



Welcome



Extreme Water Levels – Impacts and Strategies.

Agenda

- **TOPIC A: Septic Systems & Potable Water.** How vulnerable is your septic system? What are the options to resolve septic issues? How will potable water be affected by extreme water levels? What techniques/technologies are available to address these impacts?
- **TOPIC B – Insurance.** Flooding – extreme storm events – damage from wind and waves? What are the potential impacts on property insurance? What risks can be insured?
- **TOPIC C – Planning and Infrastructure.** Action Plan 2030 – review of key recommendations concerning support for individuals, businesses and municipal governments to address shoreline infrastructure impacts and shoreline resilience. What are the benefits of long-term planning vs executing short term solutions?



Extreme Water Levels – Impacts and Strategies.



- Housekeeping Information:
 - There will be a synopsis report with the slides distributed after the session.
 - Please type your questions into the Q & A box so that we can record them.
 - If we are not able to answer all questions in the session, we will answer the questions in follow-up reporting.
 - We will not be addressing basic water levels questions in this symposium, please refer to our websites for the 2020 Q&A and symposium summary where those questions were addressed by the expert panelists.
 - All housekeeping information will be located in the chat box for your reference throughout the session. Please have a look.



Rolfe Jones
Chair
Georgian Bay Association



Adam Chamberlain

Chair

Georgian Bay Forever

Water Levels 2021 - Marilyn Longlade Capreol



- Early spring of 1949, I was born to Napoleon and Norah Geroux Longlade. My first home was the island behind the Ojibway Island. During the winter months we moved to our mainland location on the shores of Pointe au Baril.
- Summer's home was always bustling with Grandparents, aunts, uncles and many cousins. We would hear the song of languages, both Ojibway and French. Hear the fishing stories each day and/or watch Grandma and aunts make their quill boxes.
- Very young we were taught to respect and understand the gifts of water, wind, animals, plants, the sky that holds beautiful stars. Our first knowledge and education were done by our parents, grandparents and community. There are no books to this day for this gift of learning. It was and is strictly learned by the teachings.
- I am very grateful and acknowledge, Mishomis Giiziis (Grandfather Sun) miinwaa (and) Nokomis Dibik Giiziis (Grandmother Moon). They encourage every living being and walk beside all each day.

Water Levels 2021 – Dr. Neil Hutchinson

Neil became passionate about environmental science as a teenager and coupled its emergence as a discipline with his personal attraction to water and Canadian geography.



Having worked on water quality from Newfoundland to BC and from southern Ontario to Nunavut, he considers himself fortunate to have taken part in the great strides made in environmental management over his 45-year (and counting!) career as a summer student, graduate student, government scientist, consulting scientist and finally managing his own consulting firm of dedicated, likeable and talented individuals.

He earned an Hon. B.Sc. in Ecology in 1978 and a Ph.D. in Zoology in 1985, both from the University of Guelph. His professional career has focused on pollutants and stressors of aquatic systems, with a focus extending from geochemical to laboratory to whole-watershed levels of investigation and a specialization in Precambrian Shield systems. Neil chairs our GBF Science Committee and is in the process of retiring from the consulting firm he founded in 2009.

Water Levels 2021 – Cheryl Evans



- **Cheryl Evans**, Director, Flood and Wildfire Resilience, Intact Centre on Climate Adaptation at the University of Waterloo
- Cheryl leads the program development, oversight and continuous improvement of a variety of initiatives whose primary objective is to mobilize on-the ground action to improve the resilience of Canadian homes, businesses and communities to flooding and wildland urban interface wildfires.
- Cheryl has over 20 years of community engagement and program management experience in the fields of stormwater management, flood risk mitigation, home energy conservation and youth environmental education. She served as a technical committee member on CSA's Guideline on Basement Flood Protection and Risk Reduction (CSA Z800) and was a lead curriculum developer for the Ontario College's Flood Risk Assessment Training Program.
- She currently serves as a member of the City of Toronto Flood Resilience Working Group and is a Climate Change Committee Member for the Canadian Water and Wastewater Association. Cheryl's team is the recipient of Canada's Clean50 Top Project Award for 2020. Cheryl holds a B.E.S. in Environment & Resource Studies from the University of Waterloo.

Water Levels 2021 – Nicola Crawhall



- Nicola's consulting firm, Westbrook Public Affairs, led the secretariat that developed Action Plan 2030.
- She is the former Deputy Director of the Great Lakes and St. Lawrence Cities Initiative, a coalition of Canadian and U.S. mayors who work together to protect the Great Lakes and St. Lawrence.
- Nicola has served as senior policy advisor to two Ontario Ministers of the Environment, and has also served as senior environmental policy advisor for the Association of Municipalities of Ontario.



Rupert Kindersley

Executive Director

Georgian Bay Association



David Sweetnam

Georgian Baykeeper
Executive Director
Georgian Bay Forever

Water Levels 2021 – Aisha Chiandet



- Aisha is a water scientist with the Severn Sound Environmental Association and focuses on water quality monitoring of lakes and tributaries in the Severn Sound watershed with a particular emphasis on nutrient conditions and responses of biological communities.
- Her work has also included analyses of climate impacts on local waterways, including on water levels. More recently she initiated several citizen science programs with goals to monitor the impacts of climate change, algae growth and water level fluctuations.

Extreme Water Levels – Impacts and Strategies.



- Housekeeping Information:
 - There will be a synopsis report with the slides distributed after the session.
 - Please type your questions into the Q & A box so that we can record them.
 - If we are not able to answer all questions in the session, we will answer the questions in follow-up reporting.
 - We will not be addressing basic water levels questions in this symposium, please refer to our websites for the 2020 Q&A and symposium summary where those questions were addressed by the expert panelists.
 - All housekeeping information will be located in the chat box for your reference throughout the session. Please have a look.



Welcome



Extreme Water Levels – Impacts and Strategies.

Agenda

- **TOPIC A: Septic Systems & Potable Water.** How vulnerable is your septic system? What are the options to resolve septic issues? How will potable water be affected by extreme water levels? What techniques/technologies are available to address these impacts?
- **TOPIC B – Insurance.** Flooding – extreme storm events – damage from wind and waves? What are the potential impacts on property insurance? What risks can be insured?
- **TOPIC C – Planning and Infrastructure.** Action Plan 2030 – review of key recommendations concerning support for individuals, businesses and municipal governments to address shoreline infrastructure impacts and shoreline resilience. What are the benefits of long-term planning vs executing short term solutions?





Rolfe Jones
Chair
Georgian Bay Association

Water Levels 2021 - Marilyn Longlade Capreol



- Early spring of 1949, I was born to Napoleon and Norah Geroux Longlade. My first home was the island behind the Ojibway Island. During the winter months we moved to our mainland location on the shores of Pointe au Baril.
- Summer's home was always bustling with Grandparents, aunts, uncles and many cousins. We would hear the song of languages, both Ojibway and French. Hear the fishing stories each day and/or watch Grandma and aunts make their quill boxes.
- Very young we were taught to respect and understand the gifts of water, wind, animals, plants, the sky that holds beautiful stars. Our first knowledge and education were done by our parents, grandparents and community. There are no books to this day for this gift of learning. It was and is strictly learned by the teachings.
- I am very grateful and acknowledge, Mishomis Giiziis (Grandfather Sun) miinwaa (and) Nokomis Dibik Giiziis (Grandmother Moon). They encourage every living being and walk beside all each day.



Adam Chamberlain

Chair

Georgian Bay Forever



David Sweetnam

Georgian Baykeeper
Executive Director
Georgian Bay Forever

A. High and Dry – Rising Waters and Your Septic and Water Systems

Speaker:

Dr. Neil Hutchinson, Director, Georgian Bay Forever



Water Levels 2021 – Dr. Neil Hutchinson

Neil became passionate about environmental science as a teenager and coupled its emergence as a discipline with his personal attraction to water and Canadian geography.



Having worked on water quality from Newfoundland to BC and from southern Ontario to Nunavut, he considers himself fortunate to have taken part in the great strides made in environmental management over his 45-year (and counting!) career as a summer student, graduate student, government scientist, consulting scientist and finally managing his own consulting firm of dedicated, likeable and talented individuals.

He earned an Hon. B.Sc. in Ecology in 1978 and a Ph.D. in Zoology in 1985, both from the University of Guelph. His professional career has focused on pollutants and stressors of aquatic systems, with a focus extending from geochemical to laboratory to whole-watershed levels of investigation and a specialization in Precambrian Shield systems. Neil chairs our GBF Science Committee and is in the process of retiring from the consulting firm he founded in 2009.

Water Levels 2021 – Dr. Neil Hutchinson

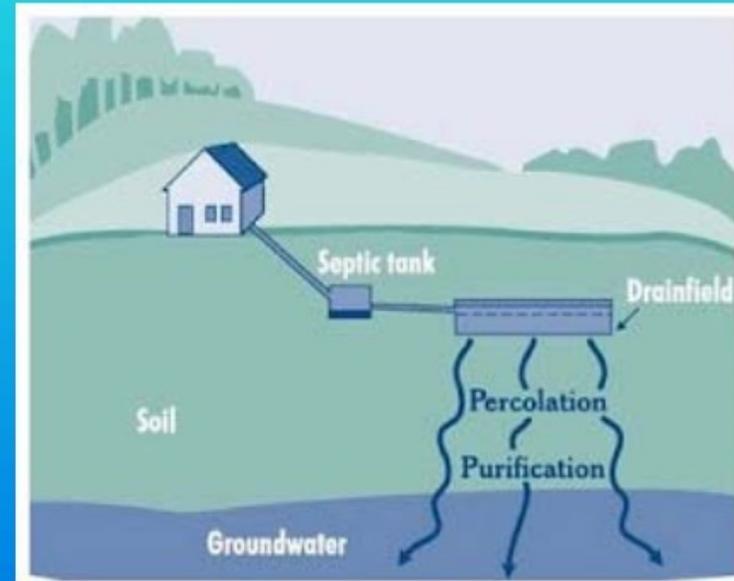
Agenda

1. Septic Systems 101
2. How do they work and what do they do?
3. The perils of saturation
4. Implications for septic systems and Georgian Bay
5. Potable water, water levels and climate change.

Microbiology of Septic Systems

The purpose of any treatment system, public or onsite, is to protect ground and surface waters by reducing the amount of nutrients and pathogens in effluent.

What happens when this is not effective?



Winter/Spring 2013

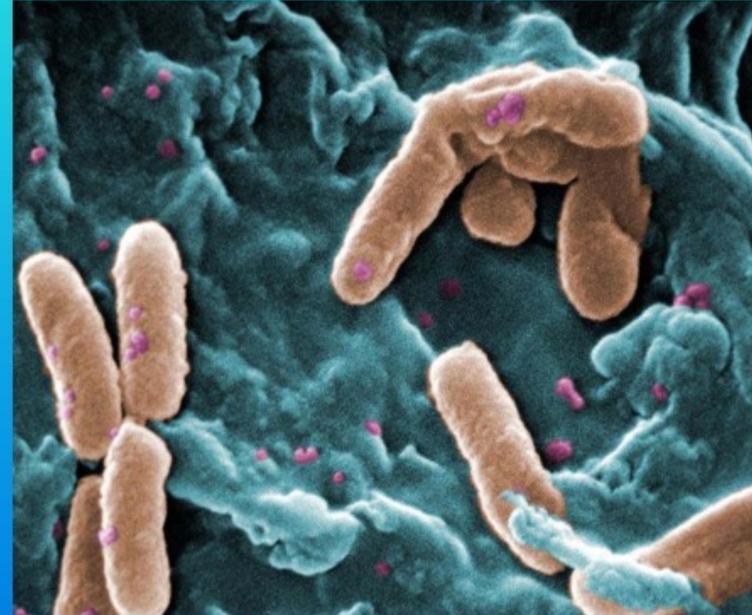
JETCC

DHHS, Division of Environmental Health

Microbiology of Septic Systems

The Process

The basic mechanisms of biological treatment are the same for all treatment processes. Microorganisms, principally bacteria, metabolize organic material and inorganic ions present in wastewater during growth.

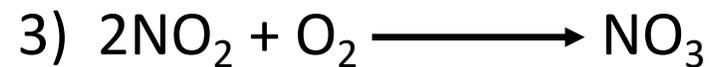
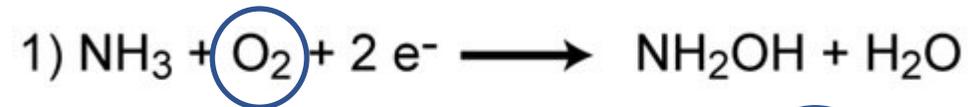
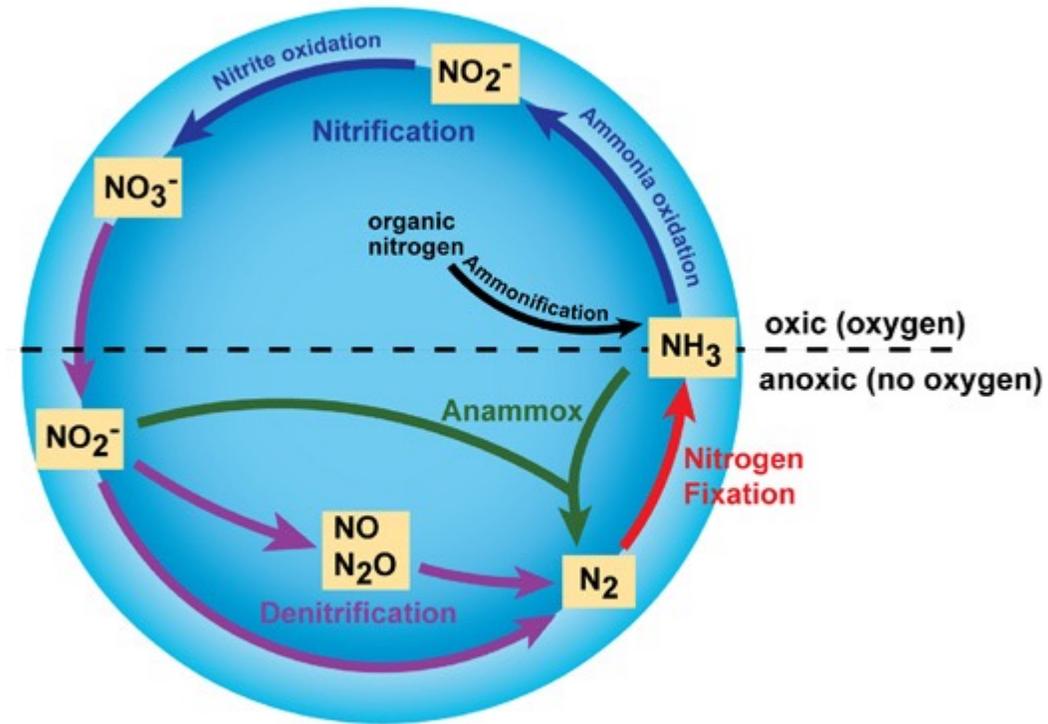
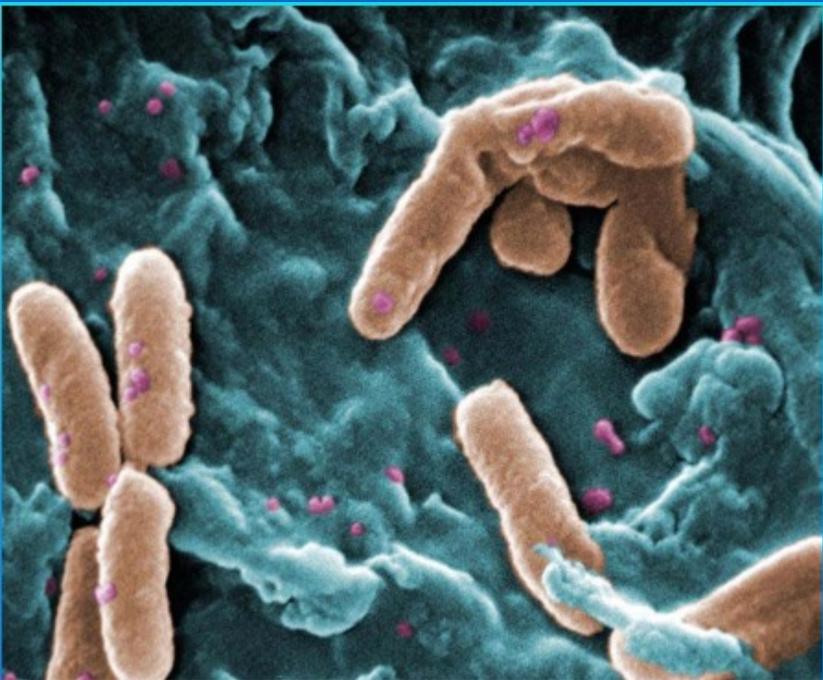


Winter/Spring 2013

JETCC

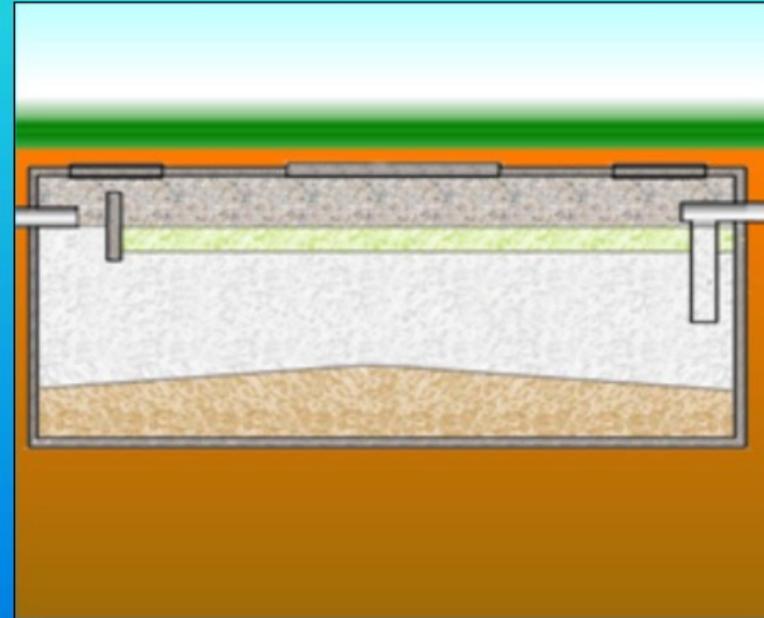
DHHS, Division of Environmental Health

Microorganisms, principally bacteria, metabolize organic material and inorganic ions present in wastewater during growth.



Microbiology of Septic Systems

A typical septic system accomplishes treatment in a two phase process. In the first phase, raw wastewater is introduced to a septic tank for a combination of solids separation and anaerobic digestion.



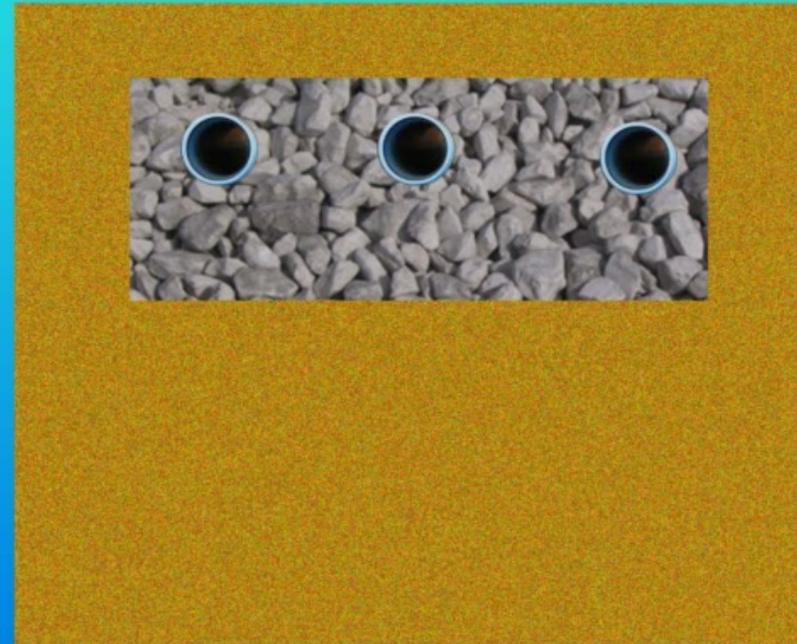
Winter/Spring 2013

JETCC

DHHS, Division of Environmental Health

Microbiology of Septic Systems

In the second phase, the primary effluent from the septic tank is treated by physical and biological processes in the disposal area and surrounding soil.



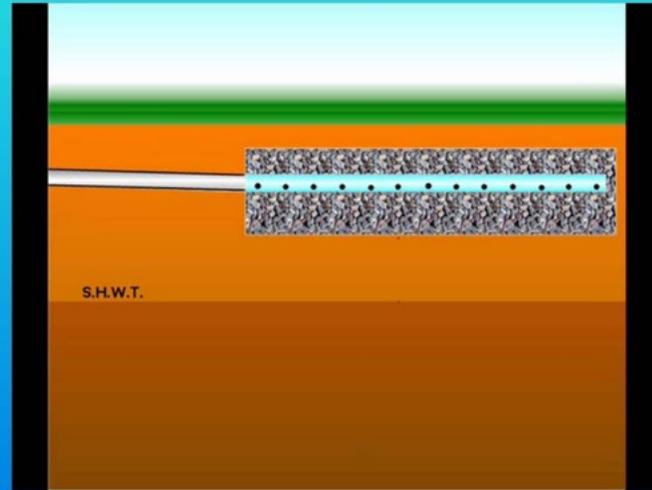
Winter/Spring 2013

JETCC

DHHS, Division of Environmental Health

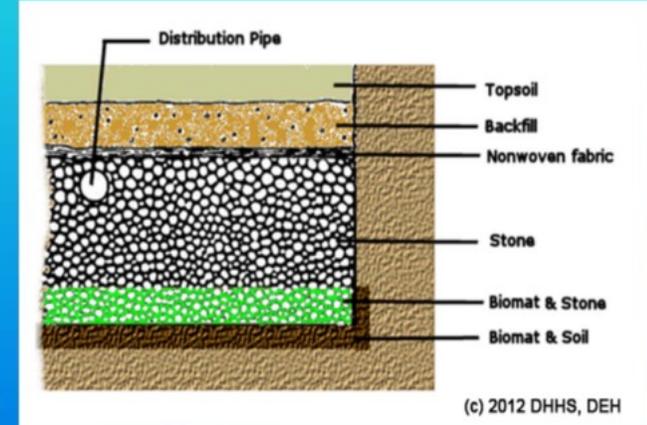
Microbiology of Septic Systems

Biological mats develop on the sides and bottoms of the trenches and add to a biological filtration of the effluent passing through it into the soil environment.



Microbiology of Septic Systems

This mat normally penetrates 1/2 to 6 centimeters into the soil. It consists of septic tank effluent solids, mineral precipitates, microorganisms, and the by-products of decomposition.



Winter/Spring 2013

JETCC

DHHS, Division of Environmental Health

Winter/Spring 2013

JETCC

DHHS, Division of Environmental Health

Water Levels 2021

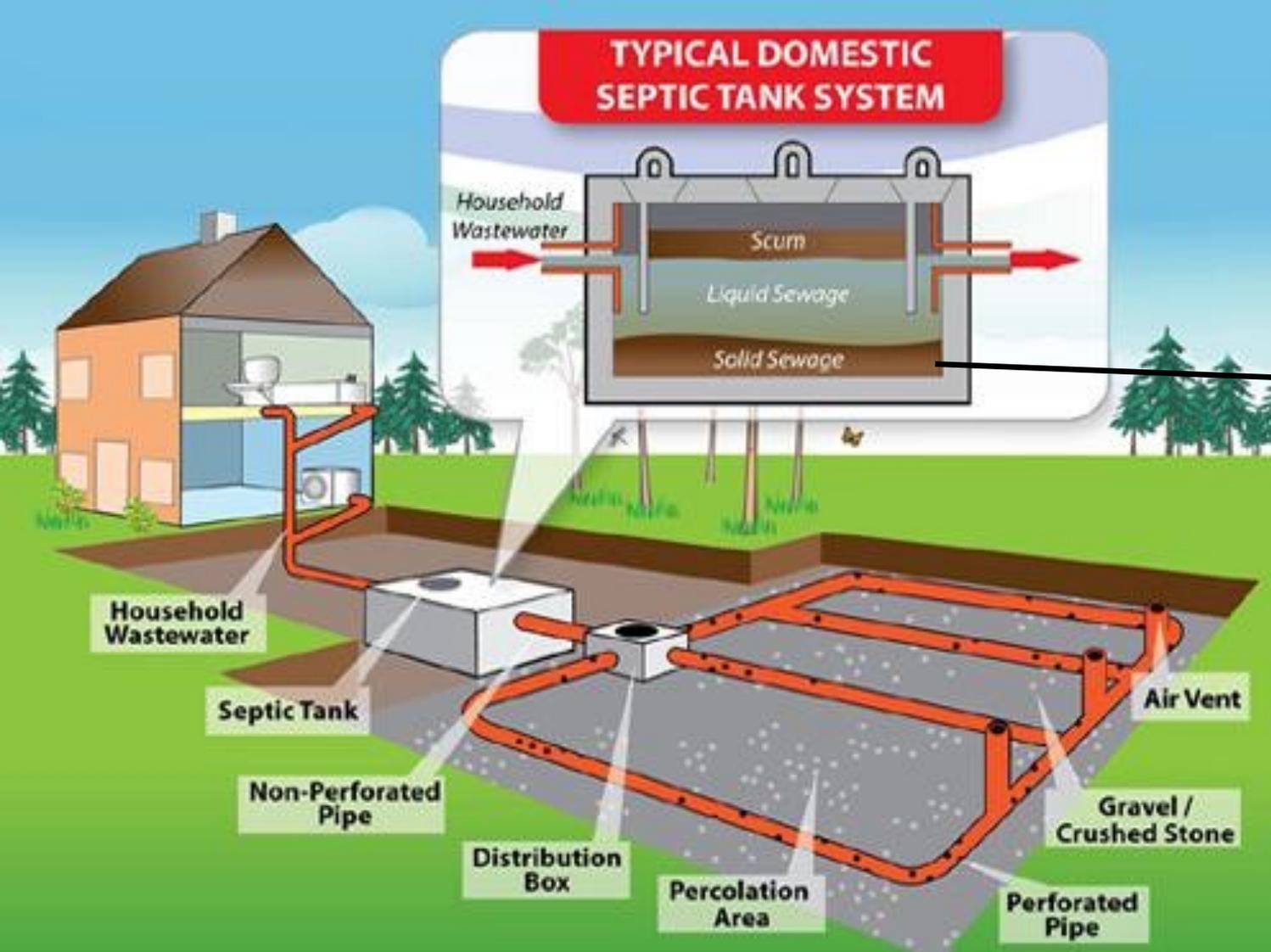
Table 3-5 Typical Composition of Untreated Domestic Wastewater

Constituent	Strong	Medium	Weak
Solids (Total):	1,200	720	350
• Dissolved (Total)	850	500	250
> Fixed	525	300	145
> Volatile	325	200	105
• Suspended (Total)	350	220	100
> Fixed	75	55	20
> Volatile	275	165	80
Settleable Solids (mL/L)	20	10	5
Biochemical Oxygen Demand, 5-day, 20°C (BOD ₅ , 20°C)	400	220	110
Total Organic Carbon (TOC)	290	160	80
Chemical Oxygen Demand (COD)	1,000	500	250
Nitrogen (Total as N):	85	40	20
• Organic	35	15	8
• Free Ammonia	50	25	12
• Nitrites	0	0	0
• Nitrates	0	0	0
Phosphorus (Total as P):	15	8	4
• Organic	5	3	1
• Inorganic	10	5	3
• Chlorides ¹	100	50	30
Alkalinity (as CaCO ₃) ²	200	100	50
Grease	150	100	50

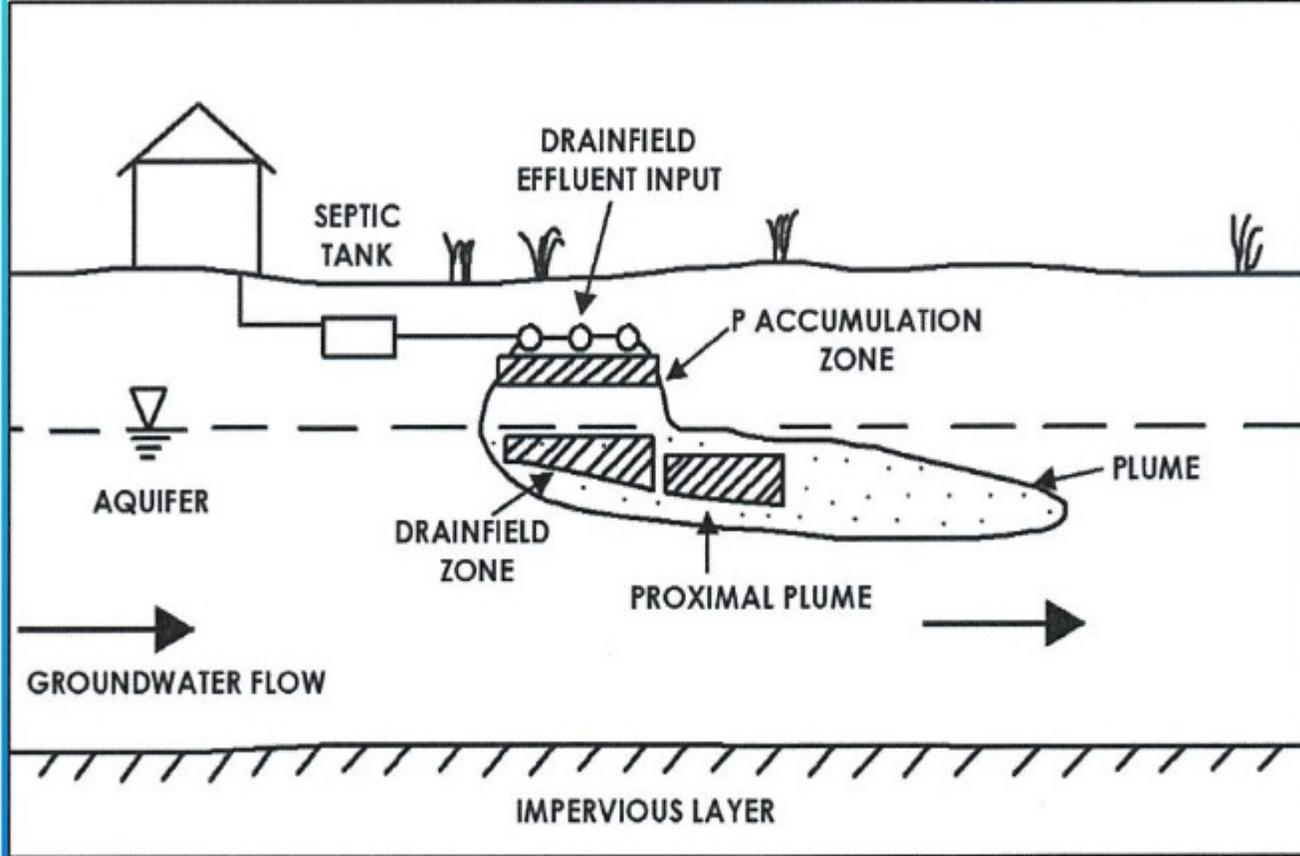
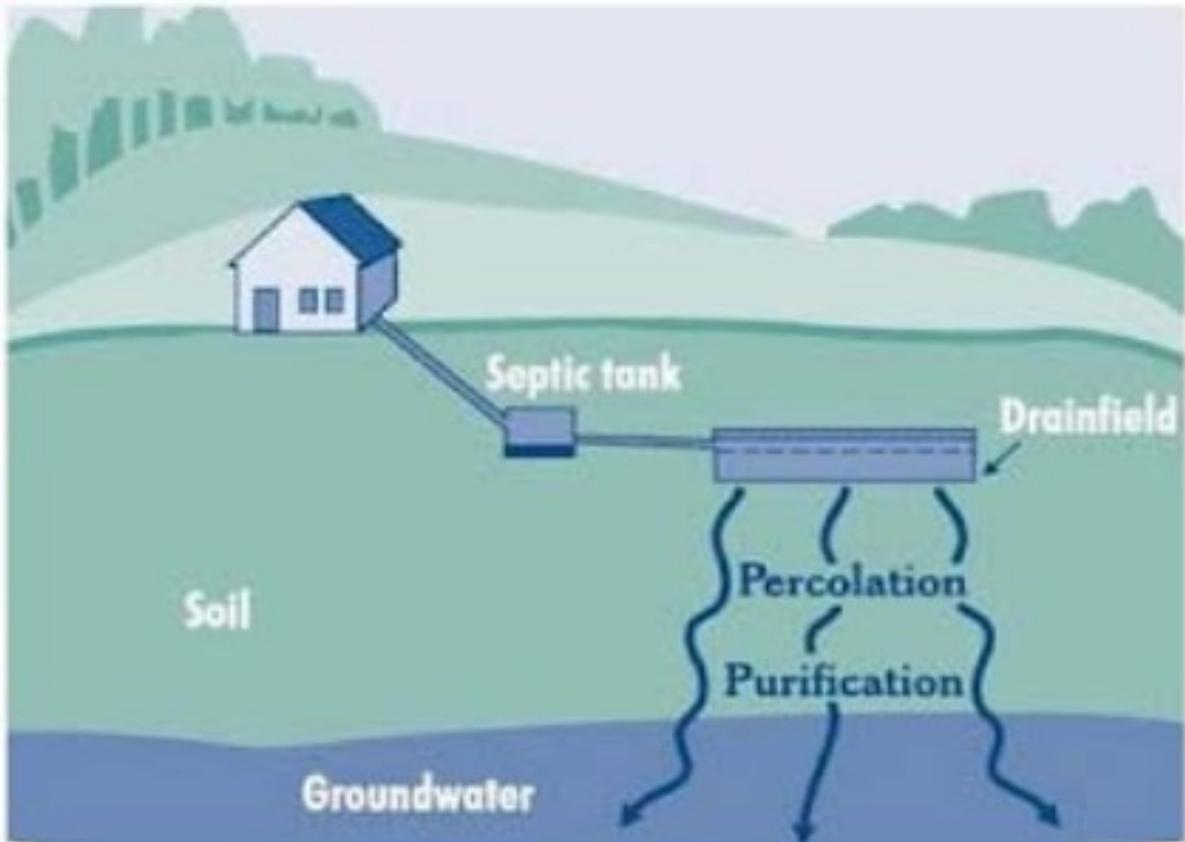
Water Quality Parameter	% Removal In A Septic Tank	% Removal In A Leach Field
BOD (Biochemical Oxygen Demand)	15% to 50%	75% to 90%
TSS (Total Suspended Solids)	25% to 45%	75% to 90%
Settleable Solids	> 90%	75% to 90%
Enteric Bacteria	10% to 40%	80% to 90%
Enteroviruses	No Significant Reductions	generally high but variable
Protozoa	No Significant Reductions	generally high but variable

Removal rates for septic tanks and leach fields.

Domestic Wastewater Composition and Treatment



https://miro.medium.com/max/996/1*iyBMajngIG1LTM3IZFwN6A.jpeg



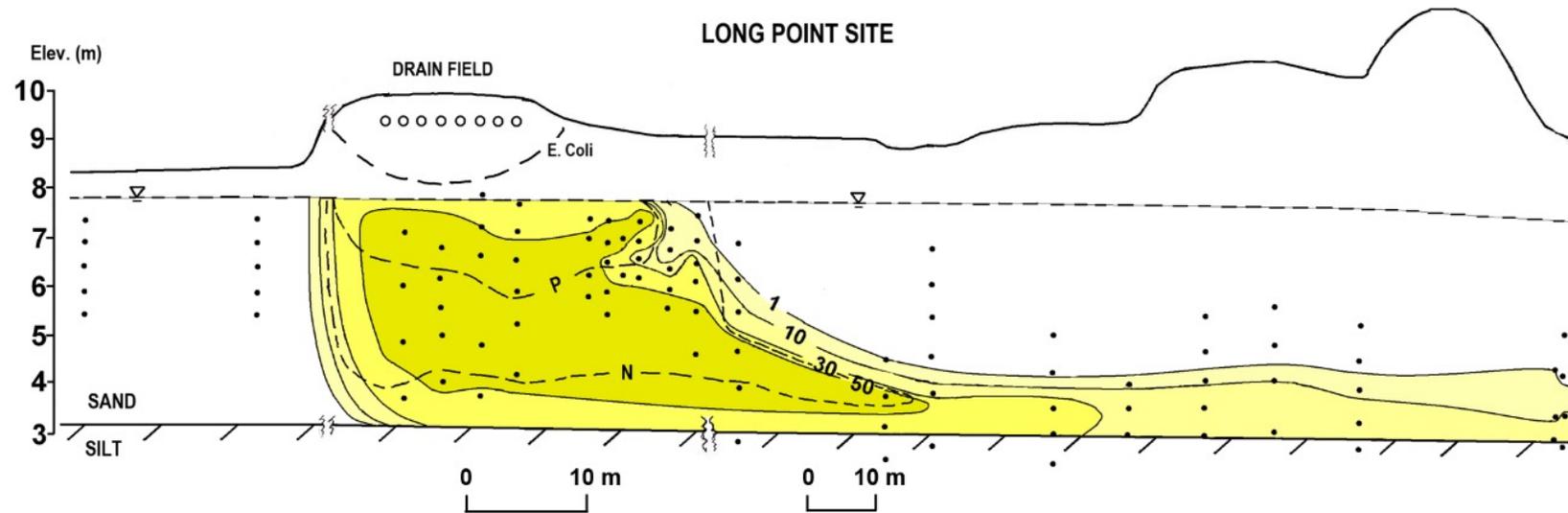
Why Keep it Dry ?

Microbiology of Septic Systems

Fortunately, pathogenic microorganisms not native to the subsurface environment generally don't multiply underground and will eventually die. Despite this they can move far enough and live long enough to be of concern around wastewater disposal areas. Of special concern, saturated flow conditions can lead to horizontal movement of microbes. Unsaturated conditions are optimal and lead to greater attenuation.

Bacteria

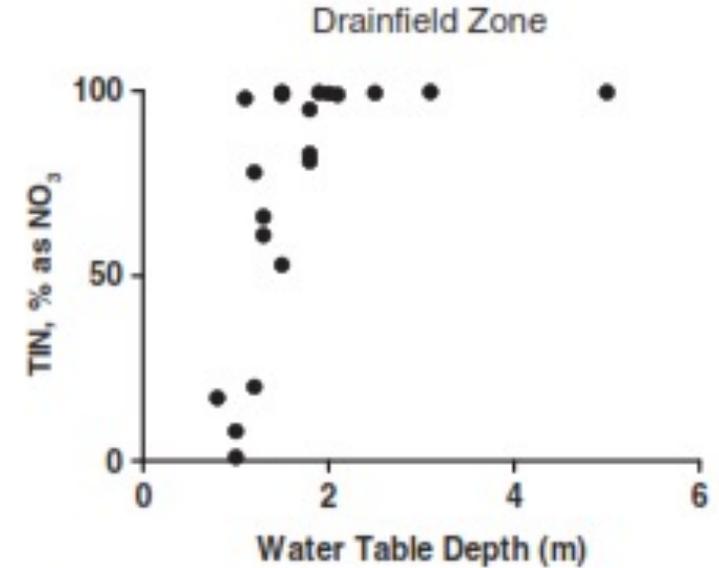
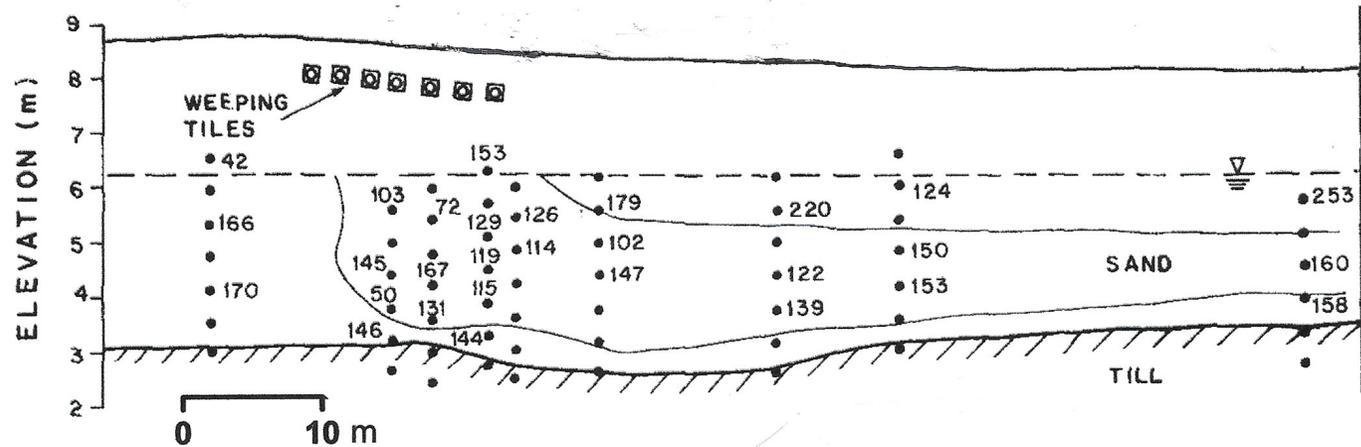
Retained microbes in dry soils can be released by surface or ground water saturation.



Treatment can be highly effective as long as an **adequate unsaturated zone** is maintained.

Nitrification of Ammonia to Nitrate

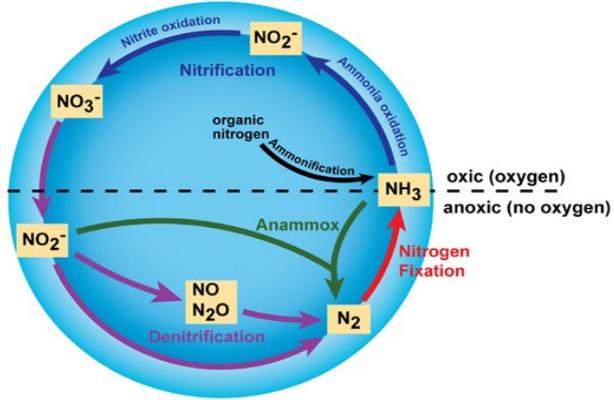
(b) CA Site Plume
NO₃ (mg/L)



Treatment can be highly effective as long as an **adequate unsaturated zone** is maintained.

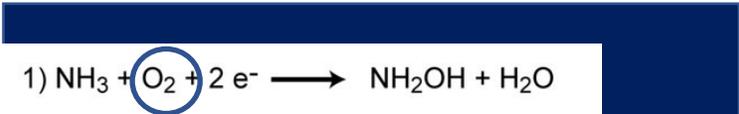
Phosphorus Attenuation and Nitrification

Treatment can be highly effective as long as an **adequate unsaturated zone** is maintained.



- Oxidizing conditions

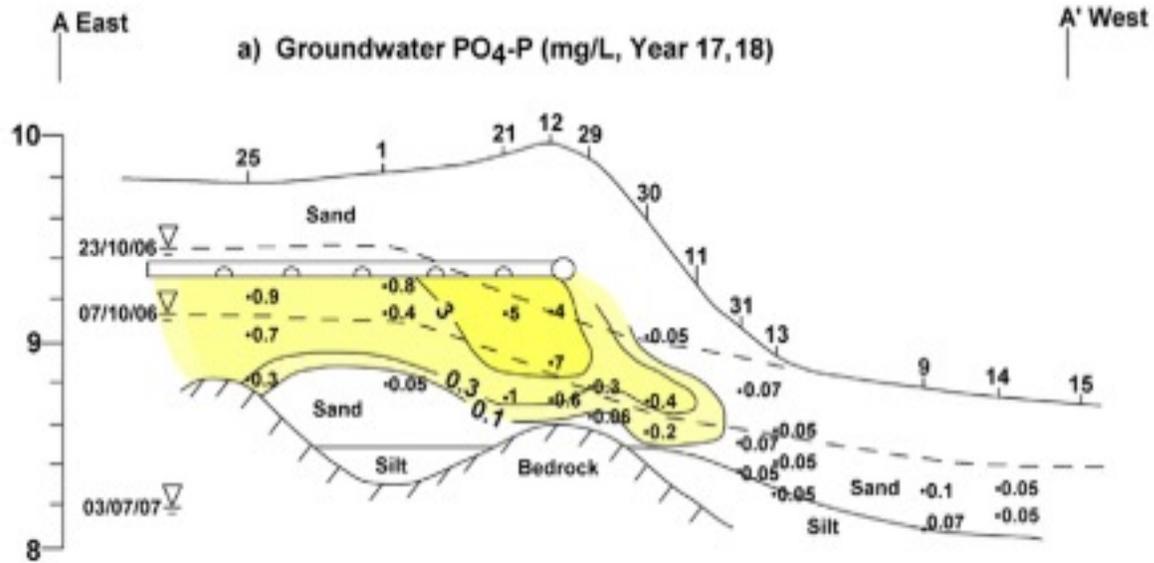
- Facilitate conversion of ammonia-N (NH₄-N) to nitrate N (NO₃-N)
- Which generate protons (H⁺) – increasing acidity (lower pH)
- Favouring reaction of soluble reactive phosphorus (SRP) with Al and Fe to form insoluble mineral complexes
- Phosphorus is removed from the effluent plume
- Insoluble mineral P will not migrate to your lake



Unsaturated zone allows O₂ infiltration.

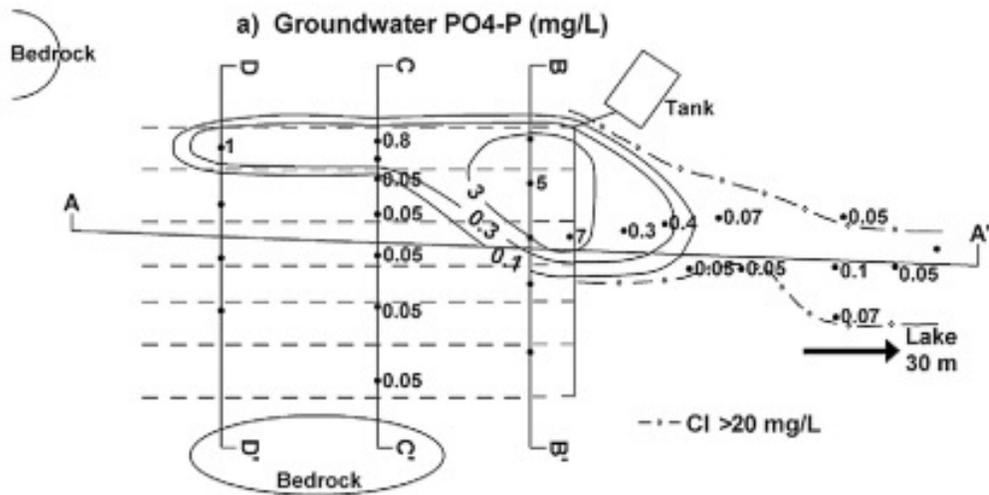


Nitrification provides protons.

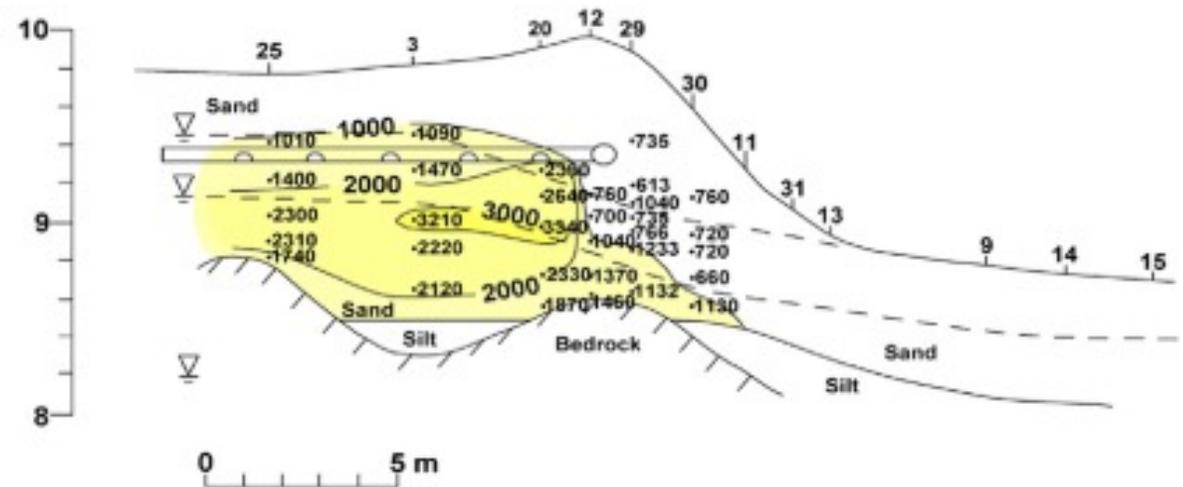


Robertson 2012 Parry Sound Septic Study

- 20 year old system
- Non-calcareous imported soil (pH 6.0)
- No elevated P >5m from tile field
- Elevated mineral and sorbed P within 1m of tile lines
 - total loading from 20 years within 5m

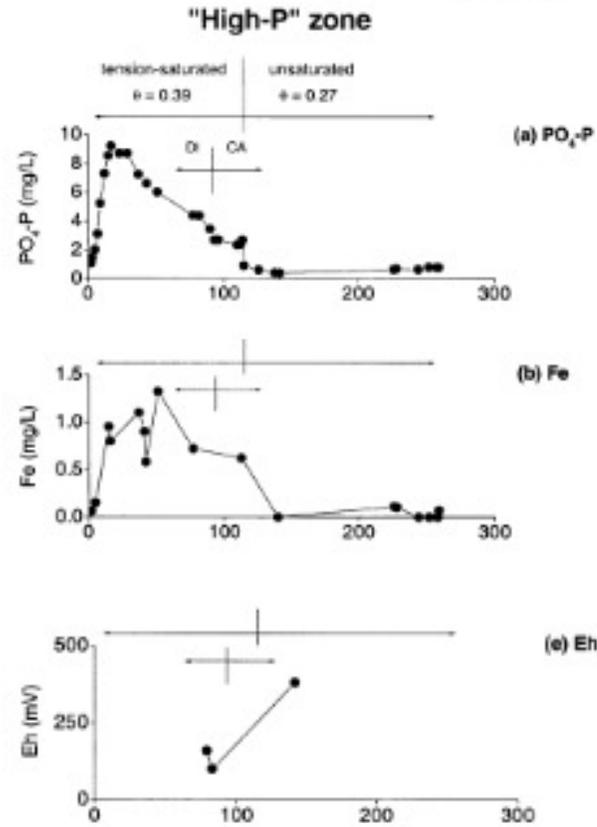
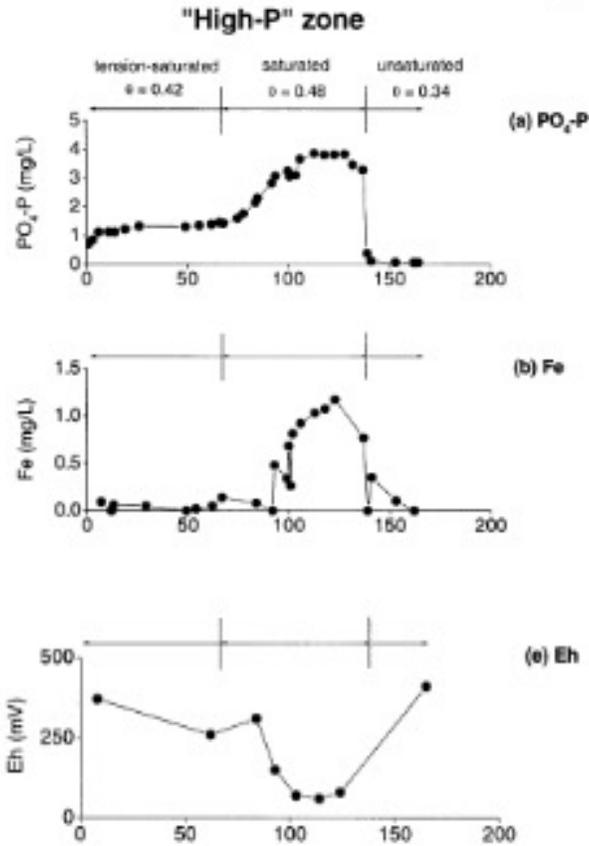


c) Sediment acid-extractable P (mg/kg, Year 19-22)



Saturation and Tile Field Phosphorus

Off-Shield – Calcareous Soils – Fe Rich



Zurawsky et al (2004)
lab Studies with tile field soils

Oxidizing conditions
- Favour insoluble Fe-P minerals

Treatment can be highly effective as long as an **adequate unsaturated zone** is maintained.

Robertson et al. 2019

“a remarkably consistent pattern of P removal was revealed, averaging 97% at sites where the drainfield sediments were non-calcareous and 67% at sites where the sediments were calcareous”

- attenuation was highly focused within a few meters of the infiltration pipes, in both young and old systems,
- attenuation was the result of mineral precipitation reactions (sand grains with secondary mineral coatings containing phosphorus and with iron and aluminum),
- these reactions were sustainable over the long term.
- Phosphorus removal in the subsurface at many of these sites was comparable to, **or better, than that normally achieved during conventional sewage treatment.**

Robertson et al. 2019. “In our view, the main threat of phosphorus loading to surface waters from septic systems is likely to be from failing systems, where surface breakout of untreated wastewater is occurring **from overloaded or saturated drainfields**, or through short circuiting via drainage ditches and pipes. Sites on clay-rich sediments with shallow water tables, may be more vulnerable to such failures. “

Treatment can be highly effective as long as an **adequate unsaturated zone** is maintained.

Summary

Living organisms make septic systems work

Both aerobic and anaerobic environments are important (in the right place)

Treatment can be highly effective as long as an **adequate unsaturated zone** is maintained.

High water tables risk flooding septic systems

- Break out of bacterial contamination and faster transport in groundwater
- Reduce oxygen inflow to create anoxic conditions within the tile field
 - Reduced breakdown of carbonaceous materials and BOD
 - Reduced nitrification (oxidation) of toxic ammonia to less toxic nitrate
 - Reduced acid generation and reduced phosphorus mineralization
 - Allow formation of soluble Fe-P complexes

Summary

Solutions ?

Proper siting of tile field

Ontario Building Code

8.7.2.1. General Requirements

(1) A *leaching bed* shall not be located,

...

(c) in or on an area that is subject to flooding that may be expected to cause damage to the *leaching bed* or impair the operation of the *leaching bed*.

above the water table year round with
at least 0.9m of unsaturated soil between pipes and groundwater or
impermeable surface (rock)

Caution ! gravity fed – septic systems favour location in low areas

Rising Water Levels in Georgian Bay Can Be Anticipated and Septic System
Design and Construction Can be Adapted to Changing Water Levels

Potable Water, Climate Change and Georgian Bay

Increased storm severity

- increased erosion from urban and agricultural areas in watershed
 - increased suspended solids and associated contaminants (bacteria, nutrients)
- increased water levels and wave heights
 - increased erosion of soft shorelines
 - increased resuspension of sediments
 - increased suspended solids and associated contaminants (bacteria, nutrients)
- increased potential for infrastructure failure
 - breakage and spills
 - sewage bypasses

Adaptation

- In general – do not consume untreated surface water
- Increased need for water treatment – filtration and chlorination

- Costs of infrastructure upgrades

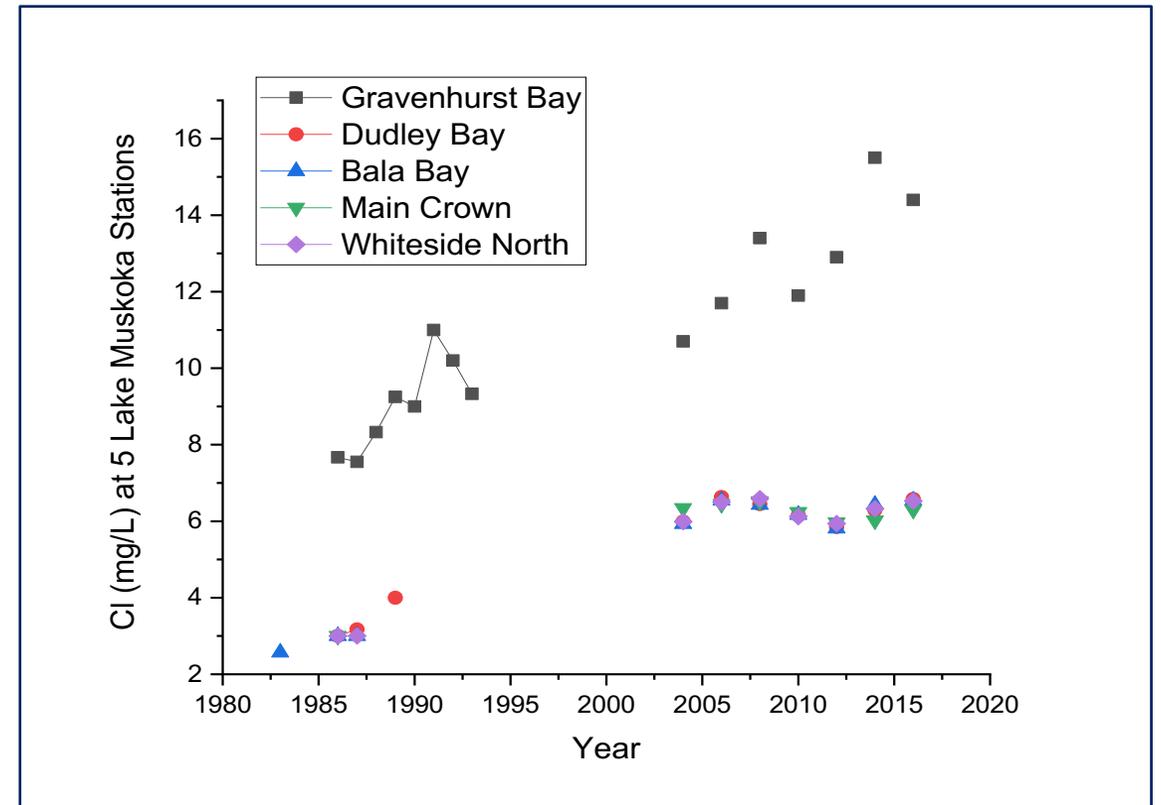
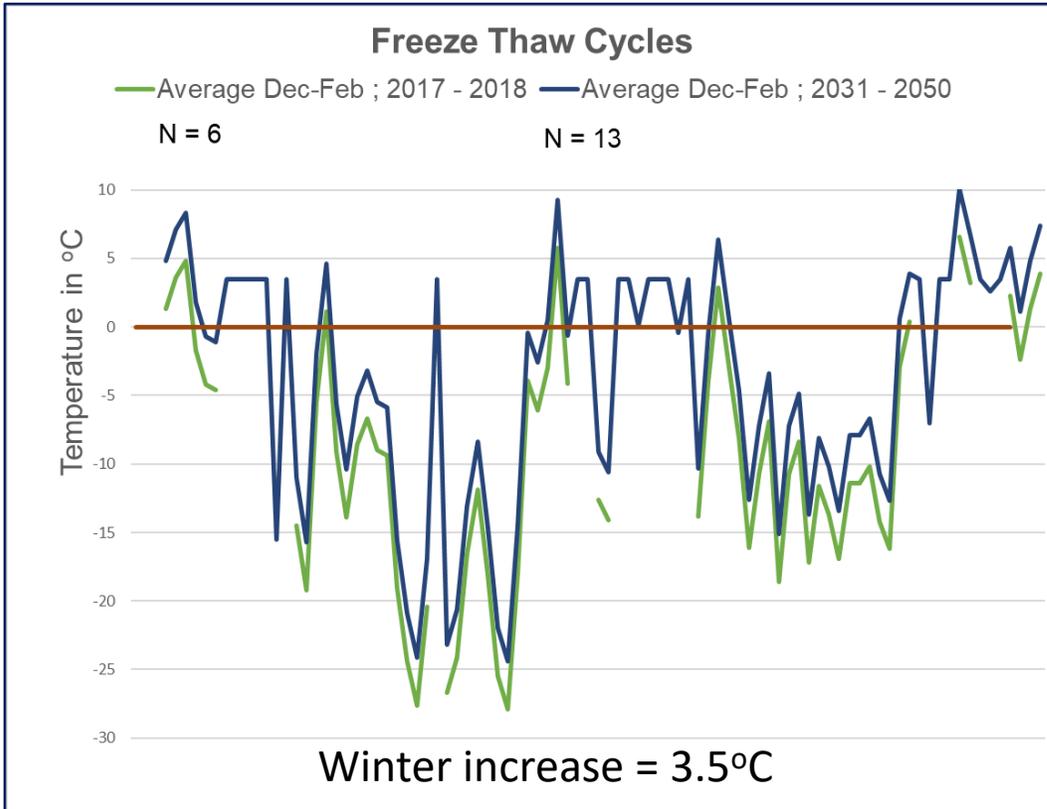
Solution – Lets get serious about our CO₂ footprint!!

Potable Water, Climate Change and Georgian Bay

Warmer winters

More temperature excursions +/- freezing

More road salt – higher chloride - altered food web



Potable Water, Climate Change and Georgian Bay

Warmer summers

Warmer water

Favours cyanobacteria

Earlier thermal stratification

Increased potential for hypolimnetic anoxia

Altered food web

Increased potential for algal blooms

- loss of water supply
- cost of treatment
- loss of recreational aesthetics



Solution – Lets get serious about our CO₂ footprint!!



Rising Water Levels in Georgian Bay Can Be Anticipated
Septic System Design and Construction Must be Adapted to Changing Water Levels
Increased Need for Treatment of Potable Water

Solution – Lets get serious about our CO₂ footprint!!

Thank You / Miigwech

References

Lusk, M.G., Gурpal S. Toor, Yun-Ya Yang, Sara Mechtensimer, Mriganka De & Thomas A. Obreza (2017) A review of the fate and transport of nitrogen, phosphorus, pathogens, and trace organic chemicals in septic systems, *Critical Reviews in Environmental Science and Technology*, 47:7, 455-541, DOI: 10.1080/10643389.2017.1327787

Maine Centre for Disease Control and Prevention. 2013. Microbiology of Septic Systems. Dept of Health and Human Services. Division of Environmental Health. 41pp.

<https://www.maine.gov/dhhs/mecdc/environmental-health/plumb/documents/training/2013/Microbiology-of-Septic-Systems.pdf>

Robertson, W.D. 2012. Phosphorus Retention in a 20-Year-Old Septic System Filter Bed. *J. Environmental Quality* 41: 1437-1444

Robertson, W.D., D.R. Van Stempvoort and S.L. Schiff. 2021. Nitrogen Attenuation in Septic System Plumes. *Groundwater* 59(3): 369–380

Robertson, W.D., D.R. Van Stempvoort and S.L. Schiff. 2019. Review of Phosphorus Attenuation in Groundwater Plumes from 24 Septic Systems. *Science of the Total Environment* 692 :640-652.

Zurawsky, M.A., W.D. Robertson, C.J. Ptacek and S.L. Schiff. 2004. Geochemical stability of phosphorus solids below septic system infiltration beds. *Journal of Contaminant Hydrology* 73 (2004) 129– 143.



Questions

Water Levels 2021



GEORGIAN BAY
FOREVER





Rupert Kindersley

Executive Director

Georgian Bay Association

TOPIC B – Insurance. Flooding – extreme storm events – damage from wind and waves? What are the potential impacts on property insurance? What risks can be insured?

Speakers:

Cheryl Evans, Director, Flood and Wildfire Resilience, Intact Centre on Climate Adaptation at the University of Waterloo



Water Levels 2021 – Cheryl Evans



- **Cheryl Evans**, Director, Flood and Wildfire Resilience, Intact Centre on Climate Adaptation at the University of Waterloo
- Cheryl leads the program development, oversight and continuous improvement of a variety of initiatives whose primary objective is to mobilize on-the ground action to improve the resilience of Canadian homes, businesses and communities to flooding and wildland urban interface wildfires.
- Cheryl has over 20 years of community engagement and program management experience in the fields of stormwater management, flood risk mitigation, home energy conservation and youth environmental education. She served as a technical committee member on CSA's Guideline on Basement Flood Protection and Risk Reduction (CSA Z800) and was a lead curriculum developer for the Ontario College's Flood Risk Assessment Training Program.
- She currently serves as a member of the City of Toronto Flood Resilience Working Group and is a Climate Change Committee Member for the Canadian Water and Wastewater Association. Cheryl's team is the recipient of Canada's Clean50 Top Project Award for 2020. Cheryl holds a B.E.S. in Environment & Resource Studies from the University of Waterloo.

FUTURE-PROOF YOUR GEORGIAN BAY HOME AND PROPERTY



Presented to:
Members of
Georgian Bay Association &
Georgian Bay Forever

Presented by:
Cheryl Evans
Director, Flood and Wildfire Resilience
c8evans@uwaterloo.ca



December 4, 2021



INTACT CENTRE
ON CLIMATE ADAPTATION

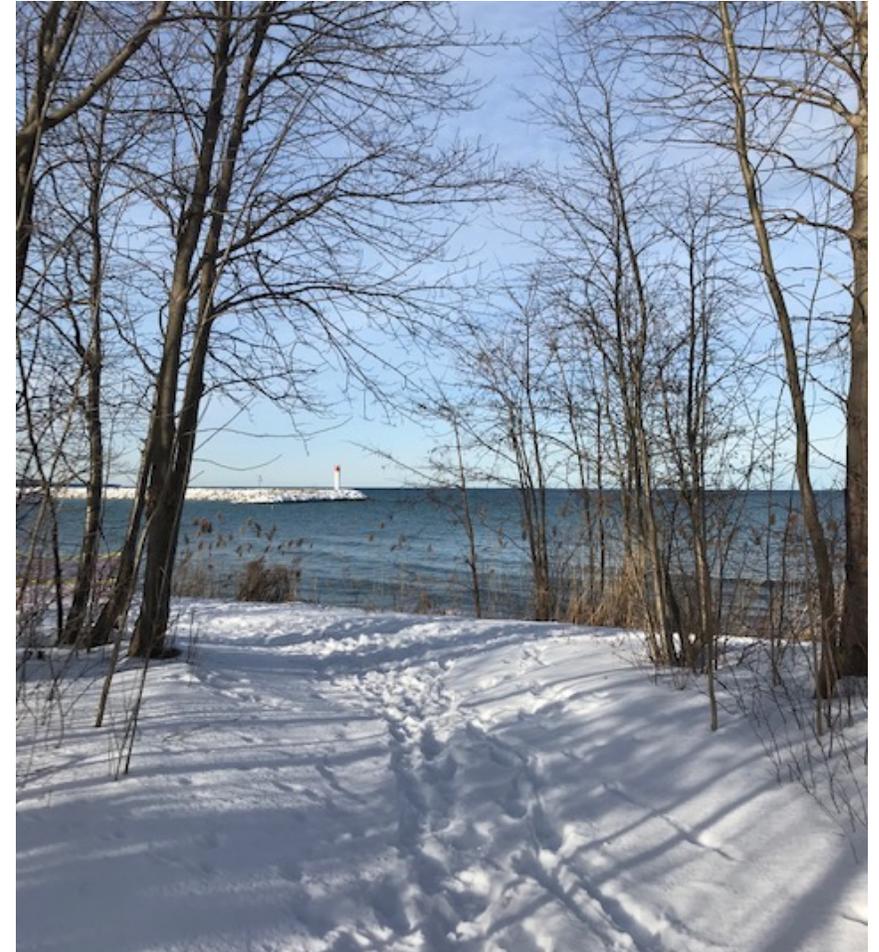
Generously supported by



AGENDA

1

- Introduction to the Intact Centre
- Impacts of a changing climate
- Identifying your home and property's unique risks
- Reviewing your options for managing risks
- Insurance considerations
- Free training & action-focused resources
- Questions



INTACT CENTRE ON CLIMATE ADAPTATION

52

- Applied climate adaptation research centre with a **national focus**
- Headquartered at University of Waterloo
- Launched in 2015 with gift from Intact Financial Corporation*

ICCA has two main goals:

1. To change the national conversation about climate change to address **climate adaptation**
2. To help **homeowners, communities and businesses** to reduce risks associated with climate change and extreme weather events

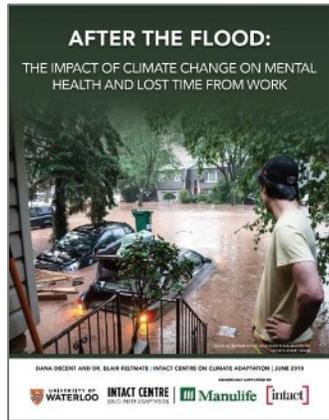


Intact Centre on Climate Adaptation,
University of Waterloo

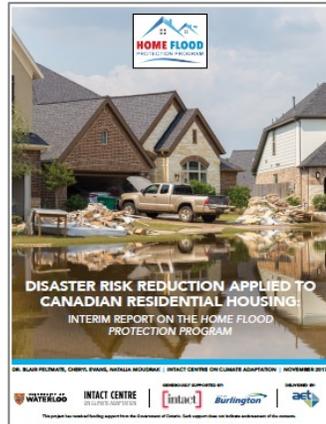
***The Intact Centre operates independently of all funders and does not benefit from the sale of any products or services.**

FLOOD RESILIENCE RESEARCH & GUIDANCE

Development of national guidelines and standards to reduce climate risk



Citizens



Homes



Commerical Real-Estate

Summary of Best Practice Actions



Coming soon...

Coastal Resilience East and West Coasts

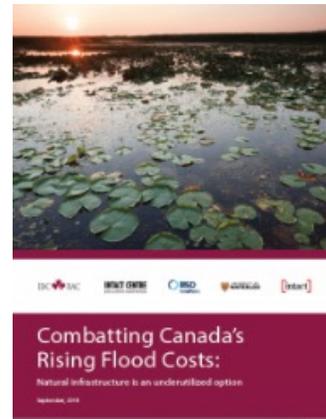
River Basin Scale Application of Natural Infrastructure



Existing Communities



New Communities



Natural Infrastructure

CANADA'S CHANGING CLIMATE

54



1. Canada's climate **has warmed and will warm further** in the future, driven by human influence.
2. Both past and future warming in Canada is, on average, **about double** the magnitude of global warming.
3. Warming is **effectively irreversible**.

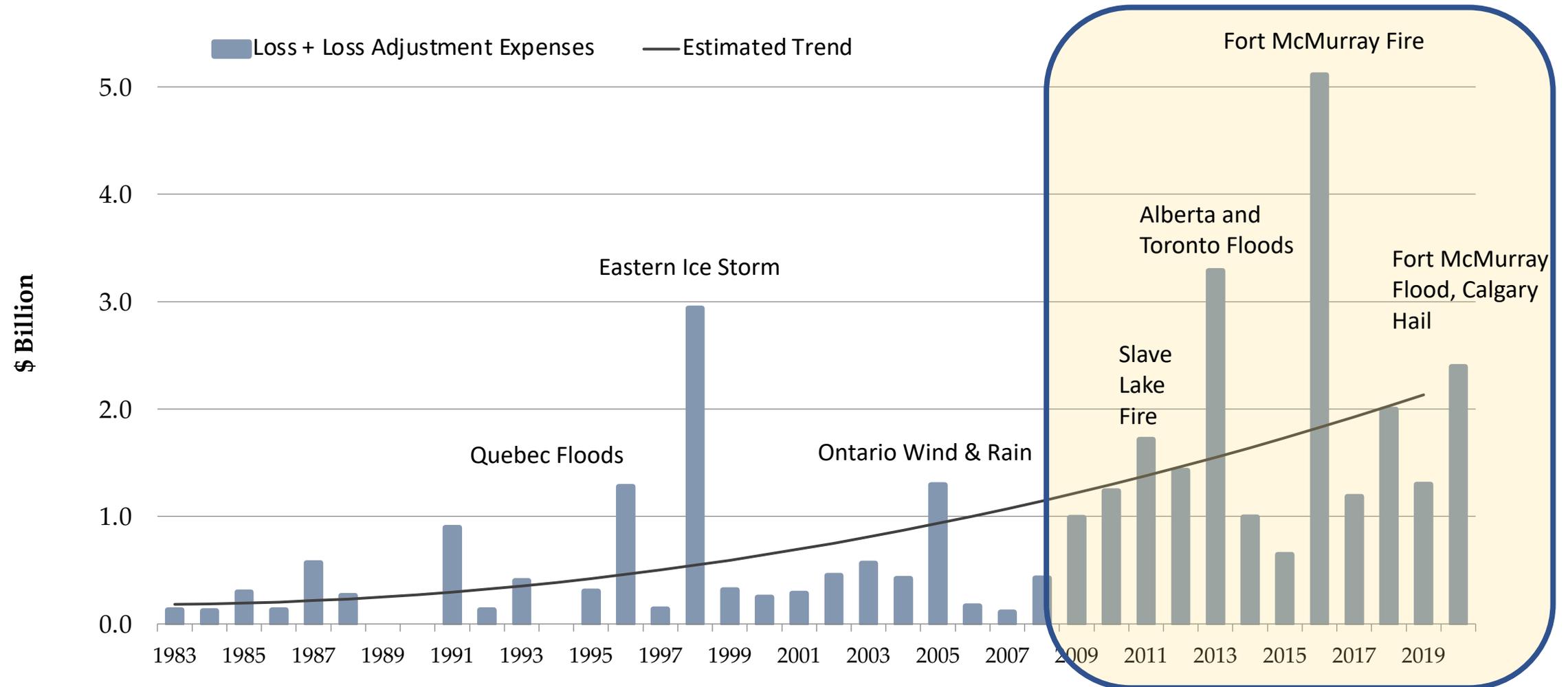
Climate Impacts

- More extreme heat / less extreme cold
- Shorter seasonal coverage of snow and ice
- Melting of glaciers and permafrost
- Rise in sea level

Intensification of certain extremes

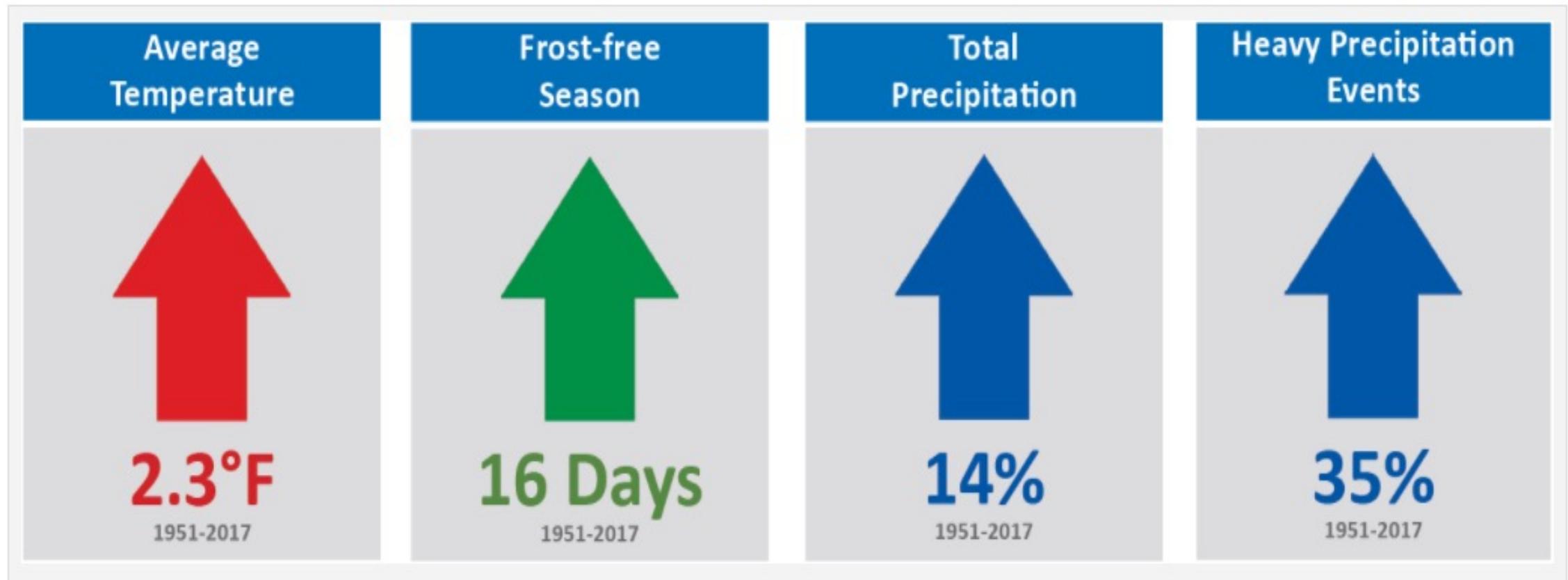
- Intense rainfall and urban flooding
- Coastal flooding
- Severity of heat waves
- Risk of drought and forest fire

GROWING COSTS OF EXTREME WEATHER IN CANADA: P&C CATASTROPHIC INSURABLE LOSSES (\$BLN)



Source: CatIQ, PCS, IBC Facts Book, Statistics Canada, IMF WEO Database. Values in 2020\$ CAN. Losses normalized by inflation and per-capita wealth accumulation.

Changes Observed from 1951- 2017



CHANGES AND IMPACTS PREDICTED BY 2100

57

Average Temperature : Increase by 3.3°C to 6.1°C).

Precipitation: More precipitation on average, but overall drier in summer and more in winter.

Impacts:

- Warmer temperatures may lead to more winter rain and earlier peak stream flows.
- More frequent summer droughts could affect soil moisture, surface waters, and groundwater supply.
- Projected increases in droughts, severe storms, and flooding events may amplify the risk of erosion, sewage overflow, interference with transportation, and flood damage.
- Greater variation in lake levels.



THE BAD NEWS AND THE GOOD NEWS

58

The Bad News

- Climate change is real, is happening and will continue to impact Canada.
- Climate change is contributing to significant increases in home flood losses.
- Residents are largely unaware of their risks.
- Residents commonly misunderstand their insurance coverages.

The Good News

A variety of free resources are available to help residents:

- Understand your home and property's unique risks
- Understand your options for managing risks
- Take action to limit damage
- “Build back better” if flood damage occurs



Source: Robert Deeks

Dumpsters line a street in Burlington, Ontario days after a massive downpour flooded out 3,500 basements in August, 2014.

HOME WATER DAMAGE FAST FACTS

59

Did you know?

- The majority (60%) of water claims are caused by leaking appliances and water pipes.
- The remainder (40%) are split between
 - Sewer back-ups
 - Sump pump failure and
 - Overland flooding caused by heavy rainfall
- **All Canadian homes are at risk of flooding from the above risks.**
- **Only about 5%** of Canadian homes are exposed to additional structural damage risks associated with **flooding and erosion from rivers, lakes and oceans. (IBC, 2016)**



Typically Covered (Widely Available)

Sudden and accidental damage caused by escape of water from:

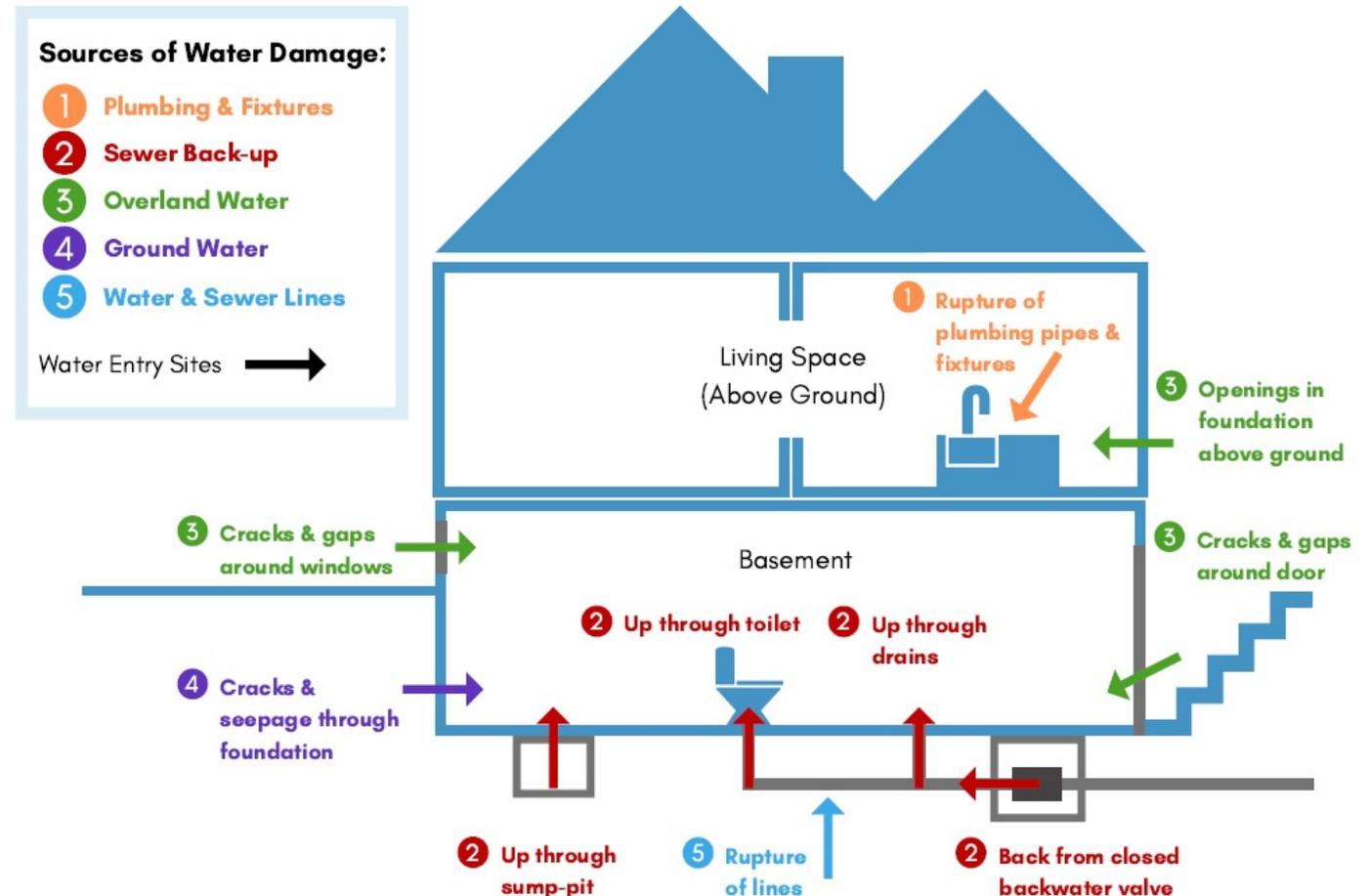
- Plumbing pipes, appliances and fixtures

Optional Coverages (Limited Availability)

May be available for sudden and accidental damage caused by:

- Sewer backup flooding
- Groundwater flooding
- Flooding from water and sewer lines
- Overland flooding

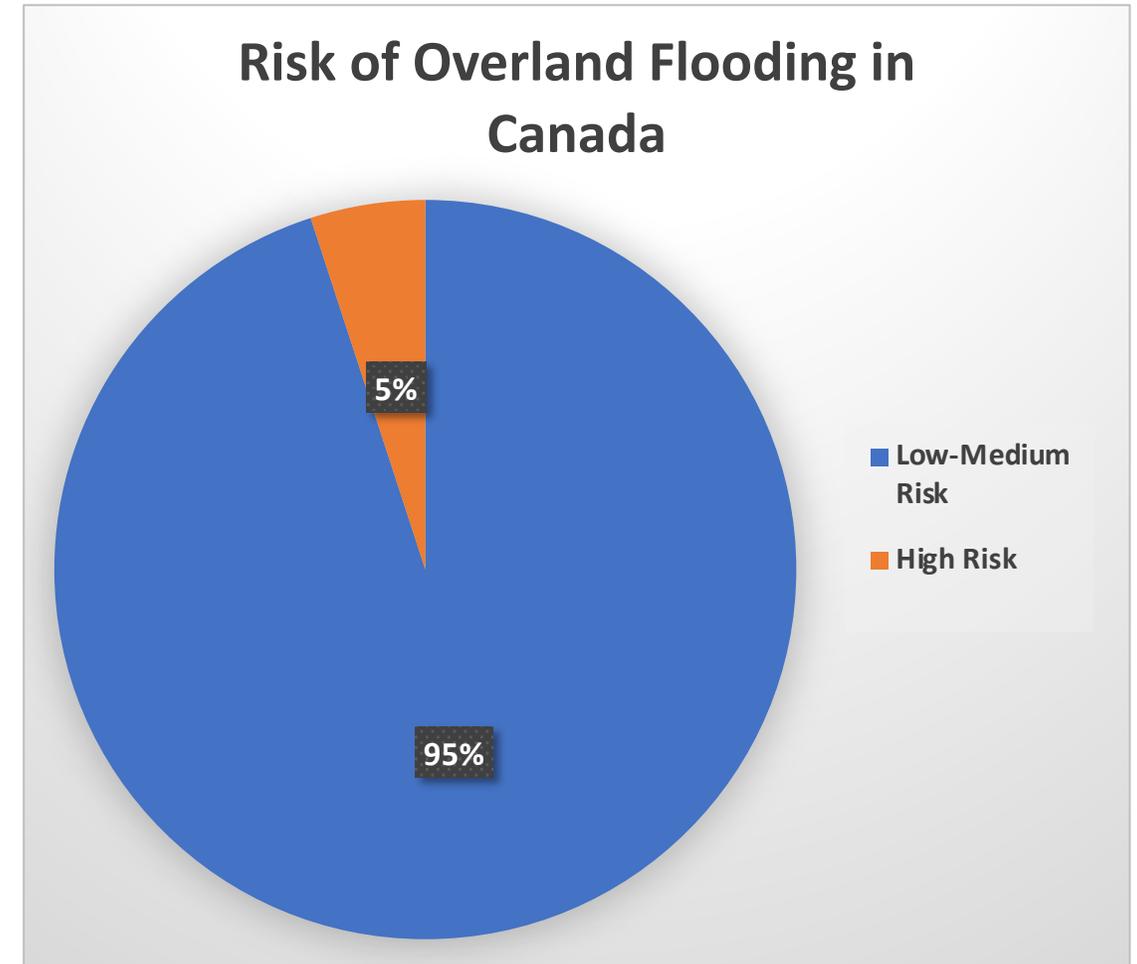
Sources of Home Water Damage



AVAILABILITY OF OVERLAND FLOOD INSURANCE IN CANADA

61

- Coverage for overland flooding (i.e., heavy rainstorms, snow melt, rivers overtopping their banks etc.) first became available in Canada in 2015 for low-medium risk homes.
- Overland flood insurance coverage is now quite widely available, at affordable prices, for low-medium risk properties.
- Approximately 5% of homes are considered to be at high risk of flooding and are generally not eligible for affordable overland insurance because they are:
 - within a floodplain of a river;
 - on the coast of an ocean or lake, or;
 - in an area with a history of sewer backup flooding.



(Insurance Bureau of Canada, 2016)

AVAILABILITY OF STORM SURGE INSURANCE COVERAGE

- Storm surge is a specific type of overland flooding, caused by rising water levels and waves during storms.
- Storm surge flooding can present a significant risk in coastal regions around lakes and oceans where extreme weather patterns have intensified with the changing climate.
- Optional storm surge coverage for high risk property owners has been available from a small number of companies since August, 2018. (Source: Cooperators, 2018)
- In Ontario and Alberta, some insurers are now including storm surge coverage in all comprehensive policies. (Source: Canadian Underwriter, 2019)



Storm surge damage in PEI, 2010.
Source: The Guardian, December 23, 2010

GOVERNMENT RECOVERY ASSISTANCE AFTER LARGE SCALE DISASTERS

- The government disaster financial assistance arrangement (DFAA) program is **only available** to Canadians who **do not have access to overland flood insurance or storm surge coverage by private insurers at a reasonable price.**
- The DFAA is not a viable alternative to private insurance and is used as a **last resort to recover from large scale disasters.**
- **If insurance is available and is affordable, but a property owner does NOT purchase it, they are NOT ELIGIBLE for government assistance.**
- DFAA coverage is only available for primary residences, **not for properties such as cottages or second homes.**



The Federal Government Task Force on Flood Insurance and Relocation reviewing options to create a 'high risk insurance pool' to provide affordable overland insurance coverage to high risk properties.

Crystal Beach, PEI trailer damaged by post tropical storm Dorian Source: M. Morrison, Facebook, 2019

DISCUSS YOUR COVERAGES AND OPTIONS WITH YOUR INSURANCE REPRESENTATIVE

Understand Your Coverages

- Ask a series of questions

Premium Discounts

- Ask about discounts for reducing risk
- Ask about using flood resilient materials when building or renovating

Build Back Better!

- Discuss options for building back better after a loss

Examples of Current Flood Resilience Insurance Discounts

Category	Flood Protection Measures
Sump Pumps	Sump pump
	Sump pump with monitored alarm
	Backup sump pump
	Backup power source for sump pump
	Sump pump discharge >1.8m or to nearest swale
Backwater Valves	Backwater valves
	Backwater valve with monitored alarm
Overland Drainage	Downspout extension >1.8m or to nearest swale
	Sump pump discharge >1.8m or to nearest swale
Plumbing and Fixtures	Automatic water shut off
	New water tank
	Tankless hot water heater

ACCESS GOVERNMENT INFORMATION RESOURCES

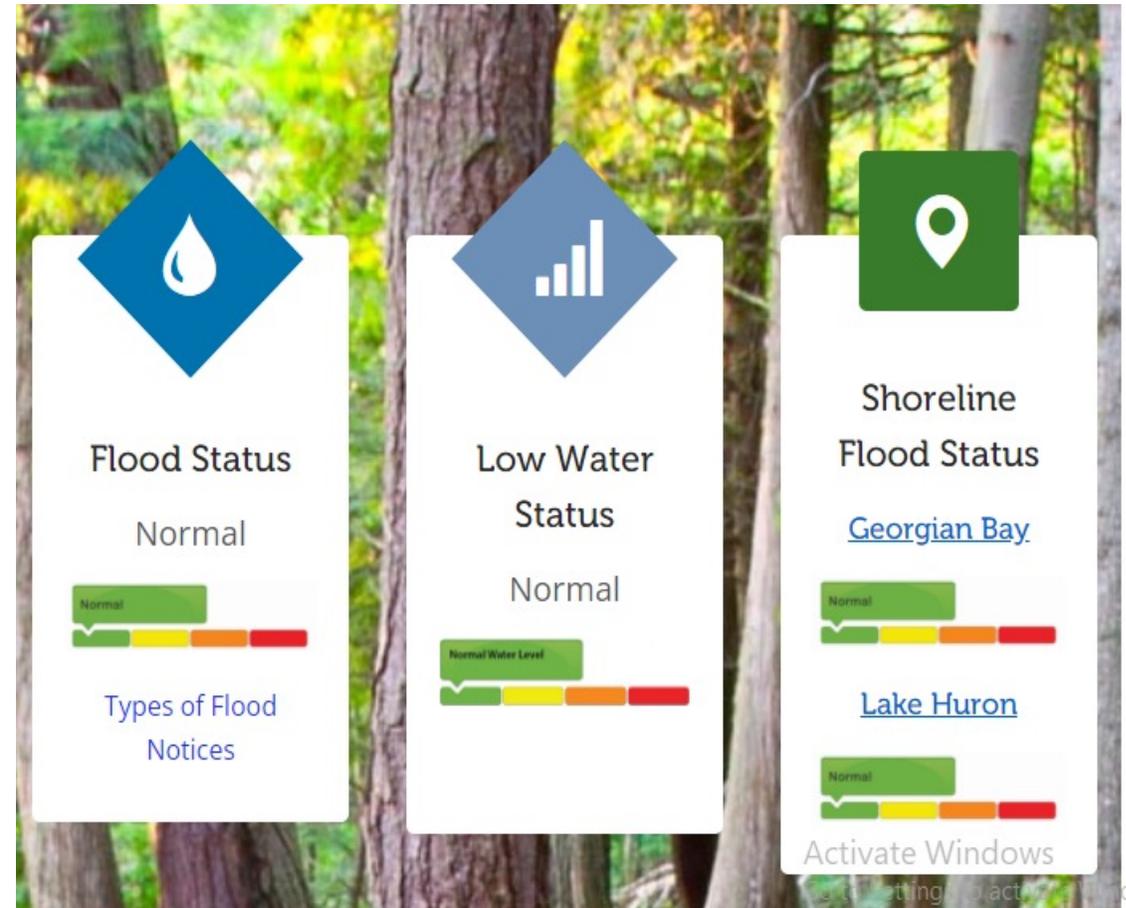
65

Conservation Authority Responsibility

- Local flood messaging (river and shoreline flood status)
- Flood risk mapping
- Regulation and permits- e.g. construction, renovation, shoreline/ riverbank amendments, safe egress
- **Grey Sauble Conservation Authority**
- **Nottawasaga Valley Conservation Authority**
- Areas not serviced by CA [Ministry of Natural Resources and Forestry district office](#).

Local Municipality Responsibility

- Development approvals and by-laws
- On-the-ground flood response



Source: Grey Sauble Conservation Authority

ASSESS YOUR LOT-LEVEL RISKS WITH A HOME FLOOD PROTECTION CHECK-UP

What is the Home Flood Protection Check-Up?

The Home Flood Protection Check-up is a free, confidential, VISUAL home flood risk assessment tool developed by the Intact Centre on Climate Adaptation at the University of Waterloo.

- Looks at the 15 most common flood risks to homes
- Applicable to all Canadian homes
- *Does not include structural risks posed by river or coastal flooding*

How can residents complete an assessment?

- Identify if you are an owner or a tenant
- Take 5-10 minutes to answer a series of yes or no questions about flood risks inside and outside of the home
- Have a confidential, custom home flood protection report emailed to you or download it onto your device



TAKE A STEP-BY-STEP APPROACH TO PROTECTING YOUR HOME FROM RAINFALL RELATED FLOODING

Dry Floodproofing Basics

Summarizes logical, step-by-step approach to address the most common home flood risks

- **Shorter term:** Complete simple, low-cost maintenance and upgrade actions
- **Longer term:** Complete more complex upgrades after evaluating options with qualified professionals, government & insurance reps

Step 1: Maintain What You've Got at Least Twice per Year

Do-It-Yourself for \$0

- Remove debris from nearest storm drain or ditch & culvert
- Clean out eaves troughs
- Check for leaks in plumbing, fixtures and appliances
- Test your sump pump*
- Clean out your backwater valve

Step 2: Complete Simple Upgrades

Do-It-Yourself for Under \$250

- Install window well covers (where fire escape requirements permit)*
- Extend downspouts and sump discharge pipes at least 2m from foundation
- Store valuables and hazardous materials in watertight containers & secure fuel tanks
- Remove obstructions to floor drain
- Install and maintain flood alarms

Step 3: Complete More Complex Upgrades

Work with a Contractor for Over \$250

- Install window wells that sit 10-15cm above ground and upgrade to water resistant windows*
- Disconnect downspouts, cap foundation drains and extend downspouts to direct water at least 2m from foundation
- Correct grading to direct water at least 2m away from foundation
- Install backwater valve
- Install backup sump pump and battery*

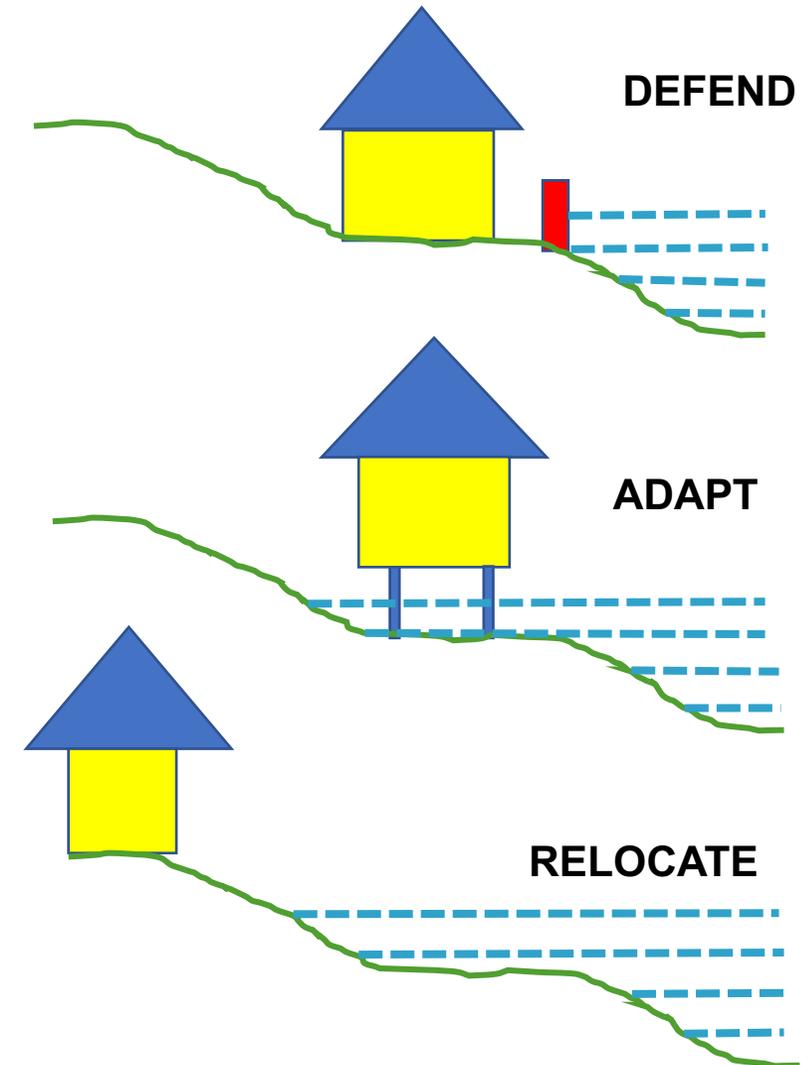
REVIEW YOUR OPTIONS FOR MANAGING FLOOD AND EROSIONS RISKS

Which approach should be used?

The approach selected to protect a home is based on

- Unique flood and erosion risks
- Severity of risk
- Budget
- Insurance coverages

Approach	Type of Actions	Level of Risk
Defend	<ul style="list-style-type: none"> • Dry Flood Proofing • Temporary Barriers 	<ul style="list-style-type: none"> • Lower • Medium
Adapt	<ul style="list-style-type: none"> • Wet Flood Proofing • Elevate Buildings 	<ul style="list-style-type: none"> • High • Higher
Relocate	<ul style="list-style-type: none"> • Relocate Buildings 	<ul style="list-style-type: none"> • Highest



TEMPORARY FLOOD PROTECTION BARRIERS

What are they?

A physical barrier that is installed temporarily during an emergency situation

- **Opening Barriers:** Block water from entering an opening in a building (e.g. windows, doors, drains)
- **Perimeter Barriers:** Block water from flowing onto a property

When are temporary barriers used?

- Installed ahead of flooding events caused by rainfall, riverine and coastal to reduce flood damages
- Advance notice requirements vary widely because barrier installation times can range
 - Minutes (click-in door barriers)
 - Days (thousands of sandbags along waterfront properties)



Roll down temporary opening barriers installed at a riverside home, Edmonton, Alberta. Source: Guy Bridgeman, 2020

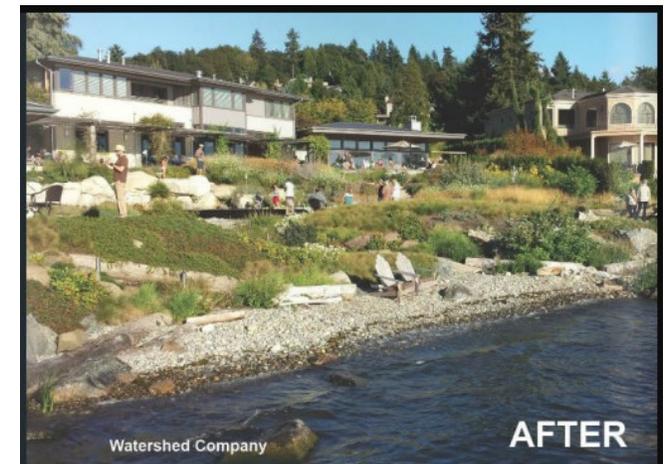
THE SHIFTING FLOOD AND EROSION MANAGEMENT MINDSET

Management with Nature in Mind

- Attempting to control natural erosion processes by straightening and “hardening” riverbanks and coastlines was considered best practice for many decades.
- From 1990 a growing number of government and not-for-profit organizations started to integrate the use of “softer” management techniques, called nature-based solutions, that mimic nature to manage flooding and erosion by restoring natural processes.

Management with Community-Level and Future Conditions in Mind

- Piecemeal, lot by lot erosion management approaches can still be seen widely today, especially on privately owned lands.
- With government guidance and oversight, in many jurisdictions, lot level management decisions are now being guided to consider community-level impacts and future climate risks.



Evolution of shoreline using “hard”(before) to “softer”(after) techniques. Credit: Watershed Company, 2021

REDUCING THE RATE OF EROSION

A range of options may be considered alone or in combination. It is best practice to plan and design coastal and river protection at a scale larger than the individual lot due to the potential to increase erosion and flooding impacts elsewhere.

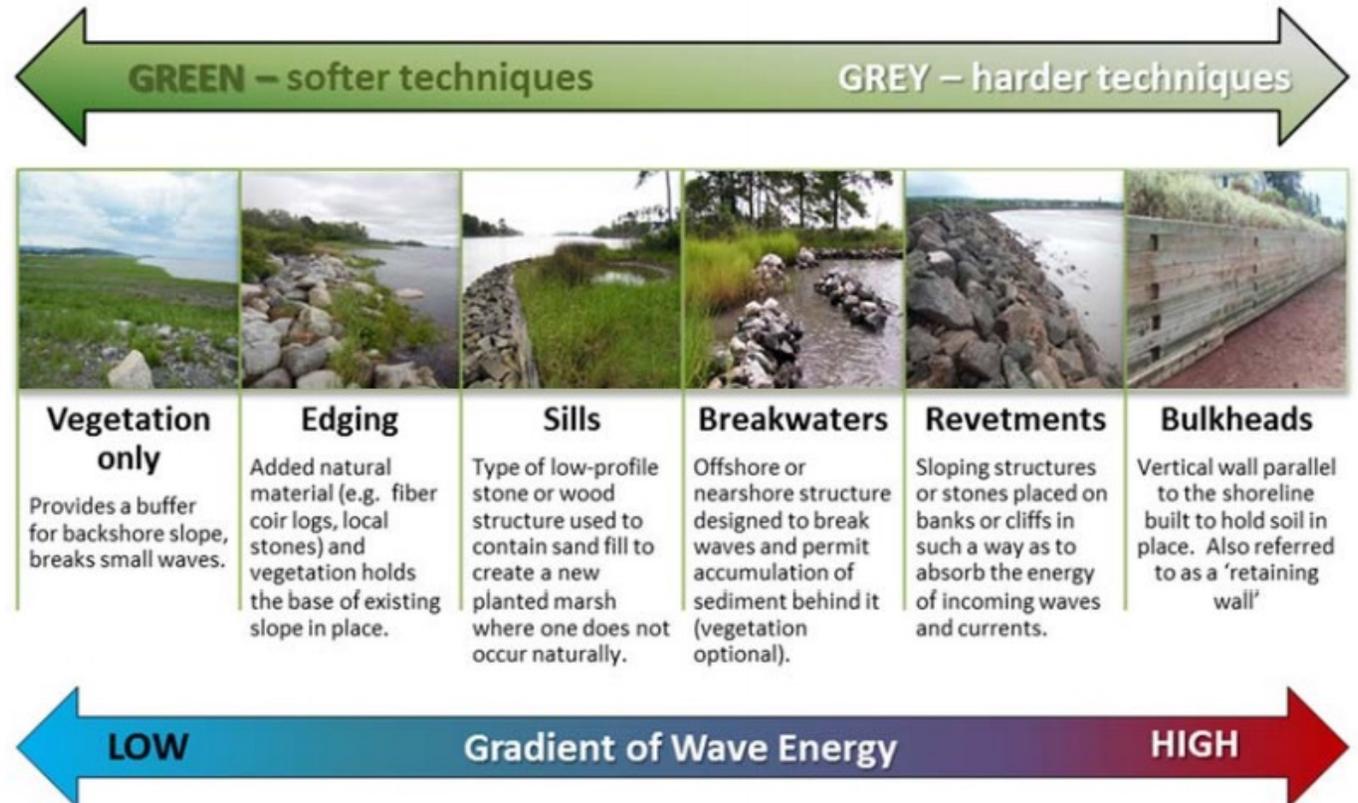
Softer (Green) Techniques

- Tend to mimic nature with form, function and plantings
- Used more often at sites with
 - Lower forces from water
 - **Available** space
 - Buildings farther from water

Harder (Grey) Techniques

- Tend to be linear, concrete, wood or stone
- Used more often at sites with
 - Higher forces from water
 - **Limited** space
 - Buildings closer to water

Continuum of Green (Soft) to Gray (Hard) Shoreline Protection Techniques



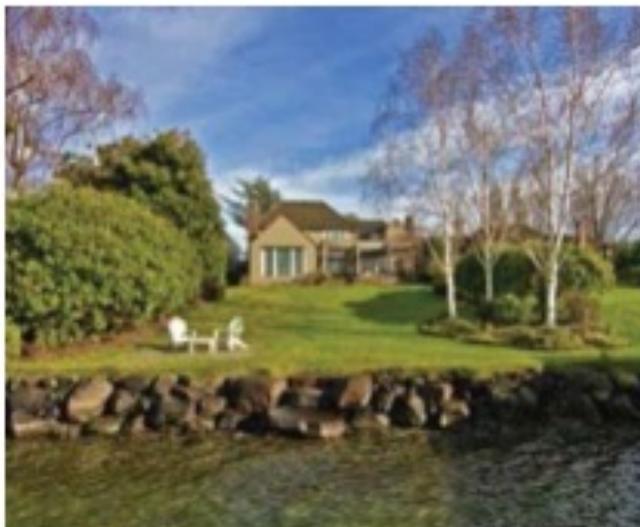
INTEGRATING NATURE-BASED SOLUTIONS

72

Community Organizations that Support Nature-Based Management Options

- [Ecology Action Centre](#)
- [Greenshores for Homes Program](#)

Riverbank Restoration Project



From this.....



to this Credit: The Watershed Company

Shoreline Marsh Restoration Project



Before



After

Source: Ecology Action Centre, 2016

LEARN MORE WITH FREE RESOURCES

www.HomeFloodProtect.ca

- ✓ Flood and erosion protection training program
- ✓ Flood insurance literacy information
- ✓ Flood protection fact sheets and how-to videos
- ✓ Home Flood Protection Checkup app
- ✓ Available municipal subsidy information
- ✓ Follow us on social media
 - Twitter [@ICCA_Canada](https://twitter.com/ICCA_Canada)
 - Facebook [@HomeFloodProtect](https://facebook.com/HomeFloodProtect)

A summary of flood protection resource links will be provided to you following this presentation.



Homeowner extends his downspouts to 2m

CONTACT US

74

- ✓ If you have additional questions
- ✓ To request the development of additional materials

Cheryl Evans

Director, Flood and Wildfire Resilience
Intact Centre on Climate Adaptation
c8evans@uwaterloo.ca





Questions

Water Levels 2021



GEORGIAN BAY
FOREVER



Water Levels 2021 – Aisha Chiandet



- Aisha is a water scientist with the Severn Sound Environmental Association and focuses on water quality monitoring of lakes and tributaries in the Severn Sound watershed with a particular emphasis on nutrient conditions and responses of biological communities.
- Her work has also included analyses of climate impacts on local waterways, including on water levels. More recently she initiated several citizen science programs with goals to monitor the impacts of climate change, algae growth and water level fluctuations.

TOPIC C – Planning and Infrastructure. Action Plan 2030 – key recommendations concerning individuals, businesses and municipal governments for shoreline infrastructure impacts and shoreline resilience. What are the benefits of long-term planning vs executing short term solutions?

Speaker:

Nicola Crawhall, Westbrook Public Affairs



Water Levels 2021 – Nicola Crawhall



- Nicola's consulting firm, Westbrook Public Affairs, led the secretariat that developed Action Plan 2030.
- She is the former Deputy Director of the Great Lakes and St. Lawrence Cities Initiative, a coalition of Canadian and U.S. mayors who work together to protect the Great Lakes and St. Lawrence.
- Nicola has served as senior policy advisor to two Ontario Ministers of the Environment, and has also served as senior environmental policy advisor for the Association of Municipalities of Ontario.

COLLABORATIVE
**GREAT LAKES
ST. LAWRENCE**



**GREAT LAKES AND
ST. LAWRENCE**
CITIES INITIATIVE



Great Lakes St. Lawrence Action Plan 2020-2030

Nicola Crawhall



Founding partners



**GREAT LAKES AND
ST. LAWRENCE**
CITIES INITIATIVE



Goals

- An **integrated Great Lakes-St. Lawrence vision**
- Increase in **investments in Great Lakes St. Lawrence protection**
 - inspired by the US ***Great Lakes Restoration Initiative***, a US federal program that has delivered over \$2B in investments in the Great Lakes region over the last ten years.
- **Innovative Approaches**
- **Alignment across governments**
- **Engagement** with stakeholders, experts and First Nations



4 challenges facing the Region



1. CLIMATE CHANGE



2. BEACHES



3. NUTRIENTS



**4. TOXICS AND
HARMFUL POLLUTANTS**



CLIMATE CHANGE

- In 2017 and 2019, lake and river levels at historical highs, caused flooding, erosion, infrastructure damage.
- Focused on in 5 Great Lakes regions, i) between Chatham-Kent and Leamington on Lake Erie; ii) between Amberley to Grand Bend on Lake Huron; iii) between the City of Toronto to Prince Edward County, on Lake Ontario; iv) between Fort William First Nation and Thunder Bay on Lake Superior; and v) between Penetanguishene and Tiny Township on Georgian Bay.





CLIMATE CHANGE

- The US [National Coastal Zone management program](#) has provided government and local agency coordination since 1972.
- Eight regional coastal zone management programs in the US Great Lakes Region.
- Voluntary partnership between the federal government and U.S. coastal and Great Lakes states and territories to address national coastal issues.
- Could serve as a model for shoreline priority zones.





Recommendations #4: Shoreline Resiliency Priority Zones

- Establish and **fund Shoreline Resiliency Priority zones and management teams** to identify and address significant threats from climate change.
 - Chatham-Kent
 - Tiny Township and Penetanguishene
 - City of Toronto-Clarington-Prince Edward County
 - Amberly to Grand Bend
 - Thunder Bay/Fort-William First Nation

Investment \$800 million



Recommendations #4: Shoreline Resiliency Priority Zones (cont'd)

Significant threats from climate change that need to be addressed

- high water levels
- stronger wind/wave energy
- erosion
- sudden spring thaws
- ice jams

Investment \$800 million

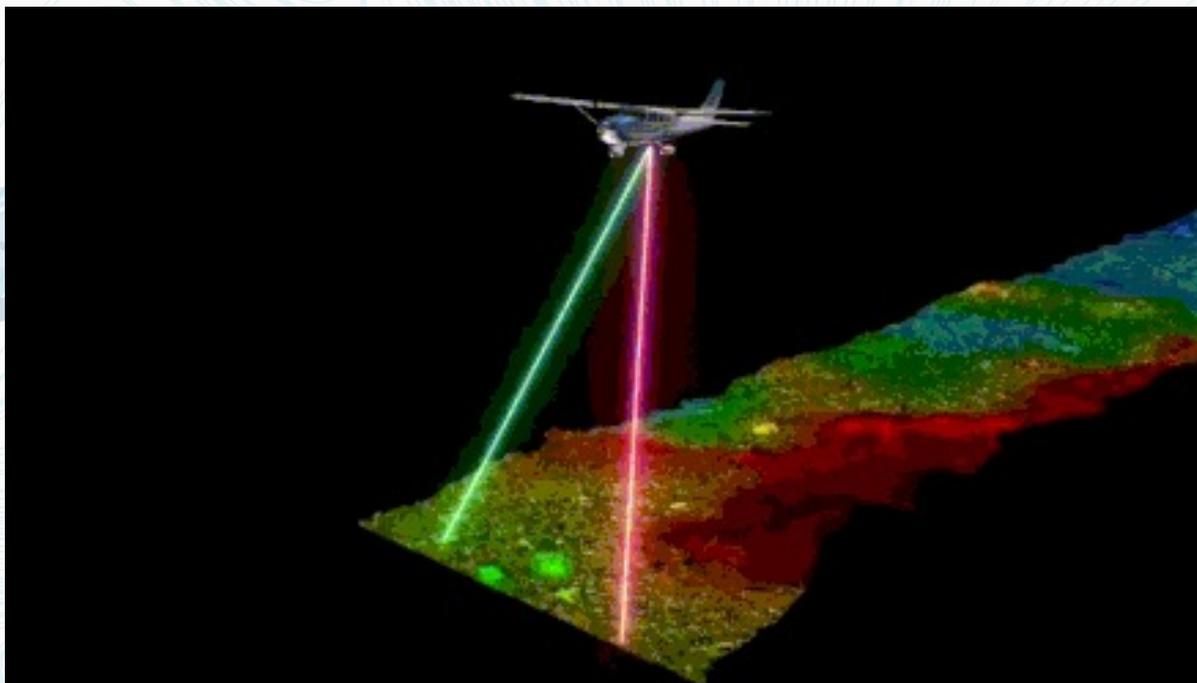


Recommendation #8 Increased investment in LIDAR, floodplain mapping

- Invest further in the development of Light Detection and Ranging (LIDAR), flood plain mapping, and monitoring/modelling data to benefit shoreline communities



Recommendation #8 Increased investment in LIDAR, floodplain mapping





Recommendation #10 Access to climate change data and information

- Ensure access to climate change data and information (2021) for local communities and support the development of information based on current and futures needs of communities.



Recommendation #10 Access to climate change data and information

Types of climate change data and information that would be of benefit to Georgian Bay communities include impacts on:

- Water Levels
- Water Temperature
- Air Temperature
- Wind and Wave action
- Ice Cover
- Precipitation
- Evaporation
- Run Off and Groundwater



Recommendation #12

Natural Infrastructure Solutions

- Support natural and green infrastructure solutions in land use and infrastructure management, particularly in developing a plan for land acquisition in underdeveloped zones.



Recommendation #12 Natural Infrastructure Solutions

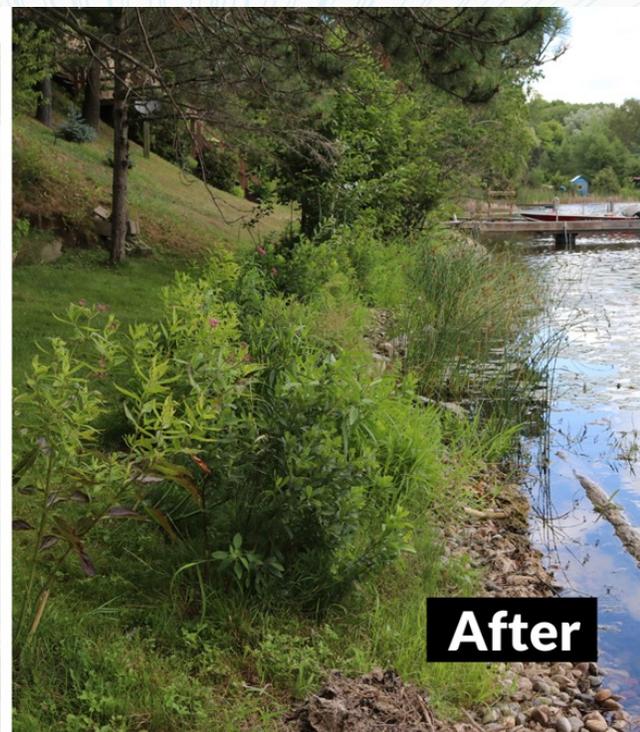


Photo courtesy of Watersheds Canada. Taken from an article by Monica Seidel:

<http://www.georgianbayforever.org/flipbook/fall2021/4/>

COLLABORATIVE
**GREAT LAKES
ST. LAWRENCE**



**GREAT LAKES AND
ST. LAWRENCE**
CITIES INITIATIVE



Questions?

Great Lakes St. Lawrence Action Plan 2020-2030

*La Malbaie, Charlevoix
Credit: Jean Paquin*

What are the benefits of long-term planning vs executing short term solutions?

Speakers:

David Sweetnam, Executive Director, Georgian Bay Forever

Rupert Kindersley, Executive Director, Georgian Bay Association



What are the benefits of long-term planning vs executing short term solutions?

- More cost effective
- Maintain safe use of property
- Avoid rapid onset disasters
- Avoid costs of multiple future disasters
- Incremental changes can be planned
- Allow risk assessments to be updated
- Adaptation of plan as it progresses
- Take advantage of developing technologies

What are the benefits of long-term planning vs executing short term solutions?

Crib/Concrete Docks

- Likely to be major issues for crib/concrete docks with increasing water levels variability:
 - Next extreme event could be water levels lower than 2013
 - access issues for many residences
 - practical problems for most municipal, marina and other shoreline businesses
 - Future high water levels could be higher than 2019/20
 - Crib/concrete docks will be un-useable for residences, municipal, marina and other shoreline businesses

Solution

- Consider converting to floating docks with ramps & flexible shoreline connections as needed **before** the next extreme water level event occurs – forward planning/preparation – long term solution

What are the benefits of long-term planning vs executing short term solutions?

Shoreline and Low Elevation Structures

High water challenges – flooding – access

- Should be a reasonable lead time before the next high water level event, therefore time to carefully plan how to address levels higher than 2019/20.
- Every property is unique and therefore has distinct challenges and potential solutions
- Major investments may be needed by municipalities, marinas and other shoreline businesses – Action Plan 2030 and others asking for government support to address.

Solutions

Consider raising or relocating (to higher ground) shoreline structures to prevent flooding and ensure continued access. Forward planning/preparation – long term solution

What are the benefits of long-term planning vs executing short term solutions?

Septic Systems

High water challenges – flooding of Class 4 systems

- Limited solutions if high water floods the leaching bed
- Relocating to higher ground is expensive and may not be possible or may be insufficient as a long term solution
- Municipalities can allow storage tanks if no other option works.

Solutions

Consider switching to alternative technologies, such as composting toilet (numerous options) and grey water pit. Limited allowable technologies is an issue we will be addressing with Ontario government. Forward planning/preparation – find a long term solution



Questions

Water Levels 2021



GEORGIAN BAY
FOREVER



Series Closing Thoughts

Speakers:

Aisha Chiandet, Water Scientist, Severn Sound Environmental Association

David Sweetnam, Executive Director, Georgian Bay Forever

Rupert Kindersley, Executive Director, Georgian Bay Association



Series Wrap up

Webinar series was intended to provide you with an overview of the information you need and describe what is currently being done to address future impacts.

- Things are changing (have already changed)
- Careful thought and planning needed to protect people and property
- Consider all the issues

Quick review of all the key takeaways from Webinar 1 & 2

- Update on future water levels – balance between increasing precipitation and evaporation will determine future levels – higher highs and lower lows and increasing variability. [Note: ECCC modelling report due out in March].
- Action Plan 2030 includes requests for action on many issues that are highly relevant to Georgian Bay issues and concerns – important to support to get the funding requested
- Climate drivers – including temperature (air and water), wind speed, and precipitation – operate at different scales, including basin-wide and local scales.
- Future projections predict ‘warmer, wetter, wilder’ conditions. Lake impacts include ice (cover and phenology) and algae growth. Bluegreen algae blooms like it hot, so extreme events favour blooms.

Quick review of all the key takeaways from Webinar 1 & 2

- Additional lake impacts can be seen in wetlands, flora and fauna. While wetlands in Georgian Bay evolved within the long-term water level regime of 6.33 feet of water level fluctuations, increasing sewage discharge (among other factors) will increasingly tax the ability of our coastal wetlands to keep our water clean.
- Many plant and animal species will be unable to adapt to the effects of even an intermediate scenario for the future climate, with taxonomic groups depending most on water (e.g., mollusks, fishes, amphibians and lichens) being most vulnerable. Additional impacts can be seen in fish (e.g., less ice cover meaning lower egg viability) and birds (e.g., botulism bacteria being passed through the food web from algae to mussels to invasive round goby to diving birds and fish).

Quick review of all the key takeaways from Webinar 1 & 2

- Waves typically originate from wind or disturbances such as boats. Fetch, depth and wind speed/duration are key factors in wave height. Bigger storms + deeper water = bigger waves closer to the shoreline. Gentler shoreline slopes and vegetation will dampen/dissipate wave energy and can be used as the basis for creating soft but stable shorelines.
- Wake boats should be operated in sufficiently deep water to protect bottom sediments and near shore vegetation.
- ‘Living shorelines’ absorb energy through the use of softer materials and live vegetation, and help buffer wave energy before it reaches shore.

Quick review of all the key takeaways from Webinar 1 & 2

- High water level marks vary between municipalities, but are all lower than the 2019/20 water level. Recommendation to consider revising upwards given that higher water levels are expected in the future.
- Water-level changes affect the many businesses that are part of our coastal infrastructure, including by increasing their capital and operating costs related to dock systems, shore-wall systems, and shoreline properties.
- There are planning permission requirements for installing new/replacement docks and for relocating shoreline structures, as well as setback requirements, and some of these vary by municipality. Those involved in new construction or relocations should consider placing structures above the minimum setback from the high water mark required by the municipality to be prepared for higher water levels.

Quick review of all the key takeaways from Webinar 1 & 2

- There is a case to be made for approaching natural assets collectively, including that they provide benefits through the cost effective delivery of core services, they can be managed (which is the focus of local government natural-asset management), and they are often over-used and under-recognized.

Closing

Water Levels 2021



GEORGIAN BAY
FOREVER





Rupert Kindersley

Executive Director

Georgian Bay Association

Water Levels 2021 - Marilyn Longlade Capreol



- Early spring of 1949, I was born to Napoleon and Norah Geroux Longlade. My first home was the island behind the Ojibway Island. During the winter months we moved to our mainland location on the shores of Pointe au Baril.
- Summers home was always bustling with Grandparents, aunts, uncles and many cousins. We would hear the song of languages, both Ojibway and French. Hear the fishing stories each day and/or watch Grandma and aunts make their quill boxes.
- Very young we were taught to respect and understand the gifts of water, wind, animals, plants, the sky that holds beautiful stars. Our first knowledge and education were done by our parents, grandparents and community. There are no books to this day for this gift of learning. It was and is strictly learned by the teachings.
- I am very grateful and acknowledge, Mishomis Giizis (Grandfather Sun) miinwaa (and) Nokomis Dibik Giizis (Grandmother Moon). They encourage every living being and walk beside all each day.

Water Levels 2021

Thank you!