

## Creating a file

The “New” command in the File Menu provides the option to create any of the file types enumerated above. Depending on the type of file to be created, the data entry user interfaces will be automatically loaded. The “Open” command in the File Menu allows the loading of any of the file types and users have the option to load the same file as many times as desired, depending on the capacity of the computing environment. Loaded data can be edited and saved. Care should be taken when the same file is loaded more than once not to overwrite previously edited records.

All inputs in the memory of the computer can be uniquely catalogued on the designated storage medium by providing a filename. In the Microsoft Windows environment, the number of characters making up a filename is not limited to only eight characters, as in the case of IBM DOS files, and users are encouraged to use more descriptive filenames to facilitate file identification and retrieval.

Though the choice of filenames is left to the user, a coherent system for naming files is still advisable. One practical approach for naming files (now commonly applied) is through a fixed format, e.g., **GSSSAR**. **G** stands for the first letter of the fish's family name, **SSS** for a combination of the first letter of the genus and the first two letters of the species name, and **AR** for the area or stock from which this file was taken. Using this format for a data set on *Upeneus moluccensis*, the file may be named **MUMORG** where **M** refers to the family name (Mullidae), **U** from *U*peneus, **MO** from *mo*luccensis and **RG** for Ragay Gulf, Philippines.

This format can be further expanded to allow for further identification. For example, if the length-frequency data in MUMORG, a file originally with 1 cm class intervals, were regrouped to 2 cm, it would be appropriate to keep the original file and to use another filename for the new file.

The new filename may contain the original name MUMORG plus a suffix, say 2, referring to the larger class interval. Thus, the new filename would be MUMORG2.

**WARNING!**

New data entered or edited are not automatically saved on disk. The "Save" and "Save As..." option under the FILE menu of FiSAT II must be used to save data that have been entered. It is good practice to save a file right after it has been created or edited to avoid losses, e.g., due to power failures.

The DATA subdirectory of FiSAT is the default address when saving and retrieving files. However, FiSAT II provides the option to save data to a different address. However, as with filenames, it is advisable to also label data folders properly for efficient retrieval of records.

**WARNING!**

Edited data are not automatically saved to disk. THEREFORE, IT IS ADVISABLE TO FIRST SAVE THE DATA AFTER EDITING BEFORE ANY ANALYSIS IS PERFORMED.

## **Printing a file**

The "Print..." option of the File Menu allows the user to print the loaded file to a printer or to a file. The "Print..." command is only applicable to data files and not to results of data analysis. A separate "Print" command button is available to users if the results are to be printed or graphs saved to disks.

The output device can be reconfigured from the "Print Setup" command of the File Menu. The printer re-configuration option can also be accessed from the Printer

Control Panel of Microsoft Windows or from a command button in the “Print” dialog box.

## **Sample manipulation**

As defined in earlier sections, file manipulation pertains to file operations which alter the original content of the file. The changes which result from these manipulations are not automatically stored to disk. It is therefore necessary to save the altered file if the new data need to be accessed for later use.

### **WARNING!**

If the manipulation of the data generates values greater than the upper limit or smaller than the lower limit set for a field, FiSAT II will display a warning message. Also, the high value(s) will be replaced by the upper limit (and conversely for low values).

A number of routines are presented below, with information arranged as follows:

<b>Required file</b>	<i>Defining the type of file required;</i>
<b>Input parameters</b>	<i>Listing the parameters required from the user;</i>
<b>Function(s)</b>	<i>Defining the mathematical model or function used by the routine and identifying its variables;</i>
<b>User interface</b>	<i>Providing notes on how to use the routine.</i>
<b>Remarks</b>	<i>Providing some comments and remarks to better describe the routine;</i>
<b>Readings</b>	<i>Providing a few suggested readings on the principles behind the routine (arranged in alphabetical order) other than the required readings, Gayanilo, Sparre and Pauly (1996), Gayanilo and Pauly (1998) and Sparre and Venema (1992).</i>

### **Merging two files**

Similar files may be merged, resulting in consolidated files. FiSAT II will not prevent users from merging several files with different labels. In such cases, however, the user should operate with care (as in any other file manipulating routines).

*Required file*      Length-frequency or weight-frequency data file with constant class size.

*Input parameter*      Source files to merge (file already loaded into memory as default input) and destination file.

*Function*                      None

*User interface*                This routine (Fig. 3.16) will require only the identification of two length frequency files with the same class sizes and filename where the merged file will be saved. The file loaded is by default, one of the two files to merge. However, the inputs for the source files can be altered.

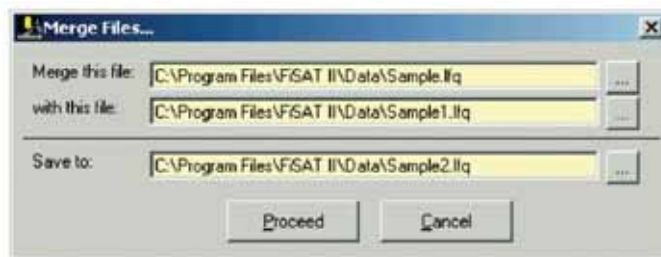


Fig. 3.16. User interface in merging two length frequency files.

*Remarks*                      The same file may be merged to itself.

### **Correcting using probabilities of capture**

Length or weight frequencies biased by gear selection can be (partly) corrected using this routine, which divides frequencies by their corresponding probabilities of capture.

FiSAT II provides two options (Fig. 3.17), (1) using a probability file or (2) using selection parameters ( $L_{50}$ ,  $L_{75}$ ,  $R_{50}$ , and  $R_{75}$ ).

*Required file*                Length- or weight-frequency data file with constant class size

*Input parameters*    **Option 1:** Filename of the probability of capture file

**Option 2:**  $L_{50}$ ,  $L_{75}$ ,  $R_{50}$ , and  $R_{75}$

In both cases, the destination filename will be required.

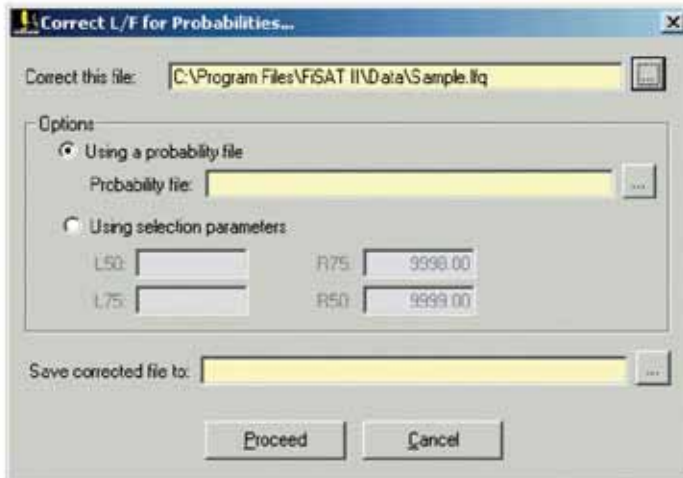


Fig. 3.17. User interface for correcting length frequencies for probability of capture.

*Functions*

The new frequency ( $N_{\text{new}}$ ) for the class group  $L$ , is computed from

$$N_{\text{new}} = N_{\text{old}} / P_L$$

where  $P_L$  is the probability of capture. If  $P_L$  is to be computed (i.e. **Option 2**), this is done using:

$$P_L = 1 / (1 + \exp(S_1 - S_2 \cdot L)) \cdot \dots \\ (1 + \exp(S_3 - S_4 \cdot L))$$

where

$$S_1 = ((L_{50} \cdot \ln(3)) / (L_{75} - L_{50})), \\ S_2 = S_1 / L_{50},$$

$$S_3 = ((L_{50} \cdot \ln(3)) / (R_{75} - R_{50})),$$

$$S_4 = S_3 / R_{50}$$

*User interface* The option to use in correcting the selected length frequency file for errors associated with probability of capture is presented in radio buttons. To select an option, click the button to enable the other input fields. Note that the default values for  $R_{50}$  and  $R_{75}$  are huge values indicating there is no deselection. However, these values can be altered.

If **Option 1** is used and the class size of the file which contains the selection data does not coincide with the length- or weight-frequency data file loaded onto memory, FiSAT II will cancel the operation and prompt for another filename.

*Remarks* Setting the right-hand selection (or "deselection") to very high values would have the effect of ignoring deselection completely for **Option 2**.

### **Adjusting class intervals**

The routine to adjust class sizes can be used to (i) allow two files with different class sizes to be merged, (ii) reduce the number of classes to fit into the limits set by FiSAT II or (iii) smooth out irregularities, and hence improve the interpretability of a data set. In FiSAT II, this routine regroups the frequencies by "slicing" the original file.

*Required file* Length- or weight-frequency data file with constant class size

*Input parameter* New class size

*Functions*

The frequencies of the new classes have the value:

$$N_{\text{new}} = N_1 + N_2$$

where

$$N_1 = N_i \cdot \left( \frac{X_{i+1} - Y_i}{X_{i+1} - X_i} \right)$$

$$N_2 = N_{i+1} \cdot \left( \frac{Y_{i+1} - X_{i+1}}{X_{i+2} - X_{i+1}} \right)$$

where

$N_i$  - frequency of the first class,

$N_{i+1}$  - frequency of the following class,

$X_i$  - lower limit of the first class,

$X_{i+1}$  - upper limit of the first class and lower limit of the following class,  $i+1$ ,

$X_{i+2}$  - upper limit of class  $i+1$ ,

$Y_i$  - lower limit of the new class, and

$Y_{i+1}$  - upper limit of the new class.

*User interface*

As a default, the active length frequency file will be the default source file. A new class size and the destination file will be required by the routine.



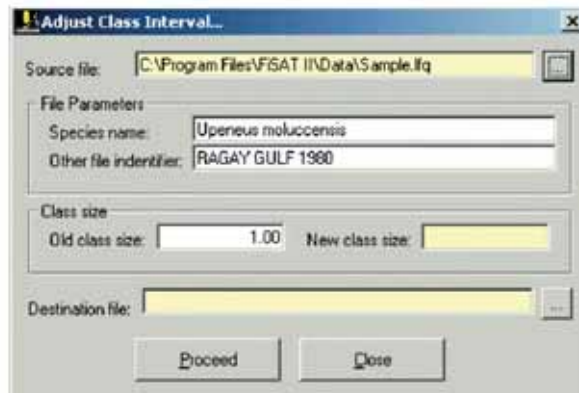


Fig. 3.18. User interface for adjusting the constant class size of a length frequency file in FISAT II.

*Remarks* Adjusting class sizes is another approach for smoothing the data files. It is advisable to always use the original file when adjusting class intervals and not to use files previously manipulated.

### Smoothing data files

This routine is meant to smooth out irregularities (Fig. 3.19). Smoothing can be done by: (1) a running average over 3 classes or (2) a running average over 5 classes.

*Required file* Length- or weight-frequency data file with constant class size

*Input parameter* None

*Functions*

**Option 1:**

$$N_{i,\text{new}} = (N_{i-1} + N_{i,\text{old}} + N_{i+1})/3$$

**Option 2:**

$$N_{i,\text{new}} = (N_{i-2} + N_{i-1} + N_{i,\text{old}} + N_{i+1} + N_{i+2})/5$$

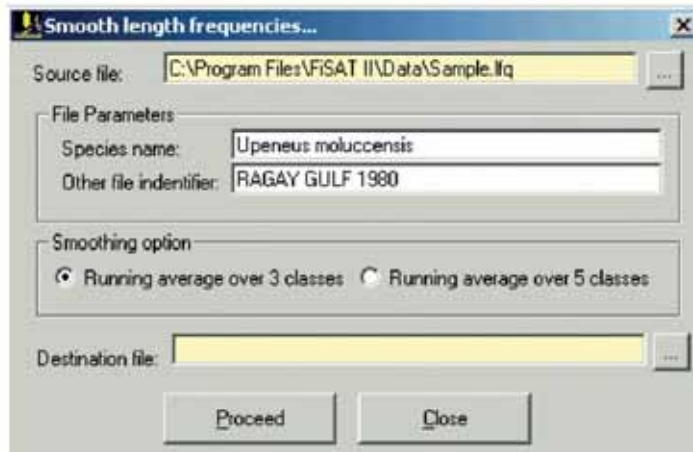


Fig. 3.19. User interface in smoothing length frequencies using running averages.

*User interface*      The default source file is the active length frequency file. Simply click the desired option, and provide the inputs for the desired destination file to complete the inputs.

*Remarks*              For both options, pseudo classes with frequencies of zero (0) are added below and above the extreme sizes, i.e. the smallest and largest classes before computing the new frequencies. FiSAT II will not prevent users from re-applying the smoothing function. However, this is not recommended, as repeated smoothing leads to loss of information.

*Readings*              Laurec and Mesnil (1987)

### **Pooling samples**

This routine (Fig. 3.20) allows a user to pool samples from several sampling dates. The weighting options (by the square root of sample total or % of sample total) that must

be considered before actual pooling are presented further below.

*Required file* Length- or weight-frequency data file with constant class size

*Input parameters* Identification of samples to be pooled.

*Function* 
$$N_{\text{new}} = N_{\text{sample 1}} + N_{\text{sample 2}} + \dots + N_{\text{sample n}}$$

*User interface* As with previous routines, the default source file is the active length frequency file. Using the mouse, select the samples to pool, provide the new sampling date (default is the average of the dates of the samples selected). Provide the address of the destination file and click the command button “Pool Selected Samples”. Continue the process until all samples to pool has been completed. Click the command button “Save File” to save the results.

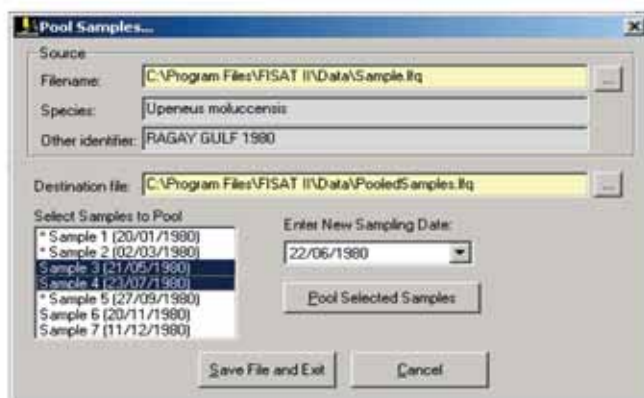


Fig. 3.20. User interface in pooling length frequency files.

*Remarks* It will be recalled that for length or weight frequencies stored through FiSAT II, a header may be attached to

each sample (e.g., sex, type of gear, depth, etc.). When pooling samples, these values (or entries) will be retained if and only if they are the same. Entries for total weight of the sample, total weight of the species and total weight of the catch will be added.

### Converting files

Certain data sets need converting before they can be used.

FiSAT II (Fig. 3.21) provides two options using either:

$L_{\text{new}} = d + e \cdot L_{\text{old}}^f$  (or length-to-length) or  $L_{\text{new}} = d \cdot W^e$  (or weight-to-length) functions.

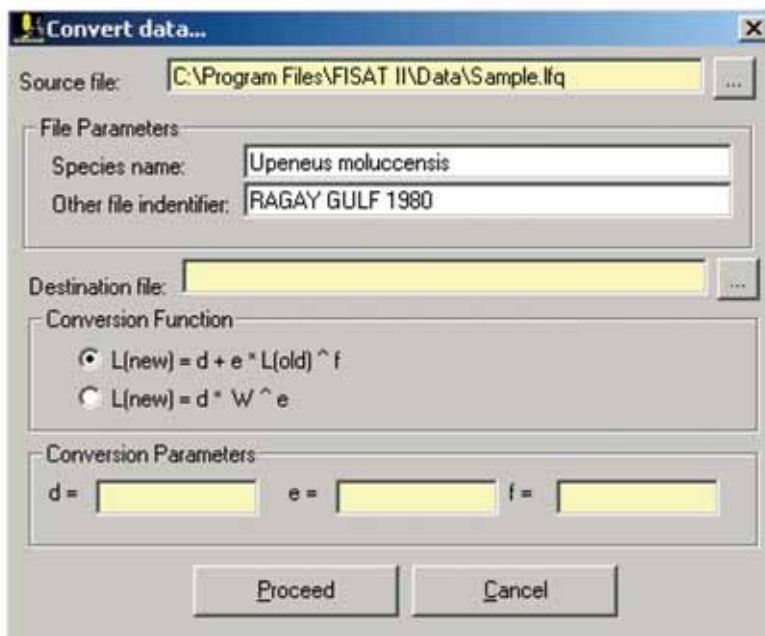


Fig. 3.21. User interface in converting grouped frequencies in FiSAT II.

*Required file*                      Length-frequency data file with constant class size

<i>Input parameters</i>	Depending on the option selected the parameters for d, e and f (for Option 1 only).
<i>Function</i>	<p><b>Option 1:</b> <math>L_{\text{new}} = d + e \cdot L_{\text{old}}^f</math></p> <p><b>Option 2:</b> <math>L_{\text{new}} = d \cdot W^e</math></p>
<i>User interface</i>	Enter the address of the destination file, select the conversion function to use using the mouse and enter the parameters before proceeding. Option 1 is used for converting one length measurement into another, e.g., total length into fork length or carapace length to total length when the variable “f” is set to 1.
<i>Remarks</i>	<p>Option 1 can also be used for conversions based on a proportionality (e.g., inches to cm), by setting <math>d = 0</math>, and <math>e =</math> conversion factor. Also, a constant can be added, by setting <math>e = 1</math> and <math>d =</math> constant.</p> <p>Option 2 can be used to convert weight-frequency data to length-frequency data given the parameters (a,b) of a length-weight relationship by setting <math>d=(1/a)^{(1/b)}</math>, and <math>e=1/b</math>.</p>

### **Raising samples**

For some of the fish stock assessment methodologies included in FiSAT II, length or weight frequencies may be required to represent certain quantities, for example, total catch. The following (Fig. 3.22) are options for raising frequencies:

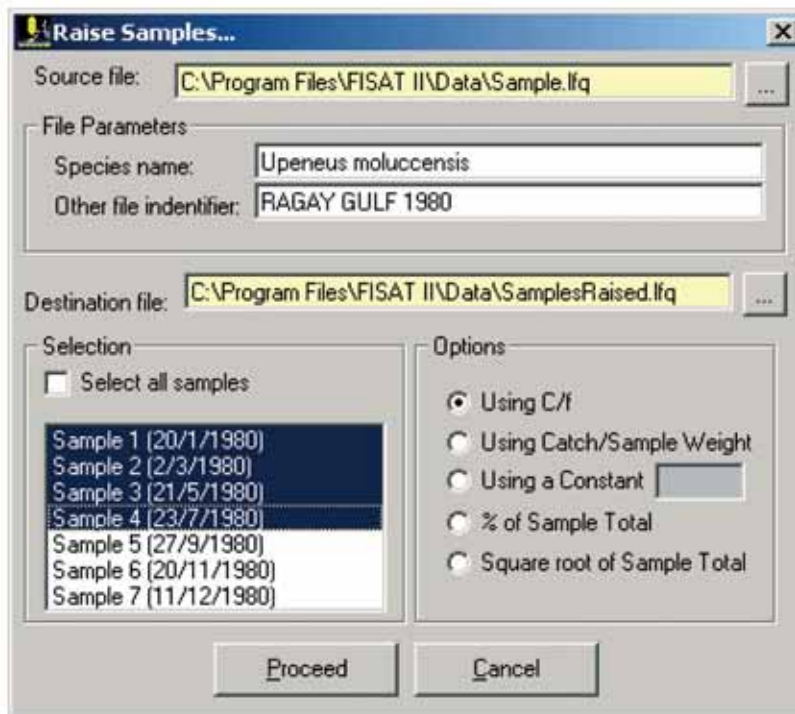


Fig. 3.22. User interface in raising length frequency files.

### Using catch per unit of effort (C/f)

When the total catch and a measure of effort is available, the frequencies can be raised to represent the catch per unit of effort (C/f).

*Required file* Length- or weight-frequency data file with constant class size

*Input parameters* Catch per unit of effort (C/f) per sample

*Function*  $N_{\text{new}} = N_{\text{old}} \cdot (C/f)$

*User interface* Select the samples to raise and click on this option to select.

FiSAT II will use the C/f data provided on the sample sub-header as default

values; in the absence thereof, FiSAT II will cease processing.

*Remarks* In a multifleet fishery, data may need to be raised using this option to obtain a better representation of total catches.

### Using catch/sample weight

When in addition to the total sample weight (WS), the weight of the total catch (WC) is available, this option will allow frequencies to be raised to better represent the total catch.

*Required file* Length- or weight-frequency data file with constant class size.

*Input parameters* Total weight of the catch (WC) and total weight of the sample (WS), or the 'a' and 'b' coefficient of the length-weight relationship to estimate total sample weight.

*Function*  $N_{\text{new}} = N_{\text{old}} \cdot (WC/WS)$ .

*User interface* Select the samples to raise and click on this option to select.

FiSAT II will use the WC and WS data provided on the sample sub-header as default values. In the absence of required parameters, the routine will prompt an error and will discontinue processing.

*Remarks* This option may be necessary to raise data to represent the total catch required for the length-structured VPA and related routines.

Using a constant

This option may be used when independent estimates of an appropriate raising factor (RF) are available, or to change units of measurements, e.g., inches to cm.

*Required file* Length- or weight-frequency data file with constant class size

*Input parameters* The factor (0 to 999,999) to raise the frequencies.

*Function*  $N_{\text{new}} = N_{\text{old}} \cdot \text{RF}$   
where RF is a constant

*User interface* Select the samples to raise and click on this option to select.

When this option is selected, FiSAT II will prompt for input of the constant. A default value of 1 (one) is provided.

*Remarks* None

Percent of sample total

This option allows the frequencies of samples to be re-expressed as % frequencies; this option can be used to give equal weight to all samples of a file; preferably it should be applied to samples having similar sizes to start with.

*Required file* Length- or weight-frequency data file with constant class size.

*Input parameters* None.

*Function* The new frequencies are defined by

$$N_{\text{new}} = [N_{\text{old}} / \Sigma(N_{\text{old}})] \cdot 100$$



where:

$$\begin{aligned} N_{\text{new}} &= \text{new frequency,} \\ N_{\text{old}} &= \text{original frequency,} \\ \Sigma(N_{\text{old}}) &= \text{total frequency in the sample.} \end{aligned}$$

*User interface*      Select the samples to raise and click on this option to select.

*Remarks*            This type of data transformation is also available in some of the routines that require data to be pooled (e.g., catch curve analysis); however, these routines do not allow saving of the data thus transformed.

### Square root of sample total

This option allows the frequencies of a sample to be re-expressed such that their sum becomes proportional to the square root of the total sample size; it should be considered for samples with initially very dissimilar sizes.

*Required file*        Length- or weight-frequency data file with constant class size.

*Input parameters*   None

*Function*            The new frequencies are defined by

$$N_{\text{new}} = [N_{\text{old}} / \Sigma(N_{\text{old}})^{1/2}] \cdot 100$$

where:

$$\begin{aligned} N_{\text{new}} &= \text{new frequency count,} \\ N_{\text{old}} &= \text{original frequency,} \\ \Sigma N_{\text{old}} &= \text{total frequency of the 'old' (original) sample.} \end{aligned}$$

*User interface*      Select the samples to raise and click on this option to select.

*Remarks*              As with the previous option, this type of data transformation is also available (but without saving) on some of the routines that require pooling of samples.

### **Temporal weighting**

Temporal weighting will raise each sample by a factor proportional to the time separating it from the nearest other sample, which gives more emphasis to samples representing longer periods and less to samples collected at close intervals.

*Required file*        Length- or weight-frequency data file with constant class size

*Input parameters*   None

*Function*              $N_{\text{new}} = [N_{\text{old}} \cdot D^{1/2}]$

where:

D is the number of days separating the sample from its nearest neighbour.

*User interface*      (see routines with this prompt: e.g. length-converted catch curve).

*Remarks*              FiSAT II will not weigh samples by time if D exceeds 3 months.

## Importing old FiSAT data

This routine will allow users of the old version of FiSAT to readily migrate to the updated FiSAT II version.

<i>Required file</i>	Length -frequency data file saved in the old version of FiSAT
<i>Input parameters</i>	Source and destination files
<i>Function</i>	None
<i>User interface</i>	Enter the source file (i.e. old FiSAT data) and the destination file (Fig. 3.23).
<i>Remarks</i>	The contents of the sub-header will not be imported other than the data of sampling.

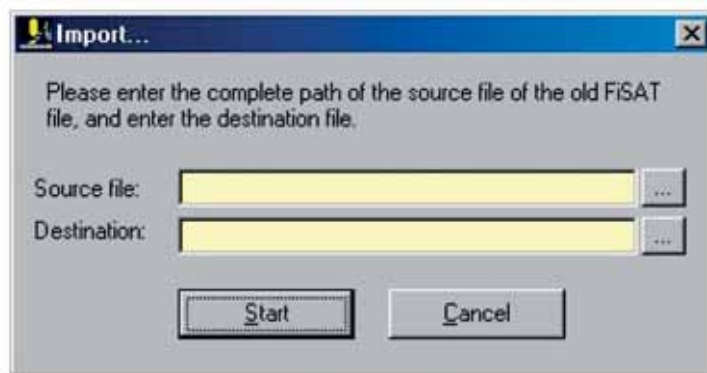


Fig. 3.23. User interface when importing old FiSAT data files to the new format.

## Exporting FiSAT II length frequencies

In many cases, the FiSAT II file may have to be exported to other forms for report purposes or to allow data importation to other software packages (e.g. Microsoft Excel).

<i>Required file</i>	Length-frequency data file with constant class size.
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*Input parameters* None

*Function* None

*User interface* The routine will access the standard dialog box (Fig. 3.24) for exporting a file. A tab-delimited file will be generated that is standard to most commercially available electronic spreadsheets and word processors.



Fig. 3.24. Dialog box used when identifying the destination file of the data to be exported.

*Remarks* The sub-headers will not be exported other than the date of sampling.