Windstorm

Wind gusts and high wind speed, that is often associated with heavy rain.

EXTENTS

REGIONAL

CONSEQUENCE

MODERATE

TYPE	DURATION	SEASONALITY	WARNING TIME	LIKELIHOOD
SHOCK	HOURS-DAYS	FALL-WINTER	DAYS	VERY LIKELY

About the Hazard

Windstorms can damage trees, powerlines and other critical linear infrastructure, with impacts that are far-reaching. Wind patterns are complex and variable. They are primarily **driven** by strong atmospheric pressure gradients caused by temperature differences on land and ocean surfaces (sometimes causing cyclones and thunderstorms). The localized intensity of the wind is **modulated** by watershed physical characteristics (topography causing funneling or shelter) and land use and changes that affect surface roughness (surface winds behave differently in a forest compared to an urban area, or coastal shoreline).

What We Assessed

We analysed wind data from three weather stations located within the RSA, and one that was within the Salish Sea (Entrance Island station). For a subset of these stations, we reviewed extreme wind data, including extreme winds and wind gusts (see the relevant technical study for details) that was reliable.

We also analysed shoreline wind fetch (the length of water over which wind can blow without obstruction).

Challenges

- Wind patterns are complex, variable, and difficult to simulate. Wind data has high uncertainty and low spatial resolution.
- There are not enough observation records from weather stations to capture the highly variable spatial patterns of local winds.
- Current modelling results are usually focused on large-scale estimates of average conditions. These models are not suitable for understanding local-scale extreme events.

Mapping Results

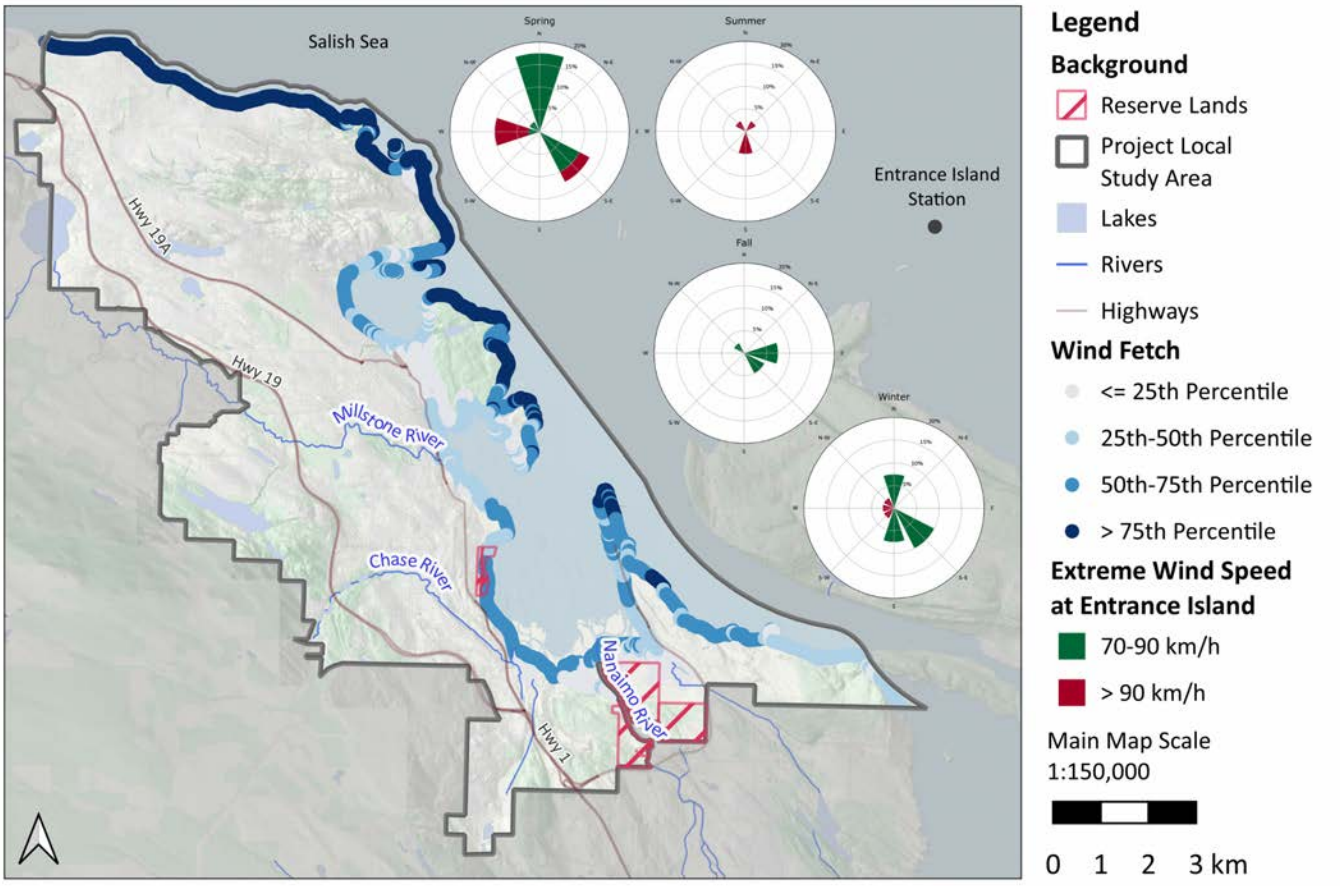
Our findings include the following for wind speed:

- In general, these are higher in areas closer to the coast, and in the Salish Sea. However, there is a very large variability in extreme wind events among the stations analysed; extreme wind directions also change seasonally.
- In the Salish Sea, extreme winds occur mostly in winter and spring, and are northerly (from the north), southeasterly, southerly, and westerly.
- A relatively small proportion of wind speeds recorded at Entrance Island were above warning thresholds (i.e. 70 km/h and 90 km/h).
- Extreme wind events have occurred sporadically in the past with notable events occurring in 2013 and 2014.
- Many coastal areas are relatively sheltered from offshore features such as Gabriola Island, Saysutshun Island, and Duke Point. However, areas with larger fetch and that are exposed to the dominant southeasterly or northwesterly wind patterns, are likely to experience higher winds. This includes the North Slope (see dark blue area at the top of the map).

Climate Change Trends

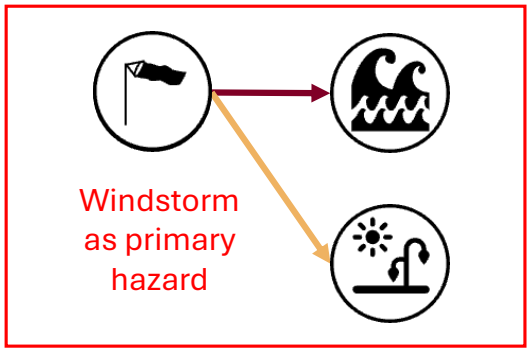
It is difficult to assess climate change influences on extreme winds in the project area due to the limited available data. Based on an analysis of wind data at Entrance Island, winds have become stronger on average; whereas the likelihood of unusually high or low winds relative to the average wind speed has remained almost constant. Therefore, it is possible that extreme winds have increased in the project area. Our confidence in this trend is low, but it is consistent with some research literature (e.g. (Cheng et al., 2014).

In the next 5-10 years, we can reasonably assume that the trend outlined above will continue.



Interactions with Other Hazards

Windstorms frequently coincide with extreme cold, extreme precipitation, and associated riverine or stormwater flooding (as part of the same storm system). Windstorms trigger, amplify, and coincide with coastal flooding (storm surge). When they occur in warmer periods, windstorms amplify and coincide with drought conditions by increasing evaporation and mobilizing dust. They can coincide with wildfires, significantly influencing their behavior.



Amplifying Triggering + Amplifying

Emergency Management Considerations

- Advocate for the collection of extreme wind speed data at more locations to obtain more representative records.
- Given the challenges associated with understanding extreme winds based on available data, focus efforts on reducing risk and increasing resilience to windstorm hazard across the project area where practicable.