

Executive Summary



Concentration of fossils (gastropods, trilobites, bryozoans, brachiopods) on a bedding surface in the Jupiter Formation (credit: Pierre Bertrand)

Country: Canada

Province: Québec

Name of Property: Anticosti

Geographical Coordinates to the Nearest Second:

49°32'19" North

63°14'43" West

Textual Description of the Boundaries of the Nominated Property

The property nominated for inscription is located in the province of Québec, Canada, on Anticosti Island. The nominated property and buffer zone are located entirely on public lands administered by the provincial government of Québec, and entirely within a network of protected areas. The nominated property is situated in the Gulf of St. Lawrence and includes all coastal outcroppings from the low water mark to the clifftops along nearly 550 kilometres. This comprises almost all of the island's coastline, with the exception

of the village of Port-Menier, and includes the Jupiter and Vauréal river flood plains.

The nominated property's coastal section extends from the low water mark on the seaward side all the way to the top of the embankment or cliff. From the coast, the property follows the main tributaries of the Jupiter and Vauréal rivers inland, which adds a contiguous tract of rock outcroppings from the watercourse to the top of the embankment or cliff. The boundaries of the nominated property encompass all the stratigraphic and fossil attributes that bear full witness to the first mass extinction event on Earth, the period from the Upper Ordovician to the Lower Silurian.

The buffer zone extends one kilometre from the landward boundary of the nominated property. On the coastal section of the property, the buffer zone extends one kilometre inland from the top of the embankment or cliff toward the interior of the island. For the Jupiter and Vauréal rivers flood plains and their main tributaries, the buffer zone is a one kilometre wide strip of land on each side of the flood plain. In both sections of the nominated property, the boundaries of the buffer zone will shift to account for natural erosion, and will always remain one kilometre in width.

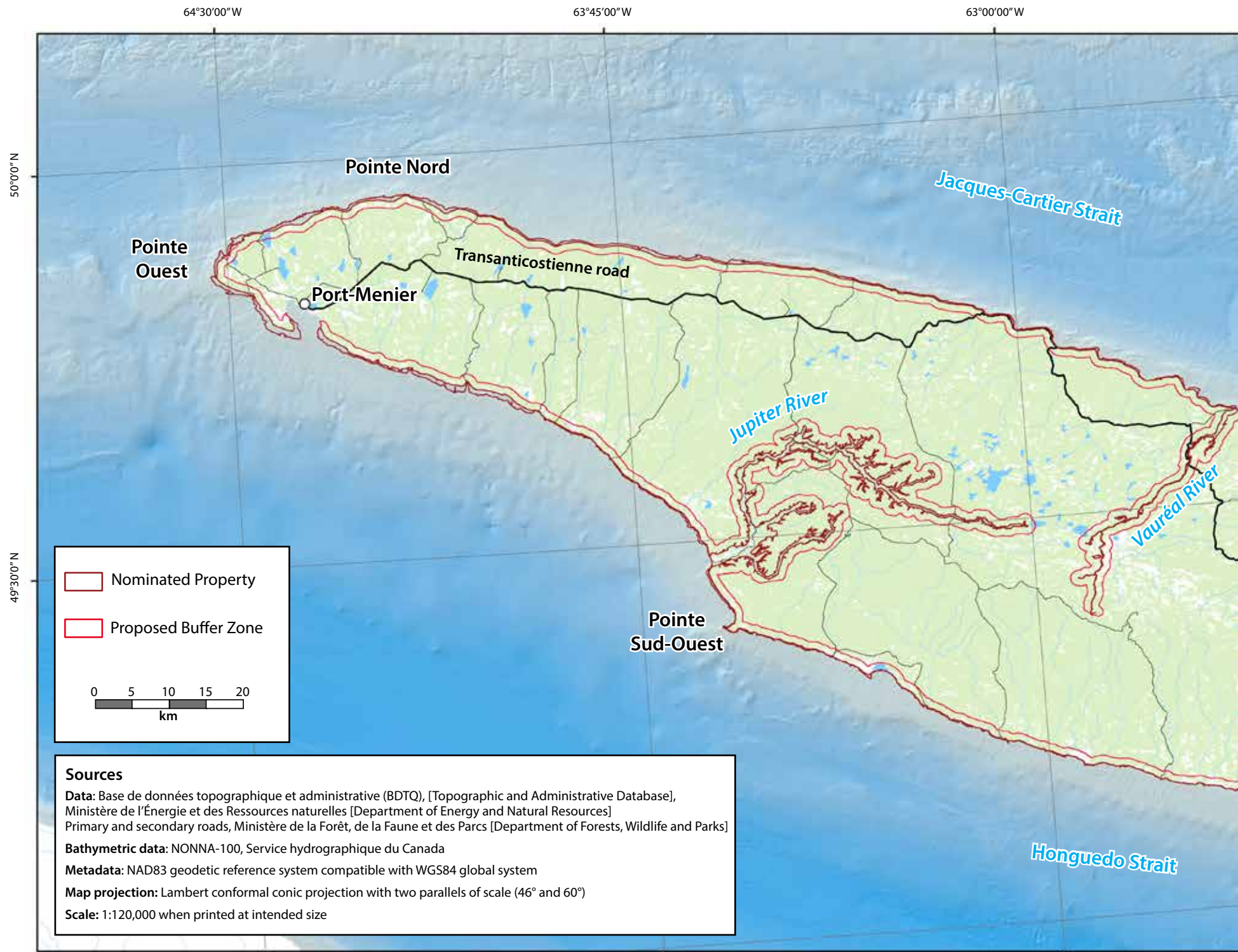


Beccsie Formation in Anticosti eastern sector
(credit: Pascal Bernatchez, UQAR)

Maps Showing the Boundaries of the Nominated Property and Buffer Zone



The nominated property is on Anticosti Island in the province of Québec, in eastern Canada, North America.



Nominated Property
 Proposed Buffer Zone

0 5 10 15 20
 km

Sources

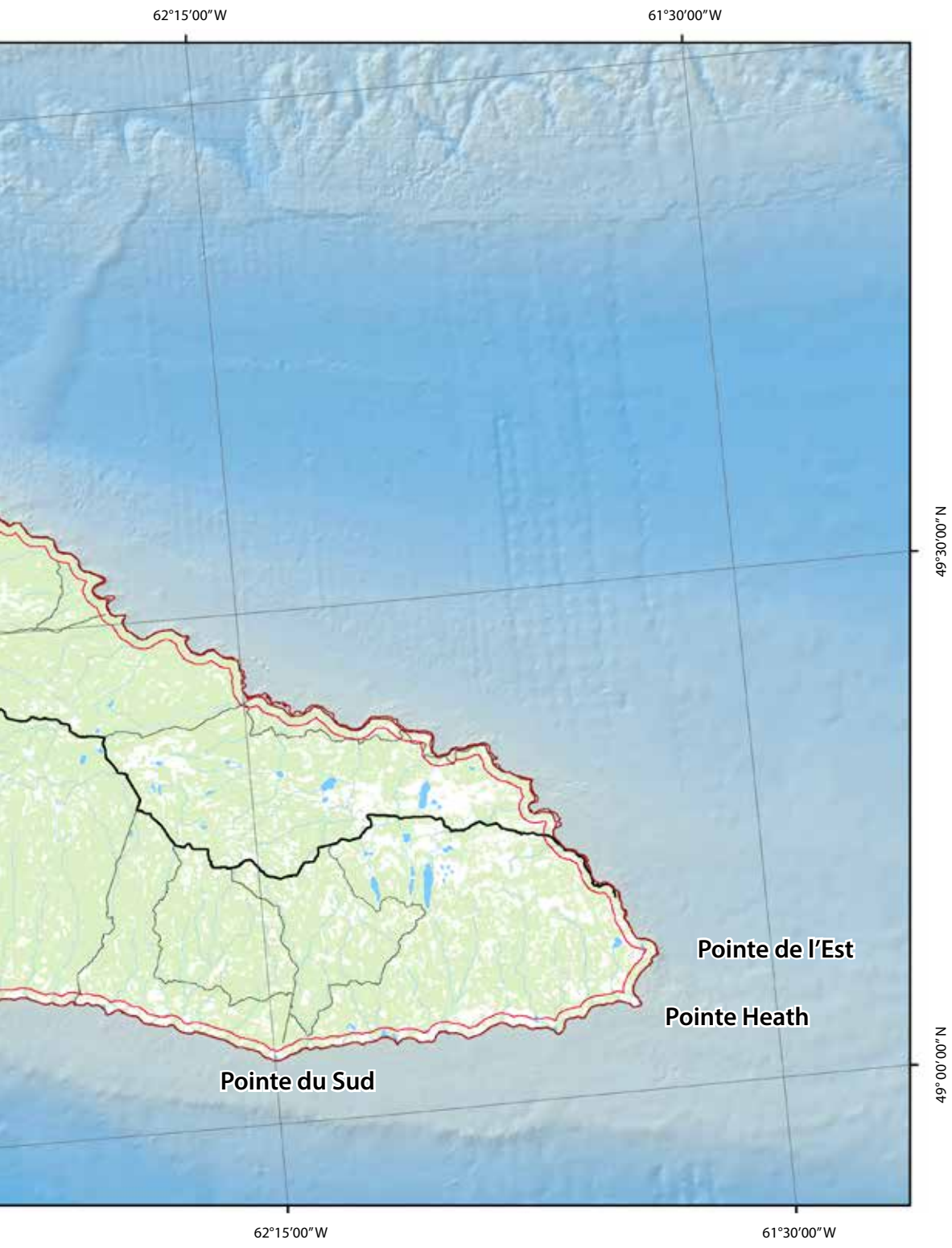
Data: Base de données topographique et administrative (BDTQ), [Topographic and Administrative Database], Ministère de l'Énergie et des Ressources naturelles [Department of Energy and Natural Resources]
 Primary and secondary roads, Ministère de la Forêt, de la Faune et des Parcs [Department of Forests, Wildlife and Parks]

Bathymetric data: NONNA-100, Service hydrographique du Canada

Metadata: NAD83 geodetic reference system compatible with WGS84 global system

Map projection: Lambert conformal conic projection with two parallels of scale (46° and 60°)

Scale: 1:120,000 when printed at intended size



Map of the nominated property and its buffer zone showing the coastal sector and the Vauréal and Jupiter river sectors.

Criteria Under Which Property Is Nominated

Anticosti is nominated for inscription on the UNESCO World Heritage List under criterion (viii) of paragraph 77 of the *Operational Guidelines for the Implementation of the World Heritage Convention*, which states that these properties must:

“be outstanding examples representing major stages of earth’s history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.”

Anticosti is notable for two natural geological attributes under criterion (viii) for inscription on the World Heritage List: stratigraphic and fossil attributes.

In 2021, the International Union for Conservation of Nature (IUCN) published a report called “Geological World Heritage: A revised global framework for the application of criterion (viii) of the World Heritage Convention.”¹ The nominated property fits in every respect with Theme 1 of this new global framework: “History of planet Earth and the evolution of life.” Theme 1 documents major events in Earth’s history and the fossil record of life. It combines two related themes from the previous 2005 report²: Theme 4 “Stratigraphic Properties – Rock sequences that provide a record of key Earth history events” and Theme 5 “Fossil Properties – The record of life on Earth represented in the fossil record.”

1 McKeever, P.J. and Narbonne, G.M. 2021. Geological World Heritage: A revised global framework for the application of criterion (viii) of the World Heritage Convention. Gland, Switzerland: IUCN.

2 Dingwall, P., Weighell, T. and Badman, T. 2005. Geological World Heritage: A Global Framework. Gland, Switzerland: IUCN.

Anticosti is nominated as the property that provides the best evidence of the first mass extinction of life on Earth. The nominated property has one of the thickest stratigraphic successions and the most complete marine fossil record from the Upper Ordovician to the Lower Silurian, a period spanning nearly 10 million years of Earth’s history, from 447 to 437 million years ago. Anticosti’s fossil outcroppings comprise the most complete and extensive stratigraphic and fossil record of the Ordovician/Silurian interval worldwide.

Draft Statement of Outstanding Universal Value

Brief Synthesis

Anticosti is a stratigraphic and fossil site of global importance with exceptionally well preserved, abundant and diverse animal fossils. The property is on Anticosti Island, the largest island in Québec, at the entrance to the Gulf of St. Lawrence, in eastern Canada. The property’s surface area is 182.4 km², and the buffer zone is 897.4 km². Together, the property and buffer zone cover 1,079.8 km², nearly 14% of the total surface area of Anticosti Island, and both are located within protected areas free from all industrial activity. There are no people permanently residing within the property or buffer zone.

Anticosti has the thickest stratigraphic record and the best preserved, exposed, accessible and complete fossil record of marine life during the O/S Interval (the boundary from the Upper Ordovician to the Lower Silurian, 447 to 437 million years ago). This time period represents a milestone event in the history of the Earth, the first global mass extinction of animal life. The property includes all coastal outcroppings from the low water mark to the clifftops along nearly 550 kilometres, as well as the outcroppings along the Vauréal and Jupiter rivers flowing to the north and south, respectively.

Anticosti’s extensive stratigraphic and fossil attributes provide a full record of the first mass extinction of life on Earth. Thousands of large bedding sur-

faces allow researchers to observe and study the many hard shell and some soft body animals that lived on the shallow ocean floor when the area was an ancient tropical sea. These animals were buried under frequent intense storms that fully preserved the living organisms and the ecological structure of the ancient marine communities. The fossil shells are so incredibly well preserved that their geochemical composition can be analyzed to identify climatic and oceanographic signals and permit In-depth study of the causes of the Late Ordovician mass extinction.

Justification for Criteria

Criterion (viii): Anticosti is the best natural laboratory in the world for studying fossils and sedimentary layers from the first mass extinction of life at the end of the Ordovician. The property has one of the thickest stratigraphic successions and the most complete fossil record of marine life from the period spanning 10 million years of Earth's history, from the Upper Ordovician to the Lower Silurian, 447 to 437 million years ago. The fossils are incredibly abundant, diverse and well preserved, which is conducive to world class scientific research.

Statement of Integrity

Anticosti's boundaries are clearly defined and include all the exposed fossil layers along the coastline and the Vauréal and Jupiter rivers. Within these boundaries, the stratigraphic and fossil records fully express the Outstanding Universal Value of the property. Natural erosion plays an important role, as retreating cliffs will reveal new fossil zones and maintain the property's Outstanding Universal Value over the long term. While the vast majority of the millions of fossil specimens are in situ on bedding surfaces, there are also many fossils ex situ in the collections of major museums worldwide.

These ex situ collections are accessible to researchers throughout the world for scientific research and to educate about the property's significance and Outstanding Universal Value.

Anticosti is located entirely within a network of protected areas free from all industrial activity, and there are no people residing permanently in the property or its buffer zone. The likelihood of modern development within or near the property and its buffer zone is low, and any potential development will be subject to strict regulations.

Protection and Management Requirements

The property and its buffer zone are protected over the long term by robust legislation, given its location within a network of publicly protected areas managed by the Québec provincial government. Québec's *Natural Heritage Conservation Act and Parks Act* will protect and maintain all the stratigraphic and fossil attributes essential to fully expressing the Outstanding Universal Value of the property and its buffer zone, as well as biological diversity. The future management team created by Québec's provincial government will enforce protective legislation, oversee daily management activities and monitor natural conditions and human activities that could threaten the property and its buffer zone.

Names and Contact Information of Official Local Institution

Organization: Direction des aires protégées
Ministère de l'Environnement et de la Lutte contre les changements climatiques

Address: Direction des aires protégées
Ministère de l'Environnement et de la Lutte contre les changements climatiques
Édifce Marie-Guyart, 4th floor, Box 21
675 René-Lévesque Blvd. East
Québec City, Québec G1R 5V7

Website: http://www.environnement.gouv.qc.ca/biodiversite/aires_protegees/index.htm

Aude Tremblay

Directrice adjointe de la conservation et de la gestion des écosystèmes

[Deputy Director of Conservation and Ecosystem Management]

Direction des aires protégées

Ministère de l'Environnement et de la Lutte contre les changements climatiques

Phone: 418-521-3907, ext. 4194

Email: aude.tremblay@environnement.gouv.qc.ca

Dominic Boisjoly

Responsable du réseau des réserves aquatiques et de biodiversité de la Côte-Nord, de la Gaspésie et du Bas-Saint-Laurent [Manager of the Network of Aquatic and Biodiversity Reserves for the Côte Nord, Gaspésie and Bas Saint Laurent]

Direction des aires protégées

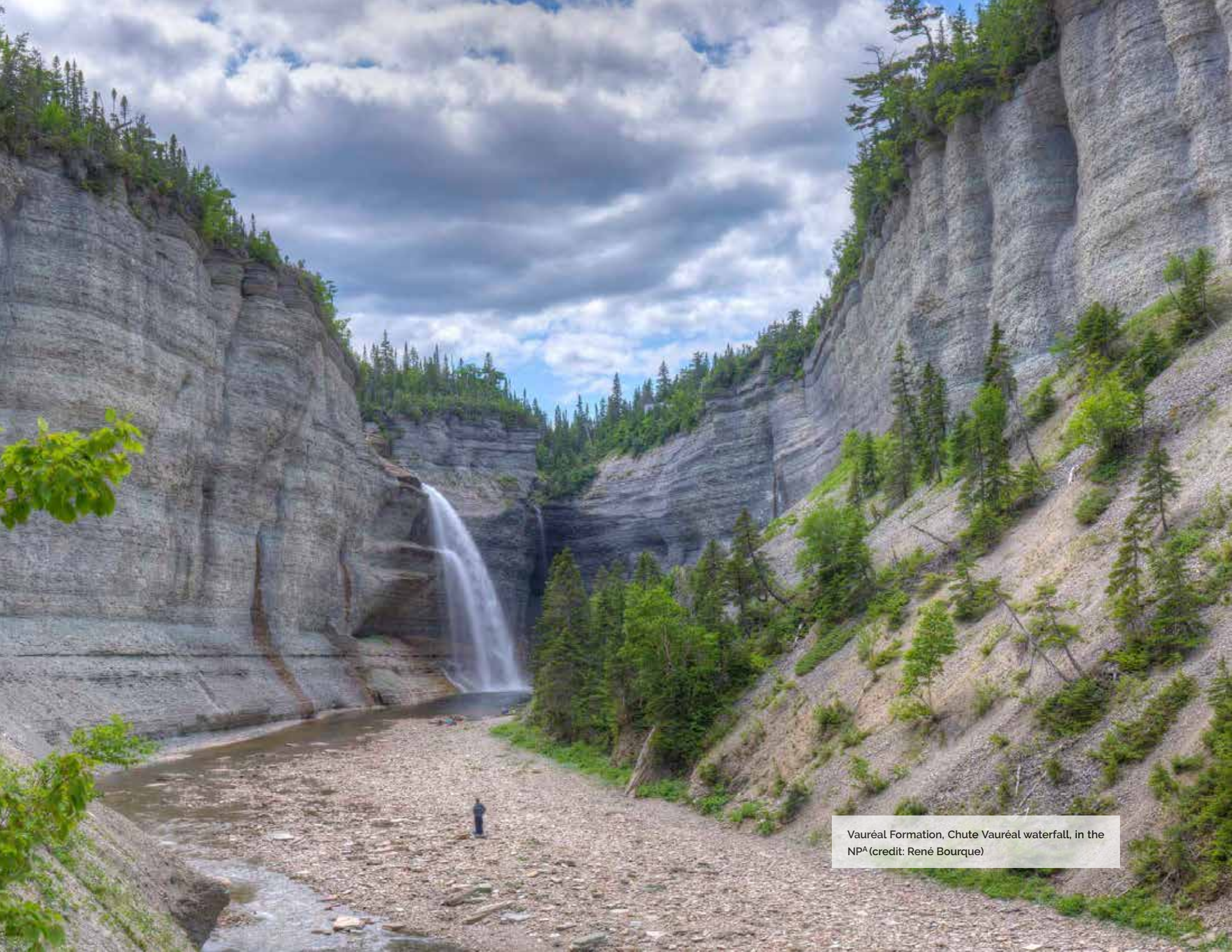
Ministère de l'Environnement et de la Lutte contre les changements climatiques

Phone: 418-521-3907, ext. 4477

Phone: 418-521-3907, ext. 4477

Email: dominic.boisjoly@environnement.gouv.qc.ca





Vauréal Formation, Chute Vauréal waterfall, in the NP^A (credit: René Bourque)

Acronyms, Abbreviations and Definitions

BR ^A	Anticosti Proposed Biodiversity Reserve ¹	MERN	Ministère de l'Énergie et des Ressources naturelles [Department of Energy and Natural Resources]
COSEWIC	Committee on the Status of Endangered Wildlife in Canada	MFFP	Ministère des Forêts, de la Faune et des Parcs [Department of Forests, Wildlife and Parks]
ER ^{GLS}	Grand-Lac-Salé Ecological Reserve ²	MIA	Municipality of L'Île-d'Anticosti
ER ^{PH}	Pointe-Heath Ecological Reserve	MRP	Master research plan
FWB	Fairweather Wave Base	NHCA	<i>Natural Heritage Conservation Act</i>
GOBE	Great Ordovician Biodiversification Event	OUV	Outstanding Universal Value
GSG	Geological Survey of Canada	O/S Interval	Ordovician/Silurian Boundary Interval ³
GSSP	Global Boundary Stratotype Section and Point	NP ^A	Anticosti National Park ⁴
HCS	Hummocky cross stratification	RCM	Regional County Municipality
HICE	Hirnantian Isotope Carbon Excursion	R.S.Q.	Revised Statutes of Québec
ICS	International Commission on Stratigraphy	SCS	Swaly cross stratification
IMP	Interpretive Master Plan	Sépaq	Société des établissements de plein air du Québec ⁵
IUCN	International Union for Conservation of Nature	SLGO	St. Lawrence Global Observatory
IUGS	International Union of Geological Sciences	SOPFEU	Société de protection des forêts contre le feu
LOME	Late Ordovician Mass Extinction	SWB	Storm Wave Base
Ma	Millions of years	UNESCO	United Nations Educational, Scientific and Cultural Organization
MELCC	Ministère de l'Environnement et de la Lutte contre les changements climatiques [Department of the Environment and the Fight against Climate Change]	UQAR	Université du Québec à Rimouski

1 Proposed Biodiversity Reserves in Québec are registered protected areas where industrial activity is banned. They are set aside under the *Natural Heritage Conservation Act* in anticipation of public consultations and designation of permanent protection status. They are managed by the MELCC.

2 Québec's ecological reserves are protected areas set aside for conservation that are generally forbidden to the public. They are managed by the MELCC.

3 Should not be confused with the boundary at the base of the Silurian system. The interval in question is a period of time covering global changes to the marine biosphere during the Late Ordovician Mass Extinction. This interval also includes the changes immediately preceding and following the mass extinction event. The interval took place approximately 447 to 437 million years ago.

4 Should not be confused with the national parks of Canada. The national parks of Québec are protected areas created by the provincial government of Québec and managed by Sépaq (see below).

5 Sépaq is a State-owned enterprise of the Québec government that oversees the management and conservation of national parks, wildlife reserves, a part of Anticosti Island and tourist establishments throughout the province.

Table of Contents

Foreword	vii
Preface	ix
Preamble	xi
Acknowledgements	xxii
Contributors	xxiv
Executive summary	xxvi
Acronyms, Abbreviations and Definitions	xxxvi
Table of Contents	xxxvii
1. Identification of the Property	2
1.a Country	4
1.b State, Province or Region	4
1.c Name of Property	4
1.d Geographical Coordinates to the Nearest Second	4
1.e Maps and Plans, Showing the Boundaries of the Nominated Property and Buffer Zone ...	6
1.f Area of Nominated Property and Proposed Buffer Zone	15
2. Description	16
2.a Description of Property	18
2.a (i) Introduction	20
2.a (ii) Stratigraphic Record	22
2.a (iii) Fossil Record	25
2.a (iv) Other Geological Attributes of the Nominated Property	48
2.a (v) Environmental Setting	60
2.b History and Development	73
2.b (i) Geological History	73
2.b (ii) Human history	86
2.b (iii) History of Scientific Discovery and Research	91

3. Justification for Inscription	100
3.1.a Brief Synthesis	102
3.1.b Criteria Under Which Inscription Is Proposed (And Justification for Inscription Under These Criteria)	104
3.1.c Statement of Integrity	106
3.1.d Statement of Authenticity (Not Applicable)	106
3.1.e Protection and Management Requirements	107
3.2 Comparative Analysis	108
3.3 Draft Statement of Outstanding Universal Value	118
4. State of Conservation and Factors Affecting the Property	126
4.a Present State of Conservation	129
4.b Factors Affecting the Property	132
4.b (i) Development Pressures	132
4.b (ii) Environmental Pressures	135
4.b (iii) Natural Disasters and Risk Preparedness	138
4.b (iv) Responsible Visitation at World Heritage Sites	139
4.b (v) Number of Inhabitants Within the Property Boundary and the Buffer Zone	143
5. Protection and Management of the Property	144
5.a Ownership	147
5.b Protective Designation	149
5.b (i) <i>Natural Heritage Conservation Act</i>	155
5.b (ii) <i>Parks Act</i>	157
5.c Means of Implementing Protective Measures	158
5.c (i) Ministère de l'Environnement et de la Lutte contre les changements climatiques	159
5.c (ii) Ministère des Forêts, de la Faune et des Parcs et Société des établissements de plein air du Québec	162
5.d Existing Plans Related to Municipality and Region in which the Proposed Property is Located	163
5.d (i) Conservation Plan for the Anticosti Proposed Biodiversity Reserve (2020)	163
5.d (ii) Conservation Plans for the Pointe-Heath and Grand-Lac-Salé Ecological Reserves (2021)	163

5.d (iii) Anticosti National Park Master Plan (2004)	163
5.d (iv) Municipality of Île-d'Anticosti Tourism Strategy (2020)	164
5.d (v) Anticosti Island Strategic Development Plan (2017-2020)	164
5.d (vi) Land Use Planning of the Minganie Regional County Municipality (1988)	164
5.d (vii) Côte-Nord Public Land Use Plan (2012)	167
5.e Management System and Statement of Management Objectives	167
5.e (i) Anticosti World Heritage Site Management Plan: Guiding Principles	167
5.e (ii) Anticosti World Heritage Site Management Plan: Objectives and Actions	168
5.e (iii) Management of the Pointe-Heath Ecological Reserve and the Grand-Lac-Salé Ecological Reserve	169
5.e (iv) Schedule for Implementation of Protection and Management System	169
5.f Sources and Levels of Finance	170
5.g Sources of Expertise and Training in Conservation and Management Techniques	172
5.h Visitor Facilities and Infrastructure	172
5.h (i) Visitor Statistics	172
5.h (ii) Current Visitor Facilities and Infrastructure	173
5.h (iii) Planned Visitor Facilities and Infrastructure	175
5.h (iv) Access to Anticosti Island and the Nominated Property	175
5.h (v) Public Safety and Risk Management	178
5.h (vi) Regional Considerations for Tourism Services	178
5.i Policies and Programmes Related to the Presentation and Promotion of the Property	179
5.i (i) Presentation of the Property	179
5.i (ii) Promotion of the Property	179
5.j Staffing Levels and Expertise (Professional, Technical, Maintenance)	180
6. Monitoring	182
6.a Key Indicators for Measuring State of Conservation	184
6.a (i) State of Conservation of the Geological and Fossil Records of the Proposed Property's OUV	185
6.a (ii) Indicators for Threats Affecting the Property's State of Conservation	186
6.a (iii) Indicators for Responsible Visitation	188
6.b Administrative Arrangements for Monitoring Property	189
6.c Results of Previous Reporting Exercises	190

7. Documentation	192
7.a Photographs, Audiovisual Image Inventory and Authorization Form	195
7.b Texts Relating to Protective Designation, Copies of Property Management Plans or Documented Management Systems and Extracts of Other Plans Relevant to the Property.....	195
i) Documents Relating to Management and Conservation of the OUV	195
ii) Documents Relating to Presentation of the OUV.....	195
iii) Legislative and Administrative Texts Supporting the OUV.....	195
iv) Documents on Consulting and Involving Local and Regional Communities.....	195
v) Other Supporting Documents	196
7.c Documents Form and Date of Most Recent Records or Inventory of Property	196
7.d Address Where Inventory, Records, and Archives Are Held.....	196
7.e Bibliography.....	197
8. Contact Information of Responsible Authorities	206
8.a Preparer.....	209
8.b Official Local Agencies	209
8.c Other Local Institutions.....	209
8.d Official Website.....	209
9. Signature on Behalf of the State Party	210
Image Credits	214
Citations	215
Appendices	
Appendix 1 Maps and Image Inventory	In separate volume
Appendix 2 Documents Relating to Management and Conservation of the OUV	In separate volume
Appendix 3 Documents Relating to Presentation of the OUV	In separate volume
Appendix 4 Legislative and Administrative Texts Supporting the OUV	In separate volume
Appendix 5 Documents on Consulting and Involving Local and Regional Communities	In separate volume
Appendix 6 Other Supporting Documents	In separate volume
Appendix 7 Form and Date of Most Recent Records or Inventory of the Property	In separate volume



Cap aux Anglais, near Baie Sainte-Claire,
in Anticosti's western sector (credit:
Pascal Bernatchez, UQAR)