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Potential climate change impacts and actions to adapt in nearshore and estuarine areas of Howe Sound/Atl'ka7tsem

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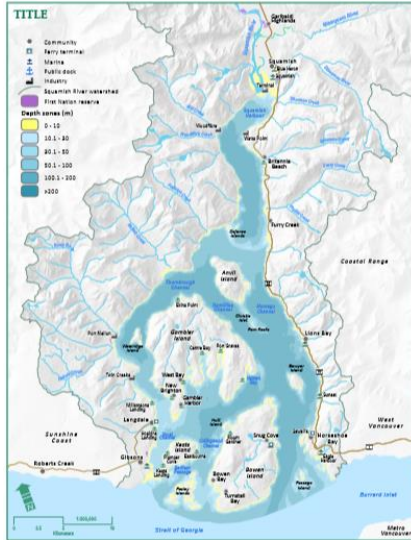


*Potential climate change impacts and
actions to adapt in nearshore and
estuarine areas of*
Átl'ka7tsem/Txwnéwu7ts/Howe Sound
Ocean Watch

Jennifer Chapman, Amber Dearden, Aroha Miller

Átl'ka7tsem/Txwnéwu7ts/ /Howe Sound (Credit: Tracey Saxby, Visual Science)

Átl'ka7tsem/Txwnéwu7ts/Howe Sound

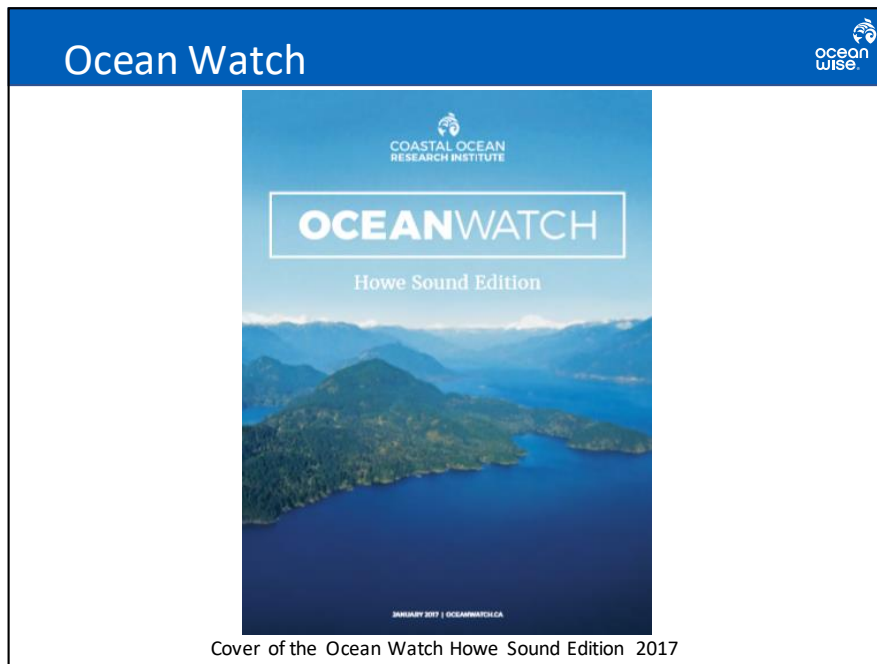


Map of If Átl'ka7tsem/Txwnéwu7ts/Howe (<https://daidsuzuki.org/project/howe-sound/>)

Átl'ka7tsem/Txwnéwu7ts/Howe Sound is a coastal fjord, just outside of Vancouver, within the unceded territory of Sḵwxwú7mesh Úxwumixw/Squamish Nation.

The well traveled Sea to Sky highway runs along one side of the Sound and links some of the nearshore communities, although others are spread over the islands and opposite shore, as seen in the map. At the head of the Sound, the town of Sḵwxwú7mesh/Squamish has developed in and around the estuary of the Squamish River, which carries water from an area over 3,650 square kilometers, into the Sound.

More than 10 governing bodies and First Nations share the area.



Ocean Watch generates snapshots of coastal ocean health and is run by Ocean Wise, based at the Vancouver Aquarium.

In 2017 the Ocean Watch Howe Sound Edition was released. This report combined community, Indigenous and scientific knowledge into accessible articles covering a range of topics related to coastal ocean health. Articles describe the current status and importance of topics, plus are easy-to-read, and include pictures, charts and infographics. At the end of each article there are recommended actions that can be taken by individuals, organizations, and different levels of government. Based on the full report, key issues and an action plan were created.

Ocean Watch Átl'ka7sem/Txwnéwu7ts/Howe Sound 2020 reports on the status, changes and actions taken. Release due late summer 2020

2017



2020



Ocean Watch reports include articles organized under 7 interconnected themes, which capture ecosystem and community topics. Some adjustments to this structure were made for the Ocean Watch Át'ka7tsem/Txwnéwu7ts/Howe Sound Edition 2020, listed below.

- For the 2020 update report a much greater emphasis has been put on climate change, shown by the orange circle touching every theme in the Sound.
- The theme “Climate change and oceanography” (originally “Oceanography and climate change”) was moved in the figure to reflect that it is now the first theme in our report. (previously, “Species and habitat”).
- All articles in other themes contain a new, high-level section describing the potential impacts of climate change on the topic. (e.g., What are the potential impacts of climate change on salmon species? What are the potential impacts of climate change on tourism and recreation?)
- Another important change was the addition of community to the center of this figure. Community health is inherently tied to ecosystem health.

In addition to moving the climate change theme to the front of the updated report, new articles were added to this section. The new articles were added to provide

background on climate change for this region and how our actions affect global warming. The link between greenhouse gases, produced by human activities, and rising temperatures has a strong evidence base, which is made clear to empower readers to consider their own greenhouse gas emissions.

Rising temperatures

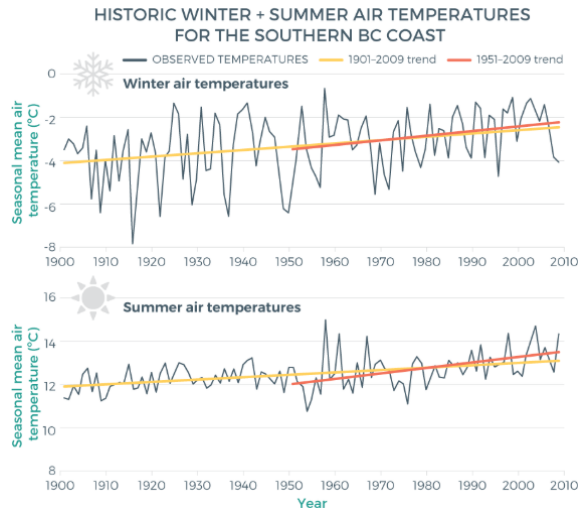
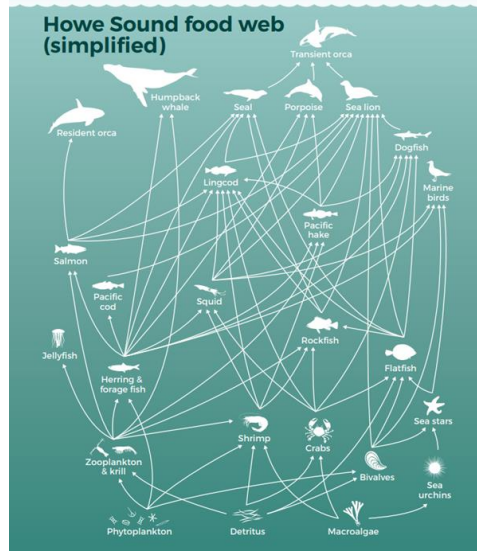


Figure Historical winter (top) and summer (bottom) air temperature time series for the south coast region of B.C., which includes Átl'ka7tsem/Txwnéwu7ts/Howe Sound. (Adapted with permission from PCIC, 2013).

Average global air temperatures are rising, as expected with climate change. For the Southern B.C. Coast area, in which Átl'ka7tsem/Txwnéwu7ts/Howe Sound is located, this trend has also been observed.

The above graphs show the trend of rising temperatures for the Southern B.C. Coast. The two timeframes (1901 – 2009) and (1951-2009) both clearly show a rising temperature trend, in both winter and summer. The trend for data from 1951-2009 shows a steeper increase (red line) than the longer timeframe (yellow line), indicating warming is speeding up.

Impacts all of the interconnected system



Changing temperatures within the Sound have impacts on every aspect of the interconnected ecosystem, and the linked coastal and estuary communities. The above diagram shows a simplified food web. Specific direct impacts on the Sound described in the Climate Change and Oceanography section include:

- shoreline erosion and sea level rise,
- ocean acidification,
- ocean warming, and
- streamflow.

Outside of these specific direct effects, it is expected that there will be an increase in storm intensity and frequency, wildfires, droughts and floods.

Indirect impacts could then affect the species in the ecosystem. For example, the spring bloom of phytoplankton (the base of the food web) could shift earlier with warmer surface waters, meaning timing no longer matches with zooplankton – so zooplankton populations crash. Such changes impact the entire food chain. Many other examples to species and subsequent effects to the system have been pointed out in the species and habitat chapters of this report.

Example impact - storms



Collecting plastic pieces near the shoreline. (Credit: Ocean Wise)

More extreme weather events, are predicted with climate change, and are already being recorded in the Sound.

Several severe storms hit the Sound in the winter of 2018 – 19.

Examples of impacts included:

- Damage to dock structures
- Mobilization of debris, for example plastic pieces (and subsequently, issues around responsibility of clean up)
- Vessels sunk or washed ashore and abandoned
- Ferry cancelations
- Flooding events
- Shoreline erosion
- Endangerment to life of First Responders

Adaptation - Flooding



A view of part of the Squamish Estuary (Credit: Tracey Saxby)

The risk of flooding is likely to increase with increased heavy precipitation events and changes in spring freshet timing. Therefore adaptations have been made in Skwxwú7mesh/Squamish, which is located at the head of the Sound in the floodplain of the Squamish River that drains an area of 3,650 square kilometers into the Sound.

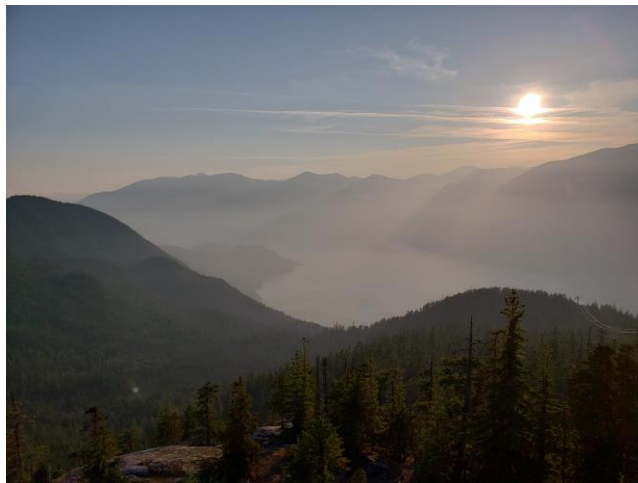
In 2017 the Integrated Flood Hazard Management Plan (IFHMP) was adopted. Some examples of action already taken based on recommendations in this plan include:

- An upgrade to Squamish River dike in Brackendale (2019)
- Planning of additional dike upgrades
- Floodplain bylaws to require elevations and setbacks of new construction in floodplain

Some examples of suggested actions that can be progressed by include:

- Conduct further studies on impacts of flood control on environmental processes and continued alternatives that work with nature.
- Continue to raise awareness of flood risks and responsible watershed stewardship.
- Incorporate latest climate change hazard assessments into emergency response planning.
- Continue to renew the IFHMP every five to 10 years.

Actions



Wildfire smoke in Átl'ka7sem/Txwnéwu7s/Howe Sound. (Credit: Tracey Saxby)

Greenhouse gases (GHG) are driving climate change. The impacts of shifts are already being seen in the Sound, and adaptations have been made. Some examples were given on the previous slide of adaptations in the Squamish Estuary to the increased flood risks. However, actions to adapt to a lifestyle of zero-carbon emissions are important to take right now, to protect ourselves from worsening climate change impacts, for example wildfire smoke as pictured here. There is clear community support for such actions demonstrated for example by global climate strikes.

What can we do now, to adapt to a lifestyle of zero-carbon emissions?

Our report contains over 50 recommendations specific to moving to zero-carbon emissions. Individuals can take actions in every aspect of life from food and transport to engaging in politics. Actions at the government level extend over virtually all aspects of societal organization, from food and transport, again, to management of nature. Taking action to reduce climate change is particularly important for communities along coast and estuaries that will face risks, such as sea level rise and flooding.

Conclusion: Still more to do



Students from Skwxwú7mesh/Squamish, B.C. call for immediate climate action at the global climate strike on September 27, 2019. (Credit: Tracey Saxby)

Overall, adaptations are occurring and will continue to occur, either in response to climate change or to prevent the worst of climate change impacts. The choice is ours to act now and adapt to lifestyles of zero-carbon emissions or continue to adapt to the increasing shifts from climate change.

You can learn more about conservation actions for climate change our upcoming release of Ocean Watch Átl'ka7sem/Txwnéwu7ts/Howe Sound Edition 2020. Check out the 2017 articles and watch for the 2020 release here:

<https://oceanwatch.ca/howesound/>

Contact us to learn about involving ocean watch with your community at oceanwatch@ocean.org.

References:

PCIC (Pacific Climate Impacts Consortium) (2013). Climate Summary for: South Coast Region. Available from: https://www.pacificclimate.org/sites/default/files/publications/Climate_Summary-South_Coast.pdf