A guide to the bats of Oman

Where to find bats in Oman and how to ID them

Nils Bouillard

BARBASTELLA ECHOLOGY
Sound analysis | Training | Research

Preface

This publication aspires to be both an overview of the literature and a report of the data I have collected through my own work as well as a two-week trip to Oman where I recorded bats almost continuously. Therefore, while it includes far more bat data than the average trip report, it is not the result of systematic research and should not be regarded as such. There are significant gaps in my data. The purpose of this publication is to provide an overview of the current knowledge of the bats of Oman as well as to give bat researchers and mammal enthusiasts pointers as to where to look for bats and what they are likely to find. While I don't expect many mammal watchers to be interested in passive monitoring data, knowing which species are present in different locations makes it easier to target the ones that are of interest. Finally, this publication is not only relevant for anyone wanting to travel to Oman but the bat echolocation identification guide can be used anywhere the species occur, particularly in Western Asia as well as parts of North Africa.

Nils Bouillard
April 2023

0.1. Methods

Wildlife Acoustics SMMini Bat recorders were deployed whenever and wherever possible, often for just one night per location. Literature on acoustic identification in the Arabian Peninsula is scarce. Most of the identifications were done based on my own experience with the species. I was lucky enough to be contracted to work on a reference library in Western Asia (not yet published) meaning that I analysed thousands of reference sequences of most of the species present in Western Asia, including Oman. Acoustic identification in Western Asia can be a powerful tool as there is relatively little overlap between the different species in terms of their acoustic behaviour and the species assemblages are relatively limited. However, it is important to note that much is still lacking in our understanding of the acoustic behaviour of a number of species in the region. Caution is advised when identifying poorly known and/or rare species.

Contents

1

The Bats of Oman

Our two-week trip was led by Joachim Betrands and Johannes Janssens, both guides at Starling Reizen. The focus of this trip was primarily birding but as I always do, I tried to find bats everywhere we went. As a result, what I did was deploy my Wildlife Acoustics SMMini Bat recorders whenever I could to collect data on bats in Oman.

The bats in Oman, like in most countries in Western Asia are quite poorly known. There are few published studies and even fewer on acoustic surveys.

Twenty-five species of bats are currently known from Oman according to the latest literature view (Benda et al. 2015). Of those, we recorded 16 of them (and possibly an unidentified 17th). A fast-paced acoustic survey has limited value for scientific research but it does have value as an exploratory survey to inform further research.

List of the bat species found in Oman according to Benda et al. 2015

Species	Distribution*
Rhinolophus hipposideros	N
Rhinolophus clivosus	S
Rhinolophus blasii	N
Asellia tridens	W
Asellia arabica	S
Triaenops persicus	W
Triaenops parvus	S
Taphozous perforatus	W
Taphozous nudiventris	W
Otonycteris hemprichii	W
Myotis emarginatus	N
Eptesicus bottae	W
Hypsugo arabicus	N
Hypsugo ariel	S
Pipistrellus kuhlii	W
Pipistrellus dhofarensis	S
Rhyneptesicus nasutus	W
Coleura gallarum	S
Nycteris thebaica	S
Nyctalus noctula	V
Rhinopoma microphyllum	S
Rhinopoma muscatellum	N
Rhinopoma cystops	S

Species	Distribution*
Tadarida aegyptiaca	W
Eidolon helvum	S
Rousettus aegyptiacus	W

*N = Northern Region, S = Southern Region, Widespread = W, Vagrant = V

- **Hajar Mountains** This mountain chain in the North extends all the way to the UAE;
- **Dhofar** Southern mountain range extending into Yemen where many African species occur.
- **Vagrant** Those species are not expected to be resident in Oman.

Figure 1.1: Rhinopoma muscatellum in Wadi Al Muaydin in a known cave at 22.955744, 57.666950

Figure 1.2: Juvenile Rousettus aegyptiacus in Salalah (Samahram Tourist Village). The species does not appear to be overly common in urban environments

Figure 1.3: Coleura gallarum near Ayn Amran in a known cavern at 17.096229, 54.276587

2

Locations

Ten separate locations were surveyed using passive acoustic recorders. The locations mostly are popular birding sites. Usually, birding hot-spots tend to also have good diversity for other species groups, which is why they were chosen.

Sampled locations

2.0.1. Golf course Muscat

GPS - 23.612348, 58.305968

Species found
Pipistrellus kuhlii
Rhinopoma muscatellum
Triaenops persicus

This golf course is a good birding site and the presence of water makes it attractive for bats as well. It is likely that these species can be recorded in other parts of Muscat as well. The presence of Triaenops persicus is interesting because it is likely that these will have travelled some distance as they normally roost in caves. Urban roosts in culverts (or similar) would be an interesting find, should they exist.

2.0.2. Wadi al Muaydin

GPS - 22.974000, 57.670000

Species found
Pipistrellus kuhlii
Rhinopoma muscatellum
Taphozous nudiventris
Taphozous perforatus
Otonycteris hemprichii
Myotis emarginatus
Tadarida aegyptiaca
Triaenops persicus

One additional unidentified species was recorded. It produced FM-QCF calls with an end frequency at 55kHz. This is not consistent with any known species in the Arabian Peninsula. A further two sequences stood out, one including typical Rhinopoma calls but at a slightly higher frequency than would be expected from R.muscatellum (Fc 37kHz) but likely not outside the repertoire of that species. The other sequence was a typical Triaenops sequence but an Fc of 86kHz is very high for T.persicus,

even for males. It is the only sequence of the sort in the dataset and no other Triaenops is known from this part of the country so it is likely to be an odd T.persicus. The point of highlighting these two sequences is to show that common species can sometimes produce sequences that fall out of the ordinary, which can lead to false positive identifications.

2.0.3. Ghubrah

GPS - 23.287015, 57.693105

Species found
Pipistrellus kuhlii
Rhinopoma muscatellum
Rhinolophus blasii
Hypsugo arabicus

2.0.4. Locations off the road to Filim

GPS - 20.716964, 58.254058 GPS - 20.623593, 58.200473

Species found
Otonycteris hemprichii

No other species than Otonycteris was recorded, which is slightly surprising. However, the number of recordings of Otonycteris was quite high and being a quiet species, this is a good indicator of good levels of activity. It could still be a single individual (although the abundance of social indicates otherwise) but it's likely to be a good site to see this bat. It flies slowly, close to the ground and is very pale. This makes it easy to spot at night with no additional light sources than the moon. A thermal scope would of course make it easier. The locations are also good for owls, especially the northern location.

2.0.5. Mahout Sewage

GPS - 20.761193, 58.317546

Species found
Rhyneptesicus nasutus

No sequences on this location presented features commonly associated with Pipistrellus kuhlii such as the FM tail or a smooth curve in the 'hockey stick'. The most likely identification for all of these sequences is Rhyneptesicus nasutus.

2.0.6. Oasis off road 31

GPS - 19.454033, 54.622850

One species was recorded on this location. It is likely that more are present but our sampling was limited both in time and in geographical scope. This oasis is rather large. The species recorded is unidentified. The calls are rather common FM.QCF calls, similar to what Pipistrellus kuhlii or Rhyneptesicus nasutus might produce for example. End frequencies vary between 31 and 34kHz, which makes it unlikely to be kuhlii or even nasutus. The shape would be unusual for Eptesicus bottae at these frequencies (steeper FM's would be expected on the upper end of its frequency band). An Hypsugo of some sort could produce such calls but H.arabicus is limited to the Hajar Mountains and H.ariel should be higher in frequency. As only two sequences were recorded, these are best left unidentified as the probability of common species such as kuhlii or nasutus producing unusual calls cannot be excluded.

2.0.7. Ayn Amran

GPS - 17.099141, 54.284135

Species found
Pipistrellus dhofarensis
Rhinopoma cystops
Taphozous nudiventris
Taphozous perforatus
Tadarida aegyptiaca
Triaenops persicus
Rhinolophus clivosus
Coleura gallarum

Coleura gallarum was not recorded on the passive recorder. Instead, the species was seen in a cavern near 17.096229, 54.276587. Access to the cavern is from the road to the North of it.

2.0.8. Wadi Kheshem

GPS - 17.104459, 54.352707

Species found
Pipistrellus dhofarensis
Rhinopoma cystops
Taphozous nudiventris
Eptesicus bottae
Triaenops persicus

2.0.9. Samahram Tourist Village

GPS - 16.986963, 54.027800

Species found
Pipistrellus dhofarensis
Triaenops persicus
Molossid sp.
Rousettus aegyptiacus

One recorded sequence includes long QCF calls with an end frequency at 15kHz. This seems too low for Tadarida aegyptiaca, the only Molossid known to occur in Oman. On Yemen, a few more African Molossids occur and it is possible that some of those do, at least occasionally, occur in Southern Oman. Those recordings cannot, in the current state of what we know about the bats of Oman, be assigned to a species.

2.0.10. Wadi Ashawq

GPS - 16.889884, 53.775987

Species found
Pipistrellus dhofarensis
Otonycteris hemprichii
Taphozous nudiventris
Rhinopoma cystops
Tadarida aegyptiaca
Triaenops persicus

3

Identification

25 species of bats are currently known from Oman according to the latest literature review (Benda et al. 2015)

Sound ID features of a selection of bat species found in Western Asia

While it is impossible to include every single ID feature in a short publication given the variation each species is capable of, it is possible to list a few commonly found features for each species. Those may not be 'hard' features i.e. they may not be unique to a species but their presence tends to indicate a higher probability for being a certain species. Please use these features with caution and don't forget to remain critical.

Only the end frequency is listed as it is often sufficient to identify a species when used in conjunction with the call shape. However, more call parameters is available in proper research papers such as the Bats of the Eastern Mediteranean series e.g. Benda at al. 2012. For Constant frequency species, the listed frequency is the characteristic frequency i.e. the frequency of the flat component of the call.

Species	Common call type(s)	End/characteristic frequency
Rhinolophus hipposideros	CF	107-115
Rhinolophus clivosus	CF	82-87
Rhinolophus blasii	CF	92-94
Asellia tridens	CF	119-122
Asellia arabica	CF	115-117
Triaenops persicus	CF	75-85*
Triaenops parvus	CF	Unknown
Taphozous perforatus	MHqCF	25-28
Taphozous nudiventris	MHqCF	19-22
Otonycteris hemprichii	FM	16-21
Myotis emarginatus	steep FM	>30
Eptesicus bottae	FM	28-33
Hypsugo arabicus	qCF/FM	28-33
Hypsugo ariel	qCF/FM	45-48
Pipistrellus kuhlii	qCF/FM	35-45
Pipistrellus dhofarensis	qCF/FM	36-46
Rhyneptesicus nasutus	qCF/FM	35-45
Coleura gallarum	MHqCF	30-33
Nycteris thebaica	steep FM	20-22
Nyctalus noctula	qCF/FM	16-25

Species	Common call type(s)	End/characteristic frequency
Rhinopoma microphyllum	MHqCF	25-28
Rhinopoma muscatellum	MHqCF	29-35
Rhinopoma cystops	MHqCF	29-35
Tadarida aegyptiaca	qCF/FM	15-19

*In Triaenops persicus, and most Rhinopoma species, males tend to echolocate 2kHz than females
**MHqCF = Multi-harmonic qCF

Description of call shapes

- Call structure
  - FM (Frequency modulated): Usually start at a high frequency and falls down to a low frequency in a short amount of time, resulting in a steep call.
  - CF (Constant frequency): Call with a constant frequency. Typical of Hipposideridae, Rhinonycteridae (e.g. Triaenops) and Rhinolophidae, high duty-cycle species.
  - qCF (quasi-Constant frequency): Either defined as having a bandwidth of 5kHz or less or as having a slope of 1kHz per ms or less.
  - Multi-harmonic qCF: call type typical of Emballonuridae and Rhinopomatidae. The second harmonic is the loudest.

Identification issues

FM.QCF 35-40kHz

There are several species using this call type in this frequency band. One, Pipistrellus kuhlii is common and widespread, making the identification of the other species difficult. The geographical location can help as there doesn't seem to be an overlap in distribution between P.kuhlii and P.dhofarensis but knowledge of the distribution of bat species in the Arabian Peninsula is patchy. Any identification relying solely on distribution cannot be considered certain. Rhyneptesicus nasutus hasn't been extensively studied from an acoustic perspective. As a result, its acoustic behaviours are therefore not well known. It appears to be quite common in desert habitats, more so than Pipistrellus kuhlii but that's not much to go on. According to the literature, P.kuhlii is absent from the Empty Quarter. Calls recorded from that region differ from the recordings obtained from Pipistrellus species in the rest of the country in regularity of the shape of the calls and in the presence of a more pronounced curvature change or kink. This feature isn't common in P.kuhlii. Lastly, P.kuhlii often presents an FM tail, which Rhyneptesicus nasutus does not. However, it's not uncommon for this tail to be missing from P.kuhlii sequences. In short, much work is needed to better understand the acoustic behaviour of these species.

Multi-harmonic QCF

Two somewhat unrelated families can produce surprisingly similar calls, Emballonuridae (Taphozous sp.) and Rhinopomatidae (Rhinopoma sp.). Both focus the energy in the second harmonic, making it the loudest. Most calls are QCF, between 20 and 20kHz. There's a 'low frequency' group and a 'high frequency' group. In the former, there's Taphozous nudiventris

4

Conclusion

A conclusion...

This incomplete guide provides a starting point for understanding the echolocation calls of some bat species in the Arabian Peninsula. However, more research and resources are needed to develop a comprehensive understanding of the diverse bat species in the region. Remember, the study of bat echolocation is an ongoing process, and new discoveries continue to be made. Happy bat listening!

A

Spectrograms of bat call sequences

Adding source code to your report/thesis is supported with the package `listings`*. An example can be found below. Files can be added using* `\lstinputlisting[language=<language>]{<filename>}`*.*

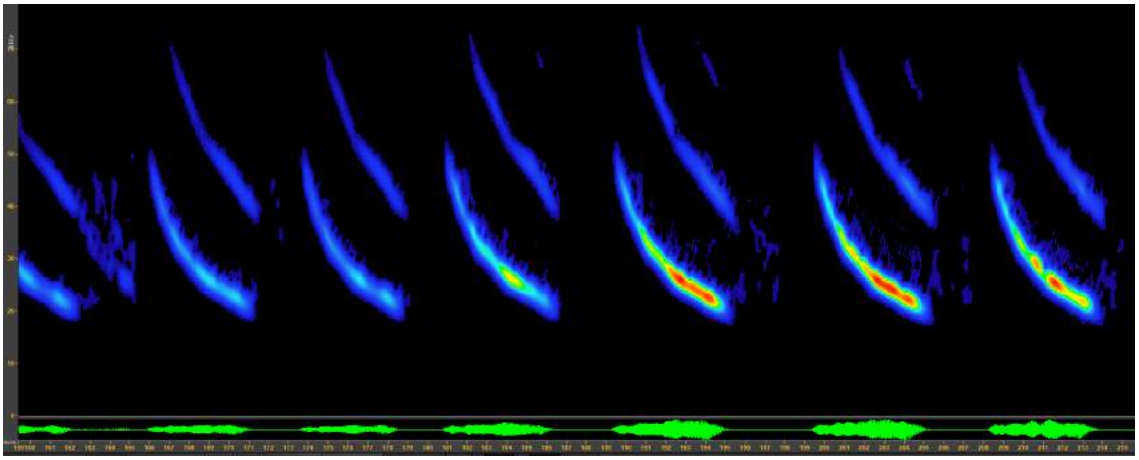

Figure A.1: Typical echolocation sequence of Otonycteris hemprichii (note the broadband calls, the low end frequencies and the visible harmonics)

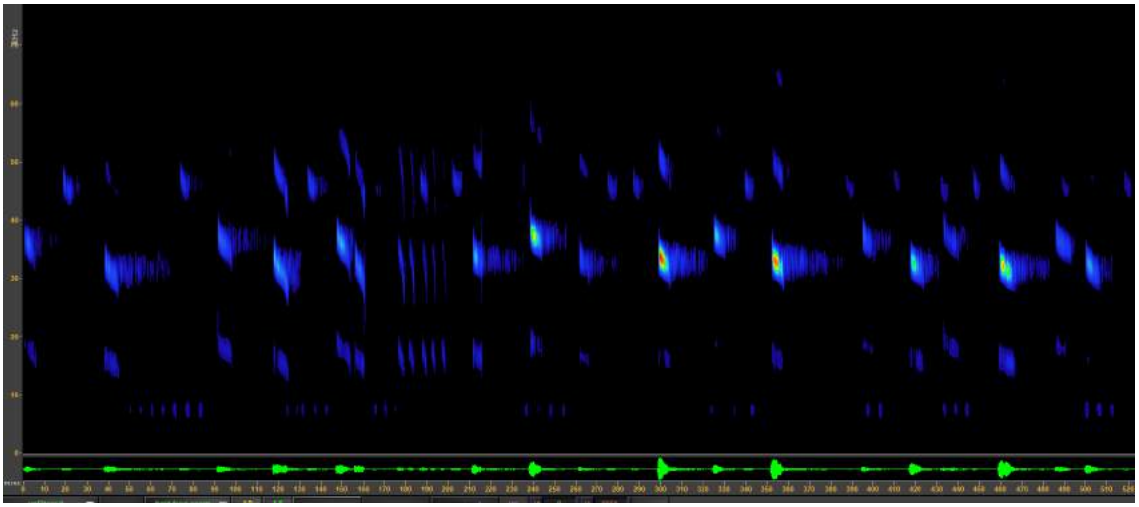

Figure A.2: Typical echolocation sequence of Rhinopoma muscatellum (two individuals) (note the visible harmonics, the second being the loudest as well as the substantial changes in shape as calls get shorter e.g. buzz in the middle

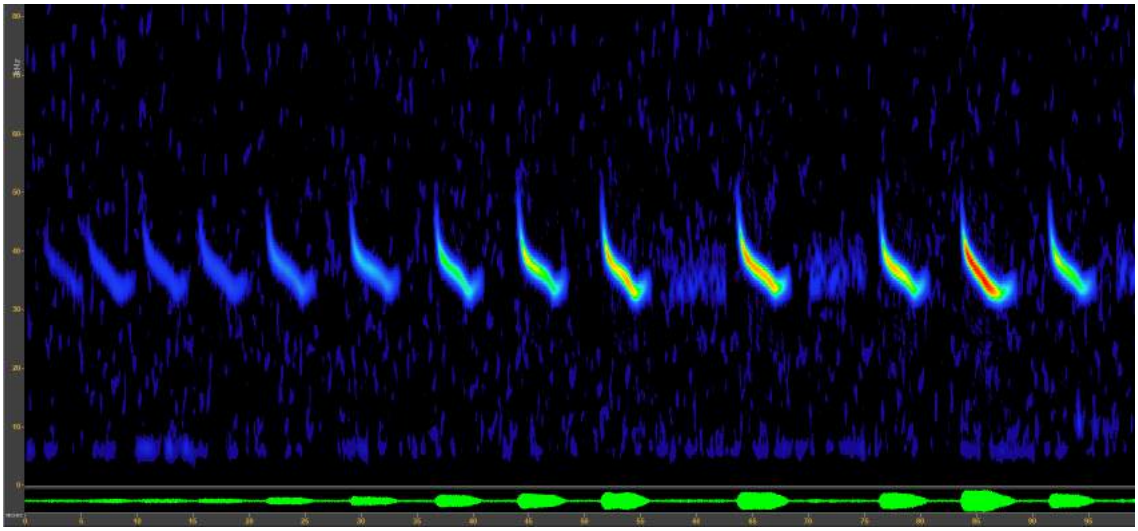

Figure A.3: Call sequence most likely produced by Hypsugo arabicus as it looks very unusual for any other species but does fit within the published parameters for H.arabicus

B

Landscape photos of some of the sampling locations

If a task division is required, a simple template can be found below for convenience. Feel free to use, adapt or completely remove.

Figure B.1: Gorgeous landscapes, full of nature! Suprisingly full of life (birds and bats alike) though...

Figure B.2: The kingdom of Otonycteris hemprichii

Figure B.3: Typical oasis landscape that attracts many bird and bat species. Always a good bet when looking for bats in arid environments