

Volume 11: Appendices (Wider Scheme)

## Appendix 35.1

# Rockabill Lighthouse, Boat-based & Headland Offshore Bat Monitoring Results Report 2022

# Rockabill Lighthouse, Boat-based & Headland

## Offshore Bat Monitoring 2022

### Results Report



Woodrow APEM Group  
Upper Offices,  
Ballisodare Centre,  
Station Road,  
Ballisodare,  
Co Sligo,  
F91 PE04.

T: +353 (0) 719140542  
Email: [info@woodrow.ie](mailto:info@woodrow.ie)



## Contents

1	Introduction .....	1
2	Methodology.....	1
2.1	Deployment.....	1
2.2	Calibration and testing of recording equipment .....	3
2.3	Maintenance .....	3
2.4	Data Analysis.....	4
3	Results.....	4
3.1	Boat-based survey results.....	4
3.2	Rockabill Island Results .....	5
3.2.1	Leisler’s bat activity.....	5
3.2.2	Nathusius’ pipistrelle activity.....	8
3.3	Headland results .....	10
4	Results Summary & Discussion .....	12
5	References .....	13
6	Appendix: Detector Locations.....	14
6.1	Rockabill .....	14
6.2	Headland .....	15

## **STATEMENT OF AUTHORITY**

### **Fionn Murphy MSc ACIEEM - Ecologist**

Fionn has five years of experience within the field of ecology, with three years in the consulting sector in Ireland. In addition to his technical skills, Fionn is a strong communicator and is adept in project management. He has previously managed teams of ecologists focused on the high intensity delivery of AA screening and NIS reports, resulting in the appropriate assessment of 90+ entities. Fionn has managed projects in a broad range of fields including infrastructure, quarrying, wind energy, agriculture, forestry and recreational facilities. This has culminated in a broad variety of reports, namely NIS, AA screenings, ECIAs and EIAr chapters. His experience includes involvements in projects from inception to delivery, as a result he is adept at field surveying, client liaison and the delivery of high-quality ecological reports.

### **Oisín O Sullivan - Ecologist; Technical Lead on bat surveys**

Oisín O Sullivan is an Ecologist with Woodrow. Oisín has completed a BSc in Ecology and Environmental Biology at University College Cork. His final year thesis involved bat activity surveys of urban habitats in Cork City. His work with Woodrow was focused on bat data analysis including bat call identification and bat roost/habitat suitability surveys. Oisín has developed a high level of proficiency with Kaleidoscope, Ecobat and BatExplorer, all of which are analysis software used to assess bat calls and activity. Since joining Woodrow, Oisín current work has involved the coordinating, surveying, analysing data, and writing technical bat activity reports for all onshore wind developments that Woodrow has worked on in the 2021 and 2022 survey seasons. This also involves the use of R to provide data on bat activity relative to weather conditions with the goal of informing curtailment as a mitigation measure. During 2022 Woodrow began undertaking offshore bat surveys including Oisín as a technical lead on these projects. These surveys involve the long-term recording of activity on islands and headlands to record migration events. Oisín is a Qualifying member of CIEEM and holds a license to survey bat roosts from the Department of Culture Heritage and the Gaeltacht.

## 1 Introduction

Offshore bat surveys have been carried out to inform the impact assessment of bats from offshore wind infrastructure as part of the proposed North Irish Sea Array (NISA) project. The information contained within this report is intended to summarise the results of bat monitoring from Spring to Autumn of 2022, consisting of three main survey components-

- Monitoring at Rockabill Lighthouse
- Monitoring on a Marine Survey Vessel
- Monitoring on headlands

The bat survey methodology was designed by Chloe Delgery (Arup) in collaboration with Woodrow Environmental Consultants. Deployments and maintenance were carried out by Oisín O Sullivan and Fionn Murphy (Woodrow).

## 2 Methodology

### 2.1 Deployment

#### Rockabill Lighthouse

Following consultation with Commissioners of Irish Lights (CIL), BirdWatch Ireland and NPWS, permission was received to access Rockabill Island for the purpose of monitoring bat activity. Rockabill Island and surrounding waters form part of Rockabill SPA (004014) and Rockabill to Dalkey Island SAC (003000). The qualifying interests (QI) for the SPA are roseate, common and arctic terns and purple sandpiper. The QI for the SAC are reefs and harbour porpoise.

Static detector surveys were undertaken using Wildlife Acoustics full spectrum Song Meter 4s (SM4s) with SMM-U2 ultrasonic microphones. Detectors were deployed on Rockabill Island, *ca.* 6km offshore of Skerries, Co. Dublin. The detectors were powered by external Lithium-ion batteries. The detectors were housed in simple plastic boxes modified to allow for power and microphone cables, to prevent excessive fouling from terns directly onto detectors. Two static detectors were deployed continuously from 19-Apr 2022 to 25-Oct 2022. This deployment window covers the spring and autumn migration windows for long distance migratory bat species. The spring migratory window occurs mainly between April and May while the autumn migratory window runs from August to October (Shiel *et al.* 1999; Collins 2016). One detector was positioned on the eastern side of the island at [53.597212, -6.00454] while the other was placed on the western side [53.597285, -6.004187], presented in **Figure 1** below. The detectors were fitted with two 512GB memory cards each, in anticipation of high levels of noise being recorded as a result of the island's large breeding tern colony. The detectors were set with 16kHz as the minimum frequency trigger for recording, differing from standard Irish bat survey methodology for which a minimum trigger of 12kHz is used to cover all species present in Ireland. This was done in order to reduce the amount of interfering noise files produced by the large tern colony on the island, while still recording within the normal echolocation frequencies of relevant species. Detector units and batteries were placed on the ground, while microphones were mounted at approximately 2m above the ground. The eastern side detector microphone was placed on a metal strut on the side of a storage shed adjacent to a wall, while the west side detector microphone was affixed to a post, positioned in the corner of a walled off area in front of the main building on the island. Both of the microphones were pointing upwards. Respective pictures for context are shown in **Appendix: Detector Locations**. There were no technical failures during the duration of this survey.



**Figure 1 - Detector deployment locations**

### **Marine Survey Vessel**

Offshore site investigations were carried at proposed offshore array area by a marine survey vessel (Fugro Mercator vessel) during May-July 2022. Two detectors Song Meter Minis (SM-mini) were also deployed on the Fugro Mercator vessel surveying the array area on dates between 31-May 2022 and 11-Jul 2022. One detector was placed on a walkway railing on the centre-front of the boat while the second was placed on a railing at the top of the boat. These detectors were set to recorded 30 minutes pre-sunset to 30 minutes post sunrise with a minimum trigger frequency of 12kHz. Their locations are shown in **Figure 2**. There were no technical malfunctions during this deployment. The boat continuously travelled at 3 knots while surveying.



**Figure 2 - Detector positions on survey vessel**



## Headland Monitoring

Two SM-mini detectors were also strategically deployed along the north Dublin coast to complement the offshore surveys (at Rockabill and the marine survey vessel) in order to provide context to any bat data that would be collected around the late summer/autumn bat migration period. They recorded from 30 minutes pre-sunset to 30 minutes post-sunrise. Unlike the island-based detectors the minimum triggering frequency was left at 12kHz as large amounts of noise interference such as that recorded on the island was not present on the headlands. These detectors were deployed on 07-Sep 2022 and collected on 24-Oct 2022. One detector was placed on a treeline north of Balbriggan while a second was deployed on the RNLI lifeboat station in Skerries. Both detectors suffered technical issues as a result of torrential rain compromising the water proof seals and corroding the extended battery housing. This resulted in the detector at Balbriggan failing on 05-Oct 2022 and the detector at Skerries failing on the 09-Oct 2022. Details of the deployment are displayed in **Table 1**.

**Table 1 - Headland deployment locations and times**

Location	Detector	Latitude	Longitude	Recording Start	Recording End
RNLI Building Skerries	WSS067	53.585937	-6.105593	07-Sep-22	09-Oct-22
Treeline North Balbriggan	WSS046	53.624458	-6.189347	07-Sep-22	05-Oct-22

## 2.2 Calibration and testing of recording equipment

All detectors were tested and settings checked prior to deployment. The sensitivity of all microphones was tested prior to and after each deployment, and all microphone checks were logged in an excel spreadsheet. No microphone experienced complete failure, however, the build-up of bird droppings on microphones on Rockabill Island resulted in the partial loss of microphone sensitivity towards the end of the recording period for some deployments. Despite this, it is considered that data was captured effectively on both detectors for the duration of the survey, and provides an accurate representation of bat activity on Rockabill.

## 2.3 Maintenance of Rockabill detectors

The island was accessed by boat. Memory cards, microphones, and batteries were changed on a monthly basis or as close to a monthly basis as weather would allow for safe boat navigation. The maintenance schedule is shown in **Table 2**.

**Table 2 - Maintenance periods of Rockabill detectors**

Visit	Date	Detector E	Detector W
Deployment	19-Apr-22	WSS055	WSS039
Maintenance period 1	19-May-22	WSS055	WSS039
Maintenance period 2	14-Jun-22	WSS055	WSS039
Maintenance period 3	21-Jul-22	WSS055	WSS039
Maintenance period 4	18-Aug-22	WSS055	WSS057
Maintenance period 5	21-Sep-22	WSS055	WSS057

Visit	Date	Detector E	Detector W
Collection	25-Oct-22	WSS055	WSS057

## 2.4 Data Analysis

Sound files were analysed using Kaleidoscope Pro (5.4.0) with automatic European classifiers filtered to Irish species. All files were manually verified by a suitably experienced member of the Woodrow bat ecology team, with the aid of Russ 2012 and Middleton *et al* 2014. Due to the large quantity of noise generated during the boat-based survey every second batch of 100 noise files were manually verified while the remainder were left as automatically classified as noise. Weather data was gathered from the M2 weather buoy in the Irish sea accessed via the Marine Institute website (Irish Weather Buoy Data<sup>1</sup>). An important caveat is that the weather recorded comes from the middle of the Irish Sea as opposed to from Rockabill itself.

## 3 Results

### 3.1 Boat-based survey results

The detectors deployed on the marine survey vessel recorded high levels of noise. Only two potential bat calls were recorded at times during which the boat was at sea. Both recordings comprised a single pulse, because of this, confirmation to species level can be more difficult. The recording of single pulses could be a product of an increased period between echolocation pulses as a result of bats being in an open environment, as well as the bat moving and the detector also being on a moving ship. One is a potential single pulse of a Leisler's bat continuous frequency call with a peak frequency at 24kHz. The second is a prospective *Nyctalus* species continuous frequency bat call with a peak frequency of 13.5kHz. The potential candidates for this would be an uncharacteristically low common noctule call or a greater noctule call, neither of which are native to Ireland. The locations and times of these calls are summarised in **Table 3**.

**Table 3 - Results from boat-based survey**

Prospective species	Date & Time	Prospective call type (Peak freq.)	Latitude	Longitude	Distance offshore
Leisler's bat	01-Jun-22 21:30	Continuous Freq. (24kHz)	53.588303	-5.799392	c. 19km
Unidentified <i>Nyctalus</i> sp	07-Jun-22 22:50	Continuous Freq. (13.5kHz)	53.690674	-5.924983	c. 17km

While both files contain bat-like sounds, they consisted of a single pulse and were therefore labelled noise by automatic classifiers. Given the nature of this survey it is exceedingly difficult to even manually confirm these as bat passes. These sound files are considered in this report due to the fact that if bat calls are present in boat survey data, they would most likely exist in this form, low quality, single pulse calls. This is due to the use of a noisy moving recording platform attempting to record targets which are also moving.

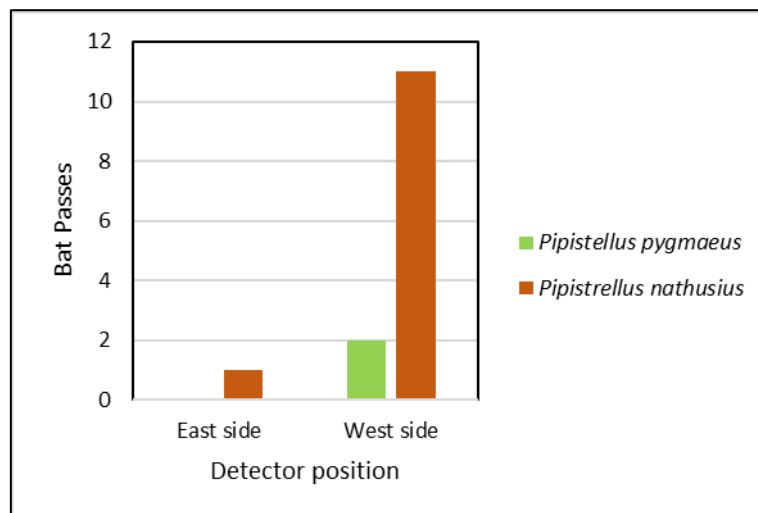
<sup>1</sup> Marine Institute Website: Irish Weather Buoy Network Observations. Available at: <http://www.marine.ie/site-area/data-services/real-time-observations/irish-weather-buoy-network-imos> (Accessed December 2022)



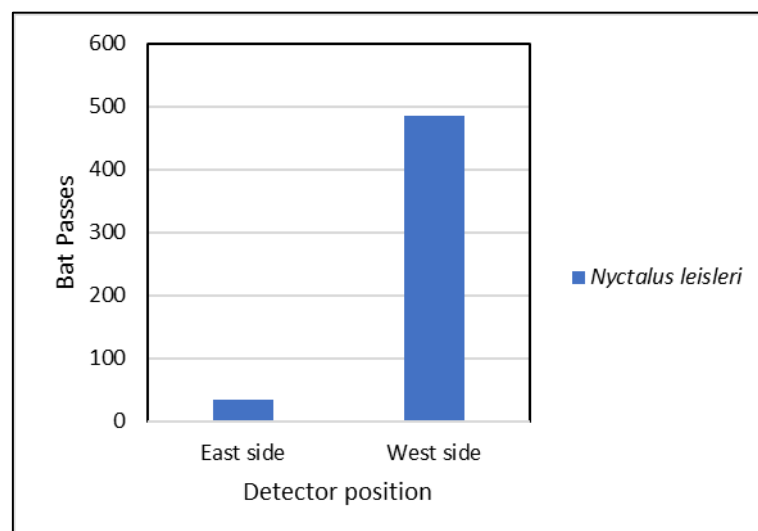
### 3.2 Rockabill Island Results

Three species were recorded at Rockabill during the survey period; Leisler's bat (*Nyctalus leisleri*), Nathusius' pipistrelle (*Pipistrellus nathusius*), and soprano pipistrelle (*Pipistrellus pygmaeus*). Only one recording period during the deployment recorded no bats on both detectors. This was between the 19-May 2022 to the 14-Jun 2022.

On 22-Sep 2022 at 20:25 and 20:36, two soprano pipistrelle passes were recorded. There was no foraging or social behaviour associated with these passes and they may represent a commuting individual. Both passes were only recorded on the detector on the western side of the island. An overview of where bat activity was recorded is presented below in **Figure 3** and **Figure 4**. These figures clearly show that across all species, more bat passes were recorded on the western detector. The species-specific bat data for Leisler's bat and Nathusius' pipistrelle are discussed in further detail in the following sections.



**Figure 3 - Comparison of pipistrelle species passes on the eastern vs western side of the island**

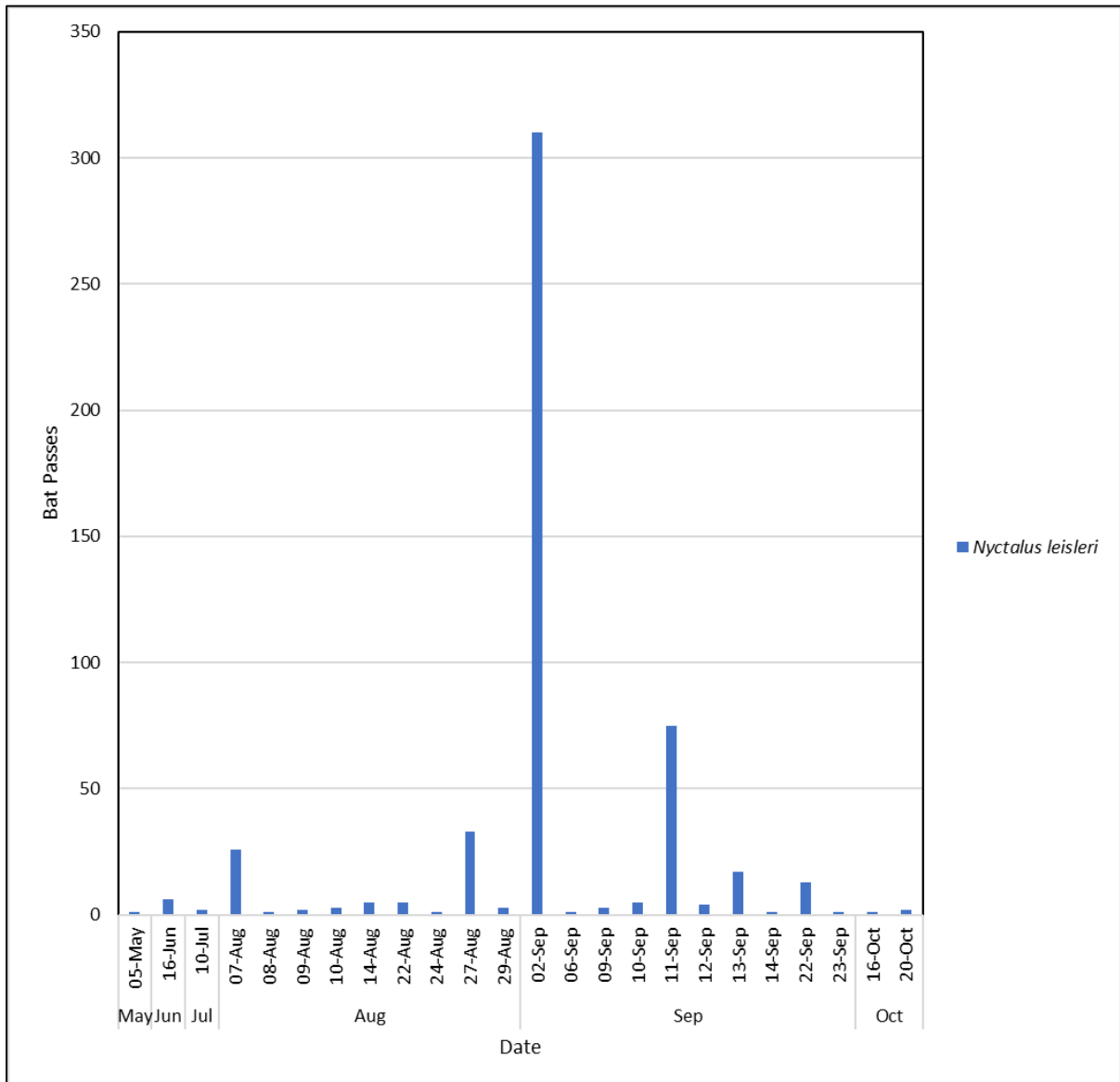


**Figure 4 - Comparison of Leisler's bat passes on the eastern vs western side of the island**

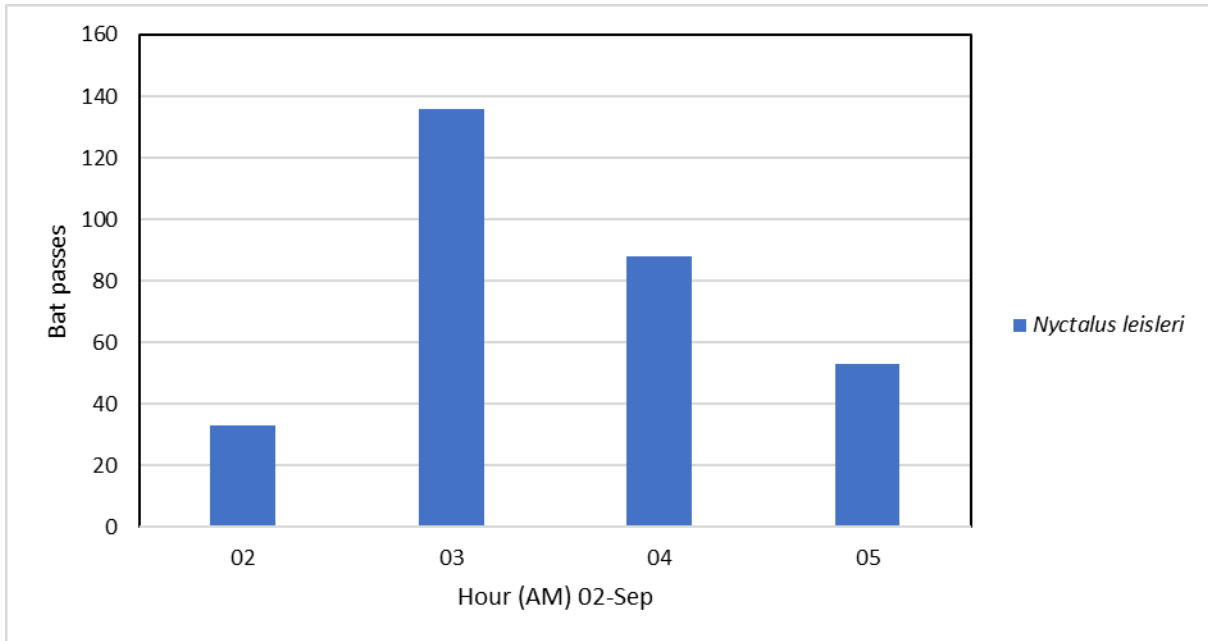
#### 3.2.1 Leisler's bat activity

Leisler's bat activity was low but near constant throughout the majority of the deployment duration. **Figure 5** shows the spread of Leisler's activity across the season. There are either none, or solely

individual passes during the initial deployment on 19-Apr to 07-Aug 2022. The 16-Jun 2022 is a slight outlier in this period, with 6 recorded passes. Across August, 79 passes were recorded in total, with noted increases on 07-Aug and 27-Aug 2022 comprising 26 passes and 33 passes, respectively. There was frequent Leisler's bat activity across the entire month of September with a total of 430 passes recorded. The two largest peaks in activity occurred on single nights on the 02-Sep and 11-Sep 2022, with 310 passes and 75 passes respectively. The Leisler's bat activity on the 02-Sep 2022 occurred between 02:00 and 05:00 as shown below in **Figure 6**. This is relative to a sunrise at 06:36. It is also important contextually that there were no Leisler's passes on the night of the 01-Sep 2022. The activity during this early morning period also featured 29 recorded feeding buzzes and a social call in a sound file containing two Leisler's bats. There were also two feeding buzzes recorded on 28-Aug.

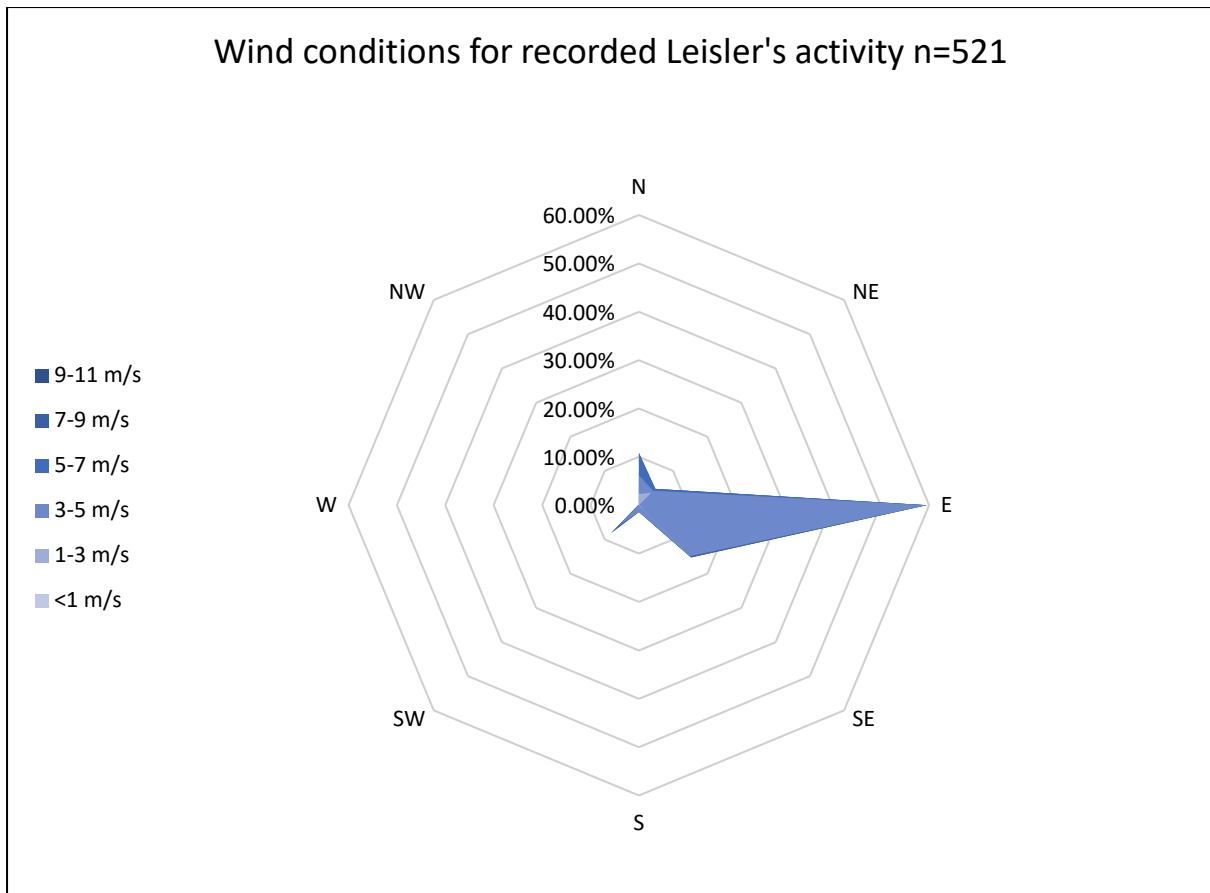


**Figure 5 - Leisler's bat passes distribution across survey period**



**Figure 6 - Spread of Leisler's bat activity to the nearest hour on 02-Sep-22**

As displayed in **Figure 7** below, Leisler's activity primarily coincided with easterly winds; a trend heavily driven by the activity peak on the 22-Sep 2022 which had an average easterly wind speed of 3.5m/s. The three most frequently observed wind directions while Leisler's bat activity was recorded were easterly, south-easterly and northerly winds. These conditions were present for 59.46%, 15.25%, and 11% of recorded passes respectively. Of the 11% of records made during northerly winds, a notable 4.44% of records were recorded during 5-7m/s wind speeds. There was a single pass which occurred during a westerly wind. This occurred on the 16-Oct 2022, while the average hourly wind speed was 10.42m/s. It is important to consider a potential discrepancy in Irish Sea conditions recorded by the weather buoy and the conditions at Rockabill.



**Figure 7 - Prevailing wind conditions during which Leisler's bat activity was recorded**

### 3.2.2 Nathusius' pipistrelle activity

Nathusius' pipistrelle activity was recorded on two occasions, 01-May and 02-Sep 2022, presented in **Figure 8** below. The activity recorded in May consisted of a single pass on the eastern detector at 22:18:29, followed by a single pass on the western detector at 22:18:38. This is relative to a sunset on the 01-May 2022 was 20:54 making these passes approximately 90 minutes after sunset. Recordings on the 02-Sept 2022, during which time the only other Nathusius' pipistrelle calls were captured, two passes were recorded in the morning at 06:33 and 06:34. Sunrise on the 02-Sep 2022 was at 06:36. That evening, 8 passes were recorded between 20:45 and 20:47 relative to a sunset at 20:12.

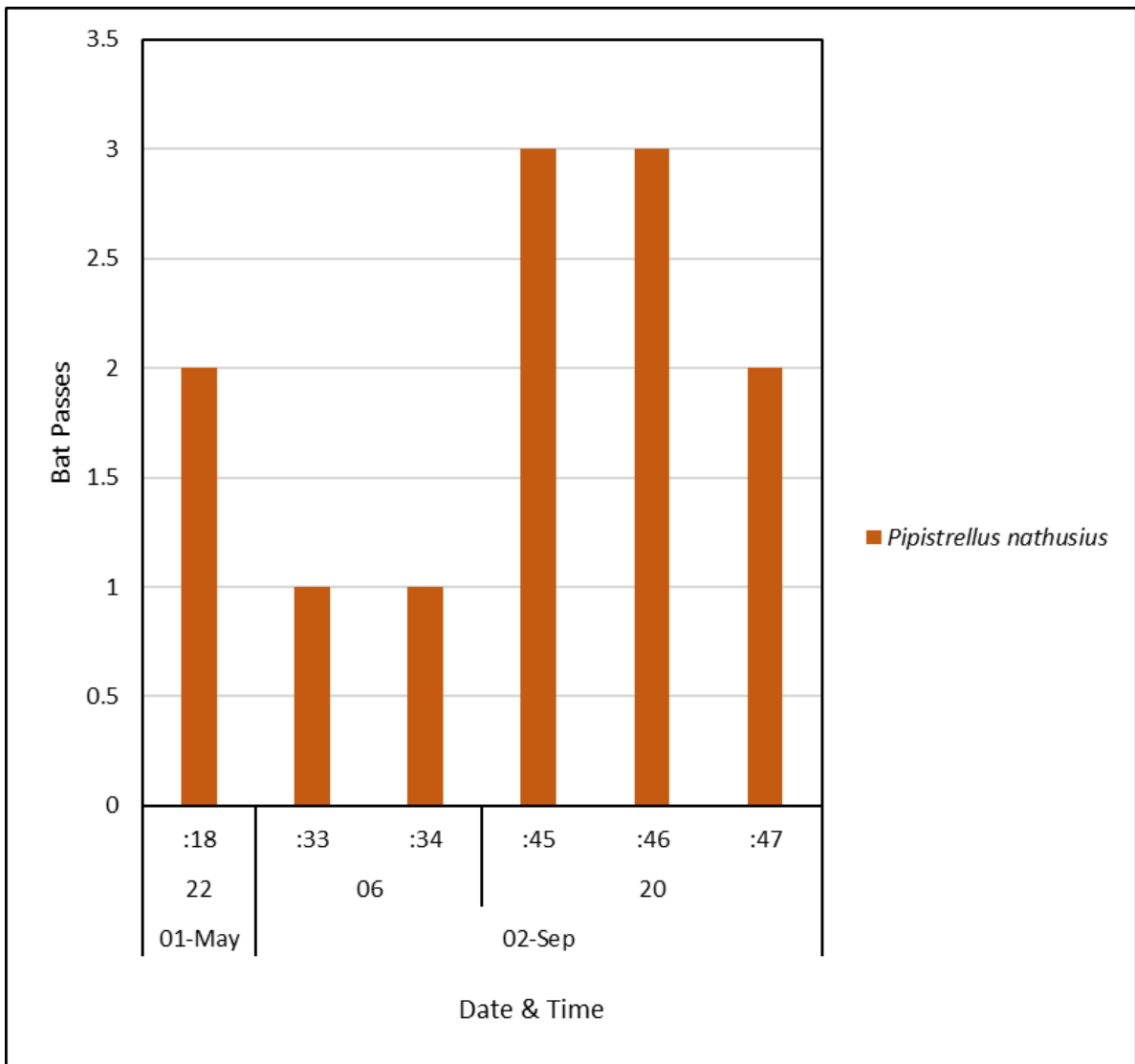
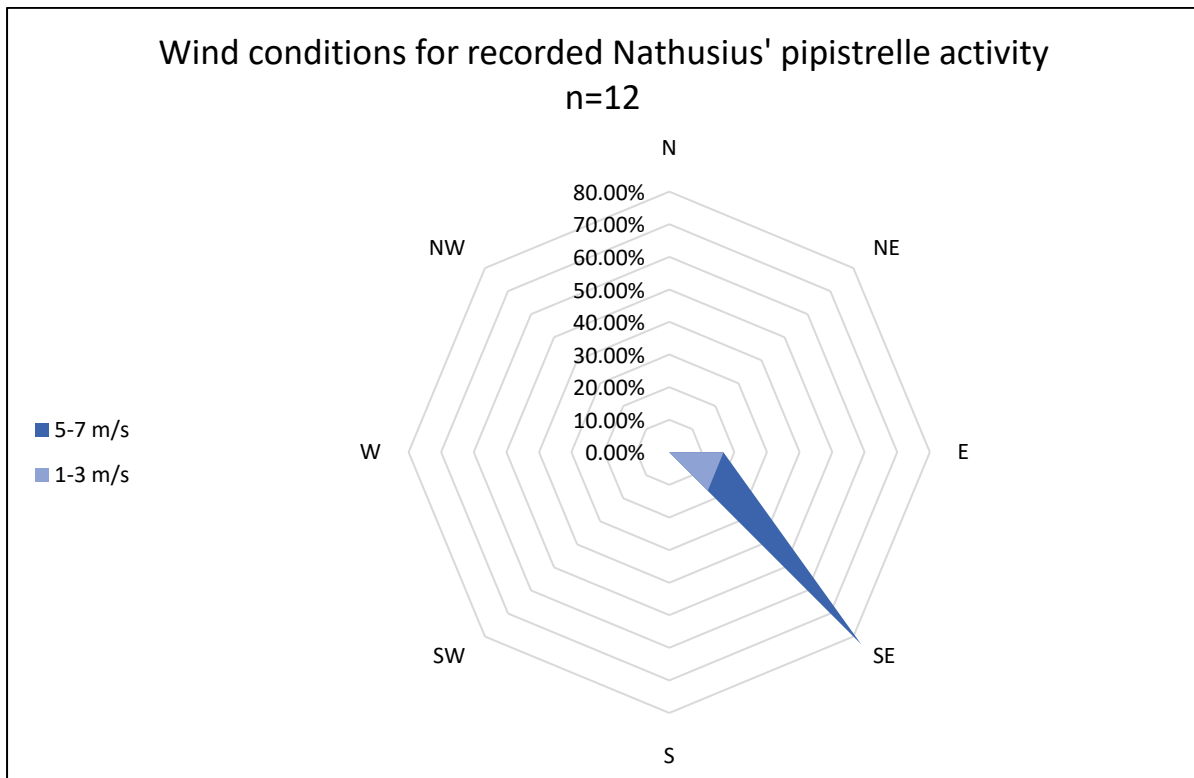


Figure 8 - Dates and times of *Nathusius' pipistrelle* activity

**Figure 9** shows the prevailing wind conditions during which Nathusius' pipistrelles were recorded. As displayed in the graphic, the total number of passes for which this figure was made is very small (n=12), however, a similar trend to what to Leisler's bat is seen with easterly and south-easterly winds being the most frequently occurring conditions, 83% and 17% respectively. It is important to note that 67% of the easterly wind recorded was between 5-7m/s in wind speed. This observation is heavily influenced by the conditions which were present on 02-Sep which was a combination of south easterly winds between 5-7m/s and easterly winds between 1-3m/s.



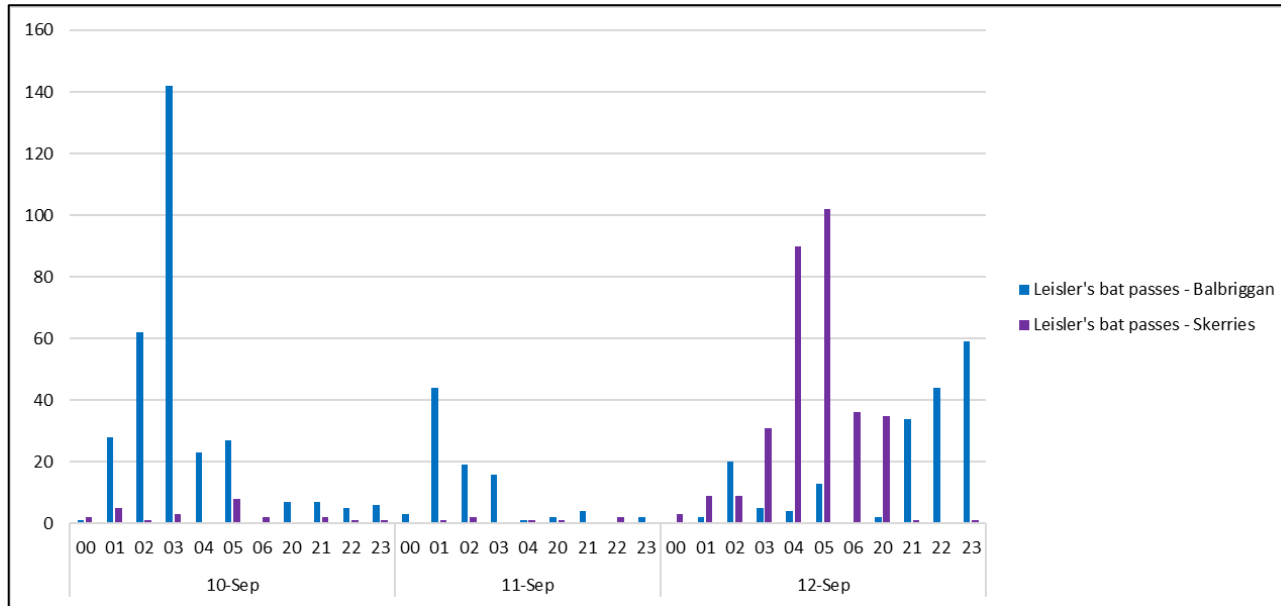
**Figure 9 - Prevailing wind conditions during which Nathusius' pipistrelle activity was recorded**

### 3.3 Headland results

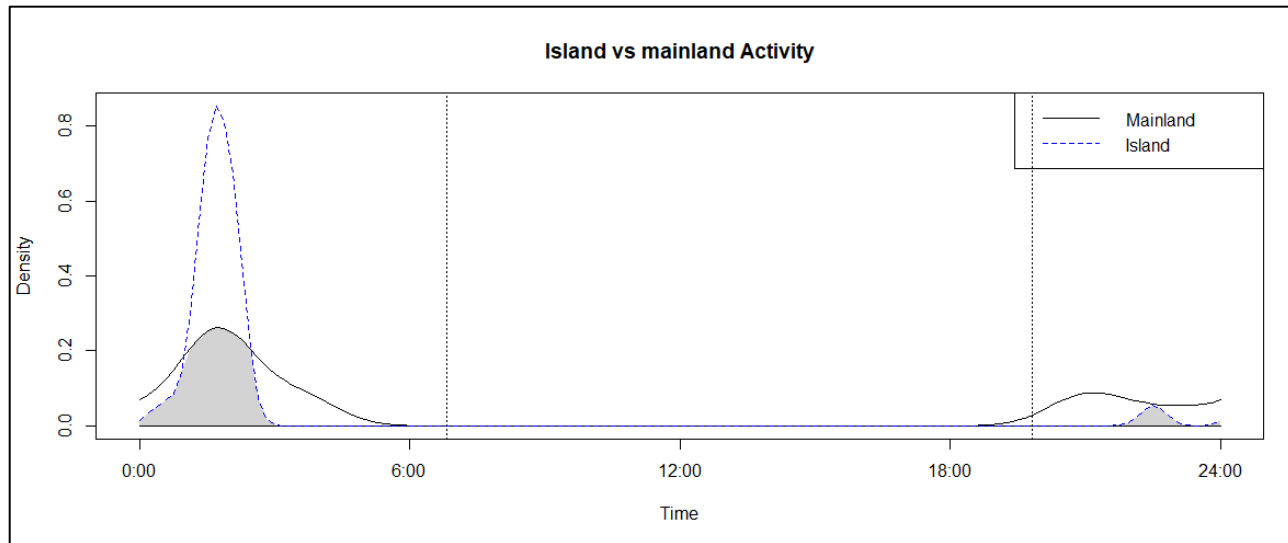
The headland detector data was examined specifically for trends in Nathusius' pipistrelle and Leisler's bat data, in light of the results recorded at Rockabill. There were no Nathusius' pipistrelle calls recorded on either headland detectors. Leisler's activity across the headland deployments is shown in **Figure 10**.

Due to land access complications, headland detectors were not in place for the night of 02-Sep 2022, which was the peak date of both Leisler's and Nathusius' pipistrelle activity.

A smaller Leisler's bat activity peak of note occurring on Rockabill while the headland detectors were deployed was on 11-Sep 2022 (75 passes). A peak in Leisler's activity occurred in Balbriggan on the 10-Sep 2022 (308 passes), with 30% less activity on the 11-Sep 2022 (91 passes). The highest levels of activity on the Skerries detector were recorded on the 12-Sep 2022 (317 passes). Examining temporal pass density plot, on the 11-Sep 2022 we can see that activity increased and decreased simultaneously at Skerries in tandem with activity on the island (**Figure 11**).



**Figure 10 - Temporal spread of Leisler's activity during headland deployment dates across the activity peaks of both locations**



**Figure 11 - Density plot of Leisler's bat activity on 11-Sep comparing data at the Skerries and Rockabill detectors**



## 4 Summary & Discussion

- The results from the boat-based study were inconclusive, but are suggestive of at least some level of potential *Nyctalus* bat activity offshore, with likely bat calls recorded at some 12km north-east and 13km east of Rockabill Island.
- The largest peaks in activity for both Nathusius' pipistrelle and Leisler's at Rockabill occurred on 02-Sep 2022. For Leisler's bat, foraging and social activity was recorded during this period.
- The periods during which both species were recorded at peak activity at Rockabill coincides with the autumn migration window, as observed in the European mainland.
- The majority of activity recorded for both species at Rockabill occurred during easterly or south-easterly winds, at speeds of 3-5m/s for Leisler's bats and 5-7m/s for Nathusius' pipistrelle.
- With the exception of 5 individual dates recording  $\leq 6$  passes in May, June, July, and October 2022, Leisler's passes were recorded at Rockabill on a frequent basis particularly between 07-Aug and 23-Sep 2022 with no more than 4 days passing without a bat pass in this period.
- The peak of Leisler's bat activity on the 02-Sep coincides with prevailing wind conditions from the east. Literature has detailed the use of tailwinds by migrating bats (Dechmann *et al.* 2017; Lagerveld *et al.* 2021), however this has not been substantiated for Leisler's bats to date but is a behaviour noted in both Nathusius' pipistrelles and common noctules. The majority of activity recorded for both species occurred during easterly or south-easterly winds, at speeds of 3-5m/s for Leisler's bats and 5-7m/s for Nathusius' pipistrelle, which would also support a migratory behaviour as it would indicate that bats were flying in an east-to-west direction. Foraging and social activity of Leisler's was recorded during the peak of activity on the 02-Sep 2022.
- The majority of activity recorded being on the western detector at Rockabill could suggest the use of the island's wind shadow for rest or foraging, or a larger open vegetated area attracting more invertebrate prey.
- The two soprano pipistrelle passes recorded at Rockabill on 02-Sep 2022 are anomalous, as they are not known to be a long-distance migratory species and are not known to fly offshore.
- Boat based surveys detected two probable bat calls in the array area, however this could not be confirmed due to the nature of data recorded- hence no robust conclusions could be drawn based on the data sample analysed.
- The headland surveys only coincided with one minor activity peak on Rockabill Island. There was increased activity at Balbriggan the previous morning and the subsequent morning at Skerries.
- More data would be required to make conclusions on bat behaviour in this coastal area, relating to those at all locations.

## 5 References

- Bach, P., Voigt, C.C., Götttsche, M., Bach, L., Brust, V., Hill, R., Hüppop, O., Lagerveld, S., Schmaljohann, H. and Seebens-Hoyer, A., 2022. Offshore and coastline migration of radio-tagged *Nathusius' pipistrelles*. *Conservation Science and Practice*, 4(10), p.e12783.
- Ciechanowski, M., Jakusz-Gostomska, A. & Żmihorski, M. Empty in summer, crowded during migration? Structure of assemblage, distribution pattern and habitat use by bats (Chiroptera: Vespertilionidae) in a narrow, marine peninsula. *Mamm Res* 61, 45–55 (2016)
- Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edition). The Bat Conservation Trust, London.
- Dechmann, D.K., Wikelski, M., Ellis-Soto, D., Safi, K. and O'Mara, M.T. (2017). Determinants of spring migration departure decision in a bat. *Biology letters*, 13(9), p.20170395.
- Lagerveld, S., Jonge Poerink, B. and Geelhoed, S.C. (2021). Offshore occurrence of a migratory bat, *Pipistrellus nathusii*, depends on seasonality and weather conditions. *Animals*, 11(12), p.3442.
- Shiel, C.B., Shiel, R.E. and Fairley, J.S. (1999). Seasonal changes in the foraging behaviour of Leisler's bats (*Nyctalus leisleri*) in Ireland as revealed by radio-telemetry. *Journal of Zoology*, 249(3), pp.347-358.

## 6 Appendix: Detector Locations

### 6.1 Rockabill



**Plate 1 - Western detector, microphone circled in red, detector and battery circled in yellow**



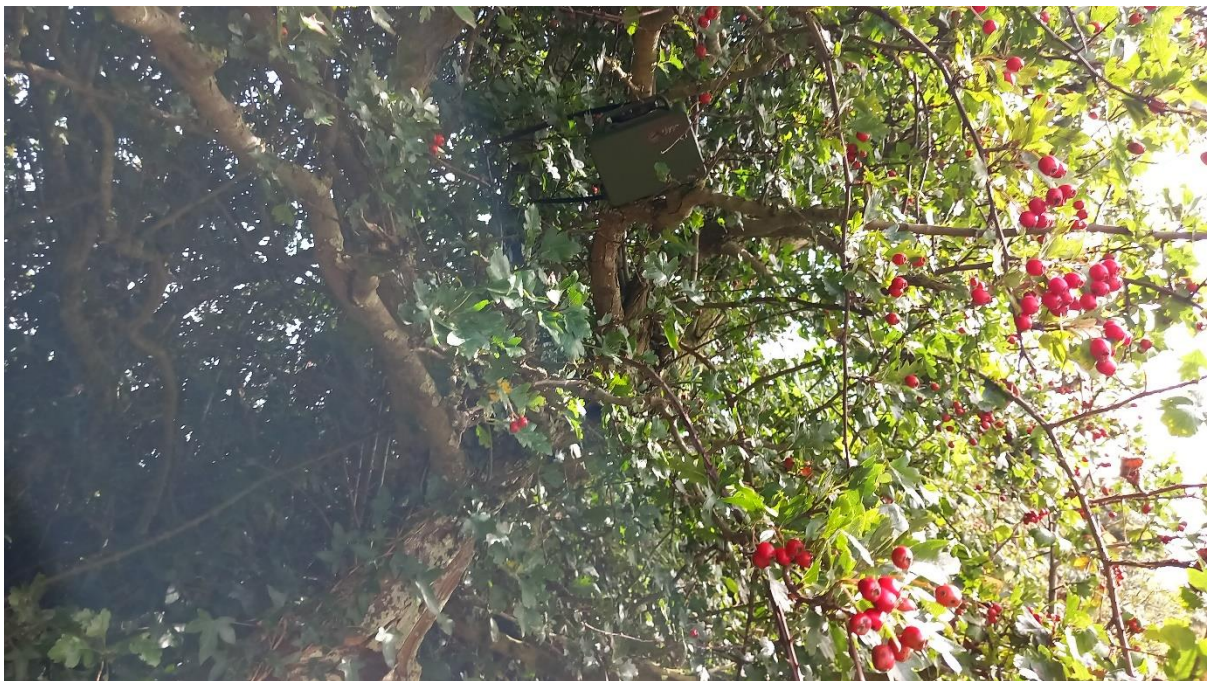
**Plate 2 - Eastern detector, microphone circled in red, detector and battery circled in yellow.**



## 6.2 Headland



***Plate 3 - Skerries detector on the RLNI weather mast***



***Plate 4 - Balbriggan detector on treeline adjacent to beach***