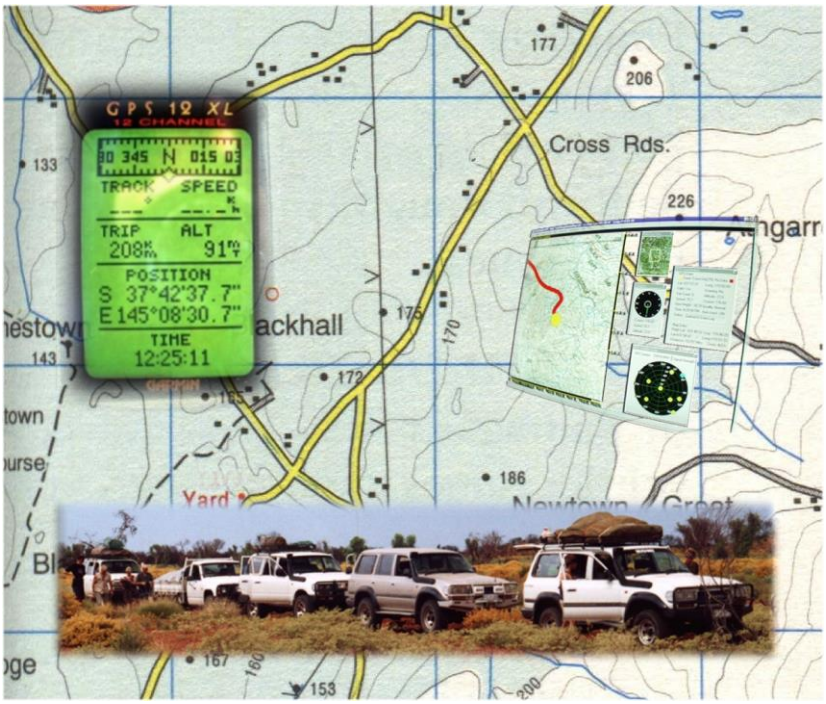
TRACKRANGER [TM]
GPS
Navigation System



GPS Map Tracking & Navigation System Version Pro-8

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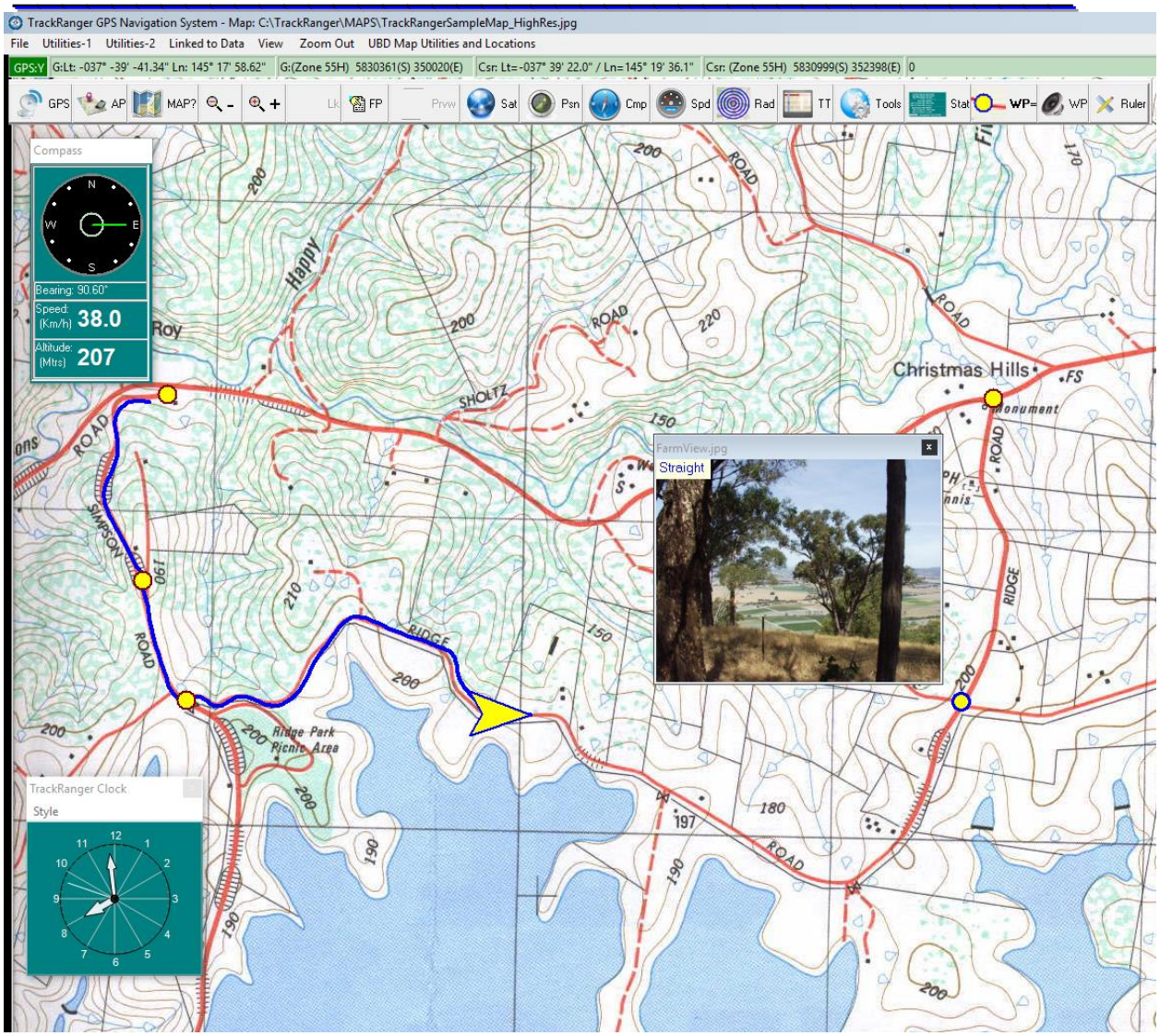

TrackRanger™
GPS Navigation System

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Section 1 – Introduction and Installation

Introduction

TRACKRANGER™ provides a powerful navigation facility for allowing a GPS (Global Positioning System) device to be connected to a personal computer, and data from the GPS unit directly plotted on a map surface presented on the screen. It may be used on notebook computers, as well as desktop units, thus allowing positioning information to be available as an 'in-car navigation' system.

Most of the map data files used by TrackRanger are already geo-Referenced (e.g. Natmap Digital Maps, Australia's Outback Tracks, Hema Australian 4WD Collection, UBD City Streets, UBD Regional Towns etc) however, for increased flexibility, users may also create their own maps may be scanned by means of a standard scanner device attached to a Personal Computer.

TrackRanger allows zooming of the map area, and Waypoints may be placed on the map and annotated at any location. A facility is provided to easily identify any of the existing waypoints. Distances may be measured across any part of the map. An automatic search facility is provided to easily locate maps that fit within the boundaries of the received GPS coordinate, thus avoiding the requirement to manually locate a map to match the current geographical location. Facilities include Scale Rulers, Compass Display, Speed, Clock, and Altitude. Area calculation using generate polygons further enhance the features provided by TrackRanger.

TrackRanger Features

- ✓ Runs under Windows XP, Vista, Windows 7, 8, 10.
- ✓ Can be used with ECW, JPG, PNG, BMP, EMF map file formats
- ✓ Supports all GPS units with the international NMEA-0183 output
- ✓ Provides graphical dynamic displays of position information
- ✓ Track Trace of traveled route data to be displayed on-screen, and stored to disk
- ✓ Compass Display
- ✓ Speed, Altitude, Bearing information
- ✓ Satellite Signal information
- ✓ Speedometer on screen (Digital Speedo)
- ✓ Speed Alert
- ✓ Birds-Eye View
- ✓ Incorporates Map Zoom features
- ✓ Auto-Track (Automatic Map Move to track location)
- ✓ Hot-Key operation for most controls
- ✓ Comprehensive Help
- ✓ Distance Measurement
- ✓ Area Measurement
- ✓ Waypoint and Route management
- ✓ Voice Prompts while travelling for planned trips
- ✓ Automatic search facility for maps that match current GPS location
- ✓ GPS position 'out-of-bounds' indicators
- ✓ Lat/Long Calculator for quickly setting coordinates of multiple maps
- ✓ Screen configuration geometry saved and automatically restored
- ✓ Map Printing
- ✓ Notepad for taking trip notes
- ✓ Information statistics
- ✓ Add Digital Camera Photographs and Video Clips directly to Waypoints
- ✓ Night Vision
- ✓ Record your journey as a GPS log file
- ✓ Provides on-board Map Calibration tools for user-supplied maps
- ✓ View travel Statistics

TrackRanger Benefits

- ❑ Designed extensively for Country, Outback and Off-road travelers
- ❑ Record your journey and review at any time
- ❑ Large, easy-to-read screen display
- ❑ Know exactly where you are
- ❑ Anticipate turn off, intersections and other landmarks in advance
- ❑ Avoids the need to find positions on messy paper maps
- ❑ Plot new features not shown on existing maps (e.g.: new tracks)
- ❑ Most operations controlled from simple one or two key keyboard commands
- ❑ Add comments information to maps
- ❑ Zoom features allow for difficult to read tracks to be able to be easily identified
- ❑ Quickly identify if a wrong turn has been taken
- ❑ Easily identify tracks that have changed / been re-routed due to floods etc

System requirements

TrackRanger requires the following minimum system hardware configuration

Computer:

- Pentium 1.6GHz CPU or greater
- Windows 10, 8, 7, XP, Vista.
- 1Gb+ RAM
- Minimum 100Mb free disk space (plus map storage space)
- 600 x 800, 1024 by 768 pixels display or higher (recommended)
- True Color (32bit) preferred, or 24 bit for high quality graphics.
- Serial data port or USB port (for connection to GPS unit) or USB to Serial adapter.
- CD-ROM drive or combo CD/DVD drive. (DVD capable drive is required for UBD, Hema and Natmap Digital)

GPS:

- Any GPS unit, NMEA-0183 (National Marine Electronics Association) capable (e.g.: TrackRanger GPS, Garmin, Magellan, Silva etc with NMEA capability)
- Data Communications cable to connect GPS to computer system

Installing TrackRanger

TrackRanger should be installed into the C:\TrackRanger\ directory. The installation procedure will decide and recommend the best location. This directory then contains the executable file (TrackRanger.exe), the master map data configuration file (TrackRanger.ini), and the entire user created map data.

To install TrackRanger, insert the installation disk. The CD-ROM distribution should automatically start the installation process, if not, use Windows explorer to navigate to the installation disk SETUP.EXE program. Double click on setup.exe.

Setup will automatically create the necessary program groups and icons, and install the application software.

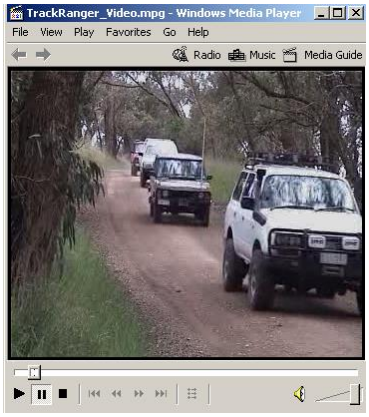
TrackRanger requires registration, and the appropriate registration files are copied during the installation, or at the first time TrackRanger is started.

Tip:
You can also install TrackRanger by running setup.exe from the Windows Start button.

Do this by selecting Start | Run and use the Browse... button to navigate to setup.exe on the disk containing the TrackRanger setup program, then press the OK button:

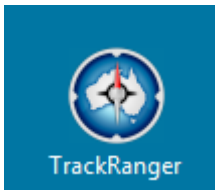
TrackRanger Video

A video showing some of the powerful features of TrackRanger is available from the Advantech Design website at http://www.advantechdesign.com.au/overview



Section 2 – Starting

Starting TrackRanger



After installation, a TrackRanger icon has been placed on your desktop. TrackRanger has also been added to the Windows Start menu | Programs options.

Start TrackRanger by selecting the TrackRanger from the Programs item of the Windows Desktop, or by double clicking on the TrackRanger.exe program from the install directory (default: C:\Program Files\TrackRanger).

TrackRanger will start, and show a welcome screen similar to the following:

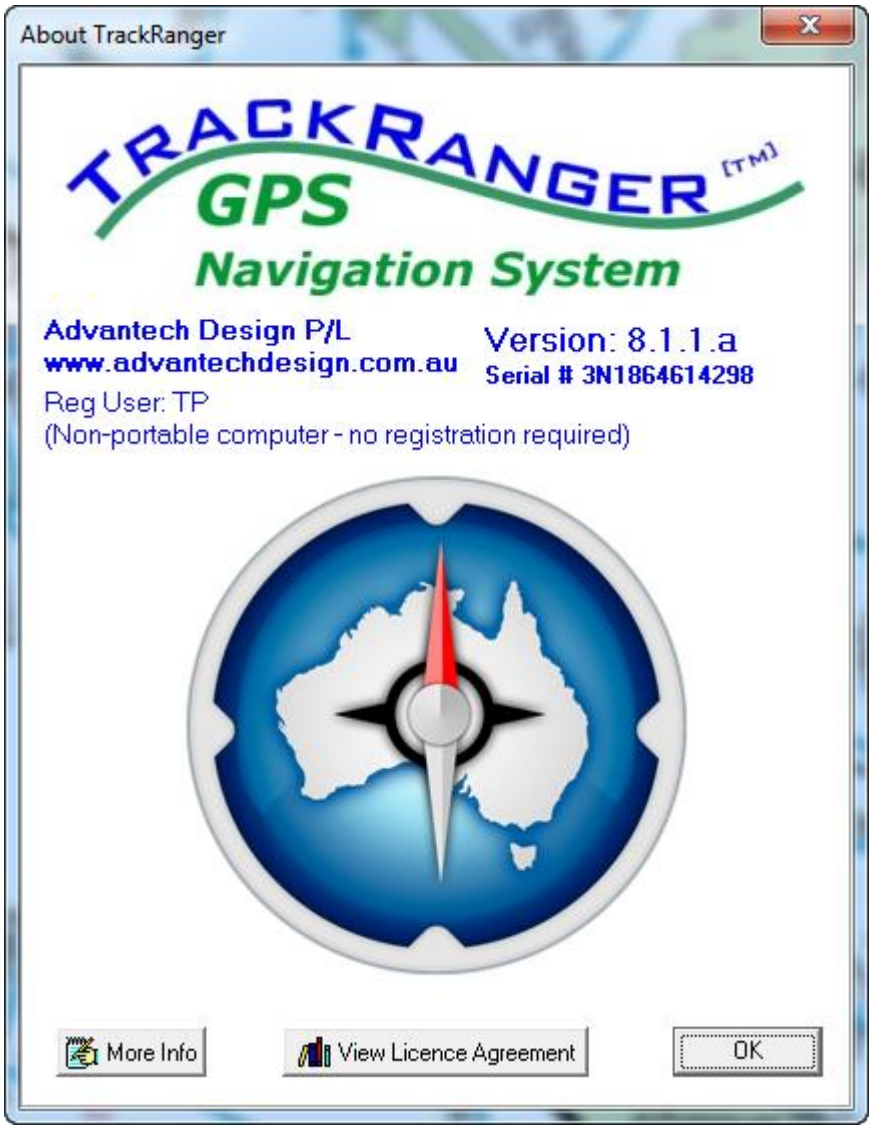
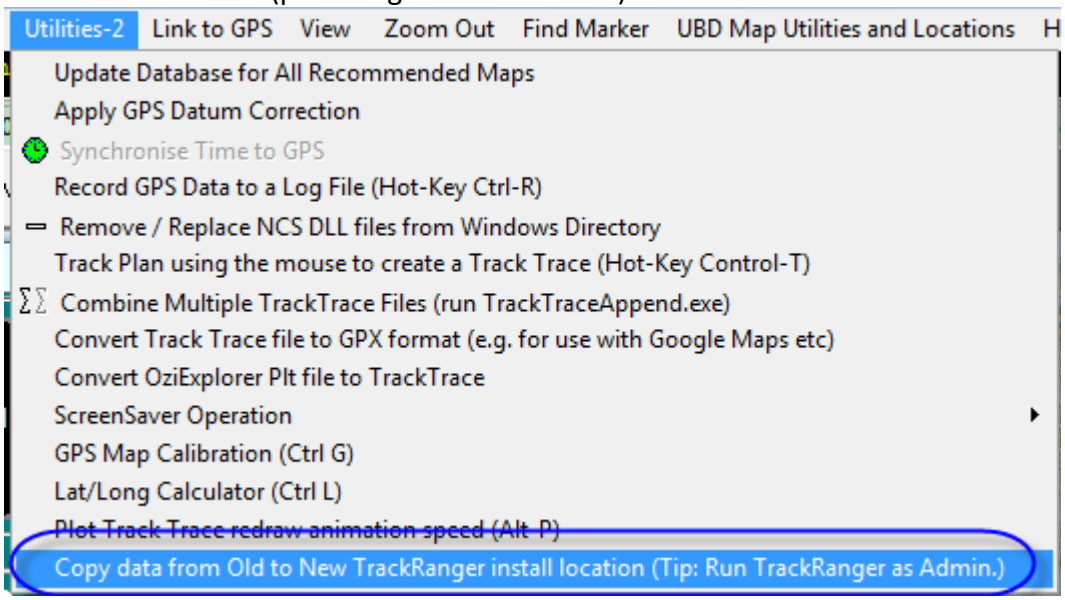


Figure 1 - TrackRanger Welcome Screen

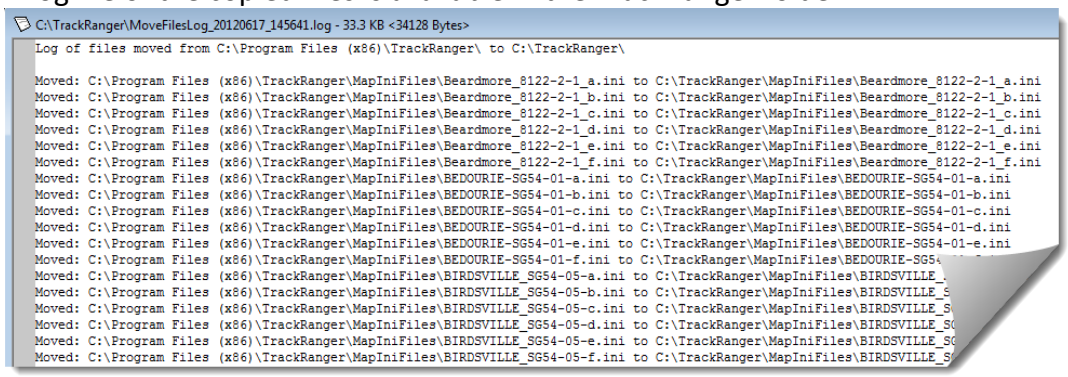
Upgrade from earlier versions

TrackRanger 7.6 and later installs by default in the C:\TrackRanger\ folder.
Earlier versions installed by default in the C:\TrackRanger\Program Files (x86)\ folder.

Tip: If TrackRanger has been reinstalled /upgraded from a version prior to 7.6, it will try to copy any existing maps, track trace data etc. This can also be performed at any time from the Utilities-2 menu (providing data is available).



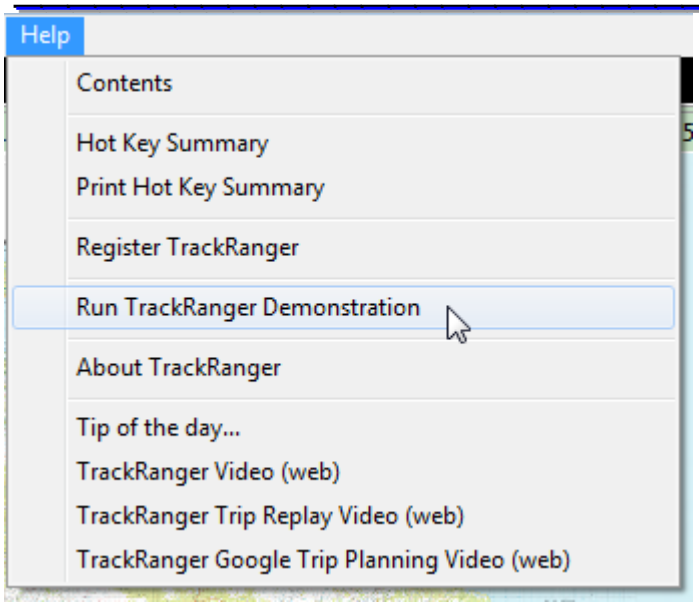
A log file of the copied files is available in the TrackRanger folder:



Running the TrackRanger Demonstration

TrackRanger includes a demonstration facility that shows some of the many features incorporated into the TrackRanger product. This demonstration may be used to assist the new user to learn of some of the functionality available from within TrackRanger.

To run the demonstration, select Run TrackRanger Demonstration from the Help Drop-down menu:

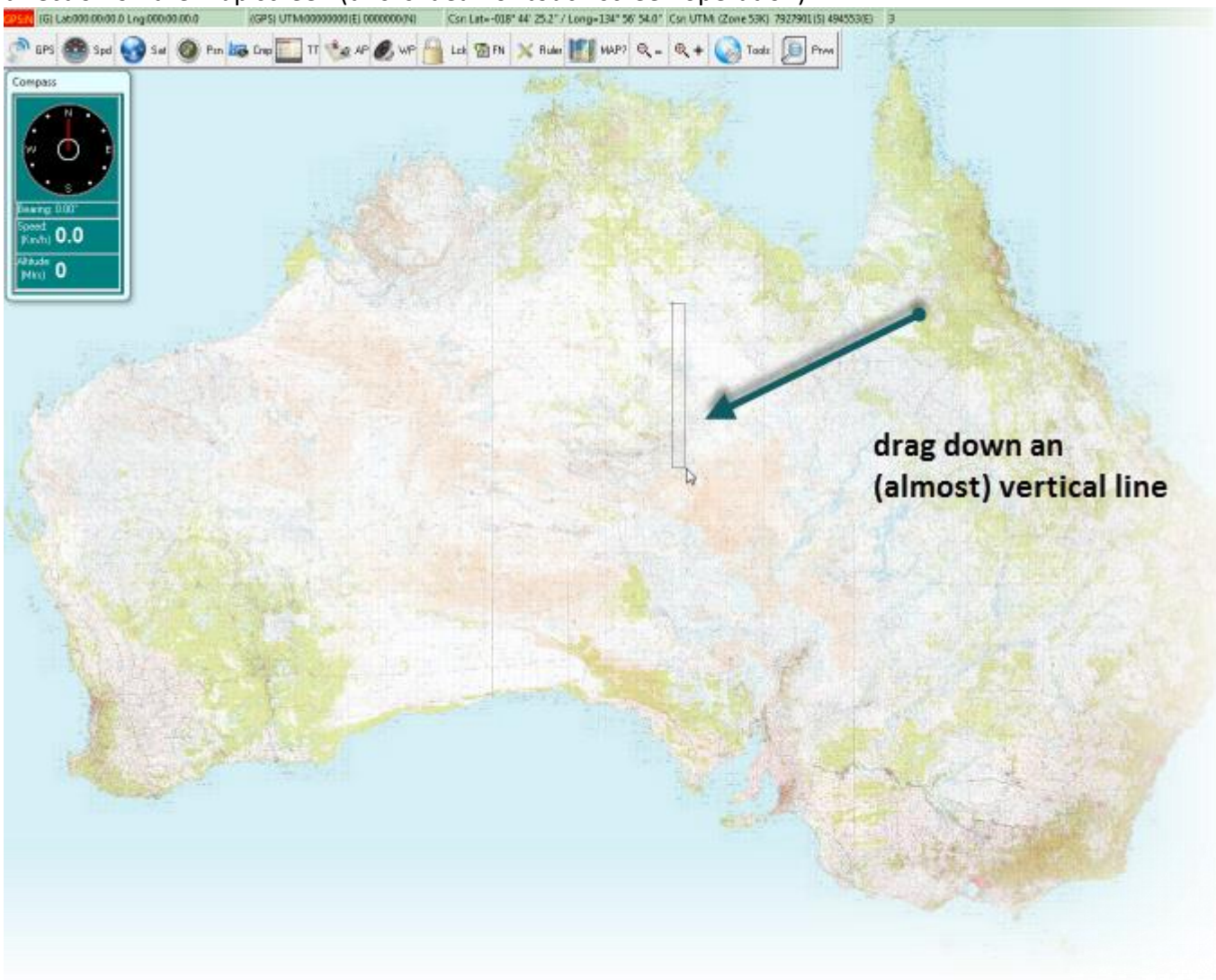


The demonstration will automatically load a map, load waypoints, and commence navigation, complete with alerts and announcements along the route.

Speed Tool Buttons

TrackRanger incorporates Speed Buttons which contain quick links to commonly used functions. By default, these are launched at startup, and can also be launched from the hot-key 'B' or from the mini-tool bar:

Another way to launch the speed buttons is to just mouse click-hold and drag in a vertical direction on the map screen (this is ideal for touch screen operation):

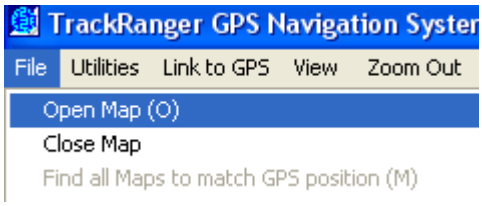


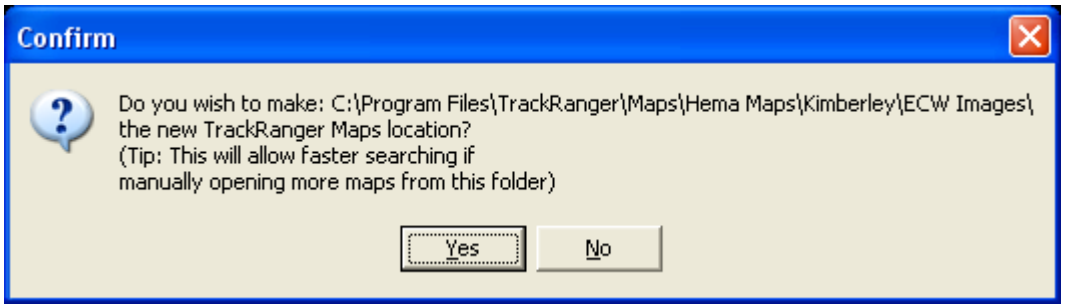
Click on the frame blue area or the heading of the speed buttons to remove the display.

The function of each of the buttons is described further within this document. Most are self-explanatory. Hints are also provided by moving the mouse over the buttons on the mini tool-bar at the top of the map screen.

Opening Maps – (General)

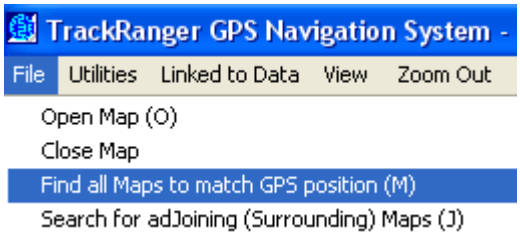
Open any map by selecting Open from the File drop down menu, or by pressing the hot key 'O'





Re: Confirm changing map directories. TrackRanger gives you the option to remember the last folder that you loaded maps from. This means that opening more maps saves the user navigating back to that folder again, and again, if other maps need to be opened. However, sometimes a user just wants to quickly load a map from a different location (e.g. a CD/DVD drive), and then resume checking maps from their existing 'favourite' maps. If the user answers Yes, the new location becomes the new default map search location, if you answer No, the current default location remains. The question is also only asked if the current default map load directory changes.

If GPS position information is being received, search for and load maps that Match your current position from the "Find all maps to match GPS position" drop-down file menu option, or by pressing the hot key 'M'



Tip:
If the selected map is an ECW map, it will be opened in preview mode. See Section 4 for more information on preview mode

Section 3 – GPS Connections and Setup

GPS wiring connections

Tip: If you have the TrackRanger GPS, this will not require any settings to be changed on the GPS. Just connect it to the laptop computer, and set the Com Port to match. No further intervention is required. Follow the instructions that came with the GPS for determining the COM port to use. TrackRanger can also automatically find the correct communications port to use – See Page 21.

For Other GPS units: Before TrackRanger can be used, it is necessary to connect the GPS unit to the computer, and establish to correct communications protocol. Cables are available from Advantech Design and most GPS suppliers; however, the following information is presented as a technical guide for those users who wish to make their own cable.

GPS Unit communications setup

The Interface of the GPS unit has to be set to output NMEA “sentences”. Garmin and Magellan units require this to be switched on via the Interface menu. Units such as the Silva Multinavigator may output this data continuously. Refer to your GPS user’s manual for more information on setting the NMEA outputs.

Ensure that you adjust the electrical interface protocol on your GPS to NMEA 0183 before connection to the TrackRanger computer. Note also that the baud rate of the TrackRanger GPS communications must be set to the same speed as the GPS receiver. Some samples are shown below:

Figure 4 - Setting the Garmin GPS12XL NMEA and Baud Rate

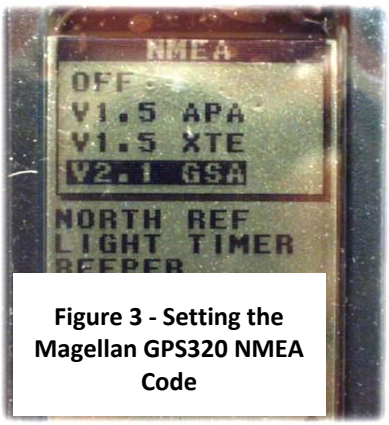


Figure 3 - Setting the Magellan GPS320 NMEA Code

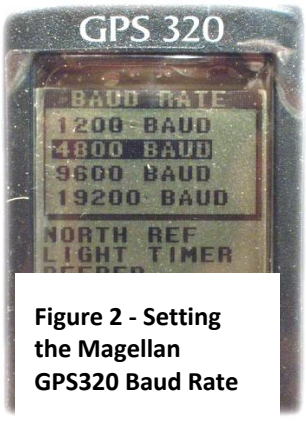


Figure 2 - Setting the Magellan GPS320 Baud Rate

Magellan Explorist Settings

Note: Make sure you set the eXplorist GPS to send NMEA messages:
1. Press **MENU**.
2. Use the **Arrow** joystick to highlight **Adv. Features**.
3. Press **ENTER**.
4. Highlight **Communications**.
5. Press **ENTER**.
6. Highlight **NMEA Data Comm**.
7. Press **ENTER**.

Note: Further information on the eXplorist is shown at the end of this section.

In TrackRanger, Press L to link to the GPS on that port

GPS Communications Setup within TrackRanger

The GPS communications format must first be established. Selecting the "GPS Satellite Data" item from the "View" drop-down menu does this.

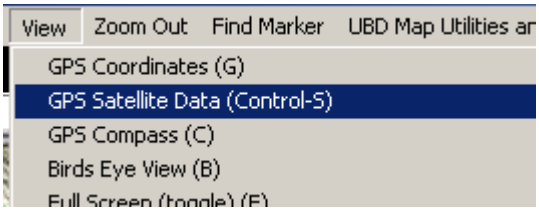
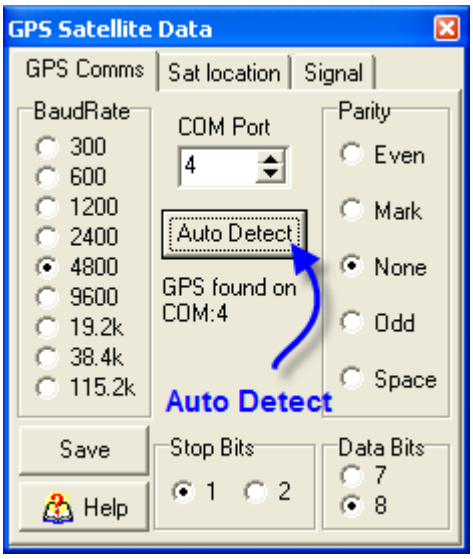


Figure 5 - Viewing GPS satellite Data option

This will present the GPS Satellite Data Form. The user then selects the GPS Comms tab, and enters the values to match the GPS unit.

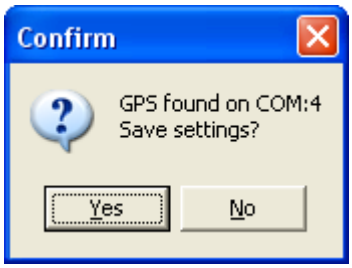


Most GPS receivers' use:

- 4800 Baud,
- No Parity,
- 8 Data Bits,
- 1 Stop Bit.

The COM port refers to the communications port on the PC or notebook that is connected to the GPS. Refer to your GPS documentation for settings specific to your requirements.

It is easiest to just connect the GPS (make sure the driver software, if required, has been installed), and press the Auto Detect button as shown. This may take a few moments to be detected. You will receive a message when the device has been successfully located:



If the GPS is setup for 4800 baud (the standard value), then the TrackRanger PC must also be setup for 4800 baud.

Note that if you are using a USB adapter or USB GPS, the COM port is likely to be COM4, COM5 or COM6 (*very unlikely to be COM 1*). Refer to your GPS documentation.

Once the values have been selected, press on the Save button to write the settings to the local disk, and then close the form if required.

Connect the data cable from the GPS unit to the computer Com Port selected above, turn on the GPS, and wait until it has established a position fix.

GPS Coordinate Systems

Generally, the GPS should be set to WGS84 coordinate system (especially when using TrackRanger with Natmap or Australia's Outback Tracks Maps).

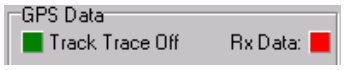
For more information on Maps, Datum's and Coordinate systems, please refer to Section 12 – Map Datums

Linking to the GPS communications

Selecting Link from the main menu makes connection to the GPS communications. The hot-key 'L' may also be used.

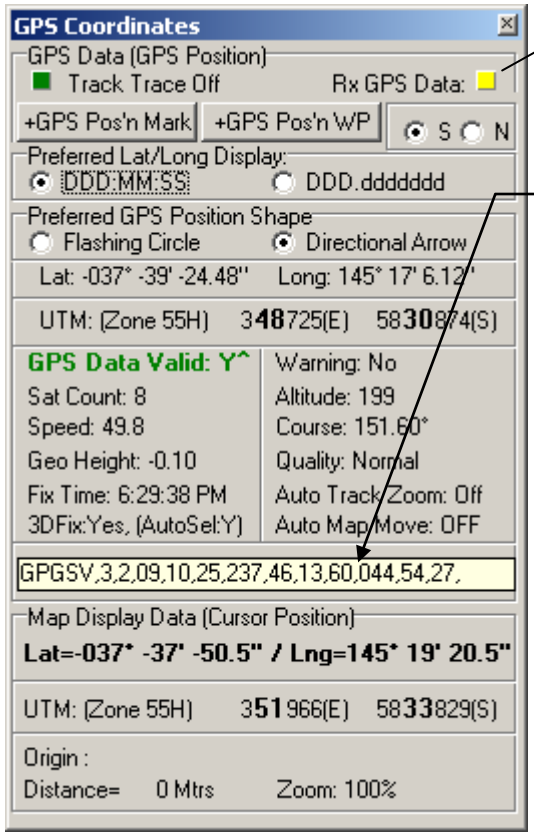
For testing purposes, the <Escape> key on the keyboard can be used to link to data stored in a demonstration disk file supplied with TrackRanger (GPSDATA.LOG). The Lat / Long, Speed, altitude, satellite data etc are all available from the TrackRanger disk file. To revert to the GPS communications from the disk file, simply press the L command on the keyboard. Tip: GPSData.Log is designed to work with the Track Ranger Sample Map files

The status of the incoming data communications is displayed on the GPS Coordinates Window (Hotkey G).



(Tip: If the communications cable from the GPS is suddenly disconnected, the GPS "Rx Data:" will flash rapidly)

To check the status of the GPS incoming data, click on the status window. The incoming sentences will appear. Click again to revert to the normal display.



Light flashes when GPS is communicating

Single click here to see GPS Messages being received.

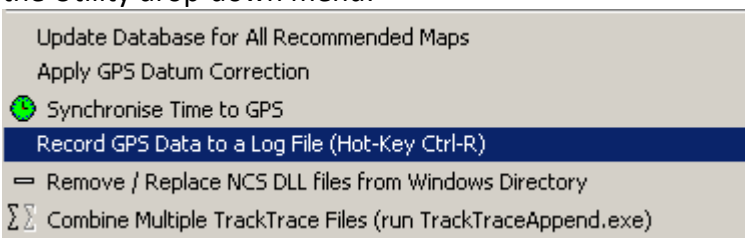
These messages are regularly updated in this window.

Most sentences will begin with the letters "GP". This may help in testing for incorrect communications setups
Tip: If this window is **RED** the there is a Communication Error, or the GPS is Unlinked

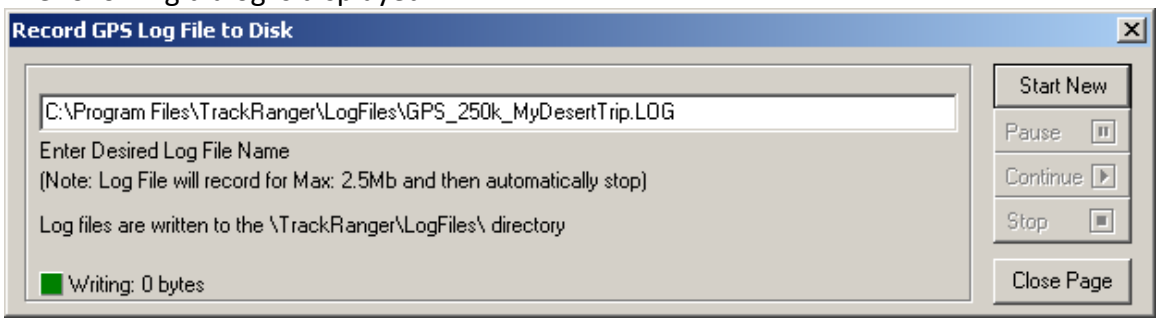
Recording a log file of the received GPS data

It is possible to Record a log file automatically as data is being received.

To activate the feature, Press Control-R, or select the record GPS Data to a Log File from the Utility drop-down menu:



The following dialog is displayed:



The data recording can be started, paused or stopped at any time.

Note that the file will automatically be closed if the data size exceeds 2.5mb.

Options are available to Pause, Stop, Continue recording at any time

The Amount of data and recording status is shown in recording form (^R), and also in the TrackRanger statistics page. (Hot-Key 'I').

To playback the newly recorded data (after the data file has been closed), hold the Shift key down before pressing Escape. TrackRanger will report that it cannot find the sample log file, and allow the user to select an alternative log file.

When data is actually being recorded, the GPS Received data light will flash red instead of yellow (see GPS Coordinates page – hot-key 'G')

Note that this function cannot be used in conjunction with simultaneous playback of a previously recorded disk log file (hot-key Escape). Unpredictable results may occur.

Tip: If the recording is paused and the speed exceeds 5km/h, an audible beep and on-screen message is displayed:

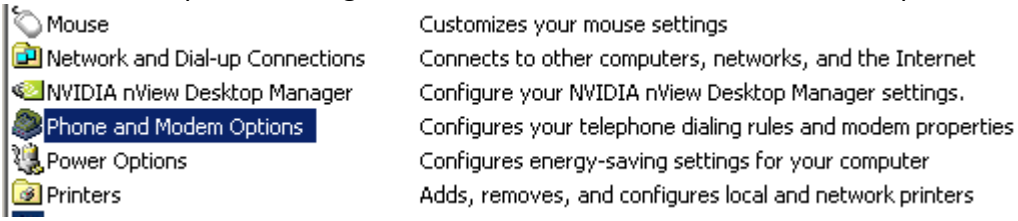
Using Magellan Explorist with TrackRanger for GPS positioning info.

Install the Magellan Software from the Magellan eXplorist Installation Wizard CD.

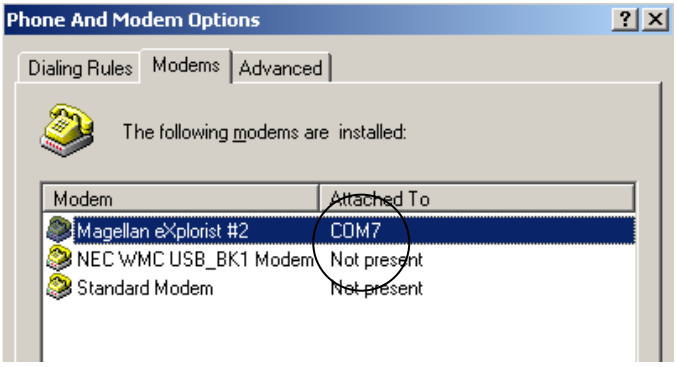
The Magellan Explorist GPS may attach to the Laptop as a Modem device:

ONLY PLUG the GPS USB connector in to the laptop AFTER the laptop has started, otherwise, Windows may allocate the GPS as a Modem device.

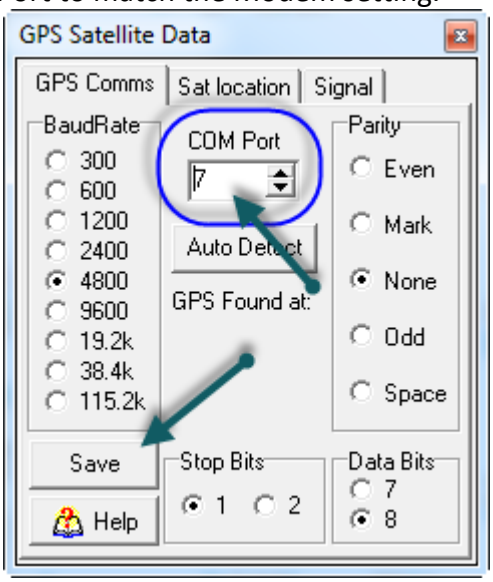
To find which port to use, go to Control Panel > Phone and Modem Options:



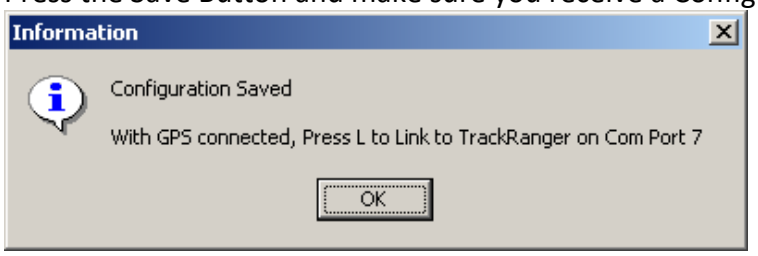
Select the Modems Tab.
Search for the Magellan eXplorist device, and note the COM port number in use:



In TrackRanger, press Control-S for Satellites, select the GPS Comms tab, and set the Com Port to match the Modem setting.



Press the Save Button and make sure you receive a Configuration Saved message.



Note: Make sure you set the eXplorist GPS to send NMEA messages:

1. Press **MENU**.
2. Use the **Arrow** joystick to highlight **Adv. Features**.
3. Press **ENTER**.
4. Highlight **Communications**.
5. Press **ENTER**.
6. Highlight **NMEA Data Comm**.
7. Press **ENTER**.

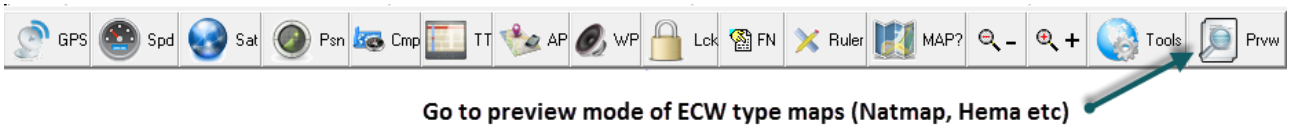
In TrackRanger, Press L to link to the GPS on that port

Section 4 – Natmap & ECW Maps

*(See further below for information on the **Natmap Digital**)*

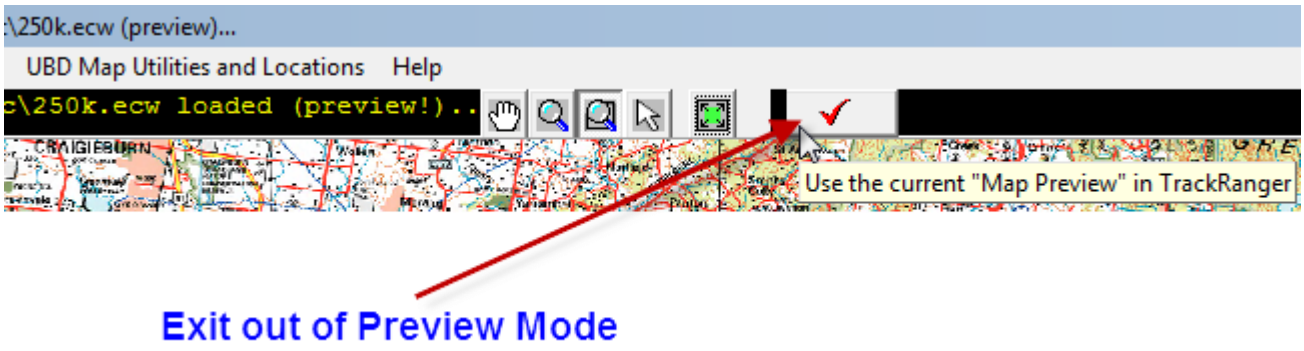
Preview Mode of ECW Maps in TrackRanger

ECW Map types allow a feature called 'Preview Mode'. Preview mode allows you to manually zoom to a different area of the map while TrackRanger is in navigation mode.



It has two main uses:
1: When planning, use it to position a desired section of the map, with zoom and move tools. Press the red tick to then 'use' the current map view in TrackRanger

2: When navigating on Auto-Pilot, and you want to look at a different part of the map, the user can quickly go to preview, which allows you to pan/zoom etc to other parts of the map without TrackRanger taking control. When finished, press the red tick and control is reverted to TrackRanger, auto-pilot takes over again without any further user intervention.

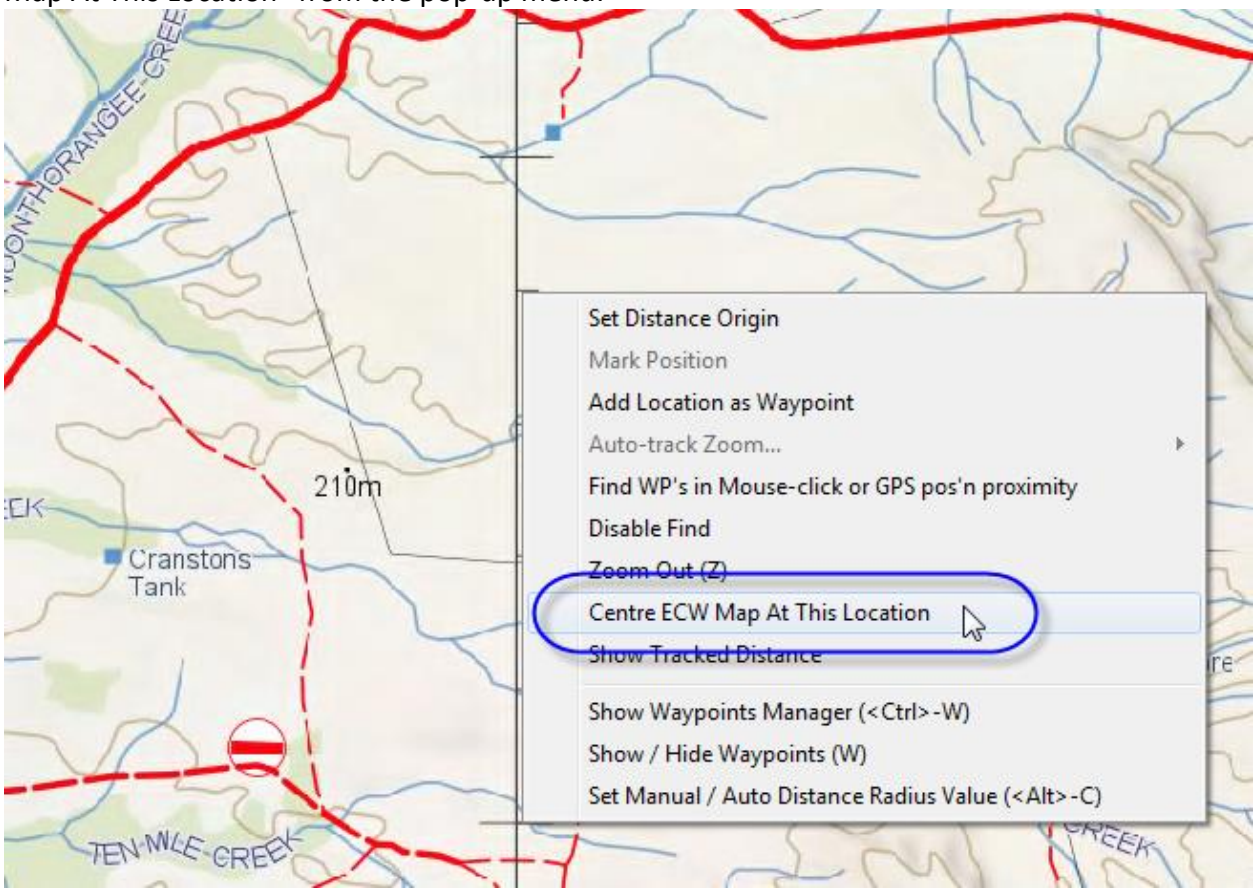


Zooming an ECW map with keyboard keys or mouse commands

Pressing the *Page Up* or *Page Down* keys allows an ECW map to be zoomed out or in respectively. The Toolbar - and + keys perform the same functions.

Quickly Centering an ECW Map

An ECW map may be centered by right-clicking on the map and selecting the “Center ECW Map At This Location” from the pop-up menu:



ECW (Natmap Mapsheets) Maps in TrackRanger

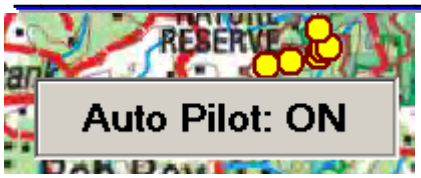
(**Note: mapSheets are an obsolete product, with limited support**)
TrackRanger Version 3.2 and above can also directly import Natmap Mapsheets maps from CDROM or hard-disk drive. These maps have an ECW file extension (Enhanced Compression Wavelet). Natmap maps are pre-calibrated.

The user should first familiarise themselves with the operation of the Natmap Digital Maps Viewer Map Reading program, and the associated controls and tools. Most of these options are also available from within TrackRanger.

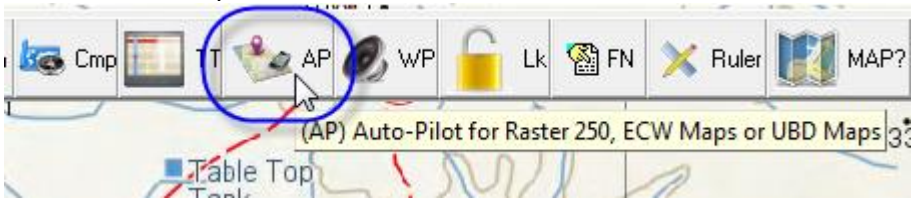
Note that most Hot-Key commands associated with Natmap maps begin with E. This is derived from the file type of ECW (Enhanced Compressed Wavelet format)

AutoPilot with Natmap Digital or UBD Maps

Press the hotkeys combination **AP** to turn on **AutoPilot**. TrackRanger will Search for and load a Natmap map, enable Auto-Recommend, and enable Auto-Map Move.



This can also be performed from the mini tool bar:

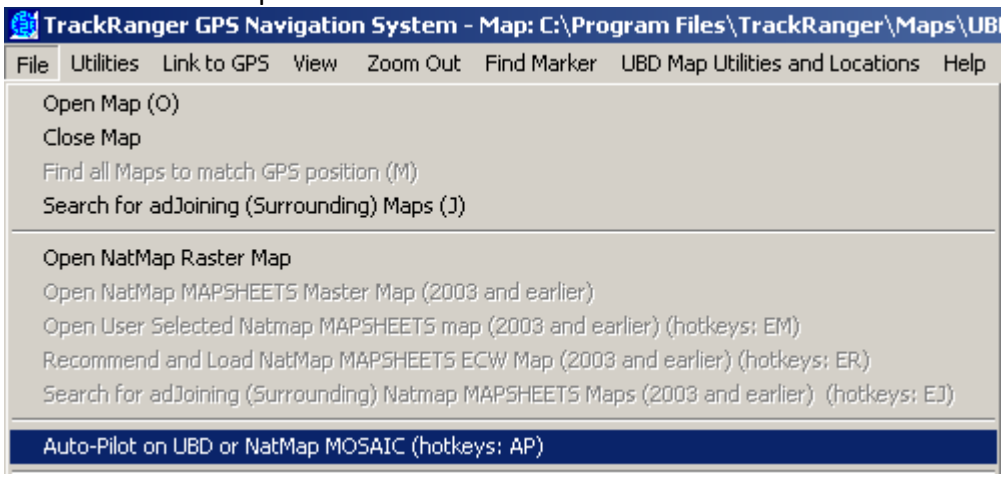


(Note: See the Section 25, 26 for full details of using UBD Maps)

Natmap Digital Maps

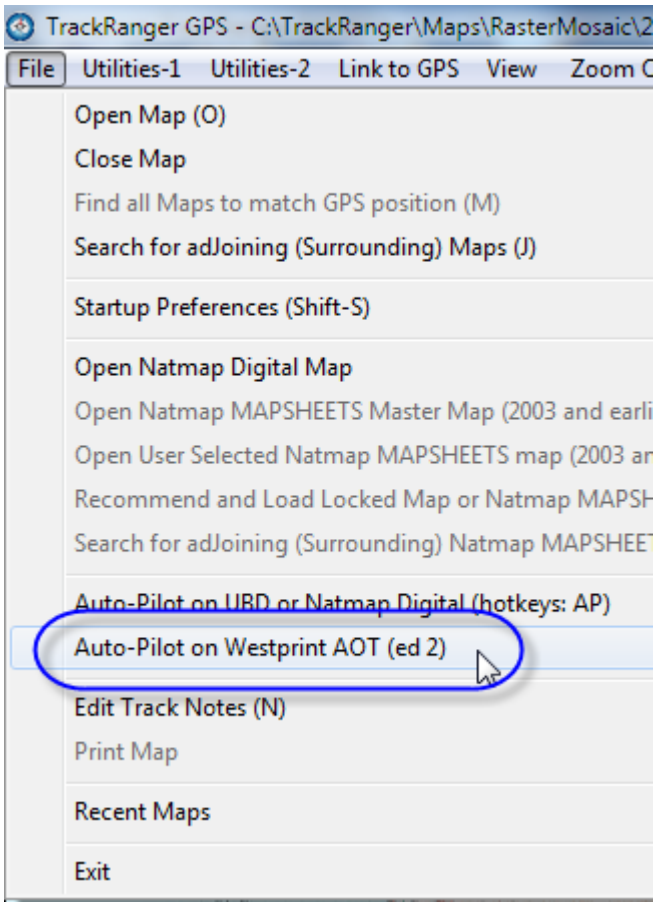
TrackRanger V4.0 and later can automatically read the Natmap Digital maps. This map set may optionally be installed first to the hard disk drive (see separate utility program included with TrackRanger to copy these maps). Maps can be automatically loaded by using the Auto-Pilot option Hotkeys 'AP', the AP button on the mini-tool-bar

or from the File drop-down menu:



AutoPilot with Westprint Australia's Outback Tracks (ed 2) Maps

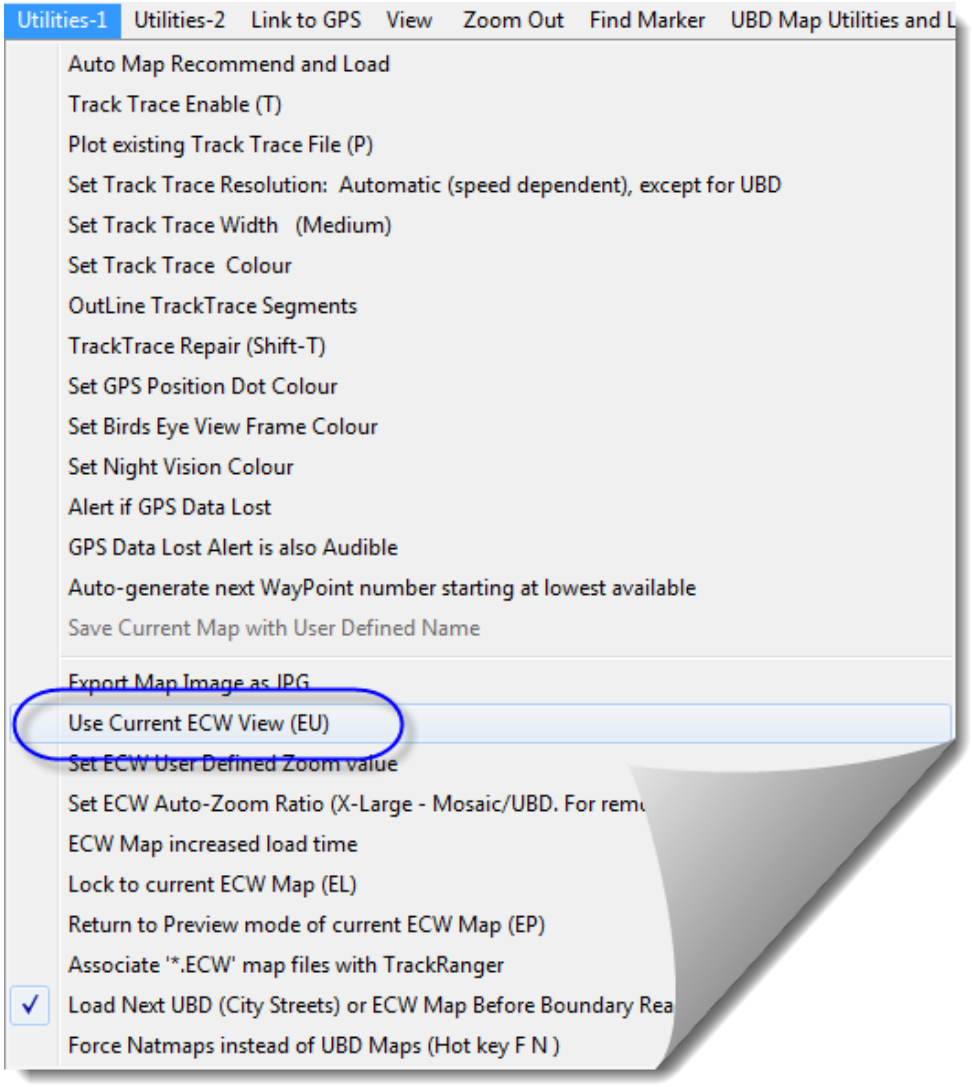
Auto Pilot on Westprint, available from the File drop down menu. Finds and starts auto-pilot on an available Westprint to match the GPS position:



Requires Westprint Maps to be installed in TrackRanger.

"Using" the ECW map:

Note that TrackRanger will allow the loaded ECW map to be used for normal positioning purposes, but the map load must be finalised before other TrackRanger functions, such as distance measurement, waypoints etc can be used.



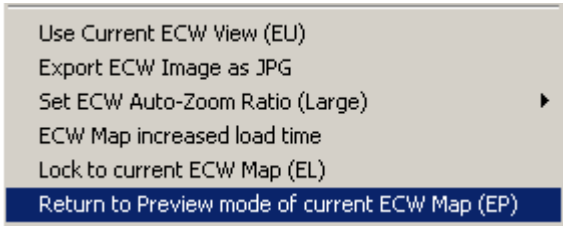
If these additional features are required, once the desired ECW map has been loaded, simply select the Utilities 1 | Use Current ECW View option, or press the hot key EU combination. This will then finalise the import of the map so that other features are available.

When an ECW map has been loaded, and is ready for internal use by TrackRanger, the small Tick button may also be pressed to load the current ECW view into TrackRanger.

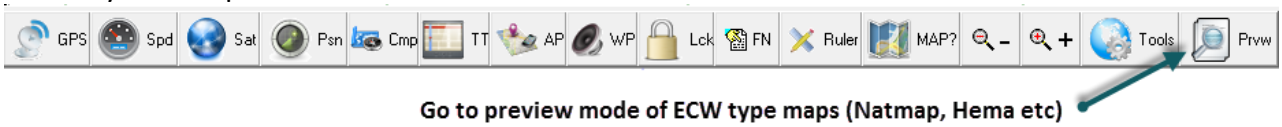
Note: The hot-key 'EP' command will revert the currently loaded ECW map to Preview mode. (See below)

Reverting to the Preview of the ECW map

If the user has an ECW map loaded, and wishes to revert to the Preview Mode (i.e. before the Red Tick was clicked, they should use the hot-keys EP, or select the option from the Utilities-1 Menu:



This may also be performed from the mini-toolbar:



Tip: See information on Preview and User modes on page 27

This is the opposite of the action taken by pressing the Use Current View in TrackRanger button:

Stored ECW Views

This feature allows you to zoom back to previous views of an ECW map using the Function Keys F12 down to F5.

This is how it works: Whenever you go to Preview mode, after zooming to required locations and pressing the red tick to go back to User mode, TrackRanger automatically stores this latest view (the displayed map extent) in the F12 key. It moves any other settings down by one, so if already had a stored extent 'view', that is moved to F11 etc. This is a first in - first out arrangement.

All you need to do is press F12 for the latest, F11 for the previous screen layout, F10 for the next previous etc. If you then create a new scene, the others are moved down. The first one of course eventually gets 'lost'. This allows for 8 previews to be quickly recalled. They are automatically created whenever the preview mode is used.

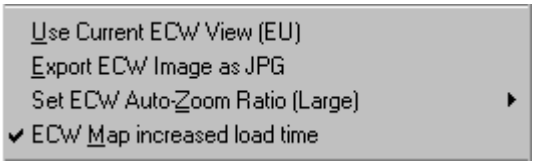
The values are also saved when TrackRanger is closed down, and reloaded when the program is next started, so you can quickly go to any of the stored views without having to recreate them.

Just remember that the latest view is always on F12 and the oldest view is on F5. There is

also a few seconds delay while the image is established once you press the Function Key. During this time, the red tick is showing.

Please note: Stored View is really designed for Natmap Raster 250k so will have unpredictable results if you mix'n'match other maps.

ECW Map load Time



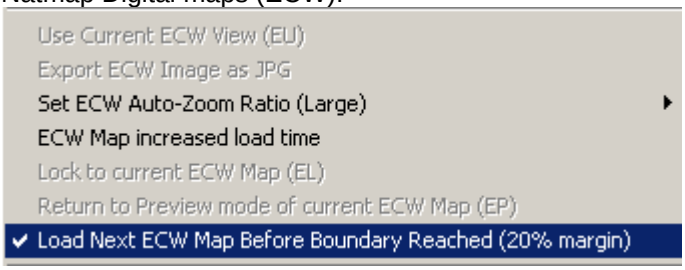
When using the ECW Recommend and Load option (hot-key 'ER'), if the map does not become clear before it is loaded into TrackRanger, it may be necessary to increase the load time. This is especially required if maps are loaded direct from the CD, and spin-up time needs to be taken into account.
If maps are copied to the hard drive, this option can usually be disabled, thus providing faster load time.

Selecting the item from the Utilities-1 drop-down menu enables / disables this option.

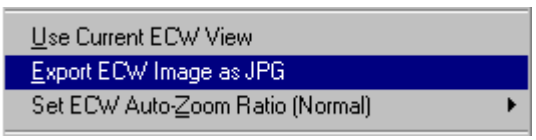
Auto-Loading the next Natmap map before map boundary reached

TrackRanger allows you the option to load the next section of the map when the GPS position is within 20% of the current map boundary, rather than waiting for the GPS position to reach the edge of the map.

To enable the feature, select the item from the Utilities drop-down menu. TrackRanger will remember your preference for the next time you start TrackRanger. This feature only works with Natmap Digital maps (ECW).



Exporting the current ECW image as a JPG file:
TrackRanger can also allow the user to optionally save the current image as a JPG file.
To export the current map as a JPG, select the Export ECW Image as JPG from the Utilities-1 menu.

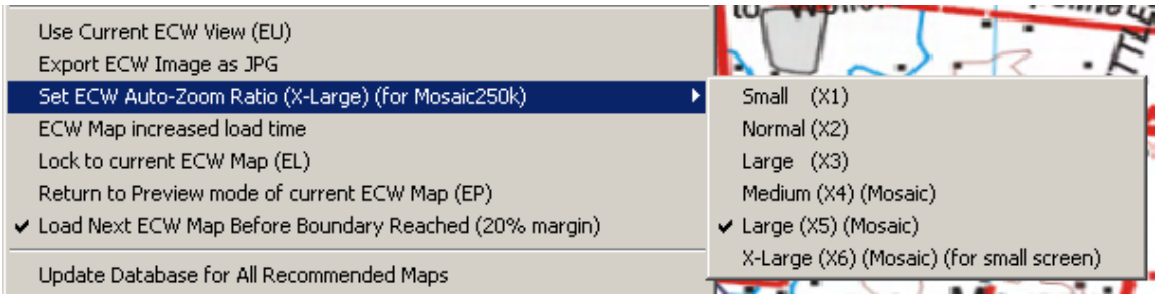


You will be required to nominate a name to save the map as.

ECW Auto-Zoom ratio:

If Option 3 (above) is selected to automatically Recommend and Load ECW Map, the user may predefine one of six magnification ratios. TrackRanger will load the map at that scale.

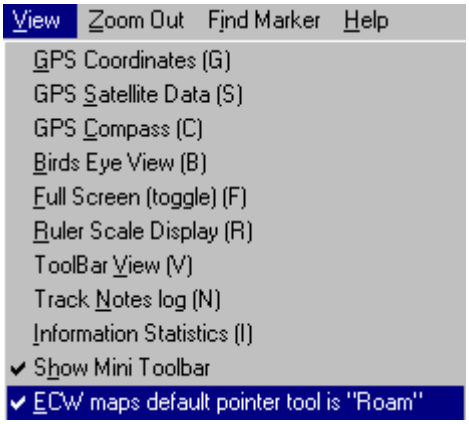
To change the magnification ratio, select the required value from the Utilities | Set ECW Auto-Zoom Ratio option. Hot-Keys X1, X2 and X3, X4, X5, X6 can also perform this function.



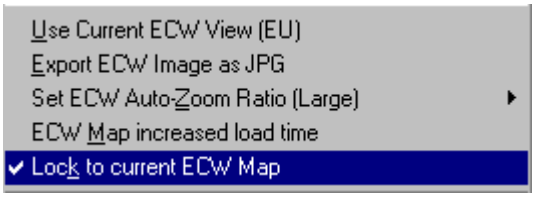
ECW Default Navigation Tool:

The user may prefer to always default to the Roam Tool whenever loading a new NATMAP / Natmap or other ECW map. To direct TrackRanger to default to the Roam tool, select the option from the View drop-down menu:

TrackRanger will remember these settings for future use.

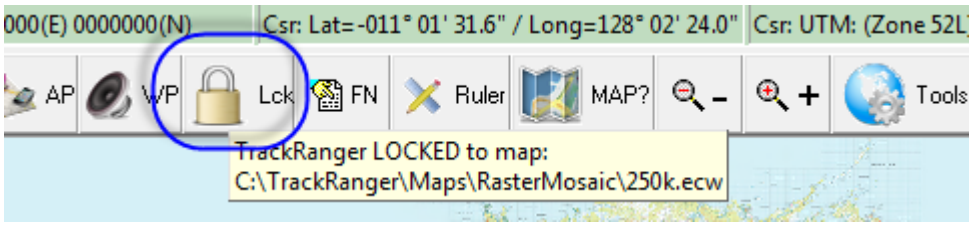


Locking TrackRanger to a particular ECW map:



The user may prefer to override TrackRanger's ability to automatically search for and load ECW maps. This allows the user to stay 'locked' onto a particular map. To use this feature, select 'Lock to current ECW map' from the Utilities drop-down menu. In lock mode, TrackRanger will not automatically select a different map; however, if the user manually loads any other map, TrackRanger immediately disables the Lock to map option.

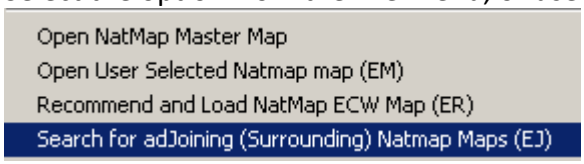
The lock to map option is also available from the mini-toolbar.



Searching for an AdJoining Natmap map:

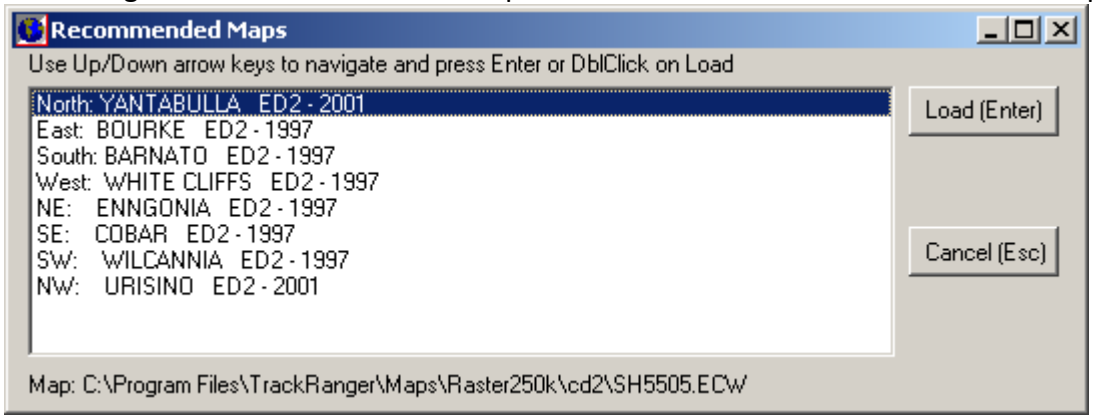
(*For obsolete Mapsheets products only*) TrackRanger allows for maps the surround the currently loaded Natmap (MapSheets) map to be automatically searched for and loaded (Note: Mapsheets are an obsolete mapping product). This function is not generally required for Natmap Digital maps

Select the option from the File Menu, or use the Hot-Key 'EJ'



(Note that for maps other than Natmap Maps, use the HotKey 'J' option)

TrackRanger will search for a list of maps that abut to boundaries of the current map.



See also the topic Auto-Pilot in Section 12 for automatic operation with Natmap maps.

Section 5 – GPS Position and Zooming

Showing the GPS position on the map

When a position fix has been established by the GPS, and the "Link To GPS" has been selected, a dot (yellow by default) will flash on the map surface at the position reported by the GPS unit.

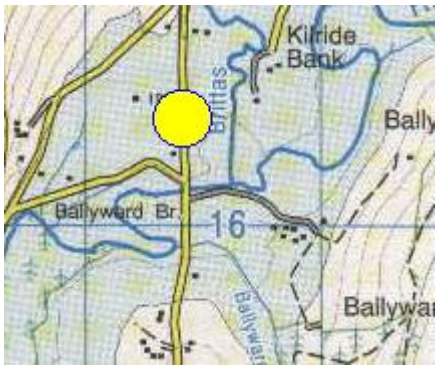


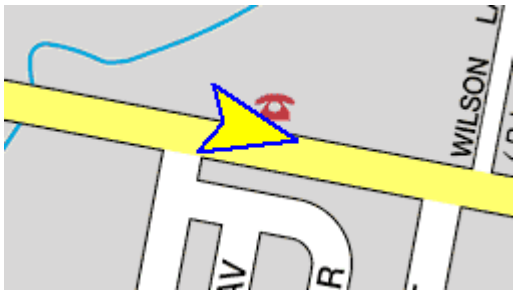
Figure 6 - GPS position shown on Map Display

Showing the position as a Directional Arrow

TrackRanger 4.1 and later allows the user the option to choose between a flashing 'circle' as the GPS position, or a directional arrow. The selection is made from the GPS Coordinates page (hot-key 'G')

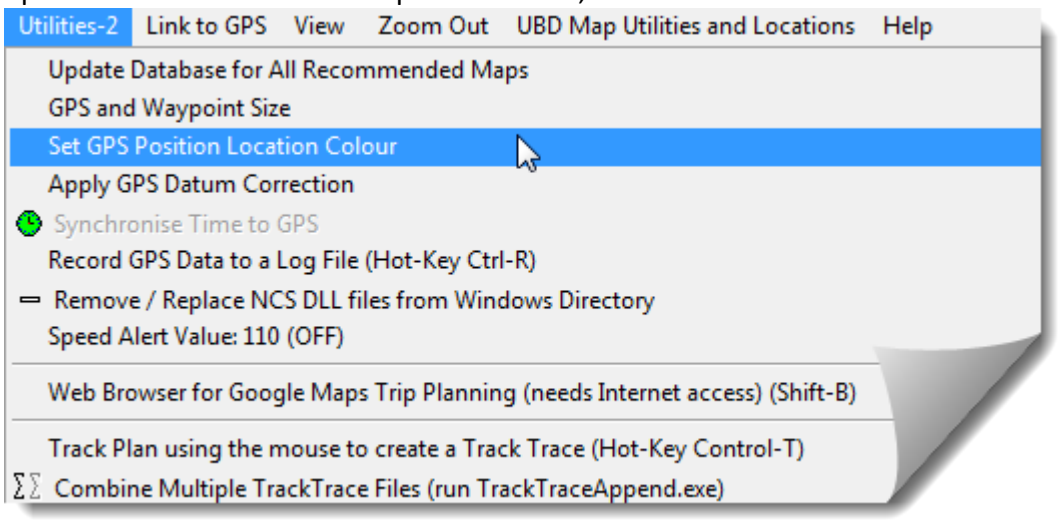
Hot keys AA (Auto-Arrow) and AC (Auto Circle) may also be used to select Arrow of Circle displays.

Choosing selection as Directional Arrow



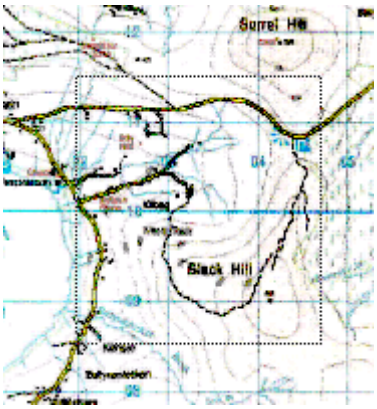
Note that if communication is lost, or the GPS reports that the data is not valid, the last reported position will appear in a 'steady' state on the map (ie: not flashing), therefore, the user may quickly identify dynamic reporting of the data by the state of the GPS position dot (flashing or steady).

Tip: The colour of this dot may be changed using the "Set GPS Position Location Colour" option from the Utilities-2 drop-down menu;



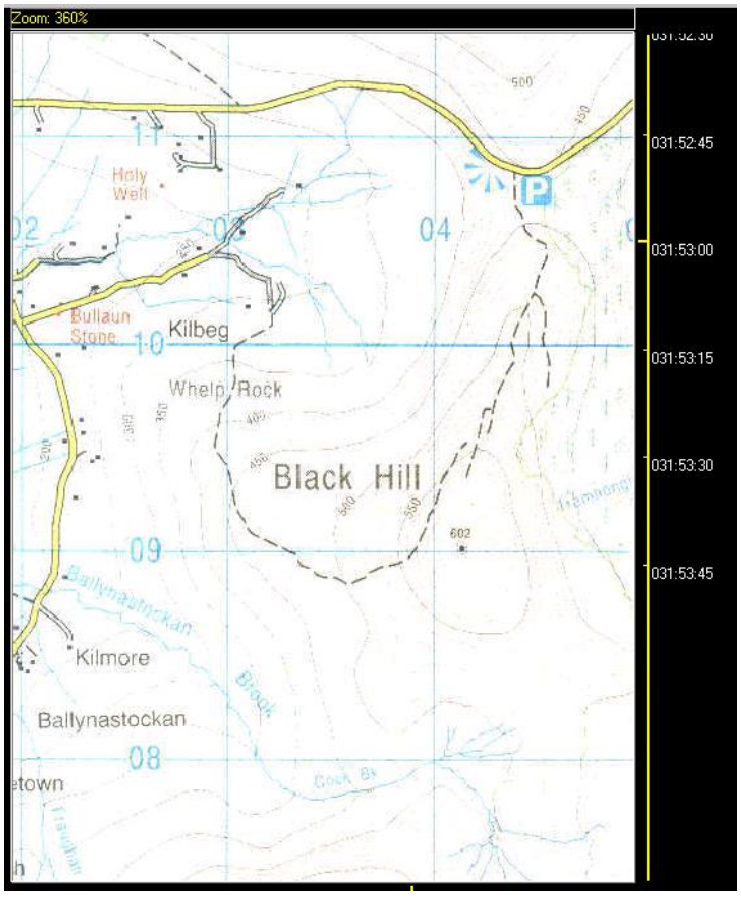
Zooming Map area

Note: This section applied for user-supplied jpg or similar format maps. For Natmap, Australia's Outback Tracks etc, use the "Revert to Preview mode" (see Section 4) to select a different manual zoom size.



A portion of the map may be zoomed by moving the mouse to a point on the map, and while holding down the left mouse button, drag an area around the required map location (rubber-banding). When the desired area has been selected, release the left mouse button.

Note that files saved in EMF format (see the section on 'Converting a JPG or BMP to an EMF' above), will offer better clarity at higher zoom levels.



The selected area will be enlarged and drawn on the map surface.

The maximum zoom value allowed is 500%, and the system will reduce larger magnifications to this value.

Figure 7 - New view showing 'zoomed-in' area

A combination of Shift/PageUp and Shift/PageDown may also be used to zoom In/Out. ***This facility does not work for *.PNG type graphics files because of their already high-definition displays.***

Zooming out

Restoring the magnification to the original size may be performed by either clicking on the Zoom Out item on the main menu bar, or by pressing the right mouse button, and selecting the Zoom Out option from the pop-up menu (hot key 'Z' is available to zoom-out):

Figure 8 - Zoom out options

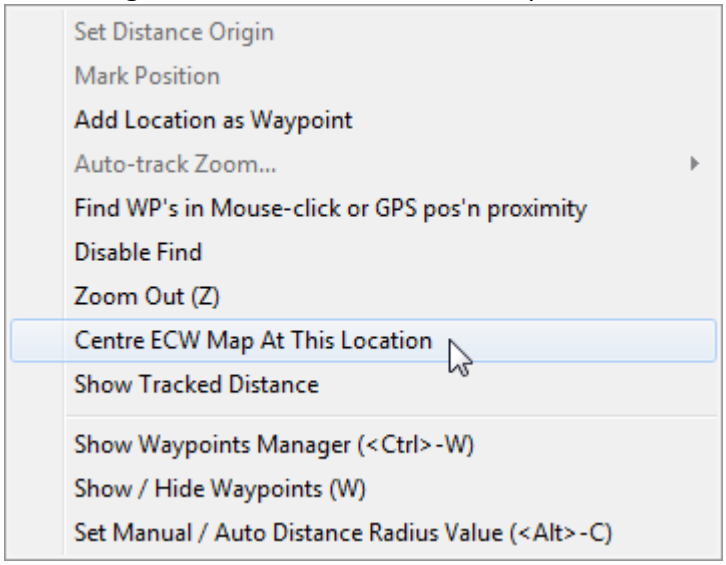
Tip: The TrackRanger Toolbar also provides an option to zoom-out.

Hot-Keys X1, X2 and X3 – X8 can also be used to quickly zoom the map. This is especially suited when using ECW type maps (e.g. Natmap, Westprint etc)

Map Panning (moving)

Maps may also be Panned and Zoomed with combinations of the keyboard arrow and Page Up / Page Down keyboard buttons.

- Use the Page Up / Page Down keys to zoom in / out.
- Use the arrow keys to move the position of the entire map within the viewing window (scroll the map)
- Use the Shift and Arrow Keys to pan the current view of the map (hold down shift while pressing the arrow keys)
- Right-clik at a location on the map and select "Centre Map at this location"



Section 6 – Waypoint, Route Management and Gazetteer

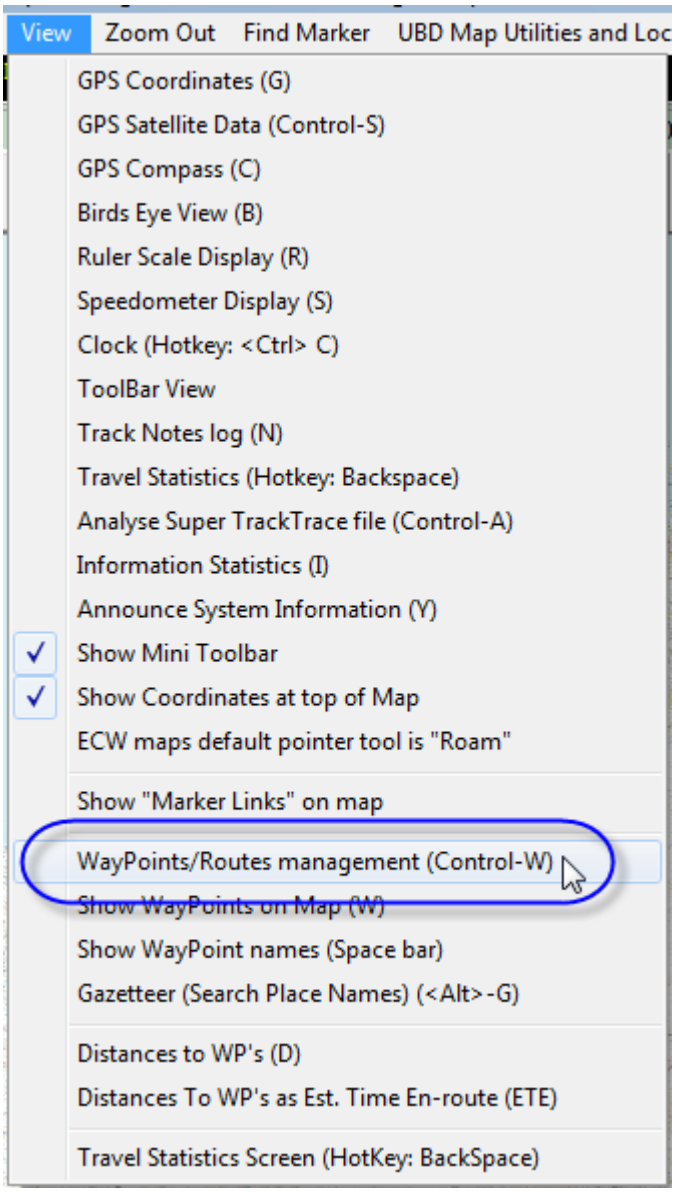
Waypoint Functionality

TrackRanger supports Waypoint management whereby waypoints can be downloaded / uploaded to the GPS, edited, deleted, renamed etc.

Routes stored in the GPS may also be downloaded to TrackRanger.

These waypoints and routes may be stored to individual disk files, thus allowing waypoints to be stored, retrieved, and uploaded to the GPS at any time.

Waypoints functionality is controlled by selecting the "Waypoints/Routes management" function from the View drop-down menu, or by pressing Hot-Key combination: **Control-W** from the keyboard.



Waypoint GPS Setup

Before uploaded/downloads can occur, it is important that the GPS be set to the correct protocol for this functionality to take place.

On a Garmin, the Interface should be set to Garmin/Garmin as seen in the following image.

Figure 9 - Setting Garmin to Garmin protocol for Waypoint management

Important: For setup of Magellan eXplorist units, and to copy files from the eXplorist GPS to the PC, see information at the end of this section.

For earlier Magellan models (e.g. 315, 320), the NMEA interface needs to be switched off so that the special waypoint requests can be executed.

Refer to your particular GPS handbook for further information on setting these protocols.

Note: If you are using the TrackRanger GPS no model setting is required to be made in TrackRanger for the GPS model, etc. All waypoints are stored inside TrackRanger.

Waypoint Management Dialog

Selecting Waypoint/Routes management launches a form that allows data to be downloaded / uploaded from the GPS.

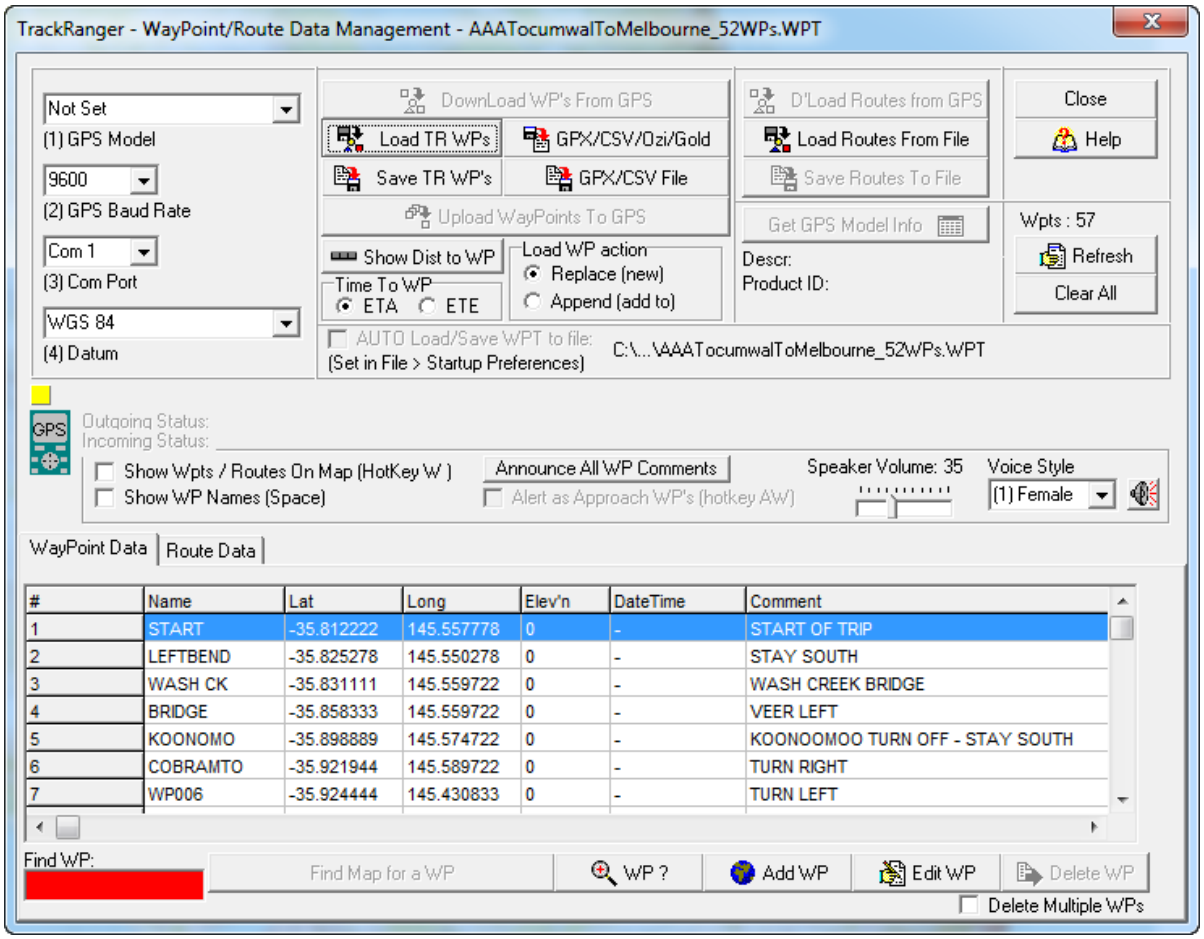


Figure 10 - Waypoints management form

To Download Waypoints from supported GPS models, use these steps (Note: not needed for TrackRanger USB GPS, where all waypoints are managed inside TrackRanger):

Initial Waypoint data is set as follows:

1: Select the GPS Model to match (as closely as possible) the GPS you are using. Note that for Waypoint functionality, not all GPS Models are supported, or available. This setting is not required for the TrackRanger GPS receiver, where all waypoints are managed from within TrackRanger.

2: Set the GPS Baud Rate (usually 9600 for Garmin models)

3: Set the comport that you wish to use (this is usually the same Com Port as being used for GPS navigation).

4: Set the Datum value to match the Datum setting of your GPS.

5: Ensure that the GPS communications have been set correctly to match your GPS model (see Waypoint GPS Setup above).

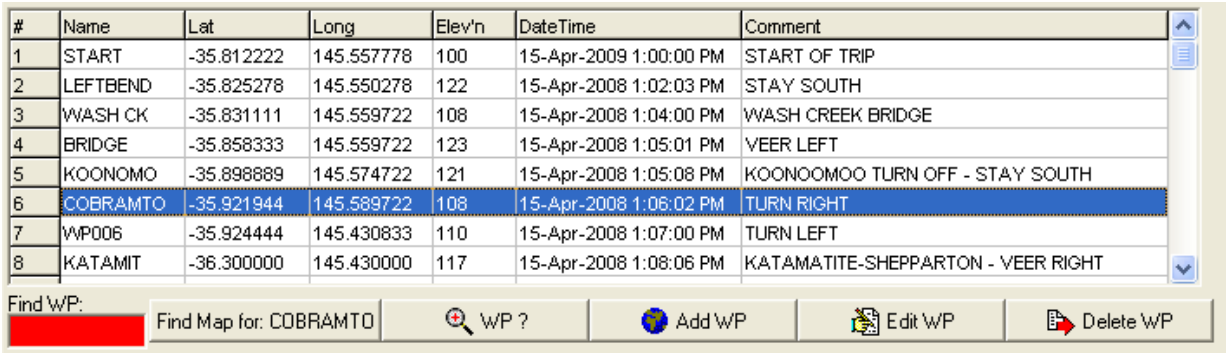
6: Press the

button.

The waypoint data will be downloaded, and displayed on the Waypoints form. TrackRanger supports facilities to manage up to 500 individual waypoints at any one time. Disk storage of individual Waypoint sets means that total flexibility and versatility can easily be achieved.

Waypoint Editing

To change any of the values, highlight the required line, and press the Edit WP button. The data is presented as DDD.ddddd format, along with the waypoint name and comment: Alternatively, select and then right-click on the desired Waypoint in the list.



#	Name	Lat	Long	Elev'n	DateTime	Comment
1	START	-35.812222	145.557778	100	15-Apr-2009 1:00:00 PM	START OF TRIP
2	LEFTBEND	-35.825278	145.550278	122	15-Apr-2008 1:02:03 PM	STAY SOUTH
3	WASH CK	-35.831111	145.559722	108	15-Apr-2008 1:04:00 PM	WASH CREEK BRIDGE
4	BRIDGE	-35.858333	145.559722	123	15-Apr-2008 1:05:01 PM	VEER LEFT
5	KOONOMO	-35.898889	145.574722	121	15-Apr-2008 1:05:08 PM	KOONOOMOO TURN OFF - STAY SOUTH
6	COBRAMTO	-35.921944	145.589722	108	15-Apr-2008 1:06:02 PM	TURN RIGHT
7	WP006	-35.924444	145.430833	110	15-Apr-2008 1:07:00 PM	TURN LEFT
8	KATAMIT	-36.300000	145.430000	117	15-Apr-2008 1:08:06 PM	KATAMATITE-SHEPPARTON - VEER RIGHT

Find WP: | Find Map for: COBRAMTO | WP ? | Add WP | Edit WP | Delete WP

Figure 11 - Selecting the waypoint to change

Select the Waypoint, and press the Edit Button, or double-click the waypoint from the list.

Tip:

You may also edit a waypoint directly on the map display by moving the mouse pointer over the waypoint, and while holding down the Control-Key, left mouse click on the waypoint.

The data may be changed to suit, as well as the Waypoint name or comment altered:

Tip, when opening a waypoint file, a backup is automatically made if the file has not previously been opened that day. Subsequent re-openings of the file will not generate a backup name. The backup name is in the format:
OriginalWaypointName_*save_yyyymmdd*.WPT

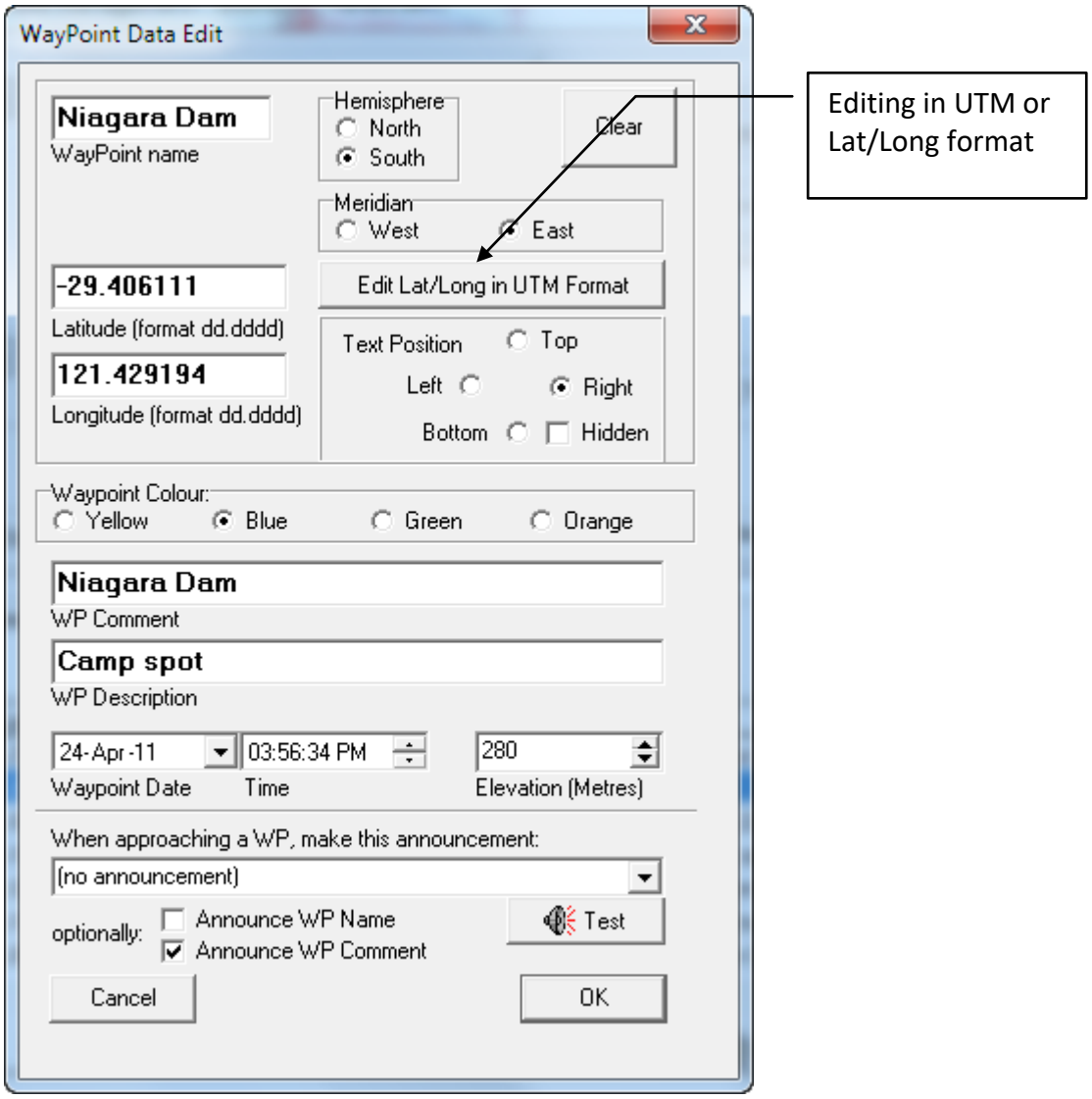


Figure 12 - Waypoint values editing

The Lat/Long of the Waypoint may also be edited using UTM coordinates format, by pressing the button on the form. This button 'toggles' between the two 'edit modes'.

TrackRanger checks to make sure that the waypoint name is not duplicated (GPS units use the Waypoint Name as the unique waypoint identifier). If a duplicate name is found the following warning is presented and the data is not altered.

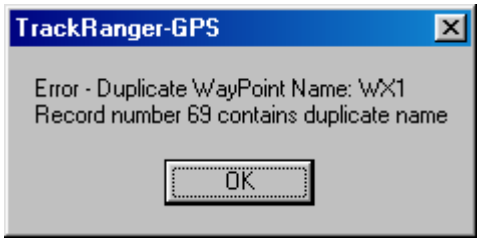


Figure 13 - Duplicate Waypoint name notification.

Waypoints Deleting

Waypoints may be deleted by selecting the required waypoint, and clicking on the “Delete WP” button. The user is required to confirm the deletion.

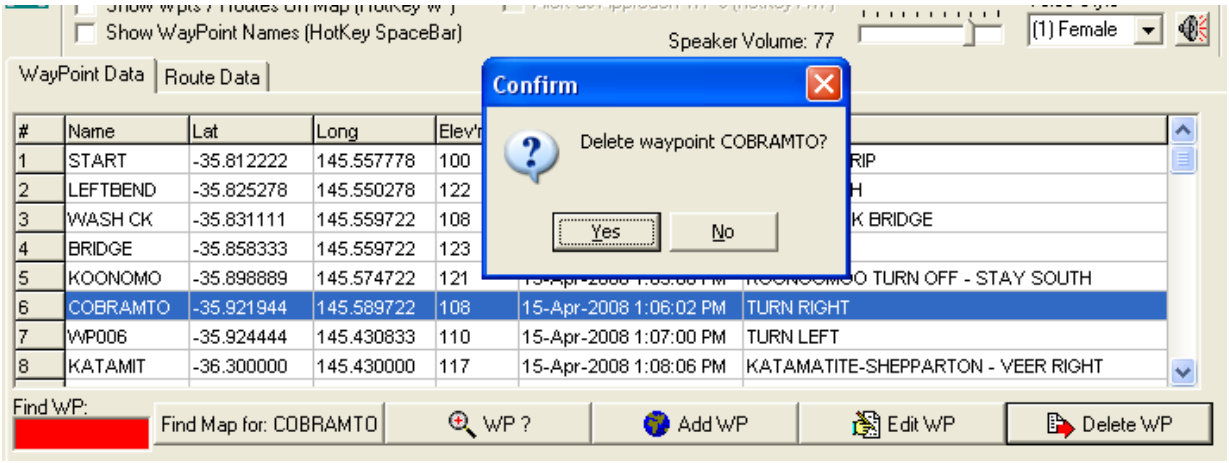
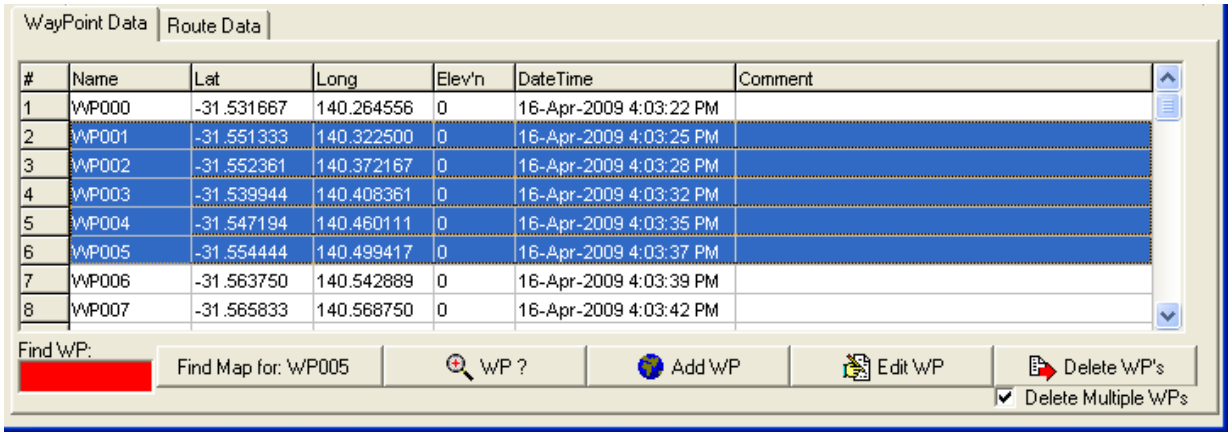


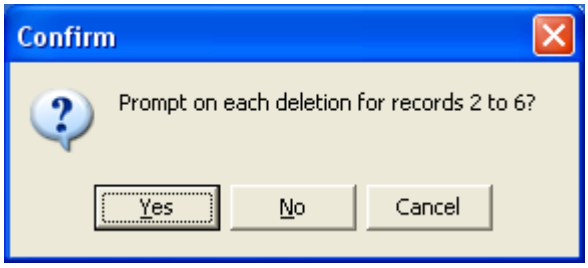
Figure 14 - Deleting a Waypoint

Deleting Multiple Waypoints

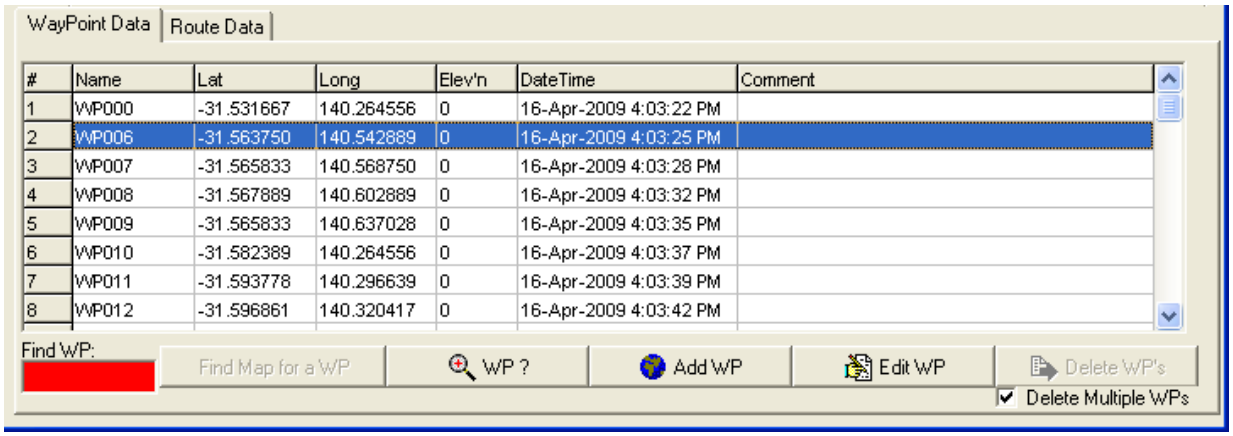
On the Waypoints Manager page, check the “Delete Multiple WPs” checkbox, and select multiple waypoints while holding down the Shift key and using with the mouse or keyboard up/down arrow keys. This allows a selection to be grouped. Press the DeleteWPs button.



TrackRanger will give you the option to be prompted for each deletion of the selected group may be deleted simultaneously.

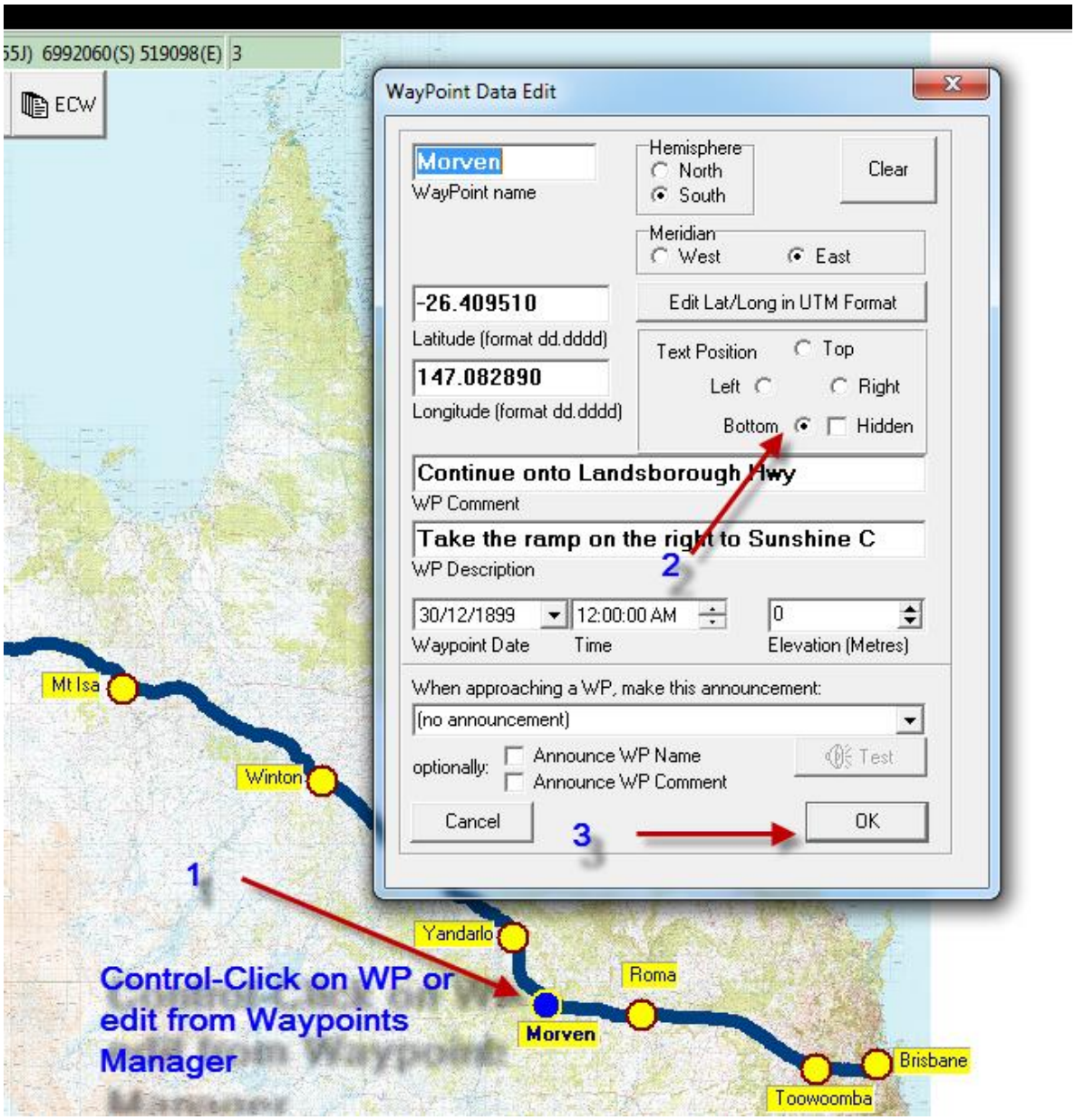


Waypoints are deleted and the page is updated to reflect the remaining waypoints:



Tip: Leave the "Delete Multiple WPs" checkbox unchecked for normal operation.

Setting Text Position of Waypoints

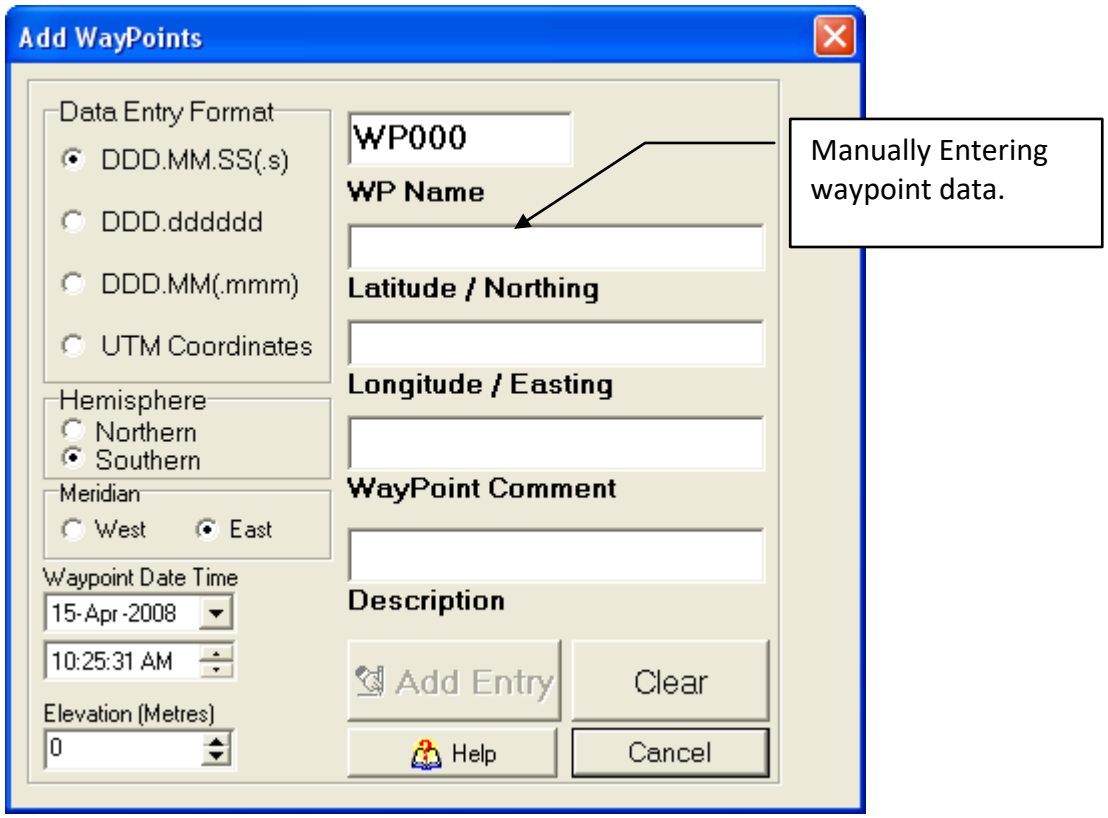


Waypoints Adding, Setting Waypoint Colour

TrackRanger supports four distinct methods to add new Waypoints.

Method 1:

From the main waypoint screen, select the 'Add WP' button. The same dialog that is used for editing waypoints is presented, but with blank fields.



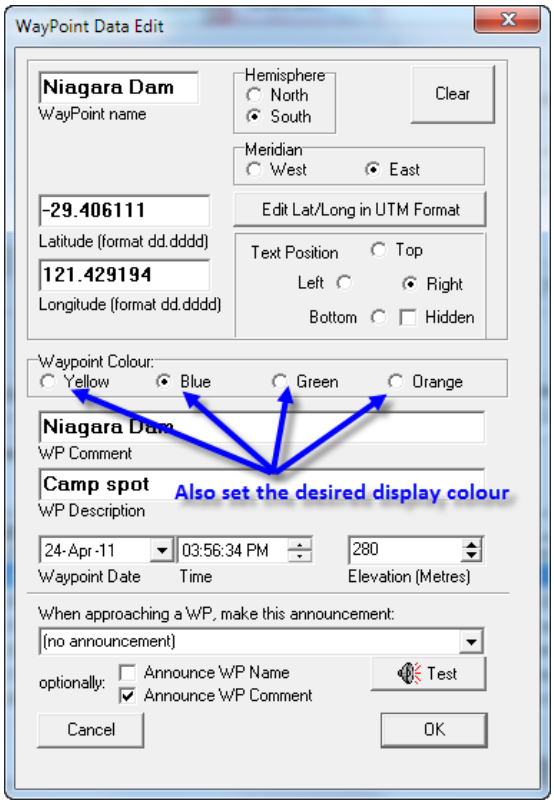
TrackRanger will automatically generate incrementing Waypoint number, based on the structure WP000, WP001 etc. The user may change the Waypoint to any preferred value.

The user should add the appropriate waypoint data, and press OK. Note that waypoint names should not exceed 8 characters, while most GPS units will allow Waypoint comments of up to 40 characters (even though most of the comment may not be viewable on the GPS unit).

The Add Waypoint facility affords more flexible means of adding waypoints, as multiple waypoints can be added during the one operation, and furthermore, waypoints may be entered in three different formats.

If a waypoint is added automatically from live GPS data (e.g. pressing the '=' or '+' keys, or from the GPS Coordinates page), then the date and time stamp and the elevation are automatically added to the waypoint data. Users may add their own timestamp and

elevation values at any time, or modify existing data, and/or set the desired waypoint colour (see also Figure 17 on Page 80 for examples of waypoint colours).



Specify if the point location is in the northern or southern hemisphere, as well as the East or West meridian.

Select the desired method to input the data (DDD:MM:SS, DDD.dddd or Universal Transverse Mercator (UTM) projection and then add the Waypoint Name, Coordinate points and optional comment. Note that if the data is entered in degrees, it is necessary to use a decimal point (full stop character) to delineate the values

E.g.: 123.45.37 would represent 123 degrees, 45 Minutes and 37 Seconds.

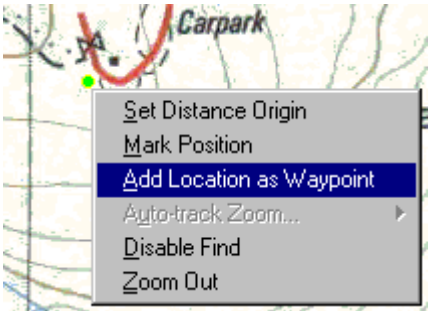
Click on the Add Entry button to add this entry and continue with further entries. When all entries have been added, click on the Close Button.

After the OK button is pressed, the waypoint is added to the Waypoint Data list:

9	BARMAHRD	-36.333889	145.402778	0	-	BARMAH - SHEPPARTON RD, VEER LEFT
10	MIDLAND	-36.379444	145.399167	0	-	MIDLAND INTERSECTION, HEAD SOUTH
11	AIRPORT	-36.429167	145.387222	120	15-Apr-2008 1:25:00 PM	SHEP. A/PRT, STAY HEADING SOUTH

Figure 15 - New waypoint visible in waypoint list

Method 2:

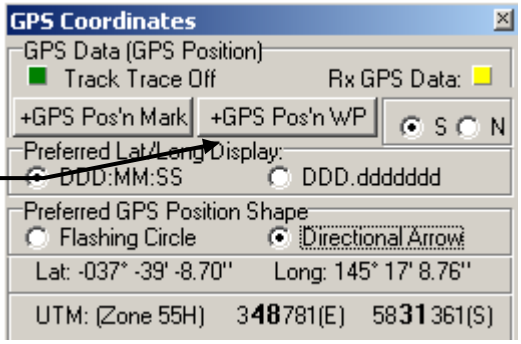


Waypoints may be added to the map by simply right-clicking at the desired location, and selecting Add Location as Waypoint from the popup menu. This will launch the Quick Add Waypoint form, but the Latitude and Longitude will already be filled in. Enter the name of the Waypoint, and an optional comment, and press the Add Entry button to store the data.

The waypoint will be shown on the map (Hot Key 'W', and Spacebar to show Waypoint name).

Method 3:

Add GPS Pos'n as Waypoint Button



It is also possible to add the **current** GPS position as a Waypoint by clicking on the "GPS Pos'n WP" button on the GPS form (Hotkey G).

The Add Waypoint form will be displayed, with the Lat/Long location already filled in. The user may then add the name and optional comment for the waypoint.

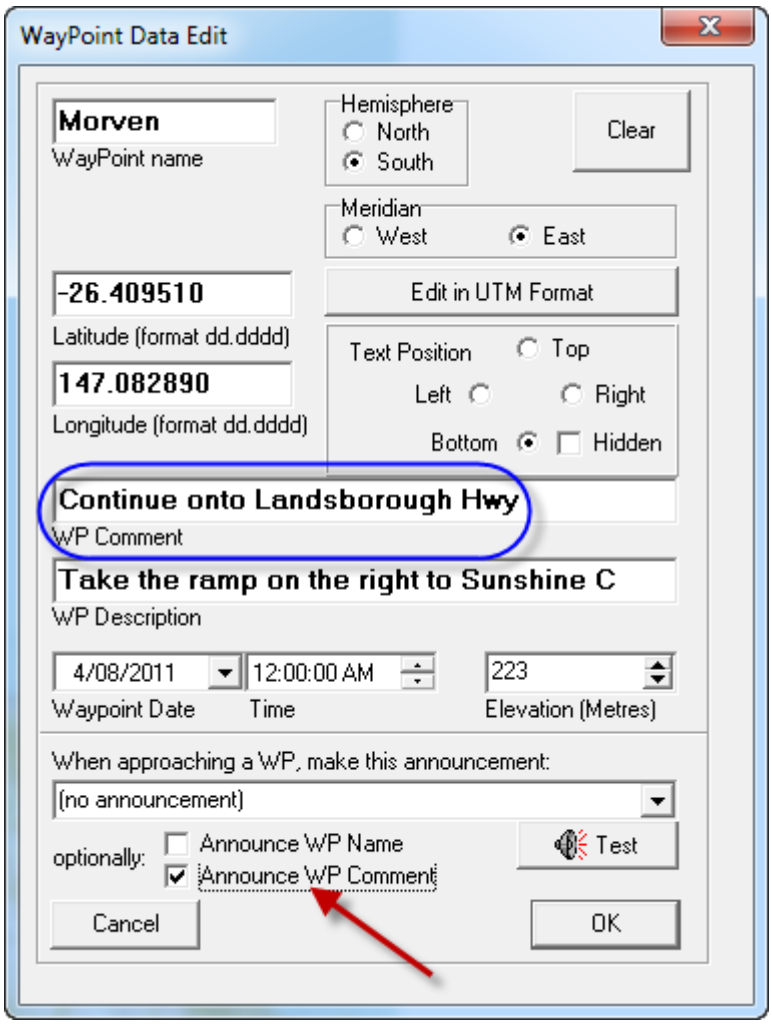
These Waypoints may be further edited from the Waypoints management dialog (hot-key 'W').

Adding a Message and a Voice Announcement to a Waypoint

TrackRanger Pro 5.4 and later allows the user to receive a 'Voice Prompt' announcement when approaching waypoints. The voice message may consist of any of 3 message types.

1. A predefined announcement (selected from a list)
2. The announcement of the Waypoint Name
3. The announcement of the Waypoint Comment

To set the Message announcement that is to be associated with the Waypoint, in the Waypoints Management page, double-click on the waypoint, or alternatively highlight the waypoint, and press the edit button.



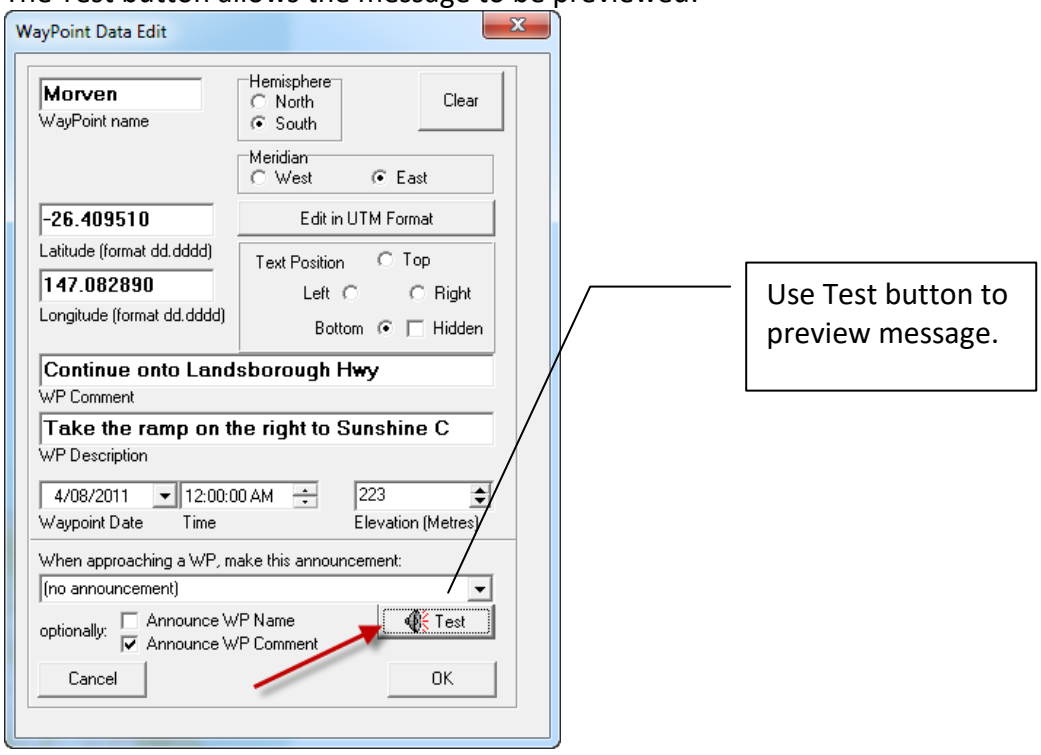
In the Waypoint data edit form, set the predefined announcement from the drop-down list. Optionally, select either of the two checkboxes, to have TrackRanger announce the Waypoint name and/or waypoint comment.

The predefined messages that are currently available are as follows:

- (no announcement)
- Continue Straight
- Turn Left
- Turn Right
- Veer Left
- Veer Right
- Turn Right and Enter the Motor Way
- Turn Left and Enter the Motor Way
- Enter the Motor Way ahead
- Continue Straight at Roundabout
- Turn Right at Roundabout
- Turn Left at Roundabout
- Take the next exit
- Take the first exit
- Take the second exit
- Take the third exit
- Take the fourth exit
- Exit the Motor Way to the Left
- Exit the Motor Way to the Right
- Exit the Motor Way straight ahead
- Turn Left into Side Road
- Turn Right into Side Road
- Keep Left
- Keep Right
- Head South
- Head North
- Head East
- Head West
- Destination

If none of these messages are suitable, then you may optionally make use of the Waypoint comment to tailor your own message.

The Test button allows the message to be previewed:



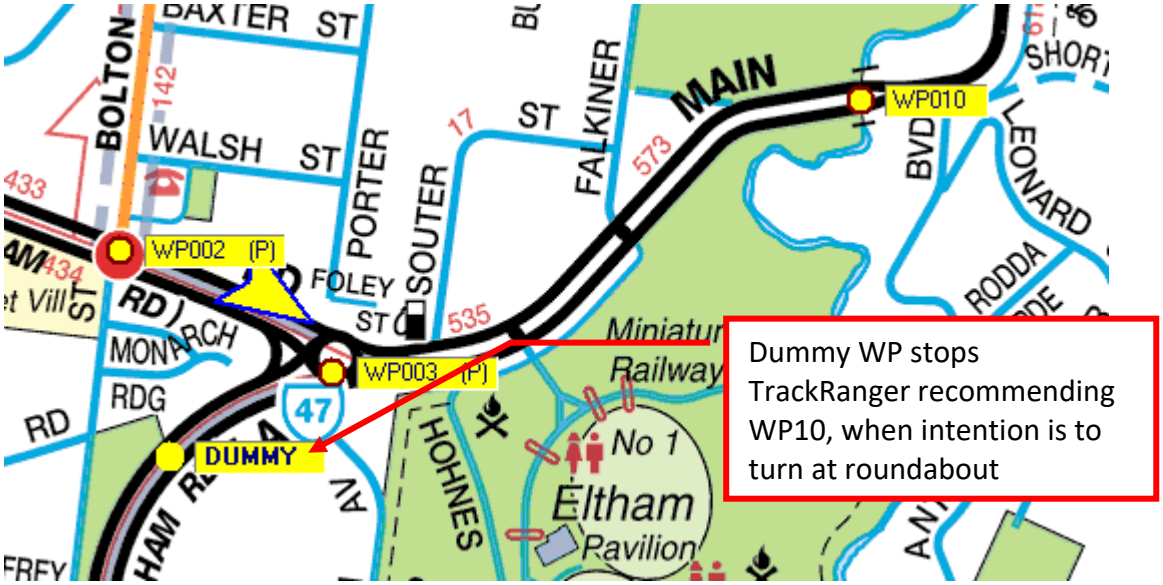
The combination of predefined announcements, and waypoint comments, allow unique instructions to be presented to the operator when needed.

Quick steps for setting up an Announcement Trip Plan using Waypoints

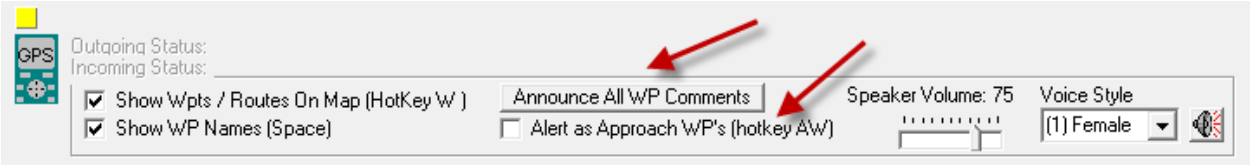
To setup a trip plan using Waypoints undertake these steps

1. Add waypoint to the map at the required locations, (turnoffs, intersections, roundabouts, etc)
2. Double-click the waypoint from the Waypoints management page (or select it and press Edit WP)
3. In the Waypoint Data Edit page, set the announcement to be made from the drop-down list, or by setting a comment and making sure the appropriate checkbox is checked.
4. Preview the announcement by pressing the Test button
5. Press the OK button to save the features
6. Edit further waypoints as necessary
7. When all waypoints have been added, save the waypoints file to disk

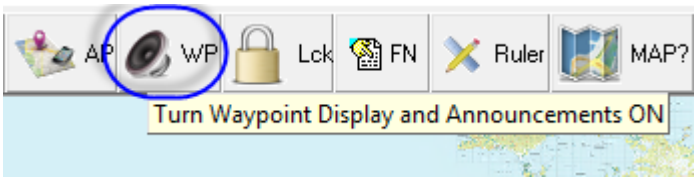
Tip: TrackRanger does not automatically follow a road. It intelligently determines the next waypoint through a complex algorithm based on current location, distances and bearing. It is possible for TrackRanger to miss an announcement, or detect an incorrect waypoint as the next available. When the direction to the next waypoint may be confusing, add a 'dummy' waypoint (optionally with no announcement), and allow TrackRanger to detect this waypoint in lieu of an incorrect announcement.



Make sure that Show Waypoints on map and Alert as Approaching Waypoints are checked on the Waypoints Management Page.



Tip: These two functions can also be undertaken instantly by pressing the speaker button on the mini toolbar:



Set the Voice announcement type (Male / Female), and the announcement Volume to suit

Press the Speaker button the review the comment and the volume.

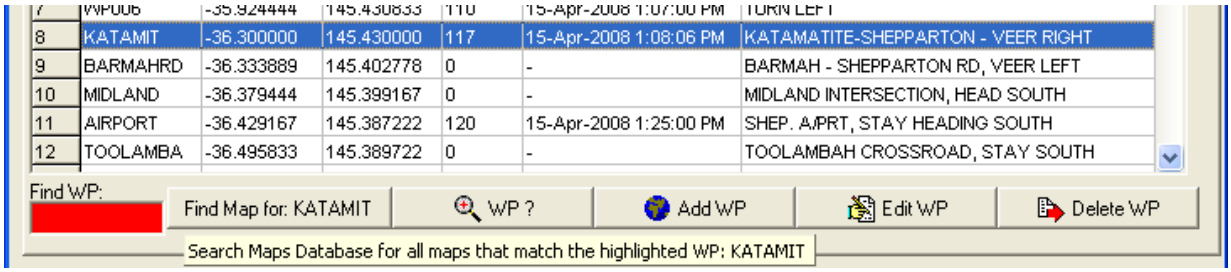
Manually checking the next Waypoint Announcement

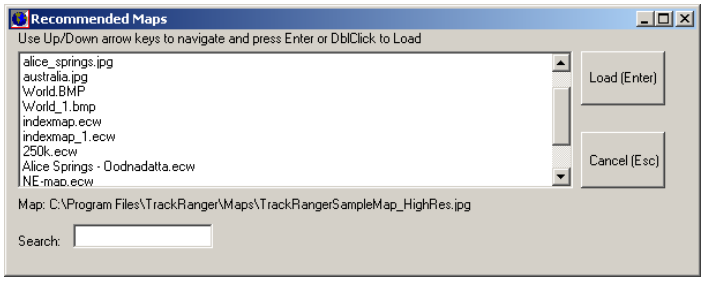
While traveling, the next estimated waypoint will always be announced by pressing the Control-Spacebar keyboard combination (hold the Control key down, and press the Space bar on the keyboard). TrackRanger calculates and announces the next waypoint and distance. If no waypoint is located, or there is no announcement for that waypoint, TrackRanger returns an informational announcement.

Tip: See also Section 7, Trip Planning, for further use on Trip Planning and setups.

Finding Maps that match a highlighted Waypoint

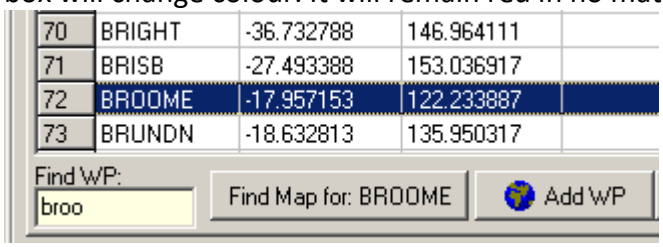
From the Waypoints Management Page, highlight a Waypoint, and the Waypoint name is shown on the 'Find Map' button at the bottom of the form. Pressing this button will request TrackRanger to search its database for all maps that this position is contained within.





Finding a Waypoint from the list

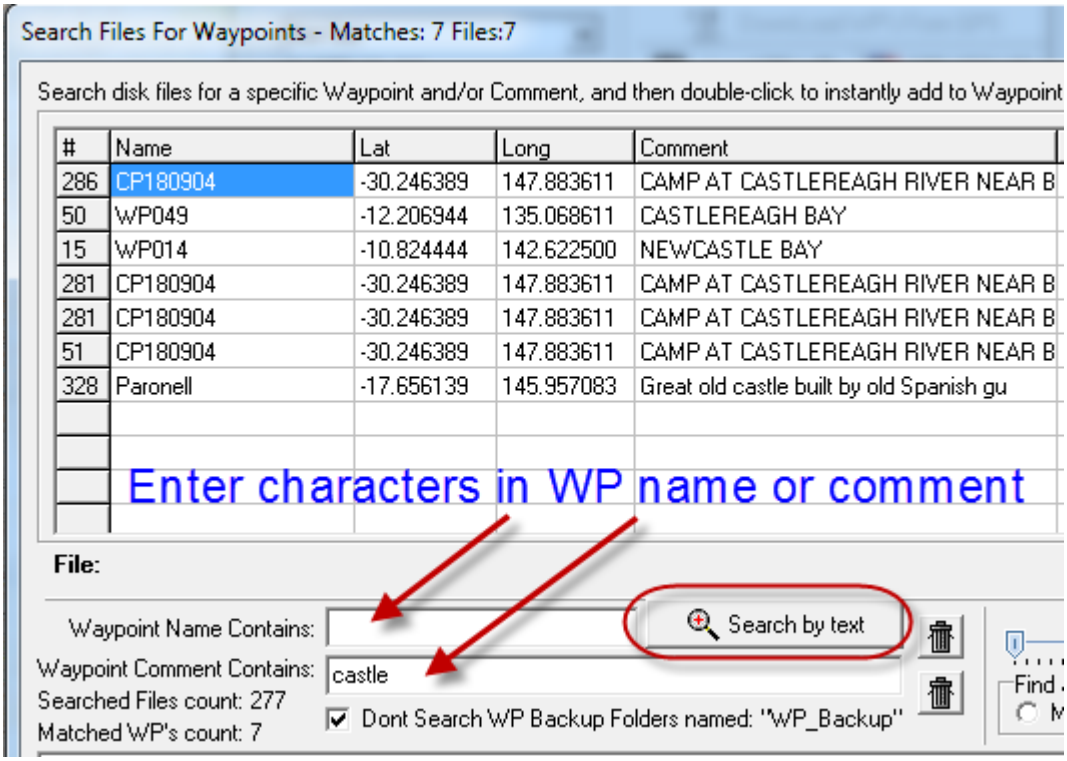
Type in the first few characters of a Waypoint name that you wish to search for, and TrackRanger fill attempt to locate the Waypoint for you. If the characters match, the edit box will change colour. It will remain red in no matches are found:



Finding Waypoints already stored on disk

On the Waypoints Management form, click on the button to allow searching of Waypoints that may already be stored on disk.

A dialog is presented to the user. The user may search by Waypoint Name, Waypoint Comment, or a combination of both.



Enter the desired search string(s) in either or both of the edit boxes, and press the Search button.

All WPT files in the TrackRanger directory and all sub-directories are searched for the matching string(s). The count of the matches is shown on the form.

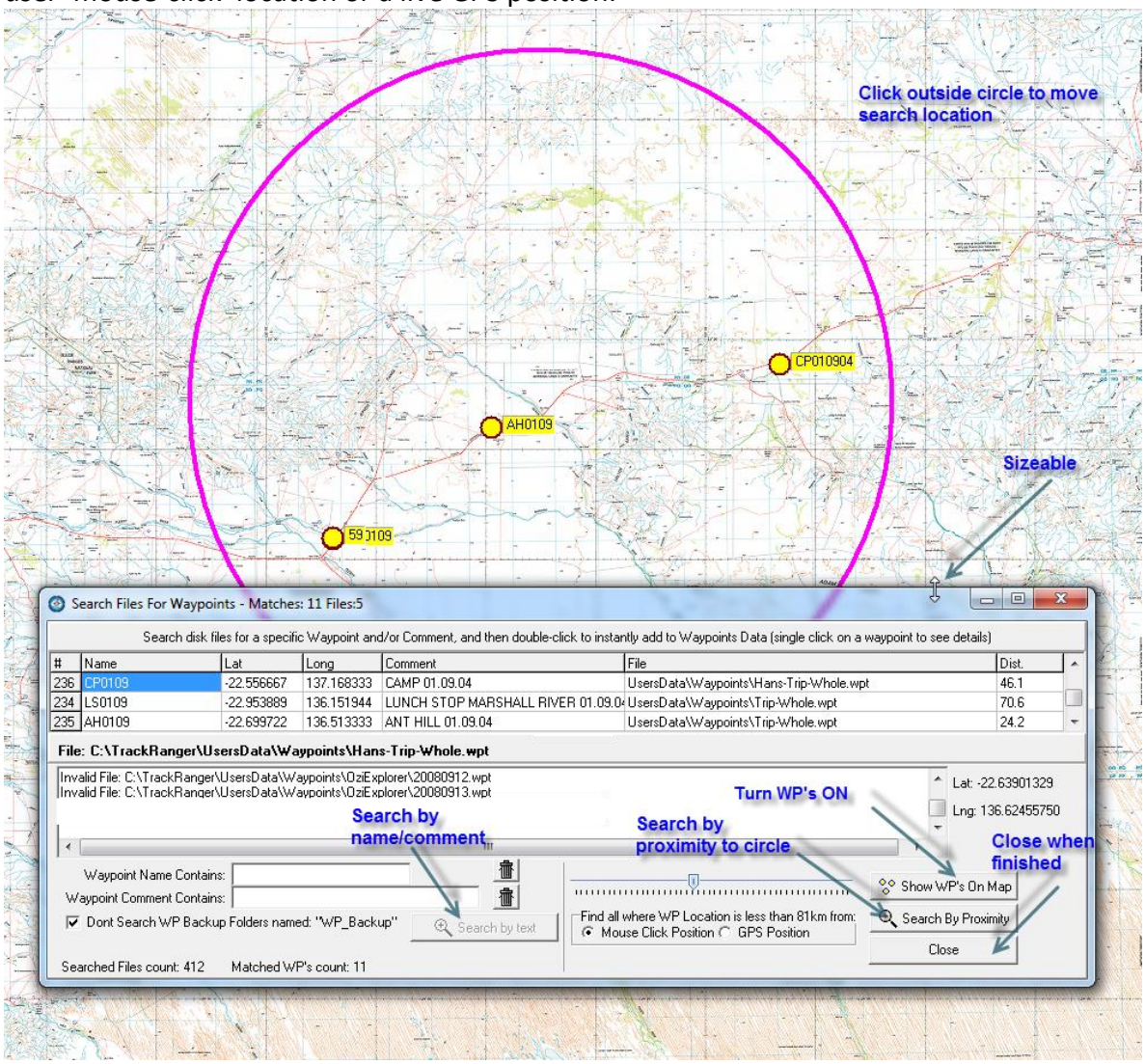
Clicking on any of the entries allows a hint to be shown, containing the waypoint name and comment. The actual file name containing the matching entry is shown below the grid.

Double-click on any waypoint to instantly add it to your waypoints data. (Duplicate waypoint names are not permitted).

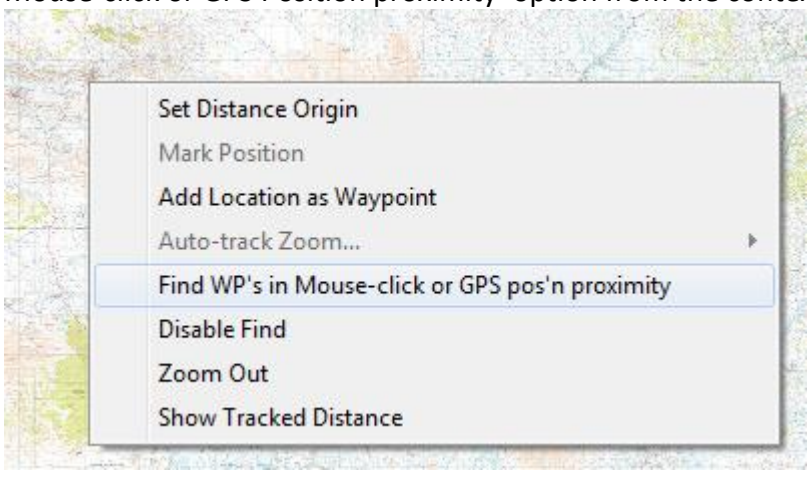
Continue to double-click to add waypoints, and press the close button when finished.

Searching for Waypoints within a proximity

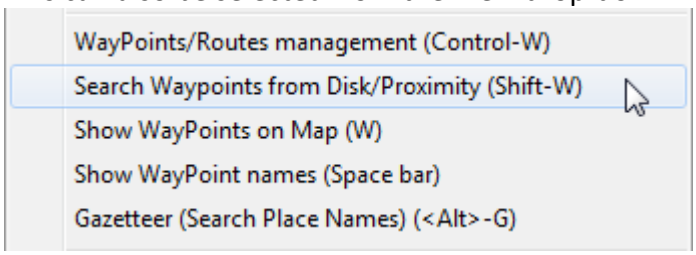
TrackRanger can locate stored Waypoints that exist within a specific proximity of either a user 'mouse-click' location or a live GPS position.



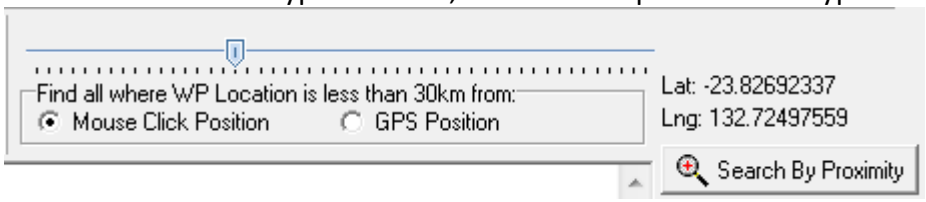
To launch, right click on the map at the desired specific location. Select the 'Find WP's in Mouse-click or GPS Position proximity' option from the context menu:



This can also be selected from the View drop-down menu.

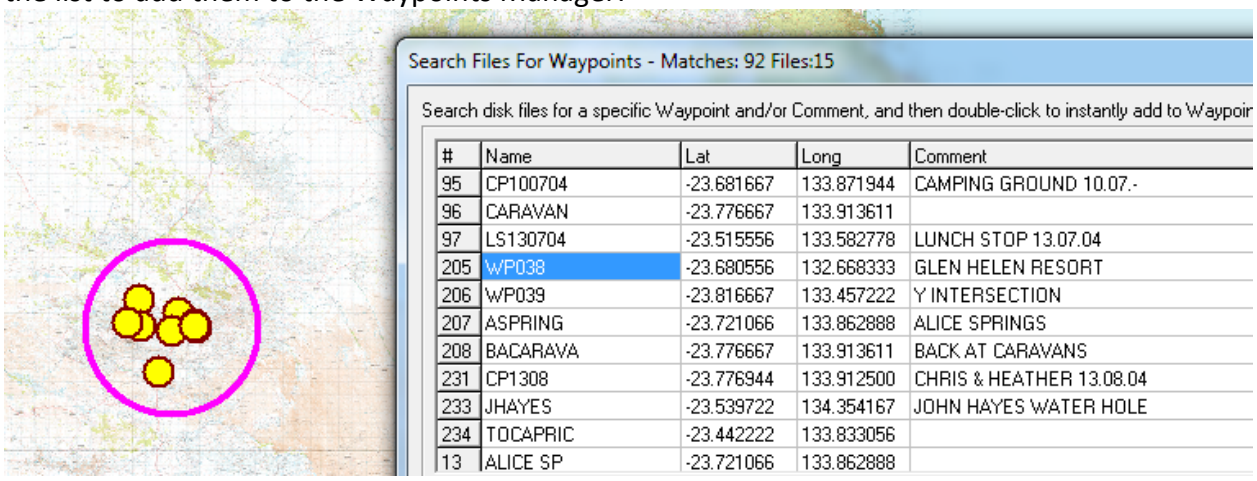


On the Search for Waypoints form, select the required search type from the Radio Group

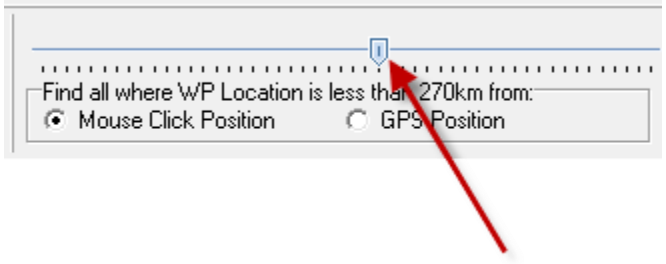


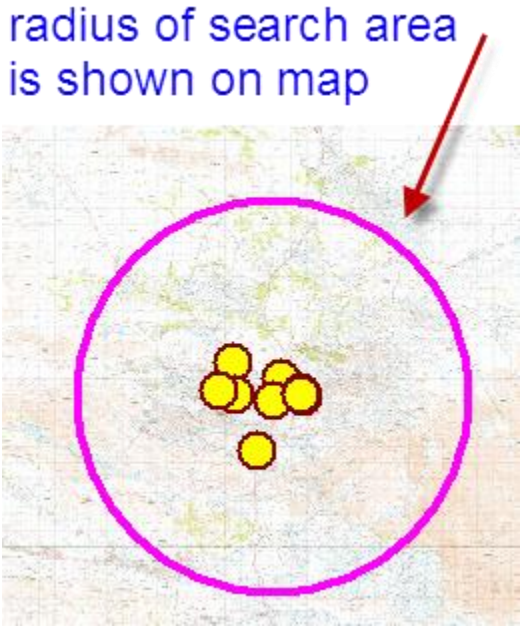
The latitude and Longitude of the 'clicked' or GPS position is shown at the right of the slider.

Set the slider to set the search range. Then press the Search by Proximity button. Only waypoints that are within the proximity range will be listed. Double-click on any items in the list to add them to the Waypoints Manager:

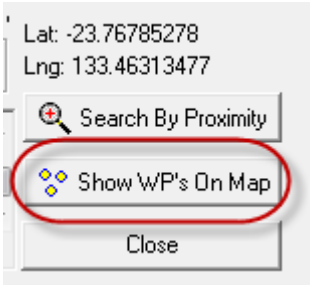


Adjust the radius to suit, and press the Search by Proximity button:





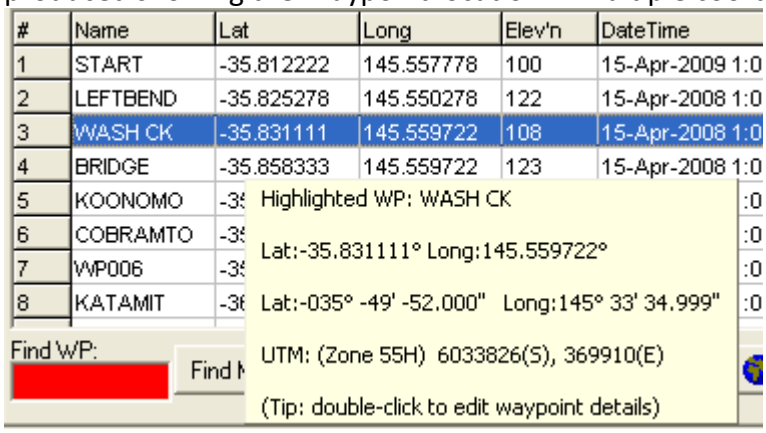
If waypoints are not showing, press the Show WP's on Map button:



The Search for Waypoints form can remain ion screen for more searches. Click on other locations to move the search proximity 'base' position.

Showing Waypoints in other coordinate formats

Click on any of the Waypoints from the list, and a context sensitive display will be produced showing the Waypoint location in multiple coordinate formats

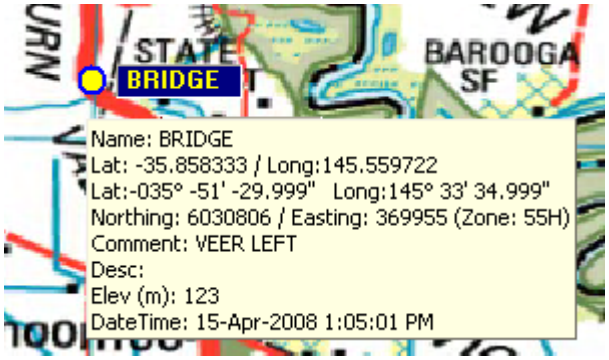


Waypoint Positions on Map

Pressing the hot-key 'W' on the keyboard enables the display of Waypoints that are within the range of the currently opened map. This function may be used to either turn-on or turn-off waypoints (toggle).

Selecting the "Show Wpts" checkbox on the Waypoints Management screen also enables this function.

Waypoints are shown on the map as a Yellow Circle with a Maroon-surrounding ring as follows:

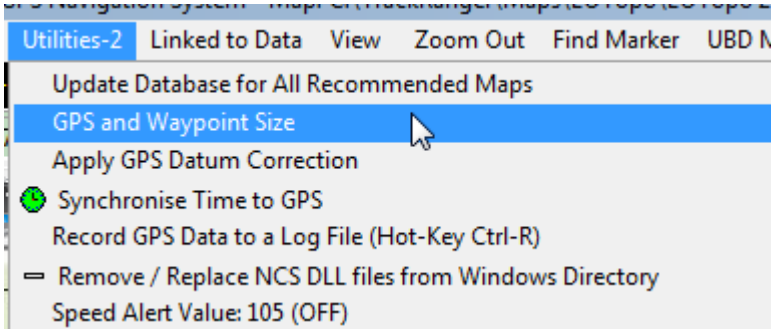


Moving the mouse pointer over the waypoint shows the waypoint name and its associated latitude and Longitude coordinate, and other relevant information.

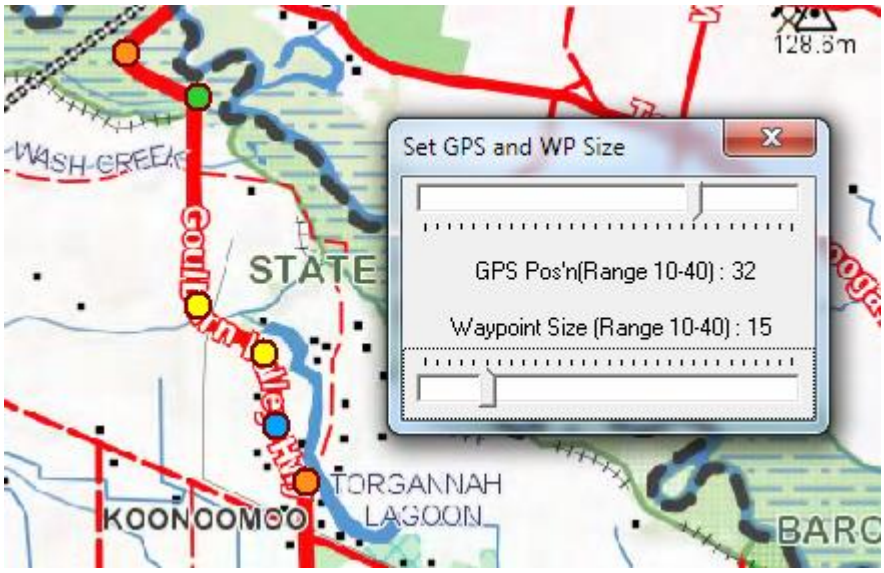
Pressing the space bar also allows the display of all waypoint names simultaneously. Press the space bar again to disable this display.

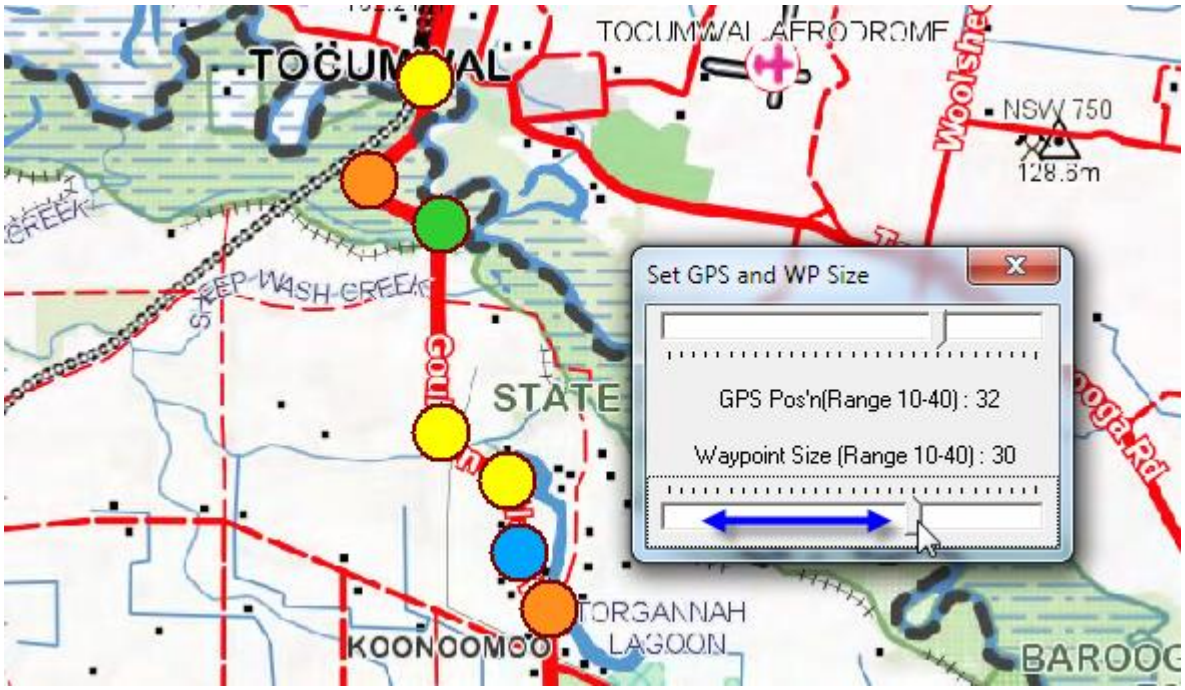
Waypoint Size on Map

The Waypoint Size may be adjusted by selecting the option from the Utilities-2 drop-down menu:



If waypoints are displayed, their size is adjusted as the slider value is changed (tip: see also GPS position size on page 151)



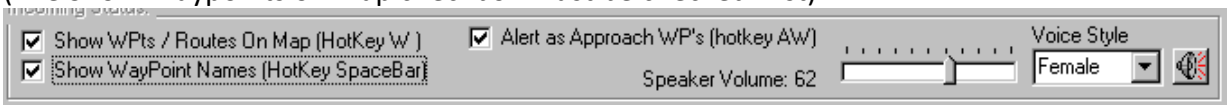


Waypoint Alerts

TrackRanger can alert a driver when a Waypoint is being approached. From the Waypoint Management Page (hot key Control-W), check the Alert when Approaching Waypoint checkbox. TrackRanger Pro 5.4 and later will automatically start presenting alerts, based on Proximity and Speed

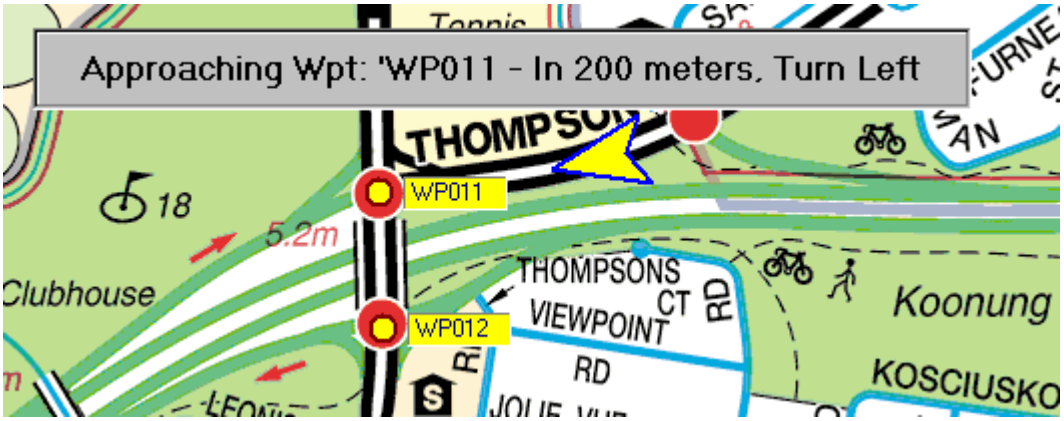
.

(The Show Waypoints on map checkbox must be checked first)



Hot-keys 'AW' may also be used for Waypoint Alert On/Off

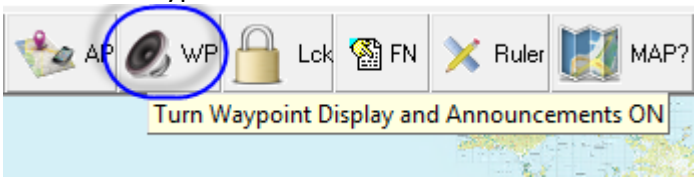
Whenever the GPS location is within the Waypoint threshold distance (approximately 4 kilometers), an audible and visible alert is presented to the operator. The corresponding Waypoint changes colour. A voice announcement is also made using the computers speaker (TrackRanger Pro 5.4 and later). The frequency of the announcement is dependent on the distance from the previous announcement, and the current travel speed.



Tip:
Alerts for Waypoint can also be enabled / disabled with the Hot-Keys 'AW'

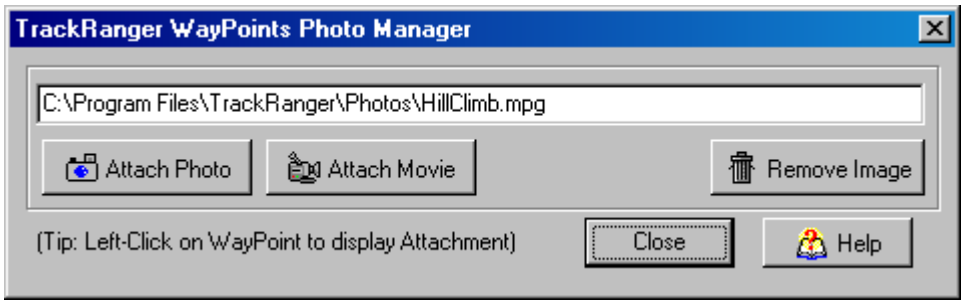
See Section 7, Trip Planning, for more features on Trip Planning and setups.

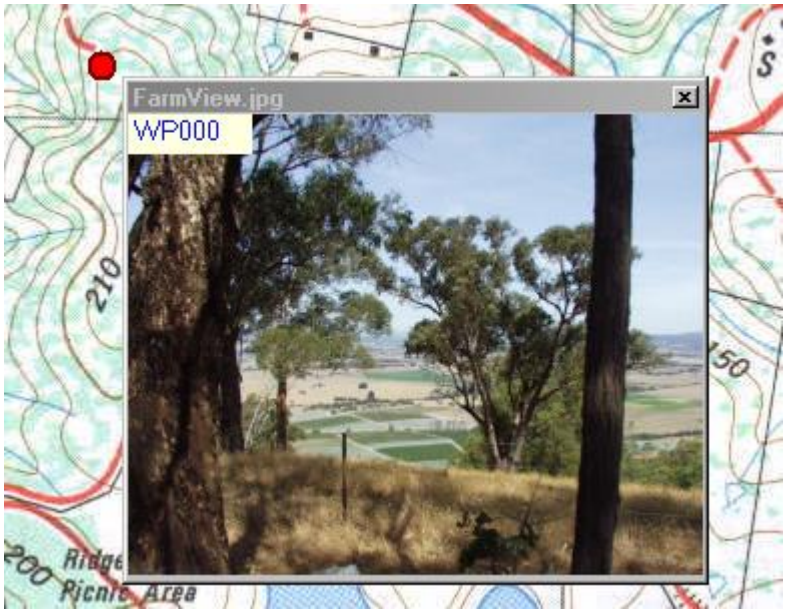
Tip: pressing the Speaker button on the TrackRanger map display mini-toolbar also turns Alerts to Waypoints ON.



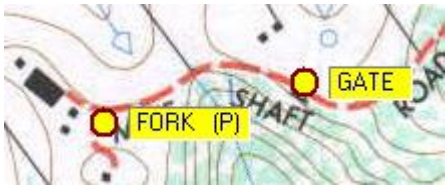
Waypoint Photographs & Videos

Note that TrackRanger also allows the user to attach a photograph (JPG) or a Video Clip (MPG) to Waypoints. Simply right-click on the Waypoint to Attach/Remove an image, and left-click to display the image.





Note that any Waypoints with attached images (Photos), will have their Waypoint name suffixed with a (P). Waypoints with Video attached will show as a (V).



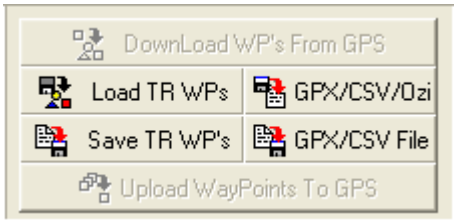
Waypoint Locating from text list

#	Name	Lat	Long
11	ALPHA	-23.642578	146.640015
12	AMMAR	-21.750183	135.249939
13	ANDAM	-30.454102	137.161560
14	ANNIT	-21.214600	136.474915

If the user clicks on any of the waypoints in the list, the corresponding waypoint will flash on the map for easy identification.

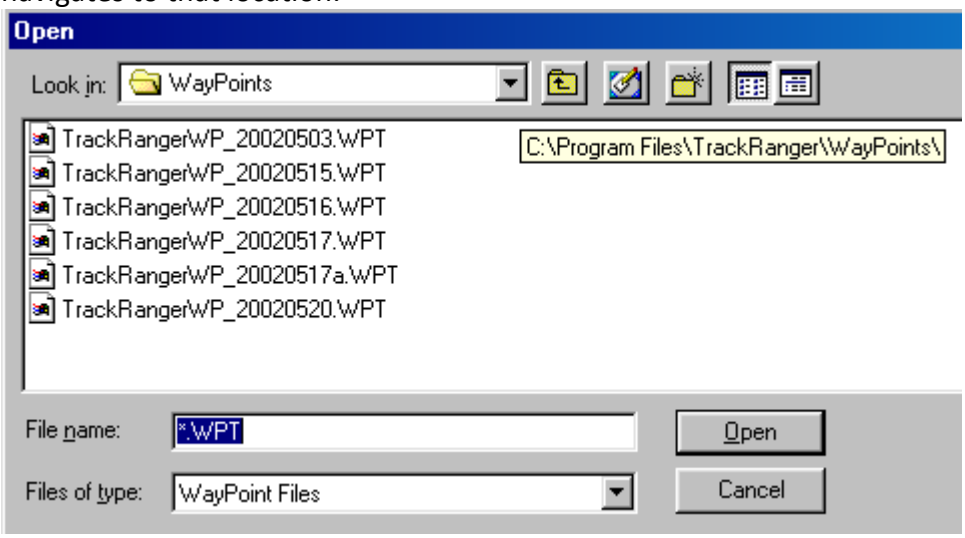
Waypoint Saving

Waypoints may be saved to disk file, and reloaded at a later stage, using the appropriate Load TR or Save TR WP's buttons.



TrackRanger will recommend a file name based on words TrackRangerWP_ followed by the current date e.g. **TrackRangerWP_20020503.WPT**

Waypoints are usually stored in the Waypoints sub-directory of the TrackRanger directory, but TrackRanger remembers the last location that you loaded/saved waypoints to and navigates to that location:



Note that the Save waypoints button will not be enabled until Waypoints have been either downloaded from the GPS, or previously loaded from a disk file.

Auto Load/Save Waypoint file

If a waypoint file has been opened / saved, and the Auto Load/Save file is checked, this file will continue to be automatically loaded and added to when TrackRanger is next started (or if the Load Waypoints from file button is pressed):

No prompts for file overwrites etc are provided when in this mode, and the button captions are changed to inform the user:

This allows a user to keep adding waypoints to the same file without having to reload the file whenever TrackRanger is started.

A message informing the user that Waypoints have been loaded is provided at startup:

To revert to manually opening/saving a file, uncheck the checkbox.

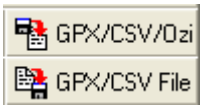
Saving and Reading Waypoint data as CSV Text Files

Waypoints may also be written to or read from a CSV Text File. (Comma Separated Values). The format for the text file is
Record Number,
WPName,
Latitude,
Longitude,
Elevation (m),
Date/Time,
Comment,
Description,
UTM Zone,
Easting,
Northing

The data should appear as follows:

```
  1,START   ,-35.812222,145.557778,100,15-Apr-2009 1:00:00 PM,START OF TRIP,,Zone
55H,369704(E),6035918(S)
  2,LEFTBEND,-35.825278,145.550278,122,15-Apr-2008 1:02:03 PM,STAY SOUTH,,Zone 55H,369047(E),6034460(S)
  3,WASH CK ,-35.831111,145.559722,108,15-Apr-2008 1:04:00 PM,WASH CK BRIDGE,,Zone
55H,369910(E),6033826(S)
  4,BRIDGE  ,-35.858333,145.559722,123,15-Apr-2008 1:05:01 PM,VEER LEFT,,Zone 55H,369955(E),6030806(S)
  5,KOONOMO ,-35.898889,145.574722,121,15-Apr-2008 1:05:08 PM,KOONOOMOO T/OFF,,Zone
55H,371375(E),6026327(S)
  6,COBRAMTO,-35.921944,145.589722,108,15-Apr-2008 1:06:02 PM,TURN RIGHT,,Zone 55H,372765(E),6023790(S)
```

Importing/Exporting GPX/CSV Waypoint data



The "GPX/CSV/Ozi" button allows text based Waypoint data to be read from disk file into TrackRanger

The "GPX/CSV File" button allows Waypoint data to be stored as either GPX format or CSV (Comma Separated values) format

GPX is the GPs data eXchange format that allows sharing of waypoint position information across multiple platforms. More information on GPX can be found at http://www.topografix.com

Tip:
To save in GPX, make sure that the selected file type ends with the characters ".GPX"
To save in CSV format, make sure that the selected file type ends with the characters ".CSV"
Note:
Waypoint data saved in any format except the TrackRanger format will not include any voice navigation information data.

Appending Waypoints from File

With TrackRanger 7.5.14 and later it is possible to have an existing set of Waypoints loaded, and append further waypoints from any other supported file format. Select the "Append" option before opening the waypoint file. See Figure 16.

You can append *any* type of Waypoints to the existing file, e.g. have TrackRanger Waypoints loaded and append further TrackRanger WP's or append Goldmine finder WP's etc.

You can also have Ozi Explorer Waypoints open and append GPX, upt, Ozi, or Goldmine WP's, or TrackRanger WPs etc

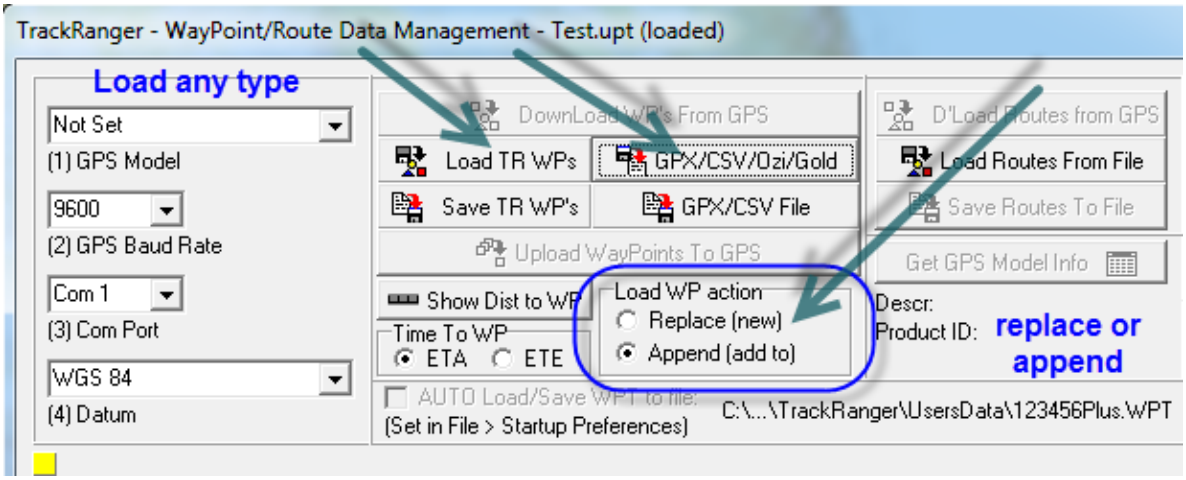


Figure 16 - Appending waypoints from a file

Using Google Maps to create a set of Waypoints for a trip

For creating Waypoints from Google Maps, please refer to the section on Trip Planning on page 90, which covers waypoints and track plan functions combined.

Importing OziExplorer Waypoint data into TrackRanger

TrackRanger Version 6.7 and above can use this button to import relevant Waypoint details from an OziExplorer waypoint file. Select the GPX/CSV/Ozi button, and navigate to the OziExplorer Waypoint file (these files also have a file extension of .wpt (usually lowercase). The file is checked for valid format, and loaded into TrackRanger if possible. The Waypoint names are created using the first 8 characters of the Waypoint Description (space characters are stripped first), and the Waypoint Description is used as the Waypoint comment.

OziExplorer Waypoint files **cannot** be loaded by selecting the "Load TR WPs" button. This will result in a Stream Read Error alert.

Note: TrackRanger cannot export its own waypoint data in OziExplorer format.

By default, the files are written to / read from the Waypoints directory

Pressing the

button allows Waypoints to be uploaded back to the GPS (not required for the TrackRanger GPS, or GPS receivers that don't support waypoints).

Please note that for most GPS units, any existing waypoints in the GPS with the same name will be over-written. Check your GPS documentation for the specifics of your GPS unit.

Remember to set your GPS receiver back to normal NMEA communications before using it to navigate with TrackRanger (not required for Silva and some Magellan GPS units, or the TrackRanger GPS) (See below for Magellan eXplorist)

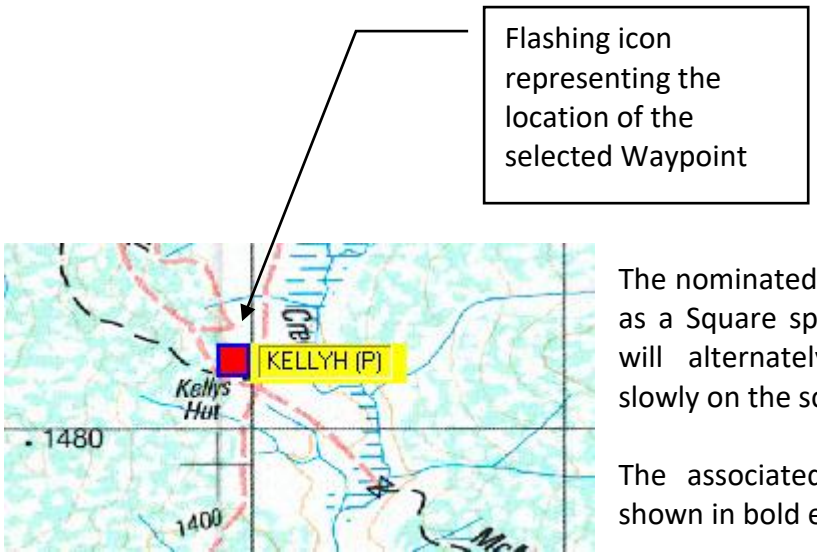
Waypoint "Go To" Function

On GPS receivers with the appropriate functionality, it is possible for TrackRanger to show a nominated "Go To Waypoint" as a flashing icon on the TrackRanger map.

To enable this function, call up the "Go To" Waypoint feature on your GPS unit. The appropriate messages are sent from the GPS (**via the standard NMEA protocol**, NOT the protocol used to download / upload Waypoints!), and received by TrackRanger.

TrackRanger will cause an icon to flash slowly on the screen at the location identified by the waypoint stored in the GPS.

It is important that the NMEA protocol be setup, and also that TrackRanger communications are "Linked" to the GPS (Hotkey 'L'). The GPS must also have a position fix before it transmits "Go To" Waypoint messages (See Valid: Yes on the GPS Coordinates screen).



The nominated waypoint will be presented as a Square spot with a Blue border, and will alternately flash read and yellow slowly on the screen.

The associated Waypoint name will be shown in bold enclosed by square brackets.

To stop the waypoint being displayed, simply cancel the waypoint "Go To" from the GPS receiver.

After canceling a "Go To" the spot will return to normal, but the waypoint name will still appear as bold. This is to indicate the location of the last Waypoint "Go To" that was used.

Note that Waypoint functionality may not be available on all GPS receivers. Some Magellan and Garmin models have this function. The TrackRanger GPS, which connects directly to TrackRanger, does not support this feature, as waypoints can be highlighted directly inside the TrackRanger program.

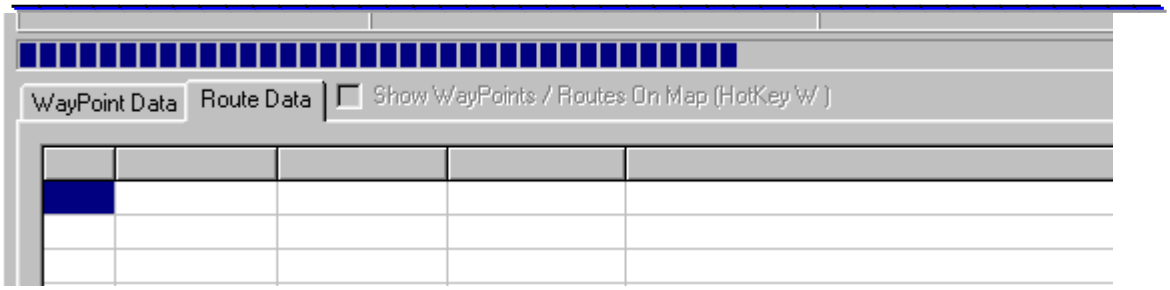
Route Management Functions

Routes may be downloaded from the GPS unit to TrackRanger and stored to disk for later analysis. Before routes can be downloaded, it is important to set the GPS communications so that this functionality is available. In general, the same communications settings that are used for Waypoint functionality applies to Route management.

To download Routes form the GPS, after setting the communications (above), select the Route data tab on the display lists on the form.

Click on the DownLoad Routes from GPS button.

As the routes are being received, a progress bar indicates the status of the transmission from the GPS.



After the routes have been received, they are displayed in the Route data table:

WayPoint Data | Route Data | Show WayPoints / Routes On Map (HotKey W)

#	Name	Lat	Long	Comment
1	Route1	-31.990551	115.939547	CABIN 02 0335
2	Route2	-37.727410	145.135826	01-MAY-02 0232
3	Route3	-37.732254	145.135462	01-MAY-02 0232
4	Route4	-37.740596	145.135698	01-MAY-02 0234
5	Route5	-37.752473	145.134062	User entered comment
6	Route6	-37.756915	145.113478	01-MAY-02 0237

The route names and positions can be changed by simply clicking on the item in the table, pressing the enter key to highlight it and editing the data.

Routes may be saved to disk, but differ from waypoints in uploading as they are recorded by the GPS as a result of a traveled journey, and therefore only received from the GPS, and not sent back to it.

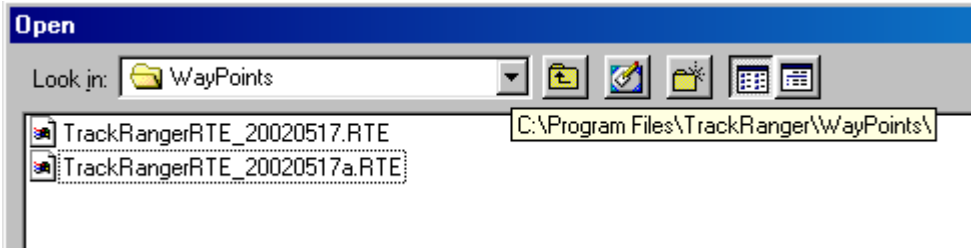
To save a route to disk, press the

button.

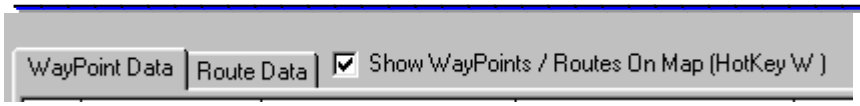
To load a pre-stored route from a disk file, press the

button.

Routes are stored in the same directory as Waypoints, but are given a unique naming convention by using a file type of ".RTE"



Routes can also be displayed on the map by ticking the checkbox on the Waypoints management form:



HotKey ‘W’ may also be used to toggle display of Routes.

Routes are displayed on the map as a Fuchsia coloured dot surrounded by a Maroon circle. This allows them to be easily identified from Waypoints (which are yellow).

Route points shown on map as Fuchsia coloured dots.

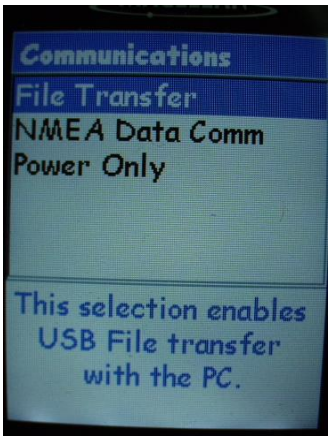
Remember to set your GPS receiver back to normal NMEA communications before using it to navigate with TrackRanger

Waypoint file management with Magellan eXplorist GPS units

To upload / download waypoints from an eXplorist GPS unit, the GPS is switched to a special File Transfer mode, and the waypoints files are copied from the GPS to the PC using Windows Explorer functions.

Note that the Magellan must be switched to USB File Transfer mode first. This is performed on the GPS by selecting

- Menu
- Adv Features
- Communications
- File Transfer:



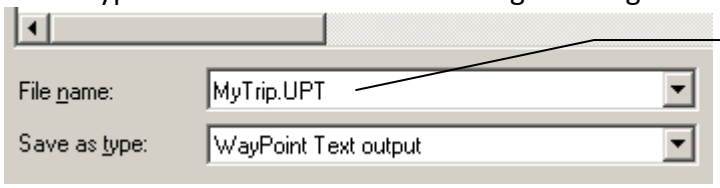
The GPS data files will appear as a removable disk in Windows Explorer.

Name	Size	Type	Modified
Background Maps		File Folder	05-Jan-2005 9:00 AM
Detail Maps		File Folder	05-Jan-2005 9:00 AM
Geocaches		File Folder	05-Jan-2005 9:00 AM
My POIs		File Folder	05-Jan-2005 9:00 AM
Routes		File Folder	05-Jan-2005 9:00 AM
Track Logs		File Folder	05-Jan-2005 9:00 AM
USBTRANS		File Folder	05-Jan-2005 9:00 AM
CRITMEM.MEM	544 KB	MEM File	17-Jan-2007 5:04 AM

The files can then be copied from the GPS unit to the user's PC using Windows Explorer.

Once the files have been downloaded they may then be loaded into TrackRanger by selecting the Read CSV file button from the Waypoints Management Page:

Waypoints may be created manually, manipulated as necessary etc, and then uploaded back to the GPS using the Write CSV file button to save to disk in UPT format, then copying the Waypoints from disk to the PC using the Magellan Mapsend program.

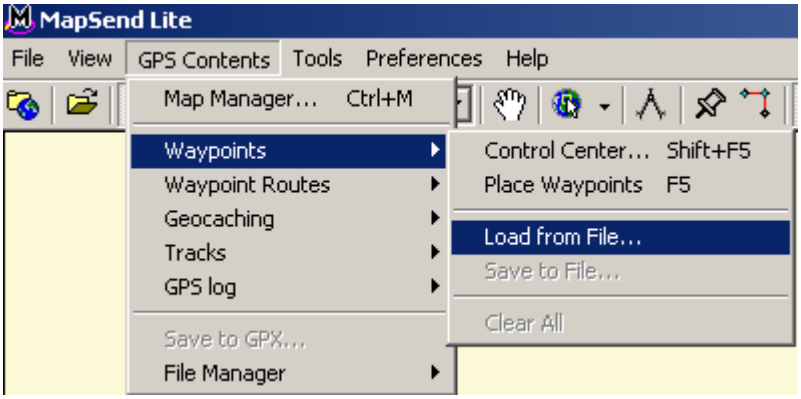


Save as a UPT file extension before using Mapsend to upload to the GPS if necessary

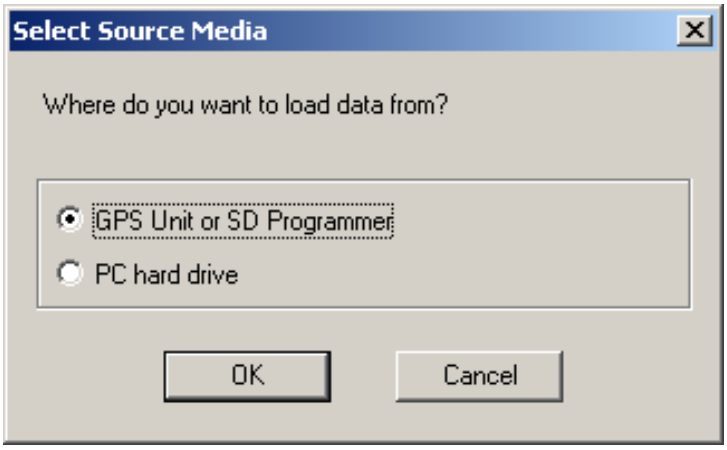
Waypoints may also be copied (downloaded) from the GPS to the PC using Mapsend (lite) if installed.

Make sure the GPS is in USB File Transfer mode, and connected to the PC.

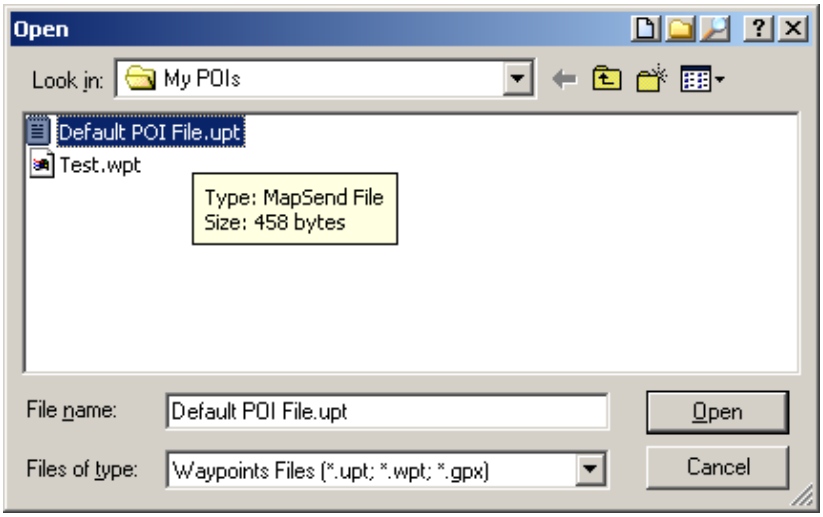
Start Mapsend, select GPS Contents > Waypoints > Load from File…



Specify the GPS unit as the source:

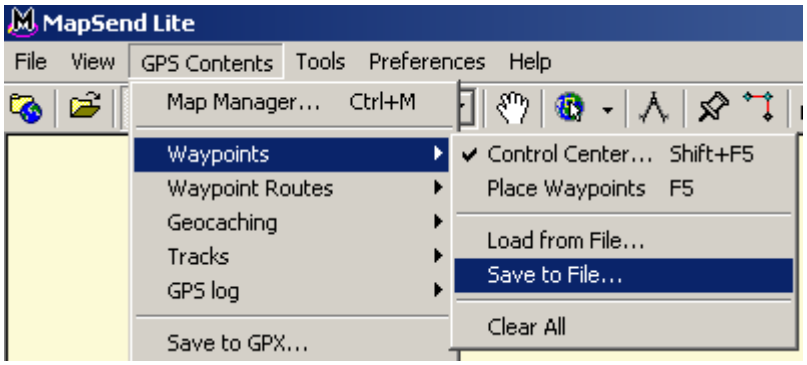


Highlight the relevant *.upt file, and press open:



The Waypoints will be downloaded to Mapsend.

Then select GPS Contents > Waypoints > Save to File… and save the waypoints to your hard drive.

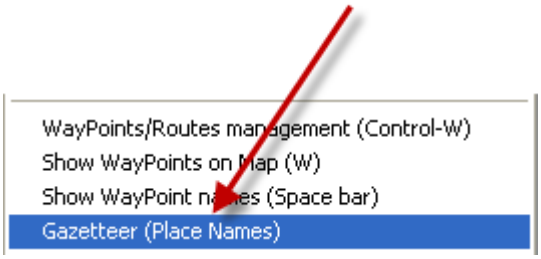


Open the waypoints in TrackRanger if necessary using the Read CSV File button.

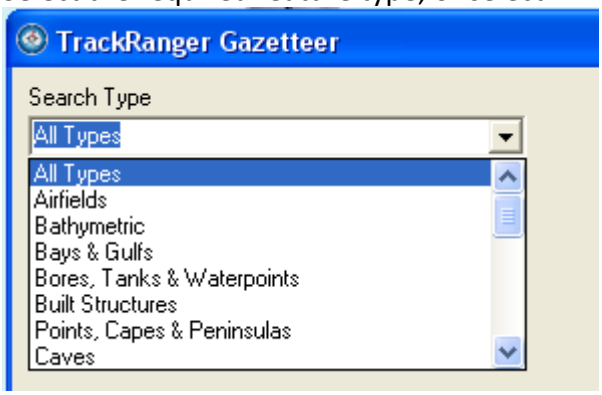
Tip: Remember to set the GPS communications back to NMEA (GSA) after waypoint management functions have been completed between the GPS and TrackRanger.

Gazetteer Place Name Search

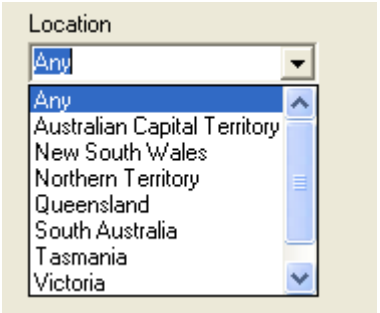
TrackRanger 7.5 and later incorporates a powerful Gazetteer place search function.
Start the Gazetteer from the **View** drop-down menu. It is listed in the Waypoints Section of the menu:



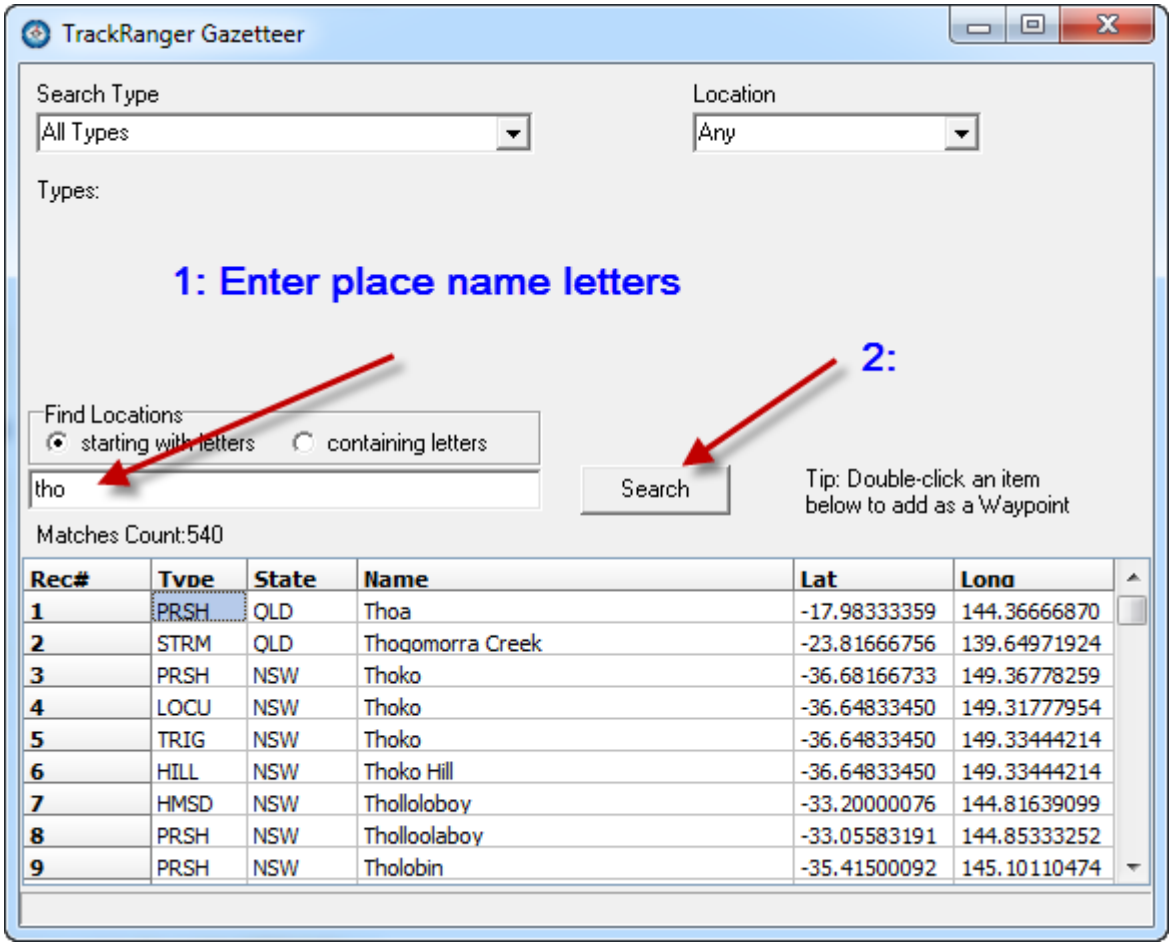
Select the required feature type, or select “All Types” to include everything:



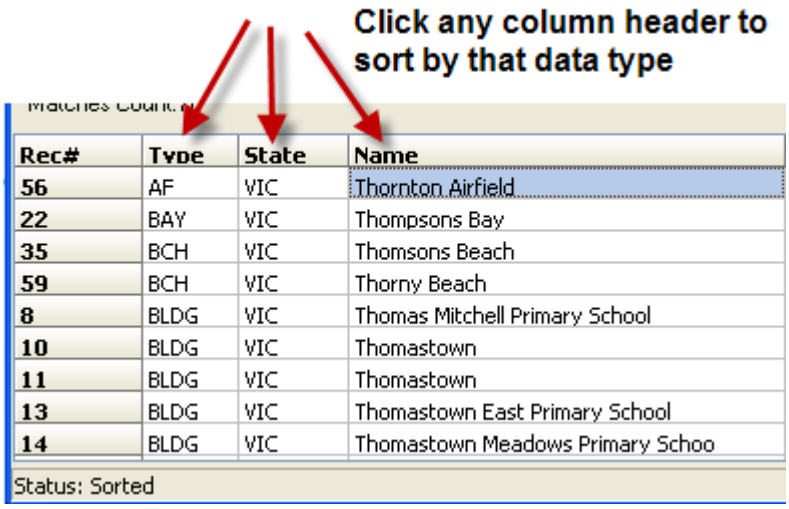
Select the specific location or choose “Any” to search all locations:



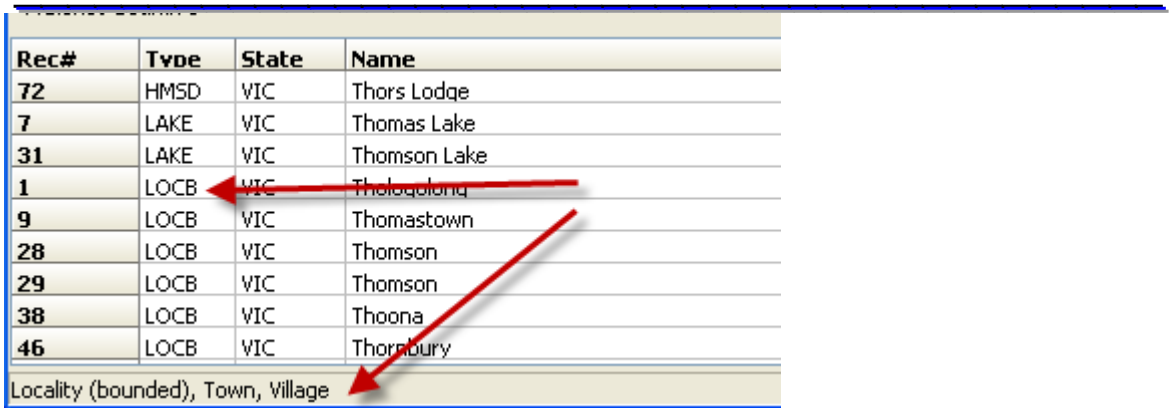
Enter one or more letters that the required place name begins with and press Enter or click on the Search button. The items are searched according to the selected preferences and displayed in the list:



Click on the title column (Name, Type, State etc) to sort by any column



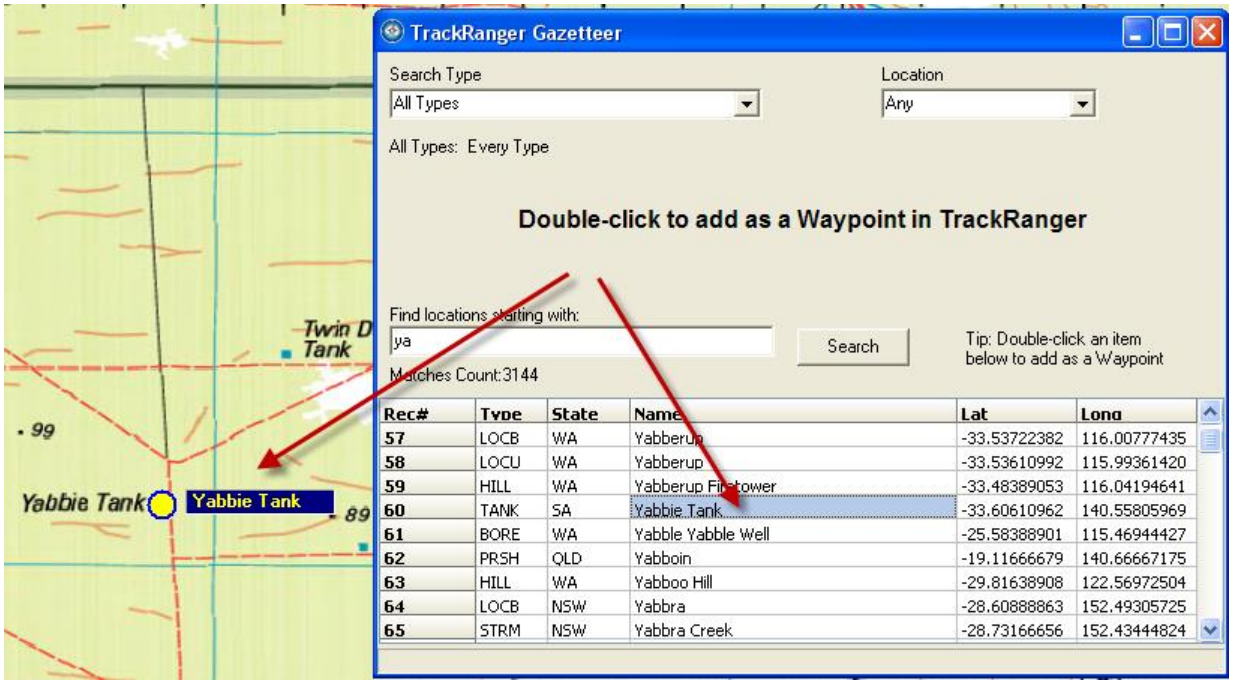
Move the mouse over a “Type” column item to see information about the feature code:



Rec#	Type	State	Name
72	HMSD	VIC	Thors Lodge
7	LAKE	VIC	Thomas Lake
31	LAKE	VIC	Thomson Lake
1	LOCB	VIC	Tholoqolong
9	LOCB	VIC	Thomastown
28	LOCB	VIC	Thomson
29	LOCB	VIC	Thomson
38	LOCB	VIC	Thoona
46	LOCB	VIC	Thornbury

Locality (bounded), Town, Village

Double-click on any item to instantly add it to the map via the Waypoints Manager:



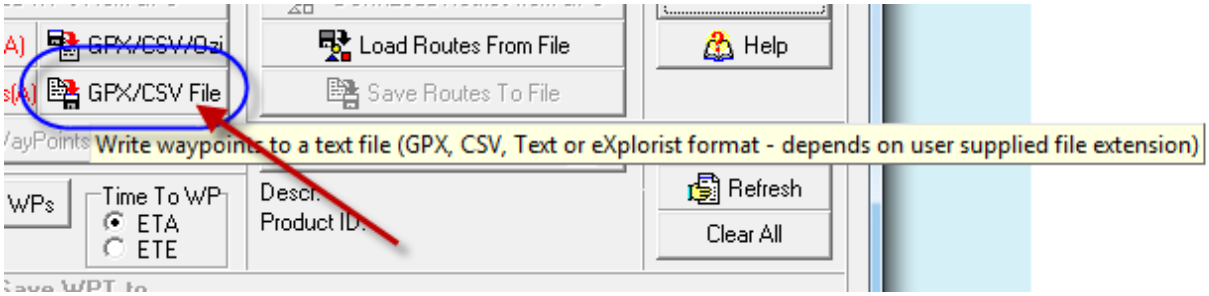
Rec#	Type	State	Name	Lat	Long
57	LOCB	WA	Yabberup	-33.53722382	116.00777435
58	LOCU	WA	Yabberup	-33.53610992	115.99361420
59	HILL	WA	Yabberup Fire tower	-33.48389053	116.04194641
60	TANK	SA	Yabbie Tank	-33.60610962	140.55805969
61	BORE	WA	Yabble Yabble Well	-25.58388901	115.46944427
62	PRSH	QLD	Yabboin	-19.11666679	140.66667175
63	HILL	WA	Yabboo Hill	-29.81638908	122.56972504
64	LOCB	NSW	Yabbra	-28.60888863	152.49305725
65	STRM	NSW	Yabbra Creek	-28.73166656	152.43444824

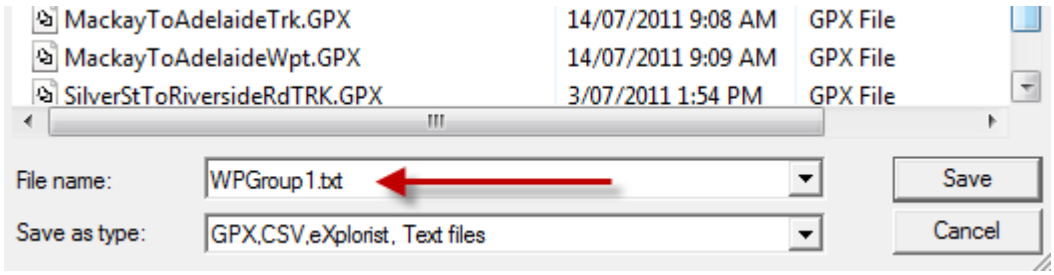
Note: the Gazetteer data is licenced under the Creative Commons agreement.
Please Refer:
http://creativecommons.org/licenses/by/3.0/au/deed.en

Merging Waypoint Files:

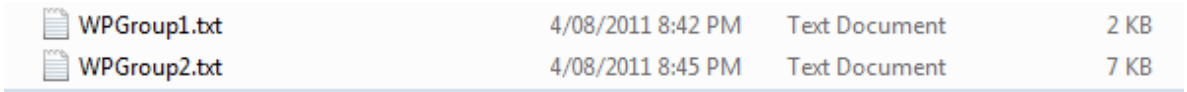
In this example the user requires to merge 2 or more separate waypoint files:

Open the first Waypoint file. In Waypoints manager, export the 1st Waypoint file to a *.txt file



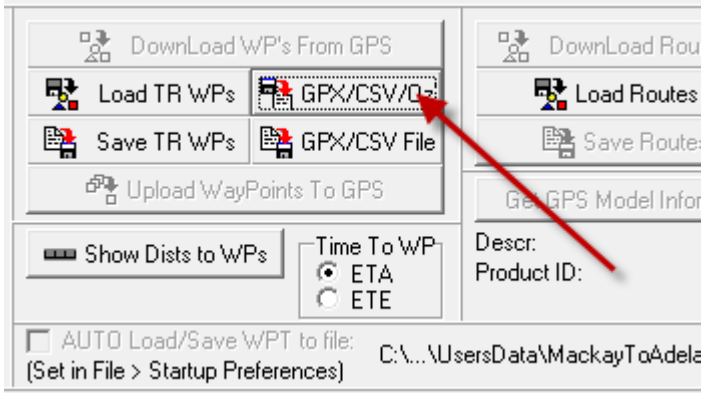


Load further Waypoint Files in TrackRanger. Save them also with different name

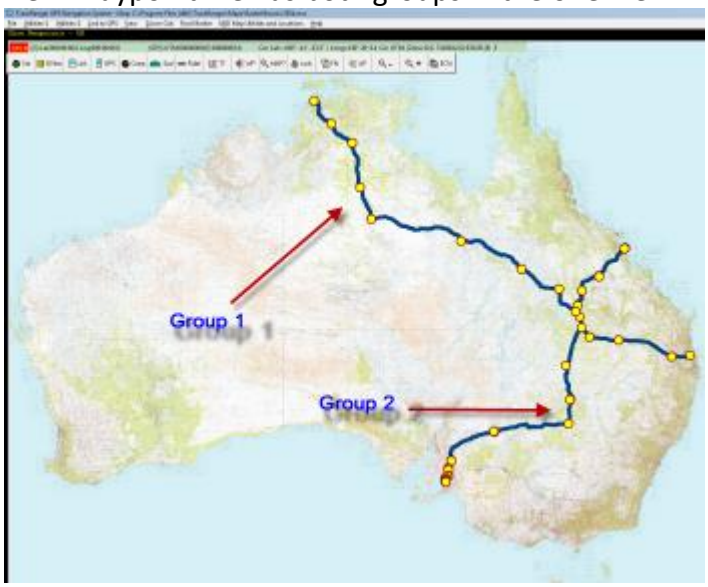


Join these files together using notepad or any editor. To do this, open the files, Select all from one file, copy, and Paste into the second file

Open the new file containing the merged Waypoint groups in TrackRanger



New Waypoint file has both groups in the one file



Save as a TrackRanger format file if required

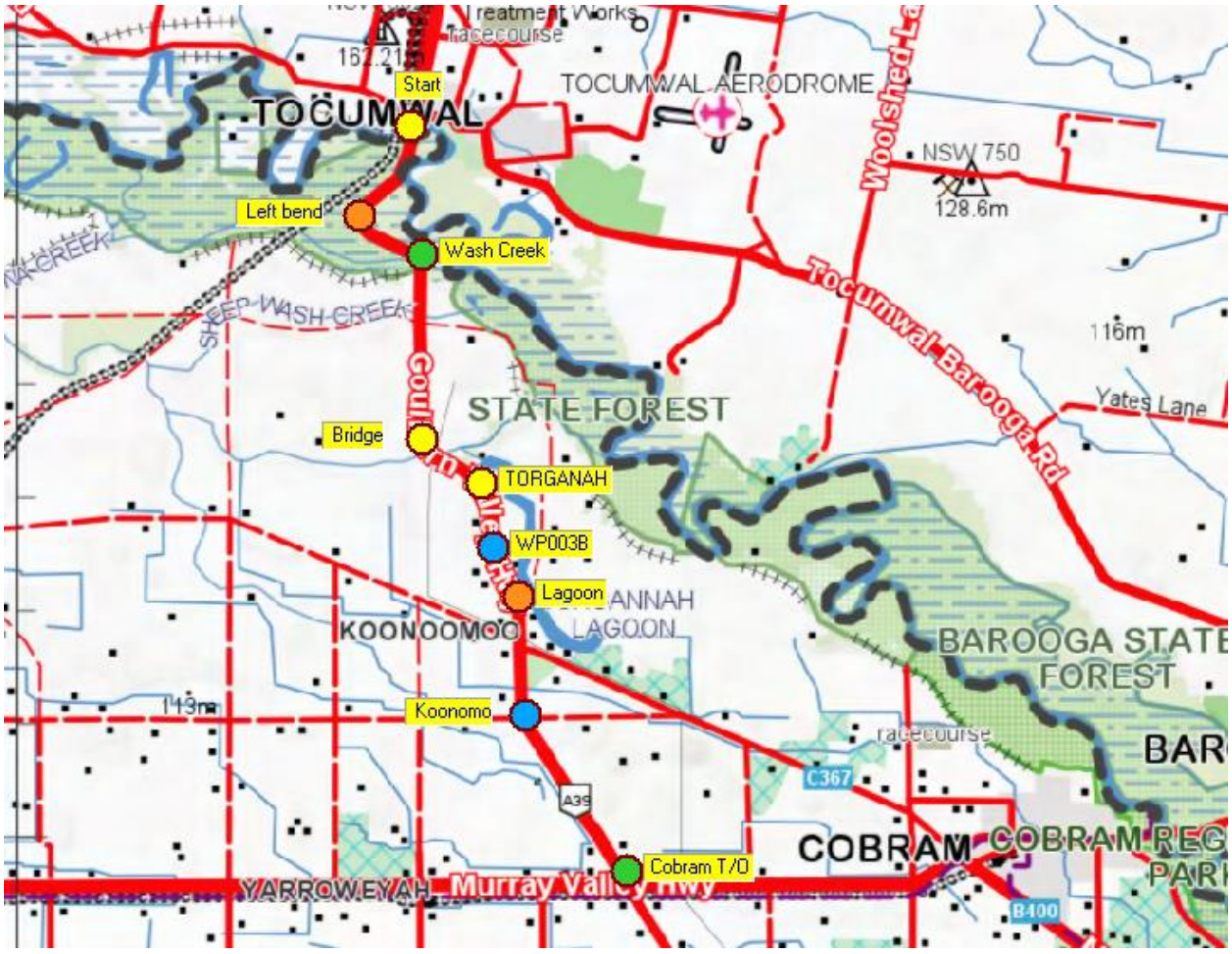


Figure 17 - Multi-coloured waypoints displayed on map.

Section 7 – Trip Planning Distance, Bearing, ETA to Waypoints

TrackRanger allows the user to view distances, direction (bearing), and ETA data to all loaded Waypoints.

Tip: See also information on Waypoints in Section 6 (above).

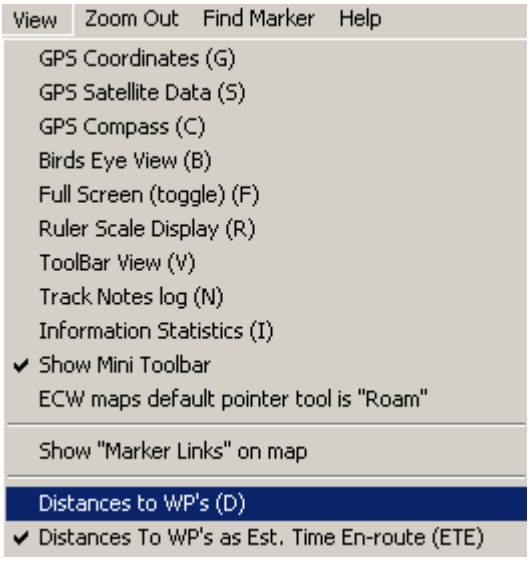
The distances are Straight-Line distances between Waypoints, based on the VMG and averaged speed. The average speed is calculated as a continuous *rolling* average. New speeds, bearings and ETAs are calculated and updated every two seconds.

Note: See also the Section on Track Plan under Track Trace in Section 18, page .153

Showing the Distance Display

The distances display is turned on by any of three methods:

1. Pressing the hot-key 'D',
2. Pressing the "Show Dists to WPs" button on the Waypoints form (hot-key 'W').
3. From the View drop-down menu (below),



Pressing the 'D' key again, or re-selecting the Distances to WPs item from the view menu will turn the display off.

The display provides a list of the Waypoints as shown in the Waypoints display.

Interpreting the distances display

Valid GPS data must be received for the display to update. The speed must be greater than zero for the ETA data to be updated (i.e. Vehicle not stationary).
The Distance value is appended with one of three characters(+, -, =)

The Plus sign (+) indicates that the GPS position is approaching the Waypoint (i.e. the current distance is less than the previously calculated distance).

The Minus sign (-) indicates that the GPS position is moving away from the Waypoint (i.e. the current distance is greater than the previously calculated distance).

The Equals sign (=) indicates that the GPS position has not changed from the last sample taken (i.e. the distance is the same).

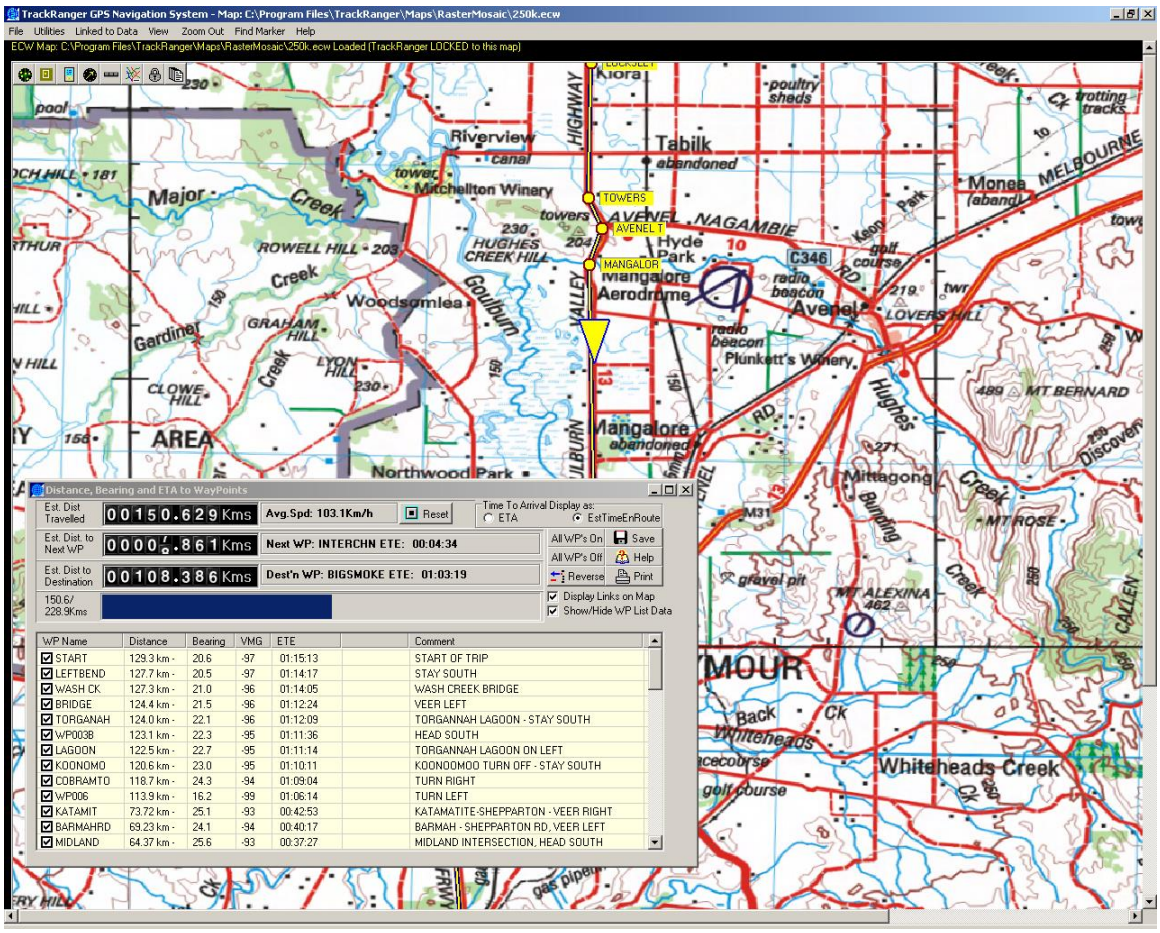


Figure 18 - Distance, Bearing and ETA to Waypoints display (Estimate Time En-route time format selected)

The bearing shows the direction needed to be taken to arrive at the listed Waypoint. Zero degrees represents north.

Estimated Distance Travelled and Average Speed

The top-left corner of the Distances & Bearing to Waypoints page shows an odometer that display the current distance traveled, and "rolling averaged" speed (since last reset).

The values shown are in Kilometers to three decimal places. To start measuring a new distance, press the Reset button. You are given the option of resetting the Average Speed also.

Estimated Distance to Next WP

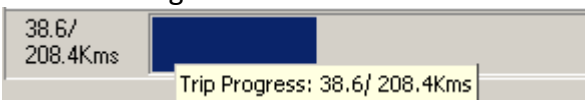
The expected next Waypoint is shown in the display, together with expected remaining travel distance, and ETA / ETE depending on which item is selected.

Estimated Distance to Destination

This value is based on the distance between the current GPS location, and the successive Waypoints that have been chosen for inclusion in the result displays.

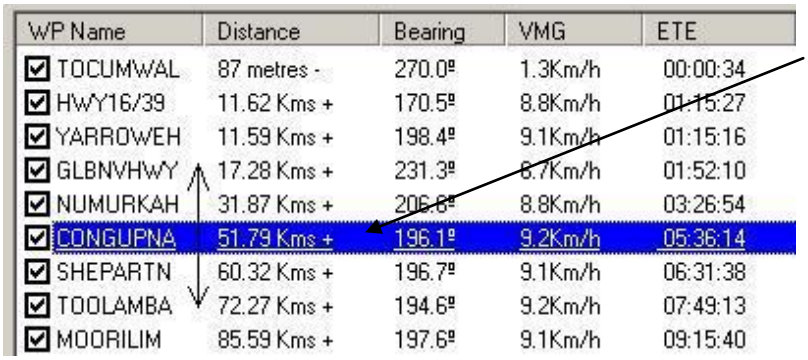
Trip Progress

The trip progress is a progress bar, which provides the user with a visual indication of the distance travelled. This allows the user to quickly identify travelled distances, as well as the remaining distance.



Waypoint Sequence Ordering

The sequence of ordering of the Waypoints may be changed at any time by clicking and holding the Waypoint with the left mouse button, and dragging it to a new location, then releasing the mouse button. The Waypoints list may be enlarged by resizing the page to facilitate location of the desired new placement location.



To change the sequence of ordering of Waypoints in the list, click and drag the Waypoint to a new location then release the mouse button

(Tip: Double-click on an item in the list to directly edit the waypoint)

Time to Arrival as Absolute or Estimated Time En-route

The ETA lists the Estimated Time of Arrival at the listed Waypoints.

Two different views of ETA are available
1: ETA – the estimated time and date of arrival, based on the current average speed
2: Estimated Time En-route (ETE) – the travel time to arrival in Hours, Minutes and Seconds

The date column shows the estimated Date of Arrival. The date is only shown for ETE format

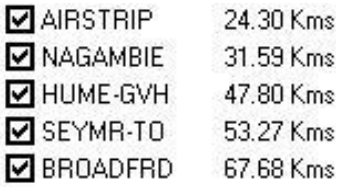
To change between Absolute and ETE Time, either select the option from the View drop-down menu:

Change the value from the Waypoints Management page:

or
Change from the Distances and Bearing to Waypoints page:

Distances Checkboxes

A Checkbox is shown adjacent to every Waypoint in the list. Only Waypoints with this checkbox 'checked' are included in the calculation of ETA. This is useful if a stopover might be taken, such as a short trip along a side road or to an adjacent location. Checking this item allows the Waypoint to be included in total distance and ETA calculations, leaving the item un-checked omits it from these calculations (please note however, that TrackRanger will still list it as the Next Waypoint if it is the nearest Waypoint with a positive Velocity Made Good value.



Showing Route Links on Map

Pressing the Display Links on Map checkbox allows links made up of the current (route to be overlaid on the map. The links correspond to the Waypoint in the list that are checked, and they are produced as an overlay on the map in the same order as they are shown in the list.

Tip: Hot keys ‘AL’ perform the same function.

Locating Waypoints on the Map from the Distances to Waypoint display

Waypoints can be highlighted and shown on the map by clicking an item on the distances page. This is the same as highlighting a Waypoint from the Waypoints management page (see Waypoints in Section 6).

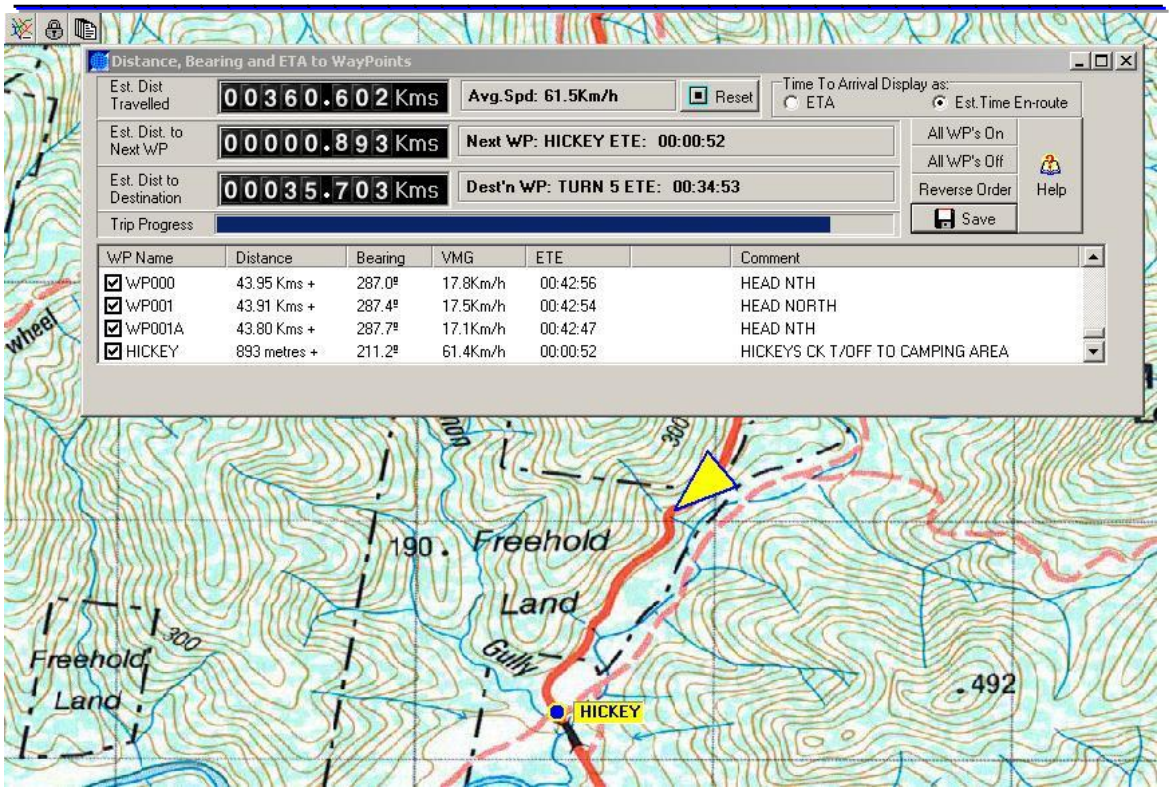


Figure 19 - Distance, Bearing and ETA display with Waypoint: HICKEY highlighted, and Estimated Time En-route format selected (HH:MM:SS to WP)

Note that the distance values are calculated based on straight-line distances only between Waypoints. ETA between Waypoints is calculated using the current average GPS speed. ETA between the current GPS position and the next Waypoint is calculated using the Velocity Made Good value, providing the VMG is positive, otherwise, the current Average Speed is used (see below for information on VMG).

Velocity Made Good (VMG) values

The term "Velocity Made Good", otherwise known as VMG, is the effective speed considered to be undertaken along a calculated bearing line. This imaginary line is the line between the GPS Position and the selected waypoint, but is influenced by the GPS bearing. In other words, Velocity Made Good is the calculated speed at which you are traveling towards (or away from) the waypoint. This is explained further in the Figure 20 and Figure 21 below:

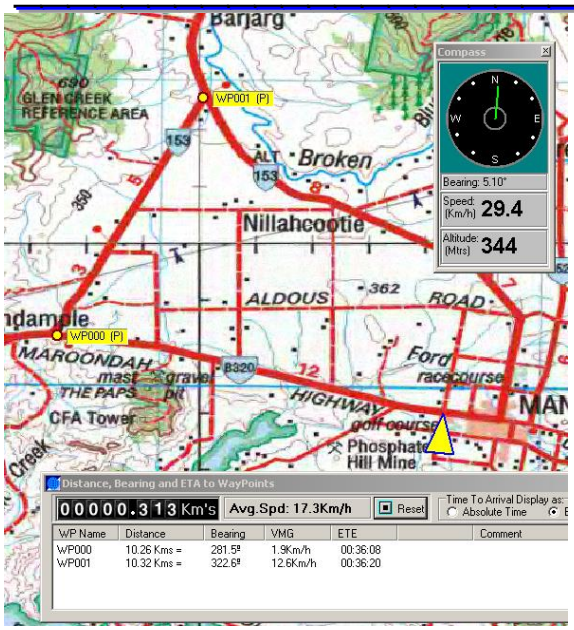


Figure 20 - Velocity Made Good to two Waypoints showing different calculated speeds to the two WPs at different locations. In the first case, VMG to WP001 is higher. Even though the distances are similar, the *direction* from the GPS position is also taken into account.

Figure 21 - As WP000 is approached, the effective speed (VMG) to WP000 increases, while the speed to WP001 decreases. This is because the GPS direction is effectively moving away from the bearing required to travel towards WP001, hence the VMG speed to that Waypoint is lower.

All WP's ON

It is important to remember that only waypoints that are selected in the checkbox at the left of the list will be used for ETA calculations (see Distance Checkboxes, above). Pressing this button selects every Waypoint in the list.

All WP's OFF

Opposite to all Waypoints ON, pressing this button instantly de-selects every Waypoint, meaning that none of them are used for the calculation.

Reverse Order

This allows the order of all of the Waypoints in the list to be instantly reversed. This feature may be useful for example, for the return journey of a trip that has already been undertaken.

Save

The Save button may be used to save the current Waypoints, complete with any changes, without the need to revert to the Waypoints management display (hot-key Control-W)

Print

The Print button (on the Distances page) allows a Travel Route Summary sheet to be printed. This prints a list of waypoints, locations (lat/long) as well as accumulated distances and comments data. A sample section of the printout is shown below:

TrackRanger Travel Route Summary: AAATocumwalToMelbourne.WPT

Waypoint	Use	Latitude	Longitude	Est.Dst	Acc.Dst	Comment
TOCUMWAL	Y	035°48'48"	145°33'32"	0m	0.0m	START
HWY16/39	Y	035°55'22"	145°35'25"	12498m	12.5km	
YARROWEH	Y	035°55'25"	145°31'52"	5330m	17.8km	
GLBNVHWY	Y	035°55'27"	145°25'53"	8982m	26.8km	
NUMURKAH	Y	036°05'48"	145°25'49"	19187m	46.0km	
CONGUPNA	Y	036°18' 7"	145°25'51"	22833m	68.8km	
SHEPARTN	Y	036°22'46"	145°23'57"	9075m	77.9km	
TOOLAMBA	Y	036°29'50"	145°23'22"	13129m	91.0km	
MOORILIM	Y	036°36'44"	145°19' 7"	14272m	105.3km	
NEWHWY	Y	036°40'43"	145°14'21"	10237m	115.5km	
AIRSTRIP	Y	036°42' 8"	145°12' 6"	4252m	119.8km	
NAGAMBIE	Y	036°46'18"	145°09'21"	8739m	128.5km	
HUME-GVH	Y	036°58'58"	145°08'41"	23502m	152.0km	
SEYMR-TO	Y	037°01'48"	145°06' 5"	6512m	158.5km	
BROADFRD	Y	037°11'44"	145°04' 7"	18643m	177.2km	
WFORD-PK	Y	037°19' 1"	145°02'54"	13620m	190.8km	
WALLAN	Y	037°23'29"	145°01'34"	8511m	199.3km	
KALKALLO	Y	037°30' 2"	144°57'12"	13738m	213.1km	
CRAIGEBN	Y	037°34'27"	144°56'29"	8255m	221.3km	
RINGROAD	Y	037°41'33"	144°57'33"	13255m	234.6km	
METRO-RR	Y	037°41'44"	145°05'35"	11789m	246.4km	END OF TRIP

Points to note on Waypoint Linking:

TrackRanger cannot of course know the road exists, nor can it implicitly follow it. TrackRanger can only show its position on earth based on data received from satellites orbiting out in space.

TrackRanger uses a combination of vehicle speed, vehicle direction, and Velocity Made Good calculations (VMG), together with the distance to the nearest waypoint to try to intelligently determine which is the next waypoint that will be arrived at.

If the 'next' waypoint is a long way away, TrackRanger can sometimes (momentarily) suggest that a different waypoint might be the next waypoint that is expected to arrive at. This happens because a closer waypoint with a higher VMG may be encountered, even though the waypoint is not in the current path. Most noticeable, this occurs when TrackRanger's direction is continually changing, such as when making a severe or sharp turn.

TrackRanger could have been designed to only follow the 'intended' route, but on the way, if an alternative route was taken, then TrackRanger itself would 'get lost', an unacceptable situation.

The prediction algorithm is designed so that if a detour is taken (expectedly or unexpectedly), TrackRanger can 'pick up where it left off' once the intended route is re-established.

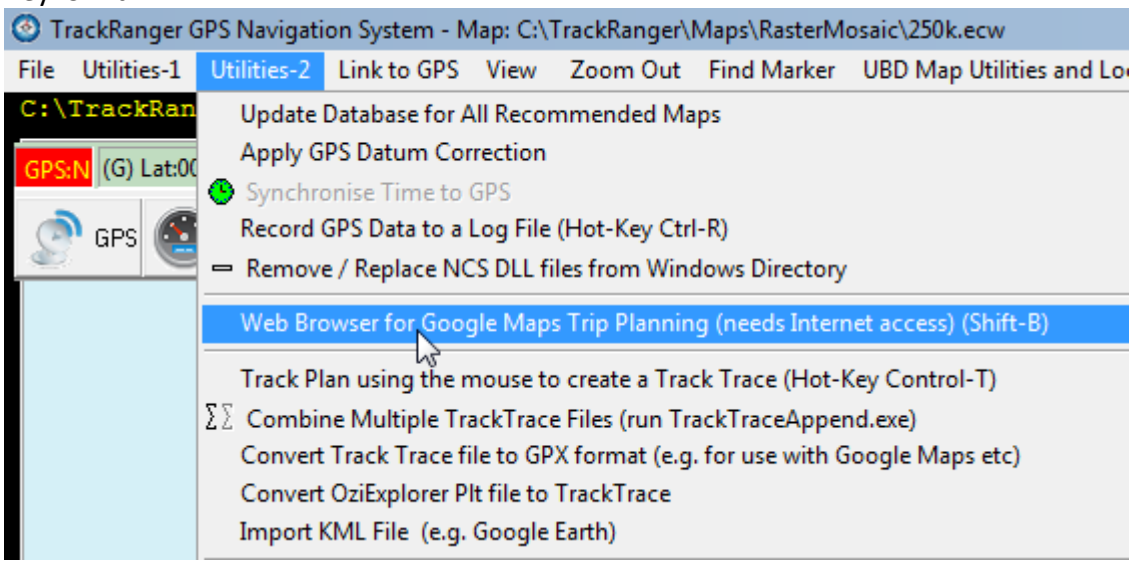
TRIP Planning using Google Maps (includes Waypoints)

Tip: A Video describing the complete process is available from this link:
http://www.advantechdesign.com.au/overview

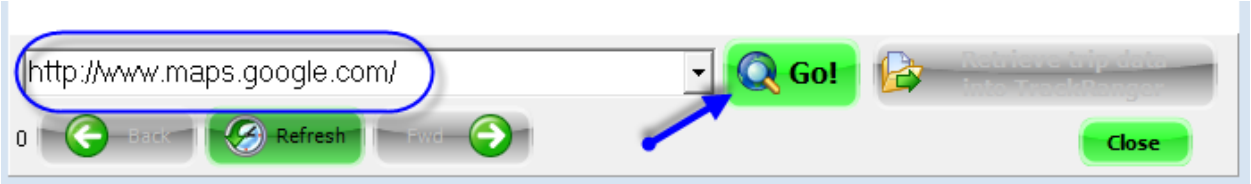
It is possible to create a trip plan with directions as waypoints directly inside TrackRanger using Google Maps

Note: Internet Access is required to undertake these steps

Launch TrackRanger's own integrated Web Browser from the Utilities-2 menu, or use Hot-Key: Shift-B

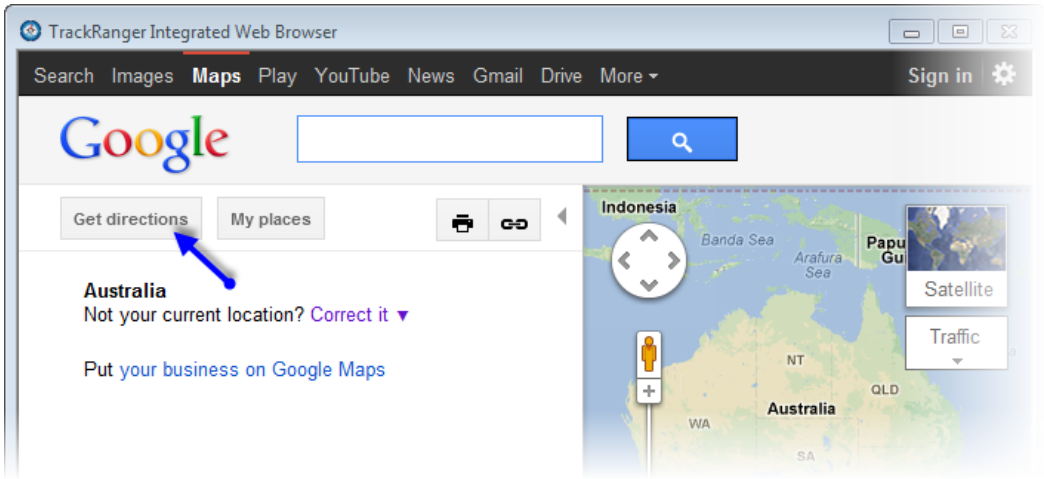


With the maps.google.com url selected, press the Go! button

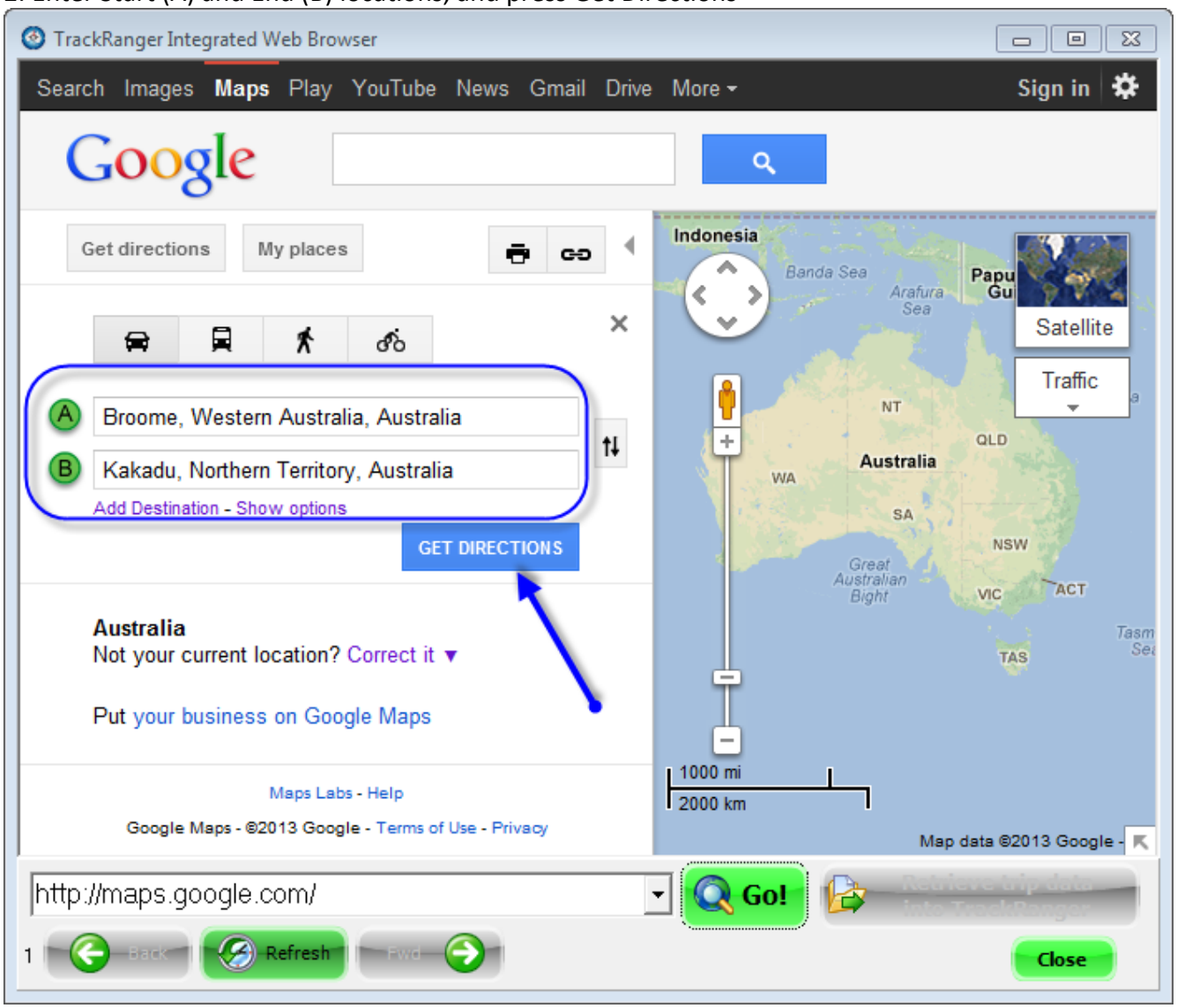


Then just follow these simple steps:

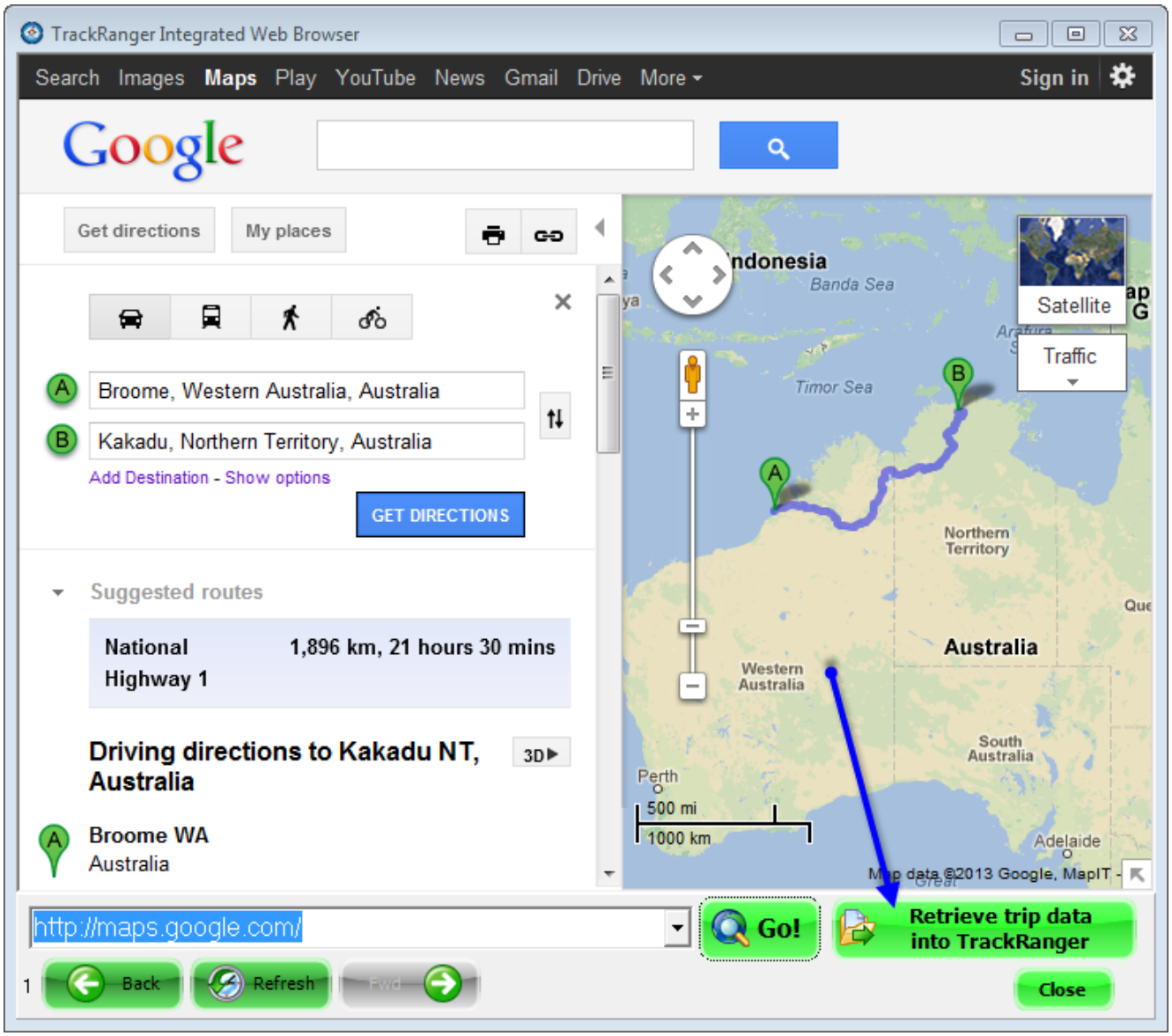
1: Click on Get Directions link:



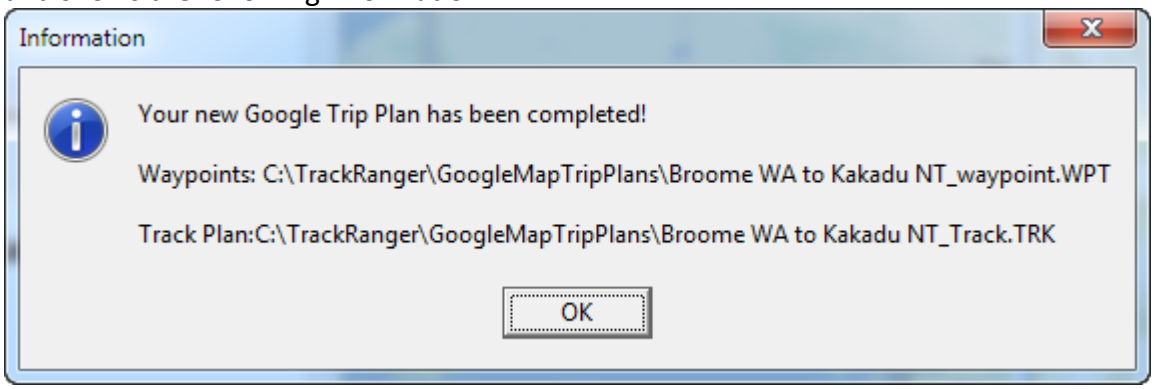
2: Enter Start (A) and End (B) locations, and press Get Directions



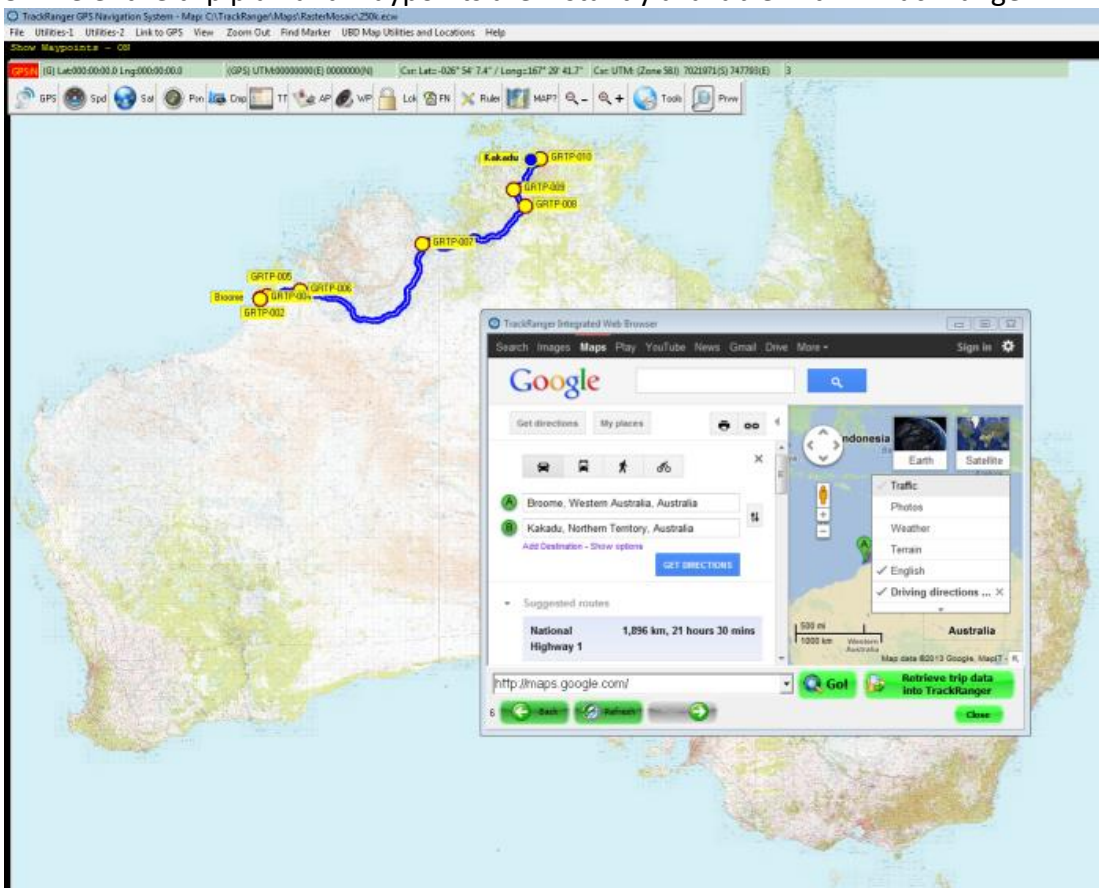
3: The trip plan is worked out, and the 'Retrieve trip data into TrackRanger' button becomes enabled. Press the button to import the data directly from the integrated browser into TrackRanger:



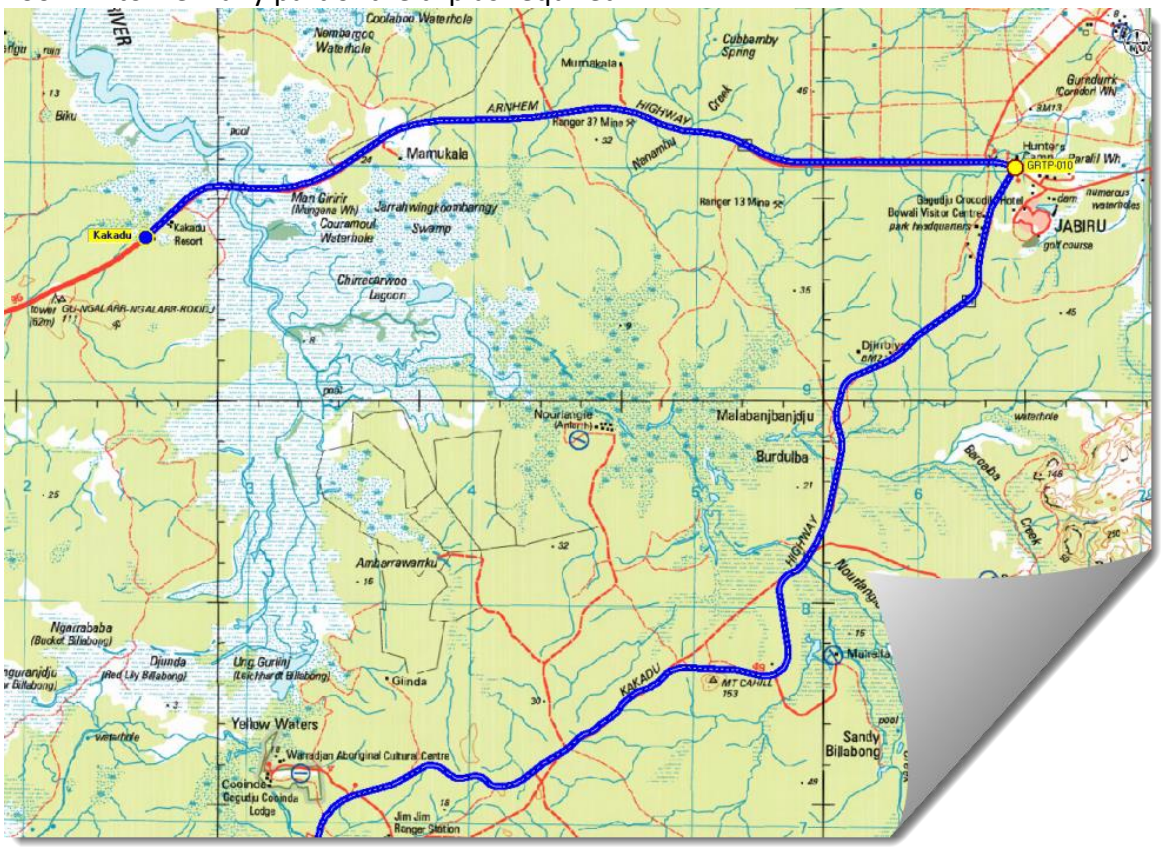
4: TrackRanger imports the data, creates the necessary files (Track Plan and Waypoints) and shows the following information:



5: The entire trip plan and waypoints are instantly available within TrackRanger

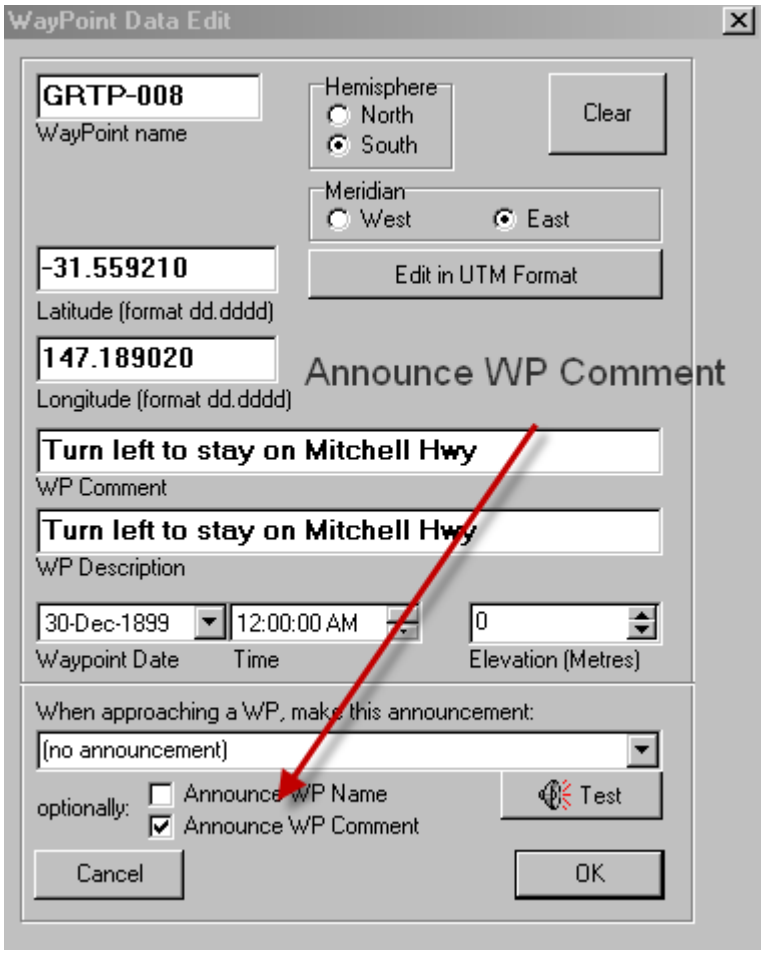


Zoom in to view any part of the trip as required.



Tip: Edit the waypoint and allow TrackRanger to announce the Waypoint Comment to get turn-by-turn directions inside TrackRanger!

Tip: Press the Announce All WP Comments to turn them all on



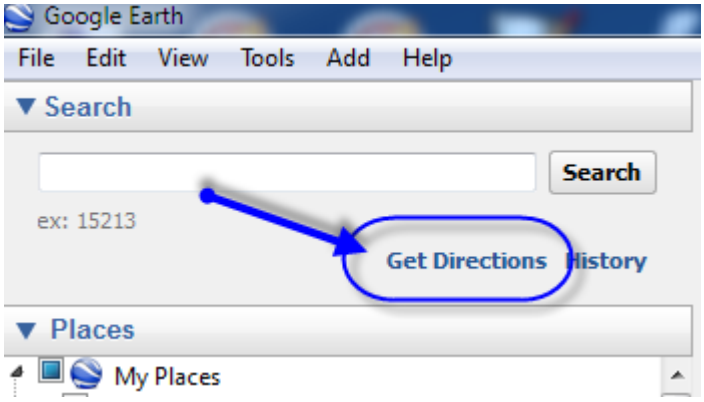
Tip: Track plot data can also be created from Google Maps and imported into TrackRanger. See “TRIP Planning using Google Maps” on page 90 for more information.

TRIP Planning using Google Earth (includes Waypoints)

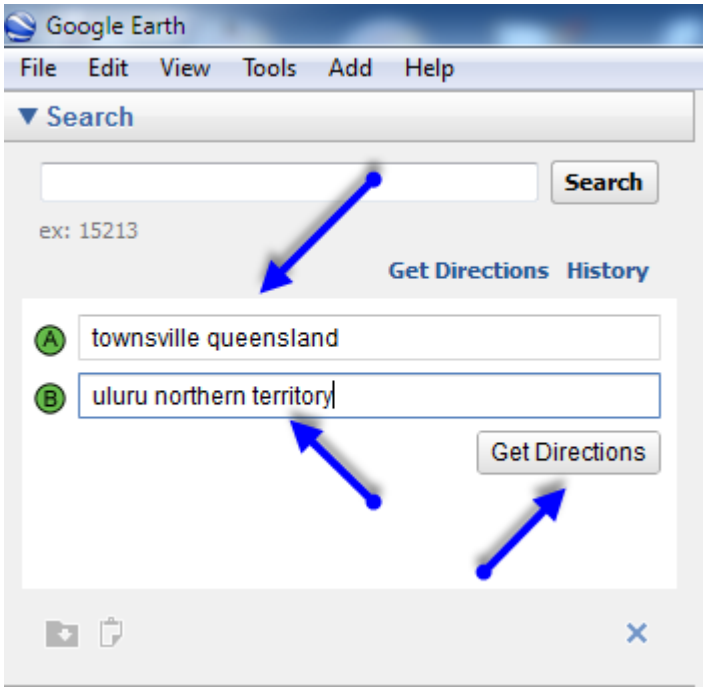
Keyhole Markup Language (KML) was developed for use with Google Earth, which was originally named Keyhole Earth Viewer. TrackRanger allows Google Map KML data to be extracted from Google Earth and imported into TrackRanger using copy and paste functions. It can also directly import Google KML data files.

This first section describes how to use the copy and paste option:

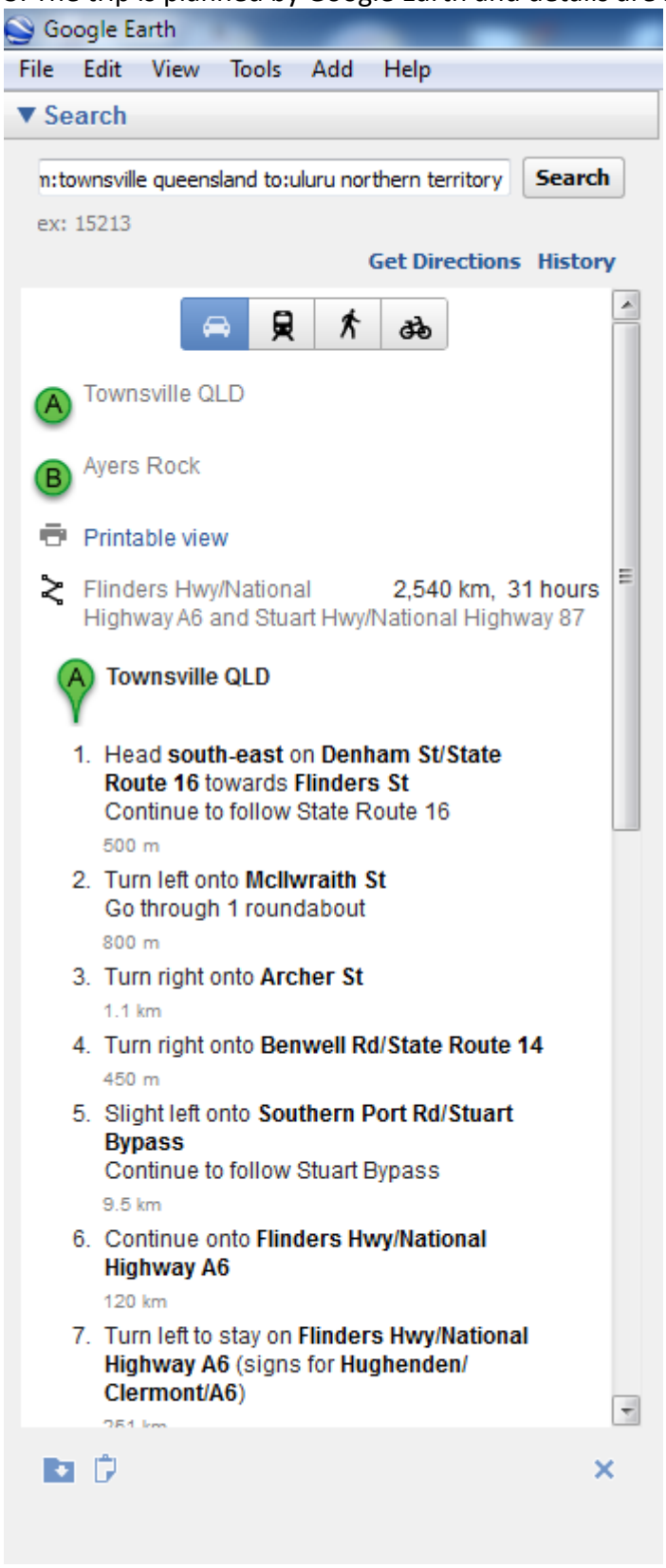
1: Start Google Earth, select Get Directions:



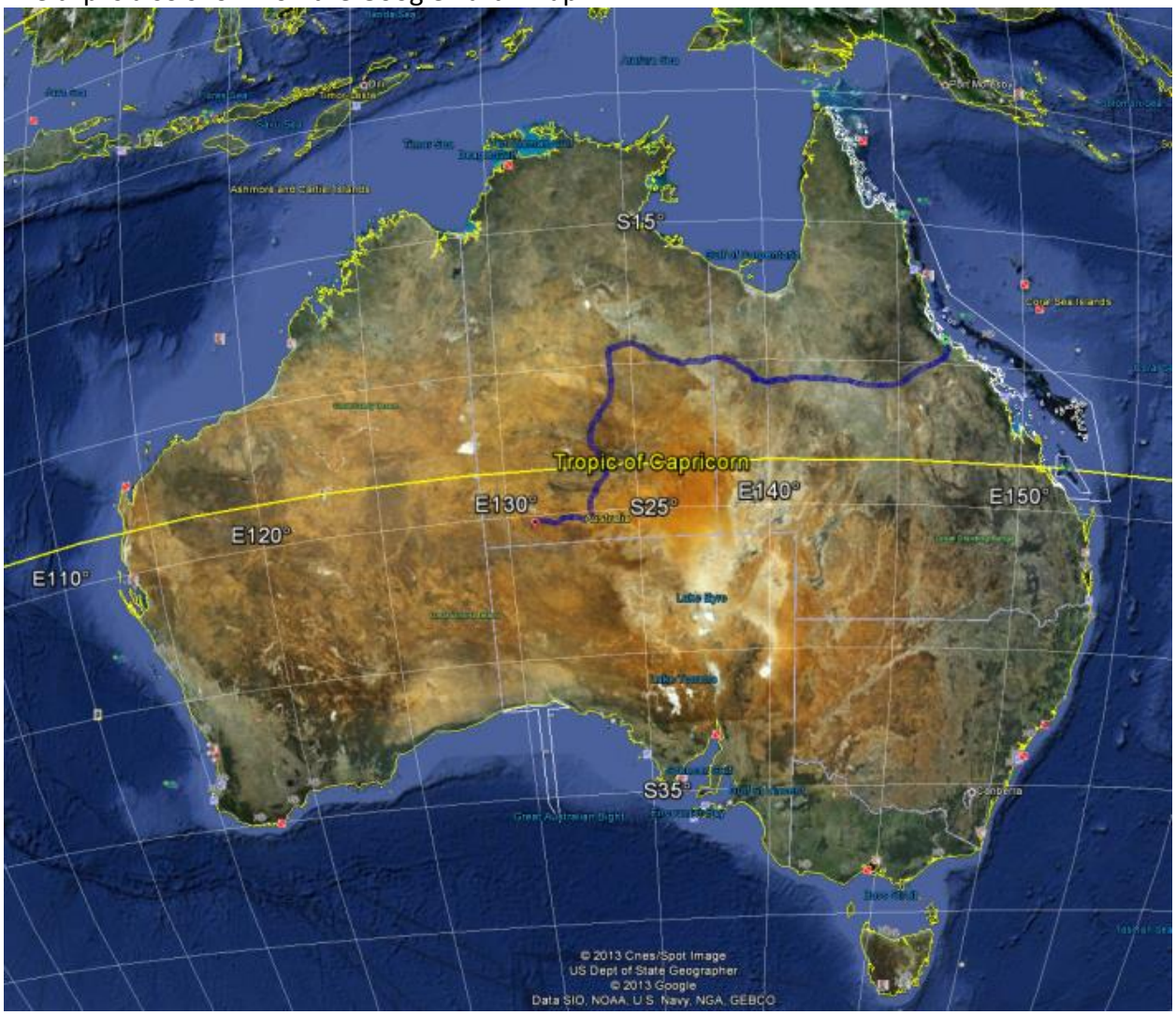
2: Enter Start and End locations to suit your desired travel, and press the Get Directions button:



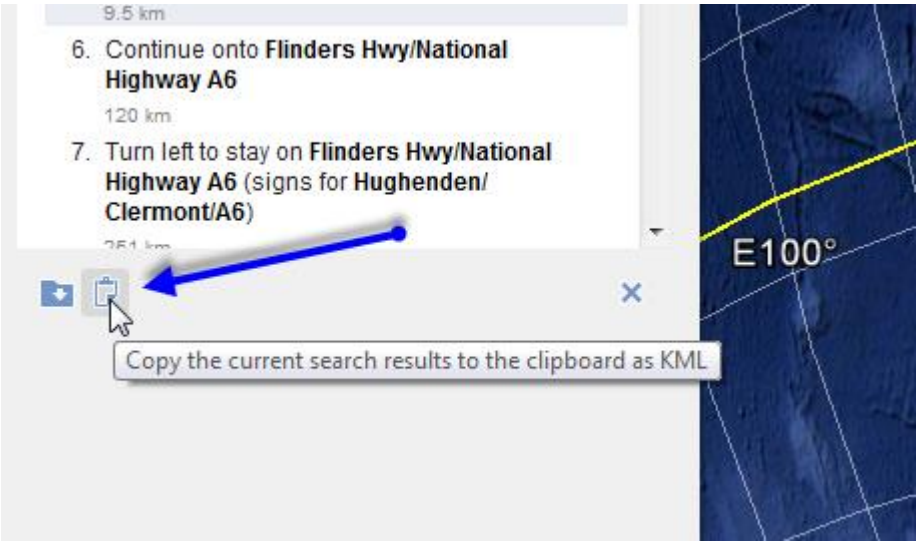
3: The trip is planned by Google Earth and details are shown:



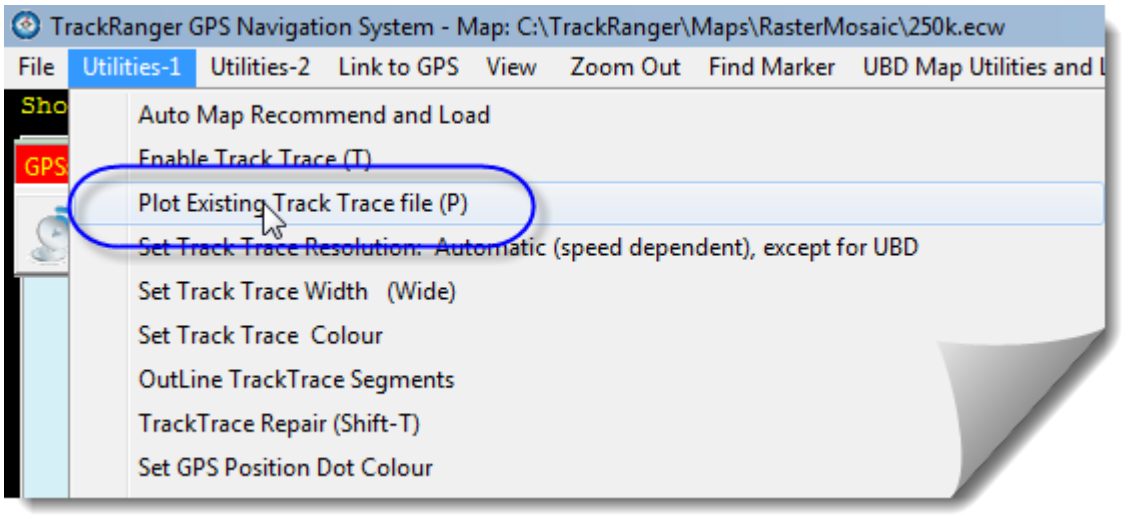
The trip is also shown on the Google Earth map:



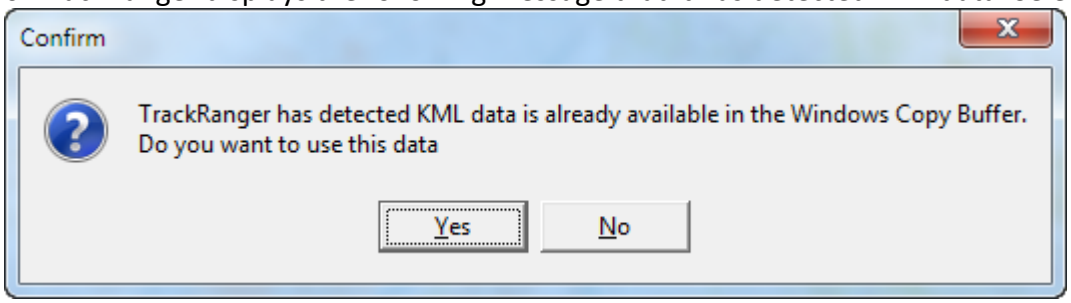
4: Click on the copy current search results to the clipboard as KML icon on the left hand side of the screen:



5: In TrackRanger, select Plot from the utilities-1 menu, or just press the keyboard letter 'P':



6: TrackRanger displays the following message that it has detected KML data. Select Yes



TrackRanger creates all of the necessary files and displays the data directly on the map, including Trip Plan and Waypoints

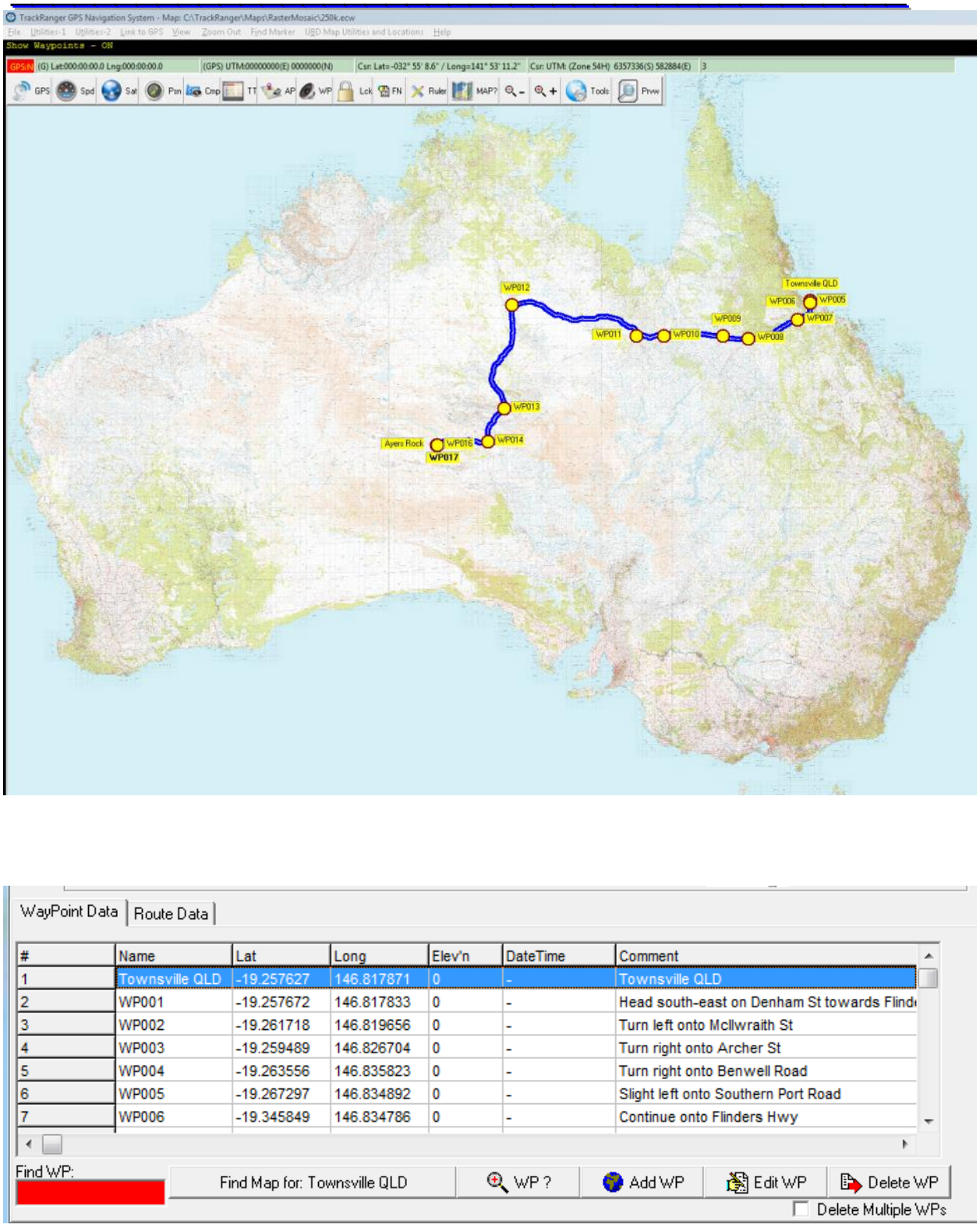


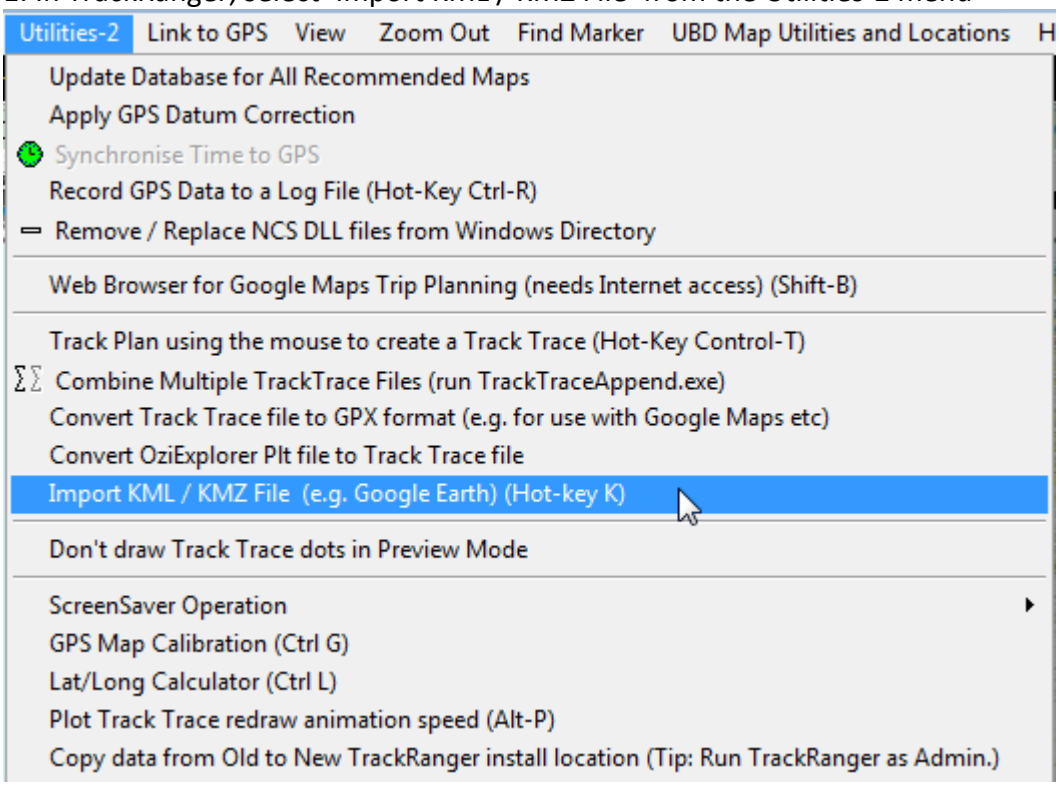
Figure 22 - The Waypoints are shown on the map and are available in the waypoints management page.

The data is automatically saved as Waypoints and Track data so you can simply use these files in the future. Also see “TRIP Planning using Google Maps (includes Waypoints)” on page 90 for more information.

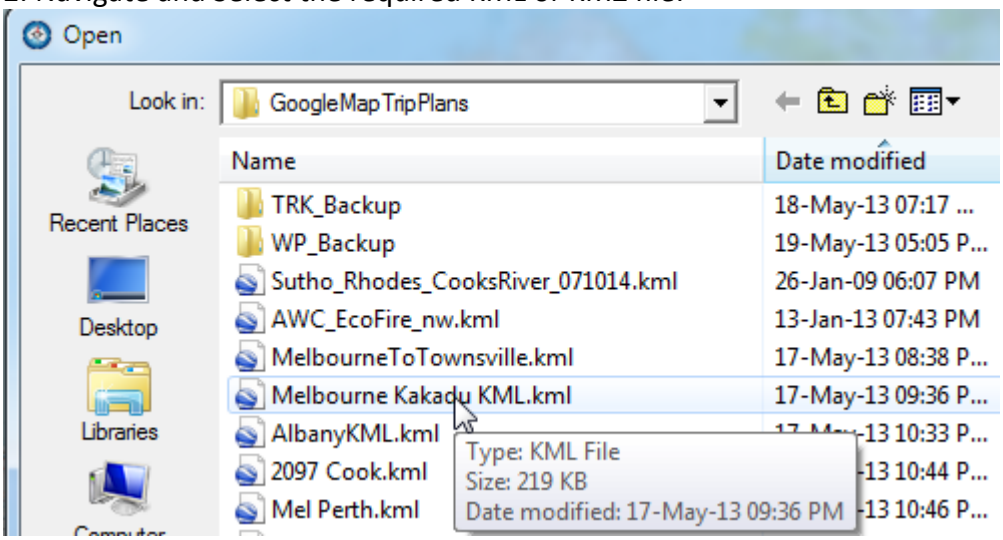
TRIP Planning using existing Google Earth KML / KMZ files.

KML files created by Google Earth can be instantly imported into TrackRanger. This section describes the process to import from KML files stored on the computer disk drive.

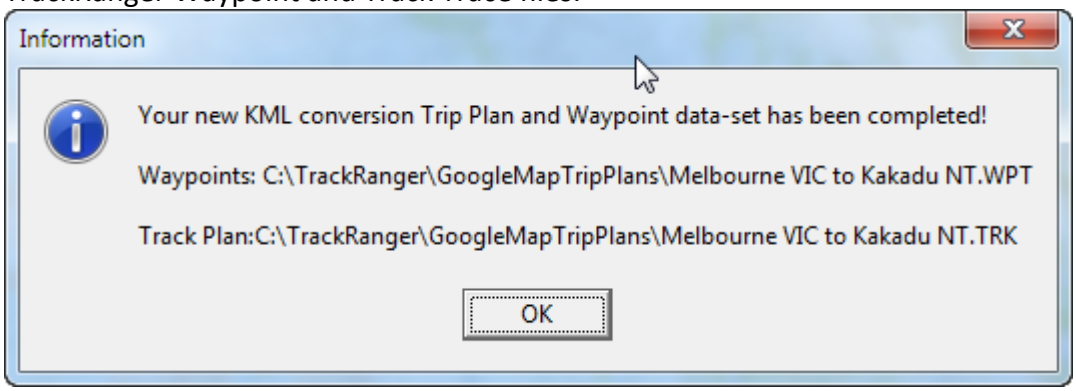
1: In TrackRanger, select 'Import KML / KMZ File' from the Utilities-2 menu

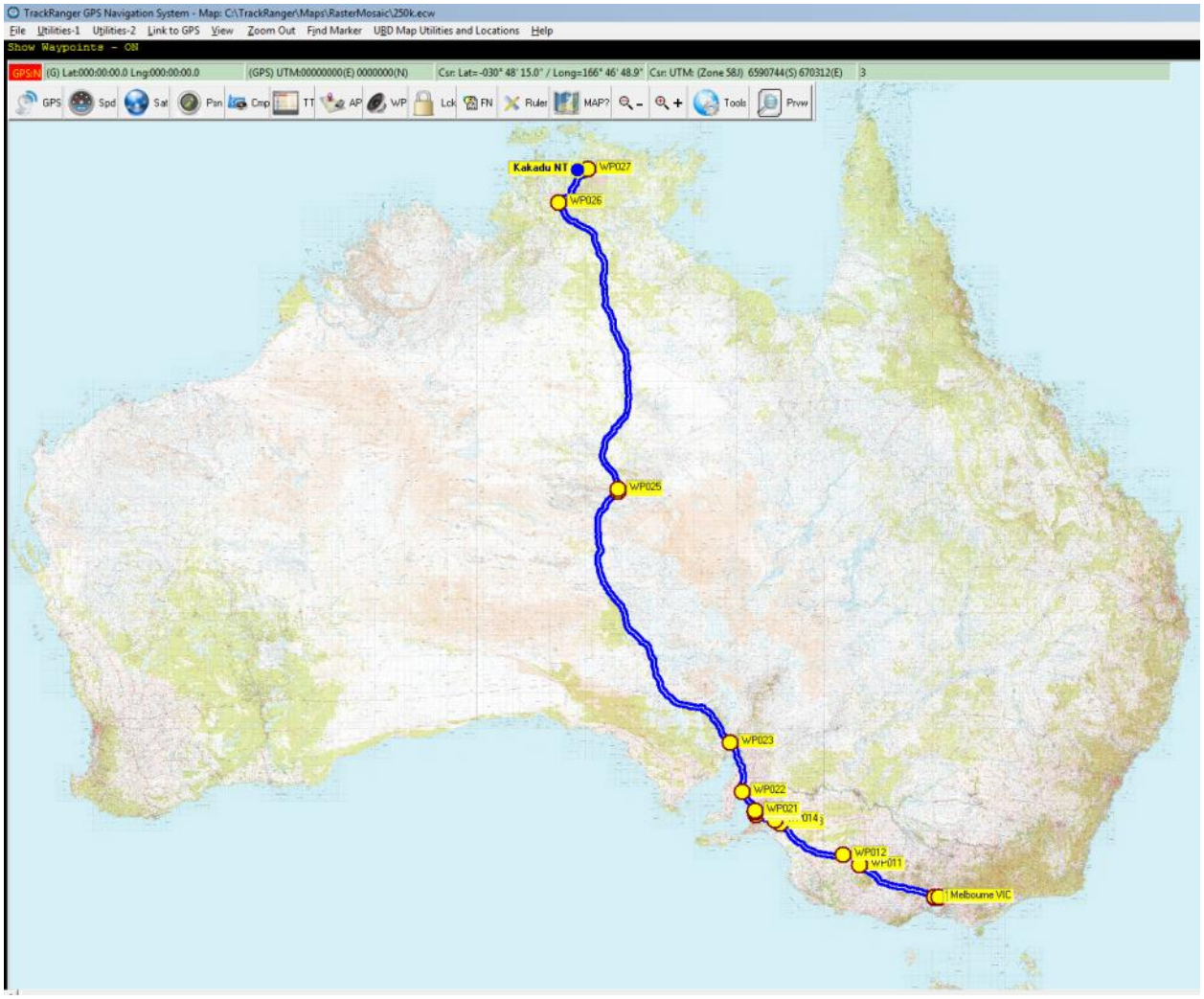


2: Navigate and Select the required KML or KMZ file:



3: The entire trip is instantly imported into TrackRanger and all details are save as TrackRanger Waypoint and Track Trace files:

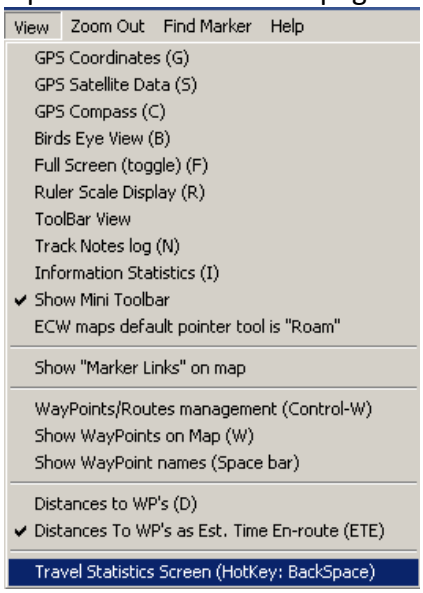




Travel Statistics Page

The Travel Statistics page may be quickly accessed by pressing the backspace key. This then shows large character displays of ETA, Destinations, and Speed etc:

Tip: the Travel Statistics page is also available from the View drop-down menu:

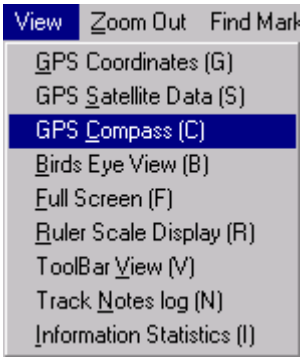


Tip: from Version 5 onwards, the maximum speed is also displayed. This may be reset from the reset button on the distances to Waypoints page (hot-key

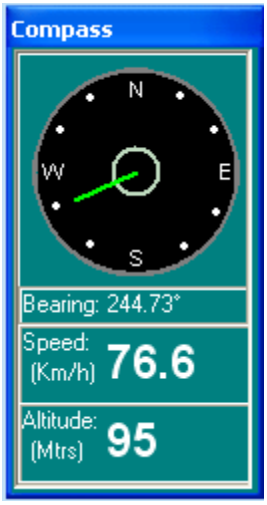
Section 8 – Compass Speedo & Toolbars

Compass viewing information

A compass facility is provided to allow a user to determine current direction. Select the GPS Compass item from the View GPS Data drop down menu (hot-key 'C'), or from the Toolbar menu.



The compass also includes speed and altitude information. A course of 360 degrees indicates Northbound, with course increments shown on the compass in a clockwise direction (e.g.: 90 degrees = East-bound).



The colour of the compass needle changes with speed (red at stop, changing to green above 35 KmH^{-1}

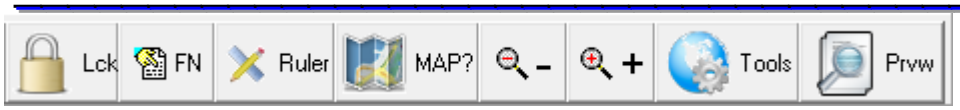
Figure 23 - Viewing the Compass Display

Compass not centered on map

Depending on screen resolution and computer model, it may occur that the compass needle is not centered on the compass background. In actual fact, the needle is centered, but the background is offset. This can be corrected by clicking just outside the border of the compass black circle while the left Control key is depressed. TrackRanger allows you to reposition the compass background until it is centered with the needle. The information is stored by TrackRanger so that subsequent starts will always show the compass correctly.

Hold the left control key down and then with the mouse positioned at the very edge of the compass press the mouse button to move and re-centre the compass background. See text

TrackRanger mini toolbar:

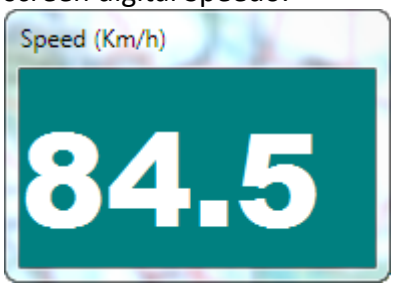


Use the mouse to hover over the buttons to see the function performed

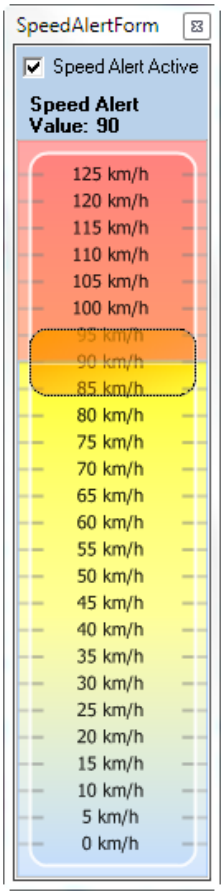
The TrackRanger main screen also has a mini-toolbar in the top left-hand corner of the screen. This may be used to toggle the overlay display of Satellites, Birds-Eye-View, GPS, Compass, Ruler, and Auto-Recommend maps for the currently loaded map type (e.g. JPG vs. ECW). For convenience when scrolling, TrackRanger will always attempt to show this mini-toolbar towards the upper left-hand corner of the screen.

Speedo

Press the hotkey 'S' or select Speedometer from the drop-down menu to launch the on-screen digital Speedo.



Alert Speed



TrackRanger supports an Alert on over-Speed warning system (Speed Alert). The settings for this may be launched from the Utilites-2 drop-down menu, or by hot keys AS (Alert Speed).

Set the desired speed to be alerted by adjusting the slider, and place a tick in the checkbox to enable the feature.

The settings are remembered and recalled automatically on the next startup.

If the set speed is exceeded, an on-screen alert is displayed, which is repeated at approximately 30-second intervals, and this cycle continues until the speed falls lower than the set-point value. The on-screen alert is accompanied by an audible signal. See Figure 24 - Speed Alert Warning

Figure 24 - Speed Alert Warning

Section 9 – Measuring Distance & Area

Distance Straight Line Measurement

Active Straight Line distances from a given point:
Straight-line distances may be measured directly on the map surface. To mark a distance origin, position the mouse on the map at the desired location, and click the right mouse button. From the pop-up menu, select the Set Distance origin item

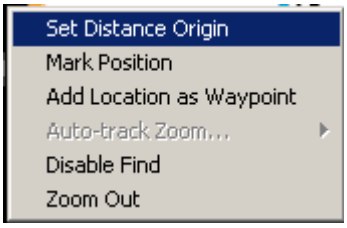
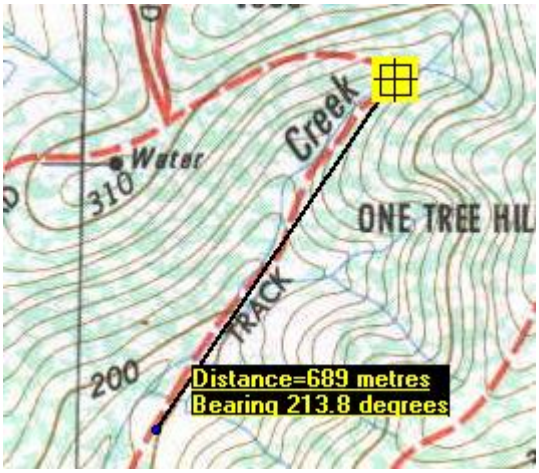


Figure 25 - Setting the Distance Origin using the right mouse button

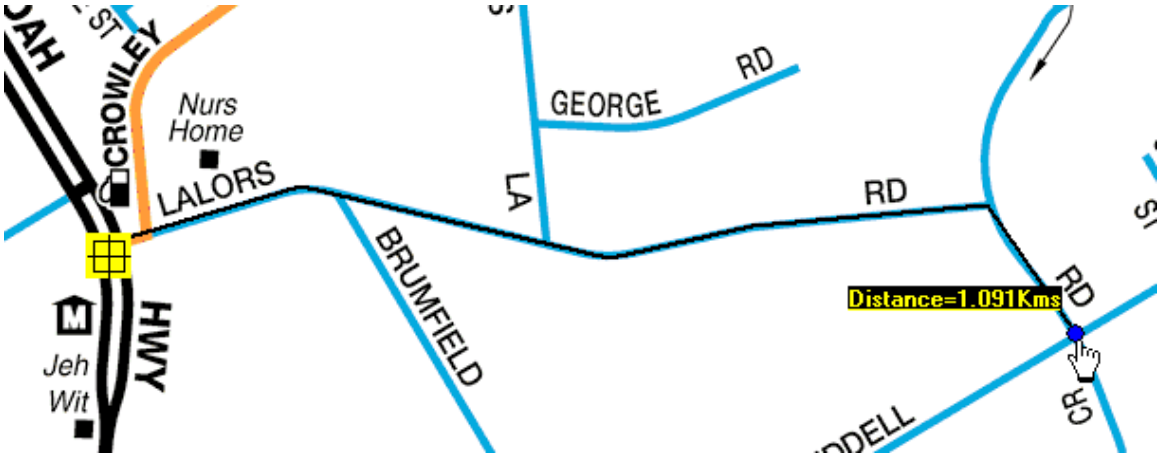
The distance origin point will be displayed as a yellow square on the map.

As the mouse is moved, the straight-line distance from the Origin Point is shown on the map. The Bearing from the last mouse-click location is also shown. When distance measurement has been completed, press the right mouse button to clear the displayed data.



The distance the mouse moves from that position will also be shown as the Distance item in the GPS Coordinates form. The distance is shown in metres/Kilometres.

Continuing to select further points accumulates distances. Right-click when all distance measurements have been taken (see figure below):



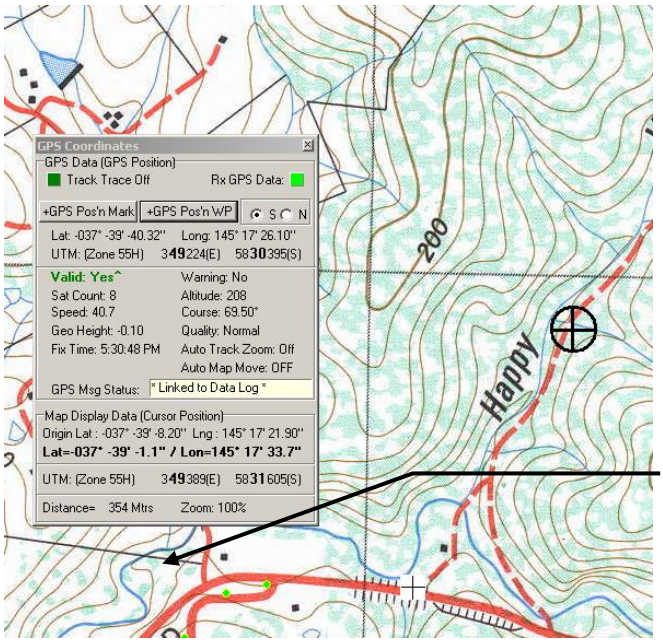


Figure 26 - Distance Measurement from the Origin Point

The selected origin point is shown in the Map Lat Long window of the GPS Coordinates form.

If no Origin point has been selected, the upper left hand screen coordinate is used.

Distance "Origin Points" are not saved in the map file database.

Distance Moved from Origin Point

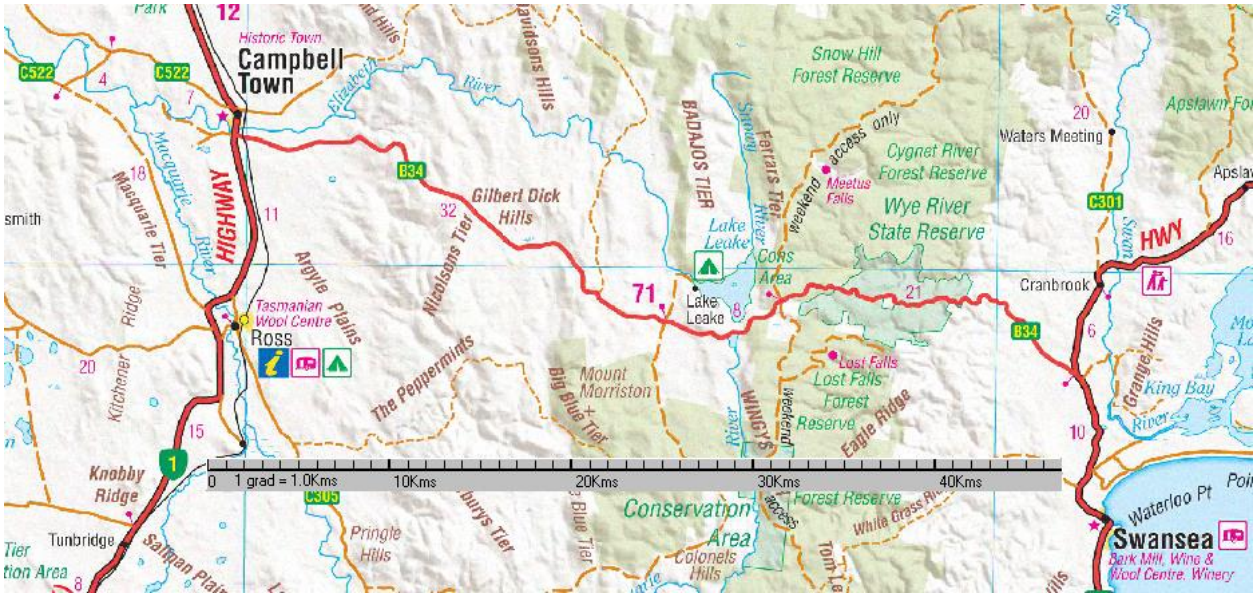
Please note that the distance moved from the origin point will always be shown on the GPS Coordinates page, regardless of whether 'Active' straight-line measurement is taking place.

Distance Ruler Measurement

A straight-line ruler and map surface contour methods are also available to measure distances.

Ruler measurement:

A Ruler (Hot key 'R') or selecting from the View | Ruler menu displays an overlaid ruler that can be easily moved over any location on the map surface. The scale of this ruler automatically adjusts to suit the zoom ratio. This feature may also be controlled from the TrackRanger Toolbar.



Floating Ruler use to measure distances

The ruler may also be particularly useful to determine map gridline spacing

Distances Contour Measurement

Distances may also be measured by tracing the contour of the map surface. While distances are being measured, the mouse cursor will change into a ruler.

There are two methods that will perform this function.

Method 1 – Single Distance measurement:

1: Place the mouse on the map surface at the starting point of the map leg to be measured. 2: While holding down the Shift key, press and hold the left mouse button, and trace a line along the required path.

3: When the path has been traced, release the left mouse button. The distance traveled (as a contour and straight-line path) will be presented to the user by means of a pop-up message.

Method 2 – Multiple Distance measurement:

This method allows the measurement to be made of a series of individual measurements, and the user may scroll or move the map in between measurement traces. The shift key may be released between measurements.

1: Press Control-D to activate the measurement facility.

2: Press and hold either shift key, and while holding down the left mouse button, drag the mouse, as described for Single Distance measurement.

3: Release the mouse, optionally move to a new position, and repeat from step 2.

4: When all measurements have been 'accumulated', press the Control-D key combination. The total distance moved is displayed.

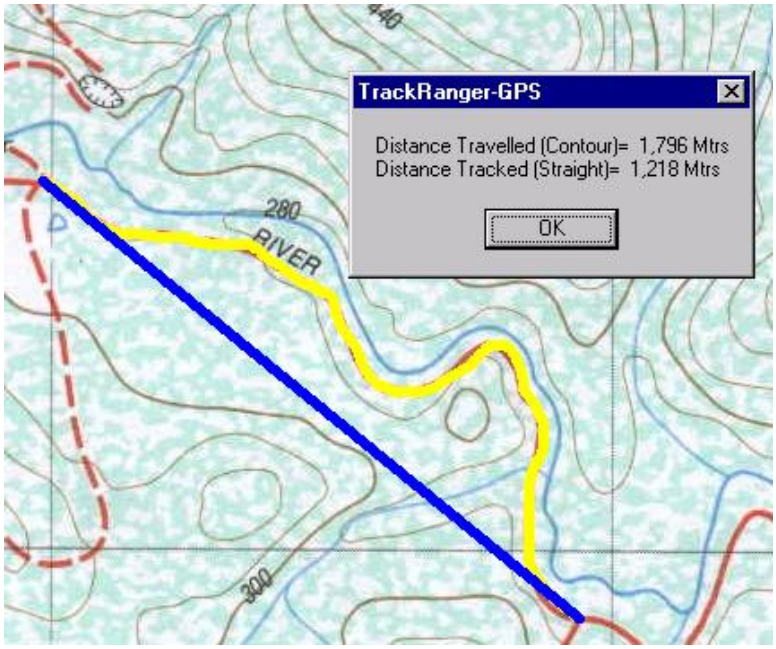
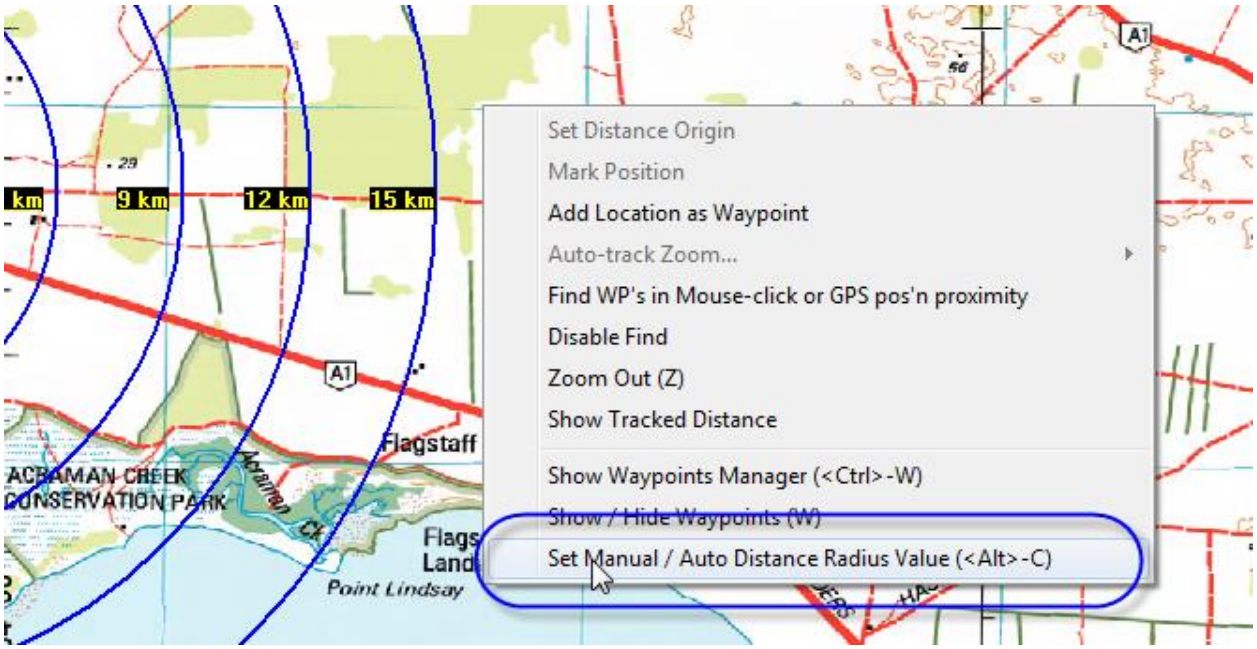


Figure 27 - Measuring distances along a path

Distance Radius Circles

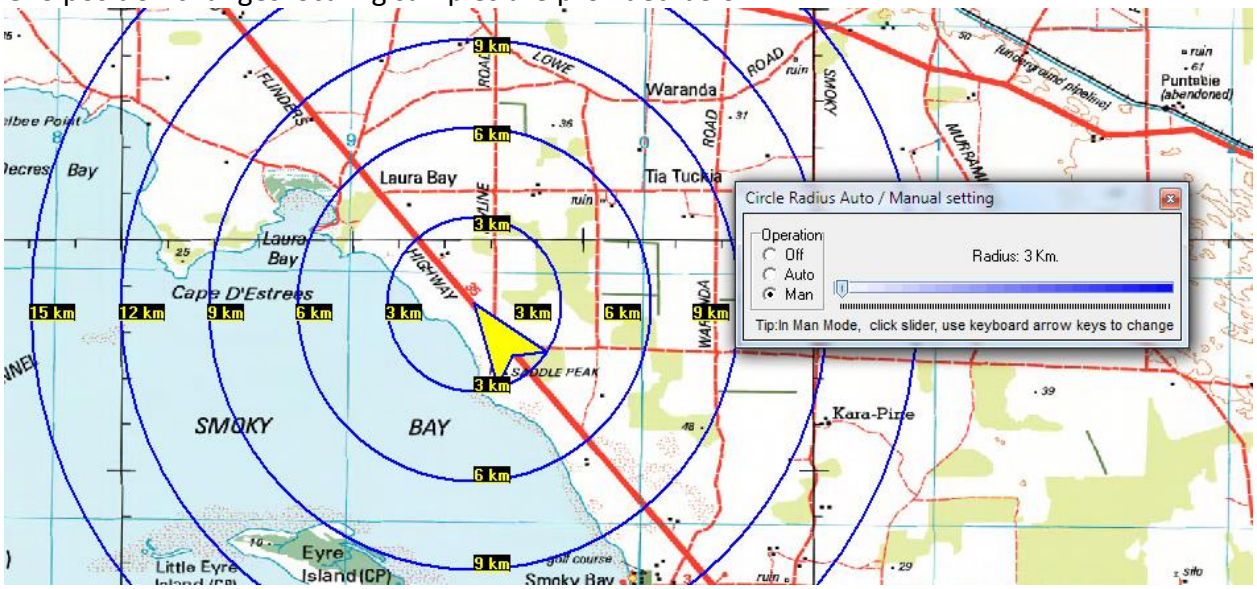
Radius Distance Circles that track from the GPS position and show the distance from the current location.

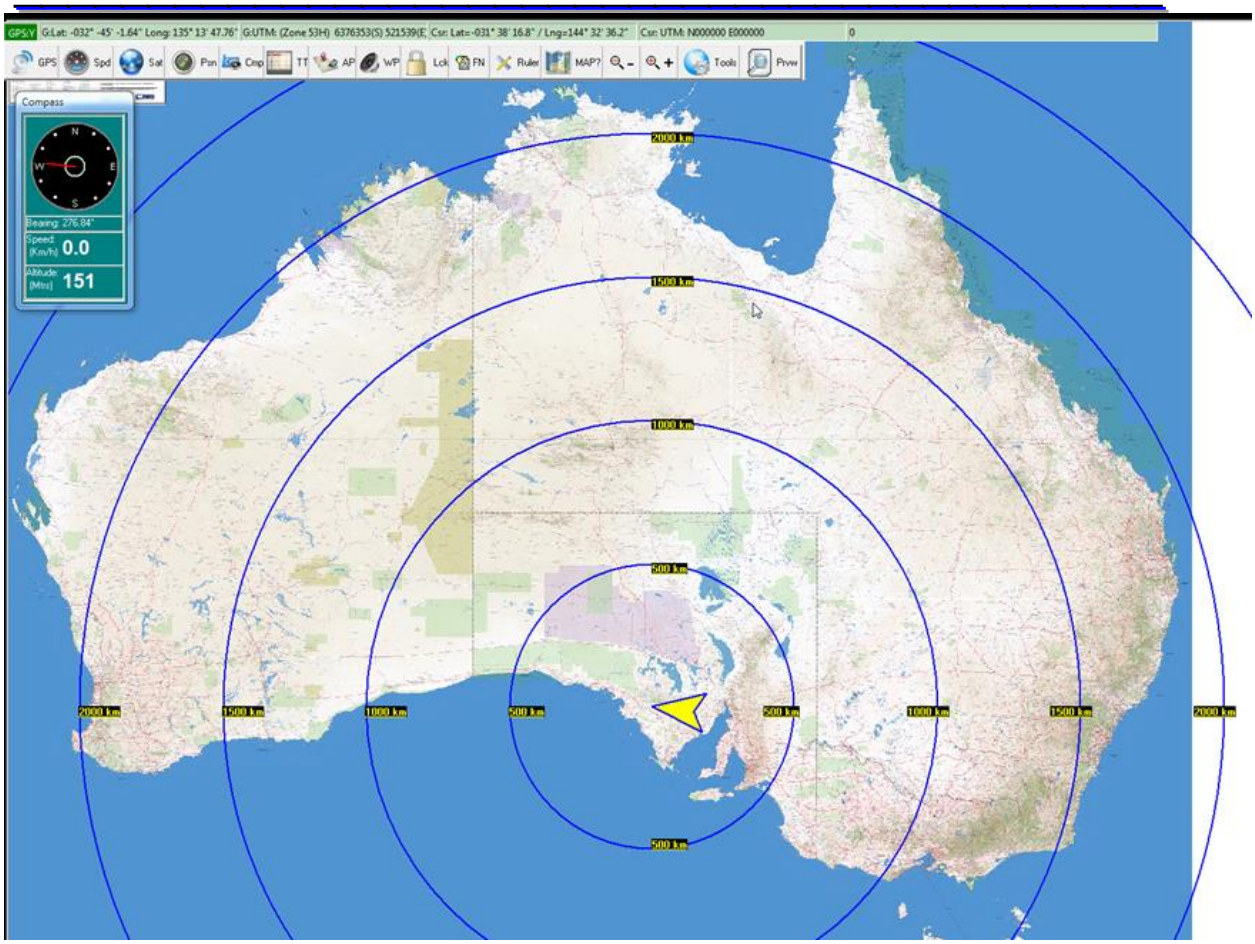
Right-click on the map and select Set Manual / Auto Distance radius, or select using Hot-keys <Alt>-C, or select from the View drop-down menu.

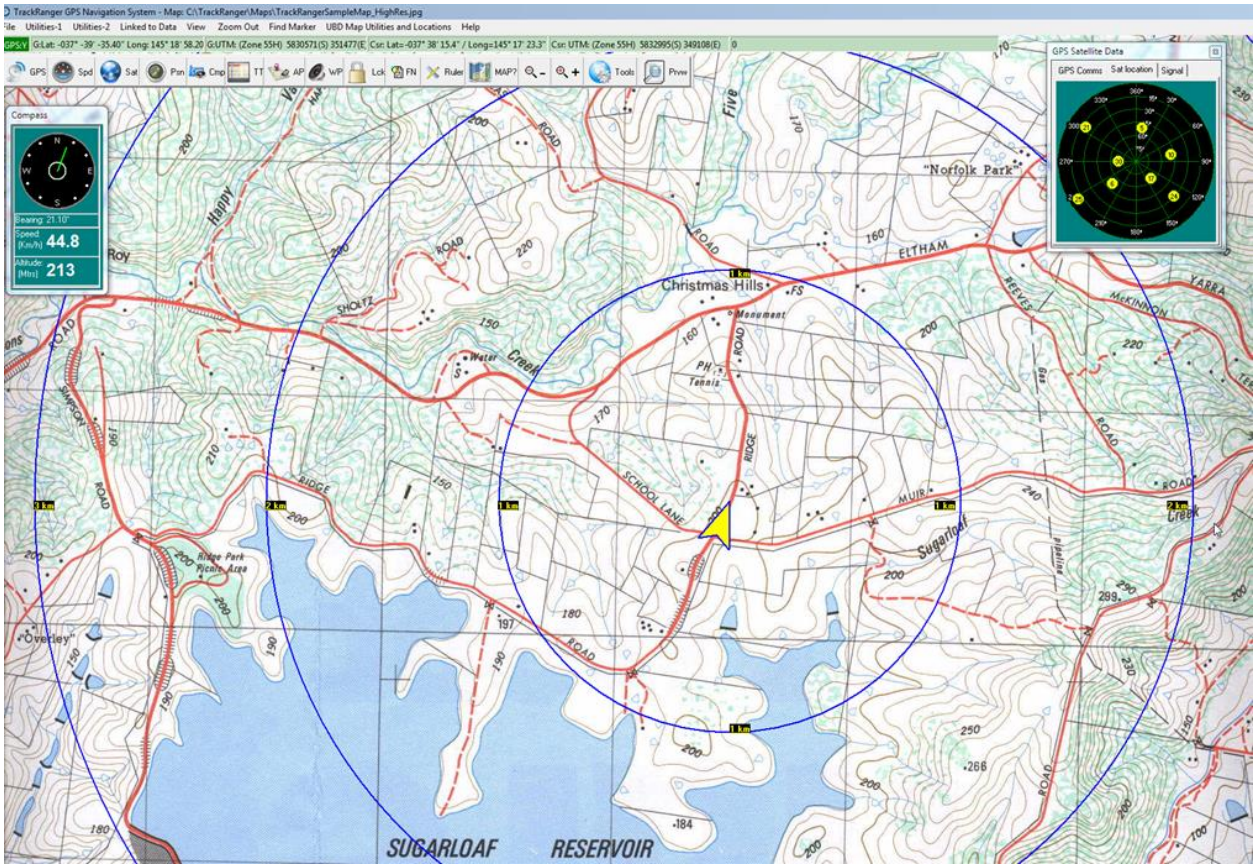


The radius circles Automatically scale depending on the magnification of the map, e.g. 1 km circles up to 500km radius circles, or Manual scale may be selected and scales from from 1km to 500km can be set.

The actual radius distance is shown at 4 points on each radius circle, and is updated as the GPS position changes. Scaling samples are provided below:




Compass
Bearing: 276.84°
Speed [Km/h] 0.0
Altitude [Mtrs] 151
2000 km
1500 km
1000 km
500 km

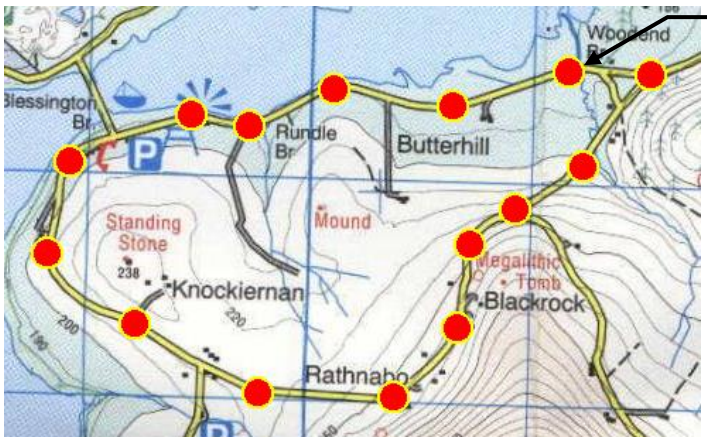

Compass
Bearing: 21.10°
Speed [Km/h] 44.8
Altitude [Mtrs] 213
GPS Satellite Data
Christmas Hills
"Norfolk Park"
ELTHAM
"Overley"
SUGARLOAF RESERVOIR

Area Measurement

TrackRanger allows you establish the perimeter of an area, and to measure the area within. Area measurement is performed by setting the perimeter points of the desired locations.

To measure an area, press and hold the Shift key down, and then using the right mouse button, successively click on the map at the locations that are to be used to define the perimeter. A Red Spot with a Yellow Ring will be marked on the map at each Right-mouse button press location. TrackRanger supports up to 36 individual perimeter points to be established.

Note: To properly set the area boundaries, it is critical that the perimeter be set in a boundary following a consistent "circular" direction. It is also imperative that the distance calibration for this map is accurate, as this value is utilised in the area calculation algorithms (See the section on Calibrating the Map Coordinates – above).



To mark-out the area:
While holding down the left "Shift" key, move along the perimeter of the desired area and click the Right Mouse Button at each point (up to 36 points).

After all points have been entered, release the shift key.

Figure 28 - Marking to boundaries of an area perimeter

After all of the perimeter points have been established release the Shift key. TrackRanger will calculate the area contained within the selected region, and display it on the map.

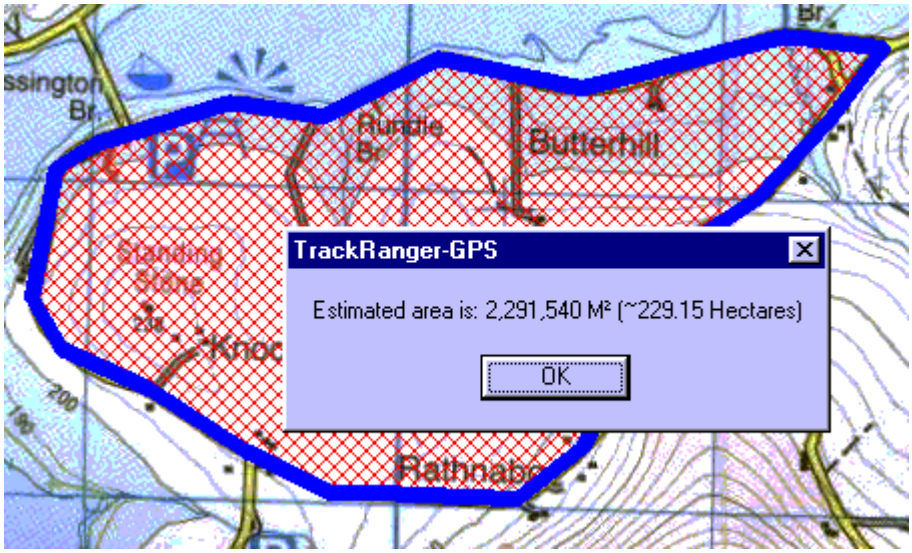


Figure 29 - Area measurement display

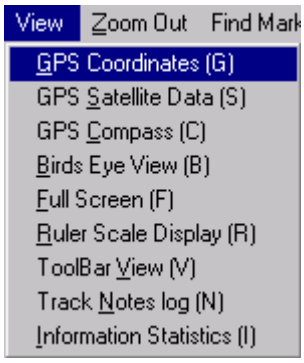
Any number of measurements may be taken (up to 36 perimeter points each). When all measurements have been taken, press the 'Z' key or select Zoom Out to clear the map display.

Tip: Track Trace and Track Plot Distances can be shown by right-clicking and selecting "Show Tracked Distance" For more information, See Track Trace and Track Plot distances on page 178

Section 10 – TrackRanger Displays

Viewing GPS coordinates

The GPS coordinates data may be viewed by selecting the View GPS Coordinates item from the top menu bar:



Tip: Hot-Keys **G** or **V**iew Tool-Bar also allows the user to toggle the display of the GPS coordinates

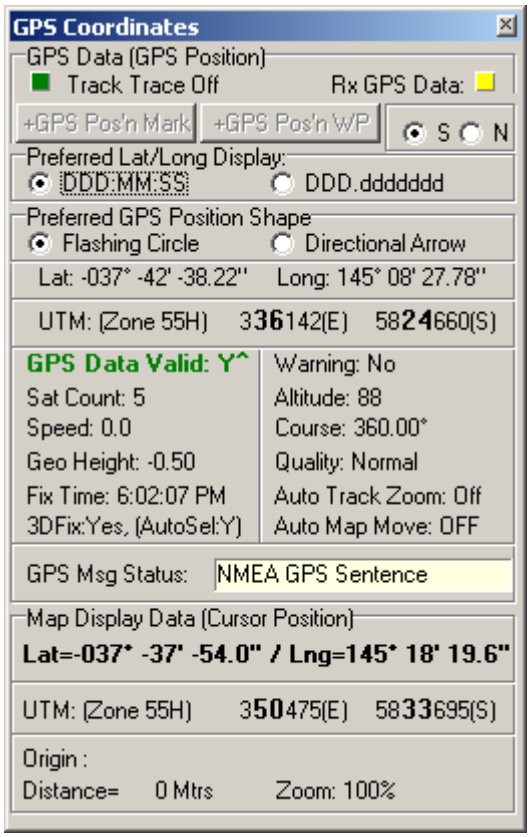


Figure 30 - Viewing GPS coordinates

The will allow the GPS Coordinates page to be displayed. This page contains information relating to the data received from the GPS unit, including:

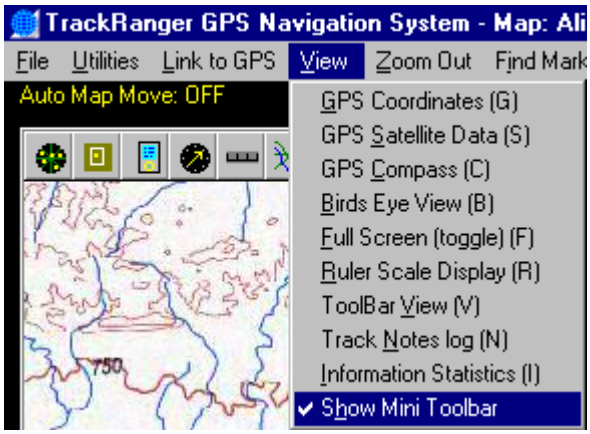
- Hemisphere (South or North)
- Latitude,
- Longitude,
- Universal Transverse Mercator (UTM) Map zone & coordinates
- Validity (Geographic position validity)
- Altitude,
- Speed,
- Satellite count,
- Course (bearing),
- Navigation quality,
- Geoid height (height of the geodid (mean sea level) above WGS84 ellipsoid.)
- Warning (a warning usually means that the receiver has no reception.)

Note that if the signal is not valid, the display will be shown in red (**Valid: No**)

A display of **Valid: Yes^** (including the carat symbol) means that more than ten consecutive valid GPS positioning messages have been received from the GPS.

Viewing the Mini Toolbar

From the view menu, select the Show Mini Toolbar option. The mini toolbar will automatically be presented towards the upper left-hand corner of the screen.



Viewing Satellite Data

Satellite data (the number of and location) may be viewed by selecting the GPS Satellite data item from the main menu (hot-key 'Ctrl-S'), or from the toolbar:

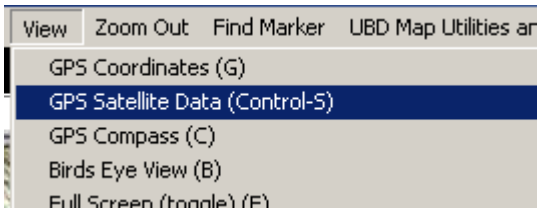
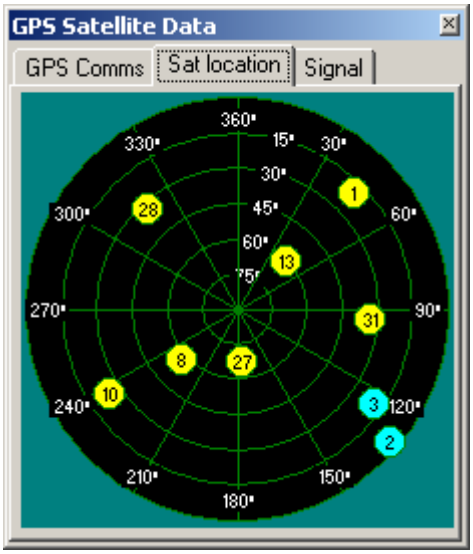


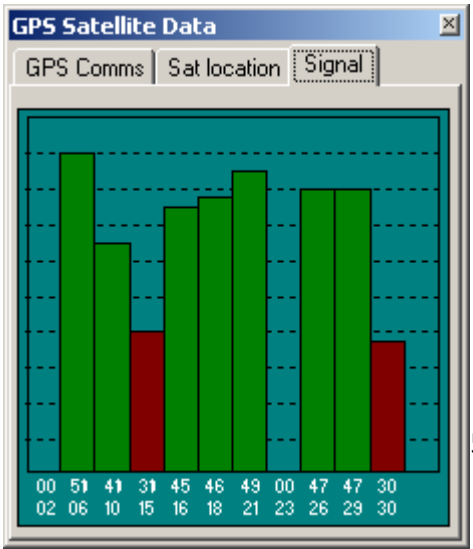
Figure 31 - Selecting the View Satellite data display



This displays information about the satellites providing valid data. The satellites are represented in their relative positions in the sky. Satellites providing valid data are displayed in yellow.

Viewing Signal Strength

The Signal Strength tab from the GPS Satellite Data form allows satellite signal strengths to be dynamically displayed. The bottom row of numbers indicates the satellite number, and the top row shows the relative signal strength.



Satellites in use by TrackRanger are shown in Green. Satellites shown in Maroon are not in use by TrackRanger, because their low signal strength does not allow them to be used for active navigation. These satellites typically correspond to the Aqua dot displays in Satellite data (see above).

Note: If Satellite data lost, then Satellite Information and Signal Strength displays all show in bright red:

Birds-Eye View

To more easily identify the overall current GPS position on and, and when Zoomed in on an area (either manually, or via Auto-Track), a Birds-Eye View is available (hot key 'B'). This shows the zoomed-in location, relative to the overall map. Birds Eye view works best with EMF files, but can also be used on JPG and BMP file types. The image is not normally displayed when using PNG graphics files.

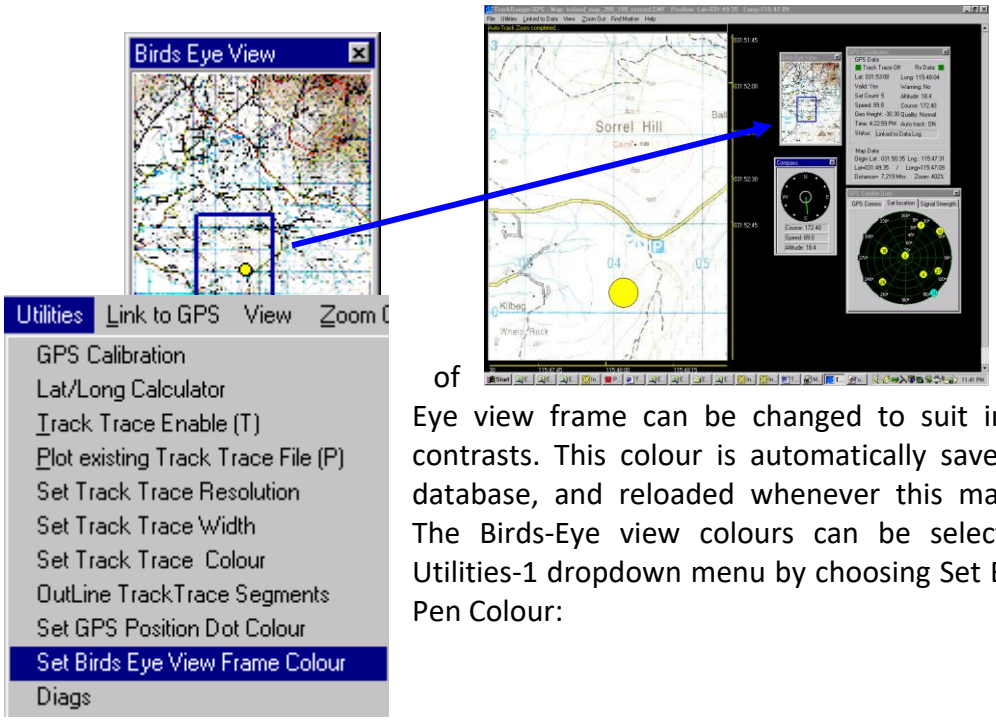
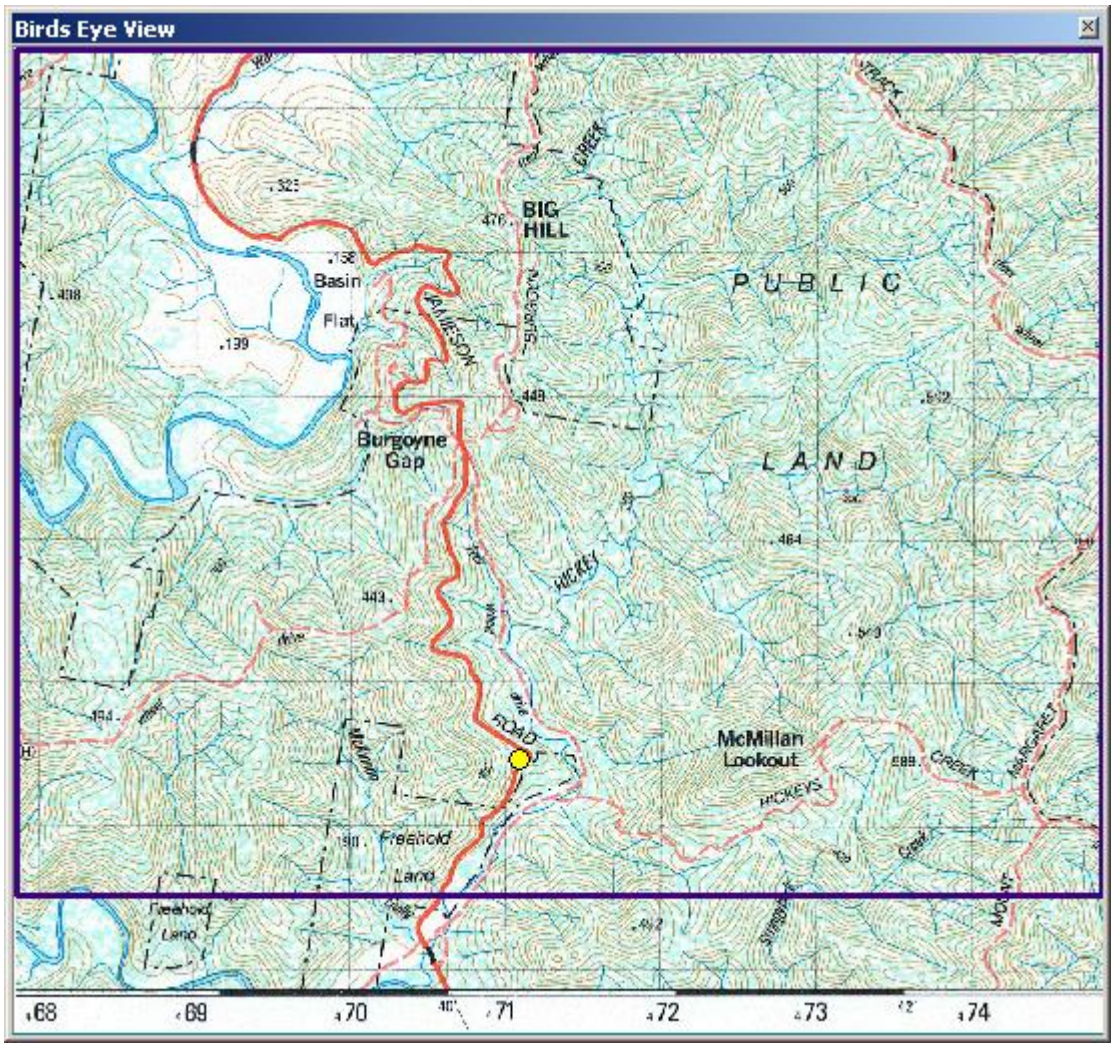


Figure 32 - Changing the Birds Eye View Pen Colour

The colour of the Birds-Eye view frame can be changed to suit individual map contrasts. This colour is automatically saved in the Map database, and reloaded whenever this map is selected. The Birds-Eye view colours can be selected from the Utilities-1 dropdown menu by choosing Set Birds Eye View Pen Colour:

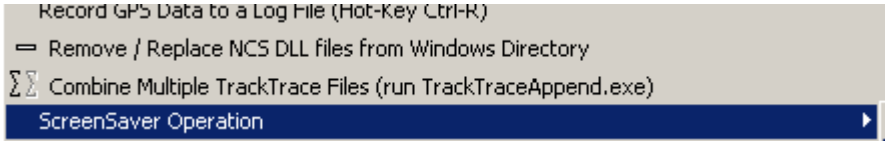
The Birds Eye View screen may be re-sized by dragging the bottom right hand corner of the form:

Click and drag the bottom right-hand corner of the Birds-Eye View form to resize the screen



Screen Saver Operation Override

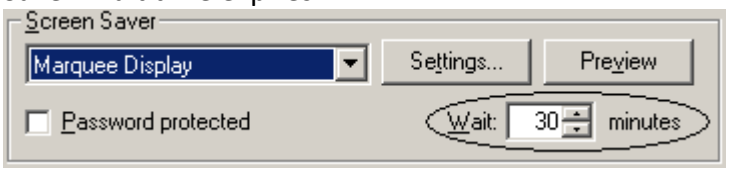
To avoid the requirement to disable the Windows Screen Saver while TrackRanger is running, it is possible to set two alternative options from the Utilities-2 menu:



1. The Screen Saver can be set to run under Windows Normal Control

2. The screen Saver can be set to be Disabled Whenever TrackRanger is running.

3. The Screen Saver can be disabled as long as the GPS position is moving. If the position becomes stationary, the Screen Saver will be invoked after the 'Screen Saver' wait time expires.



Note that the Screen Saver override does not affect disk sleep, computer hibernation modes etc.

Section 11 – Map Datums

About Map Datums'

As the earth is not perfectly spherical, a 'datum' is used to express a set of reference locations describing the earth's shape more precisely.

The World Geodetic System 1984 (commonly referred to WGS84) references a datum used by the US Military Global Positioning System (GPS). It is generally accepted that this datum provides an accurate global description of the shape of the earth. The origin of WGS84 is the same as for latitude and longitude, as is taken from a location at the centre of the earth (see below).

The Map Datum GDA94 (Geocentric Datum of Australia) is designed to replace Australian Geodetic Datum 1966 (AGD66) and Australian Geodetic Datum 1984 (AGD84), however, this datum is nominally identical to WGS84, except for the most exact location-based applications.

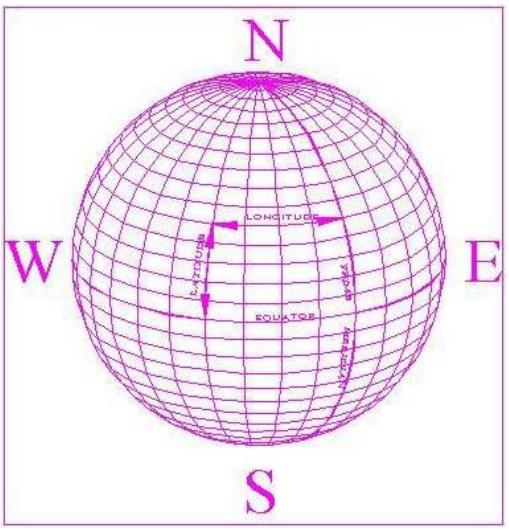
About Coordinate Systems'

Although there are many coordinate systems, there are two common coordinate systems in use today. There are:

- **Latitude / Longitude**
  and
- **Universal Transverse Mercator (UTM)**

Latitude / Longitude

Lat / Long units are in degrees, and represent a location on the earth's surface taken at an angle projected from the centre of the earth.



Latitudes are specified as the angle North (positive) or South (negative) from the centre of the earth, and are in the range +90 degrees (the north pole) to –90 degrees (the south pole).

Lines of latitude always run parallel to each other

Longitudes as specified as the angles East or West of the central meridian (the Greenwich Meridian), and are specified as –180 degrees to +180 degrees.

The lines of Longitude are referred to as meridians, and these all converge to meet at the North or South Pole as can be seen from the above diagram.

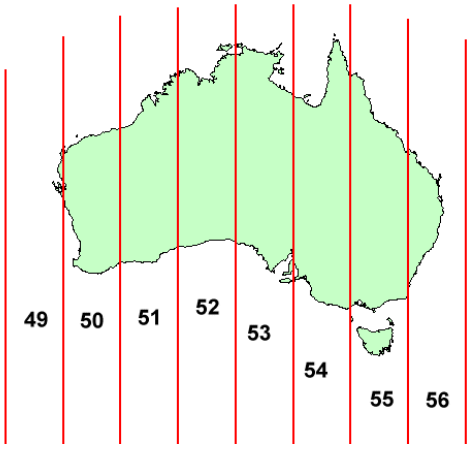
Universal Transverse Mercator (UTM)

Universal Transverse Mercator (UTM) projection is a worldwide projection, and units are in metres.

The Y coordinate (the Northing, or sometime referred to as “Southing”) is the distance from the equator, measured in metres.

The X coordinate (the Easting, or sometime referred to as “Westing”) is the distance in metres to the East or West of a Central Meridian (the Greenwich Meridian). The eastings are divided into 60 Zones, each 6 degrees wide.

The Northings are also represented by a letter designator. These two values are often represented as 56H, 51K etc, and describe the region that the ‘distance metres’ are located in.



UTM Zones

TrackRanger automatically calculates the correct letter designator when entering calibration coordinates

The Latitude/Longitude pair of
Latitude: -37.940556, Longitude: 146.700000

can be represented in UTM coordinate forms as:

Zone: 55H, Easting: 4**73**639, Northing: 58**00**737

It is common in UTM format displays for the thousands and ten-thousands units to be displayed in bold, as shown above.

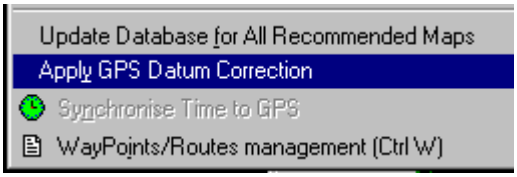
Other information on Map Datum and Coordinate Systems can be found on the GeoScience Australia Web Site at:
http://www.ga.gov.au/image_cache/GA7194.pdf

GPS Datum Shift

Some GPS units may not be able to supply data in the same Geodetic Datum as the map has been calibrated in. TrackRanger provides the ability to introduce a +/- 0 to 59 second adjustment to the position being received from the GPS. This effectively provides a datum shift.

As an example: the coordinates described by WGS84 are approximately 200 metres north/east of the same location described in a map datum of AGD66 (Australian Geodetic Datum, 1966). This is why datum correction may sometimes be required.

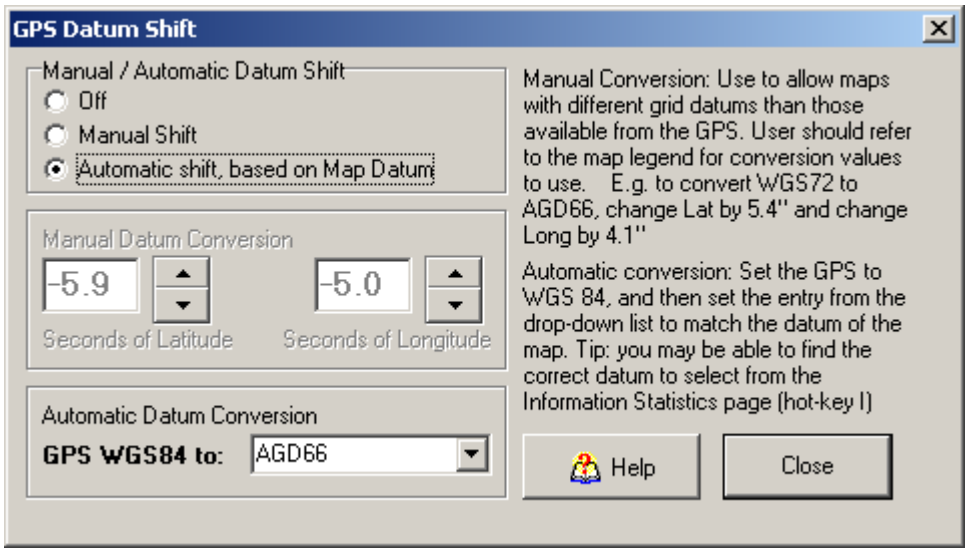
The Utilities-2 Menu | Apply GPS Datum Correction allows users to select an adjustment to the GPS position.



Automatic Datum Shift is also available in versions 4.2.d onwards.

TrackRanger provides two different methods of adjusting position to compensate for different Datums between the map and the GPS receiver:

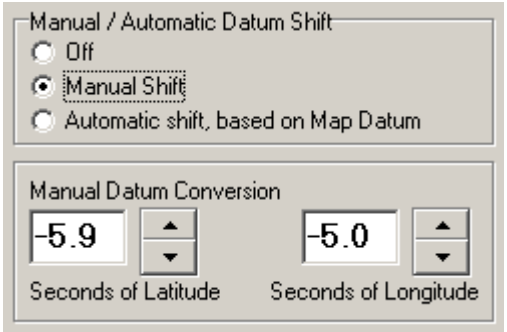
1. Manual Entry of an adjustment offset
2. Automatic Calculation of an adjustment offset



Manual Shift:

Most maps will provide conversion factors for converting from one datum to another. E.g. to convert from WGS72 to AGD66 the following values are sometimes used:

- Increase Latitudes by 5.4”
- Decrease Longitudes by 4.1”



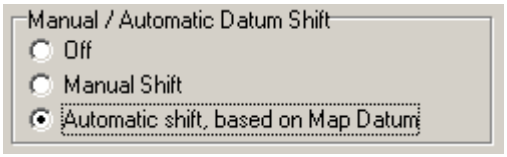
To set the values manually to match the information from your map supplier, select the Manual Shift radio button, and enter the offset values:

Tip: If you need to use the Datum Correction and are not sure of the datum shift amounts, perform the following:

1. Travel to a known location
2. With TrackRanger linked to your GPS and your map loaded, select Apply GPS Datum Correction from the Utilities-2 menu.
3. Select the Manual Shift radio button.
4. Increase/decrease the values until the displayed GPS position coincides with your current physical location.

Automatic Shift:

To allow TrackRanger to calibrate the exact offset values, make sure the WGS 84 datum is selected on your GPS receiver, and then press the Automatic Shift radio button, and set the map value from the drop-down list to match the datum of the currently used map (tip: TrackRanger will try to set this value for you automatically, from data contained within the map reference information).

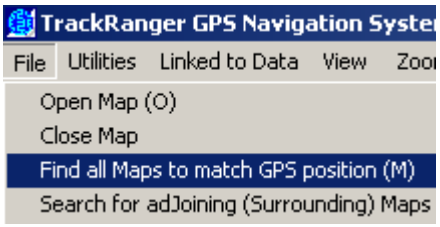


TrackRanger stores the supplied parameters, and will continue to apply this adjustment until the Apply Datum Shift box is deselected. If Datum Shift is on, the user is reminded when they next use the map.

Note: Manual Datum Offsets may also be applied to plot of Track Trace files (see section 18).

Section 12 – Auto Map Load Functions & Startup preferences

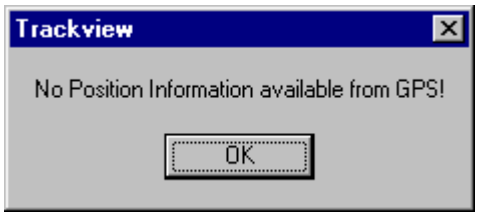
Recommended Maps Utility



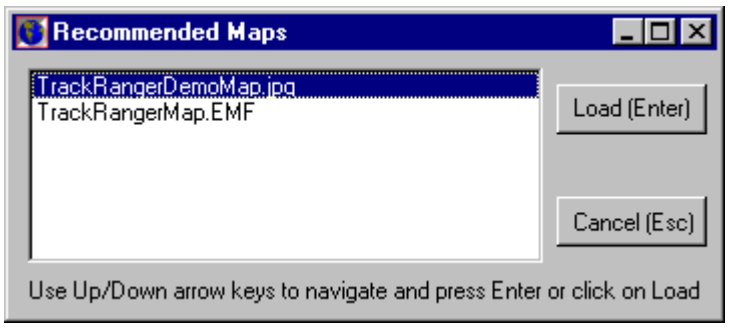
Given an input GPS coordinate, TrackRanger includes the ability to search the map database, and provide a recommendation of all maps that have boundaries surrounding the input GPS coordinate. This eliminates the requirement to manually search for a required map to suit the present location.

To use the map location facility, click on the Recommended Map item from the File drop-down menu (hot-key 'M').

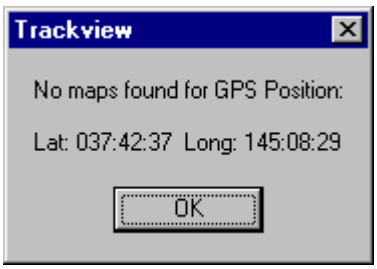
Note that the Recommend Map option is only usable if a valid GPS coordinate is being received from the connected GPS device. If no signal is available, a message is presented to alert the operator:



If a valid GPS coordinate is available, the database is scanned, and maps containing relative information are presented to the user. The user should then click on the required map from the list to allow previewing and optional opening of the recommended map file. Tip: Use the Up/Down keyboard arrow keys to more easily navigate to a desired map.



Click on the Cancel button to ignore map-loading recommendation.

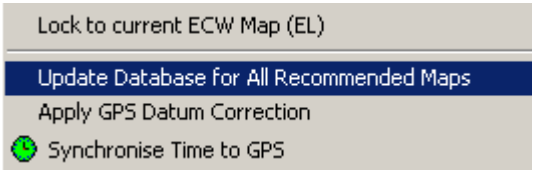


If no suitable maps are located, the following dialog (containing the current GPS position in Degrees, Minutes and Seconds) is presented to the user:

Please also refer to the section on ECW maps on page 27

Update Recommended Maps facility

TrackRanger needs to know what maps are available, and what the range of coordinates are for each map. This information is required to allow TrackRanger to recommend map(s) to match the current GPS position. When a user adds a map to TrackRanger, and enters the coordinate data, these values are automatically updated into the TrackRanger database.
However, if a user adds maps manually to TrackRanger, (for example, by copying the map file to the TrackRanger maps directory, and the corresponding map initialisation file to the MapIniFiles directory), then the TrackRanger database does not know about this map, and cannot recommend it.

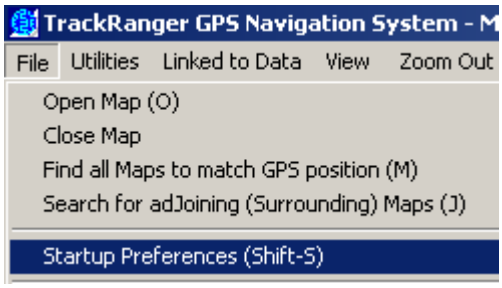


To overcome this, select the “Update database for all recommended maps” item from the Utilities-2 drop-down menu. TrackRanger will search through all map, as well as pre-GeoReferenced ECW maps, and establish coordinate points into the master TrackRanger data file. This will ensure that future searches for Auto Recommend and load (hot-key ‘AR’), and for recommend maps (Hot-key ‘M’) will suggest these maps. This function does not affect existing maps, and can be used to ‘refresh’ TrackRanger’s database at any time.

Automatically reloading last map used at next start

TrackRanger can be configured so that the previously loaded map is automatically loaded at the next startup. To enable this functionality, select the Load Last Map Used on Startup from the File drop-down menu (Startup preferences).

Tip: Hot Key 'Shift-S' also launches the Startup preferences screen.



(See below for further information on Startup preferences, Page 130)

Auto Map recommend and Load

TrackRanger can automatically search and load a map to match the current GPS position. The function is activated by the hot-keys “AR”, or from the “Auto Map Recommend and Load” option from the Utilities-1 Drop-down menu:

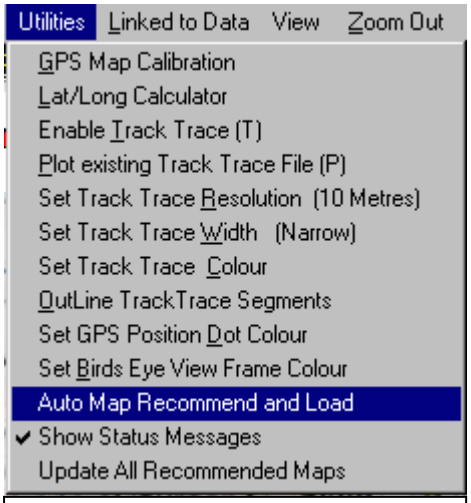


Figure 33 - enabling Auto Map Recommend and Load

Note: If a known map is not recommended, select the Update All Recommended Maps option from the same menu, and then retry.

(See Update recommended maps facility – above)

Natmap (ECW) Maps and the Auto-Recommend and Load function:

If an ECW (e.g. Natmap) map has already been loaded, then the Auto-Recommend and load facility will keep searching for and loading ECW maps. To change back to load other TrackRanger maps, first close the ECW map, and then open any of the other map types. The Auto-Recommend and Load function will then continue to load these map types.

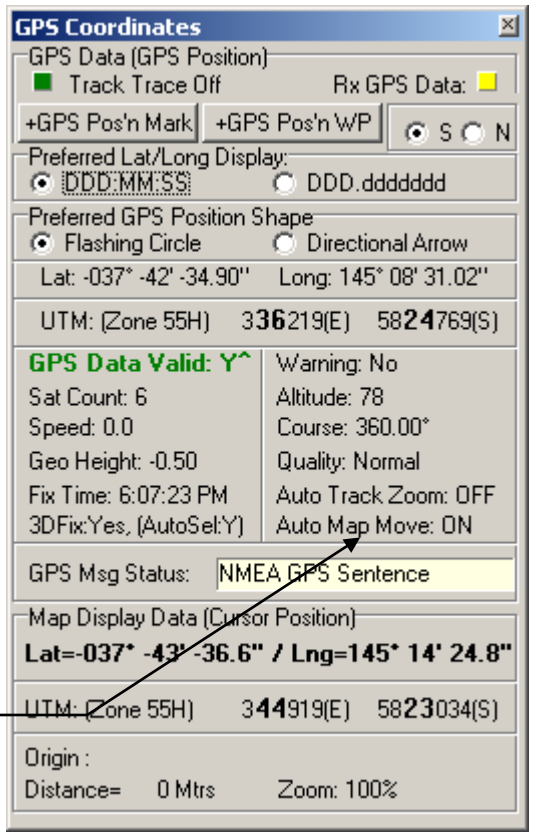
Auto Map Move

TrackRanger also supports Auto Track Move. This option causes the underlying map to "move" or "float" so that the GPS displayed position remains 'towards' the centre of the map.

AutoMapMove may be controlled by the shortcut keys "AM". These toggle the status of Auto Map Move

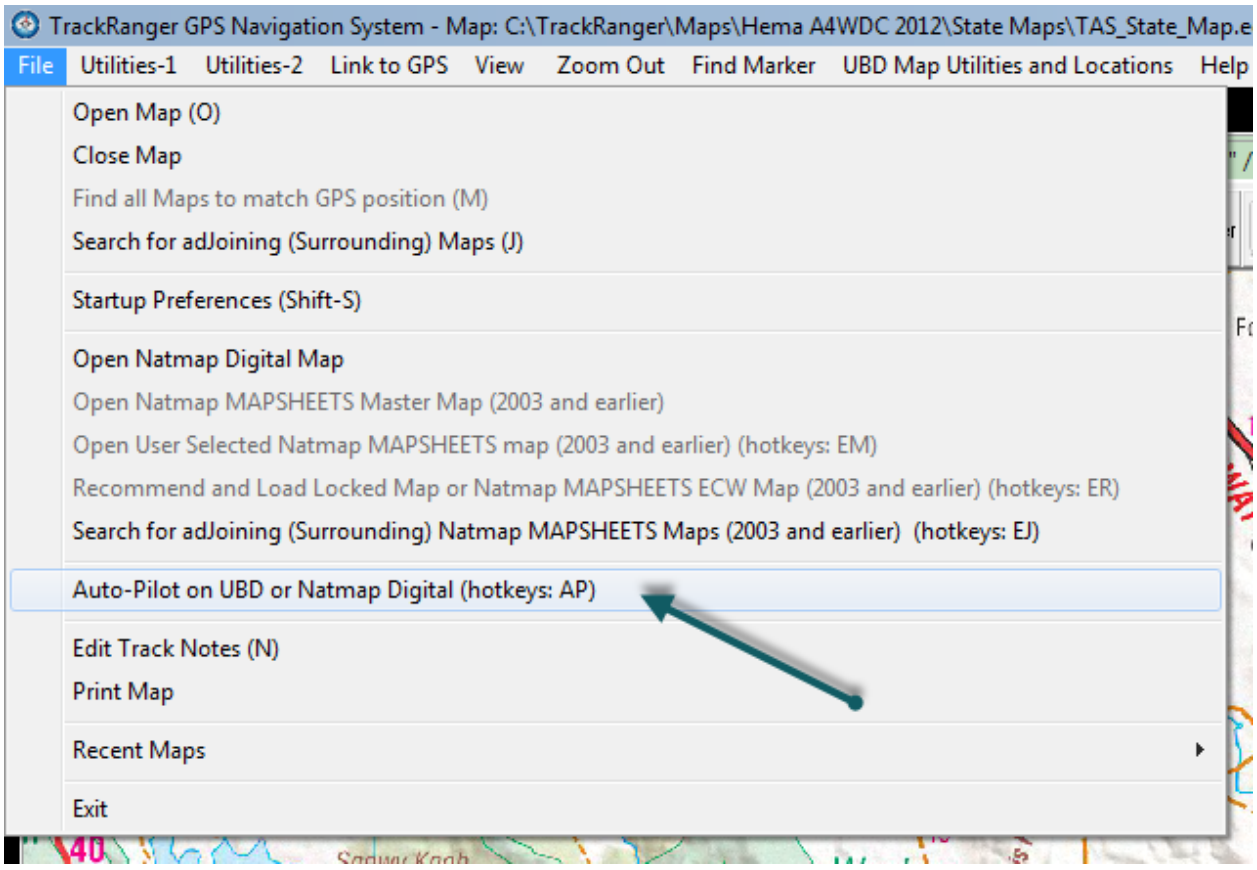
The top status bar, and the GPS coordinates form shows the current operation status of AutoMapMove.

AutoMapMove is most suitable when using non-size reduced files (such as JPG, PNG or BMP files), and when the zoom ratio is 1:1 (100%)



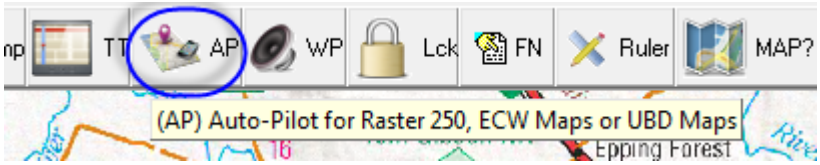
Auto Map Move status

Auto-Pilot



For Natmap maps, the Hot Keys “AP” can be used to turn on / off Autopilot. This will automatically search for and load a Natmap Digital map to match the current position, and enable Auto-Recommend maps and Auto-map-move at the same time.

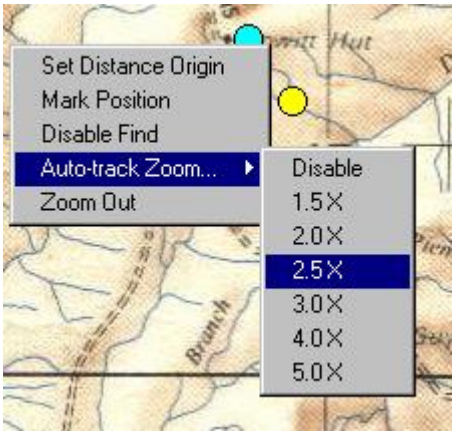
This can also be instigated from the tool bar:



Auto Track facility

For user scanned maps, not commercial maps. TrackRanger includes the ability to Automatically Track a GPS coordinate. It does this by allowing the user to select a pre-defined zoom factor, and re-positions the map automatically to match the GPS location whenever the GPS position moves outside of the current map boundary (ie: moving map display). **AutoTrack works best with compressed EMF type map files, whereas AutoMapMove works best with large high resolution JPG files.**

Auto Track is only available if valid GPS data is being received, and the received coordinate is within the current map boundary.



To enable Auto-Track, right click on the map area, and select Auto-track Zoom, and a suitable zoom factor. The Map will be redrawn at the selected zoom ratio so that the GPS coordinate is located within the map area.

Whenever the GPS coordinate falls outside of the viewable map area, the map position will be recalculated and refreshed such that the GPS position is viewable.

To turn off Auto-Track, select the Disable item from the Auto-track Zoom menu.

If the GPS coordinate falls outside of the map extremities, or the next Auto-Track calculation would attempt to create a zoomed map area outside of the present map extremities, Auto-Track is disabled.

The GPS Coordinates page shows the Auto Track status.

Hot-keys A2, A3, A4, A5 and AD (Auto-track Disable) are also available for Auto-Track, as well as the AutoTrack buttons on the toolbar.

Hotkeys X1 to X9 are most suitable for commercial maps such as Natmap, UBD, Hema, Westprint Maps etc.

Startup preferences

TrackRanger may be set to automatically undertake a number of user defined preferences each time TrackRanger is started.

Startup preferences is available from the File drop-down menu, and also from Hot keys 'Shift-S'. See Figure 34 - Startup preferences screen, below.

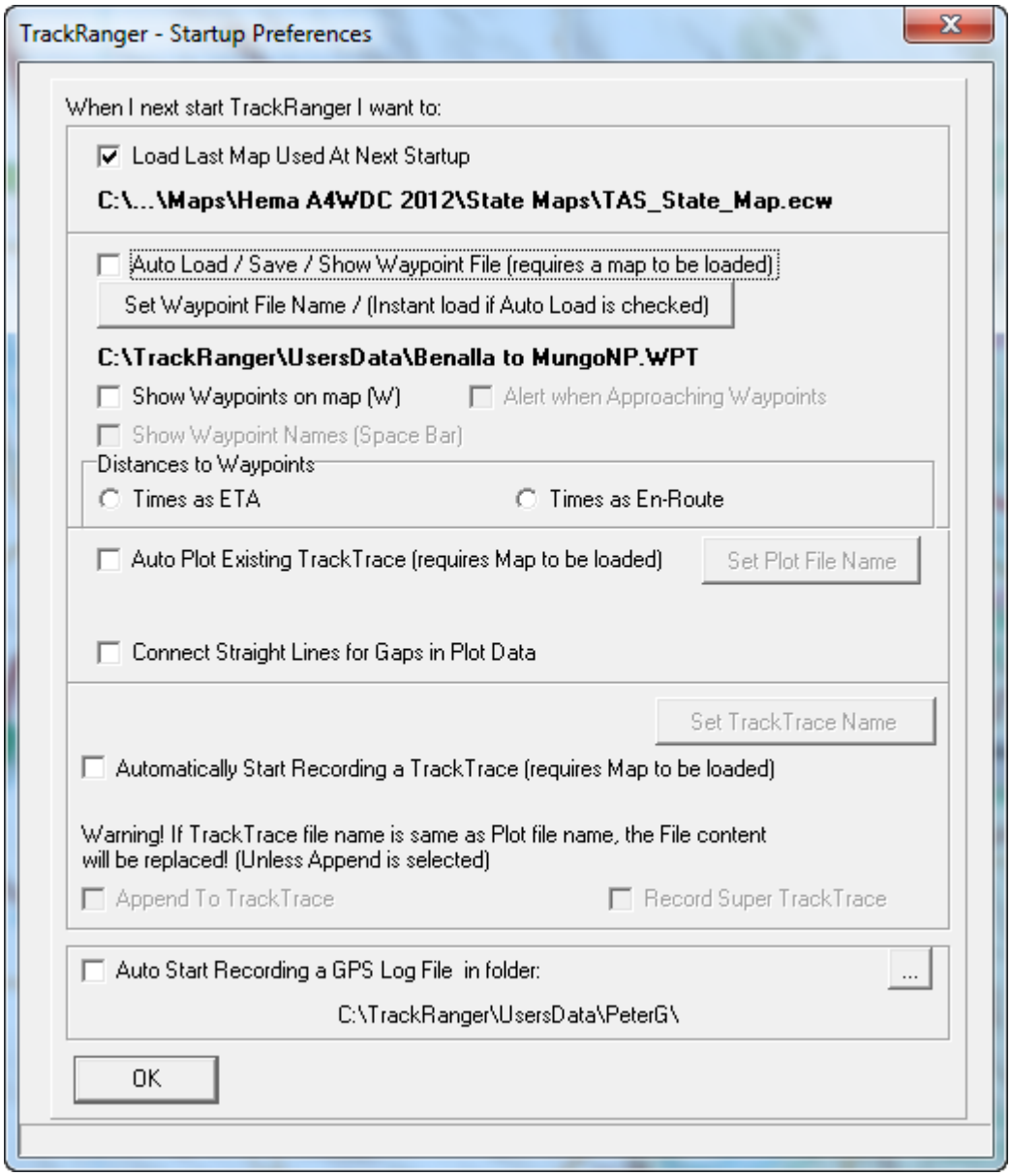


Figure 34 - Startup preferences screen

Note that if an existing Track Trace file is to be plotted automatically at startup, and a new Track Trace is to be created (or appended to) with the same name as the file being plotted, the file will be over-written. A warning is shown if the file names are identical. See Figure 35:

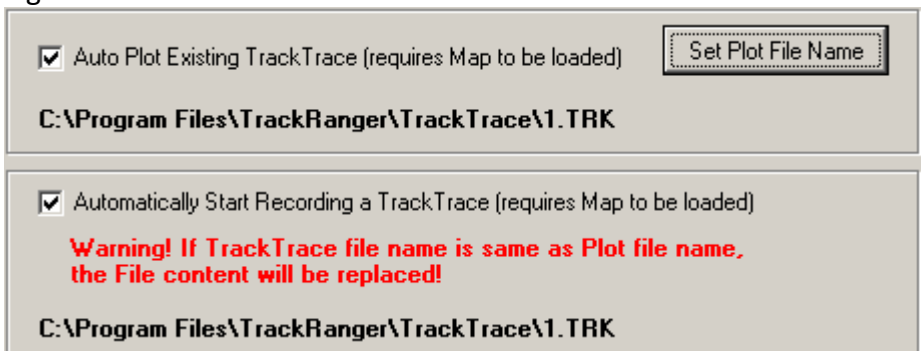
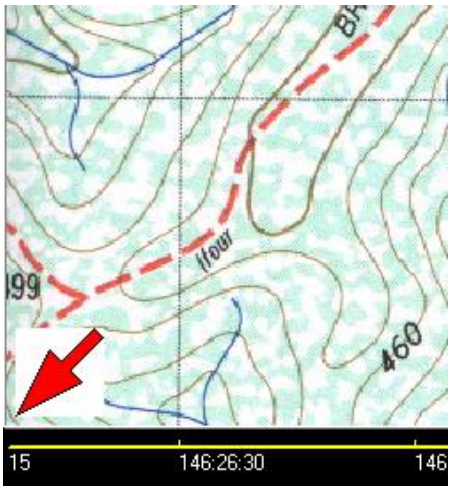


Figure 35 - Warning if identical files are used to plot and record new Track Trace

Section 13 – Other Information Displays

GPS Out of Map Boundary Indication

If the currently received GPS coordinate falls outside the viewable area, an arrow will flash at the map boundary to indicate the general direction of the GPS position in relation to the current map display. There are eight (8) available arrow locations (Top, Right, Bottom, Left, Top-Right, Top-Left, Bottom-Right, Bottom-Left. The user may then choose to load an alternative map (see also Recommended Maps Utility feature).



Status Line

A Status Line is provided at the top of the map. This line provides information relating to the most recent event undertaken by TrackRanger. This includes Zoom operations, file names etc, GPS communications messages etc.

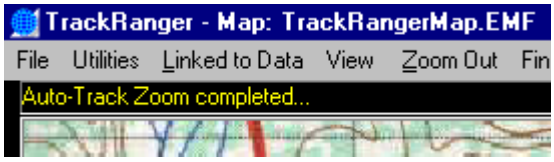
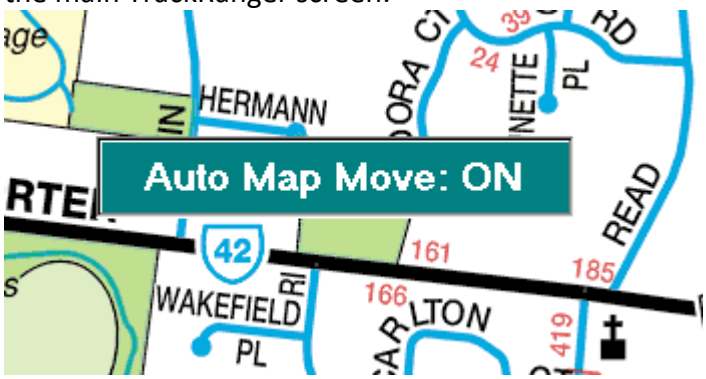


Figure 36 - The TrackRanger Status Line

TrackRanger's latest operational tasks are presented momentarily as 'splash' messages on the main TrackRanger screen:



Section 14 – Hot key Commands

Hot Keys

Single and paired key-strokes are available to perform certain common functions with TrackRanger. Selecting Print Hot Key Summary from the Help drop-down menu allow the user to print a Hot-key listing.

HotKeys that are most commonly used are preceded by an asterisk character (*)

The Hot-Key summary is available by pressing the H key. These are listed in the following table:

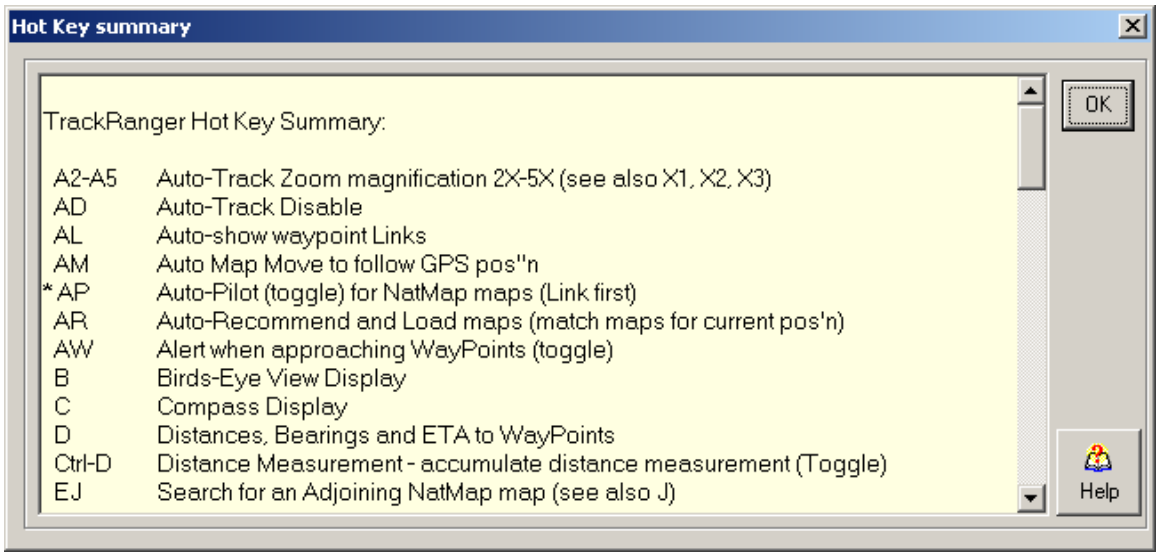


Figure 37 - TrackRanger Hot-Keys summary

The following TrackRanger Hot-key commands are available:

TrackRanger Hot Key Summary:

Cntrl-A	Analyse Super Track Trace file (graph)
A2-A5	Auto-Track Zoom magnification 2X-5X (Not for Natmap) (see X1-X6 for Natmap)
AA	Auto-Arrow (Directional Arrow GPS position display)
AC	Auto-Circle (Circle GPS position display)
AD	Auto-Track Disable
AL	Auto-show waypoint Links
AM	Auto Map Move to follow GPS pos"n
* AP	Auto-Pilot (toggle) for NatMap / UBD maps (Link first)
AR	Auto-Recommend and Load maps (match maps for current pos'n)
AW	Alert when approaching WayPoints (toggle) (Visual and Voice Announcement) (see also 'W')
B	Speed Tool Buttons Display Screen - commonly used tools
Ctrl-B	Control-Birds-Eye View Display
Shift-B	Launch TrackRanger's Integrated Web Browser.
C	Compass Display
D	Distances, Bearings and ETA to WayPoints
Ctrl-D	Distance Measurement - accumulate distance measurement (Toggle)
EJ	Search for an Adjoining NatMap map (see also J)
EL	Lock TrackRanger to only use current ECW map
EM	Open ECW Map (e.g. Auslig)
EP	Return to "Preview" mode of current ECW Map
ER	Auto Recommend and load ECW Map (e.g. NatMap)
EU	Use current ECW map view
FN	Force to use Natmaps only or UBD maps if available (toggle)
G	GPS information
Ctrl-G	Manually open Map GPS calibration dialog
Alt-G	Gazetteer Launch (Place Name search)
I	Information Statistics
J	Search for Adjoining maps (N, S, E, W, NE, SE, SW, NW) - see also EJ
K	Launch KML/KMZ file import dialog (Google)
* L	Link to GPS (connect) - see also: <Esc>
Ctrl-L	Launch the Quick Lat/Long Calculator
M	Map Recommendation for current GPS position
N	Notepad for recording trip notes
O	Open Map dialog
P	Plot TrackTrace position information from existing file (toggle)
Ctrl-P	Plot additional TrackTrace data (after first plot has been drawn) - 3 plots max
Alt-P	Animated Track Trace Plot display (Utilities-2 menu)
Ctrl-Q	Quick-add waypoint display
R	Ruler Scale display
Ctrl-R	Record a GPS Log File
S	Speedometer Display
Ctrl-S	Satellite information
Shift-S	Set Startup preferences for auto Map load, Plotting, Waypoints and TrackTrace.
T	Track Trace Position Information + Logging
Ctrl-T	Track Planning - Create a TrackTrace on map with the mouse
U	Alternate between UBD 1:20k and 1:40k maps
V	Night Vision (2 stages)
W	WayPoint Display for loaded waypoints
Ctrl-W	Open Waypoint management dialog
X1-X9	Zoom level (X9 user defined value set from Utilities 1 menu)
Y	sYstem Information announcement (sound)
Z	Zoom 100% (1X)
+ or =	Add current location as WayPoint (= is instant)

<SpaceBar> Show Id's for all W/Point posn's. / Ack approach. WP's

<Control-SpaceBar> Get Voice Announcement for next Waypoint

<BackSpace> Show Travel Statistics (large screen display)

Keyboard Arrow Keys - Scroll Map View on Screen

Shift + PageUp/PageDown: Zoom In / Out
Shift + ArrowKeys: Navigate around zoomed map surface (esp. UBD)
Shift + Left Mouse Button: Measure Distances
Shift + Right Mouse Button: Measure Area (polygonal)

Shift + Left-Click on a Waypoint - Zoom-In to WP
Shift + <Alt> + Left-Click on a Waypoint - Zoom-Out from WP

<Esc> Link to internal Demo GPS Data (Shift-Escape to load alternate file)
',' (Comma) Pause reading of internal Demo GPS Data

F12 - F5 Go to a previous ECW View (F12 is latest)

'Page Up / Down or click **+** / **-** buttons on mini tool-bar: Change zoom-level on current map

H Show Hot Keys (this command);

Right click on map allows it to be centered at the mouse-clicked location (when not on Auto-Pilot).

* Most frequently used for "Auto-Pilot" are: L(ink), then AP (for UBD / Natmap)

Section 15 – User Maps and Calibration

Map formats

A significant range of maps is already available for direct use with TrackRanger. This section is provided for users who wish to use their own supplied maps in TrackRanger, e.g. scanned maps of gold fields etc.

TrackRanger requires map input data to be provided in a Windows™ JPG, BMP, PNG (Portable Network Graphics) or Enhanced Meta-File format (EMF extension). See the section on setting up a map (below). TrackRanger can also directly import Enhanced Compression Wavelet images (ECW) format maps (e.g. Natmap, Adventurer, Hema etc). Please see the section on ECW maps for more detail. The Natmap ECW maps are already pre-calibrated. Note that for most purposes the terms ECW maps and Natmap maps are directly interchangeable.

Setting up your own map (non ECW / NATMAP)

TrackRanger 3.2 onwards can directly import maps from the Natmap Mapsheets or Natmap Digital 250K raster series CD or hard disk drive if installed there. See section 4 for more information on ECW format Natmap Mapsheets/Digital maps.

If you are scanning your own paper maps, use the following procedure.

Map information must be created before TrackRanger can display data. Various tools are available to draw shapes and other line information on a screen surface, and to save these in Windows JPG, PNG, BMP, EMF or other formats. An existing map may also be scanned and saved to a JPG, PNG, and BMP or converted to a Windows Enhanced Metafile (EMF), and this is probably to fastest way to create a map surface for use by TrackRanger.

Generally, the following procedure should be used to create the map:
Use a Scanner to scan a map area, applying the following scan resolution settings

- Resolution: 100 dpi or greater (200dpi recommended for high res.)
- Document type: Photo quality (Photo Quality 24 bits)
- Scale: 100%
- Scan Mode: Color
- Auto Density

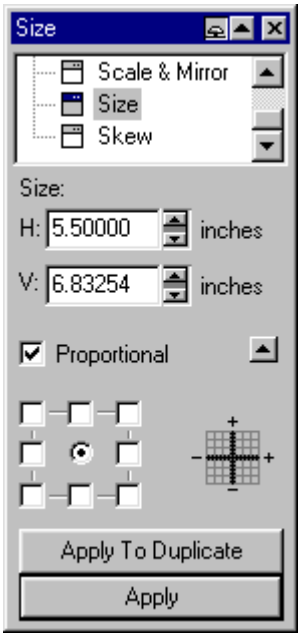
Scan the information, and save as a JPG, PNG, BMP or Windows EMF file.

TrackRanger's recommendation is to save the data in a JPG or PNG format.

If you prefer to save as an EMF file, and your scanning software does not support EMF, an alternative is to save the file as a JPG or BMP format, and use an offline utility such as CorelDraw or Paint Shop Pro to convert it to an EMF format. Once the map has been created, it should be saved to the TrackRanger Maps directory (usually C:\Program Files\TrackRanger\Maps\) on the TrackRanger computer system. Alternatively, it may be written to a CD-ROM, as a part of a user defined library of maps for use by the TrackRanger system.

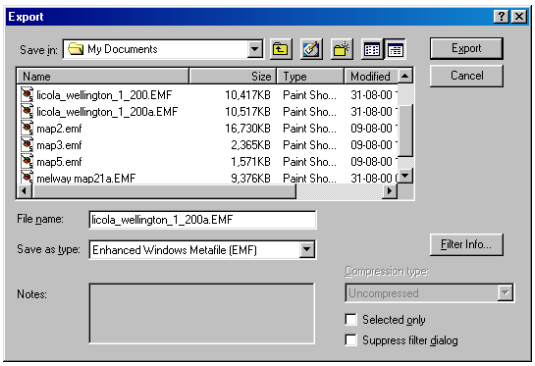
Converting a JPG or BMP to an EMF (optional only)

Although TrackRanger works well with BMP and JPG files, some users may wish to store the Map files as compressed Metafiles. Metafiles contain vectored data, and are more flexible in their scaling properties. Maps can be reduced and saved as metafiles. This then allows them to be zoomed to high magnification levels without the undesirable introduction of "graininess" to the resulting display.



The preferred method of creating the EMF is to use CorelDraw™ to Import (<Cntrl-I>) the JPG file created from the scanned image, and then use the Arrange | Transform Size option (with the proportional checkbox checked) to reduce the image to approximately 140mm (5.5") wide. This should give approximately 172mm high, depending on proportions of the original image.

Export (<Cntrl-H>) this reduced file as an EMF format, and copy into the Maps directory (default is: C:\Program Files\TrackRanger\Maps\, but you may prefer to copy to CD-ROM. This then becomes the map file for use by TrackRanger.



If the map is to be converted using Paint Shop Pro™ (PSP), open the JPG map in PSP, and use the File | Save as type option to save the data as an EMF file as shown below

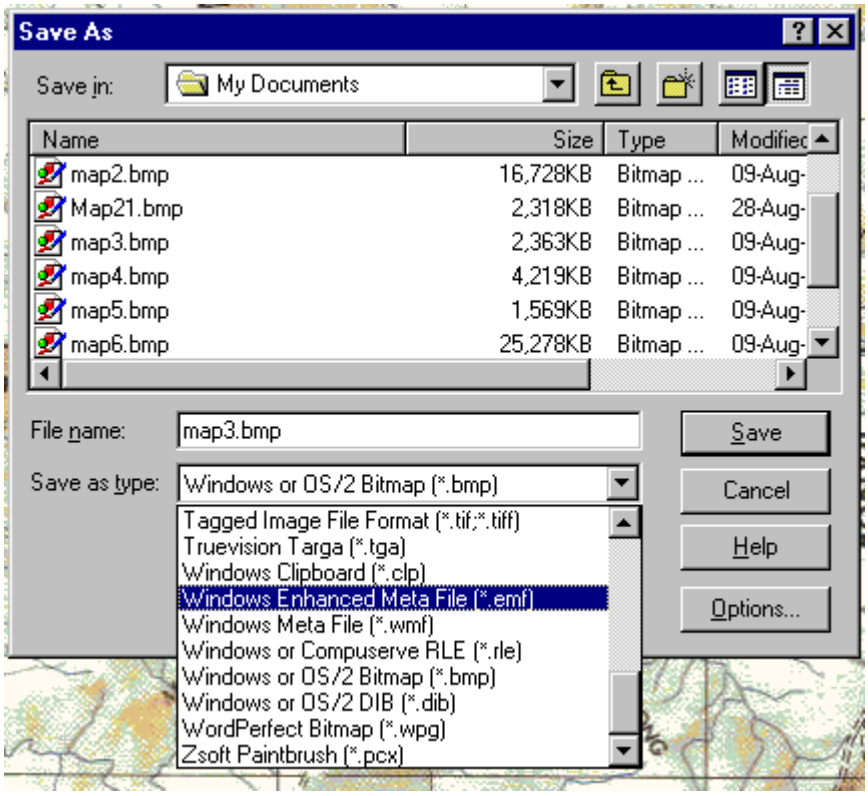


Figure 38 - Saving as Enhanced Metafile data type

As mentioned above, EMF files are particularly useful if the data is to be resized from a larger JPG or BMP file. Resizing give more flexibility to the zoom options from TrackRanger, as the picture quality remains high, even at higher zoom levels.

Loading a map file

To load a map file, select the File | Open drop down menu, (Hot-Key “O”) and navigate to the directory containing your JPG, BMP or EMF map data (usually C:\Program Files\TrackRanger\Maps\, but files may also be read from a CD-ROM if available).

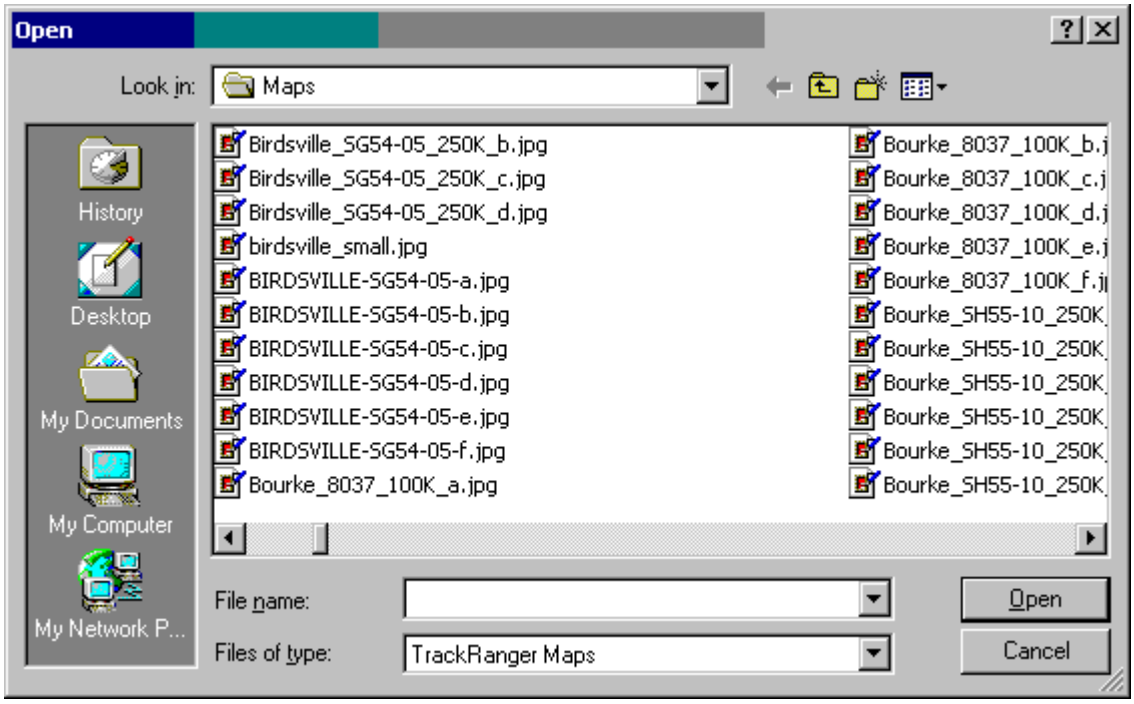


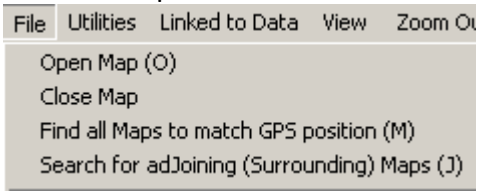
Figure 39 - Loading of Map File

Navigate to the required map file. When the correct map has been located, click on the open button. The map will be loaded into TrackRanger.

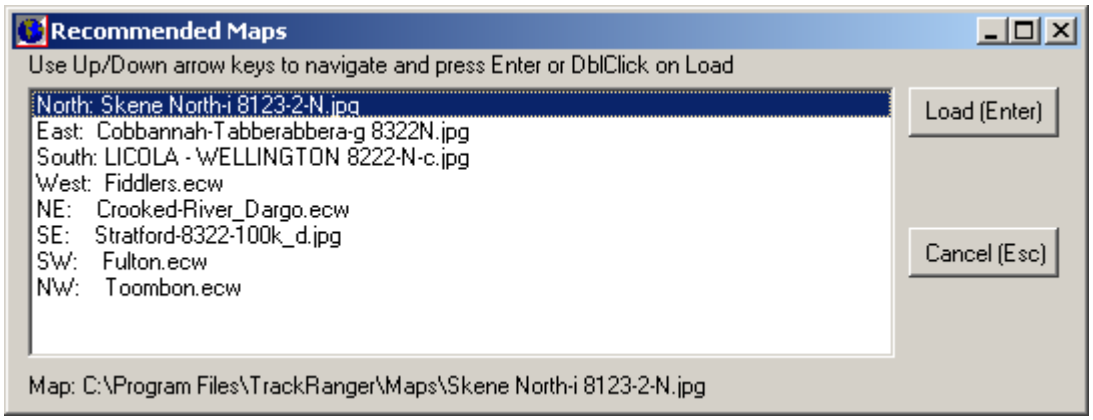
Locating adjoining maps to currently loaded map

If a map is currently loaded, TrackRanger allows for adjoining maps the surround the currently loaded map to be automatically searched for and loaded.

Select the option from the File Menu, or use the Hot-Key ‘J’



TrackRanger will search for maps that abut the extremities of the current map, or overlap into the current map for the relevant compass points of North, East, South, West, North-East, South-East, South-West and North-West.

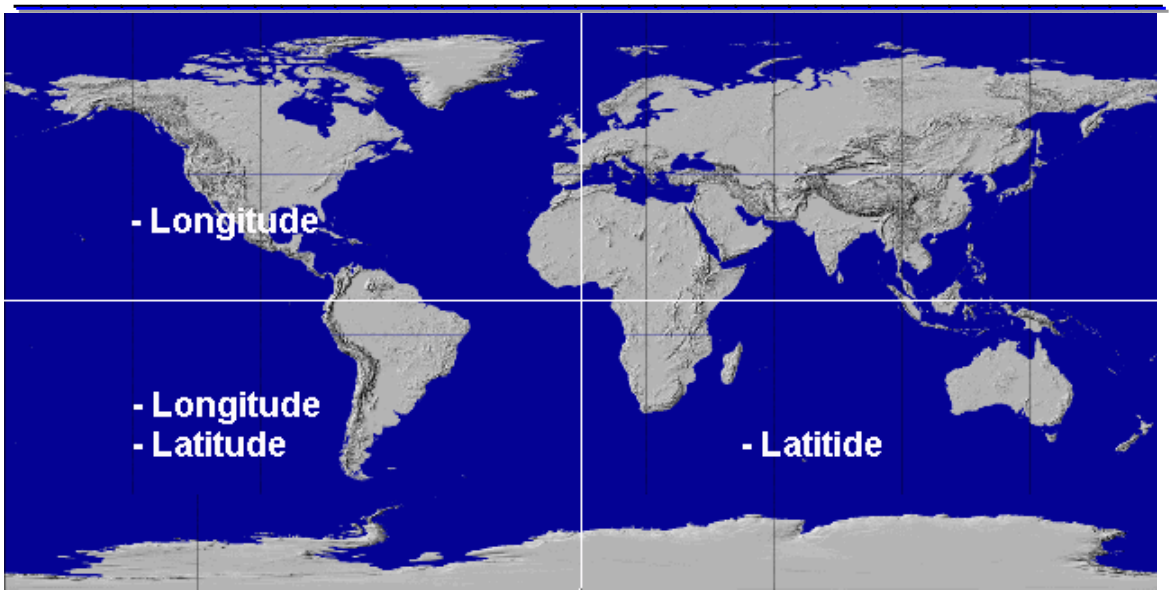


Calibrating the Map coordinates

(Note: Advanced Operation. This section does not apply to maps that are already pre-calibrated, e.g. Australia's Outback Tracks, Adventurer, Natmap, Hema maps on CD)

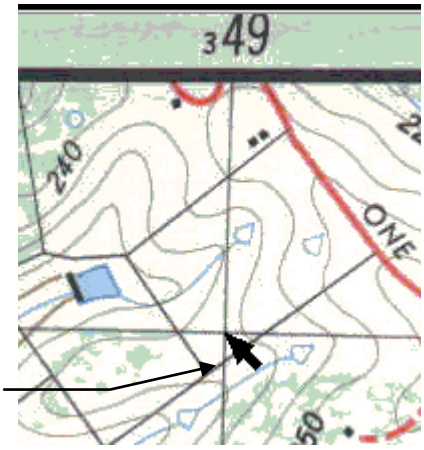
Before TrackRanger can be used as a navigation facility with a newly created map, it is necessary to initialise the TrackRanger database with the Latitude and Longitude and distance coordinates of the displayed map. This then allows TrackRanger to apply its navigation data to the map surface. Tools are provided within TrackRanger to allow these coordinates to be easily loaded and saved. The only requirement is that the user must know the coordinate points at the top left-hand and bottom right-hand locations of the map.

Note also, that as TrackRanger is capable of being used anywhere in the world, the coordinates must match the world Lat/Long values. To clarify, Latitudes south of the Equator are entered as negative, and Longitudes west of the central meridian are entered as negative. To determine whether to use positive of negative values, refer to the following world map:



As can be seen, for anywhere in Australia, enter Longitudes as positive, but Latitudes as negative for your maps.

To calibrate these coordinates, the mouse is used together with the <Control> and <Alt> keys on the keyboard. The <Control> is used to enter the top left hand coordinates; <Alt> is used to enter the bottom right-hand coordinate.

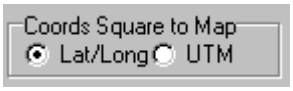


Proceed as follows:
Locate the mouse cursor over a known coordinate location near the top left-hand corner of the map, and while holding down the **LEFT <Ctrl>** key, press the **left mouse button**. This stores the top left-hand corner mouse position, which then must have a corresponding Lat/Long coordinate applied. Release the <ctrl> key.

UTM coordinates:
349000(e)
5834000(s)
Zone 55

The location does not have to be at the exact corner of the map, any known point (such as a grid-line intersection) may be used.

If the map Latitude and Longitude grids are square to the map boundary, then check the Lat/Long radio button. Conversely, if the map orientation is such that the UTM gridlines are square, select the UTM option instead.



The following screen will be presented, and the user should enter the coordinate points for the Start Latitude and Start Longitude at the exact position that the mouse button was pressed:

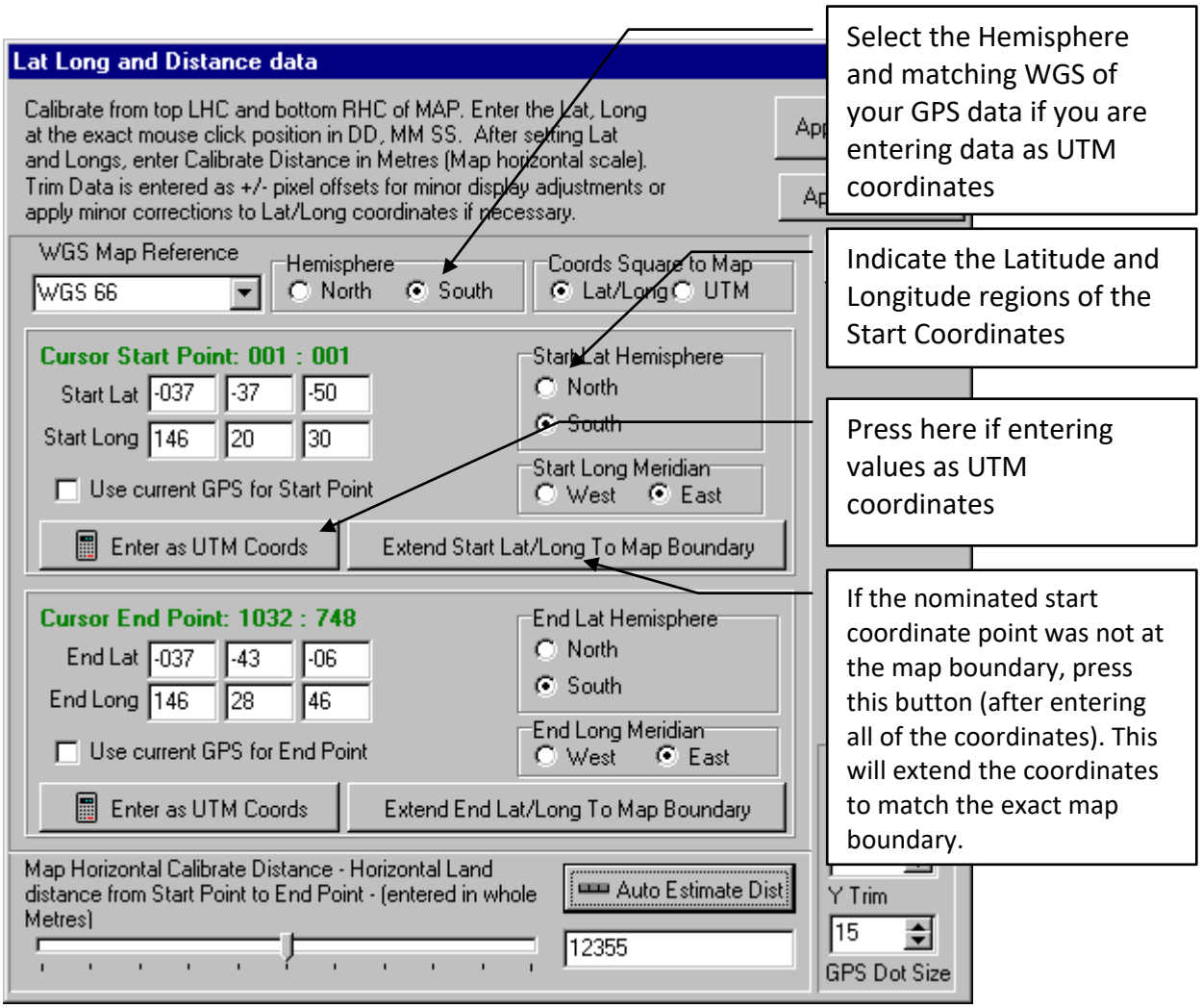
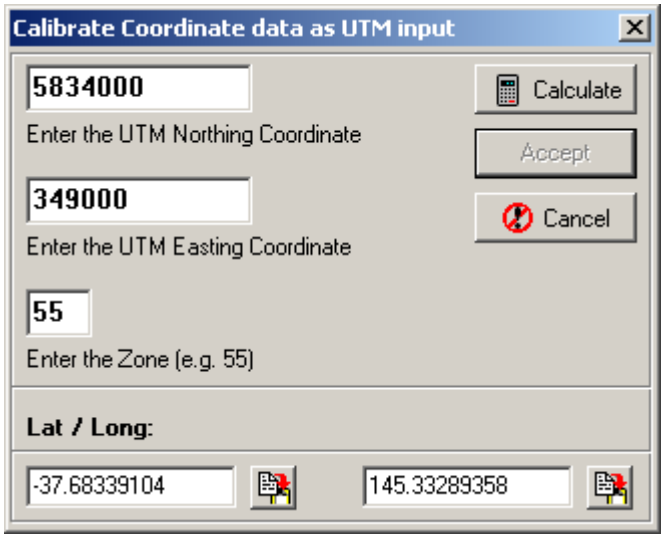


Figure 40 - Entering Lat/Long coordinates

If the coordinate points are in UTM, select the “Enter as UTM Coords” button, and enter the values taken from the map. Press the Calculate button, then the Accept button:



Note also, that you must select the appropriate Hemisphere (north or south) for the map starting point, and also select the position east or wet of the central meridian. Refer to the Lat Long and Distance Data image above for more information on the values to use.

Data is entered as Latitude and Longitude in Degrees, Minutes and Seconds or UTM format.

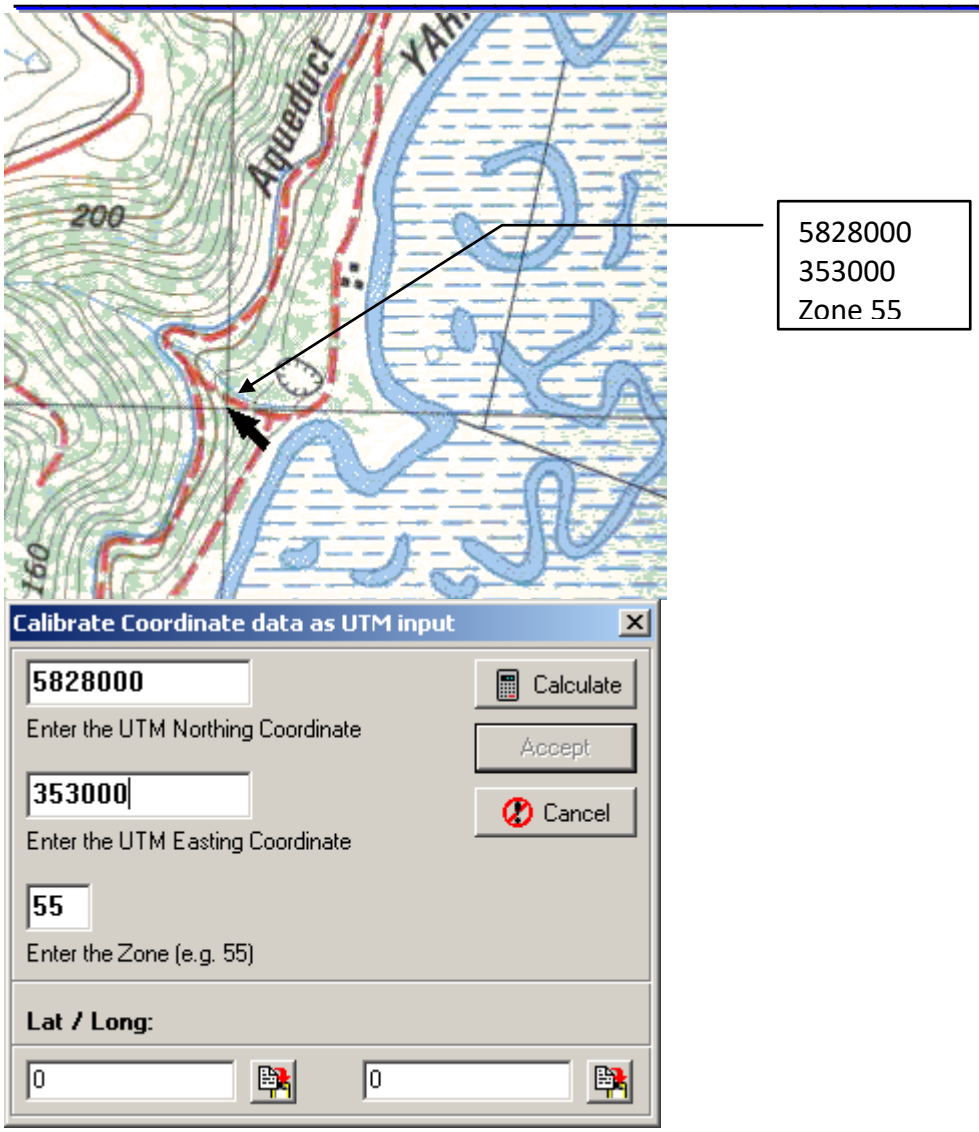
When the data for the upper left-hand coordinate position (start Lat/Long) has been entered, press the Apply + Close button.

Note that you may also enter the data as UTM coordinates by clicking on the appropriate buttons.

You should also select the WGS Map Reference and the map hemisphere to match the detail from the source map. This is required to calculate UTM reference values. If unsure, use WGS84. See also the information below on “Datum Shift” (Section 11)

To calibrate the lower right-hand corner of the map, position the mouse over the map at a known location near the lower right-hand corner, and while holding down the **<Alt>** key on the computer keyboard, press the **left mouse button** (Remember: this time you **use the ALT key instead**). Release the <Alt> key when the calibration form is displayed.

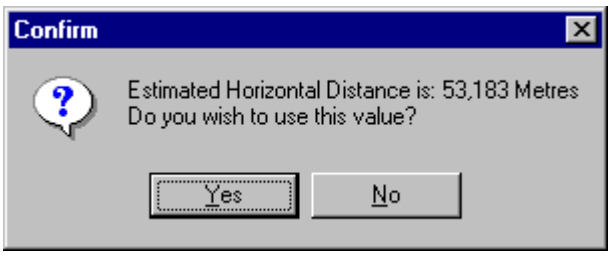
Enter the matching End Lat / End Long coordinates for the corresponding point on the map.



Click the Calculate and then the Accept buttons

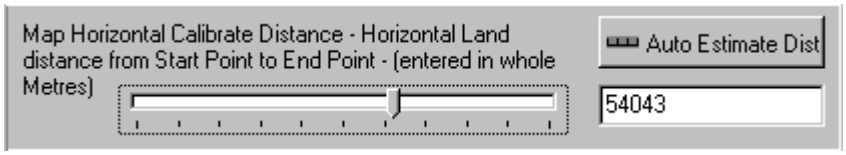
Tip: If your current position exactly matches the coordinate point on the map, check the Use Current GPS for Start / End point checkboxes. The current GPS position will be entered into the edit boxes, to save manually entering the data. *Note: this option should only be used if the GPS position currently coincides exactly with the map Start or End Points.*

After both the Start and End coordinates have been entered, a distance value should now be calibrated into the map database. This distance should be the **exact distance between the starting and ending longitude points** entered above (ie: the horizontal scale), and is entered as a value in whole metres.



TrackRanger also includes a facility to automatically estimate this distance. You may use this feature by pressing the “Auto Estimate Distance” button:

Figure 41 - TrackRanger suggesting the distance to use



The user has the ability to make fine adjustments to the calibrate distance value. One method to ensure that the estimated distance is accurate, is to position the edge of the overlay ruler (hot-key 'R') on a UTM coordinate line, and then move the slider until the ruler increments directly overlap with the UTM gridlines. The ruler scale will be automatically adjusted as he slider is moved. When the gridlines and the ruler lines match, the exact distance has been calculated.

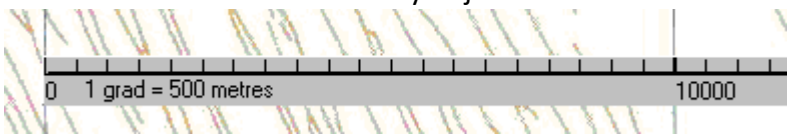
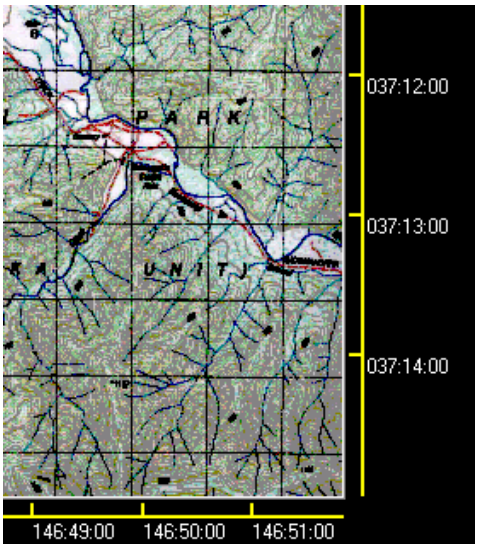


Figure 42 - Using the slider bar to adjust the estimated distance

Press the Apply + Close button to save the coordinates to the database file.

It is desirable to periodically make a backup of the TrackRanger.ini file and the corresponding Maps and their associated ini files, as these files contain all of the coordinate data points information for the maps. These files are all located in the TrackRanger, TrackRanger/MapIniFiles and TrackRanger/Maps/ directories.



Once the coordination points are set, TrackRanger will provide scale rulers along the right hand site (latitude) and the bottom of the map (longitude). These rulers show the coordinate points in Degrees, Minutes and Seconds.

Coordinate point data is saved to the local database (TrackRanger.ini) and the corresponding ini file for the open map, and is then automatically re-loaded, each time the map is opened.

The current map file name, and coordinate points are shown along the top of the TrackRanger form as the mouse is moved over the map surface.

Figure 43 - Map File information and current mouse position shown as coordinates on Menu Bar

Tip:

For convenience, if GPS communications are already available, and the position reported by the GPS is currently at the exact mouse location being entered, the user may check the Use current GPS for Start and End Point option. To do this, simply hold <control> or <alt> and click the left mouse button, then check on the "Use current GPS for Start (or End) Point" option. The current GPS position will be 'inserted' automatically into the Lat/Long distance data entry screen.

Map Initialisation Files

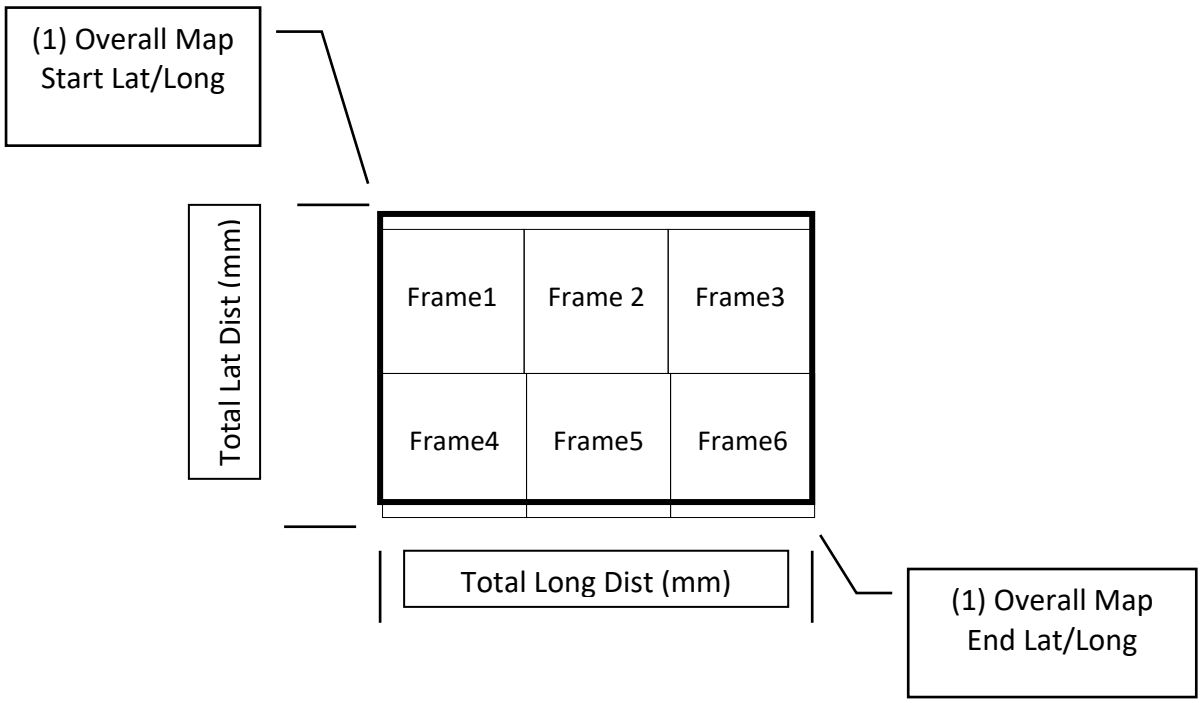
Note that the individual map *mapname*.ini files are stored in the MapIniFiles subdirectory of the TrackRanger programs directory. This is required because the data in these initialisation files is dynamic (ie: is changed by the TrackRanger software). It is therefore not possible to store these files on non-editable media (e.g.: CD-ROM). TrackRanger manages the Map "ini" files contents automatically. Manual user action is not required.

The master file "TrackRanger.Ini" is used to contain global information about TrackRanger, including details of the overall coordinate points for each of the individual maps. This is used by TrackRanger to search for maps to match the current GPS position.

File: "MapsIndexFile.txt" also contains position information relating to map locations. This file is automatically created and managed by the "Update Database for All Recommended Maps" option. It is used when searching for adjoining maps (map surrounding the current maps).

Lat / Long calculator

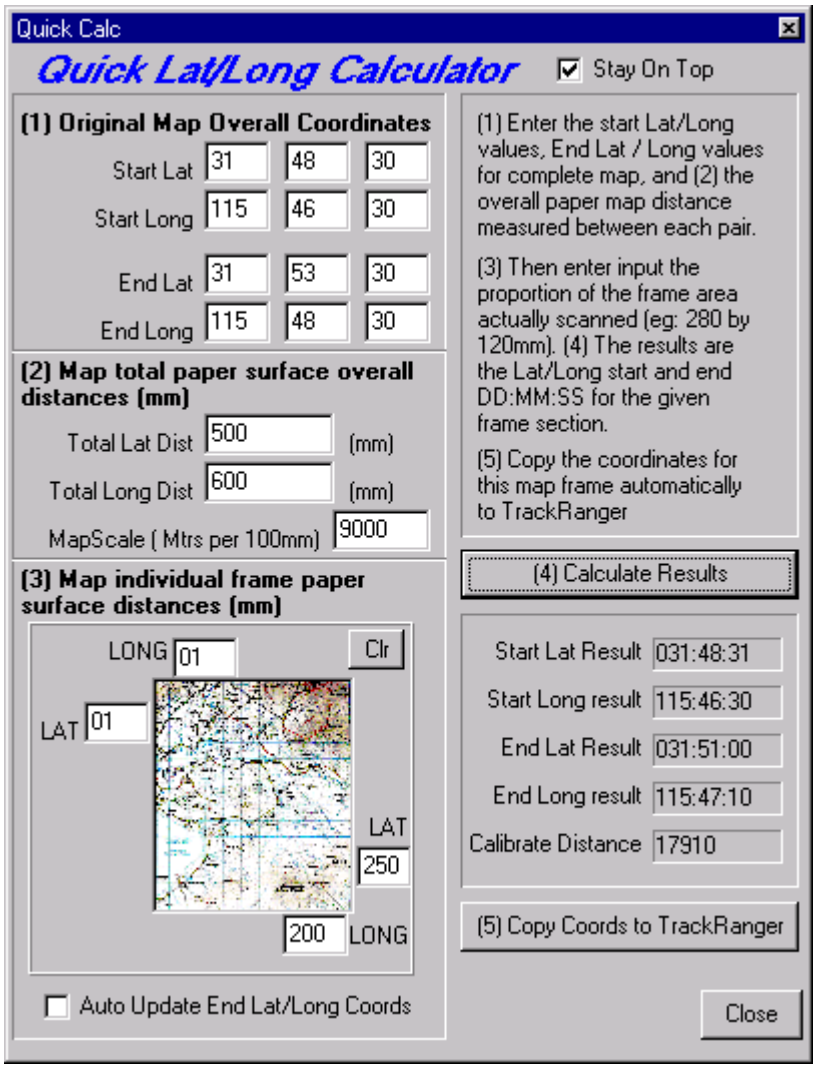
If the maps being utilised are scanned from a larger map into individual frames (e.g. a large map dissected into 6 individual frames 3 wide by 2 high), the TrackRanger Quick Lat / Long calculator may be used to more effectively and quickly input the calibration data.



First, load one of the individual map frames to be calibrated (from the TrackRanger File | Open menu). In the example above, presume that Frame1 is loaded

To start the calculator program, select the Lat / Long calculator from the Utilities-2 drop-down menu.

(1) On the calculator program, enter the start and end Lat and Long positions from the ***overall map*** (not the individual map frame, but the entire map). Data is entered in degrees, minutes and seconds.



(2) Use a ruler to measure the overall (physical paper) size of the map, and input the total latitude and longitude distance in millimeters as measured on the map surface – for example 500mm by 600mm.

Next, **use a ruler to measure the map scale, and determine the number of metres per 100mm of map scale** (for example, at a map scale of 250,000:1 a measurement of 100mm would equal a distance 25000 metres (25Km). In this case, enter 25000 in the "Mtrs per 100mm" edit box. The example above shows the value 9000 meters / 100mm of paper map surface

(3) Using a ruler, determine where the displayed map ***individual frame*** **(Frame1)** rests within the overall full map. Measure the distance to the start and end of the map frame from both the left extremity of the map (Longitude), and the top of the map (Latitude). Enter these values (as millimeters) into the Map individual frame paper surface distances (mm) edit boxes on the lower left of the calculator form.

(4) When all 4 points of the data has been entered, press on the Calculate Results button. The proportional start/end Latitude and Longitude values will be displayed in the results window on the lower right-hand corner of the Lat/Long calculator window.

(5) If you are satisfied with the results, they may be automatically transferred to the Lat Long and Distance data form by simply pressing the "Copy Coords" button.

The section on Calibrating the Map Coordinates may then be followed, but now the user will find that the Lat / Long and Distances values will have already be filled in with the results from the Lat / Long calculator.

Check the "Stay On Top" checkbox to allow the Quick Lat / Long calculator to remain in view.

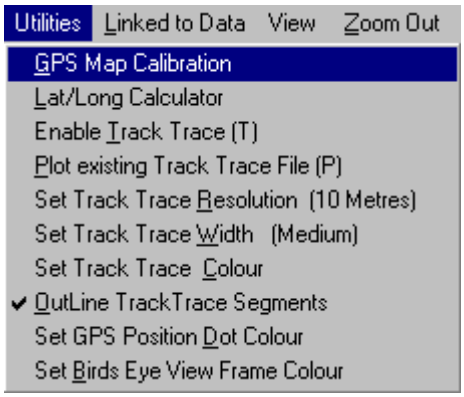
Press the "Clr" button to zero the dimension coordinates in the frame window, display (load) the next required map, and fill in the appropriate values for that frame. Repeat the above procedure until all coordinates have been completed.

Tip:
Note that after the **first** frame dimensions have been entered and calculated, if successive frames use the same "paper size", the user only has to enter the start Lat/Long (mm) values for these frames, and simply check the "Auto Update End Lat/Long Coords" option. Entry of successive data will use the same aspect sizes to automatically calculate the end lat/long cords. This feature is useful when all frames have been 'scanned' using the same scan size.

Note, you should also set the WGS reference from the Utilities-2 | GPS Map Calibration page for each frame (the default is WGS84).

Section 16 - Trims

Trimming the displayed position

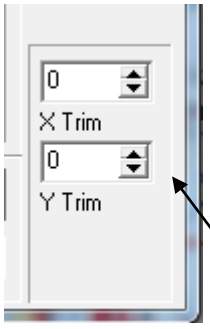


Note that the preferred way to adjust the displayed position is to use the GPS Datum Shift – see section 11, page.122

To improve position accuracy of the location of the spot on the map surface, a trim facility is provided. This allows minor adjustments to be made to the displayed position of the GPS information.

Select the GPS Map Calibration item from the Utilities-2 menu

This then displays the Calibration form that also provides the facility to apply positive or negative offsets (trims) to the GPS position on the map surface. Use this facility to apply a minor correction to the displayed position when you know the exact position of the displayed mark.



Trim adjustments are dynamic, so by pressing the Test button, the user can see the changes on the form as they are adjusted in the scroll boxes. The X trim affects longitude position, the Y trim affects latitude position. A positive X value moves the displayed position to the right. A positive Y value moves the displayed position down.

Trim Adjustment controls

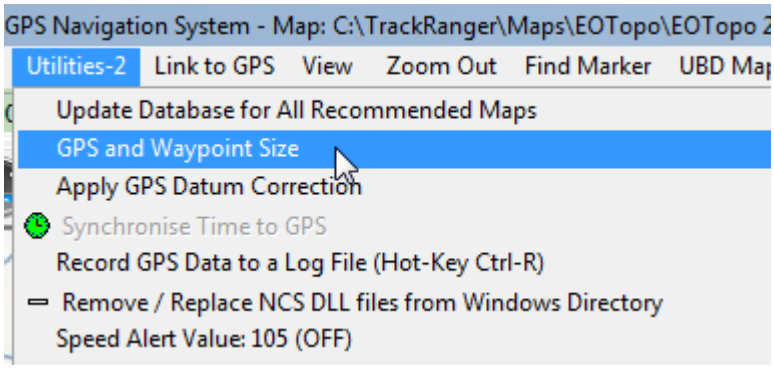
The preferable way to fine-tune the map is to make fine adjustments to the Lat/Long coordinates (usually only the seconds value). Press the Test button to check the results immediately.

Please also refer to the section on **Datum Shift**

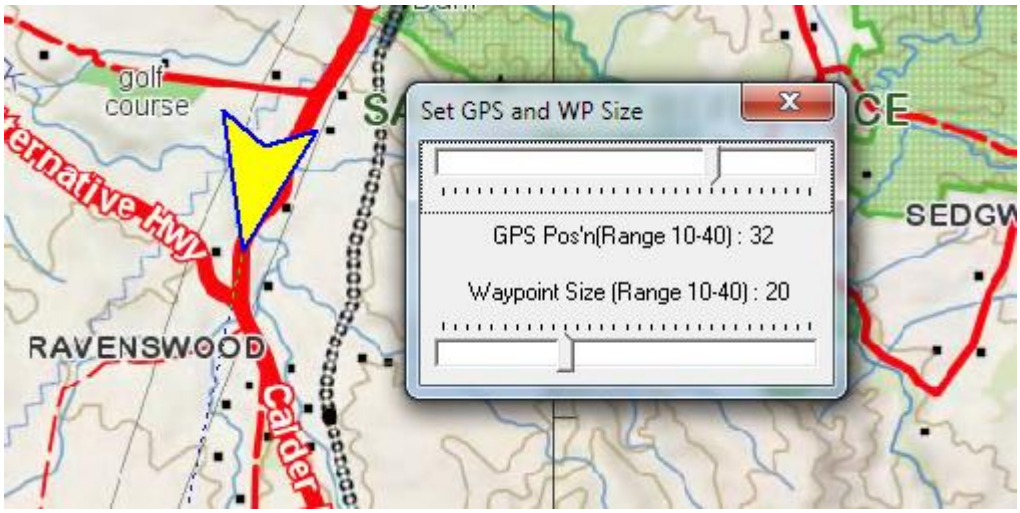
Press the “Apply + Close” button to store the trims permanently for the current map.

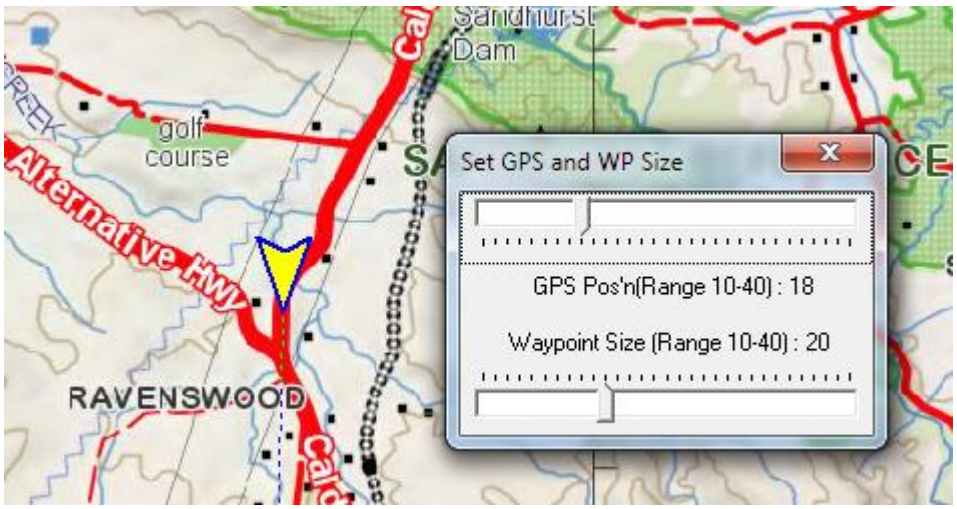
Changing the GPS location size on the map

The GPS position size and Waypoint sizes may be independently adjusted. The following information relates to adjusting the GPS position size. The displayed GPS position 'spot' size (circle or arrow) may be changed by adjusting the Dot Size option from the Utilities-2 menu (see Waypoint Size adjustment of page 62.)



Select the required size, if GPS position information is available, the GPS position size is adjusted dynamically on the map as the value is changed.

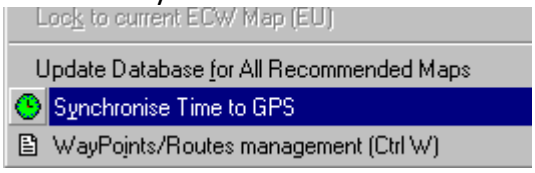




Section 17 – Time Synchronisation

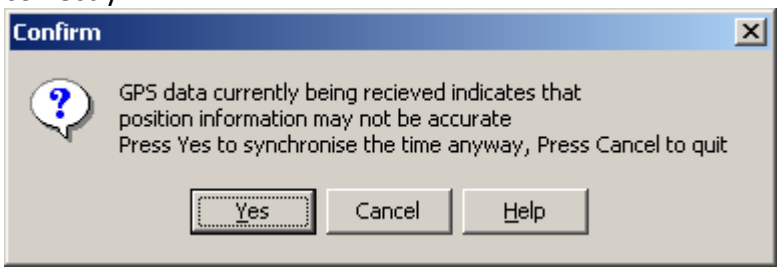
Synchronising Computer Time from the GPS

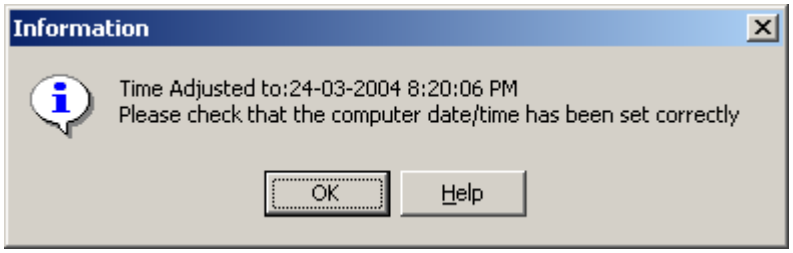
TrackRanger can synchronise the computer time from the time received from the GPS. Select the Synchronise Time To GPS from the Utilities-2 drop-down menu:



This function can only be used if Valid GPS data is being received. It will not allow synchronisation when GPS data is being read from the sample GPS data (Escape key).

Note that is Valid GPS has been received, and the valid data is subsequently lost, the user may still synchronise the time, but is asked to confirm, and then check that the time is set correctly.

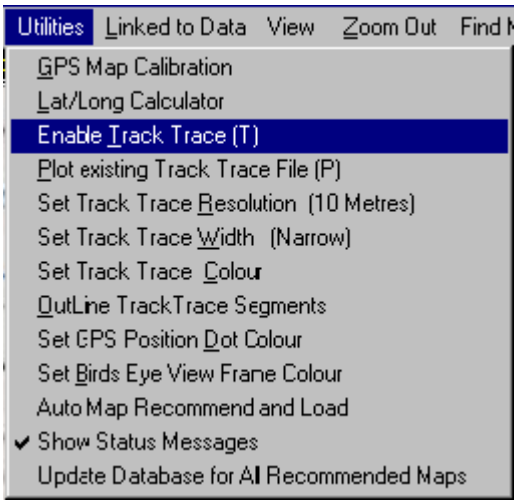




Section 18 – Track Trace. Adding Tracks to the map

Track Trace Feature

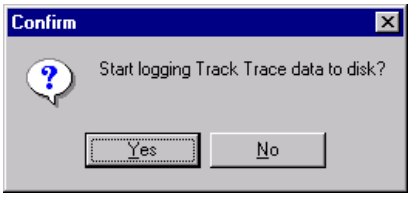
TrackRanger supports features to allow a route to be recorded and displayed, and optionally "played back" at a later date.



Selecting the Enable Track Trace option from the drop down menu starts Track Trace. Hot Key 'T' (Track Trace Enable) may also be used.

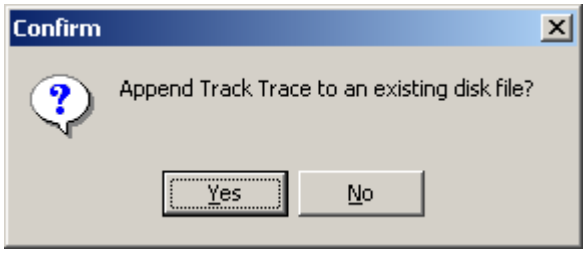
Track Trace by default selects the current map file name and appends the current date to it. This gives the file a unique name. The user may optionally change this name if so desired.

After starting the Track Trace option, and confirming the start option, accept or change the proposed file name.



Appending Track Trace to an existing log file while travelling

When starting a new Track Trace, the user has the option to write Track Trace data to a new file, or to append track trace data to an existing file. This allows for a journey that is interrupted (e.g. by overnight stopovers, lunch breaks etc) to be recorded into a single Track Trace file:



Note also, TrackRanger 4.3 or later supports Track Trace files of greater than 13,000 Km's (See Track Trace Append utility described below).

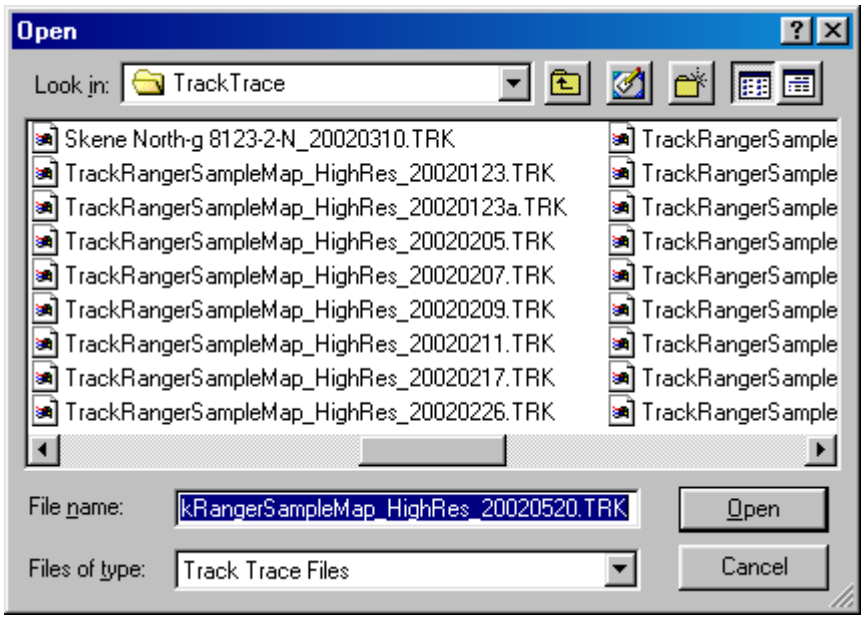
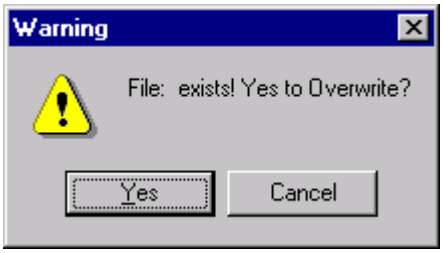


Figure 44 - Creating a Track Trace file (.TRK)

If a file already exists with the same name, the user will be given an option to overwrite or cancel.

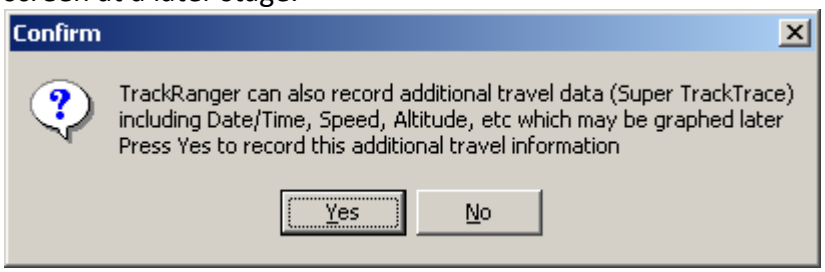


Files may be saved and loaded for display at a later time.

Super Track Trace

When the user starts Track Trace, they are prompted to start Super Track Trace also.

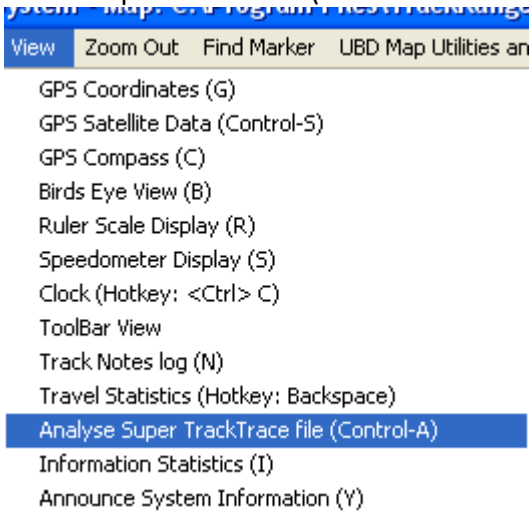
Super Track Trace records significant additional journey data, including Speed, Altitude, Location, Bearing, individual and accumulated distances, etc. This may be plotted on screen at a later stage.



The Super Track Trace data is saved in a disk-based file in the same folder that the Track Trace data is created in. The file is given a file extension of '.STT'

The GPS data is recorded to disk at a minimum of 250 metre intervals, or higher, if the Track Trace resolution is set higher to be than 250 metres (Track Trace resolution is described further, in this section).

Once a Super Track Trace data file has been recorded, its contents may be displayed graphically and in table format by selecting the Analyse Super Track Trace file from the View drop-down menu (Control-A is the hot key):



Tip: There is no need to Plot a Track Trace file on the map to display the Super Track Trace information.

If Waypoints are loaded, these will be displayed on the graph also:

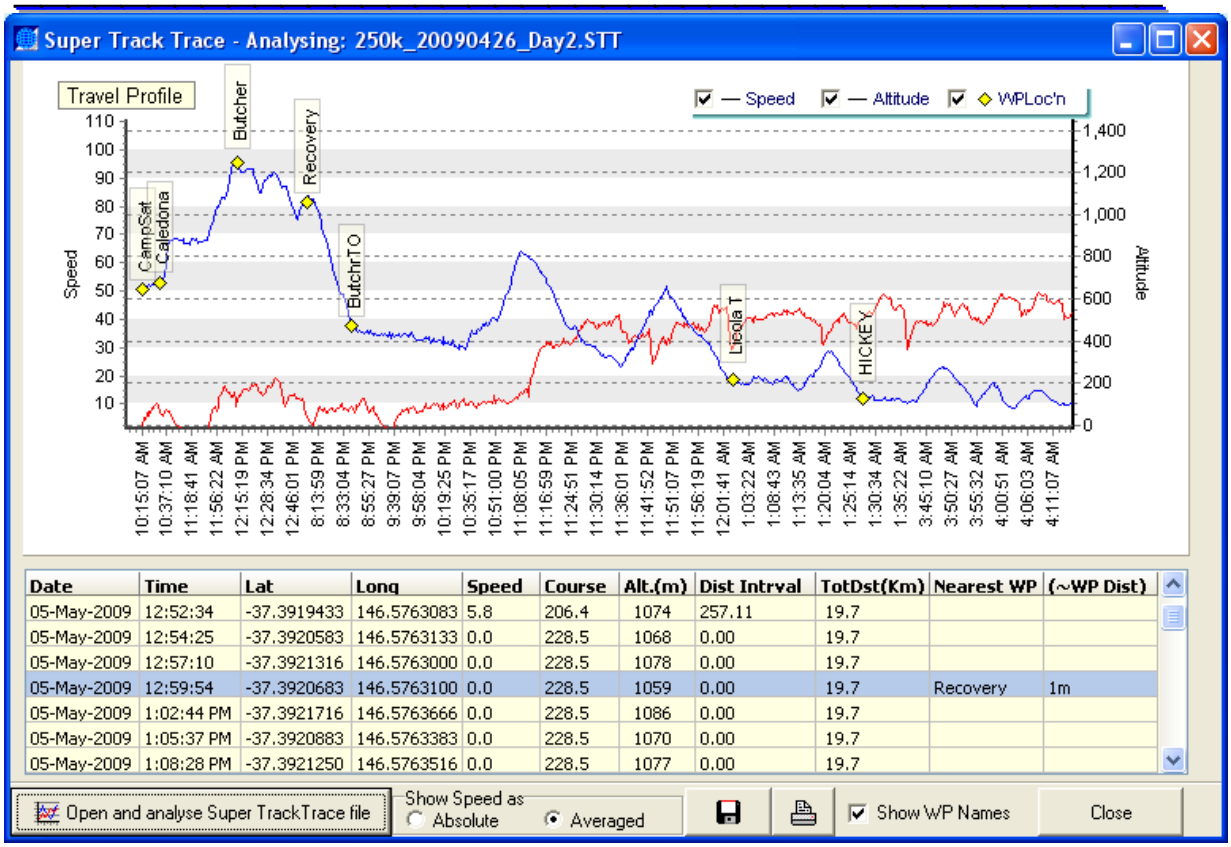
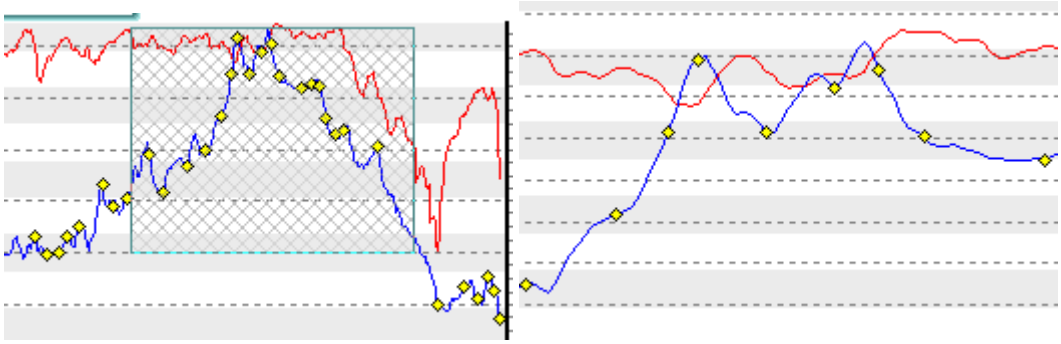


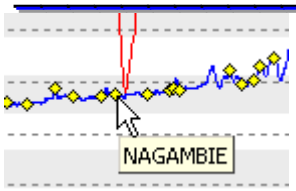
Figure 45 - Super Track Trace display

Areas can be zoomed by rubber banding with the mouse from top-left to bottom-right. (Tip: Rubber band in the opposite direction to zoom out.)

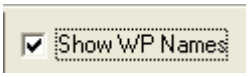


The individual graph data traces can be turned on / off by selecting the checkboxes at the top of the graph:

Waypoints are shown together with the altitude that they occur at, and moving the mouse over a waypoint shows the WP name:



The Show WP Names check box can toggle display of all waypoint names on the graph.



Clicking on a Waypoint from the graph results in the associated waypoint being searched for, and highlighted in the list

Waypoints don't have to be loaded, but if they are, the Waypoints are located on the graph and adjacent to the nearest item in the list.

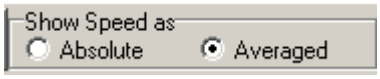
Note: A Map MUST be loaded for the Waypoint information to be displayed on the graph and in data list.

The approximate distance (nearness) to each WP is also shown:

Date	Time	Lat	Long	Speed	Course	Altitude	Distance	TotDst(Km)	Nearest WP	(~WP Dist)
21-Jun-2006	5:09:12 PM	-35.8222950	145.5523583	77.9	232.8	124.30	320.47	0.3	START	1.0km
21-Jun-2006	5:09:26 PM	-35.8245950	145.5504366	79.8	201.0	125.40	294.32	0.6	LEFTBEND	62m
21-Jun-2006	5:09:41 PM	-35.8273700	145.5514000	78.1	153.3	127.80	311.29	0.9		
21-Jun-2006	5:09:56 PM	-35.8289366	145.5541716	80.4	97.7	122.50	316.55	1.2		
21-Jun-2006	5:10:07 PM	-35.8292633	145.5569533	79.4	100.1	117.40	250.31	1.5		
21-Jun-2006	5:10:22 PM	-35.8310400	145.5596900	80.8	144.9	123.30	310.74	1.8	WASH CK	7m
21-Jun-2006	5:10:37 PM	-35.8341466	145.5605750	87.7	179.7	126.70	334.49	2.1		

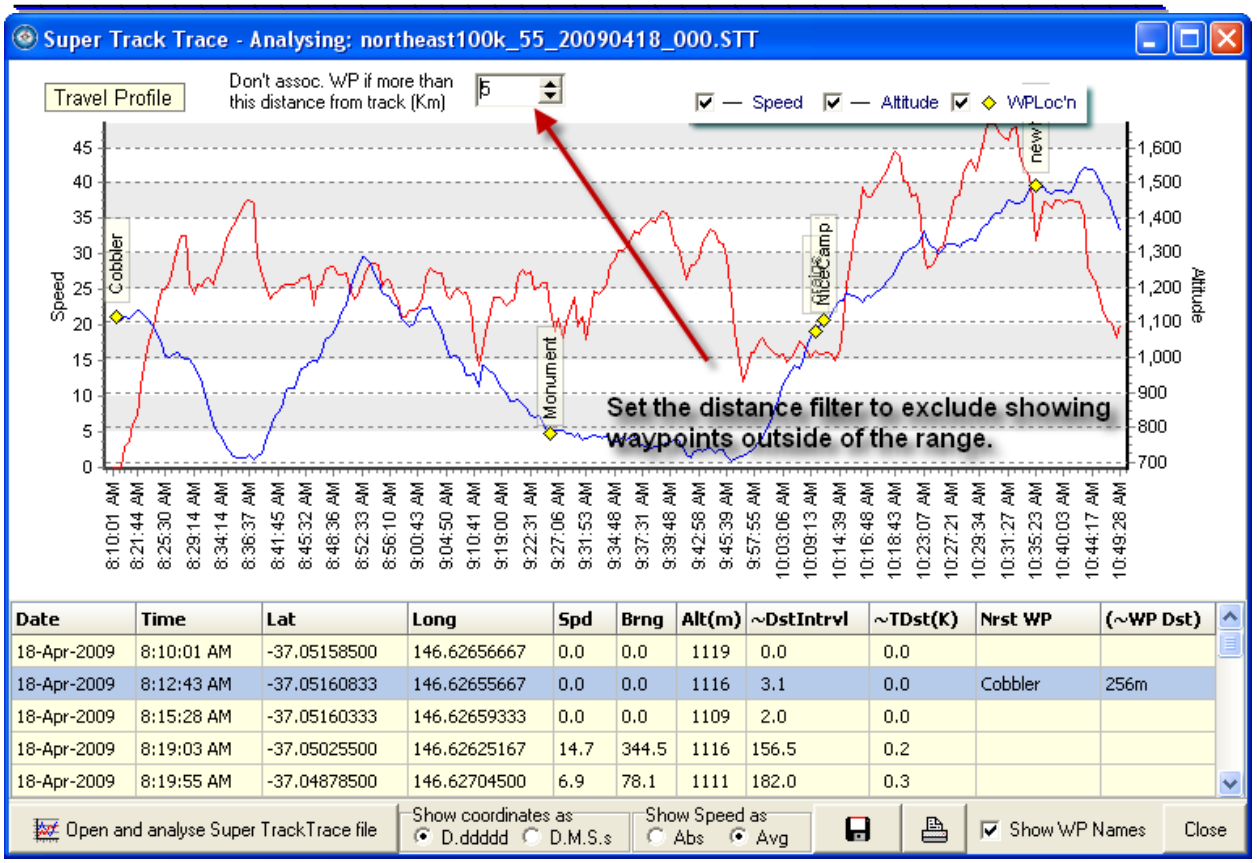
The approximate distance from the *nearest* GPS location to the *nearest* Waypoint is also calculated and shown.

Speed may be shown on the graph as Absolute, or Averaged (using a rolling average algorithm)



If the GPS position remains stationary while Super Track Trace is running, the position is still recorded to the file once per minute, instead of the determined distance interval (250 metres etc). This allows periods where the position remains stationary to be recorded and graphed also.

TrackRanger 7.4.2 and later has the ability to set a filter for the distance that a waypoint must be from the track for it to be associated.

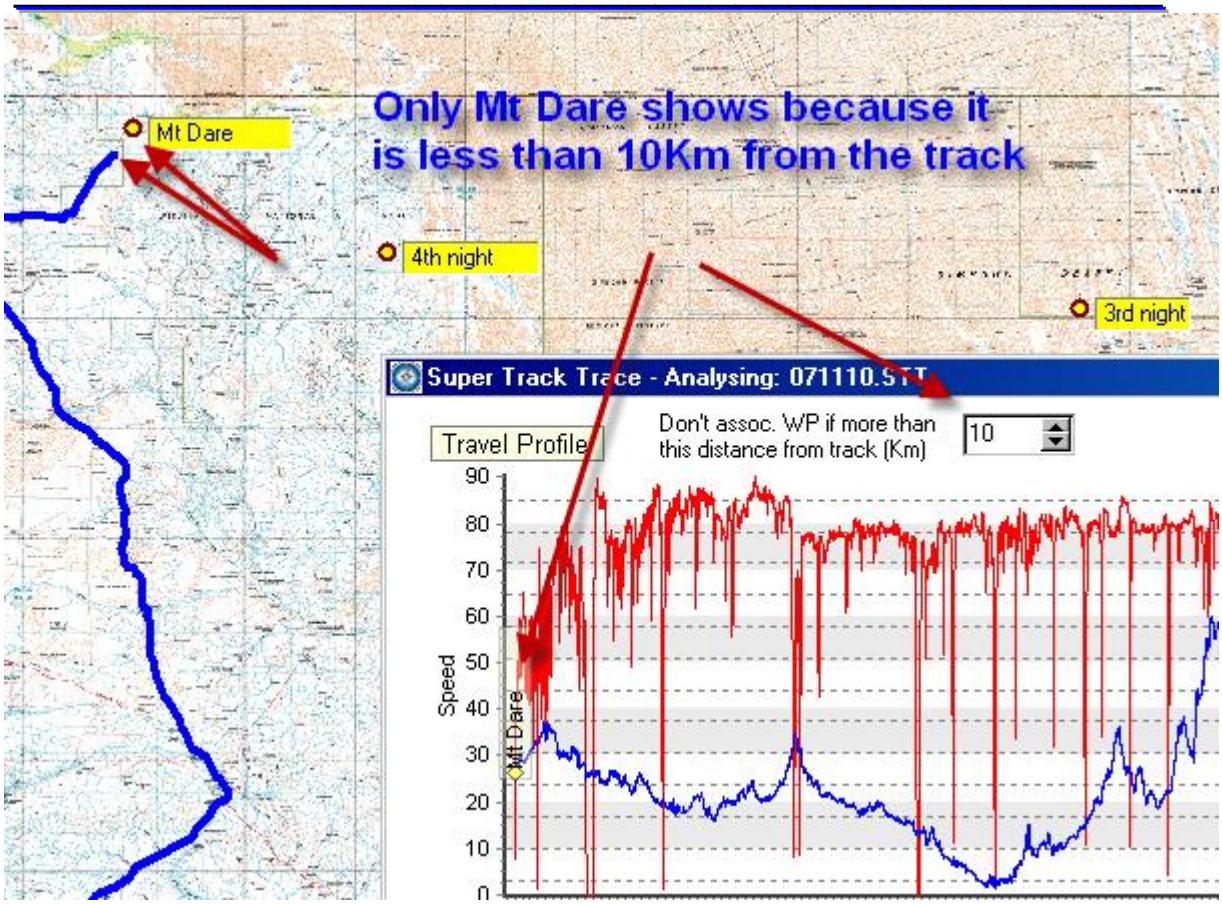


In the screen capture below there are several waypoints that are not associated with the trip. Setting the filter range allows TrackRanger to only associate waypoints within the specified distance.

Of course the intention is that the user has waypoints loaded that match the travelled route. The waypoint will not generally be exactly matched to any specific track point (they are written every several metres).

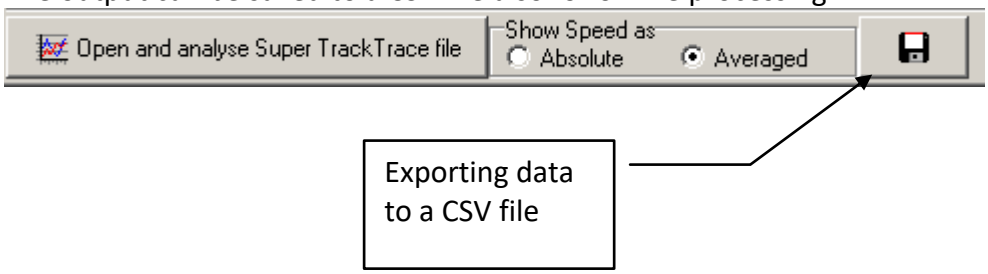
TrackRanger searches for the nearest part of the route to each loaded waypoint, and that is why it will also show the distance. Set the filter to only match waypoints that are within a specific distance of as route.

Waypoints are independent of tracks, i.e. you can load any waypoints you like and any track file that you like. Generally the user loads files that relate to each other, so if you had waypoints from other trips loaded, TrackRanger will still do its job and show how close they are to the track.


Only Mt Dare shows because it is less than 10Km from the track
Mt Dare
4th night
3rd night
Super Track Trace - Analysing: 071110.STT
Travel Profile
Don't assoc. WP if more than this distance from track (Km)
10
Speed
Mt Dare
90
80
70
60
50
40
30
20
10
0

Exporting a Super Track Trace file

The output can be saved to a CSV file also for offline processing.



The file format of the output data is as follows:

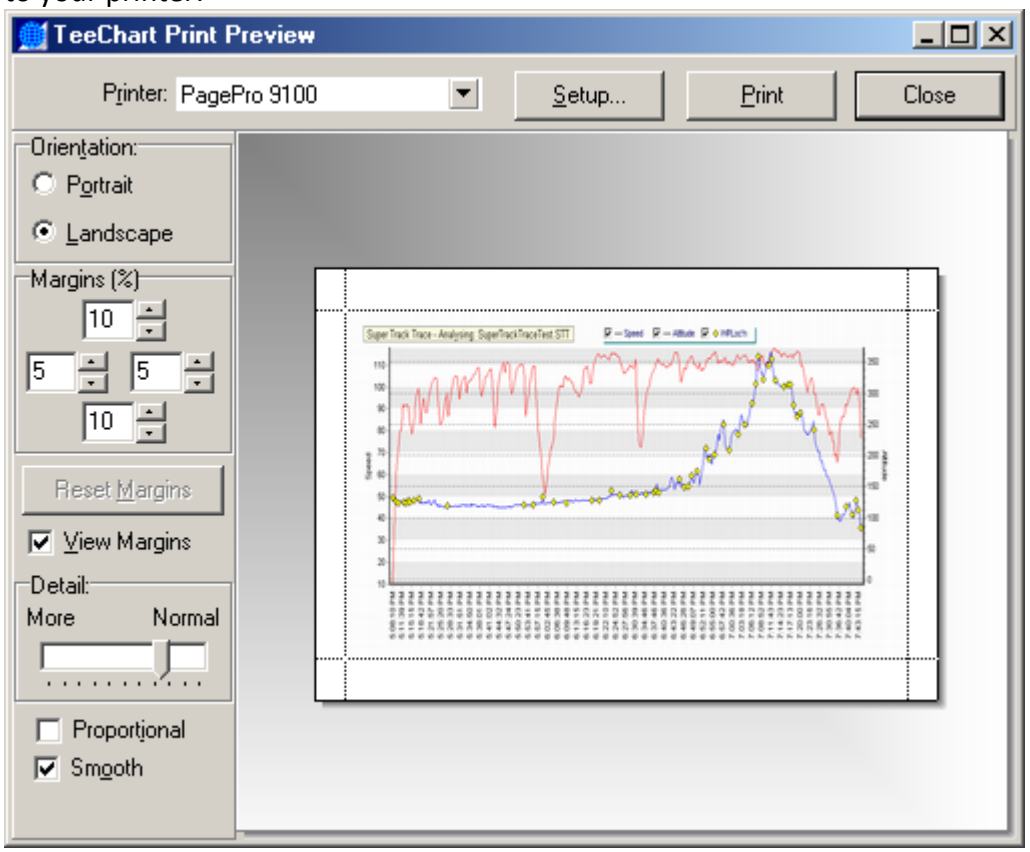
```
#Date, Time, Lat, Long, Speed, Course, Altitude, Distance, TotDst(Km), Nearest WP, (~WP
Dist)
20-Jun-2006,5:08:17 PM,-35.81369000,145.55871167,57.4,188.3,130.60,271.88,  0.3,START
,154m
20-Jun-2006,5:08:32 PM,-35.81614333,145.55792833,75.4,204.9,129.10,280.13,  0.6,,
20-Jun-2006,5:08:45 PM,-35.81844500,145.55652167,75.9,206.0,128.80,268.97,  0.8,,
20-Jun-2006,5:08:58 PM,-35.82067000,145.55515833,80.4,211.3,128.40,260.19,  1.1,,
20-Jun-2006,5:09:12 PM,-35.82229500,145.55235833,77.9,232.8,124.30,303.51,  1.4,,
20-Jun-2006,5:09:25 PM,-35.82441167,145.55053167,79.5,206.3,125.50,273.33,  1.7,LEFTBEND,80m
20-Jun-2006,5:09:38 PM,-35.82684000,145.55104833,78.9,153.1,127.10,269.05,  1.9,,
20-Jun-2006,5:09:52 PM,-35.82882667,145.55317000,77.6,108.2,125.40,289.92,  2.2,,
20-Jun-2006,5:10:05 PM,-35.82919000,145.55647167,80.1,98.8,117.80,296.27,  2.5,,
20-Jun-2006,5:10:18 PM,-35.83041333,145.55907167,77.6,132.6,121.70,269.13,  2.8,WASH CK ,84m
20-Jun-2006,5:10:32 PM,-35.83304667,145.56049000,86.6,167.6,126.00,305.29,  3.1,,
```

Data that commences with a '#' character are comment fields only.

The output file uses the same name as the Track Trace file, but with an extension of '.CSV' (Programs such as Excel can automatically import CSV files)

Printing a Super Track Trace Graph

Press the Print button to preview, and optionally print a Super Track Trace graph directly to your printer:



Datum Shift integrated in Track Trace

Note that if Datum Shift is active, this Datum Shift is also automatically applied to the data stored in the Track Trace file. Subsequent Plots of Track Trace data will have the datum shift included. If these plots are performed on a map that does not require a Datum shift, then the user may optionally select to 'remove' the datum shift offset. The amount to be removed (corrected) is the inverse (negated value) of the values set in the datum-offset dialog. In other words, the amount added previously, is the amount to now be subtracted. See the information on Datum Shift Integrated into Plotted Track Trace (below).

See also Section 11 for more information on map datums.

The Route followed by TrackRanger is drawn on the map.

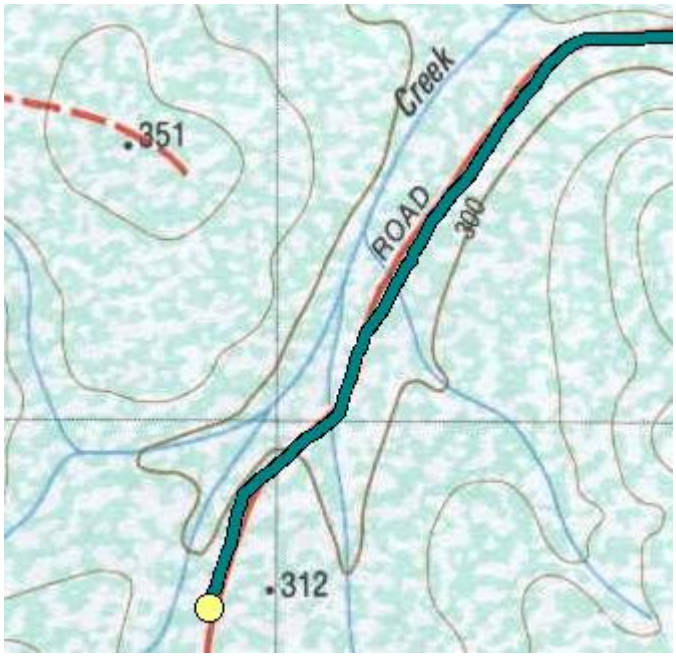
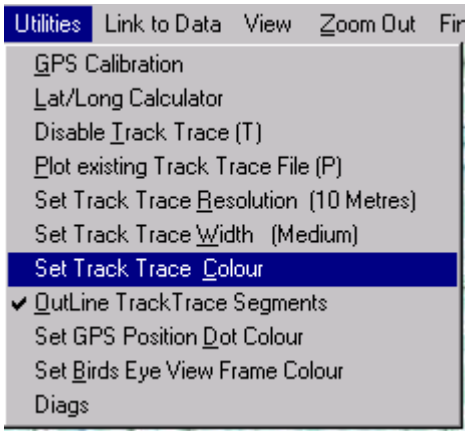
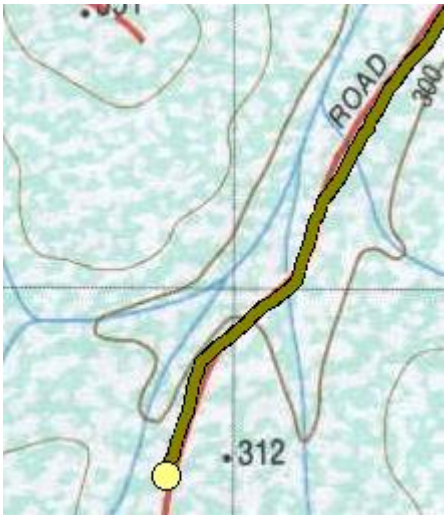


Figure 46 - Track Trace route overlaid on Map display

Track Trace Colour

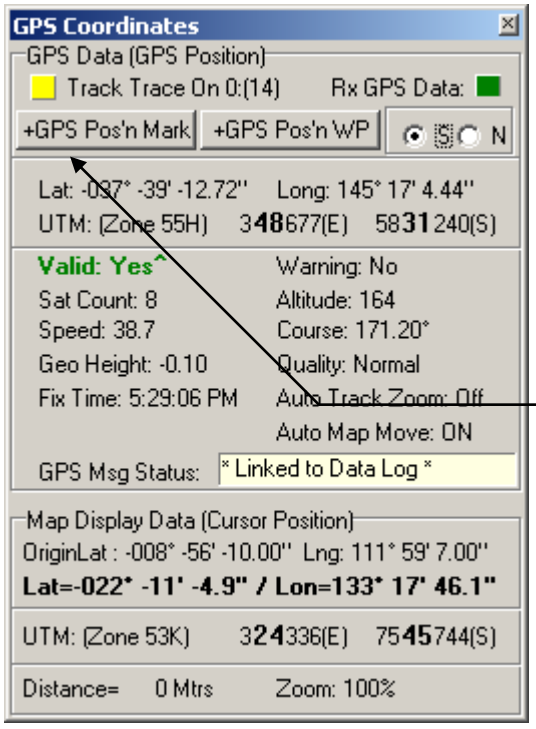


The Utilities-1 menu provides an item to optionally allow the user to change the Track Trace colour. This colour is saved with each individual Map file, so that contrast can be maintained between different Map background colours.



Tip: Multiple Individual Plots can also have separate plot colours, using the same technique.

Tip: See also the section on setting the Track Trace colour below (Setting Multiple Colours for Merged Track Trace Files under Track Trace Append).



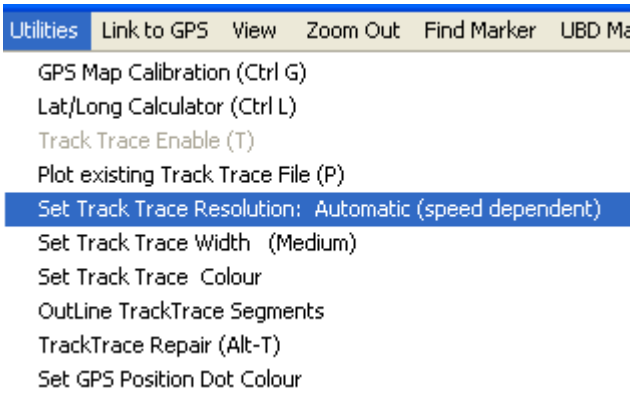
When Track Trace is running, the lamp in the GPS coordinates window is illuminated. The number following the 'Track Trace On' option shows the number of points currently recorded. Track Trace supports a total of 4096 points.

Note that Track Trace Resolution affects how many points are plotted per distance traveled (see below).

Track Trace Running indicator

Track Trace Resolution

Track Trace also supports a facility whereby the Trace Resolution may be specified. This parameter is global (applies to all maps until changed). The resolution, which affects how much distance must be traveled before the next log point is recorded, is selected from the Utilities-1 | Set Track Trace resolution option.



If a map is loaded, the current Track Trace resolution is shown on the menu item.

Note that lower resolutions will require more disk space for storage of the Track Trace data.

The resolution values are as follows:

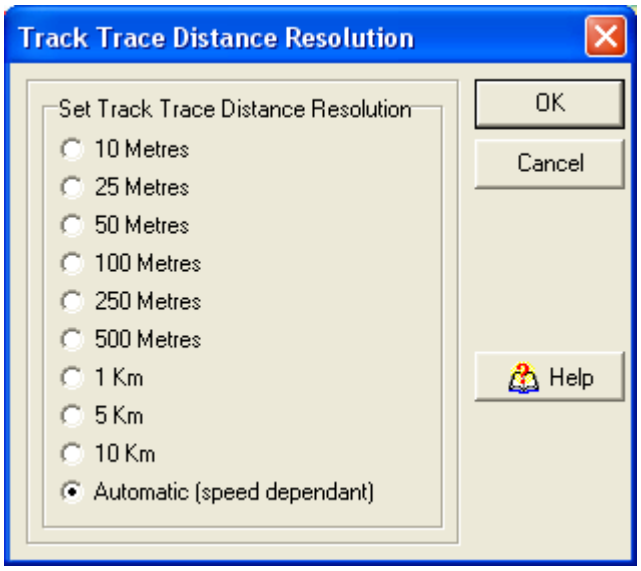
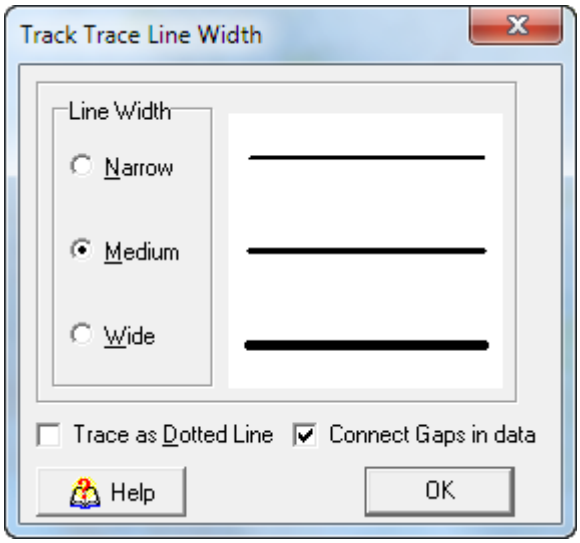


Figure 47 - Changing the Track Trace resolution

The default Track Trace value is Automatic, however, TrackRanger remembers your previous preferences, which are stored with each individual map for user scanned maps.



Track Trace Width

The Width of the Track Trace line may be changed for individual maps using the Set Track Trace Width option from the utilities-1 menu.

Note that if the Trace as Dotted Line is checked, a dotted line is added to the centre of the trace (see Figure 48).

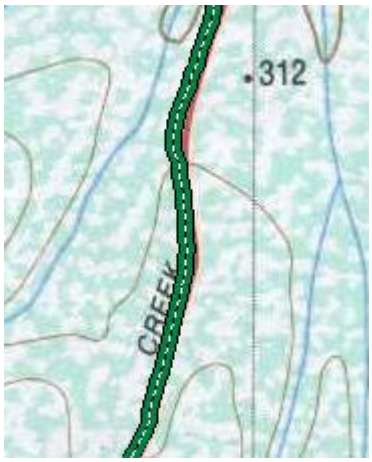
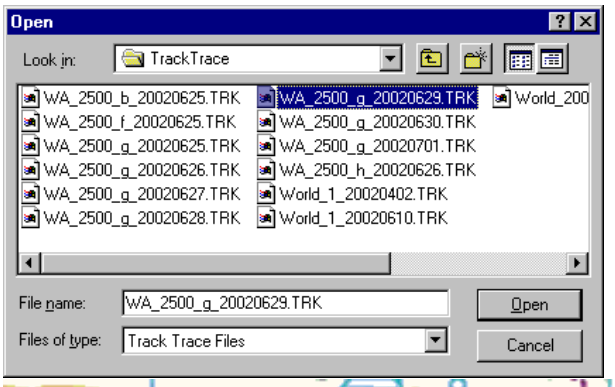


Figure 48 – Sample Track Trace display with Trace as Dotted Line actuated

Plot existing Track Trace

A previously saved Track Trace file may be drawn on the map by selecting 'Plot Existing Track Trace File' option from the Utilities-1 menu (Hot-Key 'P').



Navigate to the desired file and click on Open. The Track Trace files are automatically zoomed to match the TrackRanger display magnification.

Up to 3 individual plots may be simultaneously overlaid on the map. Use the P key or select Plot from the Utilities-1 menu to start the first plot. Add additional plots to the map by pressing Control-P, and selecting further Track Trace files.

At the conclusion of displaying the plots, press Hot-Key 'P' again, or uncheck the Plot item from the Utilities-1 menu. This will erase all plots from the screen.

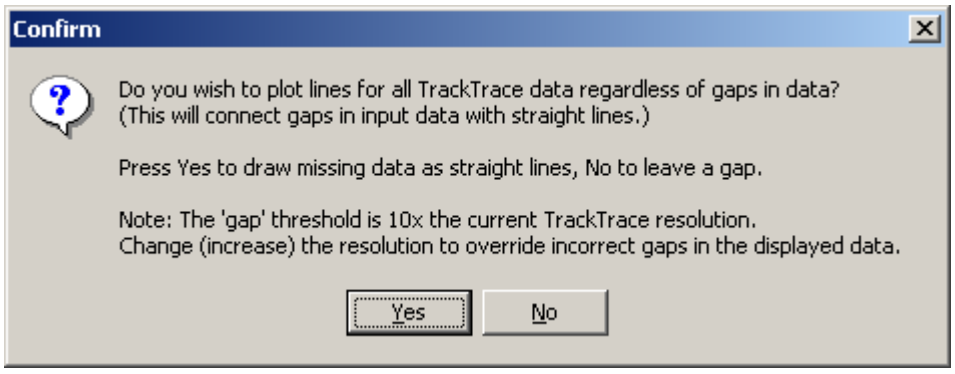
(Courtesy Hema Maps)

Note: Plotting shows as a dotted line to differentiate the trace from a live Track Trace display.

Tip: Track Plot Distance can be shown by right-clicking on the map. See Page 178 for more information

Plot missing Track Trace data as straight lines

When Plotting a Track Trace, the user is asked to select if they prefer to have missing Track Trace sections interconnected by a straight line.



The ability to join gaps as straight lines is useful where you may have a missing section, but want to allow the trip display to be continuous.

The 'gap' is controllable, as it is governed by the Track Trace resolution. If the Track Trace resolution is 10 metres, and a gap appears in the data of more than 10x the resolution, i.e. 100meters, then no line is drawn. However, if you increase the Track Trace resolution to 50metres, then a gap has to appear of 10x 50metres or 500 metres before the gap would be actually displayed.

You can change the Track Trace resolution from the utilities-1 menu, and then press 'Z' for force a redraw.

Datum Shift integrated in Plotted Track Trace

Note that when plotting an existing Track Trace, it is possible to incorporate a Datum Shift into the plotted data. This value is the inverse (subtracted rather than added) value as listed in the Datum Shift dialog. This allows track traces that were recorded with one datum to be overlaid on a different map calibrated with a different datum. See the section on "Datum Shift Integrated into Track Trace" (above).

The offset will only be applied to the Track Trace plot is the Datum Shift checkbox is active. The user will be asked to confirm to apply the datum correct offset:

See also Section 11 for more information on Map Datums.

Track Trace Combine / Append Utility (Merge multiple existing Track Trace files)

TrackRanger 4.3 and later has support for extended Track Trace file distances to be recorded and displayed (up to 4 files, each capable of more than 13,000Km's at 10 metre resolution may be recorded/displayed).

To allow users who have multiple pre-existing Track Trace files to combine these files into one larger file, the Track Trace Append utility is now provided. This may be run as an off-line program, or launched from within TrackRanger.

To launch the program from within TrackRanger, the program must exist in the TrackRanger folder. It may then be launched by selecting it from the Utilities-2 menu as shown in Figure 49.

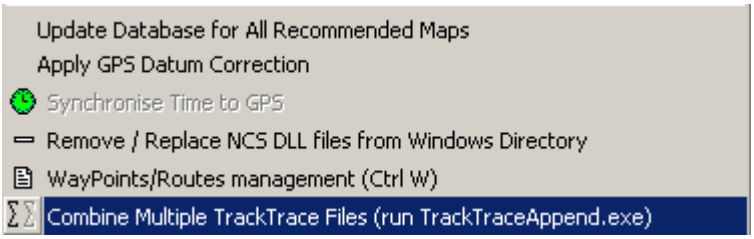


Figure 49 - Launching Track Trace Append from within TrackRanger.

Using Track Trace Append:

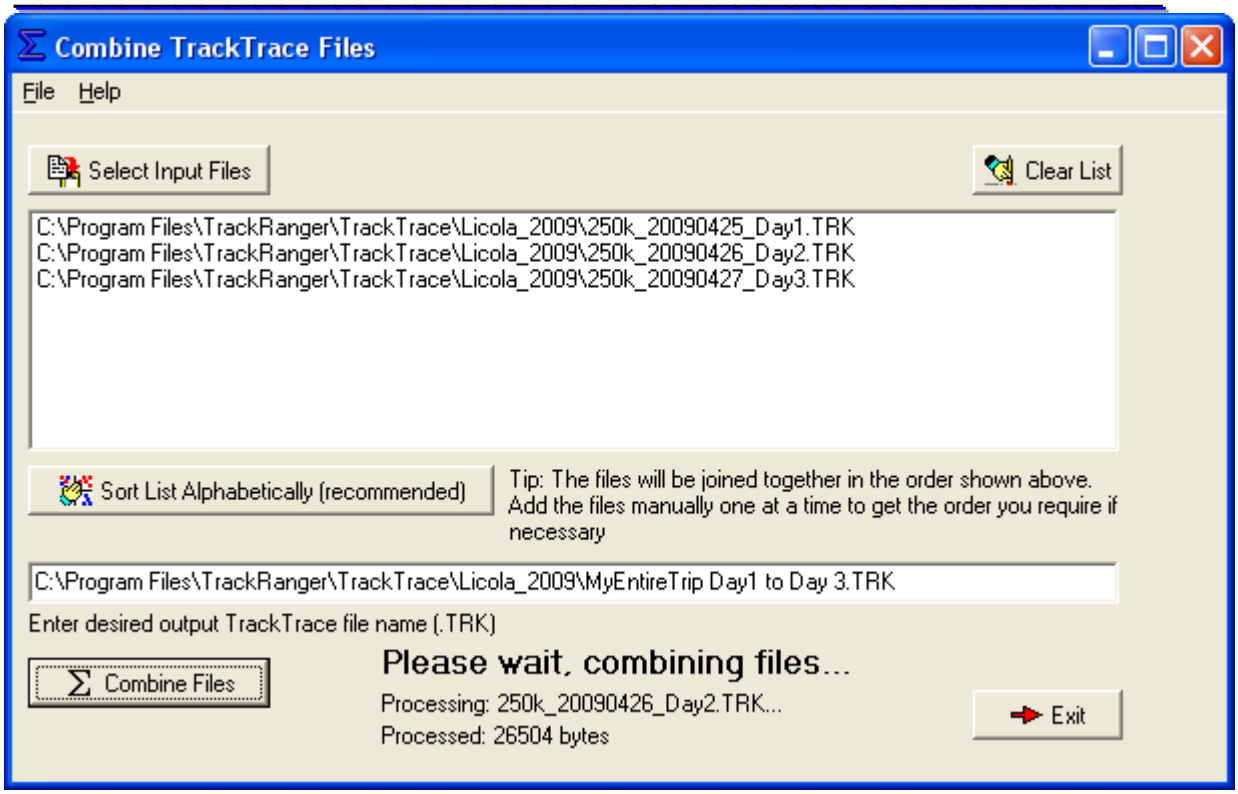
This program may be used to combine a number of Track Trace files into a new output Track Trace file.

Step 1: Select the input Track Trace (.TRK) files - note than multiple files can be selected by using the Shift or Control keys.

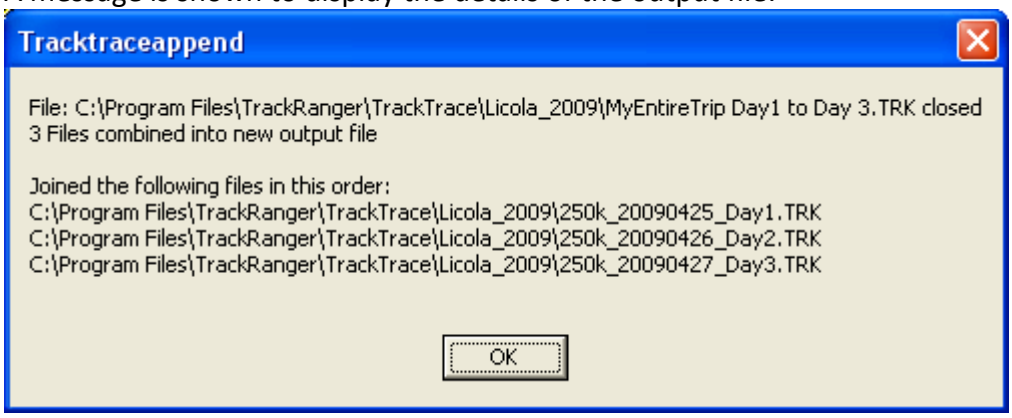
Step 2: Press the Sort List button if desired to arrange the files into a suitable output order

Step 3: Enter a name for your output file, e.g. 'MyEntireTrip.TRK'

Step 4: Press the ''Combine Files'' button.



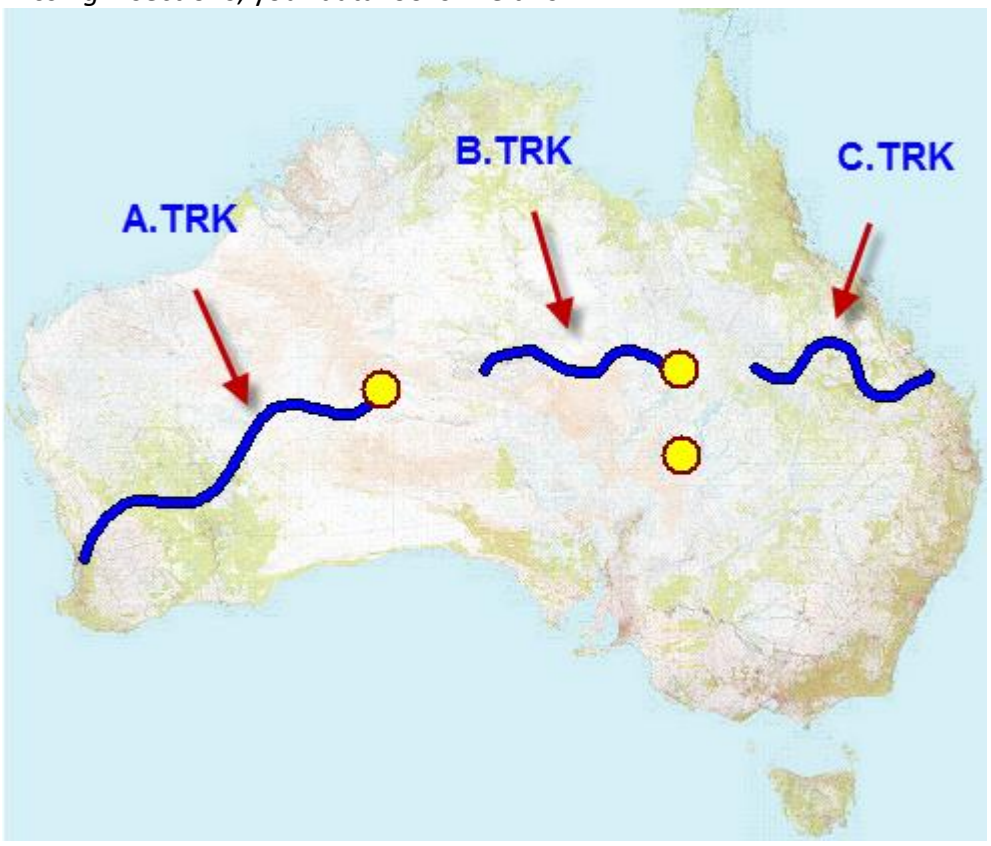
A message is shown to display the details of the output file:



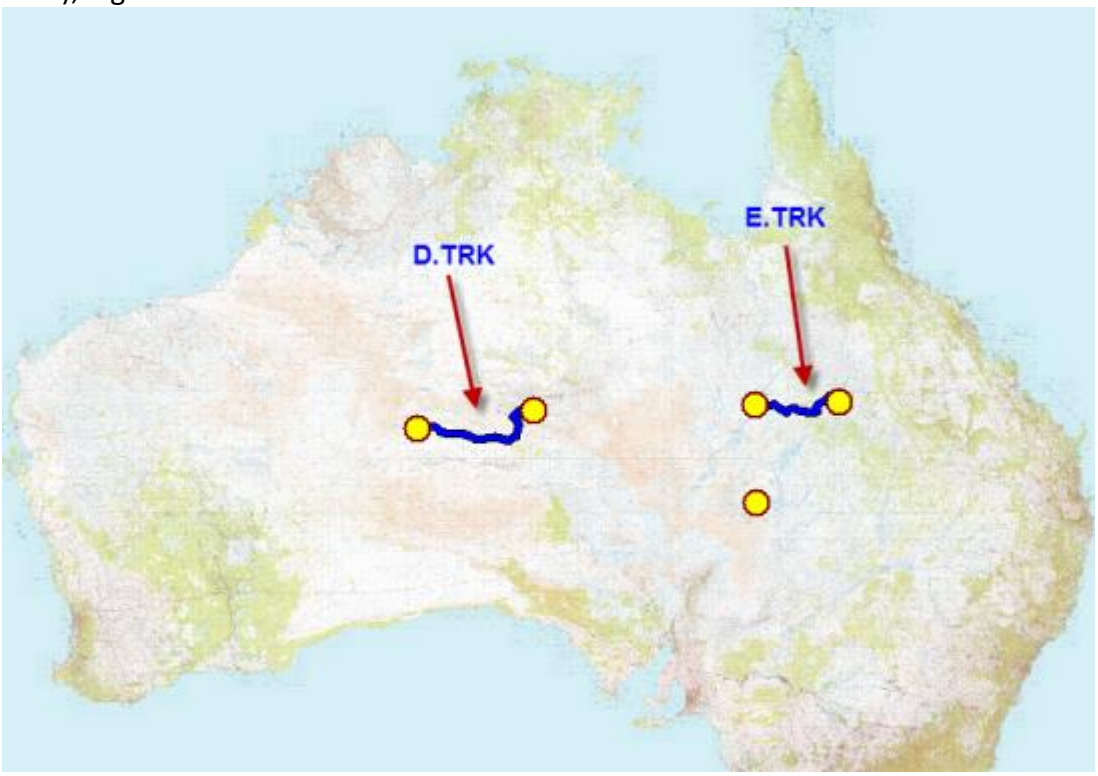
Exit the program, and return to TrackRanger and plot the new Track Trace file if required.

Advanced Track Trace Combine functions:

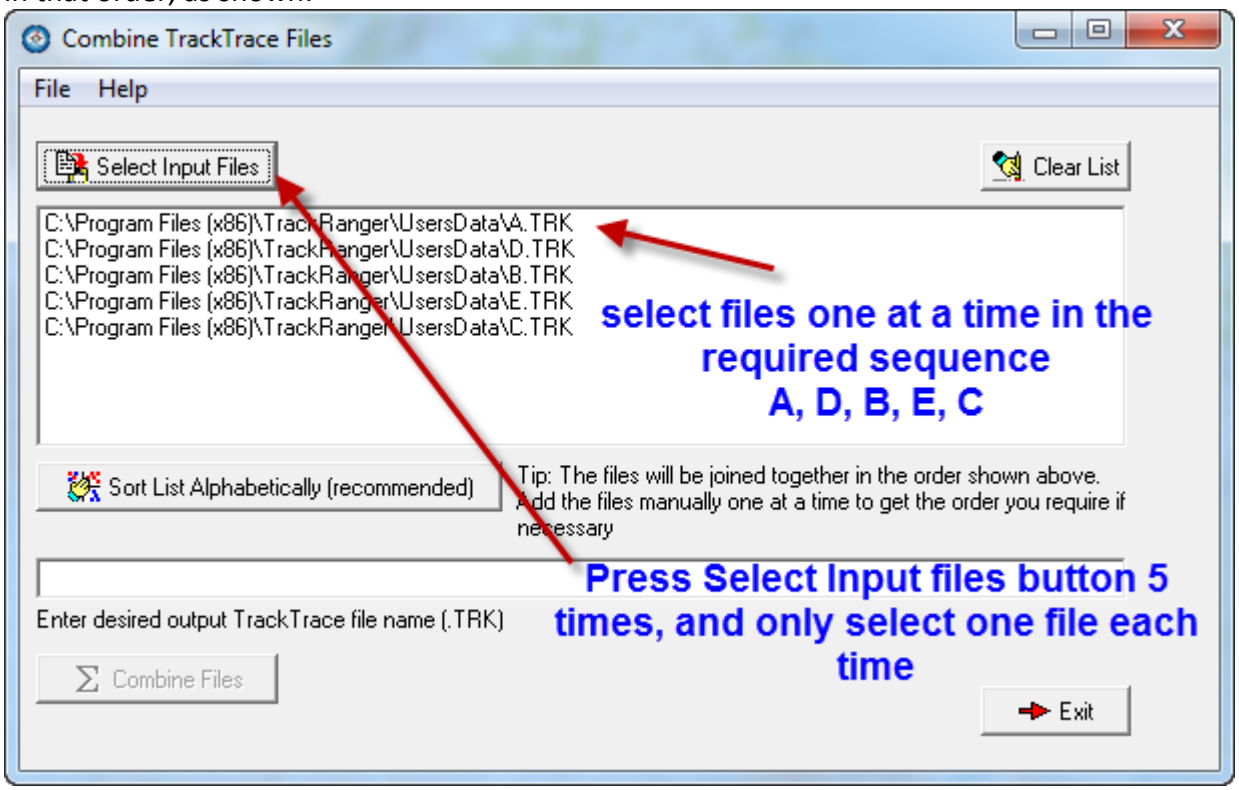
In this example, let's say you have 3 track trace files A.TRK, B.TRK, C.TRK and you are *missing* 2 sections, your data looks like this:

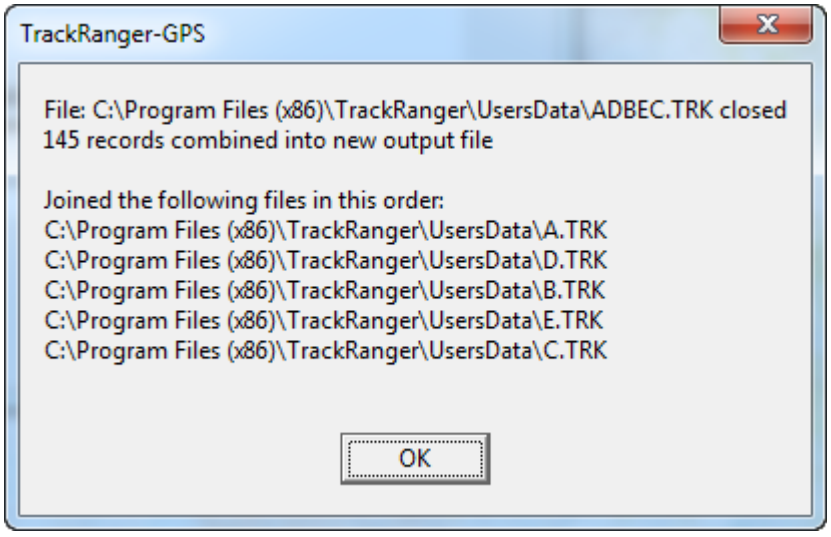


You can use Track Plan (Control-T) (see Page 174) to create the missing sections (one at a time), e.g. call them D.TRK and E.TRK:



Now use the Track Trace Combine function to combine A.TRK, D.TRK, B.TRK, E.TRK, C.TRK in that order, as shown:

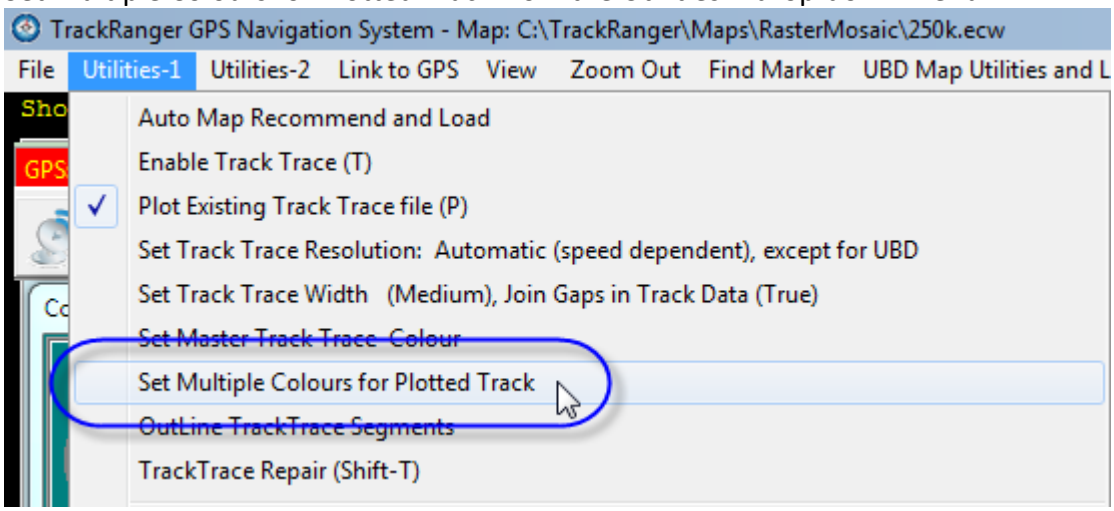


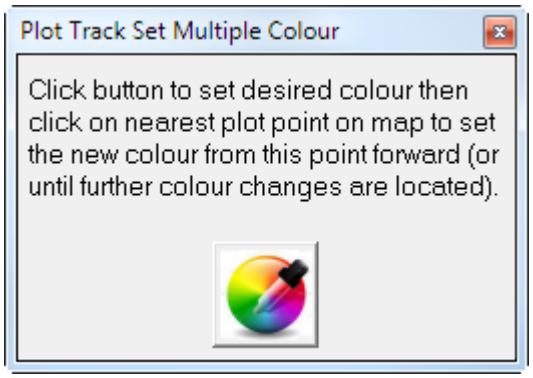


Plot the new output file:

Setting Multiple Colours for Plotted Track Trace Files

Note that from TrackRanger 8.4 and later, it is possible to set individual colours for each of the merged Track Trace sections after Plotting the Track Trace file. Plot the file, and select Set Multiple Colours for Plotted Track from the Utilities-1 drop-down menu.





Click the eyedropper colour picker button, set the desired colour, and then click directly on the plotted track at the point you wish to change the colour.

Tip: Track Trace Repair (Utilities-1 menu) can strip out any existing colour points (allows user to start again) – See page 180

See also the section on setting the Track Trace colour above (page 163).

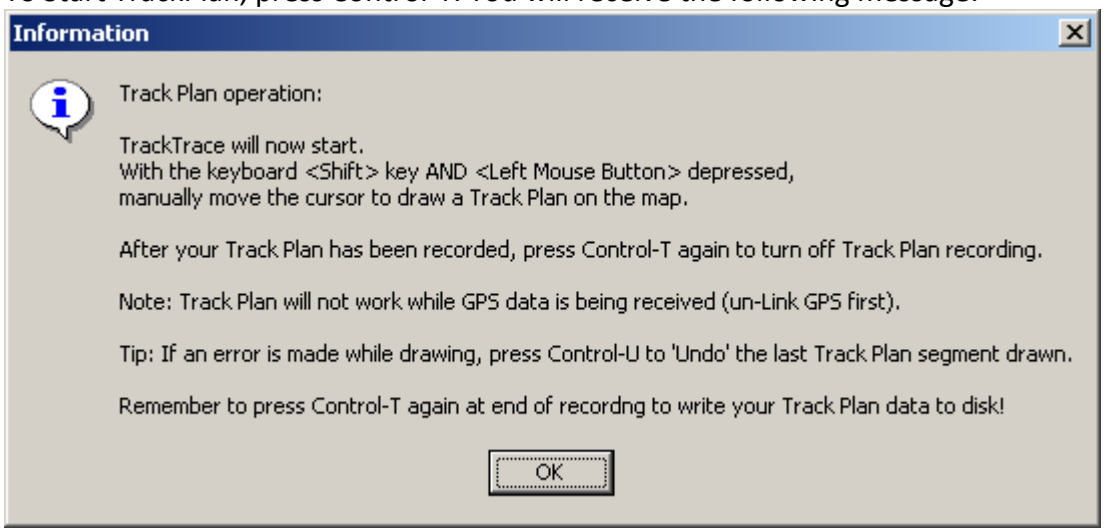
GRTP-030
GRTP-031
GRTP-025
GRTP-024
GRTP-023
GRTP-022
GRTP-021
GRTP-020
GRTP-018
GRTP-019
GRTP-017
GRTP-039
GRTP-039
GRTP-011
GRTP-010
GRTP-009
GRTP-056
GRTP-059
GRTP-063
GRTP-055
GRTP-054
GRTP-053
GRTP-046
GRTP-047
GRTP-045
GRTP-049
GRTP-050
GNLS-005

Track Plan – Creating a Track Trace manually

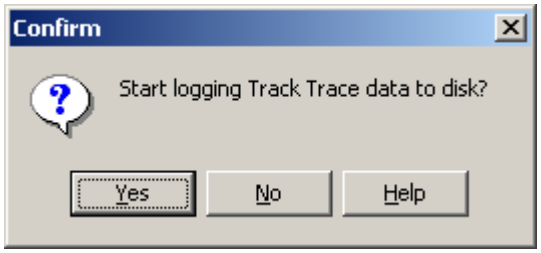
TrackRanger allows you pre-plan a trip using the Distances and Waypoints described in Section 7.

TrackPlan may also be used to manually draw a Track Trace on the screen.

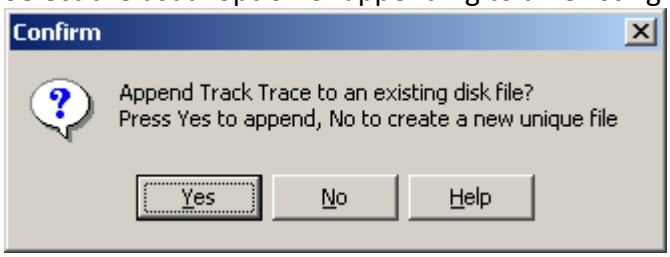
To Start TrackPlan, press Control-T. You will receive the following message:



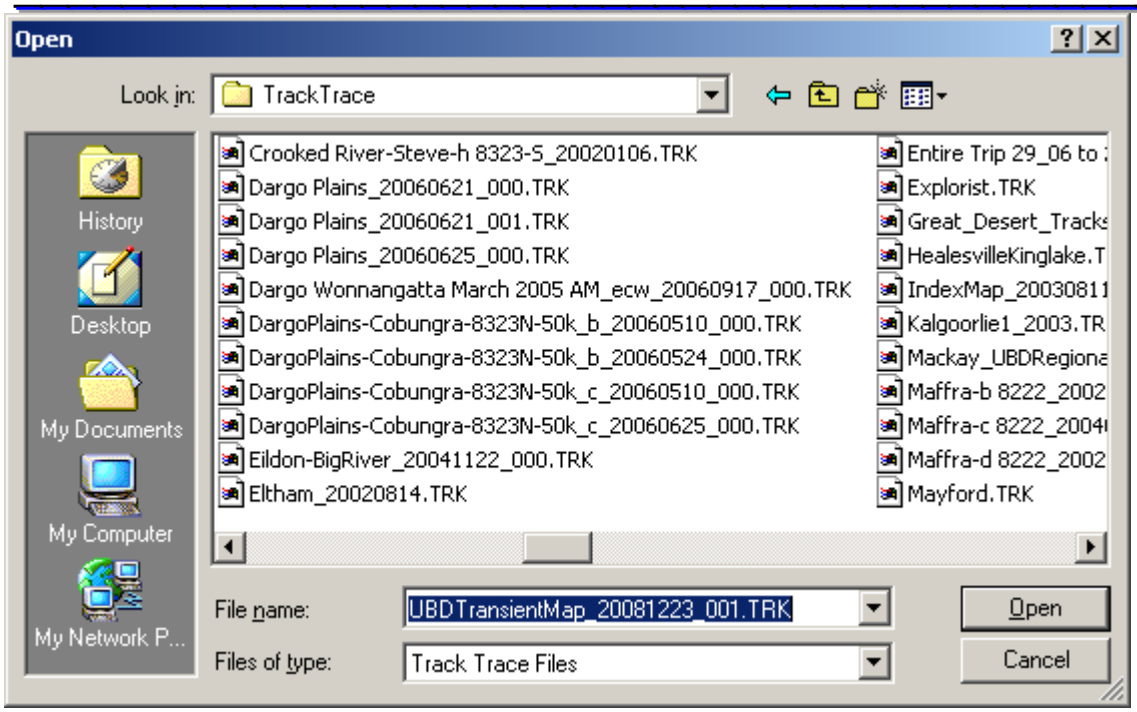
Press OK and Track Trace starts, but with Mouse recording option instead of GPS:



Select the usual option of appending to an existing file, or creating a new file:



and supply the desired file name to save to (*note: data is not saved until Control-T is pressed a second time*)

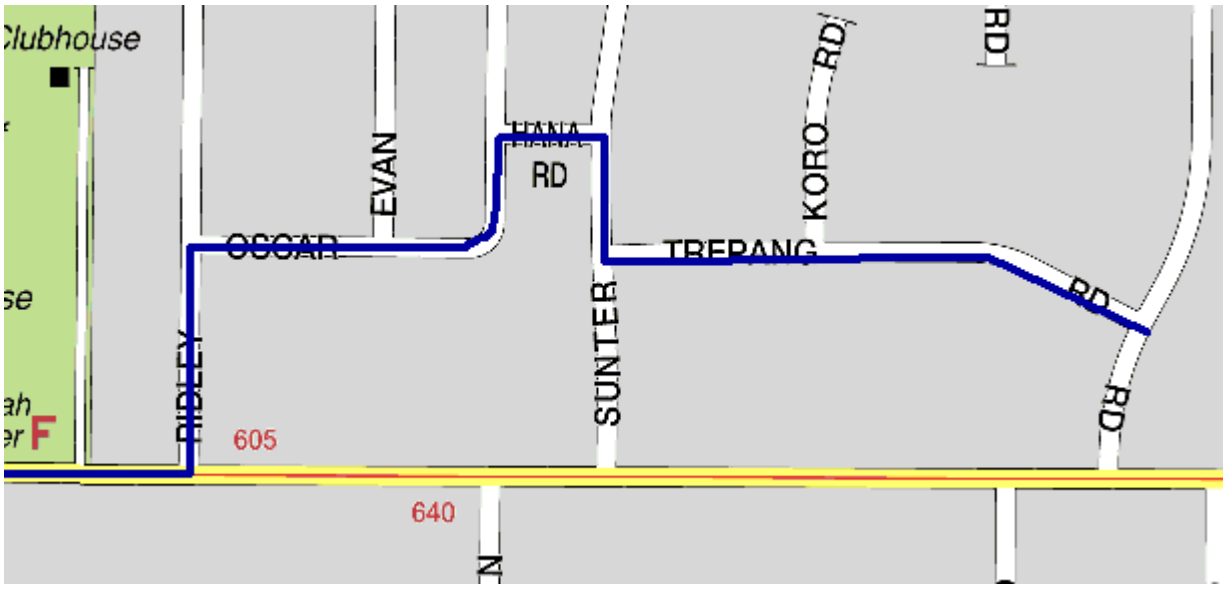


There are two ways to create a TrackPlan. Road Contour, and Straight-Line. They may be interchanged at any time:

1: Road Contour:
Move the mouse cursor to the start of the roadway that you with to 'trace' a line on, then hold the keyboard Shift key down, and with the left mouse button pressed, follow the road contour to create the track trace line manually.

2: Straight Line:
Move the mouse to a desired position. With the shift-key depressed, press the left mouse button.

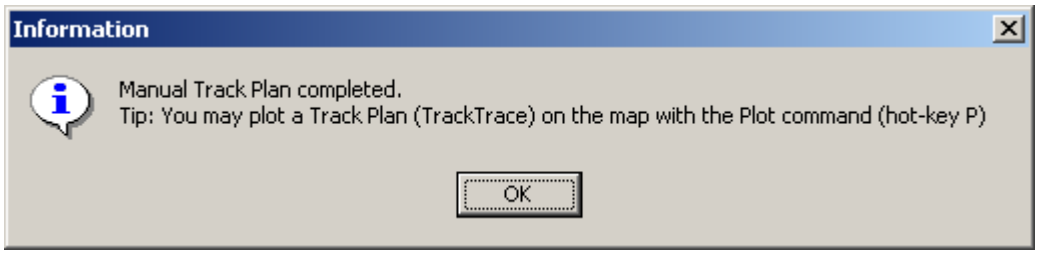
Move the mouse to the next position, and with the shift-key depressed, press the left mouse button. Keep repeating and the straight lines will be drawn. (You may optionally created a contour by adopting the Road Contour steps 1 (above) at any time.



You may repeat the above procedure until all sections have been drawn.

If a mistake is made, pressing Control-U will erase the last section added. This effectively 'undoes' the last section added.

Note: You must press Control-T again to turn off the TrackPlan feature and save the created Track Trace file to disk. Otherwise the data is not saved



Tip: TrackRanger version 5.2 and later allows a Track Trace to be shown on the screen while a new Track Trace is being recorded from GPS data. This allows a Trip Plan to be created manually, and then the displayed (plotted) onto the map, while a new Track Trace is recorded during travel.

Tip: When creating a manual Track Trace (Control T), there is nothing to stop you going to preview mode (if ECW map type) while in this mode, navigating to a new section of the map, and then going to User mode (press red tick) and continuing with the Track Plan, and so on. At the end, press Control-T again to save the track.

So while in Track Plan mode you can still go to Preview Mode, and zoom and pan the map to a new 'region' as much as you like.

This allows you to get as much detail as required within the same Track Plan.

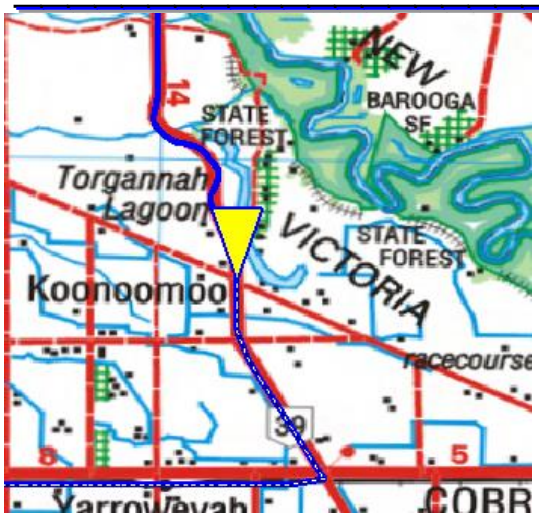


Figure 50 - Manually created and overlaid (Plotted) Trip Plan with Track Trace being recorded during travel.

It is recommended to use Track Trace Repair to correct errors in Track Trace data (see below in this same section)

To add additional Track Plan to an existing Track Trace file:

1. Open the map in the desired area, and Plot the existing Track Trace first (hot key P)
2. Then start Track Plan (Control-T)
3. Select Append to add to the exiting file you have plotted.
4. Add the new Track Plan with the mouse
5. Press Control-T when finished the Track Plan.
6. Press P to stop the Plot of the original Track Trace, then press P to Plot the newly completed Track Trace

To create a Track Plan over a larger map area (e.g. NatMap Digital Maps)
1: Open Natmap, go to preview mode, and Zoom to the desired start area, press the red tick to go out of preview mode
2: Press Control-T to start Track Trace. Set a name etc as required.

3: With the left shift key depressed, left click at points along the road you wish to follow (hold mouse button down and drag mouse to create curves if necessary)
4: When you get to the edge of the map, go to preview mode again, pan/zoom to the new area, go out of preview

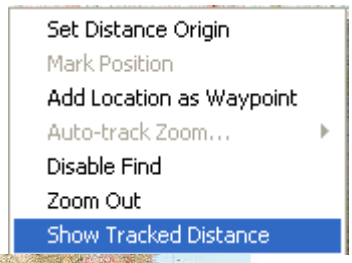
Keep repeating steps 3 & 4 until you are at the required destination
While in preview mode, TrackRanger will usually show a series of dots that represent points of the Track Trace. This can assist you to see where the track is while in preview

5: At the end of the trip, press Control-T again to turn off Track Trace and save the file to disk

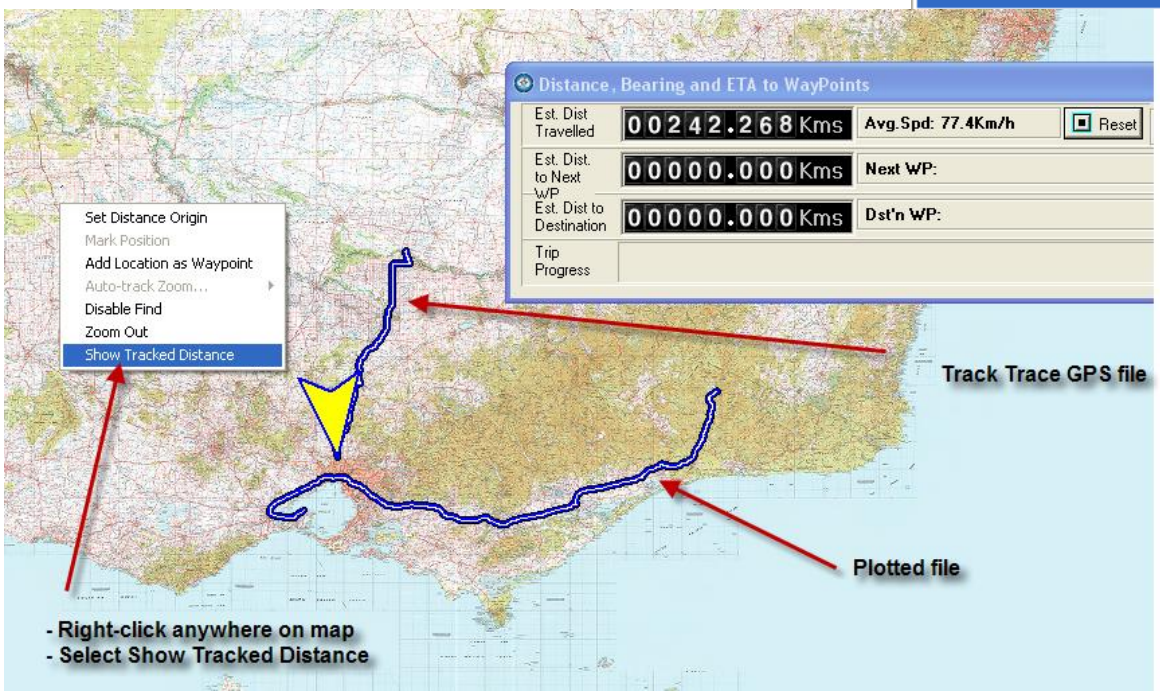
6: Plot the file on the map with the P command

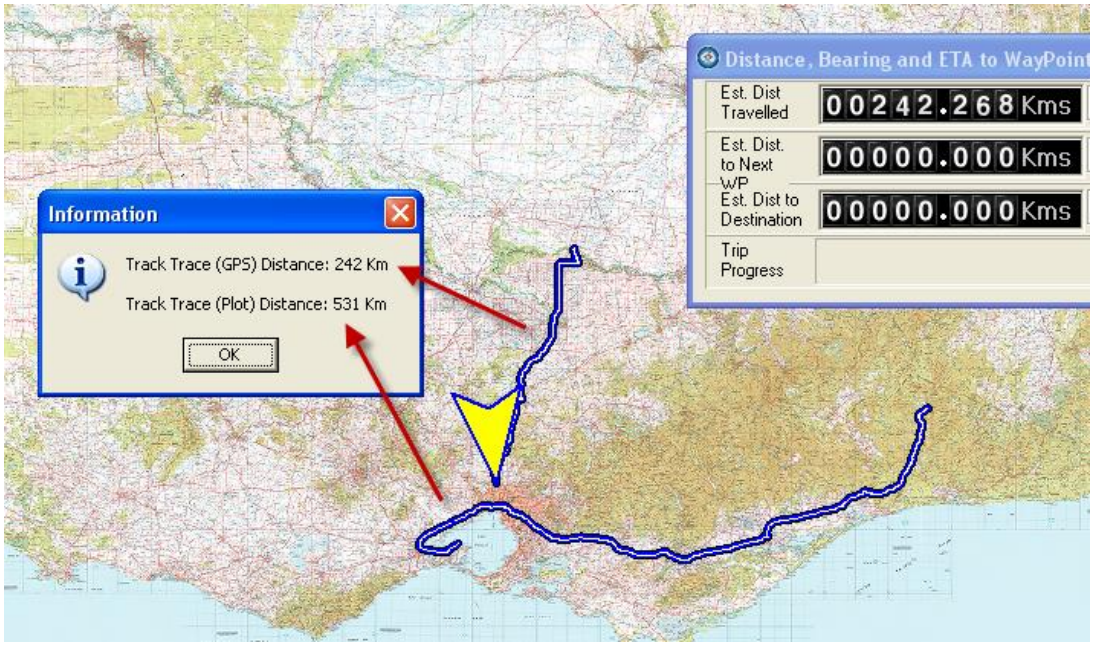
Track Trace and Track Plot distances

It is possible to quickly measure actual Track Trace Distances and Track Plot distances.
Right-click on the map and select Show Tracked Distance:



The distance of both live track Trace (GPS) and previously plotted trace (e.g. a Track Plan) are shown on the display:





Track Trace Repair – Deleting sections of a Track Trace manually

Track Trace and TrackPlan data may be repaired. Press Alt-T (you need to have the Track Trace loaded first), and the positions recorded in the Track Trace will be shown. Click on any entry in the list, and the Track Trace from that point forward will be shown in a different colour (yellow).

When the correct location has been determined, save the current data (from the start of the Track Trace to the current point) by pressing the save button.

You may delete all data preceding or following a single point, or only the single point. All data prior to or following the point is saved, depending on the selection. Press Save for each individual point that is to be deleted.

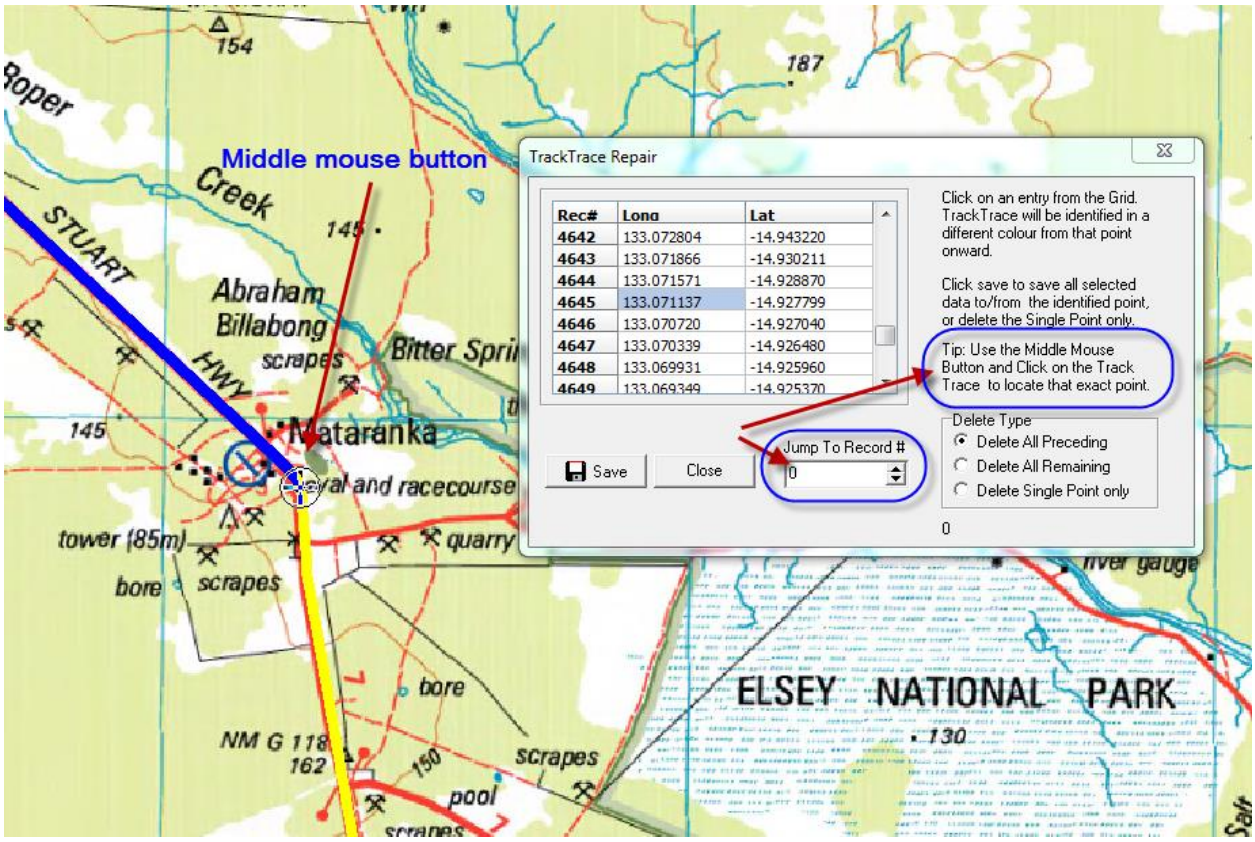


Figure 51 - Using Track Trace Repair on a Track Trace being plotted on screen with Delete All Preceding selected

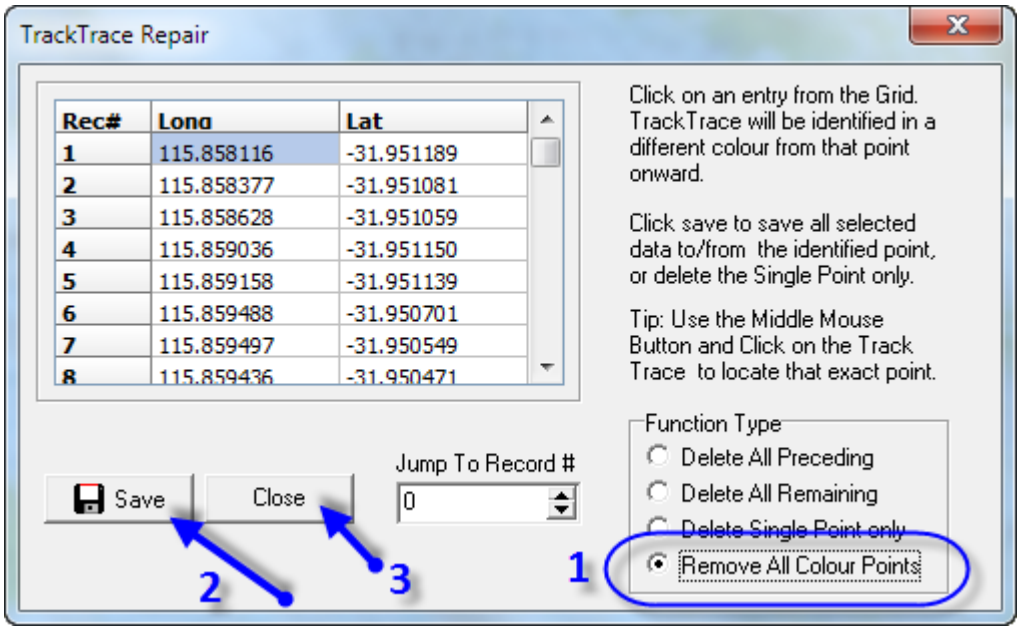
Click on the Track Trace on the map with the Middle Mouse Button. You must have the Track Trace repair dialog showing for this to work. TrackRanger locates the nearest record and updates the display. Alternatively, enter a record number in the spin control to Jump to that record

Tip: You must have the Track Trace loaded by pressing the 'P' to Plot a Track Trace file from disk. Track Trace Repair will not work while Manual TrackTrack (i.e. TrackPlan) is in operation.

Tip: It is recommended to save to a different Track Trace file name so that recovery is possible.

Track Trace Repair –Removing Colour Points from a Track Plot file

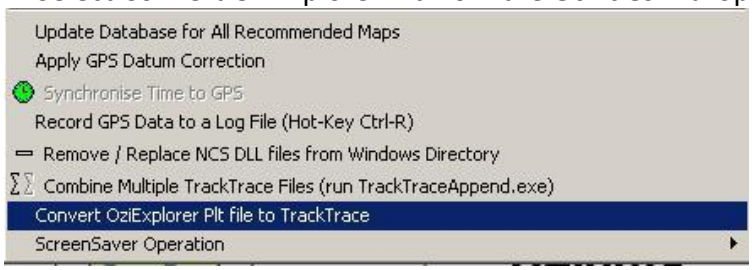
Track Trace Repair may also be used to strip out colour points from a plotted track trace file:



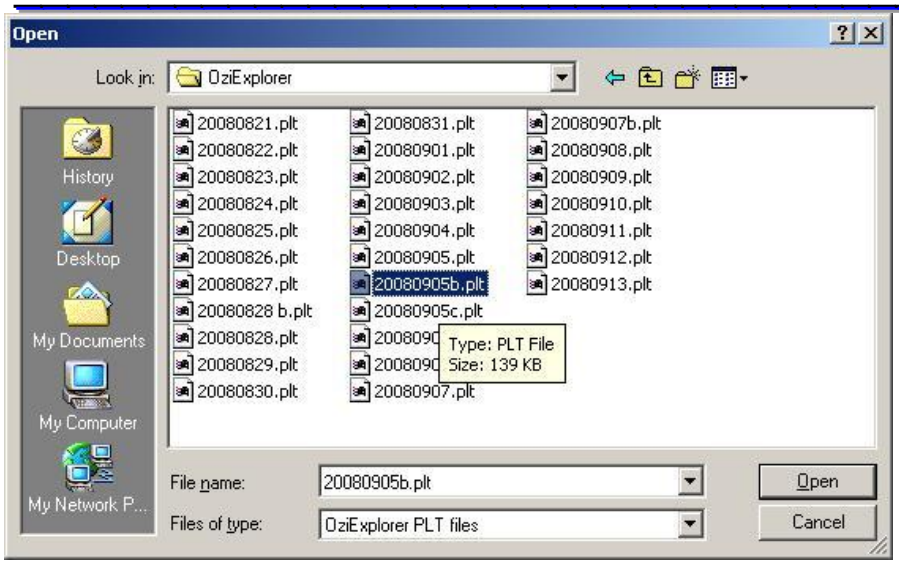
Note that you MUST then close the Track Plot and re-open to load it back from disk

Track Trace – Converting OziExplorer Plt files to Track Trace files

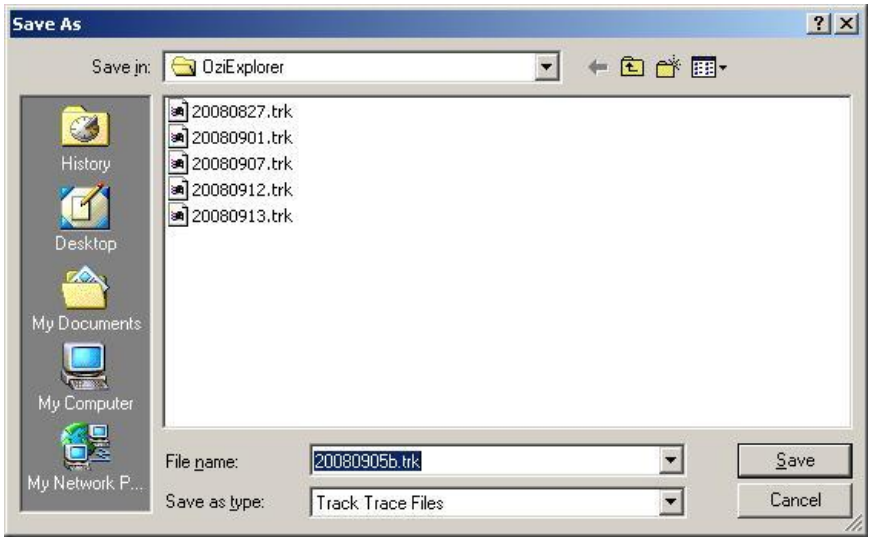
OziExplorer *.PLT files may be converted to TrackRanger Track Trace files.
(Note: Requires TrackRanger V6.7.1.a or later)
1: Select Convert OziExplorer Plt from the **Utilities-2** drop-down menu



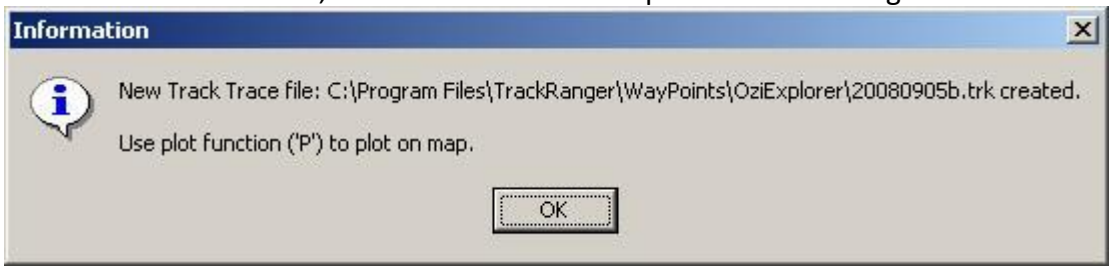
2: Navigate to and Open the desired OziExplorer PLT file:



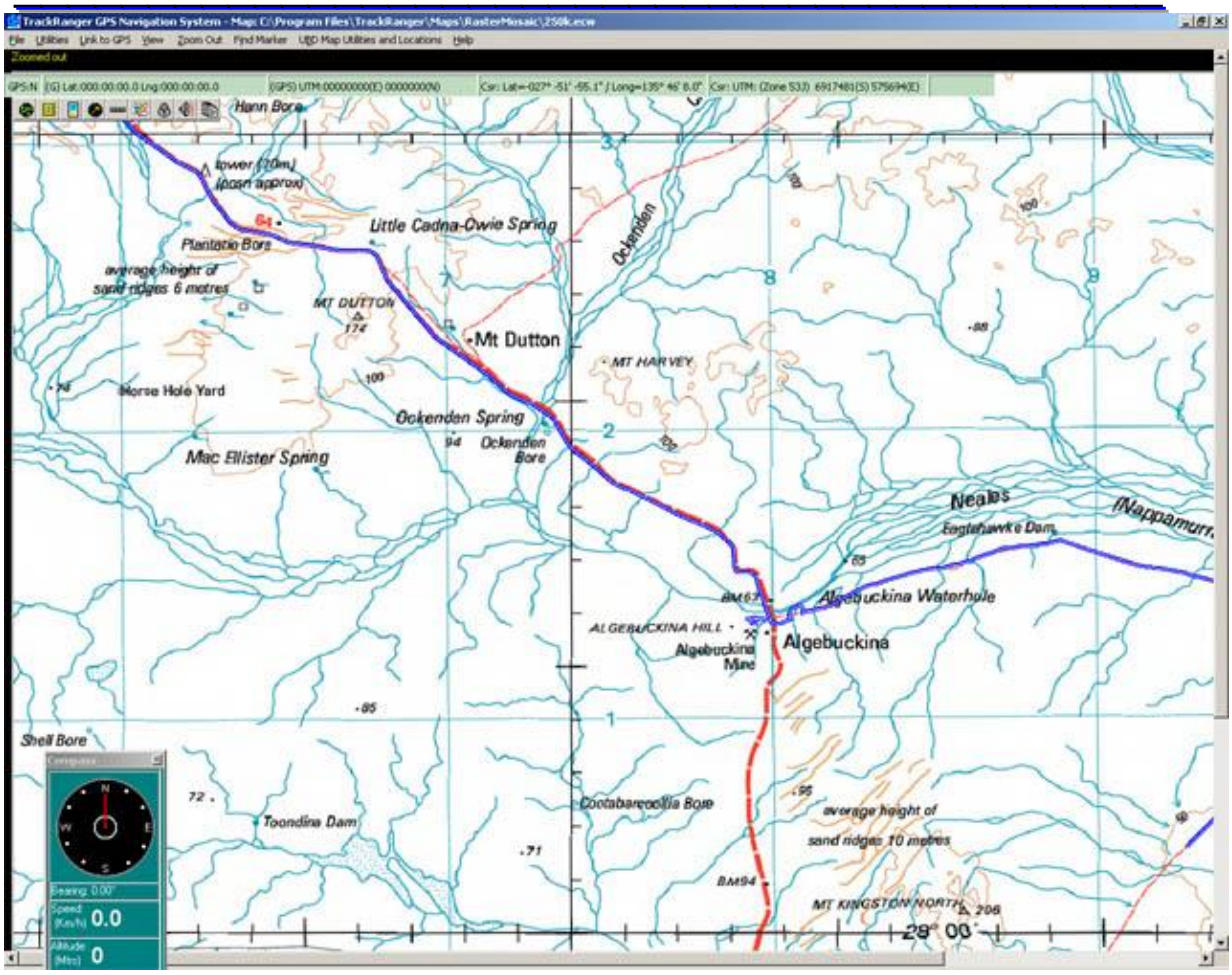
TrackRanger will attempt to save as a Track Trace file of the same name but with a '.trk' extension.



4: Press the Save button, and it will convert OziExplorer to TrackRanger Track Trace file.



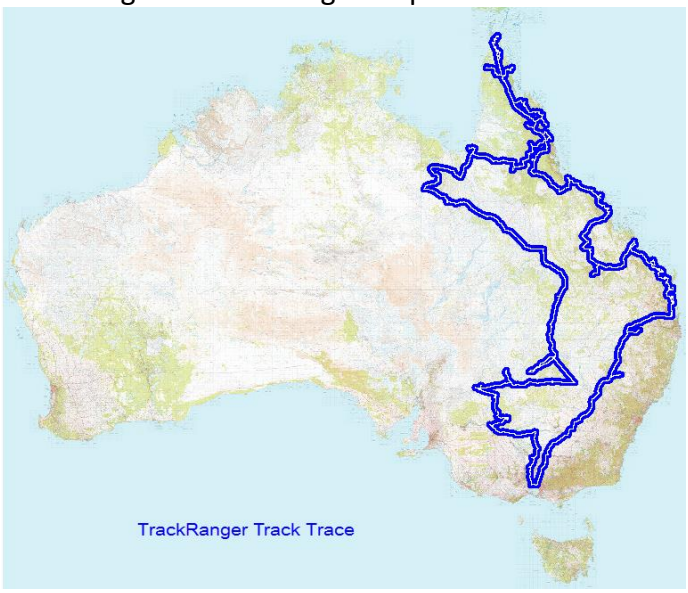
Plot the new TrackRanger Track Trace file on the map:



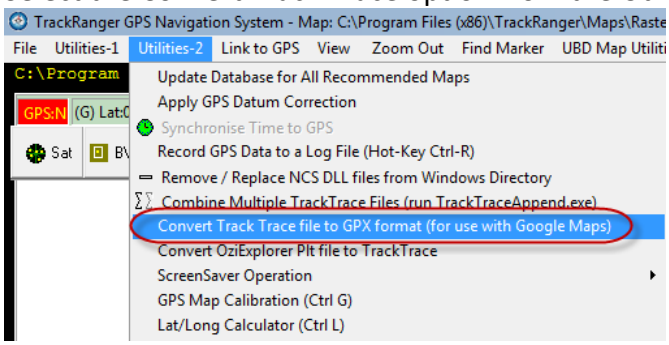
(Tip, convert multiple Plt files if necessary and use Track Trace append to join the track Trace files together)

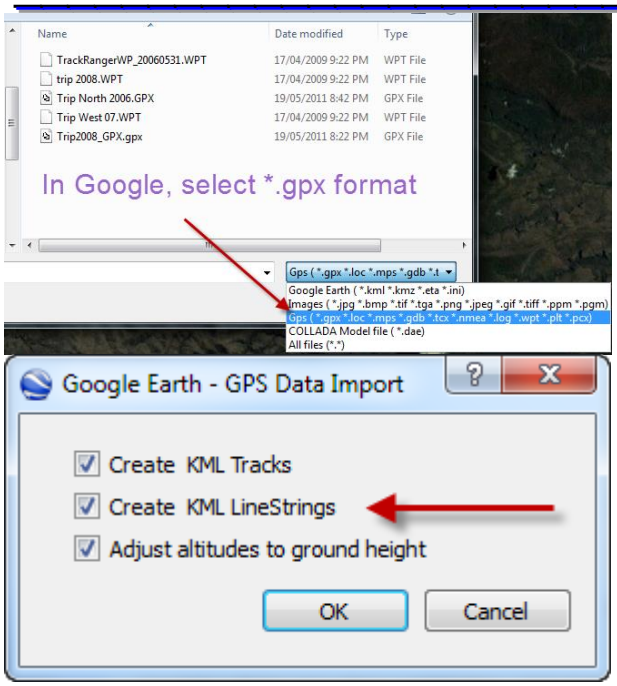
Exporting a Track Trace file to a GPX file

TrackRanger Track Trace files may be exported in GPX format. This is useful for using TrackRanger data in Google Maps etc.

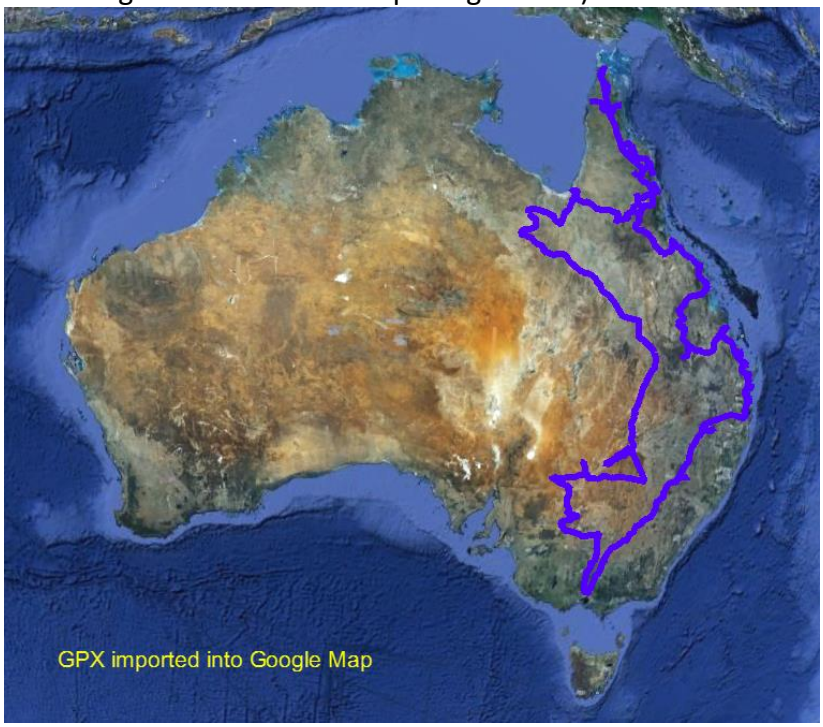


Select the Convert Track Trace option from the Utilities-2 menu



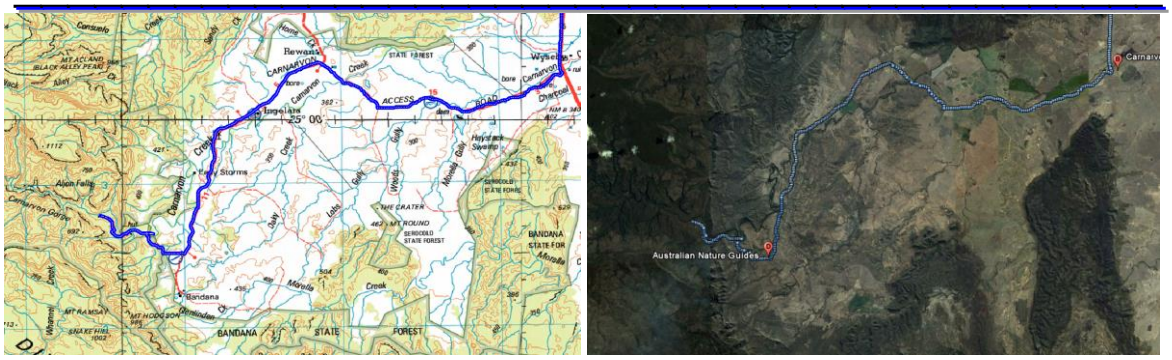


Locate the file and it is shown on the Google Map, (tip: make sure that Create KML LineStrings is selected when opening the file).



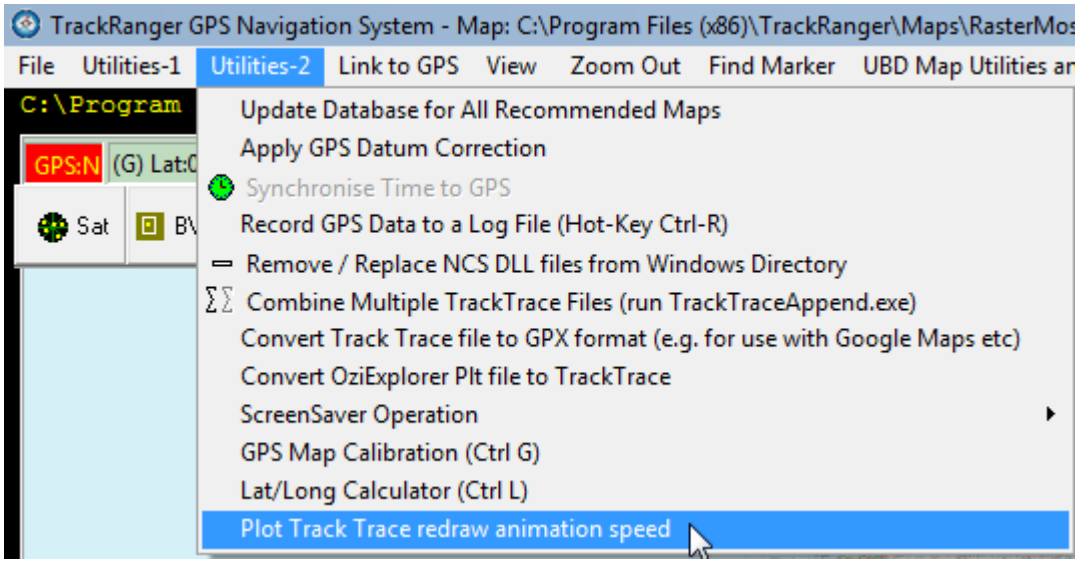
Be prepared that large track trace files will be **very slow** to load in Google maps (the GPX format is *extremely* inefficient). This is nothing to do with TrackRanger, it is the GPX data format that is huge and resource intensive.

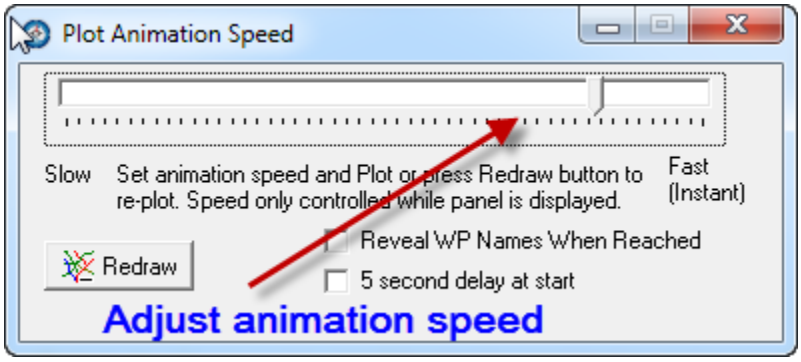
Zooming in on any section of the maps is available also:



Animating a plot of a Track Trace file

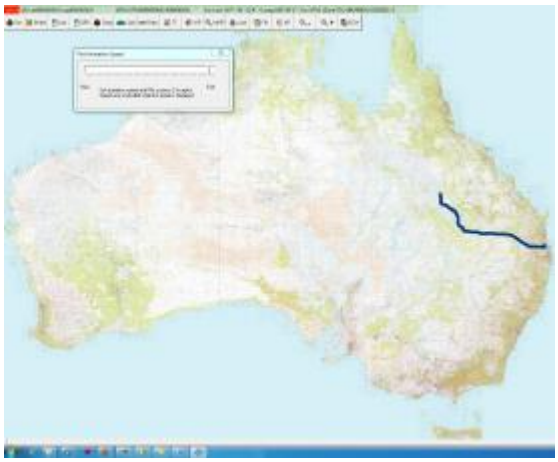
TrackRanger Track Trace files may be plotted as an animated line rather than drawing instantly. This is useful for reviewing a trip from start to finish, including viewing the direction of travel. Select the Plot Track Trace redraw animation speed option from the Utilities-2 drop-down menu. Whenever this display is active, the slider value sets the track trace redraw speed. Tip: Press Z to force a redraw also.

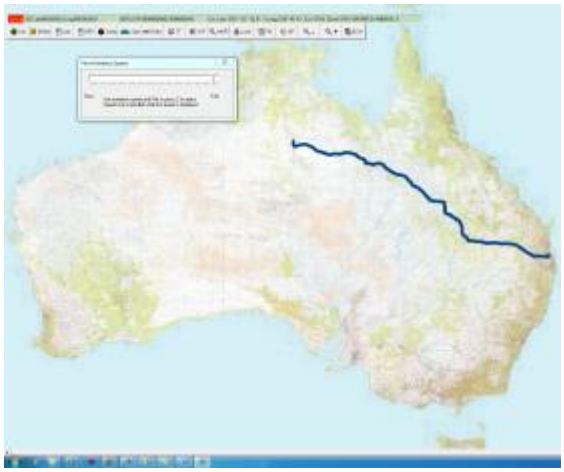


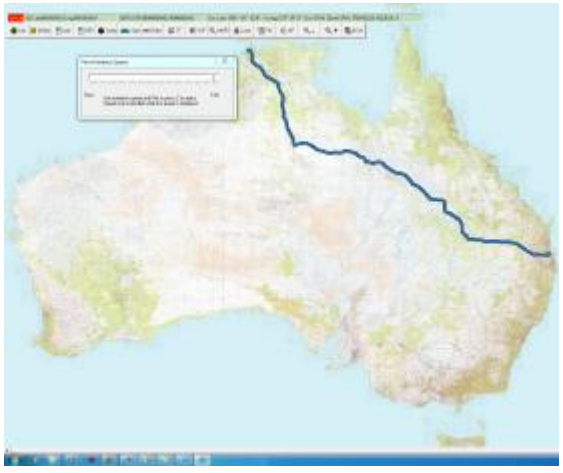


Set the slider to suit the redraw speed.

Plot a file and the track trace display is updated over a time period



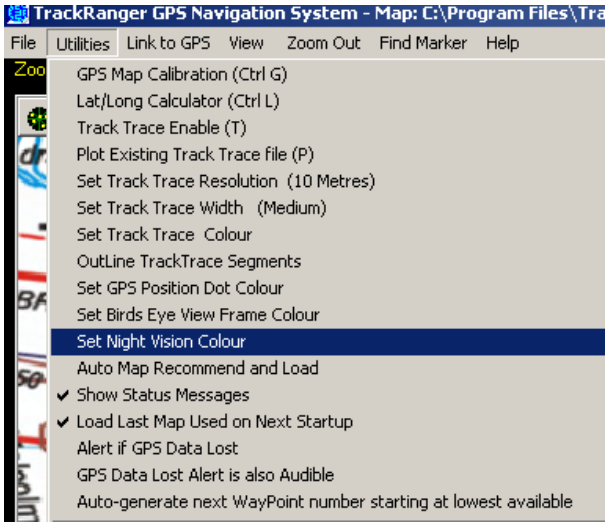




Section 19 – Night Vision

Night Vision

TrackRanger V4.5 or later supports Night Vision, allowing users to more comfortably view the computer screen in low external ambient light conditions.



TrackRanger supports two different ambient light intensities, and also allows the user to select the filter colour.
(Note: Night Vision may be CPU intensive)

Selecting Night Vision Colour

Selecting the Filter Colour.
Select the desired Filter Colour from the Utilities-1 drop-down menu.

Choose the desired colour (red works well), and press OK

Activating Night Vision

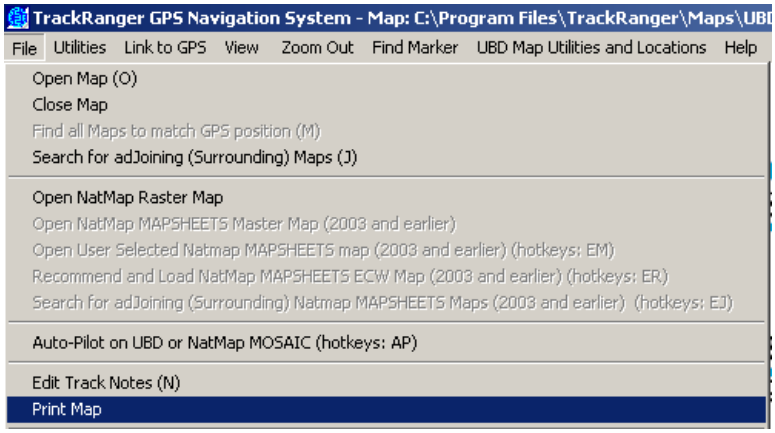
Night Vision is activated by the hot-key 'V'. Each press of the V key will toggle the state of Night Vision from Low Intensity, Maximum Intensity or Off.

Night Vision affects most displays on the computer screen, not just TrackRanger. For convenience, displays such as Compass etc are placed on top of the night vision screen, and therefore are quite readable. Night Vision should be disabled before undertaking other tasks on the computer.

Section 20 - Printing

Printing Maps

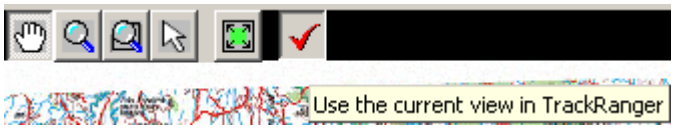
Maps may be printed for later analysis. All of the features on the current map will also be available on the printed output. This includes all Waypoints and their annotation, as well as active Track Trace data.



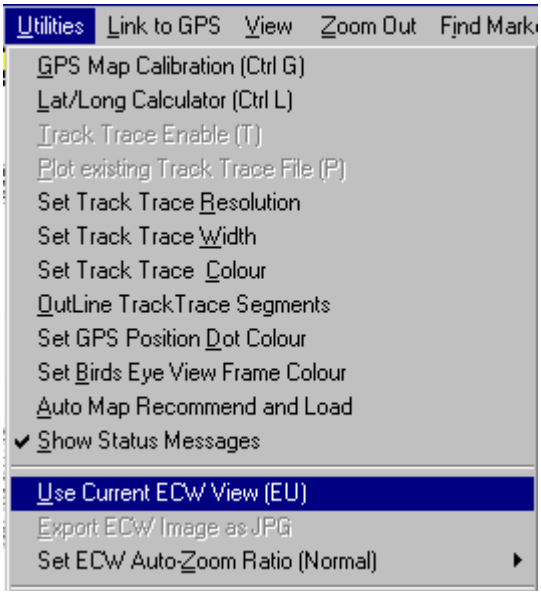
To print a map, select the print option from the File drop-down menu.

The user may select to optionally include the Latitude and longitude scales along the sides of the map. The name of the map may optionally be added to the printout.

Note that if a Natmap (ECW) map image has been loaded, but not yet 'Used' as a TrackRanger Map, then the message "No Map Loaded" will be presented. Simply select the Use Current ECW View to finalise the map load into TrackRanger (hot key 'EU'), or press the red tick from the top of the preview screen (**note that the HotKey commands may not be available when in preview mode**)



.



Section 21 - Statistics

Information Statistics

The filename, directories, map calibration status and related data are immediately available from the Information Statistics page. This is initiated from the Hot-key I or from the View | Information Statistics drop-down menu.
The following dialog is presented (see Figure 52):

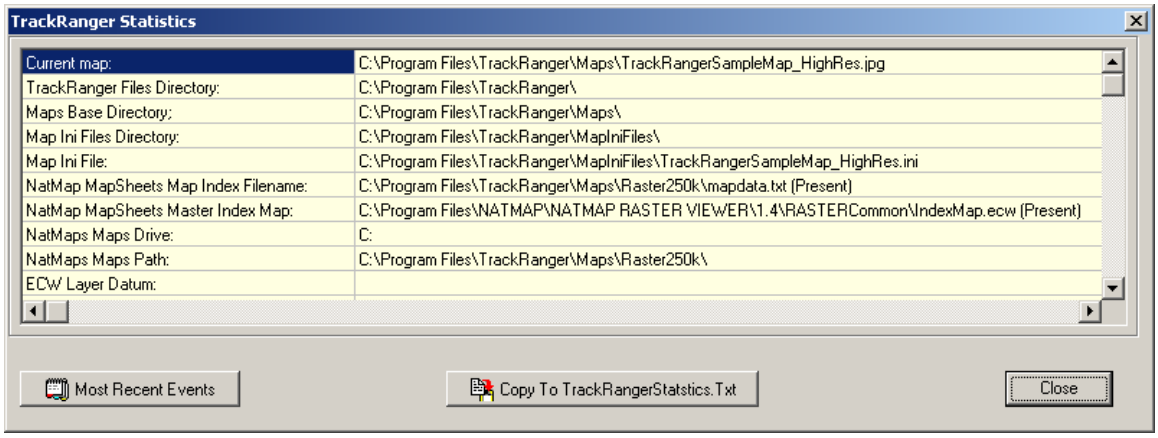


Figure 52 - TrackRanger map data statistics

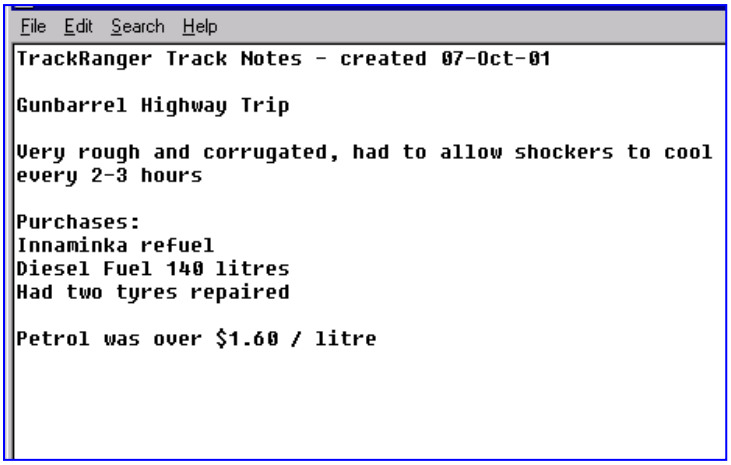
The statistics also show the number of files in each of TrackRanger's map folders.

Pressing the centre button will allow the displayed statistics to be copied to a disk-based statistics file: TrackRangerStatistics.txt. This file will be created in the TrackRanger directory.

Section 22 – Journey log

Track Notes Log

TrackRanger can automatically launch the Windows Notepad. This is useful for entering information about a trip, including fuel purchased, repair costs, accommodation etc.



Track Notes log may be launched by pressing the hot-key 'N', or from the View | Track Notes log drop-down menu.

TrackRanger creates a file with the name format TrackRangerLog_yyyymmdd.txt.

Whenever Track Notes is started, the user is informed of the previous filename used, and given the option to keep adding to that file, or create a new file. This is designed so that details of a trip lasting many days or weeks can be recorded in the one file.

Section 23 - Accuracy

Factors affecting accuracy

Several factors affect the accuracy of the GPS position on the map. These should be taken into consideration when reviewing the presented position. They include

- The available satellites
- The signal strength
- The type of navigation (2D, 3D)
- The dilution of precision reported by the GPS
- The accuracy of the map calibration information
- The linearity of the map drawing (how accurate is the map data?)
- The overall scale (distance coverage) of the map

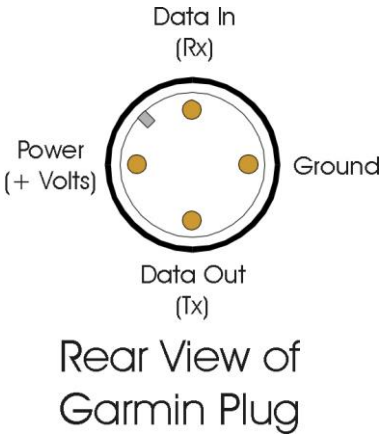
Also, if the position shown on a map appears to be out of calibration at one extremity (e.g.: Northern part of the map), and out of calibration in the opposite direction at the opposite extremity, it is likely that the map calibration points have not been set accurately. Check the topic on Map GPS Calibration.

Section 24 - Technical Information on GPS connections:

Tip: Not required for the TrackRanger GPS

Garmin Wiring

In the case of the Garmin™ GPS 12XL, the following wiring connections should be used:



Garmin GPS 12XL Wiring convention

Figure 53 - Rear View of DB9

Garmin Plug	DB9 connector	12V supply (e.g.: Cigarette Lighter
Data In (Green)	Pin 3 (Txd)	
Data Out (Yellow)	Pin 2 (Rxd)	
Power		+12V
Ground (Black)	Pin 5	Ground

For convenience, the +12V and Ground may be looped to the Garmin Plug from inside the back of the DB9 connector. The Ground is also connected to pin 5 of the DB9 connector.

Cables are available from manufacturers for connecting the GPS to a computer system. The required Garmin 12XL cable part number is: 010-10165-00 (data cable complete with cigarette lighter adapter plug), or 010-10141-00 (data cable only). An alternative Garmin Part Number is LE45CI.

Contact your GPS agent or Advantech Design for cables to suit your specific GPS device.

Section 25 – UBD Street Directory Mapping

Map Version

TrackRanger 5 and above supports UBD Australia City Streets.
The following cites / regions are covered by the UBD maps:

- Adelaide
- Brisbane
- Canberra
- Darwin
- Hobart
- Melbourne
- Perth
- Sydney
- Central Coast NSW
- Newcastle
- Wollongong

It has the ability to search by Map, Suburb, Street, and a number of facilities, generally including the following:

- Airports
- Beaches, Lakes, Water
- Bowling clubs
- Caravan / Tourist Parks
- Cemetries
- Churches
- Clubs
- Coach
- Fire Stations
- Golf courses/Driving ranges
- Guides
- Hospitals
- Hotels
- Local Government offices
- Libraries
- Lookouts
- Masonic centres
- Motor Registries
- Nursing Homes
- Parks, Reserves, Ovals etc
- Places of interest

- Police stations
- Race courses
- RAC
- Retirement
- Schools (Private)
- Schools (Public)
- Scouts
- Shopping complexes (major)
- Speed Camera Locations
- Sporting venues
- Swimming Pools
- Theatres
- Universities
- Weigh bridges
- Wineries

Functionality available varies depending on which map set is loaded.

Recommendations on Installing the UBD Maps

The installation instructions are provided with the UBD disk.

For best operational results, it is recommended that a full install be undertaken from the UBD Install program. This copies all maps to the hard disk drive on the computer.

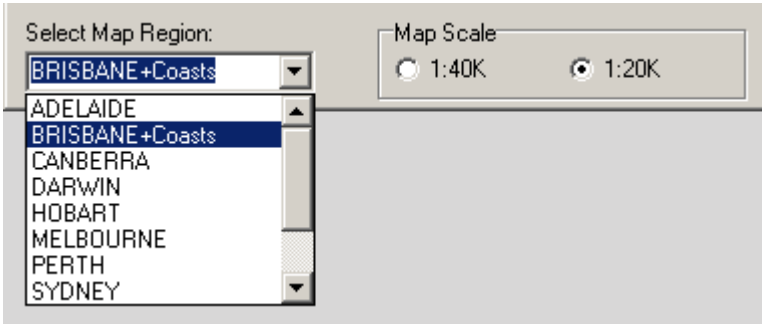
If disk space is limited, the maps may optionally be left on the UBD DVD disk, and this DVD disk must be inserted if UBD maps are to be used.

Autopilot with UBD Maps

If TrackRanger is running Autopilot and UBD maps are installed, it will attempt to load a UBD map in preference to the Natmap Digital map.
Searching for a location with the UBD maps:
The UBD functionality is available from a separate drop-down menu from the main TrackRanger page:

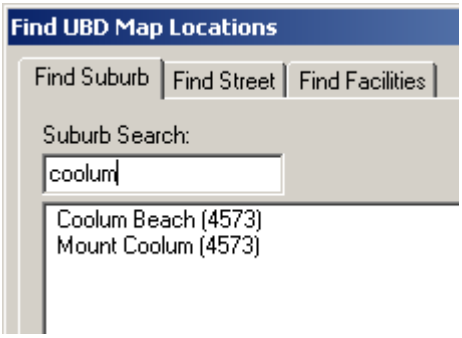
Selecting Map Region

Choose the desired map region from the drop-down list at the bottom of the UBD maps page:

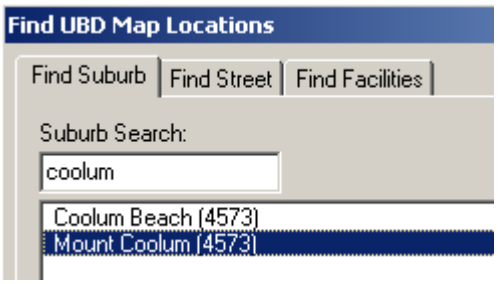


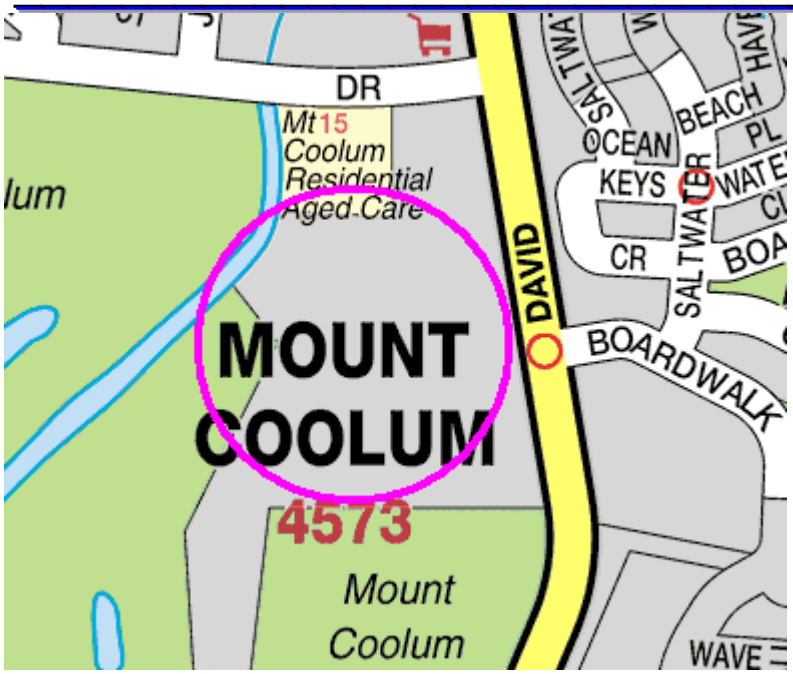
Finding a suburb

After selecting a map region, type in any of the letters contained within the suburb name. The letters entered do not have to be at the start of the name. This make is easier to locate names that identify mountains such as Mt Coolum vs Mount Coolum



Double-click on any of the names in the suburb list to immediately load the map at that location. Remember to set the desired zoom ration (e.g. X4, X5, X6 etc) before loading the map.

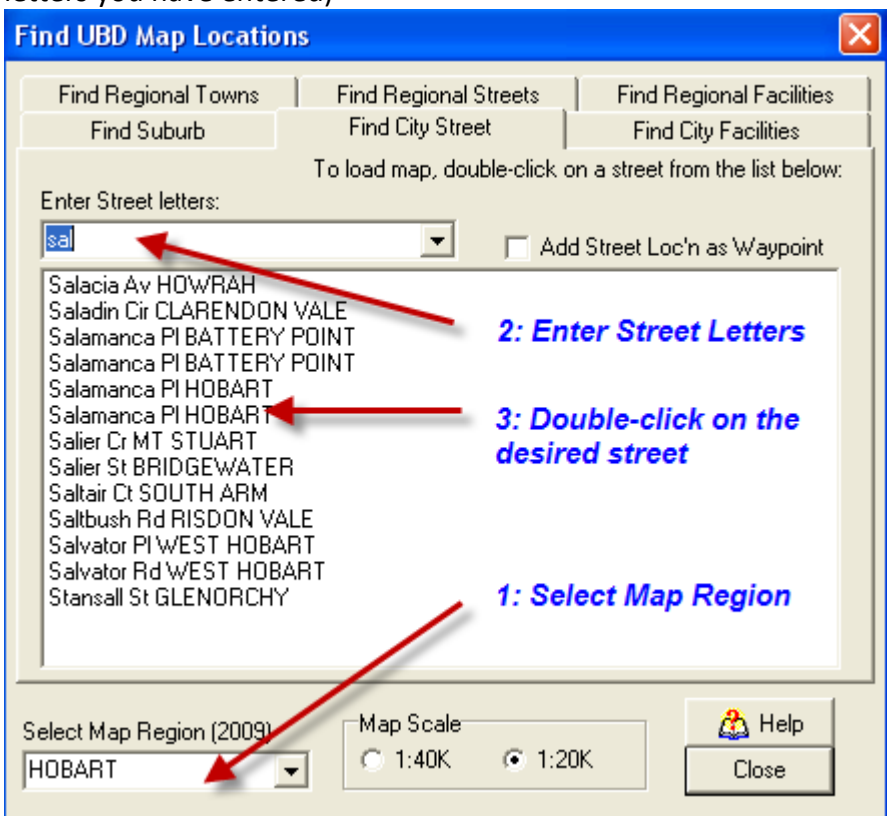




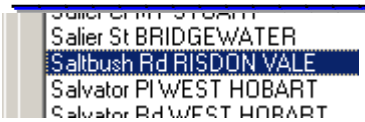
The suburb name is highlighted for easier identification.

Finding a Street or Road

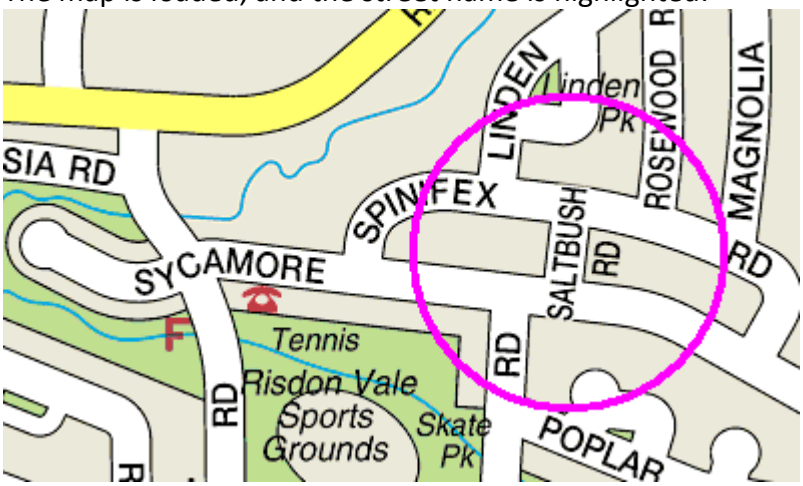
Select the desired UBD Map Region, and type in the name of the street or road (note the search for street names starts with the letters you have entered, rather than contains the letters you have entered)



Double-click on any of the entries from the list.



The map is loaded, and the street name is highlighted:

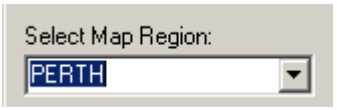


Panning the UBD Map

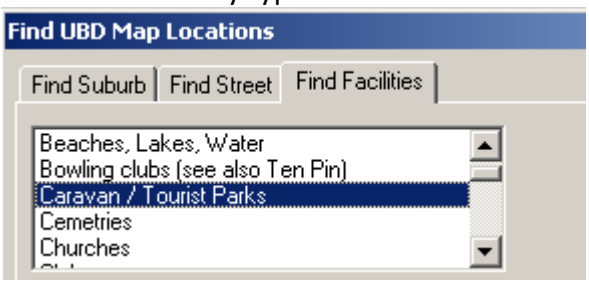
Areas adjacent to the current view may be located by pressing any of the keyboard arrow keys while the shift key is depressed. To allow for easy orientation, approximately 25% of the previous image is retained, and 75% of the image will be the newly panned area. This only works for UBD City Streets maps, not Regional Cities and Towns.

Finding Facilities

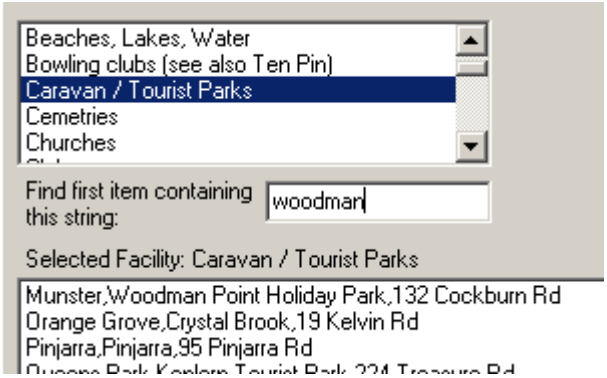
Select the desired Map Region:



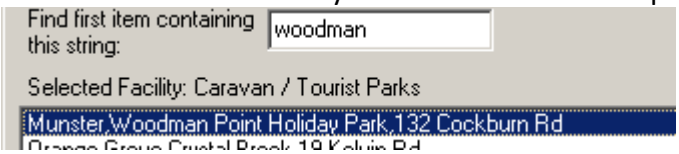
Scroll through the list of available facilities for that map region, and double-click to select the desired facility type:



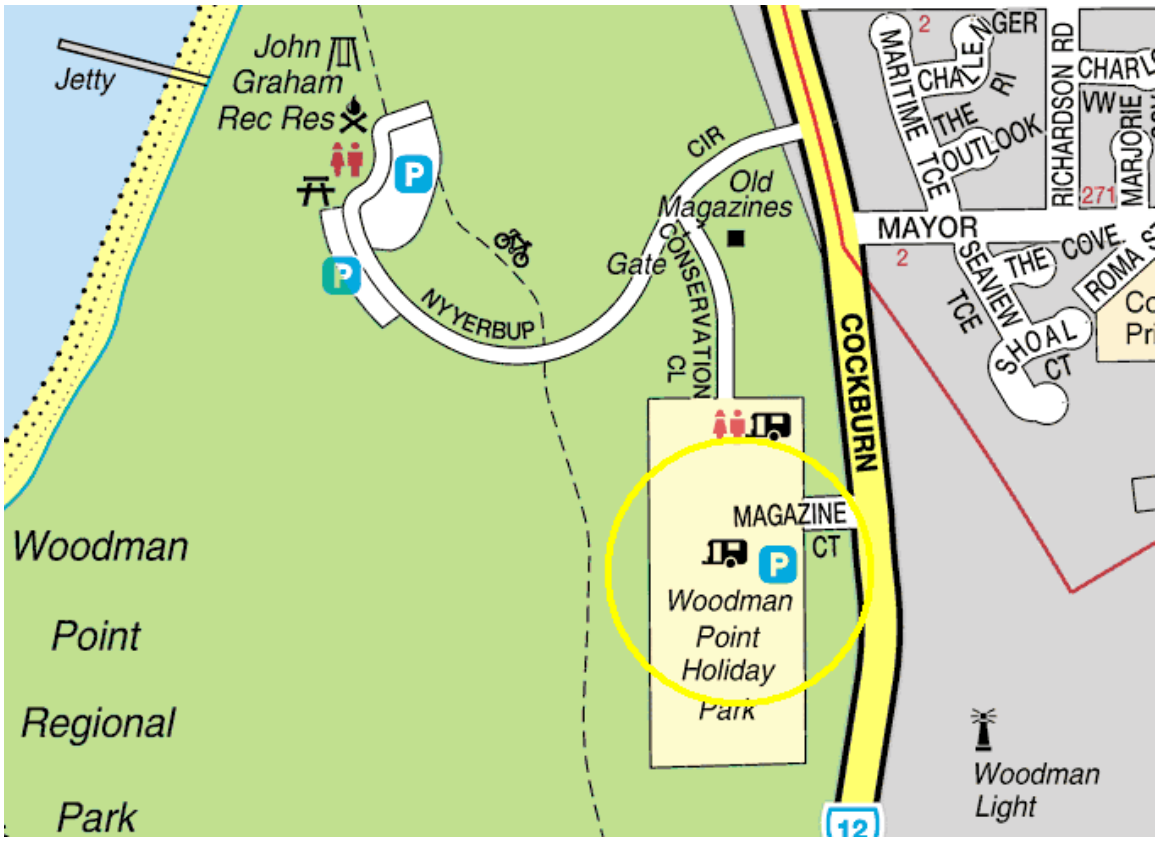
Optionally type in any of the letters contained in the selected facility to scroll the first facility containing those letters:



Double-click on the facility name to load it and display it in TrackRanger:



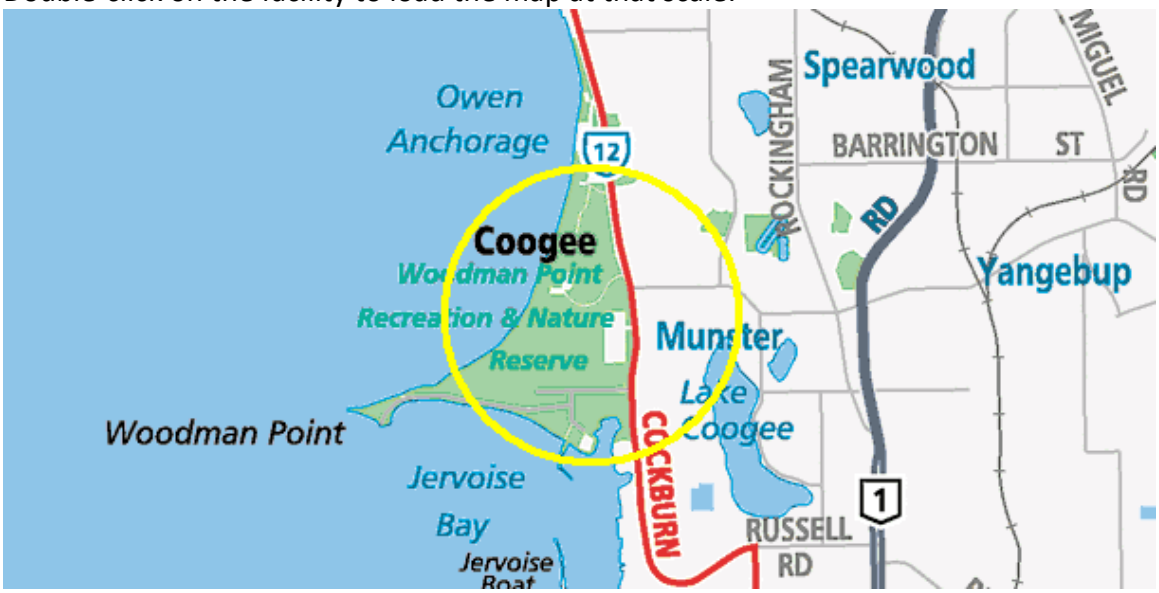
The map is opened with the selected facility highlighted:



Choosing a different UBD Map Scale

Select either the 1:20k map or the 1:40k map from the map scale selector:

Double-click on the facility to load the map at that scale:



Changing the UBD Map Scales dynamically

In some cases, two different map scales are available:
1:20k
1:40k

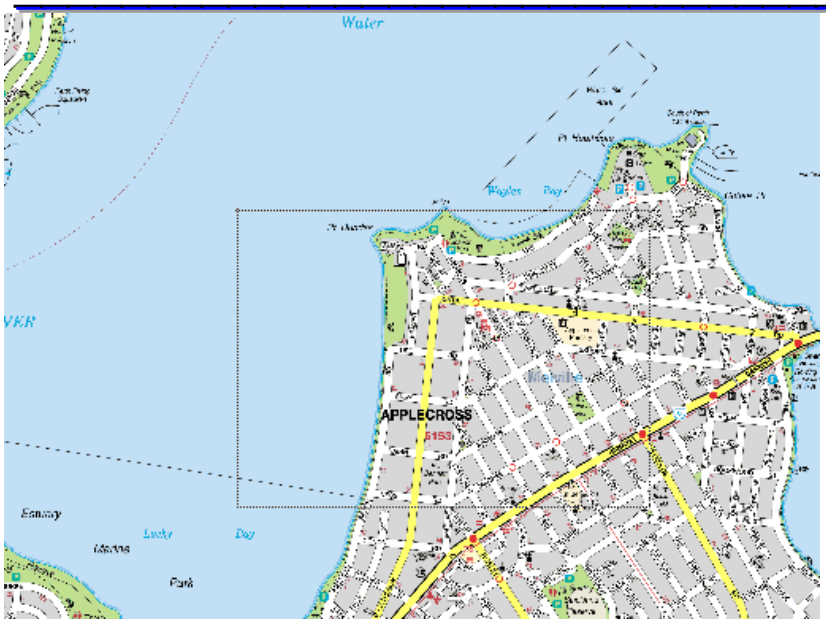
When active navigation is taking place or a search facility is open, the hotkey ‘U’ may be used to toggle between the different map scales.

Zooming the UBD Map

Using hot-keys (X1 to X8)

Zooming an area with the mouse:

For Regional Cities and Town product maps, select and drag an area, and then release the mouse button:



Drag down/right to zoom in, up/left to zoom out. Note that the UBD maps always scale by a factor of 2, so a large zoom-out area is generally required to actually create a trigger to a smaller region.

Release the mouse button, and the selected area is loaded and displayed:

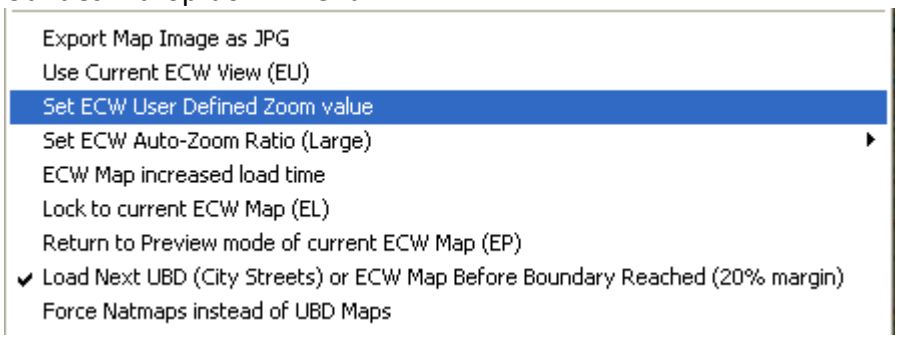
Zooming with the X1-X9 hotkeys

The current view can be zoomed in / out by pressing the hotkeys X1 through X7 or X9 (user-defined zoom).

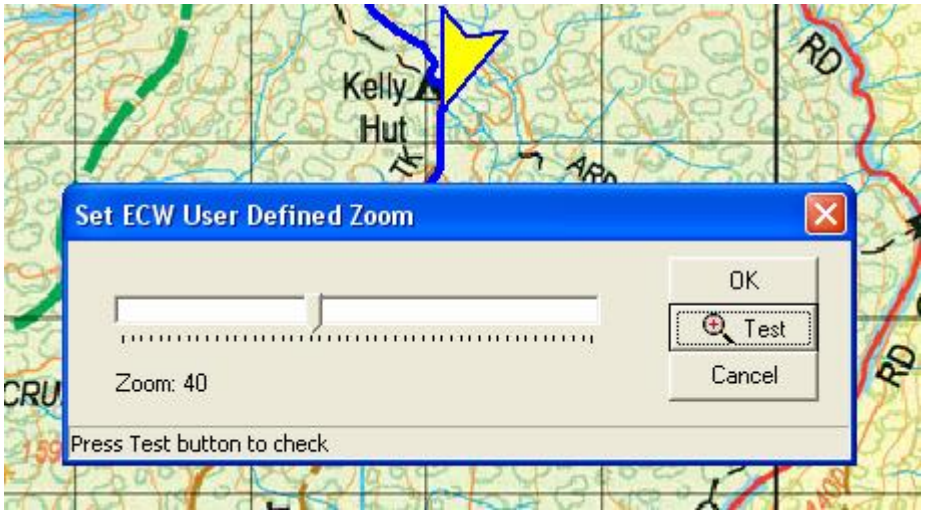
It is recommended that hotkeys X4 to X6 are most suitable for the 1:20k map scale, while X1 to X3 are best suited to the 1:40k map scale.

If valid GPS signal has been received, Zooming using hot-keys will track the GPS position. If no GPS position information is available, zooming will track as close as possible to the centre of the current image.

TrackRanger 7 and above includes a user-definable zoom: X9 Set this initially from the Utilities-1 drop-down menu:



Incoming GPS data is required to make the setting. With the map locked and on Auto-Pilot, adjust the value, press the test button, and when satisfied with the resultant map scale, press the OK button to save this setting in the X9 user defined option.



After setting the value, press X9 to select that zoom level.

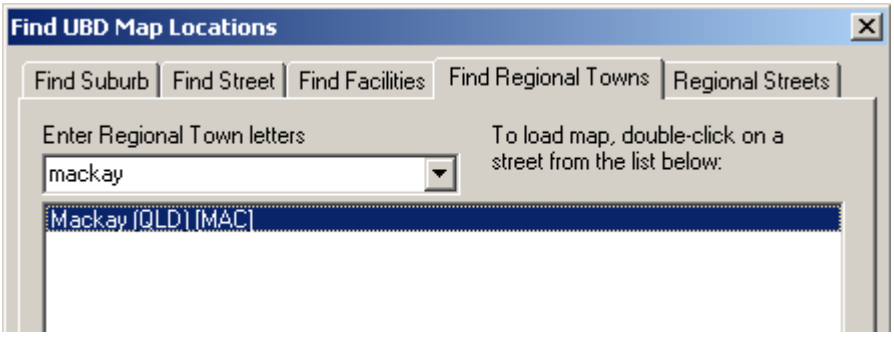
Section 26 – UBD Regional Cities and Towns Mapping

TrackRanger Pro 6 and above can optionally navigate with UBD Regional Cities and Towns maps, Version 3.0, V4.0 if installed on the TrackRanger computer.

Note: After installing the UBD Regional Cities and Towns maps, Start TrackRanger, Select Update Database from the Utilities-2 drop-down menu. This lets TrackRanger find the Regional Towns maps.

Opening a Regional Map

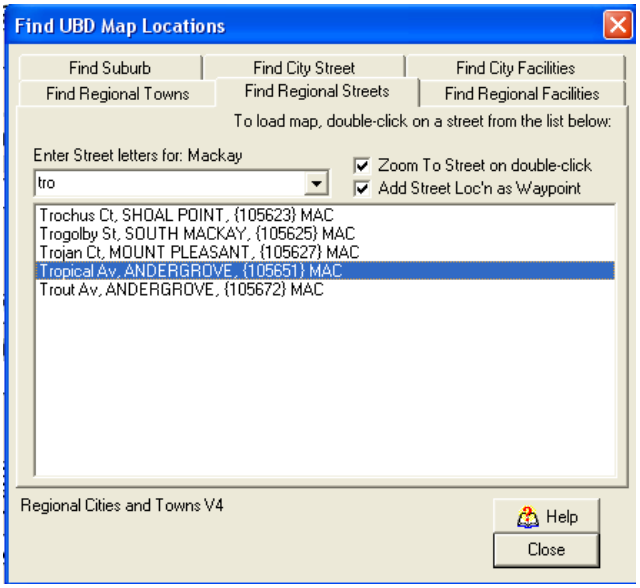
Open a Regional map manually from the UBD Map Utilities and locations drop-down menu:



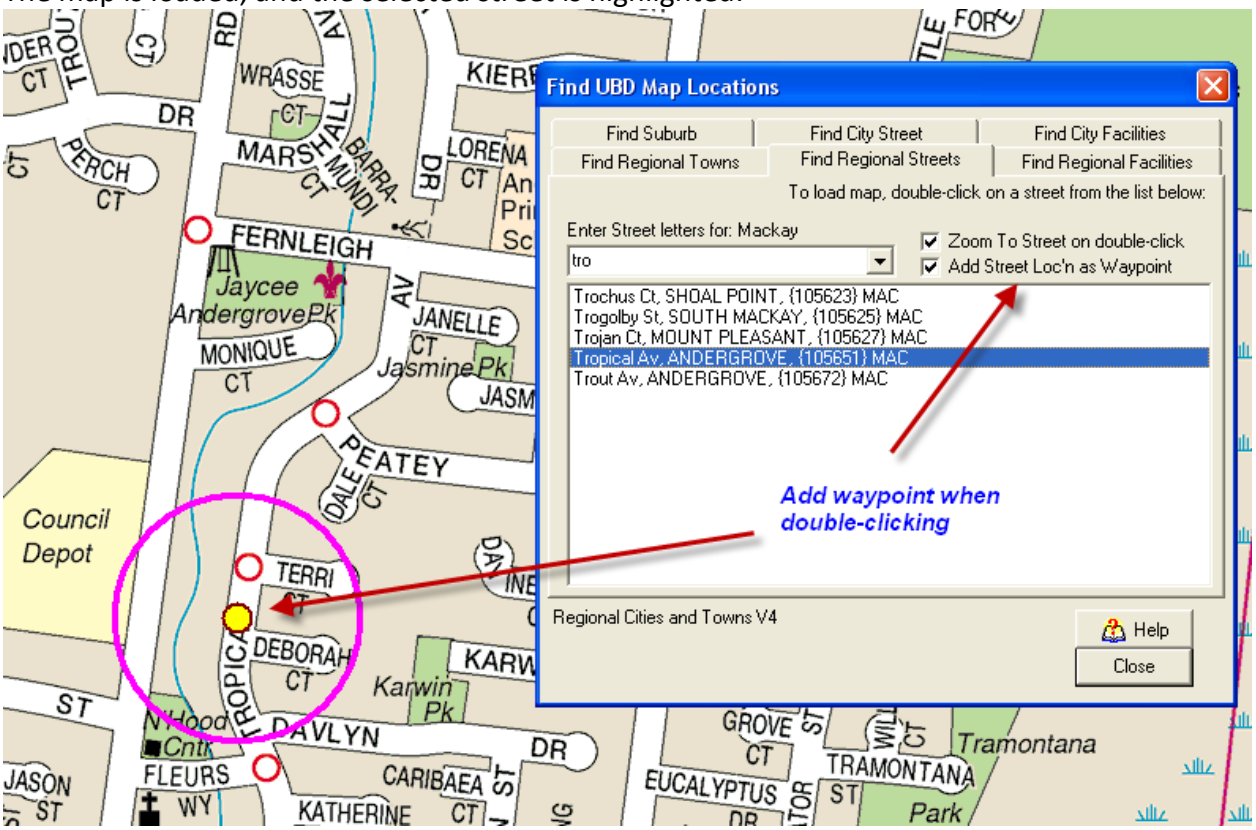
Type in letters matching the regional town, and double-click the map name from the list to load the map.

Opening a Regional Map at a particular street

Maps are initially loaded at full scale. To locate a street from the map, select the regional Streets tab, and type in the letters matching the street name. Double-click to navigate to that location.



The map is loaded, and the selected street is highlighted:



Note: Check the 'Zoom To Street' checkbox to have TrackRanger zoom in to the street. This option may produce an out of range message if the street is near the extremity of the map. In this case, uncheck the 'Zoom To Street' checkbox first. A waypoint may be automatically added by checking the Add Street loc'n as Waypoint. This option is available for most search types

Automatically Navigating on a Regional Map

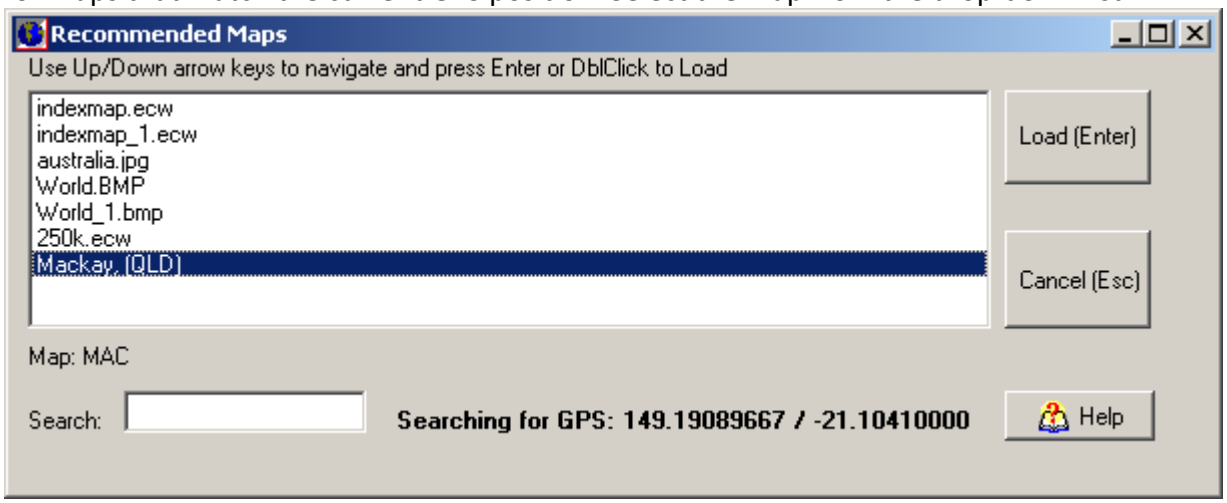
With Valid GPS data being received, press hot-keys AP to start Auto-Pilot. If a regional map is available, this will be loaded and used for navigation.

Zooming the UBD Regional Cities and Towns maps

Use the mouse and click-drag down/right to zoom-in, up/left to zoom-out. It is usually required to zoom out before zooming in at a different location. Some smaller towns will only have one scale, so zooming in/out will not change the image scaled size.

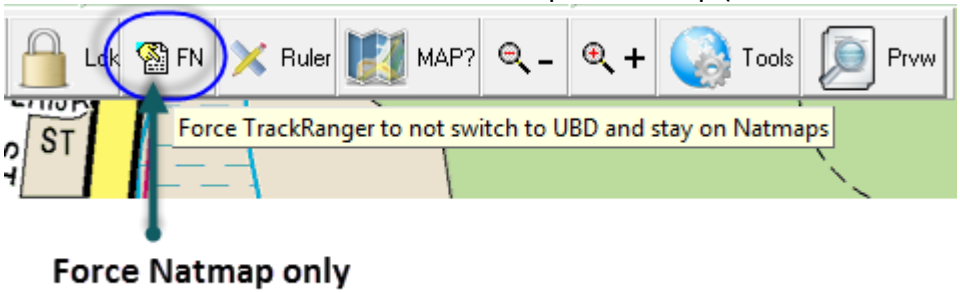
Manually Navigating on a Regional Map

With Valid GPS data being received, press hot-key 'M' to request TrackRanger to search for maps that match the current GPS position. Select the map from the drop-down list:



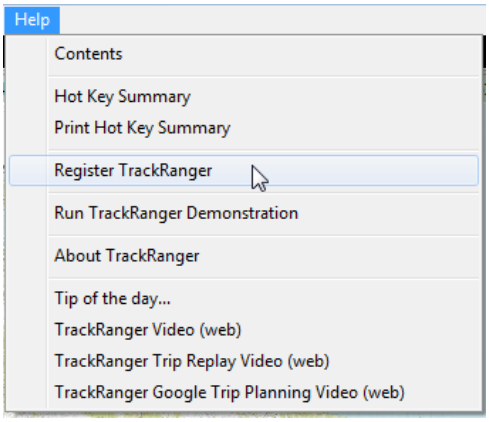
Forcing only a UBD or Natmap map

The hotkeys 'FN' will toggle the selection of Natmaps only, or UBD maps if within range. This is available from the toolbar at the top of the map (if selected to be shown)



Section 27 – Registering

Registering TrackRanger



TrackRanger need to be registered to the PC computer system that it will operate from. Registering TrackRanger involves sending a serial number and other related information to Advantech Design P/L. Advantech Design will then issue a registration number, which the user then enters. This ensures that all of TrackRanger's features are fully operational.

To register TrackRanger, select Help | Register TrackRanger from the main menu

TrackRanger supplies you with the following information:

- Serial Number
- Version
- Product Code
- Update Number

Send this information, along with the following details:

- Place and date of purchase (or indicate if "new purchase required")
- Your name, address, contact phone number and email address if available

to Advantech Design P/L
PO Box 890, Eltham Victoria Australia 3095
or email to
trackranger@advantechdesign.com.au

TrackRanger can automatically email the registration details by pressing the button on the registration form.

Advantech Design will forward a registration code to enable you to immediately register TrackRanger on this computer.

When you receive the registration code, simply go to the Register TrackRanger directory, click on the checkbox, and enter the registration code.

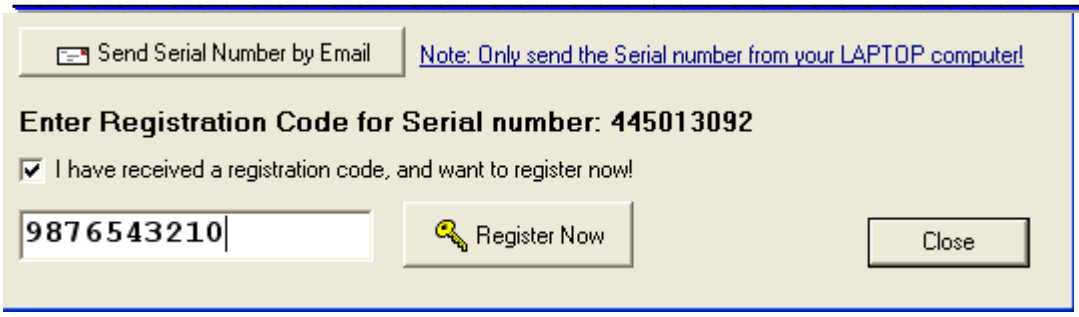


Figure 54 -Entering the registration code (Note: correct code will be supplied by Advantech Design)

Section 28 – Notes

User Notes