SILKY WAVE MOTHS IN THE AVON GORGE – 2018 MONITORING REPORT

Author: Jen Nightingale, Bristol Zoological Society

jnightingale@bristolzoo.org.uk

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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 2018 the silky wave, within the Avon Gorge, was surveyed throughout the three weeks around the peak flight period; from mid-June to the first week of July. All six priority sites, (three on the Bristol side and three on the Somerset side), were surveyed. Peak count week was up to two weeks earlier than we have experienced before; two Bristol priority sites had peak counts in mid-June, with the other priority sites having peak counts during the third week of June, this is likely to have been due to the record high temperatures experienced during spring/summer, which may have caused moths to emerge earlier than usual. In 2017 the peak flight period was approximately a week earlier than the usual first week of July. With reference to the satellite sites, seven out of nine were surveyed once throughout the flight season in order to determine presence or absence of silky wave moths. The satellite sites which were not surveyed were either overgrown or have lacked a presence of moths for several years. The presence of silky wave was confirmed at all of the 13 sites surveyed, although the peak flight period may have been missed on the satellite sites, which were surveyed during the last week of June. The total peak count was 171 moths, which was the lowest number recorded since the base-line surveys of 2011; however the peak counts are comparable with several previous years' data (2014 and 2016). Most sites showed comparable numbers given the cyclical trends we seem to see for silky wave within the Gorge. Quarry 2, a satellite site on the Somerset side, was surveyed again this year to give us baseline data prior to habitat management work being carried out to reduce tree, scrub and invasive species. Most of the sites would benefit from habitat maintenance as there is considerable scrub encroachment and, in some cases, a predominance of invasive species.

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., 2017, 2016, 2015, 2014, 2013, 2012 and 2011).

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 known one 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 - 2017 (Nightingale 2017). Research carried out 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). In order to minimise survey effort and maximise survey efficiency, Bristol Zoological Society aimed 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, as in 2016/17, the survey season was shortened to three weeks for the priority sites, (aiming to take into account peak emergence), as recommended by Butterfly Conservation. Satellite sites on both sides of the Gorge were surveyed once throughout the flight season in order to ascertain presence or absence of silky wave moths within them.

The same transects that were established in 2010, were walked at each site, during each survey event. At Quarry 3 a small section of path on the upper quarry slopes was added to the standard transect, in order to increase the survey effort to give thorough base-line data prior to habitat work commencing; this was the same transect that was also surveyed in 2017. 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 June 18th 2018 and the final survey date was July 7th 2018. Additional environmental information was recorded on a standardized form which included:

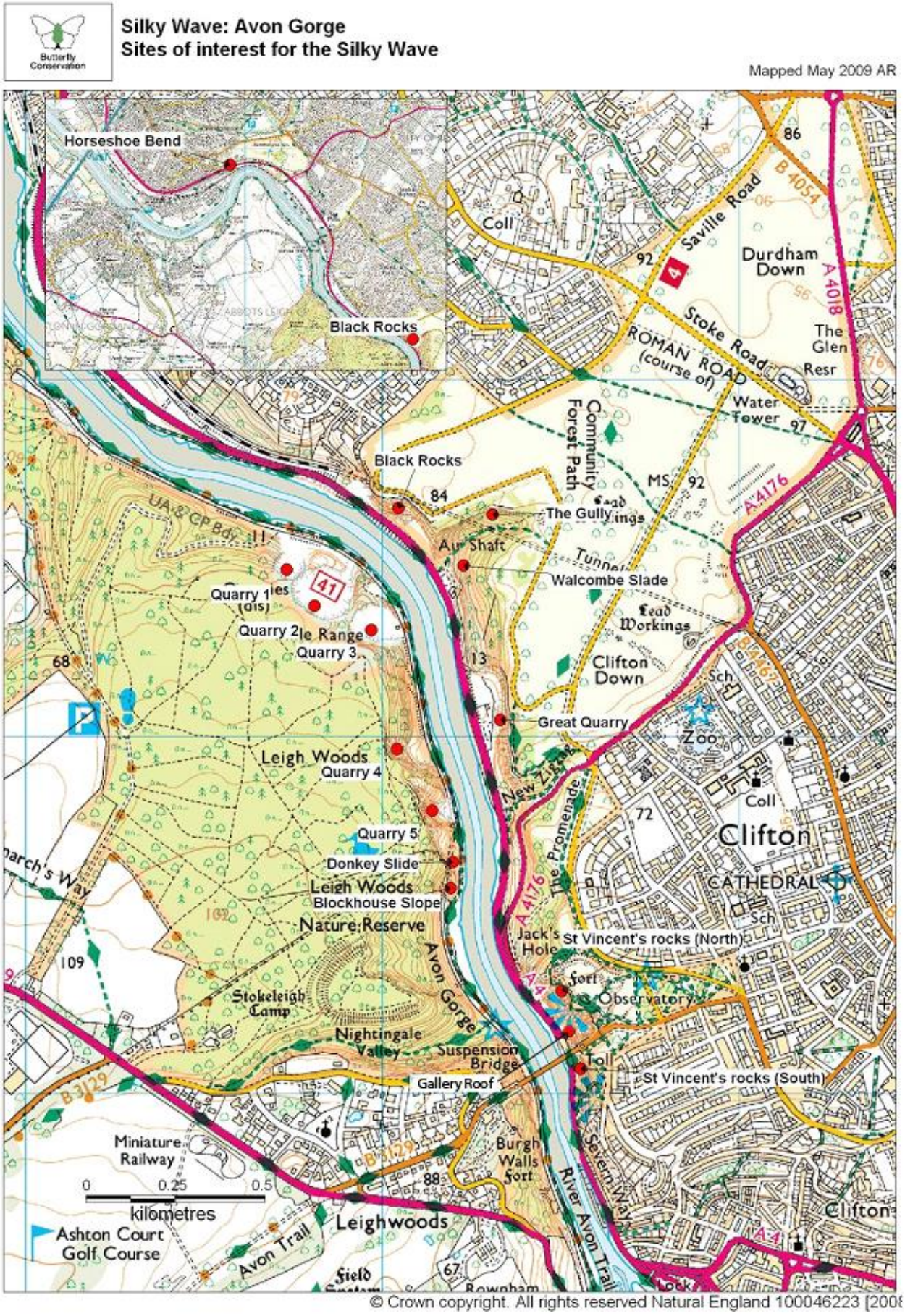
1. Temperature, measured in Celsius.
2. Humidity, measured as a percentage.
3. Wind speed, ranging from 0 - 5, using the Beaufort scale.
4. Rainfall, ranging from 0 - 4 (no rain to heavy rain).
5. Abundance of common rock rose, ranging from 0 - 4 (sparse to abundant).
6. Condition of site as a whole 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	40	18/06/18	29
Black Rocks		42	25/06/18	20
Black Rocks		40	07/07/18	1
Walcombe Slade	ST561745	36	18/06/18	11
Walcombe Slade		30	25/06/18	18
Walcombe Slade		38	02/07/18	8
Gully	ST562746	60	18/06/18	43
Gully		69	25/06/18	10
Gully		60	02/07/18	7

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	26	22/06/2018	13
Blockhouse Slope		30	29/06/2018	4
Blockhouse Slope		25	06/07/2018	2
Donkey Slide	ST561736	86	22/06/2018	21
Donkey Slide		62	29/06/2018	14
Donkey Slide		60	06/07/2018	1
Quarry 3	ST559743	60	22//06//2018	3
Quarry 3		65	27/06/2018	12
Quarry 3		60	05/07/2018	3

3.1c. Bristol satellite sites

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

Site	Grid Reference	Search effort (mins)	Date	Silky wave moth count
Great Quarry	ST562741	72	26/06/2018	4
Vincent Rocks N	ST564733	10	27/06/2018	1
Vincent Rocks S	ST564731	15	27/06/2018	2
Portway Roof	ST564731	17	27/06/2018	6

Bristol side
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).

3.1d. Somerset satellite sites

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

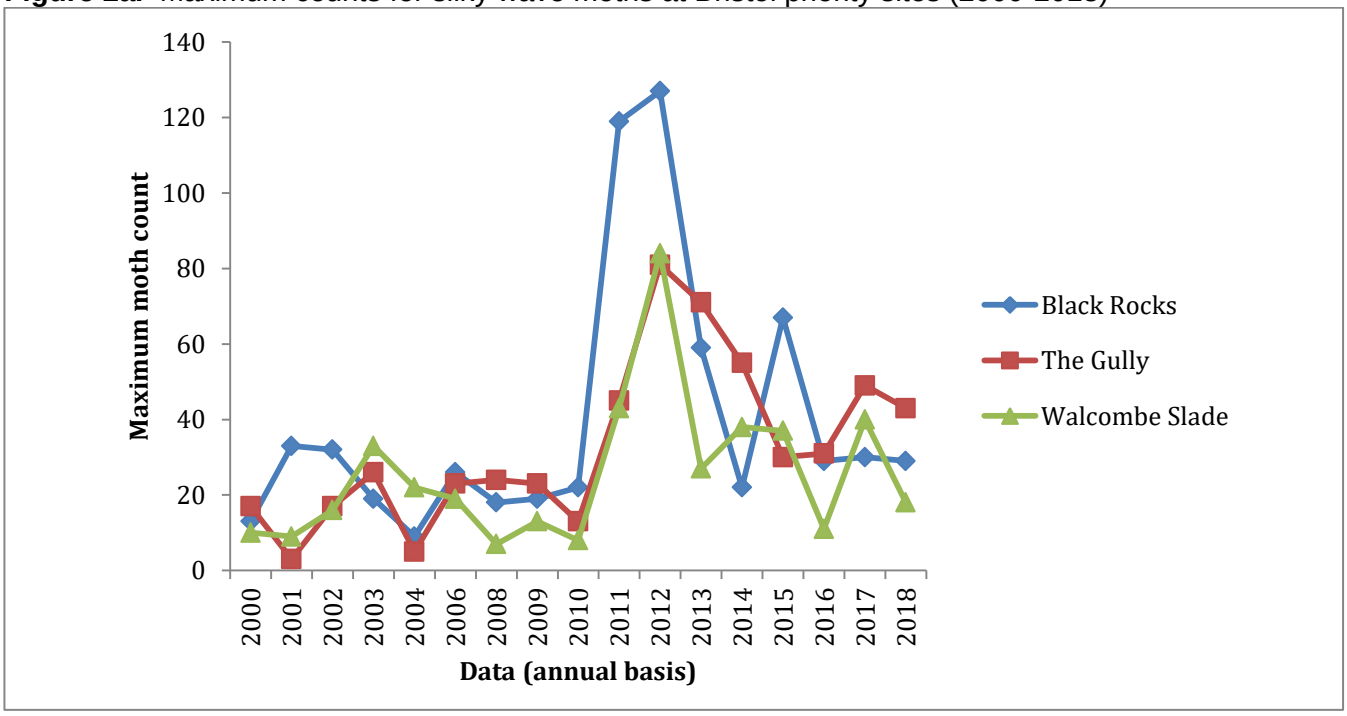
Site	Grid Reference	Search effort (mins)	Date	Silky wave moth count
Quarry 2	ST558744	60	22/06/2018	0
Quarry 2		46	27/06/2018	1
Quarry 2		40	05/07/2018	0
Quarry 4	ST571739	35	27/06/2018	7
Quarry 5	ST560738	54	27/06/2018	14

Somerset side
Three satellite sites on the Somerset side were surveyed; Quarry 2, Quarry 4 and Quarry 5 and silky wave moths were present at all of the sites. Quarry 2 was surveyed over all three weeks to capture enough base-line data prior to habitat management works being carried out. Quarry 1, the other Somerset satellite site, was still too overgrown for effective surveys to be carried out (Table 1d.).

3.2. Silky wave moth site trends

3.2a. Bristol priority sites

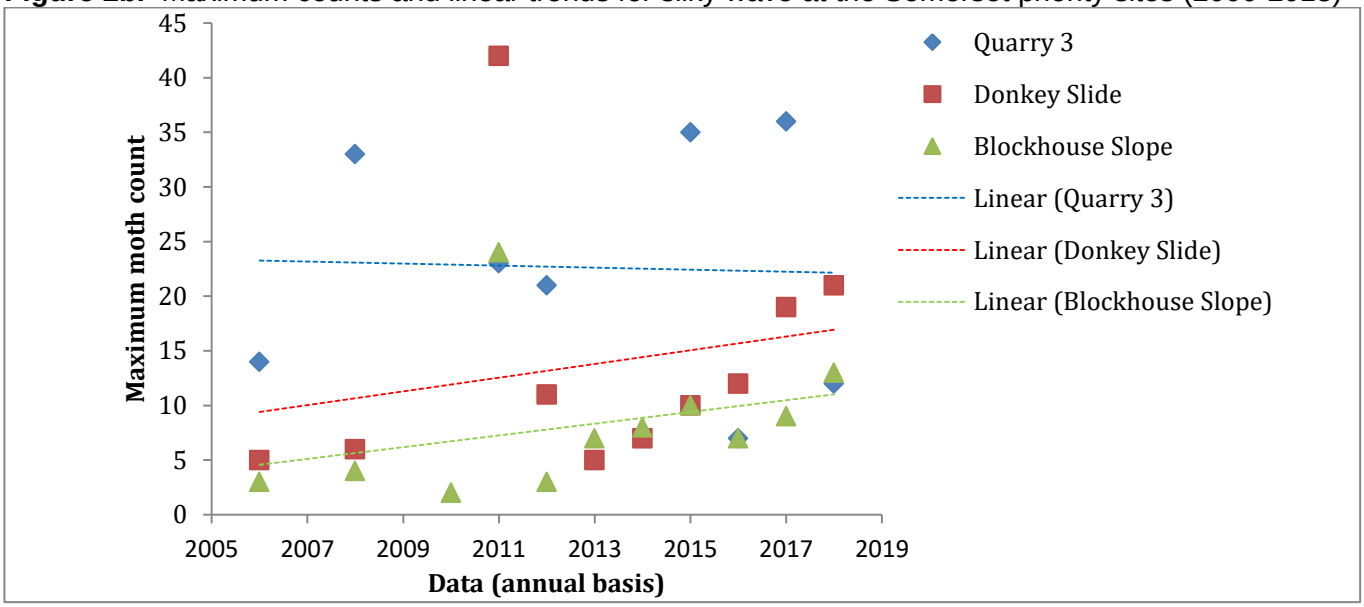
Figure 2a. Maximum counts for silky wave moths at Bristol priority sites (2000-2018)



The maximum numbers of silky wave moths recorded from Black Rocks, The Gully and Walcombe Slade were all lower than in 2017 (Table 1a; Figure 2a).

3.2b. Somerset priority sites

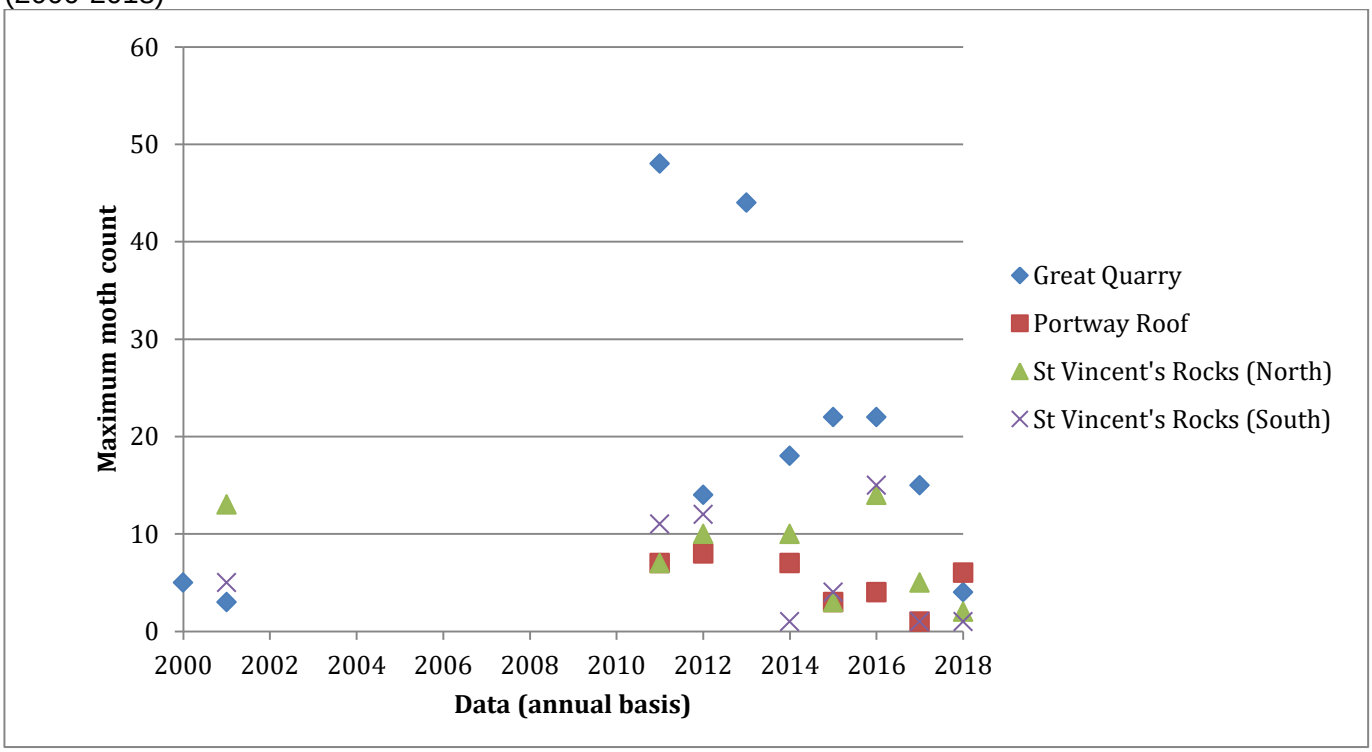
Figure 2b. Maximum counts and linear trends for silky wave at the Somerset priority sites (2000-2018)



The maximum count of silky wave moths recorded at Blockhouse Slope was higher than in all previous surveyed years, apart from the exceptionally high numbers recorded in 2011. Donkey Slide also had the highest number of moths, recorded since 2011. Quarry 3 had the lowest total number of moths than in all previously surveyed years, except for 2016, which also had a low count (Table 1b; Figure 2b).

3.2c. Bristol satellite sites

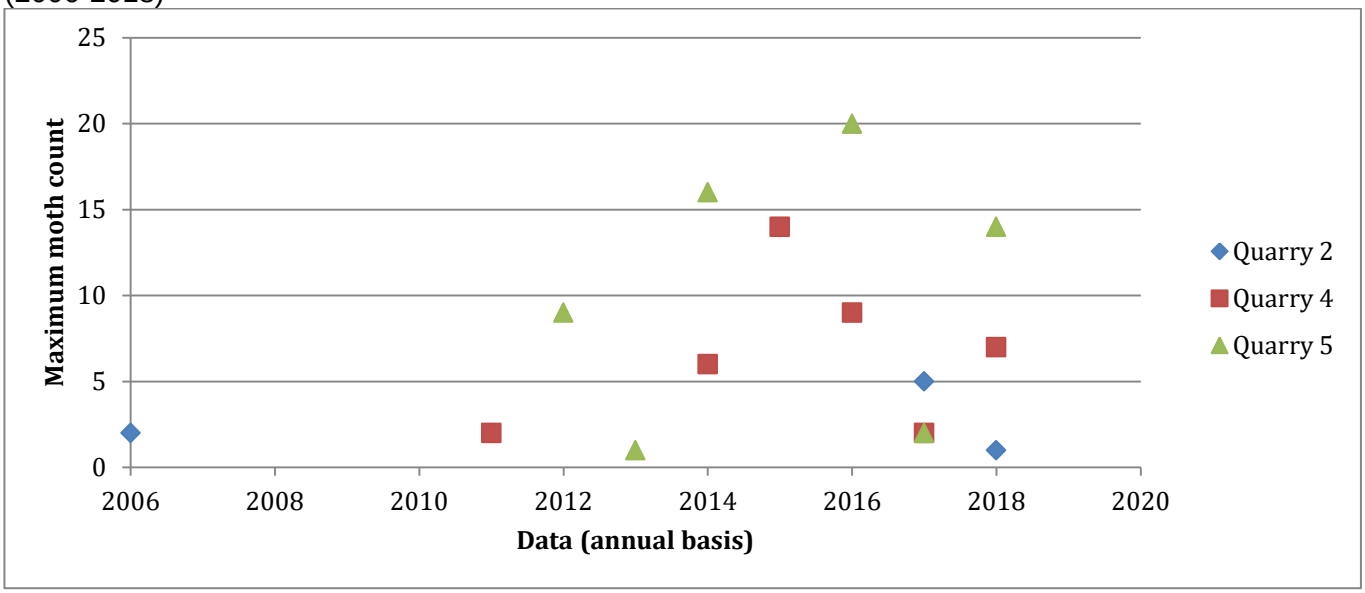
Figure 2c. Maximum counts for silky wave at the surveyed Bristol satellite sites in the Avon Gorge (2000-2018)



Throughout the flight season Great Quarry, Portway Roof, Vincent Rocks (North and South) were surveyed once and, apart from Portway Roof and St Vincent Rocks (South) moth numbers were lower than in 2017 and in all previous years from 2010 onwards (Figure 2c).

3.2d. Somerset satellite sites

Figure 2d. Maximum counts for silky wave at the surveyed Somerset satellite sites in the Avon Gorge (2006-2018)



Quarry 4 and Quarry 5 were surveyed once and Quarry 2 was surveyed three times. Moth numbers at both Quarry 4 and were higher than in 2017. Quarry 2 was surveyed for the second time since 2006 and moth numbers were again very low as in that previous year (Figure 2d).

3.3. Phenology

Peak flights were earlier this year than recorded before. Out of the six priority sites, 66% had the highest moth counts on the first survey week i.e., between 18th June – 22nd June; the other two sites had peak counts in the second survey week; i.e., between 25th and 27th June. This is in contrast to the usual trend where peak moth count usually falls in either the last week of June or the first week of July. Therefore, it is possible the actual peak flight period could have been missed for the satellite sites, which were surveyed in the last week of June. The earlier flight period is possibly due to the exceptional weather conditions that we experienced in May and June this year.

Table 3. Maximum peak count number of silky wave moths recorded at all sites from 2008 – 2018, with maximum counts for priority sites highlighted in yellow and maximum moth numbers highlighted in red

Site	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Horseshoe Bend	0			1	0	N/S	N/S	N/S	N/S	N/S	N/S
Black Rocks	18	19	22	119	**127**	59	22	67	29	30	29
The Gully	24	23	13	45	**81**	71	51	30	31	49	43
Walcombe Slade	7	13	8	43	**84**	27	38	37	11	40	18
Great Quarry	0			**48**	14	44	18	22	22	10	4
St Vincent's Rocks N	0			7	10	N/S	10	3	**14**	5	1
St Vincent's Rocks S	0			11	12	N/S	1	4	**15**	1	2
Quarry 1					0	N/S	N/S	N/S	N/S	N/S	N/S
Quarry 2				0	2	N/S	N/S	N/S	N/S	**5**	1
Quarry 3	33			23	21	0	N/S	**35**	7	36	12
Quarry 4				2	0	N/S	6	**14**	9	2	7
Quarry 5				0	9	2	16	N/S	**20**	2	14
Donkey Slide	6		0	**42**	11	5	7	10	7	9	21
Blockhouse Slope	4		2	**24**	3	7	8	10	12	19	13
Portway Roof				7	**8**	N/S	7	3	4	1	6
TOTAL Bristol Priority sites (3)	49	55	43	207	**292**	201	111	134	71	119	90
TOTAL Somerset Priority sites (3)				**89**	35	12	15	55	26	64	46
TOTAL	94	57	45	372	**382**	215	184	235	181	209	171

3.4. Habitat management recommendations

Only sites with particular habitat issues will be mentioned in this section.

3.4a. Priority sites

Black Rocks, Bristol
Scrub management would be beneficial. The amount of scrub has steadily increased over this site, covering a greater proportion of the site each year and moth count numbers have been on a downward trend since 2012; 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.

Quarry 3, Somerset
There is a large amount of cotoneaster on the slopes of this site, and this site would benefit from its removal. No common rock-rose is present on site and therefore larvae must be feeding on other food plants. Habitat management works are due to take place at this site in the near future and the results of this can then be assessed.

3.4b. Satellite sites

Great Quarry
The level of scrub has also increased at Great Quarry over the years and there is a marked increase of scrub encroaching the transect path every year, which makes the transect difficult to walk in places. This site would benefit from habitat management to reduce the scrub on both the transect and in other areas throughout the site.

St Vincent 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. These sites would benefit from scrub clearance.

Portway Roof
Due to the very high temperatures experienced during spring this year, much of the grassland was dead or considerably reduced in size and therefore the transect was much easier to walk and moth numbers, although still low, were higher than recorded in the past four years (probably due, in part, to the increased accessibility of the site). This site would benefit from scrub clearance and periodic mowing (cut and remove arisings).

Quarry 1
This site has not been surveyed for the past six 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 scrub clearance and tree removal.

Quarry 2
Quarry 2 is a mixture of woodland, low lying grassland and grassland quarry slopes. The low-lying grassland area and slopes have a large amount of scrub encroachment, and cotoneaster is of particular issue within this site. The grassland slopes are difficult to access so a full moth survey of the site is currently not achievable. A program of habitat management is planned to address these problems.

Quarry 4 and 5
Both sites could benefit from habitat management / scrub clearance to open up these sites.

4. CONCLUSION

All of the 13 sites surveyed showed a presence of silky wave moth. The total peak count for silky wave moths in 2018 was 171, which is the lowest recorded peak number of silky waves since before the base-line surveys by BZS in 2011; however this number is very similar to the low counts recorded in 2014 (184) and 2016 (181) (Table 3). The peak moth count for Donkey Slide was higher than any recorded, since the maximum count in 2011, however all the other priority sites had slightly lower peak counts than in 2017. Prior to 2011, surveys were undertaken on a fairly ad hoc basis and not regularly during the flight period and therefore the 2011 counts are taken as the base-line survey, for comparing moth data although the figures within the report include record data from as early as the year 2000 for interest. Typically the peak moth count is in the first week of July; however, in 2017 the peak moth count at the priority sites was, on average, at the end of June rather than the first week of July. Therefore in this year the satellite sites were surveyed a week earlier (26th and 27th June) to ensure that the peak flight period was not missed. However, the peak counts recorded at Black Rocks and the Gully were the earliest ever recorded (18th June) and for Blockhouse and Donkey Slide the peak count was recorded on 22nd June, which may indicate that the peak flight was missed for some of the satellite sites. However, as it is only a presence / absence total, missing the peak flight week for the satellite sites, which typically score low numbers, is perhaps not so critical. It should also be noted, that we experienced unusually high temperatures in May and June this year, which might account for the early peak flights because moths may have emerged earlier than usual.

Habitat management of all sites should be reviewed on a yearly basis. Scrub has encroached most of the sites and most of the satellite sites, in particular, would benefit from scrub management and the removal of invasive species such as holm oak and cotoneaster. Priority sites for 2019 should remain as in 2018.

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