

# Records, abundance and change in the Devon flora

The MapMate (Teknica Limited 1998–2009) database in which the records of the Devon flora are currently stored contains some 1,450,000 records. This number is of course continually increasing as new records are added, but the cut-off point for this account is the end of the year 2014. The total number in the database is an overestimate of the actual number of records, as some are repeats at lower resolution of higher resolution records. This results from the way in which historical records were imported into the database. Major sources include the tetrad data from the *Atlas of the Devon Flora* (Ivimey-Cook 1984), as well as the hectad data from the two Botanical Society of Britain and Ireland (BSBI) Atlases (Perrin & Walters 1962; Preston, Pearman & Dines 2002). The database for the second atlas, whilst including additional records, repeats the ‘Devon Atlas’ data, but at 10 km<sup>2</sup> resolution. This, and some shortcomings in the data, is discussed in the **Introduction to the species accounts** (pages 113–118).

The main ‘unit’ for recording in this Flora, as used in the maps, is a tetrad (2 × 2 km<sup>2</sup>) record within a date class (DC). The numbers of distinct tetrad records for each date class are given in Table 1, which also gives the ranges of dates for each date class (BSBI 2015). The total number of 865,416 distinct tetrad records will, of course, include instances of more than one valid record for a taxon in a tetrad within a date class. Also, some records used in compiling the New Flora are only at hectad (10 × 10 km<sup>2</sup>) resolution. Thus the number of distinct records on which this Flora is based is somewhere between 865,416 and 1,450,000, possibly around one million.

The breakdown of the records between date classes reflects a number of factors. Before 1930 (Date Class 0), the National Grid did not exist, and therefore few records can be precisely located within a tetrad. In DC 1, much of the recording effort was directed at producing hectad records for the first BSBI Atlas (Perrin & Walters 1962) and relatively little attention was paid to recording at finer resolution. By far the greatest number of records for a date class was achieved in DC 2. This is a result of the enormous collaborative recording effort put into the production of the *Atlas of the Devon Flora* (Ivimey-Cook 1984). This was followed by the period up to 1999, when the main effort was

**Table 1.** Distinct tetrad and hectad records by date class.

Date Class	From – to	Distinct 10 × 10 km <sup>2</sup> records		Distinct 2 × 2 km <sup>2</sup> records	
		Records	Taxa	Records	Taxa
0	–1929	8,023	1,586	2,066	704
1	1930–1969	39,703	1,803	24,651	1,476
2	1970–1986	47,701	1,749	344,663	1,649
3	1987–1999	56,501	2,326	75,886	2,121
4	2000–2009	45,692	1,991	248,845	1,980
5	2010–2014	37,911	1,718	169,305	1,716
<b>Total</b>		<b>235,531</b>	<b>2,742</b>	<b>865,416</b>	<b>2,686</b>

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again directed at producing hectad records for the *New Atlas of the British Flora* (Preston, Pearman & Dines 2002), and recording at the tetrad level was given lower priority, except for those tetrads included in the BSBI Monitoring Scheme (Rich & Woodruff 1995).

From 2000 onwards, the process of recording has been greatly enhanced by digital technology. Constraints that previously existed on the quantity of data that could realistically be stored have largely been eliminated. This increasing ease of storing data has been acknowledged in the reduction in the length of the date classes, leading to the current 10 years for DCs 4 and 5 as opposed to 40 years for DC 1, 17 for DC 2 and 13 for DC 3. The number of records per annum in DC 4 was greater than for the previous maximum recording rate in DC 2, and looks to be higher still in DC 5.

**Table 2.** Numbers of taxa included in the species accounts.

Taxon rank	Total	Distinct taxa
Species	1,945	1,867
Subspecies	201	125
Variety	44	9
Form	3	0
Hybrid	233	233
Cultivar	7	4
Section	14	0
Aggregate	18	5
Microspecies	277	0
<b>Total</b>	<b>2,742</b>	<b>2,243</b>

**Table 3.** Devon abundance status.

Abundance status	Total	Distinct taxa
Very common	67	66
Common	176	173
Frequent	324	315
Occasional	340	317
Rare	338	296
Very rare	876	786
Extinct	291	286
Uncertain	5	4
Not stated	325	0
<b>Total</b>	<b>2,742</b>	<b>2,243</b>

The total figure of 2,742 taxa in Table 1 above is inflated by the inclusion of higher taxa where lower taxa are also listed (e.g. species for which there are separate entries in the database for subspecies). If these extra entries are removed, the distinct taxa in this New Flora number 2,243.

Tables 2 to 4 show the breakdown, by taxon, abundance and native status, of the 2,742 taxa in the checklist derived from the database, and of the 2,243 taxa with the redundancies removed. The abundance status and native status are defined on page 116 in the **Introduction to the species accounts**. In Tables 3 and 4, the category 'Not stated' refers to higher taxa (usually species) that have lower taxa (e.g. subspecies and varieties) with different abundance or native statuses. Additionally in Table 4 (native status), the category 'Introduced' refers to plants native elsewhere in Britain and Ireland, but considered to be introduced in Devon.

Table 5 shows the breakdown of the 2,243 distinct taxa into abundance categories (defined as above).

Devon native status	Total	Distinct taxa
Native	1,321	1,115
Archaeophyte	130	130
Neophyte	742	734
Introduced*	109	68
Casual	206	173
Garden origin /planted	12	12
Uncertain	11	11
Not stated	211	0
<b>Total</b>	<b>2,742</b>	<b>2,243</b>

\*Native elsewhere in Britain and Ireland, but introduced in Devon

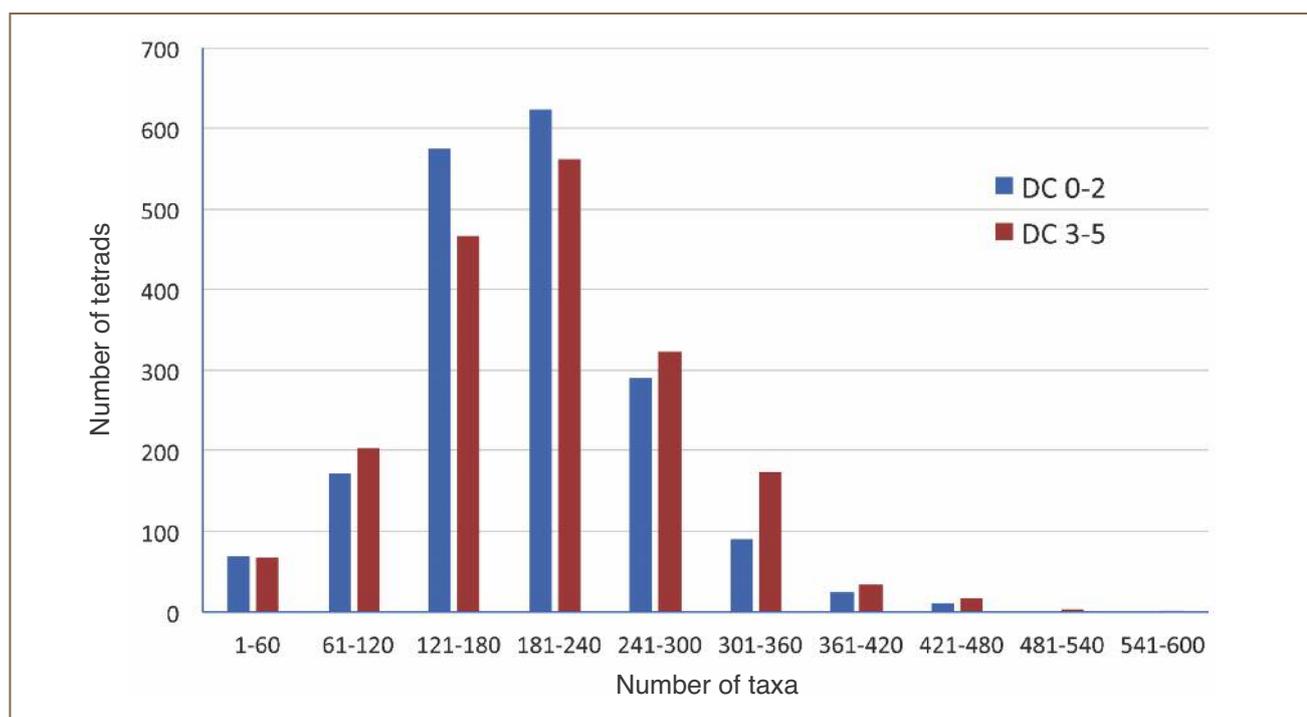
Status	VC	C	F	O	R	VR	EX	U	Total
Native	63	149	223	184	151	260	82	3	1,115
Archaeophyte	0	13	27	32	12	36	10	0	130
Neophyte	2	9	57	91	113	385	77	0	734
Introduced	1	2	4	9	9	29	14	0	68
Casual	0	0	3	0	7	63	100	0	173
Garden origin/planted	0	0	1	1	3	7	0	0	12
Uncertain	0	0	0	0	1	6	3	1	11
<b>Total</b>	<b>66</b>	<b>173</b>	<b>315</b>	<b>317</b>	<b>296</b>	<b>786</b>	<b>286</b>	<b>4</b>	<b>2,243</b>

Category	No. of taxa
Total 'unique' taxon records from above (Table 5, or sum of Tables 6, 7 and 8)	2,243
Sections of <i>Taraxacum</i> (7) and <i>Hieracium</i> (7)	14
Microspecies ( <i>Rubus</i> 118, <i>Taraxacum</i> 121 and <i>Hieracium</i> 38)	277
Other taxa without unique entries (154 species and subspecies, 13 aggregates, and 41 varieties, forms and cultivars)	208
<b>Total</b>	<b>2,742</b>

Table 6 reconciles the data in Tables 1 to 4 with that in Table 5. It includes all species that do not have a separate entry for a subspecies, the subspecies that are counted separately in Table 5, and the aggregates that are not accounted for by species or subspecies (i.e. *Rubus*, *Taraxacum* and *Hieracium*).

The number of tetrad records collected from 1987 onwards (494,036) now exceeds that prior to 1987 (371,380). Figure 1, which compares the numbers of taxa per tetrad across the date classes, shows a similar pattern in the two date ranges. In both cases the greatest number of tetrads (mode) have between 181 and 240 taxa.

However, the coverage in terms of numbers of taxa per tetrad in DCs 4 and 5 is not as even as that achieved in DCs 1 and 2. Figure 2, showing the distribution of the 100 most frequent species, reveals that whereas in most of South Devon (VC3) the coverage is better from 1987 onwards than previously, there are gaps in North Devon (VC4) and in the eastern part of South Devon.



**Figure 1.** Number of taxa per tetrad up to 1986 (Date Classes 0–2) compared with 1987 onwards (Date Class 3–5).

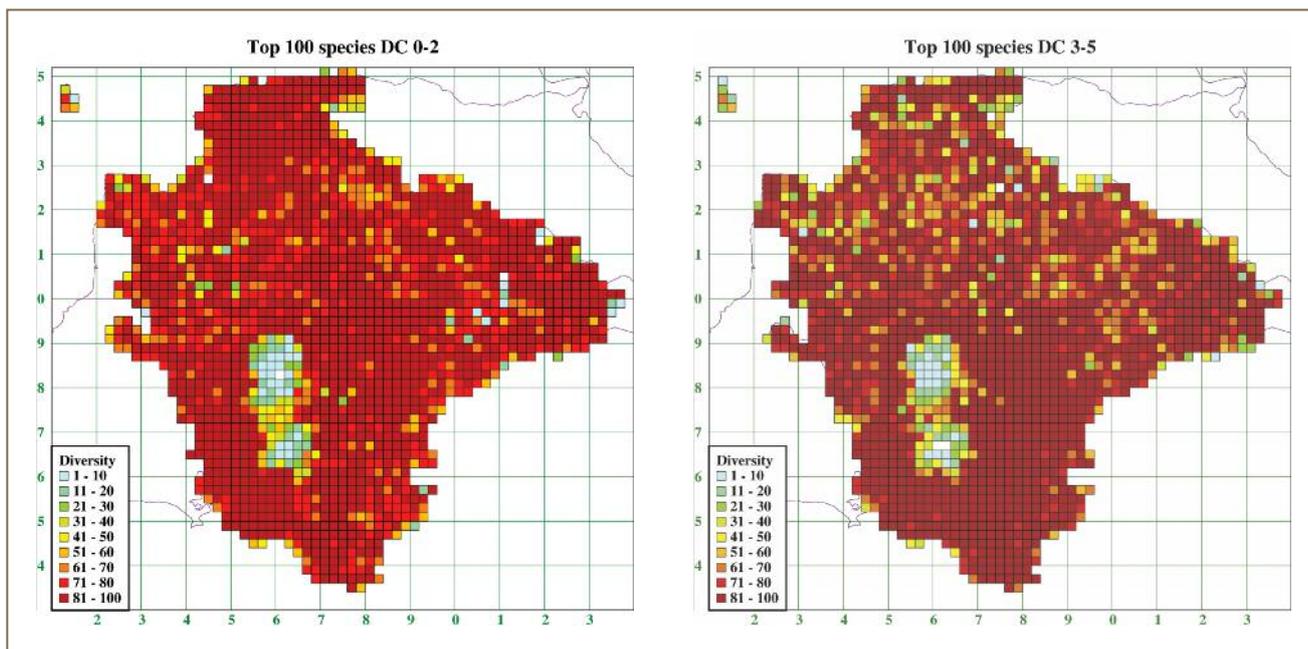


Figure 2. Comparison of coverage per tetrad between DC 2-3 and DC 4-5 of the 100 most frequent species. Maps produced using DMAP (Morton 2009).

The 10-kilometre square (hectad) SX87 is very varied in habitat and has been very well recorded over many years. Analysis of data for the 25 tetrads in this hectad suggests that the possible number of taxa per tetrad in other areas is higher than that yet achieved. The greatest number taxa per tetrad was between 241 and 300 up to 1986, and between 301 and 360 from 1987 onwards.

The species accounts in this Flora cite 290 taxa as being 'extinct' in that they have not been recorded

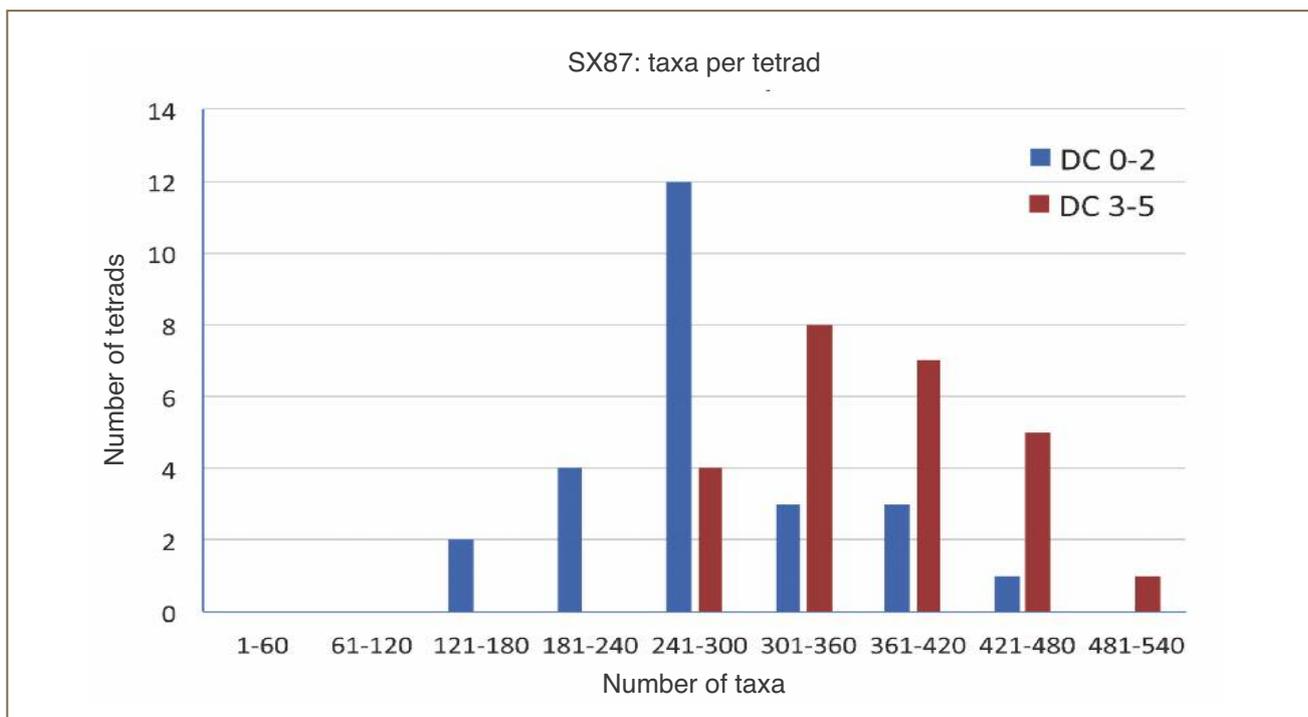


Figure 3. Comparison of numbers of taxa recorded per tetrad in SX87 up to 1986 (DC0-2) and from 1987 onwards (DC3-5).

since 1986. Of these 85 are designated as 'native', while 'casual' is the largest category, numbering 100. Species first recorded from 1987 onwards number 500 and include 164 native taxa, with 'neophyte' at 263 being the largest category. The pattern is similar in SX87, which has 249 taxa that have not been seen since 1986, but 345 first recorded from 1987 onwards. As above, most of the 'losses' and 'gains' in SX87 are casuals and neophytes. The losses include a number of rare native species, but for a selected sample of 'ecologically significant' species (habitat indicators) 31 'losses' are balanced by 29 'gains'.

Thus it would appear that the flora of the County is richer than has yet been recorded, and at the tetrad level at least, losses are balanced by gains. There is still plenty of work to be done, particularly in the North and the East. There are significant discoveries yet to be made. In terms of tetrad recording shifting the average number of species per tetrad from around 200 as at present to over 250, or possibly even 300 as in SX87, would seem to be achievable. However, that is not to say that we can be complacent about the threats to our flora posed by a number of factors, but perhaps particularly by fragmentation of habitats; a 'tick' for a species within a tetrad can easily hide loss of habitat and ecological continuity at a smaller scale.

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