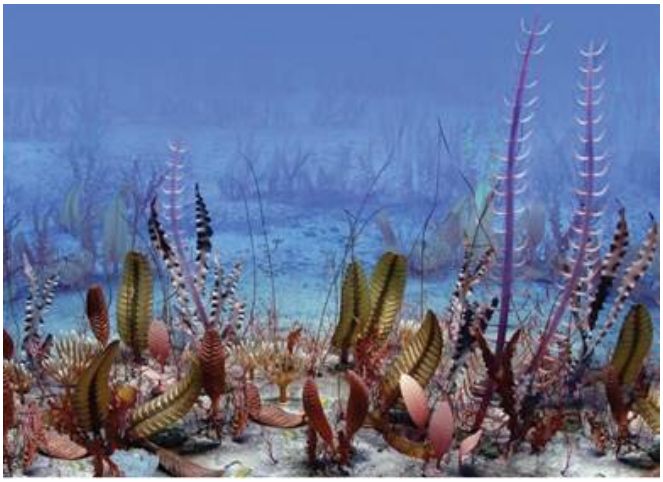
EUROPE / NORTH AMERICA

MISTAKEN POINT

CANADA



Reconstruction of the Mistaken Point sea floor

Watern Cove Surface, *Hapsidophyllas* and *Charniodiscus* - © IUCN Shafeea Mohd Leman

WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

MISTAKEN POINT (CANADA) – ID 1497

IUCN RECOMMENDATION TO WORLD HERITAGE COMMITTEE: To inscribe the property under natural criteria.

Key paragraphs of Operational Guidelines:
Paragraph 77: Nominated property meets World Heritage criteria.
Paragraph 78: Nominated property meets integrity and protection and management requirements.

1. DOCUMENTATION

a) Date nomination received by IUCN: 16 March 2015

b) Additional information officially requested from and provided by the State Party: Following the IUCN World Heritage Panel in December 2015 a progress report was sent to the State Party on 16 December 2015 seeking its response on a number of points. These related to any information on recently discovered fossil sites in the vicinity of Mistaken Point and the views of the State Party on the potential to include such areas in future serial extensions to the nominated property should it be inscribed. Additional matters concerned clarifications and rationalization of the boundaries of the nominated property; more information on the anticipated impacts of coastal erosion; and finally views regarding any potential impacts from offshore developments and how these might be mitigated. The information in response was received from the State Party on 22 February 2016.

c) Additional literature consulted: Various sources including: Anderson, M.M., and S.B. Misra. 1968. *Fossils found in the pre-Cambrian Conception group of south-eastern Newfoundland*. Nature 220: 680–81. Government of Newfoundland and Labrador. 2009. *Mistaken Point Ecological Reserve Management Plan*. Parks and Natural Areas Division, Department of Environment and Conservation, Deer Lake, NL, 26pp. Government of Newfoundland and Labrador. 2013. *Mistaken Point World Heritage Site Management Plan*. Parks and Natural Areas Division, Department of Environment and Conservation, Corner Brook, NL, 47pp. Liu, A.G., D. and M.D. Brasier. 2012. *A Global Comparative Analysis of Ediacaran Fossil Localities*. UK: Oxford. Narborne, G.M. 2011. *When life got big*. Nature 470:339-340. Narborne, G.M. and M. Laflamme 2009. *Neoproterozoic glaciations, oxygenation, and the rise of animals in Avalonian Newfoundland*. NASA Astrobiology Institute Field Trip Guidebook. E.L. Bamforth, G.M. Narbonne, M.M. Anderson. *Growth and ecology of a multi-branched Ediacaran rangeomorph from the Mistaken Point assemblage, Newfoundland*. Journal of Paleontology, 82 (2008), pp. 763–777 A.P. Benus. *Sedimentologic context of a deep-water Ediacaran fauna (Mistaken Point Formation, Avalon zone, eastern Newfoundland)*. Bulletin of the New York State Museum, 463 (1988), pp. 8–9 M. L. Droser and J. G. Gehling. *The advent of animals: The view from the Ediacaran*. PNAS (April 21, 2015) 112 (16): 4865-4870 M.A. Fedonkin, J.G. Gehling, K. Grey, G.M. Narbonne, P. Vickers-Rich. *The Rise of Animals: Evolution and Diversification of the Kingdom Animalia*. Johns Hopkins University Press, Baltimore (2007) M.F. Glaessner. Geographic distribution and time range of the Ediacara Precambrian fauna. GSA Bulletin, 82 (1971), pp. 509–513 M.F. Glaessner. *The Dawn of Animal Life: a Biohistorical Study*. Cambridge University Press, Cambridge (1984) A.G. Liu, D. Mcllroy, M.D. Brasier. *First evidence for locomotion in the Ediacara biota from the 565 Ma Mistaken Point Formation, Newfoundland*. Geology, 38 (2010), pp. 123–126 S. B. Misra. *Stratigraphy and depositional history of late Precambrian coelenterate-bearing rocks, southeastern Newfoundland*. Geological Society of America Bulletin 82 (1971):979–988. G.M. Narbonne, J.G. Gehling. *Life after snowball: the oldest complex Ediacaran fossils*. Geology, 31 (2003), pp. 27–30 Seilacher. *Early life on Earth: Late Proterozoic fossils and the Cambrian explosion*. Pp. 389–400 in S. Bengtson (ed.). Early Life on Earth. Nobel Symposium 84. (1994) Columbia University Press, New York. S. Xiao, M. Laflamme. *On the eve of animal radiation: phylogeny, ecology and evolution of the Ediacara biota*. Trends in Ecology and Evolution, 24 (2009), pp. 31–40

d) Consultations: 11 desk reviews received. The mission also met with national level representatives from Parks Canada and provincial level Government Ministers from Newfoundland and Labrador; the Provincial Parks and Natural Areas Division (PNAD), staff and community volunteers from the Mistaken Point Ecological Reserve Park; academics, community support organizations and centres such as the Geo Centre and Geo Park, St Johns and the Mistaken Point Ambassadors Inc. as well as other local stakeholders.

e) Field Visit: Mohd Shafeea Leman, 28 September – 01 October, 2015

f) Date of IUCN approval of this report: April 2016

2. SUMMARY OF NATURAL VALUES

The nominated property, Mistaken Point is located along the rugged, windswept south-eastern coast of the Avalon Peninsular in Canada's Newfoundland and Labrador Province. The property comprises a low, narrow, 17-kilometre-long coastal strip stretching from Daleys Point (1 km south of the town of Portugal Cove

South) in the northwest, to just east of Shingle Head (approximately 4.5 kms southwest of Cape Race), in the southeast. The property encompasses a 146 ha terrestrial area with an additional 74 ha buffer zone adjoining its landward margin. Virtually all of the property, plus most of its buffer zone, lies within the Mistaken Point Ecological Reserve (MPER). Mistaken Point itself, the promontory for which the entire nominated property is named, is the most obvious topographic feature within its boundaries.

Apart from a variety of rock platforms and cliff types, other geomorphological features present along the coast are small coves and gullies, larger steep-sided gulches, various headlands, small beaches, narrow sub-vertical slots eroded along faults and joints, reefs, islets, sea stacks, sea caves, and small rock arches. Geologically this coast is composed of Precambrian bedrock unconformably overlain by a late Pleistocene, up to 4-metre thick sheet of unconsolidated, very poorly sorted, granule-to boulder-grade gravel (diamicton) of glacial origin. Ninety percent of the nominated property's shoreline comprises bedrock exposures, while the remainder is occupied by nine cobble-grade gravel beaches, the longest stretch of which is about 375 metres in length. The gently to moderately rolling topography of the MPER is drained by numerous minor streams and six significant, southwest or south flowing. Blanket bogs are common and there are many small ponds.

Mistaken Point has geological links to an ancient landmass once positioned near northern South America, and with abundant evidence of deep-ocean life forms that flourished more than half a billion years ago. The property is nominated for its world renowned fossiliferous middle Ediacaran (580 to 560 million years old) geological succession including the oldest known Ediacara fauna. This comprises a two kilometre thick sequence of sandstones and mudstones most of which are deep marine turbidites, interbedded with thin layers of volcanic tuff that bury thousands of soft-bodied fossils. The fossil horizons within the nominated property lie within five rock formations that span almost the entire Middle Ediacaran Period: the Drook, Briscal, and Mistaken Point Formations of the Conception Group, and the overlying Trepassey and Fermeuse Formations of the St John's Group. More than 10,000 fossil impressions ranging from a few centimetres to 2 metres in length are to be found here including the fossils of 17 species from 14 genera.

The Ediacaran fauna are central to understanding the transition from single-celled to complex multi-celled invertebrates. There are relatively few places on earth where such soft-bodied fossils can be found, because they require special conditions for preservation. Since they have no shells or hard parts they are only preserved in anoxic, quiet-water environments.

The nominated property is put forward as the place that best illustrates the earliest stages in the emergence of biological complexity on our planet. As the nomination puts it the time "when life got big": being the first appearance of abundant and diverse, large and biologically complex organisms on Earth, 580 million years ago. The many thousands of impressions of soft-bodied, centimetre to metre-scale creatures preserved at Mistaken Point document the oldest large and biologically complex creatures known and are generally regarded as including the earliest (stem-group) ancestors of the animals. The nominated property also preserves rare insights into the interrelationships between species thus providing key information about the ecology of these ancestral animals and about the early colonization of the deep-sea floor.

Mistaken Point's fossils range in age from 580 to 560 million years, the longest continuous record of Ediacara-type megafossils anywhere, and predate the Cambrian Explosion (the relatively short evolutionary event during which the fossil record shows that most major animal phyla appeared) by more than 40 million years. Ecologically, Mistaken Point contains the oldest and most diverse examples of Ediacaran deep-sea communities known and the earliest documented examples of ecological tiering and secondary community succession. Other attributes include the first examples of metazoan locomotion, exceptional potential for radiometric dating of the assemblages, and evidence for the role of ancient oxygen levels in the regional and global appearance of complex multicellular life.

Although not nominated for its biological values the glaciated landscapes of Mistaken Point support Arctic alpine moss-heath and bog communities. At least 150 plant species have been recorded within MPER including Balsam Fir (LC), a range of berry-producing plants and various insectivorous plants such as sundews and pitcher plants. Seaweeds thrive in the intertidal and sub tidal fringes. Mistaken Point provides important habitat for a range of birdlife and is recognised as an Important Bird Area, globally significant for congregatory bird species because of its wintering populations of Purple Sandpiper (LC) and Common Eider (NT). More than 180 bird species have been sighted in the area and adjacent waters. The nominated property is also home to a range of terrestrial and marine mammals, fish and insect species typical of the region.

3. COMPARISONS WITH OTHER AREAS

Mistaken Point has been nominated under criterion (viii). The nomination dossier includes an excellent comparative analysis which is appropriate in its scope, logical in its methodology and objective in its conclusions. Expert reviewers were in agreement that the comparative analysis was a best practice example, done in a highly scientific and professional manner. The analysis begins by considering all World Heritage listed fossil sites, regardless of age, and considers the relationships to the iconic sites that represent the Cambrian Explosion on the World Heritage List – the Burgess Shale (within the Canadian Rocky Mountain Parks, Canada) and the Chengjiang Fossil Site (China). It documents the iconic significance of the Ediacaran Period in the record of life on Earth, then focuses on Precambrian/Ediacaran/Cambrian sites to

identify a selection of the most significant. Finally, in focusing on the Ediacaran, it first considers all Ediacaran sites, and then narrows them down. Finally, it uses a quantitative method, relying heavily on the IUCN thematic study of fossil sites, to complete the analysis (this includes in Inset 1 of the nomination a review based on the IUCN Fossil Site Evaluation Checklist, which is not reproduced in this evaluation). Comparisons were conducted on 84 valid candidate sites, with representatives from every continent except Antarctica. Based on the analysis, Mistaken Point was ranked first overall, and ranked first (or tied first) in six criteria: fossil abundance, fossil quality, thickness of fossiliferous strata, age of the oldest fossils, degree of site investigation and permanence.

The nomination further benefits from comparative work undertaken in 2012 by two leading Ediacaran fossil experts who analyzed all 109 sites worldwide where Ediacaran fossils have been discovered or were reputed to have been discovered. Through a systematic process of evaluating claims and assemblages for each site, this work ultimately concluded that the Mistaken Point assemblage was the largest and most important.

The analysis notes that there are other well-preserved Ediacaran assemblages but only three other sites preserve the record of later stages of the development of the first animals. These are the Flinders Ranges of South Australia (found at Ediacara Hill from where the period takes its name), the White Sea region of Russia and the very youngest, the Nama region of southern Namibia. Comparative analysis confirms that these other sites are younger and cover a shorter time span than Mistaken Point, but being in shallower water the other sites preserve a greater diversity of fauna. The Newfoundland area records the very first and oldest assemblages. There are three other Ediacaran fossil sites in Newfoundland, i.e. Catalina Dome; Spaniard's Bay region; and Fortune Head, Burin Peninsula which possess fossil assemblages. The State Party in its supplementary information has indicated that these sites do not encompass the stratigraphic entirety of the origin and early evolution of complex multicellular life that is evident in the nominated area. They note that new fossil discoveries are being regularly made and should sites with complementary values be found they would be open to considering further additions to the nominated property should it be inscribed.

In conclusion, the rigorous comparative analysis demonstrates the fundamental significance of the nominated property as an iconic representation of the record of life on Earth, and the best such example to be considered for inclusion on the World Heritage List.

4. INTEGRITY, PROTECTION AND MANAGEMENT

4.1. Protection

The property is protected under provincial legislation. Almost all of the property (99.97%) is protected within the Mistaken Point Ecological Reserve (MPER), which was established in 1987 under the Province's Wilderness and Ecological Reserves Act (WER Act). This Act has very strict provisions to prevent removing, destroying and damaging the nominated property's fossils whilst permitting scientific research and education activities. The Parks and Natural Areas Division (PNAD) of the provincial Department of Environment and Conservation manages the nominated property. The remaining portion of the nominated property (0.03%) in the Watern Cove area is designated as a Crown Lands Reserve under the provincial Lands Act.

The largest part of the buffer zone (92.3%) also lies within the MPER, and is therefore also protected under the WER Act. In Newfoundland and Labrador, there is no requirement to register interests in and/or transactions of interests in private land. The nomination dossier reports on the completion of a process to research and document the possible existence and location of private land claims within the nominated property. No documented private land claims were found, therefore, the nominated property is considered to be provincial Crown land. The buffer zone, for the most part, is also Crown land and the State Party in supplementary information has clarified and confirmed how its design provides an appropriate level of protection and management utility.

The IUCN evaluation mission concluded that all the elements (such as the impressions of various soft bodied organisms) that are fundamental in demonstrating the Outstanding Universal Value of the property remain intact within the nominated area. The WER Act and associated Fossil Ecological Reserve Regulations as well as the MPER Management Plan provide the protection framework which governs the nominated property.

IUCN considers that the protection status of the nominated property meets the requirements of the Operational Guidelines.

4.2 Boundaries

The boundaries of the nominated property have been chosen to include all the attributes of Mistaken Point's proposed Outstanding Universal Value. The nominated property spans the coastal profile between ordinary low water-mark and extends inland to an easily identifiable natural feature, the turf edge. The turf edge is the seaward-most extension of contiguous clifftop vegetation and under the influence of erosion will very gradually recede inland. The property and its values are subject to dynamic erosion and therefore changing exposures, following the examples of past coastal fossil sites at Joggins Fossil Cliffs (Canada) and the Dorset and East Devon Coast (UK). A Fossil Protection Zone overlays the nominated area and extends further landward some 15 meters to account for the retreating profile over time.

In seven locations, the inland boundary of the nominated property does not follow the turf edge due to variations in the terrain for example around the river mouths. In five additional locations, it has been adjusted inland of the turf edge to include rock

outcrops that possess features of proposed Outstanding Universal Value.

The buffer zone is a strip of land 30 metres wide that extends inland from the landward boundary of the nominated property. The buffer zone's shape and size are designed to absorb the effects of anticipated natural coastal erosion for at least several hundred years. There is one location where the buffer zone is wider than 30 metres and another where the defined 'fossil protection zone' is outside both the nominated property boundary and the buffer zone. The State Party has clarified these small variations in boundaries, and IUCN considers that the configuration of the nominated area and buffer zone represents an effective solution to protecting core values and facilitating effective long-term management.

The nominated property is of an adequate size to protect the values. IUCN notes that there is no buffer zone designated seaward however, the State Party has advised that there are no oil/gas or mineral deposits of economic value in offshore areas thus alleviating concerns regarding the potential impact of offshore development. Boundaries are not marked on the ground.

IUCN considers that the boundaries of the nominated property meet the requirements of the Operational Guidelines.

4.3 Management

As stated above the property is managed by Newfoundland and Labrador Provincial PNAD, a unit of the Department of Environment and Conservation. PNAD staff work in close cooperation with several partners including Cape Race – Portugal Cove South Heritage Inc to protect, present and manage the property sustainably and to enhance tourism experiences and economic benefits for the local community. The evaluation mission noted good relations between the authority and the various stakeholders. In the event that Mistaken Point is added to the World Heritage List, a Mistaken Point World Heritage Advisory Council will be set up to advise on the management of the nominated property. The Council will ensure wide stakeholder engagement and supersede the Mistaken Point Ambassador Inc, an organization which was established in 2013 to pursue World Heritage status.

The MPER Management Plan of 2009 presents clear and appropriate management goals and policies for the reserve. There has also been a specific World Heritage plan prepared in 2013: Mistaken Point World Heritage Site Management Plan which provides guidance within the context of the legally binding reserve management plan. As noted above a Fossil Protection Zone has been established to provide dynamic protection. The Management Plan also proposes the creation of a Scientific Advisory Committee to generate specialist input. Any scientific research or monitoring undertaken at Mistaken Point requires a permit issued by the PNAD. Inappropriate development is prohibited within the ecological reserve.

Visitation to the nominated property is currently low and has been stable with on average 1,000 visits per annum. Access is controlled through guided tours which promote education. A carefully designed visitor management system is in place ensuring carrying capacities are not exceeded.

Illegal fossil collecting which has historically been a concern is no longer considered a serious threat due to effective enforcement. Supplementary information has indicated that seaward access to the nominated property is limited to a four beach areas as the rest of the coastline is rugged and precludes boat landings. Routine monitoring of access to the beaches and the provision of regulatory signage should be considered to ensure that this point of public access does not become a threat to the fossil bearing areas within the property.

The PNAD has five staff on site at Portugal Cove South with responsibility for management, interpretation and implementing the nominated property management plan. The State Party has advised that staffing will be increased further in 2016 in order to assure the additional responsibilities anticipated should the property become a World Heritage site.

Funding comes from the Provincial Government and totals c.CAD 390,000 p.a. (c. USD 300,000) mainly to support staffing and operating costs for the reserve. Other partner organisations are separately funded and augment the resources available. As with staffing there is a commitment to increase funding should the nominated property be listed, for example the nomination notes funding will increase to c. CAD 500,000 p.a. (c.USD385,000) in 2016/17. The current protection and management structure is considered excellent with strong support from local community groups and through local stewardship initiatives.

IUCN considers the management of the nominated property meets the requirements of the Operational Guidelines.

4.4 Community

There is no reported evidence of Aboriginal settlers having occupied the area and the first European settlers date from the mid-19th Century making their livelihood from small scale fishing, hunting and meadow grazing. Today, the Southern Avalon Peninsula generally, and the Portugal Cove South area in particular, is sparsely populated, owing in large part to the closure of the commercial cod fishery in 1992.

There is solid community engagement evident in the nominated property with various community initiatives empowering stakeholders in active management and interpretation. Various mechanisms for stakeholder engagement are in place including the Mistaken Point Ambassador Inc (MPAI); Scientific Advisory

Committee; Cape Race – Portugal Cove South Heritage Inc.; Edge of Avalon Interpretive Centre; Reserve Interpreters Team, and a Fossil Guardians Team. The Interpretive Centre, Interpretive Guide Team and the Fossil Guardian Team are all created and run by the local community.

The evaluation mission reported positive support for the nomination and a healthy culture of stewardship by local people for the area. IUCN notes that community action has to a large extent driven the nomination as a means to increase the protection of this nominated property.

4.5 Threats

Mistaken Point's relative isolation and exposed windswept coastal location have protected it from past development and the nominated property is relatively free from threats.

Following the discovery of Mistaken Point's fossils in 1967 a period of fossil collecting occurred over some 20 years. An estimated 200-250 fossils were removed from the nominated property, most ending up in museum collections, however, some illegal collecting also happened. Since the late 1980s protection of the nominated property has effectively stopped this practice and incidents of theft or vandalism are extremely rare. The last known major attempt at illegal fossil removal occurred in September 1998 and was foiled by local residents.

The main potential threat to the property stems from the impact of natural phenomena, particularly surface erosion, wave erosion, and potential rock falls and landslides. Some of the nominated property's fossil-bearing surfaces are partially covered, however in general the fossils are superbly displayed. High energy storm waves, particularly from the west, constitute the biggest potential threat but evidence is that the rate of erosion is very slow, a fact confirmed via supplementary information. In the longer term (decades and centuries) this might pose some threats to the future integrity of the nominated property. The improved management plan should take into consideration on an ongoing basis whether any measures to implement low-impact coastal protection are required and feasible to minimize the threats of slope failures that can damage or destroy specific fossil sites, however such interventions should be very carefully considered before any implementation, and to the extent possible natural processes should be maintained to conserve the fossil exposures over time.

Regarding public use, the remoteness of the area and limited access limit the number of tourists who are mainly geotourists or educational groups. Strong protection measure adopted by the PNAD will ensure very little impact from tourism. Access to the nominated property is strictly controlled and limited to trails connecting to important fossils sites and for placing small signage. The rest of the trails are built outside of the buffer zone within the reserve area. As noted above access to the nominated property by boat is challenging given the rugged coastline and is not considered to pose any significant current threat.

The State Party has indicated there is no threat from offshore developments as oil, gas and/or mineral deposits are not considered to be of economic interests.

Specific points are noted in the draft decision attached to this report regarding details of management measures to be maintained in the event of the property's inscription on the World Heritage List.

In conclusion IUCN considers that the nominated property meets the integrity and protection and management requirements of the Operational Guidelines.

5. ADDITIONAL COMMENTS

None.

6. APPLICATION OF CRITERIA

Mistaken Point has been nominated under natural criterion (viii).

Criterion (viii): Earth history and geological processes

Mistaken Point fossils constitute an outstanding record of a critical milestone in the history of life on Earth, "when life got big" after almost three billion years of microbe-dominated evolution. The fossils range in age from 580 to 560 million years, the longest continuous record of Ediacara-type megafossils anywhere, and predate by more than 40 million years the Cambrian explosion, being the oldest fossil evidence of ancestors of most modern animal groups. Mistaken Point contains the world's oldest-known examples of large, architecturally complex organisms, including soft-bodied, ancestral animals. Ecologically, Mistaken Point contains the oldest and most diverse examples of Ediacaran deep-sea communities in the world thus preserving rare insights into the ecology of these ancestral animals and the early colonization of the deep-sea floor. Other attributes contributing to the nominated property's Outstanding Universal Value include the world's first examples of metazoan locomotion, exceptional potential for radiometric dating of the assemblages, and evidence for the role of ancient oxygen levels in the regional and global appearance of complex multicellular life.

IUCN considers that the nominated property meets this criterion.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee adopts the following draft decision:

The World Heritage Committee,

1. Having examined Documents WHC/16/40.COM/8B and WHC/16/40.COM/INF.8B2;

2. Inscribes **Mistaken Point (Canada)** on the World Heritage List under natural criterion (viii);

3. Adopts the following Statement of Outstanding Universal Value:

Brief synthesis
Mistaken Point is a globally significant Ediacaran fossil site almost entirely located within Mistaken Point Ecological Reserve on the southeastern tip of the island of Newfoundland in eastern Canada. The 146-hectare property consists of a narrow, 17-kilometre-long strip of rugged naturally-eroding coastal cliffs, with an additional 74 hectares adjoining its landward margin designated as a buffer zone. The superbly exposed, 2-kilometre-thick rock sequence of deep marine origin at Mistaken Point dates to the middle Ediacaran Period (580 to 560 million years ago) and contains exquisitely preserved assemblages of the oldest abundant and diverse, large fossils known anywhere.

More than 10,000 fossil impressions, ranging from a few centimetres to nearly 2 metres in length, are readily visible for scientific study and supervised viewing along the coastline of Mistaken Point. These fossils illustrate a critical watershed in the early history of life on Earth: the appearance of large, biologically complex organisms, including the first ancestral animals. Most of the fossils are rangeomorphs, an extinct group of fractal organisms positioned near the base of animal evolution. These soft-bodied creatures lived on the deep-sea floor, and were buried and preserved in exceptional detail by influxes of volcanic ash – each layer of ash creating an "Ediacaran Pompeii." Modern erosion has exhumed more than 100 fossil sea-floor surfaces, ranging from small beds with single fossils to larger surfaces adorned with up to 4,500 megafossils. The animals died where they lived, and their resultant fossil assemblages preserve both the morphology of extinct groups of ancestral animals and the ecological structure of their ancient communities. Radiometric dating of the volcanic ash beds that directly overlie the fossil-bearing surfaces is providing a detailed chronology for 20 million years in the early evolution of complex life.

Criteria
Criterion (viii)
Mistaken Point fossils constitute an outstanding record of a critical milestone in the history of life on Earth, "when life got big" after almost three billion years of microbe-dominated evolution. The fossils range in age from 580 to 560 million years, the longest continuous record of Ediacara-type megafossils anywhere, and predate by more than 40 million years the Cambrian explosion, being the oldest fossil evidence of ancestors of most modern animal groups. Mistaken Point contains the world's oldest-known examples of large, architecturally complex organisms, including soft-bodied, ancestral animals. Ecologically, Mistaken Point contains the oldest and most diverse examples of Ediacaran deep-sea communities in the world thus preserving rare insights into the ecology of these ancestral animals and the early colonization of the deep-sea floor. Other attributes contributing to the property's Outstanding Universal Value include the world's first examples of metazoan locomotion, exceptional potential for radiometric dating of the assemblages, and evidence for the role of ancient oxygen levels in the regional and global appearance of complex multicellular life.

Integrity
The clearly defined property boundary encompasses coastal exposures preserving all the features that convey its Outstanding Universal Value. All of the key fossils and strata are within the property. The width of the property and its buffer zone, which in large part corresponds to the Mistaken Point Ecological Reserve, are sufficient to absorb the very gradual, long-term retreat of the coastline due to natural erosion. The natural erosion of the site will refresh the fossil exposures over time.

The vast majority of Mistaken Point's fossils – including several type specimens – remain in situ *in the field and are thus available for study in their ecological context. Several hundred fossil specimens were collected prior to Mistaken Point Ecological Reserve being established; most of these are currently housed in the Royal Ontario Museum and form the bulk of the type specimens for taxa named and defined from Mistaken Point. Nonetheless the property is thought to contain more specimens of Ediacara-type impression fossils than the sum total of every museum collection on Earth.*

Few traces of past human activities remain and none directly affect the property's key attributes. Visitation to the site is modest and strictly controlled. The prospect of modern development within or adjacent to the property is minimal and does not impinge upon its coastal outcrops. Incidents of vandalism are very rare and no successful fossil thefts have occurred since the property was designated as an ecological reserve in 1987. No inhabitants reside permanently within the property or its buffer zone.

Protection and Management requirements
The property is provincially owned and is managed by the Parks and Natural Areas Division of the Newfoundland and Labrador Department of Environment and Conservation. Virtually all of the property, plus most of its buffer zone, lie within Mistaken Point Ecological Reserve which is protected under the Province's Wilderness and Ecological Reserves Act (1980) and Fossil Ecological Reserve Regulations (2009). With one exception, the remaining portions of the property and buffer zone are protected as Crown Lands Reserves under the provincial Lands Act (1991). Only one small part (0.5 percent) of the buffer zone has been identified as private land; current and anticipated land use is complementary to the rest of the buffer zone.

The property's key coastal exposures are further protected by the ecological reserve's Fossil Protection Zone; access to this zone is by permit only.

Undertaking activities such as scientific research at Mistaken Point requires a permit issued by the managing agency. Development is prohibited within the ecological reserve.

The comprehensive management plan developed for the property and its buffer zone is adaptive and will be revised as required. Input from local residents regarding management issues is channelled through the property's World Heritage Advisory Council. For management purposes, the property is best treated as a finite fossil site. Except for official salvage of scientifically valuable specimens, collecting fossils is illegal. For conservation reasons, public viewing of the fossils is by guided tour only. Daily patrols of the property are conducted year-round and a volunteer Fossil Guardian Program is in operation.

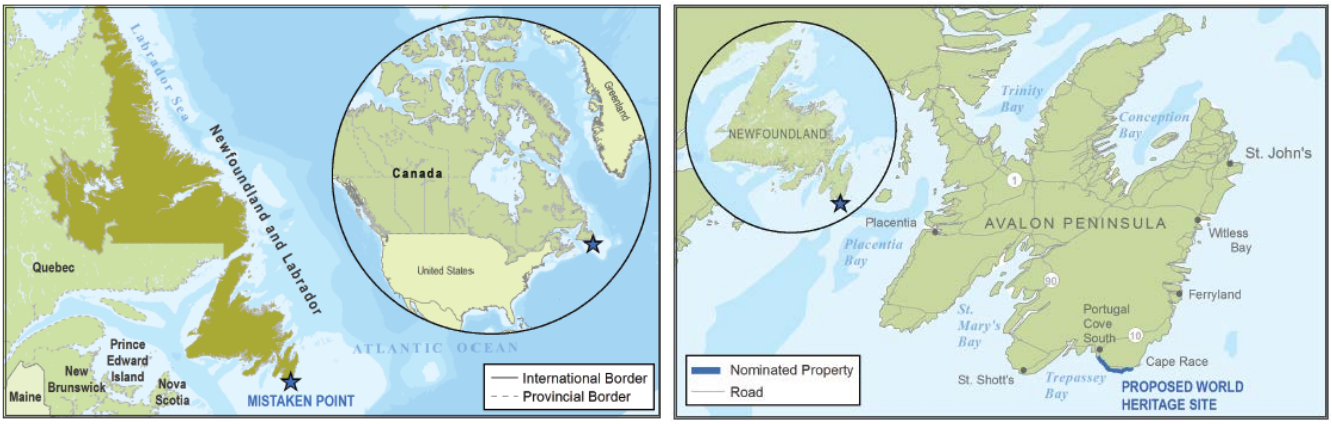
The most significant threats to be managed are the ongoing issue of change resulting from natural erosion processes, and impacts of human activity. Under the monitoring plan, vulnerable fossil localities are regularly surveyed and any problems documented. The rate of erosion appears very slow and any loss of fossils to erosion may be offset by new exposures. Monitoring processes should trigger appropriately considered management responses to document fossil evidence, if any significant losses from erosion are identified. The carrying capacity of the property is limited and the cumulative environmental impact of visitation is closely monitored and limited. Limited signs and visitor access to aid presentation of the property are carefully designed and sited to avoid adverse impacts upon the property's Outstanding Universal Value.

Through its long-term pledge to provide operational funding and staffing, the Government of Newfoundland and Labrador is committed to ensure that the highest possible standards of protection and presentation are maintained in the property.

4. Commends the State Party and all of the stakeholders involved for the development of this nomination including the rigorous and objective comparative analysis which is a model of good practice for fossil sites, and the excellent local engagement in the protection, management and presentation of the nominated property;

5. Requests the State Party to:
   a) appropriately mark and communicate the boundaries of the property and its buffer zone, including beach landing sites to reinforce protection through enhanced visitor and local awareness;
   b) monitor and mitigate if appropriate potential threats from coastal erosion, especially on the western part of the property, taking great care to evaluate the feasibility and impacts of any interventions prior to implementation;
   c) consider the possible addition of any significant new Ediacaran fossil site discoveries in the region where these would add further attributes to the Outstanding Universal Value of the property.

Map 1: Location of the nominated property in Canada and on the island of Newfoundland's Avalon Peninsula



Map 2: Nominated property and buffer zone