# Creating Capture Histories in Program Access

To import mark-recapture data into Program Mark, it must be carefully formatted to match the requirements of the Program. Program Mark has no capabilities for formatting mark-recapture data and other software must be used. The purpose of this exercise is to introduce you to Microsoft Access, a relational database and to illustrate how it can be used to create capture histories. The example dataset is 6 years of banding data for Gray Catbirds captured at a MAPS banding station at Ft. Riley.

## Obtain the Microsoft Access file

Open Internet Explorer and go to the course website: www.ksu.edu/bsanderc/biol823
Right click on the database file caphist.mdb and save to the Biol 823 folder on the desktop
Double click on the file to open the database
Double click on the file named 'Catbird' to open the file

## Exploring with Access

The datafile has five columns: Species (GRCA = Gray Catbird), Year and Date of capture, BandNumber (the unique USFWS band number), and Age-class (J = Juvenile, A = Adult). The file is in a 'vertical' file format. Capture events are sorted by date of capture and new capture events are appended at the end of the file each year. Using the bar on the left, scroll to the bottom of the file. With $n$ = 743 capture events, this file would be difficult to convert to a 'horizontal' capture history by hand.

Access is very convenient for working with data because it has a number of tools for viewing and manipulating your records. For example, put the cursor in the box where Band Number = 158120611 in about the 8$^{th}$ row. Then on the top line push the button with the lighting bolt (Filter by selection). This operation has selected all of the records for this particular bird. Put the cursor in one of the boxes where Year = 1999 and zap the lightning bolt again. You have now selected all of the records for that year for that individual bird. Select the filter button to remove the filter and view all records again.

Click the cursor in the column labeled 'Age-class' and the entire column should be dark. Now select the button labelled Z->A. This sorts the column by Z to A. At the top you can see there are three birds of Unknown age (U). Put the cursor in any Age-class box with a value of J and then press the lightning bolt button again. You have now selected all of the records for juvenile birds - there should be $n$ = 192 records. Remove the filter to view the entire file.

At the upper left corner of the screen there is a 'View' button with a little blue triangle and a pencil. If you click on this button you can view the details of the different variables in this file. If you were creating a new file, this is how you would tell access how you wanted different variables to be formatted, and you can also stipulate what possible values a variable can contain. Click the 'View' button that looks like a table in the same position to return to the regular table view. Save the file if prompted to do so.

**Creating Capture Histories**

Now we are ready to create capture histories. Close the Catbird table but leave Access database open. Click on Queries. Queries are tools that you can use to view subsets of your data, modify your data, create new datafiles and append data to existing files.

Select 'Create Query in Design View'. You will then be prompted for tables to add to this query so highlight and add the table 'Catbird'. Save this query as 'CreateCH'.

Now you are ready to add the variables to this query. Double-click on these four variables in order to add them to the query. They should read left to right as: BandNumber, Age-class, Year and Date.

Select the sigma symbol at the top which should add a line to the query stating 'Group By'. For the last column of Date, change this to 'Count'. Press the View button to see the results of this query. It will give a count of the number of capture events per individual per year. Press the View button again to return to the Design View.

Press the little triangle to the left of the exclamation mark to change the query type. Two overlapping squares indicates a Select Query, we want to change this to a Crosstab Query. This will add a new row to the query labelled 'Crosstab'. Toggle the values within each box in this row to set BandNumber and Age-class as 'Row headings', Year as a 'Column Heading' and Date as a 'Value'. Press the View button to see the results. Now the total capture per year is in a row for each individual bird. Save the query, close it and return to the tables.

The next steps import the query as a new datatable. Select File | Get External Data | Import, and then select the same database that you are working with. Click on the tab for Queries and highlight the query that we have just created: 'CreateCH'. Select 'Options' at the bottom right of this box and toggle the radio button to import this query 'As Tables'. Then press 'OK'. The query is now in the Tables window and is relabeled 'CreateCH1'. Rename this table to 'CatbirdCH'.

Double-click CatbirdCH to view the files. If the columns are too wide, put the cursor in the box labeled 1998 and drag it to the right to select all of the columns. Put the cursor on the line between two columns and drag it to resize all of the year columns.

Click on the View button and add two more variables at the end of the file, one labeled CH and one labeled Semi. Both should be text variables.

**Modifying Table Values**

The final capture history will be coded 1 = detected in year and 0 = not detected. To obtain this capture history, all of the values > 1 need to be replace with '1', all of the blanks need to be replaced with '0' and all of the yearly values need to be concatenated into one line. To do this, you will again use the query tools.

Close the table and return to Queries. Create a new query by selecting 'Create Query in Design

View'. This time add 'CatbirdCH' to the query.
Add the variable 1998 to the variables to modify. Again, change the query type by selecting the triangle to the left of the exclamation mark, but this time create an 'Update Query'.

To modify the data in variable 1998 you will need to specify the criteria for modification and what the new value will be. In the line 'Criteria', type 'Is not null'. In the line 'Update to', type '1'. Do not include the quotations around these phrases. Now press the exclamation mark to run this query. It will prompt you to update $n = 96$ records, answer 'yes'. With this operation you have converted all integer values in variable 1998 to equal 1. In the row 'Field' you can toggle the value 1998 and change it to 1999. If you again hit the exclamation mark, you can repeat these steps for variable 1999. Continue and change the values for all of the year variables up to 2003.

Then return and select variable 1998 again. In the line 'Criteria', type 'Is null'. In the line 'Update to', type '0'. Do not include the quotations around these phrases. Now press the exclamation mark to run this query. It will prompt you to update $n = 458$ records, answer 'yes'. This is putting a value of zero in all blank fields. Again repeat these steps for variables 1999 to 2003. You can switch windows at any time to look at the changes in CatbirdCH that these queries are creating.

The next step is to concatenate all of these values. In the Update Query, select variable CH in the Field row. You can delete 'Is null' from the Criteria row. In the Update to row type the following line of text:
[1998] & [1999] & [2000] & [2001] & [2002] & [2003]
The square brackets indicate the numbers are variable names and the ampersand sign (&) is the operator for concatenating text variables. Hit the exclamation mark to run this query and to update $n = 554$ rows.

In the last step, use an Update Query to put a value of ';' in every row for variable Semi. You should be able to do this by now. You could then export the last two columns of this datafile to create an input file for Program Mark.

**Pooling Capture Histories by Group**

It is a bit more concise to tally up the number of similar capture histories for each group. To do this, create a new CrossTab query in design view and add table CatbirdCH.

Add the three variables CH, Age-class and Semi. In the Total row, change Semi from 'Group by' to 'Count'. In the Crosstab row, change CH to 'Row heading', Age-class to 'Column heading' and Semi to 'Value'. In the Sort row, change CH and Age-class to 'Descending'. In the Criteria row under Age-class, enter '=A' and then '=J' in the next row. Now view the results of this query. Save the query as 'TallyCH'.

To convert this query into a table, you would have to import it following the same steps that you used above to import the previous Cross Table. To create an input file for Program Mark, you

need to replace all of the blanks with zeroes and add an additional variable with a semicolon in each row. Change the width of variable CH to be 10 characters. Complete these steps now.

To export the table as an ASCII text file, select File | Export, change 'Save as type' to 'Text files', and press 'Save All'. Export it as a 'Fixed width' file and click 'Next' until you reach the final panel and then click 'Finish'.

The final step would be to locate this file wherever you have saved it on your harddrive and change the extension from 'filename.txt' to filename.inp'. Program Mark requires ASCII text files but for some reason only recognizes files that end in '.inp' for 'input'.

You are now ready to conduct survival analyses on this datafile.