ENERGINET

ENERGY ISLAND BORNHOLM

TECHNICAL REPORT - BATS

10-04-2024

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INDHOLD

1 SUMMARY

The pre-investigation area for Energy Island Bornholm was surveyed for bats offshore by bat detector mounted on fifteen buoys distributed over the offshore area in 2022 and 2023. The offshore survey was supplemented by surveys of relevant coastal areas in the vicinity of the pre investigation area.

The following five species of bats were recorded in the pre-investigation area by a total of 94 recordings:

- Common noctule
- Nathusius pipistrel
- Particolored bat
- Soprano pipistrel
- Daubentons bats.

Common noctule, nathusius pipistrel and particolored bat were the most frequently recorded species of bats. All these species are known to be long-distance migratory bat species. The results only included a single observation of soprano pipistrel, despite a considerable coastal activity. Daubentons bat is not considered to be migratory and were only recorded a few times on two buoys near the coast of Bornholm.

The present survey shows that most of the recorded bats (91%) were recorded when the wind speed (measured 4 meter above sea level) was lower than 6 m/s. In summer and autumn, the bats seem to prefer high temperature and rarely fly offshore when the temperature is below 17 degrees Celsius. However, during the spring migration the bat are recorded offshore at lower temperatures.

2 INTRODUCTION

With the Climate Agreement for Energy and Industry of the 22nd of June 2020, the majority of the Danish Parliament decided that Denmark will become the first country in the world to develop two energy islands. One of these islands will be the island of Bornholm located in the Baltic Sea ("Energiø Bornholm"), with wind farms south-west of Bornholm with an installed capacity of up to 3.8 GW.

Because of these political decisions, a series of biological and scientific investigations have been carried out for a well-defined pre-investigation area, as a part of the baseline mapping of this part of the Baltic Sea. These studies have also included surveys to gain knowledge of occurrence, spatial distribution, and habitat use of bats in this marine area as well as onshore surveys in selected places of importance in bat migration.

The pre-investigation area for Energiø Bornholm OWF is located south and west of Bornholm (Figure 1) and covers the three areas reserved for potential offshore windfarms (OWF). The suggested wind farm areas consist of Bornholm I South (118 km^2), Bornholm I North (123 km^2) and Bornholm II (410 km^2)) (Figure 1). Bornholm I North and Bornholm II are more than 15 km from the coast of Bornholm, whereas Bornholm I South is more than 30 km from the coast of Bornholm.

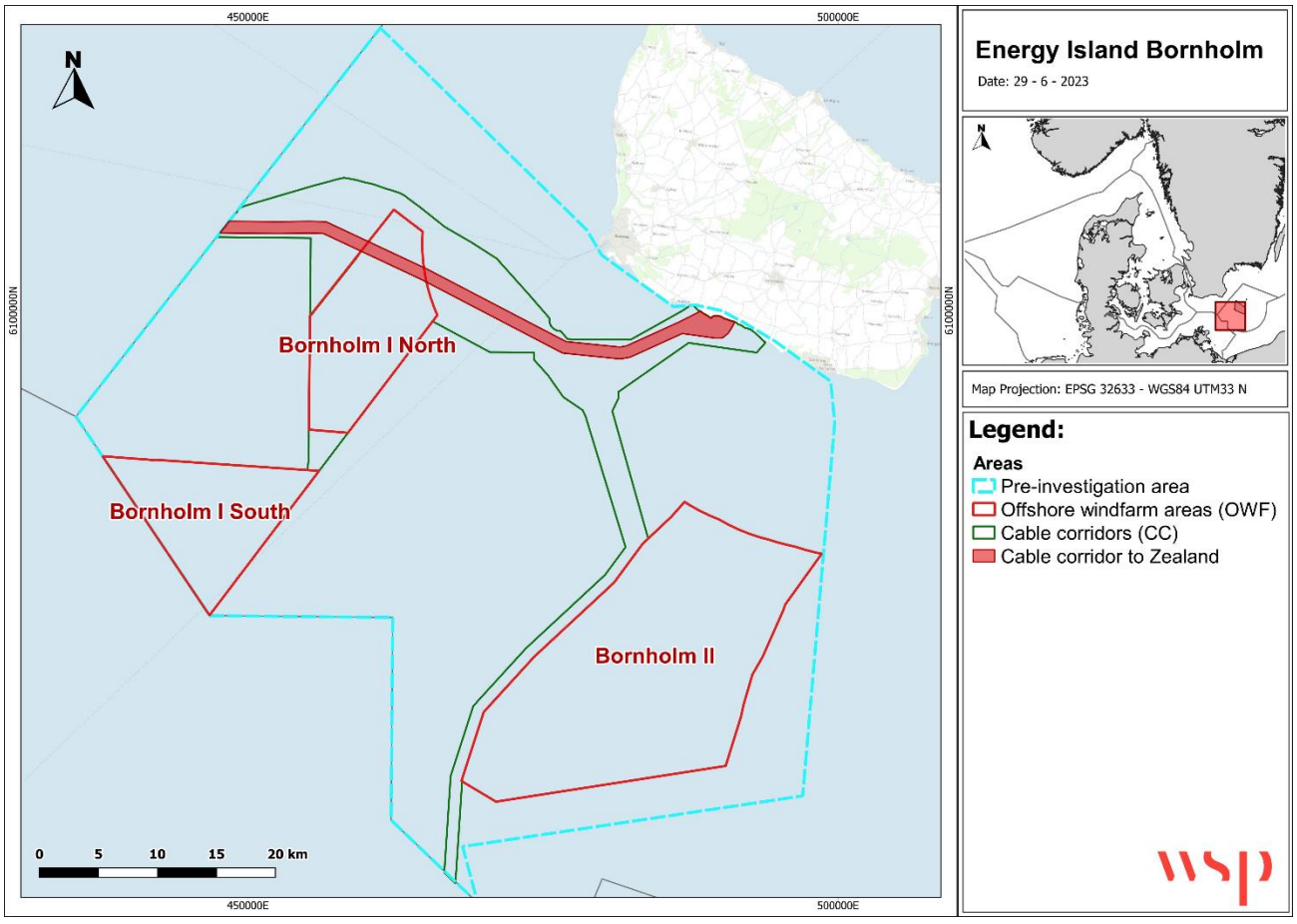

Figure 1 - The pre-investigation area (dotted turquoise polygon) and the suggested areas for wind farms (red polygons) and cables within (green polygons).

3 METHODOLOGY

The field survey programs for bat detection offshore and coastal are inspired by methods developed by BSH *(Bundesamt für Seeschifffahrt und Hydrographie, October 2013)* in StUK4 *(Standard Investigations of the impacts of Off-shore Wind Turbines in the Marine Environment),* and *technical requirements to the monitoring of bats (TA nr. A04, ver. 3, latest review 30.05.2018, DCE University of Aarhus)*. However, there are no standard survey methods developed for offshore bat surveys therefore different methods are applied and tested during this survey programme.

The surveys mainly focused on the most likely migratory seasons; spring (from mid-March to mid-June) and autumn (from August to October). Due to the uncertainty of bat activity offshore and the risk of foraging bats during the summer season, the offshore monitoring were conducted throughout the entire period from March to October. In 2023 no bats were observed offshore before mid-April and consequently all graphs below only show bat activity from 1st of April to 31st of October.

3.1.1 BUOY BASED SURVEY

Bat detectors were attached to the 15 buoys used for the marine mammal Passive Acoustic Monitoring (PAM) survey program conducted by WSP & BioConsult (Figure 2). The initial mounting on the bat detectors to the POAM station were carried out during a PAM-service expedition March 2022. The bat detectors were mounted on the buoys by a dedicated bat detector specialist.

The PAM-mounted bat detectors collected recordings of all bats passings at these 15 positions (Figure 3) in the pre-investigation area during spring, summer, and autumn (1st of April to 31st of October) in 2022 and 2023.

The service of the bat detector was coordinated with the service of the marine mammals PAM- service expeditions. During these expeditions the crew also replaced all the bat detectors.

Figure 2 - Automatic bat detector mounted on a PAM-buoy for the marine mammal survey.

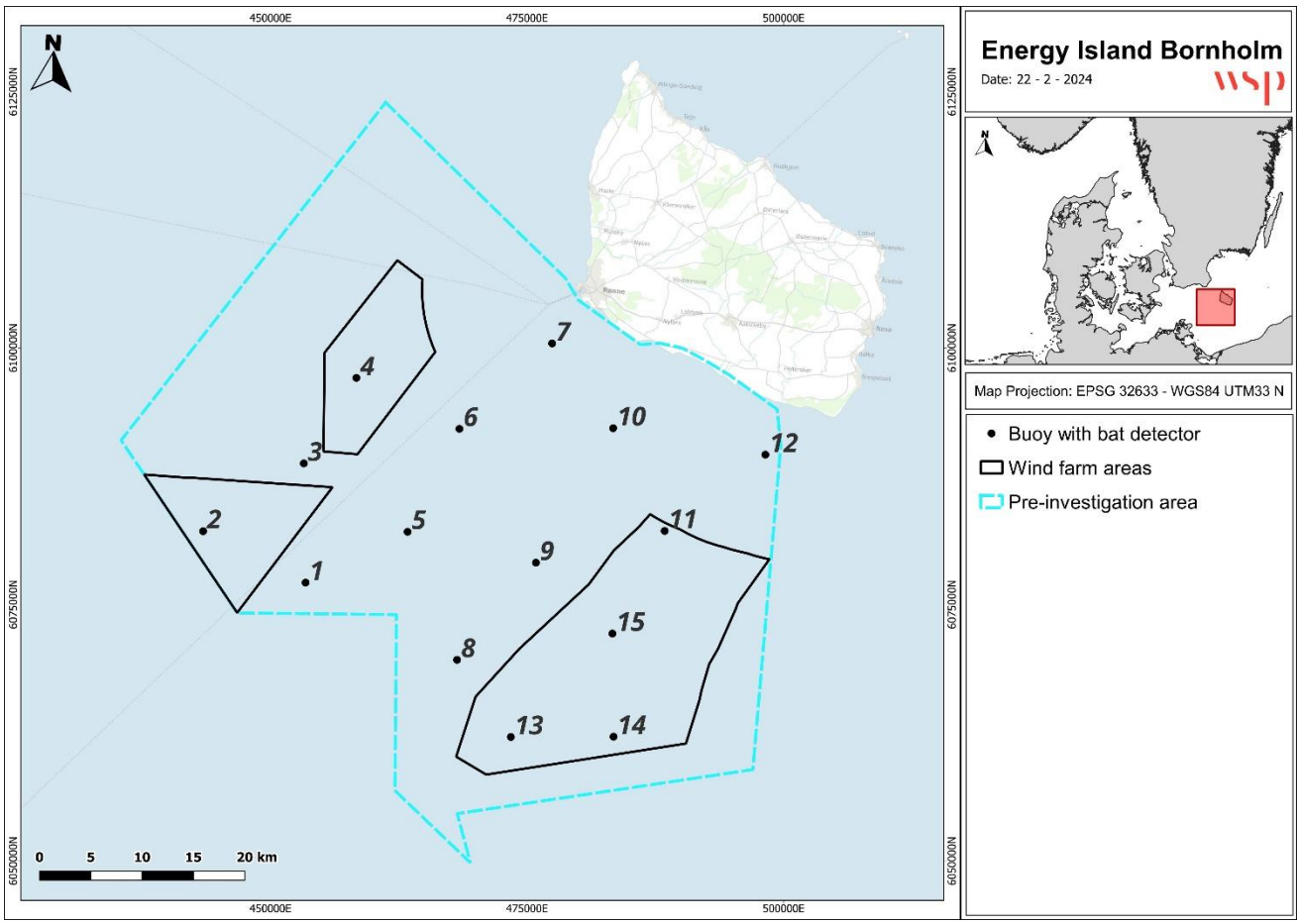

Figure 3 - Map showing the position of the buoys used for the survey.

3.1.2 OFFSHORE VESSEL BASED SURVEY

The survey vessel M/S Skoven has been visiting the survey areas for different purposes throughout the survey period (2022-2023). During this entire survey period a single bat detector was mounted to the vessel (Figure 4). This bat detector was programmed to record completely independent, with no assistance from the staff onboard the vessel. The purpose of the bat detector was to record ultrasound from any possible bats in the vicinity of the vessel and saved the recording for later analysis. The bat detector also logged the position of the vessel at any given time. Weather conditions (wind direction, wind speed and temperature were taken from the vessels logbook). The vessel-based bat surveys included data collection from March 2022 to October 2023. Unfortunately, no bats were registered by the vessel mounted bat detector during two years of operation in the pre-investigation area.

Figure 4 - Automatic bat detector (in front) mounted on the survey vessel Skoven.

3.1.3 COASTAL (ONSHORE) SURVEY

Concentration and activity of bats onshore, in the coastal regions, may be a strong indicator for migration trends. The land-based surveys included data collection from September 2021 to October 2023.

During spring (April-June) and autumn (August-October), the migrating bat species may concentrate along the coast, waiting for the right weather conditions for crossing the sea. Therefore, the level of activity measured along the coast may clearly indicate when a migration through the pre investigation area occurs.

The main migration of bats to and from Bornholm is expected to occur from southwest to northeast in spring and from northeast to southwest in autumn. Therefore, sites on northern and southern Bornholm with high probabilities for acting as exit points for the migrating bats were selected. Unfortunately, the geographical composition of the southwestern or northeastern Bornholm impedes the chances of locating the exact exit points. This is due to the fact, that this area has no obvious spits or peninsulas. The best possible locations were considered to be the southern most extreme Dueodde and the northern most extreme Hammeren.

The reference stations in coastal regions of the adjacent countries, such as at the Swedish coast of Blekinge and Skaane and the German island Rügen included several locations where sampling station were positioned. Coastal studies provide knowledge of how bats concentrate and most likely start migration from landsites that minimize migration distance or that these studies provide knowledge about potential feeding offshore at certain weather conditions.

A total of 14 detectors (Figure 5) in seven different areas along the coast at Bornholm, Rügen and Sweden, as well as two small islands between Bornholm and Sweden (Christiansø and Utklippan)) (Figure 6) has been monitoring the bat activity throughout the season in relation to bat migration in order to describe and quantify the number of bats waiting near the coast for ideal weather conditions.

After analysing the first-year data, two sets of land-based bat detectors were added at Northern Bornholm (Hammeren) and on the small Swedish island Utklippan to ensure optimal data collection.

Figure 5 - Bat detector on the southeastern coast near Dueodde of Bornholm.

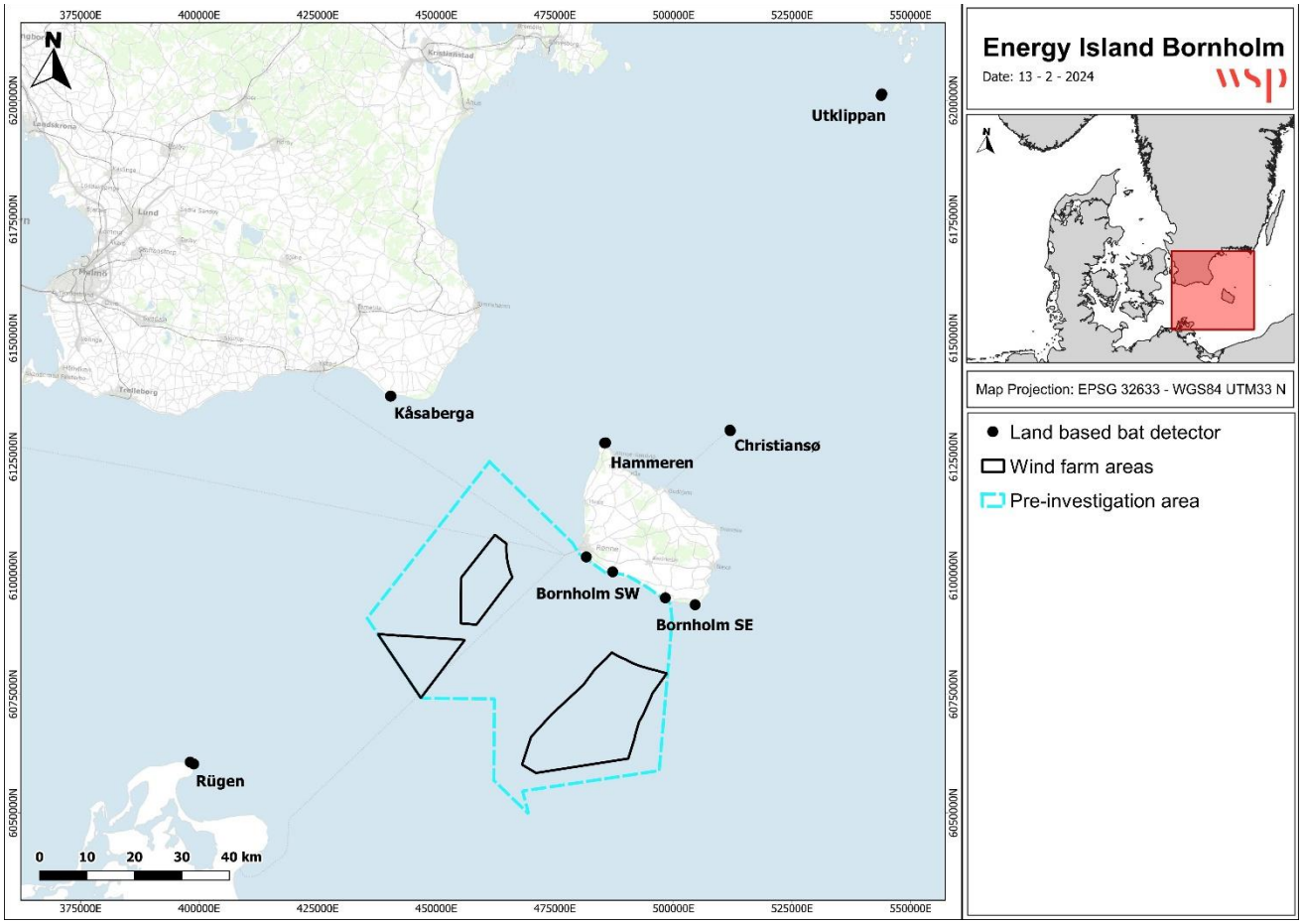

Figure 6 - Map showing the position of the coastal bat detectors.

4 EXISTING DATA

Existing data for bats within the pre-investigation area for the Energy Island Bornholm are very limited. One of the closest relatable studies was carried out in 2014, as part of the environmental impact assessment for the Bornholm Near Shore Windfarm project. Here, a ship-based bat survey was carried out over the duration of six nights in August (28th and 30th) and September (5th, 6th, 19th and 20th) in an area 5 to 10 km southwest of Bornholm (Amphi Consult , 2015). Only few bats were observed during this survey. During three of the nights, no bats were recorded. Daubenton's bat was recorded on two nights, and common noctule and nathusius pipistrelle were recorded one night each. The areas investigated in this study were situated closer (5-10 km) to the coast of Bornholm than the present project (>15 km from the nearest coast).

Due to this lack of existing data for the pre investigation area, the existing data included in this report also include data collected from different projects and studies outside the pre-investigation area. The projects were chosen in the same geographical region (southern Baltic Sea). For a comprehensive review of existing data for the Baltic Sea and the North Sea, please see Seebens-Hoyer, et al. (2021).

4.1 BAT MIGRATION

The bat species in Denmark can be divided into three groups with different migration patterns (Figure 7). Some bats are sedentary and only rarely move more than a few kilometres from their breeding and roosting sites. Other species are short-distance migrating bats with a moving range up to around 100 km, typically between a breeding site or a summer roosting site to a winter roosting and hibernation site. Most bats of northern Europe belong to this latter group. The third group is long distance migrating bats, typically migrating between a few hundred kilometres and several thousand kilometres. The long-distance migrating bats are considered the species most vulnerable to offshore windfarms (Rydell, et al., 2010; Voigt, Popa-Lisseanu, Niermann, & Kramer-Schadt, 2012; Lehnert, et al., 2014; Arnett, et al., 2016; C., et al.)

It is generally suggested that most migrating bats avoid crossing long distances over the sea. Therefore, the main migration route is expected to follow land and coast until sea crossing cannot be avoided. In northern Europe large numbers of bats are known to migrate from Finland, the Baltic countries, and Sweden to Holland, Belgium, Northern France and even southern UK (Hutterer, Ivanova, Meyer-Cords, & Rodrigues, 2005).

The pre-investigation area is located in an area where especially long-distance migrating bats might be crossing the sea in both spring and autumn migrations (Figure 8).

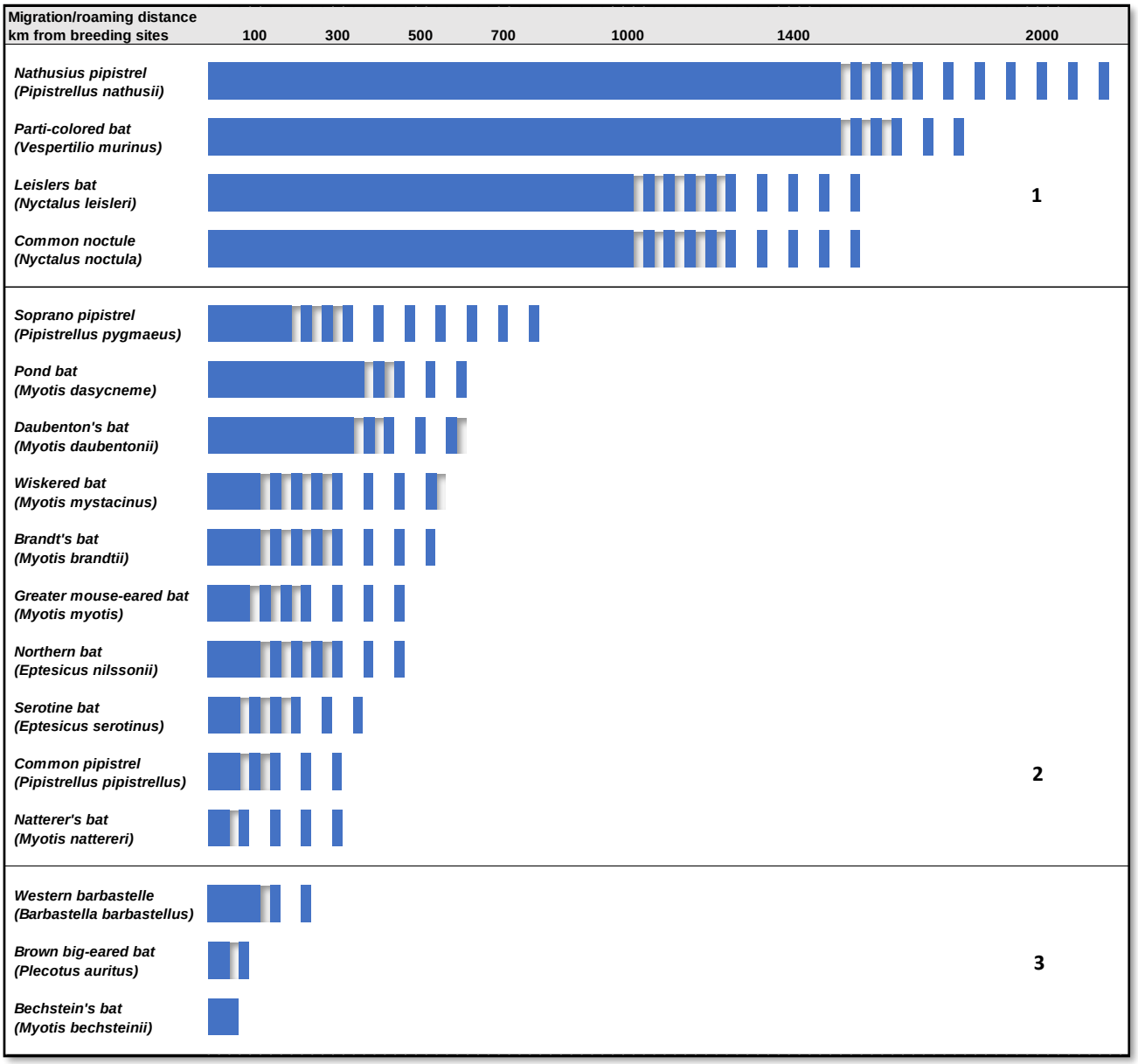

Figure 7 – General distance of migration and roaming for all Danish bat species. Figure from Christensen & Hansen (2023) (Translated from Danish). Based on sources: Baagøe (2001), Pētersons (2004), Hutterer et al. (2005), Dietz et al. (2011), Baagøe & Jensen (2007), Alcalde et al. (2021) a.o.

4.1.1 BAT MIGRATION IN SOUTHERN BALTIC SEA

There are rather few scientific studies on bat migration over the pre-investigation area, and in the Baltic Sea in Fennoscandia in general. The available studies show that bats in autumn head south from the southern Swedish coast towards the Baltic Sea and return to the coast in spring (Figure 8) (Ahlén I. , 1997; Baagøe H. , 2001; Hutterer, Ivanova, Meyer-Cords, & Rodrigues, 2005; Ahlén, Bach, & Baagøe, 2007; Ahlén, Baagøe, & Bach, 2009; Bach, Bach, & Ehnbom, Bat migration at Måkläppen (Falsterbo) 2010 – 2014, 2015). From the German Baltic coast studies of bat migration include studies on the island Greifswalder Oie, offshore Pomeranian Bay east of Rügen (Seebens, et al., 2013).

Bat migration is also known from Poland, Lithuania, and Estonia in spring and late summer where especially nathusius pipistrelle migrate along the coast (Ciechanowski, Jakusz-Gostomska, & Żmihoski, 2016; Masing, 2011; Pētersons, 2004; Šuba, Petersons, & Rydell, 2012).

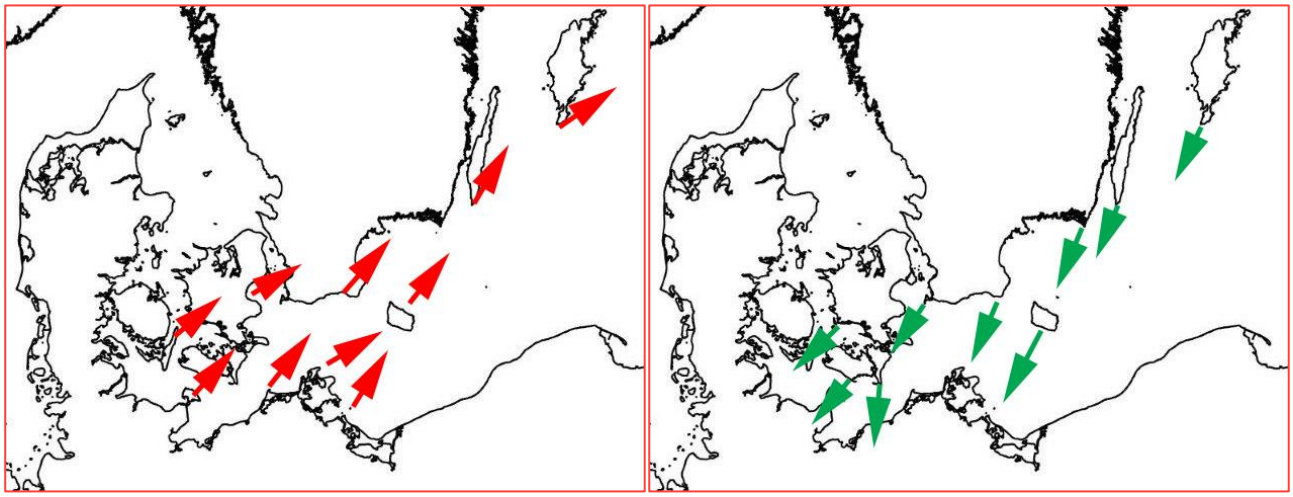

Figure 8 – Suggested patterns of bat spring (left) and autumn (right) migration in southern Baltic Sea (based on (Walter, Matthes, & Joost, 2007; Ahlén, Baagøe, & Bach, 2009; Seebens, et al., 2013; Seebens-Hoyer, et al., 2021)).

4.1.2 OFFSHORE AND COASTAL BAT SURVEYS IN SOUTHERN BALTIC SEA

Few offshore surveys for bats have been carried out in the southern Baltic Sea in the last decade (

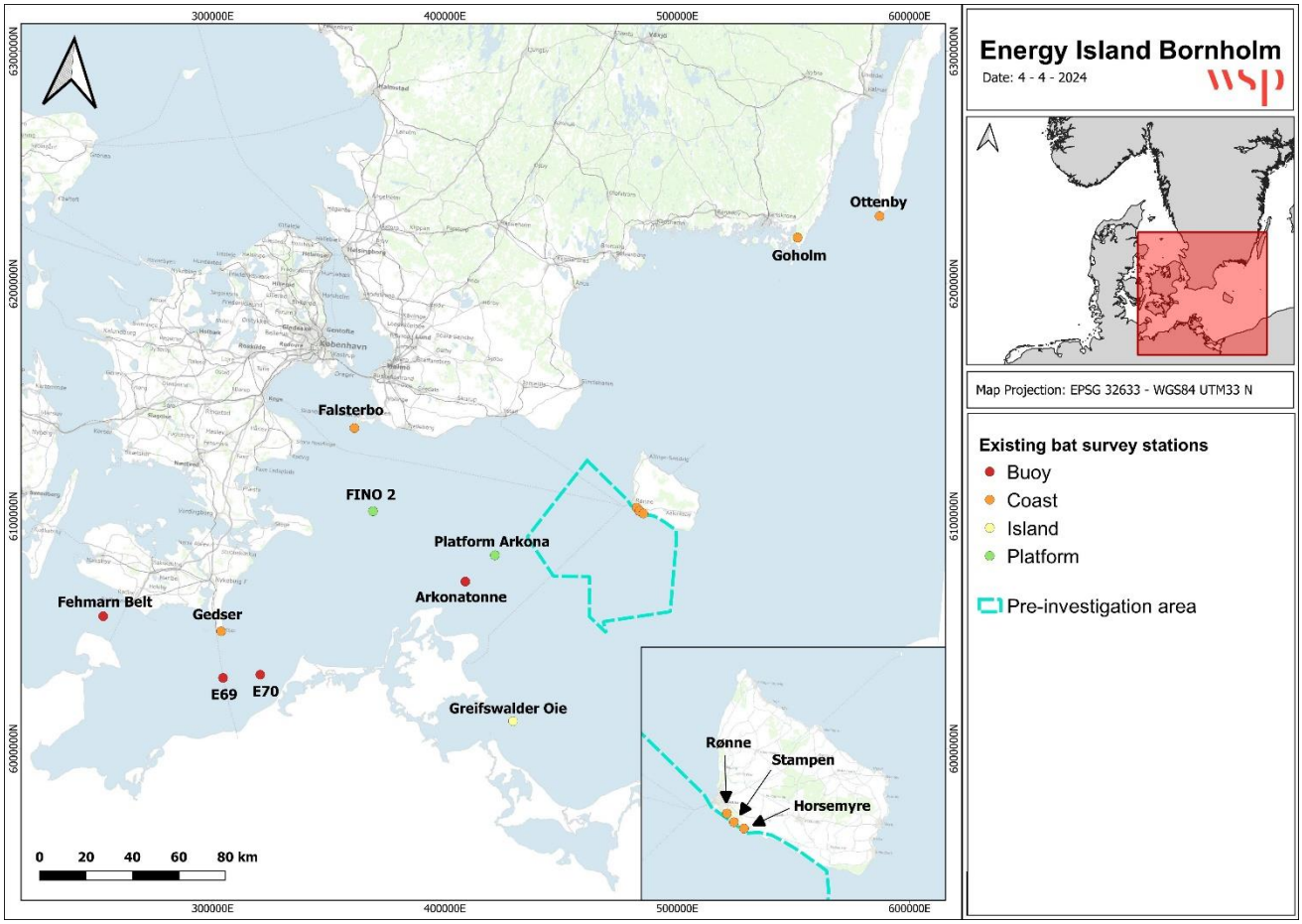

Figure 9 and Tabel 1). Most of the studies have been carried out in the German part of the Baltic Sea at two platforms and four marine buoys and carried out during the environmental impact assessment for various German offshore windfarm and the Fehmarn connection between Denmark and Germany (Figure 9). Beside these offshore surveys a few coastal surveys from southern Bornholm (Amphi Consult , 2015), Falsterbo in southern Sweden (Bach L. , Bach, Ehnbom, & Karlsson, 2017) and Gedser (FEBI, 2013) are also relevant for the understanding of the bat migration in the area. Coastal studies provide knowledge of how bats concentrate

and most likely start migration from landsites that minimize migration distance or that these studies provide knowledge about potential feeding offshore at certain weather conditions.

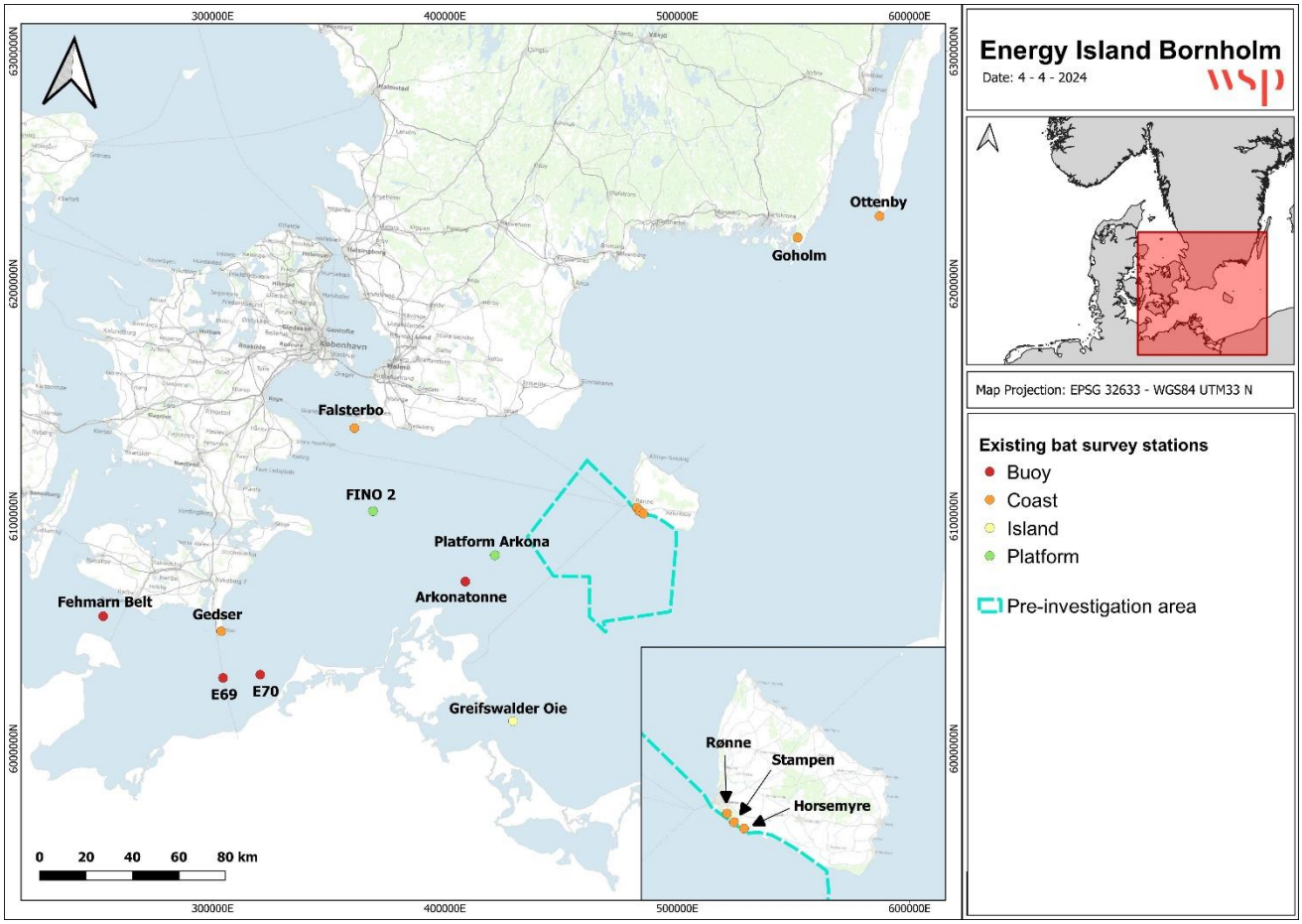

Figure 9 - Bat surveys in the southern Baltic Sea. For offshore references please see Tabel 1.

At least eight species of bats have prior to this study been recorded offshore in the Baltic Sea (Tabel 1). In all studies nathusius pipistrelle is the most frequent species with 70-90 % of all records. Common noctule, common pipistrelle and soprano pipistrelle are also recorded in most offshore surveys. Tabel 1 provide an overview of the recording of bat species in seven offshore surveys in the German part of the Baltic Sea.

Tabel 1 - Species recorded on platforms and buoys in the German part of the Baltic Sea (Seebens-Hoyer, et al., 2021).

	Common noctule	Leislers bat	Noctule or Leislers bat	Parti-colored bat	Common serotine	*Myotis* sp.	Common pipistrelle	Soprano pipistrelle	Nathusius pipistrelle	*Pipistrellus* sp.
Femmern Belt (n=122)*	8%		*6%*		1%	*1%*	1%	8%	75%	
Tonne E69 (2016-18)****(n=231)	6%	<1%	*10%*	<1%	<1%		1%	11%	71%	
Tonne E70 (2018)****(n=20)								5%	95%	
DS-W (2014)** (n=31)		3%						6%	90%	
FINO 2 (2013)*** (n=289)	4%		*4%*				16%	<1%	73%	*3%*
Arkonatonne (2017, 2018)**** (n=78)	5%	3%	*8%*	4%			3%	3%	76%	
Plattform Arkona (2017, 2018)**** (n=6)	17%								83%	

*) (FEBI, 2013)
**) (Wawra, Wolf, & Russow, 2015; Wawra, 2016)
***) (Skov, Desholm, Heimänen, Johansen, & Therkildsen, 2015)
****) (Seebens-Hoyer, et al., 2021)

4.2 BAT SPECIES LIKELY TO MIGRATE THROUGH THE PRE-INVESTIGATION AREA IN LARGE NUMBER

Two species of bats, common noctule and nathusius bat are most likely to migrate through the pre-investigation area in large numbers, because both species are known to migrate long distance and both species are present in large populations in Sweden (Westling, Toräng, Haldin, & Naeslund, 2020), Finland (Tidenberg, Liukko, & Stjernberg, 2019), and the Baltic countries (Eurobats, 2014).

4.2.1 COMMON NOCTULE (NYCTALUS NOCTULA)

Common Noctule is widespread and common on Bornholm (Møller, Baagøe, & Degn, 2013), in northern Germany (BfN, 2008) and in Sweden, with a population size of approximately 130,000 individuals. (De Jong, 2020; Westling, Toräng, Haldin, & Naeslund, 2020) . The distribution also includes the Baltic countries and southernmost Finland (Tidenberg, Liukko, & Stjernberg, 2019) (Figure 10).
Common noctule is a typical migratory bat species. Populations from north-eastern Europe are known to migrate southwest in autumn, thus covering distances of up to 1,000 km. Due to the weather conditions, western populations tend to be more sedentary (Lehnert et, al., 2018). Common Noctule is recorded in most offshore bat survey in the southern Baltic Sea (Tabel 1) and it is expected that the common noctule migrates through the pre-investigation area.

Figure 10 - Distribution of common noctule (Eurobats, 2014).

4.2.2 NATHUSIUS IPISTRELLE (PIPISTRELLUS NATHUSII)

Nathusius pipistrelle breed regularly on Bornholm but in relatively small numbers (Møller, Baagøe, & Degn, 2013; Baagøe H.). The species is very common on Bornholm during migration - both in spring and in autumn. Nathusius pipistrelle is also widespread and common in Germany (BfN, 2008) and Sweden (De Jong, 2020) and the distribution in the region also include the Baltic countries and southernmost Finland (Figure 11).

The nathusius pipistrelle undertakes a seasonal long-distance migration, usually from northeast to southwest Europe. All existing offshore surveys in the Baltic Sea show nathusius pipistrelle to be the most frequent species.

Figure 11 - Distribution of nathusius pipistrelle (Eurobats, 2014).

4.3 BAT SPECIES LIKELY TO MIGRATE THROUGH THE PRE-INVESTIGATION AREA BUT IN SMALL NUMBERS

Ten species of bat could potentially migrate or feed in the offshore area south of Bornholm. However, due to the distribution patterns and the general migration behaviour, it is unlikely that these species will occur in large number in the pre-investigation area.

4.3.1 PARTICOLOURED BAT (VESPERTILIO MURINUS)

Particolored bat has been observed a few times on Bornholm, but indication of breeding animals (Møller, Baagøe, & Degn, 2013) is not verified (Baagøe H.). The population of particolored bat is scattered displaced in northern Germany (BfN, 2008) and Sweden (De Jong, 2020). Particoloured bat is a migratory species, and the species might occur in the pre-investigation area in small numbers.

4.3.2 LEISLERS BAT (NYCTALUS LEISLERII)

The species is only recorded a few times on Bornholm (Baagøe H.) and leislers bat are rare in northern Germany (BfN, 2008) and very rare in Sweden (De Jong, 2020). In the southern Baltic Sea leislers bat has been recorded a few times in previous conducted offshore surveys. However, large numbers are not expected in the pre-investigation area since it is on the margin of this species distribution.

4.3.3 NORTHERN BAT (EPTESICUS NILSSONII)

Northern bat is recorded on Bornholm several times and recent findings indicate that the species may breed in small numbers on the island (Baagøe H.). Northern bat is very rare in Northern Germany (BfN, 2008). Although northern bat appears to be a sedentary species, ring recoveries have shown that they occasionally fly longer distances. None of the offshore surveys in the Baltic (Seebens-Hoyer, et al., 2021) recorded northern bats and it is therefore not expected that the species will occur in significant numbers in the pre-investigation area.

4.3.4 SEROTINE BAT (EPTERSICUS SEROTINUS)

Serotine bat is a common species on Bornholm (Møller, Baagøe, & Degn, 2013) and in Germany (BfN, 2008). In Sweden the species is rather rare and only found in the southernmost part of the country (De Jong, 2020). Serotine bat is rather sedentary and the distance between summer and winter roosts tends to be small. The species are only recorded very few times in the offshore surveys in the southern Baltic Sea (Seebens-Hoyer, et al., 2021). It is therefore not expected that the species will occur in significant numbers in the pre-investigation area.

4.3.5 SOPRANO PIPISTRELLE (PIPISTRELLUS PYGMAEUS)

Soprano pipistrelle is only observed in small numbers on Bornholm but may be increasing (Baagøe H.). Soprano pipistrelle is also widespread and quite common in north-eastern Germany (BfN, 2008) and in southern Sweden (De Jong, 2020). Due to its abundance and occurrence in north-east Germany and southern Sweden it is likely that a small number of soprano pipistrelle may migrate through the pre-investigation area.

4.3.6 COMMON PIPISTRELLE (PIPISTRELLUS PIPISTRELLUS)

Common pipistrelle is regularly breeding on Bornholm especially on the south coast between Rønne and Dueodde (Baagøe H.). Common pipistrel is one of the most common bats in northern Germany (BfN, 2008).

Common pipistrelle is a rather sedentary species, with summer and winter roosts often less than 20 km apart. However, long distance migrations have also been recorded. It is likely that a small number of common pipistrelle may migrate through the pre-investigation area.

4.3.7 POND BAT (MYOTIS DASYCNEME)

Pond bat is only recorded a few times on Bornholm (Møller, Baagøe, & Degn, 2013; Baagøe H.). There is no indication of breeding colonies on the island. Nearest breeding site is in northern Germany (BfN, 2008). Large number of migrating Pond Bats are not likely to occur in the pre-investigation area.

4.3.8 DAUBENTON'S BAT (MYOTIS DAUBENTONII)

Daubenton's Bat is common on Bornholm both in the breeding and migration seasons (Møller, Baagøe, & Degn, 2013), and a common species in both Germany (BfN, 2008) and Sweden (De Jong, 2020). Daubenton's bat is a migrant species and is known to fly up to 150 km between roosts. There are only few records of daubenton's bat in the offshore surveys in the Baltic Sea (Seebens-Hoyer, et al., 2021). However, the species is recorded two nights on ship-based survey south of Bornholm in 2014 (Amphi Consult , 2015). Small number of daubenton's bat are likely to occur in the pre-investigation area near by the coast of Bornholm.

4.3.9 BRANDT'S BAT (MYOTIS BRANDTII)

Brandt's bat is widespread and common on Bornholm (Møller, Baagøe, & Degn, 2013), in Sweden (De Jong, 2020) and somewhat common in northeastern Germany (BfN, 2008). Brandt's bat is an occasional migrant, but the distances covered are usually no more than 40 km. Large numbers of brant's bat in the pre-investigation area is considered unlikely.

4.3.10 WHISKERED BAT (MYOTIS MYSTACINUS)

Whiskered Bat is common and widespread on Bornholm (Møller, Baagøe, & Degn, 2013) and in Sweden (De Jong, 2020). Rare and scattered in Northern Germany (BfN, 2008). Whiskered bat is an occasional migrant, but the distances covered are usually small. Large number of whiskered bats in the pre-investigation area are considered unlikely.

4.4 SPECIES UNLIKELY TO MIGRATE THROUGH THE PRE-INVESTIGATION AREA

Four species of bats are considered to be unlikely in pre-investigation area mainly because of their very limited migration distance.

4.4.1 WESTERN BARBASTELLE (BARBASTELLA BARBASTELLUS)

Western barbastelle is not recorded on Bornholm (Møller, Baagøe, & Degn, 2013) and very rare on Rügen (BfN, 2008) and in Sweden (De Jong, 2020). Western barbastelle is largely a sedentary species; the distance between summer and winter roosts are usually below 40 km (Dietz, von Helversen, & Nill, 2011). Occurrences over the Baltic Sea far away from the coast therefore are unlikely.

4.4.2 BROWN BIG-EARED BAT (PLECOTUS AURITUS)

Brown big-eared bat is common and widespread on Bornholm (Møller, Baagøe, & Degn, 2013) and Rügen (BfN, 2008), but brown big-eared bat is a very sedentary species (Dietz, von Helversen, & Nill, 2011). Occurrences over the Baltic Sea far away from the coast seems unlikely.

4.4.3 GREATER MOUSE-EARED BAT (MYOTIS MYOTIS)

Greater mouse-eared bat is a regional migrant, whose movements between traditional summer and winter roosts usually range from 50 to 100 km (Dietz, von Helversen, & Nill, 2011) . It is only regularly breeding south of the Baltic Sea (BfN, 2008) and have never been recorded at Bornholm and there are only very few records from Sweden. Because the pre investigation area is situated outside the main distribution area of the species (Dietz, von Helversen, & Nill, 2011), it seems unlikely that the species will occur in the pre-investigation area except for very few spontaneous individuals.

4.4.4 NATTERER'S BAT (MYOTIS NATTERI)

Natterer's bat is common and widespread on Bornholm (Møller, Baagøe, & Degn, 2013) and rather common in northeastern Germany (BfN, 2008) Natterer's bat is generally considered a sedentary species; however, some individuals are known to have covered long distances (Dietz, von Helversen, & Nill, 2011). Large numbers of natterer's bat in pre-investigation area are considered unlikely.

4.5 TIMING OF BAT MIGRATION OVER THE SOUTHERN BALTIC SEA

Unfortunately, only a few systematic studies of migrating bats have been carried out at Bornholm (Rydell, et al., 2014). Most relevant is the study from 2014 as part of the environmental impact assessment for Bornholm Havmøllepark (Amphi Consult , 2015). This study showed a peak on the southern coast of Bornholm for the migration of nathusius pipistrelle from late April to early May in Spring and in September in Autumn (Figure 12). A peak of common noctule in early May and from mid-August to mid-September (Figure 13) may as well be due to migration but potentially mixed with feeding behaviour by local breeders.

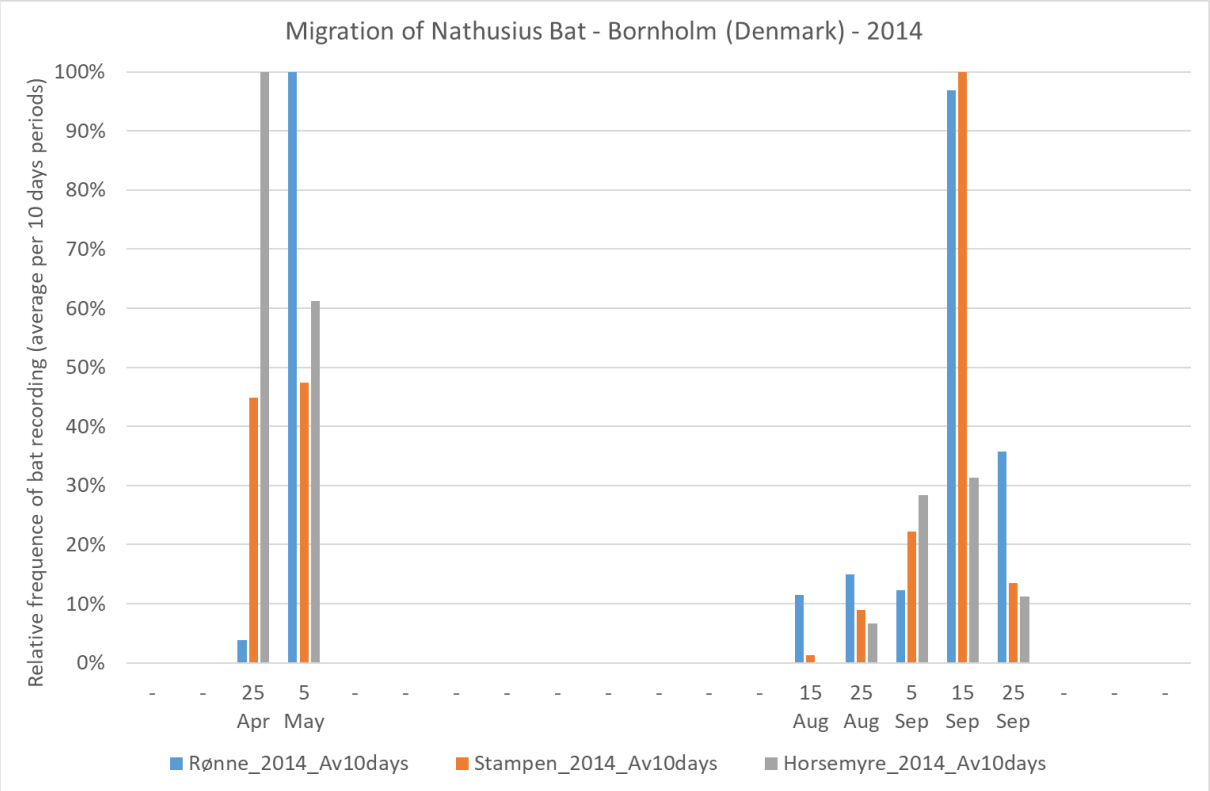

Figure 12 - Activity of nathusius bats at the southern coast of Bornholm (figure based on data from (Amphi Consult , 2015). Remark: The survey only includes data collection from 22 April to 7 May and from 13 August to 25 September.

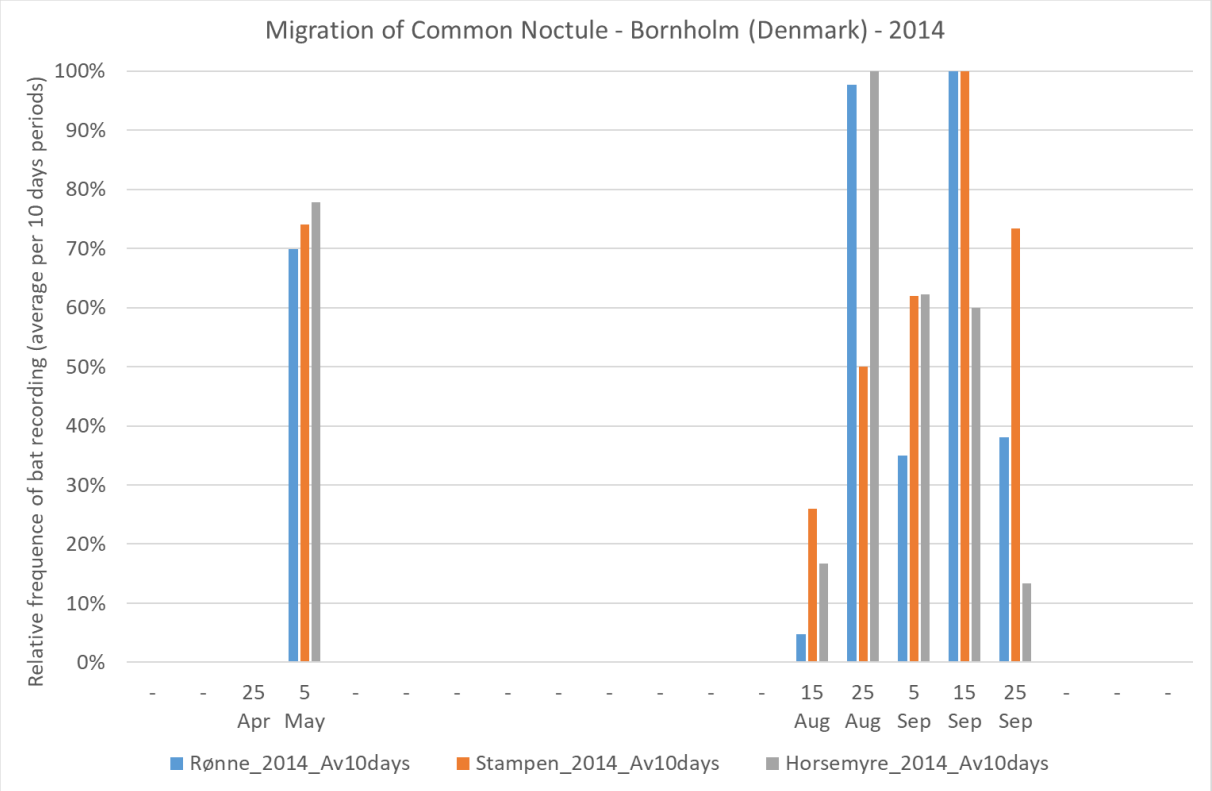

Figure 13 - Activity of common noctule at the southern coast of Bornholm (figure based on data from **(Amphi Consult , 2015).** Remark: The survey only includes data collection from 22 April to 7 May and from 13 August to 25 September.

The spring migration seems short, whereas the autumn migration is much longer and may already starts in mid-August and run until early October. It should, however, be considered that the survey in 2014 did not cover mid-May to early-June or October.

4.6 CLIMATE CHANGE AND THE TIMING OF BAT MIGRATION

The timing of the bat migration is linked to the presence of the specific types of insects which are the main feeding source for each bat species (Hawkes, et al., 2023). Change in winter temperature and change in the timing of spring and autumn may influence the insect abundance and occurrences. How exactly this influence the timing of the bat migration and how quickly the bats will adapt to the changing conditions are not known. However, an 8-year data series from Falsterbo, in southernmost Sweden, indicates a change in the migration time for nathusius bat from a median of the autumn migration in late August 2012 to late September 2019 (Bach P. , 2021).

It is likely that especially the autumn migration is highly sensitive to change in temperature and wind conditions during August, September, and October. The migration in spring is less predictable because the bats does not know the conditions at the end destination and the timing of the exit from the wintering areas is pre-dominantly driven by other factors such as day length and temperature.

4.7 FEEDING BATS DURING BREEDING SEASON

During the summer most bats are located at or in close proximity to their breeding sites feeding on the abundance of insect within this area. However, when the weather is suitable some bat species may also forage at sea. How far from shore the bats feed and how often they feed over sea is not documented. It is expected that most activity occur along the coast where most insects are found, and less far away from the coast. None of the offshore studies in the Baltic Sea show significant numbers of bats offshore during the midsummer period, from mid-June to mid-August. However, several studies show large number of bats recording in late August and early September (Seebens-Hoyer, et al., 2021). These late summer/early autumn recording may be a mixture of migrating bat and feeding bat.

5 DATA AND RESULTS

5.1 GENERAL OFFSHORE PATTERNS

From March 2022 and until October 2023 the detectors on the buoys recorded sound from 97 bats - equal to an average of 3.2 recordings of bats per year, per buoy. Due to some technical challenges with the detectors during 2022 only sound from 18 bats were recorded. Therefore, recordings from 2023 with 80 recordings in total equal to 5.3 per buoy per year may give a better estimate of the actual representation of bats in the area.

The recordings on the buoys are unequal distributed (Figure 14). The highest numbers of bats recorded occurred on the detectors placed close to the western part of Bornholm. For species level details see Appendix 1.

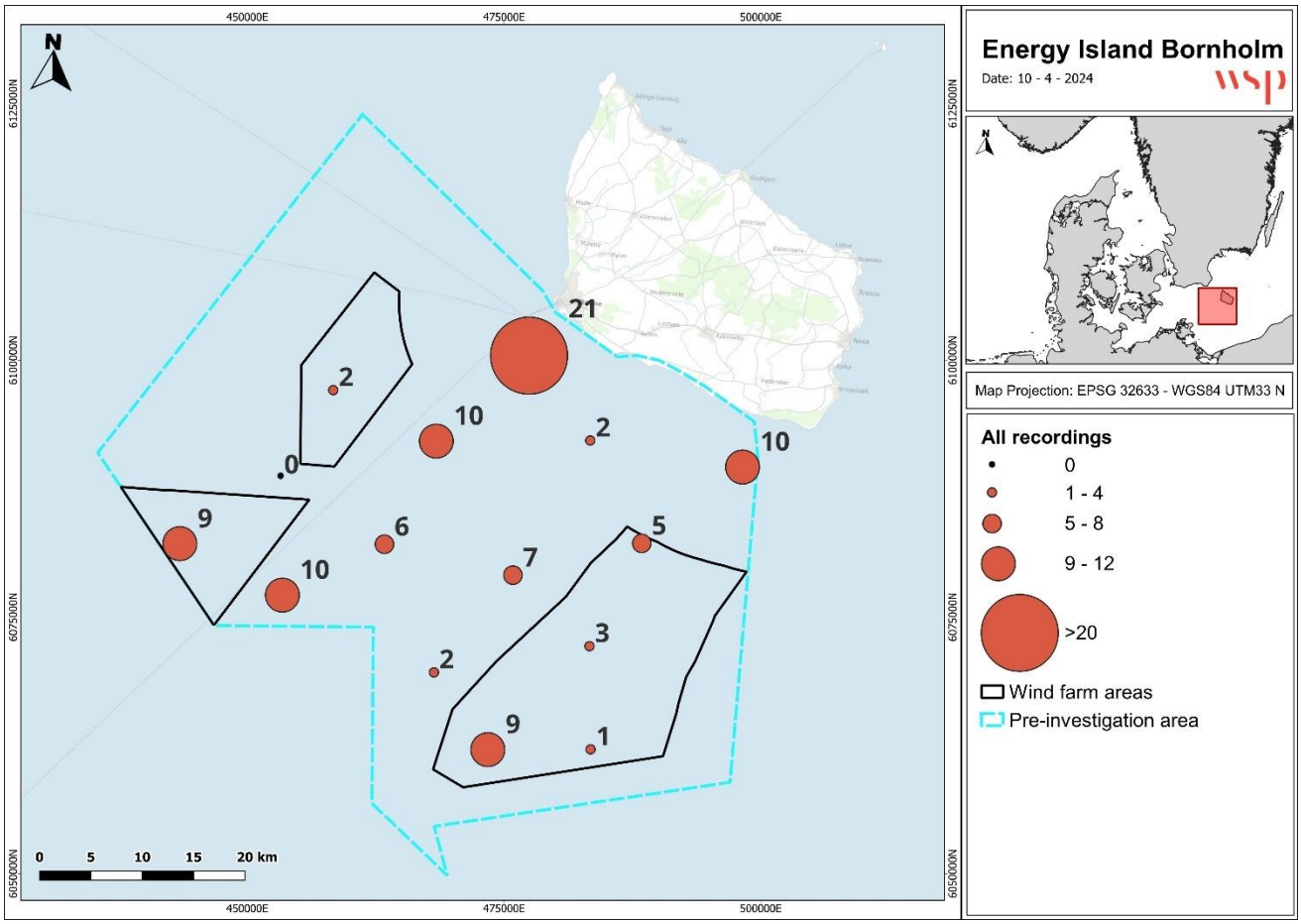

Figure 14 - Number of bat recordings per buoy for all species in 2022 and 2023. The wind farm areas shown on the map are suggested areas only.

5.2 SEASONAL VARIATION IN OBSERVATIONS

5.2.1 OFFSHORE OBSERVATIONS

The seasonal patterns of the bats offshore observations show clear indication of some autumn migration for both common noctule, nathusius pipistrel and particolored bat (Figure 15). Only a single observation of soprano pipistrel, despite the considerable activity on the coast indicates that most soprano pipistrel stay on Bornholm. Four observations of daubenton's bat in September on the two buoys nearest to Bornholm,

approximately 6 km from the coast, are considered as feeding bat from Bornholm and not as migrating bats Few recordings of parti-coloured bats may be serotine bat since the sound between the two species can be difficult to distinguish. However, serotine bat is not considered to be a long migratory species.

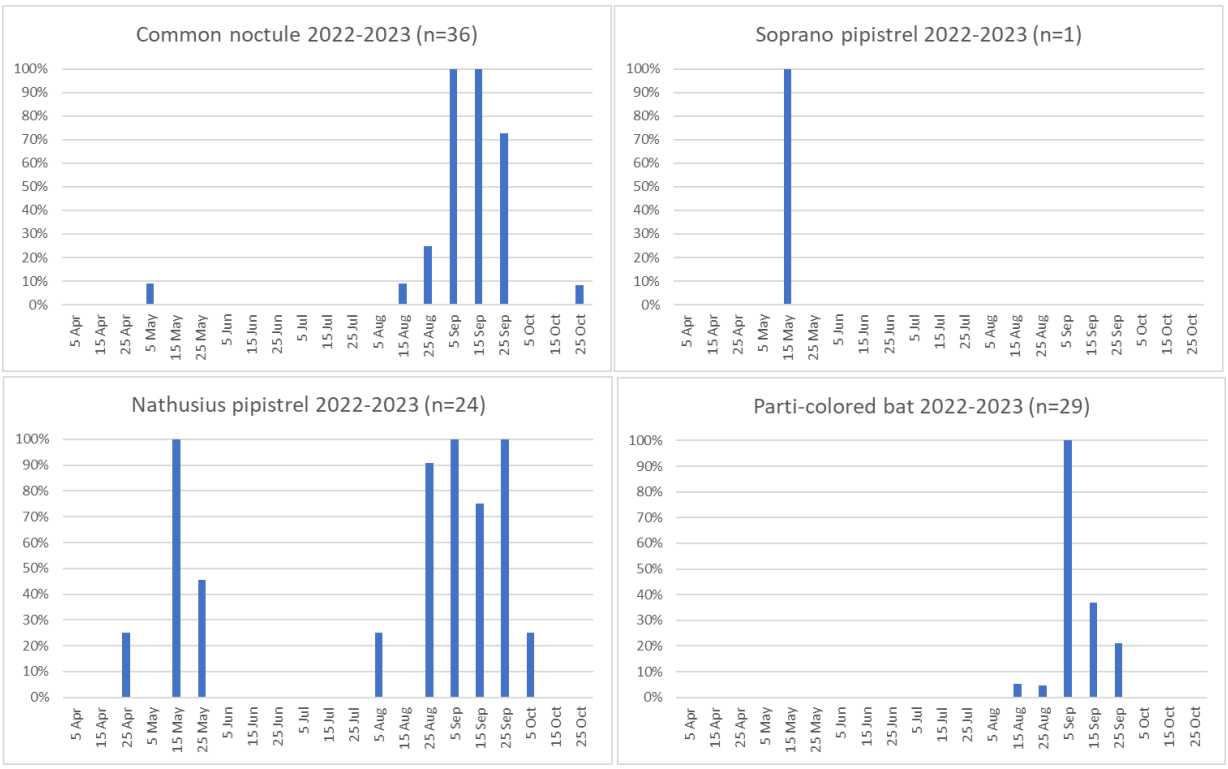

Figure 15 – Relative bat activity of the important four species of bats recorded at fifteen buoys in and within the surroundings of the pre-investigation area. The figure shows an average of bat activity of the fifteen detectors during two years of deployment. The scale is relative to the maximum value. "n=xxx" gives the total number of recordings included in the calculations.

5.2.2 COASTAL OBSERVATIONS

The information collected on the coastal detectors are very large and contains thousands of files. Therefore, this chapter only contains summary of four species. The three long-distance migrating bats common noctule, nathusius pipistrelle and parti-coloured bat as well as soprano pipistrelle are selected as focus species based on which species were present on data collected on the offshore buoys. For details on each species on each site, please see Appendix 2.

BORNHOLM SOUTHWEST COAST

The area around Rønne and on the western part of the south coast of Bornholm appears to be an important site for breeding bats. Therefore, the pattern of migrating bats is more mixed than for most other sites in this survey (Figure 16). Peaks of the activity in June and August are most likely due to locally breeding animals and feeding bats. For nathusius pipistrel this part of the island seems most important in the spring, which indicates some migrating bats. In autumn common noctules are more frequent, whereas nathusius pipistrels show less activity. Based on the geography of the coast, Rønne seems more likely to be a departure point for an autumn migration of noctule and maybe an arrival points for several species in the spring.

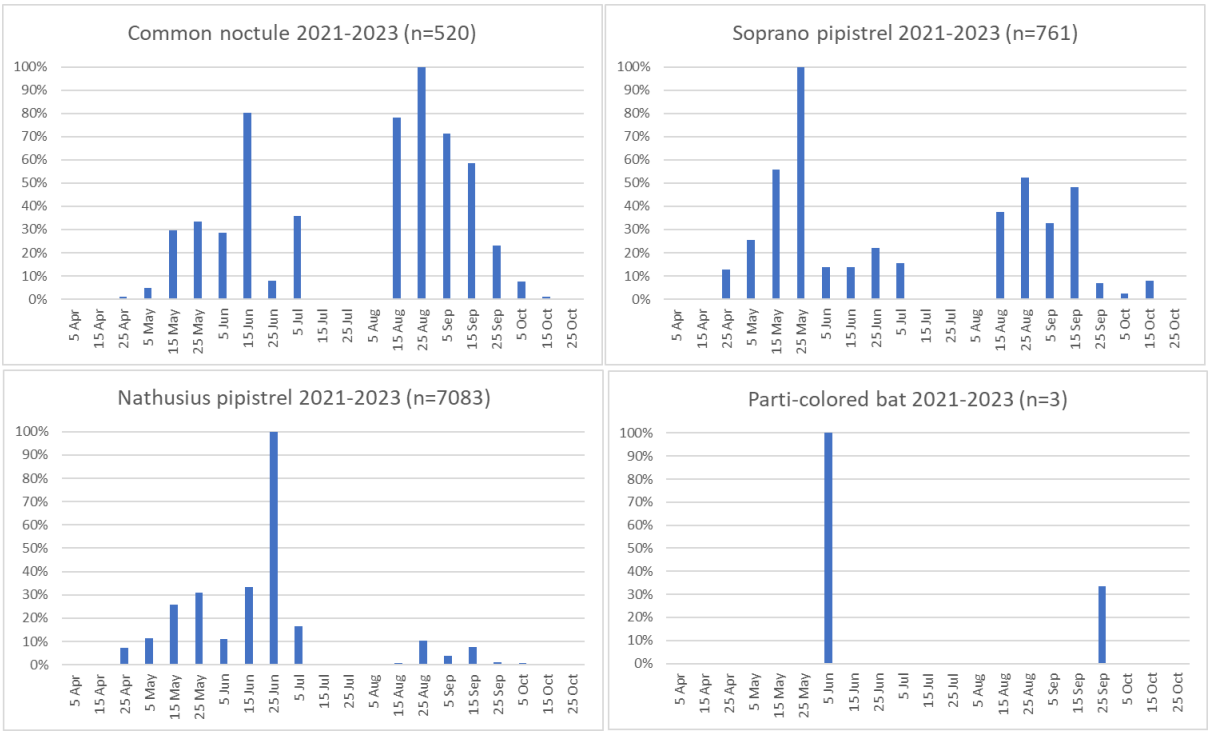

Figure 16 – Relative bat activity of the four most relevant bat species at Bornholm south coast western part. The figure shows an average of two detectors during three years of deployment – The scale is relative to the maximum value. "n=xxx" gives the total number of recordings included in the calculations.

BORNHOLM SOUTHEAST COAST

The southeastern coast of Bornholm includes the southernmost part of the island, Dueodde. This part of the island is an important area for breeding *Myotis* species but based on the recordings during summer the area seems to be less used by nathusius pipistrel and common noctule (Figure 17). Both species prefer broad-leaved trees for their breeding and the area on southern Bornholm are mainly dominated by conifers. The patterns of the observations in the part of the island may therefore provide a better picture of the migrating bats. Except for nathusius pipistrel, the other migrating bats are more or less restricted to the autumn season, which also support the theory of migration. A fairly large number of common noctules seems to concentrate on these coastal areas in late August and early September. Nathusius pipistrel has the largest activity in mid-May and mid-September. Soprano pipistrel occurs with high activity in September. However, it is uncertain if these bats are migrating or just there for feeding.

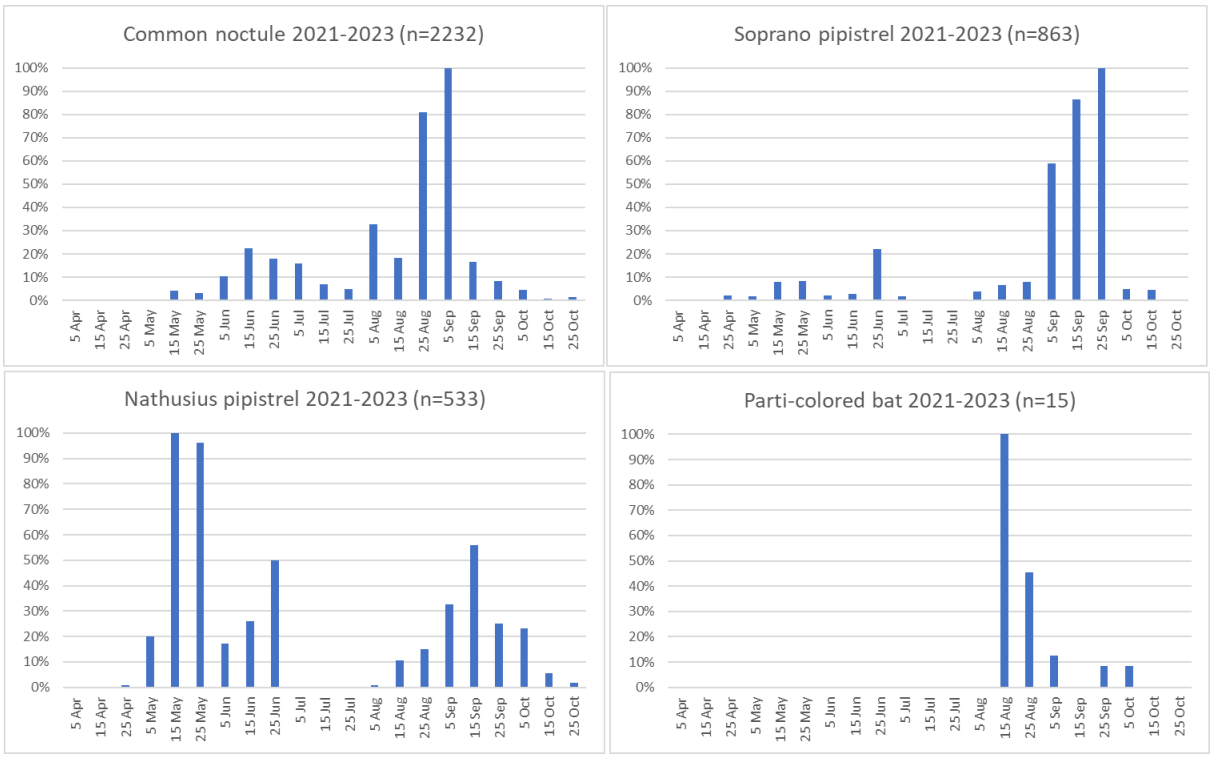

Figure 17 – Relative bat activity of the important four species of bat at Bornholm south coast eastern part. The figure shows an average of two detectors during three years of deployment – The scale is relative to the maximum value. "n=xxx" gives the total number of recordings included in the calculations.

BORNHOLM NORTHERN COAST

The northern coast of Bornholm includes the rocky area of Hammeren. The patterns of bat activity are quite different from the patterns recorded on the south coast (Figure 18). Nathusius pipistrel is almost exclusively present in spring from early May to early June. These bats most likely on their migration further north. Alternatively, these bats could be migrating bats arriving from Sweden. The migration route through Sweden to Bornholm is not unlikely. Even though the distance from central western Europe is slightly longer when choosing this migration route but includes shorter sea crossings and may therefore be less risky for the bats. Common noctule, soprano pipistrel and particolored bat are less common on northern Bornholm.

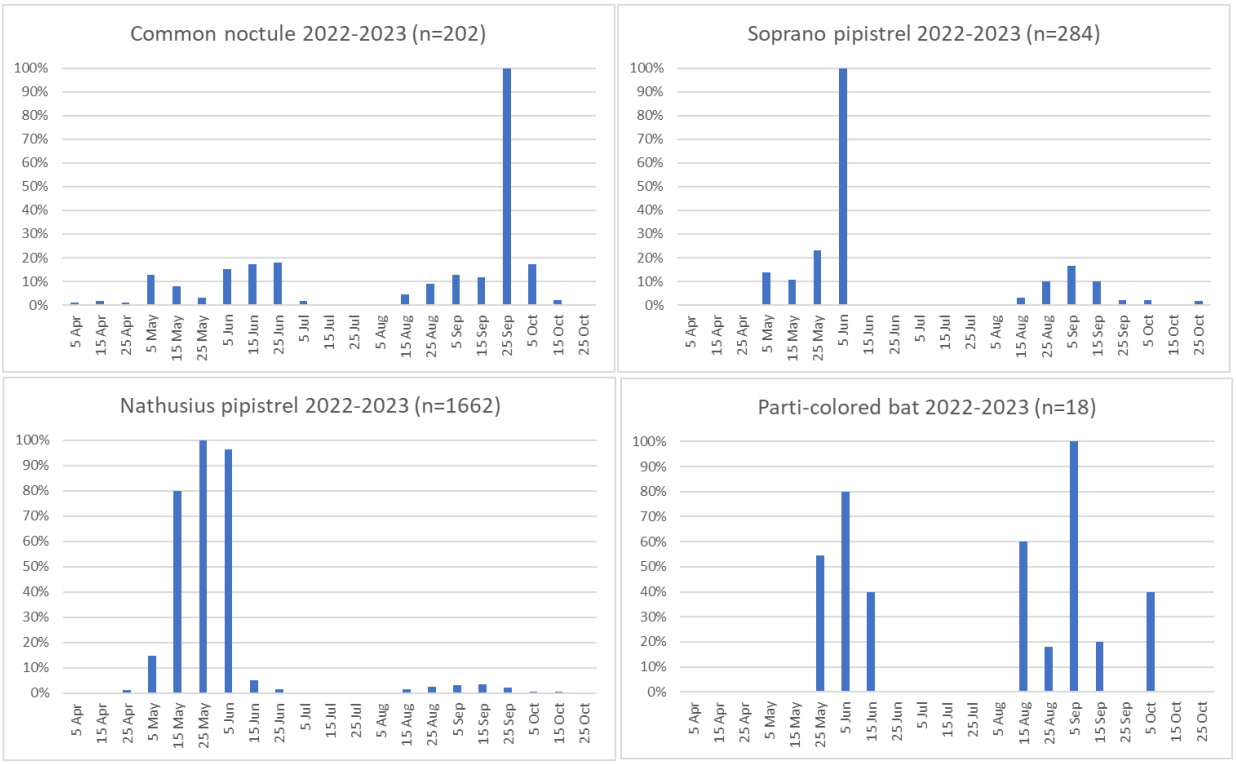

Figure 18 – Relative bat activity of the important four species of bat at Northern Bornholm, Hammeren. The figure shows an average of two detectors during two years of deployment – The scale is relative to the maximum value. "n=xxx" gives the total number of recordings included in the calculations.

CHRISTIANSØ

The island of Christiansø is of interest due to its relatively isolated position, it's the absence of breeding bats and its location, approximately 20 km from Bornholm. Therefore, all bats on the island are migrating or only rarely visitors during feeding. Only common noctules and nathusius pipistrel occur on the island in significant numbers (Figure 19), which also indicates that this is mainly a stop for the long-distance migratory bats. General pattern shows higher activity during autumn than during spring, which is interesting in comparison with northern Bornholm. Together with the information from Utklippan there are indication of a migration route from easternmost Sweden across the Baltic Sea to Bornholm. The magnitude of the migration route is uncertain. However, the bats migrating via this route may be part of a rather small population on the Baltic Islands, Öland and Gotland.

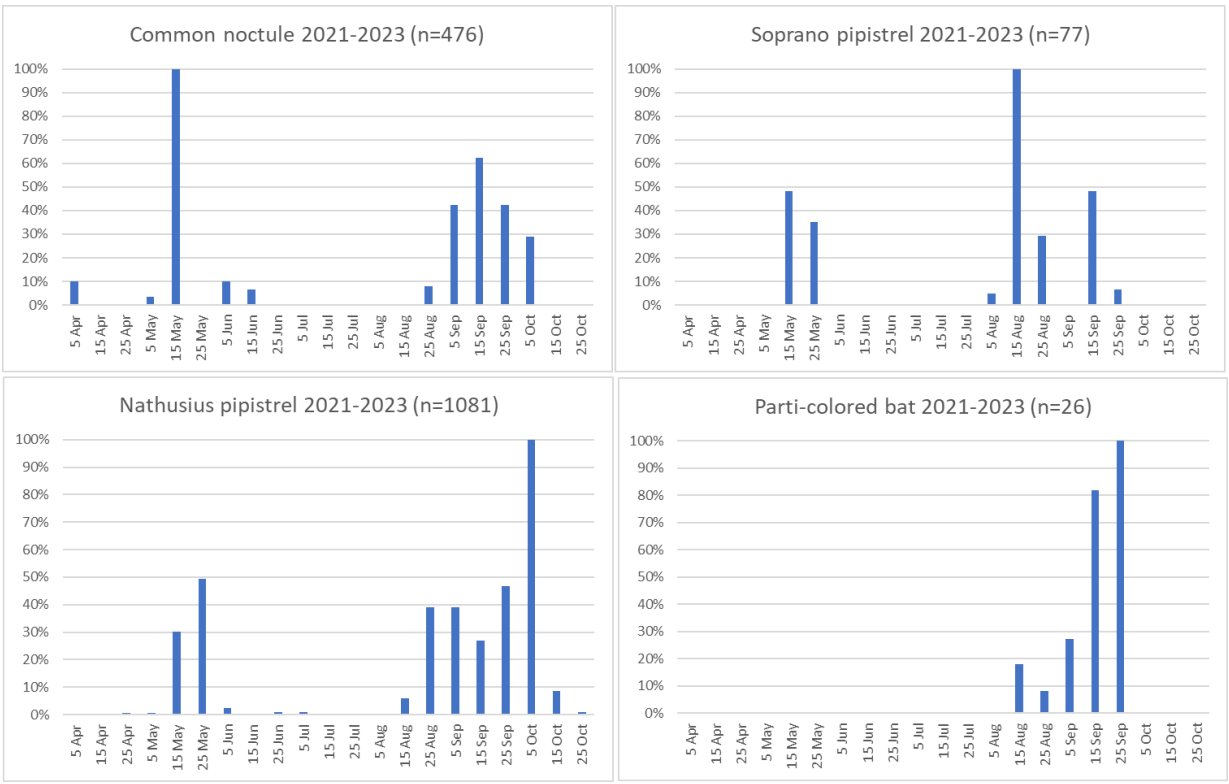

Figure 19 – Relative bat activity of the important four species of bat at Christiansø. The figure shows an average of two detectors during three years of deployment – The scale is relative to the maximum value. "n=xxx" gives the total number of recordings included in the calculations.

UTKLIPPAN, SWEDEN

The patterns of bat activity on the small island Utklippan are very similar to the patterns on Christiansø (Figure 20). It seems likely that there is a migration route between these two islands (see under Christiansø).

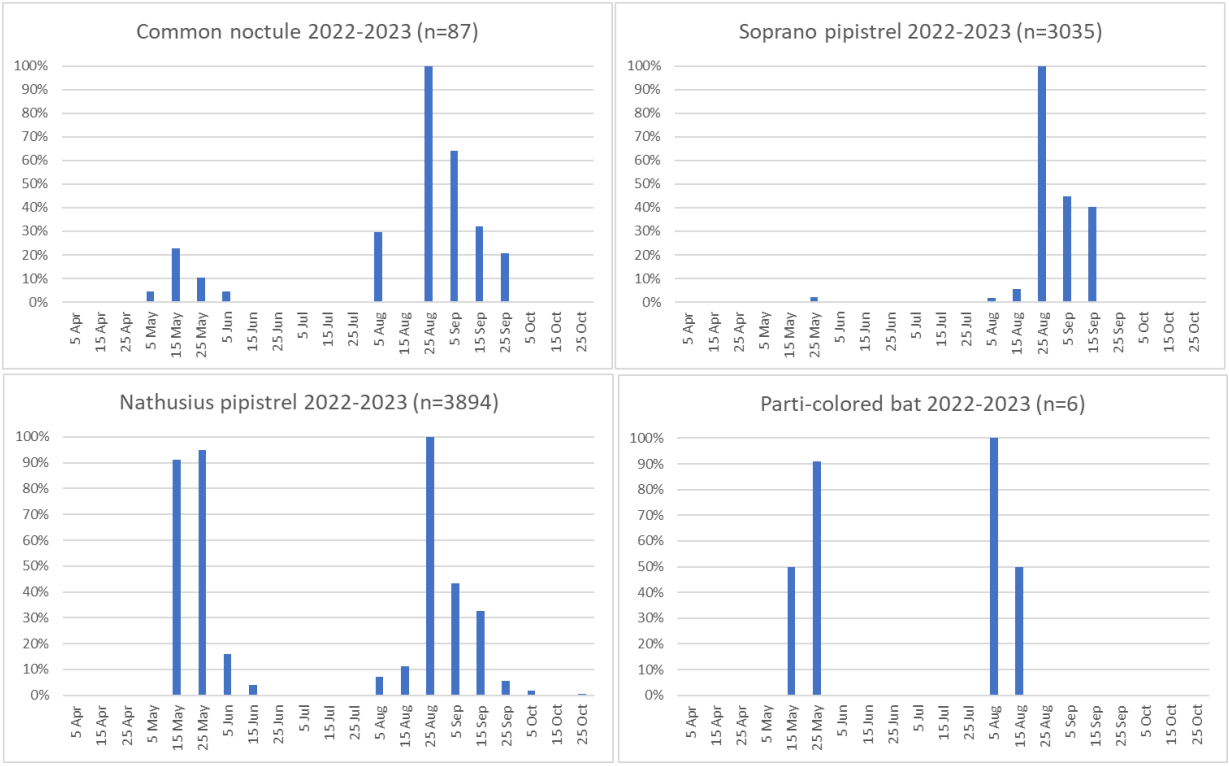

Figure 20 - Relative bat activity of the important four species of bat at Utklippan. The figure shows an average of two detectors during two years of deployment – The scale is relative to the maximum value. "n=xxx" gives the total number of recordings included in the calculations.

If bats migrate to Bornholm from Germany, it is most likely to be their starting point. Timing of the activity also show a pattern of migrating bats (Figure 21). However, the activity may also include local bats. And visitors form the large forest of eastern Rügen.

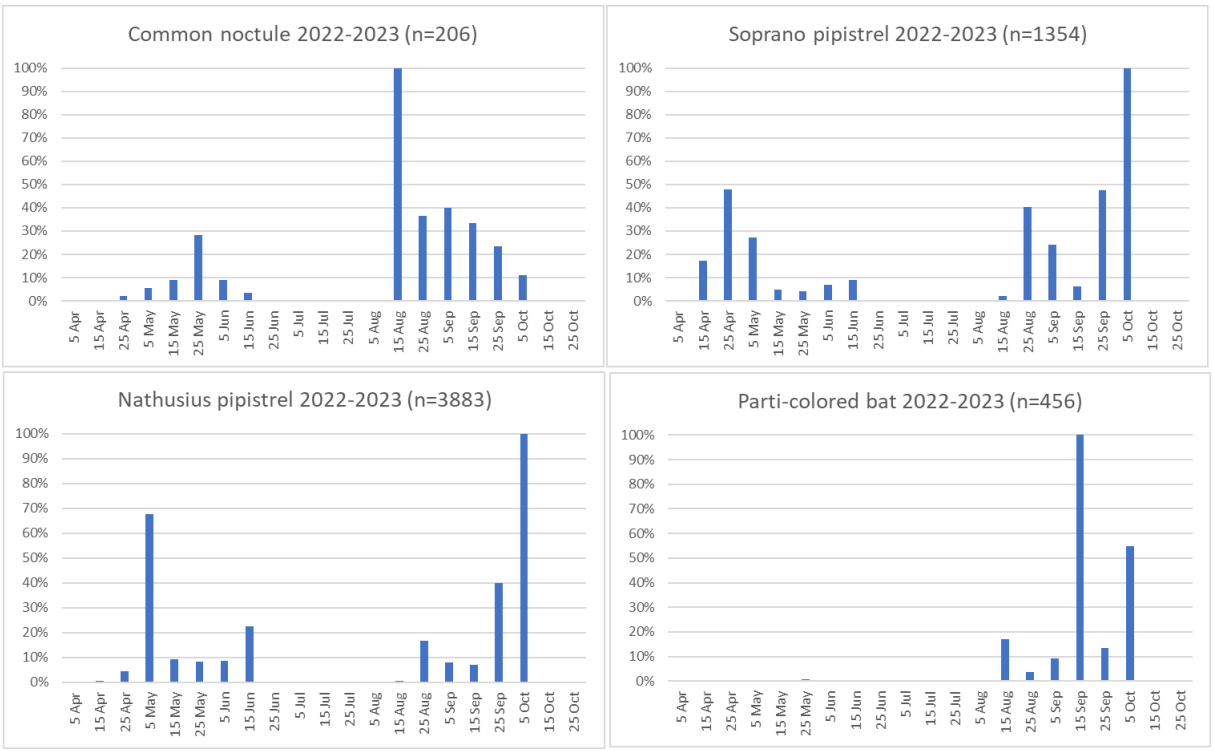

Figure 21 - Relative bat activity of the important four species of bat at Rügen. The figure shows an average of two detectors during two years of deployment – The scale is relative to the maximum value. "n=xxx" gives the total number of recordings included in the calculations.

5.3 TIME OF OFFSHORE OBSERVATIONS

The time of the night of the recordings are important in the understanding of the strategy for the sea crossing of the bats. Figure 22 and Figure 23 clearly indicates that the bats prefer to cross the open sea only when it is dark. Only very few migrating bats were registered before one hour after sunset and none occur after one hour before sunset. Crossing open sea during daylight or dusk equals a higher probability of becoming preyed upon by predators such as gulls.

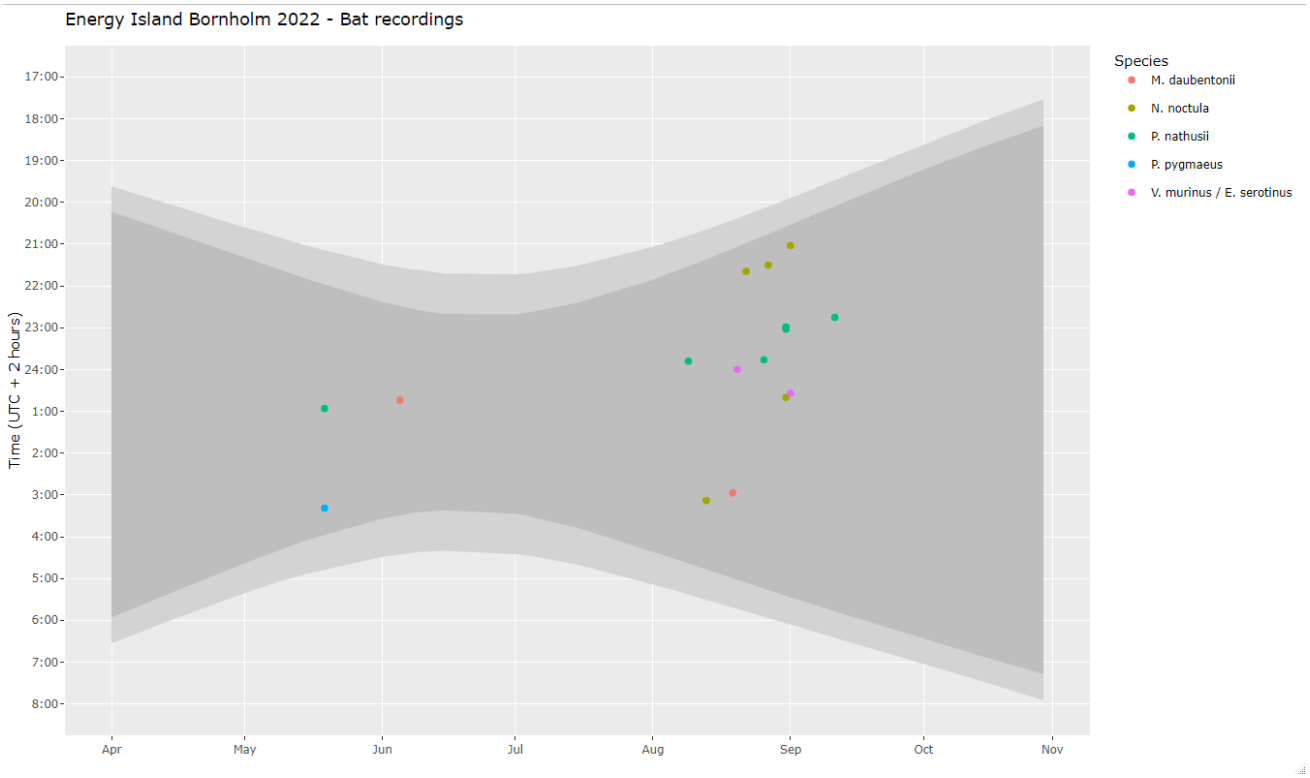

Figure 22 - Time of the bat recordings on the buoy-based detectors in 2022. Shaded areas indicate the nights. Pale shading indicates the dusk from sun set to the sun is more than 6 degrees under the horizon and similar in the morning until sunrise (see suninfo.dk for more information).

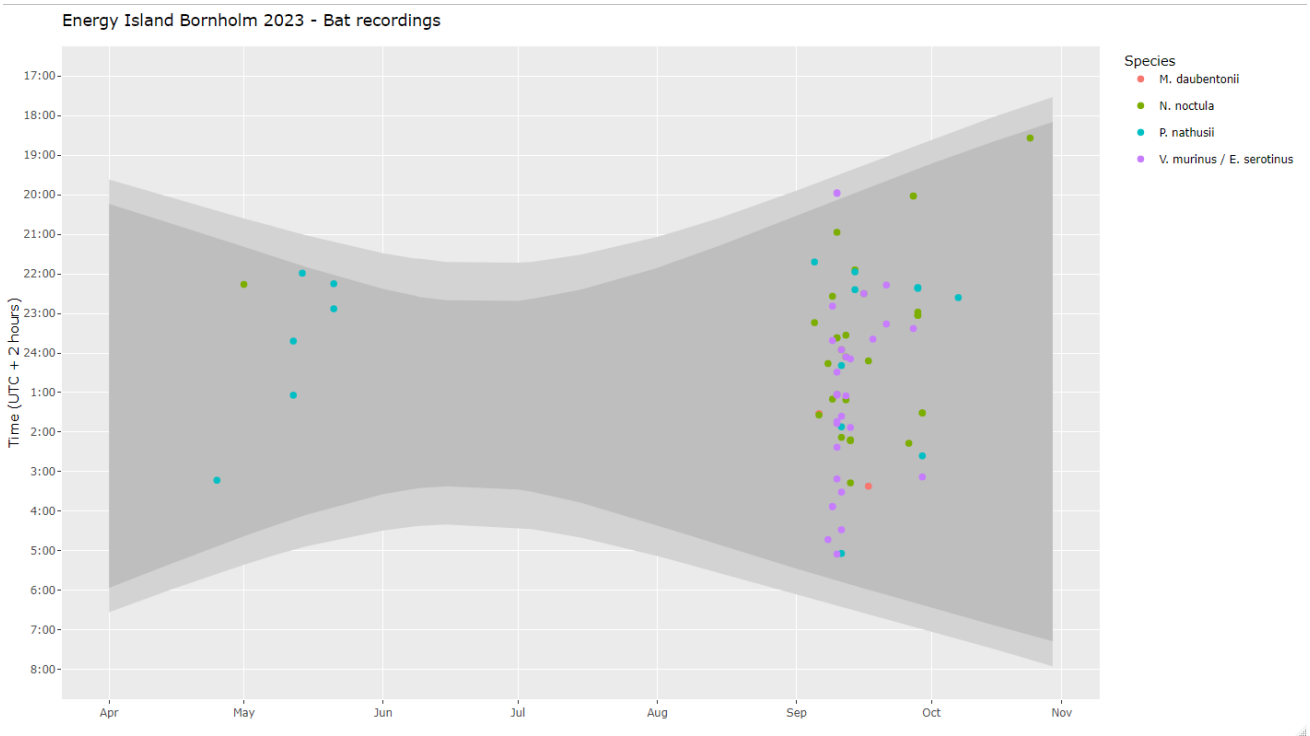

Figure 23 - Time of the bat recordings on the buoy-based detectors in 2023. Shaded areas indicate the nights. Pale shading indicates the dusk from sun set to the sun is more than 6 degrees under the horizon and similar in the morning until sunrise (see suninfo.dk for more information)

5.4 OFFSHORE OBSERVATION AND WEATHER CONDITION

Weather conditions are known to influence the migration of bat in offshore areas (Lagerveld, Jonge Poerink, & Geelhoed, 2021) and more specifically temperature, wind speed and wind direction are known to be the most significant parameters determining the level of bat activity (Lagerveld, Jonge Poerink, & Geelhoed, 2021).

5.4.1 TEMPERATURE

Figure 24 shows the air temperature for all registration of bats on the buoy-based survey in the pre-investigation area. This figure indicates a clear difference between the temperature intervals within the spring and autumn migrations. During spring, bats are observed at nights with temperatures ranging from 7 to 10 degrees Celsius, whereas most observation in autumn occur at temperatures below 17 degrees Celsius. The sea water in the Baltic Sea is relatively cold during spring and relatively warm during autumn and this may influence the air temperature in the different seasons. However, a potential combination of migrating and feeding bats in late summer and early autumn are important to consider. Feeding activities from bats offshore are only expected to occur during warmer night with temperature above 17 degrees Celsius. Most likely the feeding activity is strictly linked to the occurrence of insect in the marine area. Migrating bats, especially nathusius pipistrel, are not depended on the presence of insect and they migrate over the marine areas even the conditions temperatures are lower.

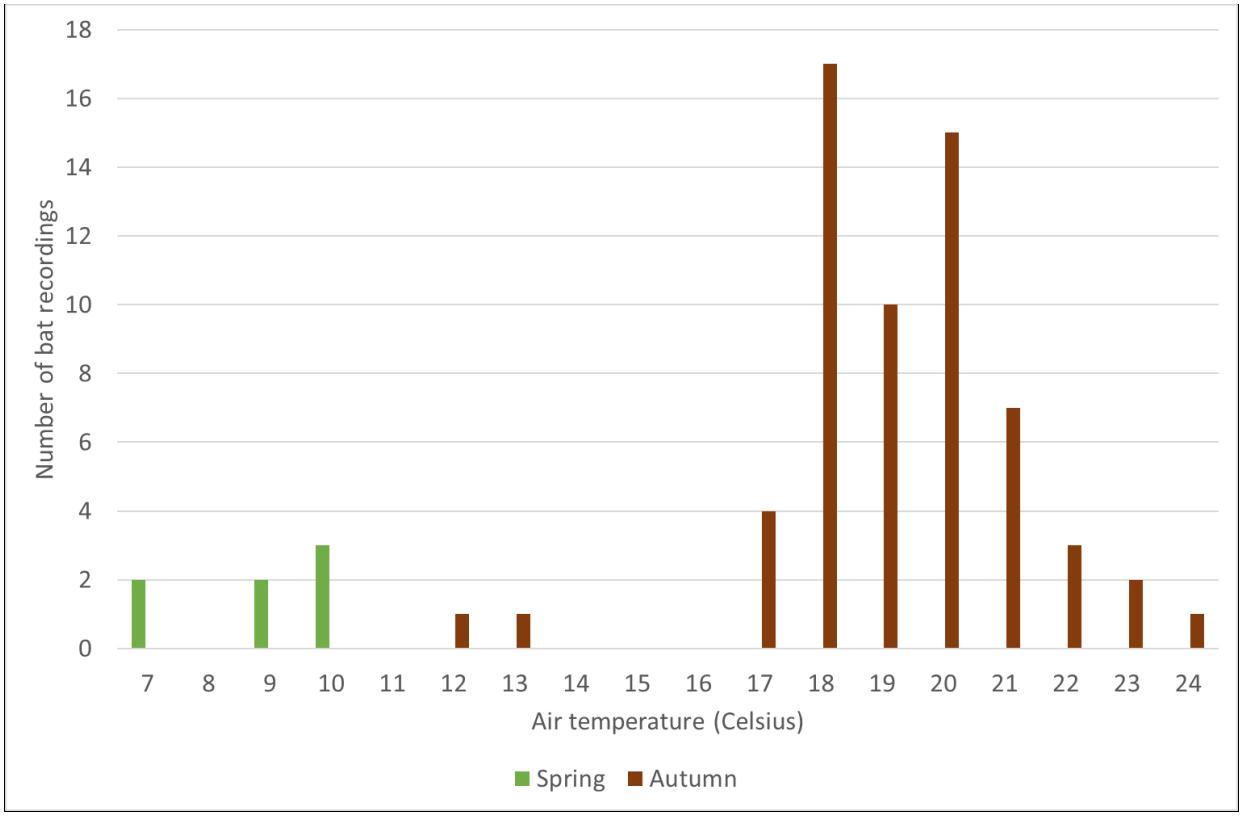

Figure 24 – Number of bat recording compared to air temperature (data on temperature from metocean buoys in the area)

5.4.2 WIND SPEED

Wind speeds are also known to be an important factor for the presence of bats offshore (Lagerveld, Jonge Poerink, & Geelhoed, 2021). Bats mainly tend to go offshore at nights with ideal (low) wind speeds. Especially the insect feeding bat might avoid strong wind speed because the absence of their prey. For the migrating

bats the preference for low wind speed is more likely link to the risk. Bats are small and strong wind will often course change in their direction and in worst case they will not be able to reach the destination before sun rise. Data from the pre-investigation area indicates, that all bats were recorded when wind speeds were lower than 7 m/s measured in 4 meter above sea level (Figure 25). Merely 8 out of 94 recording occurred at wind speeds in excess of 6 m/s, indicating that 91% of all bats fly in the offshore pre-investigation areas in conditions with wind speeds lower than 6 m/s.

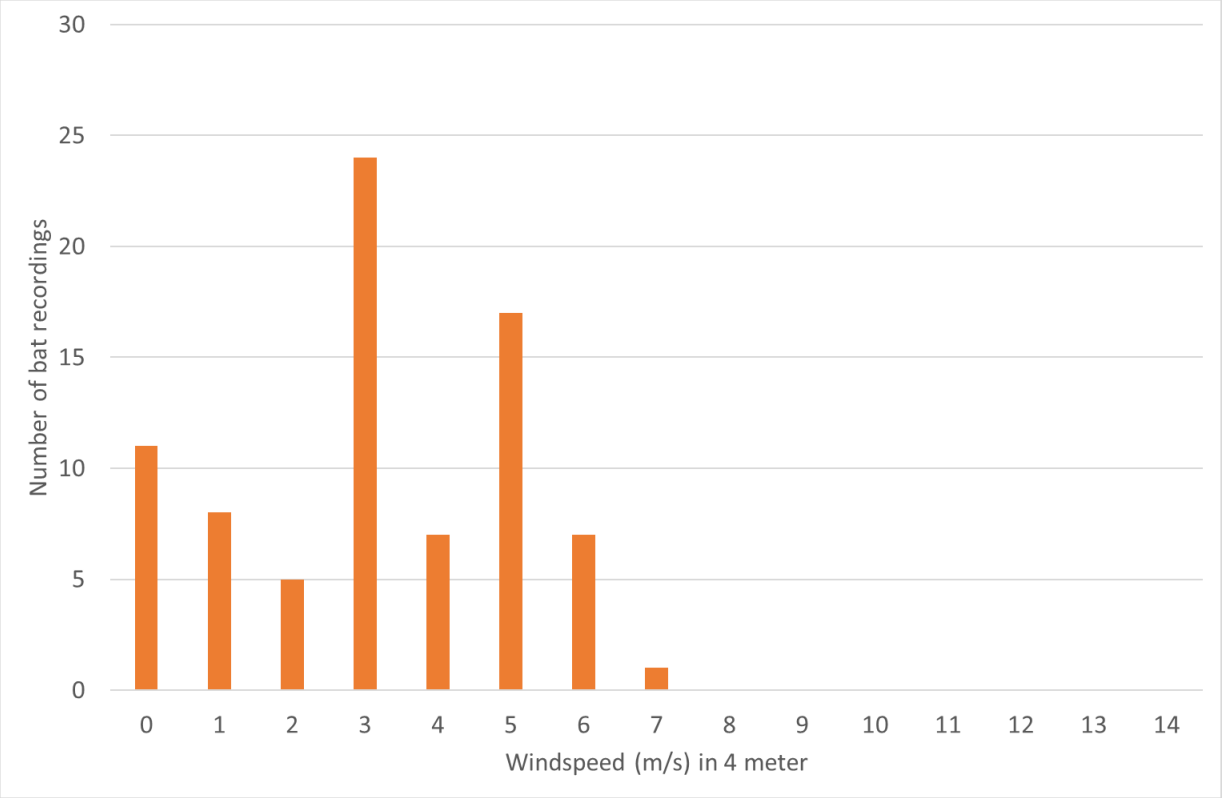

Figure 25 – Number of bat recordings compared to wind speed measured in 4 meter above sea level (data on wind speed from metocean buoys in the area)

If the logged activity of bats at sea level within the pre investigation area is compared to the wind speed measured in 150 meters above sea level (Figure 26) the wind speeds measured at the time for the bat records are generally higher and more variable. The comparison to 150 meter above sea level is relevant because the futures wind turbines may have their nacelle and their measuring instruments in this height.

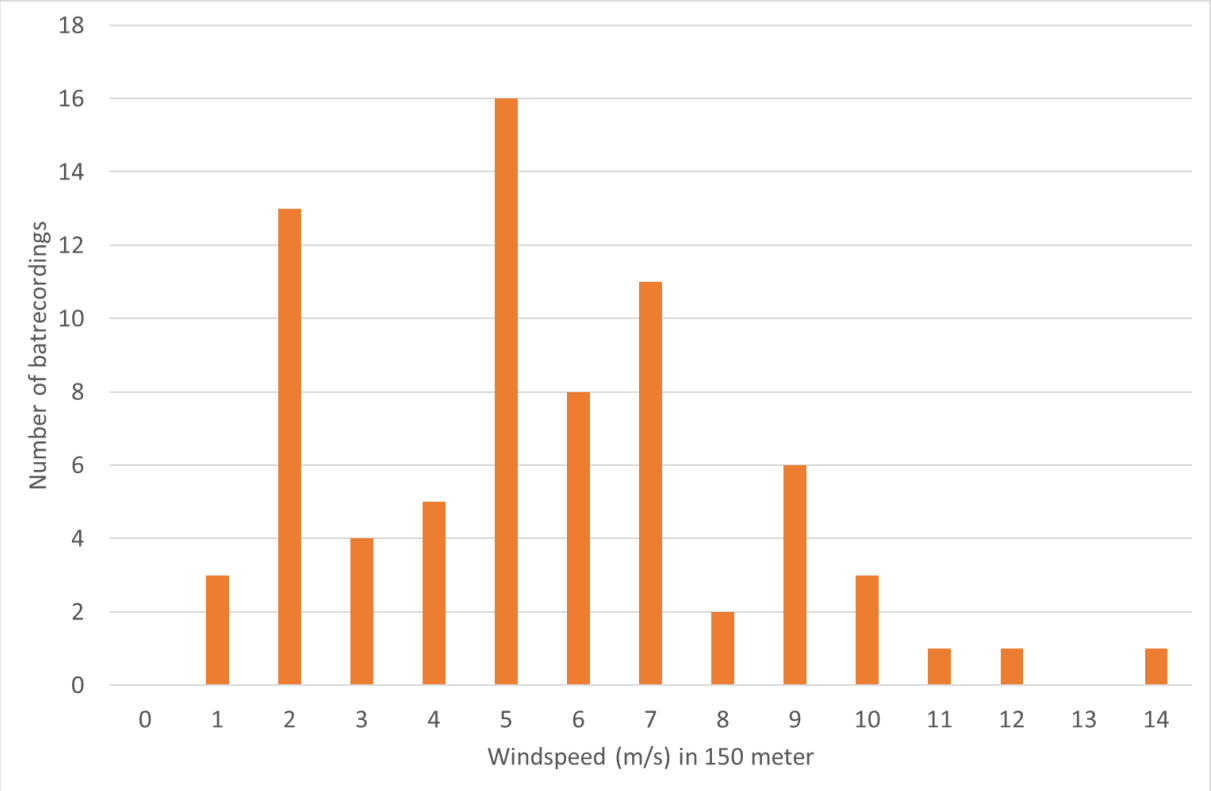

Figure 26 - Number of bat recordings compared to wind speed measured in 150 meter above sea level (data on wind speed from metocean buoys in the area).

5.4.3 WIND DIRECTION

Wind direction may also influents the bat activity offshore (Lagerveld, Jonge Poerink, & Geelhoed, 2021). An analysis the bat recordings (Figure 27) on the buoys indicates that most bats are observed in easterly wind. This might be due to the fact, that easterly winds often are combined with high temperature and low wind speed during high pressure conditions.

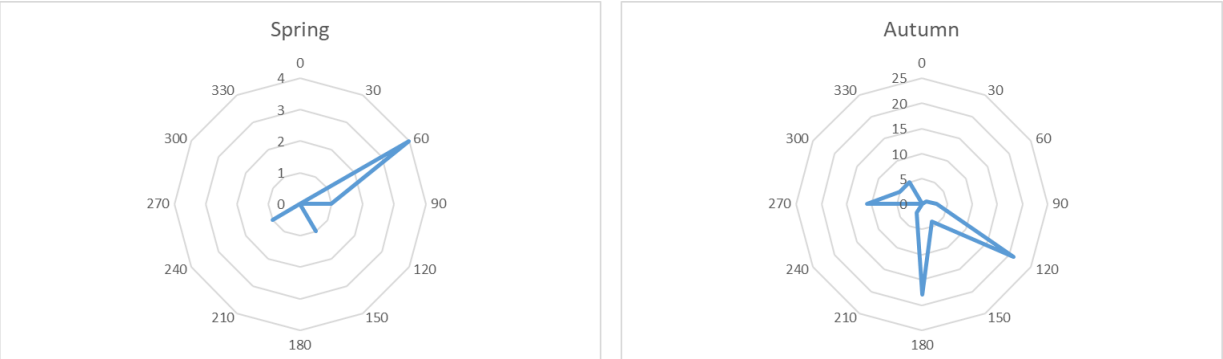

Figure 27 – Number of bat recordings compared to wind direction (data on wind direction for metocean buoys in the area).

6 STATUS

6.1 COMMON NOCTULE – STATUS IN THE PRE-INVESTIGATION AREA

Common noctule is commonly observed along the south coast of Bornholm during the autumn in the present survey. Data on the activity of common noctule acquired from the buoys in the pre investigation area back this up, as this data indicates some migration during late August and September. However, the number of offshore observations is low compared to survey from Western Baltic. There can be two reasons for these differences. Most likely the area is less important for migration of common noctule. Even though some bats may migrate across the Baltic Sea between Bornholm and Rügen, the migration occurs on a broad front with low densities. An alternative explanation could also be a matter of flight height. Unfortunately, our knowledge on the flight height of migrating bat is very limited. Especially common noctule could potentially migrate at high altitudes, a pattern known from passerine birds. Bird radar survey during spring and autumn at the Bornholm Energy Island often show massive migration in a height between 300 and 700 meters. It is generally suggested that this migration is birds. However, some of these migrations could also be common noctules.

6.2 NATHUSIUS PIPISTREL – STATUS IN THE PRE-INVESTIGATION AREA

Nathusius pipistrel are observed with high activity along the south coast of Bornholm both in spring and in autumn. Highest activity is in May and September which fit with the observations offshore. If Activity along the coast and information from the offshore survey indicate that the migration occurs over a broad front with low density. Most of the migrating bats in the strait between Rügen and Bornholm may be bats from the population on Bornholm. However, the survey from Christiansø and Utklippan indicate a flyway for some bats from Bornholm onwards to Blekinge and maybe to the area of middle Baltic Sea such as Öland, Gotland and even Finland.

6.3 PARTI-COLORED BAT – STATUS IN THE PRE-INVESTIGATION AREA

Particolored bat occurs around Bornholm only in small numbers. There are considered to be no breeding Particolored bat on Bornholm, and it is likely that the bat observed in the pre investigation area and along the coast belong populations from Sweden, Germany or Poland.

6.4 SOPRANO PIPISTREL – STATUS IN THE PRE-INVESTIGATION AREA

Soprano pipistrel seems only to migrate across the Baltic Sea in low numbers. Even though a considerable activity is observed along the south coast of Bornholm only one single Soprano Pipistrel was observed during the buoy-based survey.

6.5 OTHER BATS – STATUS IN THE PRE-INVESTIGATION AREA

Few other bat species was observed during the offshore survey. Daubenton’s bat as recorded four times on the buoys nearest to Bornholm. These observations are considered to be non-migrating bats. Daubenton’s bats are often observed feeding over the sea in coastal regions. It is likely this behaviour can include a

distance up to 10 km from the coast. The areas designated for wind farms are situated more than 15 km from Bornholm, and it seem unlikely that daubenton's bat will occur this far offshore. Few offshore observations may be serotine bat. The ultrasound of serotine bat overlaps with the sound from particolored bat and it is therefore difficult to distinguish some of the recording. However, serotine bat is normally considered to be a short distance migratory species and rarely observed offshore.

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8 APPENDIX 1 – SPECIES DISTRIBUTION

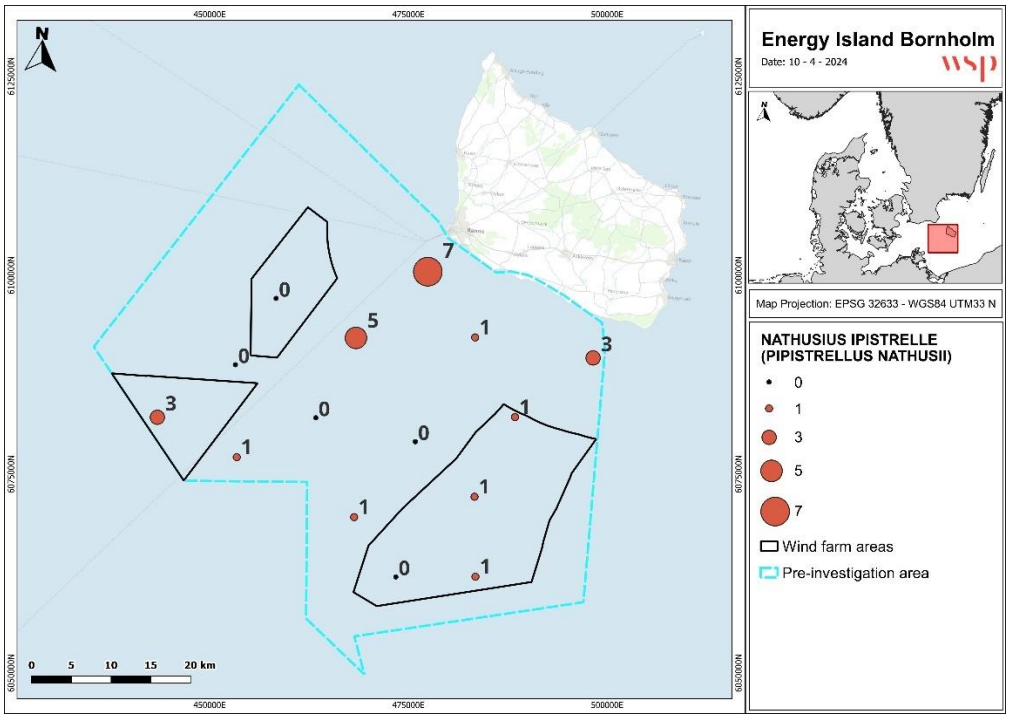

Figure 28 – Number of bat recordings per buoy. Nathusius pipistrel 2022 and 2023.

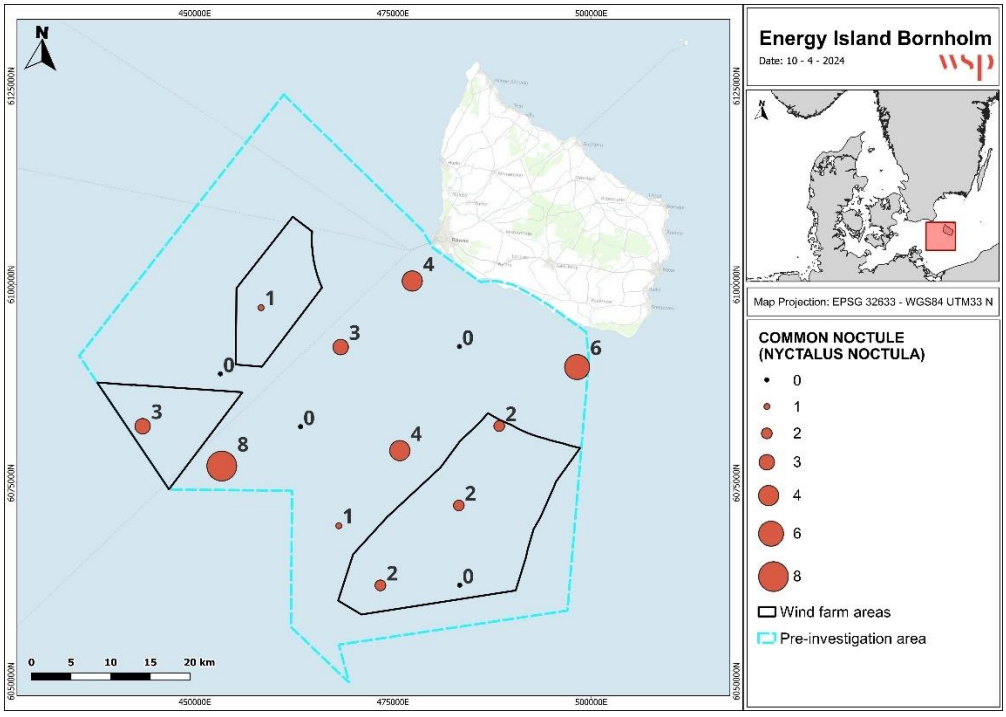

Figure 29 – Number of bat recordings per buoy. Common noctule 2022 and 2023.

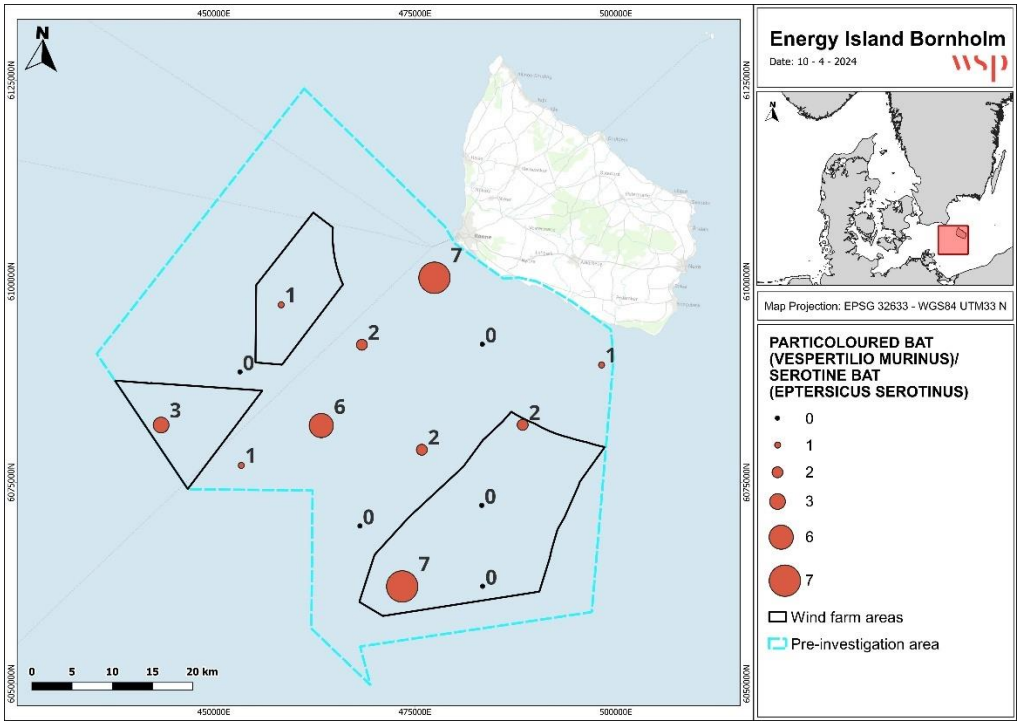

Figure 30 – Number of bat recordings per buoy. Particolored bat/Serotine 2022 and 2023.

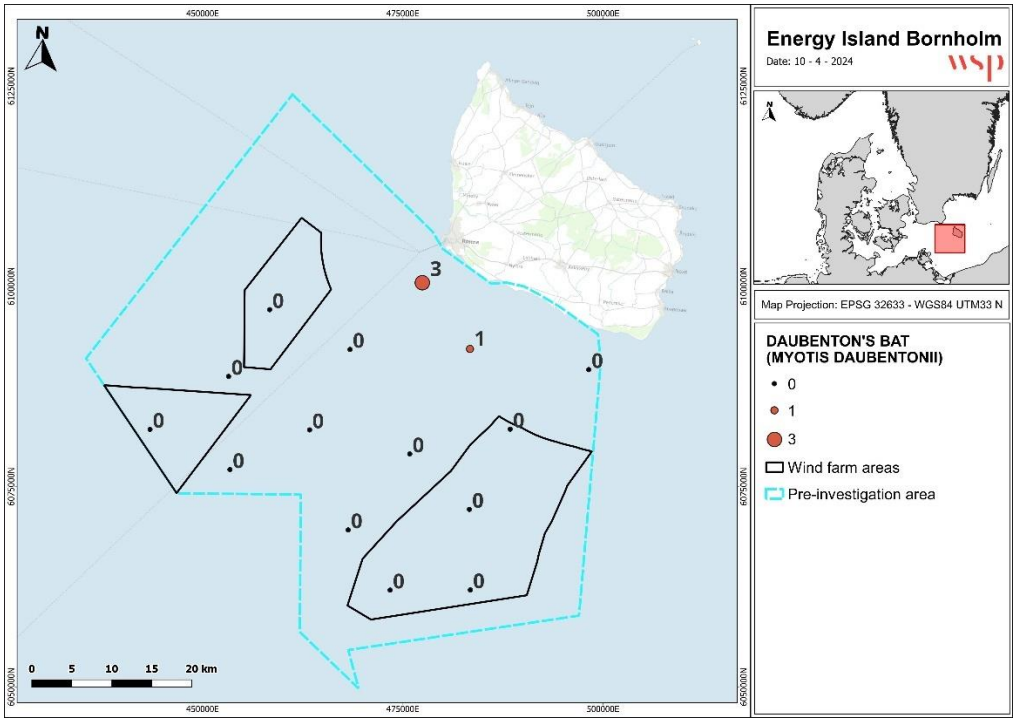

Figure 31 – Number of bat recordings per buoy. Daubenton's bat 2022 and 2023.

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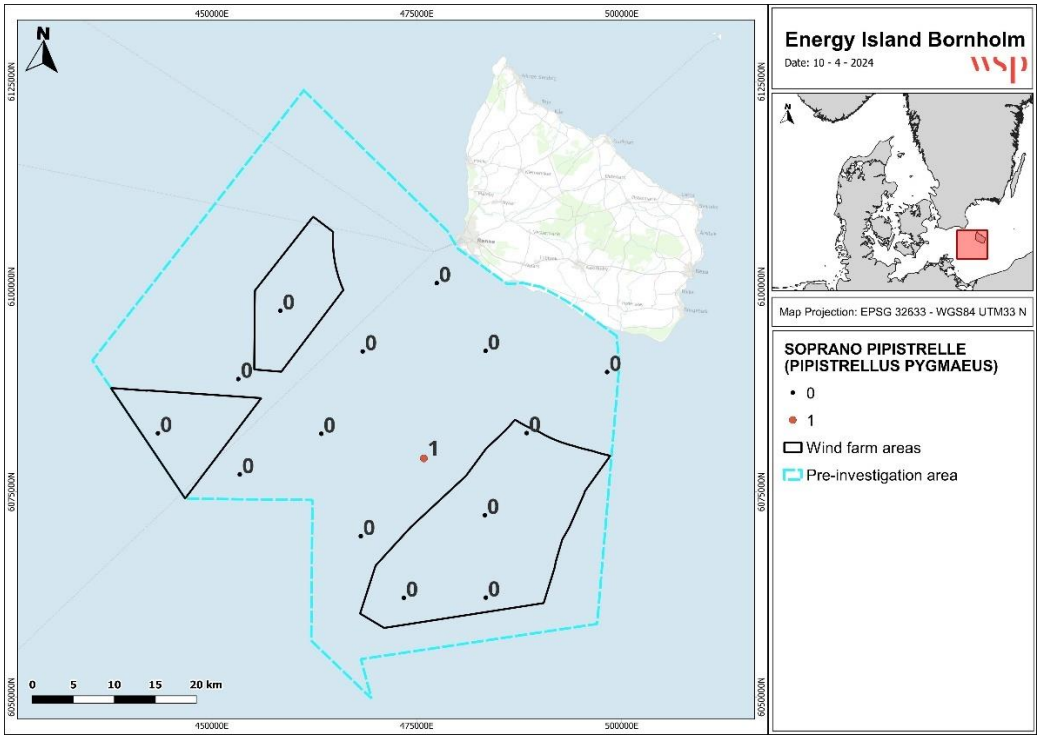
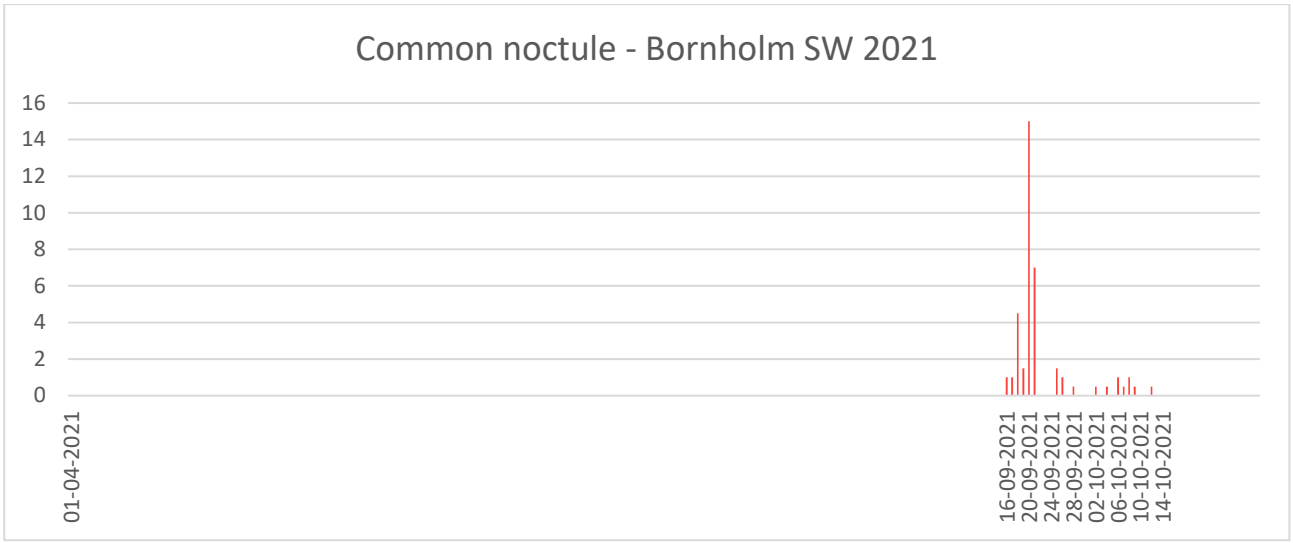
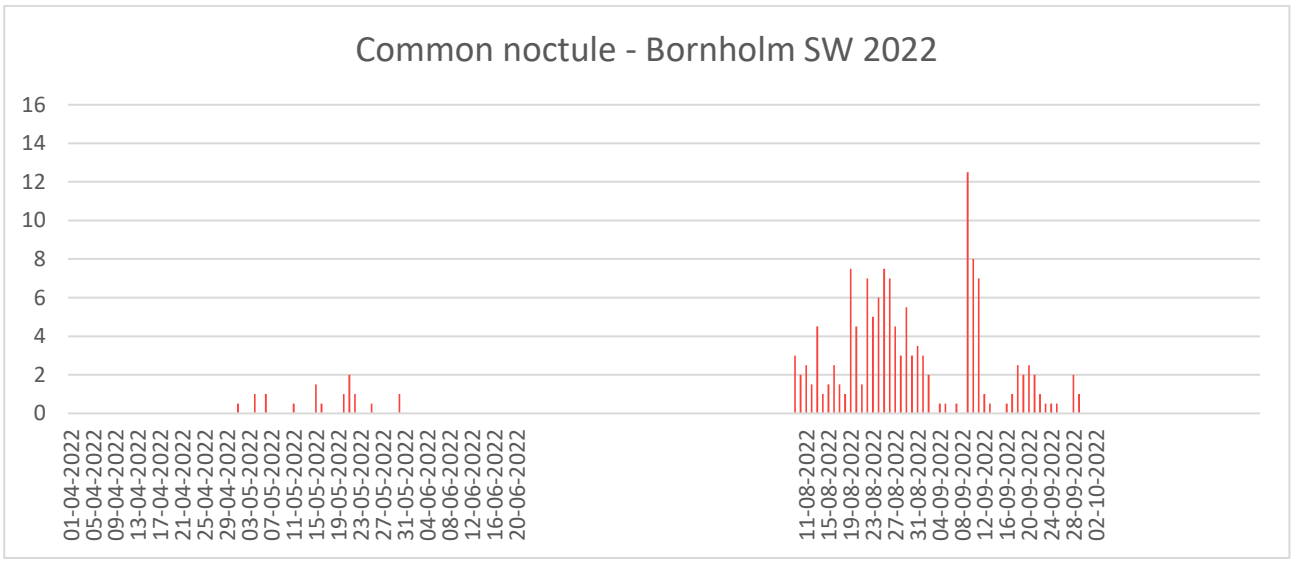
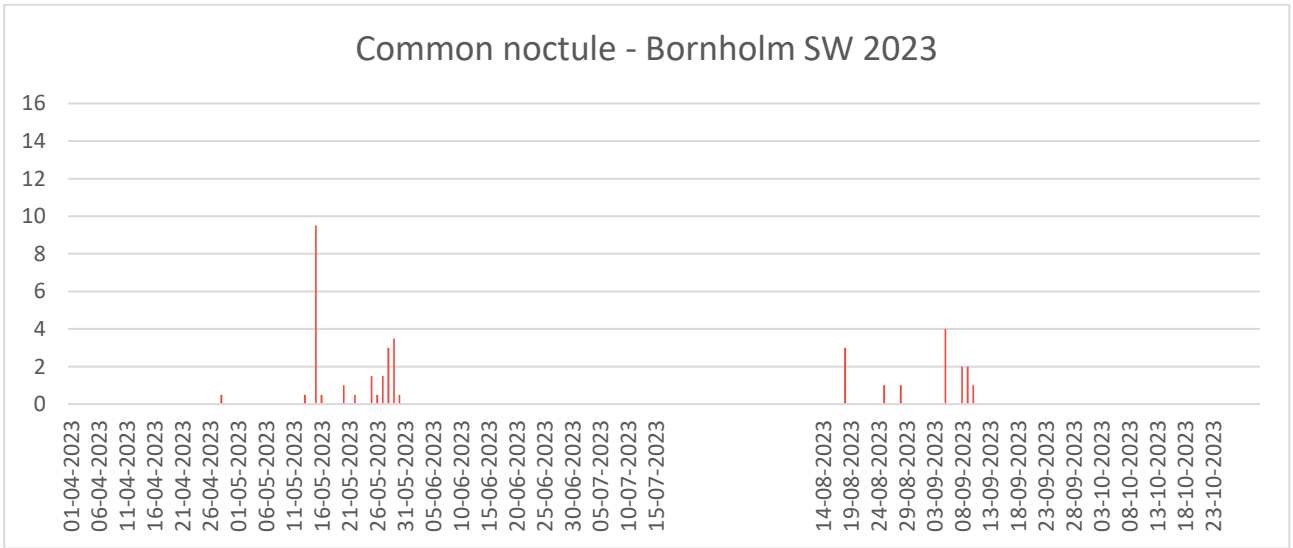


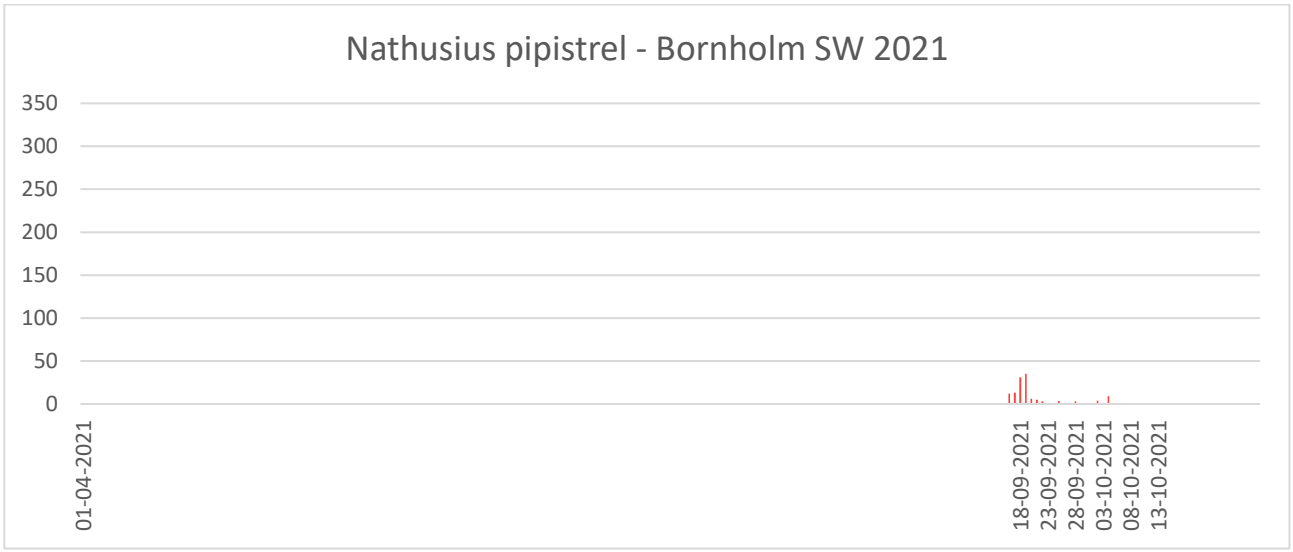
Figure 32 – Number of bat recordings per buoy. Soprano pipistrel 2022 and 2023.

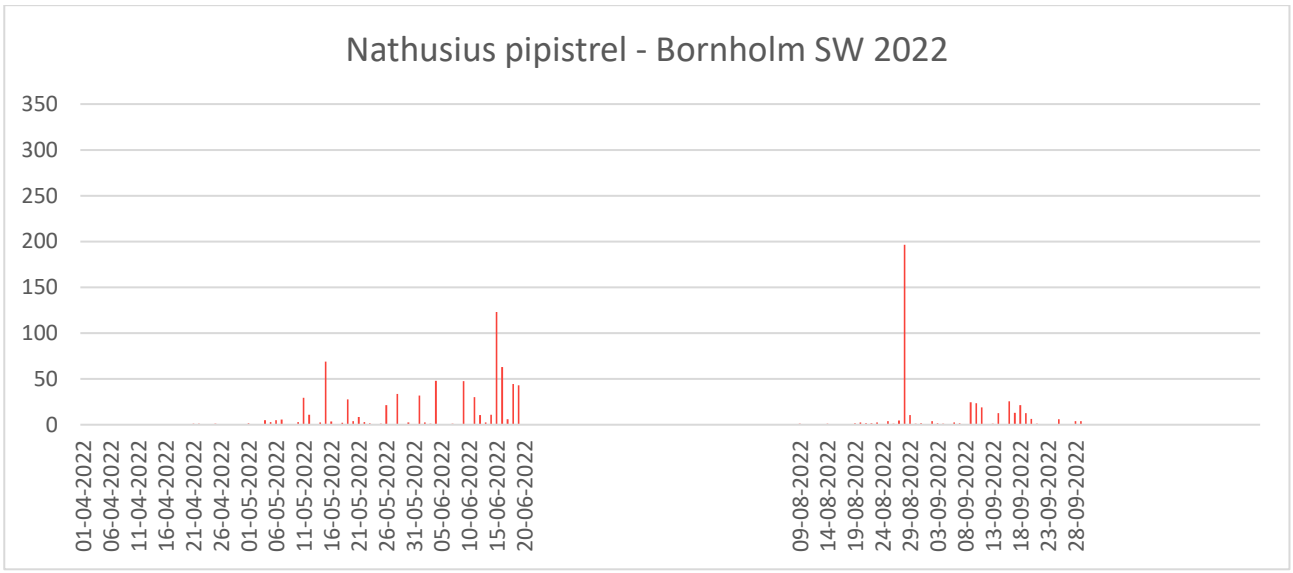
9 APPENDIX 2 – OBSERVATIONS PER NIGHT

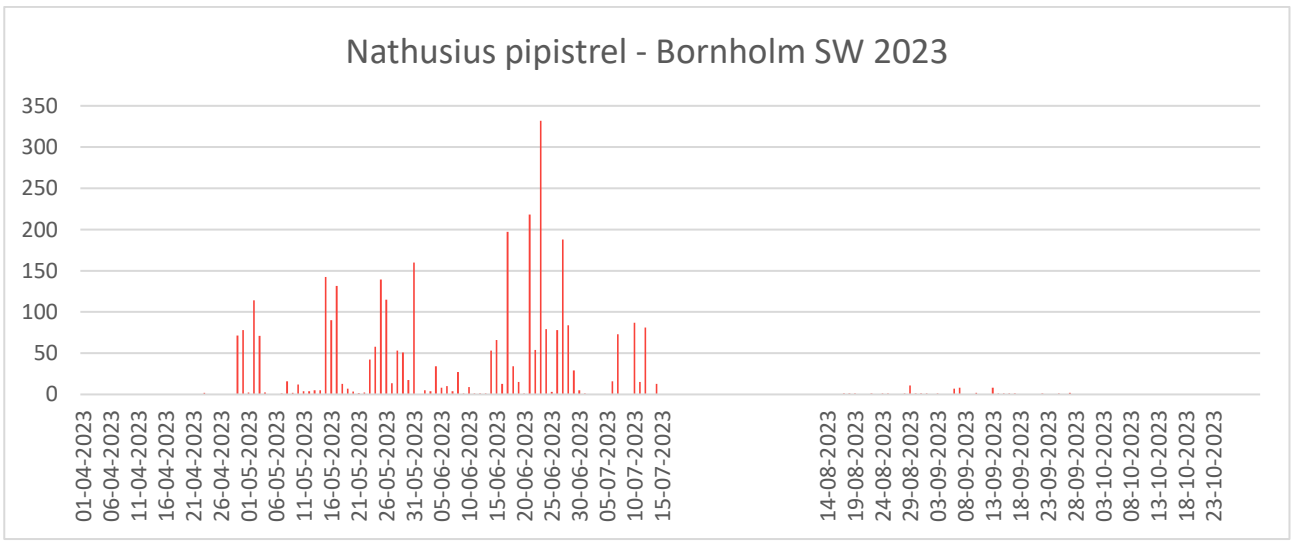







Nathusius pipistrel - Bornholm SW 2021
350
300
250
200
150
100
50
0
01-04-2021
18-09-2021
23-09-2021
28-09-2021
03-10-2021
08-10-2021
13-10-2021


Nathusius pipistrel - Bornholm SW 2022
350
300
250
200
150
100
50
0
01-04-2022
06-04-2022
11-04-2022
16-04-2022
21-04-2022
26-04-2022
01-05-2022
06-05-2022
11-05-2022
16-05-2022
21-05-2022
26-05-2022
31-05-2022
05-06-2022
10-06-2022
15-06-2022
20-06-2022
09-08-2022
14-08-2022
19-08-2022
24-08-2022
29-08-2022
03-09-2022
08-09-2022
13-09-2022
18-09-2022
23-09-2022
28-09-2022


Nathusius pipistrel - Bornholm SW 2023
350
300
250
200
150
100
50
0
01-04-2023
06-04-2023
11-04-2023
16-04-2023
21-04-2023
26-04-2023
01-05-2023
06-05-2023
11-05-2023
16-05-2023
21-05-2023
26-05-2023
31-05-2023
05-06-2023
10-06-2023
15-06-2023
20-06-2023
25-06-2023
30-06-2023
05-07-2023
10-07-2023
15-07-2023
14-08-2023
19-08-2023
24-08-2023
29-08-2023
03-09-2023
08-09-2023
13-09-2023
18-09-2023
23-09-2023
28-09-2023
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13-10-2023
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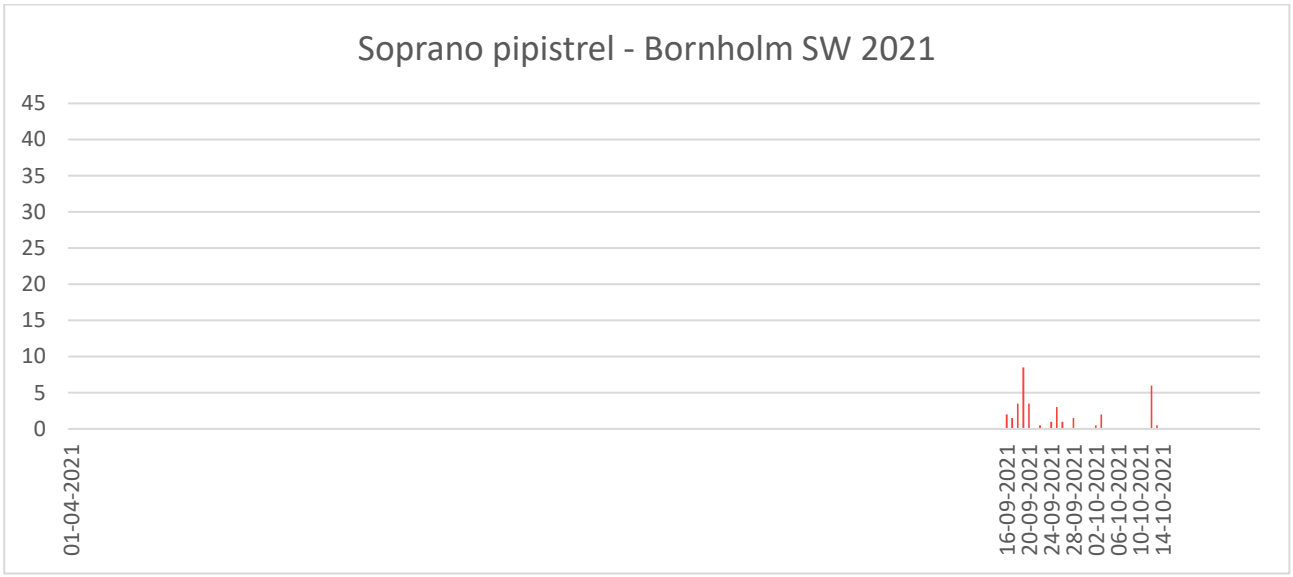
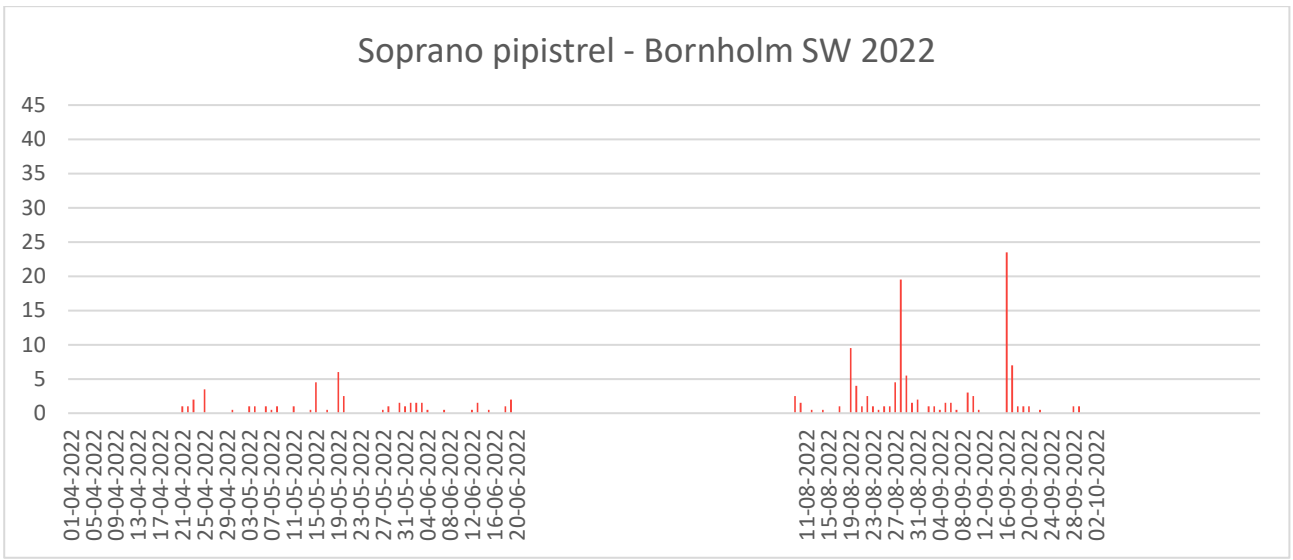
23-10-2023


Soprano pipistrel - Bornholm SW 2021
45
40
35
30
25
20
15
10
5
0
01-04-2021
16-09-2021
20-09-2021
24-09-2021
28-09-2021
02-10-2021
06-10-2021
10-10-2021
14-10-2021


Soprano pipistrel - Bornholm SW 2022
45
40
35
30
25
20
15
10
5
0
01-04-2022
05-04-2022
09-04-2022
13-04-2022
17-04-2022
21-04-2022
25-04-2022
29-04-2022
03-05-2022
07-05-2022
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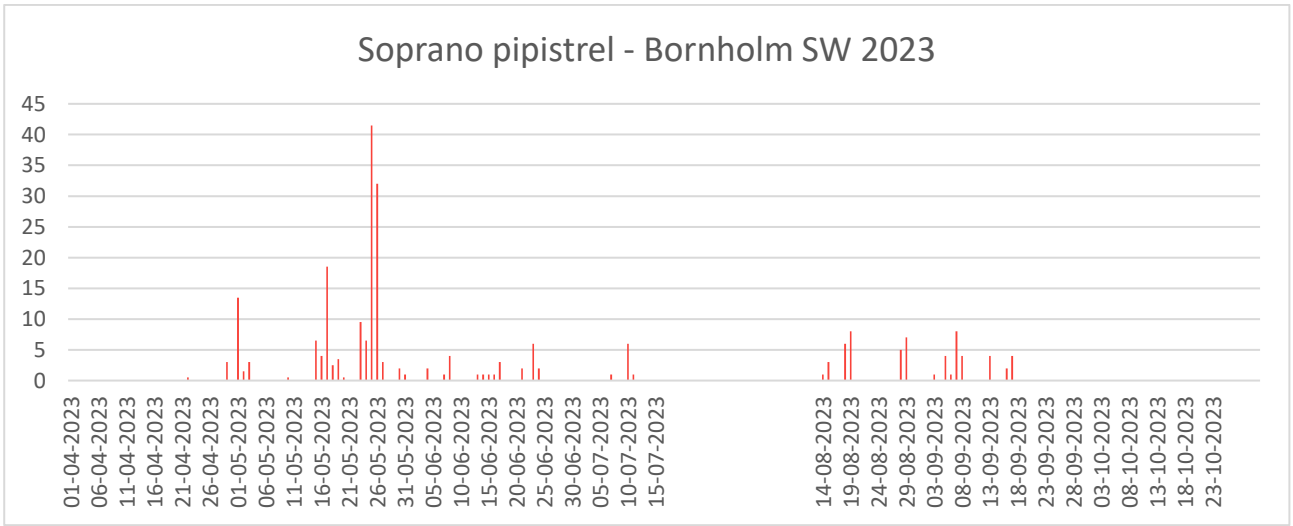
15-05-2022
19-05-2022
23-05-2022
27-05-2022
31-05-2022
04-06-2022
08-06-2022
12-06-2022
16-06-2022
20-06-2022
11-08-2022
15-08-2022
19-08-2022
23-08-2022
27-08-2022
31-08-2022
04-09-2022
08-09-2022
12-09-2022
16-09-2022
20-09-2022
24-09-2022
28-09-2022
02-10-2022


Soprano pipistrel - Bornholm SW 2023
45
40
35
30
25
20
15
10
5
0
01-04-2023
06-04-2023
11-04-2023
16-04-2023
21-04-2023
26-04-2023
01-05-2023
06-05-2023
11-05-2023
16-05-2023
21-05-2023
26-05-2023
31-05-2023
05-06-2023
10-06-2023
15-06-2023
20-06-2023
25-06-2023
30-06-2023
05-07-2023
10-07-2023
15-07-2023
14-08-2023
19-08-2023
24-08-2023
29-08-2023
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08-09-2023
13-09-2023
18-09-2023
23-09-2023
28-09-2023
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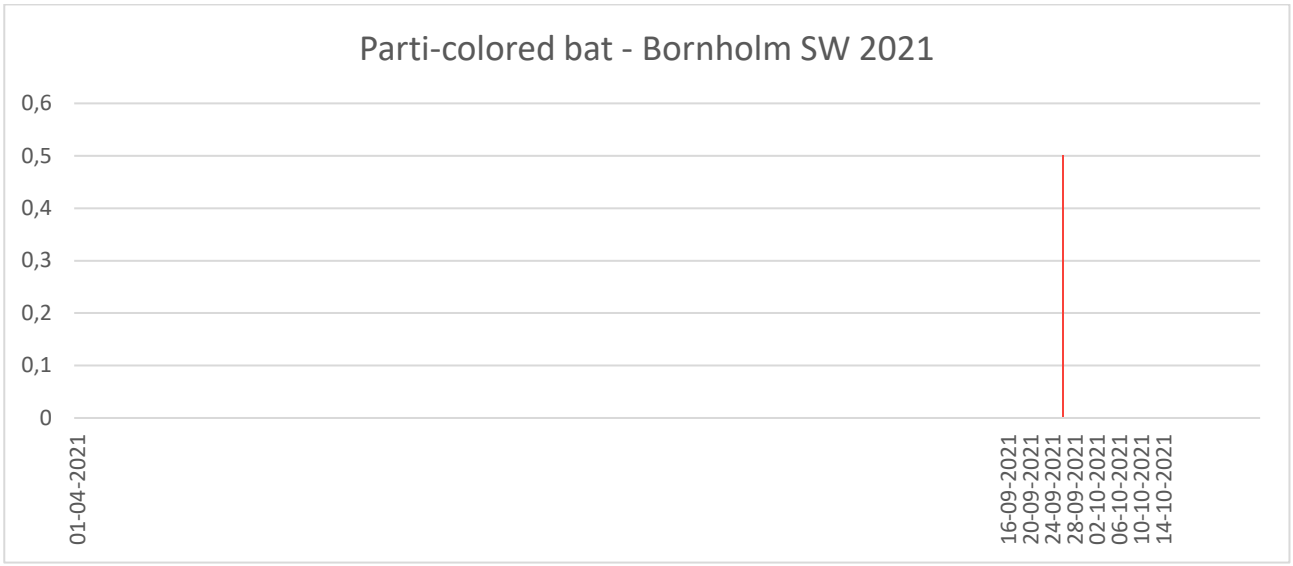
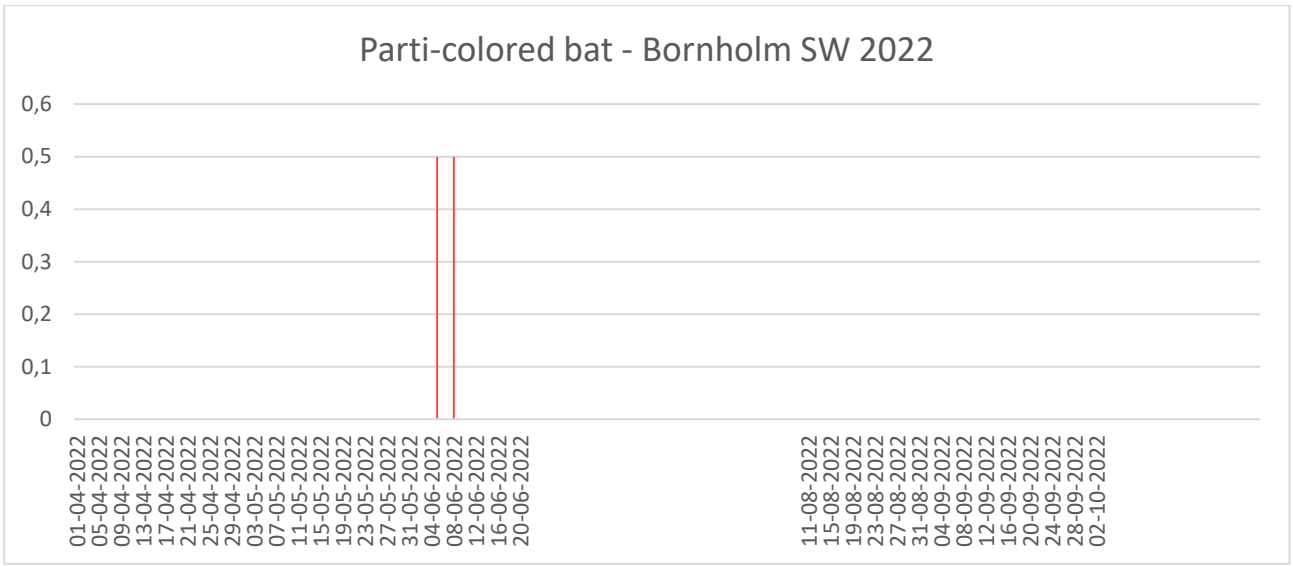
13-10-2023
18-10-2023
23-10-2023


Parti-colored bat - Bornholm SW 2021
0,6
0,5
0,4
0,3
0,2
0,1
0
01-04-2021
16-09-2021
20-09-2021
24-09-2021
28-09-2021
02-10-2021
06-10-2021
10-10-2021
14-10-2021


Parti-colored bat - Bornholm SW 2022
0,6
0,5
0,4
0,3
0,2
0,1
0
01-04-2022
05-04-2022
09-04-2022
13-04-2022
17-04-2022
21-04-2022
25-04-2022
29-04-2022
03-05-2022
07-05-2022
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15-05-2022
19-05-2022
23-05-2022
27-05-2022
31-05-2022
04-06-2022
08-06-2022
12-06-2022
16-06-2022
20-06-2022
11-08-2022
15-08-2022
19-08-2022
23-08-2022
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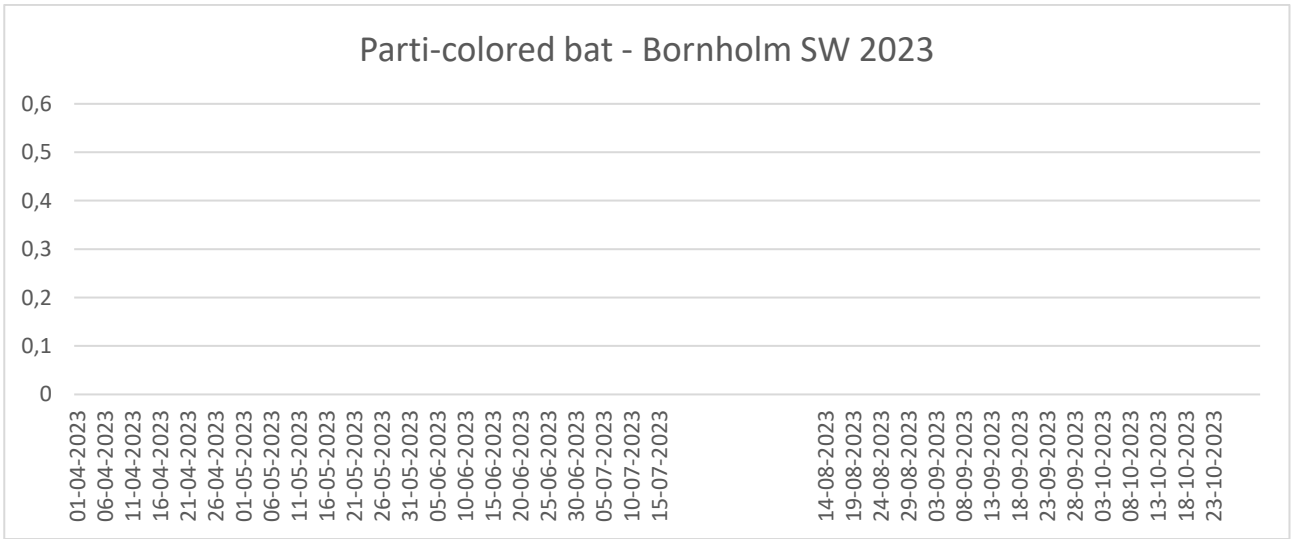
31-08-2022
04-09-2022
08-09-2022
12-09-2022
16-09-2022
20-09-2022
24-09-2022
28-09-2022
02-10-2022


Parti-colored bat - Bornholm SW 2023
0,6
0,5
0,4
0,3
0,2
0,1
0
01-04-2023
06-04-2023
11-04-2023
16-04-2023
21-04-2023
26-04-2023
01-05-2023
06-05-2023
11-05-2023
16-05-2023
21-05-2023
26-05-2023
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15-06-2023
20-06-2023
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30-06-2023
05-07-2023
10-07-2023
15-07-2023
14-08-2023
19-08-2023
24-08-2023
29-08-2023
03-09-2023
08-09-2023
13-09-2023
18-09-2023
23-09-2023
28-09-2023
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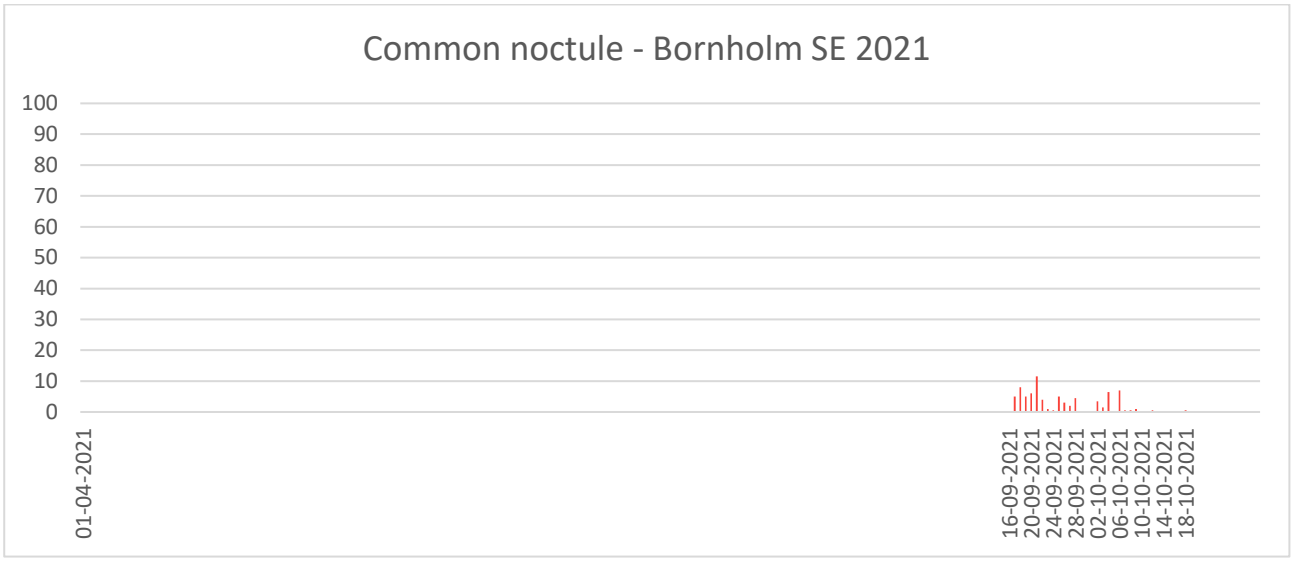
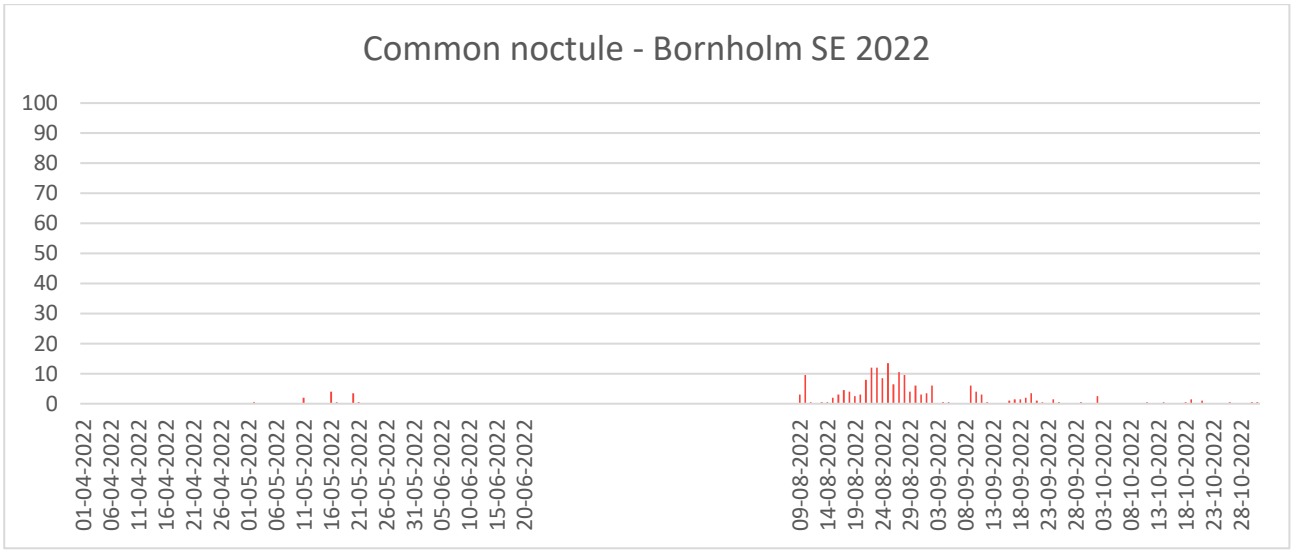
08-10-2023
13-10-2023
18-10-2023
23-10-2023


Common noctule - Bornholm SE 2021
100
90
80
70
60
50
40
30
20
10
0
01-04-2021
16-09-2021
20-09-2021
24-09-2021
28-09-2021
02-10-2021
06-10-2021
10-10-2021
14-10-2021
18-10-2021


Common noctule - Bornholm SE 2022
100
90
80
70
60
50
40
30
20
10
0
01-04-2022
06-04-2022
11-04-2022
16-04-2022
21-04-2022
26-04-2022
01-05-2022
06-05-2022
11-05-2022
16-05-2022
21-05-2022
26-05-2022
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05-06-2022
10-06-2022
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13-09-2022
18-09-2022
23-09-2022
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13-10-2022
18-10-2022
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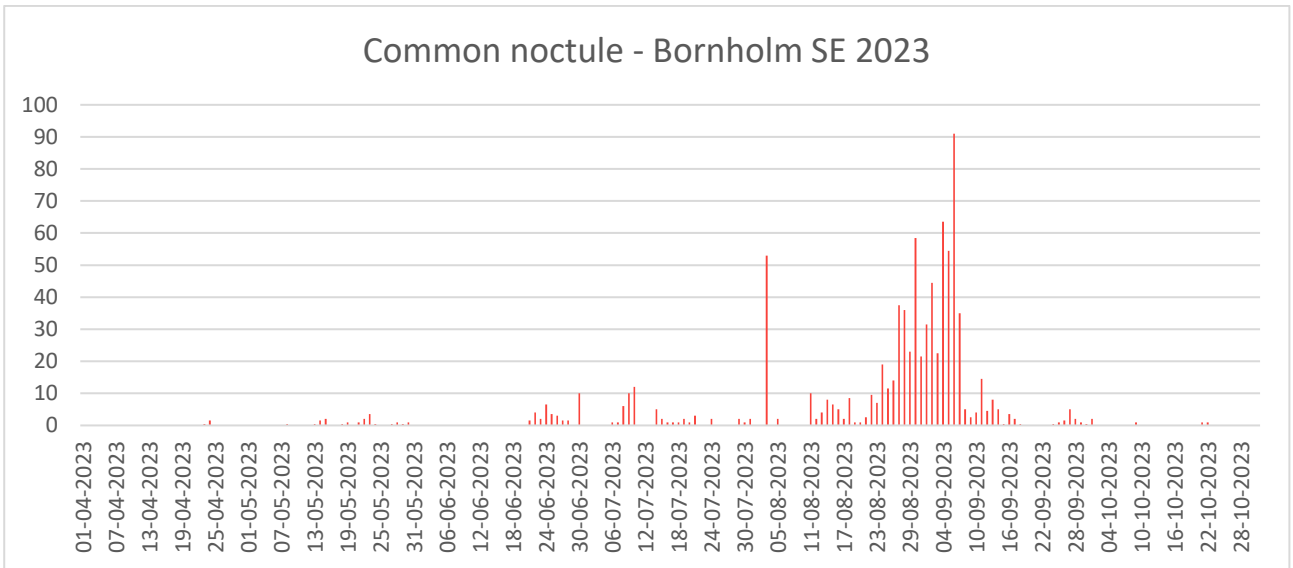
28-10-2022


Common noctule - Bornholm SE 2023
100
90
80
70
60
50
40
30
20
10
0
01-04-2023
07-04-2023
13-04-2023
19-04-2023
25-04-2023
01-05-2023
07-05-2023
13-05-2023
19-05-2023
25-05-2023
31-05-2023
06-06-2023
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24-06-2023
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04-09-2023
10-09-2023
16-09-2023
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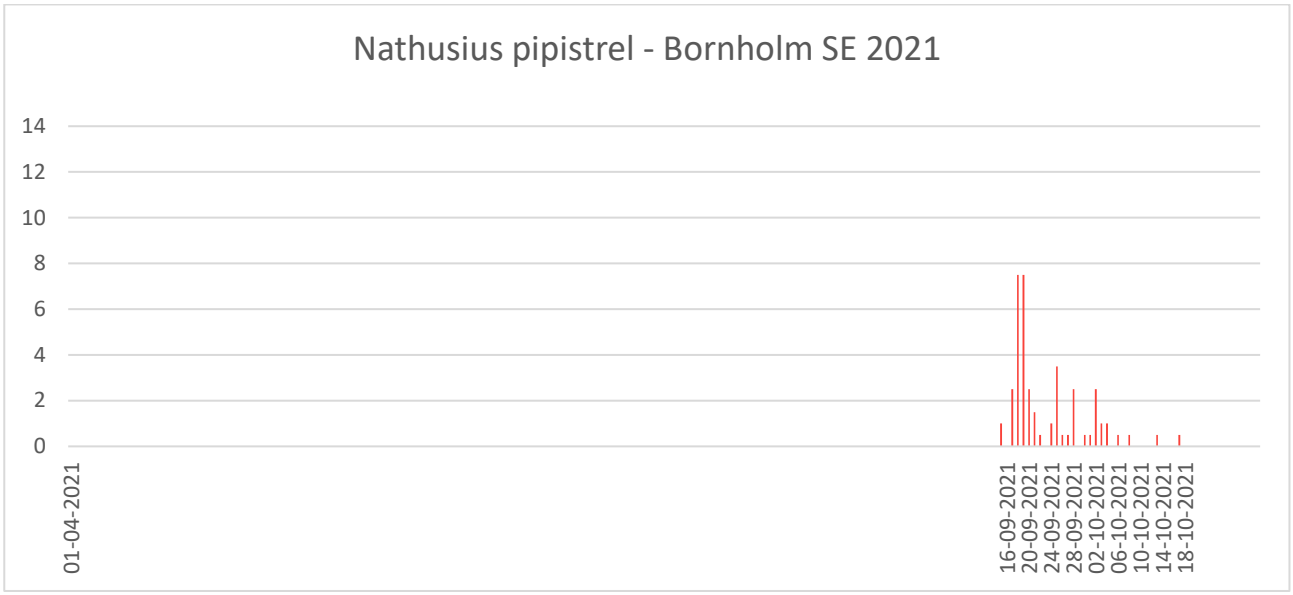
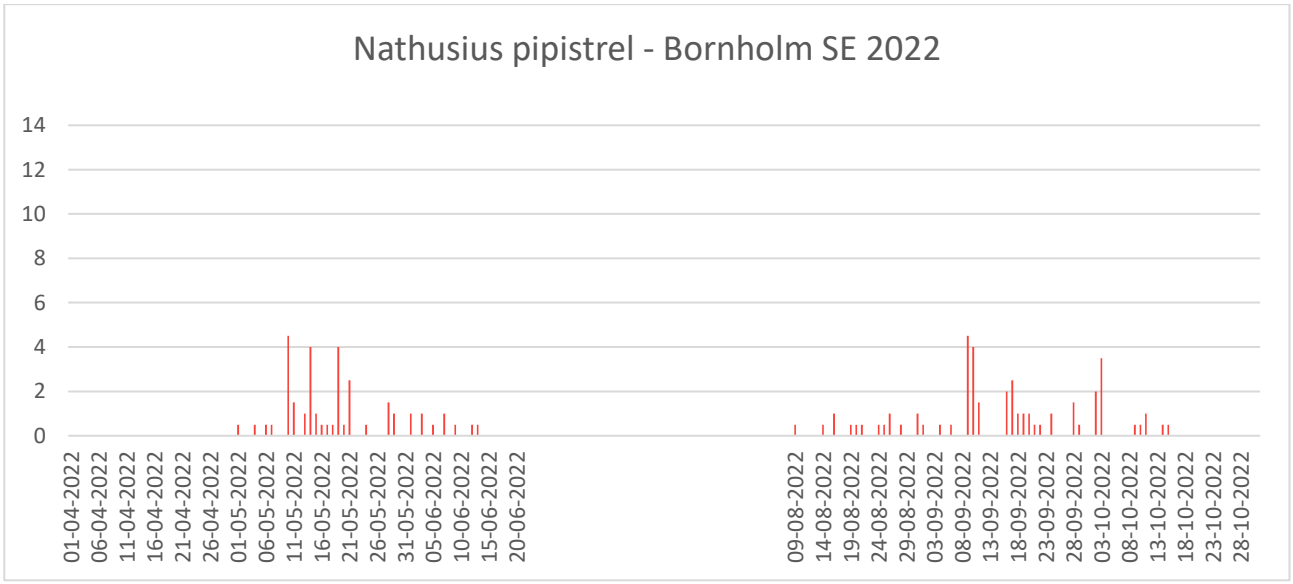
16-10-2023
22-10-2023
28-10-2023


Nathusius pipistrel - Bornholm SE 2021
14
12
10
8
6
4
2
0
01-04-2021
16-09-2021
20-09-2021
24-09-2021
28-09-2021
02-10-2021
06-10-2021
10-10-2021
14-10-2021
18-10-2021


Nathusius pipistrel - Bornholm SE 2022
14
12
10
8
6
4
2
0
01-04-2022
06-04-2022
11-04-2022
16-04-2022
21-04-2022
26-04-2022
01-05-2022
06-05-2022
11-05-2022
16-05-2022
21-05-2022
26-05-2022
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05-06-2022
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20-06-2022
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29-08-2022
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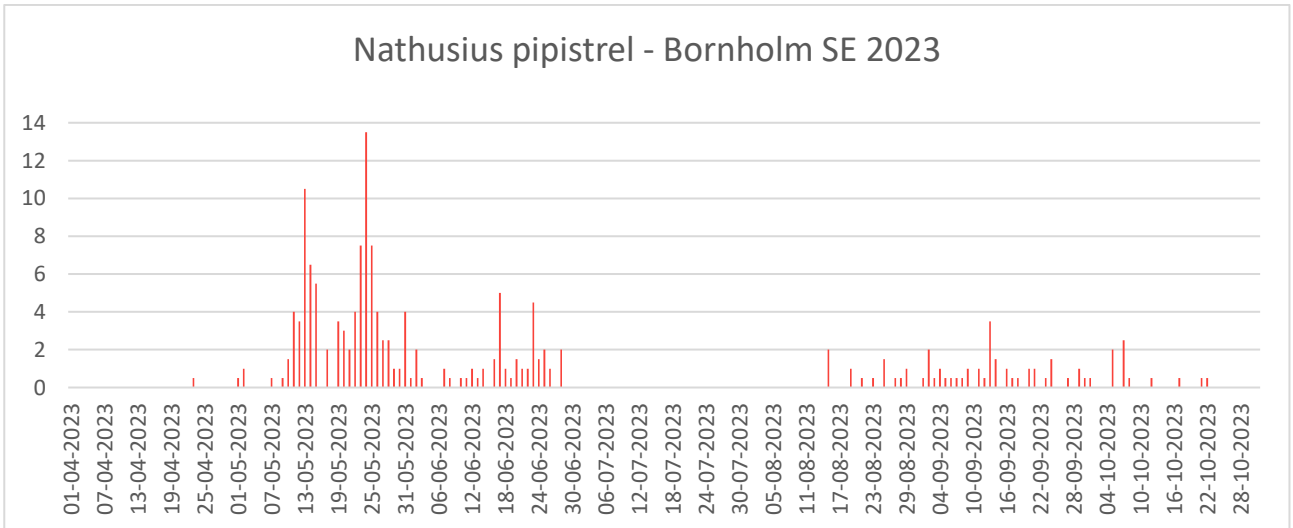
13-09-2022
18-09-2022
23-09-2022
28-09-2022
03-10-2022
08-10-2022
13-10-2022
18-10-2022
23-10-2022
28-10-2022


Nathusius pipistrel - Bornholm SE 2023
14
12
10
8
6
4
2
0
01-04-2023
07-04-2023
13-04-2023
19-04-2023
25-04-2023
01-05-2023
07-05-2023
13-05-2023
19-05-2023
25-05-2023
31-05-2023
06-06-2023
12-06-2023
18-06-2023
24-06-2023
30-06-2023
06-07-2023
12-07-2023
18-07-2023
24-07-2023
30-07-2023
05-08-2023
11-08-2023
17-08-2023
23-08-2023
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04-09-2023
10-09-2023
16-09-2023
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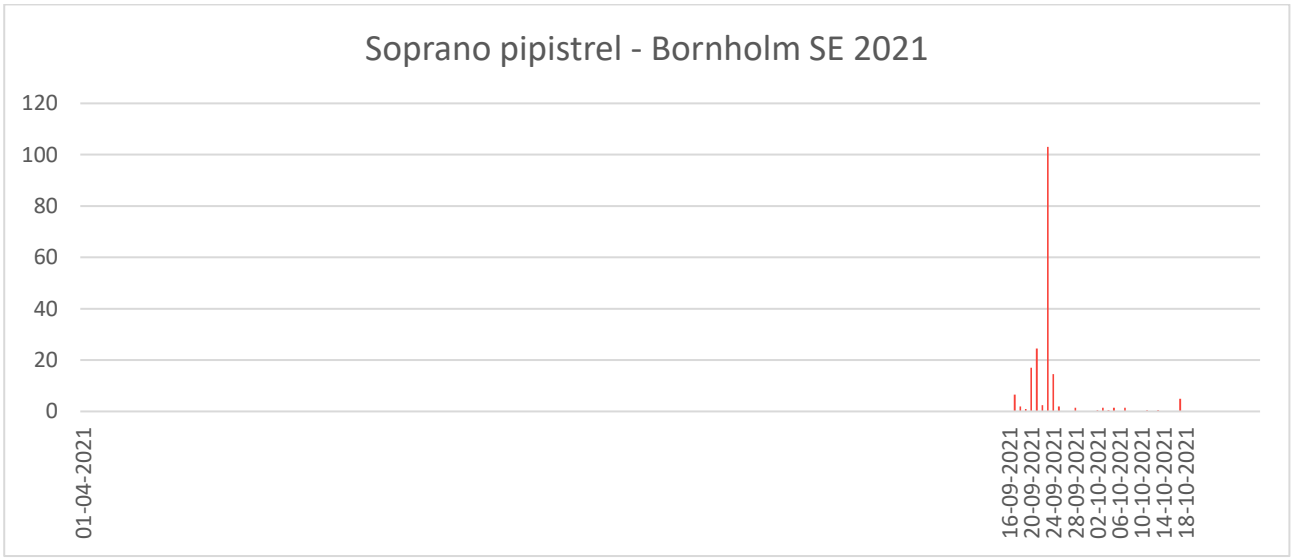
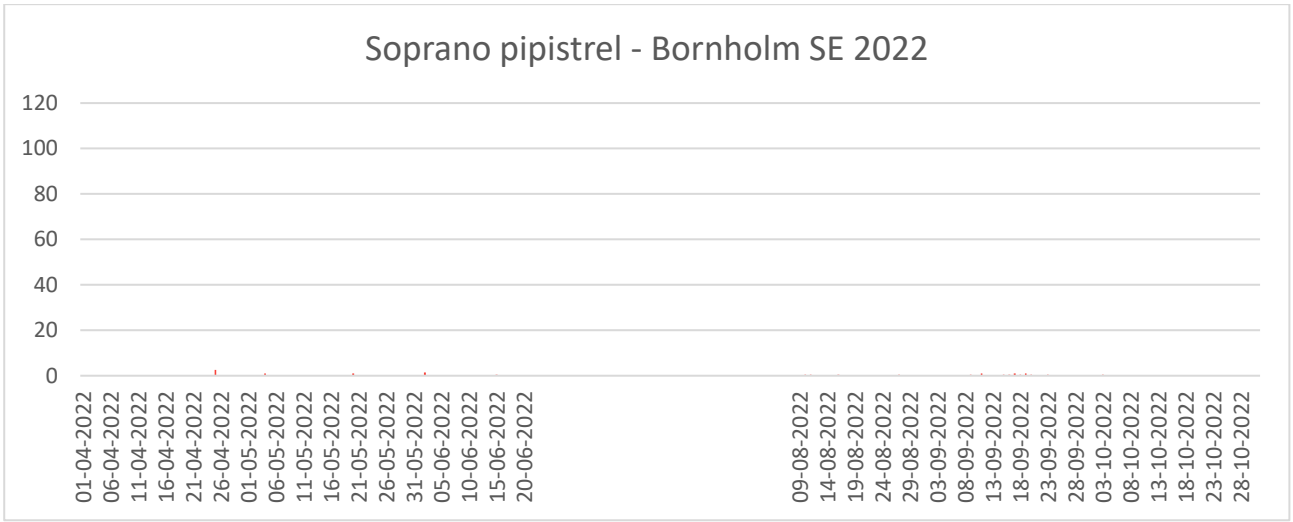
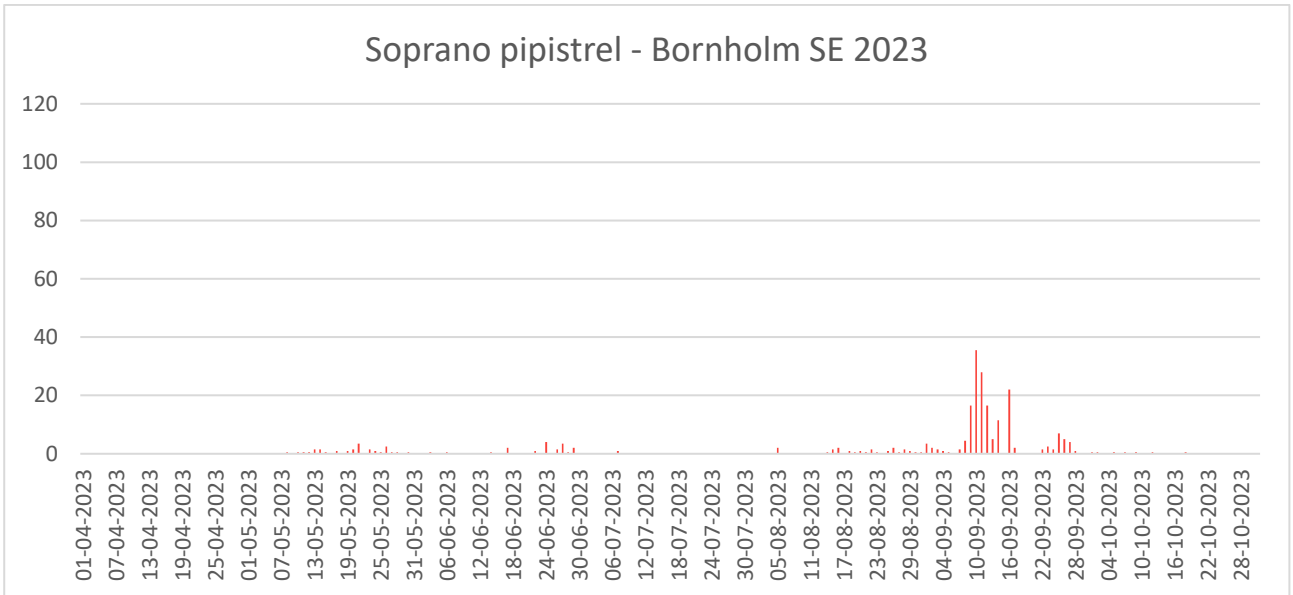
28-09-2023
04-10-2023
10-10-2023
16-10-2023
22-10-2023
28-10-2023


Soprano pipistrel - Bornholm SE 2021
120
100
80
60
40
20
0
01-04-2021
16-09-2021
20-09-2021
24-09-2021
28-09-2021
02-10-2021
06-10-2021
10-10-2021
14-10-2021
18-10-2021


Soprano pipistrel - Bornholm SE 2022
120
100
80
60
40
20
0
01-04-2022
06-04-2022
11-04-2022
16-04-2022
21-04-2022
26-04-2022
01-05-2022
06-05-2022
11-05-2022
16-05-2022
21-05-2022
26-05-2022
31-05-2022
05-06-2022
10-06-2022
15-06-2022
20-06-2022
09-08-2022
14-08-2022
19-08-2022
24-08-2022
29-08-2022
03-09-2022
08-09-2022
13-09-2022
18-09-2022
23-09-2022
28-09-2022
03-10-2022
08-10-2022
13-10-2022
18-10-2022
23-10-2022
28-10-2022


Soprano pipistrel - Bornholm SE 2023
120
100
80
60
40
20
0
01-04-2023
07-04-2023
13-04-2023
19-04-2023
25-04-2023
01-05-2023
07-05-2023
13-05-2023
19-05-2023
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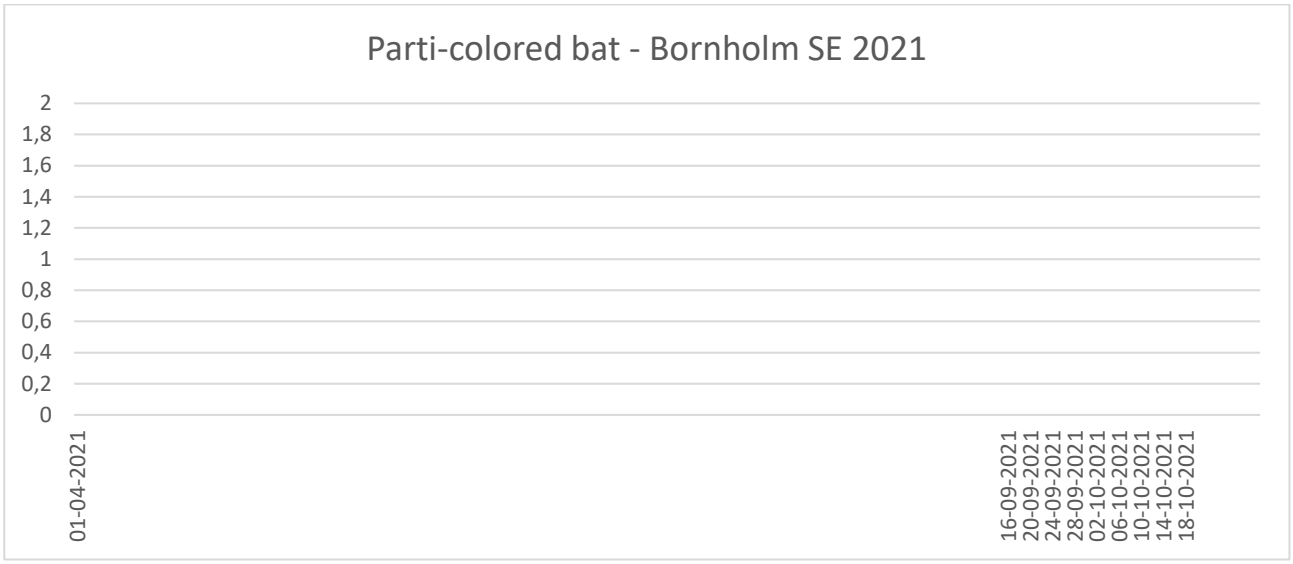
Parti-colored bat - Bornholm SE 2021
2
1,8
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1,4
1,2
1
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0,4
0,2
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01-04-2021
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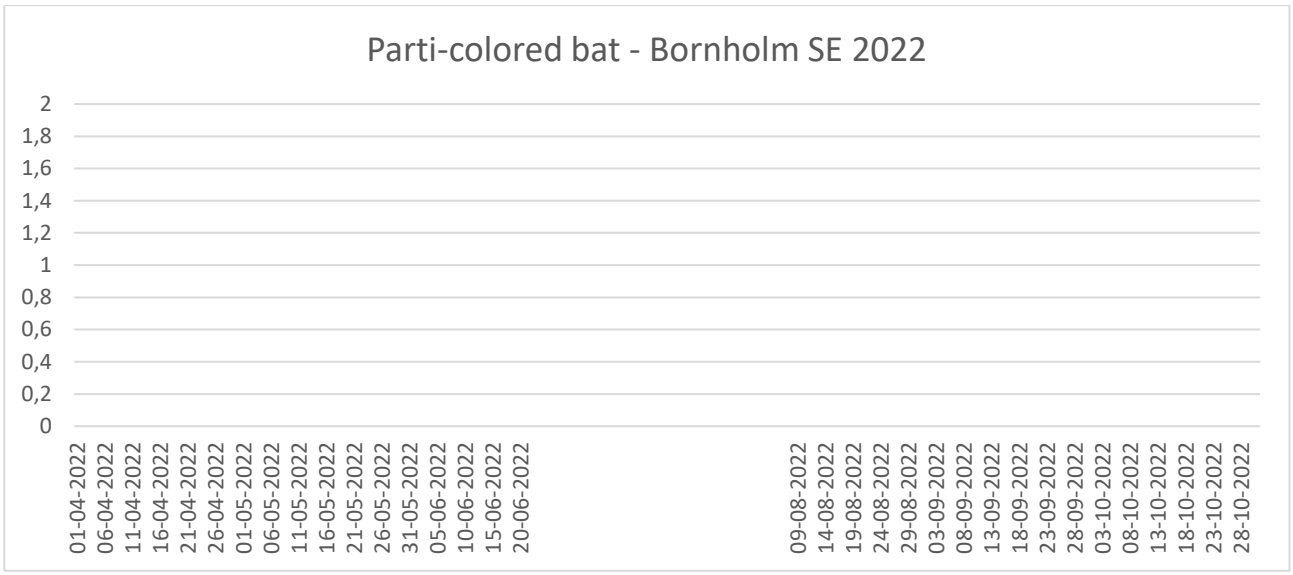
Parti-colored bat - Bornholm SE 2022
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0,4
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0
01-04-2022
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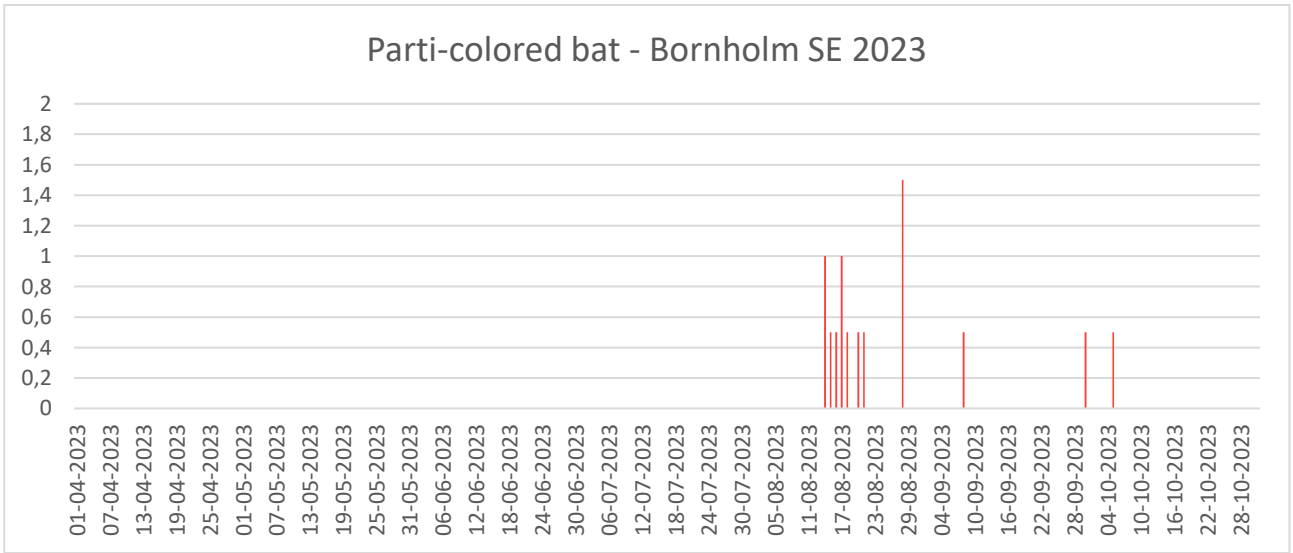
Parti-colored bat - Bornholm SE 2023
2
1,8
1,6
1,4
1,2
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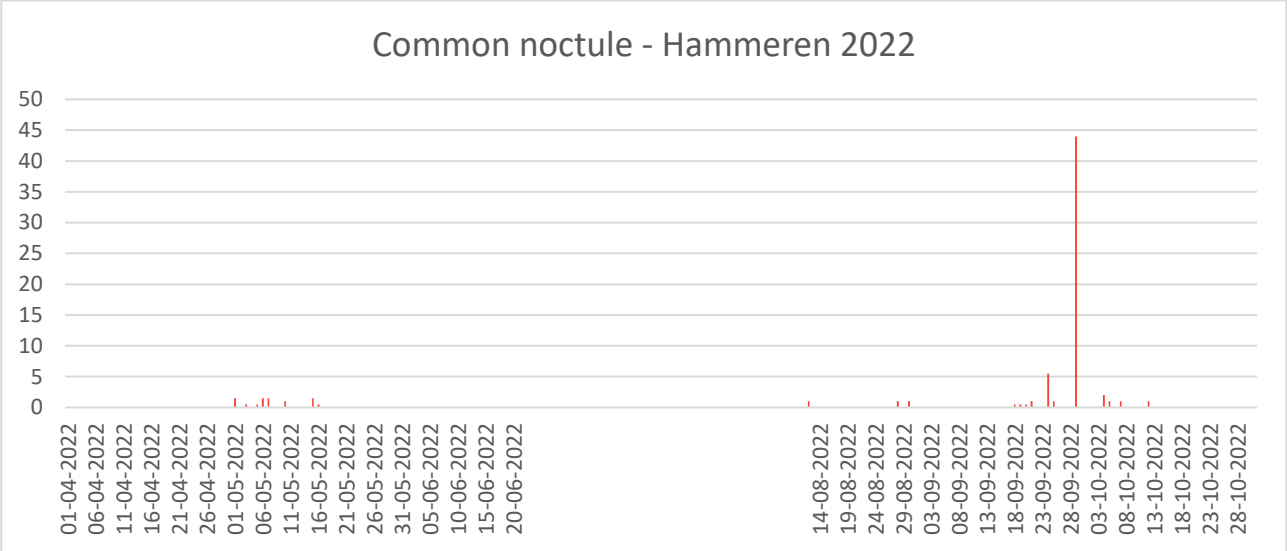
Common noctule - Hammeren 2022
50
45
40
35
30
25
20
15
10
5
0
01-04-2022
06-04-2022
11-04-2022
16-04-2022
21-04-2022
26-04-2022
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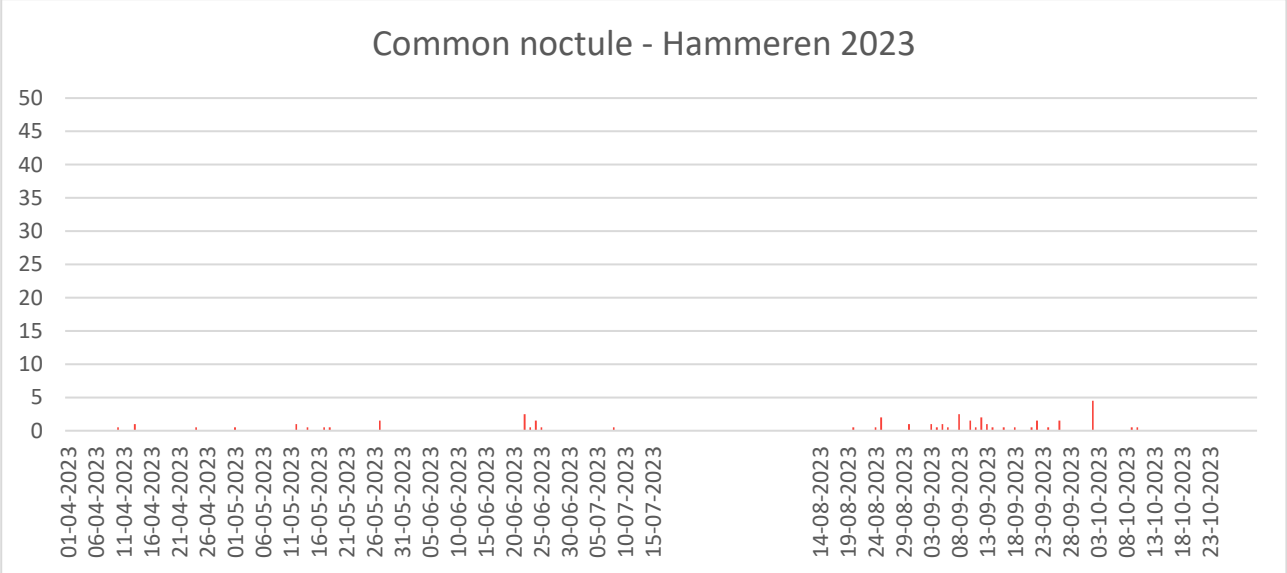
Common noctule - Hammeren 2023
50
45
40
35
30
25
20
15
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0
01-04-2023
06-04-2023
11-04-2023
16-04-2023
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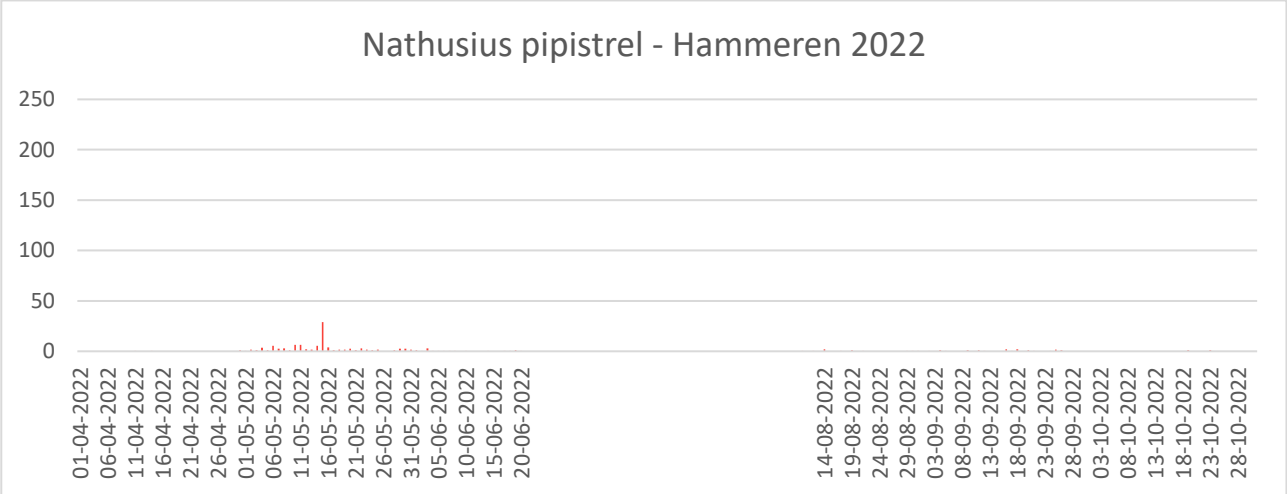
Nathusius pipistrel - Hammeren 2022
250
200
150
100
50
0
01-04-2022
06-04-2022
11-04-2022
16-04-2022
21-04-2022
26-04-2022
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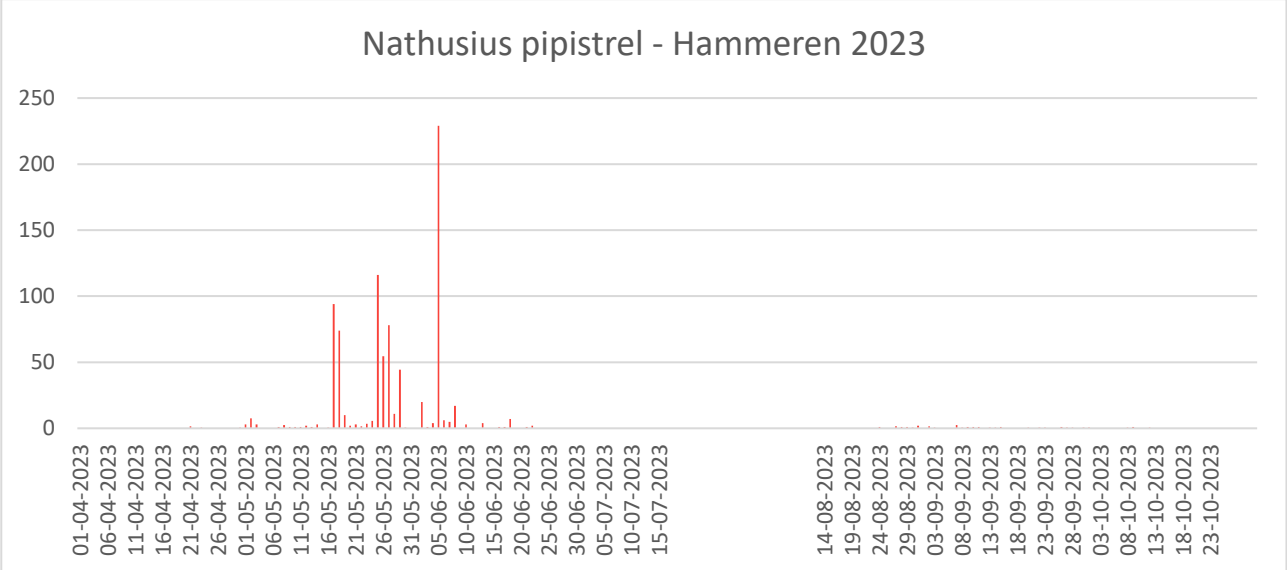
Nathusius pipistrel - Hammeren 2023
250
200
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01-04-2023
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16-04-2023
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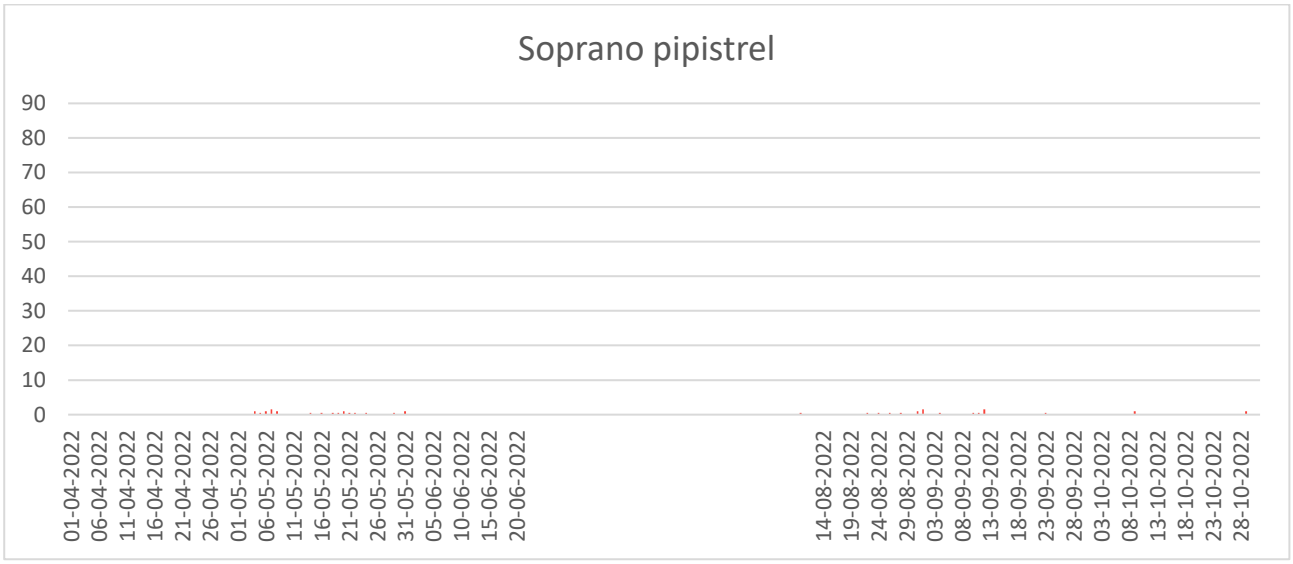
Soprano pipistrel
90
80
70
60
50
40
30
20
10
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01-04-2022
06-04-2022
11-04-2022
16-04-2022
21-04-2022
26-04-2022
01-05-2022
06-05-2022
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16-05-2022
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26-05-2022
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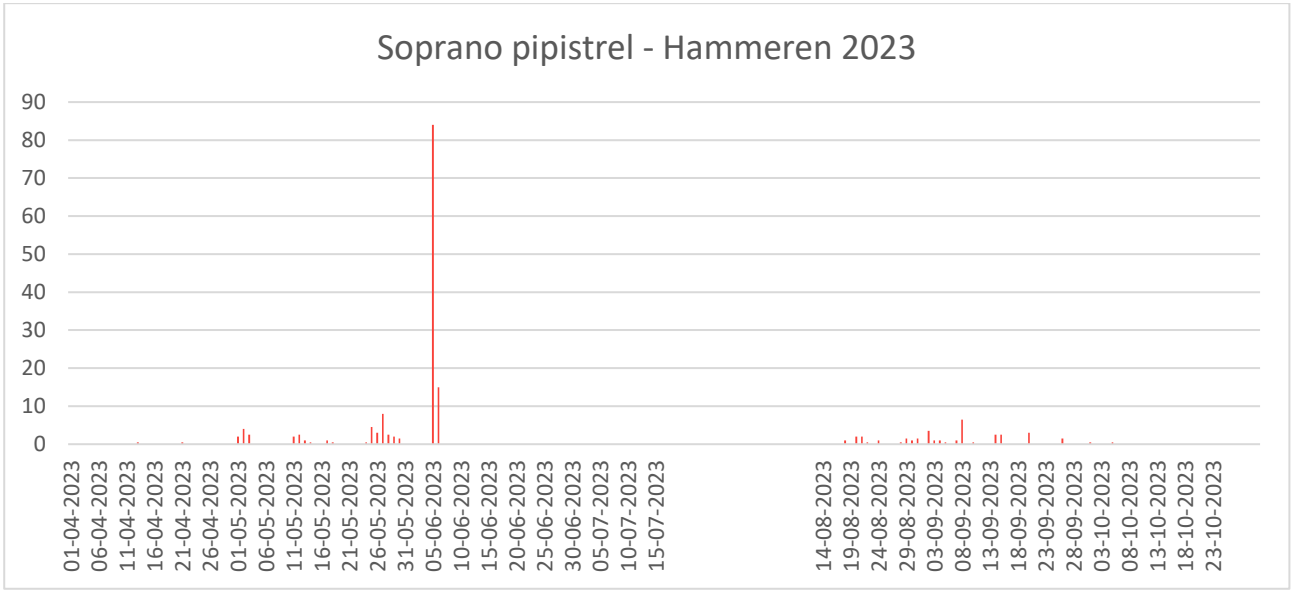
Soprano pipistrel - Hammeren 2023
90
80
70
60
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01-04-2023
06-04-2023
11-04-2023
16-04-2023
21-04-2023
26-04-2023
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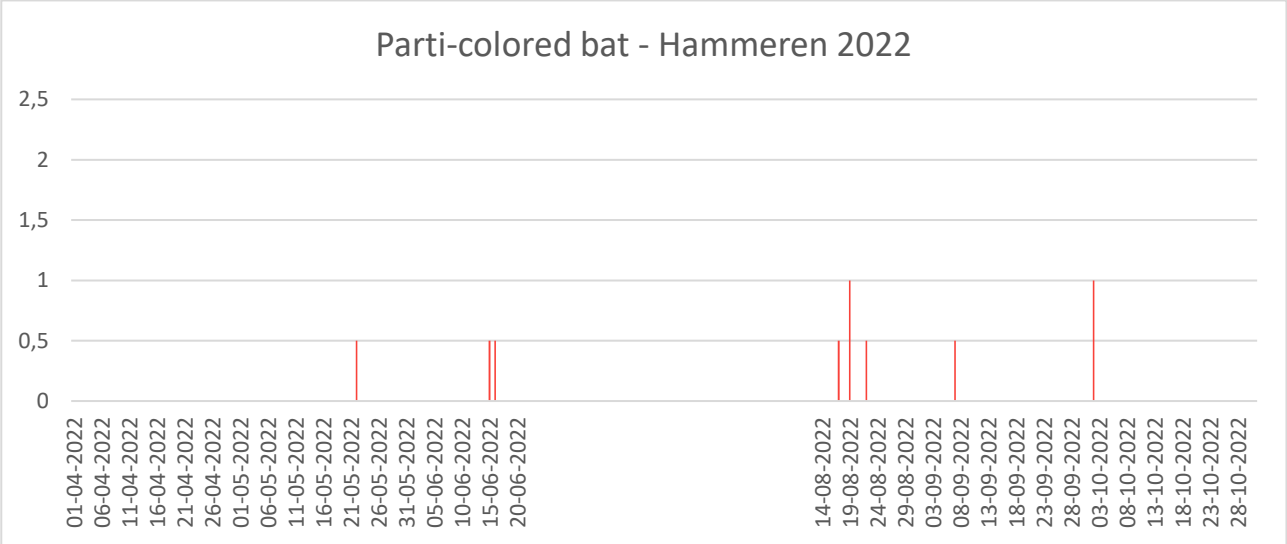
Parti-colored bat - Hammeren 2022
2,5
2
1,5
1
0,5
0
01-04-2022
06-04-2022
11-04-2022
16-04-2022
21-04-2022
26-04-2022
01-05-2022
06-05-2022
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18-09-2022
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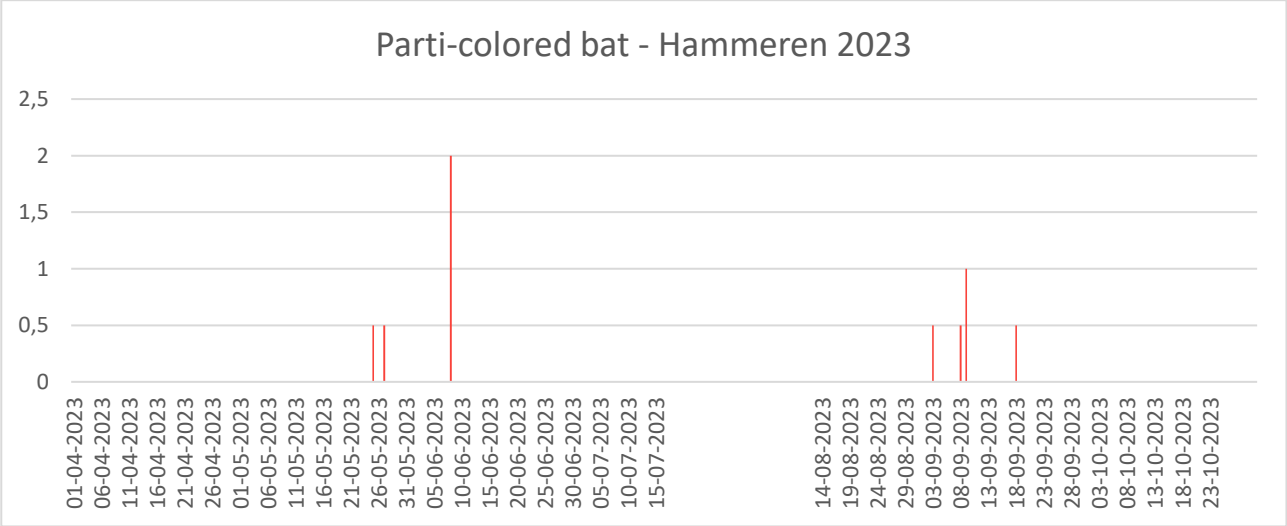
Parti-colored bat - Hammeren 2023
2,5
2
1,5
1
0,5
0
01-04-2023
06-04-2023
11-04-2023
16-04-2023
21-04-2023
26-04-2023
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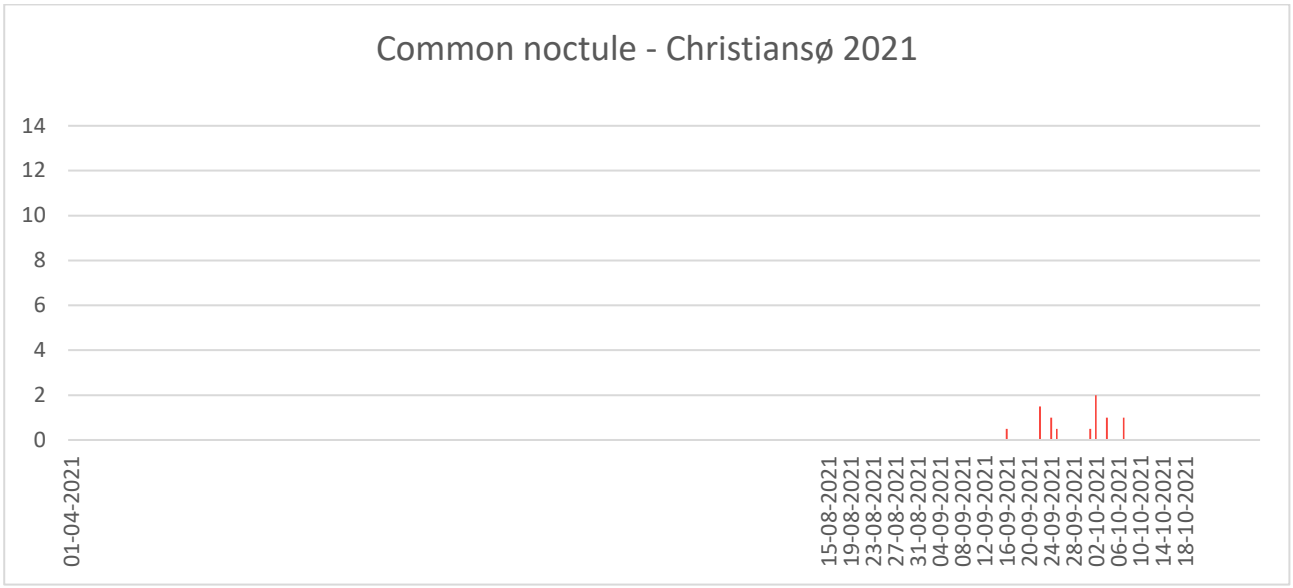
Common noctule - Christiansø 2021
14
12
10
8
6
4
2
0
01-04-2021
15-08-2021
19-08-2021
23-08-2021
27-08-2021
31-08-2021
04-09-2021
08-09-2021
12-09-2021
16-09-2021
20-09-2021
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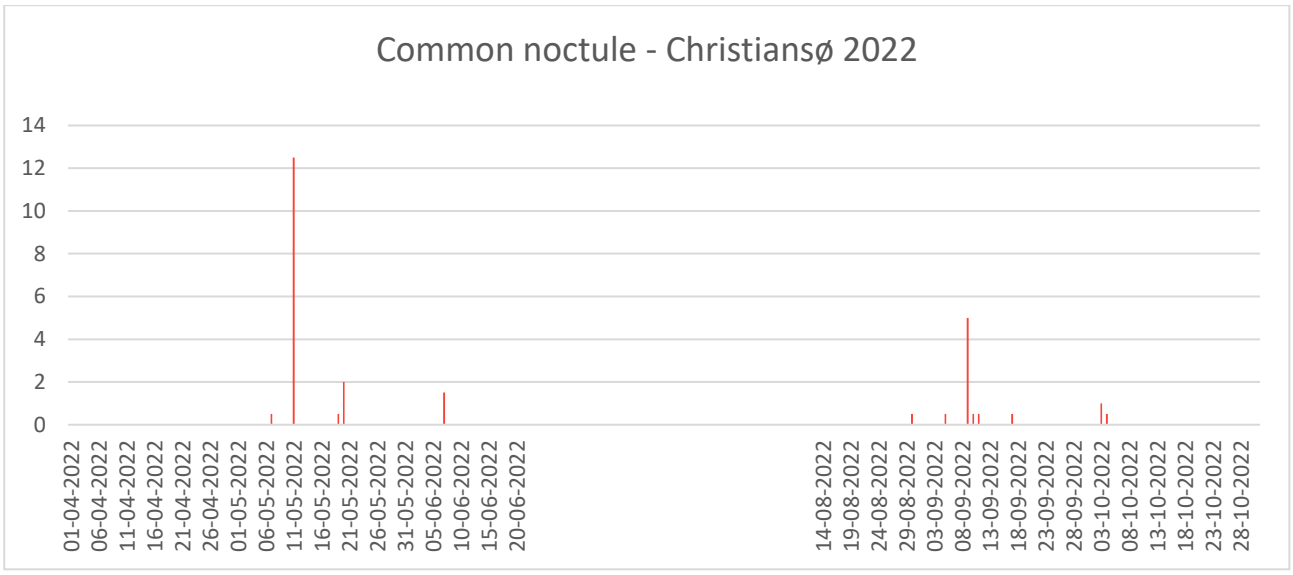
Common noctule - Christiansø 2022
14
12
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8
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4
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01-04-2022
06-04-2022
11-04-2022
16-04-2022
21-04-2022
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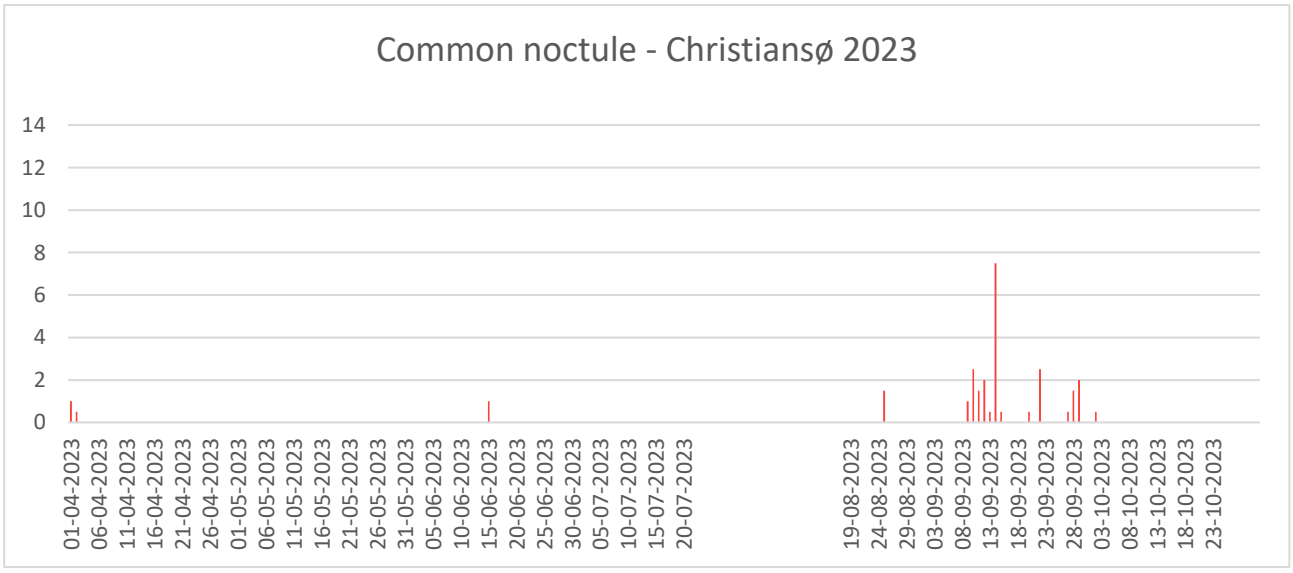
Common noctule - Christiansø 2023
14
12
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8
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4
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01-04-2023
06-04-2023
11-04-2023
16-04-2023
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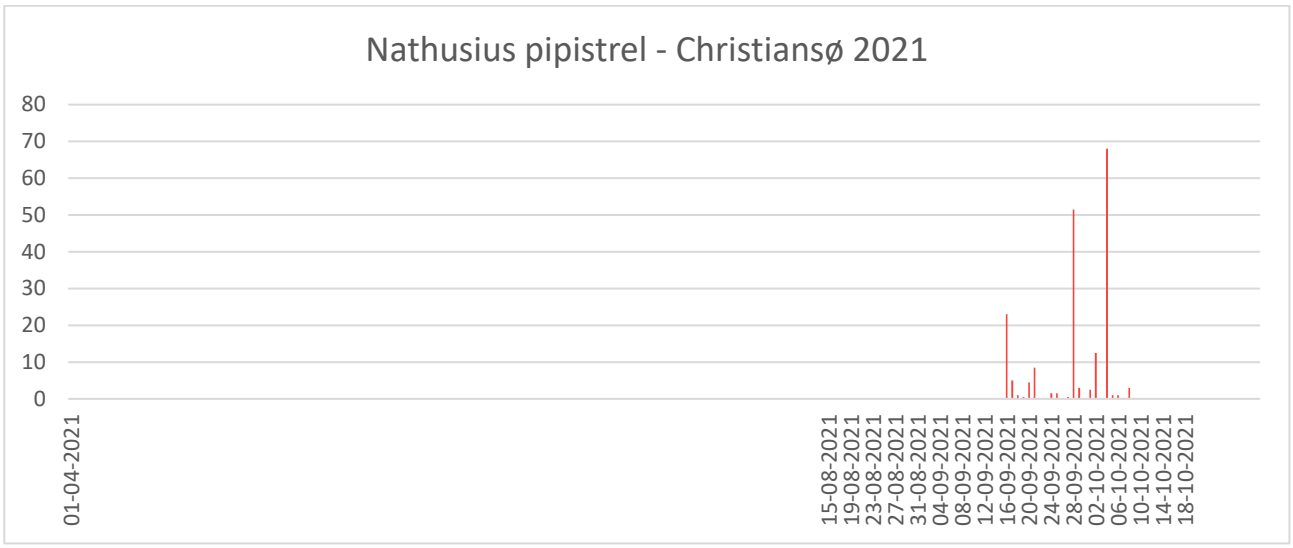
Nathusius pipistrel - Christiansø 2021
80
70
60
50
40
30
20
10
0
01-04-2021
15-08-2021
19-08-2021
23-08-2021
27-08-2021
31-08-2021
04-09-2021
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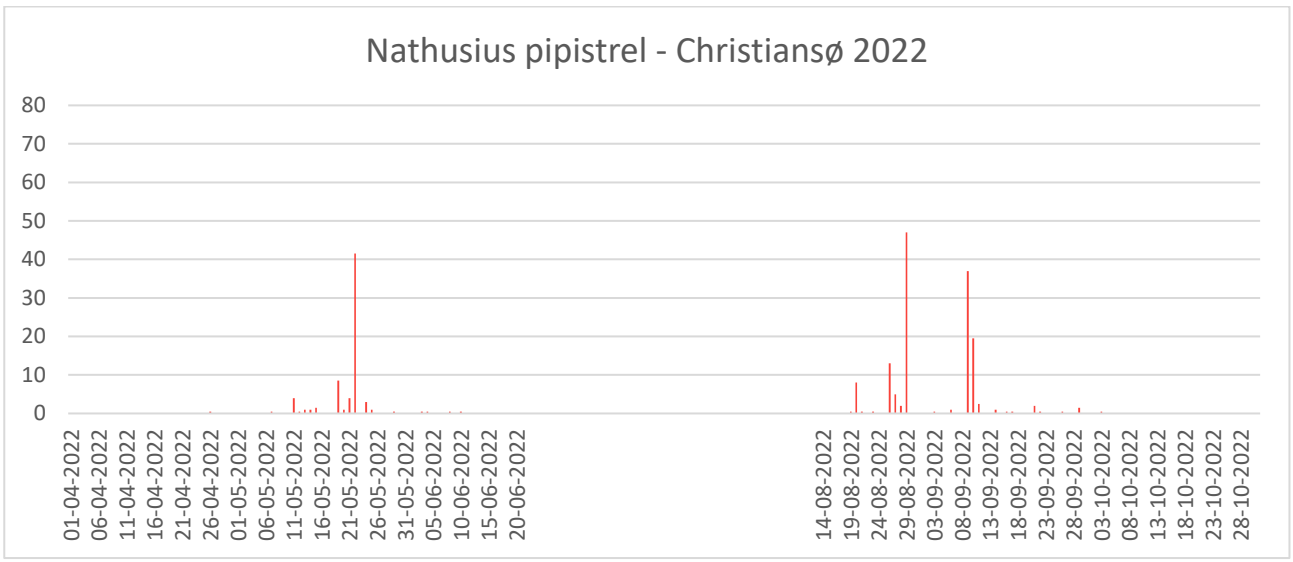
Nathusius pipistrel - Christiansø 2022
80
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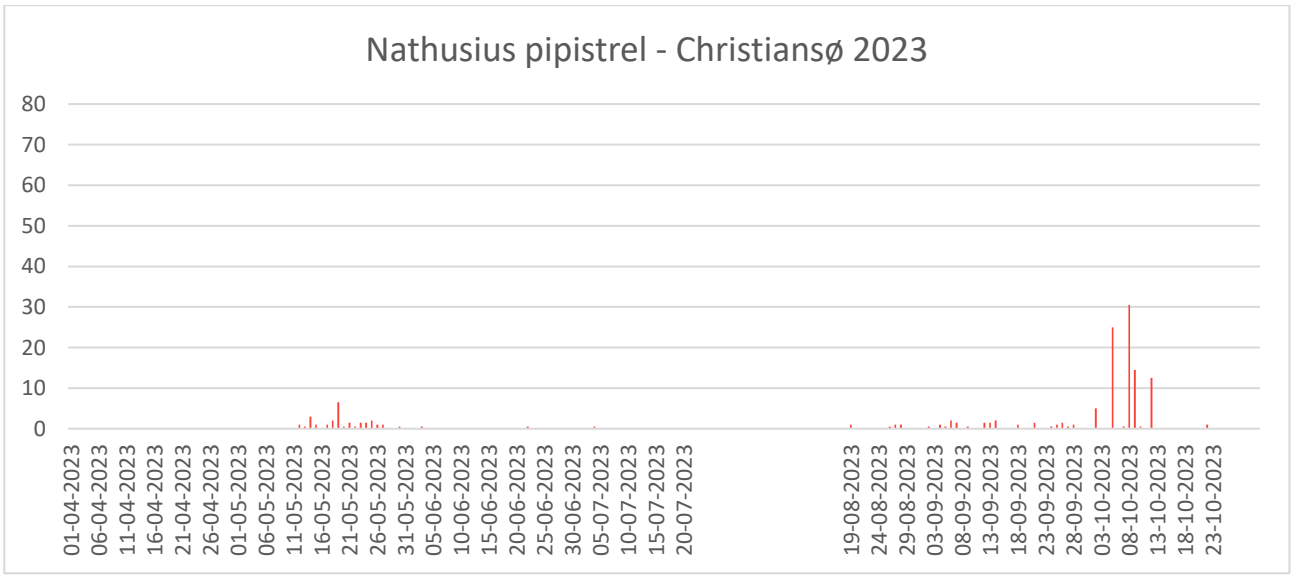
Nathusius pipistrel - Christiansø 2023
80
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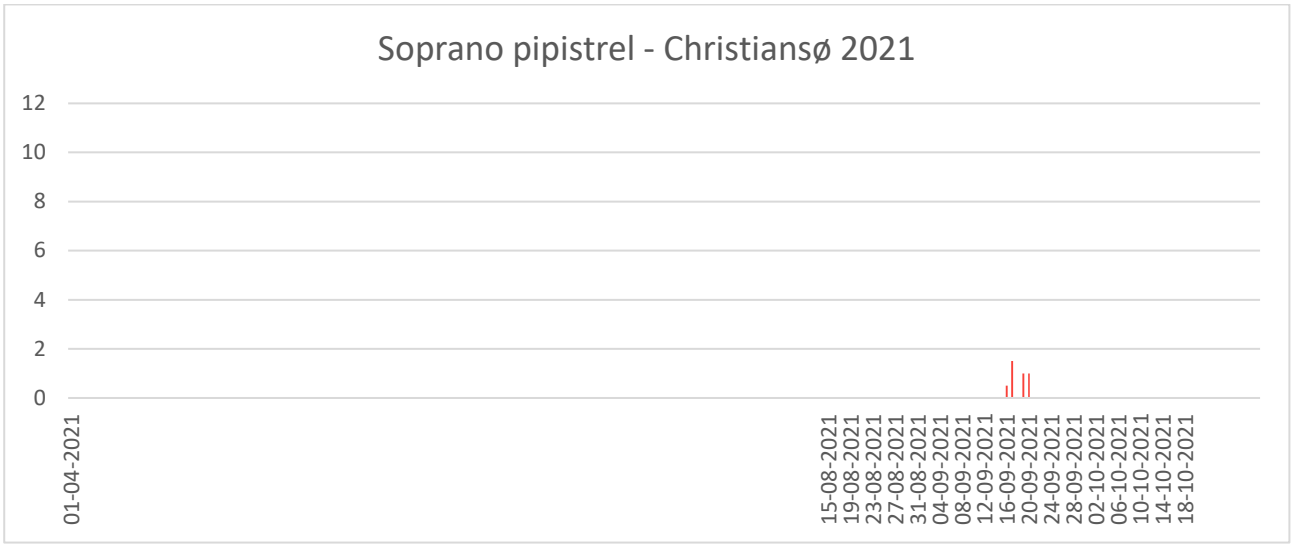
Soprano pipistrel - Christiansø 2021
12
10
8
6
4
2
0
01-04-2021
15-08-2021
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27-08-2021
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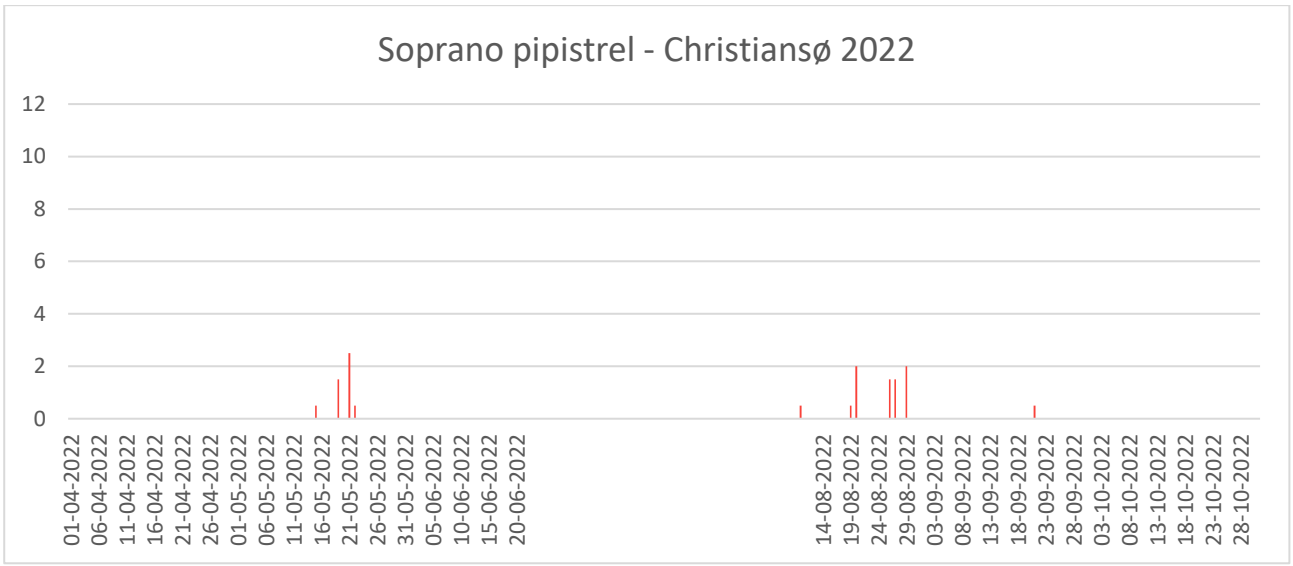
Soprano pipistrel - Christiansø 2022
12
10
8
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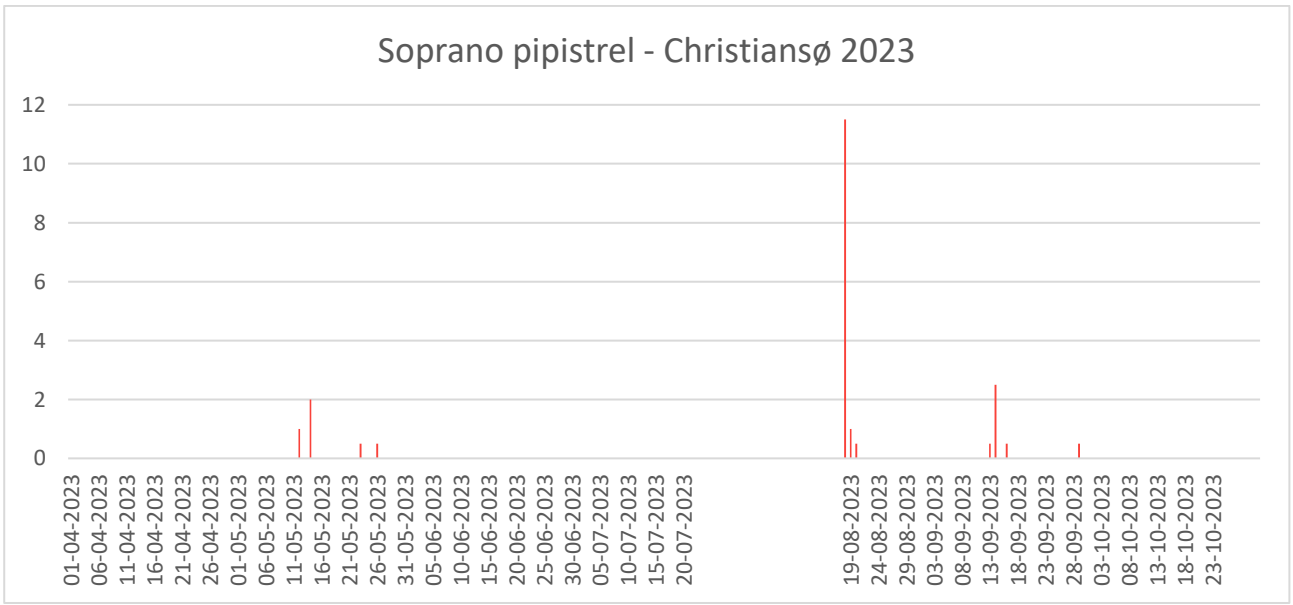
Soprano pipistrel - Christiansø 2023
12
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2
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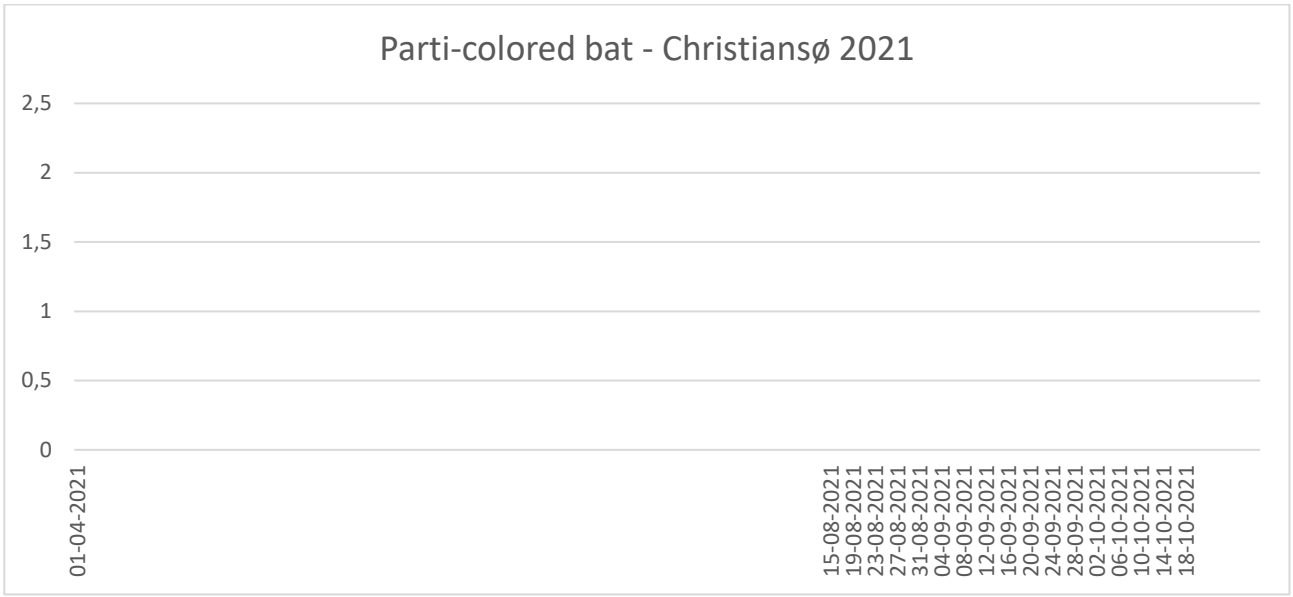
Parti-colored bat - Christiansø 2021
2,5
2
1,5
1
0,5
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01-04-2021
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27-08-2021
31-08-2021
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16-09-2021
20-09-2021
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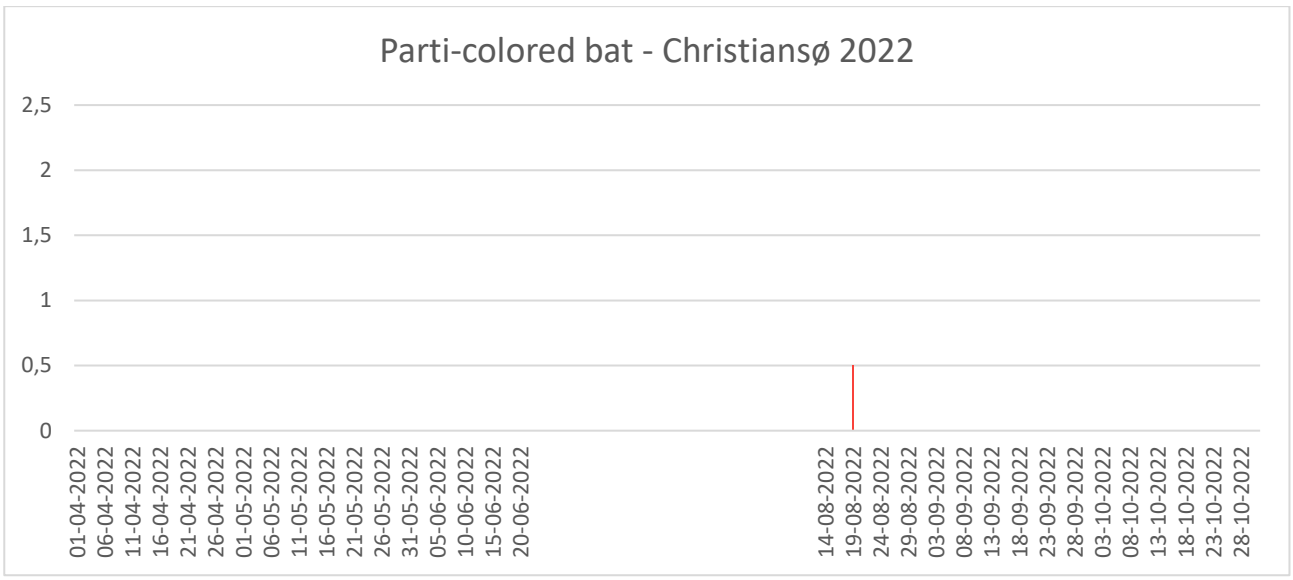
Parti-colored bat - Christiansø 2022
2,5
2
1,5
1
0,5
0
01-04-2022
06-04-2022
11-04-2022
16-04-2022
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26-04-2022
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14-08-2022
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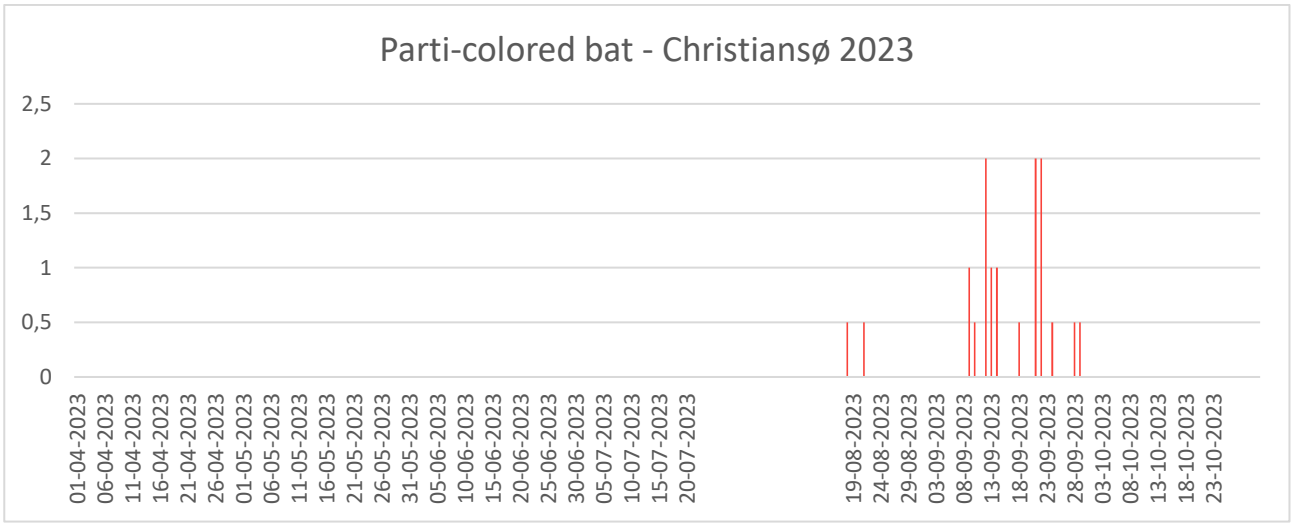
Parti-colored bat - Christiansø 2023
2,5
2
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1
0,5
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26-04-2023
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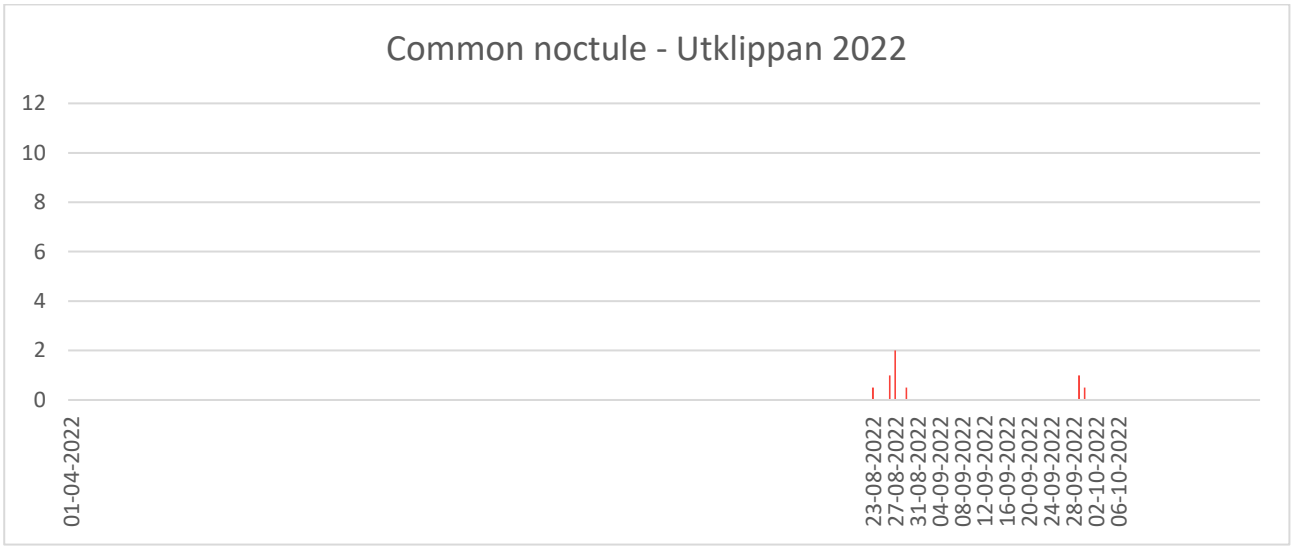
Common noctule - Utklippan 2022
12
10
8
6
4
2
0
01-04-2022
23-08-2022
27-08-2022
31-08-2022
04-09-2022
08-09-2022
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16-09-2022
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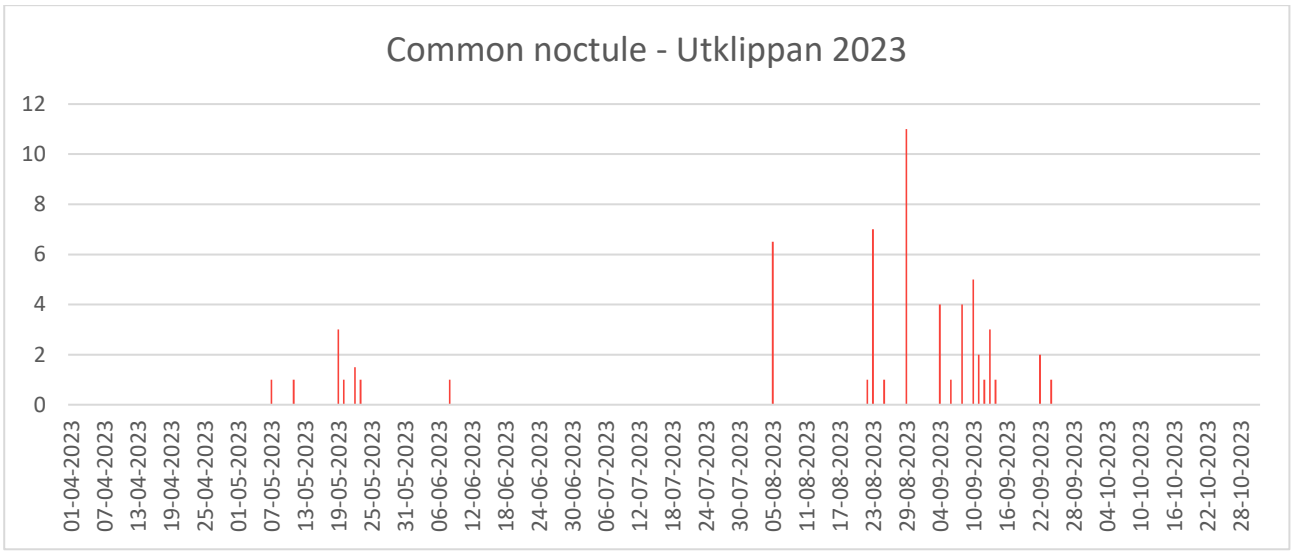
24-09-2022
28-09-2022
02-10-2022
06-10-2022


Common noctule - Utklippan 2023
12
10
8
6
4
2
0
01-04-2023
07-04-2023
13-04-2023
19-04-2023
25-04-2023
01-05-2023
07-05-2023
13-05-2023
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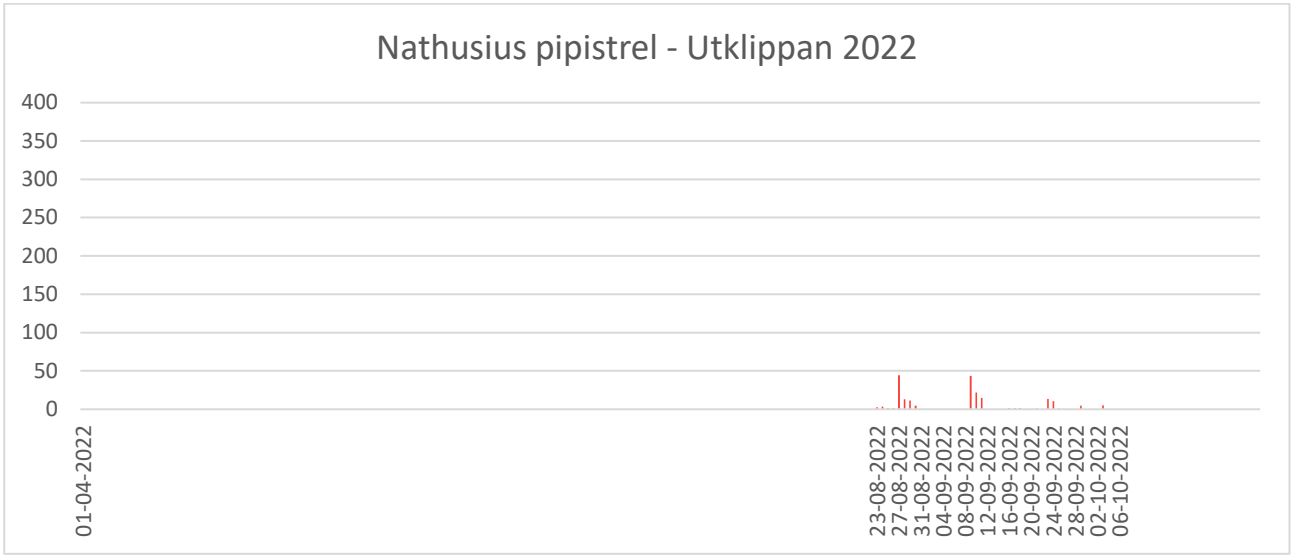
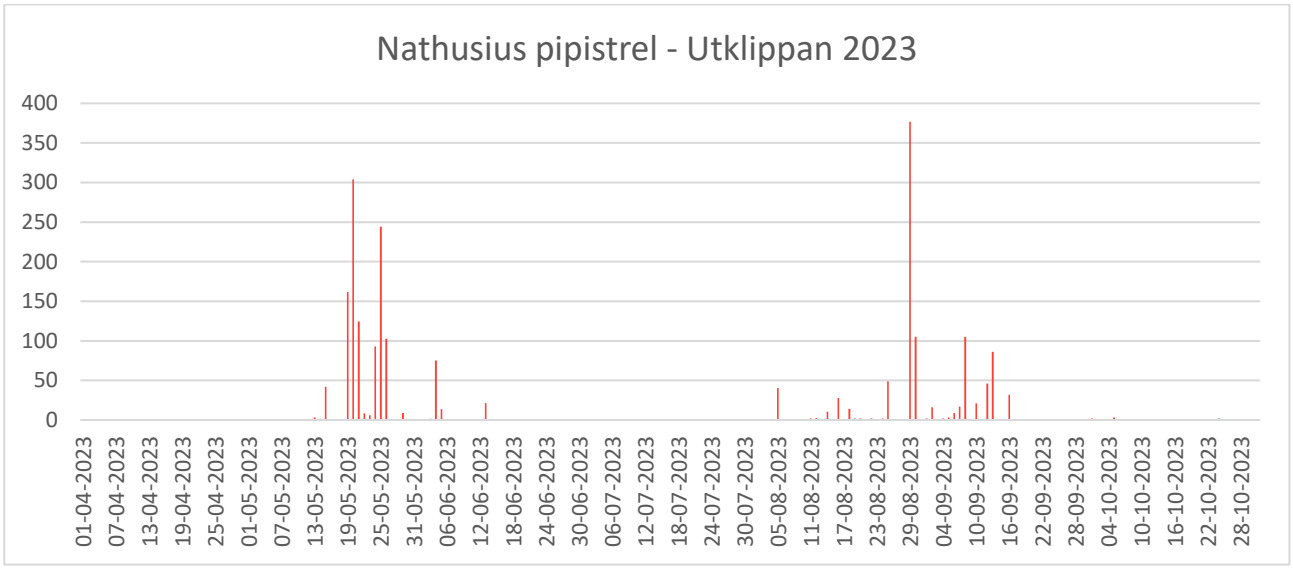

Nathusius pipistrel - Utklippan 2022
400
350
300
250
200
150
100
50
0
01-04-2022
23-08-2022
27-08-2022
31-08-2022
04-09-2022
08-09-2022
12-09-2022
16-09-2022
20-09-2022
24-09-2022
28-09-2022
02-10-2022
06-10-2022


Nathusius pipistrel - Utklippan 2023
400
350
300
250
200
150
100
50
0
01-04-2023
07-04-2023
13-04-2023
19-04-2023
25-04-2023
01-05-2023
07-05-2023
13-05-2023
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18-07-2023
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30-07-2023
05-08-2023
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04-09-2023
10-09-2023
16-09-2023
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16-10-2023
22-10-2023
28-10-2023

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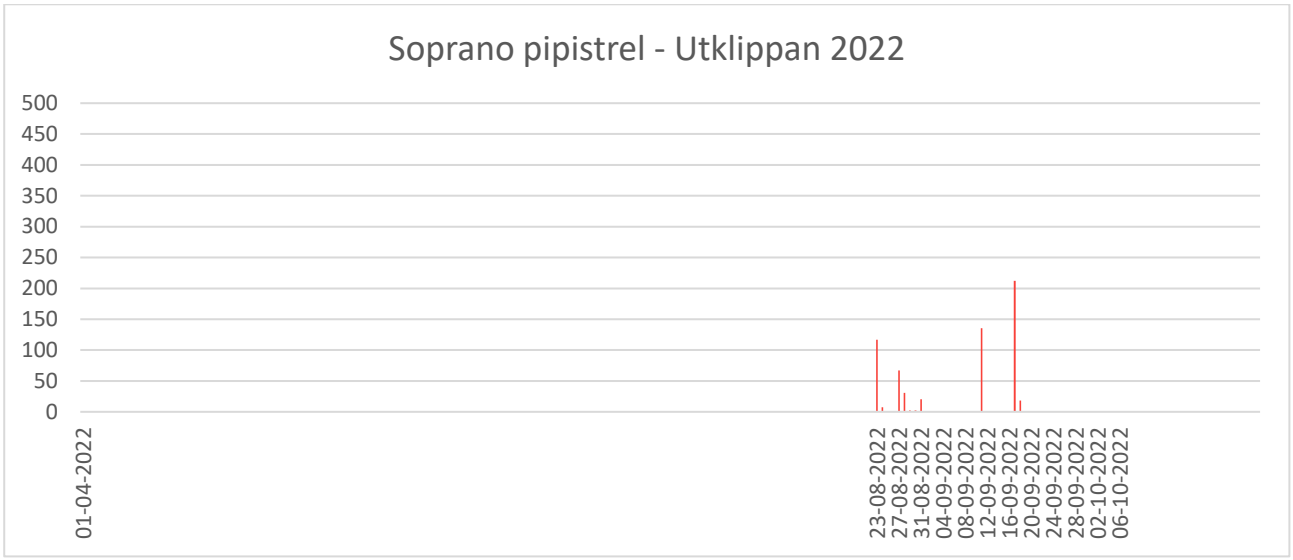
Soprano pipistrel - Utklippan 2022
500
450
400
350
300
250
200
150
100
50
0
01-04-2022
23-08-2022
27-08-2022
31-08-2022
04-09-2022
08-09-2022
12-09-2022
16-09-2022
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28-09-2022
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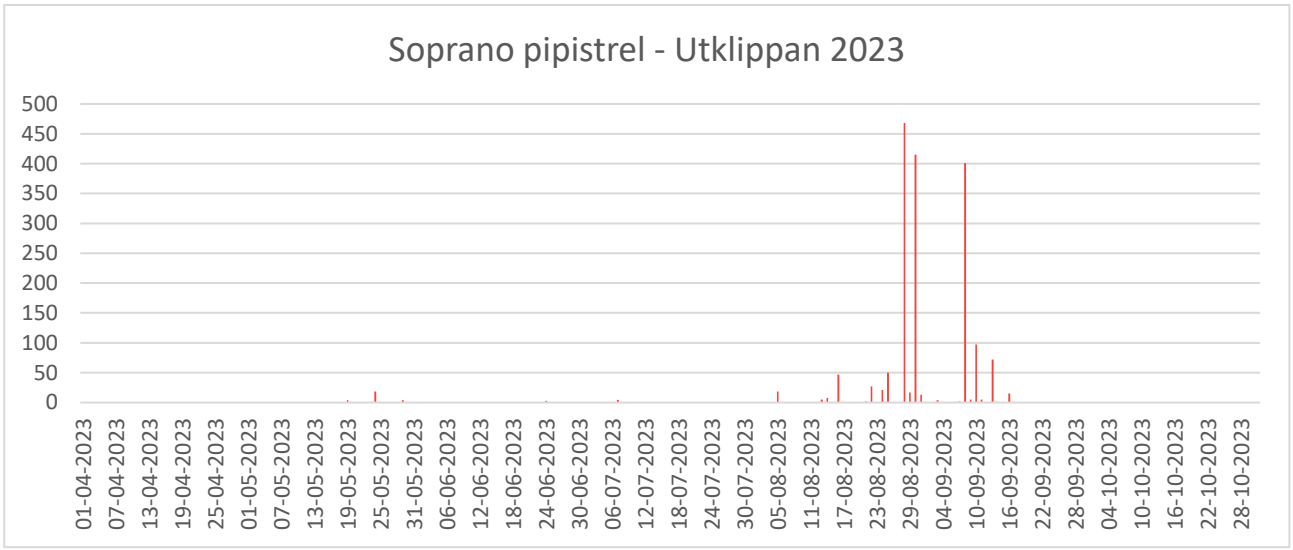
06-10-2022


Soprano pipistrel - Utklippan 2023
500
450
400
350
300
250
200
150
100
50
0
01-04-2023
07-04-2023
13-04-2023
19-04-2023
25-04-2023
01-05-2023
07-05-2023
13-05-2023
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04-09-2023
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16-09-2023
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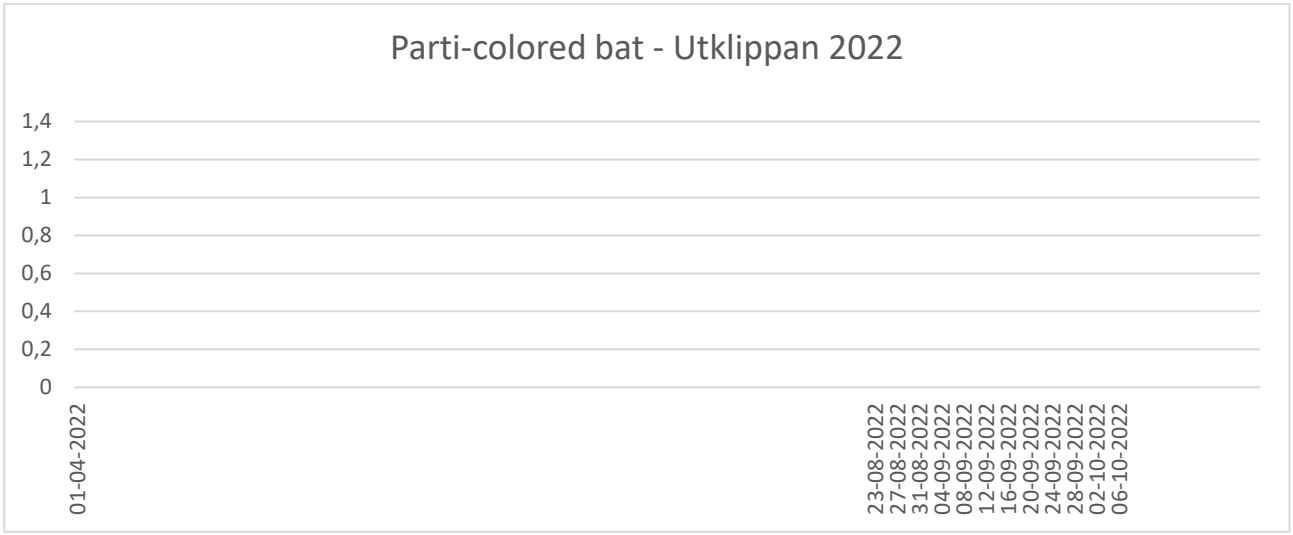
Parti-colored bat - Utklippan 2022
1,4
1,2
1
0,8
0,6
0,4
0,2
0
01-04-2022
23-08-2022
27-08-2022
31-08-2022
04-09-2022
08-09-2022
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16-09-2022
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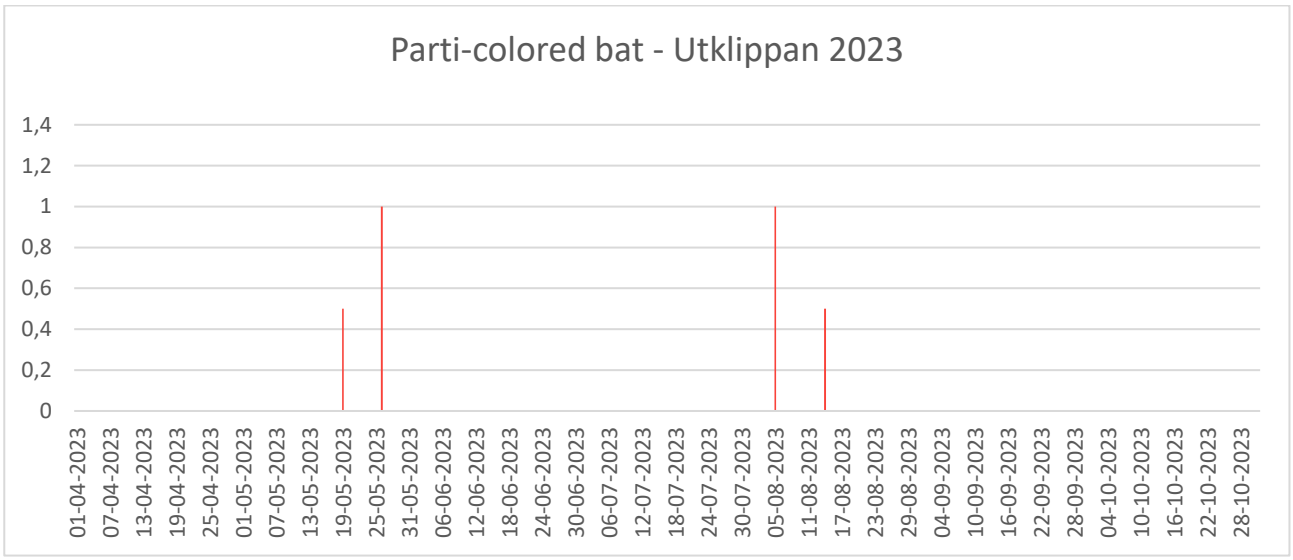
Parti-colored bat - Utklippan 2023
1,4
1,2
1
0,8
0,6
0,4
0,2
0
01-04-2023
07-04-2023
13-04-2023
19-04-2023
25-04-2023
01-05-2023
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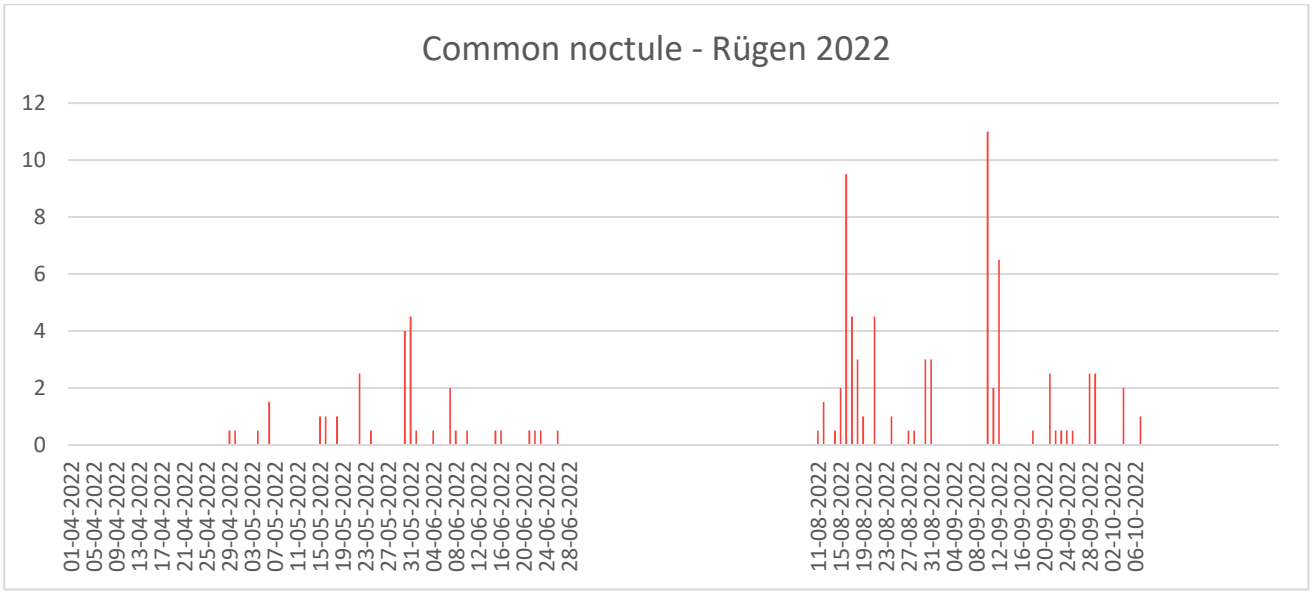
Common noctule - Rügen 2022
12
10
8
6
4
2
0
01-04-2022
05-04-2022
09-04-2022
13-04-2022
17-04-2022
21-04-2022
25-04-2022
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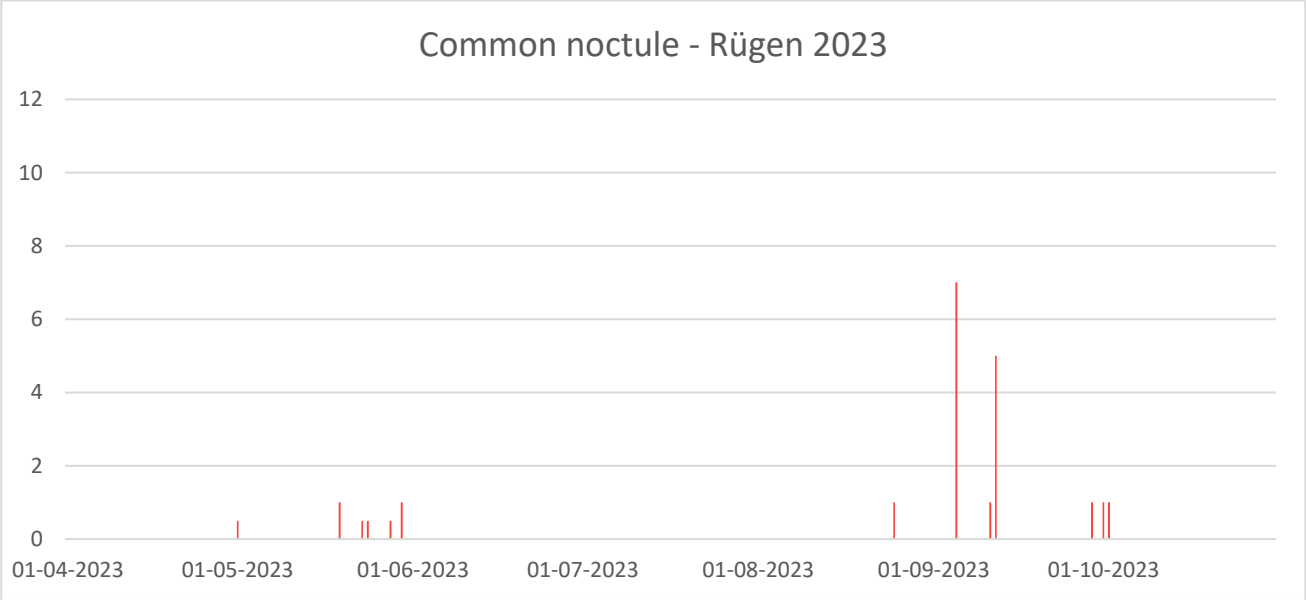
Common noctule - Rügen 2023
12
10
8
6
4
2
0
01-04-2023
01-05-2023
01-06-2023
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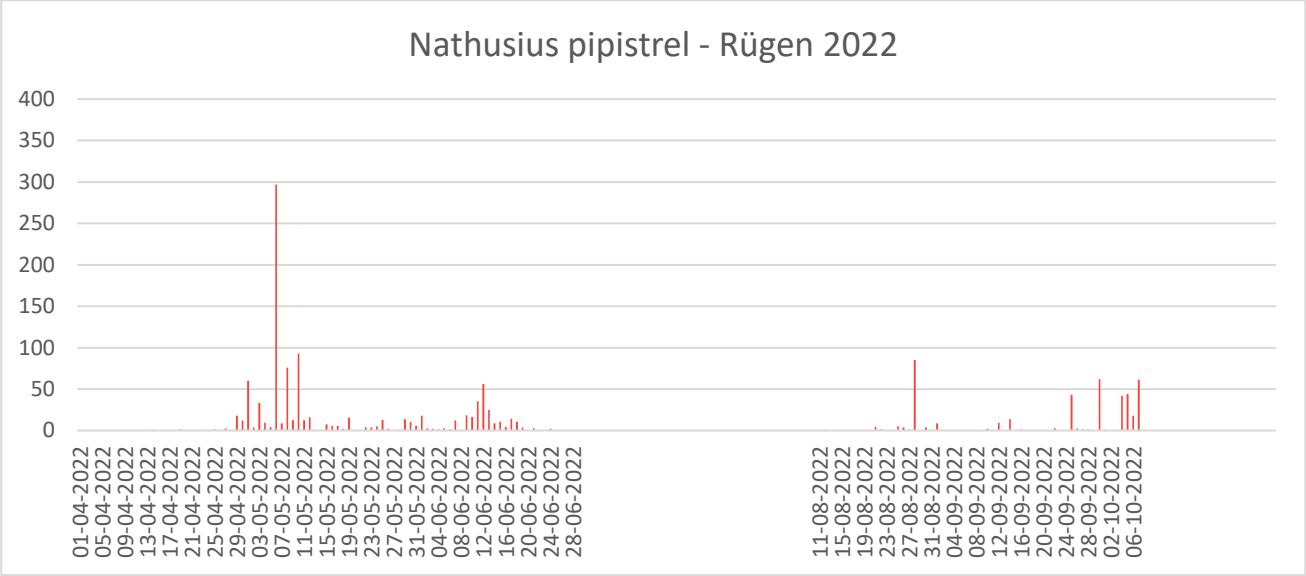
Nathusius pipistrel - Rügen 2022
400
350
300
250
200
150
100
50
0
01-04-2022
05-04-2022
09-04-2022
13-04-2022
17-04-2022
21-04-2022
25-04-2022
29-04-2022
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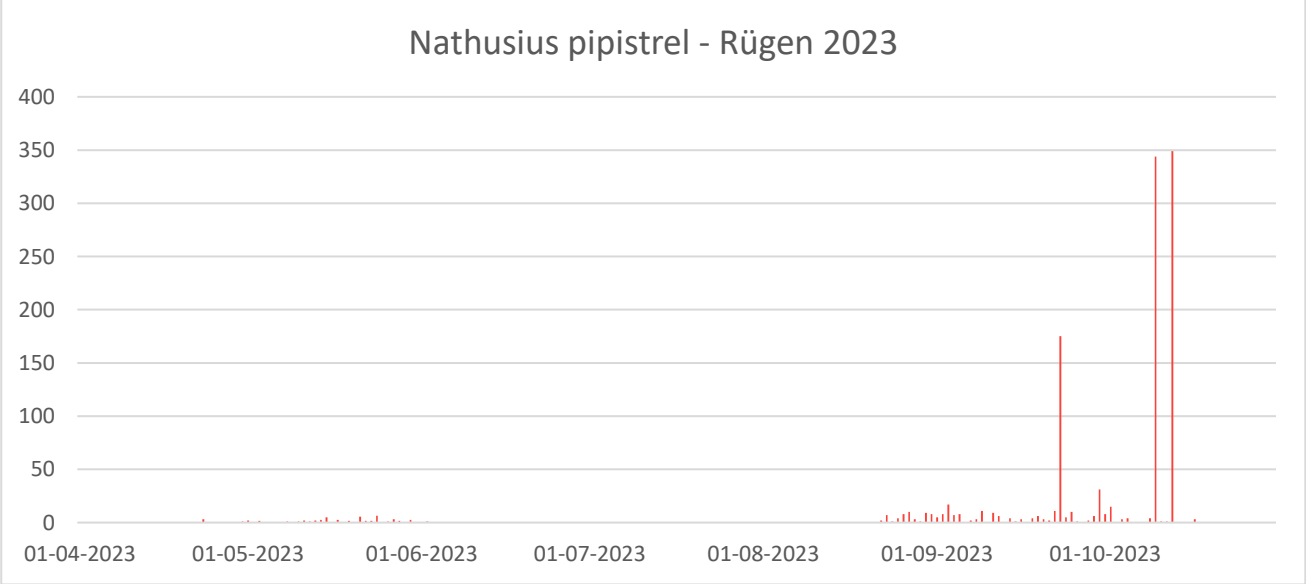
Nathusius pipistrel - Rügen 2023
400
350
300
250
200
150
100
50
0
01-04-2023
01-05-2023
01-06-2023
01-07-2023
01-08-2023
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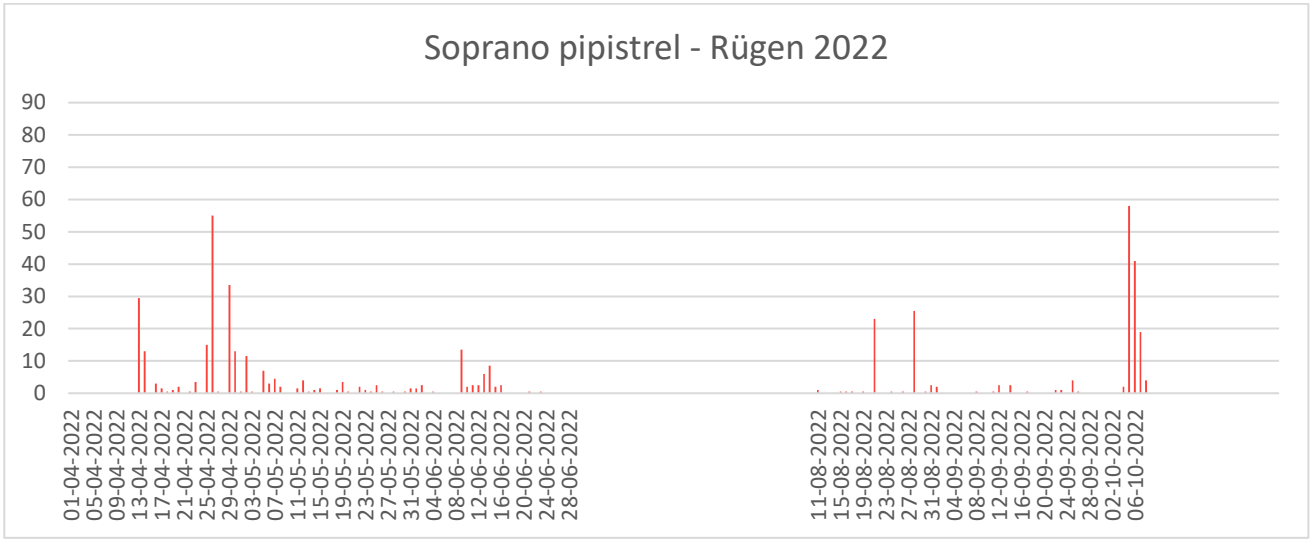
Soprano pipistrel - Rügen 2022
90
80
70
60
50
40
30
20
10
0
01-04-2022
05-04-2022
09-04-2022
13-04-2022
17-04-2022
21-04-2022
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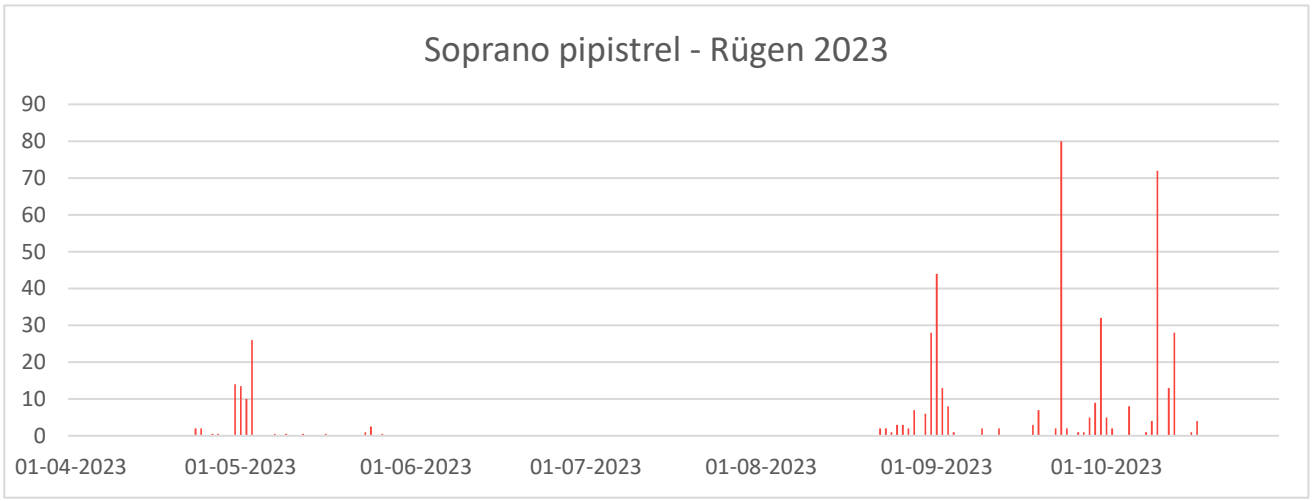
Soprano pipistrel - Rügen 2023
90
80
70
60
50
40
30
20
10
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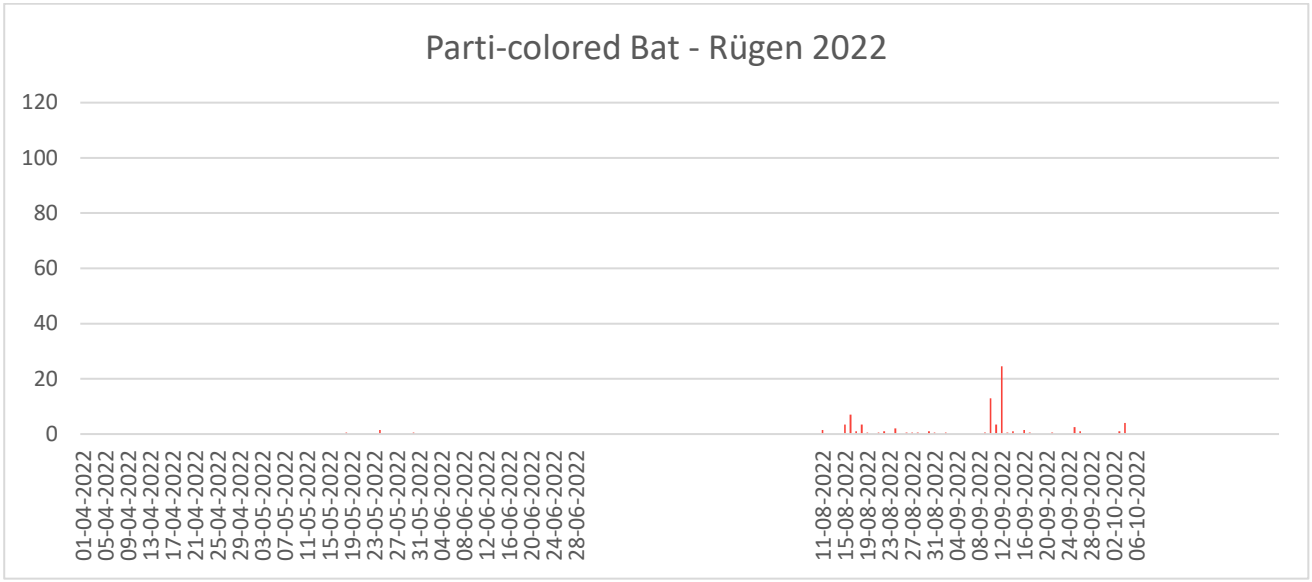
01-04-2023
01-05-2023
01-06-2023
01-07-2023
01-08-2023
01-09-2023
01-10-2023


Parti-colored Bat - Rügen 2022
120
100
80
60
40
20
0
01-04-2022
05-04-2022
09-04-2022
13-04-2022
17-04-2022
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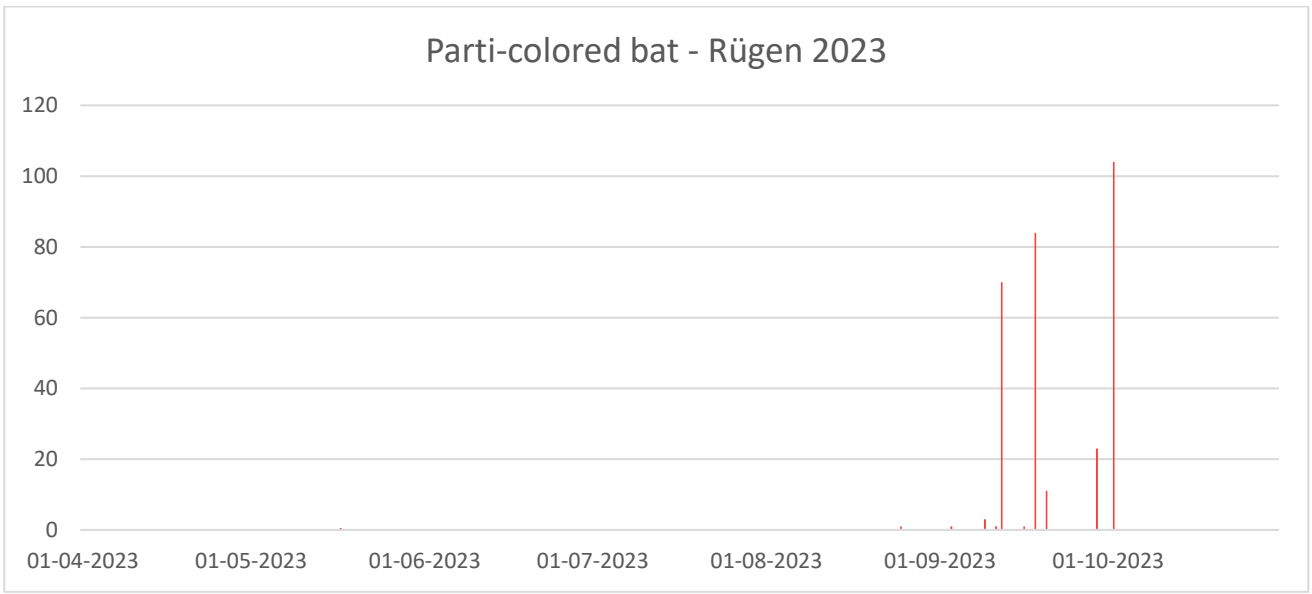
Parti-colored bat - Rügen 2023
120
100
80
60
40
20
0
01-04-2023
01-05-2023
01-06-2023
01-07-2023
01-08-2023
01-09-2023
01-10-2023