Sense of Place and Well-being

Sḵwx̱wú7mesh Úxwumixw/ Squamish Nation opening the Orca Celebration 2019. (Credit: Silke Labson)

Summary

Spending time in the outdoors not only boosts mental and physical health, but also gives people a sense of connectedness to nature. With that comes a sense of responsibility and motivation to act as guardians for the environment. In Átl'ka7tsem/Txwnéwu7ts/Howe Sound, both interest and participation in outdoor learning and citizen science have been increasing in the last decades.

Many schools, universities and organizations using the Sound as an outdoor classroom incorporate Traditional Indigenous Knowledge (TIK) into their programs. TIK enhances participants' understanding and appreciation of traditional teachings and cultural practices. However, more can be done and continued efforts to incorporate TIK should be prioritized moving forward.

Citizen scientists are some of the greatest educators in the Sound. They foster a passion and love for the environment, and readily share that enthusiasm with others during outdoor learning experiences. Citizen science groups are also pivotal in gathering information about species and habitats to address knowledge gaps that government agencies are unable to resource. The dedication of the many passionate community volunteers continues to support actions that improve ecosystems throughout Átl'ka7tsem/Txwnéwu7ts/Howe Sound.

Outdoor learning and citizen science initiatives in the Sound will continue to be very important in protecting the environment, especially in the face of climate change. Put simply, increasing outdoor learning and citizen science opportunities fosters the next generation of environmental guardians.

(NB: An update for Cultural Continuity was not available at the time of release. If an update becomes available, it will be added to our website).

Ocean Watch Health Rating

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.

ARTICLE + 2020 RATIONALE	2017	2020
CITIZEN SCIENCE There are a large number of citizen science activities in the Sound.	✓	✓
OUTDOOR LEARNING There are a large number of outdoor educational organizations and opportunities in the Sound, with an increasing emphasis on traditional knowledge.	✓	✓

Citizen Science: protecting and restoring the Sound

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REVIEWER

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What is happening?

Community members continue to play an important role in monitoring the coastal and marine environment in Átl'ka7tsem/Txwnéwu7ts/Howe Sound, as well as engaging with the public to share their knowledge and encourage participation in activities. This is reflected by the continuation of many previously identified citizen science initiatives, some of which have been running since before 2000, plus the formation of new initiatives. Volunteers in these groups generously spend considerable time taking part in these activities.

Pink salmon spawn in the Stawamus River. (Credit: Bob Turner)

What is the current status?

Since the release of the Ocean Watch Howe Sound Edition (OWHS) 2017 report, an additional five citizen science groups have been identified. Two began activities in 2019. These included nearshore habitat recovery activities and a marine species identification course for divers. The other three initiatives are not new but are additions to this list since 2017. These included the recording of biodiversity in Sḵwx̱wú7mesh/Squamish, from the ocean to the alpine region; restoration and monitoring of streams in West Vancouver; and the Great Canadian Shoreline Cleanup focused within Átl'ḵa7tsem/Txwnéwu7ts/Howe Sound. Additionally, the activities of some groups were separated out to provide a clearer view of the multiple programs they undertake (Table 1).

For many of these groups, education is a key activity within their programs. One example is the Bowen Island Fish and Wildlife Club (BIFWC), which focuses on habitat restoration and monitoring of streams to enhance salmonid populations, as well as operating the Terminal Creek Salmon Hatchery. In addition, the

An example of rubbish collected during shoreline cleanups. (Credit: Ocean Wise)

BIFWC work to educate Nexwlélexwem/Bowen Island children on the importance of protecting wild salmon and their habitats. Working together with local schools, they offer tours of the hatchery and nearby creeks, and additionally help run a "Salmonid in the Classroom" program at the hatchery.

Another example where education is a key component is the Great Canadian Shoreline Cleanup, run through Ocean Wise. Schools, workplaces or communities can get involved by either leading or taking part in a shoreline cleanup. Free curriculum-linked lesson plans are available online for elementary teachers (see Resources).

Citizen science activities are key in gathering large amounts of data, such as bird counts. The Squamish Environment Society (SES) organizes monthly bird counts in addition to facilitating larger-scale bird counts in the region, such as the Christmas Bird Count (CBC), Breeding Bird Surveys, and the Great Backyard Bird Count (GBBC). During the 2018 GBBC, a record 6,456 species of birds were counted by bird watchers from over 100 countries.[1] This accounts for over half of the known bird species in the world. This number was topped again in 2019, the 22nd year of the annual count, with 6,849 total species observed. The GBBC had 22 participants in the Sḵwx̱wú7mesh/Squamish region in 2019. The CBC is the longest-running citizen-science project in North America, with December 2019 marking its 120th year. It had 24 participants recorded for the Sḵwx̱wú7mesh/Squamish region in 2019. These counts all contribute important data to establish trends, spatially and temporally.

The knowledge held by citizen science groups and people living in the area is invaluable in supporting conservation actions that protect Átl'ka7tsem/Txwnéwu7ts/Howe Sound, such as in the creation of the Atl'ka7tsem/Howe Sound Marine Reference Guide.[2]

Table 1. Known citizen science activities in Átl'ka7tsem/Txwnéwu7ts/Howe Sound. New initiatives since 2017 are denoted by an asterisk. Initiatives that are new to this list are denoted by two asterisks.

ACTIVITY	ORGANIZATION	LOCATION	MARINE SPECIES	ROLES OF CITIZEN SCIENTISTS AND SCIENTISTS	YEAR PROGRAM STARTED
Christmas Bird Count Lower Howe Sound	Lighthouse Park Preservation Society in collaboration with local birding groups	West Vancouver to Anvil Island to Gibsons	all birds including marine species	Volunteers observe, record and report. Organizers coordinate count, compile and submit results to Audubon Society. Results available online. https://netapp.audubon.org/CBCObservation/CurrentYear/ResultsByCount.aspx	2003
Christmas Bird Count Squamish	Squamish Environmental Society	Squamish area	all birds including marine species	Volunteers observe, record and report. Organizers coordinate count, compile and submit results to Audubon Society available at: https://www.squamishenvironment.ca/programs/winter-eagle-count/eagle-counts-by-year-by-area/	1980

ACTIVITY	ORGANIZATION	LOCATION	MARINE SPECIES	ROLES OF CITIZEN SCIENTISTS AND SCIENTISTS	YEAR PROGRAM STARTED
Christmas Bird Count Sunshine Coast	Sunshine Coast Natural History Society	Includes west shore of Howe Sound from Port Mellon to Gibsons	all birds including marine species	Volunteers observe, record, and report. Organizers coordinate count, compile and submit results to Bird Studies Canada (previously, results were submitted to Audubon Society). https://www.birdscanada.org/volunteer/cbc/index.jsp?targetpg=mapviewer&lang=EN	1971
Eagle Count, Brackendale Winter Eagle Festival	Brackendale Art Gallery and Squamish Environmental Society	Lower Squamish River and tributaries	bald eagles	Volunteers observe, record and report. Organizers coordinate count and compile results. https://www.squamishenvironment.ca/programs/winter-eagle-count/eagle-counts-by-year-by-area/	1985
Monthly Bird Count Squamish Estuary	Squamish Environmental Society	Squamish estuary	all birds including marine species	Volunteers observe, record, and report to ebird. Results available online: https://ebird.org/hotspot/L292545?yr=all&m=&rank=mrec	1991
Monthly Bird Count Lighthouse Park	Lighthouse Park Preservation Society	Lighthouse Park, West Vancouver and adjacent marine waters	all birds including marine species	Volunteers observe, record, and report to ebird. Organizers coordinate count. https://ebird.org/hotspot/L292545	2004
BC Coastal Waterbird Survey	Birds Studies Canada	Bird count locations throughout Howe Sound, including Bowen Island, Squamish, Porteau Cove, Horseshoe Bay, Woodfibre, and Lighthouse Park	marine/ aquatic bird species	Volunteers observe and record details about birds using the habitat, including species, maturity (e.g., juvenile, adult), position (onshore, offshore, nearshore). This data is uploaded to Bird Studies Canada.	1999 (but for specific areas this varies)
Nearshore Habitat Recovery *	Seachange Marine Conservation Society	Howe Sound (also Gulf Islands, Sechelt Inlet, Burrard Inlet)	eelgrass, salmon, forage fish, marine riparian vegetation	Volunteers restore nearshore habitat by participating in eelgrass transplants (harvest, prepare, and replant shoots); removing subtidal debris that covers benthic habitat and shades nearshore plants; and, restoring marine riparian zone by replanting native species along the waterfront.	2017
Annapolis Biodiversity Index Study	Ocean Wise Conservation Association and Artificial Reef Society of BC	Annapolis wreck dive site, Halkett Bay, Gambier Island	invertebrates and fish	Volunteer divers observe, record and report data from personal dives. Temperature logger installed.	2015

ACTIVITY	ORGANIZATION	LOCATION	MARINE SPECIES	ROLES OF CITIZEN SCIENTISTS AND SCIENTISTS	YEAR PROGRAM STARTED
Intertidal Diversity Studies	Coastal Scene Investigation by Dr. Shannon Bard	Tunstall Bay (Bowen Island), Port Mellon and Chaster Beach, Lions Bay, Porteau Cove, Darrel Bay, Britannia Beach, Furry Creek, Whytecliff	Intertidal life	Scientists train volunteers to identify species and conduct surveys. Scientists supervise work.	1990
Marine Species Identification Course *	Ocean Wise Conservation Association – Marine Life Identification for Divers	Taught at Vancouver Aquarium	fish and invertebrates for all B.C. coast	Identification course designed to teach divers about marine species in B.C. waters.	Starting mid-October 2019
Beach & Marine Debris Cleanups **	Ocean Wise Conservation Association Great Canadian Shoreline Cleanup	Various shorelines and marine areas throughout Howe Sound	n/a	Cleanup of marine debris.	1994
Beach Sampling for Forage Fish Spawn	Friends of Forage Fish / BC Shore Spawners Alliance	Gibsons to Langdale, Sunshine Coast	forage fish species	Volunteers collect samples and analyze for presence of forage fish eggs.	2008
Exploratory Dives and Seafloor Technical Assistance	Underwater Council of BC in collaboration with Ocean Wise Conservation Association and Marine Life Sanctuaries Society	Dive sites at Lions Bay, Pam Rocks, Anvil Island, Bowen Island and elsewhere	glass sponges, rockfish	Volunteer divers explore, record and install seafloor monitoring instruments such as temperature loggers.	2013
Howe Sound Sponge Reef Studies	Marine Life Sanctuaries Society of BC	Throughout Howe Sound from Defence Island in north to Passage Island in south	glass sponges, rockfish	Volunteers build deep sea survey equipment, design studies, gather data using bathymetric mapping, drop cameras, depth sounders and seafloor instruments including temperature loggers. Work in collaboration with scientists from Fisheries and Oceans Canada (DFO) and Ocean Wise Conservation Association.	1998

ACTIVITY	ORGANIZATION	LOCATION	MARINE SPECIES	ROLES OF CITIZEN SCIENTISTS AND SCIENTISTS	YEAR PROGRAM STARTED
Glass Sponge Surveys	Ocean Wise Conservation Association	Howe Sound	glass sponges	Volunteer divers photograph and video glass sponge reef/gardens and reference markers during personal dives and submit online. This provides repeated observations of one reef.	2013
Rockfish and Select Invertebrate Surveys	Ocean Wise Conservation Association; Reef Environmental Education Foundation	Howe Sound and worldwide	rockfish, select invertebrates	Volunteer divers take rockfish identification course run by Ocean Wise. Divers observe, record and report data from personal dives.	2015
Rockfish Monitoring	Ocean Wise Conservation Association	Howe Sound and coastal B.C.	rockfish	Volunteer divers observe, record and report rockfish abundance during personal dives. Supplemented by Ocean Wise staff surveys.	2006
Lingcod Egg Mass Survey	Ocean Wise Conservation Association	Howe Sound and B.C. coast wide	lingcod	Volunteer divers observe, record and report rockfish abundance during personal dives.	1994
Herring Spawn Surveys	Squamish Streamkeepers Society	Upper Howe Sound including Squamish Estuary and Woodfibre area	herring	Volunteers map extent and character of herring roe along intertidal zone during herring spawn. Principal surveyor John Buchanan posts results on YouTube https://www.youtube.com/user/sqecs2/videos	2016
Observing and Documenting Biodiversity **	Biodiversity Squamish	Howe Sound	marine species and birds	Observers take photos; record where and when sightings occurred; and upload to the Squamish Biodiversity iNaturalist App.	2012
Habitat Restoration & Monitoring of Streams **	West Vancouver Streamkeepers	Streams in West Vancouver	salmonids	Volunteers restore habitat and monitor streams for activity.	1990
Habitat Restoration & Monitoring of Streams	Squamish Streamkeepers	Streams in Squamish area	salmonids	Volunteers restore habitat and monitor streams for activity.	2006

ACTIVITY	ORGANIZATION	LOCATION	MARINE SPECIES	ROLES OF CITIZEN SCIENTISTS AND SCIENTISTS	YEAR PROGRAM STARTED
Habitat Restoration & Monitoring of Streams	Bowen Island Fish and Wildlife Club, partnered with Pacific Salmon Foundation, Pacific Streamkeepers Federation, Metro Vancouver Parks, Bowen Island Municipality	Streams on Bowen Island	salmonids	Volunteers restore habitat and monitor streams for activity.	1982
Bowen Island Terminal Creek Hatchery	Bowen Island Fish and Wildlife Club, partnered with DFO Salmon Enhancement Program	Bowen Island	salmonids (chum, coho, pink)	Volunteers prepare, operate, maintain facilities for incubation, rearing, and release of salmon fry. Assist with taking brood stock and eggs.	1982
Creek Temperature Monitoring *	DFO with various Streamkeepers	Various creeks in Howe Sound with salmonid bearing habitat	salmon	Volunteers install, maintain, and collect data.	2019
Salmon Spawning Counts	Squamish Streamkeepers Society	Streams and spawning channels from Furry Creek to Upper Squamish River Valley	salmon (chum, coho, pink)	Volunteers are responsible for specific streams. This includes stream maintenance and enhancement and counts of spawning salmon. Some enumeration by underwater video recording.	2000
Marine Mammal Counts	Pacific Wildlife Foundation with help from Sewell's Marina Sea Safari	Outer Howe Sound	all marine mammals	Sewell's Marina Sea Safari boat-tour guides and guests observe and report wildlife sightings to Pacific Wildlife Foundation	2014
Cetacean Sightings	BC Cetacean Sightings Network, Ocean Wise Conservation Association & DFO	Pacific Coast, including Howe Sound	whale, dolphin, porpoise, turtles	Volunteers observe, record and report via smartphone app (Whale Report), web form, log book or toll-free number.	2000

What are the potential impacts of climate change on citizen science?

Predicted climate change impacts in Átl'ka7tsem/Txwnéwu7ts/Howe Sound range from increased extreme precipitation events to warmer ocean waters. Such changes will undoubtedly impact the species and habitats monitored by citizen science groups. Data collected by these groups will support the scientific understanding of changes in habitats and species, and support decisions to protect and adapt to climate change within Átl'ka7tsem/Txwnéwu7ts/Howe Sound.

What has been done since 2017?

The table below reports on progress made on recommended actions from the previous 2017 article, where identified. Many of these require ongoing action.

2017 ACTION	ACTION TAKEN
INDIVIDUAL AND ORGANIZATION ACTIONS	
Encourage citizen science participation within your company or organization.	Ocean Wise's Great Canadian Shoreline Cleanup frequently organizes local cleanup events for the organization. Information from other organizations is lacking.
GOVERNMENT ACTIONS AND POLICY	
Continue to support and raise awareness of the ongoing citizen science projects within Átl'ka7tsem/Txwnéwu7ts/Howe Sound.	Some citizen science groups partner with government institutes such as DFO. Overall, however, the groups are non-profit organizations and rely on volunteer time and donors/sponsors or external funding to continue their work.
Provide resources needed to enhance and continue local citizen science projects as funding permits.	DFO's Tenderfoot Creek Hatchery supplies the Bowen Island Terminal Creek Hatchery with salmon for their hatchery.

What can you do?

A detailed overview of recommended actions relating to climate change is included in *The path to zero carbon municipalities* (OWHS 2020). In some cases, no progress was identified on previous recommended actions; these remain listed below. Additional actions marked as NEW also follow.

Individual and Organization Actions:

- Get involved with an ongoing citizen science project in Átl'ka7tsem/Txwnéwu7ts/Howe Sound (Table 1).
- Share your photos and videos of Átl'ka7tsem/Txwnéwu7ts/Howe Sound nature on your favourite social media platform.
- Join NatureWatch (www.naturewatch.ca), a partnership of Nature Canada and the David Suzuki Foundation to engage Canadians in four ongoing citizen science projects: FrogWatch, PlantWatch, IceWatch and WormWatch.
- Donate. Almost all the groups engaged in citizen science projects in Átl'ka7tsem/Txwnéwu7ts/Howe Sound are non-profit groups and projects depend upon donations to continue.
- Learn more about citizen science and how to do it at Citizen Science Central sponsored by Cornell University's Lab of Ornithology: www.birds.cornell.edu/citscitoolkit/toolkit/steps
- NEW Collaborate across citizen science groups to strengthen advocacy for use of data within decision making.
- NEW Create a central hub where members of the community can find all of the ongoing citizen science projects in the region.

Government Actions and Policy:

- Provide and maintain a central portal of information including; citizen science project listings, data gathering, community training, and a tool-kit for best practices of designing and maintaining citizen science projects.
- Promote closer relationships with stakeholders to citizen science projects in order to facilitate further participation and awareness.
- Increase the use of citizen science data contributing to natural resource and environmental science, natural resource management, and environmental protection and policy making.
- Develop policy to recognize and weigh citizen science, in addition to other scientific evidence and traditional knowledge, submitted for review in the environmental assessment process.
- Invite citizen scientist representation at public engagement events for policies and management to add their voice to input throughout decision-making processes.
- Partner with non-government organizations and other groups to create more citizen science projects on diverse subjects.

Methods

These citizen science groups were located via personal interactions and communications throughout the Átl'ḵa7tsem/Txwnéwu7ts/Howe Sound community, and confirmed by cross-checking websites of groups, where available.

Resources

This list is not intended to be exhaustive. Omission of a resource does not preclude it from having value.

Lead a school cleanup!
https://www.shorelinecleanup.ca/school

References

[1] The Great Backyard Bird Count. Great Backyard Bird Count Should Be "Finchy" and Fun [Internet]. 2019. Available from: https://gbbc.birdcount.org/news/2019release/

[2] Make Way. Atl'ḵa7tsem/Howe Sound Marine Reference Guide [Internet]. [cited 2019 Aug 1]. Available from: https://tidescanada.org/project/howe-sound-atlkitsem-marine-reference-guide/

Outdoor Environmental Learning: increasing opportunities

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REVIEWER

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What is happening?

The Átl'ka7tsem/Txwnéwu7ts/Howe Sound region presents countless opportunities for formal and informal learning. From overnight school and camp programs to field trips and interpretive experiences, there continues to be a growing interest in providing children and youth a wide range of year-round outdoor learning opportunities. These opportunities provide meaningful outdoor experiences, which is a powerful way to foster understanding and care for our environment.

There are significant physical, social and cognitive benefits provided through learning in nature. Such benefits may include increased physical activity, reduced stress and anxiety, and enhanced enthusiasm and engagement in learning.[1]

Learning about garbage in the marine environment. (Credit: Ocean Wise)

What is the current status?

Park access and usage across B.C. has increased by approximately 23% since 2014.[2] A similar trend is evident in Átl'ka7tsem/Txwnéwu7ts/Howe Sound as public and independent secondary and elementary schools in Skwxwú7mesh/Squamish, Lions Bay, West Vancouver, North Vancouver, Nexwlélexwem/Bowen Island, Langdale and Gibsons use their school sites and nearby Átl'ka7tsem/Txwnéwu7ts/Howe Sound forests and shores for outdoor learning.

Additionally, post-secondary institutions including Quest University (Skwxwú7mesh/Squamish), Capilano University (North Vancouver), University of British Columbia (Vancouver) and Simon Fraser University (Burnaby) have all conducted field-based courses in Átl'ka7tsem/Txwnéwu7ts/Howe Sound for undergraduate students, including student-teacher candidates. Many of the groups, schools and organizations using Átl'ka7tsem/Txwnéwu7ts/Howe Sound as an outdoor learning classroom have begun to recognize and include Indigenous learnings and Traditional Indigenous Knowledge into their programs.

In addition to the numerous camps, programs and outdoor schools operating in Átl'ka7tsem/Txwnéwu7ts/Howe Sound (see tables 1 and 2, Outdoor Environmental Learning, Ocean Watch Howe Sound Edition [OWHS] 2017), three new programs have been identified since the last report. These include the Cheakamus Centre Environmental and Indigenous Learning Workshops, the Ocean Wise Mountains to Oceans Youth Leadership Camp, and the Nicholas Sonntag Marine Education Centre. The first two have been offered since 2018, and the latter since 2017.

Cheakamus Centre offers unique Skwxwú7mesh Úxwumixw/Squamish Nation cultural learning opportunities. For example, since 2018, Cheakamus Centre has been offering an Indigenous Youth Leadership Program. This is a four-week intensive learning course teaching traditional Skwxwú7mesh Úxwumixw/Squamish Nation cultural practices, with a focus on skills related to outdoor education and tourism, such as outdoor facilitation and food safety. The centre has also been offering a range of workshops for educators designed to enhance participants' understanding and appreciation of traditional Skwxwú7mesh teachings and cultural practices. Skwxwú7mesh Úxwumixw/Squamish Nation offers courses for Nation members which include, among other skills, Skwxwú7mesh/Squamish language.

Ocean Wise offers numerous educational opportunities. Amongst these, as above, is the Mountains to Oceans Youth Leadership Camp, an outdoor education program that utilizes the Squamish River watershed. This is a multi-day program with a focus on environmental learning, outdoor adventure activities and stewardship. Participants visit the Cheakamus Centre and stay at the Longhouse, spending that time to learn about traditional knowledge, led by Skwxwú7mesh Úxwumixw/Squamish Nation employees of the centre. There is a focus on traditional storytelling and history, and environmental education such as ethnobotany.

The Nicholas Sonntag Marine Education Centre is an aquarium based in Gibsons. They offer experiential and classroom learning experiences for schools, as well as week-long camps focussed on learning at

the land–sea interface. In addition, the centre carries out regular community release days, where aquarium specimens collected from the local marine environment are released upon conclusion of a display.

In addition, throughout 2019, two youth project leaders from Sḵwx̱wú7mesh Úxwumixw/Squamish Nation worked with the Marine Reference Guide (MRG) team to elevate Indigenous youth voices and participation in marine stewardship and spatial planning, while acknowledging and respecting Traditional Indigenous Knowledge and values. They led activities engaging youth in outdoor learning, such as a canoe journey to K̲w'émḵw'em and Nínich K̲w'émḵw'em/Defense Islands and a shoreline cleanup.

Various other environmental program service providers exist. Examples include the Sea to Sky Gondola, which offers interpretive environmental programs for school-aged children and youth; and the Britannia Mine Museum, which offers children's programming during school months that includes conservation-based educational content.

An educator instructing a participant at Cheakamus Centre's Youth Leadership Program, 2019. (Credit: Gadbois Photography)

What are the potential impacts of climate change on environmental learning?

The summer of 2017 and 2018 presented challenges for outdoor learning as smoke from wildfires across the province resulted in poor air quality. At certain times, air quality advisories recommended that time outdoors be restricted. Children and adults with respiratory issues were particularly at risk. These climate-related conditions present significant concerns for summer camps whose core activities are outdoor based.

What has been done since 2017?

The table below reports on progress made on recommended actions from the previous 2017 article, where identified. Many of these require ongoing action.

2017 ACTION	ACTION TAKEN
GOVERNMENT ACTIONS AND POLICY	
Prioritize protection of Átl'ka7tsem/Txwnéwu7ts/ Howe Sound's natural beauty so that it remains preserved for educational opportunities to thrive and expand in the future.	In January 2019, an Important Bird Area (IBA) in English Bay/Burrard Inlet was extended to include part of Átl'ka7tsem/Txwnéwu7ts/Howe Sound. In March 2019, Fisheries and Oceans Canada formed eight marine refuges around known glass sponge reefs in Átl'ka7tsem/Txwnéwu7ts/Howe Sound, closed to all bottom contact fishing activities. (See Marine Protected Areas, OWHS 2020).

What can you do?

A detailed overview of recommended actions relating to climate change is included in *The path to zero carbon municipalities* (OWHS 2020). In some cases, no progress was identified on previous recommended actions; these remain listed below. Additional actions marked as NEW also follow.

Individual and Organization Actions:

- Familiarize yourself with educational opportunities available to all ages in Átl'ka7tsem/Txwnéwu7ts/Howe Sound, and get involved!
- Explore opportunities to incorporate outdoor learning and natural sciences into professional development.
- NEW Promote volunteer opportunities that support educational initiatives.

Government Actions and Policy:

- Increase awareness of and encourage participation in the many educational opportunities offered in Átl'ka7tsem/Txwnéwu7ts/Howe Sound for all ages.
- Support research on children and youth development outcomes from natural science educational opportunities, in order to better understand and document the benefits of these programs and justify further growth.
- Collect and maintain information on educational opportunities and participation in Átl'ka7tsem/Txwnéwu7ts/Howe Sound to track trends to understand needs and desires for this type of learning.
- Identify additional local conservation groups, citizen science projects, and restoration efforts for potential collaborations with educational initiatives.
- Capitalize on the uniqueness of Átl'ka7tsem/Txwnéwu7ts/Howe Sound's natural beauty and accessible location by expanding outdoor education programs throughout more schools in the Greater Vancouver Area.
- NEW Prioritize and support education at a range of sites in Átl'ka7tsem/Txwnéwu7ts/Howe Sound by providing appropriate campsites and facilities and access points.
- NEW Identify and support initiatives to enhance Indigenous knowledge and connections in Átl'ka7tsem/Txwnéwu7ts/Howe Sound.

Methods

Information included in this article was obtained via scanning the websites below, specific to learning and education (see Resources Accessed). Additionally, much of the information came from conversations the author had with educators currently working in the public and independent K-12 systems in Átl'ka7tsem/

Txwnéwu7ts/Howe Sound. These were not formal interviews.

References

1 Rugel E. Green space and mental health: pathways, impacts, and gaps [Internet]. National Collaborating Centre for Environmental Health; 2015. Available from: http://www.ncceh.ca/sites/default/files/Full_Review-Greenspace_Mental_Health_Mar_2015.pdf

2 BC Parks. Facts and figures [Internet]. 2019. [cited 2019 Nov 12]. Available from: http://www.env.gov.bc.ca/bcparks/about/facts-figures.htm

RESOURCES ACCESSED

Bowen Island Community School
westvancouverschools.ca/bics-elementary/

Camp Artaban
campartaban.com

Camp Elphinstone
gv.ymca.ca

Camp Fircom
fircom.ca

Camp Sunrise
campsunrise.ca

Camp Suzuki
campsuzuki.org

Camp Potlach
bgcbc.ca

Capilano University
capilanou.ca

Cheakamus Centre
cheakamuscentre.ca

Children and Nature Network
childrenandnature.org/

Easter Seals Camp Squamish
eastersealscamps.ca

Evans Lake Forest Education Centre
evanslake.com

Island Pacific School, Bowen Island
islandpacific.org

Quest University Canada
questu.ca

Metro Vancouver School & Youth Leadership Programs
metrovancouver.org

Sea to Sky Outdoor School for Sustainability Education
seatosky.bc.ca

Sḵwx̱wú7mesh Úxwumixw/ Squamish Nation
squamish.net

Mountains to Oceans students in the Squamish Estuary, 2019. (Credit: Hailey Renaud)