



Photo by M. Lace

Assessment of Grotte Marie-Jeanne

Port-au-Piment, Republique D'Haiti

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I. Introduction:

Grotte de Marie Jeanne is a cave system located on the southwest coast of Haiti in the town of Port a Piment. (Figure 1). The cave is accessed via a well-trodden footpath that leads to the edge of a surface collapse (Figure 2). A metal-framed staircase provides access to the cave system (Plate 1). An initial assessment of the cave was conducted during the dates of August 31, September 1 and September 3, 2007. The objectives of the assessment were to determine the significance of the cave system as a natural feature, to assess its value in terms of tourism development, and to conduct a reconnaissance for the purpose of future survey, documentation and scientific study.

II. Initial Resource Evaluation and Inventory

A. Location and Geologic Setting

Grotte Marie-Jeanne is one of many karst features formed on a small limestone plateau on the south central part of the Massif de la Hotte at an elevation of approximately 120 meters. Other small caves and additional collapses have also been documented on the plateau. The cave is formed in limestone may be that is associated either with the basalts of the Dumisseau Formation or possibly in the Macaya Formation, both of late Cretaceous age (Maurrasse 1982). It's also possible that the limestone unit is Eocene in age (Army Corp of Engineers, 1999). The area is structurally complex with many faults and related features.



Figure 1: Port-A-Piment and surrounding area



Figure 2. Location of the cave with respect to Port-A-Piment
source: Brian Oakes

B. Cave Description:

Grotte de Marie Jeanne System is reported to have one km of passage (Courbon *et al*, 1989) however, there is no record of an actual survey or map. A detailed survey was initiated during the three field days though it was not completed. A total of 498 meters of passage was surveyed (Figure 3), and photo documented (Plates 1-9). At the time of the assessment the cave was dry though the many speleothems within the cave indicate that meteoric water does enter the cave as drip water from the surface. The cave is decorated with many different types of speleothems and some speleogens (Plates 2 & 3). No pooled or flowing water was observed in the sections of cave visited during the assessment.

A major surface collapse (doline) segments the cave system into two separate areas which will be called Marie-Jeanne North and Marie-Jeanne South for the purpose of this report. A small forest covers the floor of the doline. The cave system has a vertical extent of 41 meters and is developed on at least three different levels (Figure 4).

A detailed survey was started in both sections of cave but was not completed due to lack of time. There are many more passages and galleries to survey and we believe that there is much more than the kilometer of cave reported by Courbon *et al.*, (1989).

Marie-Jeanne North Section

The northern section of the system opens into a large entrance chamber and a down-climb over large boulders must be negotiated to reach the floor (Plate 1). The east side of the entrance chamber is nicely decorated with flowstone cascades, rimstone dams with an ephemeral pool, stalagmites and

stalactites. The west side of the entrance chamber contains large boulders, flowstone slopes and stalagmites. At the north end of the chamber two small passages exit the area and lead to a short segment of passage that ends in a balcony overlook. A short climb-down, 20 meters before the balcony overlook, opens into the Galerie Inferieur, a large lower level series of passages and galleries. The area contains many speleothems (flowstone, stalagmites, stalactites, soda straws and rimstone dams (Plate 2). Bell holes, a feature that is common in tropical caves, have formed in many places on the ceiling (Plate 3).

Several passages continue from Galerie Inferieur. To the north and northwest are a series of upper level chambers and galleries that are well decorated. The areas are floored with breakdown and some may lead to other entrances.

A third level of passages has developed below Galerie Inferieur. A room with a steeply sloping flood goes under this section of cave and leads to the edge of a 12 meter pit (Plate 6). We did not have enough rope or equipment to descend this area of the cave. Rocks that were dropped down the pitch could be heard to roll down a slope for a considerable distance.

Marie Jeanne South Section

Three entrances have been documented in Marie-Jeanne South. The entrance just south of the stairway descends down-slope into a breakdown passage and more chambers and passages. A large chamber with bats was observed. A small skylight at the top of the room serves as the entryway for the bats. A thick coating of bat guano covers much of the floor of the chamber.

The largest of the entrances in the doline leads to the Galerie Superieur (Plate 1). The entrance area contains many large stalactites and columns and other speleothems. A passage leading to a lower level (requires rope) exits the entrance area to the north. A ladder has been placed on the floor of the passage and has been used to access the lower level (Plate 5). Northwest of the entrance is a skylight chamber called Les Jardins Suspendus (Plate 4). Because the skylight allows sunlight into the chamber, a small forest is growing below it. Several alcoves on the south side of the chamber contain many shells of surface snails which are most likely washed out of the forest and into the cave system during rains (Plate 5).

Two passages exit the northeast side the Les Jardin and may connect. The larger of the two overlooks a ledge which requires a hand line to traverse. The second entrance leads to a tall fissure passage that is floored with large breakdown blocks. There are many small bones in this section of the cave from prey brought in by a large owl (most likely a barn owl but species not confirmed at this time) that lives near an upper entrance. The south side of the fissure passage leads to another entrance and a steep slope which may connect to the adjacent entrance mentioned above.

An exposed up climb at the north end of the fissure opens into another decorated chamber which accesses the entrance doline. A second entrance to an undocumented surface collapse was also explored.



Stairway access to the entrance doline to Grotte Marie-Jeanne (photo: M. Lace)



North entrance to Grotte Marie-Jeanne (photo: M. Lace)



One of the South entrances to Grotte Marie-Jeanne (photo: M. Lace)

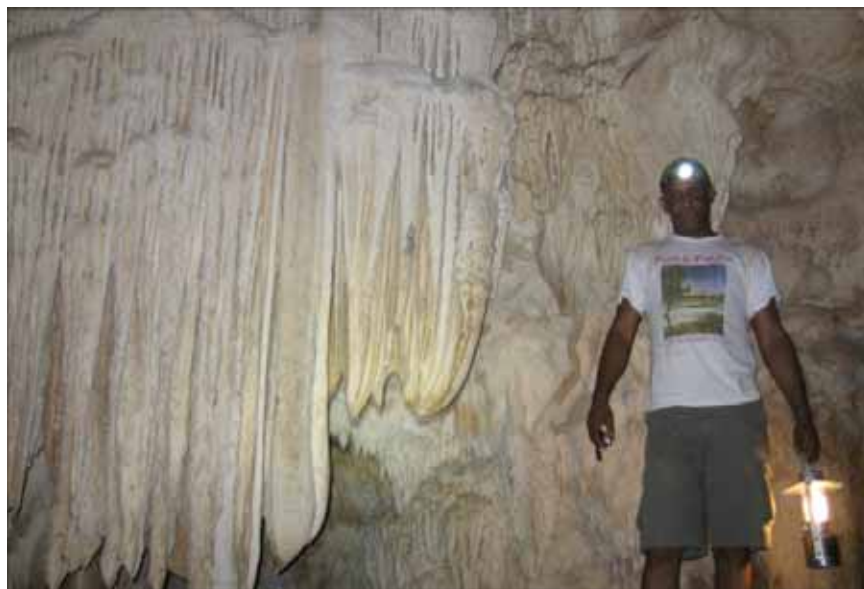
Plate 1



Stalactites in Grotte Marie-Jeanne South
(photo: M. Lace)



Stalagmites in Grotte Marie-Jeanne North
(Photo: M. Lace)



Draperies in Galerie Inferieur, Grotte Marie-Jeanne North
(photo: P. Kambesis)

Plate 2



Decorated Chamber in Galerie Superieur
(photo: M. Lace)



Bellholes in Grotte Marie-Jeanne South
(Photo: M. Lace)



Rimstone pool and cave pearls (photo: M. Lace)

Plate 3



One of the entrances in Grotte Marie-Jeanne South (photo: P. Kambesis)



Les Jardin Suspendus, Grotte Marie Jeanne South (photo: P. Kambesis)



View from Les Jardin Suspendus into one of the south entrances (photo: P. Kambesis)

Plate 4



Wooden ladder in side passage near Jardin Entrance (photo: M. Lacey)



Ferns growing among the speleothems at Les Jardins Suspendus (photo: M. Lacey)



Shells of land snails that have washed into the cave from Les Jardins Suspendus (photo: P. Kambesis)

Plate 5

C. Other caves and karst features

In addition to Grotte Marie-Jeanne, other caves and karst features have been observed on the limestone plateau. One of the smaller dolines opens into Grotte Belgique (Figure 5) The cave has a well-decorated entrance chamber and is named for the signature on the wall of a Belgian geologist (Plate 9). It's been reported that this cave may be connected to Grotte Marie Jeanne. There was not enough time during the assessment to look for such a connection though there was some air movement at the back of the cave to indicate more passages.

D. Biology

A very cursory look at the biologic resources of the cave was done during the survey and this is by no means complete (Plate 6). Among the biota observed were bats, birds, crickets, pseudo-scorpions, flies, beetles and cockroaches. Small patches of actinomycetes were observed in several alcoves. A more detailed biologic inventory will undoubtedly document more cave life as the habitat does exist for a

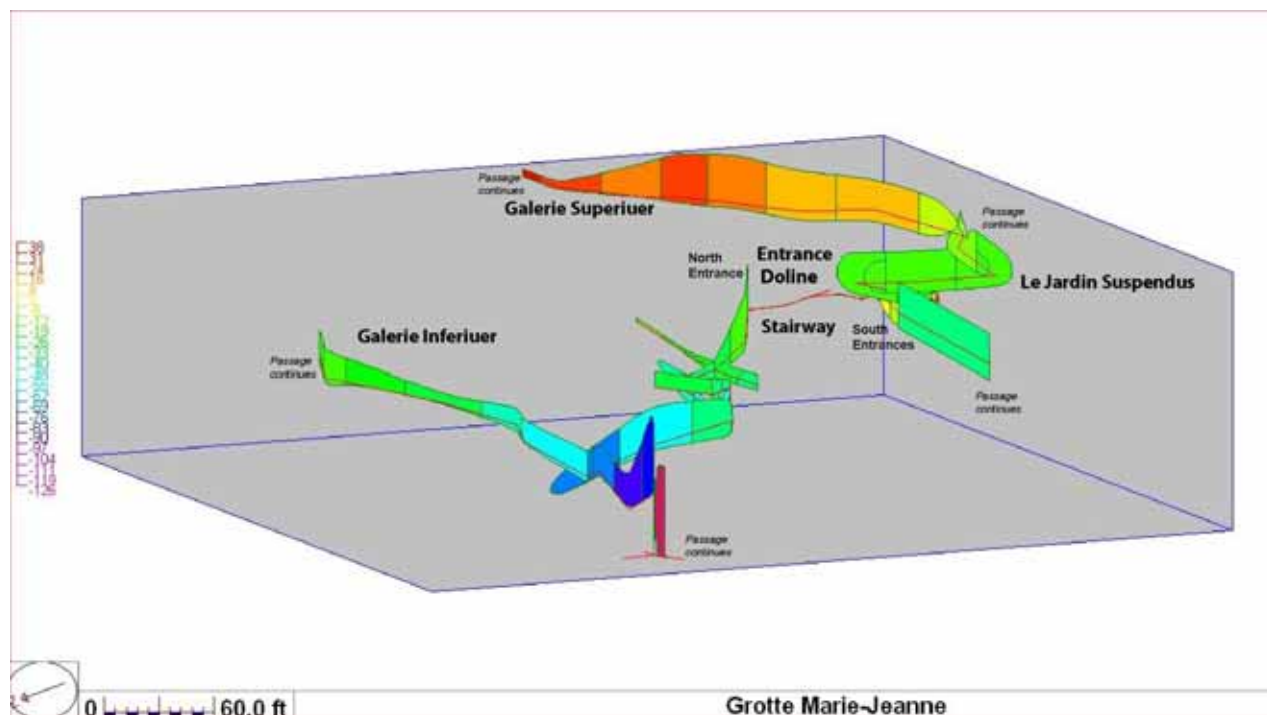


Figure 4. Profile view of Grotte Marie-Jeanne



Bat in Grotte Marie-Jeanne South
(photo: P. Kambesis)



Actinomycetes (shiny droplets) in Grotte Marie-Jeanne North (photo: P. Kambesis)



Pseudo-scorpion in Grotto Marie-Jeanne
(photo: M. Lacey)



Articulated skeleton, possibly dog or goat (photo: P. Kambesis)

Plate 6

terrestrial cave ecosystem. Should flowing water be discovered in the lower levels of the cave the potential exists for aquatic life also. The upper levels of the cave do provide habitat for a terrestrial cave ecosystem. Bats, birds and rats, all which occupy the cave and import food and deposit guano, are dependent upon forest and agricultural land for food.

In general, habitats are determined by proximity to entrances with variable temperature and humidity, which in turn determines the species living in the caves. Leaf litter falling into entrances is also locally important to the terrestrial cave ecosystem.

Bones, skulls, and fully articulated skeletons have been documented in the cave system (Plate 4) though they all appear to be of recent age. The sources of these remains include dog, pig, and goat which were animals that wandered into the cave, fell in or got lost and then perished there. Bat bones were observed in the areas that are inhabited by bats. Abundant rat and small bird bones have been documented near an entrance that is currently inhabited by an owl.

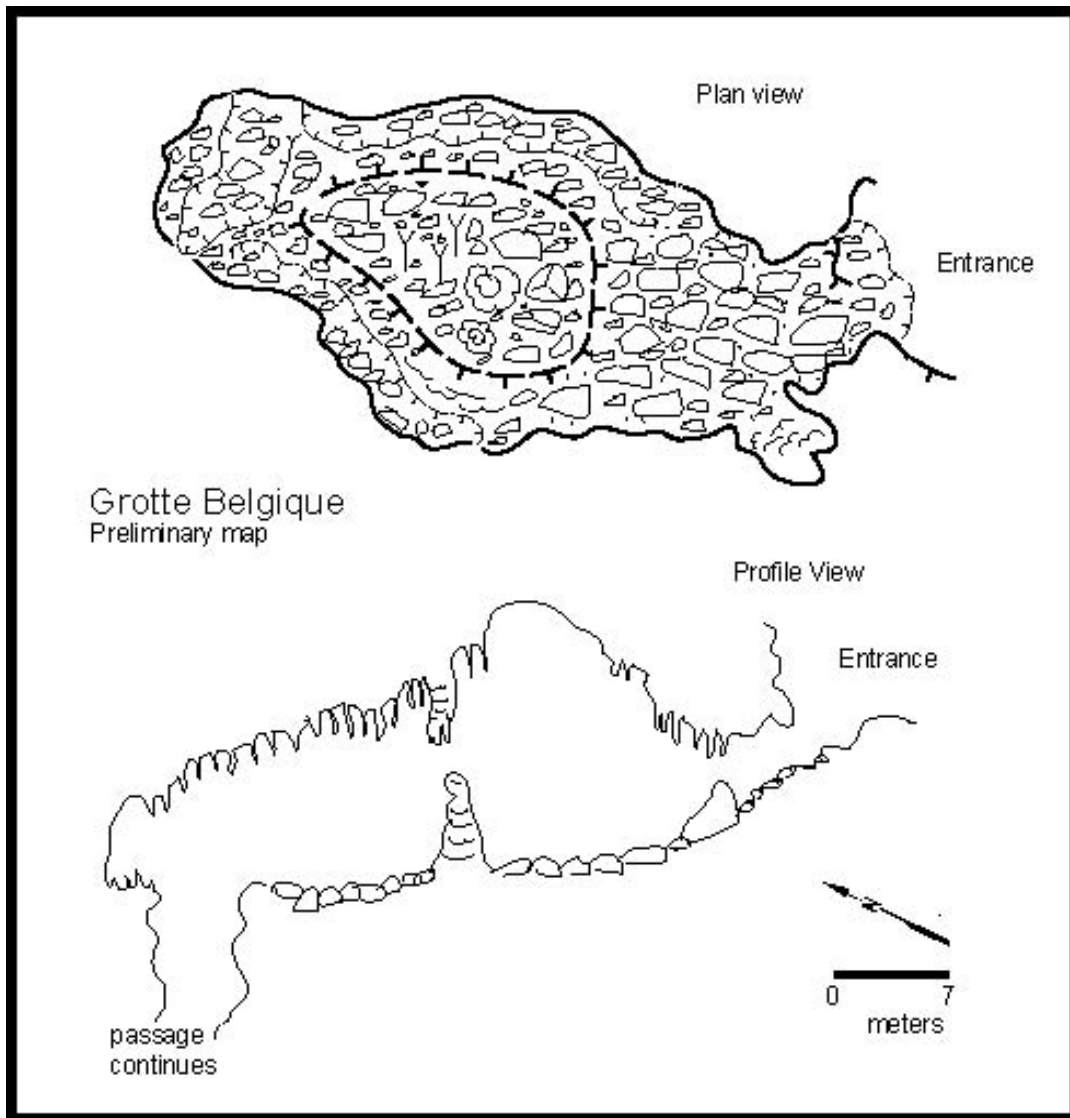


Figure 5. Grotte Belgique

E. Historical, Cultural and Archeological Resources

Grotte Marie-Jeanne and associated caves bear evidence of historical use and also of pre-historic use (Plate 7). Signatures on walls and speleothems are common in the Galerie Superieur and in Grotte Belgique. The dates range from early in the twenty century to more recent times. Other evidence of historical activity is signage which was used in Marie-Jeanne North to mark routes and chambers. Evidence of pre-human usage is also common throughout the cave system. Archeological material has also been documented in the form of pottery sherds and conch shells, characteristic of Taino use in the region.

F. Summary

Grotte Marie-Jeanne is an important natural feature and every effort should be made to preserve it and its associated resources. In addition, the limestone area surrounding cave which contains other karst features and a significant spring is an important natural context that should also be preserved and protected. Consideration should be given to designating the area as a National natural preserve.

Grotte Marie-Jeanne and its surrounding area should be made available to responsible and qualified individuals for exploration, recreation, education, and scientific study. The area residents, and members of the caving and scientific communities can interact and work together within the larger community of speleology to preserve, enjoy, study, and protect the cave and its ecosystem.

Two additional dolines were noted during the assessment but none of them were entered at this time. Northwest of the Marie-Jeanne area, a large spring issues from the base of the same limestone ridge that holds Grotte Marie-Jeanne. The recharge area for the spring is currently unknown.



Oil lamp in Grotte Marie-Jeanne
(photo: P. Kambesis)



Historic signatures in Grotte Marie-Jeanne



Pottery sherds, lens cap for scale
(photo: M. Luce)



Old signage in Marie-Grotte
North (photo: P. Kambesis)

Plate 7



Approaching the edge of the Abyss below the Galier Inferiur (photo: P. Kambesis)



Down-climb into the Ga;rtor Inferiur (photo: P. Kambesis)



Passage morphology of one of the larger chambers of the cave system (photo: M. Lace)

Plate 8



Entrance chamber of Grotte Belgique
(photo: M. Lace)



Signature of a Belgian geologist
in Grotte Belgique (photo: M. Lace)



Large spring in the Marie-Jeanne karst area (photo: P. Kambesis)

Plate 9

III. Significance of Grotte Marie-Jeanne as a natural feature:

Grotte de Marie Jeanne is one of longest caves in Haiti (Courbon *et al.* 1989). However a formal survey has never been completed so the true length of the cave system is currently unknown. Many passages were explored and even more were not visited during the initial assessment. Because of the possibility of connections between known cave segments, the cave may be considerably longer than the reported one kilometer.

The cave contains a number of significant natural resources including speleothems of all types and size, and speleogens that are unique to tropical caves (Plates 2 & 3). A series of large, well-decorated chambers developed on multiple levels gives the cave an unusual morphology (Plate 8). A large surface collapse which is the main entrance to the system is grown over with trees and other local vegetation. The many entrances and skylights allow for the development of a unique cave ecosystem which has not yet been fully identified or studied.

Evidence of pre-historical and historical human usage (Plate 7) of the cave and surrounding landscape makes it an important part of the cultural and ethnic history of the area and of the island.

IV. Value of the Grotte Marie-Jeanne in terms of Touristic Development

Despite the amount of visitation that the cave system and surrounding area has seen over the years, they have been minimally impacted. The large entrance doline has a tremendous amount of scenic value because of the existing forest that it contains and from the cave entrances that open from its periphery. The



Figure 5. View of Port-au-Piment from the trail leading to Grotte Marie-Jeanne (photo: P. Kambesis)

series of large passages and chambers are visually enhanced by the large, intact and undamaged speleothems that cover the walls, ceilings and floors. The cave is of significant cultural and historical importance, holds a dynamic ecosystem, and is of great scientific interest. These assets will provide information for interpretive experiences that have touristic value for visitors to the area.

With thoughtful development of a minimal trail within the doline, minor improvements to the in-cave trail, and the use of lanterns to light those parts of the system for a formal tour, the cave system would be easily made accessible for eco-tourism. Those parts of the cave that remain undeveloped could be shown in the context of a “wild tour” where guides take small groups into the far reaches of the system (helmets and lights should be provided).

One of the biggest challenges to provide tourist access will be the trail that leads up to the entrance doline. The trail is steep in places however it does afford a beautiful view of Port-A-Piment and should be associated with the cave tour (Figure 6).

Threats to the touristic value of Grotte de Marie Jeanne System and surrounding area include vandalism, littering, logging, and factors related to the encroaching development.

V. Value for Scientific Study

Grotte Marie-Jeanne is an unusual cave with respect to its morphology (which is unusual for the region), and layout and in terms of its natural resources (geologic, biologic, historic/cultural, archeological). The cave is a repository of features that will provide data about the development of the cave and its relationship to the surface topography. These features will also impart information on paleo-climate, sea level changes, and paleo and current hydrogeology; topics that are important on a local level and island-wide level.

Researcher activity should be encouraged not only because of the value in the knowledge that will result, but also in providing information to enhance interpretive information for eco-tours and wild tours of the cave system and surrounding area.

VI. Recommendations:

In order to properly manage and develop a natural feature, it is important to know its characteristics and extent (Kambesis 2005). Prior to any type of development efforts, the cave system and surrounding area should be carefully documented and inventoried as follows:

1. Detailed cave survey needs to be completed and a map produced. Map should be georeferenced to topography. This base map will serve as a critical tool for all future work in the cave.
2. Cave resource inventory should be conducted in association with the cave survey to document biology, historical/cultural features, archeological features, mineralogy and other important characteristics of the cave. Features should be georeferenced to the survey line.
3. Photodocumentation should be done for the entire cave and surrounding area.

4. In conjunction with photodocumentation of historical signatures, a compilation of local and oral history related to the cave and its use will be invaluable. Not only will this portion of the collective history (which might otherwise be lost over time) be preserved but such an effort can potentially strengthen community involvement in the overall project.
3. Karst feature inventory of the plateau on which the cave is formed. All features should be described, photographed and georeferenced.
4. Ecological inventory of the forest located in the entrance doline, at Les Jardin Suspendus and at sinkholes associated with the cave system.

Grotte Marie-Jeanne is an important natural feature and every effort should be made to preserve it and its associated resources. In addition, the limestone area where the cave is located contains other karst features and a significant spring in an important natural context that should also be preserved and protected. Consideration should be given to designating the area as a National natural preserve.

Grotte Marie-Jeanne and its surrounding area should be made available to responsible and qualified individuals for exploration, recreation, education, and scientific study. The area residents, and members of the caving and scientific communities can interact and work together to preserve, enjoy, study, and protect the cave and its ecosystem.

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Grotte de Marie Jeanne and surrounding area Proposed Management Plan

MANAGEMENT:

A management entity should be formed to oversee touristic, educational, conservation and scientific research activities in Grotte Marie-Jeanne and surrounding area.

The purpose of this management plan is to establish rules and procedures to aid in protecting and preserving Grotte Marie-Jeanne and surrounding area. Management and supervision of the cave will be the responsibility of a management entity and should be conducted in accordance with this plan.

Grotte Marie-Jeanne and its surrounding area should be made available to responsible and qualified individuals for exploration, recreation, tourism, education, and scientific study. Area residents, government entities, and members of the caving and scientific communities should strive to interact and work together within the larger community to preserve, enjoy, study, and protect the cave and its ecosystem.

Access and Visitation

1. Due to the unique and sensitive nature of the cave and surrounding area, at least one member of any group entering the cave should have a qualified guide. Managing entity will provide appropriate guide training.
2. Fireworks, explosives, loud music, and other noisemaking activities should be prohibited as they will disturb the cave life.
3. To minimize the impact to the cave, it is recommended that groups entering the cave be limited to twelve (12) people plus guide (formal tours), and to 6 people plus guide for wild tour. The guide should be knowledgeable of the main routes of the cave and should be aware of sensitive areas. The guide should also have safety for the visitors and concern for the cave as top priorities.
4. All plants and animals on the surface and in the cave should be respected and observed from a distance, and are never to be removed. Avoid disturbing wild life and plant life. Cave flora, fauna, and cultural resources should be left undisturbed. In addition, do not touch, break, or remove formations from the cave. Do not cut trees or brush for firewood or any other purpose..
5. Camping should not be permitted inside the cave or in the entrance doline.
6. Remove any trash brought to the cave or surrounding area.
7. Spray-painting, carbide marking, and all other types of graffiti should not be permitted. Vandalism and abuse of the cave or the surface areas should not be tolerated.
8. Modifications of the cave including placing bolts or artificial anchors, marking or constructing trails, cutting trees or brush, and other similar activities, are prohibited without written permission from the managing entity. Alterations to the natural morphology of the cave and surrounding landscape, such as digging new entrances or passages, can have dramatic effects on the cave microclimate by changing temperature, humidity, and water flow. This, in turn, can have negative effects on the cave life. Therefore all digging or blasting on the property or in the cave is prohibited without written permission from the managing entity. .
9. Collection of specimens, artifacts, or any type of natural or cultural resources from the preserve or the cave is not permitted without written permission from the managing entity

Scientific Research

The managing entity should support open exchange of ideas and welcome research proposals, provided that management rules are followed. Research involving biological, historical, and archeological aspects of the site will provide a greater understanding of the cave's significance. Students and other researchers should be encouraged to submit their written proposals to the managing entity for consideration. The safety and security of the plants and animals of the cave and surrounding area are always the first concern when reviewing any research requests, therefore any proposal that might alter the cave environment or harm the cave in any way should not be considered.

No collection of specimens, artifacts, or any type of natural or cultural resources from the the cave or surrounding area should be permitted without written permission from the managing entity. Requests for permission to collect specimens or conduct research activities which may involve the disturbance or removal of natural or cultural resources including wildlife or artifacts should be submitted to the managing entity. All researchers should be required to follow any laws and regulations regarding specimen collection and must obtain any applicable state or federal permits. Researchers should be are requested to provide a copy of any information or reports generated from their studies to the management entity in a timely fashion.

Emergency Management

The managing entity should establish policies and procedures for emergency management in the cave and should expect guides and researchers to understand and follow them.

FUTURE PLANS

Prior to development for tourism, the cave and surrounding area should be surveyed, inventoried and photographed to determine the boundaries of areas to be managed and to establish a base-line condition for the cave . Subsequent documentation would then provide impact assessment relative to the baseline condition

During any development activities, the cave should monitored for negative changes that may occur due to development. After the cave is developed, a monitoring program should be established to ensure that commercial or other activities are not negatively impacting the cave and its ecosystem.

It is recommended that Grotte Marie Jeanne be kept as close as possible to its natural state though some amount of development will be necessary in order to make it accessible to tourism. To make the cave tour-friendly but still maintain its natural state, short segments of trail should be installed in the entrance doline and small, unobtrusive ladders to allow access to upper and lower level chambers for the purpose of safety.

Installation of interpretive displays both on the surface trails and potentially within the doline entrance would be important for interprative and educational purposes.

Rather than installing a lighting system, tours can be given by lantern as the entrance doline and other entrances and skylights provide enough natural light. Lanterns will also give off enough light to illuminate other parts of the cave that are not close to entrances.

The managing entity should work with other landowners in the surrounding area to protect the cave and the surrounding natural resources.