

# Survival Blueprint

## The Cuban Greater Funnel-Eared Bat (*Natalus primus*)



**Compiler:** Jose Manuel de la Cruz Mora

**Contributors:** Lazaro Y. García, Ivón Arce Suarez, Alejandro Camejo, Carlos A. Mancina, Davi Teles, Oliver Wean, Carolina Soto, Charlie Debenham, Claudia Gray, Cassandra Murray and Olivia Couchman.

**Suggested citation:** delacruz, J.M., et al., 2019. Supporting the Funnel-Eared Bat (*Natalus primus*) one of the most endangered species in Cuba. An output from the EDGE of Existence fellowship, Zoological Society of London and Segré Fondation.



## 1. STATUS REVIEW

### 1.1 Taxonomy:

*Natalus primus* (Anthony, 1919)

Class: *Mammalia*

Order: *Chiroptera*

Family: *Natalidae*

Genus: *Natalus*

Common Name: *Cuban Greater Funnel-eared Bat*

*N. primus*, the biggest of the Cuban Natalids, is considered a medium sized bat (10 g weight and 49 mm forearm length) compared with all Cuban bat species, but compared with the other two Natalidae species, it is a giant (*Nyctiellus lepidus* and *Chilonatallus macer* are the smallest bat species in Cuba with a weight of 3 grams and a forearms of 27 to 35 mm). The ears are rounded and relatively large forming a cone towards the front of the head, while the snout is long and flattened with small lips and a large moustache (Tejedor *et al.*, 2004, 2005).

### 1.2 Distribution and population status:

Within the natalids, the genus *Natalus* (sensu stricto) has been reported as extinct across many islands in the Caribbean, and has undergone more extirpation events than the other two West Indian natalid genera (*Nyctiellus* and *Chilonatalus*). *Natalus primus*, the Cuban greater funnel-eared bat, is considered the rarest and most threatened natalid species (Dávalos, 2005). Fossil records suggest that the species was once widely distributed in the Caribbean across 13 different locations in Cuba, Bahamas and Isla de la Juventud (Tejedor *et al.*, 2005). Previously thought to be extinct, only partial fossil records of the species had been found, mostly holotypes of dentary evidence. The species was rediscovered in 1992 in a remote cave – Cueva La Barca - in Guanahacabibes peninsula, far western Cuba, to date the only known refuge for the species (Tejedor *et al.* 2004). As a result, *N. primus* population is threatened by its small population size (recently estimated to be under 750 individuals), restricted distribution (presence confirmed in just one location, vulnerable to natural and anthropogenic disturbance), and potential changes to its foraging habitat (such as logging) (Mancina *et al.*, 2017).





Figure 1: Geographic location of Cueva la Barca (blue circle) in Guanahacabibes peninsula. The inset map shows the position of the peninsula in Cuba.

### 1.2.1 Global distribution:

Country	Population estimate (plus references)	Distribution	Population trend (plus references)	Notes
Cuba	320 (162 to 721) specimens (Delacruz, <i>et al.</i> , 2019. in press.).	Cuba	Unknown	No population estimate before 2018.



## 1.2.2 Local distribution:

Country	Region / province	Site	Level of Protection	Population size	Reference(s)	Notes
Cuba	Pinar del Río	Cave La Barca, Guanahacabibes	Medium	320 (162 to 721) specimens (Based on Mark recapture study conducted in 2018).	(Delacruz, <i>et al.</i> , 2019. in press.).	Monitoring programme to be established by the Guanahacabibes National park.

## 1.3 Protection status:

The last living population of *N. primus* inhabit the National Park Guanahacabibes, which provides moderate protection to the species due to, most of its foraging habitat is located out of the park without any protection of Cuban conservation laws. Since its discovery the species was classified as Critically Endangered (CR) by the IUCN and the Red List of the Cuban Fauna but, in 2016 the species was downgraded to Vulnerable (VU) in the IUCN assessment affecting the perception of urgency of conservation actions directed to the species. The threat status is now being re-evaluated as result of the latest studies of the species (Delacruz *et al.*, 2019) and a long term monitoring plan for the population in the area has been discussed with the National Park authorities. These actions have been supported by a social campaign conducted by the Natural History Museum of Pinar del Rio.

## 1.4 Ecology, behaviour and habitat requirements:

The species inhabits exclusively in caverns, roosting in small groups, generally occupying walls in the darkest chambers, at some distance from one other (Tejedor *et al.*, 2004). *N. primus* has little tolerance for disturbances, escaping quickly under the smallest perturbation and is consequently stressed very easily. When flying they are slow and manoeuvrable, clinging to the walls, this behaviour is considered useful for catching invertebrates that feed on the dense vegetation (Tejedor *et al.*, 2005). *N. primus* is a medium size bat that displays aggressive behaviour towards other bat species when confined in a narrow space. However, the species has been seen roosting in association with other species such as *Mormoops blainvillei* and *Pteronotus parnelli*. *N. primus* roosts in low areas of the cave walls and usually change their sleeping locations, possibly a protective mechanism against predators such as Cuban boa or cave crabs.





Since the species is so rare, very little is known about its life-history, reproductive cycle and habitat requirements, making it difficult to establish an effective conservation plan (Delacruz, 2019). Empirical observation suggests *N. primus* breeding season is from the end of March to August. No breeding colony has been found in the cave during this period indicating that pregnant females move into the darkest and hottest areas of the cave to give birth. This behaviour could be useful to protect the new-borns due to its difficult to reach location over a guano swamp, limiting predator (and human) disturbance. There is no data about *N. primus* dispersion or habitat requirements, however, one accidental capture located the species in a low density forest approximately 3.5 km from the cave.

### 1.5 Threat analysis:

**Incorrect extinction risk classification (High).** The species IUCN Red List category downgrade from Critically Endangered (CR) to Vulnerable (VU) affects the ability for conservationists to effectively implement existing and future conservation actions for the species and its habitat. Although according to the IUCN criteria a case can be made for the species to be included in either threat category (CR and VU), the current classification should be conservative to guarantee the future of *N. primus*. The restricted distribution, the low population density and lack of ecological information about the species require targeted strategic management plans and research activities. Given the fragility of the species plight, it is at risk of total extinction from inadequate conservation action.

**Population size (High).** The species is threatened by its small population size (recently evaluated to be 320 (ranging from 162 to 721) individuals). This small population size can cause inbreeding, increasing the risk of disease that affect the survival of the species. Furthermore, its low population size affects the species resilience to natural or human driven stochastic events, competition with coexisting species and the planning of reintroduction strategies. It is unknown if the current population is even genetically viable.

**Habitat loss (from logging and environmental disasters). (High)** The Guanahacabibes peninsula is particularly vulnerable to storms and hurricanes, which cause huge damage and habitat fragmentation every year. Exacerbating this issue is the local forestry industry's active logging, most likely in the same areas where *N. primus* forage.

**Species distribution (High).** The species' restricted distribution (presence confirmed in just one location) increase its risk to stochastic events. La Barca Cave is located on low ground, only 800 meters from the beach and only a few meters above sea level. Natural disturbances, such as a long periods of rain or rising sea levels, as a possible effect of



climate change, are potentially significant problems for the species. This could result in the cave being flooded, or the peninsula area decreasing in size, reducing its foraging habitat or even this last know refuge.

**Lack of ecological information** (High). To implement effective long-term conservation actions is indispensable to have detailed information of habitat use, diet, lifecycle etc. The lack of ecological information complicates the establishment of efficient, in situ or ex situ, conservation plans and activities.

**The lack of funds directed to research activities and advertisement of advances in *N. primus* conservation** (High). Conservation projects in Cuba have very limited funding potential due the global economic sanctions, and limited Cuban government support for buying equipment or support for extensive social outreach campaigns.

**Wildlife tourism** (Medium). Human disturbance is another threat for the *N. primus* population. Cave La Barca is visited every year by tourists and personnel from the forestry industry, who use the cave and its surroundings for temporary camps. *N. primus*, is particularly vulnerable to human disturbances, escaping from its resting places to the darkest chambers of the cave.

## 1.6 Stakeholder analysis:

Country	Stakeholder	Stakeholder's interest in the species' conservation	Current activities	Impact (positive, negative or both)	Intensity of impact (low, medium, high or critical)
England	London Zoological Society (EDGE Fellowship programme, jointly with Segré Foundation)	Support the conservation of species Evolutionarily Distinct and Globally Endangered	Methodological and Financial Support for conservation actions	Positive	Critical
United States	Illinois College	Ecological research and wildlife conservation	Scientific collaboration and capacity building	Positive	High



Cuba	National Park Guanahacabibes	Ecological research and wildlife conservation and <i>in situ</i> monitoring	Scientific research and <i>in situ</i> conservation	Positive	Critical
Cuba	Natural History Museum of Pinar del Rio	Ecological research, educational intervention and wildlife conservation	Scientific research, and social and cultural conservation actions in local schools, communities and research institutions	Positive	Critical
Cuba	Instituto de Ecología y Sistemática de la Habana	Supports Cuban biodiversity conservation actions	Technical support	Positive	Medium
Cuba	Cuban Zoological Society	Supports Cuban biodiversity conservation actions	Support of conservation projects	Positive	Medium
Cuba	National Center of Biodiversity	Supports Cuban biodiversity conservation actions	Support of conservation projects	Positive	Medium
Cuba	Local Forestry Industry (Integral Forest Company)	The species conservation could cause the reduction of its active cutting areas	Logging in areas nearby the Guanahacabibes national Park. Supports research activities in La Barca´s area, modifying logging strategies and future management actions. Also, providing information about ecosystem impact in previous logged areas.	Both	Medium



## 1.7 Context and background information that will affect the success of any conservation action for this species:

	Description	Barriers to conservation	Opportunities for conservation
<b>Socio-cultural effects and cultural attitudes</b>	Human-Wildlife Conflict. Bats are shot and disliked by Cuban Society.	<p>Lack of knowledge related with the ecology, natural history and importance of this Natelid group.</p> <p>Inefficient social outreach strategy to support bat conservation.</p>	<p>Implement a public outreach program at the Museum of Natural History of Pinar del Río and the National Park Guanahacabibes.</p> <p>Generate materials to support education in local schools and local National Parks, focussing on the National Park Guanahacabibes.</p> <p>These materials can be used as a blueprint for other educational material to be used for conservation in other key areas.</p>
<b>Economic implications</b>	Part of the habitat used by N. primus is located in a private logging company area.	Forest logging to cover commercial wood demand.	To generate and instruct capacity building actions about ecology and importance of bats to the forest, intended for specialists





	Bats provide important ecosystem services (pollination, pest control, seed dispersion).	Lack of knowledge related with the ecology, natural history and importance of this group.  Inefficient management planning on the ecosystem impact and unsustainable forestry, by the forestry industry.	and decision makers of National Parks and the Forestry Industry (at a regional scale).  To evaluate and present an economic analysis of ecosystem services provided by bats for forestry (pollination, seeds dispersion, biological control of insect population etc.).
<b>Existing conservation measures</b>	The National Park Guanahacabibes has a strict conservation plan for wildlife species and their habitats.	Inefficient management planning for the bat population and its habitat.  Lack of information related with the ecology, status and natural history of endangered species, such as <i>N. primus</i> , and other members of the group.	Revise and improve the Guanahacabibes National Park Management Plan with up-to-date ecological information about <i>N. primus</i> and co-occurring bat species.  Implement a long-term monitoring plan to study and manage <i>N. primus</i> populations and other bat species in the area.
<b>Administrative/political set-up</b>	The Cuban Government and its Local Governmental Agencies have laws to protect	Insufficient funding directed to support biodiversity research projects and conservation.	Infrastructure and personnel from local governmental institutions will support the conservation project's goals.



	endangered species and habitats.	Bureaucratic procedures obstruct conservation action goals.	<p>Media coverage supported by local institutions, with targeted printing and distribution key materials to project stakeholders.</p> <p>Greater access to governmental funds to support project goals.</p> <p>The high extinction risk category of the species coupled with its high endemism will increase the pressure on local governments to support the project's conservation actions.</p>
<b>Local expertise and interest</b>	Local expertise has grown since 2018 with several local leaders now participating in 9 different localities of Pinar del Río and La Habana provinces.	Insufficient ongoing conservation education activities to create new local conservation leaders.	<p>Gain local leaders support to promote bat conservation messages to communities and local decision makers.</p> <p>Improving the training of specialists and park rangers from Local National Parks and protected areas, will increase the</p>



			effectiveness of conservation actions in favour of bat species.
<b>Resources</b>	Government funding to support species conservation and ecological research projects in Cuba is extremely limited.	<p>Cuba is a developing country with significant economic sanctions affecting the country's economy and national budget.</p> <p>Priority sectors for government support are Social Health and Education.</p>	<p>To develop collaboration agreement with colleagues or institutions to highlight Cuba's biodiversity conservation importance and secure support for future conservation projects.</p> <p>The Cuban economic situation is well known worldwide and despite the sanctions and challenges to access funding, the situation may also open up other external funding sources that support biodiversity conservation.</p>



## 2. ACTION PROGRAMME

<b>Vision (30-50 years)</b>	
<ul style="list-style-type: none"> <li><i>Natalus primus</i> populations protected by empirically driven projects based on social awareness and sustainable environmental conservation.</li> </ul>	
<b>Goal(s) (5-10 years)</b>	
<ul style="list-style-type: none"> <li><b>Establish baseline ecological information of <i>N. primus</i>, its habitat requirements and population dynamics, to support efficient long-term conservation of <i>N. primus</i> and its habitat.</b></li> </ul>	
<b>Objectives</b>	<b>Prioritisation</b> <i>(low, medium, high or critical)</i>
1. Implement a widespread, non-invasive, acoustic monitoring study to evaluate habitat use and distribution of the species in different habitats in the west of Cuba.	Critical
2. Establish a long-term monitoring study of the <i>N. primus</i> population using non-invasive field research methods to collect ecological information to update its IUCN Red List status.	Critical
3. Implement exploratory research to locate other caves/areas with populations of <i>N. primus</i> , or the potential to support them.	High
4. Implement ongoing physical analysis of <i>N. primus</i> individuals to evaluate diseases, presence of parasites and to collect genetic material to inform future evaluation of potential inbreeding.	Low



5. Update and improve <i>in situ</i> conservation actions using up-to-date ecological information about <i>N. primus</i> and co-occurring bat species.	Critical
6. Implement a public outreach program at the Museum of Natural History of Pinar del Río to increase public social awareness of Cuban bat endangered species.	High
7. Establish future collaboration agreements with national and international institutions to guarantee long-term research projects and conservation actions for <i>N. primus</i> .	Critical
8. Implement capacity building actions for local conservation leaders and community members to drive community conservation of the species and broader ecosystem.	High





Activities	Country / region	Priority (low, medium, high or critical)	Associated costs (currency)	Time scale	Responsible stakeholders	Indicators	Risks	Activity type
<b>Objective 1:</b> Implement a widespread, non-invasive, acoustic monitoring study to evaluate habitat use and distribution of the species in different habitats in the west of Cuba.								
Creation of an echolocation calls library of Cuban bats to support audio species identification, using different bat detectors.	West of Cuba, Cuba	High	2000€/year	1 year	ECOVIDA´ s Bat Conservation Group.  Specialist from the Natural History Museum and the National Park Guanahacabibes.	100 % of the species located in Guanahacabibes included in the library.	Work accidents.  Difficulty obtaining park access permits.  Challenges delivering equipment or funds to Cuba.	Ecological Research.
Test automatic or manual audio identification of	West of Cuba, Cuba	High	2000€/year	1 year	ECOVIDA´ s Bat Conservation Group. Specialist from the	Correct audio Identification of <i>N. primus</i> .	Fieldwork accidents.	Ecological Research.



<p><i>Natalus primus</i> and other coexisting Cuban bat species.</p>					<p>Natural History Museum and the National Park Guanahacabibes. Supported by specialist on wildlife acoustic research (Carlos Mancina, Emanuel Mora and Brock Fenton).</p>		<p>Difficulty obtaining park access permits.</p>	
<p>Field expedition to test Audiomoths (new bat-detector) performance in the field.</p>	<p>West of Cuba, Cuba</p>	<p>High</p>	<p>1000€/year</p>	<p>1 year</p>	<p>ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.</p>	<p>One field expedition to Guanahacabibes National Park.</p>	<p>Work accidents. Difficulty obtaining park access permits. Supply chain or problems affecting equipment acquisition.</p>	<p>Ecological Research.</p>



<p>If the Audiomoth test is positive; develop an acoustic campaign to analyse habitat use, distribution and species occupancy in the west of Cuba.</p>	<p>West of Cuba, Cuba</p>	<p>High</p>	<p>3000€/year</p>	<p>3 years</p>	<p>ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.</p>	<p>Three field expeditions to Guanahacabibes National Park.</p>	<p>Inefficient performance of the Audiomoth in the field.  Work accidents.  Problems in the supply chain for equipment acquisition.</p>	<p>Ecological Research.</p>
<p>Analysis of habitat use and activity pattern of <i>N. primus</i>.</p>			<p>2000€/year</p>	<p>1 year</p>	<p>ECOVIDA´s Bat Conservation Group. Specialist from the London Zoological Society. Supported by specialist on wildlife acoustic research (Carlos Mancina,</p>	<p>Map of La Barca surroundings displaying habitat preference for <i>N. primus</i>, (Map showing occupancy (or relative abundance) in different habitats</p>	<p>Incomplete expedition plan.  Problem with the office equipment (computer).  Problems in the supply chain.</p>	<p>Ecological Research.</p>



					Emanuel Mora and Brock Fenton).	and distances from La Barca cave.  Activity pattern graph).	Insufficient data collected to permit analysis.	
Present the results to decision makers of the Guanahacabibes National Park and The Center of Research and Environmental Services, ECOVIDA and national or international journals.	West of Cuba, Cuba	High	500 £/ year	Every year	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Organize and execute 2 meetings with scientist and decision makers.  Submit the study results in at least one local or international journal.	Results are not available on time. Decision makers not willing to meet. Incomplete expedition plan. Problem with the office equipment (computer).  Data not analysed on time.	Ecological Research.



**Objective 2:** Establish a long-term monitoring study on the *N. primus* population using non-invasive field research methods to collect ecological information to update the species threat status.

Test video and photo identification of <i>Natalus primus</i> ; recordings gathered with camera traps during field expeditions to Cave la Barca.	West of Cuba, Cuba	High	2000€/year	2 years	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Working reports with number of animals identified and difficulties found in the process (after each expedition).	Work accidents Problems with the access permits.	Ecological Research.
If identification is possible, establish fieldwork research to collect behavioural and ecological information of the species, including trends on the population.	West of Cuba, Cuba	High	5000€/year	5 years	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Ten expeditions conducted.	Work accidents. Problems with the access permits.  Problems in the supply chain.  Data not analysed on time.	Ecological Research.





Present the results to decision makers of the Guanahacabibes National Park and The Center of Research and Environmental Services, ECOVIDA and national or international journals.	West of Cuba, Cuba	High	500 £/ year	Every year	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Organize and execute one meeting per year.  To write and sent papers to scientific magazines.	Results not available on time. Decision makers not willing to meet. Incomplete expedition plan. Problem with the office equipment (computer).	Ecological Research.
<b>Objective 3:</b> Implement exploratory research to locate other caves/areas with populations of <i>N. primus</i> , or the potential to support them.								
Conduct field expedition to locate new populations of <i>N. primus</i> in Guanahacabibes.	West of Cuba, Cuba	High	3000£/ year	2 years	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Two field expeditions to new areas of La Barca where the species may be located.	Incomplete expedition plan.  Problem with the office equipment (computer).  Problems in the supplies chain.	Ecological Research.



Map the identified bat populations and potential refuges.	West of Cuba, Cuba	High	200 £/ year	2 months	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Map of La Barca surroundings displaying habitat refuges and distribution of <i>N. primus</i> .	Incomplete expedition plan. Problem with the office equipment (computer). Problems in the supplies chain.	Ecological Research.
To present the results to decision makers of Guanahacabibes National Park and ECOVIDA Research Center.	West of Cuba, Cuba	Hihh	500 £/ year	Every year	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Field report and formal meeting with governmental bodies involved with the conservation of the species.	Results not available on time. Decision makers not willing to meet. Incomplete expedition plan. Problem with the office equipment (computer). Data not analysed on time.	Ecological Research.



**Objective 4:** Implement ongoing physical analysis of *N. primus* individuals to evaluate diseases, presence of parasites and to collect genetic material to inform future evaluation of potential inbreeding.

Implement field expeditions to collect genetic material to evaluate population health of <i>N. primus</i>	West of Cuba, Cuba	High	400 £/ year	Every 2 years	ECOVIDA´ s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	One field expedition to the National Park Guanahacabibes.  Blood sample analysis of 100% of animals captured.  Genetic samples collected from a significant number of individuals.	The necessary permits to collect genetic material may be denied.  Incomplete expedition plan.  Insufficient collection of genetic samples.	Ecological Research.
Establish partnership with a scientific institution to process	West of Cuba, Cuba	High	200£/ year	Every year	ECOVIDA´ s Bat Conservation Group. Specialist from the Natural History	Collaboration Agreement.	Cuban bureaucracy disrupts	Ecological Research.



and analyse the genetic samples.					Museum and the National Park Guanahacabibes.	Document signed by both parties.	collaboration development.  Cuban government denies the collaboration agreement with a foreign institution.  Delay on the laboratory analysis date could affect the genetic samples viability.	
Present the results to decision makers of Guanahacabibes National Park and	West of Cuba, Cuba	High	50€/ year	Every year	ECOVIDA ´s Bat Conservation Group. Specialist from the Natural History	Write and present a formal field report.	Results not available on time.	Ecological Research.



ECOVIDA Research Center.					Museum and the National Park Guanahacabibes.		Decision makers not willing to meet.  Incomplete expedition plan.  Problem with the office equipment (computer).  Data not analysed on time.	
<b>Objective 5:</b> Update and improve <i>in situ</i> conservation actions using up-to-date ecological information about <i>N. primus</i> and co-occurring bat species.								
Create a working group to update the Guanahacabibes National Park Management Plan with action directed to	West of Cuba, Cuba	High	200€/year	2 years	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the	One workshop with specialists and decision makers to update and improve the Guanahacabibes	Problems with the workshop agenda.  Problem with the office equipment	Conservation Action.





monitor and protect bat species and their habitats.					National Park Guanahacabibes.	National Park Management Plan.	(laptop/video projector).	
Write a formal conservation proposal with updated ecological requirements of <i>N. primus</i> , to be presented at workshop to decision makers from the local forestry industry.	West of Cuba, Cuba	High	500€/year	1 years	ECOVIDA´ s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Formal Guanahacabibes conservation proposal delivered to the local forestry industry.	Problems with the workshop agenda.  Problem with the office equipment (laptop/video projector).	Conservation Action.
Create a tourist visitation schedule for Cave La Barca to minimise disturbance on the colony, and avoid tourism during bat breeding seasons.	West of Cuba, Cuba	High	200€/year	1 year	ECOVIDA´ s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Tourist Visitation Plan Included in the Guanahacabibes National Park management plan.	Problem with the office equipment (laptop/video projector).  No approval of the new version of the	Conservation Action.



							Management Plan.	
							Insufficient data obtained in the field expeditions.	
<b>Objective 6:</b> Implement a public outreach program at the Museum of Natural History of Pinar del Río to increase public social awareness of Cuban bat endangered species.								
Create a photographic and video digital database at the Museum, in addition to the ecological information on the bats of Western Cuba.	West of Cuba, Cuba	Medium	500€/year	Ongoing	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum.	Bats database updated in the National History Museum – NHM.	Malfunctioning of the field equipment.	Environmental education and social-cultural species conservation.
Produce and distribute educational material, including pamphlets and catalogues.	West of Cuba, Cuba	High	2500€/year	Ongoing	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the	Pamphlets and catalogues distributed in National Parks and local schools.	Delay on design or printing of the documents.	Environmental education.



					National Park Guanahacabibes.			
Give lectures about bat ecology, conservation and conservation threats, in schools and at the museum.	West of Cuba, Cuba	High	200€/year	Ongoing	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Four conferences at the museum and local school.	Malfunctioning of the office equipment (laptop/video projector).	Environmental education.
Create exhibitions at the Natural History Museum of Pinar del Río, about the ecology and life history of Cuban bats.	West of Cuba, Cuba	High	2000€/year	Ongoing	ECOVIDA´s Bat Conservation Group Specialist from the Natural History Museum.	Temporary exhibitions at the Natural History Museum of Pinar del Río.	No field expeditions.  Problems with the supply chain (no budget).	Environmental education.
Conduct workshops at the museum with participation of children from local schools.	West of Cuba, Cuba	High	1000€/year	Ongoing	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum.	Conduct workshops at the museum. (Report Photo evidences	Malfunctioning of the office equipment (laptop/video projector).	Environmental education.



						Before and after surveys to evaluate impact).		
<b>Objective 7:</b> Establish future collaboration agreements with national and international institutions to guarantee long-term research projects and conservation actions for <i>N. primus</i> .								
Discuss ideas and design research projects in collaboration with other scientific institutions.	Cuba	High	200€/year	Ongoing	ECOVIDA´ s Bat Conservation Group. Specialist from the Natural History Museum.	Number of partnerships created.	No collaboration actions due to governmental bureaucracy.  Malfunctioning of the equipment.	Scientific and Social research.
Write funding proposal and apply for donor funding inside and outside of Cuba.	Cuba	High	300€/year	Ongoing	ECOVIDA´ s Bat Conservation Group. Specialist from the Natural History Museum.	Number of funding proposals submitted.  Number of successful funding proposals.	Rejected applications.  Malfunctioning of office equipment.	Scientific and Social research.



**Objective 8:** Implement capacity building actions for local conservation leaders and community members to drive community conservation of the species and broader ecosystem.

Creation and delivery of training materials to support capacity building actions.	West of Cuba, Cuba	High	200€/year	Ongoing	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum	100% of the products delivered before the workshops.	Malfunctioning of the office equipment.  Insufficient funds to produce/print materials.	Environmental education and social and in situ species conservation.
Capacity building workshops aimed to rangers and local leaders to improve wildlife conservation in the West of Cuba.	West of Cuba, Cuba	High	300€/year	Ongoing	ECOVIDA´s Bat Conservation Group. Specialist from the Natural History Museum and the National Park Guanahacabibes.	Number of rangers, specialists and local leaders capacitated.	Insufficient funds to deliver workshops and lectures.  Malfunctioning of the office equipment (laptop/ video projector).	Environmental education and social and in situ species conservation.



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