event that may cause flooding.

Comments on the response of public agencies (TSW, Haliburton County, Municipalities) to the event were mostly negative. One respondent said that the human error occurred when TSW starting capturing water too soon and logs went in all over the place. He spoke to Parks Canada and was told that their measurements indicated too little snow in the bush (apparently one of many measurements), and to ensure enough water in the lake in the Spring, logs went in early. This respondent felt that rainfall seems to have been disregarded, and that the way TSW

manages the winter-spring situation allows for no buffer, no safety net, and little regard for consequences of too much water. Redstone has enormous capacity to hold overflow but not this year. He concluded by saying that the flooding was man made in his view. The only positive opinion about the response of public agencies was from a respondent who acknowledged that this was an unprecedented natural event and he believed the TSW actually did as good of a job as possible with regard to management of the dams on Redstone. He observed the log removal and concluded that TSW was effectively containing as much water as possible in the lake to minimize flooding impacts downstream. He also noted that at the lake levels which occurred, the lake water also starts to spill out of the south end of Driftwood Bay through private property.

In August 2013 the PWRRA (Piccadilly/West Redstone Road Association) finalized details regarding the significant cost of the causeway washout and provided the following update. The PWRRA (Piccadilly/West Redstone Road Association) had a total washout of the causeway on Invader Lane. The temporary repair for a bridge cost \$7k. The final cost of repair is quoted at approximately \$18k. The causeway (constructed the previous year) that washed out - cost \$9k. Reusing the two older culverts (for the to-be-newly constructed causeway) resulting in a savings of \$6k, bringing the total cost of damages to approximately \$28k.

The water levels from the pond side of the causeway (fed by Cruiser Lake/Bitter Lake and other ponds upstream) by observation and inquiry rose about 1.5 to 2 feet (3:00 p.m. to 12:30 a.m. the next morning). It is assumed the causeway breached and gave way somewhere after 12:30 am. We are very fortunate no vehicles attempted a crossing in the early morning fog, which was quite dense given the snow on the ground and air temperature. The breach was 25 to 30 feet wide, filled with very fast moving water. We're thankful we didn't have a fatality.

The total watershed area has been determined to be anywhere between 800 to 1,800 acres depending on how you choose to define watershed area. Given the frozen ground, accumulated snow, sloping north face ground, failure of a causeway upstream, and split/breach of a beaver dam and the extreme rainfall - our estimates of water flow were astronomical. All running into Redstone Lake.

The replacement causeway will be reconstructed late Thanksgiving 2013 with two additional new culverts (for a total of four). Construction also includes a wide flood spillway at a lower road level in an attempt to avoid any future flood challenges to the causeway.

The challenges we faced in April 2013 were: a) no advance extreme rainfall/flooding warning (although I'm uncertain we should receive one); b) in calling Haliburton County to advise that Invader Lane was impassible and dangerous the staff could not find Invader Lane on their listing and therefore wouldn't list it and referred us back to Dysart; c) we received no funding for repairs although it is a Dysart Municipal road (but privately maintained) and as such we have been forced to add extraordinary fees to our membership for 2013/14.

Soyers Lake

Soyers lake runs into Kashagawigamog and its watershed consists mostly of the area north including Little Soyers Lake. It is not affected by the Gull River system or the lakes feeding into it. As a result there was relatively little property damage on Soyers lake. The water level was higher than ever before but only by 10 to 12 inches. Property damage mostly limited to movement of some crib type docks and this because of ice movement on the lake. With the rain at the end of May, the water level is again almost as high. Hopefully, it will settle down a bit before all of the busy boat traffic to minimize shoreline washout due to the wakes. Perhaps it would be prudent to make announcements on the local radio stations to inform boaters of the potential damage to shorelines due to the high water levels.

White Lake

White Lake reports no issues with respect to the flood. This would be in part due to the amount of rainfall, and being a headwater lake, so the water level never reached the top of the dam, and did not exceed a historical maximum. We are still about 6-12” above what is likely to be our Preferred Water Level.

Appendix 2. Photo Gallery submitted to CEWF by Members and Residents.



Minden Village underwater



Causeway to Shuyler's Island on Horseshoe Lake under 29" of water



Spruce Lake Boathouse – showing overbank flooding of shoreline structure with ice still on the lake.



Wilkinson Road, Kennisis Lake washout of culvert



Road washout on route to Haliburton Lake



**Repairing the Invader Lane Causeway (Redstone Lake)
with a temporary bridge**



Water level scales, both upstream and downstream, at the Kennisis dam under water (only the tops of the Boards holding the scales are visible)



Buttermilk Falls dam sandbagged to prevent overflow



Johnson Park, Halls Lake



Moore Lake: Overbank flooding of shoreline infrastructure



Mountain Lake Property (2 images)



Horseshoe Lake Property (2 images)



Deer confused by flooding of road to Shuyler's Island, Horseshoe Lake



Overbank flooding Boshkung Lake



Maple Lake – with severe overbank flooding



Mississagua dam at capacity

Appendix 3. CEWF Questionnaire



April 29, 2013

CEWF Member Questionnaire re April 2013 Flood Event

Up to 50mm of rain fell across the northern portion of the Trent River watershed on April 18-19, 2013. As of April 28th total precipitation in Haliburton for the month of April was 126mm. According to Environment Canada the average total precipitation for April is 66mm or close to half of the precipitation received in 2013. Historically, there were comparable extreme rainfall events on April 27, 1956 (49mm) and on April 8-9, 1991 (52mm). However, this year the rain came at a time when the ground was still frozen in many places leading to the rapid run-off of water from the land into the lakes and rivers. The water level on some lakes reached new all-time highs – levels not seen in 100 years of record keeping. The Coalition intends to work with its member lake associations in an attempt to ensure that the lessons learned from this event are heeded for the future. Your input will be appreciated.

We are looking for ‘fact-based’ data in addition to pictures and stories that we can share. While we have access to the daily water levels on reservoir lakes, we lack water level information for flow-through lakes as well as details of changes to the log-counts at the dams.

Rather than respond to a ‘formal questionnaire’ that may not address your concerns , please use the space below to write a short narrative report including:

- the extent of any flooding around your association’s lake(s);
- details of damage to public infrastructure (roads, culverts etc.);
- details of damage to private property (docks, boats, cottages) ; and
- details of any concerns about the state of your dam.

Please also feel free to comment on:

- the response of public agencies (TSW, Haliburton County, Municipalities) to the event; and
- whether you believe that public agencies provided adequate and timely information to you about that response.

If you have any pictures to share we would like to receive these, preferably as ‘jpeg’ files. Please be aware that CEWF may chose to publish these and will require details as the location, date, subject matter, and photographer.

Finally, if you have any ‘stories’ to share we welcome those as well.

Appendix 4. Lakes of the Upper Trent Watershed & Survey Response

Responding Lakes – represented in the survey:

Gull River sub-watershed:

Kennisis & Little Kennisis; Big & Little Hawk; Hall's; Kushog; Percy; Haliburton & Oblong; Redstone; Maple & Beech; Boshkung; Mountain; Horseshoe; Big Bob; Gull; Moore.

Burnt River sub-watershed:

Drag & Spruce; Kashagawigamog; Soyers; Canning; Miskwabi; Loon; Esson – Rowbotham; Little Glamor; Glamor; White.

Nogies Creek; Mississagua; Eel's and Jack's Creek sub-watersheds:

Crystal; Mississagua; Jack's.

Lakes with no association, non-CEWF Member lakes, and non-responding lakes – not represented in the survey:

Gull River sub-watershed:

Red Pine; Nunikani; Sherbourne (Trout); Eagle; Twelve Mile & Little Boshkung; Little (South) Bob.

Burnt River sub-watershed:

Koshlong; Farquhar; Pusey (Grace); Gooderham, Contau, Fortescue; Salerno (Devil's).

Nogies Creek; Mississagua; Eel's and Jack's Creek sub-watersheds:

Anstruther; Eel's

Appendix 5. Questions Remaining

The following questions were submitted to the TSW by CEWF.

1. Do you know the volume of water that entered the Gull and Burnt river systems immediately following the April 18-19 rains and are you able to provide an estimate of the relative proportions that were due to: (a) the rain event; and (b) the continuing run-off from snow-melt/pre-existing ground water? Of the rain event water how much faster did this enter the system due to the ground being frozen than compared to normal conditions?

On September 14, 2013 the TSW's Dave Ness provided some valuable information related to the above question. For example:

- Inflows into the Gull River peaked at just over 250 cubic metres per second (m^3/s) in late April; this compares with peak flows of 100 to 150 m^3/s in 2008, 2009 and 2012.*
- At the end of April the total volume of water storage in the Haliburton reservoirs was 46,000 ha-m, 10.9% higher than the average maximum storage volume and it remained above average until mid-May.*

2. Looking at the Gull system upstream of Horseshoe Lake, we note that on April 7th there was almost enough storage available to accommodate the April 18th event but that by April 17th most of the available storage had been filled by local snowmelt/ runoff and inflow from the watershed above. Is this a fair assessment?

3. Again, looking at the mid-April water levels in the reservoirs (i.e. pre-storm), while most were close to the multi-year average, why were some lakes such as the Hawk Lakes significantly higher?

4. Immediately after the April 18-19 rain event, to what extent were log pulls (e.g. on Kennisis, Big Hawk and Horseshoe) performed to protect the dam infrastructure as opposed to mitigating flooding? We assume, for example, that the log pull on Kennisis enabled TSW to control the flow through the dam spillway as opposed to having water crest the retaining wall or go around the dam. We presume that the excess water in Kennisis Lake would have flowed downstream regardless, either under control or not. Is that a fair interpretation?

5. What consideration, if any, did TSW give to the fact that ice was still on many of the reservoir lakes until the last week of April and that bringing the water levels up early would result in above average ice damage to docks and other shoreline infrastructure? We understand for example that a log was pulled at Big Bob Lake upon request.

6. Why were no water management advisories or alerts released to the public by TSW throughout the event? This despite postings in 2012 regarding Spring Water levels and a low water advisory in the summer? Has there been a change in policy?

7. In your opinion, are there any specific locations on the reservoir or flow-through lakes where additional water level or flow-gauge monitoring systems or other water management tools would have been helpful to you?

8. In hindsight, what, if anything, might you have done differently?