Institute for Catastrophic Loss Reduction

CATtales

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Inside this issue:

New ICLR publication

Risk reduction status of homes reconstructed following wildfire disasters in Canada

ICLR's latest study looks into an aspect of wildfire disaster mitigation and recovery that has not been previously investigated. While previous research has focused on wildfire risk mitigations that homeowners should implement, those that they intend on implementing, or their attitudes towards mitigation and risk, this investigation sought to answer the question "To what degree have homeowners actually adopted and implemented FireSmart measures to mitigate the risk of future wildfire losses?"

The two worst wildland/ urban interface (WUI) fire disasters in modern Canadian history, the 2003 Okanagan Mountain Provincial Park wildfire at Kelowna, British Columbia, and the 2011 Flat Top Complex of wildfires at Slave Lake, Alberta, occurred within a decade of each other. Each was a tragedy of national scale.

However, these catastrophic circumstances also offered a rare occasion to better understand and improve upon the effectiveness of community wildfire protection and risk mitigation/ education programs. This study assessed current wildfire hazard at 445 homes reconstructed since these wildfires against recommended FireSmart® guidelines. This comparison created a reliable measure of the degree to which FireSmart guidelines have been accepted and adopted by homeowners.

This study focused on hazard mitigations applied by residents at, or very near to, private homes. It did not assess the broad scale wildfire mitigations being applied by Kelowna or Slave Lake authorities on public lands, such as extensive fuel treatments, fire guards, public education initiatives, and other FireSmart activities identified in their progressive Community Wildfire Protection Plans. The latter actions are also important and complementary to mitigations employed in backyards by local residents.

In general, results of this investigation showed that a few FireSmart solutions have been widely adopted by homeowners, others in part, ►

and some very little or not at all. The degree of adoption for known risk mitigations varied between geographic areas, between different categories of wildfire hazards, within categories of related hazard factors, and spatially within the home ignition zone. Equally important, the study revealed similarities among levels of adoption for some risk mitigations. Differences between urban centres and more rural settings were minor. Overall, twice as many wildfire hazard factors received a poor adoption grade, than those that attained an "excellent" rating.

Specifically, the degree to which guidelines have been adopted at private homes was rated good at Slave Lake, but fair to poor at Kelowna study sites. Only conditions at Slave Lake study sites could be confidently rated as "FireSmart." Present conditions at Kelowna study sites could result in a repeat of 2003 events in those neighbourhoods.

Spatial analysis of hazards within the home ignition zone revealed that the greatest degree of hazard, and lowest compliance with guidelines, existed in the most critical area (i.e. the home and the first 10m beyond). Without exception, it was concluded that the lowest levels of compliance pertained to guidelines for mitigating hazards associated with vegetation/fuel conditions in all fuel layers, and in all three FireSmart Priority Zones. Nearly 60% of all wildfire hazards were attributed to deficiencies in vegetation/fuel mitigations, whereas the hazard apportioned to each of the structural, ignition site, and topographic categories of hazards ranged from 17% to 10%.

Altogether, the investigation resulted in sixteen recommendations. These address levels of FireSmart adoption; communication, awareness, and community engagement; vegetation management; home construction and building materials; miscellaneous ignition factors; and the wildfire hazard assessment system itself.

The author made nine key recommendations in the study.

While investigation results warrant optimism that persistent programs of wildfire risk education and awareness are making progress to alleviate some important hazard factors, it is apparent that we are failing in regard to other hazard factors, including some of the most critical. This study justifies concern that low FireSmart adoption likely prevails in hundreds of other fire-prone communities across Canada.

Wildland/urban interface disasters are expected to become more frequent in the future. Adapting current programs to promote increased adoption of wildfire risk mitigation and to reduce the risk of catastrophic losses should become an urgent priority for insurers, urban planners, municipal administrators, researchers, fire prevention educators and public safety officials at all levels of government.

'Risk reduction status of homes reconstructed following wildfire disasters in Canada' can be downloaded at www.iclr.org **CT**

Author

Alan Westhaver, M.Sc. Principal, ForestWise Environmental Consulting Ltd., Fernie, B.C.

Alan Westhaver holds degrees in forestry and wildlife biology from the University of Montana. He recently retired following 34 years of service to Parks Canada, 27 of them as a senior wildland fire manager. His passion for the wildland/urban interface runs deep. He is a past president of Partners in Protection, served on its Board of Directors (1992-2012), and co-chaired the working group that developed and published the original FireSmart manual: *Protecting Your Community from Wildfire* in 1999. Between 1999 and 2012, in conjunction with the Foothills Research Institute and the Municipality of Jasper, he planned, managed, and implemented a comprehensive community wildfire protection program for the Town of Jasper, Alberta. The project merged ecological restoration and wildfire protection objectives and involved more than 1,000 hectares of mechanical and manual forest treatments. It was lauded for its many innovations with regards to communications, community engagement, and environmental sensitivity. This real-world experiment resulted in his 2006 M.Sc. thesis which integrated knowledge from wildland fire behavior, forestry, wildlife biology and social sciences to produce ecologically based fuel treatments attuned to the aesthetic concerns of WUI residents - and well supported by the public. Since retirement, Alan continues to provide services in the fields of wildland fire behavior analysis, community wildfire protection, FireSmart training, and environmental impact assessment through his Fernie-based consulting company. Alan and his wife, Lisa, spend much time camping, cycling and exploring, and are beginning to develop a fondness for the desert.

An update on urban flood-related projects at ICLR

By Dan Sandink, Manager, Resilient Cities and Research, ICLR

ICLR continues to engage in a wide range of activities aimed at reducing basement and urban flood risk for communities across Canada. Much of this work is related to ICLR's focus on lot-level mitigation, but specific projects on management of urban flood risk through improvement of infrastructure have been a growing emphasis for ICLR. This article briefly summarizes some of the ongoing urban flood mitigation work at ICLR.

Lot-level mitigation measures: Scientific evidence on reliability and maintenance

ICLR is partnering with Prof. Andrew Binns of the School of Engineering at the University of Guelph to study several aspects of lot-level flood mitigation measures. The first part of this project, which began in August, involves developing an apparatus and to measure long-term reliability issues and maintenance requirements for backwater valves. Future work will involve testing various types of backwater valves (e.g., valves placed in the interior and exterior of homes, bladder-type valves, among other products), as well as several other aspects of lot-level flood mitigation (for example, reliability of sump pump systems, issues related to sanitary laterals and issues related to the complexity of basement flooding, such as how gravel beds beneath floor slabs contribute to basement flooding and regional sewer backup risk). Testing will take place at UWO's Insurance Research Lab for Better Homes in London, Ontario.

The project is being guided by a technical committee comprised of municipal wastewater and stormwater staff and insurer representatives. Initial results of the project should be available in early 2016 and will inform continued ICLR outputs aimed at the public and technical audiences, including ongoing work on building code issues.

Building the case to manage Inflow/Infiltration (I&I) in new urban subdivisions

ICLR and the Regions of Peel and York are currently working with Norton Engineering to develop evidence concerning infiltration/inflow[1] rates in new urban developments. Though common sense would suggest that brand new developments would have negligible amounts of excess water entering sanitary systems, the experience of many municipalities suggests that I/I rates are much higher in new developments than would be expected. This work was motivated by the experience of several southern Ontario municipalities with new subdivisions and by the recent ICLR report authored by Prof. Ted Kesik (U of T) entitled *Best Management Practices for the Management of Inflow and Infiltration in New Urban Developments.*

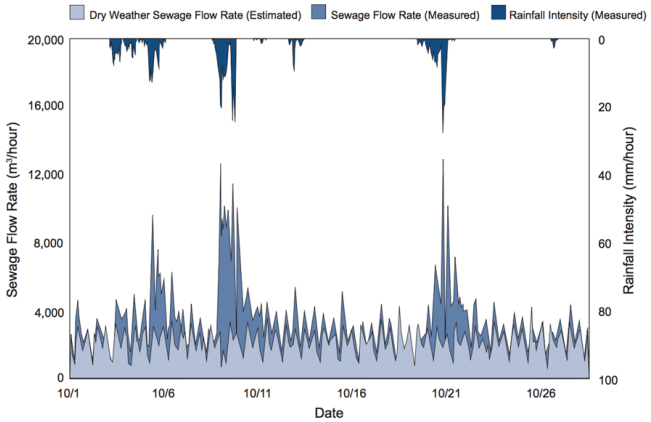
Project team members are currently rounding up sanitary sewer flow monitoring data from new subdivisions collected by various municipalities in Ontario. The intent of the project is to provide evidence to promote regulation of I/I in new developments and to identify issues related to construction and inspection practices that may affect I/I rates.

Public and stakeholder education

Development of public and technical resources to assist both the public and professionals involved in the management of urban flood risk continues to be one of the core activities of ICLR. Currently, ICLR is building its capacity in this area through in three areas, including:

- Development of accessible information on lot-level measures;
- The ongoing "Showcase Homes" program, and;
- Social marketing research in partnership with Credit Valley Conservation Authority.

Over the last few months, ICLR released a new guide entitled *Focus on Sump Pumps*. The guide outlines various important aspects related to the proper installation and maintenance of sump pumps for homeowners. ICLR is currently developing the second in this series of publications, entitled *Focus on Backwater Valves*. Further, basement flooding continues to be an emphasis of ICLR's Showcase Homes program, with recent basement flood retrofits completed in Burlington (December 2014) and Windsor (May 2015). ►



An example of I/I, as identified through flow monitoring in a sanitary system (Kesik/ICLR 2015)

ICLR is working with Credit Valley Conservation Authority on the development of a social marketing strategy focused both on lot-level green infrastructure measures and basement flood mitigation. This project will identify opportunities to identify social marketing approaches to encourage homeowners to mitigate flood risk. Specifically, the work aims to identify internal motivators that affect homeowner decisions to undertake property improvements. Typically programs aimed at homeowner risk reduction activities focus on the technical advantages of mitigation measures – like reducing risk and reducing contributions of stormwater to municipal systems through downspout disconnection. There is evidence to suggest, however, that property owners may be more likely to engage in home improvement activities for other reasons, for example improving the aesthetics of their homes and properties.

The goal of the work will be to identify factors that motivate homeowners to undertake risk reduction measures, aside from the traditionally emphasized technical reasons, and use these motivators to promote mitigation activities. The work will also identify how contractors and suppliers, including home improvement stores and plumbers, can be better motivated to encourage homeowners to undertake risk reduction work.

ML-FR4 backwater valve installation in Windsor home.

Understanding and promoting best practices

Cities Adapt to Extreme Rainfall, released in December 2014, continues to generate interest in ICLR's work related to management of urban flood risk. The book was sent to municipal councils and mayors across Canada, including Calgary, Brampton, Edmonton, Gatineau, Halifax, Hamilton, Kitchener, Laval, Longueuil, Mississauga, Montreal, Ottawa, Quebec City, Saskatoon, Surrey, Vancouver, Windsor, Winnipeg, Regina and St. John's. In several cases, municipal public servants requested copies to be provided directly to city councils to educate them on urban flood, I/I, and stormwater management issues.

Window well installation in the Burlington home, November 2014.

So far ICLR staff have been invited to give dozens of presentations based on the book to local, provincial and national groups. Later in 2015, ICLR, in partnership with Health Canada, plans to release the second book in this series, this time focusing on 20 case studies of cities management of extreme heat risk.

Improving building codes and standards

ICLR continues its involvement in building code issues related to management of urban flood risk, including advising code officials, provincial and federal code professionals on various issues related to management of urban flood risk through adaptation and implementation of building and plumbing codes. ICLR staff have recently joined a Underwriters' Laboratories of Canada/ULC technical committee focused on the development of standards on methods designed to reduce sewer backup risk, including backwater valves. The first task of the committee is to develop a technical standard on "smart" systems designed to mitigate basement flood risk (specifically, sensor controlled, electronic systems that rely on air-filled bladders to block sewer connections during sewer backup events). The technical committee will also explore the development of standards related to other aspects of lot-level sewer backup risk reduction, including alternative measures to backwater valves. ►

Wanted: New products to lighten the financial burden placed on taxpayers from disasters

By Glenn McGillivray, Managing Director, ICLR

This year may go down as the worst year ever for wildfires in British Columbia. While, to date, insured damages have been relatively low (despite 29 homes being lost in Rock Creek), suppression costs have been well above average. Indeed, the province blew through its $63 million wildfire fighting budget by the end of June, and Premier Christy Clark has estimated that suppression costs may reach $400 million for the year.

Suppression costs are also up in Alberta which, by mid-August, had already experienced a year's worth of wildfires (1,600 so far). And Saskatchewan isn't faring much better, with estimates that suppression costs will exceed $100 million when all is said and done, significantly higher than the $56 million budget set aside for 2015.

But with insured damage nowhere near that experienced in Kelowna in 2003 and Slave Lake in 2011, why should the industry care about high wildfire suppression costs?

In 'Narrowing the gap between insured and economic damage from natural hazards' (http://bit.ly/1ERW5NI) I wrote that the insurance coverage gap spells opportunity for the (re)insurance industry. In essence, the gap exists – in part – either because the proper insurance products have yet to exist or because no one from the (re) insurance industry has reached out (to governments in particular) to offer solutions to fill voids in coverage.

But the Canadian (re) insurance sector has shown that it is capable of great innovation.

A number of years ago, a block of reinsurers provided a fairly simple stop-loss product to the province of Alberta that was designed to kick in should wildfire suppression costs exceed a certain level (the state of Oregon has been purchasing such coverage from Lloyd's of London for several decades). The product was only in force for a year or two before the province opted not to renew. Nothing quite like it had been seen in Canada before, and nothing has been seen like it since. But it shows the type of (dare I say it) 'out of the box' thinking that is possible.

There is nothing stopping such a product from being put into place again. What's more, it can be used as a model for other, similar products.

Imagine a cover that kicks in if snow or debris removal expenses exceed a certain threshold, or one that reimburses a municipality or utility if overtime costs exceed a certain amount because of an extreme weather event (like the 2013 Christmas ice storm in the GTA).

How about a simple stop-loss cover that kicks in if federal Disaster Financial Assistance Arrangements (DFAAs) exceed a certain amount, or what if the DFAAs were laid off to the reinsurance industry altogether?

How about a product that provides coverage for municipal assets such as roads, sewers and culverts, which generally fall outside the usual products offered by traditional insurance or reciprocal exchanges?

What about a parametric cover that kicks in if a rainstorm or snowstorm of a certain size affects a community?

Or how about a cat bond for a city or province?

The possibilities aren't endless, but there are many of them to be sure. And while some solutions may require blazing wholly new trails, other solutions – like those involving simple stop-loss covers and other traditional reinsurance products – can easily borrow from the past.

Essentially, when a natural disaster strikes, taxpayers are – in one way or another – left holding the bag.

Why not leverage the capital strength and expertise of the (re)insurance industry and lighten the financial burden that is placed on citizens?

In many cases, it's not hard to do.

We've already proven that we can think innovatively in the area, we just need to do a better job of reaching out, and explaining the possibilities.

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Preliminary losses for 1H 2015 $37 billion, number of victims rise: Swiss Re

According to preliminary Swiss Re sigma estimates, total economic losses from natural catastrophes and man-made disasters reached USD 37 billion in the first half of 2015. The global insurance industry covered nearly 45% (USD 16.5 billion) of these losses, which is higher than the previous 10-year average cover of 27%. Around 18,000 people lost their lives in disaster events in H1 2015, up from more than 4,800 in the first half of last year. The earthquakes in Nepal, and a heatwave in India and Pakistan, claimed the highest number of victims.

Natural catastrophes caused total economic losses of USD 33 billion in the first half of the year, well below the USD 54 billion in H1 2014 and also the average first-half year loss over the previous 10 years (USD 99 billion). Of the overall insured losses, USD 12.9 billion came from natural disasters, down from nearly USD 20 billion in H1 2014 and again below the average first-half year loss of the previous 10 years (USD 25 billion). The costliest natural catastrophes for the insurance industry resulted from severe winter weather and thunderstorms in the U.S. and Europe. In February, a winter storm in the northeastern U.S. caused insurance losses of USD 1.8 billion, the highest loss of any event so far this year. Man-made disasters, meanwhile, triggered an additional USD 3.6 billion in overall insurance losses in H1 2015.

Disaster events claimed many lives in the first six months of 2015. In all, around 18,000 people lost their lives. There were more than 9,000 fatalities in the earthquakes that struck Nepal in close succession in April and May, the largest loss of life due to any natural catastrophes so far this year. The quakes also left many people homeless. The economic losses in Nepal are estimated to be more than USD 5 billion. Of those, only around USD 160 million were insured losses.

"The tragic events in Nepal are a reminder of the utility of insurance," says Kurt Karl, Chief Economist at Swiss Re. "Insurance cover does not lessen the emotional trauma that natural catastrophes inflict, but it can help people better manage the financial fallout from disasters so they can start to rebuild their lives".

In the same region, India and Pakistan were hit by a severe heat wave in May and June. Temperatures soared to 48°C, the highest recorded since 1995. It is estimated that more than 2,500 people died in India and 1,500 in Pakistan as a result of the extreme heat.

Another factor in the high number of victims of disaster events in the first half of this year is the number of migrants who have died attempting to reach Europe from conflict zones in northern Africa, often in unseaworthy vessels. In search of a better life, sadly these people have instead lost their lives as the boats capsized while carrying them across the Mediterranean.

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Table 1: Total economic and insured losses in H1 2015 and H1 2014

USD billion

	H1 2015	H1 2014	annual change	10-year average
Economic loss (Total)	37.4	59.0	-37%	107
Nat cat	33.0	54.1	-39%	99
Man-made	4.4	4.9	-9%	8
Insured loss (Total)	16.5	23.6	-30%	29
Nat cat	12.9	19.7	-35%	25
Man-made	3.6	3.9	-6%	4

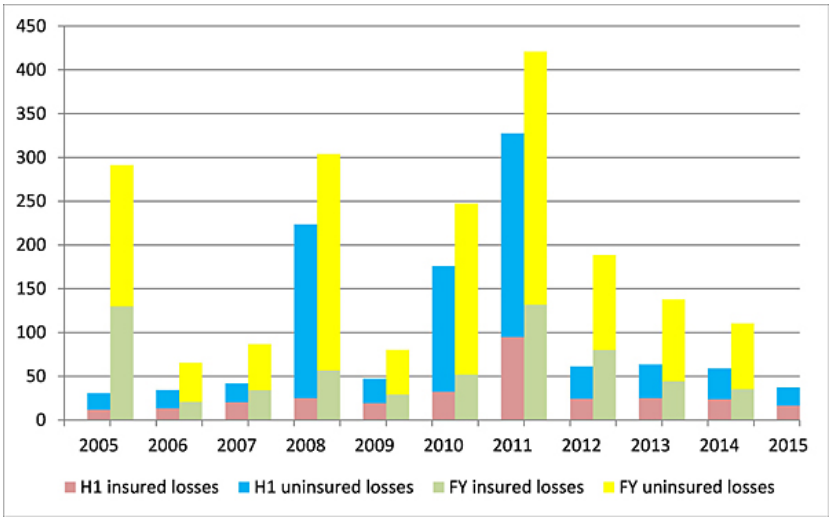
Source: Swiss Re Economic Research & Consulting and Cat Perils.

Table 2: The most costly insured natural catastrophe losses in H1 2015 (USD billion)

USD billion

Month	Insured losses[1]	Total losses	Event	Country
Feb	1.8	2.4	Thunderstorms[2]	United States
April	1.0	1.4	Thunderstorms[2]	United States
March	1.0	1.4	Winter Storm Niklas[3]	Germany, Netherlands, et al
April	1.0	1.3	Thunderstorms[2]	United States
April	0.8	1.0	Thunderstorms[2]	United States
May	0.7	1.3	Thunderstorms, Flooding[2]	United States

Note: (1) Property and business interruption, excluding liability and life insurance losses.
Source: (2) US natural catastrophe data with permission of Property Claims Services; (3) Perils AG.



Climate change and stormwater management design standards

IDF curve information is typically calculated based on historical rainfall events and does not account for the impacts of climate change, and information on how climate change might affect the frequency of extreme rainfall events has historically been out of reach of most municipal infrastructure managers. The intention of the IDFCC tool was to provide access to a standardized IDF curve update process that incorporates Global Climate Model outputs, thus allowing users to easily assess the potential impacts of climate change on local extreme rainfall information. This information can then be used to assess infrastructure vulnerability and design infrastructure that can better cope with rainfall intensities that are expected under changing climate conditions.

The IDFCC tool currently has over 280 registered users from various sectors, including municipal, provincial and federal governments, conservation authorities, and the consulting sector. The tool is publicly accessible and can be found at http://www.idf-cc-uwo.ca. Development of the tool was facilitated by funding from the Canadian Water Network and ICLR.

Conclusion

ICLR has engaged with stakeholders from across Canada to promote urban flood mitigation, and continues to develop new information to support homeowners, municipalities and insurers in the management of urban flood risk. Additional urban flood work not summarized in this article include:

- Support and involvement in the multi-year, multi-million dollar FloodNET project, which brings together flood researchers from across Canada to work on a variety of flood related projects, including flood warning systems and urban stormwater management issues;
- Providing technical support for the City of Calgary's project on assessment of flood mitigation measures;
- Ongoing partnership with Green Communities Canada to provide technical support and training for "guides" who inspect homes for basement flood risk and mitigation factors, with events held in Kitchener/Waterloo, Calgary North Bay, Hamilton, and planned events in Barrie and St. Catharines;
- Flood-related workshops as part of ICLR's ongoing *Friday Forum* workshop series, including upcoming presentations by Alberta WaterSMART on flood mitigation activities in Alberta, and;
- Recent academic publications on the topic of urban flood management and flood insurance.[2] **CT**

Notes

1) Inflow/infiltration (I/I) is excess water that enters municipal sanitary sewer systems. I/I is one of the most important causes of sewer backup during extreme rainfall events. I/I also results in capacity and operational issues at wastewater treatment plants and can cause serious environmental problems, including the release of raw sewage into lakes and streams during extreme rainfall events.
2) Sandink, D. (2015). Urban Flooding and Ground-Related Homes in Canada: An Overview. *Journal of Flood Risk Management*. DOI: 10.1111/jfr3.12168
3) Sandink, D., Kovacs, P., Oulahen, G., and Shrubsole, D. (2015). Public Relief and Insurance for Residential Flood Losses in Canada: Current Status and Commentary. *Canadian Water Resources Journal*. DOI: 10.1080/07011784.2015.1040458

Institute for Catastrophic Loss Reduction

20 Richmond Street East
Suite 210
Toronto, Ontario
M5C 2R9
Tel: (416) 364-8677
Fax: (416) 364-5889
www.iclr.org
www.basementfloodreduction.com

Mission
To reduce the loss of life and property caused by severe weather and earthquakes through the identification and support of sustained actions that improve society's capacity to adapt to, anticipate, mitigate, withstand and recover from natural disasters.

Western University
Boundary Layer Wind Tunnel
1151 Richmond Street
London, Ontario
N6G 5B9
Tel: (519) 661-3338
Fax: (519) 661-3339
www.iclr.org
www.basementfloodreduction.com