

OCEAN WISE RESEARCH INSTITUTE

OCEANWATCH

Átl'ka7tsem/Txwnéwu7ts/Howe Sound Edition 2020
Executive Summary: Overview and Future Directions



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Executive Summary: overview and future directions

Átl'ka7tsem/Txwnéwu7ts/Howe Sound is a coastal fjord in the Salish Sea, just north of the bustling city of Vancouver, British Columbia (Figure 1). Lying within the unceded territory of the Skwxwú7mesh Úxwumixw/Squamish Nation, the Sound is home to flourishing communities, and is a Traditional Knowledge hub, a biodiversity hotspot and a recreational playground.

Historically, industrial activities and development in the Sound left the water polluted and the environment damaged. However, significant efforts in recent decades have improved the health of the fjord and allowed valued species to recover.

Administered by 10 local government bodies and Skwxwú7mesh Úxwumixw/Squamish Nation, communities throughout the Sound have been working together for a number of years to create a vision of collaborative restoration, protection and sustainable growth for this unique geographic area. Today, momentum is as strong as ever, and many initiatives are coming to fruition. Careful management of the precious resources in this fjord remain necessary to ensure a sustainable future for the environment and the people who call this jewel “home.”



Above: Killer whales cruising the waters of the Sound (Credit: Rich Duncan). At left: Squamish Estuary (Credit: Rich Duncan).

Ocean Watch Health Ratings 2020

This report provides an update to the Ocean Watch Howe Sound Edition (2017). It provides both a status report and an assessment of progress made over the past three years.

The Ocean Watch ratings offer an easy, visual way to understand what is happening with the health of different indicators throughout Átl'ka7tsem/Txwnéwu7ts/Howe Sound. The green *healthy* rating is what we want to attain for all indicators; however, in most cases, more work is needed to advance in that direction.

In addition to the four ratings used in the 2017 report (healthy, caution, critical, limited data/not rated),

here we have added *improving*, as shown by an upward arrow, and *declining*, as shown by a downward arrow. These arrows indicate that even if the health rating has not changed since the 2017 report, positive forward action has been taken, or conversely, actions have regressed.

Twenty-eight articles from the 2017 report have been reassessed. Six articles are new for this 2020 edition. Despite best attempts, no update for Cultural Continuity and Squamish Nation Stewardship were available at the time of print. Thus, no ratings are given for these two articles.

Ocean Watch Health Rating Legend



HEALTHY 1) The status is healthy according to available data, 2) the trend is positive if known, 3) some data are available, and/or 4) actions to address or mitigate are well underway and are known to be effective. Actions should be taken to maintain positive status and/or trend.



CAUTION Status, trend, data, and/or actions provide contradictory or inconclusive information. Actions are needed to move into positive status and trend and avoid negative status and trend.
























































CRITICAL 1) Impacts or issues are high risk or have resulted in a low or vulnerable status, 2) improvements are uncertain, minor, or slow, and/or 3) actions to address or mitigate are non-existent, vague, or have low effectiveness. Actions are needed to move into positive status and trend.























LIMITED DATA/ NOT RATED Not rated due to the nature of the article, or there are not enough data to produce an assessment.

Table 1. Health ratings for each article. The health rating for 2017 and 2020 are shown for comparison. A rationale is provided for the 2020 health ratings.

Climate Change and Oceanography	2017	2020
CLIMATE CHANGE NEW Globally, there is limited progress to reduce drivers of climate change.		
ZERO CARBON COMMUNITIES NEW Canada is one of the 10 countries responsible for the most greenhouse gas emissions in the world. Transforming communities to zero carbon emissions is necessary.		
OCEAN WARMING Globally, record-breaking temperatures continue to occur, which directly impacts ocean temperatures.	 	 
OCEAN ACIDIFICATION NEW Ocean acidification has direct impacts on marine species and habitats.		 
SHORELINE EROSION/ SEA LEVEL RISE Sea level rise and storm surges will continue to negatively impact shorelines.		 
STREAM FLOWS Large interannual variations are observed. A shift in timing of peak flows will have effects on other species.		
SQUAMISH FLOOD PLANNING Significant progress has been made on the recommended actions from the 2017 report; however, there is still considerable work to be done.	 	  ↑
Species and Habitat	2017	2020
PLANKTON No data is presented in this update; however, a pilot plankton study using the same sites as Stockner et al. (1977) was undertaken in summer/fall of 2019.		 ↑
FORAGE FISH There is a lack of monitoring and data on forage fish in the Sound.		 
SEA STARS For some sea star species, numbers remain low and wasting disease is still observed.		

Species and Habitat (continued)	2017	2020
<p>SALMON There is a lack of comprehensive data or stock assessments for wild salmon species in the Sound.</p>		 
<p>CRITICAL FISH STOCKS (PREVIOUSLY ROCKFISH, LINGCOD) No increasing trends have been observed. Improvements are minor or slow.</p>		
<p>MARINE BIRDS Globally, considerable declines have been observed in marine bird populations due to impacts from climate change and habitat destruction.</p>		 
<p>EAGLES There is considerable annual variation in bald eagle counts, with counts in the last three years being similar to the last ten years, but lower compared to earlier periods.</p>		
<p>PINNIPEDS NEW Better management has led to increased numbers since the 1970s.</p>		
<p>CETACEANS An increase in large whale numbers and a decrease in small cetacean numbers has been reported. Much forward movement on actions has been taken.</p>	 	  ↑
<p>EELGRASS Efforts to restore and transplant eelgrass are ongoing.</p>		
<p>GLASS SPONGES Considerable advances in knowledge have been made; however, glass sponges remain vulnerable to mechanical damage and climate change.</p>		
<p>ANNAPOLIS Increases in the number of marine animals but decreases in marine plants and moss animals (bryozoa) have been noted.</p>		
<p>SQUAMISH ESTUARY Many positive actions are being taken to repair this critically important habitat; however, monitoring of these efforts is needed to measure their impacts.</p>	 	  ↑
Seafood		
<p>SPORT FISHING Pressure on fish stocks continues to increase from the rising popularity of sport fishing.</p>		 ↓
<p>SHRIMP/PRAWN FISHERY Stocks have been declining since 2015, resulting in fishery closures. Industry is trying to decrease bycatch mortality.</p>		

Clean Water		
<p>BRITANNIA MINE Some improvements have been seen following wastewater treatment; however, exceedances of water quality guidelines are still occurring.</p>		
<p>PULP MILL MARINE EFFLUENT Dioxin and furan contamination in sediment and benthic life is decreasing following regulations but is still detected.</p>		
<p>WRECKED, ABANDONED, AND PROBLEM VESSELS The passage of Bill C-64 has increased resources available for removal of vessels; however, this is a complex issue and further refining of legislation is necessary.</p>		
<p>POLLUTIONTRACKER NEW Dioxin and furan concentrations are high, especially in mussels, when compared with other areas along the B.C. Coast. Metals continue to be detected in sediments.</p>		
<p>PLASTICS NEW Plastics are ubiquitous in our oceans. However, within the Sound data for plastics and microplastics is lacking.</p>		 
Development		
<p>COASTAL DEVELOPMENT With rapid growth occurring in the region, and subsequent development, sustainable management is key.</p>		
<p>LARGE VESSEL TRAFFIC The volume of large vessel traffic has not changed significantly. Future development may increase vessel numbers.</p>		 
<p>TOURISM AND RECREATION Demands for activities and resources is high, creating pressure on ecosystems, and there is no sign of growth slowing.</p>	 	
Sense of Place		
<p>CITIZEN SCIENCE There are a large number of citizen science activities in the Sound.</p>		
<p>OUTDOOR LEARNING There are a large number of outdoor educational organizations and opportunities in the Sound, with an increasing emphasis on Traditional Knowledge.</p>		

Stewardship and Governance	2017	2020
<p>MARINE PROTECTED AREAS Positive actions have been taken, with the creation of new marine refugia to protect glass sponge reefs and the expansion of the important bird area (IBA).</p>		
<p>COMPREHENSIVE PLANNING Recent accomplishments suggest positive improvements, but a need for continued collaboration and communication is essential.</p>		 

Progress on Recommended Actions from 2017

The Ocean Watch Átl'ka7tsem /Txwnéwu7ts /Howe Sound Edition (2020) details progress on recommended actions from each article in the 2017 edition. Many actions were identified as having advanced, but many more still require further work. Only a single action in the whole report regressed (Sport fishing), while the health rating assessment for seven articles also regressed (Ocean Warming, Shoreline Erosion/Sea Level Rise, Stream Flows, Squamish Flood Planning, Marine Birds, Sport Fishing, Tourism and Recreation). Below are some examples of actions that have progressed. Details on specific actions are available in each article. Actions specifically from the 2017 Action plan that have been addressed are denoted below with **2017 ACTION PLAN**.

The Ocean Watch Howe Sound Workshop 2019 asked participants to identify key themes for moving forward on actions related to climate change ([click here](#) to see the workshop report). The suggested themes were similar to those used in the 2017 Action Plan. As such, these themes have been used here to group all past and current actions. Additional themes were added to capture the diversity of topics presented. Actions are grouped into the following themes:

- research;
- protect and restore;
- educate and engage;
- legislation;
- funding;
- monitor key indicators;
- greenhouse gas reductions.

Research

Research informs conservation actions. Examples of progress include:

- A pilot plankton sampling study was carried out in 2019 (data not available for the 2020 report).
- The Ocean Wise Research Institute's Howe Sound Conservation and Research Team continues to build on their 40-plus years of research work in the Sound's waters, conducting investigations on glass

sponge reefs, environment DNA (eDNA), critical fish stock monitoring, recording biodiversity, and many other research and monitoring projects to support conservation.

- The B.C. Cetacean Sightings Network (BCCSN) supports the Whale Report Alert System (WRAS), which provides large vessel pilots and captains with information so they can take steps to reduce risk of impacting whales while they are transiting the area.

Protect and restore species and habitats

While great steps have been taken to protect species and fragile habitats, more work is needed especially as climate change continues to impact the marine environment. Examples of progress include:

- **2017 ACTION PLAN** Ongoing eelgrass transplants throughout the Sound.
- **2017 ACTION PLAN** An increase in protected areas or conservation areas, including the extension of the English Bay/Burrard Inlet Important Bird Area part way into the Sound, and the formation of eight new marine refugia to encompass nine glass sponge reefs, bringing the total number of protected glass sponge reefs in the Sound to 11.
- Restoration of natural habitats, including the Central Estuary Restoration Project in the Squamish estuary; and restoration of waterfowl habitat to aid population recovery.

- Restriction of activities in areas of ecological importance, e.g., banning all commercial, recreational and Food, Social and Ceremonial (FSC) bottom contact fishing activities, in glass sponge reef complexes.



Decorated warbonnet, *Chirolophis decorates*, Porteau Cove. (Credit: Lee Newman)

Education and Engagement

Determined as a key priority for increasing awareness on environmental issues throughout the Sound, education and engagement increases the likelihood of behavioural changes, leading to a more invested and conservation-focused community. An example of actions progressed include:

- **2017 ACTION PLAN** The creation of a Marine Reference Guide (MRG) project in order to support decision making.
- **2017 ACTION PLAN** The Ocean Watch Task Force (OWTF), comprising representatives from local government bodies, planning staff, NGOs, and First Nations, was formed after the 2017 report release. The OWTF was instrumental in creating a [strategic plan](#) (2019– 2021) to guide local governments in taking collaborative, cohesive action.

- The Ocean Watch Howe Sound Edition (2017) report provided a summary of many aspects of ecological health specific to Átl'ka7tsem/Txwnéwu7ts/Howe Sound, the likes of which was not previously available.
- The Ocean Watch team raised awareness through community events and outreach, for example the Howe Sound Ocean Watch Workshop held in 2019, and presenting to students.
- The Ocean Watch reports (2017 and 2020) provide informative resources, such as the Integrated Flood Hazard Management Plan for Skwxwú7mesh/Squamish, location of signage in areas of ecological importance and many others.

Legislation

Legal protections and best practice guidelines offer opportunities to protect the coastal environment. This theme encompasses decisions and guidance from government or government agencies. Examples of progress include:

- **2017 ACTION PLAN** The Squamish bylaw to reduce single-use plastics.
- **2017 ACTION PLAN** The formation of eight marine refuge areas to encompass nine additional glass sponge reefs placed under voluntary protection in 2017.

- An amendment to the B.C. Sport Fishing Regulations will likely soon require a biodegradable escape mechanism, or “rot cord,” on all recreational prawn and crab traps, allowing bycatch to escape; decreased recreational daily catch limit for prawns; and prawns with eggs are no longer allowed to be kept since April 2018.
- Boating requirements including speed and location restrictions and increasing the distance between boats and cetaceans.
- Development of bylaws for coastal development (i.e., Squamish Floodplain bylaw).

Funding

Funding is imperative in supporting other key themes, such as research, protection and restoration, etc. Without funding, this work would rely on volunteers and be much more difficult to achieve in a timely manner. An example of actions progressed include:

- **2017 ACTION PLAN** Different levels of government funding support various initiatives, for example the Tenderfoot Creek Hatchery, Eagle Watch, the Marine Reference Guide, Squamish River Watershed So-

ciety initiatives, Squamish estuary restoration work, some of the Howe Sound Conservation and Research Team's work, and many more.

- Other funding, for example philanthropists, non-governmental organizations, etc., support many other projects that promote conservation within the Sound, e.g., funding the Ocean Watch reports by the Sitka Foundation and North Family Foundation.

Monitor key indicators

This category encompasses many citizen science activities, as well as baseline monitoring and ongoing monitoring of oceanographic conditions. An example of actions progressed includes:

- **2017 ACTION PLAN** Ongoing water quality and streamflow monitoring, such as waste-water quality monitoring by Howe Sound Paper and Pulp Mill and to monitor Britannia Mine; PollutionTracker

sediment samples; continuous river flow monitoring at Daisy Lake by BC Hydro; ocean temperature and acidification monitoring.

- Observations of cetacean sightings submitted via the WhaleReport app or to Wild Whales; monthly bird count data submitted to various websites and apps; counts of spawning salmon; beach cleanup data; and many others.

Greenhouse gas reductions

This category is new for 2020; however, it is a very important addition. All aspects of our environment are impacted by climate change (Figure 2). Reducing greenhouse gas emissions is key to curbing the negative impacts we are already seeing.

Impacts of greenhouse gas emissions



Figure 2. The increased concentration of greenhouse gases in our atmosphere results in direct climate change impacts (orange) and ocean acidification (purple), which then lead to indirect impacts. (yellow).

2020 Key Issues

Moving forward, momentum and collaboration between individuals, community groups, NGOs, local governments and First Nations needs to increase. Further actions are required to continue working towards a healthy Átl'ka7tsem/Txwnéwu7ts/Howe Sound marine environment. The list below highlights new and outstanding issues, which are addressed by the new Action Plan.

1. The species, habitats and ecosystems in Átl'ka7tsem/Txwnéwu7ts/Howe Sound interact in complex ways that we do not yet fully understand. Continued research efforts are needed to further our understanding of these complex biological relationships so that recommended actions do not accidentally have unintended negative consequences.
2. Pressure from population growth, tourism, and development (both land-based building and future increases in vessel traffic) are all impacting the marine environment. Increased collaborative efforts to protect and restore species and habitats is essential.
3. Education and engagement around some of the key issues facing the environment today, in particular climate change, is needed to encourage the necessary behaviour changes and coordinated stewardship efforts.
4. Legal protection is lacking for some protected areas, e.g., Important Bird Areas. Additionally, enforcement of regulations, such as fishing restrictions within glass sponge reef marine refugia, is difficult at best due to a lack of resources at various government levels.
5. Although many initiatives have good funding at present, securing continuity in funding can be difficult, meaning some initiatives must be put aside.
6. A lack of baseline data to monitor trends in species, habitats and ecosystems continues to be an issue, e.g., wild salmon, plankton, forage fish. Equally, monitoring data to evaluate whether protection and restoration efforts are having the desired outcome either do not exist, are not readily available or are held by different groups.
7. Climate change is impacting every aspect of the environment in Átl'ka7tsem/Txwnéwu7ts/Howe Sound. Coordinated, community-wide actions are needed to decrease greenhouse gas emissions.

Action Plan

The full report includes updates on past recommended actions as well as detailing new recommended actions, where applicable. Not all actions here are specifically listed within articles; however, after compiling and

assessing actions, it was apparent that higher-level recommendations were necessary. This action plan summarizes actions into broad themes to provide an overview and focus on implementation of actions.

Action 1. Research

INCREASE KNOWLEDGE OF THE LOCAL AREA AND SPECIES THROUGH RESEARCH.

1. Conduct baseline studies and ongoing monitoring of key indicator species and habitats to guide conservation actions.
2. Conduct ongoing monitoring of the impacts of climate change and ocean acidification to support adaptation and action.
3. Address key knowledge gaps that develop as knowledge increases.
4. Improve availability and sharing of data.
5. Increase participation and engagement of First Nations knowledge holders in Western science.

Action 2. Protect and Restore

PROTECT AND RESTORE MARINE SPECIES, HABITATS AND ECOSYSTEM SERVICES.

1. Create and implement a coordinated strategy for managing growth (population, tourism, development growth) sustainably throughout the Sound, to reduce impacts on the marine environment.
2. Increase the proportion of area protected within the Sound, with a particular focus on beach spawning habitat and critical habitats.
3. Work with the Federal, Provincial, First Nations and local governments to refine Bill C-64 to clarify the laws applied to abandoned, wrecked or problem vessels so location (on land or at sea), marine debris and waste management issues arising are covered.
4. Reduce entry of pollutants into the marine environment (e.g., plastics and microplastics, harmful chemicals and wastewater).

Action 3. Educate and Engage

INCREASE AWARENESS AND EDUCATION AND ENSURE CONSISTENT MESSAGING ON ENVIRONMENTAL ISSUES.

1. Work with First Nations and local governments to increase education and understanding of critical environmental issues, such as climate change, within municipal staff. Ensure key resources are shared between local governments and have uniform messaging.
2. Increase education and awareness around environmental knowledge and best practices. Include Traditional Knowledge in these education opportunities, and where applicable, ensure they are taught by Skwxwú7mesh Úxwumixw/Squamish Nation members.
3. Increase opportunities for Skwxwú7mesh Úxwumixw/Squamish Nation members to connect to Traditional Knowledge in Átl'ka7tsem/Txwnéwu7ts/Howe Sound. Further meaningful reconciliation efforts are needed.
4. Continue to work collaboratively on reconciliation with First Nations.

Action 4. Legislation

DRIVE HIGH-LEVEL CHANGE USING OFFICIAL CHANNELS (E.G., GUIDELINE, POLICY, BYLAW) APPROPRIATE TO THE CIRCUMSTANCES.

1. Implement appropriate regulations to curtail actions that are detrimental to the environment (e.g., pesticides, pollutants, boating, development).
2. Strengthen protections for vulnerable ecosystem components including legal protection, e.g., Important Bird Areas.
3. Explore the option of citizens or First Nations working with government agencies (e.g., a ranger program or something akin to the [Coastal Guardian Watchmen Program](#)).

Action 5. Funding

FINANCIALLY SUPPORT CONSERVATION ACTIONS AND ENSURE STRICTER ENFORCEMENT.

1. Strategically fund priority projects for protection of vulnerable species and restoration of critical habitats.
2. Support ongoing, and new, long-term data collection initiatives.
3. Allocate resources to clean-up activities (e.g., wrecked, problem and abandoned vessels; plastics and contaminants; shoreline cleanups and appropriate disposal or recycling, especially after storm events).
4. Incentivize transitions towards environmentally friendly practices and products, e.g., a zero carbon economy.
5. Commit more resources to enforcement.

Action 6. Monitor

COLLECT LONG-TERM DATA TO IDENTIFY TRENDS, SUPPORT DECISION MAKING, AND EVALUATE THE OUTCOME OF ACTIONS TAKEN.

1. Conduct long-term observations of key species and habitats, and potential hazards (e.g., pollutants).
2. Make information easily available to support decision making, e.g., through the Marine Reference Guide.
3. Create a centralized hub to make group information and data easily accessible and searchable, to increase group participation and data use.

Action 7. Greenhouse Gas Reductions

DECREASE GREENHOUSE GAS EMISSIONS AND MOVE TOWARDS ZERO CARBON MUNICIPALITIES TO ALIGN WITH RECOMMENDED REDUCTIONS IN GLOBAL GREENHOUSE GAS EMISSIONS, E.G., IPCC, PARIS AGREEMENT, COPENHAGEN ACCORD.

1. Invest in efficient, regular public transit options in the Sea to Sky corridor.
reporting of community-wide emissions beginning in 2020 to track success.
2. Invest in renewable energy and green infrastructure.
3. Where not already done, local governments should declare a climate emergency to enable council and staff to dedicate the resources required to immediately reduce community-wide GHG emissions.
4. Conduct a baseline GHG emission inventory for each community to identify the largest emitters, with ongoing monitoring and
5. Work with large businesses to advise on how to decrease their carbon footprint.
6. Create a climate action plan to prioritize policies and actions that will be most effective at reducing community-wide GHG emissions. Identify challenges and opportunities and establish key evaluation criteria to evaluate success.



Scalyhead sculpin, *Artedius harringtoni*, at Porteau Cove. (Credit: Lee Newman)

Action Plan Leadership

Subsequent to the release of the 2017 report, the Ocean Watch Task Force (OWTF) was created to implement the previous Action Plan. In 2019, the OWTF created a Strategic Plan to guide local governments, fulfilling their agreed goals (terms of reference).

The 2020 Action Plan reflects how far we have come, as a community, in the last three years. Nonetheless, opportunities still exist to improve the health of the coastal marine environment in Átl'ka7tsem/Txwnéwu7ts/Howe Sound. Continued, collaborative efforts across government, First Nations, organizations and individuals are key to ongoing success. The update presented above aims to guide these efforts. In addition, further leadership actions that could be taken include:

- a) Create a steering committee representing First Nations, government, business, communities, NGOs and other sectors to oversee and guide this work.
- b) On an as needed basis, create ad-hoc committees focused on progressing strategic priority actions.
- c) Establish a formal network of Átl'ka7tsem/Txwnéwu7ts/Howe Sound government staff and First Nations to update and exchange information on marine environmental issues, and share resources and information arising from this work.
- d) Appoint a sustainably funded project director/coordinator to track progress, prepare annual plans and reports, manage committees and the suggested network, and organize workshops and seminars on priority topics related to the marine environment.



A diver with copper rockfish, *Sebastes caurinus*, in the foreground at Whytecliff Park. (Credit: Lee Newman)



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