Section 3: Practical uses of the database and how to design new queries and reports to achieve them

Many of the day-to-day uses of the database will be catered for by the options available on the menus. These include diverse tasks such as producing species lists with abundance indices for selected squares or areas to use as part of environmental assessments, mapping present and historical species distributions, comparing density of selected birds of prey across the country and over time, and assessing which of Namibia's wetland sites qualify as potential Ramsar sites or are important for selected species. The use of the menus to extract these data is described in Section 1.

However, there are countless other uses to which the bird data can usefully be put, and many of these will require custom-designed data extraction queries. In this section we present some examples of how the data have been, or could be, put to use, and how queries can be designed to extract appropriate data. These examples, in combination with a basic knowledge of Access, should provide a sufficient introduction to constructing queries to allow users to design their own queries to extract data to answer specific questions.

IMPORTANT

- **If you run a query and start to delete or edit data in the resulting spreadsheet, these changes will normally be written to the underlying data tables. Whilst this can be a powerful way to edit data, it is potentially dangerous as changes may be made unintentionally.**
- **All query results should be checked to make sure they are correct. It is easy to construct queries which do not produce the results you expect!**
- **If you run a query, and then make changes to the data in the data tables, the query will automatically reflect these changes next time it is run.**

General hints for constructing queries:

1. Use an asterisk (*) as a wild-card character to represent any item in the criteria line. For example, 2017* will find 2017A and 2017BB and 2017; *bird* will find birds, Frigatebird etc. To specify not equal to, use "<>". For example, "<>*Windhoek*" will find all records which do not contain Windhoek anywhere in the field specified.
2. Use the word or to include other categories. For instance, to select data for both Etosha National Park and Skeleton Coast Park, change the criteria for the Protected_area_code field to 1 or 2.
3. Use the term Is Null (or Is Not Null) in a field's criteria to specify that the field must be empty (or must not be empty).
4. Use the Total line (activated by clicking the Σ button) to perform calculations such as count, sum, average. (the default is Group By).
5. Note that you can add another table to the query grid at any time by clicking on the Show Table icon.
6. If more than one criteria are on the same line of the query grid the query will find records that fulfil both criteria; if the criteria are on different lines, it will find records that fulfil either criteria.
7. Many queries require several steps to produce the required output. For example, to count the number of species recorded at a particular site it is usually necessary to make one query which lists the species recorded at the site and then to make a second query, based on the first one, which counts the number of species. If you try to do this in one query, you will end up with a count of the number of rows of data for the site, rather than the number of species.
8. If you design a query which computes calculations, you will end up with field names like "Count of Roberts". To rename a field simply insert a new field name followed by a colon (:) before the old one in the top line of the query design grid e.g. No of species: ROBERTS.
9. Each query has properties which can be used to refine the output. To open the query properties, click the right hand mouse button with the cursor in the grey area of the query i.e. not in any field or table. Select properties. Changing unique values to yes, for instance, will restrict output to only show an output line if it is different from all other output lines.

10. Tables and queries used in the query design grid must be joined (related) correctly to each other. If they are not, you will get unexpected and incorrect results. If you are using tables only, the correct relationships should already exist. If you add queries, you may need to add relationships between fields by dragging a field from one query/table to the corresponding field in another query/table. (This can be done in **Query design** or in the **Relationship Window**). Setting the join properties can also alter the query output. For instance, if you have two tables and you set the join properties to a one way join (by clicking on the join and the clicking the right hand mouse button) you can force the query to present all records from one table even if there are no corresponding records in the other table.

Example queries

The example queries can be accessed by opening the Database Window (select **Exit this screen and go to the database window** from the menu and then enter the correct password) and clicking on the **Query** tab. Highlight the required query by clicking on it once with the mouse. Clicking on **Open** will run the highlighted query; clicking on **Design** will show the query structure. To switch between the **Design** view and the **Datasheet** (results) view, choose **View** from the Menu and the select the desired view. The example queries have been named "_example 1 1st step", "_example 1 2nd step" etc. To run a multi-step query, it is only necessary to run the last step as the previous step(s) are run automatically. Please DO NOT make changes to these example queries. If you want to experiment, first copy the query and save it with a different name (from the **Database Window** use the right hand mouse button then choose **Copy**), or choose **Save As/Export** from the **File** menu in the query design view.

Example 1 Where are hotspots of avian endemism in Namibia?

This question is answered by finding out which QDS in Namibia have the highest number of endemic species. To use data on *all* endemic species, the SABAP dataset must be used. (If only the 10 'inland' endemics were being considered, the best dataset to use would be the Endemics data, since these data are more detailed). The desired output is thus a list of QDS with the corresponding number of endemic species. Results from analysis similar to this were published in Simmons (1998b).

The first step of this query (_example1 1st step) uses the SABAP_CARD_ID and SABAP_DATA tables to list the species recorded in every QDS. Adding the ROBERTS_CODE table, with the criteria that the Endemic status field must contain "Namibian", restricts the results to Namibian endemics only. In the query properties, the unique values option is set to yes, so that each species is listed only once for each QDS. In the second step (_example1 2nd step) the first query is used in conjunction with the QDS table (joined with a one-way join to force the output to show all QDS even if no endemic species are present) to count the number of endemic species in every QDS in Namibia. This output can then be exported for mapping.

Example 2 Which wetland sites in Namibia support a) the highest diversity of species? b) the most birds? c) the highest number of Red Data species?

2a) To calculate the total number of wetland species recorded at each site (i.e. diversity of species), a two-step query is required. The first step (_example2a 1st step) lists the species recorded at each site, using the WC_INFO and WC_DATA_WETS tables. The second step (_example2a 2nd step) is based on the first query and counts the number of species at each site. This query presents the number of species recorded over all wetland counts combined for each site. To specify the number of species recorded during one count only, you should add count date to the design grid in the first step.

2b) This query uses WC_SITE_NAME and COUNT_DATE from WC_INFO and NO_OF_BIRDS from WC_DATA_WETS to sum the number of birds at each site on each count date. The final column is sorted in descending order.

2c) The first step of this query is very similar to _example2a 1st step, but it adds the ROBERTS_CODE table so that Red Data species can be specified (as not equal to "-", since Red Data species contain a status code in this column whilst non-RD species contain "-"). The second step (_example2c 2nd step) is based on the first query and sums the number of Red Data species.

Example 3 Which species are known to use *Acacia erioloba* for nesting?

This query is shown in _example3. Descriptive data on nest locality, description and site are held in the NEST_RECORD_INFO table. Adding the ROBERTS_CODE table allows species names to be added. Since *Acacia erioloba* has many names, the query should be constructed to find all names e.g. Camelthorn, *Acacia erioloba* etc by using a criteria such as **Like "*acacia erioloba*" Or Like "*camelthorn*" Or Like "*acacia giraffae*"**. Using this criteria for all fields which contain descriptive data on nest characteristics will retrieve all nest records where any of these words are present. Additional output e.g. dates, locations can be added by adding these fields to the query grid.

Example 4 Which Red Data species have been recorded breeding in the vicinity of Waterberg by the Nest record scheme?

This query uses the NEST_RECORD_INFO table, the GAZETTEER table and the ROBERTS_CODE table. Nest records for which a precise locality was recorded have a Gazetteer number and the sixteenth degree square (SDS) is stored in the GAZETTEER table. Those with less precise locality information have either a quarter degree square (QDS) reference or a descriptive locality in the NEST_RECORD_INFO table. Hence you must query the location in both tables. This has been done as **Like "2017*"** (the degree square containing Waterberg and surrounds) for the QDS and SDS fields and **Like "*waterberg*"** in the locality field. Red Data status is stored in the Red Data Status field of the ROBERTS_CODE table and Red Data Species have been specified by **<>"-"** (i.e. not equal "-") in this field, since Red Data Species have a value such as critically endangered in this field and non RD species have a "-".

Example 5 On which sections of the Windhoek to Okahandja road have Tawny Eagles been observed each year?

This example uses the road count data set. In order to answer the question, you need to extract data on the number of times Tawny Eagles have been sighted on each 1 km section of route 1. These data are in the RRC_INFO and RRC_DATA tables. To help in interpreting this it would also be useful to extract data on how many times each 1km section has been travelled each year. The first step (_example5 1st step) uses RRC_DISTANCES and RRC_LOCATIONS to extract data on how many times each 1km section of road has been travelled. The month/year field has been formatted to extract year only and route 1 has been specified in the criteria. The second step (_example5 2nd step) adds up the number of Tawny Eagles seen on each route section in each year. The third step (_example5 3rd step) combines the first two steps. Relationships have been established between corresponding fields in the first two queries (using the mouse to drag from one field to another) and one-way joins have been set up by clicking on the relationships and setting the join properties so that the query is forced to use all data from the first step i.e. to present every route section for every year regardless of whether or not Tawny Eagles were sighted.

Example 6 How many specimens of Sabota Lark were collected between 1900 and 1950, and from which QDS?

This example extracts data from the MUSEUM_DATA table based on collection year and species. The first step (_exampe6 1st step) specifies the species name and extracts the QDS from the QDS field in MUSEUM_DATA and the SDS field in the GAZETTEER table. Because each specimen has either the SDS in the GAZETTEER table OR a QDS code in the MUSEUM_DATA table, it is easiest to just concatenate the data from these two fields to get the correct QDS code. The expression **Left([QDS] & "" & [SDS],6)** specifies that only the first 6 characters are used. Specimens with no QDS or SDS and not between 1900 and 1950 are excluded. The one-way join specifies that all specimens from MUSEUM_DATA are used, whether they have a gazetteer number or not. Because each line of data represents a separate specimen, the number of specimens is simply the number of records shown. The second step (_example6 2nd step) produces a list of QDS, and number of specimens per QDS, based on the first step.