ReefMaster v1.6

Table of Contents

Tutorials

REEFMASTER

What's new in ReefMaster version 1.6?

There are a number of significant changes and new features in version 1.6 of ReefMaster:

New features

- New Bottom Composition add-on module.
- Vector mode for map projects gives great looking maps and a wider range of map export options, including Google Earth maps for mobile devices.
- Fully customisable User Maps for near *WYSIWYG* (what you see is what you get) map editing for Navico devices.
- ESRI grid export from map projects; export generated map grids for use in GIS applications.
- Integration with the Navico Insight Map Creator makes creating AT5 maps for Navico devices a one-click process from ReefMaster.
- Volumes and Areas add-on module calculates the mapped area and water and sediment volumes over a range of depths.

Significant Changes

- Map projects now have a *generate map* button which must be used when map parameters have been changed; maps no longer automatically regenerate.
- ReefMaster now runs in 64 bit on 64 bit operating systems. This means that ReefMaster can use more memory, if available, and produce even bigger maps.

REEFMASTER

Getting Started

What is ReefMaster?
ReefMaster is a Windows PC application that combines easy-to-use underwater mapping and waypoint management, with the emphasis on features that are useful to fishermen.

Underwater Mapping
ReefMaster generates underwater maps using track log data collected on a GPS/depth sounder combination unit. Once a map has been created, it can be viewed in 2D or 3D, and depth contour lines can be exported back to compatible GPS devices.

Waypoint Management
ReefMaster includes comprehensive, easy to use, graphical waypoint management including drag and drop of waypoints in both 2D and 3D.

Track Library
ReefMaster acts as a librarian for all of your GPS data, including track logs. Tracks can be stored and viewed, edited, merged and re-exported to your GPS device.

Getting Help
Help can be accessed in a number of ways from throughout the ReefMaster application:

(1) Click the *Help* button in the Main Toolbar to open this help manual to the contents page.

(2) Pop-up help is available in many places throughout the application. Click the *?* button to show a pop-up window containing help information relevant to the current window. The pop-up help window contains a further button that can be used to directly open the relevant page of this reference manual.

(3) Press the *F1* button at any time to open this help manual.

The ReefMaster Forum
ReefMaster has an active community forum, with sections for news, support and general mapping technology and techniques. Many common questions will have already been answered there, and it is great place to look for news and ask for advice.

Checking for ReefMaster Updates
The ReefMaster application is periodically updated as new features are added and issues are fixed. You should check for updates occasionally by running the separate *check for updates* application, which is installed in the same folder as the ReefMaster executable. If an updated version is available, it will be downloaded and installed automatically. News about updates is posted in the *News* section of the ReefMaster forum.

ReefMaster Basics
The basic concepts, layout and terminology used throughout ReefMaster, are described in the *ReefMaster*

Basics manual section. As a starting point, load up the *demo workspace* that is included with the application, and read through the following topics:

- Assets and Asset Types
- The Workspace
- Application Layout
- The Main Toolbar
- The Asset Library
- The Edit Window

Once you have a handle on navigating your way around the application, a good introduction to using ReefMaster is to follow the tutorial Start to Finish - Create a Map for Your GPS, which goes through the entire process of creating a map; from importing GPS data, right through to exporting the finished map contours. Data files are provided.

ReefMaster Configuration

Before using ReefMaster with your own data, it's a good idea to take some time to configure the application:

- Choose the units that ReefMaster uses to display GPS coordinates, depths and distances in the Global Settings.
- Set up a Tide Station, if you are making maps of tidal waters.
- Configure a GPS Equipment Profile with information about your GPS/Sounder unit.

Using ReefMaster with Your Own Data

The following topics will help with collecting, importing and using your own GPS data:

- Collecting Track Log Data
- GPS Data Sources and File Types
- Importing GPS Assets

Making Your Own Maps

- Re-visit the tutorial Start to Finish - Create a Map for Your GPS, using your own data.
- Read through the Map Projects documentation.

Activating a ReefMaster License

ReefMaster is available in two editions, *LITE* and *PRO*. The *LITE* version does not include Map Projects.
A fully functional 14 day trial is provided, during which time all functions of the *PRO* version are available. After the trial period has ended, a license key for either the LTIE or PRO edition must be purchased, or ReefMaster should be uninstalled.

Using the Trial Version

When starting up ReefMaster whilst still within the 14 day trial period (and without having already a key), the window below is show:

- To continue using the trial version, click *Continue Trial.*

Buying and Activating a ReefMaster License

Clicking *Buy ReefMaster* from within the start-up window will take you to the online purchase page for ReefMaster, where a license key for either the LITE or PRO edition may be purchased. The purchase page can be found here.

Activating a License
A ReefMaster license key consists of a series of 28 alphanumeric characters, in groups of four characters separated by hyphens. When entering the license key in the steps below, it should be cut and pasted into the required field in exactly the same format as it has been received.

- Click *Activate License*, either in the start-up window, or in the *About ReefMaster* window, which can be opened by clicking the *About ReefMaster* button at the top of the Main Toolbar.
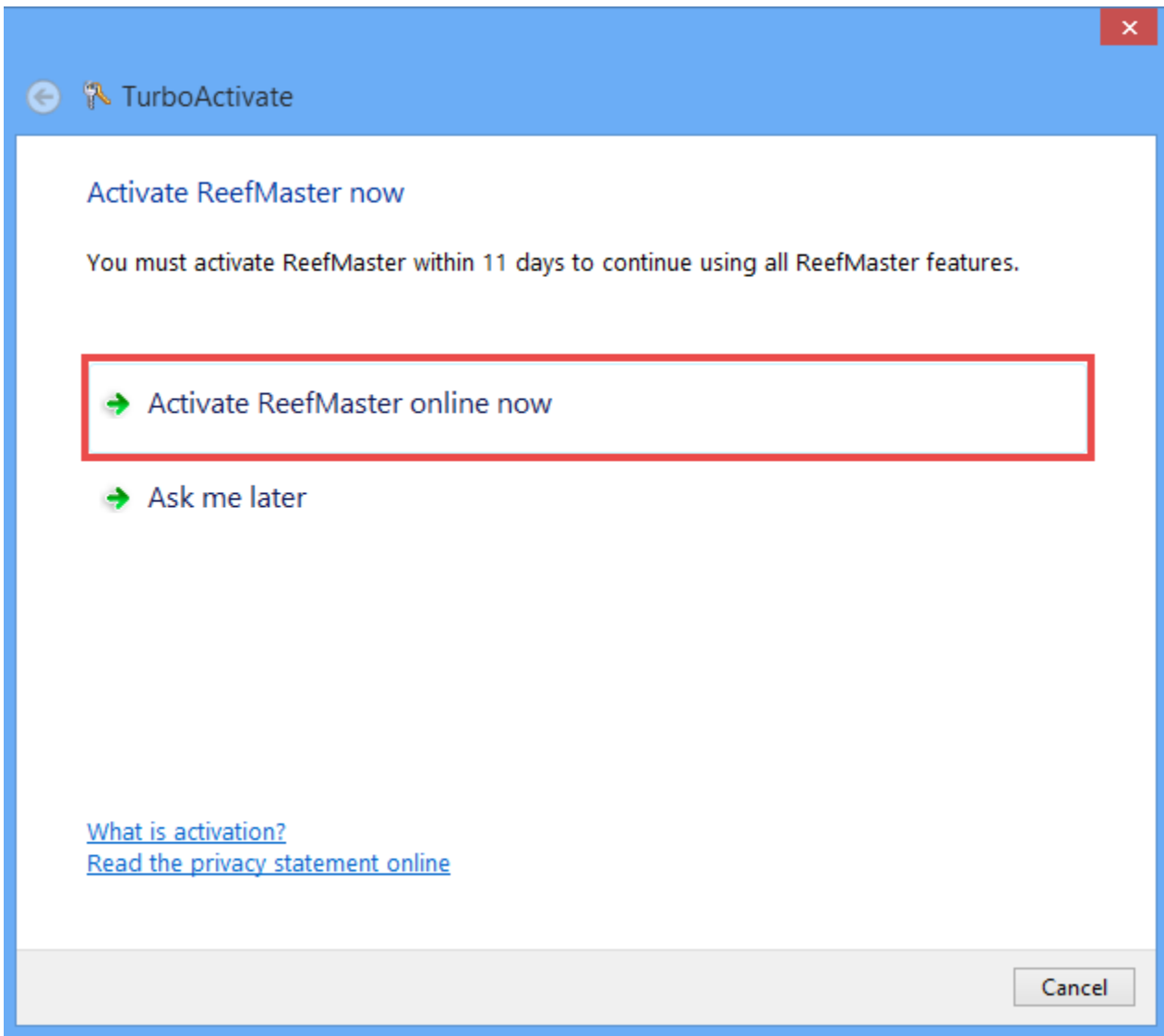
- Click *Activate ReefMaster online now*
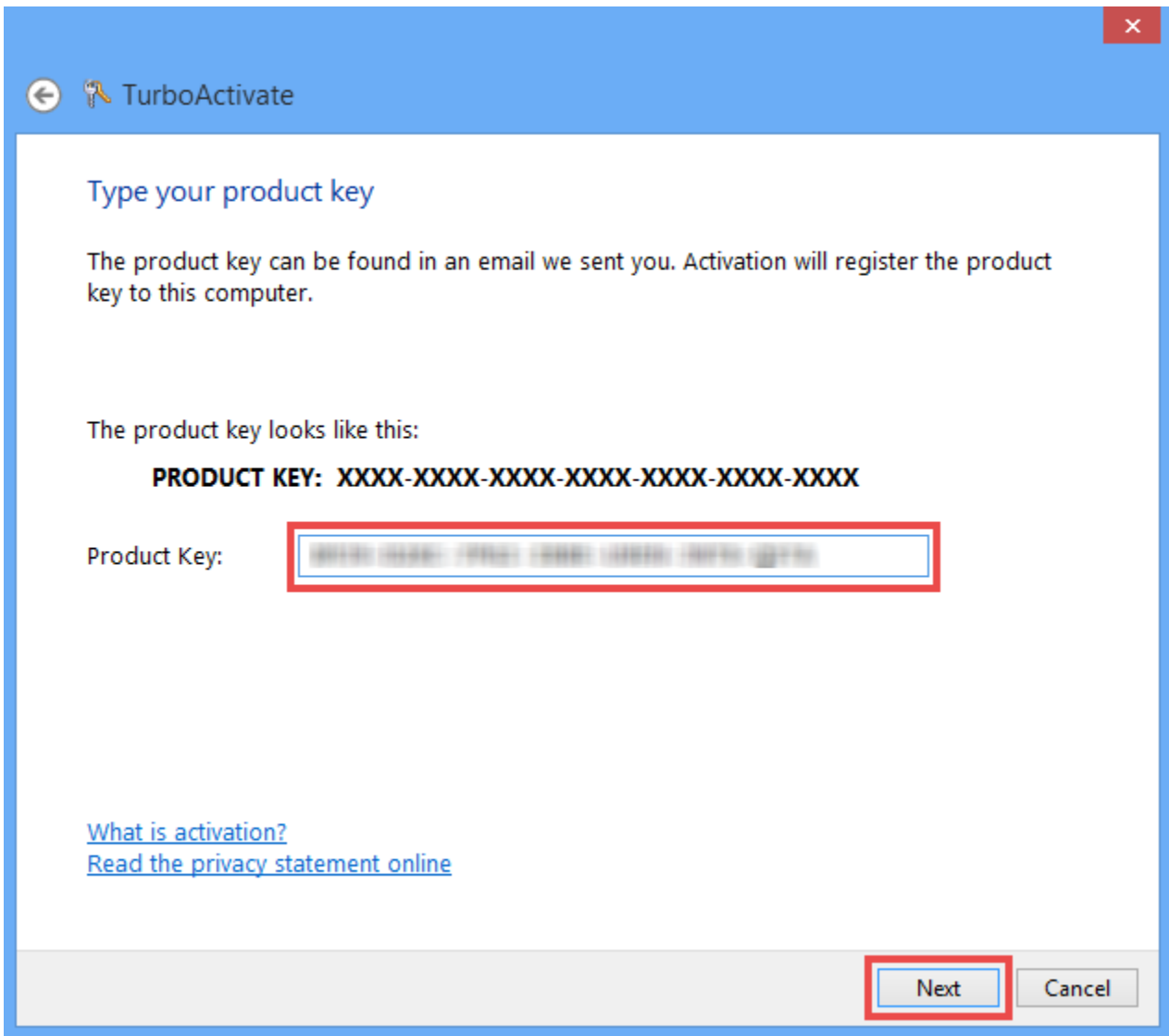
- Paste your ReefMaster activation key into the *Product Key* filed and click *Next*. A window is shown with the status of the activation. Close this window to continue using ReefMaster.

Installing additional ReefMaster modules

Volumes and Areas and Bottom Composition are additional ReefMaster modules that can be activated by following the upgrade process from the ReefMaster *About* window. Note that these are additional-cost modules, and that the upgrade process involves visiting the purchase website. An existing ReefMaster PRO license is required before upgrading to these modules.

- Open the *About ReefMaster* window by clicking on the *About ReefMaster* button at the top of the Main Toolbar.
- The installed status of the Bottom Composition and Volumes and Areas modules is displayed.
- To add a module, click the *Upgrade* button. This will open the default web-browser to the purchase page, and include details of your current license key, which are required for the upgrade process.
- Follow the purchase process.
- Once the purchase is completed, return to ReefMaster and click the *Reactivate License* button. This will update your current installation, and the installed status of the purchased module should change within the *About* window.
- Restart ReefMaster for the changes to take effect.
- If the same ReefMaster key is also being used on another PC, then the licence must be reactivated on that machine by clicking the *Reactivate* button, before the new features become available.

Deactivating a ReefMaster License

Licenses can be deactivated so that they can be re-activated on a different PC.

- Open the *About ReefMaster* window by clicking on the *About ReefMaster* button at the top of the Main Toolbar.
- Click the *Deactivate License* button.

Exporting and Importing User Settings

All user settings, such as unit display settings, recent workspaces, user defined palettes and GPS equipment profiles are stored in a *User Settings* file. This file can be exported so that it can be transferred to another machine.

- Click the *Export user settings* button to save the user settings file, and choose a file name in the save

file dialog.
- Click *Import user settings* to import a user settings file. Note that all current user settings will be overwritten.

Uninstalling ReefMaster

To uninstall ReefMaster, use the Windows function *Control Panel/Programs/Uninstall a program.*

REEFMASTER END USER LICENCE AGREEMENT

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By clicking "accept agreement" when you first install the Software, you agree to be bound by the terms and conditions of this EULA. If you do not agree to this EULA, you must click "reject agreement" during the installation process and notify ReefMaster Software Ltd by emailing support@reefmaster.com.au, so that your license key can be disabled and a refund issued.

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1.4 The ejusdem generis rule is not intended to be used in the interpretation of this EULA.

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7.1 The Licensee warrants to the Licensor that it has the legal right and authority to enter into and perform its obligations under this EULA.

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(b) that the use of the Software by the Licensee in accordance with the terms of this EULA will not infringe the UK copyright of any third party;.

7.3 The Licensee acknowledges that:

(a) the Software may not be error-free;

(b) the Software has not been developed to meet the specific requirements of the Licensee, and accordingly the Licensee will be responsible for ensuring that the Software is suitable to meet the Licensee's requirements;

(c) the Software has not been developed for use as a navigation tool and neither it nor any GPS

assets exported by or any other outputs from the use of the Software are to be used by the Licensee for the purposes of navigation or as a navigation aid, whether in relation to contour "maps" of the sea or lake beds or waypoints exported from the application or otherwise; and

(d) it is aware of the minimum system requirements for the downloading, installing and use of the Software and understands that these may change from time to time.

7.4 All of the parties' liabilities and obligations in respect of the subject matter of this EULA are expressly set out herein. To the maximum extent permitted by applicable law, no other terms concerning the subject matter of this EULA will be implied into this EULA or any related contract.

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(b) limit or exclude the liability of a party for fraud or fraudulent misrepresentation by that party;

(c) limit any liability of a party in any way that is not permitted under applicable law; or

(d) exclude any liability of a party that may not be excluded under applicable law,

and, if you are a consumer, any statutory rights which you have, which cannot be excluded or limited, will not be affected by the EULA.

8.2 The limitations and exclusions of liability set out in this Clause 8 and elsewhere in the EULA:

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8.3 The Licensor will not be liable to the Licensee for any losses arising out of a Force Majeure Event.

8.4 The Licensor will not be liable to the Licensee in respect of any business losses, such as loss of or damage to profits, income, revenue, use, production, anticipated savings, business, contracts, commercial opportunities or goodwill.

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10.1 Upon termination all the provisions of this EULA will cease to have effect and all licences granted to the Licensee hereunder shall cease immediately, save that the provisions of Clauses 1, 8 and 11 will survive and continue to have effect (in accordance with their terms or otherwise indefinitely).

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11.5 This EULA constitutes the entire agreement and understanding of the parties in relation to the subject matter of this EULA, and supersedes all previous agreements, arrangements and understandings between the parties relating to the subject matter of this EULA. Subject to Clause 8.1, each party acknowledges that no representations or promises not expressly contained in this EULA have been made by or on behalf of the other party.

11.6 This EULA will be governed by and construed in accordance with the laws of England and Wales; and the courts of England will have exclusive jurisdiction to adjudicate any dispute arising under or in connection with this EULA.

Assets and Asset Types

Data items such as track logs, waypoint sets and map projects, are referred to in ReefMaster as *assets*. Each asset type can be edited in its own window, and any number of different assets can be opened for editing at once. The active edit window can be selected by using the tab headers in the main application view. See Application Layout for a more.

Below is a very brief description of each of the asset types supported by ReefMaster. Each of these is described in detail in its own manual chapter.

Tracks
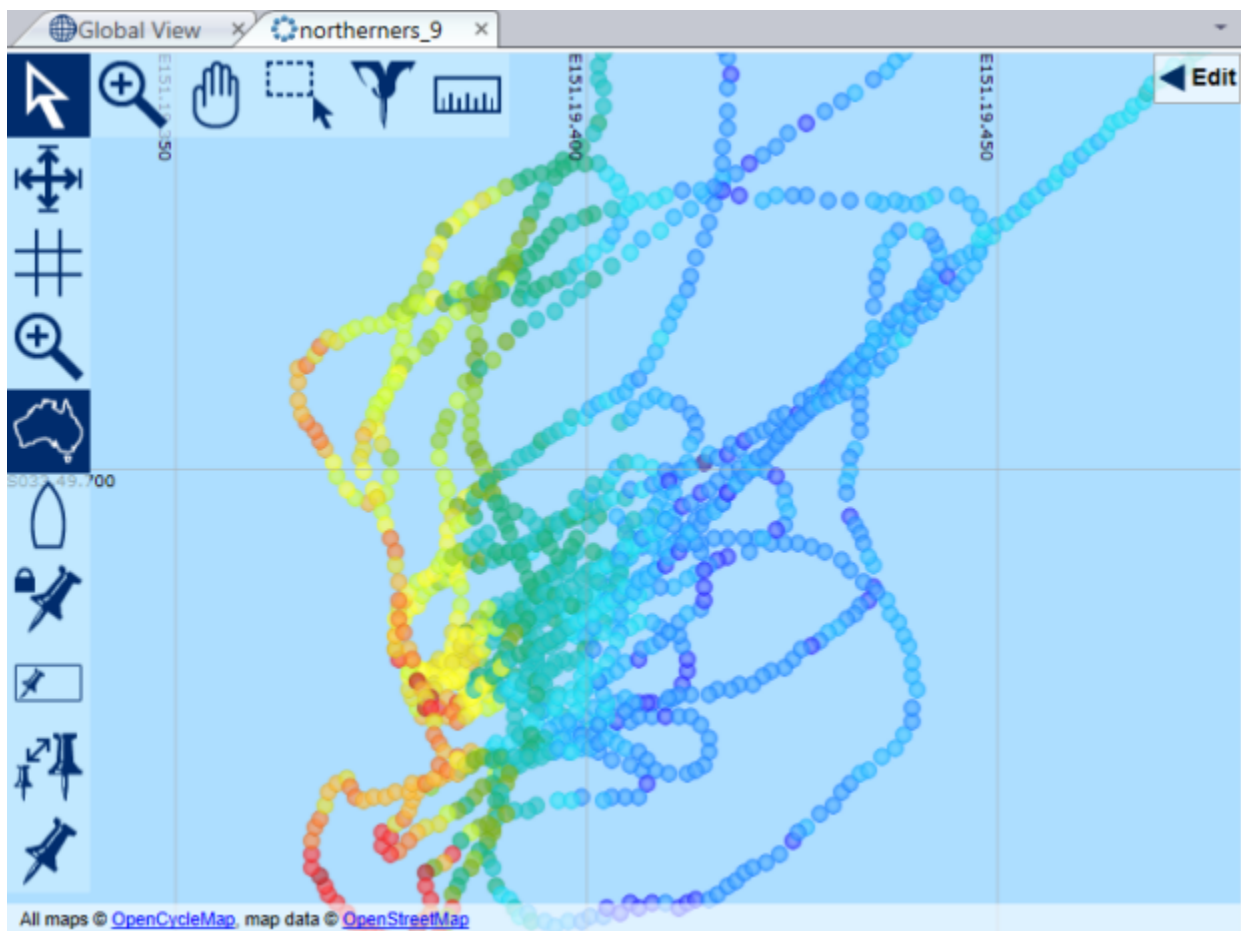
Track and sonar logs imported from a GPS device are known as Tracks. Tracks are made up of a number of individual track points which contain location and depth information. Data from tracks is used as the basis for creating underwater maps.

Tracks imported from compatible sonar logs also contain a sonar viewer, which can be used to view the raw sonar footage that was recorded as the track was made.

Waypoint Sets

A Waypoint Set is the term used to refer to a group of waypoints. There can be any number of waypoint sets within a workspace, and waypoints can easily be moved or copied between different sets.

Projects
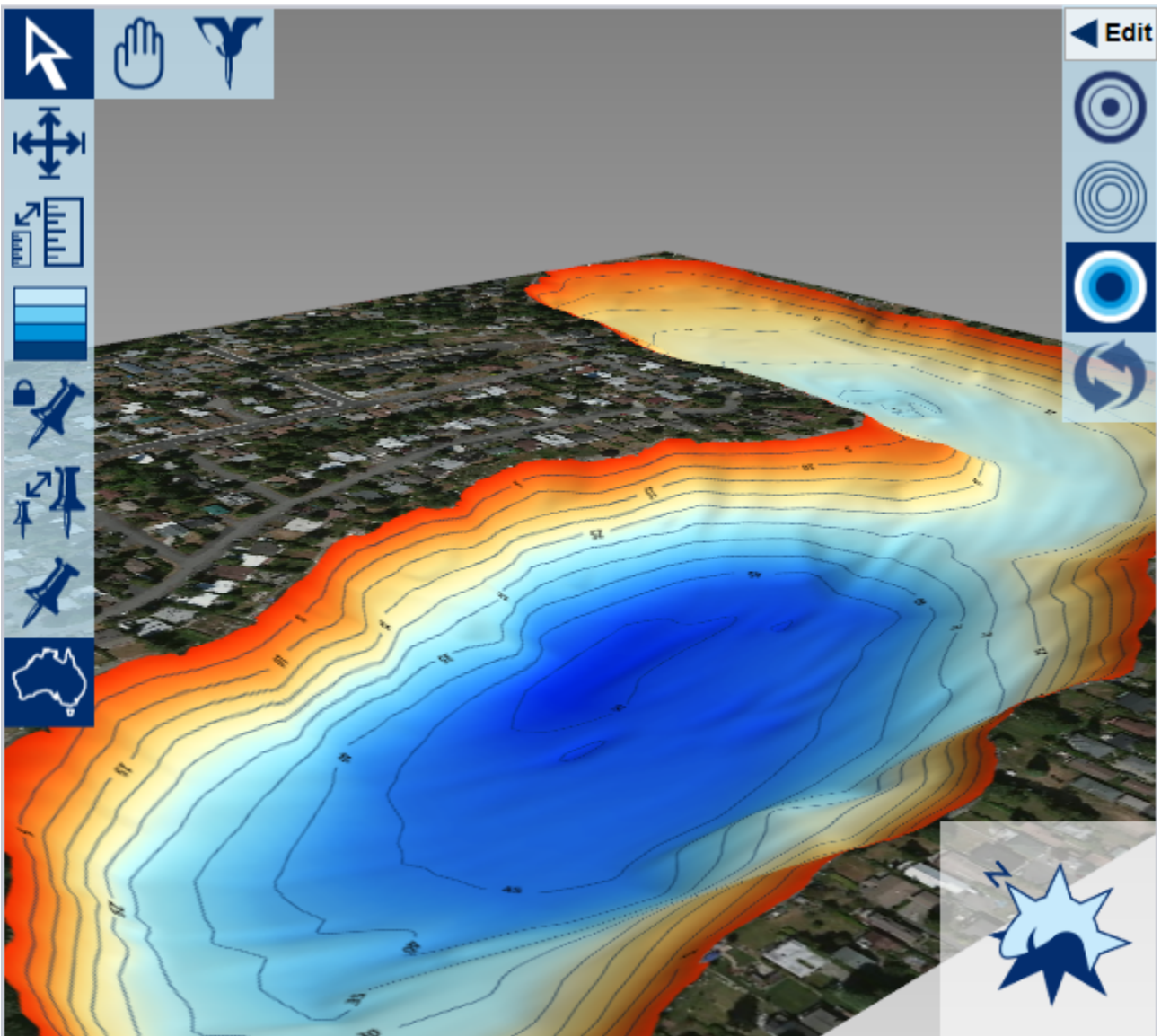
A Project is the name given to an underwater map composed of isobaths and contour lines. Maps are made using data from track points, contained within tracks. To create a map, one or more tracks are added to a project, and a map area is defined. Maps can be viewed in 3D or as contour maps.

User Maps
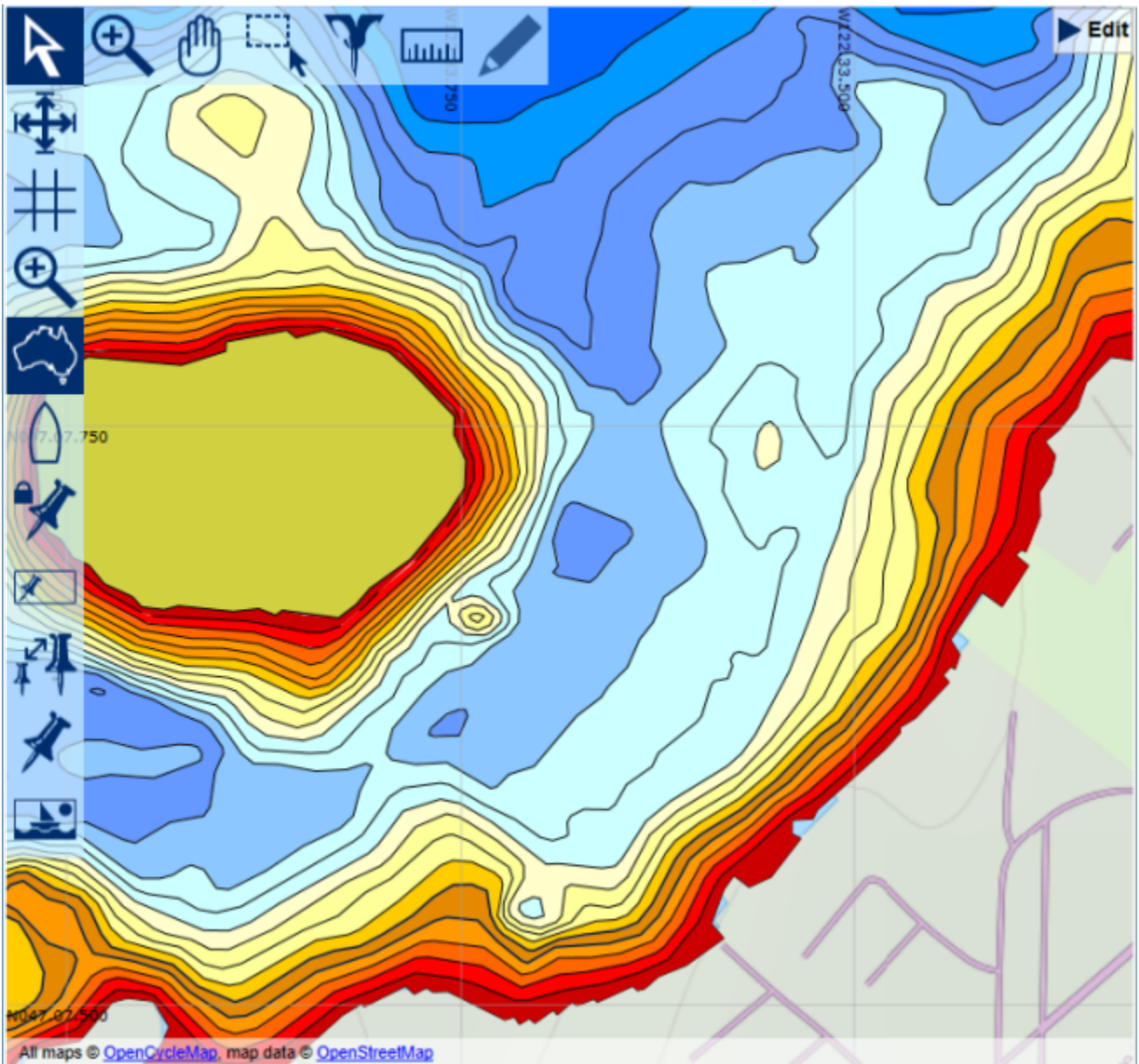
A User Map is a map created within ReefMaster specifically for export to a GPS device, consisting of a collection of contours, isobaths shorelines, tracks and custom paths and polygons.
User maps offer many more editing options than map projects, allowing components such as isobaths or contour lines to be styled individually before being exported for use in a GPS device.

Data Sets

A Data Set is a collection of assets grouped for export to a GPS device. Grouping assets into a data set makes it easy to maintain different sets of data for export; for example, you might create a data set for each different port that you fish out of, containing just the waypoints and maps needed for fishing in that location.

Background Images

Background Images can be imported and calibrated for use as a background within edit windows. For example, a high resolution satellite image could be imported for use as a background or image overlay in a map project.

The Workspace

All data stored within the ReefMaster application is contained within a database file known as a Workspace.

The Workspace

All assets within ReefMaster, such as tracks and waypoint sets, are stored in a single database file known as a *Workspace*. Workspace files have the file extension *.rmdb (ReefMaster DataBase)*.
When a new workspace is created, ReefMaster creates a new folder on disk, in which the ReefMaster database file is stored, along with all associated files, such as waypoint and background images.
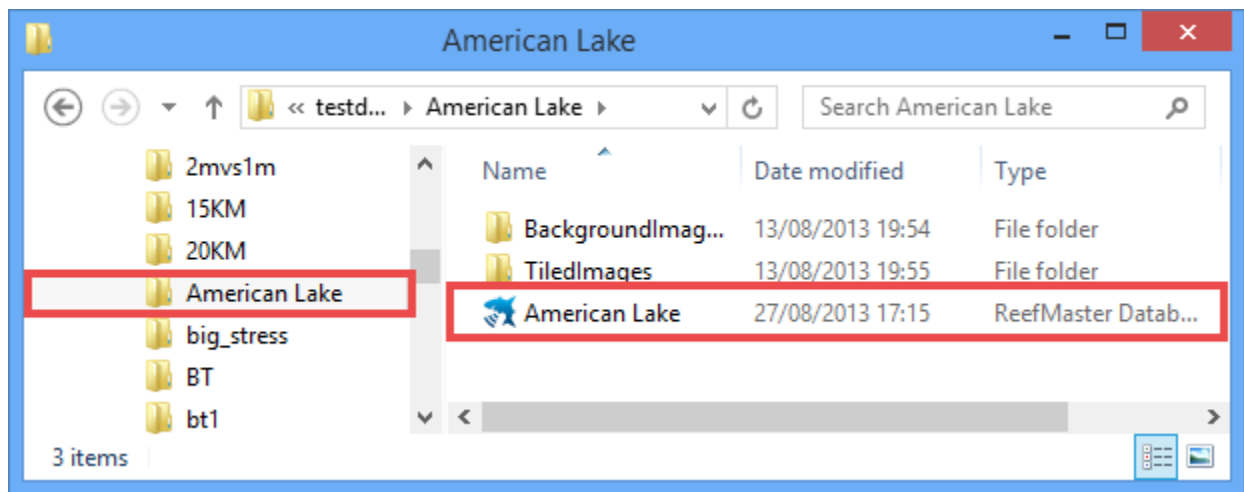
The above image shows the data and folders associated with the workspace 'workspace_demo'. Note that the workspace database file *workspace_demo.rmdb* is held within a folder of the same name (minus the file extension). Also present within this folder are sub folders that contain background and waypoint images.

Note that files and folders within the workspace folder should never be edited or deleted.

Backing up the Workspace

As always, when saving important data to computer disk, regular back-ups should be maintained. As all of the data required for a workspace is held within the folder that contains the workspace, the simplest way to back-up a workspace is to make a copy of the workspace folder and all of its contents, including any subdirectories. To save disk space, the copy can be compressed using a tool such as *WinZip™*.

Saving Work Within the Workspace

All changes to a workspace, such as adding or deleting assets, or changes to individual assets, are written immediately to the database file. This behaviour means that there is no separate "Save" function within ReefMaster. There are advantages, and also some disadvantages, associated with not having to explicitly save work. Advantages include the reduced risk of losing work due to application crashes or power outage. A disadvantage is the inability to roll back changes made in error by reverting to a previously saved file. In order to mitigate this, most destructive actions, such as deleting track points or moving waypoints, have an *undo* facility. Be aware that this undo information is lost once the application is closed.

Creating a new Workspace

To create a new workspace, use the New Workspace button in the Main Toolbar.
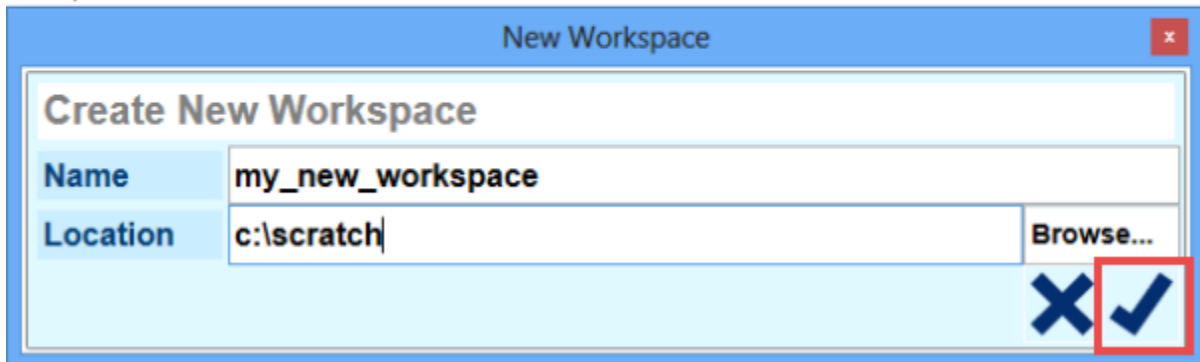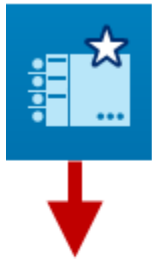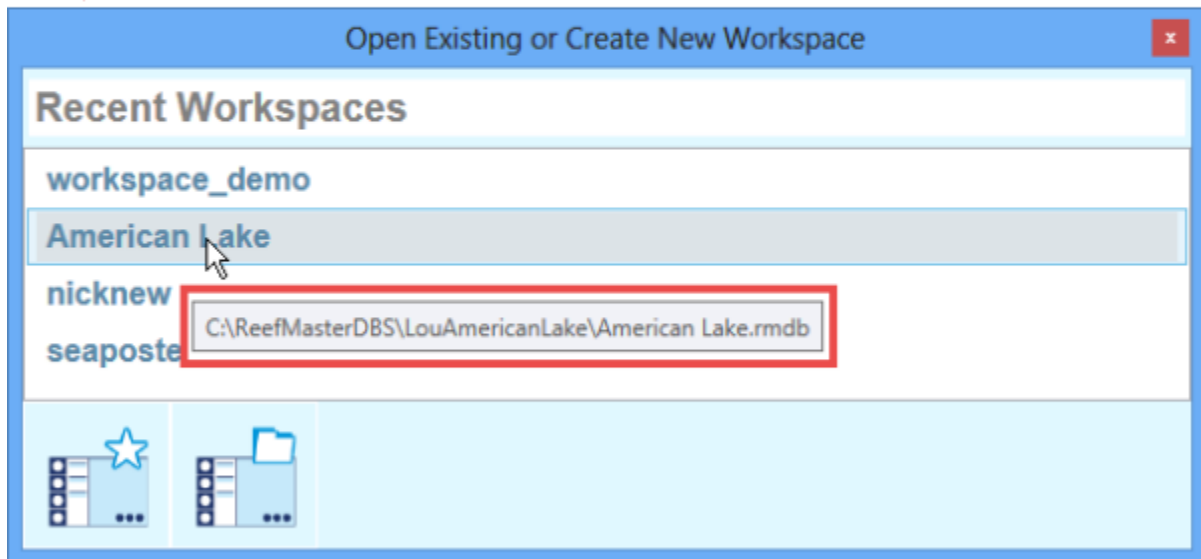
The *New Workspace* window is shown.

- Type a name for the new workspace in the Name field. Note that as the workspace name will also be the file name for the workspace folder and database file, only valid Windows file name characters are permitted as part of the name. Invalid characters will be stripped before the workspace is created.
- Select a location on disk for the new workspace, either by typing the path in by hand, or clicking the *Browse* button and selecting a folder. The path can be any location on disk with appropriate write permissions.
- Once a valid path has been selected, the *Create* button *(circled)* will become enabled. Click *create* to create the new workspace.

Opening an Existing Workspace

To open an existing workspace, use the Open Workspace button in the Main Toolbar.

The *Open or Create New Workspace* window is shown.

- To open a workspace shown in the *Recent Workspaces* list, click the workspace name. Hold the mouse pointer over a workspace name to bring up the full disk path of the workspace, which can be useful to disambiguate workspaces with the same name that are stored in different disk locations.
- To create a new workspace, use the *New Workspace* button *(1).*
- To open an existing workspace that is not shown in the recent workspaces list, click the *Browse for Workspace* button *(2)* and select the required workspace file using the open file window. Note that you must select the workspace file, with extension *rmdb*.

Application Layout
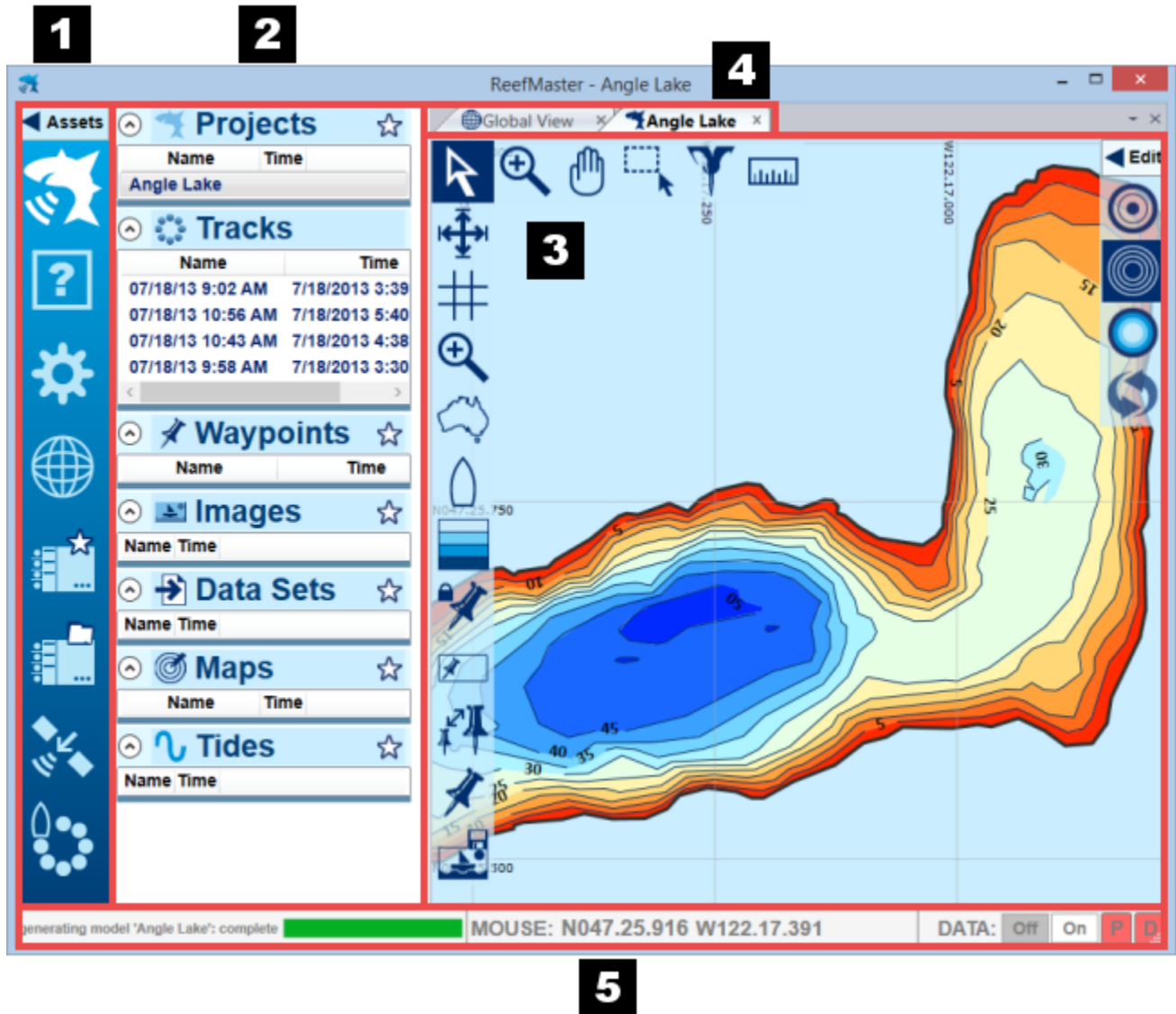
The ReefMaster application display is split into several main areas:

1. The Main Toolbar contains buttons for application-wide operations, such as the Global Settings, importing GPS data and opening or creating new workspaces.

2. The The Asset Library lists all of the workspace assets, such as tracks and waypoint sets, from where they can be opened for editing, exported to a file, deleted etc.

3. The Edit Window takes up most of the application window, and is where individual assets such as tracks and maps are edited.

4. Tab Headers
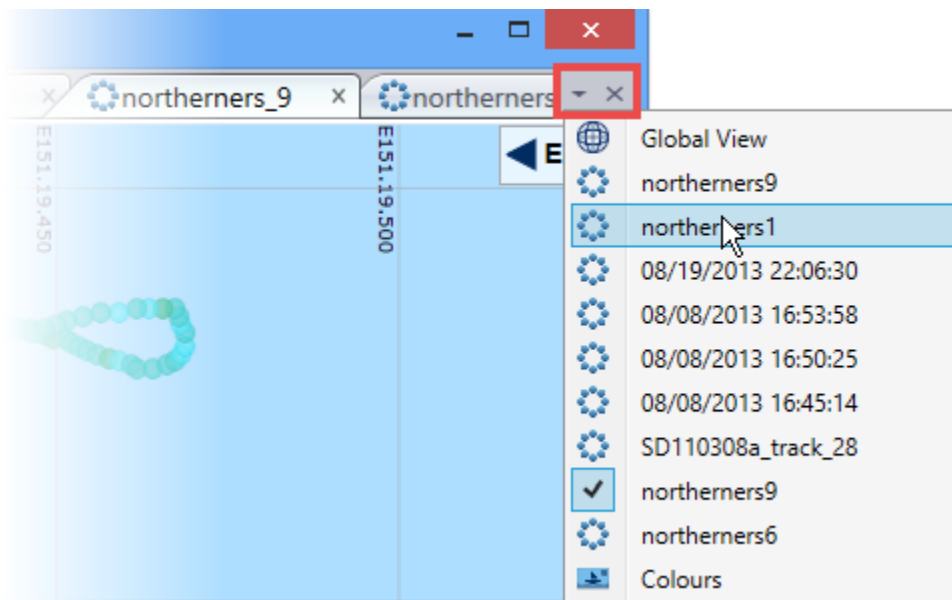
The main area of the application contains one or more *Edit Windows*, which can be selected by clicking on their *Tab Headers*. A drop-down list of all open edit windows can be displayed by clicking the downward pointing arrow at the right of the tab display. This can be useful if a large number of assets are open for editing, and the required tab cannot be seen.

Arranging Edit Windows
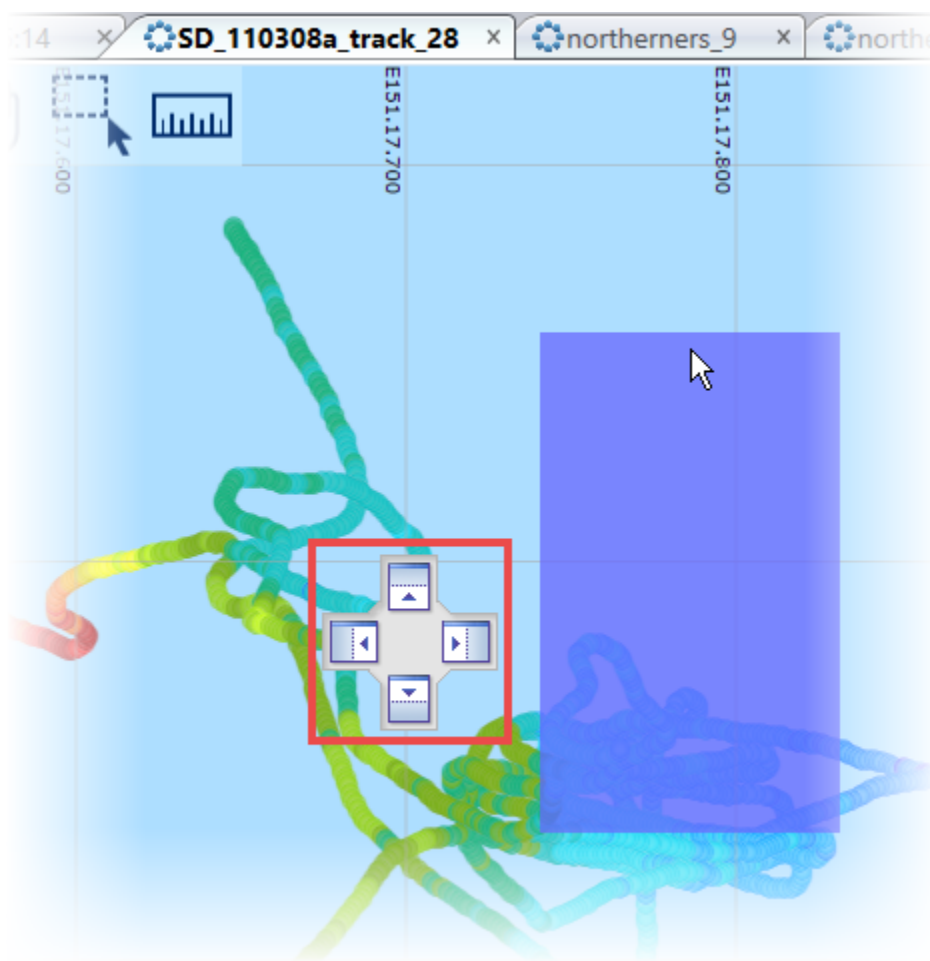
Edit windows can be arranged within the workspace so that any number of different windows can be viewed at the same time. This can be very useful in a number of situations; for example, when logging a live track whilst generating a map, the track can be viewed alongside the map project.

To arrange edit windows within the workspace, drag a window by clicking on the tab header with the left mouse-button. As the mouse is moved, a purple rectangle is shown, which represents the window being moved. A position grid appears in the middle of the current window *(circled)* which shows the possible new

positions for the window. Move the mouse pointer over the desired position, and release the mouse pointer.
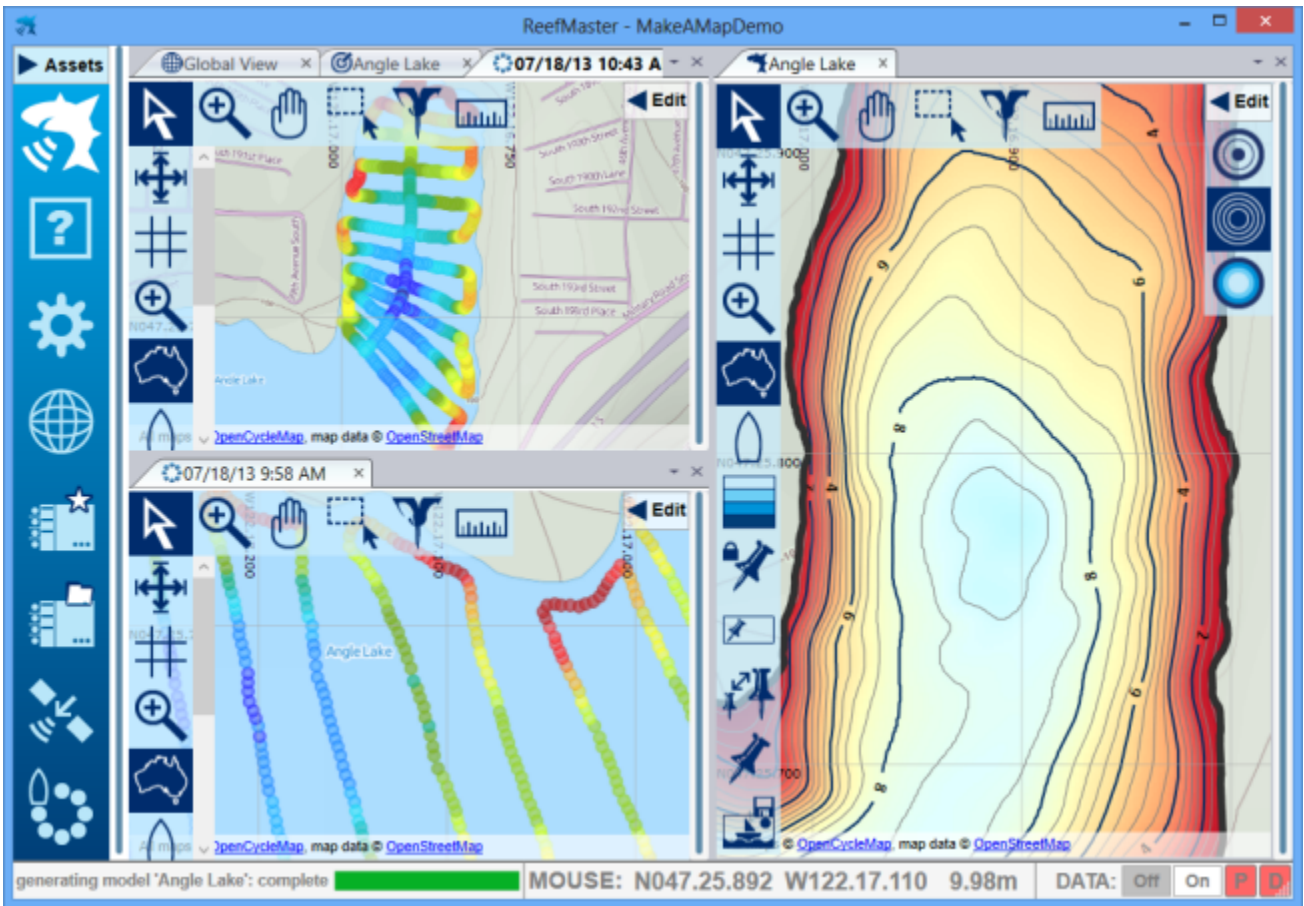
5. The Application Status Bar
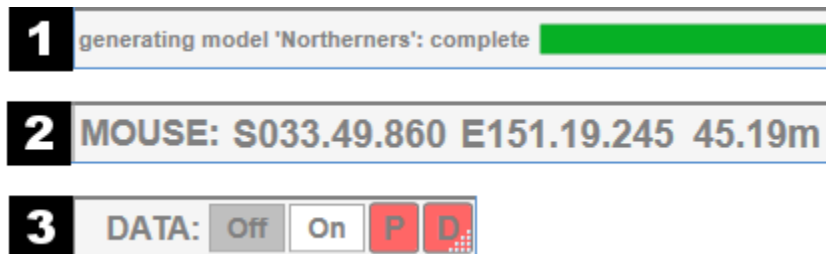
Three information panels at the bottom of the main window show update messages;

(1) Map project generation progress information shows a progress bar and a description of the current map generation stage.

(2) The mouse cursor position in latitude/longitude and also, when available, the depth at the mouse cursor position.

(3) The status of the Live Data connection. The live data connection can be started or stopped using the *On* and *Off* buttons. If no live data connections have been configured, then clicking the *On* button will open the *Live Data Configuration* window.

The Main Toolbar

The Main Toolbar contains buttons for core application functions such as creating or opening a workspace and importing data from a GPS device.

1. Assets
Show or hide the Asset Library.

2. About
Show the *About ReefMaster* information window. If the application is registered, this window also shows details of the activation key.

3. Show Help
Show this help file.

4. Settings
Show the Global Settings window.

5. Global View
Show the Global View.

6. New Workspace
Create a new workspace. The *New Workspace* window will open, where a new workspace name and location is entered. The current workspace is closed if a new workspace is created. See The Workspace.

7. Open Workspace
Open another workspace. A file browsing window will open, from which a workspace file can be selected. The current workspace is closed if a new workspace is opened. See The Workspace.

8. Import GPS Assets

Open the Import GPS Assets window, to select files containing waypoints and/or track-logs for import into ReefMaster.

9. Log Live Track
Create a new track and start logging data to the track from a live NMEA 0183 connection. See Live Data.

The Asset Library

The Asset Library lists all assets in the workspace - Projects, Tracks, Waypoint Sets, Images, User Maps, Data Sets and Background Images.
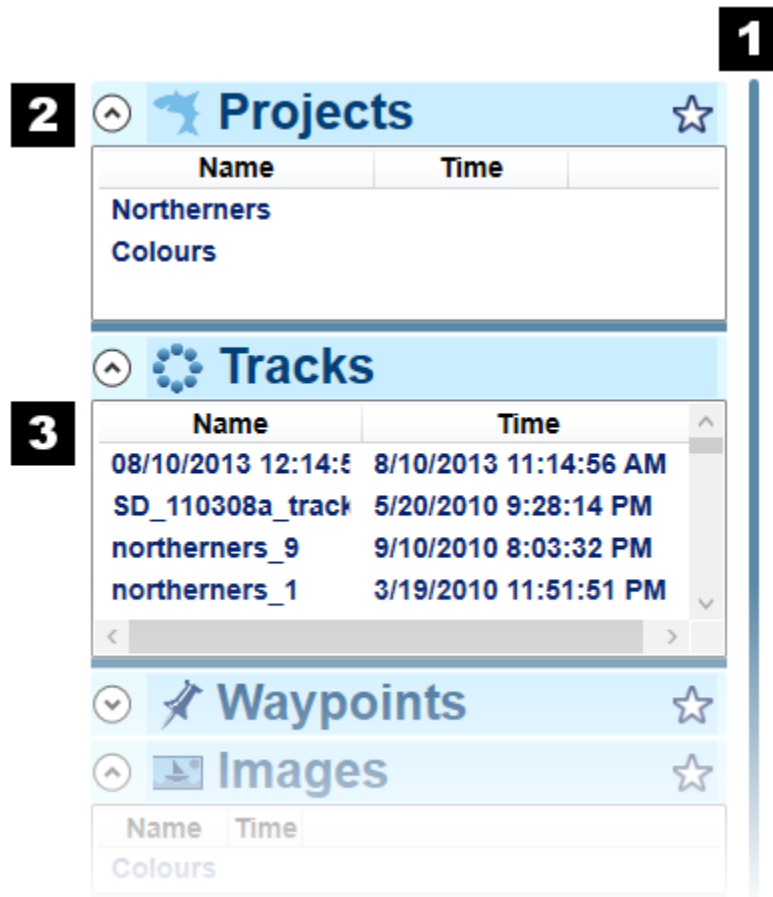
The *Asset Library* contains a separate list for each asset type, from where an asset can be opened for editing, viewing, and other operations. See Assets and Asset Types for an introduction to the data types supported by ReefMaster.

The asset library can be shown or hidden using the *Assets* toggle button at the top of the Main Toolbar. When visible, the asset library can be resized using the sizing bar, *(1)*.

2. Asset Type Header

Each asset list has has a header, which can be be used to show or hide the list, or create a new asset.

(1) Expand or hide the list of assets by clicking anywhere in the asset header.

(2) The icon and name of the asset type

(3) New Asset
For all asset types that can be created by ReefMaster - all asset types except track - this button creates a new, empty asset of the appropriate type. The new asset is opened for editing after being created.

3. Asset List
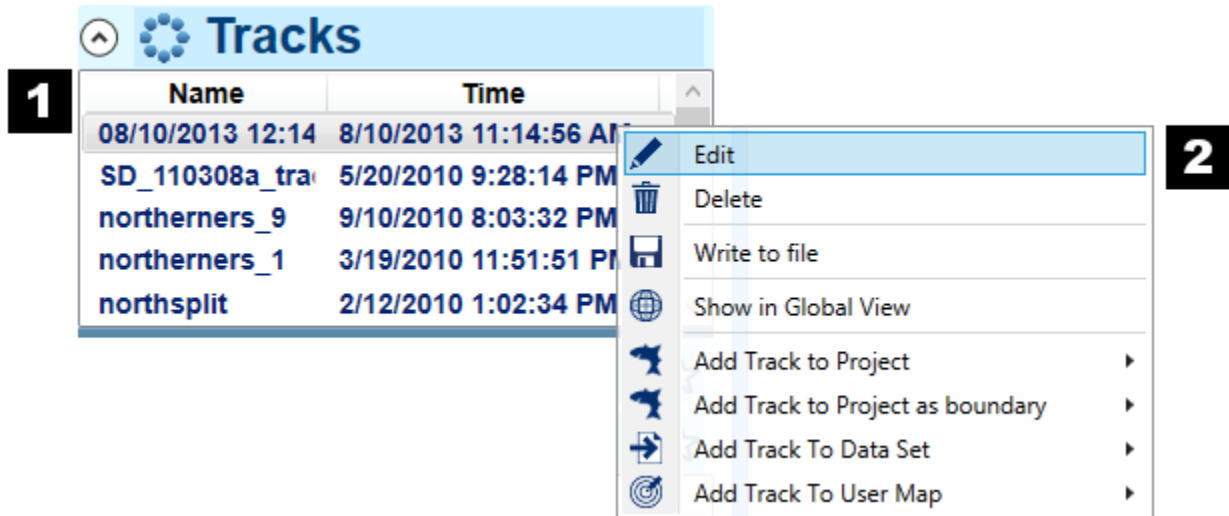
- Assets are shown in a scrollable list, which can be sorted by either name or time by clicking once in the appropriate column header.
- Assets can be selected by single-clicking with the mouse, or using the cursor keys.
- Multiple assets can be selected by use of the control or shift keys in conjunction with the mouse or the cursor keys. Note that only assets of a single type can be selected together.
- Assets can be opened for editing by double-clicking.

(1) Assets are listed by name and, where applicable, time.
The time is the start time of the asset; for tracks, the time of the first track point, and for waypoint collections, the time of the earliest waypoint.
Assets can be sorted by either field simply by clicking on the appropriate column header. Click again to reverse the sort order.

(2) Most operations on an asset can be carried out via the *Context Menu* which can be opened by using the right mouse button. The contents of the context menu vary depending on the type of asset that is selected, and on the number of assets that are currently selected.
Options that are common to most assets;

Edit
Open the selected asset(s) for editing. If an edit window is already open for the selected asset, it is brought to the front of the open edit windows in the edit area.

Delete
Delete the selected asset(s). The asset(s) are deleted from the database, and links to them are removed from any other assets of which they may be a part. For example, if a track is part of a project, the track is removed from that project before being deleted.

Note that the delete asset function cannot be undone. A warning window is shown before the assets are deleted.

Write to File
Export the asset(s) to file. The Export to GPS Window is opened, and populated with the selected assets.
Note that since only assets of a single type can be selected together in the asset library, exports containing different asset types (e.g. waypoints and tracks) must be originated some other way; either by using a Data Set or by selecting assets graphically in the Global View.

Show in Global View
Opens the global view, if required, and zooms and pans the global view so that the selected asset can be seen in the centre of the window. This option is not available for all asset types.

Other options available in the context menu are asset-type specific. Further information is available in the pages on the individual asset types.
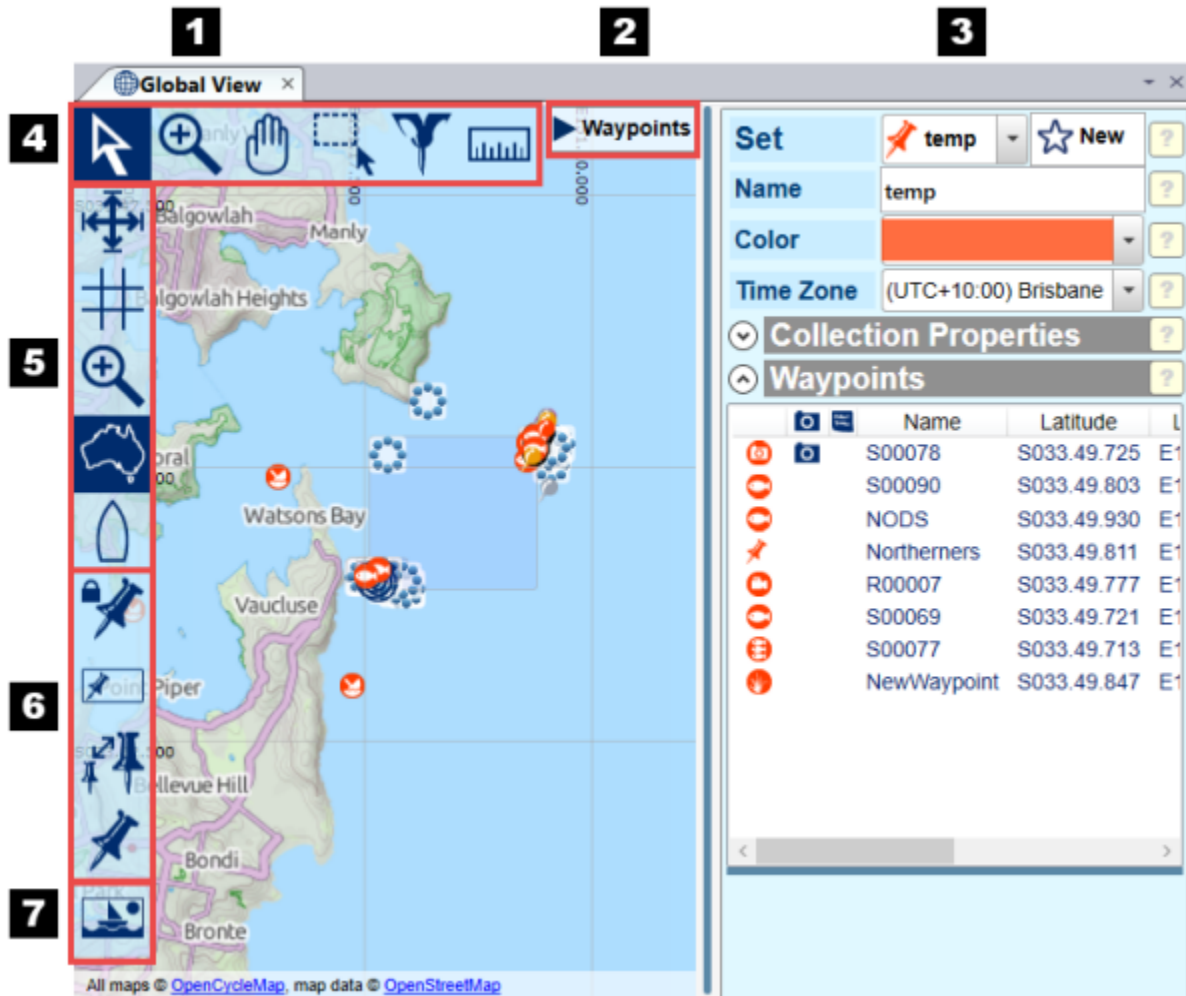
The Edit Window

Edit Windows are where individual assets, such as Tracks, Projects and User Maps, are viewed and edited.

Example Edit Window - Global View

All edit windows share the same basic layout, with different display and editing options available for different asset types.

The main area within an edit window contains a graphical representation of the asset(s) to be edited.
This area can be zoomed (using the mouse wheel, or one of the zoom tools), and panned (using the mouse in *Pan* mode).

Toolbars for selecting the mouse mode *(4)* and selecting display options *(5, 6, 7)* are displayed at the top-left, and left of the screen respectively.
For most asset types, an *Edit Pane*, with further edit controls and properties, is present at the right of the window; expand the edit pane using the toggle button at the top right of the main edit area *(2)*.

1. Edit Window Tab
Tab shows the icon of the edit window asset type, the asset name ("Global View" in the above example) and a *Close* button. Individual edit windows can be arranged by dragging the tab to a new position; see Application Layout.

Note that all edit updates to assets are saved as they occur, so changes do not need to be explicitly saved before a window is closed.

2. Show Edit Pane Button

The edit pane can be shown or hidden using the toggle button shown at the top-right of the edit area.

3. Edit Pane

The Edit Pane contains properties and in depth edit controls for the asset that is currently being edited.

Once expanded, the relative size of the edit pane can be adjusted by dragging the blue divider bar.
The contents of the Edit Pane varies with the type of the asset currently being edited. The image above shows the waypoints edit pane, which is part of the Global View.

4. Mouse Mode Selector Toolbar

The *mouse mode selector* toolbar is used to select what operation the left mouse button performs within the main editing area. The available options vary depending on the asset type being edited; the options shown above are common to most asset edit windows. The mouse cursor within the edit area changes to reflect the selected mode, and the selected mode is highlighted within the toolbar; in the example above, *Select* mode is active.

- The mouse wheel is always used for zooming; push the wheel forwards to zoom in, and backwards to zoom out.
- The right mouse button is used to activate a *Context Menu*. If the mouse pointer is over an asset, then an asset specific menu is shown, otherwise the *screen-level context menu* is shown.
- The view can be panned by using the middle mouse button, regardless of the currently selected mouse mode.

(1) Select
Select is the default mouse mode. In select mode, a single click of the left mouse button selects an item in the display, if the item is selectable. If an item can be edited, double-clicking the left mouse button on the item will open that item for editing.

(2) Zoom Box
A Zoom Box is used to zoom the edit area to fit a rectangular area drawn by holding the left mouse button down and dragging the mouse.

(3) Pan
In Pan mode the entire contents of the edit area can be "grabbed" and panned. Note that the view can also be panned by using the middle mouse button, regardless of the currently selected mouse mode.

(4) Region Select
The Region Select tool is used to select multiple items within the edit area. All items are selected within a rectangular region defined by holding the left mouse button down and dragging the mouse. Operations that can be performed on the selected assets vary according to the asset type(s) selected, and the type of edit window in use.

(5) Drop Waypoint
Clicking the left mouse button when in this mode drops a Waypoint at the point underneath the tip of the mouse cursor. The *Edit Waypoint* window is displayed, where further information, such as the waypoint name, can be entered.

(6) Ruler
Measure a distance between two points. Click and hold the left mouse at the start point and move the mouse

pointer to the second point; the ruler updates as the mouse is moved.

> **Notes on measuring distances**
> The measure tool measures the shortest distance between two points on a constant bearing (along a *rhumb line*). This is not the same as the shortest geographical distance (*great circle*), although the difference is not significant at the short distances typically required for measuring maps, waypoint distances etc. Another effect of this behaviour is that distances shown on the ruler tool may appear to reduce as the ruler length is increased to over half the circumference of the earth. This is because the calculated distance is the shortest distance between the two points, and becomes shorter going the other way around the earth.

5. Map View Toolbar

The *Map View Toolbar* is present on all edit windows, and provides options for controlling how the map area is displayed.

(1) Fit Window
Zoom the display area to fit the geographical extent of the asset being edited.

(2) Show Grid Lines
Show or hide the map grid lines, and vary the frequency of the lines. A slider is shown when this button is pressed. Moving the slider to the right increases the density of grid lines shown on the map. Moving the slider all the way to the left removes the grid lines entirely.

(3) Zoom
Another way of zooming the map. A slider is shown; moving the slider to the right increases the zoom level, whilst moving the slider to the left zooms out. Zooming using the zoom slider is centred on the middle of the edit area.

(4) Show Background Map
Show or hide the background map using the *Show Background Map* toggle button. The map which is shown is selected in Global Settings.

(5) Show Boat Position
When connected to an NMEA 0183 data source that provides GPS position and sounder depth data, boat position and a data overlay panel containing position and depth can be configured using this option. See Live Data.

6. Waypoints Toolbar

The *Waypoints Toolbar* is used to configure which waypoints are displayed in the current view, and how they are displayed. The waypoints toolbar is present in all edit windows. See also Waypoints and Waypoint Sets.
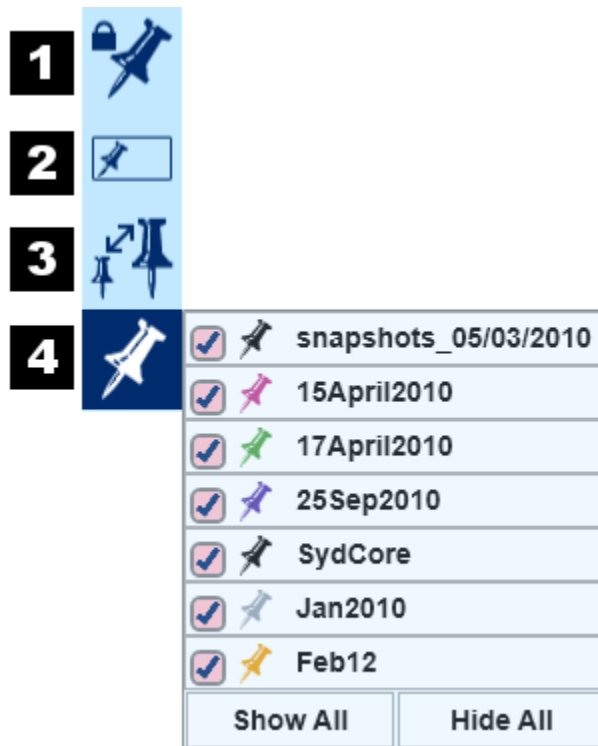
(1) Lock or Unlock Waypoints
Locking waypoints prevents them from being dragged by the mouse (when using the Select tool), which is useful to prevent accidentally moving waypoints. Use the Lock or Unlock Waypoints button to toggle the waypoint lock; the icon will change to an unlocked padlock when waypoints are unlocked.
Waypoints are locked by default; a large padlock is superimposed on the edit area when trying to drag a locked waypoint.

(2) Show or Hide Labels
Show or hide waypoint name labels using the Show Labels toggle button. Note that display performance can be reduced if a very large number of waypoint labels is shown on screen.

(3) Waypoint Size
Waypoints can be shown in two sizes; large and small. Use the Waypoint Size toggle button to switch between the two.

(4) Show or Hide Waypoint Sets
Toggle the display of individual waypoint sets within the edit area. A list of avaiable waypoint sets is shown when the Show or Hide Waypoint Sets button is pressed. Toggle the display of individual waypoint sets individually using the check-boxes shown next to each waypoint set. Use the Show All or Hide All buttons to show or hide all waypoints.

7. Background Images Toolbar
The *Background Images Toolbar* is used to toggle the visibility and adjust the transparency of images within the current edit area. See also Background Images.

When the Show or Hide Images button is pressed, a list of all available images is shown.

- Image visibility can be toggled for individual images using the check-boxes adjacent to each image, or for all images using the Show All or Hide All buttons.
- The opacity of individual images can be changed using the Opacity slider shown to the right of the

image name.

The Context Menu
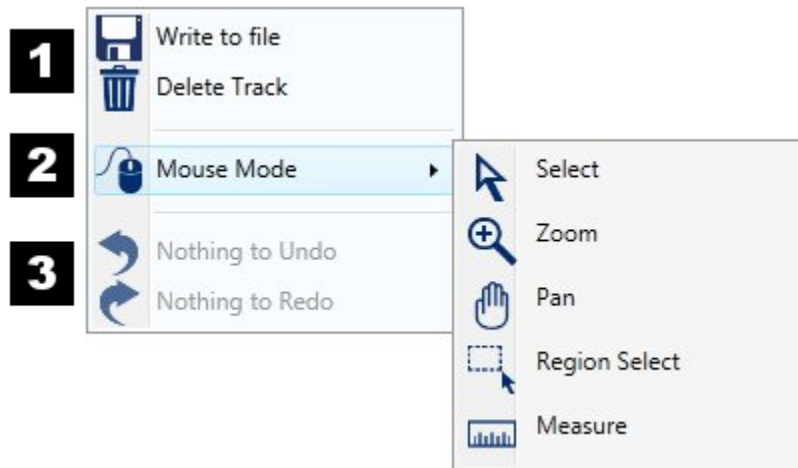
The *screen-level context menu* can be activated using the right mouse button whilst the mouse pointer is held over open space in the graphical edit area; i.e., the pointer is not held over an asset. Different asset edit windows have different options available in their context menus, with some operations common to most asset types.

The example image above shows the screen-level context menu for the track edit window, whose options are common to most asset types;

(1) Export or Delete the current asset
Export or delete the current asset (a warning window is shown).

(2) Select mouse mode
The options are the same as those in the *mouse-mode selector toolbar*.

(3) Undo or Redo a recent edit operation
Asset specific undo or redo of edit operations. Note that not all edit operations can be undone.
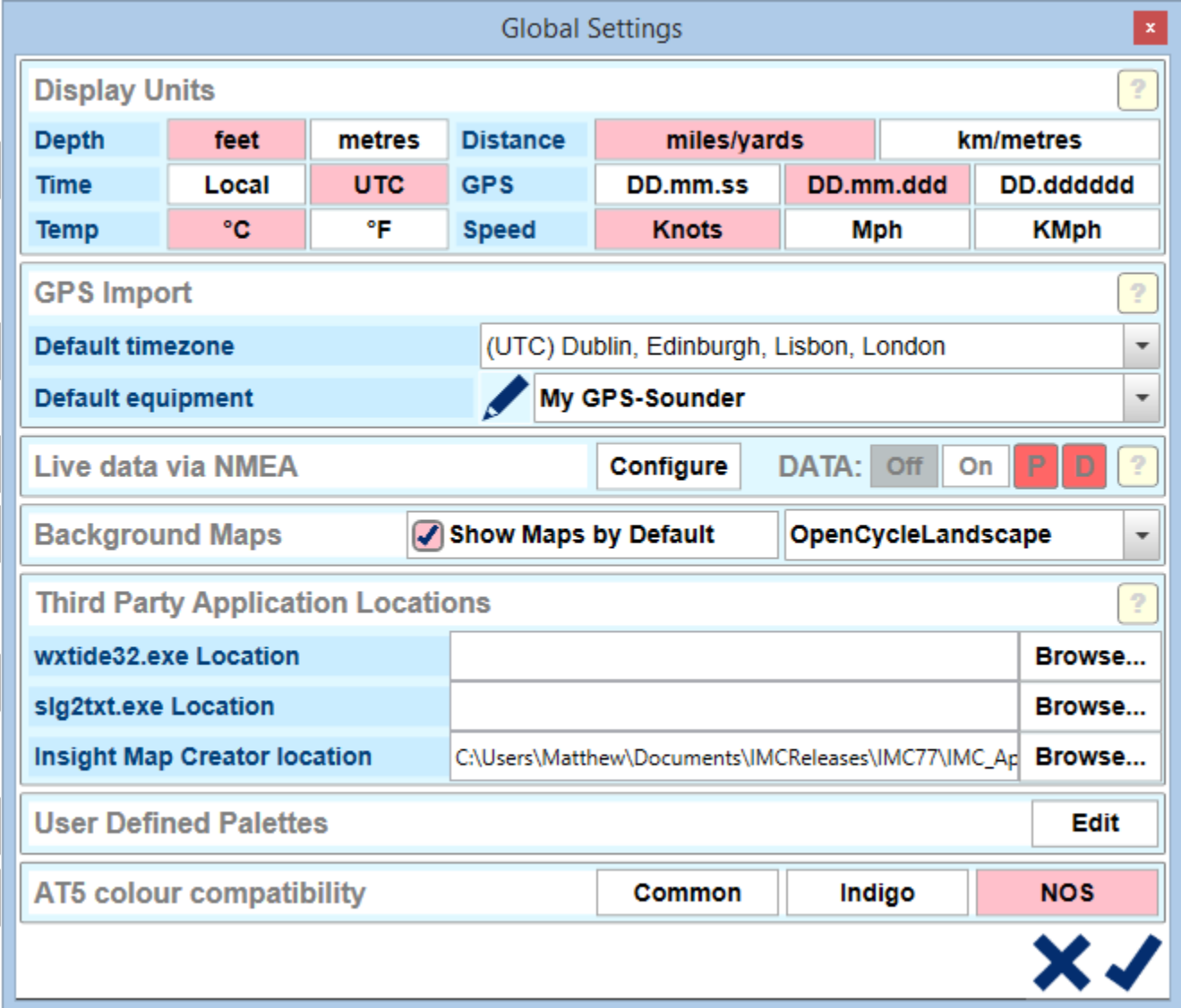
Keyboard Shortcuts

- Edit windows can be zoomed by using the + or - minus keys. Hold down the CTRL key in conjunction with the + or - key to increase the zoom amount.
- Edit windows can be panned by using the arrow keys. Hold down the CTRL key in conjunction with an arrow key to increase the speed of the pan.

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The Global Settings Window

Application-wide configuration and display settings.

Open the Global Settings window using the *Global Settings* button on the Main Toolbar.

The Global Settings window contains options for for settings that are applied application-wide, such as depth and distance units, import defaults and map settings.

1. Display Units

Display Units settings determine how values are displayed within the ReefMaster application.

Depth and Distance

Depth and distance can be shown in imperial/US measurements, which shows feet for depth and miles/yards for distance, or metric, with metres for depth and kilometres/metres for distance.

The choice of depth units affects the contour line spacings that are generated in map projects; contour lines are generated on natural boundaries of the selected unit, for example 3 feet or 1 metre. Changing the depth unit in use will cause contour lines for existing map projects to be regenerated.

GPS Coordinates

GPS coordinates can be shown in one of three formats:

- Degrees, minutes, seconds *(DD.mm.ss)*
- Degrees, minutes, decimal minutes *(DD.mm.ddd)*
- Decimal degrees *(DD.dddddd)*

Note that all GPS coordinates within ReefMaster use the WGS84 datum. ReefMaster does not convert between GPS datums.

Time

Show times as Local or UTC (Universal Time Coordinated, functionally equivalent to Greenwich Mean Time). Assets are assigned a time zone which is used to calculate the local time for display. This allows different assets to maintain different time zones if required. Note that all times are stored internally as UTC and the *Show Times As..* option only changes how these times are displayed.

Temperature

Choose between Centigrade of Fahrenheit for water temperature readings.

Speed

The speed units setting affects the speed display on the *Live Data Panel* and be one of knots, Mph (miles per hour) or KMph (kilometres per hour).

2. GPS Import

Assign default values for use during the GPS Import process.

Values set here will be used by default during the import process. These values can also be changed during the import process.

Default Timezone

The default time zone that is assigned to imported GPS assets. By default, this is the time zone set in the operating system.

Default Equipment

To simplify switching source devices during import, values associated with specific GPS/Sounder devices, such as *Cone Angle* and *Keel Offset* are grouped together into a GPS Equipment Profile. Change the profile used by default during import by selecting a profile from the drop-down list box. To add a new profile, or edit an existing one, use the *Edit* button.
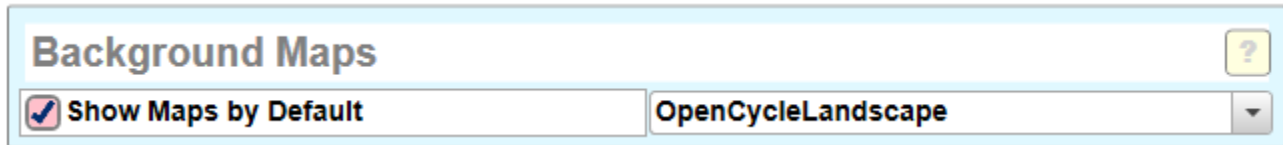
3. Live Data via NMEA

Configuration of settings required for connecting to one or more NMEA devices.
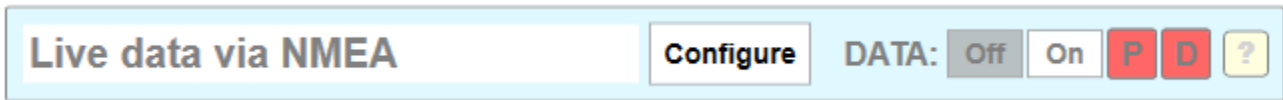
Click the *Configure* button to open the Live Data Configuration window, where settings for the live data connection, such as serial port configuration and NMEA sentences, can be configured.

4. Background Maps

Show Maps by Default

Background maps can be shown in the graphical edit windows.

Individual edit windows have the option to show or hide background maps. The *Show Maps by Default* option determines whether maps are shown or not when an edit window is first opened. Since map tiles are downloaded as required, it can be useful to uncheck this option when operating ReefMaster with reduced or zero internet connectivity.

Map Source

Map providers can be chosen from a selection in the drop-down list. Not all map providers provide maps for all locations at all zoom levels. For example, *Map Quest Ariel* provides much more detail over the continental US than for the rest of the world. Choose the map provider that provides the best results for your area of interest.

4. Third Party Applications

ReefMaster can integrate with some third party applications.

WxTide

WXTide is a free program that provides tidal predictions for much of the world. ReefMaster can use tide information from WXTide to tide adjust track-point depths. This is important for accurate mapping in tidal waters. WXTide can be installed from http://www.wxtide32.com. Once installed, locate the *WXTide32.exe* application file using the *Browse* button.

In a default installation, the application will be in directory *"C:\Program Files (x86)\WXTide32"*.

slg2txt.exe

Slg2Txt is a program provided by Lowrance™, as part of their *SonarViewer* application, that converts sonar log recording files to text files that can be imported into ReefMaster as track logs with depth information. Once SonarViewer is installed, use the *Browse* button to locate the *slg2txt.exe* application file.

In a default installation, the application will be in directory *"C:\Program Files (x86)\Lowrance Electronics\Sonar Viewer<version_number>"*.

Insight Map Creator

The *Insight Map Creator* is a free tool from Navico that processes *ESRI Shapefiles* to create maps in the AT5 format, suitable for use in Lowrance and Simrad GPS units. ReefMaster is able to run the IMC automatically so that AT5 maps can be created without having to run the IMC separately. In order to do this, the location of the installed *InsightMapCreator.exe* must be known.

The *Insight Map Creator* can be downloaded from the Navico Insight Store, on the *Insight Planner* tab.

For integration with ReefMaster, IMC v0.66 or greater must be installed.

6. User Defined Palettes

Palettes for map projects, the sonar viewer and track points can be created and edited in the Palette Editor.

7. AT5 Colour Compatibility

AT5 is a map file format used by Navico devices, which are compatible with a wide range of Lowrance and Simrad devices.

AT5 maps have a range of features and colour options that are not compatible with all units. When styling user maps or custom palettes, it can be useful to restrict the available styles to those that are compatible with the target system. In practice, this means that certain colours may be removed from the colour selection list, and the transparency option may be disabled.

Select the required compatibility from one of *Common, Indigo* or *NOS*. NOS includes transparency options and the full range of colours. Transparency options will be disabled if Indigo or Common are selected, and a smaller subset of colours is offered.

Note that this option is simply a "helper" to prevent certain styles or colours being applied to maps within ReefMaster that will result in their displaying incorrectly on older units. The compatibility setting can be changed without affecting any existing maps or palettes.

Navico device compatibility guide

- NOS - all generation Lowrance HDS, Simrad NSS and NSE units.
- Indigo - Lowrance Elite and Mark units
- Common - Lowrance LMS and LMX units.

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Tide Stations

When making maps from data gathered in tidal waters or from tracks gathered over multiple trips to lakes with varying water levels, track point depths need to be adjusted to compensate for changes in water levels. Track point depths within ReefMaster can be adjusted using either manually entered offset points, entered for each individual track (see Tracks), or through the use of a *Tide Station.*

A *Tide Station* is a collection of water level offset values, stored within ReefMaster, that can be used to offset the track-point depths of tracks within the workspace. Depth values between existing tide points are interpolated using a simple linear interpolation.

Data within a tide station must be imported from an external source; either from a comma-delimited text (CSV) file, or from the *WXTide* application.

ReefMaster does not provide tide information, nor does ReefMaster warrant that tide information imported from any suggested source is correct. Tide Station functionality within ReefMaster is simply a method of storing externally sourced tide offset data.

Lake Level Offsets

Adjusting track depths for varying lake levels typically involves using just a single depth value per track, which is most easily achieved by using a *Manual Tide Offset.* Adding a manual tide offset to a track is discussed in the Track Edit Window*.*

Creating a new Tide Station

To create a new tide station, click the *New Asset* button in the header of the *Tides* list in the Asset Library. A new tide station is created, and the *Tide Station Edit Window* is displayed.

The Tide Station Edit Window

The tide station edit window is split into two sections; tide tide display area (1) and the tide station properties panel (2).

The Tide Station Properties Panel

1. Tide Station Properties

Tide station properties contains a time-zone selection list and shows the times of the first and last offset point present in the current tide station.

The time-zone is used when displaying tides in the graphical display area, and is important when importing tide zone data from a text file, when the times within the file are local times *(see below)*.
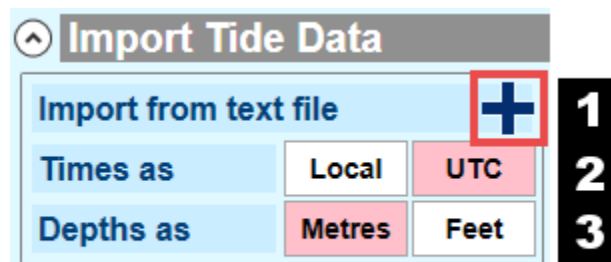
2. Import Tide Data

Tide data can be imported from comma delimited text files or the WXTide32 application.

Some principles apply whether data is imported from a text file or from WXTide:

- Tide offset data consists of a series of time-depth pairs. If, during import, a data point already exists for a specified time, it is updated with the new depth.
- Data can be mixed and matched from tide stations and data files. This can be useful for filling in missing time periods, but can also lead to errors. ReefMaster does have the capacity to warn on inconsistent tide data, it is up to the user to ensure that the data is consistent.
- If the data within a tide station needs to be updated, it is easier and safer to delete the tide station entirely and create a new one.
- The number of new or updated tide points added during an import is shown in the Status Bar once the import has completed.

Importing Tide Data from a Text File

(1) Click the *import* (+) button to import tide data from a text file. A file selector is shown, from where the required file can be chosen. The source file can have any file extension; by default, ReefMaster looks for files of type *.txt and *.csv.

(2) Times in the text file may be represented in local or UTC times. ReefMaster cannot determine this on its own, so ensure that the option is set correctly here. Note the time zone used is the time zone specified in the tide station properties, above. It is important that this is set correctly when importing tide values with local times.

(3) Depths within the text file may be in metres or feet. Set this option here.

Text File Format

```
2012-08-01 05:00:00,2.5
2012-08-01 06:00:00,2
2012-08-01 07:00:00,1.3
2012-08-01 08:00:00,0.8
2012-08-01 09:00:00,0.5
2012-08-01 10:00:00,0.6
2012-08-01 11:00:00,0.8
```

The text file must contain one pair of values per row, in the format **[TIME],[DEPTH]**.

- No units suffix to the depth values.

- The time can be represented in any standard format.
- There must be only one comma character per line.
- Lines that are incorrectly formatted are ignored.

After the import process has completed, the number of successfully imported tide values is displayed in the application status bar.

Importing Tide Data from WXTide

> **WXTide**
> *WXTide* is a free program that provides tidal predictions for many areas of the world. ReefMaster can import tide information from WXTide and save it in a tide station.
>
> WXTide can be downloaded and installed from http://www.wxtide32.com. ReefMaster needs to know the hard-disk location of the WXTide executable before it can be used. This can be done in the Global Settings or by using the *Browse* button *(2)*. In a default installation, the application will be in directory *"C:\Program Files (x86)\WXTide32"*.

(3) A list box shows all of the available tide stations in the WXTide installation. To search for a tide station, type in the search box
*(4)*. The list of tide stations adjusts automatically to match the entered search string.

(5) Specify the date range for the import using the two date fields, which refer to the start and end date of the import. Dates can either be typed in or selected using the data picker control. Note that importing long time periods of data may take a significant amount of time.

When the required settings have been set, start the import using the import button *(1)*.

The Graphical Tide Display

Tide data can be viewed in the graphical tide display.
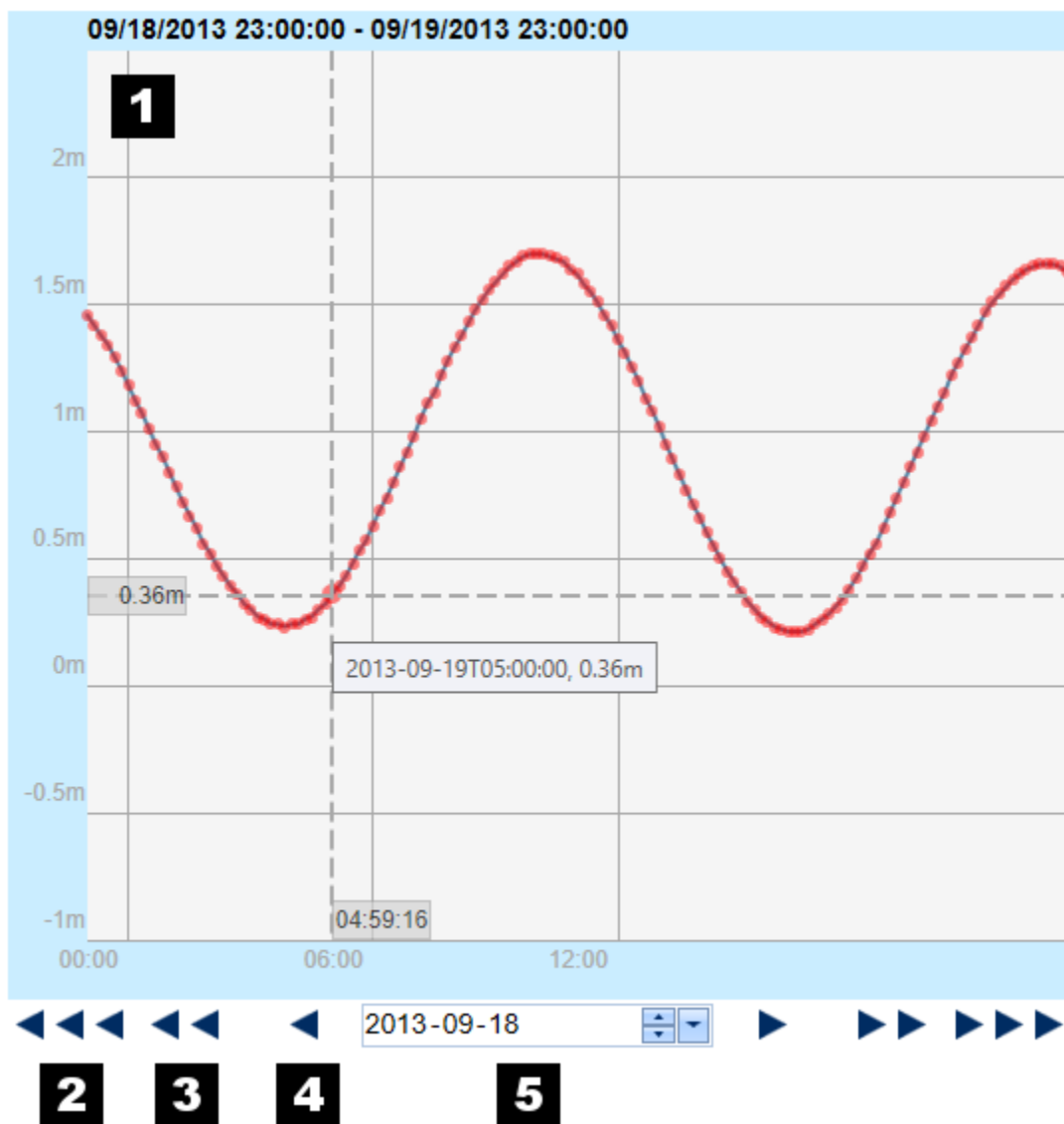
The date range of imported values is shown as a pair of read only values in the properties section.

(1) Tide data for a 24 hour period is shown in the graphical edit area. Move the mouse within the display area to show the interpolated depth value at any point in time. Hold the mouse pointer over a tide point to see the stored time and date value.

The displayed time period can be adjusted using the year *(2)*, month *(3)*, and day *(4)* arrows, or the date selector *(5)*.

User Defined Palette Editor

Palettes are used in map projects, the sonar viewer and for track points within the track editor. ReefMaster comes with a number of predefined palettes, and further palettes can be created and edited in the *palette editor.*

Opening the Palette Editor

The palette editor is accessed from the Global Settings window, by clicking the *Edit* button in the *User Defined Palettes* section.
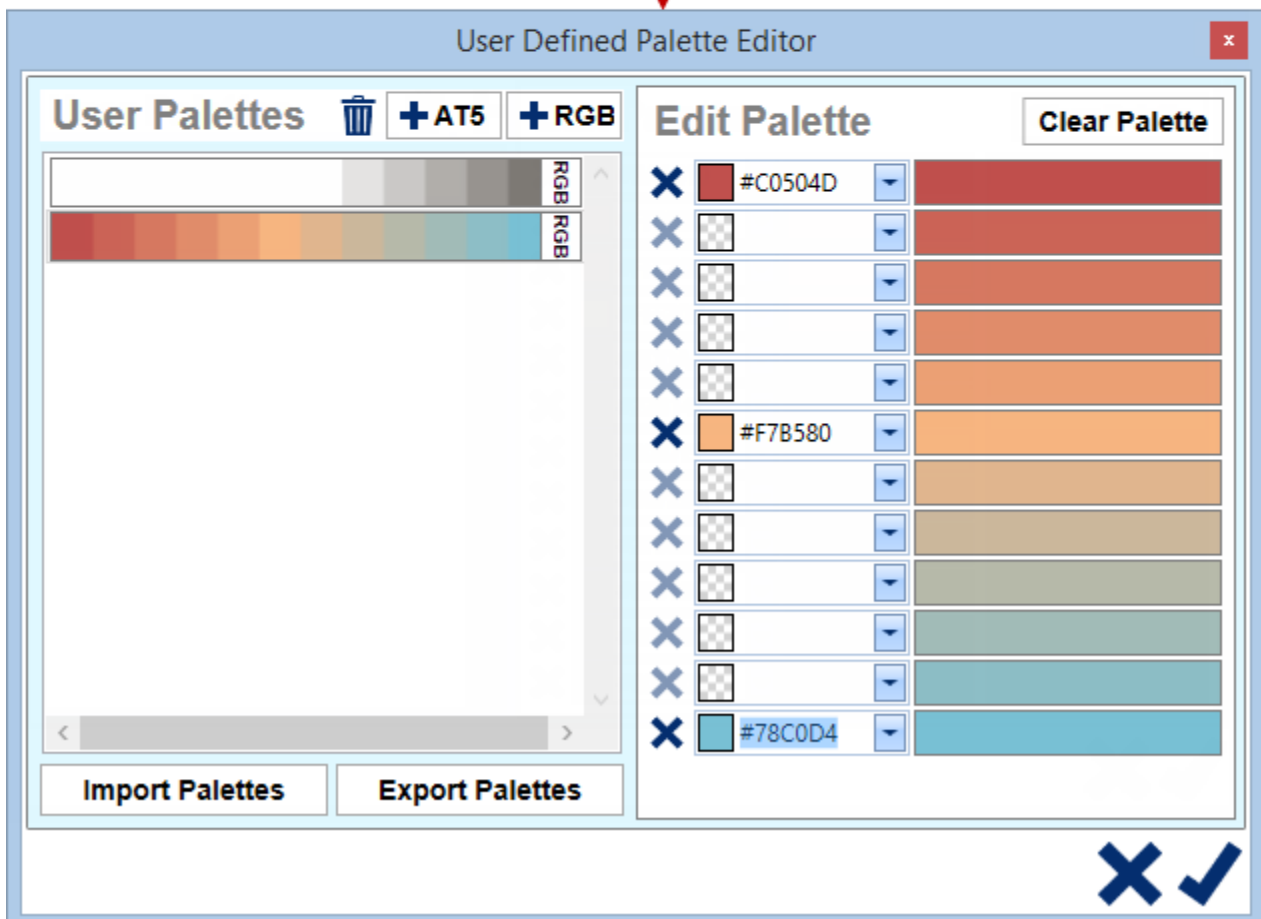
Adding and editing a new Palette

A palette is simply an ordered collection of colours, used the provide colours for track point and map project depths, and the strength of the signal return in the sonar viewer.

- ReefMaster palettes can be defined with up to twelve separate colours.
- The gaps between defined colours are interpolated for RGB palettes.
- The nearest colour is used for AT5 palettes - there is no interpolation.
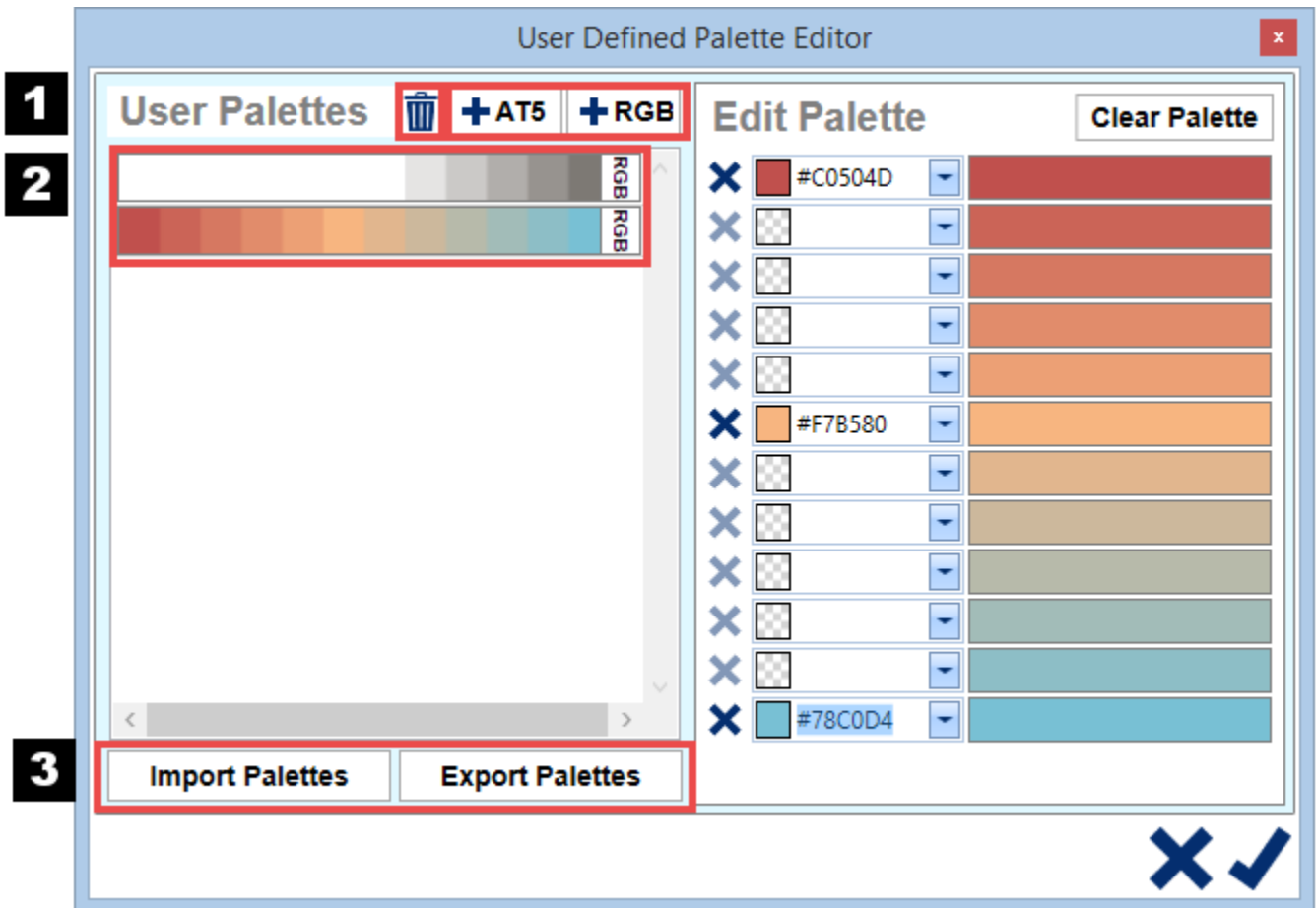
To add a new palette;
- Click one of the *Add Palette* buttons *(1)*. Palettes can be either AT5 or RGB and cannot be changed once they have been created.
- A new, empty, palette is created and added to the palette list *(2)*.

The new palette is shown in the *Edit Palette* section at the right of the window (*see below)*, with a list of empty colour slots.

To delete a palette, first select the palette in the palette list, then click *delete (1)*.

Adding colours to the palette
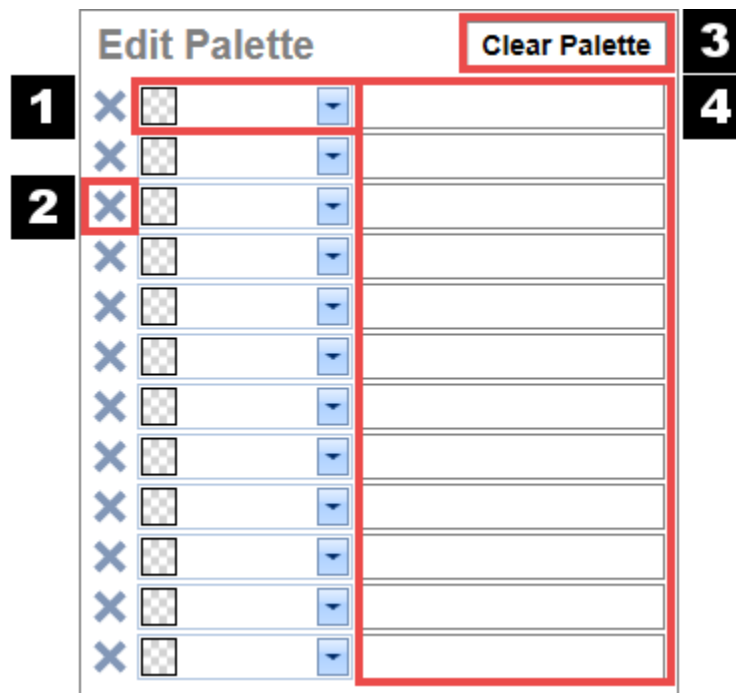
Each colour slot for the palette contains a separate colour picker control *(1)*; fill the slot with a colour by choosing a colour in the picker or, for AT5 colours, from the drop-down colour selector.

RGB Palettes

The full palette is interpolated from which ever colour slots a populated; if a single colour is populated, then the entire palette will be of that colour. To create a simple gradient from one colour to another, populate the top and bottom colour slots with the required colours.

AT5 Palettes

AT5 palettes do not interpolate between specified colours. Instead, the last colour is repeated until the next colour is encountered.

To clear a colour from the palette, use the *clear* button *(2)*. The whole palette can be cleared by clicking the *Clear Palette* button *(3)*.

The appearance of the interpolated palette is shown to the right of the edit area *(4)*.

Once the palette is complete, click the save button. Empty colour slots will be filled with interpolated colour values.

Exporting and Importing Palettes

User defined palettes can be saved to file, so that they can be moved between different ReefMaster installations or shared with other users.

To export all user palettes, click *Export Palettes (3, in image above)* and specify a filename in the file save dialog. All user palettes will be saved.

To import palettes, click *Import Palettes* and locate the required palette file, which will have the file extension *.rmpxml*. All palettes within the file will be imported.
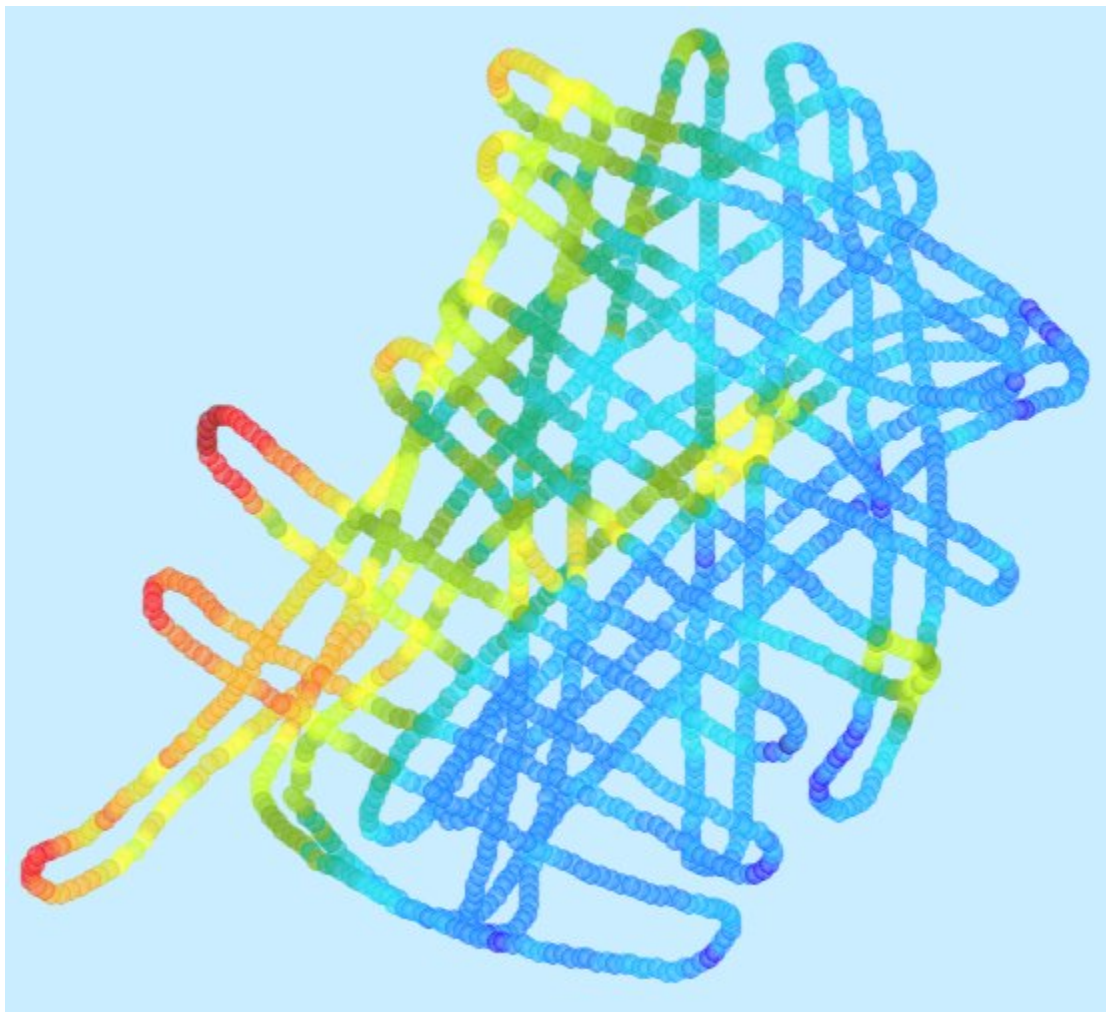
Collecting Track Log Data on your GPS Unit

Track-log data is collected on a GPS/Sonar unit and forms the basis of the 3D maps that ReefMaster generates.

General Principles

Track-logs consists of a series of *track-points*, each of which contains a depth and a location. With enough track-points in an area, ReefMaster can generate an accurate 3D model of the sea or lake bed.

Over time, simply collecting track-log data as you fish an area can provide enough information to build up a very detailed map - especially if most of your fishing is done on the move. However it can be useful in the first instance to be more methodical in your approach to mapping, traversing a grid pattern over the area of interest to collect enough data to create a basic map of the area.

- When creating the grid-lines, try to approach each area from more than one direction, which helps with resolving features of different orientations. The example image demonstrates this, showing a single track with three sets of parallels.
- Consider the maximum interpolation distance in a Map Project when deciding how far apart to space your tracks. Although ReefMaster can interpolate depths between track-points up to 100m apart, interpolating over such a large distance can give rise to very significant inaccuracies in the final map. Unless the topography of the lake or sea bottom is very flat and featureless, grid lines should be kept as close together as is practical; somewhere between 25-50m is a reasonable starting point. In shallow

water with many features, even closer tracks may be required. Consider that the average transducer, with a cone-angle of 20 degrees, covers an area that is about as wide as one third of the depth. Anything interpolated outside of this range is, to some extent, "guesswork".

Collecting Track Log Data on a Humminbird GPS Unit

Logging Sonar Data

The preferred source of Humminbird data for import into ReefMaster is logged sonar data. Sonar logs provide explicit time information for track-points which is important when tide adjusting track data.

- Ensure that you have a memory card with sufficient free space inserted into your Humminbird unit.
- On arrival at your area of interest, select the option *start recording* to start logging data.
- Record the data. This step might simply involve drifting and fishing for a few hours, or maybe a more systematic approach if you are mapping out a new area.
- Stop recording when you are done mapping an area.

Recorded sonar data is stored on the card in the *RECORD* directory. To import Humminbird a sonar log file into ReefMaster, select the *RNNNNN.DAT* file.

Humminbird Tracks

Humminbird units save depth information as part of the breadcrumb trail that is continuously produced when the unit is in use. This means that the unit is always generating usable track-log data.

> **Depth data in the Humminbird *current track***
> Many older Humminbird units have a bug whereby they stop recording depth data once the current track has filled. The *current track* is the track that is currently being recorded, and has a limit of some 21000 track-points. Once this limit has been exceeded, the track begins to get overwritten from the beginning and, in units that exhibit this bug, all depth data is lost. The simple workaround to this problem is to ensure that you start a fresh track for every new track-log by clearing the current track, and to never exceed the maximum number of track-points in a single track (with even the minimum 1 second track-point interval set, this still allows for nearly 6 hours of data per track).

Track-point Time Interval and Minimum Distance

The time interval between saved track-points is configurable on the GPS unit, down to a minimum of 1 second. A minimum distance is also applied, which means that a new track-point will not be saved if the vessel has not moved more than this minimum distance since the last saved track-point. Set the minimum distance to the smallest setting, to collect the largest amount of data. When setting the track-point time spacing, it is important to remember that ReefMaster calculates the time of Humminbird generated track-points using the track-point time interval. The time is important when applying water height offsets in tidal waterways. If the track-point time interval is set low (eg, 1 second), and the vessel is moving slowly (for example, drifting and fishing), the Humminbird unit may fail to write a track-point because the vessel has not moved more than the minimum specified distance from the last track-point within the time interval. The calculated time of track-points will become increasingly less accurate, the more track points are missed in this way.

Logging track data

- Check your device settings for *Trackpoint Interval* and *Track Min Distance*, which can be found in the *Navigation Menu Tab**.
- Set *Track Min Distance* to the lowest setting. A lower track point interval will give you more data, but remember that track points are not saved unless the *Track Min Distance* has also been moved. Bear in mind the speed that you will be traversing the area of interest and try to set the track point interval such that you will have moved the minimum distance during that period of time. This minimises the drift in time track point time calculations, which makes for more accurate tide adjustment. For example, if you are planning to drift and fish in light winds, use a higher trackpoint interval than you would if trolling at a steady 5 knots.
- Clear the current track on arrival at your area of interest. If you want to retain data in the current track, Save the current track before clearing it.

- Note the start time of the track, or take a waypoint. Taking a waypoint to record the start time of the track can be useful to confirm that the track start time that ReefMaster calculates using the Trackpoint Interval is accurate. The track start time can then be overridden in ReefMaster if required.
- Record the data. This step might simply involve drifting and fishing for a few hours, or maybe a more systematic approach if you are mapping out a new area.
- Once you have finished recording data, save the current track.
- Record multiple, short tracks. If recording for a long period of time in tidal waters, consider saving the data as multiple, shorter tracks - say, one per hour or so. This helps minimize timing errors for tide adjustment. Simply save the current track, then clear the current track and carry on recording.
- Transfer the data. At the end of the day, transfer the data onto a memory card so that it can be uploaded to ReefMaster. Choose the option *Export All Nav Data* from the Navigation Menu Tab*.

* The precise names and menu locations of settings varies by unit. Consult the documentation that came with your Humminbird device.

Collecting Track Log Data on a Lowrance GPS Unit

Lowrance units do not save depth information in their breadcrumb trails, so depth information has to be extracted from saved sonar log files.
Most Lowrance units can record sonar log files in a choice of two different file formats; *SLG* and *SL2.* The *SL2* file format is the more modern format, and has the capacity to record more than one channel of sonar simultaneously. SL2 files are the format of choice when collecting sonar log data for use in ReefMaster.

Track Start Time
If recording data in tidal waters, it is important that track points are assigned the correct time.Time information for individual track points is stored as an offset from the beginning of the recording. For this reason, it is important that the start time of the track is correct. ReefMaster uses the *last modified time* of the sonar log file as the end time of the track, and calculates the start time by subtracting the sum of the track point time offsets. It can be useful to note the start time of each sonar log, so that the start time of the track can be overridden in ReefMaster if required.

- On arrival at your area of interest, select the option *start recording sonar* to start logging data.
- Note the start time of the track, or take a waypoint. Taking a waypoint to record the start time of the track can be useful to confirm that the track start time that ReefMaster calculates using the individual track point offsets is accurate. The track start time can then be overridden in ReefMaster if required.
- Record the data. This step might simply involve drifting and fishing for a few hours, or maybe a more systematic approach if you are mapping out a new area.
- Stop recording when you are done mapping an area.
- The sonar log data can be read from the memory card by ReefMaster. To transfer waypoints, follow the manufacturers instructions for transfer to a memory card. Use only USR versions 2 or 3, or GPX as file format options when transferring waypoints for use in ReefMaster.
- Do not use the *Low Quality* setting for SLG files if you wish to view the track using the sonar viewer, or for bottom composition.

Logging Live Data

ReefMaster can create tracks in real-time by logging position and depth data via an NMEA 0183 data connection. Many units from a wide range of different manufacturers are able to output the required NMEA data, opening up a wide range of possible sources for ReefMaster data. See Live Data.

GPS Data Sources and File Types

A list of supported file types and how to import them into ReefMaster.

See also Collecting Track Log Data on your GPS Unit.

Transferring Data From a GPS Device

Before data can be imported into ReefMaster it must first be transferred from the source device.
The most common method of transferring data from a physical GPS/Sounder device is via a Memory Card.

- Consult the documentation that came with your GPS device for information on how to transfer data onto a memory card. For later model Humminbird units, for example, there is an option *Export All Nav Data* which transfers all saved tracks and waypoints.

- Once data is has been transferred onto a memory card, the card should be connected to the PC that is running ReefMaster. Although the data can be imported directly into ReefMaster from a connected memory card, it is recommended that data is first transferred to the hard-disk on the PC, where it can be stored, and is available for re-import to ReefMaster if required.

- If the file type of the data from the GPS unit is not directly supported by ReefMaster, it must be converted into a format that is. For example, native Garmin data must be converted to the GPX format using a Garmin software package.

Supported File Types

ReefMaster is able to read a range of file types containing track and waypoint data.

Sonar Log Files

- Sonar log files contain latitude, longitude, depth and time information for each track point, as well as the raw sonar data from each sonar ping and, often, further information such as water temperature, boat speed and course. As sonar log files contain so much more information than GPS track files, they are the preferred source of data when creating maps.
- As track points imported from sonar log files contain explicit time information, the Equipment Profile option *Regular Trackpoint Interval* is ignored during the import process for these file types.
- Consult your GPS/sounder unit documentation for information on how to record sonar log files.

Humminbird™ Sonar Logs
Humminbird units log sonar to data files within a directory named *RECORD*. Within this directory there is a *.DAT* file for each sonar recording that has been made, along with a sub-directory of the same name, which contains the actual sonar recording files.
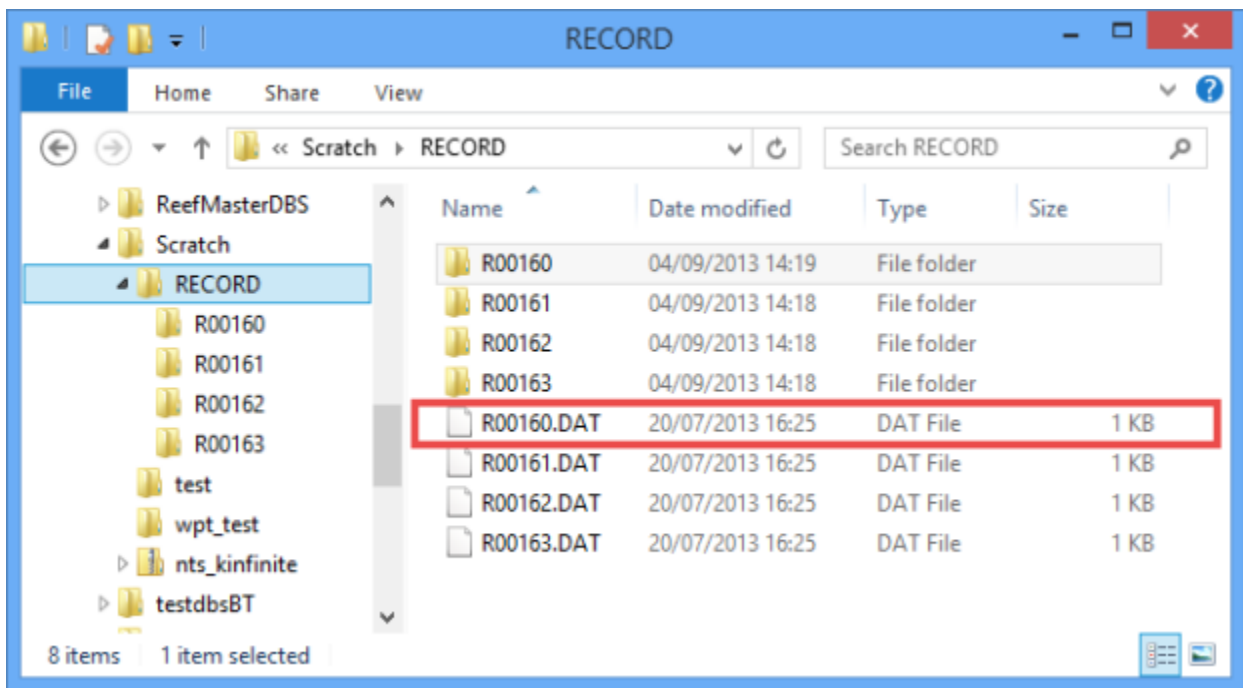
For example, a recording named *R00160* will have a file named *R00160.DAT* and a sub-directory named *R00160*. The sub-directory contains a series of *.SON* sonar log files, one for each recorded sonar channel. On a side imaging unit, for example, you might find four .SON files named *B0000.SON* through *B003.SON*. Typically, the zero numbered file contains 83khz data, number one contains 200khz data and two and three hold the left and right channels of the side imaging data. ReefMaster only imports data from the 200khz channel.
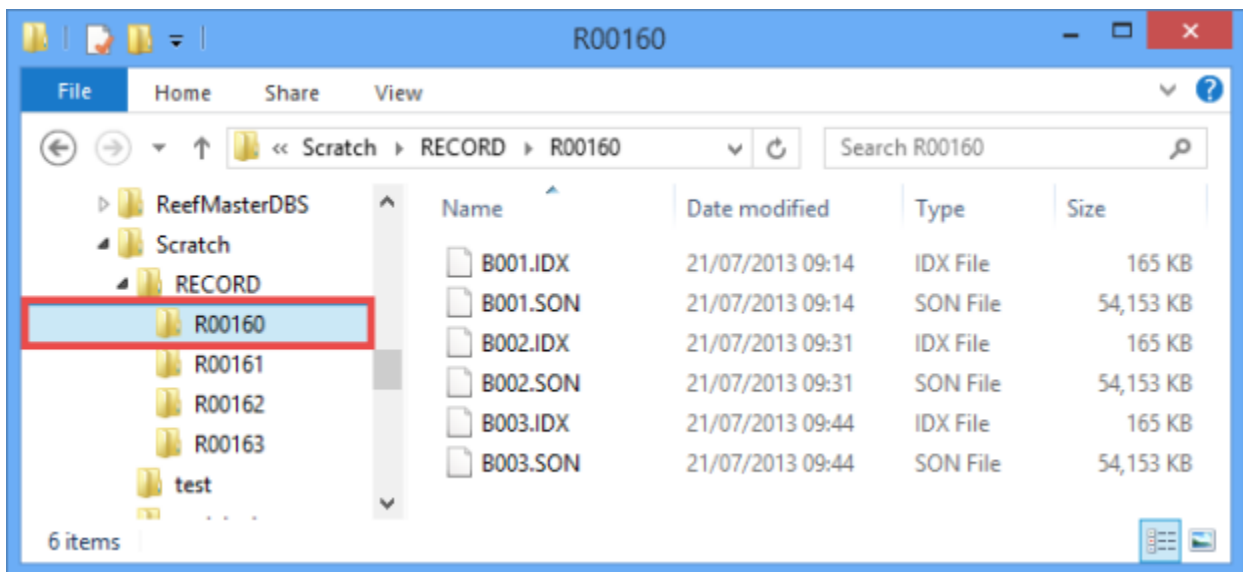
- To import a Humminbird sonar log, select the .DAT file in the RECORD directory. ReefMaster will locate and load the appropriate .SON file.

Note that older (pre v4.x) versions of the Humminbird sonar log file format do not contain depth information and are not supported by ReefMaster.

Lowrance™ Sonar Logs (.SLG and .SL2) Files
Lowrance™ units do not save depth information with track logs, so sonar logs must be used to provide the depth information required for mapping.

Lowrance units log sonar in one of two file formats; *SLG and SL2. The SL2 file format is the preferred option for use with ReefMaster.*

SLG Files
SLG files contain sonar pings for a single channel of sonar. When logging sonar on the Lowrance device, you

must specify which channel to record. The preference for ReefMaster import is the highest frequency channel. For example, if using a dual frequency sonar with 83khz and 200hkz channels, choose 200khz.

SL2 Files
SL2 files can contain sonar pings for more than one channel, and may also include side-scan data. SL2 files are the preferred choice when logging data for use in ReefMaster.

ReefMaster can import both SLG and SL2 files directly, and is also able to import files generated with the Lowrance™ utility *slg2txt.exe*. If Lowrance sonar logs are not imported correctly by ReefMaster, try installing slg2txt and checking the option *Use slg2txt* in the current Equipment Profile. This will force ReefMaster to use the Lowrance utility when importing Lowrance sonar log files.

NMEA Log Files

Text files containing logs of NMEA 1083 messages, with the extensions *.txt* or *.log,* can be imported as tracks. Position and depth messages must be contained within the same file, as NMEA depth messages do not contain time information and it is therefore not possible to interleave log files from separate NMEA devices after they have been recorded.

ReefMaster can obtain information from position messages RMC, GGA and GLL, heading messages HDG, HDM, HDT and VTG and depth messages DPT and DBT.
A new track-point is created for each change of position, which is assigned the last processed depth value. If no depth messages have been processed, the track-point is created with zero depth. A transducer position offset is applied if it has been set in the current Equipment Profile; the heading used for this calculation is derived from RMC or heading messages if available, otherwise the heading is calculated by using the last two known positions.

GPS Track and Waypoint Files

GPS track and waypoint files can be exported from some GPS units; e.g. Humminbird units can export saved tracks and waypoints in HT and HWR format files, whilst Lowrance units produce USR files than contain both waypoints and tracks.

GPX (GPs eXhange)
The GPX file format is a common file format for the exchange of GPS data between different device manufacturers.
The standard GPX format supports waypoints and track logs, but does not contain depth information for individual track points.

Humminbird™ and Garmin™ provide their own extensions to the GPX track format which do include the depth of each track point. Tracks contained in GPX files generated by Humminbird™ or Garmin™ devices can be used to generate maps, so long as the depth information is present. Tracks contained in GPX files from Lowrance™ units cannot be used to create maps, although they can be imported as zero-depth tracks.

GPX track files do not contain time information for individual track points. If time information is required - for example, to apply an accurate tide offset - then the option *Regular Trackpoint Interval* must be set in the Equipment Profile used during import. The time interval should correspond to the device setting used whilst the track was created.

CSV (Comma Separated Values)
CSV files are text files that hold a set of comma-separated values within each row. ReefMaster expects CSV files to hold data in the format *Latitude, Longitude, Depth* where latitude and longitude are decimal coordinate values expressed in WGS84 and depth is a decimal value expressed in metres. Latitude, Longitude and Depth must be the first three values on each row, and must be provided in that order. Any further values on a row are ignored by ReefMaster.

Humminbird™ Track (.HT) and Humminbird™ Waypoints and Routes (.HWR) files
Humminbird GPS/Sounder units export tracks and waypoints to two separate file types, *Humminbird Track* (.HT) and *Humminbird Waypoints and Routes* (.HWR) files. A separate .HT file is produced for each track that has been saved in the unit (typically up to a maximum of 50). These files have the name 00.HT through

[XX].HT, where [XX] is the number of saved tracks on the unit. A single .HWR file is produced containing all of the waypoints and routes in the system. These files are stored in a folder called MATRIX which is positioned at the root of the memory card.

HT track files do not contain time information for individual track points. If time information is required - for example, to apply an accurate tide offset - then the option *Regular Trackpoint Interval* must be set in the Equipment Profile used during import. The time interval should correspond to the device setting used whilst the track was created.

Note that there is a bug present on many older Humminbird™ units that resets track-point depths to zero once the current track has filled (about 21000 track-points) and started overwriting from the beginning. Once this has happened, all depths associated with the existing current track are lost and cannot be retrieved. This problem can be mitigated by saving areas of interest into one of the available saved track positions as they are recorded, or in any case before the maximum number of track-points has been exceeded. At a one second track-point interval, a single Humminbird™ track provides approximately six hours of recording time.

Humminbird™ .DAT Screen Snapshot Files

Some Humminbird™ devices can be configured to save a snapshot image of the unit's screen to file every time a new waypoint is created. This option can be very useful for recording extra information with a waypoint, such as the view of the 2D or side imaging sonar at the time. Humminbird™ saves a data file with waypoint location information, with the extension .DAT, alongside the image file in a folder named SNAPSHOTS, stored at the root of the memory card.

ReefMaster imports .DAT files as individual waypoints, along with the associated image file, which is stored as a waypoint image.

Lowrance™ .USR Files

Lowrance™ units can export waypoints and tracks in a Lowrance™ proprietary file format with the extension .USR. USR files come in several versions; ReefMaster is only able to read versions 2 and 3. Units that write version 4 USR files are usually able to also export data in GPX file format, which should be used in preference. Tracks within USR files do not contain depth information and so cannot be used for creating maps.

ESRI Shapefiles

Polygons and lines held within *ESRI Shapefiles* can be imported as tracks or map boundaries. Attributes belonging to shapefiles are not imported. Track point depths can be obtained from 3D shapes that contain Z values for each coordinate. In this case, depths are assumed to be in metres. Two dimensional shapefiles import as tracks with a uniform depth of zero. If the shapefile to be imported has an associated projection, then ReefMaster will re-project non-WGS84 projections to WGS84. *If the shapefile does not have an associated projection, then the shapefile is assumed to be in WGS84. Importing a non-WGS84 shapefile without an associated projection file will give unpredictable results.*

GPS Equipment Profiles

A GPS Equipment Profile holds all of the device-specific parameters that are used during the import of GPS data. Any number of GPS Profiles can be maintained within ReefMaster, making it easy to import assets from different devices by selecting the appropriate profile during the import process.

Adding or Editing an Equipment Profile
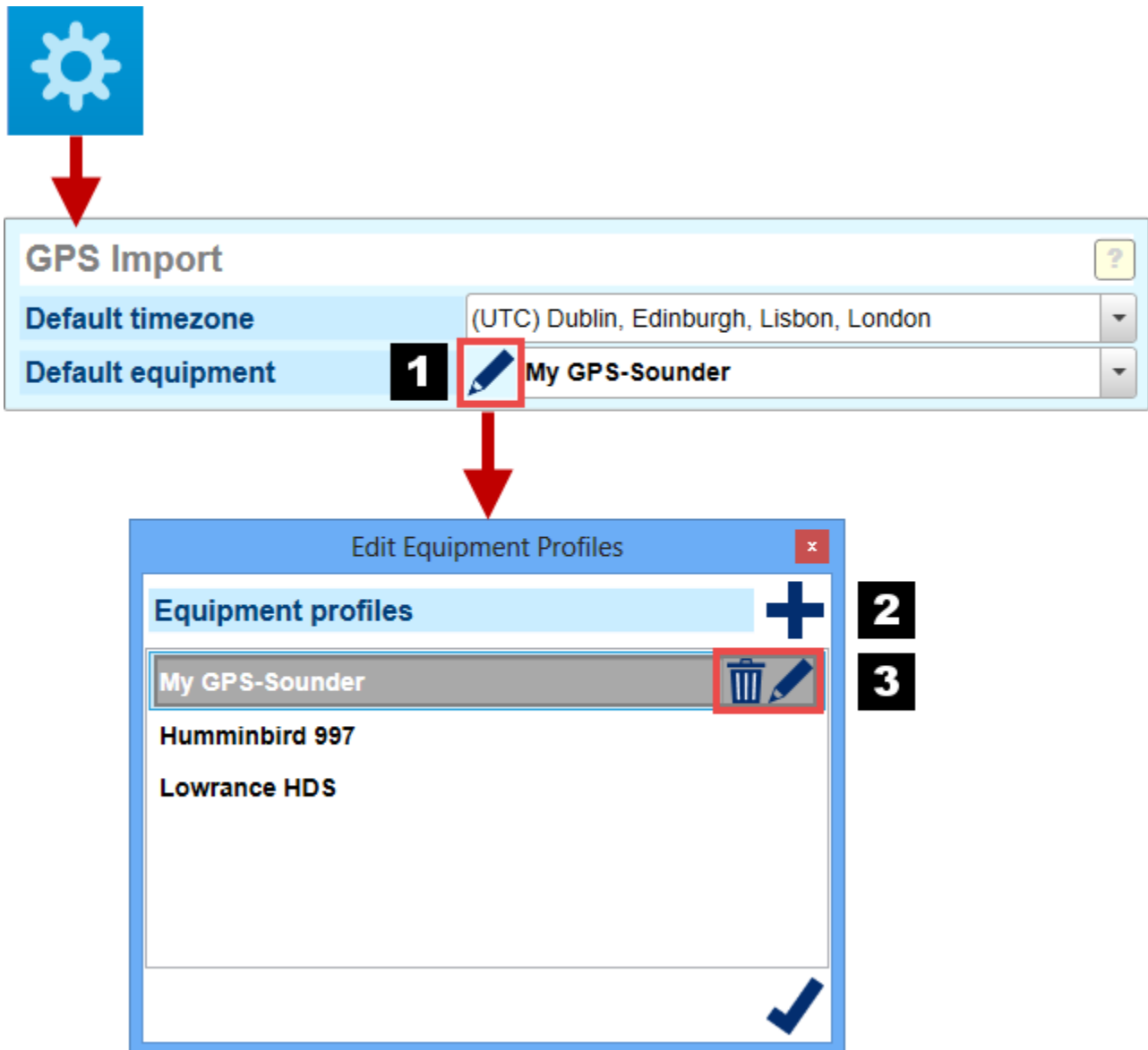
From the Global Settings window, select the *Edit* button *(1),* next to the *Default Equipment* drop-down list box. A list of available profiles is shown in a new window.

To add a new profile, click the *Add (+)* button *(2)*, or, to select an existing profile for editing, click the *Edit* button *(3)* within the existing profile row. To delete an existing equipment profile, click the *Delete* button *(3)* in the selected equipment profile row.

The *Edit Equipment Profile* window will open, either showing the existing profile that has been selected for editing, or a new profile populated with default values.

Note that the equipment profile list can also be accessed from the Import GPS Data window.

Edit Equipment Profile Window

The *Edit Equipment Profile* window is split into three areas, *General import options*, *GPX and Humminbird HT file import options* and *Sonar log file import options*.

1. General Import Options
General import options, that apply regardless of data source.

(1) Profile Name
A user-friendly name for the profile. The name is used to select the profile during the import process, so it is useful to make it descriptive.

(2) Cone Angle

The angle of the sonar beam from within which the depth is determined. This value applies to track logs, and can also be changed after import within the track edit pane.

Use the transducer cone angle specified by the source device as a starting point for this value, although as the GPS device may effectively use a narrower angle when determining depth, experimenting with smaller values may yield better results. If the source device is running multiple frequencies, use the narrower of the two cone angles.

(3) Keel Offset

This setting applies to track logs.
A fixed depth offset that is applied to all track points in the track. This depth represents the depth under the water surface of the transducer mounting position.

(4) Manufacturer

When importing waypoints from GPX files, waypoint symbols are described as text strings. ReefMaster cannot always guess the correct source of the GPX file, which could be from a number of different device manufacturers. Setting the manufacturer here helps ReefMaster translate proprietary waypoint symbol strings to the appropriate ReefMaster waypoint symbol.
This setting is only used when importing waypoints from GPX files and can be safely ignored (and left to undefined) if waypoints are not being sourced from GPX files, or if the waypoint symbol within ReefMaster is not of concern.

(5) Unicode Humminbird waypoint and track names

Check this option if you are using a Japanese of Korean Humminbird unit, which store track and waypoint strings differently to Western language units. *Do not check this option if you are not running an Asian Humminbird unit.*

2. GPS and Humminbird HT file import options

Regular Trackpoint Interval

This setting only applies to track logs that are imported from *GPX* or *Humminbird™ Track* (.HT) files.

Some devices do not record the time offset of each individual track point within a track log, but instead log track points at specific time intervals. Humminbird is an example of a manufacturer who records tracks in this way.
When sourcing track log data from a source that uses regular track point spacing, check the *Regular Trackpoint Interval* option and enter the known track point spacing, which is configurable on the GPS/Sounder source device. It is important that the correct value is used during import in order to assign the correct relative times to the track points within the track log.
See Importing GPS Data for further discussion on the importance of track point timing and some of the potential difficulties in obtaining correct track point times.

3. Sonar log file import options

Sonar log file import options are applied only when importing Lowrance or Humminbird sonar log files.

(1) Use slg2txt.exe for SL2 and SLG files (Lowrance specific)
By default, ReefMaster imports Lowrance™ SLG and SL2 directly. If ReefMaster fails to import an SL2 or SLG file, set this option to true, so that slg2txt.exe is also used when importing SL2 files. Note that slg2txt.exe can fail to import some SL2 files generated with late model Lowrance™ units.

(2) Using Lowrance™ Elite 7 (Lowrance specific)
SL2 files generated by the Lowrance™ Elite 7 running certain firmware versions have an error whereby latitude and longitude values are reversed. Check this option if imported SL2 tracks contain clearly inaccurate (or missing) latitude and longitude values. This option simply swaps the latitude and longitude values of each track point.

(3) Water salt/fresh and temperature (Humminbird specific)
ReefMaster needs to be able to accurately determine the speed of sound in water in order to locate track-points correctly within the Humminbird sonar view. It is important to correctly select between salt and fresh water, and also that the temperature is reasonably accurate. Within a normal operating temperature range, the salinity of the water makes a bigger difference to the speed of sound than temperature. Results will be acceptable so long as the temperature is set to within a few degrees.

It is important to set these options correctly when importing data for use in the bottom composition module.

(4) Transducer location offset
Sets the position of the transducer relative to the GPS antenna. ReefMaster uses the relative transducer location in conjunction with the current heading in the sonar log to adjust the position of track-points during import. The location can be one of *Forward* or *Aft* and *Port* or *Starboard* of the GPS antenna. The distance is specified in either metres or feet, depending on the current global units setting. The specified direction and distance *is of the transducer relative to the GPS antenna*. e.g. if the transducer is behind, and to port of the GPS puck (or GPS unit, if the antenna is internal), the specify *aft* and *port*, and enter the appropriate distances into the distance fields.

4. Bottom composition import options
Bottom composition import options apply to tracks imported from sonar log files, when the bottom composition module is installed. See bottom composition.

(1) Scale
Multiplier applied to calculated bottom composition values.

(2) Offset
Offset applied to calculated bottom composition values.

Scale and offset parameters can be useful for calibrating tracks recorded using different sounder units or transducers. If all data is being imported from a single source, then these values should not be changed from their default values of 1.0 and 0.

Importing GPS Assets

How to import tracks and waypoints into ReefMaster.

Selecting Files to Import
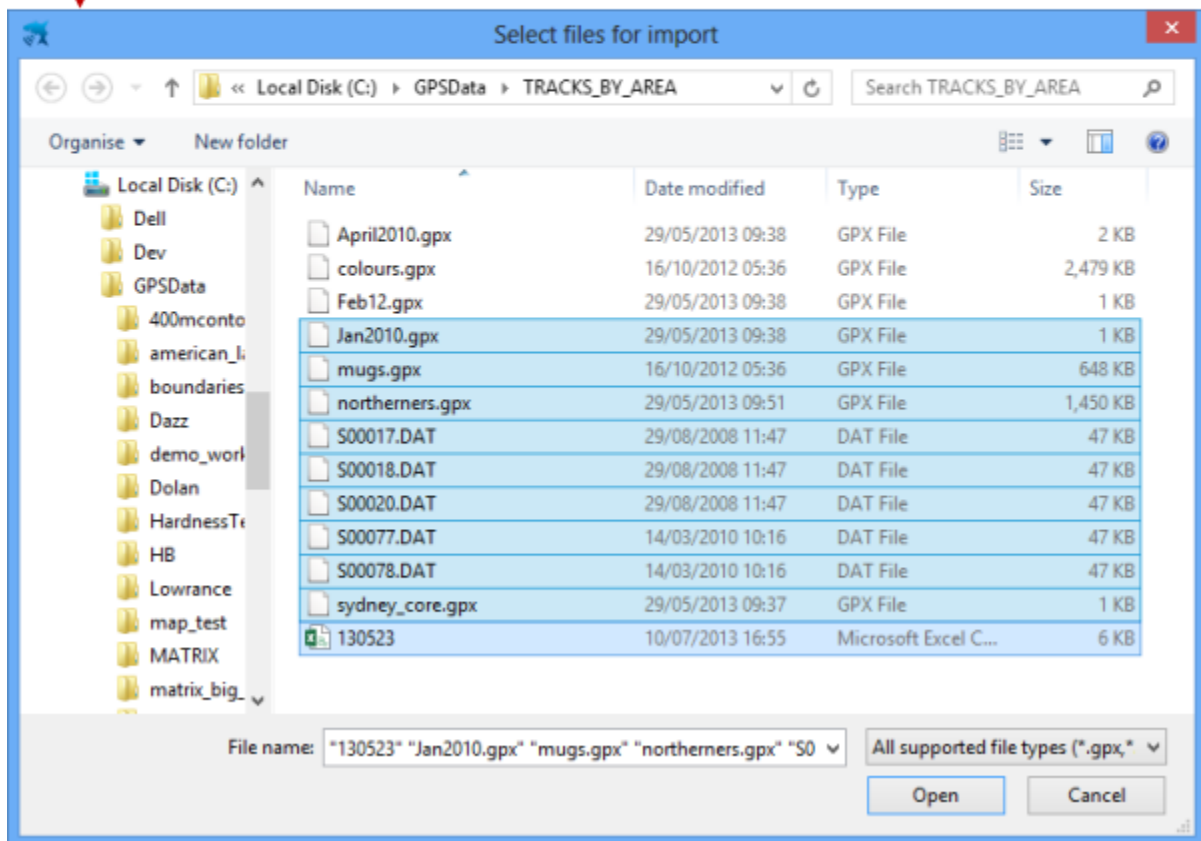
To import files into ReefMaster, click the *Import GPS Assets* button in the Main Toolbar. A standard file selection window is shown, which shows files of all supported file types. To restrict which file types are shown, select the required file type from the file types drop-down list box.

Any number of files can be selected for import, and the files can be made up of any mix of supported file types. Once the required files have been selected, click the *Open* button (or press *Return*). A progress window is shown whilst the files are processed, after which the *Import GPS Assets Window* will open.

The Import GPS Assets Window
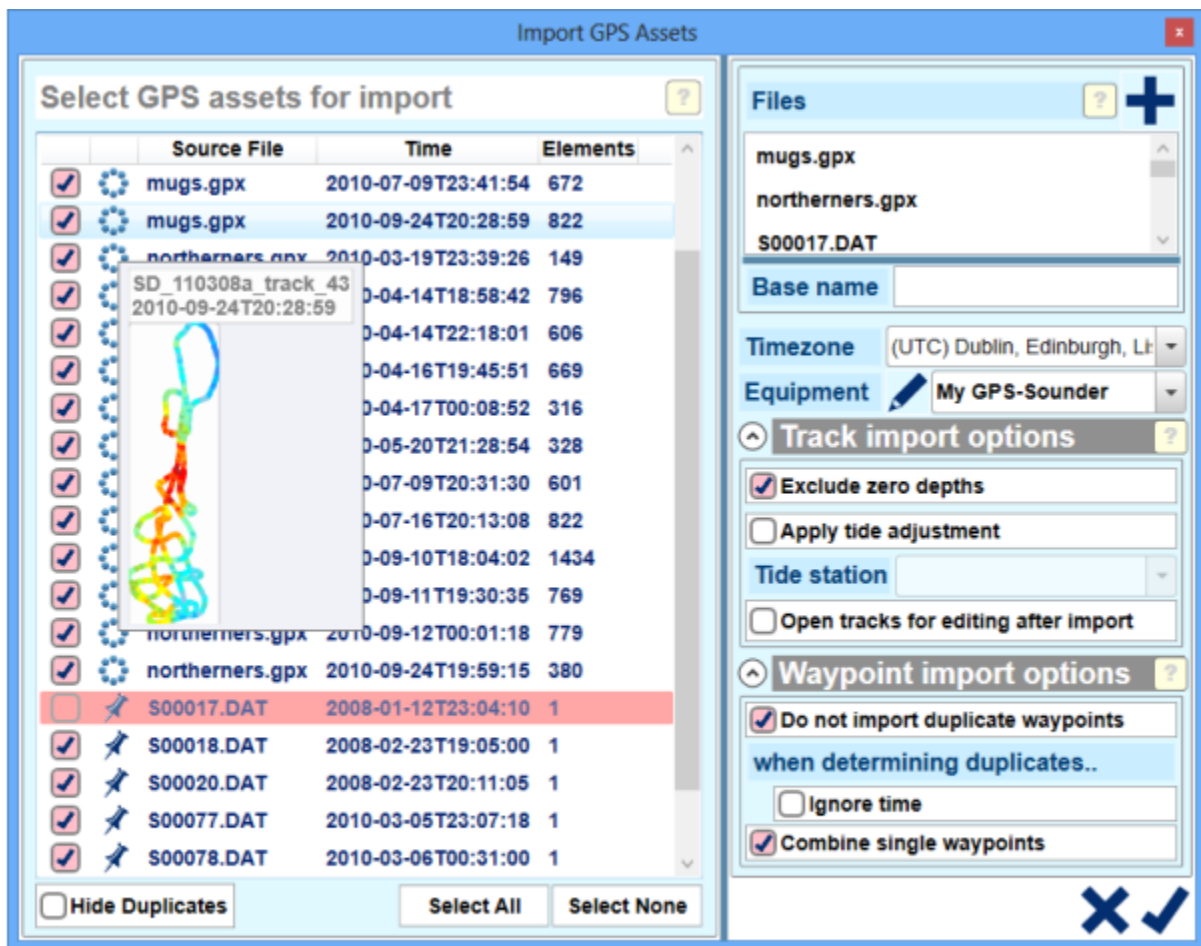
The import GPS assets window is split into two panels; the *Asset List (1)* and the *Options Panel* **(2)**.

1. The Asset List

The asset list shows all of the assets that have been read from the selected files. Note that there may be more assets in the list than the number of files selected, as individual files can contain a number of different assets.

Each asset is shown as on a separate line in the asset list, with information such as name and time, when available. The type of the asset is indicated by the icon in the second column. Holding the mouse pointer over this icon will show a preview image of track assets. The *Elements* field refers to the number of track-points within a track, or the number of waypoints in a waypoint collection.
Use the check-box in the first column to select or de-select an asset for import, or use the *Select All* and *Select None* buttons underneath the asset list to select or de-select all assets in the list.

Duplicate status

Assets may be exact or partial duplicates either of other assets within the current import batch, or of assets that have already been imported into the current ReefMaster workspace. Partial duplicates are highlighted in orange and exact duplicates in red. A Partial duplicate indicates that some data is shared between assets e.g., some track points within a track, or some waypoints within a waypoint set. By default only unique tracks are selected for import. Waypoint sets that are flagged as partial duplicates *are* selected for import by default, however duplicate waypoints within the set will not be imported unless the *Do not import duplicate waypoints* option has been unchecked *(see below)*. Use the *Hide Duplicates* button to hide all partial or exact duplicates.

2. Import Options

Files

A list of the files selected for import.
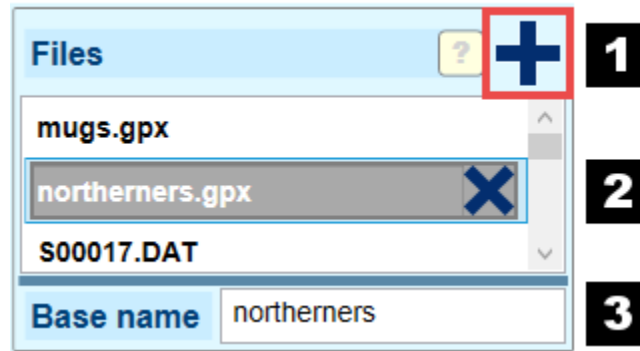
(1) Add further files to the current import using the *Add (+)* button. This can be useful when importing files from more than one file directory.

(2) To remove a file from the import batch, use the *Remove (x)* button at the right of the selected file row.

(3) Base Name
Assets within a file that do not have a name already associated with them are given a name based on their source file and the number of assets in the source file. To change this base name for assets within a file, modify the *Base Name* field. The base name field can be changed independently for each selected file.

Time Zone
The time zone that will be applied to all of the assets imported as part of this import batch. By default this is the time zone specified in Global Settings. The time zone of individual assets can be changed in the appropriate asset edit window post-import.

Equipment
Equipment profiles are a way of grouping properties of a GPS device used during the import process. Select the profile for use during the import using the drop-down list. To edit an existing profile, or to add a new equipment profile, click the *Edit* button.

Track Import Options
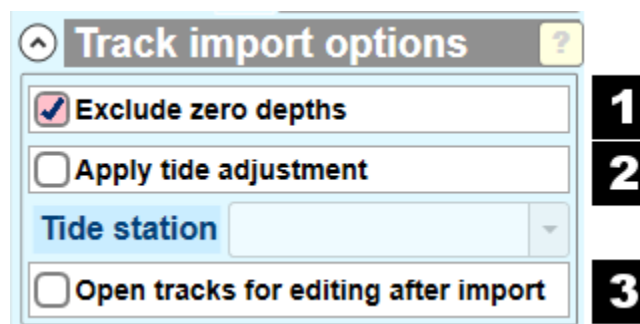
(1) Exclude zero depths
Check this option to exclude all track points with zero depths on import. This option is useful when the tracks to be imported contain depth information, and a zero depth can be considered an error.

Note that checking this option when the track to be imported does not contain depth data (i.e. all depths are zero) will result in no track points being imported for that track, and a warning window will be shown advising of this fact.

Track points with zero depths can also be removed easily after import, by filtering by depth in the Track Edit Window.

(2) Apply tide adjustment
Check this option to assign a Tide Station to all tracks being imported in this import batch. The tide station can be selected from the drop-down list.
Tide stations can also be assigned in the individual Track Edit windows; checking this option during import

saves time when multiple tracks are being imported that share the same tide information. Note that all tracks within the import will be assigned the same tide station, if one is selected. Tracks from different areas should therefore be imported in separate batches.

(4) Open tracks for editing after import
Check this option to open all tracks for editing immediately after import. This option is not recommended when importing a large number of tracks.

Waypoint Import Options
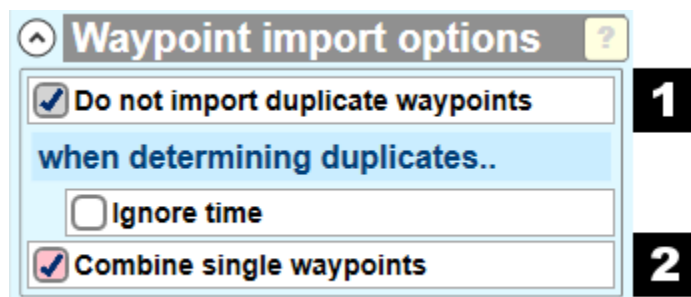
(1) Do not import duplicate waypoints
By default ReefMaster does not import duplicate waypoints. Duplicates are determined on position and time; name and symbol are not considered. To ignore time when determining whether a waypoint is a duplicate, check the option *When determining duplicates..ignore time*.

(2) Combine single waypoints
When importing waypoint image snapshots from Humminbird™ devices, each waypoint is held in a separate .DAT file. Checking this option combines all such waypoints into a single set after import. The alternative is that a new waypoint set is created for each waypoint.

The Global View

The *Global View* shows all of the assets in the workspace in a single edit window, providing an overview of how assets are situated relative to each other, as well as a graphical way of selecting assets for editing and other operations. The global view also hosts the *Waypoints Edit Pane*.
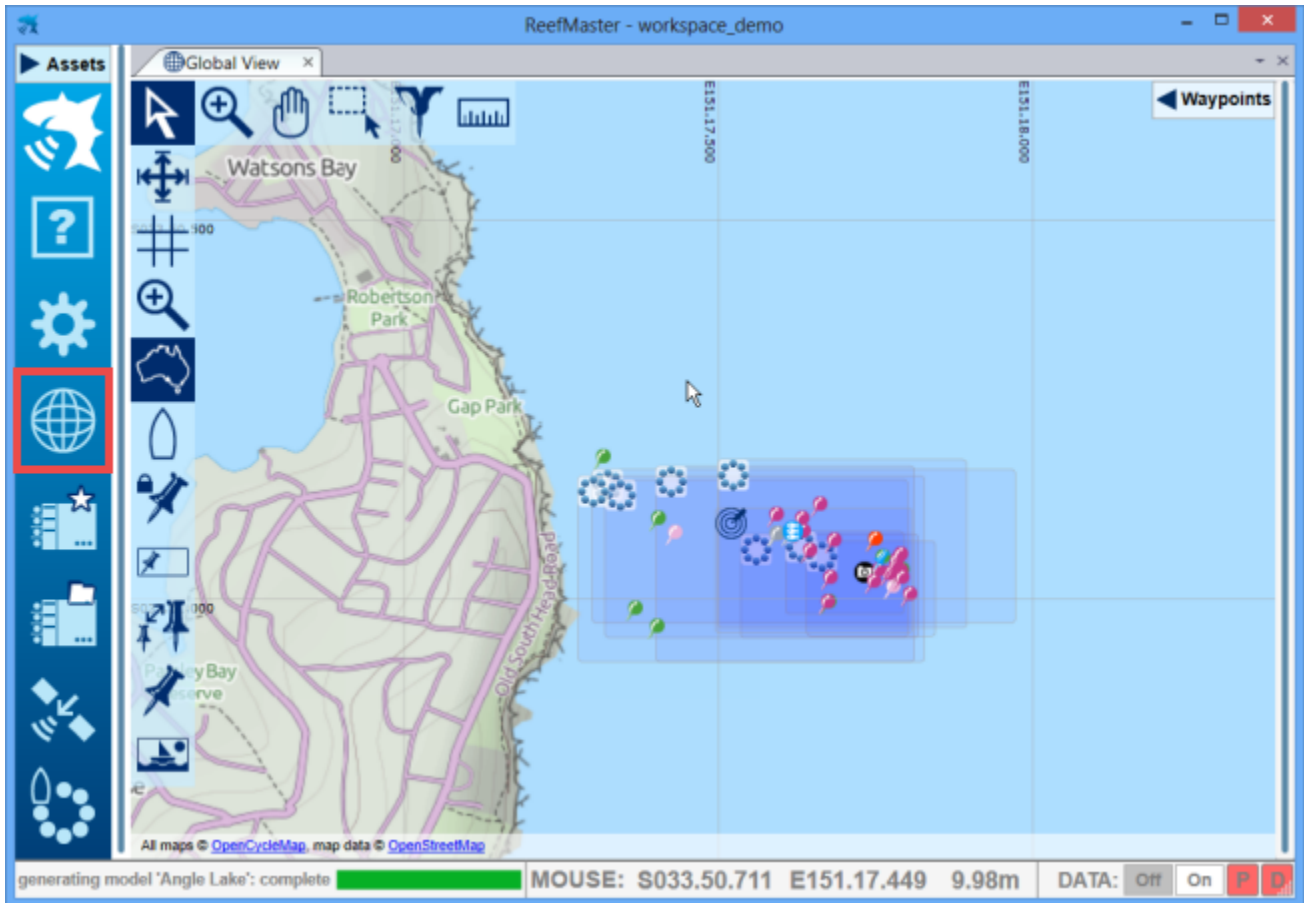
The global view is visible by default, shown after creating a new, or loading an existing workspace. If the global view is closed for any reason, it can be displayed again using the *Show Global View* button *(circled)* in the Main Toolbar.

Waypoints Edit Pane

The global view is home to the *Waypoints Edit Pane* which shows the properties and edit controls for waypoint collections. The waypoints edit pane is expanded using the *Waypoints* toggle button. See Waypoints and Waypoint Sets.

The Graphical Edit Area
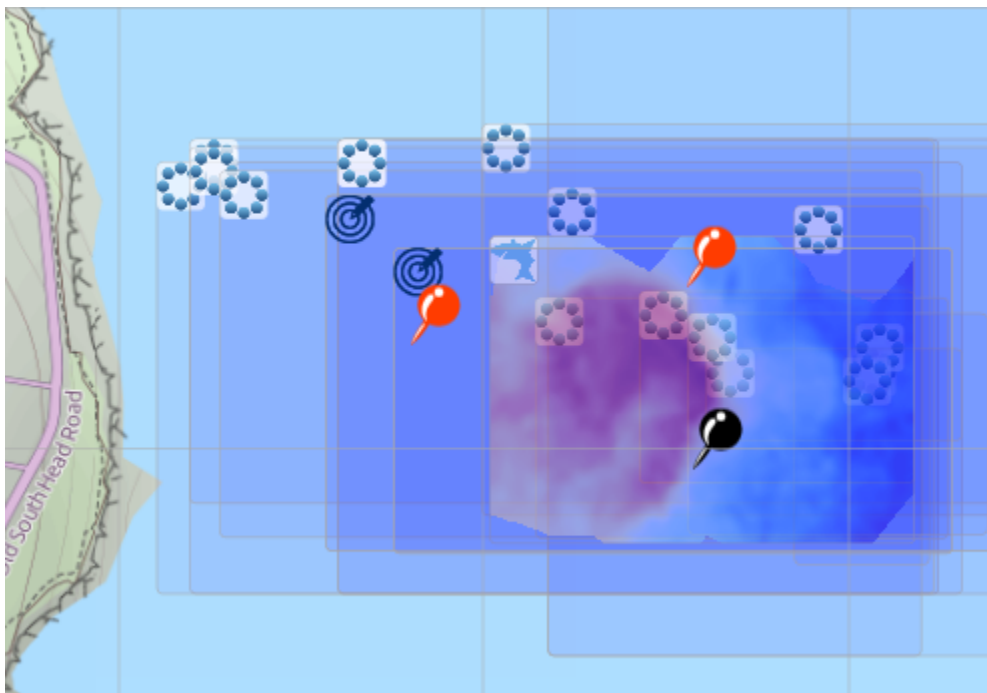
The Global View shows all of the assets that are present in the current ReefMaster workspace in one view. This includes Waypoints, Tracks, Projects, User Maps and Background Images. Assets are depicted as rectangles defining their geographic extent, with an icon identifying the type of asset shown at the top left.

- Holding the mouse cursor over the icon of an asset shows the name of the asset, and in some cases further information.
- Assets can be selected by clicking the asset icon, with the mouse mode set to select.
- Assets can be edited by double-clicking on the asset icon with the mouse in Select mode. The asset's edit screen is opened.

The Asset Context Menu
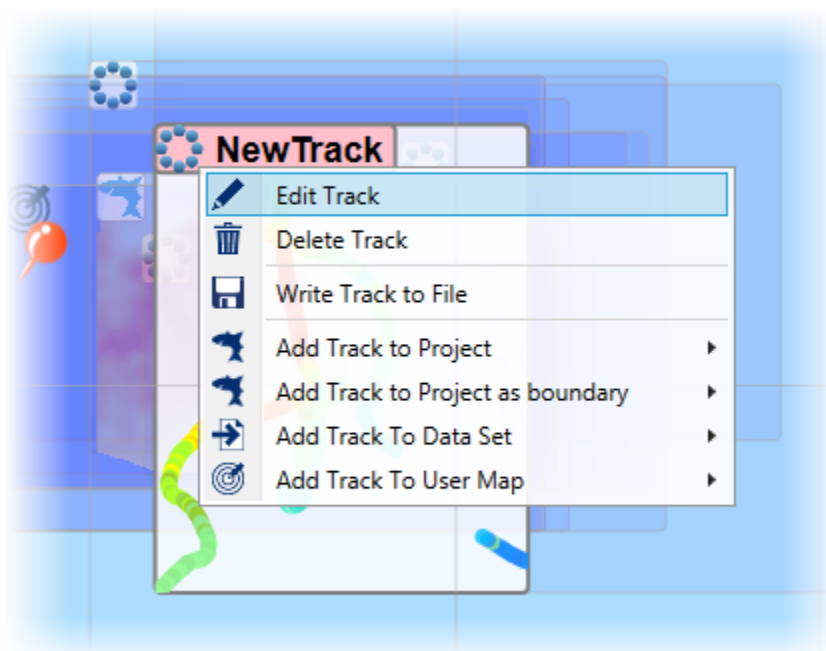
Right-clicking an asset icon shows a range of options including edit, delete and export options, as well as further options specific to the selected asset type.
In the example above, the standard options of *Edit, Delete* and *Write to File* are available, as well as a range of track specific options. The asset specific options available in the asset context menus are the same as those in the Asset Library and are described in detail in the relevant asset reference pages.

Selecting Multiple Assets
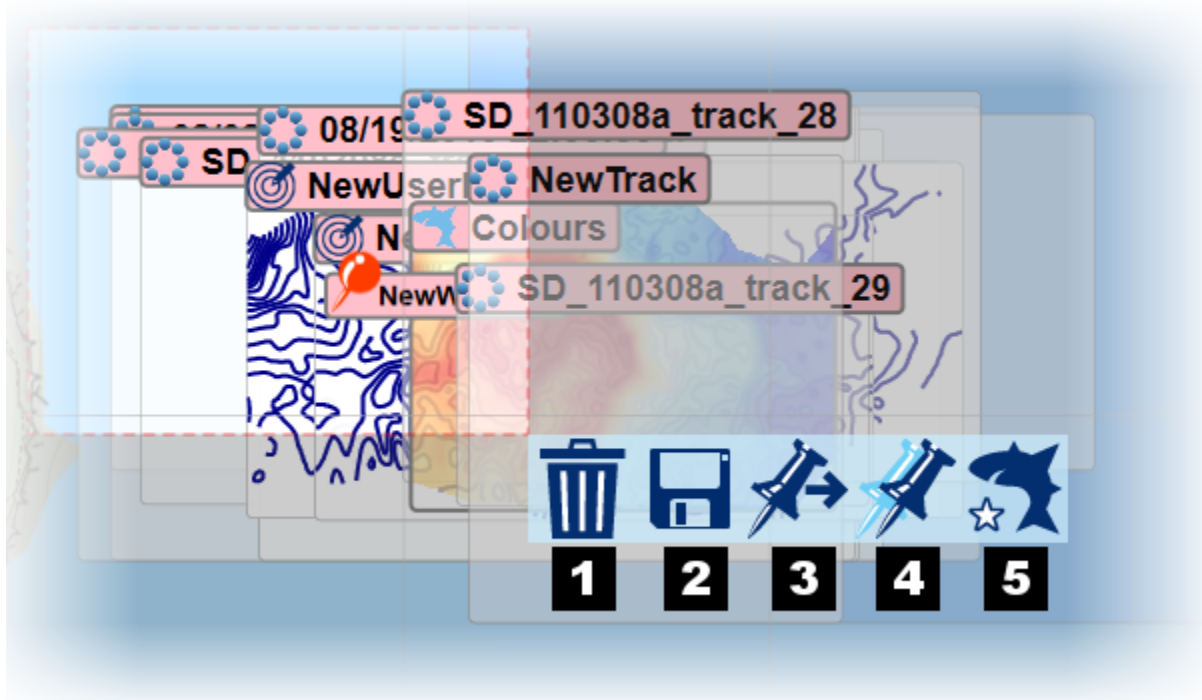
- Any number of assets can be selected at once in the global view, either by using the multi select mouse mode and enclosing the required assets in the *marquee* (the drawn rectangle), or by holding the *control* key down and selecting assets individually, with the mouse in select mode.
- When selecting assets graphically using the marquee tool, the icon area at the top left of the assets needs to be within the drawn rectangle for the asset to become selected.
- When the graphical selection of assets using the marquee tool is complete, a tool-bar slides out as shown in the image above. The range of operations available in the tool-bar depends on the type of assets that have been selected.

Note that all of the options available in the multiple selection tool-bar are also available in the context menu; press the right mouse button whilst holding the mouse pointer over the icon of one of the multi-selected assets.

(1) Delete Assets

Delete all selected assets. *This operation cannot be undone.*
A confirmation window is shown listing all of the assets selected for deletion, with a check-box for each asset type. De-select any asset types that should not be deleted, before confirming deletion using the trash icon. Press cancel to abort the delete.

(2) Export to GPS

Export the selected assets to file, for import to a GPS device. Only assets that have been selected are exported; selected waypoints are exported individually without regard to the waypoint set to which they belong. Using the multi-select marquee tool is the simplest way to export a set of assets from a specific geographical area. The Export To GPS window is opened with the selected assets, from where specific assets can be removed from the export process if required.

(3) Move Waypoints to Set

Move all selected waypoints to another waypoint set. The selected waypoints will be removed from their current set(s).

Note that the selected waypoints may currently belong to any number of different sets.

New Waypoint Collection

Create a new waypoint collection and move all of the selected waypoints into it. The New Waypoint Set window is shown, where a name and colour for the new set can be selected.

Existing Waypoint Sets

Choose an existing waypoint set to move the selected waypoints in to.

(4) Copy Waypoints to Set

Copy all selected waypoints to another waypoint set. The selected waypoints will be not be removed from their current set(s).

Note that the selected waypoints may currently belong to any number of different sets.

New Waypoint Collection

Create a new waypoint collection and copy all of the selected waypoints into it. The New Waypoint Set window is shown, where a name and colour for the new set can be selected.

Existing Waypoint Sets

Choose an existing waypoint set to copy the selected waypoints in to.

(5) Add Tracks to Project

Add the selected tracks to a map project.

New Project
Create a new project and add the selected tracks. The New Project window is shown, in which a name for the new project can be entered.
This is an easy and quick way to create a new map project using all of the tracks in one area.

Existing Project
Choose an existing project to which the selected tracks should be added. Only projects that are within range - closer to the selected tracks than the maximum map size - are shown.

Screen-Level Context Menu
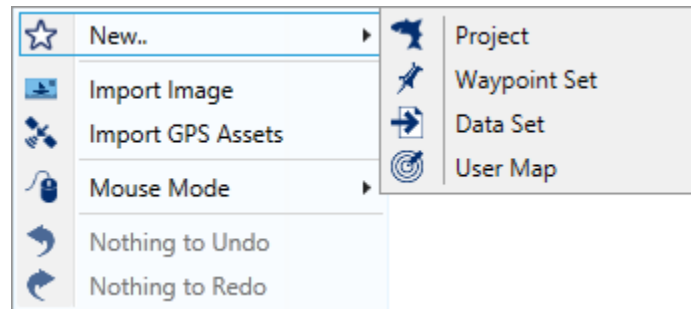
The screen-level context menu can be accessed by pressing the right mouse button whilst the mouse pointer is open space - i.e., the mouse pointer is not over an asset displayed within the global view.
In addition to the standard *Edit Window* functions, the global view context menu has options to create or import new assets and images.

The Track Edit Window

GPS track logs (or trails) and sonar logs are referred to as *tracks* after being imported into ReefMaster. Tracks can be viewed and edited in the *Track Edit Window*. If the track has been imported from a compatible sonar log file, the sonar recording of the track can also be viewed in the *Sonar* pane.
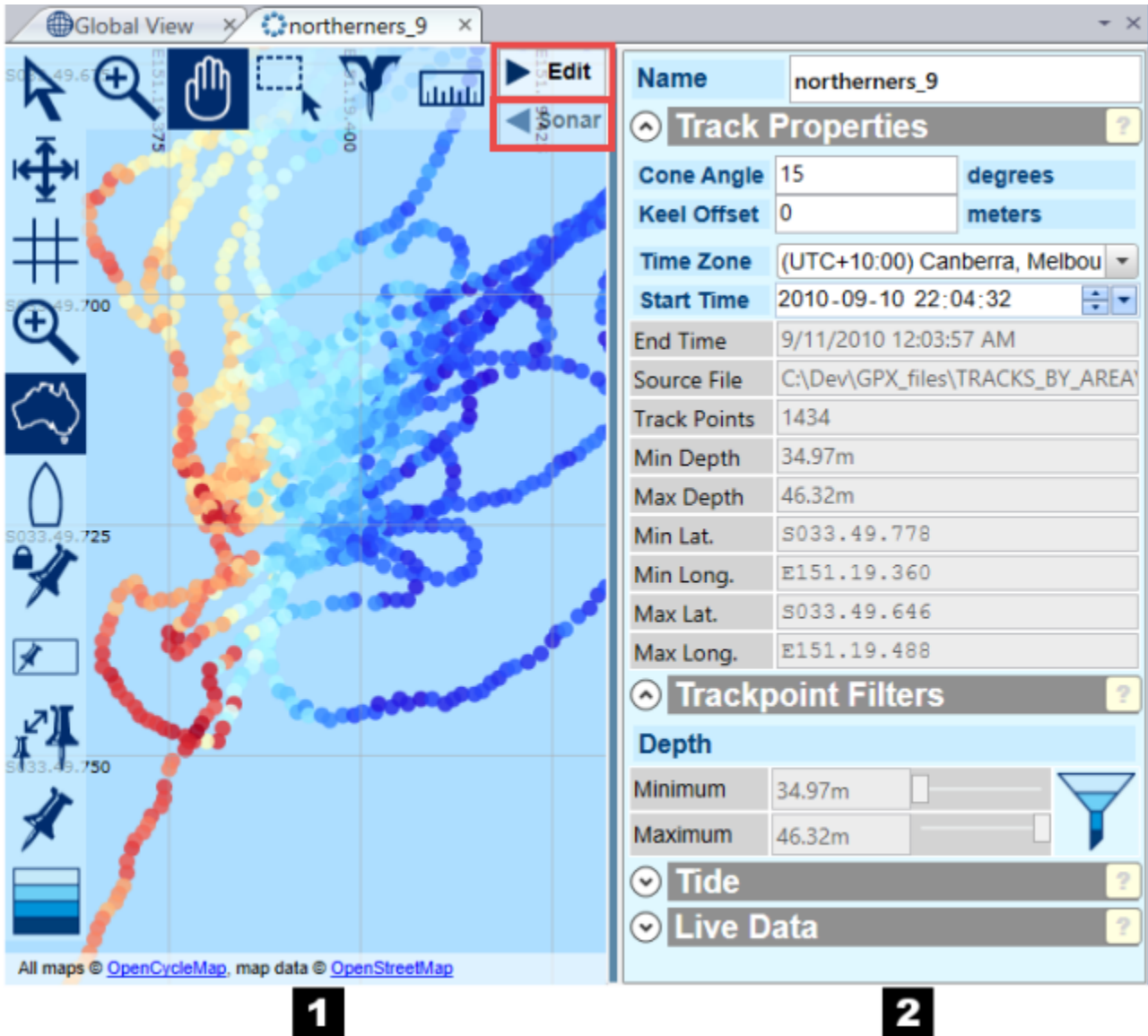
Tracks are made up of a number of individual track points, which contain location, depth and time information. Depth and location data from track points is used to generate underwater maps.

To open a track for editing:

- Double click a track or select *Edit* from the context menu of one or more selected tracks in the in the Asset Library or
- Double click a track or select *Edit* from the context menu of a selected track in the Global View or
- Check the *Open Tracks for Editing After Import* option in the <u>Import GPS Assets</u> window when importing tracks into ReefMaster.

The *Track Edit Window* consists of the *Edit Area (1)*, with standard mouse, map and waypoint tool-bars, and the *Edit Pane*, with detailed map properties and edit operations. The edit pane can be shown or hidden using

the *Edit* toggle button *(circled)*.

If the track has been imported from a compatible sonar log file, the sonar recording can be displayed by clicking the *Sonar* button *(circled)*. See Sonar Viewer.

See Edit Windows for an overview of the edit window layout and standard tool-bars.

Track Edit Area

The track edit area shows the track as a collection of individual track points.

Track point colours
Track points are colour coded to show the relative depth of the track point within the track. Dark blue represents the deepest point of the track, with red the shallowest. As the colour coding is relative, not absolute, the colours of individual track points may change as the maximum and/or minimum depth of the track changes. Relative colour coding of track points makes it easy to see when individual track points have very different depths to their neighbours, which may indicate a bad data point that needs to be removed.
The palette used to display the track-point colours can be selected using the *Palette Selector* button in the track edit area toolbar.

Selecting Individual Track Points
Individual track points can be selected using the left mouse button, with the mouse in Select mode. Track points selected in the graphical display area also become selected in the Track Point List present in the track edit pane (see below). Individual track points can be deleted through the context menu, activated using the right mouse button.

Cropping and Deleting Track Points
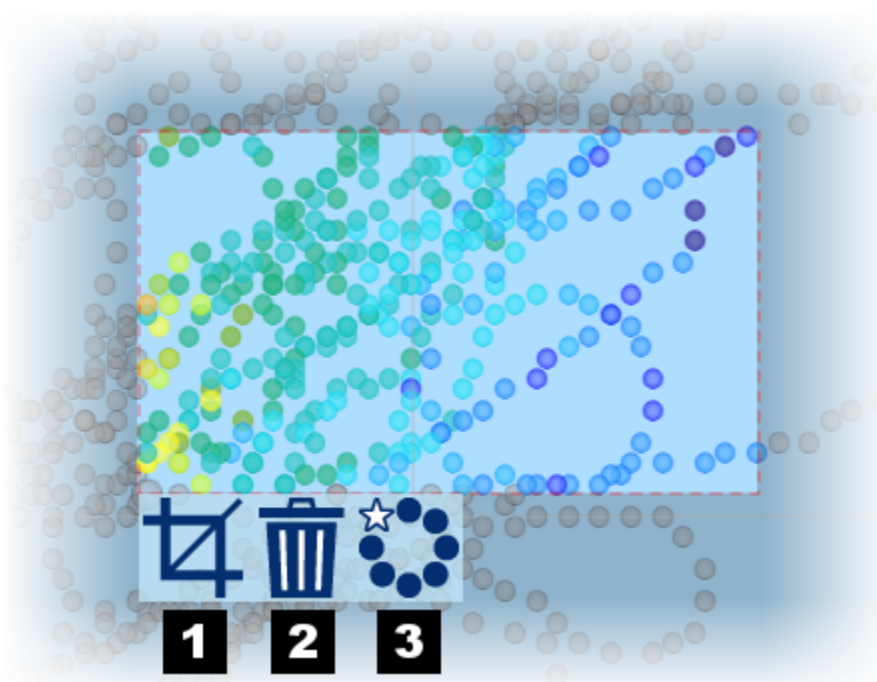
Groups of Track-points can be selected by using the *region-select* mouse tool to draw a rectangle around the required track points. Selected track-points retain their colours, whilst track points that are not in the selection zone are coloured grey.
Once the selection is complete, a tool-bar is shown with buttons for the operations that can be performed on selected track points. These options can also be accessed via a context menu, activated by right-clicking on one of the selected track-points.

(1) Crop to Range
Delete all track points other than the selected track points.

(2) Delete Track Points

Delete all selected track points. This operation is the inverse of the crop command.

(3) Create New Track From Selected Track Points
Create a new track asset using the selected track points; the current track is not modified as part of this operation.
A new asset window is shown, where a name for the new track can be entered.
This option is useful when, for example, a single large track covers several different areas of interest for mapping. New tracks can be made by selecting each area in turn, and each new track added to a different map project.

The Track Edit Pane

The *Track Edit Pane* provides detailed information and edit operations for the track.

1. Track Name
The track name can be set here. Asset names can be any string.

2. Track Properties
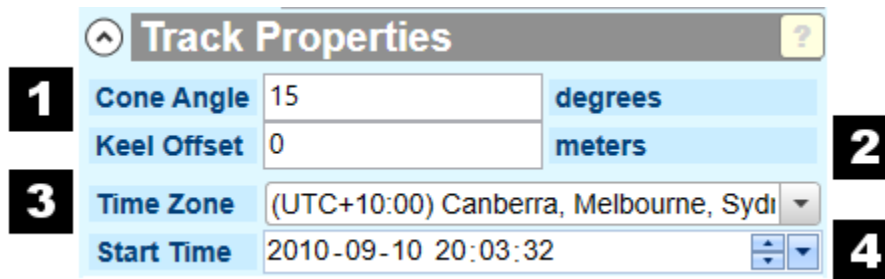
(1) Cone Angle

The cone angle of the sonar beam from within which the depth is determined.

ReefMaster uses the cone angle when calculating the depths for map generation. Using a cone angle that is approximately the same as the cone angle used to generate the depths in the track is important to maximise the level of detail that can be resolved. Using too large a cone angle in ReefMaster will erode the size of convex features, whilst using too small a cone angle will have the opposite effect.

Use the transducer cone angle specified by the source device as a starting point for this value.

Note, though, that the GPS device may effectively use an angle that is narrower than the stated cone angle when determining depth, so experimenting with smaller values may yield better results.

If the source device is running dual frequencies, use the narrower of the two cone angles.

(2) Keel Offset

A fixed depth offset that is applied to all track points in the track. This depth represents the depth under the water surface of the transducer.

(3) Time Settings

The time zone of the track can be set using the drop-down list. The time zone only affects how times are displayed, not how they are stored.

(4) Start Time

The start time of the track, which is the time of the first track point. This value is set during import when it is available. If the start time of the track has not been set, or is known to be incorrect, it can be set here. Track points times are represented as relative time offsets from the beginning of the track, and are important for accurate tide compensation. Changing the start time of the track will update the times of all track points within the track.

Track Properties

Read only track properties including depth and geographic range, number of track points and the file from which the track was sourced.

3. Track Point Depth Filter
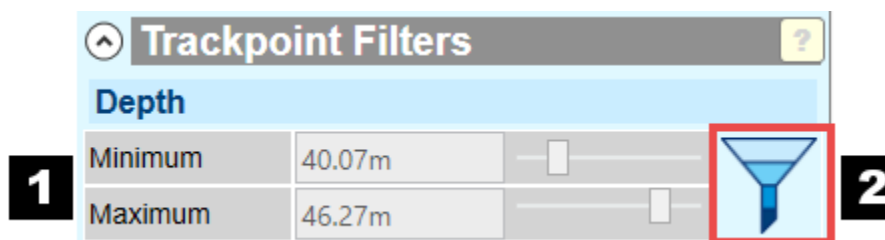
Track points can be eliminated based on a depth filter, which removes all values lower or higher than specified minimum or maximum values.

Adjust the required minimum and/or maximum values using the sliders *(1)*. The colouration of the track points in the graphical track display adjusts in response. Track points that will be eliminated as a result of the filter operation turn grey. Click the *Apply* button *(2)* to confirm the filter operation.

4. Tide

Adjust track point depths according to the state of tide or water level.

When making maps from data gathered in tidal waters or over multiple trips from lakes at varying water levels,

track-point depths must be adjusted to compensate.

Water level adjustments can be made either manually, or by using an existing Tide Station.

Tide Adjustment Using a Tide Station
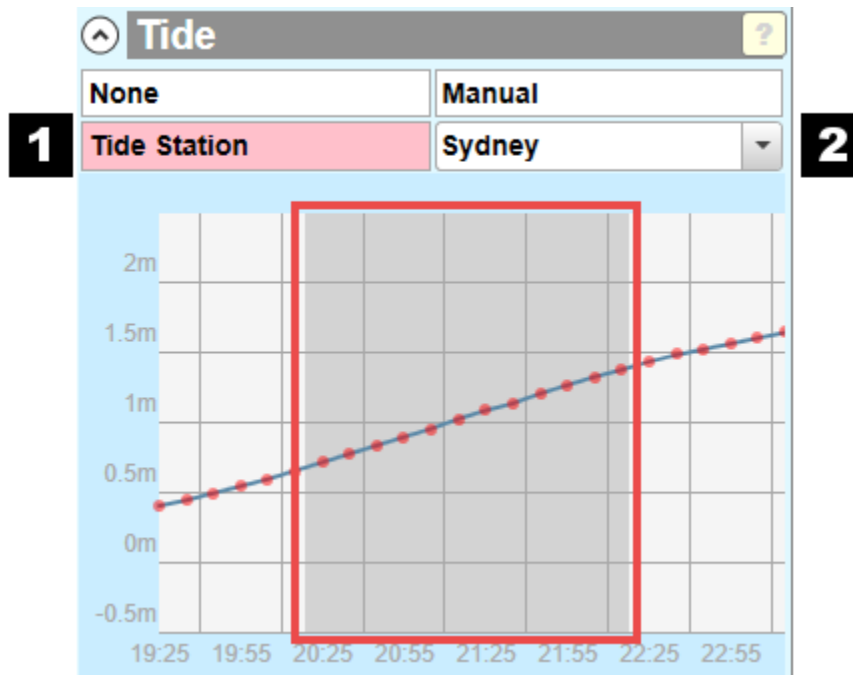
To use a tide offset values from a tide station, select the option *Tide Station (1)* and then select the appropriate tide station from the drop down list *(2)*. The tide values are shown in the graph area, with the time period of the track shaded grey *(circled)*.

Manual Tide Adjustment
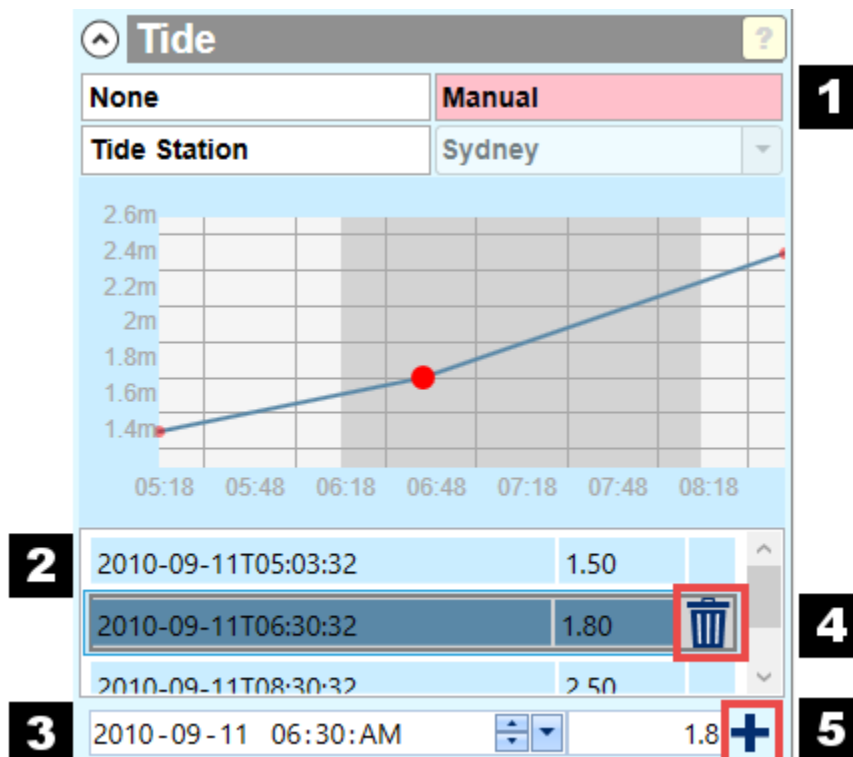
To add manual water level offsets to a track, select the *Manual* option *(1)*. A graph area is shown, with the time of the track highlighted in grey.

Depth offset values are entered using the edit area *(3)* at the bottom of the tide information panel. A time and

depth are required for each offset. Offsets are added using the *Add* button **(5)**.

Depth offsets are calculated between the points added using simple linear interpolation. If only a single point is added, then this value is used as the depth offset for all depth points. This can be useful, for example, when entering lake levels, which may vary from track to track but remain static for the duration of a track.

Once a depth point has been entered, it appears in the depth point list **(2)**. A depth point may be deleted using the *Delete* button **(4)**. To update the depth of an existing depth point, select the depth point and modify the depth in the edit area. Press the Add button to commit the change.

The Sonar Viewer

The sonar viewer is part of the [Track](#) edit window, and displays sonar recordings for tracks that have been imported from compatible sonar file logs. Sonar recordings can be replayed (at speeds of up to 30x), and track-points can be viewed. Track-point depths can be adjusted to match the displayed bottom if required.

ReefMaster processes sonar log files on import to create indexes into the sonar recording. Tracks imported prior to version 1.5 of ReefMaster will need to be reimported before they can be viewed in the sonar viewer. ReefMaster does not support viewing of Lowrance SLG sonar recordings made using the "low quality" setting.

Using the Sonar Viewer
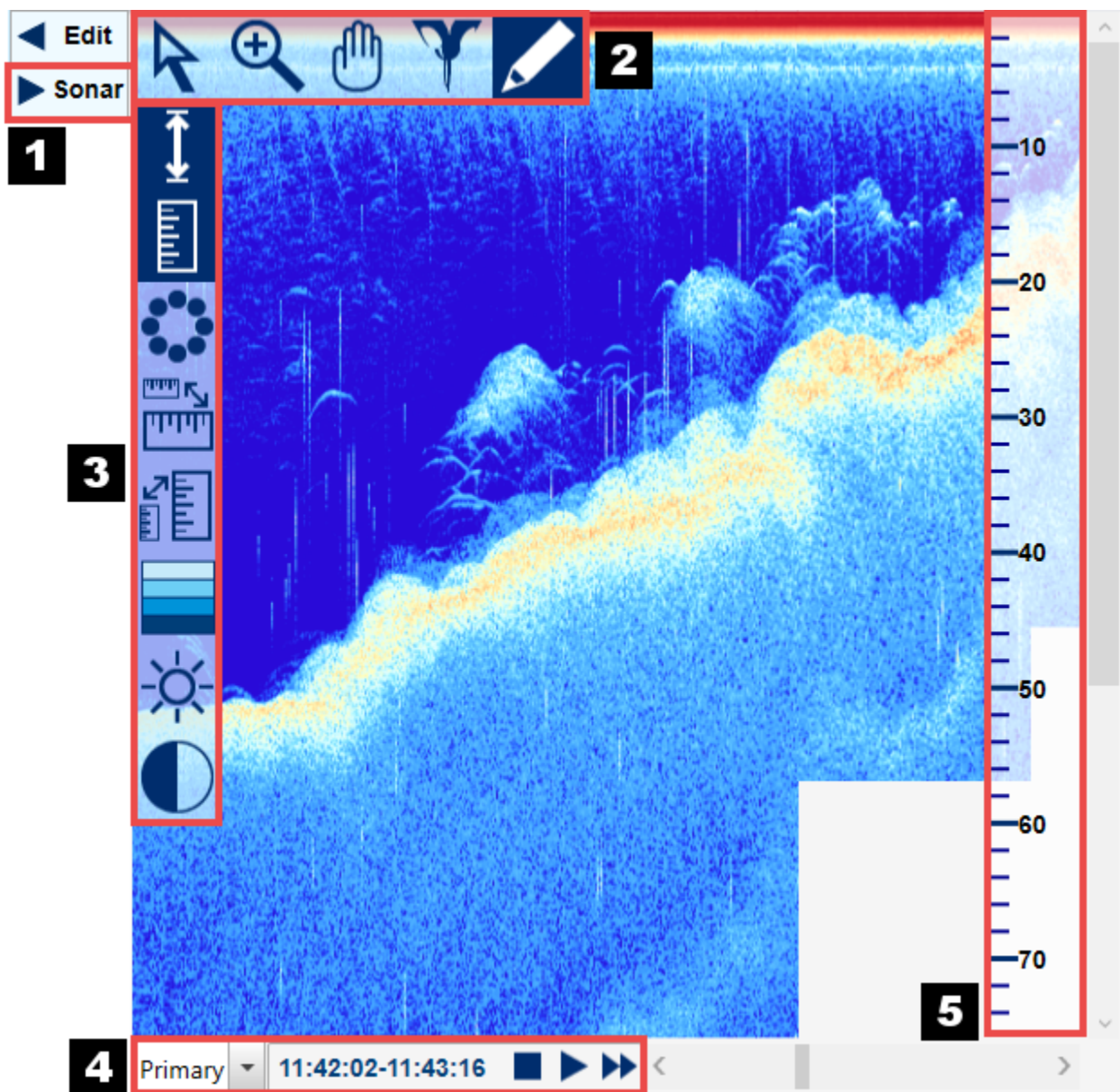
The sonar viewer display is opened by clicking on the *Sonar* button *(1)* within the track edit area. If the sonar button is disabled, then there is no compatible sonar recording associated with the track.

The sonar viewer display consists of the main display area, where the sonar recording is shown, a *mouse mode selector toolbar (2),* the *sonar display toolbar (3)*, the *playback control panel (4)* and *depth scale (5)*. The

sonar display can be scrolled using the horizontal and vertical scroll-bars.

Mouse Mode Selector

(1) Select
When in select mode, clicking within the sonar display selects the nearest track-point in the track edit window. If track-points are displayed within the sonar display *(see below)*, select mode is used to select and drag an individual track-point. Selecting a track-point within the track edit window will move the sonar display so that the position of the trackpoint is centred horizontally.

(2) Zoom
The sonar display can be zoomed using the standard zoom-box behaviour; draw a rectangle around a region to zoom in. The display can also be zoom by using the mouse wheel or the + and - keyboard short-cuts.

(3) Pan
The sonar recording can be dragged using the left-mouse button, with the mouse in *Pan* mode. The recording can also be dragged by using the middle button when the mouse is in any mode, by using the horizontal or vertical scrollbars, or using the keyboard arrow keys.

(4) Drop Waypoint
Waypoints can be created by clicking within the sonar display with the mouse in *Drop Waypoint* mode. A new waypoint is created at the location of the nearest track-point. Note that, currently, no adjustment is made within a side-scan view for distance; the waypoint is always placed on the path of the recorded track.

(5) Draw tool
The drawing tool allows track-points to be reposition by tracing the bottom with the mouse *(see below).*

Sonar Display Toolbar
The *sonar display toolbar* provides functions to set limits, horizontal zoom and palette, as well as brightness and contrast controls.

(1) Fit to vertical limits

When this option is selected, the upper and lower limits are automatically adjusted to fit the size of the sonar display window. Note that any action that zooms or scrolls the display vertically will automatically turn this option off, if it is selected.

(2) Show Scale

Show or hide the depth scale at the right of the display. Depth units on the scale are in metres or feet, depending on the global depth units setting.

(3) Show track-points
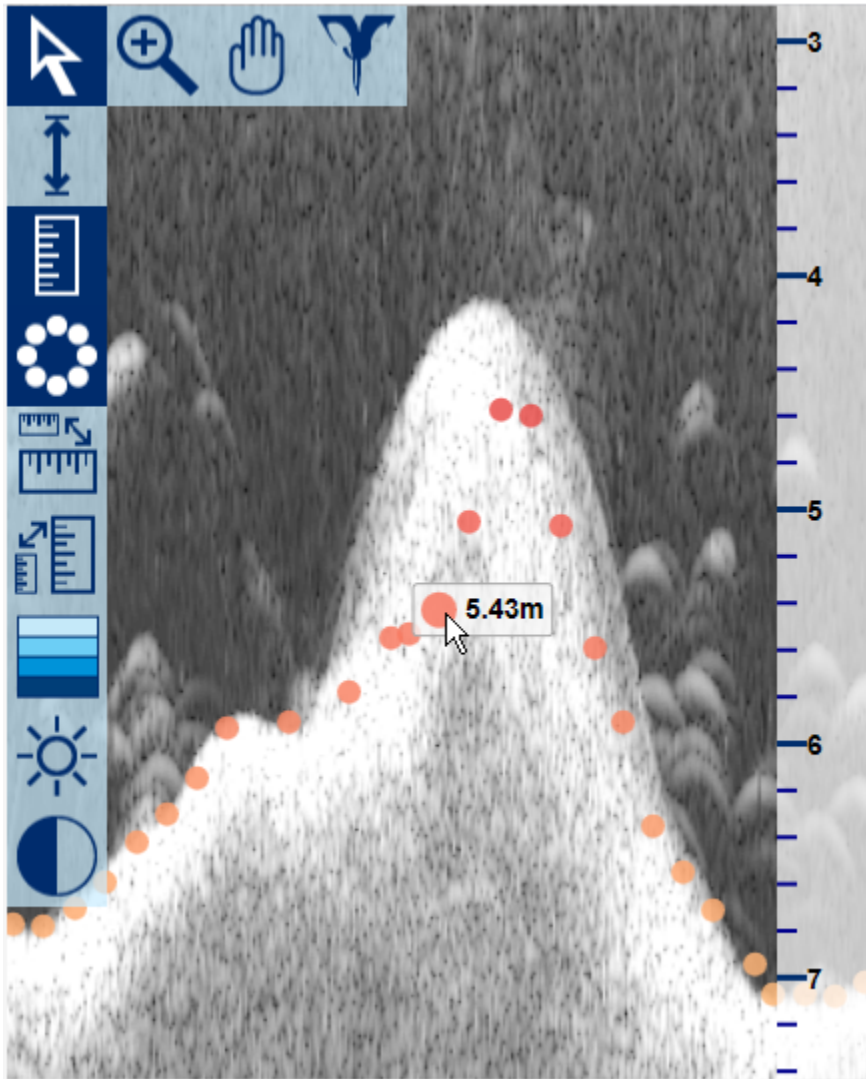
When *Show track-points* is selected, track-points from the associated track are displayed within the sonar viewer. The position of the track-point within the sonar display reflects the depth of the track-point as calculated by the originating sonar unit. If the depth is incorrect with respect to the displayed bottom, the track-point can be dragged upwards or downwards to correct it. Track-points may be easier to see if a black and white palette is selected.

Note that for Humminbird sonar logs, it is important that the water salinity and temperature have been set correctly during the import process. If these parameters have not been set correctly, track-points may be shown at incorrect depths within the sonar display. See GPS Equipment Profiles*.*

Redrawing track-points
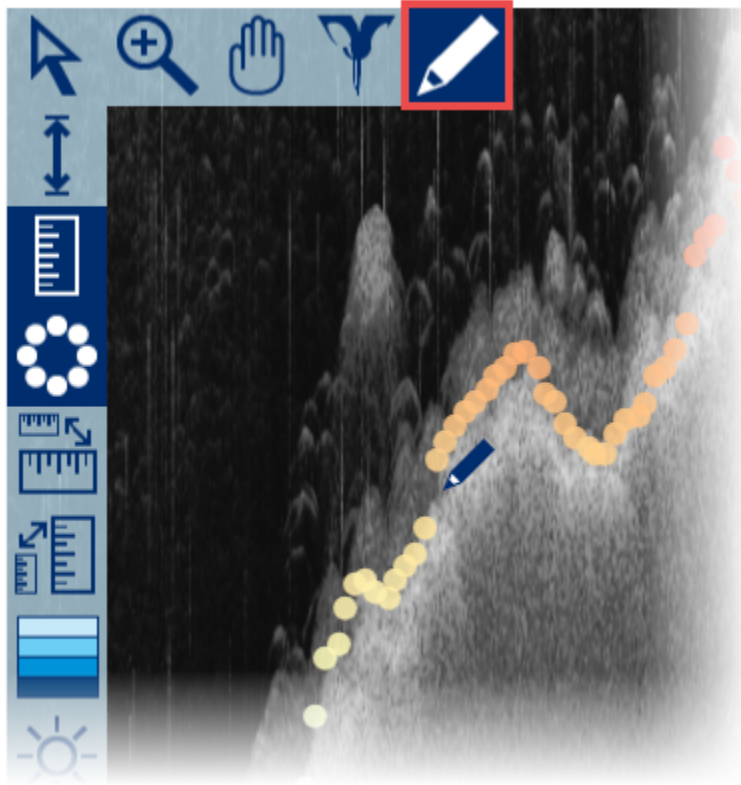
Sometimes an area of a sonar log has many depths that are not closely matched to the bottom structure. The *Draw* tool is a quick way of correcting depth values in this situation:

- Select the *Draw* tool from the mouse mode selector.
- If track-points were not already displayed over the sonar log, they will be turned on automatically.
- Trace the bottom slowly with the mouse, holding the left button down.
- Track-points will be repositioned to follow the path of the mouse.

(4) Horizontal scale
Adjust the horizontal scale of the sonar display using the pop-out slider. Moving the slider to the right zooms the image in horizontally.

(5) Vertical limits

The upper and lower display limits can be set using the two sliders. The upper slider adjusts the upper limit, and the lower slider adjusts the lower limit.

(6) Palette
The palette can be selected using the palette selector. Only RGB palettes can be used in the sonar viewer.

(7) Brightness
The brightness of the sonar image can be adjusted using the brightness slider pop-out.

(8) Contrast
The contrast of the sonar image can be adjusted using the brightness slider pop-out.

Playback Control Panel

(1) Channel selector
Tracks imported from Lowrance SL2 files may contain sonar logs for more than one channel. The displayed channel can be selected using the channel drop-down list. The possible options are *primary, secondary, downscan* and *sidescan.*

(2) Time display and playback controls
The displayed times show the beginning and end time of the portion of the sonar log displayed on screen. To start or stop playback of the recording, use the *stop* and *play* buttons.

(3) Speed control
Playback speed can be adjusted between 1x and 30x. Use the slider pop-out to adjust playback speed. The track will start playback when the speed is adjusted, if it was not playing before.

Waypoints and Waypoint Sets

How to create and edit and waypoints and waypoint sets.
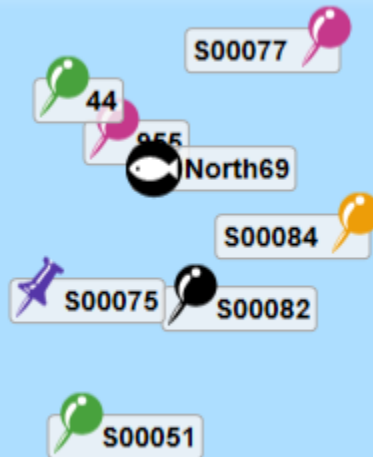
A *waypoint* is a point at a specific geographic location, stored as a pair of coordinates specifying longitude and latitude. Waypoints can contain further information, such as a name, depth at the location the waypoint was taken, notes and attached images. Additionally, all waypoints have an assigned symbol.

Each waypoint belongs to a *Waypoint Set*, which is simply a named collection of one or more waypoints. Waypoint sets are differentiated by colour; each waypoint set is assigned a colour, and all waypoints within that set are shown in that colour.

Viewing Waypoints and Waypoint Sets

- Waypoints can be viewed and edited in the edit windows of all asset types.
- Waypoint sets are listed under the *Waypoints* header in the Asset Library, from where they can be opened for editing, exported to file or deleted.
- When viewing waypoints in a graphical edit window, the visible waypoint sets, and how individual waypoints look, is controlled using the *Waypoint Toolbar (see below)*.

Waypoints Toolbar
The *Waypoints Toolbar* is part of the graphical display toolbar and is shown in all edit windows that display waypoints.

(1) Lock or Unlock Waypoints

Waypoints are *locked by default,* which them from being dragged by the mouse (when using the *Select* tool). Locking waypoints is useful to prevent accidentally moving them whilst performing other operations in the edit window. Use the *Lock or Unlock Waypoints* button to toggle the waypoint lock; the icon will change to an unlocked padlock when waypoints are unlocked.

When trying to drag a locked waypoint, a large padlock is shown in the centre of the edit area.

(2) Show or Hide Labels

Show or hide waypoint name labels using the *Show Labels* toggle button. *Note that display performance can be reduced if a very large number of waypoint labels is shown on screen.*

(3) Waypoint Size

Waypoints can be shown in two sizes; large and small. Use the *Waypoint Size* toggle button to switch between the two.

(4) Show or Hide Waypoint Sets
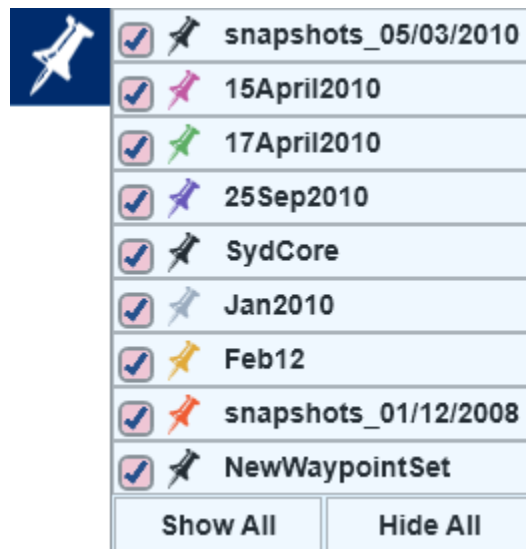
Toggle the visibility of individual waypoint sets within the current edit window.

A list of available waypoint sets is shown when the Show or Hide Waypoint Sets button is pressed. Toggle the display of individual waypoint sets individually using the check-boxes shown next to each waypoint set. Use the *Show All* or *Hide All* buttons to show or hide all waypoints.

Creating and Editing Waypoints

Waypoints in ReefMaster can either be imported from a GPS device or created within ReefMaster. New waypoints can be created by clicking in the graphical display area with the mouse in *Drop Waypoint* mode *(circled)*. A waypoint is created at the position of the mouse pointer and the *Edit Waypoint Window* is shown where further waypoint details, such as name and precise coordinates, can be edited *(see below)*.

The Edit Waypoint Window

Individual waypoints can be edited in the *Edit Waypoint* window, which can be opened by:

- Creating a new waypoint by clicking in the graphical area, with the mouse in *Drop Waypoint* mode.
- Double clicking on a waypoint in any graphical view, whilst the mouse is in select mode.
- Double clicking on a waypoint in the waypoint list in the *Waypoint Edit Pane (see below)*.
- Using the right mouse button menu in either graphical or list views and selecting the option *Edit Waypoint*.
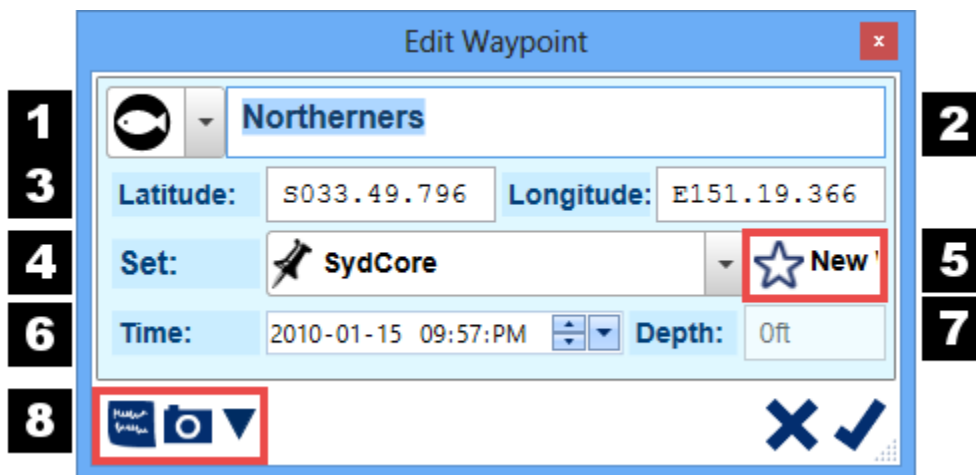
(1) Symbol
Select a waypoint symbol from the drop-down list *(see below for more on waypoint symbols)*.

(2) Name
Waypoint name.
ReefMaster can accept any string as a waypoint name, but many GPS devices cannot. Be aware of the limitations of your target device when entering waypoint names. For example, Humminbird waypoint names are limited to 11 characters long and display some characters differently, or not at all (e.g. the underscore character). When exporting, waypoint names will be truncated to suit the target device.

(3) Latitude and Longitude
Latitude and longitude can be entered by hand using the latitude and longitude fields. The format is specified in the Global Settings. All coordinates in ReefMaster use WGS84.

(4) Waypoint Set
All waypoints belong to a waypoint set *(see below)*. The waypoint can be moved to another set by selecting a set from the drop-down list box of available waypoint sets. Use the *New* button *(5)* to create a new waypoint set and move the waypoint into it. Note that you cannot copy a waypoint to another set from within the waypoint edit window.

(6) Time
The time the waypoint was taken, displayed in local or UTC time, depending on the Global Settings. This can be edited if required.

(7) Depth
The depth of the waypoint, as recorded by the originating device. This cannot be edited.

(8) Show/Hide Notes and Images
Show or hide the notes and images control *(see below).*

Waypoint Notes and Images
Any number of notes and images can be attached to waypoints using the *Notes and Images* panel, which can be expanded by clicking the *Show/Hide Notes and Images* button at the bottom left of the waypoint edit window. The notes and images panel contains separate tabs for notes and images, with buttons for adding, deleting and navigating through the notes or images shown underneath.

Notes

Notes are simply text, entered in a text editing window, with an associated time. There is no limit to the amount of text that can be entered for an individual note.

To add a new note, make sure that the *notes tab* is selected *(1)*. Click the *Add* button *(5)* and type or paste the required text into the text editing window *(2)*. The time of the note defaults to the current time, and can be edited if required *(3)*. To delete the currently displayed note, use the *delete* button *(4)*. Multiple notes can be navigated by using the arrow buttons next to the *Add* button.

Images

Images from disk can be attached to waypoints, so that they can be easily viewed within ReefMaster.

To add a new image, select the *images* tab and click the *Add* button *(3)*. A file selector window is show, from where an image file can be selected. Files in formats JPG, PNG and BMP can be selected.

Images can be "popped out" of the edit window using the button *(2)*. The image is enlarged and shown in the centre of the screen, and can be further zoomed with the mouse wheel. Click the screen anywhere outside of the image to close the pop-up.

Waypoint Symbols
ReefMaster has its own collection of waypoint symbols, most of which are related to the marine environment.

Symbols for Imported Waypoints
Many of the ReefMaster waypoints have near equivalents on most brands of GPS device. ReefMaster has internal mappings to the appropriate symbols for Humminbird and Lowrance devices, and is able to make "educated guesses" when importing waypoints from generic GPX files. This means that when importing a waypoint, ReefMaster tries to choose an appropriate symbol to match the symbol already assigned to the imported waypoint. If an appropriate symbol is not available, the default *round pin* symbol is used.

Preservation of Symbols on Export
When importing waypoints, the original waypoint symbol is saved internally, so that the same symbol can be used when exporting - regardless of the waypoint symbol that is shown in ReefMaster. This feature only works when exporting to the same file format as the original import format.

Waypoint Sets

- All waypoints belong to a *Waypoint Set*, which is simply a named collection of one or more waypoints.
- Individual waypoints belong to one and only one waypoint set, but a waypoint may be copied to multiple waypoint sets. Once a copy has been made of a waypoint, no link is maintained between the original waypoint and the copy; for example, changing the name of the copy will not affect the name of the original waypoint.
- Waypoint sets are single assets and as such can be exported individually or added to Data Sets.
- Any number of separate waypoint sets can be maintained in a single workspace, and viewed together in any edit window.
- The visibility of Individual waypoint sets in a particular edit window can be toggled using the *Show/Hide Waypoints* button in the *waypoints toolbar*.

Creating a New Waypoint Set
A new waypoint set can be created by using:

- The *New Asset* button in the *Waypoint* header of the [Asset Library](#).
- The *New* button in the *Waypoint Edit Pane (see below)*.
- The *New Waypoint Set* option when copying or moving waypoint(s).
- The *New Asset* option in the Global View screen-level context menu.
- The *New Waypoint Set* button in the Waypoint Edit Window (see above).
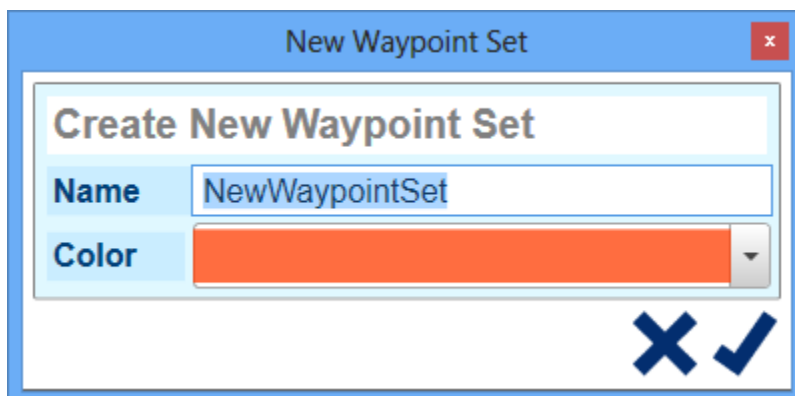
The *New Waypoint Set* window is shown, where a name and colour can be selected for the new set.

Moving and Copying Waypoints Between Waypoint Sets

Waypoints can be freely moved or copied between waypoint sets, either singly or in groups. When moving or copying a group of selected waypoints, the waypoints can originate from any number of different waypoint sets.
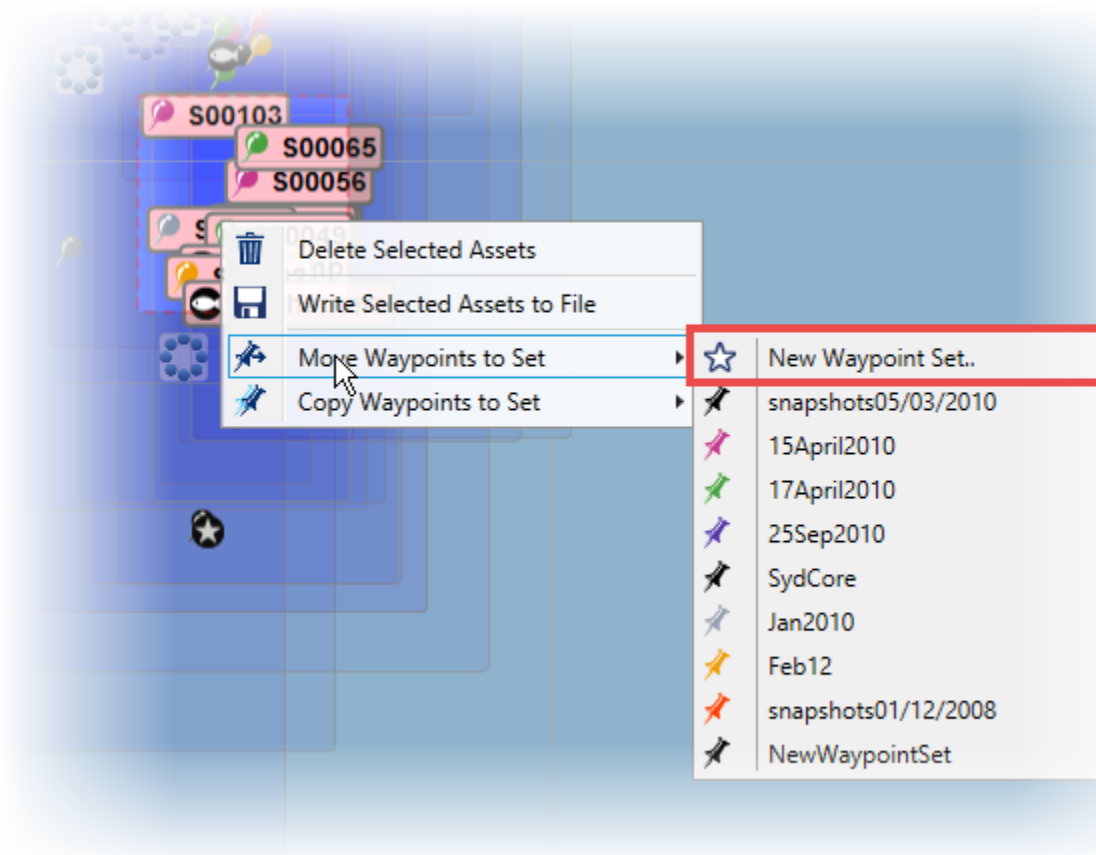
To move or copy one or more waypoints between sets:

- Use the context menu of singly or multiply selected waypoints in the graphical edit area (multiple waypoints can be selected using the *region select* tool).
- Use the context menu of one or more selected waypoints in the waypoint list in the *Waypoint Edit Pane (see below)*.
- Individual waypoints can be moved to another waypoint set from within the Waypoint Edit Window.

Waypoints can be moved or copied to a new waypoint set by choosing the *New Waypoint Set (circled)* that is displayed above any existing sets.

The Waypoint Edit Pane

The *Waypoint Edit Pane* contains properties and edit options for waypoint sets, as well as a sortable list of waypoints. for each set.

The waypoint edit pane is part of the Global View, displayed by using the *Waypoints* button in the display area of the global view or by selecting a waypoint set for editing from the Asset Library, through double clicking or use of the context menu.

(1) Active Waypoint Set
Set the active waypoint set, for which the properties in and waypoint list are shown.

(2) New Waypoint Set
Create a new waypoint set.

(3) Name
The name of the waypoint collection. Waypoint set names are only used by ReefMaster so there are no length or character restrictions.

(4) Colour
The colour for the waypoint set can be selected from the drop-down list.

(5) Time Zone
The time zone of the waypoint set. All waypoints within a set are assigned to the same time zone. If waypoints within a set belong to different time zones, and viewing local times is required, the set should be split such that all waypoints in a set belong to a single time zone. The time zone property only affect the display of waypoint times, not how they are stored.

(6) Collection Properties
Read-only properties of the waypoint set including number of waypoints, geographic and time ranges. If the

waypoint set was imported from a file, the name of the source file is also shown. Otherwise, the source file field is left blank.

(7) The Waypoint List
All waypoints in the selected waypoint set are shown in a sortable list.
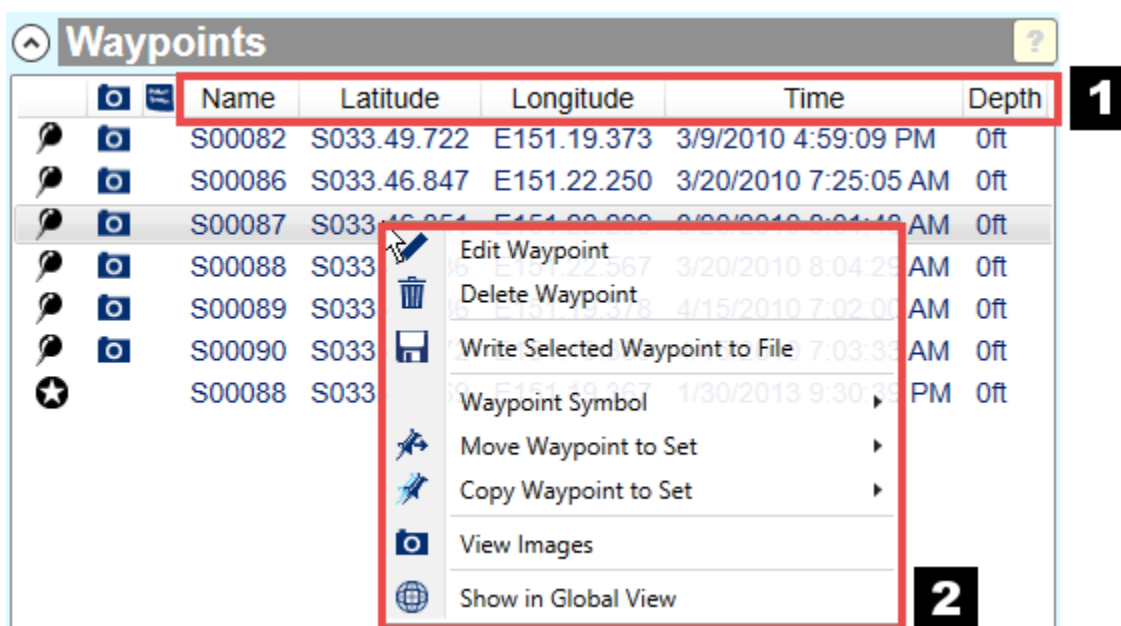
- Each waypoint is shown as a separate item in the list with *Symbol, Name, Latitude and Longitude, Time and Depth* columns. Icons indicate whether images or notes have been attached to the waypoint.
- The list can be sorted on any column value by single clicking once on the column header. Clicking on the column header once more reverses the sort order.
- Waypoints can be singly or multiply selected in the list; to select multiple waypoints, use the left mouse button in conjunction with the *Shift* key. Toggle individual selected waypoints using the mouse left button in conjunction with the *Control* key.
- Standard waypoint actions as *Edit, Delete, Write to File, Move* or *Copy to Set* can be performed on selected waypoint(s) using the context menu, activated with the right mouse button. The additional option *Show in Global View* pans and zooms the global view to show the selected waypoint.
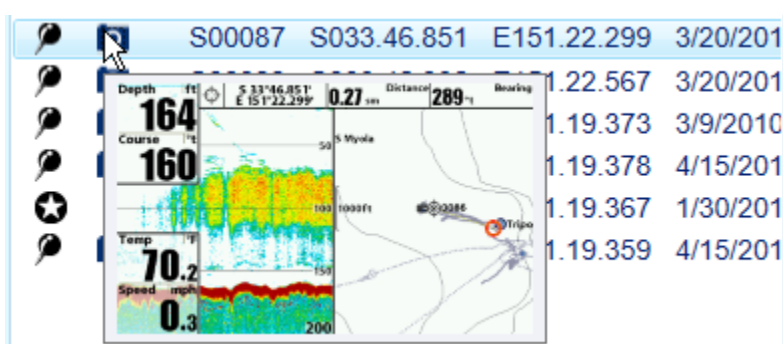
- If an image is attached to the waypoint, it can be previewed by holding the mouse pointer over the image icon. Single clicking the icon "pops out" the image to the centre of the screen, from where it can be further zoomed with the mouse wheel if required. The image can be closed by clicking in any part of the screen apart from the image.

Map Projects

Map Projects are underwater maps generated using the data from track logs.
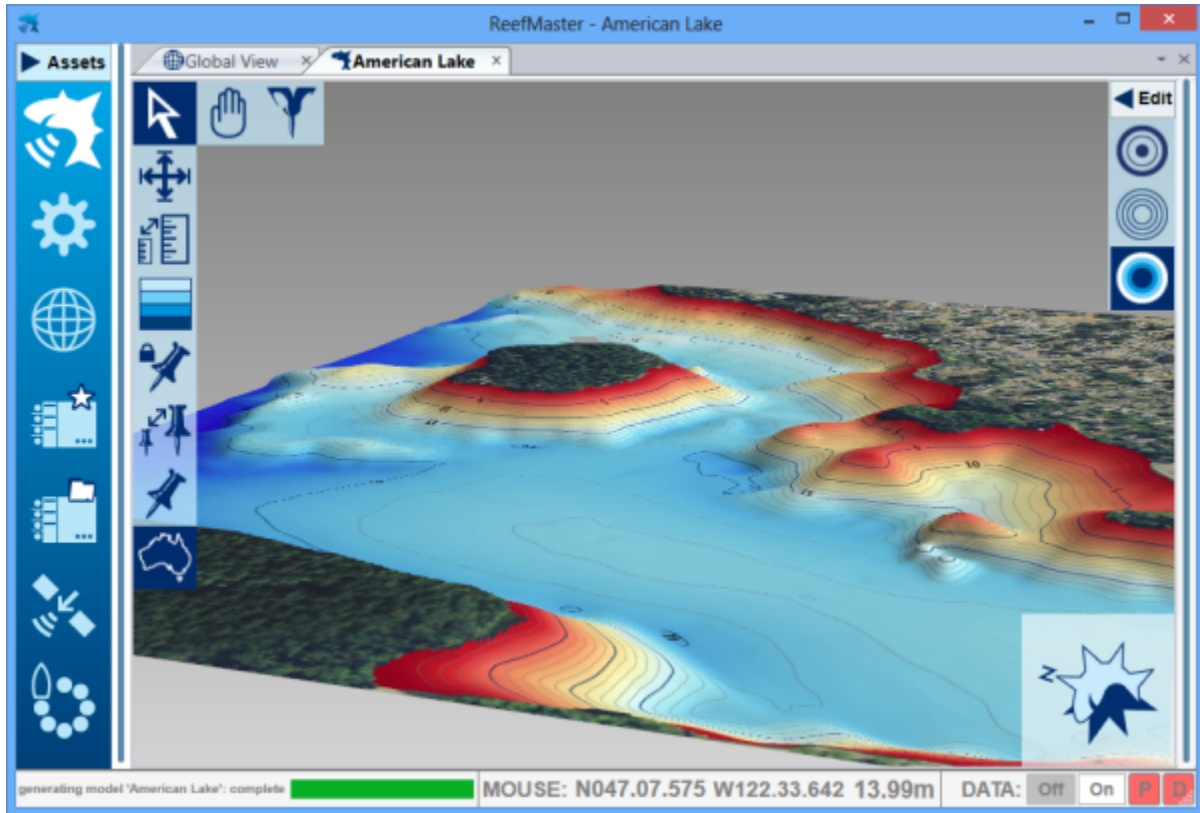
Underwater maps are generated using the depth and position information from track-points contained in one or more Tracks. Once generated, maps can be viewed in 2D and 3D, and contours can be exported for use in maps on a GPS device. Map images can also be exported.

Documentation for *Map Projects* is split across the following pages:

- Creating a Map Project
- The Project Edit Window
- The Project Properties Window
- The Define Map View
- The Contour View
- The 3D View
- Shorelines and Islands
- Image Overlays

For an introduction that demonstrates the main features of map projects, follow the tutorial Start to Finish - Create a Fishing Map for Your GPS.

Creating a New Map Project

There are a number of different ways to create a new map project; "empty" map projects can be created, which contain no tracks, using the *New Project* command in the Asset Library or the Global View, or new projects can created by selecting one or more tracks and using the *Add Tracks to Project* command.

Creating a New Map Project From the Asset Library
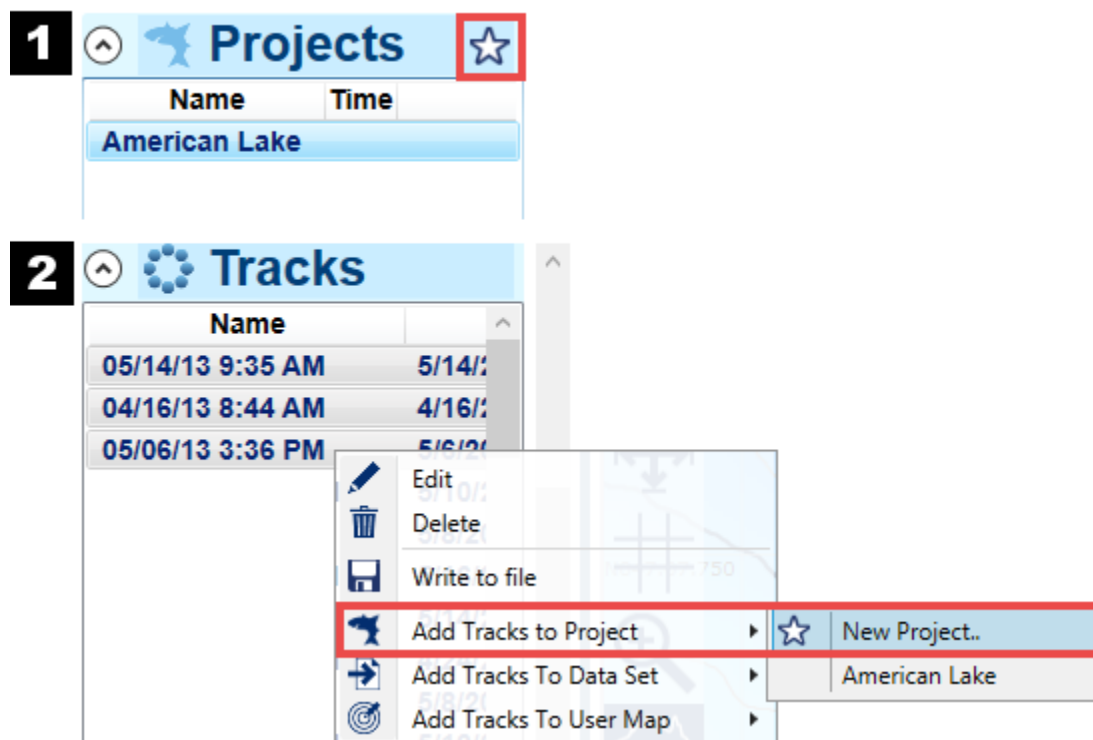
(1) New Project Button

An empty new project can be created using the *New Asset* button in the header of the projects list in the Asset Library.

(2) The Track Context Menu

Select one or more tracks in the *Tracks* asset list and right click to display the context menu. Select the option *Add Track to Project/New Project*. If other projects exist within range of the selected track, they will also be listed under the *New Project* option, and the track(s) can be added to one of those projects. Projects of which the track is already a member can not be selected. When a project is created via the track context menu, the selected track(s) are added to the new project.

Creating a New Map Project from the Global View

Context Menu

An empty project can be created using the *screen-level context menu* in the Global View.

Selected Track(s)
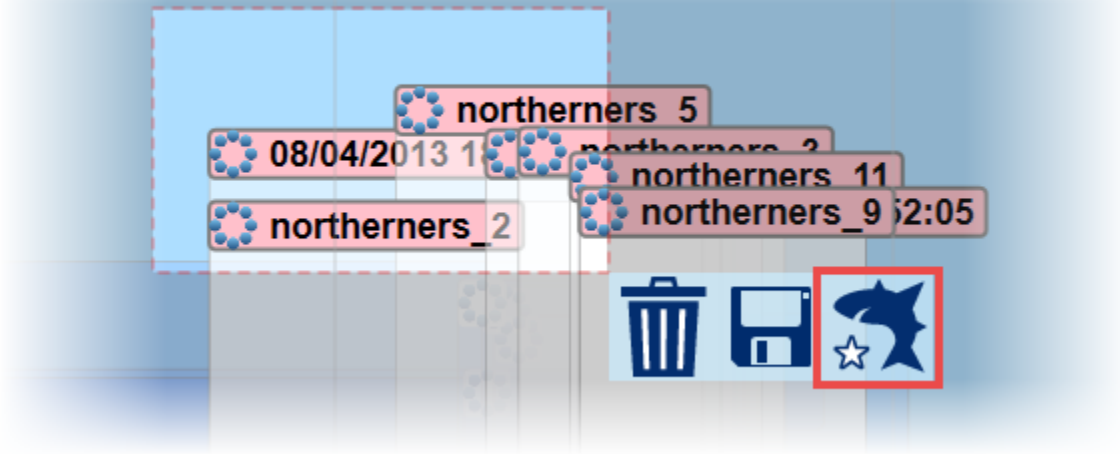
Select one or more tracks in the global view, using the mouse in multi-select mode. Click the *Add Tracks to Project* button, shown on the multi-select tool-bar, and select *New Project*. A new map project is created containing the selected tracks. Alternatively, right click on a selected track and select *Add Tracks to Project* from the context menu.

The New Project Window
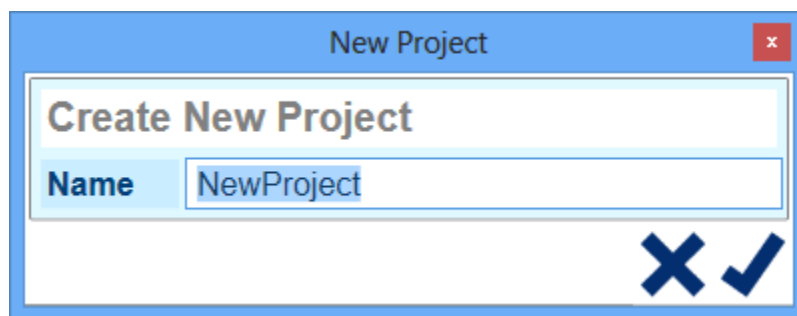
Whichever method is used to create the new project, the *New Project* window is shown. A name can be entered for the project, and the project is created once the OK button is pressed. Once the project has been created, the Project Edit Window is opened, with Define Map as the selected view.

Making a Map

A map project needs one or more tracks in order to provide the depth data. Optionally, a map can also contain shorelines and islands, which help define the map area and can also provide depths in areas too shallow to access in a boat (e.g. the shoreline itself, with a depth of zero).

The steps required to create and view an underwater map are:

- Import sonar or track logs, to create one or more ReefMaster Tracks.
- Create a new Map Project and add the imported track(s).
- Add shorelines and islands, if required.
- Define the area of the Map, so that the map is generated.
- View the generated contour and 3D maps.

This process is described in detail in the tutorial Start to Finish - Create a Map for your GPS which is a good introduction to the mapping in ReefMaster.

The Project Edit Window
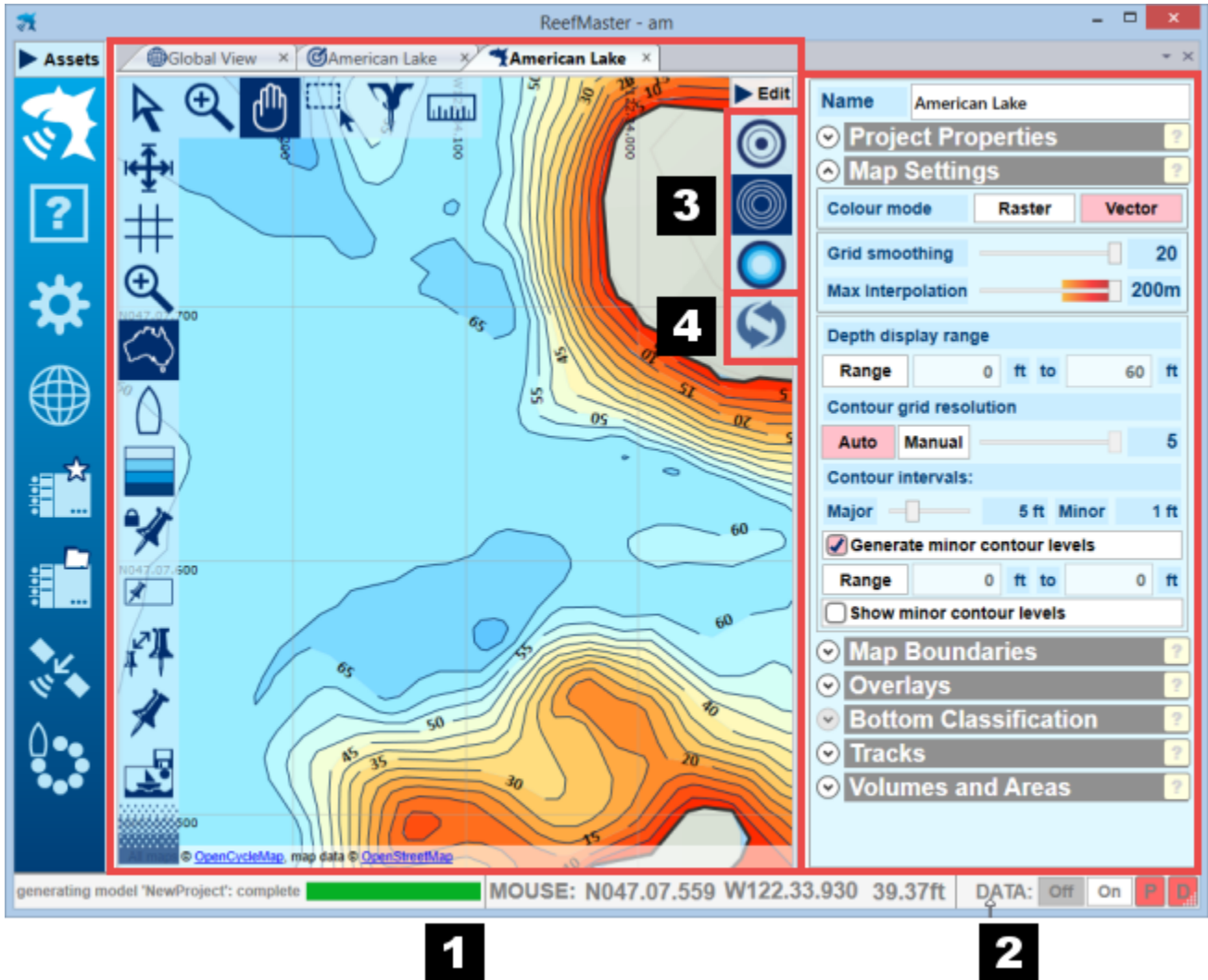
The *Project Edit Window* has a standard [Edit Window](#) layout, with a graphical edit area *(1)* and an expandable edit pane *(2)* with detailed editing options and properties display. The tool-bar options within the edit area vary depending on the selected *Project View.*

Project Views

The *Map Project Edit Window* has three separate *Views; Define Map, Contour* and *3D*, which provide different editing functions and view options. To move between the three views, use the *Project View* buttons in the top right hand corder of the edit area *(3, above)*.

Project View Selection Buttons

(1) Define Map View
The Define Map View is where the mapped area and map boundaries are defined and edited. This view also shows all of the tracks that belong to the map project, from where they can be opened for editing or removed from the project. When a map project is first created, the *Define Map* view is shown. The mapped area must be defined in the define map view before the contour or 3D maps can be viewed in their respective views.

(2) Contour View
The Contour View shows the generated map in 2D, with contour lines overlaid on a coloured depth background. Contours can be selected from the contour view for export to a GPS device or *User Map.* The contour map view can also be exported as an image for import into Google Earth or graphics applications.

(3) 3D View
The 3D View shows the generated map in 3D.

Generating the map

When map parameters are changed, the map needs to be re-generated to reflect these changes.

The map can be regenerated by clicking the *Generate Map* button **(4)**. Note that the regenerate map button is only enabled when there are pending map changes.

Project Properties

1	**Name**	Angle Lake

2 ⌃ **Project Properties** ?

Num. Tracks	3
Min Depth	0.03ft
Max Depth	52.13ft
Min Lat.	N047.25.504
Min Long.	W122.17.613
Max Lat.	N047.25.976
Max Long.	W122.16.812

3 ⌃ **Map Settings** ?

Colour mode	Raster	Vector

Grid smoothing		15
Max Interpolation		100m

Depth display range

Range	0	ft	to	0	ft

Contour grid resolution

Auto	Manual		1

Contour intervals:

Major		5 ft	Minor	1 ft

☑ Generate minor contour levels

Range	13.1	ft	to	32.8	ft

☑ Show minor contour levels

4 ⌄ **Map Boundaries** ?

5 ⌄ **Overlays** ?

6 ⌄ **Bottom Classification** ?

7 ⌃ **Tracks** ?

Component Tracks

07/18/13 9:02 AM
07/18/13 9:58 AM
07/18/13 10:43 AM

Add Tracks Add Live Track

✚ **Add all overlapping tracks**

✚ Add selected tracks

07/18/13 10:56 AM

1. Name

The name of the project. This can be any string and does not need to be unique.

2. Properties

Read only display of project properties:

- Number of component tracks
- Minimum and maximum depths
- The coordinates of the bounding rectangle

3. Map Settings
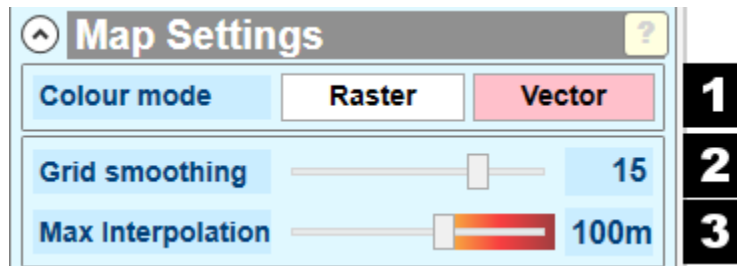
(1) Colour Mode
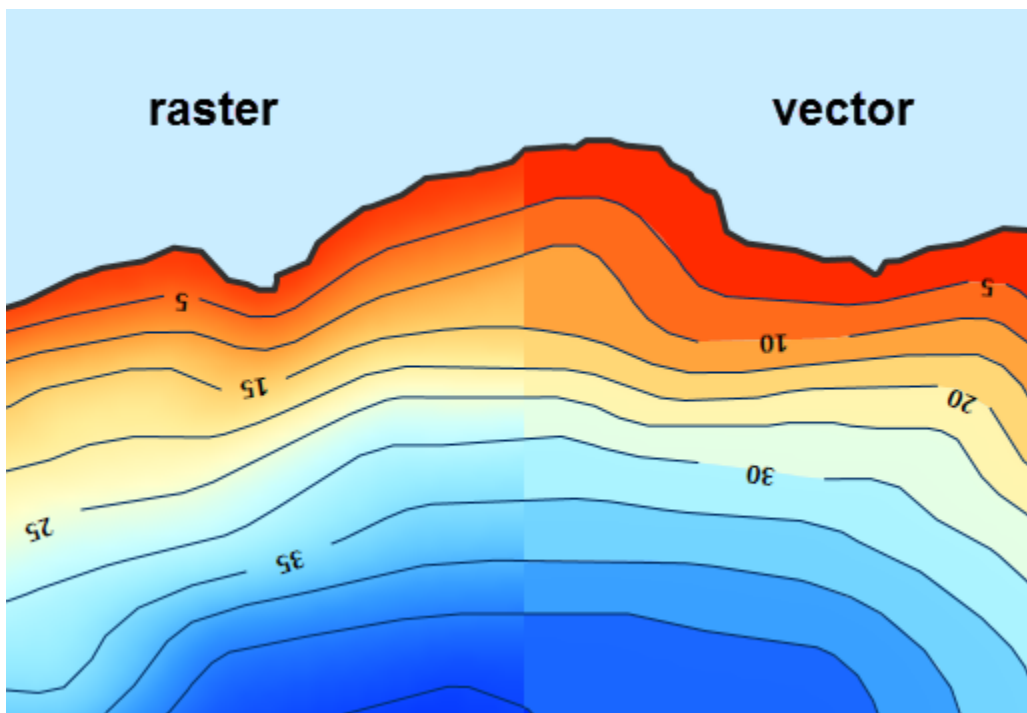
Depth colours can be represented as a single background *raster* or by a collection of *isobaths,* which are polygons that enclose an area within a specified depth range. Isobaths are selected using the *vector* option.

Raster mode

Raster mode displays depth colours as an image behind the contour lines. This image is derived from the grid that is used to generate the map, where each depth within the grid is drawn as a point with a particular colour. Raster backgrounds can be good for highlighting small variations in depth that would not be apparent in vector mode, for image exports and as colour backgrounds in some GPS map formats (e.g. AT5 maps for later Navico units).

Large raster backgrounds can consume a lot of memory and create maps with large file sizes, which can be a consideration when targeting some devices. Since the grid containing project depths is always generated as part of the map generation process, raster mode is available for any generated map without further

processing.

Vector mode
When vector mode is selected, additional processing is performed to generate the polygons that surround each depth area. The generated polygons are known as *isobaths* and are generated for each depth-range defined by the specified major contour interval. Isobaths typically consume much less memory than an equivalent raster background, and provide a number of advantages over raster backgrounds for styling and exporting maps; for example, the colour of a specific depth-range can be changed very easily. Isobath polygons can be used to create detailed maps with small file sizes and are useful for exporting to formats such as Google Earth KML (for display on mobile devices) and other GIS applications.

Note that, due to the extra processing required, generating maps in vector mode may take significantly longer than when generating only the raster background.

(2) Grid Smoothing
The higher the value, the more the detail in the map is smoothed. High smoothing values can be useful to generate smoother contour lines, e.g. for export to a GPS device, and to create better looking maps with sparse data. Smoothing large maps with high smoothing values can be a time consuming process.

(3) Max Interpolation
ReefMaster interpolates depth values between the depth points in the tracks that belong to the map project. *Max Interpolation* refers to the maximum distance over which this interpolation will occur. Increasing the maximum interpolation distance will fill out more of the generated map, but it is important to be aware of the fact that interpolated values are simply estimates of a depth between known values.

Maps with high maximum interpolation values may contain areas of significant inaccuracy.

Contours

Contours are lines defining areas of equal depth. See Contour View.

4. Map Boundaries

Lake, river or ocean shorelines and islands can be defined through the use of Map Boundaries. Map boundaries can also be used to precisely define the mapped area.

See Shorelines and Islands.

5. Bottom Composition

6. Image Overlays

The Image Overlays feature allows imported images to be shown on the 2D and 3D map views, either in front of or behind the map contour layer. Any number of images can be added to the project, and the relative order and transparency of image can be adjusted.

See Image Overlays.

7. Tracks

All map projects contain one or more tracks, which provide the depth data used to generate the map. The *Tracks* edit pane is where tracks and be added to, and removed from, the project.
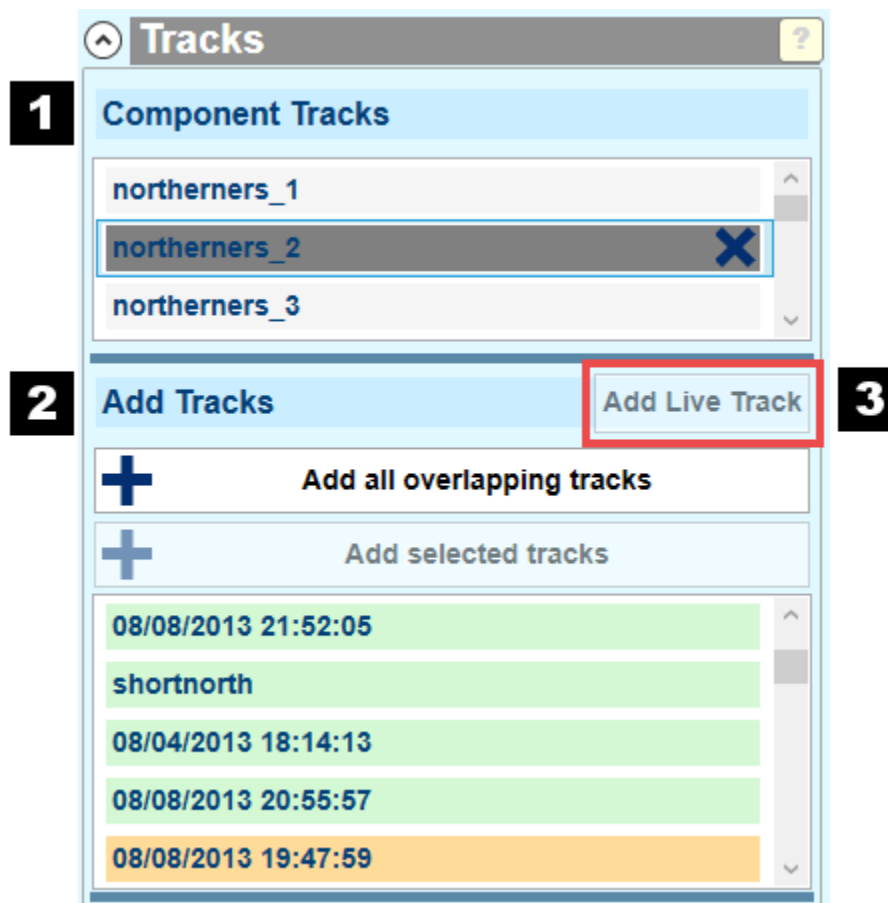
(1) Component Tracks

The *Component Tracks* list shows all of the tracks that are currently part of the map project. Tracks can be removed using the *Remove (X)* button within the track row, or using the context menu activated using the right mouse button on the track item. The map updates automatically when a track is removed. Other options in the context menu are *Edit* and *Show in Global View*, which open the track for editing or zoom to the track within the Global View. A graphical track preview is displayed if the mouse pointer is held over the track item.

(2) Add Tracks

The *Add Tracks* list contains a list of tracks that can be added to the current project. Tracks that overlap the current project are highlighted in green. Tracks that are within range of the current project, but do not overlap, are highlighted in orange. The contents of the tracks list updates as the size and/or position of the current map changes.

Tracks can be added to the project by clicking the *Add (+)* button in the track list item. Alternatively, one or more tracks can be selected and added using the Add selected tracks button. All overlapping tracks can be added simply by hitting the Add all overlapping tracks button. The map updates automatically when a track is added to the project.

(3) Add Live Track

The Live Track is a track that is currently being logged via NMEA. The *Add Live Track* is enabled only when a track is being logged, and adds the live track to current project. Note that since a live track is treated in the same way as any other track within ReefMaster, this button is just a convenient short-cut; it is also possible to add the live track to the project by selecting it from the *Add Tracks* list in the same way as any other track.

Define Map View

The Define Map view is one of three views available in the edit area of the project edit window, and is where the area and boundaries of the map project are defined and edited.
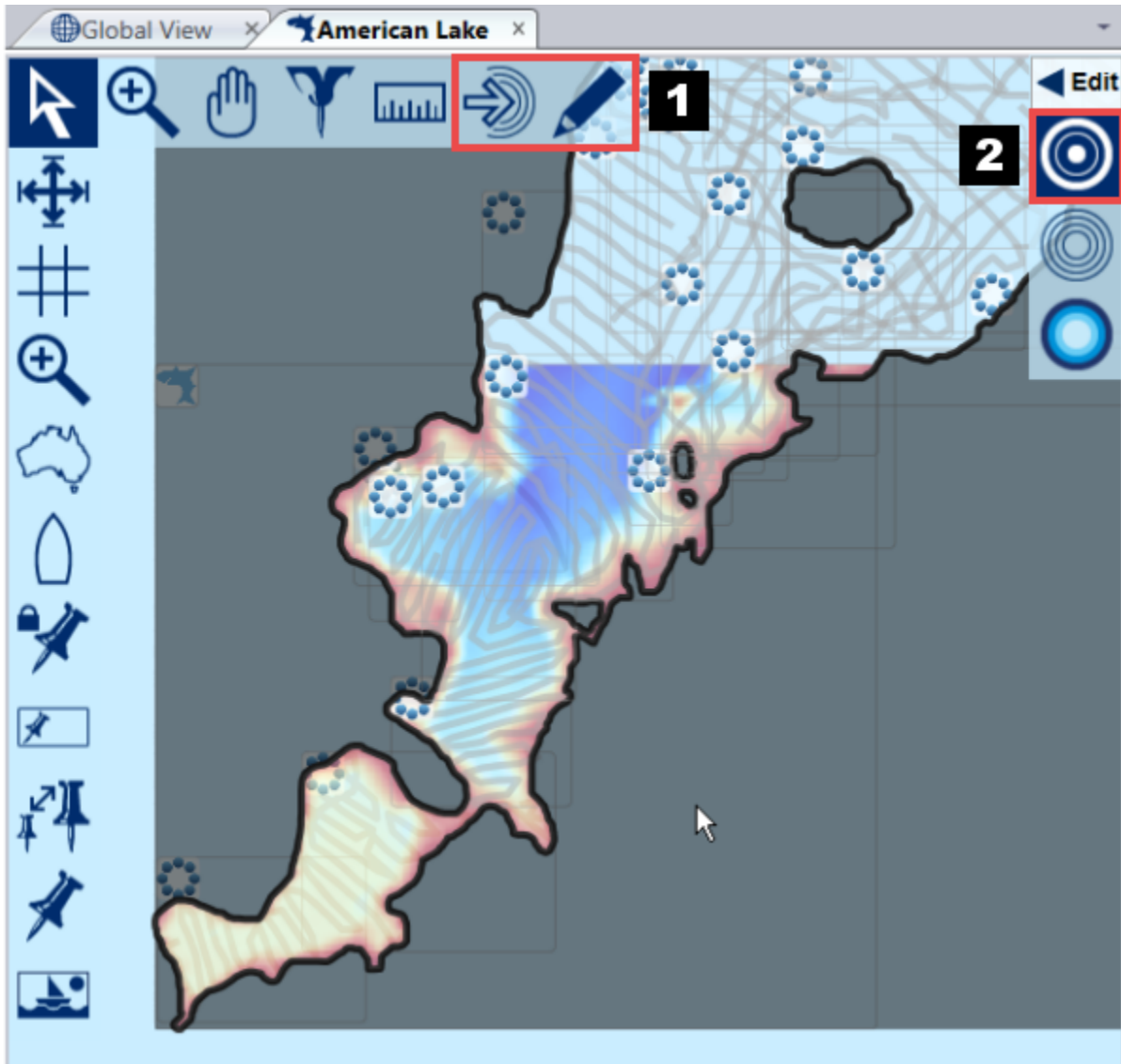
The *Define Map View* is the default project view when no map area has been defined - for example, when the project has just been created.

To show the *Define Map View,* select the *Define Map View* button *(2)* in the project view selection toolbar, from within a Project Edit Window.

The graphical editing area of the define map view displays all of the project's member tracks, along with any map boundaries that have been defined. Shaded areas within the view indicate areas of the map that will be excluded from the final map as a result of the defined Shorelines and Islands. The *mouse-mode selector toolbar* contains two modes specific to the define map view; *Define Map Area* and *Draw Boundary (1),* described in detail below, and in Shorelines and Islands.

Tracks in the Define Map View
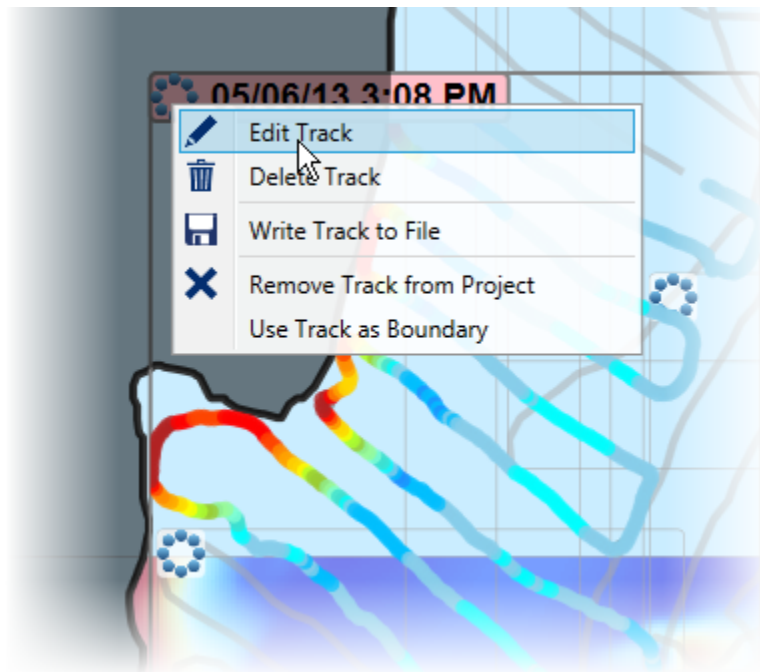
The project's member tracks are shown, overlaid, with grey trails and the standard track icon in the top-left corner. Holding the mouse pointer over a track icon or track trail highlights the track, and shows depth colours for the individual track-points within the track, which are relative to the maximum and minimum depths *within that track*. Standard track operations are available, such as *Edit* and *Delete Track*, along with the project-specific actions *Remove Track From Project* and *Use Track as Boundary (see* Shorelines and Islands*).* Double-clicking the track icon, or directly on top of the track trail, opens the track for editing in a new Track Edit Window.

Defining the Mapped Area
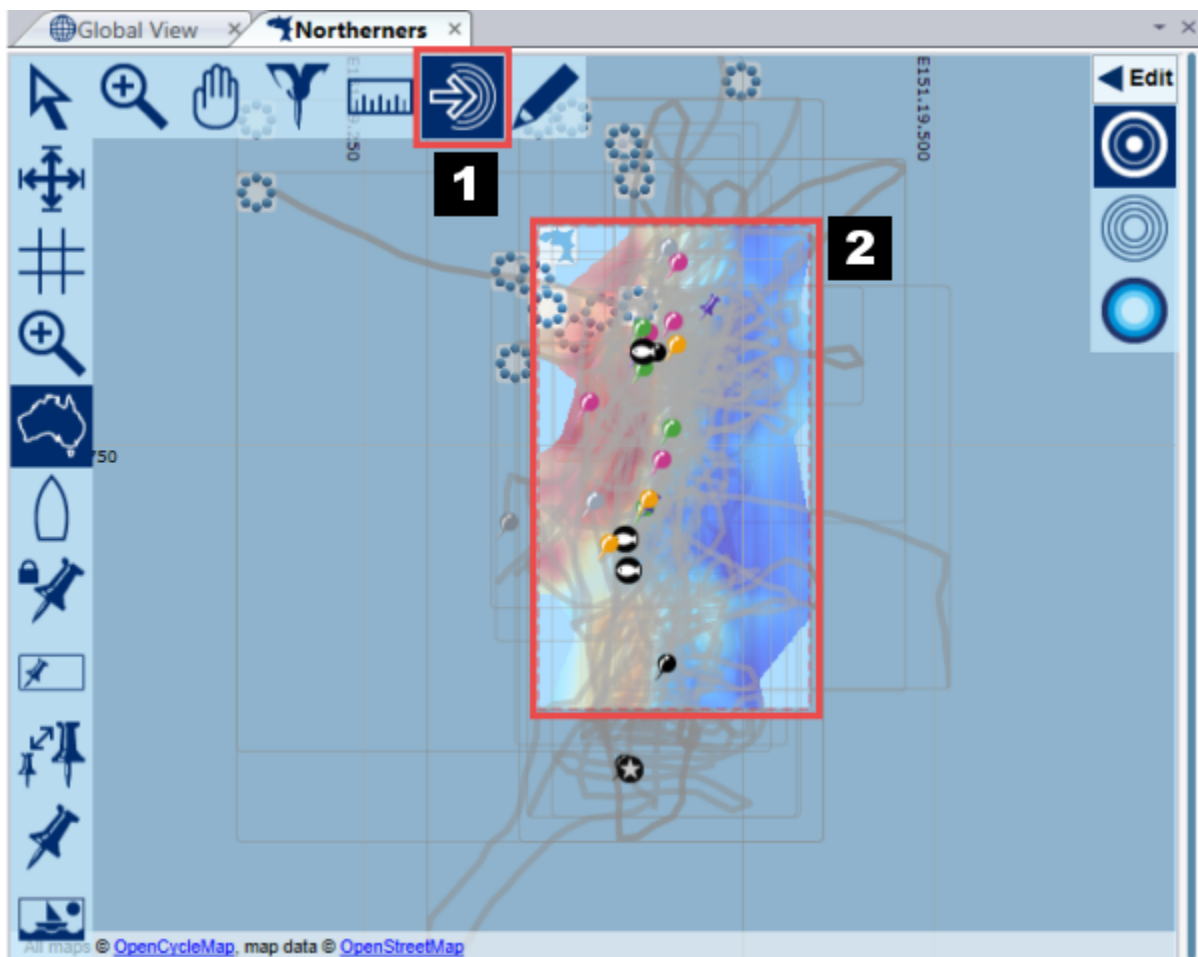
Before a map can be generated, the map area must be defined. This is done by drawing a region with the *Define Map Area* tool *(1).*

- With the mouse mode set to *Define Map Area*, draw a region around the required map area by holding the left mouse-button down and moving the mouse. A rectangular region is highlighted within a dashed red border, indicating the area that will be generated.
- Release the left mouse-button to begin the map generation.

Once the map area has been selected, the map is generated. As it can take some time to generate maps, progress indicators are shown within the edit area and application status bar, where further information about the current state of the generate process is also displayed.
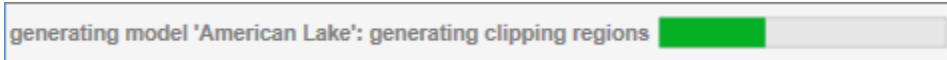
Once the model has been generated, a coloured background is displayed representing the calculated depths within the mapped region. The generated map will now be available for display in the Contour and 3D views.

Note that it is possible to continue using ReefMaster whilst the map is being generated, as map generation is executed as a background task.
The map is automatically re-regenerated any time that the data used by the map is changed. For example, if a track is added or removed to the map, or if any values within a component track are changed.

The Contour View

The Contour View displays the underwater map as contour lines shown on a background coloured by depth, and is where contours can be selected for export to a GPS device or User Map, and an image of the map can be saved to disk for printing or use in Google Earth and other software packages.
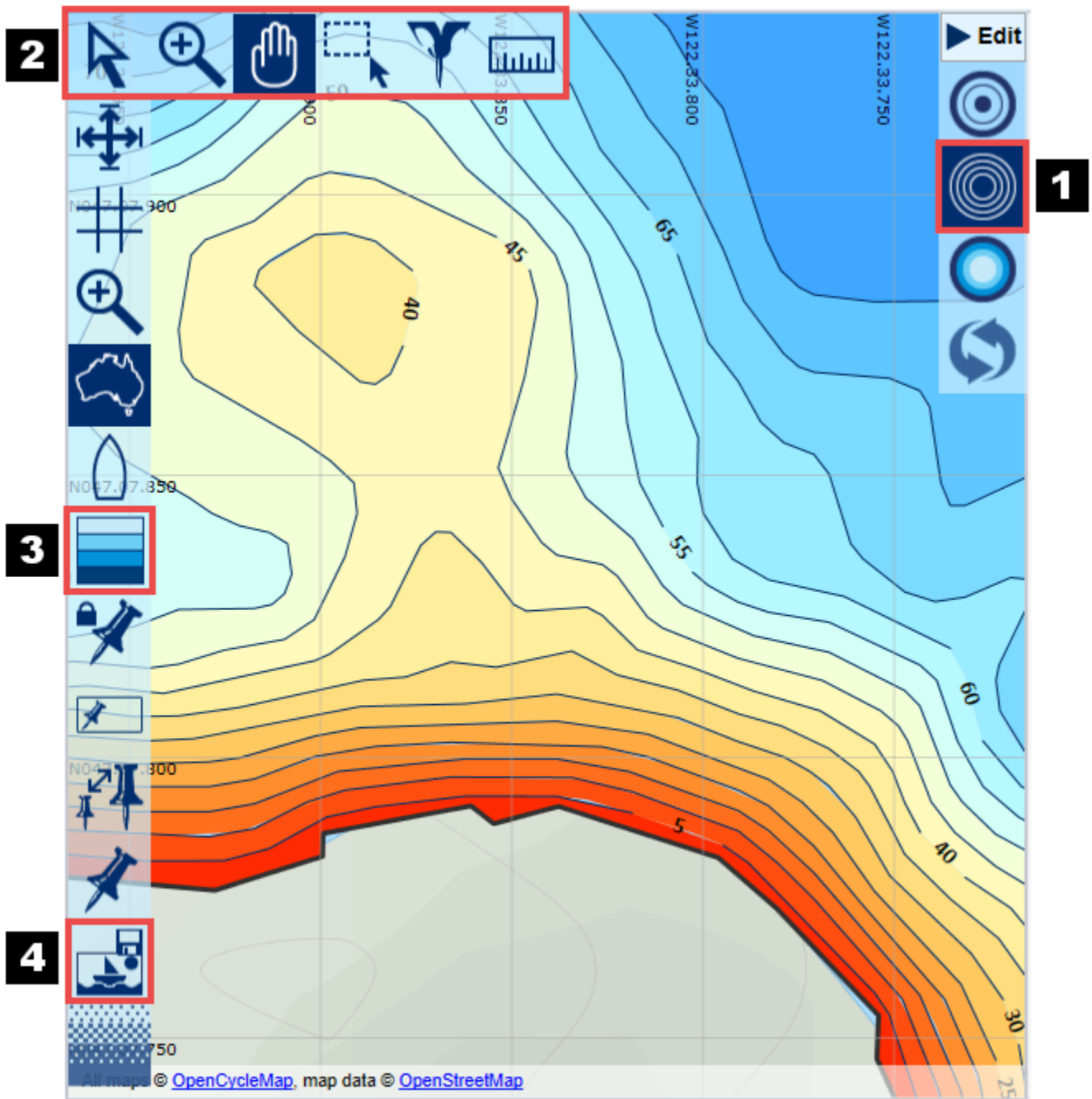
The *Contour View* is selected using the middle of the view icons *(1)*, and is the default view when opening a map project, once a map area has already been defined in the Define Map View. No map is shown in the contour view if a map area has not been defined.

Contour View Toolbars

The *Mouse Mode Selector* toolbar *(2)* contains the standard Edit Window mouse modes, while the toolbar at the left of the edit area contains two functions specific to the contour view; the *Palette Selector (3)* and *Export Map Image (4)*. Both of these options are described in detail below.

Configuring the Displayed Contours

The contour display settings are located in the *Map Settings* section of [The Project Properties Window](#).

Contours are displayed as *Major* and *Minor* levels. Major levels are shown as bold lines with depth labels, minor lines are fainter and do not display depth. Whether a given depth level is displayed as a major or a minor line depends on the current *Contour Spacing.* When the map is created in *vector mode*, isobaths are created for the depth-ranges specified by the major contour interval.

(1) Depth display range
Colours for the raster or vector depth backgrounds are derived from the depth relative to the minimum and maximum depths within the current project. The minimum and maximum depth values can be overridden for display purposes by specifying a *depth display range*.
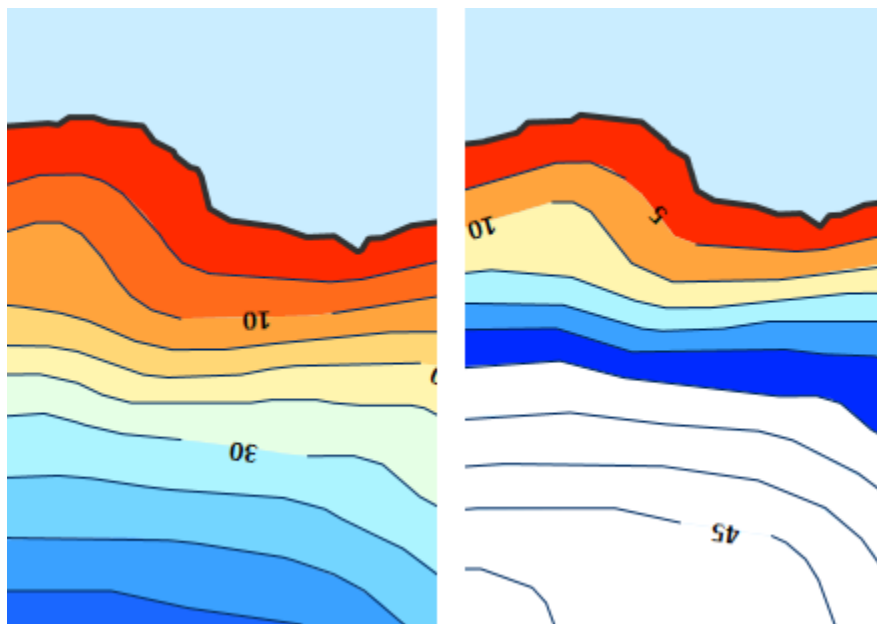
No range specified versus depth display range of 0 - 25 feet

Using a specified depth display range can be useful when generating multiple maps. If the same range and palette is used in all maps, then the colours for particular depths will be the same.

(2) Contour Grid Resolution
The resolution of the grid used to generate contours, specified in metres. This value can be determined automatically, or set explicitly to the required value. Lower values produce better quality contours with more points within each contour path, but also increase the time taken to generate the map significantly.

Since generating contours is one of the most time-consuming parts of the map generating process, care should be taken when selecting low resolution values for large maps. In practice, it is usually best to leave this setting to Auto, and only generate high resolution contours when required; for example, to export contours to a User Map or GPS.

(3) Contour Intervals
The depth interval between the displayed contour lines.

Contour lines are generated at set depth intervals, defined in feet or metres depending on the global depth unit settings. Contour lines are shown as major lines, drawn more prominently with accompanying depth labels, and minor lines, which are drawn less prominently and without labels.

Major contours can be generated down to a minimum increment of 0.5m or 1 ft, whilst the maximum contour increment is determined by the depth range of the current project. When generating vector maps, isobaths are created for depth-ranges defined by the major contour interval.

To change the major contour spacing interval, adjust the slider to the required value. The spacing of minor contour levels adjusts automatically as the major contour spacing is changed.

Contour generation can be a time-consuming process, so generating fewer contours (using a larger interval) can result in significantly faster map generation.

(4) Minor contour levels
Minor contours are generated between major contours, at an interval that is derived from the current major contour spacing.

Generate minor contour levels
Select this option to generate minor contour levels at the displayed interval. If minor contours are not required, this option should be de-selected to speed up the map generation process.

Range
The generation of minor contour levels can be confined to a defined depth range by using the *Range* option. Limiting the generation of minor contours speeds up the map generation process, and is useful for producing maps where a high level of contour detail is only required over certain depth ranges.

To apply a range limit for minor contours:

- Select *Range.*
- Enter the upper and lower depth ranges in the first and second depth fields, respectively.

The *Range* function is only available when *Generate minor contour levels* is checked.

Show minor contour levels
The visibility of minor contour lines can be toggled using the *Show Minor Contour Levels* check box. Toggling the display of minor contours does not require regeneration of the map, so long as minor contours have already been generated.

Note that any changes to contour settings requires the map to be regenerated.

Exporting Map Objects to a GPS or User Map

Contours, boundaries, isobaths and hardness areas can be exported directly to file, or to a User Map where they can be further edited and combined with other features, such as tracks.
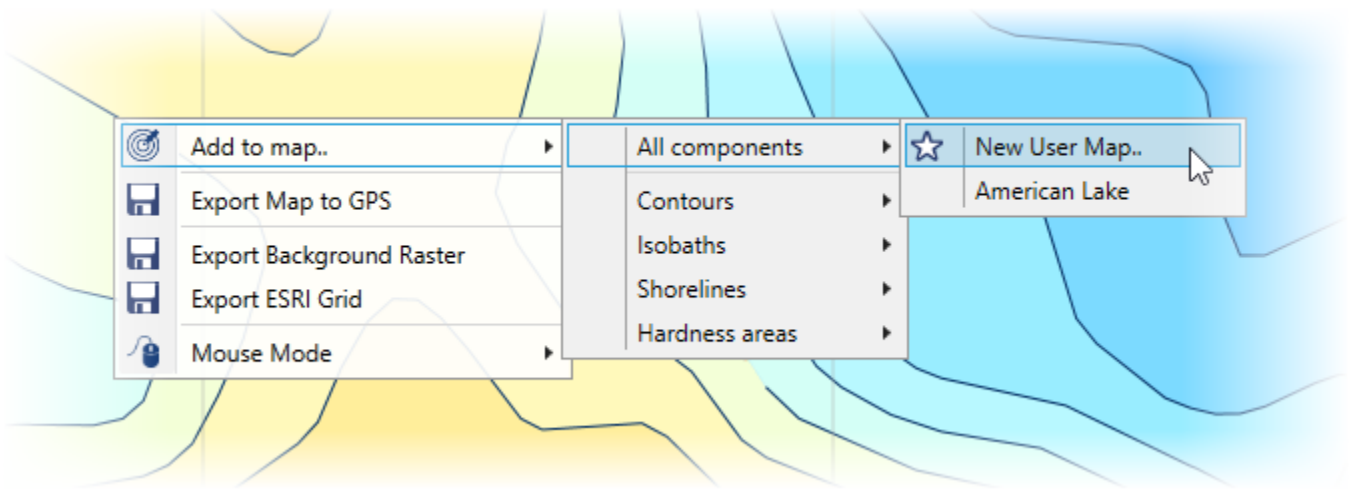
To export map objects, bring up the *screen-level context menu* by right-clicking with the mouse in the graphical edit area.

Adding objects to a User Map

To add items to a *User Map,* select option *Add to Map..* and select either *All components* or the required item type. To add the items to a new user map, choose *New User Map.. or,* to add to an existing user map, choose the required map from the displayed list.

Exporting a Map

Select option *Export Map to GPS* to export the map as a file suitable for use in a GPS device, or further software packages. The Export GPS Assets window will be displayed, from where further export options can be chosen.

Exporting a map in the Navico AT5 file format

When exporting a map in the Navico AT5 format (for use in Navico GPS units) there are a number of things to consider:

- When exporting a map in *raster mode*, the background raster can be included in the export. Maps generated in this way will only display properly on units that support raster backgrounds; Lowrance HDS gen one and later, and some later Simrad systems.
- When exporting maps in *vector mode,* the selected palette **must be AT5 compatible** when exporting to the AT5 format. RGB palettes are not compatible with AT5 maps, and all isobaths will appear white if an RGB palette is selected.
- Google Earth KML format maps can use either RGB or AT5 palettes, **but do not support raster backgrounds**; maps should be in vector mode when exporting to KML (note that it is possible to export a calibrated image for use in Google Earth, see *export map image*, below).

Exporting the Background Raster

Select the option *Export Background Raster* to export the raster image and associated *pgw (world)* calibration file.

Export ESRI Grid

ESRI grid is a raster file format that is compatible with a wide range of GIS applications.
To export the map grid, select the option *Export ESRI Grid* from the right-button menu.
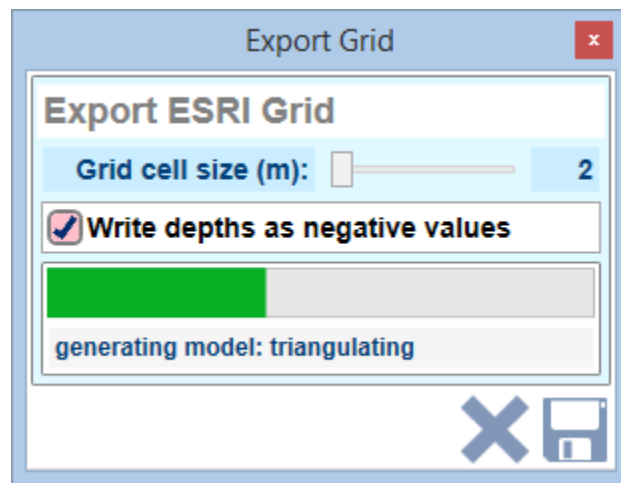
(1) Grid cell size
Grid size can be specified in metres, in the range 1 - 20. Note that the exported grid is specified in geographical coordinates, with square grid cells *in terms of degrees*. This means that, unless the map is located on the equator, grid cells in the exported file will not be square in terms of metres. The specified grid cell size applies to the horizontal dimension; the vertical grid size in metres will be the north/south distance covered by the number of horizontal degrees in the specified size (so usually, somewhat larger than the horizontal grid dimension).

(2) Write depths as negative values
By default, depths are written as negative values. Un-check this option to write depths as positive values.

All ESRI grid depths are specified in metres.

Palette Selector and Colours for Lines and Labels

The background palette can be changed using the palette selector, which contains a list of available colour palettes for the contour map background image.
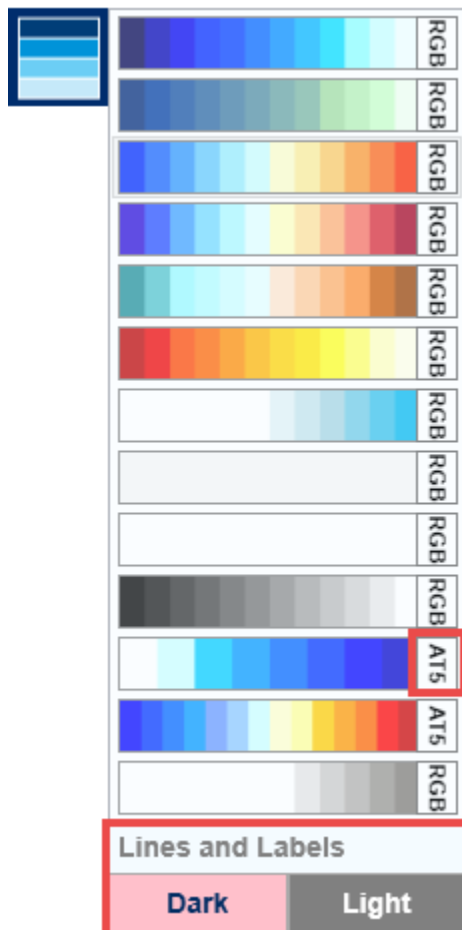
Choose a new palette by clicking on the required palette in the displayed list.

Palettes can be *RGB,* with colours specified by their Red, Green and Blue values, or *AT5,* with individual colours specified by a colour code used in Navico GPS systems. The type of each palette is indicated by a tag shown at the right of each palette in the list.

Lines and Labels

Contour and boundary lines, and associated depth labels, can be shown in dark or light colours so that they can be seen easily on different coloured backgrounds.

Export Map Image

The contour map can be saved to disk as an image file, from where it can be printed, used in other applications, posted on the internet etc. Images are exported as *PNG (Portable Network Graphics)* files, which are compatible with a wide range of software applications and preserve image transparency.

The appearance of the export image - for example, grid lines and the background palette - are taken from the current state of the contour view. To produce an export image without grid lines, for example, remove the grid lines in the contour view before selecting Export Map Image.

To export a map image, click the *Export Map Image* button in the contour view toolbar:
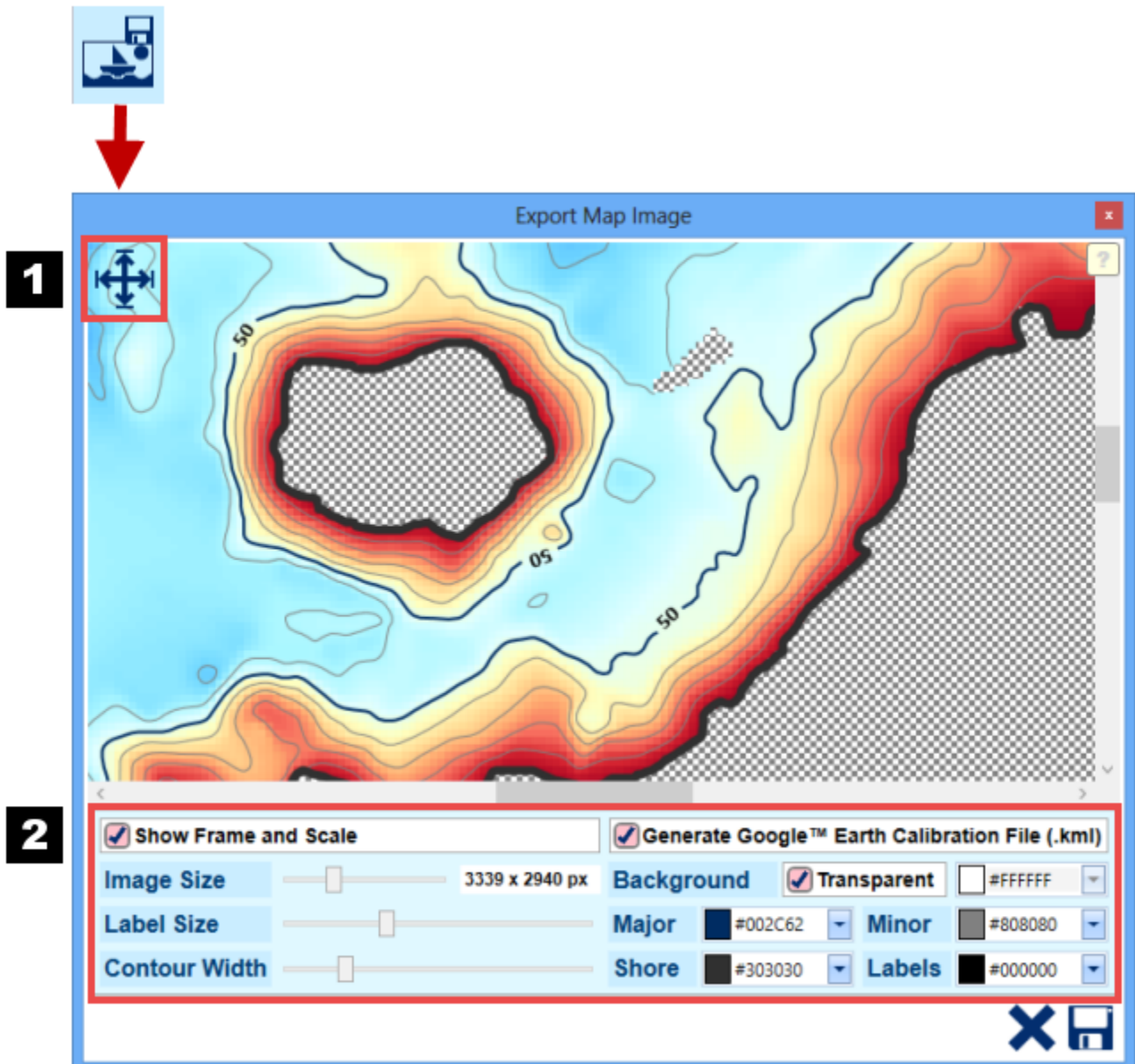
The *Export Map Image* window is shown which displays a preview of the export image and image

configuration options *(2)*. The preview image can be sized to fit the available window size, or shown in a scrollable view at full size. Use the *Fit Window* button *(1)* to toggle between these two modes.

Image Configuration Options

(1) Show Frame and Scale

Adds a frame, compass rose and scale to the image, and insets the map within the frame. This option is useful when creating a map image for printing. The frame is proportioned to fit standard printing paper, either portrait or landscape depending on the relative proportions of the map image.
If the frame and scale option are unchecked, the export image dimensions match those of the map area rectangle. This option is useful for creating image overlays for other mapping applications, e.g. Google Earth™.

(2) Image Size
Use the slider to adjust the final image size, which is displayed to the right of the slider. Creating large images using a lot of memory; ReefMaster will show an error message if there is not enough memory to create the image at the requested size.

(3) Label Size

Use the slider to adjust the relative size of the grid, depth and waypoint labels.

(4) Contour Width
Use the slider to adjust the thickness of the contour and boundary lines.

(5) Generate Google Earth™ Calibration File
Create a *Google Earth KML* calibration file, that can be read by the Google Earth™ mapping application. When a KML file is opened in Google Earth™, the associated map image will be overlaid in the correct location on the Google Earth™ map. The KML file is an additional file to the generated image file, and both the KML and PNG files must be present in the same disk location for use by Google Earth™.

(6) Background Colour
Check *Transparent* for a transparent image background, which is represented in the preview window as a checker-board pattern. If this option is unchecked, an alternative background colour can be selected using the colour-picker.

(7) Colours for contours, boundaries and labels
Colours for Major and minor contours, map boundaries (shorelines and island), and depth labels can all be set individually using the colour-pickers.

The 3D View

The *3D View* displays the map model in 3D, where it can be zoomed, panned and rotated. Waypoints can be viewed, edited, and moved around the map.
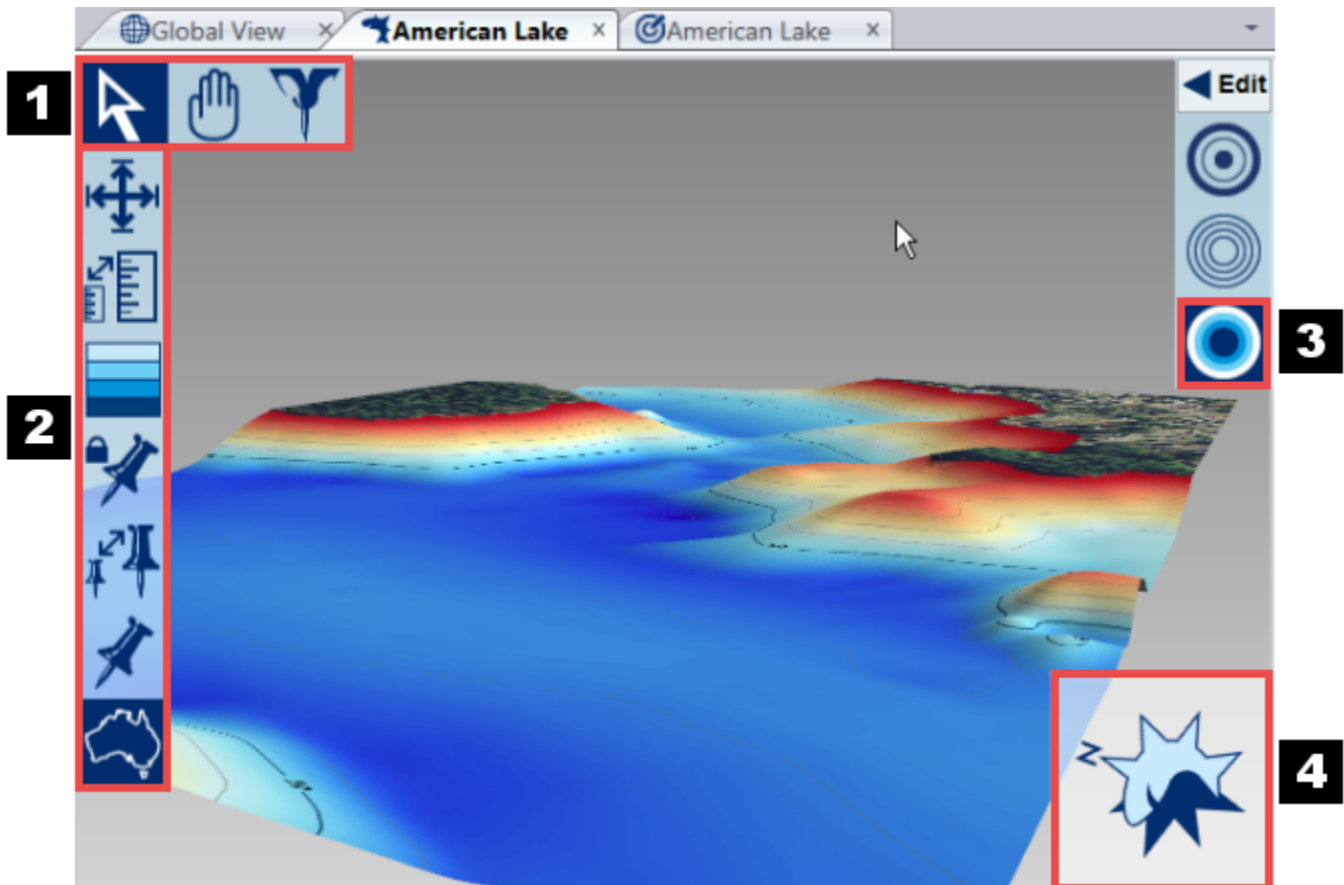
The 3D View is selected using the bottom of the project view icons *(3).* No map is shown in the 3D view if a map area has not been defined in the Define Map View.

A compass rose *(4)* indicates the direction of north by rotating with the map as it is moved.

1. Mouse Modes

The *Mouse Mode Selector* toolbar *(1)* contains modes *Select, Pan* and *Drop Waypoint*.

- With the mouse mode set to *Select*, the model can be rotated using the left mouse button, and waypoints selected for editing by double-clicking.
- The map can be moved with the mouse in *Pan* mode by moving the mouse with the left mouse button held down.
- If the mouse has a middle button, the map can be moved whilst in any mouse mode by moving the mouse with the middle button held down.
- Waypoints can be created by clicking on a point in the map with the left mouse button, with the mouse in *Drop Waypoint* mode.
- The context menu for a waypoint can be shown by right-clicking on the waypoint. It does not matter which mode the mouse is in.
- The map can be zoomed using the mouse wheel, or by holding the right mouse button down whilst moving the mouse up or down. Note that to zoom using the right mouse button, the pointer must not be over a waypoint when the right button is pressed.

2. 3D View Edit Toolbar

The edit toolbar for the 3D view contains many of the same functions as the standard edit windows, such as *Fit Window* and the standard waypoint functions.

Several extra functions are specific to the 3D view:

(1) Vertical Scale
Adjust the relative vertical scale of the 3D model.
The vertical scale can be modified in the range 0 - 10 times, whilst maintaining a constant scale along the longitude and latitude axes. Increasing the vertical scale exaggerates the appearance of depth changes, which can be help visualise changes in depth, especially in larger maps.

To adjust the vertical scale, click the *Vertical Scale* button, which opens the *Vertical Scale Control*, and move the slider *(2)*. The map will adjust in real-time, and the current scale value is displayed behind the slider. To reset the vertical scale to 1.0, click the button *(1)*.
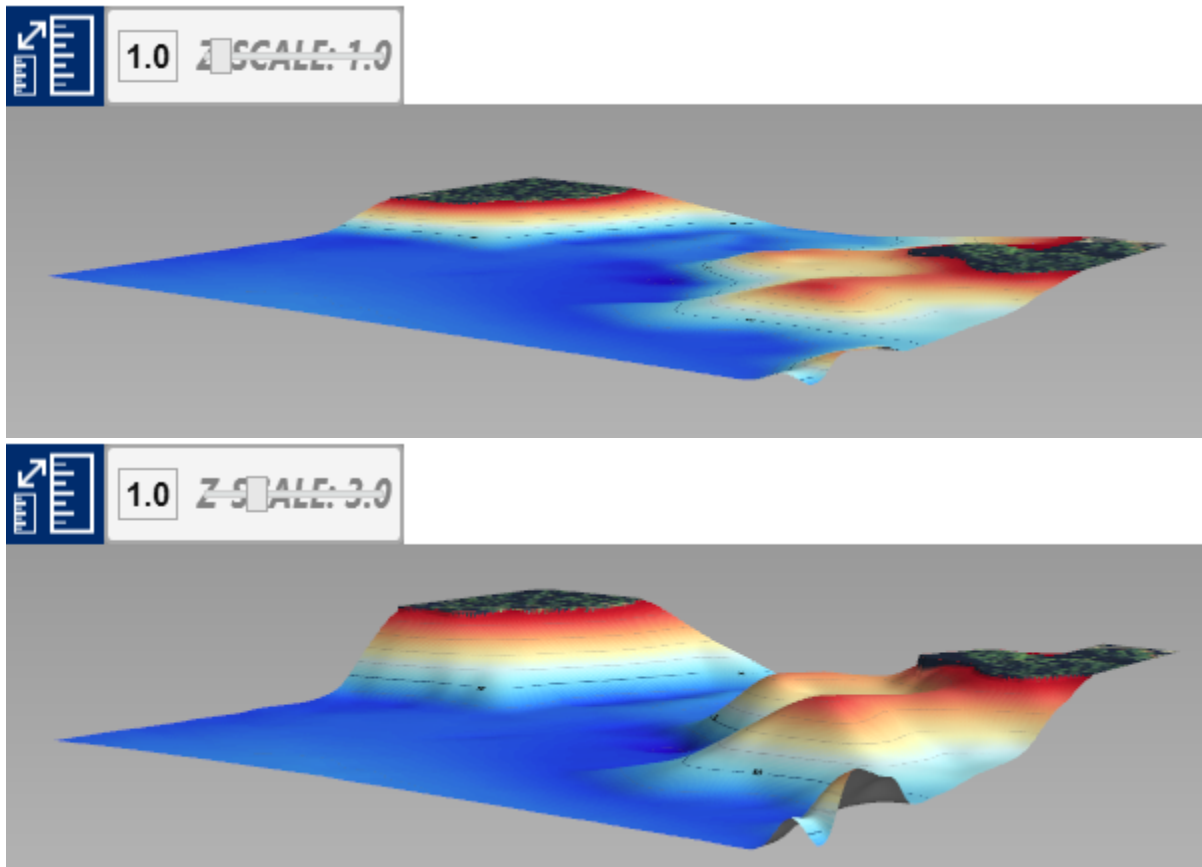
(2) Palette
Change the palette. The *Palette Selector* is described in the [Contour View](#).

(3) Waypoint Size
[Waypoints](#) are shown on the map in 3D, and can be opened for editing by double-clicking or operated on through the context menu by using the right mouse button, just as in the 2D views. When unlocked, Waypoints, can be dragged around the map surface; with the mouse in *Select* mode, click and hold the left mouse button on a waypoint and move it with the mouse. With the mouse in *Drop Waypoint* mode, new waypoints can be created on the map by clicking with the left mouse button.

Waypoints can be adjusted in size using the slider in the *3D Waypoint Size* control.
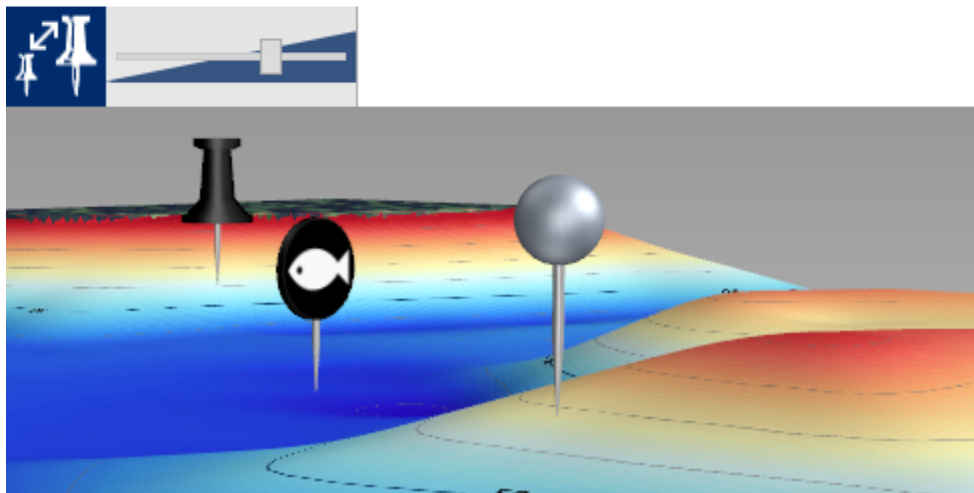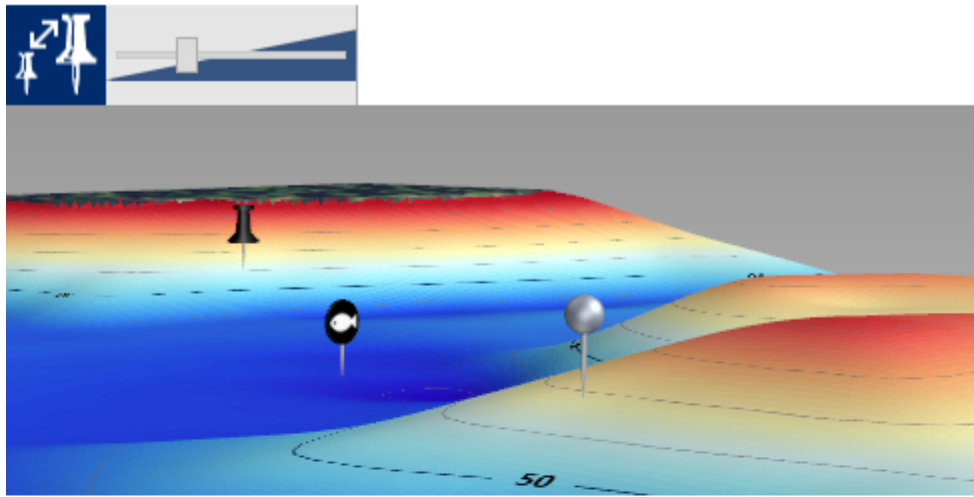
(4) Show or hide the map
Click the map button to show or hide the land mass in the 3D map. This option is only effective when a shoreline and/or islands have been defined for the project. All land is shown at a relative elevation of 0m.

Shorelines and Islands (Map Boundaries)

Map boundaries are user-defined paths that are added to a map project which serve to define the region in which the map is created and can, optionally, also provide depth information that is used during map generation.

Lake, river and ocean shorelines and islands can be defined through the use of Map Boundaries. Map boundaries can also be used to precisely define the mapped area.

A typical use of a map boundary would be to define the shoreline of a body of water, with a known depth of zero. The zero depths associated with the shoreline are included in the map calculation as if they were recorded track-points, enabling depth values to be interpolated between the shore and recorded track-points.

There can be at most one shoreline per map project, and any number of islands.

Note that adding a new map boundary, or editing an existing one, does not trigger automatic regeneration of the map. To re-generate the map after adding or changing a boundary, redraw the map area with the Define Map Area tool.

Map Boundary Properties

Map boundaries can be added and edited in the Project Properties Window and in the Define Map project view.
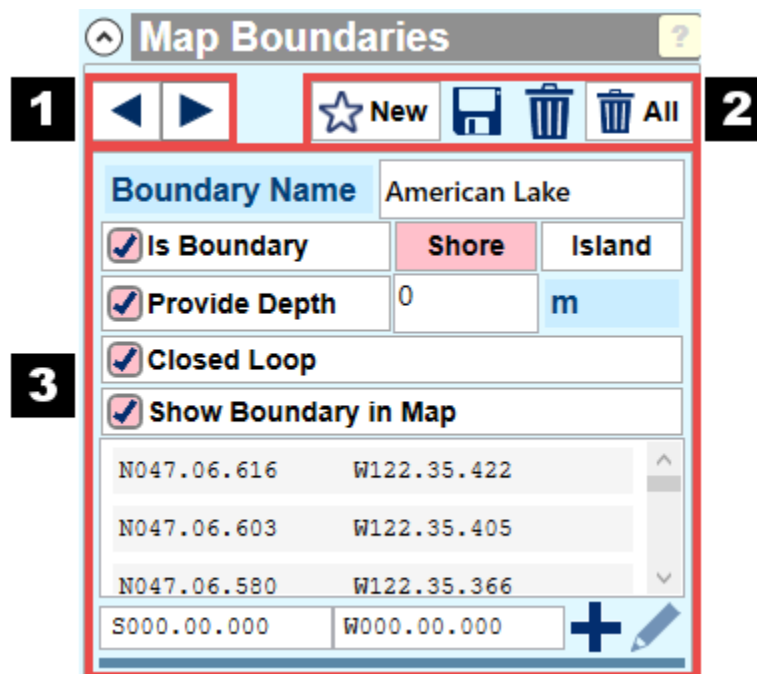
Move between boundaries in the project using the forward and back buttons *(1)*. The properties for the currently selected boundary are shown in the boundary properties panel *(3)*. Buttons to create a new boundary, import a boundary or delete one or all boundaries are contained within panel *(2)*.

Adding a Map Boundary to a Project

Importing Map Boundaries

Map boundaries can be imported directly into a project from Google Earth™ KML and KMZ files, *Shapefile* polygons or lines, or from tracks contained within GPX files.

To import map boundaries, click the *Import Boundary* button **(circled)**. A file selection window will be shown, from where one or more KML, KMZ, GPX or Shapefile files can be selected. Any number of files can be selected, with any mix of file types. Click *Open* in the file selection window to import the selected files.

By default, imported boundaries are treated as islands. This is simply because there are typically more islands than shorelines in a project, and reduces the workload significantly when importing large numbers of island boundaries.

Importing Boundaries From Google Earth Files
Tracing shoreline outlines in the Google Earth application is a good way to create boundaries:

- Trace the required boundary in Google Earth as either a polygon or a path. Both polygons and paths are treated the same in ReefMaster, which considers all boundaries to be closed loops.
- Save the polygon or path object; ReefMaster supports both KML and KMZ Google Earth file formats.
- Import the boundary into ReefMaster by following the import process described above.

Tracing boundaries in the field - the most accurate source of map boundaries
On-line map sources such as Google Earth can be very good, but are not always absolutely accurate. The most accurate way to create a map boundary is to walk a shoreline with a hand-held GPS unit and record the trail. It should be possible to convert the recorded track to a GPX file, which can be imported into ReefMaster for use as a boundary.

Using a Track as a Map Boundary
Any track within the workspace can be used as a map boundary. To add a track to a project as a boundary, use the context menu of a (single) selected track in the Asset Library, or right click a single track in the Global View. Select the option *Add track to Project as Boundary*.

To use a track that is already part of the project as a boundary, right-click the track within the Define Map view and select the option *Use Track as Boundary*. A new boundary will be added. Note that the original track will not be removed from the project in this case; remove the track manually if only the boundary is required.

Boundaries created from tracks do not retain the depth information that was present in the track.

Creating a Map Boundary within ReefMaster
Map boundaries can be created directly in the Define Map view, and drawn with the Pencil tool, or by adding path points individually to the list-box shown in the edit pane.

Drawing a New Map Boundary

To create a new map boundary using the pencil tool, simply select the Pencil mouse mode and draw a boundary. Ensure that no existing boundary is currently selected before starting the new path, or else the newly added points will be added to the selected path. The boundary can be drawn using a continuous mouse movement with the left mouse button held down, or individual points can be added by clicking the left mouse button. Path points can be deleted by using the right-click activated context menu or the path-point list box in the edit pane. Boundary editing uses the same editing functions as *path editing* in User Maps, where it is described in detail.

Creating a New Map Boundary with Explicit Path Points
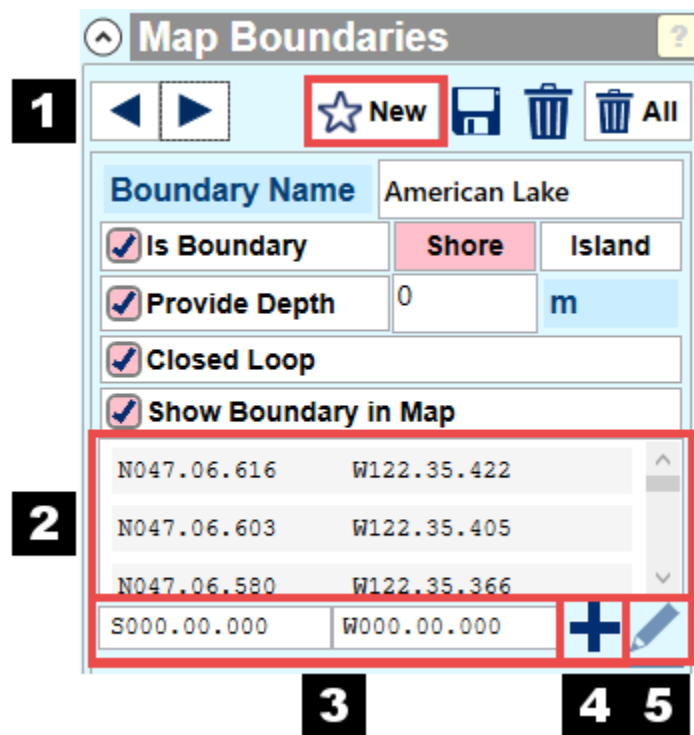
Click the *New* button in the map boundaries properties panel *(1)* to create a new boundary. Individual points for the boundary path can be entered in the latitude and longitude edit boxes *(3)*; to add a new point, click the *Add (+)* button *(4)*. To edit an existing path-point, first select the path point in the points list *(2)*, edit the latitude and longitude in the latitude and longitude boxes *(3)* and commit the change using the *Edit* button *(5)*.

Splitting large maps using map boundaries
When mapping a very large area, it can be useful to split the map between several map projects, and recombine the contours in a single, large, [User Map.](#) This can be done by using map boundaries created with explicit path points *(see above),* which can be used to define the mapped area of a project very precisely.

- Create boundary rectangles for each different map project to define the mapped area, using precisely entered path-point values to describe the corners of the rectangle. The boundaries of each project should be adjacent, so that the boundaries of all the required map projects combine to create a single large area.
- Set the boundary type of each boundary rectangle to *Shore*.
- Set the properties of the rectangle boundaries; *Is Boundary* and *Closed Loop* should be set to true, and *Provide Depth* and *Show Boundary in Map* should be false.

The map projects will generate contours only within the defined boundary areas. Contours from the adjacent map projects can then be recombined in a single *User Map* to create a finished map.

Map Boundary Configuration

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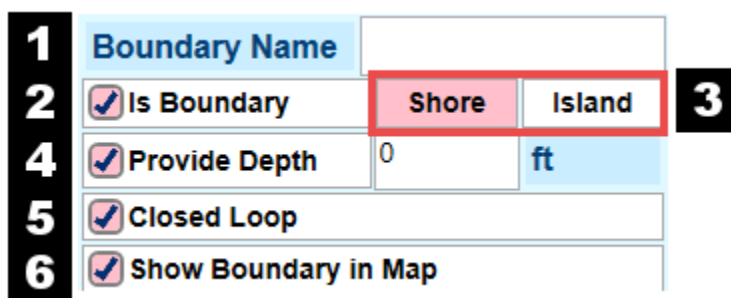
1. Name
Optional name field can be used to provide a descriptive name for a boundary. This field is populated with the name of imported polygons or paths when importing boundaries from Google Earth™.

2. Is Boundary

Specifies whether or not the boundary acts as a barrier during map generation. When this option is set, no contours are generated in the excluded areas. Typically, this value is set to yes, although it can be useful on occasion to provide depths from a path that does not act as a boundary (see *Provide Depth*, below).

3. Shorelines and Islands

Boundaries are always treated as closed polygons, and act to exclude data points from the generated depth map from either inside or outside the boundary area.

Shore

When a boundary is set to act as a shoreline, all data *outside* of the defined polygon is excluded. Note that this behaviour means that it is not possible to define, for example, two distinct shorelines within one map project. ReefMaster enforces this by allowing only a single shoreline per map.

Island

When a boundary is set to act as an island, all data *within* the defined polygon is excluded.

Configuring shorelines and islands

The configuration of shorelines and islands makes a big difference to the finished map. For example, accidentally configuring an island as a shoreline could end up excluding the vast majority of your map area from the finished map.
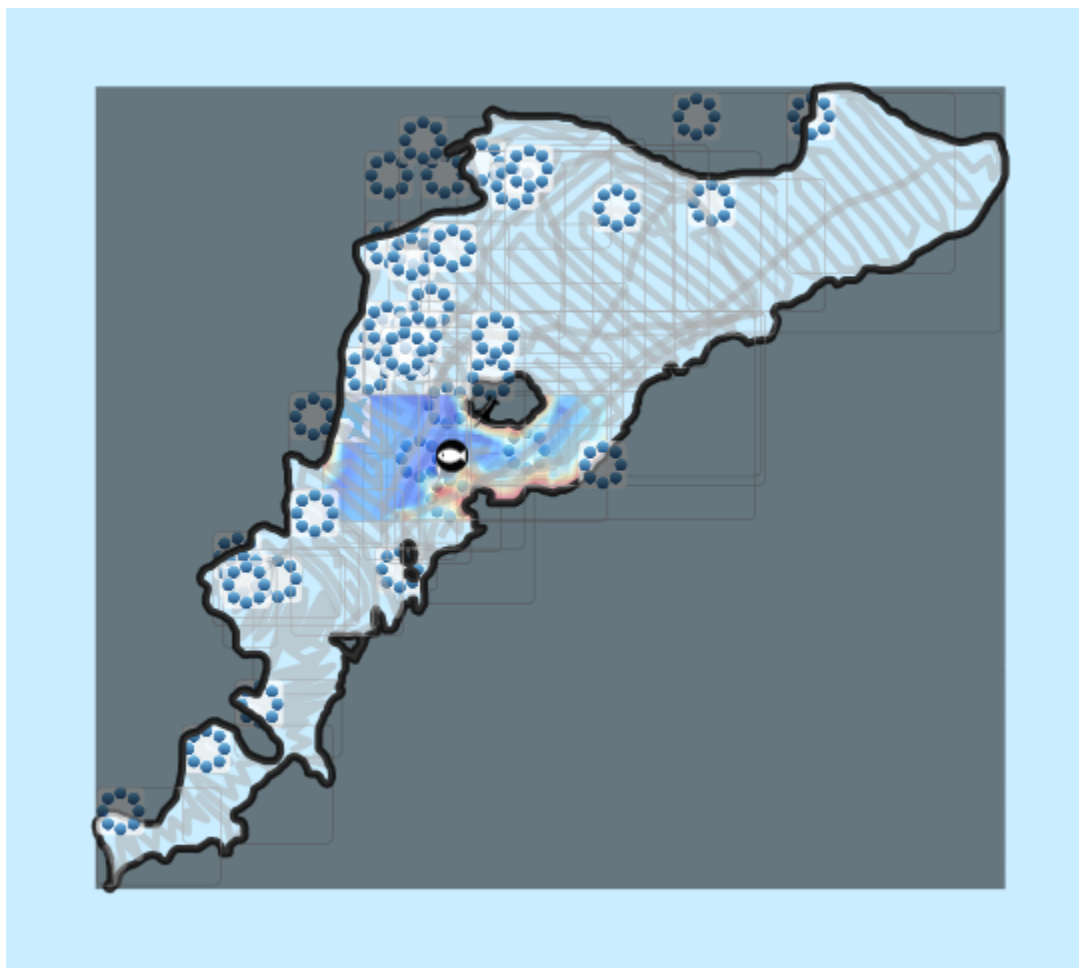
The Map Definition view makes it easy to see which areas of your generated map will be populated with data, by shading the excluded areas, as shown in the image above. Excluded areas can often be seen more clearly with background maps off, especially when using aerial imagery backgrounds.

Provide Depth

Boundaries can contribute depth information to the map generation process by using the *Provide Depth* setting and providing a depth value. Depths are provided at 1m intervals along the path, for the value provided. Zero depths are typically used for shorelines, but any depth value can be used; for example, the known depth of a dam wall could be used where the dam provides the map boundary.

When defining a region for map generation that is not related to natural features such as shorelines, set

Provide Depth to off. This will create a boundary that limits the map area but does not interfere with the map data.

Using Boundaries to Add Spot Depth Data to the Map Project

Spot depth data can be added to a map project by creating a boundary that provides depth, but does not act as a barrier during map generation.

To add spot depth soundings to a map:

- Create a boundary with options *Is Boundary* and *Show In Map* set to off, and *Provide Depth* to on.
- Assign the required depth to the boundary. All points within a boundary are the same depth.
- Draw or enter the required boundary points on the map project.

Show Boundary in Map

This option determines whether the boundary is visible in the contour view of the map project.
For shorelines and islands, this is typically set to on. When defining map areas to combine map projects, or adding spot depth data, this value is usually set to off.

Closed

Select this option to close the selected path. The loop is closed by joining the first and last path points. Although paths are always treated as closed internally by ReefMaster, it can be useful for display purposes to complete the boundary.

Map Boundaries and Map Exports

Map boundaries can be added exported to GPS devices or User Maps in the same way as map contours.

Humminbird™ Tracks

When exporting a user map with boundaries to a Humminbird™ track file, there is an option to export the boundaries as a separate track. Exporting to a separate track allows the style to be defined differently to the contour line style for display on the Humminbird™ unit.

Lowrance™ LCM files

When exporting a user map to LCM files, map boundaries are treated as lake shorelines, giving blue lake outlines on a yellow land mass, as shown in the image below.

Shapefiles for AT5 Maps

Shoreline and islands are exported as polygons that define the land area of the map. These polygons are filled in the selected land colour. Shorelines and islands are also exported as major contour lines.

Image Overlays

Image Overlays allow imported images to be shown on the 2D and 3D map views, either in front of or behind the map contour layer. Any number of images can be added to the project, and the relative order and transparency of each image can be individually adjusted.

The image above shows the 3D View of a map project. Depth information has been used to generate the model in the usual way, and an imported side-scan mosaic has been overlaid on the model. The opacity of the map layer has been reduced so that the mosaic image underneath can be seen, with the depth colours still visible.

Image Overlays Edit Pane

Images are added to projects via the *Image Overlays* edit pane, in the Project Properties Window.
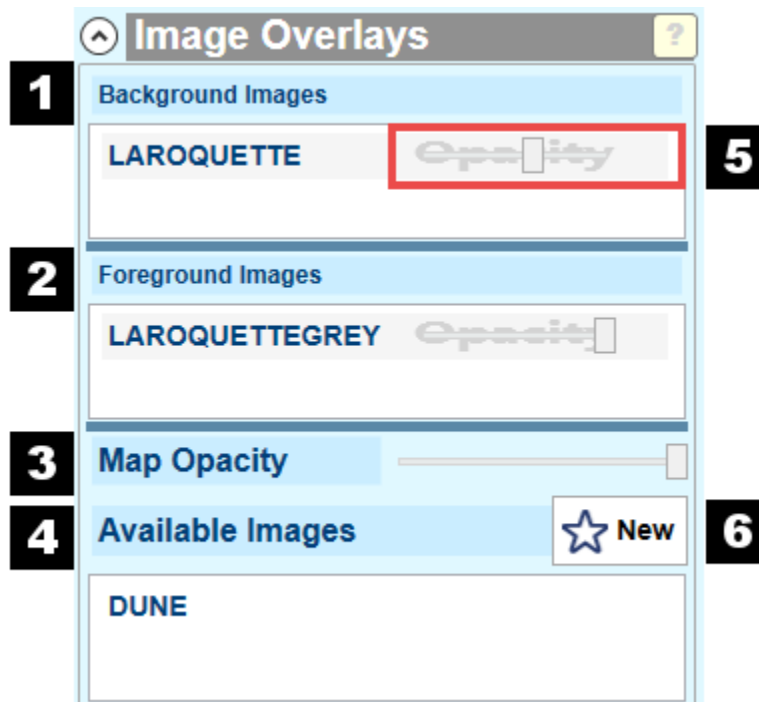
1, 2. Background and Foreground Images

Images can be added to the map project as either *foreground* or *background* images. Foreground images show in front of the *map contour layer*, whilst background images show behind the map contour layer. The *map contour layer* is the name given to the depth colour and contour line display (see *Map Opacity, below)*. The opacity of an image can be adjusted using the *Opacity* slider *(5)* shown in the image row.

3. Map Opacity

The transparency of the *map contour layer* can be adjusted using the *Map Opacity* slider. Only the coloured background is affected by changes in map opacity; the contour lines always remain at 100% opacity. Reducing the map opacity to zero is the equivalent of selecting the transparent background palette.

4. Available Images

The *Available Images* list shows a list of all images in the current workspace that can be added to the current project as an image overlay. See Background Images for information on how to import and calibrate images. Images that have already been added to the current project are not shown in the available images list. Images can be imported using the *New* button *(6)*, which starts the standard background image import process.

Adding an image to the project
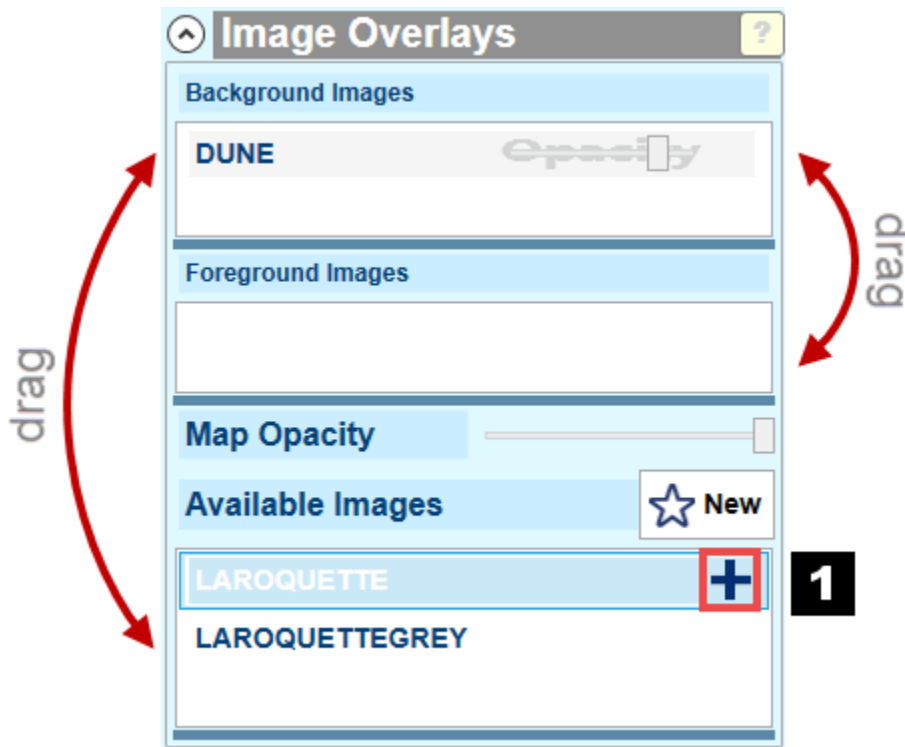
An image can be added to the project image from the available image list to the project by:

- Dragging the image to the foreground or background images list.
- Clicking the *Add (+)* button *(1)* on the image row within the available images list.
- Right-clicking the image and selecting either *Add Image to Project Background* or *Add Image to Project Foreground* from the context menu.

Image ordering

The relative ordering of images within the project can be adjusted by dragging the image up or down within the foreground or background image list. The lower the image is in the list, the further forward it is displayed.

Removing images from the project
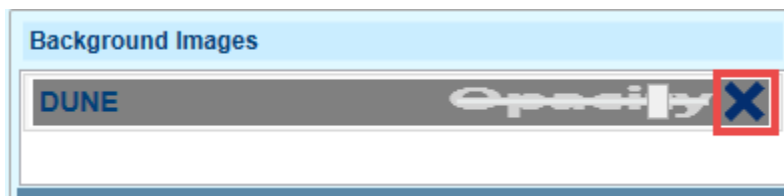
Images can be removed from the project by:

- Clicking the *Remove* button in the image row *(circled).*
- Dragging the image back to the *Available Images* list.
- Selecting *Remove Image From Project* from the image context-menu.

Notes on displaying images in the 3D view

Images that are overlaid onto a 3D model are restricted to a maximum size, with images over this size being reduced in resolution. If images appear to be at a lower resolution when viewed in 3D, try generating a smaller subsection of the map.

User Maps

Maps produced by ReefMaster are not suitable for navigation, and should never be used for navigation.

User maps are editable maps that can contain contours, isobaths, shorelines, tracks and hardness areas, as well as custom (user drawn) paths and polygons. User maps can be exported for display on GPS units or Google Earth. User maps provide many more editing options for styling maps than a raw Map Project.

What is the difference between a User Map and a Map Project?

Whilst it is possible to create excellent maps by exporting directly from a Map Project, User Maps offer a number of extra features and options that Map Projects do not:

- User map's component styles can be individually edited; the line colour and width of each individual contour can be changed, along with the fill and border colours and opacity of isobath areas. This makes it very easy to, for example, highlight a certain depth-range in a specific colour.
- Components from multiple map projects, such as contours and depth areas, can be combined into a single user map. Map projects are limited to a single shoreline, whereas user maps are just a collection of components and are not limited in this way.
- All edited style information in a user map is stored in the database; once a user map has been created and edited, it will always be available for export or further editing.
- Map projects can take a long time to generate, especially if they are large in area or have a large number of contours. User maps simply store pre-generated map components, and do not need to be re-generated when ReefMaster is loaded. For example, a common work-flow would be to work on a Map Project at a lower quality setting (less contours, higher contour grid resolution) until the map is as-required, then generate the map once with high quality settings and save the components to a user map.
- Custom paths and polygons can be drawn on top of user maps. For example, a productive fishing area or marine park zone can be drawn as a filled polygon for display on a GPS unit.

Overview

User maps are made up of a collection of *paths* and *polygons* organised in to *groups*.
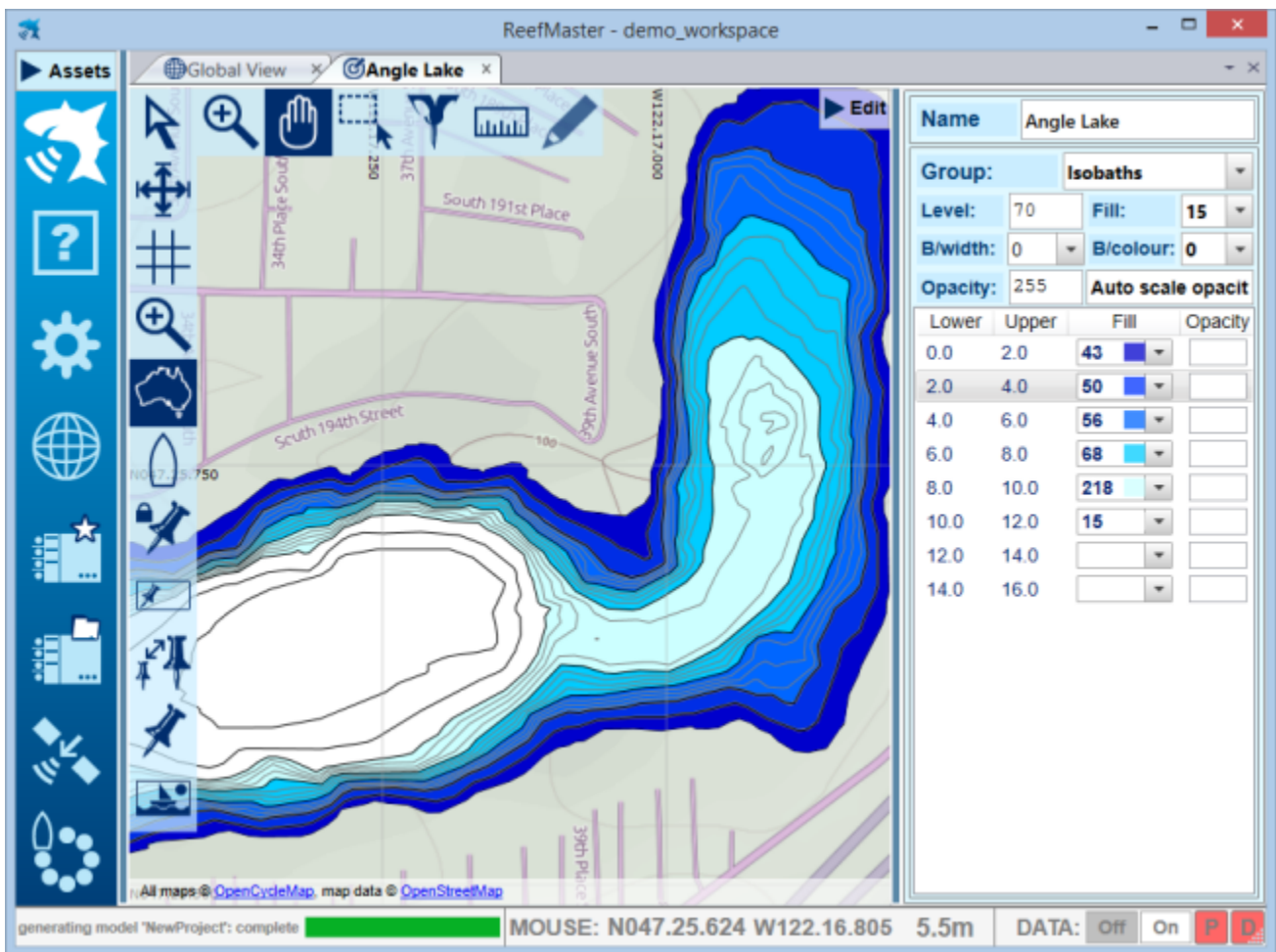
Polygons

Polygons are closed shapes, with configurable border width and colour, and fill colour and opacity (transparency). Isobaths, hardness areas, shorelines and islands are all represented as polygons in user maps.

Paths

Paths are map components that are displayed as lines, such as tracks and contours. Paths are displayed as lines, with configurable width and colour.

Groups

All paths and polygons within a map are members of a *group,* which can contain either polygons or paths (but not both). A user map contains separate groups for *isobaths, major contours, minor contours, shorelines, islands, hardness areas, custom paths* and *custom polygons*. Group styles can be edited in the same way as individual component styles; any individual component that does not have a style attribute set will inherit the style of its containing group.

Colour Schemes

In order to provide exported maps with maximum compatibility on GPS units, User Maps are limited to the *AT5 colour scheme,* which is used in Navico GPS chart plotters. Using the AT5 colours in the user map provides a near "what you see is what you get" (WYSIWYG) experience for maps targeted at Navico units.
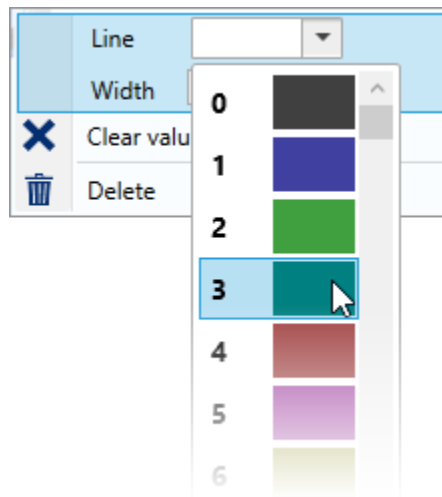
AT5 colours are identified as a number, which is shown in the colour-selector alongside the colour. Note that colours may appear slightly differently on different units.

AT5 Colour Compatibility
AT5 colours are not all supported in all units; older units (such as pre-HDS Lowrance) may support only a sub-set of the full colour range. When targeting older units, the global setting *AT5 Colour Compatibility* can be set in the Global Settings to reflect this, which will limit the colours shown in the colour selector to just those that are known to be compatible with the target unit.

Creating a new User Map

Creating a new User Map and adding components to an existing User Map
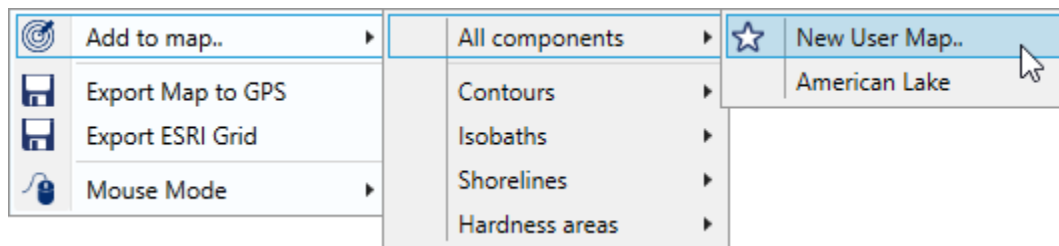
- Use the screen-level context menu of one of more selected contour lines or boundaries in the map project Contour View and select the option *Add to map...* All map components can be added, or a selection can be made from the available components. To create a new map, choose the *New User Map* option. Note that to preserve isobath or hardness colours shown in the Project, an AT5 compatible palette must be used (see below).
- Use the *New* button in the user map header of the Asset Library or the screen-level context menu of the Global View to create an empty user map.
- You can also create a new user map by selecting one or more tracks from the Asset Library and using the right-click menu option *Add Track to User Map/New User Map*.

Keeping Project colours in a User Map
Isobaths and hardness areas can be displayed in a project using either an RGB or AT5 palette, whereas user maps support only AT5 palettes. When adding components with fill colours from a map project, colours are only preserved *if they are currently displayed using an AT5 palette*. If an RGB palette is in use, then the components will not have any style values associated with them once they have been added to the user map.

Editing a User Map

Groups and individual components have *style* attributes, such as colour or line width, that can be edited at either the *group* or *component* level. If a component has a value set for a particular attribute (e.g. colour), then this value is used for the component. If no value is set for a particular component attribute, then the value is *inherited* from the group. In effect, group-level attributes provide default values for all members of that group. Note that some attributes, such as *level* for polygons or *font size* for paths, are available only at the group level.
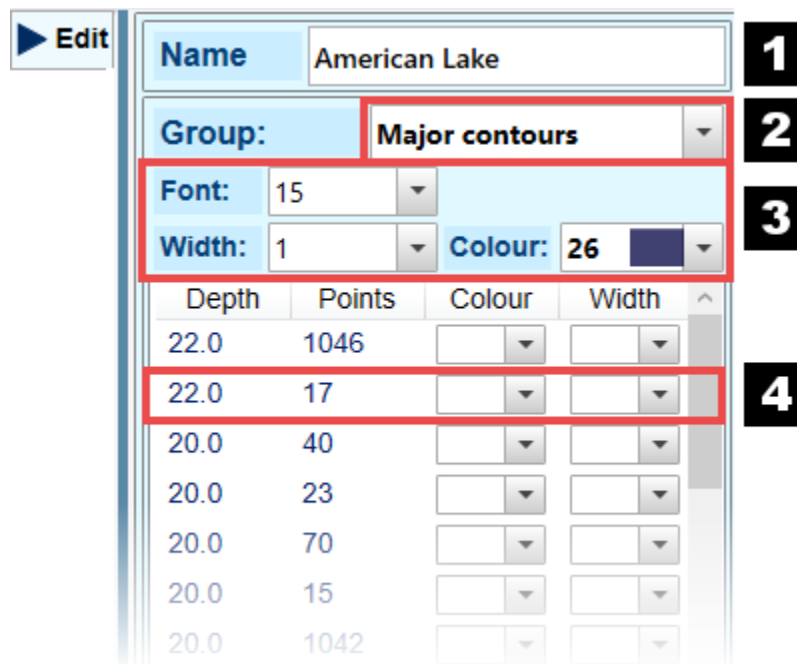
Groups and components can be edited in the *Edit Pane*, which can be opened by clicking the *Edit* button at the top-right of the graphical edit screen.

The name of the user map can be edited *(1)*.

The group selected for editing can be chosen using the *Group* drop-down list *(2)*. All items within the edit pane (other than the map name) belong to the currently selected group. Group-level attributes *(3)* are shown above the component list *(4)* which contains all components that belong to the group. The components list can be sorted by any column by clicking on the column header. Click again on the same column header to reverse the sort order.

Editing components

Component styles can be edited using the component list, or by selecting the component in the graphical view.
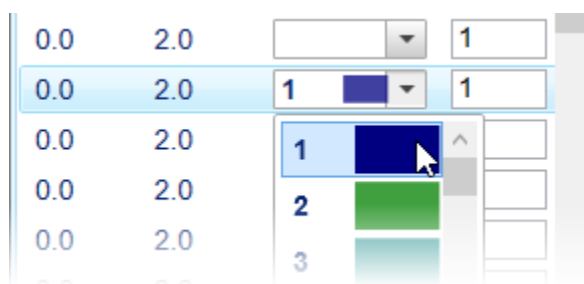
To edit a single component in the component list, select or enter the required value directly into the displayed value fields in the list row. Alternatively, right-click a single component and set the required values using the popup menu. Note that not all values are shown in the list; some values can only be modified using the menu.
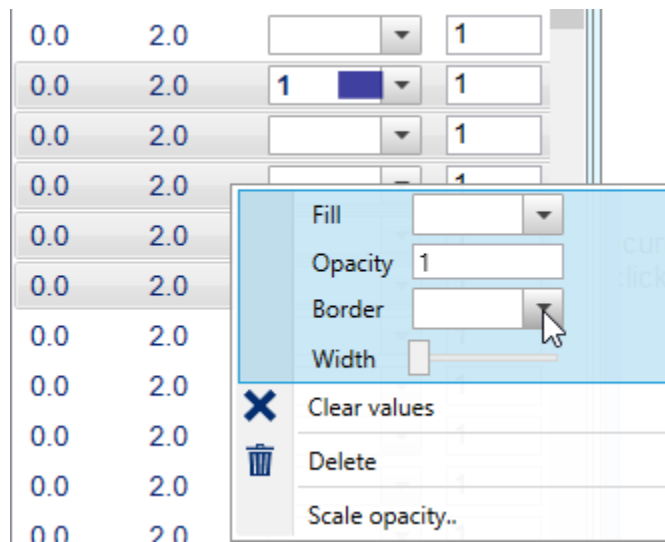
To edit the values of multiple components at the same time, select the required components in the list (use the *SHIFT* or *CONTROL* key in conjunction with the mouse to multi-select), and modify the component values using the right-button menu.
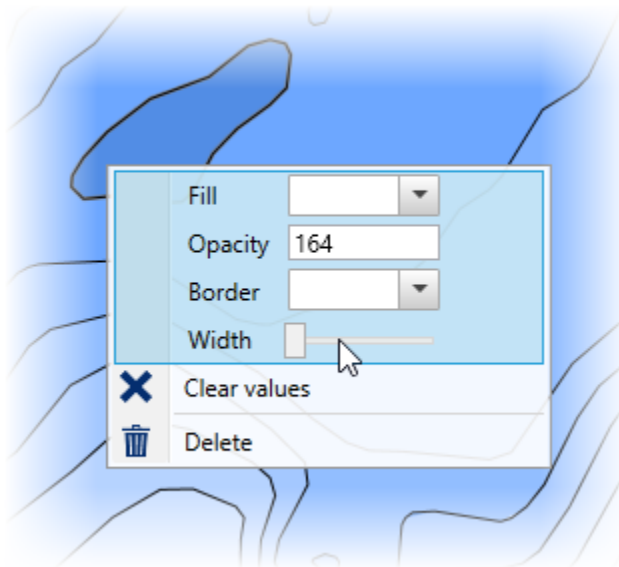
To edit a component from the graphical view, move the mouse over the component so that it is highlighted, and using the right-button menu.

Group level attributes

Attributes set at the group level are used as the default for all group components. Setting an attribute in a component will override the group-level attribute for that component, whilst clearing attribute values for a component will revert the component to the default style.

Groups are either *Path Groups* or *Polygon Groups*. Different style options are available for the different group types.

Path Attributes

Major contours, minor contours, tracks and custom paths.
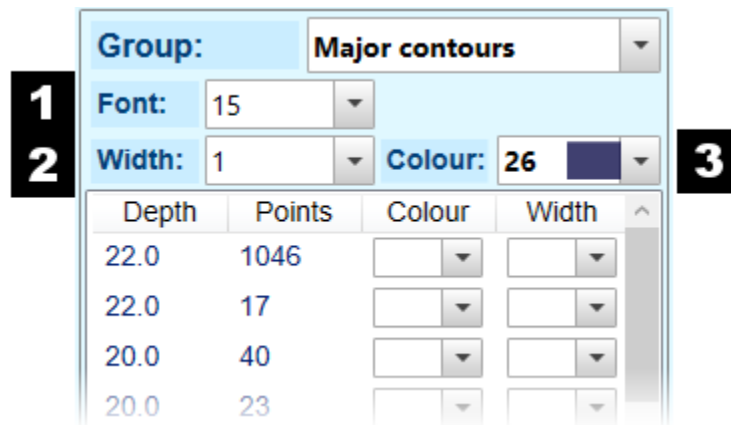
Path's have line width and line colour attributes, as well as a font size attribute that is available at the group-level only. Font size *(1)* refers to the size (in points) of path labels, and applies only to AT5 export (KML paths do have labels, but the size is not configurable). Specify a font size of 0 to disable labels for the path group. Line width *(2)* is specified in pixels from the range 0-5. Specifying a value of zero hides the line completely (this option is more useful when specifying the line style for polygon borders).

Polygon Attributes
Isobaths, hardness areas, shorelines, islands and custom polygons.
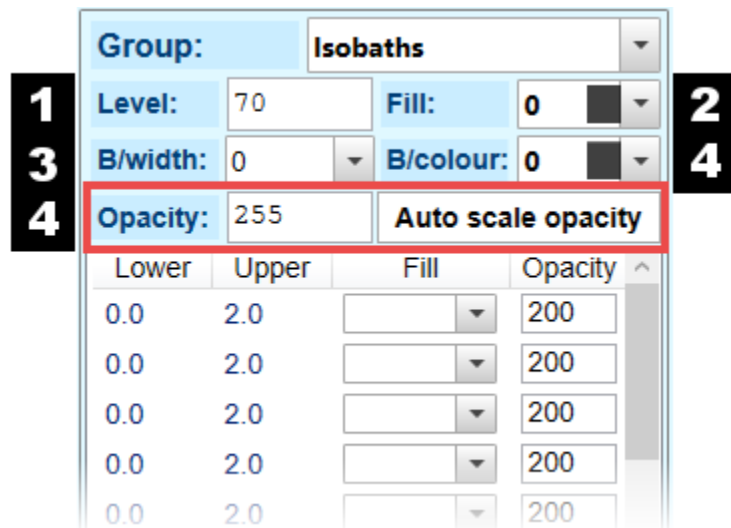
Level
Level (1) is a group-level only attribute that specifies the z-order of the polygon group. The z-order controls the order in which polygons are drawn, and is specified as a number in the range 1-100, with lower values being drawn on top of polygon groups with higher values (note that path groups are *always* drawn on top of polygons). For example, a group with a level of 80 will be shown behind a group with a level of 70.

By default, polygon groups are assigned the following levels, from back to front:

- 80, Shorelines
- 70, Isobaths
- 60, Hardness areas
- 30, Islands
- 20, Custom polygons

If more than one group is assigned the same level, then the relative draw order of those groups is undefined.

Fill and line styles
Fill and line styles can be specified at the group or component level.
Fill (2) specifies the polygon fill colour, *B/Width (3)* refers to border width and can be used to add a border to polygons, with the width specified in pixels. A width of 0 removes the border. *B/Colour (4)* specifies the border

colour and is only effective when the border width has been set to a value other than zero.

Note that border width and colour selectors are not shown in the component list; these values can be modified for individual components through the use of the right-button menu.

Opacity *(4)* refers to the level of transparency for a polygon fill colour.

Opacity

Opacity is only supported on Navico devices with the NOS operating system, which includes all HDS (generation 1 and later), and Elite HDI models. Opacity can also be used for maps exported in the Google Earth KML format.
Opacity is expressed as a number between 1 - 255, with 1 being (effectively) transparent, and 255 being fully opaque.

Note that if the AT5 compatibility global setting has been set to any value other than NOS, then all opacity related fields will be disabled in the user map.

Auto scale opacity

Using opacity can be a very easy way to create great looking maps with a limited range of colours, by adjusting the relative opacity of isobaths or hardness areas depending on their values. The *auto scale opacity* function automates this process, and the simplest way of creating maps for Lowrance HDS (or later) units.

Auto scaling of opacity can be applied to all components within the group by clicking the *Auto Scale Opacity* button in the group attributes, or applied just to selected components by multi-selecting the required components in the components list and selecting *Scale Opacity..* from the right-button menu. Note that this option is not visible unless at least two components have been selected.

Auto scaling of opacity assigns opacity values to each selected component based on that components *lower value*.
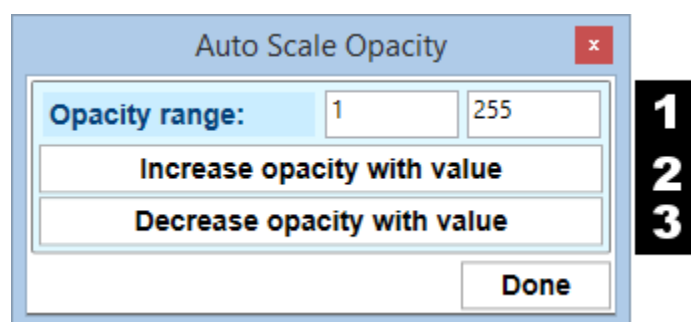
The *Auto Scale Opacity* dialog is shown. The range between which to scale the opacity value can be specified in the *opacity range* fields *(1)*. By default, the full range of opacity, from fully transparent to fully opaque, is selected.
Opacity can be scaled so that it *increases* with value or *decreases* with the value of the components. Click one of the buttons *(2, 3)* to perform the scaling. The results will be visible immediately in the map. Once you are happy with the scaling, click the *Done* button.

Opacity scaling examples
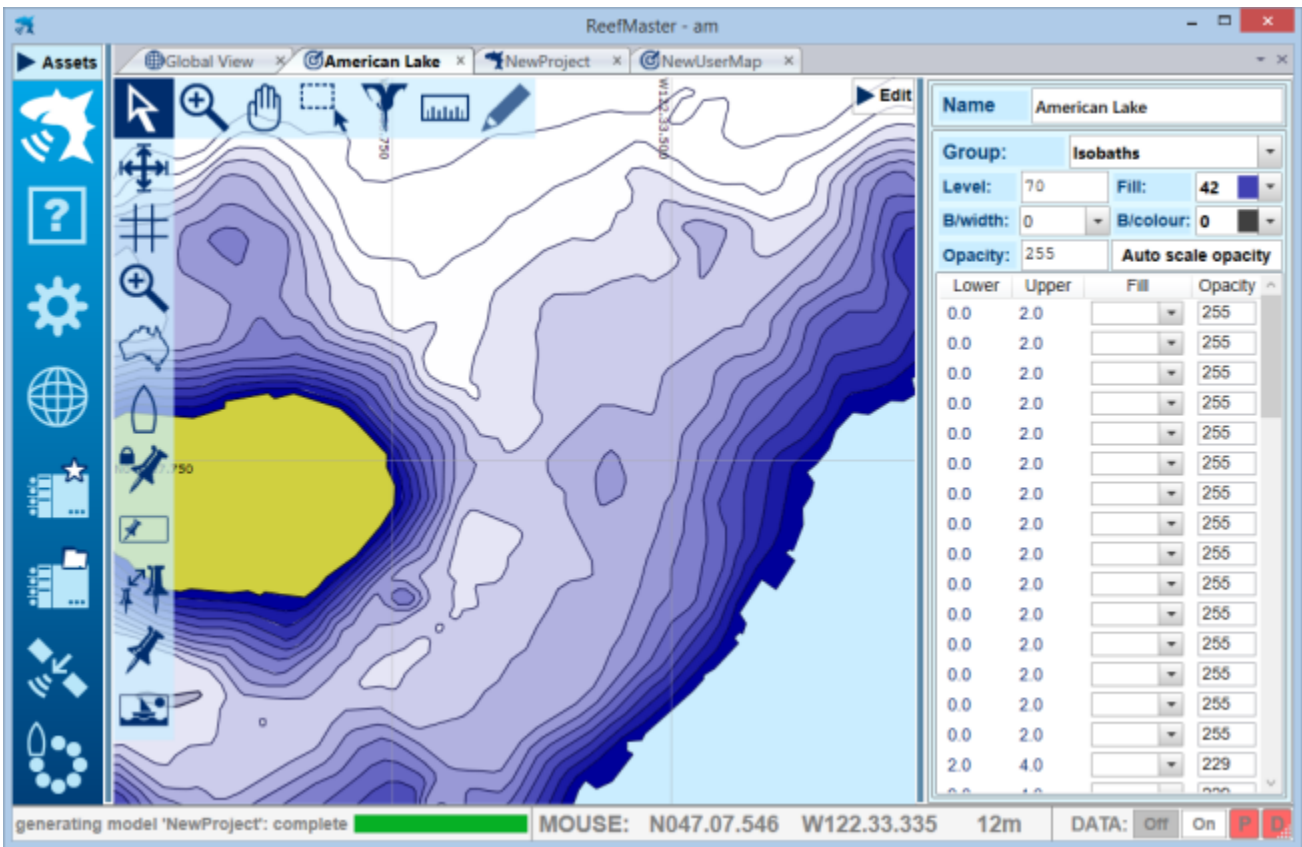
Using scaled opacities is a very quick way to create great looking maps. In the example above, isobaths between 0m and 20m have been selected, and the opacity scaled downwards from 1-255. All components below 20m have been deleted, allowing the shoreline fill colour to show through, whilst the colour for all of the scaled components is taken from the group level fill colour. Using opacity in this way means that the colour of the map can be changed by simply changing the colour of the group:
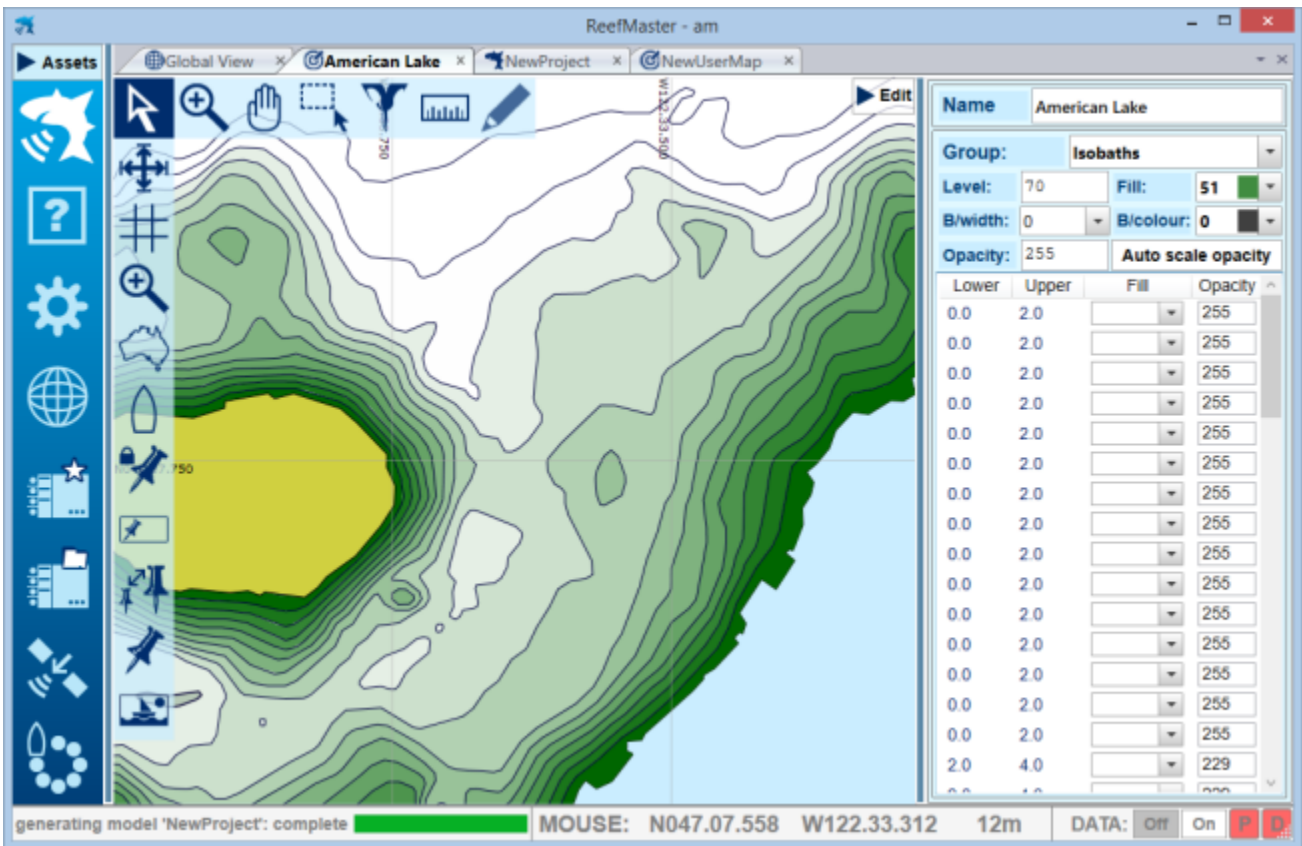
Varying the background colour (in this case, the *shoreline* polygon) can give yet more effects, as the colour of the background shows through the semi-transparent isobath polygons:
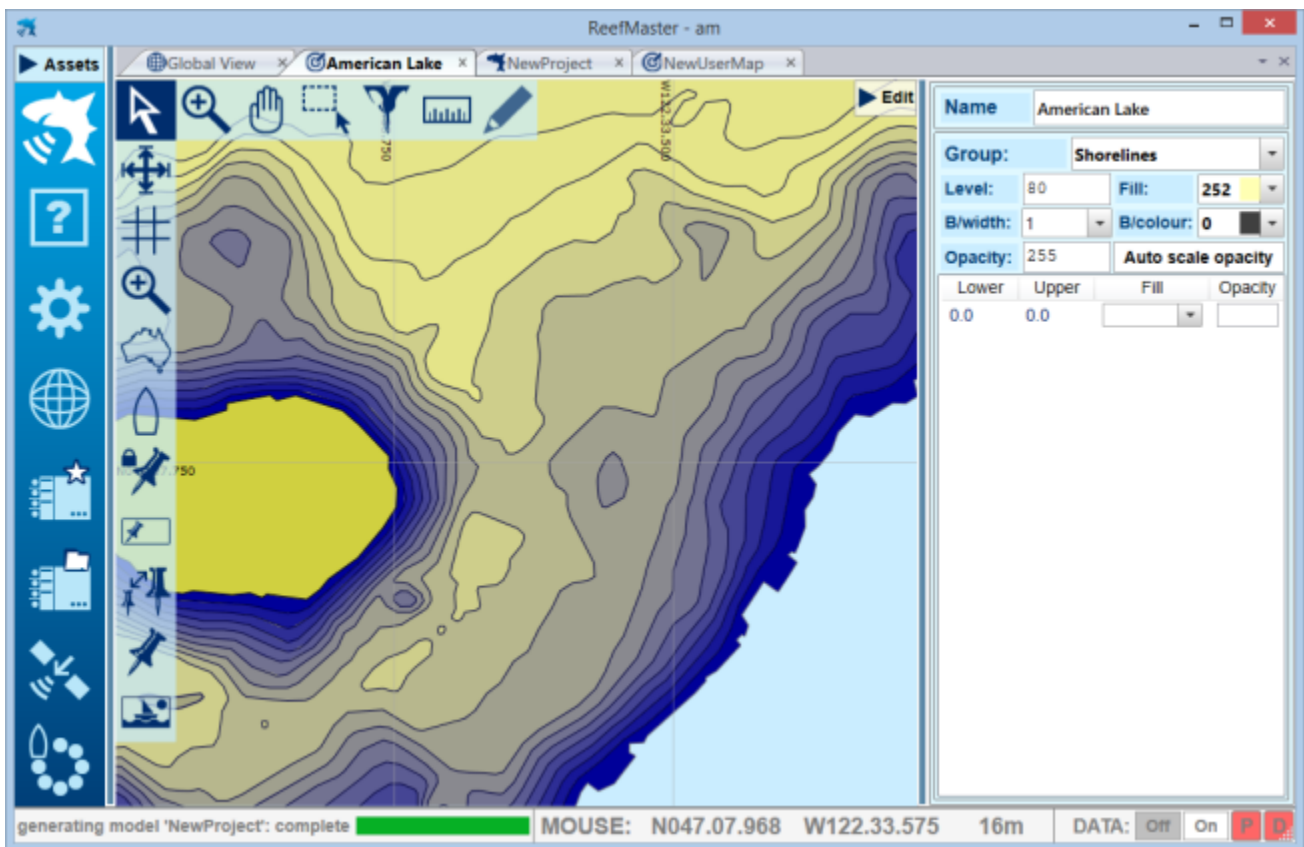
Notes on exporting maps with opacity to Navico devices

As mentioned above, opacity is compatible only with Navico devices running the *NOS* operating system, which effectively means HDS generation one units or later (including Elite HDI units).

Opacity is only displayed correctly on Navico units when a *raster background layer* is present. ReefMaster is able to automatically generate a blank raster background that enables opacity to be displayed correctly. **Ensure that the option "generate raster background" is checked in the** Export to GPS **window prior to exporting any maps with opacity for Navico NOS systems. Note also that the option "shaded relief" must be selected under Chart Options/Imagery within the Navico unit, in order for raster and opacity to be displayed.**
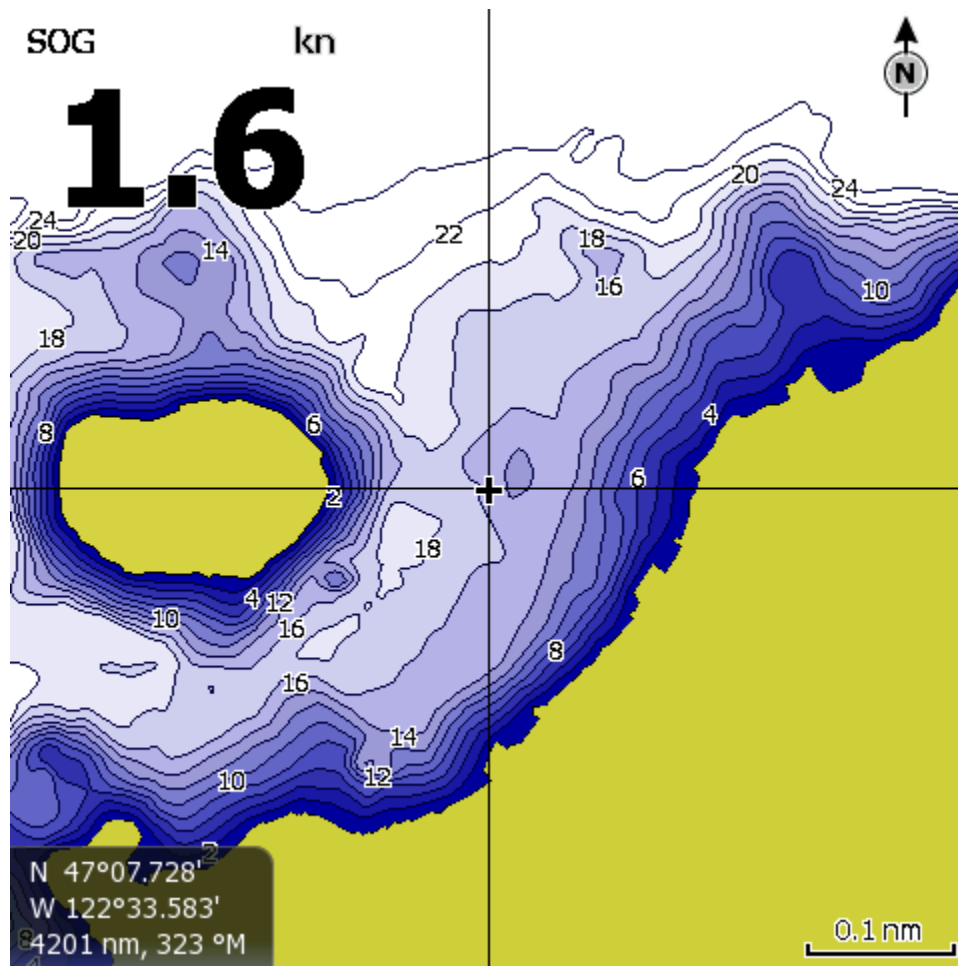
Map exported to a first generation Lowrance HDS 5

Custom Paths and Polygons

Custom paths and polygons can be added to the groups *Custom Paths* and *Custom Polygons*. Custom components can be drawn and edited, and styled in the same way as other map components.

Importing a custom component

ReefMaster offers basic path and polygon editing, described below, which can be useful for drawing simple shapes on to maps. It is also possible to import polygons and paths from files in either the *ESRI Shapefile* or *Google Earth KML/Z* file formats.
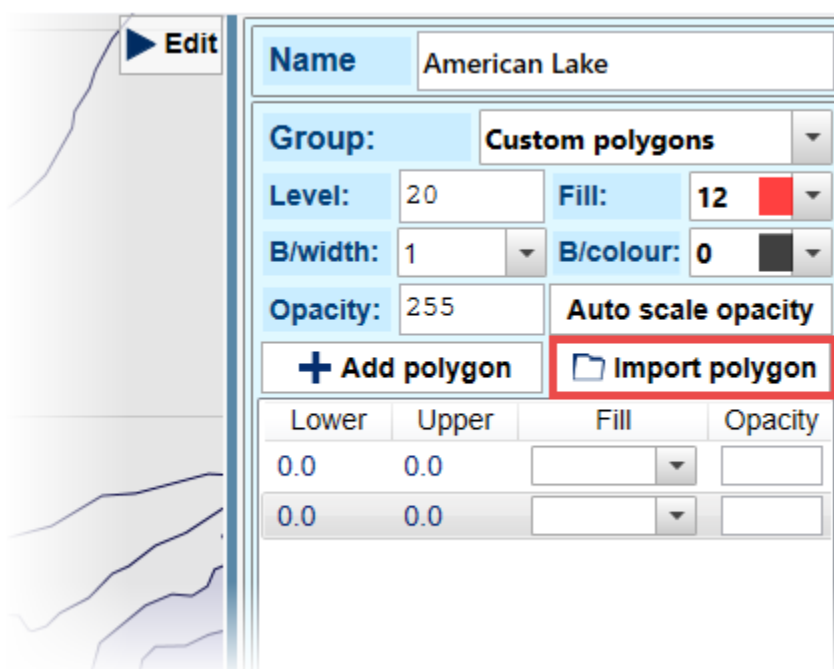
To import a path or polygon:

- Open the *Edit* pane and select the appropriate group (one of *custom paths* or *custom polygons*).
- Click *Import polygon/path*.
- Select the file(s) with the required components. Note that only components of the appropriate sort are imported; when importing polygons, all polygon objects are imported from the selected file. When importing paths, only path objects will be imported from the selected file.
- Click *Open* in the file open dialog. The selected file(s) will be processed, and the imported components will be added to the component list. An imported component can be further edited within ReefMaster in the same way as an object created within ReefMaster *(see below)*.

Adding and editing a custom component

Custom components can only be added to the *custom paths* and *custom polygons* groups.

To add a new path or polygon:

- Open the *Edit* pane and select the appropriate group (one of *custom paths* or *custom polygons*).
- Click *Add polygon/path*.

A new component is added to the map, and is shown in the components list. The *Drawing Tool* will become enabled in the mouse-mode selector panel as long as a custom component is currently selected.

Adding New Path-Points

With the drawing tool selected, click the left-mouse button within the graphical area to add a new path point. The selected path is extended *from the nearest end*. Press and hold the left mouse button whilst drawing with the mouse to create multiple path-points along the described path.
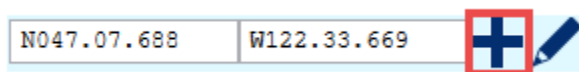
New path-points can also be added in the edit window, by entering the required coordinates in the path-point edit area and clicking the *Add* button *(circled)*.

Editing Existing Path-Points
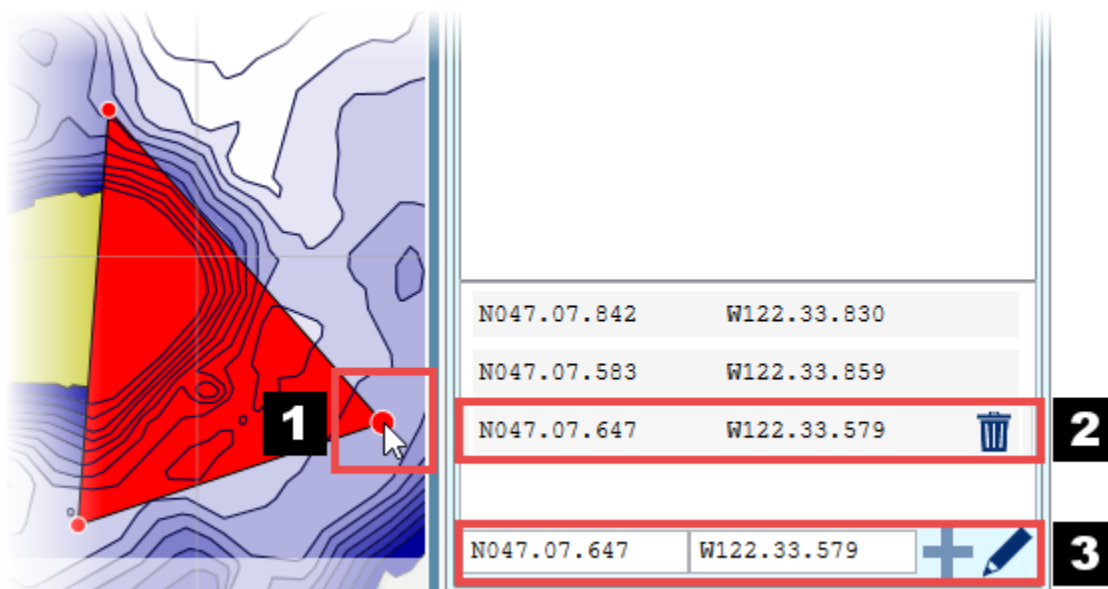
Individual path points can be selected by clicking on them in the graphical edit area *(1)*, with the mouse in *select* mode, or by clicking in the *path-point list* in the edit window *(2)*. The details of the selected path-point are displayed in the *path-point edit area (3)* underneath the path-point list. Note that the path must be selected before the path-point list is show. Selecting a path-point in the graphical edit area will select the same path-point in the edit window, and vice-versa.

- A path-point can be moved by clicking on the point with the mouse (in *select* mode) and dragging it to the required position. The coordinates of the selected path-point will update in the edit window as the point is moved.
- The selected path-point can be edited in the edit window by changing the coordinates in the path-point edit area and clicking the *Edit (pencil)* button.
- Path-points can be deleted using either the context menu in the graphical area, or clicking the *Delete* button in the path-point row within the path-points list in the edit window.

Data Sets

A Data Set is a collection of assets grouped for easy export.
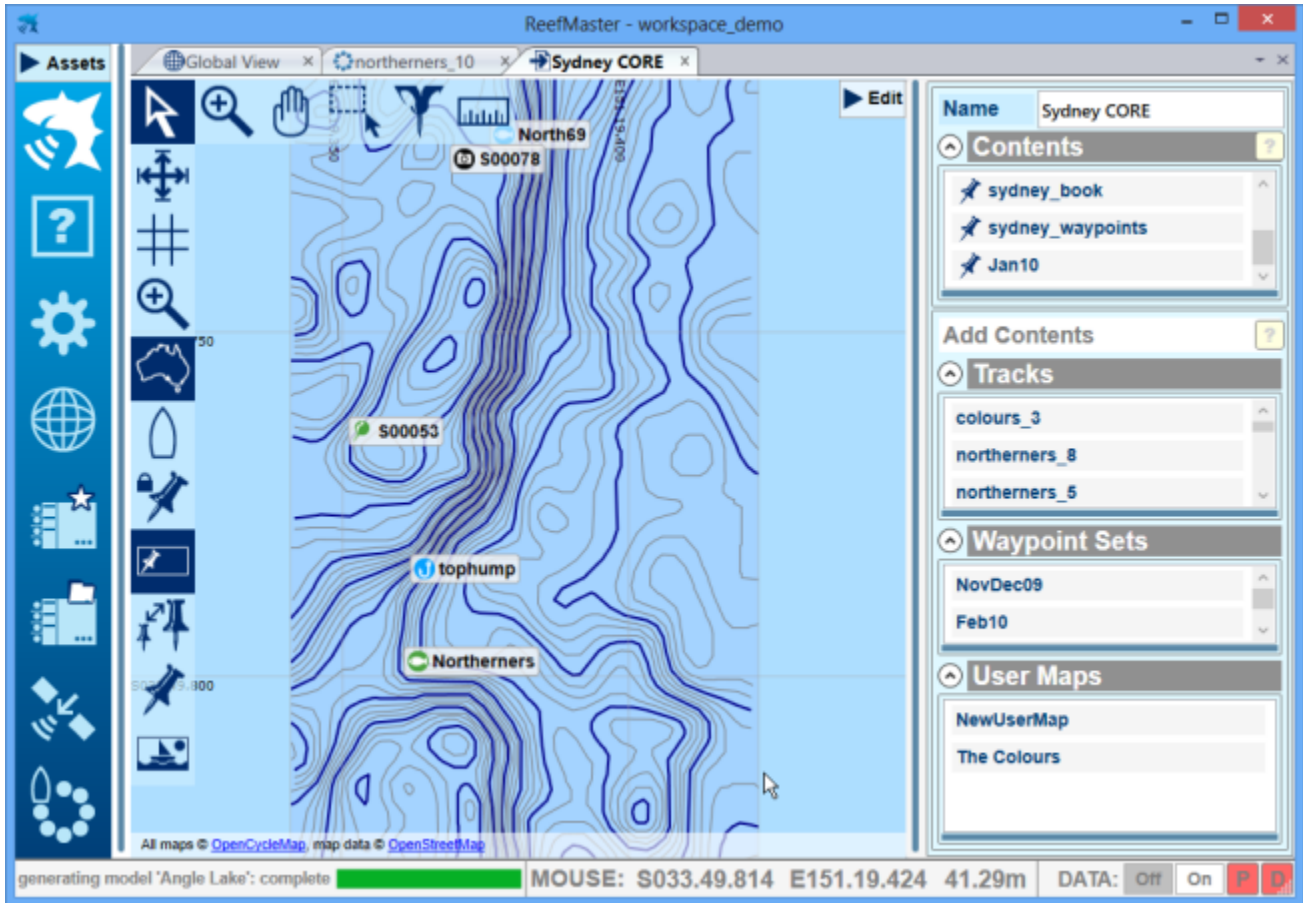
Data sets are a simple, powerful feature that make it easy to maintain a set of assets that are commonly exported together by storing links to a group of assets.

For example, a data set might hold all of the waypoints, tracks and maps required for a particular port. This data set could then exported with a single-click, rather than having to select the required maps, tracks and waypoints by hand every time the export is required.

Data sets have a standard edit window layout, with all of the assets that are members of the data set shown in the graphical area, in the same way as in the Global View.

The Data Set Edit Window
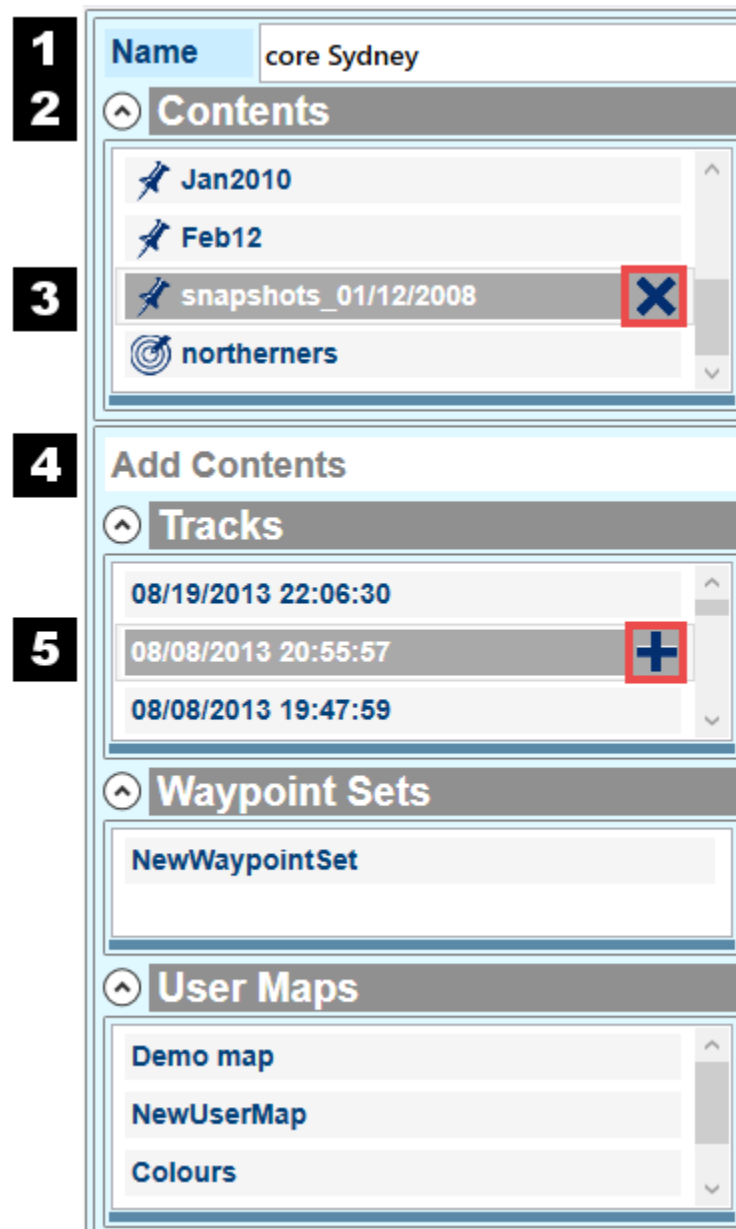
1. Name

The name of the data set.

2. Contents

Data sets can contain any combination of tracks, waypoint sets and user maps. The contents of the data set are shown in the *Contents* list, as well as in the graphical display.

Asset types can be identified in the contents list by the icon at the left of the asset row. To remove an asset from the data set, click the *Remove* button *(3, circle)* at the right of the row. Assets can also be removed through use of the the row context menu and the context menu for the asset in the graphical view.

4. Add Contents

The *Add Contents* section contains lists of all of the tracks, waypoint sets and user maps in the workspace. An asset can be added to the data set by using the *Add* button *(4, circled)*, at the right of the asset row, or through use of the row's context menu. Assets can also be added to a data set by using the asset row context menu, through use of the screen-level context menu in the data set's graphical edit area, or through the use of individual asset context menus in the Global View.

Background Images

Image files can be imported and used as background images in the graphical display areas of most asset types, and as Image Overlays in Map Projects.

Image Files
Images can be imported from JPG, PNG and BMP image files. Image files do not contain information about their location and so need to be calibrated within ReefMaster.

Google Earth Overlays
Google Earth *ground overlays* are image files that have been calibrated as backgrounds within the Google Earth application. Google Earth overlays are stored as either a *KML* file with an associated image file, or as a single *KMZ* file. When images are imported via ground overlays, they do not need to be calibrated and cannot be re-calibrated within ReefMaster. Additionally, Google Earth overlays are *tiled* as they are imported. Tiling involves splitting the image into many small pieces, that are reconstructed for viewing as required. The advantage to tiling images is that, when displaying images, ReefMaster only needs to hold the visible portion of the image in memory. This saving in memory can be significant, and means that ReefMaster is able to store and display very large image overlay files at their original (full) resolution.

Google Earth Overlays are the recommended source of background images and image overlays.

Importing Background Images
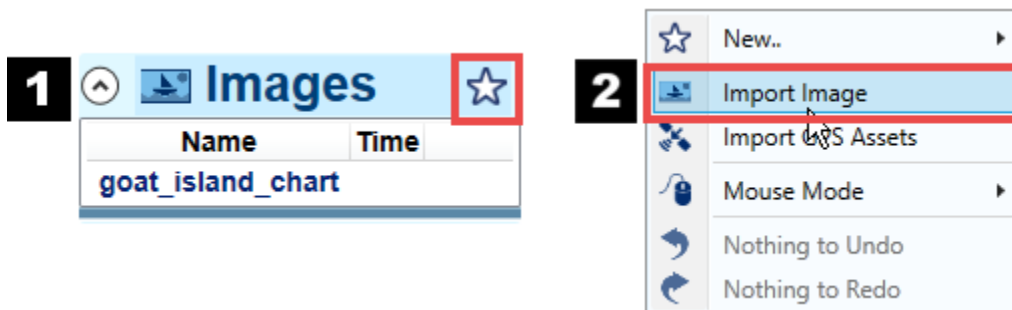
To import a new background image, either use the *New Asset* button *(1)* in the *Images* header of the Asset Library or select the *Import Image* option from the *screen-level context menu* in the Global View *(2)*.

A file selector window is shown, where a single image file can be selected. Supported file-types are image files of type *JPG, PNG* or *BMP*, or Google Earth files (containing ground overlays) of type *KML* or *KMZ*. Select the required file, and click *Open.*

Google Earth Files
If the selected file is a Google Earth KML or KMZ file, then the image is imported and tiled. Tiling can be a time-consuming process, so a progress window is shown whilst this is carried out. Once the tiling is complete, the progress window is closed and the image will be shown in the graphical edit windows in the correct location. The image will also become available for use as an Image Overlay within map projects. Note that images that have been imported via Google Earth overlays cannot be re-calibrated, and calibration options are not displayed for these images.

Calibrating Image Files

When a raw image file is imported, it is given an starting *extent* centred within the current workspace. The image needs to be calibrated so that it shows in the correct size and in the correct location. Images can be calibrated in two ways; *Drag to Calibrate* or *Point Calibration*.

Drag to Calibrate

Images can be graphically calibrated when in *Drag to Calibrate* mode.
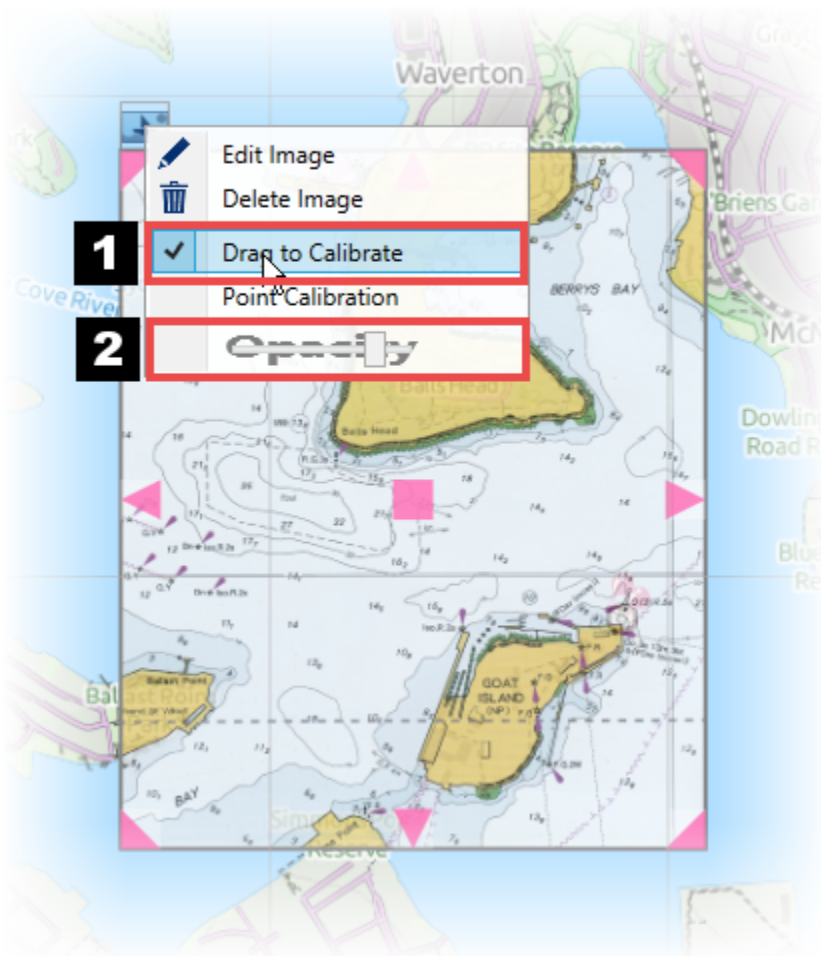
Select the menu item *Drag to Calibrate (1)* from the context menu of the background image, activated by right-clicking on the image icon at the top left of the image. The image will enter *drag to calibrate mode*, with grab handles in the centre and each edge and corner.

- The square grab handle in the centre of the image is used to drag the entire image.
- The handles in the corners stretch an image in two directions.
- The handles on the edges of the image stretch the image in a single direction.

Grid lines can assist with calibration, as can background maps; vary the opacity of the imported image using the *opacity slider (2)* in the context menu, so that items behind can be seen more clearly.

Point Calibration

Images can also be calibrated by entering the precise locations of two or more points within the image. Point calibration must be carried out in the *Background Image Edit Window*.
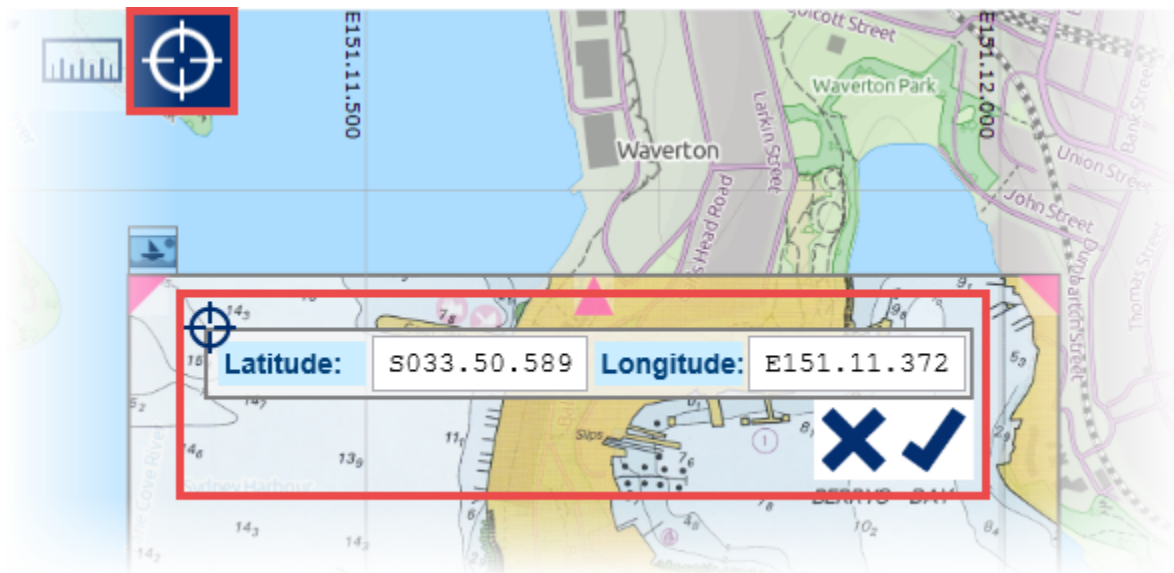
Note that images are always assumed to be north facing; ReefMaster does not rotate images, and images are always scaled uniformly. ReefMaster takes the average of all calibration points that are entered.

- Select the *Calibration* mouse mode *(circled, only available in the background image edit window)*.
- Click with the left mouse button on the calibration location, and enter the location latitude and longitude into the coordinate edit box.
- Once two or more calibration points have been entered, the image will be moved and sized accordingly.
- To calibrate using just two points, the points should share neither latitude nor longitude (i.e., they should be on different horizontal and vertical locations within the image).

Live Data via NMEA 0183

NMEA 0183 is a communications protocol used by many marine instruments, such as GPS and sounder units, that can transmit data such as GPS position and depth. GPS or sounder units can be connected to a PC via one or more *serial ports,* which ReefMaster can listen to to receive position and depth information. This information can be recorded as a Track, and used as part of a map project in the same way as any other track within the workspace. If a track is being logged while it is also part of a map project, then the map project updates as the track is logged, providing real-time map generation.

Configuring the NMEA Connection

NMEA connections can be received from up to two serial ports simultaneously. When an NMEA connection is being received from two separate serial ports, ReefMaster expects to receive depth information on one port, and GPS position information on the other. Allowing the use of two separate ports means that two separate devices can be used to provide the position and depth information required to make a map. For example, a dedicated sounder unit (with no on-board GPS unit) can be used in conjunction with a hand-held GPS unit. It is also possible to use a smart-phone as a GPS unit, using software to make the phone act as a *bluetooth GPS puck*.

Open the Global Settings window and locate the *Live data via NMEA* section *(1)*. The status of the live data connection is shown in the *Live Data Status Panel,* which is also displayed as part of the Application Status Bar *(see below)*.

Click *Configure* to open the *Live Data Configuration* window *(2)*. Clicking *On* in the *Live Data Status Panel* will show an option to open the live data configuration window directly, if the settings have not yet been configured.

The Live Data Configuration Window

Connecting NMEA device(s) to your PC

NMEA data is received via a *Serial Port* connection. Consult the documentation that came with your GPS or sounder unit for information on how to connect your device to a PC serial port. Physical serial port connectors are rare on modern computers so it is likely that a Serial port to USB adapter will be required. These are commonly available, and it is usually a simple case of "plug and play"; connect the serial output from the GPS device to the serial-USB adapter, and connect the adapter to the PC using an available USB port. The Serial-USB adapter driver software will create a serial port, which usually has a name of the form *COM<n>*.

Configuring Serial Ports
The correct serial port(s) need to be assigned for position and depth data, and the *baud rate* (speed) of each serial port needs to be set*.*

Port Name
All available serial ports are shown in the first drop-down list. Select the appropriate port for your NMEA connection.

Baud Rate
Available baud rates are shown in the drop-down list. 4800 is the most common value for GPS/Sounder devices connected over a physical serial connection, and is the default. For other devices, such as GPS puck connected via *bluetooth*, the value may be much higher. Consult the documentation that came with your device.

(1) Position
Position information includes location and time information, and can also include heading and speed.

(2) Depth
Depth data contains the current depth.

Receive position and depth data via different COM ports
When receiving both position and depth data from the same connection (for example, from a combined GPS/sounder unit), the position and depth port information is the same. In this case, the port information selectors for *depth* are disabled, and the information is taken from the selections made for *position.*

To take depth and position information from two different devices, check the option *Receive position and depth data via different COM ports (3)*. This will enable the COM port and baud rate selectors for the depth connection, which can then be set accordingly. Note that you will not be able to select the same serial port as the position connection. To revert to listening for both position and depth data via one port, un-check this option.

Latency
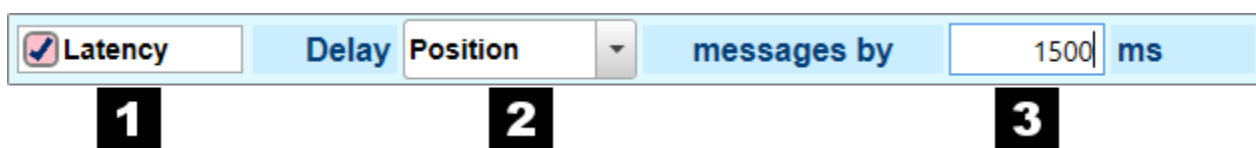
The latency between the position and depth channels can be using the *Latency* option. This option is only enabled when position and depth are being received via different ports. Latency is applied by delaying messages from one channel, relative to the other, by a set time. For example, if you know that position values are arriving after the appropriate depth message, then the depth messages should be delayed until they are synchronised.

To apply a latency setting, check the *Latency* check-box *(1)*. Choose which channel to delay using the drop-down *(2)* and enter the delay time in field *(3)*. Delay times are specified in milliseconds.

NMEA Sentences
NMEA sends data of different types in text strings known as *sentences.* There are many different sentences, each of which stores different information. Each different sentence type has a unique *sentence identifiers,* which is a three-letter character code. ReefMaster can listen to a variety of position and depth sentences, which can be filtered according to their type.

To turn a sentence filter on or off, open the *sentences* list at the right of either the position or depth

configuration row and select or de-select the required sentences using the check-boxes in the sentence list.

Choose as few sentences as possible to get the required information; this will keep ReefMaster processing requirements to a minimum, and reduce the chance of receiving conflicting data (e.g. do not select *DPT* and *DBT* at the same time, if both are sent by your sounder, as, depending on the configuration of your device, the depth data in each may differ).

Position Sentences

- **RMC** - *Recommended minimum GPS data.* Contains time, latitude, longitude, speed and heading information.
- **GGA** - *GPS position fix data.* Contains time, latitude and longitude. No heading or speed information is present.
- **GLL** - *Latitude and Longitude.* Contains time, latitude and longitude. No heading or speed information is present.
- **HDG** - *Heading.*
- **HDM** - *Heading, Magnetic.*
- **HDT** - *Heading, True.*
- **VTG** - *Course made good.*

Depth Sentences

- **DPT** - *Depth of Water.*
- **DBT** - *Depth below transducer.* Note that this value may differ from the *DPT* value if both are sent by the same device. In this case, select either DPT or DBT, but not both.

Transducer location offset

Sets the position of the transducer relative to the GPS antenna. ReefMaster uses the relative transducer location in conjunction with the current heading to adjust the current GPS position.
Note that if valid (and accurate) heading sentences are not being received, then applying a transducer location offset will have undesirable results.

The location can be one of *Forward* or *Aft* and *Port* or *Starboard* of the GPS antenna. The distance is specified in either metres or feet, depending on the current global units setting. The specified direction and distance *is of the transducer relative to the GPS antenna.* e.g. if the transducer is behind, and to port of the GPS puck (or GPS unit, if the antenna is internal), the specify *aft* and *port*, and enter the appropriate distances into the

distance fields.

Connect

Click *Connect* to attempt a connection using the specified settings. If a connection is successful, the settings are saved and the configuration window is closed. If the connection is unsuccessful, the option is given to review the settings, or to save them anyway and close the window - in which case, no connection will be made.

Note: A connection is considered "successful" if ReefMaster was able to open the specified serial port(s). It does not indicate that data has been successfully received.

Live Data Status Panel

The *Live Data Status Panel* is shown as part of the application status bar (at the bottom right of the main application window), and within the global settings window. The live data status panel holds quick-access buttons to turn the data connection on or off, and a pair of indicators for depth and position data.

(1) Data Off/On

Use the on/off buttons in the status panel as a short-cut for turning NMEA data connections on or off, once they have already been configured in the NMEA configuration window. If the *On* button is used before the NMEA port(s) have been configured, an option will be shown to open the configuration window.

(2) Data indicators

Two indicator buttons show NMEA activity – *P* for position data and *D* for depth data. The indicators will pulse green on every new data sentence that is processed. Note that the indicators only indicate the receipt of sentences that have been selected for processing – for example, there will be no indication of live data if GLL messages are being received and they are not selected within the NMEA settings.
If no data is received for 10 seconds, the indicators revert to a red colour.

The Live Data Panel and Boat Position
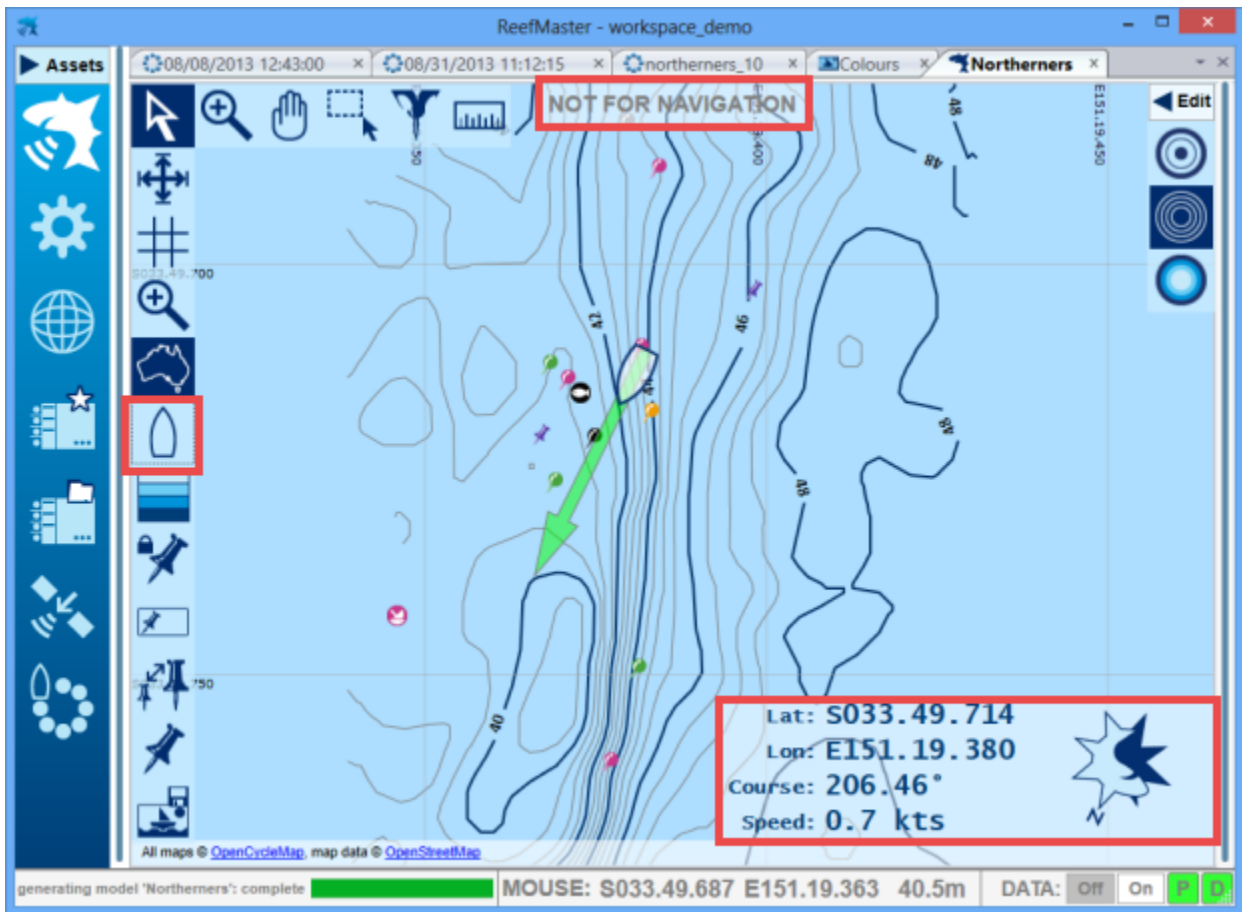
The *Live Data Panel* is an information panel, that can be displayed in any edit window, that shows position, course and speed, along with a rotating compass rose. The current position can also be shown on the map as a boat icon, with an optional *direction arrow* showing the direction of travel.

Live Data Menu

Live data settings can be accessed by clicking on the boat icon in the *map toolbar.*
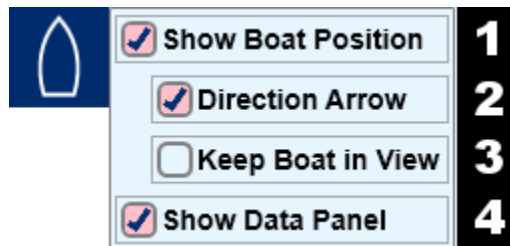
(1) Show Boat Position

Shows the current position as a boat icon plotted on top of the map area. The position and orientation of the boat update as data is received.

(2) Direction Arrow
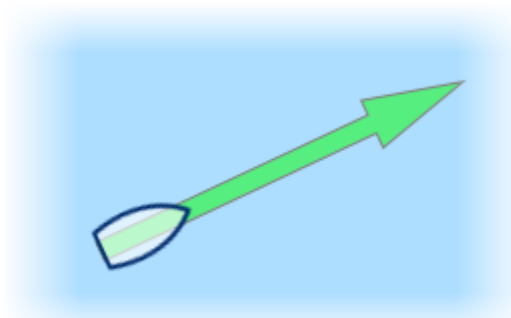
Extends the boat icon with a direction arrow, which makes it easier to see in which direction the boat is

heading.

(3) Keep Boat in View
When this option is checked, the edit window will pan to keep the boat in the central area of the view.

(4) Show Data Panel
Show or hide the *Live Data Panel*.

The live data panel shows the last received position, course and speed, along with a rotating compass rose.
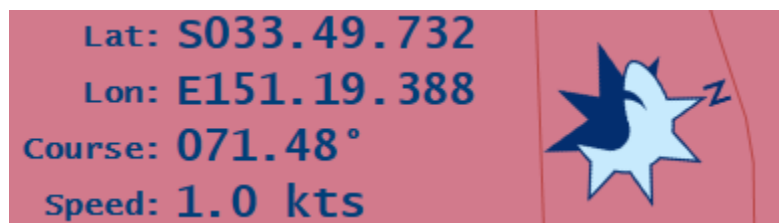
If data has not been received for ten seconds, or if the time within the received position messages is more than ten seconds older than the system time, the background of the live data panel is shown in red. The red background serves as a warning that the displayed position data is out of date.

Warning: GPS data displayed in ReefMaster should never be used for navigation.

Logging Live Data

Live data can be logged to form a Track. A track that is being created from live data is known as the *Live Track* and is, in almost all respects, treated the same as any other track within the workspace; it can be viewed, panned, zoomed, and edited in the usual ways, and used in Map Projects, User Maps, and Data Sets. Adding a live track to a map project means that an area can be mapped in real time.
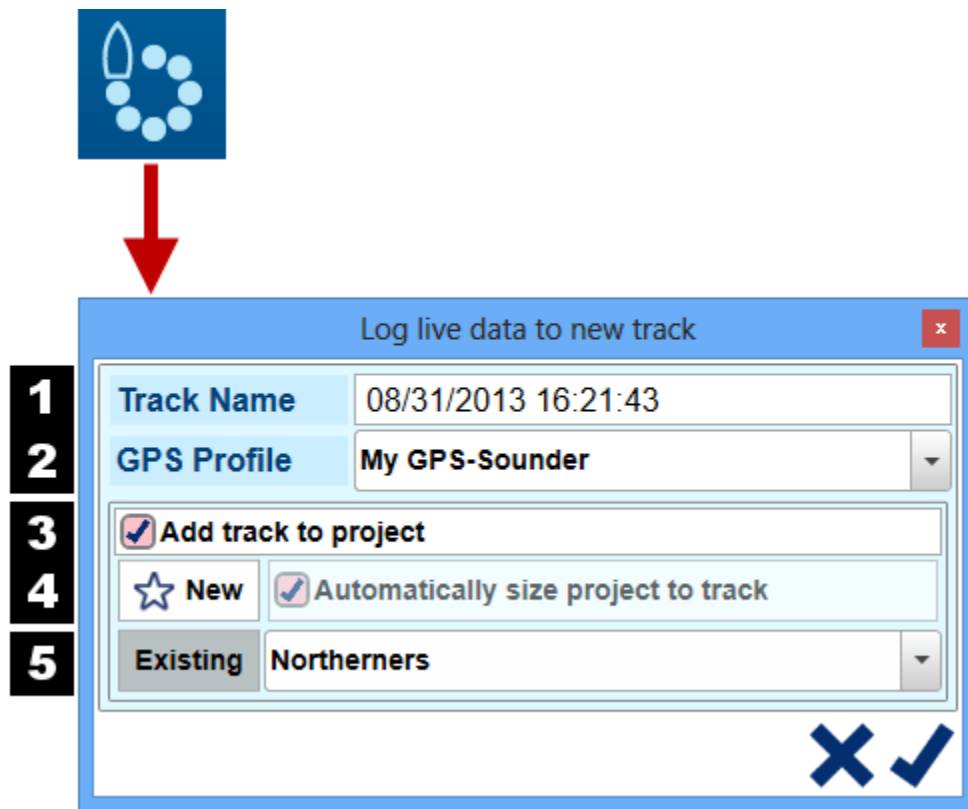
To create a new *live track*, and start logging data, click the *Log Live track* button in the Main Toolbar. A window is shown with some options for the new track:

(1) Track Name
The name of the new track. By default, the current time and date are used.

(2) GPS Profile
The GPS Equipment Profile to use for track properties *Keel Offset* and *Cone Angle*. The default profile is initially chosen, but any available profile can be selected from the list.

(3) Add Track to Project
Select the *Add track to project* option to add the new track to an existing or new map project. This option is a convenient short-cut when creating a map in real time, and has exactly the same effect as adding the live track to a project in any of the usual ways. Choose *New (4)* to create a new map project, to which the track will be added. When creating a new project to receive a live track, the option *Automatically size project to track* can be selected, which sizes the defined map area of the map project to the bounding rectangle of the live track. This automatic sizing of the map project will continue until the mapped area is overridden by defining a map area in the Define Map View of the map project.
To add the live track to an existing project, select *Existing (5)* and choose the required project from the drop-down list.

The Live Track
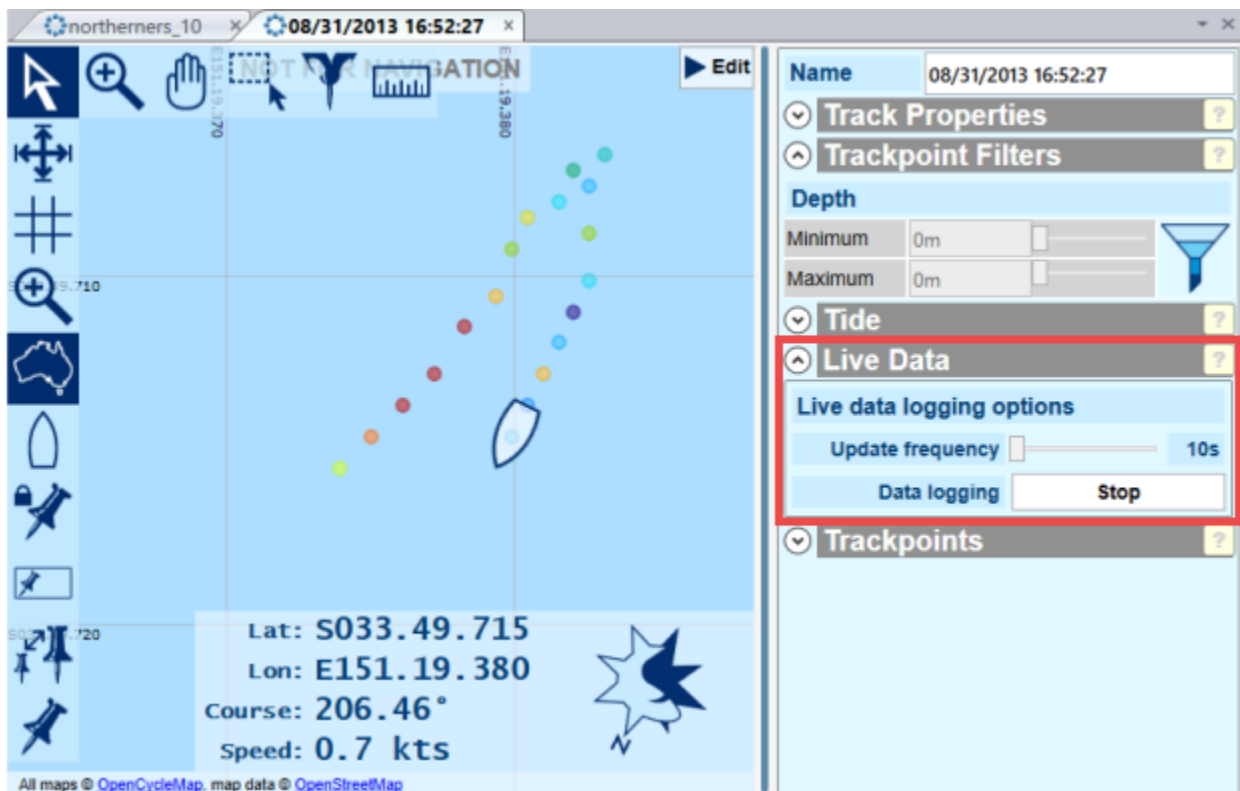
The live track is treated as just another track within the workspace; the only difference is that the track is constantly being extended by the addition of new track-points.

When a track is part of a map project, any change in the track forces the map project to regenerate. When the live track is part of map project, this would mean a complete map re-generate on every new track-point. If track-points are being added to the live track at a rapid rate, this can cause the map project to regenerate very frequently, consuming PC memory and processor resources as it does so.

To mitigate this, the frequency with which the live track informs map projects about changes can be controlled, in the *Live Data* section of the Track Edit Pane.
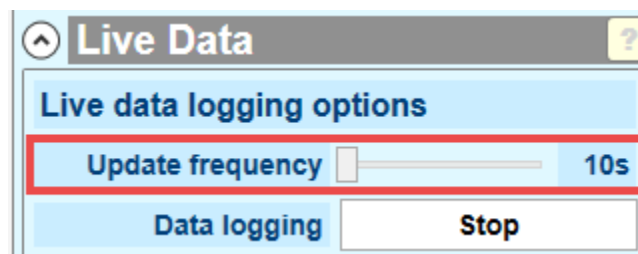
- Use the *Update Frequency* slider to adjust how often the live track informs map projects of changes. The minimum value is 10 seconds, and the maximum value is 100 seconds.

- Click *Stop* to stop logging to the live track. Logging will cease, although the data connections will remain open *(the NMEA data connection can be closed, and serial port(s) freed, by clicking the data Off button in the status bar).*

- Once logging has been stopped, it cannot be resumed within the same track. To continue logging data, click the *Log Live Track* button in the main toolbar once more, to start logging a new track. Starting to log a new track whilst an existing track is being logged will automatically stop the logging in the existing live track and create a new live track.

Replay as live track

Replay as live track is a test function that replays the current track, providing data to ReefMaster as if it were coming over an NMEA connection. Replaying a live track is a good way to explore live-mapping features, before venturing out on to the water.
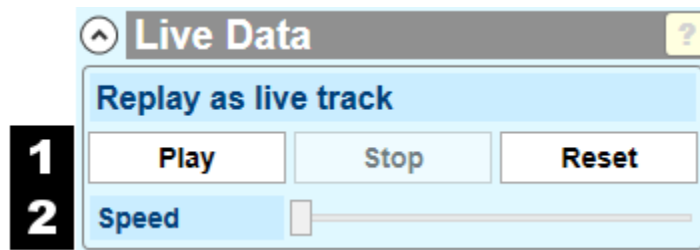
The *Replay as live track* panel is located in the *Live Data* section of the track edit pane. Note that this panel is not displayed for the live track.

To control the replay of the current track, use the buttons *Play, Stop* and *Reset (1)*. *Reset* moves the track position back to the beginning, so that hitting *Play* again will restart the track replay.

Replay speed can be adjusted on a scale of 1 - 5x using the *Speed* slider *(2)*. When replaying a track, track-points are supplied to ReefMaster as if they were from an external source, and they can be logged to a live track by following the procedure described above.

Note that any existing NMEA connections will be closed when replaying an existing track. To restart NMEA connections, use the *Connect* button in the NMEA configuration window.

Volumes and Areas

Volumes and Areas is an additional module to the ReefMaster PRO edition that provides calculation and export of the mapped area, and water and sediment volume information. For information on how to add additional ReefMaster modules see ReefMaster License Activation.

The volumes and areas module calculates the *mapped area* and the volumes of water and sediment within the mapped area of a Map Project. Water and sediment volumes can also be calculated for depth ranges, as defined by the current major contour interval settings within the project. Information such as the bounding area, maximum, minimum and average depths is also provided. Volume and area information can be easily copied to the clipboard, or exported in CSV file format for use in applications such as Microsoft Excel.

Technical Notes
- All distance and area calculations use the WGS84 Ellipsoid.
- Volume and area calculations are calculated using a data grid with a cell size of 1m. Area is calculated as the sum of filled grid cells, volume is calculated as the sum of the volume contained within each grid cell.
- Due to the nature of the source data, volume and area calculations are approximations only.
- The units used for area and volume depend on the current Global Settings.

The Volumes and Areas Edit Pane

The *Volumes and Areas* edit pane forms part of the Project Properties window and is displayed by clicking on the *Volumes and Areas* expander *(1)*.

The Volumes and Areas edit area is split into a number of sections:

2. Calculate area and volumes
Volumes and areas are only calculated for a project when the *Calculate area and volumes* checkbox is selected. Checking this box will trigger the calculation of area and volumes for the current project, and the area and volume information will be re-calculated as the project changes, so long as this option remains selected. Calculating volumes and areas increases the project generate time, so this option should be de-selected when

not required.

Export
The *Export* button exports all volume and depth information as a single CSV (comma separated value) file, suitable for use in Microsoft Excel or similar applications.

3. Area
Mapped area
The mapped area is the area within the project that has been filled with depth data. Areas within the project that are empty, due to a lack of data within the current interpolation range, are not considered when calculating areas or volumes. Note that this means that the mapped area may differ from the area contained within a shoreline, if empty areas are contained within that shoreline.

Bounding box
The dimensions of the bounding rectangle of the mapped area.

NW/SE
The geographic coordinates (WGS84) of the Northwest and Southeast corners of the bounding rectangle of the mapped area.

4. Depth
Minimum, maximum and average depth of the mapped area of the project. Average depth is calculated as the mean of the individual grid-cell depths.

5. Water Volumes
Water volume is calculated as the sum of the depth of each grid cell. Empty areas do not contribute to the volume calculation.
Total volume is shown, as well as the volume contained within depth-ranges defined by the Contour Spacing setting of the project. Area is also shown for each depth-range; area is calculated as the total area for which any volume exists in the specified depth-range.

The volume and area for each depth range is shown in a list view with columns for *lower range*, *upper range*, *volume* and *area*. The list can be sorted by any column value by clicking on the column header *(1)*. Click again on the column header to reverse the sort order. Values can be copied from the list to the clipboard; all values can be copied using the *Copy all* button *(2)*, whilst individual rows can by copied by right-clicking and selecting *Copy to clipboard* from the displayed menu *(3)*. Multiple rows can be selected through the use of the left mouse button in conjunction with the SHIFT or CONTROL keys.

6. Sediment volumes
Sediment volume is calculated as the sum of (*reference depth* minus calculated depth) for each populated grid cell. Sediment volume is useful for calculating the volume of solids above a known reference depth in body of water.

Sediment volumes				Copy all
☑ Use reference depth:			190.0	ft
Lower (ft)	Upper (ft)	Volume (ft³)	Area (ft²)	
125.0	130.0	5367	5220	
130.0	135.0	175917	101719	
135.0	140.0	998872	296610	
Total volume:			45332270	ft³

Reference depth

A reference depth can be specified by checking the option *Use reference depth* and entering the required depth in the field provided. If this option is not checked, the maximum depth of the project is used as the reference depth. Depth-range bands are created between the reference depth and the minimum depth of the project.

Bottom Composition

The bottom composition module provides a way to visualise changes in the nature of the sea, lake or river bed. The relative hardness and roughness of the bottom can be determined from sonar log files in Humminbird or Lowrance formats, and processed to produce overlays on map projects. Bottom composition overlays can then be exported in a range of formats suitable for viewing on GPS devices or use in other GIS applications.

The *Bottom Composition* module is an additional module to the ReefMaster PRO edition. See ReefMaster license activation for information on how to upgrade to, and install, the bottom composition module.
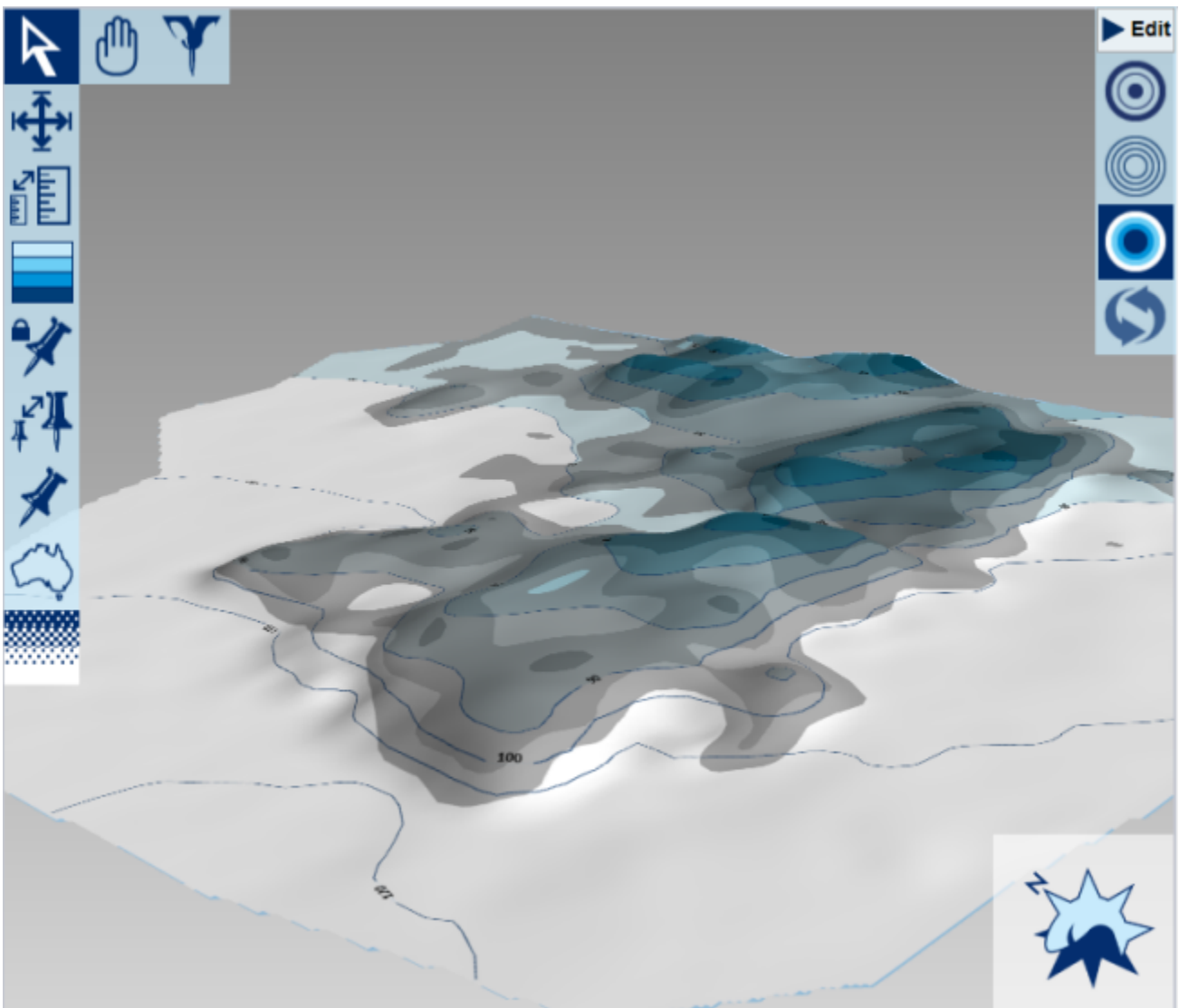
3D map image with an overlay showing harder sea bed areas

Overview

Bottom composition is determined by analysing the data within sonar log files and looking at signal returns at various positions within the returned "ping". By calculating and averaging a range of values, ReefMaster is able to determine to *relative* hardness and roughness of areas within the map project. It is important to note that the values that ReefMaster calculates for bottom hardness are unit-less and provide only an indication of relative changes in bottom type across the mapped area.

Hardness Layers

Information about the bottom type is extracted from several places in each sonar return, each of which provides a different value and each of which can be shown separately as different layers within the bottom composition module.
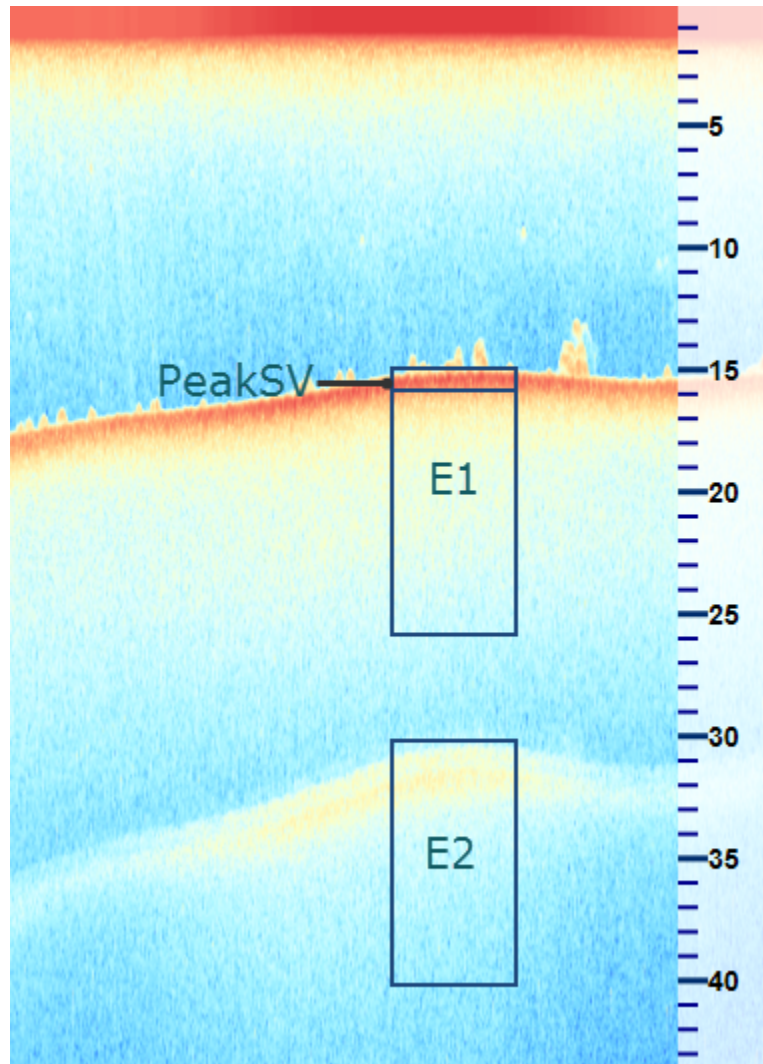
The image above shows a typical sonar return. Information that is useful for determining the relative bottom type is extracted from three distinct areas, labelled in the image above as *PeakSV, E1* (first return) and *E2* (second return). Each layer can tell us something slightly different about the nature of the bottom.

Peak SV

Peak SV simply measures the strength of the sonar return as it is reflected off the bottom, and is highly correlated to the hardness of the bottom. For various reasons, simply measuring the peak signal return at the bottom is not always as reliable as using the second echo return (*E2, see below)* but in many cases the results can be very useful. Peak SV is included as an layer in ReefMaster because many sonar logs are not recorded with a sufficient depth-range to include a usable E2 layer.

E1

The *E1* layer is derived from the sonar returns that immediately follow the peak return of the first echo return. This value is commonly referred to as *roughness* or *rugosity* and is a measure of the roughness of the bottom. Although this value is not a direct measurement of hardness, the two are often closely correlated.

E2

The *E2* layer is derived from the full second echo return of the bottom and is commonly referred to as *hardness*. The second echo return is generated when the sonar echos once again off the bottom, after having returned once to the surface and bounced off the underside of the boat. This second echo return is particularly useful for determining the relative hardness of the bottom. For example, in the image above, the second return shows a hard area in the middle much more clearly than the first.

Collecting data for use by the bottom composition module

- The process of calculating bottom composition values can be very sensitive to noise. Run slowly over areas of interest to minimise the amount of noise in the sonar recording.
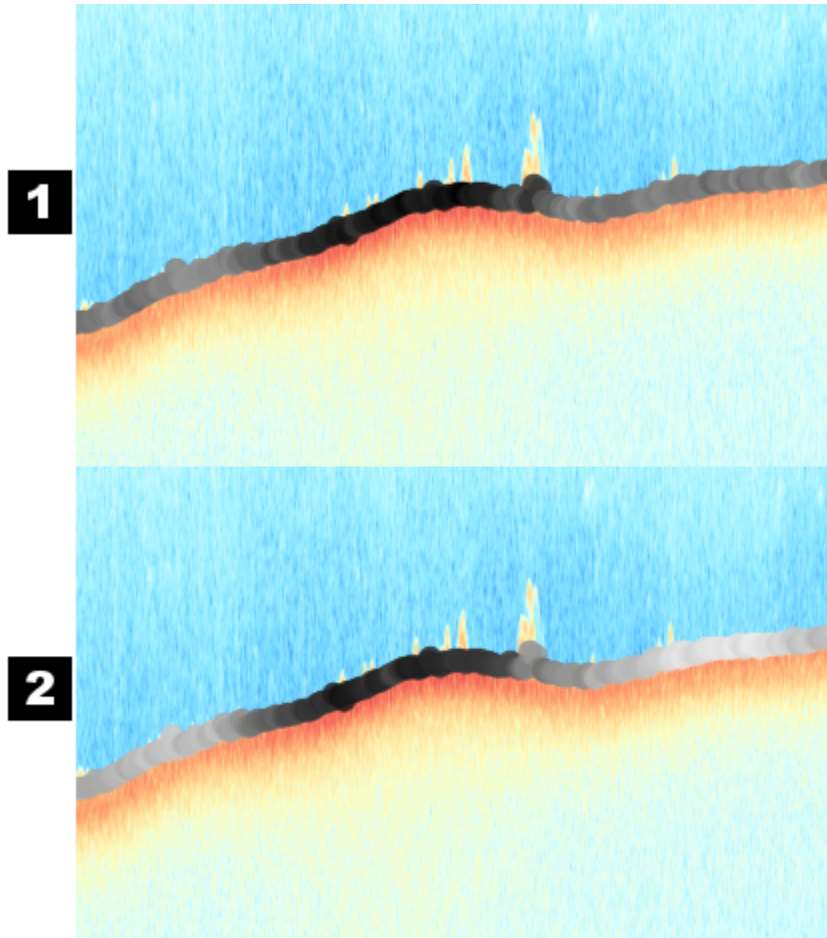
"hardness" values extracted from the PeakSV and E2 layers

- The E2 layer is the most reliable source of relative hardness information. The image above shows track-points coloured according to hardness values extracted from the PeakSV *(1)* and E2 *(2)* layers (darker colours indicate a higher return). Notice how much more clearly the harder area in the centre of the image is defined by the E2 layer. Where possible, always collect data with the sonar depth-range configured so that it is large enough range to include the full E2 return. In practice, this should be a good 10m more than *double the current depth*. Auto-range on many devices often truncates the E2 layer, or even omits it entirely, which means that a large amount of usable information is lost.

Importing bottom composition data

Sonar log files from Lowrance and Humminbird may be used to provide data for the bottom composition module. Any sonar file which is able to be displayed in the sonar viewer is capable of providing the required information. If the file cannot be seen in the sonar viewer (this applies to some early Lowrance slg files), then hardness data cannot be extracted.

When the bottom composition module is installed, hardness data will automatically be calculated whenever a compatible sonar log file is imported. Bottom composition values are assigned to each track-point within the imported track, for each of the three layers.

Note that sonar log files must be imported again after activation of the bottom composition module.
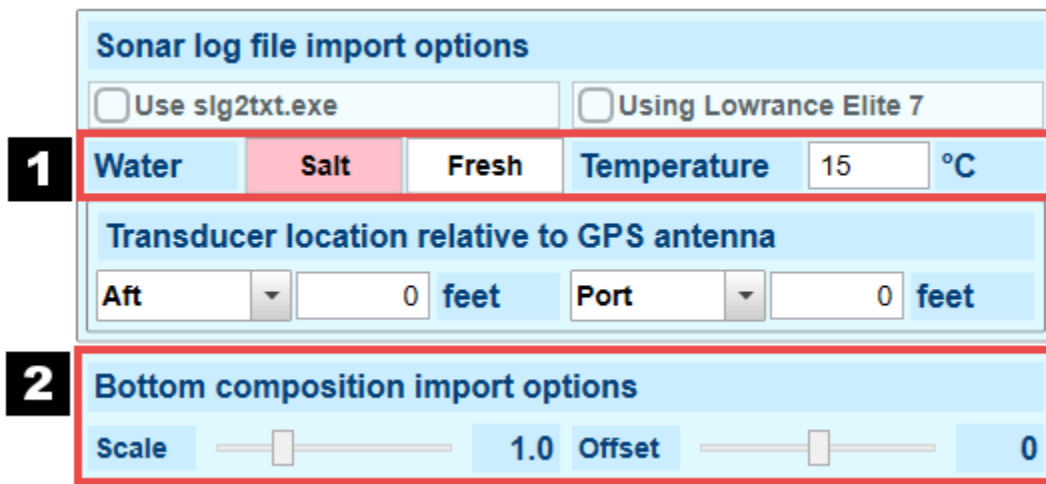
Importing Humminbird sonar log files

It is very important to set the water type and temperature parameters in the active GPS Equipment Profile *(1)*. Temperature should be accurate to within 5 degrees C.

Scale and Offset

Scale and offset are provided as import parameters, and can also be edited in the individual track properties. Scale and offset simply scale and shift the calculated hardness values by the specified amounts; scale is applied first, followed by the offset. Raw values for hardness are in the range 0 - 255; values that become less than zero after scale and offset are applied are ignored in all bottom composition calculations.

The scale and offset parameters are provided to assist in calibrating files recorded using different units or transducers and should be left to their default values unless combining data from different sources.

Viewing Bottom Composition in Tracks
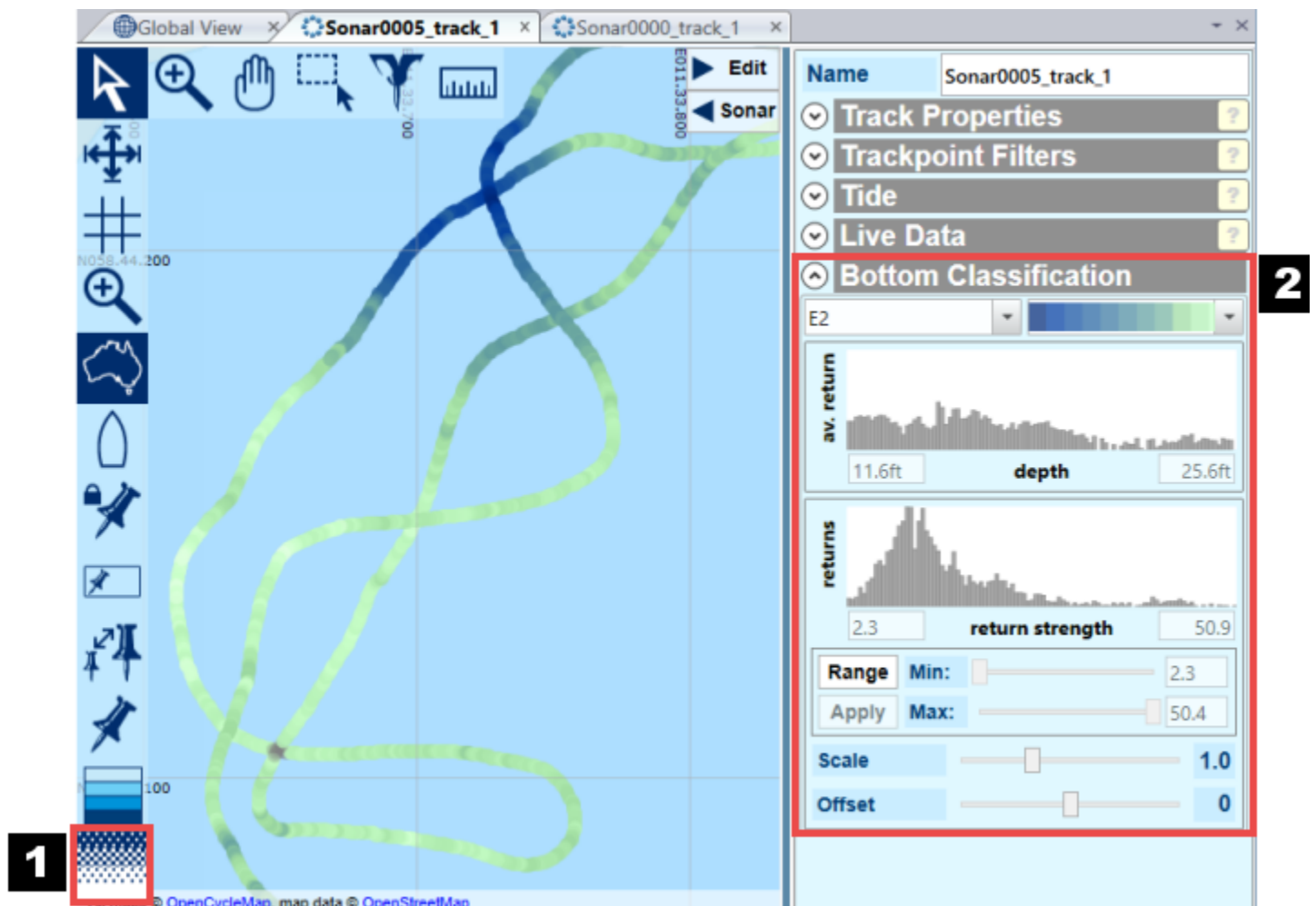
The *show hardness values* button *(1)* is enabled on tracks that have associated bottom composition values. Click this button to change the colouring of the track-points to reflect their relative bottom composition values, instead of depth.

Track-points overlaid in the sonar viewer are also shown with their hardness values when the *show hardness values* button is selected.

The *bottom classification* edit section *(2)* in the track properties panel will also be enabled when bottom composition values are present.
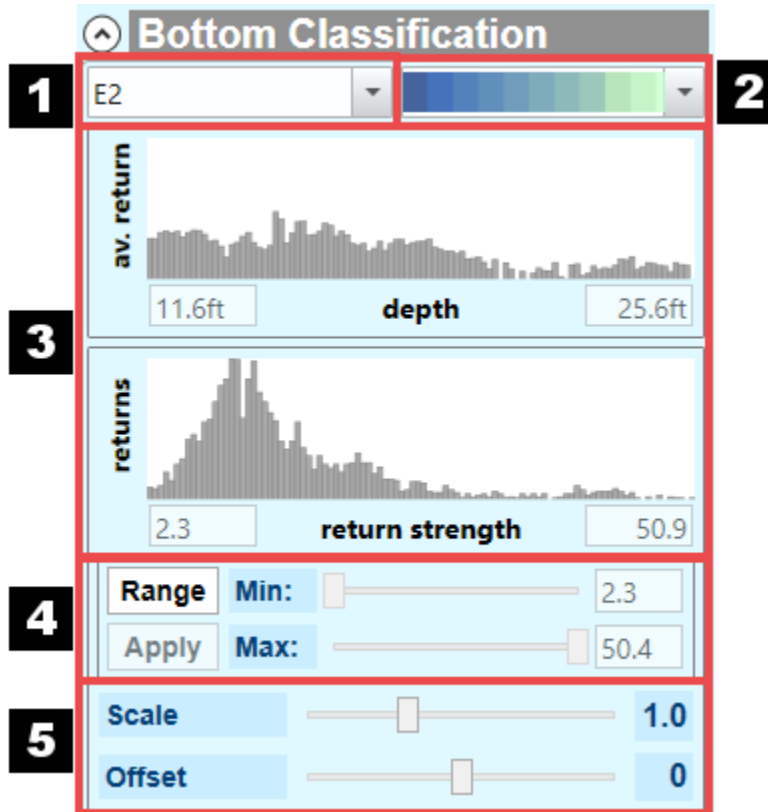
(1) Layer Selector
Choose the active layer using the drop-down layer selector. The track-point colours displayed in the graphical edit area will update to reflect the new layer values, along with the rest of the values in the bottom classification edit area.

(2) Palette Selector
The palette used for the track-point bottom composition colours can be selected using the drop-down palette selector.

(3) Signal Histograms
Two charts are shown, displaying information about the signal returns in the selected layer. The top chart displays the *average return* across the depth range of the track. The second histogram shows the distribution of signal returns across the range of return strengths. This chart in particular can be useful when adjusting range, scale and offset parameters.

(4) Range
Use a defined range to truncate values to specified lower and/or upper values. When a range is applied, any values falling above or below the maximum or minimum values specified are set to be equal to the upper or lower value; *the range values do not act as a filter.*

To apply a range, select the *Range* button and adjust the upper and lower range values using the sliders. Click *Apply* to apply the chosen values. Setting a range is not a destructive operation; the range can be set back to the full limits of the track, or the *Range* button can be de-selected so that the range is no longer applied.

(5) Scale and Offset

Scale and offset parameters, as described above. These should be left to their default values unless required to calibrate tracks from different devices.

Bottom Composition in Map Projects

Bottom composition is shown as a vector layer on top of the depth map, and is available in both the 2D and 3D views.
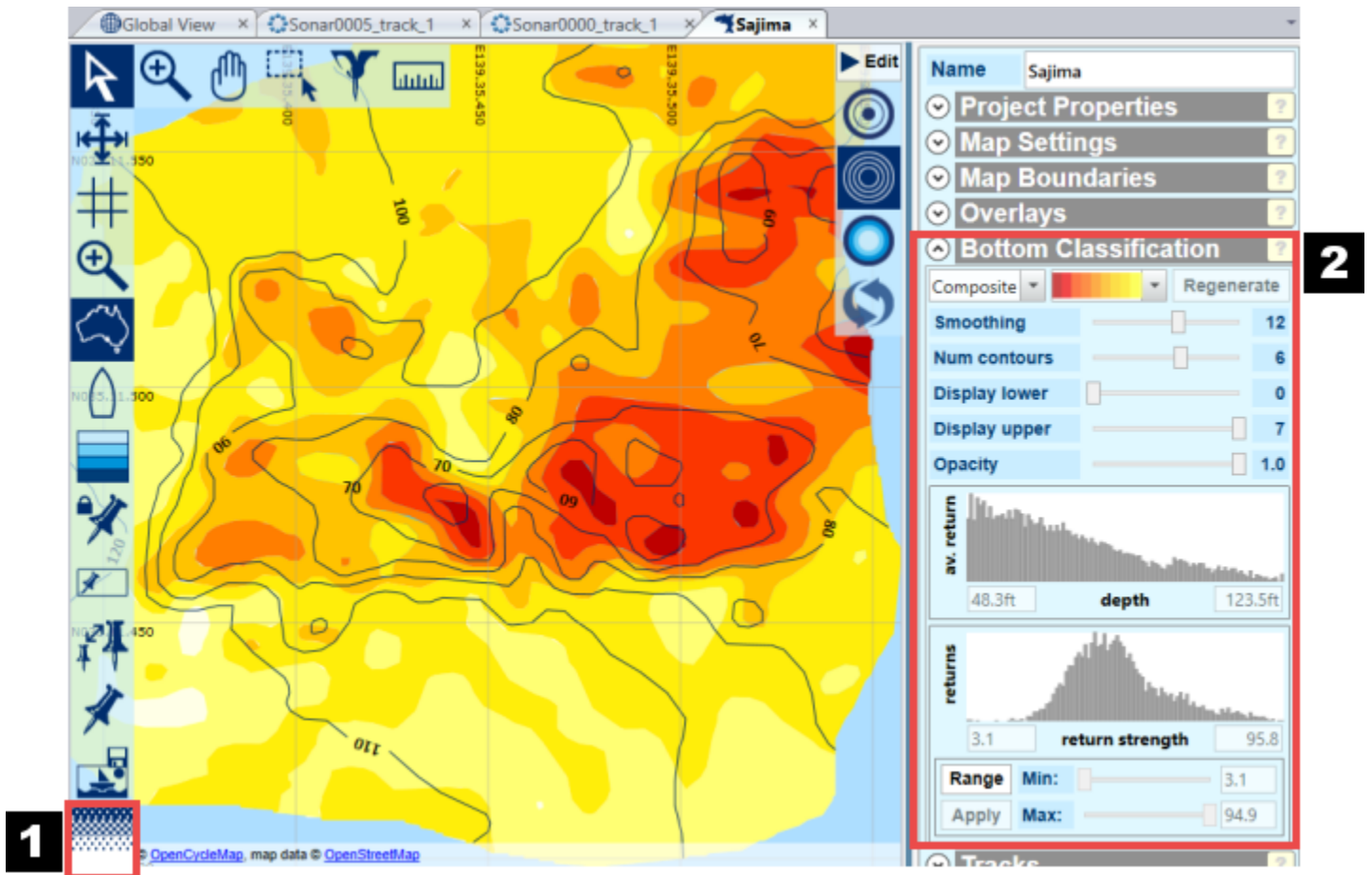
If bottom composition information is present in at least one of the map project's *component tracks* then the *Show Bottom Type* button *(1)* is enabled. Clicking this button will cause the bottom composition vector overlay to be generated, using the currently selected layer. Once the bottom composition layer has been generated, this button can be used to toggle the visibility of the layer without having to regenerate it.

The *Bottom Classification* section *(2)* of the project properties window contains further options for generating and displaying the bottom composition layers.
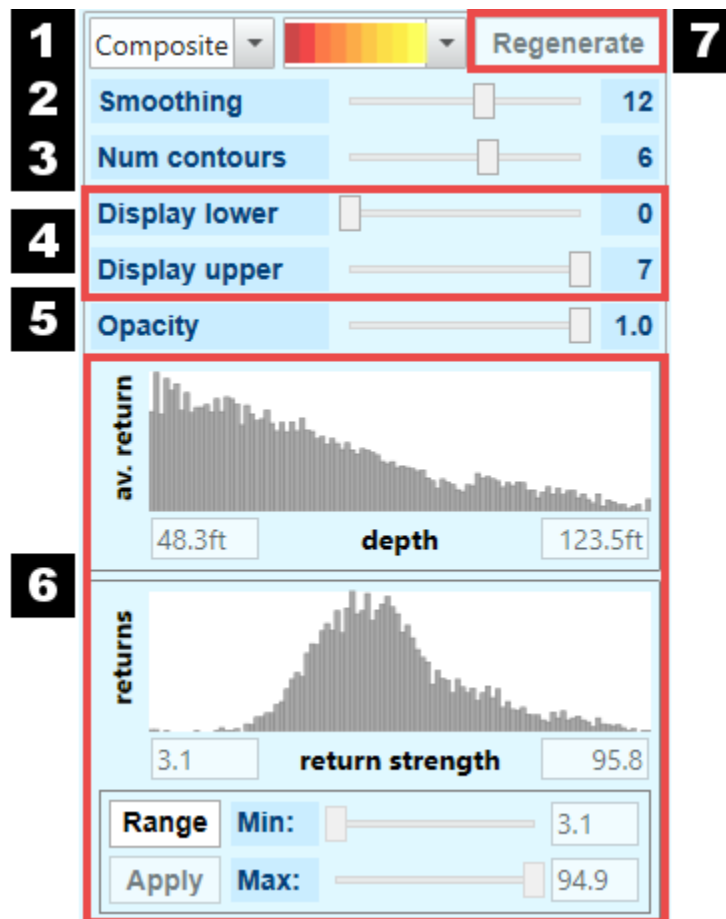
(1) Layer and palette selectors
Select the active layer using the layer selector.
Projects have an additional layer, *Composite*, which is an average of the normalised values of all of the layers present.

(2) Smoothing
The smoothing parameter relates to the amount of smoothing carried on the grid of calculated bottom composition values, before the contouring process is carried out. Higher values give smoother looking contours, at the loss of some detail.

(3) Number of contours
The number of contour levels to generate. Higher values equate to a smaller contour interval and will give a larger number of hardness areas in the finished map.

(4) Hardness area display range
Once the hardness areas have been generated, the displayed area ranges can be adjusted using the *Display lower* and *Display upper* sliders.
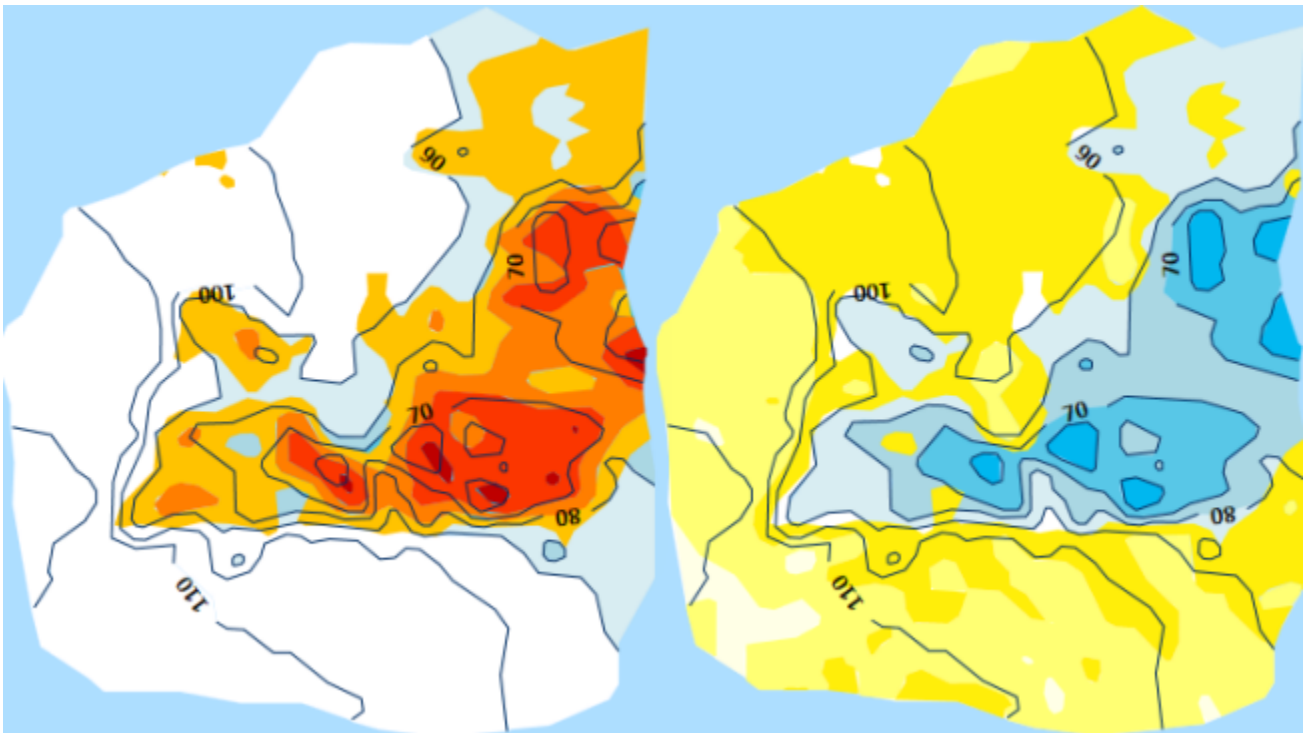
Higher value hardness areas shown on left, with lower values on the right

Adjust the sliders so that just the required areas are shown; this could be higher areas, as shown on the left in the image above, or lower areas, or any contiguous subset of areas within the range. Showing just the areas on interest is very useful when exporting maps; for example, it may be that only harder or rougher areas are of interest, so the resulting map will be much less cluttered if only those areas are exported.

(5) Opacity
Adjust the opacity slider to vary the transparency of the bottom composition layer.

(6) Range
Range can be adjusted and applied using the *Range* controls, as described above. Adjusting range in map projects can be very useful to increase the level of discrimination within a smaller range of bottom composition values.

(7) Regenerate
The bottom composition must be regenerated when parameters are changed. The *Regenerate* button will become enabled when changes have been made to parameters which affect the finished layer.

Selecting Assets for Export

- [Projects](#), [Tracks](#), [Waypoint Sets](#), [User Maps](#) and [Data Sets](#) can all be exported, to a variety of file formats.
- Any number and combination of exportable assets can be selected for export, from a single waypoint to the entire contents of the workspace.
- Use a [Data Set](#) to save groups of assets that are commonly exported together, and then export the data set via the context menu in the Asset Library.

Selecting Assets for Export from the Asset Library
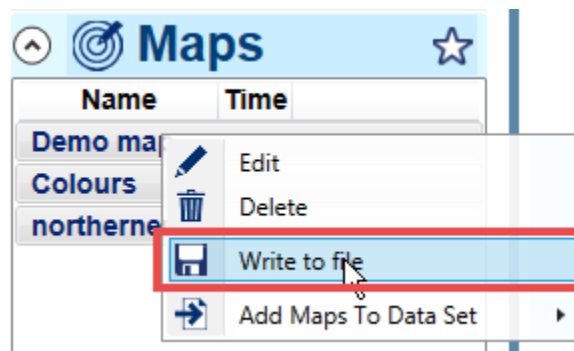
Select one or more tracks, waypoint sets, user maps or data sets, then choose the option *Write To File* in the context menu, activated with the right mouse button. Only assets of one type at a time can be exported via the asset library. To export assets of different types together, either use a [Data Set](#) or select assets for export graphically in the [Global View](#) *(see below)*.

Exporting an Individual Asset from the Asset's Edit Window
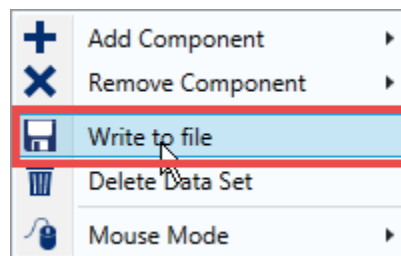
Use the *Write to File* option in the *screen-level context menu*, activated by right clicking with the mouse, in empty space, within the graphical edit area.

Selecting Assets for Export in the Global View
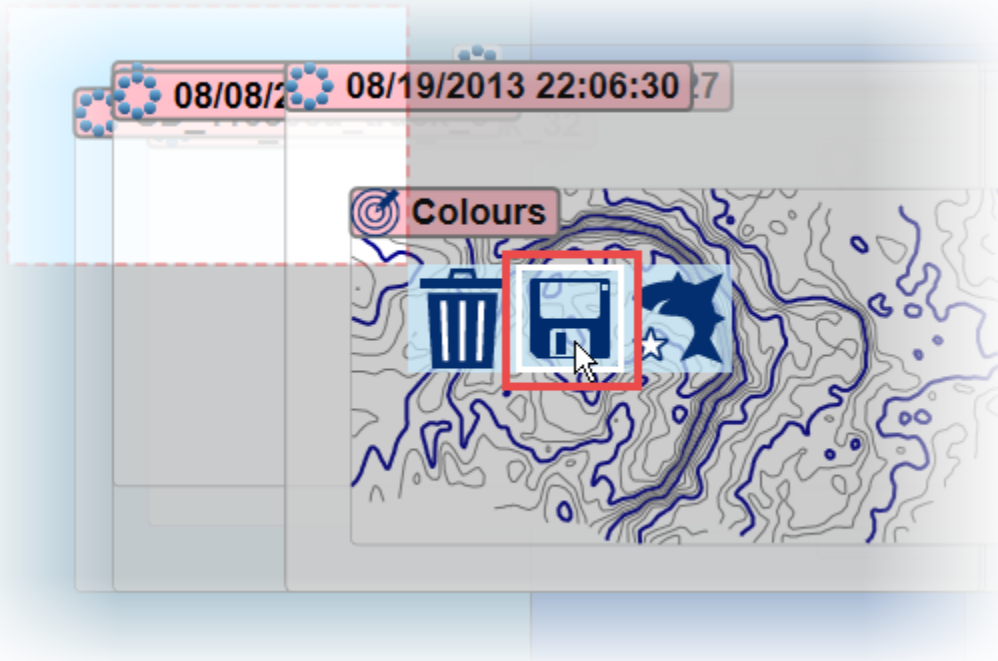
Select the assets required for export by by either drawing a rectangle around then with the mouse, with the mouse in *region-select* mode, or by clicking the required assets individually (hold the *Control* key down for multiple selection). Choose the option *Write Selected Assets* from the pop-up tool-bar or context menu.

Selecting Waypoints for Export from the Waypoints List
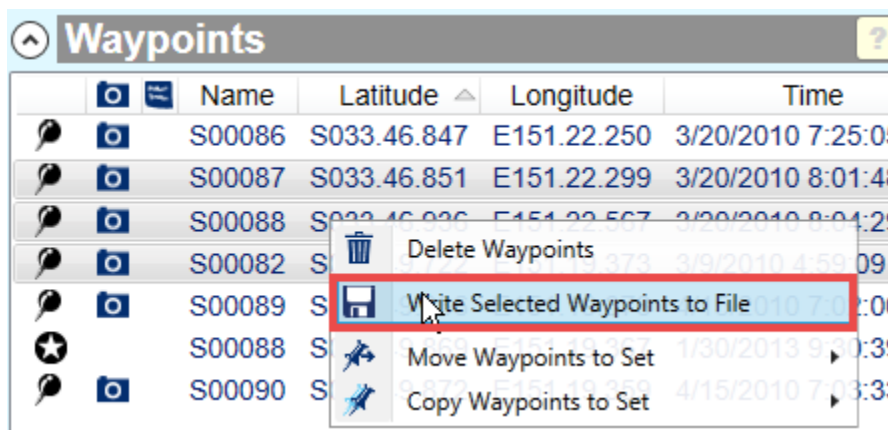
Select one or more waypoint in the *Waypoint List* in the Waypoint Edit Pane and choose the options *Write Selected Waypoints to File* from the right-button context menu.

The Export to GPS Window

Maps produced by ReefMaster are not suitable for navigation, and should never be used for navigation.
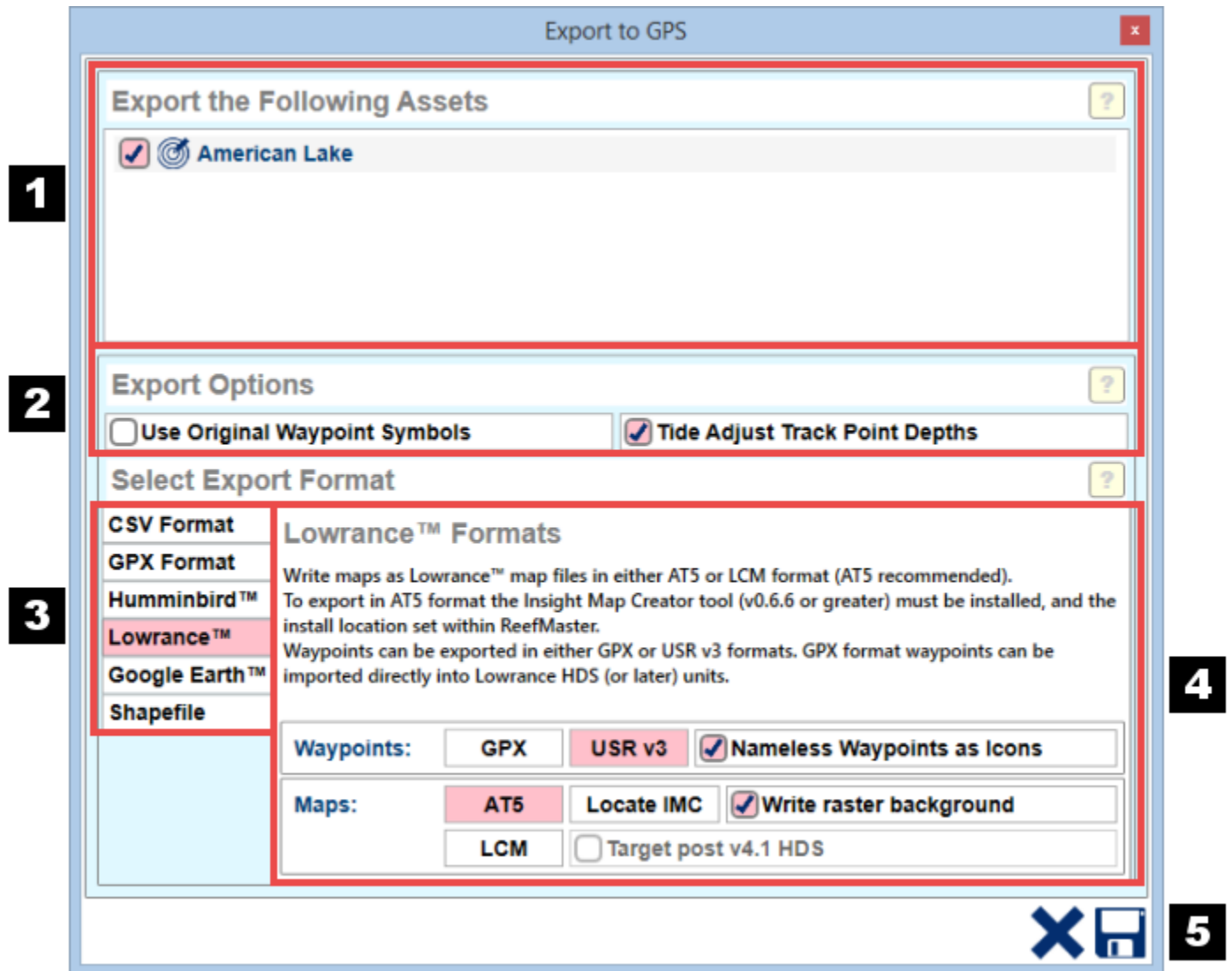
After assets have been selected using one of the above methods described here, the *Export GPS Assets* window is shown, which displays a list of the assets selected for export along with a range of export options.

1. Asset List

All of the assets that have been selected for export are displayed in a scrollable list. The type of the asset can be determined from the icon shown in the asset row. Individual assets can be deselected if not required for the export, by clicking the check-box at the far left of the row.

2. Export Options

Global options that apply, regardless of the destination file format.

Use Original Waypoint Symbols

When exporting waypoints, use the waypoint symbol that was associated with the waypoint at the time of import, if any. This option is useful if the original waypoint symbol does not have an equivalent in ReefMaster and the symbol needs to be preserved on the original device. *This option only works if the chosen export format matches the original import format of the waypoints.*

Tide Adjust Track Point Depths

Apply tide adjustment to track point depths. This option only has an effect on track for which a tide offset has been defined.

Saving the file(s)

When the required options have been set, the file(s) can be exported using the *Save* button *(5)*.

Export Formats

The required GPS file format can be selected from the displayed list *(3)*. When a file format is selected, further options specific to the chosen format are displayed in panel *(4)*.

CSV Format

Comma Separated Value or *CSV* files are text files that contain values on each row, separated by commas. CSV files are easy to import into a range of further applications, such as Microsoft™ Excel.

ReefMaster can export *Tracks* and *User Maps* as a single CSV file, with the format *latitude, longitude, depth*.

- Depth is written in metric or English units, depending on the global units setting.
- When writing in metric, depths are expressed in metres.
- When writing in English units, depths are expressed as feet with a fractional component.
- All track and path points from the selected assets are written into a single CSV file.

GPX Format

Export selected assets in GPX format. GPX stands for *GPs eXchange* format, and is a common, text (XML) based format that can be read by many different applications, as well as some GPS devices.

GPX Format

Export selected assets in GPX format. Depth information is exported only when targeting Humminbird™ or Garmin™, using proprietry GPX extensions. ReefMaster GPX files do not include depth information.

| Target Humminbird™ | Target Garmin™ | ReefMaster |
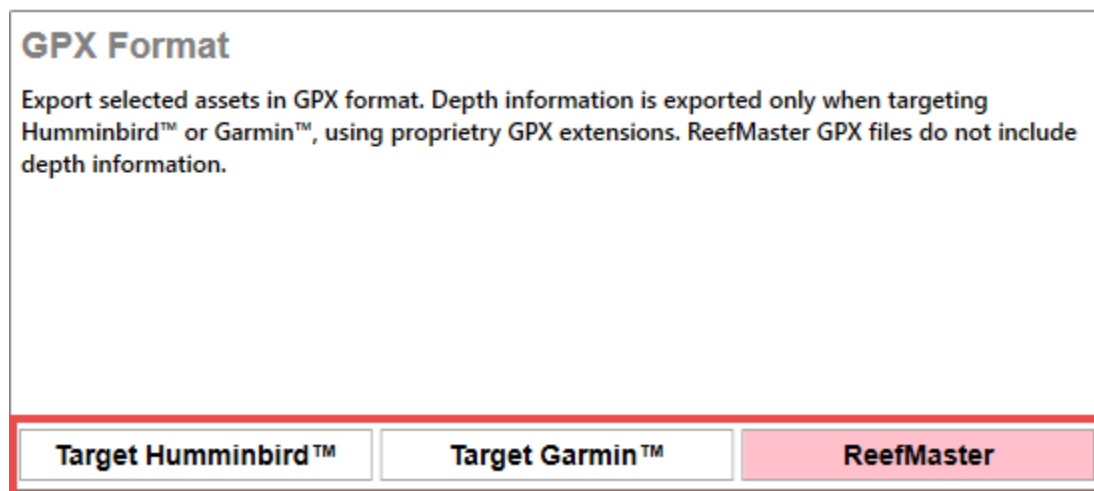
Exporting assets in GPX format results in a single file, with the extension .gpx.
Map contours are exported as *segmented* tracks; a single track with multiple separate segments for each contour line.
GPX format is a good choice when exporting data for use in other software applications, or when exporting data for use in a GPS device that is not natively supported by ReefMaster. In this case, another software package may be available that can convert GPX files into the format required for import into that GPS device.

Target Humminbird™, Target Garmin™, ReefMaster

The standard GPX file format does not contain depth information for track points. However, the file format can be extended such that it does. Both Humminbird™ and Garmin™ use a modified GPX file format that includes depth information. If targeting applications by these manufacturers, or other applications that can read this depth information, select the appropriate option here. The ReefMaster option produces a standard GPX file with no depth information in the track logs.

Humminbird™

Export selected assets in Humminbird™ native file formats. ReefMaster does not generate native map files for Humminbird devices; instead, contour lines are exported as segmented tracks, which can then be configured on the GPS device to display as solid lines in a range of colours and widths. See Configuring Maps for Display on Humminbird Devices for instructions on how to do this.

- Map contours and tracks are exported as tracks to files with naming format 00.HT, one per track or map. ReefMaster uses some undocumented Humminbird™ file format features to add multiple, separate contour lines to a single track.
- Waypoints are exported to the single file DATA.HWR.
- Hardness area outlines are exported as a separate, segmented track file. The name of the hardness track is postfixed 'H' when viewed in the Humminbird unit.

All Humminbird files must be placed in a folder titled 'MATRIX', located at the root of a memory card, for import into a Humminbird™ GPS device. *Note that any data already present in the folder selected for export may be overwritten.*

(1) Unicode track and waypoint names
Select this option to write track and waypoint names in *Unicode*, which is a two-bytes-per-character character set required for Asian languages. Use this option when targeting Japanese or Korean Humminbird devices. ***This option should not be used when targeting English language Humminbird Devices.***

Map splitting options
A single contour map can be split into multiple separate tracks, each of which can then be styled to display differently on the Humminbird™ GPS unit; for example, shorelines can be shown in a different colour or link thickness than contour lines.

(2) Track for shorelines
Create a separate track for shorelines and islands. The generated shoreline track file name is appended with "SL".

(3) Colour cycle contours
Export every third depth level into a separate track, so that a total of three contour tracks are generated. The three generated tracks can be assigned different colours in the Humminbird™ unit, which allows the direction of the depth change to be discerned. The generated colour-cycled contour track files are appended with the suffixes "C1", "C2" and "C3".

(4) Track for minor contours
Export minor contours as a separate track. The generated minor contour track file name is appended with the suffix "M".

Note that all of the above options may be combined, and are applied in the order; *shorelines, minor contours,*

colour cycle. For example, selecting all three options will yield a total of five tracks; shorelines, minor contours, and all remaining contours cycled over three tracks.

The maximum number of track-points allowed in a Humminbird track file is approximately 21,000. If a contour file exceeds that count, then further HT files are created as required, with an increasing number appended.

Lowrance™

ReefMaster exports maps in two formats that can be read by Navico units, such as Lowrance and Simrad GPS units; AT5 and LCM.

AT5 Maps
The AT5 map format is a Navico map format supported by a wide range of Lowrance and Simrad GPS devices, from the older LMS range right through to the most recent HDS touch. The AT5 format is able to combine vector layers, such as contour lines and isobaths, with raster (image) layers. See Exporting Navico AT5 Maps.

LCM Maps
LCM files are Lowrance native contour map files that can be displayed on most Lowrance chart-plotters. LCM maps have a limited range of styles, and are only capable of displaying line objects such as shorelines and contours. LCM format maps also have some compatibility issues with the most recent Navico units; in most cases, AT5 is the preferred map format for Navico devices *(see above)*.

Individual LCM files cover a set geographic range; ReefMaster generates as many LCM files as required, with increasing numeric file name suffixes, to contain the selected user map(s). All of the LCM files generated after exporting a user map should be copied to the target device.

To write maps in LCM format, select the *LCM* button.

(1) Waypoints as GPX, Waypoints as USR
Waypoints cannot be written to LCM files, so must be written either to a GPX file or to a Lowrance native USR file.

Waypoints and can be exported in a GPX file for import into HDS series Lowrance™ devices, or they can be exported in a USR Lowrance™ native file format for import into HDS or earlier devices. Note also that the full range of HDS waypoint symbols is not available in USR format.

(2) Nameless Waypoints as Icons
Lowrance has the concept of *icons*, which are waypoints that carry minimal information - just location, and symbol, but no name. When an icon is imported from a Lowrance native file, it is stored in ReefMaster as a waypoint with no name. When writing waypoints to a Lowrance USR file, waypoints with no name can be written as icons or waypoints; choose which using this check-box. If waypoints without a name are written as waypoints, they are given a name of the form *icon{n}*.

(3) Target post v4.1 HDS

Lowrance HDS units with firmware versions above 4.1 use a different method for calculating metric values on LCM maps. Check this option if exporting to a device that meets these criteria.

Google Earth™

See [Exporting Maps for Google Earth](#).

Shapefile

User maps and map projects can be exported as *ESRI Shapefiles*, which is a widely supported vector file format.
Shapefiles produced by ReefMaster are suitable for use in further GIS applications, and for use by the *Insight Map Creator* for generating AT5 maps for display on Navico devices. Shapefiles may also be useful when generating maps for display on Garmin devices using tools such as cgpsmapper.

All shapefile exports use the WGS84 datum and are exported with associated projection (.prj) files.

Shapefile export files

The following files are generated when exporting in *shapefile* format. All of the filenames detailed below are prefixed with the chosen filename on export. Note that, depending on the contents of the map being exported, not all of the following files may be generated:

- ***Isobaths.shp***   Isobaths as polygons.
- ***Major contours.shp***   Major contours as lines.
- ***Minor contous.shp***   Minor contours as lines.
- ***Shorelines.shp***   Water bodies as polygons.
- ***Islands.shp***   Islands as polygons
- ***InvertedShorelines.shp***   The bounding box of the exported map, with shorelines as holes within this box. Note that depending on the shape of the shorelines, the surrounding polygon may be rendered as a polygon without holes. Enclosed areas within the exported polygon(s) are land areas.
- ***Hardness.shp***   *H*ardness areas as polygons.
- ***ShorelinePolylines.shp***   All shoreline and island boundaries, as a set of lines.

Exporting Navico AT5 Maps

The AT5 Map Format

The AT5 map format is a Lowrance map format supported by a wide range of Lowrance GPS devices, from the older LMS range right through to the most recent HDS touch. The AT5 format is able to combine vector layers, such as contour lines, with raster (image) layers. In the example below, shown on an HDS 10 unit, a coloured raster background has been combined with vector layers for the major and minor contours and land.
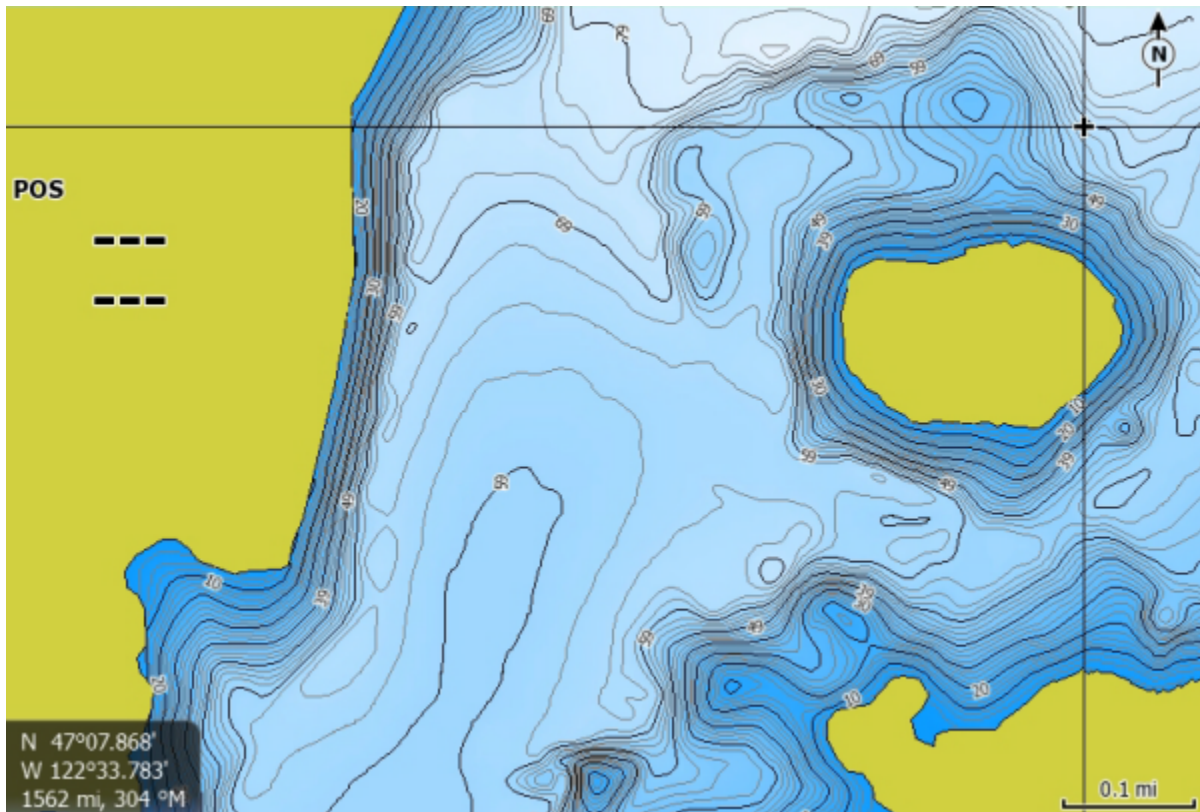
AT5 map shown on a Lowrance HDS 10. Image courtesy of AnglingCharts.com

The styling options for AT5 maps are virtually limitless. User maps provide near WYSIWYG (what you see is what you get) editing facilities; isobaths and contours can by coloured and styled, and custom paths and polygons added.

Generating AT5 Maps: The Insight Map Creator

AT5 maps are created using the *Insight Map Creator* tool from Navico. This tool is free, and can be downloaded from the Navico Insight Store, on the *Insight Planner* tab.

ReefMaster can generate the required IMC project file and run the IMC automatically during map exports. In order to do this, the location of the *InsightMapCreator.exe* executable file must be provided to ReefMaster using the *Locate IMC* option in either the Global Settings or Export File windows. **ReefMaster is compatible only with IMC versions 0.6.6 and later.**

Running the IMC manually

This manual page describes how to export AT5 maps by automatically running the IMC. It can be useful to run the IMC manually, using files generated by ReefMaster, perhaps to target older AT5 versions or add or edit attributes that are not available within ReefMaster. To run the IMC manually, export ReefMaster maps using the *Shapefile* option and use these files as input for the IMC. See the tutorial Creating maps in the Lowrance AT5 format for more.

Raster versus Vector

AT5 maps can display a combination of raster and vector components. For example, in the image at the top of this page, contour and shoreline vector components have been overlaid on a coloured raster that indicates depth values. Depth colours can also be provided by vector isobath components, which results in maps that are smaller in file size, and display-qualities that do not deteriorate as the map is zoomed.
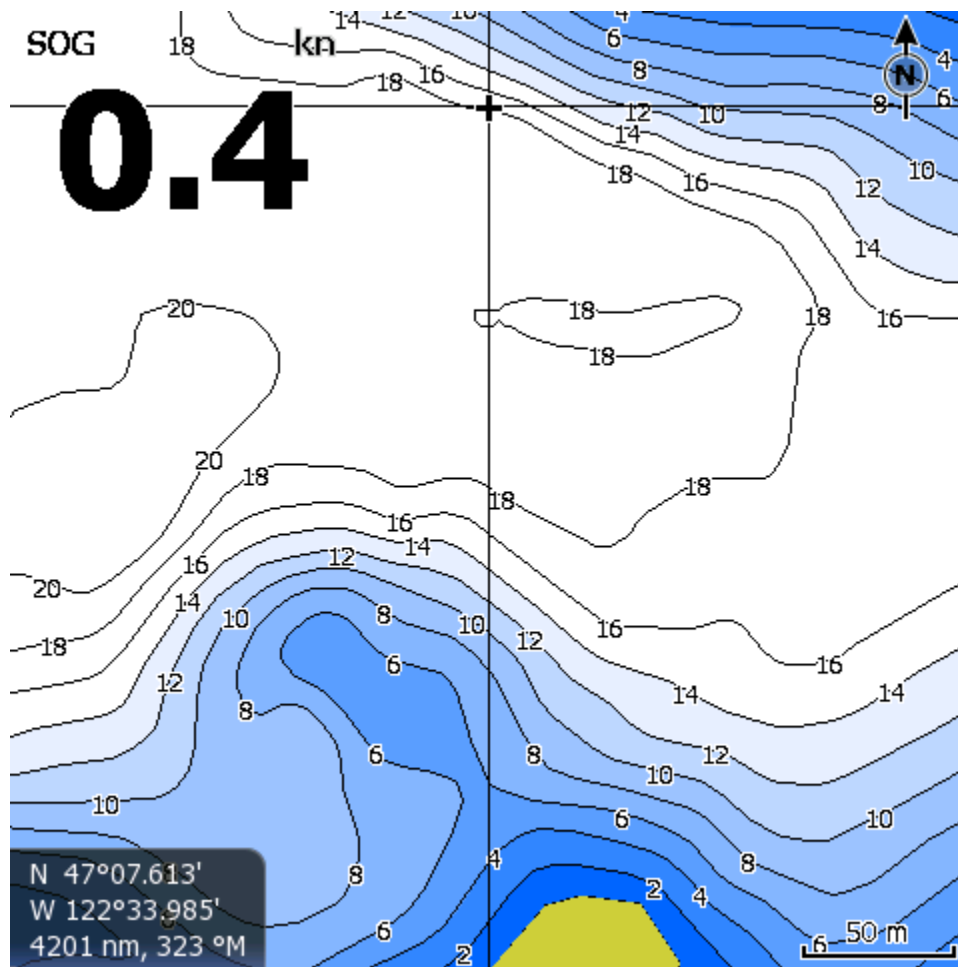
Vector depth colours on a Lowrance HDS 5

Exporting a map with raster background colours

Only map projects can be exported as an AT5 map with a coloured raster background. Since user maps do not store a background raster, User maps are always exported as vector maps.

Raster backgrounds are only compatible with more recent Navico units (later Elite units, all HDS generations). Maps for older units such as LMS and LMX should be exported as vector maps.

To export a map project with a raster background, generate a map project and ensure that the *Colour Mode* of the project is set to *Raster*. Choose the option *Write to File* from the Contour View.
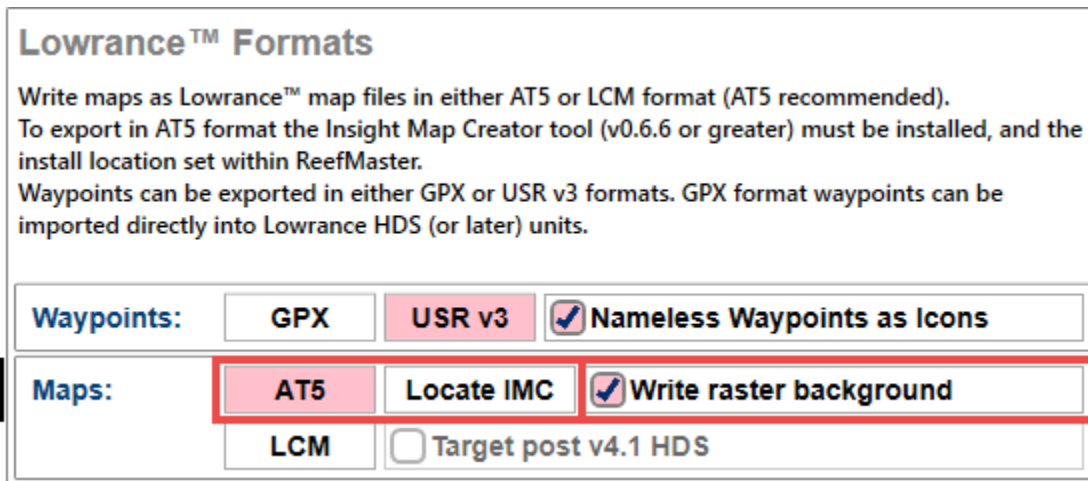
- Select *AT5 (1)* as the export format. Note that this option will not be enabled until the IMC application location has been configured. If required, select *Locate IMC* and navigate to the directory containing *InsightMapCreator.exe*. Select this file, and click OK. Note that ReefMaster required version 0.6.6 or later of the IMC, and will not let you select an earlier version.
- Ensure that the option *Write raster background* is selected.
- Click *Save,* at the bottom of the Export File Window.
- ReefMaster copies all of the resuling AT5 files into the correct directory structure for use in a memory card on a Navico unit. To write the files directly to a memory card, insert an SD card into your computer's card reader, and select the root folder of this card as the output directory in the save file window. ***Note that any existing AT5 map files will be overwritten.***
- The IMC will be launched, and the raster and vector layers created for the map. Note that this process may take some time. You can observe the progress of the operation by clicking on the IMC icon in the Windows task bar, which brings the IMC application to the front of the screen.

Vector and raster files are written to the files *at5.xml, Large.at5* and a folder *ShadedRelief*. These files should be located at the root of a memory card, and inserted into a GPS device.

- In order to see AT5 maps on your Navico device, you must select the option *Settings/Chart/Chart data/Lowrance.*
- To see the raster background, select the option *Chart options/Imagery/Shaded relief.*

Exporting a map with vector background colours (isobaths)

Maps with vector depth colours (isobaths), or no depth colours at all (just contour lines), can be exported from either the map project or a user map.

Exporting directly from a map project is a very easy way to generate maps for a Navico device, although the styling options are limited to a choice of palettes for depth and hardness areas (where applicable).

A user map gives a wide range of custom options for map styles, including the ability to choose colours for any individual area(s), add custom lines or polygons, and add tracks to the finished map, as well as use more advanced AT5 styling options such as transparency. For example, highlighting a certain depth can be easily accomplished by using a user map.

Map Projects

- To include isobaths in the exported map, ensure that the map project *Colour Mode* is set to *Vector*. Regenerate the map if necessary, to create the required isobaths.
- Set the palette of the map to an AT5 compatible palette. If exporting hardness areas, ensure that the

hardness palette is also set to an AT5 compatible palette. ***AT5 maps are not compatible with RGB palettes; if a map project is exported with an RGB palette selected, then all of the resulting isobaths will be white in the finished map.***

- Select the option *Write to File* from the *Contour View* right-button menu.
- De-select the option *Write background raster* and proceed with the map export as described above.

User Maps

User maps can be exported using the *Write to File* option, either from the asset library or the user map right-click menu.
User maps are exported as vector components, using the styles that have been assigned within the map.

Exporting user maps with opacity

Opacity can be a very useful styling tool for maps, but it is important to be aware of of a few issues when exporting maps that use opacity as AT5 maps.

Due to a quirk of the AT5 format, ***opacity only gets applied to vector shapes that are rendered on top of a raster layer.*** This means that a raster layer is required in the finished AT5 map, and that the Imagery option within the unit must be set to *ShadedRelief*, as described above (in the section on exporting raster map projects).
ReefMaster can work around this limitation by exporting a "dummy" raster layer behind the vector map. This "dummy" raster is simply a blank rectangle, rendered in the standard Navico shore colour.

To generate this dummy raster, you must check the option Write raster background when exporting user maps with modified opacity.

Exporting Maps for Google Earth™

Contour maps, tracks and waypoints can be exported to Google Earth in a single KMZ file. Exporting a map to a KMZ file is a good way of producing a mobile-viewable version of a ReefMaster generated map. The map can then be viewed within the Google Earth application running on Android and iOS devices, on top of Google Earth satellite imagery.
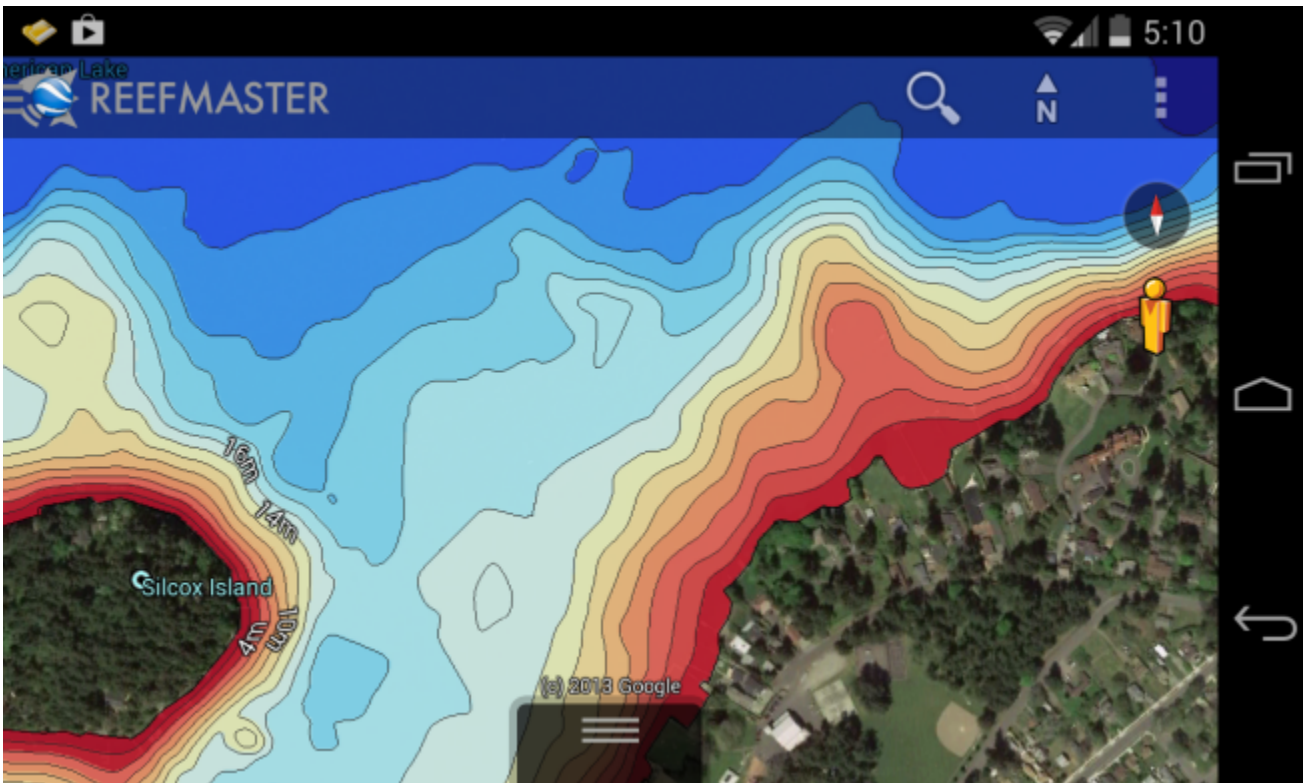
Map project exported with isobaths in vector mode, displayed on an Android phone

Maps are exported as a set of isobaths, hardness areas and contours, which are shown in Google Earth as *polygons* and *linestrings.* Each contour can be labelled with the depth, which is exported in the current global unit setting. Waypoints are exported as *placemarks*, and retain their ReefMaster symbol and colour.

To view maps on a mobile device:

- Install Google Earth for mobile.
- On Android devices, simply copy the exported KMZ file to a location on the device, and use a *File Manager* app to navigate to the file location and open the file. Google Earth will open automatically and zoom to the map's extent.
- On iOS devices, you must email the file as an attachment to an account that can be accessed on the device. Open the email on the device and select "view attachment". Google Earth will open and zoom to the map's extent.
- Performance can suffer when maps are too large. The size of map that causes problems will vary, depending on the power of the mobile device. If performance becomes an issue, try cutting maps into smaller parts (using Map Boundaries), and exporting these parts as separate map files.

Exporting Map Projects

When exporting map projects, there are a range of options available for styling the finished KMZ map. When exporting user maps, these options are hidden; instead, any styling should take place within the user map.
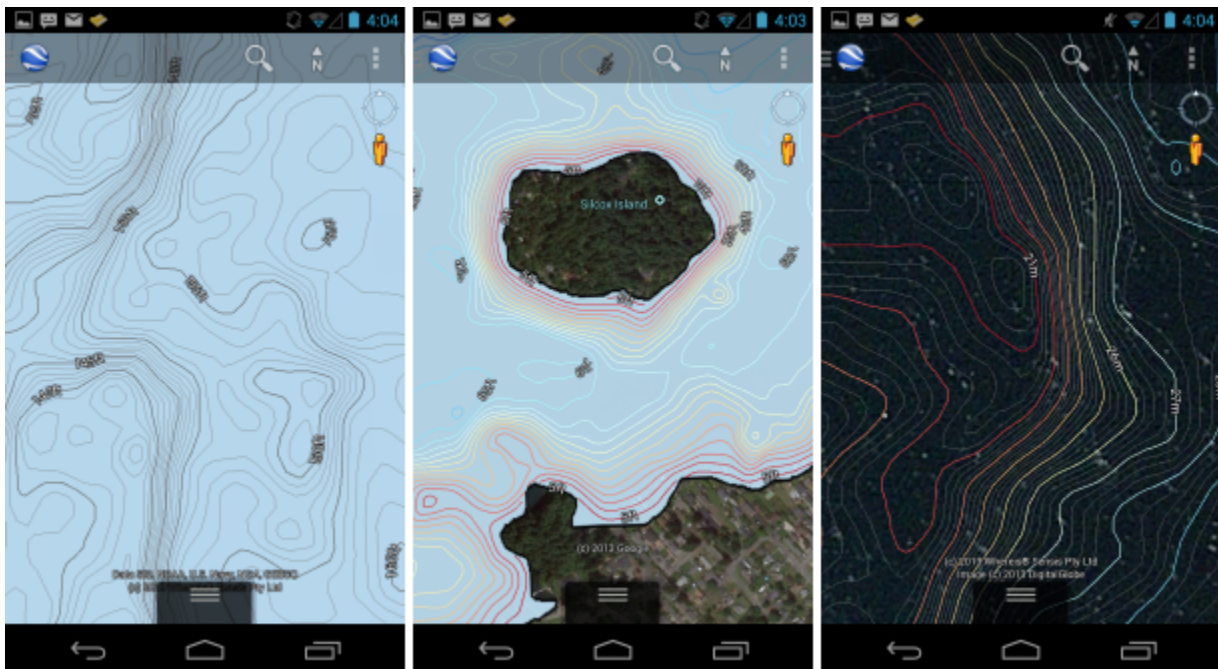
Different contour and background styles as displayed on an Android phone
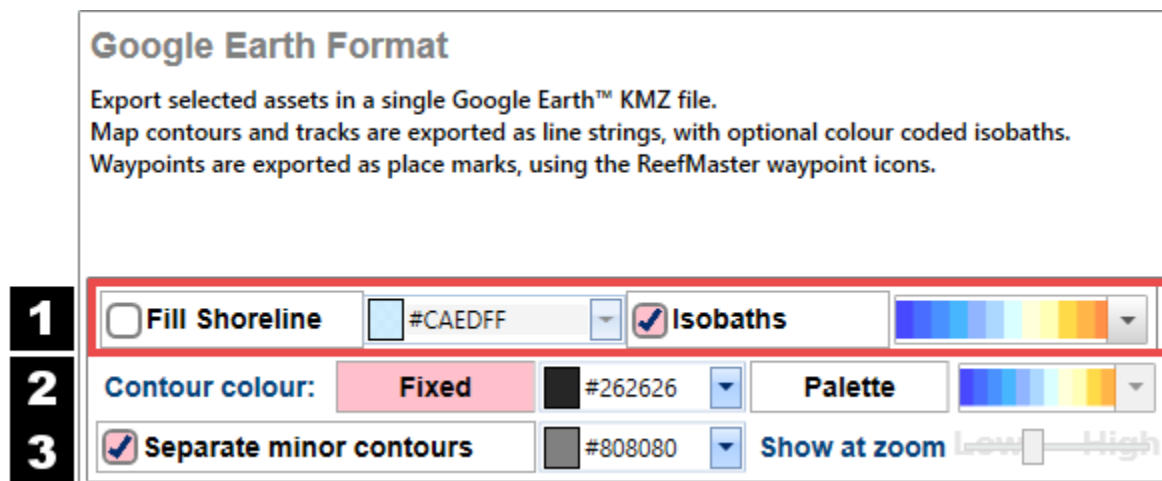
These options are only shown when exporting directly from a map project

Raster backgrounds are not exported via the Google Earth export option. A map image and associated KML calibration file can be exported using the Export Map Image option in the contour view. To generate Google Earth maps with coloured backgrounds, as shown in the image at the top of this page, ensure that the map project to be exported is in Vector Mode and isobaths have been generated.

(1) Fill shoreline/export isobaths

Check the *fill shoreline* option to fill the background of the map with a solid colour. This can be useful to make contours more visible, especially if the background in this location with Google Earth is cluttered. If the map has a defined shoreline, then the shoreline is filled. If the map does not have a defined shoreline, then the bounding rectangle of the map contours is filled. The colour can be set in the colour picker, which also supports transparency. The *alpha channel* can be specified in the first byte (two hexadecimal characters) of the colour code and ranges from 00 (fully transparent) to FF (fully opaque).

To export filled isobaths, check the option *Isobaths* and select a palette from the palette selector.

(2) Contour colour

Contours can be colour coded according to their relative depth within the map, or shown in a fixed colour. To export colour coded contours, select *Palette* and choose the required palette from the drop-down list. To draw all contours in a fixed colour, select *Fixed* and choose a colour using the colour picker.

(3) Minor Contours

Check *Separate minor contours* to export minor contours in a different colour to major contours. A colour can be chosen from the colour picker. The *Show at zoom* slider controls the visibility of minor contours. Low values mean that minor contours will be shown at a relatively low zoom level within Google Earth. High values mean that the map must be zoomed in further before minor contours become visible. The optimum setting for this value depends on the screen size and resolution of target device and the contour density of the exported map; trial and error is the best way to find the right setting.

Start to Finish - Create a Fishing Map for Your GPS

This tutorial will guide you through the process involved in creating a map for your GPS unit; from importing the raw data, through defining and configuring the map project, and on to exporting contours to a device for viewing on the water.

It is recommended that you start this tutorial with an empty workspace - see The Workspace for how to to create a new workspace.

Collect Track Data on your GPS Device

Before creating your own map, you need some track log data for the area you wish to map. See Collecting Data to Make a Map for tips on how to go about this.

To follow this tutorial, you can use the same demo files that we have used by downloading them here.

Importing the Track Log Data into ReefMaster

Configuring an Equipment Profile

To make a map, we first need to import some track log data but, before importing track data we need to configure a GPS Equipment Profile with some settings about the GPS/Sounder unit that was used to make the track recordings.

- Open the Global Settings window by clicking on the *Settings* button in the Main Toolbar.
- Click the *Edit* button next to *Default Equipment* in the *GPS Import* section of the global settings window.

The *Edit Equipment Profiles* window is displayed, which shows a list of all of the equipment profiles that have been created. By default, a single equipment profile is present with the name *My GPS-Sounder.*
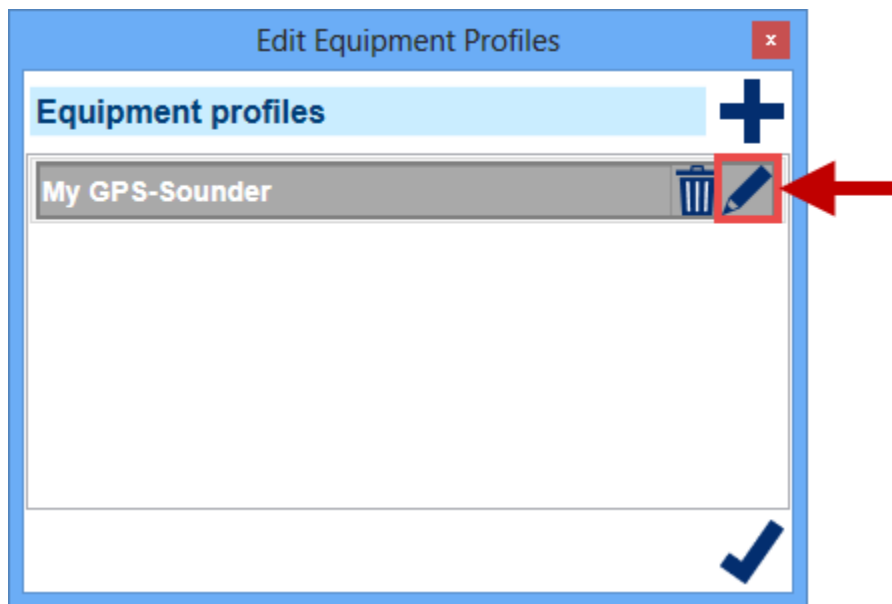
- Select the default profile, which will have the name *My GPS-Sounder* (if you have not yet edited or deleted an equipment profile).
- Once the profile has been selected, the *Delete* and *Edit* buttons are displayed. Click the *Edit* button.

The *Edit Equipment Profile* window is displayed, which contains a range of GPS-device-specific options.
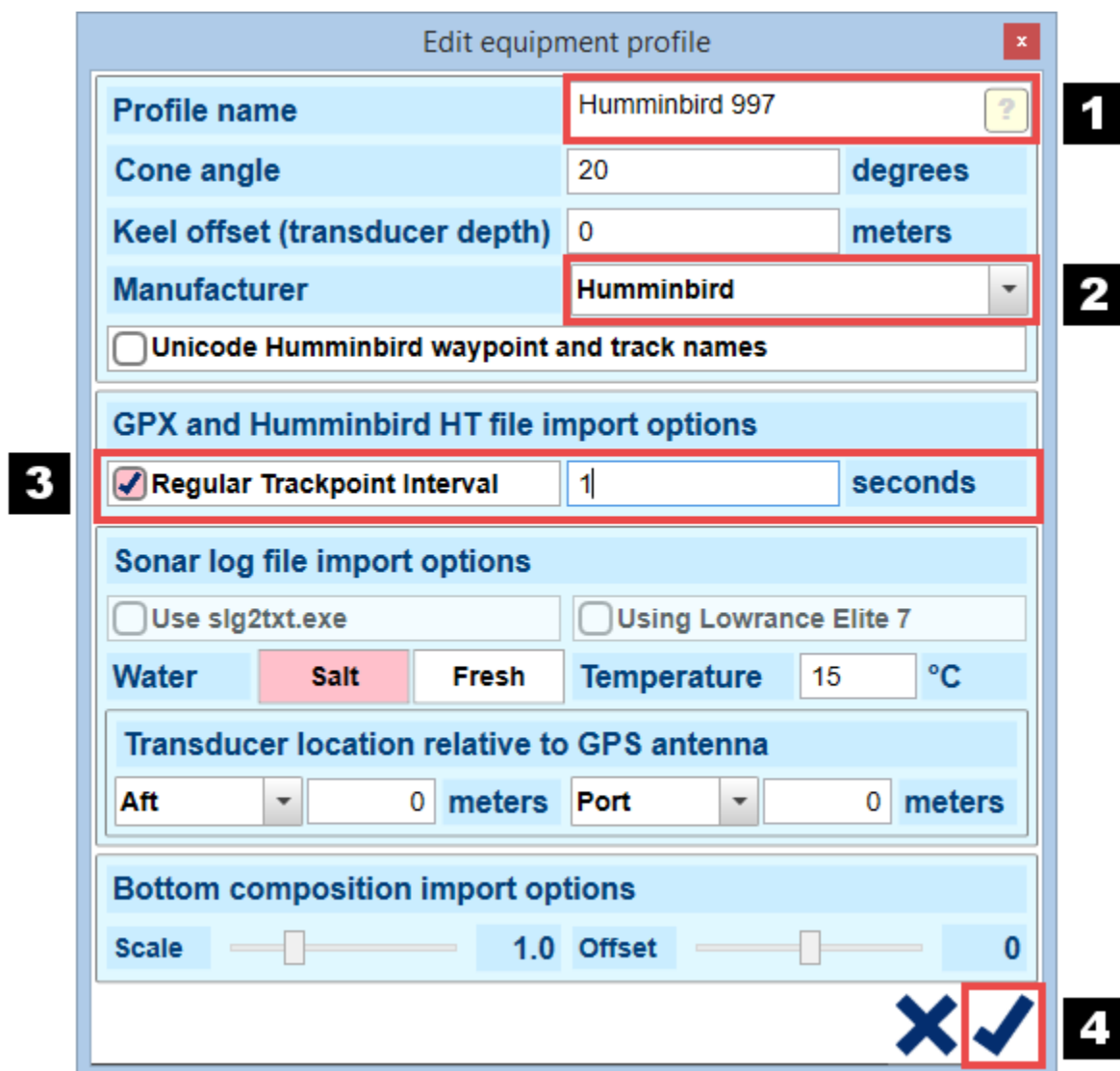
The demo tracks were recorded on a *Humminbird 997* GPS/Sounder combination unit, that was configured to record a new track-point every second. We'll set a couple of options in the import profile to reflect these settings.

1. Replace the name of the profile with something more descriptive. Here we are just using the make and model of the sounder unit.
2. Select *Humminbird* from the drop-down list of manufacturers. Note that this option is only used when importing waypoints, when translating waypoint symbols. Even though we are only going to import tracks during this tutorial, we should set this option, as we may import waypoints using this profile at some time in the future.
3. The *Regular Trackpoint interval* is for units that record track-points at regular time intervals. Check the *Regular Trackpoint interval* check-box and enter *1* into the *seconds* field. This setting is only required for Humminbird HT and GPX files and is not used when importing sonar log files.
4. Click *OK.* You will also need to click *OK* on the profiles list window and the global settings window. *Note that the OK button in ReefMaster is shown as a tick(check) symbol.*

Importing the Tracks

To import the tracks for the map, click the *Import GPS Assets* button in the main toolbar. An *Open File* window will be shown:
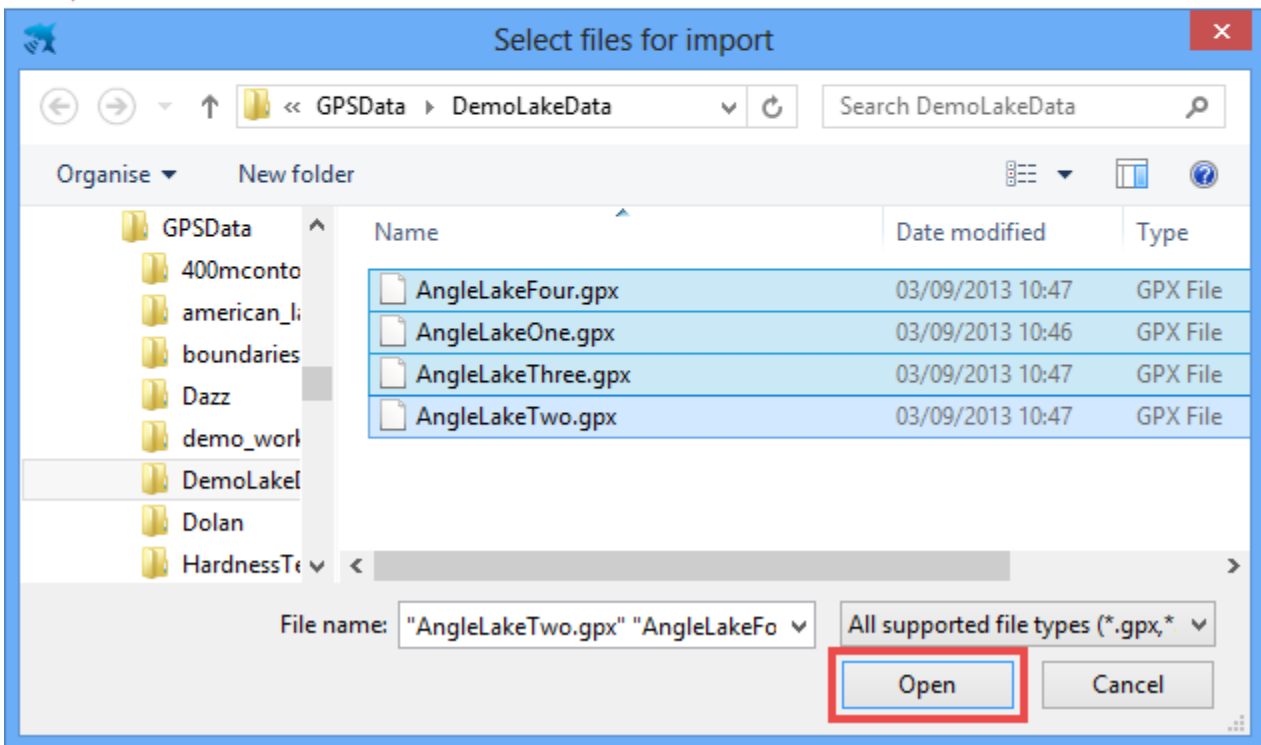
- Navigate to the location in which you stored the downloaded demo files, and select files *AngleLakeOne.gpx* through *AngleLakeFour.gpx. (To select multiple files, click on a file with the left mouse button whilst holding down the control key).*
- Once the required files have been selected, click *Open.*

The Import GPS Assets window is displayed, where all of the assets in the selected files, such as tracks and waypoints, are shown in a list *(circled)*, along with some further import options. Hold the mouse pointer over the icon of one of the tracks in the list to display a preview of the track, showing the path of the track with track-points coloured by their relative depths.
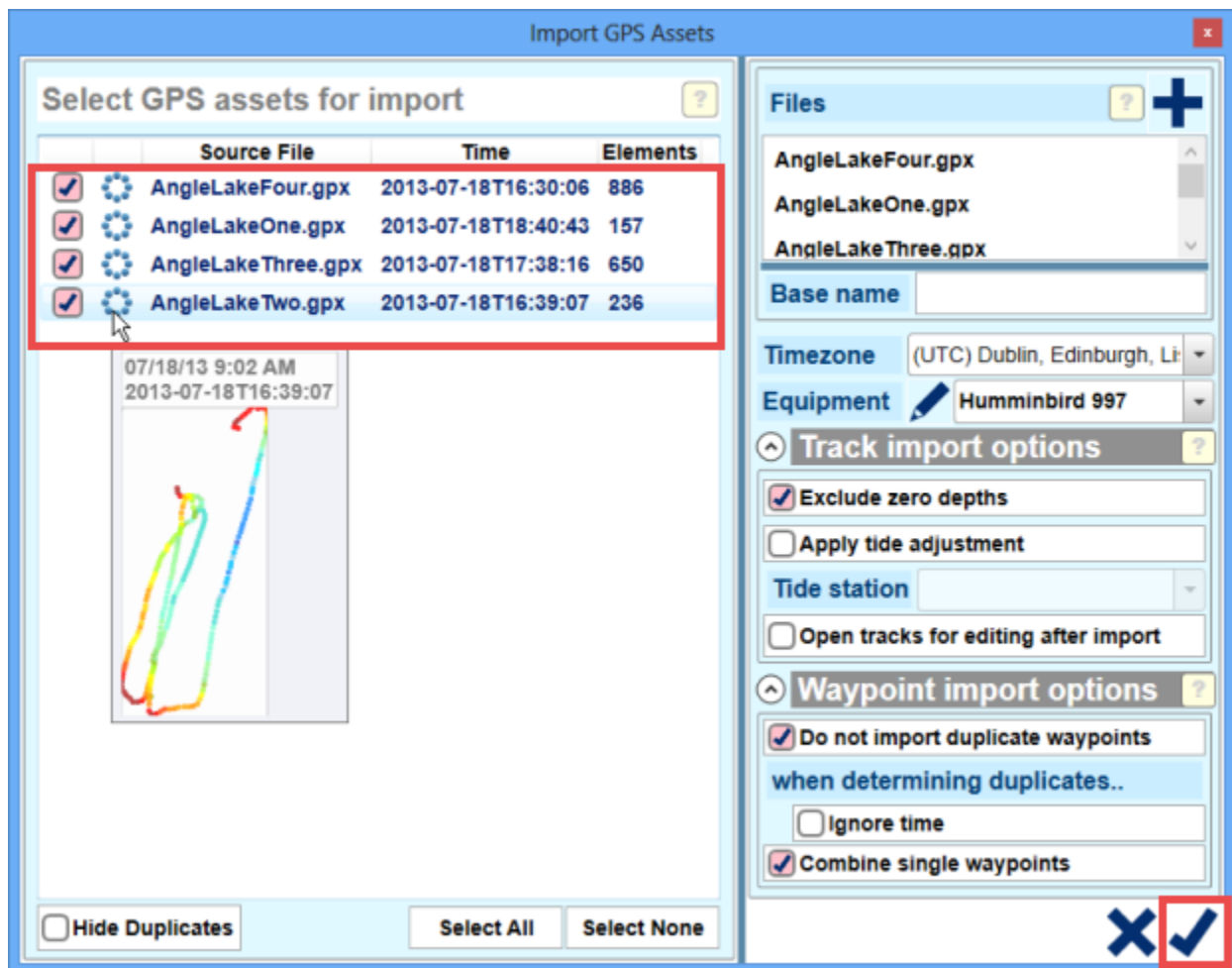
- We do not need to modify any further settings in the import GPS assets window, so go ahead and click *OK*.

A progress window will appear, whilst the tracks are imported into the ReefMaster database. Once the import has completed, the import GPS assets window is closed, and ReefMaster returns to the main application window.

Tracks

The *Tracks* list in the Asset Library now contains the four Tracks that we have just imported, and the tracks are now also displayed in the Global View.
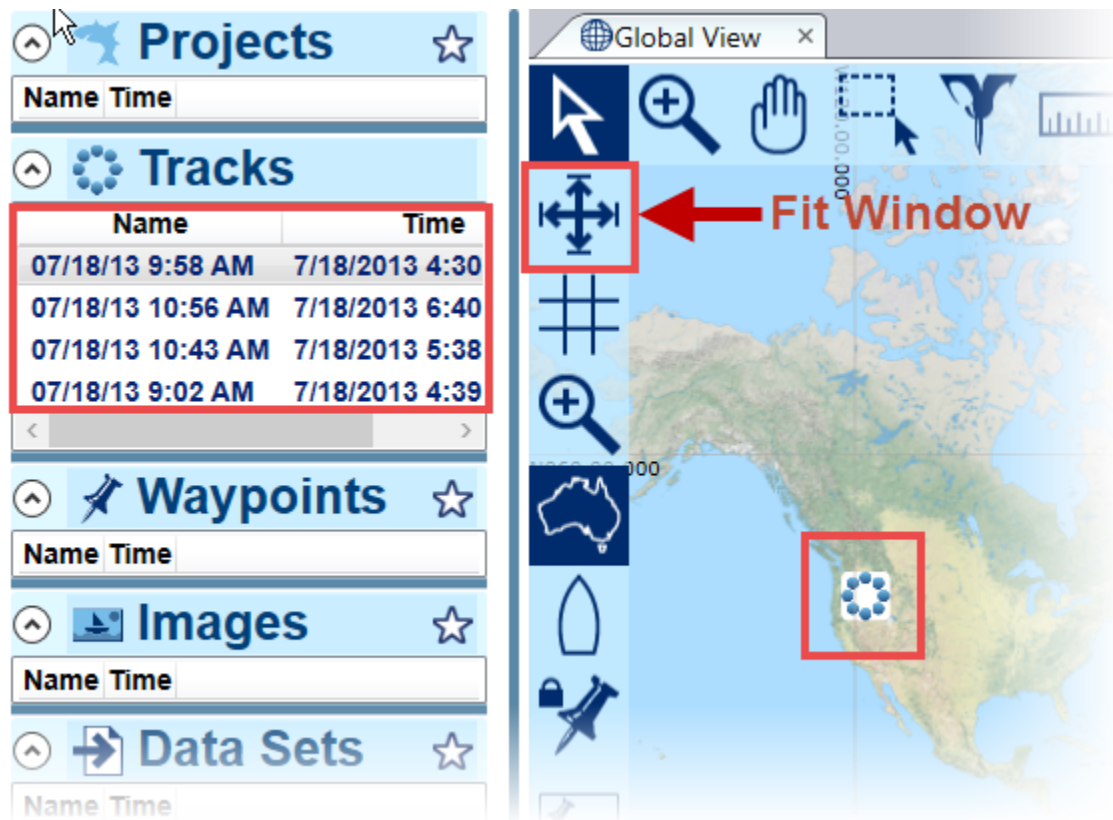
- Zoom the global view, so that the imported tracks fill the window, by clicking the *Fit Window* button in the Map Toolbar of the global view:
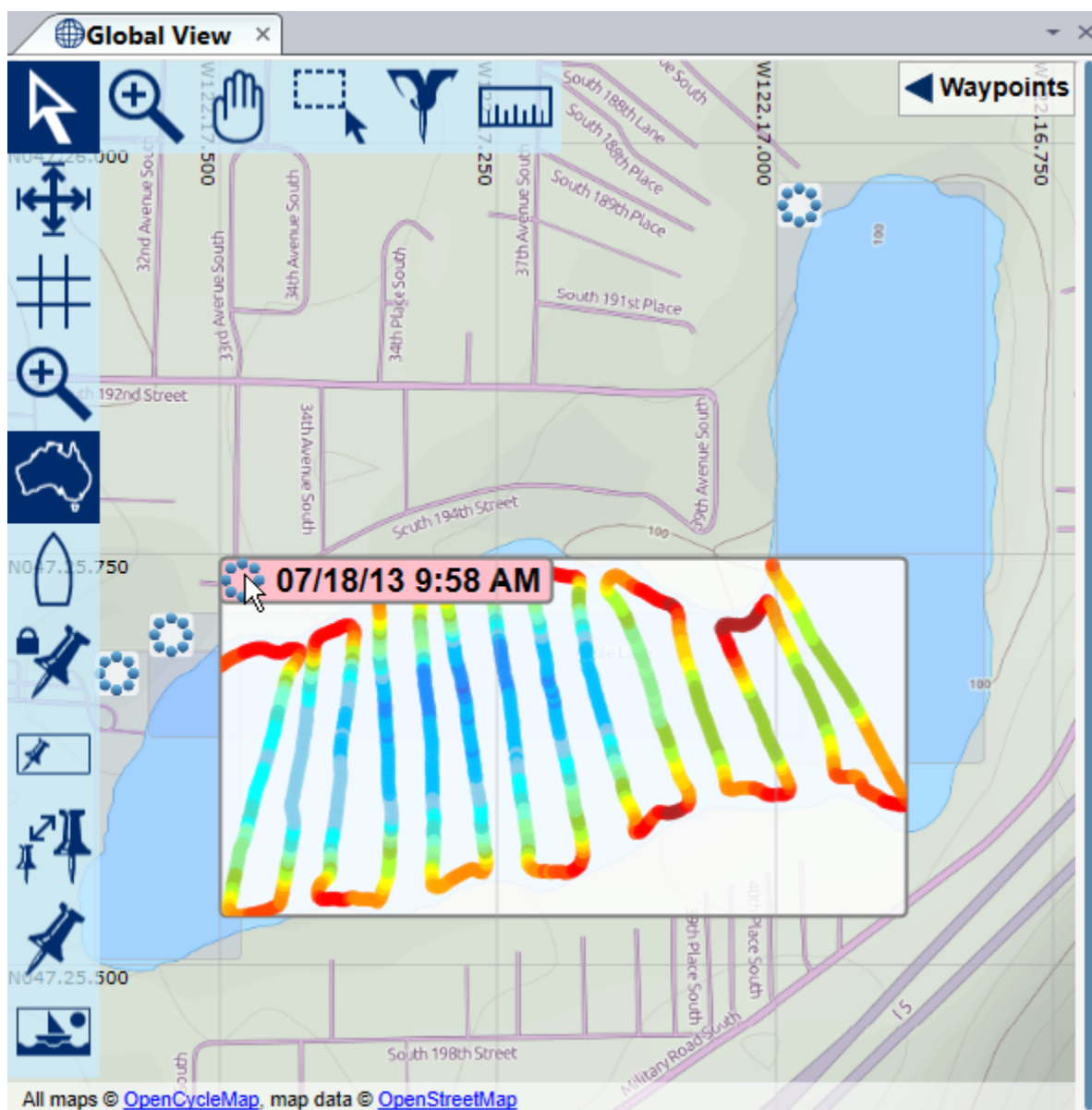
The location and relative positions of the imported tracks is now clear; they are all within a small lake in Washington State. The tracks are displayed as semi-transparent rectangles, indicating the bounding box of the track area, with a track icon in the top-left corner. If you hold the mouse pointer over this icon, the track path and depth colours are shown. The track can be edited by double clicking the icon, when the mouse is in *select (arrow)* mode.

> **Cleaning up Track Log Data and Applying Water Level Offsets**
> *The tracks used in this tutorial do not need to be edited, and water level offsets are not required as all of the tracks were logged from a lake on the same day. When using your own data, you may need to remove bad data points and/or apply water level offsets to adjust for tide or lake level variations.*
>
> Although ReefMaster applies filtering algorithms, bad data in tracks may still sometimes have a negative affect when creating the bottom map. For example, it is not uncommon for a sounder to record a number of very shallow or deep track-points whilst it is trying to get a lock on the bottom.
> It is very easy to apply water level offsets and to remove bad data points from tracks in ReefMaster; see Tracks and Tides and Lake Levels.

Creating the Map Project

The Map Project is where the imported tracks are combined, and the map is created and viewed.

There are a number of different ways to [create a new map project](), from the *asset library* or the *global view*. For this tutorial, we will create the map by first selecting the tracks that we want to combine:
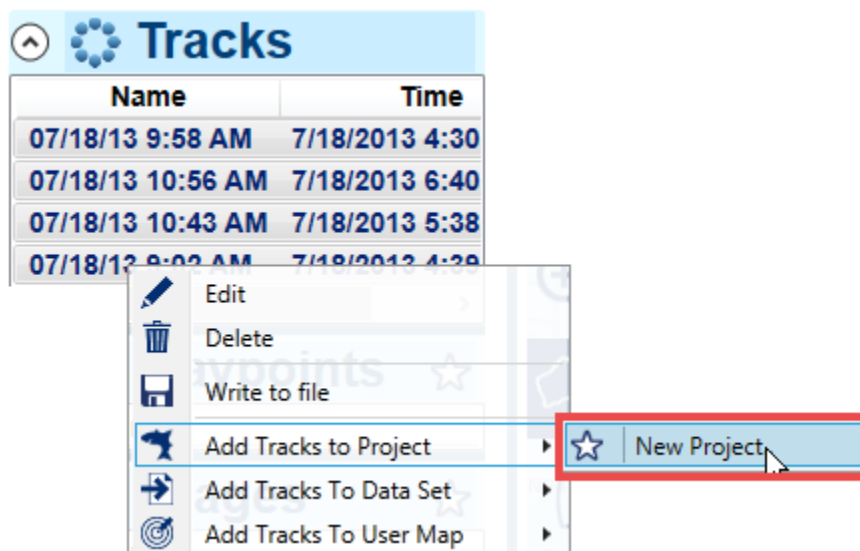
- In the *Asset Library*, select the four tracks that were just imported. To select multiple tracks, either: Hold the *control* key down, and click each track individually *or* select the top track, hold down the *shift* key and click the bottom track.
- Once the tracks are selected, click on one of the selected tracks using the *right mouse button*. The *context sensitive menu* is shown; select the option *Add Tracks to Project/New Project.*
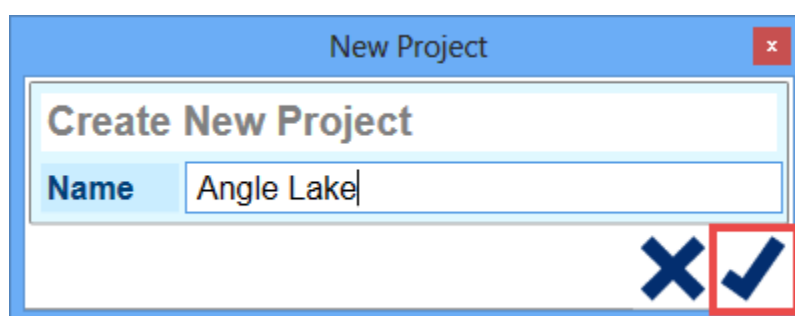
- Enter a name for the project. If you are using the demo files, the lake we are mapping is *Angle Lake*, so type that into the *Name* field.
- Click *OK.*
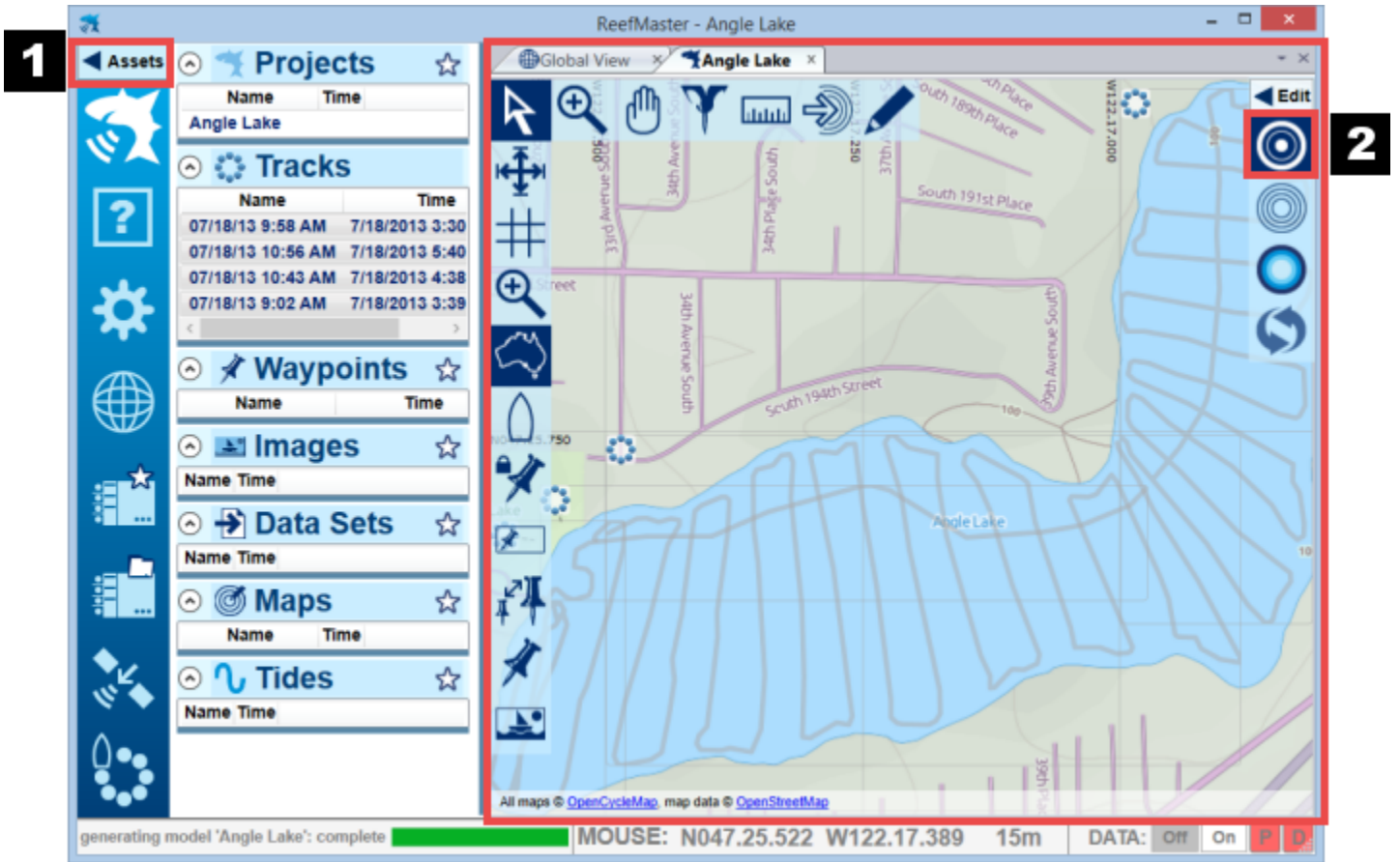
A new project is created, called *Angle Lake*, and the project edit window is opened to the Define Map View. The define map view displays all of the tracks that are members of the project, and is where the map area and *shorelines and islands* are defined for the map project.

> **Project Views**
> The *define map view* is one of three project views, the others being the Contour View and the 3D View, which we will use later in the tutorial. The active view can be selected by using the *view selector icons* at the top-right of the project edit window *(2)*.
>
> *Note that nothing will be shown in either the contour or 3D views until a map area has been defined in the define map view, so do not change views just yet.*

Tip: As we will not need to use the Asset Library for a while, we can make a little more room to work by hiding it. Click the Assets button (1) at the top of the main toolbar to collapse the Asset Library. The Asset Library can be restored to view by clicking the same button again.

Defining the Map Area

Defining the map area involves specifying the region to be mapped. This is done by drawing a rectangle with the mouse around the area that we want to map.
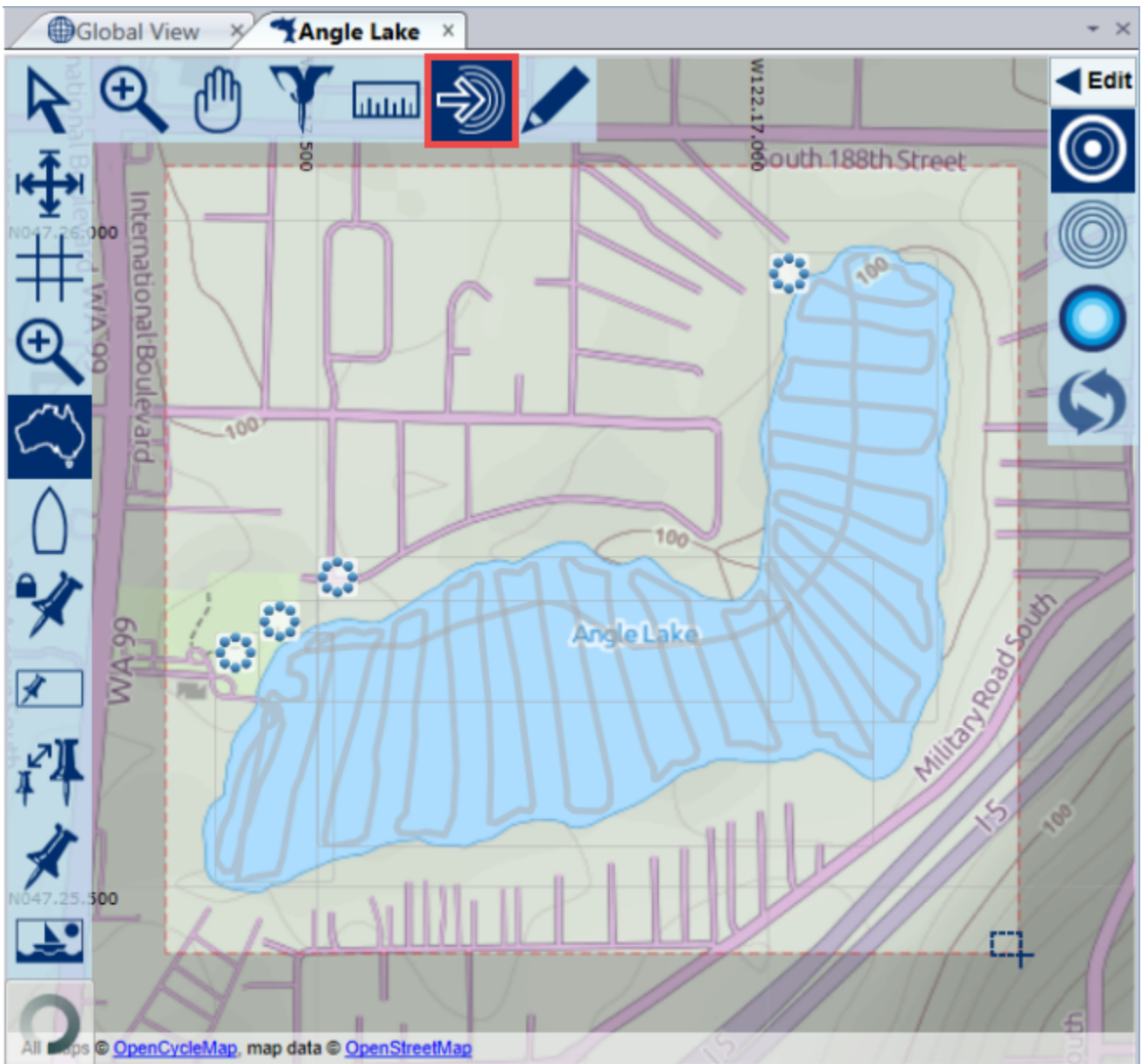
- Put the mouse in *Define Map* mode *(circled)*.
- We want to draw a rectangle around the entire lake. Zoom the view out slightly using the mouse-wheel, so that the it is easy to see all of the lake edges.
- Position the mouse pointer at one corner or the lake area, press and hold the left mouse button and draw a rectangle that covers the whole lake. Don't worry if the region is larger than the lake.
- Release the left mouse button when all of the lake is in the drawn region. The map will start generating, and progress indicators will be displayed at the bottom left of the edit view, and within the application status bar.

The map is generated, and the calculated depth values are shown. As you can see in the image below, there are a lot of gaps in our map where depth values have not been calculated. This is because these areas lie between track-points that are further apart than the *Maximum Interpolation* value (which defaults to 50m); running the ruler tool across the tracks in this project, we can see that the average distance between the grid lines is actually somewhere between 50-75m. We can improve the appearance of this map by increasing the maximum distance over which ReefMaster will interpolate depth values, up a maximum of 200m.

Note that high interpolation distances can give rise to significant inaccuracies in the finished map; more data is always better.
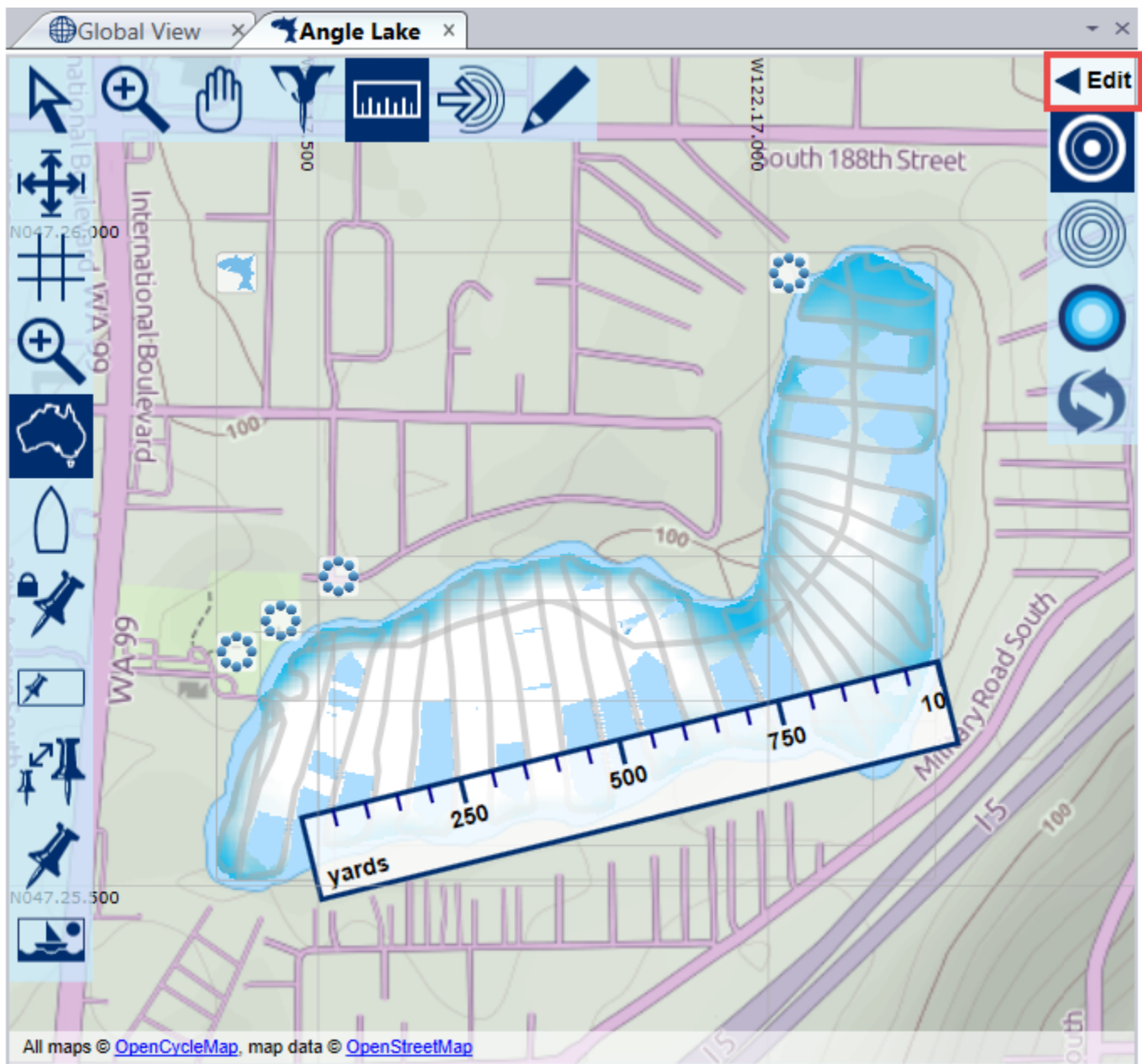
- Open the Project Properties Window by clicking the *Edit* button *(circled).*
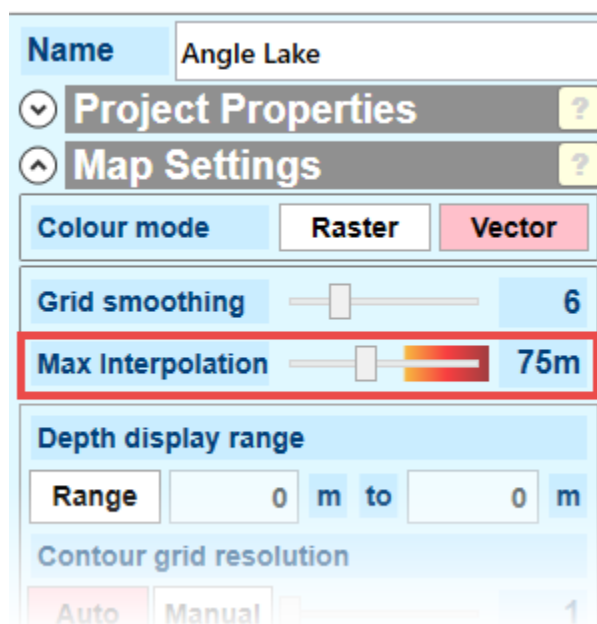
- Adjust the *Max Interpolation* value upward, to 75m, by moving the slider with the mouse.

Regenerate the Map

When map parameters are changed, the map needs to be regenerated by clicking the *regenerate* button, at the right of the graphical view.

This button becomes enabled only when there have been changes to map parameters that have not yet been included in the generated map.

- The *regnerate* button should have changed to a darker shade of blue as the maximum interpolation was adjusted.
- Click the regenerate button to regenerate the map. The map will be regenerated, and all of the empty areas should now be filled with colour.

Exploring the Contour and 3D views

Now that the map area has been defined, the generated map can be seen in the contour and 3D views.

- Switch to the Contour View by clicking the middle of the three view selector icons *(circled):*

Configuring Contours
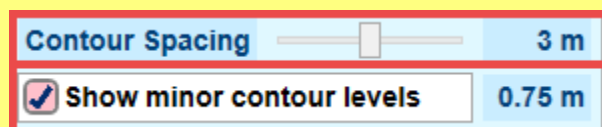
Contour intervals can be chosen from a set range of values, that is determined from the depth range of the project and the global units setting.

- Adjust the contour spacing using the *Contour Spacing* slider in the *Map Settings* section of the project properties window.
- The map must be regenerated for contour spacing changes to take effect. Click the *regenerate* button in the graphical view.
- Show or hide minor contours by checking or un-checking the *Show minor contour levels* check-box.

- Switch to the 3D View by clicking the bottom of the view selector buttons:
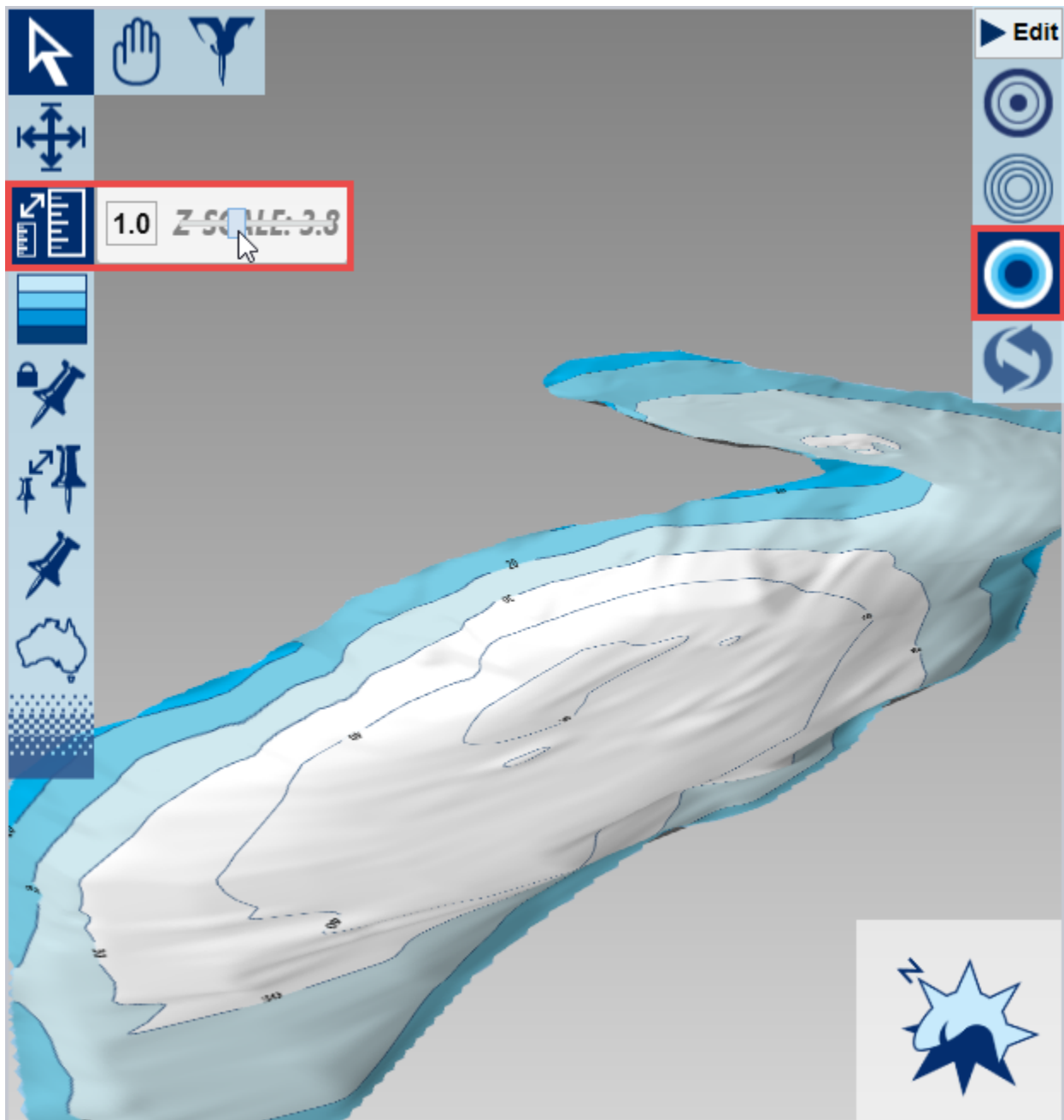
Adding a Shoreline

Although we have the basics of a nice map already, we can improve the map significantly by adding in a shoreline.

Shorelines and Islands

- Shorelines enable us to add a series of depths to the map, in areas that would be too shallow to navigate with a boat; a typical scenario would be adding zero depths along the perimeter of a lake. These additional depth points mean that we can then interpolate the depth of the lake between our shoreline and the nearest logged track and, if the shoreline and track are within the *Max Interpolation* distance, the lake will be filled to the edges with depth values.
- Shorelines also allow us to define the edges of a map project. The detail to the left shows an area where depth values have been interpolated across land, as the lake shoreline turns sharply. By defining a shoreline, we can stop these depth values from being generated.

- Return to the *Define Map* view.
- If the *Properties* window is not expanded, then expand it by clicking on the *Edit* button.
- Expand the *Map Boundaries* pane within the properties window by clicking on the *Map Boundaries* header. You may want to collapse the *Map Settings* section to create more room. Again, just click on the header.
- It can make things clearer when working on the map if the background map is hidden. To do this, click the *Background Map* button *(circled)* in the map toolbar at the left of the edit area.
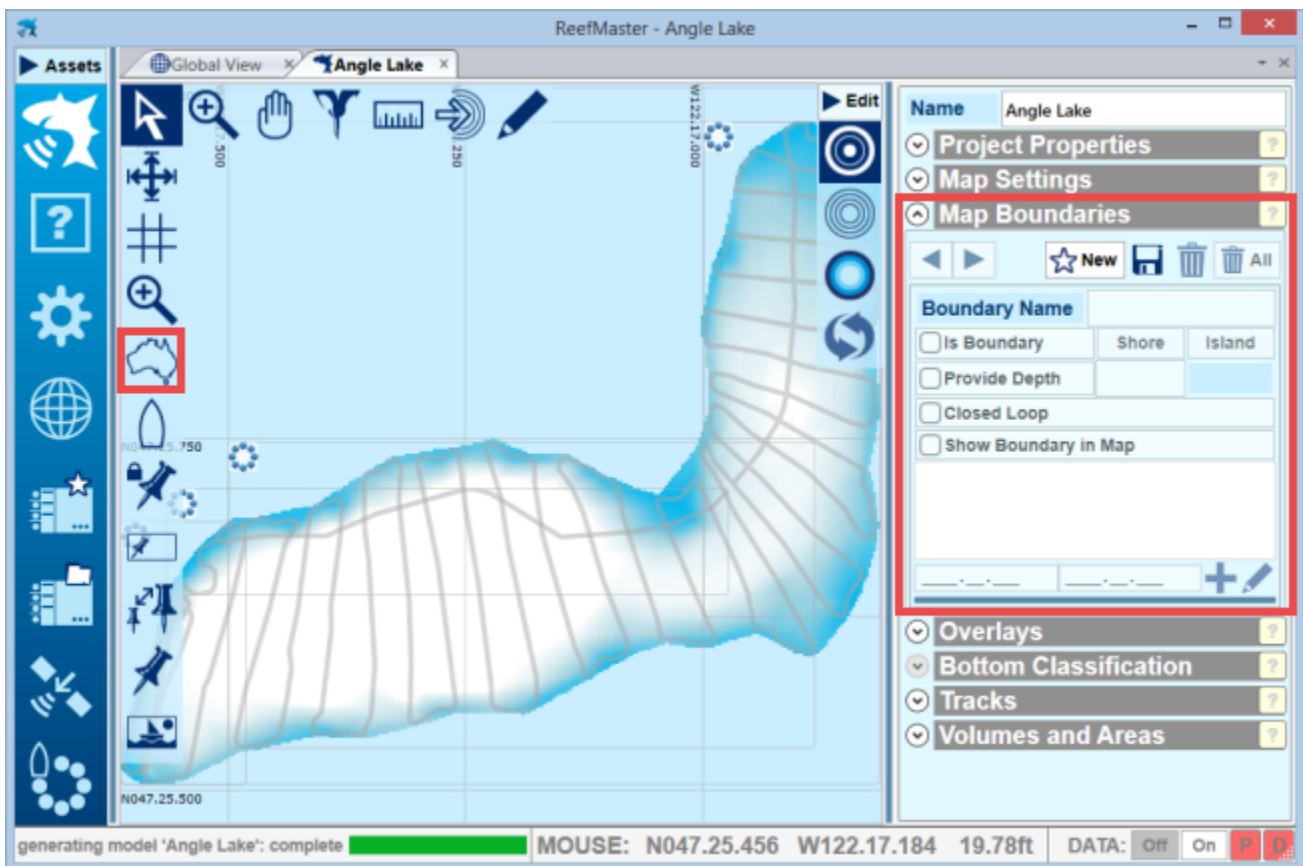
We are going to import a shoreline that has been created in Google Earth, by tracing the lake outline as a polygon. This polygon was then saved as a KML file, which can be read by ReefMaster. It is also possible to trace a shoreline directly in ReefMaster, or, for the best accuracy, to walk the shoreline with a hand-held GPS and import the saved track.

- In the *Map Boundaries* section of the project properties, click the *Import Boundary* button.

An *Open File* window will be displayed, showing files of type *KML, KMZ* and *GPX*.
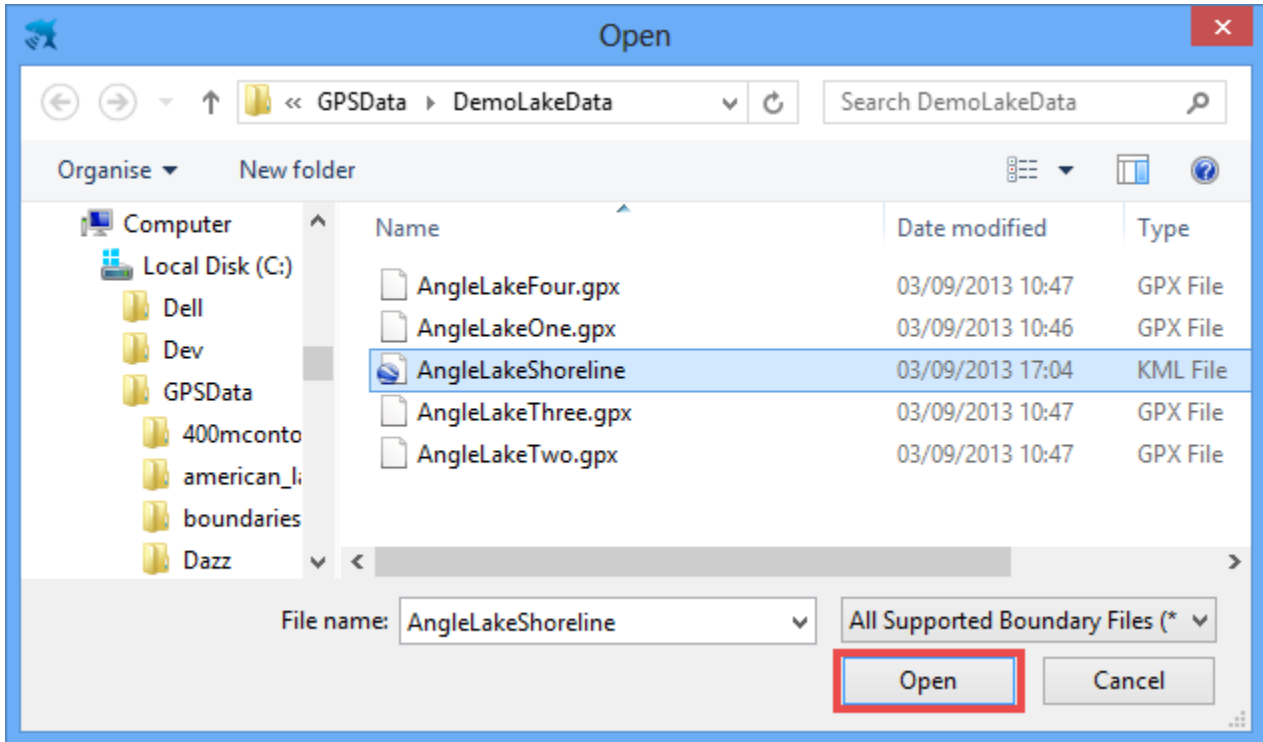
- Select the file *AngleLakeShoreline.KML* and hit *Open*.
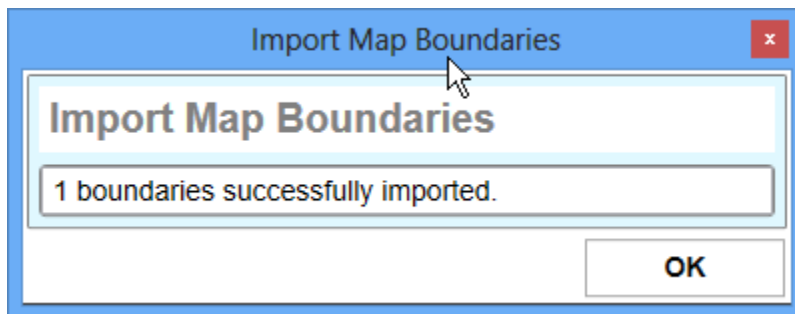
A window is shown showing the number of successfully imported boundaries. In this case, just one boundary has been imported, but it is possible for a single file to contain any number of shorelines or islands.
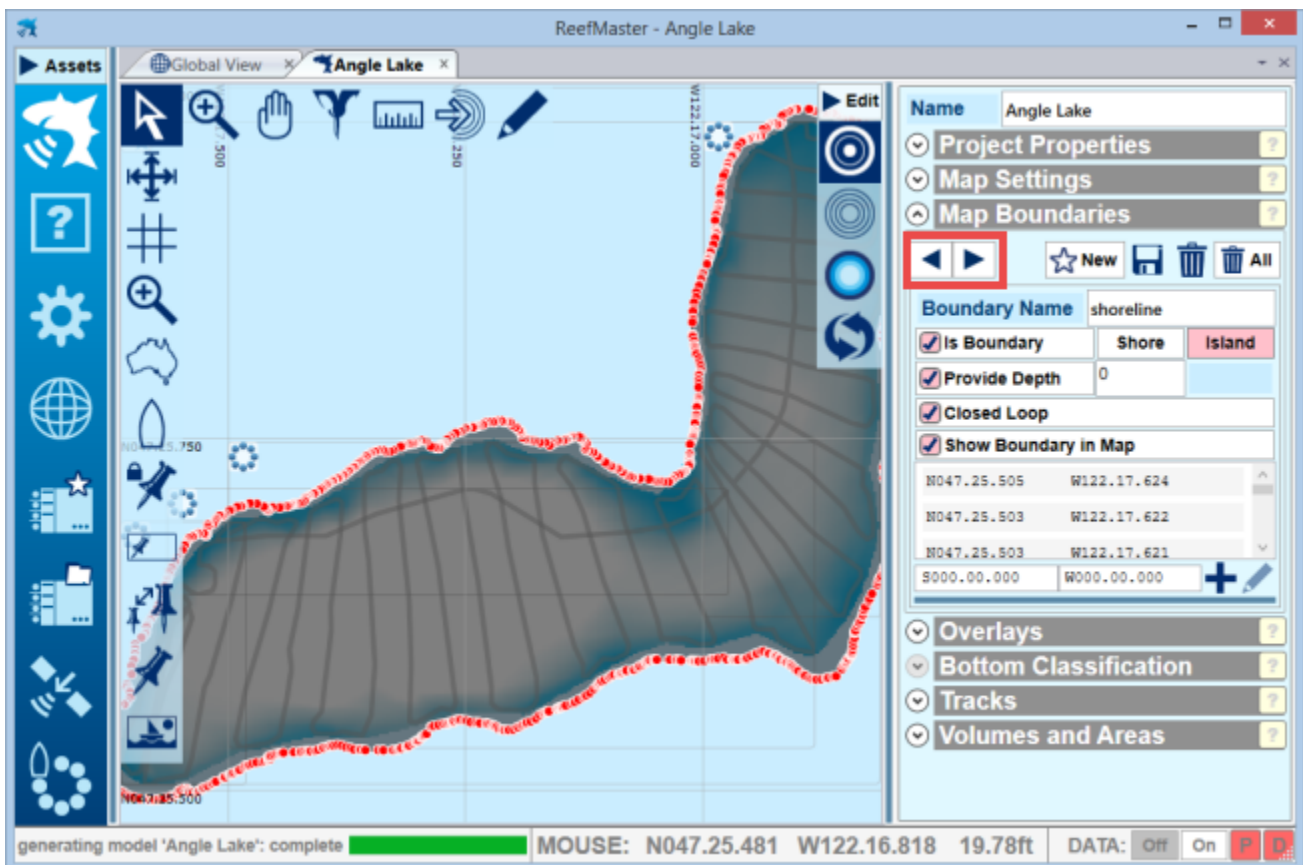
The new boundary is visible in the *Define Map* view, but is not selected by default in the *Map Boundaries* pane.

- Select the new boundary by clicking either the forward or backward arrow, or click the shoreline itself in the graphical edit area, with the mouse in *select* mode; the boundary properties area is populated with the details of the new boundary.

> **Shorelines and islands - key points**
> - A shoreline ***excludes all areas outside of it.*** There can be at most one shoreline per map. When a shoreline is defined, nothing outside of the shoreline will be included in the map.
> - Islands ***exclude the area within them***. There can be any number of islands in a map project. The area inside of an island polygon is excluded from the map.
> - The shaded area of the map in the Define Map View shows ***areas that will be excluded from the map generation.*** In our example (at the moment), that is the area inside the lake - the opposite of what we want - because;
> - Imported boundaries are set to be ***islands by default***. The reasoning behind this is simple; there can only be one shoreline per map, but possibly many islands (tens, or even hundreds in big lakes). Setting the default to *island* means less work changing boundary properties when importing a large number of islands.
> - Shorelines and islands are ***always treated as closed polygons***. ReefMaster will close a boundary, by joining the last point with the first, when using the boundary to calculate which areas to exclude from the map.
> - Changes to map boundaries ***do not trigger automatic regeneration of the map project.*** If a boundary is added to, or removed from, a project, or edited in any way, then the map must be regenerated by re-drawing the map area.

Our new boundary is configured as an island, but we need it to act as a shoreline:

- Making sure that the boundary is selected, click the *Shore* button in the boundary properties. *Notice how the shaded area of the map inverts when the island is changed to a shoreline, indicating that the area outside of the lake will now be excluded, and the area inside of the shoreline will be included in the map.*
- All of the other values can be left with their defaults; we want this boundary to provide a depth value of zero, and to show in the finished map.
- Regenerate the map by clicking the *regnerate* button. The map will regenerate, filling interpolated depth values right up to the shoreline.
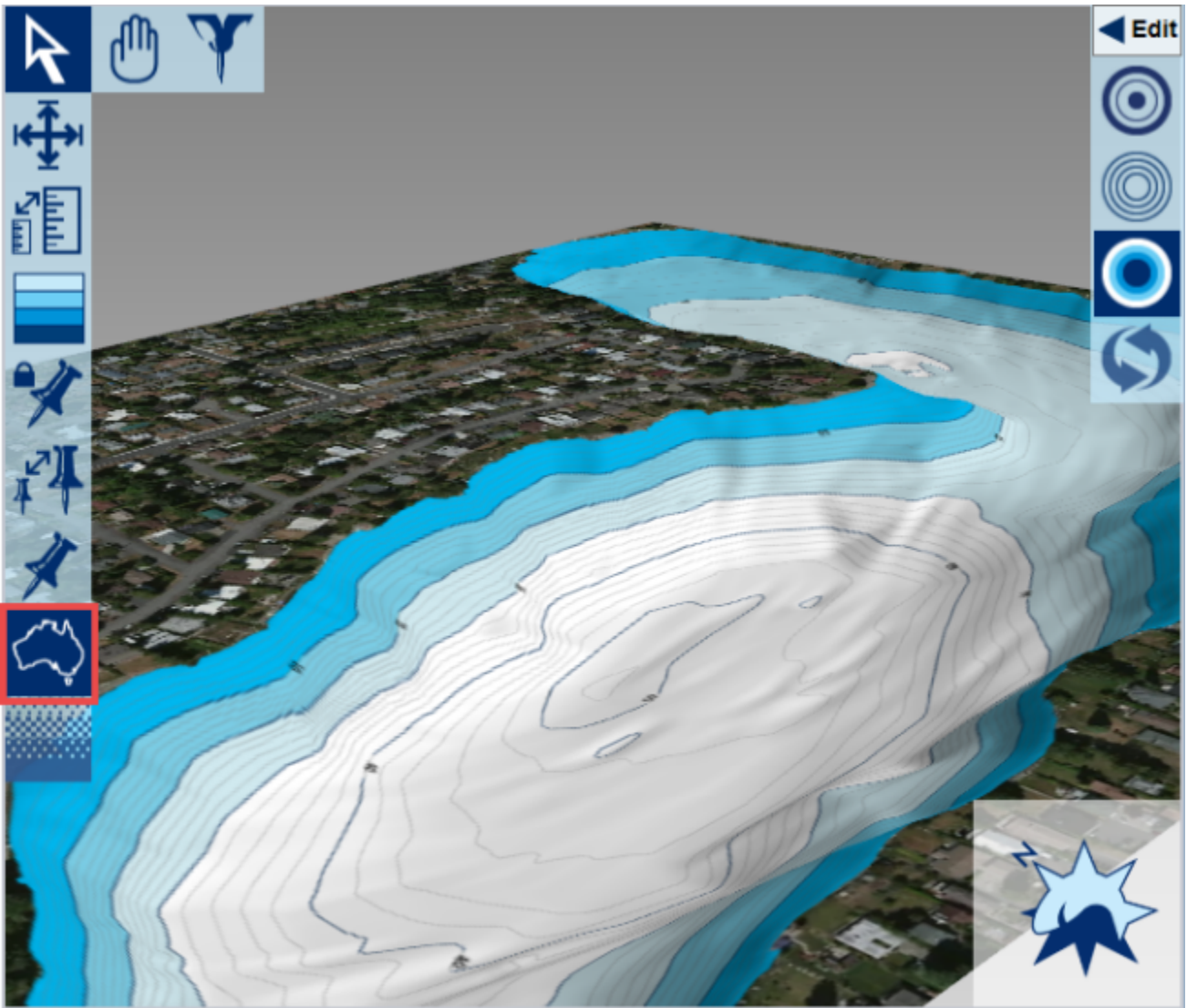
- Now that the map has a shoreline, background maps and images can be shown on land areas in the 3D view by checking the

- Experiment with the *Grid Smoothing* value in the project properties. For maps with sparse track-point data, such as this demo map, a larger smoothing value can help to reduce the visibility of artefacts from the map-generation process, and produce smoother looking contours. The image below shows the map with the smoothing value set to 15, and the background map set to *MapQuestAerial* (see Global Settings).

Colour mode: Vector and Raster

Map projects can show depth colours either as *vector* shapes (filled polygons) or as a single *raster* background. See Project Properties for more on the differences between vector and raster modes.
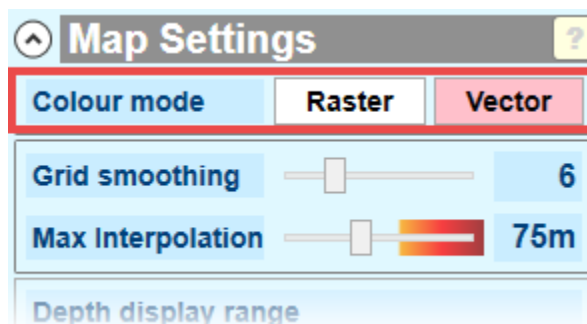
By default, new maps are created in vector mode. To switch to raster mode, click *Raster* in the *Colour mode* section of the *Map Settings* section of the properties window. Note the change in appearance of the coloured map background.

Exporting The Map

Maps can be exported in a range of different file formats, as an image or as vector contour lines. For information on exporting the map as an image, see the section *Export Map Image* in The Contour View.

> **User Maps**
> Contours and shorelines from a map project can be exported directly from the *contour view*, or they can first be added to a User Map. User maps are a collection of contours, isobaths, shorelines, tracks and custom objects that can by styled in much more detail than a map project, before being exported.

In this tutorial we will export the map in Google Earth format, in vector mode, and then export the map again as a set of contours overlaid on a raster background in AT5 mode (for use in Navico devices only).

Exporting the map in Google Earth format

- Ensure that the project is in *vector* mode.
- Configure the contours as you would like to see them on the finished map; set the contour spacing, and turn minor contours on or off as required. Note that when exporting a map direct from a project, only the components that are displayed will be exported.
- Move to the the *Contour View* by clicking the middle of the project view selector icons.
- Right click with the mouse anywhere in the graphical edit area to bring up the screen menu.
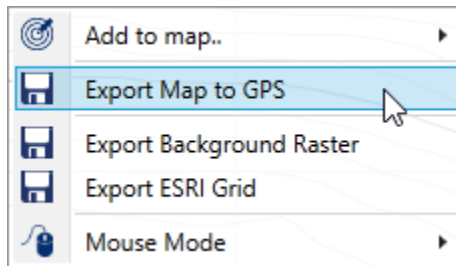
- Select the option *Export Map to GPS.*
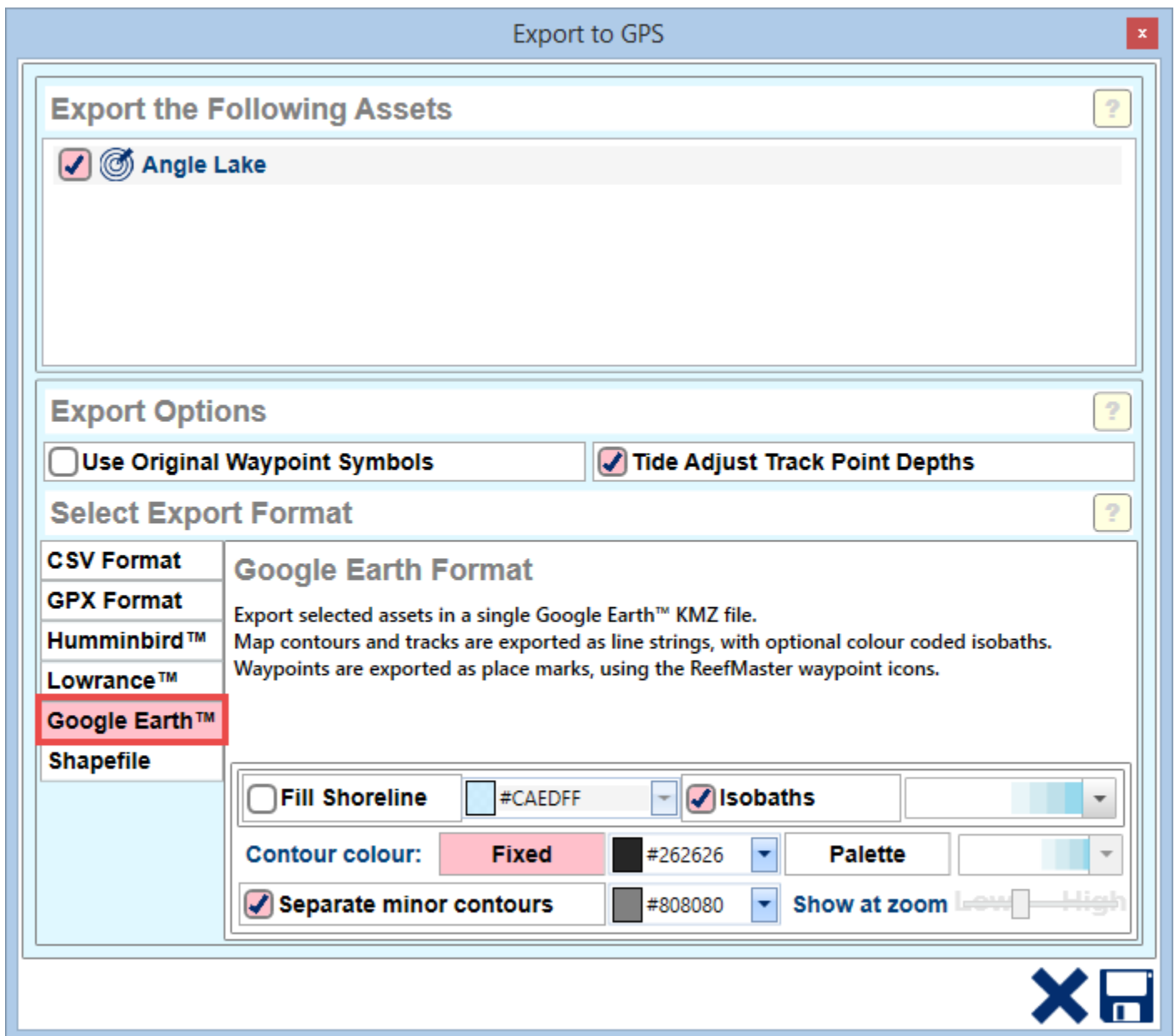
The Export to GPS window is displayed, which contains a range of export formats and options.

- Select *Google Earth* from the list of export formats. A panel containing export options specific to the chosen format is displayed.

There are a range of options that will affect the look of the finished map. More information can be found on the manual page Exporting Maps for Google Earth, but for now we are going to accept all the defaults.

- Click *Save,* which is the disk button in the bottom-right corner of the window.
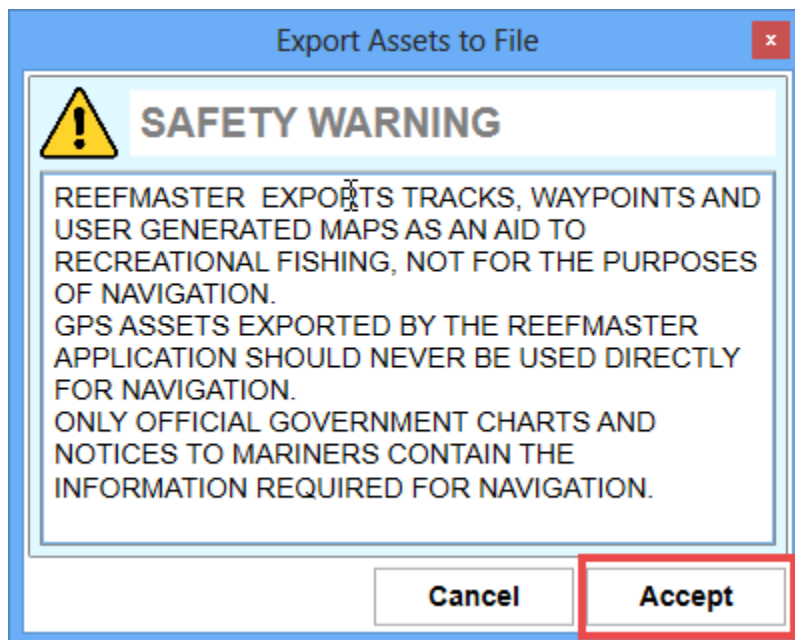
- You must read and accept a safety warning before the map export will proceed. *ReefMaster maps are not suitable for navigation*.
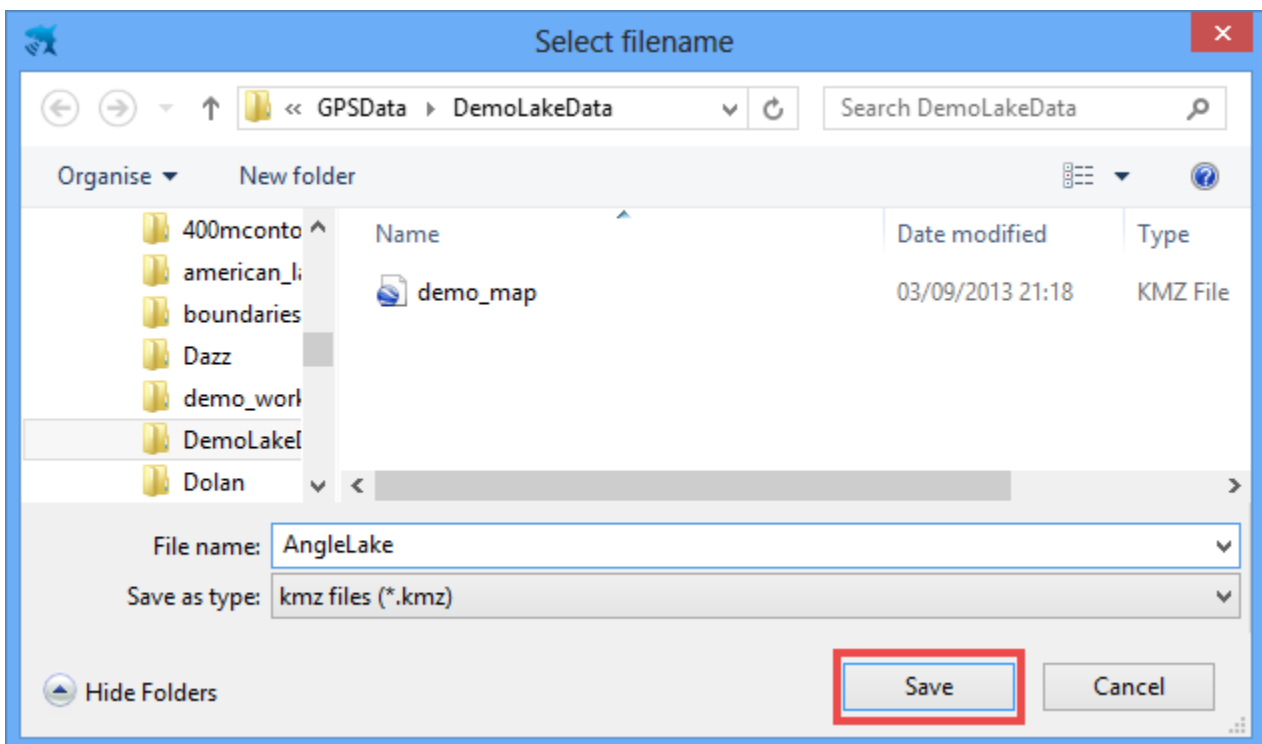
- Choose a file name for the export, and click *Save*. Files for Google Earth export have the extension *kmz*. You do not need to add the extension when entering the file name in the *Select filename* window.

To view the file, either open it on a desktop PC running Google Earth or, to view it on a mobile device:

- If running an *Android* device, either use a file manager to copy the file onto the device, and open the file from there, or
- If running an *iOS* device, email the file to yourself and download and open the file using the email reader on your mobile device. This method can also be used for Android devices.

Lake contours as viewed on the Google Earth mobile application, running on a Google Nexus 4 smart phone. The contour interval is 5 ft.
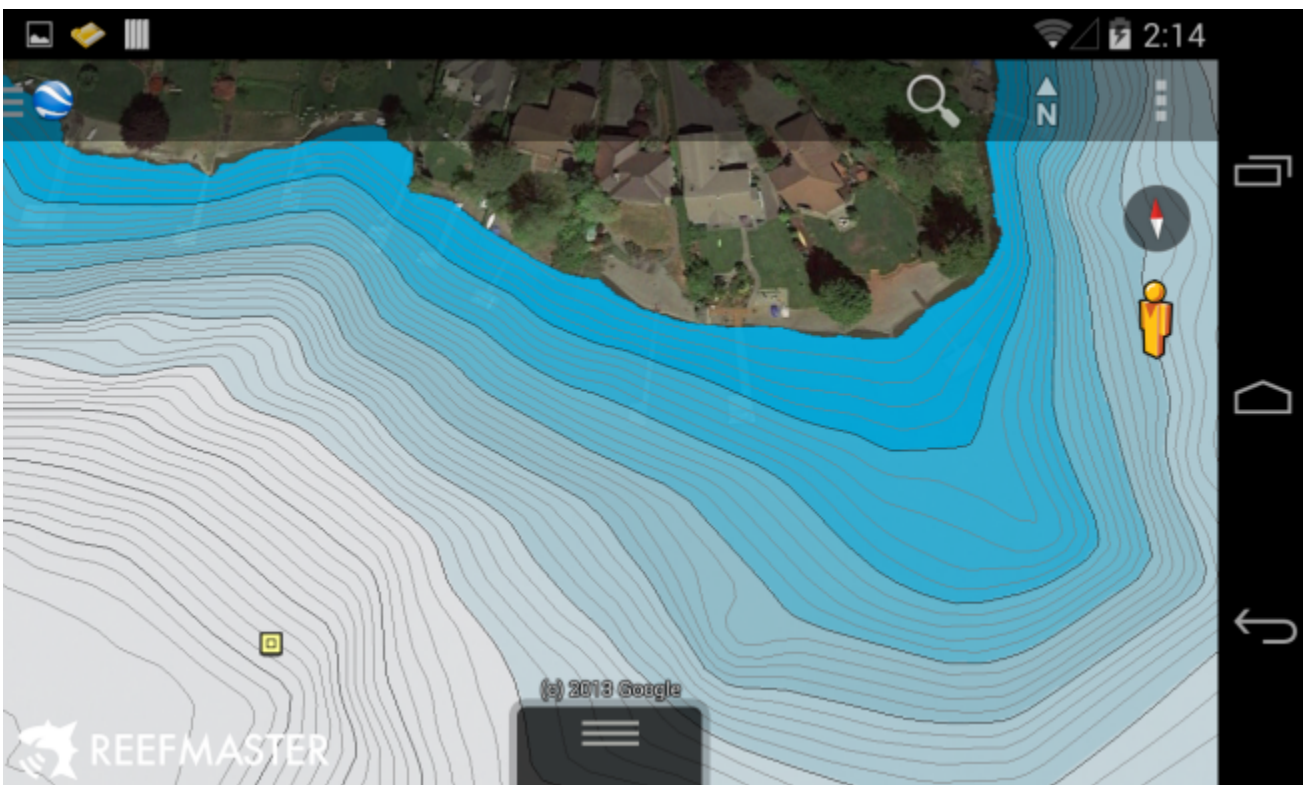
Minor contours, at 1 ft intervals, are displayed when the map is zoomed in.

Exporting a map in AT5 format for use on a Navico device

There are a number of ways that maps can be exported to the AT5 format, including contours over a raster background, and all-vector solutions. See User Maps for more on styling maps for export to AT5, including how to colour individual depth areas (e.g. for trolling lanes), and how to add custom paths and polygons.

In this example, we are going to export a contour-over-raster map, directly from the map project. This style of AT5 map is only compatible with later Navico units, such as the Lowrance HDS series and the Simrad NSS and NSE. See User Maps for tips on how to create maps that are compatible with older units such as LMS/X.
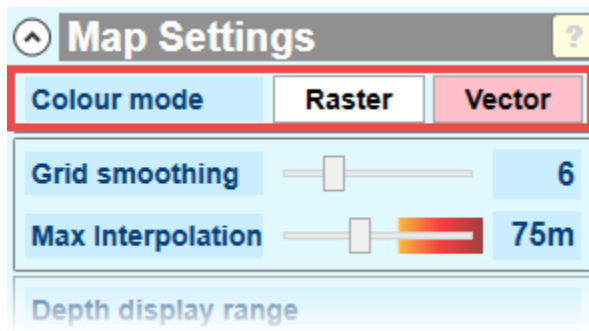
- Set the map to *Raster* mode.
- Ensure that the palette and major and minor contours are configured in the way that you would like to see on the finished map.
- Select the option *Export Map to GPS* from the screen right-click menu.
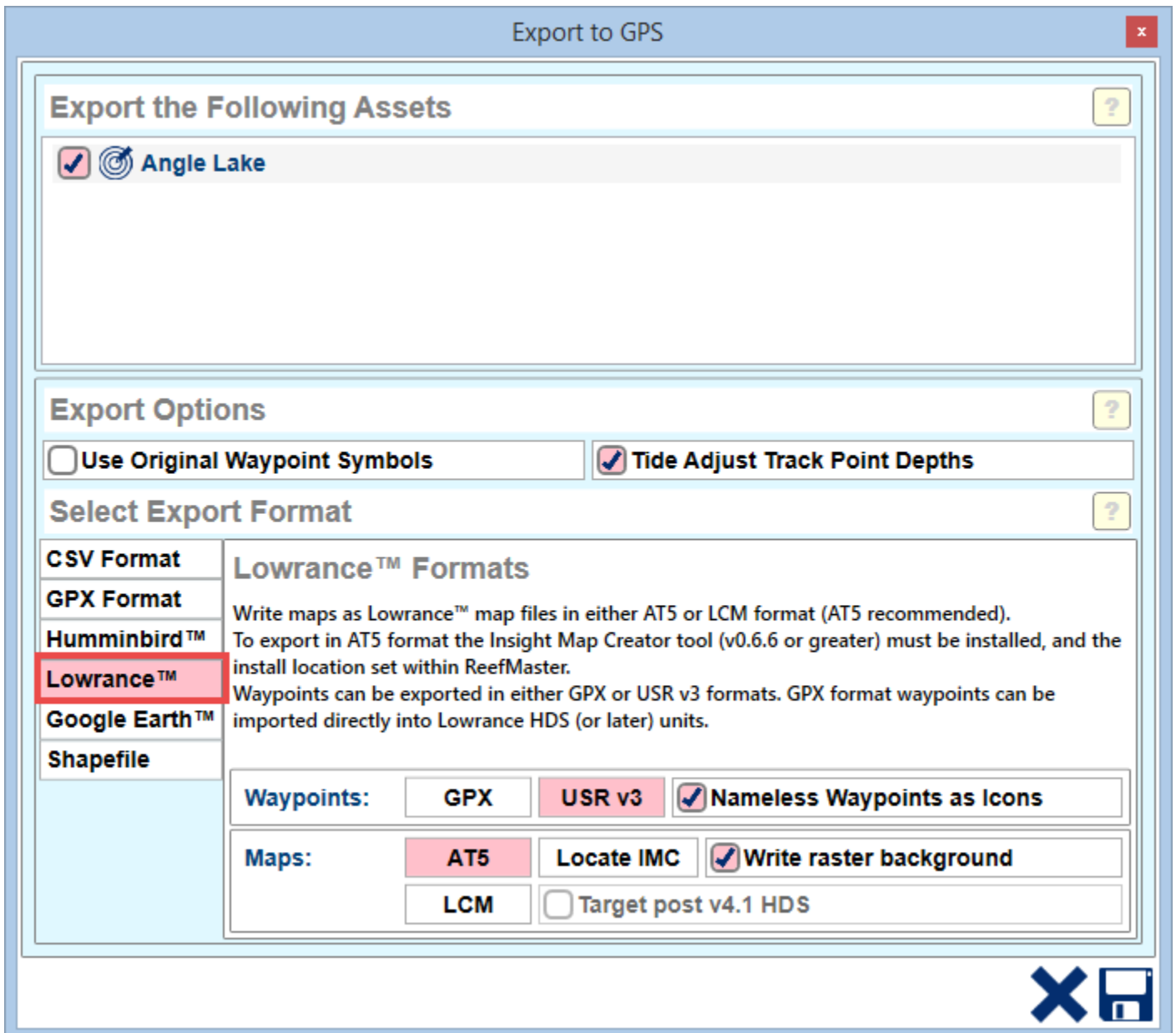
- Select the *Lowrance* export format.

In order to create AT5 maps, the *Insight Map Creator (IMC)* application is required. ReefMaster needs to know where this application is stored on your computer, so that it can be called during the map generation process.

- If you do not have the Insight Map Creator installed on your machine, download it from the Navico website (it is a free download, although you need to register to download it). The IMC can be found on the *Insight Planner* tab).

- Once the IMC has been downloaded, unpack the zip file and remember the location.
- Click *Locate IMC* and navigate to the location of the *InsightMapCreator.exe* application. Select the file and click *Open*. Note that the IMC version must be 0.6.6 or above, and ReefMaster will not let you select an earlier version.
- Now that the IMC has been located, the *AT5* format button will be enabled. Select it.
- Ensure that *Write raster background* is selected.
- Click *Save* (the disk icon, at the bottom-right of the screen) and acknowledge the safety warning.
- Select a location for the finished map files. The easiest way to create maps for your unit is to write files directly to the root directory of a memory card. Note that any existing AT5 map files will be overwritten.
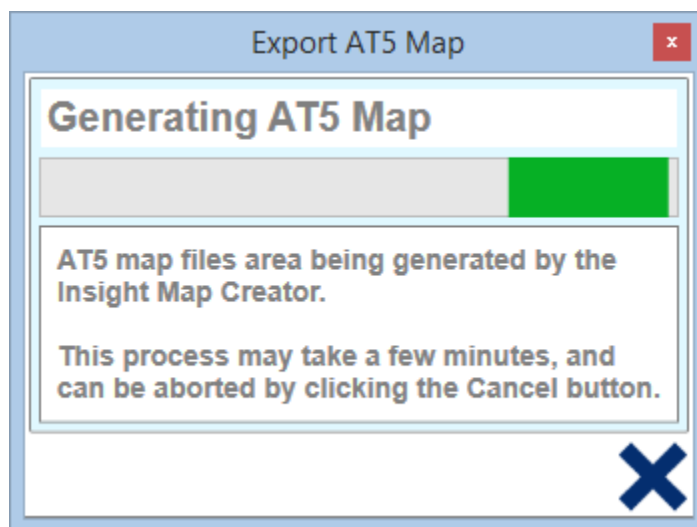
The IMC will be launched, and the raster and vector layers created for the map. Note that this process may take some time. You can observe the progress of the operation by clicking on the IMC icon in the Windows task bar, which brings the IMC application to the front of the screen.

Vector and files are written to the files *at5.xml, Large.at5* and raster files are written to the folder *ShadedRelief*. If you did not write directly to a memory card, then you should copy all three of these files to the root of a memory card

- Insert the memory card into your Navico device.
- In order to see AT5 maps on your Navico device, you must select the option *Settings/Chart/Chart data/Lowrance.*
- To see the raster background, select the option *Chart options/Imagery/Shaded relief.*
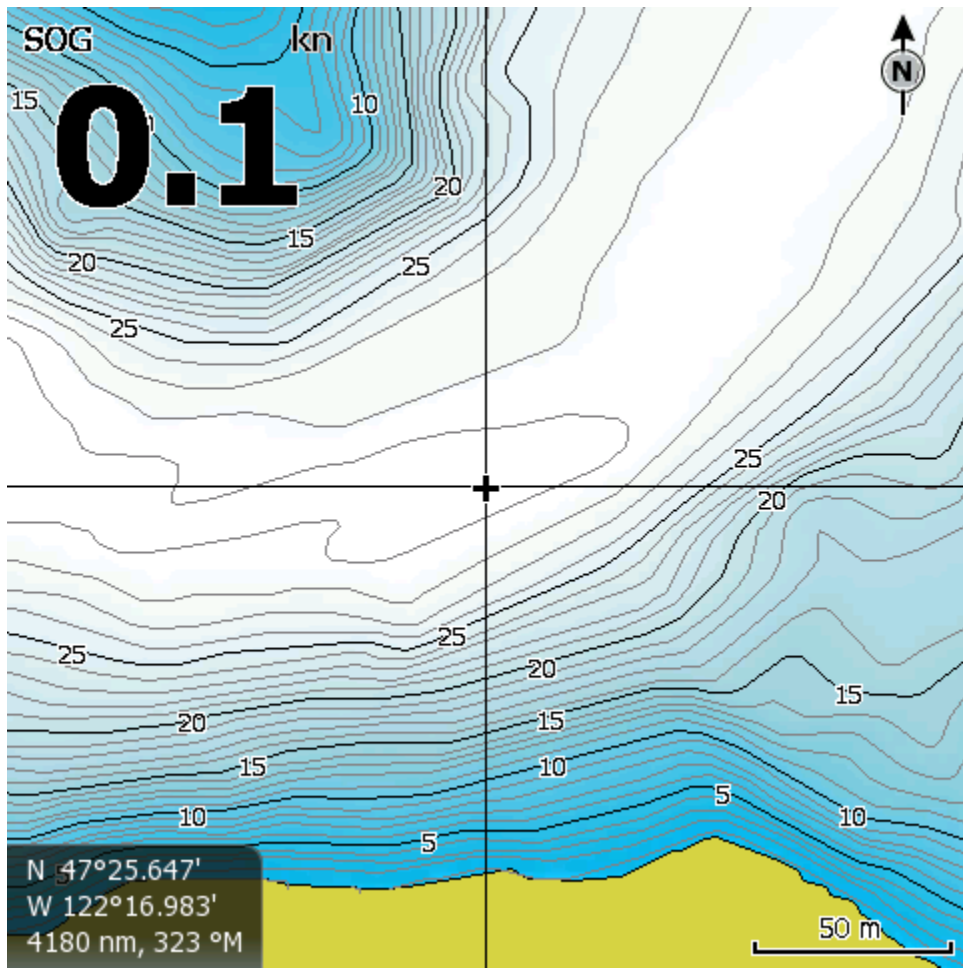
Detail of map shown on Lowrance HDS 5

How to Configure User Maps for Display on a Humminbird Unit

Contours generated by ReefMaster are exported to Humminbird units as one or more Humminbird tracks. To make the imported track(s) appear as a contour "map", the line style of the tracks needs to be modified within the Humminbird unit such that they are styled to appear as continuous lines. Different map components, such as shorelines or major and minor contours, can be styled in different ways (e.g. line thickness and colour) so that they can be distinguished when viewing the map.

Each track can contain a number of individual contours, and up to a total of just over 21,000 track points. Exported maps that contain more than the maximum number of track points for a single track are split into as many tracks as required.

This tutorial walks through the process of exporting a user map from ReefMaster, importing the tracks onto a Humminbird unit and styling the contour and shore lines for the map display.

Exporting the Contours from ReefMaster

This tutorial assumes that you have created a User Map using contours generated in a Map Project.
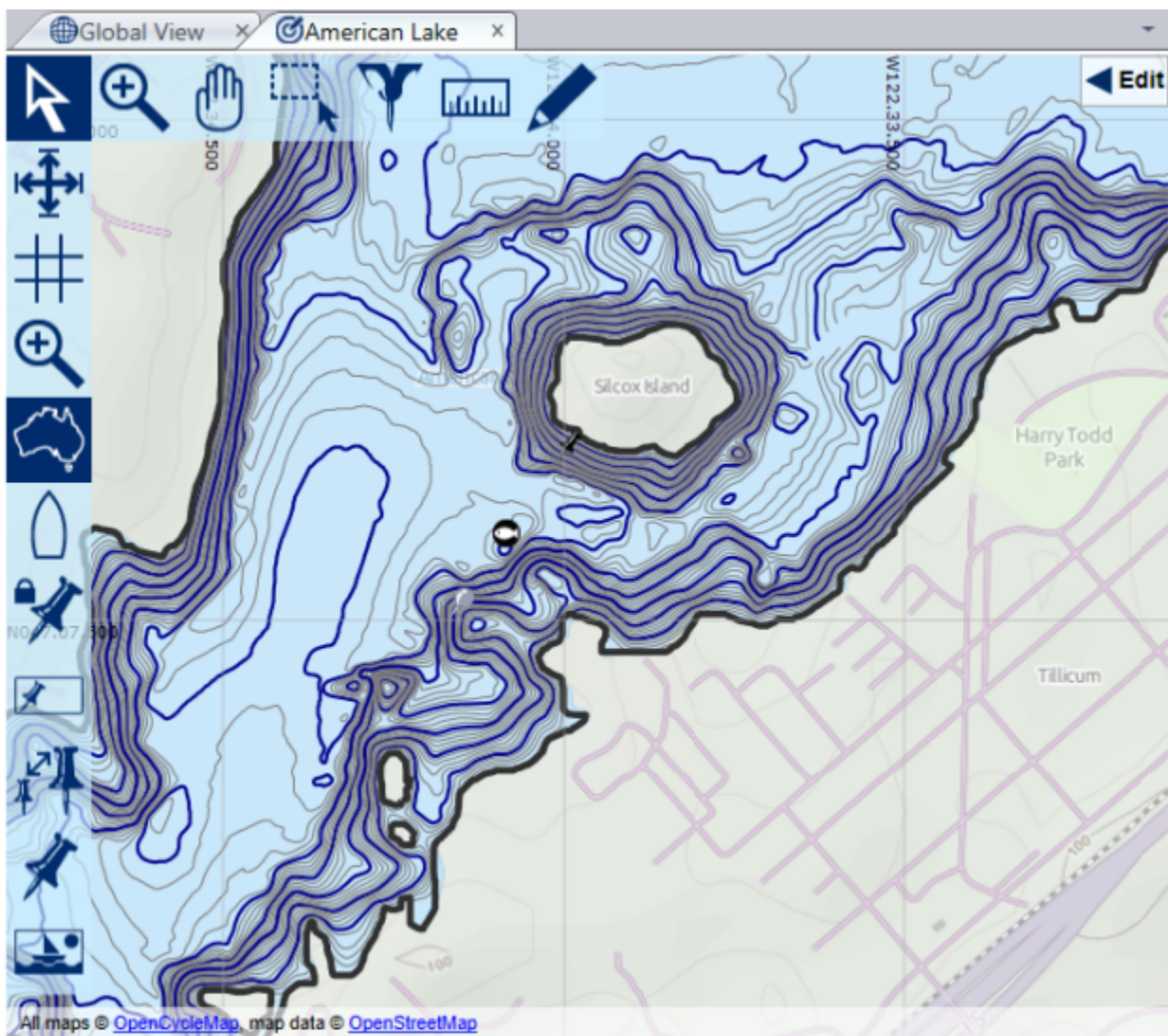
It is also possible to write contours directly from the map project, by right-clicking in the contour view and selecting Write All Contours to File.
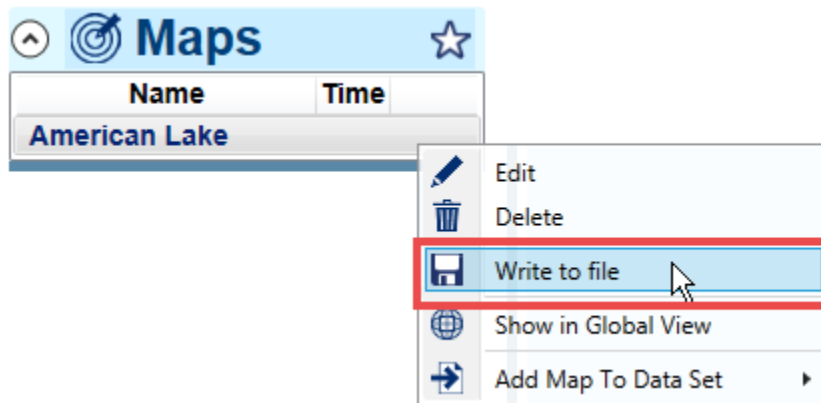
- Right-click the user map in the Asset Library and select the option *Write to File*.

The *Export to GPS* window will be displayed. Select *Humminbird* as the export format.
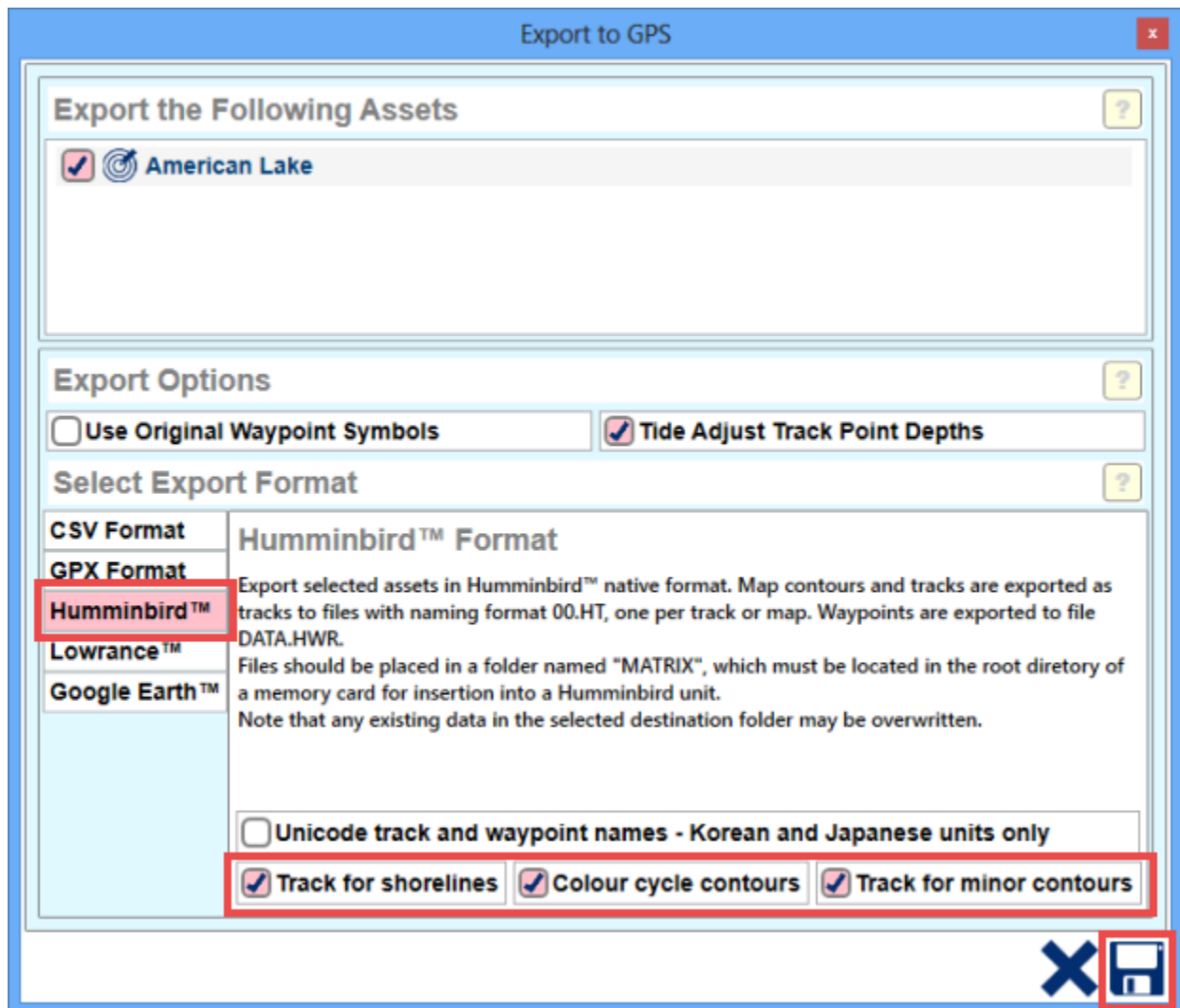
- The option *Track for Shorelines* will produce a separate track file for shorelines.
- *Colour Cycle Contours* creates three separate tracks for major contour lines. Contours are written in in depth order, and each group of three consecutive depth levels is split over three track files. For example, if a map contains contours with depths 1 through 6m, track one will contain 1m and 4m contours, track two 2m and 5m and track three 3m and 6m. Styling each of the three generated tracks with different colours in the Humminbird means that the direction of depth change can be determined from the colours of the contours.
- *Track for Minor Contours* generates a separate track file for minor contours.

In this tutorial, we are going to select all three of the above options.

Hit the *Save* button and select a destination folder. For import into a Humminbird device, the files need to be

placed in a folder called MATRIX located at the root of an SD memory card.

Importing the Tracks onto the Humminbird Unit
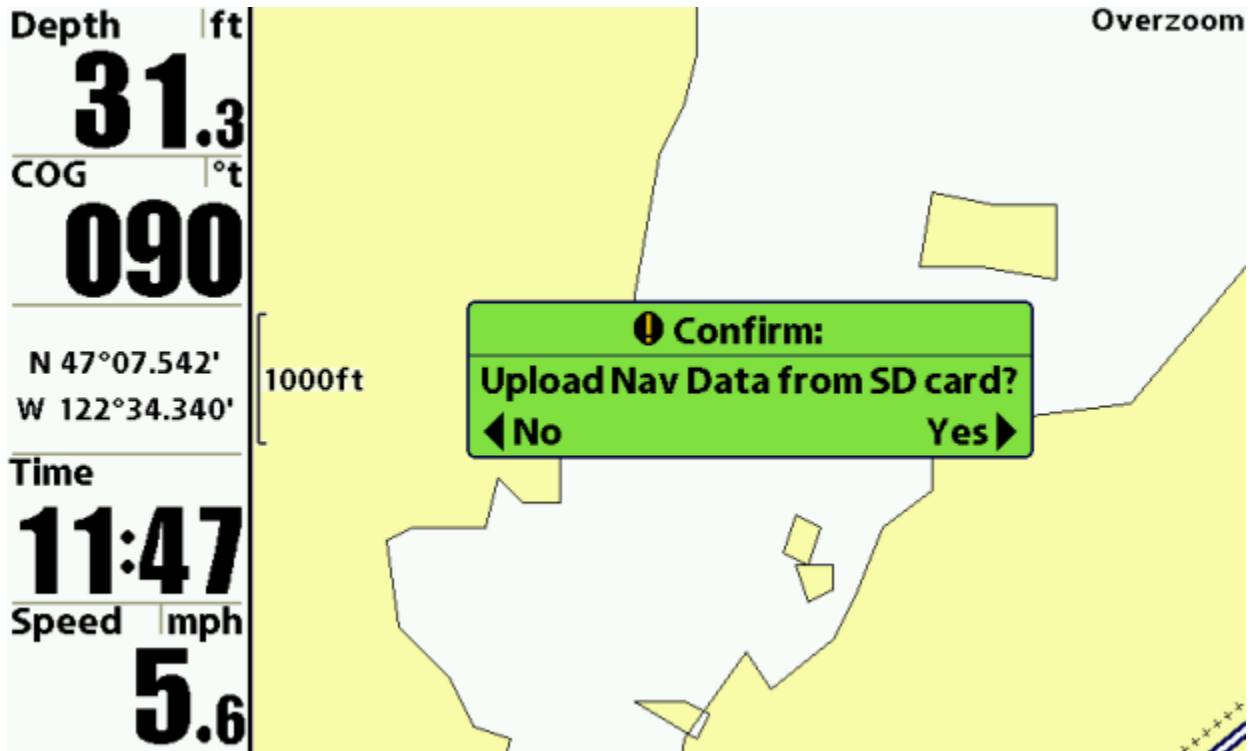
Make sure your tracks are in the MATRIX folder that is located at the root of the SD card. Turn on your Humminbird unit and, once the machine has finished initialising, insert the SD card. You should be prompted to upload navigation data. Select Yes.

Configuring the Tracks on the Humminbird Unit
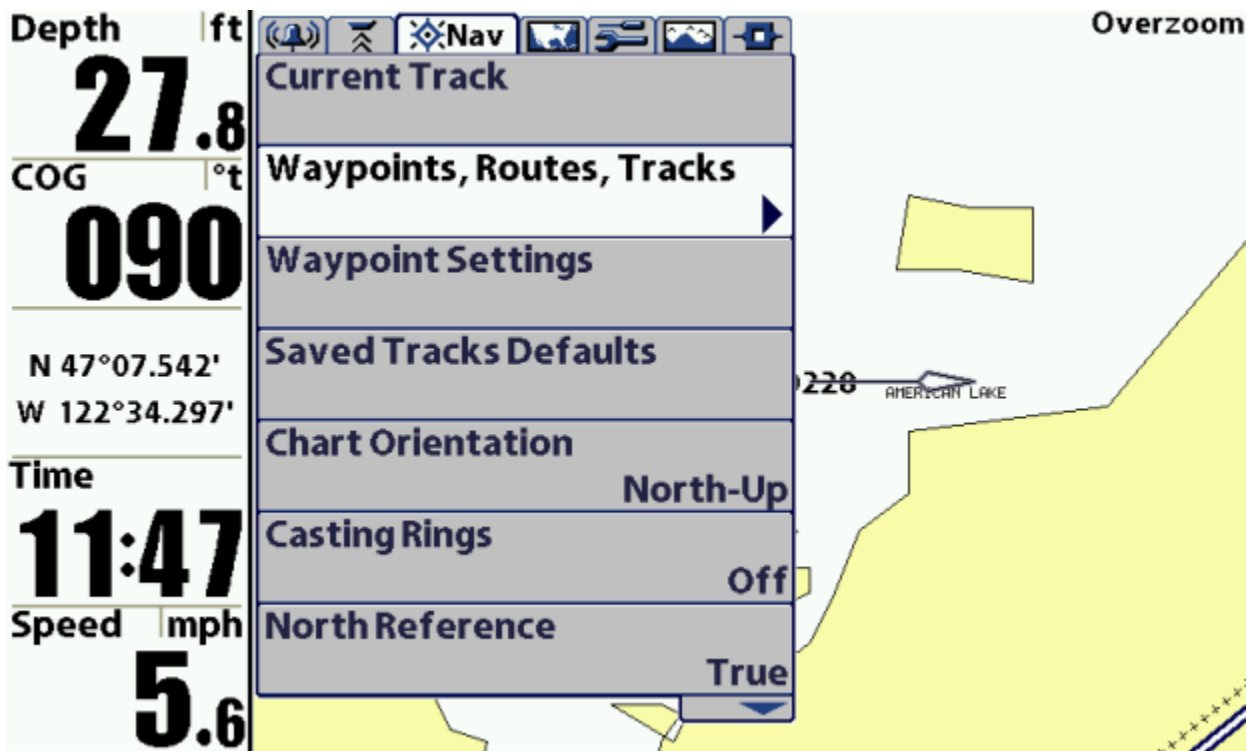
Bring up the *Nav* menu on the unit, and select *Waypoints, Routes, Tracks. Note that this menu option may be located in a different menu position and/or have a different name, depending on the model and firmware of your Humminbird unit.*

The waypoint, routes and track edit screen is displayed. Scroll through the asset list until you find the tracks that you imported in the previous step. They will have the name of the User Map that you exported from ReefMaster, with suffixes denoting whether they are major contours (CN), shorelines (SL) or minor contours (m).
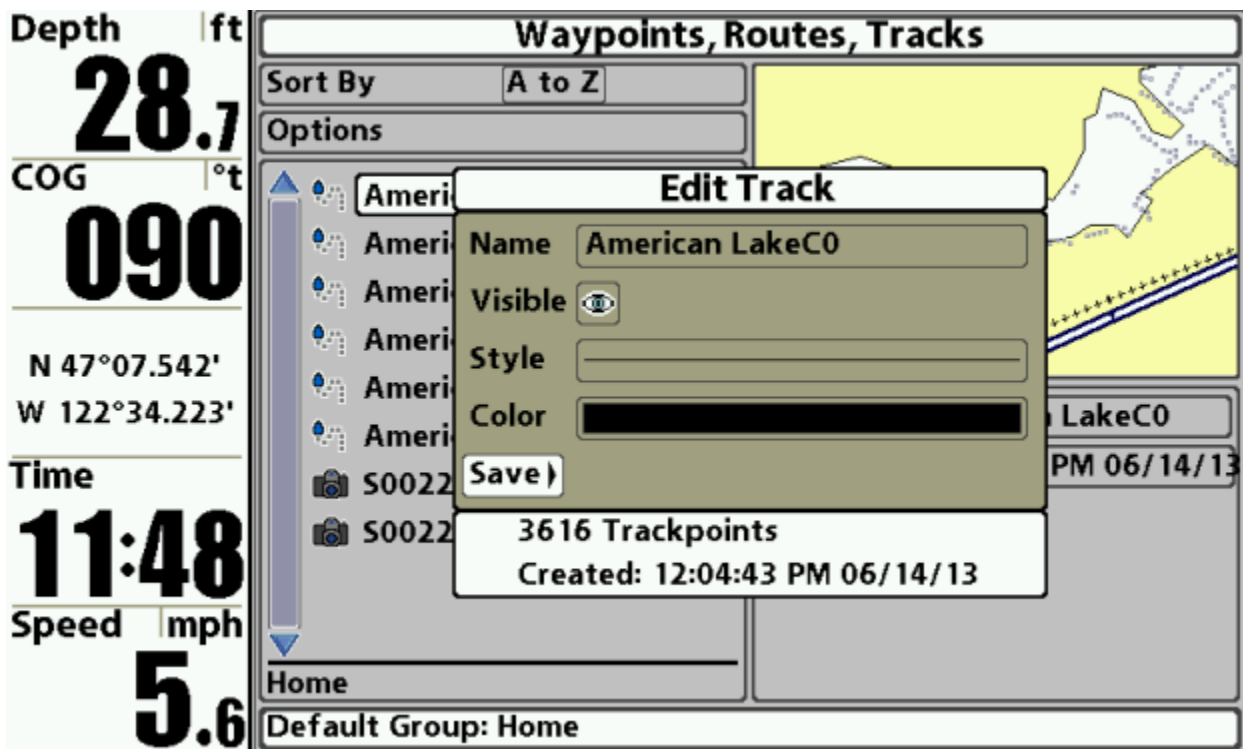
With the first track selected, hit right to bring up the Edit screen for the individual track. This is where you select the line style and colour for the contours. In the example above, we are setting the style for a set of major contours, and we have selected a thin, solid line-style, and a black colour. For subsequent major contours, we choose different colours so that adjacent contours in the finished map are displayed in different colours. This means that the direction of depth change can be discerned. There are three sets of major contour lines.

The shoreline track is set to a thicker style.

Minor contours are given a dashed style with a lighter colour. All line styles are down to user preference. A light, solid style can also work well for minor contour lines.

Viewing the map and Configuring Humminbird Chart Settings
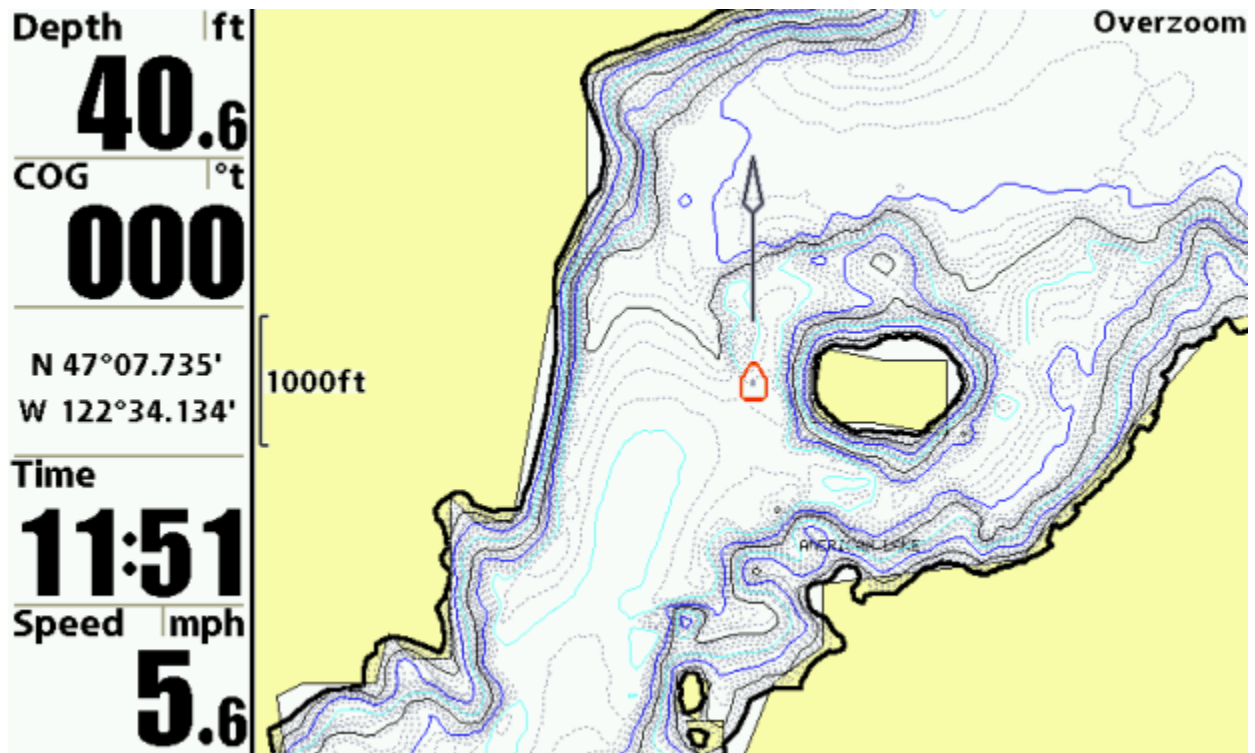
Navigate to the chart view on the Humminbird unit, and pan and zoom until you your find your contours. Our example lake is shown above, where you can see that the Humminbird base map conflicts with the displayed contours. In this case, the contours would look better without the base map display.

Turning off the Humminbird Base Map Display

Note that this step is only required if the area of your map conflicts with the inbuilt Humminbird base map.
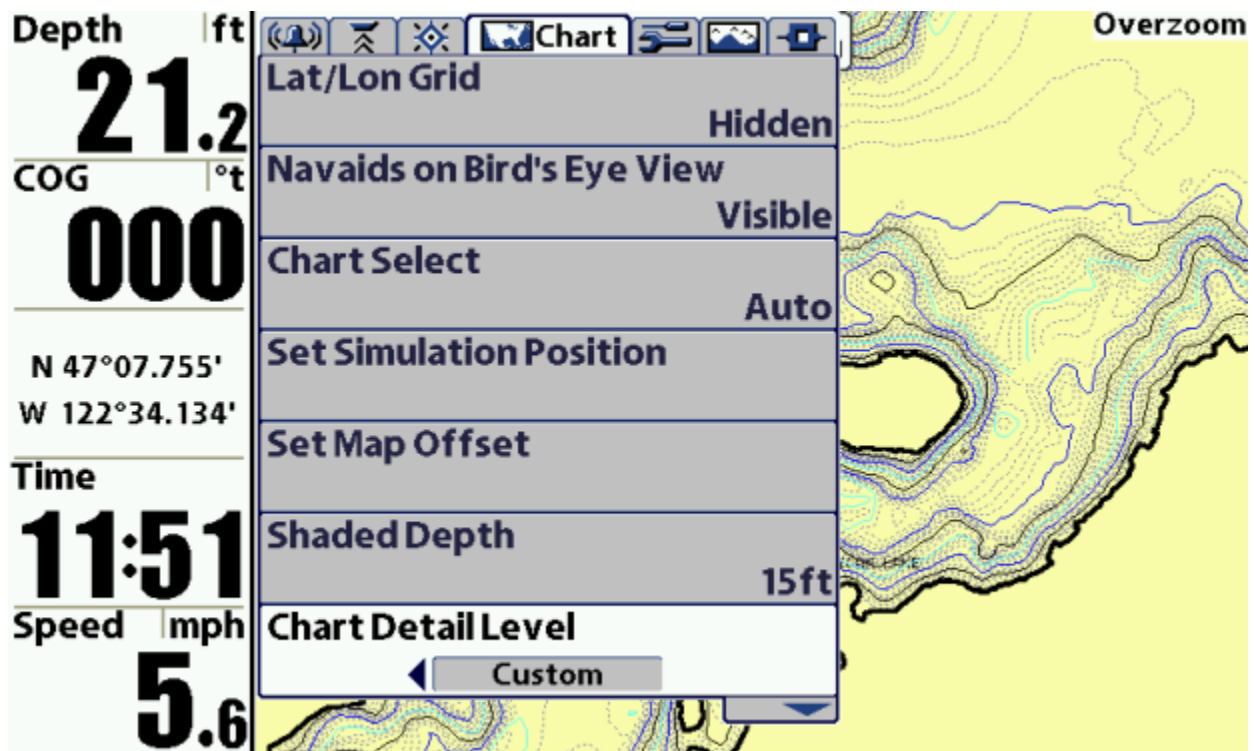
In the Chart menu, find the option Chart Detail Level and select the option Custom.
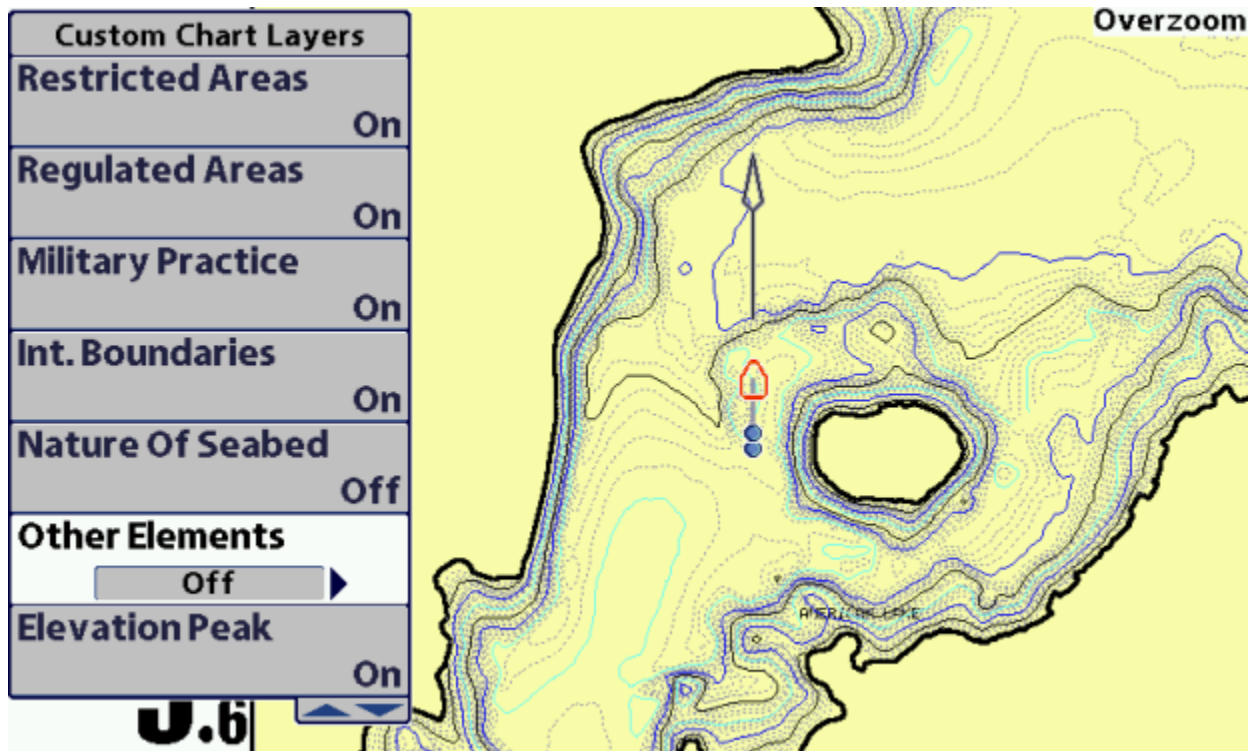
Find the option Custom Chart Layers. In the sub-menu, find option Other Elements select the option Off.
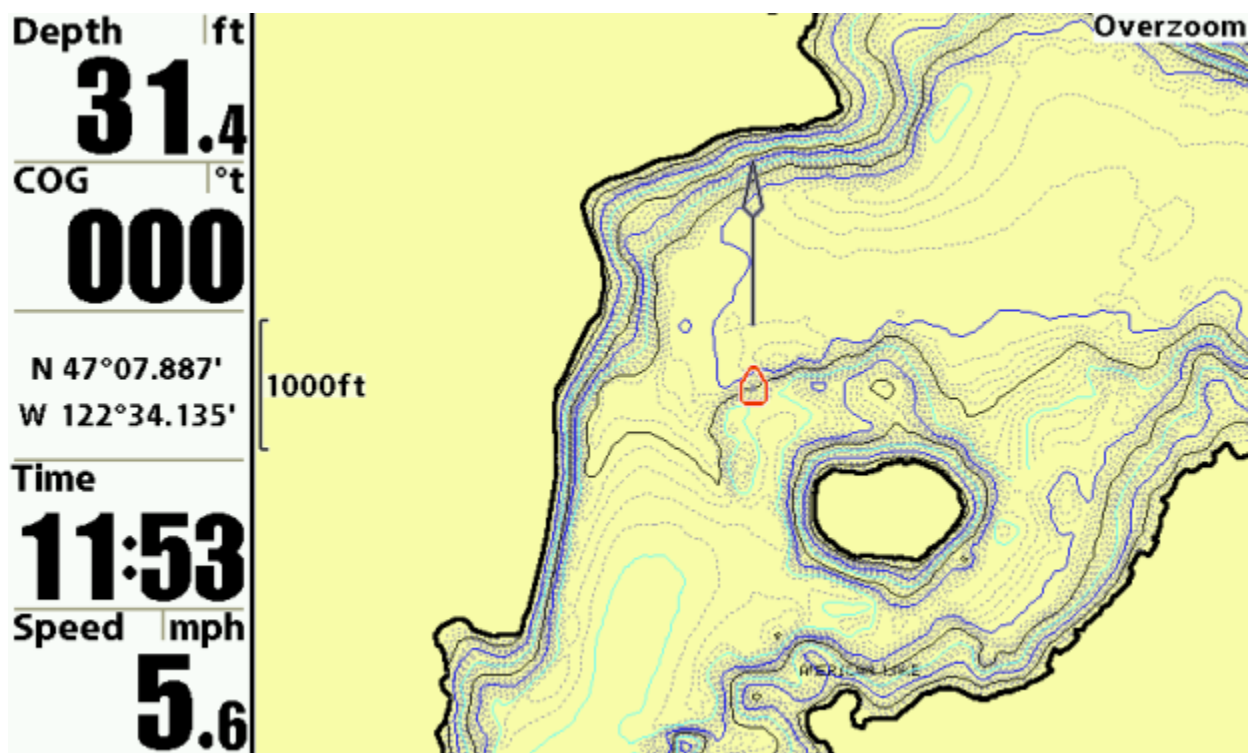
When you return to the chart screen, the base-map lake background is no longer visible. To get a white background, set the Coastlines visibility to Off in the Custom Chart Layers menu.

Other Considerations
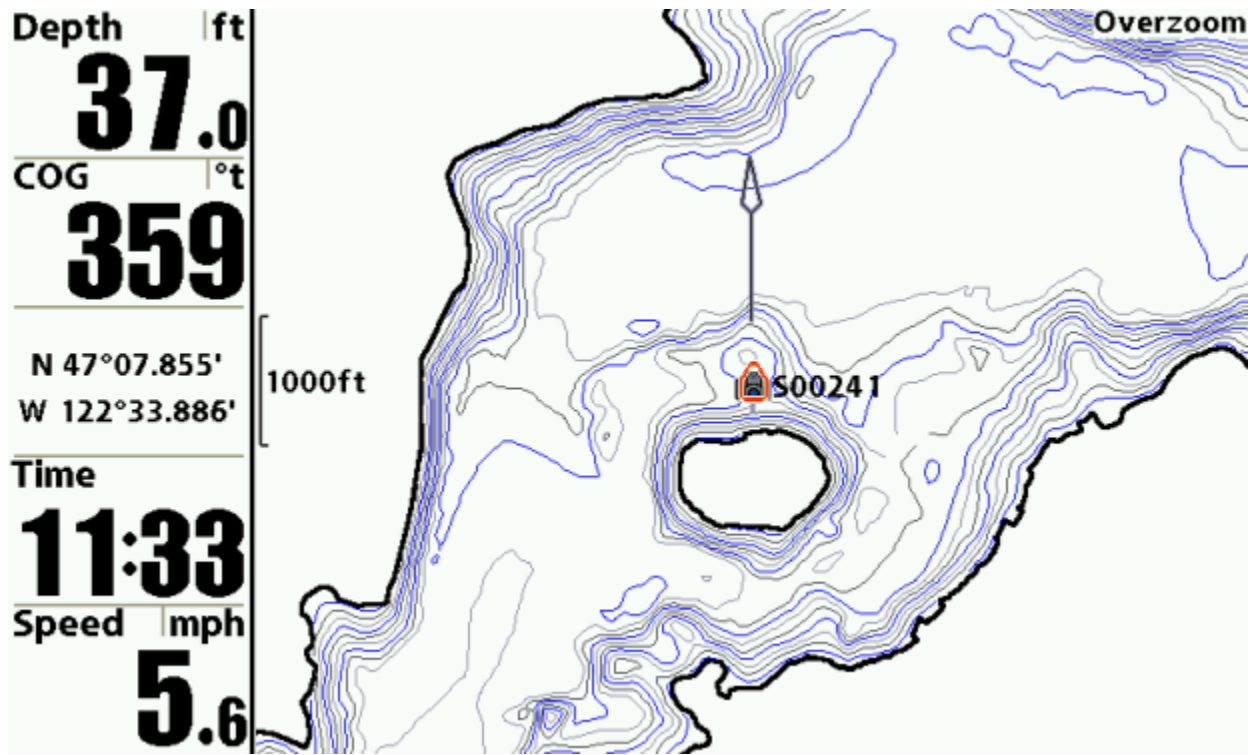
Sometimes "less is more" when exporting contours for display on your GPS unit. Using fewer contours can still convey plenty of information about the structure of the lake or sea bed beneath you, and provides a less cluttered screen. The image above shows the same lake as we used in the example, with no minor contours and major contours spaced slightly closer together (3 metres, versus 5 metres in the first example).

Index