A Synthesis of Simple Empirical Models to Predict Fish Yields in Tropical Lakes and Reservoirs

(R. 6178)

Database User Manual

Produced by MRAG Ltd under the Fisheries Management Science Programme of the Overseas Development Administration

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Introduction

LAKESDB is a relational database for storing and extracting references and data concerning fisheries in lakes, reservoirs and coastal lagoons from Africa, Asia and Latin America. Data in the database is organised into seven primary data tables and one secondary summary table.

The seven primary data tables hold the following data (the figures in brackets detailing the number of entries in each table):

- References; (440)
- Water Bodies; (2481)
- Location and Morphology; (3018)
- Hydrology and Climate; (941)
- Chemical and Biological Features; (1750)
- Fish and Fisheries; (2754)
- Demography and Land Use; (392)

The data in the primary tables above provide information on 2481 different water bodies, of which 526 are present in the summary table and have been used in the analysis.

A simple user interface is provided for users to add, view, edit and print selected references and associated data. As the potential users of the database are likely to undertake a wide variety of analyses on the data in the database there has been no attempt to build a complex data extraction facility into the application. To provide easy access to the data each of the data tables has been constructed using a standard dBase\(^1\) format, which can be accessed from a wide variety of commercially available database and spreadsheet packages. The application providing the user interface to the database is written using R:BASE. (A copy of R:BASE RunTime is provided with the database)\(^2\).

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\(^1\) dBase is a registered trademark of Borland Inc.

\(^2\) R:Base and R:Base RunTime are registered trademarks of Microrim Inc.
System Requirements

The database has the following requirements:

- An IBM PC or 100% compatible with at least an 80286 processor, (an 80386 or higher recommended);
- 640 K RAM with 465 K available for the database software. The database software can use expanded memory to a limit of 2 MB;
- A hard disk with approximately 10 MB available for the database software and data files, and a 3½" floppy disk drive for installing the software; (The database can be supplied on 5¼" floppy on request); NB: The amount of disk space required will depend on the amount of new data likely to be added.
- DOS 3.1 or later;
- CGA screen or better;
- A mouse or other pointing device may also be used for selecting menus.
Installation and Getting Started

The XTLDB database cannot be used from floppy drives; it must be installed onto a hard disk drive.

To install the database follow the simple instructions below;

1. Put the Database Installation Disk into a floppy drive and change to that drive (i.e. if your 3½” drive is drive A:, type A: [ENTER] and the A: prompt will appear.

2. Type INSTDB [ENTER] to start the database installation program.

3. The database installation program will copy the necessary files into a directory called LAKESDB on your hard disk.

4. The database installation program will then prompt you to insert the Software. Replace the Database Installation Disk with the Software Installation Disk in the a: drive.

5. Type INSTSOFT [ENTER] to start the software installation program.

6. When the installation is finished the installation program will return you to the A: prompt. The database is then ready for use.

7. To run the database is simple. Just change to the directory in which the database is stored by using the command CD C:\LAKESDB [ENTER] then type LAKESDB [ENTER]. After a few moments the main menu of the database will appear.
User Interface

The user interface for the XTLDB database has been designed using a combination of menus and forms for entering, editing and viewing data.

Menus

Three different types of menu have been used in this database, but the same principles apply to all three types. The active option in each menu is always highlighted. To change the active option use the up and down arrow keys (↑ & ↓), most menus will return you to the top of the menu list if you scroll off the bottom of the list and vice versa. To select the highlighted option press [ENTER]. If you have a mouse it is possible to change to an option by simply clicking the left mouse button whilst the cursor is over the required option. To select the option press the left mouse button again.

Other short-cuts are available on some menus. For instance the main menu is numbered 1 to 9. To select an option just press the required number. In the subsidiary menus pressing the first highlighted letter of the menu option will take you to that option. If more than one option starts with the same letter pressing the letter will take you to the next menu option starting with that letter.

In many of the forms POP-UP menus are available for some fields. These are accessed by pressing the [SHIFT] and [F3] keys simultaneously. Simply select the required option with the arrow keys and then press [ENTER], this value will then be entered into the appropriate field.

In all menus pressing the [ESC] key will abort the current menu and return you to the previous level. If you press the [ESC] key at the main menu, you will exit the database as if you had selected option '9 - EXIT'.

Forms

When you are entering or editing information in the database, the information is presented on the screen as a form with a menu bar on the top line and a status line on the bottom. The [ALT] key will move you to the menu bar, where you can select options using the arrow keys as for menus. Pressing the [ALT] key a second time will return you to the form. The menu bar can also be accessed by using the mouse, clicking the left mouse button over the appropriate option on the menu bar.

The menu options that will be available will differ depending on whether you are entering new data or browsing / editing previously entered data. When you are entering data the menu bar will contain the following options - Add/Discard, Go To and Exit. Under Add/Discard the following options will be available, Discard Row and Add Row and Exit. Selecting Discard Row will clear the form removing any data you have just entered; Add Row and Exit will save the current row to the database table and return you to the previous menu. The Go To option does not have any use whilst you are adding data. Selecting Exit will quit the form and return you to the previous menu without saving the data. When you are editing data there are the same three options as before. Under the Add/Discard option the following options will be available, Add Row, Discard Row, Delete Row, Save Changes, Add Row and Exit. All changes to the database should be saved using Save Changes before exiting the form, if modifications have been made and you attempt to EXIT then a message will appear prompting you whether or not you wish to save the changes that you have made.

The Go To menu option, has the following options, Next Row and Previous Row, (the Next Section / Previous Section options are not used in this application). These options will move you to the next / previous rows in the database. NB: [F7] and [F8] can be used as short cut keys for Next Row / Previous Row respectively.
To move between fields on a form press [ENTER] or [TAB] to move forward one field, [SHIFT][TAB] to move backward one field.

Often the forms will occupy more than one page. To move between the pages, use the [PgUp] and [PgDn] keys, or if you are on the last field of the current page press the [TAB] key to move to the next field, (conversely, if you are on the first field of the screen you can use [SHIFT][TAB] to move back one page.
The Main Menu

Figure 1 shows the main database menu that you are presented with on starting the application. Each of the functions is described below.

<table>
<thead>
<tr>
<th>Simple Empirical Models to Predict Yields in Tropical Lakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) References and Water Bodies</td>
</tr>
<tr>
<td>(2) Location and Morphology Data</td>
</tr>
<tr>
<td>(3) Hydrology and Climate Data</td>
</tr>
<tr>
<td>(4) Chemical and Biological Data</td>
</tr>
<tr>
<td>(5) Fisheries Data</td>
</tr>
<tr>
<td>(6) Demographic Data</td>
</tr>
<tr>
<td>(7) Summary Data</td>
</tr>
<tr>
<td>(8) Database Utilities</td>
</tr>
<tr>
<td>(9) EXIT</td>
</tr>
</tbody>
</table>

![Figure 1 Screen Capture of the XTLDB database main menu screen](image)
References and Water Bodies

This option allows the user to enter the key data that must be entered before any other data on a new reference or water body can be entered.

Selecting this menu option from the main menu will bring up the following options;

- **Add New Reference**
  
  This option will allow the user to enter a new reference into the database. The database will automatically allocate a unique reference number to each new reference added to the database. A description of each field can be found in Appendix I. NB: The main referencing field that is used is `ref_name`, which should have the general structure as follows;

  Single Author    SURNAME1, YEAR  
  Two Authors      SURNAME1 & SURNAME2, YEAR  
  Three Authors    SURNAME1, SURNAME2 & SURNAME3, YEAR  
  More than three authors SURNAME1 et al., YEAR

  The user should check before entering a new reference that the reference has not previously been entered. This can be done through either **Edit All References** or **Browse References (Table)** described below.

- **Edit All References**
  
  This option brings up the reference form, and all the references currently stored in the database. These will be sorted alphabetically on the `ref_name` field, i.e. alphabetically on the surname of the first author.

  The references entry and editing screen can be seen in Figures 2 & 3.

- **Browse References (Table)**
  
  This option brings up the references table in a tabular form to allow easier browsing of the whole data set. An example of the browse screen for the references can be seen in Figure 4.

- **Add New Water Body**
  
  Selecting this option will allow the user to enter the name of a new water body. No other data apart from the name is required for this option. NB: The user should check using **Edit Existing Water Bodies** that the water body has not previously been entered.

- **Edit Existing Water Bodies**
  
  Selecting this option will bring up a form that will allow the user to modify any names of waterbodies that exist in the database. This should only be done to names that have previously been entered with spelling mistakes, and those names of waterbodies already in the database should not be altered.
### Reference Editing Form

**Reference Name:** Abarca-Arenas, L.G. & Valero-Pacheco, E.<br>

**Authors:** Abarca-Arenas, L.G. & Valero-Pacheco, E.

**Title:** Toward a trophic model of Tamaulipas, a coastal lagoon in Mexico

**Year:** 1993

**Editors:** Christensen, U. & Pauly, D.

**Journal Title:** ICLARM Conference Proceedings

**Volume:** 26

**Issue:**

**Pages:** 181-185

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**Figure 2** Screen Capture showing the reference entry and editing screen (page 1)

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**Figure 3** Screen Capture showing the reference entry and editing screen (page 2)
<table>
<thead>
<tr>
<th>REF_NAME</th>
<th>REF_NR</th>
<th>AUTHORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abarca-Arenas &amp; Valero-Pacheco, 1993</td>
<td>1</td>
<td>Abarca-Arenas, L.G./Valero-Pacheco, A.F.</td>
</tr>
<tr>
<td>Achieng, 1990</td>
<td>2</td>
<td>Achieng, A.F.</td>
</tr>
<tr>
<td>Adite &amp; Van Thielen, 1995</td>
<td>3</td>
<td>Adite, A./Van Thielen, A.</td>
</tr>
<tr>
<td>Afzal et al., 1995</td>
<td>4</td>
<td>Afzal, M./Rob, A./Akhtar</td>
</tr>
<tr>
<td>Agnew, 1979</td>
<td>5</td>
<td>Agnew, S.</td>
</tr>
<tr>
<td>Agnew &amp; Chipeta, 1979</td>
<td>6</td>
<td>Agnew, S./Chipeta, C.</td>
</tr>
<tr>
<td>Allison, 1979a</td>
<td>7</td>
<td>Allison, B.R.</td>
</tr>
<tr>
<td>Hegewald et al., 1976</td>
<td>7</td>
<td>Hegewald, E., A. Aldave &amp; T Hakuli</td>
</tr>
<tr>
<td>Allison, 1979b</td>
<td>8</td>
<td>Allison, B.R.</td>
</tr>
<tr>
<td>Allison, 1979c</td>
<td>9</td>
<td>Allison, B.R.</td>
</tr>
</tbody>
</table>

Figure 4 Screen capture showing the screen format displayed when the Browse References option is selected
Entering and Editing Other Primary Data

Selecting any of the five options for the primary data tables (excluding references & water bodies), will bring up a standard menu. This menu has two options Add New Reference and Edit Existing References.

On selecting the Add New References option the user will bring onto the screen the appropriate form for the data table selected. The user will then be presented with a list of all the water bodies in the database and should choose the appropriate one. After choosing the water body to which the data applies the user should then choose a reference from a similar list. (NB: The water body name and reference should have been entered previously.) The user can then enter the appropriate data.

Each of the data entry and editing forms accessible through options 2 to 6, are shown on the following pages. Also within each section is a list of the fields for which pop-up menus are available (press <SHIFT><F3> to bring up the pop-up menu).
### Location and Morphology Data

#### List of Pop-Up Menus

The only pop-up menu available for this form is for Water Body type. Pressing `<SHIFT><F3>` will bring up a menu listing all the water body types that have already been used in the database. If however you feel that the water body does not fit into one of these types, simply press `<ESC>` to return you to the form without selecting any option and then type the water body type in the field directly.

![Figure 5](image-url) Screen capture showing the data entry and editing screen for location and morphology data (page 1).
<table>
<thead>
<tr>
<th>Water Body</th>
<th>Aba River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>Vanden Bossche &amp; Bernacsek, 1990b</td>
</tr>
</tbody>
</table>

### Morphological Data cont.

<table>
<thead>
<tr>
<th>Maximum Length</th>
<th>kn</th>
<th>Maximum Depth</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Depth</td>
<td>m</td>
<td>Annual Fluctuation</td>
<td>m</td>
</tr>
<tr>
<td>Shoreline Length</td>
<td>kn</td>
<td>Volume</td>
<td>m³</td>
</tr>
<tr>
<td>Catchment Area</td>
<td>kn²</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rivers</th>
<th>In:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Out:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perm. Open to Sea</th>
<th>(Permanent opening to the sea for C_lagoons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year Constructed</td>
<td>(Year dam closed for reservoirs)</td>
</tr>
</tbody>
</table>

**Figure 6** Screen capture showing the data entry and editing screen for location and morphology data (page 2).

---

<table>
<thead>
<tr>
<th>Water Body</th>
<th>Aba River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference</td>
<td>Vanden Bossche &amp; Bernacsek, 1990b</td>
</tr>
</tbody>
</table>

### Notes

*In Imo State*

**Other Notes .......**

**Figure 7** Screen capture showing the data entry and editing form for location and morphology data (page 3).
Hydrology and Climate Data

List of Pop-Up Menus

The only pop-up menu available for this form is for stratification classes. Pressing <SHIFT><F3> will bring up a menu listing all the stratification classes that have already been used in the database. If however you feel that the water body does not fit into one of these types, simply press <ESC> to return you to the form without selecting any option and then type the water body type in the field directly.

Figure 8 Screen capture showing the data entry and editing form for climatic and hydrological data
Chemical and Biological Data

List of Pop-Up Menus

The only pop-up menu available for this form is for the dominant phytoplankton type or types in the water body. Pressing <SHIFT><F3> will bring up a menu listing all the entries of dominant phytoplankton types that have already been used in the database.

Figure 9    Screen capture of the data entry and editing screen for Chemical and Biological data (page 1)

Figure 10    Screen capture of the data entry and editing screen for Chemical and Biological data (page 2)
<table>
<thead>
<tr>
<th>Chemical and Biological Data Entry and Editing Form</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Body</strong> : Abaya</td>
</tr>
<tr>
<td><strong>Reference</strong> : Kebede et al., 1994</td>
</tr>
<tr>
<td><strong>Biological Data cont.</strong></td>
</tr>
<tr>
<td>Zooplankton biomass : g dry wt/m²</td>
</tr>
<tr>
<td>Zooplankton production : g dry wt/m²/y</td>
</tr>
<tr>
<td>Macrozoobenthos biomass : g dry wt/m²</td>
</tr>
<tr>
<td>Macrozoobenthos production : g dry wt/m²/y</td>
</tr>
<tr>
<td><strong>Notes</strong> : Stable colloidal silt suspension impart high turbidity</td>
</tr>
</tbody>
</table>

Figure 11  Screen capture of the data entry and editing screen for Chemical and Biological data (page 3)
Fisheries Data

List of Pop-Up Menus

Three pop-up menus are available for the fisheries data entry and editing form. The fields are boat type on page 1 and origin of the fishery and fish type (main type of fish exploited by the fishery), on page 2.

Figure 12  Screen capture of the data entry and editing screen for Fisheries data (page 1)

Figure 13  Screen capture of the data entry and editing screen for Fisheries data (page 2)
### Demographic Data

#### List of Pop-Up Menus

The only pop-up menus available for this form are for water use type and pollution type both on page 2 of the form.

#### Figure 14

Screen capture of the data entry and editing screen for Demographic and Land Use data (page 1)

#### Figure 15

Screen capture of the data entry and editing screen for Demographic and Land Use data (page 2)
Entry and Editing of Summary Data

The entry and editing of summary data for a particular water body is...

List of Pop-Up Menus

Pop-up menus available in the summary form are as described in the individual data forms. They are as follows; Water body type, Stratification type, Dominant Phytoplankton, Boat Type, Fishery Type, Origin of the fishery, Dominant fish types, Water use type and Pollution type.

<table>
<thead>
<tr>
<th>Location &amp; Morphology</th>
<th>Hydrology &amp; Climate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continent: AFRICA</td>
<td>Mean Temp.: 25. °C</td>
</tr>
<tr>
<td>Type: Lake</td>
<td>Min. Temp.: 22. °C</td>
</tr>
<tr>
<td>Altitude: 1285. n</td>
<td>Stratification:</td>
</tr>
<tr>
<td>Latitude: 06°19’ N</td>
<td>Days Mixed: days</td>
</tr>
<tr>
<td>Area: 1162. km²</td>
<td>Mixing Depth: m</td>
</tr>
<tr>
<td>Shoreline: 225. kn</td>
<td>Rainfall (Mean): 1000. mm/y</td>
</tr>
<tr>
<td>Max. Depth: 15. n</td>
<td>Rainfall Duration: months</td>
</tr>
<tr>
<td>Mean Depth: 7.1 n</td>
<td>Residence Time: months</td>
</tr>
<tr>
<td>Depth Fluc.: n</td>
<td></td>
</tr>
<tr>
<td>Volume: n°³</td>
<td></td>
</tr>
<tr>
<td>Catchment: 17300. km²</td>
<td></td>
</tr>
<tr>
<td>Const. Date:</td>
<td></td>
</tr>
<tr>
<td>Perm. Open:</td>
<td></td>
</tr>
</tbody>
</table>

Form: secondary Table: SECONDAR Field: CONTIEN Page: 1

Figure 16 Screen capture of the data entry and editing screen for the summary data (page 1)

<table>
<thead>
<tr>
<th>Summary Information Table Editing Form</th>
<th>Page 2/3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Body: Abaya</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Features</th>
<th>Biological Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDS: 517. mg/l</td>
<td>Surface Chl.a: 37. µg/l</td>
</tr>
<tr>
<td>Conductivity: 925.2 µS/cm</td>
<td>Area Chl.a: mg/m²</td>
</tr>
<tr>
<td>pH: 8.82</td>
<td>Don. Phytop.: Cyanophyta</td>
</tr>
<tr>
<td>Alkalinity: 8.44 meq/l</td>
<td>Macro. Biomass: g dw/m²</td>
</tr>
<tr>
<td>Phosphorus: 272.33 µg/l</td>
<td>Peri. Biomass: g dw/m²</td>
</tr>
<tr>
<td>Nitrogen: 650. µg/l</td>
<td>Gross Photosy.: g O2/m²</td>
</tr>
<tr>
<td>Secchi disk trans.: 0.43 m</td>
<td>Met. Phy.to.: g C/m²/yr</td>
</tr>
<tr>
<td>Suspended Solids:</td>
<td>Macro. Prod.: g C/m²/yr</td>
</tr>
<tr>
<td></td>
<td>Peri. Prod.: g C/m²/yr</td>
</tr>
<tr>
<td></td>
<td>Zoopl. Biomass: g dw/m²</td>
</tr>
<tr>
<td></td>
<td>Zoopl. Prod.: g dw/m²</td>
</tr>
<tr>
<td></td>
<td>Benth. Biomass: g dw/m²</td>
</tr>
<tr>
<td></td>
<td>Benth. Prod.: g dw/m²</td>
</tr>
</tbody>
</table>

Form: secondary Table: SECONDAR Field: TDS Page: 2

Figure 17 Screen capture of the data entry and editing screen for the summary data (page 2)
Figure 18  Screen capture of the data entry and editing screen for the summary data (page 3)
Database Utilities

Under this menu option two options are available.

The first option, 'About this database' brings up a screen (see Figure 19), detailing the current number of entries in each of the database tables.

![Database Details Screen](image)

**Figure 19** Screen capture of the database "About Screen" showing information on the current level of storage for each data table in the database

The second option, 'Run Database Checking Utility' runs a short subroutine that checks the internal integrity of the database. This routine should only take a few minutes to run. It is **very important** that while this routine is running that the computer is **not interrupted**, i.e. do not press <CTRL><ALT><DEL> or attempt to break into the routine with either <CTRL><C> or <CTRL><BREAK>. If there are no problems with the database structure then the application will prompt the user to press any key to continue. If problems appear the user will be prompted to contact MRAG immediately.

Database Backups

If new data is to be entered into the database it is advised that regular backups of the data tables (*.DBF) are made. It is advised that you do not overwrite the original diskette supplied as this can be used to recreate the original database if need arises.
Appendix 1 - Entity Relationship Diagram

The XTLDB database is a simple relational database with relatively few tables. The entity - relationship diagram in Figure 20 shows the relationships between the data tables along with the key fields for each of the tables.

Figure 20  Entity-Relationship Diagram for the XTLDB Database
Appendix 2 - Data Dictionary

List of Tables in the XTL Database

Summary of Tables in the XTLDB Database

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>xtldbcsl</td>
<td>Summary of columns in database</td>
<td>RBase</td>
</tr>
<tr>
<td>summary</td>
<td>Summary information in database</td>
<td>RBase</td>
</tr>
<tr>
<td>secondar</td>
<td>Secondary data table</td>
<td>dBase - &quot;secondar.dbf&quot;</td>
</tr>
<tr>
<td>xtlref</td>
<td>References table</td>
<td>DBase - &quot;xtlref.dbf&quot;</td>
</tr>
<tr>
<td>chembiol</td>
<td>Chemical and Biological data</td>
<td>DBase - &quot;chembiol.dbf&quot;</td>
</tr>
<tr>
<td>fisherie</td>
<td>Fisheries data</td>
<td>DBase - &quot;fisherie.dbf&quot;</td>
</tr>
<tr>
<td>demograp</td>
<td>Demographic and Land Use data</td>
<td>DBase - &quot;demograp.dbf&quot;</td>
</tr>
<tr>
<td>morpholo</td>
<td>Location and Morphology data</td>
<td>DBase - &quot;morpholo.dbf&quot;</td>
</tr>
<tr>
<td>hydrolog</td>
<td>Hydrological data</td>
<td>DBase - &quot;hydrolog.dbf&quot;</td>
</tr>
<tr>
<td>water_bo</td>
<td>Water bodies reference table</td>
<td>DBase - &quot;water_bo.dbf&quot;</td>
</tr>
<tr>
<td>notes</td>
<td>General Notes table</td>
<td>RBase</td>
</tr>
<tr>
<td>codes</td>
<td>Database codes table</td>
<td>RBase</td>
</tr>
</tbody>
</table>

Details of Data Tables in the XTLDB Database

Water Bodies

<table>
<thead>
<tr>
<th>No.</th>
<th>Column Name</th>
<th>Attributes</th>
</tr>
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Database Manual

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<td>Fisheries Data Editing Form</td>
</tr>
<tr>
<td>hydrolog</td>
<td>hydrolog</td>
<td>Hydrology and Climate Data Editing Form</td>
</tr>
<tr>
<td>morpholo</td>
<td>morpholo</td>
<td>Location and Morphology Data Editing Form</td>
</tr>
<tr>
<td>refentry</td>
<td>xtlref</td>
<td>Reference Entry Form</td>
</tr>
<tr>
<td>refsedit</td>
<td>xtlref</td>
<td>Reference Editing Form</td>
</tr>
<tr>
<td>secondar</td>
<td>SECONDAR</td>
<td>Secondary Database Summary Editing Form</td>
</tr>
<tr>
<td>waterbod</td>
<td>water_bo</td>
<td>New Waterbody form</td>
</tr>
</tbody>
</table>
Appendix 3 - Database Application Source Code

The following code is the source code for the RBase Application that provides the user interface for the XTLDB database. This information will be of limited use to the end user and is provided more as a technical reference for those who wish to develop the database and application further.

```
$COMMAND
XTLAPPL
DISCONNECT
SET QUOTE = '
SET VAR SAVE_MESSAGES = (CVAL('MESSAGES'))
SET VAR SAVE_ERROR = (CVAL('ERROR'))
SET MESSAGES OFF
SET STATICDB OFF
SET ROWLOCKS ON
DEBUG SET MESSAGES ON
RUN STARTUP IN XTLAPPL.APX
SET ERROR MESSAGES OFF
DEBUG SET ERROR MESSAGES ON
NEWPAGE
SET COLOR WHITE ON BLUE
SET BELL OFF
LABEL LBEG1
NEWPAGE
CHOOSE PICK1 FROM Main IN XTLAPPL.APX  BLACK ON GRAY
IF PICK1 = 0 THEN
  GOTO LEND1
ENDIF
SWITCH (.PICK1)
CASE 1
SET VAR LEVEL2 INT = 1
WHILE LEVEL2 = 1 THEN
  NEWPAGE
  CHOOSE PICK2 FROM refmenu IN XTLAPPL.APX AT 4 13 BLACK ON GRAY
  IF PICK2 = '[ESC]' THEN
    BREAK
  ENDIF
SWITCH (.PICK2)
CASE 'Add new Reference'
  RUN addref IN XTLAPPL.APX
  BREAK
CASE 'Edit all references'
  EDIT USING  refsedit  +
  ORDER BY +
  REF_NAME ASC
  BREAK
CASE 'Browse references (Table)'
  RUN browrefs IN XTLAPPL.APX
  BREAK
CASE 'Add new waterbody'
  RUN enter_wb IN XTLAPPL.APX
  BREAK
CASE 'Edit all waterbodies'
  EDIT USING  waterbod +
```
ORDER BY +
   WB_NAME ASC
BREAK
ENDSW
ENDWHILE
CLEAR VAR VCASCADE
CLEAR VAR LEVEL2
CLEAR VAR PICK2
BREAK
CASE 2
   SET VAR LEVEL2 INT = 1
   WHILE LEVEL2 = 1 THEN
      NEWPAGE
      CHOOSE PICK2 FROM morpmenu IN XTLAPPL.APX AT 7 19 BLACK ON GRAY
      IF PICK2 = '[ESC]' THEN
         BREAK
      ENDIF
      SWITCH (.PICK2)
      CASE 'Add new entry'
         RUN newmorp IN XTLAPPL.APX
         BREAK
      CASE 'Edit current entries'
         SET VAR LEVEL3 INT = 1
         WHILE LEVEL3 = 1 THEN
            NEWPAGE
            CHOOSE PICK3 FROM editmorp IN XTLAPPL.APX AT 6 20 BLACK ON GRAY
            IF PICK3 = '[ESC]' THEN
               BREAK
            ENDIF
            SWITCH (.PICK3)
            CASE 'Edit all data'
               EDIT USING  morpholo +
               ORDER BY +
                  WB_NR ASC,REF_NR ASC
               BREAK
            CASE 'Edit for a particular reference'
               RUN edmorprf IN XTLAPPL.APX
               BREAK
            CASE 'Edit for a particular water body'
               RUN edmorpb IN XTLAPPL.APX
               BREAK
            CASE 'Edit for a particular country'
               RUN edmorpcn IN XTLAPPL.APX
               BREAK
            ENDSW
         ENDWHILE
         CLEAR VAR VCASCADE
         CLEAR VAR LEVEL3
         CLEAR VAR PICK3
         BREAK
      ENDSW
   ENDWHILE
   CLEAR VAR VCASCADE
   CLEAR VAR LEVEL3
   CLEAR VAR PICK2
   BREAK
   CASE 3
   SET VAR LEVEL2 INT = 1
   WHILE LEVEL2 = 1 THEN
     NEWPAGE
CHOOSE PICK2 FROM hydrrmenu IN XTLAPPL.APX AT 7 21 BLACK ON GRAY
IF PICK2 = ['ESC'] THEN
  BREAK
ENDIF
SWITCH (.PICK2)
CASE 'Add new entry'
  RUN newhydr IN XTLAPPL.APX
  BREAK
CASE 'Edit current entries'
  SET VAR LEVEL3 INT = 1
  WHILE LEVEL3 = 1 THEN
    NEWPAGE
    CHOOSE PICK3 FROM edhydrme IN XTLAPPL.APX AT 8 21 BLACK ON GRAY
    IF PICK3 = ['ESC'] THEN
      BREAK
    ENDIF
    SWITCH (.PICK3)
    CASE 'Edit all entries'
      EDIT USING hydrolog +
      ORDER BY +
      WB_NR ASC, REF_NR ASC
      BREAK
    CASE 'Edit for a particular reference'
      RUN edhydrrf IN XTLAPPL.APX
      BREAK
    CASE 'Edit for a particular water body'
      RUN edhydrwb IN XTLAPPL.APX
      BREAK
    CASE 'Edit for a particular country'
      RUN edhydrnc IN XTLAPPL.APX
      BREAK
    ENDSW
  ENDSWHILE
  CLEAR VAR VCASCADE
  CLEAR VAR LEVEL3
  CLEAR VAR PICK3
  BREAK
ENDSW
ENDWHILE
CLEAR VAR VCASCADE
CLEAR VAR LEVEL3
CLEAR VAR PICK2
BREAK
CASE 4
SET VAR LEVEL2 INT = 1
WHILE LEVEL2 = 1 THEN
  NEWPAGE
  CHOOSE PICK2 FROM chemmenu IN XTLAPPL.APX AT 9 21 BLACK ON GRAY
  IF PICK2 = ['ESC'] THEN
    BREAK
  ENDIF
  SWITCH (.PICK2)
  CASE 'Add new entry'
    RUN newchem IN XTLAPPL.APX
    BREAK
  CASE 'Edit current entries'
    SET VAR LEVEL3 INT = 1
    WHILE LEVEL3 = 1 THEN
      NEWPAGE
      CHOOSE PICK3 FROM edchemmm IN XTLAPPL.APX AT 8 25 BLACK ON GRAY
IF PICK3 = '[ESC]' THEN
    BREAK
ENDIF
SWITCH (.PICK3)
CASE 'Edit all references'
    EDIT USING chembiol +
    ORDER BY +
    WB_NR ASC, REF_NR ASC
    BREAK
CASE 'Edit for a particular reference'
    RUN edchemrf IN XTLAPPL.APX
    BREAK
CASE 'Edit for a particular water body'
    RUN edchemwb IN XTLAPPL.APX
    BREAK
CASE 'Edit for a particular country'
    RUN edchemcn IN XTLAPPL.APX
    BREAK
ENDSW
ENDWHILE
CLEAR VAR VCASCADE
CLEAR VAR LEVEL3
CLEAR VAR PICK3
BREAK
ENDSW
ENDWHILE
CLEAR VAR VCASCADE
CLEAR VAR LEVEL2
CLEAR VAR PICK2
BREAK
CASE 5
SET VAR LEVEL2 INT = 1
WHILE LEVEL2 = 1 THEN
    NEWPAGE
    CHOOSE PICK2 FROM fishmenu IN XTLAPPL.APX AT 8 17 BLACK ON GRAY
    IF PICK2 = '[ESC]' THEN
        BREAK
    ENDIF
    SWITCH (.PICK2)
    CASE 'Add new entry'
        RUN newfish IN XTLAPPL.APX
        BREAK
    CASE 'Edit current entries'
        SET VAR LEVEL3 INT = 1
        WHILE LEVEL3 = 1 THEN
            NEWPAGE
            CHOOSE PICK3 FROM edfishmn IN XTLAPPL.APX AT 6 14 BLACK ON GRAY
            IF PICK3 = '[ESC]' THEN
                BREAK
            ENDIF
            SWITCH (.PICK3)
            CASE 'Edit all fisheries data'
                EDIT USING fisherie +
                ORDER BY +
                WB_NR ASC, REF_NR ASC
                BREAK
            CASE 'Edit for a particular reference'
                RUN edfishrf IN XTLAPPL.APX
                BREAK
            CASE 'Edit for a particular waterbody'
            END CASE
RUN edfishwb IN XTLAPPL.APX
BREAK
CASE 'Edit for a particular country'
RUN edfishcn IN XTLAPPL.APX
BREAK
ENDSW
ENDWHILE
CLEAR VAR VCASCADE
CLEAR VAR LEVEL3
CLEAR VAR PICK3
BREAK
ENDSW
ENDWHILE
CLEAR VAR VCASCADE
CLEAR VAR LEVEL2
CLEAR VAR PICK2
BREAK
CASE 6
SET VAR LEVEL2 INT = 1
WHILE LEVEL2 = 1 THEN
NEWPAGE
CHOOSE PICK2 FROM demomenu IN XTLAPPL.APX AT 9 21 BLACK ON GRAY
IF PICK2 = '[ESC]' THEN
BREAK
ENDIF
SWITCH (.PICK2)
CASE 'Add new entry'
RUN newdemo IN XTLAPPL.APX
BREAK
CASE 'Edit current entries'
SET VAR LEVEL3 INT = 1
WHILE LEVEL3 = 1 THEN
NEWPAGE
CHOOSE PICK3 FROM eddemomn IN XTLAPPL.APX AT 7 22 BLACK ON GRAY
IF PICK3 = '[ESC]' THEN
BREAK
ENDIF
SWITCH (.PICK3)
CASE 'Edit all demographic data'
EDIT USING demograp + ORDER BY + WB_NR ASC,REF_NR ASC
BREAK
CASE 'Edit for a particular reference'
RUN eddemorf IN XTLAPPL.APX
BREAK
CASE 'Edit for a particular water body'
RUN eddemowb IN XTLAPPL.APX
BREAK
CASE 'Edit for a particular country'
RUN eddemocn IN XTLAPPL.APX
BREAK
ENDSW
ENDWHILE
CLEAR VAR VCASCADE
CLEAR VAR LEVEL3
CLEAR VAR PICK3
BREAK
ENDSW
ENDWHILE
CLEAR VAR VCASCADE
CLEAR VAR LEVEL2
CLEAR VAR PICK2
BREAK
CASE 7
SET VAR LEVEL2 INT = 1
WHILE LEVEL2 = 1 THEN
  NEWPAGE
  CHOOSE PICK2 FROM summmenu IN XTLAPPL.APX AT 7 17 BLACK ON GRAY
  IF PICK2 = ['ESC'] THEN
    BREAK
  ENDIF
  SWITCH (.PICK2)
  CASE 'Enter New Summary Data for a Waterbody'
    RUN newsec IN XTLAPPL.APX
    BREAK
  CASE 'Edit Current Data'
    SET VAR LEVEL3 INT = 1
    WHILE LEVEL3 = 1 THEN
      NEWPAGE
      CHOOSE PICK3 FROM editseco IN XTLAPPL.APX AT 8 17 BLACK ON GRAY
      IF PICK3 = ['ESC'] THEN
        BREAK
      ENDIF
      SWITCH (.PICK3)
      CASE 'Edit all summary information'
        EDIT USING secondar +
        ORDER BY +
        WB_NR ASC
        BREAK
      CASE 'Edit summary info. for a waterbody'
        RUN editsec IN XTLAPPL.APX
        BREAK
      ENDSW
    ENDSWHILE
    CLEAR VAR VCASCADE
    CLEAR VAR LEVEL3
    CLEAR VAR PICK3
    BREAK
  ENDSW
ENDWHILE
CLEAR VAR VCASCADE
CLEAR VAR LEVEL2
CLEAR VAR PICK2
BREAK
CASE 8
SET VAR LEVEL2 INT = 1
WHILE LEVEL2 = 1 THEN
  NEWPAGE
  CHOOSE PICK2 FROM utilmenu IN XTLAPPL.APX AT 7 13 BLACK ON GRAY
  IF PICK2 = ['ESC'] THEN
    BREAK
  ENDIF
  SWITCH (.PICK2)
  CASE 'About this database'
    RUN aboutrep IN XTLAPPL.APX
    BREAK
  CASE 'Run Database Checking Routine'
    RUN lakeschk IN XTLAPPL.APX
    BREAK
ENDSW
ENDWHILE
CLEAR VAR VCASCAD
CLEAR VAR LEVEL2
CLEAR VAR PICK2
BREAK
CASE 9
  GOTO LEND1
BREAK
ENDSW
GOTO LBEG1
LABEL LEND1
CLEAR VAR PICK1
SET MESSAGES .SAVE_MESSAGES
SET ERROR MESSAGES .SAVE_ERROR
CLEAR VAR SAVE_MESSAGES, SAVE_ERROR
NEWPAGE
RUN CLEANUP IN XTLAPPL.APX
RETURN
$MENU
column
[Simple Empirical Models to Predict Yields in Tropical Lakes]
[References and Water Bodies]
[Location and Morphology Data]
[Hydrology and Climate Data]
[Chemical and Biological Data]
[Fisheries Data]
[Demographic Data]
[Summary Data]
[Database Utilities]
(EXIT)
ENDC
$MENU
refmenu
POPUP [Reference Menu]
[Add new Reference]
[Edit all references]
[Browse references (Table)]
[Add new waterbody]
[Edit all waterbodies]
ENDC
$MENU
morpmenu
POPUP [Location and Morphology Menu]
[Add new entry]
[Edit current entries]
ENDC
$MENU
hydmenu
POPUP [Hydrology and Climate Menu]
[Add new entry]
[Edit current entries]
ENDC
$MENU
chemmenu
POPUP [Chemical and Biological Data Menu]
[Add new entry]
[Edit current entries]
ENDC
$MENU
|Edit for a particular water body|
|Edit for a particular country|
ENDC
$MENU
editseco
POPUP |Edit Summary Data Menu|
|Edit all summary information|
|Edit summary info. for a waterbody|
ENDC
$COMMAND
STARTUP
CONNECT xtldb
$COMMAND
CLEANUP
RETURN
$COMMAND
$COMMAND
edmorprf
choose vchoice1 from #values for distinct ref_name,ref_nr from xtlref +
where ref_nr in (sel ref_nr from morpholo) order by ref_name asc +
at 5 10 title 'References'
write 'Selecting References'
edit using morpholo where ref_nr = .vchoice1 order by wb_nr asc
$COMMAND
edmorpwb
choose vchoice1 from #values for distinct wb_name,wb_nr from water_bo +
where wb_nr in (sel wb_nr from morpholo) order by wb_name asc +
at 5 10 title 'Water Bodies'
write 'Selecting References'
edit using morpholo where wb_nr = .vchoice1 order by ref_nr asc
$COMMAND
edmorpcn
choose vchoice1 from #values for distinct COUNTRY from morpholo +
order by country asc at 5 10 title 'Countries'
write 'Selecting References'
edit using morpholo where country = .vchoice1 order by wb_nr asc
$COMMAND
edhydrf
choose vchoice1 from #values for distinct ref_name,ref_nr from xtlref +
where ref_nr in (sel ref_nr from hydrolog) order by ref_name asc +
at 5 10 title 'References'
write 'Selecting References'
edit using hydrolog where ref_nr = .vchoice1 order by wb_nr asc
$COMMAND
edhydrwb
choose vchoice1 from #values for distinct wb_name,wb_nr from water_bo +
where wb_nr in (sel wb_nr from hydrolog) order by wb_name asc +
at 5 10 title 'Water Bodies'
write 'Selecting References'
edit using hydrolog where wb_nr = .vchoice1 order by ref_nr asc
$COMMAND
edhydrrcn
choose vchoice1 from #values for distinct COUNTRY from hydrolog +
order by country asc at 5 10 title 'Countries'
write 'Selecting References'
edit using hydrolog where country = .vchoice1 order by wb_nr asc
$COMMAND
edchemrf
choose vchoice1 from #values for ref_name,ref_nr from xtlref +
where ref_nr in (sel ref_nr from chembiol) order by ref_name asc +
at 5 10 title 'References'
write 'Selecting References'
edit using chembiol where ref_nr = .vchoice1 order by wb_nr asc
$COMMAND
edchemwb
choose vchoice1 from #values for distinct wb_name,wb_nr from water_bo +
where wb_nr in (sel wb_nr from chembiol) order by wb_name asc +
at 5 10 title 'Water Bodies'
write 'Selecting References'
edit using chembiol where wb_nr = .vchoice1 order by ref_nr asc
$COMMAND
edchemcn
choose vchoice1 from #values for distinct COUNTRY from chembiol +
order by country asc at 5 10 title 'Countries'
write 'Selecting References'
edit using chembiol where country = .vchoice1 order by wb_nr asc
$COMMAND
edchemfn
choose vchoice1 from #values for distinct ref_name,ref_nr from xtlref +
where ref_nr in (sel ref_nr from fisherie) order by ref_name asc +
at 5 10 title 'References'
write 'Selecting References'
edit using fisherie where ref_nr = .vchoice1 order by ref_nr asc
$COMMAND
edfishwb
choose vchoice1 from #values for distinct wb_name,wb_nr from water_bo +
where wb_nr in (sel wb_nr from fisherie) order by wb_name asc +
at 5 10 title 'Water Bodies'
write 'Selecting References'
edit using fisherie where wb_nr = .vchoice1 order by ref_nr asc
$COMMAND
edfishcn
choose vchoice1 from #values for distinct COUNTRY from fisherie +
order by country asc at 5 10 title 'Countries'
write 'Selecting References'
edit using fisherie where country = .vchoice1 order by wb_nr asc
$COMMAND
eddemorf
choose vchoice1 from #values for distinct ref_name,ref_nr from xtlref +
where ref_nr in (sel ref_nr from demograp) order by ref_name asc +
at 5 10 title 'References'
write 'Selecting References'
edit using demograp where ref_nr = .vchoice1 order by wb_nr asc
$COMMAND
eddemowb
choose vchoice1 from #values for distinct wb_name,wb_nr from water_bo +
where wb_nr in (sel wb_nr from demograp) order by wb_name asc +
at 5 10 title 'Water Bodies'
write 'Selecting References'
edit using demograp where wb_nr = .vchoice1 order by ref_nr asc
$COMMAND
eddemocn
choose vchoice1 from #values for distinct COUNTRY from demograp +
order by country asc at 5 10 title 'Countries'
write 'Selecting References'
edit using demograp where country = .vchoice1 order by wb_nr asc
$COMMAND
addref
*( Add new reference to XTLREF )
compute vnextref as maximum ref_nr from xtlref
set var vnextref = (.vnextref+1)
enter using refentry
return
$COMMAND
browsrefs
browse REF_NAME,REF_NR,AUTHORS,TITLE,EDITORS,ED2,JOURNAL,CONF_DAT,CONF_WHE, +
CITY,WHO,YEAR,VOLUME,ISSUE,PAGES,SERIES_E,SERIES_T,SERIES_N,NOTES,KEYWORDS +
from xtlref order by ref_name asc nochq noqbe
$COMMAND
enter_wb
compute vnext_wb as maximum wb_nr from water_bo
set var vnext_wb = (.vnext_wb + 1)
enter using ewaterbo
$COMMAND
newmorp
choose vnew_wb from #values for wb_name,wb_nr from water_bo order by +
wb_name asc at 5 5 title 'Water bodies'
choose vnew_ref from #values for ref_name, ref_nr from xtlref order by +
ref_name asc at 5 5 title 'References'
enter using emorp
$COMMAND
newhydr
choose vnew_wb from #values for wb_name,wb_nr from water_bo order by +
wb_name asc at 5 5 title 'Water bodies'
choose vnew_ref from #values for ref_name, ref_nr from xtlref order by +
ref_name asc at 5 5 title 'References'
enter using ehydr
$COMMAND
newchem
choose vnew_wb from #values for wb_name,wb_nr from water_bo order by +
wb_name asc at 5 5 title 'Water bodies'
choose vnew_ref from #values for ref_name, ref_nr from xtlref order by +
ref_name asc at 5 5 title 'References'
enter using echem
$COMMAND
newfish
choose vnew_wb from #values for wb_name,wb_nr from water_bo order by +
wb_name asc at 5 5 title 'Water bodies'
choose vnew_ref from #values for ref_name, ref_nr from xtlref order by +
ref_name asc at 5 5 title 'References'
enter using efish
$COMMAND
newdemo
choose vnew_wb from #values for wb_name,wb_nr from water_bo order by +
wb_name asc at 5 5 title 'Water bodies'
choose vnew_ref from #values for ref_name, ref_nr from xtlref order by +
ref_name asc at 5 5 title 'References'
enter using edemo
$COMMAND
editsec
choose vnew_wb from #values for wb_name,wb_nr from water_bo +
where wb_nr in (sel wb_nr from secondar ) order by +
wb_name asc at 5 5 title 'Water bodies'
edit using secondar where wb_nr = .vnew_wb
$COMMAND
newsec
choose vnew_wb from #values for wb_name,wb_nr from water_bo +
where wb_nr not in (sel wb_nr from secondar ) order by +
wb_name asc at 5 5 title 'Water bodies'
enter using esec
$COMMAND
aboutrep
cls
set feedback off
print xtltitle
pause 1
set feedback on
return
$COMMAND
lakeschk
write 'Connecting to Lakes Database'
set feedback off
connect xtldb
write 'Please do not interrupt this process'
write 'Making temporary backup copy of Lakes Database'
reload xtlload with user case

*( Update column counts)

compute vnoRefs as count ref_nr from xtlref
update summary set noRefs = .vnoRefs
compute vno wb as count wb_nr from water_bo
update summary set no_wb = .vno_wb
compute vno_loc as count ref_nr from morpholo
update summary set no_loc = .vno_loc
compute vno_hyd as count ref_nr from hydrolog
update summary set no_hyd = .vno_hyd
compute vno_che as count ref_nr from chembiol
update summary set no_che = .vno_che
compute vno_fis as count ref_nr from fisherie
update summary set no_fis = .vno_fis
compute vno_dem as count ref_nr from demograp
update summary set no_dem = .vno_dem

disconnect

write 'Checking Lakes Database for Errors.'
set error variable evar
zip autochk xtlload -n
set variable e1 = .evar

if e1 > 40 then
  erase xtlload.rb?
  write 'Errors have been found in the database!'
  write 'Everything has been left as it originally was in database files.'
  write 'Please revert to previous backup copy'
  beep
endif

if e1 = 0 then
  write 'No errors have been found in the database.'
  write 'Temporary backup has been deleted.'
  erase xtldb.rb?
  rename xtlload.rb? xtldb.rb?
endif

pause 2
clear variables e1
connect xtldb
set feedback on
return