



Preparing for Extreme Heat & Poor Air Quality Events: *Health Impacts*

14 May 2019



Preparing for Extreme Heat and Poor Air Quality Events: Health Impacts



BCNPHA

BC Non-Profit Housing Association

May 14, 2019

Introduction



Outline	Presenter
1. Welcome and Introductions	Jackie Kanyuk, BCNPHA
2. Why? Changing Climate	Tamsin Mills, City of Vancouver
3. Health Impacts – Big Picture	Sarah Henderson, BCCDC
4. Health Impacts on Individual & What To Do	Michael Schwandt, BCCDC
5. Preparing for the Summer, City Resources and Activities	Tamsin Mills, City of Vancouver
6. Preparing for the Summer, Staff and Tenant Resources	Magdalena Szpala, BC Housing
7. Q&A, Wrap-up	Jackie Kanyuk, BCNPHA

A Changing Climate

Hotter, Drier Summers
with poor air quality events

Summer of 2018

- A number of temperature records were broken on Tuesday August 29, 2018:

- **Vancouver Harbour 30.5 C** (28.9 C in 1967)
- **Kamloops 38.5 C** (35.6 C in 1915)
- **Princeton 36 C** (35 C in 1897)
- **Sparwood 32.1 C** (30.6 C in 1972)
- **Williams Lake 31.9 C** (31.1 C in 1967)
- **Pemberton 35.1 C** (34.4 C in 1974)
- **Whistler 31.8 C** (31.1 C in 1996)

Air Quality – Metro Van

- Summer 2015: wildfire smoke degraded air quality for 8 days
- Summer 2017: unprecedented total of 19 days of advisories
- In August of 2018, health impacts reported among populations more sensitive to heat impacts.

 **58%**
decrease in
snowpack

WHICH MEANS

increased
risk of
summer
drought 

minimum
temp goes
up by
4.8° 

 **29%**
reduction
in home
heating
needs

increased risk
of coastal flooding

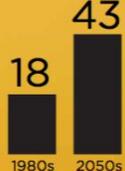

because of king tides
and stormy weather

Warmer, wetter
winters

Hotter, drier
summers

 more
frequent
heat
waves

hottest
days
even
hotter 

 **43** twice as
many
days
above
25°C
18
1980s 2050s

WHICH MEANS

increased
health risks
to vulnerable
people 

 **20%**
less rain

increased
water
restrictions 

MAJOR IMPACTS:

15%
longer
growing
season



72%
decrease
in frost days

snow
melts
earlier



20%
increase
in April
showers

When it rains it
pours

Longer Growing
Season

heavy
rain
events
35%
more
intense



21%
more
rain
on the
wettest days



WHICH MEANS

a
higher
flood
risk



Climate Projections to 2050

Vancouver:

- Doubling of days above 25°C
- Warmest days are 4°C warmer
- Very hot days intensify 32°C to 37°C
- Cooling degree days increase from 60 to 250dd/yr.
- Days above 30°C occur 12 times more frequently.
- High confidence in increased wildfire smoke impacts

BC Climate Projections 2050

- Van. Isl.: Similar to Vancouver projections
- Interior: also hotter and drier with a longer dry season and increased risk of wildfire.
- Cariboo: Increase in hot and dry conditions in the summer
- North: Increased precipitation in summer. Temps up as well.

CC Impacts

- Increased risk for heat related illness
- Increased risk for conflict due to heat
- Increased energy costs for cooling
- Increased need for shelter during inclement weather (heat and storms)
- Increased need for air filtration

Extreme Heat and Extreme Air Pollution in BC: Health Effects and Health Protection

May 14, 2019

Sarah Henderson, PhD

Senior Scientist

BC Centre for Disease Control

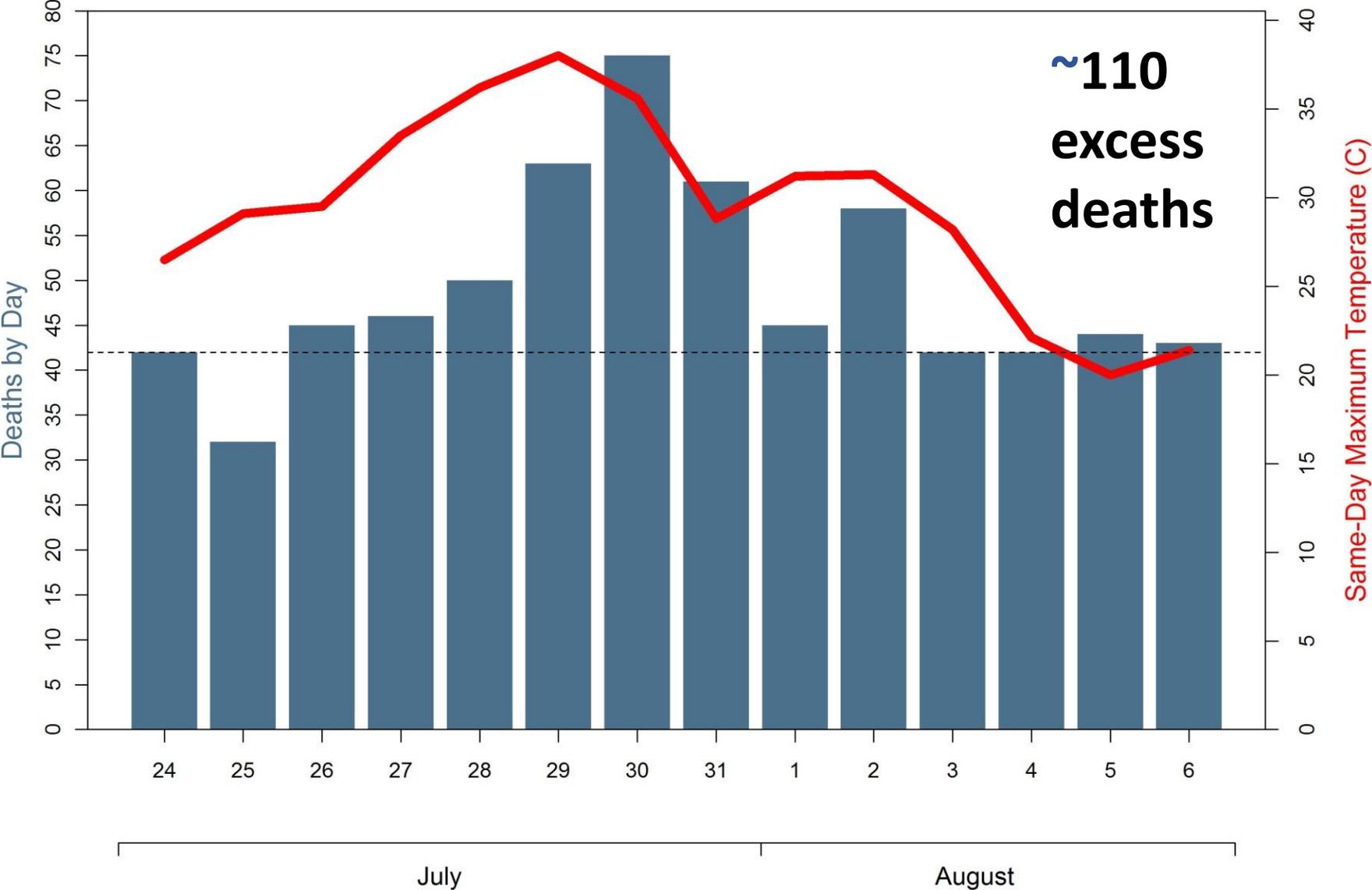


BC Centre for Disease Control
An agency of the Provincial Health Services Authority

Overview

- 1) The extreme hot weather event of 2009
 - Health effects
 - Those most at risk
 - Health protection
- 2) The extreme 2017 and 2018 wildfire seasons
 - Health effects
 - Those most at risk
 - Health protection
- 3) When smoke and heat meet

Lower Mainland 2009



Initial Analysis

		Previous Weeks	
Characteristic	Comparison Group	OR	95% CI
<65	≥ 85	1.1	0.9 – 1.5
65 – 74	≥ 85	1.5	1.1 – 2.1
75 – 84	≥ 85	1.0	0.8 – 1.4
Male	Female	1.1	0.9 – 1.4
Died out of care	Died in care	1.5	1.2 – 2.0
>1000 persons/km ²	≤1000 persons/km ²	1.2	1.0 – 1.5
>40% of 65+ living alone	≤40% of 65+ living alone	1.3	0.9 – 1.8
>20% low income	≤20% low income	1.2	1.0 – 1.4

Follow-Up Analysis on 73 Deaths

Characteristic	Group	% in 73 deaths	% in usual deaths
Age at death	< 75	78.1	37.4
	≥ 75	21.9	62.6
Location of death	Hospital	34.2	51.9
	Long-term care	19.1	30.9
	Home	38.4	14.5
	Other	8.2	2.7
Deprivation index	Low	0	20.7
	Low/moderate	0	20.7
	Moderate	13.7	19.2
	Moderate/high	26.3	19.1
	High	60.3	20.2

Follow-Up Analysis on 73 Deaths

Characteristic	Group	% in 73 deaths	% in usual deaths
Population density	Low	0	20.1
	Low/moderate	5.5	19.5
	Moderate	8.2	19.9
	Moderate/high	30.1	19.8
	High	56.2	20.7
Cause of death	Cardiovascular	22.2	27.1
	Respiratory	2.8	10.0
	Cancer	26.4	30.7
	External	13.9	3.1

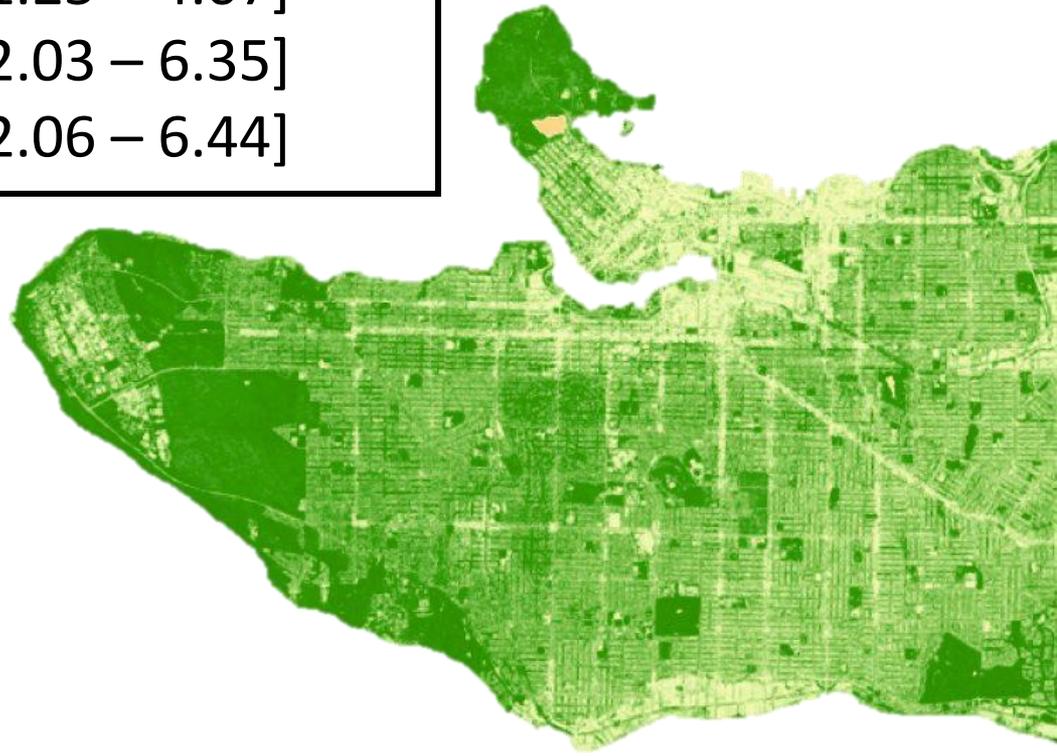
- 
- Accidental pharmaceutical poisonings
 - Accidental illicit/unknown poisonings
 - Intentional self harm

Drugs of Particular Concern

- Some drugs interfere with temperature regulation and heat perception
 - Anticholinergics (inhibit nerve impulses)
 - Used to treat incontinence, asthma, COPD, and Parkinson's, among others
 - Other anti-Parkinson's agents
 - Diuretics
 - Antihistamines
 - Cocaine

New Evidence on Greenness

Residential greenness index	Increased risk of mortality during 2009 event [95% confidence interval]
High	reference
High/moderate	1.99 [1.08 – 2.63]
Moderate	2.26 [1.25 – 4.07]
Moderate/low	3.59 [2.03 – 6.35]
Low	3.64 [2.06 – 6.44]



Staying Cool = Staying Safe

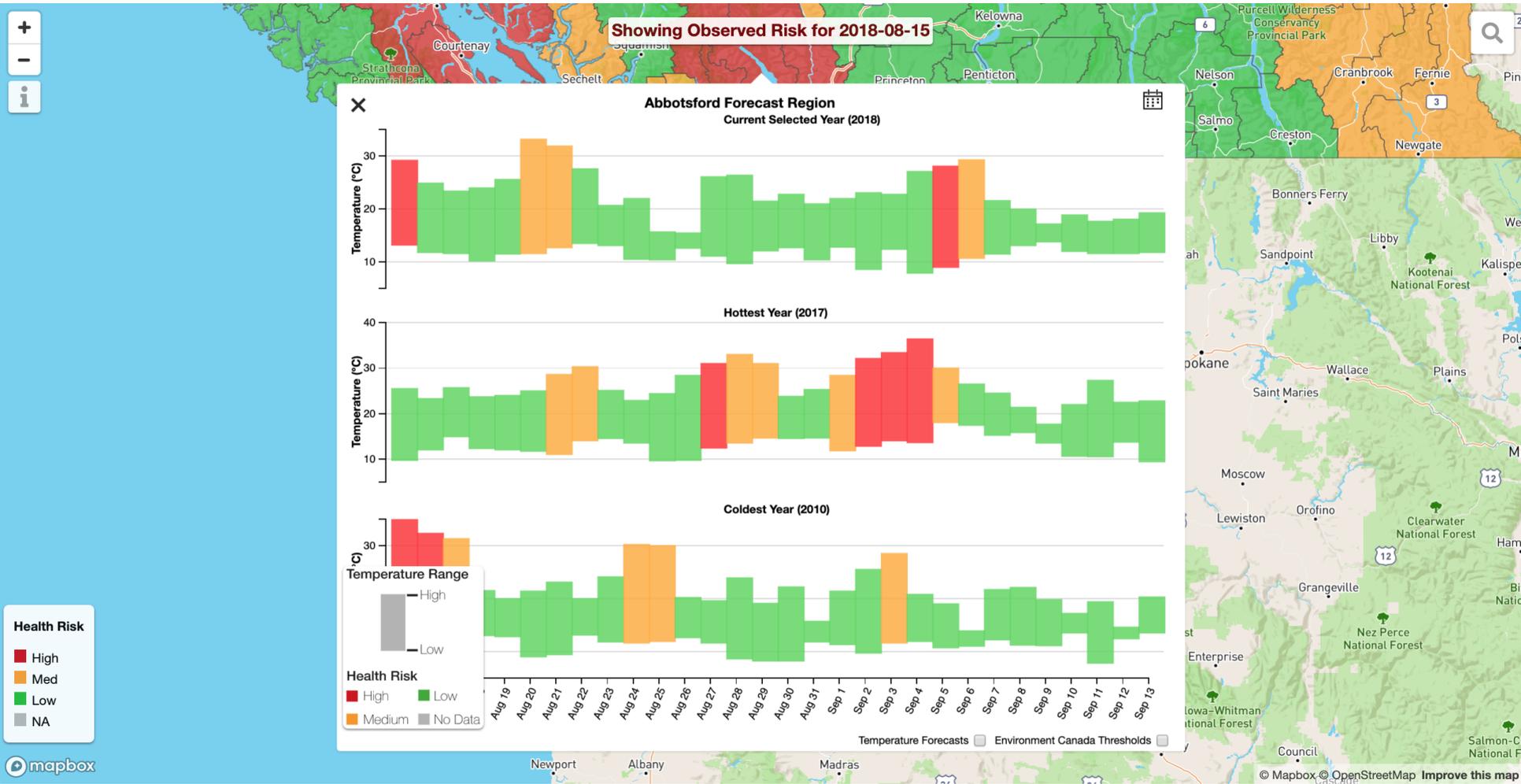


- AC is most effective
- Hydration is essential
- Wet skin improves evaporative cooling
- Trees and water features cool surrounding area

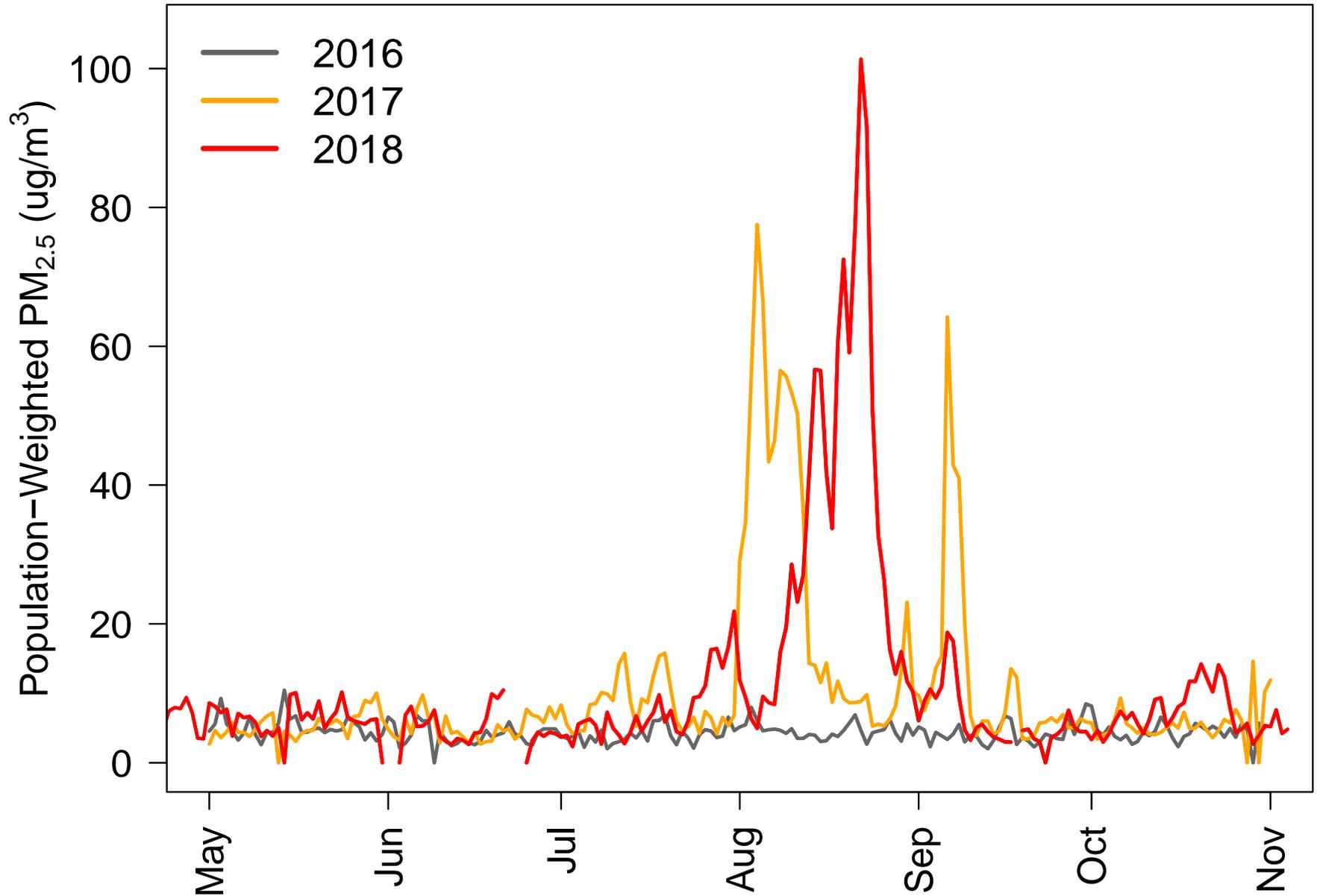


BC Heat Impacts Prediction System

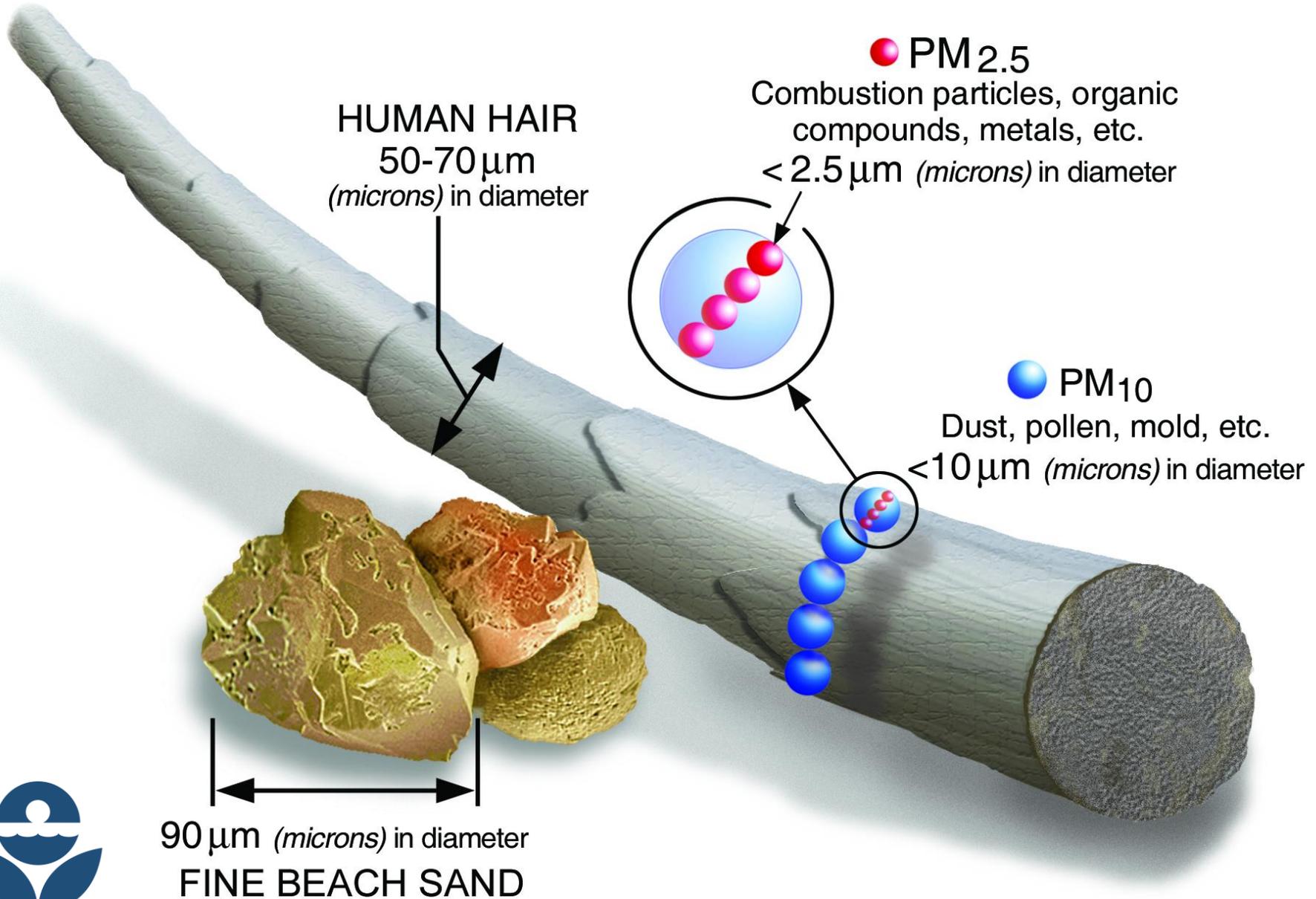
<https://maps.bccdc.ca/bchips>



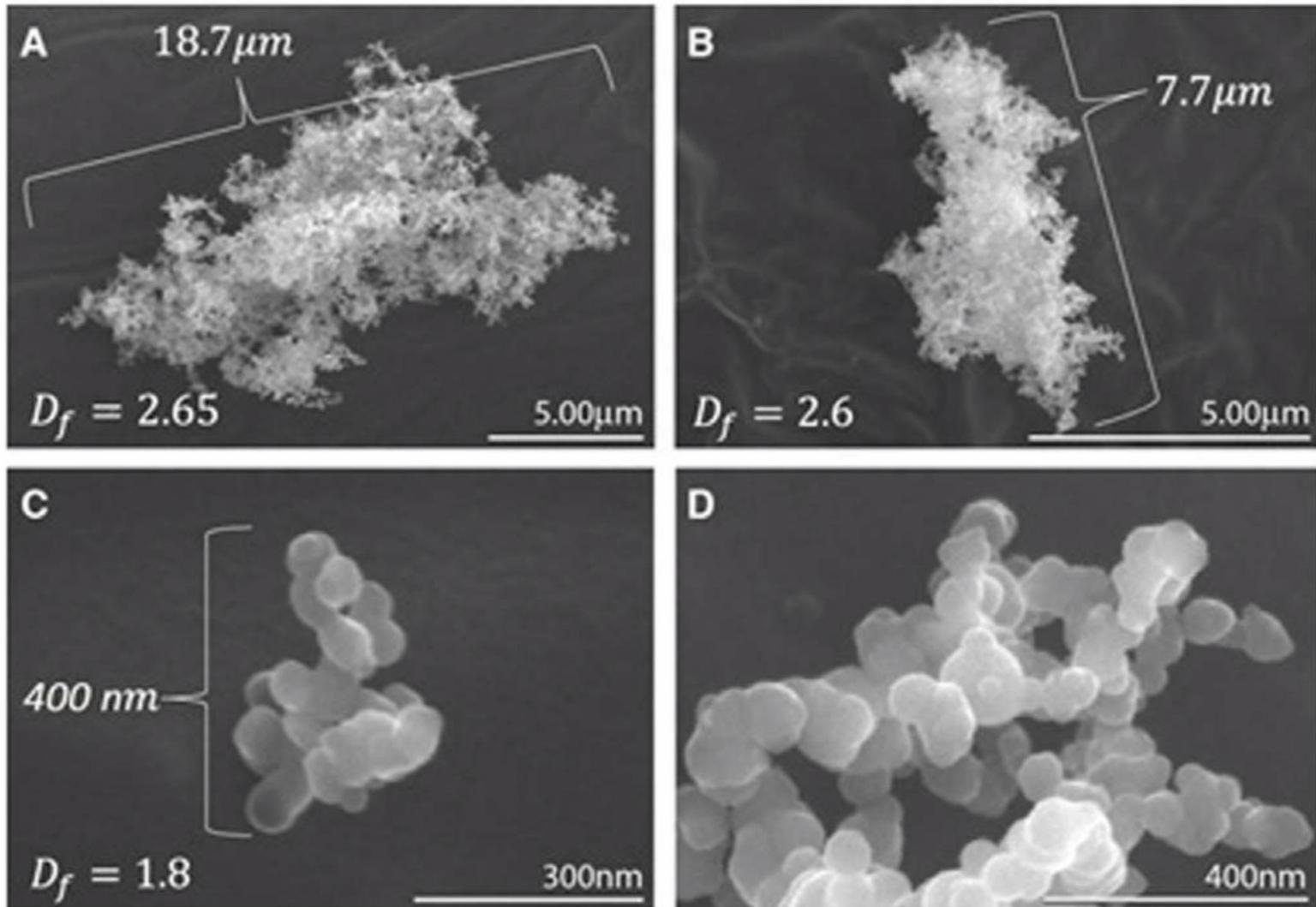
2016-2018 Wildfire Seasons



Fine Particulate Matter (PM_{2.5})



Smoke PM_{2.5} ≠ Pretty Pink Spheres



Age	Number	Susceptible due to age, asthma, COPD, heart disease, or diabetes	Pregnant
<10	108,000	108,000	
10-14	53,000	5,460	468
15-19	60,000	6,300	540
20-24	70,000	7,070	2,100
25-34	138,000	13,938	9,660
35-44	133,000	15,162	3,059
45-64	281,000	57,605	562
65-74	88,000	30,448	
75+	69,000	69,000	
Total	1,000,000	313,983 (31.4%)	16,389 (1.6%)

In 1,000,000 Population on a Very Smoky Day

- From **2-4 excess deaths***
(within the range of normal variability)
- From **65-140 excess asthma visits****
(well beyond normal variability)
- From **140-290 excess Ventolin**** dispensations
(well beyond normal variability)
- From **2-4 excess out-of-hospital cardiac arrests***** (somewhat beyond normal variability)

*Based on BC data from Henderson and Yao (2019). Environmental Health; submitted

**Based on BC data from Yao et al. (2016). JESEE; 26, 233–240

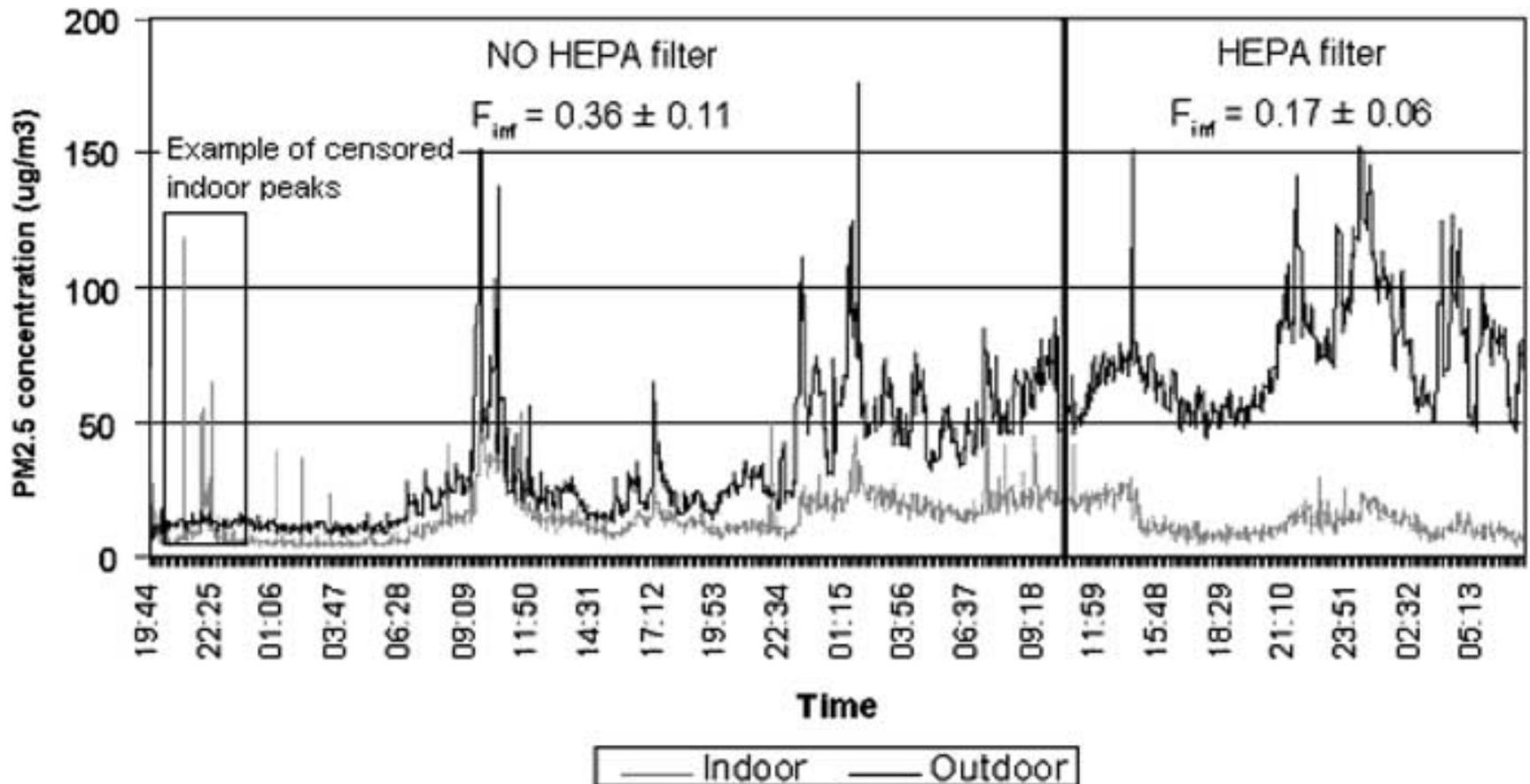
***Based on Australian data from Dennekamp et al. (2015). EHP; 123(10), 959–964

In 16,000 Pregnant Women Exposed to a Smoky Month

- Assuming the national **average birth weight of 3375 g** with a standard deviation of 555 g
- This provides a distribution with 6% of infants <2500 g (the national average)
- Assuming a **6.1 g** [3.5 – 8.7 g] average decrease in birth weight from a Californian study*
- Approximately **20 [6 – 22] babies shifted** to low birth weight category

Less Smoke Inhaled = Less Risk

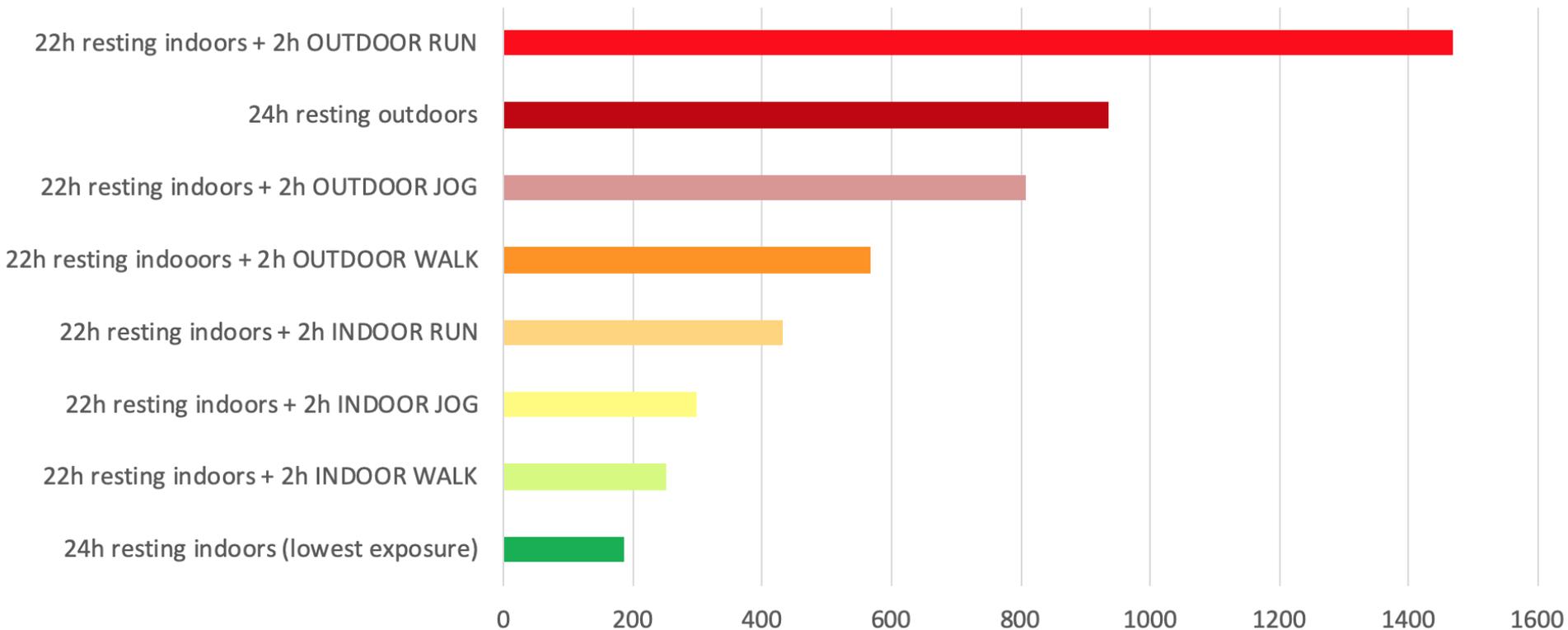
- People spend more than 90% of time indoors
- Cleaner indoor air is first line of defense



Less Smoke Inhaled = Less Risk

- Exertion = breathing faster and deeper
- More air = more smoke
- Take it easy, especially outdoors!

Assuming outdoor PM_{2.5} from smoke is 100 µg/m³ and indoor PM_{2.5} from smoke is 20 µg/m³



When Smoke and Heat Meet

- Hot weather causes thermal stress
- Smoke causes irritation and inflammation
- Different environmental exposures can add up
- Those vulnerable to both are at highest risk
 - Chronic conditions, elderly, pregnant women and infants
- Heat is a bigger health risk than smoke for most people, so cooling should be prioritized
- Cooler, cleaner indoor air is the ideal

Thank you!

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BC Centre for Disease Control
Provincial Health Services Authority

Preparing for Extreme Heat and Poor Air Quality Events: Health Impacts

May 14, 2019

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Public Health Physician, BCCDC

BC Centre for Disease Control

Provincial Health Services Authority



Outline

- Heat-related illness
- Vulnerability to heat
 - Physiological
 - Social
 - Environmental
- Planning for extreme heat
- Resources

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More than 90 deaths now linked to heat wave in Quebec

By **ALLAN WOODS** Quebec Bureau
Wed., July 18, 2018

Heat illness

Spectrum of impacts:

- Heat rash
- Cramps
- Heat exhaustion
- Confusion, lightheadedness
- Loss of consciousness
(from syncope/fainting to prolonged)
- Coma
- Risk of death

Symptoms and responses across the heat illness spectrum

HEAT STROKE

- High body temperature (103°F or higher)
 - Hot, red, dry, or damp skin
 - Fast, strong pulse
 - Headache
 - Dizziness
 - Nausea
 - Confusion
 - Losing consciousness (passing out)
- Call 911 right away-heat stroke is a medical emergency
 - Move the person to a cooler place
 - Help lower the person's temperature with cool cloths or a cool bath
 - Do not give the person anything to drink

HEAT EXHAUSTION

- Heavy sweating
 - Cold, pale, and clammy skin
 - Fast, weak pulse
 - Nausea or vomiting
 - Muscle cramps
 - Tiredness or weakness
 - Dizziness
 - Headache
 - Fainting (passing out)
- Move to a cool place
 - Loosen your clothes
 - Put cool, wet cloths on your body or take a cool bath
 - Sip water
- Get medical help right away if:**
- You are throwing up
 - Your symptoms get worse
 - Your symptoms last longer than 1 hour

HEAT CRAMPS

- Heavy sweating during intense exercise
 - Muscle pain or spasms
- Stop physical activity and move to a cool place
 - Drink water or a sports drink
 - Wait for cramps to go away before you do any more physical activity
- Get medical help right away if:**
- Cramps last longer than 1 hour
 - You're on a low-sodium diet
 - You have heart problems

Key factors affecting heat burden

- Temperature
- Humidity
- Ventilation (wind)
- Radiation (direct light)
- Behavioural (exertion, clothing, etc)

A note on ventilation and heat burden indoors

- Generally, at air temperatures *below* body temperature (~37C), wind/ventilation *reduces* heat burden.
- Thus, air *movement* as well as temperature are important to heat burden experienced indoors.
- Air conditioning and fans can both provide benefits.

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Heat vulnerability

- Factors in vulnerability/resilience to heat illness may be **physiological, social, and environmental.**
- Body temperature is maintained within a narrow range, can only tolerate minor elevations in temperature.

Physiological vulnerability to extreme heat

- Evaporation (via sweating) is the body's main mechanism for heat dissipation (along with radiation of heat from skin)
- Processes for cooling are affected by:
 - Physical fitness/obesity
 - Pre-existing medical conditions (heart and lung disease, other circulatory diseases, diabetes, neurological conditions)
 - Acute illness
 - Acclimatization
 - Medications and drugs
 - Age

Medications and drugs affecting risk of heat illness

- Antihistamines
- Decongestants
- Some antipsychotic medications (including phenothiazines)
- Tricyclic antidepressants
- Lithium
- Diuretics
- Anticholinergic agents (wide variety of conditions)
- Antiepileptic agents
- Stimulants
- Beta blockers (blood pressure management)
- Alcohol
- Cocaine
- Amphetamines
- And more...

Social vulnerability to extreme heat

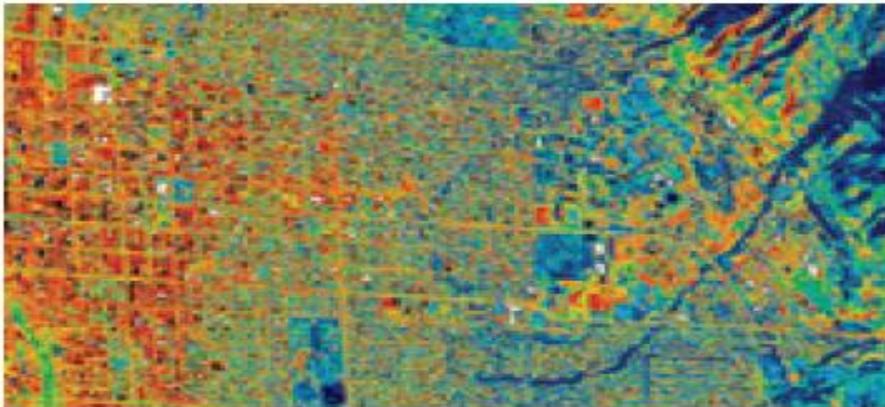
- Reduced access to cooling facilities and other heat mitigation measures (e.g. A/C)
- Social isolation and barriers to reaching help
- *Socially* vulnerable groups may be more likely to live in neighbourhoods with *environmental* vulnerability

Environmental vulnerability to extreme heat

- High population density
- Sparse vegetation
- Lack of open space in the neighborhood
- Darkly hued roofing and paving materials
- Higher heat load in urban areas (cars, ventilation systems)

Environmental vulnerability: urban heat islands

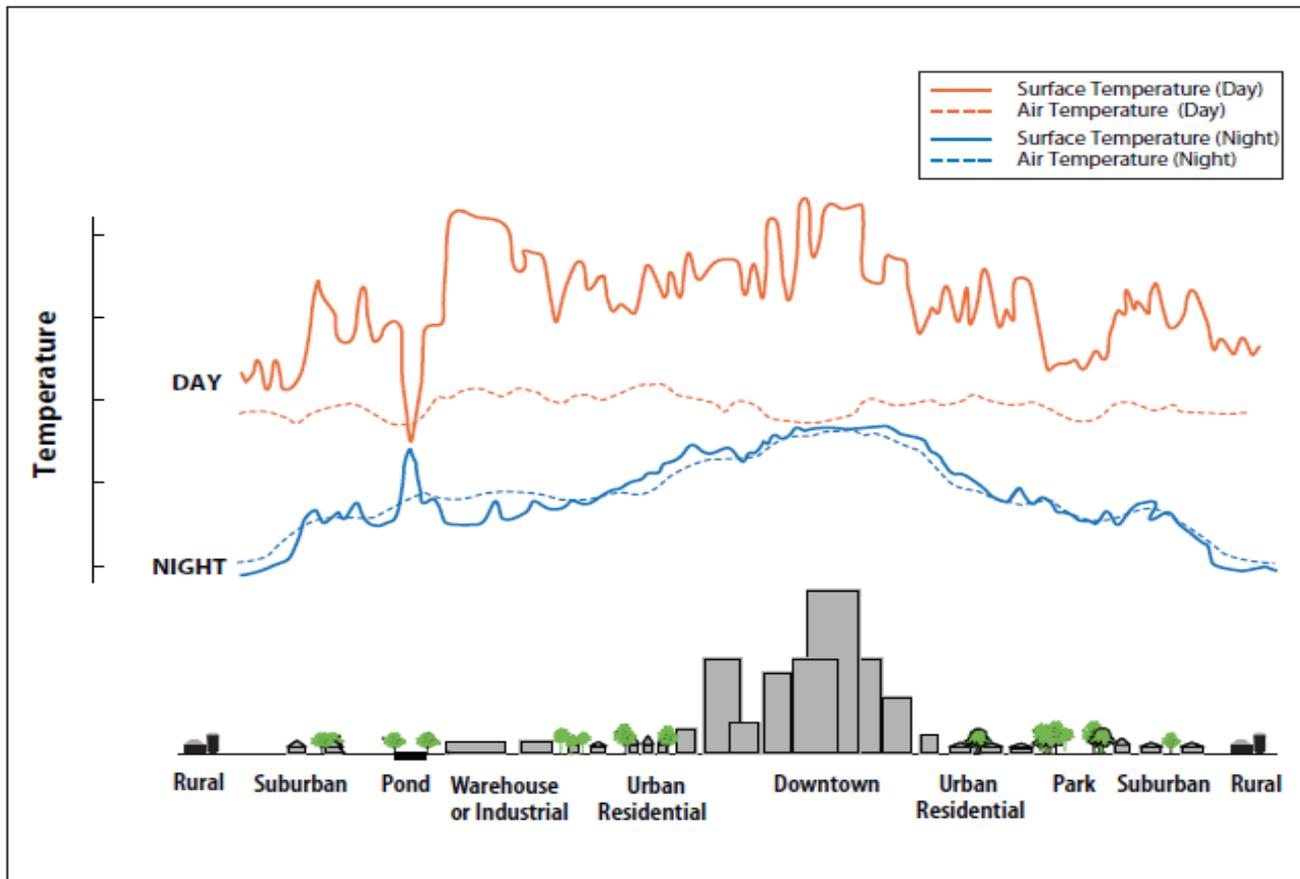
Figure 1: Thermal Image Depicting a
Surface Urban Heat Island



This image, taken from an aircraft, depicts a midday surface urban heat island in Salt Lake City, Utah, on July 13, 1998. White areas are around 160°F (70°C), while dark blue areas are near 85°F (30°C). Note the warmer urban surface temperatures (left side of image) and cooler surfaces in the neighboring foothills (on the right).

Source: <https://www.epa.gov/heat-islands/heat-island-compendium>

Urban heat islands



Modified from Voogt, 2000

Source: <https://www.epa.gov/heat-islands/heat-island-compendium>



Protective environments

- Trees and vegetation
- Green roofs
- Cool roofs (reflective)
- Cool pavement surfaces
- Ventilation, air conditioning



Considering heat and air quality together

- Air contaminants can exacerbate conditions of the lungs, airways and heart
 - e.g. Fine particulate matter, ground-level ozone, nitrogen dioxide
- Periods of poor air quality may overlap with extreme heat events (NB: wildfire season)
- Many vulnerabilities for effects of extreme heat are also important for air quality impacts
 - Older adults, infants/children, pre-existing conditions, homelessness/underhousing, access to filtered indoor air

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Components of heat response planning

- Develop clear plan of action with roles and responsibilities
- Identify susceptible individuals *prior* to the hot-weather season
- Create list of cooling facilities and strategies
- Identify and establish links with partners in community, municipal government, health agencies, community-based organizations
- Develop/share communication materials for staff and residents
- Monitoring and surveillance
- Post-season evaluation of heat response

For the Public

Do

- ▶ Use air conditioners or spend time in air-conditioned locations such as malls and libraries
- ▶ Use portable electric fans to exhaust hot air from rooms or draw in cooler air
- ▶ Take a cool bath or shower
- ▶ Minimize direct exposure to the sun
- ▶ Stay hydrated – regularly drink water or other nonalcoholic fluids
- ▶ Eat light, cool, easy-to-digest foods such as fruit or salads
- ▶ Wear loose fitting, light-colored clothes
- ▶ Check on older, sick, or frail people who may need help responding to the heat
- ▶ Know the symptoms of excessive heat exposure and the appropriate responses.

Don't

- ▶ Direct the flow of portable electric fans toward yourself when room temperature is hotter than 90°F
- ▶ Leave children and pets alone in cars for any amount of time
- ▶ Drink alcohol to try to stay cool
- ▶ Eat heavy, hot, or hard-to-digest foods
- ▶ Wear heavy, dark clothing.

For Public Officials

Send a clear public message

- ▶ Communicate that EHEs are dangerous and conditions can be life-threatening. In the event of conflicting environmental safety recommendations, emphasize that health protection should be the first priority.

Inform the public of anticipated EHE conditions

- ▶ When will EHE conditions be dangerous?
- ▶ How long will EHE conditions last?
- ▶ How hot will it FEEL at specific times during the day (e.g., 8 A.M., 12 P.M., 4 P.M., 8 P.M.)?

Assist those at greatest risk

- ▶ Assess locations with vulnerable populations, such as nursing homes and public housing
- ▶ Staff additional emergency medical personnel to address the anticipated increase in demand
- ▶ Shift/expand homeless intervention services to cover daytime hours
- ▶ Open cooling centers to offer relief for people without air conditioning and urge the public to use them.

Provide access to additional sources of information

- ▶ Provide toll-free numbers and Web site addresses for heat exposure symptoms and responses
- ▶ Open hotlines to report concerns about individuals who may be at risk
- ▶ Coordinate broadcasts of EHE response information in newspapers and on television and radio.

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Resources

Health Canada Infographics and factsheets on heat and health:

- Infographic – <https://www.canada.ca/en/health-canada/services/publications/healthy-living/infographic-staying-healthy-heat.html>
- Factsheet – <https://www.canada.ca/en/health-canada/services/publications/healthy-living/factsheet-staying-healthy-heat.html>

STAYING HEALTHY in the HEAT

Why is heat a HEALTH CONCERN?
Extreme heat involves high temperatures and can pose health risks. Over the next 30 years, the number of extremely hot days in a year is expected to more than double in some parts of Canada.

HEAT EXHAUSTION

Skin rash, Muscle cramps, Dizziness or fainting, Nausea or vomiting, Heavy sweating, Headache, Rapid breathing and heartbeat, Extreme thirst, Dark urine and decreased urination.

HEAT STROKE

High body temperature, Confusion and lack of coordination, Dizziness/fainting, No sweating, but very hot, red skin.

What are the SIGNS AND SYMPTOMS of heat illness?

Heat stroke is a medical emergency! Call 911 or your local emergency number immediately. While waiting for help—cool the person right away by:
- removing them to a cool place if possible
- applying cold water to large areas of the skin and fanning the person as much as possible.

Who is MOST AT RISK?

- FACT 1 OLDER ADULTS**: Older adults may be faced with compounding factors that could put them at increased risk during extreme heat events. These factors may include chronic illnesses, medications that interfere with the body's cooling mechanisms, social isolation, and poverty.
- FACT 2 INFANTS AND YOUNG CHILDREN**: Given the unique physiological characteristics of children's bodies and their high dependency on caregivers, they are likely to be at risk during extreme heat events.
- FACT 3 CHRONIC ILLNESS/SPECIAL MEDICATION**: Individuals with breathing difficulties, heart problems, and psychiatric illnesses are at a higher risk of heat-related health effects.
- FACT 4 PEOPLE WHO WORK OR ARE ACTIVE OUTDOORS**: People who work outdoors (e.g., construction, food service) and physically active individuals who exercise in the heat could face greater environmental heat exposure and physical strain.

SAFETY TIPS

- TIP 1 PREPARE FOR THE HEAT**: Tune in regularly to local weather forecasts and alerts so you know when to take extra care. If you have an air conditioner, make sure it works properly. If you don't have an air conditioner, find an air-conditioned cool place to where you can cool off for a few hours on very hot days.
- TIP 2 KNOW THE SIGNS OF HEAT**
- TIP 3 PAY ATTENTION TO HOW YOU AND THOSE AROUND YOU FEEL**: Frequently check yourself, family and other loved ones, especially those who are chronically ill, to make sure they stay cool and hydrated.
- TIP 4 DRINK LIQUIDS; WATER IS BEST.**
- TIP 5 STAY COOL**

How to stay cool?

- Heat: Avoid being in direct sunlight for long periods.
- Wear: Wear light-colored, loose-fitting clothing.
- Stay hydrated: Drink plenty of water.
- Plan outdoor activities: Avoid strenuous activities for longer periods during the heat of the day.
- Use fans: Use fans to circulate air.
- Stay in a cool place: Spend a few hours in a cool place if you can. If you don't have an air conditioner, find an air-conditioned cool place to where you can cool off for a few hours on very hot days.
- Never leave children or pets alone in parked vehicles.

FOR MORE INFORMATION OR ADDITIONAL RESOURCES

- Visit the Extreme Heat webpage: www.proudfirst.ca/health/infographic/healthy-living/infographic-staying-healthy-heat.html
- Visit the Health Canada health publications webpage: www150.ca.ca/health/infographic/healthy-living/infographic-staying-healthy-heat.html
- Speak with your physician or personal care provider.
- Contact your local public health authority.

FOR MORE INFORMATION

Resources

BC Centre for Disease Control

- Wildfire smoke and public health: evidence reviews and fact sheets
<http://www.bccdc.ca/health-professionals/professional-resources/wildfire-smoke-response-planning>
- Resource documents including “*Developing a municipal heat response plan: A guide for medium-sized municipalities*”
<http://www.ncceh.ca/environmental-health-in-canada/health-agency-projects/extreme-heat>



Health Effects of Wildfire Smoke

Wildfire smoke is a complex mixture of fine particulate matter (PM_{2.5}) and gases, such as carbon monoxide, nitrogen oxides, and volatile organic compounds. The mixture can change depending on the fuels, the weather, and distance from the fire. Wildfire smoke causes episodes of the worst air quality that most people will ever experience in British Columbia.

Thank you

Preparation for Extreme Heat City of Vancouver

Heat in Vancouver



- Curtis Brick dies from heat exposure in Grandview Park on July 29th, 2009.
- Council Resolution to reduce extreme heat vulnerability of homeless populations, homebound seniors, and other vulnerable populations.

2010 Extreme Hot Weather Preparedness and Response Plan

Extreme Heat IRG

- Event Escalation & Notification
- Preparedness Activities
- Response Activities
 - Increase access to drinking water
 - Provide shelter from heat
 - Monitor outdoor spaces & SROs
 - Messaging
- Tools
 - Notification templates & agendas, contact list, key messaging by topics, web links, handouts, etc.

4.3 Monitoring Outdoor Spaces For People Suffering Heat-Related Illness

Function	Activity	Department/Agency		Special Weather Statement	Heat Warning
		Lead	Support		
Increase Vigilance for People Outside	Activate VVC to patrol at risk neighbourhoods to advise vulnerable groups on locations to water fountains and to report malfunctioning water fountains	OEM	ENG (OPS)	•	•
	Perform drive-by in parks and in commercial areas to assist people exhibiting signs of heat-related illness and to encourage people to look after each other (where operationally feasible).	VFRS		•	•
	Patrol neighbourhoods and nearby parks (particularly the DTEs) by Neighborhood Policing Officers and other officers to refer vulnerable populations to nearby water access points	VPD		•	•
	Increase park patrols by Park Rangers to locate and assist people suffering from heat-related illness	PARIS		•	•
Increasing Hours of Operations for Spray Parks	Extend wading pool and spray park hours of operations (dependent on approvals)	PARIS		•	•

Climate Change Adaptation Actions



PACIFIC CLIMATE IMPACTS CONSORTIUM



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Summary of Climate Change for Peace River in the 2050s

Climate Variable	Season	Projected Change from 1961-1990 Baseline	
		Ensemble Median	Range (10th to 90th percentile)
Mean Temperature (°C)	Annual	+1.8 °C	+1.4 °C to +2.8 °C
Precipitation (%)	Annual	+8%	+1% to +16%
	Summer	+3%	-7% to +12%
	Winter	+11%	-4% to +22%
Snowfall* (%)	Winter	+7%	-7% to +17%
	Spring	-55%	-69% to -16%
Growing Degree Days* (degree days)	Annual	+225 degree days	+139 to +380 degree days
Heating Degree Days* (degree days)	Annual	-651 degree days	-989 to -485 degree days
Frost-Free Days* (days)	Annual	+16 days	+10 to +25 days

The table above shows projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period (1961-1990) to the **2050s** for the **Peace River** region. The ensemble median is a mid-point value, chosen from a PCIC standard set of Global Climate Model (GCM) projections (see the 'Notes' tab for more information). The range values represent the lowest and highest results within the set. Please note that this summary table does not reflect the 'Season' choice made under the 'Region & Time' tab. However, this setting does affect results obtained under each variable tab.

* These values are derived from temperature and precipitation. Please select the appropriate variable tab for more information.

Summary

Region & Time

Temperature

Precipitation

Snowfall

Growing DD

Heating DD

Frost-Free Days

Impacts

Notes

References

Climate Adaptation

- Pilot clean air shelters
- Planting trees in tree deficit areas
- Adding water fountains
- Temporary spray parks
- Non-market housing temporary cooling and study of long term fixes
- Climate Risk project with Evergreen

Clean Air Shelters

- Pilot summer season
- Combined with Cooling Centres
- Portable HEPA filters and assessment overall ventilation system

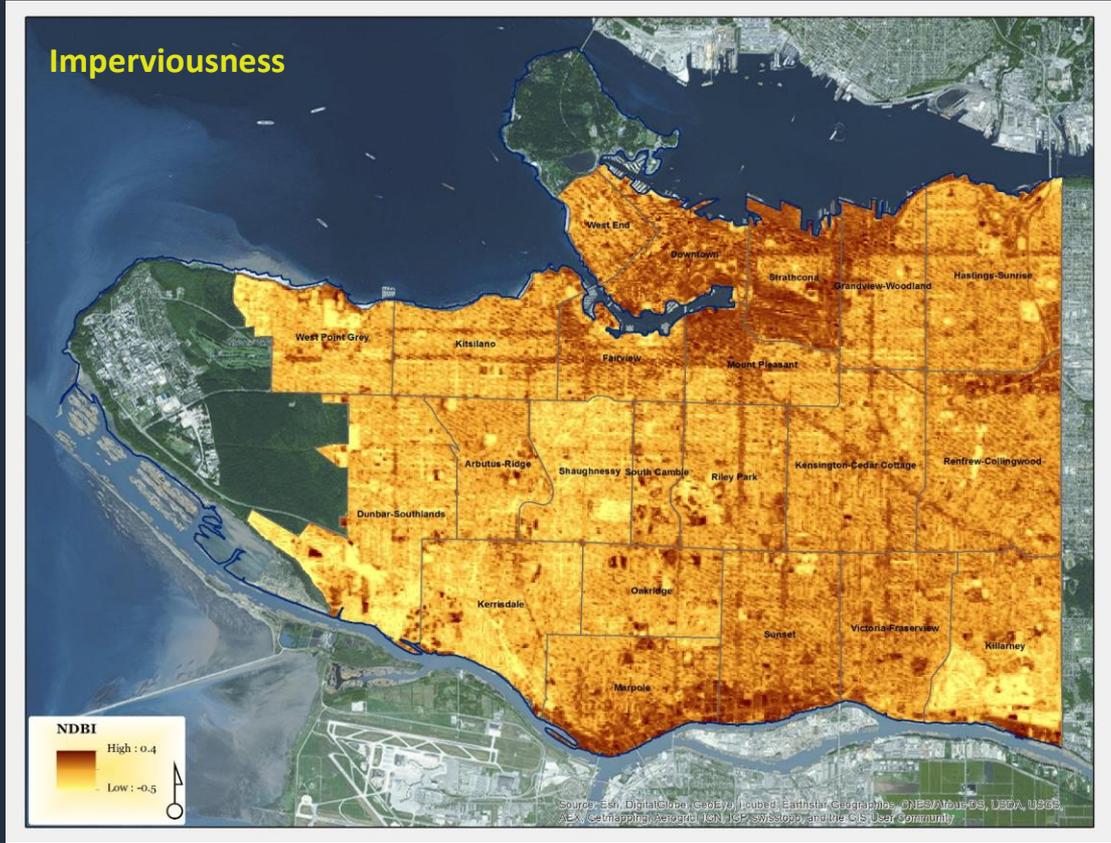
Climate Risk Project

- Evergreen with FCM and City funding
- Interviews with social housing and community centre staff
- Engagement activities with seniors and residents to understand how the city can better support people during heat and air quality events

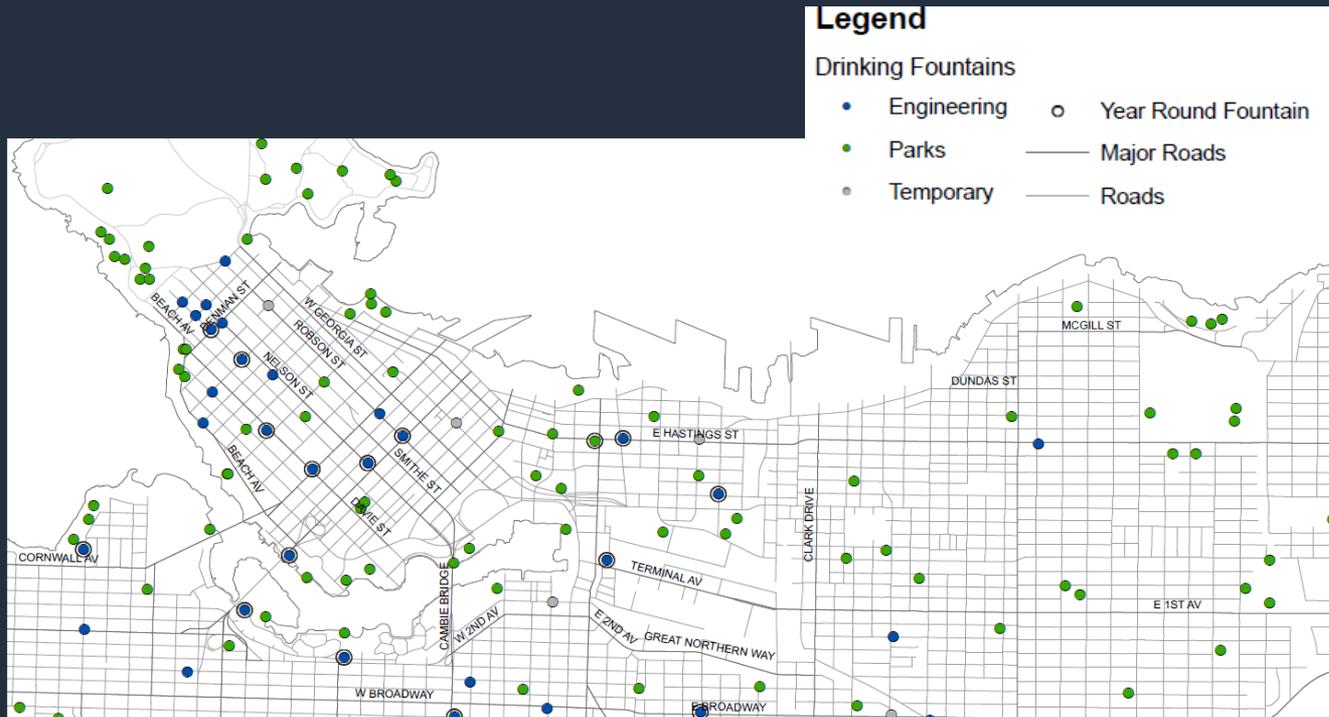
Canopy Cover



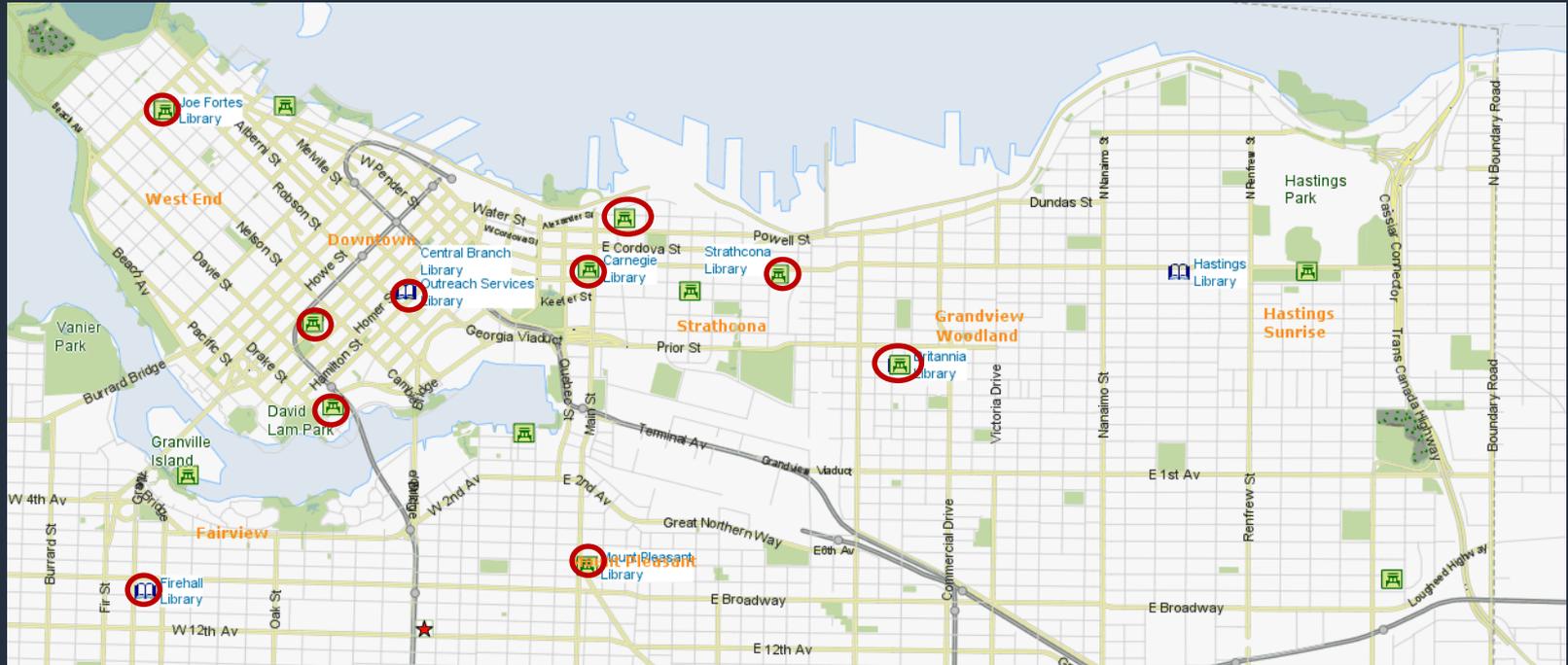
Imperviousness



City of Van Water Fountains



Cooling Centres



Passive Cooling for Buildings

<https://vancouver.ca/files/cov/passive-cooling-measures-for-murbs.pdf>



MORRISON HERSHFIELD

REPORT

Passive Cooling Measures for Multi-Unit Residential Buildings

Vancouver, BC

Communication Tools

KEEP COOL!
Here are some things you can do to protect yourself against the heat.

Drink plenty of cool fluids, like water, BEFORE feeling thirsty

▼ Drinking Fountains
Public Library
Community Centre
Washrooms
Parks

KEEP COOL!
Some resources to help

- Call 311 to find the nearest community centre
- Call 911 in an emergency
- Call 811 for HealthLink BC your symptoms
- Visit healthlinkbc.ca/heat

How to Keep Cool

- libraries and community centres provide a place to keep out of the sun, and they have washrooms
- many parks have drinking fountains and/or washrooms

KEEP COOL!
Keep this cool with you or give it to a friend

- Make a plan to beat the heat
- Wear a hat
- Try and keep out of the heat and cool off
- Drink plenty of cool fluids like water BEFORE feeling thirsty
- Sip cool water on your face and neck
- Stay Dry

KEEP COOL!
Some resources to help

- Call 311 to find the nearest library or community centre
- Call 911 in an emergency
- Call 811 for HealthLink BC and advice on your symptoms
- Visit healthlinkbc.ca/heat

KEEP COOL!
Keep this cool with you or give it to a friend

- Make a plan to beat the heat
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- Drink plenty of cool fluids like water BEFORE feeling thirsty
- Sip cool water on your face and neck
- Stay Dry

Summer heat in Vancouver

Summer heat facts
Time to heat out
Water fountains in the city

Vancouver, it's hot

When it's summer in Vancouver and the days get hotter it's important to remember that even in temperate, coastal BC, heat can be harmful. While heat can harm anyone, some people are especially vulnerable.

40790: 0 feature selected
1:107500
10.63 x 12.32 (km)
Powered by MapGuide

Brochure (fan/map), website, maps (online and hardcopy)

Organizing Actions

4.3 Monitoring Outdoor Spaces For People Suffering Heat-Related Illness

Function	Activity	Department/Agency		Special Weather Statement	Heat Warning
		Lead	Support		
Increase Vigilance for People Outside	Activate VVC to patrol at risk neighbourhoods to advise vulnerable groups on locations to water fountains and to report malfunctioning water fountains	OEM	ENG (OPS)	•	•
	Perform drive-by in parks and in commercial areas to assist people exhibiting signs of heat-related illness and to encourage people to look after each other (where operationally feasible).	VFRS		•	•
	Patrol neighbourhoods and nearby parks (particularly the DTES) by Neighborhood Policing Officers and other officers to refer vulnerable populations to nearby water access points	VPD		•	•
	Increased park patrols by Park Rangers to locate and assist people suffering from heat-related illness	PARKS		•	•
Increasing Hours of Operations for Spray Parks	Extend wading pool and spray park hours of operations (dependent on approvals)	PARKS		•	•

5.6 Conference Call Agenda for Severe Weather Statement or Heat Warning

The purpose for this conference call/meeting is to continue revisions of impacts, review specific response functions and determine whether an Advanced Planning Unit is required and/or EOC activation is required.

ATTENDEES				
<input type="checkbox"/> CMO / OEM	<input type="checkbox"/> ENG Waterworks -	<input type="checkbox"/> CS -		
<input type="checkbox"/> ENV Canada -	<input type="checkbox"/> ENG Special Events -	<input type="checkbox"/> VPL -		
<input type="checkbox"/> VPD -	<input type="checkbox"/> ENG Sustainability-	<input type="checkbox"/> MHO -		
<input type="checkbox"/> VFRS -	<input type="checkbox"/> ENG OH&S -	<input type="checkbox"/> Health (VCH) -		
<input type="checkbox"/> Corp. Comm/PB Comm -	<input type="checkbox"/> Facilities -	<input type="checkbox"/> Metro Van AQD -		
<input type="checkbox"/> 311 -	<input type="checkbox"/> Parks -	<input type="checkbox"/> Other:		
Conference Call: 604.829.4222			Date:	
Meeting ID: 84400			Time:	
Meeting password: 159751				
#	Agenda	Speaker	Desired Outcome	Actions/Next Steps
1.	Convene Meeting (CMO or EM Duty Officer or OEM Management Team) <ul style="list-style-type: none"> ▪ Introduce Chair, facilitator, experts (EC, VCH, Metro Van) ▪ Roll Call 	▪	▪ Ensure all departments are represented on the call	▪
2.	Update from Last Conference Call (Facilitator/EOC Deputy/Director)	▪	▪ As applicable	▪
3.	Hazard Update (Current & Future) <ul style="list-style-type: none"> ▪ Weather (Environment Canada) ▪ Health (Vancouver Coastal Health) ▪ Air Quality (Metro Van) 	▪	<ul style="list-style-type: none"> ▪ What is the short-term, long-term weather forecast (weather improving, stable or worse?) ▪ Is there an impact to health that requires immediate attention? ▪ Is there going to be an air quality issue? 	▪
4.	Regional Situation Awareness Update <ul style="list-style-type: none"> ▪ City/Departmental and stakeholders (Function Leads) ▪ FASE (Film & Special Events Office) 	▪	<ul style="list-style-type: none"> ▪ Any new or emerging issues? ▪ Any downstream impacts? ▪ Any major special events? 	▪
5.	Conduct Risk Assessment Update (All) <ul style="list-style-type: none"> ▪ Review risk matrix and identify current and emerging potential risks ▪ Review and identify further required mitigation measures 	▪	<ul style="list-style-type: none"> ▪ review risk matrix ▪ Are there any new aggravating factors like special planned events, etc? ▪ Are current mitigation efforts enough? 	▪

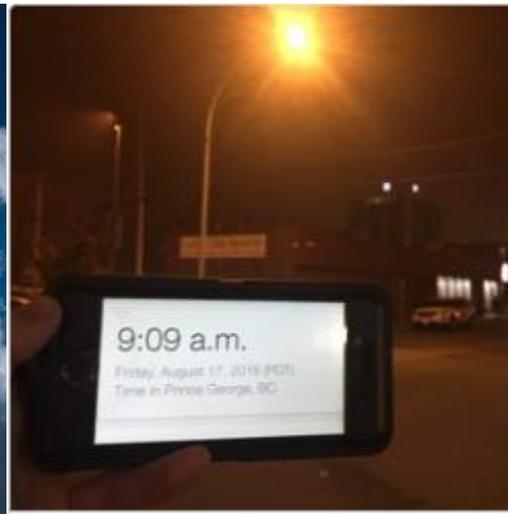
Thank you

Tamsin.mills@vancouver.ca

Sustainability Group

City of Vancouver

Staff & Tenant Resources



Photos: Global News, showing Prince George on 17 Aug.2018, 9:09am



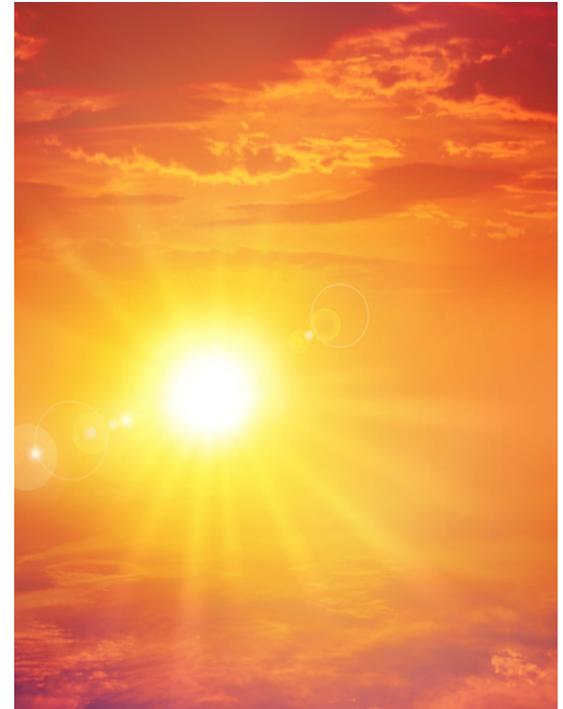
Magdalena Szpala,
Senior Sustainability Advisor, BC Housing

Outline

- Preparing & Planning
- Checking on Tenants
- Creating Community Connections
- New & Existing Resources

Extreme Heat Response Plan

- Before the summer
- Regular summer
- Extreme Heat weather: **high risk**



Before the summer:

1. Know the risks and what to do (staff training).
2. Identify tenants most vulnerable (create a list).
3. Prepare your building:
assess risk of overheating and prepare spaces where tenants may cool-off such as: shaded areas outside, a 'cooling room' in the common area in the building
4. Get what you may need during extreme heat:
 - portable air conditioning units
 - air purifiers with HEPA filters
 - fans
 - communication tools such as "[Tips to Beat the Heat](#) poster"

Checklists

Before the
Summer
Checklist

Before Summer Actions – Pod Groups		Completed? – check box Or write NA: Not Applicable
Team Members	Building Cooling	
All	1. I’m familiar with extreme heat health risks, symptoms, and appropriate action.	<input type="checkbox"/>
Site Staff and PPM	2. I have assessed where there might be potential cooling opportunities within the property for the tenants. (E.g. creation of a “cool rooms” or “chill zones” by installing a portable air conditioning or fans in the common rooms, or creation of a shaded area outside of the building if there’s adequate space, or creating air flow by opening windows when it’s colder outside than inside)	<input type="checkbox"/>
Site Staff	3. If my building has a common area, I have set it up as a “chill zone” using fans or air-conditioning.	<input type="checkbox"/>
Site Staff	4. If my building already has a portable air-conditioning unit I have maintained it (e.g. cleaned the filters) as recommended and checked that it works.	<input type="checkbox"/>

Before the
Summer
Checklist

Site Staff	5. If appropriate, I have provided shaded outdoor areas for tenants to spend time.	<input type="checkbox"/>
Site Staff	6. I have signs for the 'chill room'. (So that I can use them when the chill room is activated). Ensure water cooler/station is available.	<input type="checkbox"/>
All	7. I have all equipment or items I may want to use this summer during an extreme heat event for distribution to tenants (such as: fans)	<input type="checkbox"/>
All	8. I have communication materials for the tenants which I may need during an extreme hot weather event, such as: <i>Tip to Beat the Heat!</i> poster & flyer, neighbourhood maps showing places with air conditioning such as community centers, libraries, shopping malls, etc.	<input type="checkbox"/>
All	9. Pod Team Members, I have identified tenants who might be most at risk of heat related illnesses (created a list)	<input type="checkbox"/>

Checklist

Regular summer

Regular Summer Actions (Low-Medium Risk)	Completed? – check box Or write NA: Not Applicable
Building Cooling	
1. If my building has a common area, I have set it up as a “chill zone” using fans or air-conditioning.	<input type="checkbox"/>
2. I have posted signs for the ‘chill room’, if it’s activated.	<input type="checkbox"/>
3. If appropriate, I have provided shaded outdoor areas for tenants to spend time.	
4. I check the weather forecast on regular basis for hot weather or air quality warnings and alerts.	<input type="checkbox"/>
5. I posted Tips to Beat the Heat poster around my site/s.	<input type="checkbox"/>
6. I checked that all the heating in the building is turned off. (And reported up if there are any challenges with it)	<input type="checkbox"/>
7. I have opened windows in hallways slightly to allow air to circulate (if appropriate).	<input type="checkbox"/>
8. I encourage tenants to reduce solar heat gain by putting blinds down or drawing the curtains; and have windows open only when outdoor air is cooler than indoor air (e.g. at night).	<input type="checkbox"/>

**Regular
Summer
Checklist**

High Risk Level Response - activated when
Environment and Climate Change Canada
issues **Heat Warnings and**
Air Quality Warnings

for the specific regions in the province.
Local Health Authorities and Municipalities create
public announcements based on these alerts

ONCE YOU RECEIVE NOTIFICATION OF EXTREME HEAT, THE FOLLOWING ACTION ITEMS ARE TO BE COMPLETED

Extremely Hot Weather Actions – Pod Team Members (High Risk)	Completed? – check box Or write NA: Not Applicable
Building Cooling	
1. If my building has a common area, I have set it up as a “chill zone” using fans or air-conditioning.	<input type="checkbox"/>
2. I have posted signs for the ‘chill room’, if it’s activated.	<input type="checkbox"/>
3. If appropriate, I have provided shaded outdoor areas for tenants to spend time.	
4. I check the weather forecast on regular basis for hot weather or air quality warnings and alerts.	<input type="checkbox"/>
5. I posted Tips to Beat the Heat poster around my site/s.	<input type="checkbox"/>
6. I checked that all the heating in the building is turned off. (And reported up if there are any challenges with it)	<input type="checkbox"/>
7. I have opened windows in hallways slightly to allow air to circulate (if appropriate). ⁵	<input type="checkbox"/>
8. I encourage tenants to reduce solar heat gain by putting blinds down or drawing the curtains; and have windows open only when outdoor air is cooler than indoor air (e.g. at night).	<input type="checkbox"/>
9. I have checked on tenants that might be at high risk and notified Health & Housing Services if further assessment should be conducted.	<input type="checkbox"/>



Checking on Tenants/ Door-to-door

1. Check directly with the tenants most vulnerable to heat related illness (using your list).

2. When talking to the tenants assess:

a) home environment:

e.g. Does it feel very hot?

Are there any forms of cooling such draughts or fans?, etc.;

b) tenants:

e.g. Do they show physical signs of being in distress?

Do they know where they can go to cool off? Can they get there?

Is s/he at risk from exposure to extreme heat?

3. Take action. (*e.g. advise how to stay cool and about places to cool off, call 911 if you suspect tenant might be suffering from heat stroke*).

4. Report.

Checking on Tenants/ Door-to-door

Below is a sample recording sheet:

Date: 1 Aug. 2018 Time: 2pm

Site/building name: Grandview Terrace

Unit nr	Door opened/Not	Observations/Comments	Items given out	High risk Yes/No	Further action required
101	Yes	<i>Tenant looked hot but had drawn curtains, open windows and fan. Aware of risk and how to stay cool.</i>	<i>Cooling bandana</i>	<i>No</i>	<i>No</i>
102	Yes	<i>Tenant wearing heavy clothing. Advised to wear something lighter and looser. Unaware of risks. Hard to communicate with.</i>	<i>Fan, how to stay cool poster</i>	<i>Yes</i>	<i>Someone should revisit tomorrow</i>
103	No				
104	Yes	<i>Potential heat stroke</i>		<i>Yes</i>	<i>Called 911</i>

Conducted by: Jo Smith

Checking on Tenants/ Door-to-door

Sample recording sheet

Extreme Heat - Tenants at Risk List					Legend: Requires Further Action			Running Tally
					A	Call 911		0
					B	Contact Health Services		0
Location:					C	No One Home		5
					D	No Answer		1
					E	OK		6
					NO INFO	no information provided		0

Date	Unit #	Address	Tenant Name	Age	Time 1	Time 2	Time 3	Requires Further Action	Staff Name
08-Aug-18	104			45	D				
08-Aug-18	203			87	E				
08-Aug-18	305			51	C			In hospital	
08-Aug-18	306			80	E				
08-Aug-18	401			85	C				
08-Aug-18	402			72	E				
08-Aug-18	504			61	C				
08-Aug-18	505			84	E				
08-Aug-18	605			61	E			wants to be off list	
08-Aug-18	705			64	C				
08-Aug-18	801			59	C				
08-Aug-18	905			76	E				

Creating Community Connections

Building Neighbourliness:

- building trust, respect and social ties between neighbours in BC Housing buildings.

Co-operation and Taking Care of Each Other:

- building a culture and practice of mutual aid—neighbours helping neighbours.

Emergency Preparedness:

- building a community that is better able to respond to extreme weather (heat, cold, floods, storms, etc.).

Cooling Rooms with Tenant Engagement



Community event at BC Housing site

Tenant Education

Tips to Beat the Heat!

KEEP HYDRATED
Drink lots of water!



LIMIT

Non-essential strenuous activity during the hottest parts of the day



AVOID
Alcohol and caffeine as they can make dehydration worse



SOAK

Take a cool shower or bath to help you cool down



BE COOL

Stay indoors and make use of fans and air-conditioners



REST

Make sure you get enough sleep and rest if you are feeling tired



CHECK ON OTHERS

Including children, elderly, people with medical conditions and pets!



EAT FRESH

Try eating cold foods such as salads and fruits



SEEK SHADE
When outside



DRESS DOWN

Wear lightweight clothing and use sun screen

Download from:

<https://www.bchousing.org/publications/Tips-Beat-The-Heat.pdf>

For additional resources see BC Housing's website:
<https://www.bchousing.org/partner-services/non-profit-training-resources/extreme-heat-resources>

Using Existing Resources

SEARCH



CDC A-Z INDEX ▾

Natural Disasters and Severe Weather

Natural Disasters and Severe Weather

Earthquakes +

Extreme Heat -

About Extreme Heat

Protecting Vulnerable Groups from Extreme Heat +

Hot Weather Tips

Warning Signs and Symptoms

FAQs

Social Media +

Extreme Heat PSAs

Related Links

MMWR

Bibliography

Floods +

Hurricanes +

Landslides & Mudslides

Lightning +

CDC > [Natural Disasters and Severe Weather](#) > [Extreme Heat](#)

About Extreme Heat



Language: English (US) ▾



Heat related deaths and illnesses are preventable. Despite this, around 618 people in the United States are killed by extreme heat every year. This website provides helpful tips, information, and resources to help you stay safe in the extreme heat this summer.

What is Extreme Heat?

Extreme heat is defined as summertime temperatures that are much hotter and/or humid than average. Because some places are hotter than others, this depends on what's considered average for a particular location at that time of year. Humid and muggy conditions can make it seem hotter than it really is.

What Causes Heat-Related Illness?

[Heat-related illnesses](#), like heat exhaustion or heat stroke, happen when

BEAT THE HEAT:
Extreme Heat
Heat related deaths are preventable

WHAT:
Extreme heat or heat waves occur when the temperature reaches extremely high levels or when the combination of heat and humidity causes the air to become oppressive.

WHERE:
Houses with no air conditioning
Construction work sites

WHO:
Children
People with disabilities
Older adults

HOW to AVOID:
Stay hydrated with water.
Stay cool in an shaded, sunny, well-ventilated, air conditioned area.

Stay Hydrated

Drink more water than usual - and don't wait until you're thirsty!

BEAT THE HEAT

 Centers for Disease Control and Prevention
National Center for Environmental Health

Stay Cool

If it's too hot in your home, take a cool bath or shower.

BEAT THE HEAT

 Centers for Disease Control and Prevention
National Center for Environmental Health

Using Existing Resources

The image shows the cover of a toolkit titled "Communicating the Health Risks of Extreme Heat Events: Toolkit for Public Health and Emergency Management Officials". The cover features the Health Canada logo and the slogan "Your health and safety... our priority." in both English and French. Below the title, there is a photograph of a diverse group of people, including an elderly woman in a wheelchair, a man in a red tank top, a woman holding a baby, a young child, a man in a red football jersey, and a man in a yellow hard hat. The word "Canada" is printed in the bottom right corner of the cover.

Heat illnesses are preventable.

Drink plenty of cool liquids, especially water, before you feel thirsty to decrease your risk of dehydration. Thirst is not a good indicator of dehydration.

Never leave people or pets in your care inside a parked vehicle or in direct sunlight.

Using Existing Resources

BRITISH COLUMBIA

Home > Environmental Protection & Sustainability > Air, Land & Water > Air > Air Quality Data >

- Pollution Sources
- Air Quality Data
 - Air Advisories**
 - Air Quality Health Index
 - Current Air Quality Data
 - How We Measure
 - Air Quality Management
 - Reports & Publications
 - Contact

Air Quality Advisories

⚠️ We are experiencing higher than normal e-mail volume from the public at this time. Due to the increase there may be delays in receiving a response. We appreciate your patience and apologize for any inconvenience.

Issued Advisories

Location	Advisory Type	Status	Date
All areas	Smoky Skies Bulletin (PDF)	Ended	Sep. 13 2018

Advisories are updated during regular business hours. Outside business hours, visit [Environment Canada's Public Weather Alerts for BC](#).

About Air Quality Advisories

An air quality advisory is issued when pollutant concentrations approach or exceed predetermined limits, or when degraded-air-quality episodes are expected to continue or worsen.

Advisories are issued in order to:

- inform about degraded air quality;
- help people make informed choices about reducing their exposure to elevated concentrations of air pollutants;
- affect emission reduction actions (such as a limit on industrial emissions and/or wood stove use); and
- provide vulnerable individuals and the general public with health advice developed by BC health agencies.

About Smoky Skies Bulletins

Related Links

- [Current Air Quality Data](#)
- [Air Quality Health Index](#)
- [Ventilation Index](#)
- [BC Air Data Archive](#)

AQHI Canada App

New [National app](#) from the Government of Alberta for mobile platform.

On Twitter

Env Report BC
@EnvReportBC
[Follow on Twitter](#)

THURS: [#AirQuality](#) Smoky Skies Bulletin ENDED for West Kootenays [#BritishColumbia](#) [gov.bc.ca/air-quality-ad...](#) [@fnha...](#) <https://t.co/IR3c7edba7> 1 day ago

RT [@BCGovFireInfo](#): Effective at noon on Sept. 11, 2018, campfires will once again be allowed throughout the Coastal Fire

Source:
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-quality/air-advisories>

Using Existing Resources

Air Quality Health Index - x

Not secure | www.env.gov.bc.ca/epd/bcairquality/readings/aqhi-table.xml

Home / Environmental Protection & Sustainability / Air, Land, & Water / Air / Air Quality Data /

Air Quality Health Index - What's the Air Like Today?

Find the current and forecast Air Quality Health Index (AQHI) values to help you understand what the air quality around you means to your health.

AQHI Scale - Learn more about AQHI Categories and Explanations

1	2	3	4	5	6	7	8	9	10	+
LOW Health Risk			MODERATE Health Risk			HIGH Health Risk			VERY HIGH	

Station	Current	Maximum AQHI Forecast*		
		Today	Tonight	Tomorrow
Castlegar Sept. 14, 2018, 2:00pm PDT	LOW 1	LOW 2	LOW 2	LOW 2
Comox Valley Sept. 14, 2018, 2:00pm PDT	LOW 1	LOW 2	LOW 2	LOW 2
Cranbrook Sept. 14, 2018, 2:00pm PDT	LOW 2	N/A	N/A	N/A
Duncan Sept. 14, 2018, 2:00pm PDT	LOW 1	LOW 2	LOW 2	LOW 2
Fort St. John Sept. 14, 2018, 2:00pm PDT	LOW 2	LOW 2	LOW 2	LOW 2
Fraser Valley (Central) Sept. 14, 2018, 1:00pm PDT	LOW 1	LOW 2	LOW 2	LOW 1
Fraser Valley (Eastern) Sept. 14, 2018, 1:00pm PDT	LOW 1	LOW 1	LOW 1	LOW 1
Kamloops Sept. 14, 2018, 2:00pm PDT	LOW 1	LOW 2	LOW 2	LOW 2
Metro Vancouver (North East) Sept. 14, 2018, 1:00pm PDT	LOW 1	LOW 2	LOW 2	LOW 1
Metro Vancouver (North West) Sept. 14, 2018, 1:00pm PDT	LOW 1	LOW 2	LOW 2	LOW 2
Metro Vancouver (South East) Sept. 14, 2018, 1:00pm PDT	LOW 1	LOW 2	LOW 2	LOW 1

View Current Air Monitoring Station Data

View a list of [air monitoring stations](#) or use our [interactive map](#) below to view current air quality data in your area.

AQHI Value

- 10 - Very High Health Risk
- 9 - High Health Risk
- 8 - High Health Risk
- 7 - High Health Risk
- 6 - Moderate Health Risk
- 5 - Moderate Health Risk
- 4 - Moderate Health Risk
- 3 - Low Health Risk
- 2 - Low Health Risk
- 1 - Low Health Risk
- - Currently Unavailable

Air Monitoring Station

Objective:
The maximum acceptable level for PM_{2.5} (50 µg/m³) (micrograms per cubic metre) over a 24-hour average period.

Read more about the province's Air Quality Objectives and Standards.

Please note that air quality data may be missing for many reasons that are beyond our control including local power or communications outages, instrument calibration cycles or failure.

Additional Resources

If you have a comment or concern about the air quality content on this website [please contact us](#).

Smoke Forecast

Visit the BlueSky Canada smoke forecast page for up to date forecast information.

Source:
<http://www.env.gov.bc.ca/epd/bcairquality/readings/aqhi-table.xml>

Thank you!



Magdalena Szpala
Senior Sustainability Advisor
BC Housing
mszpala@bchousing.org

Questions / Discussion



Conclusion

