

EXECUTIVE SUMMARY OF THE BONAIRE CAVES SECTION FROM THE IMARES 2017 REPORT

“THE STATE OF NATURE IN THE DUTCH CARIBBEAN”

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Current existence and reference values

Within the Dutch Caribbean, caves mainly occur on Bonaire and then, in limestone formations. The entrances to caves are often found in or near slopes of the various limestone terraces. Roughly, three limestone terraces can be distinguished. The oldest High terrace is between 138 and 50 thousand years old, many of which have since been eroded. The younger Middle terrace is between 15 and 45. The youngest, Low terrace is between 4 and 15 thousand years old and is almost completely around the island. (De Freitas et al., 2005).

The northern and eastern part of Bonaire are higher than the southern and western part of the island. In the higher part, water-containing caves are only found in the Low terrace. In the lower part of Bonaire they can be found in the Middle and Low terraces.

A large part of the caves on Bonaire still needs to be mapped. Bats and other cave-fauna are not systematically monitored. Reference values are therefore unknown, making it difficult to determine to what extent the caves and their fauna are thriving or deteriorating.

Assessment of Conservation (See assessment system description below)

Trends: Trends in the existence of cave fauna are unknown

Recent developments

Since 2011, Bonaire, together with Aruba and Curaçao, has been a member of RELCOM (The Latin American and Caribbean Network for Bat Conservation; www.relcomlatinoamerica.net). One of the most important strategies of RELCOM is the identification of important bat areas to be protected (AICOMs – Important Areas for the Conservation of Bats) and conservation of bat locations such as bat caves (SICOMs – Sitios de Importancia for the Bat Conservation). RELCOM has designated 1 AICOM on Bonaire: Washington Slagbaai National Park (A-ABC-001). In addition, two caves were designated as 1 SICOM on Bonaire in 2016: Pos di Watapana and Lima (S-ABC-001) 5.

These caves are still unprotected but are probably the only nurseries with large colonies of 2 insectivore species of bats: the Curaçao Little Brown Bat (*Myotis nesopolus*) and the Funnel-eared Bat (*Natalus tumidirostris*). The colony of *N. tumidirostris* is probably an isolated population with relatively low numbers (<300), which makes the Bonerian population very vulnerable (source: RELCOM).

In 2016 the Caribbean Speleological Society (CARIBSS; www.caribss.org) was founded on Bonaire. This organization focuses on exploring, mapping, protecting and managing caves in the Caribbean.

In 2017, the first phase of a project aimed at establishing a "Bonaire Caves and Karst Nature Reserve" will be started, with activities such as cave management, certification of guides, closing of bat maternity chambers and research into the use of caves by bats.

Several important freshwater caves may be threatened by infiltrating soil contamination and / or infiltration of sewage from nearby settlements (e.g. on Barcadera and Punt Vierkant).

- Assessment distribution: favorable

For bats, such as the Long-nosed Bat (*Leptonycteris curasoae*), Bonaire is only part of the total habitat that extends over the other Caribbean islands (Bonaire, Curaçao, Aruba) and mainland Venezuela and probably Colombia (Simal et al., 2015; DCNA, 2014; De Lannoy, 2013). Little Brown Bat (*Myotis nesopolus*) is also genetically close to the South American population (Larsen et al., 2012). The Funnel-eared Bat (*Natalus tumidirostris*) also has a large distribution area, although the Bonerian population probably lives isolated (source: RELCOM). It is still unclear to what extent this also applies to the other bats.

The natural range of habitat caves can be assessed as favorable.

For the Bonerian populations of the individual species of bats, that assessment could be less favorable.

- **Assessment surface: favorable**

Bonaire is veined with caves. For St. Eustatius and Saba that is much less due to the volcanic origin. Much still needs to be mapped. Hardly any caves have probably been lost. The surface is therefore assessed as favorable.

- **Assessment of quality: moderately unfavorable**

The caves are vulnerable to disruption, damage and pollution, especially in the case of the cave waters.

Typical species: there are indications that around four of the nine species of bats reported for Bonaire no longer occur on Bonaire. Monitoring will have to show to what extent this is actually the case and to what extent degradation of the landscape is to blame.

Other characteristics: the preservation of caves as habitat for bats and other fauna benefits mainly from quietness and absence of soil contamination and groundwater contamination by sewage and oil spills.

Considering the indications for a decrease in the number of bats, the alleged increase in tourist turmoil, the proximity of human habitation and the discharge of sewage water near some of the most important cave systems, the quality is currently assessed as moderately unfavorable.

- **Assessment of the future perspective: moderately unfavorable**

The future perspective for the Bonaire caves and cave fauna remains speculative for now. Especially because cave fauna, such as the Long-nosed Bat (*Leptonycteris curasoae*), is part of a regional population that is not only dependent on the caves on Bonaire. To protect the endangered *L. curasoae* (VU), maternity caves outside of Bonaire will also have to be protected (Simal et al., 2015).

Developments such as CARIBSS and projects such as the intended "Bonaire Cave and Karst Nature Reserve" are positive, but do not remove the existing threats for the time being. A further degradation of the landscape of Bonaire is likely to lead to less food for bats. An increase in tourism can lead to (the demand for) more recreational-tourist use and an increase in the disturbance in the caves. The increase in the number of inhabitants on Bonaire is likely to lead to urbanization and possible destruction and contamination of caves with negative consequences for the endemic cave water fauna. Existing and possibly new windmill projects can also lead to collision victims. The future perspective is currently assessed as moderately unfavorable.

Verdict: Moderately unfavorable

Caves	2017
Distribution	Favorable
Surface	Favorable
Quality	Moderately unfavorable
Future perspective	Moderately unfavorable
Assessment of conservation	Moderately unfavorable

Recommendations for national conservation objectives

National long-term goals

Preservation of distribution and surface area and improvement of quality for the cave fauna.

National short-term goals (5 years)

Mapping the cave system and the most important caves for bats according to the RELCOM strategy.

Major threats and management implications

The strategic bat protection program 2014-2018 (Simal, 2013) is important input for determining management actions for cave protection as essential for the conservation of bats.

Major threats		Management actions
Disturbance	Disturbance of resting places and maternity habitat	<ul style="list-style-type: none">• Identify and protect important bat habitats (eg maternity chambers).• Developing a management plan for caves aimed at sustainable educational and recreational-tourist use.• Law enforcement to prevent habitat loss (eg in relation to building permits and changing land use).• Information and education about the importance of caves for people.
	Vandalism, graffiti	<ul style="list-style-type: none">• Law enforcement
Pollution	Pollution and salinization of groundwater	Identify and protect water quality in important water catchment areas

System for the assessment of the conservation status (SvI) of a species
(Ministry of LNV, 2006)

Parameter	Favorable	Moderately favorable	Very unfavorable	Unknown
Distribution	Area stable or increasing. No smaller than the "favorable reference"	Between favorable and very unfavorable	Area loss of more than 1% per year, or area more than 10% less than "favorable reference"	No or insufficiently reliable information
Population	Population greater than or equal to the favorable reference. Reproduction, mortality and age structure are no worse than normal.	Between favorable and very unfavorable	Population decrease of more than 1% per year. Lower than the favorable reference. Population more than 25% lower than the favorable reference. Or reproduction, mortality and age structure much worse than normal	No or insufficiently reliable information
Habitat	Living area is sufficiently large (and stable or increasing). The quality is suitable for the long-term survival of the species.	Between favorable and very unfavorable	Living area is clearly not large enough for the long-term survival of the species. Or the quality is clearly unsuitable for the long-term survival of the species.	No or insufficiently reliable information
Future / Perspective	Living area is sufficiently large (and stable or increasing). The quality is suitable for the long-term survival of the species.	Between favorable and very unfavorable	Strong negative influence of threats on the species. Very poor outlook. long-term viability at risk.	No or insufficiently reliable information
Overall assessment of Assessment of conservation (SvI)	Everything green or three green and one unknown	One or more orange, but no red	One or more red	Two or more unknown combined with green