





 <h1>Extreme Heat</h1> <p>Occurs when temperatures are significantly above average for an extended period.</p>				EXTENTS REGIONAL CONSEQUENCE  MODERATE-HIGH
TYPE	DURATION	SEASONALITY	WARNING TIME	LIKELIHOOD
 CHRONIC	 DAYS-WEEKS	 SUMMER MONTHS	 DAYS-WEEKS	 ALMOST CERTAIN

About the Hazard

Extreme temperatures underly many other hazards, beyond climate hazards. Heatwaves are related to hazards such as air quality degradation, drought, and wildfire, which are linked with human health and ecosystem impacts. Heatwaves are primarily **driven** by persistent large-scale climate systems (high-pressure “heat domes”) leading to prolonged high local air temperatures. The local intensity of heatwaves is considerably **modulated** by land use and changes (urban heat island effect due to urbanization and loss of vegetation) and watershed physical characteristics (like proximity to moderating water bodies). Lower elevations are generally warmer than higher elevations. Coastal environments moderate extreme temperature conditions.

What We Assessed

We assessed and mapped a **subset of temperature-based climate indices** to understand changes in frequency, duration, and severity of extreme heat and heatwave events. The climate indices were obtained from PCIC high-resolution (e.g. 800-m horizontal) climate modelling data available over the RSA. Our statistics and maps compared conditions of the recent past (1981-2010) and future (2050s).



Challenges

- ▶ Global climate models (GCMs) are extremely complex and have large uncertainty, especially at smaller scales.
- ▶ The GCM data is “downscaled” to account for regional effects such as from the ocean and mountains; however, this process can introduce further uncertainty through biases in local observed data.
- ▶ Results are best interpreted in terms of understanding relative changes between recent past and future conditions.

Mapping Results

Temperatures are generally higher at lower elevations in the RSA. This corresponds to the eastern (and more populated) LSA, including SFN reserves, where this hazard is a higher concern. The change in heatwave severity is shown in the map in terms of heatwave degree days, for the recent past and for the 2050s. Heatwave degree days is defined as the annual, cumulative daily mean temperature difference above the heat wave definition (see associated technical study).

Climate Change Projections (2050s)

The results suggest that extreme heat conditions are projected to become more severe (i.e., the hottest days in the recent past were 28°C and these will increase to 32°C). Heatwaves are projected to occur more frequently, last longer, be more widespread, and be more severe in the future compared to the recent past:

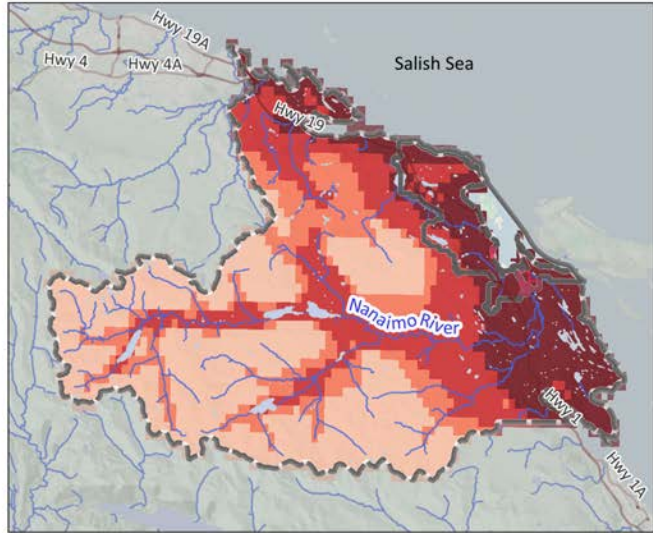
- ▶ Whereas approximately one heatwave occurred in the RSA per year in the past (this usually occurred in the lower elevation LSA), all areas of the LSA are projected to experience approximately three to four heatwaves.
- ▶ The number of heatwave days per year over the RSA will increase from 0.5 days to approximately 8 days.
- ▶ The area affected by a heat wave of moderate severity over the RSA will increase from 902 km² to 1254 km² (an increase of 39%).
- ▶ In the LSA, heatwave severity is projected to increase by up to 400%.

In the next 5-10 years, the above trends are likely to apply, meaning that this hazard is worsening. Furthermore, it interacts directly with seven other priority climate hazards.

Recent Past



Future



Legend

Background

Reserve Lands

Project Local Study Area

Project Regional Study Area

Lakes

Rivers

Highways

Heatwave Severity (°C-day)

≤ 5

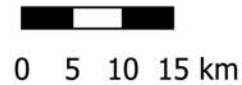
5 - 15

15 - 25

25 - 35

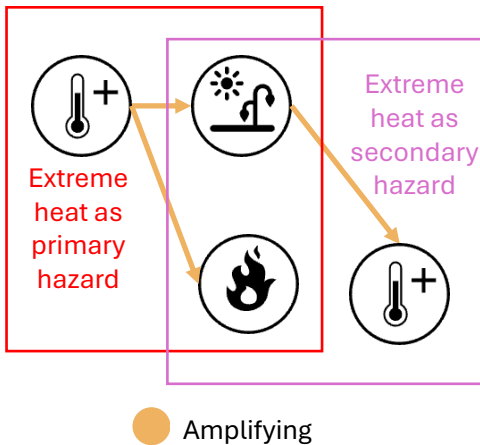
35 - 45

Map Scale 1:700,000



Interactions with other Hazards

As a primary hazard, extreme heat can amplify and coincide with wildfires and droughts. It can also coincide with windstorm, stormwater, coastal and riverine flood, and extreme precipitation. In summer, extreme heat is often linked to convective storms that cause extreme precipitation.



Emergency Management Considerations

- ▶ Temperature increases are linked to El Niño events, whose forecasting can be used to track upcoming hazard potential (see Provincial resource discussed in Section 9 Recommendations)²².
- ▶ Monitor Nanaimo weather forecast (see Federal resource discussed in Section 9).
- ▶ Prepare and plan for cooling areas that can be rapidly opened or deployed, are accessible, and are spread throughout the LSA.

²² The ENSO index is based on long-term average conditions, and it does not mean that an extreme heat event cannot occur during a La Niña phase.