

World Heritage Sites

Protected Areas and World Heritage



MIGUASHA NATIONAL PARK CANADA

The palaeontological site of Miguasha on the southern coast of the Gaspé peninsula in southeastern Québec, is considered the most outstanding fossil site in the world for its picture of the Devonian Period 'Age of Fishes'. The Upper Devonian Escuminac Formation there, dating from 370 million years ago, contains five of the six fossil fish groups known from the period and the highest number and best-preserved fossils of the lobe-finned fishes that gave rise to the first four-legged, air-breathing terrestrial vertebrates, the tetrapods.

COUNTRY

Canada

NAME

Miguasha National Park

NATURAL WORLD HERITAGE SITE

1999: Inscribed on the World Heritage List under Natural criterion viii.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

The UNESCO World Heritage Committee issued the following statement at the time of inscription:

Justification for Inscription

Natural criteria (vii) and (x): Mount Wuyi is one of the most outstanding subtropical forests in the world. It is the largest, most representative example of a largely intact forest encompassing the diversity of the Chinese Subtropical Forest and the South Chinese Rainforest. It acts as a refuge for a large number of ancient, relict plant species, many of them endemic to China and contains large numbers of reptile, amphibian and insect species. The riverine landscape of Nine-Bend Stream (lower gorge) is also of exceptional scenic quality in its juxtaposition of smooth rock cliffs with clear, deep water.

Cultural criterion (iii): Mount Wuyi is a landscape of great beauty that has been protected for more than twelve centuries. It contains a series of exceptional archaeological sites, including the Han City established in the 1st century BC and a number of temples and study centres associated with the birth of Neo-Confucianism in the 11th century AD.

Cultural Criterion (vi): Mount Wuyi was the cradle of Neo-Confucianism, a doctrine that played a dominant role in the countries of Eastern and South-Eastern Asia for many centuries and influenced philosophy and government over much of the world.

IUCN MANAGEMENT CATEGORY

II National Park

BIOGEOGRAPHICAL PROVINCE

Canadian Taiga (1.2.3)

GEOGRAPHICAL LOCATION

On the southern coast of the Gaspé peninsula in southeastern Québec province, lying along the north shore of the Ristigouche River estuary opposite the town of Dalhousie at 48°06'N by 66°22'W.

DATES AND HISTORY OF ESTABLISHMENT

1842: First discovered by the geologist Abraham Gesner and well studied since 1879;

- 1985: Declared a Provincial Park by Decree 146-85 of the Parks Law (L.R.Q., Ch.P-9) and Decree 90-023 of the Mining Law, for the geological and paleontological value of the site;
- 1972: The strip of land along the cliffs containing an important piece of the Escuminac Formation was bought by the Québec government to keep it in Canadian ownership.

LAND TENURE

The Government of Québec. The buffer zone is private land and includes part of the former Seigneurie Shoolbred now divided between 100 smallholders. The site is managed by the Fauna Conservation Service of the Ministry of Environment and Fauna.

AREA

87.3 ha. It has a protected peripheral buffer area of 775 ha.

ALTITUDE

From sea level to 220m, averaging 40m.

PHYSICAL FEATURES

The Park comprises a coastal cliff which extends along Miguasha point and the north shore of the Ristigouche River where it opens into the Baie des Chaleurs on the southern side of the Gaspé peninsula. The exposure is represented in four distinct outcrops of the Escuminac Formation 8 km long by one km wide, which has a maximum height of 100m and an underground component extending 300-600 meters below the surface. The most important of the outcrops stretches for 3 km, rises to 30m, and forms the main part of the Park. The principal occurrence is oriented east-west revealing a long anticline and syncline, the latter elevated over some degrees. The Escuminac Formation dates from the Upper Devonian Period 353-375 million years ago when the area was a tropical estuary inhabited by primitive forms of life. It is composed of alternating grey layers of thick sandstone, mudstone and calcareous schists. The largely conglomerate Fleurant Formation is found at its base. It is capped by the carboniferous Bonaventure Formation, the reddish colour of which is the origin of the Micmac Indian word *miguasha*. The Devonian is the period when fishes first diversified, took to fresh water and gave rise to the first terrestrial vertebrates. Several groups of plants and invertebrates also began to develop. But gradual cooling associated with tectonic movement caused the disappearance of several other groups of invertebrates and primitive fishes.

CLIMATE

The present climate is cool maritime, influenced by the relatively warm Baie des Chaleurs, with cold wet winters and humid moderate summers. The nomination stated that conditions were comparable in ways with those of Montreal where average temperatures are -6°C to -16°C in winter, 14°C to 26°C in summer with an average rainfall 1,024mm, heaviest between August and November. The Devonian climate was tropical.

FLORA

The present site is occupied by a mixture of cultivated crops and some boreal trees such as fir, birch and thuya. But some 370 million years ago, the coast was a tropical estuary populated with abundant primitive life-forms, many of great evolutionary and phylogenetic interest. The macroflora includes 10 species of the first vascular plants of Devonian forests: algae and some 80 spore fossil species, *Archaeopteris halliana*, a 20m tall spore-bearing precursor to the modern Gymnosperma and *Spermasposita* which is considered the oldest flowering plant.

FAUNA

The site's existing fauna is unexceptional. Its designation is entirely for its fossil remains. A two-million-year representation of Devonian life is preserved in the remarkably rich fossil beds exposed in the cliffs of Miguasha. There more than 100 vertebrate species notably fish, invertebrate species such as the 30cm *Petaloscorpio bureaui*, the first terrestrial scorpion, a fossil centipede discovered in 2003, ten species of primitive plants, algae and micro-organisms. These have allowed scientists to construct an almost complete picture of Devonian life of the time. In the warm tidal waters an astonishing variety of fish thrived, 21 species of which made Miguasha famous. Some were spiny, some armour-plated and the crossopterygian *Eusthenopteron foordi* had already developed the limb-like fins that enabled them to crawl across mud flats and the two-way gills and lung system, which

gave rise to the modern conception of evolution from fish to four-limbed terrestrial tetrapod vertebrates.

None of some 60 Devonian period fossil sites worldwide matches Miguasha in abundance of specimens, representation of vertebrate evolution in the oldest known ancestral amphibian, and in quality of preservation: the fossils even of soft body parts, gill imprints, digestive traces, and the cartilaginous parts of skeletons remain in exceptional condition. Some 5,000 fossils have been identified, described, stored and computerised. Important specimens include *Legendrelepis parenti* of the jawless Agnatha fish group and unique to the Escuminac Formation; *Diplocanthus horridus* of the Acanthodian spiny fish group, and the first jawed fish to evolve; *Bothriolepis canadensis* of the then common bony-shielded Placoderms; *Cheirolepis canadensis* of the Actinopterygian group, from which 90% of all fish (over 29,000 taxa) derive; *Miguashaia bureaui*, morphologically identical to *Latimeria chalumnae*, the sole Coelacanthi of today; *Scaumenacia curta*, a fossil fish with both lungs and gills - an important climatic indicator, and *Eusthenopteron foordi* of the crossopterygian group. In addition, *Petaloscorpion bureaui*, is an important scorpionid indicator of the paleoenvironment. Of the eight fish groups associated with this period, six are found at Miguasha; the other two are typically marine. This representation is uncommon among sites of the same age and this is the only Devonian site on the World Heritage List.

CONSERVATION VALUE

The Escuminac Formation constitutes a natural feature of national interest and unique character. For more than a century, the flora and fauna fossils of Miguasha have been recognised as unique for their abundance, Devonian ichthyofauna and evolutionary representativeness, and have been visited by large numbers of scientists and collectors. The Park also lies within a WWF Marine Global 200. Ecoregion.

CULTURAL HERITAGE

The area of the Baie des Chaleurs was part of the hunting and fishing territory of the Micmac, an indigenous Algonquian nation. Under the French between 1534 and 1760 the inhabitants were only a few seasonal fishermen and missionaries. After their conquest, English soldiers settled in Canada and loyal service to the king was rewarded by the grant of lands and lordships. In 1788 an English merchant named John Shoolbred was offered the lands which bear the name of his Seigneurie though he never lived there. This was a 30 km narrow strip along the north bank of the Ristigouche River including the small Miguasha peninsula. After abolition of the seigneurial system in 1855, several Acadian families were re-settled in the area. The site is also known as Bay of Escuminac Fossil Site and the Hugh-Miller Cliffs, after a 19th century Scottish stonemason-geologist famous for discovering many similar fossils in the Old Red Sandstone of Scotland as early as 1831.

LOCAL HUMAN POPULATION

There are no residents within Park boundaries. The Park headquarters are in the peripheral zone where there is a total of 120 permanent residents.

VISITORS AND VISITOR FACILITIES

The number of visitors increased from 7,236 in 1978 to about 40,000 in 1999 (IUCN, 1999). At Miguasha there is a fully equipped interpretation centre, opened in 1978, illustrating the plant and animal fossil remains of the area. Fossil specimens and/or reproductions from the site are lent to primary, secondary and tertiary institutions for educational purposes, and in support of specific research endeavours or exhibitions. Materials are also exchanged with museums and scientific institutions to promote the research and value of the park.

SCIENTIFIC RESEARCH AND FACILITIES

The Miguasha fossil beds were discovered in 1842 by the geologist Abraham Gesner. Starting with expeditions by the Geological Survey of Canada between 1879 and 1881, a number of studies resulted in scientific description of the specimens, and between 1888 and 1892, important collections were sent to the British Museum in London and the Royal Scottish Museum, Edinburgh, publicising the scientific importance of the site. There followed a period of great interest from foreign scientists and collectors, with thousands of fossil specimens collected and shipped to museums and research institutes around the world. Many students have trained and continue to train on the site. Some 5,000 specimens have been identified, described, stored and computerised. Of particular importance is the presence of the crossopterygian group typified by *Eusthenopteron foordi* and *Elpistostege watsoni* which was notable for focussing the attention of international scientists on the Escuminac Formation

and for initiating the modern conception of evolution from fish to terrestrial tetrapods, first recognised by the American palaeontologist Cope in 1892. Laboratory facilities are found within the park.

MANAGEMENT

The site is managed by the Fauna Conservation Service of the Ministry of Environment and Fauna and a Management Plan has been prepared. In establishing the Park for conservation and recreation, all forms of exploitation, modification or occupation which impact on the natural environment were prohibited. Quarrying from the cliffs, gathering of fossils from the beach or removal of specimens is strictly prohibited. The only forms of excavation permitted are for scientific research and development of the area, while visitor use is restricted to travelling through, observing and appreciating the Park. The cliff and beach are part of the Preservation Zone. The interior buffer (*Zone d'Ambiance*) allows for intensive preservation and moderate utilisation. There is also a small Service Zone. To provide further protection, the area in and around the Park is protected from mineral research and extraction by Decree 90-023 of 1990. There is also an education programme for visitors.

MANAGEMENT CONSTRAINTS

According to the World Heritage Nomination no major constraints appear to affect the site, due mainly to close observance of the laws regarding parks and fossil collection in Quebec. A rise in sea level due to climate warming is a future possibility.

COMPARISON WITH SIMILAR SITES

Devonian fish sites are marine in origin and are quite widespread. Other notable Devonian fossil deposits include those found in Scotland (Lethan Bar, Orkneys), Gogo in Australia, Lode in Latvia, Cleveland Shales in the United States, Wildungen and Bergisch Gladbach in Germany. Based on the comparative study of fifteen fossiliferous sites of the Devonian, Cloutier and Lelièvre (1998) concluded the Escuminac Formation of Miguasha is the site most representative of the Devonian, clearly standing out from all the other sites for its evolutionary representativeness, the exceptional quality of fossil preservation and the abundance of vertebrate remains. They concluded that Miguasha ranks first in seven of ten categories: faunal representativeness of the major sarcopterygian groups, for paleobiology, and vertebrate evolutionary events; for the floral and faunal representativeness of the aquatic and terrestrial components of the assemblages; for the quality of preservation and anatomical completeness of vertebrate fossils, for the exceptional character of their fossilization, and for its abundance of specimens. For biodiversity Miguasha's fossils rank second behind those of Spitsbergen, Bad Wildungen and the Cleveland Shale, and behind Spitsbergen for faunal representativeness of the major vertebrate groups; it ranks third for its representativeness of the major groups of placoderms.

STAFF

In 1998 there were seven permanent staff complemented by a team of students in summer. The protection, administration, library and research facilities of the Park is the responsibility of the Fauna Conservation Service.

BUDGET

In 1998, the Park received C\$255,000 for land purchase and a warehouse for stocking specimens. The total annual budget of the Park was C\$303,900 in 1996-1997, C\$292,700 in 1997-1998 and C\$537,500 in 1998-1999.

LOCAL ADDRESS

Parc de Conservation de Miguasha, Ministère de l'Environnement et de la Faune, 270, rte Miguasha Ouest, C.P.183, Nouvelle, Québec, Canada G0C 2E0.

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DATE

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