HOWE SOUND
BIOSPHERE REGION INITIATIVE

Átl'ka7tsem / Howe Sound Biosphere Reserve

UNESCO Nomination

September 2020

Title:

Átl'ka7tsem/Howe Sound Biosphere Region Nomination

Applicant:

Howe Sound Biosphere Region Initiative Society
(HSBRIS)

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United Nations Educational, Scientific and Cultural Organization

Man and the Biosphere Programme

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List of Acronyms

AHSBR: Átl'ka7tsem/Howe Sound Biosphere Region (the place)

AHSBRI: Átl'ka7tsem/Howe Sound Biosphere Region Initiative (the project)

ALR: BC Agricultural Land Reserve

BC: British Columbia

BCC: BC Council for International Cooperation

BCCFA: BC Community Forest Association

BCN: BC Cetacean Sighting Network

BEC: Biogeoclimatic Ecosystem Classification

BR: Biosphere Region

CCMAB: Canadian Commission of Man and the Biosphere

CBC: Canadian Broadcasting Corporation

CBD: Convention on Biological Diversity

CBRA: Canadian Biosphere Reserve Association

CDC: BC Conservation Data Centre

CDF: Coastal Douglas-fir Zone

CEA: Cumulative Effects Assessment

CEF: Cumulative Effects Framework

CFCG: BC Centre for Conservation Genetics

CORI: Coastal Ocean Research Institute

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

CRMP: Climate Related Monitoring Program

CWH: Coastal Western Hemlock Zone

DFO: Department of Fisheries and Oceans (Fisheries and Oceans Canada)

DNA: Deoxyribonucleic acid

EMS: Environmental Monitoring System

EPU: Elk Population Unit

FGC: Forest Genetic Council of BC

FSC: Food, Social and Ceremonial fishing

FLNRORD: Ministry of Forests, Lands, Natural Resource Operations and Rural Development

FREP: Forest and Range Evaluation Program

GHG: Green House Gas

GIS: Geographical Information System

HSBRIS: Howe Sound Biosphere Region Initiative Society (registered society name, the organization)

HSCF: Howe Sound Community Forum

IBA: Important Bird Area

IFMP: Fisheries and Oceans Canada's Integrated Fisheries Management Plan

ITC: Islands Trust Conservancy

IUCN: International Union for the Conservation of Nature

LNG: Liquified Natural Gas

LRMP: Sea to Sky Land and Resource Management Plan

MAB: Man and the Biosphere Programme (UNESCO)

MABR: Mt. Arrowsmith Biosphere Reserve

MECCS: BC Ministry of Environment and Climate Change Strategy

MH: Mountain Hemlock Zone

MNAI: Municipal Natural Assets Initiative

MOE: BC Ministry of the Environment

MOF: BC Ministry of Forests

MRG: Marine Reference Guide

MST: Musqueam, Squamish, Tsleil-Waututh Nations

MTAC: BC Ministry of Tourism, Arts and Culture

NGO: Non-government Organization

NSMEC: The Nicholas Sonntag Marine Education Centre

OCP: Official Community Plan

OGCS: Old Growth Conservancy Society

OGMA: Old Growth Management Area

OHI: Ocean Health Index

OWHS: Ocean Watch Howe Sound

PGE: Pacific Great Eastern Railroad

PSEC: Fisheries and Oceans Canada's Pacific Science Enterprise Centre

RAR: Riparian Area Regulations

RCA: Rockfish Conservation Area

RSTBC: Recreation Sites and Trails BC

SARA: Species at Risk Act (Canada)

SBOT: Stewardship Objectives Baseline Tool

SCRD: Sunshine Coast Regional District

SDGs: Sustainable Development Goals

SES: Squamish Environment Society

SLRD: Squamish-Lillooet Regional District

SRWS: Squamish River Watershed Society

SSIC: The Sea-to-Sky Invasive Species Council

TEEB: Economics of Ecosystems and Biodiversity

THLB: Timber Harvesting Land Base

UBCM: Union of British Columbia Municipalities

UN: United Nations

UNDRIP: UN Declaration on the Rights of Indigenous Peoples

UNESCO: United Nations Educational, Scientific and Cultural Organization

WGS: World Geodetic System

WHA: Wild Habitat Area

WHS: World Heritage Sit

WMA: Wildlife Management Area

WMO: World Meterological Organization

This is our story

We are the land, the waters, the sky.
We are the wild living.
We are the people.
We are Átl'ka7tsem - Howe Sound.

Carved by Ice Age glaciers into the mountain wall just northwest of the city of Vancouver, Canada, our coastal inlet of Átl'ka7tsem/Howe Sound is both urban fringe, yet in large part, wild and remote. It is an extraordinary circumstance of geography that a place so wild lies so close to a major metropolitan centre. This application for a UNESCO Biosphere Reserve designation for Átl'ka7tsem/Howe Sound reflects an evolving community commitment shaped by a central conviction that this remarkable place deserves a bright and sustaining future.

Since time immemorial, the Átl'ka7tsem/ Howe Sound inlet and adjacent mountains and valleys have been the traditional territory of the *Skwxwú7mesh Úxwumixw* (Squamish Nation), and these lands remain unceded to this day. After decades of industrial development and pollution, a public outcry in the 1980s led to environmental reforms and, over the past decade, a stunning recovery of marine life. The return of whales and dolphins to the inlet, and the discovery of internationally significant glass sponge reefs by citizen scientists, has swelled public pride and inspired further conservation and scientific efforts.

This emerging reconciliation between people and Nature now forms a basis for relationship-building and reconciliation between local settler culture and First Nations. Energized by Nature's recovery, yet concerned that no single jurisdiction has political responsibility for this place, a Howe Sound Community Forum of local elected officials has for two decades sought a comprehensive approach for the region. This Forum has brought together a broad coalition of interests – local communities, First Nations, senior governments, businesses, industries, organizations, and citizens - who come together to learn, to share, and to explore a way forward.

The success of the Forum to create community in Átl'ka7tsem/ Howe Sound has recently inspired major investments by NGOs and governments in the form of environmental and social health reports about the region, a regional conservation strategy, a provincial cumulative effects assessment, the development of a marine data base, and new protected areas. This progress has paralleled significant advances by local First Nations to plan land use, protect Wild Spirit Places and other cultural lands, create new economic ventures in forestry and land development, and promote language use and culture. Today, the conversation in Átl'ka7tsem/ Howe Sound between First Nations and settler culture sits within a larger pan-Canadian dialogue that seeks truth-telling, reconciliation and relationship-building.

The Squamish were a travelling people. They paddled up and down the Sound, along the rivers and inlets, and to the islands. One name for paddling up the sound *Átl'ka7tsem* pronounced At-Kat-sum - and the other name for paddling down, *Texwnewets'* – Chock-Now-it.

This enhanced knowledge infrastructure, community building, and strengthened relationships with First Nations sets the table for a natural next step for Átl'ka7tsem/Howe Sound – a UNESCO Biosphere Reserve designation that will formalize our biodiversity conservation commitments, strengthen First Nations – settler relations, and build capacity for community building, decision-making, education and research. This application for Biosphere Reserve designation carries the collective support of local communities, First Nations, regional governments, provincial and federal governments, and non-government organizations – a true testimonial to our community desire to achieve this status and commit to a legacy for generations to come.

So, on behalf of the Átl'ka7tsem/Howe Sound community, we are proud and excited to present this application for a UNESCO Átl'ka7tsem/Howe Sound Biosphere Reserve. We hope to contribute to the many other Biosphere Reserve communities around the world that seek a sustaining harmony and integrity that strike a balance between Nature and its peoples.

Ruth Simons, Bob Turner, Suzanne Senger, Patricia Plackett, Ian Winn and Jennifer Meilleur, Board members of the Átl'ka7tsem/Howe Sound Biosphere Reserve Initiative Society on behalf of the Working Group members, volunteers, and all of those working for conservation, reconciliation, and sustainable development in Átl'ka7tsem/Howe Sound.

Part I: Summary

1. **Proposed name of the Biosphere Reserve:** Átl'ka7tsem / Howe Sound Biosphere Region
2. **Name of the country:** Canada

Linda Williams Kwek'win Kwelhaynexw and daughter Joyce, Skwxwú7mesh Úxwumixw, photo: K. Krug with permission from David Suzuki Foundation.

SOS (Save Our Sound), photo: Lani

3 Fulfillment of the three functions of Biosphere Reserves

Article 3 of the Statutory Framework presents the three functions of conservation, development and logistic support. Explain in general terms how the area fulfills these functions.

The communities, First Nations, governments and non-government organizations of Átl'ka7tsem/Howe Sound are committed to facilitating the ecological recovery and the future integrity of the terrestrial and marine ecosystems in this important region. Following a century of environmental deterioration, the adoption of a strong community-based ***conservation*** ethic during the past four decades has born witness to a significant renewal of ecological health and an emerging dedication from all sectors to sustainable resource ***development***. Partnerships and collaboration among all involved parties within the fabric of a 'common vision for a common geography' have been the hallmarks of this progress. Home to twelve youth camps for over 40 years, Átl'ka7tsem/Howe Sound continues to be a place for people to connect with nature and the soul. Continued ***logistical support*** provided by the mandate and structure of a Biosphere Reserve will foster the collective allegiance among the Átl'ka7tsem/Howe Sound Biosphere Reserve Initiative and it's partners to embrace the importance of balancing conservation and development in this most special place.

3.1 Conservation

Contributes to the conservation of landscapes, ecosystems, species and genetic variation. (Stress the importance of the site for conservation of biological and cultural diversity at the regional or global scales.)

As one of the southern-most fjords in Canada, Átl'ka7tsem/ Howe Sound is located directly adjacent to Vancouver, British Columbia (hereinafter referred to as BC), Canada's third largest city. The Sound and its nourishing watersheds present a unique and vibrant ecosystem while at the same time, due to land and resource use issues, a pressing environmental challenge. Until only about 160 years ago, the marine and terrestrial environments in Átl'ka7tsem/ Howe Sound were essentially wilderness, the near exclusive domain and homeland of the Squamish Nation (*Skwxwú7mesh Uxwumixw*). This traditional territory of the Squamish people includes all of the islands in Howe Sound, all the Howe Sound drainages and the entire Squamish Valley flowing into the head of the Sound (see Section 9.1.1). By the 1890s, the Squamish people had been displaced from most of this territory, and the region was subsequently settled and developed by European interests to the point of ecological crisis, reaching a peak of abuse in the mid-1970s. Since then, the marine life in the waters of Howe Sound, its streams and rivers, and the forests draping its islands, mountain slopes and river valleys have undergone a remarkable recovery under the guidance of improved land and marine use planning, new environmental regulations, revised management practices restoration projects, and a new consciousness.

To fulfill the Conservation Function of a Biosphere Reserve, and in support of the UN Convention on Biological Diversity's Aichi Biodiversity Targets and Canada's 2030 protection targets the goal of the Átl'ka7tsem/Howe Sound Biosphere Region Initiative (hereinafter referred to as AHSBRI) is to be a model region for ecological integrity that is healthy and self-sustaining, while continuing to support a range of human activities that are both ecologically sustainable and socio-culturally appropriate. The pillars of the AHSBRI proposal are founded in a firm commitment to achieving the correct balance between conservation and development through holistic regional planning, ecosystem-based management and a commitment to collaboration with the Squamish Nation and all levels of government.

3.1.1 Overview of Conservation in the Átl'ka7tsem / Howe Sound Biosphere Region

The Squamish Nation, an amalgamation of 16 tribal groups, has occupied these lands for at least 10,000 years, since deglaciation in the early Holocene rendered these lands habitable. There has never been a word for 'conservation' in the Squamish language, as First Nations have traditionally practiced a system of sustainable resource harvesting that was guided by a deep spiritual and cultural connection to the land:

> **"The Squamish define themselves in relationship to their land. The spiritual and cultural connection of the Squamish to the land and its bounty is deep. From time immemorial, the Squamish have lived throughout this territory, in harmony with the land and dependent on its richness. For the Squamish culture to survive, this connection to nature must be nurtured and the land base it is based on must be stewarded."**
> *(Squamish Nation, 2001)*

In other words, '*conservation*'. Achieving this harmony means treating the ecosystem as a whole, always conscious of the interrelationships among all its integral components, both terrestrial and marine.

The Squamish Nation has a vital interest in the environment of their traditional territory,

> **"The use of land in its natural state is a primary element of Squamish culture. Therefore, access to land in its natural state must be ensured. Without this land, there will be no Squamish culture."**
> *(Squamish Nation, 2001)*

In a federation such as Canada, however, such efforts have had to struggle against an inherently divisive system of governance, where five levels of government (First Nation, federal, provincial, regional and local), each with their own suite of jurisdictional responsibilities and geographic areas of responsibility, have had difficulty achieving an efficient, collaborative and harmonious approach to resource planning, management and implementation (see Section 9.3).

However, notwithstanding these governance issues, there have been many conservation achievements over the past four decades, in particular, by many individuals and

View of outer Howe Sound, photo: J. Reid

organizations, both within and outside government, that have led, and continue to lead, the way in the ongoing ecological recovery of the lands and waters within the proposed Átl'ka7tsem/Howe Sound Biosphere Region (hereinafter referred to as AHSBR). Today, we celebrate the evidence of the fragile recovery with the return of whales and dolphins.

3.1.2 History of Conservation

The need for conservation today is a necessary response to ineffective resource management in the past, as was the case in the Átl'ka7tsem/Howe Sound region for an entire century between the late 1800s and the mid-1970s. European settlement began in the late 1800's, part of an economic boom in BC from that time through to the early 1900s. This new activity corresponded with a significant decline in the use and occupation of the region by the Squamish Nation. It also corresponded to considerable declines in environmental quality as timber harvesting took place with great relish given the immensity and quantity of the region's old growth forests. Much of the easily accessible forests had been removed by the 1880s, but logging continued in the hinterlands for decades to come, and in many areas continues to this day. As the forests were removed and more permanent settlers arrived, suitable lands were prepared for agriculture, with a variety of crops being sold in the markets of Vancouver. As a result, in the 2,000 sq. km. in AHSBR today, only about 30% of the old growth forests remain at lower elevations (FLNRORD, 2019b).

Mineral exploration also discovered valuable deposits of minerals, especially copper and gold, sand and gravel and a rare blue clay useful for building bricks for the burgeoning construction industry in Vancouver. A copper mine along the east shore of Howe Sound operated from 1904 to 1974 and by 1929 had become the largest producer of copper in the British Commonwealth. It also became the biggest source of acid rock drainage pollution in all of North America, voiding large areas of Howe Sound of all marine life (see Section 18).

In addition to mining, other heavy industries began operations in the Sound in the early 1900s with a pulp mill at Woodfibre and the Porteau Cove sand and gravel mine, both in 1908, and another pulp mill at Port Mellon in 1912. Major infrastructure improvements included linkages to these industrial operations by railway in Squamish to northern BC in 1915 and by sea in 1923, followed by mainland links by rail to Vancouver by 1955 and a highway by 1956. Meanwhile, timber harvesting experienced significant technological improvements that enabled more intensive harvesting to occur in increasingly more remote locations. Before long, little of the land at low to mid-elevations in the Howe Sound region had not been accessed and significantly impacted by one industry or another.

Similarly, in the marine environment of Howe Sound, commercial fishing began with whaling in 1868, and for shrimp and prawn as early as 1914. Commercial trolling for salmon became popular in the 1920s, but stocks of

salmon as well as halibut were already in decline by the 1930s. In only four decades, overfishing for salmon had become such a serious issue that the fishery was closed in 1963 due to declining stocks. These declines in stock abundance were seriously exacerbated by mercury and dioxin contamination from the local pulp mills and chemical plants in the 1970s, resulting in significant closures of both commercial and recreational fisheries.

The collective impacts of these activities on the terrestrial and marine ecosystems of Átl'ka7tsem/Howe Sound were devastating, and they were also occurring in many other regions throughout southern BC. The alarms were sounded in the early 1970s and a clear and decisive shift occurred toward conservation and responsible resource development that is still ongoing today.

3.1.2.1 The Conservation Response

The conservation response began in earnest in the mid-1970's through increased resource protection and new laws, regulations and policies to improve the management of natural resource use. Efforts to protect special areas within the AHSBR were few in the early decades of the 20th century. Garibaldi Provincial Park, still the largest protected area within the AHSBR (188,661 ha), was designated in 1927 as only the fourth provincial park established in the province. Today, the park is an anchor of conservation in the AHSBR, a vast wilderness of spectacular glaciers, alpine lakes and coastal forests with an extensive trail system that attracts 80,000 visitors a year.

A number of smaller feature-based protected areas were created through the 1960s to the 1990s, including Plumper Cove, Halkett Bay, Murrin, Shannon Falls (the 3rd highest falls in BC) and Stawamus Chief, one of the largest granite monoliths in the world. After Garibaldi, though, it would be another 50 years before the next large protected area would be established at Cypress Provincial Park (3,012 ha), created in 1975 in response to the first citizens' outcry in Canada over the impacts of clear-cut logging. This park today protects some of the finest remaining and most easily accessible stands of old growth mountain hemlock forest in southern BC. This forest has been in continuous existence for 1,500-2,000 years, and possibly for as long as 4,000 years, with some individual trees being the largest recorded for their species in all of BC, exceeding 1,000 years old (OGCS, 2019).

BC's Protected Areas Strategy, a province-wide thrust in the mid-1990s to bring the level of protection in BC up to 12%, led to the establishment of three large high elevation provincial parks in the AHSBR: Tetrahedron in 1995 (6,000 ha), Pinecone Burke in 1995 (38,000 ha) and Tantalus in 1998 (11,351 ha). All were created through the relentless efforts of local conservationists. Today, the full suite of protected areas in the Biosphere Region protects about 24% of the headwaters of Átl'ka7tsem/Howe Sound watersheds.

Today, the full suite of protected areas in the Biosphere Region protects about 24% of the headwaters of Átl'ka7tsem / Howe Sound watersheds.

View of Gambier Island and West Howe Sound from Bowen Island, photo: S. Senger

With the rise in environmental awareness through the 1960s and 1970s came a new approach to development, one that recognized the need for balance between resource development and environmental protection. Nowhere in the AHSBR was this more evident than in the Squamish River estuary, the largest and most productive estuary in Howe Sound. Destructive development in the 1970's had decimated the estuary's productivity, and new proposals, including a deep sea coal port, threatened what little remained of the functional fish and wildlife habitats. Following sustained public pressure, the deep sea port was not approved, and a collaborative effort among federal, provincial and municipal agencies and community stakeholders completed a management plan for the estuary in 1982. The plan struck the necessary balance between protecting the area's biological productivity and realizing its economic potential.

After more than 30 years of restoration, the estuary is once again a rich, productive ecosystem with diverse habitats for migratory and resident waterfowl and a variety of other birds and is recognized internationally as an Important Bird Area (IBA). The estuary offers renewed habitat for spawning and rearing salmon and herring, as well as for several species of mammals including black-tailed deer, grizzly and black bears, cougars and coyotes. Much of the estuary is now protected within the *Skwelwil'em* Squamish Estuary Wildlife Management Area, one of the great reconciliation and conservation success stories in the Átl'ka7tsem/Howe Sound region.

This approach in the Squamish estuary paralleled a broader awareness through the 1980s of the need to restore and protect the marine environment throughout Howe Sound. Marine environmental quality in the Sound began its decline almost a century before in the early 1900s with an intense period of industrialization that included the two pulp mills at Port Melon (since 1908) and Woodfibre (since 1912), the copper mine at Britannia (since 1904) and the chlor-alkali chemical plant in Squamish (since the late 1960s). All of these facilities discharged their effluent directly into Howe Sound contaminating sea life, drastically decreasing populations of forage fish and suffocating areas of the sea floor. The pulp mills dumped dioxins, furans and other organo-chlorines, the copper mine discharged heavy metals including copper, aluminum, cadmium, iron, zinc and manganese, and the chlor-alkali chemical plant spilled mercury into the Squamish estuary.

The cumulative effects on water quality, marine biota and habitat were devastating to the marine ecosystem. By the early 1980s much of Howe Sound was thought to be dead or dying. New environmental regulations and remediation efforts beginning in the late 1980s have had a remarkable effect on marine health and environmental quality in the Sound. Following the imposition of the Pulp and Paper Effluent Regulations under the *Fisheries Act* in 1992, effluent treatment systems were installed and regular monitoring began according to strict protocols (Willems, 2004). The pulp and paper mill at Woodfibre closed in 2006 and while the Port Mellon pulp mill is still in production, the new treatment system there has resulted in the highest air and water pollution standards of any pulp mill in Canada with a 97% reduction in dioxins and furans (Willems, 2004).

The copper mine at Britannia closed in 1974 after decades of discharging heavy metals into Howe Sound. New water treatment facilities installed there, at a cost of $100 million, were completed in 2008 and reduced the flow of contaminants into Howe Sound by 99%. Pink salmon returned to spawn in Britannia Creek in 2011 for the first time in a century. The Sound is once again open for prawn and crab fisheries. Like the restoration of the Squamish Estuary, the recovery of Britannia Creek is considered a remarkable achievement (World Rivers Day, 2012).

Pink salmon returned to spawn in Britannia Creek in 2011 for the first time in a century.

These declines in environmental quality in the marine environment of the Sound, combined with high levels of resource harvesting over most of the 20th century, have had significant effects on marine biodiversity. After a century of commercial fishing, overfishing became a serious issue by the 1930s and closures took place in the 1960s through to the 1990s for several species due to a lack of abundance. Stocks have yet to recover. Closures also occurred in upper Howe Sound for the crab, shrimp and prawn fisheries in the 1970s due to mercury contamination continuing until 1995 when the benefits of the remediation efforts discussed above allowed these fisheries to reopen (OWHS, 2017). Closures continue,

however, for the crab-by-trap fishery in certain parts of Howe Sound due to dioxin contamination (DFO, 2017b).

Populations of forage fish in the Sound, including Pacific herring, surf smelt, Pacific sand lance, northern anchovy, eulachon, capelin and Pacific sardine, also collapsed during the 20th century. Eulachon disappeared from the Sound's ecosystem in the early 1900s and have yet to return, and so had herring and anchovy until recently when large schools were rediscovered in 2010. These declines had cascading effects on marine mammal populations with corresponding declines in whale, seal and sea lion populations.

Improvements in the regulatory regime in the marine environment were complemented on land through the enactment of the Riparian Area Regulations (RAR) in 2004 requiring local governments to protect riparian areas during residential, commercial and industrial development (FLNRORD, 2019). The BC government, in cooperation with the federal Air Quality Management System, also instituted a comprehensive Air Quality Regulatory Framework, comprised of a set of legislation, regulations and codes that set air quality standards for business and industry to meet (Government of BC, 2019). Today, there are four air quality monitoring stations in Howe Sound at Horseshoe Bay, Langdale, Port Mellon and Squamish (MECCS, 2019).

Attention turned to the role of marine protected areas in the recovery of fish populations in the 1970s, beginning in West Vancouver where Whytecliff Park became the first fully protected marine area in Canada to ban all consumptive use of the park's marine life. Three coastal protected areas on Howe Sound's shores became popular in the 1970s and 1980s (Halkett Bay, Porteau Cove and Plumper Cove), and while they included their adjacent offshore areas as favoured anchorages for the recreational boating community, they did little to protect marine life. In 2007, fisheries management measures were put in place to protect and assist the recovery of threatened fish species through fishing closures and the creation of Rockfish Conservation Areas (RCAs). Two Glass Sponge Reef Marine

Bigg's Killer Whale, photo: Richard Duncan

Tetrahedron Park, photo: R. Simons

Refuges were originally established in 2015, with 8 more established in 2019.

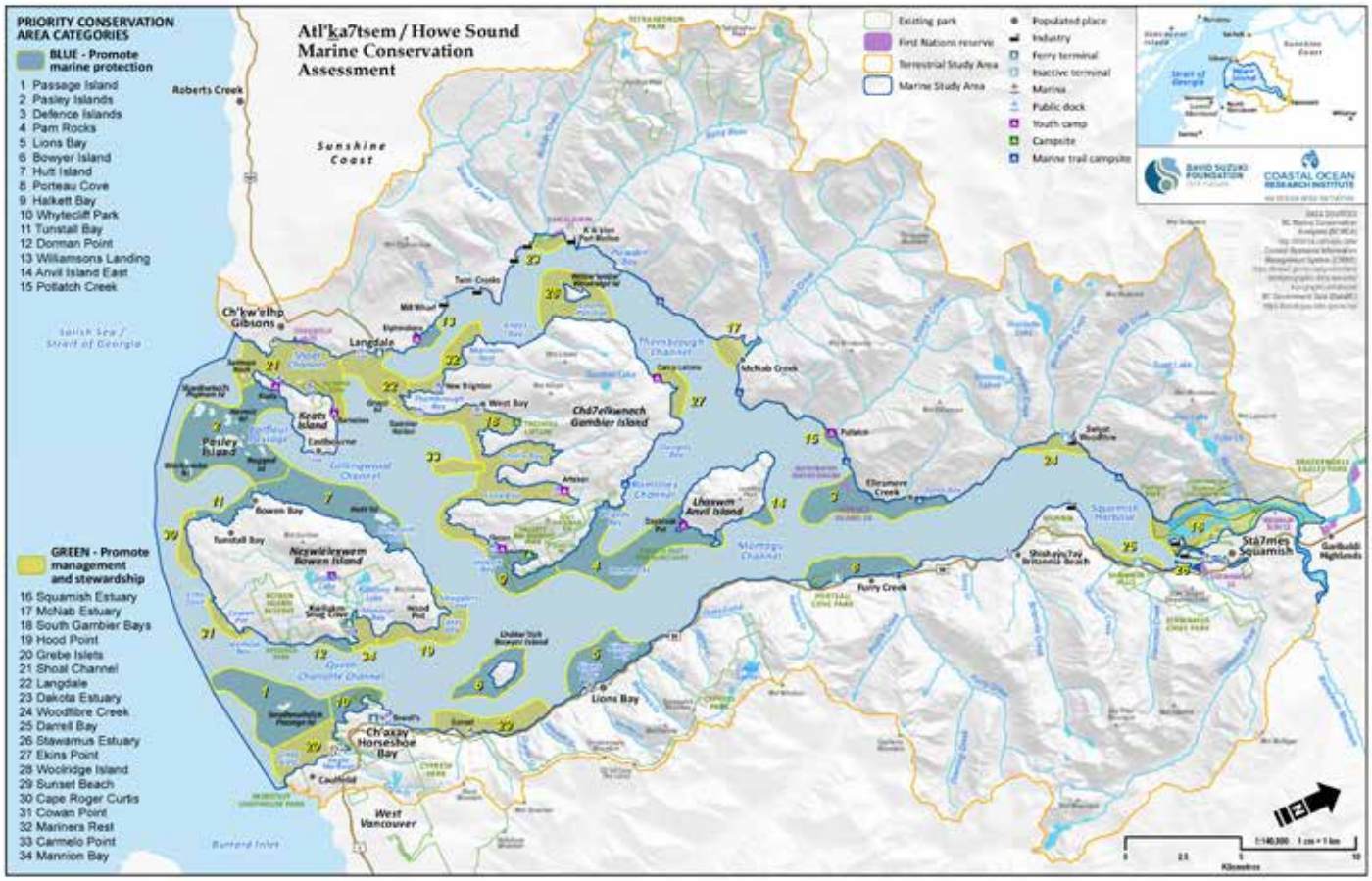
3.1.3 Tools for Conservation

Conservation results are achieved by utilizing a range of specialized tools offered by both government and non-government agencies and organizations, and First Nations. First Nations play an active role in land use planning and management as exemplified in 2001 by the Squamish Nation in preparing the *Xay Temíxw* Land Use Plan for the Forests and Wilderness of the Squamish Nation Traditional Territory. The plan describes the Squamish Nation's vision for the forests and wilderness in the northern portion of its territory and how the "land and resources should be protected, managed and utilized for the benefit of present and future generations" (Squamish Nation, 2001). The plan identifies *Kwa kwayx welh-aynexws* or Wild Spirit Places that are important as natural and cultural sanctuaries for the Squamish people "to sustain and nurture their relationship to the land" (Squamish Nation, 2001). Through an agreement with BC in 2007, some of these areas have been protected.

In BC, most conservation tools are derived from the fact that about 94% of all lands are publicly owned (hereinafter referred to as 'Public land'), whereupon the Government of BC holds legal authority while recognizing the rights and interests of First Nations. The legal framework for managing the vast forests in the AHSBR rests with the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) through its authority under the *Forest and Range Practices Act* and the *Land Act*. This authority allows the Ministry to legally establish objectives "to address and sustain landscape level biodiversity values", including the retention of old growth forests, and to plan and regulate the harvest of timber, the management of fish, wildlife and biodiversity, recreational use and water quality (FLNRORD, 2012). FLNRORD also manages wildlife resources in the province, especially hunting and fishing, under the *Wildlife Act*. These resource uses are regulated through Landscape Unit Plans that take an integrated approach to the management of forested landscapes. The Ministry of Energy, Mines and Petroleum Resources (MEMPR) administers mineral tenures and the associated exploration and development opportunities through its authority under the *Mines Act* and the *Mineral Tenures Act*.

A significant new tool for promoting integration in resource management among various government agencies, First Nations and all levels of government, is FNLRORD's Cumulative Effects Framework (CEF) for Howe Sound.

> **"The cumulative effects framework is a set of policies, procedures and decision-support tools that helps identify and manage cumulative effects consistently and transparently across British Columbia's natural resource sector. The framework incorporates the combined effects of all activities and natural processes into decision-making to help avoid unintended consequences to identified economic, social and environmental values."**
> *(FLNRORD, 2019)*



***Marine Conservation Assessment*, photo courtesy of David Suzuki Foundation.**

These values reflect specific aspects of the environment that are considered important for ensuring the integrity and well being of people, communities, economies and ecological systems. Initially, five key values have been identified for assessment: forest biodiversity, aquatic ecosystems, grizzly bears, moose and old growth forest. Interim assessment protocols have been developed for the latter four of these values (FLNRORD, 2019).

The Ministry of Environment and Climate Change Strategy (MECCS) holds the broad portfolio for the effective protection, management and conservation of BC's water, land, air and living resources and species at risk, including the management of over 1,000 provincial parks, ecological reserves and wildlife management areas, the third largest protected areas system in North America. The MECCS uses a number of tools to regulate the use of fresh water resources, both surface and subsurface, under the *Water Sustainability Act*. MECCS also measures and monitors air quality under the *Environmental Management Act*. In 2010, British Columbia won the UN Climate Action Award when it became the first government at the provincial, territorial, or state level in North America to take 100% responsibility for its greenhouse gas pollution - it has achieved carbon neutral operations ever since.

Marine environments in Canada fall under the jurisdiction of the federal government and specifically of Fisheries and Oceans Canada. Through strategic planning and the regulatory authorities under the *Fisheries Act* and the *Oceans Act*, the Federal fisheries mandate goes well beyond fisheries management to embrace all aspects of Canada's economic, ecological and scientific interests in oceans and inland waters. Through Fisheries and Oceans Canada's Oceans Protection Plan, specific tools are available to help manage abandoned boats and wrecks, study the state of the marine ecosystem in Vancouver's harbour (and its potential spill over effects into Howe Sound) and potentially provide funds through the Coastal Restoration Fund. Fisheries and Oceans Canada is also leading Canada's efforts to meet its marine conservation targets, driven by the UN Convention on Biological Diversity, to protect 10% of its oceans by 2020. In addition to being able to create Marine Protected Areas (MPAs) under the *Oceans Act*, Fisheries and Oceans Canada has tools available to it under the *Fisheries Act* to regulate fishing and to conserve

and protect fish and fish habitat. These tools have been used to great effect in Howe Sound to protect important fish species and their habitat: Rockfish Conservation Areas (RCAs) and Glass Sponge Reef Refuges (see Section 3.1.2.1).

Local governments have authority under the *Local Government Act* to authorize municipalities and regional governments to plan and regulate land use within their municipal boundaries through their Official Community Plans (OCPs) and Regional Growth Strategies. There is an increasing interest among local governments in BC in taking direct action on environmental conservation and climate change by incorporating specific provisions in these plans and strategies. Since 1974, the Islands Trust, a unique form of regional government that serves as a federation of a number of local governments, has a very specific mandate under the *Islands Trust Act* to "preserve and protect" the outstanding scenery and recreational resources, and the exceptional variety of birds, fish, intertidal life, wildlife and plants of the islands in the Salish Sea, including the islands of Howe Sound. In addition to its primary tools of land use planning and regulation under the *Local Government Act*, the associated Islands Trust Conservancy (ITC) helps island communities to protect special places by accepting donations for purchase and gifts of land, placing conservation covenants on private land and offering favourable property tax arrangements for protecting private land (ITC, 2019).

In an era of declining government capacity, the community of non-government organizations, and the rise of citizen science and community-led habitat restoration projects play a significant role in developing the necessary tools for advancing conservation in the Átl'ka7tsem/Howe Sound region. Keeping our coasts and oceans healthy starts with understanding what is happening. In 2016, the Coastal Ocean Research Institute (CORI), established by the Vancouver Aquarium, produced "Ocean Watch – Howe Sound Edition" (OWHS), 2017). Ocean Watch explores what's happening in our coastal ecosystems through articles by many guest authors and reviewers organized into seven themes. Scientists working with the Global Ocean Health Index were invited to develop a rating scheme to help people understand what is happening at a quick glance. The Ocean Watch Task Force was formed to carry forward action items recommended in the OWHS 2017 report, with a particular focus on what local governments can do.

An important tool for conservation work is the use of Geographic Information Systems (GIS), detailed electronic data mapping tools. Communities and organizations have invested in these systems and are providing many layers of data to assist with planning. Examples of the many mapping tools include:

- **Metro Vancouver's Sensitive Ecosystem Inventory**
- **BC Government Conservation Risk Assessment database**
- **BC's extensive inventory of data layers depicting a wide range of topics**
- **The Howe Sound/Átl'ka7tsem Marine Reference Guide**
- **Átl'ka7tsem/ Howe Sound Marine Conservation Analysis; and**
- **Islands Trust Conservancy Ecosystem Maps.**

3.1.4 Heritage Conservation

Conservation interests within Átl'ka7tsem/Howe Sound also include cultural heritage, referring to actions that "safeguard the character-defining elements of a cultural resource so as to retain its heritage value and extend its physical life" (Wikipedia, 2019). In Canada, all levels of government are capable of conserving their heritage resources which are often recognized through special designations such as National Historic Sites (such as the Britannia Mine Concentrator and the Point Atkinson Lighthouse in AHSBR), their listing on the BC Register of Historic places (post 1846) or as listings on a municipal Heritage Register (such as the Lower Caufield Heritage Conservation Area and Whytecliff Park in West Vancouver, and Hollyburn Lodge in Cypress Provincial Park). Cultural heritage can also be celebrated in museums, of which there are several in AHSBR, including the Britannia Mine Museum, the Squamish Museum and West Coast Railway Heritage Park and the Sunshine Coast Museum and Archives in Gibsons.

In addition to protecting the physical and visual evidence of cultural heritage, whether *in situ* or in museum collections, there is increasing interest in protecting the evidence of a cultural past that is no longer visible and which needs to be 're-found' through archaeological investigation. The Squamish Nation began to re-assert

Lighthouse Park, photo: B. Turner

their presence throughout their traditional territory by revitalizing knowledge and use of the territory, and by expanding archaeological research (Squamish Nation, 2001). In recent years, the Squamish region has been the subject of numerous archaeological investigations by academic researchers. Lithic materials (referring to stone tools) found throughout Átl'ka7tsem/Howe Sound are a major part of the archaeological record of *Skwxwú7mesh Uxwumixw*. They are found at almost every archaeological site in the region, from inter-tidal zones to high-elevation mountaintops. Both within and beyond *Skwxwú7mesh Uxwumixw*, cultural knowledge regarding powerful places is charged with mythical and spiritual power, imbuing lithic materials with social meaning and value. Certain lithic source locations, such as islands, canyons or mountaintops, are special locations because they are considered by most in *Skwxwú7mesh Uxwumixw* society as alien and wild and are often places where supernatural beings dwelt or where ancient history unfolded. In oral histories, the place names for these lithic sources reflect their association with these supernatural beings (Reimer, 2011).

In the northern portion of *Skwxwú7mesh Uxwumixw* in the mountain valleys upstream from Squamish, the Squamish Nation has called for the protection of many of these significant sites in their *Xay Temíxw* Land Use Plan, as discussed in Section 3.1.3 above. The plan identifies many of these places as *Kwa Kwayx welh-aynexws*, or Wild Spirit Places: *Nsiiwx-nitem tl'a sutich, Nexw-áyantsut, Esté-tiwilh, Payakéntsut, Kwáyatsut*. They are to be managed to retain their wilderness values for cultural and spiritual use. The plan states there should be no industrial development in these areas. These are important natural areas that should be managed to retain their wilderness attributes and to provide places for spiritual and cultural renewal for the Squamish Nation. Some have now been protected through a subsequent Land Use Agreement between the Squamish Nation and British Columbia in 2007. Generally speaking, archaeological sites in BC, whether found on public or private land, are protected by law under the BC *Heritage Conservation Act*, and must not be altered without a permit.

Cultural heritage also includes intangible values that don't necessarily have a physical presence. UNESCO defines intangible cultural heritage as " the practices, representations, expressions, as well as the knowledge and skills (including instruments, objects, artifacts, cultural spaces) that communities, groups and in some cases, individuals recognize as part of their cultural heritage" (UNESCO, 2019). These can include oral traditions such as language, performing arts, social practices and traditional craftsmanship.

The Squamish Nation is active in revitalizing these aspects of its cultural heritage. *Kwi Awt Stelmexw*, the Squamish Language Academy, in partnership with Simon Fraser University, is offering a Squamish Language Proficiency Certificate in an effort to reclaim the language and to enable fluent speakers to pass the language on to future generations, thereby also reclaiming Squamish identity and culture (Squamish Language Academy, 2019). The Squamish Lil'wat Cultural Centre, a partnership between the Squamish Nation and the Lil'wat (*L'il'wat7úl*) First Nation, is located on shared territory in Whistler (just north of AHSBR) and offers an authentic Indigenous experience to celebrate their culture through displays featuring traditional longhouse buildings, canoes, the instruments and tools of daily living, embellished with myths and legends, music, clothing and artistic expression in masks and cedar baskets (Squamish Lil'wat Cultural Centre, 2019).

3.2 Development

Fosters economic and human development which is socio-culturally and ecologically sustainable. (Indicate current activities and the potential of the proposed biosphere reserve in fulfilling the objective of fostering sustainable economic and socio-cultural development, including by securing flows of ecosystem services from the biosphere reserve).

Átl'ka7tsem/Howe Sound has a 160-year history of human use and economic development following European settlement, as described in Section 9. Today, people living in the region enjoy a diverse economy based on forestry, tourism, recreation and service-based businesses. The region is rich in ecosystem services and supports a good quality of life that respects and celebrates a region based on abundant natural resources and physical beauty.

Perched on the edge of Metro Vancouver that attracts millions of visitors each year, AHSBR provides its 44,000 inhabitants with access to a major urban centre while enjoying the calm, quiet and sense of community. The region has potential for being a model for sustainable development for the authorities at all levels of government endorsing this Biosphere Reserve proposal. Doing so reinforces their commitment to managing growth, implementing best practices and investing in the necessary infrastructure to adapt to growing tourism and recreation demands and needed adaptation to climate change. The proposed AHSBR adds logistic support to these planning challenges, (see Section 16), enabling the following distinct features:

- **Desirable communities in which to live, work and play:** AHSBR's location and natural environments have inspired many businesses and sectors to locate in the major settlements of West Vancouver, Gibsons and Squamish. The climate for new start-ups is very positive, in Squamish particularly, where new industries focused on services, rec-tech, clean energy and tourism have become established. Businesses benefit from a growing population, with a young, educated and talented workforce. The expertise and skills of the workforce are reflected in the diverse economy, including trade & transportation, technology, manufacturing, knowledge based services, education and tourism (see Section 15).
- **Rich in Ecosystem services:** A natural capital evaluation of Howe Sound estimates an annual value of up to $4.7 billion in ecosystem services. The area's natural systems provide residents with food, clean water, a stable climate, protection from natural disasters and a place to relax, recreate and reconnect with nature. The natural systems of Howe Sound can be viewed as economic assets, providing economically valuable goods and services (see Section 12).

Wood chip barge, photo: B. Turner

- **Rich in resources:** Forestry has been and will remain a mainstay for jobs in the region. According to industry consultants, areas in FLNRORD's Sea to Sky Natural Resources District have more high quality wood than the market can bear (Anderson, 2018). Forestry practices have drastically changed over the past few decades towards more sustainable practices. Reflecting the changes in time and government policy, forest management and logging in Squamish and the surrounding region now have a strong First Nation influence. Today the Squamish Nation holds a majority of timber licenses in the Sea to Sky region and takes a balanced approach. A newly emerging Community Forest near Squamish is a partnership between the Squamish Nation and the District of Squamish and will have the opportunity to exemplify best practices in forest management (see Section 3.2).
- **The 'Super Natural British Columbia' tourism marketing theme is showcased in this region.** The many recreation options and the natural beauty attract significant tourism dollars. Two recent tourism marketing strategies for the Sunshine Coast and the Sea to Sky Corridor produced by Destination BC, highlight the region's features and opportunities but also identify the gaps that threaten sustainability. Investment in infrastructure is needed to elevate BC's ability to compete as a premium tourism destination while making the province more attractive for investment.
- **Transportation to international markets:** Access to the waterfront and deep-water offers opportunities for many marine based industries on the west side of Howe Sound and at the head of the fjord in Squamish. These are critical gateways for moving forestry, steel and project cargos to and from world markets. Rail connections in Squamish provide access to many North American markets, while the $600 million upgraded highway offers safe and quick road access to Vancouver (55 minutes) and Whistler (45 minutes). There is also easy access to Vancouver International Airport (YVR), seaplanes in downtown Vancouver and BC Ferries at Horseshoe Bay.
- **Collaboration:** There are numerous multi-jurisdictional authorities converging in the region, including five municipalities within three larger regional districts, two provincial electoral districts, three forestry districts, two BC Parks districts, and 66 non-government organizations at work in the region. Collaboration and maintaining good relationships is key. The calls for action inspired levels of government to act on tougher pollution controls that have resulted in a recovering ecosystem. Since the late 1990's, there have been many region-wide community forums bringing people from various sectors and levels of government together in the spirit of cooperation. The most consistent are the Howe Sound Community Forums where collaborative consensus building takes place. Best practices are shared at the forums that take place twice a year, and through consensus building, support and advocacy for the region, new policies and action on marine protection and planning have resulted (see Section 4.6.1).
- **Community engagement:** There is a long history of people in this region fighting to Save Howe Sound. There is a robust record of public engagement in the face of perceived threats to the region, resulting in successive local governments strengthening their commitments to a sustainable future.
- **A strong knowledge base to draw on:** There is easy access to the AHSBR region for the University of British Columbia, Simon Fraser University, and Capilano University. Quest University located in Squamish is Canada's first independent, not-for-profit, secular liberal arts and science university, devoted entirely to excellence in undergraduate education. Quest University Canada's mission is to transform how students think, question, and engage with the world through a revolutionary educational model that sparks personal growth and intellectual development.
- **UNDRIP in action:** Over the past several years, steps towards reconciliation have been moving forward throughout the region. Recognition for the Squamish Nation took a major step forward in 2001 with the *Xay Temiuxw* Sacred Land Use Plan. Further, communities and organizations in the region are committed to respecting the duty to consult with First Nations. With numerous protocol agreements,

collaborative management plans and memorandums of understanding, the desire for communities and organizations to respect the rights and titles of First Nations is increasing. The Squamish Nation have asserted their rights and title by being the first to conduct their own separate environmental assessments and placing conditions on major proposed projects in the region, thereby setting the example of asserting rights and titles and ensuring projects go forward to protect important values for First Nations and to create financial benefits and jobs for their people (see Section 4.3). Restoration of the land through Squamish Nation led projects have been ongoing for more than 20 years.

- **Planning for a sustainable future:** The three large regional districts that intersect in Howe Sound and extend beyond the proposed AHSBR boundary influence the future of AHSBR. Metro Vancouver's Metro 2040 goals, the Squamish Lillooet Regional District's Integrated Sustainability Plan and the Sunshine Coast Regional District's "We Envision" plan for example, contain common values and goals that guide planning for a sustainable future. AHSBR seeks to find the sweet spot among these and other overlapping plans to strike the essential balance between conservation and development and the UN Sustainable Development Goals (see Section 15).
- **A Strong Social and Health Support Network:** The region is under the Vancouver Coastal Health Authority where access to good quality universal health care does not require great distances to travel. An ever-growing need for social support networks are putting strain on service providers, however, the COVID 19 pandemic is demonstrating the value of community organizations that provide food, shelter and community services. Financial support for organizations such as Helping Hands has accelerated plans for the construction of the new Under One Roof facility that will offer the Squamish community improved and centralized access to food, shelter and support services. Under One Roof is a collaborative project between local and provincial governments, and community partners such as the Squamish Food Bank, Cutting Barriers, Vancouver Coastal Health, to share the space and the vision for collaborative solutions.

Youth on microscope, photo: S. Fast

3.3 Logistic Support

Support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development" (Indicate current or planned activities.)

The vision of HSBRIS is to see all communities within the Átl'ka7tsem/Howe Sound region living sustainably within a healthy ecosystem that has a diversified economy and vibrant cultures.

The HSBRIS mission is to work collaboratively toward this vision by providing logistic support for research, monitoring, education, and training that not only promotes biodiversity conservation within both terrestrial and marine environments but also promotes sustainable economic development, with high priority given to nurturing social, cultural and environmental values.

HSBRIS adds significant value to Átl'ka7tsem/Howe Sound's community by working strategically and purposefully to fulfill three objectives of the UNESCO Man and the Biosphere framework in the AHSBR Region (see Section 13):

- **An overarching holistic land and marine use plan is in place for the Átl'ka7tsem/Howe Sound region that is mutually recognized and respected by all its inhabitants.**
- **Biodiversity conservation needs in the region are understood and defined, and measures are in place to ensure conservation of critical ecological values.**
- **People and culture and humanity in the region thrive in harmony with nature.**

HSBRIS is unique by comparison with many other organizations in the region due to its holistic focus on serving the entire Átl'ka7tsem/Howe Sound region. HSBRIS builds bridges across geographic divides and between many groups and jurisdictions through its coordination and convening function, by balancing perspectives during decision-making, and ensuring Indigenous perspectives and world views are upheld, respected, and actively included throughout all of its activities.

In order to build consensus and advance work toward achieving its objectives, HSBRIS brings together diverse representatives from multiple sectors and communities across the region each year through the AHSBR Roundtable. The role of the Roundtable is to provide advice and guidance to Howe Sound Biosphere Region Initiative Society. HSBRIS also supports other non-HSBRIS projects, sub-committees, task forces, and other forums that generate the dialogue, project work, and actions aimed at progressing the AHSBR objectives.

In line with the vision and mission, HSBRIS is working on three overarching strategic goals to guide the region towards becoming an exemplary model of ecosystem-based management that sensitively strikes a balance between its environmental priorities on the one hand and its social, cultural and economic priorities on the other:

- **to advance biodiversity conservation in the region's marine and terrestrial ecosystems;**
- **to advance sustainable development in line with UNESCO's Man and the Biosphere Program priorities and the UN's Sustainable Development Goals; and**
- **to advance Reconciliation in recognition of UNDRIP, the UN Declaration on the Rights of Indigenous Peoples, that enshrines the rights constituting the minimum standards for survival, dignity and well-being of the world's Indigenous Peoples.**

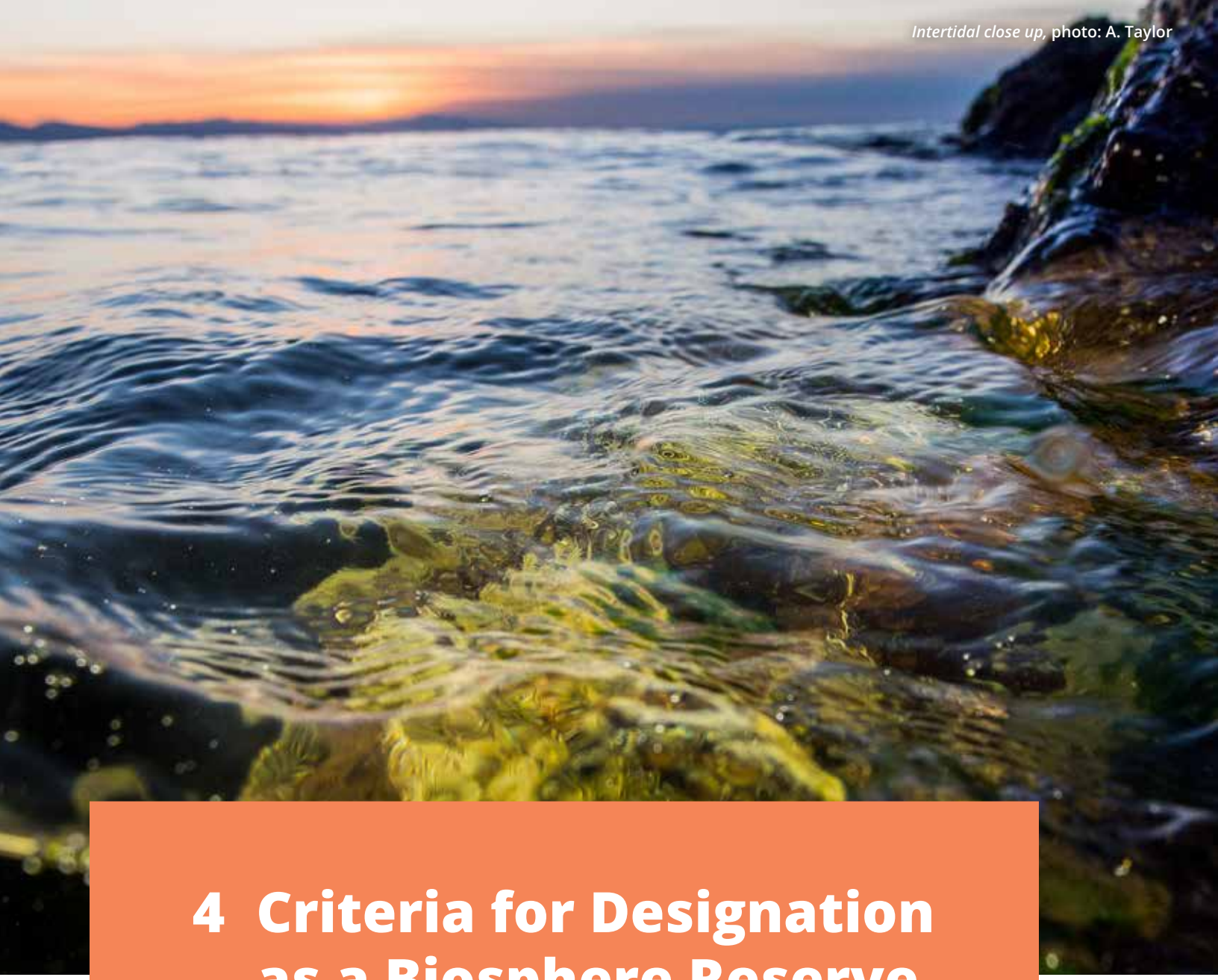
3.3.1 Current and Future Initiatives

The various HSBRIS initiatives currently underway aim to strengthen the collaboration among the region's many organizations towards conservation and protection of the region's marine and terrestrial ecosystems,sustainable development and reconciliation. HSBRIS provides programs, projects, and services that will adapt to the evolving priorities in the region. Our focus is on the promotion of best practices, identifying gaps and needs for research, supporting education, restoration and conservation projects, planning, and collaboration. In alignment with strategic plans in development, a number of ongoing initiatives include the following.

- **Marine Reference Guide: The overall objective of the Marine Reference Guide is to build capacity to protect, restore, and be stewards of the health of the diverse natural and human values associated with the Sound's aquatic environments. The Guide will provide decision-support tools, such as an online map-based library of information regarding the region's aquatic ecosystem health and human-use values, to support marine spatial planning and community education. HSBRIS is committed to**

undertaking work to update the Marine Reference Guide's tools and resources, and to continuously train and engage the Sound's community in using the tools effectively.

- Ocean Watch Action Committee: The objective of the Ocean Watch Action Committee is to advance strategic actions from the Ocean Watch Howe Sound reports & strategic plan produced by Ocean Wise in order that First Nations and Local Government members of the Howe Sound Community Forum can provide leadership in protecting coastal ocean health in Howe Sound. To assist the committee, HSBRIS convenes meetings, and assists with reporting and tracking progress to committee members and the community at large on the key priorities of the Ocean Watch strategic plan.
- Howe Sound Community Forum (HSCF): This Forum provides a venue for local, Regional District and First Nations governments to discuss strategies and initiatives that maintain and enhance the economic, environmental, cultural and social well being of the Átl'ka7tsem/Howe Sound for the benefit of present and future generations. HSBRIS members convene and facilitate the HSCF twice a year with rotating host partners at different locations around the region. The forum promotes networking, learning and sharing information about issues that affect the region.
- Educational Webinars: HSBRIS members collaborate with various organizations to host on-line webinars and on a range of current topics such as conservation and planning tools, and information on new regulations and issues affecting the region. The objective of the webinar series is to help regional partners reach and engage a diverse audience and bring awareness to current issues and available tools.
- Educational opportunities with university partners: HSBRIS members support local university faculty and staff with information, planning and community connections to promote research partnerships and multidisciplinary field schools for experiential learning and applied research within the region. (Appendix G). The objective of these partnerships is to increase capacity for research, monitoring and volunteers that support the objectives of AHSBR while fulfilling various institutional visions and objectives for place-based learning and applied research.
- UN's Sustainable Development Goal workshops: In partnership with community groups and the British Columbia Council for International Cooperation, we convene workshops throughout the AHSBR region for various audiences on themes as seen through the lens of the UN Sustainable Development Goals (SDGs). Workshops for youth, industry, local government, and candidates in municipal elections highlight striking a balance, mapping organization's contributions to SDGs, and Canada's commitment to Agenda 2030.
- Partner organization activities: HSBRIS members participate on various steering committees and in workshops related to the region. Examples of current engagement include supporting and participating on committees with: Destination BC (tourism development arm of the BC government) for the Sea to Sky Region; BC Parks in managing BC provincial parks within AHSBR; Marine Reference Guide steering committee and the Ocean Watch Task force; Fisheries and Oceans Canada's Fisheries Management Stewardship Committee. HSBRIS also assisted the Marine Life Sanctuaries Society to initiate a "Reef Watchers" volunteer group to help with conservation and protection of the Howe Sound Glass Sponge Reef Marine Refuges.
- Strategic planning forums: HSBRIS convenes both ad-hoc and ongoing meetings on issues such as reconciliation, regional air quality, vessels of concern and marine debris. These forums and meetings vary depending on the capacity needs of other organizations. The objective is to fill gaps in the capacity of these organizations as they attempt to advance their strategic plans and achieve objectives that align with the objectives of the AHSBR.
- The Howe Sound Conservation Network: HSBRIS convenes bi-annual meetings of representatives of over 20 conservation-based organizations working in the region and annually and provides news and updates to the Network during the year. The objective is to encourage networking, share information about each other's projects, leverage resources, reduce overlap and build capacity in order to help sustain these organizations.



Intertidal close up, photo: A. Taylor

4 Criteria for Designation as a Biosphere Reserve

[Article 4 of the Statutory Framework presents 7 general criteria for an area to be qualified for designation as a biosphere reserve]

In order to qualify for designation as a Biosphere Reserve, in accordance with Article 4 of the Statutory Framework, it is necessary to demonstrate that sufficient lands that are representative of the region are already set aside and appropriately managed for conservation, and that existing and future management regimes in the region support and promote sustainable development for the wellbeing of people, the economy and the environment. The following addresses the ways in which Átl'ka7tsem/Howe Sound meets the criteria for designation in being biogeographically representative, having significant biodiversity values, and demonstrating community commitment to their conservation in tandem with sustainable development.

4.1 Ecological Mosaic

"Encompass a mosaic of ecological systems representative of major biogeographic region(s), including a gradation of human interventions". (The term "major biogeographic region" is not strictly defined but it would be useful to refer to the Udvardy classification).

The rich mosaic of ecological systems found in southwestern BC are among the richest in Canada. This mosaic arises from the region's topographical diversity, with an elevation range from sea level to almost 3,000 metres within a relatively short distance, its close proximity to the moderating effects of the ocean and its location among the most southerly latitudes in the country. These factors together create a dramatic range in climate from Canada's warmest 'mediterranean' climate of warm dry summers and mild wet winters along the coastal lowlands, to the wettest climatic conditions in the country on higher west facing slopes, both contrasting with the extreme cold and heavy snow conditions at the highest elevations.

The AHSBR region incorporates the full scope of this mosaic and is highly representative of the hierarchy of three biogeographic descriptions at the international, national and provincial level. Internationally, the original classification by Udvardy in 1975 places AHSBR in the "temperate needle-leafed forests or woodlands" biome within the Sitkan Biogeographic Province of the Neararctic Realm (Udvardy, 1975). This classification has since been updated in 2001 to the Temperate Coniferous Forests biome (Olsen et al, 2001). Nationally, the region is designated within the Canadian Pacific Maritime Ecozone, while provincially, the region falls within the Pacific Ranges and Lower Mainland ecoregions (Environment Canada, 1995; Demarchi, 2011). Within these ecoregions, AHSBR is intersected by three Ecosections, from largest to smallest: Southern Pacific Ranges, Eastern Pacific Ranges, and Fraser Lowland (Conservation Data Centre, 2019a).

The Southern Pacific Ranges are comprised of rough, granitic mountains that tower above the Sunshine Coast, Howe Sound and the Fraser Valley. This ecosection is home to expansive fjords that were formed by extensive glaciation and support a complex diversity of terrestrial and marine ecosystems (Demarchi, 2011). The northern periphery of the biosphere region is within the Eastern Pacific Ranges, a rugged, mountainous transitional area that bisects the wet mild coast and the dry cold interior, which can result in periods of heavy snow accumulation during winter due to the interaction between Pacific and Arctic weather systems (Demarchi, 2011). The south-eastern portion of AHSBR overlaps a small area of the Fraser Lowland Ecosection. These lowland areas of West Vancouver contain extensive urban development; however, remnant coniferous forests remain in undeveloped areas (Demarchi, 2011).

This mosaic of ecological systems has been further described using BC's Biogeoclimatic Ecosystem Classification System (BEC). The region contains nine different BECzones as summarized below (BC Conservation Data Centre 2019a). The high number of BEC units and associated subzones are a result of the diversity and interconnection between macro and microclimates, topography, dominant vegetation species and soil type. The predominant ecosystems found in AHSBR are the Coastal Western Hemlock, Mountain Hemlock and Coastal Mountain-heather Alpine units. More detailed descriptions of these ecological systems are found in sections 11 and 14.

Total area (km²) of the Biogeoclimatic (BEC zones and associated subzones and variants found in the Howe Sound Biosphere Region.

BECCode	BECZone	Subzone/Variant	Area (km²)
CWHdm	Coastal Western Hemlock	dry mild	584.1
MHmm1	Mountain Hemlock	moist mild 1	439.3
CWHvm2	Coastal Western Hemlock	very wet mild 2	339.6
CWHxm1	Coastal Western Hemlock	very dry mild 1	259.1
CMAunp	Coastal Mountain-heather Alpine	undifferentiated parkland	218.8
CWHvm1	Coastal Western Hemlock	very wet mild 1	130.3
MHmm2	Mountain Hemlock	moist mild 2	79.8
CWHms1	Coastal Western Hemlock	moist submaritime 1	79.0
CWHds1	Coastal Western Hemlock	dry submaritime 1	57.4

Source: BC Conservation Data Centre 2019b

Seal feeding on anchovy school, photo: B. Turner

4.2 Role in Biological Diversity Conservation

"Be of significance for biological diversity conservation". (This should refer not only to the numbers of endemic or rare species, but may also refer to species on the IUCN Red List or CITES appendices, at the local, regional or global levels, and also to species of global importance, rare habitat types or habitats with unique land use practices (for example traditional grazing or artisanal fishing) favouring the conservation of biological diversity).

It is a marvel that the extensive biodiversity described in this section is in such close proximity to the 2.5 million people of Metro Vancouver. In less than a one-hour drive, urbanites can be in the habitat of grizzly bears and wolves, and witness the feeding on salmon by thousands of bald eagles. Recreational divers can be in the company of Pacific giant octopus, colorful sponges and corals without travelling far from home.

4.2.1 The Significance of Biological Diversity in AHSBR

Within this nationally significant biodiversity are elements of global significance, including large populations of migratory seabirds, high concentrations of wintering bald eagles (see 4.2.1.1), and perhaps most importantly, the recently discovered hexactinellid (glass) sponge reefs and other aggregations.

While dinosaurs roamed the earth, huge glass sponge reefs thrived in prehistoric seas. They were formerly thought to be found only in the 40 million year old fossil record, leaving only giant fossil cliffs behind that stretch across parts of Portugal, Spain, France and Germany, and across Eastern Europe to Romania. Then in 1987, Canadian scientists discovered 9,000 year-old living glass sponge reefs on the Pacific Coast of Canada. Glass sponges are some of the oldest and simplest animals on earth. They don't have eyes or even a stomach, yet they do some amazing things. Glass sponges build intricate skeletons out of silica glass that provide many other animals with a home, and they filter vast quantities of bacteria from seawater (CPAWS, 2019).

Finding new, living reefs is significant on a global scale which is why the glass sponge reefs in Hecate Strait and Queen Charlotte Sound have been placed on Canada's tentative list for World Heritage Site (Parks Canada, 2017). A number of glass sponge reefs have been discovered by government scientists on Canada's Pacific coast since 2004, and were first discovered in Howe Sound also in 2004 by a local diver who had been diving and studying the underwater life of Howe Sound for decades. The reefs were subsequently ground-truthed by Fisheries and Oceans Canada Science staff in 2012 (DFO, 2018). Since 2015, a total of eleven glass sponge reefs have been legally protected under the Fisheries Act as Glass Sponge Reef Marine Refuges which prohibits any form of bottom-contact recreational and commercial fishing, and Indigenous fishing for food, social and ceremonial purposes. These fisheries restrictions are in portions of both the Core and Buffer Marine Areas identified in the proposed biosphere zoning map.

Further protections are being considered for nine remaining marine areas in Howe Sound that are currently being assessed for ecological significance and that may contain glass sponge reefs (DFO, 2019a).

Species richness indices are a measure of the biodiversity of a region or habitat, usually according to the total number of species present, but they can also measure such parameters as species richness, evenness and dominance (Morris et al, 2014). A number of surveys and tools have been conducted or applied in Howe Sound that provide a qualitative and quantitative assessment of certain elements of the marine and terrestrial ecosystem writ large, and these include, for example, the Cumulative Effects Assessment using a number of important indicators to improve forest management and biodiversity conservation (see Section 12.2), the application of the Ocean Health Index to identify priorities for future marine management, the marine assessment work that led to the protection of the glass sponge reefs, and numerous other intertidal and sub-tidal surveys that have been conducted in the Squamish estuary. To the best of our knowledge, a systematic assessment of biodiversity in AHSBR using such a species richness index has not been undertaken. However, as discussed in the following sections, more qualitative assessments clearly point to the extraordinary and globally significant biodiversity of the BC coast, both terrestrial and marine, and to the AHSBR having among the highest biodiversity levels in the province.

A number of terrestrial and marine species of flora and fauna in the Átl'ka7tsem/Howe Sound region have been assessed by the provincial and federal governments for their relative abundance or rarity and at-risk status at the provincial and national levels. These are described below, categorized as Wildlife; Forests, Plants, Lichen/Fungi and Plant Communities; and Marine.

4.2.1.1 Wildlife

The mountainous coastal ecosystems of Howe Sound support a high diversity of terrestrial wildlife species, among the highest in Canada, primarily due to the spatial heterogeneity of the Pacific Ranges. Approximately 721 native terrestrial animal species potentially occur in the Howe Sound region: 14 amphibian species, 10 reptile species, 249 bird species, 61 mammal species, and at least 387 invertebrate species, including arachnids, gastropods, and insects. Invertebrates are the most diverse group, which is not surprising as they are the most dominant life form on the planet. Bird diversity is the second highest among all groups, followed by mammals, amphibians and reptiles, respectively. A large number of BC's amphibian species reside in the AHSBR region, largely due to the favourable climates found in the southwest section of the province. A comprehensive inventory list of wildlife species found or potentially occurring in AHSBR and their conservation status is available in Appendix A.

Átl'ka7tsem/Howe Sound is a very significant area for this wide range of species and, as a Biosphere Reserve, would play an important, even global, role in the conservation of this biological diversity. Diversity is especially high for birds, as indicated by both the Squamish River estuary and English Bay-Burrard Inlet-Howe Sound being identified internationally as Important Bird and Biodiversity Areas (IBAs) (Bird Studies Canada 2019a, 2019b). The Squamish River Area is globally significant for the number of bald eagles that congregate there each winter (Bird Studies Canada 2019a). A number of bird species recorded in the Biosphere region are migrants, which highlights the importance of Howe Sound and the Squamish Valley as migration corridors. The English Bay-Burrard Inlet-Howe Sound IBA supports significant populations of diving ducks, dabbling ducks, cormorants, gulls and shorebirds. Also, the Christie Island Migratory Bird Sanctuary, located between Gambier and Anvil Islands, is the only site in Greater Vancouver where marine birds nest, including pelagic cormorants and double-crested cormorants (Rodway et al. 2016).

Numerous at-risk wildlife species utilize habitats found in the Howe Sound region. Species at risk of extinction are designated at both federal and provincial levels. A species initially proposed as at-risk is first assessed by the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and subsequently assigned a risk status: Not At Risk (reviewed and found to be not at risk); Data-deficient (lacking sufficient scientific study); Special Concern (may become threatened or endangered due to known factors); Threatened (likely to become endangered if factors not addressed); Endangered (face extirpation or extinction); Extirpated (no longer exist in the wild in Canada); and Extinct. At-risk species are then considered by the Minister of Environment and Climate Change for inclusion on Schedule 1 of the federal *Species at Risk Act (SARA)*, which conveys legal protection to species and their critical habitat. Furthermore, a detailed recovery strategy or management plan is required for these species. *SARA* Schedules 2 and 3 include species classified as Endangered/Threatened and Special Concern, respectively, but are awaiting reassessment by COSEWIC before being listed as Schedule 1.

COSEWIC lists 30 species found or potentially occurring in Átl'ka7tsem/Howe Sound as Not At-Risk, whereas 42 are listed

School programs and children provide help with hatchery Coho salmon fry release., photo: R. O'Grady

at a higher level of risk including Extirpated, Endangered, Threatened, or Special Concern (Table 1). Of those 42 species, 39 are included on SARA Schedule 1, and thus are legally protected species in Canada. Not all species found in the region have been reviewed or are under consideration for review, so the number of Not At-Risk species is potentially low due to lack of sufficient data and study effort. At-risk species that occur or potentially occur in Átl'ka7tsem/Howe Sound with finalized recovery strategies include wolverine, Pacific water shrew and marbled murrelet. Species with proposed recovery strategies include little brown myotis and common nighthawk.

Table 1. The number of federally reviewed and designated species (COSEWIC and SARA) found in Átl'ka7tsem/Howe Sound, including potentially occurring species.

COSEWIC Designation	Total Species	SARA Designation	Total Species
Extirpated	2	Schedule 1, Extirpated	2
Endangered	10	Schedule 1, Endangered	8
Threatened	10	Schedule 1, Threatened	10
Special Concern	20	Schedule 1, Special Concern	19
Not At-Risk	30		
Total	**72**	**Total**	**39**

Source: BC Conservation Data Centre 2019b

At the provincial or subnational level, the BC Conservation Data Centre (CDC) calculates and assigns a species Conservation Status Rank based upon their rarity, threats, and any known population trends. A summary of conservation status ranks for the species found in or potentially occurring in AHSBR is presented in Table 2. Four species are presumed or possibly extirpated, 26 are considered critically imperiled or imperiled, 71 are considered vulnerable, and 505 are considered apparently secure or secure. Thirty-five species were unrankable as of 2019 due to a lack of information or conflicting information about their status or trends (NatureServe 2019).

Table 2. The number of provincially reviewed and designated conservation status for species found in Átl'ka7tsem/Howe Sound, including potentially occurring species

Provincial Status	Total Species Ranks
Presumed Extirpated or Possibly Extirpated	4
Critically Imperiled or Imperiled	26
Vulnerable	71
Apparently Secure or Secure	505
Unrankable	35
Not ranked	123
Total	**764**

Source: BC Conservation Data Centre 2019b

Átl'ka7tsem/Howe Sound has a diversity of habitats available to wildlife that span marine, freshwater aquatic, riparian, and terrestrial landscapes. Four species that exemplify the range of habitat available in the Átl'ka7tsem/Howe Sound that allow wildlife to meet their life requisites are: marbled murrelet, grizzly bear, Roosevelt elk and Pacific water shrew.

Marbled murrelet is listed as Threatened and multiple old-growth forest areas in the Biosphere region have been designated as critical habitat (Environment Canada 2014). This resident bird species has a unique life history, requiring old-growth forest for nesting (designated as critical habitat), as well as marine habitat for foraging. This species' recovery plan indicates that Átl'ka7tsem/Howe Sound is at moderate risk of exceeding the nesting habitat depletion threshold by 2032. While the region features nearly 4,000 hectares of nesting habitat, less than 500 hectares are currently protected (Environment Canada, 2014).

As an indicator species, grizzly bear are ecologically important and provide information for conservation planning and decision-making. Grizzly bear also provide viewing opportunities for eco-tourism, and is an important aspect of First Nations culture, including harvesting practices (COSEWIC, 2012). Distribution of grizzly bear has contracted to the northwestern extent of the species' range with extant populations existing in Alaska, British Columbia, and the northwestern United States (COSEWIC, 2012). Grizzly bear have been extirpated from much of their historic range and continue to be threatened due to anthropogenic disturbance (i.e., habitat loss, alteration, and fragmentation, human-wildlife conflict, harvesting and poaching). The species has been designated of Special Concern federally and provincially (COSEWIC, 2012; BC Environment, 2012). Átl'ka7tsem/Howe Sound has two grizzly bear Population Units, the Squamish-Lillooet and Garibaldi-Pitt, that support an estimated 61 individuals. Habitats within the population units have a high capability of supporting grizzly bears due to the salmon-bearing Squamish River system and the surrounding vegetated landscape (COSEWIC, 2012; BC Environment, 2012).

Provincially, Roosevelt elk are listed of Special Concern. Factors limiting Roosevelt elk include overharvesting, habitat change (decrease in quality and quantity), linear disturbance and predation (BC Conservation Data Centre, 2017; FLNRORD, 2015). Átl'ka7tsem/Howe Sound supports approximately 260 elk comprised of five Elk Population Units (EPUs) found to the northeast of Howe Sound (FLNRORD, 2015). The stable, stable-to-increasing, or increasing trend of these populations is largely due to the translocation programs that have occurred in the area since 1933 (FLNRORD, 2015).

In addition to the fauna noted above, critical habitat occurs within the Biosphere region for Pacific water shrew. Riparian habitats that are suitable for the Pacific water shrew are declining in their range and this species is severely affected by habitat fragmentation, thus the need for federally designated critical habitat (COSEWIC, 2006).

Grizzly bear on Squamish River sandbar, photo: J. Buchanan

4.2.1.2 Forests, Plants, Lichen/Fungi and Plant Communities

A comprehensive list of all vascular, non-vascular and lichen/fungi species recorded within Átl'ka7tsem/Howe Sound, including forest trees and understory plants, is found in Appendix C. Total species of plants (including subspecies and varieties) found within the Biosphere region are as follows: 727 species of vascular plants, 485 species of non-vascular plants, and 749 species of lichen/fungi that historically or presently occur.

At the federal level, only nine species in the Átl'ka7tsem/Howe Sound have been reviewed or designated by COSEWIC (Table 3). Seven species are listed at a higher level of risk such as Endangered, Threatened or Special Concern, including four vascular plant species, two non-vascular plant species, and one species of fungi. One species of diminutive lichenized fungi, frosted glasswhiskers, is considered Data Deficient.

Table 3. The number of federally reviewed and designated species (COSEWIC) found in Átl'ka7tsem/Howe Sound

Species Group			
COSEWIC designation	**Vasc.**	**Non. Vasc.**	**Lichen/Fungi**
Extirpated	0	0	0
Endangered	2	2	0
Threatened	1	0	0
Special Concern	1	0	1
Not At-Risk	1	0	0
Data Deficient	0	0	1
Total	**5**	**2**	**2**

Source: BC Conservation Data Centre 2019b

A summary of provincial conservation status for the species found in the Biosphere region is in Table 4. The majority of species are apparently secure; however, a large number of lichen/fungi species have not been ranked. Two species of non-vascular plants are believed to be extirpated, 21 species are critically imperiled or imperiled (6 vascular plants, 13 non-vascular, and 2 lichen/fungi), 142 species are vulnerable (43 vascular plants, 86 non-vascular plants, and 13 lichen/fungi) and 1063 species are apparently secure or secure (634 vascular plants, 310 non-vascular plants and 119 lichen/fungi). Six species were considered unrankable due to lack of information (2 vascular plants, 4 non-vascular plants).

Table 4. The number of provincially reviewed and designated conservation status ranks for vascular and non-vascular plants and lichen/fungi species found in Átl'ka7tsem/Howe Sound

Species Group			
Provincial Status	**Vascular Plants**	**Non Vascular Plants**	**Lichen/Fungi**
Presumed Extirpated or Possibly Extirpated	0	2	0
Critically Imperiled or Imperiled	6	13	2
Vulnerable	43	86	13
Apparently Secure or Secure	634	310	119
Unrankable	2	4	0
Not Ranked	44	70	613

Source: BC Conservation Data Centre 2019

Four plant communities identified within AHSBR have been provincially designated at a high level of risk (Table 5). These include three highbench forested floodplain communities: Sitka spruce/salmonberry (Dry), Sitka spruce/salmonberry (Very Dry Maritime) and Sitka spruce/salmonberry (Very Wet Maritime), and one mature growth coniferous community: western hemlock–Douglas-fir/electrified cat's-tail moss (Dry Submaritime 1).

Pink salmon, photo: B. Turner

Table 5. Provincially reviewed and designated conservation status for at-risk plant communities found in the Howe Sound Biosphere Region

Scientific Names	Common Names	Provincial Status
Picea sitchensis / Rubus spectabilis Dry	Sitka spruce / salmonberry Dry	Critically Imperiled or Imperiled
Picea sitchensis / Rubus spectabilis Very Dry Maritime	Sitka spruce / salmonberry Very Dry Maritime	Critically Imperiled or Imperiled
Picea sitchensis / Rubus spectabilis Very Wet Maritime	Sitka spruce / salmonberry Very Wet Maritime	Critically Imperiled or Imperiled
Tsuga heterophylla - Pseudotsuga menziesii / Rhytidiadelphus triquetrus Dry Submaritime 1	Western hemlock - Douglas-fir / electrified cat's-tail moss Dry Submaritime 1	Vulnerable

Source: BC Conservation Data Centre 2019b on

4.2.1.3 Marine

Canada's west coast is exceedingly rich in marine species compared to other temperate regions of the world. This diversity includes 6,555 species of invertebrates, 400 fishes, 300 species of sponges, 68 species of sea stars, 600 amphipod crustaceans, 75 species of anenomes, 478 species of polychaete sea worms, and 111 species of nudibranchs, among more (Austin, 2015; Lambert, 2017). Not only is biodiversity high, the marine biota of British Columbia can boast the largest chiton, the largest octopus, the largest sea slug, the heaviest sea star and the biggest barnacle in the world (Lambert, 2017).

Of these species, the Salish Sea, of which Átl'ka7tsem/Howe Sound is part, supports approximately 3,000 species of marine life. The Sound itself has more than 650 species of fish and invertebrates and has been described as "... the most biologically diverse region on the South coast of British Columbia" (Dennison, 2012). The diversity of marine life is due, in large measure, to the array of different marine habitats found throughout the Sound, including near shore, benthic and pelagic habitats. As noted above in Section 4.2.1, the recent discovery of the hexactinellid (glass) sponge reefs in Howe Sound is an exciting addition to this impressive list of species. A comprehensive list of all marine species recorded within Átl'ka7tsem/ Howe Sound is found in Appendix B.

A total of 27 marine species have been assessed by COSEWIC for their at-risk status, and as illustrated in Table 6 below, 19 species of fish, 7 species of marine mammal and one species of invertebrate have been listed as either endangered, threatened or of special concern under COSEWIC, with some not yet listed on Schedule 1 on *SARA*.

Table 6. Federally and provincially reviewed and designated conservation status for at-risk marine species found in the Átl'ka7tsem/Howe Sound

Taxa	Common Name	Scientific Name	COSEWIC	SARA
Fish	Canary Rockfish	Sebastes pinniger	Threatened	No Status
Fish	Quillback Rockfish	Sebastes maliger	Threatened	No Status
Fish	North Pacific Spiny Dogfish	Squalus suckleyi	Special Concern	No Status
Fish	Yelloweye Rockfish	Sebastes ruberrimus	Special Concern	Special Concern
Mollusc	Olympia Oyster	Ostrea lurida	Special Concern	Special Concern
Fish	Bluntnose Sixgill Shark	Hexanchus griseus	Special Concern	Special Concern
Mammals	Grey Whale	Eschrichtius robustus	Special Concern	Special Concern
Mammals	Harbour Porpoise	Phocoena phocoena vomerina	Special Concern	Special Concern
Mammals	Humpback Whale Northern Resident	Megaptera novaeangliae	Special Concern	Threatened
Mammals	Killer Whale Northern Resident	Orcinus orca	Threatened	Threatened
Mammals	Killer Whale Southern Resident	Orcinus orca	Endangered	Endangered
Mammals	Killer Whale Transient	Orcinus orca	Threatened	Threatened
Mammals	Steller Sea Lion	Eumetopias jubatus	Special Concern	Special Concern
Fish	Bocaccio Rockfish	Sebastes paucispinis	Threatened	No Status*
Mollusc	Northern Abalone	Haliotis kamtschatkana	Endangered	Endangered
Fish	Basking Shark	Cetorhinus maximus	Endangered	Endangered
Fish	Yellowmouth	Sebastes reedi	Threatened	No Status
Fish	Darkblotched Rockfish	Sebastes crameri	Special Concern	No Status
Fish	Eulachon	Thaleichthys pacificus	Endangered	No Status*
Fish	Longspine Thornyhead	Sebastolobus altivelis	Special Concern	Special Concern
Fish	Rougheye Rockfish Type I	Sebastes sp. type I	Special Concern	Special Concern
Fish	Rougheye Rockfish Type II	Sebastes sp. type II	Special Concern	Special Concern
Fish	Tope	Galeorhinus galeus	Special Concern	Special Concern
Fish	Coho Salmon	Oncorhynchus kisutch (Interior Fraser River populations)	Threatened	No Status
Fish	Chinook Salmon	Oncorhynchus tshawytscha(Upper, middle & lower Fraser River populations)	Endangered	No Status
Fish	Sockeye Salmon	Oncorhynchus nerca (migrating from Cultis Lake & Harrison river to Howe Sound-see notes 2&3)	Endangered / Special Concern	No Status
Fish	Steelhead	Oncorhynchus mykiss irideus (Thompson,Chilkotin,Fraser River populations)	Endangered	No Status
Fish	Cutthroat	Oncorhynchus clarkii lewisi	Special concern	Special Concern
Note 2: Beamish R.J. 2010, Late ocean entry of sea type sockeye salmon from the Harrison River in the Fraser River drainage results in improved productivity. NPAFC Doc. 1283. 30 pp.				
Note 3: Welch et al can. J. Fish. Aqu. Sci. 2009: Freshwater and marine migration and survival of endangered Cultus Lake sockeye salmon (Oncorhynchus nerka) smolts using a large-scale acoustic telemetry array.				
Mammals	Fin Whale	Balaenoptera physalus	Threatened	Threatened**

Source: Howe Sound Research and Conservation, Ocean Wise, Vancouver, BC, Canada
https://www.canada.ca/en/environment-climate-change/services/

* Previously ** Potentially

4.3 Demonstration of Sustainable Development

"Provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale". (Describe in general terms the potential of the area to serve as a site of excellence for promoting the sustainable development of its region (or "eco-region")).

The AHSBR region is a complex assembly of Public lands, private lands, rural areas, incorporated municipalities and unincorporated communities that require an equally complex set of plans, procedures and tools, to effect sustainable development over the region's land base and marine environments. A key objective of the AHSBRI is to support the development of a comprehensive land and marine use plan for the entire region that incorporates these sustainable tourism development plans by providing logistic support as described in Sections 3 and 17.

The Principles of Cooperation among AHSBRI's partners, generated by the Howe Sound Community Forum and the Principles of Sustainability in B.C.'s Land Use Charter, serve as congealing forces that commit all levels of government, First Nations and non-government organizations to the common pursuit of sustainable development throughout the region. The Principles of Cooperation document, signed by all local governments and Squamish Nation in 2002, emphasize the need for a collective forum of local governments and First Nations, for a common vision and for regular communication in an atmosphere of shared values and transparency (Appendix G).

The AHSBR Roundtable, as described in Section 17, will bring accountability to the region's commitment towards sustainable tourism and other economic growth through existing planning documents and tools.

Many travel publications promote features in the region as desirable destinations for tourism and recreation. Destination BC's Strategic Marketing plans for the Sunshine Coast and Sea to Sky areas, developed with Aboriginal Tourism, set out strategic themes and opportunities for the region. The vision is:

> **"Vibrant, diverse, and authentic, the Sea-to-Sky Corridor pairs a year-round sustainable and prosperous tourism management model with being the most sought after destination for world class nature-based outdoor recreation and thriving cultural experiences"**
> *(Destination BC, 2019)*

The plans pair specific motivating experiences identified for destination development with features found in the region. Seven destination development goals have been identified to support the vision, two of the three specifically:

> **"Increase resident and community prosperity through sustainable tourism growth and improve visitor use of the natural and cultural heritage in a respectful, sustainable manner"**
> *(Destination BC, 2019)*

Within the eight development themes of Destination BC's Sea to Sky Marketing strategic plan is support for the Howe Sound Biosphere Region Initiative under the strategic theme for Stewardship and Social Commitment (Destination BC, 2019). The themes identify the potential of the region to serve as a site of excellence for promoting sustainable development as an eco-region.

The *Xay Temixw* Land Use Plan - see Section 3.1.3

The Sea-to Sky Land and Resource Management Plan - The foundation for sustainable development on Public lands in much of the AHSBR rests in the Sea-to-Sky Land and Resource Management Plan (LRMP) prepared for the region in 2008, as described in Section 15.1. The purpose of the Sea-to-Sky LRMP is "to provide greater certainty for local economic development and the long-term sustainability of ecological, social and cultural values" (Government of British Columbia, 2008). The LRMP plan area includes approximately 74% of the AHSBR region and is therefor fundamental to realizing sustainable development goals in Átl'ka7tsem/Howe Sound.

The LRMP provides two levels of direction for the management of natural resources on Public land in the region, including overarching general management direction for a range of land and resource values that

Octopus eye, photo: A. Taylor

apply throughout the Sea-to-Sky region, and more area-specific direction with goals and objectives for the various land use zones and activities identified. The land and resource values include, for example, access, cultural heritage values, forest health, recreation and wildlife biodiversity, whereas specific land use zones include those areas where all resource activities are permitted to more restrictive zones such as 'wildlands' and protected areas. Of particular importance to Átl'ka7tsem/Howe Sound is the 'Frontcountry Zone' that encompasses most of the Public land adjacent to the proposed Biosphere Region's Core Areas. As discussed, these Frontcountry Zone lands form a strong foundation for the proposed Buffer Zones adjacent to the Core Areas.

The LRMP also provides processes for consulting with all stakeholders and resolving land use issues (Government of British Columbia, 2008). The plan's collaboration and consultation processes earned the 2009 Sustainability Award for Improved Decision-Making from the Fraser Basin Council, itself a collaborative organization among all levels of government dedicated to advancing sustainability throughout the region (FBC, 2019). The LRMP is particularly recognized for the extent to which it meets the needs of the region's populations while respecting Aboriginal rights and title (Gritanni-Livingston, 2009).

Landscape Unit Planning - The direction of the LRMP and, more generally, of BC's *Forest Practices Code* for Public land is, in turn, implemented through the development of Landscape Unit Plans for forest management that take an integrated approach to resource management incorporating other resource values. A priority in Landscape Unit planning is to develop legally binding objectives for landscape level biodiversity values, including old growth forests, and their role in providing wildlife habitat and other ecosystem services such as the protection of water supply and quality and the preservation of other associated natural resource values, including species at risk (FLNRORD, 2003). In AHSBR, there are a total of six Landscape Unit Plans (LUPs) regulating forest land use, including those areas of Public land not included in the Sea-to-Sky LRMP (Lower Squamish, East Howe and portions of Mamquam, Chapman, Fraser Valley South and Seymour-Capilano).

Private Lands, Municipalities and the Howe Sound Islands - Beyond Public lands where lands are privately owned, the LRMP and Landscape Unit plans do not apply. The use of private land is regulated by local governments in accordance with their authorities under the *Local Government Act* and the *Community Charter*.

Sustainable cities and communities

As discussed in sections 9 and 10, the local and regional governments within AHSBR have all prepared Official Community Plans (OCPs) and, in some cases Regional Growth Strategies, to incorporate and implement the principles of sustainable development within their respective boundaries.

The OCP for the Municipality of Bowen Island, for example, is entitled "Towards a Sustainable Future" and approaches all aspects of municipal governance from that perspective (Bowen Island Municipality, 2016). Similarly, a regional growth strategy is intended to "promote human settlement that is socially, economically, and environmentally healthy and that makes efficient use of public facilities and services, land and other resources (SLRD, 2008)." The Squamish-Lillooet Regional District's Regional Growth Strategy, for example, is a collaboration of all member local governments to promote "... development and services which are sustainable, recognizing a long term responsibility for the quality of life for future generations" (SLRD, 2008).

The jurisdiction for land use planning on all the Howe Sound islands is exclusively that of the Islands Trust. The Islands Trust is a federation of local governments, whose mandate places a clear priority on sustainability: "to preserve and protect the trust area and its unique amenities and environment for the benefit of residents of the trust area and the province..." (Islands Trust, 2019). The Trust's main goals are to: "foster the preservation and protection of the Trust Area's ecosystems; ensure that human activity and the scale, rate and type of development...are compatible with maintenance of Trust area ecosystems; and sustain island character and healthy communities" (Islands Trust, 2019). The Islands Trust mandate and goals are implemented through the development of OCPs and land use bylaws for each island or group of islands.

Throughout the AHSBR, regardless of land ownership and jurisdiction, a number of tools have been developed to assist all levels of government, First Nations and non-government organizations achieve or promote sustainable development. The tools specific to Howe Sound region, as described in Section 3.1.3, complement the planning tools available within the various levels of government. The Marine Reference Guide (MRG) is currently being developed under the leadership of First Nations and local governments to support decision makers, marine spatial planners and marine economic sectors to ensure that marine environmental health, sustainable economic development and community development can co-exist (MRG, 2018). The intent of the MRG is to support integrated marine management by providing a unified marine information resource for marine spatial planning and decision-making by all governments, sectors and communities. This project is being undertaken in collaboration with the Átl'ka7tsem/Howe Sound Marine Conservation Analysis. This conservation analysis of Átl'ka7tsem/Howe Sound's marine environment uses a Geographic Information System (GIS) to compile more than 140 layers of marine data, ranging from habitats such as eelgrass or estuaries, to species' distributions such as the sponge reefs, to a host of socio-economic information such as shipping routes, marinas and fishing areas. Through computer modeling software known as Marxan, the analysis can reveal where the marine biodiversity hotspots are and where future management needs to be directed to protect and conserve the 34 high priority areas for conservation already identified (DSF, 2019).

The Cumulative Effects Framework (CEF) in Howe Sound is the first assessment of its kind on BC's south coast region, and the AHSBR boundary aligns with the boundary of this study. The project is the direct result of concerns expressed by local governments and stakeholders about the potential for cumulative effects of numerous land and resource developments being undertaken and proposed in the AHSBR region, and the need to consider all of Átl'ka7tsem/Howe Sound and its watersheds as a single ecological entity. The CEF will help with the implementation of a coordinated, multi-sector approach to assessment and managing cumulative effects, and of a long-term monitoring program to identify key trend information (FLNRORD, 2019).

BC and many of AHSBR's partners have demonstrated their commitment to sustainable development in Átl'ka7tsem/Howe Sound through their ongoing collaboration, leadership and participation in a number of land and sea use planning initiatives and the application of specific analytical tools as described above and in Section 15. However, critical to the success and achievement of the Province's destination development plan goals, the roll out of the strategic plans must be done in a coordinated way as noted in the plan as one of the development themes: "Interaction of development themes and motivating experiences: For any destination development strategy to achieve its goals, there must be coordinated interaction with the other components of the tourism process."

HSBRIS will contribute to the roll out of success of the strategic plans working with various tourism and recreation sector stakeholders.

4.4 Biosphere Reserve Size

"Have an appropriate size to serve the three functions of biosphere reserves" (This refers more particularly to (a) the surface area required to meet the long term conservation objectives of the core area(s) and the Buffer Zone(s) and (b) the availability of areas suitable for working with local communities in testing and demonstrating sustainable uses of natural resource.)

The total area of AHSBR is 218,723 hectares, with combined terrestrial and marine Core Areas of 42,378 ha, or 19% of the total area, and a combined terrestrial and marine Buffer Zone of 30,371 ha or almost 14% of the total area. Given the large size of this Biosphere Reserve, and the fact that a total of 33% of the reserve is within the combined terrestrial and marine Core Areas and Buffer Zones, and an additional 4,161 ha in the Transition Area are also protected or in conservation lands, there is every confidence that the AHSBR is large enough and has an effective zoning configuration to meet the long-term conservation objectives while also working with local communities and stakeholders to demonstrate sustainable development.

4.5 Through appropriate zonation

(a) a legally constituted core area or areas devoted to long term protection, according to the conservation objectives of the biosphere reserve, and of sufficient size to meet these objectives". (Describe the core area(s) briefly, indicating their legal status, their size, the main conservation objectives).

Areas of Core, Buffer and Transition Zones within AHSBR

Zone	Terrestrial Area (ha)/%	Marine Area (ha)/%	Total Area (ha)/%
Area of Core	42,218 - 23%	160 - .475%	42,378 - 19%
Area of Buffer	28,461 - 16%	1,910 - 5.46%	30,371 -14%
Area of Transition	113,056 - 62%	32,918 - 94%	145,974 - 67%
Total	**183,735 - 84%**	**34,988 - 16%**	**218,723**

4.5.1 Core Areas

A combined total of 42,218 ha of high elevation forests and alpine areas and 160 ha of marine area are proposed as the Core Areas of the AHSBR. As described in Section 7, the terrestrial Core Areas reflect the vast mountain wilderness available in the region which, while providing an exceptional resource for recreationists seeking isolation and a wilderness experience, also provide a number of important ecological funcations that serve both the protected areas themselves and the entire AHSBR area. Many of these functions are addressed in 4.5.3(d) in terms of how the terrestrial and marine Core, Buffer and Transition zones interact with each other, especially with respect to water production, but there are many other critical functions including enhancing air quality, providing vast and highly connected expanses of habitat for a wide variety of wildlife, and ensuring a permanent wild and scenic backdrop for the region's tourism industry. These terrestrial parks extend well beyond the boundaries of AHSBR and collectively include another 212,000 ha of adjacent protected areas.

The low to mid-elevation terrestrial environments below these high elevation Core Areas are also well represented in the network of protected areas distributed throughout the Buffer and Transition zones. As described in 4.5.2, these protected areas include a number of provincial parks, ecological reserves, wildlife management areas and specially managed Public forest lands encompassing over 28,000 ha. While not included as Core Areas, these areas protect numerous representative examples of the various ecosystems and habitat types that typify these lower elevation areas.

Garibaldi Provincial Park was established in 1927 to protect alpine meadows and unique volcanic features, represent of what is known as the Rugged Pacific Ranges Regional Landscape. This vast mountain park contains iconic features – the volcanoes of Mount Garibaldi, Black Tusk, and The Table; the azure waters of Garibaldi Lake; and alpine meadows famous for their wildflowers. This western portion of the park is managed as a Natural Environment Zone with "the objective of this zone to protect scenic values and provide for backcountry recreation opportunities in a largely undisturbed natural environment" (BC Parks, 2019). Recently in 2019, BC purchased an additional 5.6 hectares of land to expand the park in order to protect ecologically sensitive areas, promote biodiversity and enhance recreation opportunities (BC Parks, 2019).

Pinecone-Burke Provincial Park is part of the Lower Mainland Nature Legacy initiative established in 1995. It protects the western shore of Pitt Lake outside of AHSBR, the largest fresh water tidal lake in North America. It is a wilderness area protecting old-growth forests, numerous alpine lakes, rugged terrain and remnant icefields. Widgeon Slough is the largest freshwater marsh in southwestern BC and Widgeon Lake is largest hanging lake in Greater Vancouver's north shore mountains. The portion of the park within AHSBR boundary is contiguous with Garibaldi Provincial Park. A management plan for the park is in development with the Katzi First Nation (BC Parks, 2019).

Tantalus Provincial Park and the adjoining *Este-Tiwilh*/Sigurd Creek Conservancy protect the higher elevation reaches of the very rugged Tantalus Range. The Tantalus Range rises to almost 3,000 metres from the Squamish River, its estuary and the ocean to glacier-clad summits just west of Squamish. Tantalus offers "exceptional mountaineering as well as landscape viewing, hiking, and fishing in a wilderness setting. The old-growth coastal forest ecosystem is managed to maintain important wildlife and vegetation values" (BC Parks, 2012). Conservation objectives for Tantalus and the *Este-Tiwilh*/Sigurd Creek Conservancy are managed jointly with two other contiguous protected areas along the Squamish River, Brackendale Eagles Provincial Park and Baynes Island Ecological Reserve (BC Parks, 2012).

Tetrahedron Provincial Park is part of the Lower Mainland Nature Legacy initiative and was established in 1997. The park protects mid-elevation forests and mountain peaks from 900 to 1,800 metres elevation and straddles the western boundary of AHSBR. The park protects a wide range of landscapes, including mountain peaks, lakes, streams and wetlands, and a community watershed, and is managed to retain its wilderness character.

Cypress Provincial Park was established in 1975 and straddles the AHSBR boundary along its mountainous south-east corner above West Vancouver. The park is adjacent to the 60,000 ha Greater Vancouver Watershed lands. The park is part of the towering North Shore Mountains that form a backdrop to Metro Vancouver and have beckoned outdoor recreationists for many years. The park protects high elevation old growth forests, lakes and wetlands as well as hosting a controlled commercial alpine and Nordic ski area, and access road. Within the boundaries of the AHSBR, the park continues along the ridge of the famous Lion peaks, that provide backcountry access along the Howe Sound Crest Trail to Mt. Brunswick (BC Parks, 2019a).

BC's ancient glass sponge reefs are a globally unique and fragile ecosystem that provide important habitat for many marine species. In 2015 and 2019 Fisheries and Oceans Canada created ten Glass Sponge Reef Marine Refuges in Howe Sound, that protect a total of eleven glass sponge reef aggregations. These Refuges have been selected as the Core Areas in AHSBR's marine environment.

Terrestrial Core Areas

Terrestrial Core Area	Area of Park within Biosphere Region (ha)	Total Park Area (ha)	IUCN Category	Management Plan
Garibaldi Provincial Park	23,018	194,676	II	1990
Tantalus Provincial Park	10,809	11,351	Ib	2012
Pinecone Burke Provincial Park	2,612	38,000	II	In development
Tetrahedron Provincial Park	2,035	6,000	II	1997
Cypress Provincial Park	2,605	3,012	II	1997
Este-Tiwilh/Sigurd Creek Conservancy	1,139	1,112	II	2012
Total Areas	**42,218**	**254,151**	---	---

Marine Core Areas

BC's ancient glass sponge reefs are a globally unique ecosystem that provide important habitat for many marine species including spot prawns, rockfish, herring, halibut and sharks. The eleven glass sponge reefs within ten marine refuges selected as Core Areas in the marine environment are contiguous with the areas of protection put in place by Fisheries and Oceans Canada following extensive research and consultations with First Nations and stakeholders. The first two reefs were protected in 2015 followed by a further eight in 2019. The marine extension to Halkett Bay was for the sole purpose of protecting the Halkett Point Glass Sponge Reef.

Type of Protected Area	Total Area (ha)	% of total marine area	Zone	Restrictions	Regulatory Authority
Sponge Reef Closure Areas (11 aggregations)	160	.475%	Core	No bottom contact fishing activities	Fisheries & Oceans Canada

4.5.2 Buffer Zones

(b) a Buffer Zone or zones clearly identified and surrounding or contiguous to the core area or areas, where only activities compatible with the conservation objectives can take place". (Describe briefly the Buffer Zones(s), their legal status, their size, and the activities which are ongoing and planned there).

Areas compatible with the conservation objectives extend beyond borders of the Core Areas. Terrestrially, the proposed AHSBR Buffer Zones include mostly Public land that is immediately adjacent to and contiguous with the six Core Areas. Much of the high elevation lands adjacent to the Core Areas are highly constrained and are managed under a combination of legal designations identified as "Protected Areas" and "Resource Exclusion Areas" under the *Parks Act* and *Forest and Range Practices Act*, the *Land Act or the Environment* and *Land Use Act*. They include parks, conservancies, culturally significant areas, Wildlife Management and Habitat Areas, Ungulate Winter Ranges, Old Growth Management Areas, Wildland Areas or areas with visual quality objectives under the Government Actions Regulation (see Section 4.3). This combination of protected areas, resource exclusion areas, and the overlapping Frontcountry Area zoning and Scenic Area provide more benefit than simply buffering a Core Area, they provide protection of important wildlife and sensitive ecosystems beyond and throughout the proposed Biosphere Reserve area and meet MAB's requirement that the Buffer Zone permit only activities compatible with the conservation objectives of the Biosphere Reserve.

Areas to note include The Skwelwil'em/Squamish Estuary Wildlife Management Area (WMA) encompasses 673 ha of the largest and most productive estuarine ecosystem in Howe Sound. It provides wintering, migration, feeding and/or breeding habitats for waterfowl and shore birds, as well as raptors, passerines and other species. Together with Brackendale Eagles Provincial Park and Baynes Island Ecological Reserve, the area attracts globally

significant congregation of bald eagles and was consequently designated an International Bird and Biodiversity Area (IBA). It is also a feeding, spawning and rearing ground for a variety of fish species, including provincially significant species such as eulachon, steelhead and salmon. The estuary also provides good habitat for a number of mammal species including blacktail deer and black bear (BC Environment, 2007).

Municipal lands adjacent to the Core Areas are zoned for the expressed purpose of protecting the natural environment and providing for limited recreation use.

Land Designations and Management within the Buffer Zone

Terrestrial Buffer Area	Habitat features	IUCN Category	Area (ha)	Management Plan
Provincial Parks				
Alice Lake Provincial Park	Lakes, forest	II	412	2003
Brackendale Eagles Provincial Park	River, floodplain forests, eagle and salmon habitat	IV	764	2012
Stawamus Chief Provincial Park	Rock bluffs, forest	III	530	1997
Shannon Falls Provincial Park	Stream, falls, riparian	III	91	1985
Murrin Provincial Park	Lake, rock bluffs	Possibly OECM	32	1981
Apodaca Provincial Park	Rocky knoll, unique plant communities, tidal	II	8	1954
Plumper Cove Marine Provincial Park	Beach, forest	II	33	1960
Porteau Cove Provincial Park	Beach, forest	II	6	1981
Halkett Bay Marine Provincial Park	Rocky Tidal Coastline, forest	II	293	1988
Provincial Ecological Reserves				
Bowen Island Ecological Reserve	Flora, fauna, forest		400	1973
Baynes Island ER	River, island	II	45	2012
Wildlife Management Areas				
Skwelwil'em Squamish Estuary WMA	Estuary	IV	623	2007
Municipal Parks				
Nelson Canyon	Old-growth forest, creek		92	2014
Whyte Lake	Wetlands, lakes, old-growth forest		65	2014
Buffer - Provincial Protected Area				
Stawamus Chief	Rock bluffs , forest		2	1997
Sub-total of Protected Areas			3,396	
500 Meters Adjacent to Core Areas				
High elevation areas lacking commercial forest	Alpine, subalpine forest		4,267	
Resource Exclusion Areas				
Wildlands	Alpine, subalpine forest		4,685	
Wildlife Habitat Areas	Riparian, wetlands, forest		1,995	
Ungulate Winter Range Areas	Riparian, wetlands, forest		7,272	
Old Growth Management Areas	Forest		6,414	
Mineral Reserve (no mining activity)	Forest		432	
Sub-total area in Resource Exclusion Areas			20,798	
Total Area			**28,461**	

Marine Buffer Zones

Throughout the Marine area are various protection measures by Fisheries and Oceans Canada in place to protect fish and fish habitat. Surrounding the glass sponge reef edges is an additional 150 meters of area that lies within the Glass Sponge Reef Marine Refuges, as described in 4.5.1. This precautionary measure was taken due to uncertainty regarding the accuracy of fishing gear deployment and the possible impacts of sediment plumes caused by gear placement near the reefs in order to avoid possible impacts of sediment plumes caused by fishing gear placement near the delicate reefs. Five of the Glass Sponge Reef Marine Refuges are within Rockfish Conservation Areas (RCAs). RCA's prohibit the following methods: commercial and recreational hook-and-line, commercial shrimp and groundfish trawl, commercial sablefish trap, and recreational spearfishing. The conservation objectives of the glass sponge reef marine refuges and RCAs are to protect the fragile glass sponge reefs and inshore rockfish and their habitat, respectively.

BC is legally responsible for the seabed, while Fisheries and Oceans Canada and Transport Canada have legal responsibility for activities taking place below the high water mark throughout the marine environment. Fishing and harvesting activities in these marine Buffer Zones are limited, with numerous closures in effect.

Type of Protected Area	Total Area (ha)	% of total marine area	Zone	Restrictions	Regulatory Authority
Glass Sponge Reef Marine Refuges	705	.21%	Buffer	All bottom-contact fishing activities, including prawn trap, crab trap, shrimp and groundfish trawl, groundfish hook and line, and the use of downrigger gear on recreational salmon troll in several reefs.	Fisheries & Oceans Canada
Rockfish Conservation Areas, (11 discrete RCAs)	1,205 (5 of 10 RCA's)	3.4%	Buffer	Prohibited fisheries in Rockfish Conservation Areas include commercial and recreational hook-and-line, commercial shrimp and groundfish trawl, commercial sablefish trap, and recreational spearfishing. FSC fishing is permitted.	Fisheries & Oceans Canada

4.5.3 Transition Areas

(c) an outer Transition Area where sustainable resource management practices are promoted and developed. (The Seville Strategy gave increased emphasis to the Transition Area since this is the area where the key issues on environment and development of a given region are to be addressed. Describe briefly the Transition Area(s), the types of questions to be addressed there in the near and the longer terms. The Madrid Action Plan states that the outer boundary should be defined through stakeholder consultation).

As required by the Madrid Action Plan, the proposed outer boundary of AHSBR was one of a number proposals presented to stakeholders and Squamish Nation. The proposed boundary selected was a logical choice arrived at by consensus as it follows the boundary of the Cumulative Effects Assessment project conducted by BC which was also done in consultation with local governments and First Nations. It also aligns with other maps defining the entrance to Howe Sound.

AHSBR's terrestrial Transition Area is a combination of public lands, private lands and First Nations Reserves, incorporated municipalities and unincorporated communities. Much of the land within the Transition Zone has been restored or is managed in a way that supports a healthy eco-system, particularly in the Squamish Valley where restoration work has resulted in the recovery of fish and many other species.

Generally speaking, the public lands are located at mid to high elevations and are predominantly forested and designated as within the Timber Harvesting Land Base (THLB). Within the THLB strong measures are in place to ensure sustainability in forest management activities. Specific regulations that must be followed by harvestings operators set numerous objectives and targets to protect the environment including for biodiversity, riparian, visual and cultural heritage values and to protect the community water supply.

Due to the topographical imperative of the region, all settlements, both urban and rural, are located on the coastal edge adjacent to the shoreline of the fjord in the Transition Zone, below the high elevation Core areas and the mid-elevation Buffer Zone. This lowland fringe also accommodates the entire transportation infrastructure and hence the vast majority of the social and economic activities within AHSBR.

The marine area of Howe Sound represents 16% of the entire area of AHSBR, the vast majority of which is within the Transition Zone. While significant conservation measures are in place through the Fisheries Act to protect the eight species of cetaceans and pinnipeds found in the Sound, the globally significant glass sponge reefs and the many recovering species of fish and invertebrates, the past century and a half of industrialization continues to leave a legacy of diminished biodiversity that only recently has given hopeful signs of recovery. Increased protection efforts over the past decade could herald a new beginning for Howe Sound wit further conservation measures being contemplated, not only for glass sponges and rocky reefs but through a more holistic approach to include the full representation of marine environments in the Sound, from estuaries to deep pelagic waters. Such an approach would require full integration with the planned sustainability of the numerous ongoing and potential future activities in the Sound including a limited commercial fishery, coastal industry, a variety of recreational activities and shipping routes for ferries and commercial vessels.

There are many legislative and planning tools in place within the Transition Area to effect resource conservation and sustainable resource management, as described in Section 4.3. Going forward, there are several key questions that these measures will face, many of which are ongoing and, no doubt, include others that will emerge in the coming years:

- **Given the fundamental importance of forestry to the region, how can future forestry practices continue to sustain economic viability while maintaining visual quality, protecting outdoor recreation and tourism values and water production and quality?**
- **How can the maintenance of a sustainable economy serve Reconciliation efforts between BC and the Squamish Nation and address specific issues important to the Nation including access to economic opportunities, housing and rejuvenation of the *Sḵwx̱wú7mesh sníchim* language?**
- **How can the Biosphere Region help address current and future issues related to climate change, including sea level rise, ocean acidification, wild fire and drought?**
- **How can the Biosphere Region help local communities and municipalities cope with the pressures of population rise and increased development, and the host of environmental and social issues that arise with them?**
- **How can the management of the marine environment maintain or enhance the pace of recovery in the health of the marine ecosystem while continuing to accommodate existing and evolving levels of economic activity?**

HSBRIS and its partners will place considerable focus in their deliberations and public consultations to address these and other questions related to the long-term security of the Region's environmental, economic and social fabrics. The requirement for extensive consultation vested in the relevant legislation and policy instruments will ensure a robust consultation process at all levels of planning and administration.

(d) Please provide some additional information about the interaction between the three areas)

The snow covered peaks and surrounding forests of the Core Area watersheds are managed to protect a number of important values that directly affect the adjacent lower elevation lands, especially the waters that flow down through the Buffer Zones and Transition Areas into

View of Squamish River plume in inner Howe Sound, photo: B. Turner

Howe Sound. This water source is of critical importance for community water supplies, for nurturing the limited lowland agricultural land and for enhancing wetlands, streams and lakes and the habitats they provide for a variety of floral and faunal species. These waters provide nutrients for the marine environments they flow into and critical spawning habitat for several species of anadromous fish. The Squamish River is the source of 90% of the fresh water in Howe Sound providing important exchanges with deep seawater.

In terms of human use, the terrestrial Core and Buffer Zoned areas are heavily forested and are managed to conserve natural resources, especially in the Protected Areas and the Resource Exclusion Areas. Recreation use is limited and managed to ensure recreation and conservation objectives are met.

In the marine environment, most of the protected glass sponge reefs are at or exceed depths accessible only by deep sea professional divers. The protection from bottomcontact fishing plus the protections of the Rockfish Conservation areas prohibiting hook and line fishing support accidental damage from uses in the Transition Zone.

4.6 Organizational Arrangements

(should be provided for the involvement and participation of a suitable range of inter alia public authorities, local communities and private interests in the design and the carrying out of the functions of a biosphere reserve).

The range of organizational arrangements already in place, and those envisioned for the future, to implement the functions of a Biosphere Reserve vary from NGO-led initiatives, to more institutionalized arrangements within and among local and provincial government agencies with specific management authorities. There are many collaborative and co-management arrangements in place between NGOs, governments and First Nations. HSBRIS' role is to encourage and develop collaboration among the various agencies and organizations.

4.6.1 Arrangements in Place or Foreseen

(Describe involvement of public and/or private stakeholders in support of the activities of the biosphere reserve in core, buffer and Transition Areas (such as agreements, protocols, letters of intent, protected areas) plans).

The Howe Sound Community Forum (HSCF) has been active in the region for the past 20 years. The purpose is to provide a forum for senior governments, local governments and First Nations discussion about maintaining and enhancing the economic, environmental, cultural and social well being of the Howe Sound region for the benefit of present and future generations.

The HSCF is not a decision-making body but enhances collective action among senior governments, local governments, and First Nations. Over the past 20 years, advocacy for comprehensive planning, marine protection, and other policy initiatives have resulted in actions taken by various levels of government. This assembly of local and provincial government agencies, First Nations and NGOs are committed to the Principles for Cooperation (see Appendix G). The members share information, discuss strategies for addressing common environmental and socio-economic issues, and collaborate toward sustainable solutions. The HSCF has been instrumental in facilitating the creation of HSBRIS and this nomination to UNESCO for the establishment of a Biosphere Reserve. Members of the HSCF have providedletters of support for the AHSBR Initiative. (see Appendix E)

Participants in the AHSBR Roundtables, as described in Section 17, include a broader and more diverse representation of the region that support the objectives of the UNESCO framework and are committed to the AHSBR and HSBRIS Guiding Principles. The AHSBR Roundtable complements the HSCF and will serve to further support activities in the region. Some of the many agreements, protocols, and co-management plans respecting the management of the core, buffer, and transition zones are referenced in section 17.1.4.

HSBRIS' role is to support and monitor the application of the many current and future protocols and arrangements that exist between agencies, First Nations and governments.

4.6.2 Cultural and Social Impact Assessments

Have any cultural and social impact assessments been conducted, or similar tools and guidelines been used? (e.g. Convention on Biological Diversity (CBD)'s Akwé: Kon guidelines; Free, Prior, and Informed Consent guidelines, Biocultural Community Protocols, etc.). (UNESCO's Programme on Man and the Biosphere (MAB) encourages biosphere reserves to consider and respect indigenous and customary rights through programmes or tools, in accordance with the United Nations Declaration on the Rights of Indigenous Peoples (http://www.un.org/esa/socdev/unpfii/documents/DRIPS_en.pdf when relevant and appropriate)).

To date, there have been no formal social or cultural impact assessments conducted specifically regarding First Nations in the AHSBR region, but the completion of Canada's Truth and Reconciliation Commission's report in 2015 is an assessment of social and cultural conditions affecting all First Nations People in Canada over the past century. Further, with Canada's formal adoption of UNDRIP a year later in 2016, there is an enhanced recognition of basic human rights for all First Nations Peoples in Canada, as already recognized in Section 35 of the Canadian Constitution, including rights to self determination, language, equality and land, among others.

The adoption of the Commission's report and of UNDRIP has accelerated the pace at which Canada is moving forward with reconciliation with Indigenous people. The report has made a number of specific recommendations with respect to such social issues as child welfare, education, language and culture, health and justice, and identified a number of priority actions to pursue on the journey toward reconciliation, including improved recognition of First Nations rights and title.

In 1993, under the British Columbia Treaty process, the Squamish Nation officially began to negotiate aboriginal title to those lands and waters that constitute Squamish Nation traditional territory, rights to the resources of Squamish Nation traditional lands and waters, and the Squamish Nation inherent right to self-determination. The claim is currently at Stage Three of a six stage process (Squamish Nation, 2019).

BC and the Squamish Nation have worked for over a decade in the spirit of reconciliation through improved land use planning policy, government-to-government discussions and land use agreements, as occurred in the 2008 completion of the Sea-to-Sky Land and Resource Management Plan (LRMP) (which incorporates 74% of the AHSBR region). The plan and its accompanying Land Use Agreement with BC in 2007 identifies and protects a number of culturally significant areas as Wild Spirit Places, Conservancies and Wildlands, as well as other Cultural Management Areas and Sites, the use of which must protect First Nations values and ecological integrity. More recently, a 2012 agreement regarding the cooperative management of Este-tilwilh/Sigurd Creek Conservancy, Brackendale Eagles and Tantalus provincial parks and Baynes Island Ecological Reserve is in the process of implementation, and a similar cooperative management agreement is underway for Pinecone-Burke Provincial Park.

The Squamish Nation has developed and is now implementing its own independent assessment process for major projects proposed in its territory, known as the Squamish Nation Process. The 2015 "Squamish Nation Process, Getting to Consent" (Ratcliffe and Company 2015) outlines the background, what it is and how it may ultimately lead to the reconciliation of Crown and Squamish Nation decisions on major project proposals in Squamish territory.

More and more, organizations are adopting the understanding of applying an Indigenous Lens to their programs. Principles that all learning is grounded in understanding the connected relationship of language, land and culture. School District 48, Sea to Sky, is doing an exemplary job at integrating Indigenous learning, approaches and cultural components into the curriculum, a method to be emulated by other districts in B.C. and across Canada. The public and independent schools in the area are implementing curriculum and practices that pay homage to the heritage of the land and its original peoples – something that benefits Indigenous students but also non-Indigenous ones, according to educators. These changes have helped spike Aboriginal graduation rates, which some years recently has reached 100%, There are still challenges, but more commitments are being made. (Johnson, Feb 2020)

4.7 Mechanisms for Implementation

Does the proposed biosphere reserve have: (a)"mechanisms to manage human use and activities in the Buffer Zone or Zones"? If yes, describe. If not, describe what is planned

As discussed above in Section 4.5, the high elevation lands in the terrestrial Buffer Zones are excluded from, or have limited access for, resource activities such as forest harvesting, mining or large-scale hydro-electric development. They have been created for the expressed purpose of protecting biodiversity or because they lack harvestable resources due to high elevation.

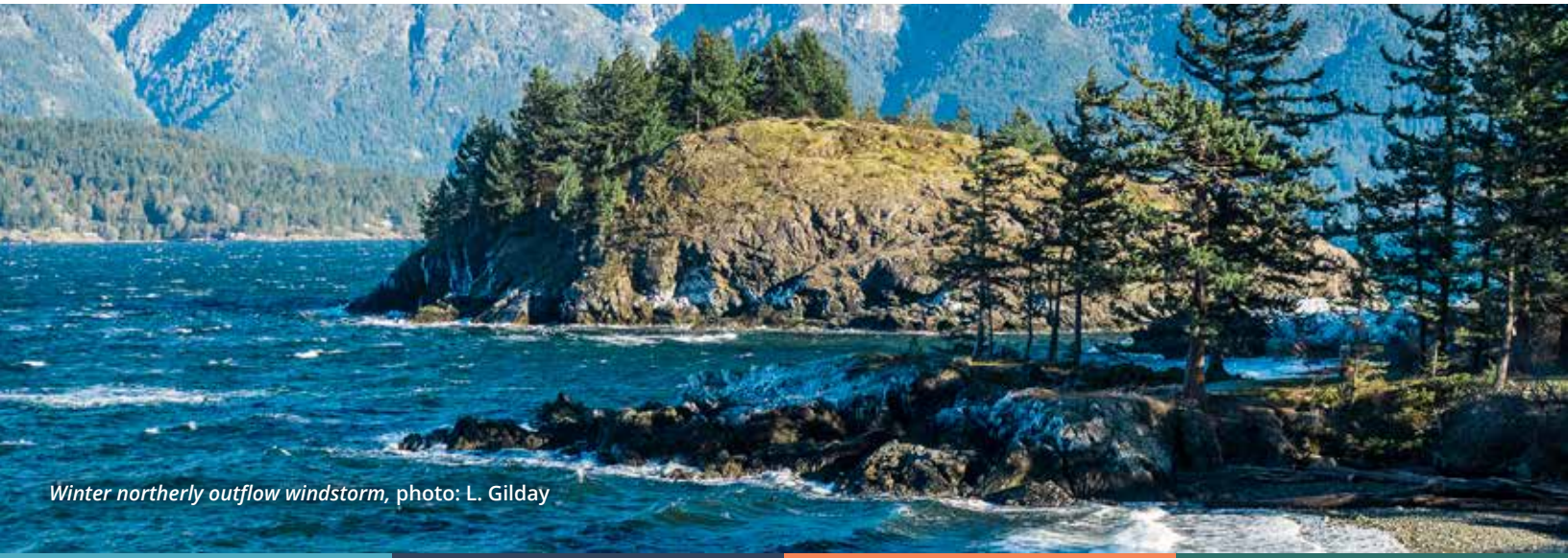
The remaining lands in the Buffer Zone lie outside the Timber Harvesting Land Base (THLB). Even though these lands are still potentially available for timber harvesting and other resource activity, they are generally considered to be physically or economically inoperable from a forest harvesting perspective due primarily to steep slopes, soil sensitivity and/or economic viability (Ministry of Forests and Range, 2008).

The wide range of resource activities on these lands, including forest harvesting, outdoor recreation, wildlife management and hunting, is managed by FLNRORD, the province's land and forest management agency, in accordance with several operational plans as mentioned in Section 4.3.2, in particular, the Forest Stewardship plans and the Landscape Unit plans that incorporate specific rules and conditions, including inter-agency referrals, for those proposing land use activity. Most of the lands are also managed under the guidance of the Sea to Sky LRMP and *Xay Temiewx* Plan so use of these Buffer Zone lands is clearly defined and co-managed with First Nations.

Fishing activities within the marine Buffer Zones are managed by Fisheries and Oceans Canada in cooperation with members of the public who help enforce the fishing regulations by calling Observe, Record and Reporting line which triggers investigation by Conservation and Protection officers. Various NGO's provide support to Fisheries and Oceans Canada through monitoring and reporting on changes and activities in the marine area. Management plans are created in cooperation with BC Parks for enhancing protection of the important conservation values.

(b) a management plan or policy for the area as a biosphere reserve"? If yes, describe. If not, state how such a plan or policy will be developed, and the timeframe. (If the proposed area coincides with one or more existing protected natural area(s), describe how the management plan of the proposed biosphere reserve will be complementary to the management plan of the protected area(s)).

As yet, there is no single management plan for the proposed Biosphere Reserve. An objective of HSBRIS is for there to be a comprehensive and holistic land and marine use plan for the entire AHSBR region (see Section 13). AHSBR Roundtable provide a forum for considering management plans and actions that support a comprehensive plan. With representatives from various sector stakeholders, land authorities and First Nations participating in the AHSBR Roundtable, updating existing



Winter northerly outflow windstorm, photo: L. Gilday

management plans would be influenced towards the objectives of the Biosphere Reserve. In any planning for the region, referrals to HSBRIS would be expected. The long term strategic plan for AHSBR will be developed with contributions from the AHSBR Roundtable participants taking into considering the existing plans and identifying the gaps and opportunities.

HSBRIS participates as advisors to various committees and groups that are considering plans for the region. For example, the current management planning for Squamish community forest adjacent to the Garibaldi Provincial Park is complemented by the intentions to buffer core protected areas within the Biosphere Reserve (see Section 15.4.1).

(c) A designated authority or mechanism to implement this policy or plan"?

HSBRIS is responsible for the strategic plan and management towards the objectives as described in Sections 3.3 and 17. There is no single authority responsible for the preparation and implementation the management plan for the Biosphere Reserve. The governance model for AHSBRI calls for a collaborative effort among its government, NGO and First Nations partners to undertake this task.

(d) Programmes for research, monitoring, education and training"? If yes, describe. If not, describe what is planned.

As described in Sections 3.3.4 and 16.1, there is a great deal of research and monitoring already taking place in AHSBR. For example, the Squamish River estuary has been undergoing restoration work over the past 20 years and ongoing projects continue to improve fish access. Newly discovered glass sponge reefs are being been ground-truthed by Fisheries and Oceans Canada in the hope of future protection and restoration projects continue for stream-keeping and eelgrass mapping.

With its growing population and wealth of natural resources located on Metro Vancouver's doorstep, the region is, and will continue to be, a place for learning and discovery that is highly attractive to a wide array of government and university researchers and NGO groups as well as youth camps and field schools. The universities with active research programs in the region include the University of British Columbia, Simon Fraser University, BC Institute of Technology, Quest University and Capilano University. The First Nations contribution to learning and discovery is also highly significant, including the Squamish Nation's cultural journey programs that continue to connect youth to the traditions and language of their people.

Capilano University has signed a Letter of Engagement with HSBRIS that provides a statement of intent and commitment focused on exploring novel educational opportunities, specifically place-based learning and applied research in addition to a field school in the region, and also helping to identify sources of funding to support these initiatives. In line with its Vision 2030 the letter affirms the University's commitment to sustainability and to the local First Nations with respect to the Truth and Reconciliation Report's Call to Action and the UN's Declaration on the Rights of Indigenous Peoples.

The current HSBRIS Board of Directors has engaged with Dr. David Zandvliet, Director of the Institute of Environmental Learning based at Simon Fraser University and the recently appointed UNESCO Chair of Biocultural Diversity Education, on a plan for ongoing collaboration. The Institute has as its mission the creation of a vibrant, active research and education network with the overarching goal a sustainable future for BC. It involves partnerships with researchers, educators, and government stakeholders as well as First Nations, industry and NGOs. It aims to facilitate education and action-oriented research around environmental learning and sustainability and has been chartered by the United Nations as a Regional Centre for Expertise on Education for Sustainable Development representing BC and the North Cascades. One member of the HSBRIS Board has been invited to participate in the Institute for Environmental Learning's Advisory Council and Dr Zandvliet has been invited to join the HSBRIS Working Group. Plans are underway to collaborate on the delivery of the Vancouver Ocean Literacy-focused Field School scheduled for May and June 2021. Discussions have also commenced on potential contributions to several Simon Fraser University Faculty of Education courses related to environmental education. Discussions also have placed priority on exploring funding opportunities that would leverage the strengths of HSBRIS and the Institute of Environmental Learning focusing on place-based curriculum centered on Howe Sound.

Developing education programs about the UNESCO Biosphere Region program will be an important role for HSBRIS. Through networking with other members of the World Network of Biosphere Reserves and the Canadian Network of Biosphere Reserves HSBRIS will share and further extend its work on biodiversity conservation, sustainable development and Reconciliation; it will also communicate the outcomes of this work to both residents and visitors to the region on a regular basis. For many millennia First Nations have demonstrated the tremendous power of telling stories about harmonious human interactions with nature, noting how inextricably intertwined they are. A priority for HSBRIS is partnering with groups specializing in the arts to enhance the communication process through using the powerful and effective medium of storytelling to convey the region's science on an emotional level.

5 Endorsements

5.1 Signed by the authority/authorities in charge of the management of the core area(s):

Ministry of Environment and Climate Change Strategy
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Victoria, BC
V8W 9M1
250-387-1288
jim.standen@gov.bc.ca

Jim Standen, Assistant Deputy Minister, BC Parks and Conservation Officer
Service Division

Fisheries and Oceans Canada
Regional Headquarters
200-401 Burrard St
Vancouver BC
V6C 3S4

Rebecca Reid, Regional Director General

Squamish Nation
320 Seymour Blvd,
North Vancouver, BC
V7J 2J3
peter_baker@squamish.net

Peter Baker, Rights & Titles Director

5.2 Signed by the authority/authorities in charge of the management of the Buffer Zone(s):

Ministry of Forests, Lands, Natural Resource Operations and Rural Development

Ministry of Forests, Lands and Natural Resource Operations and Rural Development
PO Box 9352 Stn Prov Govt
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V8W 9M1
778-974-5878
craig.sutherland@gov.bc.ca

Craig Sutherland, Assistant Deputy Minister - Coast Area

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Mary Ann Booth, Mayor

Fisheries and Oceans Canada

Fisheries and Oceans Canada Regional Headquarters
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Rebecca Reid, Regional Director General

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North Vancouver, BC
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peter_baker@squamish.net

Peter Baker, Rights & Titles Director

5.3 Signed as appropriate by the National (or State or Provincial) administration responsible for the management of the core area(s) and the Buffer Zone(s):

Ministry of Environment and Climate Change Strategy
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Jim Standen, Assistant Deputy Minister, BC Parks and Conservation Officer Service Division

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Craig Sutherland, Assistant Deputy Minister - Coast Area

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Rebecca Reid, Regional Director General

Squamish Nation
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peter_baker@squamish.net

Peter Baker, Rights & Titles Director

5.4 Signatures of authorized elected local government representing the local community in the Transition Area.

Village of Lions Bay
PO Box 141,400 Centre Road,
Lions Bay, BC
V0N 2E0
604 921-9333
mayor.mclaughlin@lionsbay.ca

Ron McLaughlin, Mayor

District of Squamish
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kelliott@squamish.ca

Karen Elliott, Mayor

Bowen Island Municipality
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Gary Ander, Mayor

District of West Vancouver
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Mary Ann Booth, Mayor

Sunshine Coast Regional District
1975 Field Road,
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Lori Pratt, Chair

Town of Gibsons
474 S Fletcher Rd,
Gibsons, BC
V0N 1V0

Bill Beamish, Mayor

Squamish Lillooet Regional District
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Tony Rainbow, Chair

Gambier Island Local Trust Committee
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Gabriola Island, BC
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Sue Ellen Fast, Chair

Metro Vancouver
4730 Kingsway,
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Chris Plagnol, Corporate Officer

Squamish Nation
320 Seymour Blvd,
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V7J 2J3
peter_baker@squamish.net

Peter Baker, Rights & Titles Director

5.5 Signed on behalf of the MAB National Committee or focal point:

United Nations Educational, Scientific and Cultural Organization · Canadian Commission for UNESCO

Canadian Commission for UNESCO
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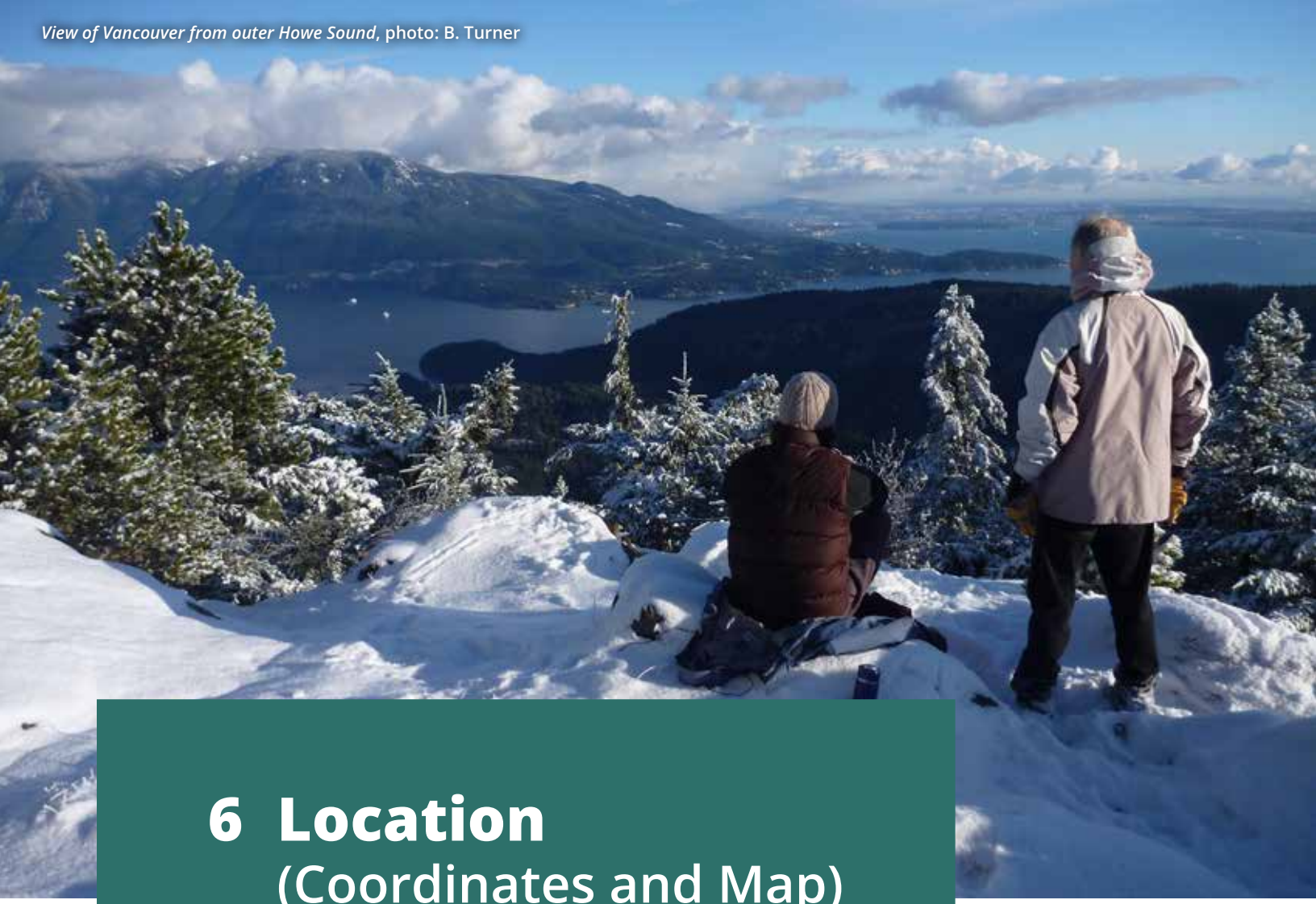
Ottawa, ON
K1P 5V8
sebastien.goupil@unesco.ca

Sébastien Goupil, Secretary General

Part II: Description

Hikers on top of the Squamish Chief, photo: B. Turner



View of Vancouver from outer Howe Sound, photo: B. Turner

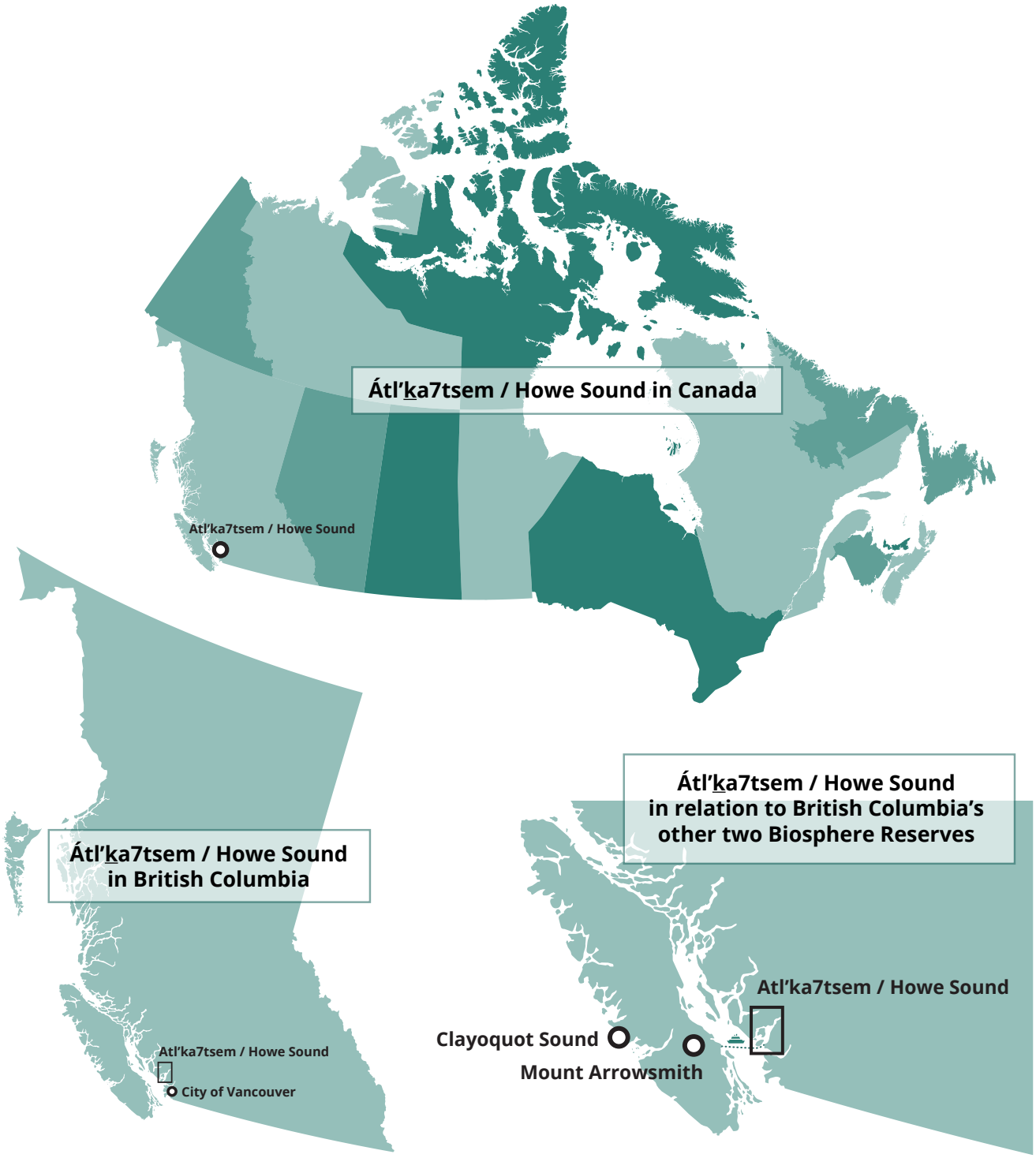
6 Location (Coordinates and Map)

6.1 Geographic Coordinates

Provide the biosphere reserve's standard geographical coordinates (all projected under WGS 84)

Cardinal Points:	Latitude	Longitude
Most central point:	49° 39.608'N	123° 12.782'W
Northernmost point:	50° 03.341'N	123° 15.119'W
Southernmost point:	49° 19.216'N	123° 21.970'W
Westernmost point:	49° 29.634'N	123° 37.356'W
Easternmost point:	49° 37.755'N	122° 48.209'W

AHSBR would join two other Biosphere Reserves along the shores of the Salish Sea and Vancouver Island in southwestern British Columbia. Mt Arrowsmith BR lies 60 km to the west across the waters of the Salish Sea from AHSBR, on eastern Vancouver Island. Clayoquot Sound BR is another 70 km west or 45 minute drive on the west coast of Vancouver Island.

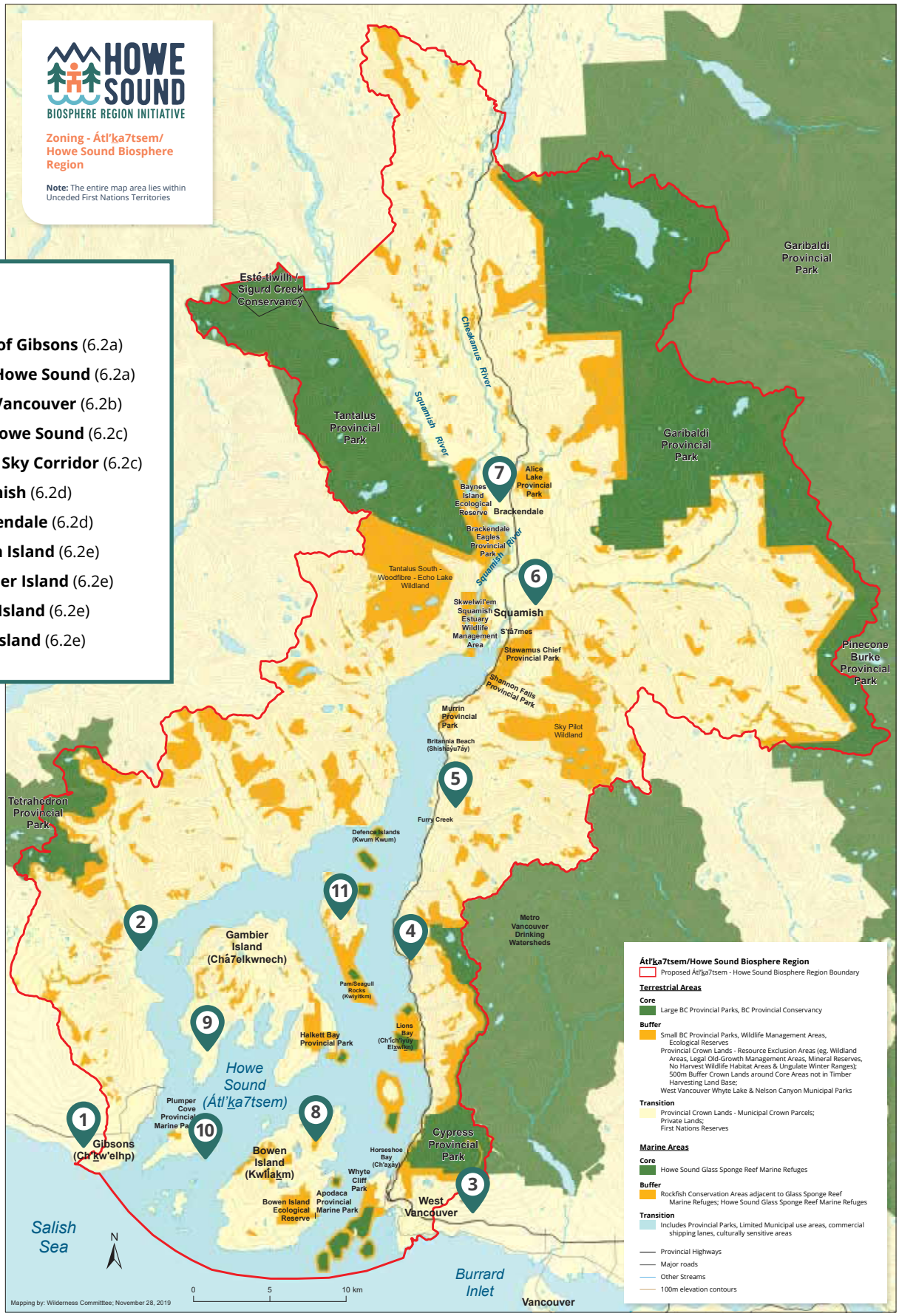


6.2 Provide a map(s) as a topographic layer of the precise location and delimitation of the three zones of the biosphere reserve.

(Maps shall be provided in both paper and electronic copies). Shapefiles (also in WGS 84 projection system) used to produce the map must be attached to the electronic copy of the form. If possible, also provide a link to access this map on the internet (e.g. Google map, website...).

https://howesoundbri.org/location

Please see next page for map.


HOWE SOUND
BIOSPHERE REGION INITIATIVE
Zoning - Átl'ka7tsem/ Howe Sound Biosphere Region
Note: The entire map area lies within Unceded First Nations Territories
Legend
1. Town of Gibsons (6.2a)
2. West Howe Sound (6.2a)
3. West Vancouver (6.2b)
4. East Howe Sound (6.2c)
5. Sea to Sky Corridor (6.2c)
6. Squamish (6.2d)
7. Brackendale (6.2d)
8. Bowen Island (6.2e)
9. Gambier Island (6.2e)
10. Keats Island (6.2e)
11. Anvil Island (6.2e)
Garibaldi Provincial Park
Esté-tiwilh / Sigurd Creek Conservancy
Cheakamus River
Squamish River
Tantalus Provincial Park
Alice Lake Provincial Park
Baynes Island Ecological Reserve
Brackendale
Brackendale Eagles Provincial Park
Tantalus South - Woodfibre - Echo Lake Wildland
Skwelwil'em Squamish Estuary Wildlife Management Area
Squamish
S'ta7mes
Stawamus Chief Provincial Park
Shannon Falls Provincial Park
Murrin Provincial Park
Britannia Beach (Shishàyu7ây)
Sky Pilot Wildland
Pinecone Burke Provincial Park
Tetrahedron Provincial Park
Furry Creek
Defence Islands (Kwum Kwum)
Metro Vancouver Drinking Watersheds
Gambier Island (Chá7elkwnech)
Pam/Seagull Rocks (Kwiyitkm)
Halkett Bay Provincial Park
Lions Bay (Ch'ich'iyáy Elxwíxn)
Howe Sound (Átl'ka7tsem)
Plumper Cove Provincial Marine Pa
Gibsons (Ch'kw'elhp)
Bowen Island (Kwilakm)
Horseshoe Bay (Ch'azáy)
Whyte Cliff Park
Apodaca Provincial Marine Park
Bowen Island Ecological Reserve
Cypress Provincial Park
West Vancouver
Salish Sea
Burrard Inlet
Vancouver
N
0 5 10 km
Mapping by: Wilderness Committee; November 28, 2019
Átl'ka7tsem/Howe Sound Biosphere Region
Proposed Átl'ka7tsem - Howe Sound Biosphere Region Boundary
Terrestrial Areas
Core
Large BC Provincial Parks, BC Provincial Conservancy
Buffer
Small BC Provincial Parks, Wildlife Management Areas, Ecological Reserves
Provincial Crown Lands - Resource Exclusion Areas (eg. Wildland Areas, Legal Old-Growth Management Areas, Mineral Reserves, No Harvest Wildlife Habitat Areas & Ungulate Winter Ranges); 500m Buffer Crown Lands around Core Areas not in Timber Harvesting Land Base;
West Vancouver Whyte Lake & Nelson Canyon Municipal Parks
Transition
Provincial Crown Lands - Municipal Crown Parcels; Private Lands; First Nations Reserves
Marine Areas
Core
Howe Sound Glass Sponge Reef Marine Refuges
Buffer
Rockfish Conservation Areas adjacent to Glass Sponge Reef Marine Refuges; Howe Sound Glass Sponge Reef Marine Refuges
Transition
Includes Provincial Parks, Limited Municipal use areas, commercial shipping lanes, culturally sensitive areas
Provincial Highways
Major roads
Other Streams
100m elevation contours

Looking up west Howe Sound to Garibaldi Provincial Park, photo: R. Simons

7 Area

The total area of the proposed AHSBR is approximately 218,723 ha including both its terrestrial and marine components. The terrestrial component encompasses 183,735 ha or 84% The marine waters represent the remaining 34,988 ha or 16% of the total AHSBR.

Zone	Terrestrial (ha)	Marine (ha)	Total (ha)
7.1 Core Areas	42,218	160	42,378
7.2 Buffer Zones	28,461	1,910	30,371
7.3 Transition Areas	113,056	32,918	145,974
Total	**183,735**	**34,988**	**218,723**

7.4 Rationale for Zonation

(Provide a brief rationale of this zonation in terms of the respective functions of the biosphere reserve. If a different type of zonation also exists, indicate how it can coexist with the requirements of the biosphere reserve zonation).

The zonation of the proposed BR meets the criteria of the Statutory Framework for the World Network of BRs. (See also Section 4.5). The proposed Átl'ka7tsem/Howe Sound Biosphere Reserve follows the same boundaries as the Howe Sound Cumulative Effects project (see Section 3.1.3) conducted by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD, 2014).

Terrestrial Area:

Tetrahedron Park, photo: R. Simons

Core Area

While there are collectively over 74,840 hectares of protected and conserved areas in the AHSBR region, representing close to 42% of the terrestrial area, the five parks and one conservancy were selected as the Core Areas on land due to the adjacent protective buffering that permit only activities compatible with the conservation objectives of the Biosphere Reserve.

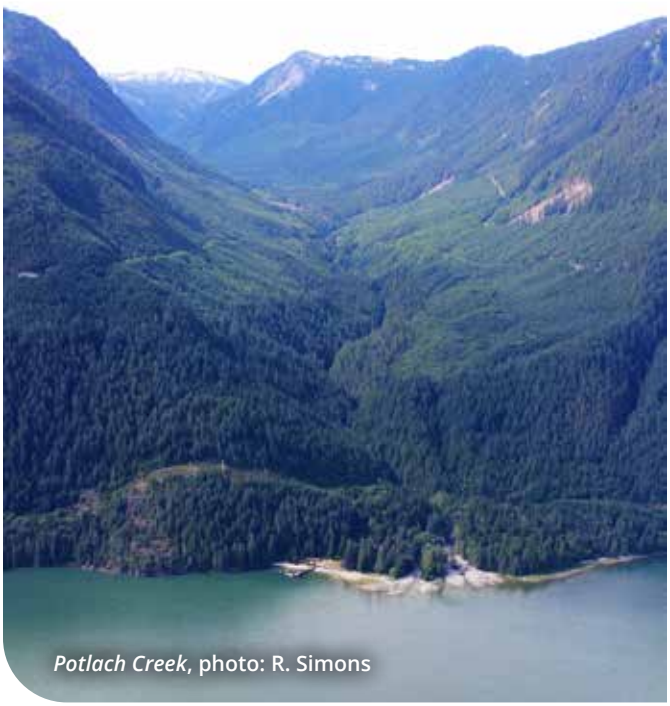
42,218 ha of Core Area reflect the vast wilderness available in the region. Straddling the mountainous rim of the proposed boundary, the five parks (Garibaldi, Pinecone-Burke, Cypress, Tetrahedron, and Tantalus) protect extensive mid- and high elevation forests and alpine areas. These parks extend well beyond the boundaries of AHSBR, and collectively include another 212,000 ha of adjacent protected area. In addition, the eastern watersheds of AHSBR lie adjacent to the Metro Vancouver Drinking Watershed lands, a 31,920 ha area managed by the Greater Vancouver Water District for drinking water quantity and quality. These lands are managed with restricted public access and border 80% of the eastern boundary of AHSBR. These protected areas beyond the AHSBR boundary, totaling almost 244,000 ha, perform an extensive buffering role for Core, Buffer and Transition zone lands in AHSBR, and greatly enhance the protection of biodiversity by providing connectivity to vast areas of protected forest, river valley, lake and wetland habitats.

The Core Areas reflect the cultural values in the region, managed collaboratively by BC Parks and the Squamish Nation. The *Este-Tiwilh*/Sigurd Creek Conservancy is approximately 1,112 hectares in size and is adjacent to the northern boundary of Tantalus Park. The conservancy represents approximately 12% of the 9,164 hectare *Esté-tiwilh Kwékwayex Kwelháynexw ta Skwxwú7mesh Temixw*, or Squamish Nation Wild Spirit Places on the west side of the Squamish River between the Ashlu and Elaho watersheds. The conservancy is also adjacent to *Yelhixw*, a Squamish Nation village site, at the confluence of the Squamish River and Ashlu Creek.

Buffer Zone

Based on discussions with the government land managers, Buffer Zones as illustrated are compatible with the Biosphere Region conservation objectives and extend well beyond the borders of the Core Areas. A combined 28,461 ha of area protects diverse habitats including lakes, rivers, waterfalls, wetlands, ocean shorelines and estuaries. Buffer Zones adjacent to the Core areas are at high elevations which places constraints on the degree and nature of resource-based activity. The Public lands within the Buffer Zone are comprised of protected areas that include parks, conservancies and wildlife management areas. They also encompass Resource Exclusion Areas that are managed primarily to protect old growth forests, the winter range of ungulates such as elk, deer and mountain goat, specific wildlife habitats and wildlands. Buffer Zone lands also are within overlapping Frontcountry Area and Scenic Area zoning, a provincially approved higher-level direction assigning a management priority of visual landscape management to retain the high scenic values of this region for local communities and the visiting public, as well as for the outstanding recreational potential of the area.

With respect to the working forests of AHSBR, BC's forest ministry, FLNRORD, is committed to the long-term conservation of forest biodiversity in the region (FLNRORD, 2019b).The results of the Cumulative Effects assessment on forest biodiversity provide a general estimate of the



Potlach Creek, photo: R. Simons

condition of forest biodiversity which then helps identify appropriate management responses to retain or improve biological and habitat diversity in the region.

Municipal Lands adjacent to Cypress Park are a combination of lands zoned as protected areas, Limited Use and Recreation zoning with the intent of protecting the natural environment and sensitive habitat.

Transition Area

Within the Transition Area, is a combination of Public lands, municipal lands, private lands and First Nations Reserves. By far, the largest land ownership category within the Transition Area is Public land that supports the local forest industry, as well as numerous Resource Exclusion Areas and Spatially Managed Areas that are reserved from forestry activity to conserve forest and wildlife biodiversity. By legislation they are managed sustainably for multiple values including forestry, wildlife habitat and recreation. Regulations set numerous objectives to protect the environment including for biodiversity, riparian, visual quality, cultural heritage and community water supply. These regulations must be followed by proponents harvesting on the provincial Crown Forest Land Base.

There are also numerous provincial and local protected areas distributed throughout the Transition Area including local parks created by regional governments and municipalities, and private conservation lands.

Due to the topography of the land, all of the private lands in AHSBR occur primarily along the populated shorelines of southern Átl'ka7tsem/Howe Sound and along the Highway 99 corridor between and including West Vancouver and Squamish. Private lands are primarily residential and centered on the coastal communities where there are also commercial centers.

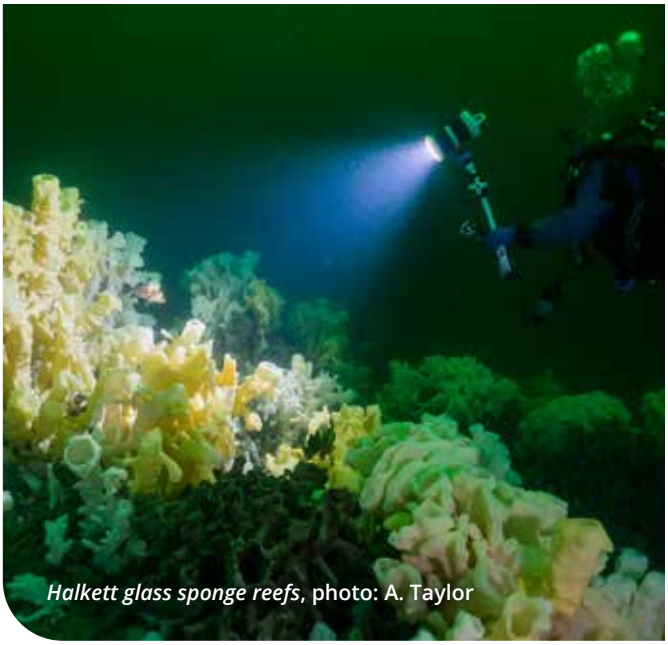
McNab Creek Valley, photo courtesy of Sea to Sky Air.

Squamish River plume colours inner Howe Sound, photo courtesy of Sea to Sky Air.

Marine Area

Core Area:

In the marine realm, the Core Areas are an archipelago of eleven protected glass sponge reefs within ten Glass Sponge Reef Marine Refuges. These conservation protections recognize the global significance of the glass sponge reefs found nowhere else in the world other than the west coasts of Canada and the northern United States.



Halkett glass sponge reefs, photo: A. Taylor

Buffer Zone:

Surrounding each of the glass sponge reefs edges is an additional 150 mtrs of area, 705 ha total, that lies within the protected Glass Sponge Reef Marine Refuges, established as a precautionary measure due to uncertainty regarding the accuracy of fishing gear deployment and the possible impacts of sediment plumes caused by gear placement near the reefs. Five of the Glass Sponge Reef Marine Refuges are within 1,205 ha of Rockfish Conservation Areas (RCAs). RCA's prohibit the following fishing methods: commercial and recreational hook-and-line, commercial shrimp and groundfish trawl, commercial sablefish trap, and recreational spearfishing. They are managed for conservation purposes. Further protections are being considered for nine remaining marine areas in Howe Sound that are currently being assessed for ecological significance and may contain glass sponge reefs (DFO, 2019a).

Transition Zone:

While there are many protections overlaying the marine Transition Area and culturally significant areas, the Átl'ka7tsem/Howe Sound marine area hosts a wide range of social and economic activities, being very popular for many recreational activities including sail and motor boating, kayaking, SCUBA diving and wind surfing, as well as being a busy corridor for ferry, commercial, and industrial shipping traffic.

Cheakamus Centre, photo: R. Simons

8 Biogeographical Region

Indicate the generally accepted name of the biographical region in which the proposed biosphere reserve is located. (The term 'biographic region' is not strictly defined, but you may wish to refer to the Udvardy classification system.)

8.0 Biogeographical Region

According to Udvardy's global biogeographical classification system, as recognized by UNESCO and the IUCN as the international standard for classifying the world's biotic ecosystems for the purposes of conservation, the AHSBR is located in the Sitkan Biogeographic Province of the Neararctic Realm, with its characteristic biome being classified as "Temperate needle-leafed forests or woodlands" (Udvardy, 1975). This classification has since been updated to place AHSBR in the "Temperate Coniferous Forest" biome (Olsen et al, 2001).

In the National Ecological Framework for Canada, this area is classified as being within the Pacific Maritime Ecozone in portions of the Georgia Puget Basin, Lower Mainland and Pacific Ranges ecoregions (Environment Canada, 1995). At the provincial level, the lower elevations of the AHSBR are located within the Fraser Lowland Ecosection, and the higher elevations in the Southern Pacific Ranges Ecosection, both in the Georgia Depression Ecoprovince (Demarchi, 2011). Parks Canada, under the National Parks System Plan, locates Howe Sound within the Strait of Georgia Lowlands and the Pacific Coast Mountains (Parks Canada, 1993).

West Howe Sound log sorts, sawmills and pulp mill, photo: F. Beaty

9 Land Use

9.1 Historical

(If known, give a brief summary of past/historical land use(s), resource uses and landscape dynamics of each zone of the proposed biosphere reserve).

Only 160 years ago, the lands and waters within AHSBR were wilderness, as they had been for the previous 10,000 years of post-glacial evolution. The terrestrial Core Areas of AHSBR still reflect this wilderness spirit and are known today for their beauty, remoteness and high outdoor recreation values. In the intervening years, changes in the use of the land, particularly in the Transition Area, have been transformative, witnessing a shift from serving as the exclusive homeland of coastal First Nations, to becoming the new home of European settlers and the beginnings of a resource based economy in the late 1800s. Today, the Transition Area and to a lesser extent the Buffer Zone, continue to support this resource based economy but through a modern policy lens that respects other values and the need for a more sustainable approach to development. Coupled with a new respect for Indigenous rights and title to the land, the region is home to a diverse population of people using and enjoying the landscape and seascape in a thriving economy.

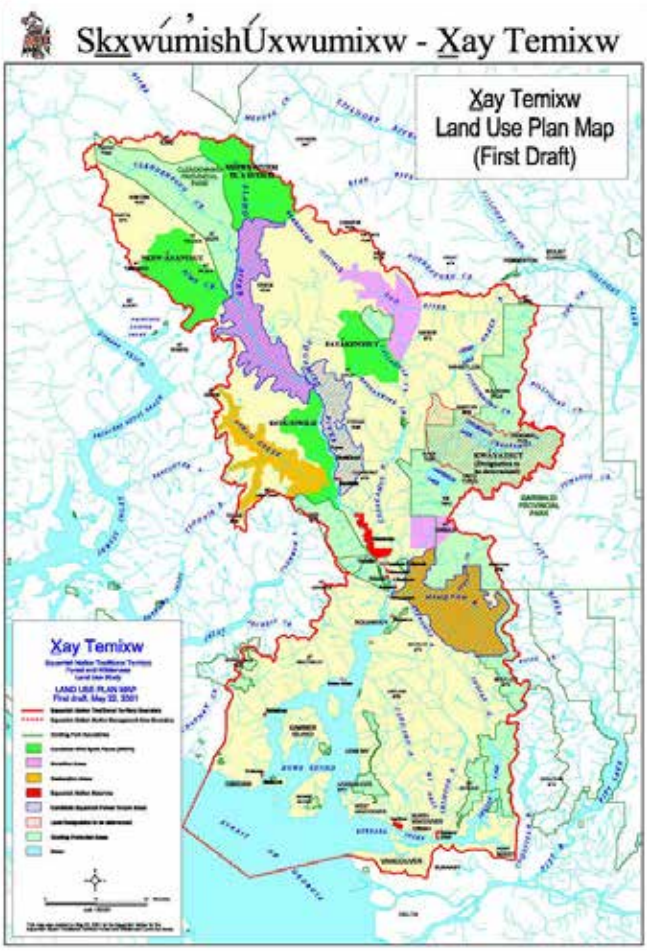
9.1.1 Indigenous Culture Period

The archeological, ethnographic, historical and geological records and *Skwxwú7mesh Uxwumixw* (Squamish Nation) cultural knowledge all provide evidence of the Squamish people occupying the lands and waters of Átl'ka7tsem/ Howe Sound and beyond for at least 10,000 years (Reimer 2011; Squamish Nation 2001). The Howe Sound and Squamish River system is an important and central watershed of the Salish Sea covering a total of 6,732 sq kms (Squamish Nation, 2001). The long term and continuous occupation by Skwxwú7mesh people in Átl'ka7tsem/Howe Sound is evident from numerous lines of evidence. Major geological events occurred at the end of the last Ice Age about 12,000 years ago, with the archaeological record commencing soon thereafter.

The geological history of Átl'ka7tsem/Howe Sound during the period of 12,000-10,000 BP is tied to continental glacial events and reflected in *Skwxwú7mesh* oral traditions. Much of *Skwxwú7mesh Uxwumixw* was covered in glacial ice and was no different than elsewhere in the northern hemisphere. During this time in *Skwxwú7mesh* history, people were under stress mainly because large ice sheets were melting and sea levels were changing dramatically ((Hill-tout 1900; Reimer 2011). Reimer (2011) terms this as *Sxwexwiyam* to Indigenize and decolonize the archaeological record of the southern Northwest Coast. During this time, *Skwxwú7mesh* people were utilizing obsidian from *Nch'Kay*, a dormant volcano that erupted during the last ice age.

During these time periods, archaeological research validates *Skwxwú7mesh* occupation. Geologically, the use of lithic materials includes *Nch'kay* obsidian, Watts Point dacite and Anvil Island andesite (Reimer 2011). Geological materials modified into artifacts are common in *Skwxwú7mesh Uxwumixw* and beyond. Additionally, the Coast Salish and Squamish Nation pattern of regular resource use is evident from how the ancestral village site of *Sta'mis*, on the banks of the Squamish River, is like other Coast Salish settlements (Edmonds 2012).

Throughout *Skwxwú7mesh Uxwumixw*, they relied on the bounty of the land and sea for sustenance. The sea provided a wide variety of fish including eulachon, herring, smelt, lingcod, rockfish, sturgeon, perch and flounder, while the freshwater rivers supported the five species of anadromous salmon, steelhead and char. Sea mammals, such as seals, sea lions and porpoises, numerous species of seabirds, including surf scooters, mallards and mergansers, and beach foods such as sea urchins, crabs and clams, provided important additional sources of protein (Squamish Nation, 2001).



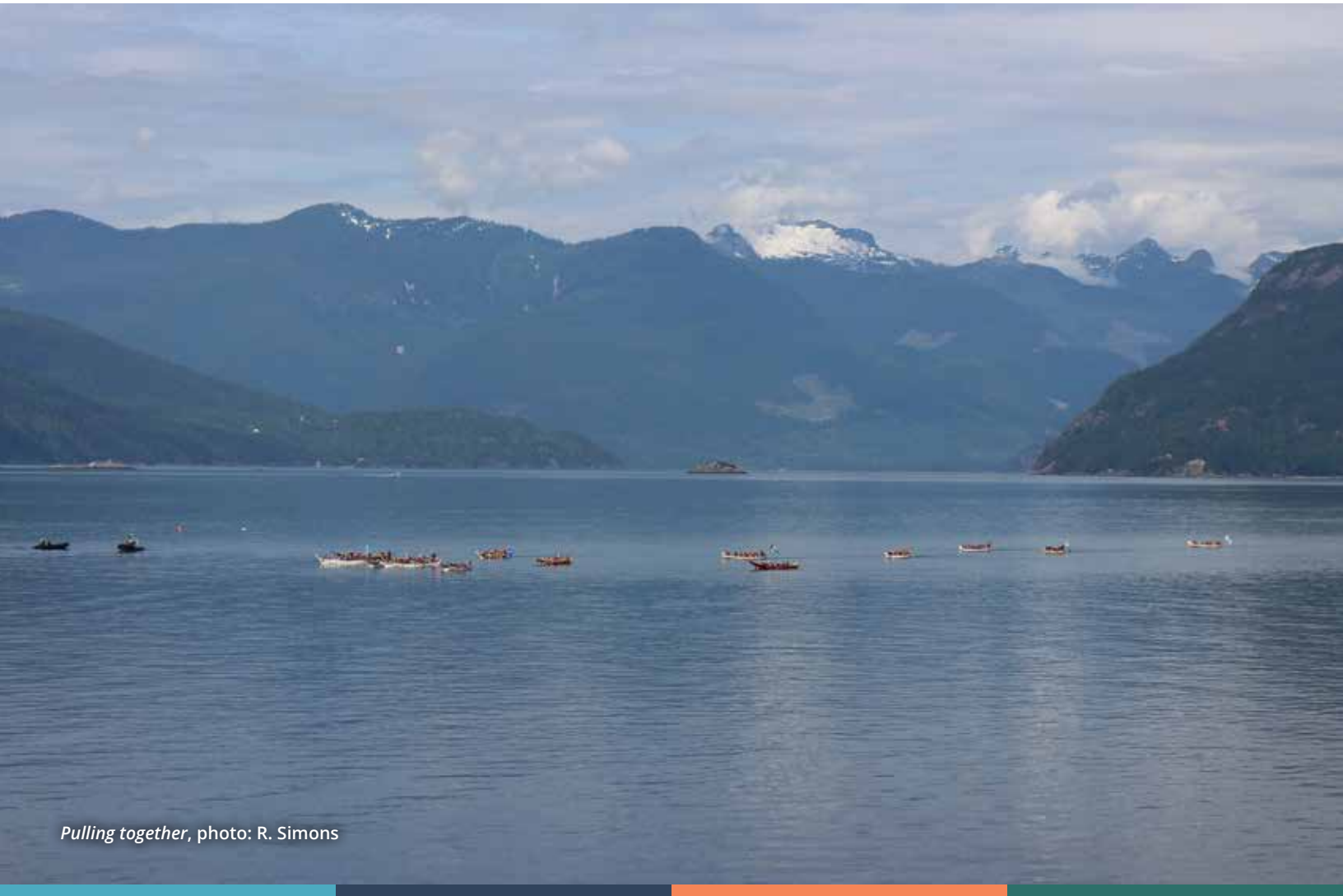
Squamish Nation Land Use Map

On land, the Squamish people hunted for deer, elk, black bear, mountain goat, beaver, raccoon, muskrat and other animals, as well as many birds, such as ruffed grouse and blue grouse. They also utilized a variety of plants for berries, fruits and edible roots, tubers and bulbs. Still other species of plants were gathered for their medicinal qualities.

The forests of the traditional territory were essential for providing many of the non-food necessities of life including wood for the construction of longhouses, canoes, furniture, weapons, utensils and ceremonial objects. Tree bark and roots were used to make clothes, towels, mats, mattresses and baskets (Squamish Nation 2001; Reimer, 2011).

The economy of First Nations people was characterized by subsistence activities, including fishing, hunting, and gathering, and trade. Fish and meat were staple foods and were supplemented by diverse wild plants and berries. Historians have identified over sixty different types of fish, shellfish, and marine animals that were utilized, including sturgeon, herring, trout and clams, but salmon was the single most important food source. One estimate concluded that Indigenous populations living in the area prior to contact with Europeans consumed, on average, as much as six hundred pounds of salmon per person per year. Men from closely associated kin groups caught the fish and women preserved the catch through smoking, salting and dry curing. If there was a surplus after tending to immediate needs and preserving enough for winter, leading men in the kin group might take the surplus to kin in other villages in exchange for gifts or traded for other foods. Salmon became a source of wealth. If a family acquired more wealth than it gave, it could hold a potlatch and distribute its excess among its relatives, earning prestige that might attract other wealthy relatives and thus further enmesh the family and kin group into a socioeconomic safety net (Suttles, 1987).

Howe Sound was the demographic center of the Squamish Nation, but they also had several seasonal villages in Burrard Inlet, Stanley Park and False Creek areas, in what is today Metro Vancouver. This brought them into regular contact with their neighbouring First Nations with whom they also shared territory and actively traded (Roine, 1996). Eastern Howe Sound from West Vancouver to Lions Bay is shared with the Tsleil-Waututh First Nation who would also venture throughout the Sound for their sustenance. There is also shared territory with the Katzie and Musqueam First Nations to the south and east, with the Hul'quimi'num speaking nations to the west, (including the Hahalt, Stz'uminus, the Cowichan Tribes, Lake Cowichan, Lyakson and Penelakut), the Lil'wat to the north, and to the north-west, the shíshálh (Sechelt) (Squamish Nation, 2001; Morin, 2015).



Pulling together, photo: R. Simons

These First Nations, except the Lil'wat Nation who are Interior Salish people, share their culture as Coast Salish people and the cultural practices typical of what is known as the Northwest Coast culture. This culture is characterized by "a coastal or riverine settlement pattern; diverse subsistence base with a focus on anadromous fish [salmon], but also including game and plant/root resources; complex fishing and storage economy; bilateral kinship; social/political organization with families, households, local groups and winter villages as the basic elements; and regionally similar myth system including vision quests, shamanism, life-cycle and subsistence cycle celebrations and rituals" (Morin, 2015).

This cultural foundation was soon to shift, however, beginning in the late 1700s, when patterns of use and access by the Squamish, and their neighbouring First Nations, to their traditional territory would be altered dramatically by contact with Europeans. This new association coincided with a decline in the Squamish Nation's use and occupation of the land, primarily in what is proposed as AHSBR's Transition Zone, that continued until very recently (Reimer, 2011).

9.1.2 European Contact and The Early Colonial Period (1790 – 1880)

Howe Sound and its islands were first visited in 1791 by Spanish explorer Don Jose Narvaez who explored the Strait of Georgia and the Sound, which he named Boca del Carmelo. A year later in 1792, Captain George Vancouver also explored the Sound and renamed the body of water as Howe Sound after Admiral Richard Howe, the Admiral of the Fleet in the British navy. Contact between Europeans and Indigenous people began with early explorers representing the interests of the competing fur trading powers, the North West Company and the Husdon's Bay Company. Between the years 1793 and 1843, the fur trading added a new dimension to the Squamish economy. Burrard Inlet had also become a centre of industry and some members of the Squamish moved from Howe Sound to their villages in Burrard Inlet and were introduced to numerous opportunities for wage employment (Roine, 1986).

Steamship,
photo courtesy of Britannia Mine Museum Archives

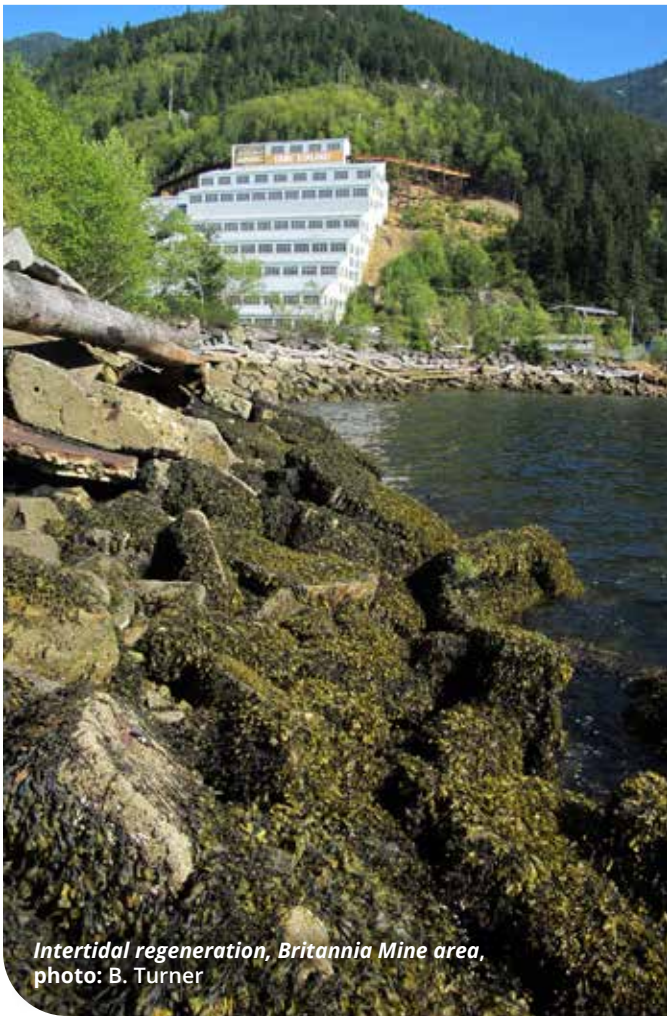
In 1858, the British Parliament created the new colony of British Columbia by Royal Proclamation. In 1860, Captain George Henry Richards undertook the next significant exploration and survey of the Sound when most of Howe Sound's islands were named. Shortly after the proclamation, the British Parliament created a process whereby land could be pre-empted for settlement purposes. Authority for the colony to unilaterally dispose of Crown land and make free land grants without seeking Great Britain's approval wasn't gained until the Legislative Council's Land Ordinance of 1870. Consequently, when British Columbia joined Canada as its sixth province in 1871, much of Howe Sound's islands, shores and surrounding watersheds still remained as wilderness and as the almost exclusive domain of the Squamish people.

In the mid- to late 1870s, the first loggers arrived on the islands of Howe Sound, closely followed by homesteaders who began to build houses, farms and orchards. The first pre-emptions of land occurred on *Kwilakm*/Bowen

Miners waiting for a train,
photo courtesy of Britannia Mine Museum Archives

Island in 1874 and about the same time on *Cha7elkwnech*/ Gambier and Anvil islands. There was a so called 'land rush' on *Kwilakm*/Bowen during the 1880s and 1890s and commerce grew steadily, revolving around logging, fishing and farming with the export to Vancouver of farm produce and wild game.

Development of the Lower Mainland accelerated rapidly from the mid-1800's in response to both the Cariboo gold rush in central BC (1860-1863) as well as burgeoning local sawmilling activity. But Howe Sound remained a relatively quiet area, removed from the focus of colonial activity, until the late 1880s when the Union Steamships opened up the area to settlement and resource-based development. In response to the rapid industrial growth in Burrard Inlet, the logging industry in Howe Sound began to accelerate. Logging, water transport and longshoring became prominent occupations among Squamish men as early as the 1860s in this industrial expansion.



Intertidal regeneration, Britannia Mine area, **photo:** B. Turner

Settlers had arrived in the Squamish Valley by 1874 and a small community was established in Brackendale by 1892. Agriculture formed the foundation of the local economy taking advantage of the fertile valley bottom soils. By the late 1890s, agriculture served to support other activities such as horse and steam-donkey logging, mining at Britannia in 1904 and eventually the pulp mill at Woodfibre in 1912. Full-scale industrial logging operations using railroad and high-lead technology began around Squamish in 1926. By the late 1940s, truck logging and the advent of the chainsaw made industrial logging possible in the more remote valleys and logging superseded all other activity as the main driver of the economy. The Pacific Great Eastern (PGE) Railway finally connected Squamish with North Vancouver in 1956 and Highway 99 arrived in 1958.

The communities on the east side of Howe Sound from Horseshoe Bay to Squamish have deep historic origins in fishing, logging and mining. Horseshoe Bay had its modest beginnings in small logging operations in the late 1800s. Its relative isolation from Vancouver was relieved when the PGE Railroad and Marine Drive finally reached the Bay by the early 1920s, enabling its development. A new resort emerged in 1931 known as Whytecliff Lodge which, along with Sewell's Marina, developed an international reputation for sport fishing. Black Ball Ferries began operation in Horseshoe Bay with service to Gibsons in 1951, later expanding to Nanaimo and *Kwilakm*/Bowen Island. This service would become the beginnings of BC Ferries in 1961. Logging had cleared the forests on the site of what is today Lions Bay by 1939, and it became a boat access only summer camping destination for Vancouverites.

9.1.3 Modern Transformation

The sheltered waters of Howe Sound are still essential to the forest industry for transport, sorting, booming and storage of logs harvested along the BC coast and destined for mills in the Sound and the Lower Mainland. Transportation of logs and wood products – by water, railway, and road – is a very prominent theme in the history of the Sound area's forest industry. This is due not only to the ongoing challenges presented by difficult mountain terrain and unpredictable rivers, but also because of a strategic position in a unique coast interior transportation corridor. Squamish has served as a tidewater portal for

Squamish Nation log sort, photo: B. Turner

Interior forest product exports for nearly a century. It is estimated that 30-40% of logs cut on the coast also pass through Howe Sound and 80% of the logs stored in the Sound originate from outside the immediate area.

In the west Howe Sound area, between Twin Creeks to Port Mellon, various forest operations employ about 1,000 people in sawmills, wet and dry log sorting facilities and log home building. The west side of Howe Sound and around *Cha7elkwnech*/Gambier Island are home to the largest combined wet log sorting operation in North America. Port Mellon has been the site of a pulp and paper mill since 1908 and, employing about 350 people, continues to be one of the largest employers on the Sunshine Coast. Through successive ownerships, the mill's owners have invested heavily to meet and exceed environmental requirements, contributing to the successful ecological recovery of the Sound. The Government of Canada has also made significant investments during the last decade, under the federal Pulp and Paper Green Transformation Program. These investments have improved the mill's energy efficiency, reduced greenhouse gas emissions and increased renewable energy production. The west side of Howe Sound was also home to another pulp mill located on the west side of Howe Sound at Woodfibre, employing about 350 people from 1912 until its closure in 2006. A Liquefied Natural Gas (LNG) plant is now emerging as a proposed development at the Woodfibre site.

Given the strategic transportation location, the Howe Sound economy was stimulated by the arrival of the PGE railway in 1915, connecting Squamish with the BC interior. The eventual extension of the railway to northern BC and the expansion of wood industries and pulp production capacity at various locations in the province created the opportunity for a deep-water port up the coast from Vancouver. In 1971, Squamish Terminals Ltd. was developed to become the only deep-water, break-bulk terminal in Howe Sound. Located at the northern end of the Sound, the company traces its history back to the 1960s. The first ship arrived in 1972 and since then Squamish Terminals has handled more than 22 million tonnes of cargo destined for markets around the world.

From subsistence to commercial, Howe Sound has long supported a diverse fishery. Before the 1930s there were so many salmon in Howe Sound that fisherman commonly said they would never run out. In fact, between 1935 and 1950 almost every large BC fishing company had established camps and a presence in the Sound. However, by the 1970s, a study on the status of the marine ecosystem in Howe Sound reported a different story. Log booming activities, chemical plants, effluent from pulp mills and mining, as well as municipal sewage discharges were all taking a collective toll on the water quality in the Sound. Halibut was no longer fished, lingcod populations had declined to the point where recreational restrictions were necessary and the commercial salmon

fishery closed in 1971 due to mercury contamination from the chlor-alkali plant located in Squamish at the head of Howe Sound. The salmon fishery eventually reopened but only as a recreational fishery. Additional industrial pressures resulted in the almost complete collapse of a major herring spawning area in the Squamish Estuary as well as several shellfish closures. Lower Howe Sound was closed to commercial fishing in 1989 and shellfish harvesting was restricted in various locations at numerous times. While some industrial anti-pollution regulations have substantially reduced the release of contaminants into Howe Sound, and have made way for the reopening of some fisheries, the marine environment continues to be the subject of concern.

Traditional Squamish Nation canoe, photo: B. Turner

Howe Sound has transitioned from an early subsistence economy to a lengthy period of resource extraction and industrial processing dominance, to a now-growing service orientation, capitalizing on its land and marine resource assets for their spectacular recreation and tourism values. This marine environmental recovery in Howe Sound has also led to an increase in its recreational use of the Sound. Boating, kayaking, recreational scuba diving, windsports and sports fishing. Many children's summer camps have long histories of in west Howe Sound, and now with the ecological recovery of the Sound underway, these activities are being recognized as significant growth opportunities to enhance and diversify the economy. Adventure recreation and tourism are among the fastest growing outdoor activity markets in western Canada and Howe Sound is poised to take advantage of this growth.

9.2 Reserve Users

Who are the main users of the biosphere reserve? (for each zone, and main resources used). If applicable, describe the level of involvement of indigenous people taking into account the "United Nations Declaration on the Rights of Indigenous Peoples".

Core Areas

The Core Areas identified in AHSBR are unpopulated today, but, as discussed above, this was not always the case. The Squamish Nation have historically used these areas and have identified numerous culturally and spiritually significant places in their *Xay Temixw* Land Use Plan (see Section 4.3.1), all of which are high elevation areas in the Coast and Tantalus mountain ranges. BC Parks have co-management agreements with First Nations.

The Core Areas are comprised exclusively of protected areas, each is large enough to constitute a wilderness environment and attract those seeking isolation, challenge and adventure in a recreational backcountry experience of hiking and camping. Cypress Provincial Park, located on the very edge of Vancouver, offers down-hill and cross-country skiing, snowshoeing and hiking in a near urban semi-wilderness environment. The skiing facilities are offered by the private sector providing a viable commercial recreation venture in direct association with public lands and non-commercial recreational opportunities

In the marine Core Areas, the glass sponge reefs are accessed for scientific research. Due to the depth of the glass sponge reefs, most have very limited access, whereas the shallower reefs such as at Halkett Point provide access for recreational divers, but are limited to those with specialized training, and only on one reef located within Halkett Provincial Park.

Buffer Zones

The Buffer Zone is also comprised of provincially managed public lands, and because of their proximity to the protected areas in the Core Zone, they attract backcountry recreation users as well, but in an environment with few, if any, facilities and services. Much of these Buffer Zone lands are managed as Resource Exclusion Areas to protect wildlife habitat or old growth forest, and are not managed to accommodate much human use. Other portions of the Buffer Zone include Public lands outside the Timber

Harvesting Land Base (THLB) that may be subject to limited resource harvesting activity by private forestry companies. Land Conservancies, Wildlife Management Areas limit human use to walking and nature trails. Provincial parks are managed for recreation use such as hiking, non-motorized boating and camping.

Buffer Zones in the marine environment include Rockfish Conservation Areas (RCAs) with strict limits on the types of recreational and commercial fishing that can occur. RCAs are closed to recreational angling and any other forms of fishing that could harm rockfish and lingcod or their habitat. Certain forms of fishing by handpicking, by trap or specific types of nets is permitted; however, Howe Sound is currently closed to recreational rockfish and lingcod fishing.

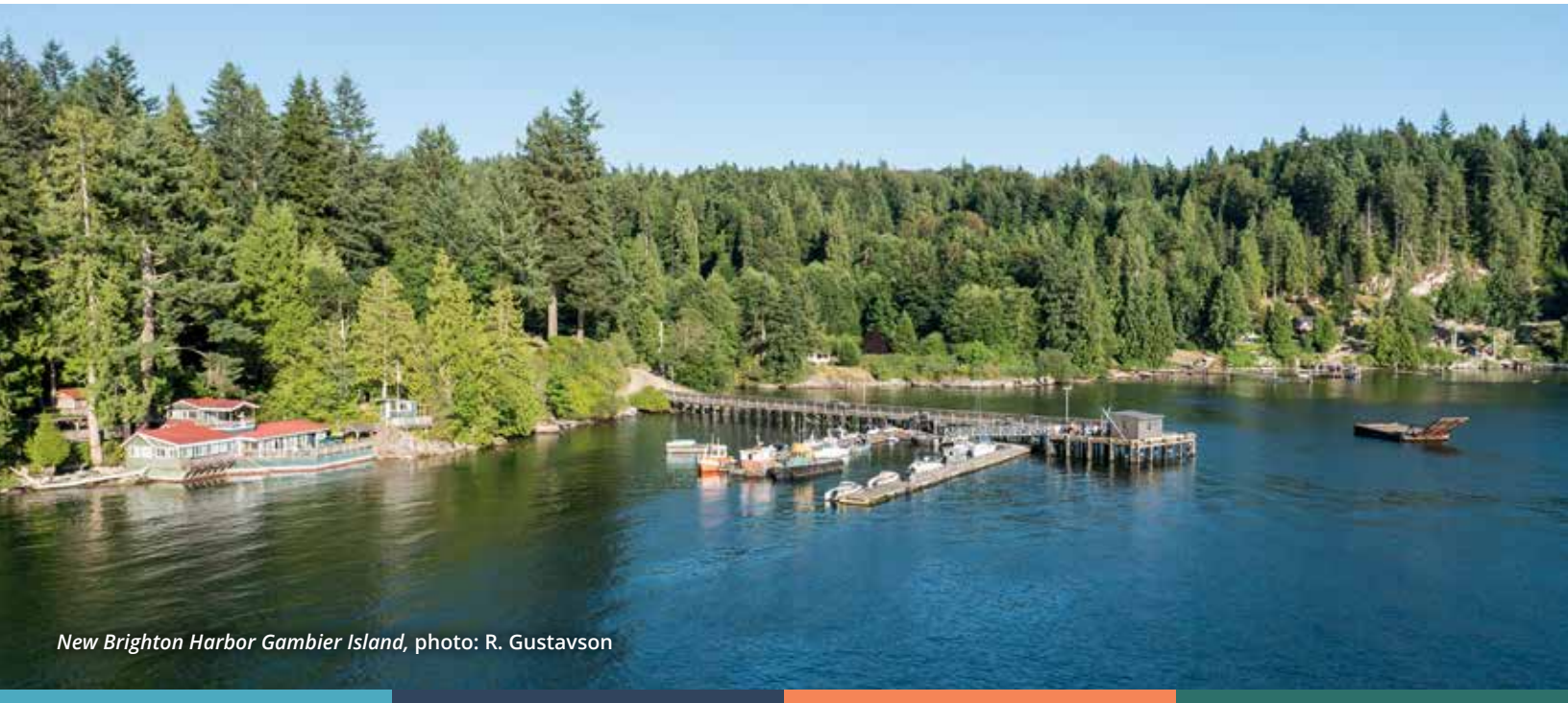
Transition Area

The Transition Area encompasses most of the public lands outside of the protected areas, as well as First Nations Reserves and considerable amounts of private land within the various local municipalities and regional governments. This zone involves the full range of resource uses including timber harvesting, mining, commercial tourism operations, ranching, farming, industry and a deep-sea port. The public lands within the Crown Forest Land Base are managed for multiple uses including resource harvesting, wildlife management and outdoor recreation.

This zone also includes an array of smaller provincial parks, ecological reserves, municipal or regional parks, nature reserves, wildlife management areas or forest lands where public lands dedicated to protecting old growth forests or wildlife habitat. The smaller Islands Trust Conservancy Nature Reserves have a strong conservation mandate, focusing on the protection of sensitive, rare and endangered species and habitats. The limited recreation opportunities, primarily walking and hiking, while available to all, are primarily oriented to their island residents. The Regional Parks are primarily intended for local recreational use and play a relatively minor role in conservation.

Agricultural development within AHSBR is limited to a small agricultural community in the Squamish Valley, and to a lesser degree on some of the Howe Sound islands and near Gibsons, due to the scarcity of arable land and reduced sunlight given the steep valley slopes. The availability and affordability of farmland is decreasing due to community growth and increasing land prices. The few farms in the region are growing organic market vegetables, fruits and berries, fowl and small livestock, honey and hops, all destined for local consumption and Vancouver markets. Farm related tourism is also a growing sector within the agricultural community.

In the marine Transition Zone, commercial, recreational and Indigenous fishing occurs under the appropriate rules and regulations administered by Fisheries and Oceans Canada. Recreational boating takes place throughout the Sound. Commercial transportation providers such as BC Ferries, private water taxi operators and industrial marine shippers use identified routes under the rules of



New Brighton Harbor Gambier Island, photo: R. Gustavson

Transport Canada. Other facilities include private marinas and private and commercial docks. Local governments and developers have licenses to discharge treated sewer water. Some commercial forestry operators are permitted log booming, and there are two restricted disposal at sea sites administered by Environment and Climate Change Canada.

9.3 Land Use Rules

What are the rules (including customary or traditional) of land use in and access to each zone of the biosphere reserve.

There is a complex mixture of public and private lands in the AHSBR with an equally complex set of rules and regulations governing the use of those lands. Provincially managed public lands occupy approximately 89% of the AHSBR and are therefor of considerable interest in the management of land use in the region. Generally speaking, public lands are accessible to the public with relatively few restrictions, but these rights of access are still often limited by special provisions related to whether they are within a protected area or, if not, by the operations of licensed resource users, for example by mining or logging operations.

Core Areas

The Core Areas are comprised entirely of protected areas, five provincial parks managed as Class A parks under BC's Park Act and the *Este-Tiwilh*/Sigurd Creek Conservancy managed under the *Protected Areas of British Columbia Act*. Class A parks are "dedicated to the preservation of their natural environments for the inspiration, use and enjoyment of the public", and no development is permitted unless necessary for the maintenance of the park's values (BC Parks, 2019b). The Conservancy explicitly recognizes the importance of the area to the Squamish Nation for social, ceremonial and cultural purposes and its management and development will be based upon land use and collaborative management agreements between British Columbia and the Squamish Nation (BC Parks, 2012). Conservancies are managed to provide for a wider range of low impact, compatible economic opportunities than Class A parks. Parts of both designations may be closed to public access if necessary to protect sensitive ecosystems or either people or wildlife from perceived hazards.

All five protected areas meet the standards for IUCN Category II which are defined as:

> **"Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities"**
> ***(International Union for the Convention of Nature, 2019)***

In the marine areas, the fishing restrictions in the glass sponge marine reef refuges are set by Fisheries and Oceans Canada under the *Fisheries Act* and its associated regulations in order to protect the reefs from damage. As the reefs have only recently been discovered and protected, rules for responsible diving are being determined and self-imposed by the Underwater Council of BC and other users.

Buffer Zone

The Biosphere's terrestrial Buffer Zone is wholly comprised of Public land that is immediately adjacent to the five large provincial parks and the *Este-Tiwilh*/Sigurd Creek Conservancy in the Core Zone. Much are these lands are legally identified as "Protected Lands" and "Resource Exclusion Areas" under the *Forest and Range Practices Act*, the *Land Act* or the *Environment and Land Use Act*. They can include, for example, Wildlife Habitat Areas, Ungulate Winter Ranges, Old Growth Management Areas, Wildland Areas or areas with specific Visual Quality Objectives. These areas are established to manage for key species and values and are identified based on the physical or biological requirements. Through legislation and regulation these areas are not available for resource activities such as forest harvesting, mining or large scale hydroelectric development. Areas adjacent to Core Areas and Buffer Zone resource exclusion areas that were identified as lacking harvestable resources due to high elevation or limited access were included in the AHSBRI Buffer Zone to increase the conservation offered. Combined, the areas identified in the Buffer Zone offer protection of key values in the crown forest land Base.

Other portions of the Buffer Zone include Public lands outside the Timber Harvesting Land Base (THLB). The THLB defines the 'working forest' and while still potentially available for timber harvesting, areas outside the THLB are generally considered to be physically or economically unusable from a forest harvesting perspective due primarily to steep slopes, soil sensitivity and/or economic viability (Ministry of Forests and Range, 2008).

In the marine area recreational and commercial fishing licenses must be purchased and fishing regulations and rules are determined by Fisheries and Oceans Canada as per the *Canada Fisheries Act*.

Transition Area:

AHSBR's terrestrial Transition Area is a combination of provincial Public lands, private lands and First Nations Reserves. A significant portion of the Public land is allocated to some form of resource based commercial activity, mostly timber harvesting or mining. These kinds of operations are authorized under the *Forest and Range Practices Act*, while mining activities are regulated under the *Mines Act* and the *Mineral Tenure Act*. Other land uses on public land can be authorized as tenures under the *Land Act*. These can be linear tenures for electric power lines, pipelines, roads or trails or reserves, to protect specific lengths of shoreline for recreational use. They can also be tenures for summer homes, docks and wharves, church camps, yacht club outstations, log storage or Community Watersheds. All such activities are further regulated by the *Environmental Assessment Act* and the *Environmental Management Act*.

The Transition Area also includes a number of protected areas established as smaller provincial parks, ecological reserves, nature reserves, a wildlife management area, regional and municipal parks, and Resource Exclusion Lands (areas of public land largely preserved from forest harvesting and other resource development). These areas are managed under the *Park Act, Ecological Reserves Act, Wildlife Act, Local Government Act, Islands Trust Act* and the *Land Act*. The local nature reserves created by the Islands Trust Conservancy on Bowen and Gambier islands are managed under the *Islands Trust Act*, to offer a high level of protection while providing for local low-impact recreational use (ITC, 2019).

With respect to private lands, access is controlled, or not, by the landowner. All private lands within AHSBR are located within the Transition Zone. The uses of private lands located within the boundaries of a municipal or regional government are regulated by their Official Community Plans (OCP) and their implementing Land Use Bylaws, as authorized under the *Local Government Act.* Each municipality develops their own OCP independently, based on objectives determined through consultation with area residents. As discussed in Section 10, there are three intersecting regional governments, as well as a portion of West Vancouver, and five municipalities in the AHSBR, all of which have prepared their OCPs. Also, the islands in Howe Sound are under the jurisdiction of the Islands Trust which has also prepared OCPs for each island. BC has not adopted a Right to Roam law and therefore private landowners may enforce trespassing rules.

As discussed in Section 3.1.5, there are six heritage places in AHSBR, two of which are protected as National Historic Sites under the *Canada National Parks Act* (the Britannia Mine Concentrator and the Point Atkinson Lighthouse), and three are registered under BC's Register of Historic Places (Caulfeild Park and Whytecliff Park in West Vancouver, and Hollyburn Lodge in Cypress Provincial Park). These heritage registrations are identified by local governments in their Community Heritage Register under the *Local Government Act* as places of heritage value, but this offers no permanent legal protection and the owners are not prevented from altering the property. In addition, West Vancouver has also designated through its OCP the Lower Caulfield Heritage Conservation Area in which it is necessary to apply for an alteration permit prior to undertaking changes to buildings or property. The *Heritage Conservation Act of BC* encourages and facilitates protection of heritage and archeological values in the Province. The strengthened protection for archeological sites is a commitment by the Province to act on implementing the UN Declaration on the Rights of Indigenous People.

In marine areas, commercial shipping is governed by rules and laws under the *Canada Shipping Act* administered by Transport Canada. Foreign ships over 350 gross tonnes or a Canadian vessel over 10,000 tonnes require a BC Coast Pilot to guide it through Howe Sound. Most frequent users of the marine area are those travelling on BC Ferries transporting cars and passengers to and from the mainland. There are numerous recreational boaters as well, as the Sound is a popular boating, kite surfing and paddling destination. All recreational boaters are also subject to the rules and

regulations under the *Canada Shipping Act* and must have a Canada Boating License. Commercial and recreational fishers are subject to the rules and regulations under Canada's *Fisheries Act* administered by the Department of Fisheries and Oceans.

Reserve lands around Squamish are lands originally resulting from Canada's *Indian Act* the government originally imposed on the Squamish. The *First Nations Land Management Act* is a federal law. These lands are generally for the use of First Nation members.

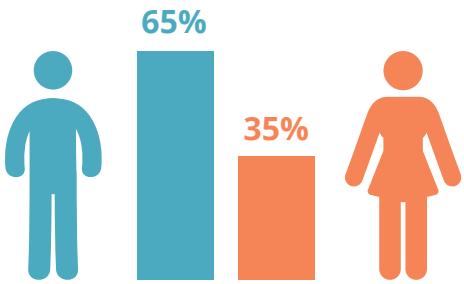
9.4 Gender and Resource Use

Describe women's and men's different levels of access to and control over resources. (Do men and women use the same resources differently (e.g., for subsistence, market, religious/ritual purposes), or use different resources?).

In accordance with the *Canadian Human Rights Act* of 1977 relating to equality and prohibition against discriminatory practices, men and women have equal rights of access to and control of resources within Canada.

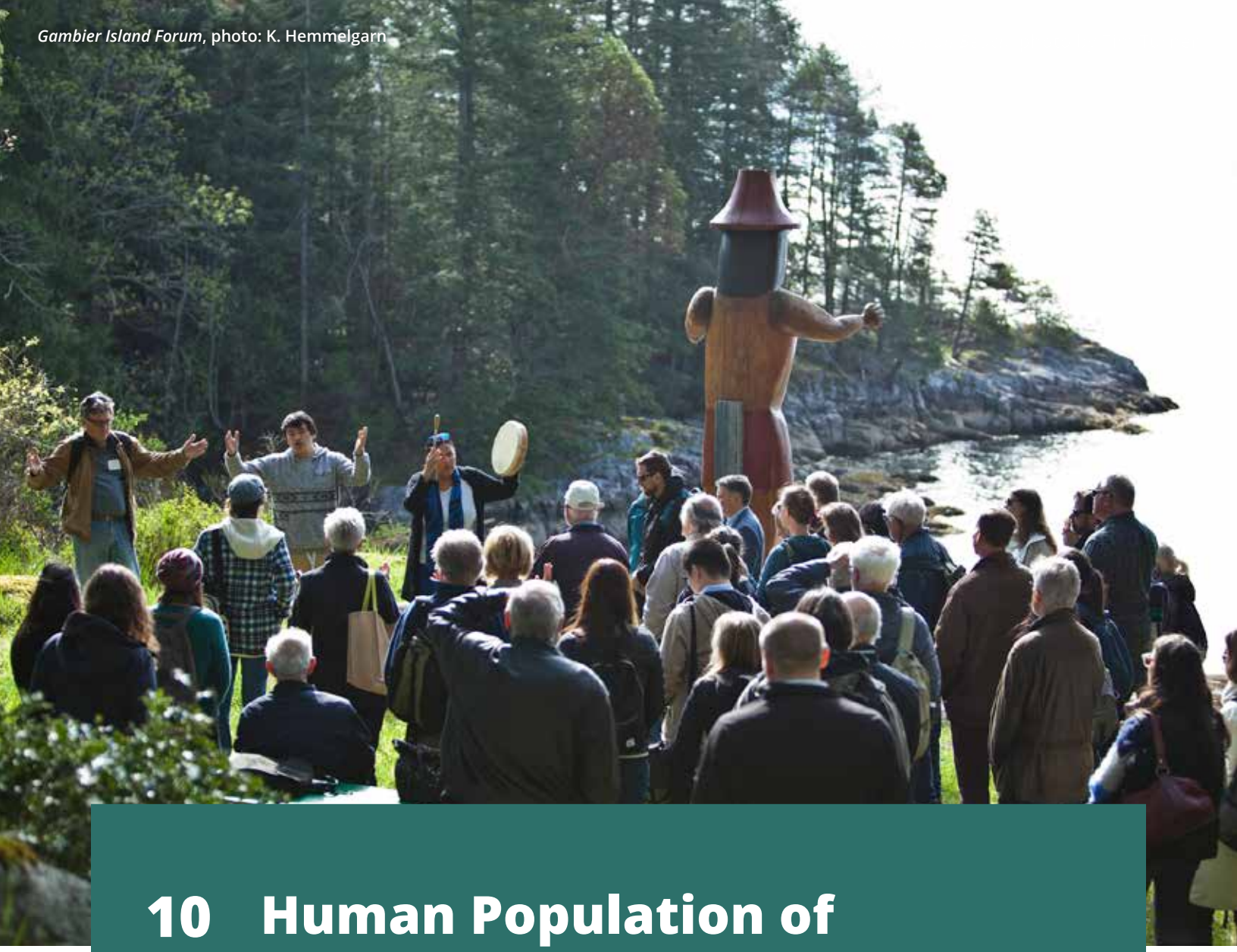
The current BC Government has established the Gender Equity Office to ensure the government's mandate on removing barriers that stop people from reaching their full potential is achieved.

Women represent 35% of the elected representatives in local government and 38% of the elected Squamish Nation Council are female.



As described in section 16.1.1 the Sea to Sky Community Foundation's Vital Signs reports provide indicators on socially important issues concerning communities, such as belonging and community, diversity and inclusion, housing diversity and attainment, personal safety and work. Important issues within the AHSBR are identified as access to affordable housing, lack of child care facilities, transportation and employment close to home which link to different levels of access to and control over resources.

Squamish Access Society, photo: B. Moorehead



Gambier Island Forum, photo: K. Hemmelgarn

10 Human Population of Proposed Biosphere Reserve

The table below illustrates the approximate permanent and seasonal population living within AHSBR as of the last Canada Census in 2016.

	Permanently	Seasonally
10.1 Core Area(s)	0	0
10.2 Buffer Zone(s)	0	0
10.3 Transition Area(s)	45,858	~3,300*
Total:	**45,858**	**~3,300***

* all in the Howe Sound islands, does not include visitors

10.4 Brief description of local communities living within or near the proposed biosphere reserve

(Indicate ethnic origin and composition, minorities etc., main economic activities (e.g. pastoralism, tourism) and the location of their main areas of concentration, with reference to the map (section 6.2)).

For the past 10,000 years, Átl'ka7tsem/Howe Sound has been settled by First Nations people whose livelihoods and cultural identity have been supported and inspired by the area's lands, waters and contributing watersheds. Prior to contact with Europeans, estimates of the Indigenous population in Átl'ka7tsem/Howe Sound was in the 'several thousands' where lands and waters were used and occupied either exclusively by the Squamish or jointly with First Nation neighbours. Following the arrival of Europeans in the late 1700's, First Nations populations declined through the 19th and 20th centuries to perhaps 10% of their number prior to contact (Morin, 2015). Today, the Squamish Nation consists of 23 villages encompassing 28.3 square kilometers on parcels of land scattered from Vancouver to Gibson's Landing to Squamish and to the area north of Howe Sound. Over 60% of its 3,600 members reside on-reserve in the Squamish area, Gibson's Landing and Metro Vancouver (Squamish Nation, 2019a).

In the late 1880's, the Squamish area was settled by European and Scandinavian farmers, with hops, hay and potatoes among important early crops. By the early 1900s, forestry and mining had grown to prominence and many resource-based communities grew and evolved with these industries. As the resource and manufacturing sectors declined, however, especially over the past two decades, employment in the region has become more diverse and focused in the service industry sector and tourism-related services, with a much higher proportion of occupations in the arts, culture, recreation and sports fields than the provincial average (Lions Gate Consulting, 2013; Squamish, 2019b). At the southern end of the Sound, the local economy is now fully integrated into the Metro Vancouver economy.

Today, Átl'ka7tsem/Howe Sound contains a total population of almost 50,000 persons, the vast majority of which are permanent residents. In addition, the region is situated on the doorstep of Metro Vancouver, the third largest city in Canada, with a population of about 2.6 million people. Otherwise known as Hwy 99, the unforgettably spectacular cliffside Sea to Sky Highway is the main route from Metro Vancouver to the Resort Municipality of Whistler, home to 11,854 and visited by over 2 million people during the year. There are three major communities within AHSBR, each serving as anchors on the east and west sides of the Sound's entrance: Gibsons to the west and Horseshoe Bay in West Vancouver to the east. Squamish/Brackendale are located at the north end of the fjord, with smaller communities distributed along its east and west shores, and a few permanently and seasonally inhabited islands in the Sound.

Mouth of Squamish River and inner Howe Sound, photo: B. Turner

Population of Átl'ka7tsem/Howe Sound Communities, 2011 and 2016

Community	2011	2016	% Change
Village of Lions Bay	1,410	1,334	-5.4
Municipality of Bowen Island	3,720	3,680	-1.1
Town of Gibsons, including Port Mellon	4,450	4,605	+3.5
District of Squamish and Brackendale	18,725	19,512	+4.2
Squamish Lillooet Electoral Area D*	835	1,057	+26.6
Sunshine Coast Electoral Area E*	3,480	3,664	+5.3
Sunshine Coast Electoral Area F*	2,015	2,043	+1.4
Metro Vancouver Electoral Area A*	66	72	+9.1
Municipality of West Vancouver*	9,978	9,891 *	-0.1
Total	**44,679**	**45,858**	**+2.6**

* only a portion of these communities are located within AHSBR
(Source: Canada Census, 2011 and 2016)

Growth in the overall region has been modest during the past decade but is beginning to accelerate. This is particularly the case in Squamish and the Sunshine Coast, as the pressures of the increasing cost of living in Metro Vancouver, as well as expanding tourism employment in the area, encourage young and retiring populations to these nearby accessible communities. Overall, the collective populations in these communities outside of Metro Vancouver are expected to increase by 29% over 2011 levels by 2036 (Lions Gate Consulting, 2013).

10.5 Major Settlements

Name(s) of the major settlement(s) within and near the proposed biosphere reserve with reference to the map (section 6.2):

As illustrated in the Map in Section 6.2, there are several communities on the mainland and on the islands of AHSBR, as described below.

Town of Gibsons and the West Coast of Átl'ka7tsem/Howe Sound - *Section 6.2a*

For many generations before the arrival of the first settlers, the Gibsons area was the location of two important summer villages of the Squamish Nation, *Schen'k* and *Ch'kw'elhp*, within their traditional territory. These village sites are known as one of the Places of Origin for the Nation. Stone tools from this area have been dated to as early as 8,000-10,000 years before present.

Settlers to the region arrived in the mid-1800s from England, Finland, China, Japan and Italy, drawn to the province by the forestry, mining and fishing. Northwest of Vancouver and just a 40 minute ferry ride from Horseshoe Bay, Gibsons is a picturesque, coastal community perched on a hillside at the southwest end of Howe Sound. A quaint town of 4,600 residents, the Town of Gibsons is a member municipality of the Sunshine Coast

Regional District (SCRD), and in 2009 earned a United Nations-endorsed international award for being the "The World's Most Livable Community (population under 20,000 category)". It was also recognized as a leader in sustainable planning and development by also winning the 2009 Energy and Climate Action Award for Community Planning and Development. But perhaps the Town of Gibsons is best known as being the location of the long running, internationally popular, CBC television series, "The Beachcombers". (The Gibsons Landing Story, Lester R. Peterson).

Gibsons, photo: Shutterstock

Adjacent to the Town of Gibsons is the unincorporated, mostly rural area, of Elphinstone that sits partially within the AHSBR boundary. The population of the total area is 3,664.

West Howe Sound includes several important industrial employers, many of their employees live in the area. Langdale and the BC Ferry terminal provides the only link to the mainland and Gambier and Keats islands. Port Mellon, the region's only remaining pulp mill, also hosts several other local operations linked to forestry.

Much of the recent growth and large housing developments in the area is due to commuters working in Vancouver, and increase in the number of recent retirees. The area also leads all of BC in the number of summer camps due to its proximity to Vancouver. A popular hiking and biking area, the 2016 population is 2,043 residents.

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West Vancouver - *Section 6.2b*

The eastern boundary of AHSBR is the Cypress Creek area in the District of West Vancouver. The portion of West Vancouver within the AHSBR, that stretches along 28 kms of shoreline and up the slopes of Hollyburn Ridge and Cypress Mountain, began as a popular summer holiday destination for City of Vancouver residents, who crossed Burrard Inlet to picnic or camp. Eventually they settled in a string of small self-contained communities, which were oriented to the shoreline and, over time, crept up the mountainside. The natural topography separated the early settlements and later served to define West Vancouver's many neighbourhoods.

View of Whytecliff Park, West Vancouver, photo: Shutterstock

Apart from logging and fishing, the new municipality didn't attract much commerce. Determined to turn that negative into a positive, the first Official Community Plan under the Town Planning Act of 1926 banned any new industry and called for building lots that were larger than elsewhere in the Lower Mainland.

At a time when logging and canneries were the only significant industries, the Great Northern Cannery (GNC) that opened in West Vancouver in 1891 gained a reputation as being an inclusive community that was ahead of its time with respect to employing and housing new Canadians and First Nations. Today, the cannery site is a Department of Fisheries and Oceans research lab and is evolving into an educational hub as the Pacific Science Enterprise Centre.

West of the cannery, the neighbourhood of Caulfeild was laid out as an English-style village according to the contours of nature, including the paths of wild animals and cows. Further west, the Point Atkinson Lighthouse was installed by the Government of Canada in 1875. Lighthouse Park was originally set aside as a timber preserve to provide fuel for the lighthouse and its steam fog alarm. As a result, the park has never been logged and retains many of its original native trees and plants.

Today, West Vancouver's ethnic and cultural diversity is drawn from Asia, the Middle East and Europe, as well as from elsewhere in BC and Canada. The District continues to have no industry and offers the same attractions that originally drew the first tourists: beaches, forests, mountain trails, golf courses and ski slopes. Residents place a high value on the natural environment, recreational opportunities, quality community amenities and a rich cultural life.

Long before the arrival of the first Europeans, journeys began and ended in Horseshoe Bay, then known as *Ch'axáy*. *Ch'axáy* was a traditional meeting place as well as an overnight resting stop when travelling back and forth between villages on the Squamish River and Burrard Inlet in the heart of today's Vancouver. It was a popular place to go fishing for herring and cod, and to hunt birds and other animals. Horseshoe Bay is Vancouver's gateway to Átl'ka7tsem/Howe Sound and is also the location for the major BC Ferry terminal that connects the mainland of British Columbia to Vancouver Island (at Nanaimo), the Sunshine Coast and Bowen Island. It has also been an important boat basin for recreational boats and commercial water taxi operations since 1931. The total population living within West Vancouver in the ASHBR is 9,891, with approximately 1,000 concentrated around Horseshoe Bay.

The East Coast of Átl'ka7tsem/Howe Sound and the Sea-to-Sky Corridor - *Section 6.2c*

The AHSBR includes the entire 42 km east coast shoreline of Átl'ka7tsem/Howe Sound from West Vancouver to Squamish. A significant feature of this coastline is the reknowned Sea-to-Sky Corridor and its parallel Canadian National (CN) Railway and Highway 99 that wind along the shoreline, continuing north to link Vancouver with the Resort Municipality of Whistler and beyond to the northern part of the province. Following a $600 million upgrade for the 2010 Vancouver Winter Olympics, traffic on the highway has increased by 24% since 2009, averaging almost 20,000 vehicles per day or over two million visitors a year through Squamish and on to Whistler. The Sea to Sky corridor is recognized as one of the most scenic drives in Canada, with a number of popular tourism destinations along the way. The development of this infrastructure has been fundamental to the socio-economic development of the east side of Átl'ka7tsem/Howe Sound.

Three unincorporated coastal communities have a combined 2016 population of 1,129 residents plus 1,300 people that live in the Municipality of the Village of Lions Bay. Due to the low availability of land for further residential development, the population in this area is expected to rise only slightly over the next 5 to 10 years.

Canada Day in Lions Bay, photo: R. Simons

The remaining coastline in AHSBR north of Lions Bay up to but not including Squamish has tourism features that include parks, a campground and the mining museum in the community of Britannia. With over 60,000 people having lived and worked in the copper mining town in the past, the current population has reduced to about 300 people since the closure of the mine in the 1970's. Today, the neighbourhood of Britannia Beach is experiencing a profound resurgence with new residential, commercial and retail development.

Squamish and Brackendale - *Section 6.2d*

The word *Squamish* derives from the name of the *Skwxwú7mesh Úxwumixw* people which in their language is Skwxwú7mesh. *Ch'iyákmesh* is the name of an old village that was located on the Cheakamus River. *St'á7mes* is a community located near the south entrance to the town of Squamish, which lies below the Stawamus Chief mountain, and gets its name from that village. *Mámxwem* is where the Mamquam River name comes from. Today approximately 555 Squamish Nation people live on reserves within the area.

The communities of Squamish and Brackendale had their beginnings in the early 1870s in agriculture, being located on the fertile estuary and valley bottom of the Squamish and Cheakamus rivers. By 1892, about 35 families lived in Brackendale. Others in the valley would have included Chinese and Punjabi labourers who built the dykes, prospectors, sawmill workers, loggers and trappers. These communities further blossomed during the construction of the Pacific Great Eastern Railway in the 1910s, as forestry began to usurp agriculture as the main driver of the local economy.

Patagonia event in Squamish, photo: R. Simons

Forestry has traditionally been the main industry in the area, and the town's largest employers were a large sawmill and logging operation and a pulp mill. Both facilities had closed by 2006. In recent years, Squamish has embraced tourism as its economic mainstay and branded itself as the "Outdoor Recreation Capital of Canada" with world-class opportunities for mountain climbing, hiking, kayaking and kite surfing. Squamish and Brackendale have a population of 19,900 people and have witnessed a 20% increase between 2006 and 2011 as they became popular with Vancouver and Whistler residents escaping the increasing costs of living, both less than one hour away by highway (Lions Gate Consulting, 2013).

Community Fair, Bowen Island, photo: B. Turner

Bowen, Gambier, Keats and Anvil Islands - *Section 6.2e*

Bowen, Gambier and Anvil islands are the first, second and third largest islands, respectively, in Átl'ka7tsem/Howe Sound. With the exception of Bowen Island, most islands in Átl'ka7tsem/Howe Sound are either sparsely populated or support mostly seasonal populations. The first settlers came from the United Kingdom after the loggers in the 1870s to build homes and produce crops. Bowen Island is the only island community in the Sound that is an incorporated municipality, and it has a regular car ferry service that has enabled it to develop as a part of the larger Metro Vancouver. In 2016, Bowen had a population of 3,680 people and it is expected to grow by almost 20% to about 4,440 people by 2036 (Lions Gate Consulting, 2013).

In contrast, Gambier Island has a small resident population of approximately 125 people that swells to about 600 with seasonal residents throughout the summer months. Most reside in the three small communities spread around the island. There are limited roads on Gambier and many homes are rustic in style with no hook up to electrical services. Its neighbor, Anvil Island, was a major supplier of bricks that were used to build the first buildings in Vancouver. Today, only 1 or 2 people live year-round as caretakers of the Daybreak Point Bible Camp that replaced the brick factory. Due to its topography, the less than 20 seasonal homes are situated near the shoreline.

Keats is a small 6 square kilometer unspoiled island, only a 10 minute passenger ferry ride east of Gibsons. The island is rural and sparsely populated, mostly comprised of seasonal cabins with about 80 full time residents. However, the part time summer population on Keats can grow to over 1,300 residents.

Cultural Journey
Sea-to-Sky Highway

CONNECTING PEOPLE AND COMMUNITIES ALONG THE WAY

TANTALUS KIOSK
Mountain goat hunters and their dogs were transformed into the Tantalus Range

MOUNTAIN GOATS

RAIN FOREST
Beside the Squamish Lil'wat Cultural Centre

ANVIL ISLAND

CANOES
Squamish River Estuary

UNLOCKING TREASURES OF OUR ANCESTORS

Ha Yáchtn / H'álhw Á7acw

WELCOME FROM THE SQUAMISH AND LÍL'WAT FIRST NATIONS

Every inch of the route is rich in mystery with First Nations oral history, supernatural beings and place names. Learn how mighty Thunderbird, giant two-headed serpents and other mythical beings have shaped our land. Enjoy your journey along this modern path culminating at our crown jewel in Whistler, British Columbia — The Squamish Lil'wat Cultural Centre. Witness through our eyes the place where we have thrived and existed since time immemorial.

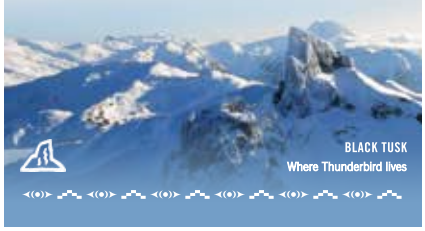
THE SELF-GUIDED CULTURAL JOURNEY ROUTE

The Sea-to-Sky Corridor is a route stretching north from Vancouver through Whistler, renowned world wide for its breathtaking ocean views and magnificent mountain ranges.

Going northbound from Vancouver, stop at kiosks 1 to 5 on your way up to Whistler — they are all on the east side of the highway. In Whistler visit kiosk 6 at Olympic Plaza and kiosk 7 at the Squamish Lil'wat Cultural Centre. Southbound from Whistler back to Vancouver, stop at kiosks 8 and 9, which are both on the west side of the highway. Enjoy viewpoint signage on both sides of the highway at easily accessible pullouts. Also, along the way, enjoy the spectacular scenic features marked on the map.

THE SEA-TO-SKY CORRIDOR IS MUCH MORE THAN SPECTACULAR SCENERY.

IT IS ALSO A CULTURAL JOURNEY.



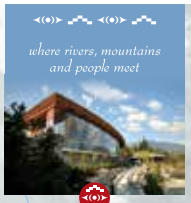
BLACK TUSK
Where Thunderbird lives

JOURNEY HIGHLIGHTS

KIOSKS 5
Designed in the shape of our woven cedar-bark hats, the kiosks are located at pullouts where you can stop and learn about our diverse culture.

VIEWPOINTS
These viewpoints markers indicate that you are approaching a kiosk.

HIGHWAY SIGNAGE
You will see route / kilometre markers, direction signs, creek / river signs and community gateway signs themed in Squamish and Lil'wat languages and motifs.



Skwxwú7mesh Ílílwat7úl
SQUAMISH LÍLWAT CULTURAL CENTRE

Pemberton
Mount Currie Village
Mount Currie
Lillooet Lake
Nairn Falls
A very good hunting site
Green Lake
Alta Lake
Nita Lake
WHISTLER
BRANDYWINE
Daisy Lake
Black Tusk
Cheakamus Lake
Garibaldi Lake
Mount Garibaldi
Tantalus Range
TANTALUS
Brackendale
Alice Lake
Squamish
ADVENTURE CENTRE
STAWAMUS CHIEF
Shannon Falls
A resource gathering area
BRITANNIA BEACH
Porteau Cove
Anvil Island
TUNNEL POINT
Gambier Island
Lions Bay
The Lions
Howe Sound
Bowen Island
HORSESHOE BAY
West Vancouver
North Vancouver
Siwash Rock
Downtown Vancouver

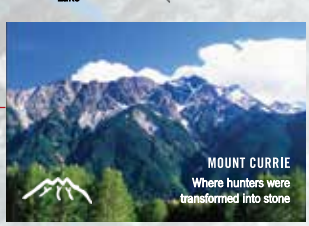
Lil'wat pictograph of grizzly bear tracks captures the bear's spirit.

The mountain goat was highly prized by both the Lil'wat and Squamish people.

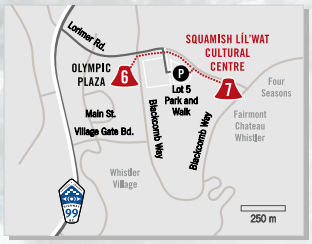
In Squamish mythology the sun comes to earth as an eagle.

Pictograph signifying unity. Both the Squamish and Lil'wat Nations are close-knit and family-oriented.

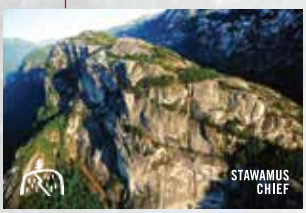
0 km 5 km 10 km



MOUNT CURRIE
Where hunters were transformed into stone



A safe haven during the Great Flood
MOUNT GARIBALDI



STAWAMUS CHIEF

SMOKED SALMON

SÍWASH ROCK
The transformer stone

Two Chief's daughters transformed into stone
THE LIONS

CULTURAL JOURNEY KIOSKS

1 Ch'ax-áy' HORSEHOE BAY
Journeys begin and end here at the gateway to spectacular Howe Sound. It was here that two long-ago giants waged an epic battle with slingshots. Their weapons were transformed into huge boulders, still visible today in the stretch of ocean between K'ttl'alsm (Eagle Harbour) and Sldwtsut (Lighthouse Park).
32.2 km to Britannia Beach Kiosk

2 Shishá4' u7áy BRITANNIA BEACH
Britannia Beach, where screech owls call and mountain goats climb. At Britannia Beach trespassers were transformed into stone during mythological times. Nearby Porteau Cove is an area rich in all kinds of wildlife, marine life and medicinal plants.
8.8 km to Stawamus Chief Kiosk

3 Siy' ám' Smánit STAWAMUS CHIEF
From its three summits, stunning panoramic views of Howe Sound and the surrounding Coastal Mountains can be seen. The two-headed serpent Sínulhk-ay' scaled this mountain in the long ago. Nearby Kwikwetbtown (Shannon Falls) is where Squamish Nation medicine people trained.
2.8 km to Adventure Centre Kiosk

4 H-w' kw' instn ADVENTURE CENTRE
Spectacular views of the Stawamus Chief and the trail left by the serpent Sínulhk-ay'. Home to the town of Squamish, named after Sk-wx-wú7mesh (the River People) and the Squamish River, where several Squamish villages exist today.
40.7 km to Brandywine Kiosk

5 Payakéntsut BRANDYWINE
Site of Black Tusk Mountain, landing place of Ín7inyáx-a7en, the great Thunderbird, and a spiritual training place for the Squamish people. Also home to the Cheakamus River, formerly a vital trade and travel route and today renowned for its salmon stocks.
8.9 km to Olympic Park Plaza Kiosk

6 Whistler OLYMPIC PLAZA
In the long ago, Thunderbird flapped his wings creating booms of thunder causing a great rock and water slide to crash down into Rubble Creek Valley – destroying the shared Squamish / Lil'wat village site of Spo7ez. Thunderbird was punishing our Ancestors who had forgotten to follow and respect our traditional values.
0.5 km to Squamish Lil'wat Cultural Centre

7 Squamish Lil'wat Cultural Centre
An architectural masterpiece and the highlight of the Cultural Journey. Tour our family-friendly museum, galleries and interactive exhibits. Watch a spectacular 15-minute film showcasing our cultures. Meet our Ambassadors, engage in story-telling and make a craft. Visit the gift gallery and Aboriginal café.
32.5 km to Tantalus Kiosk

8 Tsilxwm TANTALUS
Where T'elhnáyem (elite alpine navigators) trained to hunt mountain goats. Some are immortalized, along with their dogs, in the towering granite and stone of the Tantalus Mountains. This area is home to wildlife like grizzlies, elk, wolverines, deer, cougars, wolves and eagles.
47.0 km to Tunnel Point Kiosk

9 H-él'elstn TUNNEL POINT
A vantage point to the islands of Howe Sound where mythical serpents and Sasquatches roam, and where Mink and Skunk held their infamous feast. To the north is Porteau Cove, a sturgeon fishing area and one of the oldest archaeological sites on the Northwest coast.

The launch of the Cultural Journey marked the end of a decade of work to officially recognize and honour the Indigenous people of the Sea to Sky. Including Squamish place names on signage, or naming recognition, is one of the legacies from the 2010 Olympics negotiated by the Lil'wat and Squamish people.

10.6 Cultural Significance

(Briefly describe the proposed biosphere reserve's importance in terms of past and current cultural values (religious, historical, political, social, ethnological) and others, if possible with distinction between material and intangible heritage (c.f. UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage 1972 and UNESCO Convention for the Safeguard of the Intangible Cultural Heritage 2003)

The cultural significance of Átl'ka7tsem/Howe Sound lies in its legacy as *Skwxwú7mesh Uxwumixw*, the traditional territory and recognized homeland of the Coast Salish and Squamish Nation for the past 10,000 years. As discussed in Section 9.1.1, the entire area of Átl'ka7tsem/Howe Sound and its watersheds are enriched with mythology, spiritual and ritual places, place names, village sites, seasonal camps, burial grounds and resource gathering areas.

The Northwest Coast culture in southwest BC at the time of contact was the most densely populated area of Indigenous people in all of Canada. Of these, the Coast Salish, including the Squamish Nation, were the largest of the southern groups, numbering in the tens of thousands.

The Northwest Coast culture would become recognized as one of the most complex and celebrated Indigenous cultures in the world, particularly due to their social/ political structure and artistic traditions (MacKinnon, 2003).

The rich abundance of natural resources throughout their territory, especially cedar, salmon and a host of marine and terrestrial wildlife, plants and berries, enabled the Coast Salish culture to flourish and develop deep artistic traditions and a close-knit social life. Salmon could be preserved through drying or smoking, created a stable food source and allowed them to live in larger, more socially stratified groups than was typical among Indigenous peoples in Canada. Coast Salish family life centered on the longhouse, large buildings that would house many extended families. The old village of *Xwáýxway* in what is today's Stanley Park in Vancouver had a longhouse that was 60 metres long and 20 metres wide that housed 11 families totalling 100 people. Beyond the immediate extended families, there are strong kinship ties that connect their social life and cultural events to other families and neighboring First Nations (Wikipedia, 2019).

Squamish Nation ceremony blessing new canoe, photo: B. Turner

Map compiled by Vancouver City archivist based on conversations with Squamish Nation elders during 1930s to 1950s.

As described in Section 4.3.1, the Squamish Nation has developed its own land use plan, known as the *Xay Temixw*, to speak for and help protect places, resources and values that are essential to their Nation's future survival. The plan identifies: secluded places for traditional cultural practices; plants for food and other uses; wildlife and wildlife habitat, especially mountain goats, grizzly bears, and animals for food such as moose, deer, and fish; for fishing; healthy rivers and streams; clean air, and clean water for drinking, for ritual bathing and for the ecosystem; resources from which Squamish members can earn a living; and places to heal, recover and re-connect with the land (Gardner, 2016). The plan explains and identifies Kwa kwayx welh-aynexws (Wild Spirit Places). These important areas should be managed to retain their wilderness attributes, to provide places for spiritual and cultural renewal for the Squamish Nation, and for compatible uses. The following sections describe community perspectives on Squamish Wild Spirit Places candidate areas to be safeguarded.

The First Nations considerable wealth and complex social organization produced elaborate cultural institutions, as exemplified by the potlatch ceremony, usually centered around an event such as a birth, marriage or a coming-of-age ceremony. A Squamish potlatch would differ somewhat from that of other Coast Salish nations with the focus of the event being a large feast to which members of the community, nation or neighboring nations would be invited (Canadian Encyclopedia, 2019).

Throughout history, Indigenous societies in North America have relied on the oral transmission of stories, histories, lessons and other knowledge to maintain a historical record and sustain their cultures and identities. These stories are captured in various books such as "Capilano - the Story of a River" by distinguished Vancouver physician James W. Morton. Pubished in 1970, it describes how when the Europeans first appeared in these waters, the Squamish and their northern enemies declared peace.

"To celebrate it, a great potlatch was held for the two tribes at Potlatch Creek on Howe Sound, across from Anvil Island," Morton wrote. The peace was "further confirmed" by the marriage of the northern chief's daughter to a young Squamish, "Paytsauma, half-brother to old Chief Ki-ap-a-la-no," the legendary giant-sized chief after whom the whites renamed the Homulcheson River. "One authority states that the first child of this marriage was a daughter, Lay-hu-lette, meaning 'beginning of the world.' A more reliable source believes the first child was a son and Lay-hu-lette was his daughter," Morton wrote. "In any case, Lay-hu-lette was born at Potlatch Creek, probably in 1857." Lay-hu-lette went on to marry a Squamish named Sahp-luk who became Hyas Joe, Capilano Joe and finally Chief Joe Capilano. It was the chief and his wife who gave Pauline Johnson the stories she included in her Legends of the Squamish, which a Vancouver Province Newspaper editor changed to Legends of Vancouver.

So the mouth of Potlatch Creek was the setting of a major First Nations peace pact and the birthplace of a Squamish matriarch whose name was Beginning of the World (Coast Reporter, 2012).

Xwelxwelítn (place of the white people), today referred to as Watts Point, was the location of the first contact between the Squamish Nation and Captain George Vancouver in 1792. A Squamish Elder sighted what appeared to be a large floating island offshore. The warriors approached with canoes in attack formation prepared for battle or trade. The found a large canoe with a dead tree on it manned by *stéwakin* - people so pale they appeared dead. Upon boarding, the warriors were greeted with a handshake which was a gesture of challenge known as *keléxw* to the Squamish. A *Chiyák'mesh* warrior realized that the foreigners were actually living beings when his opponent cried out in pain upon having his finger dislocated. (December 2011 from: Cultural Journey Sea-to-Sky Corridor website, Squamish and Lil'wat First Nations)

Howe Sound and lush Squamish Valley created an ideal place to call home, with many native village sites located along the coast and rivers. A 1975 survey uncovered archaeological sites on the islands of Keats, Bowen and Gambier. Shell middens, granite hammers, a basalt adze and many other artifacts have been discovered, providing a glimpse into historical life on the coast.

Howe Sound is also home to several sacred burial sites. Native burial sites were often located on islands, as they provided protection from wolves who roamed the area. Remains have been found at Gower Point near Gibsons, and on other small islands in Howe Sound.

In addition to these artifacts and sacred grounds, First Nations pictographs can be found on the rock walls of Howe Sound at tide line and in the Squamish Valley. Furry Creek is home to rock paintings believed to be anywhere from 800 to 3000 years old. These images are of the same style as other First Nations art found all the way from California to Siberia (Paul De Jong, Squamish Reporter 2014).

The Squamish Lil-wat Cultural Centre located in Whistler just north of AHSBR unites the Squamish and Lil-wat Nations and provides a venue for celebrating their ancient customs and contemporary history. The Centre was a legacy project of the 2010 Olympic Winter Games, an event that brought about significant changes in the shift of attitudes of Canadians to First Nations and a new sense of pride among aboriginal people. The cultural centre was one of a number of legacy projects from symbolic to economic (Globe and Mail, Robert Matas).

10.7 Languages

Specify the number of spoken and written languages (including ethnic, minority and endangered languages) in the biosphere reserve. (Refer, for instance, to the UNESCO Atlas of Endangered languages (http://www.unesco.org/culture/languages- atlas/index.php)).

Prior to contact, it is estimated that an historic population in southern coastal BC of about 80,000 people spoke 18 distinct languages, of which about 16 are still spoken today (MacKinnon, 2003). One of these, *Sḵwx̱wú7mesh sníchim*, was historically an oral language spoken by the Squamish people in Átl'ka7tsem/Howe Sound that lacked a formal writing system. Various writing systems have since been developed but the most recent system was adopted as the official written form by the Squamish Nation in 1990 and is used by most contemporary language speakers (kwiawtstelmexw, 2019). In the same year, the Chief and Council of the Squamish Nation declared the *Sḵwx̱wú7mesh sníchim* language to be the official language of their

Reviving traditional practice of harvesting herring roe on hemlock boughs., photo: T. Cyr

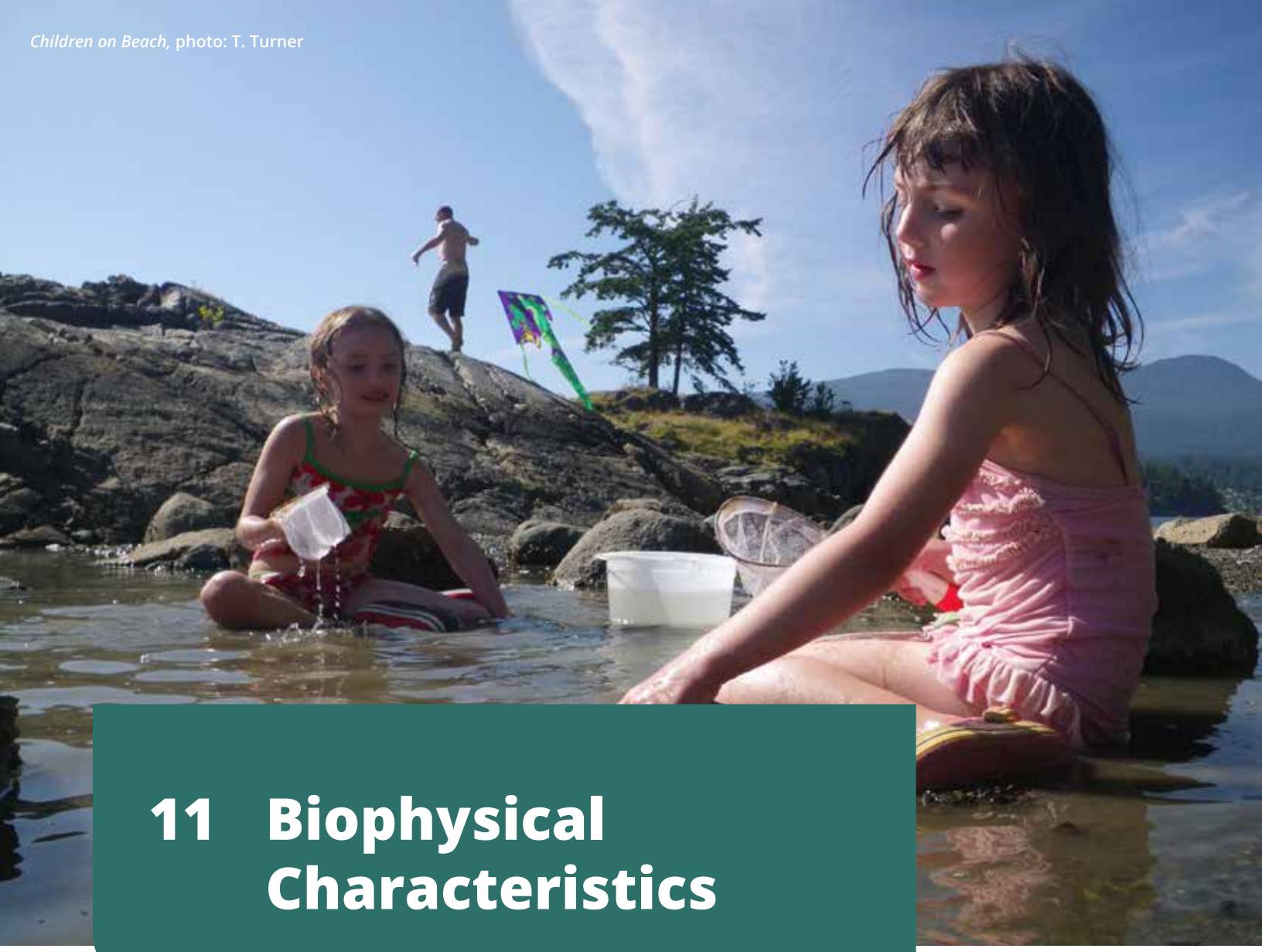
Bilingual sign, Sea to Sky Highway, photo: B. Turner

people, but in 2010, the First Peoples' Heritage, Language and Culture Council considered the language to be "critically endangered" and "nearly extinct", with just ten fluent speakers. Neighbouring First Nations, the Tlseil-Waututh speak a *Hul'q'umi'num* dialect and the Lil'wat, an interior dialect known as *Sťáťimcets*.

There has been a strong movement over the past decade to resurrect the Squamish language. A Squamish–English dictionary was completed in 2011, and the Squamish Nation held a language festival in 2013 to inspire more efforts to keep the language alive. The festival was part of a multi-faceted effort to ensure the language's long-term survival, not only by teaching it in the schools, but by encouraging parents to speak it at home (Burke, 2013). Today, in collaboration with Simon Fraser University, the Squamish Nation operates the Squamish Language Academy offering a Proficiency Certificate, providing people with the opportunity to become fluent speakers and to pass the language down to future generations (Squamish Nation, 2019). Similar courses are offered by other institutions, including Capilano University in North Vancouver and the Nicola Valley Institute of Technology, BC's Indigenous Public Post-Secondary Institute (NVIT, 2019).

During the early years of European settlement, English was the prominent language among the British, Irish and Scottish settlers, but there were also Finnish settlers who arrived in Gibsons in 1905 whose presence and language is still felt in the area. Although there is little evidence of French settlement in AHSBR's history, French is Canada's second official language and French immersion programs have been offered in Squamish and Gibsons since 1990 with a Grade 5 entry point. Further opportunities to offer French immersion in kindergarten and elementary classes are being pursued. In West Vancouver, French immersion programs are available in all levels of elementary and secondary schools.

The natural resource industry in the region attracted workers and their families from far and wide in the early years. Today, West Vancouver is the most cosmopolitan community where the mother tongue of the population is: English (70%); Farsi (8.1%); Chinese (6.6%); German (2.4%); Korean (2.2%); French (1.3%) and others (.8%) . In Squamish, after English, Punjabi (5%) and Tagalog (1%) are the first languages spoken (Wikipedia, 2019).



Children on Beach, photo: T. Turner

11 Biophysical Characteristics

11.1 General description of site characteristics and topography of the area

(Briefly describe the major topographic features (wetlands, marshes, mountain ranges, dunes, etc) which most ***typically characterize the landscape of the area****)*

The proposed Átl'ka7tsem/Howe Sound Biosphere Region (AHSBR), includes approximately 2000 km2 of mountainous coastal terrain on the eastern shores of the Salish Sea between the Vancouver metropolitan area and the mountain resort community of Whistler. The central geographic feature of AHSBR is Átl'ka7tsem/Howe Sound, a glacially-carved coastal inlet or fjord that extends 42 km inland from the Salish Sea to the mouth of the Squamish River. Howe Sound is broad and island-strewn at its mouth, but narrows inland into a steep-walled finger of ocean that continues to the head of the fjord. AHSBR includes the marine waters of Howe Sound, its islands, and adjacent watershed areas to the east, west and north. AHSBR includes much of the region referred to as "Sea to Sky Country". Within the boundaries of AHSBR are the iconic geographies of Sea to Sky Country: coastal communities, rugged shorelines, forested islands, rich estuaries, cascading waterfalls, dormant volcanoes, alpine lakes and peaks and tumbling glaciers. From top to bottom – from the summit of the highest peak at 2,678 metres to 325 metres deep below the waters of Howe Sound – there is a great diversity of habitat and life.

11.2 Altitudinal Range

11.2.1 Highest Elevation above sea level: 2,678 metres (Mt. Garibaldi)

11.2.2 Lowest Elevation above sea level: 0 metres (coast line, Pacific Ocean)

11.2.3 For coastal/marine areas, maximum depth below mean sea level: 325 metres (sea floor, Howe Sound, 2 km WSW of Furry Creek).

11.3 Climate

(Briefly describe the climate of the area, you may wish to use the regional climate classification by Köppen as suggested by WMO (http://www.wmo.int/pages/themes/climate/understanding_climate.php)

The south coast of BC has a temperate oceanic climate (Köppen climate classification Cf), and at sea level is characterized by long, mild and wet winters, and sunny and dry summers (Ministry of Forests, 1999). At higher elevations, from 900 to 1,800 meters above sea level, the climate is characterized by long, cool and wet winters, and shorter, cooler summers (MOF, 1997). Above 1,600 meters, colder temperatures become prevalent. Moisture is brought by the numerous Pacific westerly weather systems that sweep the region. The mountains act as a barrier and cause this moisture to be released as rain or snow, resulting in this region as being one of the wettest in Canada. Rainfall occurs at sea level from early September to late June, especially between October and March. Snow at alpine elevations can come as early as the first days of September (MOF, 1997).

Much of the local weather is strongly modified by topography. The average annual precipitation in any point is the result of its geographic location, either within a rain shadow or a rain belt, and its elevation. The hard boundaries that flank the area on the west are the slopes of the *tsekílx*/Tantalus Range and the Caren Range with peaks up to 2,600 meters, and on the east are the slopes of the Garibaldi and the Britannia Ranges with their peaks up to almost 2,700 and 2,000 meters respectively. Average annual precipitation at low elevations range from the least in Gibsons with 1,323 mm, to 1,905 mm on Gambier Island and to 2,342 mm in the northern section in Upper Squamish. Precipitation at higher elevations such as on Hollyburn Ridge in Cypress Provincial Park can be as high as 2,805 mm. Snowfall in Gibsons accounts for 30 cm of the precipitation, in Upper Squamish 233 cm and on Hollyburn Ridge 720 cm (Environment Canada, Climate Normals Station Data 1971-2000 and 1981-2010).

Winds through Átl'ka7tsem/Howe Sound are primarily northerly or southerly. From November to February, almost 80% of all reported winds at Pam Rocks are from northern directions. In the summer, that drops to about 35%. During the winter months, less than 10% of reported winds are from the south, while during the summer it is about 50%. The strongest winds occur during the winter with a ridge of high pressure over the interior of British Columbia resulting in northerly outflows bringing cold artic air. These *Skwxwu7mesh* winds, meaning "Mother of the Wind", and known locally as the 'Squamish wind', can reach up to 45 knots with gusts up to 64 knots. The area is free of low clouds and precipitation during these events when temperatures can drop below zero (Lange, Owen S., 1999).

Climate predictions for this region anticipate changes in temperature, weather and sea level rise. Overall, Canada is expected to shift to hotter and wetter climate, with an increase in frequency of extreme events. A projected annual average temperature increase for the Howe Sound area of 2º C is expected between the years 2040-2070. Estimations predict that the region will have twice as many days above 25º C than there is today. As a result, the area will see drier summers and decreased snowpack on the mountains by the 2050s (City of Vancouver, 2017).

By the year 2050, precipitation in the area will increase by 5% during winter months, 7% in the spring and 12% in the fall. Not only will frequency increase, but the intensity of heavy rain events is likely to increase as well, resulting in extreme rain events. Alternatively, summer months will see precipitation decrease by 19% from current values, resulting in a warmer and drier climate during this season. Global sea levels are expected to rise over the next hundred years, with a 0.5m rise by 2050 and 1.0m rise by 2100 (City of Vancouver, 2017).

11.3.1 Average Temperature of the Warmest

Winter outflow storm, photo: L. Gilday

Month

- 17.9 °Celsius - Gibsons - July or August - elevation 34 m
- 18 °Celsius - Upper Squamish - July or August - elevation 46 m
- 13 °Celsius - Hollyburn Ridge - July or August - elevation 930 m

11.3.2 Average Temperature of the Coldest Month

- 4.2 °Celsius - Gibsons - December - elevation 34 m
- 0 °Celsius - Upper Squamish - December - elevation 46 m
- -1.8 °Celsius - Hollyburn Ridge – December - elevation 930 m

11.3.3 Mean annual precipitation

- 1,323 mm - Gibsons
- 1,905 mm – Gambier Island
- 2,342 mm - Upper Squamish
- 2,805 mm - Hollyburn Ridge (Environment Canada, Climate Normals Station Data 1971-2000 and 1981-2010).

11.3.4 Meteorological Station Records

Meteorological records have been recorded in the formats listed below at local sites: (Environment Canada, Climate Normals Station Data 1971-2000 and 1981-2010).

Name of station	Location	Elevation	Period
Gibsons Gower Point	49° 26 N; 123° 26 W	34 m	1971 - 2003
Gambier Harbour	49° 26 N; 123° 26 W	53 m	1971 - 2003
Upper Squamish	49° 53 N; 123° 17 W	46 m	1979 - 2007
Hollyburn Ridge	49° 23 N; 123° 11 W	930 m	1971 – 1995

Tantalus Range in winter from Howe Sound, photo: HSBRIS.

11.4 Geology, Geomorphology And Soils

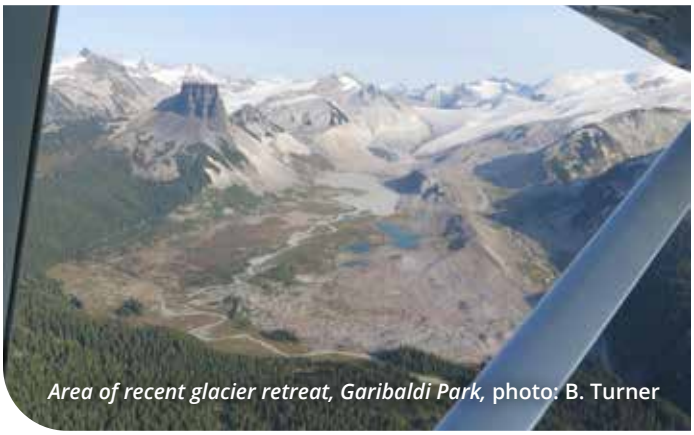
(Briefly describe important formations and conditions, including bedrock geology, sediment deposits, and important soil types)

Átl'ka7tsem/Howe Sound and the surrounding region has a dynamic landscape which captures the unique interplay of volcanism, glaciation and plate tectonics, as well as the unique landforms and the physical human geography that have occurred as a result. This uniqueness has motivated the Council of the Resort Municipality of Whistler, just north of AHSBR, to pursue a UNESCO Global Geopark designation for the Sea to Sky region.

11.4.1 Ice Age (Pleistocene) History

The Pacific coast of BC is a fjord-land characterized by long, finger-like inlets that extend deep into the coastal mountains. This fjord-land coast was carved during the Ice Ages (Pleistocene Era) that began 2 million years ago and ended 10,000 years ago (Clague and James, 2002). Prior to the Ice Ages, Howe Sound was a river valley drained by a mountain river that flowed into a broad valley that today is occupied by the Salish Sea. This ancestral Salish Valley was bound to the west by mountains (now Vancouver Island) and drained by rivers that met the ocean near the present site of Victoria. During the Ice Ages, glaciers expanded to cover much of BC many times, separated by long periods where glaciers melted back to cover only the highest mountains (Clague and James, 2002). During glacial expansions, glaciers flowed down mountain valleys, straightening, steepening and deepening them.

During the last ice advance, which peaked about 15,000 years ago, glacier thickness exceeded 2 kms in Howe Sound and covered all but the highest peaks. Glaciers, flowing southwards down the present Cheakamus and Squamish River valleys, combined to flow southwards through Howe Sound and joined a much larger glacier flowing southeast down the Salish Sea. Glacier erosion steepened valley walls, truncated side ridges, streamlined hills into whaleback shapes and rounded mid-elevation peaks into dog-tooth summits, such as The Lions above Lions Bay. The highest peaks that rose above the glacier limit such as the high elevation peaks of the Tantalus Range west of Squamish remained craggy. Glacial debris (till) composed of sand, mud and pebbles was spread as a veneer at the base of flowing glaciers and today is found everywhere in the region. A giant submarine ridge 200 metres high of glacial debris, known as a terminal moraine, spans Howe Sound at Porteau Cove and marks the forward limit of a short-lived glacial advance during the latest stages of the last Ice Age (Friele and Clague, 2002).



Area of recent glacier retreat, Garibaldi Park, photo: B. Turner

As the glaciers retreated 12,000 to 10,000 years ago, marine waters advanced into the deeply carved and indented coastal region, forming the Salish Sea and isolating Vancouver Island. Crustal depression of the Earth's crust due to loading by glaciers caused shorelines of Howe Sound to be 150 m higher than today, but with glacier retreat, the isostatic rebound caused sea levels to fall. Current sea levels stabilized about 5,000 years ago (Clague and James, 2002).

During the Little Ice Age in the 1700s and 1800s, mountain glaciers advanced again throughout southwestern BC. Retreat of these glaciers in the Howe Sound area since the mid 1800s has left behind broad expanses of rock debris and barren bedrock in fore fields of modern glaciers (Koch et al., 2009).

Post-Ice Age (Holocene) History

Rivers flowing into ancient Howe Sound immediately following the Ice Age deposited sand and gravel as deltas that have now been stranded by a sea level fall of 50-150m above sea level. Today, these deposits are sites of active and former sand and gravel quarrying operations such as immediately north of Lions Bay and along the lower Mamquam River in Squamish (Friele and Clague, 2002).

The Squamish River drains glaciated mountain terrain and unstable volcanoes, and so carries a high bed load of sand, mud and gravel. It meets the sea at the head of Howe Sound where it forms an elongated river mouth delta and estuary. The delta has advanced seaward 27 km over the past 10,000 years, infilling 27 km of fjord and converting it to valley bottom (Brucker et al., 2007). From spring to fall, a cold turbid plume of river water spreads southwards down Howe Sound.

11.4.2 Soils

Soil formation has occurred over the past 10,000 years on the widely distributed veneer of glacial parent materials and reworked products. The cool wet conditions have produced podzolic soils that are leached, acidic and reddish brown in colour (Valentine et al., 1978). Historic and present agriculture is very limited, and primarily occurs on floodplain areas with rich alluvial soils such as in the Squamish River valley and estuary.

Squamish River, photo: B. Turner

Town of Squamish at mouth of Squamish River and view of Howe Sound, photo: B. Turner

Mount Garibaldi rising above Howe Sound, photo: T. Turner

11.4.3 Submarine Bathymetry

The submarine seafloor of Howe Sound is characterized by steep rock walls that descend to flat sediment-covered basins. Bedrock seamounts protrude through the sediment locally and are favoured sites for glass sponge reefs and rock gardens, and provide ideal rockfish habitat. The ridge of glacial debris (terminal moraine) at Porteau Cove divides an inner deeper basin to the north from a complex outer basin to the south. Depths in the inner basin exceed 270 metres just north of Porteau Cove and shoal gently to the north. The submarine slopes of the Squamish River delta extend 10 km south below the waters of Howe Sound from the river mouth and are carved by channels that carry avalanches of river sand southwards to the floor of the inner basin (Brucker et al., 2007).

The complex outer basin is separated into channels by a number of islands. A deeper trough, reaching depths of about 250 metres, extends south from Porteau Cove along the eastern side of Howe Sound, marking the locus of ice stream flow of the Ice Age glacier. Maximum depths elsewhere generally range from 100 to 200 metres. A partial moraine ridge underlies Shoal Channel at the mouth of Howe Sound between Gibsons and Keats Island.

Core sampling shows that most of the seafloor of Howe Sound is covered by river-derived mud, primarily from the Squamish River in northern Howe Sound and from the Fraser River in southern Howe Sound. Seismic surveys indicate that below the seafloor is a blanket of sediment as much as 500 m thick overlying the bedrock trough (Hamilton, 1992).

11.4.4 Bedrock Geology

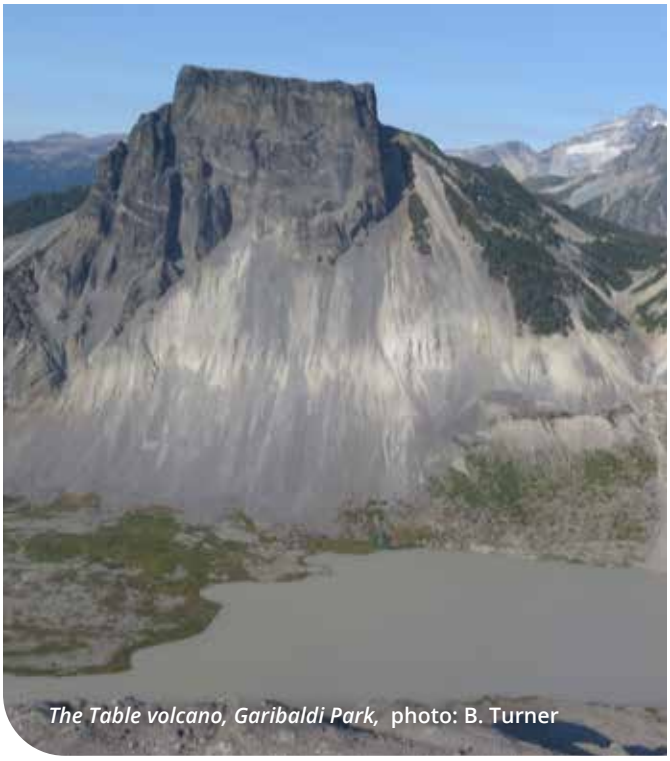
Three major types of bedrock underlie AHSBR: granitic and gneissic rocks, metamorphosed volcanic rocks and eroded volcanoes of the Cascade Volcanic Belt (Roddick and Woodsworth, 1979; Monger and Journeay, 1994). Granitic rocks are the dominant rock of the southern Coast Range, and underlie most of HSBR. These granitic rocks are coarse-grained, salt-and-pepper coloured rocks that formed 160 to 90 million years ago during the Jurassic and Cretaceous periods of Earth history by the slow crystallization of magma deep in the Earth. Some of these granitic rocks were later sheared and deformed by Earth's tectonic forces to form layered granite-like gneiss. Resistant to erosion, granitic rocks form most of the highest peaks in AHSBR including the Tantalus Range, Cloudburst and

Mamquam mountains near Squamish and the famous climbing walls of the Stawamus Chief. Granitic rocks also form the striking pale-grey shorelines along Howe Sound at Horseshoe Bay and Whytecliffe Park in West Vancouver, and Lighthouse Park and Gower Point at the mouth of Howe Sound. A coastal exposure of these rocks displaying unique and complicated geological features at Caulfeild Cove in West Vancouver has been used for over 5 decades as a teaching site by local universities and has been proposed as a geological heritage site (Cook, 2015).

The second major bedrock type exposed in AHSBR is the metamorphosed volcanic and sedimentary rocks of Jurassic and Cretaceous age (180 to 90 million years old) that form most of the islands of Howe Sound. Dark grey Jurassic age volcanic and thin-layered sedimentary rocks of the Bowen Island Group underlie most of Bowen Island and the outer islands of Howe Sound, while younger pale green volcanic and sedimentary rocks (e.g. lava, breccia, tuff, and sandstone) of the Gambier Group underlie most of Gambier Island, the Britannia mine area and Garibaldi Lake. The Britannia mine operated from the 1920s to 1976, extracted copper-zinc ores from the Gambier Island Group rocks, and today is the site of the Britannia Mining Museum.

The third major bedrock type in AHSBR is comprised of the volcanoes and associated lava flows from eruptions over the last 2 million years (Kelman et al, 2002). As part of the Cascade Volcanic Arc, the Howe Sound watershed has more volcanoes than any other coastal watershed on the BC Coast. The largest and most famous of these volcanoes is Mount Garibaldi, which erupted about 12,000 to 13,000 years ago during the waning stages of the last Ice Age. A series of violent eruptions built a cone of block and ash and lava 3000 metres high on an ice-free ridge and adjacent

Caulfeild Pkintrusive, Caulfeild Park, photo: D. Cook



The Table volcano, Garibaldi Park, photo: B. Turner

valley glacier. As the glacier melted, the western half of the volcano collapsed into the valley, forming the present-day Cheekeye Fan, a great fan-like wedge of sediment north of Brackendale. The over-steepened western face of Mt Garibaldi continues to erode rapidly today, creating an ongoing debris flow hazard for development on the Cheekeye Fan.

A dozen or so other smaller volcanoes and lava flows occurred throughout western Garibaldi Provincial Park and are renowned for their features that display interactions between erupting volcanoes and glacier ice such as the flat-topped Table volcano and the cliffs of The Barrier. Other volcanoes include The Black Tusk near Garibaldi Lake, Castle Crags just west of Squamish, and Watts Point just north of Britannia along the shores of Howe Sound. These volcanic rocks, including other volcanoes upstream along the Squamish River, are highly fractured and therefore unstable and easily eroded, and so supply large volumes of volcanic debris to the Squamish River system.

Obsidian and other flint-like rocks from these volcanic rocks were source materials for the making of stone tools by First Nations over the past 10,000 years (Reimer, 2011). These stone harvest sites influenced Squamish Nation place names and oral history and continue to have cultural importance to this day.

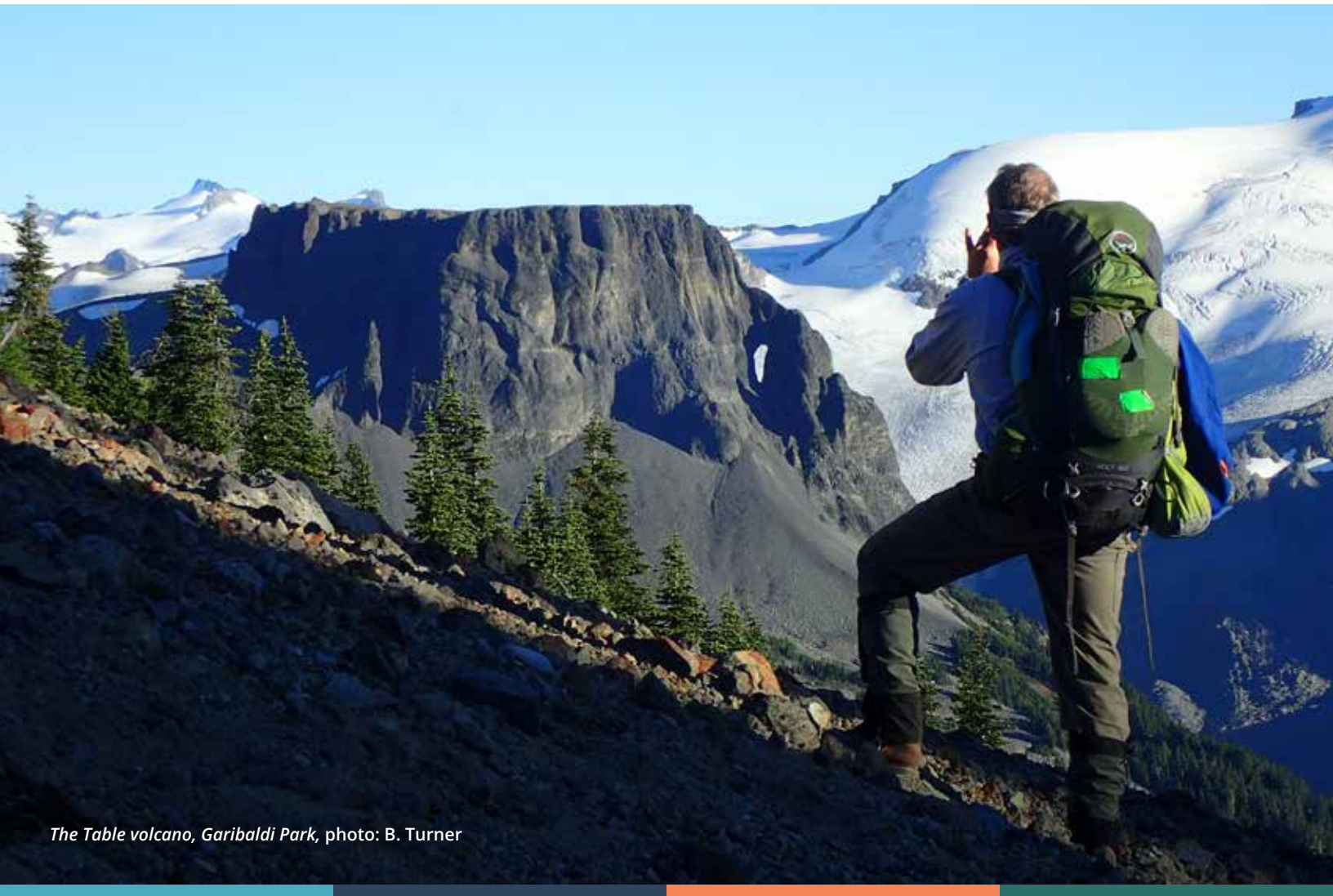
11.4.5 Geological Hazards

Southwest BC lies above a subduction zone where the oceanic Juan de Fuca tectonic plate is sliding below the western edge of the North American plate. This subduction causes volcanoes, earthquakes and the uplift of coastal mountains. The volcanoes are part of the Cascade Volcanic Arc, a chain of volcanoes that stretches from southern BC to northern California and is part of the larger circum-Pacific "Ring of Fire". All volcanoes within AHSBR are considered dormant as they lack any associated seismicity and hot springs and none have erupted for 10,000 years or more (Kelman et al., 2002).

South-west BC, including all of AHSBR, lies in a seismically active zone vulnerable to earthquakes. Major subduction zone earthquakes, up to magnitude 9, occur at intervals of 300 to 500 years, and most recently shook the region in January, 1700 (Clague, 1997). Smaller intra-plate earthquakes happen more frequently.

The Salish Sea is largely protected from tsunami generated below the open Pacific Ocean by Vancouver Island and the Gulf Islands chain in the Salish Sea. However, tsunami generated by a shallow crustal earthquake, a submarine landslide from the Fraser River delta, or a landslide that descends from steep mountain slopes into Howe Sound are all possible hazards.

Steep mountain slopes along the Highway 99 corridor and elsewhere are prone to landslides as well as debris flows along stream courses during winter storms. Debris flows in the early 1980s claimed the lives of drivers and residents near Lions Bay. Earthquakes could trigger landslides, as well as liquefaction instability, on the Squamish River delta (Blais-Stevens, et al, (2012).



The Table volcano, Garibaldi Park, photo: B. Turner

Garibaldi Lake, Garibaldi Park, photo: B. Turner

11.5 Bioclimatic Zone

AHSBR is located within the Temperate Oceanic Bioclimatic Zone of the world, as shown in Table 7 below. The check marks indicate that all of AHSBR is located in the Pre-humid Area of the globe (Rivas-Martínez, et al, 2015).

Table 7: Aridity index resulting from the use of P/ETP: Mean annual precipitation (P)/mean annual potential evapotranspiration (ETP)

Areas	Average annual rainfall/mm	Aridity Index		Core area(s)	Buffer Zone(s)	Transition Area(s)
		Penman	(UNEP index)			
Hyper-arid	P<100	<0.05	<0.05			
Arid	100-400	0.05-0.28	0.05-0.20			
Semi-arid	400-600	0.28-0.43	0.21-0.50			
Dry Sub-humid	600-800	0.43-0.60	0.51-0.65			
Moist Sub-humid	800-1200	0.60-0.90	>0.65			
Pre-humid	P>1200	>0.90		√	√	√

Old growth Mountain Hemlock forest, photo: B. Turner

11.6 Biological Characteristics

(List main habitat types (e.g. tropical evergreen forest, savanna woodland, alpine tundra, coral reef, kelp beds) and land cover types (e.g. residential areas, agricultural land, pastoral land). For each type, indicate:

REGIONAL if the habitat or land cover type is widely distributed within the biogeographical region within which the proposed biosphere reserve is located, to assess the habitat's or land cover type's representativeness;

LOCAL if the habitat or land cover type is of limited distribution within the proposed biosphere reserve, to assess the habitat's or land cover type's uniqueness. For each habitat or land cover type, list characteristic species and describe important natural processes (e.g. tides, sedimentation, glacial retreat, natural fire) or human impacts (e.g. grazing, selective cutting, agricultural practices) affecting the system. As appropriate, refer to the vegetation or land cover map provided as supporting documentation.

As introduced in Section 4, AHSBR is a rich ecological mosaic comprised of a variety of terrestrial, freshwater and marine habitats as well as a number of land cover types depending on the degree of human activity. These habitat (regional) and notable land cover (local) types are described below and include the following:

- **Terrestrial Habitats: temperate rainforest and alpine tundra**
- **Freshwater and Riparian Habitats: rivers and lakes; wetlands and riparian systems**
- **Marine Habitats: nearshore and benthic habitats; sponge reefs; estuaries; eelgrass beds; beaches/kelp beds/algae; pelagic waters**
- **Land Cover Types: urban areas; rural and agricultural areas**

11.6.1 Terrestrial Habitats

Temperate Rainforest

The Coastal Western Hemlock (CWH) forests in Átl'ka7tsem/Howe Sound are located along the coast and the west side of the coastal mountains at elevations from sea level to 900 m. and have a typically cool climate year-round (Meidinger and Pojar, 1991). Mean annual temperatures range from 5.2 to 10.5 degrees Celsius. This is the wettest forest type in BC and precipitation can range from 1,000-4,000 mm with an annual mean of 2,228 mm. In the Howe Sound region, 15% of the precipitation falls as snow (Meidinger and Pojar, 1991). The CWH is commonly referred to as a "temperate rainforest" because of the mild, wet climate and complex and high productivity (Ministry of Forests, 1999).

The most common species of tree in CWH forests is the western hemlock that regenerates under the canopy of mature trees and on acidic raw humus or decaying wood. Other common trees include the western redcedar, Douglas-fir in drier areas and Amabilis fir in higher elevations, shore pine or lodgepole pine on very dry or very wet sites, red alder on disturbed sites, black cottonwood on floodplains, sitka spruce on floodplains or beaches, and grand fir, western white pine, and bigleaf maple in warmer and drier areas. The most common community in the CWH is the Western hemlock – Amabilis fir – Alaskan blueberry association. Common shrubs include salal, blueberry, false-azalea and white-flowered rhododendron. A well-developed moss layer typically covers the ground along with deer fern (Meidinger and Pojar, 1991).

Above the CWH forest is found the Mountain Hemlock Zone (MH) forests occurring on sub-alpine mountain slopes at an elevation of 900 – 1,800 metres. At this elevation, the climatic conditions are considered hyper-maritime with short, cool summers and long, cool, wet winters with heavy snowfall. The mean annual temperature ranges from 0 to 5 degrees Celsius. The mean annual precipitation ranges from 1,700 to 5,000 mm, with 20-70% falling as snow (Meidinger & Pojar, 1991). The shrub layer is typically well-developed and comprised of huckleberries, salal, false-azalea and white-flowered rhododendron. A well-developed moss layer typically covers the ground along with deer fern (Meidinger and Pojar 1991).

The most common tree species in the MH forests are mountain hemlock, amabilis fir and yellow cedar. Other tree species include western hemlock, western redcedar, Douglas-fir, western white pine, sitka spruce, lodgepole pine, subalpine fir, and whitebark pine. Due to the deep snowpack, there is a short growing season that is more noticeable at high elevations. At high elevations, the Mountain Hemlock forest thins out to open areas with isolated clumps of trees and subalpine meadows. Species on the forest floor characteristic of the hyper-maritime subzone of the Mountain Hemlock forests include a variety of herbs, bryophytes and lichens (Meidinger & Pojar, 1991).

The most common large mammals in the CWH and MH forests are black-tailed deer, black bear and grey wolf, with grizzly bear occurring in select areas of the upper Squamish valley. The forests of AHSBR support a high diversity of bird species, second only to amphibians in number of species (see Section 4.2.1 and species list in Appendix A). These forests are particularly well known for their globally significant populations of bald eagles, particularly in the winter when they gather for the salmon spawning season. All recorded species of amphibians and reptiles in the Biosphere region are year-round residents. The majority of mammal species are residents, with the exception of two migratory species of bat: silver-haired bat and hoary bat. Numerous species of Lepidopterans (i.e., moths and butterflies) found in the Biosphere region are known to migrate south for the winter including the painted lady, red admiral and monarch.

Evidence is emerging of the effects of climate change on BC's west coast forests including decreased precipitation and the consequent increased incidence of wildfires and disease infestations, changes in forest growth rates and species composition, including the die-off of western redcedar in drier areas (Natural Resources Canada, 2019)

Black bear feeding in intertidal zone, photo: W. Husby

Coastal Douglas-fir tree,
photo: Islands Trust Conservancy

The coastal Douglas-fir forests in south-western BC have the highest density of species of conservation concern of any of the 16 biogeoclimatic zones in the province. The forests throughout Átl'ka7tsem/Howe Sound lie within the Coastal Western Hemlock (CWH) biogeoclimatic zone which is considered globally secure with only 3% of its total area converted to human use. However, within the range of forest conditions in the CWH, the driest, known as the very dry maritime subzone (CWHxm), has Douglas-fir as one of its dominant species along with a high number of rare species and ecosystems. Many of these species and ecosystems are similar to those found in the adjacent Coastal Douglas-fir (CDF) biogeoclimatic zone (Islands Trust Conservancy, 2018).

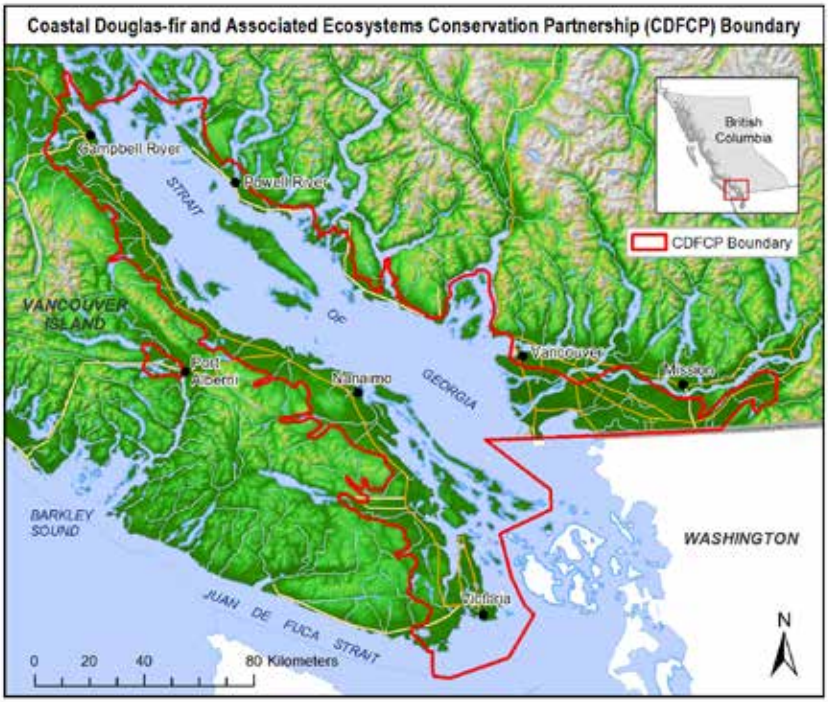


Photo: CDFCP

13 CLIMATE ACTION

The Islands Trust Area's forests are unique and globally important.

Forests provide biomass and soils as "living carbon," using natural processes to remove and store carbon dioxide from the atmosphere in a dynamic process of growth, decay, disturbance and renewal. At a global scale, forests help maintain Earth's carbon balance. The carbon cycling of forests provide essential life support services that protect us from the impacts of climate change (Islands Trust CDF Toolkit).

Alpine Tundra

The Alpine Tundra zone occurs above 1,650 m and is a rugged and relatively barren environment concentrated on the summits and high ridges of the coastal mountains. Here, the climate is cold and windy with deep snow and short frost-free periods, The average annual temperature ranges between -4 to 0 Celsius and normally remains below 0 Celsius for 7-11 months. The mean annual precipitation is between 700-3,000 mm with 70-80% as snow (Meidinger & Pojar, 1991). Much of the alpine landscape is comprised of rock, ice, and snow with stunted vegetation. There are some tree species that are widely spaced in small numbers at lower elevations in the alpine including subalpine fir, Engelmann spruce, white spruce, mountain hemlock, whitebark pine and alpine larch. Most vegetation consists of low growing shrubs, herbs, bryophytes, and lichens, with some characteristic species including the Krummholz form of partridgefoot, kinnikinnick, alpine azalea and mountain heather (Meidinger & Pojar, 1991).

Wildlife is relatively sparce in the alpine zone due to the limited vegetation. In the summer, Rooselvelt elk, black-tailed deer, wolverine and golden eagles will frequent the alpine, along with the more permanent residents such as mountain goat and white-tailed ptarmigan.

Climate change is having a dramatic effect on western Canada's alpine environments, where, for example, the average temperate at Cypress Mountain within ASHBR rose by 1.5 degrees between 1901 and 2015. The ski resort at Cypress Mountain had to close that year due to a lack of snow. Even with the best-case scenario of a two-degree rise in temperature, BC's coastal ski resorts will no longer be able to support the sport by the end of the 21st century (Canadian Geographic, 2018). The retreat of glaciers is also unprecedented, and they are not only decreasing in area but also in mass, meaning they are not replacing themselves and further loss is inevitable. This will have ongoing impacts on the integrity of high elevation habitats, through loss and fragmentation, and the wildlife that depend on them (Canadian Geographic, 2018).

11.6.2 Freshwater and Riparian Habitats

Rivers and Lakes

The largest watershed in the Howe Sound region is that of the Squamish River located at the northern end of Howe Sound. The Squamish River watershed is a complex ecosystem covering an area of approximately 3,300 km^2. There are several large glacial sub-basins in the Squamish River watershed including the Cheakamus River, Mamquam River and Elaho River. In addition to these three large sub-basins, numerous steep mountain creeks are included in the watershed. The Squamish River and its tributaries support both anadromous and resident salmonid populations, including: rainbow, steelhead cutthroat and bull trout and chum, pink, chinook, coho and sockeye salmon. Other species include dolly varden, mountain whitefish, river lamprey, pacific lamprey, prickly sculpin, coast range scuplin and green sturgeon.

In addition to the Squamish River watershed, there are multiple mountain streams that flow directly into both the east and west shores of Howe Sound (Furry Creek, McNab Creek, Woodfibre Creek, Rainy River, McNair Creek, Britannia Creek). Although many of these smaller creeks are inaccessible to anadromous salmon, chum salmon are known to spawn in the lower reaches of several of these creeks such as Britannia and Furry Creek. Resident populations of trout are present in the majority of Howe Sound's smaller tributaries, as well as non-salmonids such as sculpins and stickleback.

Riverine habitats in Howe Sound vary from steep mountain streams, to larger rivers like the Squamish River with canyons, deep slow water and shallow braided channels. The rivers and streams of Howe Sound generally experience periods of higher discharge during the spring snow melt from April to July and during fall storms between October and December. Low discharge periods are generally observed during the winter when the majority of precipitation falls as snow and in late summer (August/September) when run off from snow melt has ended.

Nearly all the lakes in the Howe Sound region are located in the alpine or sub-alpine and are fed by snowmelt. The largest lakes in the Squamish River watershed can be found in the Cheakamus River sub-basin: Cheakamus Lake,

Callaghan Lake, Garibaldi Lake, and Daisy Lake (man-made reservoir). In the wider Howe Sound region other notable alpine lakes include: Echo Lake, Lake Lovely Water, Henriette Lake, Brennan Lake, and Deeks Lake. There are also several closer to sea level in the region as well: Alice Lake, Stump Lake, Fawn Lake, Edith Lake and Brohm Lake that offer valuable habitat for waterfowl, amphibians and resident fish populations. Fish species present in Howe Sound lakes include rainbow trout, bull trout, dolly varden, cutthroat trout, sculpins, stickleback and lamprey.

These lake and river ecosystems are under pressure from both forestry and urban development. Forestry has increased siltation, had a major impact on riparian vegetation cover and reduced fish habitat in riverine and stream habitats in the Howe Sound region (Golder 2005; Slaney and Martin 1997). Urban development has resulted in loss of flood plain habitat and constrained river channels though dyking in the Squamish, Mamquam, and Cheakamus Rivers.

Small run-of-the-river hydro-electric facilities have also been built on multiple tributaries in the Howe Sound region including: Ashlu Creek, Mamquam River, Skookum Creek, McNair Creek, Woodfibre Creek, Furry Creek, and Culliton Creek. Effects of these small scale hydro projects on resident fish populations and the wider ecosystem are unclear due to a lack of adequate monitoring (Connors et al. 2014). In 2016 the Box Canyon project was completed with three main intakes and six tributary intakes in the McNab Creek watershed.

In addition to direct effects from human developments and resource use, climate change is projected to cause major changes in the lakes and rivers of Howe Sound. Projected impacts from climate change on the rivers in the South Coast of British Columbia include: increasing occurrence of flood events, changes in stream flow timing, increasing water temperature, and loss of glaciers to augment late summer flow and moderate river temperatures (Schnorbus et al. 2014; Shanley et al 2015).

Wetlands and Riparian Systems

Included in the lower elevation CWH forests are water channels with riparian forests and wetlands. These channels are used by various wildlife and fish species, including salmonids for spawning, rearing and cover.

Along with fish, berries from the vegetation in these forests offer an abundance of food for bears that inhabit the CWH. It is noted that these areas support some of the densest populations of grizzly bears and black bears in the province. These water channels eventually lead to the ocean in Howe Sound, creating estuaries (see Section 11.6.3.3 below) (Meidinger and Pojar, 1991).

Alpine lakes in the Cheakamus Watershed are at risk as glaciers and annual snow pillows diminish with changing weather patterns associated with climate change. Alpine habitat in British Columbia is projected to shrink, which puts the alpine lakes of Howe Sound at risk of disappearing (Shanely et al. 2015).

11.6.3 Marine Habitats

Nearshore and Benthic Habitats

Nearshore tidal and subtidal marine habitats, generally those less than 20 metres in depth, are widely distributed through AHSBR, but due to generally steep shorelines, do not occupy large areas. They can include rocky shores and hard substrate, sandy beach and soft bottom subtidal and are associated with distinct biological communities and submerged aquatic vegetation, such as eelgrass and kelp beds. Nearshore habitats are critically important for reproduction of some forage fish species, in particular herring that spawn in subtidal and intertidal vegetation such as eelgrass or algae, and sand lance and surf smelt that spawn on pebble and sand beaches just below the high tide line.

Further offshore, Howe Sound is recognized for its specialized benthic fauna that is typical of fjord environments with steep rocky walls. This fauna is characterized by cup corals, especially the orange cup coral, the encrusting hard corals, brachiopods and sponges (Levings et al, 1983). In the outer basin of the Sound common species include brachiopods and serpulids with large numbers of hexactinellid or glass sponges, gorgonian coral and anemone (Levings et al, 1983). The soft corals and glass sponges are important habitat for several species including echinoderms and various species of fish (Levings et al, 1983).

The inner basin is much more influenced by detritus and glacial runoff from the Squamish River as well as low

dissolved oxygen due to the poorer circulation inside the sill at Porteau Cove. At times, this anoxic condition can lead to the mass mortality of sedentary cliff fauna as well as some mobile forms such as prawn and shrimp (Burd et al, 2008). The inner sill rarely sees strong currents and the silts that have deposited on top of the sill have attracted dense growths of coral, notably sea whips, and also support 'ramparts' of glass sponges (Levings et al, 1983).

Sponge Reefs

As discussed in Section 4.2.4, Howe Sound is home to multiple glass sponge gardens (sponge on rock) and glass sponge reefs (bioherms); glass sponge reefs represent a unique habitat that was once thought to be extinct 40 million years ago. Of these reefs, only 5 are located in shallow waters around 30m, as they are are typically found in very deep waters (MLSS 2016). These sponge habitats are utilized by many marine species for various reasons. Juvenile rockfish use sponge gardens as a nursery habitat (Cook, 2005), and in Howe Sound, the redstripe rockfish is a species almost exclusively associated with these habitats (Gibbs, D.M., C. Gibbs, and A. Lamb. Pacific Marine Life Surveys. Data accessed August, 2019). Sponge bioherms are equally important for adult rockfish, providing important habitat. Spot prawns are another species known to aggregate around these reefs, sustaining an important fishery on the BC coast. Sponge reefs have also been found to be important refuge for sea stars and other crustaceans, providing decreased predation pressure and a corresponding increase in their abundance (Cook, 2005).

Fisheries and Oceans Canada has protected these glass sponge reefs and is actively identifying more, but they still may be at risk from climate change due to increasing water temperatures, acidification of the oceans and human abuse. Research suggests that warmer ocean temperatures and acidification could significantly weaken the ability of the sponges to filter-feed which is not only essential to their own wellbeing but is key to the health of entire marine ecosystems. The sponges play an essential role in maintaining local food chains; they can also filter water volumes equivalent to all of the water in Howe Sound three times in one year, removing bacteria for their own growth and releasing clean water (DFO, 2018).

Estuaries

With its many steep-sided shorelines, there are relatively few estuaries in Howe Sound. The largest, the Squamish Estuary, is a fjord head estuary draining 3650 km^2 of coastal rainforest and is a highly productive ecosystem. It provides wintering, migration, feeding and/or breeding habitats for waterfowl and shore birds, as well as raptors, passerines and other species. The estuary is also important habitat to many avian species including waterfowl and songbirds. Additionally this area is recognized as an important resting and feeding spot for migratory birds such as the bald eagle and mountain blue birds. In 1994, Squamish held the world record count for bald eagles, which come to this area in the winter to roost, perch and feed (BC Parks, 2017). All of this combined has recognized the Squamish Estuary as a Canadian Important Bird Area (Ocean Watch 2017).

It is also a feeding, spawning and rearing ground for a variety of fish species, including provincially significant species such as eulachon, steelhead and salmon. Herring spawn in these estuaries, and as a result grey whales feed on the herring roe. The estuary also provides good habitat for a number of mammal species including blacktail deer, black bear, cougar, coyote, moles, voles, and rabbits. (*Skwelwil'em* Squamish Estuary Wildlife Management Plan, 2006)

Eelgrass Beds

Eelgrass can be found throughout Howe Sound and its islands. These areas are considered critical habitat for marine wildlife including waterfowl, shellfish, fish and invertebrates. Up to 80% of important fish species and marine invertebrates use eelgrass at some point in their lifecycle for shelter, nursery or refuge (Ocean Watch 2017). Eelgrass restoration has taken place in the AHSBR since 2008, and multiple sites have seen survival and growth

13 CLIMATE ACTION

"One solution to the increasing amount of carbon in our atmosphere starts in the Estuary"

The Squamish River Watershed Society (SRWS) has been leading estuary restoration projects in the area since 1998. Through the Blue Carbon Project, the SRWS will identify estuary habitat restoration and conservation opportunities in Squamish and establish a blue carbon monitoring plan to support the development of blue carbon off-set protocol in British Columbia.

Sea Stars, photo: T. Turner

since their initial planting (Seagrass Conservation Working Group, 2019).

Beaches/Kelp Beds/Algae

Although much of Howe Sound has steep shorelines, there are numerous mini-deltas and small beaches at creek mouths and these are important fish habitat. Surveys on beaches between the mouth of the Squamish River and Furry Creek detected 18 families and 39 species in 1997 (Grout et al 1998). Kelp beds are found on both steep shorelines and beaches and provide important habitat for marine life and are very biologically diverse. Within Howe Sound there are many species of kelp and seaweed, found throughout the area. Kelp as a whole act as a nursery for small fish and juvenile invertebrates, such as spot prawns which rely on Neoagarum fimbriatum for protection. Kelp also acts as a food source for many animals, including sea urchins and other grazers. At the base of all foods chains are phytoplankton, which are unicellular marine algae, and make up the energy source for all living creatures in the ocean (David Suzuki 2014).

Pelagic Waters

The open pelagic waters of Howe Sound are home to increasing populations of migrating fish, in particular several species of salmon as they utilize the restored spawning habitat in the Squamish estuary. The Squamish River has historically been a big producer of chum, pink, coho and Chinook salmon, in that order of importance, producing 100% of Chinook and pink escapements into Howe Sound, and 99% of coho and 95% of chum (BC Environment, 1980).

Other groups of pelagic and demersal fish that frequent Howe Sound include several species of flat fish (sanddab, sole, flounder), lingcod, greenling, rockfish, perch, pacific cod and sculpins among others. Rockfish populations throughout Howe Sound are low following depletion over the past century, and two species of rockfish have been extirpated from Howe Sound, the Black rockfish and Bocaccio. Other species are approaching extirpation, including Yelloweye rockfish and Canary rockfish (Dennison, 2013).

Forage fish are lower trophic level species that comprise an important food source for a variety of higher trophic level species of fish, marine and terrestrial animals and seabirds. These species include Pacific herring, surf smelt, Pacific sand lance, northern anchovy, eulachon, capelin and Pacific sardine. Only three of these species are known to spawn in Howe Sound: herring, sand lance and surf smelt, and as remediation efforts in Howe Sound progress, there has been a significant recovery in their populations.

These waters of Howe Sound are also home to a total of nine species of marine mammals, including humpback, gray and killer whales (orca), other cetaceans including Pacific white-sided dolphins and harbor porpoise, three species of pinnipeds (harbor seal, Steller sea lion and California sea lion, and the river otter (see marine species list in Appendix B). Many of these species have recovered from near or complete disappearance from the Sound because of the recently recovered populations of forage fish such as herring, anchovy and sand lance.

Átl'ka7tsem/Howe Sound hosts a wide array of marine birds characteristic of the west coast of North America. Seabirds such as species of cormorants, gulls, guillemots, murres, and murrelets spend much of their lives at sea but congregate to breed along the coast, with some colonies as large as 400 breeding pairs in the Sound (ECCC, 2019). Other common seabirds include shorebirds like sandpipers and plovers, species of loons, grebes, cormorants, mergansers, herons, waterfowl, gulls, terns and alcids (OWHS, 2017).

In Átl'ka7tsem/Howe Sound, winter is the season of the greatest concentrations of seabirds, either migrating or overwintering, with a total count of 130 marine species of which 73 can be observed regularly, often in concentrations exceeding 11,000 birds (Ricker, 2016). About 23 of these species stay to breed or are suspected to breed in Átl'ka7tsem/Howe Sound (OWHS, 2017). Species commonly observed during the Christmas bird count include surf scoters, Barrow's goldeneye, double-crested and pelagic cormorants, buffleheads, glaucous-winged gulls, marbled murrelets and great blue herons. It is notable that the presence of a large number of marbled murrelets suggests that Átl'ka7tsem/Howe Sound is an important location for these birds and likely reflects access to old or older growth forests on Gambier Island, the Sunshine Coast and potentially the west facing slopes of the Coast Range (OWHS, 2017).

Consequently, in 2018 much of Howe Sound was added to English Bay and Burrard Inlet (in Vancouver's harbour) as an Important Bird and Biodiversity Area (IBA) (Bird Studies Canada and Nature Canada, 2018). In addition to the species listed above, this IBA is deemed as globally significant for western grebe, Barrow's goldeneye, and surf scoter, though populations of the former two species have experienced local declines from thousands to mere hundreds in recent years. This IBA is also deemed as nationally significant for great blue herons (Bird Studies Canada and Nature Canada, 2018). The Christie Islet Migratory Bird Sanctuary (MBS), a 1.0 ha island located within this IBA, is the only site in the Vancouver area and in all of Howe Sound where substantial number of seabirds are known to nest, including pelagic cormorants, glaucous-winged gulls and double-crested cormorants (Environment and Climate Change Canada, 2018).

The lower reaches of the Squamish River, its tributaries, and estuary are also designated an Important Bird and Biodiversity Area (IBA). This area is deemed globally significant for bald eagles that congregate in the winter to feed on spawning coho and chum salmon. An estimated 3,000 eagles are present at the annual peak period (3% of the global population), the largest concentration of eagles in Canada.

11.7 Land Cover Types

Approximately 82% of AHSBR is forested, with the remaining 18% distributed among the two other dominant land cover types: urban and rural.

11.7.1 Urban Areas

As discussed in Section 10, the urban communities in the AHSBR region are small and have a total population of about 46,000 people. The largest are Gibsons, Squamish and West Vancouver and the others are almost rural in character. They are very localized in nature and together occupy about 5% of the land base in AHSBR. From a conservation and sustainable development perspective, these communities have embraced these principles in their Official Community Plans and are all actively involved in the pursuit of a regional holistic approach to planning and resource management in Átl'ka7tsem/Howe Sound.

11.7.2 Rural Areas

Rural areas occupy even less of the Átl'ka7tsem/Howe Sound landscape than do urban areas. Most of the land in the Howe Sound islands, for example, would be considered rural with many people living in country estate properties, some with small hobby farms. Similarly, the outer reaches of Gibsons and Squamish are occupied by larger residential parcels in low density neighbourhoods. Some of these rural areas are located within the Agricultural Land Reserve (ALR), an area legally designated by the Government of BC for the protection of agricultural land (BC Ministry of Agriculture, 2017). The District of Squamish, combined with Electoral Area D of the Squamish-Lillooet Regional District, has the most rural agricultural land in AHSBR, but only about 1.3% of the area is within the ALR, and only about 2% of the designated land, or about 47 hectares, is being actively farmed. Most of the ALR area remains in a natural or semi-natural state, continuing to provide valuable habitat for a wide range of species (BC Ministry of Agriculture, 2017).

McNab estuary, photo: B. Turner

12 Ecosystem Services

12.1 Ecosystem Services and Beneficiaries

If possible, identify the ecosystem services provided by each ecosystem of the biosphere reserve and the beneficiaries of these services. (Please refer to the Millennium Ecosystem Assessment Framework and The Economics of Ecosystems and Biodiversity (TEEB) Framework (http://millenniumassessment.org/en/Framework.html and http://www.teebweb.org/publications/teeb-study-reports/foundations/)).

HSBRIS expects to play an important educational and informational role in furthering the public and institutional understanding and significance of the wide range of beneficial services provided by the Sound's ecosystems.

While significant research has been undertaken to assess the health of ecosystems in Howe Sound, to date, only limited but important ecosystem service's assessments have been undertaken.

In a 2015 study of the Howe Sound Region commissioned by the David Suzuki Foundation, "Sound Investment: Measuring the Return on Howe Sound's Ecosystem Assets", The Economics of Ecosystems and Biodiversity (TEEB) framework was applied to categorize ecosystem functions, goods and services, and to estimate the economic value of key ecological services provided by the Sound's ecosystems (Molnar, 2015; TEEB, 2010). The ecosystems identified in Howe Sound study area included: beaches; estuaries; eelgrass beds; wetlands; lakes and rivers; riparian buffers; forests; and marine ecosystems. The TEEB framework is the most comprehensive research undertaken to date on Howe Sound's ecosystem goods and services, and the results of the study are a primary information source for the ecosystem service assessment.

The TEEB framework categorizes ecosystem services as:

- **Provisioning services:** basic primary products including food, drinking water, fuel, raw materials and medicinal resources;
- **Regulating services:** benefits from the natural control of ecosystem processes such as regulation of climate and air quality, carbon sequestration and storage, waste and water treatment, nutrient cycling, erosion and soil fertility maintenance, pollination, control of disease organisms and the moderation of extreme events;
- **Habitat or Supporting services:** the essential refuge and reproductive habitat that ecosystems provide for plants and animals to survive and for the maintenance of biological and genetic diversity;
- **Cultural services:** provide humans with meaningful interaction with nature such as spiritually significant species and natural areas, natural places for recreation and opportunities to learn about the planet through natural science and education (TEEB, 2010).

The stock of ecosystems — or natural capital — in Howe Sound generates a considerable flow of value, comparable to an annual stream of income from economic goods and services. Howe Sound's range of ecosystems provides a wealth of goods and services that underpin the health, economy, culture and quality of life of regional residents, and draw rapidly growing tourist populations to the region. As stated in the Molnar report, the beneficiaries of these services is the growing population in Metro Vancouver: "The sound acts as the lungs and circulatory system for the entire Lower Mainland region, maintaining air quality and nutrient cycling" (Molnar, 2015).

Ecosystem service benefits provided by ecosystems in Howe Sound

Ecosystem Services	Beaches	Estuaries	Eelgrass Beds	Wetlands	Marine	Lakes & Rivers	Riparian Buffers	Forests
Provisioning Services								
Food				X	X	X		
Water Supply		X		X		X		X
Raw Materials								
Medicinal Resources								
Regulating Services								
Gas and Climate Regulation		X	X	X	X			X
Disturbance Regulation	X			X				X
Soil Erosion Control								
Water Regulation								
Biological Control								
Waste Processing				X				
Soil Formation								
Nutrient Cycling		X	X					
Pollination								
Habitat & Support								
Habitat Refugium		X	X	X	X	X	X	X
Primary Productivity								
Cultural Services								
Aesthetic Information								
Recreation & Tourism	X	X		X	X	X	X	X
Science & Education	X	X	X	X	X	X	X	X
Spiritual, Religious & Cultural Use								

Key:
- Shaded cells indicate ecosystem goods/services produced by that land/water cover class
- White cells indicate ecosystem goods/services not provided by that land/water cover class
- X in cells indicates ecosystems goods/services that have been valued

Source: Molnar, 2015

Old tree stump, photo: R. Simons

12.2 Indicators for Biosphere Functions

Specify whether indicators of ecosystem services are used to evaluate the three functions (conservation, development and logistic) of biosphere reserves. If yes, which ones and give details.

A variety of projects have assessed the health of ecosystems in and around Howe Sound. These studies provide information on current conditions and trends in certain ecosystems, key species, habitats, coastal development, resource use and aspects of the ecosystem services they produce. Creating a Biosphere Region in Howe Sound provides an opportunity to integrate previous work and develop a consistent set of ecosystem service indicators that could be monitored to guide policy direction and management initiatives, and to evaluate those services in terms of the conservation, development and logistic functions in the area. These projects and their findings are provided below.

Ocean Health Index - Ocean Watch Report for Howe Sound (OWHS 2017):

As described in Section 4.5, this quantitative and qualitative assessment of Howe Sound's ocean health examined ecological, socio-economic, cultural and governance aspects and included quantitative input from scientists behind the Ocean Health Index (OHI) (OWHS, 2017).

A snapshot assessment of all the status information was compiled and a rating scheme was developed. The ratings say as much about the need for action related to any topic as they say about the health status overall.

The OHI scores are calculated separately for each goal people have for healthy oceans and then combined to get an overall score on a scale of 0-100. Data was not available from Howe Sound for all aspects of the OHI scores that examine artisanal opportunities, habitat, species, coast protection, carbon storage, clean waters, seafood, mariculture, livelihoods, economies, natural products, iconic species, lasting special places and tourism and recreation.

As stated in "Assessing ecosystem services in UNESCO Biosphere Reserves", (Vasseur, L& Siron,R, 2019) Ecosystem Services are a tool to connect people with nature. This beautifully illustrated Ocean Watch report has been a guide and reference for governments, non-government organizations, First Nations, academia and science to understand the value of the Howe Sound marine environment. The ratings are indicators that have helped to prioritize actions that lead to improved health of the oceans. A phase two of this report is in progress to be published in 2020. The phase two report looks at progress on action items, current state and action planning for climate change in Howe Sound's marine environment.

Cumulative Effects Assessment (CEA) for the Howe Sound Area

As described in Section 4.5, FLNRORD has conducted a Cumulative Effects Assessment (CEA) for the Howe Sound Area. The assessment followed the same boundaries as the AHSBR. Initial values based on key indicators that will continue to be monitored are aquatic ecosystems, old growth, forest biodiversity, forest visual quality, grizzly bear, Roosevelt elk and marbled murrelet. The current condition assessments for the Howe Sound Cumulative Effects Project give a general indication of some cumulative impacts from past and current activities, such as high road densities and limited old-growth at lower elevations. The assessments also highlight positive trends including stable to increasing elk populations and decreasing impacts to forest visual quality. These current condition assessments will provide additional information for decision makers when considering impacts to values and potential mitigation or management recommendations (FLNRORD, 2019).

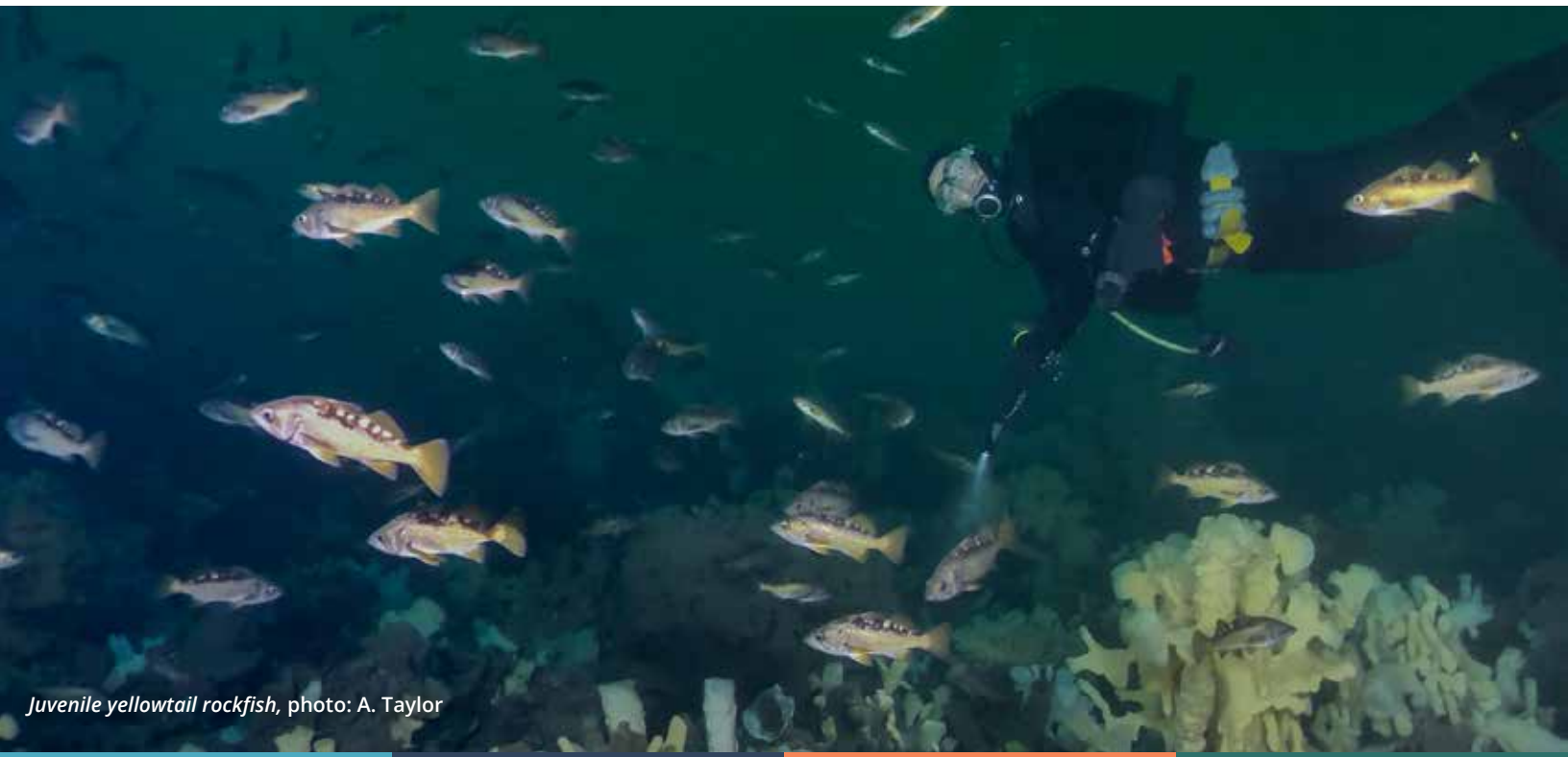
The Squamish Blue Carbon Project

This is an initiative of the Squamish River Watershed Society (SRWS). It is a community-based climate change mitigation project to appraise the value of carbon stores in the Squamish estuary and apply it to conservation and restoration initiatives. This project acts on the significant carbon storage potential of estuarine habitats and the opportunity to offset GHG emissions through their management, conservation and restoration. The Squamish estuary boasts over 100 ha. of saltmarsh habitat, an ecosystem recognized globally as having the highest rates of carbon accumulation compared to other blue carbon ecosystems and terrestrial ecosystems (Laffoley & Grimsditch, 2009)

Howe Sound Glass Sponge Reefs

The ancient and unique Glass Sponge reefs in AHSBR's Core Area are known to play an important role in filtration, processing large amounts of carbon and nitrogen. Studies done on nine reefs found they clean over 17 billion litres of water in Howe Sound daily and remove approximately 436 kg of total organic carbon and 112 kg of nitrogen daily. The nine Howe Sound sponge reefs remove nearly five times more carbon per m^2 than can be exported by vertical flux alone in a typical Pacific fjord (Fisheries & Oceans Canada, 2018).

The above research activities provide qualitative and quantitative information on the status and health of Howe Sound's marine, freshwater and terrestrial ecosystems, as well as some important ecosystem services. However, they have not focused specifically on ecosystem services and their indicators and have not been structured in the TEEB framework (TEEB, 2010).



Juvenile yellowtail rockfish, photo: A. Taylor

The recent David Suzuki Foundation report identified approximately 93% of the Howe Sound region's ecosystems and a description of the associated goods and services (Molnar, 2015). The TEEB framework quantified ecosystems by area covered and economic value and significance where applicable. Georeferencing of Howe Sound ecosystems and their services provides an important tool to monitor changes in area and value over time however, limitations in the 'benefit transfer' methodology reduces the quality of monitoring changes in monetary values in the future.

The ecosystems providing services with the highest economic value per hectare are beaches, wetlands, eelgrass beds, and lakes and rivers. Ecosystem services with the highest total value are food provisioning, clean water, carbon storage, disturbance regulation and recreation and tourism. Conservative estimates of the value of eleven services across land and marine-based ecosystems assessed in the report range from approximately $800 million to $4.7 billion per year. As long as the natural infrastructure of these ecosystems is sustained, this flow of value will likely increase into the future. However, if these natural systems are degraded, costly investments will be needed to replace lost services and the lack of market signals relating to changes in their supply means they are not normally included in planning and decision-making in any systematic manner (Molnar, 2015).

12.3 Biodiversity

Describe biodiversity involved in the provision of ecosystems services in the biosphere reserve (e.g. species or groups of species involved).

As described in the Molnar report, the foundation of ecosystem services is healthy biodiversity: the variability among living organisms from all sources including terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are a part, including diversity within species, between species, and of ecosystems (Molnar, 2015).

Aquatic Ecosystems

One can estimate the health of the aquatic ecosystems by considering the status of salmon and orcas, which are keystone or indicator species that are sensitive to changes in water quality, trophic webs and pollution levels. The closure of the salmon fishery and rarity of orca sightings over the past few decades appear to fit the classic ecosystem theory that size of organisms declines with degraded ecosystems. To the amazement of all, this trend is reversing. The salmon fishery has re-opened, orcas and humpback whales have returned. Estuaries, kelp forests and eelgrass meadows are vital ecosystems to aquatic species and crucial to the maintenance of fishery resources. The Squamish estuary accounts for 96% of estuarine habitat in the Sound, providing habitat, rearing areas and food for the migrating anadromous fish

Bald eagle nest in Lions Bay, photo: J. Dudley

populations of six river systems. The brackish waters of the estuary also acclimatize seagoing salmonids to the salt levels of the Pacific Ocean. Likewise, the nearshore kelp and eelgrass beds provide intertidal and subtidal habitat for invertebrates, fish birds and mammals.

Terrestrial and Freshwater Biodiversity

The Howe Sound region contains diverse habitat types (see Section 19.2), which support a variety of wildlife. Mountain goats, Columbian black-tailed deer, cougar, bobcat, black bear, raptors and small furbearers can be found in the timbered mountain slopes and flat bottomland. The freshwater ecosystems support populations of waterfowl, shorebirds, waders and numerous fish species, most notably juvenile salmon and anadromous trout. The health of these species is highly dependent upon the integrity of the ecosystems in which they reside. Areas of heightened importance include riparian corridors and small streams, the loss or degradation of which can result in a large net loss to overall productivity.

The report provides a snapshot of the health of the terrestrial biogeoclimatic zones. It provides the provincial extent of the zone in square kilometres, the conservation status (which is based on criteria that include rarity, trends and the level of threat from human activity), and the number of species of global and provincial conservation concern. Lastly, the conservation status of ecological communities provides a finer level of detail, through the classification of ecosystems contained within a zone.

Credit: David Suzuki Foundation

The Coastal Western hemlock zone covers over 100,000 square kilometres of BC and is the most common biogeoclimatic zone in the study area. Its conservation status is "apparently secure," which indicates some cause for long-term concern; the zone is uncommon but not rare, and widespread where it is found. Although it contains the highest number of species of conservation concern, and lists over 80 per cent of its ecological communities of provincial concern, the shear extent of the zone prevents it from receiving a listing of higher conservation concern. Within the study area, the loss of low-elevation old growth forests is a concern shared by many. What remains of these forests is essential for wildlife corridors and wintering habitat.

The mountain hemlock zone occurs sporadically throughout the study region, primarily inland and at higher elevations of the Lower Mainland. It is also listed as "apparently secure," yet only half of the ecological communities within the zone have been assessed. Although the number of species of conservation concern is relatively low, it is likely that many of the species of the zone have not been assessed.

12.4 Ecosystem Assessment

Specify whether any ecosystem services assessment has been done for the proposed biosphere reserve. If yes, is this assessment used to develop the management plan?

As discussed above, an explicit assessment of ecosystem services was undertaken for only a portion of AHSBR (Molnar, 2015). Although it provides a relatively comprehensive assessment of ecosystem services, it has not been explicitly used for management planning. This assessment has been a valuable tool for changing the conversation about the economic value of the region. After decades of development proposals looking at the land only through the lens of economic development, BC has yet to adopt an ecosystem service lens.

Two local governments in the region, the District of West Vancouver and the Town of Gibsons, have been undertaking the Municipal Natural Assets Initiative

(MNAI). Through the MNAI, local governments are exploring options to develop and scale-up the approach for integrating natural capital considerations into asset management and financial planning. Each community has key objectives. The MNAI team provides scientific, economic and municipal expertise to support and guide local governments in identifying, valuing and accounting for natural assets in their financial planning and asset management programs, and in developing leading-edge, sustainable and climate resilient infrastructure.

Priceless fun at the Lions Bay Beach, photo: R. Simons

As described in Section 4.5, the Squamish Nation has taken the lead in resource management planning for AHSBR and has developed the *Xay Temixw* Land Use Plan which describes the community's vision for the future of the forests and wilderness of their traditional territory (Squamish Nation, 2001). A Marine Use Plan is the next phase of planning with the goal to identify areas in the marine environment the Nation wants to protect, and to find ways to sustain their livelihoods and those of neighbouring communities while still protecting the ecosystem. To move forward with their marine planning process, the Squamish Nation seeks to forge partnerships, and appeal to agencies and to local governments for assistance (Squamish Nation, 2001).

As discussed above, the provincial government's CEA assessment is the first report for the specific Biosphere Region. This report is intended to be continuously updated and used for management planning. It will complement and contribute to the Squamish Nation's marine use planning. The CEA is the kind of decision tool that can assist the Squamish Nation and all levels of government in planning for Howe Sound. With an emphasis on terrestrial and freshwater ecosystems, the CEA began with an assessment of environmental values but more values will be added as time, resources and data become available. This work will provide additional information on the changing quantity and quality of Howe Sound ecosystems and services that, as a Biosphere Region, could be more effectively integrated with information from other studies to inform future policy formulation and management planning processes (FLNRORD, 2019).

The emerging availability of this wealth of diverse ecosystem information from various stakeholders presents a timely opportunity for HSBRIS to provide a critical coordination role to advance integrated management planning in Howe Sound.

The Lima Acton Plan underlines that "Biosphere Reserves (are) recognized as sources and stewards of ecosystem services" (UNESCO 2017). HSBRIS will support continued updating of the ecosystem services and cumulative effects monitoring by various organizations to be used in management planning to ensure we are providing a report in our 10 year review that meets the expectations of UNESCO.

Part III:
Biosphere reserve objectives, functions and management

Outdoor school canoe journey, photo: T. Turner

Protect Howe Sound flotilla, photo: R. Duncan

13 Main Objectives for the Biosphere Reserve's Designation

13.1 Main Objectives

Describe the main objectives of the proposed biosphere reserve, integrating the three functions (conservation, development and logistic), presented below (sections 14 to 16), including components of biological and cultural diversity. Please specify the indirect pressures and/or organizational issues.

Objective 1. An overarching holistic land and marine use plan for the Átl'ka7tsem/Howe Sound region that is mutually recognized and respected by First Nations, civil society, stakeholders and all levels of government.

Howe Sound Biosphere Region Initiative Society already plays an important role as a convenor of the HSCF and the AHSBR Roundtable in order to build consensus and provide advice and support to advance work of relevance to these AHSBR objectives, This arrangement is intended to ensure we move forward together in the development of the marine and land use plan as the principal means of achieving our objectives for the Biosphere Reserve.

The framework of the UNESCO Man and the Biosphere Program aligns well with the commonly expressed objectives of people within this region, as heard over the many years of public forums and discourse. It is a widely held view that the current fragmented governance systems negatively impact the region, as expressed in the Howe Sound Community Forum's Principles for Cooperation. (Appendix G). An overarching comprehensive land and marine use plan specific to the region has been long called for by local governments. In 2013, a resolution was passed at the Union of BC Municipalities (UBCM) conference to urge the provincial government to support the development of a Comprehensive Management Plan for Howe Sound that facilitates a coordinated land and marine use planning process between First Nations, senior and local governments, and other local bodies to ensure ongoing recovery and responsible land use planning within Howe Sound.

The past decades have witnessed political support for land and resource management planning, in particular during the 1990's and early 2000s when about 90% of BC had such regional plans. The 2008 Sea to Sky Land and Resource Management Plan (LRMP) covers the northern 74% of AHSBR.

The Squamish Nation's Xay Temixw Sacred Land Use Plan was unprecedented at the time and it changed the rules by forcing a shift in how the BC government was dealing with First Nations in relation to land use. Subsequent agreements were developed between BC and the Squamish Nation to accommodate differing views on land use.

However, subsequent governments cancelled further LRMP's, leaving the southern 25% of the Howe Sound watershed, on the edge of Metro Vancouver, without a comprehensive plan or vision.

The current government is undertaking a modernization of land use planning, and with its commitment to UNDRIP, there are high expectations of a renewed collaborative approach to land and marine use planning in the AHSBR region. In that regard, a possible model for Howe Sound is the Marine Area Planning Partnership (MaPP) for the North Pacific Coast of BC between BC and the sixteen member First Nations from the region. MaPP has developed and is now implementing four sub-regional marine use plans and a regional action framework. Marine stakeholders representing multiple sectors provided input and advice to the planning process through advisory committees (MaPP, 2019).

The advancing consequences of climate change raises the urgency for good planning so there is an improved chance of cohesive adaptation to these consequences. The frequent change in local government leadership and the shifting priorities of provincial governments is an ongoing challenge.

The Squamish Nation are the only government who view the ecosystem as a whole. In 2014 the Nation committed to creating a Marine Use Plan. The collaborative, consensus based AHSBR Roundtable meetings will help cut through the complexity and build support for action needed to address the challenges facing the region. And this will be done in the context of the Squamish Nation holistic vision (see Section 17).

Objective 2. Biodiversity conservation needs in the region are understood and defined, and measures are in place to ensure conservation of critical ecological values.

The AHSBR initiative is motivated by the need to protect and conserve biodiversity in the region and support Canada's commitment to the Aichi targets. Current and future protected areas are to be safeguarded from the pressures of human activities that could erode their values to biodiversity. Strengthening protection for species' habitats starts with educating about the ecosystem values and working together to protect those values. Strengthening effective management of the protected areas is a goal for preserving these spaces for future generations.

One of the objectives of the Biosphere Region is to be a model for best practices and a place where people live in harmony with nature by bringing together First Nations, NGOs, academia, industry and civil society. HSBRIS supports projects that contribute to preserving the Squamish Nation language and culture, stem further loss of biodiversity and help to fill in the gaps where more work needs to be done. An important source of baseline information is the traditional lifestyle of Indigenous people and the abundance of nature that existed before European settlement.

Encouraging the culture and language of the First Nations people is a path to conserving biodiversity. Added tools such as the Cumulative Effects Assessment and the Marine Reference Guide move us forward by ensuring we have all the support tools and information needed to make more informed decisions.

Given the combined pressures from human occupation and climate change, understanding the value of our rich biodiversity is foremost. A Biosphere Region designation will bring awareness supported by education, research, monitoring and an understanding of what AHSBR's population has, what is threatened and how to stem further losses.

Challenges from increasing human interference on the land and more people venturing into wild areas increases the potential for wildlife conflicts and habitat loss. HSBRIS supports the objectives of furthering education and reinforcing current regulations that protect both wildlife and humans in AHSBR. Threats to biodiversity are already known. The growth in publicly accessible planning tools provide us with the information and resources to mitigate those threats. HSBRIS will raise the awareness and knowledge of species-at-risk using the tools available.

Provincial and federal environmental impact assessments strengthen and weaken with successive governments. As a strategic communications and engagement hub, AHSBR would serve as a long-term resource for information about the region and goals for biodiversity conservation. A UNESCO Biosphere Reserve designation would bring a sense of pride to those who live, work and play in the region and inspire hope for future generations. We seek a balance between protecting Howe Sound and the ability for people and culture to thrive. A Biosphere Region is sustainable development in practice. The global strategy for the UN Sustainable Development Goals and the Lima Action Plan (LAP) emphasize the key role of the Man and the Biosphere Program in the UN Agenda 2030 for Sustainable Development Goals (SDGs). AHSBR has begun capturing and mapping the region's contribution towards Canada's commitment to Sustainable Development.

Objective 3. People, culture and humanity in the region thrive in harmony with nature.

Family climbing shoreline rocks, photo: B. Turner

Reporting on the progress towards the SDG goals and measuring the key indicators would form part of the annual AHSBR report produced by HSBRIS. AHSBR will support education and awareness of the SDGs that inform community planning to ensure a balanced approach to development in the region where no one is left behind.

Researching, sharing and inspiring best practices is a role of AHSBR. Applying an ecosystem services approach to planning is a model already begun in the region. Major concerns for the consequences of climate change bring threats of water shortages, forest fires and flooding to communities' planning. While five of the seven local communities are carbon neutral in their operations, the region's contribution to green house gas (GHG) reductions is challenged by new developments and growth. Improving infrastructure, transportation choices and affordability of housing options are key priorities for communities.

These objectives can be realized while striking a balance among the seventeen SDGs.

13.2 Sustainable Development Objectives

Describe the sustainable development objectives of the biosphere reserve. (If appropriate, please refer to Agenda 21, Rio+20 and SDG post 2015).

With AHSBR located so close to Metro Vancouver, the city has a strong influence on sustainability in the Átl'ka7tsem/Howe Sound region. In 2011, twenty-one municipalities including three communities in Átl'ka7tsem/Howe Sound, adopted the 2040 regional growth strategy for Metro Vancouver Regional District. It contains strategies to attain five goals related to: urban development; regional economy; environment and climate change; housing and community amenities; and integrated land use and transportation. The predicted population growth of 1 million people by 2040 in the Metro Vancouver Regional District will impact visits to the AHSBR (Metro 2040).

HSBRIS and the British Columbia Council for International Cooperation (BCC) have collaborated on hosting forums to discuss leadership of sustainable development in the Howe Sound region through the lens of the SDGs. At the September 2018 SDG Forum seventy community stakeholders and First Nations members were involved, hearing from local government, First Nations and civil society leaders regarding sustainable development issues and the role of leadership. Participants provided examples of organizations contributing to each of the goals. Based on these discussions, HSBRIS will focus on identified gaps as part of AHSBR's objectives. The organizations in the region that are contributing towards each of the SDGs is being mapped in the BCCIC's Movement Map (BCC, 2019).

HSBRIS will support the following activities and programs as actions towards AHSBR's objectives and report annually on these ongoing activities against the seventeen UN SDGs. The AHSBR Roundtable and HSBRIS board may add to or amend these focus areas as annual strategic plans are reviewed and developed.

- **Measure and track the "living wage" requirement in order to influence and support affordability.**

- **Share information on initiatives for locally grown and harvested food.**
- **Provide information and support Regional Zero waste initiatives.**

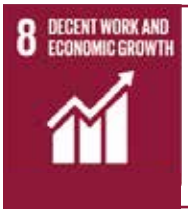
- **Report on and support regional Air Quality objectives.**

- **Provide more education, research and monitoring in order to measure results and take action on protecting species at risk.**

- Ensure HSBRIS and AHSBRI governance is gender balanced, leading by example.

- Reporting on and supporting regionwide water quality objectives.
- Initiatives to develop a base of regional watershed governance knowledge and planning.

- Implement education initiatives and actions on renewable energy programs and measuring the region's dependency on use of fossil fuels.



- Measure and track the "living wage' requirement in order to support payment of fair wages.
- Providing studies that support sustainable economic growth within the region taking an ecosystems services approach.

- Achieve a regional common understanding of the risks from climate change and apply a watershed approach to preparing for the threats ahead.
- Complete an ecosystem services valuation of the region and ensure it is embedded into planning.

- Encourage Howe Sound-wide commitment to join the Coalition of Inclusive Municipalities.
- Increase understanding and respect for Squamish Nation language and culture.

- Complete an ecosystem services valuation of the region and ensure it is embedded into planning.
- Create a set of key indicators for annual reporting on progress towards SDG targets in the region.
- Achieve a regional common understanding of the risks from climate change and take a watershed approach to preparing for the threats ahead.

- Support education and actions by communities and the public to reduce landfill.
- Support sustainable tourism initiatives.

- All communities become carbon neutral and achieve Community GHG reduction targets.
- Supporting actions on leading in a Climate Emergency that contribute towards mitigation and adaptation.

- Support ongoing maintenance and education associated with the Marine Reference Guide and Marine Conservation assessment to ensure it is a long term information and support tool
- Participate in the Marine Conservation Analysis and Marine Reference Guide to further restoration and conservation in areas of high ecological value.
- Supporting local initiatives towards education, research, monitoring and conservation.

- Assessment of the current Sea to Sky LRMP and the Xay Temixw Plan.
- Support comprehensive land use planning to include the entire watershed.
- Support expanding the Cumulative Effects Assessment by adding marine values and apply findings to decision making.
- Support updating of park management plans.
- Support research and monitoring of conservation areas and expansion of conservation areas, enforcement of conservation rules in order to protect important habitat and species at risk.
- Promote education, research and monitoring in order to measure results and take action on protecting species at risk.
- Convene the Howe Sound Conservationist Network as a forum to share information and planning.

- Encourage Howe Sound-wide commitment to the UN Declaration of Municipalities against Racism and Discrimination.
- Create a set of key indicators for annual reporting on progress towards SDG targets in the region.
- Foster understanding and respect for Squamish Nation language and culture.

- Continue with the Howe Sound Community Forums to support dialogue and reduce conflicts in the region.
- Widely share the information so it is accessible to all.
- Promote the objectives of UNESCO Man and the Biosphere Program and utilize the network of World Biosphere Reserves to share best practices.
- Ensure collaboration with multiple partners to advance the mutual objectives of AHSBRI.

Lichen, dry coastal bluffs, photo: B. Turner

13.3 Indicate the main stakeholders involved in the management of the biosphere reserve

HSBRIS supports best practices for stakeholder consultation, ensuring stakeholders are informed of these processes and workshops are inclusive. Public consultation within the region is frequent and stakeholder consultations have been improving over the years.

In the terrestrial area of AHSBR, the Core Areas are managed by BC Parks which has partnering volunteer agreements with several recreational outdoor groups to help maintain the parks, all of which are considered as stakeholders. BC Parks also has co-management agreements with First Nations. Beyond the Core Areas, BC Parks management planning workshops invite representatives from multiple recreation-based not-for-profit organizations and commercial operators to meetings. In the marine Core Areas, protection efforts are undertaken by Fisheries and Oceans Canada, which regularly consults with a range of Indigenous groups and stakeholders, including scientists, commercial and sport fishing operators, as well as conservation and scuba diving groups.

In the terrestrial Buffer Zone, FLNRORD is responsible for the management of the land, and depending on the management issue, stakeholder consultations take place with various forestry tenure holders, BC Parks and a number of recreation groups. In the marine Buffer Zone, the managers are Fisheries and Oceans Canada, and the stakeholder groups are the same as described above for the Core Areas. BC Parks would be considered a stakeholder in the BC Provincial Marine Parks.

In the Transition Area, local and regional governments have responsibility for management within their boundaries and stakeholders would include property owners. Transportation is managed by agencies contracted under the BC Ministry of Transportation and Infrastructure, and include members of the public. Tourism planning is under the Ministry of Tourism, Arts and Culture and stakeholder events involve commercial operators, local governments, First Nations, arts groups, recreation groups, FLRNORD and BC parks. In the marine transition zone area, Transport Canada has been conducting stakeholder consultations that engage with commercial and private transportation groups, and local conservation groups. Not-for-profit organizations working in the region would be considered stakeholders depending on the issue.

13.4 What consultation procedure was used for designing the biosphere reserve?

Over the past three years, HSBRIS has conducted consultation using a combination of methods:

- **Workshops – 20 Working Group meetings and 10 special sector groups;**
- **Presentations to local and regional governments and the Squamish Nation;**
- **Presentations to various association group meetings;**
- **Field trips in the region with various experts and stakeholders;**
- **Visits to and meetings with other Biosphere Reserves;**
- **Individual interviews and meetings in person, on webinars and over the phone;**
- **Events – participation at several community events;**
- **E-news and invitations for feedback.**

Howe Sound Community Forum, photo: B. Turner

During these engagements, HSBRIS was examining different boundary options, seeking input and consensus. Seeking written support from boards of stakeholders, as well as local and regional governments, was important in the early stages to provide momentum and an indication of support for the UNESCO MAB objectives and values. Decisions on the formation of HSBRIS and its vision, mission, strategy and actions have been arrived at organically through the consultation process. Regularly reporting back on progress and actions, with continual feedback from members and stakeholders, has enabled HSBRIS to build the momentum for the current Biosphere Reserve design that will continue to be a work in progress.

13.5 How will stakeholder involvement in implementing and managing the biosphere reserve be fostered?

The networking and forum for working through complex issues is an incentive for many stakeholders to participate. The AHSBR Culture of Engagement and Guiding Principles participants agree upon are intended to foster trust, mutual respect and open dialogue with a diversity of views around the table (Appendix G). For First Nations participants, creating Ethical Space is intended to be more familiar to societal norms (see section 17.1.8).

As a strategic communications and engagement hub, HSBRIS will continue to utilize various methods for communicating with stakeholders in the region. People's time and resources are limited, therefore maximizing the effectiveness of the AHSBR Roundtable meetings will require skilled and motivated staff to ensure meetings are well planned and organized, and agendas are relevant. The turnover of members within the stakeholder groups is high, but staying connected and working collaboratively with partners and stakeholders on projects of mutual interest is key to retaining interest and trust in the AHSBR Roundtable.

HSBRIS' role is to maintain a network of contacts in the region in order to ensure a robust, committed, and diverse group of advisors who support engagement and commitment to the AHSBR vision and objectives (Appendix G). HSBRIS' role is to steward actions and projects that result from the bi-annual Roundtable meetings.

Action items and minutes from the meetings and working groups will be hosted on the HSBRIS website, and representatives will report back to their respective organizations. HSBRIS will provide updates at Forums and on the website via e-news. The continuous tracking of and reporting on progress is an important way of ensuring that HSBRIS stays relevant.

Communicating creatively through the arts, being present in the communities, utilizing social media and traditional media are activities HSBRIS embeds in its activities. Hosting and co-hosting a variety of events that engage

diverse audiences, volunteers and funders in ways that are interesting and enjoyable is an important aspect of fostering engagement and involvement.

13.6 What are the expected main sources of resources (financial, material and human) to implement the objectives of the biosphere reserve and projects within it?

(Please provide formal commitments and engagements.)

In order for HSBRIS to be an adaptive and resilient organization with the capacity to implement projects, a diversified portfolio of revenue combined with value-added relationships and partnerships is needed to sustain the ongoing work of HSBRIS towards meeting its objectives.

HSBRIS' capacity will be leveraged by partnerships with universities (Appendix G). The main source of long-term sustainable income will be derived from investment returns from a dedicated endowment fund that is currently in place with a local community foundation. HSBRIS currently receives funding for projects from local governments, grants from private funders and foundations, individual donations from fundraising campaigns and in-kind contributions such as offers of meeting space. These sources of funding and support will continue to be an important foundation for HSBRIS' revenue.

HSBRIS has received fees for service for advisory and coordinating roles and will continue to pursue these sources of revenue. Co-hosting and collaborating with other NGO's and local governments maximizes the efficiency of available human resources and minimizes overhead costs.

HSBRIS is building a community of practice in public engagement, dialogue and facilitation in the areas directly related to its main objectives and logistic support functions (see Section 3.3). The Howe Sound region is home to highly skilled and educated people and through our networks we draw upon people in the region with skills and intrinsic motivation to join our Working Groups and AHSBR Roundtable.

Protect Howe Sound flotilla, photo courtesy of Topo Films

Whales off Gambier Island, photo: K. Hemmelgarn

14 Conservation Function

The primary conservation function of a Biosphere Region is to make a significant contribution to the conservation of landscapes, ecosystems, species and genetic variation, both within the Biosphere Region itself and beyond its boundaries to further share the impacts and benefits of the Biosphere Region with the surrounding ecosystems and communities. As discussed in Sections 3, 4 and 11, the natural features that define the Biosphere Region reveal an ecological mosaic of considerable significance for biodiversity conservation. Further, the communities of the Biosphere Region are ideally positioned for and committed to serving as a model region to demonstrate the means of achieving an effective balance between the conservation of this biodiversity and enabling sustainable development in a viable economy.

While Section 14.1 below summarises the general characteristics of the landscapes and ecosystems of Átl'ka7tsem/Howe Sound which have been described in greater detail in Sections 4 and 11, the Conservation Function of the proposed AHSBR is described specifically in Sections 14.2, 14.3 & 14.4.

14.1 Landscapes and Ecosystems

(At the level of landscapes and ecosystems (including soils, water and climate)

14.1.1 Location of Ecosystems and/or Land Cover Types of the Biosphere Reserve

The dominating feature of the landscape of Átl'ka7tsem/ Howe Sound is the fjord of the same name. Recognized as one of the most beautiful fjords in the world, the combination of terrestrial and marine ecosystems produces a remarkable blend of wilderness, biodiversity and accessibility with its complex landscape of high, steeply sloped mountains, glaciers, deep inlets, rugged islands and protected ocean waters. The diverse marine environments of the fjord are surrounded on two sides by the mountains of the Coast Range to the east and the Tantalus Mountains to the west, by the archipelago of the Howe Sound islands guarding the fjord's entrance to the south and the estuaries and riparian habitats of the Squamish and Cheakamus River valleys to the north (Section 19.2).

The following addresses these terrestrial and marine ecosystems, and their component land covers and marine habitats. Terrestrial ecosystems are described by their principal divisions of forests, alpine and freshwater systems, and marine by coastal, benthic and pelagic habitats.

Terrestrial Ecosystems

Terrestrially, this complex landscape has created a mosaic of ecosystems and land cover types to rival any other landscape in Canada, primarily due to the range in elevation from sea level to the highest peak at 2,678 metres within a relatively short distance. The seaside climate is 'mediterranean' in nature with hot, dry summers and warm, moist winters, with forests adapted to these conditions. Transitioning to higher elevation forests that are cooler and capture more moisture, the classic west coast "temperate rainforest" dominates. Transitioning further to the subalpine and alpine environments of the mountain ranges' highest peaks, their extreme cold and heavy snow conditions transform the forest to an often treeless expanse.

Forests

Átl'ka7tsem/Howe Sound lies between the Coast Mountains and the Pacific Ocean, resulting in different air fronts converging and producing significant amounts of moisture in the form of rain or snow. The resulting temperate rainforest, that covers about 82% of the AHSBR's land area, is a highly productive and diverse ecosystem which is part of a much larger forest in North America comprising almost half of the world's temperate rainforest (OGSC, 2019). These forests are predominantly coniferous with the dominant species including Douglas fir, western red cedar and western hemlock (see Section 4.2.3) (Meidinger and Pojar, 1991).

The variation in elevation and the proximity to the moderating influence of the ocean are reflected in the classification of these forests into biogeoclimatic (BC) zones and subzone variants. The area below 900 metres is in the Coastal Western Hemlock (CWH) BC which, on average, is the wettest BC zone in BC, encompassing the low and mid-elevation coastal forests on windward slopes. From sea level to about 150 metres, these forests are drier and characterized by warm, dry summers and moist, mild winters and are typically dominated in drier sites by the coastal variety of Douglas fir. The low to mid-elevation forests are covered by Western hemlock, accompanied by minor amounts of grand fir, red alder and bigleaf maple. Finally, the very wet, maritime forests occur only at elevations greater than 650 metres (BC Environment, 2006; Madrone Environmental Services Inc., 2009).

At higher elevations exceeding 900 metres and as high as 1,800 metres on south coast west-facing slopes, forests of Mountain Hemlock predominate, accompanied by amabilis fir, yellow cedar, western red cedar, Douglas fir and western white pine. This forest thrives in the long, wet and cold winters with short, cool summers and high snowfalls. The forest is typically older with 86% being in age classes 7-9 (120-250+ years), often with old growth stands exceeding 1,000 years old (Banner, 2011; BC Parks 1997). Tree growth thins approaching the tree line and often transitions into subalpine heath, meadow, bog and fen vegetation. (BC Parks, 1997; Meidinger and Pojar, 1991)

Alpine Tundra

The Alpine Tundra zone occurs above 1,600 metres along the windward spine and summits of the Coast Mountains. This zone is subject to the harshest climate in BC with cold temperatures for most of the year and very high snow falls. Around the tree line, vegetation is lush with mountain hemlock, yellow cedar and subalpine fir. Under storey vegetation and ground cover above the tree line is typically characterized by low-growing evergreen dwarf shrubs such as white and pink mountain-heather (MacKenzie and Meidinger, 2006). Above the tree line, trees are stunted and show the 'krummholz' form and are populated primarily by mountain hemlock, whitebark pine, Englemann Spruce, subalpine fir and subalpine larch. On average, about 88% of this zone lacks vegetation and is covered by rock, snow and ice (CFCG, 2017).

Freshwater: Rivers, Wetlands, Lakes and Riparian Areas

Valley bottom ecosystems between the mountain ranges include ribbons of riparian forests along the various river and stream courses, lakes and wetlands. These riparian ecosystems are, generally speaking, among the most productive systems in AHSBR providing habitat for about 25% of vertebrate, invertebrate and vascular plant species in BC (Government of BC, 2019c). Riparian forests contain species that prefer moist soils such as black cottonwood, red alder, western red cedar and Sitka spruce, and have an understory of willows, red-osier dogwood and salmonberry, with a herbaceous layer of rushes, sedges and skunk cabbage. These habitats are home to numerous species of insects, crustaceans and amphibians, including the blue-listed red-legged frog, as well as many of the same species of birds and mammals found in the adjacent higher elevation forests (Melville and Lindquist, nd).

Wetlands, in the form of marshes and bogs, are a common component of riparian forests. Marshes are moist sites with saturated nutrient rich soils characterized by a vegetation of sedges, grasses and reeds. Bogs are nutrient poor and their soils are saturated with acidic soil and cool conditions favouring the growth and long-term accumulations of peat formed by *Sphagnum* moss, accompanied by stunted trees of lodgepole pine and an understory of bog blueberry, Labrador tea, bog cranberry and skunk cabbage. Wetlands are important habitat for a variety of amphibians, birds and small mammals.

Riverine habitats vary from steep mountain streams, with little to no fish bearing capacity, to larger rivers such as the Squamish and its three tributaries: the Cheakamus, Mamquam, and Elaho rivers, with deep slow water and shallow braided channels. The rivers support significant fish populations, including rainbow, steelhead and cutthroat (anadromous and non-anadromous) trout; chum, pink, chinook, coho and sockeye salmon, bull trout and dolly varden (Melville and Lindquist, nd).

In addition to the Squamish River watershed, there are multiple mountain streams that flow directly into both the east and west shores of Howe Sound. Although many of these smaller creeks are inaccessible to salmon, they are known to spawn in the lower reaches of several of these creeks such as McNab, Britannia and Furry Creek.

Nearly all the lakes in Átl'ka7tsem/Howe Sound are located in the alpine or sub-alpine zones and are fed by snow melt, the largest being Garibaldi Lake. Other notable alpine lakes include Echo Lake, Lake Lovely Water, Henriette Lake, Brennan Lake and Deeks Lake. There are also several lakes near sea level as well, including Alice Lake, Stump Lake, Fawn Lake and Edith Lake that offer valuable habitat for waterfowl, amphibians and resident fish populations (Melville and Lindquist, nd).

Marine Ecosystems

Where land meets the sea, the steep mountain slopes continue steeply below sea level to depths of 275 meters. Being a classic fjord, Howe Sound has multiple basins separated by submerged glacial sills that cause distinctive oceanic circulation patterns and oceanographic conditions that influence the composition of marine life. Marine environments in the Sound range from shallow coastal habitats and productive estuaries to deep fjord pelagic waters and benthic habitats.

Coastal Environments

Coastal and nearshore tidal and subtidal marine habitats, generally those at sea level to less than 20 metres in depth, include rocky shores with hard substrate, sandy beach and soft bottom subtidal habitats and are associated with distinct biological communities and submerged aquatic vegetation, such as eelgrass and kelp beds. Coastal habitats, notably sand and gravel beaches, are critically

Squamish River estuary, photo: B. Turner

important for the reproduction of some forage fish species, in particular herring that spawn in subtidal and intertidal vegetation such as eelgrass or kelp as well as bedrock, and sand lance and surf smelt that spawn on pebble and sand beaches just below the high tide line.

Eelgrass is critical habitat for many marine species including waterfowl, fish and invertebrates with about 80% of marine invertebrates and important fish species using this habitat during some part of their life cycle. Because of where eelgrass grows, in shallow, protected waters, they are very vulnerable to development practices that disturb the seabed or disrupt the penetration of sunlight from above, as from log storage or boat moorage (OWHS, 2017).

Estuaries

There are several estuaries in Howe Sound that play a critical role in sustaining marine life (Molnar, 2015). Estuaries are naturally rare on the BC coast, comprising only 2.3% of the natural shoreline (BC Conservation Data Centre, 2006). Many of the smaller estuaries in the Sound have been impacted by industrial and residential development, as well as log storage, gravel extraction, dredging and waste disposal (BC Fish and Wildlife Branch, 1979). The largest estuary in the Sound is at the mouth of the Squamish River, accounting for 96% of all estuarine habitat in the Sound (Molnar, 2015).

The Squamish Estuary provides habitat, rearing areas and food for migrating salmon populations and accounts for the vast majority of all spawning capacity in the Sound (OWHS, 2017; Golder Associates, 2005). The Estuary is such an important habitat to many avian species including waterfowl and songbirds that it has been protected as a Wildlife Management Area and designated in 2017 as an Important Bird and Biodiversity Area (IBA).

Fjord Pelagic and Benthic Environments

Oceanographically, Átl'ka7tsem/Howe Sound is a true fjord with an average depth of 275 metres and a length of 46 kms extending from its entrance seaward of Bowen Island and the Pasley Group to the estuary of the Squamish River. The Sound has two distinct basins, the 'sound' portion at the entrance to the fjord which is 20 kms across, and the more 'fjord-like' portion where it narrows between steep precipitous cliffs near Porteau Cove to about 3.5 kms wide and extending 26 kms inland to the estuary of the Squamish River. The two basins are divided by a sill that rises to 35 metres below the surface, blocking the northward movement of deep oceanic waters creating the relative stagnation of bottom waters in the basin north of the sill (Thompson, 1981).

Átl'ka7tsem/Howe Sound is recognized for its specialised benthic fauna that is typical of fjord environments with steep rocky walls. This fauna is characterized by cup corals and encrusting hard corals, brachiopods and sponges. The soft corals and glass sponges are accompanied by predatory molluscs, echinoderms and various species of fish (Levings et al, 1983). As discussed in Section 11.6.3.2, hexactinellid or glass sponge reefs are a globally unique ecosystem whose presence in the ocean waters of western Canada is a recent discovery. They are thought to exist nowhere else in the world but in the Pacific waters off western Canada and the United States.

14.1.2 Describe the state and trends of the ecosystems and/or land cover types described above and the natural and human drivers of the trends.

As described in the introduction, the region has been undergoing an environmental recovery over the past thirty years. The restoration projects, pollution regulations, improved forestry practices, planning and marine protections have resulted in key environmental measures that are trending in the right direction. As people in the region are celebrating the return of the whales and dolphins to Howe Sound a rash of new proposed developments were announced that raised concerns about the lack of a comprehensive plan for the entire Sound that could threaten this recovery.

Throughout the AHSBR region, concerns have been expressed about the accelerating rate of land and resource development proposals and, in particular, about the potential cumulative effects of these developments on environmental values in both the terrestrial and marine realms.

In 2013 local governments in the region resolved to send a clear message to the provincial government that social license had been obtained from the surrounding communities for the creation of a Land and Marine Resource Management Plan that would encompass the entire AHSBR. The Minister responsible for Forests Lands and Natural Resources Operations (FLNRO) committed to a pre-planning process. Heading into 2014, FLNRO informed stakeholders that the LRMP process had been replaced by new approach called the Cumulative Effects Assessment (CEA). Subsequently, AHSBR worked closely with local government partners to shape agendas for the Howe Sound Community Forum and other venues to earn support for and encourage engagement in a provincial CEA planning process. Regional and Local Government support for the planning process grew and by the fall of 2014 and FLNRO confirmed they would in fact undertake a Cumulative Effects Assessment (CEA) process for Howe Sound.

Commencing in 2015, the BC Government approved the initial application of the new Cumulative Effects Framework (CEF) in the Howe Sound region to implement "...a coordinated, multi-sector approach to assessing and managing cumulative effects" (Government of BC, 2019). The project provides important baseline information and implement a long-term monitoring program, based initially on seven key values: aquatic ecosystems, old growth forests, forest biodiversity, forest visual quality, grizzly bears, Roosevelt elk and marbled murrelet (Government of BC, 2019).

Marbled murrelet, photo: C. Olsen

The CEF project is especially relevant in the forests of AHSBR, where about 58% of the original forests have been removed through timber harvesting, and only 30% remains at lower elevations. This is known to have had a significant impact on forest and wildlife biodiversity (see Section 4.5.3.1). Indeed, FLNRORD says it is currently exploring a number of actions in response to the CEA results such as: "assessing recent trends in these indicators, comparing these predictions to available site-specific forest biodiversity assessments and applying these risk assessments to land and resource planning and management decisions where possible." It says the management of forests and wildlife habitat has evolved considerably over the past several decades so that there are now a number of legal conservation tools being used to retain a more appropriate balance/interspersion of old, mature and early seral forest stands (FLNRORD, 2019).

Contemporary forest management policy, implemented through Landscape Unit Planning, recognizes the error of these historic ways, and is now starting to place a clear priority on the conservation of forest biodiversity and other values, while continuing to maintain an economically viable, albeit reduced, timber harvesting industry. Climate change and historical ways are challenging the government into what is now an urgent transition period for the forest sector. AHSBR's location so close to Metro Vancouver is in a unique position to work with FLNRORD, community forest operators, local and regional governments and First Nations, to bring stakeholders together around innovative ideas and best practices as we move through this transition period.

In the marine environment, Átl'ka7tsem/Howe Sound, the industrial facilities discharged their effluent directly into Howe Sound contaminating sea life, drastically decreasing populations of forage fish and suffocating the sea floor. Today, with many of these sources of pollution and stress now in the past, the Sound's marine ecosystems are rebounding with populations of herring, anchovy, salmon, Pacific white-sided dolphins, killer whales (orca), pinnipeds (seals and sea lions), and humpback whales returning in numbers not seen in a century. Fish stocks have rebounded to enable the resumption of a salmon recreational fishery and commercial fisheries for prawn and shrimp.

However, human-caused pressures continue to drive change in Átl'ka7tsem/Howe Sound. Climate change is perhaps the most significant concern, causing ocean warming, sea level rise, ocean acidification and possibly changes in fish populations and rearing behavior. The BC Coast edition of OceanWatch is monitoring the long-term warming trend in BC's coastal waters that have risen by 0.1 degree Celsius per decade since 1981. This ongoing warming is expected to affect the abundance of phytoplankton production, a primary food source for fish, mammals and birds (OWHS, 2019). Increased vessel traffic, population growth and associated shoreline development can directly affect habitat through damage from boat mooring and abandonment, dock construction over sensitive habitats such as eelgrass, increased fishing activity with damage to sensitive habitats such as glass sponge reefs, increased pollution and invasive species.

Increased vessel traffic can lead to noise pollution, increased risk of collisions and contact with sea bottom habitats (OWHS, 2017). In addition, the CEF recognizes the scope of these environmental changes underway in BC in conjunction with increased development pressures, and will work to identify and manage the cumulative effects of all these changes and activities to ensure sustainability going forward (Government of British Columbia, 2019d).

The return of the dolphins and whales to Howe Sound inspires people to protect this fragile recovery. The trend is currently towards gathering of more information that includes Indigenous ways of knowing, and to consider the value of nature's assets in decision making. Throughout the region there is strong community effort and collaboration among organizations working on the many restoration and conservation initiatives. These efforts support Canada's pathway to Target 1, the Aichi Biodiversity Targets.

14.1.3 What kind of protection regimes (including customary and traditional) exist in the core area(s) and Buffer Zone(s)?

The Legal Acts that apply to the Core Areas and Buffer Zones are described in Section 17.1.2. The parks fall under the *BC Park Act*, the Ecological Reserve managed under the *Ecological Reserves Act*, the *Este-Tiwilh*/Sigurd Creek Conservancy, managed under the *Protected Areas of British Columbia Act*, and the *Skwelwil'em* Squamish Estuary Wildlife Management Area (WMA) managed under the BC

Wildlife Act. The Conservancy is co-managed by BC and the Squamish Nation under a 2007 collaboration agreement. All conform to the standards for IUCN Category I, II, III or IV protected areas. The Conservancy is located adjacent to the north end of Tantalus Provincial Park providing important connectivity to an additional 12,000 ha of high elevation wilderness of importance to mountain goat and grizzly bear, managed for biodiversity conservation under BC's *Land Act*. The WMA, ecological reserve and one of the provincial parks provide direct connectivity from the high elevations of Tantalus to the Squamish River and estuary. BC Parks employs rangers and contracts with Park Operators to manage the parks in order to meet the objectives of the park management plans.

The terrestrial Buffer Zone is mostly comprised of provincially owned Public land that is immediately adjacent to and contiguous with the protected areas in the Core Areas. Most of these adjacent Public lands are legally identified as 'Protected Areas', 'Resource Exclusion Areas' under the *Forest and Range Practices Act*, the *Land Act* or the *Environment and Land Use Act*. They include areas, known as Conservation Lands, managed as Wildlife Habitat Areas, Ungulate Winter Ranges, Old Growth Management Areas, Wildland Areas or areas with specific Visual Quality Objectives. Generally speaking, these areas are excluded from or have limited access for resource activities such as forest harvesting, mining or large-scale hydro-electric development, and exist for the expressed purpose of protecting biodiversity or because they lack harvestable resources due to high elevation. Other Public lands not included in these specially managed areas have been zoned through the Sea-to-Sky Land Resource Management Plan for a management priority on the retention of high scenic values and recreational opportunities. This zoning would place constraints on the access on and activities in these lands by resource industries. Municipal owned lands adjacent to one of the parks is also managed through municipal zoning for the purpose of protecting the natural environment and sensitive habitat.

From an enforcement perspective, the BC Conservation Officer Service is a leading natural resource law enforcement agency specializing in public safety as it relates to human/wildlife conflict, managing complex commercial environmental and industrial investigations and compliance and enforcement services. The public can contact the Service to report violations or conflicts.

BC is committed to considering cumulative effects as an integral component of natural resource decision-making. Improving cumulative effects assessment and management will be a vital part of sustainable and integrated resource management. The Cumulative Effects Framework (CEF) includes policy, procedures and decision-support tools that complement current land management achieved through BC's legislative framework, land use plans and various best practices and processes. The framework provides important foundational information that can be used in a number of ways, including the potential to inform consultation with First Nations where a proposed decision or activity by the Province may affect claimed or proven Indigenous or treaty rights. Transparently reporting on cumulative effects assessment information and management considerations will enable coordinated, consistent management of cumulative effects across the natural resource sector. (Prov. BC Interim Policy, 2016). AHSBR supports the intended protections of the Cumulative Effects Assessments in the region as intended to reduce harm from growing pressures of development.

In the marine environment, the protection of marine ecosystems within AHSBR's Core Area is focused on protecting the globally significant glass sponge reefs. The marine Core Area is comprised of eleven Glass Sponge Reef Refuges established under by Fisheries and Oceans Canada under the *Fisheries Act* to protect these internationally significant reefs. Fisheries restrictions apply to both the marine Core areas and Buffer Zones surrounding these Sponge Reefs.

The marine Buffer Zone five Rockfish Conservation Areas (RCAs) overlay the Glass Sponge Reef Marine Refuges created by Fisheries and Oceans Canada, also under the *Fisheries Act*.

Fisheries and Oceans Canada (DFO) enforces the *Fisheries Act* and other regulations and legislation such as Canada's marine mammal regulations to ensure minimum vessel approach distances from whales while in the area. Enforcement activities are carried out by Fishery Officers across Canada. They conduct regular patrols on land and sea as well as in the air. Fisheries Officers patrol the marine areas in the Sound and the public are encouraged to Observe, Record and Report to the Fisheries and Oceans Canada (DFO) hotline.

Quillback Rockfish, photo: A. Taylor

14.1.4 Which indicators or data are used to assess the efficiency of the actions/strategy used?

There are numerous monitoring programs in place throughout Átl'ka7tsem/Howe Sound to assess the effectiveness of several initiatives over the recent past to improve the environment of the region as described in Section 16. There are four air quality monitoring stations in the Howe Sound area alone, in addition to many in Metro Vancouver, to measure progress following the closure or remediation of historic sources of air pollution. Annual fish counts are held through Fisheries and Oceans Canada to monitor the recovery of depleted fish populations such as rockfish and lingcod. A water quality monitoring system known as Pollution Tracker, was launched In Howe Sound in 2018 by Fisheries and Oceans Canada and the Vancouver Aquarium's OceanWise to observe chemical pollution such as the presence of mercury, dioxins and furans, still lingering from historic sources, as well as more recently derived pharmaceuticals, pesticides and micro plastics (Seyd, 2018; Pollution Tracker, 2019).

The Ocean Health Index is also being applied to Howe Sound by a team of local scientists and researchers to measure the condition of marine related species and habitats in the Sound. The research used highly productive environments including salt marshes, sponge reefs and soft-bottomed habitats as a measure of both habitat quality and the status of marine life that occupy them.

With respect to the forests of AHSBR, BC's forest management agency, FLNRORD, is committed to the long-term conservation of forest biodiversity in the region (FLNRORD, 2019b). Under BC's Howe Sound CEF project, the current condition of forest biodiversity is determined using the distribution of forest age classes as a surrogate for estimating wildlife habitat and biological diversity. Forest biodiversity risk ratings are assessed to estimate the likelihood of reduced forest biodiversity as compared to historic natural forest conditions, utilizing the following five indicators: old forest amount; old and mature forest amount; early seral forest amount; old and mature interior forest amount; and area undisturbed by roads and linear features (FLNRORD, 2019b). The results of this assessment provide a general estimate of the condition of forest biodiversity which then helps identify appropriate management responses to retain or improve biological and habitat diversity in the region.

15 LIFE ON LAND

There are more than 40 non-government organizations and citizen scientists contributing to the conservation work in the region.

For example the Squamish River Watershed Society monitors the status of its work on amphibian wetlands, restoration and removal of barriers in salmon creeks and channels, eelgrass plantings, brownfield site restoration and actively takes part in various fish studies.

Consolidation of the available data and support to identify gaps in information in order to effectively monitor cumulative effects is an important role AHSBR and HSBRIS will provide is the community. Universities, prospective developers and many other agencies often search for information in multiple locations. Through being a consolidator of the resources, time and effort can be spent on research and monitoring of the gaps in information.

14.2 Status and Trends at the level of species and ecosystem diversity

14.2.1 Identify main groups of species or species of particular interest for the conservation objectives

(especially those that are endemic to this biosphere reserve, and provide a brief description of the communities in which they occur).

While there are no known species that are endemic to AHSBR or the surrounding region, there are several species for which there are conservation concerns that will be addressed specifically in the management objectives for AHSBR. As discussed in Section 4.2.1, the Roosevelt elk, grizzly bear and mountain goat are of particular conservation interest due to historically declined populations that have either only recently stabilized or have a considerable way to go before becoming stable. The Roosevelt elk populations are stable or increasing and have ample habitat in younger and maturing seral stage forests, some of which are now protected through Wildlife Habitat Areas (WHAs) to protect critical winter ranges. Similarly, mountain goat populations at higher elevations appear stable and also have much of their critical winter ranges protected in WHAs. Grizzly bears had been extirpated from much of south-western BC and are still considered threatened throughout AHSBR and the surrounding area. In the absence of a comprehensive recovery strategy for grizzlies, the focus of non-government efforts is to safeguard their habitat through science-based planning and community involvement.

In the marine environment, marbled murrelets are the primary species of concern in Átl'ka7tsem/Howe Sound. The Sound is known as an important location for these birds, particularly in that portion of the Sound within the English Bay, Burrard Inlet and Howe Sound Important Bird Areas, since they still have access to old or older growth forests necessary for nesting and rearing their young. Below the surface, species of rockfish as well as lingcod, and the glass sponge reefs, are the primary species of concern.

Chinook salmon is an important keystone species on Canada's west coast. It is a vital food source for a diversity of wildlife, including killer whales, bears, seals and large birds of prey. The fish hatcheries on Bowen Island and in Squamish focus on enhancing coho, pink, chum and chinook salmon stocks. The hatcheries releases more than 3.3 million smolts each year.

Transient Bigg's killer whales prey on mammals and Northern Resident killer whales prey on Chinook and Chum salmon. Both are regular visitors to Howe Sound and considered Threatened by Canada's Species at Risk Act.

In BC, new legislation is under development that will protect species and ecosystems at risk. In the interim, BC and Canada are working collaboratively through a federal-provincial accord and agreement on species at risk using Canada's *Species at Risk Act* and BC's *Wildlife Act* to identify and protect species at risk. The terrestrial and marine species of concern in AHSBR are discussed in detail in Section 4.2.1.1.

14.2.2 What are the pressures on key species?

In other words: what are the threats (example unsustainable management of forest), their immediate causes (drivers of change like forest change or habitat change), their underlying causes (example overgrazing, fire, pollution), and the main driving forces (example: economic, political, social, external, etc.) and the area(s) concerned?

In a forest dominated environment, the key pressure on both plant and animal species relates to the management of the forest and its impacts on forest and wildlife diversity. The analyses undertaken as part of the Cumulative Effects Assessment (CEA) for Howe Sound found that as a result of historic patterns of timber harvesting and urban development, there has been a decline in old (>250 years) and older and mature forests (>101 years) over the past 200 years, with a corresponding increase in the amount of forest currently in the early seral stages of forest renewal. The study concludes that this historic pattern has had a significant impact on species diversity over time, in particular those species dependent on old or older forests (ie. marbled murrelet). Recognizing the strong correlation between forest habitat diversity and forest and wildlife species diversity, the CEA seeks the restoration and maintenance of structural complexity in the forest to mimic historic conditions (FLNRORD, 2019). The extent to which new conservation lands, such as Old Growth Management Areas, other protected areas and forest management practices achieve this condition will require ongoing monitoring.

Herring, photo: B. Turner

Beyond the mid- to high elevation forests, the nature of land development often focuses on riparian areas, shorelines and wetlands at lower elevations. These habitats are the most critical for conservation of species at risk and of concern, in particular reptiles and amphibians. Where management efforts tend to focus on larger animals (eg. grizzly bear and elk), the smaller creatures in these low elevation habitats are often overlooked with their populations suffering the most by the cumulative effects of human land use and development (Knight, 2019).

In addition to forest and riparian management, other anthropogenic causes of disturbance include the following:

- **overfishing in the marine environment, with such declines in species abundance for salmon, rockfish, lingcod and other species that fisheries closures have been in effect for decades;**
- **pollution from a number of industrial sources over the past decades has contributed to ongoing fisheries closures and overall declines in marine biodiversity;**
- **land and marine use changes including urban, commercial and industrial development along the shores of the Sound and decades of log storage and inappropriate boat moorage and abandonment;**
- **modest changes due to climate change including sea level rise, sea warming and more frequent and severe storms;**
- **increasing outdoor recreational activity disturbing whales and seabirds and leading to increased poaching of rare and endangered species.**
- **hunting, the main activity that extirpated the Roosevelt Elk population by 1900, and has had significant impacts on other large mammals such as black and grizzly bears;**
- **increased populations of people recreating throughout the watershed and insufficient amount of enforcement officers; and**
- **spread of invasive species introduced to the region by settlers.**

Human population increase, and economics are the main drivers of these pressures.

14.2.3 What kind of measures and indicators are currently used, or planned to be used to assess both species groups and the pressures on them?

Who undertakes this work, or will do so in the future?

The work of assessing and managing populations of species at risk is undertaken primarily by Fisheries and Oceans Canada in the marine environment, and BC's forest management agency, FLNRORD and BC's Ministry of Environment and Climate Change (MECCS) on land and in freshwater. All agencies are aided by a capable cadre of citizen scientists

Great Blue Heron, photo: T. Cyr

and non-government organizations, many of whom are credited with significant discoveries and restoration efforts.

As mentioned above, FLNRORD's CEA is the leading effort in AHSBR for assessing species at risk using a number of measures and indicators that vary by species. For example, the current condition of marbled murrelets and estimates of the risk to population sustainability is measured using two nesting habitat indicators: suitable nesting habitat and suitable nesting habitat protected. Also, Roosevelt elk populations are managed on a population unit (PU) basis, using specific indicators to estimate their future sustainability risk: forest cover interspersion; winter range requirement; winter range availability and quality; forage cover availability; population resiliency; predation risk; and unregulated hunting (FLNRORD, 2019). Similar efforts are being made for other species such as grizzly bear and mountain goat.

In the marine environment, Fisheries and Oceans Canada, with the assistance of citizen scientists, employs regular surveys of abundance for such species as rockfish and lingcod, both good indicators of ecosystem health. Detailed counts of sightings for cetaceans and pinnipeds have been kept by the BC Cetacean Sightings Network (BCN) and have documented the recovery of marine mammal populations for decades (BCN, 2019).

Where information indicates a need for stronger enforcement or work to improve, conservation groups at work in the region make recommendations to government. Such as the current work on management plans for high use recreation areas, i.e. the Shannon Basin Recreation Plan and the nomination of marbled murrelet nesting habitat for Wildlife Habitat Area (WHA) designation. There are many example where research and monitoring have resulted in investments in restoration, protections and implantation of special designations, such as important bird areas and refuges for glass sponge reefs.

14.2.4 What actions are currently undertaken to reduce these pressures?

The most significant action terrestrially to manage pressures on wildlife populations is the relatively recent emphasis by FLNRORD on conserving forest biodiversity and protecting habitat, especially for grizzly bear and ungulate populations: Roosevelt elk, black-tailed deer and mountain goat. Wildlife Habitat Areas have been established to protect critical winter ranges; Old Growth Management Areas (OGMAs) have been created to protect critical nesting habitat for marbled murrelets and to add forest diversity for all species. Hunting is being more stringently managed to reduce poaching pressures. The grizzly bear hunt was terminated completely in 2017.

Other significant actions in the Sound include decades of habitat restoration work in the Squamish Estuary, the replanting of eel grass and kelp beds, the improvements to drainage and stream crossing culverts to remove barriers for fish, extensive work to remove or manage invasive species and new habitat mapping to identify priority areas for conservation.

In the marine environment, Fisheries and Oceans Canada has closed most commercial fisheries in Howe Sound due to concerns over species abundance, with only limited prawn and crab and some finfish fisheries remaining. Fisheries and Oceans Canada has also designated 11 Rockfish Conservation Areas to protect important habitat and enable population recovery for the many species of rockfish and for lingcod. In addition, Marine Refuges were established to protect the globally significant populations of glass sponge reefs.

14.2.5 What actions do you intend to take to reduce these pressures?

As discussed in Section 13, the main goal of a Biosphere Region in Átl'ka7tsem/Howe Sound is to support, reinforce and coordinate the network of governments, First Nations and non-government organizations who collectively are undertaking the conservation and restoration in, and the sustainable development of, this important region.

The AHSBR Roundtable Governance will be instrumental in the development of a long term strategy that provides the logistic support through HSBRIS to achieve the stated objectives.

This effort will go beyond the scope of existing measures to embrace a strategy for the future that builds on the results of the CEA to develop best practices and a suite of management measures that learns from and reverses past mistakes.

The coordination of research, monitoring, education and communication programs will be the hallmarks of the Biosphere Region's efforts to lead the pursuit of a model region for conservation and sustainable development.

14.3. At the level of genetic diversity:

14.3.1 Indicate species or varieties that are of importance

(e.g. for conservation, medicine, food production, agrobiodiversity, cultural practices, etc).

While more than 60 species in BC have been the subject of genetic research, only a few have been genetically classified below species level. Most research in BC has been undertaken in areas of historic isolation, on the edges of species' known ranges, and on islands and glacial refuges. Several species that are important in AHSBR's ecosystems have been studied genetically in other parts of the province, especially for population differentiation, including species of northern goshawk, wolverine, western painted turtle, Roosevelt elk, salmon, grizzly and black bears and marbled murrelet (Wilson et al, 2007; Todd, 2019). That data cannot, however, be readily extrapolated from one region to another (Wilson et al, 2007).

Roosevelt Elk, photo: T. Cyr

Grey Owl, photo: T. Cyr

As discussed in Section 4, those species assessed federally by COSEWIC and listed on SARA, and/or listed provincially as at–risk, have consideration given to conserving genetic diversity for these species, especially those with recovery plans (see Section 4.2.1.1). These include, for example, the coastal tailed frog, painted turtle, northern goshawk, Roosevelt elk and grizzly bear (Todd, 2019). The only genetically unique species in AHSBR known at this time is the Kokanee salmon (a non-anadromous form of sockeye salmon), found in Killarney Lake and Grafton Lake on Bowen Island, important refugia for this genetically unique population of the species (Todd, 2019; Knight, 2019). It may also be possible, though not yet confirmed, that genetically unique populations of western painted turtle and coastal northern goshawk may occur within AHSBR (Todd, 2019).

14.3.2 What ecological, economic or social pressures or changes may threaten these species or varieties?

As noted above and in previous sections, there are a number of ecological, economic or social pressures or changes that could affect species important for conservation at this time. At the *genetic* level, the two most serious threats to diversity are inappropriate development, particularly in riparian zones, and the issue of invasive species. Too often, human development focuses on riparian areas at lower elevations, such as along shorelines and wetlands, the preferred habitat of several smaller species-at-risk (Knight, 2019). The monitoring of invasive species is critically important to the future of native species, especially given that many species of concern in AHSBR are on the edge of their home ranges (Knight, 2019; Todd, 2019).

Additional threats to the genetic diversity of species and communities in AHSBR include altered trophic ecologies and direct impacts to survivorship within native populations (affecting genetic selection), habitat loss and modification (with impacts on survivorship, movement and gene flow) and potential cross-breeding (Todd, 2019).

14.3.3 What indicators, at the level of the species, are used, or will be used, to assess the evolution of population status and associated use?

Natural populations require genetic diversity in order to evolve and adapt to new environmental conditions, especially due to climate change, but also from insects and diseases. Because it is not possible to measure all ecological processes or species, indicators are used to reduce the complexity of natural systems into simpler parts. The use of indicators has become a globally accepted practice in describing, reporting and monitoring progress towards ecologically sustainable development (Innes et al, 2009).

Indicators of genetic diversity are usually applied in conservation management to address two primary monitoring objectives: to safeguard the genetic diversity of a species on which the continued evolution of the species depends; or to conserve genetically distinct or unique populations of a species. The former relates to ecosystem health and services and the need to keep landscapes, ecosystems, and species representative and diverse. The latter is more a conservation status issue where a particular subspecies or variant, and the integrity of this genetically unique population, requires conservation attention (Todd, 2019).

There is a considerable amount of work being undertaken in BC on forest genetic conservation research both within the BC government at FLNRORD and at the Centre of Forest Conservation Genetics (CFCG) at UBC in Vancouver. Both theoretical and applied research is used to advise on forest resource management issues such as seed supply, timber supply analysis and planning, and the benefits of protected areas. FLNRORD is also advised by the Forest Genetics Council of BC (FGC) that coordinates research activities on the conservation, resilience and value of BC's forests, seeking knowledge on population, ecological and quantitative genetics, comprehensive inventories of genetic resources and identifying priorities for conservation (FGC, 2019).

The following 16 indicators are included in a monitoring framework utilized in BC for assessing the status of or trends in forest species, under three categories: Biodiversity; Natural Disturbances and Ecosystem Drivers:

Biodiversity:

- **Ecosystem Distribution and composition**
- **Ecosystem productivity**
- **Species diversity**
- **Genetic diversity**
- **Ecosystem connectivity.**

Natural Disturbances:

- **Insects and diseases**
- **Wind throw**
- **Fire**
- **Mass movements**

Ecosystem Drivers;

- **Precipitation**
- **Snowpack**
- **Stream flow**
- **Water temperature**
- **Water quality**
- **Glaciers**
- **Unseasonable or unexpected weather conditions (Innes et al, 2009).**

Indirect or surrogate indicators can also be used to monitor the conservation of genetic diversity and the associated genetic processes that support it (e.g., genetic differentiation, gene flow), including, for example, ecosystem and tree species diversity, floral and faunal community and species diversity, habitat diversity or landscape connectivity (addressing gene flow) (Todd, 2019).

14.3.4 What measures will be used to conserve genetic diversity and practices associated with their conservation?

Measures utilized by management authorities to further the conservation of genetic diversity will include the implementation of monitoring and adaptive management actions to address the threats to the conservation of genetic diversity, as discussed in 14.3.2 above. AHSBR's partners will assist management authorities to design and develop a monitoring framework for the AHSBR region that employs both direct and indirect indicators of genetic diversity. This framework will include existing monitoring and research programs, such as FLNRORD's Forest and Range Evaluation Program and the Stewardship Objectives Baseline Tool (SBOT) initiative to monitor cumulative effects on populations of key species, including genetically unique and designated populations (FLNRORD, 20xx). In addition, provincial and federal species management plans (e.g., for tailed frogs and western toads) and recovery strategies (e.g., for northern goshawks) already contain strategies and practices which will address genetic conservation, as well as recommendations for future research needs to improve the level of understanding of genetic differentiation, isolation and population status (Todd, 2019). For example, BC, in collaboration with local universities, has completed genetic research into western painted turtle and is currently undertaking similar genetic research into coastal goshawk, western toads and coastal tailed frogs, to support their recovery strategies and management plans. The study areas for this research all overlap with the AHSBR region, and future research will continue.

Sea to Sky Gondola viewpoint, photo: B. Turner

15 Development Function

15.1 Potential for fostering economic and human development which is socio-culturally and ecologically sustainable.

The proposed AHSBR fosters sustainable development operating within the following context:

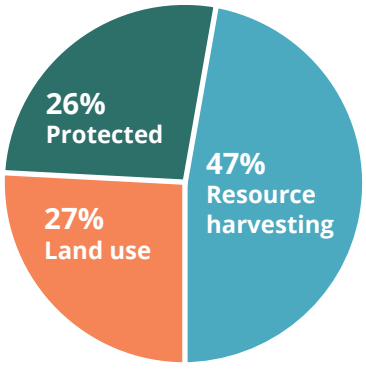
16 PEACE, JUSTICE AND STRONG INSTITUTIONS

The Squamish Nation has developed and has implemented its own independent assessment process for major projects proposed in its territory (the Squamish Nation Process).

The UN Declaration on the Rights of Indigenous People establishes the importance of receiving free, prior and informed consent from Indigenous peoples before their traditional lands are taken, occupied, used or damaged (Ratcliff & Company, 2015).

The foundation for sustainable development in much of the AHSBR rests in the Sea-to-Sky Land and Resource Management Plan (LRMP), a land-use plan prepared for the region in 2008 (see Section 4.3.2). Approximately 74% of AHSBR is inside the boundary of the LRMP, and the direction provided in the plan is therefor fundamental to designing a sustainable future for the region. The LRMP provides general direction for the management of natural resources in the Sea-to-Sky region and a process for resolving land use issues. Significantly, the LRMP provides for 26% of the region to be protected in a number of types of protected areas, and an additional 27% to be placed in a number of land use categories that recognize their cultural values to First Nations, their biophysical values for wildlife habitat and biodiversity, and their wilderness and visual values for tourism and backcountry recreation. In these areas, timber harvesting and infrastructure for hydro-electric power generation is not permitted, although some sub-surface mining activity could occur in a manner that respects these other values. The remaining 47% of the Public lands in the region are available for resource harvesting activity, ensuring economic viability for the region's industrial base, but even here, major consideration is given to areas with high cultural values for First Nations, and biodiversity and recreation values for wildlife and people (Government of BC, 2008).

Sea-Sky Land and Resource Management Plan



AHSBR is fortunate for having much of the ground work for a sustainable future already completed through the LRMP as described above, which can further leverage the considerable potential of a Biosphere Region to foster appropriate economic and human development in the region. This potential is strengthened by the LRMP's

Canoe full of kids, photo: T. Turner

recognition of Indigenous rights and title, also reflected in subsequent land use agreements spawned by the Plan, and the ongoing Reconciliation efforts by the federal and provincial governments with the Squamish Nation. To this end, BC committed in 2019 to becoming the first province in Canada to introduce legislation to implement the United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP). Article 29 of UNDRIP declares that: "Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources". Further, Article 32 declares "Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources, and that States shall consult and cooperate in good faith with the Indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources" (United Nations, 2008). The implementation of these provisions will have significant implications for land use

decision-making into the future to ensure an appropriate flow of benefits to First Nations communities.

Metro Vancouver which overlaps part of the AHSBR and includes the municipalities of Bowen Island, part of West Vancouver and Lions Bay, is committed through its 2040 regional growth strategy to five goals; 1) create a compact urban area; 2) support a sustainable economy; 3) protect the environment and respond to climate change impacts; 4) develop complete communities; and 5) support sustainable transportation choices (Metro 2040).

The Islands Trust governs all the islands in the Salish Sea with its Preserve and Protect Mandate. The islands in Howe Sound are part of Islands Trust area and are committed to the implementation of policies and principles guided by the Islands Trust's First Nations Engagement Principles Policy. The Islands Trust seeks to create capacity, convene meaningful dialogue and understanding between the people of the Islands Trust Area, First Nations communities and governments, staff and Trustees (Island's Trust First Nations & Reconciliaton).

The Sunshine Coast Regional District's (SCRD) "We Envision" plan encompasses the following values; Collaboration – we facilitate working cooperatively within the organization and externally with all levels of government, First Nations, the public and community groups and organizations; Equity – we ensure appropriate and affordable service levels and have the costs for those services shared fairly; Environmental Leadership – we strive to protect, sustain, restore and enjoy our land, air, water and biodiversity; Respect & Equality – we welcome the contributions and diverse viewpoints from within our organization and community to inform and deliver service; Transparency – we promote openness and clarity in decision-making (SCRD, 2011).

The Town of Gibsons and communities on the West Side of Howe Sound fall under the SCRD governance.

The Squamish Lillooet Regional District's (SLRD) Integrated Sustainability Plan has the following objectives:

1. **Live within the limits imposed by natural systems;**
2. **Minimize our dependence on limited, non-renewable resources;**
3. **Encourage zero-waste, re-use and recycling;**
4. **Minimize disturbance of ecological and physical processes;**
5. **Manage land, water and air resources wisely and efficiently;**
6. **Recognize and reduce human causes leading to climate change while adapting, as necessary, to unavoidable negative impacts of climate change;**
7. **Understand the interconnections among Economy, Society and the Environment and apply these considerations systematically in the decision making process; and**
8. **Work to meet basic human needs, distributing resources and opportunities fairly with an awareness of the needs of future generations.**

The communities north of Lions Bay on the east side of the fjord and up to the northern part of the boundary fall within the SLRD. (SLRD, 2013)

Each local government within the region has official community plans (see Section 19.4). A scan of these plans for references to sustainability found common values and commitments across the region.

Port Mellon Pulp Mill, photo: B. Turner

Squamish Nation Welcome Figure, photo: B. Turner

15.1.1 Describe how and why the area has potential to serve as a site of excellence/model region for promoting sustainable development.

The support of the various authorities and many non-government organizations and individuals for this nomination as a UNESCO Biosphere Reserve is an indicator of the commitment towards the objectives of AHSBR. AHSBR will use this commitment to the BR to promote sustainable development in the region.

AHSBR will strive to serve as a site of excellence/model region for promoting holistic sustainable development through:

- **Fostering collaboration to maintain cooperation across the region;**
- **Modeling respect for First Nations Rights and Titles and the needs of First Nations communities;**
- **Promoting UN Sustainable Development Goals and providing region-wide key indicators;**
- **Researching and promoting Best Practices that can be shared region-wide; and**
- **Generating recognition for the Átl'ka7tsem/Howe Sound Region.**

Fostering Collaboration to maintain Cooperation

The power of the AHSBR Roundtable model as described in Section 17, lies in the strength and commitment of the many partnerships and the 'community of communities' that care for this region. Twice a year, HSBRIS coordinates the Howe Sound Community Forums that bring together elected officials and staff from the local governments, regional districts, First Nations and non-government organization representatives, as described in Section 16. HSBRIS also convenes the AHSBR Roundtable twice a year and various working groups, as described in Section 17.

HSBRIS' key role as a strategic communications and engagement hub is to maintain networks and foster ongoing collaboration between authorities, sectors, industry and business associations, members of civil society and First Nations. As a non-partisan organization, HSBRIS will strive to build new and maintain existing relationships and cooperation among interested stakeholders across all sectors advocating for best practices in sustainable development. In addition, HSBRIS will generate interest in and advocate for robust public engagement during the planning and assessment of projects, in support of our partners and community member projects and programs.

Modeling respect for First Nations Rights and Titles and the needs of First Nations communities.

AHSBR offers an opportunity to serve as a site of excellence working together with First Nations. The Squamish Nation's strategic Plan 2020-2035 identifies that Sustainable economic development that provides economic, ecological, and social benefit to their community is integral to implementing their plan (Squamish Nation, 2019).

The aim of HSBRIS and AHSBR is for First Nations to be co-chairing the Board of the HSBRIS Society and the AHSBR Roundtable. The Nation has expressed support for this approach. The Biosphere Reserve offers a unique opportunity to develop a co-governance model with First Nations, which integrates indigenous cultural practices and traditions into decision-making and innovate a replicable model for collaboration with First Nations throughout the Biosphere Region.

Promoting UN Sustainable Development Goals

Based on the response to the SDG workshops already conducted in the region and the number of organizations mapped on the Movement Map, HSBRIS will continue to promote awareness of the Sustainable Development Goals in the region, working with partner organizations, such as the Sea to Sky Community Foundations, to communicate how the region is performing with the applicable goals. HSBRIS contributes to achieving the goals various projects aimed at promoting awareness within each community (see Section 13.2).

Researching and Promoting Best Practices

HSBRIS will conduct the research and provide a platform for sharing stories of best practices. There are award winning businesses and industries in the region that currently lead by example. The Town of Gibsons was awarded the UN-endorsed "World's Most Livable Community (population under 20,000 category) award in 2009 and in 2018 Gibsons and its partners in the Municipal Natural Assets Initiative (MNAI) were recognized with a Real Estate Foundation of BC Land Award. The MNAI was declared winner for not-for-profit enterprise in the Land Use and Conservation category.

For a second time, Squamish was ranked in 2019 as the Best City for Work by BC Business magazine (District of Squamish, 2019b). The community attracts a young competent and trained work force, those wishing to balance a good career with a great lifestyle enjoying the outdoors and quality of life. Squamish has access to good transportation infrastructure and is seeing continued economic growth, attracting new companies investing in clean energy technologies, passive home-builders and brand name businesses in the recreational and technology sectors. Squamish has also recently won the designation of a carbon neutral municipality and been awarded the Achievement of Carbon Neutrality by the Province (Squamish Community Foundation, 2017; District of Squamish, 2019a). In 2019, Squamish also received an Excellence in Policy Planning award from the Planning Institute of British Columbia for its Squamish 2040 Official Community Plan. The Squamish Chamber of Commerce showcases the many Squamish Success Stories of companies that view Squamish as a land of opportunity, calling itself "a community of entrepreneurs, trailblazers and innovators. From technology to tourism, manufacturing to marketing, we are all connected through our love of Squamish's extraordinary landscape and the adventures it provides (Squamish Chamber of Commerce, 2019).

Photo courtesy of Britannia Mine Museum.

Industries within the region are being recognized for their excellence such as: Squamish Terminals won awards for innovation in cargo tracking computer systems and for environmental stewardship, and the Box Canyon Hydroelectric Project won the 2017 Tree For Life Award.

As a National Historic Site, multiple award winning Britannia Mine Museum is a key location for sharing sustainable industry practices and lessons learned from the past. AHSBR will share stories that combine historical knowledge with today's best practices for ensuring a sustainable future.

Generating Recognition for the Átl'ka7tsem/Howe Sound Region

Since the Beachcombers TV series filmed in Gibsons, the region has experienced rapid growth as a film industry location. In 2017, forty-eight productions chose the Squamish area as their filming location and Howe Sound is identified in many more productions and T.V. commercials.

Destination BC's Sea to Sky Corridor Destination Strategy supports BC Government's goals to lead Canada in growth of overnight visitor expenditures, and secure the highest Net Promoter Score in North America. Seven goals for the Sea-to-Sky corridor and eight themes align with the objectives of AHSBR with regards to conservation, sustainable development and reconciliation. The strategy supports AHSBR as a prospective UNESCO Biosphere Reserve and has set support for the nomination as a priority goal (Sea to Sky Destination, 2019).

Industry, Innovation and Infrastructure

Apart from many tourism publications recognizing the region as one of the must see destinations in the world, various businesses are generating recognition for the region such as Carbon Engineering in Squamish who are commercializing two clean energy technologies that can rapidly accelerate the shift to a net-zero carbon world: their Direct Air Capture technology can deliver large-scale negative emissions by removing carbon dioxide directly from the atmosphere; and their AIR TO FUELS™ technology can significantly reduce the carbon footprint of transportation by creating clean synthetic fuels – made from air, water and renewable power. The plant expected one million tons of CO2 removed from the atmosphere and permanently stored underground each year. (Carbon Engineering, 2019)

With Howe Sound already used by schools and universities for field schools, AHSBR's participation through the World Network of Biosphere Reserves will encourage more connections between the universities in our region and those in other Biosphere Reserves. HSBRIS will promote the opportunities of AHSBR for field schools and contribute to the programs that focus on sustainability, conservation, global studies, and the social sciences.

15.1.2 How do you assess changes and successes?

(which objectives and by which indicator)?

There are many reports described in this document that provide environmental indicators such as air and water quality and greenhouse gas emissions. Economic development is measured by the number of housing starts, employment rates, number of hotel beds and tourism revenue. The Squamish Chamber of Commerce has developed the Squamish Economic Development Dashboard which assesses economic health using 16 metrics across three pillars, People, Business and Place.

Community Futures-Howe Sound, in partnership with the Whistler Centre for Sustainability, conducts the annual Social Venture Challenge which promotes social enterprise in the region. The organization considers the success of their lending programs as indicators of growth for the region and their organization.

The vitality of communities is measured in Vital Signs reports published by community foundations in the region. These annual reports provide indicators of change and the degree of success in meeting targets. The region-wide Vital Signs Sea to Sky report highlights some of the pressures experienced throughout the region, and is aimed at catalyzing conversations to better understand the issues, and identify potential solutions and region-wide responses.

HSBIRIS' annual report will track success against the strategic goals and the AHSBR objectives as stated in Section 13. Indicators will include:

- **Number of roundtable forums and participation levels by the various sectors;**
- **Advancement of planning tools and use by local planners;**
- **Updates to local government policies and Official Community Plans;**
- **Cumulative Effects Assessment reports and evidence of use in planning;**
- **Amount of newly conserved areas;**
- **Number of restoration, research and monitoring projects completed in the region;**
- **Number of communities achieving carbon neutrality and taking action on carbon reduction through policies;**

VisViewpoint on Sea to Sky Highway, photo: B. Turner

- **Number of communities signing and committing to Coalition of Inclusive Municipalities;**
- **Number of reconciliation events taking place in the region;**
- **Year over year changes to indicators in community Vital Signs reports;**
- **Increase in number of organizations contributing to the SDGs; and**
- **Stories from the region where the UNESCO brand has influenced behavior.**

15.2. If Tourism is a Major Activity

There is a long history and growing interest in tourism-based economic development among the communities of the Átl'ka7tsem/Howe Sound region and Sea-to-Sky Corridor. The Sea-to-Sky Corridor is the only area of the province where tourism is the highest ranked basic economic sector, primarily due to its proximity to Metro Vancouver and to the Resort Municipality of Whistler's high global profile as a tourism destination (Destination Development BC, 2019).

Destination BC is the industry-led Crown corporation that coordinates tourism marketing to support regions, communities and First Nations in developing tourism experiences and economic development. Destination BC partners with Indigenous Tourism British Columbia (ITBC) to grow and promote a sustainable, culturally rich Indigenous tourism industry. Destination BC has just completed the Sunshine Coast and the Sea to Sky Corridor Destination Development Strategy. The plan states "Vibrant, diverse, and authentic, the Sea to Sky corridor pairs a year-round sustainable and prosperous tourism management model with being the most sought-after destination for world class outdoor recreational and thriving, cultural experiences." (Destination Development BC, 2019).

15.2.1 Describe the type(s) of tourism and the touristic facilities available.

Summarize the main touristic attractions in the proposed biosphere reserve and their location(s).

The Sea-to-Sky Corridor Destination strategy identifies key strengths: the region's global reputation; outdoor playground for nature-based tourism; proximity to large markets; Whistler Blackcomb and Whistler resort community; diverse geography, climate, natural assets and Provincial Parks; agritourism/food culture; cultural experiences; funding programs; unique communities; and sustainability practices (Destination Development BC, 2019).

In providing wilderness and marine adventure recreation opportunities to the 2.3 million nearby residents of Metro Vancouver, a huge part of the Howe Sound tourism economy, the tourism and recreation distinction is somewhat blurred. Branding Squamish as the "Outdoor Recreation Capital of Canada", the title reflects the value

that area residents and visitors alike place on the prized natural environment of the Sound and is testimony to the critical importance of its protection and enhancement.

Sailing, power boating, paddling, kiteboarding, windsurfing, waterskiing, diving, fishing, camping, hiking, backpacking, mountain biking, rock climbing, bird watching, whale watching, nature observation and many other outdoor recreation opportunities are prominent. Eco-tourism is a thriving sector in many communities, particularly Squamish, Horseshoe Bay and along the Sea-to-Sky Corridor. The Sea-to-Sky Corridor alone has more than 700 km of recreation trails, including the Sea to Sky Marine trail that connects with the Trans Canada Trail. A recent dramatic increase in the number of trails and trail use is due to the growing popularity of mountain biking in the corridor. The region also contains 30 recreation sites, 53 recreation trails and 14 provincial parks and reserves for local residents and thousands of annual visitors during all seasons. Howe Sound is also a major boating destination with over 300 separate sites for boat havens, marinas, private yacht clubs, public wharves, strata and private moorage. Sport fishing has high intrinsic value and angling is gaining strength, as salmon stocks rebound after a significant decline in the 1990s (Lions Gate Consulting, 2016).

Tourism businesses and services are clustered around Gibsons, Horseshoe Bay and Squamish, but most communities host infrastructure, amenities, attractions and services that support the rapidly growing tourism economy. The region has approximately fifty accommodation facilities including bed and breakfasts

Sailing race, photo: B. Turner

(B&Bs), hotels, motels, resorts and campgrounds. A tourist train features the Sea-to-Sky experience in its trip through the region. Special events take place year round such as concerts, festivals and sporting competitions.

About 35 tour operators offer rental and tour services featuring wildlife viewing, horseback riding, mountaineering, kayaking, fishing and skippered charters, as well as cruise-and-learn boat trips for day use and multi-day outings. A major attraction, the Sea-to-Sky Gondola, offers sweeping views of Howe Sound, luscious coastal forest and spectacular surrounding mountains from 885 meters above sea level. It complements the more established operations like Sewell's Marina and the Britannia Mine Museum.

The Cultural Journey is a self-guided route through the Skwxwú7mesh Úxwumixw (Squamish Nation) and

Descent on trails, photo: Ian Robertson Photography.

Collage of camps in the region.

Lil'wat First Nations lands and includes seven kiosks and viewpoint signage at easily accessible pullouts. Going northbound from Vancouver, kiosks 1 to 5 are on the way up to Whistler and kiosks 6 and 7 are on the southbound side of the highway.

There are multiple summer and youth camps in the region, hosting thousands of children and adults annually from areas outside the region, in addition to the many University program field schools (see Section 16.2.1).

15.2.2 How many visitors come to the proposed biosphere reserve each year?

(Distinguish between single-day visitors and overnight guests, visitors only visiting the proposed biosphere reserve or only passing on the way to another place). Is there an upward or downward trend, or a particular target?

Following the upgrades to the Sea to Sky highway, built for the 2010 Winter Olympics hosted by Vancouver and Resort Municipality of Whistler, and the international recognition that came with this event, tourism has flourished. Each year about 2.3 million visitors travel the eastern shore of the Sound, by road or rail, to attractions along the Sea-to-Sky Corridor, Squamish, Whistler and beyond. Areas on the Sound's western shore and the islands are also major visitor attractions. As many of these visitors originate in Metro Vancouver, they are statistically treated as recreationists, rather than tourists.

According to the Canadian Tourism Commission report in 2011, the number of British and Australian tourists to visit Canada in 2010, for instance, was double the figures for 2009. About 290,000 British visitors spent $380 million in Canada that year. That was an increase of $134 million over 2009's figure. More than 70,000 Australians booked trips to Canada that year, spending $117 million. The number of German travellers increased by more than a third to 128,000. They spent $196 million during their Canadian trips, up from 2009's $135 million (Canadian Tourism, 2011).

According to the Destination BC Development Strategy 2019, there are several indicators available to measure performance of the tourism industry at a local level. The data that exists includes: room revenue, airport volume, average daily rate, occupancy, highway volume and visitor centre statistics. According to the study conducted to support the strategy, year-over-year analysis of room revenue trends between 2010 and 2016 show strong growth in Squamish.

Further, due to the diversity of recreation and tourism activities throughout the Sound, there are no comprehensive use estimates. However, data are available for some specific activities. For example, from 2005 to 2014, local Provincial Park attendance grew from 2.5 to 3.4 million visitors, including day use, camping and boating. Throughout BC from 2012 to 2016, visitors to Provincial Parks grew from 20.8 million to 24.9 million, an increase of almost 20% in only five years (BC Parks, 2019). From 2004 to 2015, angling effort in and around the Sound increased from 8,000 to about 9,800 angler days (Lions Gate Consulting, 2016) .

Trail-based activities such as hiking, backpacking, trail riding and mountain biking are a major contributor to the region's recreation and tourism industry. In 2006, mountain biking in the Sea-to- Sky Corridor generated $10.3 million in expenditures and over 194 jobs (Mountain Bike Tourism Association, 2007). Although studies of other trail activities have not been undertaken, they are believed to generate similar levels of use and economic activity. The Sea-to-Sky Gondola drew about 300,000 visitors in 2015

Constellation Festival, photo: Ian Robertson Photography.

and is growing at a very rapid pace (Lions Gate Consulting, 2016). This facility also employs more than 100 local male and female residents. Britannia Mine Museum attendance was approximately 74,000 in 2015, a threefold increase over 2010.

Festivals and events draw thousands of attendees to Howe Sound communities every year. Outdoor recreation and arts/culture themes predominate, and the many road and mountain bike races have international attendees.

15.2.3 How are tourism activities currently managed?

Tourism activities, events and facilities are managed by a wide range of public and private organizations, charities, religious organizations, community groups and First Nations. There are 14 Provincial Parks within AHSBR managed by BC Parks, located on Keats, Bowen and Gambier islands, and along the Sea-to-Sky Corridor. Lighthouse Park at Point Atkinson is managed by the District of West Vancouver.

Of the 14 marinas in the Sound, some are commercial operations and have facilities for the general boating public. Others are private, with facilities for members only, such as those maintained by the Royal Vancouver and West Vancouver Yacht Clubs. Summer camps are run by various community and religious organizations. Britannia Mine Museum is a charitable Society while the Sea-to-Sky Gondola is privately managed.

To address the unprecedented growth rates in recent years, the close proximity to the Lower Mainland, competing stakeholder expectations, and the complex land use issues in the area, the Ministry of Tourism, Arts and Culture (MTAC), through Recreation Sites and Trails BC (RSTBC), has implemented the Sea-to-Sky Corridor Recreation Trail Strategy. The RSTBC has been working with consultants, local governments, First Nations and other stakeholders to develop a comprehensive trail strategy for the area. The strategy focuses on identifying key actions to support development of a "well coordinated, sustainable and environmentally responsive trail network spanning the corridor, managed for the benefit, health and prosperity of a diverse range of users" (RSTBC, 2019). This multi-stakeholder partnership for the management and maintenance of recreational trails on a regional basis is the first of its kind in BC.

Work is beginning on a recreation management strategy for the greater Shannon Basin – an area encompassing the Stawamus Chief & Shannon Falls Provincial Parks and the Shannon Creek Watershed. This project is a partnership between the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (Sea

to Sky district) and Squamish Nation, in collaboration with BC Parks. The Fraser Basin Council is assisting the project partners as an impartial facilitator and to conduct outreach and engagement with stakeholders.

Services of the Royal Canadian Mounted Police, Conservation Officer Services of BC, BC Parks Rangers, Fisheries and Oceans Enforcement Officers, Lions Bay Search and Rescue, Marine Search and Rescue, Fire and Rescue are also very important to the overall management of activities in the region.

15.2.4 Indicate possible positive and/or negative impacts of tourism at present or foreseen and how they will be assessed. (linked to Section 14)?

Tourism in Howe Sound is increasing rapidly and, may reach carrying capacity for various resources in the near future. Therefore, it needs to be effectively monitored and managed. Tourism presents a huge economic growth opportunity when managed proactively but there is an enormous responsibility to ensure sustainability. Part of the difficulty for management is that tourism strategies are based on marketing and not necessarily on development nor resource carrying capacity. The Destination BC Sea to Sky Marketing Plan outlines key challenges such as staff housing constraints, staffing and funding for land-based management, lack of tourism operators and visitor-ready experiences, lack of visitor amenities, aging infrastructure and lack of data to make informed decisions (Destination Development BC, 2019).

Over the past decade, there has been a dramatic increase in the number of trails and trail use, due to the growing popularity of cycling and mountain biking in the corridor, which in turn has resulted in a growing list of liability, user conflict, maintenance and management issues. Coastal recreational opportunities are concentrated in a few places that become "pinch points" and, due to limited water access and steep slopes, this concentrates impacts in those places and contributes to conflicts. The limited number and types of access points to Howe Sound shoreline and waters (due to residential, port and industrial development, as well as geography) is a constraint on current marine recreation and future growth. It is a factor that creates both competition and conflicts among users, and conflict between users and private landowners.

Hiking the Chief, photo courtesy of Tourism Squamish.

With an increase in marine recreation, there is an increase in identified threats to aquatic environments including: damage to wildlife habitat, poaching, increased spills and unregulated discharge, damage due to irresponsible diving and boating, marine animal disturbance, introduction of invasive species and noise pollution. The main concerns relating to the growth in recreational fishing include: people not following regulations, an increase in unlicensed saltwater guides, low capacity for enforcement of fishery regulations and guidelines, and a lack of data available on recreational fisheries.

15.2.5 How will these impacts be managed, and by whom?

With the wide range of tourism and recreation experiences available in Howe Sound, it is important to ensure coordination among all levels of government, First Nations and local organizations through a tourism and recreation development and impact management strategy. The Sea-to-Sky Corridor Recreation Trail Strategy is a positive step for trail management and an important vehicle for all stakeholders to participate in its implementation. In marine recreation, there is an identified need to develop thresholds, limits and associated management and regulatory tools to manage continued growth in boating and recreational fishing. The strength of the collaboration and partnerships in the region support the relationships needed to address conflicts and develop action plans aimed at addressing the issues.

HSBRIS plays a key role in providing local knowledge and data to agencies in order to make informed decisions.

Aerial of Squamish, photo courtesy of Sea to Sky Air.

15.3. Agricultural (including grazing) and other activities

15.3.1 Describe the type of agricultural (including grazing) and other activities, area concerned and people involved (including men and women)

The Squamish Nation has used and occupied lands within the Squamish Valley for fishing, hunting, and plant and herb cultivation since time immemorial. Around the 1870's, agriculture was also a key economic driver in Átl'ka7tsem/ Howe Sound for the first small groups of European settlers, producing forage, livestock, vegetable and hops. But, due to geographical constraints, there is a lack of productive agricultural land and, while it is still important to the local communities, it is now a less significant economic activity.

British Columbia has designated the Agricultural Land Reserve (ALR) on lands where agriculture is recognized as the priority use, farming is encouraged, and non-agricultural activities are restricted. Due in part to mountainous topography and settlement patterns that pre-date the inception of the ALR, the overall agricultural potential in Howe Sound is focused on small scale independent farms as opposed to large commercial holdings found elsewhere in British Columbia. These small farms are suitable to supply local food productions through farm gate sales, farmer's markets, and local grocery store supply.

At the northern and eastern areas of Howe Sound, in the District of Squamish and Electoral Area D, the ALR is found mostly in the Squamish Valley and comprises only 1.3% of the area. Although a relatively small amount of the inventoried ALR is actually used for farming, additional lands outside the ALR are also being farmed (BC Ministry of Agriculture, 2017). Pasture is the most common crop, with other crops including small amounts of hops, vegetables, fruit trees, mixed berries and tomatoes. Small scale livestock is also carried out in the valley. It is also significant that over 90% of the effective ALR is covered by natural and semi-natural vegetation and wetlands with minimal current anthropogenic use.

These underutilized lands represent a potentially valuable land base to expand regional agricultural production in the future but will require costly clearing to become agriculturally productive.

The Squamish Community Action Network (CAN), a local action group dedicated to reducing the community's carbon footprint, is empowering the community by developing, promoting and implementing sustainable strategies to mitigate climate change. One of their primary focus areas is the creation of a resilient food system (Squamish CAN, 2019).

In the Sunshine Coast Regional District (SCRD), on west Howe Sound, only 1% is protected in the ALR and the

average farm size is about 2.8 ha. Over 60% of the ALR land area, however, is forested and uninhabited, and most ALR land is located outside the boundaries of the proposed AHSBR. Small scale Sunshine Coast agriculture is neither a major contributor of local food nor to the local economy, and has been declining over the past several years.

On the islands at the mouth of Howe Sound there are about 50 farms. Most are found on Bowen Island where they encompass about 240 ha., or less than 2% of the island. Farmers have established the Bowen Agricultural Alliance to promote and facilitate the development of local food systems, agricultural knowledge and community building (Swift, 2018).

15.3.2 Indicate the possible positive and/or negative impacts of these activities on biosphere reserve objectives.

The future agricultural sector will likely contribute more resilient, organic food systems to the small scale food farming character of the Átl'ka7tsem/Howe Sound rural life style. The geographic and economic constraints will limit significant commercial expansion but regional population growth, demographic changes and evolving lifestyle characteristics will encourage the modest growth of local farm-to-table agriculture in the region.

15.3.3 Which indicators are, or will be used to assess the state and its trends?

The BC Ministry of Agriculture will continue to regularly collect information on the type and extent of areas available for agricultural purposes, agricultural uses (both inside and outside the ALR), types of agricultural activity, production volumes and values, and employment to assess the ongoing state and trends in Howe Sound agriculture.

Regional Districts, Islands Trust and municipalities will continue to include agricultural protection and development strategies in their OCPs. The Sunshine Coast Regional District's Agricultural Plan outlines a number of performance indicators to establish baselines, milestones and targets; evaluate circumstances and progress; devise alternative strategies as necessary; and make adjustments over time (SCRD, 2019). The Squamish Climate Action Network (CAN) organization is very active and publishes regular information on their activities and events. The changing scope and growth of their organization and activities can be readily tracked.

15.3.4 What actions are currently undertaken, and which measures will be applied to strengthen positive impacts or reduce negative impacts on the biosphere reserve objectives?

Local governments are encouraging the expansion of small-scale agriculture in their jurisdictions. The Sunshine Coast Regional District and the District of Squamish, in conjunction with Electoral Area D of the Squamish-Lillooet Regional District, have recently undertaken Agricultural Development Plans which include parts of the proposed AHSBR area.

Most of the ALR lands within the AHSBR boundaries lie in the Squamish District along the west bank of the Squamish River, in both Squamish Nation reserves and private lands. The majority of this land is in a natural or semi-natural state. However, the District of Squamish has included agriculture and food system policies in their 2018 OCP that highlight the desires of the community to support local agriculture and foster a sustainable food system in Squamish. This is supportive and complementary to the activities of the Squamish CAN organization.

Although much of Electoral Area D is outside the boundary of the AHSBR, local and regional policies of the SLRD Electoral area D promote the preservation of agricultural lands and support increasing agricultural production and activities in the region. The Sunshine Coast Agricultural Area Plan was initiated by the Regional District to encourage local agriculture – not only as a viable economic sector, but as a means for all Sunshine Coast residents, individually and collectively, to become more food self-sufficient and, as a community, more resilient. Essentially, the plan serves to coordinate regional, local government and community action in support of agriculture within and for the region (SCRD, 2019).

15.4 Other types of activities

Positively or negatively contributing to local sustainable development, including impact/influence of the biosphere reserve outside its boundaries.

The abundant natural forest resource of Howe Sound spawned an extensive forest industry that has been the mainstay of the region's economy for over a century. Although the industry is experiencing important structural changes, it will continue to be a major economic and employment contributor for Indigenous and non-

Indigenous residents. Today, the Sound is rapidly developing a burgeoning outdoor adventure recreation and tourism industry on land and sea, a growing international film industry, many successful Squamish "rec-techs," which produce technologically advanced products that aid recreation, and is facing potential resource-based industrial expansion and related commercial shipping growth, along with extensive peri-urban housing development and associated small scale commercial activity.

15.4.1 Describe the type of activities, area concerned and people involved.

BC is home to one of the largest public forests on earth. With a total land base of 95 million ha, nearly two- thirds or about 60 million ha, is forested. Only 5 per cent of the land base is privately owned meaning that most of the forest is publicly owned and is managed and administered by the provincial government through its land and forest management agency, FLNRORD. Public ownership allows the B.C. government to manage the land base in keeping with the environmental, social and economic interests of British Columbians. The government manages the public forests through laws that enable the use of the forest, while ensuring its long-term sustainability.

About 10 per cent of B.C.'s forests are protected areas. Overall, decisions about how public land is used and managed are made through strategic land use planning processes. FLNRORD authorizes the use of public lands for activities such as logging and grazing. It also enacts legislation that requires all users of the forest to conserve forest values, including timber, biodiversity, water and soil quality and wildlife habitat. Government has the primary responsibility in determining how and where harvesting takes place, and how much harvesting occurs. B.C.'s approach to forest management ensures that all forest values are considered and that there are opportunities for First Nations and public involvement.

The waters of Howe Sound have long been a source of food for Indigenous people. In the last 150 years the waters have long been used for the transport, sorting, booming and storage of logs, providing sheltered areas for these activities and accessibility to mills in the Sound and the Lower Mainland. Likewise, upland areas surrounding the Sound have been an important source of timber for the

KIteboard in the Howe Sound, photo courtesy of Josh McCulloch, Tourism Squamish.

region's timber industry. A report published in 2016 noted active logging was taking place on about 9,100 hectares in the area, approximately 10% of the Public operating forest (Lions Gate Consulting, 2016).

With the growth of recreational activities in the Squamish area, and a shift in where timber harvesting takes place, First Nations forestry companies are working more closely with local recreational groups. Whereas there used to be conflict between recreational interests and those of timber harvesters, there is a growing recognition of mountain biking, in particular, as an important part of the local community and as a legitimate user of the forest resource. Both parties are seeking the social license to operate in cooperation. To this end, the Squamish Nation and the District of Squamish have established the Squamish Community Forest Corporation, formalizes a governance structure to manage 10,000 hectares of Crown forest land close to the community. This community forest offers benefits such as long-term economic development and

Ferry to Bowen Island, photo: B. Turner

local employment; local level planning and decision-making over timber harvesting in key areas such as cultural and spiritual sites, watersheds, viewscapes and recreational areas; and education and research opportunities including increased community awareness of forest management. This is the first partnership agreement signed by the Nation and district where the two organizations will be co-managing a local asset (Chua, 2018).

A number of projects have been in the planning or proposal stage in the region for a number of years, such as: a liquified Natural Gas export project on the northwest side of Howe Sound, at the former site of the Woodfibre pulp mill; a 70 ha. sand, gravel and rock mine on the northwest shore of the Sound; a ski resort/housing development north of Squamish; and a number of other resort and housing development projects are in the concept stage but their future is uncertain. Public approvals, permits, climate change adaptation measures and the environmental and First Nations conditions placed on the projects impact project costs and timing.

The Sound is an active marine transportation corridor. In 2015, 12,921 commercial vessels transited the Sound, an average of 36 vessels daily, with BC Ferry traffic and commercial tugs making up 95% of that traffic. Most industrial traffic is associated with the forest industry and the movement of logs and wood chips from the ports of Squamish and Port Mellon. A major shipping point is the deep-water, break-bulk facility in Squamish. BC Ferry traffic is part of the provincial highway system and provides crucial transportation links between Horseshoe Bay, Bowen Island and the Sunshine Coast. Traffic densities are 13 times higher between Horseshoe Bay and Bowen Island than in the northern part of the Sound (OWHS, 2017).

Capitalizing on the recreational and lifestyle amenities of Howe Sound, substantial tourism development is expected along Sea-to-Sky Corridor communities and in the vicinity of the District of Squamish over the next few decades. A major development has been proposed for the area adjacent to Garibaldi Park. Development of the project is conceived in four stages with the ultimate build-out accommodating possibly 20,000 beds over the next 30-50 years. The project has received a Provincial Environmental Assessment Certificate, with conditions, and support from the Squamish Nation. Regional government land use zoning changes, however, will be required for the project to proceed. If approved, an estimated 5,000 jobs would be created during construction with 4,000 annually during build-out. Jobs and training have been committed for members of the Squamish Nation (Bartlett, 2019).

Howe Sound property values are considerably below those in Metro Vancouver. This factor, along with improved road and transit connections to Vancouver, and outdoor lifestyle attractiveness are generating growing residential interest and population growth along the Sea-to-Sky corridor to Squamish and beyond. On the western side of the Sound, there is increasing residential demand among retirees, and these population growth trends are expected to continue.

Peri-urban development proposals for Britannia Beach include 850-1000 residential units and expansion of

the commercial area. A $400 million destination resort is proposed for the Shannon Falls area and more than 200 new homes are being planned for Furry Creek. The Squamish Nation has partnered with developers for a major, multi-purpose park, residential, commercial and light industrial development on the Squamish waterfront. (Chan, 2018; Thuncher, 2019). While the regional districts have growth plans, the infrastructure investments required to mitigate flood and other climate related risks tend to slow the rate at which projects are undertaken.

With the scope and extent of proposed development on both sides of the Sound, an integrated regional development plan that addresses environmental, community, socio-cultural and transportation elements is called for that involves all the relevant levels of government. This comprehensive planning for the region is a key objective for HSBRIS under the framework of sustainable development, biodiversity conservation and reconciliation (see Section 13).

15.4.2 Indicate the possible positive and/or negative impacts of these activities on biosphere reserve objectives. Have some results already been achieved?

Each challenge presents an opportunity to meet the objectives of the AHSBR. Ongoing forestry development and management trends can be expected to contribute substantially to sustainable income and employment objectives for both Indigenous and non-Indigenous residents, as well as providing a more sustainable environment for wildlife. However, rapid and extensive growth of the recreation sector in many areas of Howe Sound will result in increasing potential conflicts with forestry, both harvests and road construction, that will have to be managed cooperatively.

Potential new industrial activity in the Sound will also generate increasing direct and indirect employment opportunities. At the same time, construction and operation of the proposed LNG plant and gravel mine, and the associated large vessel traffic, raise concerns for the environmental health of the Sound. The LNG project has been approved by Provincial and Federal Governments, and the Squamish Nation, after imposing 25 legally enforceable impact mitigation measures on the proponent.

The BC Environmental Impact Assessment (EIA) process for the gravel mine identified potential impacts on the following resource values: underwater construction noise impacts on marine mammals; various fish habitat and wildlife disturbances; watershed and groundwater impacts; air quality reductions; and open pit visibility impacts. In a separate process, the Squamish Nation focused primarily on potential fish habitat and wildlife impacts. Both the Provincial and Squamish Nation assessments approved the project. However, the Sunshine Coast Regional District has denied a rezoning application, necessary for the project to proceed (Woodrooffe, 2018).

Large vessel traffic concerns relate primarily to the speed and underwater noise of vessels in the Sound on their access and egress routes, with particular concern for rockfish habitat and glass sponge reef protection.

As mentioned in Section 15.4.1, The Squamish Nation and the District of Squamish have established the Squamish Community Forest Corporation to manage an area of Crown forest land near the District. This is an opportunity to create a management plan that exemplifies the objectives for sustainable development, managing important resources while protecting important biodiversity and human values.

15.4.3 What indicators are, or will be used to assess the state and its trends?

As mentioned in Section 16, there are numerous tools and reports that measure the state and trends. Local community associations such as the Chambers of Commerce, the Community Foundations, Community Futures, Tourism organizations in the region plus HSBRIS' annual reporting will provide key information for assessing the state and trends.

15.4.4 What actions are currently undertaken, and which measures will be applied to strengthen positive impacts or reducing negative ones on the biosphere reserve objectives?

The collaborative model of the Howe Sound Community Forum and the AHSBR Roundtable provide forums for assessing and taking action (see Section 17). Citizen engagement and advocacy are influential actions that can move consensus based actions forward into policy and regulations. HSBRIS' role as a communication and engagement hub adds the logistical support to inform improved policy and enforcement of existing regulations.

Port in Squamish River estuary, photo: B. Turner

Current examples are found in the program agendas for the Howe Sound Community Forums held in the spring and fall. The urgency around taking action on climate change is a very current theme. The dialogue that is generated between local governments in the region leads to consensus building and resolutions being taken forward by local governments to specific actions.

15.5 Benefits of economic activities to local people:

15.5.1 For the activities described above, what income or benefits do local communities derive directly from the site proposed as a biosphere reserve and how?

The growth of adventure recreation and tourism, start-up companies and the film industry in Átl'ka7tsem/Howe Sound, will generate income and employment benefits for local residents, but it will also attract new residents to grow the population and share the development benefits. First Nations language and culture are enjoying a resurgence in many territories through the dedicated efforts of local communities and a growing interest in reconciliation initiatives. Cultural tourism has the potential to generate both economic and socio-cultural benefits to First Nations and will increase knowledge of First Nation history, lore, legends and way of living among non-Native populations. The Squamish and Tsleil-Waututh Nations are embracing these opportunities (CBC, 2014; Aboriginal & Eco Tours, 2019).

Projects generated by HSBRIS and other partner organizations working towards the objectives bring opportunities for youth to engage as volunteers. Where funding is available through various grants, both temporary and long term jobs are created. HSBRIS brings resources and attention to the region and, in collaboration with other organizations, generates the opportunities for mentoring projects that benefit the region and lead to a succession of key leadership roles in the region.

15.5.2 What indicators are used to measure such income or other benefits?

Local economic benefits tend to be measured in terms of employment, and wage and salary income from full and part time employment during construction and operating phases, as well as local taxes. The beneficiaries of the employment opportunities may be existing local residents or, if the skills required are not available locally, migrants to the region. These employment and income benefits will be generated directly to project employees or indirectly to project goods and service providers, and through the re-spending of those

Swisk Jay Natrall, photo courtesy of Squamish Lil'wat Cultural Centre

income benefits in the community. Local tax benefits will be paid to local governments but tend to equal the costs of providing local services.

Socio-cultural benefits are more difficult to define and measure. However, with the growing importance of these activities, more attention will be paid to measuring these important dimensions.

15.6 Spiritual and cultural values and customary practices Provide an overview of values and practices, including cultural diversity

The Squamish Nation culture is rich and resilient. Members continue to practice their customs and traditions, which are strongly interconnected with their traditional territory. Together with their lands, their customs and traditions are the foundation of who they are as *Sḵwx̱wú7mesh*.

The First People lived in a world of spirit. For example, the Cedar Tree is thought of as the Tree of Life and the Squamish gave blessing before using any part of the tree. Cedar was used to make skirts and ponchos, waterproof hats and baskets, tools for hunting and fishing, cooking boxes and giant dishes for feasting. Women worked with the soft inner board of the cedar, pounding it until it was soft and fine enough to wrap a newborn babe. All of this carving, pounding and shredding was accompanied by ceremony.

Ceremonial events of the Squamish people are customarily conducted in the Longhouse. During pre-contact, certain Longhouses were utilized as community dwellings, and others were set aside for the exclusive use of the winter spiritual dances. The Longhouse is a sacred place that plays a significant role in the culture of the Coast Salish people.

Squamish Nation values were articulated in their Sacred Land Use Plan. Values and uses of the forest and wilderness of the Squamish traditional territory that community members care deeply about include:

- **secluded places for traditional cultural practices (e.g., storing regalia, vision quests);**
- **wildlife and wildlife habitat, especially mountain goats, grizzly bears, and animals for food such as moose and deer;**
- **fish for fishing, and healthy rivers and streams;**
- **clean air, and clean water for drinking, for the ecosystem and for ritual bathing;**
- **resources from which Squamish members can earn a living, such as forestry and tourism; and**
- **places to heal, recover and re-connect with the land (Squamish Nation, 2001).**

When settlers arrived in the region from Europe, they brought their Christian values and practices which are still customary today. The influence of Christianity through settlers, missionaries and government policy significantly altered life for Indigenous peoples. Today, the Squamish Nation celebrate their cultural traditions mostly at their community buildings, and include annual Pow Wow and drumming festivals, and traditions celebrated in sporting competitions, dance, art and weaving.

Cultural diversity is celebrated in communities throughout the region. There are 17 Christian religious facilities of varying denominations and one Sikh Temple in the region. Nine of the 12 youth camps are Christian based and owned by churches. Today, the region has a diverse population resulting from settlers drawn to the region for work in the resource industries. Each year the Sikh Festival in Squamish draws

Ceremony from Kwi awt stelmexw students after their completion of Skw xwú7mesh sníchim (Squamish language) program, photo: J. Williams.

a huge crowd with parades, food and dance. Traditional community festivals in the region for over 40 years include Loggers Sports Days, Bowen Island Festival and Gibson's Sea Cavalcade.

15.6.1 Describe any cultural and spiritual values and customary practices including languages, rituals, and traditional livelihoods. Are any of these endangered or declining?

In 2010, the language of the Squamish Nation, *Skwxwú7mesh Snichim*, was considered 'critically endangered' and 'nearly extinct' with only ten fluent speakers still alive. The Nation's history is based on oral story telling and is not written down. The elders pass along their stories, but with their passing the original language and words so connected to the history is in danger of being lost. A Squamish–English dictionary was completed in 2011 to preserve the words.

It has only been 160 years since settlers first came to the region, mainly drawn to the traditional livelihoods based in the natural resource industries of forestry, fishing and mining. Few families of the original settlers still live in the region today and the main sources of income are derived from non-traditional industries. Forestry, fishing and mining industries have evolved, and their history well preserved through community historical societies.

15.6.2 Indicate activities aimed at identifying, safeguarding, promoting and/or revitalising such values and practices.

In 2015, *Kwi Awt Stelmexw* a not-for-profit *Sḵwx̱wú7mesh* organization was formed. It is an arts & education organization with the objective of encouraging a society of culturally and artistically fluent *Sḵwx̱wú7mesh*. Through partnership, support, and a strong mandate, *Kwi Awt Stelmexw* exists to "strengthen all aspects of *Sḵwx̱wú7mesh* heritage, language, culture, and art". The Society serves the interests and desires of the Squamish people, but also aims to build bridges with those who share their values. The campaigns include building a dedicated language centre, full time language programs, and Little *Sḵwx̱wú7mesh* Books a series of booklets that focus on basic language skills, vocabulary, and phrases that are typically used within the home or within family settings when out and about. The Society hosts fundraising events to support the campaigns.

In school district 48, *Aya7ayulh Chet* (Cultural Journeys) is a Kindergarten to Grade 6 program of choice guided by the principle that all learning is grounded in understanding the connected relationship of Language, Land and Culture. In this program, students learn to respect a shared worldview of environmental livability and sustainability related to their physical, emotional, spiritual and intellectual learning (Kwi Awt Stelmexw, 2019).

In 2010, the Sea-to-Sky corridor became the cultural highway as visitors travelling from Vancouver to Whistler for the Olympic Winter Games. The games were a new beginning for revitalization of First Nations culture and heritage.

15.6.3 How should cultural values be integrated in the development process: elements of identity, traditional knowledge, social organizations, etc.?

Development processes need to respect the rights and title, protocols and cultural values of First Nations with claims in the region. In 2019, the BC government passed legislation to implement UNDRIP, and the subsequent B.C. Declaration on the Rights of Indigenous Peoples Act "...aims to create a path forward that respects the human rights of Indigenous peoples while introducing better transparency and predictability in the work we do together." (BC Government, 2019 Indigenous People).

The Squamish Nation's Strategic Plan 2020-2023 explains that sustainable economic development is integral to the implementation of its strategic plan. It identifies priorities for planning and management of lands and waters, and building relationships with local and regional governments throughout the region. (Squamish Nation, 2020). HSBRIS currently supports many of these priorities through the Howe Sound Community Forum, the Marine Reference Guide, and Howe Sound Conservation Network. The AHSBR Roundtable will further provide an evolving, collaborative forum to support integration of cultural values into development processes.

Land acknowledgment is becoming an expected sign of respect and understanding that all local governments and many local organizations, including HSBRIS, are learning to embed in their meetings and gatherings. In addition, the use of Indigenous languages, where appropriate, advances the inclusion of their values, culture and perspectives throughout regional organizations and decision-making. To this end, HSBRIS acknowledges, supports and advocates for the use of the traditional place names and ancestral territories at all meetings it convenes and provides logistic support to all mapping and communications materials it creates, as well as on information signs throughout the region.

The District of Squamish takes the lead in beginning their Council meetings with an opening statement in the Squamish Language. Guiding principles on its relationship with the Squamish Nation were embedded into The District of Squamish Official Community Plan (OCP), as well as objectives to advance and strengthen the relationship with the Squamish Nation. The District also works with the Squamish Nation to address issues of mutual concern and capitalize on common opportunities, to encourage the expression of Squamish Nation culture, values and heritage, and to harmonize and align land use planning approaches and activities.

Similarly, the Islands Trust Council acknowledges that the Islands Trust Area, including the islands in Howe Sound, is situated within the traditional territories of the Coast Salish peoples and encompasses many gathering places and villages of these strong and vibrant First Nations. Respect for this place inspires the Trust to celebrate the richness of Coast Salish history, knowledge and culture, and informs the work that they do.

The Islands Trust has, since 2015, committed to the implementation of policies and principles guided by the Islands Trust First Nations Engagement Principles Policy. The Islands Trust seeks to create capacity, convene meaningful dialogue and promote understanding among the people of the Islands Trust Area, First Nations communities and governments, and its staff and Trustees. The Islands Trust Council adopted its Reconciliation Declaration in 2019 and adopted a Reconciliation Action Plan at the same time.

HSBRIS will encourage all communities within AHSBR to adopt the principles of the Coalition of Inclusive Municipalities to improve their practices to promote social inclusion, establish policies to eradicate all forms of racism and discrimination, and promote human rights and diversity.

15.6.4 Specify whether any indicators are used to evaluate these activities.

If yes, which ones and give details. (Examples of indicators: presence and number of formal and non-formal education programmes that transmit these values and practices, number of revitalization programmes in place, number of speakers of an endangered or minority language).

With specific reference to First Nations, the BC Government has redesigned its school curriculum to include an improved knowledge and understanding of First Nations Peoples in BC, of their place in BC and Canadian history, and their unique perspective on their past, present and future foundations in BC society. Indigenous perspectives will be integrated into all aspects of the curriculum and students will be assessed, as with all subject matter in the curriculum, on their understanding of these perspectives (BC Education, 2019).

HSBRIS will support communities who have joined the Coalition of Inclusive Municipalities to report on key indicators within their communities demonstrating their actions and results.

Bioblitz at Porteau Cove, photo: R. Simons

16 Logistic Support Function

The environmental recovery of Átl'ka7tsem/Howe Sound began in the 1970s when health, air quality and water quality studies led to improved government regulations combined with monitoring and the development and enforcement of regulations based on better standards. Átl'ka7tsem/Howe Sound has been a hub for research and a model for environmental recovery since the turn around began.

With many pressures continuing to influence the health of the region, HSBRIS provides ongoing support to existing organizations by: being an information resource; identifying needs to advance objectives; initiating projects; providing human resources; generating funding; acting as a central communications hub; and acting as an ambassador and champion for the region.

Citizen scientists sampling for forage fish eggs, photo: B. Turner

16.1 Research and Monitoring

There is a wealth of information available on Átl'ka7tsem/Howe Sound that informs decision-making. Resources for this work are sourced from provincial and federal governments, non-government organizations, environmental consulting firms, citizen scientists, regional districts and universities.

16.1.1 Existing and Planned Research

Describe existing and planned research programmes and projects as well as monitoring activities and the area(s) in which they are (will be) undertaken in order to address specific questions related to biosphere reserve management and for the implementation of the management plan (please refer to variables in Annex I).

Átl'ka7tsem/Howe Sound Biosphere Region objectives are described in Section 13. The AHSBR Roundtable supported by HSBRIS will address the following questions supported by information and tools as described below. Gaps in information and tools will initiate more research and monitoring as needed:

- **What are the cumulative effects of human activity and their impacts on biodiversity?**
- **How is the region contributing towards the tracking of BC's and Canada's biodiversity objectives?**
- **How well are we managing human activities in the region and their impact on conserved areas?**
- **What are the impacts of climate change on our ecosystems and biodiversity and how are we adapting?**
- **How are the people in the region contributing to Canada's 2030 goals on Sustainable Development? How "in balance" is the region with respect to the applicable SDGs and how healthy is our region?**

The following sources of compiled research, reports and Geographic Information System (GIS) tools inform these questions. HSBRIS will synthesize the information to help inform the bigger picture.

Cumulative Effects: *What are the cumulative effects of human activity and their impacts on biodiversity?*

As described in Section 3.1.3, BC's Howe Sound Cumulative Effects Assessment reports are based on data collected through research and monitoring that include aquatic ecosystems, forest visual quality, grizzly bear, Roosevelt elk, and marbled murrelet. BC intends to use this systematically collated information in making decisions around cumulative effects management in the region. While the reports are indicating recent management strategies are supporting several positive trends, they outline additional considerations for future management

needs. The HSBRIS and the AHSBR Roundtable will support the integration of this and other current information into decision-making for new project developments and advocate for more values to be reported on, particularly marine values.

AHSBR is influenced by growth and development in nearby Metro Vancouver. The cumulative impacts of marine shipping is being studied by Transport Canada and HSBRIS actively participates when the opportunity arises. From environmental assessments, transportation, tourism destination planning and current public input on privately managed forests, the cumulative effects of development on people, communities and the environment need to be adequately addressed (Auditor General, 2015).

Ocean Wise info gathering, photo: R. Simons

Ocean Wise's Coastal Ocean Research Institute (CORI) was established by the Vancouver Aquarium Marine Science Centre to gather and analyze information from diverse sources to assess what is happening in Howe Sound's marine environments. As also described in Section 3.1.3, the Ocean Watch – Howe Sound Edition 2017 and 2020 reports provides a comprehensive synthesis of information and is a valuable resource to understand the current status and trends of important marine ecological values. The report compiles the research and monitoring in the marine environment being undertaken by citizen science, First Nations and science experts, and describes and provides short and long term actions that can be taken (OWHS, 2017).

An Ocean Watch Task Force was formed by local governments as an outcome of one of the Howe Sound Community Forum meetings in 2017. The Task Force was a collaborative group of representatives from locally elected governments, planning staff, NGOs and First Nations who have come together to advance the recommendations in the Ocean Watch - Howe Sound Edition report. HSBRIS is supporting the continuation of this task force and convening the Ocean Watch Action Committee with the launch of Phase 2 of the report that provides an update with a focus on action planning for climate change in Howe Sound's marine environment. To this end, the Task Force has created a common framework and strategic action plan for member local governments is being implemented through their regulatory processes to assist the ongoing recovery of this region. HSBRIS has been instrumental in supporting and moving the actions contained in the plan forward. Examples of HSBRIS led projects that have required research have included development and advocacy for best practices for dock management and recommendations for managing marine debris.

14 LIFE BELOW WATER

The Ocean Wise/Suzuki Foundation's Átl'ka7tsem/Howe Sound marine conservation analysis features a series of maps depicting more than 140 layers of data.

Through computer modelling utilizing the software Marxan, the Átl'ka7tsem/Howe Sound marine conservation analysis shows where marine biodiversity hot spots are and recommends 34 candidate areas for protection and management (David Suzuki Foundation, 2019).

To build on this achievement, the development of the Howe Sound/Átl'ka7tsem Marine Reference Guide (MRG), as described in Section 17.1.7, utilizes the DSF marine conservation analysis data and promotes research, information gathering and specific projects such as eelgrass mapping. The MRG is a mapping tool that also acts as a catalyst for reconciliation as the project generates funding and opportunities for First Nations youth. It integrates Indigenous perspectives with the science and local knowledge of the marine environment in the region. Recommendations from the community and industry lead to research by regulators prior to moving to regulation, as demonstrated in the past with the creation of Rockfish Conservation Areas and Glass Sponge Reef Refuges. Research on glass sponge reefs is continuing today by Fisheries and Oceans Canada. HSBRIS plays a key role in

this project through participation on the Marine Reference Guide steering committee, and in support for research, funding requests and projects (Tides Canada, 2019).

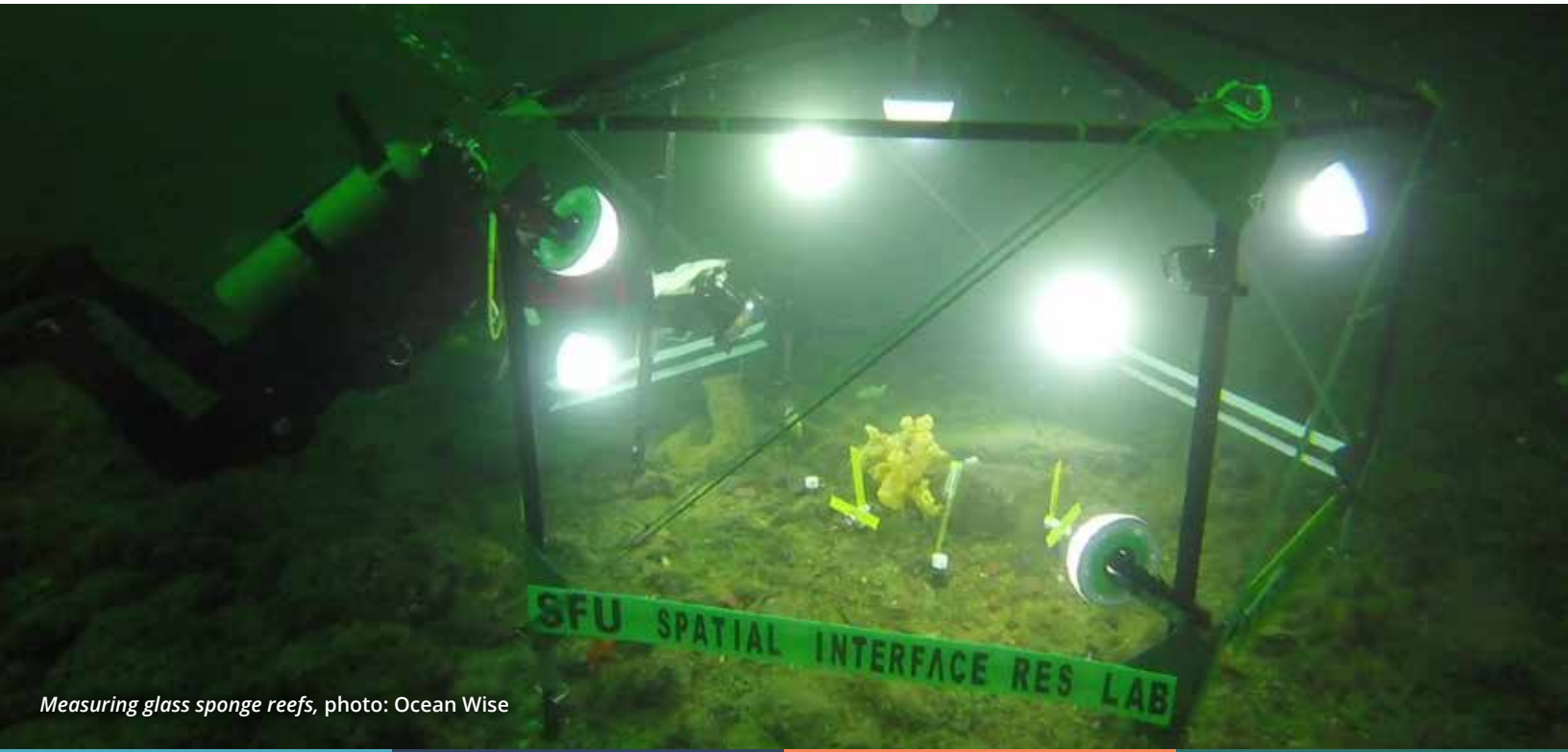
The Stewardship Baseline Objectives Tool (SBOT) is complementary to BC's Cumulative Effects Assessment process as a valuable mapping tool that brings together a wealth of spatial and scientific data on natural resources managed at the provincial level (BC Government, 2019). The SBOT integrates scientific data, management objectives, regulation, policy, land use planning and natural resource expert opinions. The foundational data comes from integrated, science-based resource monitoring available through the Forest and Range Evaluation Program (FREP) and from the Natural Resource Sector Multiple-Resource Value Assessments. FREP data has been collected since 2005 to monitor forest industry compliance to objectives set out under the results-based *Forest and Range Practices Act*. As the manager for public lands in BC, FLNRORD collects FREP data from the natural resources sector to inform decision-making. In addition to FREP data, information is available on fish passage assessment, wildlife populations and fish-sensitive watersheds. The SBOT explores three values for the terrestrial and freshwater ecosystems in Howe Sound, each with indicators that are monitored to assess against objectives defined under the *Forest and Range Practices Act* framework.

The Squamish Nation *XAY Temixw* (Sacred Land) Land Use Plan (2001) provides guidance on values, management objectives and actions that are important to Squamish Nation members. These can be incorporated into a framework for cumulative effects monitoring. A report was completed in 2019 with the support of HSBRIS. The report provides recommendations to move forward with a long-term cumulative effects monitoring program for the Squamish Nation as well as a short-term action-oriented set of tasks (Squamish Nation, 2001).

Biodiversity: *How is the region contributing towards the tracking of BC's and Canada's biodiversity objectives?*

Monitoring of species in the region, particularly for species-at-risk is tracked in the BC Conservation Centre database (see Section 4.2). The monitoring of species is conducted by provincial staff biologists and contracted specialists. Forestry companies are responsible for reporting annual species counts on mountain goat and Roosevelt elk. Overall, biodiversity and ecosystem services are poorly understood with only a handful of species regularly monitored. Province-wide, 46,200 out of 50,000 species have not had their conservation status assessed because basic information, such as provincial distribution, is incomplete or unknown (Molnar, 2015).

Citizen science plays a key role in helping to fill in the data gaps. Bioblitz assessments are conducted on an annual basis and there is ongoing citizen science monitoring that contributes to species identification. In 2019, BC Parks



Measuring glass sponge reefs, photo: Ocean Wise

contracted students through the University of Victoria to conduct Bioblitz work in BC Parks with the help of local citizens.

Building closer ties with one or more of the universities in close proximity to Howe Sound already conducting research supports HSBRIS' objectives a) to advance programs that fill information gaps and b) to provide a central communications hub for collating and maintaining sources of information on research and monitoring results that are essential for supporting researchers and citizen science. Verifying the existence of species in this region is a major management consideration. This central communications hub will support ongoing education programs.

Squamish River Watershed Society, photo: R. O'Grady

Human Impacts: *How well are we managing human activities in the region and their impact on conserved areas?*

With increased visitor use and pressures of development, BC Parks managers struggle to keep up with the resources required to effectively manage parks and conserved areas. Restoration work combined with the impacts of climate change face setbacks through uninformed and unmonitored human use. Several organizations conduct surveys on park experience, and issues are monitored by BC Parks and Conservation Officers who deal with wildlife conflicts. Visitor experience is monitored overall through tourism offices in the region and by Destination BC (refer to Section 15.2).

To address the human impacts HSBRIS supports the organizations working on developing management plans to address the impacts. As the plans develop HSBRIS supports stakeholder engagement to ensure good participation contributes information during updates to annual work plans and works to influence decision-making around activities that threaten the conservation objectives. HSBRIS engages with conservation groups in the region by convening the Howe Sound Conservationists Network. Through the important collaboration of non-government groups focused in their particular communities, conserved areas needing more research and monitoring are identified. HSBRIS partners with BC Parks and engages volunteers in projects such as invasive species pulls, bio blitz', education, signage and maintenance.

HSBRIS representatives participate on a variety of committees and workshops to help shape future conservation and protection efforts. As knowledge holders, ambassadors and champions for the region, we serve as a hub to support 'boots on the ground' efforts of the various groups.

Climate Change: *What are the impacts of climate change on our ecosystems and biodiversity and how are we adapting?*

The consequences of a changing climate are being experienced with drier periods resulting in water shortages, forest fires and more intense storms that lead to storm surges, flooding and erosion. Current studies are noting the impacts on climatic zones and BC is tracking changes in partnership with the Living Lab Program. The mission of the Living Lab Program is to encourage climate change research in protected areas in order to document changes in BC's natural world with a view to incorporating predicted changes into management plans for parks and other provincially managed areas (BC Parks, 2019d).

The Living Lab Program promotes BC's protected areas as places to learn about the effects of climate change, how to manage for these effects, and how to apply this information to management actions and decision-making. The program encourages research in protected areas through partnerships with academic institutions and their collaborative work with the broader conservation community.

Monitoring in the Squamish estuary, photo courtesy of the Squamish River Watershed Society.

Science organizations focused on marine issues are studying the effects of climate change on various species. Because rises in water temperature are a major concern for the health of the Howe Sound ecosystem, temperature monitors are being placed on glass sponge reefs. The annual mixing of cooler fresh water with sea water is vitally important to the phytoplankton that feed the many species in the chain.

Although there are various studies on climate change impacts on Átl'ka7tsem/Howe Sound, it is essential to have preventative actions that citizens and local governments can take to further prevent a warming planet, and to adapt these actions over time for enhanced resilience. HSBRIS can provide support to help local governments meet their commitments to greenhouse gas reduction targets at the local level and support organizations aimed at informing the public about adaptation and the transition to a low carbon economy. Communities around the Sound have local groups supporting transition and these groups will benefit from the coordination efforts that HSBRIS can offer.

Striking Balance: *How are the people in the region contributing to Canada's 2030 goals on Sustainable Development? How "in balance" is the region with respect to the applicable SDGs and how healthy is our region?*

Four community foundations are located within the region: West Vancouver, Bowen Island, Squamish, and the Sunshine Coast. Each conduct surveys and research on specific local social metrics in health, education, employment and other key areas that measure community vitality. These valuable local metrics can then be used to support evidence-based, locally-relevant solutions to improve the quality of life in different communities. Vital Signs Reports and Vital Conversations are used by residents, businesses, community organizations, universities and colleges, and government leaders to take action and direct resources to where they will have the greatest impact. Collating the metrics from the individual communities and aligning these results with the 17 Sustainable Development Goals provides an overall picture of the health within the region.

Sustainable Development Goals, photo: R. Simons

In collaboration with the BC Council for International Cooperation (BCCIC), HSBRIS has convened SDG forums/ workshops and contributes to the tracking on the Movement Map and reporting back to communities. BCCIC, a membership-based organization made up of interested individuals, international development organizations and practitioners, and BC civil society groups, is a network that engages in sustainable development and social justice work. It works on liaison work on the UN's sustainable development goals, specifically in terms of public engagement, capacity building, networking, policy and representation, research, and youth engagement (BCC, 2019).

HSBRIS project plans include researching and enhancing multi-stakeholder efforts by promoting partnerships and bridging efforts across sectors in support of Canada's Agenda 2030. Projects include: raising awareness and support for the 2030 Agenda in the region; ensuring that Howe Sound's progress on the 2030 Agenda leaves no one behind, including vulnerable or marginalized groups; and fostering and integrating Indigenous and local knowledge into approaches and efforts to achieve the 2030 Agenda. (Towards Canada's 2030 Agenda National Strategy)

Information attained through these projects will be used as a resource and teaching tool in the community and for youth, and help direct action towards striking balance on issues that matter to people's lives.

16.1.2 Summarize past research and monitoring activities related to biosphere reserve management

(please refer to variables in Annex I)

Research and monitoring is ongoing in the region involving close collaboration among First Nations, local governments, universities, private developers and environmental consulting firms.

The monitoring has focussed primarily on abiotic factors, including measuring air quality, sunlight/temperature, wind and water and are undertaken for the region by Environment Canada, the BC Ministry of Environment and regional governments. Permanent monitoring stations for air quality are located in three locations in the region, and an Environment Canada weather monitoring station has long been established at Pam Rocks in the centre of Howe Sound. Wind is also monitored at the Squamish Airport.

Site specific monitoring of pollutants, erosion and water quality are conducted by local governments and industry. The information collected is reported to governments to ensure regulation standards are being met. Industry and government have a responsibility to ensure safety and health in the region but citizens play an important role in reporting areas of concern where monitoring may not be managed effectively.

Since the 1970's, water quality standards and regulations have greatly improved and targeted industrial pollution sources from mining and pulp and paper mills. Local governments are responsible for monitoring drinking water and public swimming areas. Erosion is a concern for public safety and oceanfront properties. Agencies responsible for public transportation are monitoring and repairing the steep cliffs and highway drainage to ensure runoff is flowing effectively. Research is underway within Fisheries and Oceans Canada on the effects of pollutants from cars draining into the marine environment.

Opportunities for improving monitoring and subsequent decision-making will increase opportunities for maintaining biodiversity in the region. With a number of Run-of-the-River electricity generation projects on creeks and rivers in the region, the effectiveness of controls used to maximize production while managing the safety of fish is an important balance. HSBRIS provides support to

organizations raising the awareness of monitoring and decision making gaps.

With respect to the monitoring of biodiversity, the use of Bioblitz efforts and technologically advanced tools enable more people to become engaged in researching and monitoring the region's vast biodiversity. The Monitoring and Research MAB directory (Annex I) lists the species applicable to the region in addition to those not listed such as the glass sponge reefs. The Howe Sound Research Group of the Vancouver Aquarium has been researching

Monitoring in Howe Sound, photo: R. Simons

and monitoring specific marine life in the region for over 40 years. Fisheries and Oceans Canada past and present have been making observations and conducting research in the Átl'ka7tsem/Howe Sound area, with a recent focus on the study of Fraser River sockeye salmon, glass sponge reefs and sea star wasting disease.

As mentioned in 16.1.1, community Vital Signs reports track how well communities are performing in order to improve quality of life. Vital Signs reports are a compilation of data and community research around key socio-economic issues and are used to measure the vitality of our communities. Community foundations gather data and write Vital Signs reports to spark conversation about significant social and economic trends to tell the story of how Canadian communities are faring in key quality-of-life areas. Vital Signs reports may focus on a single topic, or they may be longer and provide oversight to a broad range of community themes and issues.

In regards to integrated monitoring, the annual Resource Stewardship Report from the FLNRORD Assistant Deputy Minister's summarizes the results of resource management effectiveness evaluations, inclusive of the Forests and Range Evaluation Program results (FLNRORD, 2017). It provides recommendations to improve on the ground resource management practices and decision-making. This report's purpose is to provide a provincial scale status report that will inform decision-making among those who manage British Columbia's natural resource values on behalf of the public. Fisheries and Oceans Canada's Integrated Fisheries Management Plan (IFMP) provides a common understanding of the basic rules for the sustainable management of the fisheries resource, especially salmon on the south coast (DFO, 2019c). HSBRIS strives to catalogue all the available reports related to integrated monitoring that apply in the region.

16.1.3 Indicate what research infrastructure is available in the proposed biosphere reserve and what role the biosphere reserve will play in supporting such infrastructure.

The Fisheries and Oceans Canada Pacific Science Enterprise Centre (PSEC) is located on the waterfront in the West Vancouver area of AHSBR. This world-class institute actively advances scientific knowledge and is a hub of innovation and collaboration with multiple community partners such as University of British Columbia and Ocean Wise. Located on the site of a former cannery, PSEC opened as a marine research centre in the early 70s. More recently, Fisheries and Oceans Canada has established the Environmental Science Academy in partnership with the West Vancouver School District. Conveniently located near a freshwater creek, the Fraser River and good transportation access, the centre is a hub of research activity. Its plastics lab located within PSEC studies the effects of micro-plastics on the marine environment. Fish hatcheries are located on Bowen Island and in Squamish. These facilities provide salmon enhancement, monitoring, stream keeping and education.

Howe Sound is easily accessible by land and by water from Metro Vancouver. Staff from the Vancouver Aquarium's Howe Sound Research Group and researchers from University of British Columbia, one of the world's top research universities, regularly access the Átl'ka7tsem/ Howe Sound area for their project work. In addition, Capilano, Simon Fraser and Quest universities champion a broad range of research activities in the region.

16.2 Education for Sustainable Development and Public Awareness

Átl'ka7tsem/Howe Sound has been a hub for environmental education for youth for over 50 years, where each year about 22,000 students experience environmental education with the Sound as the classroom (OWHS, 2017). The Átl'ka7tsem/Howe Sound area hosts the largest regional cluster of summer camps, outdoor schools, and environmental programs in BC. Many more people, young and old, meet and learn about nature through the region's schools and universities, local community groups and commercial ecotourism throughout the Átl'ka7tsem/Howe Sound region. This outdoor learning significantly benefits from proximity to Vancouver and the diverse geography and ecology that Átl'ka7tsem/Howe Sound offers.

Being located close to the urban area of Metro Vancouver with access to a number of universities has facilitated the delivery of education about sustainable development on many levels. The city of Metro Vancouver hosts many educational sessions for the public such as sustainability dialogues and community breakfasts. Many organizations within the region have been formed to educate and engage local citizens on transition to sustainable ways of living. Local citizens taking action provide ways for the public to engage as volunteers at a community level and as individuals.

Within the region, there have been many programs related to sustainable development and outdoor education for students and the public. The Sea-to-Sky Outdoor School for

Learning about salmon at the Cheakamus Centre, photo courtesy of Cheakamus Centre

Sustainability Education is a camp for youth that has been operating in the region for over 25 years. Established in 1969, its Cheakamus Centre is an overnight environmental education facility located on 165 ha of ecological reserve near Squamish, BC. The Centre is owned by the North Vancouver School District and offers a wide variety of experiential environmental educational programs to children and adults from the Sea-to-Sky Corridor, Metro Vancouver and beyond. Its renowned overnight field school and cultural programs include nature-based and outdoor activities tied to the new BC education curriculum. Educational program offerings also include youth leadership, recreation, and other hands-on experiences intended to instill in young learners a sense of respect and appreciation for the natural world.

HSBRIS has a valuable working relationship with Simon Fraser University's Institute for Environmental Learning and is working with its founder and current director, Dr David Zandvliet, in support of his nomination as UNESCO Chair in Bio-Cultural Diversity Education. Since the founding of this institute in 2010, it has been responsible for substantive progress in advancing the field of environmental learning in BC. Students from the Institute were engaged in field studies in the Átl'ka7tsem/Howe Sound area in August 2019 in conjunction with AHSBR as the first in a series of activities undertaken as part of this collaborative partnership.

AHSBR has also been actively engaged for over four years with the EarthWorks program at Capilano University, a multi-faculty initiative aimed at educating and inspiring greater understanding of complex environmental issues among students and the local community in order to build awareness and action. HSBRIS has been exploring opportunities within the region with faculty and the Dean of the Faculty of Arts and Sciences at Capilano University. Capilano University has expressed its commitment to collaborate with HSBRIS to explore novel educational opportunities, including place-based experiential learning and applied research.

Quest University located in Squamish aspires to integrate principles of environmental sustainability into every facet of the University.

As noted above, HSBRIS collaborates on SDG education forums within the Átl'ka7tsem/Howe Sound region with BCC, the Council for International Cooperation network in BC, that champions a range of initiatives related to the SDGs in the province.

16.2.1 Describe existing and planned activities, indicating the target group(s) and numbers of people involved (as "teachers" and "students") and the area concerned.

Local community groups also play a role as important environmental educators. They conduct interpretive hikes and other outdoor activities for the public throughout the year. Each winter the Eagle Watch programs and Bald Eagle Festival are held to help thousands view and learn about the yearly return of eagles to the Squamish Area. Cheakamus Centre hosts a community open house to share outdoor environmental learning with is 2000 annual visitors (OWHS, 2017).

Quality education

Átl'ka7tsem/Howe Sound's diversity of wild spaces and proximity to Metro Vancouver make it an ideal outdoor classroom. In 2015, five outdoor school programs brought over 15,000 elementary and secondary school students to Howe Sound from the Vancouver Region and the Sea-to-Sky Corridor. Public secondary and elementary schools in Squamish, Lions Bay, West Vancouver, North Vancouver, Bowen Island, Langdale and Gibsons, as well as a private school on Bowen Island, use their school sites and nearby forests and shores to teach a variety of natural science subjects.

Outdoor learning,
photo courtesy of Squamish River Watershed Society.

First Nations cultural and spiritual heritage are subjects taught through various educational programs in current curriculum programs. Recently, the BC Government has placed much higher priority on integrating First Nations Principles of Learning across the curriculum. First Nations, either inhabiting or using Átl'ka7tsem/Howe Sound since time immemorial, have been educating their children to become immersed in the local environment. The *Skw'une-was* Program at Cheakaumus Centre has shared the traditional practices of First Nations people since 1986 through its overnight programs at the Coast Salish Big House. Students engage in traditional long house life, eating traditional foods cooked over open fires, hearing local legends and traditional songs, and learning about traditional ceremonies, medicinal plants, basket-weaving and carving.

In Sea to Sky School District 48, *Aya7ayulh Chet* (Cultural Journeys) is a Kindergarten to Grade 6 program of choice guided by the principle that all learning is grounded in understanding the connected relationship of Language, Land and Culture. In this program, students learn to respect a shared worldview of environmental livability and sustainability related to their physical, emotional, spiritual and intellectual learning.

The Squamish River Watershed Society (SRWS) engages with over 20 schools, colleges and universities, both local and international and over 1,500 youth each year. Numbers for public programs and special events would be approximately 600 people. SRWS alone provides these regular opportunities through its annual elementary school outreach program, workshops and events.

The Nicholas Sonntag Marine Education Centre in Gibsons BC has 30 exhibits from the waters of Howe Sound including a collect-and-release program and interactive displays. These facilities that provide school education programs are located at the Gibsons Public Market to which many visitors are attracted annually.

The Marine Life Sanctuaries Society is an NGO that provides beach interpretation at locations around the region. It's public events bring people into contact with marine life that divers collect and then release, augmented by science education delivered through informative displays and pamphlets.

HSBRIS is connecting with field schools in Howe Sound organized by universities to share information about the

Learning at Nicholas Sonntag Marine Science Centre, photo: NSMSC

Biosphere Region. Numerous opportunities to engage students from these field programs in projects that advance the objectives of AHSBR ranges are generated, such as connecting to volunteer 'boots on the ground' projects for restoration, monitoring and educational projects.

16.2.2 What facilities and financial resources are (or will be) available for these activities?

Many of the facilities that provide shelter for outdoor learning have been in place for over 40 years, the YMCA Camp Elphinstone has been operating in West Howe Sound for over 100 years. There are 12 youth camps funded by private organizations and foundations and school districts. Financing is provided through taxes, individual donations and contributions from private foundations. The camps are a lasting legacy for those people who had the vision of protecting a place where youth can connect with nature.

In addition to the existing camp facilities and those mentioned in 16.1.3 and 16.2.1, private enterprises such as the Brackendale Art Gallery has been a hub for the arts since the 1970s and the annual eagle watch and count as Brackendale is known as the World Eagle Capital for wintering Bald Eagles. The facility has been a social enterprise and a community hub known for hosting meetings, workshops and educational events with a conservation focus. The gallery's owners will leave a legacy that will not be forgotten as an important part of the region's past.

The Britannia Mining Museum is a National Historic Site. The Museum promotes mining awareness through entertaining, experiential education programs, historic collection preservation and insightful public engagement.

Squamish River Watershed Society, photo: R. O'Grady

Governed by the non-profit Britannia Mine Museum Society, the museum allows guests to leave with a better understanding of mining in BC and the impacts the mine had on Howe Sound past, present and future.

The list of organizations contributing to research, monitoring and education in the region is long, and includes a combination of government, for profit and non-profit organizations, each with their own funding challenges. Two to three private foundations have focused their giving on the marine environment of Howe Sound and have been generously granting funds toward the research, tools and reporting. HSBRIS is the only established organization representing the AHSBR. With contributions from various NGO's and funders, the work to date has been funded through donations, consulting fees and by sharing resources with partners and grants (see Section 17.4.11).

In 2018, the Howe Sound Biosphere Region Fund was established with the West Vancouver Community Foundation. HSBRIS' long-term goal is to build a Átl'ka7tsem/Howe Sound Biosphere Region endowment fund as a legacy to sustain the management of a UNESCO Biosphere Reserve for generations into the future. Leaving a lasting contribution to sustain an Átl'ka7tsem/Howe Sound UNESCO Biosphere Reserve that works to conserve biodiversity, demonstrate sustainable development and build the local community's capacity to deal with human and environmental issues in this region, would appeal to the many who have worked hard in the past to Save Howe Sound for future generations.

16.3 Contribution to the World Network of Biosphere Reserves

On the invitation of the Canadian Commission for UNESCO, AHSBRI has been represented as a prospective Biosphere Reserve at every opportunity. HSBRIS attendance at EuroMAB 2019 in Dublin, Ireland was the first exposure to the network outside of Canada. HSBRIS is committed to ongoing participation at these events and will expect to build its understanding of the ways in which it can most effectively contribute to this valuable network by sharing best practices related to Biosphere Region management. Members of AHSBRI have also attended two Canadian Biosphere Reserve Network gatherings plus the 2018 UNESCO AGM in Ottawa. HSBRIS is committed to continued participation and contributing to the network aiming one day to play host to the Canadian Biosphere Reserve Network. The future HSBRIS staff member serving in the

capacity of Executive Director will actively participate in the UNESCO World Network of Biosphere Reserves and act as a liaison between HSBRIS and the other members of the network.

16.3.1 How will the proposed biosphere reserve contribute to the World Network of Biosphere Reserves, its Regional and Thematic Networks?

Canada is one of only six countries globally with a fjord coastline, along with Norway, Chile, New Zealand, Denmark (Greenland) and the United States (Alaska). Biosphere Reserves currently exist in only three of these fjord environments: Glacier Bay-Admiralty Island in Alaska, Northeast Greenland and, to a more limited extent, Cabo de Hornos in Chile. These are all remote locations with significant access challenges, whereas Átl'ka7tsem/Howe Sound is one of the most southerly fjords in the northern hemisphere, and *is unique in the world* being in such close proximity to a large urban centre. Being immediately adjacent to Vancouver and easily accessible to all those in this cosmopolitan city, Átl'ka7tsem/Howe Sound is in an ideal position to represent fjord environments facing the challenges of urban encroachment in the World Biosphere Reserve Network. Additionally, HSBRIS is well placed through its history and broad base of stakeholder support to promote UNESCO's MAB Programme to a large and diverse audience and to demonstrate the effectiveness of the designation in facilitating a harmonious relationship between man and nature over time.

As a coastal Biosphere Reserve facing the challenges of sea level rise, sharing its impact assessments and remedial action plans for climate change impacts on coastal communities is a contribution that HSBRIS can make to the World Network of Island and Coastal Biosphere Reserves. Sharing its research results, monitoring assessments and adaptation/mitigation actions would be of value for understanding the nature of these impacts and predicting the magnitude of risk.

Reconciliation with First Nations and supporting the revival of Indigenous languages in the region is an issue that Átl'ka7tsem/Howe Sound has in common with other Canadian Biosphere Reserves. There is an opportunity for the Squamish Nation members in this region to participate in the Indigenous Circle that has been convened by CCUNESCO.

16.3.2 What are the expected benefits of international cooperation for the biosphere reserve?

The international network presents many opportunities for those that choose to take advantage of them. HSBRIS would expect the connection internationally between Indigenous groups to be greatly beneficial to First Nations in the region. There is currently interest from Indigenous groups in the Pacific Rim and South America looking to the Squamish Nation's lead with conducting their own environmental assessments. The Nation is setting an example of how to assert their rights and title while generating jobs and sharing in the resource economy.

Many of the private enterprises in the region conduct business internationally and rely on their sector networks such as tourism, film, forestry and others for reaching their potential markets. The international recognition derived from being a model region for sustainable development would bring opportunities for exchange of ideas and best practices. We expect for profit and non-profit organizations alike will benefit from connections made through the international network where mutual interests align around UN programs that support Sustainable Development Goals, climate change, Indigenous languages and biodiversity conservation.

Only 45 minutes from the Vancouver International Airport, AHSBR is well positioned to attract groups from other Biosphere Reserves. Once in the Átl'ka7tsem/Howe Sound region, BC Ferries will transport travellers to Vancouver Island providing access to the Mt. Arrowsmith Research Institute and the Mt. Arrowsmith Biosphere Reserve (MABR). A drive through the MABR across to the west coast of Vancouver brings one to the Clayoquot Sound Biosphere Reserve.

Field schools for international universities is currently an area for future attention. Also, HSBRIS has hosted visiting students in interdisciplinary social and environmental justice programs from the United States for the past three years. With four universities either in or in close proximity to the AHSBR, the intention is to develop further relationships for field school opportunities.

16.4 Internal and External Communication Channels and Media used by the Biosphere Reserve

Good communications are essential to effective teamwork. A shared online database has been established internally among the AHSBRI Working Group members and the Board of Directors. Team members are given access to all documents, action plans and news.

The HSBRIS website provides updates to the public, and a short video about the initiative communicates its vision. E-mail communications are most frequently used for reaching donors and subscribers. Many in-person meetings, public presentations around the region and presentations by invitation have taken place to date. The local media, mostly newspapers and online news sources, have referenced the initiative, and it was cited in the book about Howe Sound entitled Whale in the Door published in 2017.

16.4.1 Is there a biosphere reserve website?

Yes, HSBRIS has had an active website for several years. It is subject to continuous improvement to ensure content is current and as impactful as possible. The website URL is: http//www.howesoundbri.org.

16.4.2 Is there an electronic newsletter? If yes, how often will it be published?

An electronic newsletter from HSBRIS started to be sent out to subscribers prior to the completion of this nomination and continues every three months.

16.4.3 Does (will) the biosphere reserve belong to a social network (Facebook, Twitter, etc.)?

The HSBRIS Facebook page is the most utilized form of social media. AHSBR also has Instagram and Twitter accounts. In addition, HSBRIS has a YouTube channel where videos related to UNESCO MAB and Átl'ka7tsem/ Howe Sound are posted and linked from the HSBRIS website. The videos on the channel have been a central part of the initiative's digital storytelling strategy.

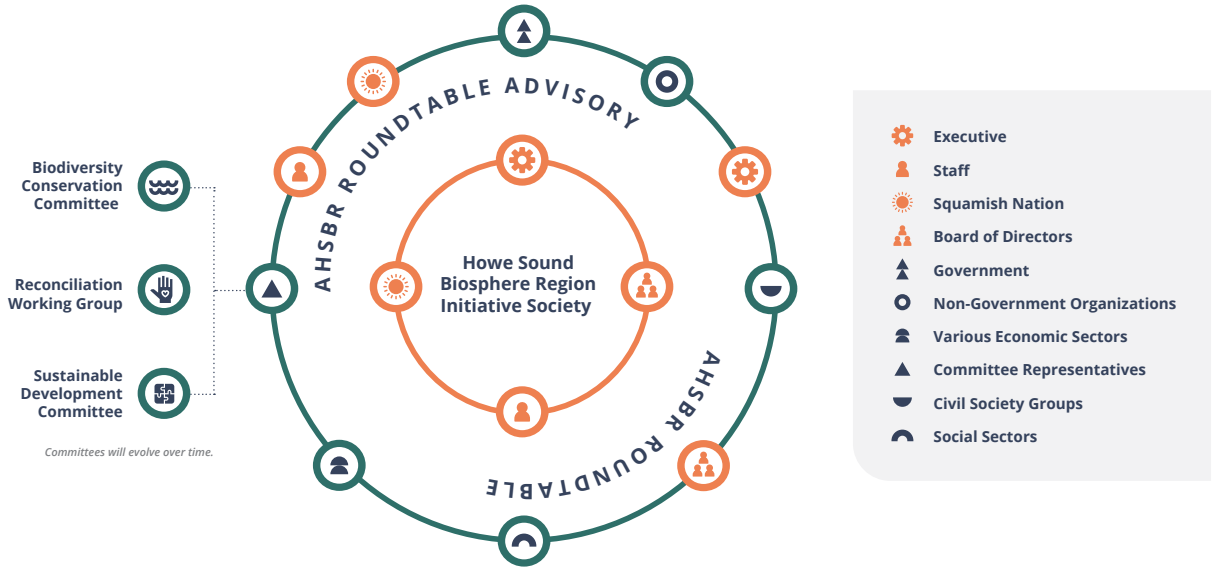
Visiting students from Roosevelt University, photo: B.Barratt

Howe Sound Community Forum, photo: K. Hemmelgarn

17 Governance, Biosphere Management and Coordination

17.1 Management and Coordination Structure

The Howe Sound Biosphere Region Initiative Society (HSBRIS), a registered non-profit organization, will assume responsibility for the management and coordination of the Átl'ka7tsem/Howe Sound Biosphere Reserve (AHSBR). Members of the HSBRIS Board and participants in the AHSBR Roundtable will be a balanced representation of First Nations, federal, provincial and local governments, various commercial sectors and civil society.



Howe Sound Biosphere Region Initiative Society (HSBRIS), Átl'ka7tsem/Howe Sound Biosphere Region (AHSBR) - advisory to HSBRIS.

17.1.1 What is the legal status of the biosphere reserve?

Once established, the AHSBR will have no statutory or legally binding status in relation to Canadian or British Columbian law. In accordance with the Statutory Framework for the World Network of Biosphere Reserves, requiring at least one legally protected Core Area and an adjacent Buffer Zone, such areas have been established and incorporated into AHSBR. The legal status of these and other lands and marine waters in AHSBR is summarized in 17.1.2 below.

17.1.2 What is the legal status of the Core Area(s) and the Buffer Zone(s)?

The AHSBR encompasses two primary categories of lands and waters, those in the public domain (Public land) and those municipally held. The Province of British Columbia asserts legal administrative authority over all land and seabed land under marine waters in AHSBR's Core Areas and Buffer Zones, as outlined in Section 17.1.3 below, with one exception: the District of West Vancouver is the legal administrative authority and manager of the Buffer Zone lands adjacent to Cypress Provincial Park. The Government of Canada asserts legal administrative authority over marine waters in the water column above provincial seabed.

All of the AHSBR region is located within the Squamish Nation's unceded territory and its inherent jurisdiction according to their own laws. These lands have been used and occupied since time immemorial.

17.1.2.1 Core Areas

The Legal Status of Protected Lands and Marine Waters in the Core Areas

Protected Area	Legislation
Garibaldi Provincial Park	*BC Park Act*
Cypress Provincial Park	*BC Park Act*
Tetrahedron Provincial Park	*BC Park Act*
Pinecone-Burke Provincial Park	*BC Park Act*
Tantalus Provincial Park	*BC Park Act*
Este-Tiwilh/Sigurd Creek Conservancy	*Protected Areas of British Columbia Act*
Howe Sound Glass Sponge Reef Marine Refuges	*Canada Fisheries Act*

17.1.2.2 Buffer Zones

The Legal Status of Land and Marine Waters in the Buffer Zones.

Provincial Public Land Areas	Legislation
Forested and non-forested Public lands adjacent to designated Public lands	*BC Forest and Range Practices Act*
Wildlands	*BC Forest and Range Practices Act*
Resource Exclusion Areas	*BC Forest and Range Practices Act*
Protected Lands	*Protected Areas of British Columbia Act*
Municipal Land Areas	**Legislation**
Lands adjacent to Cypress Provincial Park zoned CU2 and Limited Use and Recreation Development Permit Area UL9	Municipal and Regional governments under the *BC Local Government Act* and the *Community Charter*
Marine Areas	**Legal Status**
Rockfish Conservation Areas and Howe Sound Glass Sponge Reef Marine Refuges	*Canada Fisheries Act*

Future of Howe Sound Forum 2013, photo: L. Johnson

17.1.3 Which administrative authorities have competence for each zone in the biosphere reserve (Core Area(s), Buffer Zone(s) and Transition Area(s))?

Administrative Authorities in the Core Areas, Buffer Zones and Transition Areas

Core Areas	
Provincial Parks	BC Parks, under the jurisdiction of the Ministry of Environment and Climate Change Strategy
Provincial Conservancy	BC Parks, under the jurisdiction of the Ministry of Environment and Climate Change Strategy
Howe Sound Glass Sponge Reef Marine Refuges	Fisheries and Oceans Canada
Buffer Zones	
Crown Forest Land Base, Resource Exclusion Areas, Provincial Parks	BC Parks, under the jurisdiction of the Ministry of Environment and Climate Change Strategy and Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Rockfish Conservation Areas and Howe Sound Glass Sponge Reef Marine Refuges	Fisheries and Oceans Canada
Transition Areas	
Ecological Reserve	BC Parks, under the jurisdiction of the Ministry of Environment and Climate Change Strategy
Wildlife Management Area	Environmental Stewardship Division, under the jurisdiction of the BC Ministry of Environment and Climate Change Strategy
Resource Exclusion Areas, Spatially Managed Areas and Wildlands, Crown Forest Land Base	BC Ministry of Forest, Lands, Natural Resource Operations and Rural Development (FLNRORD)
Marine waters of Howe Sound	Fisheries and Oceans Canada and Transport Canada
First Nations Reserves	Squamish Nation and Aboriginal Affairs and Northern Development Canada (AANDC) held in trust for the Squamish Nation
Private Lands	Municipal and Regional governments under the *BC Local Government Act* and the *Community Charter* and the Islands Trust under the *Islands Trust Act*
Provincial Marine Parks	BC Parks, under the jurisdiction of the Ministry of Environment and Climate Change Strategy

17.1.4 Clarify the respective competence of each of these authorities. Make a distinction between each zone if necessary and mention any decentralized authority.

Responsible Authority	Jurisdictional Competence
Core Areas	
First Nations	• Collaborative management agreement with BC Parks for the management of *Este-Tiwilh*/Sigurd Creek Conservancy.
BC Parks	• Authority under the *BC Park Act* for all affairs related to the planning, management and enforcement of regulations in provincial parks.
Fisheries and Oceans Canada	• Authority under the *Canada Fisheries Act* and the *Oceans Act* to manage all matters in the water column relating to fisheries and ocean management, including enforcement of regulations under both pieces of legislation.
Buffer Zones and Transition Areas	
BC Parks	• Authority under the *BC Park Act* and the *Ecological Reserves Act* for all affairs related to the planning, management and enforcement of regulations in provincial parks and ecological reserves.
BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD)	• Responsible for the stewardship of provincial Public land and natural resources under the *Forest and Range Practices Act*, and for the protection of BC's archaeological and heritage resources under the *Heritage Act.*
Local Governments	• Manage use of private lands and municipal parks within municipalities and regional districts under the *BC Local Government Act*, the *Community Charter* and the BC Islands Trust under the *Islands Trust Act.*
Owners of Private Conservation Lands	• The Islands Trust Conservancy manages Nature Reserves, Sanctuaries and Covenants on private lands under the *BC Islands Trust Act.*
Canadian Wildlife Service, Environment and Climate Change Canada	• Manages Christie Islet Migratory Bird Sanctuary (private land) under the *Canada Migratory Birds Convention Act.*
Fisheries and Oceans Canada	• Manages fisheries sustainably, including Rockfish Conservation Areas, supports Indigenous participation and manages national network of harbours under the *Canada Fisheries Act* and the *Fishing and Recreational Harbours Act*; • Under the *Oceans Act*, protects oceans, freshwater and aquatic ecosystems and species from negative impacts and invasive species; • Maintains waterways and navigational aids to ensure safety for all mariners; and • Responds to maritime incidents such as search and rescue and environmental emergencies.
Aboriginal, Affairs and Northern Development Canada	• Indian Reserves are created under *Canada Indian Act,* and in AHSBR are set aside for the exclusive use of the Squamish Nation. The lands remain owned by the federal Crown and are held in trust for the use and benefit of the First Nation.

17.1.5 Main Land Tenure (Ownership) for Each Zone

The main land tenure for Core Areas and Buffer Zones is provincially-owned Public land. Buffer Zone lands adjacent to Cypress Provincial Park are both provincial Public and municipally owned. Transition Areas include provincial Crown, municipal, First Nations reserves, and private land.

17.1.6 Is there a single manager/coordinator of the biosphere reserve or are several people in charge of managing it?

If one manager/coordinator, who designates and employs him/her (national authorities, environmental administrative agency, local authorities)?

There is no one single manager/coordinator governing the region. Any site-specific changes, whether through policy or conservation action, will be enacted by the appropriate land management organization as described above (e.g., First Nations, BC Parks, FLNRORD, municipal governments or NGOs) through their own decision-making processes.

Howe Sound Biosphere Region Initiative Society (HSBRIS) Is responsible for managing the strategic direction and planning for the Biosphere reserve.

17.1.7 Are there consultative advisory or decision-making bodies (e.g., scientific council, general assembly of inhabitants of the reserve) for each zone or for the whole biosphere reserve? If yes, describe their composition, role and competence, and the frequency of their meetings.

The AHSBR Roundtable established by HSBRIS would be considered the most inclusive and representative body that would advise the direction of the Biosphere Reserve. The participants invited to the Roundtable would be representative of the various locations and sectors in Átl'ka7tsem/ Howe Sound. A committee of HSBRIS is tasked to ensure balanced representation and invited participants agree to the Terms of Reference (see Appendix G). The role of participants is to provide advice and guidance to HSBRIS in order to: advance biodiversity conservation in the region's marine and terrestrial ecosystems; advance sustainable development in line with the UNESCO's Man and the Biosphere Program and the UN's Sustainable Development Goals; and advance reconciliation in recognition of UNDRIP. And, to support development and implementation of AHSBR's objectives and projects that support those objectives.

The AHSBR Roundtable will be convened twice a year and additional working groups may be struck.

There are numerous consultative advisory and decision making bodies in the region. Representatives from the following groups and ones established in the future will participate at the AHSBR Roundtable.

Official opening of the Sea to Sky Marine Trail , photo: G. McKeever

17 PARTNERSHIPS FOR THE GOALS

The Howe Sound Community Forum (HSCF) is a body of elected representatives from the ten local governments, Squamish Nation and three regional districts that was formed in 2000 around Principles for Cooperation.

The HSCF's purpose is "to provide a forum for local governments, Regional Districts and First Nations discussions to maintain and enhance the economic, environmental and social wellbeing of Howe Sound for the benefit of present and future generations" (Appendix G). Meetings take place twice per year and the role is to share information relevant to the region, build cooperation and relationships.

The Ocean Watch Task Force formed to move forward strategic actions items contained in the the 2017 Ocean Watch Report specific to Howe Sound.

The Marine Reference Guide (MRG) leadership team and Steering Committee work to improve marine ecosystem health in Átl'ka7tsem/Howe Sound by advancing marine habitat protection and restoration, and collaborative ecosystem-based management that effectively integrates human values (e.g. culturally important areas) with ecological systems (see Section 4.3). The MRG brings together scientific, Indigenous, and local knowledge into a decision-support tool that can identify areas of high ecological and human-use value. The MRG consists of an interactive map accompanied by narrative documentation, education resources, and media. It is a unified resource on marine data for planning and decision-making by all levels of government and community groups, and for supporting collaborative management and stewardship of the region's marine ecosystems. The information will be openly accessible, subject to privacy concerns, and is intended to be used by governments (local, provincial, First Nations, and federal) to support zoning and marine planning, official community planning, and by community groups to strategize stewardship and education initiatives. Data collection for the Marine Reference Guide involves workshops, meetings, interviews, field work, and surveys from a body of representatives from various sectors, including First Nations, industry, recreation, conservation, business and government, with a focus on development of information and narratives related to the marine and freshwater areas of the region.

AHSBR encompasses portions of numerous districts that converge in Howe Sound and extend beyond the borders of the Biosphere Reserve. The terrestrial Core Areas are

Future of Howe Sound Forum, photo: L. Johnson

co-managed by BC Parks with First Nations. Annual Park Management meetings set priorities. Communications and meetings with other Provincial agencies and other stakeholders regarding impacts and potential activities near the park are ongoing.

Lands in the terrestrial Buffer Zones managed by the Provincial agencies depend on professional relationships with various organizations. Legislation requires public advertising of operating plans and proposals under both the *BC Forest and Range Practices Act* and *Land Act*. In addition to public review, there is extensive consultation with First Nations, stakeholders, other ministries, local governments, and agencies. Applications for use of Public Land go through an approval process ongoing throughout the year. Decision makers engage and build relationships with First Nations, stakeholders, local governments on any issue at any time.

Lands in the Transition Areas fall under the jurisdictions of three regional governments: Metro Vancouver, the Sunshine Coast Regional District and the Squamish Lillooet Regional District, as well as the Squamish Nation and the Islands Trust. Representatives from each of the municipalities and rural areas within the regions and the Islands Trust meet regularly, and the Squamish Nation Council has representation from the Squamish area. Regional Growth plans and Official Community Plans are developed and sent for referral to neighbouring regions, First Nations and government agencies, before being approved and filed with the BC Government.

In the terrestrial Transition Area there have been many advisory committees convened within the region around specific issues. These include the Invasive Species Councils, Sea to Sky Clean Air Society's strategic planning for management of the airshed, the Socio-economic Forum and the Science and Knowledge holders workshops in developing the Ocean Watch reports. The consensus based decision-making of these various bodies, and associated consultation processes, influence higher-level decision making. The term of these bodies varies according to their specific purposes. There are frequent short-term working groups established depending on the issue.

The marine Core and Buffer Zones are managed by Fisheries and Oceans Canada. An advisory process was developed with Indigenous groups and stakeholders to establish the Glass Sponge Reef Marine Refuges in Howe Sound. A broader consultation process was developed for the identification of Rockfish Conservation Areas in the 2000s. The Squamish Lillooet Sport Fishery Advisory Committee was established as an advisory body to provide advice on recreational fishing issues to Fisheries and Oceans Canada in the region; this group meets at least twice a year.

17.1.8 Has a coordination structure been established specifically for the biosphere reserve?

If yes, describe in detail its functioning, composition and the relative proportion of each group in this structure, its role and competence. Is this coordination structure autonomous or is it under the authority of local or central government, or of the manager/coordinator of the biosphere reserve?

The coordination structure of the AHSBR initiative has been evolving over the past five years and continues to evolve through the UNESCO nomination process. The Howe Sound Biosphere Region Initiative Society (HSBRIS) was established in 2017 and is a registered non-profit society. HSBRIS is autonomous from the authority of local, regional or provincial governments or agencies that manage resources within the Biosphere Reserve. The HSBRIS Board strives for balanced equitable representation, as described in its Guiding Principles, and members are selected through a process defined by the HSBRIS Terms of Reference (see Appendix G). Former, current and future members of the HSBRIS Board are connected and invested in the region through their work, study or home. HSBRIS staff are responsible for preparing the bi-annual meetings, materials, communications and reports. Advice from the Roundtable guides HSBRIS in the management of the AHSBR towards its objectives (see Section 13).

HSBRIS is committed to creating and operating in a culture of "Ethical Space" as defined by Ermine, W. (2007):

The AHSBR Roundtable (see Section 17.1.7) functions as an advisory body of HSBRIS, providing advice to the HSBRIS

"It is the natural confluence of Indigenous and non-Indigenous worldviews and cultures. It is created through relationship building and shared governance. At a societal level, it is a vision of a future where these worldviews come together, and where both are valued equally."

Board and staff on priority action areas and research to be pursued in the short, medium and long-term. The Roundtable helps to build stronger connections across sectors in the region, sets priorities for activities and projects related to regional Biosphere priorities, strengthens the vision and builds consensus. Through diverse representation, the AHSBR Roundtable itself sets a model for how people and communities with different interests and mandates work together in a respectful, collaborative and effective way.

A sub-committee of HSBRIS staff, Board and Roundtable members is responsible for setting selection criteria and selecting and electing members to participate on the AHSBR Roundtable (see Appendix G).

Over 30 people have joined an ad hoc Working Group established in 2016 providing support and guidance on strategies and many contributed to the content of the nomination dossier and the structure and coordination of the AHSBR Roundtable. Over time, representatives from the BC Government, local governments, Squamish Nation, conservancy organizations, forestry sector, academia, marine institutes, youth and a variety of business and environment interests have attended and contributed. Participants in the working group have connections to the region working with or retired from organizations referenced in this document.

17.1.9 How is the management/coordination adapted to the local situation?

To understand how management and coordination are currently practiced in Átl'ka7tsem/Howe Sound, it is important to understand some of the history of the region (refer to Section 16). The history demonstrates how adaptation to situations occurring in the region have been addressed in the past. Today, Átl'ka7tsem/Howe Sound is in transition, with shifts in the average age of leadership, demographics, and the main drivers of the economy within the region. In addition, the Sound is being impacted by climate change and the significant population growth in neighbouring Metro Vancouver.

There are currently several groups and committees that are steering the dialogue towards a comprehensive land and marine use plan for the region, as addressed in Section 17.1.7 above. Resources within government at the provincial and local levels are limited, and the COVID19 pandemic has caused significant disruption within the economy. However, many organizations and citizen groups are more engaged than ever before. HSBRIS's role is to adapt to the region's changing realities, while respecting the history, knowledge, skills and contributions of many diverse groups and First Nations. As a service oriented organization, HSBRIS needs to be evolving and adapting in order to service its purpose, vision and mission. Doing this will allow HSBRIS to facilitate and steer the planning for the region within the framework of the key Biosphere Reserve objectives.

17.1.10 Is there a procedure for evaluating and monitoring the effectiveness of the management?

The effectiveness of the various management programs operating in the region is reflected in various reports regularly produced by different agencies, as previously referenced in Section 16. Since the Province manages 89% of the lands within the region, the cumulative effects monitoring is likely a more comprehensive report on the effectiveness of biodiversity management.

Orca Celebration, photo courtesy of My Sea to Sky.

The AHSBR and HSBRIS strategic plans will contain key and measurable indicators. Progress will be assessed annually by the HSBRIS Board and at the AHSBR Roundtable.

17.2 Conflicts Within the Biosphere Reserve

17.2.1 Describe any important conflicts regarding the access or the use of natural resources in the area considered (and precise period if accurate).

If the biosphere reserve has contributed to preventing or resolving some of these conflicts, explain what has been resolved or prevented, and how this was achieved for each zone.

Over the last few decades Howe Sound has been undergoing a transition from a focus on heavy industrial activity to a service-based economy based on increased tourism, recreational activity and residential development. Through the Howe Sound Community Forums, there has been regular reporting on issues impacting the region and relationship building that supports conflict resolution. This is likely an important reason why communities and various levels of government and other stakeholders are supportive of the region becoming a Biosphere Reserve.

Conflicts within the Biosphere Region are mostly limited to the Transition Areas and are reflective of the general conflicts facing many areas of BC in general. Examples include:

- **sport and commercial fishing restrictions to protect wild fish and shellfish populations;**
- **human/wildlife interactions and the concerns of increased urban encroachment;**
- **inadequate funding to replace aging infrastructure;**
- **increased visitors to the region and traffic congestion;**
- **pollution from wrecked marine vessels;**
- **lack of affordable housing;**
- **fears that new protected areas may restrict land use;**
- **the use of non-renewable resources; and**
- **new fossil fuel supporting industry.**

A continuous debate is taking place on these topics and most people have seen that the status as a Biosphere Reserve can provide important tools to help solve local problems.

BC Parks is working collaboratively with the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) to manage increased use and demand by recreation users. The Provincial Parks and conserved areas in the Sea-to-Sky area of the Howe Sound region are the most highly used in the province. This increase in users is a result of BC Parks' efforts to increase visits to the parks, and as a result, new management measures are required.

Over the past eight years, certain development projects have created conflict in the region among residents, developers and community. Providing a forum for information, HSBRIS plays an important role in the pursuit of best practices and sustainable development by, for example, ensuring citizen science is recognized in the assessment process, urging that decision-making is based on Cumulative Effects Framework assessments and recognizing local management plans during environmental assessments.

In the marine areas, severe storms and storm surges during the winter of 2018/2019 resulted in a high amount of debris landing on beaches and shorelines as a result of damage to docks and other structures. HSBRIS coordinated a Howe Sound-wide clean up and is moving forward with recommendations for prevention. HSBRIS is creating a discussion over how communities are preparing for, and residents are adapting to, climate change in order to prevent future damage and to reduce the amount of debris by implementing best practices for dock management.

Conflicts over regular abuses of the rules in areas designated for conservation are common. HSBRIS supports citizen engagement in supporting existing agencies tasked with managing conflicts, including the Conservation Officer Services of the Ministry of Environment and Climate Change and the Department of Fisheries and Oceans Canada. HSBRIS' role is to inform the public of these conservation areas, and encourage them to "Observe, Record and Report" violations.

17.2.2 If there are any conflicts in competence among the different administrative authorities in the management of the biosphere reserve, describe these.

While no conflicts in competency between administrative authorities in the management of the Biosphere Reserve have been revealed, conflicts do arise in the availability of support resources. The Sea-to-Sky corridor is experiencing a dramatic increase in visitors and residential growth and development. Changes to government philosophy and the resulting prioritization of resourcing in the region has put additional pressures on communities. The downloading of responsibilities between levels of government is an ongoing challenge. When further reductions in support staff for natural resource operations is threatened, the community speaks. This has resulted in the retention of key positions within the federal government for wildlife education in schools and conservation officers. The added voice of the Squamish Nation has ended many conflicts due to a proposed reduction of services.

17.2.3 Explain the means used to resolve these conflicts, and their effectiveness.

Transparency of information is at the core of building trust and a spirit of cooperation and commitment to public engagement by all levels of government. The various levels of government have laws regarding Freedom of Information, and over past years there has been increased improvement in public engagement processes during the decision-making process around development proposals. While there are still improvements needed to meet the desired high levels of trust with the public, the collaborative environment among the partners within AHSBR has done much to put pressure on decision makers to resolve conflicts favorably. The use of social media to increase the level of public engagement means decision makers receive more feedback than would otherwise be the case.

The Principles for Cooperation (Appendix G) and twice annual meetings of the Howe Sound Community Forum facilitates the sharing of information among the various working groups and committees working collaboratively on projects. Letter writing and face-to-face meetings with elected representatives bring the voices of the public to the decision makers. Consensus building has been at the core of cooperation and this has been demonstrated in local governments resolving to urge the BC government to undertake a comprehensive land and marine use plan for the region.

There is a strong government-to-government relationship with First Nations and respect for the duty to consult, particularly made more prominent in recent years. Conflicts over the proposed Liquified Natural Gas processing and export facility in west Howe Sound, for example, are ongoing but the Squamish Nation's approval of the project was conditional on monitoring and a change of project design for environmental reasons.

Private forestry companies planning to work in areas used by recreation enthusiasts have developed a process of consultation with the recreation groups prior to work commencing in order to reduce conflict and improve

safety. Consultants are contracted by the BC Government to support recreation management plans in high conflict areas where multiple users are competing for the same resources.

These stakeholder engagement and consultation processes have improved over time. The increased opportunity for public engagement and open dialogue about regional sustainability concerns, and the generation of potential solutions, has resulted in increased trust in the collaboration process overall and the ability to achieve balance among environmental, social and economic objectives.

17.3 Representation, participation and consultation of local communities

17.3.1 At what stages in the existence of a biosphere reserve have local people been involved: design of the biosphere reserve, drawing up of the management/cooperation plan, implementation of the plan, day to day management of the biosphere reserve? Give some specific examples.

The process to begin Howe Sound region's recognition as a "Biosphere Region" was initiated in 2016. The BC land management agency, FLNRORD, has taken the biodiversity conservation approach in its planning for some time, which is why there is substantial support for a Biosphere Region.

The vision for a holistic planning approach to protect the important values of Átl'ka7tsem/Howe Sound began in 2013, and as mentioned in Section 3.3.1 on the formation of AHSBRI, the public have been engaged and consulted continually through various public forums ever since. The public forums attended by representatives from various sectors have led to this nomination for formal recognition and designation by UNESCO.

Through HSBRIS initiatives, presentations, reports and webinars we have engaged local community groups and individuals on the idea of a UNESCO Biosphere Reserve since its inception. The Working Group meetings held approximately every two months have been open to those interested in learning more and becoming engaged. In 2016, the initiative to become a UNESCO Biosphere Reserve was presented to the Howe Sound Community Forum. Numerous presentations to community groups, industry associations and staff meetings, local government councils, Squamish Nation and universities have also taken place.

The process to nomination has been a volunteer effort with participation from various sectors who have a strong sense of pride and place. HSBRIS' Directors and Working Group members represent many of the organizations currently working in the region and there is good synergy among the groups.

There are many projects and programs currently underway

Future of Howe Sound Roundtables, photo: L. Johnson

that engage local people that are being administered by the HSBRIS, or are being worked on in close collaboration with these other organizations (see Section 3.3).

17.3.2 Describe how the local people (including women and Indigenous communities) have been, and or are represented in the planning and management of the biosphere reserve (e.g. assembly of representatives, consultative groups).

The planning and project management has been transparent and inclusive of those in civil society, First Nations, partner organizations and local government from around the region expressing interest in becoming involved as part of the HSBRIS Working Group that has been meeting over the past four years on a regular basis.

The Working Group has been open to members of the public and First Nations, and participation has been fairly balanced by gender and has involved youth, retirees and actively working people from various sectors. Documents and plans are made available on a shared database, and regular updates have been communicated through presentations, social media, newsletters and many one-on-one meetings. The Project Manager travels around the region on land and by water on a regular basis to engage with people in the region. The writing of this dossier has involved contributions from and consultation with a wide variety of people in the various departments of government, science based organizations, Squamish Nation and various knowledge holders.

Participation in the AHSBR Roundtable and on the board of HSBRIS is based on a set of criteria that aims to strike a balance of inclusion and diversity that is representative of the region. (Appendix G).

17.3.3 Describe the specific situation of young people in the proposed biosphere reserve (e.g. potential impacts of the biosphere reserve on youth, consideration of their interests and needs, incentives to encourage them to participate actively in the governance system of the biosphere reserve)

The mission of the Biosphere Reserve is focused on ensuring a healthy environment for future generations and to create a succession plan for the stewards of the region.

As described in Section 4.5, the region is a hub for youth connecting to nature with more than 12 youth camps located in the area. The region is also a location for family summer cottages. Many of those involved and engaged in the AHSBR initiative have a connection to the area from an early stage in life. The objectives of the AHSBR result from those who wish to ensure a bright future for their successive generations. Youth have participated in the HSBRIS working group and are actively working on HSBRIS committees and in the design and planning of the AHSBR.

The Squamish Nation look to seven generations ahead in their planning. Grants aimed at engaging First Nations youth are being put to good use and each local committee or authority has youth engagement and advisory councils. Many events in the region are organized by youth attending universities.

HSBRIS provides volunteer opportunities for youth to engage in various projects. NGO's providing outdoor education offer training for youth camp councillors, educators and park rangers. Schools in the region have a requirement for volunteer hours and youth have many opportunities to take part in events and projects, such as restoration, shoreline clean-ups or invasive species removal. Social media sites related to Howe Sound provide insight into the connection of youth to the region. In close proximity to four universities, students have studied, participated in field schools, and produced reports that consider the complexity of the issues in the region.

17.3.4 What form does this representation take (e.g. companies, associations, environmental associations, trade unions)?

A balance of private sector, and not-for-profit organizations from various sectors, as well as elected officials, First Nations and members of civil society are represented on the HSBRIS Working Group, the AHSBR Roundtable, in committees or in activities as described in the various programs.

17.3.5 Are there procedures for integrating the representative body of local communities (e.g. financial, election of representatives, traditional authorities)?

Squamish RIver Watershed Society working group, photo: R. Simons

The HSBRIS nomination committee has established Terms of Reference for selection and invitation to participate in the AHSBR Roundtable (Appendix G). Some local governments make formal appointments to the Howe Sound Community Forum. As the convenor, HSBRIS has procedures in place to ensure balanced representation and participation. Observers from non-government organizations and the private sector active in the region are invited to attend.

17.3.6 How long-lived are consultation mechanisms (permanent assembly, consultative on specific projects)? Make a complete description of this consultation. What are the roles of involved stakeholders compared to the role of the biosphere reserve?

The role of the HSBRIS Board of Directors sets a prescribed minimum requirement as required by the BC Societies Act (2015). Besides the standard reporting and procedures as established by provincial law for a charitable society, board members are consulted quarterly on the budget and projects. The role of those participating in the Roundtable is also established through its Terms of Reference. The HSBRIS Board develops a strategic plan in consultation with the AHSBR Roundtable and all decisions are consensus based.

Projects affecting the Biosphere Region have various legally prescribed consultation procedures depending on the authorizing authority and size of the projects. In the Core Areas, BC Parks undertakes consultations with First Nations and stakeholders over a period of many months depending on the nature of the requested changes. Projects of a certain size trigger Provincial and Federal environmental assessments that include public consultation periods; four such projects over the past six years have gone through this process.

Workshops, advisory committees, task forces and steering committees involved in issues contributing to the management of the Biosphere are created and then concluded based on the purpose of the assembly. The role of the stakeholders involved in these various forums is to convene around issues and projects in the marine area, airshed matters, industry, recreation and emergency management. HSBRIS' role through the Roundtable governance model is to convene representatives from all sectors of the Biosphere.

17.3.7 What consultation mechanisms have been used, and who has been involved? Are they for specific purposes or long-term? What impacts have they had on decision-making processes (decisional, consultative or merely to inform population)?

From the early days of the initiative to have Howe Sound designated as a UNESCO Biosphere Reserve, the team has communicated broadly. The first presentation was

to the Howe Sound Community Forum in 2016, followed by updates at each subsequent meeting. The audience is representative of three levels of government and NGOs. Reports have been prepared and shared widely. There have been many presentations to community associations, chambers of commerce and business groups. HSBRIS has been invited as guest speakers at numerous Annual General Meetings. Updates on the initiative and planning have been provided to local government boards and councils through presentations directly to them, including the Squamish Nation Council.

Representatives from various sectors have been invited to attend Working Group meetings and engagement in the nomination process feedback has contributed to continual improvement of our organization and purposes.

17.3.8 Do women participate in community organizations and decision-making processes? Are their interests and needs given equal consideration? What incentives or programmes are in place to encourage their representation and participation (e.g. was(were) a 'gender impact assessment (s)' carried out?

We are fortunate to live in a society where women are involved and engaged on equal footing with men in the planning work. Communities around the region recognize and practice non-discrimination and the removal of barriers for persons of all genders, abilities, races and religions. Employers adhere to legally binding Provincial Human Rights codes.

17.4 Management Policy

17.4.1 Is there a management/cooperation plan/ policy for the biosphere reserve as a whole?

Overall, there is no single comprehensive land and marine management/cooperation plan/policy that is strategically guiding management for all the land and waters in the Howe Sound area at this time. This is the number one objective for HSBRIS. This area is collectively managed by various levels of government at multiple scales reflecting a diversity of jurisdictions, values, administrative boundaries and plans. One of the motivations for the Biosphere Region framework is to create a unified vision and plan for the region and avoid the fragmented planning that has been the case to date. The Howe Sound communities have been calling for a comprehensive land and marine use plan for some time, and the Biosphere Region framework and strategic planning towards the objectives and goals will take this holistic view.

As discussed in Section 3.1.3, a number of planning tools are now available to support land and marine use planning and there are several organizations in the Howe Sound region that are in the process of applying these tools. In the marine environment the Ocean Watch Task Force, the Marine Conservation Guide, the Marine Reference Guide and the Cumulative Effects Assessment reports are all contributing to the ongoing conversations and planning efforts. They provide the essential facts, narratives and maps of the region where none have existed in the past.

The Howe Sound Community Forum's stated Common Vision and shared values contained in the Principles for Cooperation (2014) serve as the basis for management by consensus of the Biosphere Region in the interim (Appendix G). All local government members have adopted the Principles that include the Common Vision.

17.4.2 Which actors are involved in preparing the management/cooperation plan? How are they involved?

Management plans for protected areas, communities and regional land use are in place in the region with all due consideration given to various stakeholders. Community's official community plans are sent to neighbouring communities for comment before final adoption. The various sectors include tourism, transportation, industry, forestry and recreation, among others, all of whom would be represented on the AHSBR Roundtable. Organizations in the region are commonly evolving their own governance models to include First Nations representation. The aim of HSBRIS and the Biosphere Region is for First Nations to be co-chairing the Board of the the HSBRIS Society andparticipating in the AHSBR Roundtable.

17.4.3 Do local authorities formally adopt the management/cooperation plan? Are local authorities making reference to it in other policies and/or plans? If so, please provide details.

Local and regional governments along with other

stakeholders often reference the Sea-to-Sky Land Resource Management Plan (LRMP) and its strategic direction in other planning and resource management forums and documents. Overall, the Sea-to-Sky LRMP has generally been quite well respected by local governments over the past decade in part due to their participation and input into the planning process. Endorsement of the AHSBR nomination to UNESCO and participation at the Howe Sound Community Forum is a non-binding commitment that HSBRIS will ensure is referenced in Official Community planning, conservation planning, business planning and tourism plans going forward. Destination BC's Sea to Sky Destination Development Strategy published in 2019, references the strategic advantage of a UNESCO Biosphere Reserve designation for tourism (Destination BC, 2019). Over time, we expect AHSBR to be referenced in planning documents where applicable.

17.4.4 What is the duration of the management/ cooperation plan? How often is it revised or renegotiated?

BC's LRMPs were originally intended to be long-term living documents that provided strategic level direction for ten or more years before being considered for an update. During this time major, minor and administrative amendments can be made to the plan. However, new direction on land use planning in BC is moving away from large comprehensive land use planning exercises to more targeted issue-focused planning processes in collaboration with First Nations and local stakeholders. As such, a full update to the whole Sea-to-Sky LRMP is unlikely at this time but targeted planning related to certain site-specific management issues or information gaps is possible.

17.4.5 Describe the contents of the management/cooperation plan. Does it consist of detailed measures or detailed guidelines? Give some examples of measures or guidelines advocated by the plan? (Enclose a copy).

As mentioned above, a comprehensive plan for the entire region is still to be developed for the region, however examples of management already in practice fall under the Sea to Sky LRMP. Visual quality objectives are a component of this plan that influence forestry decisions. With the development of major tourism attractions, consideration of view corridors is important. Examples of

Future of Howe Sound Forum, photo: L. Johnson

Shared sense of place, photo: L. Johnson

measures advocated by the LRMP was the 2013 consensus by HSCF members that resulted in a resolution for a comprehensive land and resource management plan for the Howe Sound Region and for protection of the glass sponge reefs. The process involves discussion and learning at the Howe Sound Community Forum meetings, and crafting draft resolutions for representatives to report back to their respective organizations and municipal Councils. Resolutions may go forward to the Union of BC Municipalities (UBCM) annual conference where, if adopted, are forwarded to the BC or federal government for response.

Over the years, task forces have also been struck to address regional issues to be implemented such as the Sea-to-Sky Air quality management plan and the Ocean Watch Task Force. Recommendations from the task forces are then referred to the bi-annual forums.

17.4.6 Indicate how this management/ cooperation addresses the objectives of the proposed biosphere reserve (as described in section 13.1).

The conditions required to meet the objectives described in Section 13.1 exist currently in the region. Important willingness for collaboration between organizations is demonstrated through various forums and assemblies. The current BC government is committed to collaborating with Indigenous governments in natural resource management that is informed by the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the Truth and Reconciliation Commission Calls to Action. As part of this approach, the BC government has committed $16 million over three years (2018/19–2020/21) to work collaboratively with Indigenous governments, communities, and stakeholders to modernize land use planning.

17.4.7 Is the plan binding? Is it based on a consensus?

Legally binding community plans and various land and marine plans within the region are reviewed every several years. The proposed consensus-based comprehensive land and marine use plan for the region is intended to influence planning and policy.

The Sea-to-Sky Land Resource Management Plan is a consensus-based strategic "higher level" plan that provides integrated land use and resource management direction for the region supported by the BC government. The implementation of some parts of the plan have resulted in the establishment of various legal land use designations or legal objectives. The plan also harmonizes direction from land use agreements with some local First Nations and the honour of the Public is at stake to implement these negotiated agreements.

17.4.8 Which authorities are in charge of the implementation of the plan, especially in the Buffer Zone(s) and the Transition Area(s)? Please provide evidence of the role of these authorities.

When a comprehensive plan is developed, implementing the plan rests with the existing government authorities. The BC Government and its various agencies have been responsible for coordinating the implementation and

monitoring of the Sea to Sky LRMP since 2008. Most of the plan has been implemented over the past decade.

As mentioned above, task forces or committees may be struck by the Howe Sound Community Forum with Terms of Reference approved by the local governments. Decision making power may be extended to the representatives of the committee. For example, the Sea-to-Sky Clean Air Management Plan was developed by a task force struck to work with the BC Ministry of Environment and Climate Change Strategy to create the plan, and, to establish a longer term partially funded coordinating organization.

17.4.9 Which factors impede or help its implementation (e.g. reluctance of local people, conflicts between different levels of decision-making)

At present, there are no known factors that would impede the task of implementing a strategic management plan for the proposed Biosphere Region other than the availability of people's time.

17.4.10 Is the biosphere reserve integrated in regional / national strategies? Vice versa, how are the local/municipal plans integrated in the planning of the biosphere reserve?

At the national level, the Canadian Biosphere Reserves Association (CBRA) is in the process of developing its strategic plan for Biosphere Reserves/Regions in the country that will focus on supporting sustainable development, biodiversity conservation, climate change adaptation and social justice. Canada's and BC's commitment to these principles are well established in a number of policies, programs and procedures, all of which have been described in the preceding sections of this report. Although most government programs in support of Biosphere Reserves are provincial in origin, the Government of Canada supports the marine conservation initiatives in AHSBR through the Department of Fisheries, Oceans and the Canadian Coast Guard and manages the key protected areas and ecosystem-wide resources in the marine Core, Buffer and Transition Areas of AHSBR. Conversely, it was AHSBR's NGO partners who originally discovered, and encouraged DFO to protect, the globally significant glass sponge reefs in Átl'ka7tsem/Howe Sound.

The Government of Canada also committed in 2015 to adopt the UN 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs). The work of HSBRIS supports the efforts towards implementing these goals, particularly to work with all partners to build public awareness and foster new partnerships and networks to advance the SDGs. HSBRIS has also partnered with the BC Council for International Cooperation on co-hosting SDG workshops in the region.

Canada is also committed to the UN Declaration on the Rights of Indigenous People (UNDRIP), and the current government supports the harmonization of national laws to this end. While AHSBR is not promoting political objectives, HSBRIS demonstrates respect for existing Indigenous rights in the region.

In BC, the recently elected government (2018) has issued clear direction to its Ministers and their staff, in the form of Mandate Letters, to implement a number of initiatives that directly support AHSBR. Some of the more significant for biodiversity conservation include the following:

- **revitalize the Environmental Assessment process and review the professional reliance model to ensure the legal rights of First Nations are respected, and the public's expectation of a strong, transparent process is met;**
- **enact an endangered species law and harmonize other laws to ensure they are all working towards the goal of protecting our beautiful province;**
- **implement a comprehensive climate-action strategy that provides a pathway for BC to prosper economically while meeting carbon pollution reduction targets, including setting a new legislated 2030 reduction target and establishing separate sectoral reduction targets and plans; and**
- **improve wildlife management and habitat conservation, and collaborate with stakeholders to develop long and short term strategies to manage BC's wildlife resources.**

In terms of sustainable development and support for the UN's Sustainable Development Goals, this new direction

strives to:

- champion tourism as a job creator throughout BC and work to expand tourism-marketing efforts internationally;
- take measures to improve housing affordability;
- establish a Fair Wage Commission to support the work of implementing the $15-per-hour minimum wage by 2021 and to bring forward recommendations to close the gap between the minimum wage and livable wages; and
- through partnerships with local governments, the federal government, and the private and not-for-profit sectors, begin to build 114,000 units of affordable market rental, non-profit, co-op, supported social housing and owner-purchase housing.

To support First Nations in pursuit of social justice, the direction includes measures to:

- implement the new First Nations history curriculum, develop full-course offerings in Aboriginal languages and implement the educational Calls to Action from the Truth and Reconciliation Commission;
- work collaboratively and respectfully with First Nations to establish a clear, cross-government vision of reconciliation to guide the adoption of the United Nations Declaration on the Rights of Indigenous Peoples, the Truth and Reconciliation Commission Calls to Action, and the Tsilhqot'in Supreme Court decision;
- in partnership with First Nations, transform the treaty process so it respects case law and the United Nations Declaration on the Rights of Indigenous Peoples;
- support Indigenous communities seeking to revitalize connections to their languages; and
- partnering with local governments and First Nations to develop a community capital infrastructure fund to upgrade and build sports facilities, playgrounds, local community centres, and arts and culture spaces.

At the local government level, municipal and regional land use plans in place already align well with the concept of a Biosphere Reserve as conceived and described in other sections of this document. The communities' visions and planning are already models for sustainability. Regionally, growth management strategies of the three regional districts have an influence on the impacts of higher densification and on the infrastructure needed to ensure

April 2019 Howe Sound Community Forum, photo: K. Hemmelgarn

sustainability. Pressures to expand the density prior to implementation or adequate infrastructure are ongoing.

17.4.11 Indicate the main source of the funding and the estimated yearly budget

HSBRIS intends to generate $250,000 annually in revenue, including in-kind contributions of goods and services to cover costs for communications, engagement and overhead (see Appendix G).

Over the long-term, anticipated revenue will continue to be received from diversified sources. Long term sustainable income for 1.5 full-time staff and fixed overheads will be derived from investment returns from a dedicated endowment fund that has been established with local community foundations. Fundraising strategies have begun aimed at increasing contributions over the long-term.

HSBRIS has and continues to receive funding from local governments, grants from private funders and foundations, individual donations from fundraising campaigns and in-kind contributions, such as offers of meeting space and office space.

Developing strong relationships with universities, as described in the Letter of Engagement from Capilano University, increases the opportunities for projects to receive funding and in-kind support from new sources.

HSBRIS has also received fees for service for advisory and coordinating roles from local governments and non-government organizations. Co-hosting and collaborating with other NGO's and local governments maximizes the efficiency of available human resources and limited overhead costs.

17.5 Conclusions

17.5.1 In your opinion, what will ensure that both the functioning of the biosphere reserve and the structures in place will be satisfactory? Explain why and how, especially regarding the fulfilment of the three functions of biosphere reserves (conservation, development, logistic) and the participation of local communities

The strength of the Átl'ka7tsem/Howe Sound Biosphere Region Initiative lies in the leadership and commitment of the Átl'ka7tsem/Howe Sound community that stands behind it. This grass roots initiative has evolved from the first Howe Sound Roundtable in 1998, where the need for a comprehensive plan for the Howe Sound Region was first articulated. Since then, the many voices, forums, workshops, reports, and recommendations have held fast to the vision that such a comprehensive plan be achieved by 2020. This Biosphere nomination is the product of that two decade-long effort.

Conservation within the proposed biosphere rests upon the mandates and expertise of Provincial and Federal managers of Core Areas, Provincial managers of extensive forest lands, and Provincial, regional district, and municipal managers

Second growth coastal forest,
photo courtesy of Little Explorers

of a host of small protected areas throughout the biosphere. But the strength of conservation efforts going forward rests on the fact that the AHSBR area is an attractive place to do science and conservation because of the strong, collaborative AHSBR community and citizen science community. This community strength is in addition to protect and conserve the stunning natural beauty, strong biodiversity, and world famous geography along the transportation link between Vancouver and Whistler resort area. Science-based NGOs working on marine conservation, restoration and planning, and the BC's Cumulative Effects Assessment team have been attracted to work in AHSBR because of an active and collaborative community and strong citizen science efforts. The HSBRIS further strengthens collaboration in the Átl'ka7tsem/Howe Sound community as a facilitator, networker, logistics supporter, and information hub.

As Vancouver City Councillor and Chair of Metro Vancouver's Climate Action Committee recently stated "the designation would push sustainable development in the region to a higher set of standards with more input from First Nations and more accountability." The Mayor of Squamish also stated "The goals of the Biosphere Reserve align very much with where Squamish wants to go with its future. "Together we can start to find ways that industry can function within the Howe Sound region without damaging the land on which it operates." Sustainable development within the proposed Biosphere Reserve with leadership of the local, provincial, Federal and First Nations governments and their commitment to ensuring development meets best possible practices. For so long people in the region have been fighting against what they don't want. The UNESCO Biosphere Reserve designation framework provides a vision for what they do want. As Metro Vancouver's backyard and playground, Howe Sound is uniquely positioned to be a model for sustainable tourism and development based on this leadership.

HSBRIS is already respected as a neutral entity focused on serving the Átl'ka7tsem/Howe Sound region. As a charitable non-profit society, the proposed Roundtable structure and staff capacity will provide logistical support, neutral facilitation, the convening of community sectors and the building of relationships to face complex challenges. The AHSBR community has already proved its capacity to bring its members together through socio-economic forums and sustainable development goal workshops. HSBRIS acknowledges and respects that the Biosphere Region is unceded territory of the *Skwxwú7mesh Úxwumixw* and seeks transparent and collaborative cooperation with our First Nations partners. We understand that strong networks bind our community together and HSBRIS already provides important logistic support to existing organizations in the region.

Howe Sound inspiration, **by Ryan Nickerson**

18 Special Designations

[Special designations recognize the importance of particular sites in carrying out the functions important in a biosphere reserve, such as conservation, monitoring, experimental research, and environmental education. These designations can help strengthen these functions where they exist or provide opportunities for developing them. Special designations may apply to an entire proposed biosphere reserve or to a site included within. They are therefore complementary and reinforcing of the designation as a biosphere reserve. Check each designation that applies to the proposed biosphere reserve and indicate its name]

Name:

( ) UNESCO World Heritage Site

While not currently a World Heritage Site (WHS), the Glass Sponge Reefs of Hecate Strait and Queen Charlotte Sound in northern BC are on Canada's Tentative List for future consideration for WHS status.

( ) RAMSAR Wetland Convention Site

(√) International Bird and Biodiversity Area (IBA)

There are two IBAs in Howe Sound awarded by Birdlife International in partnership with Bird Studies Canada and Nature Canada:

- **The Squamish River Area IBA (Site: BC023) covers the lower reaches of the river and its estuary where it drains into Howe Sound. This site is globally significant for its congregation of bald eagles, as well as other raptors, shorebirds and seabirds; and**
- **The English Bay, Burrard Inlet and Howe Sound IBA (Site: BC020) covers approximately 45% of the marine component of AHSBRI in Howe Sound . The site is globally and continentally significant for congregating seabirds.**

( ) Long term monitoring site (specify)

The former Britannia Copper mine site was considered one of the largest point sources of metal pollution discharging to surface water in North America. Prior to remediation, the majority of the contaminated discharge at Britannia originated when surface water (in the form of precipitation and melting snow), flowed through the mine and reacted with mineralized rock in the mine workings. The reaction between exposed ore, air and water creates acid rock drainage which contains elevated levels of heavy metals including copper, zinc and cadmium and is highly acidic.

Site investigation and remediation work at the site began in 2001. In 2005 construction was completed on the water treatment plant and groundwater management system. A long-term program to monitor environmental conditions in Howe Sound and the Britannia fan area was then implemented to assess the effectiveness of remedial initiatives. Further technical studies to improve surface water drainage and storm water quality began and numerous site safety improvements were made.

Between 2010 and 2011 an overall Britannia Mine Closure Plan was developed. An extensive sampling and environmental monitoring program was initiated for the Furry Creek watershed.

The Provincial Crown Contaminated Site Program continues to work towards a risk-managed closure of the Britannia mine.

( ) Long Term Ecological Research (LTER site)

( ) Other (specify)

National Historic Sites

Designated in 1987, the Britannia Mine Concentrator is a gravity-fed concentrator used to process copper ore for one of Canada's largest mining operations in the 1920s and 1930s. This site is illustrative of the innovation that made the Britannia Mines an important site in Canadian mining history.

Designated in 2015, the Point Atkinson Lighthouse, an 18.3-metre (60 ft) high hexagonal lighthouse located across Burrard Inlet from Vancouver, is an early example of its type.

Herring Roe, photo: T. Cyr

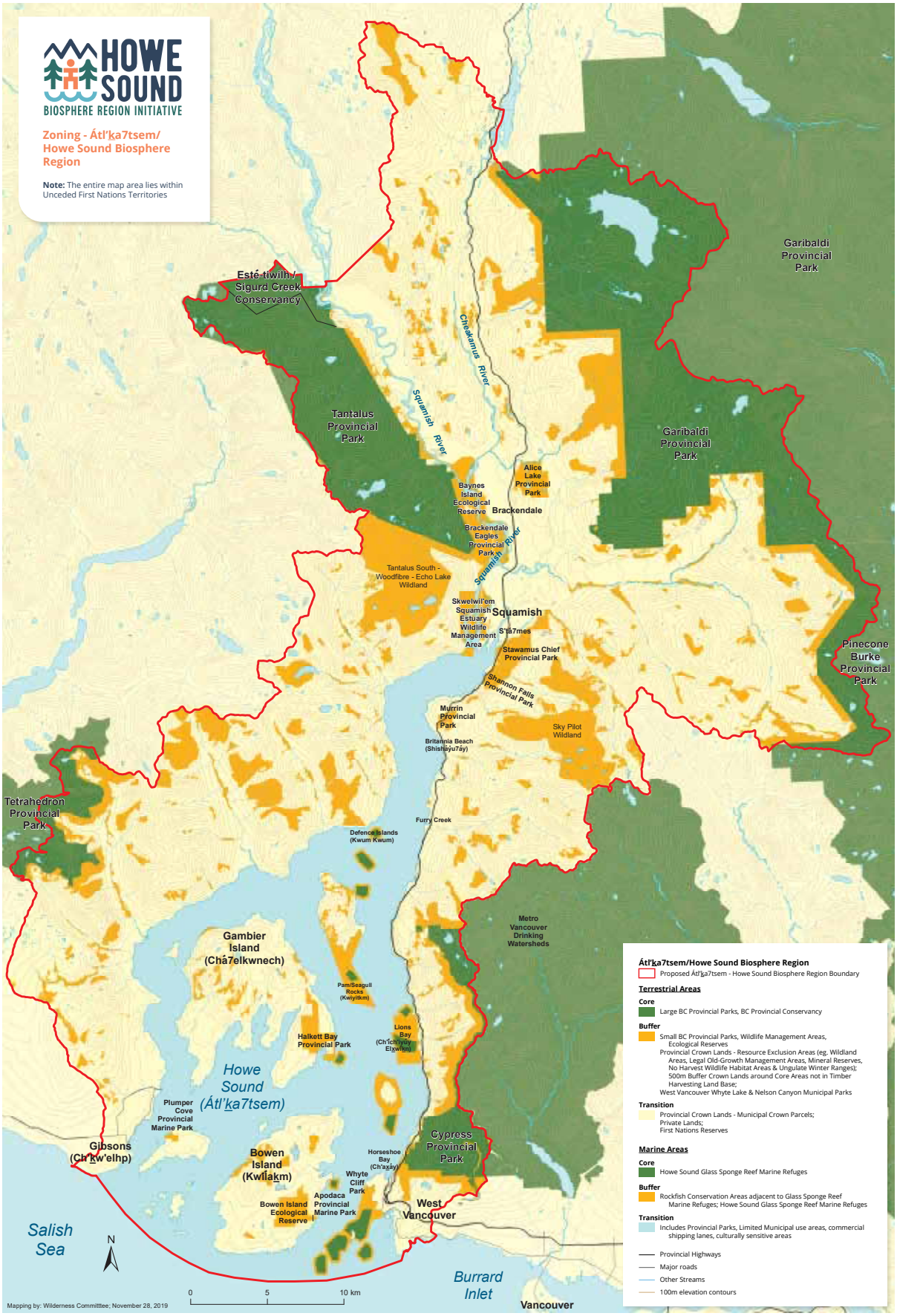
19 Supporting Documents & Appendices

19.1 Location and zonation map with coordinates

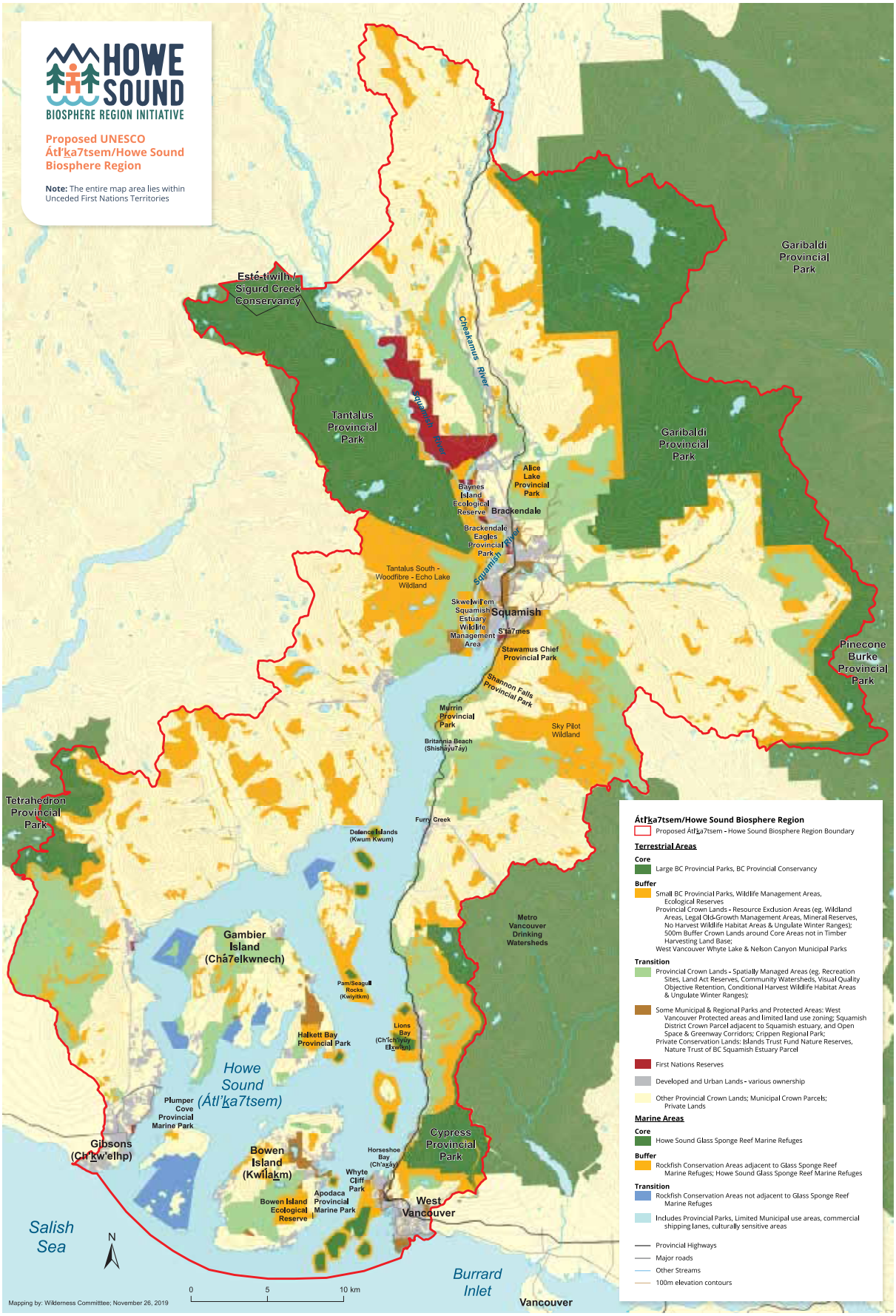
[Provide the biosphere reserve's standard geographical coordinates (all projected under WGS 84). Provide a map on a topographic layer of the precise location and delimitation of the three zones of the biosphere reserve (Map(s) shall be provided in both paper and electronic copies). Shapefiles (also in WGS 84 projection system) used to produce the map must also be attached to the electronic copy of the form. If applicable, also provide a link to access this map on the internet (e.g. Google map, website).

Geographic Coordinates:

Cardinal Points:	Latitude	Longitude
Most central point:	49° 39.608'N	123° 12.782'W
Northernmost point:	50° 03.341'N	123° 15.119'W
Southernmost point:	49° 19.216'N	123° 21.970'W
Westernmost point:	49° 29.634'N	123° 37.356'W
Easternmost point:	49° 37.755'N	122° 48.209'W


HOWE SOUND
BIOSPHERE REGION INITIATIVE
Zoning - Átl'ka7tsem/ Howe Sound Biosphere Region
Note: The entire map area lies within Unceded First Nations Territories
Esté-tiwilh / Sigurd Creek Conservancy
Tantalus Provincial Park
Garibaldi Provincial Park
Cheakamus River
Squamish River
Alice Lake Provincial Park
Baynes Island Ecological Reserve
Brackendale
Brackendale Eagles Provincial Park
Tantalus South - Woodfibre - Echo Lake Wildland
Skwelwil'em Squamish Estuary Wildlife Management Area
Squamish
S'ta7mes
Stawamus Chief Provincial Park
Shannon Falls Provincial Park
Murrin Provincial Park
Britannia Beach (Shishàyu7ây)
Sky Pilot Wildland
Pinecone Burke Provincial Park
Tetrahedron Provincial Park
Furry Creek
Defence Islands (Kwum Kwum)
Metro Vancouver Drinking Watersheds
Gambier Island (Chá7elkwnech)
Pam/Seagull Rocks (Kwyitkm)
Halkett Bay Provincial Park
Lions Bay (Ch'ich'iyáy Elxwíxn)
Howe Sound (Átl'ka7tsem)
Plumper Cove Provincial Marine Park
Gibsons (Ch'kw'elhp)
Bowen Island (Kwilakm)
Horseshoe Bay (Ch'axáy)
Whyte Cliff Park
Apodaca Provincial Marine Park
Bowen Island Ecological Reserve
Cypress Provincial Park
West Vancouver
Salish Sea
N
0 5 10 km
Burrard Inlet
Vancouver
Mapping by: Wilderness Committee; November 28, 2019
Átl'ka7tsem/Howe Sound Biosphere Region
Proposed Átl'ka7tsem - Howe Sound Biosphere Region Boundary
Terrestrial Areas
Core
Large BC Provincial Parks, BC Provincial Conservancy
Buffer
Small BC Provincial Parks, Wildlife Management Areas, Ecological Reserves
Provincial Crown Lands - Resource Exclusion Areas (eg. Wildland Areas, Legal Old-Growth Management Areas, Mineral Reserves, No Harvest Wildlife Habitat Areas & Ungulate Winter Ranges); 500m Buffer Crown Lands around Core Areas not in Timber Harvesting Land Base;
West Vancouver Whyte Lake & Nelson Canyon Municipal Parks
Transition
Provincial Crown Lands - Municipal Crown Parcels; Private Lands; First Nations Reserves
Marine Areas
Core
Howe Sound Glass Sponge Reef Marine Refuges
Buffer
Rockfish Conservation Areas adjacent to Glass Sponge Reef Marine Refuges; Howe Sound Glass Sponge Reef Marine Refuges
Transition
Includes Provincial Parks, Limited Municipal use areas, commercial shipping lanes, culturally sensitive areas
Provincial Highways
Major roads
Other Streams
100m elevation contours

Zonation and Transition Land Use

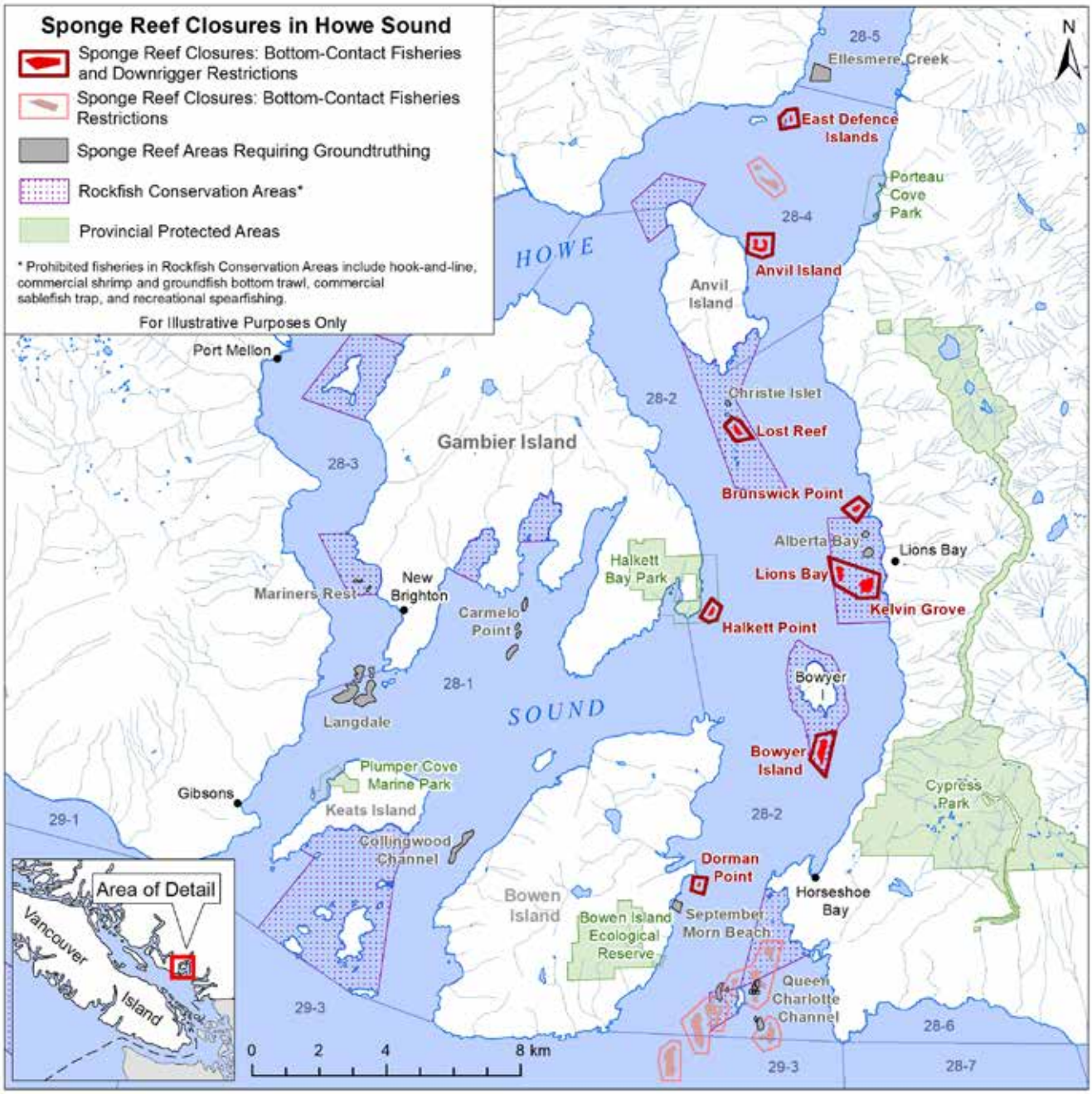


Zonation - Marine

Core areas and buffer zones in Sponge reef closures.
No commercial, recreational or Indigenous Food, Social and Ceremonial bottom-contact fishing activities are allowed.

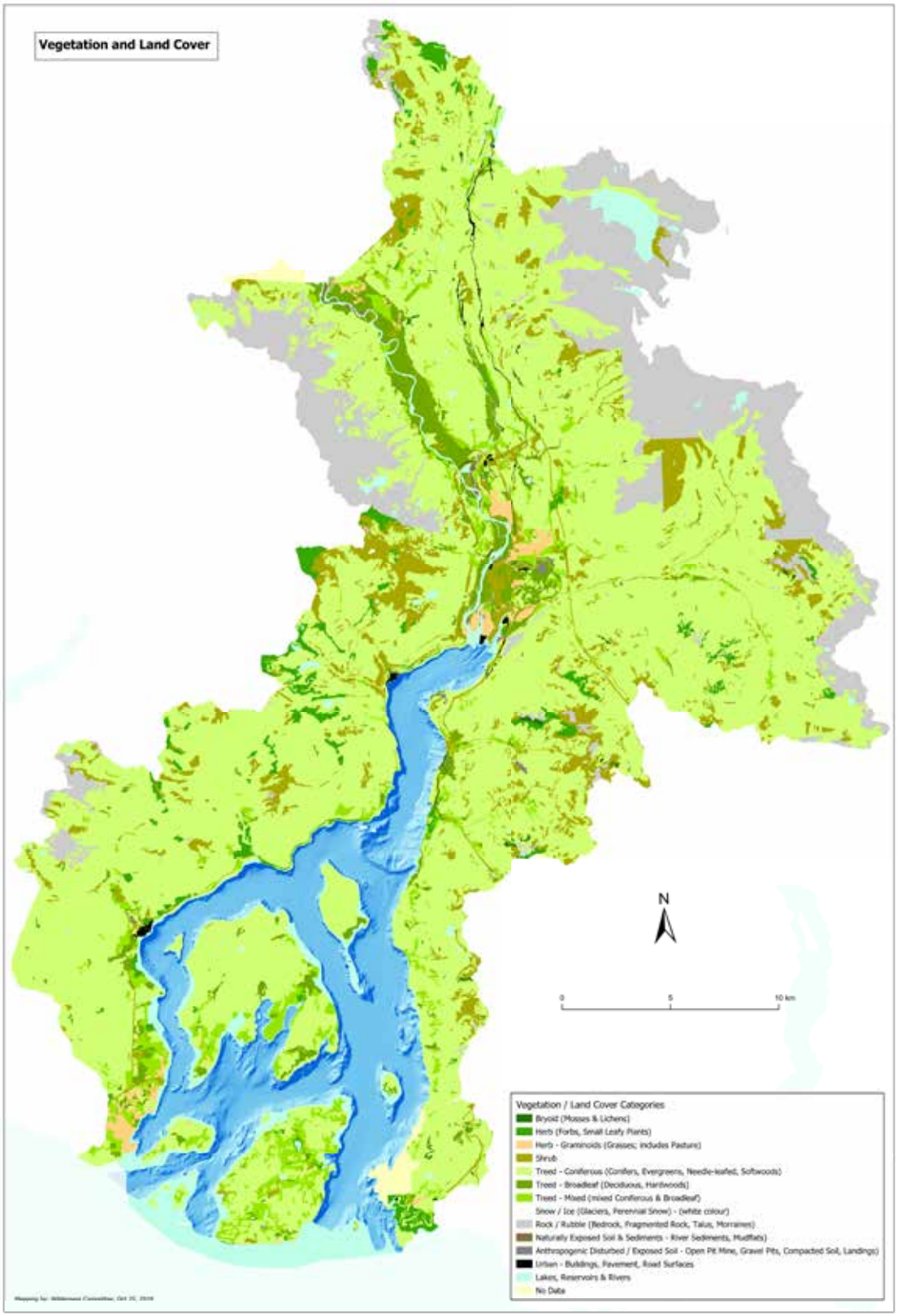
Details here: http://www.dfo- mpo.gc.ca/oceans/ceccsr-cerceef/closures-fermetures-eng.html

Rockfish Conservation Areas (buffer zones) Details here: https://www.pac.dfo-mpo.gc.ca/fm-gp/maps-cartes/rca-acs/index-eng.html).



19.2 Vegetation map or land cover map

A vegetation map or land cover map showing the principal habitats and land cover types of the proposed biosphere reserve should be provided, if available.



19.3 List of legal documents

List the principal legal documents authorizing the establishment and governing use and management of the proposed biosphere reserve and any administrative area(s) they contain. Provide a copy of these documents.

Heritage Conservation Act http://www.bclaws.ca/civix/document/id/complete/statreg/96187_01

Environment and Land Use Act http://www.bclaws.ca/civix/document/id/complete/statreg/96117_01

Forest and Range Practices Act http://www.bclaws.ca/Recon/document/ID/freeside/00_02069_01

Land Act http://www.bclaws.ca/civix/document/id/complete/statreg/96245_01

Environmental Management Act http://www.bclaws.ca/civix/document/id/complete/statreg/03053_04

Environmental Assessment Act http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_02043_01

Mines Act and the Mineral Tenure Act http://www.bclaws.ca/civix/document/id/complete/statreg/00_96292_01

Ecological Reserves Act http://www.bclaws.ca/civix/document/id/complete/statreg/96103_01

Wildlife Act http://www.bclaws.ca/civix/document/id/consol31/consol31/00_96488_01

Local Government Act http://www.bclaws.ca/civix/document/id/complete/statreg/r15001_01

Islands Trust Act http://www.bclaws.ca/civix/document/id/complete/statreg/96239_01

Canada Fisheries Act https://laws-lois.justice.gc.ca/eng/acts/F-14/

Canada Shipping Act https://laws-lois.justice.gc.ca/eng/acts/s-9/

19.4 List of land use and management/cooperation plans

List existing land use and management/cooperation plans (with dates and reference numbers) for the administrative area(s) included within the proposed biosphere reserve. Provide a copy of these documents.

Regional Land Use/Conservation Plans:

Squamish Nation Sacred Land Use Plan – Xay Temixw https://www.squamish.net/about-us/our-land/xay-temixw-sacred-land-land-use-plan/

Sea-to-Sky Land and Resource Management Plan (LRMP), April 2008. Available at: https://www2.gov.bc.ca/gov/content/industry/crown-land-water/land-use-planning/regions/south-coast-region-plans/seatosky-lrmp

Islands Trust Fund Regional Conservation Plan 2018-2027, January 2018. Acquired at: http://www islandstrustfund.bc.ca/media/84722/rcp-final-web-mar-27.pdf

Official Community Plans:

Bowen Island Municipality Official Community Plan, September 2011. Available at: https://bowenisland.civicweb.net/document/45604

Gambier Island Official Community Plan, May, 2017. Available at: http://www.islandstrust.bc.ca/media/344028/gmbl73_ocp-consolidated-may-30-2017.pdf

Gambier Associated Islands Official Community Plan, December 2010. Available at: http://www.islandstrust.bc.ca/media/343011/13gmassocislandsbaseocpbyl109.pdf

Metro Vancouver 2040: Shaping our Future – Regional Growth Strategy, July, 2017. Available at: http://www.metrovancouver.org/services/regional-planning/PlanningPublications/RGSAdoptedbyGVRDBoard.pdf

Metro Vancouver Electoral Area A Official Community Plan, June 2017 Draft. Available at: http://www.metrovancouver.org/services/regional-planning/PlanningPublications/June2017OCP-Draft.pdf

District of West Vancouver Official Community Plan, Spring 2018. Available at: https://westvancouver.ca/sites/default/files/OCP%20Bylaw%204985%2C%202018%20-%20Schedule%20A.pdf

Village of Lions Bay Official Community Plan, April 2009. Available at: https://www.lionsbay.ca/sites/2/files/docs/bylaws/bylaw_408_-_ocp_designation-revised.pdf

Squamish 2040 – Official Community Plan, June 2018. Available at: https://squamish.civicweb.net/filepro/documents/157445

Squamish-Lillooet Regional District Electoral Area D Official Community Plan, No. 1135-2013. July 2019. Available at: https://www.slrd.bc.ca/sites/default/files/bylaws/pdf/Bylaw%201135-2013%20consolidated%20up%20to%201555-2018_0.pdf

West Howe Sound Official Community Plan, October 2011. Available at: https://www.scrd.ca/files/File/Community/Planning/WHS%20OCP%20/Adopted%20Version/2011-10-27%20Adopted%20Version%20Bylaw%20640%20Appendix%20A%20WHS%20OCP.pdf

SMART PLAN: Town of Gibsons Official Community Plan, March 2015. Available at: https://gibsons.ca/wp-content/uploads/2019/01/Official-Community-Plan-Bylaw-No.-985-2015-current.pdf

Protected Area Management Plans:

Garibaldi Provincial Park Master Plan, September 1990. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/garibaldi/garibaldi_mp.pdf

Garibaldi Park: Management Plan Amendment for the Spearhead Area, 2014. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/garibaldi/garibaldi_mp_amendment_approved_feb2014.pdf

Brackendale Eagles, Baynes Island Ecological Reserve, Tantalus Park Management Plan, February 2012. Available at: http://www.env.gov.bc.ca/bcparks/explore/parkpgs/brackendale_eagles/bebit_mp.pdf?v=1558549341219

Esté-tiwilh/Sigurd Creek Conservancy Management Plan, December 2009. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/este_tiwilh_sigurd_creek_csy/este_sigurd_mp_draft_2009.pdf

Tetrahedron Provincial Park Management Plan, January 1997. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/tetrahed/tetra_mp.pdf?v=1524693074009

Pinecone-Burke Provincial Park Management Plan. Planning process is underway (2019). Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/pinecone-burke/pinecone-burke-mp.html

Cypress Provincial Park Master Plan, June 1997. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/cypress/cypress_mp.pdf

Porteau Cove Provincial Park Master Plan, November 1990. Available at: http://www.env.gov.bc.ca/bcparks/explore/parkpgs/porteau/

Alice Lake Provincial Park Purpose Statement and Zoning Plan, December 2002. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/alicelk/alicelk_ps.pdf?v=1558563965670

Skwelwil'em Squamish Estuary Wildlife Management Area Management Plan, August 2007. Available at: https://squamish.ca/assets/PDF/3.14.4-Skwelwilem-WMA-Management-Plan-2007.pdf

Stawamus Chief Provincial Park Management Plan, March 1997. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/stawamus/stawamus_mp.pdf?v=1558564569607

Shannon Falls Provincial Park Master Plan, December 1995. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/shannon_falls/shannon_falls_mp.pdf?v=1558564718102

Murrin Provincial Park Master Plan, October 1981. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/murrin/murrin_mp.pdf?v=1558564391757

Halkett Bay Provincial Marine Park Master Plan, December 1989. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/halkett/halkett_mp.pdf?v=1558564279045

Apodaca Provincial Park Master Plan, November 1983. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/apodaca/apodaca_mp.pdf?v=1558564055449

Plumper Cove Provincial Marine Park Master Plan, December 1980. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/plumper/plumper_cove_mp.pdf?v=1558564468690

Bowen Island Ecological Reserve Management Statement, March 1990. Available at: http://www.env.gov.bc.ca/bcparks/planning/mgmtplns/bowen_er/bowen_ms.pdf?v=1558564168832

Bowen Island Parks Plan Final Draft, 2018. Available at: https://bowenisland.civicweb.net/document/155270

Mt. Artaban Nature Reserve Management Plan, June 2009. Available at: http://www.islandstrustconservancy.ca/media/10352/itfmgmtplanartaban.pdf

David Otter Nature Reserve Management Plan, May 2007. Available at: http://www.islandstrustconservancy.ca/media/10358/itfmgmtplandotter.pdf

Brigade Bluffs Nature Reserve and Long Bay Wetland Nature Reserve Management Plan, May 2007. Available at: http://www.islandstrustconservancy.ca/media/10346/itfmgmtplanbbay.pdf

19.5 Species Lists (to be annexed)

[Provide a list of important species occurring within the proposed biosphere reserve, including common names, wherever possible.]

- **Appendix A: Wildlife Species Occurring in Átl'ka7tsem/Howe Sound**
- **Appendix B: Marine Species Occurring in Átl'ka7tsem/Howe Sound**
- **Appendix C: Vascular And Non-Vascular Plants and Lichen/Fungi Species Occurring in Átl'ka7tsem/Howe Sound**

19.6 List of main bibliographic references (to be annexed)

[Provide a list of the main publications and articles of relevance to the proposed biosphere reserve over the past 5-10 years].

- **Appendix D: Bibliography of Selected References**

19.7 Original Endorsement letters according to paragraph 5.

- **Appendix E: Letters of Support**
  - Squamish Nation
  - Fisheries and Oceans Canada
  - Ministry of Forests, Lands, Natural Resource Operations and Rural Development for the Province of BC
  - Village of Lions Bay
  - Metro Vancouver
  - District of Squamish
  - Bowen Island Municipality
  - District of West Vancouver
  - Sunshine Coast Regional District
  - Town of Gibsons
  - Squamish Lillooet Regional District
  - Gambier Island Local Trust Committee
  - Islands Trust Council

19.8 Further supporting documents.

- **Appendix F: Additional letters of support**
  - Patrick Weiler, Member of Parliament, West Vancouver-Sunshine Coast-Sea to Sky Country
  - Jordan Sturdy, Member of the Legislative Assembly, West Vancouver - Sea to Sky
  - MLA Nicholas Simons, Member of the Legislative Assembly, Powell River – Sunshine Coast
  - Resort Municipality of Whistler
  - The Keats Island Conservation Group
  - Coastal Ocean Research Institute, Ocean Wise
  - Gambier Island Conservancy
  - Squamish Environmental Conservation Society
  - David Suzuki Foundation
  - My Sea to Sky
  - West Vancouver Memorial Library
  - Squamish River Watershed Society
  - Bowen Island Conservancy
  - Future of Howe Sound Society
  - Sunshine Coast Conservation Association
  - BC Spaces for Nature
  - Dr. David Zandvliet, Simon Fraser University

- **Appendix G: Further supporting documents**
  - Principles for Cooperation – Howe Sound Community Forum
  - Letter of Engagement Capilano University
  - Guiding Principles HSBRIS and AHSBR Roundtable
  - Culture of Engagement
  - Terms of Reference AHSBR Roundtable
  - Terms of Reference AHSBR Selection Committee
  - HSBRIS 2021-2022 Operating Budget
  - Photography credits

20 Addresses

20.1 Contact address of the proposed biosphere reserve:

[Government agency, organization, or other entity (entities) to serve as the main contact and to whom all correspondence within the World Network of Biosphere Reserves should be addressed.]

Ruth Simons
P.O. Box 465
Lions Bay, BC V0N2E0
Canada
604 921-6564
howesoundbri@gmail.com
www.howesoundbri.org.

20.2 Administering entity of the core area(s):

BC Parks
Jennie Aikman
Regional Director
South Coast Region
BC Parks
604 398-5913
jennie.aikman@gov.bc.ca

Fisheries and Oceans Canada
Regional Headquarters
200-401 Burrard St
Vancouver BC
V6C 3S4
Rebecca Reid
Regional Director General
Pacific Region
604-666-6098
Rebecca.Reid@dfo-mpo.gc.ca

20.3. Administering entity of the Buffer Zone(s):

Ministry of Forests, Lands and Natural Resource Operations and Rural Development
Dave Southam
District Manager
Sea to Sky Natural Resource District
604 898-2141
dave.southam@gov.bc.ca

District of West Vancouver
750 17th Street,
West Vancouver BC
V7V 3T3

Fisheries and Oceans Canada
Regional Headquarters
200-401 Burrard St
Vancouver BC
V6C 3S4
Rebecca Reid
Regional Director General
Pacific Region
604-666-6098
Rebecca.Reid@dfo-mpo.gc.ca

20.4. Administering entity of the Transition Area(s):

Village of Lions Bay
PO Box 141,400 Centre Road,
Lions Bay, BC
V0N 2E0
604 921-9333

District of Squamish
37955 2 Ave,
Squamish, BC
V8B 0A3

Bowen Island Municipality
981 Artisan Ln,
Bowen Island, BC
V0N 1G2

District of West Vancouver
750 17th Street,
West Vancouver BC
V7V 3T3

Sunshine Coast Regional District
1975 Field Road,
Sechelt, BC
V0N 3A1

Town of Gibsons
474 S Fletcher Rd,
Gibsons, BC
V0N 1V0

Squamish Lillooet Regional District
PO Box 219,
Pemberton, BC
V0N 2L0

Gambier Island Local Trust Committee
700 North Road,
Gabriola Island, BC
V0R 1X3

Metro Vancouver
4730 Kingsway,
Burnaby BC,
V5H 0C6

Rights and Titles Department
Squamish Nation
320 Seymour Blvd,
North Vancouver, BC
V7J 2J3

Annex i

MABnet Directory of Biosphere Reserves Description

Administrative details

Country: Canada
Name of BR: Átl'ka7tsem/Howe Sound Biosphere Reserve
Year designated: (to be completed by MAB Secretariat)
Administrative authorities: (17.1.3) Howe Sound Biosphere Region Initiative Society
Name Contact: (20.1) Ruth Simons
Contact address: (Including phone number, postal and email addresses) (20.1) P.O. Box 465, Lions Bay, BC V0N2E0 Canada
Related links: (web sites) www.howesoundbri.org
Social networks: (16.4.3) Facebook: https://www.facebook.com/HoweSoundbri.org/, Twitter: https://twitter.com/HoweSoundBRI, Instagram: howesoundbiosphere

Description

General description:

(Site characteristics in 11.1; human population in 10)

Approximately 25 lines

The proposed Átl'ka7tsem/Howe Sound Biosphere Region (AHSBR), includes approximately 2000 km2 of mountainous coastal terrain on the eastern shores of the Salish Sea between the Vancouver metropolitan area and the mountain resort community of Whistler. The central geographic feature of AHSBR is Howe Sound, a glacially-carved coastal inlet or fjord that extends 42 km inland from the Salish Sea to the mouth of the Squamish River. Howe Sound is broad and island-strewn at its mouth with the Salish Sea but narrows inland into a steep-walled finger of ocean that continues to the head of the fjord. AHSBR includes the marine waters of Howe Sound, its islands, and adjacent watershed areas to the east, west and north. AHSBR includes much of the region referred to as "Sea to Sky Country" that lies along Highway 99 between Vancouver and the mountain resort town of Whistler. Within the boundaries of AHSBR are the iconic geographies of Sea to Sky Country: coastal communities, rugged shorelines, forested islands, rich estuaries, cascading waterfalls, dormant volcanoes, alpine lakes and peaks and tumbling glaciers (Figures 1-8). From top to bottom – from the summit of the highest peak at 2,678 metres to 325 metres deep below the waters of Howe Sound – there is a great diversity of habitat and life.

Today, Átl'ka7tsem/Howe Sound contains a total population of almost 46,000 persons, the vast majority of which are permanent residents. In addition, the region is situated on the doorstep of Metro Vancouver, the third largest city in Canada, with a population of about 2.6 million people. Otherwise known as Hwy 99, the unforgettably spectacular cliffside roadway (Lonely Planet Guide) Sea to Sky Highway is the main route from Metro Vancouver to the Resort Municipality of Whistler, home to 11,854 and visited by over 2 million during the year. There are three major communities within the AHSBR, each serving as anchors on the east and west sides of the Sound's entrance: Gibsons to the west and Horseshoe Bay in West Vancouver to the east. Squamish/Brackendale are located at the north end of the fjord, with smaller communities distributed along its east and west shores, and a few permanently and seasonally inhabited islands in the Sound.

Major ecosystem type: (14.1)

Marine systems, fresh water systems, terrestrial systems

Major habitats & land cover types: (11.6)

- **Terrestrial Habitats:** temperate rainforest and alpine tundra
- **Freshwater and Riparian Habitats:** rivers and lakes; wetlands and riparian systems
- **Marine Habitats:** nearshore and benthic habitats; sponge reefs; estuaries; eelgrass beds; beaches/ kelp beds/algae; pelagic waters
- **Land Cover Types:** urban areas; rural and agricultural areas

Bioclimatic zone (11.5)

AHSBR is located within the Temperate Oceanic Bioclimatic Zone of the world,

Location (latitude & longitude): (6.1)

Cardinal Points:	Latitude	Longitude
Most central point:	49° 39.608'N	123° 12.782'W
Northernmost point:	50° 03.341'N	123° 15.119'W
Southernmost point:	49° 19.216'N	123° 21.970'W
Westernmost point:	49° 29.634'N	123° 37.356'W
Easternmost point:	49° 37.755'N	122° 48.209'W

Area: (7)

Zone	Terrestrial (ha)	Marine (ha)	Total (ha)
7.1 Core Areas	42,218	160	42,378
7.2 Buffer Zones	28,461	1,910	30,371
7.3 Transition Areas	113,056	32,918	145,974
Total	**183,735**	**34,988**	**218,723**

[1] To be posted on the MABnet once the nomination has been approved. The numbers refer to the relevant sections of the nomination form.

Different existing zonation: (7.4)

Frontcountry Area zoning and Scenic Area

Resource Exclusion Areas

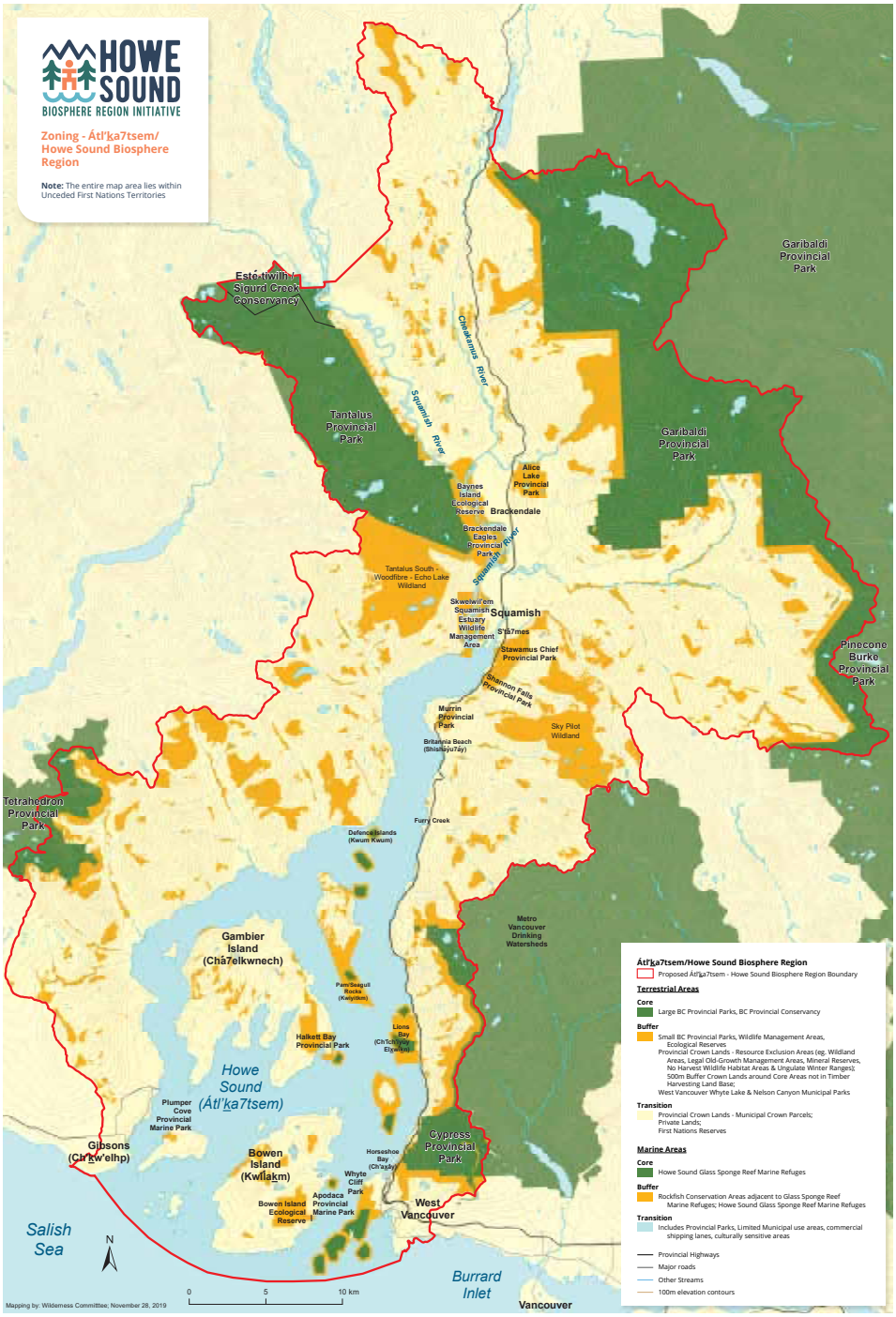
Altitudinal range (metres above sea level): (11.2)

Highest Elevation above sea level: 2,678 metres (Mt. Garibaldi)

Lowest Elevation above sea level: 0 metres (coast line, Pacific Ocean)

For coastal/marine areas, maximum depth below mean sea level: 325 m (sea floor, Howe Sound, 2 km WSW of Furry Creek).

Zonation map(s): (6.2)



Main objectives of the biosphere reserve

Brief description (13.1)

Approximately 5 lines

1. For there to be an overarching holistic land and marine use plan for the Átl'ka7tsem/Howe Sound region that is mutually recognized and respected by First Nations, civil society, stakeholders and all levels of government. 2. Biodiversity conservation needs in the region are understood and defined, and measures are in place to ensure conservation of critical ecological values. 3. People, culture and humanity in the region thrive in harmony with nature.

Research

Brief description (16.1.1)

Approximately 5 lines

For over 40 years Howe Sound marine area has been the focus of research on various species, more recent attention given to the newly discovered glass sponge reefs. Research through various institutions is being conducted on cumulative effects, climate, species at risk, carbon sequestering.

Monitoring

Brief description (16.1.1)

Approximately 5 lines

Monitoring is conducted by various government agencies in partnership with non government organizations. Air quality, sunlight/temperature, wind and water and are undertaken for the region by Environment Canada, the BC Ministry of Environment and regional governments.

Site specific monitoring of pollutants, erosion and water quality are conducted by local governments and industry. The Former Britannia Copper mine is a long term monitoring site.

Hummingbird, photo: B. Wilson

Specific Variables

Abiotic		Biodiversity	
Abiotic factors	X	Afforestation/Reforestation	X
Acidic deposition/Atmospheric factors		Algae	X
Air quality	X	Alien and/or invasive species	X
Climate, climatology	X	Amphibians	X
Contaminants	X	Arid and semi-arid systems	X
Drought	X	Autoecology	X
Erosion	X	Beach/soft bottom systems	X
Geology	X	Benthos	X
Geomorphology		Biodiversity aspects	X
Geophysics		Biogeography	
Glaciology		Biology	X
Global change	X	Biotechnology	
Groundwater	X	Birds	X
Habitat issues	X	Boreal forest systems	
Heavy metals	X	Breeding	
Hydrology	X	Coastal/marine systems	X
Indicators	X	Community studies	X
Meteorology	X	Conservation	X
Modelling		Glass sponge reefs	X
Monitoring/methodologies		Degraded areas	X
Nutrients	X	Desertification	
Physical oceanography	X	Dune systems	
Pollution, pollutants	X	Ecology	X
Siltation/sedimentation		Ecosystem assessment	X
Soil		Ecosystem functioning/structure	X
Speleology		Ecosystem services	X
Topography		Ecotones	
Toxicology		Endemic species	X
UV radiation		Ethology	
		Evapotranspiration	
		Evolutionary studies/Palaeoecology	X
		Fauna	X
		Fires/fire ecology	X
		Fishes	X
		Flora	X
		Forest systems	X
		Freshwater systems	X
		Fungi	
		Genetic resources	

		Biodiversity *(continued...)*	
		Genetically modified organisms	
		Home gardens	
		Indicators	X
		Invertebrates	X
		Lichens	X
		Mammals	X
		Microorganisms	X
		Migrating populations	X
		Monitoring/methodologies	X
		Natural and other resources	
		Natural medicinal products	
		Perturbations and resilience	X
		Pests/Diseases	
		Phenology	
		Phytosociology/Succession	
		Plankton	X
		Plants	
		Polar systems	
		Pollination	X
		Population genetics/dynamics	X
		Productivity	X
		Rare/Endangered species	X
		Reptiles	X
		Restoration/Rehabilitation	X
		Species (re) introduction	X
		Species inventorying	X
		Taxonomy	X
		Temperate grassland systems	
		Vegetation studies	X
		Wetland systems	X
Socio-Economic		**Integrated Monitoring**	
Agriculture/Other production systems	X	Biogeochemical studies	
Agroforestry		Carrying capacity	X
Anthropological studies	X	Climate change	X
Aquaculture	X	Conflict analysis/resolution	
Archaeology		Ecosystem approach	X
Bio-prospecting		Education and public awareness	X
Capacity building		Environmental changes	X
Cottage (home-based) industry	X	Geographic Information System (GIS)	X

Socio-Economic *(continued...)*		**Integrated Monitoring** *(continued...)*	
Cultural aspects		Impact and risk studies	X
Demography	X	Indicators	X
Economic studies	X	Indicators of environmental quality	X
Economically important species	X	Infrastructure development	X
Energy production systems		Institutional and legal aspects	X
Ethnology/traditional practices/knowledge	X	Integrated studies	X
Firewood cutting		Interdisciplinary studies	X
Fishery	X	Land tenure	X
Forestry	X	Land use/Land cover	X
Human health	X	Landscape inventorying/monitoring	X
Human migration		Management issues	X
Hunting	X	Mapping	X
Indicators	X	Modelling	X
Indicators of sustainability	X	Monitoring/methodologies	X
Indigenous people's issues	X	Planning and zoning measures	X
Industry		Policy issues	X
Livelihood measures	X	Remote sensing	
Livestock and related impacts		Rural systems	
Local participation	X	Sustainable development/use	X
Micro-credits		Transboundary issues/measures	X
Mining	X	Urban systems	X
Modelling		Watershed studies/monitoring	X
Monitoring/methodologies	X		
Natural hazards	X		
Non-timber forest products	X		
Pastoralism			
People-Nature relations	X		
Poverty	X		
Quality economies/marketing			
Recreation	X		
Resource use	X		
Role of women			
Sacred sites	X		
Small business initiatives	X		
Social/Socio-economic aspects	X		
Stakeholders' interests	X		
Tourism	X		
Transports	X		

Annex ii

Promotion and Communication Materials for the Proposed Biosphere Reserve

Provide some promotional material regarding the proposed site, notably high quality photos, and/or short videos on the site so as to allow the Secretariat to prepare appropriate files for press events. To this end, a selection of photographs in high resolution (300 dpi), with photo credits and captions and video footage (rushes), without any comments or sub-titles, of professional quality – DV CAM or BETA only, will be needed.

In addition, return a signed copy of the following Agreement on Non-Exclusive Rights. A maximum of ten (10) minutes on each biosphere reserve will then be assembled in the audiovisual section of UNESCO and the final product, called a B-roll, will be sent to the press.

United Nations Educational, Scientific and Cultural Organization

Organisation des Nations Unies pour l'éducation, la science et la culture

Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura

Организация Объединенных Наций по вопросам образования, науки и культуры

منظمة الأمم المتحدة للتربية والعلم والثقافة

联合国教育、科学及文化组织

UNESCO Photo Library
Bureau of Public Information

Photothèque de l'UNESCO
Bureau de l'Information du Public

AGREEMENT GRANTING NON-EXCLUSIVE RIGHTS

The following 7 photographs:

Reference:

Backpacker above Garibaldi Lake;
Point Atkinson, Lighthouse Park;
Seal hunting anchovy off Bowen Island;
Squamish Nation blessing ceremony for new canoe;
Squamish River and valley
View of Squamish River estuary from Stawamus Chief mountain
View of Vancouver from mountain top, Bowen Island

1. a) I the undersigned, copyright-holder of the above mentioned photo(s) hereby grant to UNESCO free of charge the non-exclusive right to exploit, publish, reproduce, diffuse, communicate to the public in any form and on any support, including digital, all or part of the photograph(s) and to licence these rights to third parties on the basis of the rights herein vested in UNESCO

b) These rights are granted to UNESCO for the legal term of copyright throughout the world.

c) The name of the photographer will be cited alongside UNESCO's whenever his/her work is used in any form.

2. I certify that:

a) I am the sole copyright holder of the photo(s) and am the owner of the rights granted by virtue of this agreement and other rights conferred to me by national legislation and pertinent international conventions on copyright and that I have full rights to enter into this agreement.

b) The photo(s) is/are in no way whatever a violation or an infringement of any existing copyright or licence, and contain(s) nothing obscene, libellous or defamatory.

Name and Address : **Bob Turner, 710 Minnows Lane, Bowen Island, BC V0N1G2**
Date : **Sept 5, 2020**

Signature :

(sign, return to UNESCO two copies of the Agreement and retain the original for yourself)

United Nations Educational, Scientific and Cultural Organization

Organisation des Nations Unies pour l'éducation, la science et la culture

Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura

Организация Объединенных Наций по вопросам образования, науки и культуры

منظمة الأمم المتحدة للتربية والعلم والثقافة

联合国教育、科学及文化组织

UNESCO Photo Library
Bureau of Public Information

Photothèque de l'UNESCO
Bureau de l'Information du Public

AGREEMENT GRANTING NON-EXCLUSIVE RIGHTS

Reference: **1. Rockfish on Sponge**

2. Halkett Bay Sponge Reef

1. a) I the undersigned, copyright-holder of the above mentioned photo(s) hereby grant to UNESCO free of charge the non-exclusive right to exploit, publish, reproduce, diffuse, communicate to the public in any form and on any support, including digital, all or part of the photograph(s) and to licence these rights to third parties on the basis of the rights herein vested in UNESCO

b) These rights are granted to UNESCO for the legal term of copyright throughout the world.

c) The name of the photographer will be cited alongside UNESCO's whenever his/her work is used in any form.

2. I certify that:

a) I am the sole copyright holder of the photo(s) and am the owner of the rights granted by virtue of this agreement and other rights conferred to me by national legislation and pertinent international conventions on copyright and that I have full rights to enter into this agreement.

b) The photo(s) is/are in no way whatever a violation or an infringement of any existing copyright or licence, and contain(s) nothing obscene, libellous or defamatory.

Name and Address: Adam Taylor 843 Hummingbird Lane Bowen Island BC V0N 1G1

Date: Sept 6 2020

Signature:

(sign, return to UNESCO two copies of the Agreement and retain the original for yourself)

AGREEMENT GRANTING NON-EXCLUSIVE RIGHTS

Reference:

1. Howe Sound Sunset
2. Howe Sound Islands
3. Heart of Howe Sound Gambier Island
4. Orca in the Sound.

1. a) I the undersigned, copyright-holder of the above mentioned photo(s) hereby grant to UNESCO free of charge the non-exclusive right to exploit, publish, reproduce, diffuse, communicate to the public in any form and on any support, including digital, all or part of the photograph(s) and to licence these rights to third parties on the basis of the rights herein vested in UNESCO

b) These rights are granted to UNESCO for the legal term of copyright throughout the world.

c) The name of the photographer will be cited alongside UNESCO's whenever his/her work is used in any form.

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Name and Address : Richard Duncan Photography.
Po box 2895
Garibaldi BC.
V0N 1T0.
Date : Sept 8, 2020

United Nations Educational, Scientific and Cultural Organization

Organisation des Nations Unies pour l'éducation, la science et la culture

Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura

Организация Объединенных Наций по вопросам образования, науки и культуры

منظمة الأمم المتحدة للتربية والعلم والثقافة

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Date : Sept. 8, 2020

Signature : Ruth Simons

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UNESCO - Man and the Biosphere (MAB) Programme - Biosphere reserve nomination form - January 2013

Mailing address: 7 Place Fontenoy, 75352 Paris 07 SP, Direct Telephone: 00331 – 45681687
Direct Fax: 00331 – 45685655; e-mail: photobank@unesco.org;
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