

Converting GPX Waypoints, Routes and Tracks

Overview

GPXconvertVBA is an Excel VBA (Visual Basic for Applications) workbook that will convert GPX files to one of the following formats.

- Comma-Separated (CSV) text files
- Excel workbook formatted for the Raymarine Waypoint Utility

The CSV files can be established in several formats for import to most Chart Plotting programs. Two versions of the Excel VBA workbook are distributed in a single zip file. One version is for Excel 2003 and the other for Excel 2007.

The Raymarine Waypoint Utility software will accept the Excel 97-2003 workbook created by this program and create a file on a Compact Flash Card (CF) that can be loaded by the Raymarine Multi-Function Display (MFD) systems. However this output format has been tested only with the Raymarine C-120 MFD.

Installation

The GPXconvertVBA workbook is installed by extracting the VBA workbook and all other files from the downloaded zip file into any folder on the target system. Then opening the VBA workbook like any Excel Workbook. Depending on the version of Excel, you will receive a warning that the workbook contains macros. The macros must be enabled for the GPXconvertVBA program to be active. This is accomplished differently depending on the version of Excel.

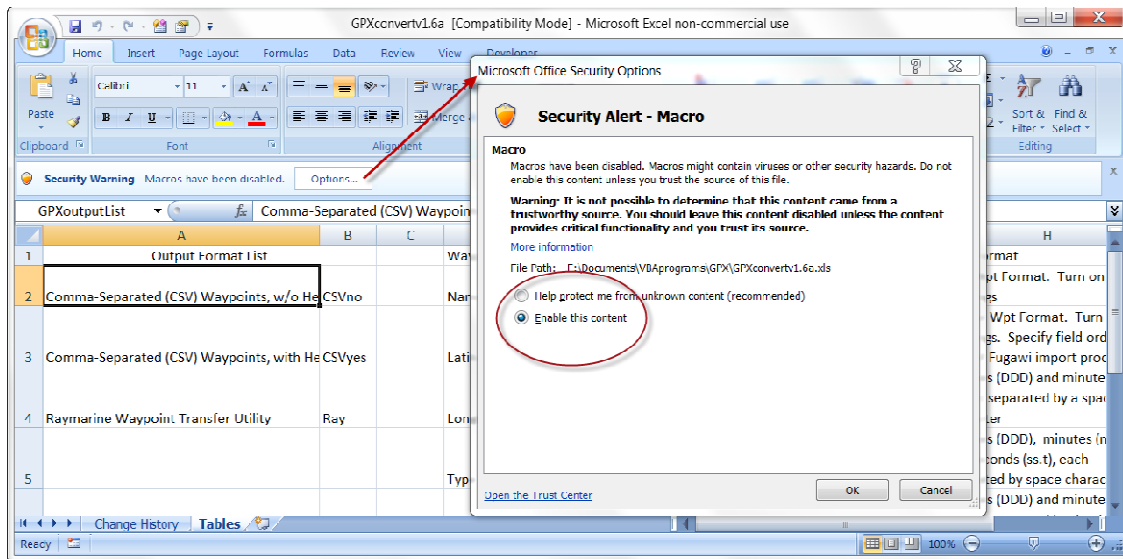


Figure 1: Excel 2007 Macro Enable

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The screen capture above shows how the workbook macros are enabled in Excel 2007.

These macros provide the functionality of GPXconversionVBA. If you are not willing to accept this workbook as from a trusted source then you should not use this program.

Once the macros have been enabled the program is ready for use and the Waypoints button should be available.

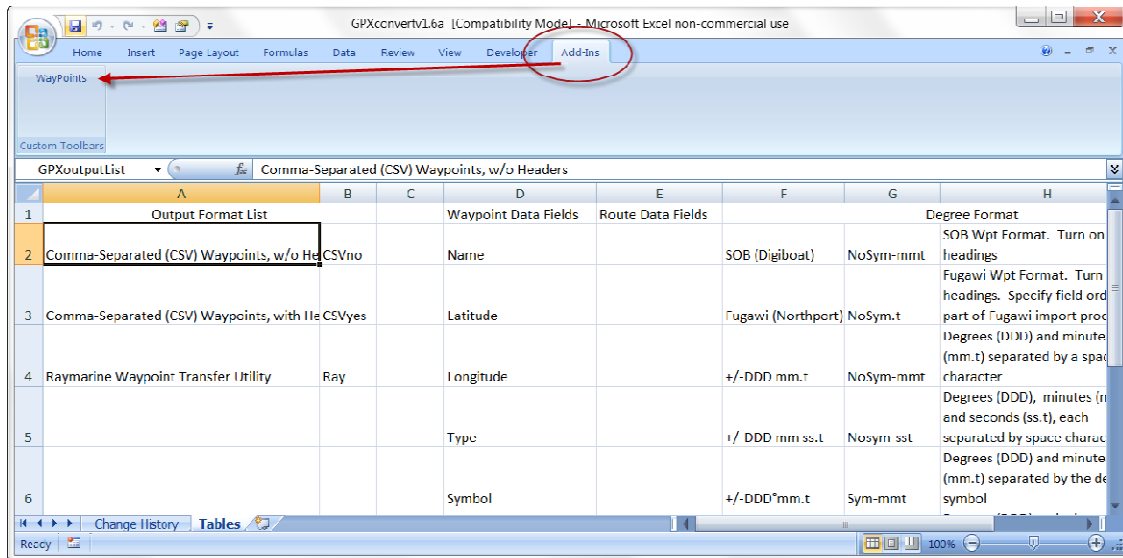


Figure 2: Macros Enabled in Excel 2007

The screen capture above shows the Waypoints button visible in the Add-Ins tab under Excel 2007. Clicking on that button will bring up the GPXconversionVBA form as shown below.

Converting GPX Waypoints, Routes and Tracks

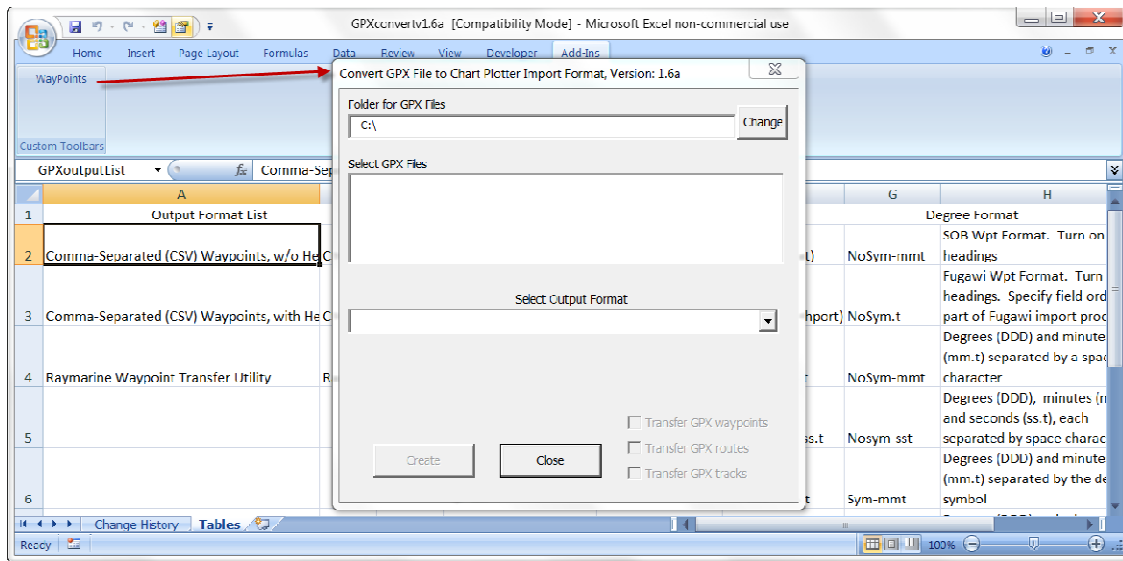


Figure 3: Initial Userform for GPX conversion

Now we are ready to convert a GPX file.

Converting GPX Waypoints, Routes and Tracks

Operation

There is a set of information that must be specified in the GPX conversion user form before a conversion can be initiated.

Specify Output Format

First select the output format options

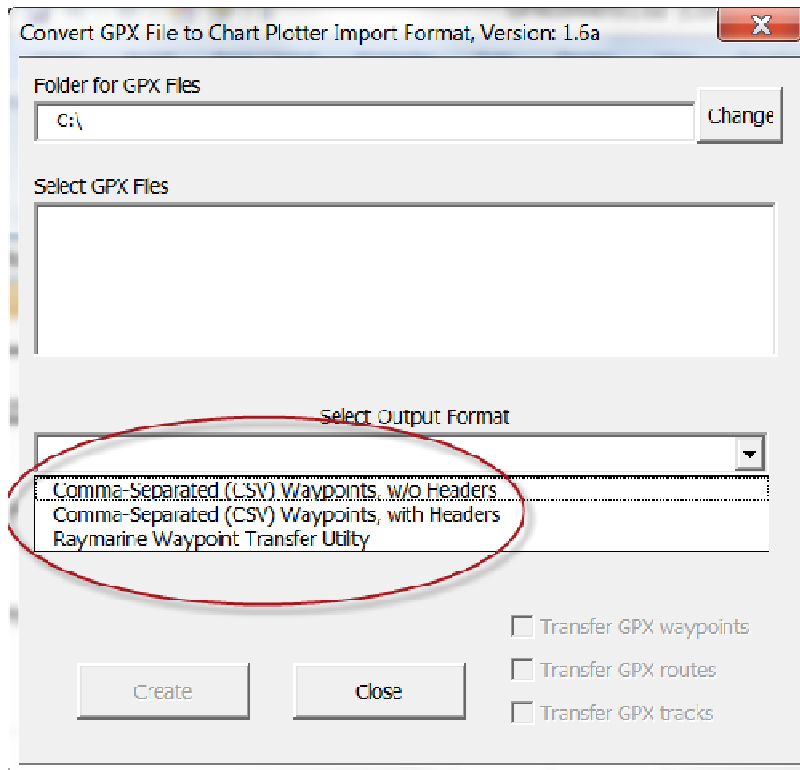


Figure 4: Output format options

The currently supported output formats are:

1. CSV files without field headers
2. CSV files with field headers
3. RTWU workbook

The output option can be selected from the drop down list shown above. If the RTWU option is selected then the location of the RTWU workbook template (Archive.xlt) must be specified.

Converting GPX Waypoints, Routes and Tracks

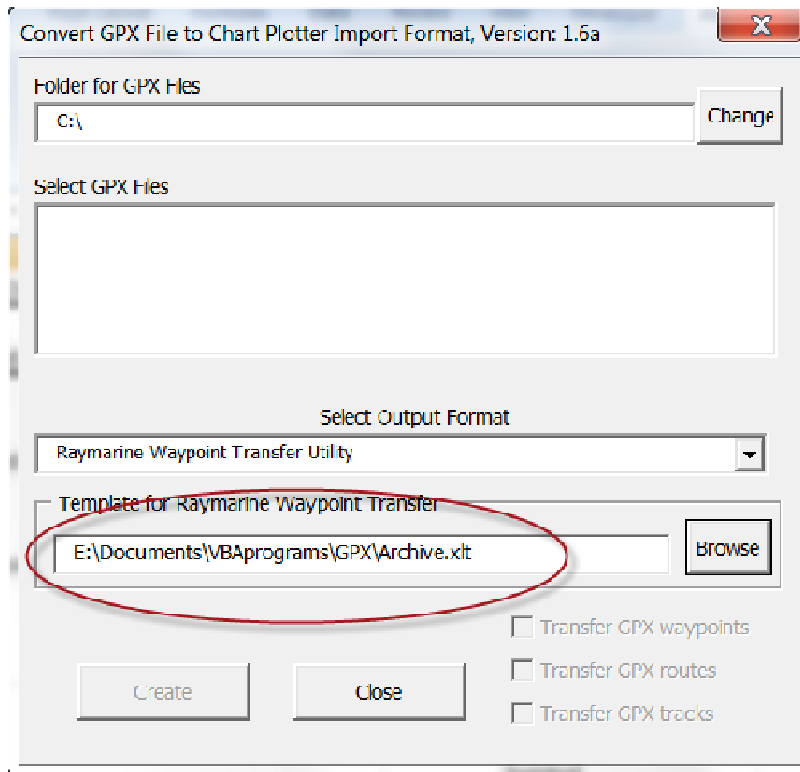


Figure 5: Raymarine Waypoint Utility Workbook Template

Click the browse button and specify the location of the template. This will normally be the same folder in which you extracted the GPXconvertVBA workbook

Converting GPX Waypoints, Routes and Tracks

Set Source Folder

Then specify the folder that contains the GPX file(s) to be converted.

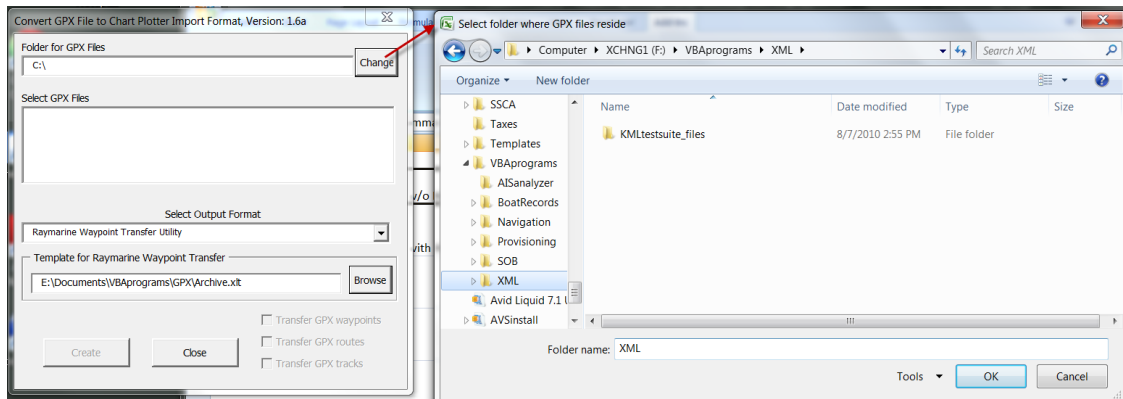


Figure 6: Folder for GPX file input

Click the “Change” button on the form and use the standard Windows dialog boxes to specify the folder that contains in the input GPX file(s).

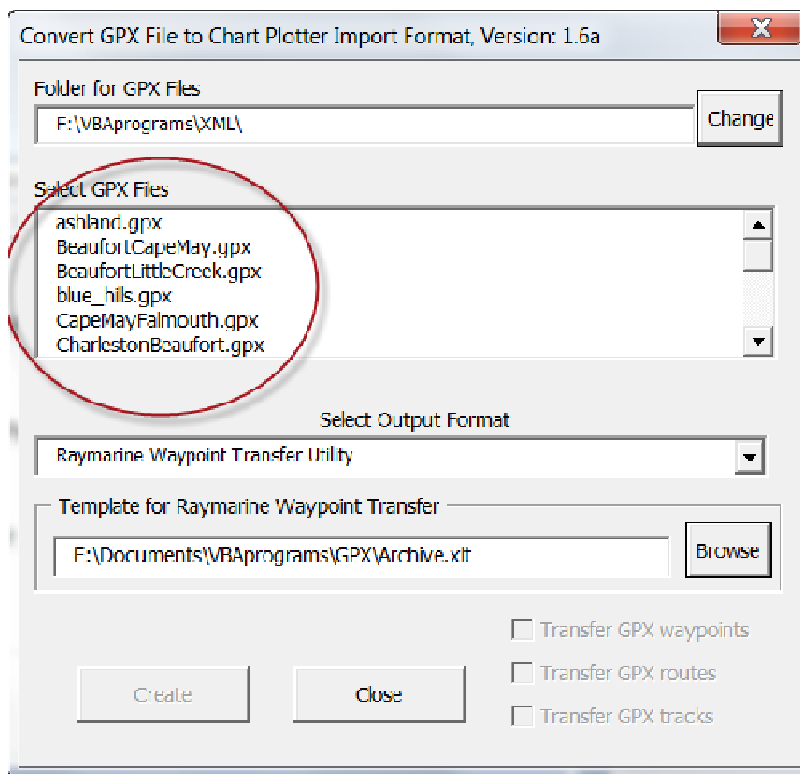


Figure 7: GPX files in the Specified Folder

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If there are any GPX files in the specified folder they will be listed in the Select GPX Files box. If no GPX files are listed, then a different folder should be specified.

Converting GPX Waypoints, Routes and Tracks

Select GPX File

Click on one of the GPX files in the list and the contents of that file will be displayed.

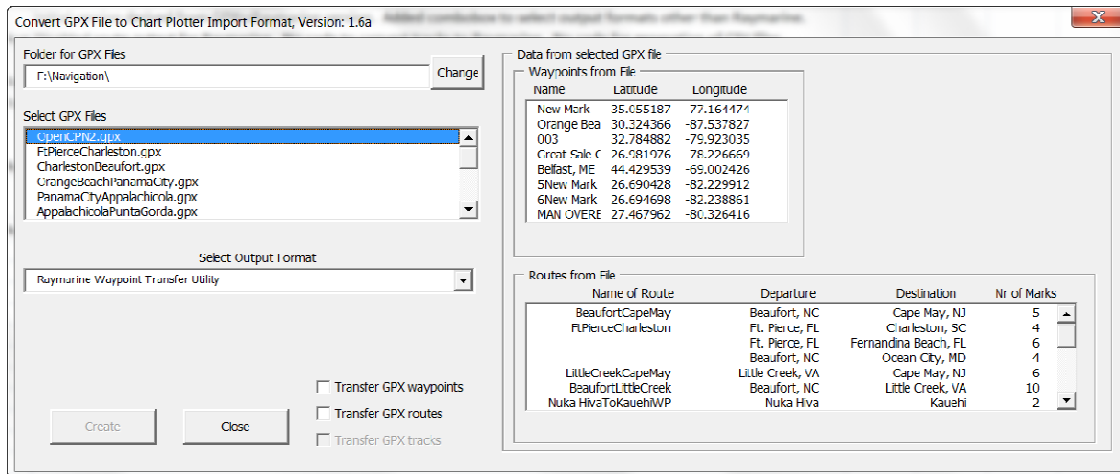


Figure 8: Contents of OpenCPN2.gpx File

In this case I have selected the OpenCPN2.gpx file and the contents are displayed in the list boxes in the expanded form. This GPX file contains a number of waypoints and routes. It does not contain any tracks as they would have been displayed as well.

Select GPX Elements

The waypoints, routes and tracks are the basic elements of a GPX file. Any or all may be specified for conversion.

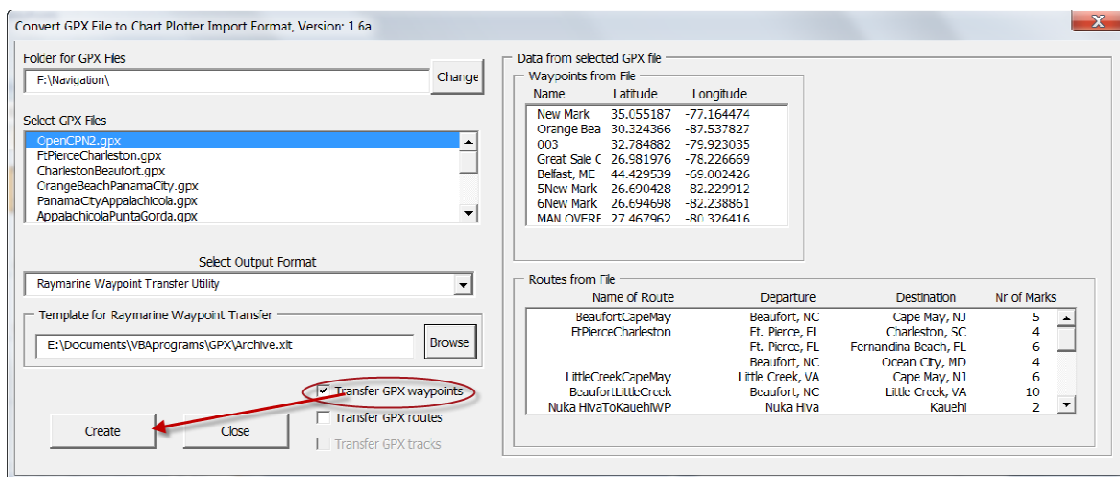


Figure 9: Convert GPX Waypoints

Converting GPX Waypoints, Routes and Tracks

In this case I have clicked on the “Transfer GPX Waypoints” check box. This enables the “Create” button. If I click on this button all of the waypoints in this GPX file will be converted.

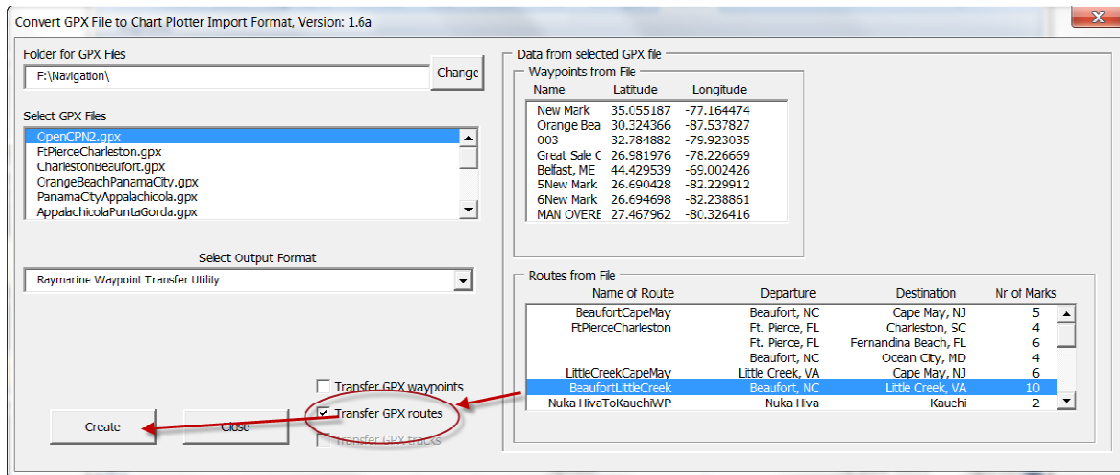


Figure 10: Convert GPX Routes

Individual routes or tracks must be selected for conversion. In this case I have selected the BeaufortLittleCreek route for conversion. When I then click on the “Transfer GPX routes” check box the “Create” button is enabled. The Create button starts the conversion process.

Converting GPX Waypoints, Routes and Tracks

GPX Conversion

There are two basic conversion processes for the GPX files, which depend on which Output Format has been selected.

Conversion to Raymarine Waypoint Transfer Utility (RWTU) workbook

Converting GPX Waypoints and Routes to RWTU Workbook

If the selected output format is the Raymarine Waypoint Transfer Utility and either the “Transfer GPX waypoints” or “Transfer GPX routes” check box has been clicked the GPX conversion will be proceed to completion without requiring any further input from the user.

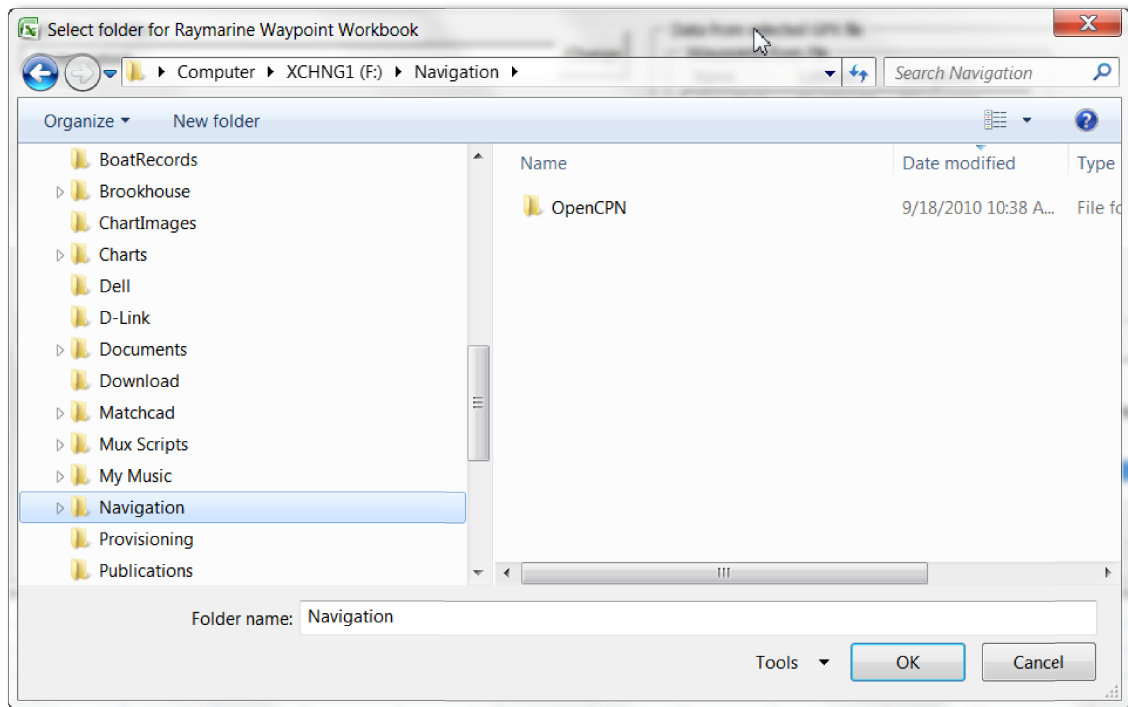


Figure 11: Select the Folder to Save the workbook for the RWTU

In the screen capture above the program has transferred the waypoints from the BeaufortLittleCreek route to a blank workbook created from the Archive workbook template, and now is requesting the folder into which the workbook should be saved.

Converting GPX Waypoints, Routes and Tracks

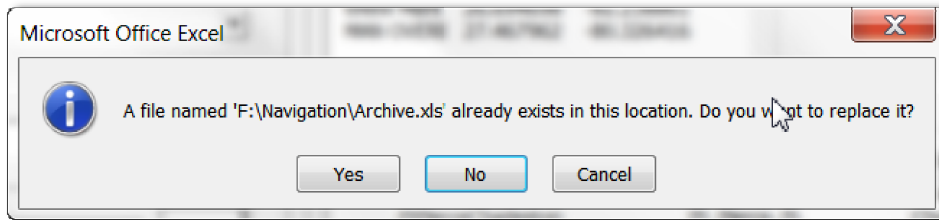


Figure 12, Warning of Archive.xls Overwrite

If you have previously used this program to create an Archive.xls workbook, you will overwrite a previously created one. The Archive.xls is an intermediate file in this conversion process so there is no need to save previously created workbooks. Just overwrite the previous one.

A screenshot of the Archive.xls workbook in Excel. The table has columns: Name, Symbol, Lat Degs, Lat Mins, Lat N/S, Long Degs, Long Mins, Long E/W, Temp C, Depth M, Time, Date, Comment, and Group. The Group column contains the text 'BeaufortLittleCr' for all rows. A red circle highlights a note in the Name column: 'Name Waypoint names must be between 1 and 16 characters long'.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	Name	Symbol	Lat Degs	Lat Mins	Lat N/S	Long Degs	Long Mins	Long E/W	Temp C	Depth M	Time	Date	Comment	Group
1														
2		empty	34	42 816	N	76	40 739	W						BeaufortLittleCr
3	NM002	diamond	34	41 308	N	76	40 051	W						BeaufortLittleCr
4	NM001	diamond	34	37 995	N	76	40 837	W						BeaufortLittleCr
5	2	empty	34	15 473	N	76	27 855	W						BeaufortLittleCr
6	3	empty	35	7 867	N	75	12 700	W						BeaufortLittleCr
7	NM001	empty	36	54 915	N	75	55 444	W						BeaufortLittleCr
8	NM002	empty	36	56 915	N	76	1 388	W						BeaufortLittleCr
9	NM003	diamond	36	58 172	N	76	6 096	W						BeaufortLittleCr
10	NM004	diamond	36	58 430	N	76	7 332	W						BeaufortLittleCr
11	5	empty	36	56 499	N	76	10 621	W						BeaufortLittleCr
12														
13														
14														
15														
16														
17														

Figure 13: Contents of Archive.xls workbook

When the Archive.xls workbook is opened it contains each of the waypoints specified in the route. In the Group column (far right side of the worksheet) each waypoint has been assigned to the Group BeaufortLittleCr (the name of the route truncated to 16 characters). This is done to simplify the process of building the route on the Raymarine MFD after the waypoints have been loaded.

The final step in converting these waypoints to the Raymarine format is to run the Raymarine Waypoint Transfer Utility against the Archive.xls workbook. Refer to the RWTU documentation for instructions on this process. Once the waypoints have been transferred to CF card by the RWTU, the waypoints can be loaded into the Raymarine MFD.

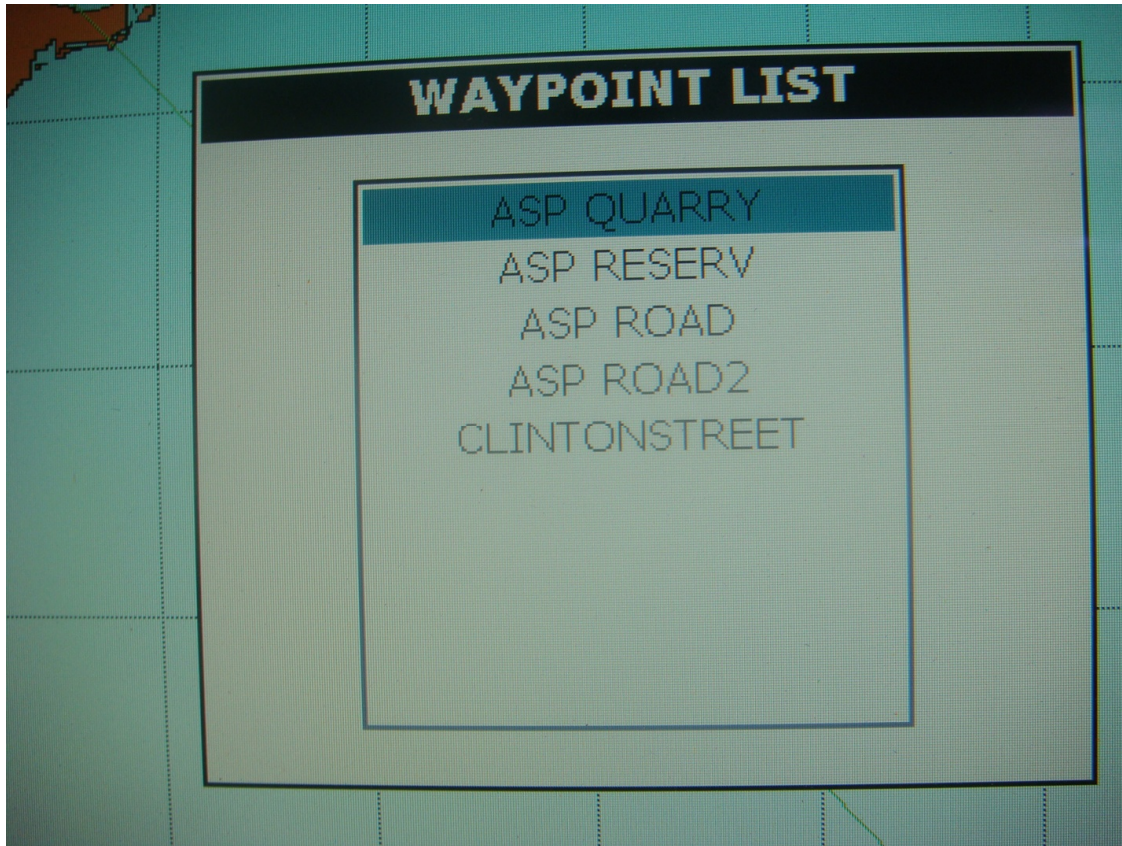


Figure 14: Loading the Waypoints by Group Name

In the picture above I have started loading waypoints on my C120 MFD. Because the waypoints are assigned a group name based on the source (route or track) name they can be selectively loaded onto the MFD and easily identified after they have been loaded to create a route.

Converting GPX Waypoints, Routes and Tracks

Converting GPX Tracks to RWTU Workbook

If the GPX file contains track records, the track points can also be converted to waypoints. However normally there are far more track points than are desirable for a waypoint set. Therefore the conversion program provides a means to reduce the number waypoints generated by the conversion.

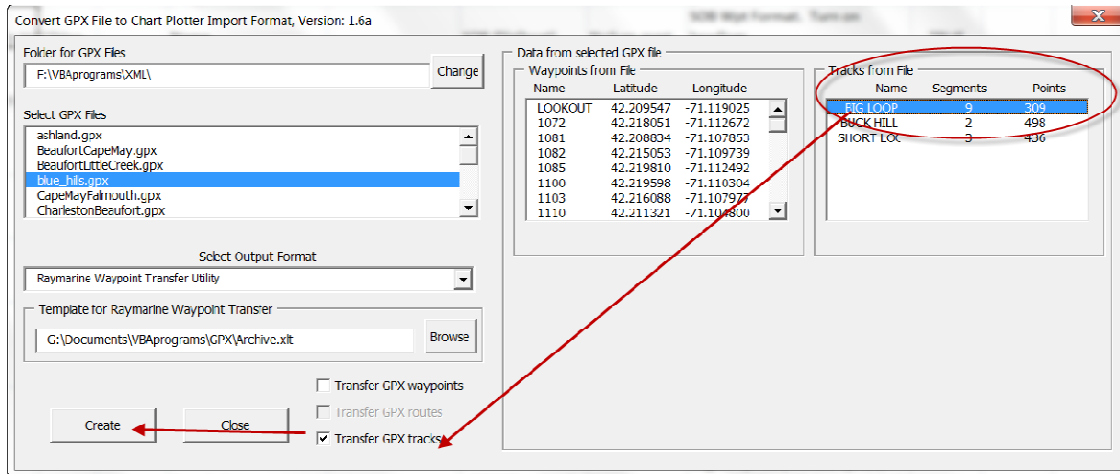


Figure 15: Convert Track to RWTU workbook

In the screen capture above the Big Loop track has been selected to transfer a RWTU workbook.

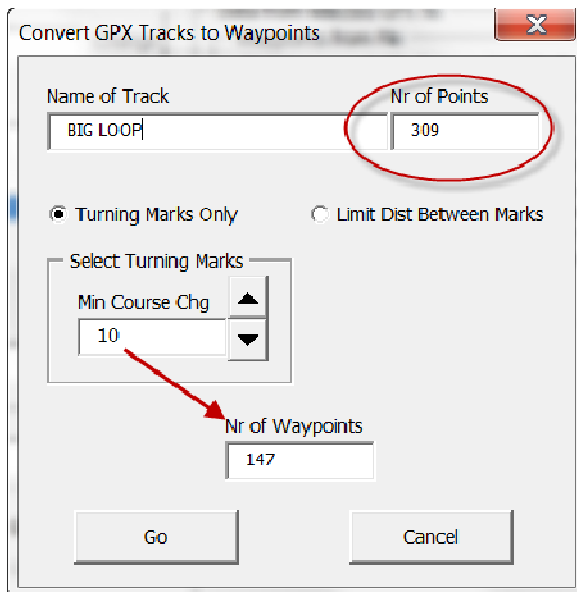


Figure 16: Filter the Number of Points in a Track

When the Create button is clicked the Convert GPX Tracks to Waypoints form appears. The form shows that the Big Loop track contains 309 points, far more than we might want to use to create a route on the

Converting GPX Waypoints, Routes and Tracks

Raymarine MFD. Currently the primary filter is to select Turning Marks Only. In the screen capture above a Min Course Chg value of 10 degrees has been specified. That means only those points that represent a course change of more than 10 degrees from the previous course will be included in the output file. This filter has reduced the number of waypoints that will be converted to waypoints to 147 from the original 309. It should be noted that Big Loop is not a marine track, but actually a bicycle track. The number of track points and the number of course changes are much greater than what would normally be included in a marine track. Future plans call for a distance/time filter to further reduce the number of points that will be converted.

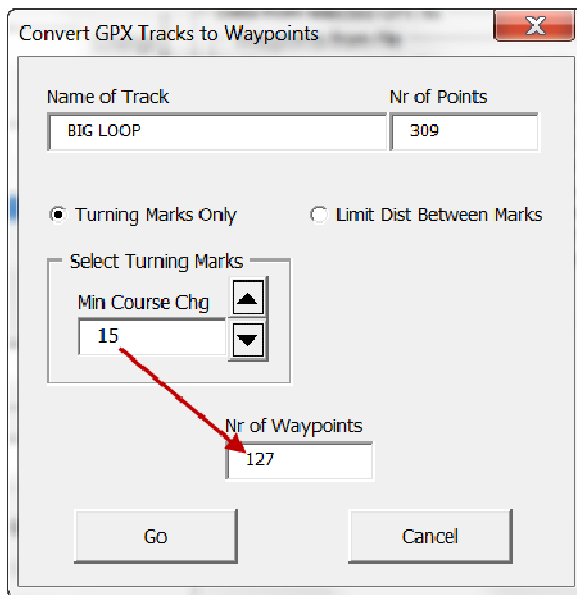


Figure 17: Increase the Filter Value to 15 Degrees

In the screen capture above the Min Course Chg value has been increased to 15 degrees which has resulted in the number of points to be converted has been reduced to 127.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Name	Symbol	Lat Degs	Lat Mins	Lat N/S	Long Degs	Long Min	Long E/W	Temp C	Depth M	Time	Date	Comment	Group
2	0BIG LOOP Big lo	Dot	42	12 601 N		71	5 773 W							BIG LOOP
3	1BIG LOOP Big lo	Dot	42	12 602 N		71	5 773 W							BIG LOOP
4	2BIG LOOP Big lo	Dot	42	12 603 N		71	5 777 W							BIG LOOP
5	6BIG LOOP Big lo	Dot	42	12 572 N		71	5 791 W							BIG LOOP
6	8BIG LOOP Big lo	Dot	42	12 543 N		71	5 796 W							BIG LOOP
7	10BIG LOOP Big I	Dot	42	12 525 N		71	5 787 W							BIG LOOP
8	11BIG LOOP Big I	Dot	42	12 510 N		71	5 769 W							BIG LOOP
9	14BIG LOOP Big I	Dot	42	12 495 N		71	5 715 W							BIG LOOP
10	15BIG LOOP Big I	Dot	42	12 498 N		71	5 680 W							BIG LOOP
11	16BIG LOOP Big I	Dot	42	12 494 N		71	5 665 W							BIG LOOP
12	17BIG LOOP Big I	Dot	42	12 489 N		71	5 664 W							BIG LOOP
13	18BIG LOOP Big I	Dot	42	12 486 N		71	5 659 W							BIG LOOP
14	19BIG LOOP Big I	Dot	42	12 489 N		71	5 659 W							BIG LOOP
15	20BIG LOOP Big I	Dot	42	12 490 N		71	5 660 W							BIG LOOP
16	21BIG LOOP Big I	Dot	42	12 489 N		71	5 664 W							BIG LOOP
17	22BIG LOOP Big I	Dot	42	12 490 N		71	5 664 W							BIG LOOP

Figure 18: RWTU Workbook with Converted Track Points

Clicking the Go button creates the RWTU workbook shown above.

Converting GPX Waypoints, Routes and Tracks

Conversion to CSV file

Converting a GPX file to a CSV file requires an additional step than what is required to convert the file to the RWTU workbook. This step is required to define the contents of the CSV file records.

Converting Waypoints and Routes to CSV

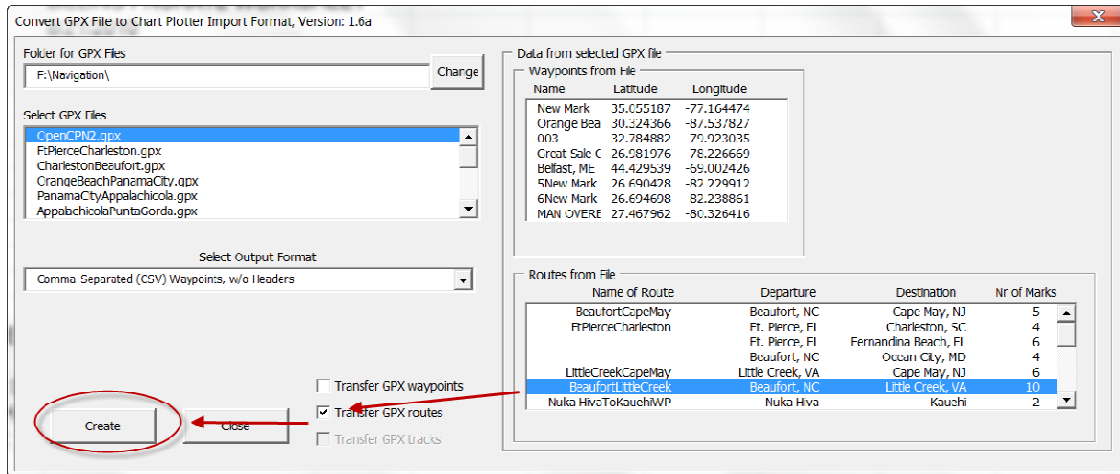


Figure 19: Converting GPX route to CSV waypoint file

In the screen capture above, the same GPX route, BeaufortLittleCreek, has been selected and the Transfer GPX routes box has been checked. In this instance to “Comma-Separated (CSV) Waypoints, w/o Headers” output format has been selected. This selection can be changed before the output file is generated, so it is important at this point only to specify one of the CSV formats.

Converting GPX Waypoints, Routes and Tracks

Convert GPX Waypoints to CSV File

Name of CSV Output File
F:\Navigation\OpenCPN2.csv

☐ Add Heading Line to Output

Data Fields Not Output

Data Fields to Output

- Name
- Latitude
- Longitude
- Type
- Symbol
- Time
- Description
- ID

Select Lat/Lon Format

Move Up Move Down

Convert Cancel

Figure 20: CSV Content Form

Before the conversion process starts the contents of the CSV file must be specified. The possible data fields are listed in the Data Fields to Output list. If not all the fields are wanted or available the unwanted fields can be moved to the Data Fields Not Output list using the buttons between the two lists.

This form was called with the CSV option to have no data field headers. If headers are actually needed then the Add Heading Line to Output box should be checked.

Converting GPX Waypoints, Routes and Tracks

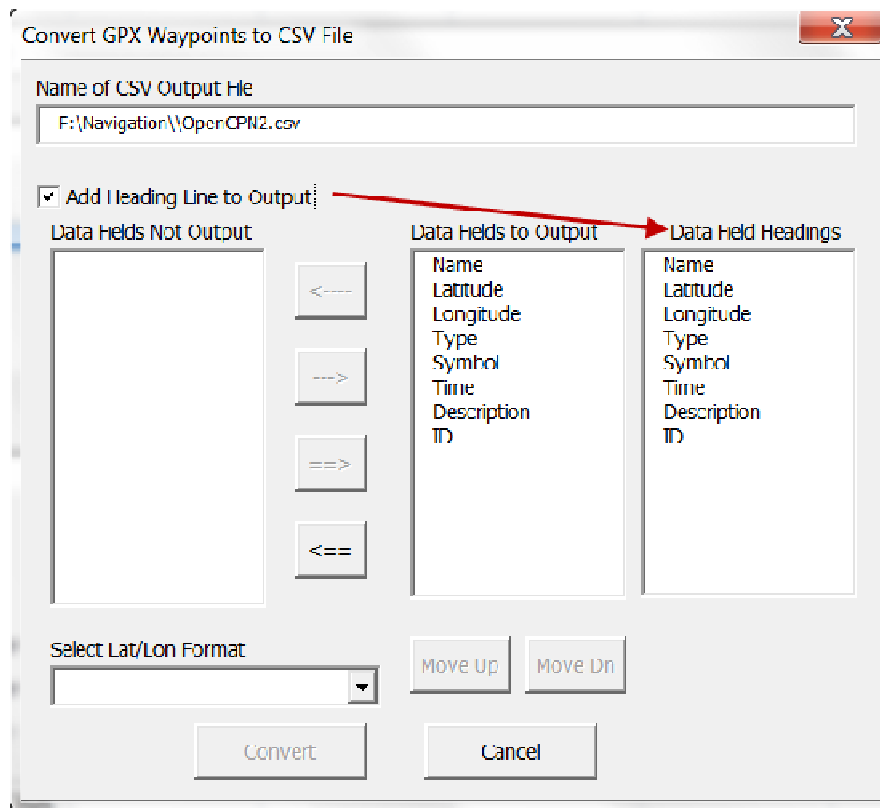


Figure 21: CSV Output with Field Headers.

Checking this box expands the form and shows the standard data field headings. The text for each of the headings can be modified as necessary.

Converting GPX Waypoints, Routes and Tracks

Convert GPX Waypoints to CSV File

Name of CSV Output File
F:\Navigation\OpenCPN2.csv

☒ Add Heading Line to Output

Data Fields Not Output

Data Fields to Output

Data Field Headings

Select Lat/Lon Format

- SOB (Digiboat)
- Fugawi (Northport)
- +/-DDD mm.t
- +/-DDD mm ss.t
- +/-DDD°mm.t
- DDD°mm.t N/S/E/W
- +/-DDD°mm'ss.t"
- DDD°mm'ss.t N/S/E/W"

Figure 22: Specify the Lat/Lon Format

At the bottom left corner of the form is the drop down list to specify the format of the latitude and longitude values. There are also two standard format options for the SOB and Fugawi chart plotting programs.

Converting GPX Waypoints, Routes and Tracks

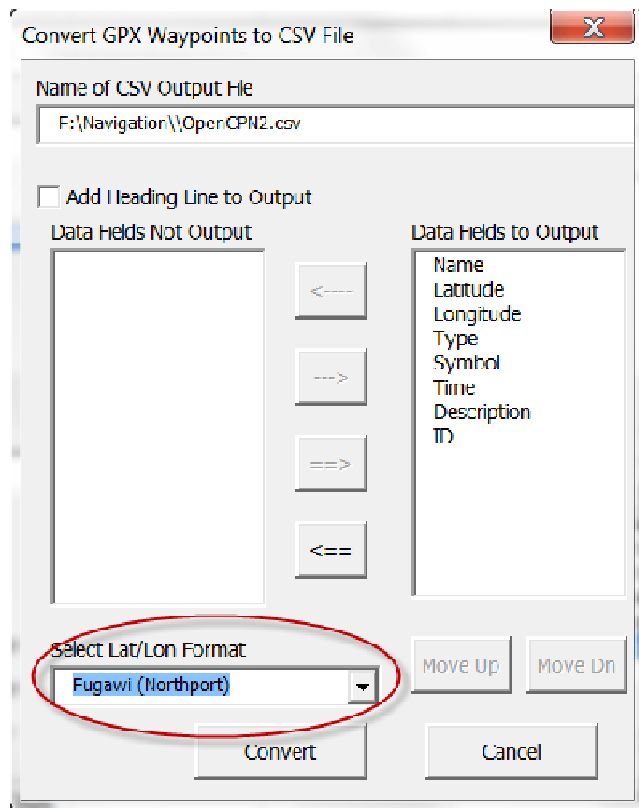


Figure 23: Fugawi Format

Fugawi will not import CSV files with headers so that option has been turned off. The latitude and longitude values will also be formatted as required by Fugawi.

Converting GPX Waypoints, Routes and Tracks

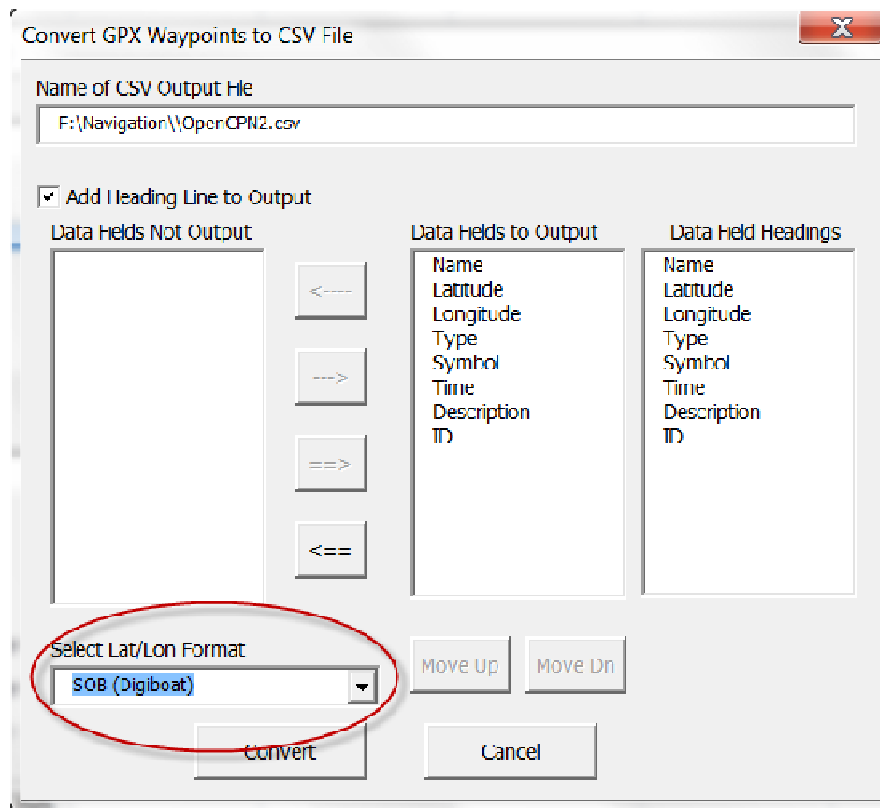


Figure 24: SOB Format

SOB requires headers for the fields; the headers are added when that option is specified.

Converting GPX Waypoints, Routes and Tracks

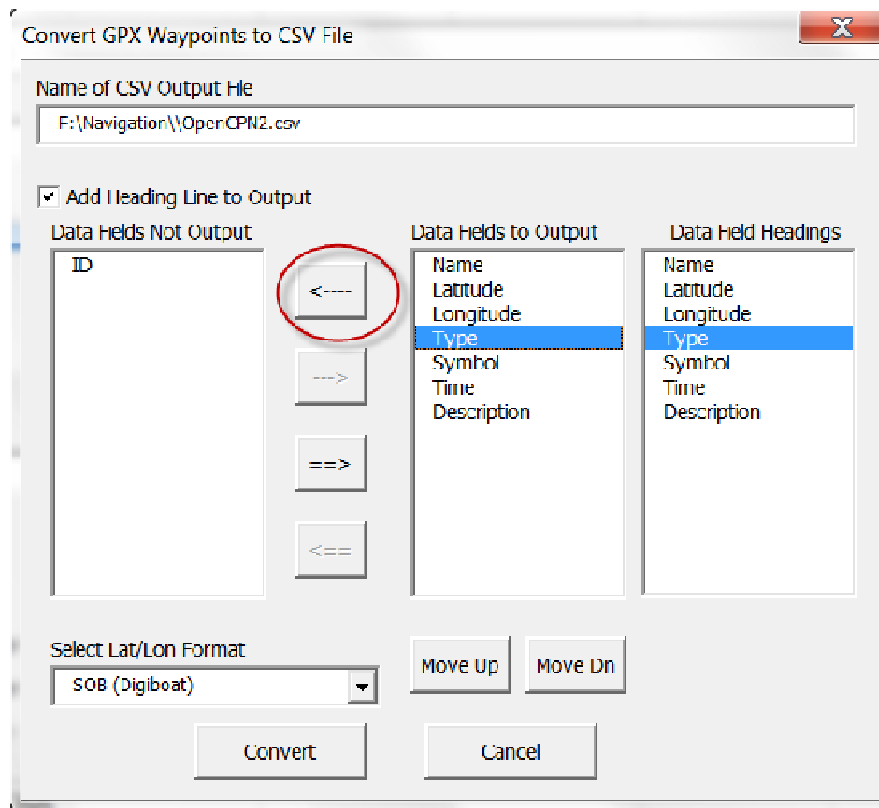


Figure 25: Modifying the Data Fields

For a given chart plotter target, not all of the data fields are necessary or allowed. Some may also not be available in the GPX data. Any unnecessary or unwanted fields can be eliminated by moving those fields to the Data Fields Not Output list. In the screen capture above the ID field has been removed from the output, and the Type field has been selected and will also be eliminated by clicking the "<----" button.

Notice the headers for the eliminated data fields have also been eliminated.

Converting GPX Waypoints, Routes and Tracks

```
"Name,Latitude,Longitude,Symbol,Time,Description"
"3, 34 42.8,-76 40.7,empty,2010-07-22T08:09:03Z,"
"NM002, 34 41.3,-76 40.1,diamond,2010-07-22T08:09:03Z,"
"NM001, 34 38.0,-76 40.8,diamond,2010-07-22T08:09:03Z,"
"2, 34 15.5,-76 27.9,empty,2010-07-22T08:09:03Z,"
"3, 35 7.9,-75 12.7,empty,2010-07-22T08:09:03Z,"
"NM001, 36 54.9,-75 55.4,empty,2010-07-22T08:09:03Z,"
"NM002, 36 56.9,-76 1.4,empty,2010-07-22T08:09:03Z,"
"NM003, 36 58.2,-76 6.1,diamond,2010-07-22T08:09:03Z,"
"NM004, 36 58.4,-76 7.3,diamond,2010-07-22T08:09:03Z,"
"5, 36 56.5,-76 10.6,empty,2010-07-22T08:09:03Z,"
```

Figure 26: CSV File Created

When the Create button is clicked the CSV file is created in the specified format.

Converting GPX Waypoints, Routes and Tracks

Converting GPX Tracks to CSV Waypoints

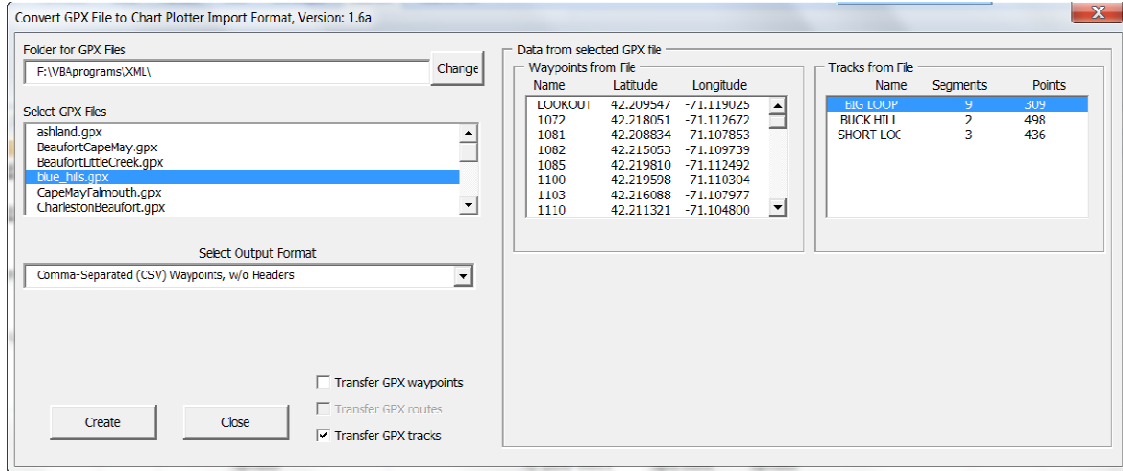


Figure 27: Convert GPX Track Points to CSV Waypoints

Converting the track points to waypoints in a CSV file is the same process as for GPX waypoints or GPX routes with the added step of filtering the number of points included in the CSV file. In the screen capture above the Big Loop track has been selected for conversion to a CSV file.

Converting GPX Waypoints, Routes and Tracks

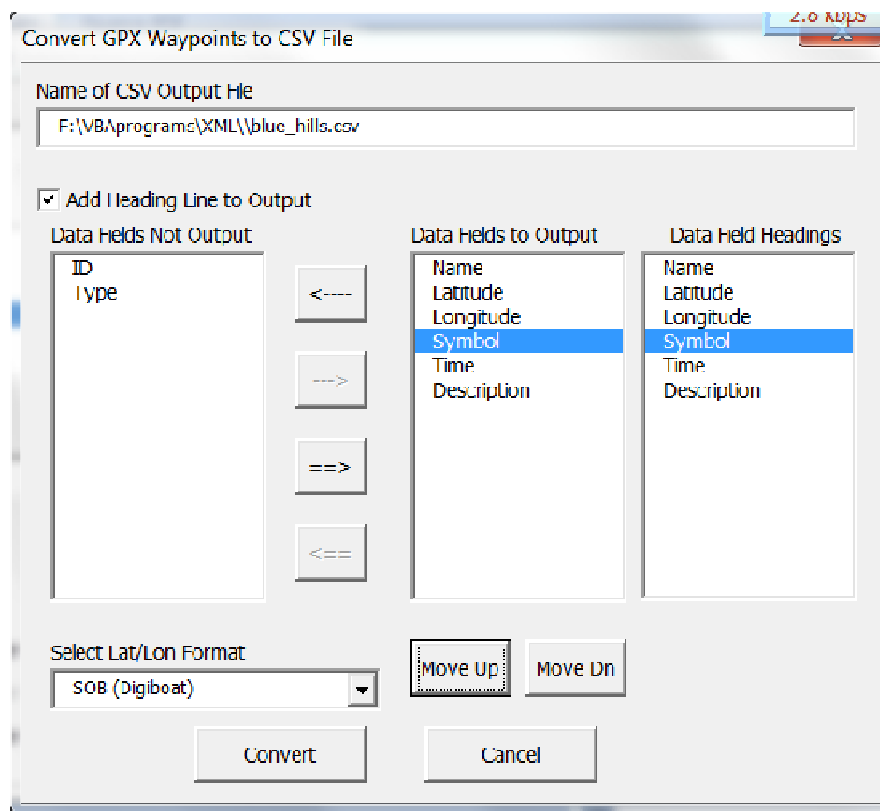
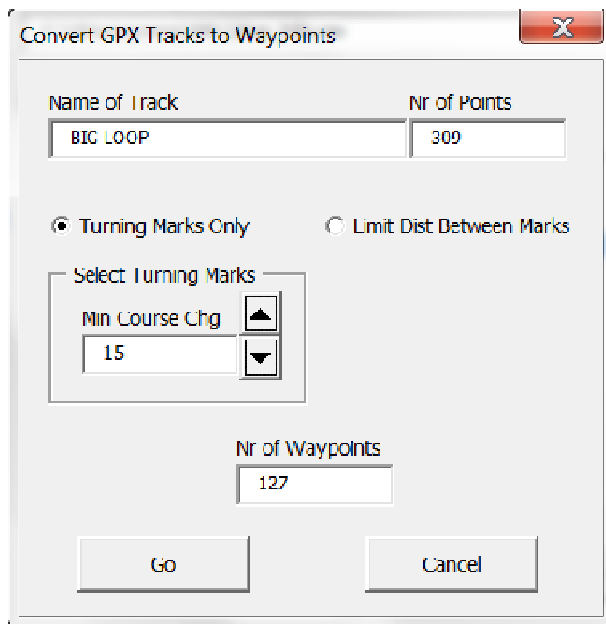


Figure 28: CSV Output Format

Clicking the Create button calls up the form used to specify the CSV file format.

Converting GPX Waypoints, Routes and Tracks



Convert GPX Tracks to Waypoints

Name of Track: BIG LOOP

Nr of Points: 309

☒ Turning Marks Only ☐ Limit Dist Between Marks

Select Turning Marks

Min Course Chg: 15

Nr of Waypoints: 127

Go Cancel

Figure 29: GPX Track Point Filter

Now when the Convert button is clicked the track filter form appears. When the Go button is clicked the 127 track points will be converted to waypoints and included in the output CSV file.

Converting GPX Waypoints, Routes and Tracks

```
"Name, Latitude, Longitude, Symbol, Time, Description"
"0BIG LOOP Big l, 42 12.6, -71 5.8, Dot, 2001-06-24T15:09:09Z, "
"1BIG LOOP Big l, 42 12.6, -71 5.8, Dot, 2001-06-24T15:09:29Z, "
"2BIG LOOP Big l, 42 12.6, -71 5.8, Dot, 2001-06-24T15:16:04Z, "
"6BIG LOOP Big l, 42 12.6, -71 5.8, Dot, 2001-06-24T15:16:51Z, "
"8BIG LOOP Big l, 42 12.5, -71 5.8, Dot, 2001-06-24T15:17:15Z, "
"10BIG LOOP Big l, 42 12.5, -71 5.8, Dot, 2001-06-24T15:17:36Z, "
"11BIG LOOP Big l, 42 12.5, -71 5.8, Dot, 2001-06-24T15:17:59Z, "
"14BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:18:33Z, "
"15BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:18:53Z, "
"16BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:19:03Z, "
"17BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:19:07Z, "
"18BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:19:21Z, "
"19BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:19:39Z, "
"20BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:20:44Z, "
"21BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:20:58Z, "
"22BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:21:13Z, "
"23BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:22:22Z, "
"25BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:22:36Z, "
"28BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:23:03Z, "
"29BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:23:12Z, "
"30BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:23:20Z, "
"31BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:23:24Z, "
"32BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:23:30Z, "
"34BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:23:50Z, "
"35BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:23:55Z, "
"36BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:24:02Z, "
"38BIG LOOP Big l, 42 12.5, -71 5.7, Dot, 2001-06-24T15:24:30Z, "
"40BIG LOOP Big l, 42 12.5, -71 5.8, Dot, 2001-06-24T15:25:08Z, "
"41BIG LOOP Big l, 42 12.5, -71 5.9, Dot, 2001-06-24T15:25:20Z, "
"42BIG LOOP Big l, 42 12.6, -71 5.9, Dot, 2001-06-24T15:25:23Z, "
"45BIG LOOP Big l, 42 12.6, -71 5.9, Dot, 2001-06-24T15:25:34Z, "
"46BIG LOOP Big l, 42 12.5, -71 5.9, Dot, 2001-06-24T15:25:37Z, "
"49BIG LOOP Big l, 42 12.5, -71 5.9, Dot, 2001-06-24T15:25:50Z, "
"52BIG LOOP Big l, 42 12.4, -71 6.0, Dot, 2001-06-24T15:26:38Z, "
"53BIG LOOP Big l, 42 12.4, -71 5.9, Dot, 2001-06-24T15:26:47Z, "
"55BIG LOOP Big l, 42 12.4, -71 5.9, Dot, 2001-06-24T15:27:01Z, "
"56BIG LOOP Big l, 42 12.4, -71 5.9, Dot, 2001-06-24T15:27:04Z, "
"61BIG LOOP Big l, 42 12.4, -71 5.8, Dot, 2001-06-24T15:28:27Z, "
```

Figure 30: CSV File with track points

The partial content of the resultant CSV file is shown above.