

# Population Estimates and Echolocation Calls of Edible-nest Swiftlets (*Collocala fuciphaga*) in Pilar Caves

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## Abstract

Swiftlets is of special interest due to its use of echolocation and its intricately constructed saliva nests which in some species contain no other material such as feathers, moss or twigs and are collected, selling at extremely high prices. This study was conducted to assess the population estimates and echolocation calls of edible-nest swiftlets (*Collocala fuciphaga*) in Pilar Caves. This study was conducted at Balisong Cave in the Municipality of Pilar during the Month of September – October 2019 using descriptive survey method. A mark-recaptured method was done in determining the population size. A 35-mm monofilament mist nets of 12 m length x 2 m wide, 9 m length x 2 m wide and 6 m length x 2 m wide was used to catch swiftlets. Proper identification were done through published books, journals and INatural.Org. Echo-Sonar meter and frequency generator was used to measure and observed the echolocation calls of swiftlets. The sounds were recorded as they enter the cave and find their way to their nest in a dark environment. A 273 population estimates of cave swiftlets were recorded from Site A, 157 were recorded on Site B and 172 were recorded from Site C with a total population estimates of 602 cave swiftlets. Clumped dispersion in all sample sites were also observed. A succession of single click (6.97 Hz) followed by pause and a succession of double click (8.81 Hz) followed by a pause and a succession of single click (8.50Hz) was observe. As it enters the dark environment it produces a very high frequency 125.2 Hz and echo level of 0.50%. A high frequency of sound increase as it enters the dark environment was observed.

**Keywords:** Echolocation calls, population estimates, population distribution

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## Introduction

Many species of birds are economically important. Domesticated and undomesticated birds (poultry and game) are important sources of eggs, meat, and feathers. Songbirds, parrots, and other species are popular as pets. Guano (bird excrement) is harvested for use as a fertilizer. Birds prominently figure throughout human culture. About 120–130 species have become extinct due to human activity since the 17th century, and hundreds more before then. Human activity threatens about 1,200 bird species with extinction, though efforts are underway to protect them. Recreational birdwatching is an important part of the ecotourism industry.

Swiftlet, (genus *Collocalia*), any of numerous species of cave-dwelling birds belonging to the family, Apodidae, found from southeastern (India and Sri Lanka) and the Malay Peninsula through the , and eastward to the islands of the South Pacific. The taxonomy of the 15 to 20 nearly identical species is controversial. Dull brown or gray above (sometimes glossed with blue or green) and paler on the rump and underparts, swiftlets are 9 to 15 cm (3.5 to 6 inches) long. The edible nests of swiftlets, valued as a delicacy and as food for convalescents by the people of China, are built in limestone caves along the seashore in many parts of the Philippines. The export of the nests is in the hands of local Chinese merchants, and although accurate statistics are difficult to obtain it has been stated that the Netherlands Indies in 1927 exported 109,310 kilograms of nests valued at 822,913 guilders. In only one of the Philippine Islands, Bacuit, has an attempt been made to derive municipal revenue from the trade, when in 1927 the traditional ownership of the birds nest caves, which had existed for generations, was supplanted by municipal ownership and the annual leasing of the caves to the highest bidder. As a reply to this move, the Chinese dealers formed a ring so that the bidding, which reached 1,700 pesos in 1927, had fallen in 1936 to 500 pesos, and in a footnote to a recent paper on the subject, Canuto G. Manuel states that as no bid at all was offered in 1937, the caves have relapsed to the system of traditional ownership (Philippine J. Sci., 62, 379, March 1937). From Bacuit, approximately 500 kilograms or about 100,000 nests are exported annually but poaching of nests is common, and attempts to limit the collecting with the view of conserving the stock have met with little success.

Swiftlets is of special interest due to its use of echolocation and its intricately constructed saliva nests which in some species contain no other material such as feathers, moss or twigs and are collected, selling at extremely high prices. It has been argued that the high demand for these nests could have had an adverse effect on their populations (Hobbs, 2003; Marcone, 2005) but other authorities (Jordan, 2004) have shown that modern techniques of nest farming have increased the bird population.

The use of echolocation was once used to separate *Aerodramus* from the non-echolocating genera *Collocalia* and *Hydrochous* (virtually nothing is known about *Schoutedenapus*). But recently, the pygmy swiftlet *Collocalia troglodytes* was discovered making similar clicking noises in and outside its cave (Price et al., 2004).

Characteristics of behavior, such as what materials other than saliva the nests contain, can be used to differentiate between certain species of *Aerodramus* (Lee et al., 1996).

Several ecosystems have been threatened to existence; among these are caves systems which have been severely damaged due to continuous access by human. Thus the purpose of the study was to mainly assess the avifauna (swiftlets) diversity of selected cave systems in the municipality of Pilar. Results would serve as an additional information or benchmark data for database information. Likewise results would serve as a basis for conservationists to do further review on policies related to conservation and management and its implementation. And further to recommend possible and workable strategies for immediate access and adoption by the local government, local residents and the community. The objective of this study was to assess the population estimates and echolocation calls of edible -nest swiftlets (*Collocala fuciphaga*) in Pilar Caves. Specifically, it was conducted to determine the population estimates of cave swiftlets (*Collocala fuciphaga*) in Pilar Caves; to determine the dispersion patterns of cave swiftlets (*Collocala fuciphaga*) in Pilar Caves; and determine the echolocation calls of cave swiftlets in Pilar Caves.

### **Materials and Methods**

This study was conducted at Balisong Cave in the Municipality of Pilar during the Month of September – October 2019 using descriptive survey method. Balisong cave is the graveyard of Balisong Heroes. The cave has also an archaeological and environmental significance and value. It is untouched with beautiful rock formations. Before the study a permission from the MENRO was obtained. After instruction from the MENRO a preliminary survey was done together with some of the personnel and guide of MENRO, this allows team members to familiarize themselves with the area, Tasks and responsibilities was assigned after obtaining feedback on team members expertise and preferences. Equipment was also tested in field conditions. Three observation sites were identified. These sites is observed to be the nesting sites of the cave swiftlets. A mark-recaptured method was done in determining the population size.

A 35-mm monofilament mist nets of 12 m length x 2 m wide, 9 m length x 2 m wide and 6 m length x 2 m wide to catch swiftlets. Mist nets was hoisted along possible flight paths of birds. Captured birds were marked and counted, were photographs for identification and were freed to their environment with the aid MENRO personnel. Proper identification were done through published books, journals and INatural.Org. As to the echolocation calls of swiftlets, the sounds were recorded using echo-sonar meter as they enter the cave and find their way to their nest in a dark environment. Frequency generator were used to measure the frequency of the sound made by swiftlets.

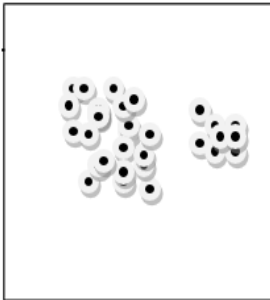
## Results and Discussion

### POPULATION ESTIMATES OF CAVE SWIFTLETS

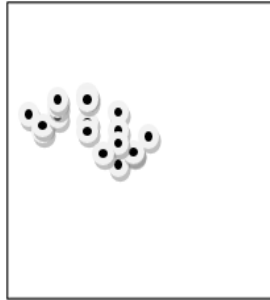
Sample Site	Number Captured (First Capture)	Number Capture (Second Capture)	Number Recaptured with Mark	Total Population Estimates
A	221	245	198	273
B	141	155	139	157
C	152	167	147	172

After a the thorough investigation and identification, a species of cave swiftlets (*Collocalia fuciphaga*) belonging to family Apodidae was identified. A 273 population estimates of cave swiftlets were recorded from Site A, 157 were recorded on Site B and 172 were recorded from Site C with a total population estimates of 602 cave swiftlets.

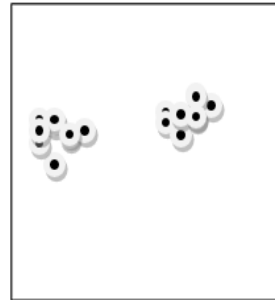
### DISPERSION PATTERN



Site A



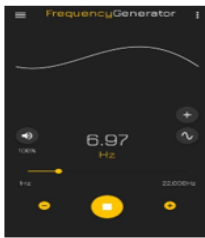
Site B



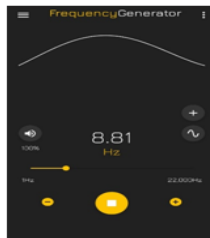
Site C

As to the population dispersion, it was observed that the pattern of dispersion of cave swiftlets were clumped dispersion in all observed sites.

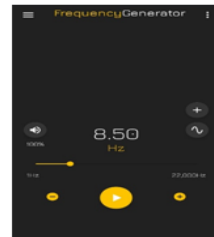
## ECHOLOCATION CALLS OF CAVE SWIFTLETS



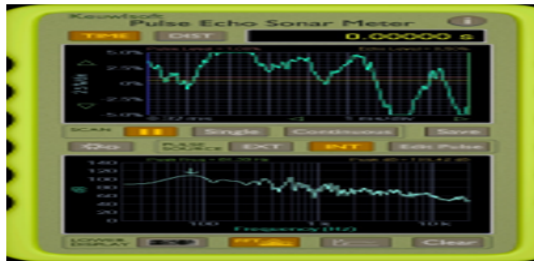
Single click frequency



Double click Frequency



Single click frequency



Echo Sonar Meter showing high frequency sound

For the echolocation of cave swiftlets a succession of single click (6.97 Hz) followed by pause and a succession of double click (8.81 Hz) followed by a pause and a succession of single click (8.50Hz) was observe. As it enters the dark environment it produces a very high frequency 125.2 Hz and echo level of 0.50%. A high frequency of sound increase as it enters the dark environment was observed.

### Conclusions and Recommendations

Based on the investigation only one species of cave swiftlets found in Pilar Cave (*Collocalia fuciphaga*) belonging to family Apodidae was identified. A 602 population estimates were recorded and clumped distribution pattern were observed. A succession of single click (6.97 Hz) followed by pause and a succession of double click (8.81 Hz) followed by a pause and a succession of single click (8.50Hz) was observe as echolocation calls of cave swiftlets. As it enters the dark environment it produces a very high frequency 125.2 Hz and echo level of 0.50%. A high frequency of sound increase as it enters the dark environment was observed.

Based on the results of the study a thorough investigation of population genetics and etymology of the swiftlets be conducted and a policy on the conservation and protection of this species be formulated.

### References

Sankaran, R. "The status and conservation of the Edible-nest Swiftlet (*Collocalia fuciphaga*) in the Andaman and Nicobar Islands Biological Conservation, Volume 97, Issue 3, February 2001, Pages 283–294

Dale H. Clayton , J. Jordan Price, Kevin P. Johnson "The evolution of echolocation in swiftlets" *Journal of Avian Biology* Volume 35, Issue 2, pages 135–143, March 2004