CMIX TUTORIAL

Introduction

CMIX is a program for fitting mixture distributions to length-density data obtained from net surveys using maximum likelihood estimation. This tutorial outlines how to use the CMIX Excel Add-In to create an input file suitable for CMIX, run CMIX and display CMIX output in Excel. For more detail than this tutorial can provide please see the CMIX Manual.

Lessons

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The CD supplied contains the files needed for this tutorial. If you have not already followed the installation procedures for CMIX and the CMIX Excel Add-In then complete the following steps below.

- Before continuing with the following installation procedure please make sure you have uninstalled any previous versions of the Add-In. See 'Uninstalling CMIX and Excel Add-In'.
- Double click the "setup.exe" file supplied in the base directory of the CD. This should handle the whole installation process on your PC.
- The default installation directory is C:\Program Files\CMIX\. It is recommended that you do not change the installation directory from this default directory.
- Various ActiveX controls and Dynamic-Linked Libraries (DLL's) are supplied in conjunction with this installation. The setup process will prompt you if there are newer controls or DLL's on your system than those being installed. Do not overwrite your system files in these cases.
- Once the required files have been installed, on some systems Excel is automatically launched and the CMIX Excel Add-In is loaded. You should see the CMIX Excel Add-In menu bar which can be dragged to any location. If Excel is not launched after completing the setup double click on the file '*Installation Directory*\install.xls' to have the Add-In loaded for you.
- The Add-In will now be available to use with any Excel workbook. If you wish to turn the Add-In on or off at any stage, on the Excel file menu, choose Tools >> Add-Ins and deselect or select the CMIX Excel Add-In checkbox.
- All tutorial example files are installed to *Installation Directory*\CMIX\Examples.
- If you wish to run CMIX manually, without using the CMIX Excel Add-In, then as a default "CMIX.exe" is located in C:\Program Files\CMIX\ or whatever installation directory you have chosen during the installation process.

If CMIX and the CMIX Excel Add-In have been installed using the 'setup.exe' installation program, use the following procedure to uninstall the software.

- In Excel, choose the menu options Tools >> Add-Ins and make sure the 'CMIX Excel Add-In is deselected and then close Excel.
- From the Windows Start menu select Settings >> Control Panel >> Add/Remove Programs.
- Select 'CMIX' from list and hit the 'Add/Remove' button. The un-installation procedure will begin. If prompted do not remove any components that are designated as shared components as this may affect the operation of other software.
- In Excel, choose the menu options Tools >> Add-Ins and click on the 'CMIX Excel Add-In' name. When prompted select 'Remove From List' and then close Excel.

If CMIX and the CMIX Excel Add-In were installed manually, use the following procedure to uninstall the software.

- In Excel, choose the menu options Tools >> Add-Ins and make sure the 'CMIX Excel Add-In is deselected and then close Excel.
- Locate the files 'CMIX.EXE' and 'CMIX_Excel_Add-In.xla' on your local system and delete them.
- In Excel, choose the menu options Tools >> Add-Ins and click on the 'CMIX Excel Add-In' name. When prompted select 'Remove From List' and then close Excel.

This example illustrates the step by step process on how to construct a new input file suitable for running through CMIX. The settings for CMIX in this example are all basic and introductory.

- The Excel file supplied to be used in conjunction with this tutorial can be found in the directory '*Installation Directory*\Examples\Example.xls'.
- Open the excel file and make sure the CMIX Excel Add-In toolbar is visible. If the Add-In has not been installed please see 'Setting Up CMIX and Excel Add-In' for instructions on how to do so.
- From the CMIX Excel Add-In toolbar select the 'CMIX Wizard'. The CMIX Wizard displays a series of forms which guide the user through the process of creating a CMIX input file.
- Complete the details of the input form (Figure 1):

  1. Enter the name you would like to assign as a prefix for the worksheets created by the CMIX wizard in the 'CMIX Input Worksheet' drop down list.

  2. Enter a description of the data you will be using. For example: 'CMIX Input File Description'.

  3. Click the 'Next' button or the 'Bounds' tab to continue.

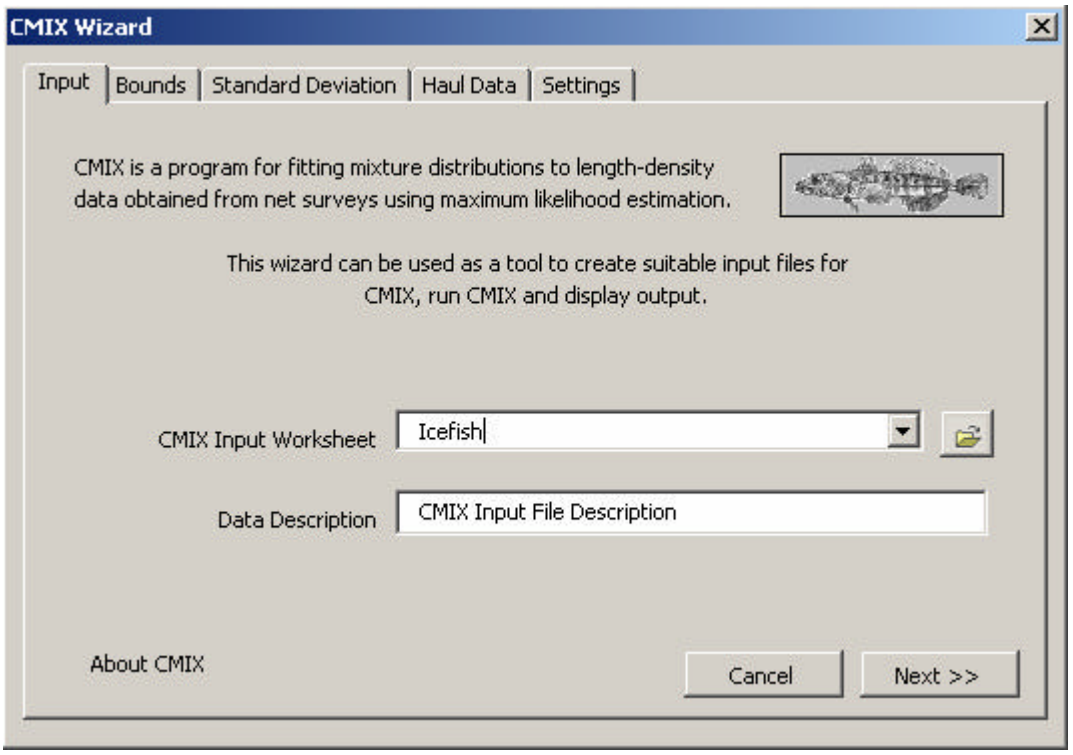

Figure 1 CMIX Wizard Input Details

- Complete the ‘Mixture Component Bounds’ form (Figure 2):

  Setting the mixture component bounds forces CMIX to find the mean length of fish within these bounds for each component.

  1. Using the ‘Add Bounds From Spreadsheet’ tool select the lower and upper bounds of the mixture components from the worksheet (Cells J20 to K21). You do not need to include the component numbers or the table headers in the selection. You may type in the selected cell range or use the button to select the range from the worksheet.

  2. After selection, the bounds table will automatically be updated with the bounds you have selected from the worksheet. These are available for editing if you require. Just click on the relevant row in the table and the current bounds appear in the ‘Add/Edit Bounds’ frame. The bounds may be edited in this frame. Click the ‘Add/Edit’ button to update the edited bounds in the bounds table.

  3. Click the ‘Next’ button or the ‘Standard Deviation’ tab to continue.

  Notes:

  1. There are two other methods to add bounds to the bounds table. You may directly add the bounds using the ‘Add/Edit Bounds’ frame.

  2. You may use the ‘Set von Bertalanffy Length Bounds’ button to insert von Bertalanffy parameters and get the wizard to calculate the bounds automatically for you. This method is explained in the ‘Complex Features’ lesson.

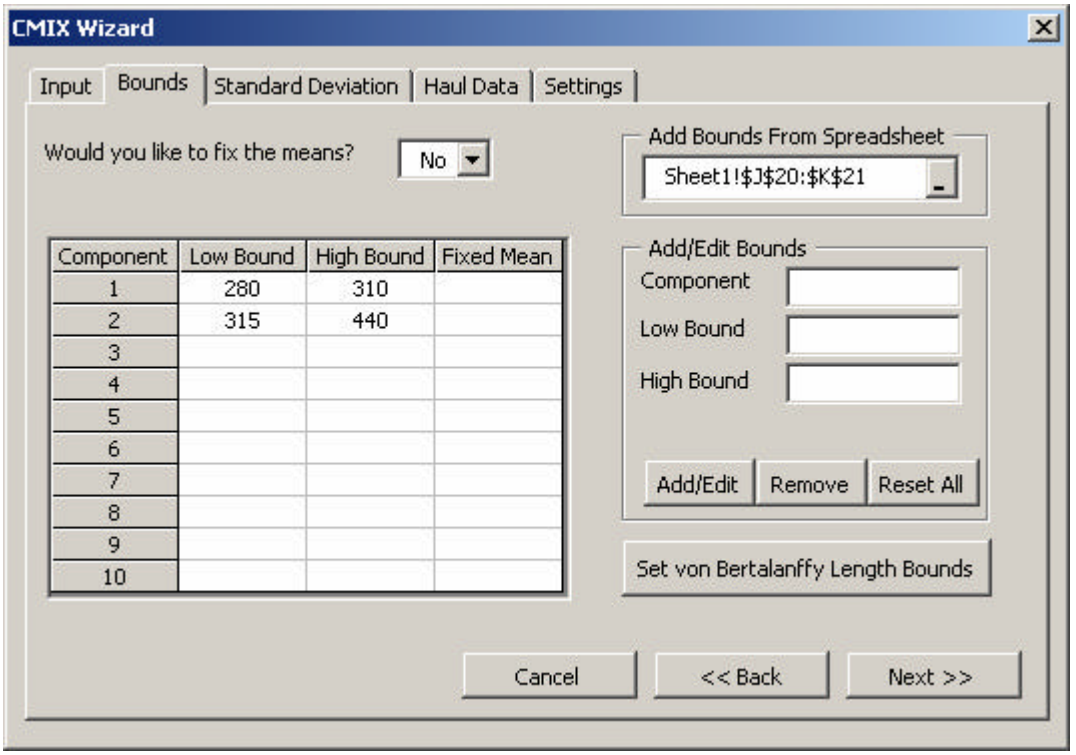

Figure 2 CMIX Wizard Mixture Component Bounds

- Complete the ‘Standard Deviation Settings’ form (Figure 3):

  The mixture standard deviation settings can be chosen to be linearly related to the mean or independent of the mean. Defaults are loaded into the CMIX Wizard for both cases. Only edit the settings for the tab of interest. As defaults are provided, you may not have to make any changes to this form, it is up to you.

  For this example do the following:

  1. Make sure the standard deviations have been chosen to be linearly related to the mean.

  2. For this example, the default settings will be used, so no changes need to be made.

  3. Click the ‘Next’ button or the ‘Haul Data’ tab to continue.

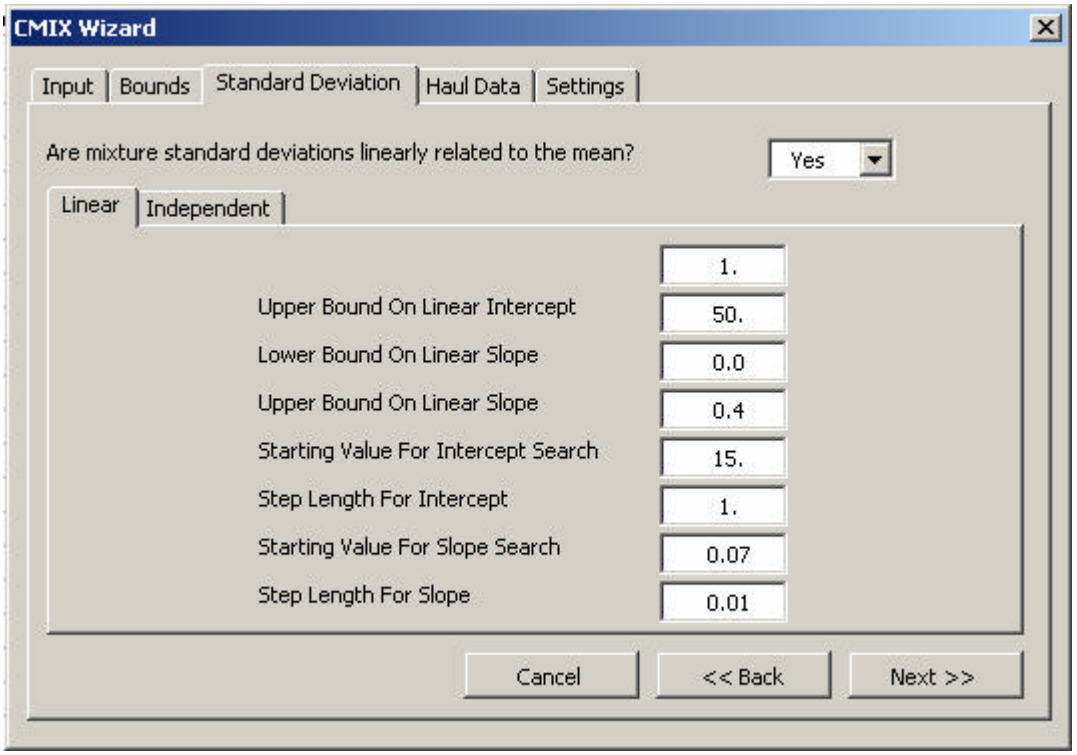

Figure 3 CMIX Wizard Standard Deviation Settings

- Complete the ‘Haul Data’ form (Figure 4):

  Haul data must be contained as a table anywhere within the current worksheet of your Excel spreadsheet. The first column must contain the lower length bin, followed by subsequent columns of individual haul density data. There is no limit to the number of length bins or hauls allowed. The very last length bin of the table must not contain any haul data as it is actually the upper limit on the length of the second to last bin.

  1. Using the ‘Select Haul Data’ tool, select the relevant haul data from the worksheet (cells A9 to G33). Note that you do not include the header of the table in this selection.

  2. This should automatically update the haul data table with the haul data selected from the worksheet.

  3. This form also has a button to merge bins, which is useful in compacting bins containing minimal data. Select the rows in the table corresponding to bins 40 to 90 and click the ‘Merge Bins’ button. The haul data table should now contain one bin starting at 40, with the following bin starting at 260.

4. Click the ‘Next’ button or the ‘Settings’ tab to continue.

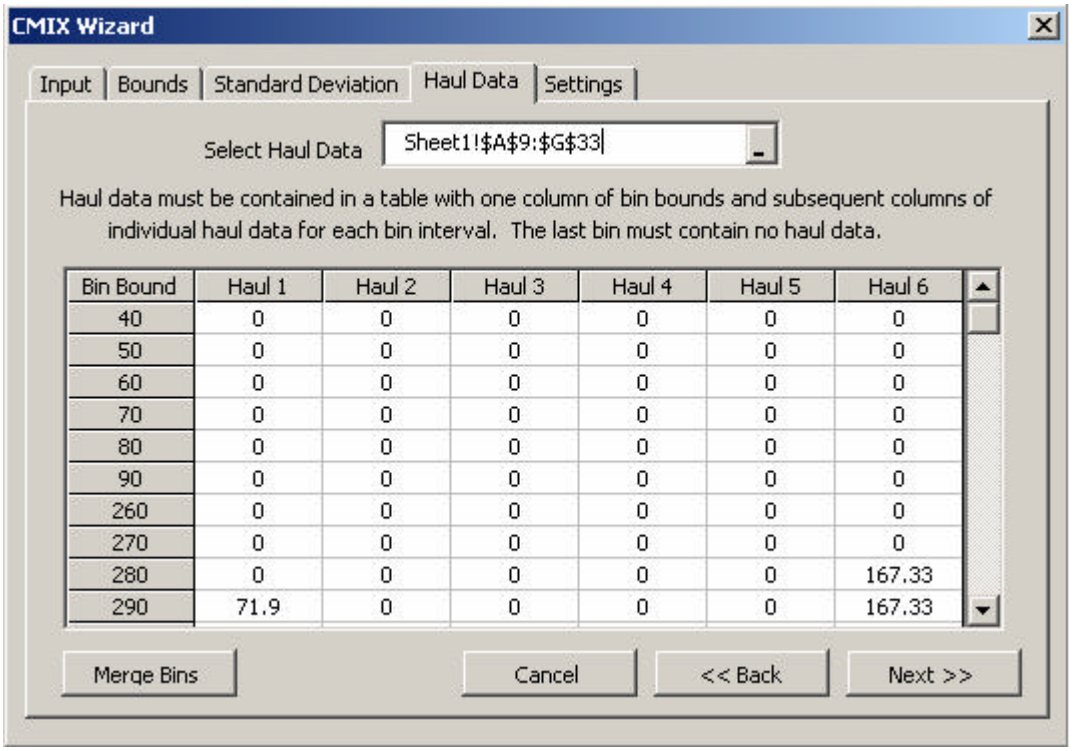

Figure 4 CMIX Wizard Haul Data

- Complete the ‘Settings’ form:

  The settings form contains final settings for CMIX. These are set up with default values, however you may choose to alter any of the settings as you desire.

  1. For this example, the default settings will be used, so no changes need to be made.

- Run CMIX:

  1. Click the ‘Run CMIX’ button to build the CMIX input file.

  2. The CMIX input file will be imported to the Excel workbook as a new worksheet with name ‘Icefish_Input’. (Icefish’ being the prefix defined on the input form of the CMIX Wizard).

  3. A DOS command window will be automatically brought up on screen. You will have to wait until the program finishes execution. On Windows 2000, Windows NT and later, the DOS command window will automatically close after execution is complete, for earlier versions you will have to manually close the DOS window upon completion.

  4. Once CMIX has finished execution and the DOS window has been closed (either manually or automatically) the output will be imported to Excel and presented graphically. Five output worksheets will be imported into your current Excel workbook with names:

     Icefish_Output
     Contains the output file from CMIX loaded as an Excel worksheet.

     Icefish_Results
     Contains the results of the CMIX run such as the calculated length means of the mixture components and the density of the mixture components.

Icefish_Distribution

Contains a density vs length distribution plot.

Icefish_Density Plot

Contains a observed and expected density vs length plot. Note that this worksheet contains checkboxes underneath the plot to alter the series displayed. You may choose to show or hide the confidence intervals, standard error bars, normal mixture distributions, observed and expected densities.

Icefish_Residuals

Contains a plot of the residuals.

Final Note

This working example can be copied for any haul data for any fish type to fit mixture distributions to length-density data.

This example illustrates the step by step process to load an existing input file into Excel and use the CMIX Excel Add-In tools to run CMIX.

- The text CMIX input file supplied to be used in conjunction with this tutorial can be found in the directory '*Installation Directory*\Examples\Input.dat'.
- Open a new workbook in Excel.
- From the CMIX Excel Add-In toolbar choose the 'Run CMIX' button.
- You will be prompted to select to display the files in the current or a new workbook. Make your selection.
- The 'Run CMIX' form is displayed (Figure 5):

  1. Use the browse button to locate the CMIX Input file 'Input.dat'.
  2. Click the 'Run CMIX' button. CMIX will run and the output will be automatically displayed upon completion in the selected workbook.

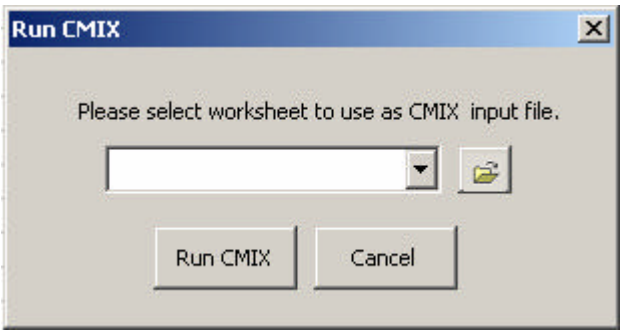

Figure 5 Run CMIX form

To Edit And Then Run The CMIX Input File:

There are two alternatives:

- You may load the input worksheet into the CMIX Wizard for editing. On the first form of the CMIX Wizard all worksheets ending in "_Input" will be available for selection as the 'CMIX Input Worksheet'. If you choose an existing worksheet then the data is automatically loaded from the worksheet into the wizard. You just have to progress through the wizard making changes only where you need to. You can then build the input file, run it through CMIX, and display the output using the wizard.
- You may manually edit the input worksheet and hit the 'Run CMIX' button in the CMIX Excel Add-In toolbar. This is not recommended as the format for the CMIX input file is complicated.

This example illustrates the step by step process to display a CMIX Output file graphically in Excel.

- The text CMIX output file supplied to be used in conjunction with this tutorial can be found on the CD as 'CMIX Tutorial/Output.out'. Copy this file to a suitable working directory on your hard drive.
- Open a new workbook in Excel.
- From the CMIX Excel Add-In toolbar choose the 'Display CMIX Output' button.
- You will be prompted to select to display the files in the current or a new workbook. Make your selection.
- The 'Display CMIX Output' form is displayed (Figure 6):

  1. Click the 'Display' button to view the output in Excel.

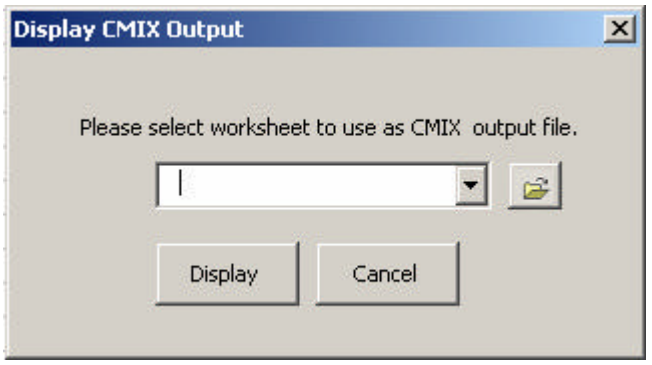

Figure 6 Display CMIX Output Form

This example loads an existing CMIX input file and edits it to use more complex features, such as setting the bounds using the von Bertalanffy method, and fixing component means.

- The text CMIX input file supplied to be used in conjunction with this tutorial can be found in the directory '*Installation Directory*\Examples\Input.dat'.

- Load the data into the CMIX Wizard. See lesson 'Loading And Editing Existing Input Files' if you are unsure on how to do this.

Setting Fixed Means For Components:

- In the 'Mixture Component Bounds' form there is the option to fix the means for each component/cohort. This can be done if you have a good understanding of the growth parameters for the species type and consequently know the expected mean length for each cohort. This means that the CMIX program will not have to calculate the mean length for the component with the specified fixed mean and saves a great deal of run time.

- If you choose to fix the means, note that you do not have to fix all of the means for each component, it is up to you. Try fixing the means for one component and have a look at your results.

Calculating von Bertalanffy Length Bounds:

- Go to the 'Mixture Component Bounds' form to display the form shown in Figure 7. Instead of using the component bounds specified here we will set the bounds using the von Bertalanffy method.

- Click the 'Set von Bertalanffy Length Bounds' button. The values of the parameters used in this form are dependent on the type of fish and area being modelled. The parameters used in this example are typical of Icefish.

    1. For this example enter the parameter values as they are in Figure 7.

    2. You may import and export default sets of parameters as you require.

    3. If you would like to view the length vs age plot determined using the von Bertalanffy equation click on the plot image.

    4. Click the 'Set Bounds' button to have the bounds automatically set 'Mixture Component Bounds' form.

- Note that if in the 'Mixture Component Bounds' form you have elected to fix the means then the bounds and the fixed mean are set using this method.

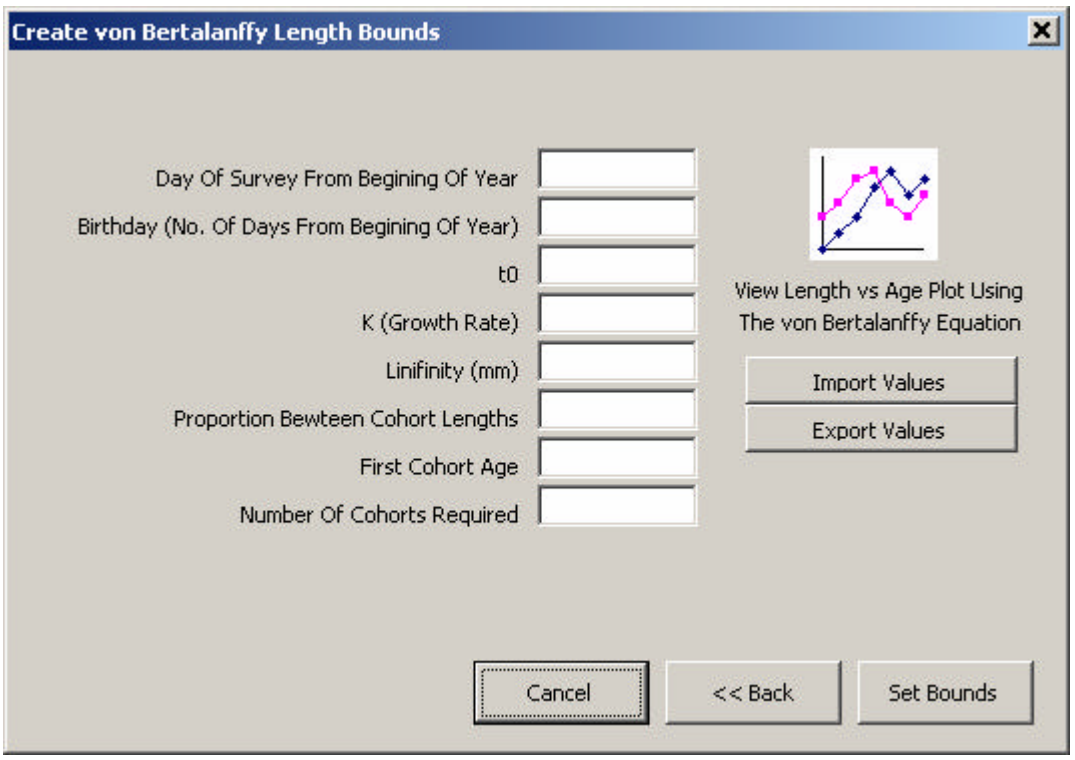

Figure 7 CMIX Wizard Create von Bertalanffy Length Bounds