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The Seychelles sheath-tailed bat *Coleura seychellensis*: monitoring methodologies and recommended priority actions

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Abstract.— The Seychelles sheath-tailed bat *Coleura seychellensis* is Critically Endangered with fewer than 30 individuals censused in 1996/1997. The surviving population is estimated to be as low as 50 to 100 individuals. Records from the last century and popular reports indicate that a strong decline in numbers and probably range has occurred. The species is present on Silhouette, Mahé, Praslin, and possibly already extinct on La Digue. Recommended monitoring comprises annual census of individuals along established transects using bat detectors, regular visits to all known caves and census of individuals, searches for roosting caves nearby repeated contacts with the species and assessment of the evolution of its distribution every 3 or 4 years. The main conservation actions required are legal protection for all known roosting caves and their immediate surroundings, control of introduced predators (barn owls and cats) in these areas, habitat protection within known feeding area and public sensitisation to help protecting the species and obtain information on feeding areas or roosting caves. Research into the biology and autecology of the Seychelles sheath-tailed bat is required, including basic information on feeding ecology and diet, habitat preference, movements, roosting habits and breeding ecology.

Historical and ecological background

The Seychelles Sheath-tailed bat *Coleura seychellensis* PETERS, 1868, called 'Sousouri banann' (chauve-souris banane) in Creole, is a critically endangered species listed under the IUCN Red Data Book of the Globally Threatened Species of bats of the world. Its population is currently estimated no more than 50 to 100 individuals in the four major granitic islands of Seychelles: Mahé, Praslin, Silhouette, and La Digue, where it could be already extinct. Two subspecies can be distinguished : *C. s. seychellensis*, recorded from Mahé and Praslin, and *C. s. silhouettae* from Silhouette and La Digue (HILL, 1971).

Monitoring and searches have been conducted in 1995 by JOUBERT (1995), 1996 and 1997 by a Ministry of Environment team (SELBY RÉMIE, ROLAND NOLIN, PERLEY CONSTANCE, FLAVIEN JOUBERT & GÉRARD ROCAMORA; see ROCAMORA, 1997; volume

2) with some participation from Glasgow University Expedition in 1996 (MELLAMBY *et al*. 1997) to develop a first general overview of the population size and distribution of *C. seychellensis*. Only 5 to 7 bats were found on Mahé, 2 on Praslin and none on La Digue during extensive transects covering most of the road network of these 3 islands in 1997. On Silhouette, only 20 individuals were counted in a roosting cave in 1996 (JOUBERT 1996) and 17 in 1997 (ROCAMORA *et al.* 1996). A monitoring database has also been set up (ROCAMORA 1997; Vol. 2).

The roosting cave of Silhouette is the only known at present. It is situated at low altitude in Silhouette island (JOUBERT 1996; ROCAMORA *et al. 1*996). A roosting cave was known or suspected in the past on Mahé (JOUBERT, *op. cit*.), but the cave is currently unoccupied. One cave was also known on Praslin, and one on La Digue (NICOLL & SUTTIE 1982), but have not been located and visited since then. This species has apparently gone through a dramatic decline in numbers and probably range as well. WRIGHT (1868) noted that the species was very common near Port Victoria, and historical popular reports show evidence that this bat was much more abundant in the past (elderly residents remember large numbers emerging at dusk on Mahé, or caves with large numbers; NICOLL & SUTTIE, *op. cit.* ; JOUBERT, *op. cit*.).

In total, the minimum population known to exist is less than 30 individuals, very sparsely distributed, and the total population can be estimated between 50 to 100 individuals. It is extremely urgent to undertake the necessary research and conservation work to save this species from extinction.

Monitoring

The basic monitoring of the Sheath-tailed bat should include:

* annual census of individuals detected along established transects using bat detector
* searches for roosting caves nearby repeated contacts with the species
* regular visits to all known caves and census of individuals
* an assessment of the evolution of its distribution every 3 or 4 years

Annual transects

Since we do not know precisely the preferred habitats of *Coleura seychellensis*, certain assumptions regarding its spatial and temporal occurrence may need to be remoulded depending on the outcome of future research and monitoring to be conducted on that species.

Considering the outcome of earlier trials, the species seems to have a preference for coastal and low altitude habitats, and to be more likely to be contacted at dawn or at crepuscular hours. Therefore, observations along transects should be carried out at dawn (04:30 - 06:00) and dusk (18:30 - 20:30).

What is being monitored along the transects is essentially the vocalisation of the bat which is very distinctive and easily detected with a bat detector. In such a nocturnal species, it is the best indicator of its presence. Sometimes, however, bats can also be seen and counted.

We do not know whether there is a particular period of the year during which feeding bats would be more detectable. Two types of transects, Walking transects and Car transects, should be carried out.

Walking transects.— Permanent walking transects have been established on Mahé, Praslin, La Digue and Silhouette. An open set of criteria have been used for establishing walking transects but the most important ones were, former presence of *C. seychellensis*, accessibility and distance. On Mahé, 3 walking transects could easily be defined as there exists already known specific areas when *C. seychellensis* has been recorded. On Praslin, only 2 short walking transects were tried in two areas where bats had been first contacted by car transects. In La Digue, a combination of walking and bicycle was used along the main road/path transects. On Silhouette, transects cover the two plateau areas of La Passe and Grand Barbe.

Mahé:	1. Grande Anse-Béolière-Mahé Beach
	2. Port Launay-CapTernay
	3. Bel Ombre -Anse major
Praslin:	1. Anse Madge
	2. Baie Pasquière.
La Digue:	1. L'Union entrance-Anse source d'argent
	2. Grande Anse - Anse Coco
Silhouette:	1. La Passe plateau
	2. Grande Barbe plateau

Walking transects allow more detailed searches. More of them could be defined in future years depending on new areas of presence of the species that could be found.

Car transects.— Searches from a moving vehicle were found adequate to prospect for the presence/absence of the bats along road transects. These road transects cover most of the main road network for Mahé and Praslin (done by car) and La Digue (done by bicycle). It allows greater coverage of larger areas that would otherwise have taken longer by other methods. Once bats were detected from the vehicle, more precise searching was done by foot. Contrary to what may be expected, wind and engine noise did not appear to have any major effect on the performance of the detector nor detection of bat calls.

Equipment.— Monitoring can be done with sound detectors like Batbox III and Mini III detectors, both tunable. They are similar in sensitivity and call resolution but there is comparatively more noise from the Mini III detector. Higher performance models like U30 can also be used. Detectors were set to just below 40KHz**,** as there exists a relatively stable and intense call component at that frequency. The disadvantage of such a high frequency is that it attenuates faster and thus imposes limits on the detectable distance, which is around 50 meters (note that the calls of *C. seychellensis* reaches as low as 25Khz).

Observation and transect forms.— For each contact with the species done along a transect, a number of parameters should be recorded on an observation form. This includes the location (with precise map), time and altitude, the meteorological conditions especially regarding the presence of wind or rain, a rough description of the habitat (vegetation layers, presence of water, particular features, etc.), the activity of the bats detected (flight, vocalisation, interactions) and eventually some information on their feeding.
Feeding rates can be determined by counting the incidence of feeding buzzes with the bat

detector and information on the type of prey they are hunting can sometimes be obtained by direct observation.

The problem with this type of transect method is when do we consider that two consequent contacts with the species along the same transect represents different individuals. In order to standardise our method, we have decided that encounters over short distances (less than 100m) should not be considered as distinct individuals, the chances to count two times the same individual being too important.

At the end of the transect, results obtained during the transect are summarised on a transect form (attached), for later input into the database.

Remarks.— The number of individuals recorded using bat detector along established permanent transects could be used as an indicator of the population status. However, due to the present very low number of individuals encountered along the transects, this is unlikely to be used as a statistically significant index when comparing results obtained for different years.

A minimum of one survey per year shall be made on all four islands where this bat is known to exist. However, depending on resources and other activities' schedules, the coverage of the survey could be increased.

It is interesting to note that only a certain percentage of the resident population of bats can be detected along the transects. For example out of the 20 individuals present in La Passe roosts on Silhouette, only about half of them were recorded during walking transect on the La Passe plateau (JOUBERT 1996).

Searches for caves with roosts

Searches for caves holding possible roosts must be organised systematically in the vicinity of areas where bats have been contacted repeatedly during transects. This is particularly valid for early morning contacts of bats at dawn, less likely to be far from their roost.

Caves can be located during the day, but because these endangered bats are likely to be extremely sensitive to disturbance, caves should be entered only during that time of the day when the bats are likely to be least active and possibly even torpid. This may be in the early morning when the temperature is likely to be the lowest (RACEY, *pers. comm*.).

Once located, roosts should be legally and adequately protected against any kind of human activity or interference, and their location should not be publicly advertised.

Visits to caves and roosts counts

Being a critically endangered species extremely sensitive to disturbance, monitoring activities in caves with roosts should be reduced to the strict minimum and always been undertaken with extreme silence and precautions.

It is likely that *C. seychellensis* is as sensitive to disturbance as *Coleura afra* studied by McWilliam in Kenya, two colonies of the latter having declined as a result of adjacent tourist developments and a general increase in human activity (Racey, *pers. comm*.). In general, larger colonies of bats appear to be more stable and the smaller the colony the more sensitive to disturbance it should be.

Whenever possible, the roosts should be counted from the entrance with tripod

mounted binoculars (MCWILLIAM, *in lit*.). Visits to the caves should not be too frequent, and limited to annual (or maximum quarterly) visits for basic routine monitoring. However visits in the vicinity of the area where the cave is situated can be done more frequently to prevent any threat or development to take place, especially when roosts are located near settlements, or when human activities take place nearby.

Any information related to the reproductive cycle (observation of mating, presence of young) should be noted on an opportunistic basis, but no specific monitoring of the breeding success is possible within the frame of such basic monitoring. Faeces can also be collected by night from the roosts, at a time when the bats are foraging and absent from the roost. Faecal analysis should be given a high priority in any future research programme willing to determine the species diet (by identifying insects from fragments of exoskeleton).

Distribution monitoring

Every 3 to 4 years, all existing data should be put together to produce a distribution map of the species (using a 1×1km square-grid for example) covering each of the four granitic islands, in order to monitor the evolution of the distribution of the species (see distribution map for 1996-1997 surveys in ROCAMORA 1997, volume 2).

Results from all road and walking transects and cave visits should be entered into the database created at the Conservation section of the Ministry of Environment for this purpose and where all observations from 1996-1997 have been stored (SUSURDTB.XLS; in ROCAMORA 1997; vol. 2)

Recommendations for conservation and research

Since the world population of that critically endangered bat might well be comprised between 50 and 100 individuals only, it is extremely urgent to undertake the necessary research and conservation work to save it from possible extinction.

Location and protection of roosts and feeding areas

A research and conservation programme should in the first instance be aimed at locating and protecting roosts, understand why the species is in such a critical situation and what should be done for its recovery. A project proposal was prepared with this purpose and forwarded to funding agencies (see conservation projects, ROCAMORA 1997 volume 3, for more details). All known roosting caves should receive legal protection status protecting them against any kind of development or human activities in the vicinity of the caves. The same applies to feeding areas that need to be located, and then protected. Introduced predators such as cats and barn owls should be trapped and eradicated from roosting caves and their immediate surroundings.

Biology and autecology

The biology and autecology of the sheath-tailed bat remain largely unknown and need to be studied. Consistent efforts are needed to obtain basic information on feeding ecology and diet, habitat preference, movements, activity rhythms and behaviour, roosting habits and breeding ecology, interaction with other species, including parasites. Present knowledge on its status also needs to be improved. It is extremely important not to undertake any activities that could create disturbance at roosts and put in jeopardy the survival

of the species. This should help to identify factors limiting the size of the sheath-tailed bat population, present and potential threats, and to propose conservation measures.

Public sensitisation

Exposure of *C. seychellensis* as a highly endangered species should be sustained. Public sensitisation is also very important for an effective protection of this extremely fragile population, and also to obtain information about new sites (feeding areas or roosting caves) occupied by the species.

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