BSBI New Year Plant Hunt 2018

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Summary

The BSBI's seventh New Year Plant Hunt (NYPH) was held between 30st December and 2nd January 2018. Volunteers submitted lists of native and alien (non-native) plants they found in flower in wild situations during a three-hour walk at sites throughout Britain and Ireland. Results were submitted via a smartphone app and online (https://nyph.bsbi.org/). 688 families, groups of friends or individual recorders and 21 recording groups submitted 612 lists (152 more than in 2017), comprising 9907 records of 532 species. The average number of species recorded in flower within this three-hour period was 16.2. This result was significantly lower than the averages for 2014-2016 (when an average of 20.2-23 species were recorded) but only slightly higher than in 2017 when an average of 15.5 species were recorded. The difference between years, however, was less marked for alien species. The five most frequently recorded species found in flower in 2018 was identical to 2017 (Daisy *Bellis perennis*, 1st; Groundsel *Senecio vulgaris*, 2nd; Dandelion *Taraxacum* agg., 3rd; Annual meadow-grass *Poa annua*, 4th; Gorse *Ulex europaeus*, 5th).

In terms of flowering times (phenology), the vast majority of species recorded were flowering late (58%) rather than early (14%), early or late (18%) or as would be expected at New Year (10%). When expressed as the proportion of all records made (rather than as proportion of all species recorded) however, 39% of records represented species that we would expect to be flowering at New Year whereas 38% were of species that normally flower into the autumn and so were flowering late. These proportions were almost identical to previous years suggesting that the vast majority of 'unseasonal' flowering since 2014 has been of 'autumn stragglers' rather than species that are flowering early. The lower incidence of flowering in 2017 and 2018 appears to be due to colder conditions in the months preceding New Year compared to the much milder winters of 2014, 2015 and 2016.

Introduction

Since 2012, the Botanical Society of Britain & Ireland (BSBI) has run an annual hunt for plants in flower during a four-day period over New Year. Since the first New Year Plant Hunt (NYPH) was carried out by Tim Rich and Sarah Whild in Cardiff in 2012, the scheme has grown rapidly with more than 800 participants taking part at 450 locations in 2017 (Walker & Marsh, 2017). FLORON, the Dutch botanical society, have been running a similar scheme since 2014, largely inspired by the NYPH (Year End Plant Hunt; Sparrius, 2016).

Although intended to provide a fun and competitive activity for botanists during a quiet period, these surveys have a serious element. Observations of 'unseasonal' phenological events are being reported from around the globe in response to rising temperatures which are predicted to exceed 2˚C above pre-industrial levels in the coming decades. Citizen science projects such as NYPH are therefore providing evidence of how changing weather patterns are influencing wildlife, as well as providing new information on the phenology of common British and Irish species outside of the normal recording season.

Through the use of new technologies, such as social media and online recording applications, the NYPH has also raised the profile of the BSBI and introduced its work to new audiences.

Method

For NYPH 2018 volunteers picked a day between Saturday 30th December 2017 and Tuesday 2nd January 2018 and recorded all native plants and naturalised aliens (excluding obviously planted species in private gardens) that they found in flower on a walk not exceeding 3 hours (excluding breaks and time travelling between sites).

Recorders were encouraged to restrict their recording to a single area or site but in a few cases multiple sites were visited within the three hour period (for example at stops along a motorway).

Recorders were encouraged to check that plants were actually flowering, for example by checking that catkins were open, that grasses had open florets with stigmas or anthers on show etc. Ferns and fern-allies were excluded from lists.

In 2018 the majority of lists were submitted via the NYPH online data portal which allowed submission and simultaneous visualisation of the results as they came in (Fig. 1). This substantially increased the efficiency of data entry and reduced errors during data processing.

Data processing prior to analyses included checking the completeness of lists and that the site details submitted were correct, identifying unidentified species from photographs, checking doubtful records and that taxa matched those given by Stace (2010), and removing ferns and fern-allies and taxa identified to genus only.

For analyses, species were categorised as native or alien following Preston et al. (2002) and allocated to one of four categories based on their normal flowering phenology (Table 1).

Table 1. Classification for species flowering at New Year based on normal flowering.

Phenology	Description
Expected	Flowering at New Year (either winter specialists of flowering all year)
Early	Flowering in the spring, many extending into the summer months
Late	Flowering in the summer and autumn
Early or late	Flowering in the summer only or from the spring to the autumn

The typical flowering months were taken from Clapham *et al.* (1987) in the first instance and Sell & Murrell (1996 *et seq*) for species not covered by Clapham *et al.* Species were then categorised as 'expected' if they flower at New Year; flowering 'early' if they typically flower in the spring and complete flowering by summer at the latest; 'late' if flowering extends from the summer into the autumn; and 'early or late' for species with an extended flowering period (i.e. from spring-autumn) or just flower briefly in the summer months.

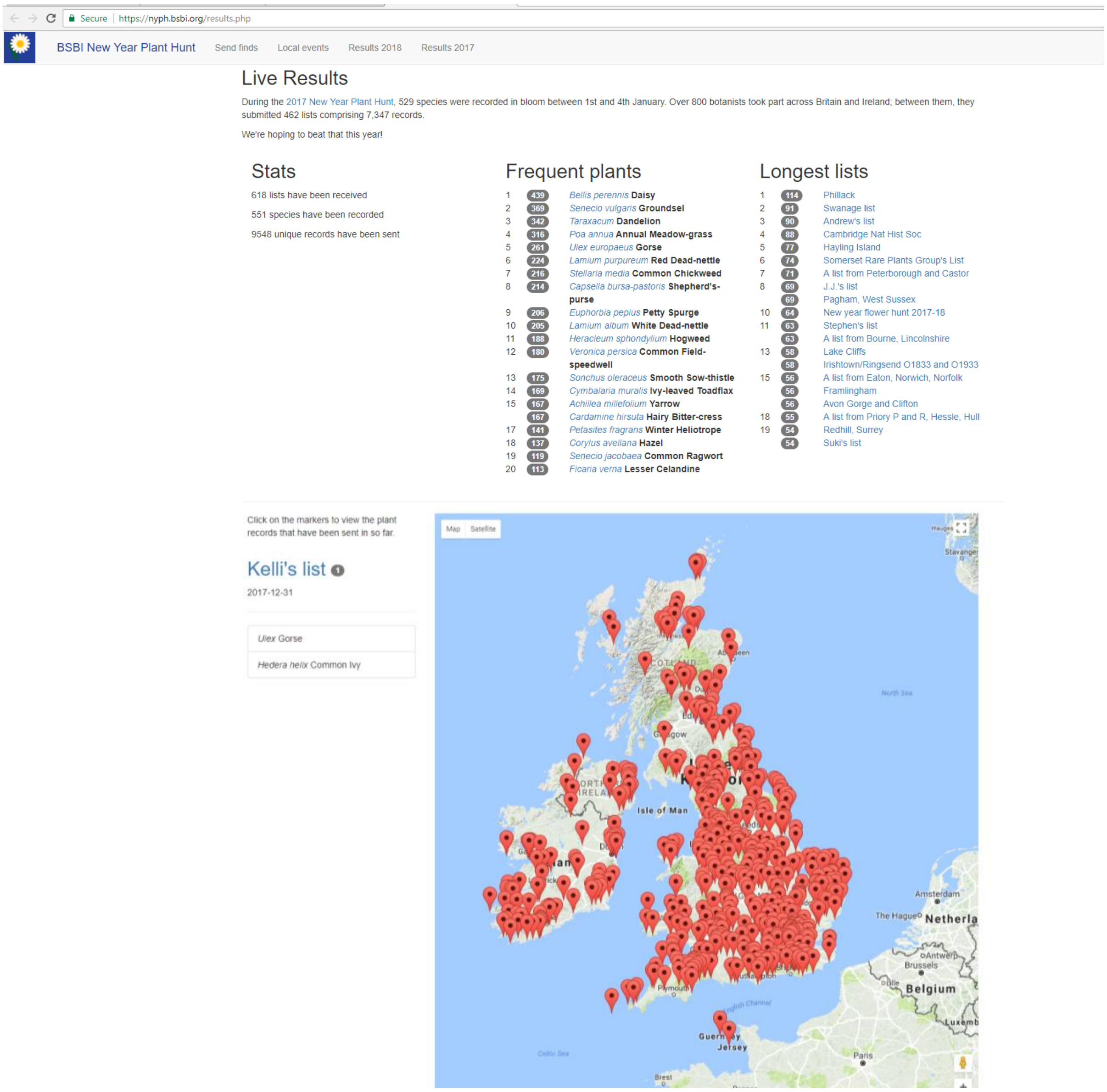

Figure 1. Screenshot of the New Year Plant Hunt 2018 online data portal showing live results and locations of plants hunts across Britain and Ireland.

Results

Number of participants

A total of 709 recorders submitted records via the data portal (Table 2) although, as in previous years, the total number of participants is likely to have been much higher, as many families and groups of friends, along with 21 botanical recording groups, submitted their records under a single name.

The actual number of participants is therefore likely to be well in excess of 800 and may even have exceeded 1000 but we hope that in 2019 we will be able to log individual recorders and present an accurate total number of participants.

Table 2. The number of groups/individuals participating in the New Year Plant Hunts, 2014-2018.

Participants	2014	2015	2016	2017	2018
	70	c.300	405	416	709

Number of lists
In 2018, 612 lists were submitted, 152 lists more than in 2017 (Table 3). This increase mainly occurred in England (+145) with slight increases in Wales (+5) and Scotland (+14) and slight declines in Ireland (-10) and Channel Islands (-1). These lists were distributed in 521 hectads (Fig. 2) compared to 392 in 2017. Although the majority of lists were located in the more populated regions of Britain and Ireland, good numbers were also recorded in remoter areas, such as southwest England and Ireland, Cumbria, eastern Scotland, etc.

Table 3. The number of lists submitted for the New Year Plant Hunt, 2014-2017.

Lists	2014	2015	2016	2017	2018
England	32	101	297	282	427
Wales	5	10	19	28	33
Scotland	10	9	64	43	57
Ireland	3	21	50	104	94
Channel Isles	1	2	2	3	2
Total	51	143	432	460	612

Number of species
In 2018 532 species recorded in flower, 40 more than in 2017 but 79 less than in 2016 (Table 4). As in previous years, this total was roughly equally distributed between natives and aliens naturalised in wild locations: in 2018 aliens comprised 45% of all the species recorded in flower which is comparable, and certainly not significantly different, from the numbers recorded in previous years when they represented between 40 and 49% of all the species recorded.

Table 4. The number of plant species recorded in flower during the New Year Plant Hunt. The percentages are given in parentheses.

Species	2014	2015	2016	2017	2018
Native	135 (60%)	206 (56%)	313 (51%)	264 (54%)	290 (55%)
Alien	89 (40%)	160 (44%)	298 (49%)	228 (46%)	242 (45%)
Total	224	366	611	492	532

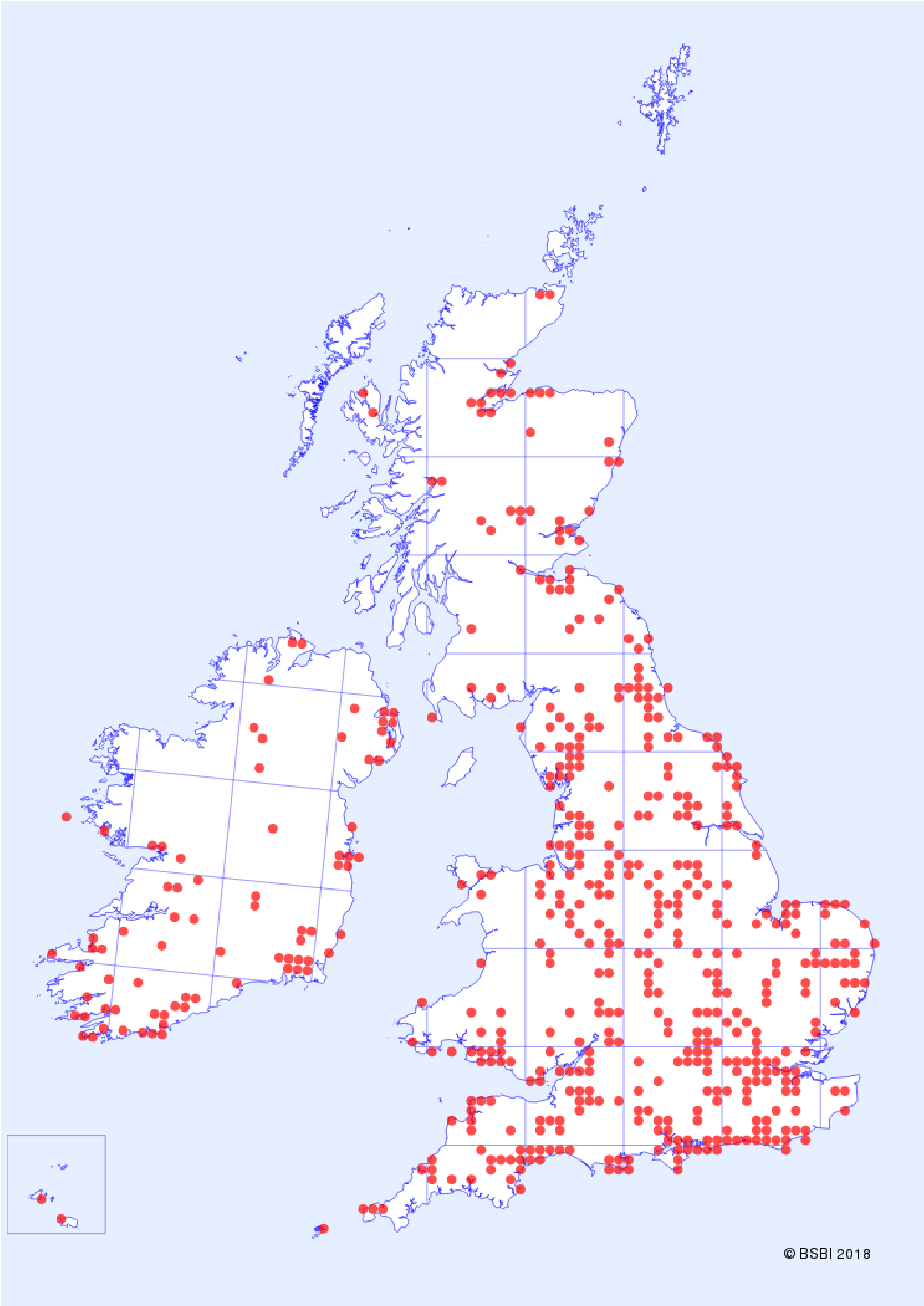

Figure 2. Map of the New Year Plant Hunt lists received in 2018. Each dot represents a hectad (10 × 10 km grid square) in which at least one NYPH list was recorded.

Number of records

9907 records of species in flower at New Year were submitted in 2018, which was substantially more than in 2017, but similar to 2016 despite the fact that only 432 lists were recorded in that year (Table 5). As in previous years, records of native species accounted for roughly two-thirds of all the records submitted in 2018 (64%).

Table 5. The number of records submitted as part of the New Year Plant Hunts, 2014-2017. The percentages are given in parentheses.

Records	2014	2015	2016	2017	2018
Native	741 (63%)	1874 (65%)	6210 (68%)	4509 (63%)	6376 (64%)
Alien	432 (37%)	1019 (35%)	2950 (32%)	2614 (37%)	3531 (36%)
Total	1173	2893	9160	7123	9907

List length

On average 16.2 species were recorded in flower at New Year in 2018, comprising 10.1 native and 5.8 non-native species (Table 6; Fig. 3). The total number of species recorded in 2018 was significantly lower than in 2014 and 2016 but not 2015 and 2017 whereas for natives numbers were significantly lower than in 2014-2016 but not 2017. In comparison, differences in the numbers of aliens recorded were only marginally different across all years.

Table 6. The average number of species recorded in flower during the New Year Plant Hunt, 2014-2018. The significance of the differences between years was tested using a One-way ANOVA with Tukey's HSD used to test for significant differences between means (means with the same letter are not significantly different from one another).

List length	2014	2015	2016	2017	2018	F-value	P-value
Native	14.5a	13.1a	14.4a	9.8b	10.1b	15.85	<0.001
Alien	8.5a	7.1a	6.9a	5.7a	5.8a	3.29	<0.05
Total	23.0a	20.2ab	21.2a	15.5c	16.2bc	9.97	<0.001

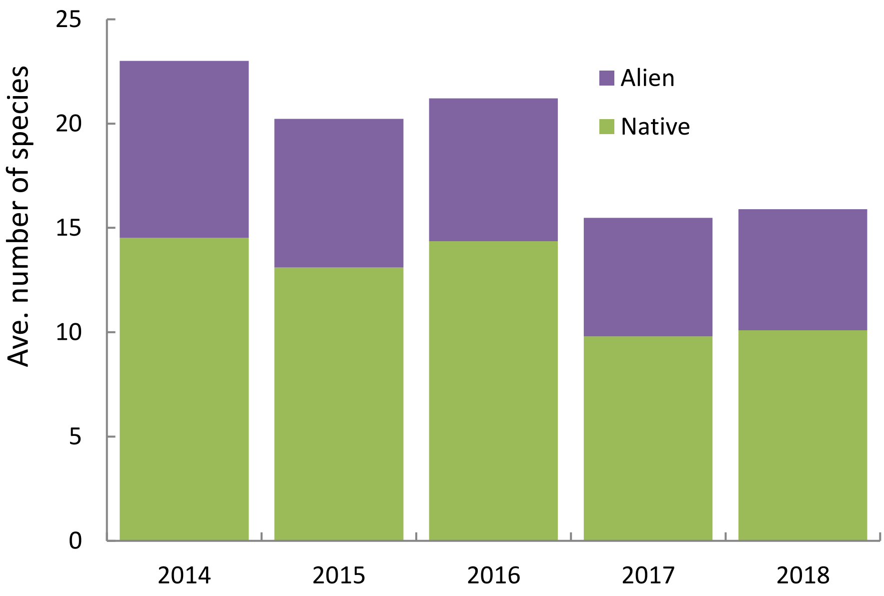

Figure 3. The average number of species recorded in flower at New Year, 2014-2018.

Species rank

In 2018 the five species most frequently recorded in flower, in order of frequency, were Daisy (*Bellis perennis*), Groundsel (*Senecio vulgaris*), Dandelion (*Taraxacum* agg.), Annual Meadow-grass (*Poa annua*) and Gorse (*Ulex europaeus*) (Table 7). This rank order was identical to 2017 and almost identical to 2016. Compared to 2017, *Lamium album* was the only top-ten ranked species that was markedly more frequent in 2018 (ranked 16th in 2017).

Table 7. The 10 species most frequently recorded in flower during the New Year Plant Hunts, 2014-2018. Species are listed in their rank order in 2018. The top 10 ranked species in each year are given in bold; '=' indicates equal rank.

	2014	2015	2016	2017	2018
Bellis perennis	**2**	**1=**	**1**	**1**	**1**
Senecio vulgaris	**1**	**3**	**3**	**2**	**2**
Taraxacum agg.	**3**	**1=**	**2**	**3**	**3**
Poa annua	**5**	**4**	**4**	**4**	**4**
Ulex europaeus	13	**5**	**5**	**5**	**5**
Lamium purpureum	**9=**	13	**8=**	**9**	**6**
Capsella bursa-pastoris	**7=**	**6**	11	**6**	**7**
Stellaria media	**6**	**10=**	29	**8**	**8**
Lamium album	11	**9**	**10**	16	**9**
Euphorbia peplus	**7=**	**8**	14	**7**	**10**
Heracleum sphondylium	25=	**10=**	12	18	11
Veronica persica	**9=**	12	22	**10**	13
Sonchus oleraceus	**4**	**7**	**6**	11	14
Senecio jacobaea	15=	16	**7**	15	21
Geranium robertianum	14	23	**8=**	29	29

Phenology

Of the species recorded in flower in 2018, 58% were flowering late, 14% were flowering early, whereas only 10% of the species recorded normally flower at New Year (Table 8; Fig. 4). In comparison, 18% of species have a long flowering period and therefore it is not possible to say whether a species is flowering early or late at New Year. These percentages were scarcely different when alien species were excluded and were very similar to previous years (especially 2017) and there is no evidence to suggest that these proportions have differed significantly over the last four winters.

Table 8. The % of species recorded at New Year that were flowering early, late or as expected, 2014-2018. See Table 1 for an explanation of the categories.

Phenology	**2014**	**2015**	**2016**	**2017**	**2018**
Early	10	12	17	15	14
Early or late	13	17	17	16	18
Expected	16	13	10	11	10
Late	61	58	55	58	58

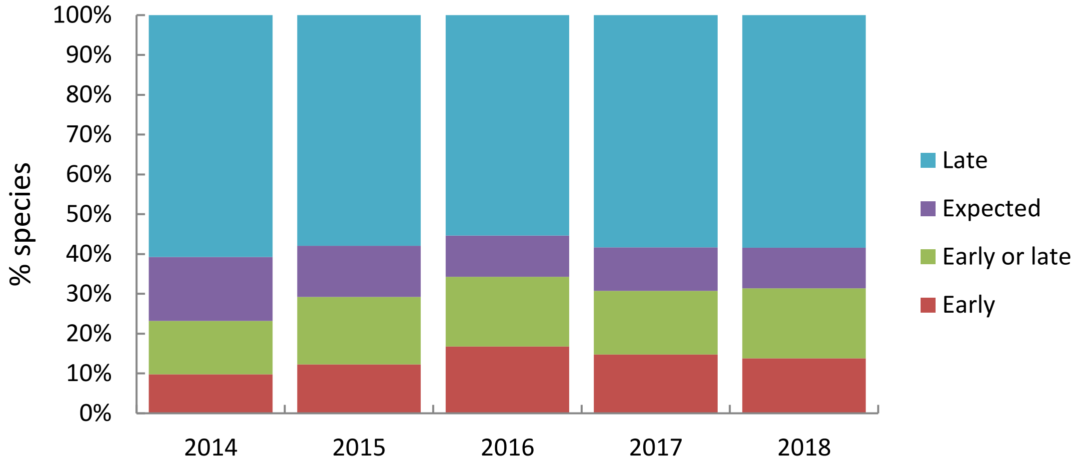

Figure 4. The % of species recorded in flower at New Year that were flowering early, late or as expected, 2014-2018. See Table 1 for an explanation of the categories.

In Table 9 and Figure 5 we present the flowering figures as the proportion of records rather than the proportion of species within each category. This shows that roughly the same proportion of occurrences were flowering late (38%) as would be expected at New Year (39%) whereas only 10% of individuals were flowering early and 13% were flowering early or late.

Table 9. The % of the species occurrences recorded at New Year that were flowering early, late or as expected, 2014-2018.

Phenology	2014	2015	2016	2017	2018
Early	5	9	12	9	10
Early or late	13	13	13	13	13
Expected	38	38	32	39	39
Late	44	40	42	38	38

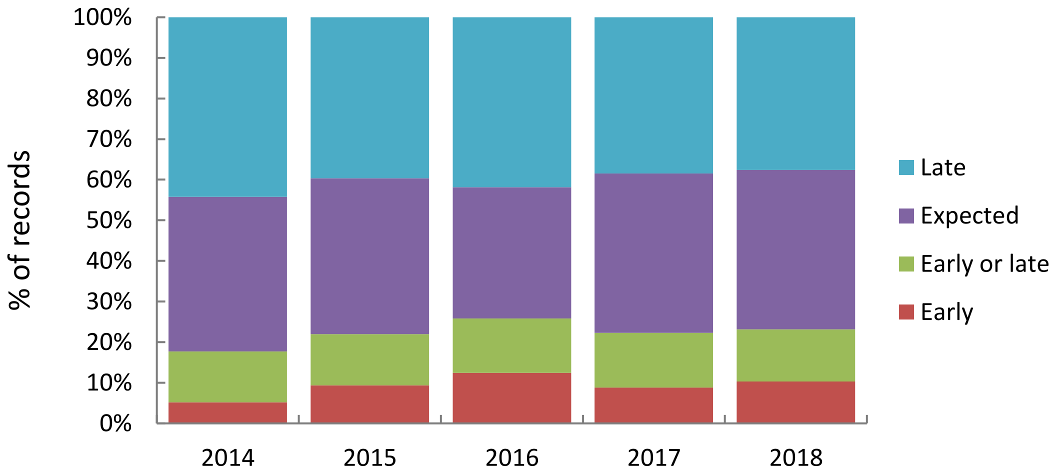

Figure 5. The % of records of species in flower at New Year that were flowering early, late or as expected, 2014-2018.

Discussion

With the exception of 2017, far fewer species were recorded in flower in 2018 than in previous years (Fig. 3). This was particularly the case for natives, whereas the differences for aliens were less marked (Table 6). A comparison of the weather data for October to December would suggest that these differences were largely due to temperatures during the late autumn/early winter months preceding the New Year Plant Hunt. These months were exceptionally mild in 2013-2015 when compared to long term averages (1981-2010), especially December 2015 when the average temperature was 4˚C above average (Fig. 6). In comparison, the same period was much colder in 2016 and 2017 when widespread frosts presumably curtailed the flowering of many species.

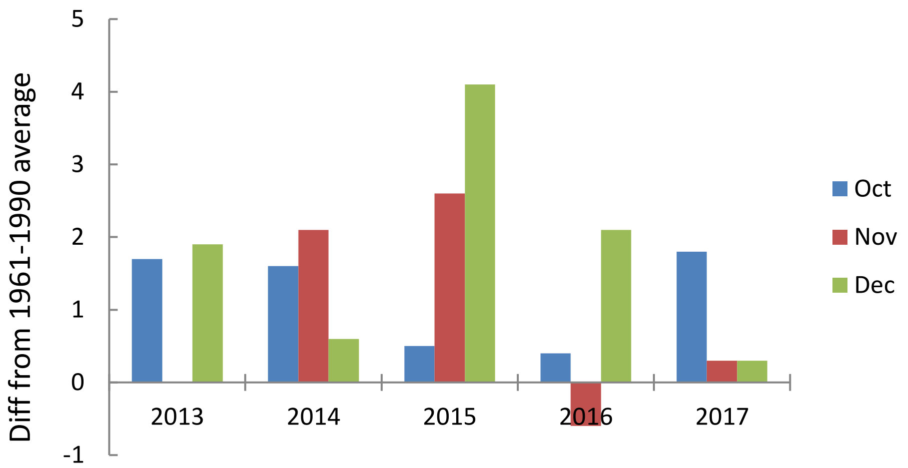

Figure 6. UK mean temperature 1961-1990 anomalies for the winter months (October to December) preceding New Year, 2013-2018. Data from UK Met Office (http://www.metoffice.gov.uk/climate/uk/summaries).

Despite these differences, the NYPH results for 2014-2018 have shown that many more species are flowering at New Year than was previously thought. Overall, NYPH has given us a much clearer picture of the common species and large numbers of aliens that are able to exploit thermophilous habitats, particularly in urban areas where temperatures are maintained a few degrees above those in the surrounding countryside. The lack of a historic baseline means that we can tell whether plants are flowering more often at New Year than in the past, but the results of the first five years have shown that there can be marked increases in flowering due to unseasonal weather. The main effects of these milder conditions are to allow species that usually flower in the autumn to continue flowering well beyond the first frosts. By comparison, there seems very little evidence to suggest that vernal species are flowering earlier. This may be because many vernal species require a period of stratification before warmer temperatures stimulate spring growth. Further work is needed to better understand the links between autumn/winter weather and the unseasonal flowering events revealed by the NYPH. Such work should focus on correlations between flowering with climate data whilst taking into account the potentially confounding effects of latitude, the built environment and survey effort.

Acknowledgments

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