

Appendix
**10.1 Bat Surveys River Moy,
Ballina, Co. Mayo 2022**

Bat Surveys
River Moy
Ballina
Co. Mayo
2022



Ecological Services

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Introduction

Mayo County Council are planning flood relief measures along the river Moy and tributaries in Ballina, Co. Mayo. This will involve strengthening of river embankments and new or altered defences where necessary. A selection of bat surveys were defined, to try to ascertain if there were any bat roosting points in any of the masonry or other built structures along the river within the town. Trees which would be affected by the flood relief works were surveyed for bat roost potential and those deemed to have potential were subject to a bat survey.

The river Moy rises in Sligo's Ox Mountains and is approximately 100Km long. It flows through Ballina town before emptying into the Atlantic. The town is built around the river and its tributaries and is prone to flooding at intervals. See Fig 1, 2.

Fig.1: Location of the section of the river Moy proposed for flood relief management, between the red lines.

Irish grid reference: G 25115 19304. (Irish Grid Reference Finder – IGRF)



Fig.2: View of The Moy River in Ballina town looking downstream towards Lower Bridge and Cathedral Road in the background. Note walled embankments and hard built surfaces along the river.



Bats in Ireland

In summer, many of Ireland's nine breeding species of bat use both built structures and trees for maternity roosts. Here, they raise their pup in a colony of females until the autumn when the young are self-sufficient. In autumn when the young are independent, some or all of the roost disperses into smaller roosts, commonly amongst trees containing cracks and crevices.

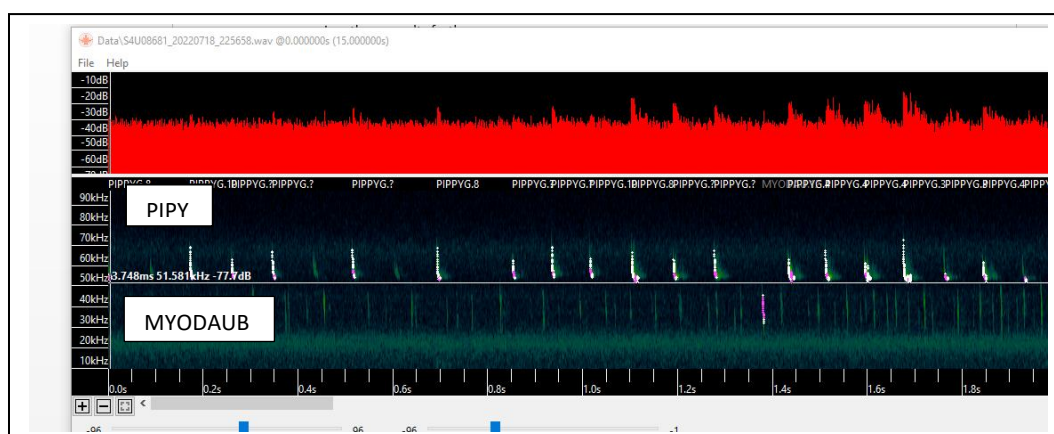
In winter, bats gather for hibernation, often in a separate location from the maternity roost. These locations, such as tree cavities, caves, souterrains, or deep stone walls are chosen because of steady temperatures, which allow the bats to stay in torpor and conserve energy.

Bats have developed a highly sophisticated echolocation system that allows them to avoid obstacles and catch insects. When they are flying, bats produce a stream of high-pitched calls and listen to the echoes to produce a sound picture of their surroundings. See Fig 3.

Due to the ecological behaviour of bats in Ireland, it is appropriate that this site is surveyed for bats. It contains potential in its building, woodland and river system, for roosting, commuting and foraging bats.

All Irish bats are protected under National and EU legislation (The Wildlife Act 1976, the Wildlife (Amendment) Act 2000, and European Communities (Birds and Natural Habitats) Regulations 2011). Both the animals themselves and their roosts are protected, and it is an offence to disturb or interfere with them without a licence.

Fig.3: Sonogram of a Soprano Pipistrelle, (PIPY) (above the white line) and Daubenton's bat (MYODAUB) recorded at Bachelor's Walk / the River Moy in Ballina. This is an image representing the sound a bat emits when echo locating, when they are commuting, foraging and communicating with each other.



METHODS

The walls and other structures along the river Moy in Ballina town were visually inspected for features that could potentially hold a bat roost. All trees along the same section were logged and surveyed for bat roost potential.

Emergence / re-entry surveys were carried out over the bat active season from viewpoints (VP's) on each section of the river as shown in Fig 5.

The walls, bridges, and any built construction along the river were surveyed at either dusk or dawn and any bat activity in the viewpoint area during the survey is documented in the results section. A summary table of these results may also be seen in Table 1.

Song Meter 4 bat detectors were deployed at points in the survey areas and recorded for the duration of some of the surveys. Location of Song Meters 4 may be seen in Fig 6. Song Meter 4 data were then downloaded and analysed to identify bat species using the river area.

Other bat detectors used during surveys were Echo Meter Touch, Elekon bat scanner and Petterson Heterodyne. See Fig 4.

Details of survey dates, weather conditions, and sunset/sunrise times may be seen in Table 4 in the results section.

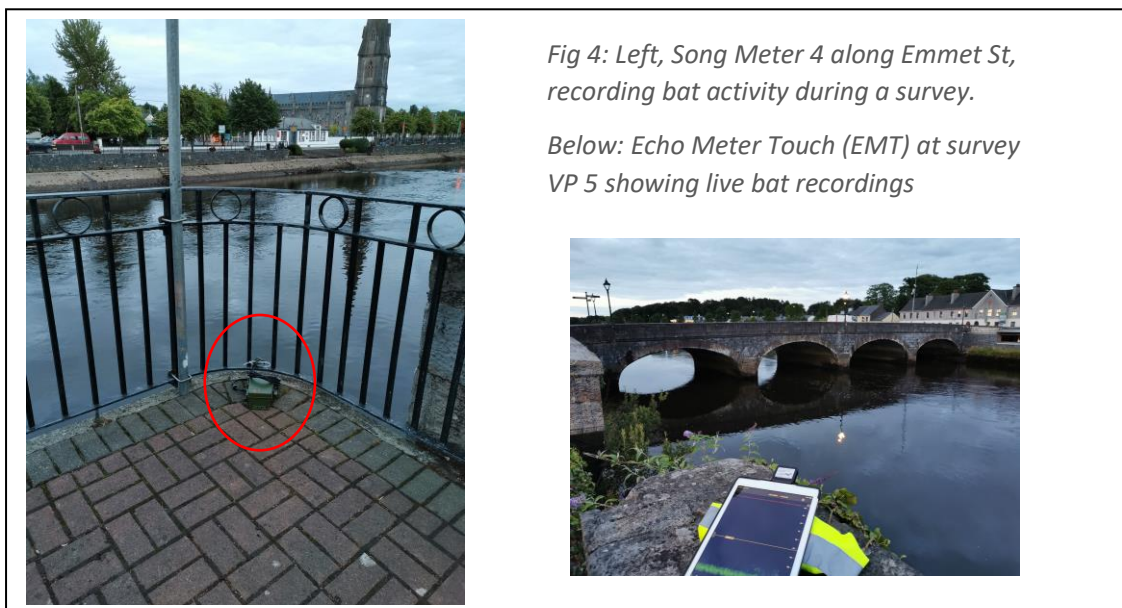


Fig 5: Points from which sections of the riverside were surveyed for bats along the river Moy in Ballina town. ● Trees surveyed that had bat roost potential. ●

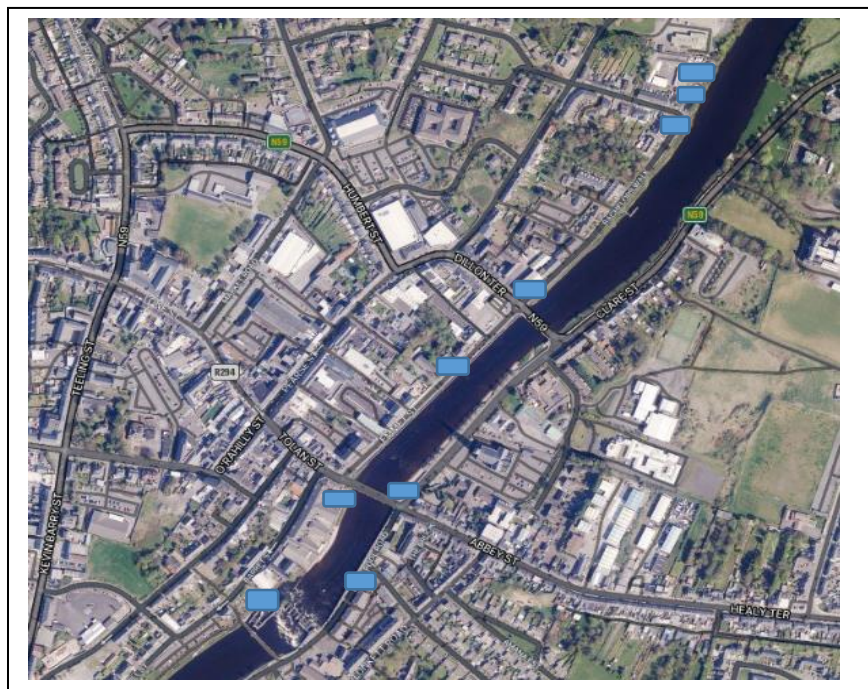
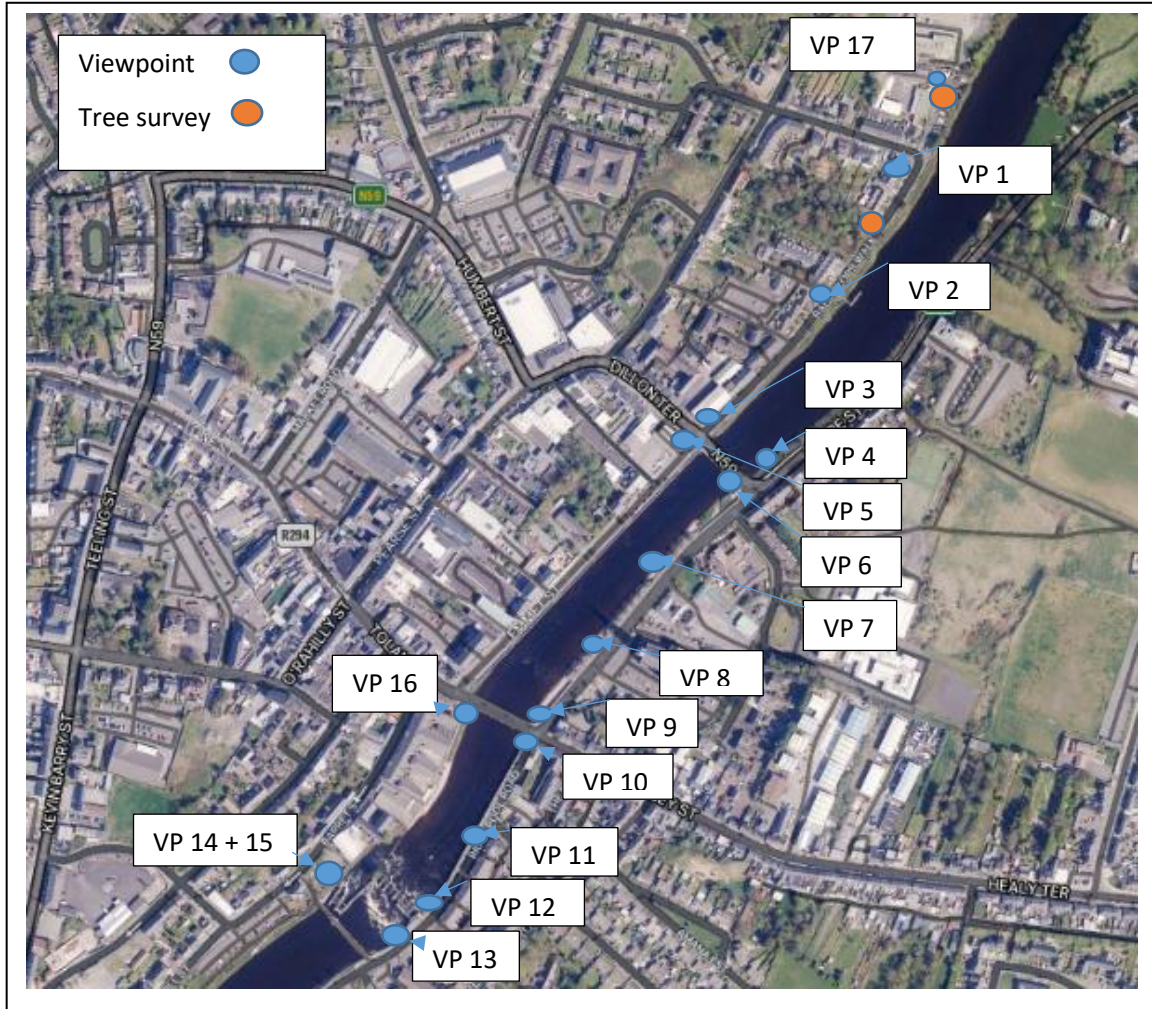


Fig 6: Song Meter 4 placements along the river Moy in Ballina town. ■

Results – River Moy Ballina

Riverside inspections

The River Moy in Ballina town has large sections of stone walls, steps and other built constructions along its banks and associated with the salmon weir. Not every aspect of these structures could be accessed, but where possible they were inspected for signs of possible bat roost locations. To compensate for the difficulty of accessing some areas, vantage point surveys were laid out along the river's edge in order to encompass a view of built structures with the aim of locating bat roosts – if present – during these VP surveys. It must be noted that certain areas were difficult to view during the VP surveys due to bright street lighting and difficulty of getting close enough to certain points. No roost location was found during the inspections.

During the day inspection of the boatyard beside Bachelors walk, it was decided that the shed there had bat roost potential and would be later surveyed.

Below are the dates of surveys and their corresponding VP survey locations and results. Table 1 summarises these results further.

Bat Surveys 18/07/2022 - Dusk

VP1 – Dusk, Bachelors walk

Soprano Pipistrelle (*Pipistrellus pygmaeus*) Common Pipistrelle, (*Pipistrellus pipistrellus*) and Daubenton's, (*Myotis daubentonii*) were recorded foraging in this area. There was constant foraging by Soprano Pipistrelle circling around the riparian vegetation and over to the trees at St Muredach's college. Common Pipistrelle and Daubenton's calls were noted less frequently.

VP2 – Dusk, Bachelors walk, river steps near end of Rope Walk lane

Soprano Pipistrelle, Common Pipistrelle, and Daubenton's, were recorded foraging in this area with activity levels similar to VP1.

VP3 – Lower Bridge Northwest (downstream side)

Soprano Pipistrelle, Common Pipistrelle, and Daubenton's, were recorded foraging in this area. Soprano Pipistrelle and Daubentons dominating the activity. #4 Daubentons were observed feeding around the bridge.

VP4 - Lower Bridge Northeast side (downstream side)

Soprano Pipistrelle and Daubenton's, were recorded foraging in this area. Soprano Pipistrelle #3 dominating the activity. Daubentons #2 towards end of dusk survey came through bridge arch and circled back downstream in a foraging pattern. (#3 Daubentons were observed feeding around the bridge on the downstream side earlier in the survey.)

Bat Surveys 26/07/2022 - Dusk

Boatyard

The boatyard at the end of Bachelors walk is an enclosed private compound with a slipway into the river. It has trees and shrubs along its river edge. These could not be previously surveyed for bat roost potential, so the vegetated boundary was now assessed and it was determined that a section with tall

partially ivy covered trees – Sycamores – were deemed to have moderate potential for roosting bats and would need further survey.

A Song Meter was also placed in the yard to record for the night in order to give an indication of what species were present in the area. Analysis of this recorder showed Soprano Pipistrelle, with the most calls, foraging throughout the night. The first Daubentons call logged was at 22.33. There was also Common Pipistrelle, and Leisler’s bat recorded.

VP 5 – lower Bridge, southwest side (upstream of bridge)

Soprano Pipistrelle, Leisler’s, Daubenton’s and Common Pipistrelle were recorded. One Soprano Pipistrelle was foraging between the first arch and Emmet St. river wall. It was soon joined by another and they foraged, both sides of the archway during the survey. Daubenton’s were first noted foraging on the downstream side of the Lower Bridge, and eventually two were noted flying through the archways and feeding on the upstream side. No roost was located

Bat Surveys 27/07/2022 - Dawn

VP6 – Lower bridge, south east side (upstream of bridge) –Cathedral road

No bats were observed entering the bridge to roost. Only Soprano Pipistrelles were foraging on the northwest side of this bridge at dawn. Note: the reflections of street lights on the water – a constraint in terms of visibility during surveys. See Fig 11.

VP7 – Cathedral Road - Steps opposite vegetated area on opposite bank

Soprano Pipistrelle was observed briefly. No other activity was noted. Seal observed again in river.

Bat Surveys 27/07/2022 - Dusk

VP 8 - Cathedral Road – Lantern Chinese on opposite side

Leisler’s bat was recorded foraging overhead on a few occasions. Soprano Pipistrelle was observed briefly. No other activity was noted.

VP 9 - Cathedral Road – Upper Bridge, north east (downstream of bridge)

Soprano Pipistrelle first noted at 22.14, two feeding around the bridge. Leisler’s bat was foraging also. See Fig 7.

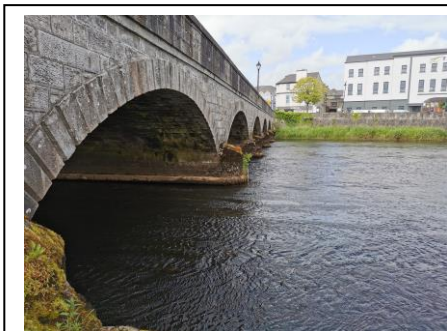


Fig 7: View from VP 9 beside the Upper Bridge just off Cathedral Road, Ballina.

Bat surveys 07/08/2022 - Dusk

VP 10 – Upper Bridge at Lower Street Bridge, (upstream side)

Soprano Pipistrelle, Leisler’s and Daubenton’s bat foraging.

VP 11 - Near the junction of The Brook and Lower Bridge Street

Soprano Pipistrelle and Leisler’s foraging. Daubentons pass at 22.44.

VP 12 – To the right of the salmon weir building
Soprano Pipistrelle and Leisler's foraging.

VP 13 - Between The Weir building and new bridge
First Soprano Pipistrelle at 21.55. Leisler foraging also. Checked far side of new bridge after survey – #2 Daubentons foraging under new bridge and around weir structures. It was recommended further survey should be carried out in this area.

Bat surveys 12/09/2022 - Dusk

VP 14 – Salmon weir pool
Soprano Pipistrelle foraging consistently, Daubenton's bat arrived at 20.46. One bat could be seen foraging, mainly in the calm water on the downstream side of the weir infrastructure.

VP 15 – Ruined building stone wall adjacent to the weir
This wall was surveyed for bats as it had potential as a roost site. No bats emerged during the survey

VP16 – Upstream side of the upper bridge North West side
Soprano pipistrelle foraging. Two Daubentons foraging in and around the first two bridge arches and at times further over the river.

Bat surveys 13/09/2022 - Dusk

VP 17 Boatyard shed - dusk
A Soprano pipistrelle was observed emerging from within the boatyard shed (20.17pm), third bay from entrance gate. See Fig 8. It foraged consistently in the yard throughout the survey. Daubentons bat was also observed coming up the boat slip and returning to the river. Two Daubentons bats foraged along this stretch of river during the survey. Leisler's bat was also recorded foraging in the area.

Fig 8: Location of emerging Soprano Pipistrelle from the open fronted boatyard shed.



Tree survey – Boat yard - dusk

Two sycamore trees present in the boundary between the boatyard and the river were surveyed. No bat activity was noted specifically around these trees.

Bat survey 14/09/2022 - Dawn

Tree survey – Willow, Bachelors walk

One Soprano pipistrelle was foraging around this tree continually throughout the survey and was sometimes joined by a second. The last activity was noted at 06.46 when it headed upstream.

Legend for Table 1. Bat species and their corresponding abbreviations

<i>Soprano Pipistrelle</i>	<i>Common Pipistrelle</i>	<i>Daubenton's</i>	<i>Leisler's</i>
PIPY	PIPI	MYODAUB	NYCLEI

Table 1: Summary of surveys carried out at the River Moy in Ballina and the species recorded

Date	Vantage Point (VP)	Species	Commuting	Foraging	Emergence/Re entry
18/07/2022	1 dusk	PIPY, PIPI, MYODAUB		X	No
18/07/2022	2 dusk	PIPY, PIPI, MYODAUB		X	No
18/07/2022	3 dusk	PIPY, PIPI, MYODAUB		X	No
18/07/2022	4 dusk	PIPY, PIPI, MYODAUB		X	No
26/07/2022	5 dusk	PIPY, PIPI, MYODAUB, NYCLEI		X	No
27/07/2022	6 dawn	PIPY		X	No
27/07/2022	7 dawn	PIPY	X		No
27/07/2022	8 dusk	PIPY, NYCLEI		X	No
27/07/2022	9 dusk	PIPY, NYCLEI		X	No
07/08/2022	10 dusk	PIPY, MYODAUB, NYCLEI		X	No
07/08/2022	11 dusk	PIPY, NYCLEI, MYODAUB	X	X	No
07/08/2022	12 dusk	PIPY, NYCLEI		X	No
07/08/2022	13 dusk	PIPY, NYCLEI		X	No
12/09/2022	14 dusk	PIPY, PIPI, MYODAUB		X	No
12/09/2022	15 dusk wall ruin	No bats emerged			No
12/09/2022	16 dusk	PIPY, MYODAUB		X	No
13/09/2022	VP 17 dusk	PIPY, NYCLEI, MYODAUB	X	X	Yes – PIPY#1
13/09/2022	Boatyard trees dusk	PIPY, DAUB	X	X	No
14/09/2022	Willow Tree dawn	PIPY		x	No

Song Meter Activity

Song Meter 4 were deployed on 11 different occasions along the river Moy in Ballina Town during the bat surveys. See Fig 6: These recordings were downloaded and calls checked and verified to species level.

As during the surveyor surveys – four species were recorded, Soprano Pipistrelle, Common Pipistrelle, Daubenton’s and Leisler’s bat.

Tree Surveys

Trees along the section of river as shown in Fig 9 were surveyed for potential bat roost features (PFR). Each tree was assessed from ground level – the majority being young isolated trees along the foot paths. Each tree species was documented along with its level of potential as a bat roost. Trees that had a moderate or higher level of potential were later surveyed. A summary of trees inspected can be seen in Table 2.

Fig 9: Trees surveyed for potential roost spots along the banks of the River Moy in Ballina. See also table 2



Table 2: List of trees along the streets and banks of the River Moy Ballina town.

Note: Tree numbers followed by a letter denotes a tree on the river bank, i.e. on the river side of a wall. All other trees listed are along the rivers adjacent footpath. (PRF Potential Roost Feature)

Tree No.	Species	PRF	Tree No.	Species	PRF	Tree No.	Species	PRF
1	Ash	No	31	Hornbeam	No	49c	Sycamore	Low
2	Ash	No	32	Hornbeam	No	49d	Sycamore	No
3	Ash	No	33	Hornbeam	No	50	Maple	No
4	Ash	No	34	Hornbeam	No	50a	Willow	Low
5	Ash	No	35	Hornbeam	No	51	Maple	No
6	Ash	No	36	Alder	No	51a	Sycamore	No
7	Ash	No	37	Willow	No	52	Maple	No
8	Ash	No	38	Hornbeam	No	53	Maple	No
9	Ash	No	39	Hornbeam	No	54	Maple	No
10	Ash	No	40	Hornbeam	No	55	Maple	No
11	Ash	No	41	Maple	No	56	Maple	No
12	Ash	No	42	Maple	No	57	Maple	No
13	Ash	No	43	Maple	No	58	Maple	No
14	Ash	No	44	Maple	No	59	Lime	No
15	Lime	No	45	Maple	No	60	Lime	No
16	Lime	No	45a	Aspen	Low	61	Lime	No
17	Lime	No	45b	Alder	Low	62	Lime	No
18	Lime	No	45c	Alder	Low	63	Lime	No
19	Lime	No	46	Maple	No	64	Lime	No
20	Lime	No	46a	Sycamore	No	65	Lime	No
21	Lime	No	46b	Alder	Low	66	Lime	No
22	Lime	No	46c	Alder	Low	67	Lime	No
23	Lime	No	46d	Alder	Low	68	Lime	No
24	Lime	No	46e	Alder	Low	69	Lime	No
25	Lime	No	47	Maple	No	70	Lime	No
26	Lime	No	47a	Willow	Moderate			
27	Lime	No	48	Maple	No			
28	Birch	No	49	Maple	No			
29	Birch	No	49a	Hawthorn	No			
30	Birch	No	49b	Sycamore	No			

Boatyard Trees

There is a tree/shrub line along the private boatyard at the end of Bachelors walk in Ballina town. Fig 10. Each of these trees were assessed for PFR's and their species and bat roost potential is listed in Table 3. Note: only one area in this tree line was deemed to have bat roost potential. There is a cluster of multi stem sycamore which had ivy growing on them. This was surveyed on the 13/09/2022 at dusk, but did not have any bat activity particularly associated with it. No bat emerged from these trees.

Fig 10: Boatyard, Bachelors walk, Ballina town



Table 3: Trees along the boatyard and their suitability for bat roosts.

Tree No.	Species	PRF
A	Hawthorn	No
B	Sycamore	No
C	Horse chestnut	No
D	Fuchsia	No
E	Willow scrub	No
F	Sycamore	No
G	Alder	No
H	Alder	No
I	Alder	No
J	Ash	No
K	Ash	No
L	Sycamore Cluster	Moderate

Weather, Sunrise and Sunset Times

The survey and recordings were carried out in as optimal weather conditions as possible. See Table 4.

Table 4: Weather/Sunrise & Sunset Times

Date	Survey	Sunrise/ Sunset	Wind speed Bf	Cloud cover %	Precipitation Y/N	Temperature °C
18/07/2022	VP 1,2,3,4	21.57	F2/3	100	N	19
26/07/2022	VP 5	21.46	F2	100	N	16
27/07/2022	VP 6,7	05.39	F0	50	N	11.5
27/07/2022	VP 8,9	21.44	F0	0	N	16
07/08/2022	VP 10,11,12,13	21.25	F1	0	N	18
12/09/2022	VP 14,15,16	20.01	F3	90	N	17
13/09/2022	VP 17&tree	19.59	F1	95	N	17
14/09/2022	Willow tree	07.03	F3	100	N	14

Results Summary

Four species of bat were recorded during the bat surveys along the river Moy in Ballina Co. Mayo.

Soprano and Common Pipistrelle, Daubenton's and Leisler's bat were all recorded commuting and foraging along the river. 19 dedicated bat surveys were carried out, with only one roost located in an open shed in the Boatyard. Here a single Soprano Pipistrelle was roosting.

Daubentons bats were found foraging during many of the river vantage point surveys, especially around the bridges, the pool area of the weir and the tree lined area along the boatyard. No roost locations were noted.

82 species of tree were inspected for potential roost features (PRF) and two of these were further surveyed at dusk and dawn respectively for bat activity. Neither trees had any roosting bats.

Discussion

The results of all the bat surveys along the river Moy in Ballina, Co. Mayo would indicate that there are no bat roost points along the surveyed infrastructure of the river within the town. Only one bat roost was found in the boatyard shed – a structure that is not likely to be affected by any flood relief works.

There was no great number of bats noted during any survey, indicating that individuals had arrived at river sections to forage, as opposed to a group of bats leaving a roost. There is no indication of a maternity roost.

The alteration or removal of infrastructure and trees surveyed will therefore not pose any threat to roosting bats. However consideration should be given to the foraging value of trees along the river – and if removed, replacement specimens must be added as part of the flood relief plans.

The street lighting along the river were a constraint at times with light reflecting on the river. This impeded the vision of the surveyor of commuting and foraging bats and is likely to cause reduction in foraging potential of some bat species See Fig 11. Future lighting schemes should reduce this light spill.

Fig 11: Street lighting impacting the darkness of the river Moy. These lit up areas reduced the foraging potential of the Daubenton's bats and made their movements hard to follow during the surveys. Future lighting schemes should endeavour to eliminate the light spill onto the river.



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