Species Information Service

Data Entry Module

User Instructions

Last updated June 2004

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1 Introduction

We suggest that you spend a little time familiarising yourself with the Data Entry Module (DEM), and how it works, before you start the process of entering data. It is also recommended that you read this entire document to fully understand all the functionality and capabilities of the software before you begin. Once you are familiar with the system, you should find the process of entering data to be reasonably fast and efficient.

1.1 System Requirements

The DEM is compatible with either Microsoft Access 2000 or Access XP. If neither of these versions of the Microsoft Access software is installed on your computer then the installation program will install a runtime version of Access allowing you to use the DEM. Although there is a mapping component within the database, there is no requirement for any GIS software to be already installed on your computer.

Unfortunately Microsoft Access is not available for Mac computers at present although it may be possible to use a PC emulator. This requires that a PC emulator be installed on the Mac so that Windows designed software such as Microsoft Access can be installed.

2   Prerequisites
2.1   For Windows 95
- Y2K Update 2 - To be installed from the WIN95\Y2K folder on the CDROM or the installation program set.
- Internet Explorer 4.01 SP1 – To be installed from the WIN95\IE4 folder on the CDROM or the installation program set.

3   Installation Instructions

The first step is to install the Data Entry Module (DEM) on your computer. To begin the installation, double-click on the file *setup.exe* on the CD.

3.1   Installation of the database without the mapping tool

1. The installation process contains a screen titled "Select Features". This contains two items
   a. SIS Data Entry Module
   b. Mapping Tools and Dependencies

2. The Mapping Tools and Dependencies item is selected by default. De-select it if you do not wish to install the mapping module.

3. Proceed with the installation by clicking on the "Next" button at the bottom of the Install Shield Wizard window.

4 An Overview of the Main Menu

4.1 Opening the Data Entry Module

There is more than one way to open the Data Entry Module (DEM). Firstly it is possible to find it in your list of programs. On your computer left mouse-click on the *'Start'* Menu (usually in the bottom left-hand corner of your screen). From the list that appears, go to *'Programs'*, and then follow the arrow on the right-hand side to the next list that appears. You will find an entry called "SIS Data Entry Module". Highlight this entry and left-mouse-click to select it. The DEM should now open.

Alternatively using "Windows Explorer" find the directory called *c:\Program Files\SIS* on your computer and double-click on the file called *"SIS Data Entry Module 2000.mdb"* within this directory. The DEM should now open.

The data that is entered in to the DEM will be stored in a file called *"SIS data files.mdb"*. At a later date when it is necessary to send the data from the DEM to a colleague or the leader of a project, then only send this file.

4.2 Overview of the Main Menu

When the database first opens you will see the "Main Menu" window as shown in Figure 1.
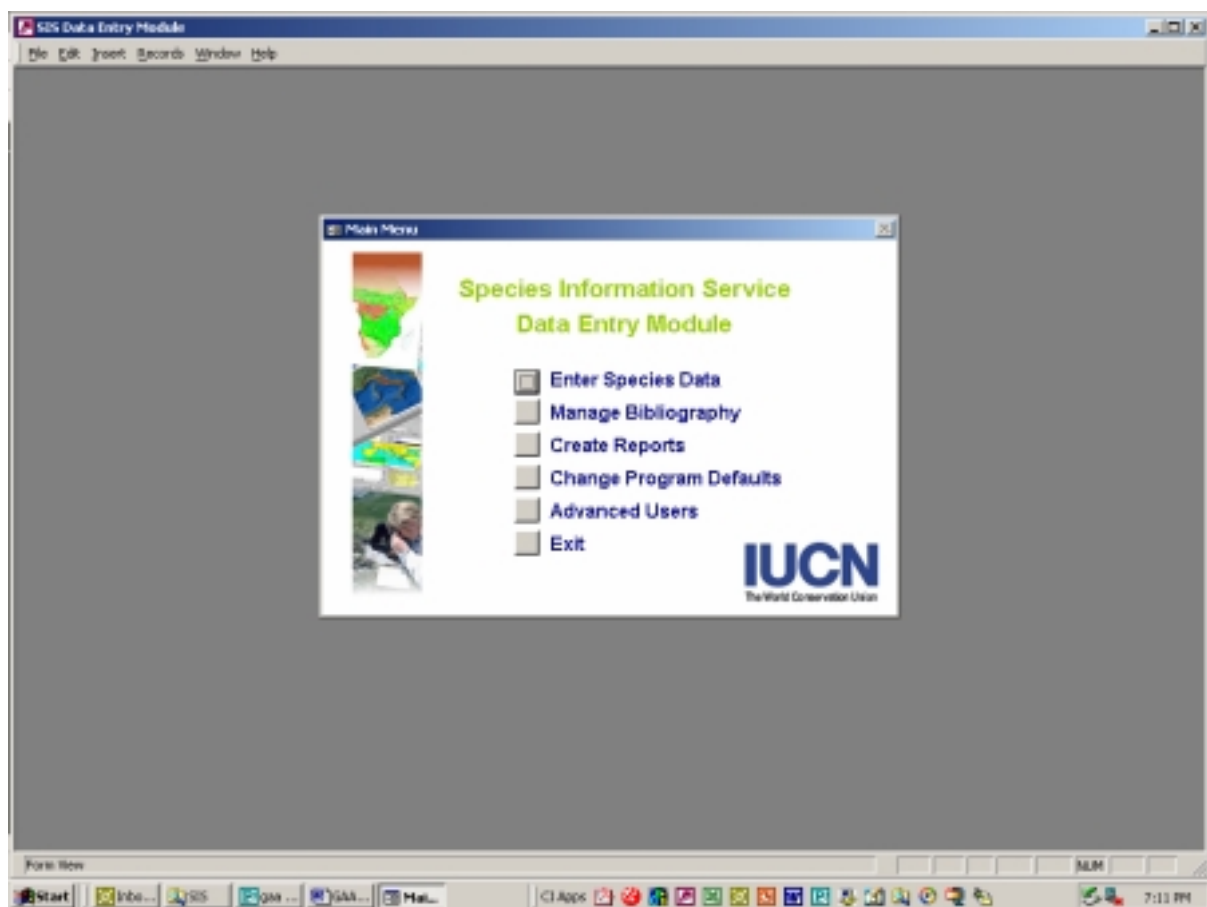
Figure 1. The Main Menu of the Data Entry Module.

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It is from this Main Menu that you can access all the various functions of the DEM. On the Main Menu there are six options that you can choose from. The general outline of each of these functions is given below.

4.2.1   Enter Species Data

This part of the DEM is where all of the species level data entry takes place. It consists of a main window, which links to a series of sub-windows. The sub-windows are accessible through the main window by clicking on various buttons (i.e., Red Listing, General Information, Extent of Occurrence, Countries of Occurrence, Habitat Preferences, Occurrence in Marine and Inland Water Bodies, Major Threats, Conservation Measures, Utilisation, Purpose/Type of Use, Removed from Wild, Source of Specimens and Bibliography). Further details regarding this part of the DEM are given in Section 5 of this document.

4.2.2   Manage Bibliography

This part of the DEM is where the bibliographic records entered by the user can be modified, added or deleted. Further details regarding this part of the DEM are given in Section 6 of this document.

4.2.3   Create Reports

This part of the DEM contains all of the available reporting functionality. From here it is possible to print reports summarising the species level data that has been entered in to the system. Further details regarding this part of the DEM are given in Section 7 of this document.

4.2.4   Change Program Defaults

This part of the DEM enables the user to change some of the default values within the system. It is recommended that users are extremely cautious in changing any of these values as they can affect the overall working of the DEM. If in doubt, contact user support before making any changes in this section. Further details regarding this part of the DEM are given in Section 8 of this document.

4.2.5   Advanced Users

This part of the DEM, as the name suggests, is primarily for the more advanced user. From here it is possible to import into the DEM the names of species from an existing file; to combine the data from two separate DEM modules; and to export the maps created in the DEM to a format compatible with the ArcGIS software package. Further details regarding this part of the DEM are given in Section 9 of this document.

4.2.6   Exit

Clicking on "Exit" will close the DEM.

5   Entering Species Data

When you select "Enter Species Data" from the Main Menu the following Window will open (see Figure 2).

Figure 2. The 'main window' to enter species data.

This main window is linked to a series of subwindows. The sub-windows are accessible through the main window by clicking on various buttons; General Information, Extent of Occurrence, Countries of Occurrence, Habitat Preferences, Occurrence in Marine and Inland Water Bodies, Major Threats, Conservation Measures, Utilisation, Purpose/Type of Use, Removed from Wild, Source of Specimens, Red Listing and Bibliography. Each of these subwindows is described in detail in the following sections.

To return to the Main Menu at any time from the enter species data section of the DEM, simply click on the *'Return to Main Menu'* button in the main window.

To move between fields within each of the windows, use the *<Tab>* key or the cursor. If a field has a pull-down menu then to select a value you can either select from the menu by clicking on the appropriate option or start typing the appropriate word.

Each species has one record in the main window. When clicking on any of the buttons in the main window, information corresponding to the species shown in the main window is displayed in the sub-window that opens. To close a sub-window, click on the relevant button

at the bottom of the window. Alternatively, in most windows it is possible to use the *<Enter>* key to save changes and close the window, and *<Esc>* to close the window without saving.

5.1 <u>Systematics</u>

When entering data it is simplest to go through species-by-species, entering the systematic information first. It is possible to add species, and to delete them, and the procedures for doing this are outlined below.

The systematics section of the DEM is contained within the left-hand side of the main window. To navigate between species records use the *'Previous Record'* and *'Next Record'* buttons or to find a specific record try using the *'Find'* command button. Before clicking on *'Find'* you must first click in the field that you would like to search. It is also possible to move through species records by using the record navigator buttons in the bottom left-hand corner of the main window. Please note, the species are ordered alphabetically by taxonomy in the main window, and not by the order in which they are entered into the database.

If you cannot find a species that you are looking for, it may actually be entered as a synonym of another species. To search for a species in synonymy, click on the *'Search in Synonymy'* button on the main window, a small sub-window will then appear. Click on the Synonym name and then click on the *'Find'* button in this sub-window. Then type in the name you are looking for and click *'Find Next'*. If the name is in the system then it will now appear in the *'Synonym'* box, and then the name used in the DEM will be given in the box below. Close this window and search for this name in the DEM to find the species. If the name is not known, a message will appear confirming that the species name is not in the system.

If you are being given the DEM as part of a project you may already have the taxonomy for all your species entered in to the system. For others it may be necessary to add each species one by one. To import taxonomy from another file (for example an Excel spreadsheet) please see Section 9.1 of this document.

5.1.1 <u>Adding a New Species</u>

To add a new species to the DEM click on the *'Add species'* button in the main window. The window shown in Figure 3 will now open.
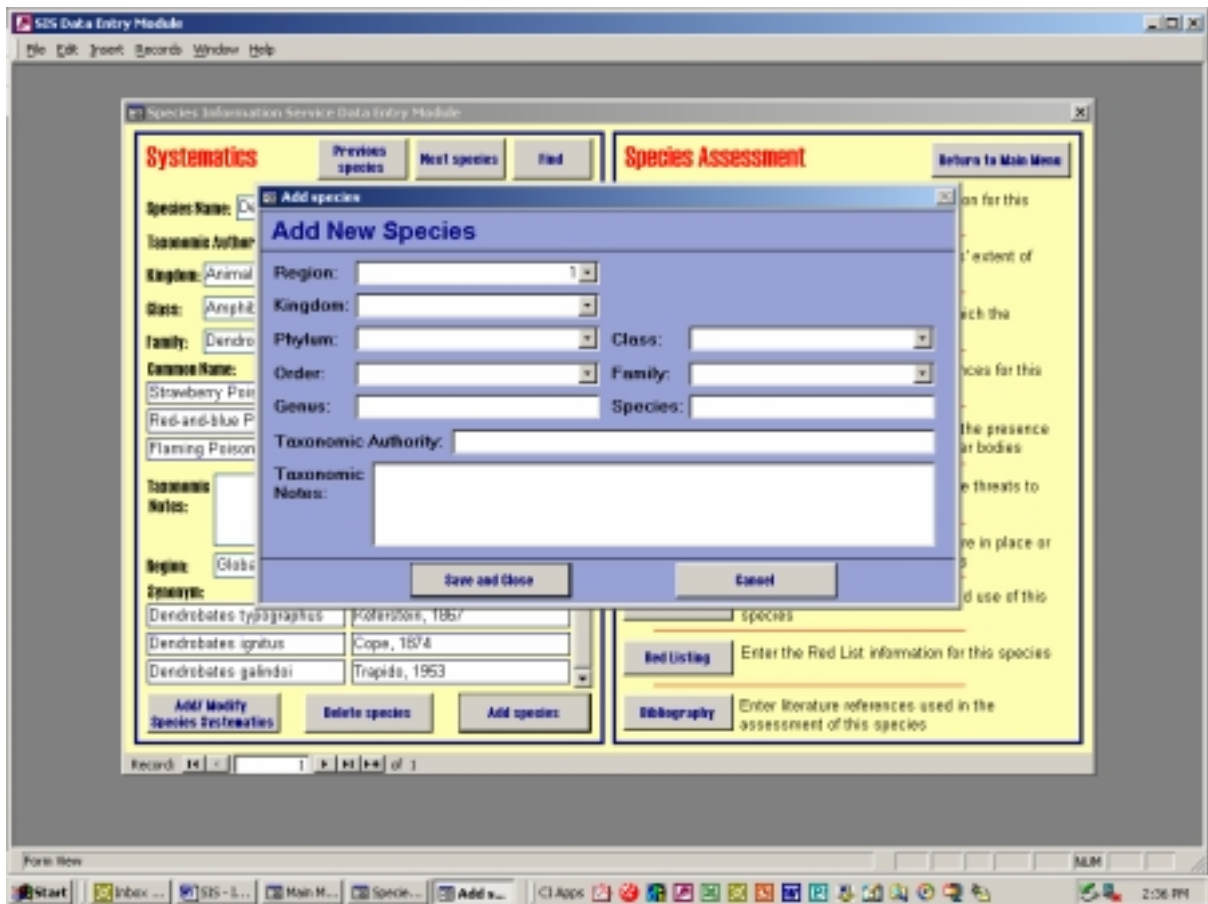
Figure 3. The 'Add species' sub-window.

The first box that will need to be entered is the 'Region'. By default this is set to "Global", ie. you would like to assess the global status of the species. The choices that are available within the pull-down menu for 'Region' can be changed. Please see section 8.3 of this document for instructions on how to change these values.

In this window the Kingdom, Phylum, Class, Order, Family, Genus and Species information must also be entered, as well as the Taxonomic Authority. This data can be modified later using the "Add/Modify Species Systematics" section of the DEM (see Section 5.1.2).

The best way to enter this data is to first select the Kingdom from the pull-down menu for Kingdom. The choice you make will then affect the choices available in the Phylum pull-down menu. Similarly the choice you make in the Phylum pull-down menu will affect the choices available in the Class pull-down menu, and so on. The Genus and Species information will need to be entered by the user and no pull-down menus are available.

When you have finished entering the data in to the 'Add species' window, click on the '*Save and Close'* button to close the sub-window and return to the main window. The species that has just been added will now be visible as a record in the main window. The species in the main window are displayed alphabetically by taxonomy so it may be necessary to either search for the new species or cycle through the records to find your newly entered species.

If for some reason you would like to cancel the entry of a new species then click on *'Cancel'* in the sub-window. You will then be prompted to confirm that you would like to delete this newly added species, click *'OK',* and you will be returned to the main window.

When adding a new species, only the taxonomy needs to be entered first. To add additional information such as synonyms and common names or to modify the taxonomy that has already been entered click on the *'Add/Modify SpeciesSystematics'* button on the main window.

5.1.2 <u>Modifying the Species Systematics Information</u>

To modify the Species Systematics already entered in to the DEM, or to add or edit synonyms or common names, click on the *'Add/Modify Species Systematics'* button on the main window. A new sub-window will then appear (see Figure 4).
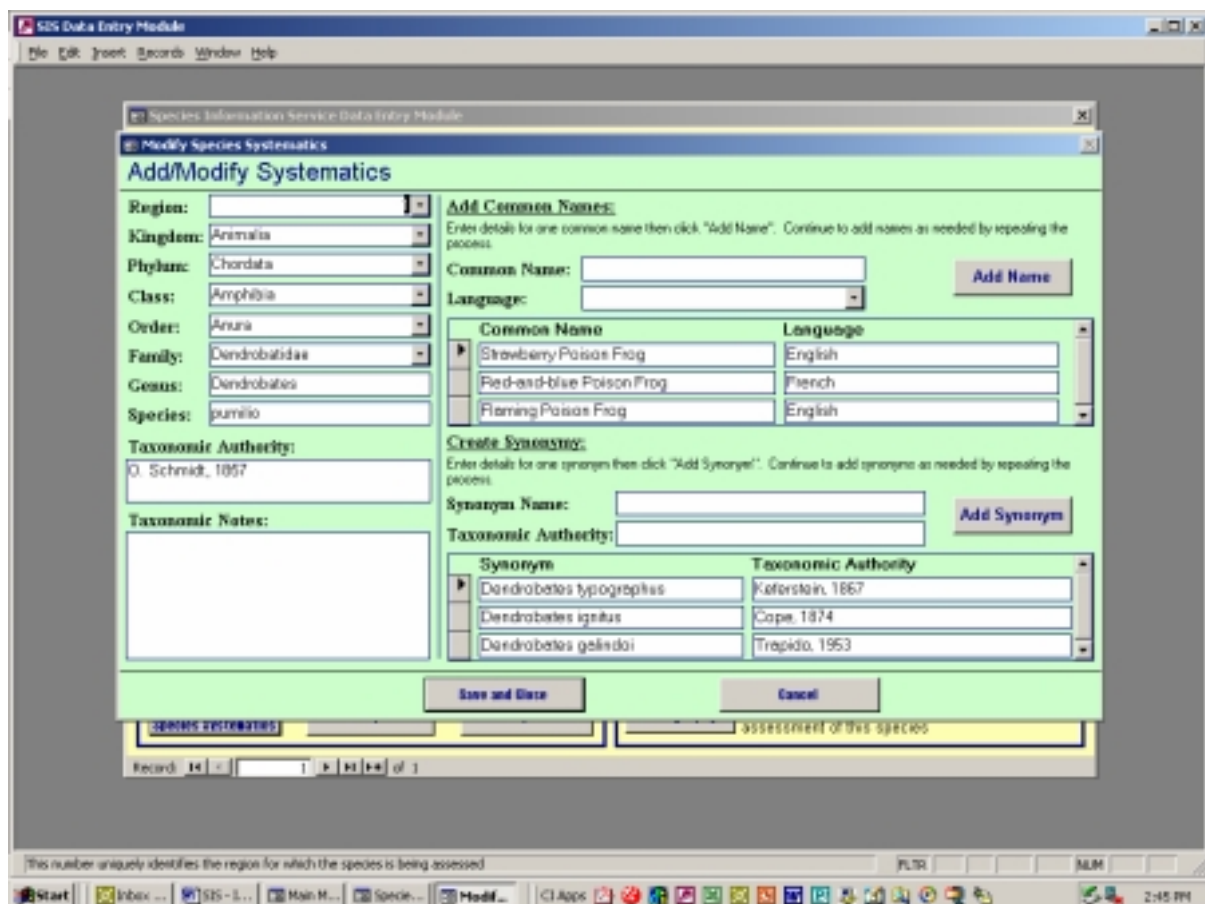
Figure 4. The 'Add/Modify Systematics' sub-window.

You can make whatever changes you need to the Systematics information of a species by editing the data in this sub-window. To save any changes that you make, close the window by clicking on the *'Save and Close'* button. To disregard the changes you have made click on the *'Cancel'* button.

To add a common name, enter the name in to the '*Common Name'* box at the top of the sub-window. Then just below this, choose the language of the common name from the pull-down menu. When you have filled in both of these boxes, click on the *"Add Name"* button to the

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right. This information will now be transferred to the list below. The boxes will now be empty and another name can then be added by repeating this process. If more than three names are entered you will need to use the scroll bar on the right-hand side of the list of names to look through all of them.

Adding a synonym for a species is similar to adding a common name. Enter the name of the synonym in to the *'Synonym Name'* box. Then just below this, enter the taxonomic authority for the synonym. When you have filled in both of these boxes, click on the *'Add Synonym'* button on the right. This information will now be transferred to the list below. The above areas will now be empty and another synonym can then be added by repeating this process. If more than three synonyms have been added you will need to use the scroll bar on the right-hand side of the list of synonyms to look through all of them.

When editing the taxonomy of the species, notice that each of the drop down menus are linked to one another. Therefore, the choice you make in a higher-level pull-down menu will then affect the choices available in the pull-down menu of the level below. For example, the choice you make in the Phylum pull-down menu will affect the choices available in the Class pull-down menu, and so on. The Genus and Species information will need to be edited by the user and no pull-down menus are available.

5.1.3   Deleting a Species

To delete from the DEM the species currently displayed in the main window, click on the *'Delete species'* button in the main window. A message will then appear to confirm that you would like to delete the species, click *'Yes'* to confirm, or if you are not sure, or you no longer want to delete the species click *'No'*. If you clicked *'Yes'*, then the species record will be removed from the DEM and you will be redirected back to the beginning of the records.

Please note that this deletes not only the systematics information, but also all the other information relating to this species, including that on Red Listing, General Information, Species Distribution, Habitat Preferences, Occurrence in Marine and Inland Water Bodies, Major Threats, Conservation Measures, Utilisation and Bibliography.

5.1.4   Further Information on Entering Data in the Systematics section

The following is some advice on what information is being requested within the systematics section of the DEM:

1. The taxonomic authority is the name of the describer of the species, together with the year in which the species was described. If the species is now included within a genus that is different from the one used by the original describer, the taxonomic authority should be put in brackets. For example, the taxonomic authority for *Salamandrina terdigitata* is (Lacépède, 1788) because this species was originally described as *Salamandra terdigitata*. However, the taxonomic authority for *Rana temporaria* is Linnaeus, 1758, since this species is still included in its original genus.
2. There is no need to enter all synonyms for every species. Instead, just include any synonyms that are still in regular usage, and which should be mentioned so that there is no doubt about what is being included under a particular species name. You do not need to include obscure, old names. If you feel that there is no need to mention a synonym for a particular species then don't add one. If you do want to include one or more synonyms,

make sure that you include the Genus and Species names, and the Taxonomic Authority (name of person who first introduced the name and the year).

3. It is not essential to enter a common name for every species, but if a name is in common usage, please enter it.

4. In the *'Taxonomic Notes'* section, where necessary, please give further information on any taxonomic discrepancies or recent changes to a species' taxonomy. Please be aware that this field is just for taxonomic notes, not notes on other aspects relating to the species.

5.2   <u>General Information</u>

To enter the general information about a species, click on the '*General Information*' button on the right-hand side of the main window. The 'General Information' sub-window will now appear, as shown in Figure 5.

Figure 5. The 'General Information' sub-window.

The first question asks which biomes the species occurs within. Tick all the boxes that apply for this species.

The next question refers to the status of the distribution map drawn within the 'Extent of Occurrence' section of the DEM. It is not necessary to fill in this box. If desired, the map status can be used to keep track of whether the map drawn is of the global distribution or only regional, or whether drawing a map at this time is not possible for various reasons.

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In the '*Geographic Range*' box, enter general information on the geographic distribution of the species. For example, for a widespread species like *Bufo viridis* you could enter something like: "*Europe (including southern tip of Sweden, but excluding the rest of Fenno-Skandia and the British Isles and western Europe west of the Rhine River) east to Kazakhstan and Altai mountains in Russia, Mongolia, and western Xinjiang, China; northern Africa from western Morocco (including the Ahoggar Massif) to western Libya; south-western Asia and Arabian Peninsula in the southern Hadramaut*". For *Salamandrina terdigitata* (which is an Italian endemic) you could enter something like: "*Italy in the Apennines from Liguria to Campania provinces*". For a species that is know from just one locality, such as *Nectophrynoides asperginis* from Tanzania, you could enter more precise geographic information if it is readily available, such as: "*Kihansi River Gorge upper falls spray wetland, Udzungwa Mountains, Tanzania*". Please if possible also give an elevation range for the species' distribution and indicate whether any of the given range is predicted or historical.

In the '*Population*' box you should include a population estimate for the species if this is available. Of course, for many species, this will not be possible, and in such cases please give a qualitative estimate of the population status (eg. it is a rare species, or it is quite common, etc.). In the case of some of the rarer species, you might be able to make a rough estimate, and in such cases you might want to use the ranges of figures that are used in the Red List criteria, for example: < 50; 50-249; 250-999; 1,000-2,499; 2,500-9,999; >10,000 mature individuals (though of course, if you have more precise information, you should use it).

In the '*Habitat and Ecology*' box you should enter just very short, general information on what is known of the habitat and ecological requirements of the species in question, including a focus on habitats that are know to be essential for breeding. For *Nectophrynoides asperginis* it could include information such as; "*Can only survive in the spray zone of waterfalls*". For *Salamandrina terdigitata*, it could be something like: "O*ccurs mainly in damp forest habitat, usually close to streams. It is dependent upon streams and sometimes ponds for breeding*".

In the '*Major Threats*' you can elaborate on the threatening process impacting the species. Short sentences can be used, and if the species in question is believed to be declining because of habitat destruction, this should be stated. It is acceptable to mention threats that can reasonably inferred, even if they cannot be conclusively demonstrated. You should note that you can mention threats to a species, even if it does not qualify for one of the more threatened Red List Categories.

In the '*Conservation Measures*' box you should include measures that are species-specific (such as inclusion in CITES or national legislation, a captive breeding programme, or some form of species-specific field action) as well as more general conservation measures that have a broader focus on the ecosystems in which the species occurs, but which nevertheless are likely to benefit the species (such as occurrence in a protected area).

When you have finished entering information in this sub-window click on '*Save and Close*' to save all the information that you have entered, or click '*Cancel'* to undo these changes.

5.3 <u>Extent of Occurrence</u>

To create or edit a distribution map for the species click on the '*Extent of Occurrence'* button on the right-hand side of the main window. This will launch the Geographic Information System (GIS) component of the DEM as shown in Figure 6.
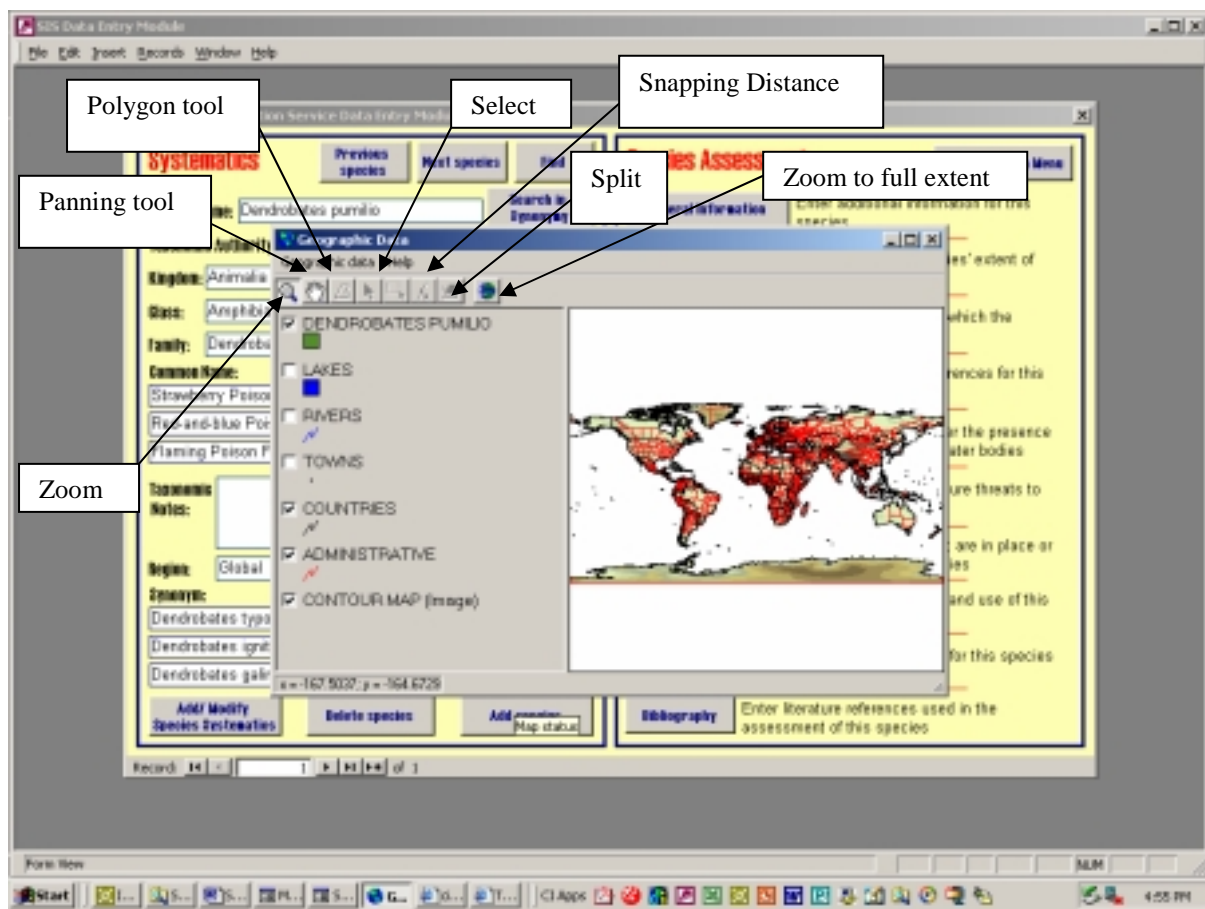
Figure 6. The 'Extent of Occurrence' section of the DEM.

In this section you should draw the geographic distribution of the species that is currently displayed in the main window. The distribution that you should draw should be the Extent of Occurrence of the species. IUCN defines the Extent of Occurrence of a species as: "*The area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy. Extent of Occurrence may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g., large areas of obviously unsuitable habitat).*" In other words, you should draw a polygon, rather than a point distribution map for your species.

Before you start to enter data in this part of the DEM, it is worth spending a little time getting used to the system, and how it works. If you are not used to mapping distributions, this might seem a little complex at first, but with a small amount of practice you will soon get used to it. It is recommended that you try out the system experimentally at first, following the instructions given below.

5.3.1 <u>Moving the map around</u>

When you open this section, you will at first see a map of the world including various 'layers' such as administrative boundaries, lakes and rivers.

To use the system effectively, you will need to zoom in on the region that is of relevance to the species you are dealing with. To activate the zoom, click on the magnifying glass button on the left-hand side of the toolbar (see Figure 6). Then move your cursor over the map and choose a point as one of the corners of the rectangle that you wish to zoom in on. Click on this point, and keep your mouse button held down. Then move your mouse to draw the rectangle that you are going to zoom in on. Once you are satisfied that you have the right rectangle, release the mouse button and the map will be zoomed to the area of the rectangle that you have drawn. If you find that you have not zoomed in enough, then draw another rectangle in the appropriate place, and repeat the procedure.

If you find that you have zoomed in too far, it is possible to correct for this by clicking on the right mouse button. This will cause the map to gradually zoom out again. To zoom out to the full extent of the map, click on the button on the far end of the toolbar that has a picture of the world on it (see Figure 6). The trick is to use the zoom mechanism to find the scale of resolution that allows you to draw as accurate an Extent of Occurrence as possible for your species. With a little practise, you will get used to doing this.

If you find that the part of the map you are looking at does not include the area that you need, it is possible to move the map without changing the level of zoom. To do this, you should use the panning tool on the toolbar. The panning tool is activated by clicking on the button with the hand on it that is second from the left on the toolbar (see Figure 6). Then click on the map and without releasing the mouse button, drag the map in the desired direction. Once you have the map in the correct position, release the mouse button.

5.3.2   Drawing the distribution

Once you are familiar with moving the map around, and using the zoom, you should practise drawing some species' distributions. To the left of the map there are a series of layers which can be switched on or off by clicking on the white box next to the name of the layer. The top layer is the name of the species that is currently displayed in the main window of the DEM. This is the layer that can be edited to display the species distribution. Click on the name and the layer should become active and be displayed slightly raised.

To add a geographic distribution for the species currently displayed in the main window of the DEM, you must first enter 'Edit' mode. To enter the 'Edit' mode, click on the *'Geographic data'* menu (situated above the toolbar in the top left of the sub-window). From the pull-down menu that will appear, select *'Layer'*, and then *'Edit'* from the next pull-down menu. Then click on the *'Polygon'* button, which is third from the left on the toolbar and looks like a leaning *'L'* (see Figure 6). When this button is indented it is possible to draw polygons (i.e., the boundaries of the Extent of Occurrence of your species). This is done by clicking at appropriate points on the map where you wish to create vertices. Vertices are points on the boundary of the distribution of your species. Each time the mouse is clicked a vertex is added. The system assumes that the boundary of the Extent of Occurrence of your species consists of straight lines between the vertices. So in drawing the Extent of Occurrence, you should proceed slowly and carefully along the boundary, clicking to create vertices whenever you wish the boundary to deviate from a straight line. To close a polygon, double click. If the Extent of Occurrence of your species is fragmented, then you will need to

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draw more than one polygon, and in such cases you will need to close each polygon before starting on the next one. Once a polygon is closed, it is still selected. To clear the selection, click outside the boundary of the polygon.

To save a newly created polygon, click on the *'Geographic data'* menu and select *'Edit'* from the pull-down menu, and then *'Save'* from the next pull-down menu. Polygons that are saved will be shown in a different colour. After saving, the 'Edit' mode will automatically be exited.

To delete a polygon, firstly enter 'Edit' mode (by going to the *'Geographic data'* menu, then *'Layer'*, then *'Edit'*). Then click on the *'Select'* button on the toolbar, which is in the middle of the toolbar and has an arrow on it (see Figure 6). To select the polygon, click inside the polygon on the map. The vertices of the polygon will then be highlighted. From the *'Geographic data'* menu select *'Edit'* and then *'Delete Selected'*. Alternatively selecting the *'Cancel'* option in the *'Edit'* menu will cancel the last operation and delete any polygons that have not already been saved. By selecting *'Cancel'*, however, the 'Edit' mode will also be automatically exited.

An existing polygon can be edited by adding, deleting or moving a vertex. Firstly 'Edit' mode must be entered (by going to the *'Geographic data'* menu, then *'Layer'*, then *'Edit'*). To delete a vertex, select the polygon using the *'Select'* button on the toolbar so that the vertices are highlighted. Then click on the vertex that is to be deleted. This vertex should now be highlighted differently from the other vertices. From the *'Geographic data'* menu select *'Edit'* and then *'Delete Selected'*.

To add a vertex, select the polygon using the *'Select'* button on the toolbar so that the vertices are highlighted. Then click on the *'Split'* tool, which is the second button from the right on the toolbar (see Figure 6). Click on the boundary of the polygon where the new vertex is to be added. To add more than one vertex, keep repeating this process.

To move a vertex, select the polygon using the *'Select'* button on the toolbar so that the vertices are highlighted. Then click on the vertex that is to be moved and, without releasing the mouse button, drag the vertex to the new position and release the mouse button.

At times it may be difficult to select the individual vertex that you want to. It may therefore be necessary to redefine the *'snapping distance'*, which is the minimum distance at which two vertices are perceived to be distinct. The default snapping distance will usually be satisfactory but if you are working at quite a fine scale it may be that when you attempt to select one vertex, another one may be highlighted. Similarly when working at a courser scale it may be difficult to click close enough to a vertex to select it.

To modify the snapping distance, first highlight the name of the species layer on the left-hand side of the map. It is then best to zoom in on the map to the scale at which you are entering polygons. Then enter 'Edit' mode (by going to the *'Geographic data'* menu, then *'Layer'*, then *'Edit'*) and then click on the third button from the right on the toolbar. It should be called *'Snapping distance'* (on some operating systems, it may be called *'Search Distance'* and it is fourth from the right on the toolbar) and has a picture of a rectangle and an arrow on it (see Figure 6). With this button highlighted, click on the map and drag the cursor to create a rectangle. The size of this rectangle will then determine how big an area the cursor looks in when highlighting a vertex. So at fine scale, make this rectangle smaller than the distance

between the vertices and you should be able to select each of the vertices individually. On a larger scale, make this rectangle large enough so that by clicking on the vertex it will be within the snapping distance.

When finished editing the distribution in this sub-window, click on the *'X'* in the top right-hand corner of the sub-window to close it.

5.3.3   Things to remember

- For terrestrial species, if the extent of occurrence of the species follows a coastline, extend the polygon boundary outwards so that the coastline is included. The boundary of the polygon will be cut to the coastline when the data is processed at a later date.
- At present the help feature is unavailable.

5.4   Countries of Occurrence

To enter the countries in which a species is found, click on the '*Countries of Occurrence*' button on the main window. This will open the relevant sub-window for the species that is currently displayed in the main window. The sub-window that will appear will look like that shown in Figure 7.
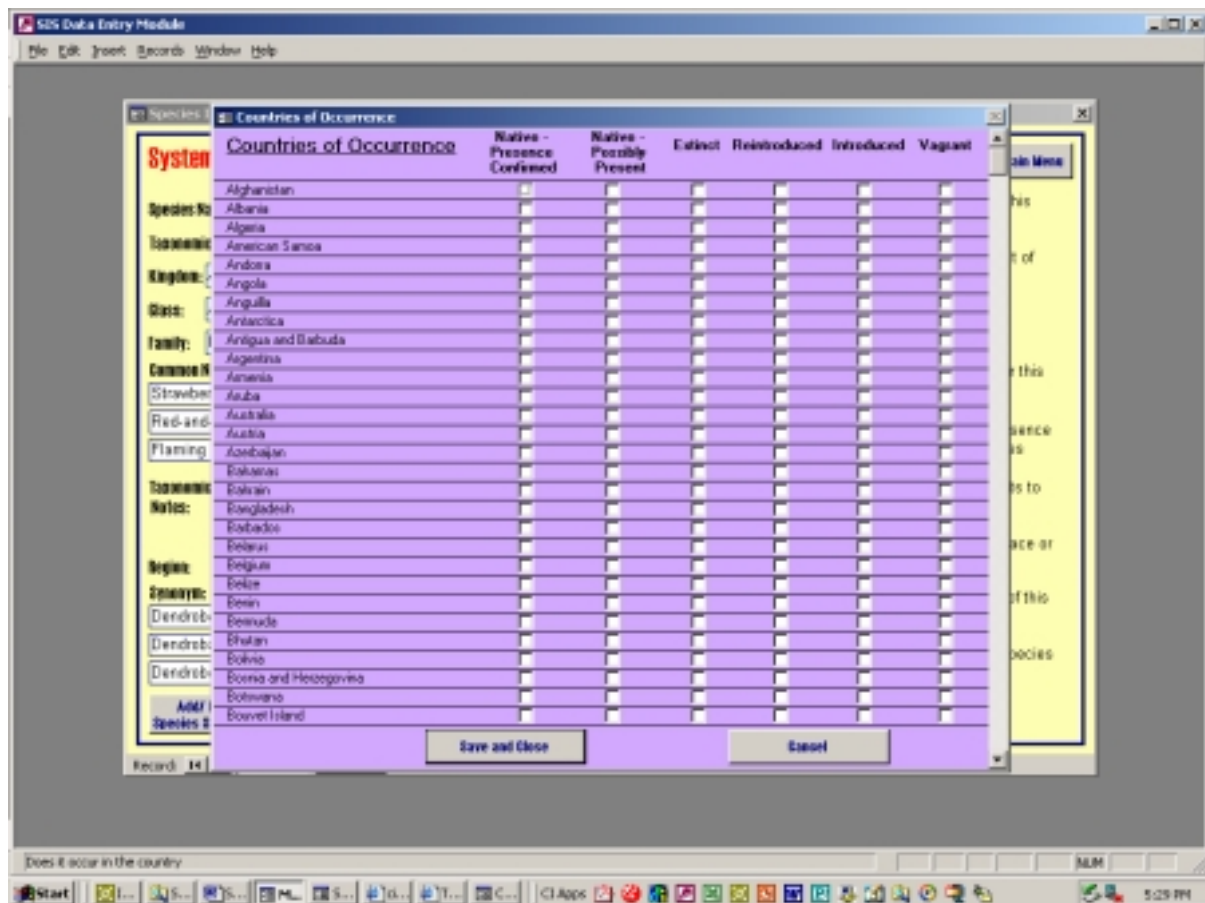

Figure 7. The 'Countries of Occurrence' sub-window.

This sub-window contains a list of all the countries in the world, with six columns: *Native - Presence Confirmed*, *Native – Possibly Present, Extinct, Reintroduced, Introduced* and *Vagrant*. You should click in any of the small boxes that apply. In completing this section of the database, please note the following definitions:

- *Native* species are those currently occurring within their natural range (past or present) and dispersal potential (i.e. within the range they occupy naturally or could occupy without direct or indirect introduction or care by humans.)
- *Re-introduced* species are those that have been successfully established by humans in an area which was once part of their historic range, but from which they had been extirpated or become extinct.
- *Introduced* species are those occurring outside their natural range (past or present) and dispersal potential (i.e. outside the range they occupy naturally or could not occupy without direct or indirect introduction or care by humans).
- *Extinct* species are those no longer occurring in the country in question. A species is presumed extinct when there is no reasonable doubt that the last wild individual in the country has died. Such a presumption can be made when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal), throughout its historic range in the country have failed to record a wild individual.

From these definitions, please note the following:
- If a species is recorded as *Reintroduced* in a country, it should also be recorded as *Native*.
- If a species is recorded as *Extinct*, it cannot also be recorded as *Native* or *Reintroduced.*
- A species that is recorded as *Introduced* in a country cannot also be recorded as *Native*, *Reintroduced* or *Extinct* unless it is introduced in part of the country outside its natural range, but occurs (or used to occur) naturally in another part of the same country.
- Under the definitions used here, an *Extinct* species is not necessarily globally extinct, but is extinct in the wild in the country in question.

When you have finished editing, click on the '*Save and Close*' button to save the information you have entered, or click *'Cancel'* to undo the changes.

5.5 Habitat Preferences

Click on the *'Habitat Preferences'* button on the right-hand side of the main window, to enter the habitat preferences for the species currently displayed in the main window. The habitats are listed according to a two-level hierarchical system called the upper and lower levels. Two sub-windows will open that correspond to these levels, which are shown in Figure 8.

While the lower level habitats are more detailed habitat types that are linked to satellite imagery, the upper level ones are more general habitat types whose names should sound more familiar to the user. The upper level is meant as a way to help you identify the lower level habitat types that best describe the species' habitat.
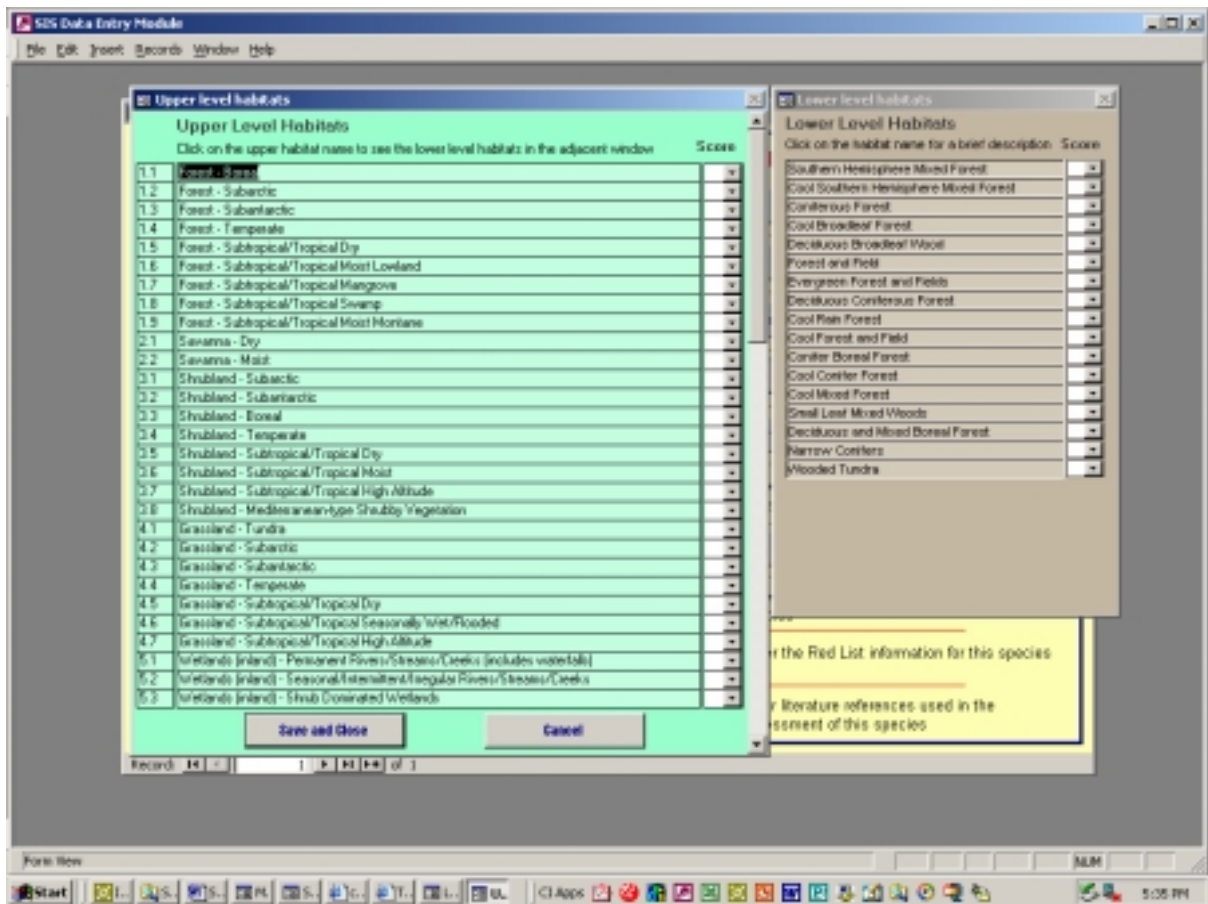
Figure 8. The upper (green) and lower (brown) 'Habitat Preferences' sub-windows.

5.5.1 <u>Understanding how the Habitat Hierarchy Works</u>

Like the Extent of Occurrence part of the database, it is also worth spending a short time familiarising yourself with the *'Habitat Preferences'* part . The sub-window for the upper level habitat types contains a list of 66 different habitat types. If you click on the name of a particular upper habitat type, the list of lower habitats in the lower habitat sub-window change to reflect the names of the lower level habitat types that fall under the higher level habitat type that you have selected. So for example, if you select "*Forest – Boreal*" in the upper level hierarchy, you will observe a different list of lower level habitats than if you select, for example, "*Forest – Subarctic*". However, you should also notice that some habitat types in the lower level sub-window are listed under both "*Forest – Boreal*" and "*Forest – Subarctic*". For example, Coniferous Forest is listed under both. It is important to realise that a lower level habitat type can correspond to more than one upper level habitat type when you are entering data. You will notice that for some of the upper level habitats there are no corresponding lower level habitats. This applies in particular to most wetland and artificial/terrestrial habitats, and to all subantarctic and marine habitats, as well as to rocky areas, caves and subterranean habitats.

The precise meaning of some of the lower level habitats is not immediately obvious. For instance, how do Coniferous Forest, Deciduous Coniferous Forest, Conifer Boreal Forest, Cool Conifer Forest, and Narrow Conifers relate to each other? Which ones would you wish to score for a particular species? These names are taken from the Global Land Cover Characterisation (GLCC), and if you are interested you can obtain more information from the

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USGS website. If you click on the name of the lower level habitat, a box will appear that provides a short description of this particular habitat type. This should help you to understand what is meant by the terms used in the GLCC.

5.5.2   Understanding the Scoring System

Each habitat type in both levels can be given a score according to the suitability of the habitat for the species. You will see the scores to the right of the names of the habitat types. By default no scores are given for any habitats. If you click on the arrow to the right of the score, a pull-down menu will appear that gives you four options to choose from: 1, 2, 3 and 9. The meaning of these numbers is as follows:

1 = Suitable
- main or preferred habitat
- presence of major populations
- higher population densities

2 = Moderately Suitable
- secondary habitat
- presence of minor populations
- lower population densities
- patchy distribution into the considered habitat type

3 = Unsuitable
- Unsuitability expressly known or easily inferred from species' ecology

9 = Undefined
- Data deficient, possibly suitable or moderately suitable as inferred from species' ecology

5.5.3   Scoring a Species for its Habitat Preferences

Once you have familiarised yourself with how the '*Habitat Preferences*' part of the DEM works, you are ready to enter data for a species. There are a few points to keep in mind when doing this:

1. If a habitat type is unsuitable for your species, strictly speaking you should score it as "3". However, it would be very time-consuming to go through all the habitats, scoring the unsuitable as well as the suitable ones. So, if a habitat is unsuitable for your species, it is best to leave it with no score to save yourself time.
2. Once you come to an upper level habitat that is, or might be, suitable for your species, score it as "1", "2" or "9" as appropriate.
3. If you are not sure what does a particular lower level habitat type mean, click on the name of the lower level habitat in question to obtain an explanatory box.

When you have finished entering the habitat preferences for a species, close the '*Habitat Preferences*' sub-windows by clicking on the '*Save and Close* ' button on the Upper Level Habitats sub-window. If you want to cancel the changes that you have made, click '*Cancel*'.

5.6   Occurrence in Marine and Inland Water Bodies

To add information on a species' occurrence in marine and inland water bodies, click on the *'Occurrence in Marine and Inland Water Bodies'* button on the right-hand side of the main window. This will open the relevant sub-window for the species that is currently displayed in the main window. The sub-window that will appear will look like that shown in Figure 9.
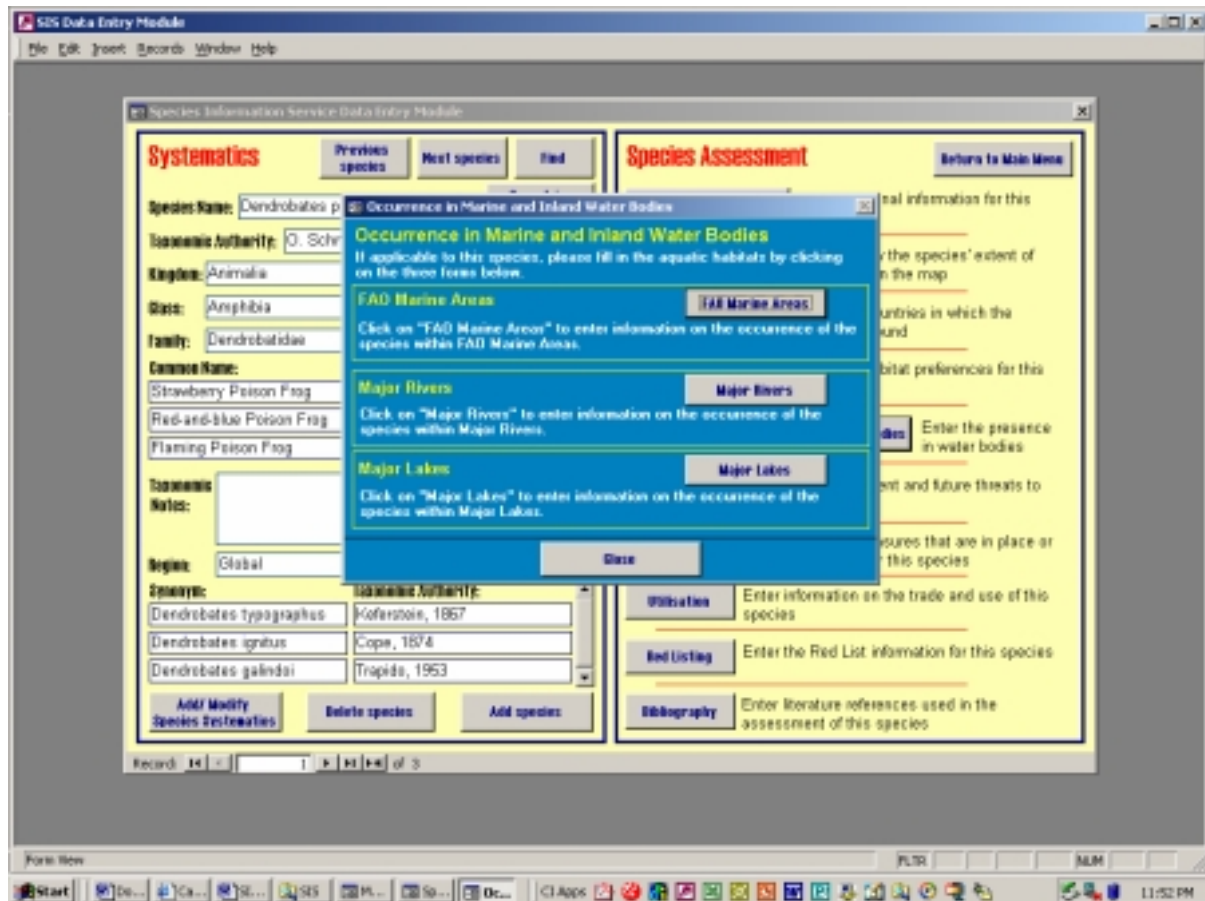
Figure 9. The 'Occurrence in Marine and Inland Water Bodies' sub-window.

From this sub-window it is possible to access the sub-windows to enter information on the species' occurrence in FAO Marine Areas, major rivers and major lakes. Click on each of the buttons in this window to open these sub-windows. To close this sub-window click on *'Close'*.

The categories for the three subwindows; FAO Marine Areas, Major Rivers and Major Lakes are the same as for the countries of occurrence (ie. *Native -Presence Confirmed*, *Native – Possibly Present, Extinct, Reintroduced, Introduced* and *Vagrant*). Please see the definitions of these given in Section 5.4 of this document.

In the Major Rivers and Major Lakes sub-windows it will be necessary to use the scroll bar on the right-hand side to view all of the rivers and lakes. Please tick all of the boxes that apply for a species.

In each of the three sub-windows, when finished editing click on *'Save and Close'* to save your edits, or click on *'Cancel'* to cancel the changes.

5.7 Major Threats

Open the section on major threats by clicking on the '*Major Threats'* button on the right-hand side of the main window. This will open the relevant sub-window for the species that is currently displayed in the main window as shown in Figure 10.
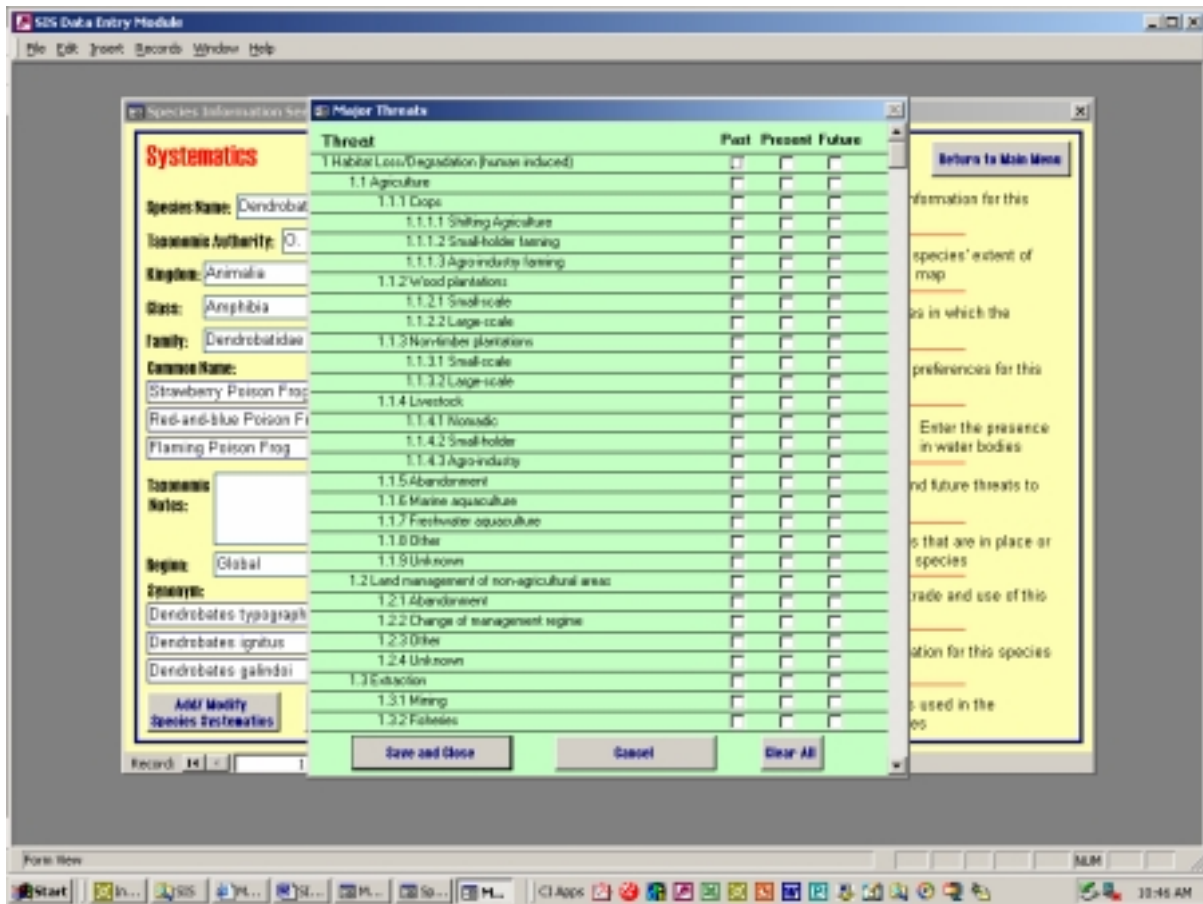
Figure 10. The 'Major Threats' sub-window.

The threats are broken down into a four-level hierarchy. Click inside each of the white boxes in the sub-window to select the relevant threats and whether they are acting in the past, present or future. For an ongoing threat, click in all three boxes, ie. past, present and future.

When you click on a lower level of the hierarchy, the upper levels will automatically be updated. For example if you click on *1.1.4.3 Agro-Industry*, then levels *1.1.4 Livestock*, and *1.1 Agriculture* and *1 Habitat Loss/Degradation (Human induced)* will also be ticked. Please note that when you remove a tick the corresponding upper level ticks will not be removed, and will need to be unticked manually.

To clear all of the ticks in the boxes, click on the *'Clear All'* button at the bottom of the tick boxes. A message will appear asking you to confirm that you would like to clear all of the ticks. Click *'Yes'* to clear them all, or *'No'* to leave them as they are.

When you have finished editing the major threats, click on '*Save and Close*' to save all the information that you have entered, or click *'Cancel'* to cancel the edits that you have made.

5.8 Conservation Measures

Click on the *'Conservation Measures'* button on the right-hand side of the main window to open the conservation measures sub-window for the species that is currently displayed in the main window, as shown in Figure 11.

Figure 11. The 'Conservation Measures' sub-window.

Like the major threats, the conservation measures are broken down into a four-level hierarchy. Click inside each of the white boxes in the sub-window to select the relevant conservation measure and whether it is currently "in place" or is "needed".

When you click on a lower level of the hierarchy, the upper levels will automatically be updated. For example if you click o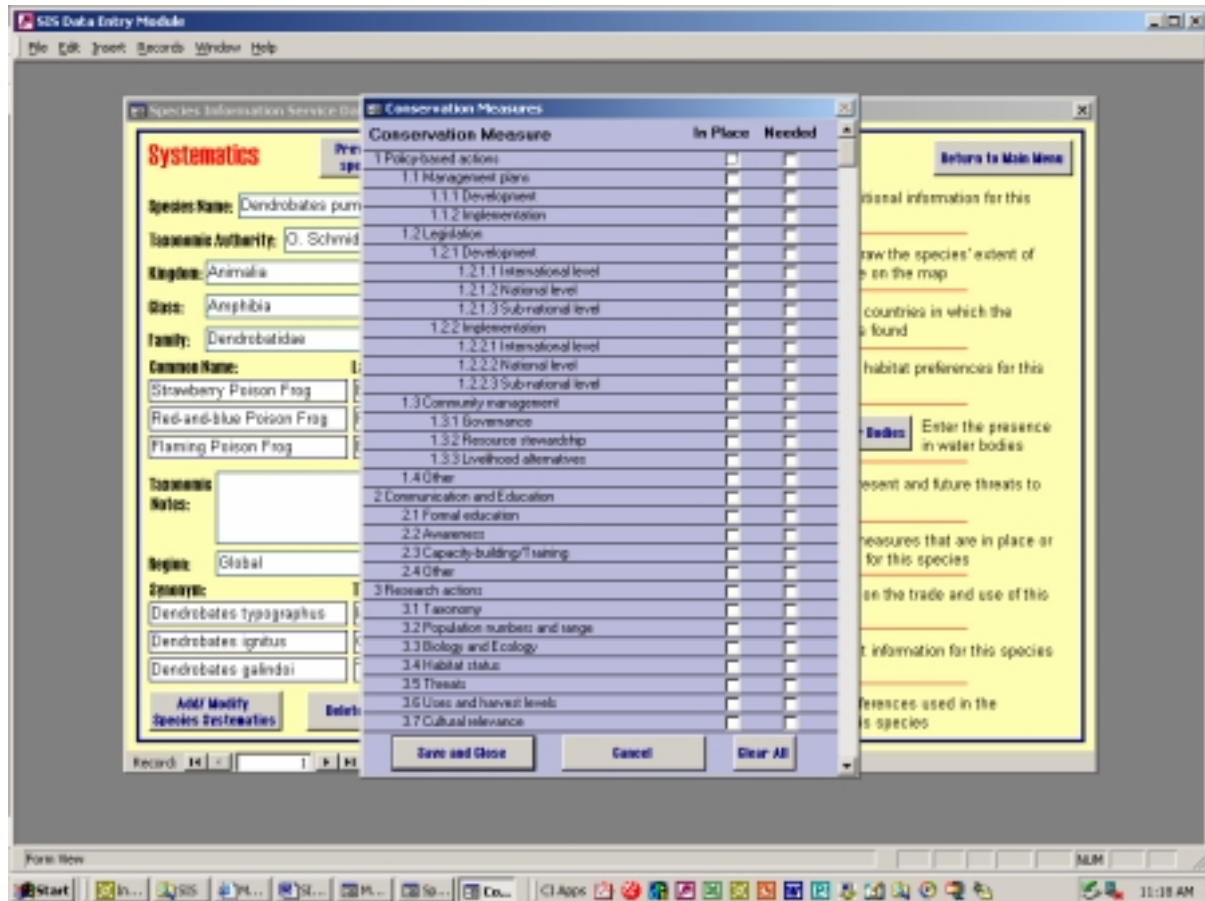n *1.2.1.3 Sub-national level*, then levels *1.2.1 Implementation*, and *1.2 Legislation* and *1 Policy-based actions* will also be ticked. Please note that when you remove a tick the corresponding upper level ticks will not be removed, and will need to be unticked manually.

To clear all of the ticks in the boxes, click on the *'Clear All'* button at the bottom of the tick boxes. A message will appear asking you to confirm that you would like to clear all of the ticks. Click *'Yes'* to clear them all, or *'No'* to leave them as they are.

When you have finished editing the conservation measures click on '*Save and Close*' to save all the information that you have entered, or click *'Cancel'* to cancel the edits that you have made.

5.9   Utilisation

The Utilisation section of the DEM can be opened by clicking on the '*Utilisation*' button on the lower right-hand side of the main form. A sub-window will then open showing information relevant to the species currently displayed in the main window, as shown in Figure 12.
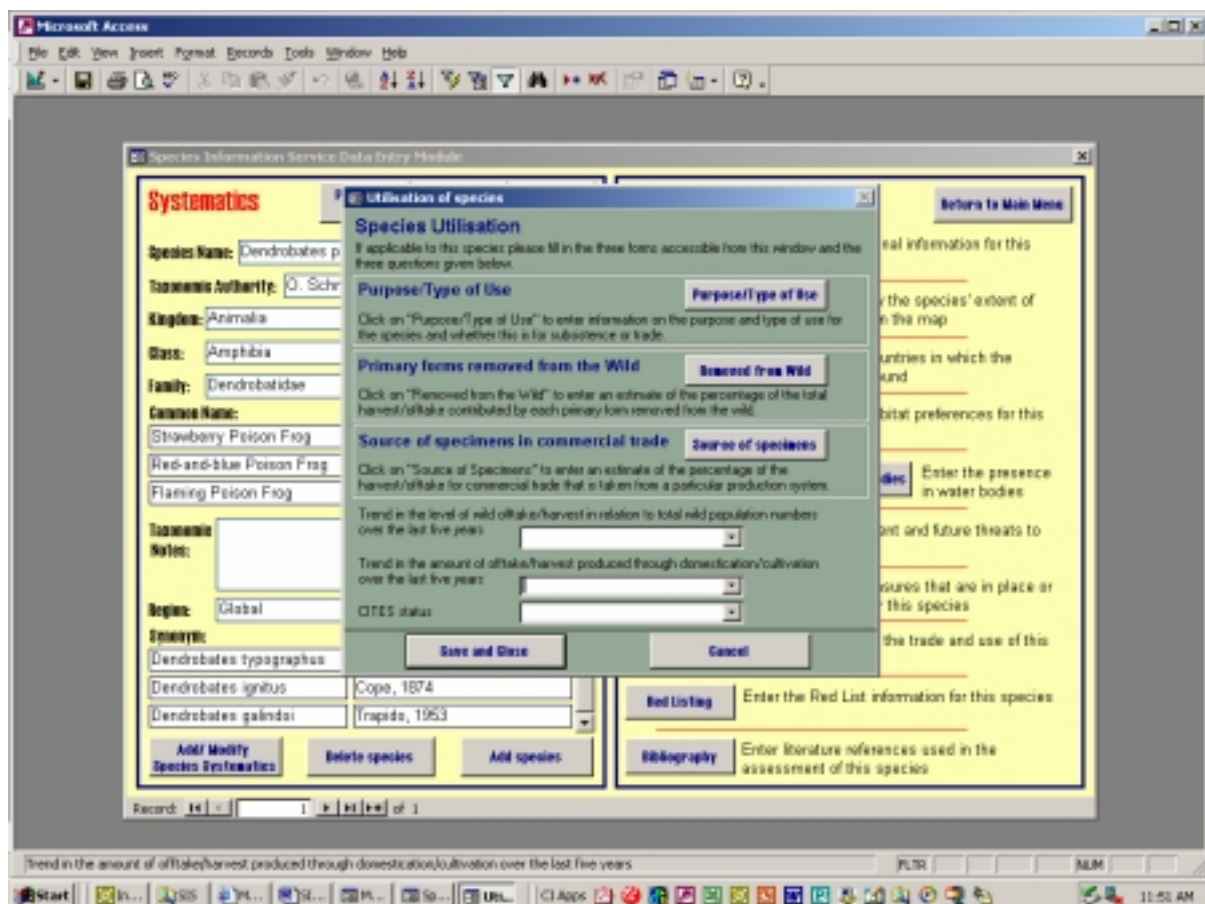
Figure 12. The 'Species Utilisation' sub-window.

The Utilisation sub-window has three further buttons which each open another sub-window. Underneath these three buttons there are three further questions to be answered. It is best to fill in the Utilisation sub-windows from top to bottom. The instructions on how to fill in these sub-windows follow.

5.9.1   Purpose/Type of Use

There are 17 categories listed in this sub-window. You will need to use the scroll down bar on the left-hand side to see them all. For each one please click, as appropriate, inside the white boxes to indicate whether or not this species is used at one (or more) of three levels defined in the sub-window as *"Subsistence"*, *"National"* and *"International"*. These three categories are defined below:

Subsistence = Subsistence use/local trade (generally implies direct use by the harvester/family/local community; includes barter for other locally-produced goods, but not for sale profit.

National = Sub-national/national trade (commercial trade, i.e., involving sale/barter for profit without crossing international borders).

International = Regional/international trade (commercial trade crossing one or more international borders.

Please leave this sub-window blank if the species is not used for any purpose.

When you have finished entering information, click on '*Save and Close*' to save all the information that you have entered in this sub-window, or click *'Cancel'* to cancel any edits that you have made.

5.9.2   Primary Forms Removed from the Wild

The 'Removed from Wild' sub-window is accessible by clicking on the button in the 'Utilisation' sub-window.

There are six primary forms listed with brief descriptions in the sub-window. An estimate of the percentage of the total harvest/offtake contributed by each form should be given. The estimated percentage is broken down in to five categories; 100%, >75%, 51-75%, 26-50% and 0-25%.

Please leave this sub-window blank if the species is not used for any purpose.

When you have finished entering information, click on '*Save and Close*' to save all the information that you have entered in this sub-window, or click *'Cancel'* to cancel any edits that you have made.

5.9.3   Source of Specimens in Commercial Trade

The *'Source of Specimens'* sub-window is accessible by clicking on the button in the *'Utilisation'* sub-window.

There are seven sources of specimens in commercial trade listed with brief descriptions. An estimate of the percentage of the harvest/offtake for commercial trade (i.e., not for subsistence use) that is taken (sourced) from a particular production system should be given for each of the seven sources listed. The estimated percentage is broken down in to five categories; 100%, >75%, 51-75%, 26-50% and 0-25%.

Please leave this sub-window blank if the species is not traded commercially.

Having completed these three sub-windows, proceed to the final section at the bottom of the Utilisation sub-window, where there are three questions. For each of these questions please select a response from the pull-down menu. The last of these questions which refers to CITES status should already be filled in. If not then please put in what you believe to be the CITES status of this species. Please also change the information that is already entered if you think that it is incorrect.

When you have finished entering information, click on '*Save and Close*' to save all the information that you have entered in the Utilisation sub-window, or click *'Cancel'* to cancel any changes that you have made.

5.10 <u>Red Listing</u>

To enter information regarding the IUCN Red List status for a species, click on the *'Red Listing'* button on the right-hand side of the main window. The sub-window that opens corresponds to the species currently displayed in the systematics section of the main window, and you will see the correct name of the species entered automatically in the top box in the sub-window, as shown in Figure 13.

Figure 13. The 'Red Listing' sub-window.

The system will not allow you to edit the name of the species in this sub-window. To move to a different species, you must first return to the systematic main window, and select a new

species from there. In order to complete the Red List information for a species, you need to be familiar with the IUCN Red List Categories and Criteria, which are attached as Annex 1 of this document. If you have any questions about how to use and apply the Categories and Criteria, please contact your IUCN Programme Officer.

Having made your Red List assessment for the species, enter the appropriate Red List Category in the box entitled '*Red List Assessment*'. Do this by clicking on the arrow to the right of the box, and then select the Category from the pull-down menu that will appear.

If the species qualifies as Critically Endangered, Endangered or Vulnerable, then you will need to enter the criteria that qualify it for inclusion in these Categories. The process for determining the criteria is described in Annex 1 of this document. If the species is listed in one of the other Red List Categories (i.e., Extinct, Extinct in the Wild, Near Threatened, Least Concern or Data Deficient), then no criteria should be entered.

To enter the criteria, click on the *'Enter Criteria'* button next to the Red List criteria box, and the Red List Criteria sub-window will appear as shown in Figure 14.
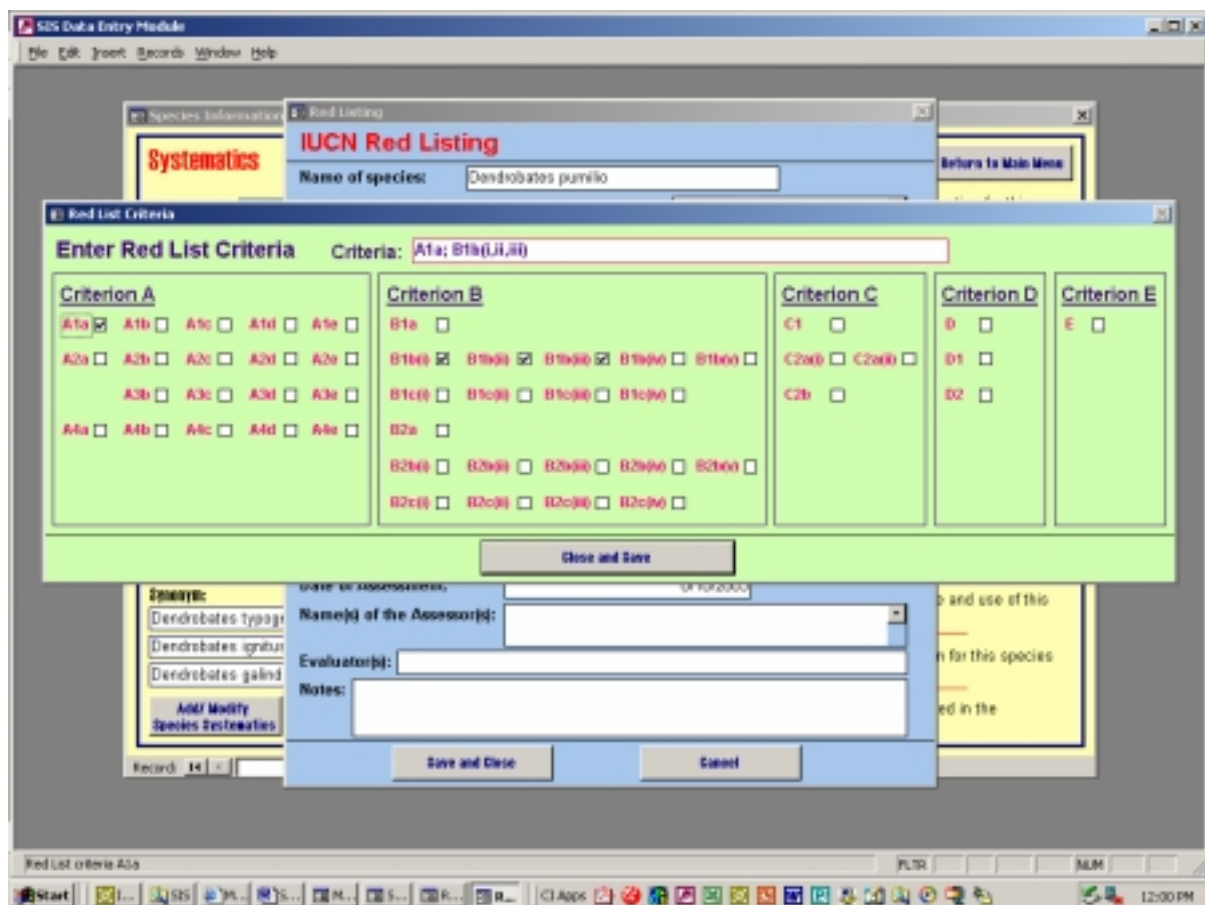
Figure 14. The 'Enter Red List Criteria' sub-window.

Click on each of the boxes to the right of each of the criteria that apply for the species. You should only tick those criteria that correspond to the Red List category you have chosen. The criteria expression at the top of the sub-window will automatically update as each of the boxes are ticked. When you have finished ticking all of the criteria that apply, click on *'Save*

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and Close'. The Red List criteria on the Red Listing sub-window will now be updated to reflect the changes that you made.

In the '*Rationale for the Red List Assessment*' box you should include a brief summary of the data, assumptions, and inferences made to support the Red List assessment. An example of such summaries are: "*Listed as Least Concern in view of its wide distribution, presumed large population, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category*"; "*Listed as Near Threatened because its Extent of Occurrence is probably not much greater than 20,000 km^2, and its habitat is severely fragmented and declining, thus making the species close to qualifying for Vulnerable*"; "*Listed as Vulnerable in view of a predicted decline of 30% over the next 10 years caused by extensive habitat loss resulting from the construction of the San Roque Dam*"; "*Listed as Critically Endangered in view of a population estimate of less than 250 mature individuals, all in a single sub-population, and in decline*"; "*Listed as Extinct because thorough surveys in known and suspected habitat have failed to record an individual since 1989, and the species is not known to occur in captivity*".

In the section of the Red Listing sub-window entitled '*Reason for change in Red List Assessment from that in the 2000 Red List*' you only need to tick one of the boxes if the species in question has previously been assessed, and you have found it necessary to change either the Red List Category or the Criteria. If the listing remains unchanged from the previous assessment, or if the species has not previously been evaluated, then please ignore this section. If you do need to complete this section for a species, then please tick any boxes that apply. In many instances, only one box will be relevant, but in some cases you may want to tick two or more (you should note that the ones entitled "*New or better information available*" and "*Incorrect information used previously*" may sometimes amount to the same thing, in which case both should be ticked).

In the '*Current Population Trend*' box, click on the arrow on the right-hand side of the box, and select one of the four options (increasing, decreasing, stable, or unknown) from the pull-down menu that will appear. In most cases, you will need to use inference to make a selection. You do not need to have empirical data in order to make a selection. For example, if the habitat of the species in question is decreasing, then it is a reasonable inference to assume that the species is also decreasing. If the range of the species is expanding, then it is reasonable to assume that the species is increasing. If the species is common and highly adaptable to environmental changes, it is reasonable to assume that it is stable.

In the '*Date of assessment (day/month/year)*' box, enter the date on which you made the Red List assessment for the species. On some computers with US settings the date should be entered in US format, ie. month/day/year. If at first you enter the date in day/month/year format and it appears to interpret the date incorrectly, then please try entering the date in US format.

In the '*Names(s) of the Assessor(s)*' box, enter your own name, or the name(s) of other experts who are responsible for the assessment.

In the '*Evaluator(s)*' box, the names of the experts who evaluated the assessment are entered. For the first stage of an assessment this should be left blank.

Finally, in the '*Notes*' box, add any other information relating to Red Listing that you think might be important. This box is optional.

Click on '*Save and Close*' to save all the information that you have entered in the Red Listing sub-window, or click *'Cancel'* to cancel the edits that you have made.

5.11 <u>Bibliography</u>

Finally, the most important and relevant literature references that have been used for the assessment should be listed in the Bibliography for that species. This information should be entered into the sub-window available in the bottom right-hand section of the main window entitled "*Bibliography*". To open the sub-window, click on the '*Bibliography*' button. When opening a species bibliography for the first time there should be no records shown. Any references that have previously been entered for this species will be displayed in alphabetical order, as shown in Figure 15.
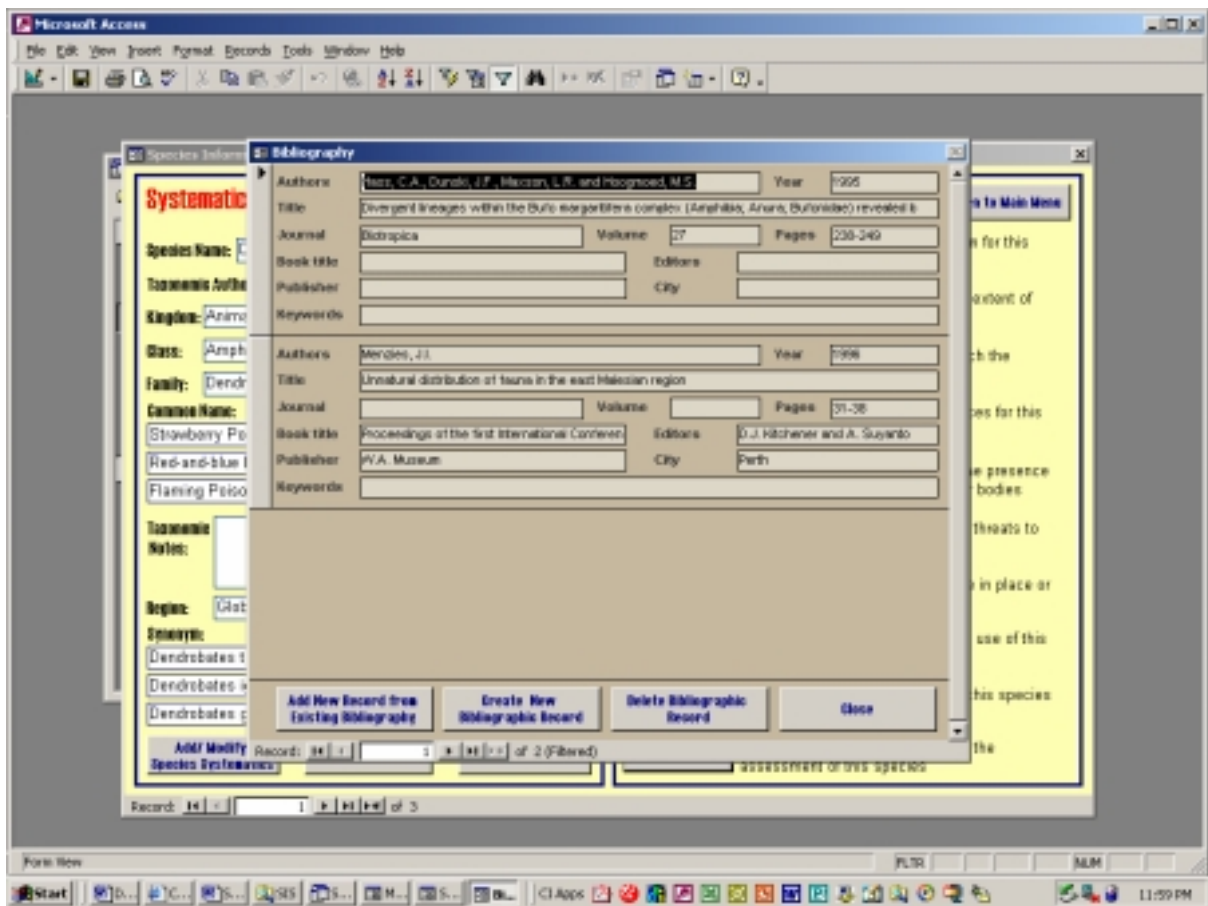

Figure 15. The 'Bibliography' sub-window.

It is not necessary to produce an exhaustive bibliography. You should concentrate on just a small number of references that are the most important in providing the key status information on the species in question.

5.11.1 <u>Add a New Bibliographic Record</u>

To add a new bibliographic record for a species that has not previously been entered in to the DEM for any other species, click on the button *'Create New Bibliographic Record'*. Then enter the relevant citation in the boxes provided in the sub-window. When you have finished, click on the '*Save and Close*' button to save the information that you have entered. To cancel the addition of a new reference, click on the *'Cancel'* button.

5.11.2 Add a previously entered Bibliographic Record

To add a new bibliographic record for this species that has already been entered in to the DEM for another species, click on the *'Add New Record from Existing Bibliography'* button on the Bibliography sub-window. In the first box in the sub-window you will be able to see the other records already entered for other species by clicking on the drop-down menu. From the pull-down menu you will see the author, year, title etc. of the various publications. These details should enable you to uniquely identify which reference you would like to add for a species. Having selected the relevant record from the drop-down menu, the rest of the details should automatically be completed in the boxes below. It is then possible to check that you have chosen the correct record before saving it. Click on *'Save and Close'* to save the record, or *'Cancel'* to cancel the addition of the record. The references displayed in the drop-down menu are listed alphabetically by author, then by year, title, etc.

5.11.3 Deleting a Bibliographic Record for a Species

To delete a bibliographic record for a species, click on the *'Delete Bibliographic Record'* button from the 'Bibliography' sub-window. A sub-window will now appear with the first record shown first. It is possible to use the arrows at the bottom of the form to scroll through the different bibliographic records for a species. When the record that you want to delete is shown, click on the *'Delete record'* button. A message will appear asking you to confirm your deletion. Click *'Yes'* to delete, or *'No'* to leave the record for the species. To close the sub-window, click on *'Save and Close'*.

This will only delete the bibliographic record for this species. The record will remain in the DEM and links to other species will remain. To delete a bibliographic record entirely from the DEM, it is necessary to go to the *'Manage Bibliography'* section of the DEM which is described in detail in section 6. Likewise, to modify the details of a record that has already been entered, use the *'Manage Bibliography'* section of the DEM.

6   Manage Bibliography

Click on the *'Manage Bibliography'* button on the Main Menu to access the bibliography management part of the database, as shown in Figure 16.
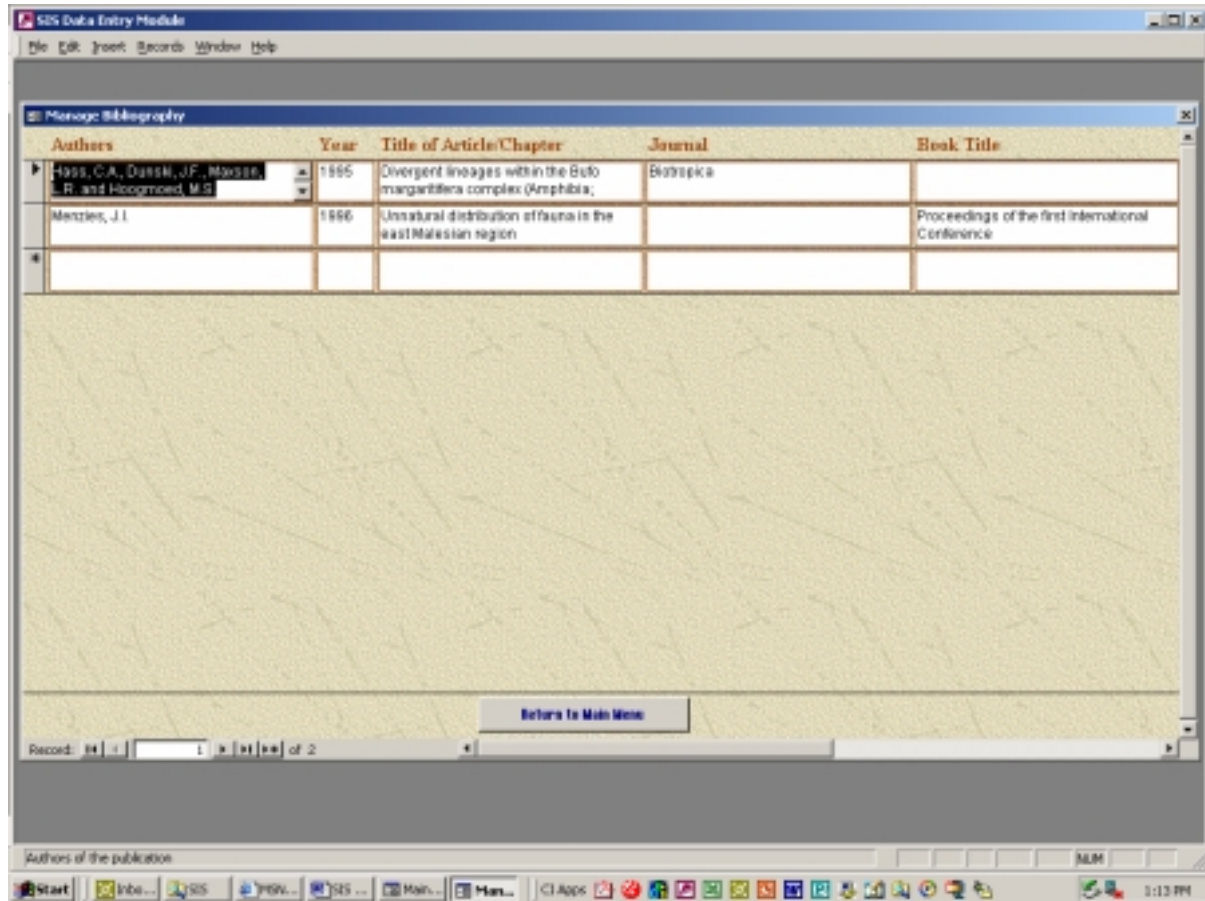
Figure 16. The 'Manage Bibliography' section of the DEM.

In here you will find all of the bibliographic records entered in to the DEM. In this section it is possible to delete, modify or add bibliographic records to the DEM. Use the scroll bar on the right-hand side of the window to move through the records or use the arrows on the bottom of the window. A black arrowhead will highlight the current record to the left-hand side of the record. Each bibliographic record will be listed only once regardless of the number of times it is linked to a different species. To view all of the data for a record, use the scroll bar on the bottom of the window to move the records across.

6.1   Adding a new record

To add a new bibliographic record to the DEM, simply enter the details in the bottom row of the table. As you start to type, a new record will be added below. Fill in all of the details for your record in the row that you started typing in. Please note that entering a record in this section of the DEM does not link it to any species. It is necessary to use the 'Bibliography' sub-window of the 'Enter Species Data' section of the DEM, described in Section 5.11, to link a bibliographic record to a species.

6.2 <u>Modifying an existing record</u>

To modify an existing bibliographic record within the DEM, simply change the information shown in the box for the record. Please note that this will change the details for this record for all the species for which it is linked.

6.3 <u>Deleting a record</u>

To delete a bibliographic record within the DEM, highlight the grey box to the left-hand side of the record that you wish to delete. This grey box will now darken and an arrowhead pointing to the record will appear. To delete this record, press the *<Delete>* key on your keyboard. A message will then appear asking you to confirm that you would like to delete the record from the system. Please note that if you delete a record from this section, its links to all species will also be deleted. If this is what you would like to do, then click *'Yes'*, otherwise click *'No'* to cancel the delete process. If you clicked *'Yes'*, a further message will appear confirming the deletion, click *'Yes'*.

When you have finished making changes to the bibliographic records within the DEM, click on *'Return to Main Menu'* at the bottom of the window.

7   Create Reports

It is possible to print a series of reports from the DEM. To access these reports, click on the *'Create Reports'* button on the Main Menu. The window shown in Figure 17 below will now open.
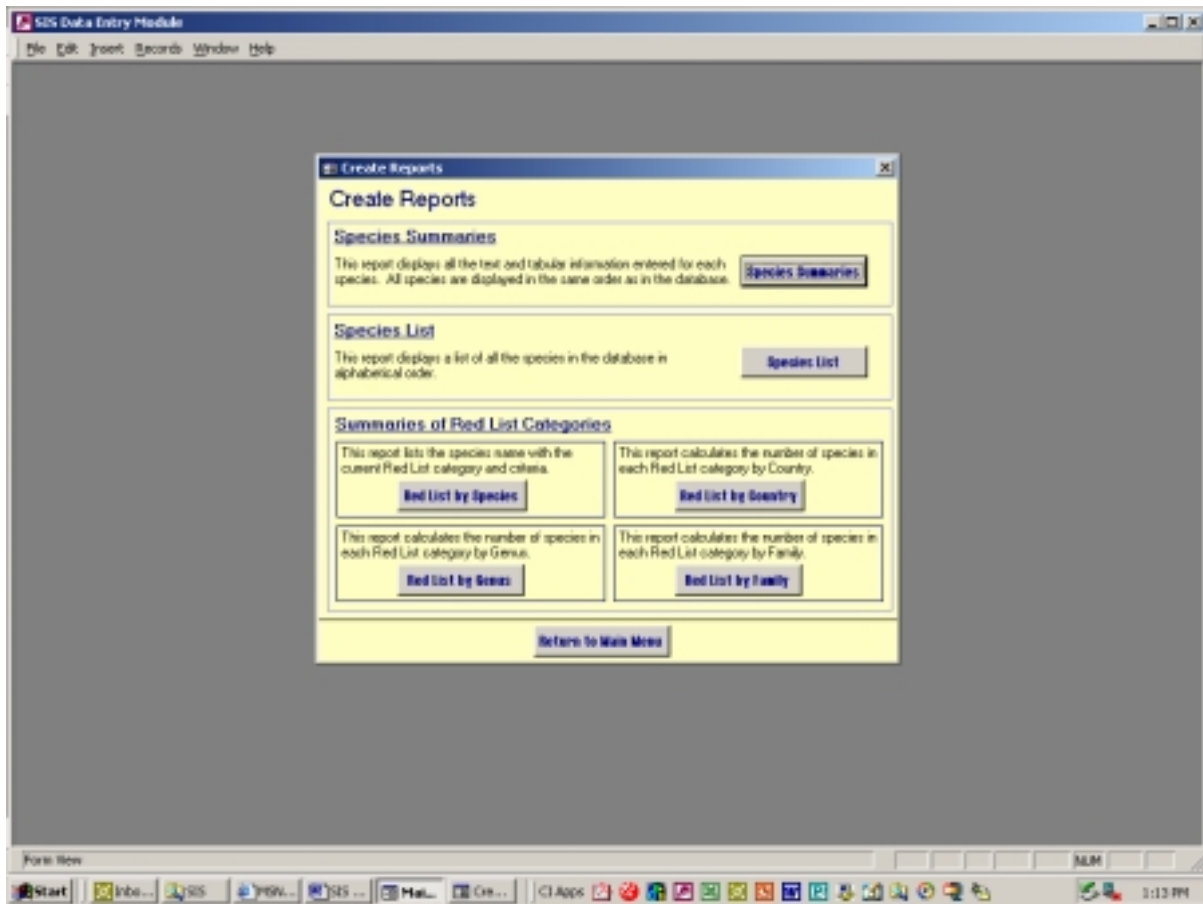
Figure 17. The 'Create Reports' section of the DEM.

The first time that you open a report you may receive the following message *"This document was previously formatted for the printer \\CIWASH26\C4550psCABS on 10.1.204.38, but that printer isn't available. Do you want to use the default printer…"*. Simply click *'OK'*, and the report will be reformatted for your default printer.

To view each report, click on the relevant button on the 'Create Reports' window. To print a report, open each report, and then choose *'Print'* from the *'File'* menu at the top left-hand corner of the screen. When the printer dialog box appears choose the printer you would like to print to.

After you have finished creating reports, click on the *'Return to Main Menu'* button at the bottom of the Create Reports window.

8 Change Program Defaults

This section of the DEM should be used cautiously, and if in doubt do not make any changes. To access this section click on the *'Change Program Defaults'* button on the Main Menu of the DEM. A window will now appear as shown in Figure 18.

After you have finished changing any of the program defaults, click on the *'Return to Main Menu'* button at the bottom of the Create Reports window.
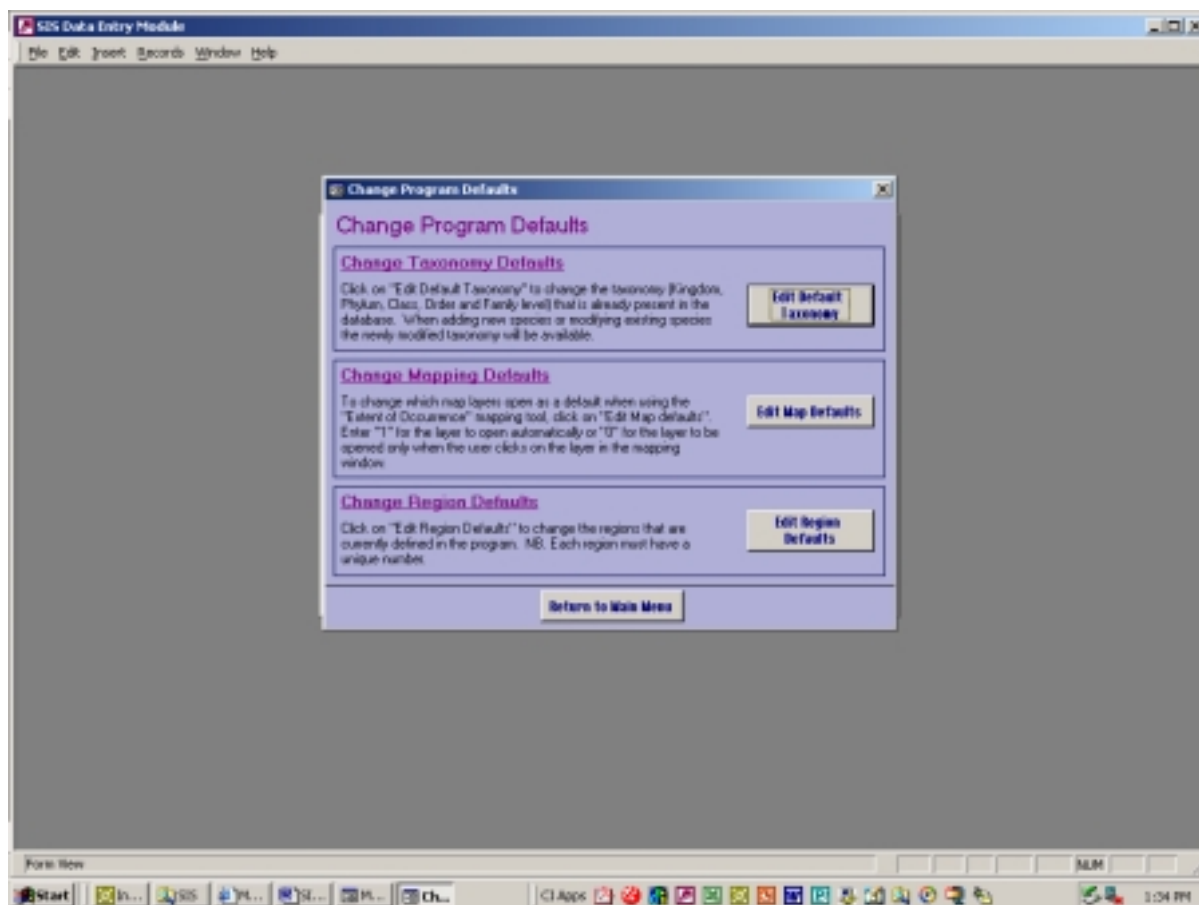
Figure 18. The 'Change Program Defaults' section of the DEM.

8.1 Change Taxonomy Defaults

When entering data for a species it is possible to use the various drop-down menus to enter the taxonomy (as detailed in sections 5.1.1and 5.1.2). If you need for any reason to add more records to those already contained within the DEM then click on the *'Edit Default Taxonomy'* button of the 'Change Program Defaults' window. A table detailing the Kingdom through to Family level will now display, as shown in Figure 19.

To add a new record, use the scroll bar on the right-hand side to reach the end of the table. It is then possible to add information in to the blank row at the bottom of the table. To add a family that was not already entered by default in to the DEM you will also need to enter the higher taxonomic levels in the same row of the table.

To modify the spelling of any of the taxonomy, simply click on the error and correct it. Please note that this will change the default values in the system but will not change the spelling of taxonomy that has already been entered for a species. When finished editing the data, click on the 'X' in the top right-hand corner to close the table.
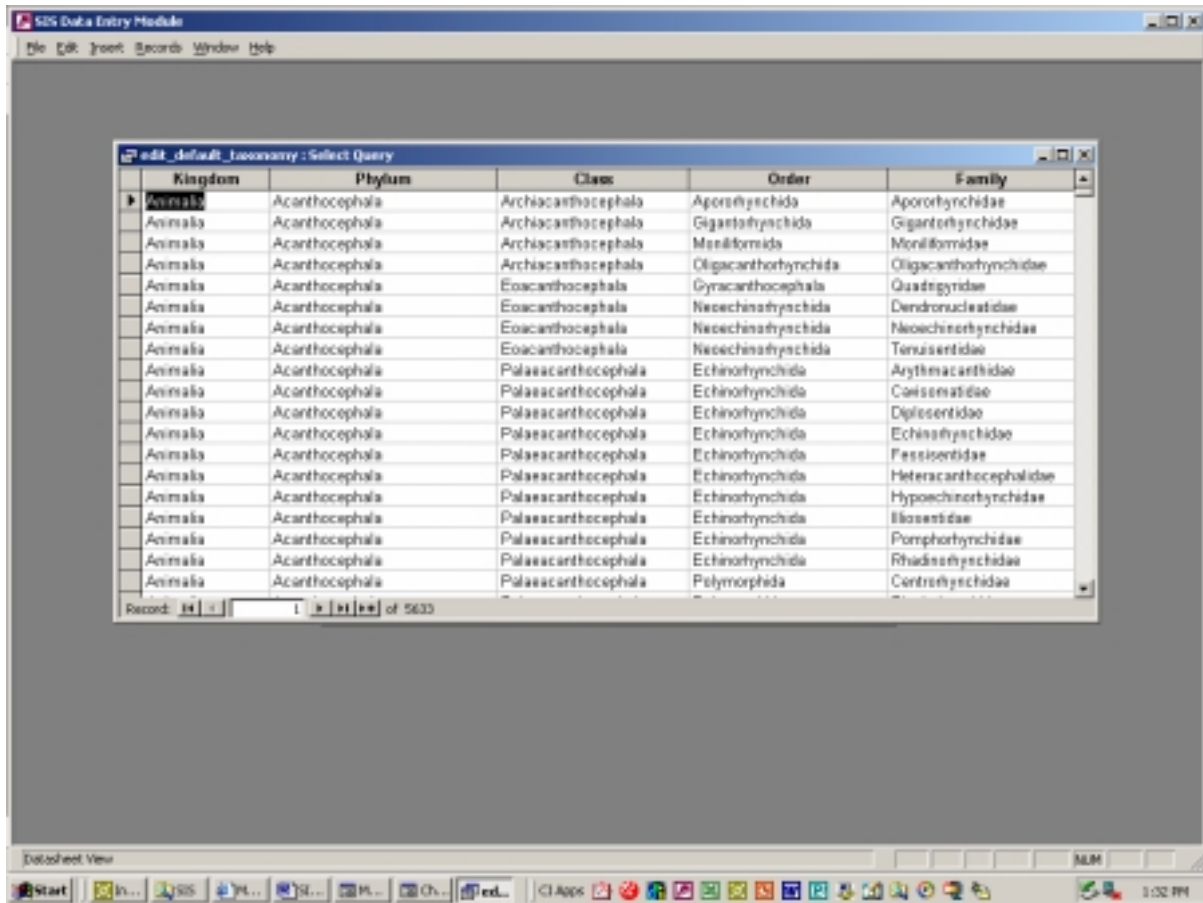
Figure 19. The 'Edit Default Taxonomy' table.

8.2 Change Mapping Defaults

Changing the mapping defaults will affect the 'Extent of Occurrence' sub-window for the 'Enter Species Data' section of the DEM (see Section 5.3). When the 'Extent of Occurrence' sub-window first opens a number of geographic "layers" are shown by default. It is possible to turn on or off these layers by clicking on the tick box next to the layer when the sub-window opens. Alternatively you can change which layers are turned on or off when the 'Extent of Occurrence' sub-window opens by doing the following:

Click on the *'Edit Map Defaults'* button of the 'Change Program Defaults' window of the DEM. A small table will then open that has two columns; Default Status and Name of Map Layer. A "0" in the Default Status column will mean that when the 'Extent of Occurrence' sub-window opens the layer will not be active by default. If there is a "1" in the Default Status column then when the 'Extent of Occurrence' sub-window opens the layer will be active by default. In this table only edit the Default Status column, and in this column only enter a "0" or a "1".

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When finished editing the data, click on the *'X'* in the top right-hand corner to close the table.

8.3   <u>Change Region Defaults</u>

Changing the region defaults will affect the choices available within the 'Region' drop-down menu in the Systematics section of the 'Enter Species Data' part of the DEM (see Section 5.1). The 'Region' box can be used for various different purposes as required. For example it can allow greater flexibility in keeping track of different copies of the DEM, or it can be used to distinguish between global or regional assessments.

If you have received the DEM as part of a project you will probably have been told how to use the 'Region' box. For example, if you are assessing a species within China only, then "China" would be the region you would enter from the pull-down menu. If the regions have already been entered then you will not need to change the default values.

If you need to edit the 'Region' defaults currently entered in the DEM, then click on the *'Edit Region Defaults'* button in the 'Change Program Defaults' window. A table will then open with two columns; Region number and Name of Region. To add a new region, enter a number in the Region number column in the bottom row, and then enter a name for the region in the adjacent column. The number is not important, it is merely a way of storing the data, it simply has to be unique within the column.

When finished editing the data, click on the *'X'* in the top right-hand corner to close the table.

9　Advanced Users

The average user of the DEM will most likely never use this section of the DEM, instead many of the features available here are directed towards project managers.

To access the 'Advanced Users' section of the DEM, click on the *'Advanced Users'* button on the Main Menu. The window, as shown in Figure 20, will now appear. There are three sections of the 'Advanced Users' window.
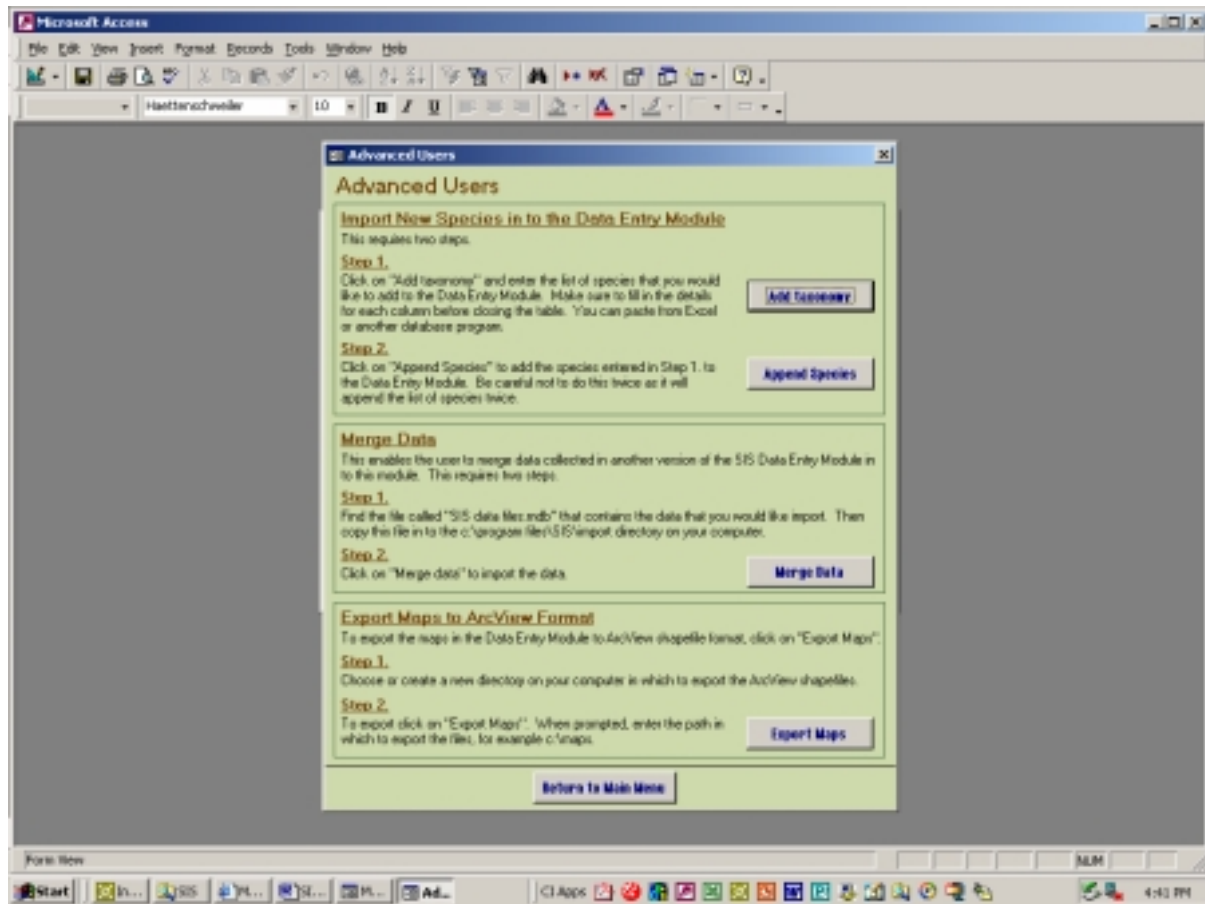
Figure 20. The 'Advanced Users' section of the DEM.

After you have finished working in this section, click on the *'Return to Main Menu'* button at the bottom of the 'Advanced Users' window.

9.1　Import New Species in to the DEM

You may already have a list of species in another software program that you would like to import in to the Data Entry Module. The basic instructions for how to import these species in to the DEM are given in the top section titled "Import New Species in to the Data Entry Module" on the 'Advanced Users' window. More detailed instructions are given below.

Firstly click on *'Add Taxonomy'* in the 'Advanced Users' window of the DEM. A table will then appear. If the table is not empty then highlight all of the data and press the *<Delete>* key on your keyboard to delete all the existing information.

It should be possible to copy and paste the data from your own data file in to this table. Make sure that the table you are copying from has the columns in the same order as those in the DEM first, then highlight and copy all of the data in you own copy of the data. In the DEM then highlight with your mouse all of the column titles in which you would like to paste data. When the columns are highlighted, from the *'Edit'* menu select *'Paste'*. You may be asked to confirm that you wish to paste the data, click *'Yes'*. If you have data already in the table that you would like to add to, select *'Paste Append'* instead of 'Paste' to avoid overwriting the existing data.

When you are satisfied that this table contains the taxonomic information that you would like to add to the DEM, close the table by clicking on the *'X'* in the top right-hand corner.

To now add this taxonomy to the DEM, click on the *'Append Species'* button in the 'Advanced Users' window. A message will appear when the species have been successfully added. Be careful not to click on the *'Append Species'* button twice as it will append the list of species twice.

9.2   Merge Data

This section enables data from two different copies of the DEM to be merged in to one. The basic instructions for how to merge the data are given in the middle section titled 'Merge Data' in the 'Advanced Users' window of the DEM. More detailed instructions are given below.

There are two data files being referred to here; one is to be merged and the other is the file in which the data will be merged in to. The version of the DEM that will incorporate the newly merged data should be in the directory c:\program files\SIS on your computer. In this same directory, create a new folder called "import" if it does not already exist. In to this directory copy the "SIS data files.mdb" file that contains the data to be merged. When all of the data files are in place, open the version of the DEM that will incorporate all of the merged data.

To merge the data, click on the *'Merge Data'* button on the 'Advanced Users' window of the DEM. A message will appear when the data have been successfully merged. Be careful not to click the *'Merge Data'* button more than once or an error message will appear.

It is not necessary to keep the data file in the "import" directory after the data have been successfully merged. If you would like to import another file, place the next file to be imported in to the "import" directory and repeat the process.

9.3   Export Maps to ArcView Format

The GIS component built in to the database for creating the 'Extent of Occurrence' of a species is only a basic GIS tool. To use more advanced GIS techniques you will need to export the distribution maps that were created within the DEM to a GIS compatible format. In this section of the DEM you can export all of the maps within the DEM to ArcView shapefile format (.shp) for use with ESRI's ArcGIS range of products.

Before exporting the maps, either create or decide which directory you would like to export the maps to, then click on *'Export Maps'* in the 'Advanced Users' window of the DEM. A

box will now appear requesting that you type the export path for the shapefiles. Type in the full path name of the directory that you would like to export the maps to, for example, c:/maps, then click *'OK'*. The files will then be imported to this directory.

10 Annex 1 – IUCN Red List Categories

IUCN RED LIST CATEGORIES

VERSION 3.1

Prepared by the

IUCN Species Survival Commission

As approved by the
51st Meeting of the IUCN Council
Gland, Switzerland

9 February 2000

IUCN RED LIST CATEGORIES

I. INTRODUCTION

1.   The IUCN Red List Categories are intended to be an easily and widely understood system for classifying species at high risk of global extinction. The general aim of the system is to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk. However, while the Red List may focus attention on those taxa at the highest risk, it is not the sole means of setting priorities for conservation measures for their protection.

Extensive consultation and testing in the development of the system strongly suggest that it is robust across most organisms. However, it should be noted that although the system places species into the threatened categories with a high degree of consistency, the criteria cannot take into account the life histories of every species. Hence, in certain individual cases, the risk of extinction may be under- or over-estimated.

2.   Before 1994 the more subjective threatened species categories used in IUCN Red Data Books and Red Lists had been in place, with some modification, for almost 30 years. Although the need to revise the categories had long been recognized (Fitter and Fitter 1987), the current phase of development only began in 1989 following a request from the IUCN Species Survival Commission (SSC) Steering Committee to develop a more objective approach. The IUCN Council adopted the new Red List system in 1994.

The IUCN Red List Categories and Criteria have several specific aims:

- to provide a system that can be applied consistently by different people;

- to improve objectivity by providing users with clear guidance on how to evaluate different factors which affect the risk of extinction;

- to provide a system which will facilitate comparisons across widely different taxa;

- to give people using threatened species lists a better understanding of how individual species were classified.

3.   Since their adoption by IUCN Council in 1994, the IUCN Red List Categories have become widely recognized internationally, and they are now used in a range of publications and listings produced by IUCN, as well as by numerous governmental and non-governmental organizations. Such broad and

extensive use revealed the need for a number of improvements, and SSC was mandated by the 1996 World Conservation Congress (WCC Res. 1.4) to conduct a review of the system (IUCN 1996). This document presents the revisions accepted by the IUCN Council.

The proposals presented in this document result from a continuing process of drafting, consultation and validation. The production of a large number of draft proposals has led to some confusion, especially as each draft has been used for classifying some set of species for conservation purposes. To clarify matters, and to open the way for modifications as and when they become necessary, a system for version numbering has been adopted as follows:

Version 1.0: Mace and Lande (1991)
The first paper discussing a new basis for the categories, and presenting numerical criteria especially relevant for large vertebrates.

Version 2.0: Mace *et al.* (1992)
A major revision of Version 1.0, including numerical criteria appropriate to all organisms and introducing the non-threatened categories.

Version 2.1: IUCN (1993)
Following an extensive consultation process within SSC, a number of changes were made to the details of the criteria, and fuller explanation of basic principles was included. A more explicit structure clarified the significance of the non-threatened categories.

Version 2.2: Mace and Stuart (1994)
Following further comments received and additional validation exercises, some minor changes to the criteria were made. In addition, the Susceptible category present in Versions 2.0 and 2.1 was subsumed into the Vulnerable category. A precautionary application of the system was emphasised.

Version 2.3: IUCN (1994)
IUCN Council adopted this version, which incorporated changes as a result of comments from IUCN members, in December 1994. The initial version of this document was published without the necessary bibliographic details, such as date of publication and ISBN number, but these were included in the subsequent reprints in 1998 and 1999. This version was used for the *1996 IUCN Red List of Threatened Animals* (Baillie and Groombridge 1996) and *The World List of Threatened Trees* (Oldfield *et al* 1998).

Version 3.0: IUCN/SSC Criteria Review Working Group (1999)
Following comments received, a series of workshops were convened to look at the IUCN Red List Criteria following which, changes were proposed

affecting the criteria, the definitions of some key terms and the handling of uncertainty.

Version 3.1: IUCN (2000)
The IUCN Council adopted this latest version, which incorporated changes as a result of comments from the IUCN and SSC memberships and from a final meeting of the Criteria Review Working Group, in February 2000.

All new assessments from January 2001 should use the latest adopted version and cite the version number and/or date.

4.   In the rest of this document, the proposed system is outlined in several sections. Section II, the Preamble, presents basic information about the context and structure of the system, and the procedures that are to be followed in applying the criteria to species. Section III provides definitions of key terms used. Section IV presents the categories, while Section V details the quantitative criteria used for classification within the threatened categories. Annex I provides guidance on how to deal with uncertainty when applying the criteria; Annex II suggests a standard format for citing the Red List Categories and Criteria; and Annex III outlines the documentation requirements for taxa to be included on IUCN's global Red Lists. It is important for the effective functioning of the system that all sections are read and understood to ensure that the definitions and rules are followed. (**Note:** Annexes I, II and III will be updated on a regular basis.)

II. PREAMBLE

The information in this section is intended to direct and facilitate the use and interpretation of the categories (Critically Endangered, Endangered, etc.), criteria (A to E), and subcriteria (1, 2, etc.; a, b, etc.; i, ii, etc.).

1. Taxonomic level and scope of the categorization process

The criteria can be applied to any taxonomic unit at or below the species level. In the following information, definitions and criteria the term 'taxon' is used for convenience, and may represent species or lower taxonomic levels, including forms that are not yet formally described. There is sufficient range among the different criteria to enable the appropriate listing of taxa from the complete taxonomic spectrum, with the exception of micro-organisms. The criteria may also be applied within any specified geographical or political area, although in such cases special notice should be taken of point 14 below. In presenting the results of applying the criteria, the taxonomic unit and area under consideration should be specified in accordance with the documentation guidelines. The categorization process should only be applied to wild populations inside their natural range, and to populations resulting from benign introductions. The latter are defined in the IUCN *Guidelines for Re-introductions* (IUCN 1998) as '...an attempt to establish a species, for the purpose of conservation, outside its recorded distribution, but within an appropriate habitat and eco-geographical area. This is a feasible conservation tool only when there is no remaining area left within a species' historic range'.

2. Nature of the categories

Extinction is a chance process. Thus, a listing in a higher extinction risk category implies a higher expectation of extinction, and over the time-frames specified more taxa listed in a higher category are expected to go extinct than those in a lower one (without effective conservation action). However, the persistence of some taxa in high-risk categories does not necessarily mean their initial assessment was inaccurate.

All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable. Together these categories are described as 'threatened'. The threatened categories form a part of the overall scheme. It will be possible to place all taxa into one of the categories (see Figure 1).
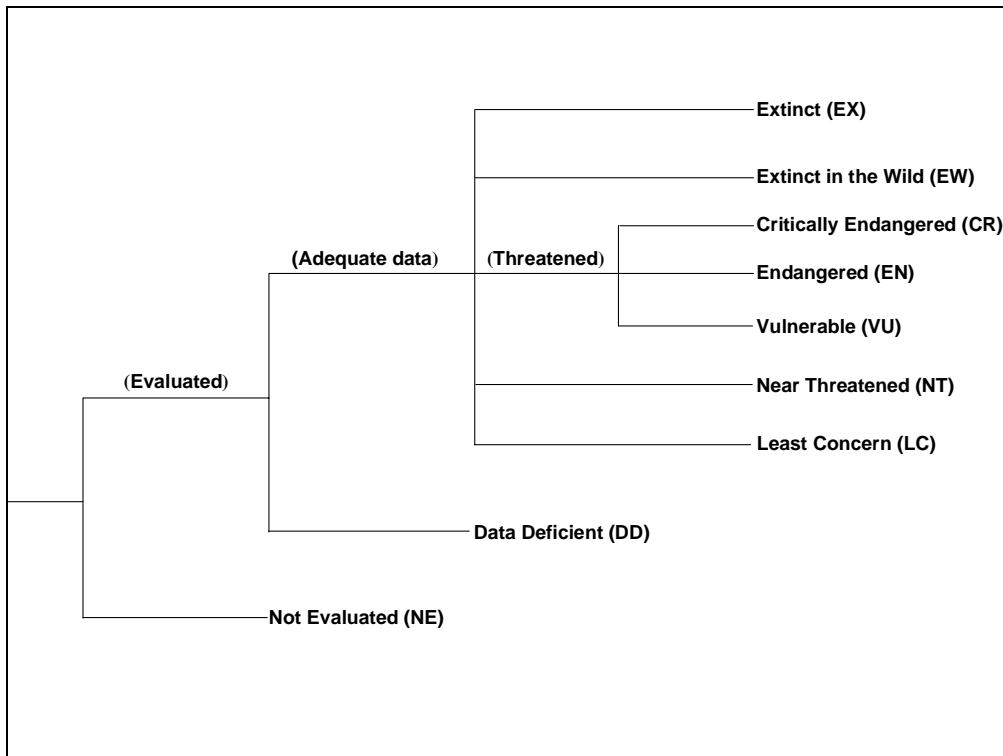
Figure 1. Structure of the categories.

3. Role of the different criteria

For listing as Critically Endangered, Endangered or Vulnerable there is a range of quantitative criteria; meeting any one of these criteria qualifies a taxon for listing at that level of threat. Each taxon should be evaluated against all the criteria. Even though some criteria will be inappropriate for certain taxa (some taxa will never qualify under these however close to extinction they come), there should be criteria appropriate for assessing threat levels for any taxon. The relevant factor is whether *any one* criterion is met, not whether all are appropriate or all are met. Because it will never be clear in advance which criteria are appropriate for a particular taxon, each taxon should be evaluated against all the criteria, and *all* criteria met at the highest threat category must be listed.

4. Derivation of quantitative criteria

The different criteria (A-E) are derived from a wide review aimed at detecting risk factors across the broad range of organisms and the diverse life histories they exhibit. The quantitative values presented in the various criteria associated with threatened categories were developed through wide consultation, and they are set at what are generally judged to be appropriate levels, even if no formal justification for these values exists. The levels for different criteria within categories were set independently but against a common standard. Broad consistency between them was sought.

5. Conservation actions in the listing process

The criteria for the threatened categories are to be applied to a taxon whatever the level of conservation action affecting it. It is important to emphasise here that a taxon may require conservation action even if it is not listed as threatened. Conservation actions which may benefit the taxon are included as part of the documentation requirements (see Annex 3, point 6).

6. Data quality and the importance of inference and projection

The criteria are clearly quantitative in nature. However, the absence of high-quality data should not deter attempts at applying the criteria, as methods involving estimation, inference and projection are emphasised as being acceptable throughout. Inference and projection may be based on extrapolation of current or potential threats into the future (including their rate of change), or of factors related to population abundance or distribution (including dependence on other taxa), so long as these can reasonably be supported. Suspected or inferred patterns in the recent past, present or near future can be based on any of a series of related factors, and these factors should be specified as part of the documentation.

Taxa at risk from threats posed by future events of low probability but with severe consequences (catastrophes) should be identified by the criteria (e.g. small distributions, few locations). Some threats need to be identified particularly early, and appropriate actions taken, because their effects are irreversible or nearly so (e.g., pathogens, invasive organisms, hybridization).

7. Problems of scale

Classification based on the sizes of geographic ranges or the patterns of habitat occupancy is complicated by problems of spatial scale. The finer the scale at which the distributions or habitats of taxa are mapped, the smaller the area will be that they are found to occupy, and the less likely it will be that range estimates (at least for 'area of occupancy': see Definitions, point 10) exceed the thresholds specified in the criteria. Mapping at finer scales reveals more areas in which the taxon is unrecorded. Conversely, coarse-scale mapping reveals fewer unoccupied areas, resulting in range estimates that are more likely to exceed the thresholds for the threatened categories. The choice of scale at which range is estimated may thus, itself, influence the outcome of Red List assessments and could be a source of inconsistency and bias. It is impossible to provide any strict but general rules for mapping taxa or habitats; the most appropriate scale will depend on the taxon in question, and the origin and comprehensiveness of the distribution data.

8. Uncertainty

The data used to evaluate taxa against the criteria are often estimated with considerable uncertainty. Such uncertainty can arise from any one or all of the following three factors: natural variation, vagueness in the terms and definitions used, and measurement error. The way in which this uncertainty is handled can have a strong influence on the results of an evaluation. Details of methods

recommended for handling uncertainty are included in Annex 1, and assessors are encouraged to read and follow these principles.

In general, when uncertainty leads to wide variation in the results of assessments, the range of possible outcomes should be specified. A single category must be chosen and the basis for the decision should be documented; it should be both precautionary and credible.

When data are very uncertain, the category of 'Data Deficient' may be assigned. However, in this case the assessor must provide documentation showing that this category has been assigned because data are inadequate to determine a threat category. It is important to recognize that taxa that are poorly known can often be assigned a threat category on the basis of background information concerning the deterioration of their habitat and/or other causal factors; therefore the liberal use of 'Data Deficient' is discouraged.

9.   Implications of listing
Listing in the categories of Not Evaluated and Data Deficient indicates that no assessment of extinction risk has been made, though for different reasons. Until such time as an assessment is made, taxa listed in these categories should not be treated as if they were non-threatened. It may be appropriate (especially for Data Deficient forms) to give them the same degree of attention as threatened taxa, at least until their status can be assessed.

10.   Documentation
All assessments should be documented. Threatened classifications should state the criteria and subcriteria that were met. No assessment can be accepted for the IUCN Red List as valid unless at least one criterion is given. If more than one criterion or subcriterion is met, then each should be listed. If a re-evaluation indicates that the documented criterion is no longer met, this should not result in automatic reassignment to a lower category of threat (downlisting). Instead, the taxon should be re-evaluated against all the criteria to clarify its status. The factors responsible for qualifying the taxon against the criteria, especially where inference and projection are used, should be documented (see Annexes 2 and 3). The documentation requirements for other categories are also specified in Annex 3.

11.   Threats and priorities
The category of threat is not necessarily sufficient to determine priorities for conservation action. The category of threat simply provides an assessment of the extinction risk under current circumstances, whereas a system for assessing priorities for action will include numerous other factors concerning conservation action such as costs, logistics, chances of success, and other biological characteristics of the subject.

12.   Re-evaluation

Re-evaluation of taxa against the criteria should be carried out at appropriate intervals. This is especially important for taxa listed under Near Threatened, Data Deficient and for threatened taxa whose status is known or suspected to be deteriorating.

13.　Transfer between categories
The following rules govern the movement of taxa between categories:

A.　A taxon may be moved from a category of higher threat to a category of lower threat if none of the criteria of the higher category has been met for five years or more.

B.　If the original classification is found to have been erroneous, the taxon may be transferred to the appropriate category or removed from the threatened categories altogether, without delay (but see Section 10).

C.　Transfer from categories of lower to higher risk should be made without delay.

14.　Use at regional level
The IUCN Red List Categories and Criteria were designed for global taxon assessments. However, many people are interested in applying them to subsets of global data, especially at regional, national or local levels. To do this it is important to refer to guidelines prepared by the IUCN/SSC Regional Applications Working Group (e.g., Gärdenfors *et al.* 1999). When applied at national or regional levels it must be recognized that a global category may not be the same as a national or regional category for a particular taxon. For example, taxa classified as Least Concern globally might be Critically Endangered within a particular region where numbers are very small or declining, perhaps only because they are at the margins of their global range. Conversely, taxa classified as Vulnerable on the basis of their global declines in numbers or range might be Least Concern within a particular region where their populations are stable. It is also important to note that taxa endemic to regions or nations will be assessed globally in any regional or national applications of the criteria, and in these cases great care must be taken to check that an assessment has not already been undertaken by a Red List Authority (RLA), and that the categorization is agreed with the relevant RLA (e.g., an SSC Specialist Group known to cover the taxon).

III. DEFINITIONS

1.   Population and Population Size (Criteria A, C and D)

The term 'population' is used in a specific sense in the Red List Criteria that is different to its common biological usage. Population is here defined as the total number of individuals of the taxon. For functional reasons, primarily owing to differences between life forms, population size is measured as numbers of mature individuals only. In the case of taxa obligately dependent on other taxa for all or part of their life cycles, biologically appropriate values for the host taxon should be used.

2.   Subpopulations (Criteria B and C)

Subpopulations are defined as geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange (typically one successful migrant individual or gamete per year or less).

3.   Mature individuals (Criteria A, B, C and D)

The number of mature individuals is the number of individuals known, estimated or inferred to be capable of reproduction. When estimating this quantity, the following points should be borne in mind:

- Mature individuals that will never produce new recruits should not be counted (e.g. densities are too low for fertilization).

- In the case of populations with biased adult or breeding sex ratios, it is appropriate to use lower estimates for the number of mature individuals which take this into account.

- Where the population size fluctuates, use a lower estimate. In most cases this will be much less than the mean.

- Reproducing units within a clone should be counted as individuals, except where such units are unable to survive alone (e.g. corals).

- In the case of taxa that naturally lose all or a subset of mature individuals at some point in their life cycle, the estimate should be made at the appropriate time, when mature individuals are available for breeding.

- Re-introduced individuals must have produced viable offspring before they are counted as mature individuals.

4.   Generation (Criteria A, C and E)

Generation length is the average age of parents of the current cohort (i.e. newborn individuals in the population). Generation length therefore reflects the turnover rate of breeding individuals in a population. Generation length is greater than the age at first breeding and less than the age of the oldest breeding individual, except in taxa that breed only once. Where generation length varies

under threat, the more natural, i.e. pre-disturbance, generation length should be used.

5.   Reduction (Criterion A)

A reduction is a decline in the number of mature individuals of at least the amount (%) stated under the criterion over the time period (years) specified, although the decline need not be continuing. A reduction should not be interpreted as part of a fluctuation unless there is good evidence for this. The downward phase of a fluctuation will not normally count as a reduction.

6.   Continuing decline (Criteria B and C)

A continuing decline is a recent, current or projected future decline (which may be smooth, irregular or sporadic) which is liable to continue unless remedial measures are taken. Fluctuations will not normally count as continuing declines, but an observed decline should not be considered as a fluctuation unless there is evidence for this.

7.   Extreme fluctuations (Criteria B and C)

Extreme fluctuations can be said to occur in a number of taxa when population size or distribution area varies widely, rapidly and frequently, typically with a variation greater than one order of magnitude (i.e. a tenfold increase or decrease).

8.   Severely fragmented (Criterion B)

The phrase 'severely fragmented' refers to the situation in which increased extinction risk to the taxon results from the fact that most of its individuals are found in small and relatively isolated subpopulations (in certain circumstances this may be inferred from habitat information). These small subpopulations may go extinct, with a reduced probability of recolonization.

9.   Extent of occurrence (Criteria A and B)

Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy (see Figure 2). This measure may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g. large areas of obviously unsuitable habitat) (but see 'area of occupancy', point 10 below). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

10.   Area of occupancy (Criteria A, B and D)

Area of occupancy is defined as the area within its 'extent of occurrence' (see point 9 above) which is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied

habitats. In some cases (e.g. irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon, the nature of threats and the available data (see point 7 in the Preamble). To avoid inconsistencies and bias in assessments caused by estimating area of occupancy at different scales, it may be necessary to standardize estimates by applying a scale-correction factor. It is difficult to give strict guidance on how standardization should be done because different types of taxa have different scale-area relationships.

11.   Location (Criteria B and D)

The term 'location' defines a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a taxon is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.
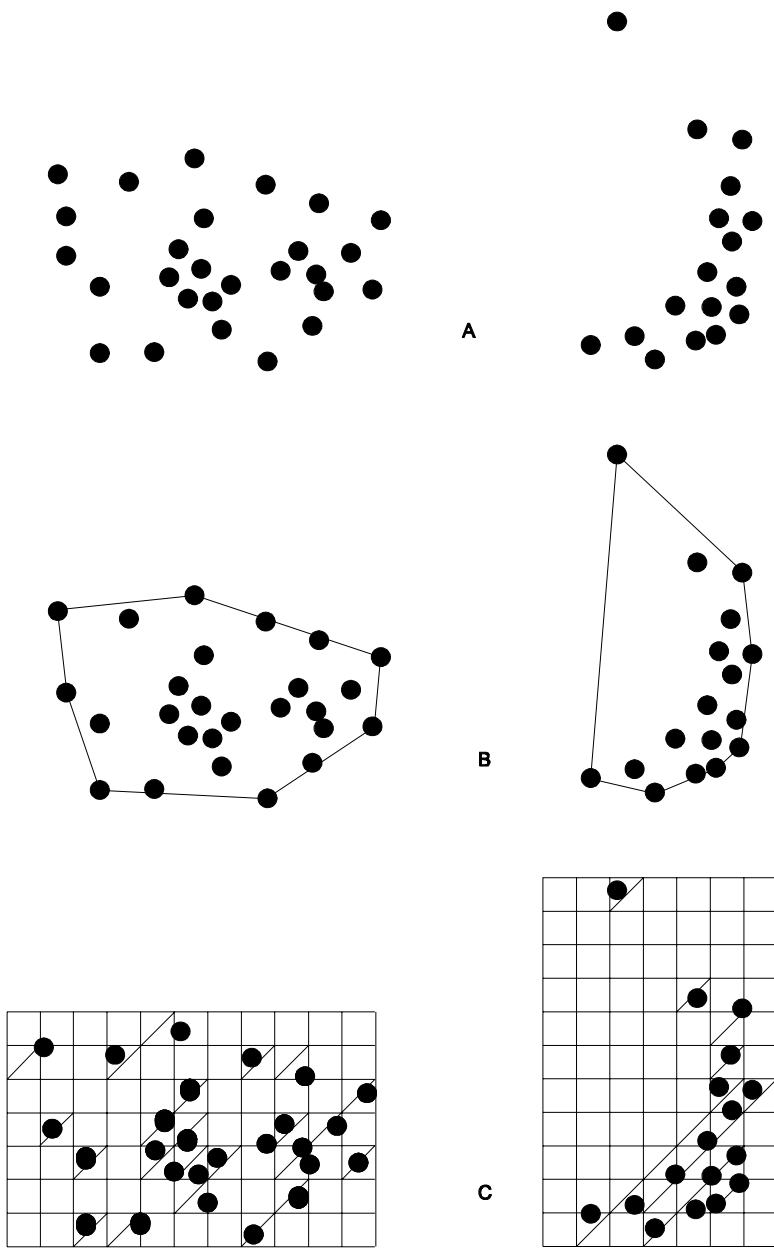
Figure 2. Two examples of the distinction between extent of occurrence and area of occupancy. (A) is the spatial distribution of known, inferred or projected sites of present occurrence. (B) shows one possible boundary to the extent of occurrence, which is the measured area within this boundary. (C) shows one measure of area of occupancy which can be achieved by the sum of the occupied grid squares.

12. Quantitative analysis (Criterion E)

A quantitative analysis is defined here as any form of analysis which estimates the extinction probability of a taxon based on known life history, habitat requirements, threats and any specified management options. Population viability analysis (PVA) is one such technique. Quantitative analyses should make full use of all relevant available data. In a situation in which there is limited information, such data as are available can be used to provide an estimate of extinction risk (for instance, estimating the impact of stochastic events on habitat). In presenting the results of quantitative analyses, the assumptions (which must be appropriate and defensible), the data used and the uncertainty in the data or quantitative model must all be documented.

IV. THE CATEGORIES [1]

A representation of the relationships between the categories is shown in Figure 1.

EXTINCT (EX)
A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time-frame appropriate to the taxon's life cycle and life form.

EXTINCT IN THE WILD (EW)
A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time-frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)
A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

ENDANGERED (EN)
A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)
A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)
A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)

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[1] *Note: As in previous IUCN categories, the abbreviation of each category (in parenthesis) follows the English denominations when translated into other languages (see Annex 2).*

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE)

A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

V. THE CRITERIA FOR
CRITICALLY ENDANGERED, ENDANGERED
AND VULNERABLE

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing an extremely high risk of extinction in the wild:

A.   Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥90% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:

    (a) direct observation
    (b) an index of abundance appropriate to the taxon
    (c) a decline in area of occupancy, extent of occurrence and/or
        quality of habitat
    (d) actual or potential levels of exploitation
    (e) the effects of introduced taxa, hybridization, pathogens,
        pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥80% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥80%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥80% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B.   Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 100 km^2, and estimates indicating at least two of a-c:

   a. Severely fragmented or known to exist at only a single location.

   b. Continuing decline, observed, inferred or projected, in any of the following:

      (i) extent of occurrence
      (ii) area of occupancy
      (iii)area, extent and/or quality of habitat
      (iv)number of locations or subpopulations
      (v) number of mature individuals.

   c. Extreme fluctuations in any of the following:

      (i) extent of occurrence
      (ii) area of occupancy
      (iii)number of locations or subpopulations
      (iv)number of mature individuals.

2. Area of occupancy estimated to be less than 10 km^2, and estimates indicating at least two of a-c:

   a. Severely fragmented or known to exist at only a single location.

   b. Continuing decline, observed, inferred or projected, in any of the following:

      (i) extent of occurrence
      (ii) area of occupancy
      (iii)area, extent and/or quality of habitat
      (iv)number of locations or subpopulations
      (v) number of mature individuals.

   c. Extreme fluctuations in any of the following:

      (i) extent of occurrence
      (ii) area of occupancy
      (iii)number of locations or subpopulations
      (iv)number of mature individuals.

C.　　Population size estimated to number fewer than 250 mature individuals
　　　　and either:

1.　An estimated continuing decline of at least 25% within three years or
　　 one generation, whichever is longer, (up to a maximum of 100 years in
　　 the future) OR

2.　A continuing decline, observed, projected, or inferred, in numbers of
　　 mature individuals AND at least one of the following (a-b):

(a) Population structure in the form of one of the following:
(i) no subpopulation estimated to contain more than 50 mature
individuals, OR
(ii) at least 90% of mature individuals in one subpopulation.

(b) Extreme fluctuations in number of mature individuals.

D.　　Population size estimated to number fewer than 50 mature individuals.

E.　　Quantitative analysis showing the probability of extinction in the wild is at
　　　 least 50% within 10 years or three generations, whichever is the longer
　　　 (up to a maximum of 100 years).

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a very high risk of extinction in the wild:

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥70% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:

    (a) direct observation
    (b) an index of abundance appropriate to the taxon
    (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
    (d) actual or potential levels of exploitation
    (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥50%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥50% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, AND where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 5000 km², and estimates indicating at least two of a-c:

a. Severely fragmented or known to exist at no more than five locations.

b. Continuing decline, observed, inferred or projected, in any of the following:

    (i) extent of occurrence
    (ii) area of occupancy
    (iii) area, extent and/or quality of habitat
    (iv) number of locations or subpopulations
    (v) number of mature individuals.

c. Extreme fluctuations in any of the following:

    (i) extent of occurrence
    (ii) area of occupancy
    (iii) number of locations or subpopulations
    (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 500 km^2, and estimates indicating at least two of a-c:

a. Severely fragmented or known to exist at no more than five locations.

b. Continuing decline, observed, inferred or projected, in any of the following:

    (i) extent of occurrence
    (ii) area of occupancy
    (iii) area, extent and/or quality of habitat
    (iv) number of locations or subpopulations
    (v) number of mature individuals.

c. Extreme fluctuations in any of the following:

    (i) extent of occurrence
    (ii) area of occupancy
    (iii) number of locations or subpopulations
    (iv) number of mature individuals.

C. Population size estimated to number fewer than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):

    (a) Population structure in the form of one of the following:
    (i) no subpopulation estimated to contain more than 250 mature individuals, OR
    (ii) at least 95% of mature individuals in one subpopulation.

    (b) Extreme fluctuations in number of mature individuals.

D.   Population size estimated to number fewer than 250 mature individuals.

E.   Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer (up to a maximum of 100 years).

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing a high risk of extinction in the wild:

A.   Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are: clearly reversible AND understood AND ceased, based on (and specifying) any of the following:

    (a) direct observation
    (b) an index of abundance appropriate to the taxon
    (c) a decline in area of occupancy, extent of occurrence and/or
           quality of habitat
    (d) actual or potential levels of exploitation
    (e) the effects of introduced taxa, hybridization, pathogens,
           pollutants, competitors or parasites.

2. An observed, estimated, inferred or suspected population size reduction of ≥30% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

3. A population size reduction of ≥30%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

4. An observed, estimated, inferred, projected or suspected population size reduction of ≥30% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, AND where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

B.   Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 20,000 km^2, and estimates indicating at least two of a-c:

a. Severely fragmented or known to exist at no more than 10 locations.

b. Continuing decline, observed, inferred or projected, in any of the following:

    (i) extent of occurrence
    (ii) area of occupancy
    (iii) area, extent and/or quality of habitat
    (iv) number of locations or subpopulations
    (v) number of mature individuals.

c. Extreme fluctuations in any of the following:

    (i) extent of occurrence
    (ii) area of occupancy
    (iii) number of locations or subpopulations
    (iv) number of mature individuals.

2. Area of occupancy estimated to be less than 2000 km^2, and estimates indicating at least two of a-c:

a. Severely fragmented or known to exist at no more than 10 locations.

b. Continuing decline, observed, inferred or projected, in any of the following:

    (i) extent of occurrence
    (ii) area of occupancy
    (iii) area, extent and/or quality of habitat
    (iv) number of locations or subpopulations
    (v) number of mature individuals.

c. Extreme fluctuations in any of the following:

    (i) extent of occurrence
    (ii) area of occupancy
    (iii) number of locations or subpopulations
    (iv) number of mature individuals.

C.   Population size estimated to number fewer than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or three generations, whichever is longer, (up to a maximum of 100 years in the future) OR

2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):

   (a) Population structure in the form of one of the following:
   (i) no subpopulation estimated to contain more than 1000 mature individuals, OR
   (ii) all mature individuals are in one subpopulation.

   (b) Extreme fluctuations in number of mature individuals.

D. Population very small or restricted in the form of either of the following:

   1. Population size estimated to number fewer than 1000 mature individuals.

   2. Population with a very restricted area of occupancy (typically less than 20 km^2) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

E. Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

Annex 1: Uncertainty

The Red List Criteria should be applied to a taxon based on the available evidence concerning its numbers, trend and distribution. In cases where there are evident threats to a taxon through, for example, deterioration of its only known habitat, a threatened listing may be justified, even though there may be little direct information on the biological status of the taxon itself. In all these instances there are uncertainties associated with the available information and how it was obtained. These uncertainties may be categorized as natural variability, semantic uncertainty and measurement error (Akçakaya *et al.* 2000). This section provides guidance on how to recognize and deal with these uncertainties when using the criteria.

Natural variability results from the fact that species' life histories and the environments in which they live change over time and space. The effect of this variation on the criteria is limited, because each parameter refers to a specific time or spatial scale. Semantic uncertainty arises from vagueness in the definition of terms or lack of consistency in different assessors' usage of them. Despite attempts to make the definitions of the terms used in the criteria exact, in some cases this is not possible without the loss of generality. Measurement error is often the largest source of uncertainty; it arises from the lack of precise information about the parameters used in the criteria. This may be due to inaccuracies in estimating the values or a lack of knowledge. Measurement error may be reduced or eliminated by acquiring additional data. For further details, see Akçakaya *et al.* (2000) and Burgman *et al.* (1999).

One of the simplest ways to represent uncertainty is to specify a best estimate and a range of plausible values. The best estimate itself might be a range, but in any case the best estimate should always be included in the range of plausible values. When data are very uncertain, the range for the best estimate might be the range of plausible values. There are various methods that can be used to establish the plausible range. It may be based on confidence intervals, the opinion of a single expert, or the consensus opinion of a group of experts. Whichever method is used should be stated and justified in the documentation.

When interpreting and using uncertain data, attitudes toward risk and uncertainty may play an important role. Attitudes have two components. First, assessors need to consider whether they will include the full range of plausible values in assessments, or whether they will exclude extreme values from consideration (known as dispute tolerance). An assessor with a low dispute tolerance would include all values, thereby increasing the uncertainty, whereas an assessor with a high dispute tolerance would exclude extremes, reducing the uncertainty. Second, assessors need to consider whether they have a precautionary or evidentiary attitude to risk (known as risk tolerance). A precautionary attitude will classify a taxon as threatened unless it is certain that it is not threatened, whereas an evidentiary attitude will classify a taxon as threatened only when there is strong evidence to support a threatened classification. Assessors should resist an evidentiary attitude and adopt a

precautionary but realistic attitude to uncertainty when applying the criteria, for example, by using plausible lower bounds, rather than best estimates, in determining population size, especially if it is fluctuating. All attitudes should be explicitly documented.

An assessment using a point estimate (i.e. single numerical value) will lead to a single Red List Category. However, when a plausible range for each parameter is used to evaluate the criteria, a range of categories may be obtained, reflecting the uncertainties in the data. A single category, based on a specific attitude to uncertainty, should always be listed along with the criteria met, while the range of plausible categories should be indicated in the documentation (see Annex 3).

Where data are so uncertain that any category is plausible, the category of 'Data Deficient' should be assigned. However, it is important to recognize that this category indicates that the data are inadequate to determine the degree of threat faced by a taxon, not necessarily that the taxon is poorly known or indeed not threatened. Although Data Deficient is not a threatened category, it indicates a need to obtain more information on a taxon to determine the appropriate listing; moreover, it requires documentation with whatever available information there is.

Annex 2: Citation of the IUCN Red List Categories and Criteria

In order to promote the use of a standard format for citing the Red List Categories and Criteria the following forms of citation are recommended:

1). The Red List Category may be written out in full or abbreviated as follows (when translated into other languages, the abbreviations should follow the English denominations):

Extinct, EX
Extinct in the Wild, EW
Critically Endangered, CR
Endangered, EN
Vulnerable, VU
Near Threatened, NT
Least Concern, LC
Data Deficient, DD
Not Evaluated, NE

2). Under Section V (the criteria for Critically Endangered, Endangered and Vulnerable) there is a hierarchical alpha-numeric numbering system of criteria and subcriteria. These criteria and subcriteria (all three levels) form an integral part of the Red List assessment and all those that result in the assignment of a threatened category must be specified after the Category. Under the criteria A to C and D under Vulnerable, the first level of the hierarchy is indicated by the use of numbers (1-4) and if more than one is met, they are separated by means of the '+' symbol. The second level is indicated by the use of the lower-case alphabet characters (a-e). These are listed without any punctuation. A third level of the hierarchy under Criteria B and C involves the use of lower case roman numerals (i-v). These are placed in parentheses (with no space between the preceding alphabet character and start of the parenthesis) and separated by the use of commas if more than one is listed. Where more than one criterion is met, they should be separated by semi-colons. The following are examples of such usage:

EX
CR A1cd
VU A2c+3c
EN B1ac(i,ii,iii)
EN A2c; D
VU D1+2
CR A2c+3c; B1ab(iii)
CR D
VU D2
EN B2ab(i,ii,iii)
VU C2a(ii)
EN A1c; B1ab(iii); C2a(i)

EN B2b(iii)c(ii)
EN B1ab(i,ii,v)c(iii,iv) + 2b(i)c(ii,v)
VU B1ab(iii) + 2ab(iii)
EN A2abc + 3bc + 4abc; B1b(iii,iv,v)c(ii,iii,iv) + 2b(iii,iv,v)c(ii,iii,iv)

Annex 3: Documentation Requirements for Taxa Included on the IUCN Red List

The following is the **minimum** set of information which should accompany every assessment submitted for incorporation into *the IUCN Red List of Threatened Species*™:

- Species name including authority details
- English common name/s and any other widely used common names (specify the language of each name supplied)
- Red List Category and Criteria
- Countries of occurrence (including country subdivisions for large nations, e.g. states within the USA, and overseas territories, e.g. islands far from the mainland country)
- For marine species, the Fisheries Areas in which they occur should be recorded (see http://www.iucn.org/themes/ssc/sis/faomap.htm for the Fisheries Areas as delimited by FAO, the Food and Agriculture Organization of the United Nations)
- For inland water species, the names of the river systems, lakes, etc. to which they are confined
- A map showing the geographic distribution (extent of occurrence)
- A rationale for the listing (including any numerical data, inferences, or uncertainty that relate to the criteria and their thresholds)
- Current population trends (increasing, decreasing, stable, or unknown)
- Habitat preferences (using a modified version of the Global Land Cover Characterization (GLCC) classification which is available electronically from http://www.iucn.org/themes/ssc/sis/authority.htm or on request from redlist@ssc-uk.org)
- Major threats (indicating past, current, and future threats using a standard classification which is available from the SSC web site or e-mail address as shown above)
- Conservation measures (indicating both current and proposed measures using a standard classification which is available from the SSC web site or e-mail address as shown above)
- Information on any changes in the Red List status of the species, and why this status has changed
- Data sources (cited in full; including unpublished sources and personal communications)
- Name/s and contact details of the assessor/s
- Before inclusion on the IUCN Red List, all assessments will be evaluated by at least two members of a Red List Authority. The Red List Authority is appointed by the Chair of the IUCN Species Survival Commission and is usually a sub-group of a Specialist Group. The names of the evaluators will appear with each assessment.

In addition to the minimum documentation, the following information should also be supplied where appropriate:

- If a quantitative analysis is used for the assessment (i.e. Criterion E), the data, assumptions, and structural equations (e.g. in the case of a Population Viability Analysis) should be included as part of the documentation.
- For Extinct or Extinct in the Wild taxa, extra documentation is required indicating the effective date of extinction, possible causes of the extinction, and the details of surveys which have been conducted to search for the taxon.
- For taxa listed as Near Threatened, the rationale for listing should include a discussion of the criteria that are nearly met or the reasons for highlighting the taxon (e.g., they are dependent on ongoing conservation measures).
- For taxa listed as Data Deficient, the documentation should include what little information is available.

Assessments may be made using version 2.0 of the software package RAMAS® Red List (Akçakaya and Ferson 2001). This program assigns taxa to Red List Categories according to the rules of the IUCN Red List Criteria and has the advantage of being able to explicitly handle uncertainty in the data. The software captures most of the information required for the documentation above, but in some cases the information will be reported differently. The following points should be noted:

- If RAMAS® Red List is used to obtain a listing, this should be stated.
- Uncertain values should be entered into the program as a best estimate and a plausible range, or as an interval (see RAMAS® Red List manual or help files for further details).
- The settings for attitude towards risk and uncertainty (i.e. dispute tolerance, risk tolerance, and burden of proof) are all pre-set at a mid-point. If any of these settings are changed this should be documented and fully justified, especially if a less precautionary position is adopted.
- Depending on the uncertainties, the resulting classification can be a single category and/or a range of plausible categories. In such instances, the following approach should be adopted (the program will usually indicate this automatically in the Results window):
  – If the range of plausible categories extends across two or more of the threatened categories (e.g. Critically Endangered to Vulnerable) and no preferred category is indicated, the precautionary approach is to take the highest category shown, i.e. CR in the above example. In such cases, the range of plausible categories should be documented under the rationale including a note that a precautionary approach was followed in order to distinguish it from the situation in the next point. The following notation has been suggested e.g. CR* (CR-VU).
  – If a range of plausible categories is given and a preferred category is indicated, the rationale should indicate the range of plausible categories met e.g. EN (CR-VU).
- The program specifies the criteria that contributed to the listing (see Status window). However, when the data are uncertain, the listing criteria are approximate, and in some cases may not be determined at all. In such cases, the assessors should use the Text results to determine or verify the

criteria and sub-criteria met. Listing criteria derived in this way must be clearly indicated in the rationale (refer to the RAMAS® Red List Help menu for further guidance on this issue).

- If the preferred category is indicated as Least Concern, but the plausible range extends into the threatened categories, a listing of 'Near Threatened' (NT) should be used. The criteria, which triggered the extension into the threatened range, should be recorded under the rationale.
- Any assessments made using this software must be submitted with the RAMAS® Red List input files (i.e the *.RED files).

New global assessments or reassessments of taxa currently on the IUCN Red List, may be submitted to the IUCN/SSC Red List Programme Officer for incorporation (subject to peer review) in a future edition of the *IUCN Red List of Threatened Species*™. Submissions from within the SSC network should preferably be made using the Species Information Service (SIS) database. Other submissions may be submitted electronically; these should preferably be as files produced using RAMAS® Red List or any of the programs in Microsoft Office 97 (or earlier versions) e.g. Word, Excel, or Access. Submissions should be sent to:
IUCN/SSC Red List Programme, IUCN/SSC UK Office, 219c Huntingdon Road, Cambridge, CB3 0DL, United Kingdom. Fax: + 44-(0)1223-277845; EMail: redlist@ssc-uk.org.

For further clarification or information about the IUCN Red List Criteria, documentation requirements (including the standards used) or submission of assessments, please contact the IUCN/SSC Red List Programme Officer at the address shown above.

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