TagBase - Tag database for fish tags
Quick Start Guide

1. Introduction

TagBase is ideal for

- Centralizing tag data within a unified relational model

- Integrating with metadata and auxiliary data

- Querying data efficiently (subset, regroup, summarize)

- Visualizing data rapidly (e.g. forms with MS-Graph)

- Integrating with other tools as a backend database and manage result outputs

TagBase is a relational database application for the management of output files from manufacturer's post-recovery or post-reporting software. TagBase implements a comprehensive relational model handling both archival and pop-archival satellite tag files from all major tag manufacturers. Implemented in Microsoft Access, this application can be easily ported to a variety of database management systems across platforms. Highlights of the current TagBase implementation include automated importation of tag files, data summary forms, extensive plotting capabilities, and flexible export of tag data to other applications for further analysis.

Limitations

TagBase is geared towards maintaining post-manufacturer processed data files for display and analysis. By default, most of the hardware status messages will not be assimilated. Examples of hardware messages include the RawData worksheet from Wildlife Computer PAT tag files (.xls), "Light too dim" data column for Lotek Wireless Archival tag files (.csv), or, "Wet/Dry State" for Wildlife Computers Archival tag files (.csv).

It is highly recommended that you always adopt the practice of archiving raw files, including files that are downloaded from the tag directly and output files after processing with manufacturer's software suite. Then use TagBase to maintain data that are quality control and carefully maintained for data visualization and analysis purposes.

Where necessary, a very simple, separate database can be developed to keep track of archived raw files in relation to data residing in TagBase.

Lastly, when you need to a large number of tags (more than 1 Gb), it will be more efficient to implement TagBase in a high-end database management system, rather than what it is now in Microsoft Access.

Disclaimer

Please understand that TagBase is still currently under development. And we appreciate all comments, inputs to making TagBase a better tool.

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2. Abbreviations and Terminology

Abbreviations

The followings are used throughout TagBase (in the database) and in this document:

Manufacturers/ Tags
- ➢ Archival or Arc: Archival tags (both Wildlife Computers, Lotek Wireless)
- ➢ LTD: Lotek Wireless
- ➢ MT: Microwave Telemetry
- ➢ PAT: Pop-up archival tags
- ➢ SPOT: smart-position only tags (Wildlife Computers)
- ➢ WC: Wildlife Computers

Wildlife Computers only
- ➢ BinInfo: the definition of values for the 12 or 14 Bins for time-at-depth and time-at-temperature, depending on tag model
- ➢ FrequencyData: PAT tags time-at-depth and time-at-temperature data

Tables/ Queries
- ➢ Proc: Processed
- ➢ Sum: Summary
- ➢ Tmp: Temporary

Forms/ Graphs
- ➢ Freq: Frequency
- ➢ Pdt: WC PDT worksheet data for PAT tags
- ➢ Wtd: Weighted
- ➢ Temp: Temperature
- ➢ TS: Time Series

Others
- ➢ FTrack_RTE: Position estimates from EASy-FishTracker (FTrack)
- ➢ KF: Kalman filter models (KFSST, UKFSST)
- ➢ Pos: Positions
- ➢ sst: Sea Surface Temperature
- ➢ TrackIt: Geolocation model with light

Terminology

When you work with TagBase in Microsoft Access, Access offers you *Tables, Queries, Forms, Reports, Macros,* and *Modules*. Here's a quick overview of what these are and when to use them (taken from http://allenbrowne.com/casu-01.html).

Tables. All data is stored in tables. When you create a new table, Access asks you define **fields** (column headings), giving each a unique name, and telling Access the **data type**. Use the "Text" type for most data, including numbers that don't need to be added e.g. phone numbers or postal codes. Using Wizards, Access will walk you through the process of creating common tables such as lists of names and addresses. Once you have defined a table's structure, you can enter data. Each new row that you add to the table is called a **record**. To define **relationships** between tables, click Database Tools | Relationships in Access 2007, or choose Relationships from the Tools menu in Access 95, 97, 2000.

Queries. Use a query to find or operate on the data in your tables. With a query, you can display the records that match certain **criteria** (e.g. all the members called "Barry"), **sort** the data as you please (e.g. by Surname), and even **combine data** from different tables. You can **edit** the data displayed in a query (in most cases), and the data in the underlying table will change. Special queries can also be defined to make **wholesale changes** to your data, e.g. delete all members whose subscriptions are 2 years overdue, or set a "State" field to "WA" wherever postcode begins with 6.

Forms. These are screens for **displaying** data from and **inputting** data into your tables.

3. The Form Navigation Tool

This tool is opened by default when you start TagBase. It allows you to sub-select the operations you want to do (e.g. import or export), and takes you to the right place to carry out the operation.
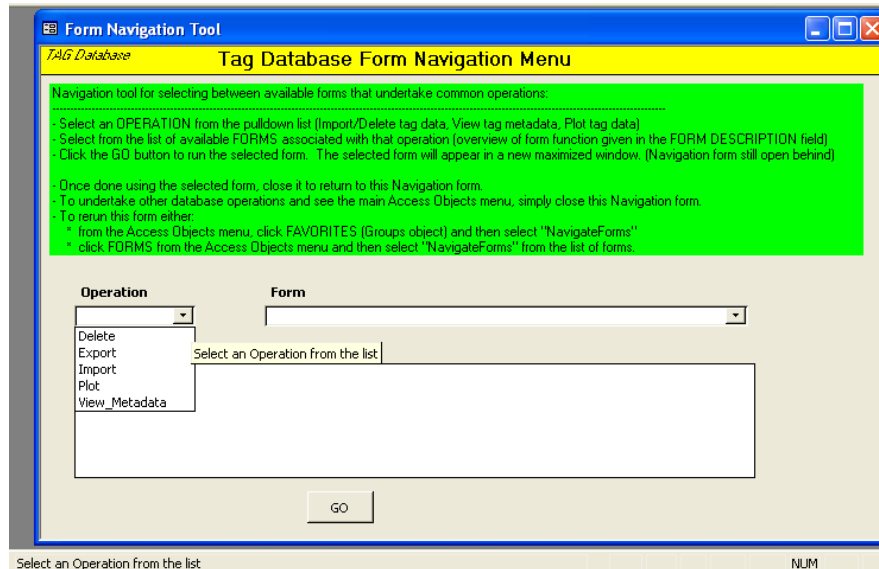
If you have closed this tool and want to bring it up again, you can simply – click on **Groups > Favorites > NavigateForms**
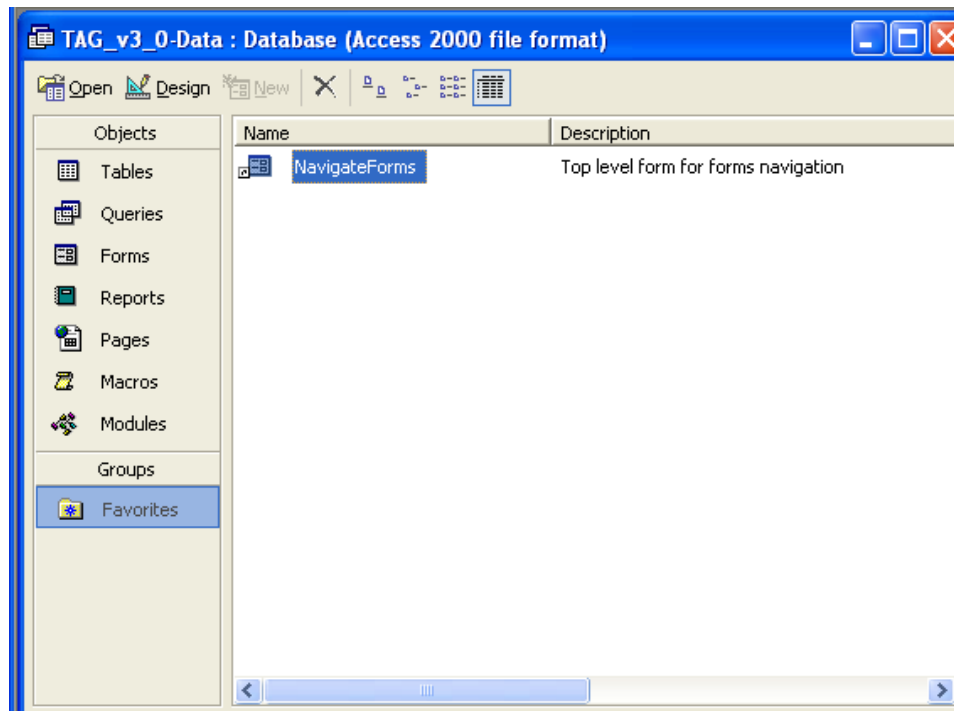
4. Import

Before you import any files, make sure you have the following

Essential information needed for Import:

A. TagCode – the serial code of your tag and has to be a unique. This unique code will allow us to distinguish a single tag from others.
B. Date_Deploy – the date time of your deployment
C. Date_Popoff – the date time of your tag recovery or pop-off

Format of your tag data files:

PAT tag files (.xls) from WC and MT

- Files should have been processed by the manufacturer software
- No further preparation is necessary

Archival tag files

ARCHIVAL
Lotek and Wildlife Computers
File #1 • Depth, Light, Temp File #2 • Estimated Locations

- 2 files for each tag.
- All files must have a header line.

For Wildlife Computers:

- File #1 is the time series file (.csv), obtained from Hex-Decoder software (see below, Hex-Decoder options for more details)
- File #2 is the output file (.xls) with location data, obtained from WC-TSP software

For Lotek Wireless (using Viewer 2000 software)

- File #1 is the time series file (e.g. .BIN.TimeSeries.csv)
- File #2 is the day log file (e.g. .BIN.DayLog.csv) with location data

What to turn OFF (uncheck) in HexDecoder:

a. Include rows with no sensor data
b. Hour Markers & Battery Voltages
c. Deployment/ Duty Cycle Markers
d. Date Range (off by default)

While using (checked):

e. Titles of Fields in First Row
f. Date Stamps as dd/mm/yyyy (default)
g. Time stamps as hh:mm:ss (default)

5 steps to import tag data:

1. Set up a batch job file from the Excel template, TagBaseBatchJob.xlt
2. Put the batch job file into the folder where your tag data files are
3. Start TagBase
4. Set up Binning schemes (only for WC PAT tags)
5. Import via Batch_Import_TagData form

Step 1 – Setting up the batch job file from the Excel template, TagBaseBatchJob.xlt

General outline: Each row of data corresponds to a single tag output file. You can have 2 or more rows of data for an archival tag or for a double-tagged fish. All essential and required fields must be present for each row of data.

IndivID	Filename	TagCode	TagPTT ID	TagType	DateTime _Deploy	DateTime _Popoff	Lat_ Deploy	Lon_ Deploy	Lat_ Popoff	Lon_ Popoff	BinSample Interval	BinID_ Depth	BinID_ Temper ature
1	LTD2310B 2313.csv	050112	bet2313	Archival	07-May-04	26-Dec-04	-1.98	-95.17	-0.52	-94.78			
1	LTD2310B 2313_050 112DayLo g.csv	050112	bet2313	Archival	07-May-04	26-Dec-04	-1.98	-95.17	-0.52	-94.78			
2	BET03900 57.csv	0390057	BET57	Archival	26-Mar-03	22-Feb-04	-1.98	-95.18	0.13	-95.08			
2	BET03900 57loc.xls	0390057	BET57	Archival	26-Mar-03	22-Feb-04	-1.98	-95.18	0.13	-95.08			
3	2003_MT_ 0006074_ 19571_B1 .xls	0006074	19571	MT									
4	19374_03 P0550.xls	03P0550	19374	WC							24	1	100

For each tag you import, make sure you have the following **Essential fields** (5, Yellow): IndivID, Filename, TagCode, TagPTTID, TagType

IndivID – This number denotes how many individual fish you are trying to import. If you have data for 10 fish, this IndivID should start from 1 for the first fish, then increment by one all the way to 10 for each of the remaining fish. The same IndivID number can be used for the same fish that carries multiple tags or has data from two or more output files.

Filename – This is the filename of the file you are importing. Include the file extension (.csv or .xls), but the file directory path (e.g. C:\Data\) is not necessary.

TagCode – This is the serial code of your tag and has to be a unique. Use the same TagCode for archival tags where there are two output files for each tag.

TagPTTID – This can be the PTT code you use for Argos transmission, or a label of your own.

TagType – This denotes the type of data to import, it must be from one of these 4 options: WC, MT, Archival, SPOT.

Additional required fields for Archival tags (6, Turquoise): DateTime_Deploy, DateTime_Popoff, Lat_Deploy Lon_Deploy, Lat_Popoff, Lon_Popoff

Additional required fields for Wildlife Computers PAT tags (3, Orange): BinSampleInterval, BinID_Depth, BinID_Temperature

BinSampleInterval – This denotes in hours (e.g. 2, 6, 12 or 24), how frequent is your time-at-depth or time-at-temperature is being sampled

BinID_Depth – the identifier (any number < 100) that corresponds to a particular binning scheme, BinID, having been set in WC_BinInfo table

BinID_Temperature – the identifier (any number >= 100) that corresponds to a particular binning scheme, BinID, having been set in WC_BinInfo table

Step 2 – Save your batch job file (e.g TagBaseBatchJob.xls) into the folder where your data files are located

Step 3 – Start TagBase

Step 4 – Setting up the WC_BinInfo (Wildlife Computers PAT tags only)

You may have used multiple histogram binning schemes for the time-at-depth or time-at-temperature worksheets. Depending on the tag model as well, there can be 12 or 14 Bins. All the binning schemes can be specified in WC_BinInfo table in the following way:

1. Open WC_BinInfo from Tables
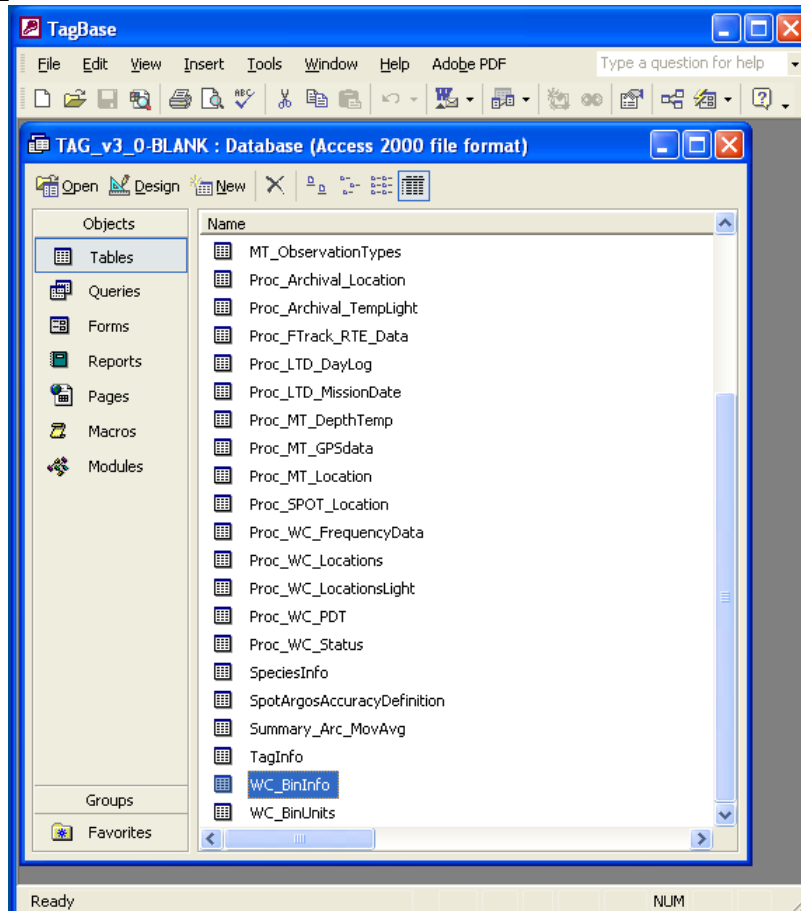
2. Modify or add binning schemes are explained below:

WC_BinInfo				
BinID	Bin	BinRange	BinMin	BinMax

WC_BinInfo				
BinID	Bin	BinRange	BinMin	BinMax
1	1	<-1.5	-999	0
1	2	-1.5-5	0	5
1	3	5-10	5	10
1	4	10-20	10	20
1	5	20-40	20	40
1	6	40-60	40	60
1	7	60-100	60	100
1	8	100-150	100	150
1	9	150-200	150	200
1	10	200-250	200	250
1	11	250-350	250	350
1	12	350-1000	350	1000
100	1	<5	-999	5
100	2	5-7.5	5	7.5
100	3	7.5-10	7.5	10
100	4	10-12.5	10	12.5
100	5	12.5-15	12.5	15
100	6	15-17.5	15	17.5
100	7	17.5-20	17.5	20
100	8	20-22.5	20	22.5
100	9	22.5-25	22.5	25
100	10	25-27.5	25	27.5
100	11	27.5-30	27.5	30
100	12	30-60	30	60

BinID − Unique ID for a particular scheme. By convention, BinID < 100 is used for depth, BinID > 100 for temperature. The above example, showed two schemes of 12 bins (BinID = 1 for depth and BinID = 100 for temperature).
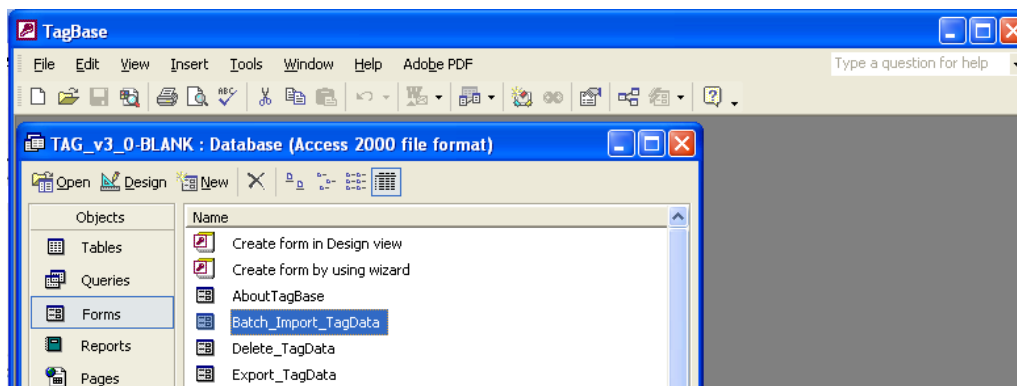
BinMin, BinMax – fill in the physical values for a specific bin (1-12)

Step 5 – Import via Batch_Import_TagData form

1. You can browse from the Form Navigation Tool > Import > Batch_Import_TagData
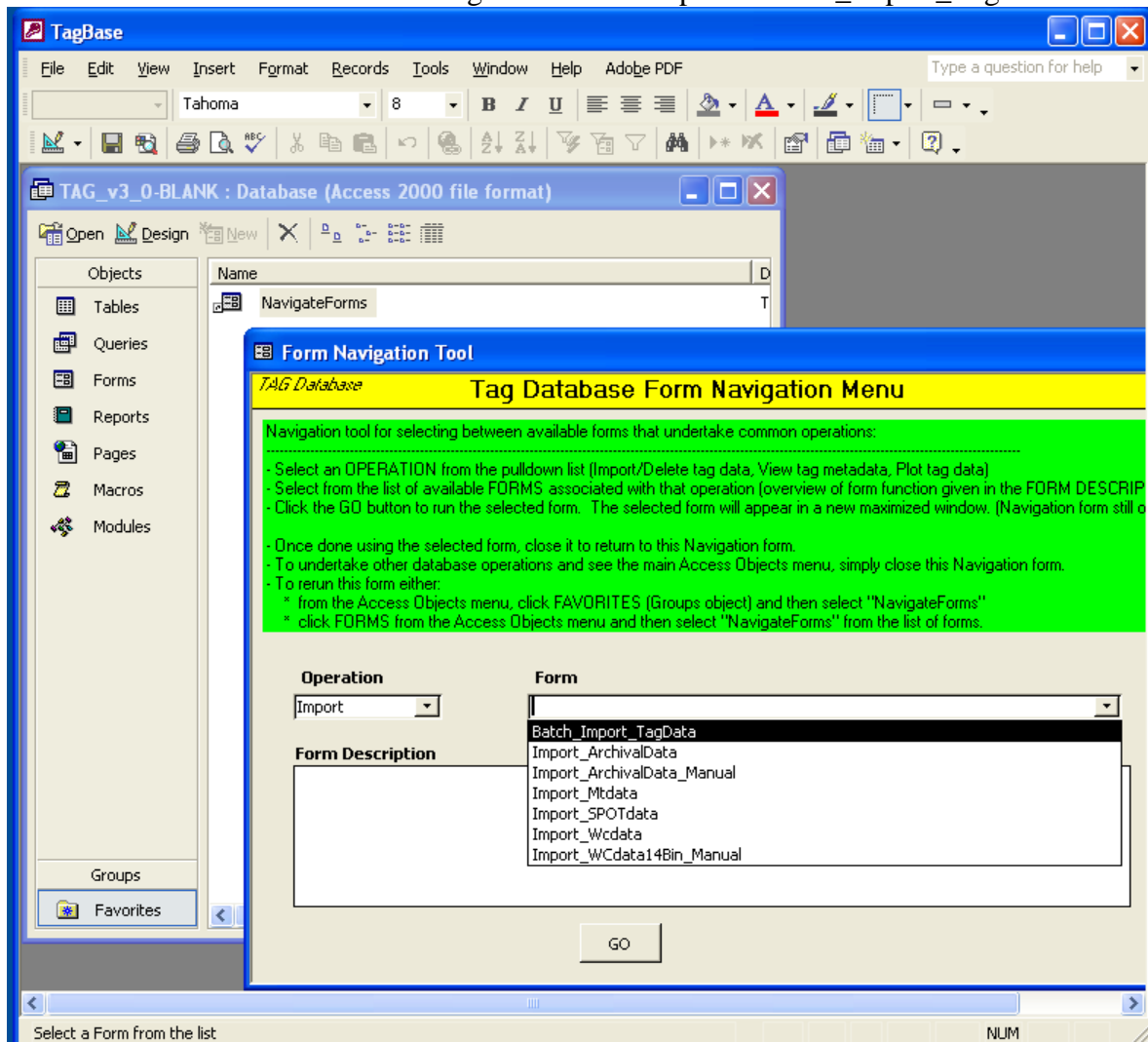
2. Or, open Batch_Import_TagData from Forms to import

3. Follow the instructions on the form to import

TagBase - [Batch_Import]

File   Edit   View   Insert   Format   Records   Tools   Window   Help   Adobe PDF

TAG Database   **Batch Import of Tag Data**

Instructions:

Step 1. Locate your batch job file (B
* Click on the Binoculars Icon and B
  Browse to your batch file and clic

Step 2. Check your import records
* Scroll through your records and m

Step 3. Execute import
* Click on the Fish Icon to import all r
* Status bar in Access (bottom left)
* A popup message will confirm you

Step 1. Click on the Binoculars to find your file

Batch file is located!

Step 2. Check your records (scroll down)

File path	Individual ID	Tag Code	Tag PTTID	Tag Type	Date Time of Deploy	Date Time of Popoff	Deployment Latitude	Deployment Longitude
E:\TagBase\tagfiles\All\	1	050112	bet2313	Archival	5/7/2004	12/26/2004	-1.98	-95.1
E:\TagBase\tagfiles\All\	1	050112	bet2313	Archival	5/7/2004	12/26/2004	-1.98	-95.1
E:\TagBase\tagfiles\All\	2	0390057	BET57	Archival	3/26/2003	2/22/2004	-1.98	-95.1
E:\TagBase\tagfiles\All\	2	0390057	BET57	Archival	3/26/2003	2/22/2004	-1.98	-95.1
E:\TagBase\tagfiles\All\	3	aaaa	bbbb	Microwave Teler				
E:\TagBase\tagfiles\All\	4	eeee	fffffff	Microwave Teler				
E:\TagBase\tagfiles\All\	5	kkkk	lllllll	Microwave Teler				
E:\TagBase\tagfiles\All\	6	1234	11111	Wildlife Compute				
E:\TagBase\tagfiles\All\	7	4567	22222	Wildlife Compute				

Step 3. Click on the Fish to import files

Import Summary

ImportFailed	FullPath	IndivID	TagCode	TagPTTID	TagType	Err
No	E:\TagBase\tagfiles\All\LTD2310B2313_050	1	050112	bet2313	Archival	
No	E:\TagBase\tagfiles\All\LTD2310B2313.csv	1	050112	bet2313	Archival	
No	E:\TagBase\tagfiles\All\BET0390057.csv	2	0390057	BET57	Archival	
No	E:\TagBase\tagfiles\All\BET0390057loc.xls	2	0390057	BET57	Archival	
No	E:\TagBase\tagfiles\All\2003_MT_0006074.	3	aaaa	bbbb	Microwave Telemetry	
No	E:\TagBase\tagfiles\All\2003_MT_0006076.	4	eeee	fffffff	Microwave Telemetry	
No	E:\TagBase\tagfiles\All\2003_MT_0006077	5	kkkk	lllllll	Microwave Telemetry	

Record: 1 of 18

*** Unique identifier for any individual

5. Data Tables and their Relationships

Data Tables

Here are the main groups of table that your data and metadata reside. This is useful to know when you are trying to set up your own queries, or modify the data.

Metadata

- ➢ **FishInfo** – Table with information about individual tagged fish, such as species, body length
- ➢ **TagInfo** – Table with Tag Summary Information, including the unique TagCode for each tag, deploy and popoff information
- ➢ **SpeciesInfo** – Table with species standardized name and TSN identifier listings
- ➢ **WC_BinInfo** - Table with WildlifeComputers Tag Bin classification scheme data

Archival tag data

- ➢ **Proc_Archival_TempLight** – Table with fully processed depth, temperature and light time series data
- ➢ **Proc_Archival_Location** – Table with fully processed WC light-based geolocation data (older tag models)
- ➢ **Proc_WC_Locations** – Table with fully processed WC light-based geolocation data (newer tag models)
- ➢ **Proc_LTD_DayLog** – Table with Lotek DayLog data (daily summary of positions, sst and others)
- ➢ **Proc_LTD_MissionDate** – Table with Lotek data that matches up mission day (day at liberty) with a Date (mission date)

Microwave Telemetry PAT

- ➢ **MT_ObservationTypes** – Description of ID fields used in Microwave Telemetry Processed Depth Temperature table, Proc_MT_DepthTemp
- ➢ **Proc_MT_DepthTemp** – Table with fully processed MicrowaveTelemetry Pressure & Depth Data
- ➢ **Proc_MT_GPSdata** – Table with fully processed Microwave Telemetry Argos Data
- ➢ **Proc_MT_Location** – Table with fully processed Microwave Telemetry manufacturer light-based geolocation data

Wildlife Computers PAT

➢ **Proc_WC_FrequencyData** – Table with fully processed Wildlife Computers Time-at-Depth and Time-at-Temperature data
➢ **Proc_WC_Locations** – Table with fully processed WC light-based geolocation data
➢ **Proc_WC_LocationsLight** – Table with fully processed Wildlife Computers manufacturer light data in the Locations worksheet
➢ **Proc_WC_PDT** – Table with fully processed Wildlife Computers PDT Data
➢ **Proc_WC_Status** – Table with fully processed Wildlife Computers Argos data from the Status worksheet

If you want to know the details about any of the above tables, you can select that table and click **Design**
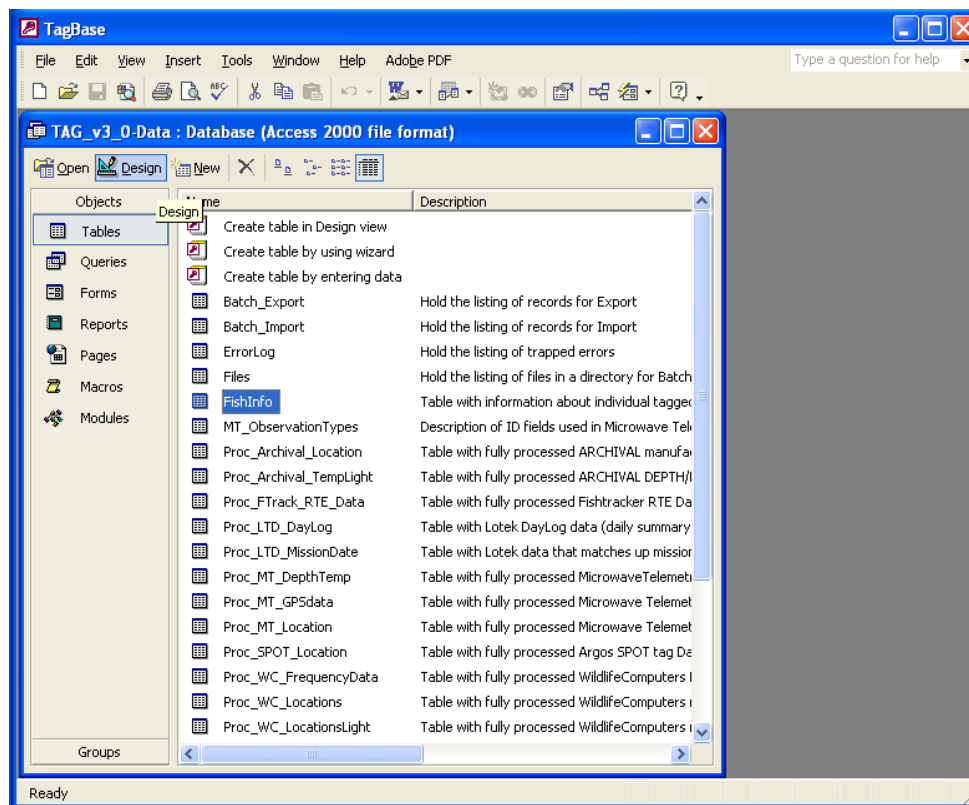
And a detailed list of fields with their descriptions will be shown
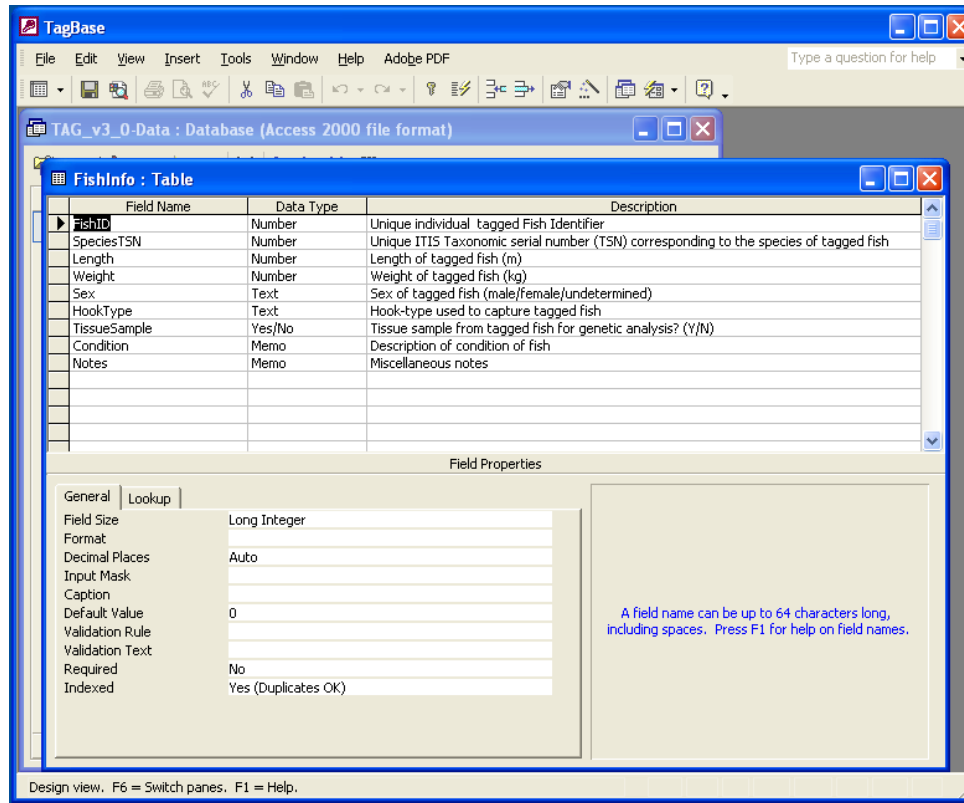
Relationships

Relationships are a key feature of database systems and allow us to specify how data fields are related to each other among various tables. In TagBase, there are two key relationships that link up all data:

1. **FishInfo** table ←→ **TagInfo** table
2. **TagInfo** table ←→ All downstream data tables

1. FishInfo table ←→ TagInfo table

These two tables are linked by the FishID field, which any individual fish you have imported data for should have a unique FishID (a number). For each FishID, i.e. a distinctive individual, you can one or multiple tags, as represented by a unique TagID. For example, you can have a fish, FishID = 5, carrying two tags, TagID = 10 and 11.

This way, metadata can be added to the FishInfo table or new tables that are linked to the FishInfo table; while, tag data are related back to an individual fish through TagInfo.
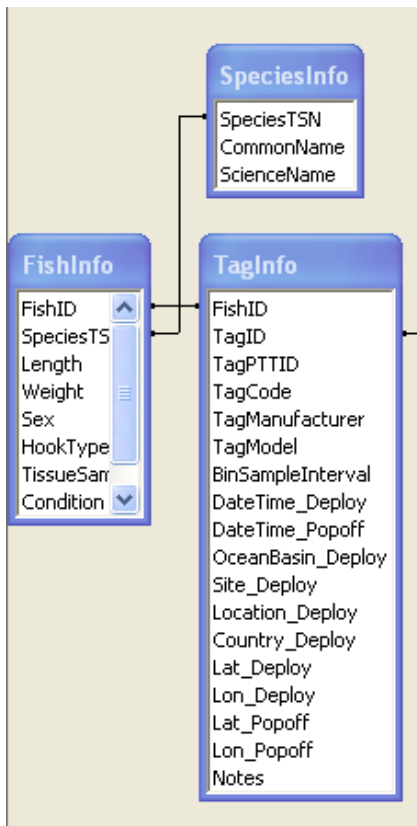
Example Case: Modify the species information of a newly imported fish

Scenario

When you have imported a new tag from a new fish using the **Batch_Import_TagData** form (see **Import**), this new fish will be assigned a new **FishID** (= 8, in this example) in the **FishInfo** table. By default, since TagBase has no idea which species this new fish is, this fish will be associated with a **SpeciesTSN** = -999 in the same **FishInfo** table.

This SpeciesTSN corresponds to a record in the **SpeciesInfo** table. Open the table and you can find a record for **SpeciesTSN** = -999. Obviously, you may want to describe your species better than "Generic fish". So you can add a new record in this table, such as the below example.

SpeciesInfo		
SpeciesTSN	**CommonName**	**ScienceName**
-999	Generic fish	Fishie fish
159903	White shark	Carcharodon carcharias

Now, go back to the **FishInfo** table, and enter the new **SpeciesTSN** = 159903 for **FishID** = 8, and your fish will be associated with "White Shark" instead.

FishInfo								
FishID	SpeciesTSN	Length	Weight	Sex	HookType	TissueSample	Condition	Notes
8	159903	200	350	Male	J	No		

2. TagInfo table ⬅➡ All downstream data tables

Data from a tag file are stored in multiple tables, for example, for an archival tag, the depth-temperature-light time series data are stored in one table, while the location estimates are stored in another table. **TagInfo** table connects all these data tables together through the **TagID** field. Every individual tag you import will have a unique **TagID** (a number), and all the data for that particular tag will be associated with the unique **TagID**. In this way, data that belong to one tag can be obtained from different data tables using its **TagID**.
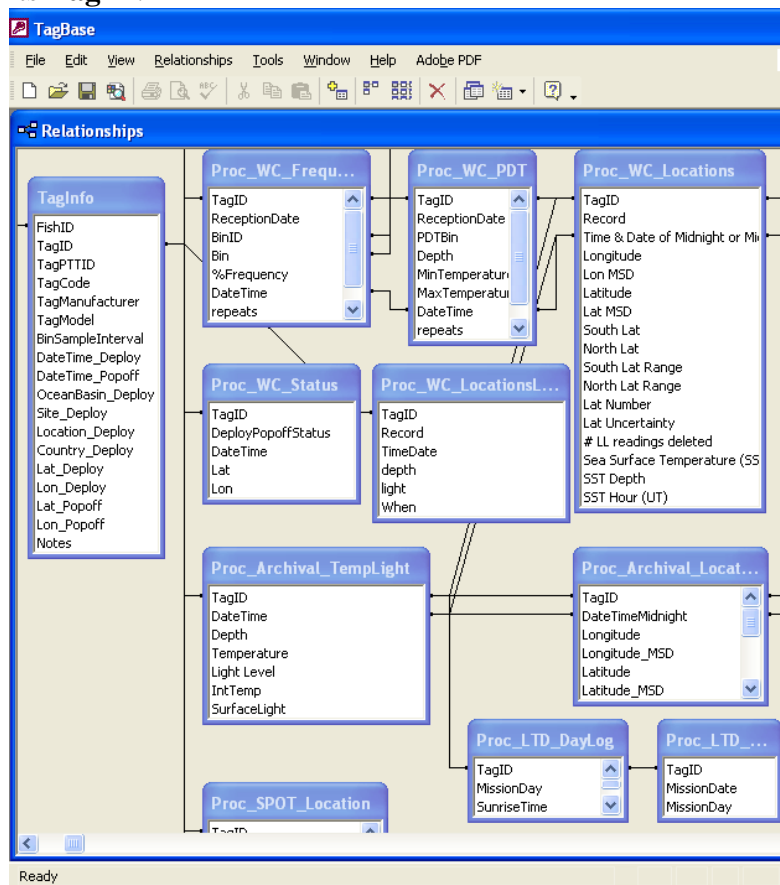
If you want to know all the relationships in TagBase, you can bring up the **Relationships** diagram by using the toolbar button, as shown below:
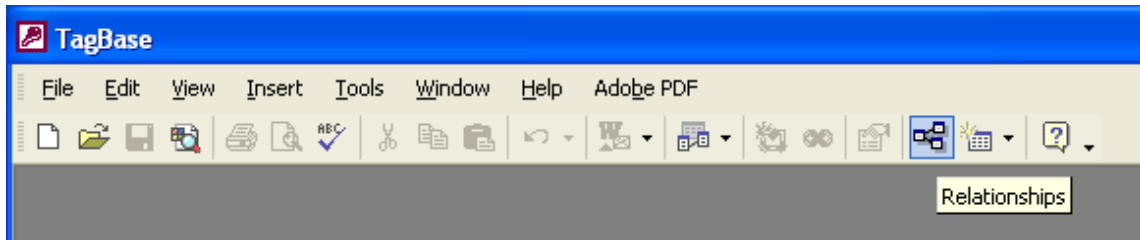
6. Display and Graphs

The Display/ Plot forms have pre-set graphs that plot your tag data. A variety of plot forms, along with a specified description of what are being plotted, are accessible through the Form Navigation Tool > Plot. Examples of these plots include:

- XY/Time Series
- Histogram
- Bubble Plots
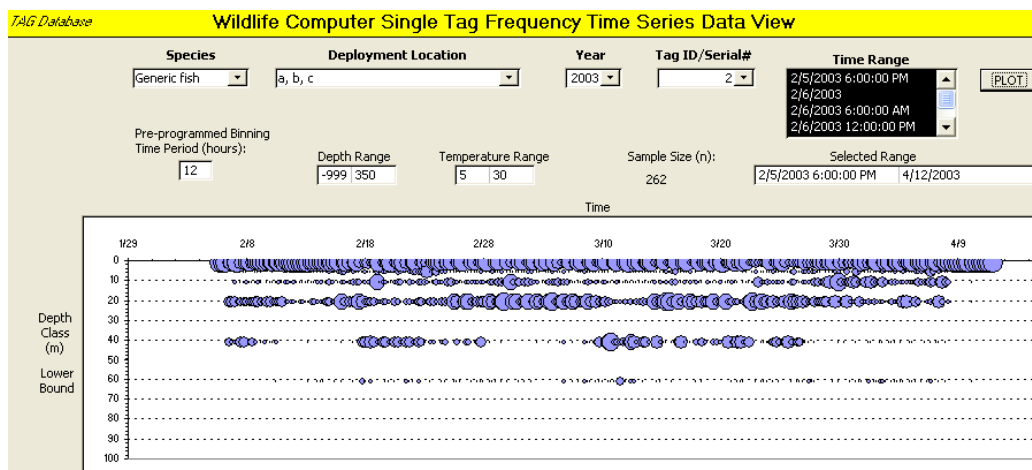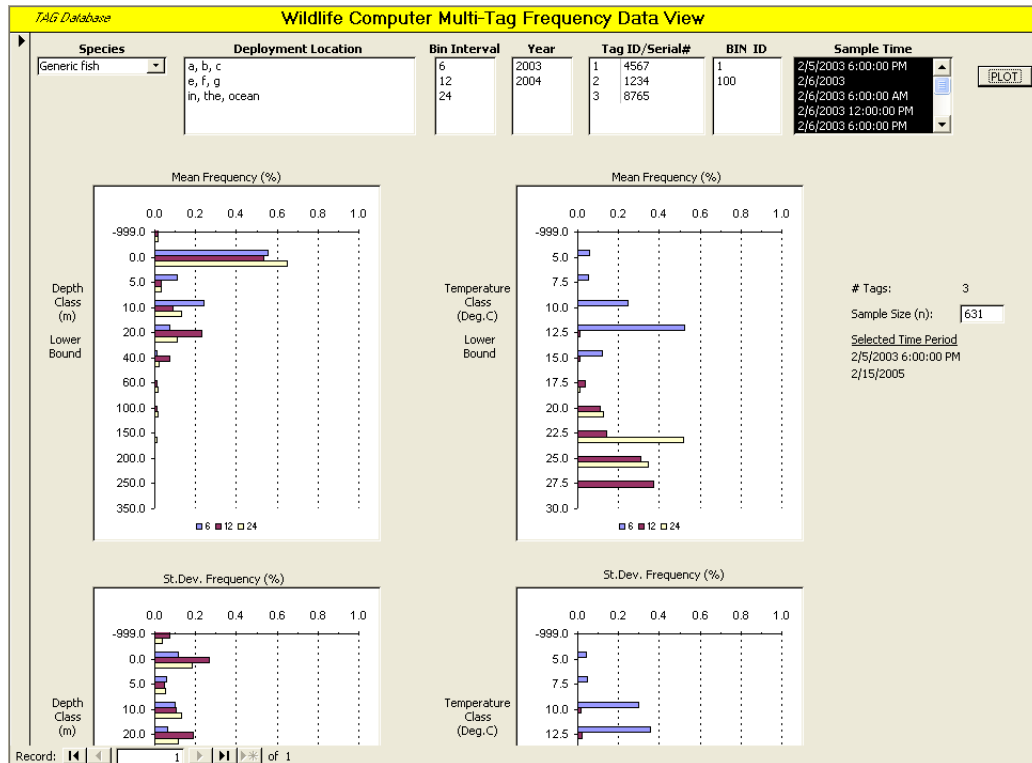
Tips on using Plot forms

➢ When Microsoft Access displays the following error message *"An error occurred while sending data to the OLE server (the application used to create the object"*. (see below) when you open a form,

Just click **OK**. Nothing has gone wrong; it is just an obscure glitch in MS Access.
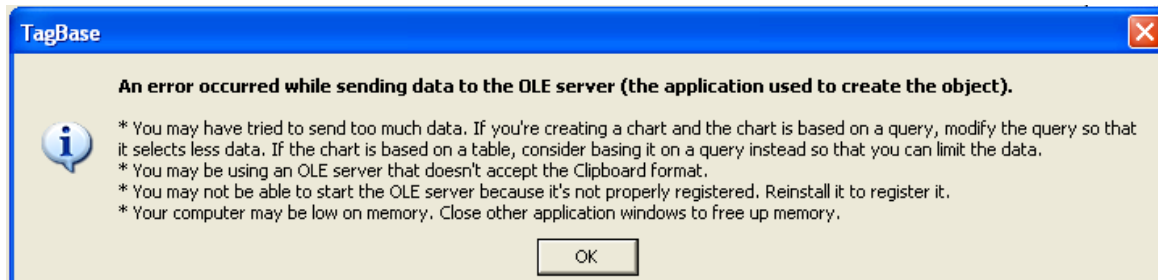
➢ **Close an existing plot form before you start up a new one**

This avoids conflicts before forms and keeps things running smoothly

➢ To see the plotted data in a spreadsheet view, **double-click anywhere on a graph**.

You can copy the data to clipboard and plot it in Excel or other software
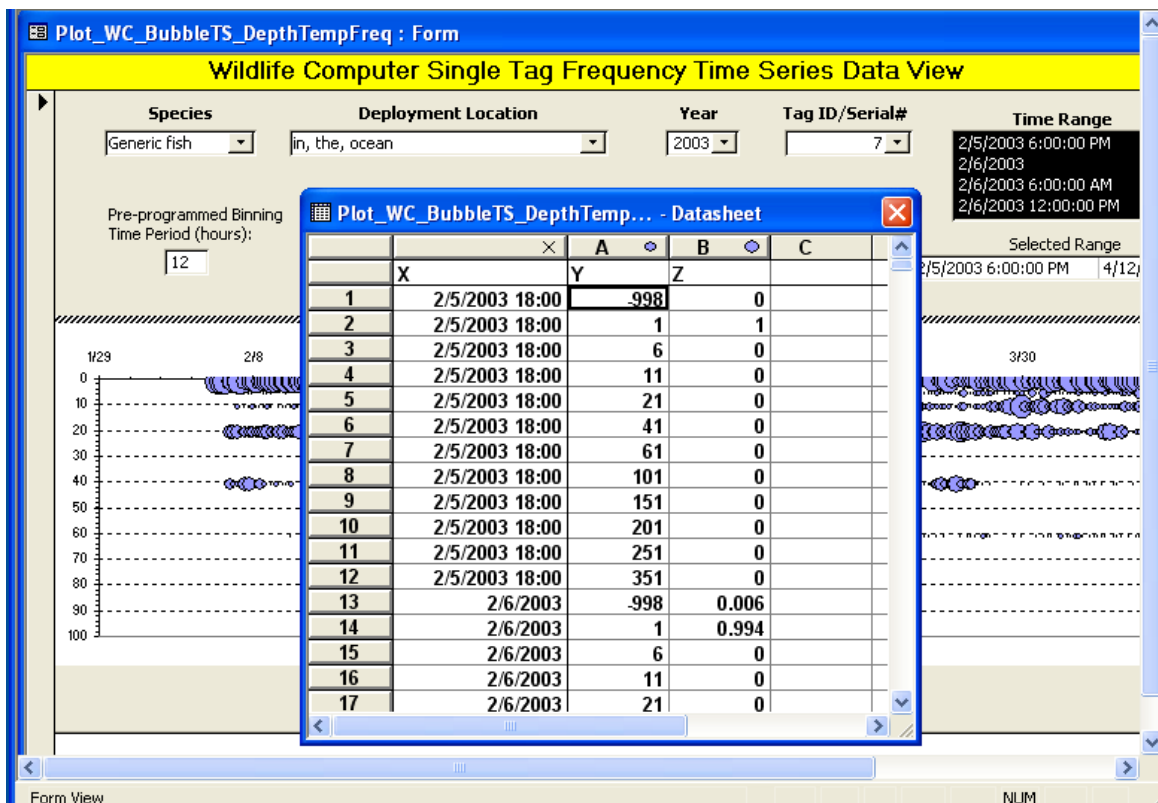
➢ To modify the graph properties, **right-click anywhere on a graph**, and select from the pop-up menu. Graph properties are similar to those in Excel.
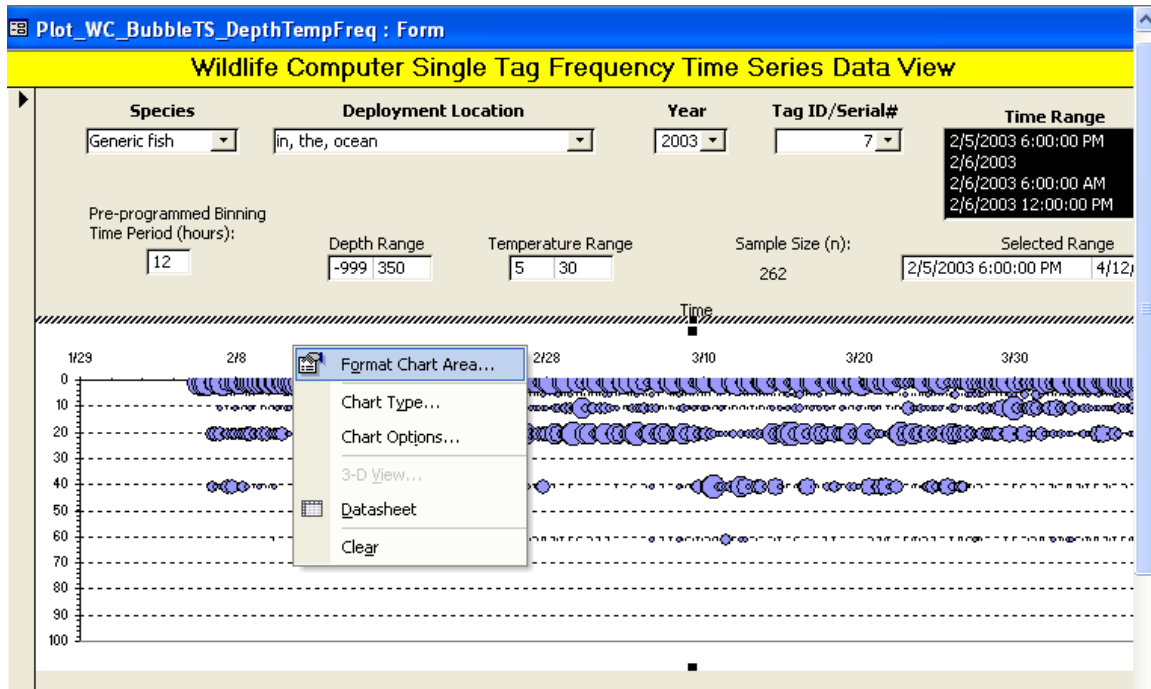
➢ To change the X or Y-axis (or gridlines), right-click on an axis (a gridline), and select **Format Axis** from the pop-up menu.
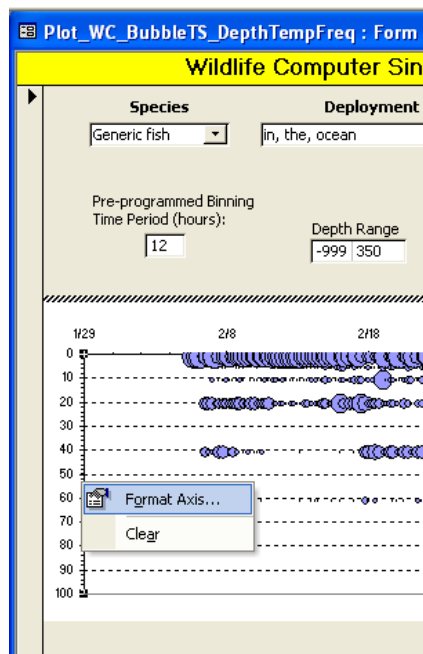
➢ To make a snapshot of the graph, just click on the graph, and press **Ctrl+C** or **Edit > Copy Chart** from the menu.

Points to note on specific Plot forms

Plot_WC_BubbleTS_DepthTempFreq

> ➢ Bubble-sizes from a single column represent the Time-at-Temperature or Time-at-Depth values (which add up to 1) from a time period
> ➢ Y-values are lower bound values, which corresponds to **BinMin** values from **WC_BinInfo** table
> ➢ In the Depth plot, Y-values are **BinMin + 1**; this is done only to enhance visualization.

Plot_WC_PdtBubbleTS_TempMidRangeVsDepthClass, Plot_WC_PdtTS_TempMidRangeVsDepthStratum

> ➢ Median temperature is calculated from (Min Temp + Max Temp)/ 2 for each PDT class (8 in total)

Plot_ARCHIVAL_DepthTempLightTS

> ➢ Only max. 65000 records can be plotted at any time, an overflow error will be displayed if the maximum number of records to be plotted is exceeded.

7. Export

1. From the **Form Navigation Tool**, select **Export** from Operations, and then **Export_TagData**
2. Follow the instructions to export data.
3. Required fields: **TagID** and **Export Type**.

4. Optional fields: File Name, Folder Path and Depth Filter (WC PAT only).
5. Depth Filter is only used when SST data are coming from Proc_WC_PDT, instead of Proc_WC_Locations

8. Other Resources

9. Troubleshoot

Error message: *"Undefined Function Date( ) in expression"*

For a number of people who have Access 97 Databases and have now converted their legacy databases to Access 2000 (or from 2000 to 2003) you may find that you will experience above error. You may have a variation on this error message stating that an object or reference is missing also the error message that you may get could be for another function other than the Date ( ) function.

When: On startup

Solution:

1. Launch **Microsoft Access 2000**.

2. Navigate to and **Open** TagBase.

3. Click on the **Modules** option within the **Objects** section of the Database window (fig 1.0)
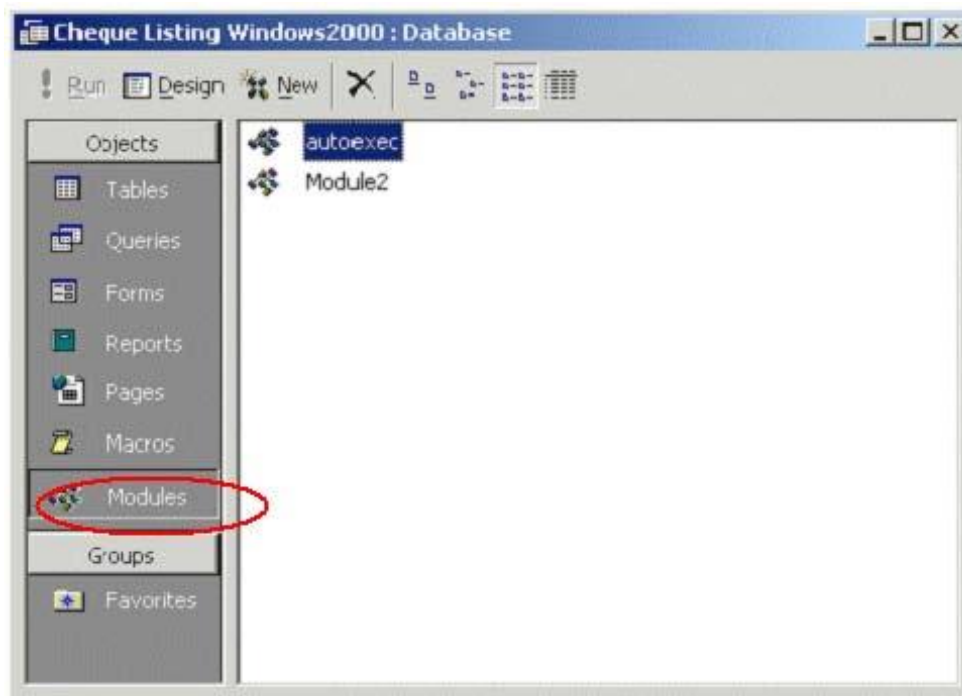

Fig 1.0 Database Window Screen

4. Click on the **New** button to start the creation of a new module and the Visual Basic Editor Window will be displayed on the screen, or double-click on an existing one on the right.

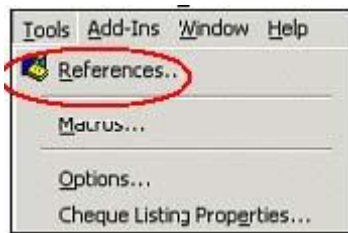5. From the **Tools** drop-down menu select **References** (fig 1.1)

Fig 1.1 References option from the Tools menu

6. Once you have selected the References option the following **References Dialog Box** will be displayed (fig 1.2):
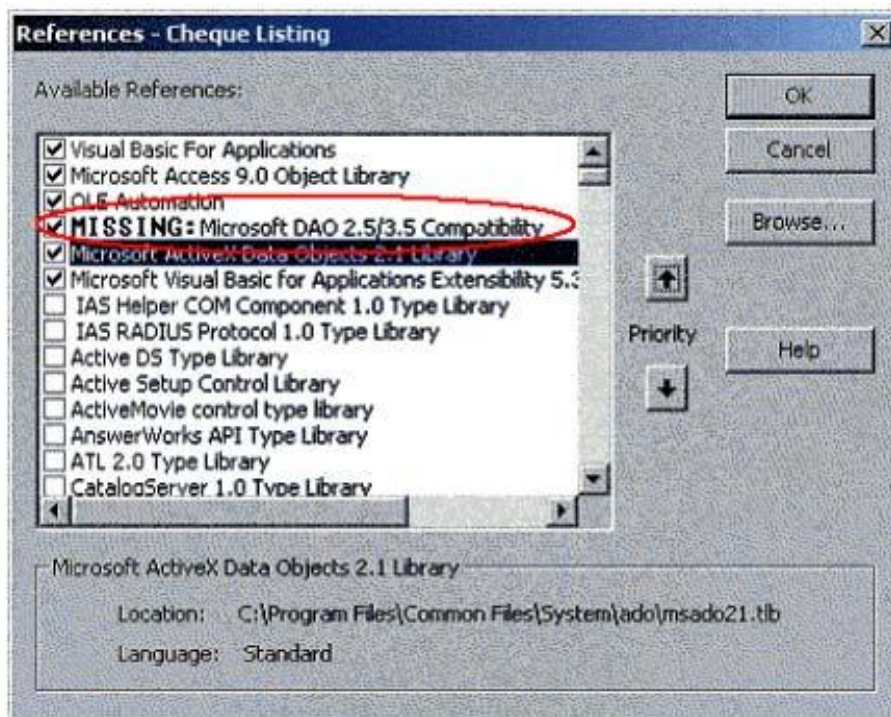

Fig 1.2 References Dialog Box

7. You will notice within the References dialogue box that you will have one or more **MISSING** references (Fig 1.2 indicates a missing reference).

8. For each and every **missing reference** that you have **remove the tick** from the ☑ box to the left of each library reference line.

9. You now need to scroll down the list until you reach the **Microsoft DAO 3.6 Object Library** reference and place a tick into the ☑ box.

10. To resolve all the legacy problems that deal with invalid object references/functions/library errors you need to replicate the following Reference Dialog box (Fig 1.3) to mirror your own. Pay particular attention to the order of the references within the list as the **Microsoft DAO 3.6 Object Library** needs to be above the **Microsoft ActiveX Data Objects 2.1 Library .**

Note: If you are missing any of the references contained within the list you need to scroll down the list and find each of them in turn and place a tick in the ✔ box to the left of each reference line until you get a complete list as illustrated.
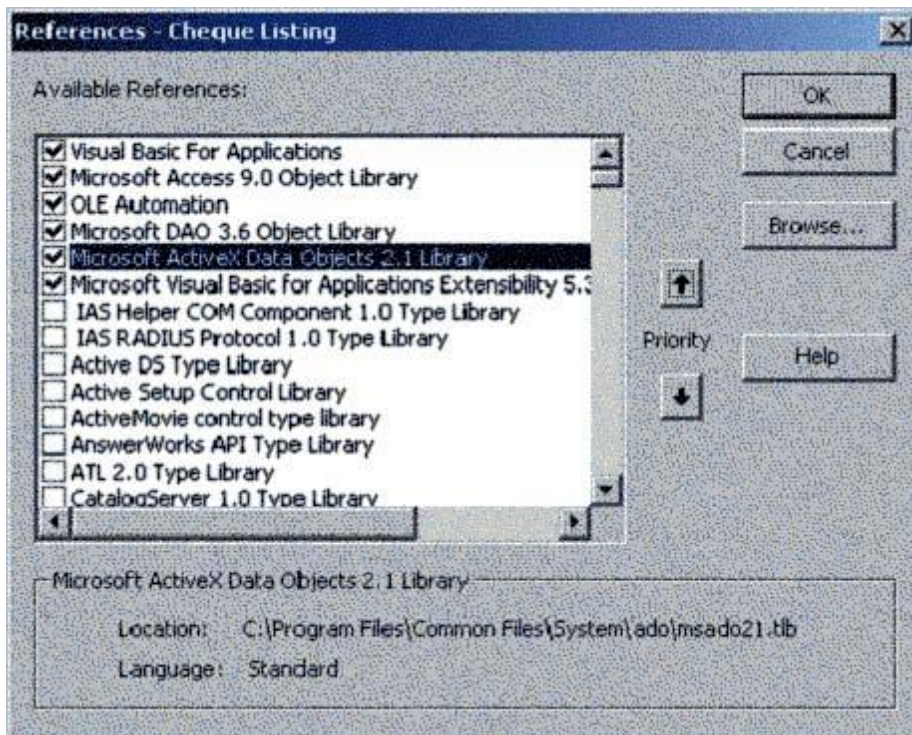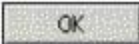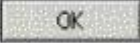

Fig 1.3 Reference Dialog Box displaying correct library References

11. Once you are satisfied that your list of references mirrors the list contained within fig 1.3 click on the [OK] button to accept your revised references list.

12. Click on the ▇ **Save** button to save the module. The name that you give the module is irrelevant you can leave the name as the default and click on the [OK] button to confirm the save operation.

11. From the **File Menu** select **Close & Return to Microsoft Access** to **Exit** the Visual Basic editor.