



Tetrad distributions for some selected pairs of British species

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Background

I have been wondering what I wish to learn from the BSBI Atlas 2020 project. At hectad scale I already have the *New Atlas of the British and Irish Flora* with its species captions. For change at tetrad scale I have BSBI's *Change in the British Flora 1987-2004*, and for detailed species accounts I have my own *Short Flora of Berwickshire* and a range of other County Floras. These, taken together, enable me to interpret the stunning detail now available on the BSBI Distribution Database (DDb), with its facility to allow searches of individual records.

It has occurred to me to experiment with the tetrad distributions of two species superimposed. I have found the exercise rewarding and present the results of my mini-project here. All the maps relate to the period 1987-2019.

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The project

The tetrad distributions that have been building up on the DDb during the BSBI Atlas 2020 project are fascinating. Detail, that has until recently only been available for those vice-counties with recent tetrad Floras, is now available for most of Britain, albeit on a sample basis in much of the north and west. I have left aside the study of change to examine the patterns of the distributions. The patterns are at their most interesting in species that are neither scarce nor very widespread as, for them, texture is apparent at 2km scale over much of their distribution range.

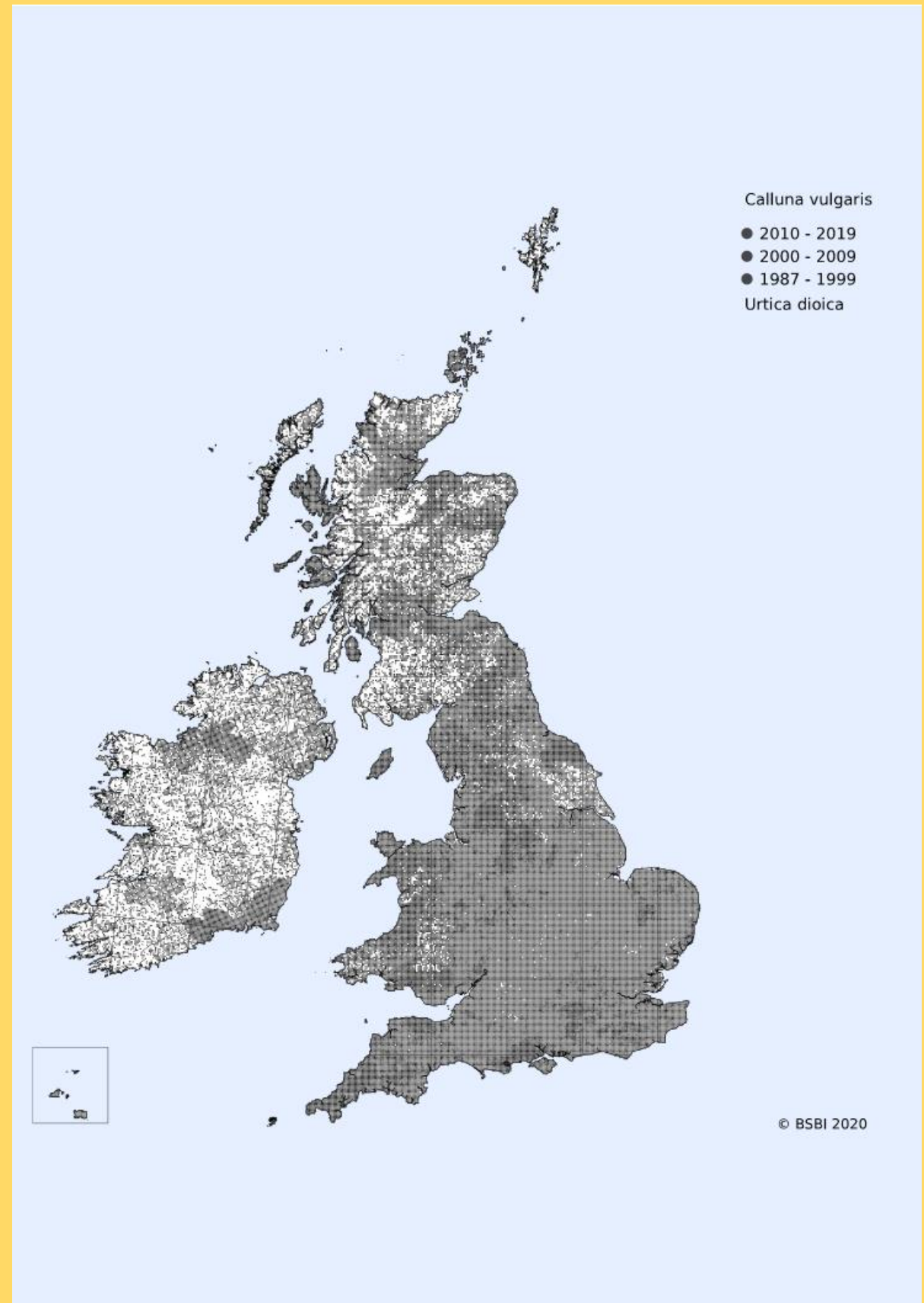
I have used the species groupings in BSBI's *Change in the British Flora 1987-2004* as a source of inspiration in choosing the pairs of species presented here, biased towards species that I know well and that are unexpectedly plentiful or scarce in the Scottish Borders. I have also examined supposedly native species that might be introductions.

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Survey coverage

A reasonable understanding of the survey coverage at tetrad scale between 1987 and 2019 can be grasped from this map of *Urtica dioica* combined with *Calluna vulgaris*.

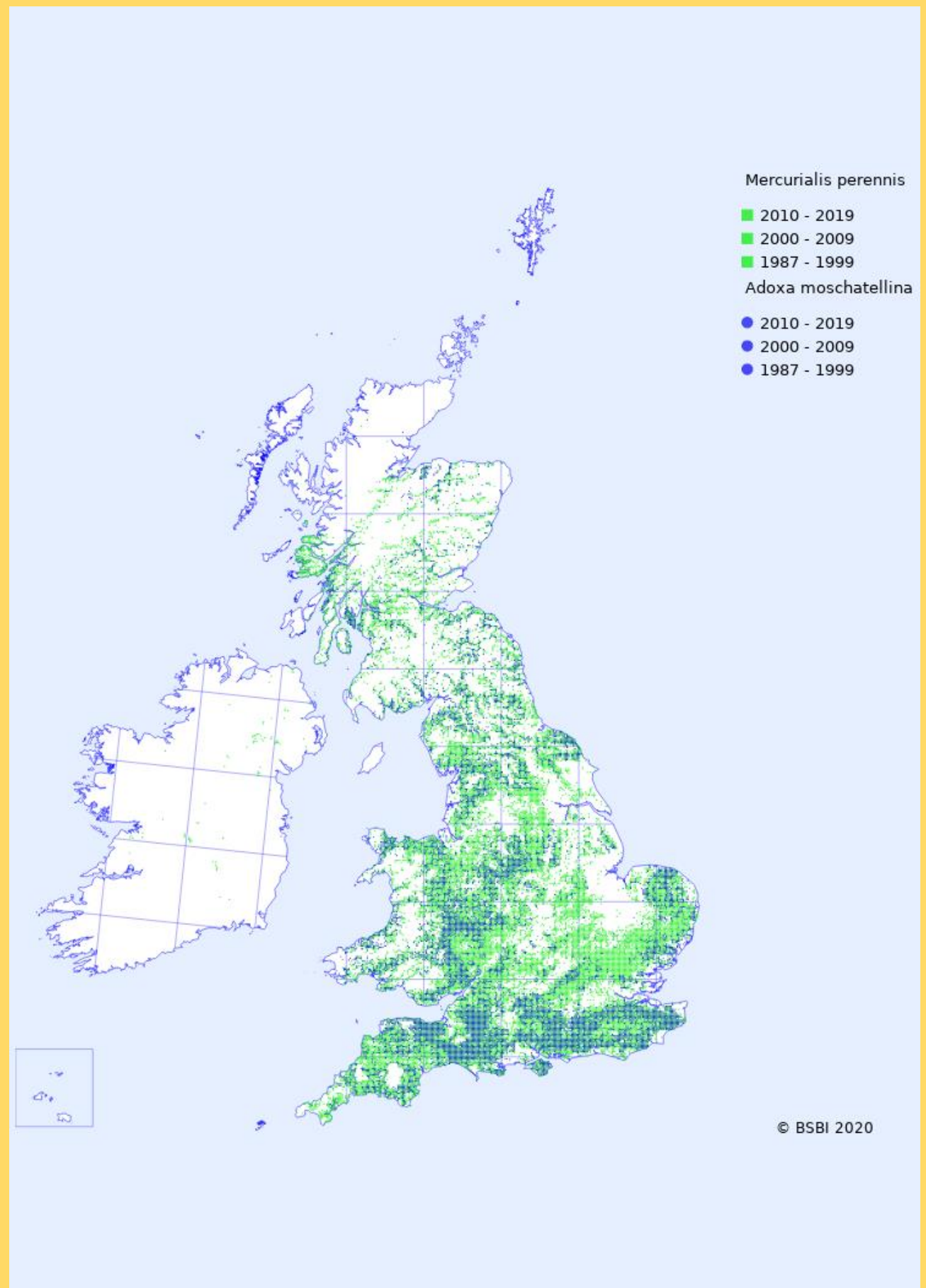
Coverage is excellent in England and Wales but more variable in Scotland. Much of Ireland has a fairly even sample coverage, but a few Irish vice-counties have almost complete coverage.



Adoxa moschatellina over *Mercurialis* *perennis*

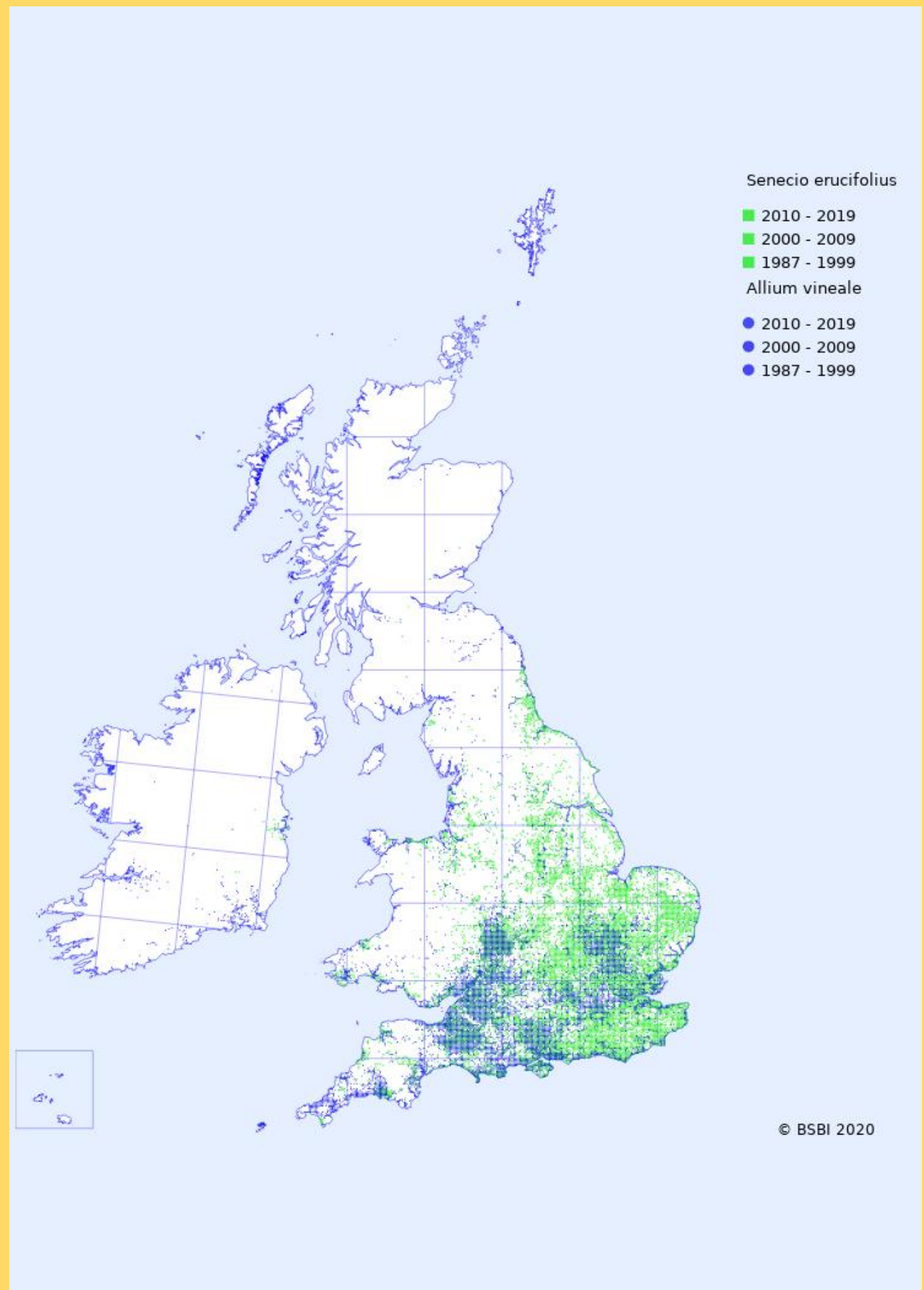
The intricate and seemingly improbable tetrad distribution of *Adoxa moschatellina* is brought into focus by comparison with *Mercurialis perennis*.

Adoxa moschatellina favours damp woodland along river valleys and woods on calcareous rocks while *Mercurialis perennis*, though less demanding in its habitats, is also almost confined to ancient woodland sites, though it often survives unfavourable management.



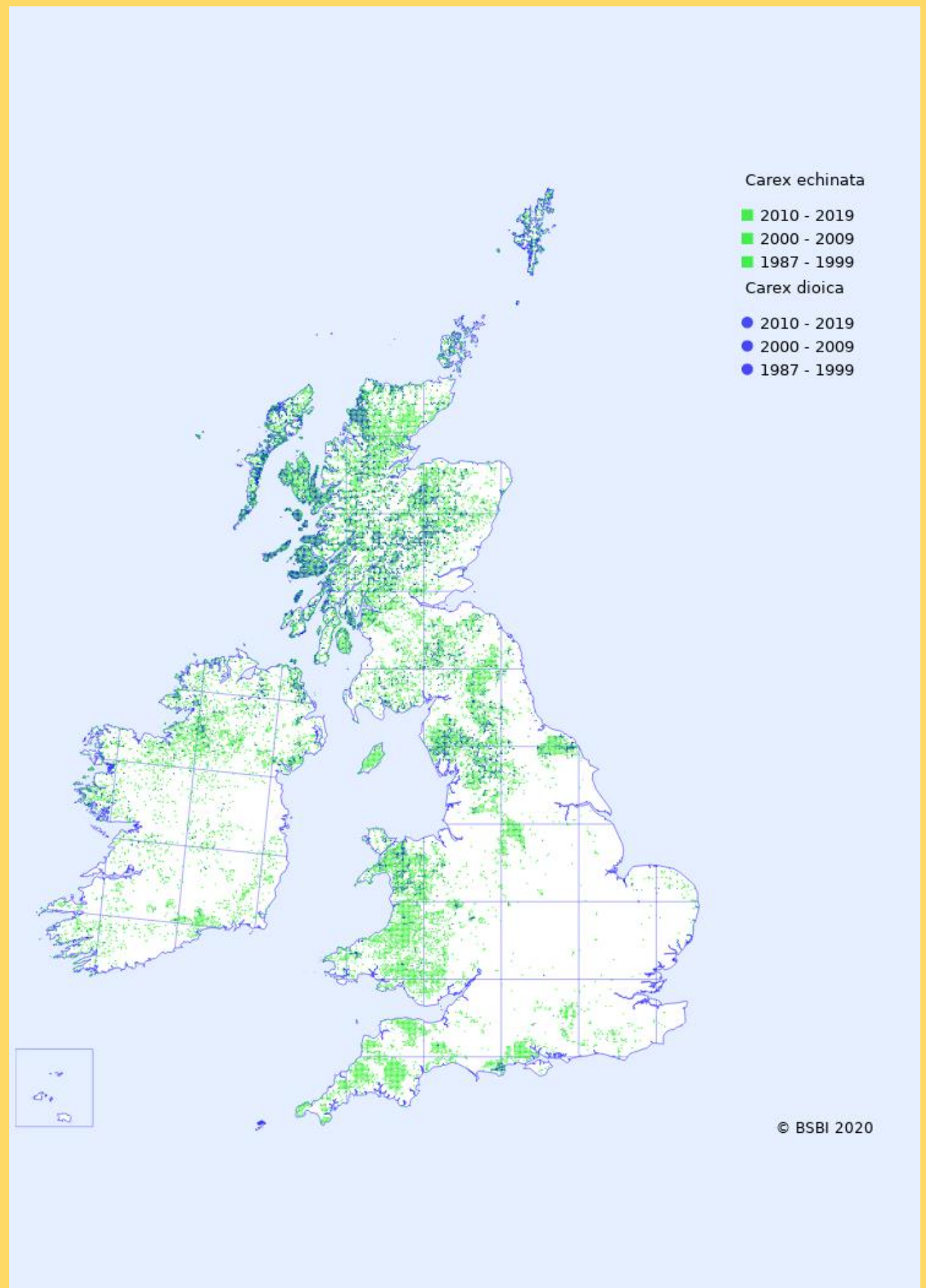
Allium vineale over *Senecio* *erucifolius*

My interest in *Allium vineale* stems from its recent colonisation of the banks of the River Tweed in the Scottish Borders, an area where it was previously confined to the coast. *Senecio erucifolius* is a grassland species more often found in ruderal habitats. Both species have southern distributions, but that of the native *Senecio erucifolius* lacks the clumping of *Allium vineale* which might indicate an archaeophyte whose ability to disperse is limited by its reliance on vegetative spread by bulbils.



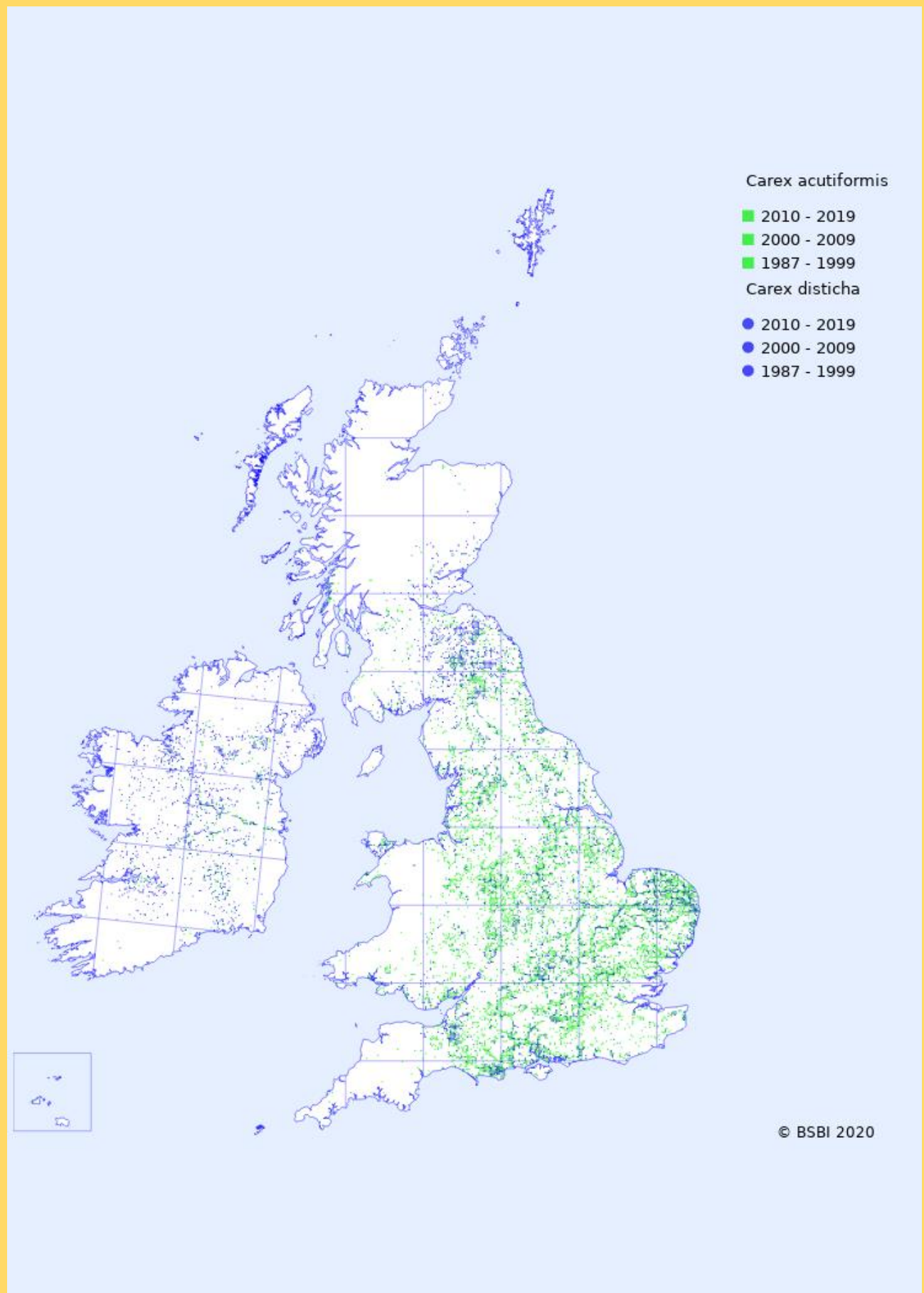
Carex dioica over *Carex echinata*

In the Scottish Borders, I know *Carex dioica* as a local species of slightly calcareous hill flushes, while in the west of Scotland I have found it to be plentiful in low altitude moorland where it grows in much more acidic conditions. One of its associates is *Carex echinata*. This map confirms my field experience and contrasts it with *Carex echinata* which is frequent in all types of moorland.



Carex disticha over *Carex* *acutiformis*

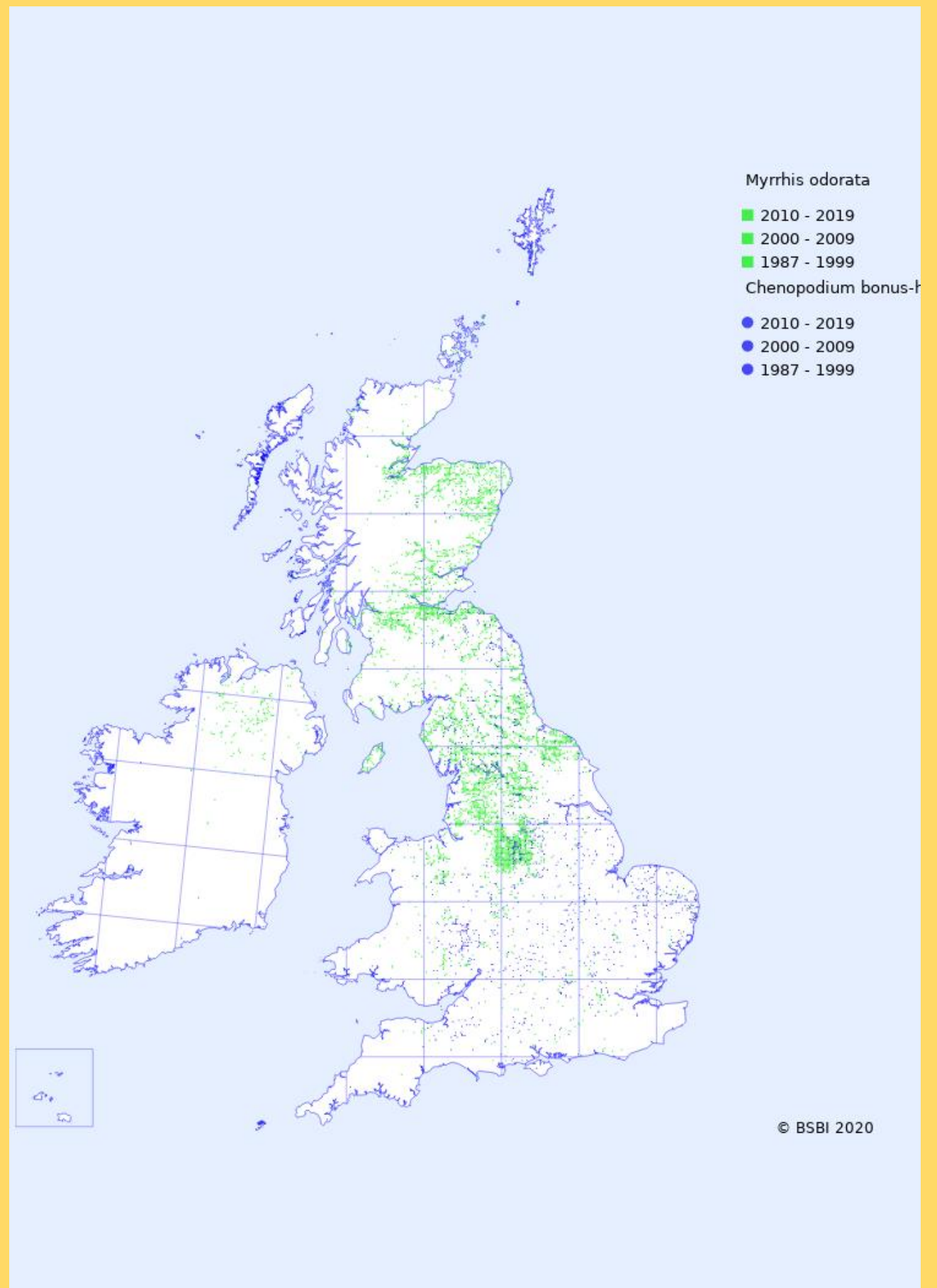
Carex disticha is a frequent plant in the Scottish Borders in only slightly calcareous mires, both by hill burns and in other wetland. It is a mystery why it is more frequent here than anywhere else except for parts of East Anglia, but seems to relate to the frequency and diversity of fens. *Carex acutiformis* forms dense colonies in wetland near burns and rivers, occasionally with *Carex disticha* at the margins. *Carex acutiformis* has a similar distributional range in Britain but is free from the regional concentrations of *Carex disticha*.



Chenopodium bonus-henricus over *Myrrhis odorata*

These two species have similar histories in Britain. Both were widely introduced to cottage gardens at an early date.

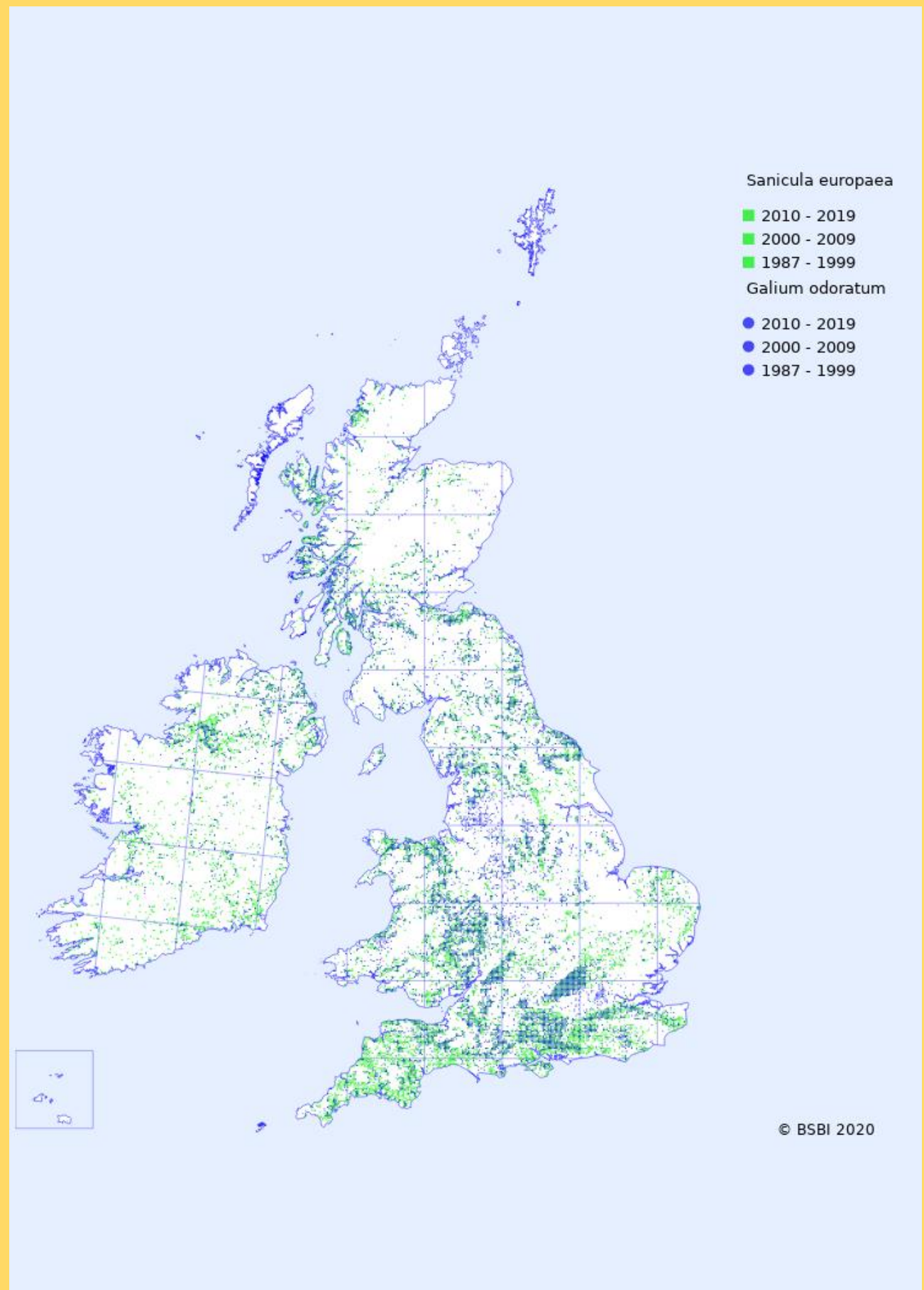
Chenopodium bonus-henricus as a pot herb and *Myrrhis odorata* as a flavouring. Both are still widespread, but, while both species are found as patches in lane verges near the gardens from which they were thrown out and the *Chenopodium* is occasionally established on river shingle, it is only the *Myrrhis* that has become truly naturalised. It can be plentiful along roadsides and stream-sides, but only in the Peak District and further north.



Galium odoratum over *Sanicula* *europaea*

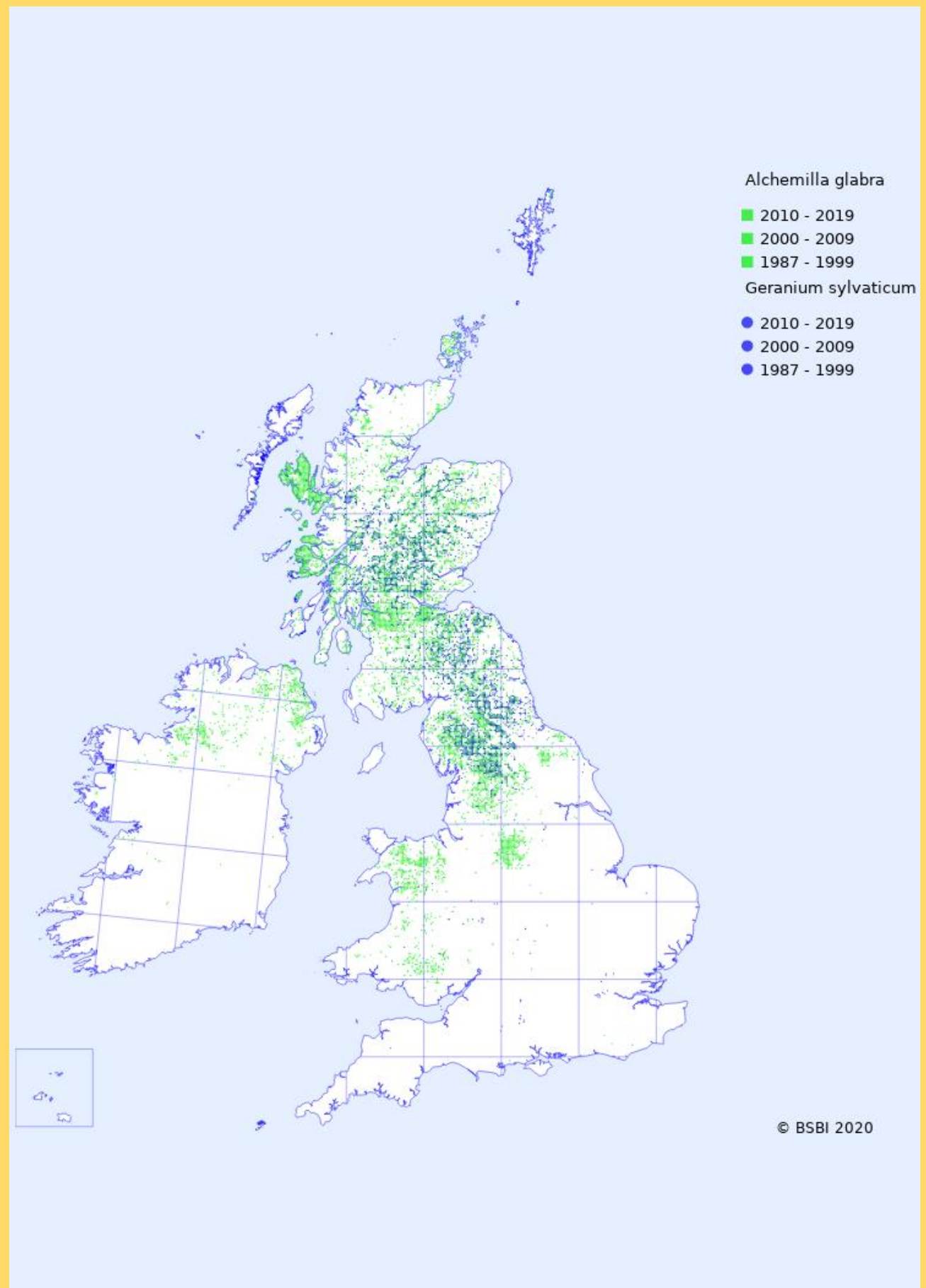
Sanicula europaea and *Galium odoratum* have very similar distributions as ancient woodland specialists of neutral or calcareous soils. The differences are hard to understand, *Galium odoratum* is surprising scarce in Kent while *Sanicula europaea* is surprisingly widespread in Cornwall. Both are more widespread in the south than in the north but extend to suitable parts of northern Scotland.

The intricate distribution patterns are a good example of what is learned by zooming in from hectad to tetrad scale.



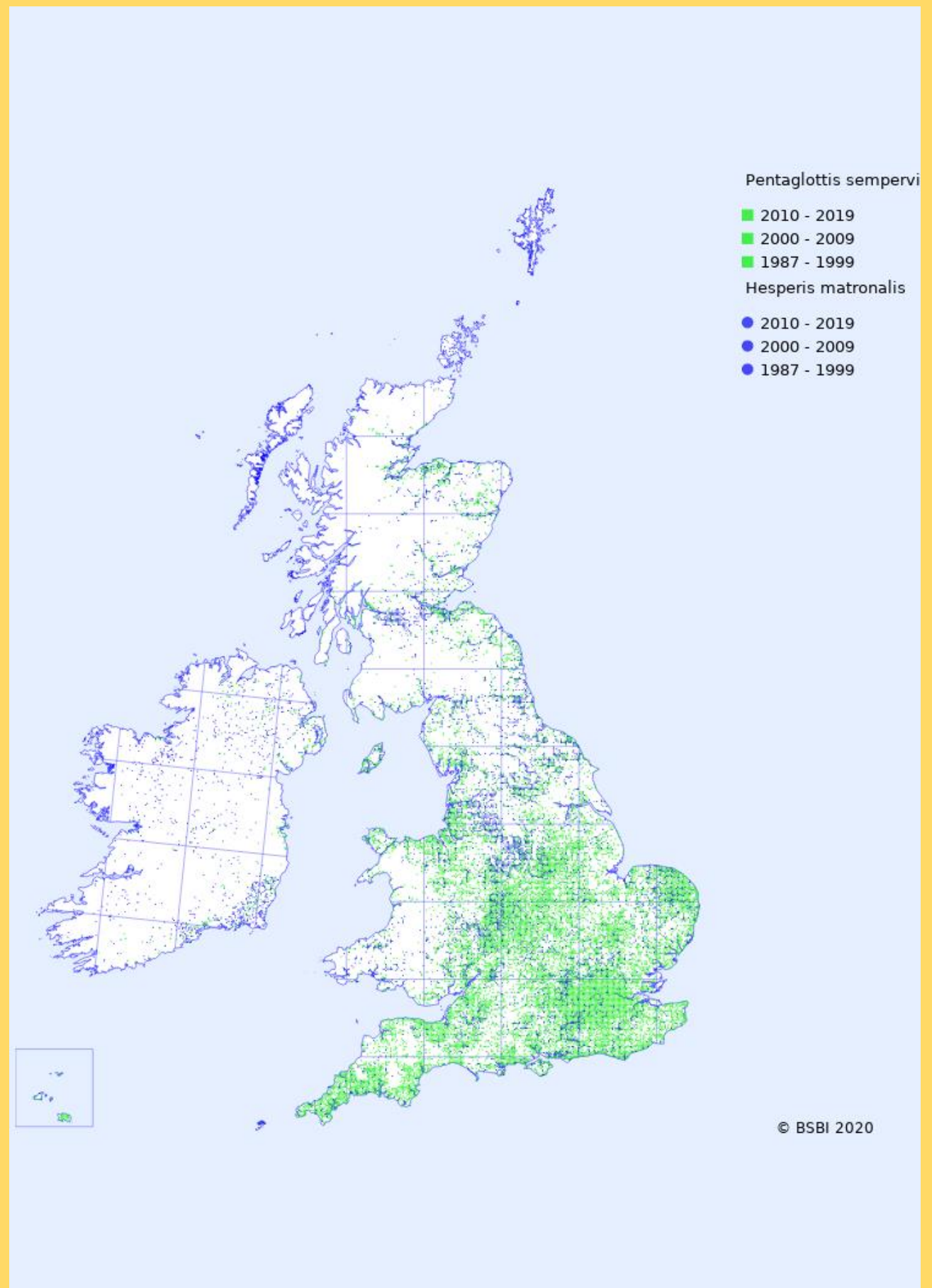
Geranium sylvaticum over *Alchemilla glabra*

Both these species are characteristic hill plants of the north of Britain. *Alchemilla glabra* is less dependent on neutral to calcareous soils than *Geranium sylvaticum*.



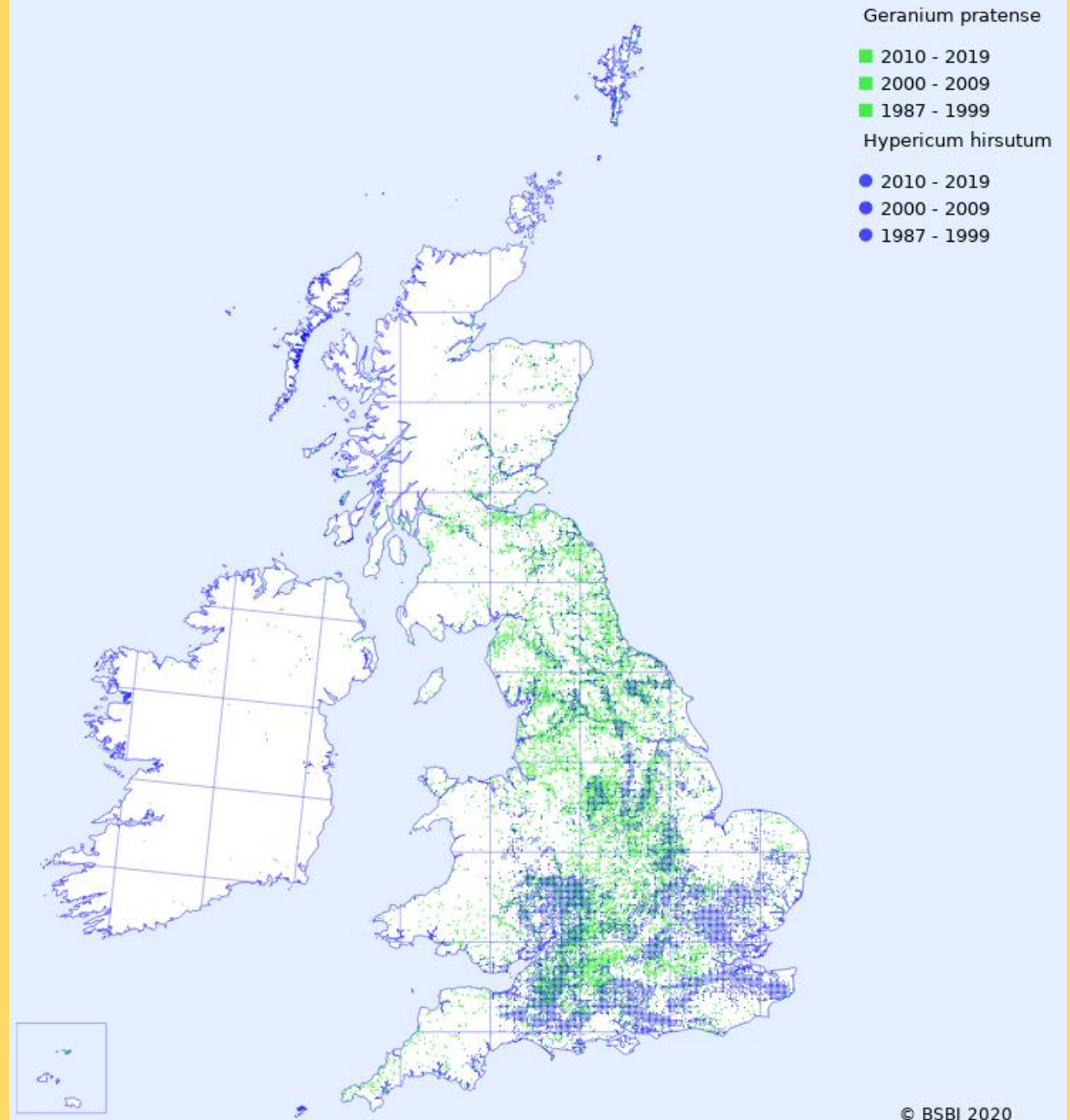
Hesperis matronalis over *Pentaglottis sempervirens*

These two widely naturalised introductions sometimes grow together in riverside vegetation but have distributions that have as many differences as similarities. *Hesperis matronalis* is usually found in partial shade whereas *Pentaglottis sempervirens* favours full sun and has the more southerly distribution of the two.



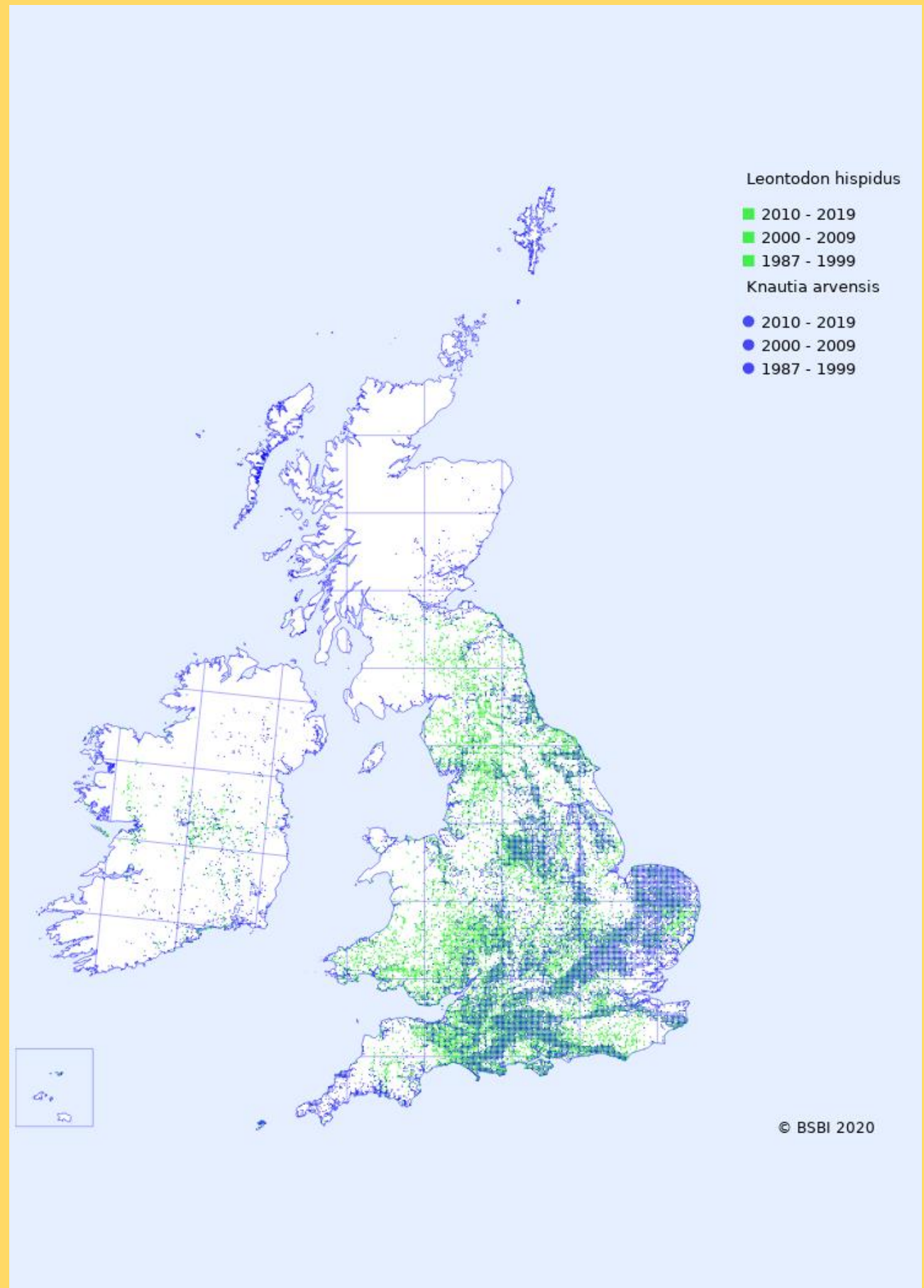
Hypericum hirsutum over *Geranium pratense*

The distribution of *Geranium pratense* is hard to understand, and most authors consider it an introduction in some areas. It is a common grassland plant where it occurs. It favours neutral to calcareous soils which might account for its scarcity in Cornwall and Wales, but not its scarcity in Kent and East Anglia. *Hypericum hirsutum* is a stricter calcicole than *Geranium pratense* but has a similar range. Both species have restricted distributions in Scotland.



Knautia arvensis over *Leontodon* *hispidus*

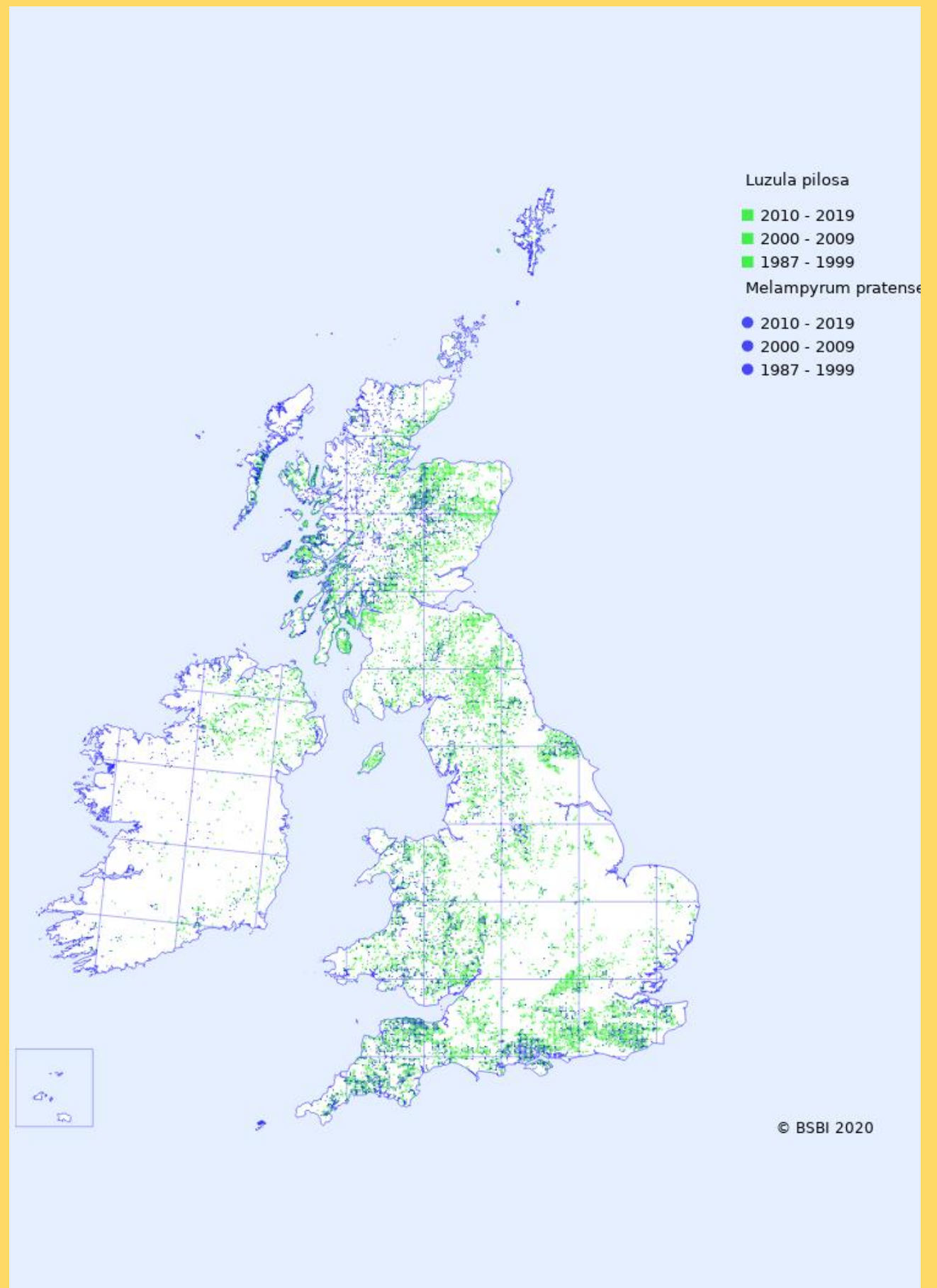
This pair of species illustrate the effects of soil chemistry on the distributions of grassland plants. *Knautia arvensis* is a classic calcicole while *Leontodon hispidus* has a tolerance of neutral soils which has enabled it to flourish more widely.



Melampyrum pratense over *Luzula pilosa*

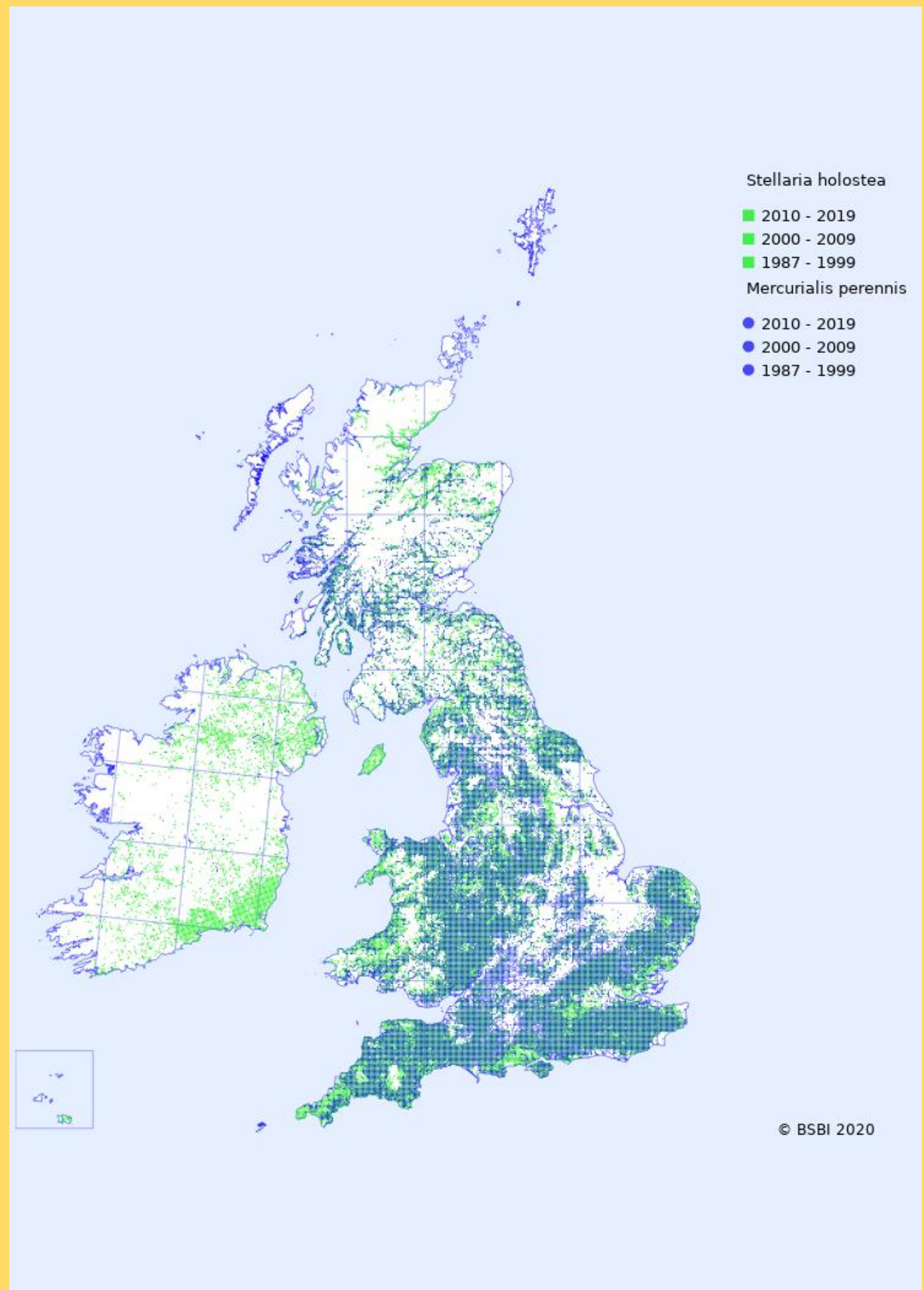
These two species have largely matching distributions, but not in the Scottish Borders. There *Melampyrum pratense* is notably scarce, both as a woodland plant favouring oakwoods and as a upland plant of hill cleughs. This may relate to the extreme shortage of ancient woodland and the history of muirburn on the Border hills.

Luzula pilosa is found in similar habitats where it has a much greater ability to survive periods of unfavourable management.



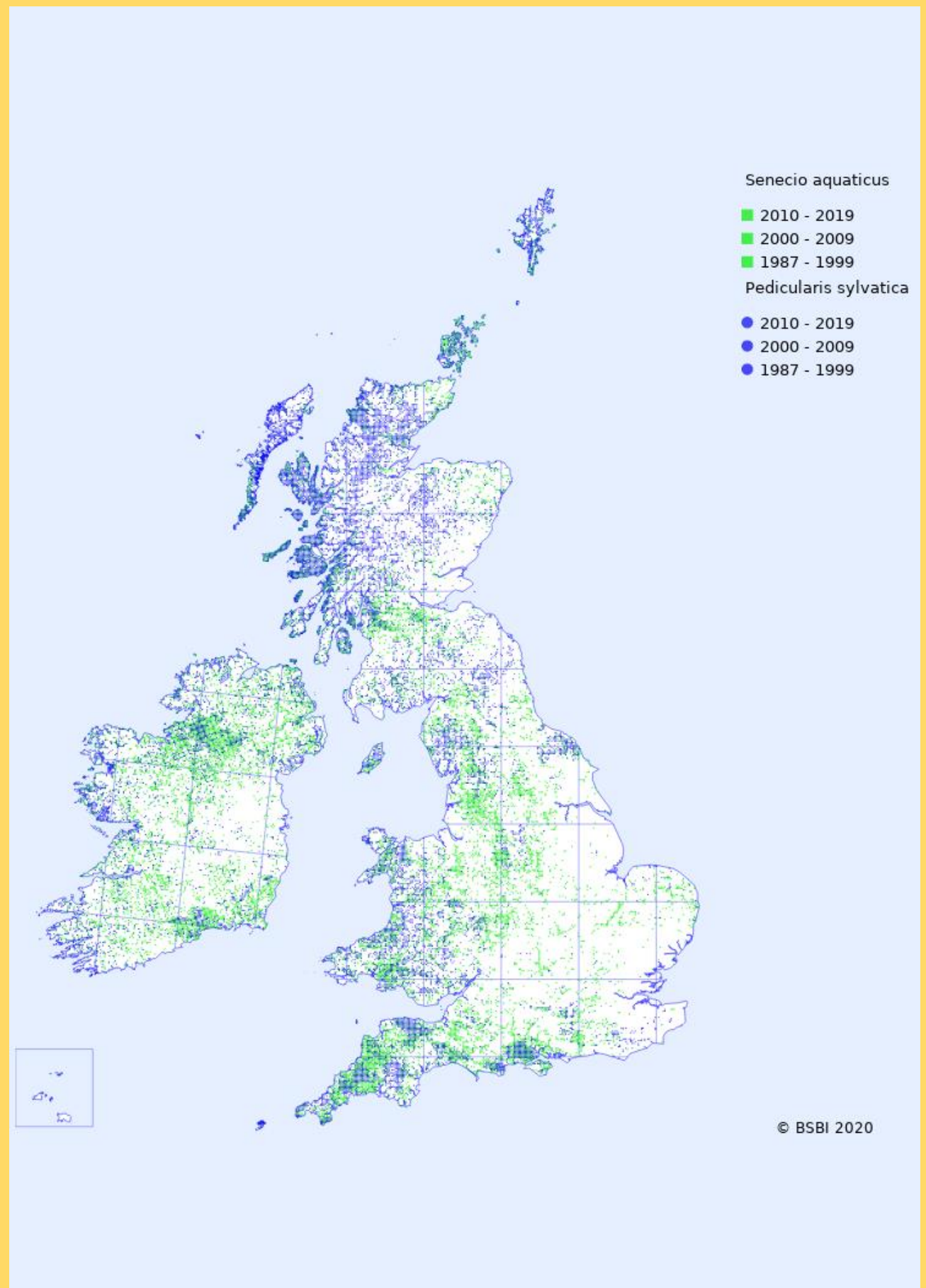
Mercurialis pratense over *Stellaria holostea*

It is hard to find a more widespread woodland specialist than *Mercurialis perennis*, but *Stellaria holostea* is such a species. In Scotland *Stellaria holostea* is found in birchwoods in the hills which are too acid for *Mercurialis perennis*.



Pedicularis sylvatica over *Senecio aquaticus*

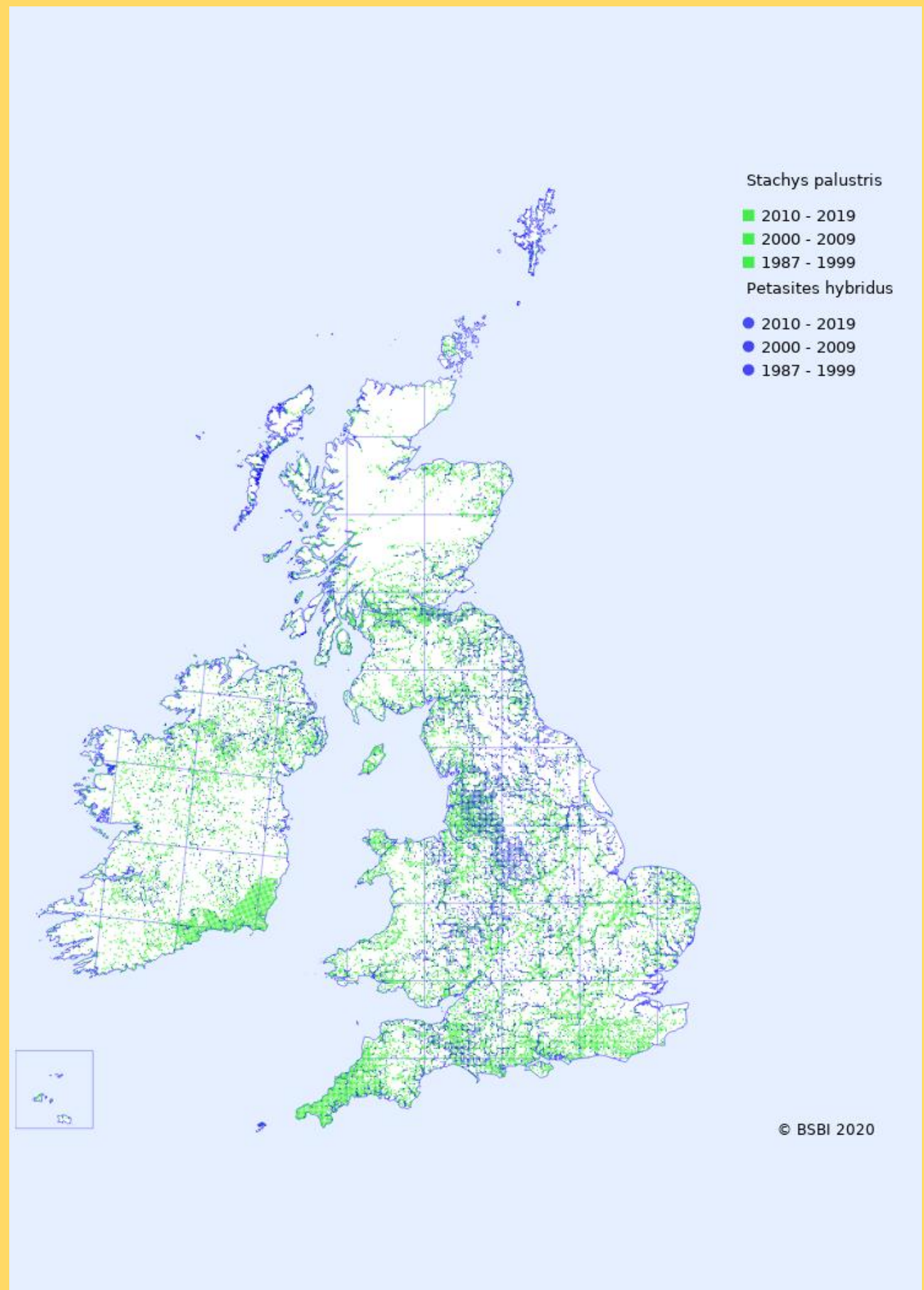
Pedicularis sylvatica is a very widespread and plentiful plant in wet moorland along western coasts, where it is often loosely associated with *Senecio aquaticus*. In the east *Pedicularis sylvatica* is much more sparsely distributed, as much of the moorland is too dry for it, while *Senecio aquaticus* is also sparse and more often found in acidic burns and ditches. Nevertheless *Senecio aquaticus* is sometimes found in neutral or even slightly basic wetland and its restricted distribution is a little unexpected.



Petastites hybridus over *Stachys palustris*

Petastites hybridus is usually found as the male plant, which is spread vegetatively along watercourses. The female plant is comparatively scarce. This disparity suggests that *Petastites hybridus* is an early introduction. The tetrad distribution confirms that it is largely confined to the main watercourses but the distribution is not clumped in a way that would offer direct support for non-native status.

Stachys palustris has a more even distribution as it is found in tiny burns and damp meadows as well as by the main watercourses and is unambiguously native.

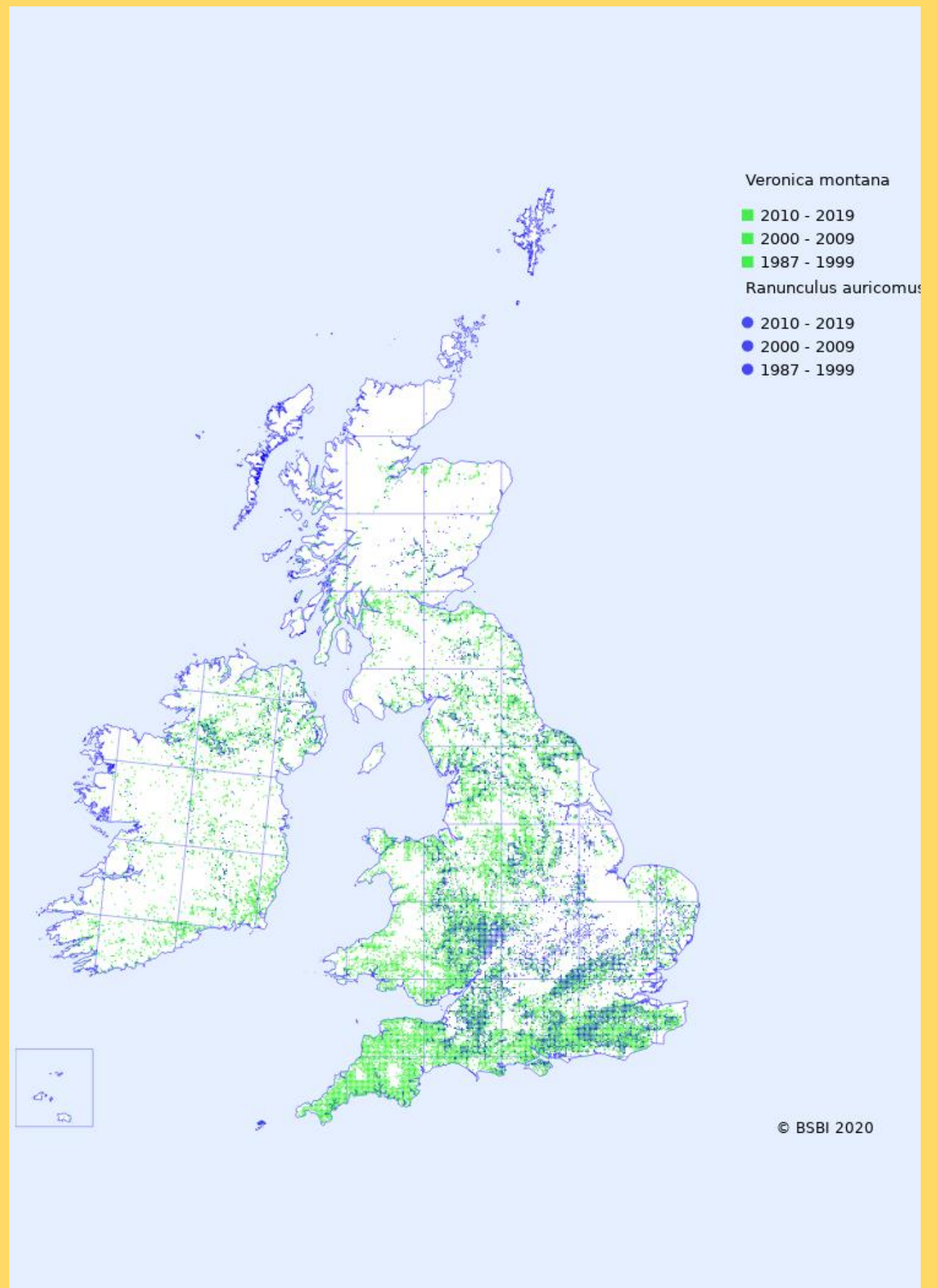


Ranunculus auricomus over *Veronica montana*

Ranunculus auricomus is a fairly strict calcicole that is found on sparsely wooded banks as well as under a mature woodland canopy and is restricted to ancient woodland sites, though they are often much modified.

Veronica montana has a similar distribution but extends into areas with neutral soils. It can spread within plantations, especially along woodland rides.

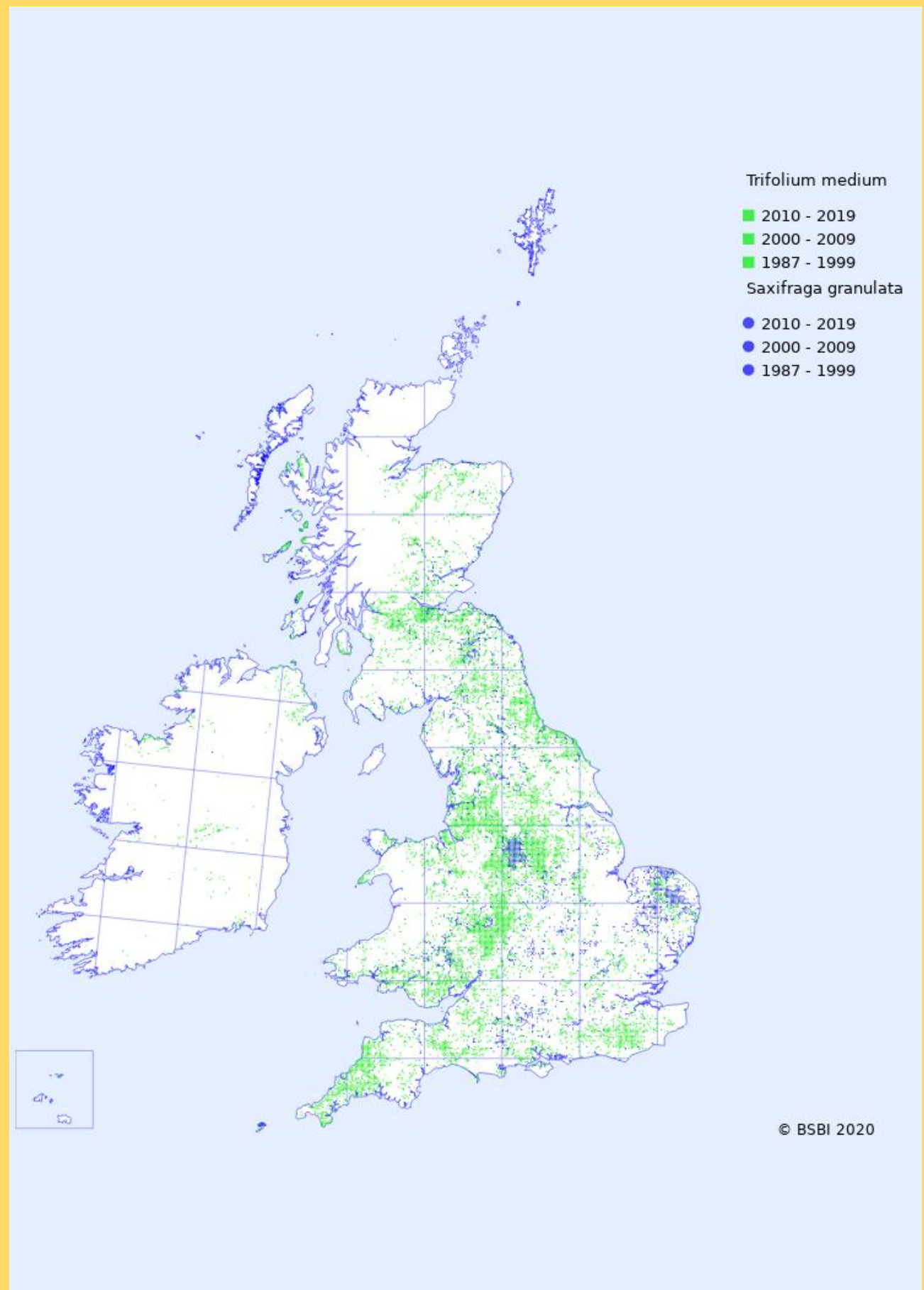
Both species are local in Scotland, probably for climatic reasons.



Saxifraga granulata over *Trifolium medium*

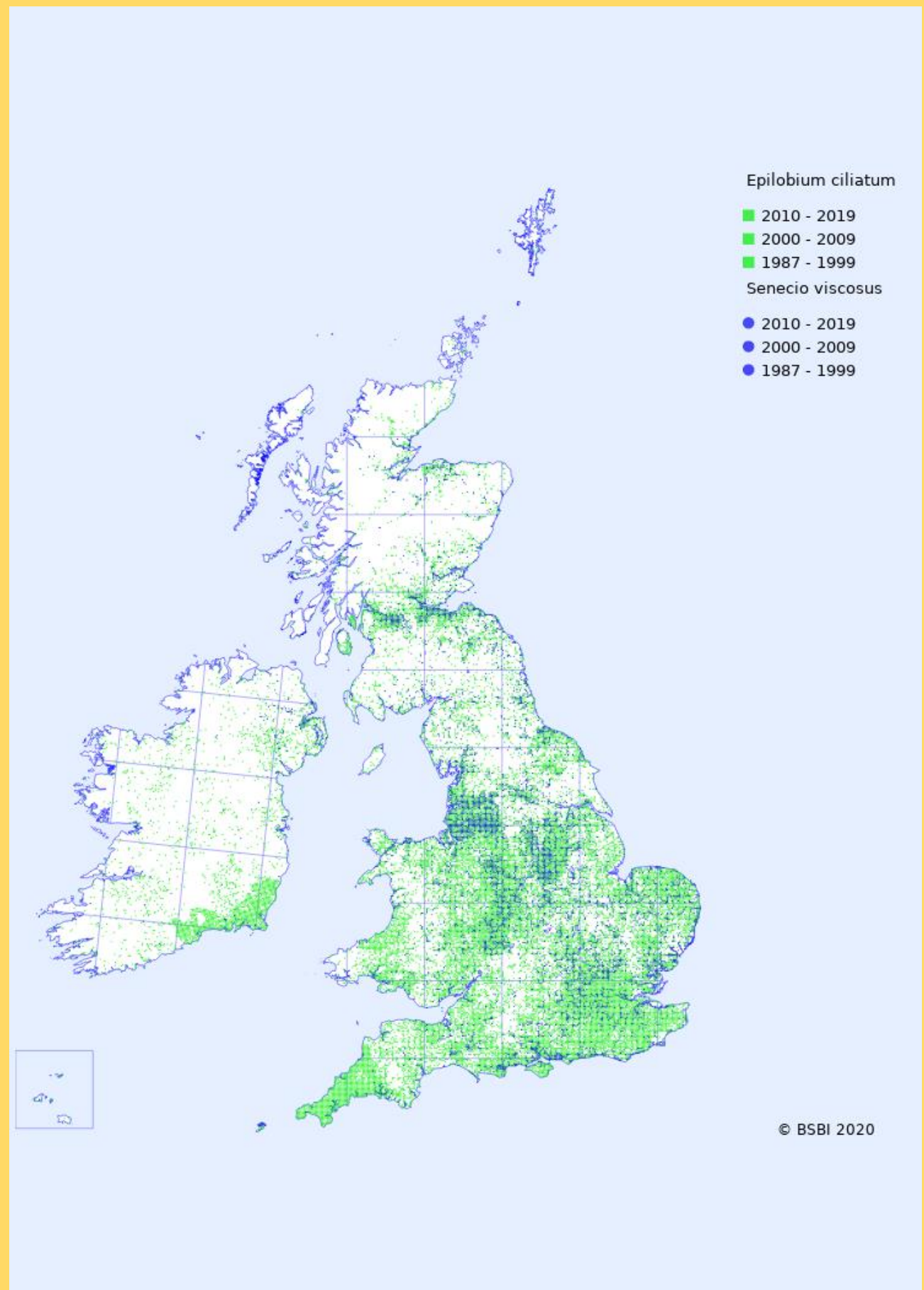
Saxifraga granulata is a speciality of the Scottish Borders, the Peak District and Breckland but very sparsely distributed elsewhere. In the Scottish Borders it is often, but not exclusively, found on rocky knowes. In the Breckland it is associated with thin soils.

Trifolium medium is a fairly widespread species of neutral and basic grassland. There is some correlation with the distribution of *Saxifraga granulata* but it throws little light on the reasons for the restricted distribution of that species.



Senecio viscosus over *Epilobium* *ciliatum*

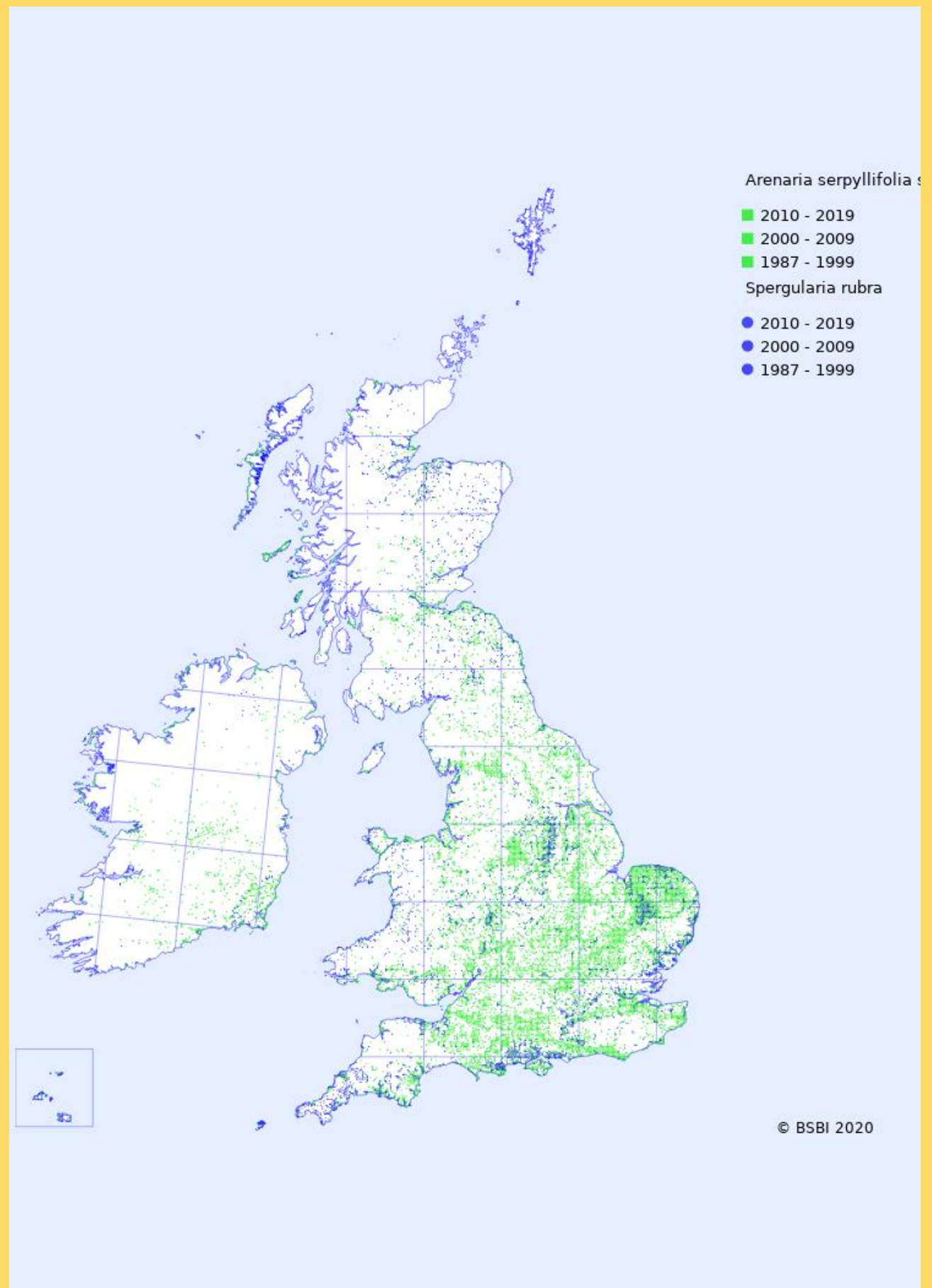
These are two introductions of ruderal habitats. Comparison between the two gives some insight into dispersal patterns. *Senecio viscosus* has been present in Britain long enough to have developed a mature distribution centred in urban areas while *Epilobium ciliatum* is still spreading. *Epilobium ciliatum* is found as a garden and field weed well away from urban areas and, given its wind-dispersal, it is rather surprising that it is still relatively scarce in some lowland areas, but may be under-recorded.



Spergularia rubra over *Arenaria* *serpyllifolia*

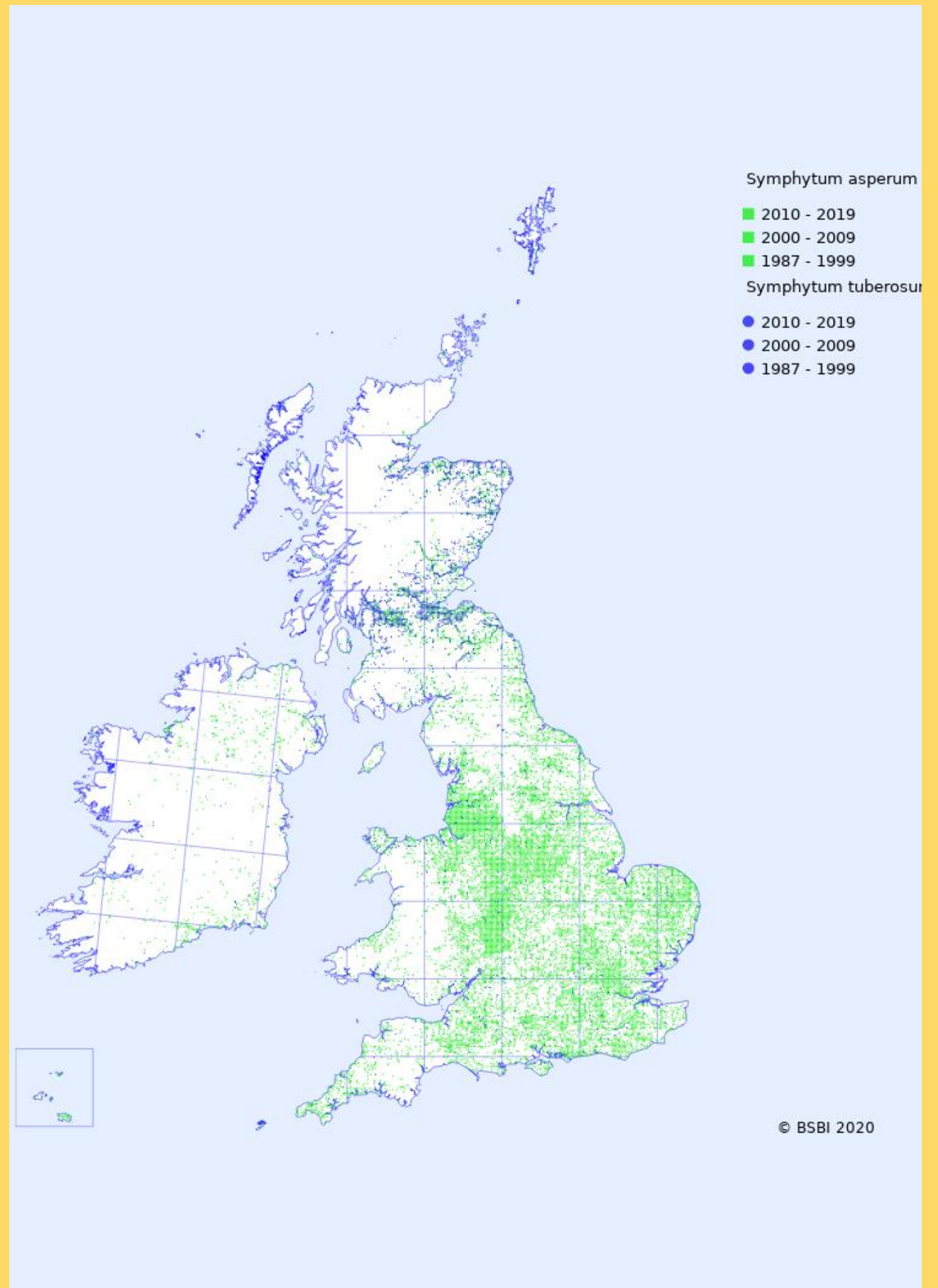
Spergularia rubra is a sand specialist that seems to be unable to coexist with grassland species of thin soils such as *Geranium pusillum* and *Sherardia arvensis*. *Spergularia rubra* is seemingly native in a few areas in the south, mainly near the coast, but elsewhere it is a colonist. It may multiply in sand and gravel pits and then be spread to brownfield sites, forestry tracks and suchlike.

As a native, *Arenaria serpyllifolia* is a specialist of scree and grit on rocky slopes, but it colonises road-stone quarries and railway ballast and is then dispersed widely.



Symphytum tuberosum over Symphytum x uplandicum

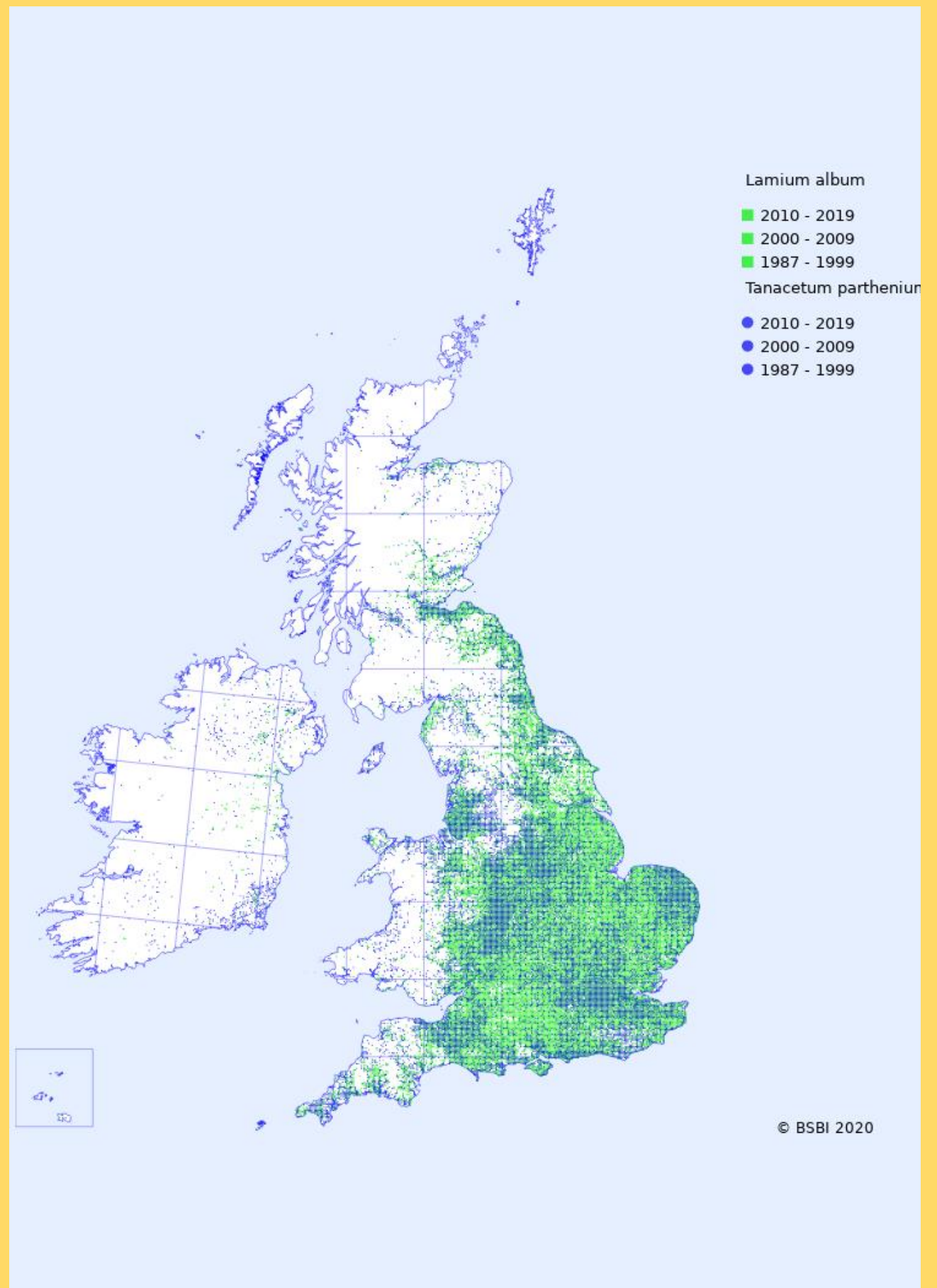
In Scotland these two taxa have almost identical distributions. Both are most prominent along river banks, where *S. tuberosum* occupies a slightly moister micro-habitat than *S. x uplandicum*. In England *S. tuberosum* is very local, while *S. x uplandicum* has a slightly clustered distribution. The history of *S. x uplandicum* makes it clear that it is an introduction whereas the history of *S. tuberosum* is not well documented. Its expanding distribution is a strong indication that it, too, is an introduction, probably cultivated in gardens as a herbal substitute for *S. officinale* from C18.



Tanacetum parthenium over *Lamium album*

Tanacetum parthenium has a clustered distribution around the main conurbations where it is a colonist very frequent in ruderal habitats.

Lamium album is now usually considered an archaeophyte, and a 'follower of man'. I believe it to be an early introduction, naturalised from cottage gardens where it had a variety of uses including the use of the fragrant flowers to make a cosmetic, similar to rose water, applied 'to improve the complexion'. In the north of Britain it only spreads vegetatively and is almost always found near habitation or along river banks. The tetrad distribution further south, where it may spread by seed, lacks any texture which might indicate its history.



Viola lutea over *Briza media*

Viola lutea is locally frequent in the north of Britain on rocky slopes with neutral or slightly basic soils. *Briza media* is found much more widely in similar grassland and also, confusingly, in soligenous flushes. Although the two species seldom grow together, the two distributions are interestingly similar.

