SILKY WAVE MOTHS IN THE AVON GORGE – 2024 MONITORING REPORT

Author: Nic Cooke, Bristol Zoological Society

ncooke@bzsociety.org.uk

DISTRIBUTION LIST

Circulation: *Rosie Jackson (Bristol City Council / Avon Gorge & Downs Wildlife Project); Jen Nightingale (Bristol Zoological Society, BZS); Rosie Sims (BZS); Anna Stevens (BZS/ Avon Gorge & Downs Wildlife Project); Darren Mait (National Trust); Janine Connor (National Trust) Ray Barnett (Bristol & District Moth Group); Dan Hoare (Butterfly Conservation); Jenny Plackett (Butterfly Conservation); George Tordoff (Butterfly Conservation); Russel Hobson (Butterfly Conservation); Tim Corner (Bristol Regional Environmental Records Centre, BRERC);*

ACKNOWLEDGEMENTS

The author would like to thank Butterfly Conservation, for their continued advice and support. The Avon Gorge & Downs Wildlife Project steering committee is thanked for their support and knowledge of the sites and the National Trust team, for their assistance with Quarry access. Thanks also to our 2024 surveyor team: Carys Peotto, Neil Green, Nicola Cooke, Jen Nightingale and Adam Stubbs.

SUMMARY

The silky wave moth *Idaea dilutaria* (Hübner 1799*)*, is a Section 41 species under the 2006 Natural Environment and Rural Communities (NERC) Act and is found on only one site in England, the Avon Gorge, Bristol. Its presence within this area has been monitored / surveyed on an *ad hoc* basis since 1992 with regular surveys undertaken by Butterfly Conservation from 2000. Since 2011, the Bristol Zoological Society has carried out annual silky wave surveys throughout the moth's flight season.

In 2024 the silky wave, within the Avon Gorge, was surveyed throughout the five weeks around the peak flight period; from early June (11) through to the first week of July (02). All six priority sites, three on the Bristol side and three on the Somerset side, were surveyed and the peak count week varied between sites and was between the penultimate and last survey week, i.e., 25 June and 2 July 2024. With reference to the satellite sites, six out of nine were surveyed once during the flight season to determine presence or absence of silky wave moths. The satellite sites that were not surveyed were either overgrown or have lacked the moth for several years. The presence of silky wave was confirmed at all of the 12 sites surveyed. The total peak count was 158 moths, which was lower than the 2023 count, and the lowest count since 2013 when the annual surveying of all 12 sites began.

The peak counts of the Bristol priority sites were lower than last year and more in line with 2022, largely due the high peak count at Walcombe Slade in 2023. Numbers were still considerably lower than the baseline years (2011/12). The Somerset priority sites were similar to the 2023 count but lower than the previous five years but the general trend for these sites is an increase in silky wave peak counts from 2012 onwards. Silky wave numbers this year indicate that the current habitat management regime for Quarry 4 has been successful for this species, but other sites may need to be reviewed given the recent moth declines; however, it should be noted that moth populations can experience cyclical changes, which may be affected by other environmental factors, such as weather patterns.

1. INTRODUCTION

The Bristol Zoological Society has been reporting annually on the silky wave within the Avon Gorge, Bristol, since 2011. Since 2015, the annual reports are now more concise, building on earlier work and reporting the key silky wave survey results. For further background please see previous silky wave moth reports (Nightingale et al., 2011 - 2023).

The silky wave is a species of larger moth occurring in central and southern Europe and in the Caucasus to north-eastern Turkey, and is also found in northern France, Germany and in one site in Sweden. It is classified as Rare (RDB 3) in Great Britain, where it is on the edge of its range, and is found in only three areas. Two of these areas are within Wales; on the Gower coast of Glamorgan and on the Great Orme in North Wales. The third population is the only one known in England and is within the Avon Gorge in Bristol. The Avon Gorge has natural cliffs and quarry exposures of carboniferous limestone, which are of significant geological interest and, together with the scree, scrub, pockets of grassland and adjacent woodland, support an exceptional number of nationally rare and scarce plant species. It is designated as a Special Site of Scientific Interest (SSSI) and a Special Area of Conservation (SAC). The silky wave moth was first recorded in the Avon Gorge in 1851.

2. METHODS AND MATERIALS

The silky wave moth flight period is typically throughout June and July as shown by survey data collected from 2000 - 2023 (Nightingale et al., 2023). Research undertaken during the 2014 survey season determined that the moths are most active in warm, sunny conditions, with low wind speeds. The research also suggested that activity peaked during the morning and late afternoon, with a dip in activity towards the middle of the day (McCafferty, 2014). To minimise survey effort and maximise survey efficiency, Bristol Zoological Society aim to carry out all surveys during the conditions and time scales when the silky wave moth is most active, but with the target of recording a peak count during the moths' flight period.

Although the moth occurs at several discrete sites within the Gorge, six priority sites have been identified for monitoring purposes: three on the Bristol side and three on the Somerset side. The Bristol side priority sites are: Black Rocks, The Gully and Walcombe Slade. On the Somerset side the priority sites are Blockhouse Slope, Donkey Slide and Quarry 3. In addition, there are satellite sites that have had silky wave moth sightings over the past decade or more. The map (Figure 1) details all the silky wave moth sites with the Avon Gorge.

Once the flight season had begun, the priority sites, on both the Bristol and Somerset sides of the Gorge were surveyed regularly, once a week. This year, the survey season on the Bristol side was extended to five weeks for the priority sites, (aiming to take into account peak emergence), to ensure that peak flight period was recorded. Satellite sites on both sides of the Gorge were surveyed once throughout the flight season to ascertain presence or absence of silky wave moths within them.

The transects, which were established in 2010, were walked at each site, during each survey event. At Quarry 3 in addition to the small section of path on the upper quarry slopes that was added to the standard transect in 2018, a linking section was added to increase the survey effort to provide a thorough data set as significant habitat work has been undertaken. The surveyors used hiking sticks to disturb the vegetation along either side of the transect. Typically, each transect was walked once per week in suitable weather conditions and these were timed. The first survey date was 11 June 2024, and the final survey date was 2 July 2024. Additional environmental information was recorded on a standardized form which included:

1. Temperature, measured in Celsius.
2. Humidity, measured as a percentage.
3. Wind speed, ranging from 0-5, using the Beaufort scale.
4. Rainfall, ranging from 0-4 (no rain to heavy rain).
5. Abundance of common rock rose, ranging from 0-4 (sparse to abundant).
6. Condition of site as a whole in terms of whether more management is needed.
7. Additional notes and other species identified

Moth sightings were marked onto the transect maps. All sites had fixed point photography, i.e., a point marked on the transect, where a photograph was taken in a particular direction.

Fixed point photography monitoring of all sites surveyed, combined with the sketch maps, allowed assessment of site use by the species and detection of any general habitat changes over time. The 2010 monitoring forms were used to record all the data and Field Studies Council identification charts were used, when necessary, to identify other invertebrate species that were observed during the timed transects.

All silky wave moth records were submitted by Bristol Zoological Society to the County Moth Recorders for VC34 and VC6 and to the Bristol Regional Environmental Records Centre (BRERC). All other invertebrate species recorded were also submitted to BRERC.

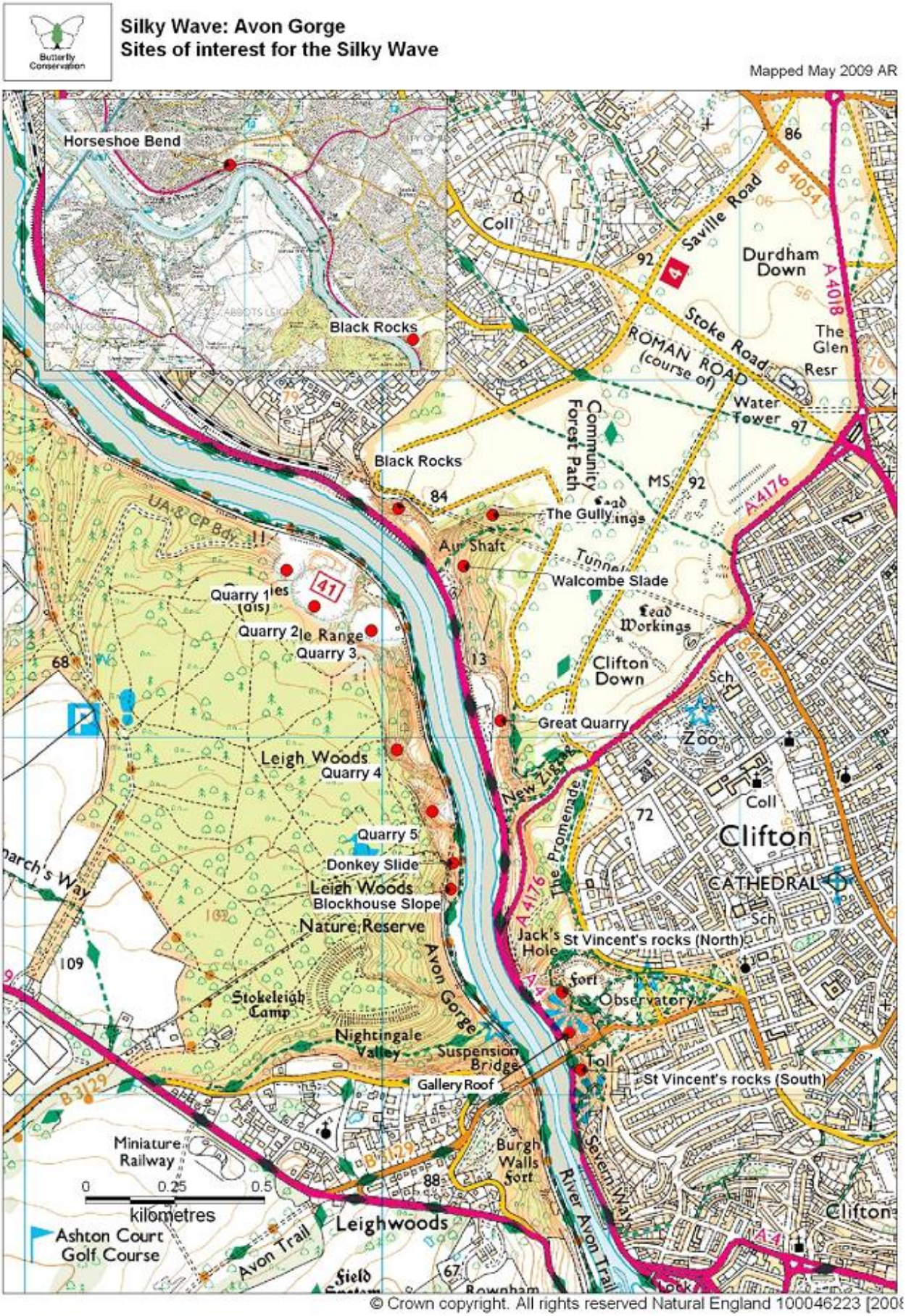

Figure 1. All known silky wave moth sites, with agreed monitoring names, within the Avon Gorge, showing both Bristol and Somerset sites (revised 2011).

3. RESULTS AND DISCUSSION

3.1. Monitoring analysis

3.1a. Bristol priority sites

Table 1a. Silky wave moth counts for Bristol priority monitoring sites on each visit, maximum counts for each site highlighted.

Site	Grid reference	Search effort (mins)	Date	Silky wave moth count
Black Rocks	ST559746	42	11.06.2024	16
Black Rocks		36	18.06.2024	16
Black Rocks		20	25.06.2024	20
Black Rocks		36	2.07.2024	15
Walcombe Slade	ST561745	30	11.06.2024	0
Walcombe Slade		33	18.06.2024	4
Walcombe Slade		15	25.06.2024	11
Walcombe Slade		36	2.07.2024	13
Gully	ST562746	60	11.06.2024	14
Gully		36	18.06.2024	20
Gully		18	25.06.2024	15
Gully		24	2.07.2024	25

3.1b. Somerset priority sites

Table 1b. Silky wave moth counts for Somerset priority monitoring sites on each visit, maximum counts for each site highlighted.

Site	Grid reference	Search effort (mins)	Date	Silky wave moth count
Blockhouse Slope	ST561736	16	18.06.2024	5
Blockhouse Slope		24	25.06.2024	8
Blockhouse Slope		12	2.07.2024	10
Donkey Slide	ST561736	20	18.06.2024	2
Donkey Slide		30	25.06.2024	11
Donkey Slide		20	2.07.2024	5
Quarry 3 (T1&T2)	ST559743	30	18.06.2024	10
Quarry 3 (T1&T2)		40	25.06.2024	12
Quarry 3 (T1&T2)		43	2.07.2024	28

3.1c. Bristol satellite sites

During the flight period, surveys were carried out at four of the Bristol-side, satellite sites and silky wave moths were found to be present on all four of these sites (Table 1c).

Table 1c. Silky wave moth counts for Bristol satellite sites.

Site	Grid Reference	Search effort (mins)	Date	Silky wave moth count
Great Quarry	ST562741	38	25.06.2024	7
Vincent Rocks N	ST564733	8	25.06.2024	5
Vincent Rocks S	ST564731	4	25.06.2024	2
Portway Roof	ST564731	14	25.06.2024	6

3.1d. Somerset satellite sites

Two satellite sites on the Somerset side were surveyed; Quarry 4 and Quarry 5 and silky wave were recorded at both (Table 1d). Quarry 1 and 2, the other Somerset satellite sites, were still too overgrown for effective surveys to be undertaken and had no recorded moths on them for several years.

Table 1d. Silky wave moth counts for Somerset satellite sites.

Site	Grid Reference	Search effort (mins)	Date	Silky wave moth count
Quarry 4	ST571739	40	2.07.2024	29
Quarry 5	ST560738	32	2.07.2024	2

3.2. Silky wave moth site trends

3.2a. Bristol priority sites

In comparison to the 2023 peak moth counts, two of the Bristol priority sites: Black Rocks and The Gully had similar or slightly increased moth numbers. Walcombe Slade recorded a large decrease from 2023 with 2018-2022 numbers. 2023 numbers may be a result of an increased survey effort due to extra surveyors. (Table 1a; Figure 2a).

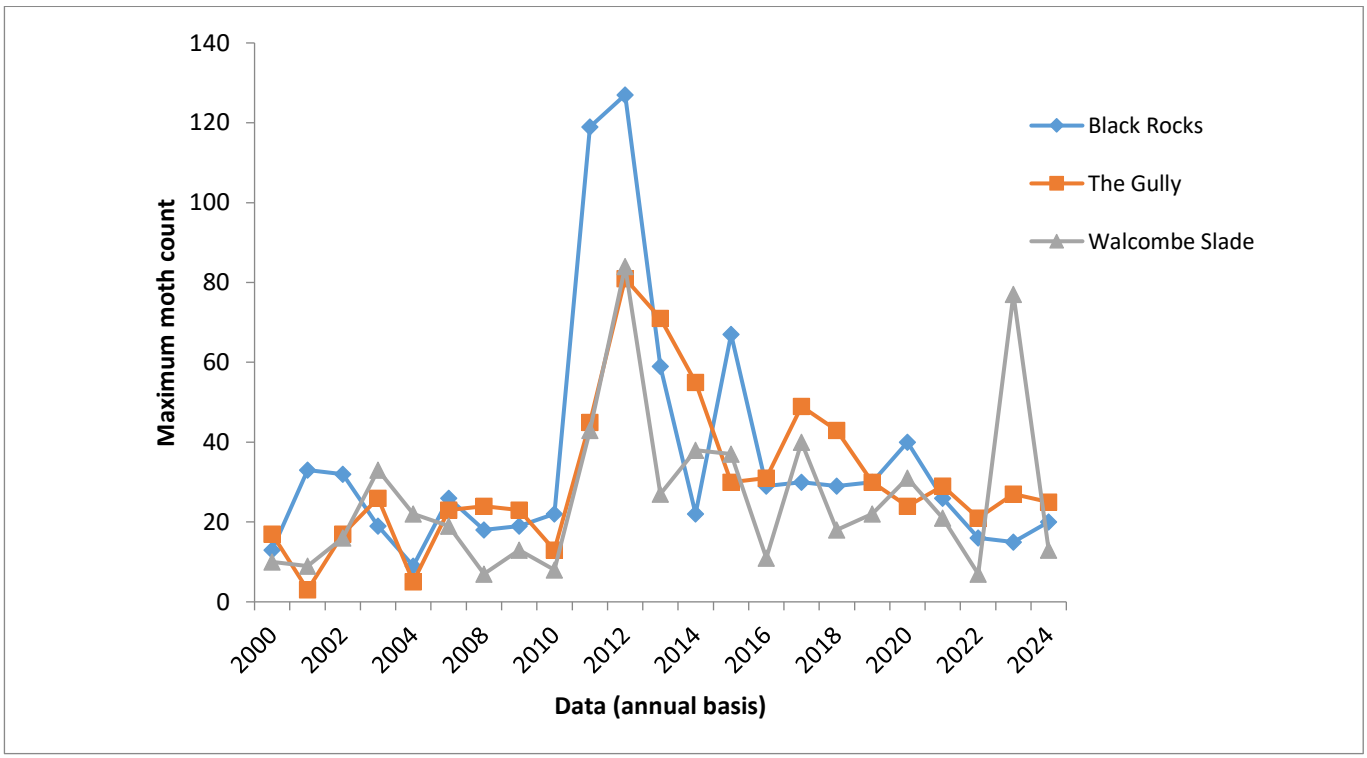

Figure 2a. Maximum counts for silky wave moths at Bristol priority sites (2000-2024).

3.2b. Somerset priority sites

The maximum count of silky wave recorded at Donkey Slide and Blockhouse were slightly lower than the 2023 counts and considerably lower than the counts of 2020-2021. Quarry 3 had a silky wave peak count higher than 2023 and was more in line with 2021-2022 surveys (Table 1b; Figure 2b).

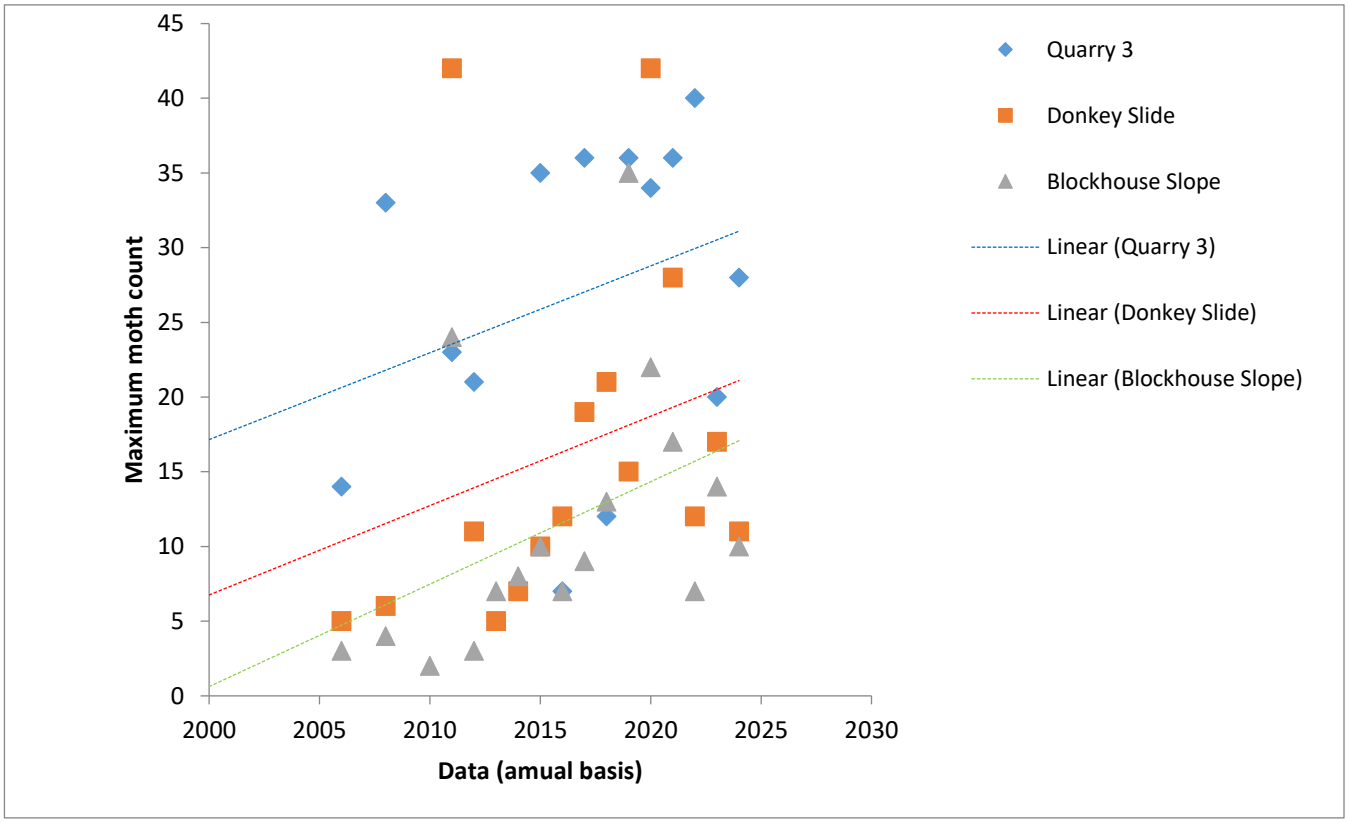

Figure 2b. Maximum counts and linear trends for silky wave at the Somerset priority sites (2000-2024).

3.2c. Bristol satellite sites

Great Quarry, Portway Roof, Vincent Rocks (North and South) were surveyed once during the silky wave flight season. Great Quarry silky wave counts were lower than 2023, with the rest of the sites showing similar results. Great Quarry had lower numbers than the previous five years, but this year's counts were much more comparable with the pre 2018 silky wave records. St Vincent's Rocks (North and South) had low numbers but were comparable with previous years (Figure 2c; Table 1c) and the Portway Roof had low numbers similar to the last three years.

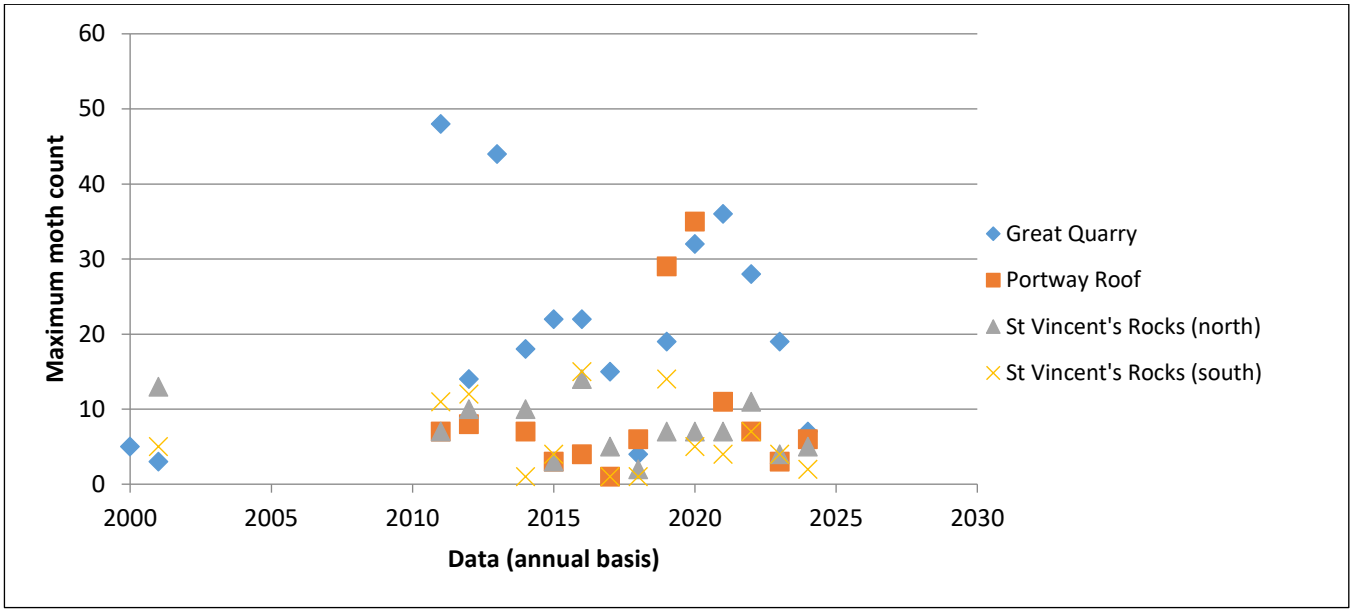

Figure 2c. Maximum counts for silky wave at the surveyed Bristol satellite sites in the Avon Gorge (2000-2024).

3.2d. Somerset satellite sites

Quarries 4 and 5 were surveyed once during the silky wave flight season. Quarry 4 had a higher peak moth count than 2023, but still lower than the peak counts in the 2019-2022 years. Quarry 5 had lower numbers than 2023 showing a continued decline since the peak counts of 2019. Quarry 2 was not surveyed this year (Figure 2d; Table 1d).

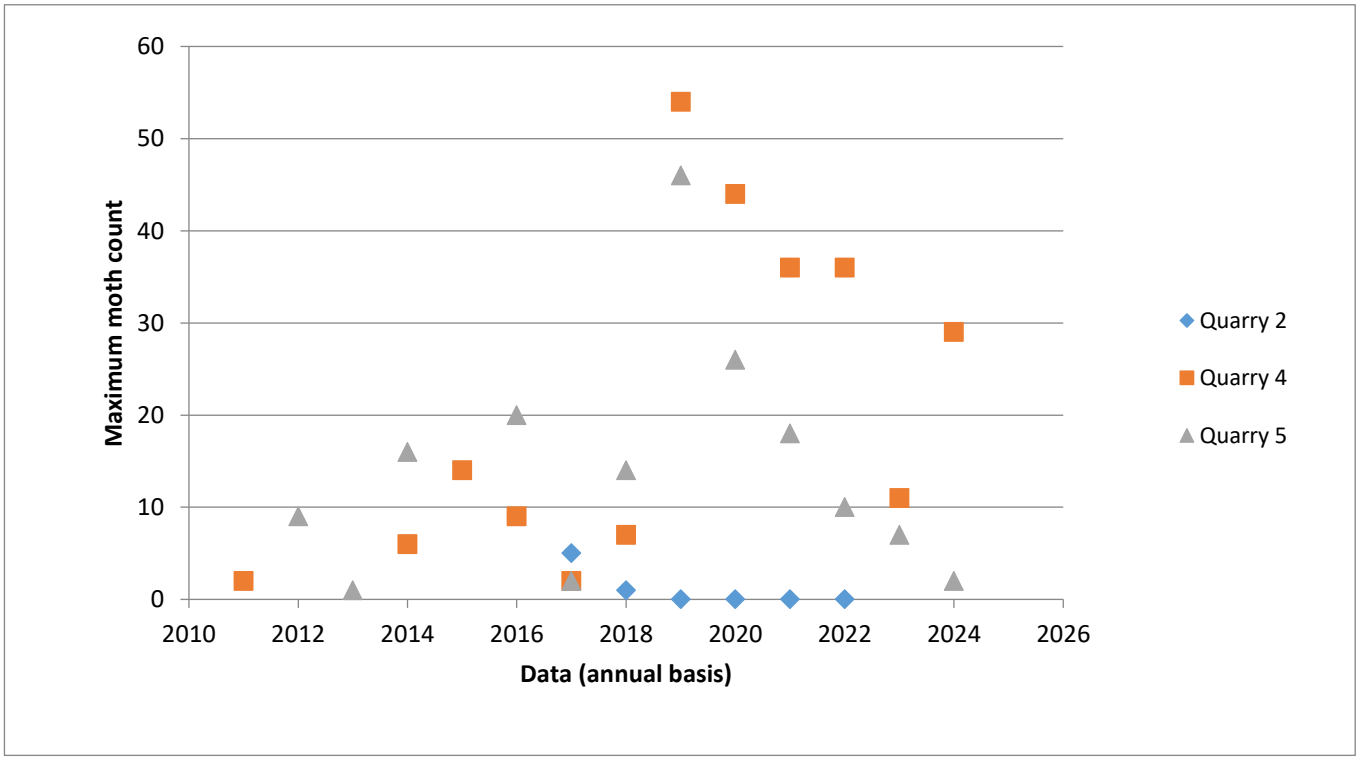

Figure 2d. Maximum counts for silky wave at the surveyed Somerset satellite sites, Quarry 2, Quarry 4 and Quarry 5 in the Avon Gorge (2011-2024).

3.3. Phenology

Peak flights for the priority sites were slightly variable; this is the same trend as has been observed in recent years. Peak counts varied throughout the survey season from the 25th June to the 7th July.

(Tables 1a & 1b).

Figure 3. Silky wave moths at The Gully.

Table 3. Maximum peak count number of silky wave moths recorded at all sites from 20011-2024, with maximum counts for priority sites highlighted in yellow.

SITE	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Black Rocks	119	**127**	59	22	67	29	30	29	30	40	26	16	15	20
The Gully	45	**81**	71	55	30	31	49	43	30	24	29	21	27	25
Walcombe Slade	43	**84**	27	38	37	11	40	18	22	31	21	7	77	13
Great Quarry	**48**	14	44	18	22	22	10	4	19	32	36	28	19	7
St Vincent's Rocks N	7	10	N/V	10	3	**14**	3	2	7	7	7	11	4	5
St Vincent's Rocks S	11	12	N/V	1	4	15	1	1	14	5	4	7	4	2
Portway Roof	7	8	N/V	7	3	4	1	6	29	**35**	11	7	3	6
Quarry 1		0	N/V	N/V	N/V	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
Quarry 2	0	2	N/V	N/V	N/V	N/S	5	1	0	0	0	0	N/S	N/S
Quarry 3	23	21	0	N/V	35	7	36	12	**36**	34	31	40	20	28
Quarry 4	2	0	N/V	6	14	9	2	7	**54**	44	36	36	11	29
Quarry 5	0	9	1	16	N/V	20	2	14	**46**	26	18	10	7	2
Donkey Slide	**42**	11	5	7	10	7	19	21	15	**42**	17	12	17	11
Blockhouse Slope	24	3	7	8	10	13	9	13	**35**	22	28	7	14	10
TOTAL from original Bristol priority sites (3)	207	**292**	157	115	134	71	119	90	82	95	76	44	119	58
TOTAL from Somerset Priority sites (3)	89	35	12	15	55	26	64	46	86	**98**	76	59	51	49
TOTAL	**371**	**382**	**214**	**188**	**235**	**181**	**207**	**171**	**337**	**342**	**264**	**202**	**218**	**158**

3.4. Habitat management recommendations

3.4a. Priority sites

Black Rocks, Bristol

The amount of scrub has steadily increased over this site, covering a greater proportion of the site each year and moth count numbers are much lower than the baseline years (2011/12); therefore, it would be useful to assess if increased scrub management can reverse this trend. Part of the transect is still inaccessible due to scrub encroachment and therefore it is difficult to assess if the increase in scrub has reduced moth numbers or whether they are still present but cannot be detected as easily.

The Gully and Walcombe Slade

Silky wave numbers continue to be much lower than the peak counts of 2011 and 2012 in the Gully, which corresponds with the time that the goats were introduced to this area. The subsequent reduction in moth numbers could indicate that this management regime, may not be as beneficial to the silky moth as it is for other native species. Additional goats were introduced in 2021 and the goat grazing has reduced scrub levels and created more open grassland habitat with both sites showed an increase in common rock rose to the previous year. It maybe that the increase in common rock rose this year will impact the following year's silky wave numbers.

Blockhouse & Donkey Slide

Silky wave numbers have decreased on both these sites. The sites have become scrubby with non-native species and native trees leading to less open areas and common rock rose. A new management regime needs to put in place with non-native and native scrub clearance recommended.

Quarry 3, Somerset

Silky wave numbers remain fairly consistent over the past three years. There are still issues with invasive plant species dominating the habitat in some areas of this quarry, despite significant habitat restoration taking place in recent years. More invasive species control in particular removal of cotoneaster should take place as this is clearly an important location for this species.

3.4b. Satellite sites

Great Quarry

The level of scrub has increased at Great Quarry over the years and this site would benefit from habitat management, to reduce the scrub on the transect pathway, to facilitate the survey effort.

St Vincent's Rocks North and South

The surrounding area of this site has a large amount of scrub encroachment since the 2012 surveys and some of the transect pathways are now fairly inaccessible. Moth numbers have been fairly consistent over many years. It is likely that the silky wave is inhabiting other areas on the slope, which are inaccessible without climber assistance.

Portway Roof

Silky wave numbers were considerably lower than in the 2019 and 2020; however, the moth numbers are consistent with most years of data. There is considerable scrub encroachment, and this site would benefit from additional habitat management.

Quarry 1

This site has not been surveyed for the past eight years as it is very inaccessible due to a large amount of scrub encroachment along the quarry slopes and pit. This site would benefit from the removal of invasive species, such as cotoneaster and holm oak, enabling native species to thrive.

Quarry 2

Quarry 2 is a mixture of woodland, low-lying grassland and grassland quarry slopes. The site has seen very few moths over the years and none recorded since 2018. It was not surveyed this year.

Quarry 4 and 5

The scrub clearance done on Quarry 4 has been effective with the peak count increasing from 2023 numbers. Quarry 5 numbers are declining, and the pathways are now almost inaccessible due to scrub encroachment. The silky wave survey will need to be abandoned if scrub clearance does not take place.

4. CONCLUSION

During the 2023 silky wave moth survey, 12 sites, out of 12 surveyed, showed a presence of silky wave. The total peak count for silky wave moths in 2024 was 158. This was lower than last year, with Somerset numbers remaining similar but the Bristol numbers showing a decline. The peak count numbers however were still lower for both sides this year when compared with 2019-2021 surveys. The Bristol side showed a large decrease in moth numbers, in line with 2022 counts. The Somerset side numbers were more in line with counts recorded between 2014-2018 (Table 3). The variation in moth numbers, from the previous years, could be due to environmental factors such as weather patterns influencing the overwintering / early spring success of part-grown larva.

Prior to 2011, surveys were undertaken on a fairly *ad-hoc* basis and not regularly during the silky wave flight period; therefore, the 2011 counts are taken as the base-line survey for comparing silky wave data. Typically, the peak moth count has been observed during the first week of July; however, in the last five years the peak moth count at the priority sites has been, on average, at the end of June rather than the first week of July. This year peak counts on both sides were on the 25th of June or 2nd July. The 2nd of July was the latest survey to take place and it is possible that the peak count was missed this year explaining the low numbers. Habitat management of all sites should be reviewed on a yearly basis, particularly at The Gully and Walcombe Slade with the introduction of additional goats during 2021. Many of the sites have large amounts of invasive scrub encroachment and habitat work is necessary to maintain their suitability for silky wave. Quarry 4 is a good example of successful scrub management with silky wave numbers increasing after clearing had taken place. Planned work in the other Quarries should have a similar positive impact.

5. REFERENCES

Cooke N. (2023). Silky wave moths in the Avon Gorge – 2023 Monitoring Report. Bristol Zoological Society, Bristol, UK.

McCafferty G. (2014). Ecology and behaviour of the silky wave moth, *Idaea dilutaria* in the Avon Gorge, Bristol. University of West of England.

Nightingale J. (2013). Silky wave moths in the Avon Gorge – 2013 Monitoring Report. Bristol Conservation & Science Foundation, Bristol, UK.

Nightingale J. (2015). Silky wave moths in the Avon Gorge – 2015 Monitoring Report. Bristol Zoological Society, Bristol, UK.

Nightingale J. (2016). Silky wave moths in the Avon Gorge – 2016 Monitoring Report. Bristol Zoological Society, Bristol, UK.

Nightingale J. (2017). Silky wave moths in the Avon Gorge – 2017 Monitoring Report. Bristol Zoological Society, Bristol, UK.

Nightingale J. (2018). Silky wave moths in the Avon Gorge – 2018 Monitoring Report. Bristol Zoological Society, Bristol, UK.

Nightingale J. (2019). Silky wave moths in the Avon Gorge – 2019 Monitoring Report. Bristol Zoological Society, Bristol, UK.

Nightingale J. (2020). Silky wave moths in the Avon Gorge – 2020 Monitoring Report. Bristol Zoological Society, Bristol, UK.

Nightingale J. (2021). Silky wave moths in the Avon Gorge – 2021 Monitoring Report. Bristol Zoological Society, Bristol, UK.

Nightingale J. (2022). Silky wave moths in the Avon Gorge – 2022 Monitoring Report. Bristol Zoological Society, Bristol, UK.

Nightingale J. & Ivey M. (2012). Silky wave moths in the Avon Gorge – 2012 Monitoring Report. Bristol Conservation & Science Foundation, Bristol, UK.

Nightingale J. & Rees M. (2011). Silky wave moths in the Avon Gorge – 2011 Monitoring Report. Technical Report. Bristol Conservation & Science Foundation, Bristol, UK.

Nightingale J. & Wells S. (2014). Silky wave moths in the Avon Gorge – 2014 Monitoring Report. Bristol Zoological Society, Bristol UK.
Rosenthal A. (2010). Silky Wave *Idaea dilutaria* – Avon Gorge Monitoring Programme. Butterfly Conservation.