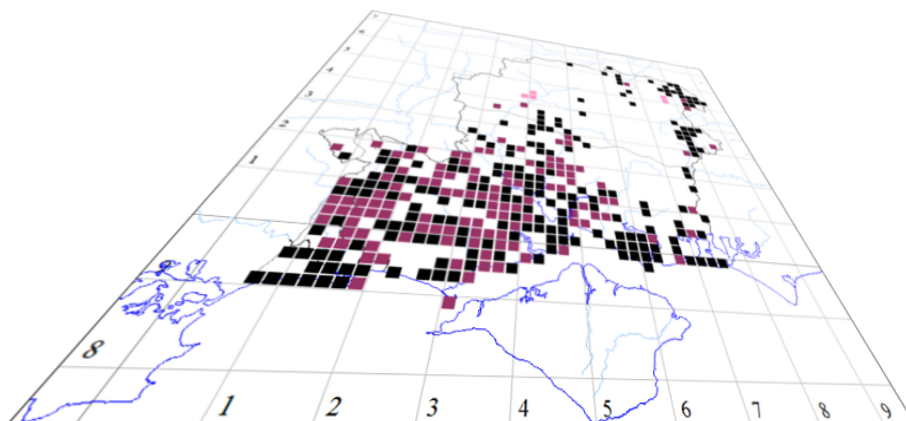


# *Chapter 7*

## *Maps and Atlases*



*The author of this handbook is pleased to have errors pointed out and to receive suggestions for improvement and other comments.*

*Please send all communications to:*

*[vc11recorder@hantsplants.net](mailto:vc11recorder@hantsplants.net)*

### Introduction

If your aim is to make a comprehensive collection of records for your area - whether that is a country, a county, a parish or a copse – you are likely to benefit from being able to visualise your data on a map. This is one of the key features of MapMate, and it provides wide-ranging facilities for plotting records and information derived from them. Maps can be used interactively within MapMate to search for record details by pointing; they can also be exported en masse or as individual images for inclusion in documents or Web sites.

Basic distribution maps at a national, county or vice-county level are quite simple to set up, and of course we shall tackle these first. Some of the other options available are not immediately obvious (and not well documented in the MapMate help files) and take a bit more work, but we shall explore these thoroughly in later parts of the chapter, so that you can appreciate just how much can be achieved in the MapMate package.

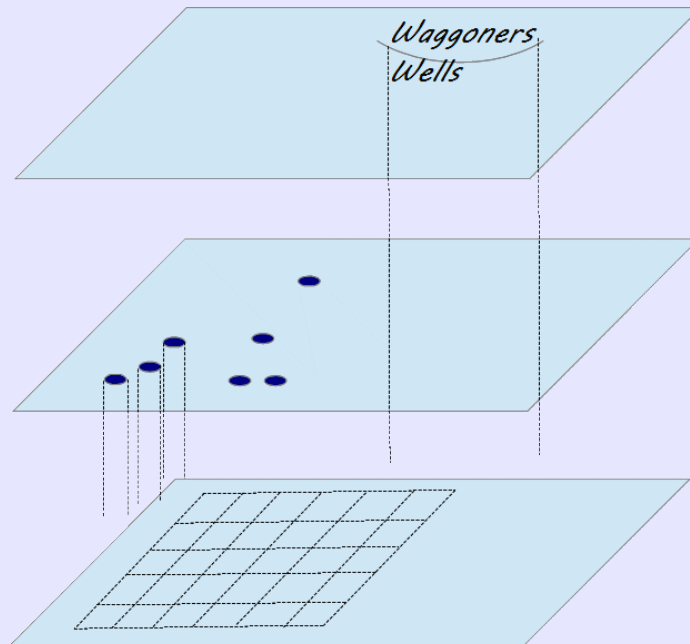
Versatile as MapMate's mapping is, there are some things you might want to do which it simply can't achieve, or which require an unreasonable amount of effort. In Chapter 9 we shall look at ways of transferring data to other software packages to cover these situations.

## CHAPTER 7 MAPS AND ATLASES

### How maps are organised

To make use of MapMate maps, it's important to understand how they are put together. You will also need to know the three basic categories of map in MapMate and how they are used.

A fundamental way of organising data in computerised mapping is through the **layer**. Every plotted component belongs to a layer, and the name suggests how it works. Imagine that each layer is a transparent sheet.



These transparent sheets are overlain on each other, and any of the detail that appears on a higher layer will overlay detail in the same position on a lower, possibly obscuring some of it. Although it doesn't refer to them as "layers", this is the way MapMate works, in common with most other mapping software.

### Types of MapMate map

There are three types of map that MapMate supports.

**Base Maps** represent the background information for a map, such as grid lines, area boundaries, coastlines and watercourses. These are the things that are by and large static. If they need to be changed, it is done as an occasional 'one off' operation.

Base Maps are multi-layered, but typically all the layers in a base map form a foundation set for the other types of mapping, sitting at the bottom of the stack of layers. They don't have to sit there, but in most circumstances it makes sense.

The other two types of map present dynamic data; in other words, what they show at a given time depends on the records and supporting information you've put into your database. Both these other types make use of a Base Map to give them their context. It is possible to put things you would normally put into a Base Map as layers into one of the other map types; but that would be making a rod for your own back. Lots of different map formats can all use the same Base Map, allowing a change to the static information to be made in just one place. Having the static information repeated in all your maps means you will have to maintain it in every one of them.

**Atlases** portray information about the Records: essentially, about the **geographical location** of Records in your database. They give you a lot of flexibility in what is shown, and how it's depicted.

**Special Maps** are a set of predefined maps intended chiefly to show **statistics** about the data in your database, using a geographical breakdown. They come predefined, and what you can do to reconfigure them is much more limited.

From the above, you will see that defining a useful map from scratch is a two-stage process:

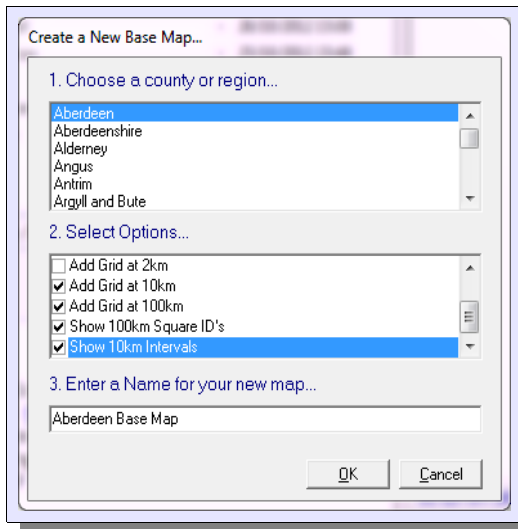
- defining the Base Map;
- defining the Atlas or selecting the Special Map, specifying which Base Map it should use.

## CHAPTER 7 MAPS AND ATLASES

### Defining a Base Map

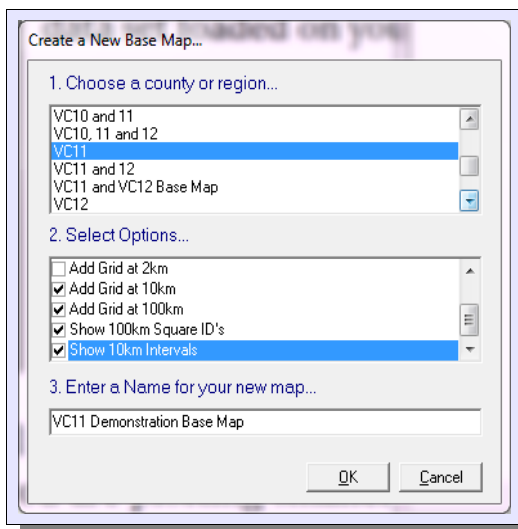
We'll start with the simple case, which is to choose a Base Map area that MapMate has already predefined. Other options are possible (both larger scale and smaller scale), but they use a different method which we shall cover later.

Select **File / New Map / Base Map Wizard...** from the MapMate menu bar.



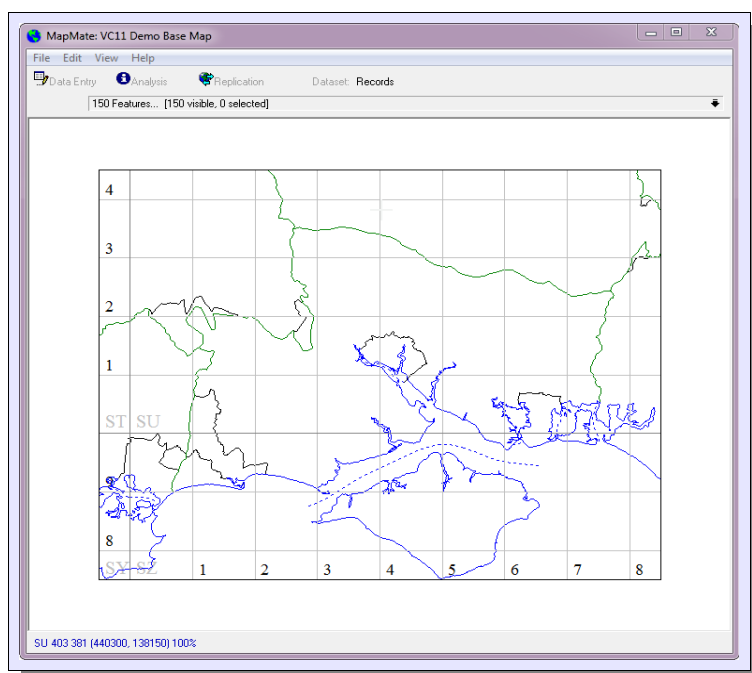
The first window lists all the Watsonian vice-counties, administrative counties and unitary authorities for the British Isles. Choose the area that is appropriate for you: for illustrative purposes, I am going to use vice-county 11 (South Hampshire), and if you have the Training data set loaded on your computer, so can you. Your actual data on Atlases may differ a bit from mine.

The second window lists the standard range of detail that you can include in your Base Map. As we shall see later, that isn't everything you can have, but it will get us going for now. If you scroll the box up, you'll see that not only are grid lines included, but also vice-county boundaries, administrative boundaries, and (if you have any) coastline; and these are all ticked. I suggest you go with the default settings for now. 2km grid lines can be useful if you are plotting smaller territories, but for a whole vice-county or smaller scales, they will clutter your map.



Finally, you can edit the name for your map. This is a useful feature if you want several Base Maps for the same territory, including different features. However, you should keep the phrase 'Base Map' as part of the name. This ensures that when you want to use it in other mapping, the name will appear in pick lists for Base Maps. Here are my options. Click on **OK**, and MapMate will create your new map.

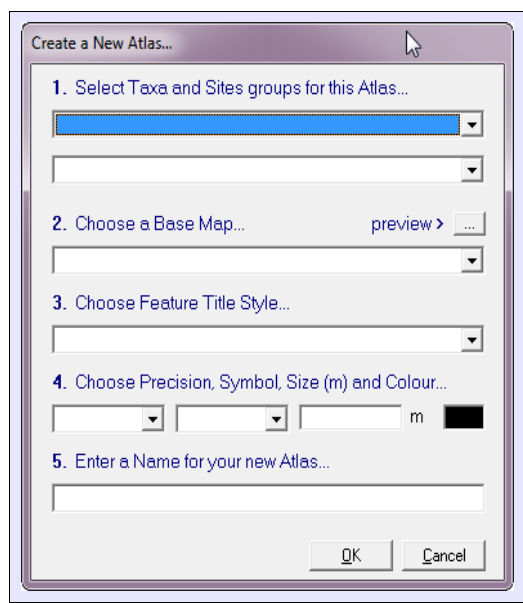
## CHAPTER 7 MAPS AND ATLASES



Your previously blank window on MapMate should now be showing something like this. You will see that it provides labelling for each hectad (10km x 10km square), and for changes in the 100km x 100km squares, according to the Ordnance Survey National Grid conventions. By default, vice-county boundaries are shown in green and administrative county and unitary authority boundaries in black. Also, where they follow the same line, vice-county boundaries take precedence (in other words, they are in a higher “layer”). All these things are changeable; we shall see how later.

## CHAPTER 7 MAPS AND ATLASES

### Setting up an Atlas



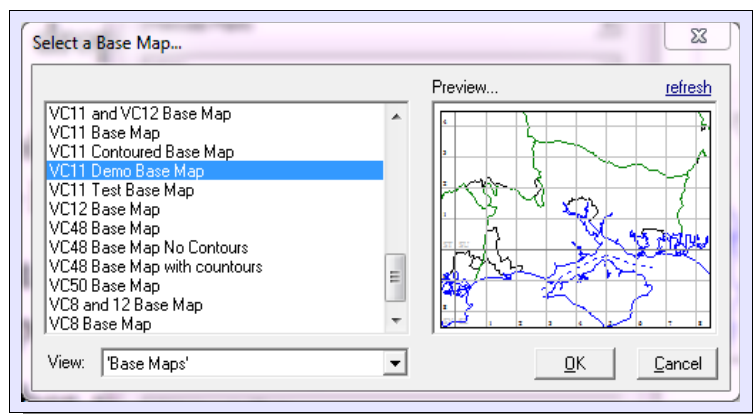
Now we have a map to put distribution data onto, it's time to define our first Atlas. Select **File / New Map / Atlas Wizard...** from the MapMate menu bar. As it comes “out of the box”, an Atlas is designed to show distribution data for a species group on a series of maps, one for each taxon in the group.

The first box gives us the chance to select our species group. What appears in the drop-down list will depend on the species groups you selected when setting up MapMate in **My Configuration**. Choose **Vascular Plants**, or **Vascular Plants (plus microspecies)**.

The second box sets the geographical extent over which we will display data. Again, what appears in the drop-down list depends on the territories you included in **My Configuration**. You can create additional

ones, and we shall see some ways of doing this later. For most purposes, however, you'll want to use the same territory as the Base Map.

Choosing the Base Map is a separate operation, however. Here you get a drop-down list which offers you those maps you've previously defined.

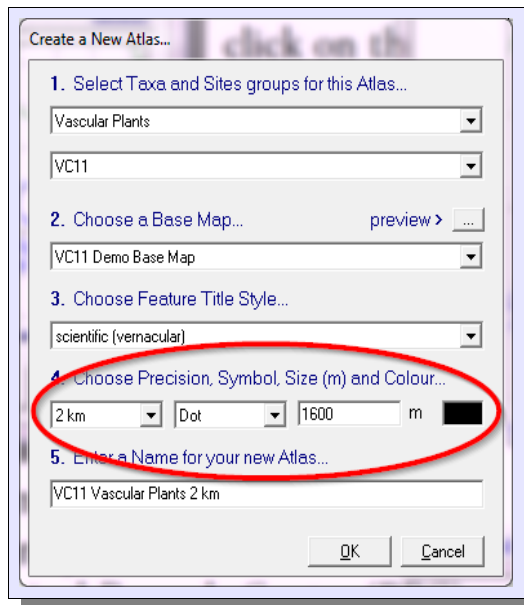


If you have a lot, and can't remember which one you want to use, you can click on the **preview >** button to get a thumbnail display of available maps. Note that if you have maps that don't have a '...Base Map...' title, you can find them through this preview option by changing the map **View** selection option at the bottom.

Back on the main Atlas form, you now need to choose a title which will be displayed on each map, documenting the taxon currently on view. These title elements are mostly self-explanatory, but 'Code' means the Biological Records Centre (BRC) code attributed to the taxon, if it has one. If you don't want MapMate to present a title (as may well be the case if you're exporting your maps to another document), you may be surprised to find that there isn't an option for 'none'. Don't worry about this; just choose any format, and we shall see how to suppress it later.



## CHAPTER 7 MAPS AND ATLASES



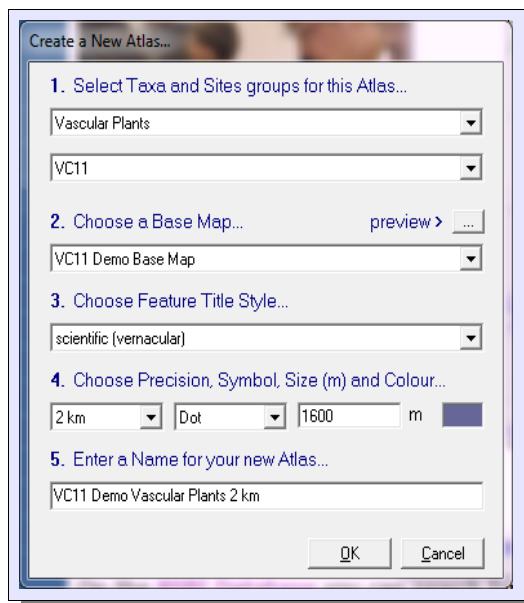
The next line determines the appearance of symbols on the map that plot the distribution. You will need to choose **Precision** to match what you want to achieve with the map; what can be legibly represented on the map in its final form; and most importantly, what the precision of location in your data can meaningfully sustain.

For a vice-county or county, a 2km precision is probably the commonest used, and 1km is about the limit for readable presentation, unless you are recording a very sparse distribution. But there is a range of precisions to suit everything from the British Isles to a small conservation site. You can also map an **Absolute** precision to show a centre point for any record at any resolution, but be warned; if your data is recorded at different resolutions, this could be

somewhat misleading, since MapMate will not automatically scale the symbol size to fit the precision.

If you choose (say) a 1km precision, you may be wondering what happens to any records you have that were **not** recorded at that resolution. In fact, any record with a **more** precise location will be included in registering presence in the square; any with a **less** precise location will be ignored. So, for instance, a record with a 100-metre reference such as SU403177 will contribute to making a dot for SU4017.

The **Symbol** option provides a small, simple range of marker symbols for plotting distribution. Apart from the two 'Cross' options, these are all solid filled symbols by default, but that's something you can change later.



You'll see that **Symbol Size** defaults to something a little smaller than the total extent that the precision denotes, leaving a little white space around each dot (assuming you're not plotting vice-counties or absolute positions). This is usually a visually pleasing option, although you may at times want to extend this out to make a solid fill wherever adjacent dots are plotted. There's no point in making the size larger than the precision of the plot, except in some cases when you're using absolute precision and want to emphasize each dot.

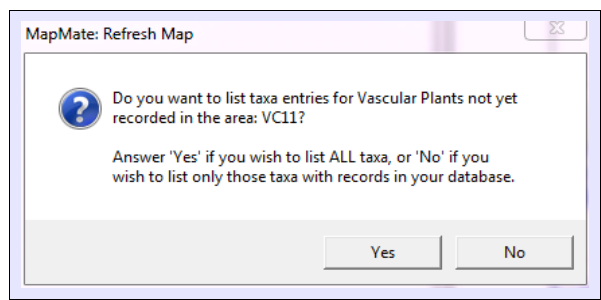
Click on the colour block for a palette of colours. Unless you're plotting over a base map to which you've added a dark background layer, you should choose a mid to dark tone.

The final step is the naming of your Atlas. MapMate will manufacture a default name based on your choices so far. You can change this to something you find more acceptable,

## CHAPTER 7 MAPS AND ATLASES

or to avoid a clash with a previously created name. Be aware of a couple of quirks.

- MapMate will occasionally come up with a default name that is unacceptable by its own naming rules (usually by being too long). Then you will have to rename it.
- If you change any of the preceding options, MapMate overwrites your changed name with its default.

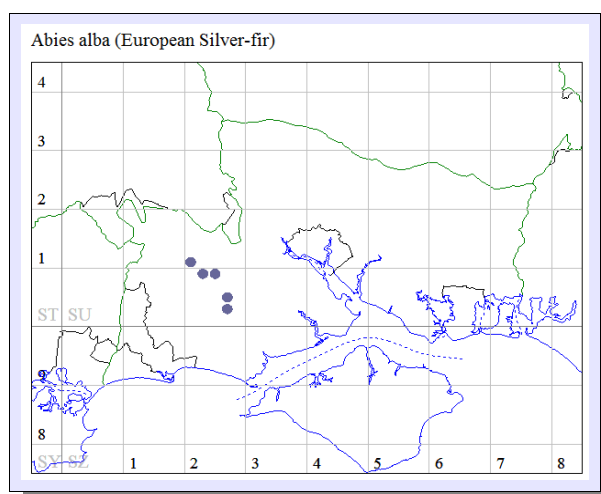


When you've completed the form and clicked on **OK**, you will be presented with a choice.

If you are dealing with a relatively small species group such as **Dragonflies**, you will probably want to answer **Yes**, as the overhead of carrying maps for species for which you have no records is relatively small. With a large species group such as **Vascular Plants**, or (worse) **Vascular Plants (plus**

**microspecies)**, unless you are mapping national distribution then answering **Yes** will result in large numbers of blank maps in your atlas.

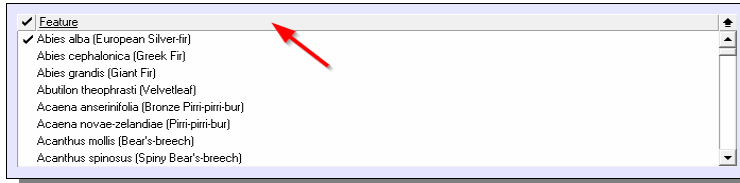
The downside to answering **No** is that when you add a record for a new taxon to your territory, it won't automatically appear in the atlas. You will need to go through this atlas building process again to include it. This is a simple enough process (described later), but you have to remember to do it.



Once the atlas building process has completed, you should see a screen with the first taxon in your recorded territory mapped. With the options shown above and my full vice-county data set, this is what I see.

## Exploring the Atlas

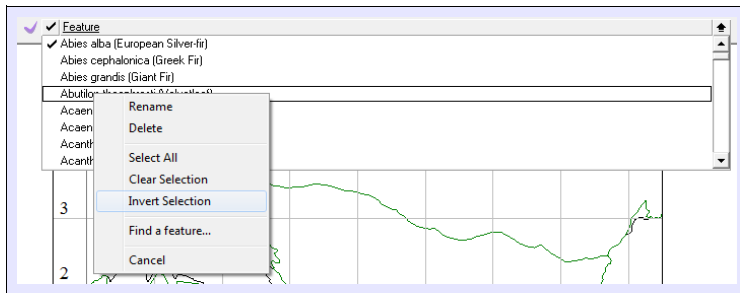
### Navigating the Taxon List



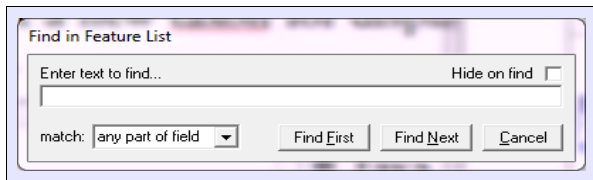
To navigate to another species, click on the bar with the feature tally and the drop-down arrow, just above the map. This will display taxa in the order of the first element that

appears in the title – in this case, alphabetically by scientific name.

You can now use the up and down arrows, the **Page Up** and **Page Down** keys or the scroll bar to move through the list. To select a new taxon for display, click on its name. The list is then automatically rolled up again. If you want to hide the feature list without making a new selection, use the upward-pointing black arrow at its top right corner.



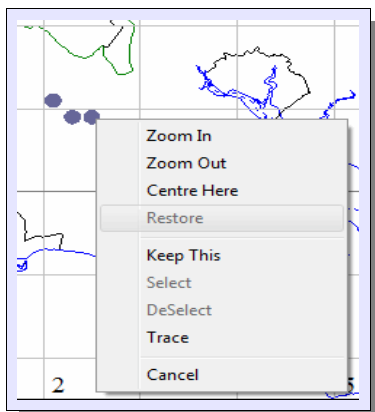
This is all very well for a short list of taxa, but it can become tedious if moving to the far end of a long list. An alternative is to drop down the list, and then right-click somewhere in the list area. Choose the option **Find a feature...**, which will allow you to enter all or part of a taxon name.



You will see that there are various options for matching to part of a name. Unfortunately, they don't include use of the short '2+3' notation available in the Data Entry form. When using scientific names, if you type a part-name and it

cropps up in both generic and specific names, it will successively find matches in both name parts.

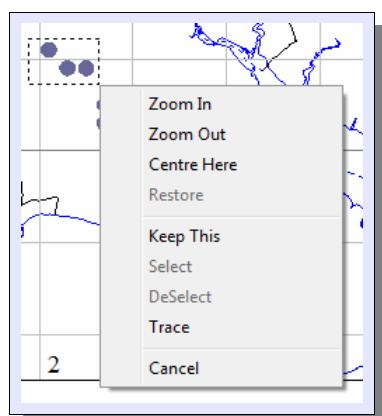
### Navigating the Map Surface



With your cursor somewhere over one of the dots showing distribution on your map, make a normal mouse click. You should see this pop-up menu. (If you see a different menu, you used the other mouse button. We'll come on to that one later.)

Initially, the map centre is located in the middle of the full displayed area for your territory. If you select a single point on the map, then wherever the centre is at the time, **Zoom In** and **Zoom Out** will zoom from this centre point. You can move the centre point with **Centre Here**, which uses the place where you made your mouse click. And once you have zoomed and / or panned around your map in this way, the **Restore** option becomes available to go back to displaying the full map territory.

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You can zoom in by a chosen amount, and re-centre your map at the same time, by zooming in to a selected rectangular area. Hold the mouse button down at one corner of your desired rectangle, drag the mouse to the opposite corner, and let go. The same menu will pop up, but **Zoom In** will now directly zoom and centre onto the rectangle you selected (with a little bit of extra detail round the edges). **Zoom Out** also works with a rectangle selection (you may sometimes see this referred to as a “marquee”), but zooms out by a fixed amount centred on your rectangle.

### Drilling Down to Detail

There is one more option that we need to look at on this menu now, the **Trace** facility. This lets you retrieve the details for any records at a selected region of the atlas. Assuming that you clicked on one of the distribution dots, click on **Trace**. You will see a grid display of any records at, or close to, that point, just like those you get using the standard reporting facilities.

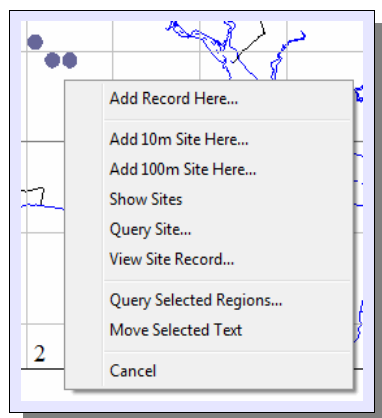
Taxon	Vernacular	Site	Gridref	VC	Quant	Date	Recorder	Method	Comment
Abies alba	European Silverfir	Bolderwood Grounds	SU2239082	11	1	10 Jul 2004	Voddi, Dr R.M.	Field record / observation	One small tree
Abies alba	European Silverfir	Clumber Inclusive	SU2650333	11	1	26 Jul 2005	Budd, P.	Voucher Specimen Hb EJC	Small (18m) self-sown plant, southern edge of Clumber Inclusive
Abies alba	European Silverfir	Puckpits Inclusive	SU2550396	11	3	25 Feb 2006	Rand, M.W.	Field record / observation	
Abies alba	European Silverfir	Ober Water, Rhinefield	SU2640331	11	1	26 Jul 2005	Philip Budd	Daytime observation	Actual grid ref is SU2650333 Self sown
Abies alba	European Silverfir	Vinney Ridge Inclusive, New Forest	SU265047	11	1	27 Apr 2012	Philip Budd	Daytime observation	Self sown

Record 1 of 5 Records

You can also select a rectangular area rather than a single point. Hold the mouse button down at one corner of your desired rectangle, drag the mouse to the opposite corner, and let go. The same menu will pop up, but **Trace** now finds Records at Sites anywhere within the rectangle.

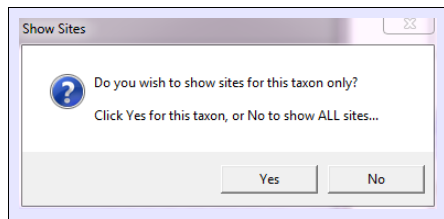
Other options on this menu relate to editing the map, and we shall return to them later. It's now time to explore the other menu, available by right-clicking on the map surface.

### Examining Record Sites on the Map

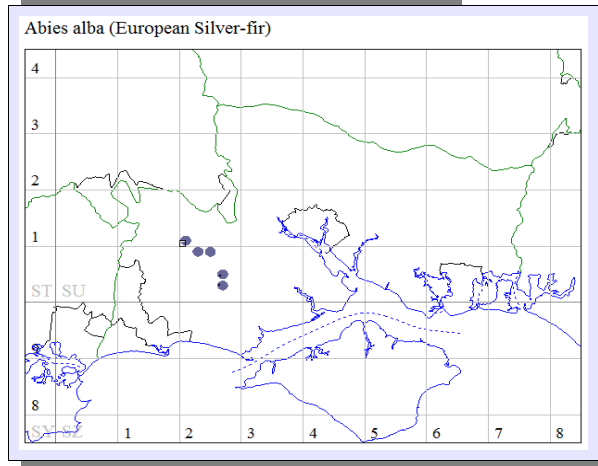


To see this option, right-click on the map to bring up this menu, and select **Show Sites**.

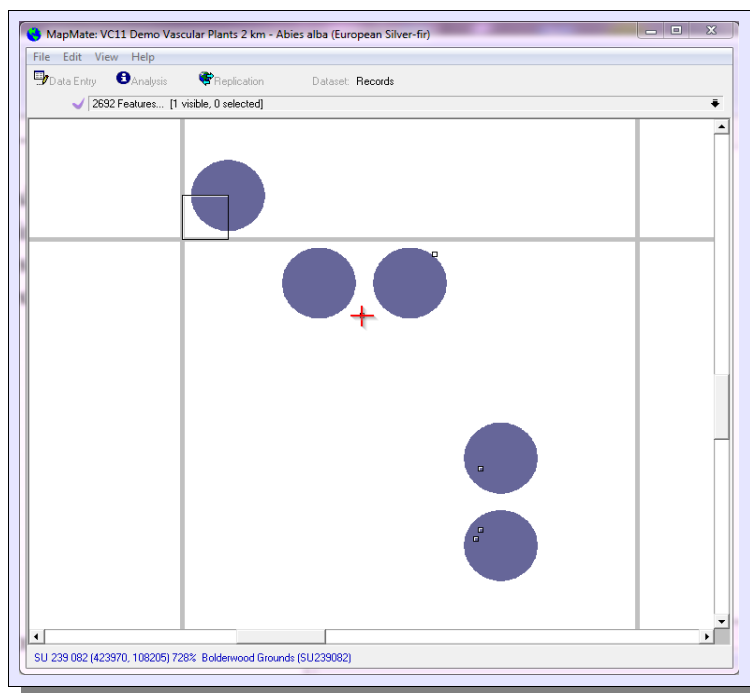
## CHAPTER 7 MAPS AND ATLASES



If you are mapping a large territory, and have many Records in your data set, choosing **No** to show Sites for all taxa will probably result in a dense and confusing overlay of dots and boxes.

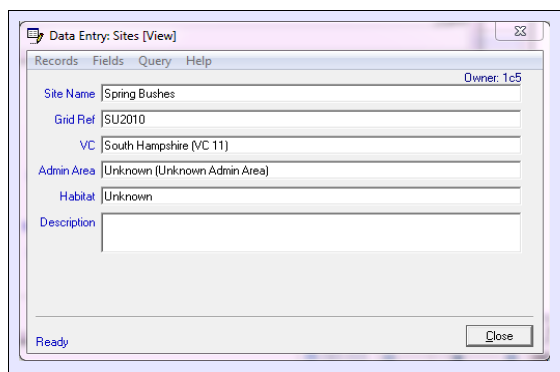


In the example shown here, I've chosen to show Sites for just a single (rare) taxon in my area. At first glance, this looks as if a number of Sites have been missed.



However, if you zoom in to an area where records are concentrated, you can see better what's going on. Each Site is outlined with a hollow square, the extent of which reflects the precision with which the Site's location has been recorded. The top left site has a 1km precision; other Sites (with very small boxes) are all to 100m precision.

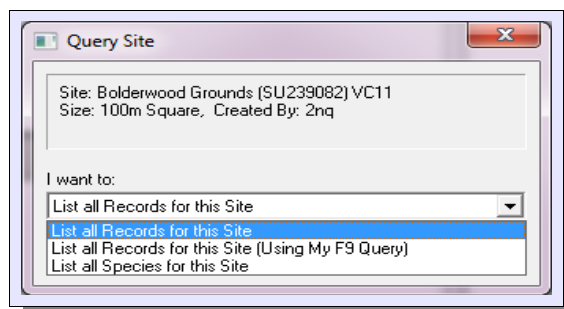
What's more, if you hover the cursor over one of these sites, the status line at the bottom of the MapMate window shows you the defined coordinates and name for the Site.



If you want to see more details for the Site, you can put the cursor over the box, right-click and choose **View Site Record...** If you have only one Site defined at that location, this will work fine. But be warned: if there's more than one Site defined there, the one that's displayed in the Data Entry form is not necessarily the one associated with your mapped

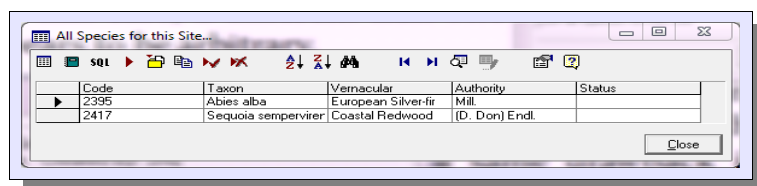
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Record. In this case, a different 1km Site from the one for *Abies alba* has come up. The choice appears to be arbitrary.



The menu option **Query Site...** allows you to get to data linked to that Site; but it suffers from the same drawback if you have more than one Site defined at a location.

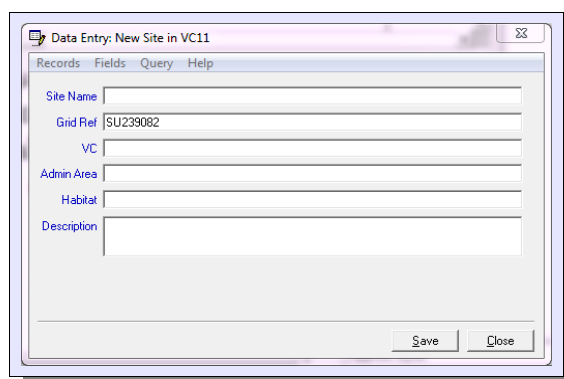
The options for querying data are all fairly self-explanatory; you may remember from Chapter 4 that **My F9 Query** lets you specify which columns you would like to see in the returned data.



Here is an example of running **List all Species for this Site** on one of the 100m Site references on my map.

### Editing Sites and Records from the Map

If you want to edit an existing Site from the map, use the **View Site Record...** facility described above, then select **Records / Edit Record** from the Data Entry form's menu. Of course this will only work if you are the owner of the Site record, as with any other means of editing Site or other data.



To add a new Site at the point where your cursor is, bring up the menu by right-clicking and then choose either **Add 10m Site Here...** or **Add 100m Site Here...** This brings up the normal Data Entry window for a new Site.

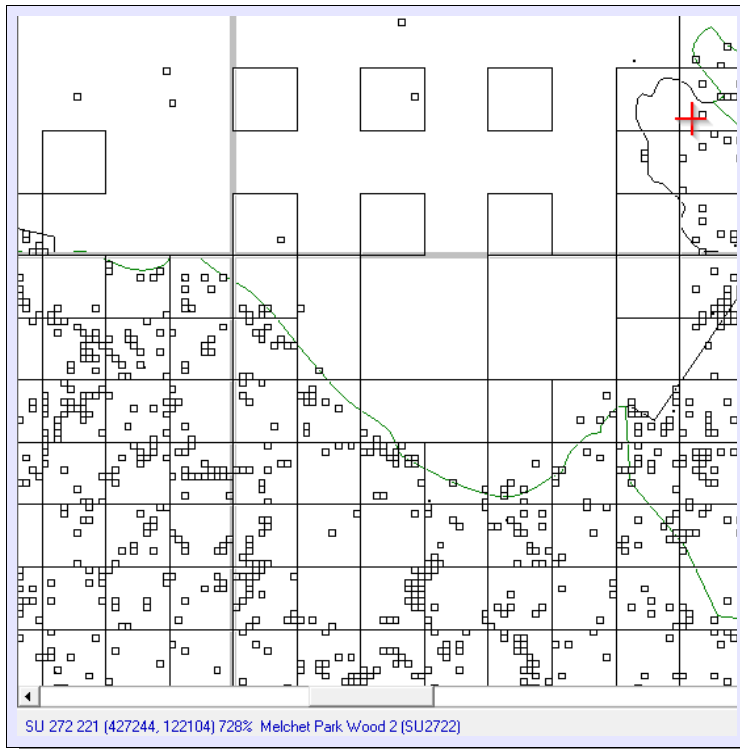
You may question how useful this is: if you are working from an Atlas of a large territory, especially if you have no topographic background detail to help you locate the Site accurately, it's a bit of a shot in the dark unless you are already sure

of the OS grid reference, and therefore can check it against the status display of cursor map coordinates below the Atlas. Even then, the effort saved by not entering the grid reference manually may be offset by not having an automatic way of generating the vice-county or administrative area for the Site, as one can do from within the normal Data Entry screen for Records.

It's also possible to add Records directly from the map. Select the option **Add Record Here...** from the menu. This works best if you already have the Site defined; you can then use the resolution for the Site location that you find most appropriate. If you want to re-use Site definitions wherever possible, it's best at this point to zoom in to a reasonably large scale on the map, and use **Show Sites** to show **all** sites.



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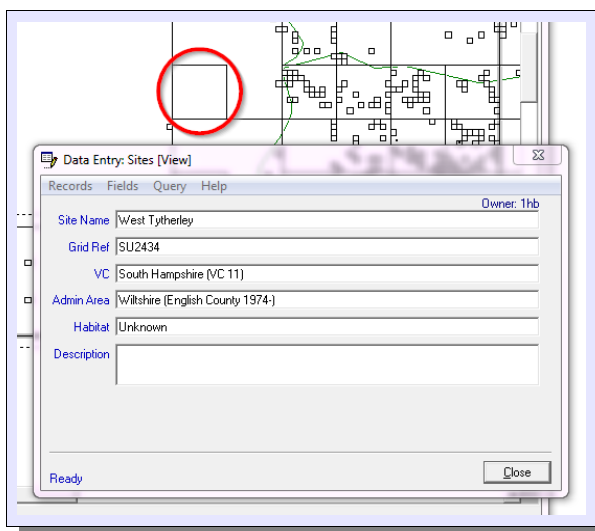


As you can see from this map, you can now easily determine which locations have Sites defined for them, and at what resolution. By moving the cursor to the right point, the presence or absence of a Site name and its associated grid reference will show you whether a Site is defined there.

If you choose to add a Record at a location that has no defined Site, then MapMate will offer you the chance to create a new Site with a 10-figure (1m) grid reference. Of course it's unlikely that you will achieve that level of accuracy by pointing on a medium- to small-scale map, and certainly for collecting a county archive of records I discourage

people from making Sites at that resolution; it just leads to a “Site explosion” of unmanageable proportions. But once the Data Entry form for the Record is opened, you can change the grid reference to something more appropriate. Also, you can now use the standard data entry convention **Site Name@GR123456** to get you an “instant Site” with defaults for other Site attributes.

Is this method of entering Sites and Records very useful? If you are bulk entering records, especially for large territories, I would say no. If you are entering one or a few records for a limited area like a small to medium nature reserve, it could be good – especially if your base mapping includes topographic maps, aerial or satellite images that give you good points of reference on the ground. We haven't seen how to do this yet; it will come later in this chapter.



There's one activity, however, for which the ability to display and link to Sites from a map is very useful. That is visually checking for misplaced Sites. If you do record only for a territory like a vice-county, you can see which Sites lie outside the boundaries of that territory (as long as your Base Map shows the boundaries). You can then display the Site record, display any Records associated with that Site, and get the necessary corrective action under way. If it's a Site you own, you can do it directly; otherwise you will probably need to get the collaboration of a sync partner.

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Of course it's important to check which element of the Site record is wrong; it could be the grid reference, the county or the vice-county. If it's the grid reference, make sure that changing it will not falsify the Records of any other recorder who used it in good faith.

Unfortunately, if you do choose to display all available Sites on a map, MapMate doesn't filter them by the declared area of interest for your map, or any other area of interest you try to impose. It displays everything it finds within the map's bounding rectangle. That means that if you collect data from more than one territory, this technique for finding misplaced Sites doesn't work well across the internal boundaries of a group of territories. For instance, the illustration above shows part of an Atlas for vc11, with the green boundary line marking the western boundary of the vice-county. The highlighted Site should be vc8, not vc11. But other Sites shown west of the boundary are correctly attributed to vc8 already; the only way to discover that is to select them one at a time.

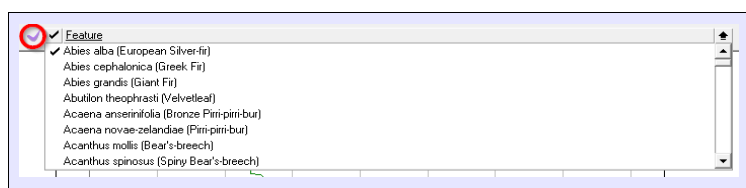
Finally, be careful with Sites whose extent runs across territorial boundaries. If you use the quick and dirty way to declare a new Site from the MapMate Record Data Entry form, the default action by MapMate is to assign the vice-county and administrative county that match to the south-west corner of the Site extent. Obviously it's legitimate also to have another Site at the same precision which covers the other vice-county or admin county. This is probably best handled by having the relevant territory identified in the Site name; but if you act as a hub, you may not always have control of this. First be sure that changes really are needed to the Site you are considering; then consider whether other recorders are likely to have used the Site not realising that it referred to a different territory.



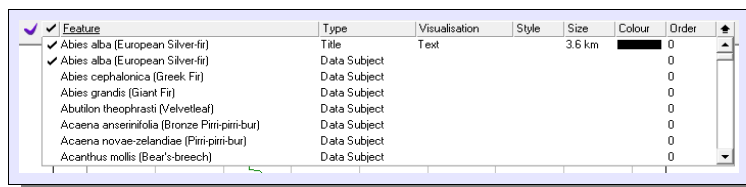
## Modifying an Atlas

The Atlas we've developed so far is good as far as it goes, but you are probably already thinking of refinements you would like to incorporate, and perhaps changes to the overall appearance. This section will take you through some simple changes to the appearance of objects on the map, before going on to look at the basic technique for age-banding Atlas data. We then consider adding extra adornments to the maps or their borders.

### Carrying Out Atlas Editing

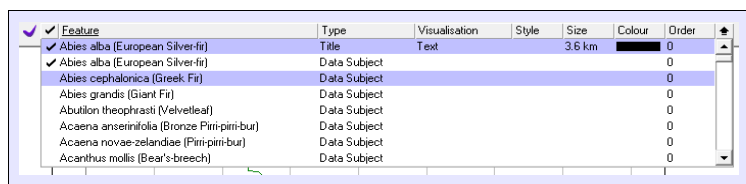


here, which is faded to a pastel lilac colour.



are now in **editing mode** for the Atlas. Clicking on the purple tick again will take you back to viewing mode.

You'll notice that there are two features with the same label, but one has a **Type** of **Data Subject**, and the other a **Type** of **Title**. In fact there are lots of Data Subjects, and everything which is a Data Subject is simply one instance of a taxon in the catalogue for the Atlas. Data Subjects are things that you need not, should not, and in most respects cannot, edit.



change colour as well. If you click a second time on one of the highlighted rows, the highlighting colour disappears. This is a process of **selecting** and **deselecting** one or more features. Some of the editing operations you can carry out work on a group of all the currently selected items. Be very careful, when making a radical change on a group of items, that you haven't got more selected than you intended.

### Making Basic Changes

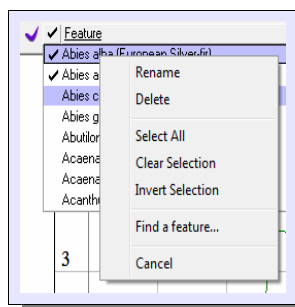
Let's look at the **Title** for a moment. It, at least, has lots of attributes. To review and change any of them, you must put your cursor in the row and column of the feature you want to change, and right-click. You might like to try this on the **Feature** column for the Title.

When you open an Atlas for normal use, you will see that the feature list is simply a catalogue of all the taxa you've included in your Atlas. Note also the purple tick mark highlighted

Click on this tick mark, which has the effect not only of turning it a richer purple colour, but also of displaying extra features and extra attributes in the drop-down list. You

If you make a normal mouse click on any row in the list, you will see its background colour change as it becomes **highlighted**. If you click on another row, you will see that row

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Several of these options relate to selecting or deselecting features, but unlike the single mouse click they operate on the whole feature set. **Clear Selection** gets rid of all the feature highlighting; while **Invert Selection** makes all currently selected features deselected, and vice versa. This can be handy if you want to select a large subset of features quickly; simply select the few you don't want, then **Invert Selection**.

By the way, you'll notice that if you do **Select All**, only one of the Data Subject features gets highlighted. This is the one that is currently displaying on the Atlas. I shall refer to this as being **attached** to the Atlas display.

For the Title, there's a limited amount we can do to change the Atlas appearance. We could try **Rename**, but in fact that would be pointless. The currently displayed name gets rewritten automatically to the name of the newly attached feature every time we select a different taxon to view in the Atlas. So we'll defer talking about renaming until we get into other types of feature.

That leaves us with **Delete**. You'll remember that when we first set up our Atlas, we didn't have a choice about whether we had a title or not. So, if you intend to export your Atlas maps into an environment such as a book or report, and want full independent control of the placement, content and appearance of individual titles, here's where you can suppress the title that MapMate provides.

But wait! Will you only ever use this Atlas in that way? If so, you can go ahead and use **Delete** without qualms. But suppose that at other times would like to have it present. Of course you could have two copies of the Atlas, one with the title removed and one with it left in. But that's extra work in setting up, and in maintenance if you want to make other changes later.

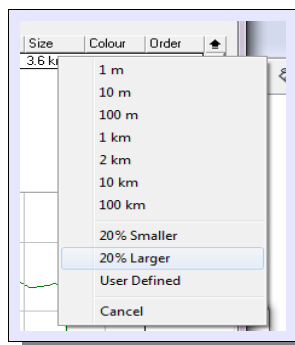
A screenshot of a table with columns: Feature, Type, Visualisation, Style, Size, Colour, and Order. The 'Feature' column has a red circle around the first row, 'Abies alba (European Silverfir)'. The 'Type' column has 'Title' for the first row and 'Data Subject' for the others. The 'Visualisation' column has 'Text' for the first row and is empty for the others. The 'Style' column is empty for all rows. The 'Size' column has '3.6 km' for the first row and is empty for the others. The 'Colour' column has a black tick for the first row and is empty for the others. The 'Order' column has '0' for all rows.

Feature	Type	Visualisation	Style	Size	Colour	Order
Abies alba (European Silverfir)	Title	Text		3.6 km	<input checked="" type="checkbox"/>	0
Abies alba (European Silverfir)	Data Subject				<input type="checkbox"/>	0
Abies cephalonica (Greek Fir)	Data Subject				<input type="checkbox"/>	0
Abies grandis (Giant Fir)	Data Subject				<input type="checkbox"/>	0
Abutilon theophrasti (Velvetleaf)	Data Subject				<input type="checkbox"/>	0
Acaena anserinifolia (Bronze Pitti-pitti-bur)	Data Subject				<input type="checkbox"/>	0
Acaena novae-zelandiae (Pitti-pitti-bur)	Data Subject				<input type="checkbox"/>	0
Acanthus mollis (Bear's-breech)	Data Subject				<input type="checkbox"/>	0

There's a simple way to suppress the title (and any other feature) for the time being, without removing it altogether. **Cancel** the current pop-up menu and instead, click over the

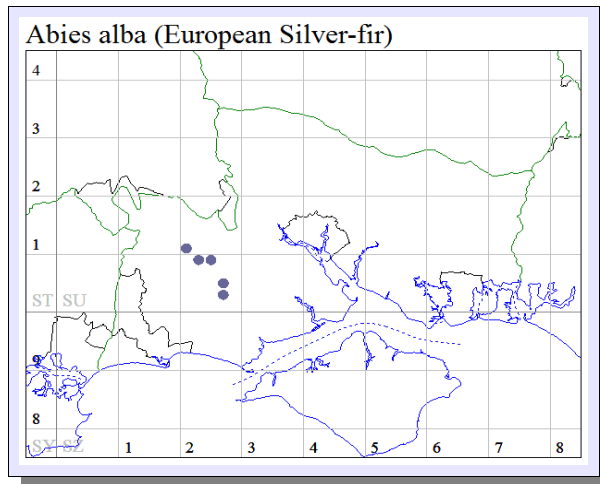
little black tick in the title row. The tick will disappear. Close up the drop-down list with the upward arrow at its top right corner, and you will see that the title has also gone from the map. By opening up the feature list again, and clicking again in the same column for the feature row, you can bring it back.

### Changing Size and Appearance

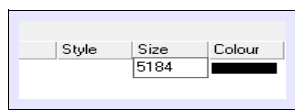


Now (having brought it back) move right to the **Size** column and right-click there. Sizes in MapMate maps are expressed in rather bizarre units – the extent (in this case, the text height) that they would occupy if they were at the ground scale of the map. There is a certain logic to this, because you can take that figure and compare it mentally with things (like the OS grid) that you have included on the map. Any other units would actually be more difficult to visualise, given that Mapmate provides no guides or rulers, as you might find in a drawing or desktop

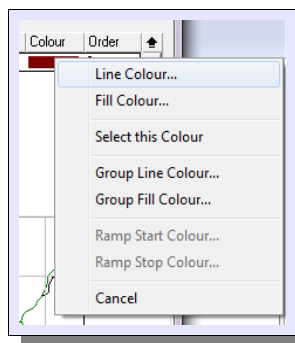
publishing package.



The list of fixed size options is really not much good to us here; it usually isn't. More useful are the two options to increase or decrease size by a fixed proportion. These are generally a quick way to a "good enough" desired size, even if they have to be repeated a couple of times. Here's the result of applying **20% Larger** twice.



If you want fine control, you can use the **User Defined** option. This opens up a small editing box at the top of the **Size** column. Into this you must type a nominal size (in metres).



Now let's try the **Colour** column. Right-click here for the title, and you should see this pop-up menu.

For a single item which has a **Visualisation** type of **Text**, there is only one relevant option here, and that is **Line Colour...**



Choose this, and you are presented with a standard colour picker. For a wider palette of colours, click on **more colours...**

### Finding Other Feature Types

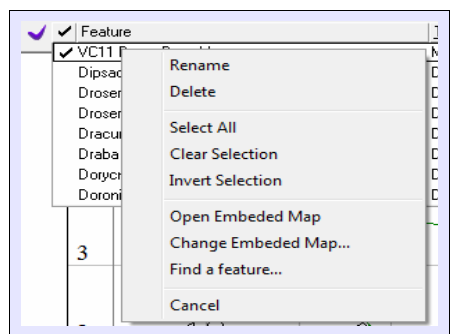
So far it appears as if there are only two types of feature on the Atlas, and one of those you can't modify. Is that it?

Feature	Type	Visualisation	Style	Size	Colour	Order
VC11 Demo Base Map	Map					0
Dipsacus piosus (Small Teasel)	Data Subject					0
Drosera intermedia (Oblong-leaved Sundew)	Data Subject					0
Drosera anglica (Great Sundew)	Data Subject					0
Dracunculus vulgaris (Dragon Aum)	Data Subject					0
Draba muralis (Wall Yellowgrass)	Data Subject					0
Doronicum hirsutum (Canary Clover)	Data Subject					0
Doronicum x wilidenovii (D. pardalianches x plantagi)	Data Subject					0

Fortunately, no. At the moment all the features are sorted by feature name order, so that other edit-worthy items are hidden deep in the list of

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Data Subjects. To retrieve them quickly, we can click on the **Type** caption at the head of that column, and get features sorted by category.



This only brings up one more type at this stage, but we may as well take a quick look at this. If you click in the **Feature** column for the Map row in the list, you will get a new pop-up menu.

Some of this is familiar from the title row, and you could get rid of the Base Map for the Atlas altogether with the **Delete** option, though this would usually be a mistake. More interestingly, if you decided that there were features in the Base Map that you wanted to change, you could **Open Embedded Map** to switch to that map for editing; we shall cover Base Map editing later.

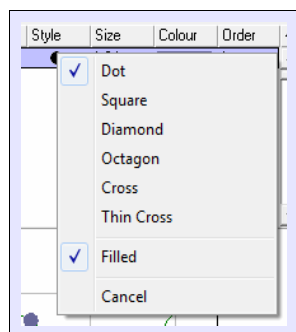
Alternatively, you could decide that a different Base map is more appropriate. In that case, **Change Embedded Map...** will allow you to select a different map. But before you do this, make sure that your substitute Base Map is defined for the same geographical extent as your original; otherwise you will get some very strange effects!

Feature	Type	Visualisation	Style	Size	Colour	Order
✓ All Records	Data Object	Polydot	●	1.6 km	1	0
✓ Abies alba (European Silver-fir)	Title	Text		5.2 km	0	0
Dipsacus pilosus (Small Teasel)	Data Subject				0	0
Drosera intermedia (Oblong-leaved Sundew)	Data Subject				0	0
Drosera anglica (Great Sundew)	Data Subject				0	0
Dracunculus vulgaris (Dragon Arum)	Data Subject				0	0
Draba muralis (Wall Whitlowgrass)	Data Subject				0	0
Dorycnium hirsutum (Canary Clover)	Data Subject				0	0

There are more editable features in this Atlas, and we can find them most quickly by clicking on the **Type** caption a second time. This will sort them in reverse order and bring the

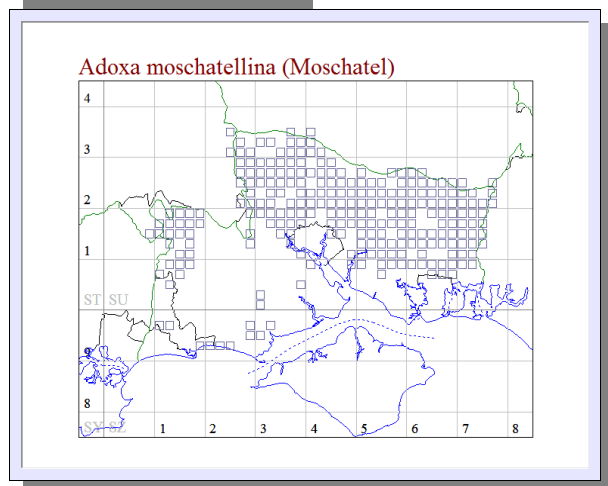
rest to the top.

### Changing Dot Appearance



We've already seen **Title**. **Data Object** is what is used to represent all the taxon (Data Subject) data on the map – the “dot”. To change the marker shape representing the dot, click on the marker symbol for the row in the **Style** column. This will bring up a menu of available shapes; the options are the same as when you created the Atlas, but you can also now choose to have a filled or hollow outline.

If you change the marker to **Square** and untick the **Filled** option, you maps should now look like this.

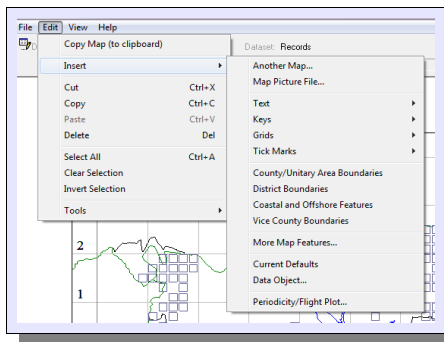


Of course, you can also change the **Colour** of the markers, as you did for the title feature. The colour category to select is still the **Line Colour**, even for a filled marker.

## Age-banding Data

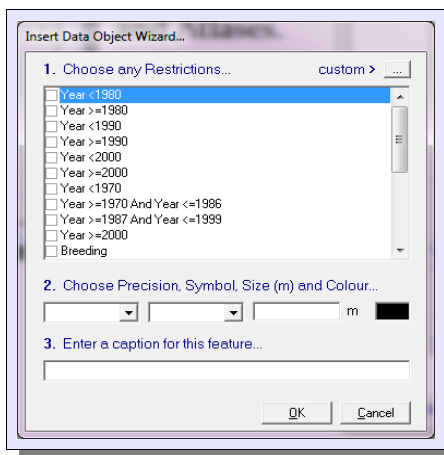
Showing change over time is an important element of wildlife recording, and a method used increasingly in recent decades, particularly at the national level or beyond, is mapping distributions by age bands. If you have a reasonably thorough set of records collected systematically over a long enough period, this can also be very revealing at the local level, too; and the finer granularity available can show patterns not easily seen at, say, a 10km resolution.

Choose a species to display that has a reasonably large set of records with a good spread in time. Make sure that you have the purple tick mark checked for your Atlas, so that you can edit your Atlas data.



Once you've done that, you'll find that the **Edit** menu in MapMate's main menu bar has more options. Choose **Insert** to give you a list of features you can add to Base Maps and Atlases.

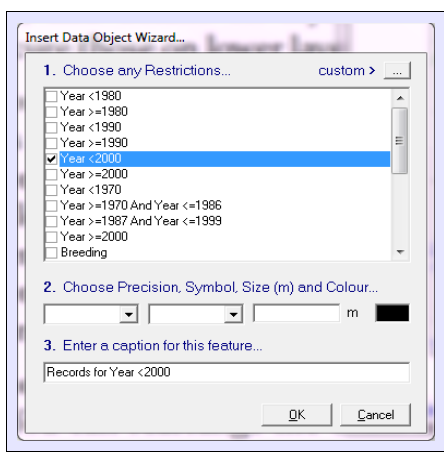
The one to go for is the **Data Object...** near the bottom of the list. You'll remember that Data Objects are the things that put marks on maps for record data.



Before you go any farther, consider the precedence in which you would like your date-banded data to be displayed. Remember that each feature in an atlas forms a layer on the map, and details on layers with higher precedence can obscure those on lower layers.

If you are mapping decline, you will probably want to place dots with recent records to obscure dots which have older records only. This means that the older records should have the lower precedence. If you were mapping the spread of a recently introduced species, you would want the older records to have the higher precedence so that you could see the nuclei from which the spread started.

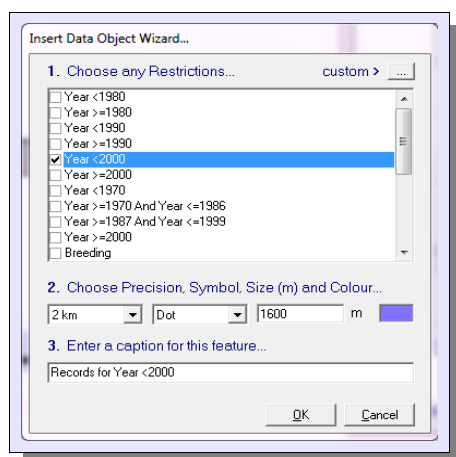
As you define a succession of new Data Objects, each gets a higher precedence than the ones before. You can rearrange the order later, but to save work you may as well set it up the way you want it in the first place.



For this example I'll assume we're mapping a possible decline (or else a lack of recent recording!) We'll just use two date bands: before 2000, and 2000 onwards. So first check the box labelled **Year <2000**.

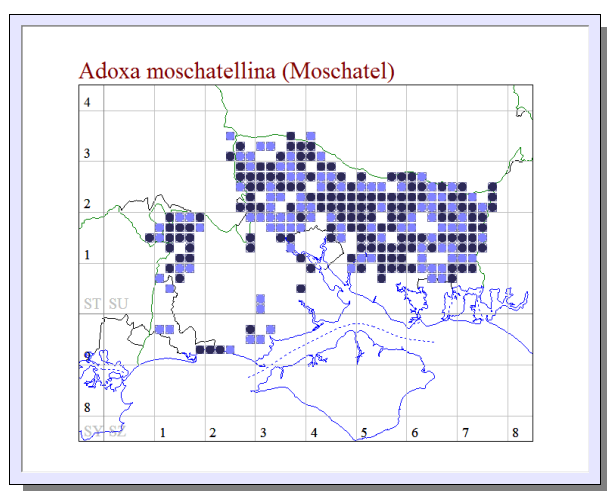
Now you need to specify how the marker will be depicted; this is just like the original setup for the Atlas. We'll choose a paler coloured dot (still at 2km resolution) for older records.

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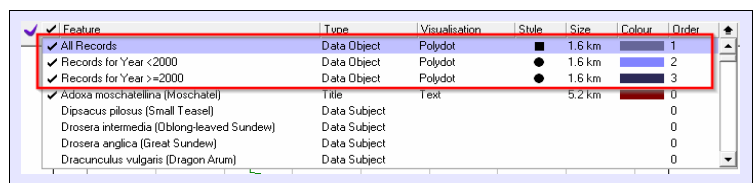
MapMate will give you a manufactured default caption for the Data Object, but you can modify it, as I have done here.

Click on **OK**, then repeat the whole process. This time select **Year >=2000**, and select a darker shade of roughly the same colour.



Once you've done this, you should have a map looking something like this (assuming you had data both before and after 2000).

Looking closely at this map, you'll see that there is one minor imperfection; the dots for undifferentiated dates are still there as hollow squares, giving a distracting outline around my rounded dots.



To deal with this, drop down the feature list again, and if necessary sort on **Type** so that the Data Objects come to the top.

First notice the values in the **Order** column at the far left. The more recently added the feature, the larger the number, and the later the layer is applied to paint the whole picture. As we wanted, the records since 2000 come out on top. We'll look at order changing later.

Our original, and now redundant feature, is the **All Records** dot. If you never wanted to see records without date bands again on this Atlas, you could just delete it. (Remember: put the cursor over it and right-click to get the menu for this.) But if you would like to use the Atlas so that sometimes you show date bands and sometimes you don't, you can simply hide it for the time being by unchecking the tick on the **All Records** row.

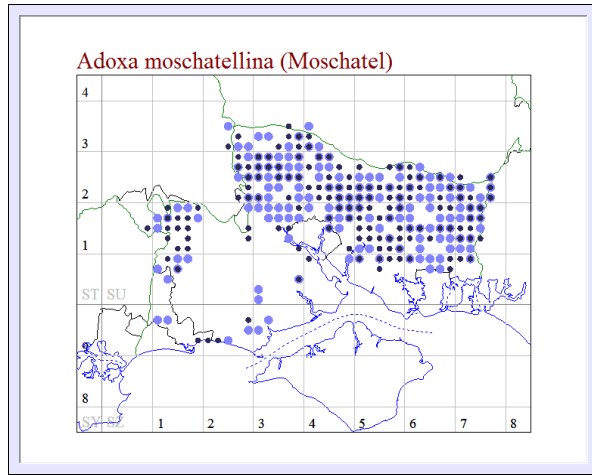
When you do one of these operations of bringing rows in or out of the display, MapMate sometimes alarmingly shows you an incomplete rendering of the map with lots of dots missing. Don't be alarmed if this happens; simply select **Map / Reload** from the MapMate main menu bar and all should come right.

You may decide at this point that it would be nice to be able to distinguish between tetrads



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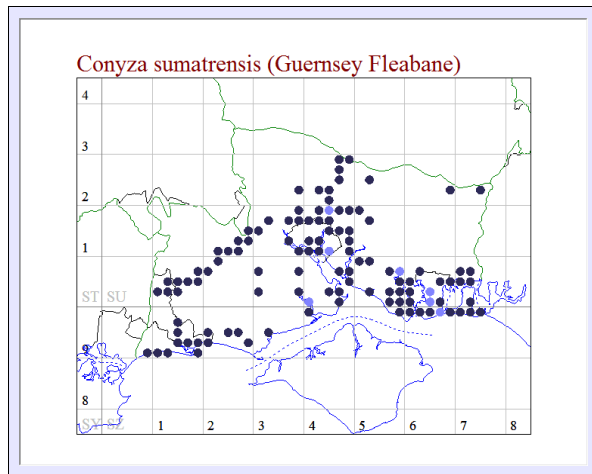
that have only had records from 2000 onwards, and those that have had records both before and after 2000. One of the simplest ways to achieve this is to make the upper dot smaller than the one below, so that any earlier occurrence shows up as a halo around the later.



You might like to try this now by adjusting the **Size** attribute of **Records for Year >=2000** on the feature list. Here's the result of setting it to a "1km" dot size.

This works well for two date bands, but is not very good for three or more unless you're using a large dot on the display. Unfortunately, MapMate's repertoire of tricks is not as great as some more sophisticated mapping applications. There's no way to set a "transparency level" on a layer so that colours can blend to show you overlaid information. Also the symbols occupy

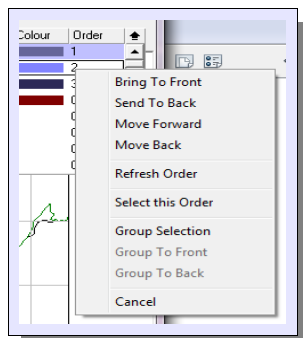
the entire region defined by the symbol size, and symbols from lower layers only show through in that region if there's "white space": that is, if the symbol is an unfilled outline. You'll see that there are, for instance, no semicircle markers that occupy one half of a plotting region and allow two different elements to be plotted side by side in the same grid square. We'll look at some alternatives to MapMate's own mapping, and how you can move MapMate data into them, in Chapter 9.



Next we'll look at reversing the plotting precedence of our two age bands. Some of the species in my area are declining; some are "spreaders". I could define a different Atlas for each, but why go to the trouble of setting up and maintaining two when I can just ring the changes in one? If I revert to dots of the same size, this is what the map currently shows for one of the expanding non-natives in my area.

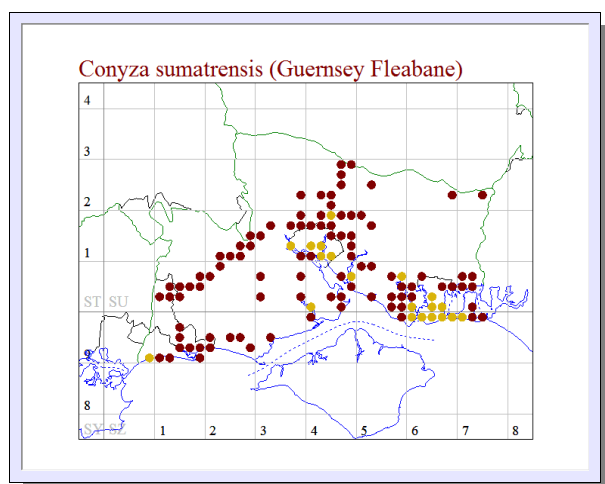
I can see that it was present in some mostly urban areas before 2000 (and not recorded since), but I can't see how far it had spread

before 2000 and how much is new (or at least unrecorded) territory since.



On the feature list, right-click on the **Order** column for the feature **Records for Year <2000** (which currently shows 2). The option to go for here is **Move Forward**. Once you've done this, you should see that the order numbers for the two age-banded features are now reversed. The first four items in the Order menu should now be self-explanatory. We'll visit the others when we come to make additions and adjustments to Base Maps later.

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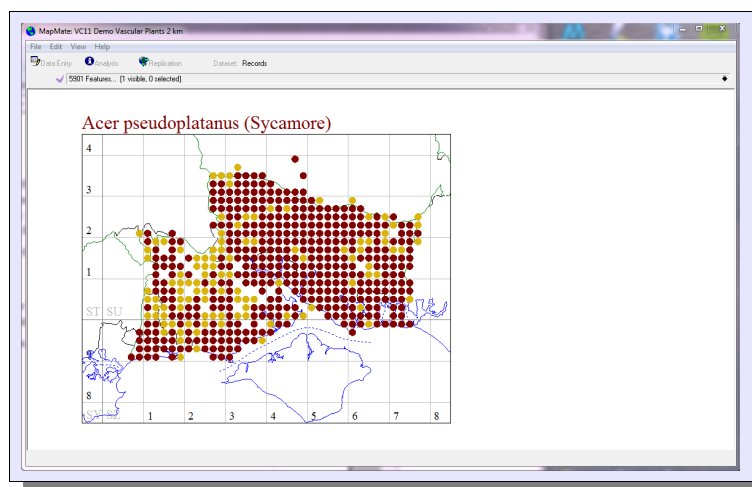


My map (with the colours adjusted at the same time) now looks like this. I can see in full the almost entirely urban centres this plant occupied before 2000.

You probably have a few other questions at this point. You will have noticed that there is a fairly good range of date classes in the menu for Data Objects. But what if none of them fits the bill for you? Can you use different date ranges? And are there other criteria for choosing which records to map with a given feature?

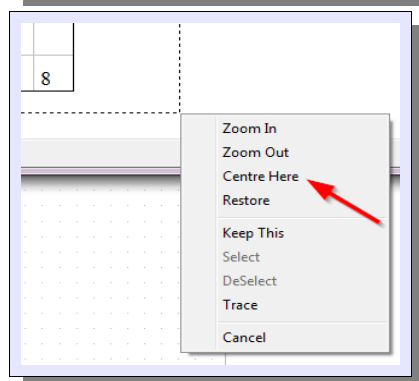
The answer is certainly “yes”, but we’ll cover these facilities in a later section of this chapter.

### Adding Adornments



So far we’ve only seen one adornment to the map panel, the title. Once you start mapping with different symbols, you will almost certainly need annotation to explain them.

Before you start, give yourself some space on the MapMate window by extending it on one or another edge, like this.



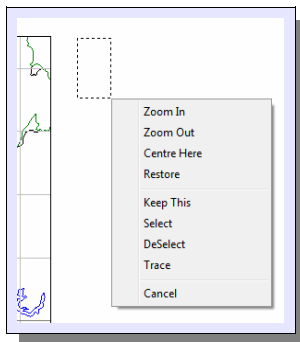
First widen your MapMate window. Make sure when you do this that you don't widen the window to take up too much of your screen; you'll see why soon. Then drag the mouse to enclose a rectangle including all of your map detail and a good chunk of white space on one side. Let go the mouse, and choose **Centre Here** from the menu. If this still leaves you with not enough white space on one edge and too much on the opposite one, repeat the process.



Now we come to one of the most frustrating and bizarre aspects of MapMate's user interface – placement of text. In order to put some text on your map, you can't just point somewhere and start to insert it. First you have to trace out a box where it will go on the map – freehand, and without any ruler or alignment tools to help you line up with existing features. Then, the size of the text is controlled by the height of the box you drew. You can change this later, but if your text was made up of multiple lines then the size will change, but not the spacing.

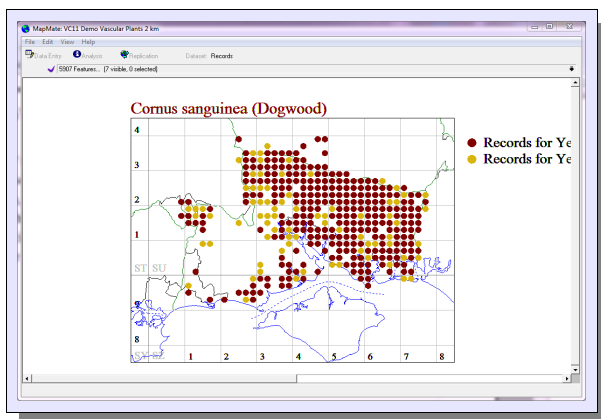
### Adding a Key

In the following example, I'm going to create a key to the coloured dots on the map. MapMate has a built-in facility for this: it will make one item for each of the Data Object features you've added to this map. You may remember that earlier I said there are two ways of dealing with the originally created Data Object for the Atlas when you've replaced it with your own: you can either delete it, or you can hide it by unchecking its box. The second method does, however, have a disadvantage: when you are creating a key, it will still be included even though the feature isn't mapped. To get around this, I've deleted the original **All Records** feature from my Atlas.



Draw a box in a blank part of the frame of the map, by dragging the mouse cursor. When you release the mouse button, choose **Keep This** from the pop-up menu. But how big should it be? Well, the width doesn't matter. But the height will control the size of your text. When you insert the Key feature, MapMate will work out what it considers the “right” size of text based on the number of items (Data Objects) in your Key and the height of the box you drew. So make your best guess.

Once you've selected **Keep This**, the box outline should remain on the screen.



Now select **Edit / Insert / Keys / Key** from the MapMate main menu. The chances are that on your first attempt you'll choose a box height that's too big. If you chose to put your text on the left hand side of the map, you may be overwriting part of the map. If, like me, you chose to put it on the right hand side of the map, you'll see another annoying feature: MapMate will re-centre your map automatically, but without taking into account the legend you've just added!

If your text is of the right size but has (like mine) slipped off the right hand side of the screen, then you will need to widen the MapMate window until you can see all of the text. Then trace a box to include all the map area and the legend, and select **Centre Here** after releasing the mouse button. You may need to repeat this a couple of times in order to move the map far enough left to get rid of redundant white space. Then you can reduce the window size again.

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### Adjusting Text Size

If your text is **almost** of the right size, you can alter it by dropping down the feature list and scanning for the features of type **Key Item**.

Feature	Type	Visualisation	Style	Size	Colour	Order
Records for Year >=2000	Data Object	Polydot	●	1.6 km	Red	3
Records for Year <2000	Data Object	Polydot	●	1.6 km	Yellow	2
Records for Year <2000	Key Item	Key Item	●	4.7 km	Yellow	4
Records for Year >=2000	Key Item	Key Item	●	4.7 km	Red	4
Cornus sanguinea (Dogwood)	Title	Text		5.2 km	Red	0
Sherardia arvensis (Field Madder)	Data Subject					0
Sibbaldia procumbens (Sibbaldia)	Data Subject					0
Sibthorpia europaea (Cornish Moneywort)	Data Subject					0

You'll see that the Key Items have been given a "size" of 4.7km. Right-click on the **Size** column in each of the appropriate

rows, and then type a value (in metres) that makes the right sort of proportional adjustment. As I mentioned earlier, this won't change the spacing between lines.

### Changing Text Content

You'll have noticed that when you create a Key Item, the text it shows is taken from the feature name of the Data Object it represents. However, that's simply copied to become the feature name of the Key Item itself, and then has an independent existence. So, if you want to change the displayed text, just edit the Key Item name.

Feature	Type	Visualisation	Style	Size	Colour	Order
Records for Year >=2000	Data Object	Polydot	●	1.6 km	Red	3
Records for Year <2000	Data Object	Polydot	●	1.6 km	Yellow	2
Records for Year <2000	Key Item	Key Item	●	2.4 km	Yellow	4
Records for Year >=2000	Key Item	Key Item	●	2.4 km	Red	4
Acer campestre (Field Maple)	Title	Text		3.6 km	Black	0
Draba muralis (Wall Whitlowgrass)	Data Subject					0
Dryopteris affinis (Scaly Male-fern)	Data Subject					0
Dryopteris aemula (Hay-scented Buckler-fern)	Data Subject					0

To do this, right-click on the Key Item in the drop-down feature list and select **Rename**. All text will initially be highlighted, so if you just start typing you

will replace everything in the box. However you can use the **Left** and **Right** keyboard keys, or the mouse, to move around in the text. There are a couple of quirky features to get used to:

- The **Backspace** key will delete the character preceding the cursor position, but the **Delete** key doesn't do anything.
- Once you've made changes, you must press the **Enter** key. If you just move off to another item in the feature list, or close up the list, your changes will be lost.

Feature	Type	Visualisation	Style	Size	Colour	Order
Records for Year >=2000	Data Object	Polydot	●	1.6 km	Red	3
Records for Year <2000	Data Object	Polydot	●	1.6 km	Yellow	2
Records up to 1999	Key Item	Key Item	●	2.4 km	Yellow	4
Records for 2000 onwards	Key Item	Key Item	●	2.4 km	Red	4
Acer campestre (Field Maple)	Title	Text		3.6 km	Black	0
Draba muralis (Wall Whitlowgrass)	Data Subject					0
Dryopteris affinis (Scaly Male-fern)	Data Subject					0
Dryopteris aemula (Hay-scented Buckler-fern)	Data Subject					0

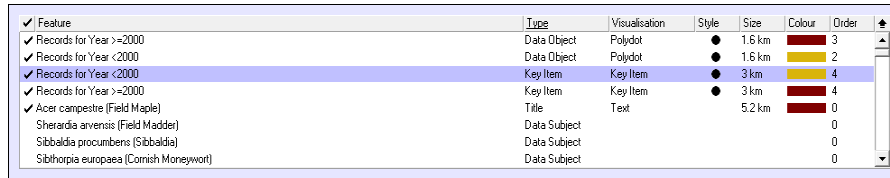
Here's the result of making changes to both the Key Items. You'll see that the text displayed in the Key automatically reflects these changes.

### Moving Text

If, after resizing text, you decide that the gap between text lines is not right, or if you want to adjust the overall position of a block of text, you could try moving some of the text. Although I'll describe this process now, you'll soon see once you try it why I don't recommend it for any sort of editing where swift, accurate placement is required, especially if you have to move more than one feature at a time.

## CHAPTER 7 MAPS AND ATLASES

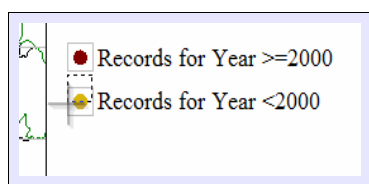
First you need to select just one feature. Open the drop-down feature list, search for the **Key Item** features. If you can see, or suspect, that you may have several features already highlighted, first right-click on the name of any feature and choose the **Clear Selection** option from the menu.



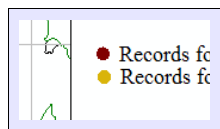
Feature	Type	Visualisation	Style	Size	Colour	Order
✓ Records for Year >=2000	Data Object	Polydot	●	1.6 km	Dark Red	3
✓ Records for Year <2000	Data Object	Polydot	●	1.6 km	Yellow	2
✓ Records for Year <2000	Key Item	Key Item	●	3 km	Yellow	4
✓ Records for Year >=2000	Key Item	Key Item	●	3 km	Dark Red	4
✓ Acer campestre (Field Maple)	Title	Text		5.2 km	Dark Red	0
Sherardia arvensis (Field Madder)	Data Subject					0
Sibbaldia procumbens (Sibbaldia)	Data Subject					0
Sibthorpia europaea (Cornish Moneywort)	Data Subject					0

Then click on the name of the feature you want to move and make sure that it, and it alone, is highlighted.

Now move the mouse cursor anywhere over the main window containing the map, and right-click. You should now see the option **Move Selected Text**, which you should select.



Once you've done this you'll see that you have a cursor with a dotted box, and grey boxes outlining the start element of the other textual features on the map. These are guidelines that let you make a stab at getting features accurately aligned. In this example, if I want to close the space between Key Items, I need to move the dotted box upwards, keeping it in line with the grey box for the dark red dot.



Once you've moved into what you judge is the right position, right-click and choose the option **Drop Text Here** from the menu. Then, if you are very lucky, everything will line up beautifully. More likely, as here, things will be slightly out of alignment. Then, because MapMate has no **Undo** facility, your only option is to have another go until you get it right.

You'll appreciate that if you have several lines of text to move around (and of course you can only move one at a time), the problem of alignment only gets worse, and is compounded by the problem of maintaining an even spacing between them. What to do then? My advice is that if you want to reorganise a key layout, delete all the existing Key Items and start again! Even if you have to do it a couple more times to get the sizing and placement exactly right, you will get a more professional result with less grinding of teeth.

The same goes for changes in the number of Data Objects to be presented in the Key – for instance, if you want to add another age band to your map. Although there is an option in the **Edit / Insert** menu to add a single Key Item, you will probably find it better to recreate the whole Key from scratch.

### Inserting Other Text Annotation

I have some caveats here.

- Be aware that you can't enter multi-line text. If you want a block of text you will have to do it line by line, with all the issues that we have seen in moving Key Items (and then some, because you don't get alignment markers when inserting each new feature).
- Be careful to go through the business of tracing a new destination box for each text line you are adding. Otherwise you can end up simply overwriting the previous

## CHAPTER 7 MAPS AND ATLASES

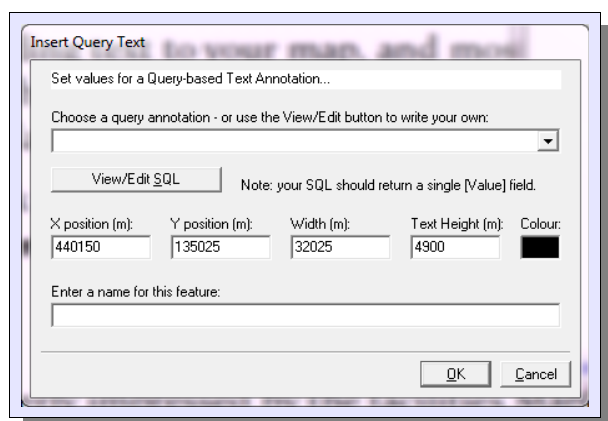
feature you added.

- There are some circumstances (which I haven't been able to pin down) when, instead of inserting a new Annotation feature on the map with the text content you specify, MapMate places text on the map using the text content of the **last** feature you added, and doesn't create a corresponding feature in the feature list. Even weirder, the text is dynamic – if you deselect the feature from the map display whose name it's currently showing, it will start to display the next highest layer name instead.

This is bad news for your Atlas, because you can't delete that text by pointing at it on the map, and there's no feature in the list that you can select in order to remove it. You will have to redefine your Atlas from scratch.

### Query-based Annotations

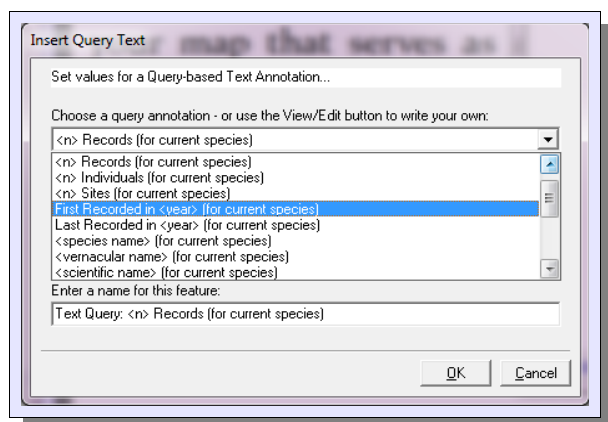
There are a number of options for adding text to your map, and most of them will be self-explanatory. We shall take a look at how to use **dynamic** text; in other words, text that varies depending on the data in your database.



First, as usual, outline a box on a blank area of your map that serves as a placeholder for the text. Then select **Edit / Insert / Text / Query Based Annotation**.

With this facility, you have the ability to specify an exact position (in map terms) for your text; the position shown is that of the box you drew. That makes it possible to get accurate alignment of multi-line text. Don't worry too much about the placement of the box for the second and subsequent lines; for a block of left-aligned text,

for instance, you can specify the same **X position** and a **Y position** that fits in with a standard **Text Height** for successive rows.



Look first at the drop-down list; this gives you quite a large set of stock items that you might want to include on the map. As with Atlases, choosing a particular option puts a default phrase in the feature name.

Notice that the options allow you to choose different styles and layouts for the elements of the Taxon name, and you can include its family. Be warned that queries on the number of individuals suffers from the same drawback as the stock queries in Analysis; frequency codes

(which are stored as zero or negative figures in the database) are treated as though they are actual counts, resulting in distorted and sometimes nonsensical figures.

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It's possible that one of the existing items produces almost what you want; or that you want something entirely different. In that case you can use the **View/Edit SQL button** to modify or write SQL code directly.

```
SELECT Count(*) & ' Records' as [Value] FROM (Records INNER JOIN (Taxa
\Default) ON Records.[Taxon] = [Taxa\Default].[L_guk]) INNER JOIN (Sites
\Default) ON Records.[Site] = [Sites\Default].[L_guk] WHERE [Taxon]
='Subject$';
```

If you've already selected one of the stock items, the code for that item will be made available for editing. Modifying this code (or, even worse, starting from scratch) requires a good

knowledge of both SQL and the MapMate data model, so I don't recommend it if you don't have those proficiencies. For those who do, there are a couple of points to note:

- The query must return a single value in the item **[Value]**, as shown in the display.
- You can refer to the taxon currently on display in the Atlas with the special placeholder word **'\$Subject\$'**, again as shown above. The single quote marks are a required part of the word.

However, because of the capability it provides to lay out text accurately, and because in this instance it's simple to use, I can recommend custom annotation to all for accurate placement and spacing of multi-line **fixed** text.

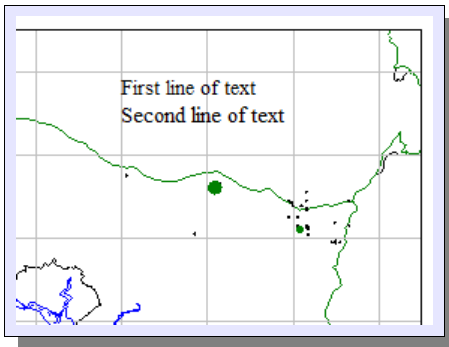
As an illustration, mark out a box of roughly the right position and height in the usual way, then select **Edit / Insert / Text / Query Based Annotation**. If you need to, adjust the position and height of the text so that it makes figures that are easy to work with, as I've done here. Make a note of the **X Position**, **Y Position** and **Text Height** figures.

Now select the stock annotation **<scientific name> (for current species)**. We choose this one because it's one of the easiest to modify.

Replace the word **Taxon** with the text you want to put on your Atlas, enclosed in single quote marks. Save it by clicking on **OK**, and again on **OK** for the main form.

You can repeat the process with a second line of text. You don't have to be too fussy about where you draw the box, since you can now specify the exact positioning and height (as shown here).

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You now have text that, albeit with a bit of clerical work, you can position (and re-position) very precisely. If you look in the drop-down feature list you will see these text features listed with a Type of **Autosummary**. There are the usual facilities for changing text size, colour, and plotting order; but in addition, if you right-click on the feature name, you will see an additional option, **Edit...** Selecting this option puts you back into the form you saw when creating the feature, giving you the additional ability to fine-tune

the position. One word of warning, though; trying to change the SQL code at this stage doesn't seem to work reliably.

### In Conclusion

You will gather by now that I'm not overly impressed by the facilities MapMate provides for putting text onto maps. The user interface is bizarre, complex and long-winded, leads to a number of possible “gotchas”, doesn't provide a choice of font, and isn't conducive to a high quality result.

The basic features of mapping are very good if you want to display mapping information on screen interactively within MapMate. But when I'm exporting MapMate maps to a document or a Web page where a polished final appearance counts, I would rather export a bare-bones Atlas map (without even a Title), and use the facilities of my document editor to add the rest. The result is not only better-looking, but more controllable and more easily made consistent. Also, as we shall see when it comes to exporting maps, MapMate is not very helpful at letting you get side annotations onto maps.

In Chapter 9 we shall explore some ways of moving MapMate data into other mapping applications that may give you more power and flexibility.



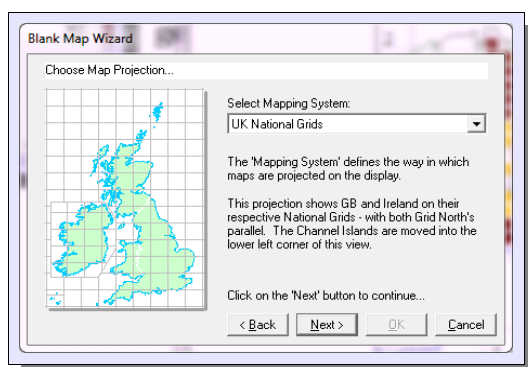
## Coincidence Mapping

Often it's useful to be able to show two or more taxa at the same time on a map. For instance, you may want to show a species and its subspecies, either lumped together or differentiated; or, if your interests extend farther than botany, an insect and its host plant.

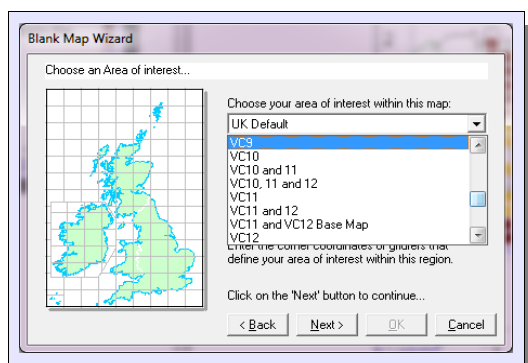
A standard Atlas doesn't give you this facility. It is possible to build it into an Atlas, but it has to be done on a taxon by taxon basis. If you have a lot of combinations you want to map, setting them up can be laborious, and making use of them and maintaining them thereafter can be complicated. We'll start, then, by making a map just to show a single combination of taxa. This will introduce us to a new feature – building maps from scratch.



From the MapMate main menu, select **File / New Map / New Blank Map**. Although you are going to work on a limited region, you need to keep the **UK** selection, because this determines the types of map projection system to be used (in this case, Britain and Ireland). If you record abroad, don't get too excited at this point – **UK** is the only option that has ever been implemented.



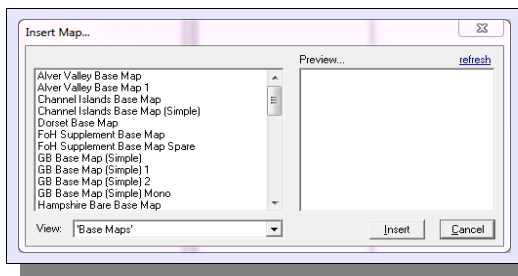
On moving to the next screen, you get to “choose” the actual projection system. But again, there is only the default option.



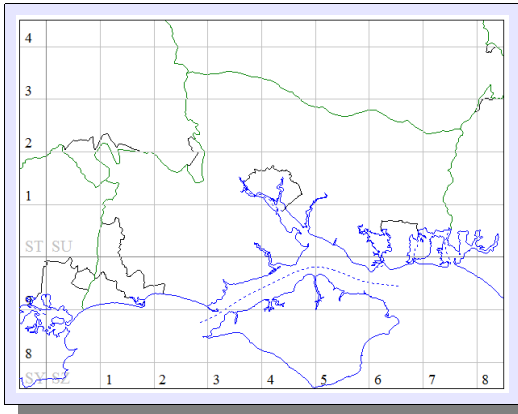
On the next screen, you have a choice for setting up the map area. Ignore for the time being facilities for defining a custom area of your own design in the lower part of the form; we shall revisit that in the next main section of this chapter. For now, use one of the vice-county or administrative / geographical areas that are predefined for you in the drop-down list. If you are following my example, choose **VC11**.

You should now have on screen the world's most boring map: just a thin outline rectangle. You need to add a base map to it. You may have noticed that you don't have a purple tick mark next to the drop-down feature list for this map. Any map other than an Atlas is always in editing mode; you can change or add features at any time.

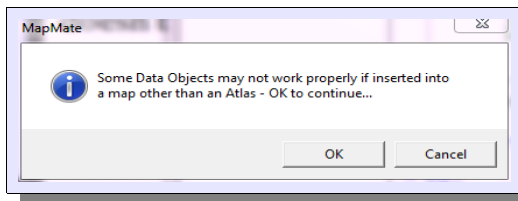
## CHAPTER 7 MAPS AND ATLASES



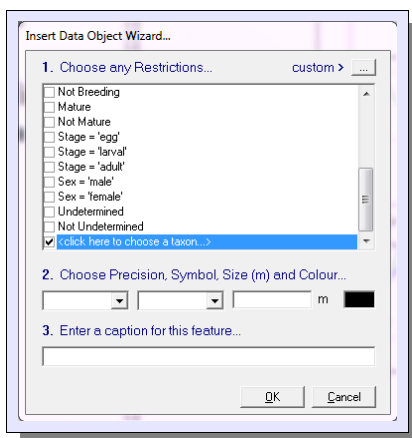
Select **Edit / Insert / Another Map...** from the MapMate main menu. If you change the **View:** to '**Base Maps**', the list will shorten to those of immediate interest. If you're keeping to my example, select the base map for VC11 that we created earlier, and click on **Insert**.



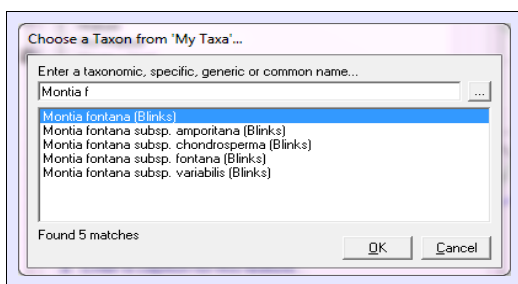
All being well, you'll now have the map displayed nicely framed in the black rectangle. I have occasionally in the past had the scaling go awry, so that I was left with a very small or very large image of all or part of the map. If this happens to you, select **View / Reframe Map / Best Fit** from the MapMate main menu. And if this doesn't work, choose **View / Reframe Map / Frame Like Another Map...** and reselect the same base map.



Now it's time to overlay some data on the map. Select **Edit / Insert / Data Object...** from the main menu. You'll see a warning like this, which you can ignore.



This will be familiar to you from Atlas editing. Scroll down to the bottom of the options in the form, and click on the check box of **<Click here to choose a taxon...>**.

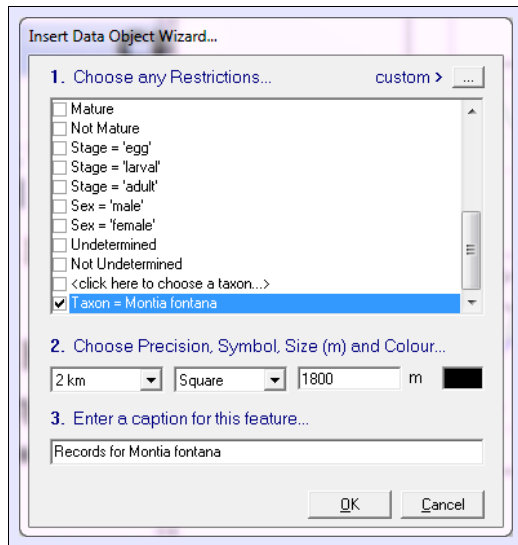


Click on the **caption** of **<Click here to choose a taxon...>**, and you'll be given the chance to select a taxon to map. You'll find that using a '2+3' abbreviation for names, as you could in the Data Entry form, doesn't work here.



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As with an Atlas, the sensible thing to do is to start with the features you want underneath on your map and progressively add the features you want above. Of course you can always change the plotting precedence later by editing the **Order** in the drop-down feature list.



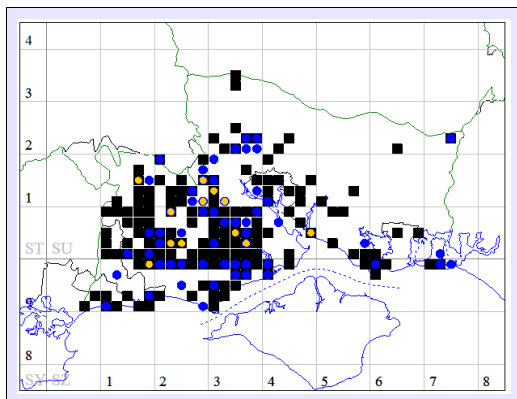
I'm going to show the records I hold for the species *Montia fontana* and two of its subspecies. (Fortunately for the legibility of this map, we only have two subspecies in Hampshire.) I'll start by putting down markers for the species.

You'll see that once I choose a taxon, it appears explicitly in the Data Object list. To follow the example, make the changes I've illustrated here to the marker representation. Note that I've also simplified the rather long-winded caption that MapMate gives the feature.

Click **OK** to see that you now have your taxon mapped.

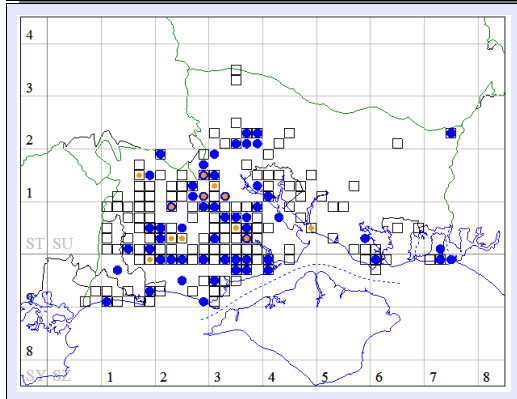
Now carry on and add the other taxa (at 2km **Precision**) in the same fashion. I recommend that you add them one at a time, although the form lets you add new ones without clicking **OK**; and make sure that you check the **<Click here to choose a taxon...>** box before clicking again on its caption to choose the next one. Adding more than one at a time makes it impossible to edit the caption as you want, and I've found problems from time to time with not all the objects plotting on the map.

Choose *Montia fontana* subsp. *chondrosperma* next, and make it a blue dot 1600m in size. Caption it **Montia fontana subsp. chondrosperma**. Finally, choose *Montia fontana* subsp. *amporitana*, give it a yellow 1200m dot, and use the same caption style.



When you click for the last time on **OK**, you should see a map like this.

This isn't as clear as it should be, so make a few last changes. Drop down the feature list, and right-click on the black square that represents the species records. Uncheck the **Filled** option. Click on the **Size** for subsp. *amporitana*, and make it **900**; also turn it orange rather than yellow.



The final map should look something like this. If there are records for both subspecies in the same tetrad, it's now possible to see that as a blue halo around the yellow dot.

## CHAPTER 7 MAPS AND ATLASES

Clearly this method of showing taxa alongside each other could result in your having to construct a large set of maps, one for each taxon set. It is possible to add individual taxa in the same way to an Atlas. The only issue then is that these features will always by default be “turned on” and will appear on the Atlas regardless of which other taxa are shown.

This may be satisfactory if, for instance, you want to map an Atlas of invertebrates against their one common food plant. Where, as in our example, you want to show aggregates and segregates, you will have to add all the segregates as separate features, and then use the drop-down feature list to turn their display on and off as you move through the main subject feature of the Atlas. Moving in the Atlas, say, from *Montia fontana* to *Ficaria verna* will entail turning off all the *Montia* subspecies features and turning on all the *Ficaria* subspecies features to keep the map meaningful. For a large atlas this can get laborious even to use, let alone to set up.

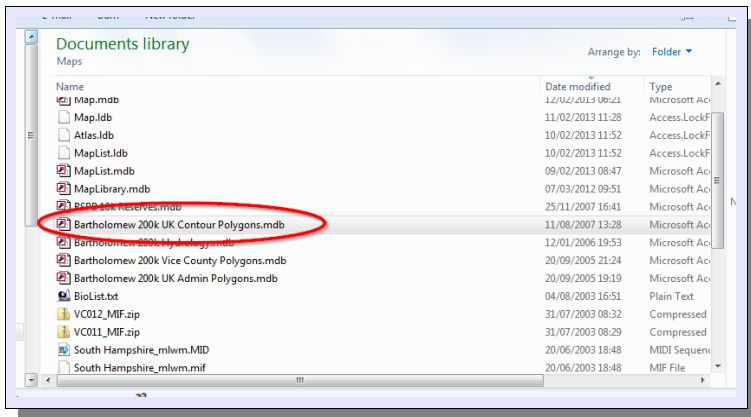
## More on Base Maps

When you add a Base Map to an Atlas or other map, all its detail appears as a single individual layer underpinning your dynamic data. In fact, Base Maps are themselves made up of many layers of features, and these layers can be edited in their own right. This makes it possible to add extra features to the bare-bones map produced by the Base Map Wizard, or change the depiction of the ones you have.

## Adding More Topographic Detail

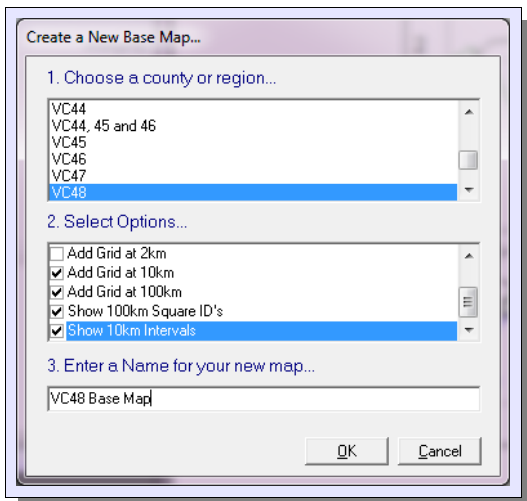
We'll start by adding in some extra landscape features. But first you will need to download the data for these from the MapMate web site, if you haven't already done so. Go to the MapMate support Web page, select the **User Zone**, and then **Downloads**. The file you are looking for is **Bartholomew200kUKContourPolygons.zip**. Download this file, then extract its contents to the right MapMate folder – but note that the on-line instructions on where they go are likely to be out of date if you are running a recent version of Windows. If your **Maps** folder is actually under **My Documents / My MapMate**, then this is where the extracted files should go.

I assume that you have a tool for extracting compressed files held in a ZIP file. If you're using a modern version of Windows you can do it directly by opening up Windows



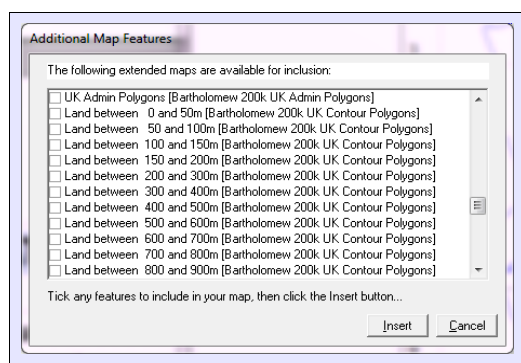
Explorer (**Computer** or **Documents** will get you there), navigating to the Zip file, and then opening it to get to its contents just as if it was a folder. Or you may prefer to use a separate utility such as the free program 7Zip or the commercial WinZip.

Before you start using MapMate again, you should be able to see this in your **Maps** folder.



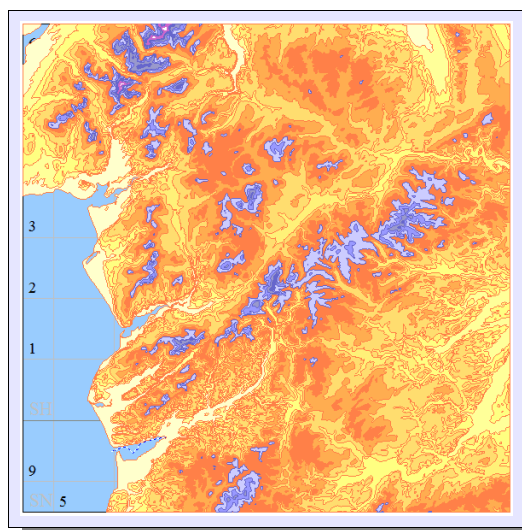
For the next example I shall desert my beloved Hampshire and take you through building a map for Merionethshire, simply because the result will be prettier and more graphic. Start the process by selecting **File / New Map / Base Map Wizard...** from the main menu. Select **VC48** from the list of standard options; the rest of the detail you can leave as it is.

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Now select **Edit / Insert / More Map Features...** from the main menu. Scroll down in the list of features until you find the block captioned **Land between...**

I suggest you tick all the features for contours up to **Land between 900 and 1000m**. Adjust the range, of course, to suit the topography of your own area. If you wanted to leave the lowlands uncoloured, you could omit the first few; but if you omit any in the middle of the range, you will end up with a confusing banding.



You might then decide to add **Sea Background Fill**. If you go ahead and do this now, the sea will be far from in the background! But don't worry; drop down the feature list, find the feature called **Sea**, click on **Order**, and then right-click and **Send to Back**. All being well, you will now have a map like this.

This is colourful, but it has a drawback – the boundary and grid information is largely hidden. Don't worry about that for the moment; we'll first add some hydrology.

Return to **Edit / Insert / More Map Features...** This time look for, and tick, **Lakes and Lochs**, **Rivers – Primary** and **Rivers – Secondary**. On a small scale map like this, it's not worth adding **Rivers – Tertiary**.

Feature	Type	Visualisation	Style	Size	Colour	Order
Sea	Poly Points	Polygon	—	1 m	Blue	1
Border	Poly Points	Polyline	—	1 m	Black	2
National Boundary [Part]	Poly Points	Polyline	—	1 m	Black	3
County / Unitary Boundary	Poly Points	Polyline	—	1 m	Black	3
County / Unitary Boundary [Part]	Poly Points	Polyline	—	1 m	Black	3
County / Unitary Boundary [Part]	Poly Points	Polyline	—	1 m	Black	3
National Boundary [Part]	Poly Points	Polyline	—	1 m	Black	3
County / Unitary Boundary	Poly Points	Polyline	—	1 m	Black	3

Now we need to get our boundaries and grid lines back on the top of the display. Drop down the feature list, which you will

see has now grown appallingly long. Fortunately you don't have to edit them all one by one! Click on the caption **Order** so that you have the features in ascending plotting precedence.

**Border** (the rectangle round the whole map area) is simple to deal with, as there is only the one feature. Right-click on the Order number in its row and select **Bring To Front**. Now you should see all of the box again.

Feature	Type	Visualisation	Style	Size	Colour	Order
Sea	Poly Points	Polygon	—	1 m	Blue	1
County / Unitary Boundary	Poly Points	Polyline	—	1 m	Black	2
County / Unitary Boundary	Poly Points	Polyline	—	1 m	Black	2
County / Unitary Boundary	Poly Points	Polyline	—	1 m	Black	2
County / Unitary Boundary	Poly Points	Polyline	—	1 m	Black	2
County / Unitary Boundary [Part]	Poly Points	Polyline	—	1 m	Black	2
County / Unitary Boundary [Part]	Poly Points	Polyline	—	1 m	Black	2
County / Unitary Boundary	Poly Points	Polyline	—	1 m	Black	2
County / Unitary Boundary	Poly Points	Polyline	—	1 m	Black	2

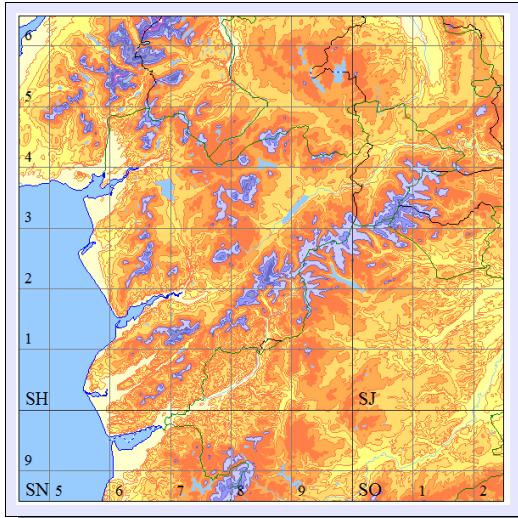
Next bring all features that are now at Order level 2 to the front. (On my map, these are **County / Unitary Boundaries**.) Right-

click on the Order number of any of them, and choose **Select This Order**. This should highlight them all.

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Right-click again on the Order column, and select **Group To Front**. Again, you should see these boundary lines appear over the topographic map details.

You can keep on doing this for each successive set of features that comes up as Order 2 as you move the others up. Stop when you come to the first **Land between...** set.



Because the grey legend doesn't show up very well on the colourful map, I've also gone back and made the grid lines a darker shade of grey, and the 100km square annotation black. If you have a job finding them amongst all the other features, try sorting the features by name. The final map looks like this, and I hope yours does too.

One more thing: being a traditionalist, I like to see my lowest-lying land in a shade of pale green rather than buff. So I shall go back into the feature list, right-click on the Order number of one of the **Land between 0 and 50m** features, and **Select This Order**. I will then right-click over the colour box and choose **Group Fill Colour...**



The standard colours that are on offer are a bit heavy, but by choosing **more colours...** I can fine tune the shading. First click in the spectrum to put a small black marker down (as shown), then select from the shades on display at the bottom.

You might like to try this too. Also, if you find the contour shading a bit busy for your hilly area, you can recolour adjacent sets of contours the same and make the Line Colour between them the same as the Fill Colour. What you can't do is leave some out, as this will simply give you white bands in the

gaps; unfortunately, the contour polygons are designed only to go to a defined upper limit, not from their lower limit to infinity.

Of course, we could have avoided shuffling the order of features by creating the map "right first time" - but then I wouldn't have been able to show you the facilities for group selection and modification. To build a Base Map in the right order from the ground up, untick all the features such as grid lines and boundaries that MapMate wants to provide for you when you initially define the map. Then use **Edit / Insert** repeatedly, starting with the topographic detail and ending with the grid overlay and grid annotation.

### Removing a Group of Features

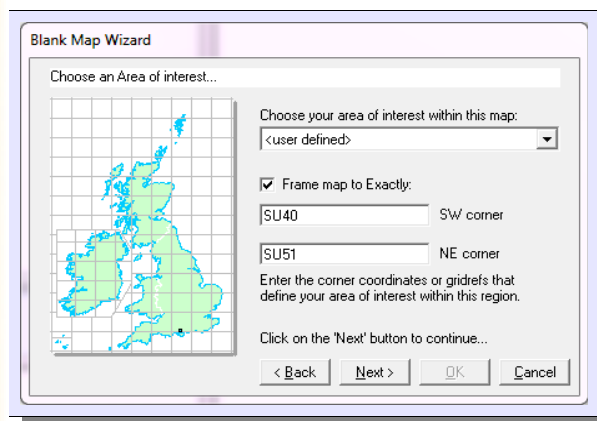
Sometimes you will need to remove an entire group of features that you've added to a map. To start the process you can choose one and **Select This Order** as usual. But to get rid of them all in one go, you must use **Edit / Delete** from the main menu bar, or press the **Delete** key on your keyboard. Right-clicking on one of the selected features in the drop-down list and choosing **Delete** will only remove that one feature.



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### Mapping a Custom Area

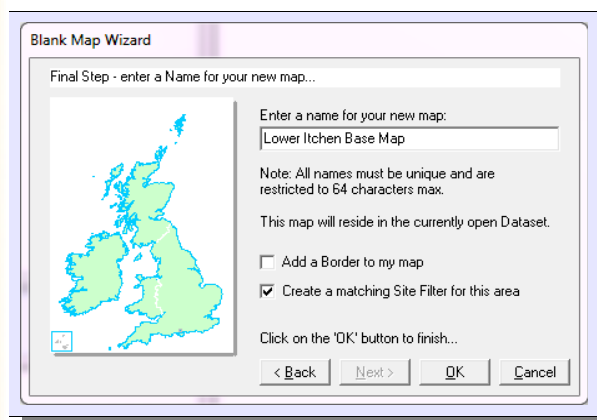
So far we've been limited to using the national and regional territories that MapMate provides. But you may want to use a region that combines several of these, or perhaps a much more restricted area such as a parish or nature reserve. This section shows you how to build a map to an area of your choice, and the next explains how to add a background custom map image to it. You will need to get hold of the image file **SU41.jpg**, downloadable from ([link](#)). The best place to put it is in your MapMate **Maps** folder.



Start by selecting **File / New Map / New Blank Map** from the main menu.

Accept the defaults on the first couple of screens, but when you get to the third screen, check the **Frame map to Exactly** box and enter the coordinates shown. You can also enter the coordinates as eastings and northings to 1-metre resolution separated by commas; in this case, they would become **440000,100000** for **SW corner** and **450000,110000** for **NE corner**.

You may (as here) see a box on the map that shows you whether you have made any gross mistakes in the positioning. But when working on very small areas, it won't always appear after you get the second set of figures in.



After clicking on **Next**, you need to make the changes illustrated on this screen. If you are going to use this map as a Base Map for an Atlas or other map, don't forget that life is simpler if you include the words 'Base Map' in your name.

Whatever you do, make sure you untick **Add a Border to my map**. If you don't, you'll end up with an unusable map image that you can't manipulate! And tick **Create a matching Site Filter for this area**; this means that if you use this map with an Atlas, you can specify the Sites you

want with this filter; then you won't get data from outside the boundaries plotting in the map borders in an ugly and distracting way.

Click on **OK**. Congratulations! You now have a completely blank map.

### Adding An Image

If you have access to an image file for your area of interest (such as a map or aerial photograph), you can use this as a background. Don't forget that many image sources are copyright, and you need to be sure what rights you have to use them. Organisations such as the Ordnance Survey may allow you to distribute map images for non-profit purposes when you sign up to one of their schemes for maps or GIS data, but require you to include an acknowledgement of source and copyright. In this case I am using Ordnance Survey

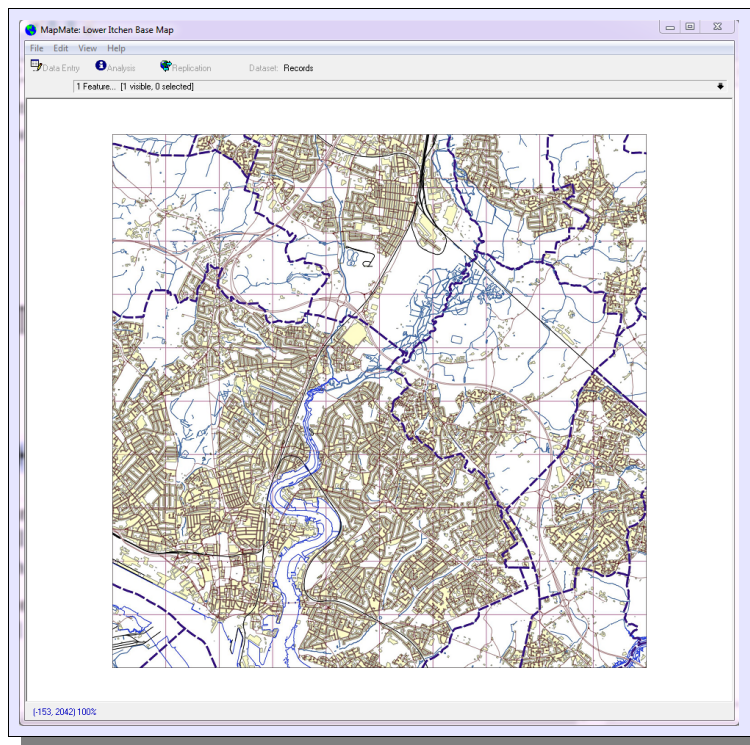
## CHAPTER 7 MAPS AND ATLASES

OpenData Mapping, which is obtainable free from the Ordnance Survey web site. How I got it into a format to use in MapMate will be a topic in Chapter 9.

Of course there are many categories of data (such as geological, soil or land use data) that may be of interest, but finding suitable sources of these can sometimes be a challenge, and will often involve a cost. If you just want to beautify your background, you can use any image you like – for instance, a landscape or a flower close-up. But it must be in one of the three supported formats: bitmap ('.bmp'), JPEG ('.jpg') or GIF ('.gif').

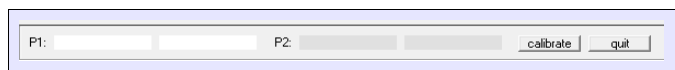
The other main thing is to get your image into an **aspect ratio** (ratio of height to width) that matches the area you want to map. This will ensure that you can fill the map area without blank edges or overlaps. I've deliberately chosen a very simple 10km square area for the exercise, so that you can see the steps and not get distracted by minutiae.

Finally, before you start this process, be warned that it can be both frustrating and mystifying. I've been doing it for ten years, and I still end up puzzled from time to time. The secret is not to get too bogged down in the interactive editing and sizing, as there is a way to correct unpredictable effects at the end.



Continuing my example from the last section, select **Edit / Insert / Map Picture File...** from the main menu. Search for the map **SU41.jpg** and select it.

This looks good, but it isn't quite the end of the job. We still have to relate the scale of this image to the scale of the map area we want to plot our data on.



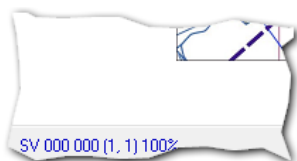
Drop down the feature list and right-click on the caption of **Picture file: SU41.jpg**.

Choose **Calibrate...** This will give you a new toolbar above the map. Your job is to relate the OS grid coordinates of the map area to the corners of the image.

First pick the south-west corner of the image (you can actually use either of the two opposite corners of the map in either order, but the most straightforward arrangement is south-west followed by north-east). You need to enter the corresponding grid reference in

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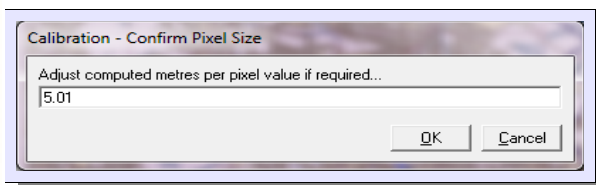
the left-hand box of **P1**; enter **440000,100000**. (Remember this is the long form of SU40. Don't try using **SU40** itself; it always seems to give a wrong calibration.)



Then move the cursor so that it's exactly over the bottom left corner of the image. You will find this frustratingly difficult. You are looking for a reading of **(0,0)** in the status bar at the bottom. Don't worry if you can't hit it exactly; there is a way to correct it later. When as close as possible, right-click and you will see the coordinates written into the right-hand box of the **P1** pair.

Now do the same for the top right; into the **P2** pair of boxes put **SU450000,110000** (SU51), then position the cursor as accurately as possible on the top right-hand corner of the map. This ought to yield a reading of **(2000,2000)** or very close. This figure reflects the carefully contrived pixel count of my image, and will obviously vary for other images. But it may not even work for you with this one! For some reason, MapMate sometimes does some sort of scaling on the imported image, and then reflects this in the screen coordinates.

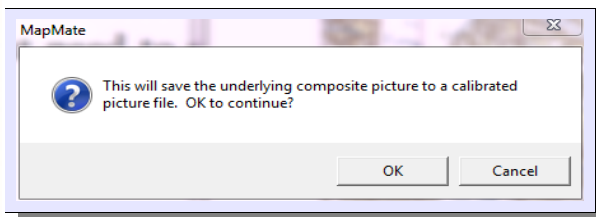
Now right-click as before. If you're satisfied, click on **calibrate**. If you're not, you can always go back and have another go, but don't waste too much time on perfection.



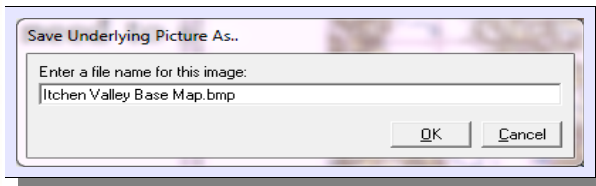
If you didn't quite achieve perfection, you can make a scaling adjustment when the next window opens. If the image in this case did show exactly 2000 pixels to represent the map area of 10,000 metres, the answer should of

course be 5. If it's slightly different, as here, change it. If it's utterly mysterious, don't bother.

Now at this point, if all went perfectly, when you move your cursor to just inside the bottom left hand corner of the map, the status bar should show **SU400 000**; and when you do the same just inside the top right hand corner; it should show **SU499 099**. If the first of these is wrong, or both are, you probably did something wrong with specifying the first point. If the second only is wrong, then something's amiss with the scaling, and in my experience this is, as often as not, MapMate's fault.



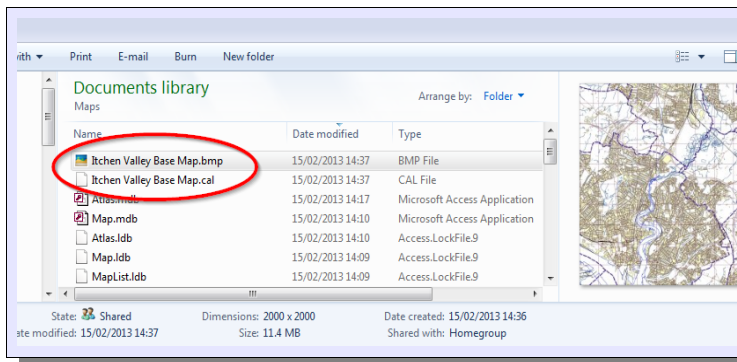
To overcome these problems, you next need to select **File / Save / Calibrated Base Picture...** from the main menu.



When you click on OK, you'll be asked where to save the calibrated map. It's a good idea to make sure that this is not the same file name as the original one you loaded. You may want to retrieve that for re-use later.



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This process actually saves two files into your MapMate **Maps** folder. They both have the same root name; the one with the **.bmp** extension is the saved map image; the other has the extension **.cal** and, it's a text file with calibration information in it. Note that if you position yourself on the **.bmp** file, it shows the pixel size of the image in the panel at the bottom.

If you right-click over the **.cal** file entry, you should find a menu option called **Edit** or, failing that, **Open with...** That will allow you to open the file with a plain text editor such as Windows Notepad. It's best to avoid using programs like Microsoft Word or OpenOffice Write, as they may introduce formatting that will interfere with MapMate's use of the file.

```
1 <mapmate>
2 <cal>
3 <name>Itchen Valley Base Map</name>
4 <timestamp><timestamp>
5 <copyright></copyright>
6 <units>m</units>
7 <datum>WGS84-modified</datum>
8 <projection>Local</projection>
9 <coodtype>EN</coodtype>
10 <rotation>0</rotation>
11 <type>raster</type>
12 <xo>440000</xo>
13 <yo>100000</yo>
14 <xi>453617</xi>
15 <yi>113617</yi>
16 <xpixels>2000</xpixels>
17 <ypixels>2000</ypixels>
18 </cal>
19 </mapmate>
20
```

Here's what I see when I open my calibration file using the program Notepad++.

Many of these lines we can safely ignore; the ones of interest, which you may need to edit, are those from **<xo>** down to **<ypixels>**.

**<xo>** and **<yo>** lines refer to the OS grid reference eastings and northings of the bottom left-hand corner. In this case, they are exactly what I'd expect. And so are **<xpixels>** and **<ypixels>**.

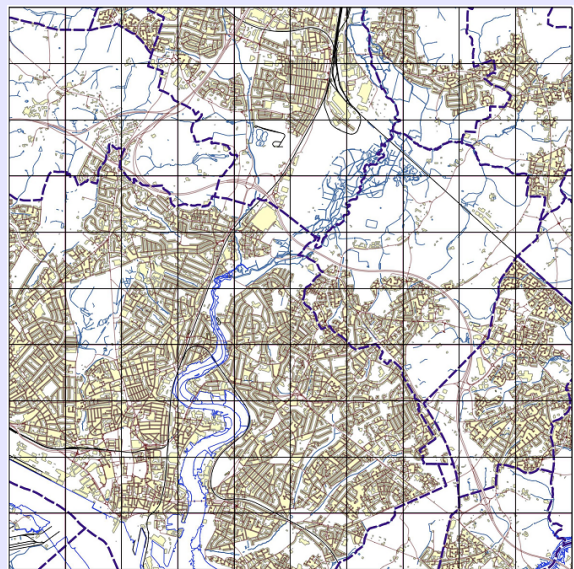
The ones here that don't make any sense are **<xi>** and **<yi>**; they ought to give the eastings and northings of the top right of the image, but clearly the scaling has gone wrong. I can remedy this by changing **<xi>** contents to **450000**, and **<yi>** to **110000**.

If you make a change of any kind, remember to save the file back to the same place and file name when you're done.

Will your image now appear with the right OS grid coordinates when you move the cursor over it? Will it plot species data in the right place? No, it won't. The old calibration figures are still "built in" to MapMate in connection with this map. What you must now do is drop down the feature list and **Delete** the Map picture. The map image at this point will stay on screen. Close the map (**File / Close**). Then immediately re-open it, and using **Edit / Insert / Map Picture File...**, put the newly saved image back in. MapMate will now make use of the new calibration file, and as long as you made the right edits, everything will tie up. There's no need to go through the calibration exercise again – in fact, that would be a big mistake!

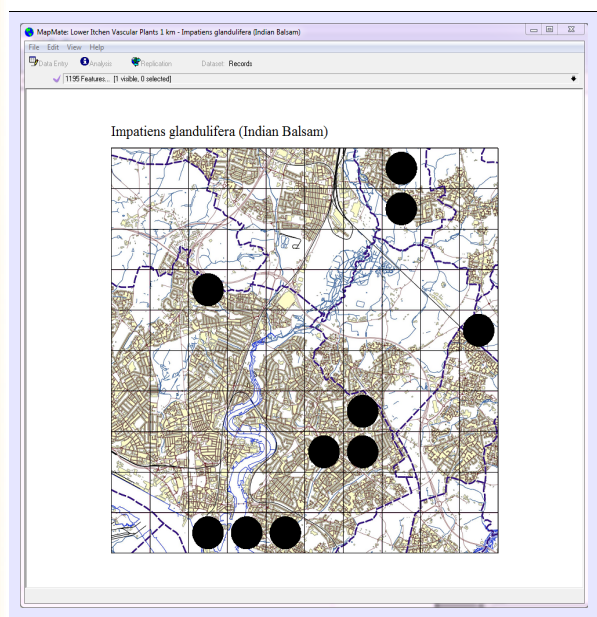
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### Making Use of the Image-based Map



The MapMate help file recommends that if you're going to add other MapMate features to the Base Map, you don't do it directly to this image map. I think you will now see why; if you have to make any changes and recalibrate, it will be a lot messier if there is a whole raft of other features floating on top (and in fact, having a border on your map at recalibration time may blow the recalibration process clean out of the water).

Instead, save this one to use as an inserted layer in **another** Base Map, and create a second Base Map. You have enough knowledge under your belt now to be able to do this, so I won't go through all the details. Use the **New Blank Map** option to start the process, and define the same geographic boundaries. This time it's OK to add a border. When you get your empty map display on screen, choose **Edit / Insert / Another Map...** and insert your map with the base image. You can then go ahead with inserting other features such as grid annotation. Above is mine, with just the 1km grid lines added for extra emphasis, saved as a new Base Map called **Lower Itchen Full Base Map**. Unfortunately, at larger scales you're not going to get sensible grid line annotations out of MapMate, and will probably have to fall back on including them in the source material for your image.



Finally, here's an illustration of an Atlas based around the new Base Map. Remember that when you do this, you should select the Site

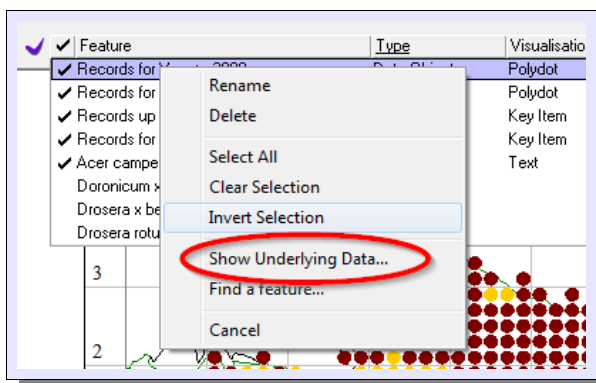
Filter (**Lower Itchen Base Map**) that you created in the early stages of the whole process. This will ensure that only "dots inside the box" will plot.

## More Ways to Refine Atlases

### Custom Age Banding

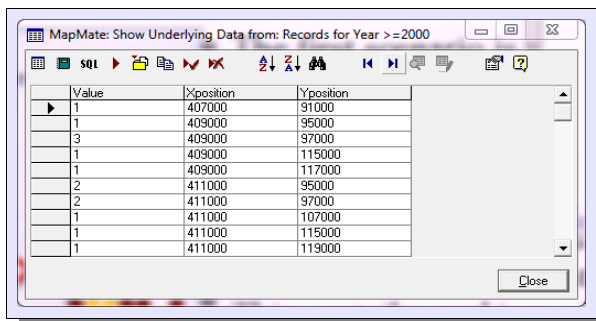
Earlier in the chapter we saw how to add age bands to Atlas records. What if the age bands offered by MapMate don't suit your purposes? In that case you have two options: they both involve doing some simple operations with Structured Query Language (SQL), so you may want to take a refresher back in the section "User Queries: Tailor-made Reports the Hard Way" in Chapter 4.

### Changing Existing Features

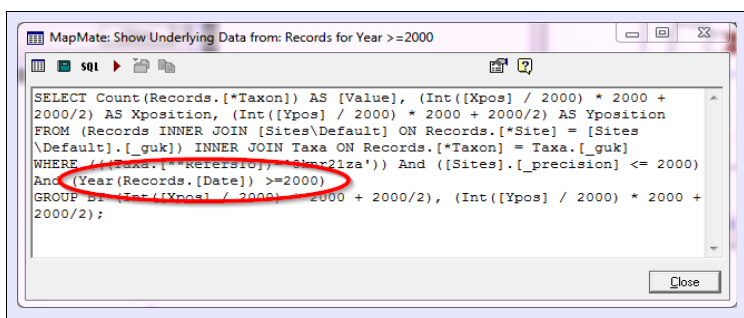


The first scenario is where you have already put some age banded Data Objects into your Atlas, and you want to change the ranges. Re-open the map for VC11 that we created earlier. Turn on editing, drop down the feature list and search for the Data Objects. Let's suppose that we should like to show our year break at 1990 rather than 2000, because that was the start of a recording project for a new county Flora. This entails making changes to both Data Objects.

Right-click on the caption of the first one and select **Show Underlying Data...**



This doesn't on the face of it look very useful. It is, of course, a data grid such as you get from running a query; bit it's a specialised query designed to extract information that can put the dots on the map. For our purposes, the valuable feature is the **SQL** button in the browser's toolbar. Click on this now.

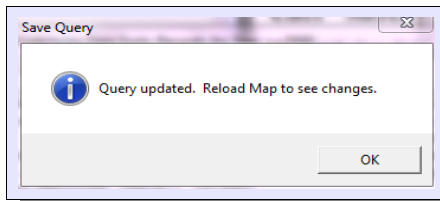


Most of this, you'll be pleased to know, can safely be ignored. The bit to tackle is the WHERE clause – the part of the command that says which records to include. Specifically, we want to deal with the part to do with the date, highlighted here. (If you're curious, **Records.[Date]** is the place in the database where MapMate stores

the first of the recording 'Date from' and 'Date to' pair linked to a Record. **[Date]** is in square brackets to stop it being confused with the unadorned word **Date**, which is a meaningful word in the SQL language. And **Year(...)** takes the date value given to it in the round brackets, and gives back just the year part of it. )

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Change the **2000** in this line (don't change any others!) to read **1990**. This should enable the **Save Query** icon in the toolbar of this window. You must click on this before you click on **Close**; otherwise your change will not be saved. You will be asked to confirm the change.

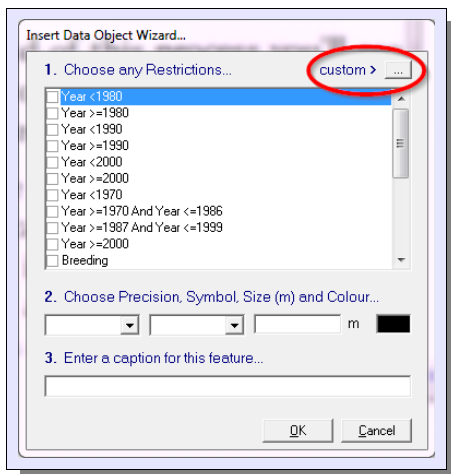


At the end of this process you'll see this message. There's no need to **Reload** just yet; you still need to change the other Data Object.

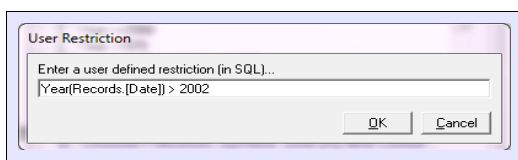
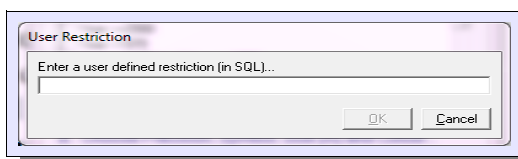
Make the change to the other Data Object. You'll notice that the captions for your Data Objects are now incorrect; they're not automatically updated. And if you kept the key on the map, those Key Item captions will be wrong too. Go through and make the changes by right-clicking on each one and selecting **Rename**. When this is done, go ahead and select **File / Reload** from the main menu.

### Creating New Date Ranges

If you're starting out on an Atlas from scratch, there's another way to get custom date ranges. To try this, start building a new Atlas as usual with **File / New Map / Atlas Wizard...** Use the VC11 Site and Base Map references as before; and choose a symbol with a 1km precision.



Now switch on editing with the purple tick mark, and select **Edit / Insert / Data Object...** Click on the **custom** button in the top right corner.

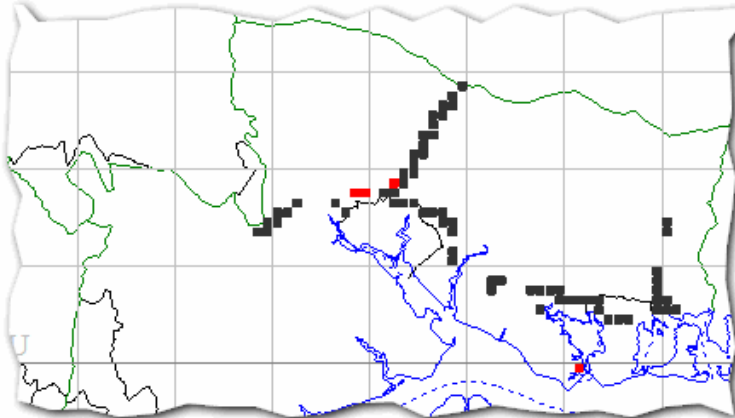


This gives you a rather intimidating blank form for typing SQL code. But remember the last procedure. What you have to put in this box is the innards of a SQL WHERE clause. You don't need the 'WHERE' itself, you don't need a semicolon at the end, and you don't need any of the other query paraphernalia that appears when you examine the underlying data of an existing feature. All that's required of you is an expression (formally expressed according to SQL language rules, of course) that will be true for any data you wish to display in this Data Object. Here's an example to suit our current purposes. (> is a symbol for "greater than".)

Go on to complete the entry for the Data Object, giving it a 1km precision. At this point, or later if you prefer, you can delete the original **All Records** Data Object from the feature list.



Now create a second Data Object. This time the code should read **Year(Records.[Date]) <= 2002**. (<= is a symbol for “less than or equal to”.) Again, give it a 1km precision and make sure it gets a distinctive colour.



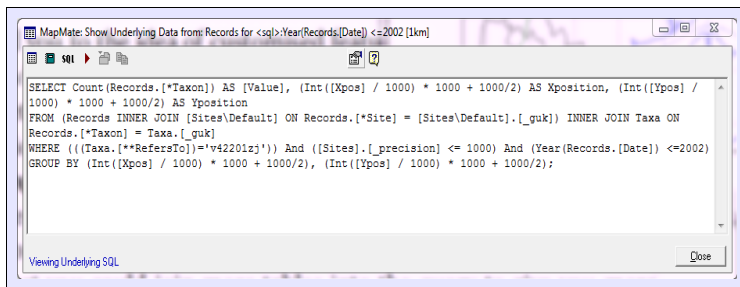
Here's a map showing the results for *Bassia scoparia*, an alien “motorway plant” that started an explosive spread along Hampshire roads in 2003. Just the pre-2002 records are shown in red; since we inserted the Data Object for later records first, the earlier ones show up over the later where it has persisted.

Of course this map could be made even more informative if it included

several age bands, each with a span of a couple of years, to cover the last decade. If you are interested, you now have all the techniques to do this.

### Custom Mapping Categories

The last section introduced you to the idea of customised features in Atlas mapping. Since you have *carte blanche* in what you put into the box for a custom User Restriction, you are limited only by your competence in writing SQL expressions and by the data items that are available to you for selection.



If you right-click on one of the Data Objects you've just added, select **Show Underlying Data...** and again choose **SQL**, you will see that the SQL query makes use of only two tables in MapMate's database, the Records table and the Sites table. That restricts you to using only data items

in these tables; see Appendix A for the full list of items. If you're a SQL expert you could join more tables into the query to give you more data, but I don't intend to illustrate that.

You can combine more than one condition into an expression using **And** and **Or**; in the example above you can see that **And** is used twice. You won't be surprised to learn that two conditions linked by an **And** both have to be true for the expression to be true; while with two conditions linked by an **Or**, either of them can be true for the expression to be true. One trap for the unwary, however, is what happens when you mix **And**s and **Or**s in the same expression. If you have an expression such as

```
[Sites].[_precision] <= 1000 And Year(Records.[Date]) = 2002 Or
Year(Records.[Date]) = 2003
```

then what you get is almost certainly not what you wanted! And if you try and beat the system by rewriting this as

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```
Year(Records.[Date]) = 2002 Or Year(Records.[Date]) = 2003 And [Sites].  
[_precision] <= 1000
```

it won't actually improve things.

This is because, when the database software interprets a chain of connected logical conditions, it applies two rules:

- It works left to right through the chain to evaluate and combine conditions.
- **But** it prioritises the **And**s over the **Or**s, other things being equal.

The effect of this in the first example above is that it will include Records from 2002 only if they are at 1km precision or better:

```
[Sites].[_precision] <= 1000 And Year(Records.[Date]) = 2002
```

but it will include all Records from 2003, regardless of precision.

```
Or Year(Records.[Date]) = 2003
```

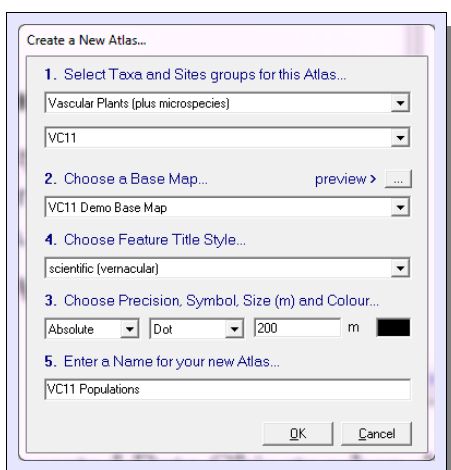
In the second example the effect is equally wrong, but different – can you work it out?

You can overcome this by including an extra pair of parentheses () around the pair of conditions you want to force to be combined first. So the first example above becomes:

```
[Sites].[_precision] <= 1000 And (Year(Records.[Date]) = 2002 Or  
Year(Records.[Date]) = 2003)
```

Now the year question will be settled first, and the condition for precision of Site will be applied in either case. In complicated expressions you can nest parentheses several deep to achieve the right effect; and if you're not sure whether they are needed in a particular situation, including them does no harm. If you look at some of the stock queries in the **Analysis** menu, you'll see that they sprout redundant brackets like fledglings sprout feathers.

### An Example: Representing Population Sizes



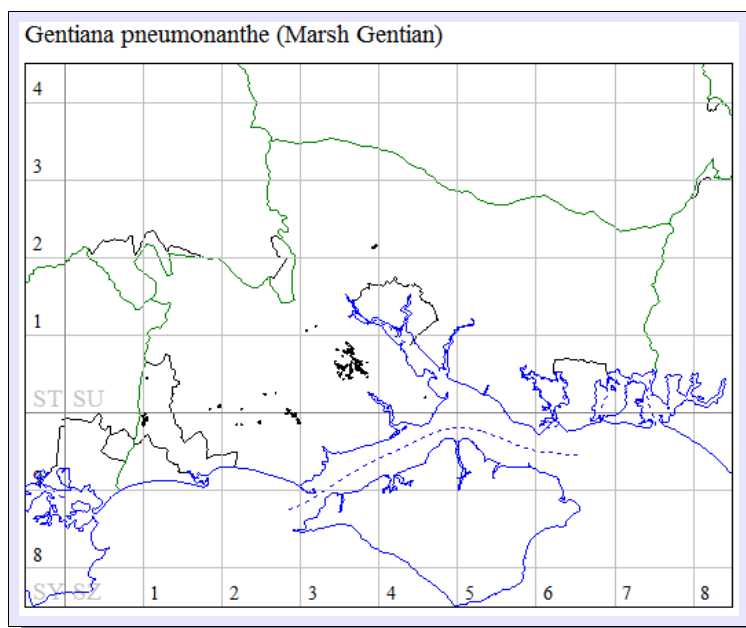
One application of custom code is to represent different population sizes with different sizes of dots. Of course, this depends for its success on your having a reasonably coherent and accurate set of counts or estimates in your data.

To demonstrate this, we'll set up a new Atlas with population sizes. As usual, select **File / New Map / Atlas Wizard**.

You can follow most of the detail here by rote, but notice the selection of **Absolute** for **Precision**. This means that rather than plotting to a regular grid, Records will be shown as close to their stated position as their resolution allows.

Note also that I've made the **Size** quite small.

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Go through the rest of the stages to define the Atlas, and you should have a display like this.

Put the Atlas in editing mode, and select **Edit / Insert / Data Object...** from the main menu. Click on the **custom** button at the top right.

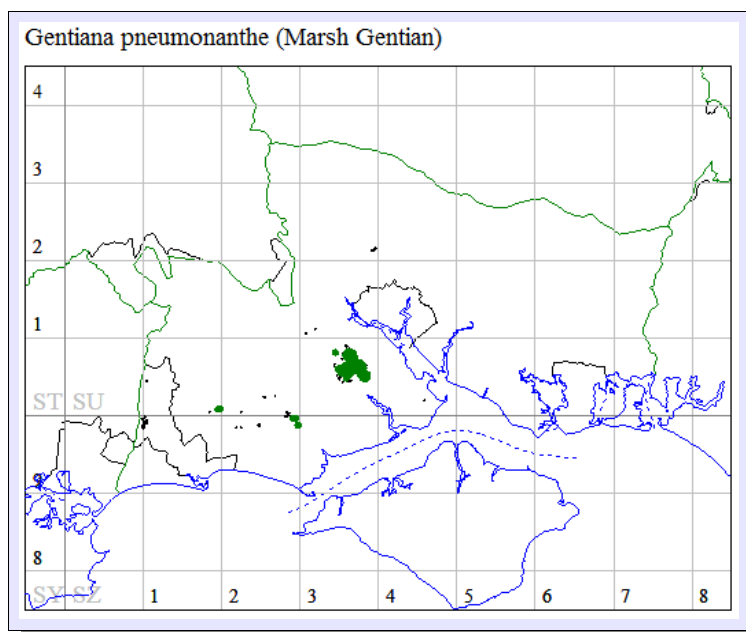
User Restriction

Enter a user defined restriction (in SQL)...

Records.Quantity > 50

OK Cancel

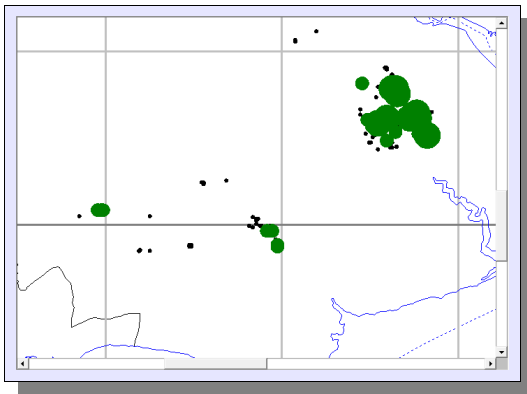
Add the size criterion, then go through the rest of the setup, again choosing **Absolute** precision. I suggest you choose a dot size of 750m and a different colour for the dot.



Do this once more for counts of more than 200, using a dot size of 1500m and the same colour as before. I now have a map that looks like this.



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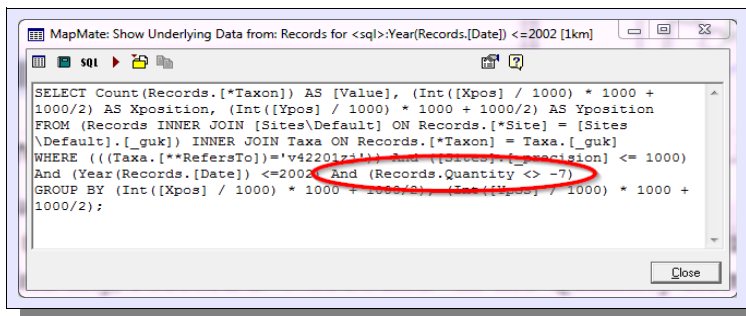


If I zoom in on my heartland for this species, I get a better picture of distribution than with a conventional grid dot.

You may like to consider what to do with records with DAFOR abundance codes rather than absolute counts. Also, your map may be showing “false positives”: read the next section for more on this.

### Suppressing Null Records

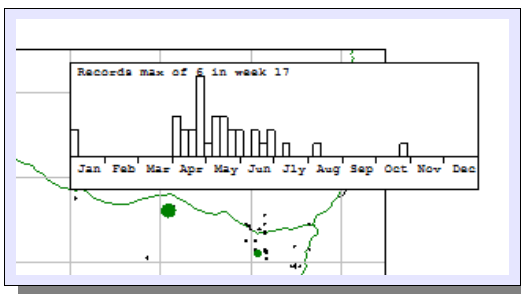
There's one change I make to system-generated Data Objects when defining a new Atlas, and it's an addition I make to my own. If I am going out to do a targeted search or survey for a species and I don't find any, I record a “Not Found” in the Quantity element of the Record; and I encourage others to do the same. (MapMate calls this “Not Present”, but I prefer to interpret it as “Not Found”, and show it as such on reports. ) The numeric code for this, stored by MapMate in the Quantity field, is -7. But the code for the Data Object fails to take account of that – so these records will plot as dots on the map!



This can be remedied by adding an extra condition to the SQL code of any of the Data Objects that need it.

### Adding Time-series Graphs

One adornment to Atlases that may interest you if you study phenology is the **Periodicity / Flight Plot** feature. As you will gather from the name, it was provided with entomologists in mind; but if you keep records of flowering or fruiting times it can also be useful for plants. It may also give you pointers to unlikely or unreliable times of year for records of critical species such as Dandelions.



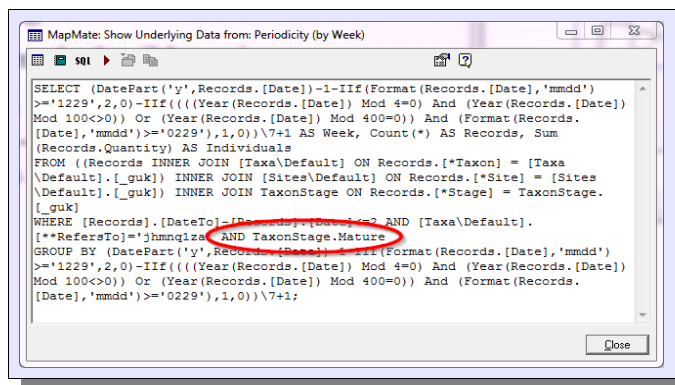
To create the graph, first draw and keep a box on the screen where you want your graph to appear. Use **Edit / Insert / Periodicity / Flight Plot**. You should now have something on your Atlas like this, which shows records on a week by week basis.

## Weaknesses of the Graph

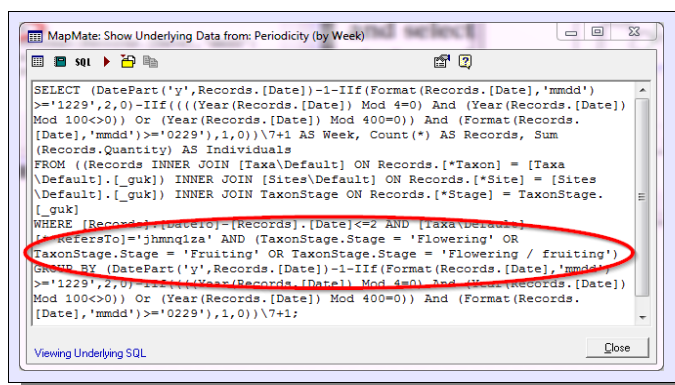
One thing to be aware of is that if you have any records that are recorded with the year only as the date, they will appear heaped up at the beginning of January. This is a side-effect of the way in which MapMate stores imprecise dates; it keeps a record of the start and end dates of the period, and by convention a date specified as a month or year only will have a start date at the beginning of the period and an end date at the end of it. The graph uses the start date for its census.

More crucially, the graph only selects certain records to plot; these are the ones whose Stage is flagged in the system as being 'Mature'. But unfortunately the definition of 'Mature' for flowering plants has several anomalies. **Mature** itself, **Flowering** and **Fruiting** are all marked as 'Mature'. But:

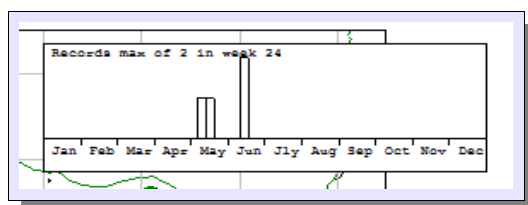
- **Aquatic Form** and **Terrestrial Form** are also marked 'Mature'.
- **Not Recorded** is marked as 'Mature'.
- **Flowering / Fruiting** is **not** marked as 'Mature'.
- **Sporophyte** is not marked as 'Mature'.



One way to overcome this is to edit the SQL that generates the data for the feature. In editing mode, use the drop-down feature list to find and select the **Periodicity Plot** in the list. Right-click on the feature's caption and select **Show Underlying Data...** Then click on the **SQL** button.



You can replace the highlighted code to suit your own purposes by selecting exactly those stages you want to see, as shown here. If you combine several terms, make sure you put round brackets around the combination, as illustrated. If you need to remind yourself of the Stage terms that are available to you with your taxonomic group, open the Data Entry window, click on the caption of **Stage**, and select **List Possibles**. Once you've made the changes, make sure to click the **Save** icon before you leave the SQL form, and **Reload** the map to see the effect.



You can see that this has a quite dramatic effect on my graph, as most of the records have 'Not Recorded' against their Stage.

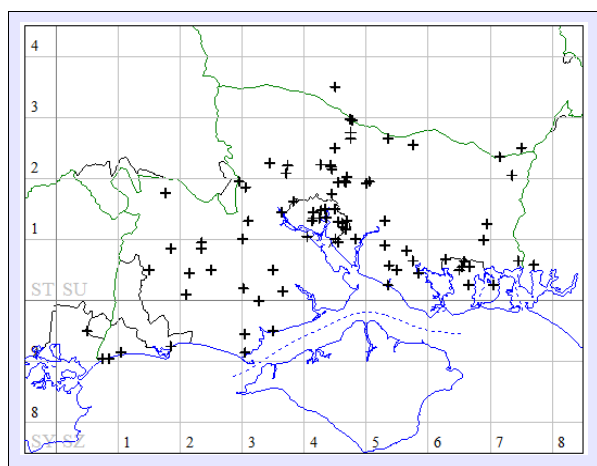
## CHAPTER 7 MAPS AND ATLASES

### Special Maps

There is one class of map that we haven't yet considered. Special Maps are a means of presenting statistics about your data assets in a mapped form. Each is predefined to the extent that it presents one category of information in one way, although like other maps they can be tweaked if you are prepared to make changes to SQL code.

They can all be initiated by selecting **File / New Map / Special Map Wizard...** I won't go through the detail of selecting Taxa, Sites and Base Map for the maps, a process you should now be familiar with. Be aware that some of the maps can take a while to generate on a large data set, as there is quite a lot of data processing going on in the background.

#### Site Information



**Recorder Locations** simply shows grid positions of recorders' addresses, where these are noted in their details. My predecessor in the county usually added address details to Recorder; but I prefer not to, since it adds to the burden of maintenance (people, as individuals, are more mobile than plants!) and raises issues of data protection.

I'm not quite sure what a map like this provides for botanists; if everyone recorded only in their own patch and their levels of recording were similar, I suppose it might tell us something. For

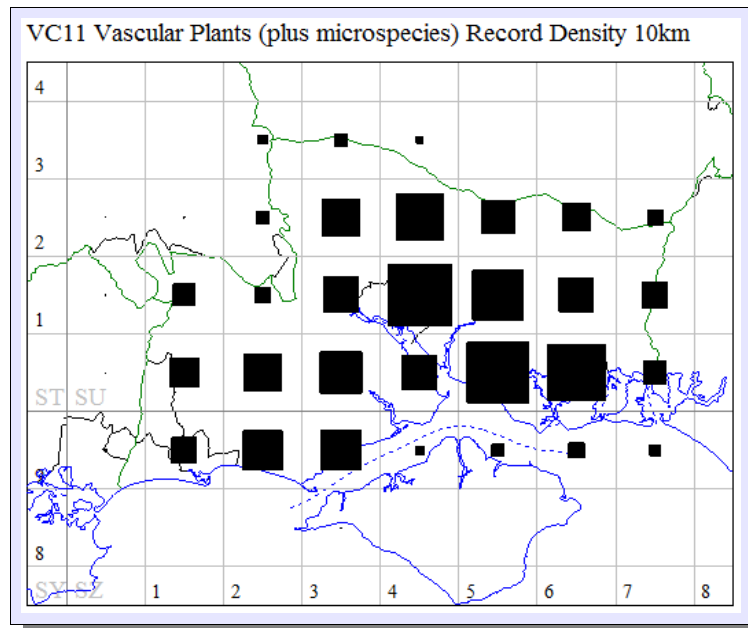
moth recorders who predominantly record by running light traps in their gardens or neighbourhoods, it could provide a useful correlation with **Recorded Sites**. (Note that you can combine several of the listed features on one map. )

**Recorded Sites** and **Recorded Sites 2km** needs little exposition. It may, of course, tell you something about coverage in your territory, but that will depend on whether your data is mostly from systematic survey; a Site can represent a single recording event of a single species, a species census run over many years, or a location for hundreds of species recorded on multiple occasions. The map does, however, exclude Sites that have no records associated with them for the currently selected species group.

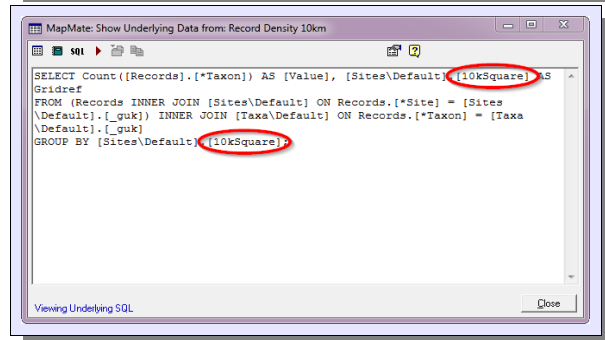
#### Recording Coverage

**Recorded 10km Squares** and **Recorded 2km Squares** are certainly useful if you are trying to check coverage of a wide-ranging systematic survey (for instance, the BSBI National Atlas or a County Flora). For me, in a county where recording effort is high and some degree of coverage ubiquitous, it serves quite well to show areas that have been recorded at locations outside the vice-county they were said to be in.

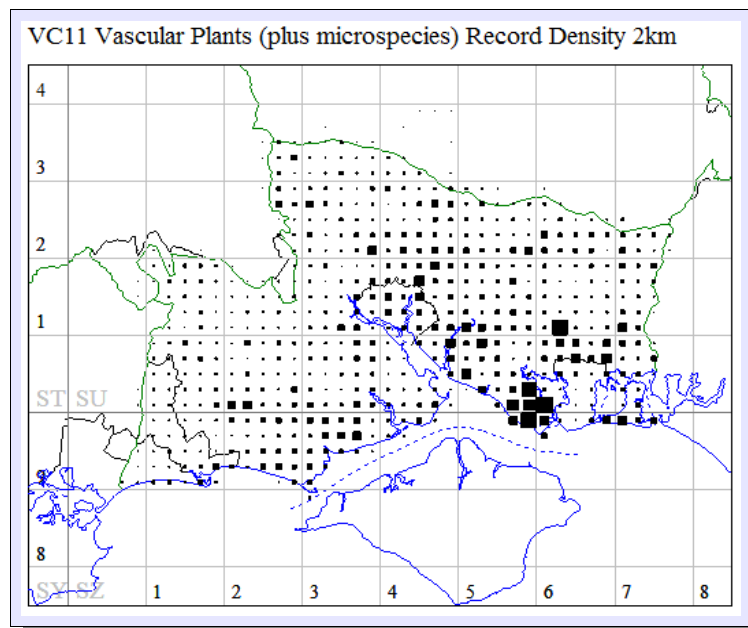
## CHAPTER 7 MAPS AND ATLASES



**Record Density** is somewhat more interesting. The supplied resolution of 10km is rather coarse for a county or vice-county, and you may be wondering whether you can produce a similar map at 2km. You can, with a little bit of manipulation. Drop down the map's feature list, and look for the item with **Type** of **Data Object** and **Visualisation** of **Polyzed**. Right-click on the caption and select **Show Underlying Data...** When the data grid appears, click on **SQL**.



Look for the two occurrences of **10kSquare**, and change them both to **2kSquare**. **Save Query**, and **Close** the form. You will need to change the **Size** of the feature to **2km**; and it's a good idea to rename the feature to **Record Density 2km**, and to change the **Title** name as well. Finally, select **File / Save / Copy of this map As...** and give it a name more appropriate to a tetrad resolution.



Then **Reload** the map. You should now have something like this. One has to be careful in interpreting this map; what it highlights in my case is the enthusiasm for re-recording on a year-by-year basis by a few dedicated people.

**Log (Record Density) 10km** will give you a similar map on a logarithmic scale. As you might expect, it gives a result which is less exaggerated at the top end of the scale. You can put it onto a 2km resolution by following the same steps as I've just described.

## CHAPTER 7 MAPS AND ATLASES

**Species Density 10km** and **Log(Species Density) 10km** do a very similar job for taxa, and you may be expecting that you can produce 2km analogues of those, too. But this is going to involve you in an extra stage of work, as you have to create a new Query to extract the data at a different resolution; you can't just fiddle with the SQL of the Data Object in the map.

Select **Analysis** from the MapMate toolbar, then open up **User Queries**. Navigate to the bottom of the query list and pick **<new user query>**. Call it **Sites and Species 2k**.

Now you need to replace the text in the query with this:

```
SELECT DISTINCT Records.[*Taxon], [Sites\Default].[2kSquare]
FROM (Records INNER JOIN [Sites\Default] ON Records.[*Site] = [Sites\Default].[_guk]) INNER JOIN
[Taxa\Default] ON Records.[*Taxon] = [Taxa\Default].[_guk]
WHERE [Sites\Default].[2kSquare] <> "";
```

Make sure that you only type carriage returns into the text between clauses; that is, where the larger gaps appear above before the **FROM** and the **WHERE**. If you are reading this electronically, cut and paste it from here.

```
SELECT Count([U\Sites and Species 10k].[*Taxon]) AS [Value],
[U\Sites and Species 10k].[10kSquare] AS Gridref
FROM [U\Sites and Species 10k]
GROUP BY [U\Sites and Species 10k].[10kSquare];
```

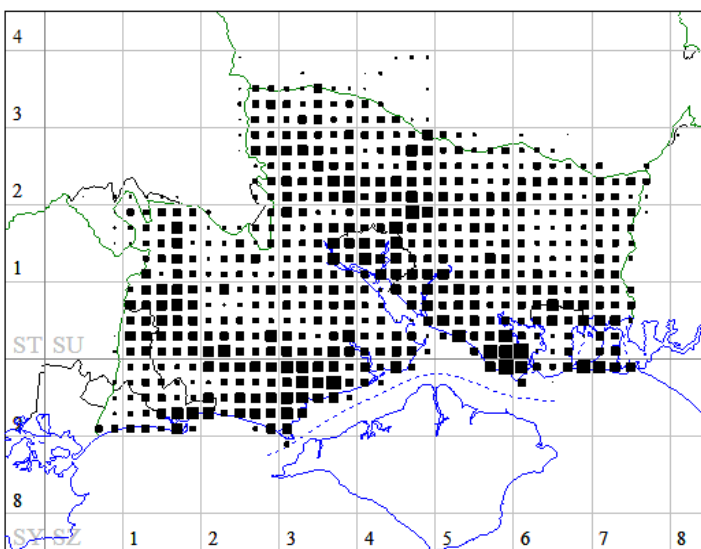
```
SELECT Count([C\Sites and Species 2k].[*Taxon]) AS [Value],
[C\Sites and Species 2k].[2kSquare] AS Gridref
FROM [C\Sites and Species 2k]
GROUP BY [C\Sites and Species 2k].[2kSquare];
```

Save the query, close the form, and return to the map. Find the feature showing data at 10km resolution, and **Show Underlying Data...**

You now need to modify the highlighted parts of this so that it reads as shown. Make sure you change every instance of **U\** and of **10k**. (You may be wondering what

the **U\** and the **C\** are about. They are codes which determine which part of the Analysis menu a query appears in. **U\** actually means that they don't get listed at all, and **C\** stands not very intuitively for the **User Queries** section; I think it implies "custom". As MapMate allows you to add queries only to **User Queries**, this is where it must look for yours.

VC11 Vascular Plants Species Density 2km



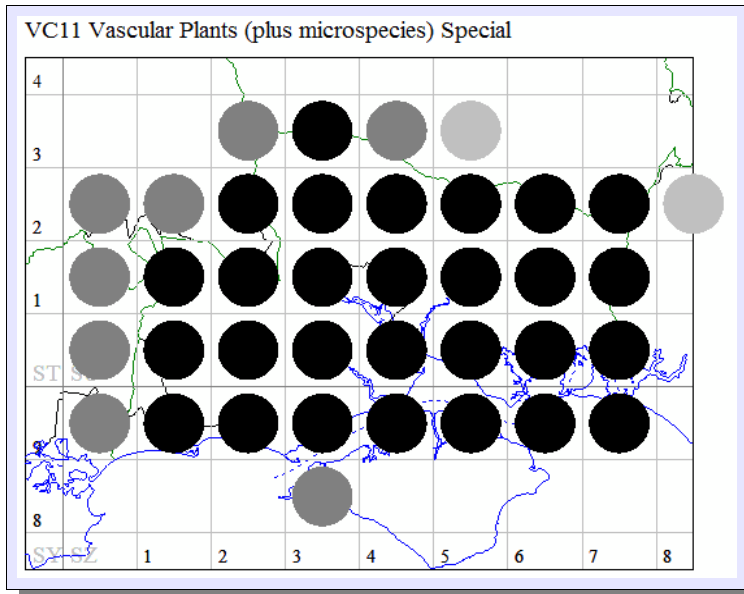
Save the edited query, close the form, make the other necessary changes to the size and captions of features, and **Reload** the map. If all went well, you will now be looking at something like this. If you end up staring at a blank map, you will need to go back over both queries, making sure you got all the code and all the naming and references right.



## Species Richness

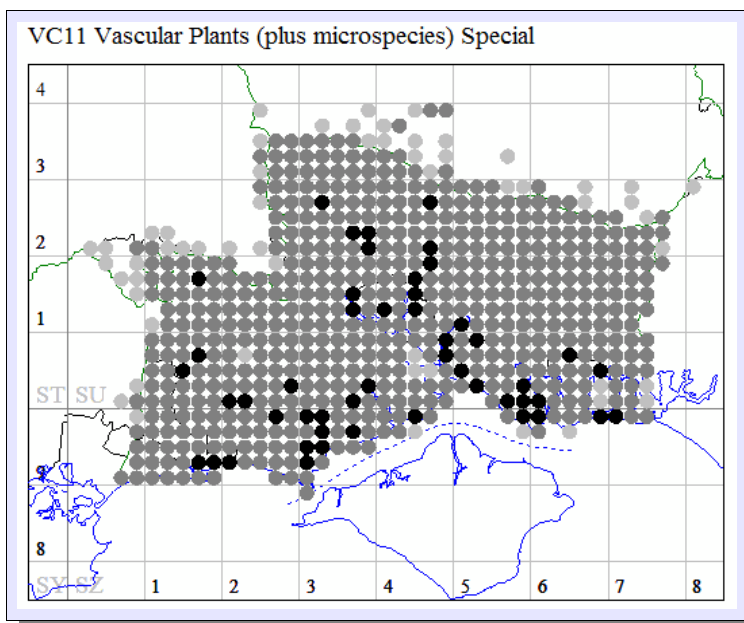
- ☐ 71 to 80 Species 10km
- ☐ 81 to 90 Species 10km
- ☐ 91 to 100 Species 10km
- ☐ 11 to 100 Species 10km
- ☐ 101 to 1000 Species 10km

The remaining features listed for special maps are designed to be used in combination. You'll see that they fall more or less into compatible groups providing linear, logarithmic or quasi-logarithmic scales, and they allow you to introduce more variety into your depiction of statistics; showing different colour shades in place of or alongside different symbol sizes, for instance.



For this map I've chosen three of the features: **1 to 10 Species**, **>100 Species**, and **>500 Species**. Yes, I know there's a gap in there, so let's deal with that now. As usual, right-click on the **1 to 10 Species** feature in the drop-down list, select **Show Underlying Data...**, and display **SQL**. Change the 10; at the very end of the code to 100; **Save Query** and **Close** the form.

The map will start off with all the features represented the same, and I've chosen to use shades of grey to differentiate between them.



Once again, you may be asking whether it's possible to create a 2km version of this map. It is; but you'll need to have read the previous section. If you haven't already created the new user query detailed there, you'll now have to do so. You must then go to the SQL underlying every one of the Data Object features on your map, and make the same changes as described above. Watch out, there are more changes to make this time! Don't forget to **Save Query** for each feature. Then make the necessary **Size** adjustments, and **Reload** the map.

If you've come this far, you will probably appreciate that it's possible to create other types of Special Map by creating variations on the user query you saw above, and varying the conditions that appear in the **HAVING** or **WHERE** clauses of the SQL of Data Objects. I leave you to experiment, in the knowledge that you can't actually damage your data by making maps.

## CHAPTER 7 MAPS AND ATLASES

### Map Housekeeping

#### Deleting Maps

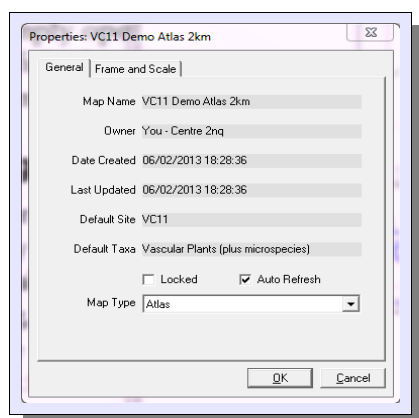
If you want to get rid of a map, simply open it for display, then use **File / Delete** from the MapMate main menu. But be careful when getting rid of Base Maps that you don't have any Atlases that still depend on them.

#### Copying Maps

It may be that you need two similar maps, and the setup for either of them is complicated. In this case you can make a copy of the first map, once you are satisfied with it, to act as a template for the next. With the first map on display, select **File / Save / Copy of this map As...** from the main menu. You will then be prompted for a name for the copy.

#### Refreshing and Reloading Maps

When you first build an Atlas or other map that displays dynamic data, MapMate configures it to refresh the display automatically whenever you enter new record data. Often this will be perfectly acceptable. But if you have an especially large data set, or a complex set of criteria for mapping, or if you are displaying one of the special maps that analyses and summarises data, the map refresh may become slow to the point where it interferes with your data entry work flow.



In this case, you can turn off the automatic refresh. With the map or atlas on display, select **File / Map Properties...** from the MapMate main menu. Then click on **Auto Refresh** so that it is unchecked, and click on **OK**.

Now, if you want to see the map updated to reflect the latest data entered or acquired, you'll need to select **File / Reload** from the main menu bar.

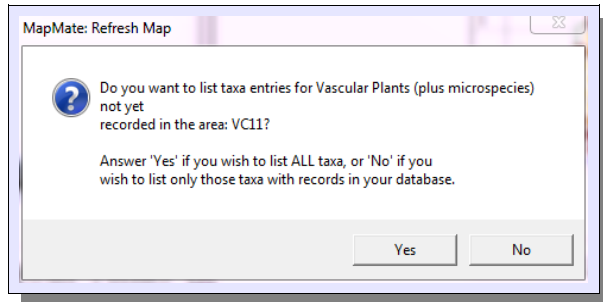
Even when automatic refresh is turned on, MapMate maps will not respond immediately to every change in existing data. If, for example, you change the grid reference of a Site or the date of a Record so that a dot's position or appearance is due to change, this won't happen straight away. If you want to see the effects of your change immediately, you'll need to select **File / Reload**. Alternatively, if you're in the middle of entering Records, the next new Record you enter will cause the map to update.

In certain cases, when you add new features to a map or change existing features (for instance, changing the Base Map of an Atlas), these changes will not immediately be reflected on the map. A **Reload** will be needed.



### Rebuilding Maps

**Reload** works with the taxon data set you gave it when the map was built. If you included all taxa in your chosen species group regardless of whether MapMate held records for them, then this is never a problem. But if you built an Atlas to use only the taxa for which you have data, and you add a first record for a previously unmapped taxon, MapMate will not automatically make a new Atlas page for the taxon. The same is true if you are using a more restrictive filter on Taxa with your Atlas (such as a BAP species list), and a taxon comes into or out of the selection criteria.



In such cases, you need to use the **File / Rebuild...** facility from the main menu. After asking you whether you want to go ahead, MapMate will again ask whether you want an all-inclusive Atlas or only the taxa for which you hold records. If you want to back out at this stage, you can click on this dialog's Close (X) button rather than answering **Yes** or **No**.

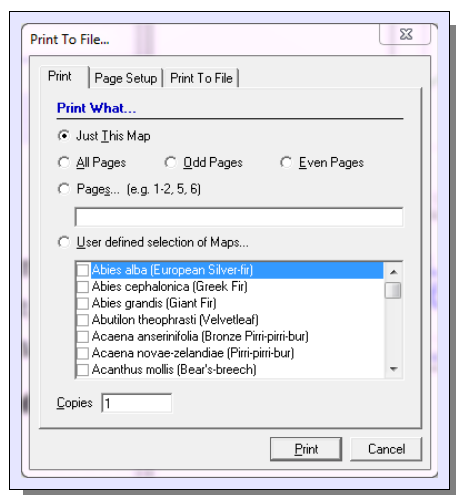
Don't try running **Rebuild** on a Special Map: the results will be surprising! Rebuilds will turn any map into an Atlas, which in this case is probably not what you wanted.

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### Map Export

#### Printing Maps

MapMate has facilities for printing map images. Printing can be directly to a printer; or you can send the output to a file, from which it can be printed later or loaded into an image editing program for further manipulation.

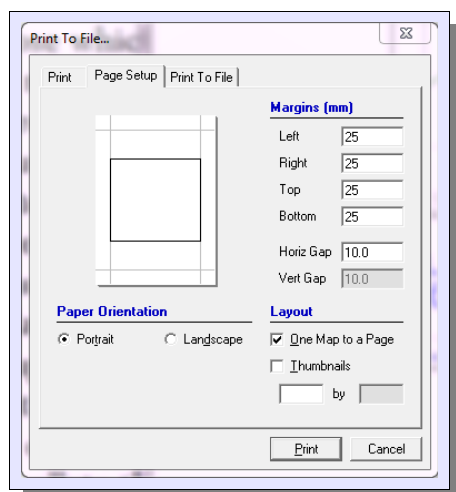


To invoke printing, select **File / Print...** from the MapMate main menu while the map you want is on display.

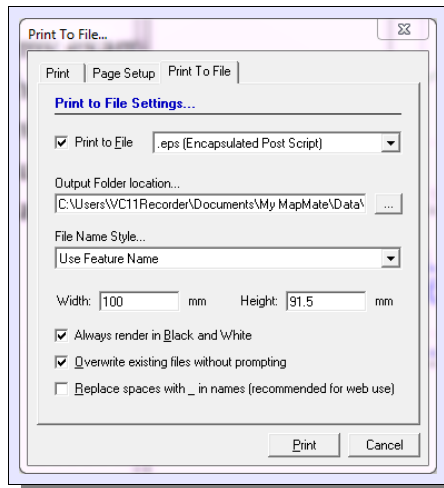
If you are printing an Atlas, the first tab, **Print**, lets you choose which parts of your Atlas you'll send for printing. I've met very few people who actually want to print an entire Atlas as it stands, or even make a printable document of one, so I suspect the **All Pages** option will be of limited interest to most people. You may be wondering why there are options for **Odd Pages** and **Even Pages**. This is because the next tab in the dialog, **Page Setup**, will let you set layout and margins.

Unfortunately what you can't do is set up alternative layouts for odd and even pages, and then print the lot. So, if you really wanted to use this feature, you would need to make the layout for one set of pages, print those, change the layout, print the others, and then find a way to collate the two. In the days when we sent hard copy to printers for publication this probably made some sense.

For my example I shall keep to printing **Just This Map**.



Most of the settings on the **Page Setup** page will be fairly self-explanatory. **Thumbnails** lets you run a series of small images in a matrix layout onto a single sheet. It only makes sense, of course, if you are printing more than one map.



Finally, the slightly confusingly named **Print to File...** tab lets you specify where your output will go. If you want to send it straight to a printer, untick the **Print to File** box. When you then click the **Print** button, MapMate will send the output directly to whatever is the **default** printer on your Windows setup, without displaying the usual Windows printer dialog.

This is annoying, because you may want to choose a different printer or adjust the printer quality settings before you print. The only remedy is to change your default printer settings in Windows before you start, and then remember to put them back once you've done.

Another annoying feature is that if you have annotation such as a key on your map which is outside the map display area, MapMate may fail to take this into account when applying the margins for printing. You may not see this truncation all the time, because in fact it uses the dimensions for the map area set up in the **Map Properties...** facility. There is a way to overcome this using **Map Properties...**, but it usually results in a distorted map unless you are prepared to go through a lot of trial and error fiddling, and so I'm not recommending it.

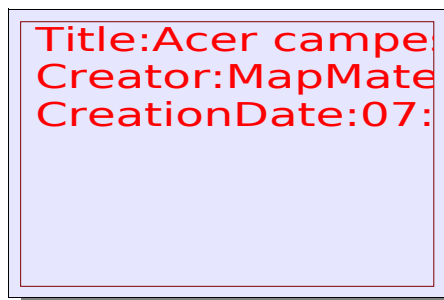
### Printing to a File

For the example, I am going to use the **Print to File** option. Choosing the right format will not take up much of your time. You may never have heard of EPS as it isn't one of the typical formats used for interactive image handling these days, but it remains a common output option in many desktop publishing and graphics editing programs, and is widely accepted for electronic document exchange by printing companies.

The **Output Folder location...** presents you with the option of where to send your file, and needs little explanation. **File Name Style** presents you with various options for naming the file, some with more long-term memorability than others.

As the file output is independent of layout on a physical page, the **Width** and **Height** options let you specify the default dimensions which your file will acquire when given a graphic representation. If you adjust **Width**, **Height** will be rescaled automatically to preserve the image proportions.

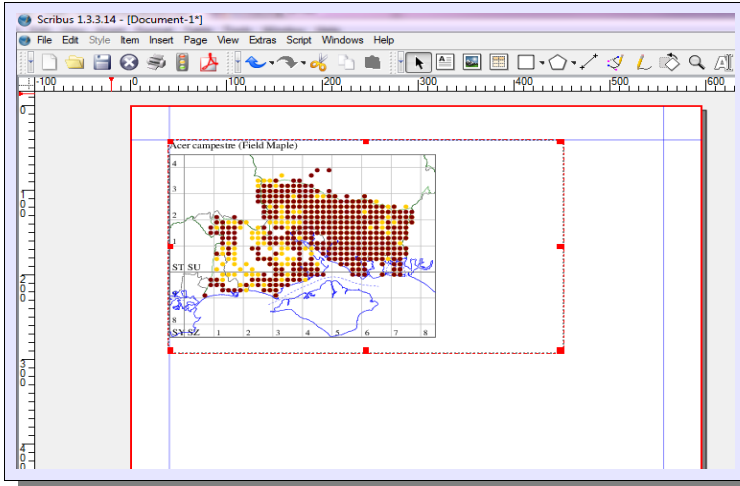
The option **Replace spaces with \_ in names (recommended for web use)** is an amusing one. It's not possible to display EPS images embedded into a Web page! However, if you are likely to transfer your file into a non-Windows environment, it's a good option to choose.



You might now think that it will be a straightforward matter to import your image file into a word processing program such as OpenOffice Writer for document editing. But this is what you get if you try. What's going on here? Well, you need to know that an EPS file normally contains two images – the full works, and and a “preview” image. MapMate doesn't produce the preview image. It seems that

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OpenOffice can display the header data from the file, but not the main image. This issue of two representations has been a bugbear for portability of EPS files almost since they were conceived. You'll get a similar (but slightly more informative) result if you try loading the file into Microsoft Office programs.



In practice, you'll find that some software copes well with reading EPS files and some doesn't. Here, for instance, is our exported map nicely rendered in the free open-source desktop publishing program Scribus. (Note that for me, at least, MapMate again lost the key annotations when it wrote the file. ) Some programs, like the free image editor GIMP, need you to install a separate (free) utility called Ghostscript to interpret and render the file when you load it.

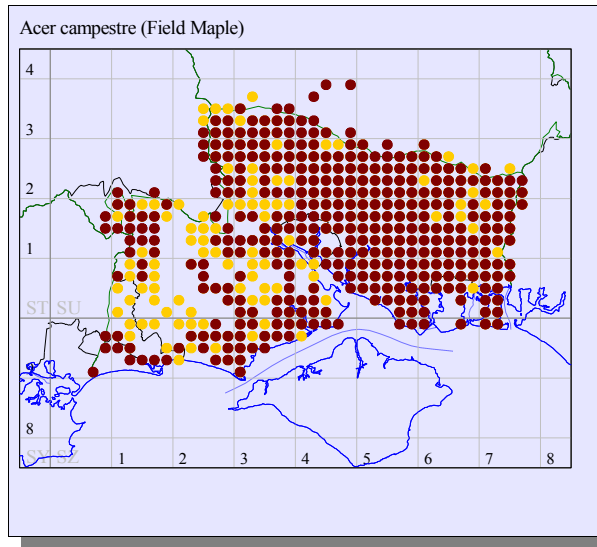
Once you've done this, GIMP and other image editors will let you export the file to other formats that **can** be embedded in Web pages.

### Printing – in Conclusion

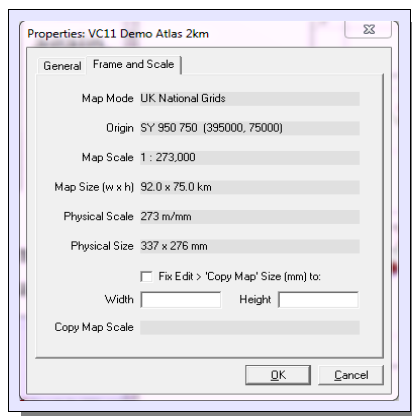
Printing directly to a printer is relatively straightforward, but I suspect that it will be an irrelevance to most people these days, other than for the odd copy to take to a meeting or pin on a display board. Most of us are probably more interested in being able to embed map images in documents or Web pages. For this, MapMate is disappointingly restricted in its options. If you want a good quality image, it's certainly true that EPS is a good format to use; but unless you are technically minded and willing to get to grips with a range of other software, it's likely to present you with a challenge. If you want the best quality imagery to go into a professionally produced book, and you don't have confidence in your computer skills, I can only suggest you befriend an experienced technical person to help you.

If you want to be able to export reasonably good images (certainly good enough for Web pages and less formal printed works), then the next section will describe an alternative method which is quick and simple. Before we leave this topic, however, I'll mention one other option for producing a document with maps in. This is a class of software usually called "PDF printers". You install them in Windows just like any other printer driver, and they can then be invoked from any program that prints documents to a hardware printer. By selecting the PDF printer, what you get is an Acrobat *Portable Document Format* file which can be read with the Adobe Acrobat Reader or displayed through a Web browser. What you won't be able to do with the normal run of editors and word processors is edit them. For that you will need to invest in a PDF **editor** program. There are quite a few PDF **generating** programs around, some of which are free (I currently use PDFLite, but I have used several others satisfactorily, including CutePDF). Be aware that some of the free programs advertised as "PDF editors" will only give you very limited capabilities, mostly to do with re-ordering, merging and extracting parts of existing documents.

## Copying Maps

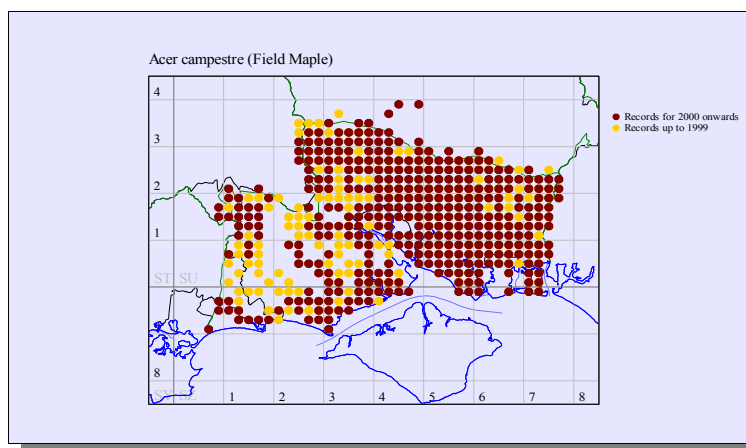


If you want an individual map out of MapMate, the alternative is to bring it up in the MapMate main window and select **Edit (Copy map to clipboard)** from the main menu. You can then paste it into any document editing program that lets you display images, or any image editing program. What you are looking at on the left is exactly the result of doing that, with a little bit of rescaling. Notice that once again, MapMate has discarded the annotation on the right hand side. But it's possible that you won't see this side-effect; more on this shortly.



If you are seeing it too, select **File / Map Properties...** from the MapMate main menu, and make sure that **Fix Edit 'Copy Map' Size (mm) to:** is unchecked.

The legend suggests that this will only affect the **Copy Map** facility. But it doesn't; it also alters what you see when printing maps. However I've found that trying to get a satisfactory scaling and aspect ratio for printing is then very hard.



With the box unchecked, I will get the map and all its annotations when I copy and paste it.

I can affect the resolution of the copied image (and, as a result, its file size) by checking the box, and MapMate will then propose a default size. If I then change the **Width** to a higher value, the **Height** value will automatically adjust to preserve proportions, and I will get a higher resolution (larger scale) map which takes up more file space. If I change **Width** to a lower value, the resolution is coarsened but the file size is smaller – often a better option

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for Web page illustrations.

When you put a copied map into a document, the story is not quite so simple. The map will probably be rescaled again, to fit whatever space is allotted for it. These changes can cause step-like irregularities (known as “aliases”) to appear in the illustration, often worse at some scalings than at others. You may need to play around a little to find the optimum relationship between the scaling in MapMate and the size of the illustration on your document page. Also remember that when printing your document, the selected print quality will also come into play.

Unfortunately, MapMate doesn't provide a “dots per inch” control on resolution that will let you make a direct judgement on quality. But choosing a width of 200mm or more will give good quality results in almost all circumstances for printing in standard book sizes. Large displays on posters may merit more.

You may have noticed that if you adjust the **Height** without editing the **Width**, MapMate doesn't appear to adjust the width to keep proportion. You may even imagine that this is a way to bring your right hand side annotation into view when copying a map. But no: MapMate, as soon as you copy the map, will go back to finding the map area based on the Title and map area, and will reset the width to stay in proportion with the specified height. You can verify this by making a height change, copying a map, and then going back to the **Map Properties...** form to see what has happened to the figures. Only unchecking the **Fix Edit...** seems to have the right effect.