First TUFMAN Training Workshop (TTW-1)

3-7 December 2012

SPC, Noumea, New Caledonia

Session 9.0

Mapping with TUFMAN

1 INTRODUCTION

This document presents the TUFMAN mapping module, in order to give a better understanding of how it works, and of the various possibilities offered.

2 PRE-REQUISITES

This modules works in conjunction with Mapinfo GIS. Therefore, you will need Mapinfo 5.5 or later to be installed either on your network or on your own computer.

For the specific purpose of the TTW1 workshop, you will find a version of MAPINFO under
[\\172.19.4.11\studentshare](\\172.19.4.11\studentshare)

*Following are the codes to access this network area:*

- **student user:** TRAINSVR\student
- **student password**: learner1

Once Mapinfo is installed/available, you will then need to go in the TUFMAN ADMIN options (Admin button on the main menu) and then fill in the path to Mapinfo application (click on Locate to get the right path)
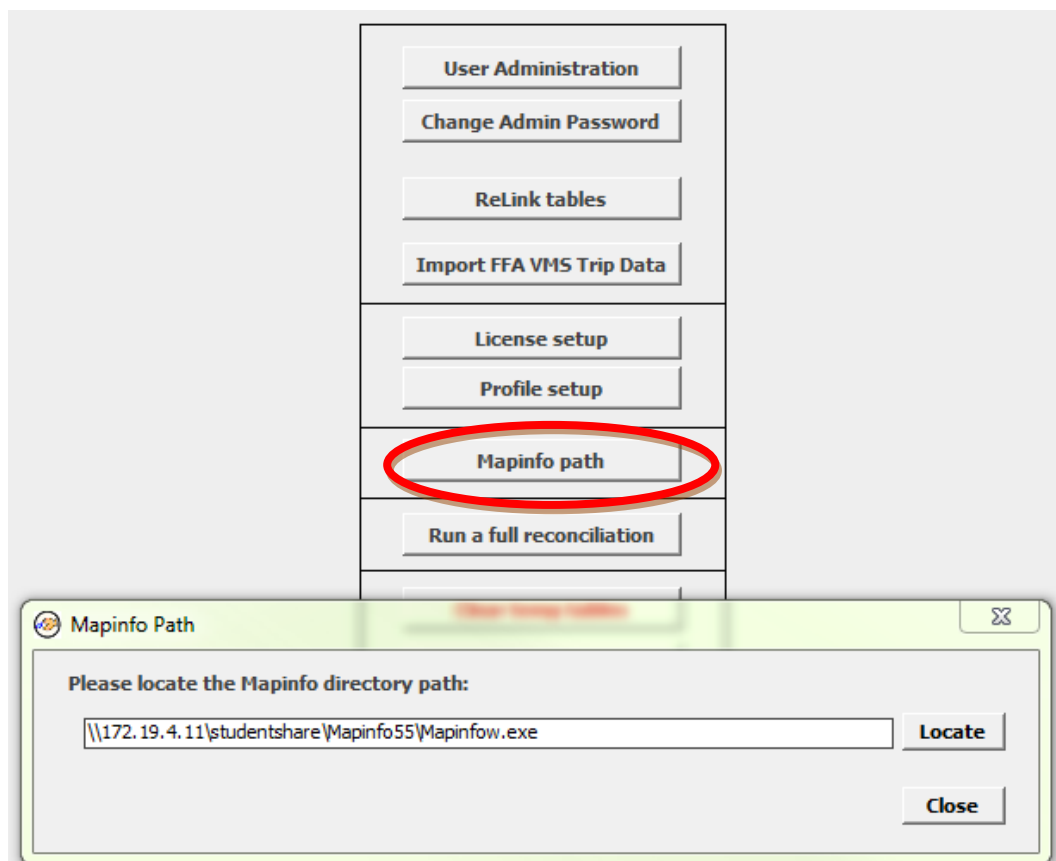
3 HOW TO ACCESS THE MAPPING MODULE

The TUFMAN mapping module is part of the reporting options. From the main menu of TUFMAN (on the left side), you can access it by clicking on Reporting, then Mapping
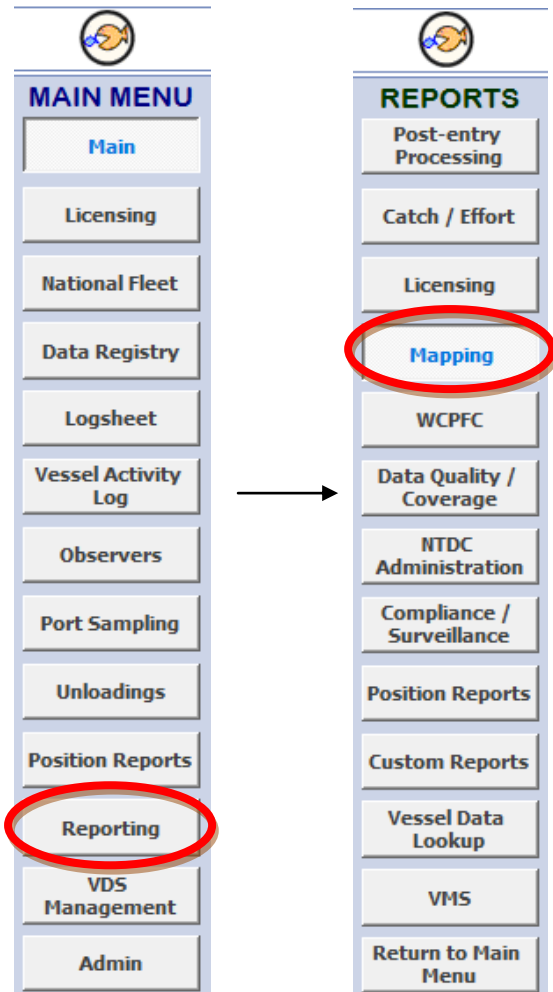
4 MAIN TUFMAN INTERFACE

The mapping module is divided in 2 parts: the list of maps that you can produce, and the parameters that you will have to setup for the selected map

Part 1: List of maps available

This part of the module lists all the available maps.

- **Map of Catch and Effort**: this option will enable you to produce maps based on the logbook data set. The maps generated are usually showing graduated circle plots, aggregated by 1/5 degree square. Each circle will be showing, in a proportional way, the effort or the catch, depending on user parameters selected.
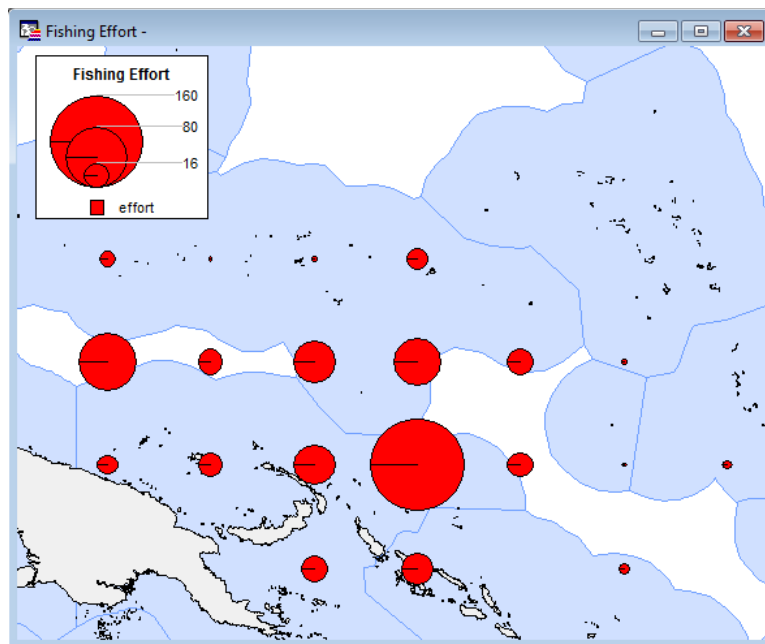
- **Vessel Trip Daily cruise track**: this option enable you to produce a track for one specific vessel trip, selected in the map parameters. Each point represents a daily position of the vessel, taken from the logbook data
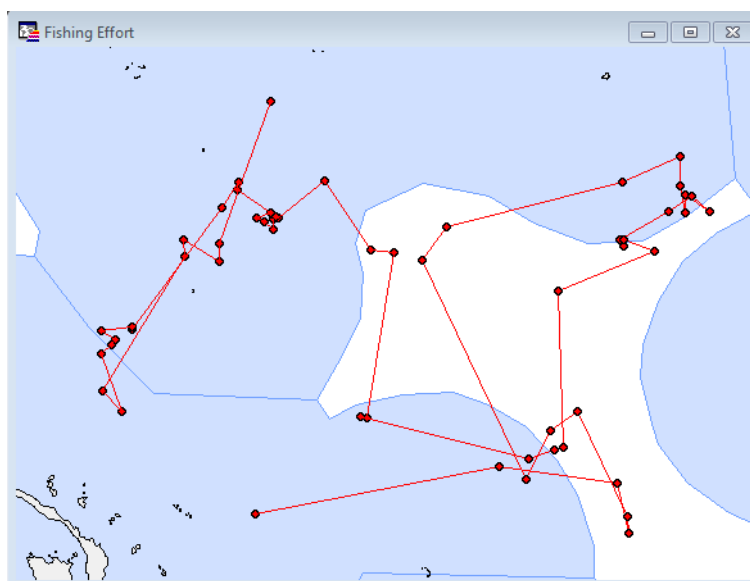
- **Vessel Trip track – VMS data** : this option enable you to produce a track for one specific vessel trip, selected in the map parameters. Each point represents a daily position of the vessel, taken from the VMS data
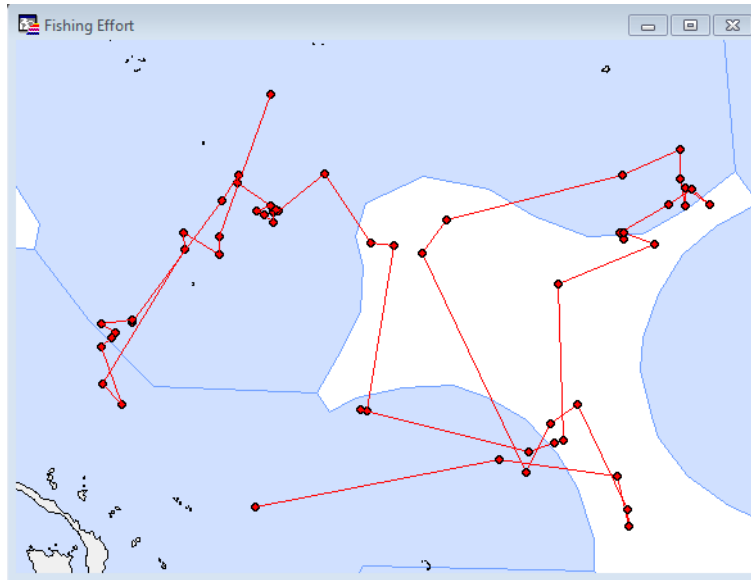
- **Telex positions** : this option will enable you to map all the telex positions received (and imported in the system) for a specific period of time
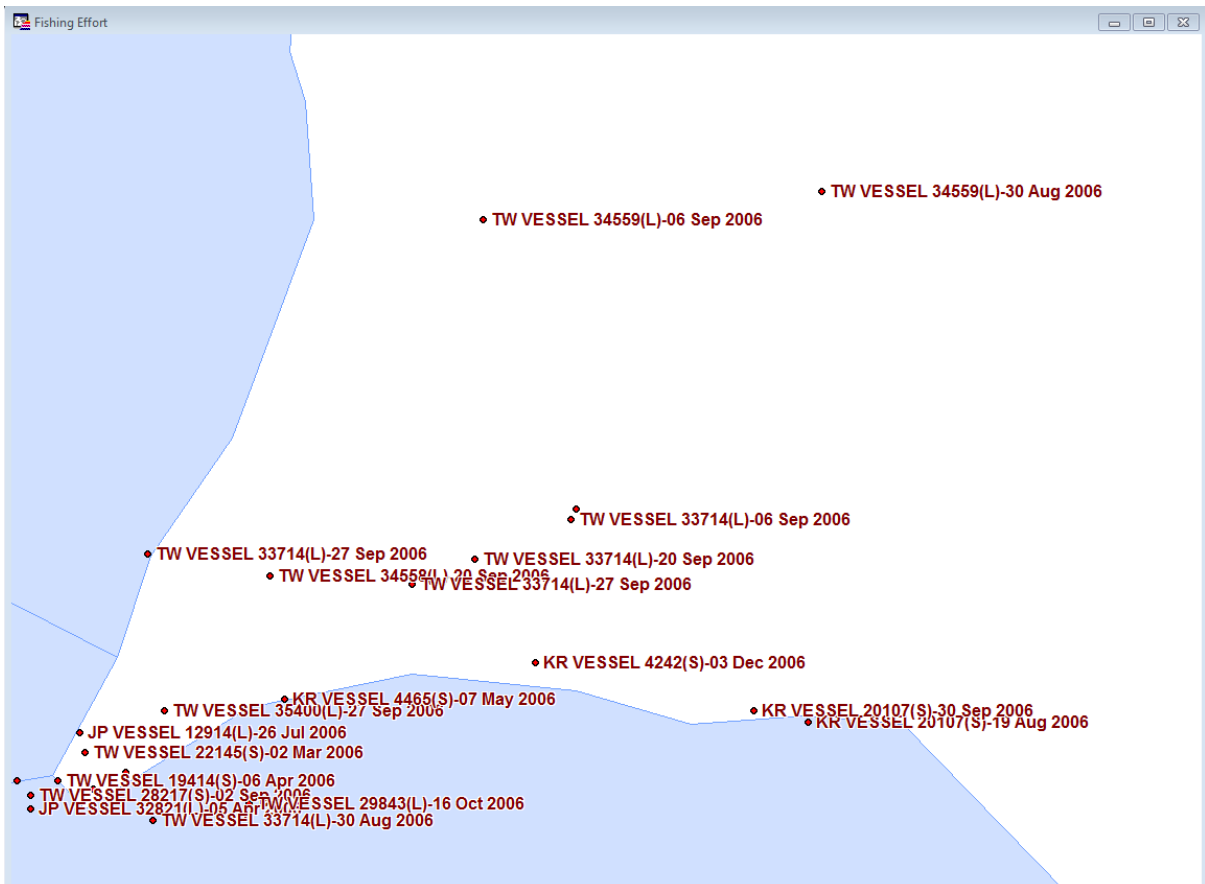
Part 2: parameters for the map

The second part of the mapping module allows you to setup the map/query parameters.

- **Gear Type**: select the gear type that you are interested in mapping

- **Nationality of the Catch**: this will allow you to filter the data to a specific nationality. There are 3 possibilities for this option:
  - Filter for a specific vessel <u>Company Nationality</u>
  - Filter for a specific vessel <u>Flag of Registration</u>
 - Filter for all vessels defined in your <u>National Fleet</u>

  Note that the 2 last options will only map data from vessels that are licensed. Any non licensed vessel data will be ignored (thus the importance of having a license definition for all of the vessels)

- **Time** period: you can select here a specific period of time. Only data falling into this period will be mapped. You can choose a specific year, and decide to aggregate the data per
  - <u>Year</u> (1 single map generated)
  - <u>Year and month</u> (12 maps generated, one for each month)
  - <u>Year and quarter</u> (4 maps generated, one for each quarter)

- **Area** aggregation: In order to map data with graduated circle plots, you need to aggregate your data positions by some square degree. This option allows you to aggregate by
  - <u>1 degree square</u>
  - <u>5 degree square</u>

  If you are mapping a large area, it might be useful to aggregate by 5x5, in order to avoid getting too many graduated circles on your map. However, at the country scale, it is most of the time more adapted to aggregate by 1x1 degree.

- **Vessel/Trip**: When mapping vessel tracks, you have the possibility to select a specific vessel (the list depends of course on the gear type selected prior to this), as well as a specific trip for the selected vessel. The resulting map with be the vessel track for the trip selected.

- Map Calculation fields: There are 3 types of calculation you can show on you map

- o Effort: when you select effort, a small colored square appears on the left side of the selection, allowing you to select the color which will be used on the map to visualize the effort. Click on the small colored square to change the color.
  - o Catch in numbers of fish (only available for Longline and Pole and line)
  - o Catch in metric tons

Select the one you need to visualize on the map.

- **Species**: If you have chosen to map the catch, you will be offered to select some specific species catch. Purse seine, Pole and line and Ringnet gear selection will only activate the 3 main tuna species (Yellowfin, Bigeye, Skipjack), while Longline will activate them all. The small colored squared next to the species is showing in which color the associated species will be respresented. You can change it by clicking on the little square button Note that you can unselect all species by clicking on the NONE button, or select them all at once with the ALL button.

  Note that if you select

  - o one single species : a graduated circle map will be generated. The bigger the catch for this species, the bigger the circle will be.
  - o several species: a graduated pie map will be generated. This means that all species selected will be represented into a pie, each species within the pie being a percentage of the whole species selected.
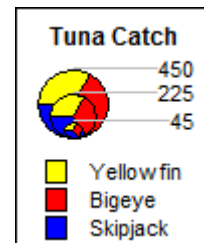
  If you haven't selected all the species that are available to you, you can aggreagate the rest of these unselected species into 1 total sum, by selecting the Non Selected Species option. This will give you another item shown in the map as "Other Species (not selected)

- **Legend**: You can add a title to the generated map. This title will appear in the legend, as show above. You ccan also modify the legend further in Mapinfo, as described in the "Tuning the map legend" paragraph further below.

- **Legend max value**: this option has the same utility than the one described further below "Changing the scale of pies/Circles in Mapinfo". Sometimes, it might happen that your circles/pies are overlapping too much to distinguish anything. If you need to decrease the size of all circles/pies of your map, you can select a higher number for this option.
  Note that this number should be more or less correlated with the maximum catch that you can see at the top of the legend.
  This parameter is of course not mandatory, but rather for fine tuning your maps.
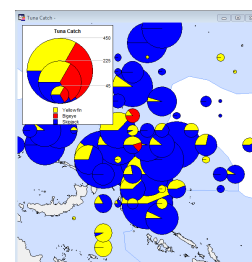
- **Legend embedded to the map**: if you select this option, the little legend show above will be embedded into the map. The advantage of embedded the legend to the map is that it can then be exported together with the map from Mapinfo, into any of the picture format available (refer to **Export your map** paragraph below). This exported picture of the map & legend can then be imported into a Word document.

- **Map Window Area**: this option willl allow you to choose various zoom for your map, from bigger zoom (Home EEZ, to focus on the country EEZ) to smaller zoom (Pacific Ocean, to display a broader area). Note that the map zoom can also be changed in Mapinfo using the shown button on the Main toolbar.

- **Coast line / fill**: this option give you 2 possibility as far as the colors of the coast line layer are concerned:
    - Color / color: the countour of the map is in color, as well as the filling (best for electronic publications)
    - Black / Grey: the contour of the map is in black, filled with some grey tones (best for B/W printout)
- **EEZ Line / Fill**: idem, but for the EEZ layer

5 VIEWING GENERATED MAPS IN MAPINFO

Once you have pressed the "Produce Map" button in the TUFMAN mapping interface, one or several maps will automatically be generated according to the selected parameters, and Mapinfo will then automatically open to display them.

NB: Error when producing maps.

In some special case, you might get an error message and the maps won't be generated. Please check in the Administration option that you have filled in the path to the Mapinfo software. This is likely to be the problem.

Tuning the map legend

Tuning the map legend has a direct effect on the map. It will change scales, colors, text,…

- **Changing the scale of Pies/Circles in Mapinfo**: it might happen that the scale of the generated pies or circles in Mapinfo is not properly setup.
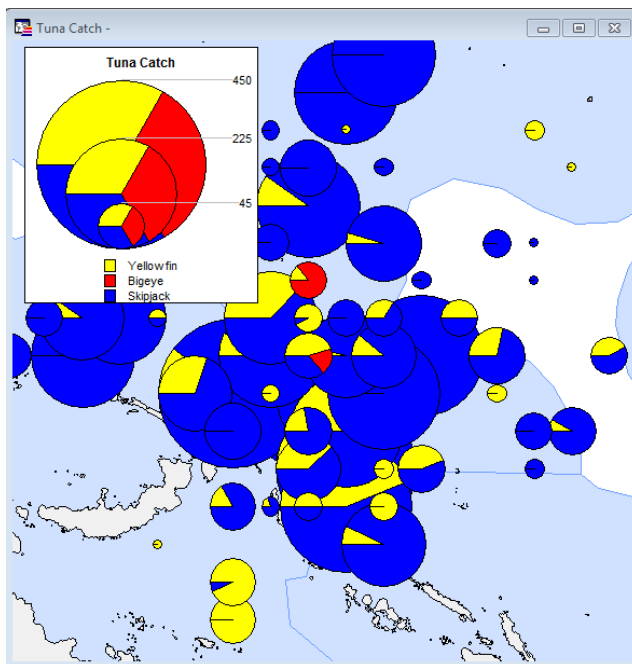
In this case, there is too much overlap in the pies to see anything useful.
You can adjust this by double clicking on the separate legend, then on Style button, and then adjust the diameter for the maximum sum: in this case you wil want to have a smaller diameter for the maximum sum.
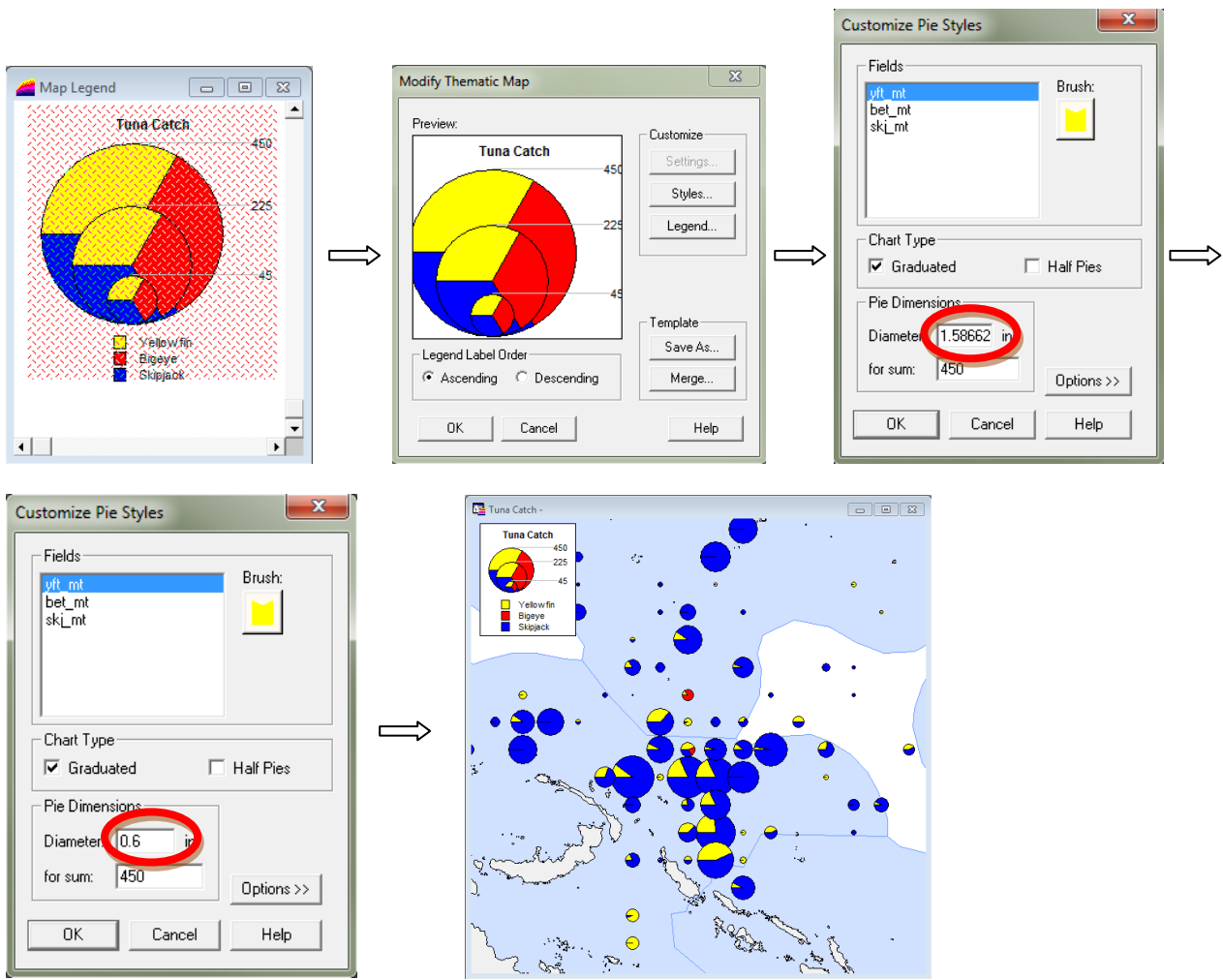
- **Changing the legend headers**: you might want to change some of the text shown inside the legend. Double click on it, then on Legend button, and you will be able to customise it. You can change the title, subtitle, but also each species text (click on one, then change the text in the "edit selected range here" area)
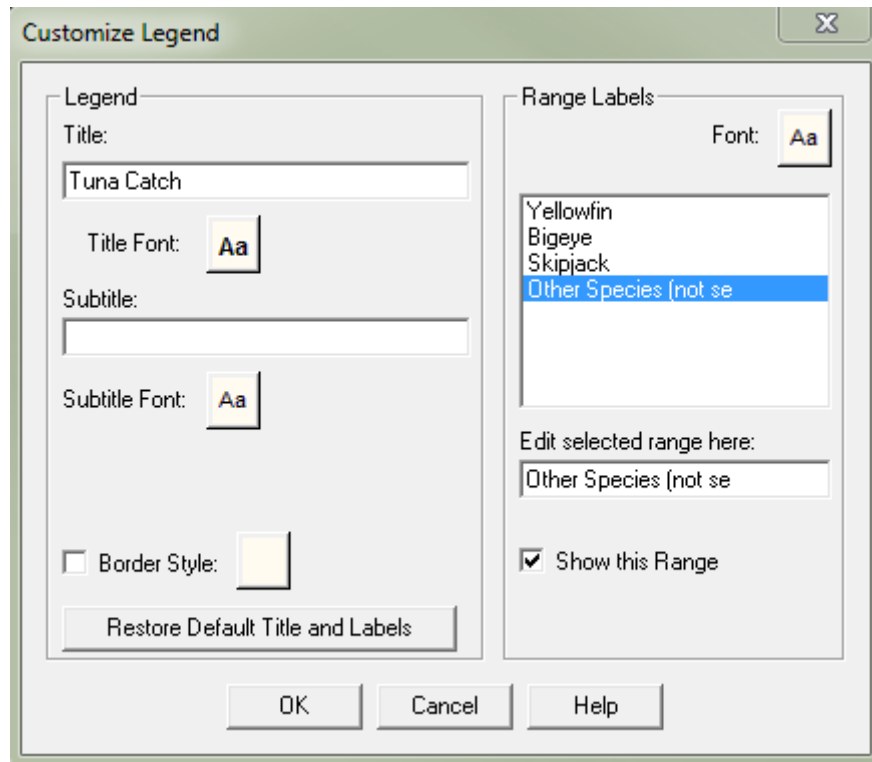
You can also change the fonts or change the order of shown labels.

Dealing with MAPINFO layers

A map consist of several layers, displayed on top of each other, most of the time:

- The pies / circle / track
    - The graduated layer (only for pies or circles): this is the layer that contains the graduated shapes which size is proportional to the field mapped (catch, effort). This layer is the visible one of the 2.
    - The symbol layer: contain the position data associated to the graduated symbol. This layer shouldn't be displayed, the graduated one is the one you want to see only.
- The coast lines
- The EEZs

There is also an additional layer, the "Cosmetic Layer", which is the one where you can add some text, drawing,… to the map (a "user" layer). You can access/control these layers from the menu Map -> Layer control, or from the Main toolbar
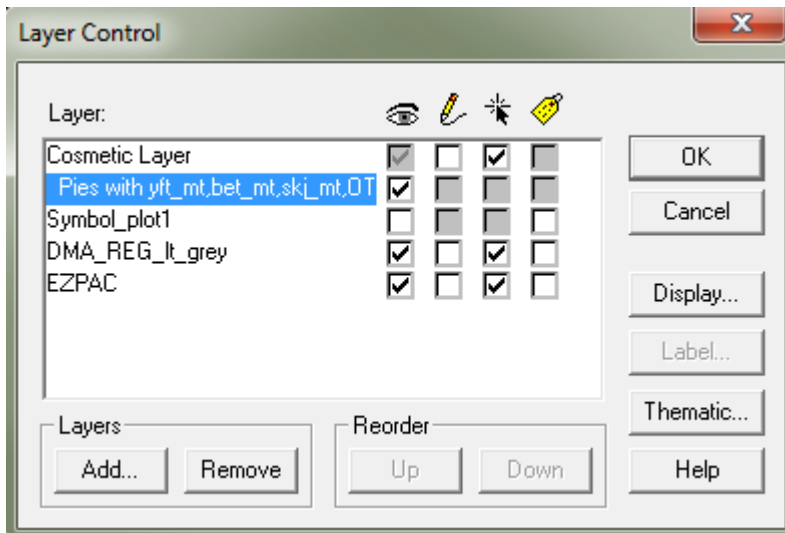
Each layer is a distinct row.

If you want to hide or display one specific layer, you can check the 👁 checkbox next to the layer.

If you need to add some new text to the map (or graphics), you should enable the ✎ checkbox of the "Cosmetic Layer". This will store all your additional text into this temporary drawing layer.

How to add additional text, symbols or drawings to your map

The drawing toolbar should be visible on the screen. If it's not available on your screen, you can display it by going into the Options menu, and click on toolbars. You can then choose to show the "Drawing" toolbar as a floating window. On this Drawing toolbar, select the A button to add some text. You can also add any object such as circles, rectangles, lines, pin… by clicking on one of the available shapes in this toolbar.

NB: you can usually add Degree (°) symbol by holding down the <ALT> key and typing '248' on the numeric keypad

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Exporting and using the produced map

When you are happy with your map(s), you might want to export it in order to be able to place it into a Word publication. There are a couple of ways of doing that, but the best in our view is to export the map as a JPEG, then import the JPEG into the Word document.

- **Exporting the map(s) to a JPEG**: File menu -> Save Window As

This option will allow saving your current active map under several picture formats. We suggest you save under JPEG, for compression matters. Mapinfo will keep the file small, but with a reasonable image quality.

- **Importing the map(s) into a Word document**: under MS Word: Insert menu -> Picture

Note that this process will be the same from any word processing package. This will enable you to import your maps into your document, where the cursor is.

6 GENERATING YOUR OWN MAPS FROM AN EXCEL FILE

In some instances, you might want to build your own maps outside of the Mapping module. TUFMAN will allow you to get some of the standard reports results in the form of a list of latitude, longitude, catch, which you can export into Excel.

Example: Catch / Effort report #8 – Vessel Trip catches by species and by set

Lat	Lon	eez_code	hooks_n	ALB_n	alb_mt	BET_n	bet_mt	YFT_n	yft_mt
0541N	15903E	FM	1000	0	0	3	120	1	30
0529N	15907E	FM	1000	0	0	2	80	2	50
0321N	15952E	FM	1000	0	0	4	160	1	30
0315N	15953E	FM	1150	0	0	3	120	3	80
0315N	15954E	FM	1150	0	0	4	160	3	90
0318N	15952E	FM	1150	0	0	5	200	4	110
0339N	15953E	FM	1150	0	0	4	160	3	90
0345N	15957E	FM	1150	0	0	5	200	2	60
0458N	16001E	FM	1150	0	0	5	200	10	200

Convert geographical coordinates to decimal

Mapinfo needs to have latitudes and longitudes in a decimal format in order to be able to display the catch. You will therefore have to do a small transformation of the current geographical coordinates (degree/minutes/hemisphere) into decimal.

For example, a latitude of "0230S" is equivalent to –2.5 in decimal degrees (note that south of the equator is to represented as negative). A longitude of 17000W will translate to 190 in decimal degree (from 0 to 360).
The following formulae should be used to convert latitude and longitude to decimal format, which is what is required for MAPINFO:

- **Longitude**
  =ABS(IF(RIGHT(<LONGITUDE CELL>,1)="E",0,360)-(LEFT(<LONGITUDE CELL>,3)+MID(<LONGITUDE CELL>,4,2)/60))

- **Latitude**
  =IF(RIGHT(<LATITUDE CELL>,1)="N",1,-1)*(LEFT(<LATITUDE CELL>,2)+MID(<LATITUDE CELL>,3,2)/60)

**NB:** a sample XLS file is available as an example of this coordinate transformation:
\\172.19.4.11\studentshare\Examples\Decimal_Lat_and_Lon_formulae.xls

D2			fx	=IF(RIGHT(B2,1)="N",1,-1)*(LEFT(B2,2)+MID(B2,3,2)/60)			
	A	B	C	D	E	F	G	H	I

	A	B	C	D	E	F	G	H	I
1	LogDate	Lat	Lon	**LATD**	**LOND**	hooks_n	BET_n	bet_mt	YFT_n
2	23-Jul-07	0541N	15903E	5.683333	159.05	1000	3	120	1
3	24-Jul-07	0529N	15907E	5.483333	159.1167	1000	2	80	2
4	26-Jul-07	0321N	15952E	3.35	159.8667	1000	4	160	1
5	27-Jul-07	0315N	15953E	3.25	159.8833	1150	3	120	3

Once you have translated your coordinates into decimal format, you will now open your excel file within Mapinfo.

## Open the Excel file into MAPINFO

The excel file need to be opened in Mapinfo, and geo referenced. This process will indicate to mapinfo which fields in the excel file are indicating the positions (lat/lon)

- **Step 1: open the excel file -** File menu -> Open table, then choose the Microsoft Excel (*.xls)" file type, and finally select your XLS file in the folder where located

- **Step 2**: **Indicate to Mapinfo the structure of the EXCEL map file -** As shown below, you will indicate here that the first raw are the headings, and that the data starts at the 2nd row ("A2")
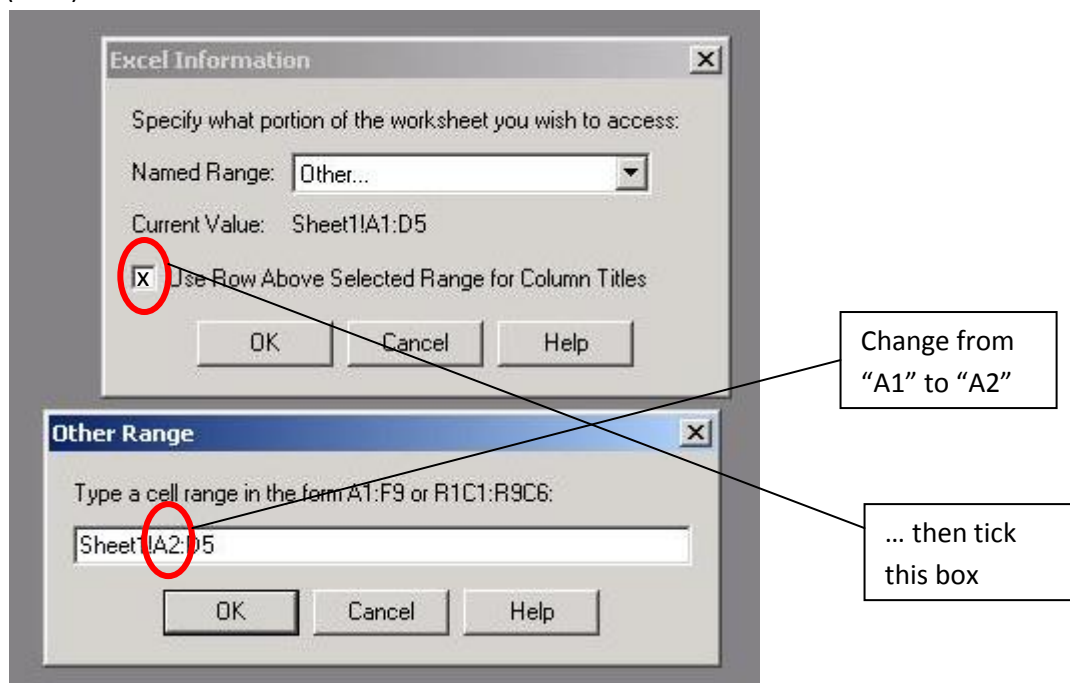
Once this step is done correctly, MAPINFO will display your file in a table.

- **Step 3: indicate which column represent the positions (lat/lon)** – Table menu -> Create Points..
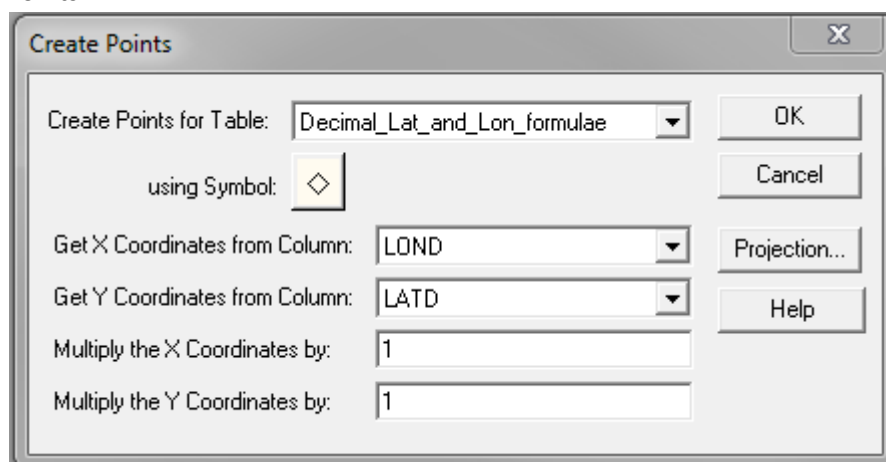

Note that "X coordinate" should always be the longitude, while "Y Coordinate" the latitude. These are the only 2 fields you should change here. This will finish the conversion process.

Display the Excel file on a map

You are now ready to display the excel file points on a map. You can do that through the Windows menu -> New Map Window option. You should now get the points shown on a map. Next step is to add some layers, which you can do through the File->Open
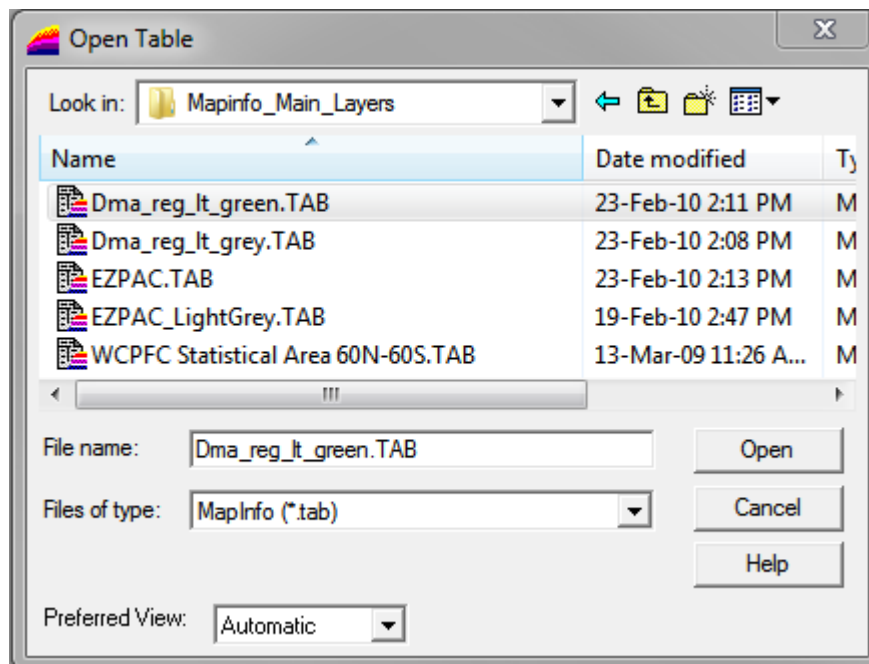
- DMA type layers show very detailed coast lines for the Pacific
- EZPAC type layer show the Exclusive Economic Zones for the Pacific
- GRIDS: 1x1 – 5x5 – 10x10 degrees
- WCPFC Statistical area shows just that.

NB: These 3 main layers are available for the exercises under
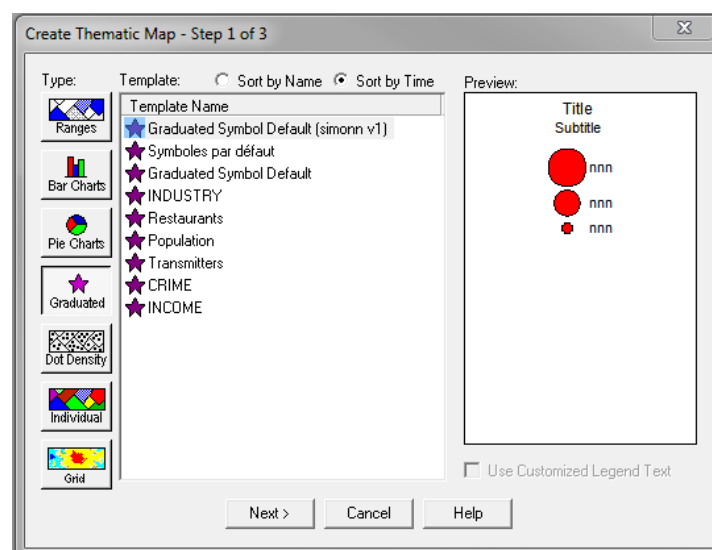\\172.19.4.11\studentshare\Examples\Mapinfo_Main_Layers

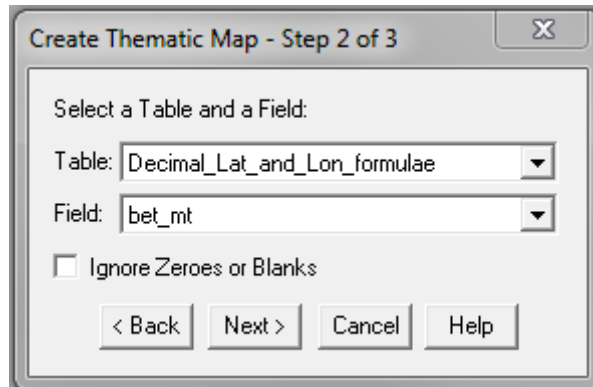Feel free to take a copy of this folder home, if you wish to keep them
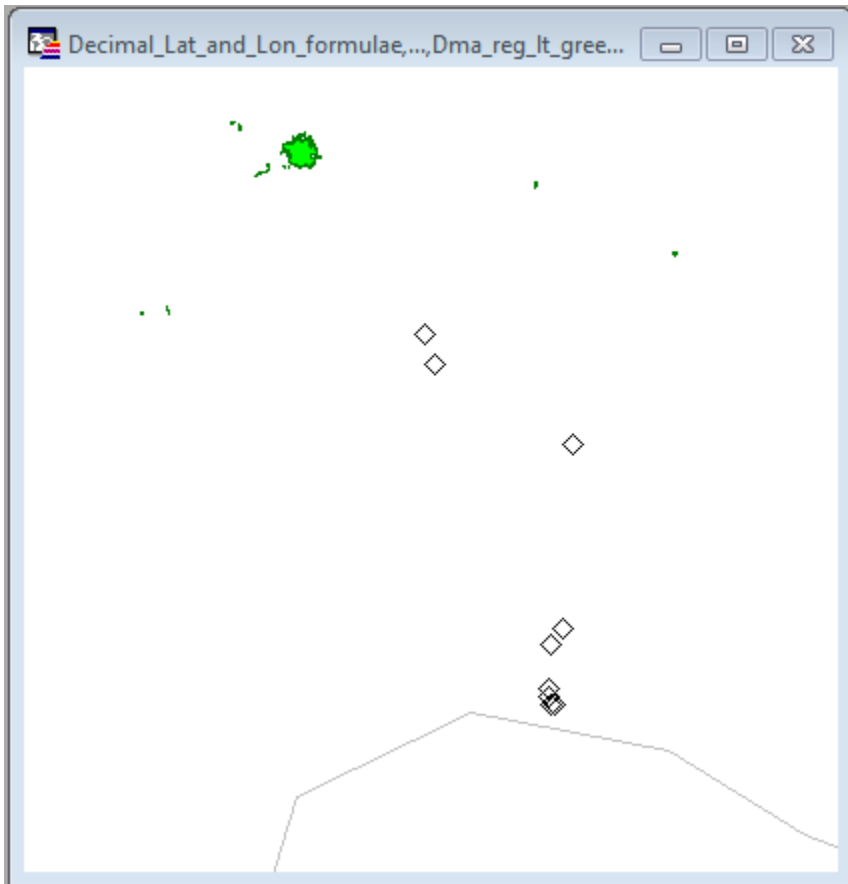
Create a thematic map

Next step is to create a thematic map, in order to view the amount of catch for each position. You can do that through the Map menu -> Create Thematic map
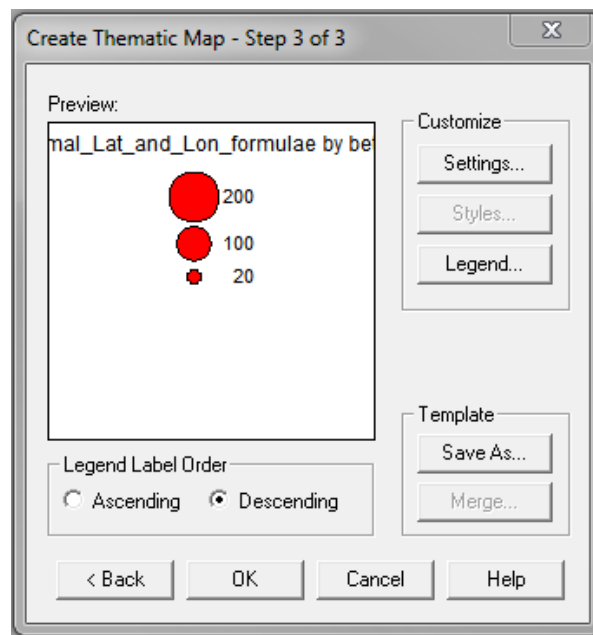
- **STEP 1** : choose what type of graph you wish

- **STEP 2**: Choose the field you want to map (Bigeye in metric tons in that example)

- **STEP 3**: customize the legend (as described in section 5) – you can just say Ok here if you don't want to customize

Once the 3 steps are finished, your thematic mapping is completed, and you can now view a representation of the catch of of bigeye in metric tons (in this case)
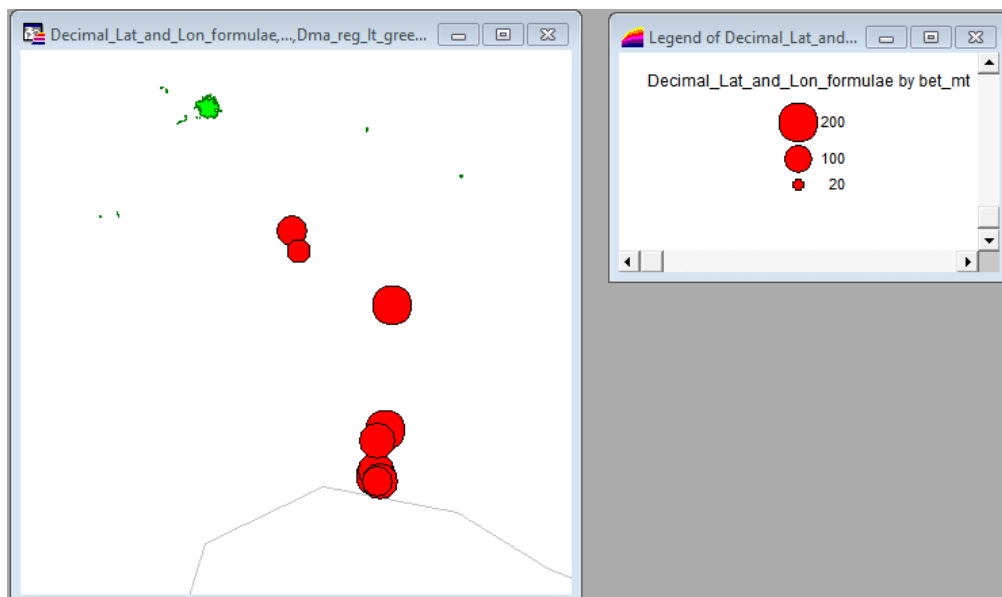
Should you wish to map several species catch on the same map, you will need to select PIES CHARTS option in STEP1. This will allow you to select several species to map in the same circle (percentages of the total catch). Keep in mind that you should choose similar fields with this option (you don't want to mix apple with oranges).

Embedding the legend in the map

After completing last section, a Legend should be automatically displayed in another window. You can adjust the legend window to fit the appropriate size at any point.
However, you cannot export your Legend window separately into an MS WORD document, so you need to embed the Legend into your Map window. To do this, you must do the following.

In the FILE Menu, select "Run MAPBASIC Program" and select to run "Legends.MBX". This will add a new menu option called "LEGENDS MANAGER" into the TOOLS menu. Select the Map window, enter into the "LEGENDS MANAGER" and select "Create embedded LEGEND" . This will automatically put a window of the legend into the map window. You can then use the mouse to position this window wherever you wish in the map window. You can tune your embedded legend by double clicking on the external one.