City of Delta Heat and Wildfire Smoke Response Plan

Contents

BC Provincial Heat Alert and Response System (BC HARS)

In 2022, BC established a two-tier Heat Alert and Response System (HARS) that integrated the heat alert criteria used by Environment & Climate Change Canada (ECCC) in issuing a **Heat Warning** with new criteria for an **Extreme Heat Emergency**. This system warns the public about heat risk through an organized and defined communication system. This alerting system helps individuals and communities to prepare and protect themselves, both before and during heat events, and alerts decision-makers to take preventive

actions to protect public health. Heat events may also coincide with wildfires and this plan addresses the need for clean-air public spaces where people can seek relief from wildfire smoke.

Stage 1: Heat Warning

ECCC will issue a Heat Warning for the Southwest region (Delta) when there are **two or more consecutive days** during which the daytime maximum temperatures are forecast to reach or exceed **29°C** and night-time lows do not fall below **16°C**. Heat Warnings will be issued electronically to emergency management representatives registered on Environment Canada's EC Alert Me system (ecalertme.weather.gc.ca), and publicly on the WeatherCAN app and their public weather alerts webpage (weather.gc.ca/warnings).

Before issuing a Heat Warning, ECCC may send a **Weather Notification** email to health sector and emergency management personnel when forecast data is certain enough to warrant an elevated likelihood of a heat event. For the first event of the year, ECCC may issue a public-facing **special weather statement** and include some strategic pre-event messaging.

Effective May 2023, for the first three heat events of the summer in a given forecast region, a Heat Warning will be issued when there are two or more consecutive days during which the daytime maximum temperatures are forecast to reach or exceed the established trigger temperature criteria for that region and the overnight low is expected to reach or exceed the regional minimum temperature value. To mitigate warning fatigue and recognising the behavioural and physical adaptations as the heat season progresses, after the third Heat Warning has been issued, the BC HEAT Committee[1] may recommend extending the daytime and overnight criteria for a Heat Warning by one day. After the third event the Heat Warning criteria could be extended to three consecutive days and two consecutive nights with no change to the temperature value criteria.

Stage 2: Extreme Heat Emergency

The Extreme Heat Emergency criteria are met when the forecast or observed temperatures surpass Heat Warning criteria, and there is a high certainty that temperatures will substantively increase day over day for **three or more** consecutive days. When there is potential for a Heat Warning to evolve into an Extreme Heat Emergency, the BC Heat Committee will convene and reach consensus before issuing an Extreme Heat

[1] BC HEAT Committee is led by BC Centre for Disease Control, BC Ministry of Health, and Emergency Management BC, and includes representatives from each BC regional health authority, First Nations Health Authority, BC Emergency Health Service, BC Housing, Emergency Management BC, Environment and Climate Change Canada, Office of the Provincial Health Officer, and WorkSafe BC.

Emergency alert. Once the BC Heat Committee confirms that the Extreme Heat Emergency criteria level has been reached, the BC HARS notification system will be triggered. Vancouver Coastal Health and Fraser Health will then issue an Extreme Heat Alert to the public. Health Emergency Management BC will forward the Extreme Heat Alert to Emergency Management BC and Local Government Emergency Planners

Alerts will be issued through the national public wireless alerting system, Alert Ready. Once the Extreme Heat Emergency alert is issued there will be provincial and regional coordination calls, and coordinated press releases.

Figure 1. BC Heat Alert Response System 2023

Type of alert	Heat Warning*	Extreme Heat Emergency
Public health risk	Moderate (5% increase in mortality)	Very high (20% or more increase in mortality)
Descriptor	Very hot	Dangerously hot
Historic frequency	1-3 per summer season	1-2 per decade
Criteria (See Table 1 for a description of the geographical regions that fall under the five ECCC defined heat zones that B.C. is divided into)	Southwest = 29-16-29** Fraser = 33-17-33** Southeast = 35-18-35** (largely Interior region of B.C.) Northeast = 29-14-29** Northwest = 28-13-28**	Heat Warning criteria have been met and forecast indicates that daily highs will substantively increase day-over-day for three or more consecutive days

*As of May 2023 — After the first three heat events of the summer in a given forecast region, the BC HEAT Committee may recommend extending the minimum number of days for Heat Warning criteria in the region to be when three or more consecutive daytime high temperatures are expected to meet or exceed the regional Tmax value and the overnight low is expected to reach or exceed the regional Tmin value for two or more consecutive nights.

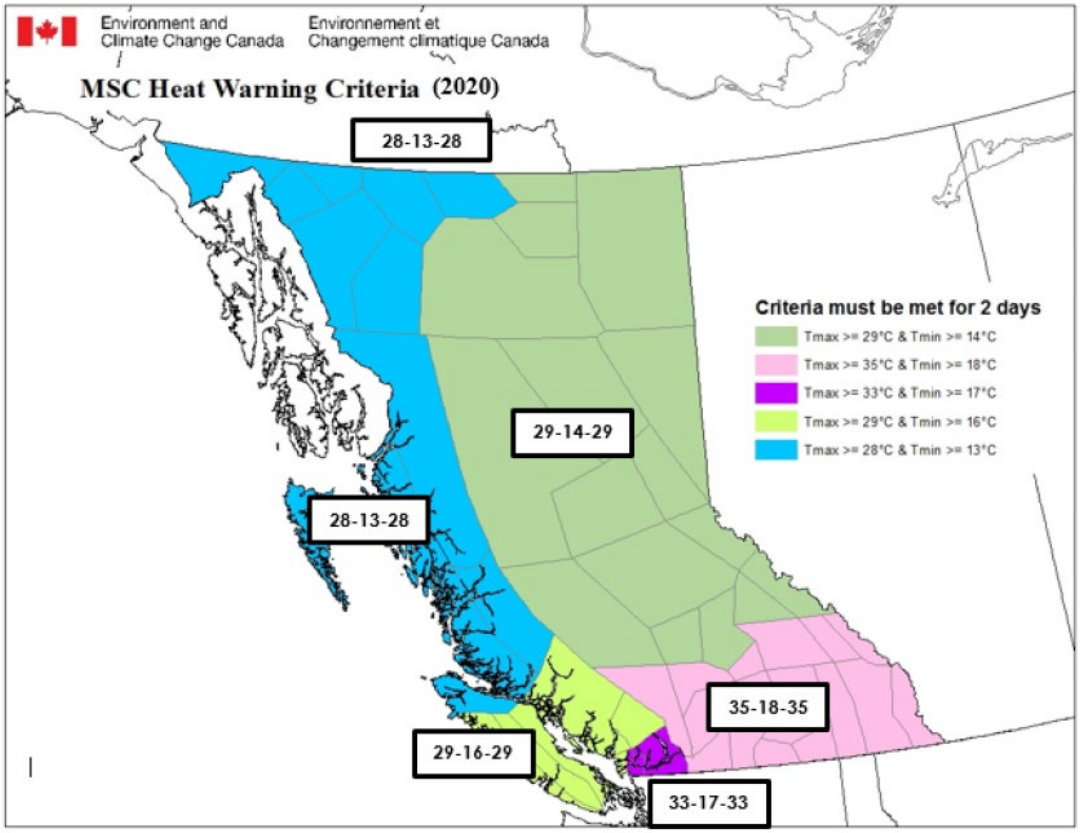
** °C Tmax ≥ daytime high, Tmin ≥nighttime high, Tmax ≥ daytime high (high - low - high)

The ECCC heat alerting system includes daytime and nighttime temperature criteria (in degrees Celsius) that trigger warnings (the high-low-high approach). The triggers for Delta in the table above are 29-16-29.

NOTE: Due to its coastal location **Delta is in ECCC's Southwest region** (shown as lime green in Figure 2), with lower trigger temperatures for heat alerts, and the Delta-Surrey border marks the change to the Fraser region (shown as purple in Figure 2), which has higher trigger temperatures. Delta is also within Fraser Heath Authority's jurisdiction. Delta's unique geography means that the communities of Ladner and Tsawwassen, which are closer to the water and more rural, often have lower temperatures

than many parts of North Delta, which may be several degrees hotter due to the urban heat island effect. This happens when heavily urbanised spaces have reduced airflow, less green space, more concrete surfaces which absorb radiant heat, limited tree-shaded areas, and more human created heat sources. This may impact decision-making when allocating resources during an extreme heat event as there may need to be a greater emphasis on mitigation in North Delta.

Figure 2. ECCC Heat Warning Regions



City Actions and Priorities

Pre-Season:

Pre-planning and community outreach prior to the summer season will help ensure the City and its residents are aware and prepared for an extreme heat event. Pre-season activities start in **May**.

Lead Dept	Action
Communications	Prepare community heat messages and communication strategies to help identify heat risks and mitigation actions. Consider communications in different languages and using accessible multi-media options. Develop targeted outreach for unique are such as Annacis Island See Attachment D – *Heat Response Communications & Engagement Plan.*
Planning	Consider long-term planning opportunities to reduce the impacts of extreme heat eg. increasing tree canopy, building design.
Corporate Services	Engage with the Delta Extreme Weather Working Group and community groups that have interface with high-risk or susceptible populations to raise awareness about the risks of extreme heat and provide information about extreme heat response.
	Work with PR&C to develop and maintain a list of community partners that can assist in responding and providing services during heat events.
Emergency Management Office (EMO)	Review and update heat response plan in consultation with key partners. Ensure the ClimateReadyBC Cooling Centre Portal is up-to-date with places to cool off in Delta Extreme Heat | ClimateReadyBC (gov.bc.ca)
	Organize or participate in exercises and forums to discuss and improve individual and collective responses to extreme heat.
	In conjunction with Emergency Preparedness Week (first week of May), implement a social media campaign to get people thinking about heatwaves and how to protect themselves and others.
	Order and display heat health communication material in City facilities and Distribute to community partners.
ENG/Information Services	*Beat the Heat* telephone hotline (604-946-3200) closed and message set to 'No heat event' (see Attachment E).

Lead Dept	Action
Parks, Recreation & Culture	Check contingency planning for air-conditioning, and power supply in City-owned Buildings, including HEPA filters for designated cooling facilities.
	Maintain a list of municipal air-conditioned buildings that could be used as Cooling Centres and municipal HEPA air-conditioned buildings that could be used as Cooling and Clean Air Centres.
	Prepare signage for 24/7 cooling facilities.
	Work with CS to develop and maintain a list of community partners that can assist in responding and providing services during heat events.

Heat Warning:

Once a Heat Warning has been issued, Delta's Emergency Management Office (EMO) will notify and provide situational awareness to Mayor and Council and key staff identified in Attachment A.

Lead Department	Action
Communications	Advertise and publicise cooling centre locations through all feasible media sources.
	Update the *Beat the Heat* page on Delta's website and provide consistent messaging through social media platforms.
Corporate Services	Work with the Delta Extreme Weather Working Group and other community partners to identify and reach out to vulnerable people, including seniors, people with disabilities and unhoused people.
EMO	Submit Expense Authorization Form to EMBC to allow Delta to claim expenses incurred as a result of heat warning and emergency alerts (see Attachment F).
	Participate in coordination calls with EMBC and coordinate information flow to and from key Delta staff and Mayor & Council.
Engineering/Information Services	*Beat the Heat* telephone hotline (604-946-3200) staffed during normal office hours and message set to 'Heat Warning' (see Attachment E).

Lead Department	Action
Parks, Recreation & Culture	Review cooling centre facilities, supplies and staff resources. Make sure the ClimateReadyBC Cooling Centre Portal is up-to-date with Delta's places to cool off Extreme Heat | ClimateReadyBC (gov.bc.ca)
	Encourage local services, clubs and organizations to reschedule or relocate services or major events.
All	Ensure that staff engaging with the public are aware of City activities and resources available to protect residents from extreme heat.

Extreme Heat Emergency:

Once the BC Heat Committee confirms that the Extreme Heat Emergency criteria level has been reached, the BC HARS notification system will be triggered. Vancouver Coastal Health and Fraser Health will then issue an Extreme Heat Alert to the public. Health Emergency Management BC will forward the Extreme Heat Alert to Emergency Management BC and Local Government Emergency Planners. All actions identified under Heat Warning will continue in addition to:

Lead Dept	Action
Communications	Encourage wellness checks for seniors living alone and other highly vulnerable people.
	Increase community messaging through social media and standard communication channels.
Corporate Services	Undertake community outreach and work with the Delta Extreme Weather Working Group and other community partners to reach high risk populations and groups. Implement wellness checks in collaboration with local agencies and utilizing existing lists of potentially vulnerable people.
EMO	Participate in coordination calls for situational updates with EMBC and coordinate information flow to and from key Delta staff and Mayor & Council.
	Activate EOC to support event if required.
Delta Police	Staff monitor after hours 24/7 information and dispatch hotline.
Human Resources & PR&C	Coordinate staffing for 24/7 cooling centres.

Lead Dept	Action
ENG/Information Services	*Beat the Heat* telephone hotline (604-946-3200) staffed 24/7 and message set to 'Extreme Heat Emergency' (see Attachment E).
PR&C	Open 24/7 cooling centres at McKee Seniors Recreation Centre, Kennedy Seniors Recreation Centre, and KinVillage Community Centre (Attachment C).
	Redeploy Delta Seniors Buses to transport residents to and from cooling centres.
	Where feasible and available, install portable water stations and/or misting stations at key locations throughout the community.
	Reschedule non-essential outdoor programs and services to another day or cooler part of the day.
	Consider providing free access to public pools during extreme heat events.

Deactivation:

The BC HEAT Committee will determine the appropriate timing for ending the Extreme Heat Emergency alert. When recommended by BC HEAT Committee, ECCC will confirm the de-escalation of the Extreme Heat Emergency via a special weather statement and notification through the ECCC Alert Me system, WeatherCAN app and the public weather alerts webpage.

Messaging will be sent from the EMO to key staff that the extreme heat emergency is over and request that staff immediately demobilize all assets related to the activation of cooling centres. The EMO will work with Communications to repeal the posting of the heat advisory notice(s) and issue notification of the cancellation and the standing down of all heat related support measures (including cooling centres). Additional actions:

- Undertake after-action review and update heat response plans and activities as required (EMO).
- Engage with local service providers and community members about how they managed through the heat event and respond to new or emerging needs (CS/PR&C).

Delta Extreme Weather Working Group:

A separate extreme heat plan has been developed by the Delta Extreme Weather Working Group[2] to coordinate community responses during extreme heat events and ensure that the needs of homeless or precariously-housed individuals are addressed. This plan identifies community-specific services that are offered during periods of extreme hot weather, including pop-up cooling locations (misting tents), supplies such as water, ice packs, sunscreen, and hats, and transportation services.

Actions under this plan are triggered when **"feels like temperatures are at or above 29°C"**. "Feels like" temperature considers the combined effects of ambient air temperature, relative humidity and wind speed to determine how weather conditions feel to bare skin. This means that actions under this plan may be triggered in advance of Delta's Heat Response Plan to allow community resources, volunteers, and other supports to be organized and coordinated to deal with those especially vulnerable to heat events. Once the Provincial HARS system is triggered, then Delta will implement its Heat Response Plan and support the community-based efforts.

Wildfire Smoke Events:

Heat events may coincide with wildfire smoke events and people may wish to seek relief from wildfire smoke in community-based cleaner air spaces. This means that the building is fitted with air conditioning and air filtration that is capable of filtering fine particulate matter (PM 2.5), and controlling temperature, relative humidity, and air exchange rate. A minimum efficiency reporting value (MERV) of 13 or more is recommended to remove fine particulate matter. The cooling centres at McKee Seniors Recreation Centre, Kennedy Seniors Recreation Centre, and KinVillage Community Centre are clean-air buildings for the purposes of wildfire smoke events.

2023 Heat Risk Assessment Study:

In 2023, with funding from UBCM, Delta and Tsawwassen First Nation (TFN) undertook a combined heat risk assessment and comprehensive evaluation of the risks extreme heat poses in Delta and TFN. The study helped to identify the social, economic, and environmental impacts of extreme heat events,

[2] The Delta Extreme Weather Working Group includes representatives from the Homelessness Services Association of BC (HSAB), Options Community Resources, Fraser Health Authority, Deltassist, New Hope Church, Ladner Baptist Church, Phoenix Society, Lookout Housing, Sources Community Services, and City of Delta (Police, Fire, Bylaws, Emergency Social Services, and Social Planning).

and the potential slow onset risks heat may have on Delta and TFN. Having this information helps staff engage with heat-sensitive populations (elderly, isolated, people with disabilities or functional limitations etc.) and provide information to those populations and community at large on the risks associated with extreme heat, and the resources and strategies (e.g., implementation of cooling centres during time of need) that can be employed to help ensure the health and well-being of residents. A summary of the report is included as Attachment G.

LIST OF ATTACHMENTS:

A. Municipal Cooling Centres for Stage 1 Heat Warning Events
B. 24/7 Municipal Cooling Centres for Stage 2 Extreme Heat Emergency Events
C. Heat Response Communications & Engagement Plan
D. *Beat the Heat* Telephone Hotline
E. Municipal Cost Eligibility Assessment for Heat Events
F. Community Health and Extreme Heat: Mapping exposure, sensitivity, and adaptive capacity to extreme heat in Delta and Tsawwassen First Nation (August 2023)

ATTACHMENT A - MUNICIPAL COOLING CENTRES FOR STAGE 1 HEAT WARNING EVENTS

Following notification of a Heat Warning alert, information about municipal facilities with air conditioning and swimming pools/water parks will be advertised through a variety of media sources. An **interactive map of cooling centres and hours of operation** is available on Delta's Beat the Heat webpage [Beat the Heat | City of Delta]

RECREATION AND COMMUNITY CENTRES		
FACILITY	**ADDRESS**	
North Delta Recreation Centre	11415 84 Avenue	North Delta
Kennedy Seniors Recreation Centre	11760 88 Avenue	North Delta
Sungod Recreation Centre	7815 112 Street	North Delta
Ladner Leisure Centre	4600 Clarence Taylor Cres.	Ladner
McKee Seniors Recreation Centre	5155 47 Avenue	Ladner
Winskill Aquatic & Fitness Centre	5575 9 Avenue	Tsawwassen
South Delta Recreation Centre	1720 56 Street	Tsawwassen
KinVillage Community Centre	5410 10 Avenue	Tsawwassen
OUTDOOR POOLS AND WATER PARKS		
FACILITY	**ADDRESS**	
North Delta Outdoor Pool	11415 84 Avenue	North Delta
Lions Wellness Park	9150 112 Street	North Delta
Memorial Park – Ladner Rotary Splash Park	5010 47 Avenue	Ladner
Ladner Outdoor Pool	5105 47 Avenue	Ladner
Diefenbaker Park – Rotary Waterworks Playground	5579 1 Avenue	Tsawwassen
PUBLIC LIBRARIES		
FACILITY	**ADDRESS**	
George Mackie Library	8440 112 Street	North Delta
Ladner Pioneer Library	4683 51 Street	Ladner
Tsawwassen Library	1321A 56 Street	Tsawwassen

ATTACHMENT B - 24/7 MUNICIPAL COOLING AND CLEAN AIR CENTRES FOR STAGE 2 EXTREME HEAT EMERGENCY AND WILDFIRE SMOKE EVENTS

Following notification of an Extreme Heat Emergency alert, Delta staff will activate 24-hour cooling and clean air centres within the community to ensure individuals with no access to air conditioning have an opportunity to receive respite from the heat overnight and/or wildfire smoke. Cooling centres will be staffed by City of Delta staff, Delta Emergency Support Services Volunteers and Delta Police Department COPs Volunteers.

FACILITY	**ADDRESS**	
Kennedy Seniors Recreation Centre	11760 88 Avenue	North Delta
McKee Seniors Recreation Centre	5155 47 Avenue	Ladner
KinVillage Community Centre	5410 10 Avenue	Tsawwassen

Cooling centres will provide bottled water, chairs, cots (as available) and passive entertainment (books, puzzles etc.).

The cooling centres will also provide areas for pets, and with the support of the Delta Community Animal Shelter, will utilize the City's Emergency Support Services Pet Plan to accommodate the care and keeping of household pets.

Transportation:

During a Stage 2 Extreme Heat Emergency, Delta's Senior's Buses will be redeployed to provide transportation to and from cooling centres in Delta. Bookings can be made through the *Beat the Heat* telephone hotline 604-946-3200.

ATTACHMENT C - HEAT RESPONSE COMMUNICATIONS & ENGAGEMENT PLAN

Purpose:

Develop an educational and awareness campaign to engage Delta residents on the risks associated with extreme heat events and provide information on how to prepare and keep safe including:

- Information on City cooling centres, telephone support line, free bus service, and other resources available to the public to help mitigate the effects of high/extreme heat.

Objectives:

- Educate and engage with residents about heat risks during the summer season and getting prepared for potential high/extreme heat events.
- Share information on the City's heat response plan and *Beat the Heat* strategy to highlight free resources available to help residents deal with and mitigate the effects of any future high/extreme heat events.
- Encourage Delta residents and businesses to consider their role in reducing risks and protecting themselves during high/extreme heat events.
- Promote how Delta is preparing to assist Delta residents should another high/extreme heat event occur this summer.

Key Messages:

- High/extreme heat events can be hazardous and it is important to know the risks and learn how to be prepared both at home and while outside. Learn the risks and how to protect yourself at Delta.ca/beattheheat.
- Are you prepared in the event of high/extreme heat? We're sharing tips to help you stay cool and beat the heat this summer! Visit Delta.ca/beattheheat to learn more.
- With warm weather finally here, we have some tips to help you and your loved ones stay safe and cool. Learn more at Delta.ca/beattheheat
- With high temperatures expected this weekend, be sure to stay hydrated and cool. Learn how to prepare for extreme heat and how to stay cool. Delta's Cooling Centres will be open 24/7 for residents to seek relief from the heat. More info: Delta.ca/beattheheat

Timeframe:

- Campaign Duration: **May to September**
- Launch online engagement, web page and social media: May

Target Audience:

- Delta residents, local media, community partners (Deltassist, Delta Libraries, Seniors Centres, etc., to help reach local seniors & vulnerable residents), Chamber of Commerce, Tsawwassen Business Improvement Association, Ladner Business Association, North Delta Business Association, City staff and City Council.

Deliverables:

1. **Delta.ca Webpage: Delta.ca/beattheheat**
    - Features interactive map of Delta cooling centres, information on heat risks and how to prepare for a heat event.
    - Create graphic to feature on home page banner of Delta.ca under City Updates that links to *Beat the Heat* webpage.
2. **Social Media Campaign**
    - Create and share content across platforms weekly to educate and raise awareness regarding risks associated with high/extreme heat events and how to keep cool.
    - During a heat event, provide daily updates on Delta's social media channels.
    - Share urgent update posts on Facebook community pages (i.e. Ladner's Landing, North Delta Community Corner, Tsawwassen LOOP) for extra exposure.
    - Utilize both the City's and Mayor's social platforms and tag community partners for extra traction and promotion.
    - Hashtags: #BeatTheHeat #DeltaBC
3. **Posters**
    - *Beat the Heat* and *Cooling Centre* posters featured on Delta.ca/beattheheat.
    - Posters can be put up at City facilities, libraries, community centres, senior's facilities, non-profit community partners and other public spaces (as deemed necessary by relevant departments).
4. **News release**
    - Should Delta expect an extreme heat event, the City will prepare and issue a news release with key information on free resources available to target local media and help increase community awareness.
5. **Reader boards/Community Message Boards**
    - Create graphic for reader board to submit to PR&C (Message Board Form) to promote Delta.ca/beattheheat and cooling centre info (when appropriate) on all Delta community reader boards.
6. **Delta Fire & Emergency Services "Be Prepared" Public Education Sessions**
    - Include information about coping with high/extreme heat and distribute information booklets.

Evaluation:

- Total number of page hits on delta.ca/beattheheat.
- Amount of email correspondence and social media comments received in response to Delta's *Beat the Heat* campaign.

- Local media coverage of City's *Beat the Heat* strategy and corresponding City cooling centres and information.
- Social media analytics to demonstrate reach.
- Feedback from City Council.

ATTACHMENT D - *BEAT THE HEAT* TELEPHONE HOTLINE

A dedicated *Beat the Heat* telephone hotline line has been established: **604-946-3200.**

During a Heat Warning, Engineering staff will answer the phone during normal office hours and will provide general information about preparing for and dealing with the heat.

During an Extreme Heat Emergency, the phone will be staffed 24/7 (after hours calls will be transferred to Delta Police non-emergency line) to provide information on cooling centres in Delta, booking transportation to cooling centres, and general heat information.

Phone messaging:

- No heat event: Thank you for calling the City of Delta's *Beat the Heat* telephone hotline. Since we are currently not experiencing a heat event, the service is closed. For more information please visit delta.ca/beat the heat.

- Heat Warning: Thank you for calling the City of Delta's *Beat the Heat* telephone hotline. We can provide information about cooling centres in Delta and general information about heat events and how to protect you and those around you. Please hold while we direct you to an operator. If this is after office hours, please leave your name and contact number and we will call you back tomorrow.

- Extreme Heat Emergency: Thank you for calling the City of Delta's *Beat the Heat* telephone hotline. We can provide information about cooling centres in Delta, booking transportation to cooling centres, and general information about extreme heat and how to protect you and those around you. Please hold while we direct you to an operator. If the line is busy, please leave your name and contact number and we will call you back shortly.

ATTACHMENT E - MUNICIPAL COST ELIGIBILITY ASSESSMENT FOR HEAT EVENTS

The Province will provide financial support for municipalities that incur costs responding to a Heat Warning and/or Extreme Heat Emergency. When a heat alert is issued, Delta's EMO will submit an Expense Authorization Form (EAF) to EMBC for approval. The EAF provides the details of the expenditure, its rationale, and an estimate of the total expense for the response activity. Incremental costs will be considered for an extreme heat emergency, a forecasted extreme heat emergency or heat warning where actions are taken as outlined in the BC Provincial Heat Alert and Response System.

Expense Item	Response Item	Eligible	Not Eligible
Bottled water	Materials	Bottled water made available at community cooling centre facilities. Bottled water distributed during health and wellness checks where water is not readily available.	Bottled water purchased for distribution to private residences or locations that have water readily available.
Staff overtime	Wages and overtime	Incremental overtime for current staff to keep civic facilities open as cooling centres outside of normal operating hours. Incremental costs for the wages of temporary auxiliary staff hired under contract to specifically to support a designated cooling centre facility.	Regular salaries or straight time for current staff; benefits and taxes; and the incremental payroll expenses (when working outside of the deployment shift length guidelines are ineligible. For example: • The regular salary or hourly wage expense associated with response activities. • Benefits, taxes and overhead or loading costs for current staff. • Payroll expenditures not directly related to response activities (i.e., the backlog of regular work due to time spent working on the event.
Day and night facility for use as a cooling centre	Facility rental	Rental of a non-local authority or First Nation facility for the provision of a cooling centre. Incremental janitorial and utilities. Incremental security costs.	Rental of community-owned facility or loss of use charges.

Expense Item	Response Item	Eligible	Not Eligible
Transportation to and from Cooling Centre	Emergency Response Measures	Commercial transportation of community members to and from cooling centers as needed in communities where no scheduled public or reasonable transportation exists. Mileage reimbursement at Provincial government rates for vehicles operated by a First Nation and local authorities for the transportation of community to and from cooling centers where no scheduled public or reasonable transportation exists.	Transportation costs where other reasonable alternatives exist.
Emergency services	Fire services	Incremental costs to fire services responding to increased heat related medical calls, specifically, operational response to assist.	Routine operations supporting medical response.
Messaging	Emergency response measures	Print, radio, social media messages to local population amplifying ECCC and/or HEMBC messaging.	Messaging unrelated to heat wave response and/or unapproved by ECCC and/or HEMBC.
Volunteer support for wellness checks	Materials. Wages or overtime.	Incremental overtime for Local and First Nations Government staff to provide "Just in Time" training for volunteers on wellness checks. Incremental costs for Local and First Nations Governments to provide additional materials, additional transport costs, or tools to do wellness checks (e.g., thermometer, and bottles of water).	Regular salaries or straight time for current staff; benefits and taxes; and the incremental payroll expenses.
Partner organization support to operate cooling centers	Wages or overtime for organizations contracted by First Nations & Local Government.	Incremental overtime for organizational staff keeping facilities open as cooling centres outside of normal operating hours. Incremental janitorial and utilities.	Regular salaries or straight time for current staff; benefits and taxes; and the incremental payroll expenses.
First Nations supports	Community navigator	Incremental costs for Community Navigator connecting public with supports provided by FNHA, FNESS and ISC.	

Expense Item	Response Item	Eligible	Not Eligible
Cooling device rental for Provincial government partner organizations		Cost of cooling device rentals. Incremental utility expenses.	Cooling device costs submitted in the absence of a prior approved EAF.
Basic snacks and bottled water at day and night facilities	Materials	Snacks to be available for the general public at community cooling centre facilities.	Food purchased for distribution to private residences. Meals provided at day and night facilities.

Photo: Tsawwassen First Nation (2019)

Community Health and Extreme Heat

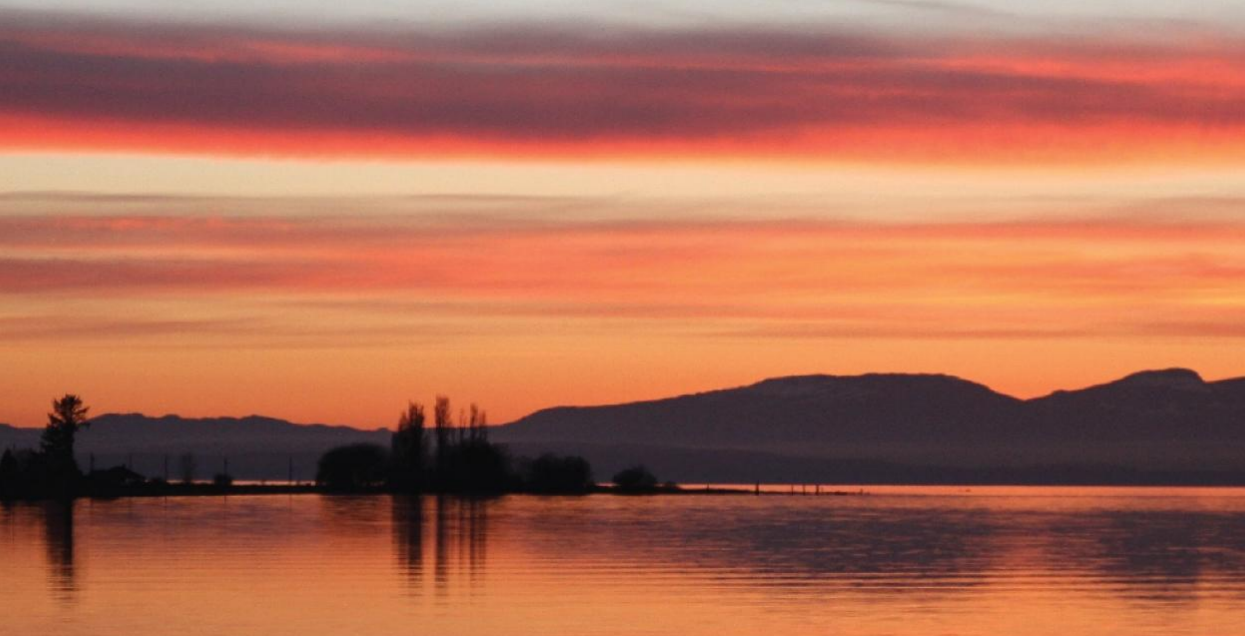
Mapping exposure, sensitivity, and adaptive capacity to extreme heat in Delta and the Tsawwassen First Nation

Delta

səwɬaθən məsteyəxʷ
TSAWWASSEN FIRST NATION

Licker Geospatial Consulting

August 2023



Extreme Heat in Delta and TFN

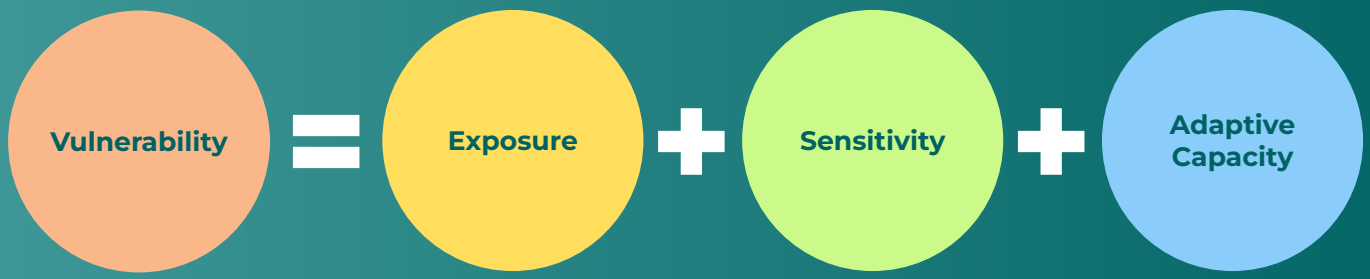
The summer of 2021 was a tragic reminder of the deadly potential of extreme heat events, with the event in British Columbia leading to unprecedented loss of life and detrimental impacts on the environment. Tsawwassen First Nation (TFN) and the City of Delta (Delta) are aware of the increasing global concern over climate change and its multifaceted impacts, and have taken a science-based approach to understanding and addressing the risks of extreme heat in their communities.

This assessment of extreme heat vulnerability is based off a previous project developed by researchers from the University of British Columbia (UBC), Vancouver Coastal Health, Fraser Health Authority, and Interior Health. A major goal of this work was to engage community members to help understand their lived experience, both in regards to the negative physical outcomes (such as injury, illness, and death) and mental health impacts (like stress, anxiety, and trauma) as they relate to extreme heat in their community. We also engaged first responders and engineering department representatives to help understand their lived experience through an operational lens during extreme heat events. Our engagement both informed and validated the selection of various determinants of vulnerability to extreme heat.

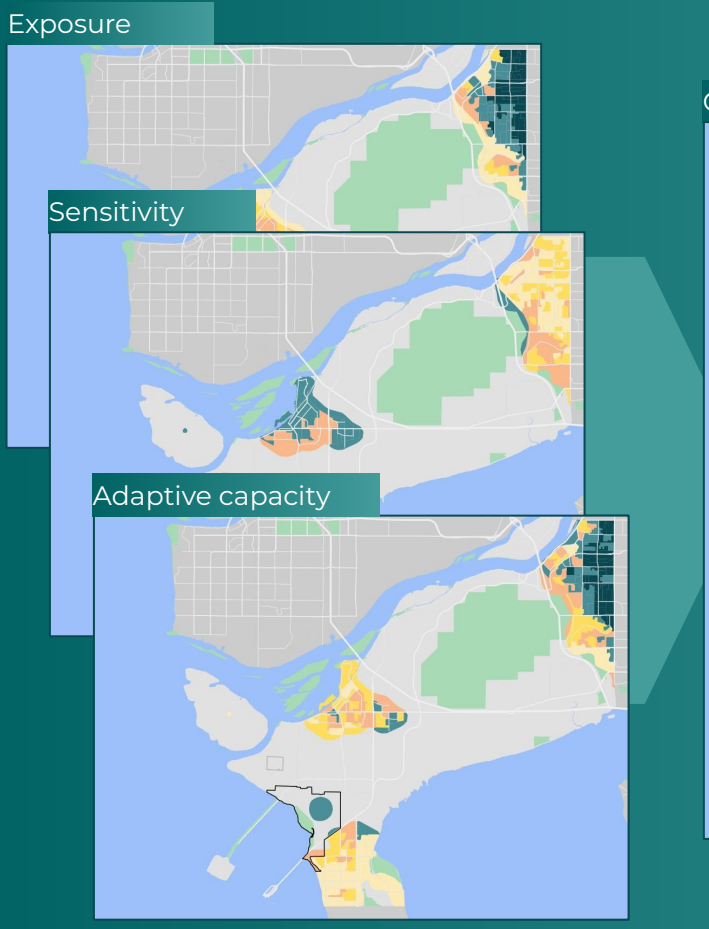
This document provides an overview of our extreme heat vulnerability mapping process and engagement outcomes. We also show our emergency response plan update recommendations for both Delta and TFN. A project report is also available and provides greater focus on technical details on methodology, engagement process and outcomes, emergency response plan recommendations, and potential next steps. We hope that this document and the maps created in this effort will advance the collective understanding of the impacts of extreme heat on individuals and communities in the region, and provide decision-support for resilience building opportunities.

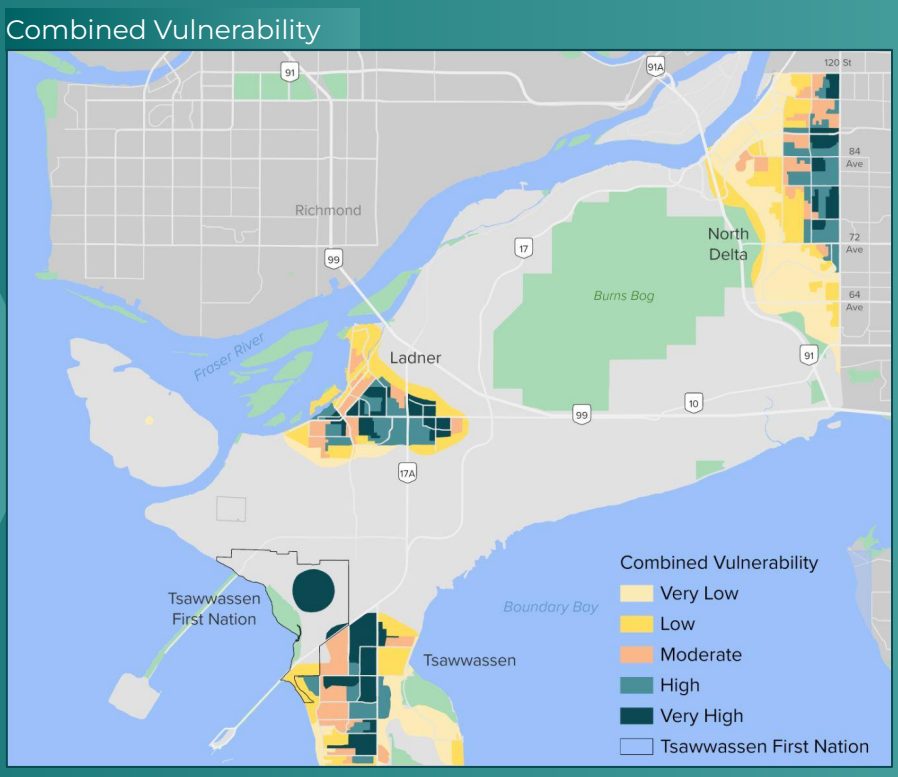
Mapping Extreme Heat Vulnerability

The model that underpins the maps was initially created by a team of UBC researchers who studied the characteristics that make people more or less vulnerable to climate hazards. These characteristics were categorized into three broad and well-established elements that make up a community's climate vulnerability: exposure, sensitivity, and adaptive capacity.



Adapted from: Buse, C. G. (2018). Why should public health agencies across Canada conduct climate change and health vulnerability assessments? Canadian Journal of Public Health, 109(5–6), 782–785.





A high resolution **poster map** is available to explore these vulnerability layers.

Exposure

Extreme heat is not equally distributed throughout our communities. We describe exposure to extreme heat as two factors: 1) **the current extreme heat distribution** as experienced in the 2021 heat dome event, and 2) **future extreme heat distribution**. We use IPCC worst-case scenario forecasts (2080s - 2100s) to understand future extreme heat distribution. The table below summarises these two components of exposure to extreme heat.

Current extreme heat distribution	2021 heat event mean land surface temperature (°C)
Future extreme heat distribution	End of century IPCC-compliant high-emission relative concentration pathway extreme heat (*RCP 8.5*; °C)

Sensitivity

Sensitivity represents **the degree in which an individual is likely to suffer when exposed to extreme heat**. The factors that drive up sensitivity are largely based on the social determinants of health, including age (under 5 years of age and over 65 years of age) and pre-existing health conditions (e.g. cardiovascular, respiratory, or renal disease, chronic health conditions, and pregnancy). The selection of these two variables was guided by our engagement outcomes, the literature, and data availability. For example, we know that children, pregnant women, older adults, and people living with chronic health conditions are more sensitive to climate hazards.

Adaptive Capacity

Adaptive capacity is an **individual or community's ability to adjust to climate change and reduce associated risks**. Adaptive capacity is made up of several variables, many were also identified through engaging the community and literature review. Determinants of adaptive capacity include household variables (like recent immigrants, people living alone, and those not speaking official languages), environmental variables (such as the 'greenness' of the environment and local tree canopy coverage). Determinants also include housing characteristics (like the age of dwelling and state of disrepair), and the driving distance to the nearest cooling facility.

Some communities might struggle to recover from extreme heat events due to historical and ongoing imbalances in political, cultural, and economic power. They may lack the political influence and financial means to bounce back quickly from the extreme heat impacts. Living conditions can play a significant role in how well people cope with extreme heat. Good quality housing, along with an environment that has many trees providing shade, can offer protection during heatwaves. It helps individuals deal with the stress of excessive heat more effectively.

To that end, **our work is limited by the data we can assemble** to help measure adaptive capacity (as well as exposure and sensitivity). Our engagement outcomes showed that *social cohesion* is an important indicator of adaptive capacity and is not captured in our data . As such, observed community responses and associated adaptive capacity during extreme heat events may differ to that illustrated.

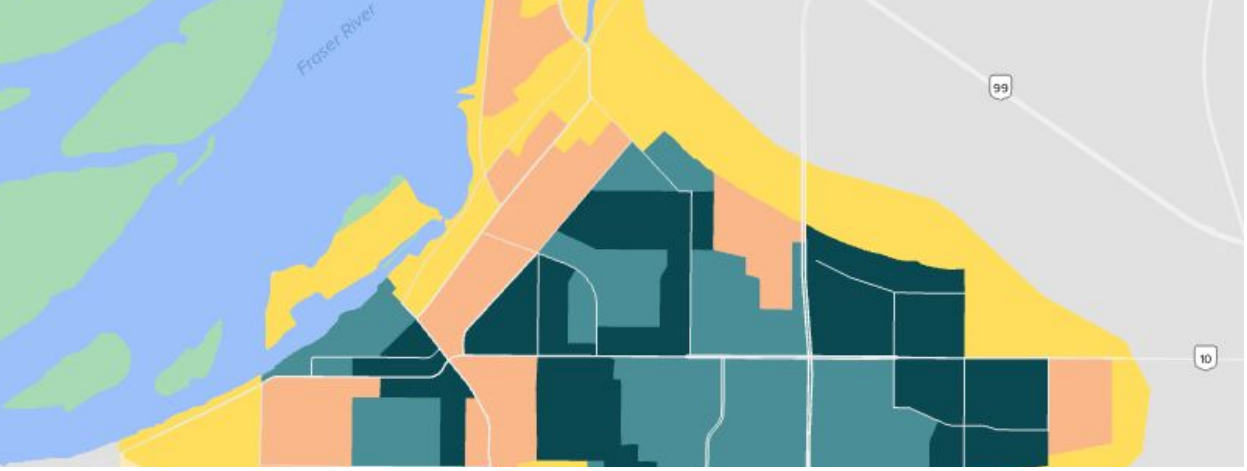
Principal Component Analysis (PCA)

The scores/values represented on the maps were produced using an inferential statistics method known as principal components analysis (PCA). PCA is a *data dimensionality reduction* approach, which means that it is used to reduce a theme captured by multiple variables (like recent immigrants, people living alone, and other variables that are included in the "theme" of adaptive capacity) into a single variable (like the adaptive capacity score itself). Statistically speaking, we reduce many variables into one by grouping variables into *components* and creating component weights based on the distribution of data. These are used in a calculation of an overall score.

The scores we have created for extreme heat vulnerability are *exposure*, *sensitivity*, and *adaptive capacity*. We calculate *combined vulnerability* with equally-weighted mean of exposure, sensitivity, and adaptive capacity. Each map will show analysis at the *dissemination area* scale, a geographical unit.

The PCA results allow us to see how vulnerability may differ across an area. PCA may overlook important contextual factors, which is why the maps should be used to support conversations about climate and health vulnerability, and not relied on as a complete picture of community health vulnerability to climate change. Here are some limitations of PCA:

- PCA is **sensitive to input data**, so depending on the variables that we include in our assessment, our understanding of vulnerability distribution may change considerably.
- PCA **uses statistics to infer how important a variable is** in relation to the other variables. Recent studies in this area argue that the engagement process (leveraging *subject matter experts* and *lived experiences*) should be used to assign importance of variables. The greater the variable importance, the more that variable will be represented in the vulnerability layer.



Engagement Overview and Outcomes

Our objective in this work was to conduct a robust consultation process with key project partners that included community service organisations, municipal and First Nation department representatives, federal weather forecasters, provincial response representatives and others. Semi-structured interviews were conducted with a total of 23 people. Our engagement objectives of this project were to:

- ➔ Identify potential determinants of risk of extreme heat that emerged from identified stakeholders' experience and response to the *2021 extreme heat event*
- ➔ Identify potential extreme heat risks associated with *infrastructure* throughout Delta and TFN
- ➔ Generate a broad understanding of lived-experiences, lessons learned, and *community-level mitigation strategies*.

Our engagement findings suggest the 2021 heat event revealed a lack of preparedness for extreme heat of this magnitude, with a **lack of coordinated plans and protocols** leading to overwhelmed systems and significant fatalities. Overlapping hazards like wildfire smoke and COVID posed additional complications. Major improvements were made in planning and coordination for 2022, but **key elements remain untested**, such as effective cooling center operations/transport to them. The **community connectivity and government responsiveness within TFN prevented deaths in the 2021 event**.

The biggest challenges looking toward 2080 include a **lack of appropriate physical spaces** such as permanent shelters and reliable cooling centers in Delta, as well as **urgent housing needs** in Tsawwassen. Concerns around electrical load with increasing air-conditioning and electric vehicle usage and the need to shore up natural cooling mechanisms such as restoration of The Bog, highlight the complexity of adapting to future heat hazards. Also brought forward were concerns of an aging population, challenges with cooling requirements for new building developments, and uncertainties around extreme events in the future. Without significant adaptation of the building stock for cooling, the risks of mortality will remain significant.

Immediate Improvements:

- Enhance communication between the stakeholder groups and with residents
- Strategically locate and staff cooling centers with trauma-informed staff, partner with community organizations for cooling strategies.
- Resolve the privacy versus safety dilemma to support in-person wellness checks.
- Explore creative solutions for transportation and ways to make cooling more social and accessible.

Medium-long Term Improvements:

- Focus on retrofitting buildings and cooling requirements for new buildings, understanding electrical load, and managing water supply/demand.
- Explore various ways to cool buildings including tree planting
- Apply a resilience lens across all planning and development policy areas

Key Takeaways

- Folks want to know *who is responsible* for extreme heat response, whether it falls to federal, municipal, provincial, or health authority jurisdiction, but there is also interest in moving beyond this question.
- Unlike cold weather, which receives provincial funding, extreme heat response lacks similar support, placing more strain on municipal resources and creating a need for legislation similar to the Assistance to Shelter Act.
- The challenge lies in understanding how to reduce heat risks in a responsive, cost-effective manner, particularly in the face of community-specific variables. For example, in the First Nations community (TFN), the collectivist culture served as a huge protective factor, community connectivity and responsive governance outweighed health vulnerabilities.

Emergency Response Plan Recommendations

This effort sought to provide update recommendations to the City of Delta Heat Response Plan (2022) and the Tsawwassen First Nation Emergency Response Plan (2022). Here are our high-level recommendations for consideration. Our full set of recommendations and further information is available in the **project report.**

City of Delta Emergency Response Plan

- Define **'preseason'** period, considering shifts in 'heat season'.
- Develop **targeted outreach** for unique areas like Annacis Island.
- Clarify **differing activation thresholds**
- **Publicise accessibility features** of cooling centers and provide free access to pools during heat events.
- Establish an **interactive webpage for cooling centers** that are staffed with trained individuals.
- Implement **mandatory wellness checks** during 'extreme heat emergencies', in collaboration with local agencies and utilizing existing lists of potentially vulnerable people.

Tsawwassen First Nation Emergency Response Plan

- Implement **work stoppage thresholds** for outdoor workers, coordinating with WorkSafe BC.
- Include **coordination with leaseholder populations**.
- Create a **plan for a cooling centre within TFN**, aligning with new facility developments.
- Review and **update the plan frequently**, considering continuous changes in hazards, vulnerabilities, and climate models.
- Confirm **several roles currently listed as "to be declared"**, such as the authority for emergency declarations.

More Information

- Check out our **poster map** for a visualisation of the various dimensions of extreme heat vulnerability in Delta and TFN.
- Take a read of the **project report** that provides a deep dive on methodology, results, and discussion.
- See also a background report produced by UBC in 2020 that is available online at the the University of British Columbia's Open Collections.

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UBCM Union of BC Municipalities

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