DISCOVERY
ASPIRING GEOPARK

HALF A BILLION YEARS IN THE MAKING

DISCOVERY ASPIRING GEOPARK APPLICATION DOSSIER FOR UNESCO GLOBAL GEOPARKS

Table of Contents

A Identification of the Area

A.1 Name and Identity of the Proposed Geopark

The applicant is the **Discovery Aspiring Geopark**, located on the Bonavista Peninsula, Newfoundland Labrador, Canada.

The Discovery Aspiring Geopark respectfully acknowledges its territory is part of the ancestral homelands of the Indigenous People of the region. Historical and archaeological records document the now-extinct Beothuk People lived throughout the northeast coast of the island of Newfoundland, particularly in areas surrounding Notre Dame Bay and Bonavista Bay. As an extinct cultural group, they had a unique language and culture deeply based upon resources from the land and sea. Early explorers would most likely have encountered Indigenous peoples.

The name "discovery" originates and references the historic landing of Italian explorer Giovanni Caboto (or John Cabot) when he first discovered the new found land on June 24, 1497. According to legend, upon landing and finding the sea teaming with cod fish, his first words were "O buono vista!". When translated into English, this phrase means "Oh happy sight!", a fitting description for the historic town now known as Bonavista, the site of Cabot's North America landing.

Statue of John Cabot along the Discovery Trail, Cape Bonavista, Newfoundland.

Cape Bonavista Lighthouse Provincial Historic Site, Caper Bonavista, Newfoundland.

> *O buono vista!*

A.2 Location of the Proposed Geopark

The Aspiring Geopark is located on the upper half of the Bonavista Peninsula on the eastern coast of the island of Newfoundland, Canada. The proposed Geopark is positioned along a series of highways aptly named the "Discovery Trail", via Route 233 or 230. The geographic region is approximately 3 hours from both Gander and the Argentia ferry, and 3½ hours from the capital city of St. John's.

The proposed Geopark is within the existing political and management boundaries and covers a geographical area extending from just south of Ireland's Eye Island (48.177934, -53.506716) in the east through to Southern Bay Station (48.383037; -53.671541) in the west, to the tip of the Bonavista Peninsula (48.718797, -53.089501) in the north east and to north of Western Head to the south west (48.646801, -53.428559).

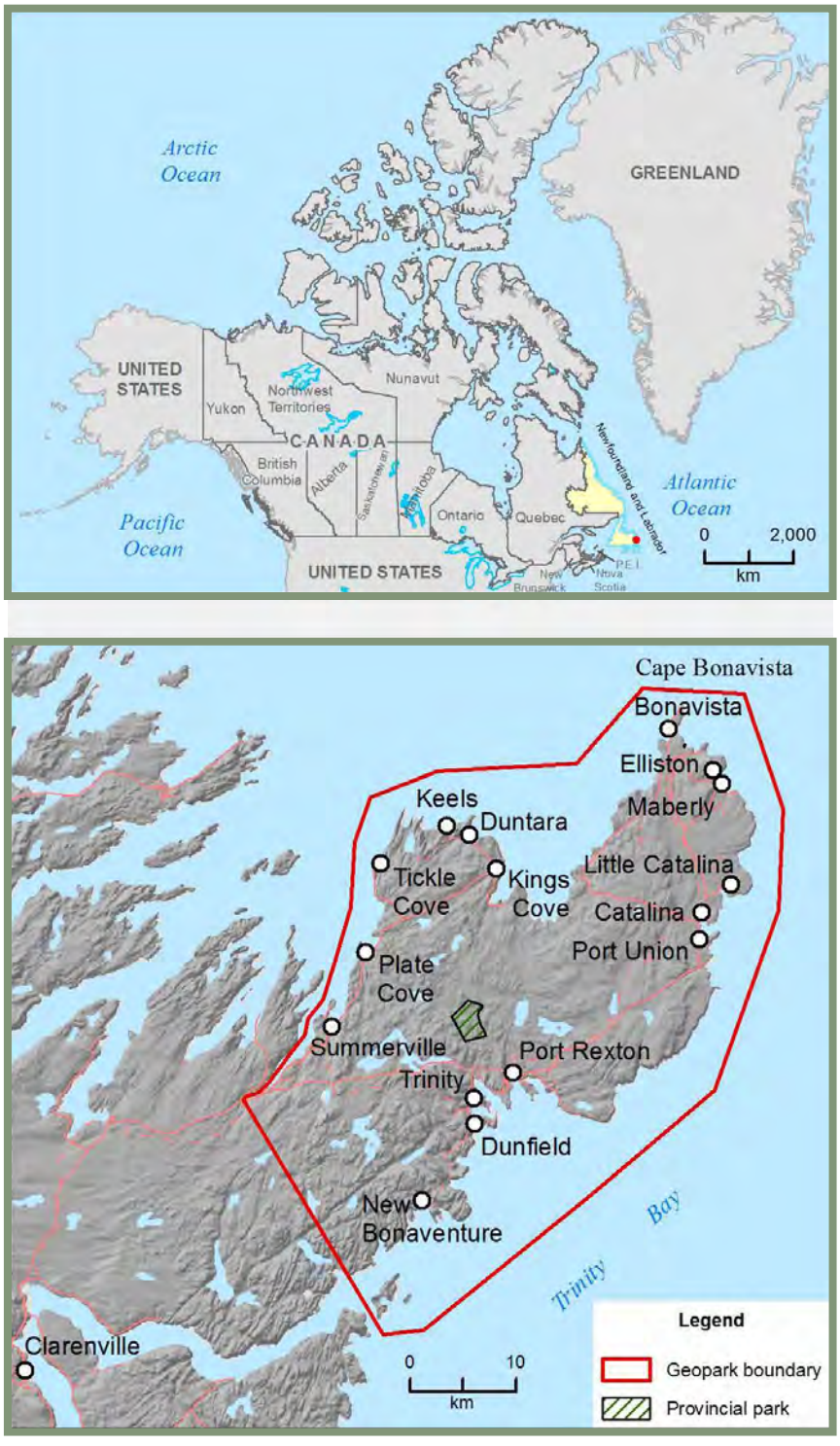

Figure 1. Location of Bonavista Peninsula within Newfoundland Labrador, Canada. Boundary of the Discovery Aspiring Geopark is identified.

A.3 Surface Area, Physical and Human Geography Characteristics

The region of the aspiring Geopark includes approximately 280 km of stunning rugged coastline and incorporates an area of approximately 1150 km². The boundary of the Discovery Aspiring Geopark comprises 27 communities, including seven incorporated municipalities, and a population of about 8000 people (2016 Census).

While there are no Indigenous communities with Land Claims within the proposed Geopark boundaries, the current population comprises descendants of English, French, Scottish and other European immigrants. Situated in a portion of their ancestral homeland, the Beothuk people are honoured at the Beothuk Interpretation Centre Provincial Historic Site. Located in Boyd's Cove, the centre houses exhibits, artifacts and the remains of a Beothuk village site celebrating the Beothuk people who once occupied the province.

The aspiring Geopark has a land surface having elevations up to 350 metres above sea level. Much of the area is below 180 metres with the higher elevations corresponding to the western edge of the more resistant geological unit of the Musgravetown Group. The Bonavista Peninsula is flanked by Trinity Bay (down to 500 metres deep) and Bonavista Bay (down to 200 metres deep), and incised by fiord valleys including Clode Sound, Goose Bay, Sweet Bay and Southern Bay on the north coast, and Northwest Arm and Smith Sound on the south coast. These fiords reach depths of 200 metres.

The Discovery Aspiring Geopark's history is based upon subsistence living along this coastal backdrop. The landscape is diverse, comprising three ecodistricts: North Shore Forest in the west, Northeastern Barrens Subregion in the east and Eastern Hyper - Oceanic Barrens Ecoregion in the northeastern tip of the Bonavista Peninsula. Due to its strategic geographical positioning, and the influences of climatic, geological and glacial factors, the region has a diverse ecological setting with a corresponding natural diversity of plant and animal communities. The coastal geography of the area is formed from the action of the ocean. The entire Bonavista Peninsula, apart possibly from Elliston – Burnt Ridge near Bonavista, was covered by ice during the last, late Wisconsinan, glacial period. The town of Bonavista sits on a wide marine terrace having formed during the retreat of the last ice sheet and subsequent isostatic rebound. Bonavista's unique landscape compares to the region's neighbouring communities which are largely populated along steep cliffs and hill sides sitting around jagged harbours, providing protection from the oceans storms. The resulting richness of geodiversity and biodiversity is protected in two Provincial Parks (Lockston Path and the Dungeon Provincial Park), one National Historic District (Port Union, Trinity Bay North) and one National Historic Site (Ryan Premises, Bonavista) within the aspiring Geopark.

The Spirit of the Beothuk, created by Gerald Squires.

The region has a diverse ecological setting due to climatic, geological and glacial factors. Ocean waves, ice, wind, and weather have shaped everyday life in this coastal region. The elements have shaped the landscape, controlling where communities were established, and how its citizens live and interact with the diverse flora and fauna living within their natural habitat. Leading plants along the shoreline are large brown seaweeds and kelp. Inland through the boreal forests and barrens are lichens, mosses, Tuckamoor, Balsom Fir, and the province's official flower the Pitcher Plant, an herbaceous plant which is stylized as part of the brand logo for Newfoundland Labrador.

The proposed Geopark area is also home to an abundance of wildlife including moose, rabbits, beavers, mink, otters, various inland fish including trout and salmon, birds and migratory waterfowl (Canada Geese and duck), partridge, eagles, osprey (fish hawks), and the ever popular Atlantic Puffin which can be found burrowing at Cape Bonavista and Elliston.

The Bonavista Peninsula is a key tourism destination, showcasing a rich cultural heritage, local folklore and traditions, and an enchanting colorful history. The preservation of built heritage is evident throughout the region, but especially well-known in the communities of Trinity, Port Union, Elliston, Bonavista and King's Cove. The region boasts structures of architectural and historical significance, community and marine infrastructure. There is an array of restored buildings and properties, churches, lighthouses, fishing wharves, flakes and stone root cellars. The region also offers Provincial and National Historic Sites, internationally acclaimed hiking trails, boat tours, kayaking, museums, galleries, theatres, restaurants, tea rooms, shops and accommodations. The Bonavista Peninsula's economic development has historically been based on the fishing industry. Today, 25 percent of the economic activity is derived from the tourism industry. Nature, culture, and history of the peninsula continue to be the backdrop for artists, writers, theatre, film makers, culinary festivals and visitors.

Newfoundland and Labrador's diverse geology has played a key role in shaping the very fabric of daily life. It reveals a unique opportunity to connect how our geological past shapes the landscape, where we live, what we eat, and economic activity. One of the contributing factors to Newfoundland's diverse wealth and economic activity is its proximity to the geological boundary of the North American continent. This boundary lies offshore at the edge of the continental shelf. The shelf varies in width from about 100 km off Labrador to over 600 km off the east coast of the island of Newfoundland. It includes relatively shallow areas known as banks, and deeper areas, known as troughs, or channels.

The Grand Banks of Newfoundland is a group of underwater plateaus south-east of Newfoundland. These areas are relatively shallow, ranging from 15 to 91 metres in depth. The cold Labrador Current mixes with the warm waters of the Gulf Stream here. The mixing of these waters and the shape of the ocean bottom lifts nutrients to the surface. These conditions helped to create one of the richest and largest fishing grounds in the world. Fish species include Atlantic cod, swordfish, haddock and capelin; shellfish include scallop and lobster. The area also supports large colonies of seabirds such as northern gannets, shearwaters and sea ducks and various sea mammals such as seals, dolphins and whales.

Life on the Bonavista Peninsula has revolved around the fishery for thousands of years. Indigenous peoples first settled along the coastline of Bonavista Bay to look for shellfish, trout and salmon. The migration of the cod into the bay and harbours around Bonavista created an abundant harvest. Within a few years of Cabot's voyage the existence of fishing grounds on the Grand Banks became generally known in Europe. Ships from France and Portugal were first to fish there, followed by those from Spain. These fish stocks thus became important for the early economies of Newfoundland and were the main reason European settlers established permanent colonies on the island.

For many years fish plants dotted the coastline where inshore and offshore fleets would land their catch. Those who did not fish worked in the processing plants and local businesses supplying the fishing industry. The economy flourished. Much of everyday life revolved around the sea until the Bonavista Peninsula was negatively impacted by major changes in the fishing industry throughout the 1990's. In 1992, a moratorium was imposed on fishing of many species, including cod. The region suffered a significant decline in population as displaced fishery workers relocated to find employment elsewhere. Many local businesses closed including five of the six fish processing plants in operation. Those remaining in the fishing industry began to look to other species of fish to diversify.

Fishing boats in Bonavista Harbour.

A.4 Organization in Charge and Management Structure

The Discovery Aspiring Geopark governing body supports a collaborative and inclusive approach to encouraging responsible management and empowering communities. The governing authority is truly grassroots. The governing organization has been proudly building strong relationships through community and resident engagement in the planning and direct management of the aspiring Geopark initiatives.

The governing organization is the Discovery Aspiring Geopark Incorporated (DAGI), a provincially incorporated not-for-profit organization. It is a self-governing interim working management board, representing many organizations and communities, including incorporated municipalities, individuals, support agencies and experts across several disciplines. Board members are admitted in accordance to the Interim Constitution and Bylaws. More information about the organization, administration, and management can be found in DAGI's Management Plan (Annex 7).

A.4.1 Board Membership

The membership of DAGI and its Interim Board of Directors shall consist of not more than thirteen persons. The Interim Board of Directors is comprised of nine voting and four non-voting (ex officio) members representing various stakeholders. The nine voting members include two private sector representatives, six not for profit representatives and one geopark operator (membership) position. The non-voting members include two representatives (one from the education sector and one resource partner representative) and two government representatives, one from a Federal and Provincial Government Department. All of the appointments to the Interim Board shall be for a two year term. During the proposed Geopark's application year, the interim working-management board will transition to a traditional board. At the Annual General Meeting, the board will elect four executive positions: Chair, Vice-Chair, Secretary and Treasurer. The board's officers will be selected by a majority vote every two years.

Strategic oversight and management of the activities of the DAGI shall be vested in the Directors. At least six Interim Board of Directors meetings shall be held during the fiscal year. Within the current organization are a majority of the organizations or government departments who have authority over most of the Geosites. Some key members, such as Trinity Historical Society, Sir William Ford Coaker Heritage Foundation, Municipality of Trinity Bay North, Tourism Elliston, Town of Bonavista, and the King's Cove Historical Society represent much of the existing tourism industry within the region. Government departments and municipal governments involved represent geoscientists, archivists, anthropologists, site managers, the provincial college system (local Bonavista campus of the College of the North Atlantic), funding agencies, and managers of existing trail networks and exterior tourism infrastructure throughout the region.

Discovery Aspiring Geopark Organization

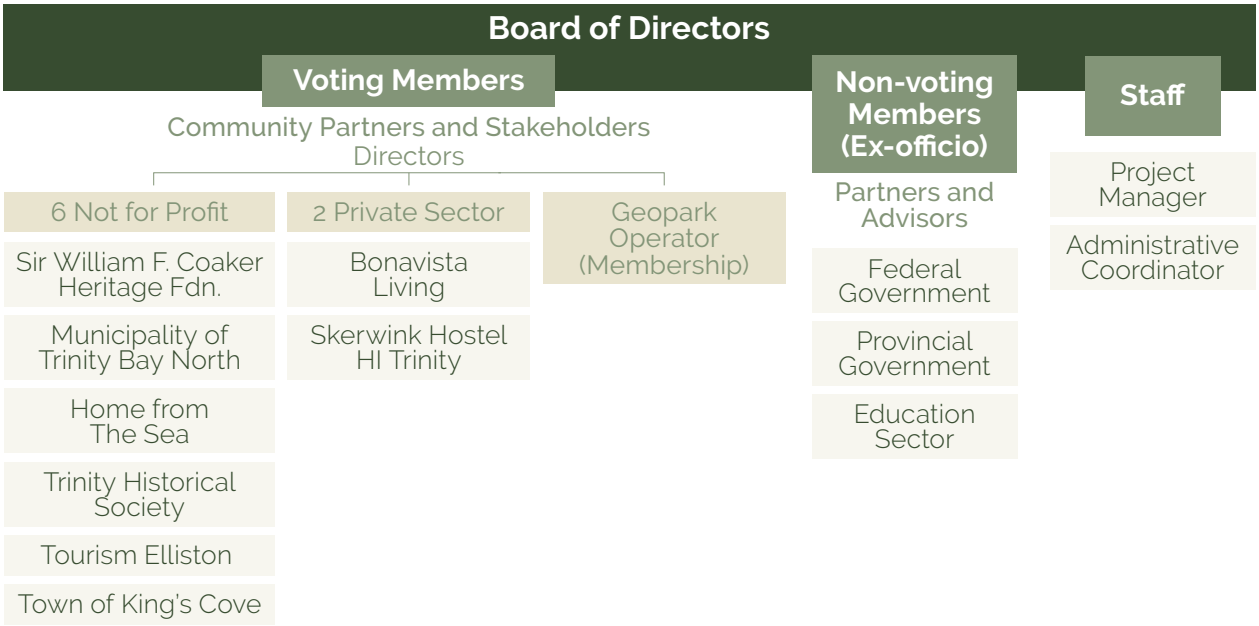

Figure 2. Discovery Aspiring Geopark Inc. Organogram.

A.4.2 Board Committees

The Discovery Aspiring Geopark's managing authority has formed five working committees. Each committee is to be comprised of a minimum of one voting board member in either a chair or vice-chair capacity. The remaining committee members may be comprised of other board members, including ex-officio members, and members of the community at large. The chair or vice-chair acts as liaison between the board and the working committees. Each committee will make recommendations as per their terms of reference and present them to the board for resolution. The committees of the Discovery Aspiring Geopark include:

1. Finance and Administration;
2. Organizational Governance;
3. Preservation, Stewardship and Education;
4. Community and Cultural Connections;
5. Sustainable Economic Development and Marketing.

Finance and Administration

This committee acts as an advisory body on all matters relating to the day-to-day operations, staffing and general financial affairs. The committee assists the Board of Directors in enhancing DAGI's financial viability, and advising on matters relating to administration, finance, accounting, fundraising, and major expenditure items.

Organizational Governance

This committee acts as an advisory body to the Board of Directors for organizational governance and questions relating to DAGI. The committee advises the Board of Directors on all aspects of organizational governance, strategic planning, related questions, and to facilitate effective organizational governance.

Preservation, Stewardship and Education

This committee acts as the technical advisory body, to review technical material for scientific value, accuracy and authenticity. The committee seeks to ensure the preservation, conservation and stewardship of Geosites. The committee advises the Board of Directors on educational programming and activities to schools, students, stakeholders, patrons and other UNESCO Global Geoparks. This committee also facilitates a coordinated approach between the managing agency, local organizations and stakeholders, ensuring the preservation and stewardship of the Geopark's sites, developing educational awareness, advocacy and site recognition activities.

Community and Cultural Connections

This committee acts as an advisory body on all matters relating to strengthening the community, cultural, arts, heritage and indigenous connections. The committee is to help advance the mission of DAGI within the community through effective public relations, community engagement opportunities and collaborating with the education and public outreach initiatives.

Sustainable Economic Development and Marketing

This committee acts as an advisory body to the Board of Directors for the branding and developing partnerships. The committee is to provide direction on all aspects of branding and marketing to ensure continuity and brand recognition. This committee also facilitates strong, sustainable economic development through partnerships with the business and not-for-profit community. The long term focus is on business growth through the Discovery Aspiring Geopark brand.

A.4.3 Administration

The Discovery Aspiring Geopark will store its administrative records at the Bonavista - Trinity Regional Chamber of Commerce. Located in the Town of Bonavista, the Regional Chamber of Commerce delivers services, support, and communications to its members and the business community, while keeping informed of local, provincial, and federal government issues that affect businesses and citizens on the Bonavista Peninsula.

The aspiring Geopark will utilize existing infrastructure and or buildings throughout the Bonavista Peninsula, as necessary, for display areas for exhibits, presentation and educational space. The Discovery Aspiring Geopark aims to be sustainable, responsible and inclusive of the greater region in its decision-making.

A.4.4 Functions of the Organization

A Shared Vision - The Discovery Aspiring Geopark has experienced many years of transformation and growth, guiding and shaping its vision, mission, goals and core values. The aspiring Geopark aims to embrace, advance and implement the United Nation's 17 Sustainable Development Goals (SDGs) as it continues to build capacity for the Geopark initiatives.

Figure 3. The United Nation's Sustainable Development Goals (SDGs).

Vision

Our vision is for a Geopark that can be enjoyed by everyone to experience and appreciate the importance of their geological heritage. The Geopark exists to promote excellence in geoconservation, and to contribute to local economies through the advancement of the Sustainable Development Goals (SGDs).

> *"...be enjoyed by everyone to experience and appreciate the importance of their geological heritage.*

Mission

We support people and organizations to work collaboratively to ensure conservation of geoheritage, to ensure better understanding about our natural environment, to promote sustainable tourism, providing a vibrant community and strengthening livelihoods.

Goals

1. To strategically plan and promote the sustainable development of the Discovery Aspiring Geopark region with special focus on sites of geological, natural and cultural value, by developing actions and implementing activities that benefit the region.
2. To protect and conserve the region's natural heritage, with particular emphasis on geological heritage and its enhancement as a resource, for the economic and social development for the community.
3. To promote and support research, education (both formal and informal) and the dissemination of the Earth sciences regionally, provincially, nationally and internationally.
4. To promote and facilitate nature based tourism, with special focus on sites of geological value, as they relate to cultural heritage, within a framework of sustainability and to improve the quality of visitor experiences.
5. To facilitate an environment conducive to economic activities compatible with the goals of the Discovery Aspiring Geopark, particularly initiatives designed to promote local products. [1] *For the purposes of this document, "local products" are local crafts, and food sourcing using local products.*
6. To actively seek and collaborate with diverse partner stakeholders that can help further the aims of the Discovery Aspiring Geopark and its managing organization.
7. To support and promote the objectives of a sustainable UNESCO Global Geopark.

These values form how we work together to fulfill our Vision, our Mission and our Goals.

Values

respect *collaboration* *safety*
engagement *stewardship* *sustainability*

A.4.5 Project Team

Technical Support

The following experts provide advice and technical support to the Discovery Aspiring Geopark management team. The Discovery Aspiring Geopark respectfully acknowledges and thanks all those who have contributed to this application and ongoing initiatives.

Geoscience

Dr. Alana Hinchey, Manager of Regional Mapping Section, Geological Survey of Newfoundland Labrador, Department of Natural Resources, Government of Newfoundland Labrador

Andrea Mills, Project Geologist, Geological Survey of Newfoundland Labrador, Department of Natural Resources, Government of Newfoundland Labrador

Neil Stapleton, Computer Systems Analyst and the Cartographic Team, Geological Survey of Newfoundland and Labrador, Department of Natural Resources, Government of Newfoundland Labrador

Dr. Jack J. Matthews, Postdoctoral Research Fellow, Memorial University of Newfoundland, Oxford University Museum of Natural History

Dr. Alexander G. Liu, University Lecturer in Palaeobiology, University of Cambridge

Dr. Emily G. Mitchell, Department of Earth Sciences, University of Cambridge

Governance

Jamie Best, Campus Manager, Bonavista Campus of College of the North Atlantic

Tourism and Economic Development

Scott Andrews, Manager, Provincial Historic Sites, Department of Tourism, Culture, Industry and Innovation, Government of Newfoundland Labrador

John Angelopoulos, Strategic Tourism Product Division, Department of Tourism, Culture, Industry and Innovation, Government of Newfoundland Labrador

Paula Roberts, Regional Economic Development, Department of Tourism, Culture, Industry and Innovation, Government of Newfoundland Labrador

Nancy Robbins, Regional Development Officer, Atlantic Canada Opportunities Agency (ACOA), Government of Canada

Tourism Team, Parks Canada, Government of Canada

A.5 Application Contact Person

The Discovery Aspiring Geopark team is comprised of the Interim Board of Directors and two employees.

A full time Project Manager/Geologist has been hired to work closely with the management board and committees. This individual provides day to day management of the aspiring Geopark initiatives and is supported by a part time Administrative Coordinator.

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Chair, Discovery Aspiring Geopark
T: +1 709 468-7789
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A.6 Website and Social Media

discoverygeopark.com

@DiscoveryGEOPark
@DiscoveryGEONL
@DiscoveryGEONL
linkedin.com/in/discoverygeopark

B Geological Heritage

B.1 General Geological Description of the Region

B.1.1 Geologic Zones of Newfoundland

The rocks of Newfoundland are divided into major geologic zones (Figure 4). The zones, from west to east, are Humber, Dunnage, Gander and Avalon. While the Humber Zone has been part of North America for at least the last billion years (1000 million), the other three zones are relative newcomers.

During the Proterozoic, 900 million years ago, the Earth was dominated by the supercontinent Rodinia. During the late Proterozoic (early Ediacaran, 600 million years ago), this supercontinent broke apart forming smaller continents, with small oceans between them.

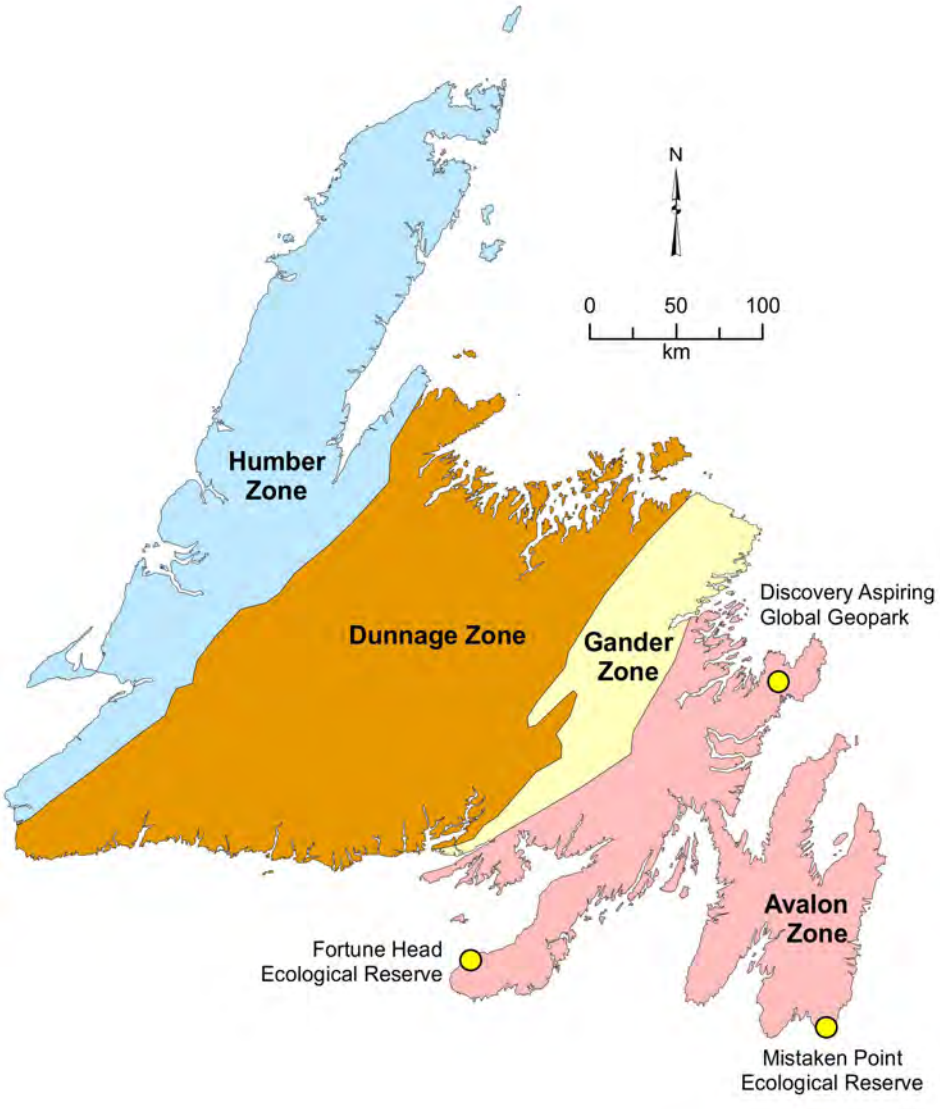


Figure 4. Major Geologic Zones of Newfoundland.

The super-continents of Laurentia and Gondwana eventually formed from this break-up. A mid-ocean ridge developed between Gondwana and Laurentia as the new ocean began to open (Figure 5). This ocean was called Iapetus. At that time Gondwana and Laurentia were separating and as a result Newfoundland's western Humber Zone formed the eastern edge of Laurentia on a northwestern margin of the Iapetus.

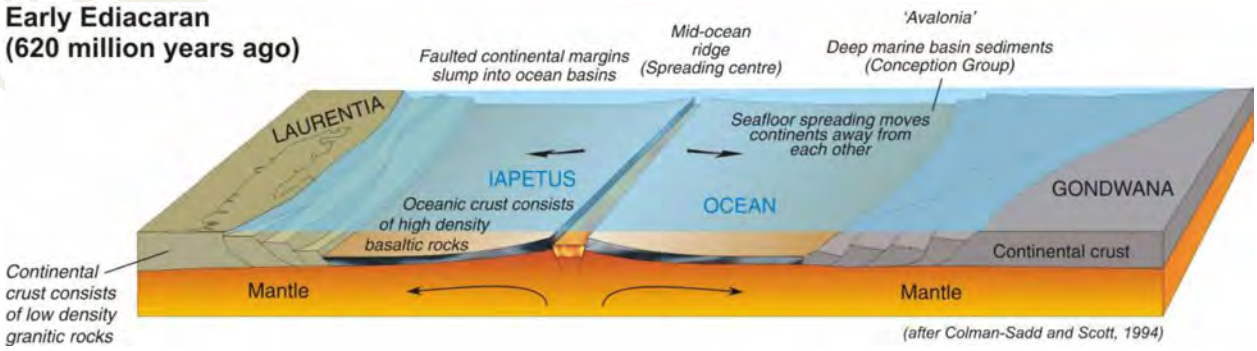


Figure 5. Development of Subduction Zone.

In the middle Ediacaran, 580 million years ago, a subduction zone developed on the margin of the Iapetus Ocean adjacent to the northern continental margin of Gondwana (Figure 6), and a narrow chain of island arc volcanoes developed above this subduction zone. The development of this island arc sequence is the earliest history of what can now be seen in the Discovery Aspiring Geopark since this chain resulted in the formation of Avalonia and the fossilization of Ediacaran organisms.

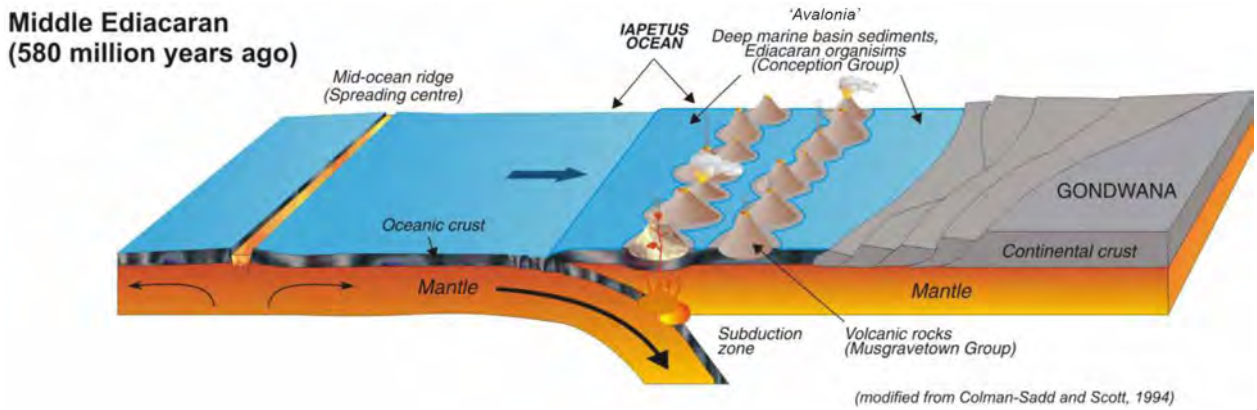


Figure 6. Development of Island Arc Sequence and Avalonia.

Approximately 515 million years ago, during the middle Cambrian, a subduction zone formed on the other side of the spreading ridge, and ocean crust began to subduct beneath Laurentia (Figure 7). By the early Ordovician, volcanic island arcs had developed above the second subduction zone, as the floor of the Iapetus Ocean sank back into the mantle. Today, the remains of the oceanic crust and these island arcs are preserved in the volcanic and intrusive rocks of the Dunnage and Gander Zones of Newfoundland.

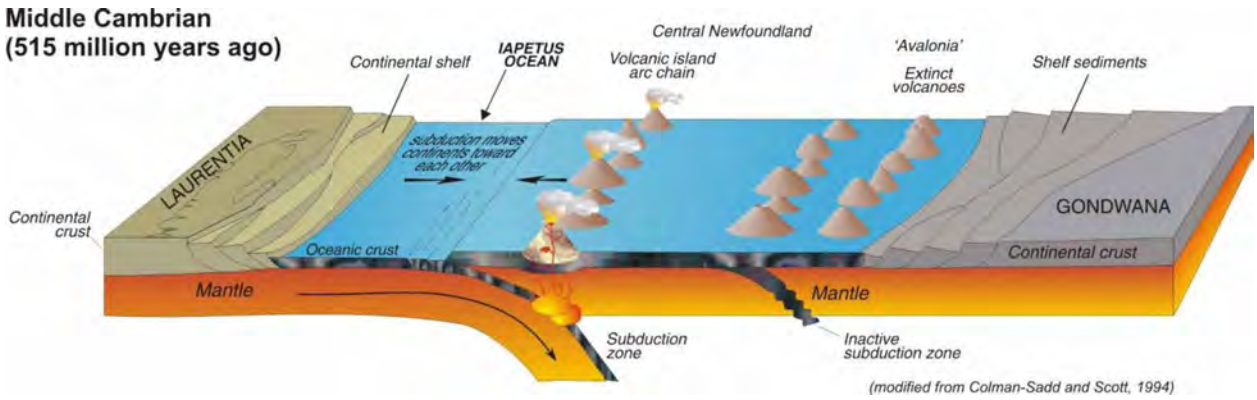


Figure 7. The Split of Avalonia from Gondwana.

Due to the subduction of the Iapetus Ocean seafloor, the water body began to close, and Laurentia and Gondwana were slowly pulled together (Figure 8). Key to the formation of the Bonavista region is the fact that approximately 480 million years ago, in the early Ordovician, Avalonia split away from Gondwana, becoming a drifting micro-continent and behind it formed the Rheic Ocean. At the same time the Iapetus Ocean continued to shrink in front of it.

What is now the island of Newfoundland ended up in the interior of this new continent until the early Jurassic when the continents broke apart to form the present Atlantic Ocean. This break did not occur exactly along the old Iapetus Ocean suture, but instead lay just east of it, leaving fragments of Gondwana still attached to Laurentia.

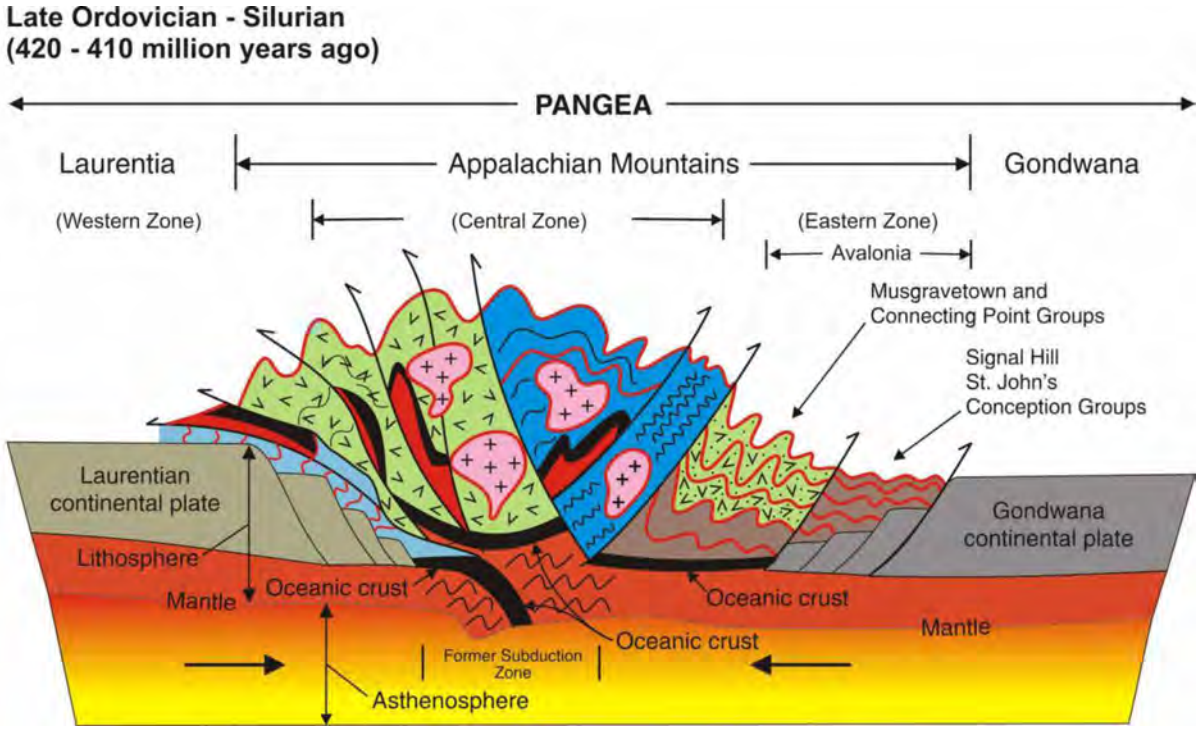


Figure 8. Pangea, the formation of Newfoundland.

One of these fragments, Avalonia, constitutes the Eastern Zone of modern day Newfoundland and the Bonavista Peninsula (Figure 9). The southern half of the mountain range that marked the line of the Iapetus Ocean closure and continent-continent collision now form the Appalachian Mountains of eastern North America, running from Alabama in the USA to Newfoundland, Canada. The northern half is to be found across the Atlantic Ocean in Scotland and Scandinavia.

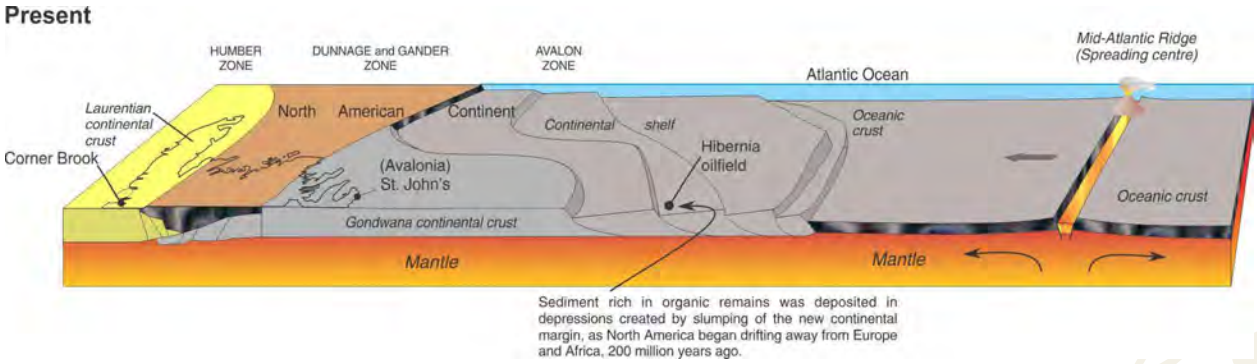


Figure 9. Present Day Newfoundland with Major Geologic Zones.

Over the last 150 million years there have been profound developments. The oil reservoirs found on the Grand Banks formed. Continued seafloor spreading separated the Grand Banks from Spain and Portugal, the Appalachian Mountains from the Caledonide Mountains, and later the Precambrian shields of Labrador, Greenland and Norway.

B.1.2 Regional Geology and Scientific Activity

Scientific Activity within the Region

The first recorded geological investigations within the region of the aspiring Geopark were made during Sir Martin Frobisher's late sixteenth century expeditions. Frobisher documented the widespread occurrence of coarse-grained metallic mineralization (initially identified as gold and copper) in slates on the coastline near Catalina, Trinity Bay North. The same exposures were later visited by members of one of Sir Humphrey Gilbert's expeditions; samples were collected and sent for assay in England, where the mineralization was correctly identified as pyrite. Despite the early interest in its geology and minerals, the Bonavista Peninsula's geological diversity was unknown.

In 1864, the first systematic geological investigations began, when the Geological Survey of Newfoundland was formed by Sir William Logan, who appointed Alexander Murray as director. Murray and his assistant (and eventual successor), James Howley, were pioneering geologists whose work lead to the first geological map of Newfoundland, published in 1907. The Geological Survey was revived in the 1930s under the leadership of Government Geologist A.K. Snelgrove, who was working at Princeton University. It was under his guidance that a continuous series of geological investigations began within the country's Department of Natural Resources.

After Confederation, a single Provincial geologist, sometimes with one or two assistant geologists, carried out regional investigations, and little classical geological mapping was being done due to limited funding. Hayes and Rose (1948) mapped the westernmost part of the Bonavista Peninsula between Trinity and Placentia Bays. They correlated rocks in the westernmost Bonavista Peninsula with those in the Clode Sound area of Bonavista Bay; all were assigned to their newly defined Musgravetown Group. The Geological Survey of Canada (GSC) completed a broad reconnaissance survey of the larger Bonavista map area in the summer of 1949. This work was published as a 1:125 000 preliminary map (Christie, 1950) and was integrated with other regional bedrock mapping (e.g., Hayes, 1948 at 1:125 000 scale; Jenness, 1963 at 1:250 000 scale; Younce, 1970 at 1:63 360 scale).

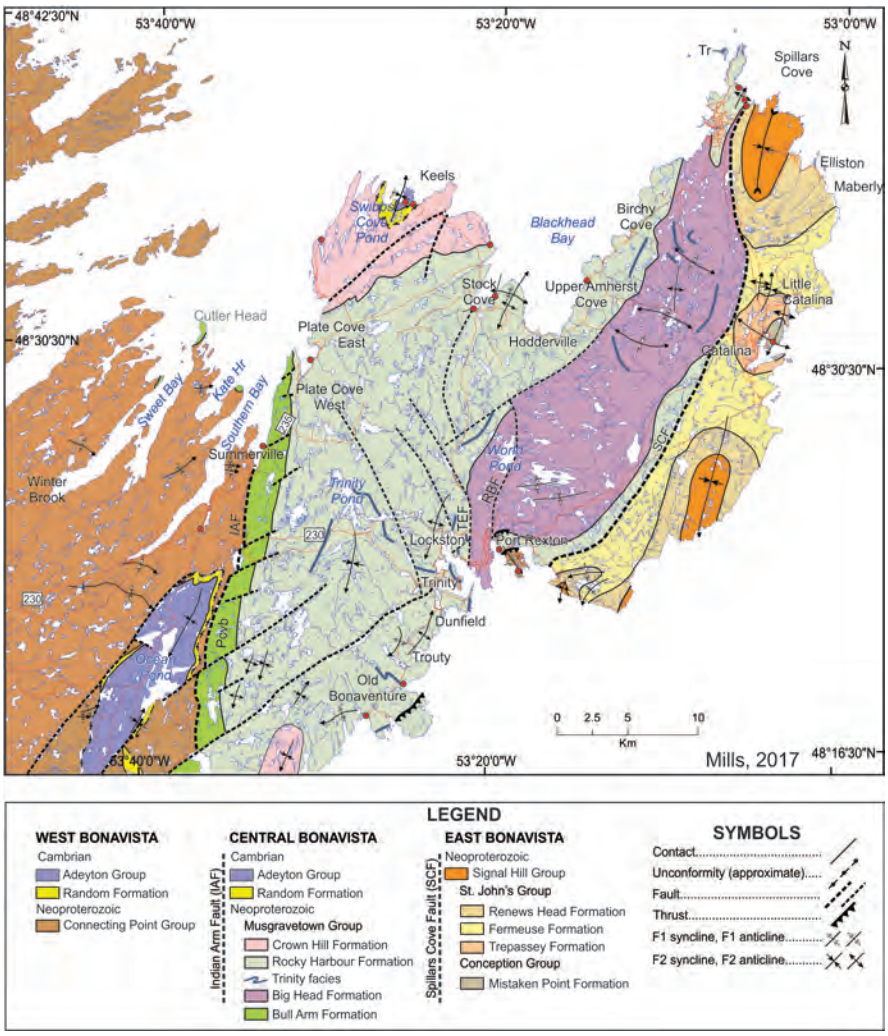


Figure 10. Geology of Bonavista Peninsula (Mills, 2017).

No further regional bedrock mapping was conducted until the late 1980s and early 1990s. The Geological Survey of Newfoundland and Labrador (GSNL) initiated surveys focused on areas west of Bonavista Bay and the westernmost Bonavista Peninsula in the Eastport and Sweet Bay area (O'Brien, 1987, 1992, 1993, 1994; Knight and O'Brien, 1988; O'Brien and Knight, 1988). Regional lake-sediment geochemical surveys were carried out on the Bonavista Peninsula in 1981 (Butler and Davenport, 1981), and with follow-up stream sediment and soil geochemical surveys in 1985 (Butler and Davenport, 1985).

The Geological Survey of Newfoundland and Labrador's bedrock mapping research in the early 2000s played a critical role to major changes to the stratigraphic framework of the eastern Bonavista Peninsula. This was largely due to recognizing correlative units to the Conception, St. John's and Signal Hill groups, including the discovery of the fossiliferous Mistaken Point Formation containing the internationally significant Ediacaran fossil beds (O'Brien and King, 2002, 2004, 2005). During this time, the GSNL also included a regional till-geochemistry survey of NTS 2C map area (Batterson and Taylor, 2001). A 1:50 000-scale regional mapping project began in 2009, and bedrock mapping was completed in the Trinity, Bonavista and Random Island map sheets (Normore, 2010, 2011, 2012).

In 2011, the GSNL began collecting remote-sensing and ground-based data in the Bonavista Peninsula (Knights Cove and Sandy Beach) as part of the province-wide coastal monitoring program. This research provides information on coastal change and associated hazards to communities and stakeholders for planning and management decisions (Irvine, 2012, 2013, 2014, 2015 and 2018). These ongoing coastal studies allow for the measurement of temporal changes in landscape morphology and sediment characteristics.

Despite all this, there is still much to be done within the region. Currently, an ongoing regional bedrock mapping project aims to produce an updated geological map of the Bonavista Peninsula. The geodiversity within the region of the Discovery Aspiring Geopark continues to provide a challenge for researchers in creating a modern, regional tectonic context and structural model (Mills, 2014; Mills and Sandeman, 2015; Mills, Dunning and Langille, 2016; and Mills, Calon and Peddle, 2016.

Mineral Exploration with the Region

Other than investigations by local area prospectors, one of the only exploration programs for base metals, prior to the late 1990s, was carried out by Cominco, who briefly investigated select geochemical anomalies for lead and zinc that had been identified in earlier government surveys. In the mid-1990s, variegated slates that occur in tightly folded Cambrian rocks at Keels were test quarried on a small scale. Slate deposits in correlative rocks occur south of the area studied, at Nut Cove, in Smith Sound, Trinity Bay, where the Hurley Slate Works Inc. is currently producing purple and green roofing slate from rocks first quarried commercially between 1850 and 1907. In 1999, prospectors with Cornerstone Resources Inc. discovered significant chalcocite mineralization in the uppermost Proterozoic red bed succession in the northwestern Bonavista Peninsula (Red Cliff Property). Recent drilling on the property (near Duntara) by joint venture partners, Cornerstone Resources Inc. and Noranda Inc., intersected a chalcocite-bearing, pyritic grey sandstone–siltstone unit within the red beds, which returned assays of 1% Cu and 12.1 g/t Ag over 14.25 m including 2% Cu and 23.1 g/t over 6 m (see Cornerstone Resources Inc. press releases 01- 10). An overview of the mineral economic potential of the region is presented in Hinchey (2012).

B.1.3 Geodiversity

Discovery Aspiring Geopark's Geological History

- Two eons (Proterozoic and Phanerozoic);
- Three eras (Neoproterozoic, Paleozoic and Cenozoic);
- Four geological periods (Ediacaran, Cambrian Triassic and Quaternary) spanning over 600 million years;
- Sixteen lithological units.

The number of rocks types is expansive; dominated by an extensive volume of sedimentary rocks, and to a lesser extent plutonic and volcanic rocks. There are sixteen lithological units found within the Geopark, the most abundant are the deep sea sediments that span much of the region.

Geological features and structures are very diverse ranging from 620 Ma to 200 Ma. The aspiring Geopark also preserves recent geomorphological features formed during the late Wisconsinian glacial period. This glacial period began about 25,000 years ago, reached its peak at 18,000, and ended between 13,000 and 8,000 years ago. During that time, most of the northern half of North America was covered with ice up to 3 km thick. On the Bonavista Peninsula, coastal areas were ice-free by 13,000 years ago and most ice was gone by 10,000 years ago. Evidence of this glacial event is found throughout the aspiring Geopark, including, marine terraces, raised beaches, pebble beaches, and erratics. The area preserves wonderful examples of dynamic earth processes of coastal erosion, with sea stacks, wave action, tidal currents, and movement of beach sand.

Major Geological Units

The Avalon Terrane is dominated by a complex assemblage of Neoproterozoic sedimentary, volcanic and plutonic rocks developed between 760 and 540 Ma; these are overlain by Cambrian and locally Ordovician sedimentary rocks of shallow-water setting.

Early development of the Avalon Terrane is dominated by volcanism and plutonism considered to be of broadly arc-related character. The assembly of these individual arcs into a composite terrane was followed by the development of sedimentary basins during the time period now termed the Ediacaran (~630 Ma to 542 Ma). In a general sense, Ediacaran sedimentary rocks of the Connecting Point and Musgravetown groups (western Avalon zone) and the Conception, St. John's and Signal Hill groups (eastern Avalon zone) constitute shallowing-upward sequences that progress from deep marine to shallow water and then to terrestrial and alluvial environments. However, the western and eastern sequences differ in lithology and depositional environments. At the top of these (both eastern and western) sequences, a marine transgression indicates a return to marine conditions in Cambrian times, and the base of the Cambrian sequence ranges from a local disconformity with respect to the terrestrial Crown Hill Formation (upper Musgravetown Group) to an angular unconformity with older Connecting Point Group rocks. The

Ediacaran in the western Avalon Terrane was also marked by extensive bimodal volcanism of the Bull Arm Formation, which sits near the base of the Musgravetown Group in the central part of the Avalon Terrane.

The Bonavista Peninsula region is dominated by Ediacaran sedimentary rocks juxtaposed with older volcanic and plutonic rocks to the west, by a series of faults. Volcanic rocks of the Bull Arm Formation occur on the western part of the peninsula (the Plate Cove volcanic belt), and Cambrian rocks are preserved as synclinal outliers in two main areas (Ocean Pond and Keels areas). The sedimentary rocks of the eastern extremity of the peninsula are demarcated by an important fault zone called the Spillars Cove – English Harbour fault zone from the time-equivalent sequences of the Conception, St. John's and Signal Hill groups, for which the type areas are in the eastern Avalon Peninsula. Much of the sedimentary rocks on the eastern side of the Bonavista Peninsula are assigned rocks to a lower marine sequence (Rocky Harbour Formation) within the Musgravetown Group. The Bonavista Peninsula thus preserves portions of two discrete sedimentary basins that are separated by the Spillars Cove – English Harbour fault zone. New age constraints suggest that rocks west of the Spillars Cove – English Harbour fault zone are markedly older than those to the east.

B.2 Listing and Description of Geological Sites

B.2.1 Geological Storyline

The Discovery Aspiring Geopark is dominated by its striking coastlines. The hiking trails within the region give visitors remarkable vistas of a host of coastal formations, including caves, arches, and sea stacks. Through these stunning landscapes, active geomorphological processes can be viewed at the interface between land and sea. The area also contains a varied history of glaciations. The earliest deposits formed during the last great ice age of the Precambrian, approximately 580 million year ago. Marine terraces and deposits from the Quaternary Period are evidence from the Last Glacial Maximum. As well, Newfoundland and Labrador is also one of the few places in the world where you can watch icebergs pass by, with the majority being carved off Western Greenland.

From Sir Humphrey Gilbert's mining of pyrite as if it were gold in the 16th century, through to the stone root cellars used to store food through the fierce winters, to the modern rise in geotourism; geology has been a defining feature of life in this region.

The sites within the boundary of the aspiring Geopark tell the story of how a region's geological history has shaped the land, and the land has shaped the people and culture.

Sea Arch in Tickle Cove.

B.2.2 Inventory Method and Geosite Selection

An initial inventory of sites of geological significance was completed in 2011 by a geological consultant, in collaboration with the Geological Survey of Newfoundland and Labrador. There are 40 sites having international, national and/or regional geological significance. An inventory of all potential sites is maintained by the Geological Survey of Newfoundland and Labrador.

The Discovery Aspiring Geopark is comprised of a diverse collection of accessible sites dispersed throughout the Bonavista Peninsula. For inventory purposes, the sites have been grouped into six distinct Geosite areas and principally based upon tourism clusters within the region:

Table 1. Tourism Clusters and Regional Location of Geosites Summary Table.

Tourism Cluster	Regional Location	No. Geosites
A	British Harbour - English Harbour	11
B	Melrose - Port Union - Catalina-Little Catalina	11
C	Maberly - Elliston - Bonavista	10
D	Birchy Cove - King's Cove	4
E	Duntara - Keels	2
F	Tickle Cove - Open Hall	2

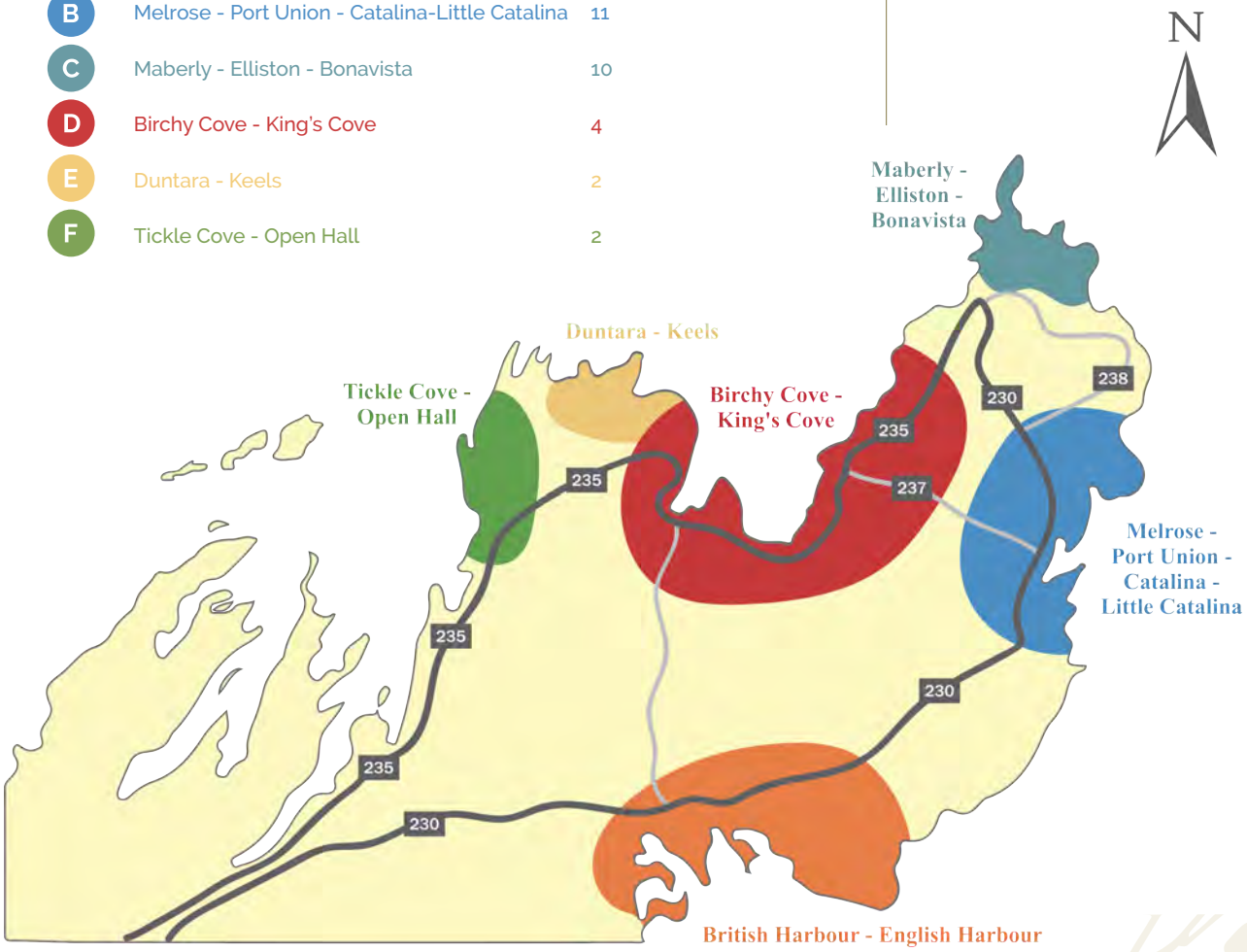


Figure 11. Regional Map with Tourism Clusters within the Discovery Aspiring Geopark.

Table 2. Summary Table of Sites of Geological Significance within the Discovery Aspiring Geopark.

Tourism Cluster A. Trinity Bight – English Harbour

Geosite #	Site Name	Naturally Occurring Geological/Geomorphological Features	Type of Geosite
A-1	Fort Point – Trinity – Fort Point Lighthouse	Marine terraces, faults, raised beach, abandoned wave-cut platform, sea stacks and ripple marks	• Glacial History • Coastal and Oceanic Landforms • Landscape
A-2	Trinity East –Skerwink Trail	Sea stacks, marine terraces, raised beach, barasway	• Coastal and Oceanic Landforms • Erosion Landforms
A-3	New Bonaventure – Cape Random – Random Passage Site	Sedimentary rocks, folding	• Lithology • Structural
A-4	Trinity – Lester–Garland House	Archaeology, slope failures and rockslides	• Archaeology • Natural Hazards
A-5	Champney's West – Fox Island Trail	Dipping sedimentary layers, sea stacks (Skerwink), marine terrace, raised beach and abandoned marine platform, barasway, shingle/pebble beach, stone wall construction	• Deposition • Coastal and Oceanic Landforms • Erosion Landforms
A-6	Port Rexton – Robin Hood Bay Beach	Shingle beach, barasway (coastal lagoon), marine terrace, raised beach, abandoned wave-cut platforms, ripple marks (cross section), tilting layers	• Coastal and Oceanic Landforms • Erosion Landforms
A-7	Port Rexton – Devil's Cove – Skiff Cove	Modern beach and raised beach, marine terrace and abandoned wave-cut platform, graded bedding, cross bedding (magnetic laminations), peperite	• Deposition • Coastal Geology
A-8	Dunfield	Ancient shorelines, glaciation, marine terrace, raised beach and abandoned wave-cut platform	• Glacial History • Coastal and Oceanic Landforms
A-9	Trinity East – Blackberry Point	Marine terrace, flow banding, raised beaches and abandoned wave-cut platforms	• Glacial History • Coastal and Oceanic Landforms
A-10	Port Rexton – Gun Hill Trail – Gun Hill	Cultural and historical connections; Vistas	• Coastal and Oceanic Landforms • Landscape • Cultural and Historical
A-11	Trinity – Gun Hill Trail – Gun Hill Trinity	Gateway to the Discovery Aspiring Geopark; Vista; Upper Trail gives a view of Trinity; Significance of the name Trinity (three bays), marine terraces	• Coastal and Oceanic Landforms • Landscape

Tourism Cluster B. Melrose – Port Union – Little Catalina – Catalina

Geosite #	Site Name	Naturally occurring Geological/Geomorphological Features	Type of Geosite
B-1	Port Union – National Historic District Boardwalk –Fossil Site	Ediacaran fossils and early life	• Fossils and Early Life
B-2	Port Union – Murphy's Cove Trail to Lodge's Pond Trail – Haootia	Ediacaran Fossils and early life, superposition of beds, folding, coastal erosion (coves and gulches)	• Fossils and Early Life • Coastal and Oceanic Landforms • Erosion Landforms
B-3	Port Union – Lodge's Pond Trail – Back Cove Tail – Long Point	Slumps, Ediacaran fossils and early life, natural water spout (during heavy seas - high waves), tilted and folded beds	• Fossils and Early Life
B-4	Catalina – Catalina Harbour West – Catalina Stone	Minerals and rocks, pyrite (fool's gold) and the 1500's geological discoveries	• History of Geological Resource Development
B-5	Little Catalina – Little Catalina Beach – Fossil Site	Ediacaran fossils an early life, sandy beach, marine terrace, raised beach, wave-cut platforms, slump-folds, sedimentary layers with cleavage	• Fossils and Early Life • Coastal and Oceanic Landforms
B-6	Little Catalina – Arch Rock Trail – Arch Rock	Coastal erosion (Sea arch, cove, gulches)	• Geomorphology • Coastal and Oceanic Landforms • Erosion Landforms
B-7	Melrose – Melrose Trail –Vista	Ediacaran fossils and early life; Coastal erosion (beach and barasway)	• Fossils and Early Life • Coastal Erosion
B-8	Catalina – Catalina Harbour Wharves – Fossil Site	Ediacaran fossils and early life	• Fossils and Early Life
B-9	Catalina – Goodland Point – Fossil Site	Ediacaran fossils and early life, tilting and folding, coves and beaches, graded beds, loadcasts and scours, folding and continental collision	• Fossils and Early Life • Tectonic Activity
B-10	Catalina – Lookout Pond Municipal Park – Glacial History Site	Municipal Park; Municipal operated facility; Hiking network around the pond Glacial scoured rock surfaces	• Glacial History
B-11	Little Catalina – Johnson Surface (H14) – Fossil Site	Ediacaran fossils and early life	• Fossils and Early Life

Tourism Cluster C. Maberly – Elliston – Bonavista

Geosite #	Site Name	Naturally occurring Geological/Geomorphological Features	Type of Geosite
C-1	Cape Bonavista – The Dungeon Provincial Park	Sea caves, sea arches, folding, blow-hole (gloup)	• Coastal Erosion • Erosion Landforms • Coastal and Oceanic Landforms
C-2	Elliston – Root Cellars Site and Puffin Colony Vista	Subsistence living and root cellar construction. Elliston viewing site offers the closest view of the Atlantic Puffin colony from land in North America	• Coastal Erosion • Landscape • Ecology • Cultural and Historical
C-3	Elliston – Coles Gulch	Historical and cultural connections and geological controls. Connection to outport Newfoundland life and the fishery. Link to the Grand Banks and the fishery	• Coastal Erosion • Erosion Landforms • Coastal and Oceanic Landforms • Cultural and Historical
C-4	Spillars Cove – Cable John Cove Klondike Trail and The Chimney	Formation of a sea stack, sea caves, sea arches, dykes, joints, frost heaves, igneous dyke forming sea stack	• Coastal Erosion • Erosion Landforms • Coastal and Oceanic Landforms
C-5	Cape Bonavista – Cape Bonavista Lighthouse	Raised beach, abandoned wave-cut platform, sea stack, bedding (cross and graded)	• Coastal Erosion • Coastal and Oceanic Landforms • Erosion Landforms • Glacial History
C-6	Bonavista – Ye Mathew Legacy	An interpretation centre telling the story of 500 years of history. Visitors can tour a replica of John Cabot's 15th-century ship	• Cultural and Historical
C-7	Maberly	Sea arch, sea stacks, sea caves, coastal erosion	• Coastal Erosion • Erosion Landforms • Coastal and Oceanic Landforms
C-8	Elliston – Burnt Ridge	An upland plateau characterized by lichen-covered rock, with a felsenmeer-like appearance ('sea of rock')	• Geomorphology • Glacial History
C-9	Bonavista – Long Beach – Lisbon Earthquake	The story of the Lisbon Earthquake Tsunami	• Natural Hazards
C-10	Bonavista – Ryan Premises National Historic Site of Canada	Historical and cultural connections and geology controls. Connection to the Grand Banks and the fishery	• Landscape • Coastal and Oceanic Landforms • Ecology • Cultural and Historical

Tourism Cluster D. Birchy Cove – King's Cove

Geosite #	Site Name	Naturally occurring Geological/Geomorphological Features	Type of Geosite
D-1	King's Cove – Lighthouse Trail – Brook Point and Lighthouse Site	Spectacular multi-colour bedrock layering, cross bedding, graded bedding, rip up clasts, mud cracks, river channels	• Sedimentary Environments • Sedimentary Structures • Sediments • Lithology • Geological Process
D-2	Black Bay – Blackhead Bay – Mega Ripples Site	Mega-ripple marks, glacial erratics, shingle beach, marine terrace, raised beach and abandoned wave-cut platform, cross bedding	• Sedimentary Environments • Sedimentary Structures • Geological Process • Glacial History
D-3	Amherst Cove	Layers, cross beds, large ripple marks	• Sedimentary Environments • Sedimentary Structures • Geological Process
D-4	Hodderville – Blackhead Bay – Ancient Beach Site	Shingle beach (rocky or pebble beach), cross-beds, ripple marks	• Sedimentary Environments • Sedimentary Structures • Sediments • Geological Process

Tourism Cluster E. Duntara – Keels

Geosite #	Site Name	Naturally occurring Geological/Geomorphological Features	Type of Geosite
E-1	Keels – Devil's Footprints	shingle (pebble) beach, anticline, syncline, bedding (cross bedding) and cleavage, Cambrian fossils, strata-bound concretions	• Sedimentary Environments • Sedimentary Structures • Geological Process
E-2	Duntara – Mudcracks Site	mud cracks, dipping layers, fault	• Sedimentary Environments • Sedimentary Structures • Geological Process

Tourism Cluster F. Tickle Cove – Open Hall

Geosite #	Site Name	Naturally occurring Geological/Geomorphological Features	Type of Geosite
F-1	Tickle Cove – Sea Arch	Marine terrace, raised beach and abandoned wave-cut platforms, barasway*, sea arch, cross bedding, cleavage, red and grey beds, erratic, scours, rip up clasts, load casts, tension gashes. *A barasway (or barachois) is a coastal lagoon separated from the ocean by a sand or shingle bar.	• Sedimentary Structures • Glacial History
F-2	Plate Cove East – Vista	Marine terrace, raised beach and abandoned wave-cut platforms	• Landscape • Vista

Some of these sites are fully accessible, with no restrictions for public tourism and/or education purposes. Other sites will have restricted access due to their sensitive nature. Sites of outstanding scientific value are the focus of ongoing study and active research projects, and will therefore not be actively promoted for geotourism purposes.

The sites have been grouped based upon site accessibility into four categories, A, B, C and D. Key site accessibility factors include a combination of the following: ease of access; safety; ownership; and geotourism potential. Additional information about site management can be found in the Discovery Aspiring Geopark Management Plan (Annex 7).

Based upon this inventory list, a short list of 10 key Geosites will be fully developed within this application period. Sites were selected based upon scientific significance, site management, regional location and accessibly. Other geological sites have been identified, but will be developed in a later phase.

Table 3. Summary Table of Developed Sites of Geological Significance within the Discovery Aspiring Geopark. These Geosites have a high level of geological heritage significance, educational value and varying levels of interpretation.

Table Heading Key

Site Accessibility Categories:

A = Geotourism (Full Access)
B = Geoeducation (Full Access)
C = Guided Interpretation (Limited Access)
D = No Geotourism (restricted Access)

Geosite #	Site Name	Naturally Occurring Geological/Geomorphological Features	Type of Geosite	A	B	C	D
A-11	Trinity – Gun Hill Trail – Gun Hill Trinity	Gateway to the Discovery Aspiring Geopark; Vista; Upper Trail gives a view of Trinity; Significance of the name Trinity (three bays), marine terraces	• Coastal and Oceanic Landforms • Landscape	●	●		
B-1	Port Union – National Historic District Boardwalk –Fossil Site	Ediacaran fossils and early life	• Fossils and Early Life	●	●	●	
B-2; B-3	Port Union – Murphy's Cove Trail to Lodge's Pond Trail – *Haootia*	Ediacaran Fossils and early life, superposition of beds, folding, coastal erosion (coves and gulches)	• Fossils and Early Life • Coastal and Oceanic Landforms • Erosion Landforms	●	●		
C-1	Cape Bonavista – The Dungeon Provincial Park	Sea caves, sea arches, folding, blow-hole (gloup)	• Coastal Erosion • Erosion Landforms • Coastal and Oceanic Landforms	●	●	●	
C-2	Elliston – Root Cellars	Subsistence living and root cellar construction. Elliston viewing site offers the closest view of the Atlantic Puffin colony from land in North America	• Coastal Erosion • Landscape • Ecology • Cultural and Historical	●	●		
C-4	Spillars Cove – Cable John Cove Klondike Trail and The Chimney	Formation of a sea stack, sea caves, sea arches, dykes, joints, frost heaves, igneous dyke forming sea stack	• Coastal Erosion • Erosion Landforms • Coastal and Oceanic Landforms	●	●		
C-9	Bonavista – Long Beach – Lisbon Earthquake	The story of the Lisbon Earthquake Tsunami	• Natural Hazards	●	●	●	
D-1	King's Cove – Lighthouse Trail – Brook Point and Lighthouse Site	Spectacular multi-colour bedrock layering, cross bedding, graded bedding, rip up clasts, mud cracks, river channels	• Sedimentary Environments • Sedimentary Structures • Sediments • Lithology • Geological Process	●	●		
E-1	Keels – Devil's Footprints	shingle (pebble) beach, anticline, syncline, bedding (cross bedding) and clevage, Cambrian fossils, strata-bound concretion	• Sedimentary Environments • Sedimentary Structures • Geological Process	●	●		
F-1	Tickle Cove – Sea Arch	Marine terrace, raised beach and abandoned wave-cut platforms, barasway, sea arch, cross bedding, clevage, red and grey beds, erratics, scours, rip up clasts, load casts, tension gashes	• Sedimentary Structures • Glacial History	●	●		

B.3 Details on the Value of Geological Sites

B.3.1 International Value

Emergence of Complex Life Forms

The coastal geology offers a unique opportunity to observe, study, and celebrate one of the most significant transitions in Earth's history: the Ediacaran Period, and its associated rise of animal life. The Catalina Dome comprises deep-marine siliciclastics containing bouma-type turbidites. It is upon the laterally extensive bedding planes that the exceptionally preserved remains of rangeomorph and other Ediacaran fossil forms are found. Often preserved beneath volcanic ash beds, the Catalina Dome fossil assemblage contains over 20 different taxa, and offers a globally significant opportunity for studies into the taphonomic, taxonomic, ecological, environmental, and stratigraphic contexts of the rise of large, complex life.

Rock layers exposed along the shoreline record a dramatic transition period in Earth history, from approximately 575 to about 525 million years ago (Ediacaran to early Cambrian periods). The oldest rocks on the Bonavista Peninsula formed in the diminishing stages of the Gaskiers glaciation, a period of extreme weather and worldwide glaciations, when micro-organisms clung to life

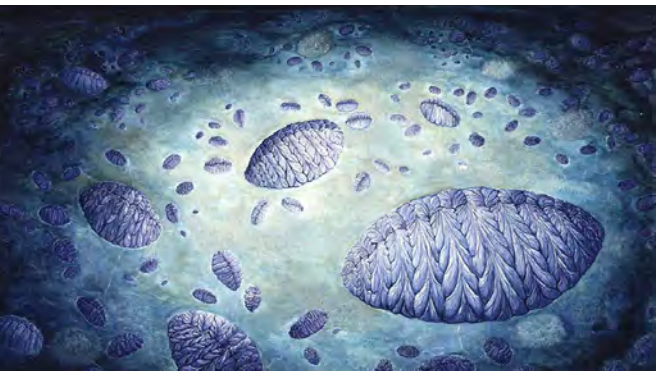
in a frigid, ice-covered ocean. The youngest rocks contain signs of recognizably modern, complex organisms such as sea-dwelling worms that thrived in a warming climate as a rising sea level encroached on the shore. What happened during the intervening time period as life mysteriously and rapidly evolved? Evidence found along the Discovery Aspiring Geopark's shoreline answers this question.

Ongoing Research Activity

The Bonavista Peninsula's remarkable geology and well-exposed coastal surfaces makes it a desirable research area. Since the discovery of the significant Ediacaran beds (O'Brien, King, 2004, 2004, 2005), researchers frequent the region to study the evolution of Ediacaran biota. Initial studies were conducted by the late Dr. Hans Hofmann of McGill University (Hofmann, O'Brien, King, 2008), however, today the region hosts multiple ongoing scientific investigations by international researchers. In the past two years, scientific activity has been published in peer-reviewed scientific papers by researchers at Queens University (Ontario), Cambridge, Oxford, Harvard, MIT and Memorial University of Newfoundland. Ongoing study and research projects exploring the wide breadth of disciplines from palaeoecology to taphonomy, taxonomy, phylogenetics, geochronological dating, environmental reconstruction, and sedimentology - all contributes to improved knowledge of these fossils and this time interval.

The Discovery Aspiring Geopark's fossiliferous deposits are overlain by a succession of shallow marine Ediacaran strata. It was within these strata of the lower Fermeuse Formation of Back Cove that lead to the discovery of *Haootia quadriformis* fossil by the late Dr. Martin D. Brasier of the University of Oxford in 2008. *Haootia quadriformis* is an extinct animal belonging to the Ediacaran biota. Estimated to be about 560 million years old, it is identified as a cnidarian polyp, and is regarded as the earliest animal possessing fossilized evidence for muscles. While it was discovered in 2008, news of the find was not made public until it was formally described in 2014 (Liu et al., 2014). *Haootia* is the first Ediacaran organism discovered to show fossil evidence of muscle fibers making this one of the best opportunities to interpret early life on Earth.

Members of Research Team with the laser used to map out Ediacaran fossil surfaces to a 40 micron resolution at a site near Port Union, Trinity Bay North. (From left): Dr. Alex Liu, Dr. Emily Mitchell, and Dr. William McMahon.



Fractofusus reconstruction, Johnson Surface (H14) Fossil Site. Artwork by Charlotte Kenchington, published in Mitchell et al., 2015.

The Johnson Surface (H14) Fossil Site, Little Catalina, Trinity Bay North.

Current research being conducted by Dr. Emily Mitchell of the University of Cambridge focuses on understanding the ecology and biology of the oldest complex Ediacaran macro-organisms in the fossil record. The project aims to establish how Ediacaran organisms reproduce, what they gained from being large, and how they interacted with each other and their environment. These organisms differ fundamentally from those found in any other time periods, making it difficult to resolve their basic biology such as their phylogenetic relationships or their ecology. However, the in-situ preservation of thousands of these sessile organisms across hundreds of bedding planes in the Catalina Dome region provides a near-census record of these first macro-organism communities. The team's research utilizes spatial statistics and theoretical models to extract biological and ecological information from fossil spatial patterns. The project aims to map and then analyze the Avalonian Ediacaran communities (surfaces with >100 fossils). The research integrates innovative technology and uses a laser-line probe, mounted on a tripod to laser scan the fossil surfaces. The laser captures the entire fossil surface to a 40 micron resolution enabling the spatial and anatomical data to be extracted. The sites in and around Port Union and Little Catalina, Municipality of Trinity Bay North are a substantial proportion of the oldest complex, macroscopic fossil communities in the world, with the vast majority of the others afforded the maximum protection available for their area.

Scientific Endorsement of International Significance

The Discovery Aspiring Geopark offers a unique opportunity to examine and celebrate one of the most significant transitions in Earth's history: the Ediacarian Period, and its associated rise of animal life. With rocks over a half a billion years old, the aspiring Geopark is host to some of the most spectacular and exceptionally preserved Ediacaran fossil sites. These internationally significant sites are of continuing interest to researchers from around the world. They are the focus of ongoing study and research projects, with new discoveries being made and the continuing publication of peer-reviewed scientific papers.

Fossil Naming Convention Honours the Beothuk Language

The Beothuk People who previously inhabited the island of Newfoundland avoided contact with English settlers and fisherman, therefore limiting communication and information about the language. Three female Beothuk women served as sources of vocabulary and wordlists during their captivity: Oubee, Demasduit (or Mary March) and Shanawdithit. In 1978, following a decade of research, John Hewson published Beothuk Vocabularies: A Comparative Study, integrating the three vocabularies based into one master wordlist. The Beothuk 'dictionary' is a compilation of these words collected from the three women, and includes a wordlist of 325 gloss, 21 numerals and the names of the month.

The following researchers extend their signatures endorsing the international value and significance of these Ediacaran fossil sites:

Paulo C. Boggiani
Assistant Professor, Institute of Geosciences, University of São Paulo

Ms. Frances Dunn
PhD Candidate, University of Bristol

Dr. Andrew H. Knoll
Fisher Professor of Natural History, Harvard University

Dr. Marc Laflamme
Assistant Professor, University of Toronto, Mississauga

Dr. Chao Li
Professor of Biogeochemistry, China University of Geosciences (Wuhan)

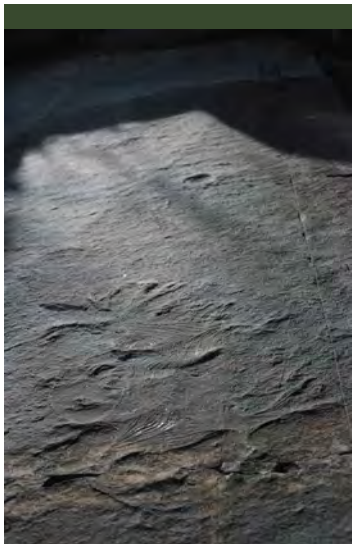
Dr. Alexander G. Liu
University Lecturer in Palaeobiology, University of Cambridge

Dr. Gabriela Mangano
Professor, University of Saskatoon

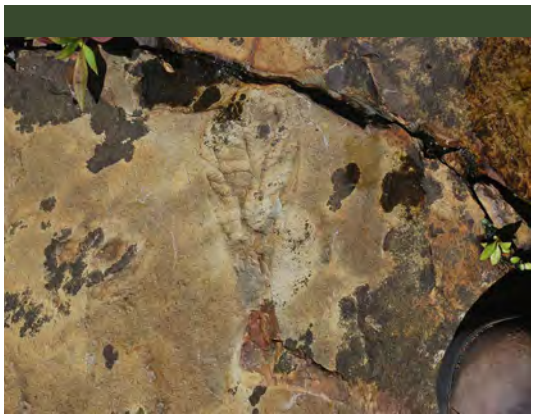
Dr. Jack J. Matthews
Postdoctoral Research Fellow, Memorial University of Newfoundland, Oxford University Museum of Natural History

Dr. Duncan McIlroy
Professor, Memorial University of Newfoundland

In 2009, researchers Martin Brasier and Jonathan Antcliffe first referenced the Beothuk language within paleontological research by naming a newly discovered Ediacaran fossil *Beothukis*. In 2014, Alexander Liu and colleagues used a Beothuk word when formally describing a cnidarian-like fossil found within the Discovery Aspiring Geopark. Liu et al. considered possible descriptive words, or words that describe particular anatomical features but the Beothuk words were usually very long or complicated to pronounce. Haoot, meaning 'demon', was fitting as it was short and suggesting an otherworldly appearance. This was especially significant given the interpretation of the fossil had not been seen in the fossil record until this point. The newly discovered genus was therefore named *Haootia*.

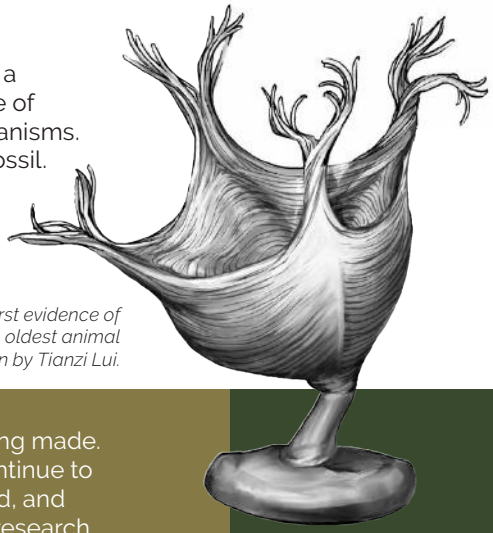


Haootia quadriformis.



Beothukis plumosa from the Discovery Aspiring Geopark.

Haootia quadriformis resembles a cnidarian-like organism, capable of feeding on other planktonic organisms. It is possibly the oldest animal fossil.



Haootia quadriformis, the first evidence of muscular tissue, and possibly the oldest animal fossil. Artist reconstruction by Tianzi Lui.

As a site of continuing scientific research, new discoveries are still being made. Researchers working in the aspiring Geopark have stated they will continue to use the Beothuk language as these discoveries are formally described, and in doing so, respectfully acknowledge that the territory on which the research takes place is part of the ancestral homelands of the Beothuk.

Dr. Emily Mitchell
Henslow Junior Research Fellow, University of Cambridge

Dr. Paul Myrow
Professor of Geology, Colorado College

Ms. Patricia G. Weaver
Collections Manager Geology/ Palaeontology, North Carolina Museum of Natural Sciences

Dr. Shuhai Xiao
Professor and Chair of the IUGS Ediacaran Subcommission, Virginia Technological Institute

Dr. Graham Shields-Zhou
Professor of Geology, Chair of the IUGS Cryogenian Subcommission, University College London

Dr. Maoyan Zhu
Professor in Geology and Palaeontology, Nanjing Institute of Geology and Palaeontology

The Dungeon Provincial Park.

B.4 Listing of Other Sites of Natural, Cultural and Intangible Interest

The Bonavista Peninsula has a tremendous inventory of tourism infrastructure already in place. Discovery Aspiring Geopark Inc. has partnered with Parks Canada, the Province of Newfoundland and Labrador, local municipalities and community-based organizations who own and operate various tourism attractions in the region. Many of these attractions are located near Geosites selected to be part of the Discovery Aspiring Geopark.

B.4.1 Natural Heritage Sites

A strong link between the geology, the natural environment and human activities can be found within the boundary of the Discovery Aspiring Geopark. The region's geological heritage and geodiversity continues to underpin and influence sites of historical, cultural and intangible interest.

Table 4. Summary Table of Natural Heritage Sites within the Discovery Aspiring Geopark.

Natural Heritage Site	Description	Web Link
The Dungeon Provincial Park	The site features a twin entranced sea cave with a collapsed roof, which has been carved into the cliff face by the relentless action of the sea.	tcii.gov.nl.ca/parks
Lockston Path Provincial Park	This provincial park with its sheltered campsites and freshwater beach provides a good base camp for visits to nearby historic communities.	tcii.gov.nl.ca/parks
Bird Island Puffin Site, Maberly	A colonized system of sea stacks and islands near the coast is home to one of the best accessible places in North America to view the Atlantic Puffin.	townofelliston.ca
Elliston Municipal Park and Campground, Elliston	A municipal park offering serviced campgrounds, tenting and picnic areas, located opposite Sandy Cove Beach.	townofelliston.ca
Lookout Pond Municipal Park, Trinity Bay North	A municipal park in Trinity Bay North offering a freshwater swimming pond and recreation space.	trinitybaynorth.com
Landfall Municipal Park, Cape Bonavista	A municipal park in Bonavista and home to the statue of John Cabot commemorating his North American landing.	townofbonavista.com
Hike Discovery Trail Network, Bonavista Peninsula	A coastal hiking trail network on the Bonavista Peninsula provides the opportunity to hike 8 unique trails and experience the coastal geology.	hikediscovery.com
Champney's West Aquarium, Chapney's West	A number of aquaria and touch tanks displaying local marine life.	champneysisland.net
Long Beach, Bonavista	A favourite location for recreation east of Bonavista Harbour.	townofbonavista.com
Beaver Pond Habitat Stewardship Site, Bonavista	One of three habitat stewardship sites occurring within municipal boundaries and protected under provincial legislation. The site is committed to restoring wildlife habitat.	samnl.org/bonavista
Long Pond Management Unit Habitat Stewardship Site, Bonavista	One of three habitat stewardship sites occurring within municipal boundaries, protected under provincial legislation and home to a number of species at risk.	samnl.org/bonavista
Old Day Pond Habitat Stewardship Site, Bonavista	A provincially protected wetlands stewardship site, home to a popular walking trail, interpretation and various wildlife species.	samnl.org/bonavista
Cape Bonavista Coastal Habitat Stewardship Site	A coastal nesting environment protected under provincial legislation.	samnl.org/bonavista

B.4.2 Cultural and Historical Heritage Sites

The Discovery Aspiring Geopark also includes cultural and intangible heritage sites within the regional ecosystem. The region's partners and stakeholders are leaders in protecting, promoting and preserving built and intangible heritage. The area boasts structures of architectural and historical significance, community and marine infrastructure. There is an array of restored buildings and properties, churches, lighthouses, fishing wharves, flakes and stone root cellars. These include staffed interpretation centers, historic sites, and districts which are operated by partners supporting the Discovery Aspiring Geopark. As there is an extensive inventory of heritage structures[2] throughout the region, the following tables list some of the major attractions and historical destinations.

[2]*The Town of Bonavista has more than 1000 heritage structures within their municipal inventory.*

Table 5. Summary Table of Cultural Heritage Sites within the Discovery Aspiring Geopark.

Cultural Heritage Site	Description	Web Link
Elliston Root Cellars, Elliston	Elliston is the "Root Cellar Capital of the World", with 133 documented root cellar structures to preserve vegetables and perishables.	townofelliston.ca
Random Passage Site, New Bonaventure	Constructed for the filming of the international TV mini-series Random Passage, it is a fictitious village depicting life in early Newfoundland.	randompassagesite.com
St. Paul's Anglican Cathedral, Trinity	A timber framed church built between 1892 and 1894 in the Gothic Revival style of architecture, featuring a tower with a spire.	heritagefoundation.ca
Roman Catholic Church of the Most Holy Trinity, Trinity	A timber famed church built in the Gothic Revival style of architecture in 1833.	heritagefoundation.ca
Memorial United Church, Bonavista	The largest wooden church in eastern Canada, constructed in 1918 in the Classical Revival style.	heritagefoundation.ca
John C. Crosbie Sealers Interpretation Centre and Memorial Site, Elliston	Commemorates the 254 lives lost at sea in the twin sealing disasters of 1914.	homefromthesea.ca
Matthew Legacy Interpretation Centre, Bonavista	This site presents the story of John Cabot and his uncharted voyage across the Atlantic Ocean in 1947.	matthewlegacy.com
Garrick Theatre, Bonavista	One of the oldest surviving theatres in the Province, dating to 1945 and a popular entertainment venue and social centre.	garricktheatre.ca
Orange Hall, Bonavista	The Loyal Orange Lodge was built in 1907 and is the largest fraternal hall of wooden construction in North America.	heritagefoundation.ca
King's Cove Head Lighthouse, King's Cove	A lighthouse built and made operational in 1893. It could be seen for 14 nautical miles.	newfoundlandlabrador.com

Town of Trinity from Gun Hill.

Table 6. Summary Table of Historical Heritage Sites within the Discovery Aspiring Geopark.

Historical Heritage Site	Description	Web Link
Ryan Premises National Historic Site of Canada, Bonavista	This site commemorates five centuries of commercial fishing on Canada's east coast and is managed by Parks Canada.	pc.gc.ca newfoundlandlabrador.com
Port Union National Historic District – Sir William F Coaker Heritage Foundation, Port Union	Port Union is North America's only union built town with buildings constructed in 1916. It is designated as a National Historic District.	historicportunion.com
Mockbeggar Plantation Provincial Historic Site, Bonavista	The site contains historical gems from the oldest surviving wooden structure in the province, dating to the early 1700s, and interpreting the life and business of the middle class workers pre-Confederation with Canada in the 1940s.	seethesites.ca
Cape Bonavista Lighthouse Provincial Historic Site, Bonavista	Ocean and scenic views make this the most visited Provincial Historic Site. Built in 1843, the original lighthouse interprets the working lifestyle of a lightkeeper's family. The site offers guided natural and geological history interpretation.	seethesites.ca
Trinity Visitor Centre Provincial Historic Site, Trinity	This site features a new interactive exhibit telling the colourful story of Trinity's past and present.	seethesites.ca
Mercantile Premises Provincial Historic Site, Trinity	The business hub for three merchant families over 150 years. This Trinity counting house provides a glimpse at seaport life in the 1700s.	seethesites.ca
Hiscock House Provincial Historic Site, Trinity	This site presents life in Trinity in the late 19th and early 20th centuries and features the home of Emma Hiscock (circa 1910), a widowed entrepreneur providing for and raising her family.	seethesites.ca
Lester – Garland House, Trinity Historical Society Site, Trinity	A reconstructed brick Georgian residence used as a museum and education centre.	trinityhistoricalsociety.com
The Trinity Museum, Trinity Historical Society Site, Trinity	Built in the 1880s in saltbox style by the DeGrish Family, the building has been used as a museum since 1967.	trinityhistoricalsociety.com
The Cooperage, Trinity Historical Society Site, Trinity	This site is functional living museum where you can see a cooper's skills at work.	trinityhistoricalsociety.com
The Green Family Forge, Trinity Historical Society Site, Trinity	This site is fully operational as a living history museum. The Green Family practiced as blacksmiths in Trinity since 1750.	trinityhistoricalsociety.com
Fort Point Military Site, Trinity	Commonly referred to as Admirals Point, this site was built by the British in 1748 and explores a fortification used to protect Trinity Harbour.	trinityhistoricalsociety.com
William Alexander House – Bridge House, Bonavista	This wood framed Georgian style building is the oldest documented, residential structure in Newfoundland, built either 1811 or 1814.	heritagefoundation.ca
Gerald S. Doyle Memorial Museum, King's Cove Historical Society, King's Cove	A local museum commemorating the culture and economic diversity of this fishing village commonly known as "The Athens of the Sea".	facebook.com/kingscove
English Harbour Arts Centre, English Harbour	This reclaimed church is the centre for educational programs, an art gallery, gift shop and an artist-in-residency program.	englishharbourartsassociation.com
2 Rooms Contemporary Art Projects, Duntara	A platform for temporary projects, exhibitions, events, and a museum of material culture housed in a saltbox house built in 1881.	2roomscontemporaryartprojects.com bonavistabiennale.com

The Green Family Forge, Trinity Historical Society, Town of Trinity.

C Geoconservation

C.1 Current or Potential Pressures on the Proposed Geopark

C.1.1 Natural Elements

The Discovery Aspiring Geopark is comprised of a variety of diverse and vulnerable sites. The single most important natural threat to these sites is coastal erosion. The geographic location of coastal sites and their respective landscapes and landforms make them highly susceptable to nature's erosive forces. Ocean waves, ice, wind, and weather have shaped everyday life on the Bonavista Peninsula—throughout its history and to this day. Of all the Earth's processes on display around the region, it is the effect of the elements that most strongly connects to the rich historical and cultural heritage. The elements have shaped the landscape and its materials, influencing where communities were established and how their inhabitants lived. The governing authority acknowledges these natural changes will continue to occur with time and embraces it as an opportunity to learn and share with visitors.

Natural coastal erosion processes provide much of the region's most dramatic scenery. Thanks to a variety of rock types and rock layers in different orientations, the region has a wide variety of shoreline morphology in every stage of development. The high aesthetic appeal of the coastal scenery offers a unique opportunity to engage visitors with geological heritage and its role in our lives.

C.1.2 Anthropic Pressures

Many of the sites within the proposed Geopark provide a natural setting for ongoing scientific research, education, public outreach, and areas for enjoyment. Ediacaran fossil assemblages within the Catalina Dome contain over 20 different taxa, offering globally significant opportunities for further study. The Discovery Aspiring Geopark is committed to working with its stakeholders and partners, scientific researchers, and other agencies to maintain geosite and fossil integrity while balancing sustainable economic development with visitor experience.

Anthropic pressures have been identified as a potential pressure within the applicant's boundary, especially at Geosites with Ediacaran fossils. Measures are being taken to restrict and/or limit visitation at some of the fossil Geosites. At some sites, visitors may be asked to wear protective footwear, similar to the bama booties worn at Mistaken Point WHS prior to walking on surfaces with significant fossils.

C.2 Current Status in Terms of Protection of Geological Sites

Newfoundland and Labrador has a variety of geological heritage and geodiversity sites protected by a legislative framework. Figure 12 illustrates the geoconservation regulatory framework and the differing regulatory bodies. For instance, Gros Morne UNESCO World Heritage Site is protected by federal legislation under the Canada National Parks Act. Mistaken Point UNESCO World Heritage Site and Fortune Head Ecological Reserve are protected by provincial legislation under the Wilderness and Ecological Reserves Act 1980.

Geosites within the Discovery Aspiring Geopark fall under various ownership and management regimes. These include local not-for-profits of the tourism industry, private landowners, local Municipal Governments, and the

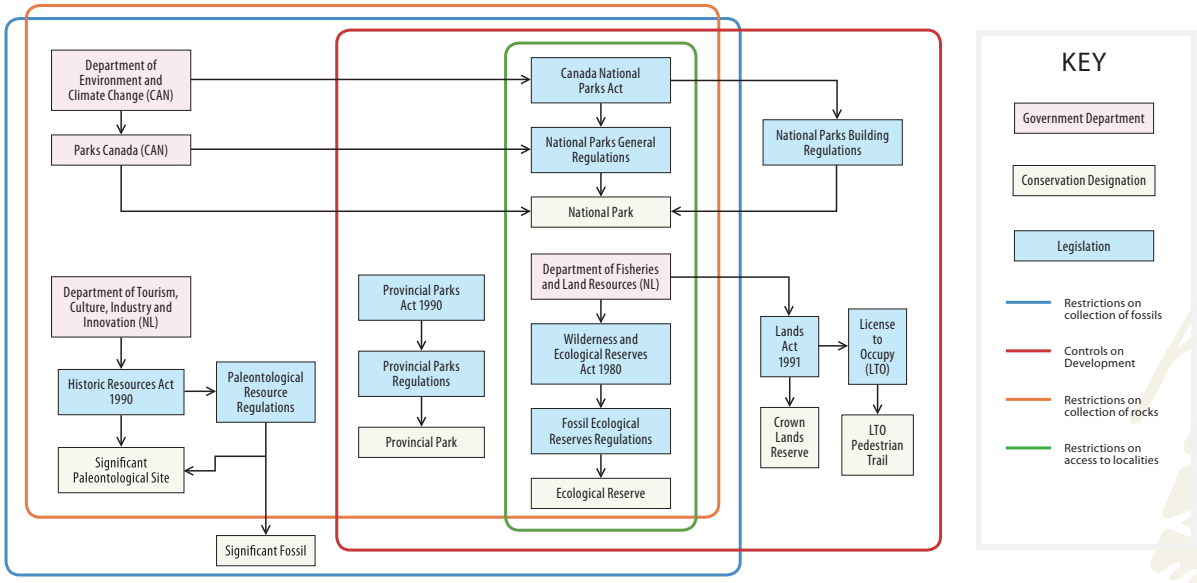
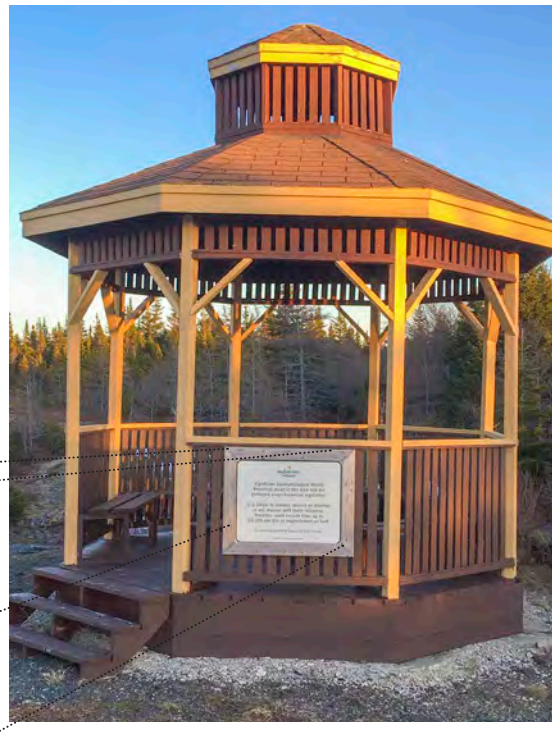


Figure 12. Summary of Geoconservation Regulatory Framework in Newfoundland Labrador

Provincial Government. The Dungeon Provincial Park is an example of a Geosite protected by provincial legislation under the Provincial Parks Act 1990. This collapsed sea arch is well known for its aesthetic and geomorphological significance, and a frequented geotourism site within the aspiring Geopark.

C.2.1 Palaeontological Resource Regulations

Since 2011, Provincial legislation protects significant palaeontological (fossil) resources. The Government of Newfoundland Labrador, Department of Tourism, Culture and Recreation's Palaeontological Resource Regulations 67/11 under the Historic Resources Act O.C. 2011-198, states it is illegal to remove, destroy or interfere in any manner with these fossil resources. This legislation protects fossils sites within the communities of Melrose, Port Union, Catalina and Little Catalina, Municipality of Trinity Bay North and Elliston. Although this legislation provides a mechanism to prosecute violators, the managing authority fosters education and empowering communities to serve as stewards of all Geosites. The Province of Newfoundland Labrador's legislation on significant fossil resources protection can be found at www.assembly.nl.ca/Legislation/sr/Regulations/rc110067.htm.



Signage displaying the Provincial protection legislation at the gateway kiosk to the Port Union-Murphy's Cove to Lodge's Pond Trail, Municipality of Trinity Bay North.

C.2.2 Stewardship

The Discovery Aspiring Geopark's partners and stakeholders strive to uphold informal measures of geoconversation. Community partners and residents act as stewards and guardians of Geosites. This is most evident through the Sir William Ford Coaker Heritage Foundation, a not-for-profit organization in Port Union, Municipality of Trinity Bay North who unofficially guard and protect the fossil beds adjacent to their properties. Developing a community engagement strategy and connecting local people to their geological heritage, will further enhance stewardship and protection measures. DAGI will continue to foster positive relationships with the academic and research community in developing Geosite Guardianship initiatives.

Port Union – National Historic District Boardwalk Fossil Site.

C.2.3 Scientific Research

Fostering ongoing scientific research is important to the Discovery Aspiring Geopark. However, it is also essential that this research be conducted to ensure high scientific value does not damage or destroy future investigations. All research being carried out at a significant palaeontological site requires the researcher to hold a permit for that investigation. A research permit is issued from the Provincial Archaeology Office (PAO), Arts and Heritage Division, Department of Tourism, Culture, Industry and Innovation. Applicants for permits are required to provide a description of the proposed research, including their objectives, methodologies, and anticipated time lines. In exceptional circumstances, collecting samples is permitted. In 2014, permission was granted for the collection of *Haootia*. The specimen was under threat, removed, and is on display at The Rooms Corporation of Newfoundland Labrador in St. John's.

C.2.4 Memorandum of Understanding

There is a Memorandum of Understanding (MOU) in place with site owners of key developed sites. The MOU formalizes the commitment and engagement of these partners and helps facilitate the involvement of residents and communities in the sustainability, management and stewardship of their Geosite.

As part of the MOU, DAGI agrees to be the governing body of the Geopark Project. MOU's have been signed with key stakeholders and are included in Annex 7.

This MOU includes the following commitments:

1. Stakeholder commits to obtaining a License to Occupy (LTO);
2. Stakeholder will adhere to Palaeontological Resource Regulations;
3. Stakeholder commits to site maintenance with regard to public safety;
4. Stakeholder commits to site maintenance with regard to upkeep, aesthetics, and cleanliness;
5. Stakeholder commits to incorporating Geopark signage at sites, if and when, the UNESCO Global Geopark designation is obtained;
6. Stakeholder commits to stewardship within the Discovering Aspiring Geopark;
7. Stakeholder adheres to the operating principles of a UNESCO Global Geopark.

C.2.5 License to Occupy

Geosites within the Discovery Aspiring Geopark fall under a number of land owners. The governing authority works with its stakeholders and partners to identify private and public land use within the area to accommodate access and use. Many of the current and potential Geosites are located along the Hike Discovery Trail Network on the Bonavista Peninsula. Hike Discovery Inc. is the governing authority of this trail network and a MOU has been established between the two regional organizations. Hike Discovery Inc. requires stakeholders to verify a License to Occupy (LTO) and retains a copy within their records. A License to Occupy is issued for the establishment and maintenance of a pedestrian trail within Newfoundland Labrador. The LTO is issued by the Regional Lands Manager, Lands Branch, Department of Fisheries and Land Resources, Government of Newfoundland Labrador. Hike Discovery assists in the identification of the LTO stakeholder for Discovery Aspiring Geopark Geosites, as appropriate. Hike Discovery also completes maintenance and repairs on the existing trails within the trail network. For the purposes of this application dossier, all developed Geosites in the initial phase have a License to Occupy (Annex 7).

C.2.6 Code of Conduct

The Discovery Aspiring Geopark achieves its Vision and Mission through collaborating with stakeholders, partners and, with the support of visitors. A Code of Conduct helps provide a framework for all participants of the aspiring Geopark. Everyone must play a fundamental role in respecting the heritage, both geological and non-geological. The Code is presented as a Hiker's Trail Etiquette. It will be available on the aspiring Geopark's website as well as key Geosite locations. The long version is included, but a short version will also be made available throughout the aspiring Geopark.

CODE OF CONDUCT
HIKER'S TRAIL ETIQUETTE

PARKING Always ensure you vehicles are left safely off the road and away from private driveways and thoroughfares.

PRIVATE PROPERTY Be mindful of directional signage and keep off private property.

PETS Pets are welcome on trails, but they must be leashed at all times. As a courtesy to other trail users, please make certain you clean up after your pet and practice stoop and scoop on or near trails.

LEAVE NO TRACE Pack out any garbage that you have brought with you. Leave nothing behind – not even footprints. Stay on the trail. Taking a cut off on a switchback (landing or turning platform) trail will cause increased erosion. Do not throw rocks or anything else over the side of cliffs or hills – they may strike someone passing below.

FIRES No fires. Use a small camping stove. A fire should only be started if you are camping and it is a special camp fire container. Fires are not permitted when the forest fire index is high.

SMOKING If you smoke, make certain that your cigarette is completely extinguished when you are finished and carry the butt out with you.

WHEN NATURE CALLS When nature calls, go off the trail at least 50 metres and far from streams and lakes to avoid contaminating the water. Bury your solid waste and carry out toilet paper.

WILDLIFE AND PLANTS Be mindful of wildlife both on and off the trail. You are a visitor in their habitat. Do not feed wildlife. Be mindful of fragile flora such as plants, berries, mosses, lichens, wildflowers and other plant life. Leave plants undisturbed for others to enjoy.

PROTECT YOURSELF Protect yourself from the sun and weather elements. Keep a safe distance from cliffs and avoid overhanging rocks.

LAWS AND REGULATIONS Respect Provincial laws governing palaeontological resources. Significant fossil resources are protected under Provincial legislation. It is illegal to remove, destroy or interfere in any manner with these resources. Penalties could include fines up to $50,000 per day or imprisonment or both. For additional information, call +1 709 729 2462.

C. 3 Management and Maintenance of Heritage Sites

Many Geosites currently have various forms of management capacity in place as they are maintained by private landowners, local not-for-profit organization, Municipal Governments, and the Provincial Government. Sites to be used for geotourism and earth sciences education, and promoted as official Geosites within the aspiring Geopark must adhere to the commitments outlined in the Memorandum of Understanding (Annex 7). Currently, property owners or stakeholders having entered into a MOU with the Discovery Aspiring Geopark must complete a DAGI Maintenance Record. At a minimum, the stakeholder is required to conduct bi-weekly maintenance inspections of their Geosite during the tourist season. In addition, a pre-season inspection of the site is to be conducted by a designate from DAGI and the stakeholder. Where appropriate, a Hike Discovery Inc. designate may perform the inspection on behalf of DAGI.

Stakeholders commit to site maintenance with regard to upkeep, aesthetics, and cleanliness. All stakeholders must ensure their respective Geosite is up kept and does not fall into disrepair. For the purpose of the MOU agreement, disrepair refers to a site(s) being maintained to their original intent. The stakeholder also agrees to addressing items with regard to upkeep, aesthetics, and cleanliness. For example, broken signage, over-flowing receptacle bins, and unclean washrooms are addressed as needed.

The managing authority continues to work with property owners to establish active Geosite management plans as sites are being developed to ensure long term protection, maintenance and appropriate interpretive content of each Geosite. The Discovery Aspiring Geopark supports all Geosite stakeholders in achieving their management objectives.

C.3.1 Awards in Conservation or Heritage

Awards

Stakeholders and partners of the Discovery Aspiring Geopark have been honoured with the following awards, designations and commemorations recognizing their contributions to Conservation or Heritage Leadership.

National Award

- Town of Bonavista – Prince of Wales Prize for Municipal Heritage Leadership (2014).

Provincial Awards

- Home from The Sea John C. Crosbie Sealers Interpretation Centre – Manning Award for Public Presentation of Historic Places (2016).
- Sir William F. Coaker Heritage Foundation and the Municipality of Trinity Bay North – Memorial University's Dean of Humanities and Social Sciences Community Engagement Award (2017).
- Trinity Historical Society – Newfoundland Historical Society Award of Merit (2014).
- Trinity Bay North – Municipalities Newfoundland and Labrador Tidy Town of Excellence Award (2015).

Designations and Commemorations

- Port Union – National Historic District of Canada.
- Port Union – Provincial Heritage District.
- Port Union – Municipal Heritage District.
- Trinity Historical Society – National Historic Sites and Monuments Board of Canada recognized Rev. Dr. John Clinch as the first person to vaccinate for Smallpox in the New World (North America) in 1799/1800.
- Trinity Historical Society – National Historic Sites and Monuments Board of Canada recognized Sir Richard Whitbourne for holding the First Court of Admiralty in North America in Trinity in 1615.
- Trinity Historical Society – Provincial Historic Commemorations Program, Person of Provincial Significance, John Bingley Garland.

D Economic Activity and Sustainable Development

D.1 Economic Activity in the Proposed Geopark

Economic activity within the region of the proposed Geopark is focused on two main industries – fishery and tourism. Other major industries include aquaculture, the health and service sector, education including a regional college campus, agriculture, and forestry. In recent years, the region has been experiencing a resurgence of self-discovery. Residents are celebrating and profiting from its rich natural, cultural, and historical heritage. The region has become one of the province's most popular tourist areas due to its internationally acclaimed coastal hiking trails, and rich density of heritage structures. The area continues to be a backdrop for artists, writers, theatre, film makers, and culinary festivals and visitors.

D.1.1 Fishery

The Bonavista Peninsula juts out toward the Atlantic Ocean separating Bonavista and Trinity Bays. For hundreds of years, coastal communities and its residents prospered from a self-sufficient fisheries-based economy. However, the region's viability was challenged in the 1990s by the downturn in fishery activities. In 1992, a moratorium on the cod fishery resulted in a significant decline in population as fishery workers relocated to find employment.

Cleaning cod fish on splitting table, Trinity.

Today, the fishery continues to be the largest employer within the region of the proposed Geopark. Residents find seasonal employment as licensed fish harvesters, deck hands, fish processors, trucking operations and supply companies. The region maintains a strong crab fishing industry. A single crab processing plant remains in operation in the Town of Bonavista, and in 2018 employed 277 individuals. Fishers and merchants continue to make a living fishing many species, including cod, herring, mackerel, seal, capelin, crab, lobster, and more recently farming mussels. A number of residents also relocate seasonally to other regions throughout the province to work in fish processing plants.

A down turn in the fishery sector prompted regional community leaders and economic development partners to seize opportunities to diversify the local economy. Non-profit organizations are leading the way in initiating long term community planning and sustainable economic development activities. By drawing upon the region's vibrant history, culture and nature, the area is attracting public and private investment in growing the region's hospitality services and building a leading tourism destination.

D.1.2 - Tourism

Tourism is the second largest economic generator for the region. The area of the proposed Geopark is a place where history, culture and nature blend into diverse adventures making the Bonavista Peninsula one of Newfoundland Labrador's top visitor destinations.

The peak vacation travel season is from May to October however, a growing demand for services is extending the season. Throughout the fall, many tourism attractions and operators remain open until December to accommodate visitors.

The area of the proposed Geopark has a built inventory of tourism attractions and amenities. These include:

- 1 National Historic District;
- 1 National Historic Site (managed by Parks Canada);
- 2 Provincial Historic Districts;
- 5 Provincial Historic Sites;
- 2 Provincial Parks;
- 3 Municipal Parks;
- 3 Private campgrounds;
- 4 Municipal museums;
- >1500 Heritage structures;
- 7 Boat tour operators;
- 3 Hiking tour operators;
- 1 Golf course;
- 3 Performance theatres;
- 2 Art galleries;
- 10 Festivals of music and craft;
- Coastal trail network comprised of 8 hiking trails;
- 105 Licensed accommodations;
- 30 Restaurants;
- 3 Visitor (Tourism) Information Centres.

D.2 Existing and Planned Facilities and Infrastructure

Newfoundland Labrador is accessible by air, sea and road. The Province has two international airports, one in St. John's and Gander, both within a 3.5 hour drive to the proposed Geopark region. The Discovery Aspiring Geopark is accessible along the "Discovery Trail" and has three road entrances: Route 230 and 230A in Clarenville, and Route 233 in Port Blanford. This series of provincially maintained highways is approximately 240 km from Gander and 311 km from St. John's. The province is developing a new "Tourist-Oriented Directional Signage" system and will be phasing in this internationally-recognized system based on well-known symbols. Visitors travelling to the proposed Geopark region are encouraged to make car rental reservations before travel. The Towns of Bonavista and Trinity are also cruise ports, providing dock and marina infrastructure for privately owned vessels.

The region boasts an array of amenities including quality accommodations, dining, taxi services, banking, grocery stores, gasoline service stations, visitor information services and public washrooms. Many sites and local businesses offer free public Wi-Fi for access.

Municipal infrastructure varies between communities. Larger towns such as Bonavista, Trinity and Port Union, Trinity Bay North provide municipal water and sewer services. Residents of local service districts rely on drilled wells, as the island of Newfoundland has an abundance of fresh water sources. Communities in the region are part of the Eastern Regional Waste Management Authority. Green recycling service is also available in Bonavista.

D.2.1 Geo-education

The proposed Geopark delivers a variety of educational activities in partnership with its stakeholders including businesses, not-for-profit organizations and research institutions.

Geology and Paleontology Research and Networking

The region of the proposed Geopark has been the focus of scientific activity since the late sixteenth century expeditions by Sir Martin Forbisher. Forbisher's initial documentation of coarse-grained metallic mineralization near Catalina, Trinity Bay North is one of many geosites sparking curiosity and generating discussion with the public, students and their families. Today, we know the mineralization once believed to be gold, is actually pyrite, or fool's gold. This site provides a unique opportunity for visitors to connect history and science, learning the difference between rocks, minerals, and their economic importance in daily life.

Since the discovery of the significant Ediacaran fossil beds, researchers frequent the region to study the evolution of the Ediacaran biota. Currently, researchers from Queens University (Ontario), Cambridge, Oxford, Harvard, MIT, Memorial University of Newfoundland and the Geological Survey of Newfoundland and Labrador have done recent work in the region.

The Discovery Aspiring Geopark, in collaboration with research institutions, conferences and professional organizations regularly host programs, tours, and professional development opportunities. In 2012, the aspiring Geopark assisted with planning and logistics of the GAC-MAC St. John's 2012 post-conference field trip entitled, *Geotourism and the Coastal Geological Heritage of the Bonavista Peninsula*: Current Challenges and Future Opportunities. The field trip was led by geologists from the Geological Survey of Newfoundland and Labrador and attended by 18 national and international geoscientists. The field trip complemented the special conference session, *Preservation of Geological Heritage and Its Contribution to Education and Economic Development*, marking the first opportunity for representatives from the Discovery Aspiring Geopark to present at a professional geoscience conference. Research teams, undergraduate and graduate field school students also frequent the region. In September 2015, under the leadership of Dr. Alexander G. Liu, NERC Independent Research Fellow, University of Bristol, the aspiring Geopark hosted a group of undergraduate students from Novosibirsk State University, Russia. The group visited Ediacaran fossil sites, and explored the geological assets of the Bonavista Peninsula. That same year, the aspiring Geopark also hosted researchers from Memorial University of Newfoundland and the University of Cambridge. In 2017, the proposed Geopark hosts a fieldtrip, organized as part of the International Symposium on the Ediacaran-Cambrian Transition (ISECT). The field trip includes many of the voting members of the international Subcommission on Ediacaran Stratigraphy. A MIT graduate field course also occurred that year.

GAC-MAC St. John's 2012 Post-Conference Field Trip.

Researchers frequently partner with the aspiring Geopark and assist with delivering educational school programming. Recently, Dr. Emily Mitchell, University of Cambridge, developed customized educational resource tools complementing the school curriculum and visited schools within the region. Dr. Mitchell also presented at a teacher's professional development session, speaking about the Discovery Aspiring Geopark and its geological assets. This ongoing research activity will help enhance the creative energy around the educational programming and allow new insights to be incorporated into the interpretative materials.

The Discovery Aspiring Geopark continues to be a desired destination for professional geoscientists, including academia and students. The region of the proposed Geopark aims to continue fostering partnerships and host field trips associated with degree courses, conferences and professional development.

Public Lectures

The Discovery Aspiring Geopark regularly partners with research institutions and teams as part of their ongoing education and public outreach activities. The Sir William Ford Coaker Heritage Foundation, a key founding partner, hosts these public lectures, special presentations and events on local geology and Earth history. Research teams deliver public-friendly educational sessions sharing their research investigations and its significance. Examples of special presentations include:

- *New Perspectives on the Ediacaran Fossils: An Example of Science and Art Collaboration*, Dr. Jack J. Matthews, Memorial University of Newfoundland, Oxford University Museum of Natural History (August 2018);
- *International Significance of the Ediacaran Fossils*, Dr. Alexander G. Liu, Cambridge University (July 2018);
- *Stonehammer UNESCO Global Geopark Development and Business Opportunities*, Gail Bremner, Executive Director, Stonehammer UNESCO Global Geopark (June 2018);
- *Geoheritage, Geoconservation and Geotourism – An Introduction to the Discovery Aspiring Geopark*, Dr. Jack J. Matthews, Memorial University of Newfoundland, Oxford University Museum of Natural History (June 2017);
- *Rocks on the Rock – Increasing Opportunities for Sustainable Geotourism Opportunities in NL*, Dr. Jack J. Matthews, Memorial University of Newfoundland (October 2016);
- *Ediacaran Fossils of the Catalina Dome*, Dr. Ducan Mcllroy, Memorial University of Newfoundland and Dr. Jack J. Matthews, Memorial University of Newfoundland (The Rooms Corporation, January 2016);
- *Geological Heritage of Port Union and Recent Fossil Finds*, Dr. Alexander G. Liu, Cambridge University (August 2015);
- *The Ediacaran Fossils of the Catalina-Port Union Area*, Jack J. Matthews, Oxford University (August 2014).

Public lecture poster.

School Programming

The Discovery Aspiring Geopark will be launching a pilot education program during the 2018-2019 School Year. This curriculum-linked program will see the delivery of half-day activity-based workshops. It includes user-friendly lesson plans, student and teacher activities. The programs supports the Newfoundland Labrador Science Curriculum, including: Grade 4: Rocks, Minerals and Erosion Unit and the Grade 7: Earth's Crust Unit. A geoscience educator from the proposed Geopark will facilitate the workshop and visit schools within the boundary of the Discovery Aspiring Geopark.

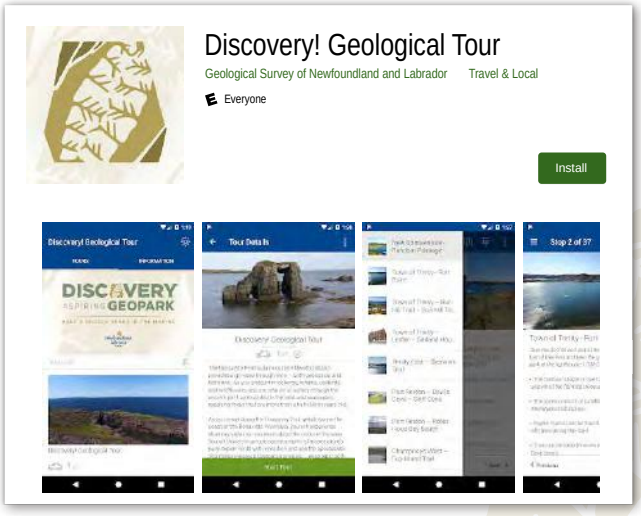
Table 7. Summary Table of School Population within the Discovery Aspiring Geopark.

Community	School Name	Grade	Student Numbers[3]
Port Rexton	Bishop White	K-12	125
Catalina	Catalina Elementary	K-8	120
Bonavista	Matthew Elementary	K-6	260
Bonavista	Discovery Collegiate	7-12	325
King's Cove	Saint Mark's	K-12	60

[3] *Student numbers based upon September 2017 enrollment.*

Discovery! Geological Tour App

The Discovery Aspiring Geopark launched an App, ***Discovery! A Geological Tour Through Time***, profiling the unique geological heritage of the Bonavista Peninsula. The App was created by the Geological Survey of Newfoundland and Labrador, under the leadership of Dr. Alana Hinchey to support the ongoing Geopark initiatives. It showcases HR drone imagery captured at various Geosites along the coastline, provides UTM coordinates, driving directions and parking location, maps, and a geological narrative. The App is free and accessible by download on the Apple App Store or an Android App is available from Google play. It was launched in 2017 and recently rebranded in 2018 with the Discovery Aspiring Geopark logo.



D.2.2 Geo-tourism

Geotourism and Adventure Activity

The Discovery Aspiring Geopark offers a wide variety of visitor experiences. A range of adventure tourism operators offer nature and wildlife-based land and sea tours. During the spring and summer months, the area is visited by icebergs, marine wildlife and seabirds. Newfoundland Labrador is one of the world's premier whale watching locations. With 22 species of whales, tourists frequent the region to catch a glimpse of these ocean giants. Whale species include: finback, minke, sperm, pilot, blue, and the world's largest population of humpbacks.

Whale watching in Trinity Bay with Sea of Whales Adventures.

Visitors may also see various species of dolphins, porpoises, bald eagles and seals.

Newfoundland Labrador is also a major birdwatching destination, a place commonly known as the Seabird Capital of North America. The province is home to over 35 million seabirds, including 25,000 gannets and 500,000 puffins. Other offshore seabirds include black guillemots, kittiwake, terns, and murres. The aspiring Geopark offers some of the Province's best places to discover birding watching experiences.

Tourism operators within the proposed Geopark boundary are recognizing the rich geological assets of the region, and developing experiences which incorporate these geological stories.

There remains enormous tourism potential to create stronger links and connections between the region's geological heritage and marine wildlife habitats. The aspiring Geopark continues to work with tourism partners and operators to expand the interpretive stories and enhance the geotourism product. Adventure Tourism Operators include:

The Atlantic Puffin is the provincial bird of Newfoundland Labrador.

Table 8. Summary Table of Geotourism and Adventure Tour Operators within the Discovery Aspiring Geopark.

Tour Operator	Description	Web Link
Bonavista Adventure Tours, Bonavista	Offers guided group and private tours, geological walking and hiking tours, including a traditional Newfoundland beach boil up.	bonavistaadventuertours.com
Discovery Sea Adventure Tours, Bonavista	A Zodiac-based puffin and whale watching tour company located in Bonavista.	dsatours.ca
Bonavista Puffin and Whale Boat Tours, Bonavista	Set sail on the Lady Marguerite and cruise around scenic Bonavista Bay and Trinity Bay. Visitors experience marine wildlife and seabirds.	bonavistaboattours.com
Tuckamore Discoveries, Bonavista	Nature-based tourism using eco-hiking, specializing in puffin tours.	tuckamorediscoveries.com
Bonavista Bicycle Picnics and Café, Bonavista	A culinary cycling experience offering bicycle rentals, a packed picnic lunch and map with suggested cycling routes.	bonavistapicnicscafe.com
Sea of Whales Adventures, Trinity	A Zodiac-based whale-watching excursion specializing in guided marine wildlife adventure tours.	seaofwhales.com
Atlantic Adventure Boat Tours, Trinity	Tours aboard a 46-foot motorsailor to see whales, icebergs, birds, coastal scenery and abandoned fishing villages.	atlanticadventures.com
Trinity Eco-Tours, Trinity	Specializing in marine wildlife adventure Zodiac-style boat tours and guided sea kayak tours.	trinityecotours.com
Rugged Beauty Boat Tours, New Adventure, Trinity Bay	A boat tour operator linking history, culture and folklore with tours to enchanting and resettled communities.	ruggedbeautyboattours.com
Trinity Bay Tours, Trinity East	Guided tours involving active hiking, linking history, culture and folklore, including learning the history of the fishery.	skerwinkhostel.com
Trinity Historical Walking Tours, Trinity	Time travel through five centuries of Newfoundland's colourful history along the paths of historic Trinity.	trinityhistoricalwalkingtours.com
Walk to the Sea, Elliston	A guided tour linking the Sealers Interpretation Centre to the Memorial Statue and Monument at Porter's Point. Learn about history, folklore and the deep connection to the sea.	homefromthesea.com

D.2.3 Tourism Infrastructure

There is a high level of infrastructure currently in place throughout the Bonavista Peninsula to support the establishment of the proposed Discovery Geopark. The Discovery Aspiring Geopark has partnered with well-developed tourism sites and attractions, including Parks Canada, the Province of Newfoundland Labrador and regional tourism attractions. Visitors can access a variety of amenities and services, including directional and informational signage, parking, staffed interpretive centres, and washroom facilities.

D.2.3.1 Trail Network

Hike Discovery

Hike Discovery is a hiking trail network located on the Bonavista Peninsula. The network has eight well-maintained coastal trails throughout the region of varying lengths and difficulty. This not-for-profit organization is managed by a volunteer board, representing seven municipalities who contribute to annual trail maintenance. Hike Discovery operates under a self-sustaining model, employing a seasonal project manager and two trail maintenance employees. Funds are raised through annual corporate sponsorships, donation boxes and merchandise, including sales from trail maps. All trails are located within the proposed Geopark and trail maps and events are accessible by free download on the Hike Discovery Trail App.

The Hike Discovery Trail Network is a primary travel motivator for tourists visiting the Bonavista Peninsula and the Skerwink Trail is its hiking jewel. This coastal path between Port Rexton and Trinity receives about 30,000 visitors a year. Travel and Leisure magazine hailed it as one of the top trails in North America and Europe.

Table 9. Hike Discovery Trails within the Discovery Aspiring Geopark.

Tourism Cluster	Trail Name	Distance (Km)	Hiking Level	Discovery! Geological Tour App	Hike Discovery App
A	Gun Hill Trail (Lower Route), Trinity	2 looped	Easy - Moderate	●	●
A	Skerwink Trail, Port Rexton	5.3 looped	Moderate - Difficult	●	●
	Fox Island Trail, Chapney's West	5.5 looped	Moderate	●	●
B	Murphy's Cove to Lodge's Pond Trail, Port Union, TBN	7.7 looped	Moderate	●	●
C D	Little Catalina to Maberley Trail,	16 one-way	Difficult		●
C	Klondike Trail, Elliston	3 one-way	Easy - Moderate	●	●
C	Cape Shore Trail, Bonavista	3.5 one-way	Easy - Moderate	●	●
D	Lighthouse Trail, King's Cove	3.5 looped	Easy - Moderate	●	●

Hike Discovery Trail Map

D.2.3.2 Geosite Signage

The Discovery Aspiring Geopark launched its own brand of **Geosite Interpretative Panels** in 2018. Interpretation text length was limited to approximately 150 words and written at a standardized age 12 reading level. Common design elements include:

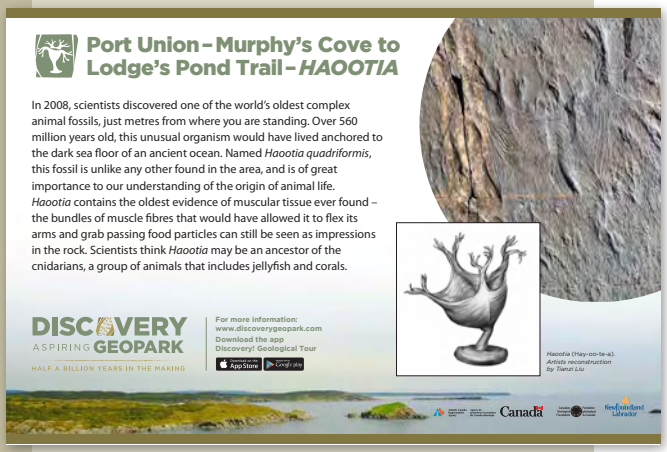
- Icon to the left of the title;
- Main logo in the bottom left;
- www link;
- App download link;
- Supported logos;
- Brown bars of colour across the top and bottom.

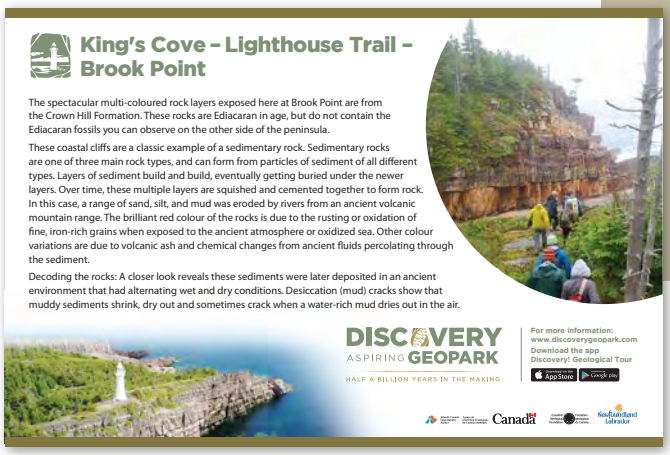
The signage also maintains a Geosite Naming Convention ensuring enhanced regional visibility.

Geosite Naming Convention

- Town Name
- Trail Name (if applicable)
- Site Name

Example:
King's Cove – Lighthouse Trail – Brook Point





Discovery Aspiring Geopark branded interpretative panels.

D.3 Geotourism Potential Analysis

The Discovery Aspiring Geopark region hosts a variety of dramatic and informative geological features in a setting of breathtaking scenery. These geological features complement richly interrelated cultural and historic narratives. The region attracts an influx of well-educated tourists seeking nature-centric experiences. The effort to further build on and share the rich geological heritage of the region is leading to enhanced collaboration and creative new ideas for partnership and product development that builds on the existing base of attractions, accommodations, and visitor experiences.

D.3.1 Regional Tourism Statistics

Visitor Vacation Profile

Newfoundland Labrador tourism activity has increased significantly since 2000, with non-resident visitation up by 30% and visitor spending almost doubling. In 2016, there were an estimated 540,000 visitors to the province, spending more than $560 million. Combined with resident tourists, total tourism related expenditures in Newfoundland Labrador tourism is estimated at $1.1 billion annually.

A combination of natural, historical and cultural attributes make the Bonavista Peninsula one of the province's most visited tourism destinations. The Province's 2016 Exit Survey indicated that 54% of all non-resident visitors from May to October visit the Bonavista Peninsula. 43% of the non-resident visitors are from Ontario, 24% from other Canadian provinces, including 11% from the Maritimes, and 8% are international travelers (primarily the UK, Germany and Australia). Almost half of those visiting earn greater than $100,000 annually; they are mature (60% are 55+) and well-educated (81% have university or post graduate education). The tourism season is concentrated from May to October, but shoulder seasons are getting stronger year to year.

About 15% of visitors to the province participated in geological tours or fossil observation; this figure is almost double the figure from the 2011 exit survey. Research indicates those who participated in geological or fossil related activities tended to travel in larger parties, stay longer, spend more money and are more likely to stay in commercial accommodations. These visitors participated in scenic tourism and pleasure walking, trail hiking, whale and birdwatching and boat tours. The high interest in these activities aligns well with the geotourism product available in the Discovery Aspiring Geopark region. The top non-resident vacation activity on the Bonavista Peninsula includes pleasure walking in communities (89%) and hiking (79%), whale and bird watching and boat tours. Increasing the region's visibility and accessibly of its geological and fossil-related features – both physically through infrastructure development and intellectually through interpretation and visitor experiences – will enhance the Bonavista Peninsula's reputation as a unique visitor destination! Research also indicates attracting tourists with these interests can potentially lead to longer stays and greater average expenditures per visit (Newfoundland Labrador, 2018).

D.3.2 Visitor Experience Development

D.3.2.1 Destination Development

Legendary Coasts

The proposed Geopark is located in the Eastern Region of Newfoundland Labrador – a destination promoted and managed by Legendary Coasts. Legendary Coasts of Eastern Newfoundland is one of five provincial tourism destination management organizations. The organization represents stakeholders and tourism operators in rural areas of the Bonavista, Burin and Avalon Peninsulas. In 2014, the organization launched a regional *Destination Development Plan*, outlining priorities and recommendations. The strategic plan identified visitor experiences relating to geology as a top priority.

Geological Network of Eastern Newfoundland

In May 2015, the Discovery Aspiring Geopark Inc. joined other significant geological sites in the eastern region to form a Geological Network of Eastern Newfoundland (GNEN). This partnership comprises operators offering geology-related market-ready products. Through the network, members work together to enhance geotourism opportunities by developing geology-themed itineraries for visitors. The nine sites include:

- Discovery Aspiring Geopark Inc.;
- Mistaken Point UNESCO World Heritage Site;
- Manuel's River Experience;
- Johnson GEO CENTRE;
- St. Lawrence Miners' Memorial Museum;
- Fortune Head Geology Centre;
- Bell Island Community Museum and #2 Mine Tour;
- Cape St. Mary's Ecological Reserve;
- The Rooms Corporation of Newfoundland Labrador.

The network's mandate is to develop and promote culturally focused visitor experiences, weaving together the story of its geological gems, while protecting and preserving geological heritage, the environment, protected (fossil) sites and landscapes.

This network is working together to develop itineraries for visitors, and enhance geotourism experiences. The partnership strengthens the awareness of the strong geological attributes throughout the eastern part of the Province.

> *"Increasing the region's visibility and accessibly of its geological and fossil-related features – both physically through infrastructure development and intellectually through interpretation and visitor experiences – will enhance the Bonavista Peninsula's reputation as a unique visitor destination!*

D.3.2.2 Branding and Marketing

Brand Guidelines

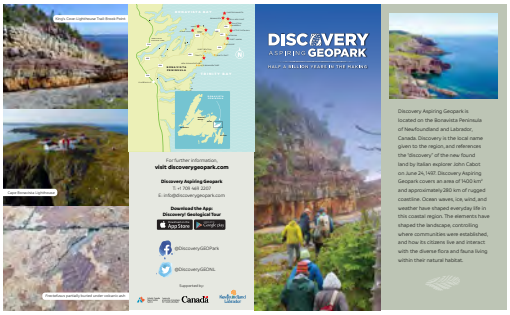
The brand for the Discovery Aspiring Geopark combines text with an icon. The icon is a depiction of *Fractofusus andersoni*, one of many Ediacaran fossils found on the Bonavista Peninsula and published in Mitchell et al., 2015. The fossil icon is designed to reproduce well in black, white, and colour. The *Discovery Brand Guidelines* document depicts the various logo versions and serves as a best practices guide for their use. To support the many Geosite locations and features, a number of companion icons have been developed for the initial sites. These icons can be used alone or in conjunction on signage and general promotional materials.

Fractofusus andersoni.

Marketing Materials

The Discovery Aspiring Geopark uses a variety of marketing materials to promote its activities, while others will be developed and developed as the project progresses. The following is a list of marketing materials:

- Brochure;
- Trade show pop-up banner;
- Tear drop flag;
- Stationary package;
- Advertising templates;
- Post cards, bookmarks, magnets and stickers;
- Decals for vehicles;
- Photographs, including HD drone imagery;
- Interpretative signage;
- Maps;
- Educational materials;
- Newsletter;
- App;
- Website and social media accounts.



D.4 Sustainable Development

D.4.1 United Nation's Sustainable Development Goals

The Discovery Aspiring Geopark will work in partnership to promote this geologically rich landscape and build upon the region's rich culture, heritage and natural assets for sustainable communities free from disparity.

The aspiring Geopark aims to use the United Nation's 17 Sustainable Development Goals (SDGs) as a framework for its sustainable development. As part of the planning process, emphasis will be placed on the following Sustainable Development Goals:

Table 10. UN's Sustainable Development Goals and the Discovery Aspiring Geopark's Contributing Actions.

Sustainable Development Goal	Contributing Actions Underway
	Tourism sites and municipal Infrastructure support active and creative lifestyles leading to good physical and mental health. Businesses and organizations support local and international efforts to end poverty. Community gardens and root cellars promote food sustainability and support local food banks.
	Free quality education is offered by a K-12 school system and opportunities for inexpensive post-secondary education at the College of the North Atlantic Campus, Bonavista Campus. Community engagement and empowerment contributes to quality and experiential education at proposed Geosites, including site interpretation. Engaging communities and individuals about the value and significance of their geoheritage will also contribute to enhanced geoconservation surrounding the Geosites.
	The region is steadily attracting young female entrepreneurs who are moving to the area to build upon the growing tourism industry. New businesses such as the Bonavista Social Club, Bonavista Adventure Tours, Port Rexton Brewery, Boreal Diner, Broken Books, East Coast Glow, Aunt Sarah's Chocolates, Sweet Rock Ice Cream, Newfoundland Salt Company, Sea of Whales, Skerwink Hostel HI Trinity, and Bonavista Bicycle Picnic and Café are all operated by the new Millennial women entrepreneurs and couples. Women are in leadership roles in towns and not-for-profit organizations, including the aspiring Geopark.
	The Bonavista Peninsula is a best practice example of innovation in rural economic development. This story is being shared outside the province through written articles and guest speaking engagements helping to inspire other community leaders. Investment in tourism infrastructure is leading to growth of small business, generating decent employment and leading to economic growth. Innovative community infrastructure such as the "Bonavista Commons" operated by the Bonavista Trinity Regional Chamber of Commerce supports the growing number of entrepreneurs seeking a creative atmosphere to build their business idea.
	Planning for sustainable community development begins with public input. Community consultations helped organizations decide where to best invest in community development including municipal infrastructure, green spaces and public spaces like the Garrick Theatre. These efforts diversified the economy and stabilized the population on the Bonavista Peninsula leading to inclusive, safe, resilient and sustainable communities. Residents enjoy outdoor sustainable activities including hiking, biking, farming, hunting, berry picking, ice fishing, and winter recreation. Activities affecting terrestrial ecosystems are protected under Provincial regulations.
	Communities on the Bonavista Peninsula are part of the Eastern Regional Waste Management Authority. Waste going to local landfills is being reduced as residents are encouraged to reduce, reuse and recycle at the Green Depot in Bonavista.
	Municipalities Newfoundland Labrador is helping communities in the aspiring Geopark to identify ways to reduce and treat municipal waste water effluent going into the ocean as part of Canada's actions against climate change.
	Discovery Aspiring Geopark and its membership work in cooperation and partnership with local and regional stakeholders. The aspiring Geopark aims to continue forming relationships with other aspiring and established UNESCO Global Geoparks from Canada and the Global Geopark Network to work on joint sustainable goals.

Profile of an Entrepreneurial Woman

Emma Hiscock

Emma Hiscock lived in Trinity, Newfoundland. Her life spanned a time when Trinity's heyday as a centre for the salt fish trade was in the past, but it was still the centre of commerce for the area. In 1893, a sudden storm at sea killed her husband Richard, leaving her a widow with six small children. Faced with these devastating circumstances Emma persevered, drawing upon the examples of strength that her mother and grandmother provided. Defying the conventions of the time, Emma chose not to remarry and supported her children on her own. In addition to support from her family, Emma had another asset, the Hiscock Property. Her resourcefulness enabled her to use it to the fullest potential including running a shop, acting as postmistress, and renting out her front room to a bank. All of which provided a comfortable life for Emma and her children. Emma's story is one of many, and is a testament to the strength, resourcefulness and resilience of the women of Newfoundland Labrador.

Emma's story is captured at the Hiscock House Provincial Historic Site, Trinity Historic Sites, Trinity.

D.4.2 Role of Women in the Management of the Proposed Geopark

The Discovery Aspiring Geopark's Interim Board of Directors is dominated by the presence and role of women. Women assume six of the nine voting members of the working-management board. These women are passionate, strong community leaders, representing incorporated municipalities, non-for-profit organizations and business. The Board's ex-officio members, including partners and advisors are also women with academic backgrounds in geoscience, business and economic development.

The aspiring Geopark directly employs two staff, however other partners and advisors support the aspiring Geopark project as a part of their work plans.

N°	Name	Employment	Function	Skill	% Time	Gender
1	Amanda McCallum	Temporary	Project Manager, Geologist	Geoscience, Education	100	F
2	Renee Paul	Temporary	Administrative Coordinator	Finance, Bookkeeping	25	F
3	Dr. Alana Hinchey	Advisor (GSNL)	Geologist	Geology	25	F

D.4.3 Business Partnerships

The Discovery Aspiring Geopark will partner with local and regional businesses as part of its economic development initiatives. Efforts are underway to implement a membership program. Various types of membership will be available based upon a fee structure. The fee structure, including the categories and members benefits will undergo an annual review by the Board. The proposed membership structure below will contribute to the sustainability of the aspiring Geopark.

Membership types can take two categories: operator or associate member. There are two operator categories: direct and indirect operator. A direct operator is a business offering a Tourism Oriented Product (TOP) at a Geosite and charges a fee. An example is a tour operator offering hiking or boat tours. An indirect site operator is a business delivering a TOP operating within the boundaries of the Discovery Aspiring Geopark. Examples include accommodations (hotels, bed and breakfast) and restaurants for food and beverages. Associate members may include corporate, family, individual or student.

Table 11. Proposed Membership Fees within the Discovery Aspiring Geopark.

Membership Type		Fees	Details
Operator	Direct Operator	$500	All businesses offering a Tourism Oriented Product (TOP) at a geosite with Geopark themed material and programmes.
	Indirect Operator	$300	All businesses offering a Tourism Oriented Product (TOP) within the boundaries of the Geopark.
Associate Member	Corporate	$100	All businesses, not-for-profit organizations, and municipalities.
	Family	$20	Two adults (age 18 years or over) and all children under 18 living in the same household.
	Individual	$10	One adult (age 18 years or over)
	Student	Free	Complimentary with a valid student I.D.

D.4.4 Regional Products

In recent years, young entrepreneurs have been bringing new life to this rural region. New businesses such as East Coast Glow, Aunt Sarah's Chocolates, Sweet Rock Ice Cream, and the Newfoundland Salt Company are all producing local products. Within the boundaries of the proposed Geopark, there is enormous potential for business owners to learn about the benefits of the Geopark initiatives. The Discovery Aspiring Geopark will work with business to raise awareness and promote local products as part of its growing marketing plans. Potential membership within the Global Geoparks Network will also provide opportunities for enhanced visibility of local products.

Regional and local products available within the Discovery Aspiring Geopark.

Science and Art

The collaboration between science and art gives us new ways of seeing and thinking about the world around us. It provides a powerful platform to bring people together from different backgrounds and presents opportunities for community engagement and sustainable development. The Bonavista Peninsula has a rich history of arts and crafts. The Discovery Aspiring Geopark aims to collaborate with existing arts organizations. In 2017, the 2 Rooms Contemporary Art Projects launched the Bonavista Biennale. This Biennale is large-scale, multi-site contemporary visual art exhibition in a variety of non-traditional gallery space spread throughout communities and the landscape. For instance, the Union Electric Building, Port Union, Trinity Bay North has recently been restored by the Sir William F. Coaker Foundation.

In 2018, a collaborative project was initiated between University of Plymouth's Illustration students and Dr. Jack Matthews, Oxford University Museum of Natural History. The team focused on creating new, scientifically informed illustrations of the Ediacaran Fossils from within the aspiring Geopark. The project's illustrative artwork products are used on the Discovery Aspiring Geopark's branded interpretation panels, public lecture and special presentations correspondence. The project led to a visit from Rachel Simpson, a student with the School of Art, Design and Architecture's Illustration programme. Simpson used the Sir William F. Coaker Foundation's historic presses to print illustrations of the fossil *Fractofusus*. She also worked with local artist Michael Flaherty, Wild Cove Pottery to create Ediacaran fossil inspired pottery.

Print illustration of the fossil *Fractofusus*.

Ediacaran fossil inspired pottery.

D.5 Community Empowerment and Engagement

Community empowerment and engagement is a key priority for the Discovery Aspiring Geopark; engagement and collaboration are two of the organization's core values. The aspiring Geopark has worked diligently to develop strong partnerships and meaningfully engage with key stakeholders including municipalities, the Bonavista-Trinity Regional Chamber of Commerce, academic and educational institutions, and other tourism stakeholders such as the Trinity Historical Society, the Sir William F. Coaker Heritage Foundation, Tourism Elliston, Home from the Sea Sealers Interpretation Centre, King's Cove Heritage Society, and Hike Discovery.

The Discovery Aspiring Geopark will continue to regularly update the community through a newsletter, website, local presentations, radio and television news reports.

Annual General Meeting

The Discovery Aspiring Geopark Incorporated held its first Annual General Meeting (AGM) in October 2017 at the Bonavista Campus of the College of the North Atlantic. This public meeting allowed the Board of Directors to share information about the Geopark, including the financial report, operations summary and annual report. The community liaison officer also presented about the year's community engagement initiatives. Members of the general public had an opportunity to ask questions. Meeting highlights included a musical performance and greetings from the Federal and Provincial Government. The business brief was followed by a networking social with refreshments.

Discovery Aspiring Geopark Board of Directors, AGM 2017.

D.6 Public and Stakeholder Awareness

Investing in community and stakeholder outreach has been a priority for the aspiring Geopark for the past number of years. Emphasis was placed on talking about a Global Geopark – what it is and, what it is not. Enhanced communication and information sharing has increased stakeholder knowledge and awareness about the region's geological assets. In turn, this has lead to a greater understanding of the geoheritage and its significance, geoconservation, and the region's geotourism potential.

Stakeholder Engagement

In 2017, the Discovery Aspiring Geopark recruited and hired staff to assist with building community and stakeholder capacity. A project manager and a community liaison officer were recruited to undertake a series of community engagement sessions throughout the region. The liaison officer and board members met with Municipalities, regional community groups and organizations, including Community Connections, Rotary Club of Clarenville, Legendary Coasts, and the Bonavista-Trinity Regional Chamber of Commerce. A variety of presentations were delivered to local schools, including a guided field trip for students and teachers of Matthew Elementary (Bonavista), Catalina Elementary (Trinity Bay North) and Saint Mark's School (King's Cove).

Business Collaboration

Public information sessions emphasizing business and visitor experience have also been delivered. With the most recent session in June 2018, the aspiring Geopark partnered with the Bonavista-Trinity Regional Chamber of Commerce. Through this collaboration, Gail Bremner, Executive Director of the Stonehammer UNESCO Global Geopark, Saint John, New Brunswick presented to members about the breadth of business opportunities within a UNESCO Global Geopark.

When the general population is better informed about opportunities within the aspiring Geopark, residents of the region will have the best opportunity to achieve benefits from the project. The Discovery Aspiring Geopark will continue to regularly host networking sessions, and create valuable opportunities for businesses and stakeholders.

Students from Catalina Elementary taking part in a field trip within the Discovery Aspiring Geopark.

Scientific Collaboration

The Discovery Aspiring Geopark has a collaborative relationship with international researchers who frequent the region. Through this partnership, the aspiring Geopark has been represented at the following national and international academic conferences:

Hinchey,A.M. 2018. From Experimental Tourism to Flying Drones: The Evolving Role of the Geological Survey in Geoheritage Projects, Newfoundland and Labrador. Resources for Future Generations, Vancouver, Jun 2018

Matthews,J.J. 2018. (POSTER) Discovery Aspiring Geopark: A candidate for UNESCO Global Geopark from the Bonavista Peninsula of Newfoundland. Progeo IX Symposium, Poland, Jun 2018

Matthews,J.J. 2018. (POSTER) Discovery Aspiring Geopark: A candidate for UNESCO Global Geopark from the Bonavista Peninsula of Newfoundland. Resources for Future Generations, Vancouver, Jun 2018

Matthews,J.J. 2018. Geoconservation Monitoring Networks: Protecting the World's Oldest Complex Macrofossils in the Ediacaran of Newfoundland. European Geosciences Union General Assembly, Vienna, Apr 2018.

Dr. Jack Matthews represents the Discovery Aspiring Geopark at the Progeo IX Symposium, Poland (2018).

D.7 Selling of Geological Material

The Discovery Aspiring Geopark is not involved in the direct selling of geological material, such as fossils, mineral, or polished rocks. The governing authority of the proposed Geopark agrees to uphold the Operational Guidelines for UNESCO Global Geoparks, in particular, Section 3. (vii).

D.8 Networking

Global Geoparks Network

Since its inception, the Discovery Aspiring Geopark has been actively engaging and participating in the Global Geopark Network. In partnership with the Geological Survey of Newfoundland and Labrador's education and public outreach initiatives, they developed a relationship with the Copper Coast UNESCO Global Geopark. In 2009, local representatives traveled to Ireland on a *Best Practice Mission* to strengthen partnerships and learn from other Geoparks about the process.

In 2010, members of the aspiring Geopark steering committee attend a *Geopark 101* training session at the Stonehammer Global Geopark in Saint John, New Brunswick. In April, members of the steering committee and government partners participate in a *Best Practices Mission* to Stonehammer Geopark, Saint John, New Brunswick.

Board members attend the 1st Annual Canadian Aspiring Geoparks Symposium in Tumbler Ridge Aspiring Geopark, British Columbia, in July 2013. Representatives attend the 2014 Global Geopark Network International UNESCO-supported Conference at Stonehammer Global Geopark, Saint John, New Brunswick.

Students from Saint Mark's School, King's Cove sing the folk song, Pat Murphy's Meadow during the Canadian National Committee for Geopark's site evaluation visit.

In 2018, board members and project manager attend the Canadian Geoparks Workshop in Ottawa, Ontario. In June, the aspiring Geopark hosts the Canadian National Committee for Geoparks (CNCG) site evaluation team. In September, a small delegation attends the 8th International Conference on UNESCO Global Geoparks, Adamello Brenta Geopark, Madonna di Campiglio, Italy.

Discovery Aspiring Geopark delegation attends the 8th International Conference on UNESCO Global Geoparks, Adamello Brenta Geopark, Madonna di Campiglio, Italy.

Canadian Geopark Network attends the opening ceremony at the 8th International Conference on UNESCO Global Geoparks.

E Interest and Arguments for becoming a UNESCO Global Geopark

The Discovery Aspiring Geopark believes it possesses the necessary features to become a successful member of the UNESCO Global Geoparks Network.

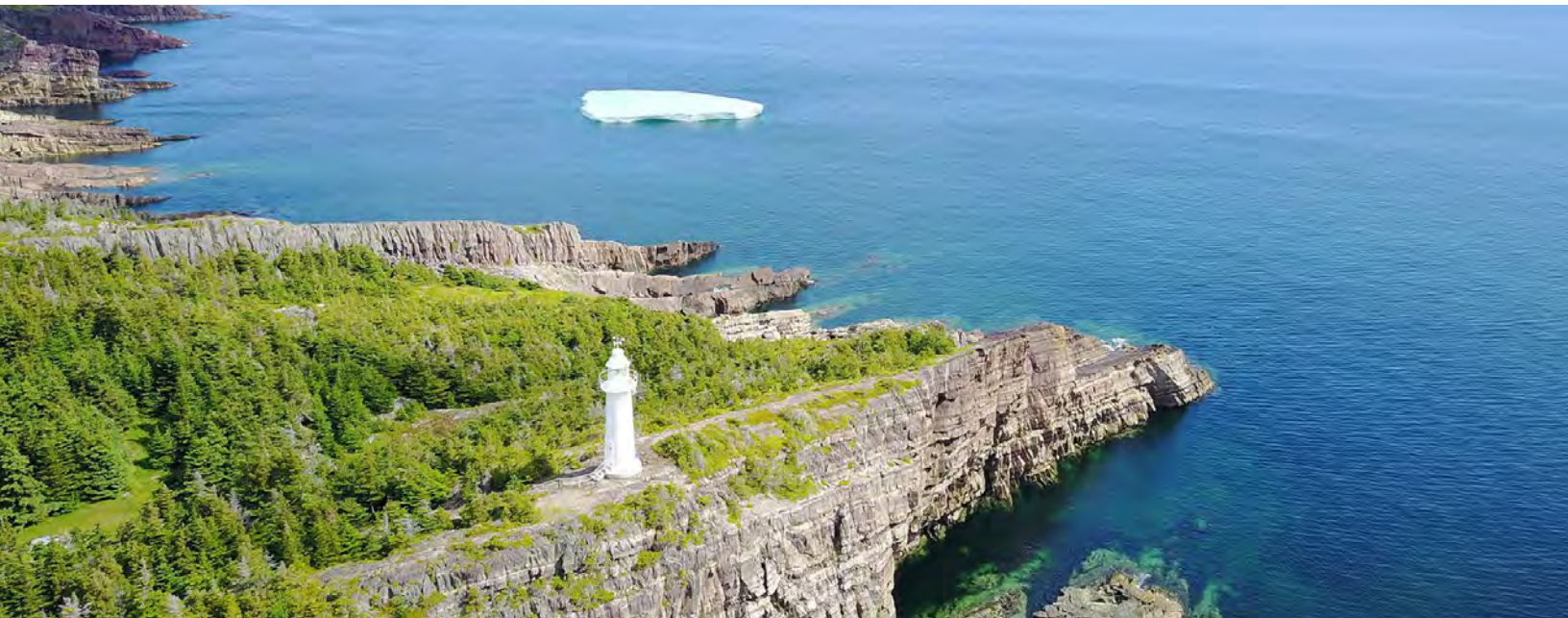
The governing body supports a collaborative and inclusive approach to encouraging responsible management and empowering communities. The governing authority is truly grassroots. It represents many organizations and communities, including incorporated municipalities, individuals, support agencies and experts across several disciplines. The governing organization has been proudly building strong relationships through community and resident engagement in the planning and direct management of the aspiring Geopark initiatives. It is due to a shared vision, passion and sheer determination of a group of dedicated volunteers that has propelled this project forward. The board and its members have addressed concerns and shortcomings to strengthen a collaborative management approach. Maintaining an inclusive and regional approach maximizes the potential for all communities throughout the region to benefit from receiving the UNESCO Global Geoparks designation.

A UNESCO Global Geoparks designation will bring a multitude of benefits to this region and be a catalyst for sustainable economic development. The Bonavista Peninsula's economy has historically been based on the fishing industry. Today, 25 percent of the economic activity is derived from the tourism industry. By attracting new markets and potentially longer-stay destination visitors, a UNESCO Global Geoparks designation will strengthen the existing tourism industry and the overall economic viability of the individual communities within the region. The Discovery Aspiring Geopark stakeholders believe a UNESCO Global Geoparks designation will strengthen the regional economy and raise the international profile of the area's geological significance and unique landforms.

Canadian Geoparks Network

The Discovery Aspiring Geopark welcomes the opportunity to increase the number of designated Geoparks in Canada and proudly join the Global Geoparks Network. We look forward to continuing to model the United Nation's sustainable development goals, promote geotourism, to deliver educational programming and to foster community engagement so everyone can experience and discover our aspiring Geopark. As a member of the Canadian Geoparks Network, it will allow for exchange with other Canadian Geoparks for best practices. Furthermore, it will allow for the expansion of the network to Canada's most eastern coast and reinforce the key messages of UNESCO Global Geoparks on a regional, provincial and national scale. Discovery respectfully acknowledges the ground work laid by the Canadian Geoparks, including Stonehammer UNESCO Global Geopark, Tumbler Ridge UNESCO Global Geopark and Percé UNESCO Global Geopark. The Discovery Aspiring Geopark has also been collaborating with the Cliffs of Fundy Aspiring Geopark, sharing dialogue and experiences to help strengthen the identities of both respective aspiring Geoparks.

King's Cove Lighthouse along Lighthouse Trail, Newfoundland.



Global Geoparks Network

The Discovery Aspiring Geopark has initiated enhanced promotional efforts with the launch of the Discovery! Geological Tour App, Apple App Store, 2017. Interpretative signage developed and marketed under the Discovery Aspiring Geopark brand and a social media presence is already bringing new interest to the region.

The UNESCO Global Geopark designation and label would confirm the value and significance of the region's geological heritage and geodiversity. It will strengthen regional and provincial stakeholders' support and investment in the continued development of the aspiring Geopark.

The opportunity to join and integrate as part of the Global Geoparks Network will give local communities and its citizens a sense of pride. It will help strengthen the region's identify and ensure individuals and communities experience and enjoy their local landscape and appreciate the value and importance of its geological heritage. It will provide a platform to help incubate new local enterprises and support businesses. It will also stimulate community leadership, training and programming and enhance credibility within the geotourism industry. A more vibrant and engaged community leads to a stronger and more prosperous economy. Most importantly, it will provide an opportunity to give back to communities throughout the region. The Discovery Aspiring Geopark hopes it will fulfill its vision and be successful in securing a prestigious place on the list of UNESCO Global Geoparks.

Acknowledgments

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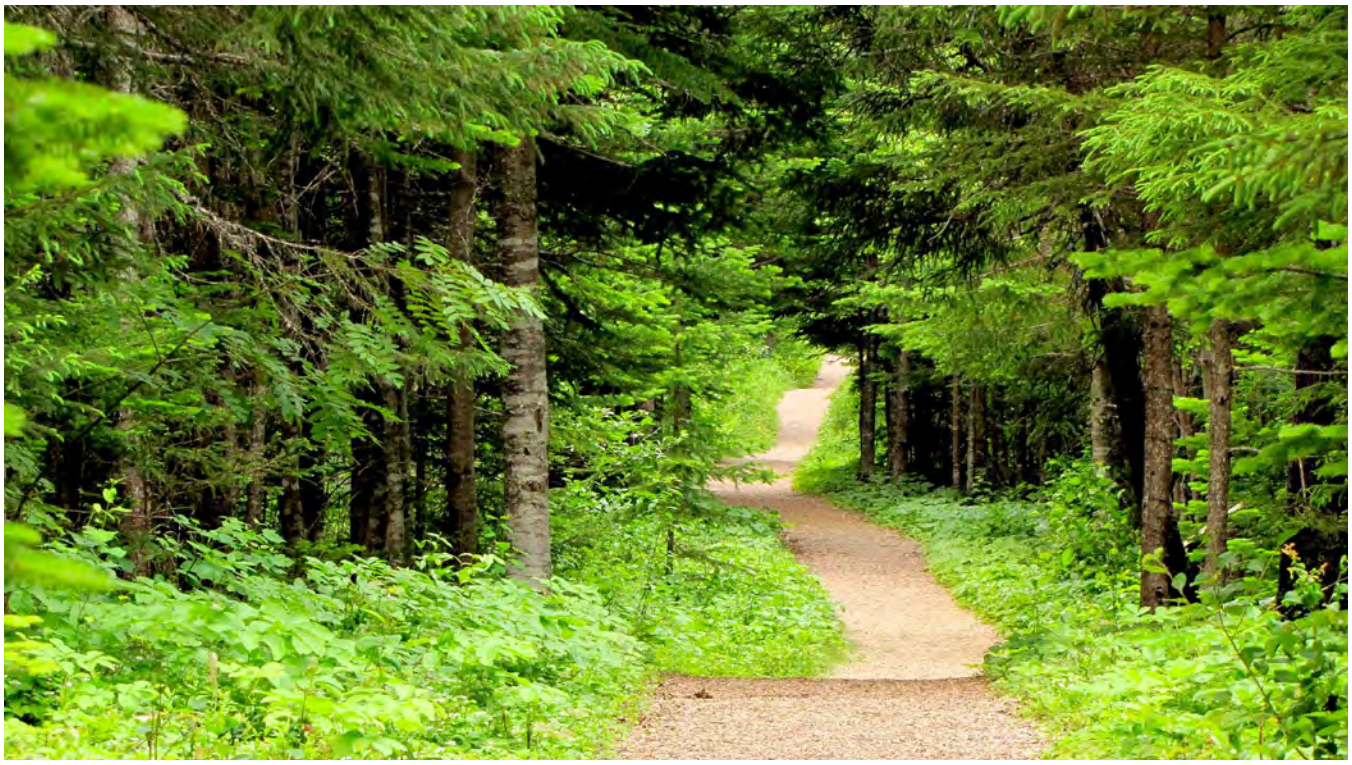

The Beothuk Trail, Boyd's Cove.

Photo Credits

Page	Photo	Credit
Cover (Front)	GAC-MAC 2012 Field Trip, King's Cove – Lighthouse Trail – Brook Point.	Dr. John Calder, Nova Scotia Department of Natural Resources
Cover (Back)	Hiking near The Dungeon Provincial Park in Bonavista.	Newfoundland and Labrador Tourism
3	Statue of John Cabot along the Discovery Trail, Cape Bonavista, Newfoundland.	Crystal Fudge
	Cape Bonavista Lighthouse Provincial Historic Site, Cape Bonavista, Newfoundland.	Dr. Alana Hinchey, Geological Survey of Newfoundland and Labrador, Government Newfoundland Labrador
5	The Spirit of the Beothuk, created by Gerald Squires.	Provincial Historic Sites
6	Fishing boats in Bonavista Harbour.	Newfoundland and Labrador Tourism
16	Sea Arch in Tickle Cove.	Beth McLarty Halfkenny, University of Carleton
21	Members of Research Team with the laser used to map out Ediacaran fossil surfaces to a 40 micron resolution at a site near Port Union, Trinity Bay North. (From left): Dr. Alex Liu, Dr. Emily Mitchell, and Dr. William McMahon.	Dr. Emily Matthews, University of Cambridge
	The Johnson Surface (H14) Fossil Site, Little Catalina, Trinity Bay North.	Dr. Emily Matthews, University of Cambridge
22	Beothuk Interpretation Centre Provincial Historic Site.	Provincial Historic Sites
23	*Haootia quadriformis*.	Dr. Jack Matthews, Memorial University of Newfoundland
	Beothukis plumose from the Discovery Aspiring Geopark.	Dr. Jack Matthews, Memorial University of Newfoundland
24	The Dungeon Provincial Park.	Newfoundland and Labrador Tourism
25	Town of Trinity from Gun Hill.	Edward (Bud) Vincent
26	The Green Family Forge, Trinity Historical Society, Town of Trinity	Newfoundland and Labrador Tourism
28	Signage displaying the Provincial protection legislation at the gateway kiosk to the Port Union-Murphy's Cove to Lodge's Pond Trail, Municipality of Trinity Bay North	Amanda McCallum, Ignite Education Inc
	Port Union – National Historic District Boardwalk Fossil Site	Discovery Aspiring Geopark
30	Root cellar in Elliston.	Newfoundland and Labrador Tourism
31	Cleaning cod fish on splitting table, Trinity.	Newfoundland and Labrador Tourism
32	GAC-MAC St. John's 2012 Post-Conference Field Trip	Dr. John Calder, Nova Scotia Department of Natural Resources
34	Whale watching in Trinity Bay with Sea of Whales Adventures	Sea of Whales Adventures
	The Atlantic Puffins is the provincial bird of Newfoundland Labrador.	Mark Gray
36	Town of Trinity.	Provincial Historic Sites
37	Town of Trinity.	Provincial Historic Sites
38	*Fractofusus andersoni*	Dr. Alexander G. Liu, University of Cambridge
40	Profile of an Entrepreneurial Woman, Emma Hiscock.	Trinity Historical Society
41	Regional and local products available within the Discovery Aspiring Geopark.	Crystal Fudge for the Discovery Aspiring Geopark
42	Print illustrations of the fossil *Fractofusus*.	Edith Samson, Sir William Ford Coaker Heritage Foundation
	Ediacaran fossil inspired pottery.	Dr. Jack Matthews, Memorial University of Newfoundland
43	Discovery Aspiring Geopark Board of Directors, AGM 2017.	Crystal Fudge for the Discovery Aspiring Geopark
44	Students from Catalina Elementary taking part in a field trip within the Discovery Aspiring Geopark.	Discovery Aspiring Geopark
	Dr. Jack Matthews represents the Discovery Aspiring Geopark at the Progeeo IX Symposium, Poland (2018).	Dr. Jack Matthews, Memorial University of Newfoundland
45	Students from Saint Mark's School, King's Cove sing the folk song, Pat Murphy's Meadow during the Canadian National Committee for Geoparks site evaluation visit.	Amanda McCallum, Ignite Education Inc
46	Discovery Aspiring Geopark delegation attends the 8th International Conference on UNESCO Global Geoparks, Adamello Brenta Geopark, Madonna di Campiglio, Italy.	Discovery Aspiring Geopark
	Canadian Geopark Network attends the opening ceremony at the 8th International Conference on UNESCO Global Geoparks.	Discovery Aspiring Geopark
47	King's Cove Lighthouse along Lighthouse Trail, Newfoundland.	Dr. Alana Hinchey, Geological Survey of Newfoundland and Labrador, Government Newfoundland Labrador
48	The Beothuk Trail, Boyd's Cove.	Provincial Historic Sites