NavView User Guide – 14 Database Services

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14. DATABASE SERVICES

14.1 OVERVIEW

NavView supports comprehensive data logging ranging from basic logging for normal construction operations, to more specialized applications such as position fix averaging, DVL calibration and USBL calibration.

NavView's Database Services uses SQL Server databases. SQL Express LocalDB is installed with NavView to provide a basic minimum logging medium. NavView can optionally connect to any instance of SQL Server or SQL Express available on the network. The main difference between an instance of SQL Express LocalDB and SQL Server or SQL Express is that a LocalDB instance is available only to the NavView application running on the same PC, where a single instance of SQL Server or SQL Express installed on a network is available to all NavView clients with network access.

Note: There should only be a single instance of SQL Server on a vessel based NavView network. All NavView systems onboard are to be configured to connect to this instance. They will all log to and access the databases on this server.

NavView manages the databases and the features that use them, including logging and querying across multiple databases. Database Services is located in the Data section of the project Explorer window, see FIGURE 14-1

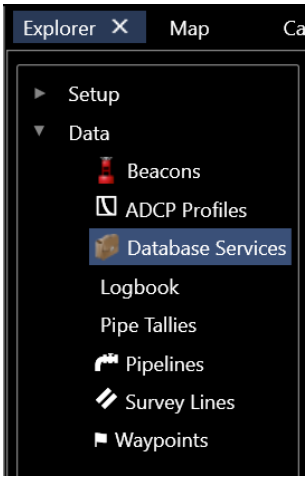


FIGURE 14-1 DATABASE SERVICES – EXPLORER

If Roles and Privileges are enabled, the user must log in as Admin in order to configure the Database Services.

14.2 CONFIGURING DATABASE SERVICES

In order to use any Database Service the user must follow these steps:

1. Enable the services.
2. Select the instance of Database Server to connect to.
3. Select and configure the authentication type to use.

4. Configure the services, including the target folder of the associated database files in the case of localdb.
5. Test the connection.
6. Apply the connection.

These steps are broken down here.

Note: When using SQL Server or SQL Express, a User (admin) with a password (admin) must be added to SQL with permission to create databases and administer bulk operations. For details on installing and configuring SQL, refer to Introduction section Optional Software: SQL Server Express and SQL Server Management Studio.

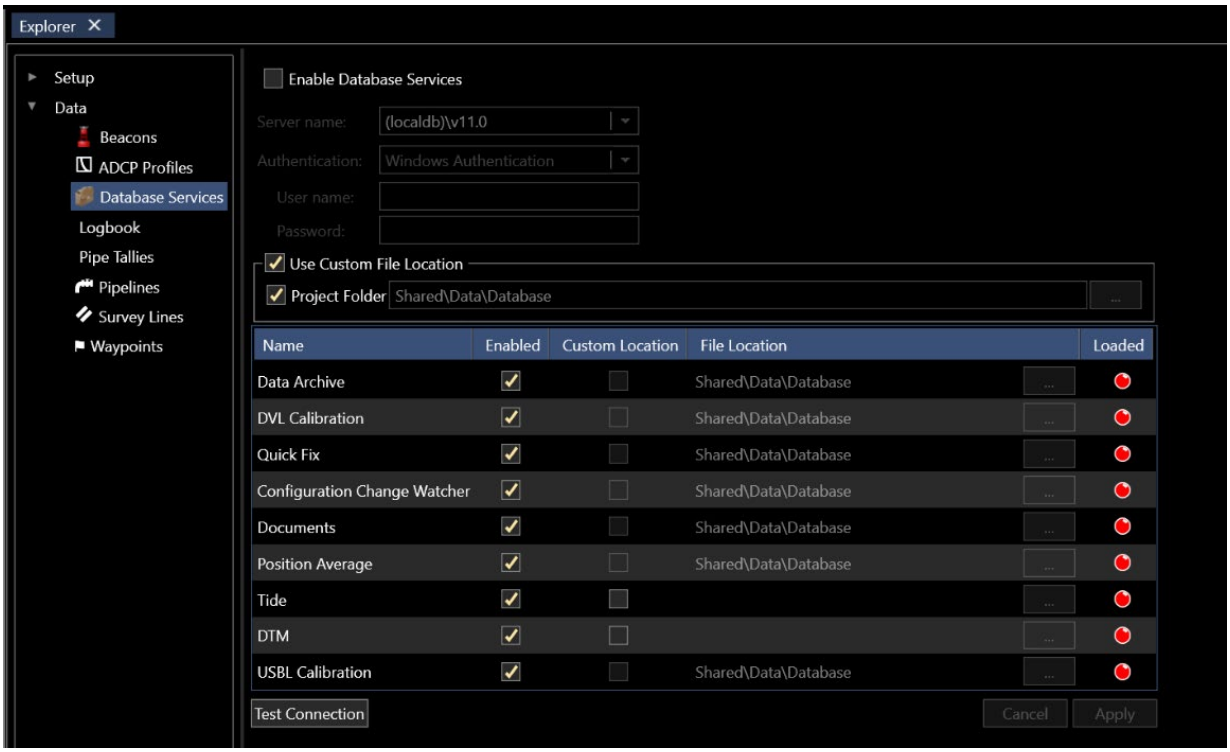


FIGURE 14-2 DATABASE SERVICES – SERVER CONFIGURATION

14.2.1 CONFIGURE SERVER

1. Open the Explorer window and navigate the tree to select **Database Services** to access the server configuration shown in FIGURE 14-2
2. **Enable Database Services**: Check this box to enable database services, this will activate the options for selecting the Database Server. See FIGURE 14-3

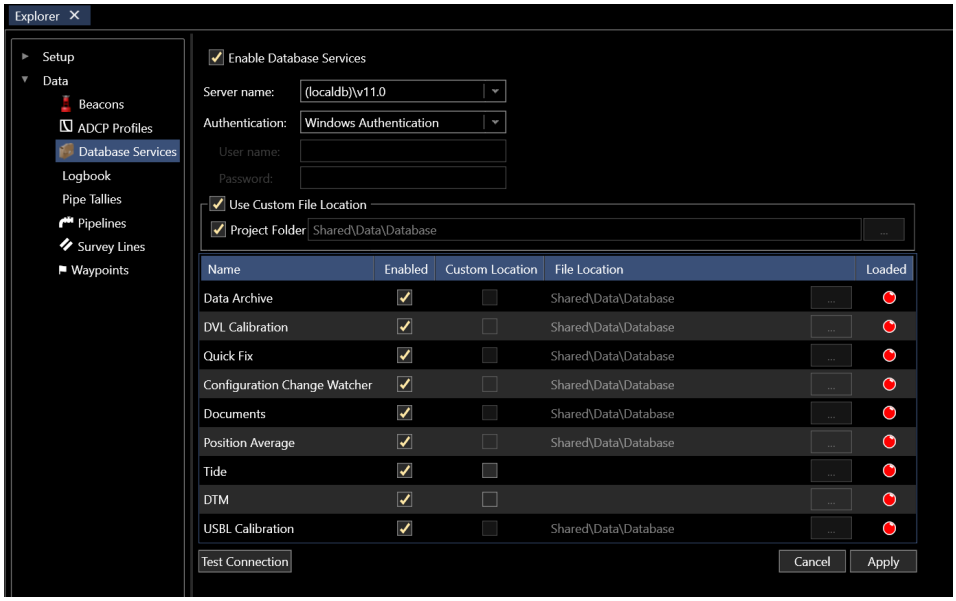


FIGURE 14-3 DATABASE SERVICES ENABLED

3. **Server name:** Select the server to connect to from the drop-down list.
    I. Selection of the server determines the configuration options
    II. The default is the **(localdb)\v11.0**, the local SQL server installed with NavView
    III. If a different server is desired than default **(localdb)\v11.0**, such as SQL Server or SQL Express, click on **<Browse for more...>**. NavView will detect all versions of (localdb) on the local PC and all SQL Server and SQL Express instances present on the network. From the list generated, select the desired database and click OK. If the desired server instance is not present in the list, a server name can be typed into the editable Server name combo box using the format [Computer name or IP address]\[SQL Server instance name].

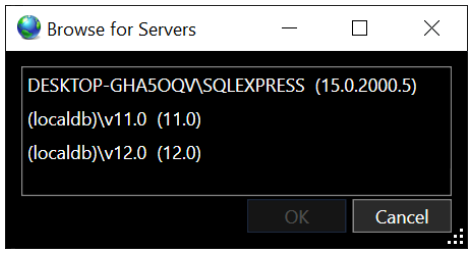


FIGURE 14-4 DATABASE BROWSE RESULTS

Note: NavView only supports the version of localdb installed with NavView, **(localdb)\v11.0**.

Note: NavView supports all versions of SQL Server and SQL Express.

4. **Authentication:** From this drop down list, select the authentication method to use to access and create databases
    - **Windows Authentication:** Select this option to use the current Windows user's credentials to connect with the database

- **SQL Server Authentication:** Select this option to use a SQL Server login account to connect with the database
  - Username: admin
  - Password: admin

Note: Windows Authentication is only recommended when the (localdb) is used. Otherwise use SQL Authentication.

Note: The Username and Password given here are based on the instructions given in Section 1.1.3 Optional Software: SQL Server Express and SQL Server Management Studio in Introduction of this guide.

14.2.2 CONFIGURE DATABASE SERVICES FOR LOCALDB

The use of SQL LocalDB enables a flexibility not available with other database server options, specifically designating where the database files will be saved. The default is the [Project]\Shared\Data\Database folder. Using this location simplifies project management and archiving since all data saved to databases for the project is contained within the NavView project folder.

1. **Use Custom File Location:** Check this box to enable assigning the location for the database files.

Note: Only Tide and DTM are available for Custom File Location.

2. **Project Folder**: Check this box to direct the database files to the current project folder, specifically the [Project]\Shared\Data\Database folder.
3. **Browse button:** If the Project Folder box is not checked, click this button to browse to and select the target folder for the database files.

Note: If the **Custom Database File Location** option is not checked, the database files are written to the localdb\v11.0 default location.

4. In the data grid section of the window displaying the database services supported by NavView, select those services to be loaded and used.

Note: If the user is not familiar with the NavView Database Services it is recommended that the default setting of all services being Enabled be used.

- **Name**: Name of the database service
- **Data Archive:** Supports comprehensive data recording, querying and exporting
- **DVL Calibration:** Supports Doppler Velocity Log (DVL) calibration
- **Quick Fixes:** Supports configurable single button fixing
- **Configuration Change Watcher:** Supports tracking and logging of NavView configuration changes
- **Documents:**
- **Position Average:** Supports comprehensive position fix data recording, reporting, querying and exporting

- **Tides:** Supports loading and application of tide data
- **Digital Terrain Model (DTM):** Supports loading and managing of DTMs
- **USBL Calibration:** Supports data logging for USBL Calibration
- **Enabled**: Check/uncheck the respective boxes to select those services that are to be used
- **Custom Location**: In the case of the Tide and DTM services, the target folder for the associated database files can be overridden by checking this box, then clicking the associated Browse button to navigate to and select the desired target folder
- **File Location:** Displays the target folder for the associated database files if a Custom File Location is used

Note: In the case of Tide and DTM database files, the File Location is only displayed if the Custom File Location is overridden.

- **Loaded**: Traffic light indicating status of service
  Indicates the service is not loaded, will display if service is not enabled or if it is enabled but unable to load. Mousing over the Name or Loaded cell will show a tool tip detailing the problem.
  Indicates the service is enabled and successfully loaded.

Note: The selection of Database Services can be edited at any time, including after the database services have been enabled and used.

14.2.3 CONFIGURE DATABASE SERVICES FOR SQL SERVER OR SQL EXPRESS

The use of SQL Server or SQL Express is required if other computers, including other NavView clients, require access to the databases.

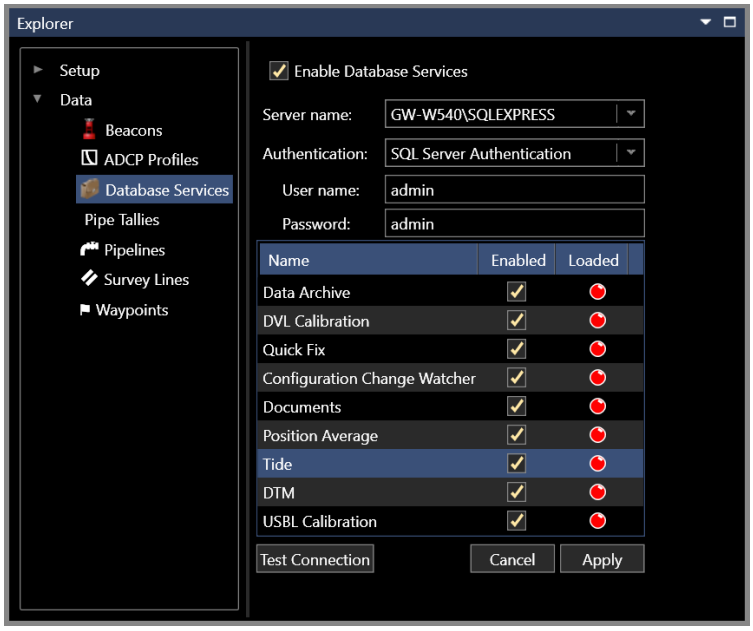


FIGURE 14-5 CONFIGURE SQL EXPRESS DATABASE SERVICES

1. In the data grid section of the window displaying the database services supported by NavView, select those services to be loaded and used.

14.2.4 TEST AND APPLY DATABASE SERVICE CONNECTION

1. Click **Test Connection** to confirm that the configuration is correct and the user has the required privileges to create databases and administer bulk operations.

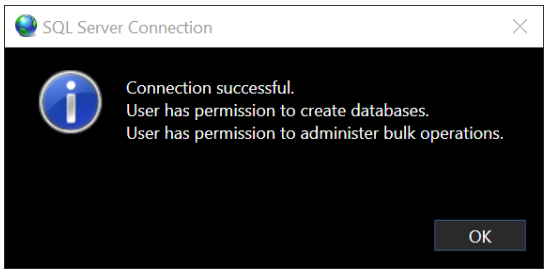


FIGURE 14-6 SUCCESSFUL CONNECTION TEST RESULTS

2. Click OK to complete test.

Note: If this test fails, investigate the database instance configuration and server Roles before proceeding to step 3. The most likely reason for a failed connection test is insufficient server privileges assigned to the SQL user account.

3. Click Apply
4. Monitor the loading of the services, the icon in the Loaded column will turn from red to green as each is successfully loaded.

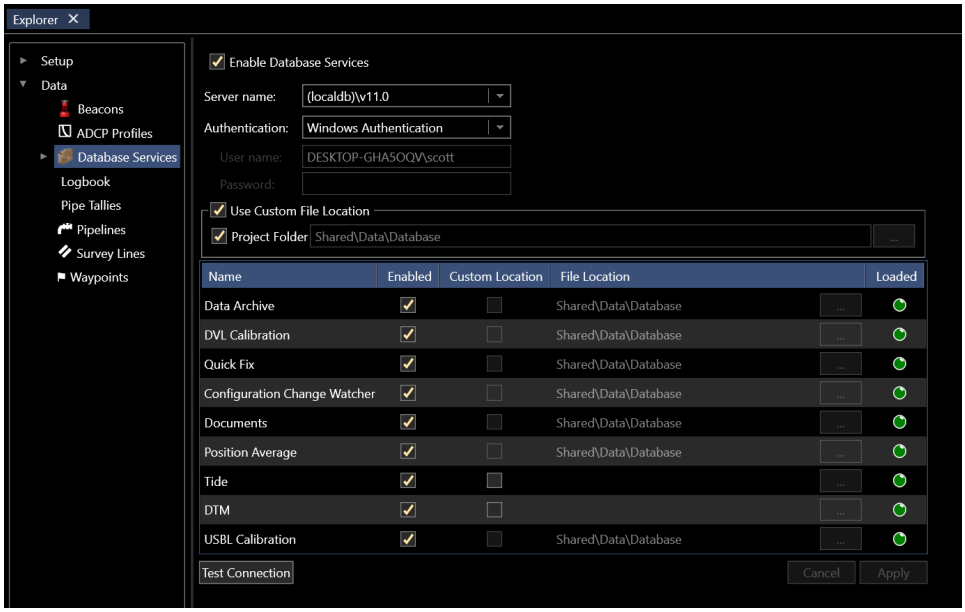


FIGURE 14-7 DATABASES LOADED

14.3 DIGITAL TERRAIN MODEL (DTM)

NavView supports loading and generating digital terrain models (DTM) used in depth queries for waypoints, pipeline profiles, anchor catenary modelling, pipelay catenary modelling and display seafloor topology in 3D Map views. The DTM can also be used to generate contour maps for display in Map views.

The DTMs are loaded/generated via the Database Services, saved to the database server and made available to all NavView clients connected to the network by Network Services. Multiple DTMs can be loaded simultaneously. When more than one DTM is available for a specific task, e.g. waypoint depth query, the user is presented with the appropriate options for the selection of the DTM to use.

Three data source options are available to load and generate the DTM from. These are listed here with their characteristics.

- XYZ ASCII file
- Supports depth queries
- Displays seafloor topology in 3D views
- ESRI ASCII grid
- Supports depth queries
- Displays seafloor topology in 3D views
- Flat DTM
- Map projection grid coordinate based, i.e. requires Projected CRS
- Supports depth queries
- Displays seafloor topology in 3D views

The following sections detail the loading and use of DTMs.

14.3.1 DTMS, CRSS AND UNITS

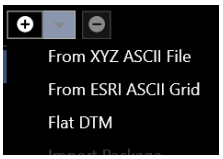
During the DTM import configuration, the Horizontal CRS and Vertical CRS that the data is referenced to are specified. When the DTM is loaded, the XYZ values are loaded and maintained as they exist in the source, no transformations or conversions are performed on the data, and the XYZ units defined for the respective CRS are implicitly used for the DTM XYZ values. Changing the Horizontal CRS or Vertical CRS of a DTM after it has been loaded (see Managing DTMs), does not change the DTM's XYZ values, just how the data is used.

When a depth query is made of a DTM, the position to be queried is transformed to the DTM's Horizontal CRS and the depth determined for the position. The resulting depth is transformed from the DTM's Vertical CRS to the required CRS and returned.

If a DTM's Horizontal CRS is not the same as the current Working Horizontal CRS, the map layers for the respective coverage area and contours generated from it are not available for display in Map views and the DTM is not available for display in 3D Map views.

14.3.2 LOAD A DTM

1. From the Explorer window, expand the Data > Database Services branch in the hierarchical tree and select DTM.

2. Click the 

button and select from the options to load.
    a. From XYZ ASCII File

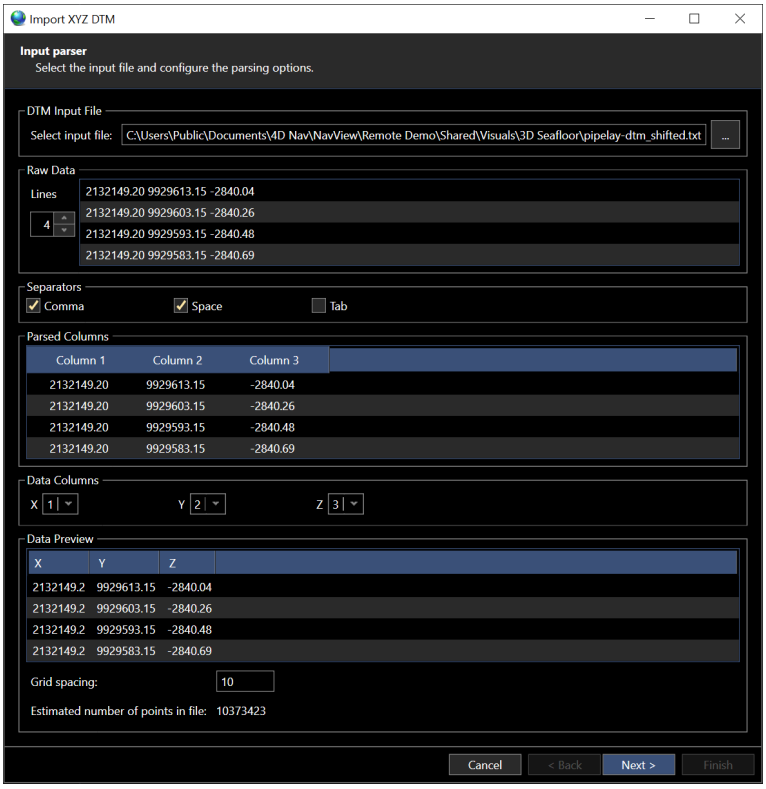


FIGURE 14-8 DTM - IMPORT XYZ ASCII DTM FILE

I. **DTM Import File:** Click the browse 

button and navigate to and select the xyz file to import and click **Open**

Note: The default file extensions are *.xyz, *.csv and *.txt.

II. **Raw Data:** Upon selection of a file, the first 4 records are displayed here. If XYZ data is not present in these records, i.e. the first four records are header records, use the  button to increment/decrement the number of records displayed until XYZ data is present. Alternatively, enter a number directly. Each time this value is changed, NavView attempts to parse the first 3 fields of each record displayed as numbers and if successful determines that XYZ data is present in the record, even if it is not necessarily in the first three fields.

Note: The maximum number of records that can be displayed is 20. If the number of header records exceeds 20, the file will need to be edited to remove header records until they number 20 or less.

Note: The total number of data records displayed here is duplicated in the **Parsed Columns** data grid. The total number of records with XYZ data displayed here is duplicated in the **Data Preview** data grid.

III. **Separators:** Select the field separators present in the file by checking the associated boxes, confirm by reviewing the columns displayed in **Parsed Columns**

IV. **Parsed Columns:** Displays the records showing in **Raw Data** as columns after parsing using the selected separators, enables confirmation of correct separators being selected and which column contains the X, the Y and the Z data

V. **Data Columns:** Select the column numbers for the XYZ data using the information displayed in the **Parsed Columns** data grid

VI. **Data Preview:** Displays the XYZ data as it will be imported based on the separators and XYZ column selection configuration to confirm that the import is correctly defined. The grid interval between points of the loaded DTM is calculated by NavView during loading. In addition, the estimated number of points in the selected file is displayed. For large files, this should be noted so the importing progress can be better monitored

Note: It is important to note if the Z value displayed in the **Data Preview** is a positive or negative. The sign convention used by NavView when loading XYZ data is negative below the vertical datum (e.g. points on the seafloor), positive above (e.g. points onshore). If the Z values do not agree with this sign convention, the Z values will need to be inversed during the loading. This setting is on the next page in the DTM wizard.

VII. **Next:** The Next button activates if the selected file name is valid and NavView has determined that XYZ data is present in the file. Click Next to go to step 3.

b. From ESRI ASCII Grid

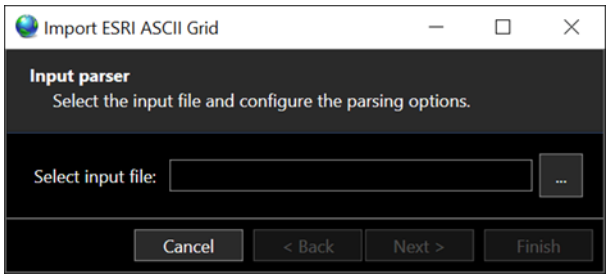


FIGURE 14-9 DTM – IMPORT ESRI ASCII GRID – FILE SELECTION

I. **Input Parser:** Click the browse ... button and navigate to and select the ESRI ASCII Grid file to import and click **Open**

Note: The default file extensions are *.asc and *.txt

II. **Next:** The Next button activates after a file name has been selected. Click Next to go to step 3

c. From Flat DTM

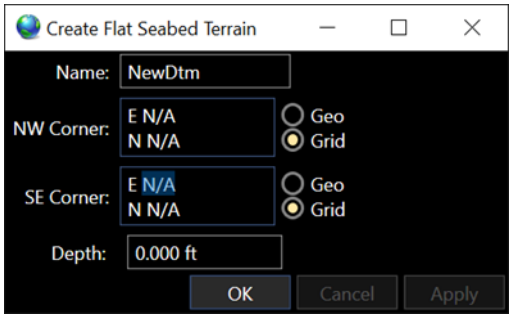


FIGURE 14-10 DTM – CREATE FLAT SEABED TERRAIN DIALOG

I. **Name:** Enter a name for the DTM being created

II. **NW Corner:** Enter the coordinate defining the northwest corner for the area to be represented by the DTM

III. **SE Corner:** Enter the coordinate defining the southeast corner for the area to be represented by the DTM

IV. **Depth:** Enter the depth of the DTM

V. Click **OK** to create the DTM and close the dialog, **Apply** to create the DTM and leave the dialog open, **Cancel** to abort the process and close the dialog

VI. Go to step 4

3. Configure the DTM import options.

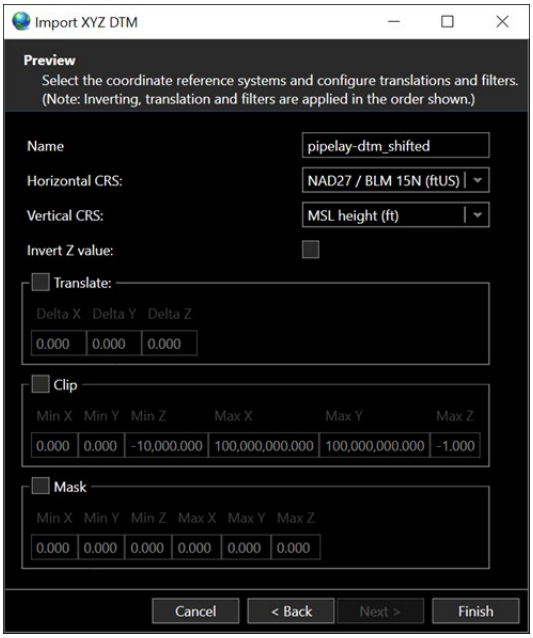


FIGURE 14-11 DTM – IMPORT XYZ DTM CONFIGURATION

a. **Name:** Enter the name the DTM is to be referred to, default is the name of the file being loaded
b. **Horizontal CRS:** Select the Horizontal CRS that the source XY data are referenced to

Note: The source XY Horizontal CRS must be added to NavView to be available in the drop-down list. See the Geodesy section for details.

Note: The DTM XY units must match those of the selected Horizontal CRS. For example, in the case the selected Horizontal CRS is a Projected type, the units may be meters, feet, US feet, etc. In the case it is a Geographic 2D type, the units are degrees.

c. **DTM Vertical CRS:** Select the Vertical CRS the Z data are referenced to

Note: The DTM Z units must match those of the selected Vertical CRS.

d. **Invert Z Value:** Check this box if the Z value representing depths in the DTM being loaded is positive
e. **Translate:** Check this box if the DTM data is to be translated in one or more axis, e.g. made deeper or shallower to address a known variation relative to the selected vertical CRS
    I. **Delta X:** Enter the distance the Easting is to be shifted
    II. **Delta Y:** Enter the distance the Northing is to be shifted
    III. **Delta Z:** Enter the distance the elevation is to be shifted (a positive value makes the elevation higher)

Note: The Delta values are added to the DTM values.

Note: Entry of translation distances does not allow inclusion of units. The XY units are those of the Horizontal CRS, the Z units are those of the Vertical CRS.

f. **Clip:** Check this box if only a specific section of the DTM is to be loaded, e.g. the immediate area around a drill center
    I. **Min X:** Enter the minimum Easting of the rectangular area to be loaded
    II. **Min Y:** Enter the minimum Northing of the rectangular area to be loaded
    III. **Min Z:** Enter the minimum elevation of the rectangular area to be loaded
    IV. **Max X:** Enter the maximum Easting of the rectangular area to be loaded
    V. **Max Y:** Enter the maximum Northing of the rectangular area to be loaded
    VI. **Max Z:** Enter the maximum elevation of the rectangular area to be loaded

Note: The XY units must be those of the selected Horizontal CRS, the Z units must be those of the Vertical CRS.

Note: Clipping is a convenient way to prevent loading zero Z values which are often present in DTM data sets. The default Min/Max Z values address this while allowing deep Z data.

g. **Mask:** Check this box if a section of a DTM is not to be loaded, e.g. the area around a drill center from a low resolution DTM is not to be loaded if it will be covered by another higher resolution DTM
   I. **Min X:** Enter the minimum Easting of the rectangular area not to be loaded
   II. **Min Y:** Enter the minimum Northing of the rectangular area not to be loaded
   III. **Min Z:** Enter the minimum elevation of the rectangular area not to be loaded
   IV. **Max X:** Enter the maximum Easting of the rectangular area not to be loaded
   V. **Max Y:** Enter the maximum Northing of the rectangular area not to be loaded
   VI. **Max Z:** Enter the maximum elevation of the rectangular area not to be loaded

Note: The XY units must be those of the selected Horizontal CRS, the Z units must be those of the Vertical CRS.

h. **Finish:** Click Finish to load the selected DTM as configured

4. Monitor loading.
   a. Upon commencing the loading of the DTM, a message box will appear stating **Loading points into memory** with the elapsed time since the start of the importing process displayed

FIGURE 14-12 DTM – IMPORTING DTM – MONITOR LOADING

   b. When the importing of the DTM is completed, the message box will disappear and the user is returned to the Explorer view with the DTM branch displaying the loaded DTM

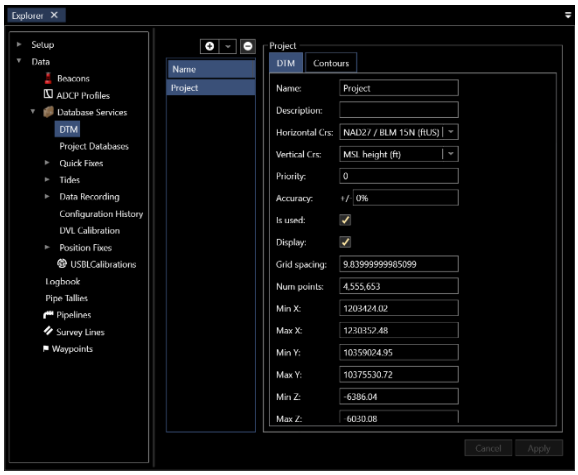


FIGURE 14-13 DTM LOADED

14.3.3 MANAGING DTMS

The DTMs loaded in NavView are managed from the Explorer window. This includes selecting a different Horizontal and/or Vertical CRS if the incorrect one was selected when loading, editing the name used for the DTM, adding a description and enabling and disabling its use.

1. From the Explorer window, expand the Data > Database Services branch in the hierarchical tree and select DTM (see Figure 14-13)
2. From the DTM's loaded under **Name**, select the DTM to review and/or edit.

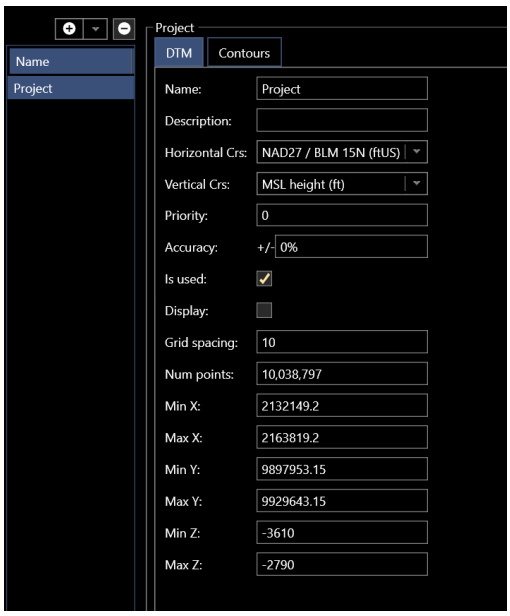


FIGURE 14-14 DTM REVIEW/EDIT

3. From the **DTM Tab**, edit configuration and use as required.
    - **Name:** Edit the name to be used when working with the DTM (when loaded from a file, the default is the file name)
    - **Description:** Enter/edit the description for the DTM, this is available as part of the DTM's metadata
    - **Horizontal CRS:** If the incorrect Horizontal CRS was selected when the DTM was loaded, the correct one can be selected
    - **Vertical CRS:** If the incorrect Vertical CRS was selected when the DTM was loaded, the correct one can be selected
    - **Priority:** If multiple DTMs are loaded, when NavView interrogates for a depth where DTMs overlap it will use the depth from the DTM with the highest priority. The lower the number, the higher the priority, e.g. 1 is higher priority than 2
    - **Accuracy:** Is the accuracy of the DTM a percentage of water depth, this is given by the DTM supplier. This value is entered here
    - **Is Used:** Check this box if the DTM is to be used for depth queries
    - **Display:** To display the DTM in the 3D Map. When display is turned off, the DTM can still be queried for depths along as ***Is Used*** is checked
4. Review DTM attributes, these values cannot be edited.

- **Grid Spacing:** The grid interval between points of the loaded DTM, this is calculated by NavView during loading
- **Num Points:** The total number of points in the DTM
- **Min X:** Minimum X in the Horizontal CRS units of DTM
- **Max X:** Maximum X in the Horizontal CRS units of DTM
- **Min Y:** Minimum Y in the Horizontal CRS units of DTM
- **Max Y:** Maximum Y in the Horizontal CRS units of DTM
- **Min Z:** Minimum Z in the Horizontal CRS units of DTM
- **Max Z:** Maximum Z in the Horizontal CRS units of DTM

5. **Apply/Cancel:** Click Apply to apply the changes made, Cancel to abort and revert to the previous settings.

14.3.4 CONTOURS FROM A DTM

NavView supports generating contours from any Projected CRS based DTM. Contours provide a visual representation of the seafloor topology in Map views. Figure 14-15 shows an example of a single set of contours created from a DTM and displayed as a layer in multiple Map views.

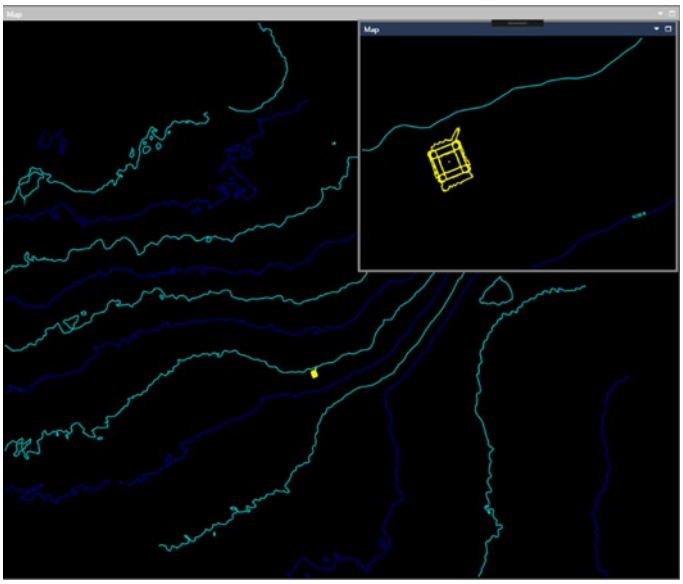


FIGURE 14-15 DTM CONTOURS – MAP VIEW

14.3.4.1 GENERATING CONTOURS FROM A DTM

1. From the Explorer window, expand the Data > Database Services branch in the hierarchical tree and select DTM.
2. From the DTM's loaded, select the DTM whose contour configuration is to be edited and click the **Contours Tab** (see Figure 14-16)

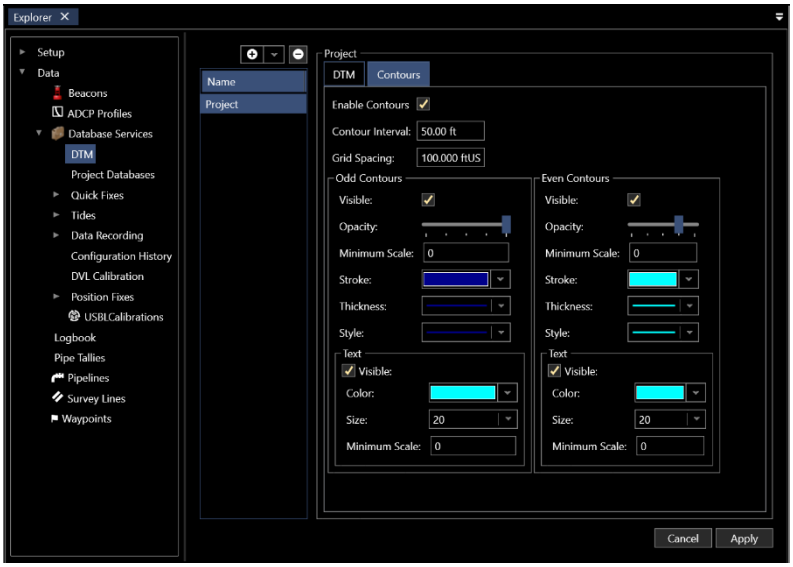


FIGURE 14-16 DTM - CONTOUR CONFIGURATION

3. Configure the contour generation.
   a. **Enable Contours:** Check this box if the contours are to be generated
   b. **Contour Interval:** Enter the desired contour interval
   c. **Grid Spacing:** Enter the grid spacing to be used to generate the contours

Note: The grid spacing determines the horizontal resolution of the contour lines drawn on the map. If the grid spacing is too small the generation of the contours will take a long time while one that is too large will result in contours with low horizontal resolution. The goal is to use the largest grid spacing that still produces contours with an acceptable horizontal resolution. This may take several attempts to determine the optimum spacing for the application.

Note: When a new DTM is loaded into NavView the software calculates recommended default values for the contour interval and grid spacing.

   d. **Odd Contours/Even Contours:** Configure the graphics to be used for alternating contours, referred to here as the odd and even contours
      - **Visible:** Check this box if the respective contour is to be displayed
      - **Opacity:** Using the slider, set the opacity (brightness) to display the contours and text, all the way to the left is an opacity of 0 and the contours will not display, all the way to the right is an opacity of 1 and the contours will display brightly
      - **Minimum Scale:** Contours will only be visible in Map view if the map scale is greater than value entered here
      - **Stroke:** Select the color to draw the contour line in from the drop-down list
      - **Thickness:** Select the thickness to draw the contour line with from the drop- down list
      - **Style:** Select the style to draw the contour line with from the drop-down list

- **Text:**
  - **Visible:** Check this box if the respective contour annotation is to be displayed
  - **Color:** Select the color to draw the contour annotation in from the drop-down list
  - **Size:** Select the font size to use for the contour annotation from the drop-down list
- **Minimum Scale:** Contours will only be visible in Map view if the map scale is greater than value entered here

4. Click **Apply** to apply the configuration and if the **Enable Contours** is checked, generate the contours, or **Cancel** to abort the configuration changes.

14.3.4.2 CONTOUR LAYERS IN MAP VIEWS

When contours are generated, they are added as a layer to all Map views. The display of these contours is controlled from the standard Map view Layers control feature. Figure 14-17 illustrates the display and layer control for two contour sets, one of high resolution and one of low resolution. Contours are only available for display if generated from a DTM whose Horizontal CRS matches the Working Horizontal CRS.

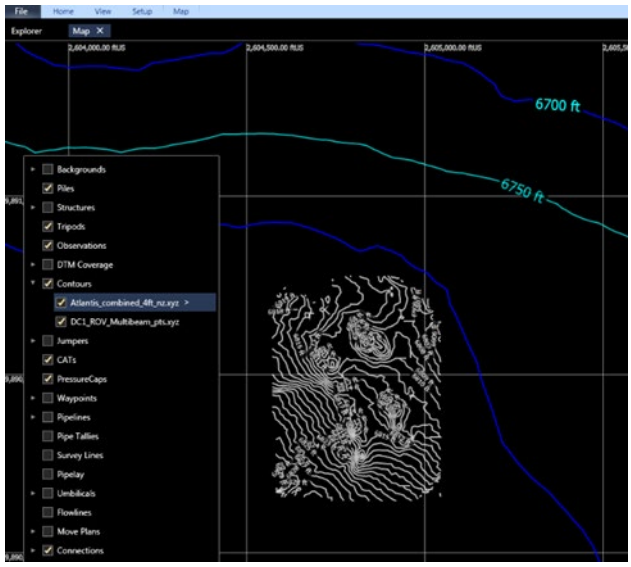


FIGURE 14-17 DTM – MAP VIEW – MULTIPLE CONTOUR LAYERS

14.4 PROJECT DATABASES

During a project the localdb server or SQL Express server can accumulate many databases, Project Databases in Database Services gives the ability to manage these databases, this would include **Backup**, **Archive/Restore** and **Detach**.

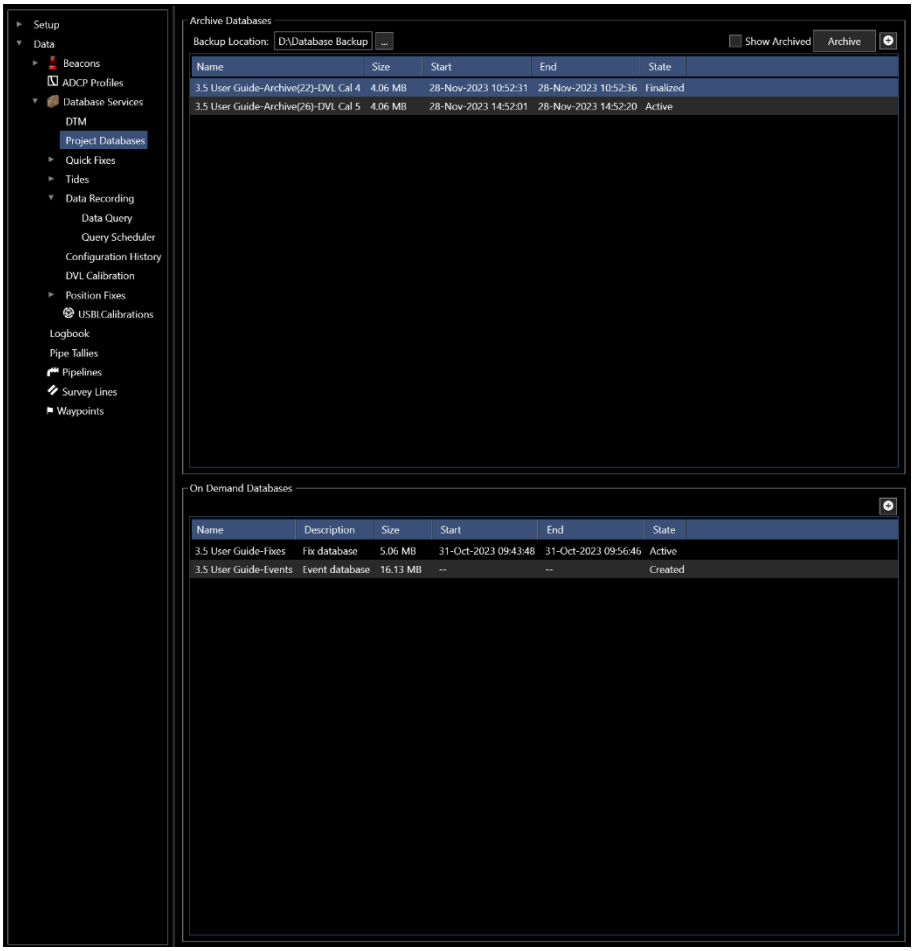


FIGURE 14-18 PROJECT DATABASES MANAGER

There are two database panels, **Archive Databases** panel lists the project databases created using Data Recording which can be queried. **On Demand Databases** panel lists the project databases created using **Position Fixes**, **Quick Fixes**, **USBL Calibration**, etc.

14.4.1 DATABASE BACKUP

To back up a database or databases,

1. Using the browse button in **Backup Location**, navigate to the location to store the backups.

2. Select a single database or a group of databases to backup, right click on selected database(s) to open the options window and select **Backup**.

Note: The **Backup** function requires SQL Server Management Studio installed with SQL Server Maintenance Solution attached. See Sections 1.1.3 and 1.1.4 in **Introduction** of this User Guide.

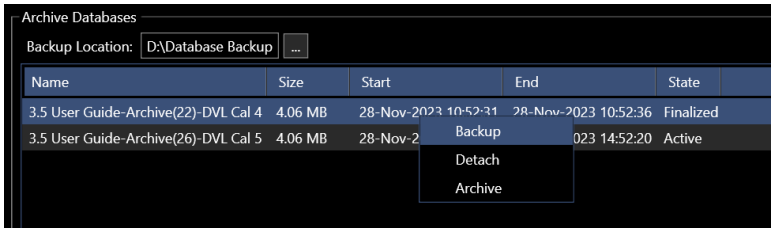


FIGURE 14-19 PROJECT DATABASES – DATABASE BACKUP

14.4.2 DATABASE ARCHIVE

When a database is Finalized the database(s) can be archived. Once archived the database status will change from Finalized to Archived. To archive a database(s),

1. Select a single database or a group of databases to Archive, right click on selected database(s) to open options window and select **Archive**. The database will be removed from the Archive Databases panel and not be available to be queried.

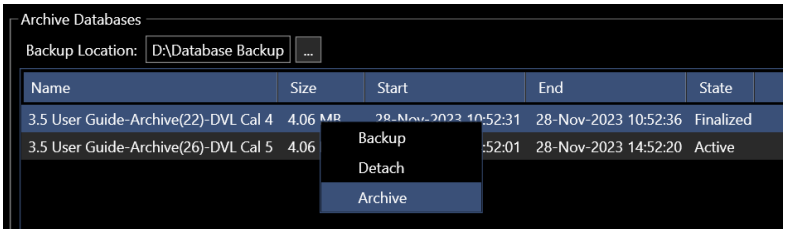


FIGURE 14-20 PROJECT DATABASES – DATABASE ARCHIVE

Note: Only databases that are Finalized can be Archived. On Demanded databases cannot be archived.

If a database has been Archived and the data needs to be queried in the current project then the database will be required to be **Restored** to be available for selection in the Archive Databases panel.

2. To **Restore** an archived database or a group of databases check the **Show Archived** box.

   This will display all archived databases in the Archive Databases panel.

3. Right click on selected database(s) to open options window and select **Restore**. The database(s) status will show Finalized and available to query.

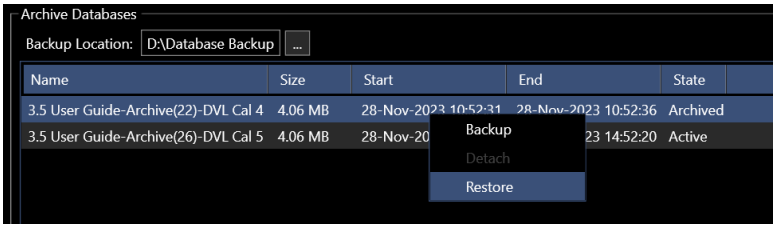


FIGURE 14-21 PROJECT DATABASES – DATABASE RESTORE

14.4.3 DATABASE DETACH

If a database is to be moved from the server then it must be detached. To detach a database from the server,

1. Select a single database or a group of databases to Detach, right click on selected database(s) to open options window and select **Detach**. The Database will be removed from the Archive Databases panel and not be available to query.

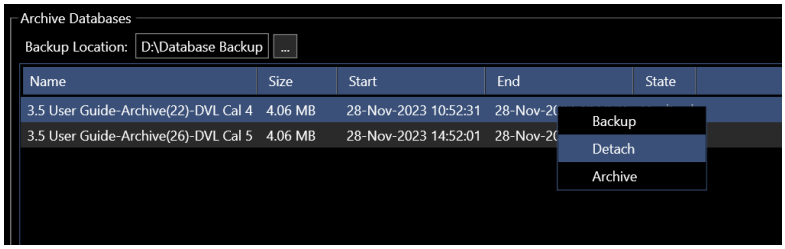


FIGURE 14-22 PROJECT DATABASES – DATABASE DETACH

Note: SQL Server Management Studio is required to attach a detached database. See Sections 1.1.3 in Introduction of this User Guide.

14.4.4 ADD DATABASE FROM SERVER

To add a database or databases from the server to the current NavView project,

1. Click the add button  this will open the Database Selection window.

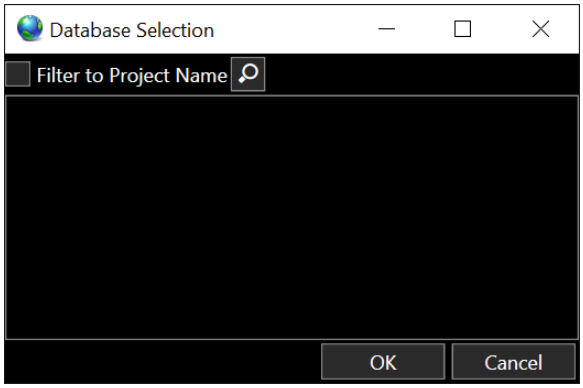


FIGURE 14-23 PROJECT DATABASES – DATABASE SELECTION

- **Filter to Project Name:** Check the box to retrieve only databases created in the current NavView project. If box unchecked all databases on the server will be retrieved
- **Search**  **:** Searches the server for databases

2. Select the database(s) by checking the associated box. This will add the database to the current project.

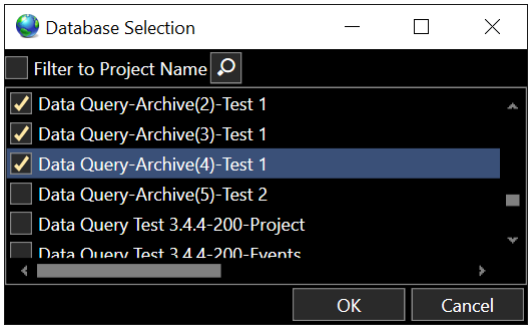


FIGURE 14-24 PROJECT DATABASES – DATABASE SELECTION

14.5 QUICK FIXES

Quick Fixes are a means to capture a snapshot of selected data at a specific epoch with the push of a single button. This feature is configurable and supports the creation of multiple Quick Fixes each designed to collect different task specific data. For example, for buoy deployment from the stern of a vessel a Quick Fix could be configured to log the position of the respective vehicle's Stern Roller offset and the parent Vehicle heading, the only data required to locate the point of deployment.

Note: The date and time of each specific observation logged by the Quick Fix is always recorded.

14.5.1 QUICK FIX CONFIGURATION

1. Access the Configure Quick Fixes dialog.
   a. Click on the **Quick Fixes** icon in the Position Fixes section of the Data ribbon to open the **Configure Quick Fixes** dialog

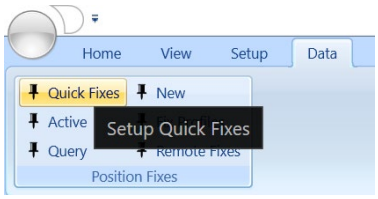


FIGURE 14-25 QUICK FIXES – DATA RIBBON

   b. Or open the Explorer window and navigate the tree to select **Quick Fixes** under **Data > Database Services**

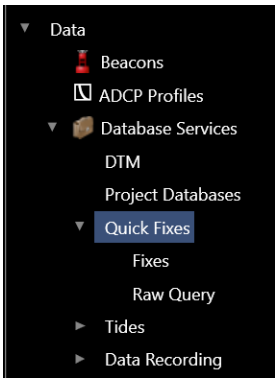


FIGURE 14-26 QUICK FIXES - EXPLORER

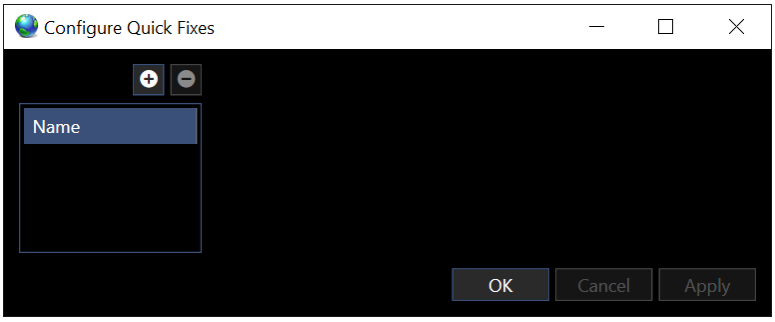


FIGURE 14-27 QUICK FIXES - CONFIGURE QUICK FIXES DIALOG

2. Click the  button to add a Quick Fix. The default is Quick Fix F1.
3. In the Fix Configuration tab.

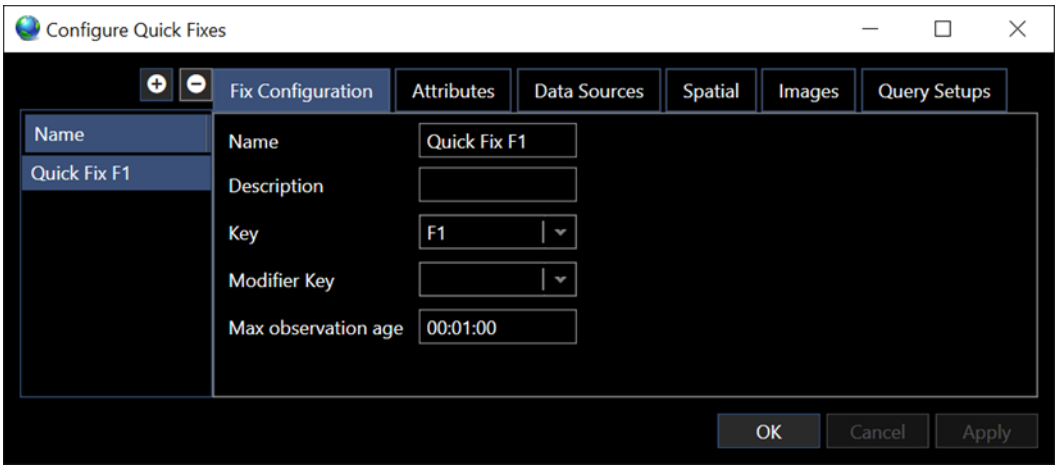


FIGURE 14-28 QUICK FIXES - CONFIGURE QUICK FIXES - FIX CONFIGURATION TAB

   a. Enter a **Name** for the fix
   b. Enter a **Description** for the fix (optional)
   c. Select a function **Key** from F1 to F24 to assign the Quick Fix to
   d. An optional **Modifier Key** can be assigned, available options are Alt, Ctrl, Shift or Windows ()
   e. Enter **Max observation age** of observations acceptable for the fix, default is 1 minute
   f. Click **Apply**
4. The **Attributes** tab allows the user to set up data fields to be filled in when a fix is taken. It is possible to set up blank fields that can be typed in, by leaving the Possible Values field blank, or set up a dropdown list of possible values by typing them in as a comma separated list.

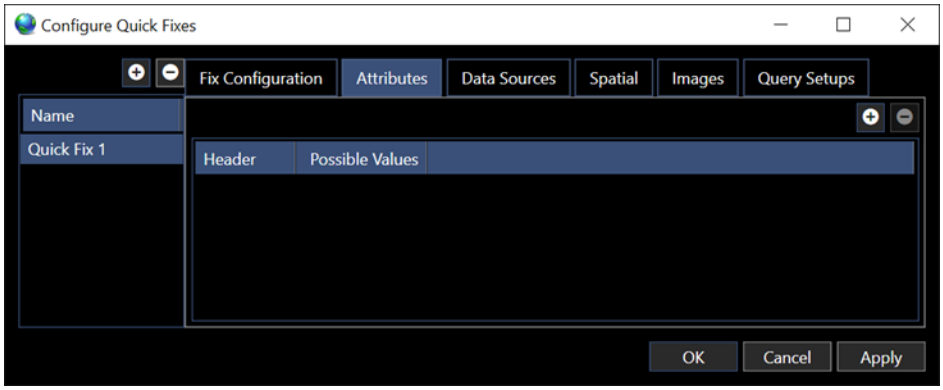


FIGURE 14-29 QUICK FIXES - CONFIGURE QUICK FIXES - ATTRIBUTES TAB

a. Click the ⊕ button to add an attribute field. In this example, the Value field will allow the user to select from the options Vessel CRP or Stern

FIGURE 14-30 QUICK FIXES - CONFIGURE QUICK FIXES – ATTRIBUTES ADDED

5. In the **Data Sources** tab, the user selects what data source will be recorded in the Quick Fix.

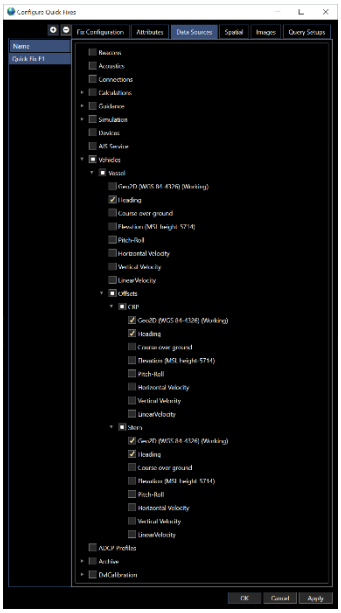


FIGURE 14-31 QUICK FIXES - CONFIGURE QUICK FIXES – DATA SOURCES

b. Expand the listed **Data Sources** to navigate and select those data sources to be logged with the Quick Fix

I. Data sources are presented in a hierarchical tree with the parent data source, e.g. Vehicles, at the top level and branches descending through each child level until the base sources for that branch is reached, e.g. Offset

II. A data source can be checked and unchecked at any level and the action will be applied to all children below the selected item

III. A check mark in a box indicates that source and all those below it are selected to be logged

IV. An empty box indicates that source and all those below it are not selected to be logged

V. A filled square in a box indicates that some but not all sources below it are selected to be logged

c. Click **Apply**

6. The **Spatial Tab is** used to make selected select spatial items available for exporting to a waypoint or added to Pipe Tally. See Figure 14-32.

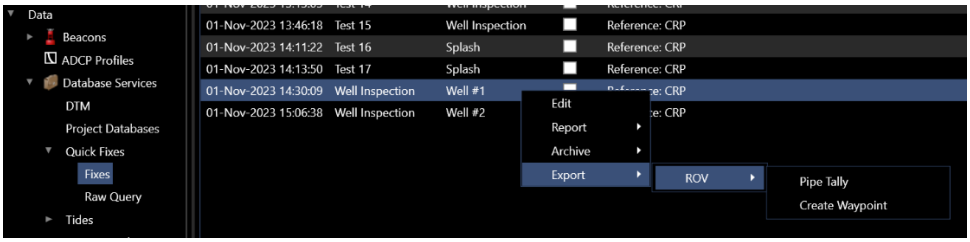


FIGURE 14-32 QUICK FIXES – SPATIAL DATA EXPORTING EXAMPLE

Note: Only items selected in **Data Sources** are available for selection in the **Spatial** tab. Multiple Spatial items can be added. The spatial item is the same time epoch when the Quick Fix is taken.

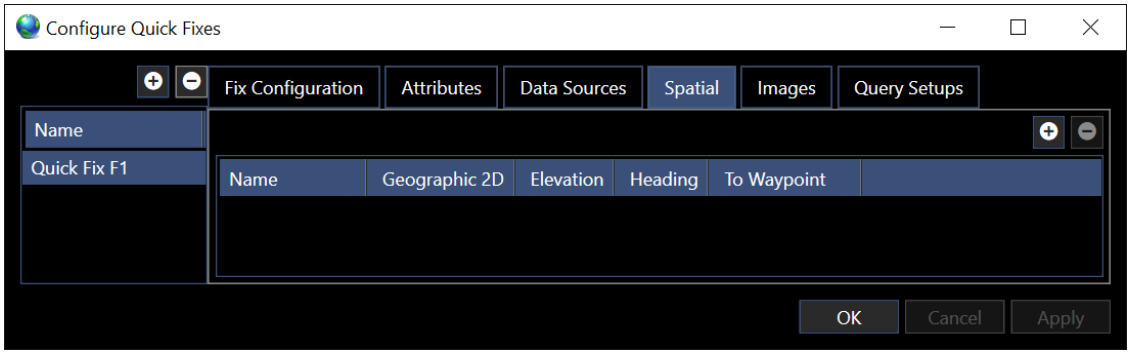


FIGURE 14-33 QUICK FIXES - CONFIGURE QUICK FIXES - SPATIAL TAB

a. Click the ⊕ to add spatial items that will be available for exporting

b. In the **Name** cell, enter the name to be assigned to the spatial item

c. In the **Geographic 2D** cell, select from the drop-down list the position source

d. In the **Elevation** cell, select from the drop down list the elevation source

e. In the **Heading** cell, select from the drop down list the elevation source
f. Check the **To Waypoint** box to automatically create a Waypoint when the Quick Fix is taken
g. Click **Apply**

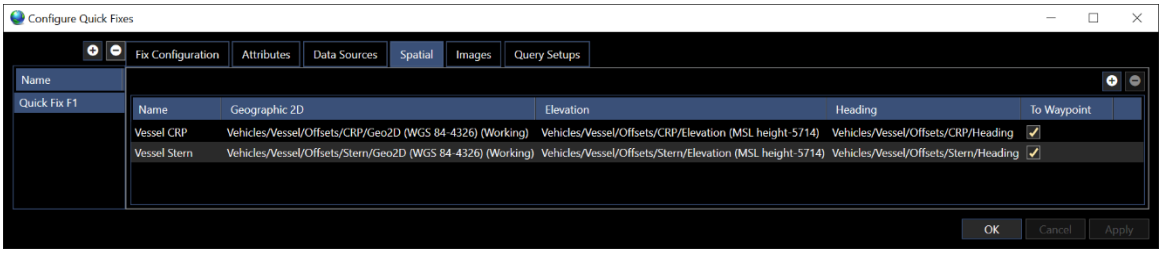


FIGURE 14-34 QUICK FIXES - CONFIGURE QUICK FIXES - SPATIAL ITEMS ADDED

7. Images Tab

If a video source is interfaced and configured in NavView, i.e. ROV HD Camera, then this will become an available source for stills to be captured when a Quick Fix is executed.

With a video channel selected, when the quick fix is taken, it will trigger a screen grab to be taken on the video channel, the screen grab is stored in the Quick Fix database.

Note: When a report is generated an Image folder is created in the location the reports are saved. This folder contains the images captured when a Quick Fix is taken.

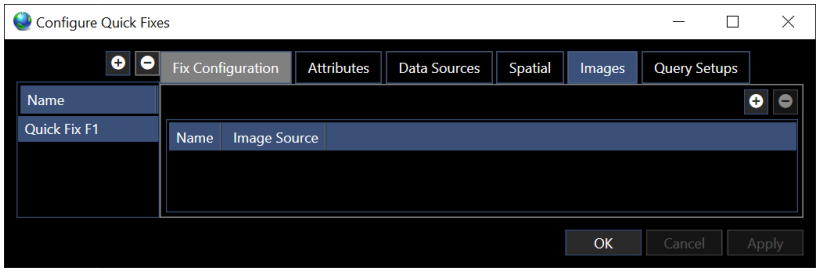


FIGURE 14-35 QUICK FIXES - CONFIGURE QUICK FIXES - IMAGES TAB

a. Click the ⊕ button to add a video source
   b. Click on cell below **Name** to give an identifier for the video screen grab. This name is used to add the screen grab to Query Report. See Figure 14-40 and Figure 14-41 where an image is configured in the report setup
   c. Click on cell below **Image Source** to open available video source selection. The example has a ROV HD Camera as an image source

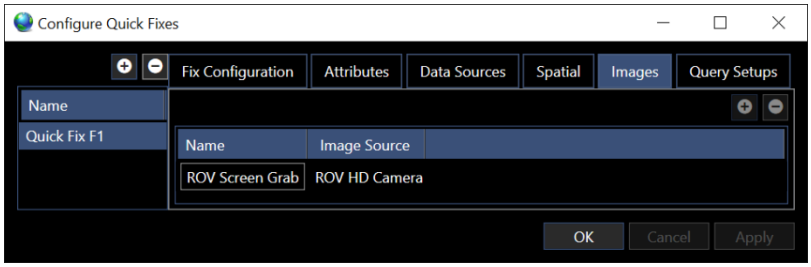


FIGURE 14-36 QUICK FIXES - CONFIGURE QUICK FIXES - IMAGES SETUP EXAMPLE

8. The **Query Setups** tab is used to select the report format and the data sources to be used in the report.

Note: Only items selected in the Data Source tab will be available for Query Setups. See Figure 14-31

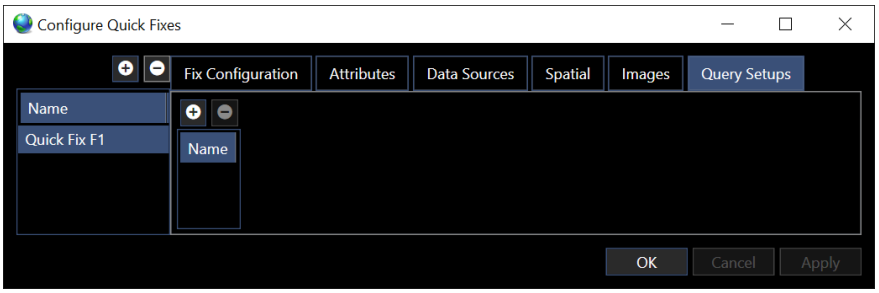


FIGURE 14-37 QUICK FIXES - CONFIGURE QUICK FIXES - QUERY SETUPS TAB

a. Click the ⊕ button to add Query configuration
   b. Attributes section
   c. **Name:** Enter name for Query Settings
   d. **Export Filter:** Displays the selected Query Report format, default is Comma Separated Values (*.csv). Other options are HTML and JSON
   e. Query Tab

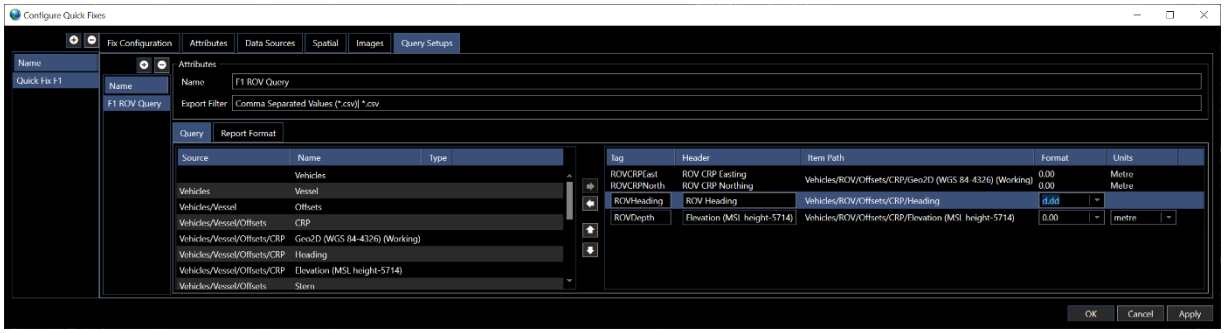


FIGURE 14-38 QUICK FIXES - CONFIGURE QUICK FIXES - QUERY SETUPS - QUERY TAB

I. The items selected in the Data Sources tab are shown in the left panel

II. From the list, select an item to be added to the query and click the ➡ button to move the item to the right panel

III. As each item is moved to the right panel, an Add Formatter window is opened. This is used to format the data, edit the Item Header text and add Item Tags. Item Tags are used for Report setup and to override observations when capturing a Quick Fix (see Figure 14-44)

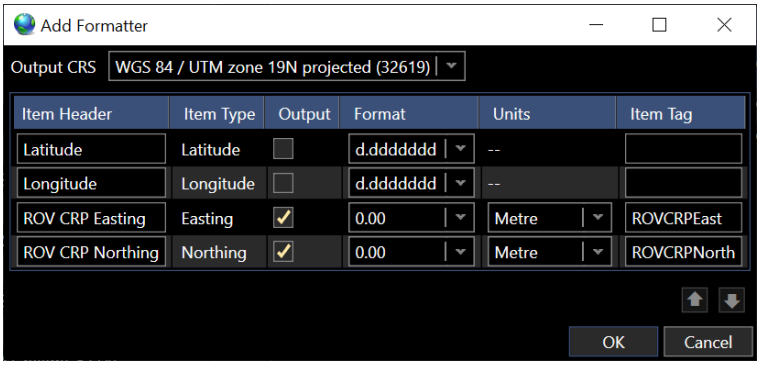


FIGURE 14-39 QUICK FIXES - ADD FORMATTER

IV. Repeat process for each item to be added

f. **Report Format** tab gives the option to select the report format, CSV, HTML or JSON

- **CSV Format**

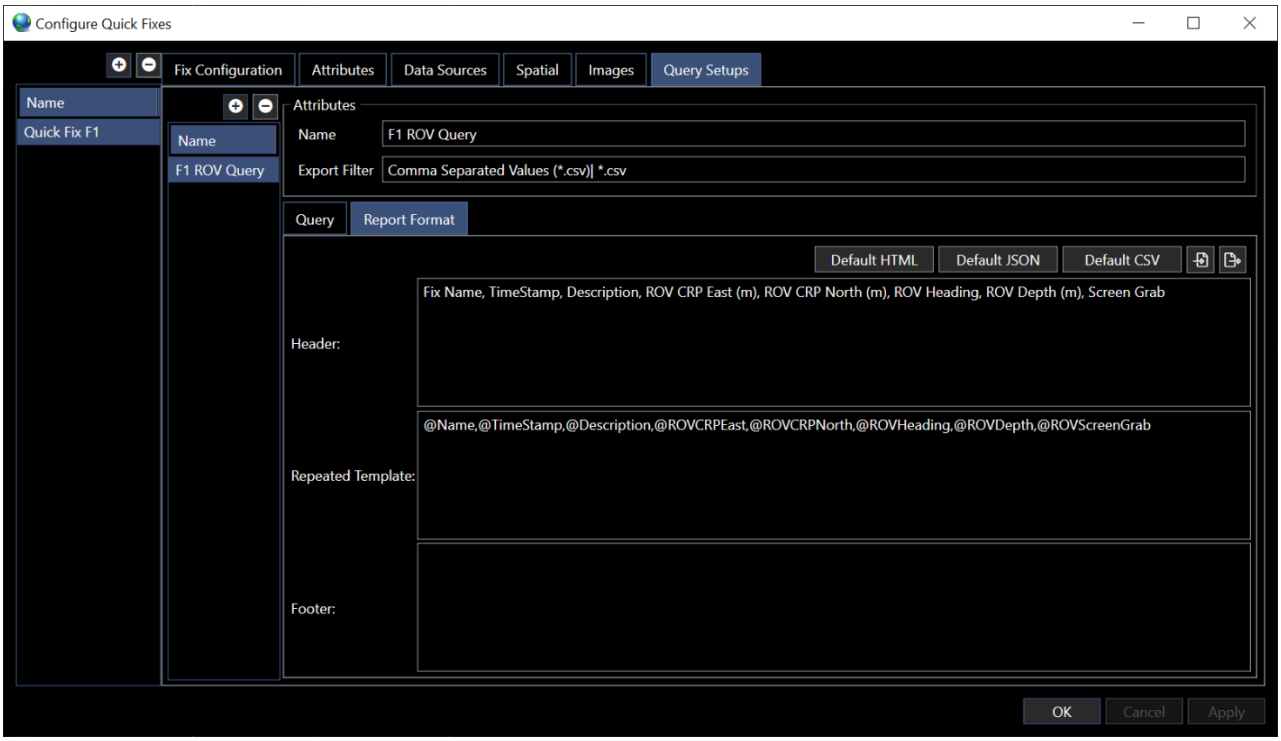


FIGURE 14-40 QUICK FIXES - CONFIGURE QUICK FIXES – QUERY SETUPS - CSV REPORT FORMAT EXAMPLE

I. Click the **Default CSV** button

II. The **Header** panel contains the item headers that will be displayed in report. The default contains Fix Name, TimeStamp and Description. Additional items are added as comma separated names

III. The Repeated Template panel contains the data items to be displayed in the report. The default contains @Fix Name, @TimeStamp and @Description. Additional items are added by typing @ which opens a window of available data items to select from. This list includes items that have been assigned a tag in the Query tab and images added in the Image tab

IV. The Footer panel contains optional footer items. Typing @ will open a window of available data items to select from

V. Clicking  button saves the template to a file

Note: If the fix is setup to capture an image, the path to the image is shown in the report.

- **HTML Format**

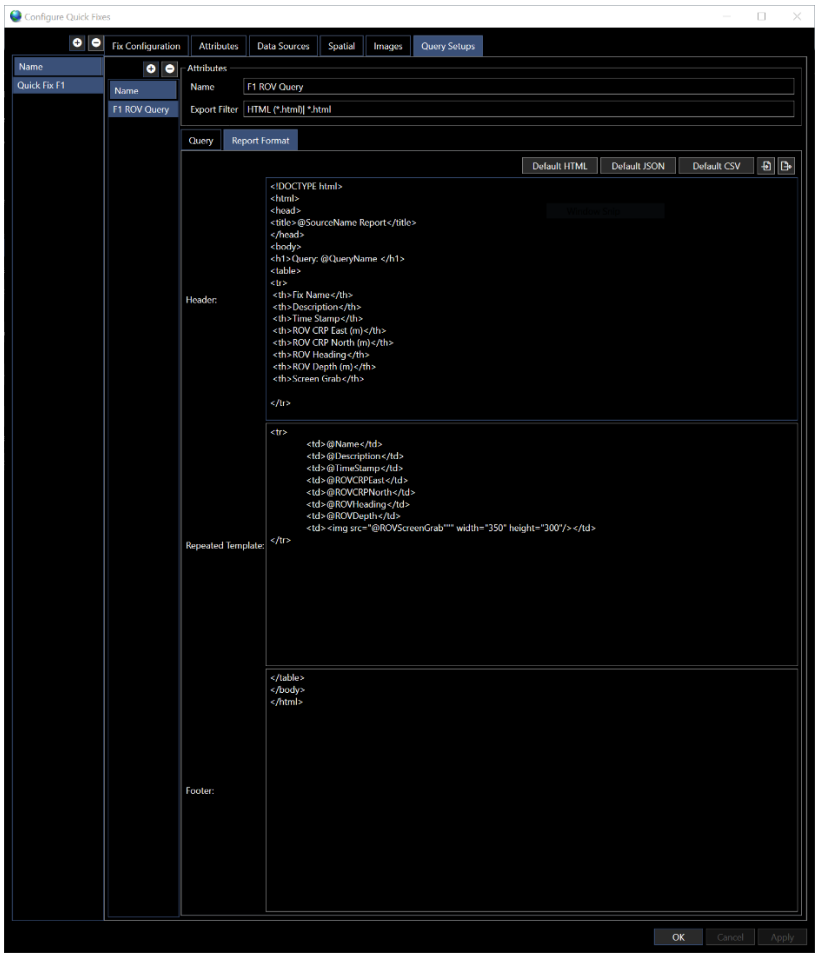


FIGURE 14-41 QUICK FIXES - CONFIGURE QUICK FIXES – QUERY SETUPS - HTML REPORT FORMAT EXAMPLE

I. Click the **Default HTML** button

II. The **Header** panel contains the item headers that will be displayed in the report. The default contains Fix Name, Description and TimeStamp. Additional items are added using HTML expressions

III. The Repeated Template panel contains the data items to be displayed in the report. The default contains @Fix Name, @Description and @TimeStamp. Additional items are added by HTML expressions and typing @ which opens a window of available data items to select from. This list includes items that have been assigned a tag in the Query tab and images added in the Image tab

IV. The Footer panel contains optional footer items that are added using HTML expressions

V. Clicking  button saves the template to a file

Note: If the fix is setup to capture an image, the image is shown in the report.

- **JSON Format**

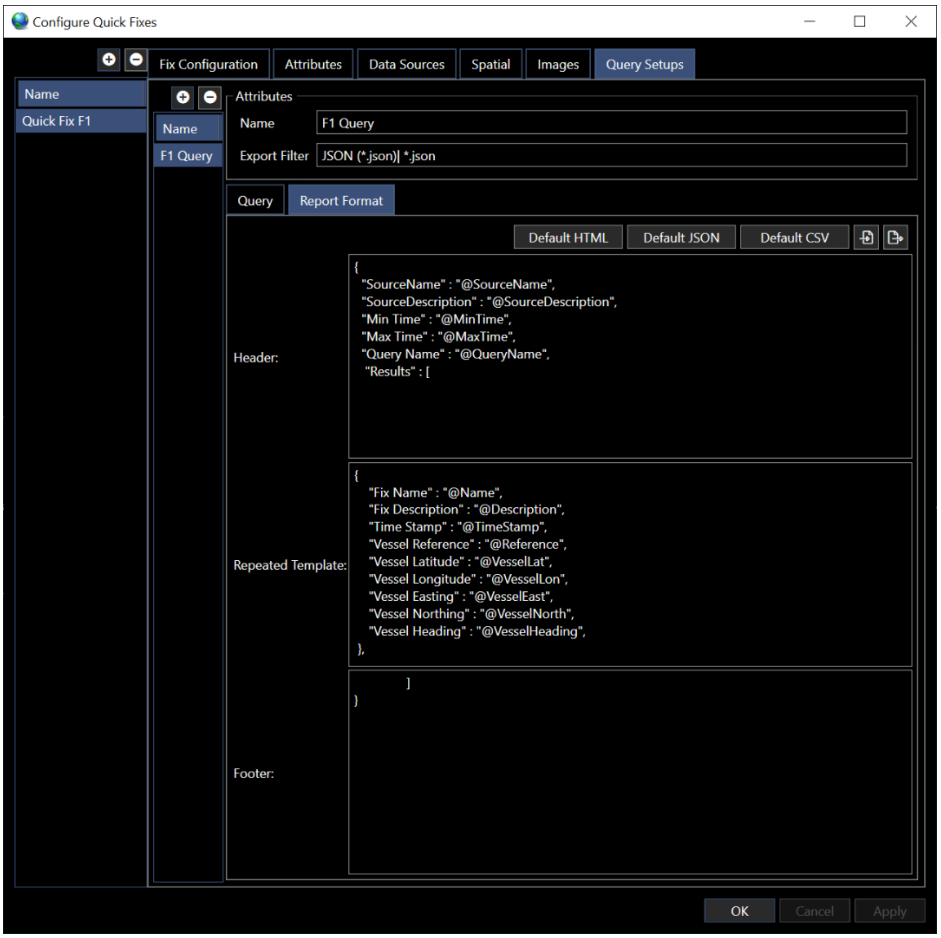


FIGURE 14-42 QUICK FIXES - CONFIGURE QUICK FIXES – QUERY SETUPS - JSON REPORT FORMAT EXAMPLE

I. Click the **Default JSON** button

II. The **Header** panel contains the item headers that will be displayed in report. The default contains Fix Name, Description and TimeStamp. Additional items are added using JSON expressions

III. The Repeated Template panel contains the data items to be displayed in the report. The default contains @Fix Name, @Description, and @TimeStamp. Additional items are added by JSON expressions and typing @ which opens a window of available data items to select from. This list includes items that have been assigned a Tag in the Query tab and images added in the Image tab

IV. The Footer panel contains optional footer items that are added using JSON expressions

V. Clicking  button saves the template to a file

14.5.2 TAKE A QUICK FIX

1. Press the respective function key.

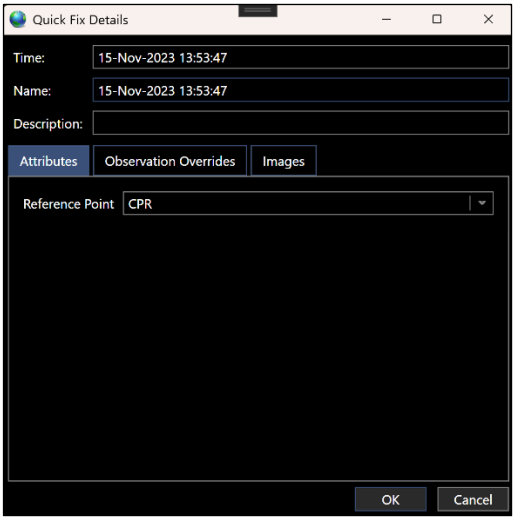


FIGURE 14-43 QUICK FIXES - QUICK FIX DETAILS - ATTRIBUTES ENTRY EXAMPLE

2. A dialog appears displaying the date and time of the fix, enter a **Name** and **Description** for the fix. If **Attributes** have been configured for this fix type, enter/select entries in the Attributes tab.
3. In the **Observation Overrides** tab, any data sources that were given a Tag can be overridden. If an **Edited Value** is entered the value will override the **Original Value** in the generated reports. To reset the value back to the original, clear the **Edited Value** field. Overrides can be set by editing a Quick Fix.

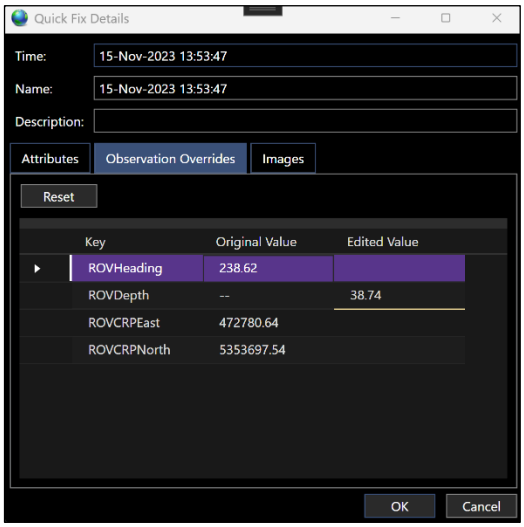


FIGURE 14-44 QUICK FIXES - QUICK FIX DETAILS – OBSERVATION OVERRIDES ENTRY EXAMPLE

4. If images were configured when the Quick Fix was set up, they will be displayed in the **Images** tab. If multiple images were collected, they can be viewed by selecting the appropriate thumbnail image.

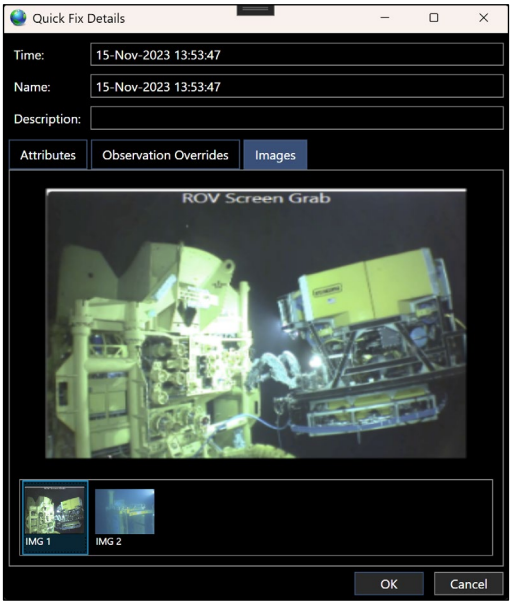


FIGURE 14-45 QUICK FIXES - QUICK FIX DETAILS – IMAGES EXAMPLE

5. Click **OK** to save the Quick Fix, click **Cancel** to discard it.

14.5.3 ACCESSING QUICK FIX DATA

The Quick Fixes are logged to a database. They can be accessed under Database Services in the Explorer window by selecting Fixes or Raw Query.

1. Quick Fixes – Fix Data

a. Open the Explorer window and navigate the tree to select **Fixes** or **Raw Query** under **Data > Database Services > Quick Fixes**

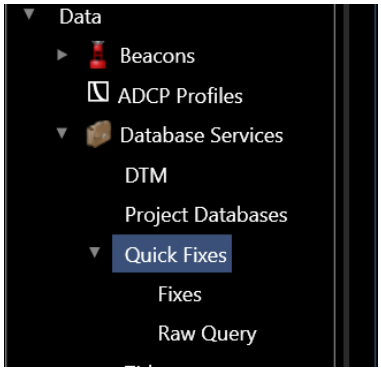


FIGURE 14-46 QUICK FIXES - FIXES AND RAW QUERY

b. Select the **Fix source** from the drop-down. This will contain a list of configured Quick Fixes

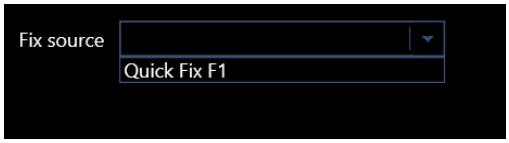


FIGURE 14-47 QUICK FIXES – FIXES - FIX SOURCE

c. Query the database using the **Start Time** and **End Time**. This will display all fixes within the time window specified

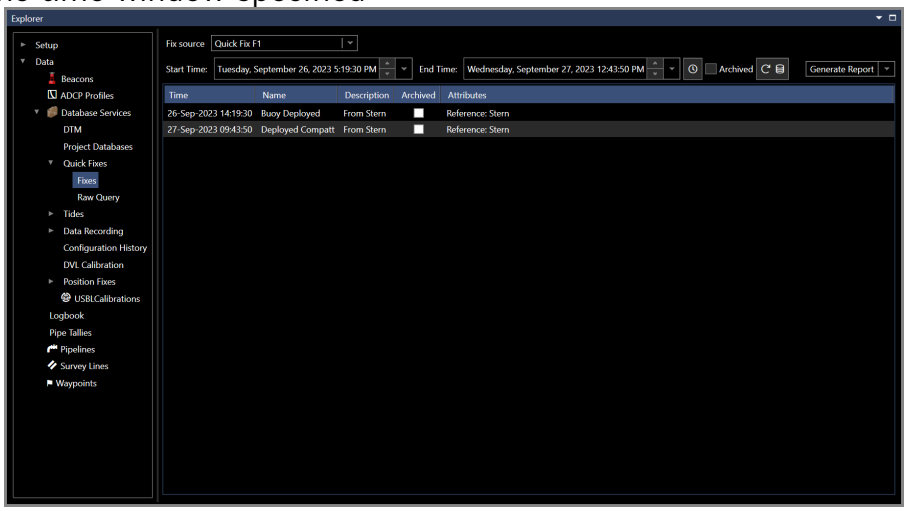


FIGURE 14-48 QUICK FIXES – FIXES - DISPLAYED FIXES

d. To generate a Quick Fix report of all fixes that have been queried, click on the drop down in **Generate Report** and select the report format that was set up in the **Report Format** tab; or

TO GENERATE A QUICK FIX REPORT FOR A SINGLE FIX OR A GROUP OF FIXES, SELECT FIX(ES) OF INTEREST THEN RIGHT CLICK ON SELECTED TO OPEN A POP UP WINDOW, SELECT **REPORT.** SEE

e. Figure 14-49

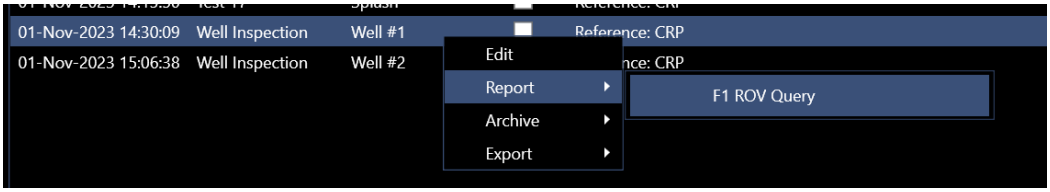


FIGURE 14-49 QUICK FIXES – FIXES – SINGLE FIX REPORT EXAMPLE

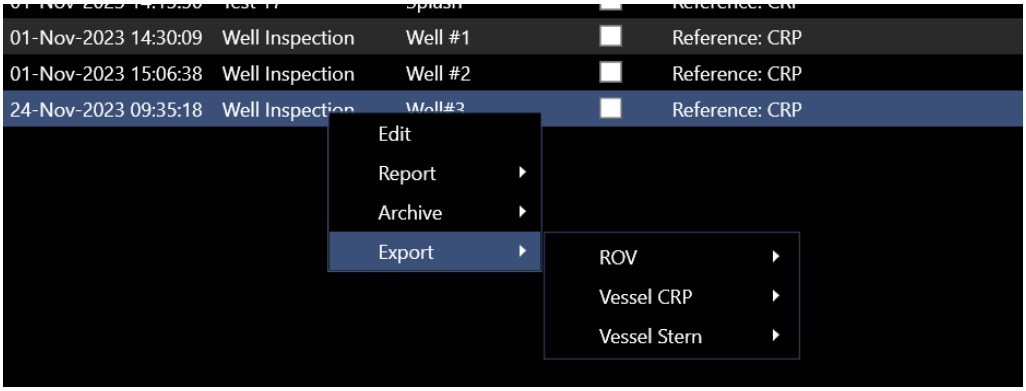


Figure 14-50 Quick Fixes – Fixes – Spatial Export

f. To edit a fix, select a fix of interest then right click on selected to open a pop up window and select **Edit** (see Figure 14-44).

2. Quick Fixes – Raw Query

All Quick Fixes that have been taken are displayed in the Quick Fixes panel.

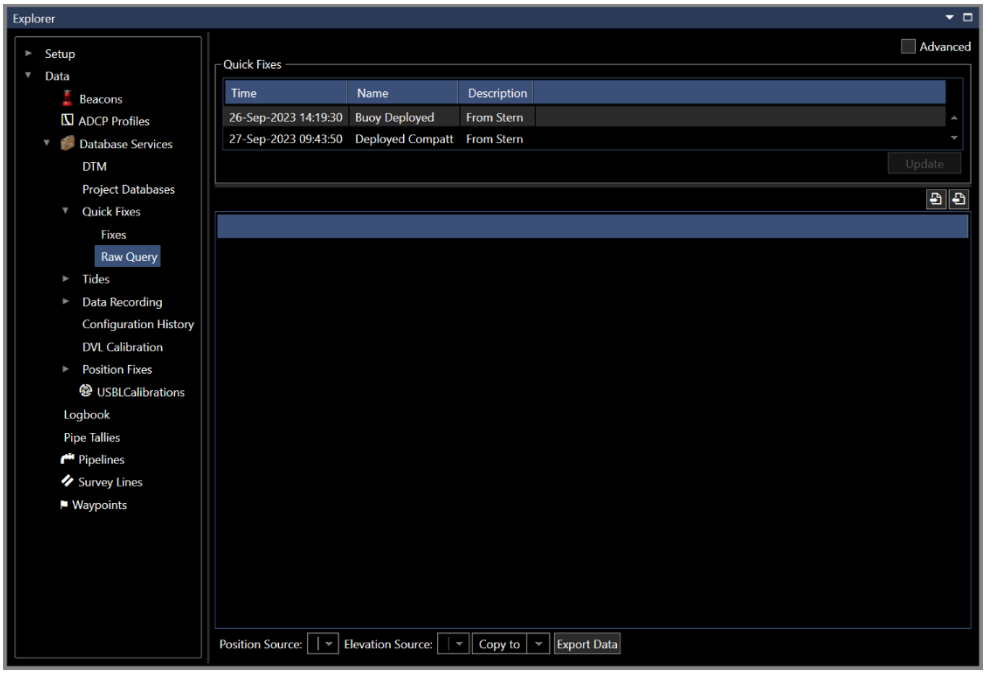


FIGURE 14-51 QUICK FIXES - RAW QUERY

a. By selecting an individual fix or a group of fixes in the top panel **Quick Fixes** and clicking the **Update** button, a grid listing of captured data is displayed in the bottom panel. See FIGURE 14-52

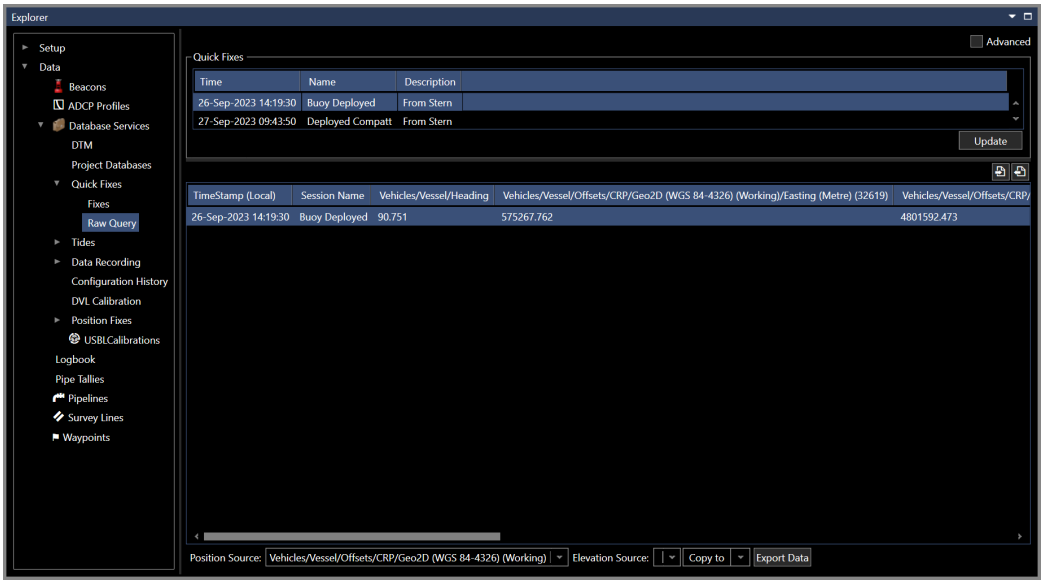


FIGURE 14-52 QUICK FIXES - RAW QUERY – FIX CAPTURED DATA

- **Position Source:** Drop-down displays the position sources of recorded fix
- **Elevation Source:** Drop-down displays the Elevation sources of recorded fix
- **Copy to:** Option to add recorded fix to a **Pipe Tally** or create a **Waypoint**
- **Export Data:** The selected fixes can be exported as a text file

b. By selecting the **Advanced** box, query options become available

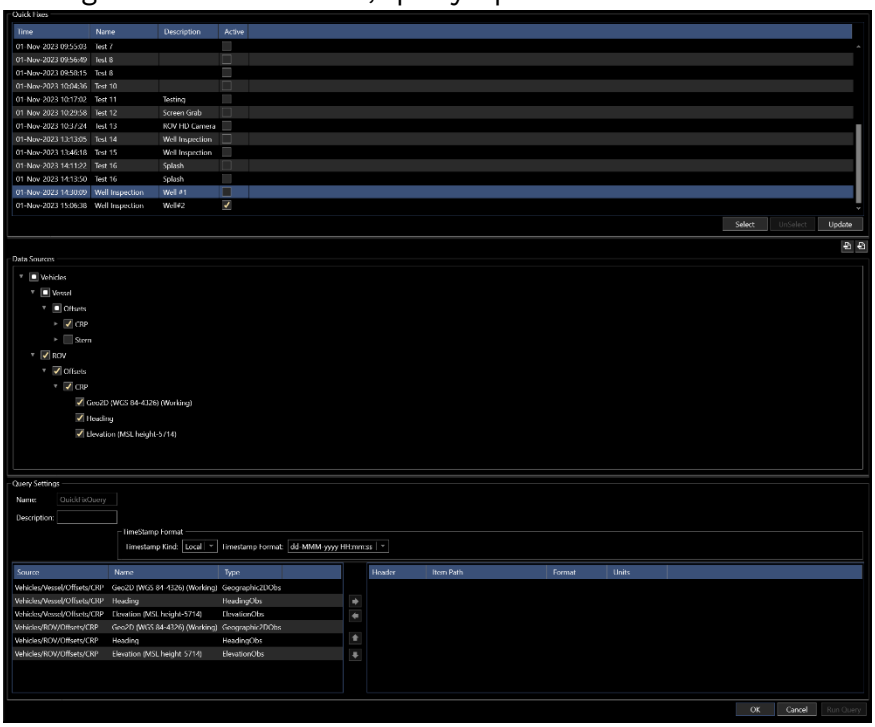


FIGURE 14-53 QUICK FIXES - RAW QUERY – ADVANCED

- **Quick Fixes Panel:** Lists all Quick Fixes in the database. The fixes can be selected individually or as a group
  I. Click the **Update** button after selecting fixes, this populates the Data Sources panel and the Query Settings panel

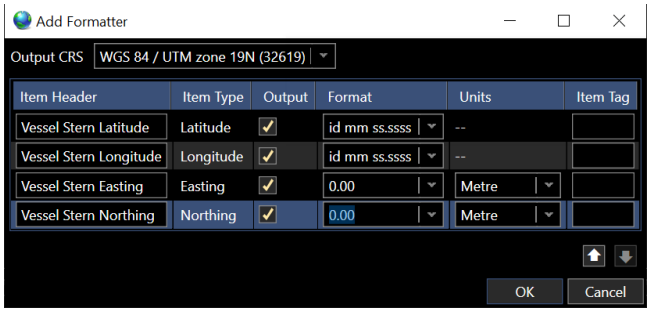
- **Data Sources Panel:** Populated with data sources that were configured for the respective fix. Check the box associated with data that is to be queried in Query Settings

FIGURE 14-54 QUICK FIXES - RAW QUERY – ADVANCED – DATA SOURCES PANEL

- **Query Settings Panel:** Query configuration options for the selected fix(es)
  - **Time Stamp Format:** Configure the timestamp to be Local or UTC and format
  - The **Data** grid (see Figure 14-55) contains in the left panel the data sources selected in the **Data Source** panel (see Figure 14-54) that are available to be queried. The right panel shows the selected items to be queried (see Figure 14-56)

FIGURE 14-55 QUICK FIXES – RAW QUERY – ADVANCED - QUERY SETTINGS - DATA SOURCE GRID

c. Select data source in left panel and move to right panel using the  button. This opens the **Add Formatter** dialog to configure the fix data



Note: The **Item Header** in the Add Formatter can be edited. This gives the operator the ability to user define the header text in the query display and exported text file. **Item Tag** not required.

d. Repeat for all data sources required to be queried

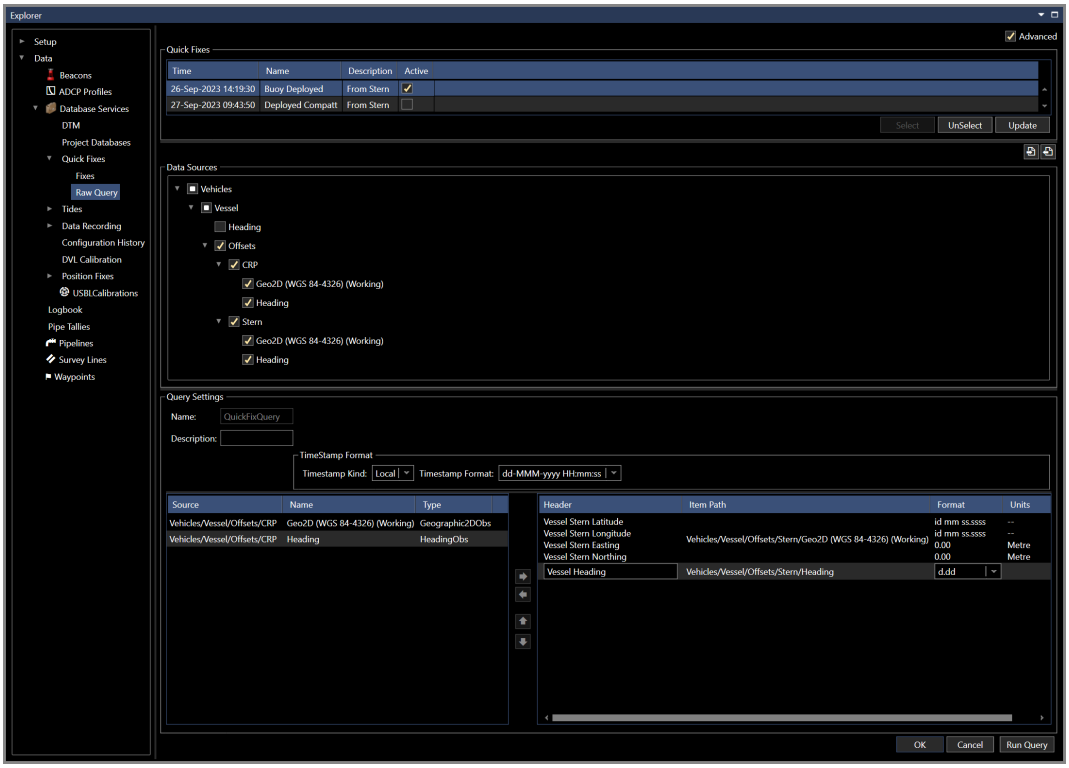


FIGURE 14-56 QUICK FIXES – RAW QUERY – ADVANCED - QUERY SETTINGS – ITEMS TO BE QUERIED

Note: Query Settings default to last configuration that was setup.

e. Click Run Query to query the database for the selected fix(es) data

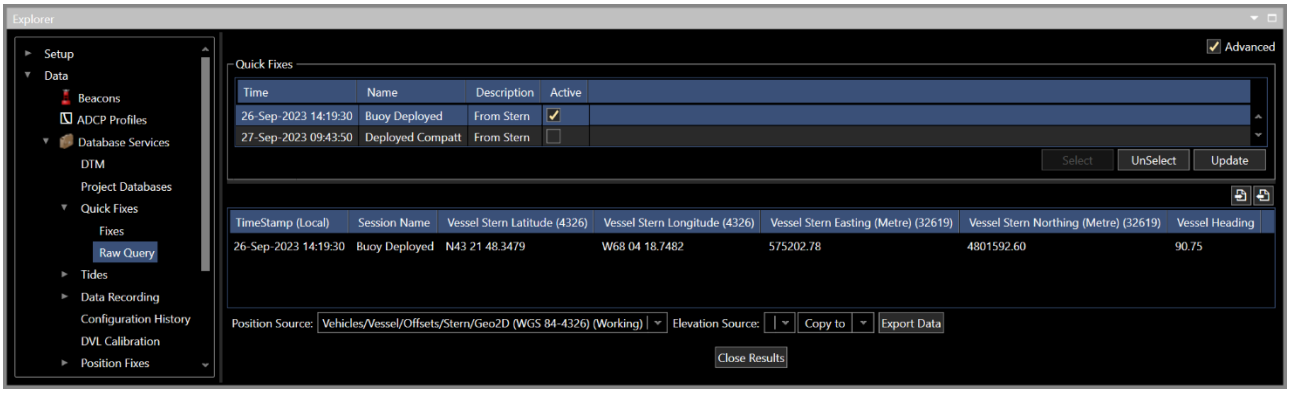


FIGURE 14-57 QUICK FIXES – RAW QUERY – ADVANCED - QUERY RESULTS

- **Position Source:** Drop-down displays the position sources of recorded fix
- **Elevation Source:** Drop-down displays the Elevation sources of recorded fix
- **Copy to:** Option to add recorded fix to a Pipe Tally or create a waypoint
- **Export Data:** The selected fix(es) can be exported as a text file

f. Use the to export the Query Settings to a file or click to import a Query Settings file

Note: If the selected data source does not contain a Geographic2D observation, there is insufficient information to create a waypoint with. In this case if the Create Waypoint option is clicked an Error message stating that *The sequence contains no elements* appears. A waypoint cannot be created. Acknowledge the error message to continue.

14.6 TIDES

Tidal data from a Tide Station can be imported providing a graphical plot and ability to query for a tide at a specific date and time.

Note: Real Time Tide Station not implemented.

14.6.1 MANAGEMENT

Tide Station data is imported by the Management function.

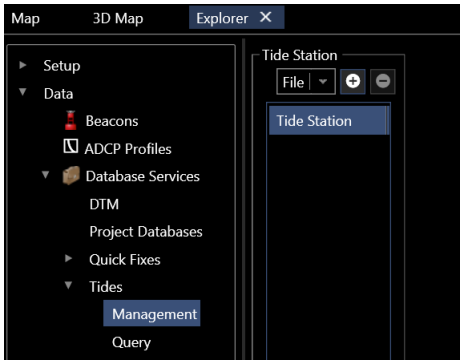


FIGURE 14-58 TIDES – MANAGEMENT

1. Select Management in Tides.
2. Select File to add a Tide Station then click the add button

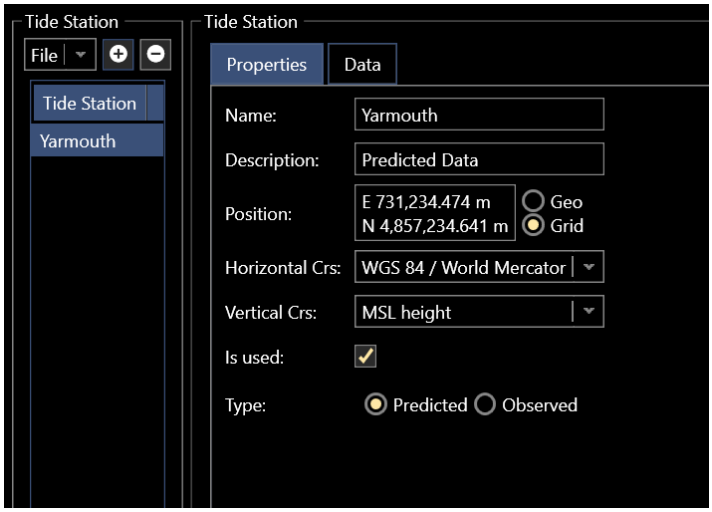


FIGURE 14-59 TIDES – MANAGEMENT – TIDE STATION – PROPERTIES TAB

a. Properties Tab

I. Enter Tide Station name

II. Enter Description of Tide Station (optional)

III. Enter Tide Station position

IV. Select Horizontal CRS of Tidal Station

V. Select Vertical CRS of Tidal Station

VI. Check the box to use the Tide Station data

VII. Select tidal data type, Predicted or Observed

b. Data Tab

FIGURE 14-60 TIDES – MANAGEMENT – TIDE STATION – DATA TAB

I. Import tidal data by clicking the Import drop-down to select file format

FIGURE 14-61 TIDES – MANAGEMENT – TIDE STATION – DATA TAB – FILE FORMATS

II. Plot tab displays graphically the imported tide data (see Figure 14-62). The Table tab displays a data listing (see Figure 14-63)

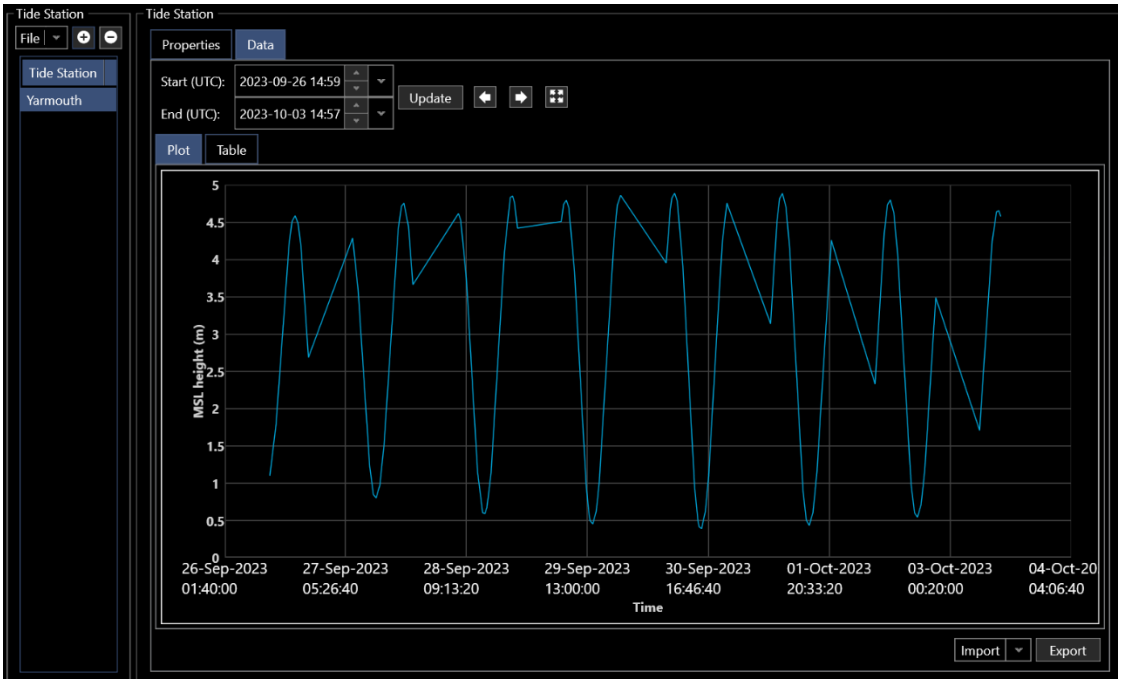


FIGURE 14-62 TIDES – MANAGEMENT – TIDE STATION – DATA TAB – TIDE DATA GRAPH

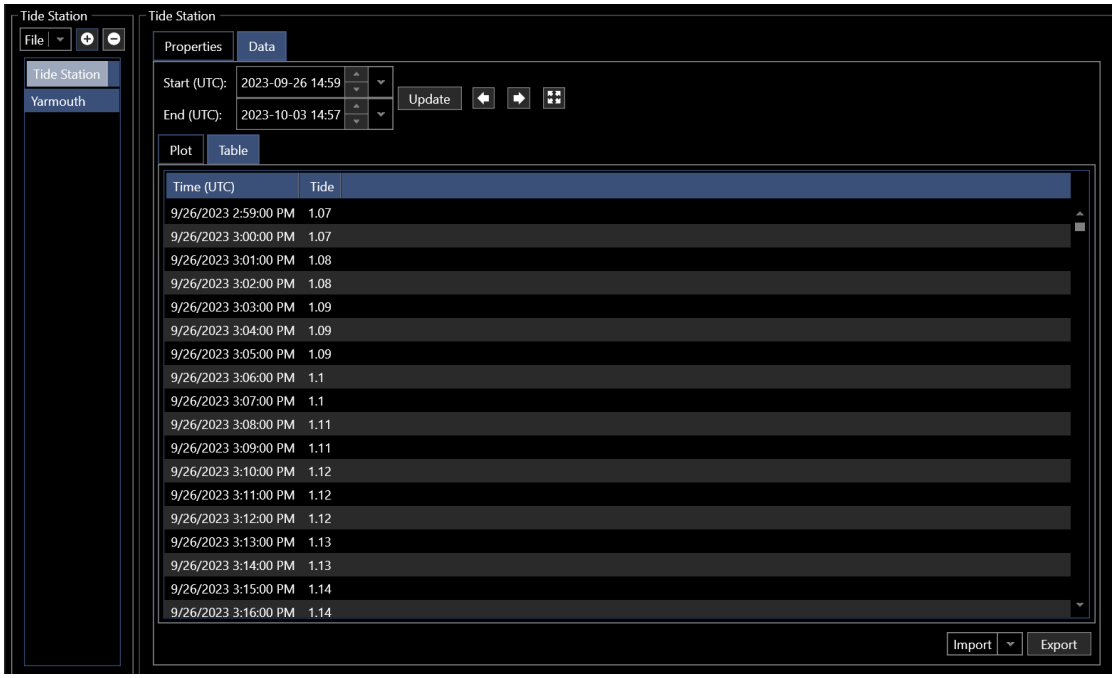
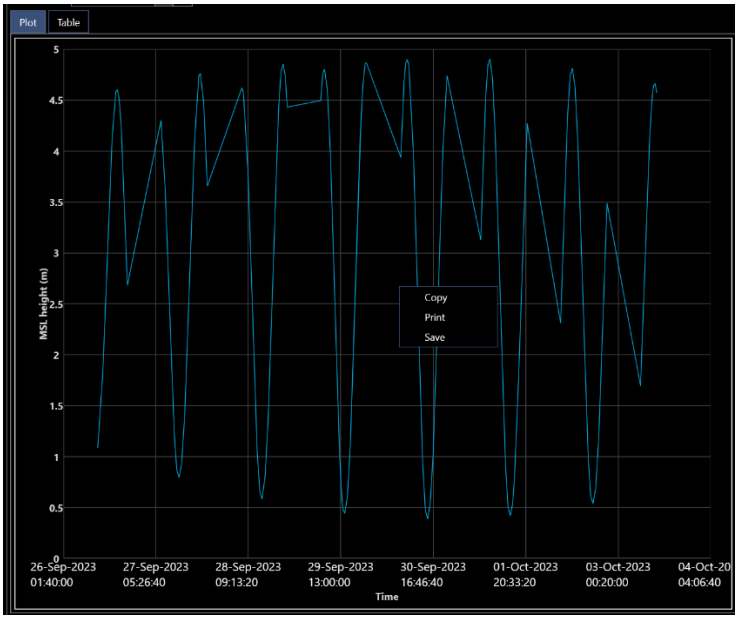


FIGURE 14-63 TIDES – MANAGEMENT – TIDE STATION – DATA TAB – TIDE DATA TABLE

III. The time toolbar is used to modify the time span of tide data to display. The default is the extent of the imported file

IV. Right-clicking on the plot window opens a tool to copy, print or save the plot



Note: The Export button  has not been implemented.

14.6.2 QUERY

The Tides Query is used to display the tide from an entered specific date and time.

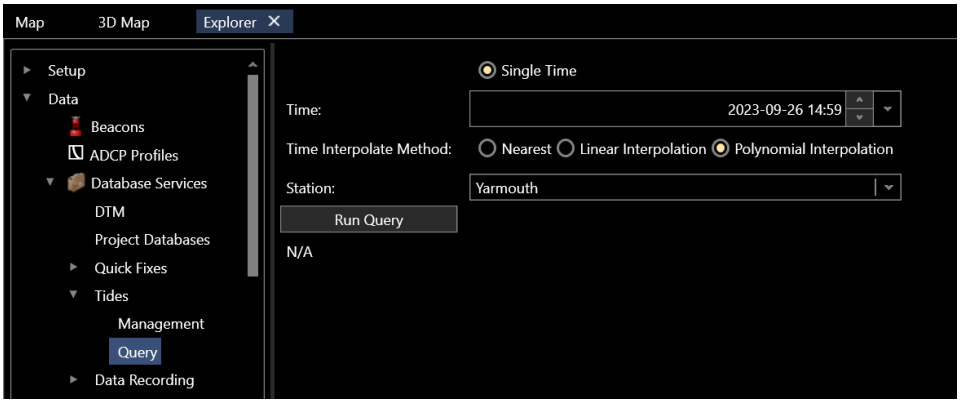


FIGURE 14-64 TIDES – QUERY

- **Single Time :** Query method, only single time available
- **Time:** Select time to query tide
- **Time Interpolation Method:** Options available are Nearest, Linear Interpolation or Polynomial Interpolation. Click button to select method
- **Station:** Tide stations that have been added in Tides Management will be available in the drop-down. Select the Tide Station to query

1. Click on Run Query to report the tide at the entered date and time

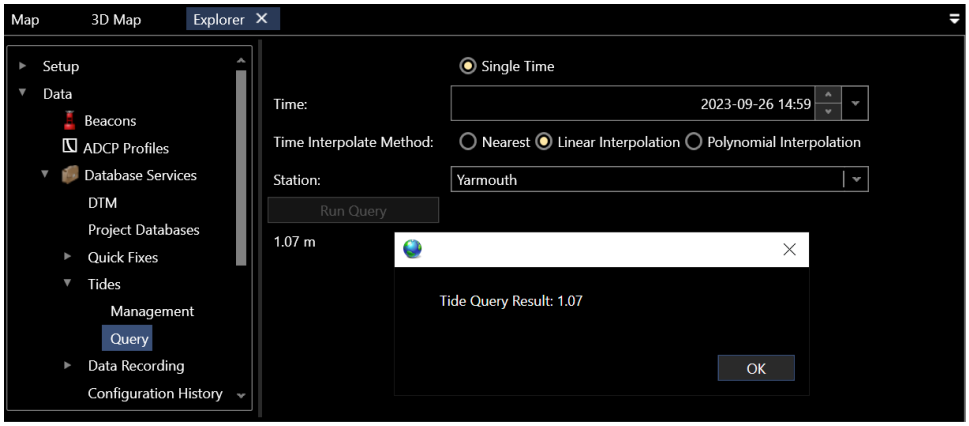


FIGURE 14-65 TIDES – QUERY - RESULTS

14.7 DATA RECORDING

NavView supports extensive data recording options. The logged data can be queried, and the results exported for use in 3rd party software.

14.7.1 CONFIGURE DATA RECORDING

1. Open the Explorer window and navigate the tree to select **Data Recording** (see Figure 14-66) this will open the data recording configuration dialog (see Figure 14-67)

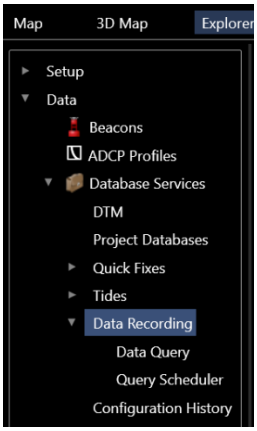


FIGURE 14-66 DATA RECORDING - EXPLORER

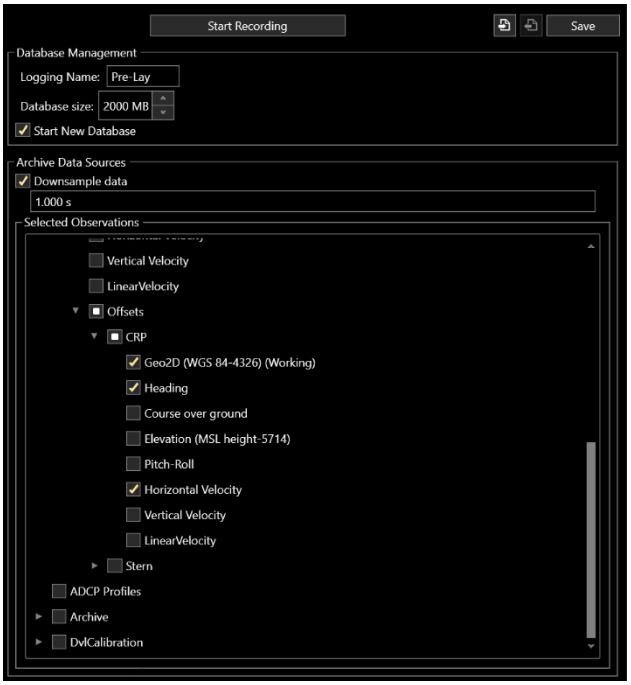


FIGURE 14-67 DATA RECORDING - CONFIGURE DATA RECORDING

2. In **Database Management** (see Figure 14-67)
   a. **Logging name**: Data recording databases are by default named **[Project Name] - Archive(n)** where Project Name is the name of the current NavView project and n is an incrementing database count/id. This name can be augmented by adding a user defined name that is appended to the default name. This facilitates subsequent data querying by allowing the operator to name databases based on tasks (e.g. Gyro Calibration) or project stages (e.g. Pre-Lay) making it easier to identify which databases are relevant when performing queries.

Note: Once a Logging Name is entered, it will continue to be used until it is either cleared or changed. Therefore, it is strongly recommended that this entry be checked prior to starting any data logging session to confirm it is still relevant.

   b. **Database size**: Enter the maximum size of the databases. Selecting the maximum database size is a balance between optimizing performance and file management, i.e. few large databases versus many small databases. Be aware that SQL Express and SQL localdb each have a maximum database size of 10 GB so do not set a maximum size larger than this or data will be lost. Default is 2GB.
      To enter the maximum size, either type it in or use the up/down arrows. NavView interprets the entry as MB regardless of any abbreviation entered.

Note: When logging data, NavView monitors the recording of data to the current database and as the size approaches the maximum, it creates the next database so that switching between databases is seamless and no data is lost.

c. **Start New Database**: Check this box to force NavView to start a new database when the data recording is next started. If this box is not checked, the current active database is written to when data recording is started.

d. **Export Template**  **:** Clicking this button enables the user to save the current configuration, both the Database Management and Archive Data Sources, to a *.4dl file as a template. This allows multiple logging scenarios to be created and saved for later use.

e. **Import Template**  : Clicking this button enables the user to browse to and select a previously exported *.4dl file to load the Database Management and Archive Data Sources configuration.

f. **Save**: When recording is started, the Database Management and Archive Data Sources configuration is saved. In order to save the configuration without clicking **Start Recording** the user must click this Save button.

3. In **Archive Data Sources**, configure the logging interval and the data to be logged.
   a. **Downsample data**: Check this box to enable control of the data recording interval. This addresses instances where the rate of observations published by a single data source are much greater than what is required to be logged, e.g. an MRU outputting at 80Hz. If this is unchecked, all data for all selected data sources is logged.
   b. If checked, enter the logging interval, i.e. the minimum interval at which to accept an observation of the same type from the same data source. Entry is in time format, e.g. 10 seconds entered as 10, 1 minute as 1:00 or 60, etc.

Note: Entering 0 for the **Downsample data** setting results in all data for the selected data sources to be logged.

   c. **Selected Observations:** Select those data sources to be logged
      I. Data sources are presented in a hierarchical tree with the parent data source, e.g. Calculations, at the top level and branches descending through each child level until the base sources for that branch is reached, e.g. Calculations\Vehicle\ Heading or Calculations\Vehicle\Offsets\Origin\Heading.

FIGURE 14-68 DATA RECORDING - EXPANDED SELECTED OBSERVATIONS TREE

II. A data source can be checked and unchecked at any level and the action will be applied to all children of that source

III. A check mark in a box indicates that source and all those below it are selected to be logged

IV. An empty box indicates that source and all those below it are not selected to be logged

V. A filled square in a box indicates that some but not all sources below it are selected to be logged

Note: If an observation source is added to the project after setting up the data recording items, e.g. a Vehicle or Device, if any observations generated by the new source are to be recorded, the Data Recording must be stopped (see 14.7.2), select the items to be recorded and the recording started again.

Note: There are redundancies in the Selected Observations. For example, Figure 14-69 shows the same 2D Geographic observation selected via the Vehicle branch and the Devices branch. However, users are warned not to be overly selective in an attempt to minimize media space when logging data in case the required data is overlooked and not logged.

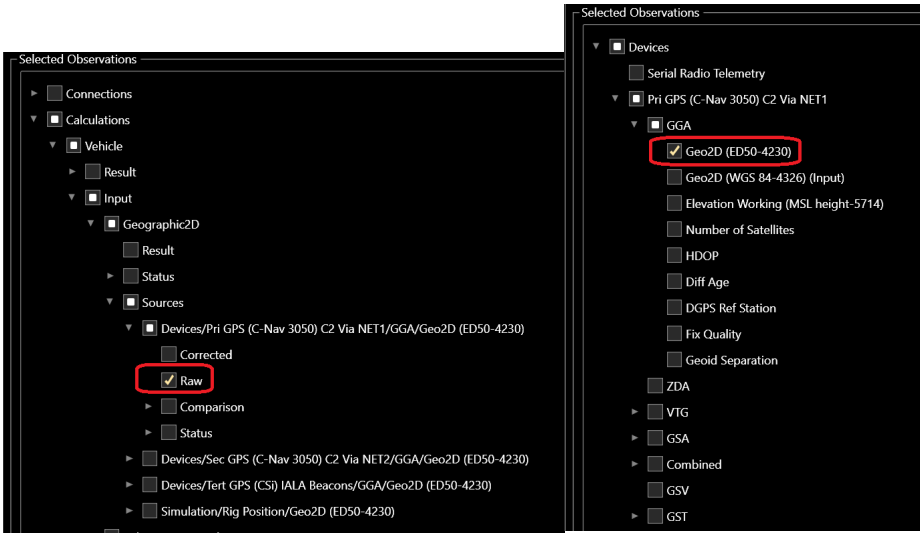


FIGURE 14-69 DATA RECORDING - REDUNDANCIES

14.7.2 START/STOP RECORDING

1. Open the Explorer window and navigate the tree to select **Data Recording** (see Figure 14-67)
2. Click Start Recording.
3. Data recording starts and the view changes to a data recording monitoring view (see Figure 14-70)

Note: It may take several seconds to start the initial recording session as NavView addresses database management, including creating a database if required.

Note: Data recording takes place regardless of whether the Explorer window is open or not, or if the Database Services item is selected and visible.

4. To stop recording, click the Stop Recording button. The widow will revert to the recording configuration window.

14.7.3 MONITOR RECORDING

Data recording can be monitored via the Explorer view, in Text windows and a specific Archive Monitoring view.

14.7.3.1 EXPLORER VIEW

1. When data recording is active, open the Explorer window and navigate the tree to select **Data Recording**, the data recording status is displayed in **Archive Status**

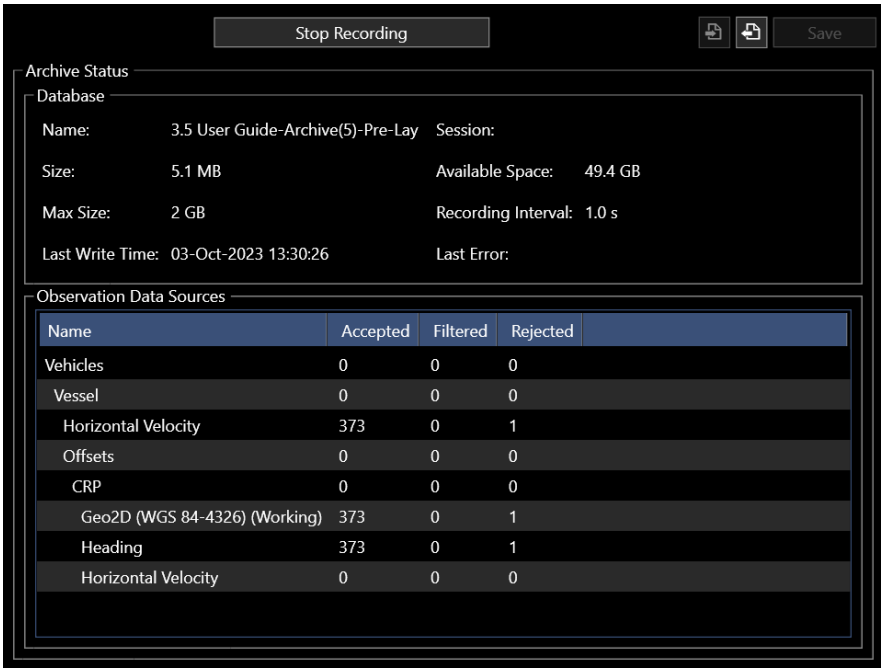


FIGURE 14-70 DATA RECORDING – ARCHIVE STATUS - EXPLORER

- **Database** information
  - **Name:** Name of the database being written to
  - **Size:** Current size of the database being written to
  - **Max Size:** The maximum size for the databases is displayed
  - **Available Space:** The current available space remaining on the server
  - **Recording Interval:** If Downsampling is enabled, the recording interval is displayed
  - **Last Write time:** Date and time of the last data written to the database
  - **Last Error:** Date and time of the last error
- **Observation Data Sources** recording summary and status in a data grid
  - **Name:** Name of each data source being recorded, listed hierarchically with the parent(s) of any child source being logged also listed whether the parent(s) themselves are being logged in order that the branch any data source belongs to is clearly evident
  - **Accepted:** The number of data records logged
  - **Filtered:** The number of records that have been discarded and not recorded based upon the **Downsample** setting, i.e. logging interval

Note: The use of **Downsample** is recommended when one or more of the data sources to be recorded have very high update rates, e.g. pitch and roll from an MRU device can often be input to NavView 50Hz and higher. In most cases it is not necessary to record all this data and the impact of logging it all would then be wasted space used for the database.

- **Rejected:** The number of records that have been rejected, this value should only increment when the first database is created as NavView initiates the data recording, these are the records that occurred between the clicking of **Start Recording** and the actual starting of the recording. This value should not change while recording is active.

14.7.3.2 TEXT VIEWS

Information regarding the state and status of the data recording can be displayed in a Text view. Figure 14-71 shows the display options available under Data Archive and Observations > Archive.

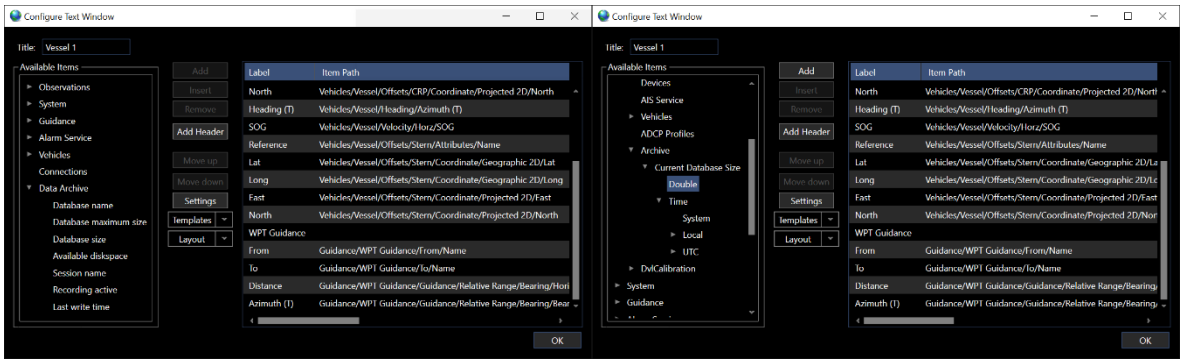


FIGURE 14-71 DATA RECORDING STATUS- TEXT CONFIGURATION

Data Recording	
Database name	3.5 User Guide-Archive(7)-Pre-Lay
Database maximum size	2000MB
Database size	4.1 MB
Available diskspace	49.4 GB
Recording active	True

FIGURE 14-72 DATA RECORDING STATUS- TEXT VIEW

14.7.3.3 DATA ARCHIVE VIEW

Data recording can also be monitored using the Archive Monitoring window. This is opened from Archive Monitoring icon in the View ribbon as shown in Figure 14-73. The resulting window in a not data recording state and a data recording state is shown in Figure 14-74. When in a recording state, the information displayed mimics the Explorer View.

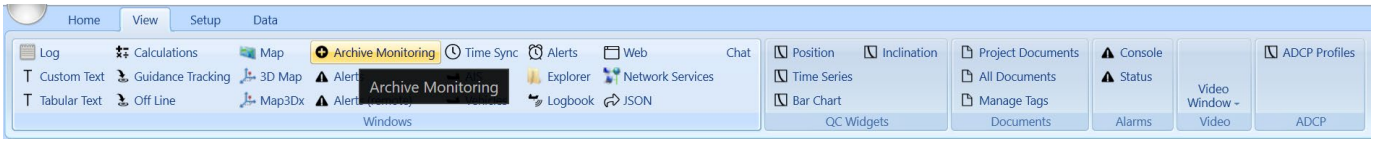


FIGURE 14-73 DATA RECORDING STATUS - VIEW RIBBON

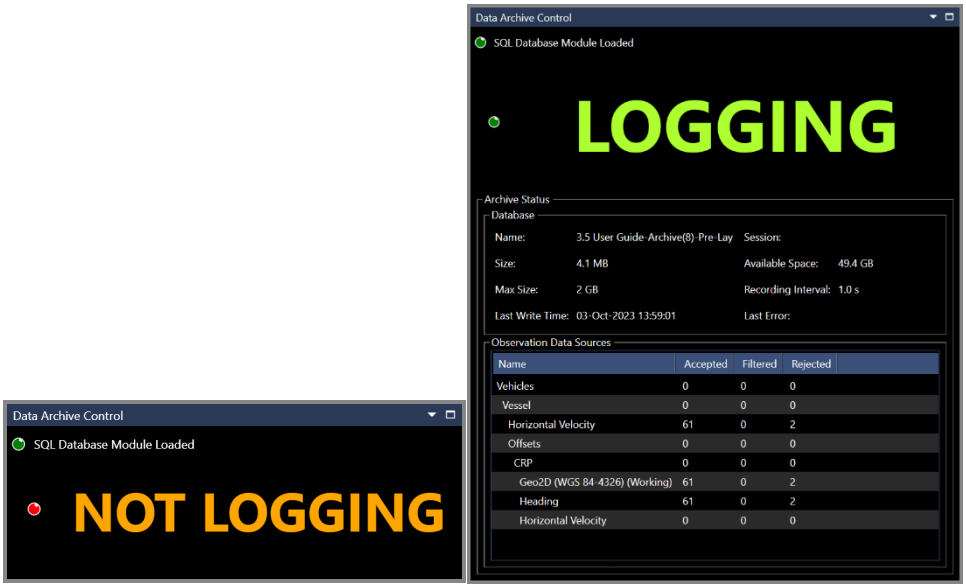


FIGURE 14-74 DATA RECORDING STATUS - ARCHIVE MONITORING VIEW

14.7.4 DATA QUERY

NavView supports querying of the recorded data to enable the extraction of selected observations for viewing and export as a text file. Data can also be exported to various types within NavView itself, including Waypoints, Pipelines and Survey Lines.

Note: A database can be queried even if it is the current database that is being written to while the data query is being executed.

Note: SQL Server and SQL Express databases can be queried by any NavView client on the network that has been configured to connect to the server.

1. Open the Explorer window and navigate the tree to select **Data Query** under **Data Recording**

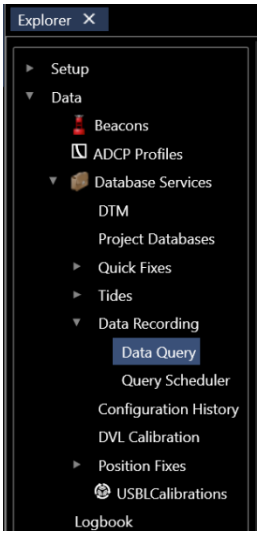


FIGURE 14-75 DATA RECORDING – EXPLORER - DATA QUERY

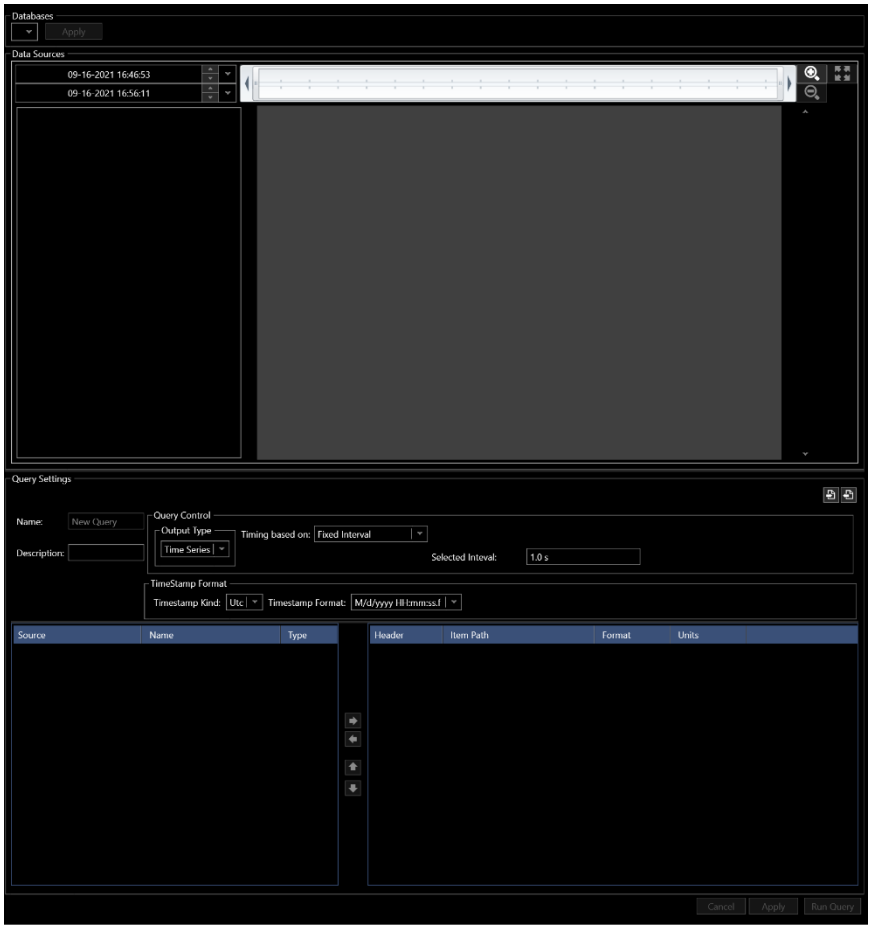


FIGURE 14-76 DATA RECORDING - DATA QUERY VIEW

2. **Databases**: Select the database(s) to query by checking the box of the available archive databases loaded in the project that are listed in this drop-down. Click **Apply**.

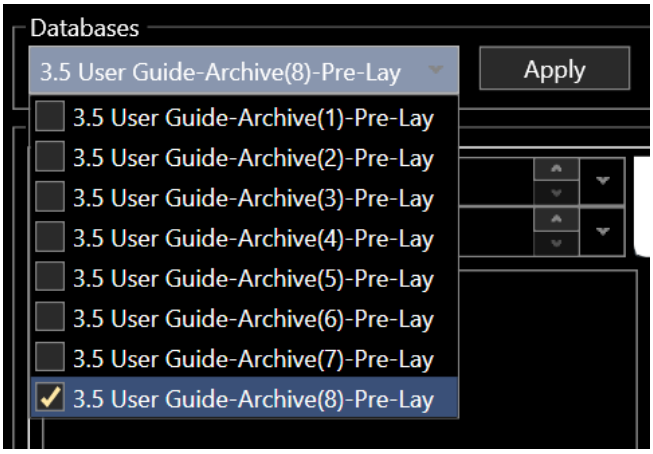


FIGURE 14-77 DATA RECORDING - DATA QUERY - SELECTED DATABASE

3. **Data Sources:** Select the time frame and the data sources to query.
   a. **Data Timeline:** Select the time frame to query data

FIGURE 14-78 DATA RECORDING - DATA QUERY - DATA TIMELINE

- **Start Time:** A date and time may be entered for the start time of the query. The left side of the selection window (Slider) updates to match the time in the date/time box. If the selection window is moved, the time in the box will update
- **End Time:** Similarly, the end time of the query can be controlled both from the right edge of the selection window (Slider) and from the time entered in the lower box. Time is displayed in the currently selected time format (either UTC or local as set in Preferences)
- **Zoom Buttons:** The zoom buttons are used to update the view to get a closer look at the data. Once the start and end time have been updated with the date/time boxes or the sliders, the zoom in button will become highlighted. Clicking this option will zoom the view so that the selected area fills the entire width
  - The zoom out button will zoom the previously selected range, one step back
  - The zoom extents button will zoom out to the entire range of data in the selected databases

Note: The default Start Time is the start time of the oldest of the databases selected and the default End Time is the end time in the newest database selected at the time of the Apply button being clicked.

b. **Data Sources Indicators:** The presence of data is shown by the data indicators. This consists of a data source tree on the left, and data bars on the right panel

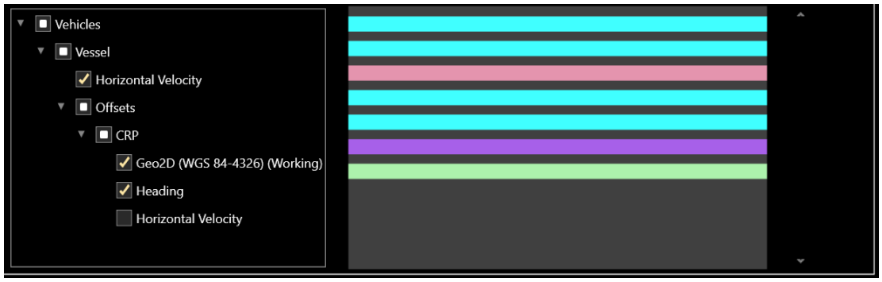


FIGURE 14-79 DATA RECORDING - DATA QUERY - DATA INDICATORS

Data sources that have been selected as part of the data tree but do not directly provide data are shown by an aqua bar covering the selected time period. As an example, Figure 14-80 shows the “Simulated Circle” data source being selected, described by an aqua colored bar. The simulated circle data source itself does not have any observations, but it acts as a parent data source for the sub items, Geographic2DObservation and HeadingObservation.

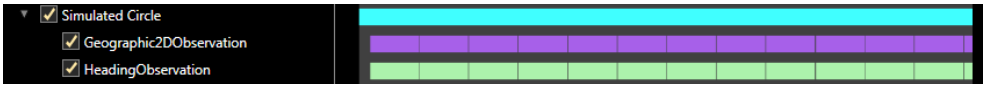


FIGURE 14-80 DATA RECORDING - DATA QUERY - DATA INDICATORS - SELECTED DATA SOURCES

The ToolTip for a parent data source will provide the time period spanned by the Logging session of which it is derived while the tooltip for a child observation data source will show the actual data of the observation (see Figure 14-81). It is required to zoom in on the specific data bar to see the individual observation

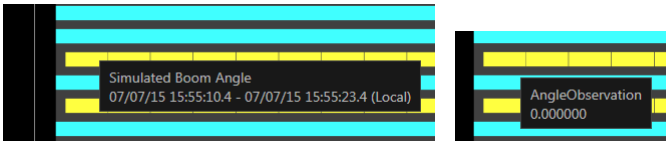


FIGURE 14-81 TOOLTIP FOR PARENT DATA SOURCE VS CHILD DATA SOURCE

The data sources available are color coded according to type, as shown in the following table:

Data Type	Color
Geographic2D (latitude, longitude)	
Elevation	
Heading	
Pitch/Roll	
Other	

c. **Data Tree:** Select the data to query from the hierarchical tree in the left panel that lists the data that was recorded for the specified time frame by checking or unchecking the associated box. Only the data sources selected will be made available to query

Note: It is recommended to only select those data sources that contain the data to be queried. This minimizes the number of observation types listed to be selected from when configuring the Query itself.

Note: Only data from that recording session will appear in this tree, not all real time data sources available in the project. This enables data to be queried offline by a system that does not have the same real time setup.

4. **Query Settings:** Once the start and end times and data sources are configured the query can be configured. The query settings panel is shown in Figure 14-82.

   The data grid on the left, referred to here as the Available Data Sources Items, contains all the data sources that were selected in the data source tree. The columns are:

   - **Source:** The path of the selected data source, i.e. Vehicles/Vehicle Name/
   - **Name:** The name of the data source, together with the source forms the full path
   - **Type:** Shows the type of observation associated with the data source

The data grid on the right, referred to here as the Selected Data Sources Items, contains those data sources selected to query. The columns are:

- **Header:** The user assigned column header for query result
- **Item Path:** The data source path and data name (see above)
- **Format:** The user assigned format for the query result
- **Units:** The user assigned units the query result is to be output in

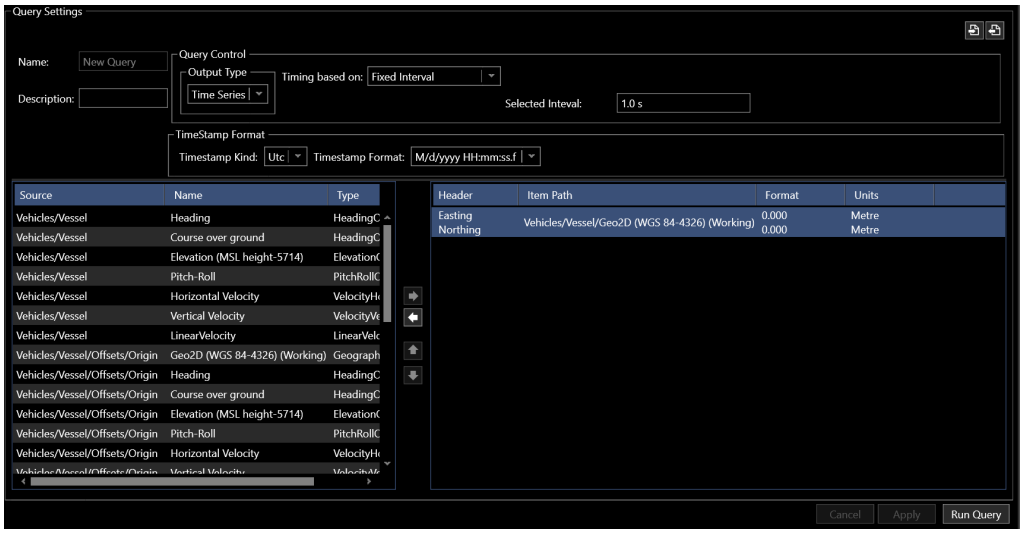


FIGURE 14-82 DATA RECORDING - DATA QUERY - QUERY SETTINGS

a. Add items to the query

   I. Select one or more data sources from the Available Data Sources and click the  to move them to the Selected Data Sources

II. Adding a data source to the Selected Data Sources will open an **Add Formatter** dialog (see Figure 14-83) allowing the selection of the specific data to query in the case of data sources providing multiple values, e.g. Geographic2D, the text to appear in the query result column header, the units to use and the data format, e.g. number of decimal places, include units term, etc. (see section 14.7.4.1)

Note: It is recommended that the format not include unit abbreviations nor symbols as these will potentially make importing and analysis with 3rd party software difficult.

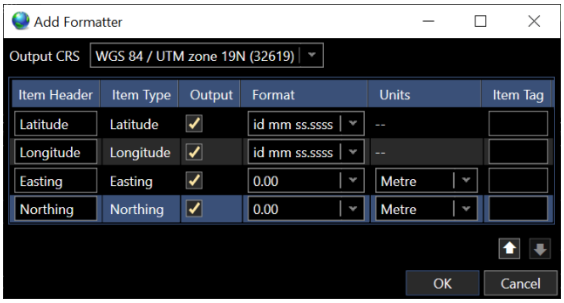


FIGURE 14-83 ADD FORMATTER DIALOG

III. If one data source is added at a time, a dialog will appear so that the formatter can be configured prior to the observation being added to the selected list

IV. If multiple data sources are added at once, default settings are applied and all formatters are created and the data sources added to the selected list

V. The formatters for the data sources already added to the data grid on the right can be edited

VI. If the data source provides a single value, e.g. Pressure, double clicking on the Item Path cell will open the respective formatter dialog, but the Header and Format can be edited directly in the data grid by clicking in the respective cell

VII. If the data source provides multiple values, e.g. Geographic2D, double clicking on the data source (any cell) will open the respective formatter dialog

b. Remove items from the query

I. Select the data source to be removed from the query in the Selected data Sources on the right

II. Click the  button to move it back the Available Data Sources

c. Change the items order

I. Select the item to move in the Selected Data Sources and click the  button to move up in the order or the  to move it down in the order

d. **Query Control:** Configure the query timing, see Query Control for details
   I. Apply the Settings by clicking the **Apply** button
   II. Run the query by clicking the **Run Query** button. Depending on the period of time queried, it could take several seconds or minutes to complete the query. A status indicator will appear, and when the query is complete, the list of result data will be shown

5. **Results**: The query results are presented in a tabular data grid format, with headers set in the format configurations. An example output is shown in Figure 14-84.

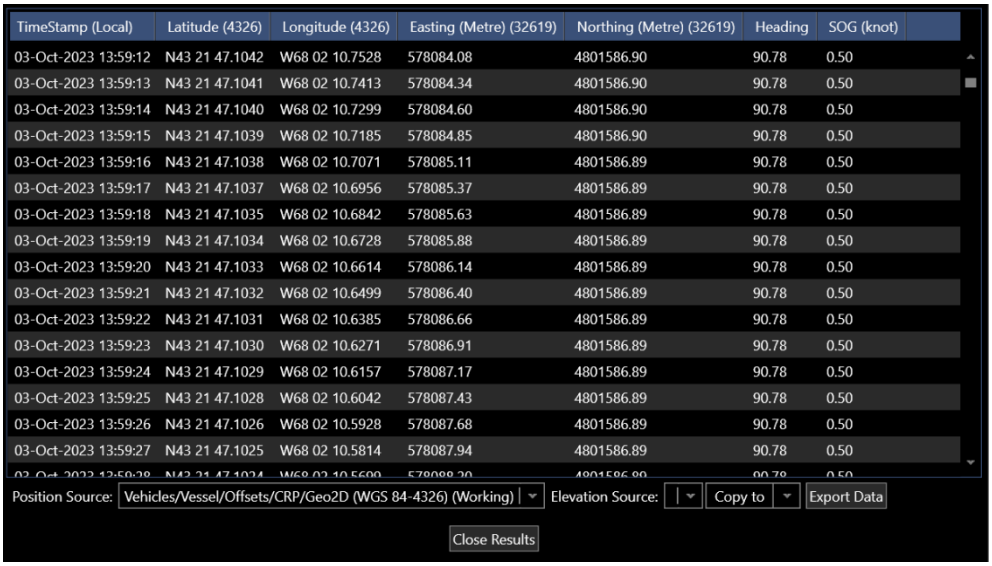


FIGURE 14-84 DATA RECORDING - DATA QUERY - DATA QUERY RESULTS

a. **Export to Text File:** Use the **Export Data** button to save the resulting data as a text file. Available formats are Comma Separated, Tab Separated or Semicolon Separated
   b. Once the export has completed, the user will be prompted with a message stating how many records were exported and if they wish to open the file with the default Windows text editor, click Yes or No accordingly

Note: If there is no default text editor. NavView will throw an exception and abort the attempt to open the exported file.

c. **Copy To:** If the queried data contains position sources (Geographic2D), it can be exported into various data types for use directly in NavView. The options are found by clicking the down arrow on the **Copy To** button. The options available are as shown below

FIGURE 14-85 DATA RECORDING - DATA QUERY - DATA QUERY RESULTS - COPY TO OPTIONS

- **Create Pipelines:** When selected a confirmation window will open to select Yes to proceed or No to abort. Refer to the section on Pipelines
- **Pipe Tally:** When selected a confirmation window will open to select Yes to proceed or No to abort. Refer to the section on Pipe Tally

- **Create SurveyLine:** When selected a confirmation window will open to select Yes to proceed or No to abort. Refer to the section on Survey Lines
- **Create Waypoints:** When selected a confirmation window will open to select Yes to proceed or No to abort. Refer to the section on Waypoints

Note: Creating waypoints will create one waypoint for each epoch of data, so exercise caution if there is a great number of data times in the results.

d. **Close Results:** Click to return to the query screen and perform additional queries.

14.7.4.1 DATA FORMATTERS

There are two main categories of data formatters: basic and multi. A basic formatter is used for those data sources that provide one value, also referred to as a data field, such as a heading, or length. A multi formatter is for data sources that provide multiple data fields, like Position, Pitch/Roll, Surge/Sway and USBL observations.

Each data field will form one column in the data results. The data formatter controls how the data in that column is presented. This includes the following components:

- **Header:** The text that will display at the top of the column
- **Format:** How the value will display, i.e. number of decimal places, if a thousandths separator is used, if symbols will be included, and if the units will be included
- **Units:** The units the data will be in, if applicable

Basic formatters can be configured directly in the data grid (inline) as well as via a dialog, while multi formatters must be configured in the dialog. Figure 14-86 shows the configuration dialog and the inline configuration for a heading formatter, a single data field data source.

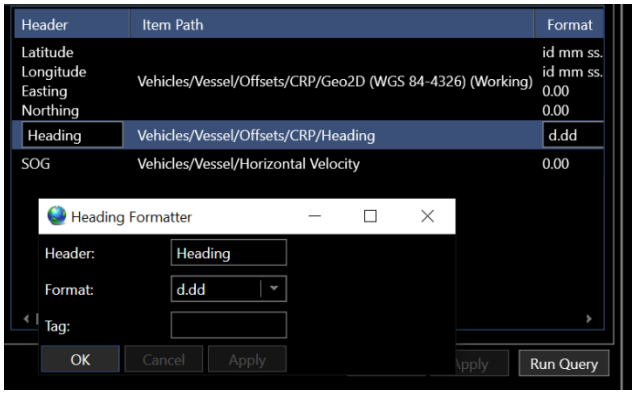


FIGURE 14-86 BASIC FORMATTER CONFIGURATION DIALOG

Figure 14-87 shows an example of a multi formatter configuration dialog. Each individual data field that is available in the data source is listed in a data grid and can be configured for a header, whether or not the data is to be included in the results, format and units selection (if available).

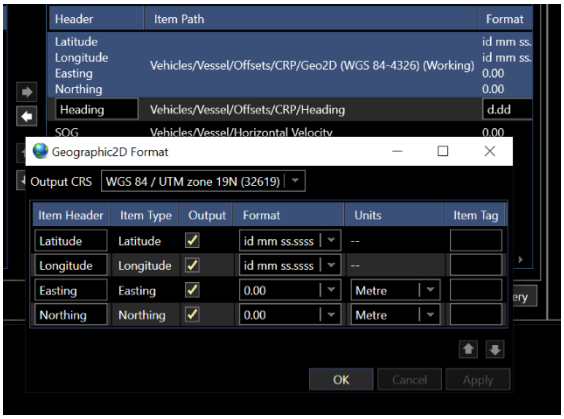


FIGURE 14-87 MULTI FORMATTER CONFIGURATION DIALOG

The format options are selectable from an applicable drop-down list as shown in Figure 14-88. If the desired format parameters do not appear in the list, it is possible to manually type in a format. For instance, there is no format to display 4 decimal places, so if this is required, simply type “0.0000” or “0.0000 u” to output a 4 decimal place result with or without a unit indicator (u).

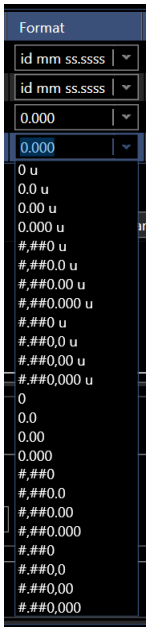


FIGURE 14-88 FORMAT OPTIONS

In the case of the formatter for Geographic positioning data, the formatter configuration allows for the selection of an output Coordinate Reference System. By default, the current working CRS will be selected when the formatter is created. This can be changed to select any other CRS currently added to the project. The data will be converted after query and the result output.

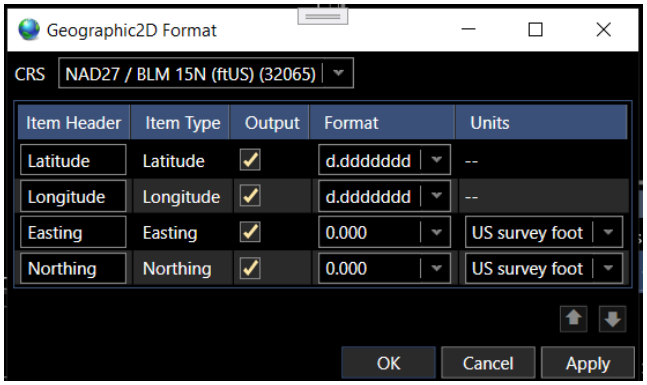


FIGURE 14-89 GEOGRAPHIC FORMATTER

14.7.4.2 QUERY CONTROL

The query control has the option to output data as either a time series, or as a statistical roll-up.

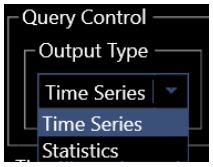


FIGURE 14-90 DATA RECORDING - DATA QUERY - QUERY CONTROL-OUTPUT TYPE

If the statistical option is chosen, the statistical function chosen in each formatter will be applied for the duration of the query, and one result output. If the time series option is selected, the output will be based on the timing selection.

14.7.4.2.1 TIME SERIES - TIMING CONTROL

Data for the queries are formed by querying the database with specific times based on one of the following options:

- Selected DataSource
- Fixed Interval
- Minimum Interval
- Manual Times

A linear interpolation, based on the specified time, is performed to retrieve data for each selected data source in the query. Details of each timing source are given below.

14.7.4.2.2 SELECTED DATASOURCE TIMING

A data source from the Selected Data Source list is selected as the source of the primary data epoch. Data is queried from the database for this data source. Data from all other data sources is then interpolated to match the time stamps of the primary data source.

FIGURE 14-91 DATA RECORDING - DATA QUERY - QUERY CONTROL - SELECTED DATA SOURCE TIMING

For example, if Geographic2D data was received and logged at 3 second intervals and heading data was received and logged at 1 second intervals, it is recommended that the Geographic2D data source be selected as the primary data source. Then for each Geographic2D observation the closest preceding and following heading observations are used in a linear interpolation to determine the heading for the Geographic2D data epoch.

Note: It is recommended that the key data source observation type be selected as the Selected Data Source for this query type. For example, if investigating USBL data, select the USBL device data as the Selected Data Source so that other data is interpolated to its epoch.

14.7.4.2.3 FIXED INTERVAL TIMING

A fixed interval value is selected by the user. Data is then queried for all data sources, and a linear interpolation is performed at each time interval to derive a value for that epoch.

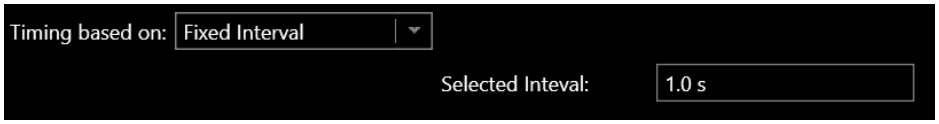


FIGURE 14-92 DATA RECORDING - DATA QUERY - QUERY CONTROL - FIXED INTERVAL TIMING

14.7.4.2.4 MANUAL TIMES

With the Manual Times option, a list of specific times may be imported from a Timestamp file. The Query will then use these specified times to interpolate all data formatters. The Timestamp file consists of a text file where one time value is stored on each row.

FIGURE 14-93 DATA RECORDING - DATA QUERY - QUERY CONTROL - MANUAL TIMES TIMING

1. Click on 

to open the Manage Times window to import file containing specific times.

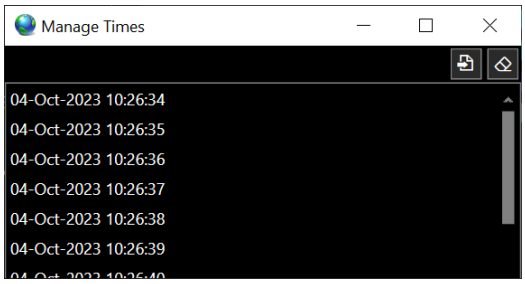


FIGURE 14-94 MANAGE TIMES IMPORT

14.7.4.2.5 MINIMUM INTERVAL

Minimum interval requires the selection of a primary data source, and a minimum time. Timestamps will be determined based on the data times of the primary data source, but if that data source comes in at a greater speed than the minimum interval to query, then the in between epochs will not be output. The other data sources will be linearly interpolated to match the epochs of the resulting primary data source epochs.

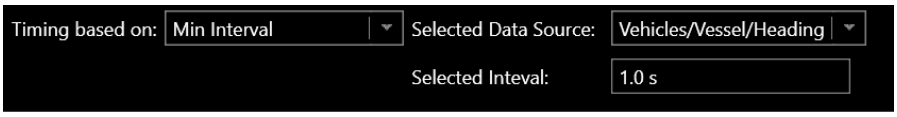


FIGURE 14-95 DATA RECORDING - DATA QUERY - QUERY CONTROL - MINIMUM INTERVAL TIMING EXAMPLE

Note: The minimum interval option for the query is dependent upon the **Downsample** setting in use during the data recording. If data was logged at 1 minute intervals, the smallest applicable interval for a subsequent query is 1 minute. Setting it to anything less results in the same data being retrieved since the closest interval of available data is 1 minute.

Note: If a small interval is used for a large period of time, the query may time out. In this case an error is reported to the user. Acknowledge this and try with either shorter period, a larger interval or some combination of both.

14.7.4.2.6 STATISTICAL OPTIONS

If the Statistics output type is selected, the available statistical methods are displayed as columns in the query configuration.

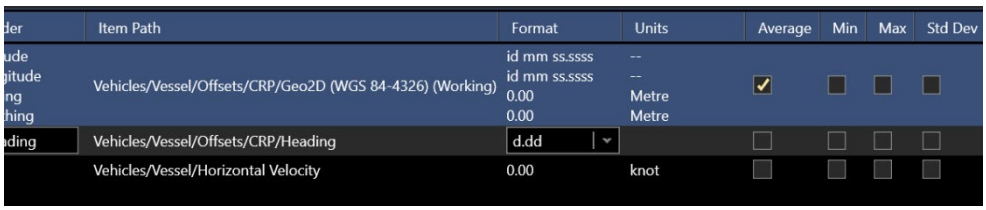


FIGURE 14-96 DATA RECORDING - DATA QUERY - QUERY CONTROL - STATISTICAL OPTIONS

The available statistical methods are Average, Min, Max, Standard Deviation. On each formatter, the checkbox must be checked for the desired statistical methods.

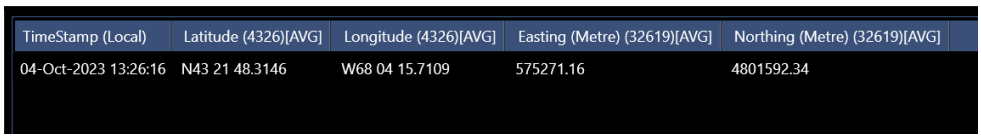


FIGURE 14-97 DATA RECORDING - DATA QUERY - QUERY CONTROL - STATISTICAL OPTIONS – RESULTS

14.7.4.3 EXPORT/IMPORT OF QUERY SETTINGS

The query settings can be exported to a *.4dq file and subsequently imported for future queries.

To export the settings, click the button in the Query Settings panel, navigate to the target folder, enter a suitable file name and save. To import a *.4dq file, click the button, navigate to the source folder, select the desired file and open.

Note: In order to use the Query Schedule tool, the desired query settings must be configured and a *.4dq file exported.

14.7.5 QUERY SCHEDULE

The Query Scheduler provides a means to automate data queries. The interface is shown below.

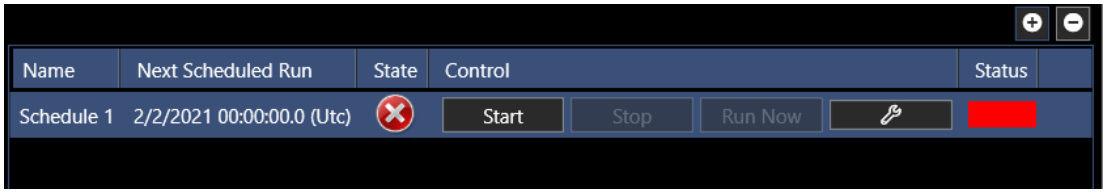


FIGURE 14-98 DATA RECORDING - QUERY SCHEDULER

Each query consists of a CRON timing expression, a previously exported *.4dq query settings file, duration and interval settings, and an output folder. The schedule configuration view is shown in Figure 14-99.

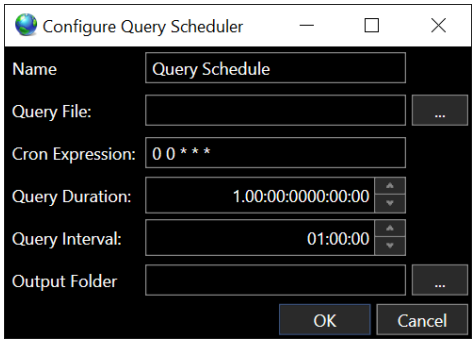


FIGURE 14-99 DATA RECORDING – QUERY SCHEDULER – CONFIGURE QUERY SCHEDULER

Options are described below:

- **Name:** Enter a name associated with the query schedule, to easily identify it
- **Query File:** The path and *.4dq file name to use for the query. To select this, click the browse button, navigate to the source folder and select the desired *.4dq file
- **CRON Expression**: A Cron expression allows for jobs or tasks to be scheduled at fixed intervals. The string consists of sub expressions, each one controlling a unit of time. For example ‘0(minute 0) 0(hour 0) *(every day of the month) *(every month of the year) *(every day of the week)’ = ‘0 0 * * *’. The formatting of CRON expressions allow for great versatility in terms of how query schedules are set up.

For more information, please consult https://en.wikipedia.org/wiki/Cron. The default when a query schedule is created is '0 0 * * *' which will run every day at midnight. NavView will check expression as entered for validity. See https://cron.help/examples for common cron schedules

Note: Cron Schedule times are in the UTC time zone. As an example if the Query Schedule is to start at Midnight local time then the difference between UTC and local time needs to be applied.

- Midnight UTC, the Cron expression would be 0 0 * * *
- Midnight UTC-3, the Cron expression would be 0 3 * * *
- Midnight UTC+3, the Cron expression would be 0 21 * * *

- **Query Duration**: When the query schedule task is run, the system will look back the duration time set here to determine the start time to begin the query and the time to stop the query
- **Query Interval:** The query interval describes the length of sub-queries. Over the course of a query duration, the query can be repeated multiple times, with each sub-query being the length of the query interval. See Figure 14-100

Note: The Query Duration and Query Interval entry format is d.HH:mm:ss

- **Output Folder:** Choose a folder in which to output query files. The query files will be formatted with the schedule name and the time (UTC) of the actual query

Figure 14-100 shows the CRON expression, Query Duration and Query Interval settings for a data query to be run every 12 hours (noon UTC and midnight UTC) for the past 12 hours (figure on left) and every 24 hours (at midnight UTC) for the previous 24 hours (figure on right).

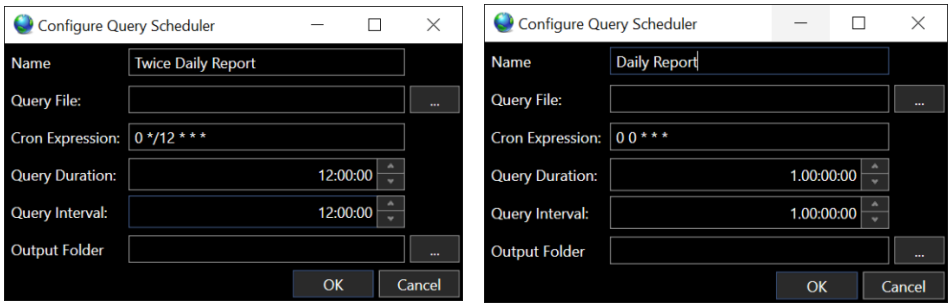


FIGURE 14-100 DATA RECORDING – QUERY SCHEDULER - QUERY SCHEDULE EXAMPLES

14.8 POSITION FIX

NavView provides a position average feature, referred to as Position Fix. This feature provides the capture of data to determine an average position complete with supporting scatter plots and histograms, comparison to a specified target and heading if desired, generation of a report and export of the data.

A Position Fix has two states:

- **Active**
  - When a Position Fix is first created, it is Active
  - If it is Active, data can be recorded to it, starting and stopping indefinitely
  - Data can be reviewed and edited; reports generated
- **Finalized**
  - Once a Position Fix has been completed and no further data is to be logged, it is to be set to Finalized
  - Data can be reviewed and edited; reports generated

14.8.1 ADD A POSITION FIX

Position Fixes are added using a Setup Fix Profile wizard to guide the user through the process. It is important to note that all settings made in the wizard can be edited later with the exception of the target database, and the vehicle and offset to be positioned.

1. Launch the Position Fix wizard by:
   a. Selecting **New** in Position Fixes, Data Ribbon. This will open the Setup Fix Profile wizard (see Figure 14-104)

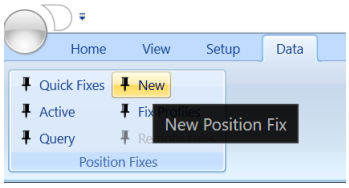


FIGURE 14-101 POSITION FIXES – DATA RIBBON – NEW

or,

   b. Selecting **Active** in Position Fixes, Data Ribbon. This will open the Active Fixes window

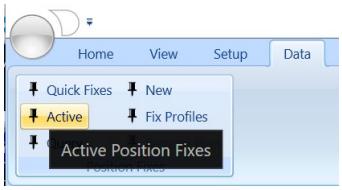


FIGURE 14-102 POSITION FIXES – DATA RIBBON – ACTIVE FIXES

or,

   c. Open the Explorer window and navigate the tree to select **Position Fixes/Active** under **Database Services**

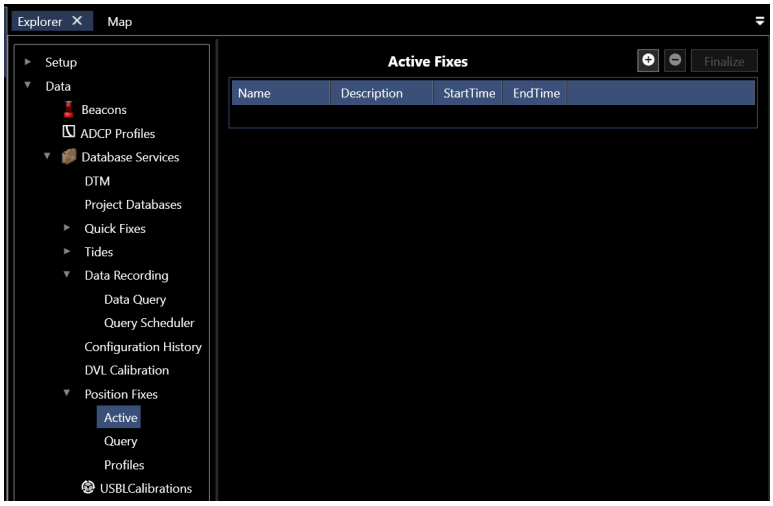


FIGURE 14-103 POSITION FIXES – EXPLORER – ACTIVE FIXES

Click the ⊕ button to open the Setup Fix Profile wizard (see Figure 14-104)

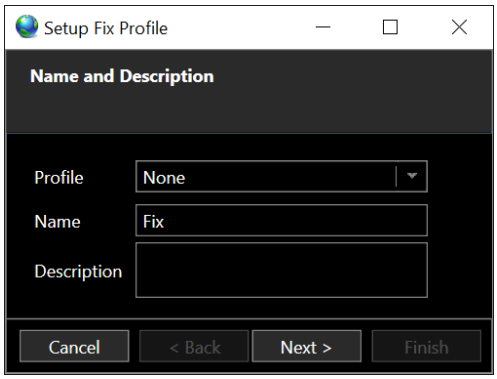


FIGURE 14-104 POSITION FIXES - SETUP FIX PROFILE – NAME AND DESCRIPTION PAGE

2. **Name and Description** page.
   a. If there is an existing profile created, it can be selected from the **Profile** drop-down

Note: Profiles allow the user to pre-configure repeated Position Fix configurations. They also enable execution of Position Fixes remotely. Profiles are configured by selecting Profiles under Position Fixes in the Data ribbon or in Explorer.

   I. Enter a **Name** for the fix
   II. Enter a **Description** for the position fix

Note: The Name is used in the title of the Fix report. The Description is also included verbatim in the report.

   b. Click **Next**

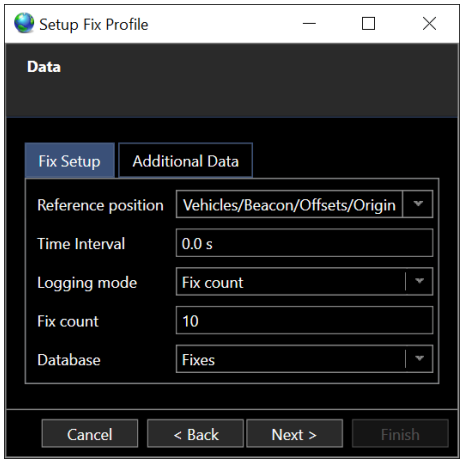


FIGURE 14-105 POSITION FIXES - SETUP FIX PROFILE – FIX SETUP TAB

3. **Data** page.
   a. Fix Setup Tab
      I. **Reference position:** From the drop-down list select the reference position to average
      II. **Time Interval:** Enter time interval to log data, an entry of 0 will result in data being logged on update
      III. **Logging mode:** From the drop-down select the logging options
         - **Manual:** Logging starts after clicking **Finish,** data logging is stopped by clicking 
         - **Fix count:** Logging starts after clicking **Finish**, NavView automatically stops when the specified number of position observations are recorded
         - **Elapsed time:** Logging starts after clicking **Finish**, NavView monitors the elapsed logging time and automatically stops the logging when the specified time period is reached

Note: The operator is able to stop and start logging anytime, prior to the specified number of fixes or elapsed time being reached. Once this is reached, NavView will only log more if the mode is set to **Manual;** or to **Elapsed Time** and the specified time is set greater than that which has already elapsed; or to **Total # Fixes** and the specified number of fixes is greater than the number of position observations logged so far.

      IV. **Database:** Enter a name for a new database or select an existing database from the drop-down

Note: The flexibility of the database(s) options for Position Fix recording allows the operator to create a database for each position fix, a database for groups of fixes, a database for an entire project, or some combination of these. The option used largely depends upon the project, the desired portability of the databases and simplifying database management from a naming and human friendly tracking perspective, i.e. easily recognizable and understood database names on the server.

b. **Additional Data tab** enables logging of additional data that can be used in the event that there are problems with the base data logged.

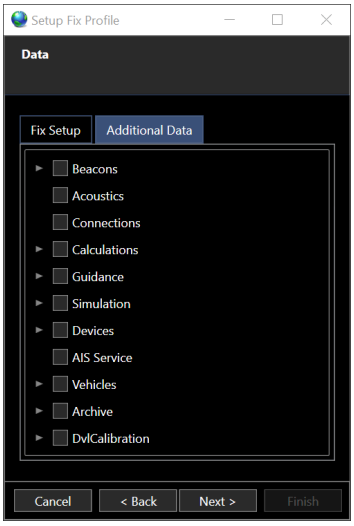


FIGURE 14-106 POSITION FIXES - SETUP FIX PROFILE – ADDITIONAL DATA TAB

I. Expand the available data sources to navigate and select those data sources to be logged

II. Data sources are presented in a hierarchical tree with the parent data source, e.g. Calculations, at the top level and branches descending through each child level until the base sources for that branch is reached, e.g. Devices/GPS Port/GGA

III. A data source can be checked and unchecked at any level and the action will be applied to all children of that source

IV. A check mark in a box indicates that source and all those below it are selected to be logged

V. An empty box indicates that source and all those below it are not selected to be logged

VI. A filled square in a box indicates that some but not all sources below it are selected to be logged

c. Click **Next**

4. **Target** page

a. If the Position Fix is being executed to determine position and/or heading relative to a design location and/or heading, e.g. a final well location relative to the design location, configure the design target location and heading

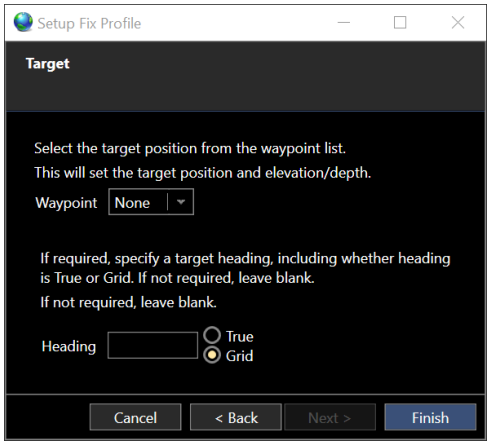


FIGURE 14-107 POSITION FIXES - SETUP FIX PROFILE - CONFIGURE TARGET

I. Select the **Waypoint** that defines the design target location from the existing waypoint list

II. If there is specified design **Heading**, enter this value and specify if it is **True** or **Grid**

III. Click **Finish**, the Position Fix data collection will start

14.8.2 POSITION FIX PROFILES

Position Fix Profiles can be created which contain commonly used settings, the profile can then be selected in the Position Fix wizard when adding a position fix. A profile can be created by selecting Fix Profiles in the Position Fixes section of the Data ribbon, see Figure 14-108. A profile can also be created in Explorer by selecting Profiles under Position Fixes, see Figure 14-109.

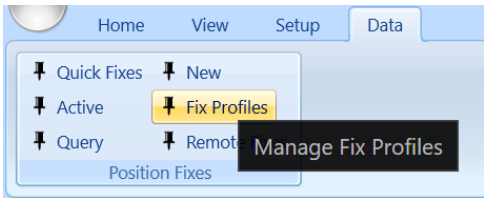


FIGURE 14-108 POSITION FIX PROFILES - DATA RIBBON

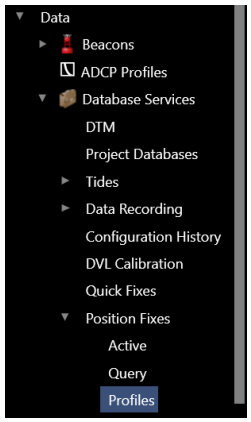


FIGURE 14-109 POSITION FIX PROFILES - EXPLORER

14.8.2.1 ADDING A POSITION FIX PROFILE

1. Select profiles in the Data ribbon or in Explorer, this opens the Fix Profile Manager

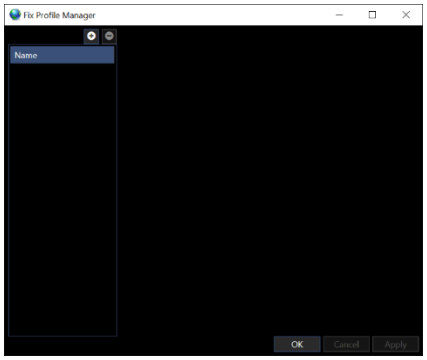


FIGURE 14-110 FIX PROFILE MANAGER

2. Click the add button  to add a new profile, this displays the dialog to define the profile (see Figure 14-111).

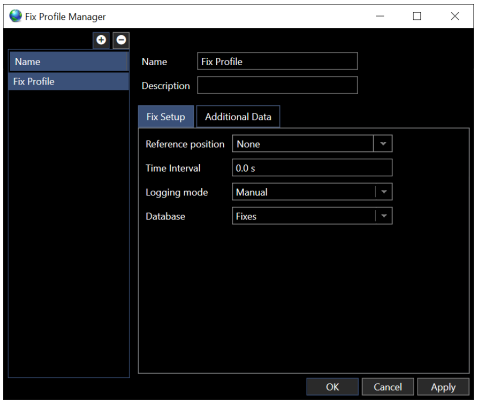


FIGURE 14-111 FIX PROFILE MANAGER DIALOG

3. Define the profile
   - **Name:** Name for profile
   - **Description (Optional):** Description of profile
   - **Fix Setup Tab:** See Fix Setup Tab
     Additional Data Tab: See **Additional Data tab**

14.8.3 EDIT POSITION FIX SETTINGS

Position fix settings can be edited if data collection for the fix is not active. This may be required to manipulate the data logging control, e.g. increasing the total number of fixes to log if additional data is desired. It also enables the refining of the name and description for report purposes.

4. Access the Active Fixes view (see Figure 14-112, Figure 14-113, Figure 14-114). Select the position fix in the data grid to be edited (see Figure 14-115).

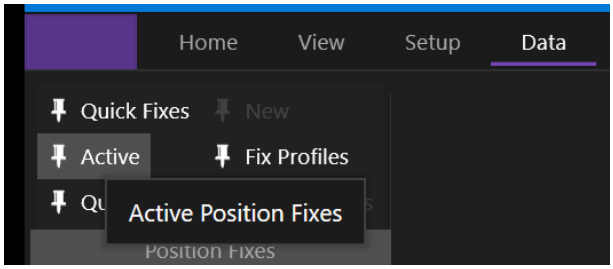


FIGURE 14-112 DATA RIBBON - ACTIVE FIXES

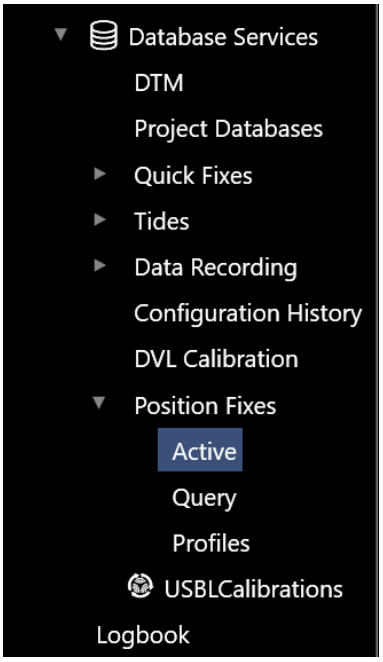


FIGURE 14-113 EXPLORER VIEW - ACTIVE FIXES

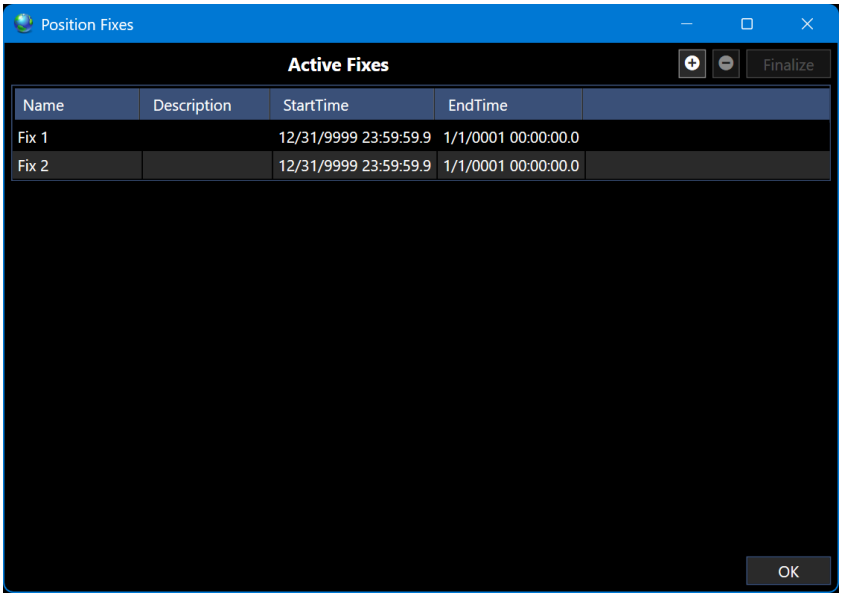


FIGURE 14-114 ACTIVE FIXES VIEW

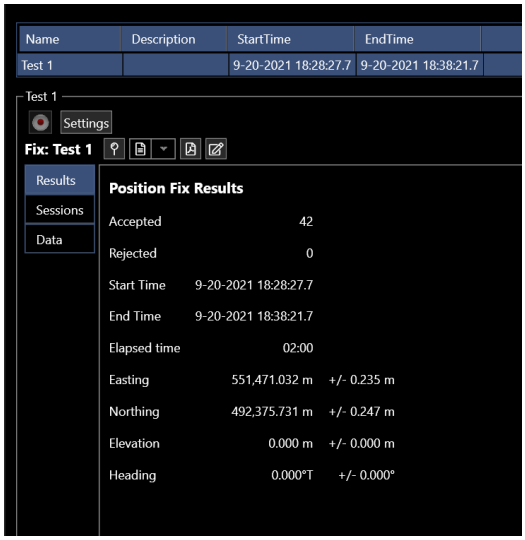


FIGURE 14-115 POSITION FIX TO BE EDITED

5. Click the **Settings** button to enable editing

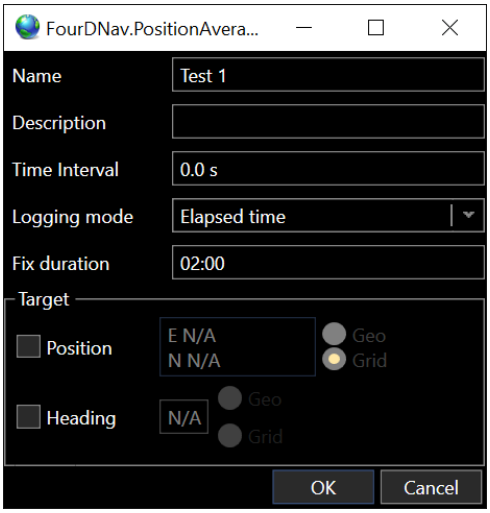


FIGURE 14-116 POSITION FIX EDIT DIALOG

a. Edit the **Name** as desired
   b. Edit the **description** as desired
   c. Edit the data logging **Time Interval** as desired
   d. To change the logging **Mode**, select **Manual**, **Fix Count** or **Elapsed Time** from the associated drop- down list
   e. If **Fix Count** or **Elapsed Time** is selected, this value must be greater than that associated with any data collected for this fix to this point if additional data is to be logged
   f. If a **Target** has already been configured the target information will be displayed, if the **Target** has not already been configured the details can be entered into the fields

Note: The Target selection process in the Position Fix wizard only allows the selection of an existing waypoint. The editing of the Position Fix settings allows for setting the Target data to any position.

6. Click **Okay**

14.8.3.1 REMOVE A POSITION FIX

1. Open the Explorer window and navigate the tree to select **Position Fixes/Active** under **Database Services** (see Figure 14-101)
2. Select the position fix to be removed in the data grid (see Figure 14-117)

FIGURE 14-117 POSITION FIX TO BE REMOVED

3. Click the button to remove the fix from the database

14.8.3.2 CONFIGURE POSITION FIX REPORT

NavView supports a configurable Position Fix report. This report by default presents the Position Fix name as part of the title, the description and the results of the position fix average. The inclusion of plots and data is configurable. The configuration is accessed from the Position Fixes Summary view.

1. Open the Explorer window and navigate the tree to select **Position Fixes** under **Database Services** (see Figure 14-101)
2. Click **Configure Report** button located in the summary toolbar (see Figure 14-118)

FIGURE 14-118 POSITION FIX - SUMMARY TOOLBAR

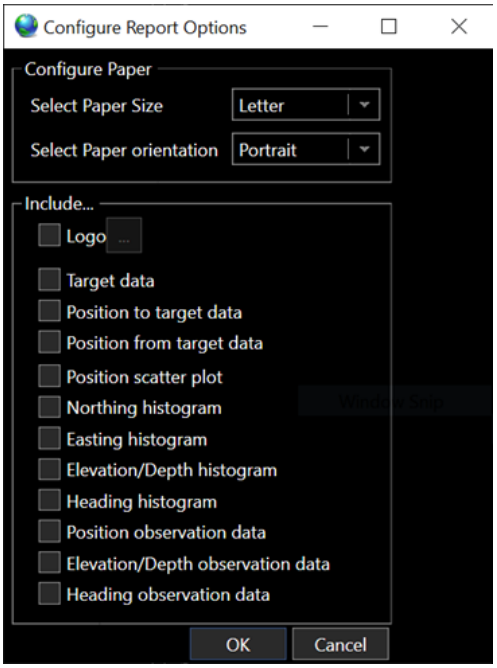


FIGURE 14-119 POSITION FIX - CONFIGURE REPORT OPTIONS

3. Configure the report options, these will be used for all reports generated until changed
   - **Configure Paper**
     - **Select Paper Size:** From drop-down, options are letter or A4
     - **Select Paper orientation**, options are portrait or landscape
   - **Include**
     - **Logo:** To incorporate a logo, check this box and click the ... button to browse and select the image to load (png, bmp, jpg, gif)
     - **Target data:** Check this box to include the Target data and information in the report
     - **Position to target data:** Check this box to include the spatial relationship from the position fix to the target, includes range and bearing in both geographic and grid, delta Northing, delta Easting, delta latitude, delta longitude, delta elevation/depth and delta heading in both geographic and grid
     - **Position from target data:** Check this box to include the spatial relationship from the target to the position fix, includes same data as above
     - **Position scatter plot:** Check this box to include a scatter plot of the position observations, if target data is selected the target position is included in the plot
     - **Northing histogram:** Check this box to include a histogram plot of the Northing observations
     - **Easting histogram:** Check this box to include a histogram plot of the Easting observations
     - **Elevation/Depth histogram:** Check this box to include a histogram plot of the Elevation observations

- **Heading histogram:** Check this box to include a histogram plot of the heading observations
- **Position observation data:** Check this box to include a tabular presentation all of the position observations
- **Elevation/Depth observation data:** Check this box to include a tabular presentation all of the elevation observations
- **Heading observation data:** Check this box to include a tabular presentation all of the heading observations

Note: The report can be exported to Excel format. The option to include the observations is implemented to enable the export of the data to a file format that enables processing with other software packages.

4. Click **OK**

14.8.4 ACTIVE POSITION FIX VIEW

To view and control a specific Position Fix, open the Explorer view and expand the tree to navigate to **Position Fixes** under **Database Services**. Expand this branch to select active or query. Active fixes will remain in the window until they are finalized. Fixes located in the active window can be logged to until they are finalized.

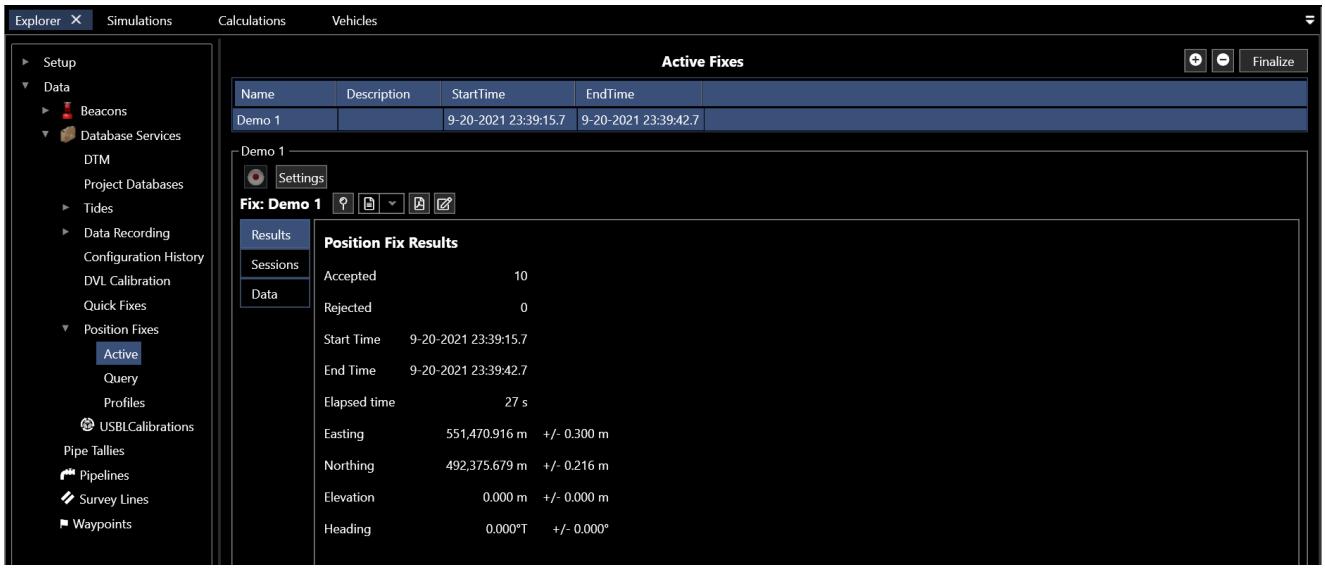


FIGURE 14-120 POSITION FIX VIEW

From this view (see Figure 14-120), the user can control the data logging, review and edit the data, create a waypoint from the results, export data and generate a report. The controls and use of this view are detailed here.

Once it is determined that no further data need be logged to a fix, it should be finalized. Select the fix and click Finalize. It can still be accessed via the query window for reviewing, editing and generating reports.

14.8.4.1 POSITION FIX VIEW TOOL BAR

Logging Button: In this state indicates that logging is inactive. Click to start data logging, button will change to 

Logging Button: In this state indicates that logging is active. Click to stop data logging, button will change to 

Note: When data is logging, it is written to the database. The Position Fix view is updated with the latest data after every 2nd position observation is logged. When logging is stopped, the Position Fix view is updated with the last of the data regardless of how many observations are involved.

Create Waypoint Button: If data is present, clicking **Create Waypoint** creates a waypoint with the average position and elevation, with the same name as the position fix

Export Data: If data is present, clicking **Export Data** presents the options of exporting the data to a single comma delimited (CSV) file or multiple CSV files. Selection of either launches the Save File dialog. Navigate to the target folder and enter a file name and click Save. Upon completion of writing to the file(s), a message box appears summarizing the number of each observation type to which file.

- **To single CSV file:** Data are written to a single file, e.g. Sample.csv, grouped by observation type
- **To multiple CSV files:** Data are written to individual observation specific files where the file name is based on the entered file name with an underscore and observation type appended, e.g. Sample_PSN.csv

Generate Report: If data is present, clicking **Generate Report** generates a report for the position fix as configured in the Configure Report Options (see Figure 14-119)

14.8.4.2 POSITION FIX DATA VIEW

Within the Position Fix view, there is a sub-view that presents the data graphically for review and editing. This is referred to as the Position Fix Data view. The data presentation type is selected by clicking on the respective tab on the left side of the view. These views and their associated options are detailed here.

14.8.4.2.1 RESULTS TAB

Selection of the Results tab displays basic information about the position fix.

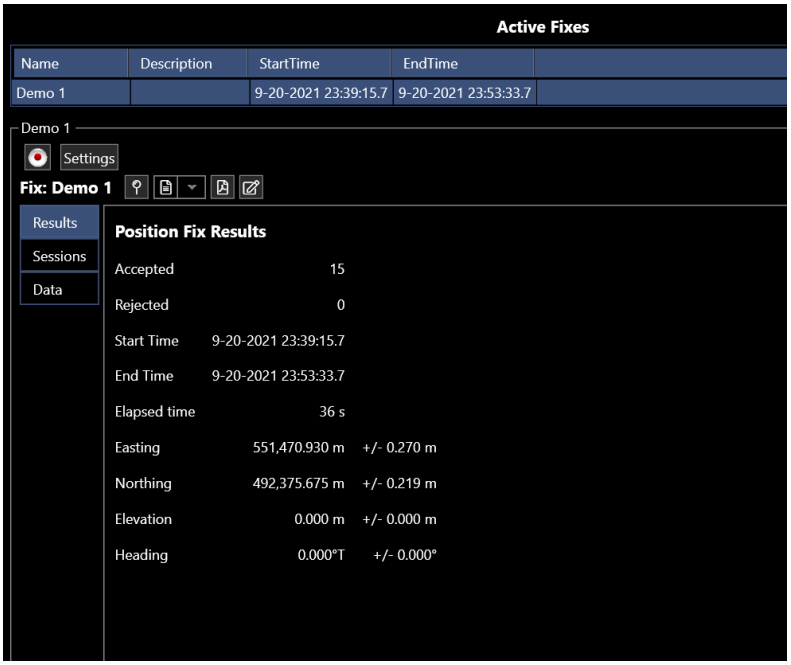


FIGURE 14-121 POSITION FIX RESULTS TAB

14.8.4.2.2 SESSIONS TAB

Selection of the Sessions tab, see FIGURE 14-122 displays an overview of the different recording sessions pertaining to the position fix. A session is created each time data logging is started and closed when the logging is stopped. If multiple recording instances have been initiated over the duration of a fix, they will be listed in the sessions tab. Unchecking the used checkbox for a session will prevent the data from that session being used in the position fix.

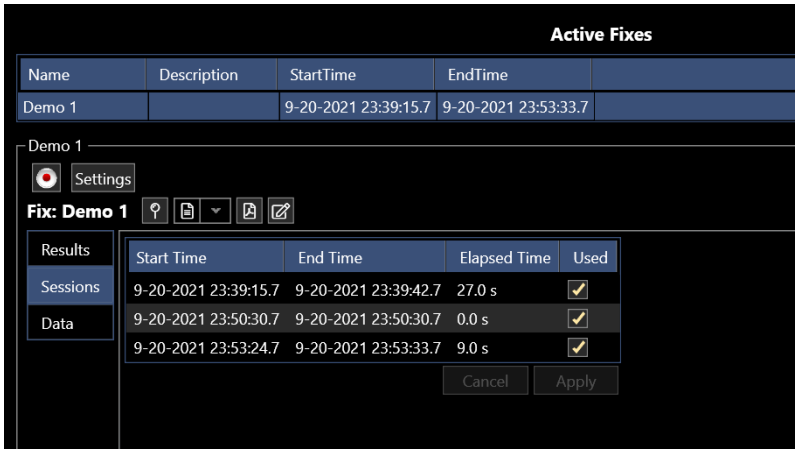


FIGURE 14-122 POSITION FIX SESSIONS TAB

14.8.4.2.3 DATA TAB

Selection of the Position tab (see Figure 14-124) displays a window with multiple tabs presenting options for viewing and editing the data. There are two primary tabs, Details and All Data. In addition, the user can select which data to view if additional data has been logged with the fix.

Selecting the Details tab presents the user with a set of tabs relevant for the review and editing of the selected data source. Selecting the All Data tab presents a view displaying all data logged with the fix.

- **Data Source**
  From the drop-down list, select the data to display in the Details views
- **All Data Tab**
  Selecting the All Data tab presents a view listing all data logged for the fix in tabular view displaying an overview of the data logged

Note: The Source selection does not affect this view.

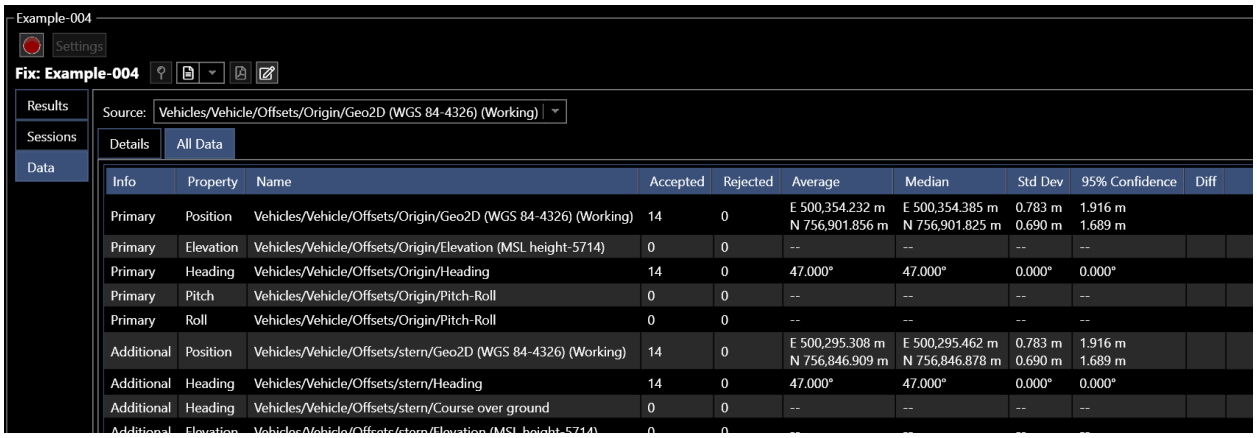


FIGURE 14-123 POSITION FIX WINDOW - DATA/ALL DATA TAB

- **Details - XY Scatter Tab**
  This tab displays a scatter plot of the position fix position data complete with a tool bar with viewing and editing tools and a summary of the results. The default scatter plot scales to display all logged data and if configured, the target point. The following details the scatter plot view.

Note: This view is only present if the selected Source is a Geo2D observation.

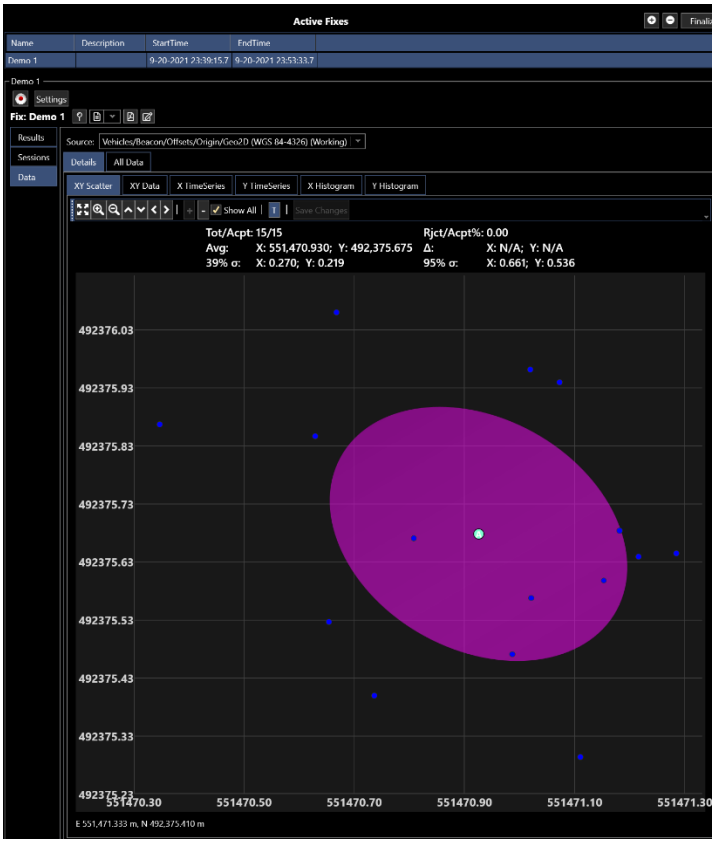


FIGURE 14-124 POSITION FIX DATA TAB

Note: The vertical and horizontal scale are not necessarily the same. It is important to ensure the scaling is known when interpreting the data.

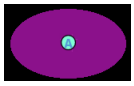
- **Plot Features**

   Location of the data sample's average position

   If configured, location of target position

   An accepted in position

   A rejected position

   Error ellipse for data sample

- **Rollover**

  Rolling the mouse over the error ellipse displays the error ellipse data

- **Viewing Options**

   Click the *zoom extents* button to revert the scatter plot to the default scale and center

   Click the icons to zoom in and out

Click the arrows to move the center of the display up, down, left and right respectively, note that these only have an effect if the view has been zoomed in and not showing the full extents of the data

- **Rectangle Zoom:** Left mouse click in the scatter plot and drag the mouse to capture a rectangle, release the mouse to zoom to that rectangle
- **Scroll Wheel:** Scrolling the mouse wheel zooms the scatter plot in and out while maintaining the absolute position of the mouse within the plot

- **Data Summary Features**

Tot/Acpt:	Ratio of total number of position observations to accepted
Rjct/Acpt%:	Percentage of number of rejected position observations vs. accepted
Avg:	Average position X (Easting) and Y (Northing)
Δ:	Delta from target position to average position, if target is configured, in X (Easting) and Y (Northing)
39% σ:	Standard deviation at 1 sigma (39% confidence level) in X (Easting) and Y (Northing)
95% σ:	Standard deviation at 95% confidence level in X (Easting) and Y (Northing)

- **Editing Tools**

Click to accept the rejected point closest in distance to the average position, this button is not active if there are no rejected points

Click to reject the accepted point furthest in distance from the average position, this button is not active if there are no accepted points

If this box is checked, all rejected points will be displayed on the chart to the full extent. If box is unchecked, the rejected points outside of 1 sigma from the maximum extent of the accepted data will not be shown

Toggle this button to turn on/off the target display on the chart

- **Save:** Click **Save** to write the changes made to the data
- **Left Mouse button:** Click on a point in the scatter plot to toggle it between accepted/rejected

Note: It is important to note that NavView does not remove or alter any data in the position fix. Each observation written to the database has an edit flag associated with it that indicates if the observation is to be used (accepted) or not (rejected). Editing of the data is strictly restricted to accepting or rejecting a position observation, i.e. changing the use/don't use state of this flag. Any changes made to the state of this flag in the view are not written to the database until the **Save** button is clicked.

Selecting the Data tab displays the selected Source data in table listing the timestamp, value(s), residual(s) and the option to use in the calculations by checking/unchecking a Used box. A Statistics panel to the right of the table displays the average(s) and standard deviation(s) at the 95% confidence level for the data.

Figure 14-125 shows the Data tab, shown as the XY Data tab, for 2DGeo Source. The table includes the timestamps, Y (Northing), X (Easting) and residuals in a data list format. The used check box can be unchecked to not include data in the position fix results.

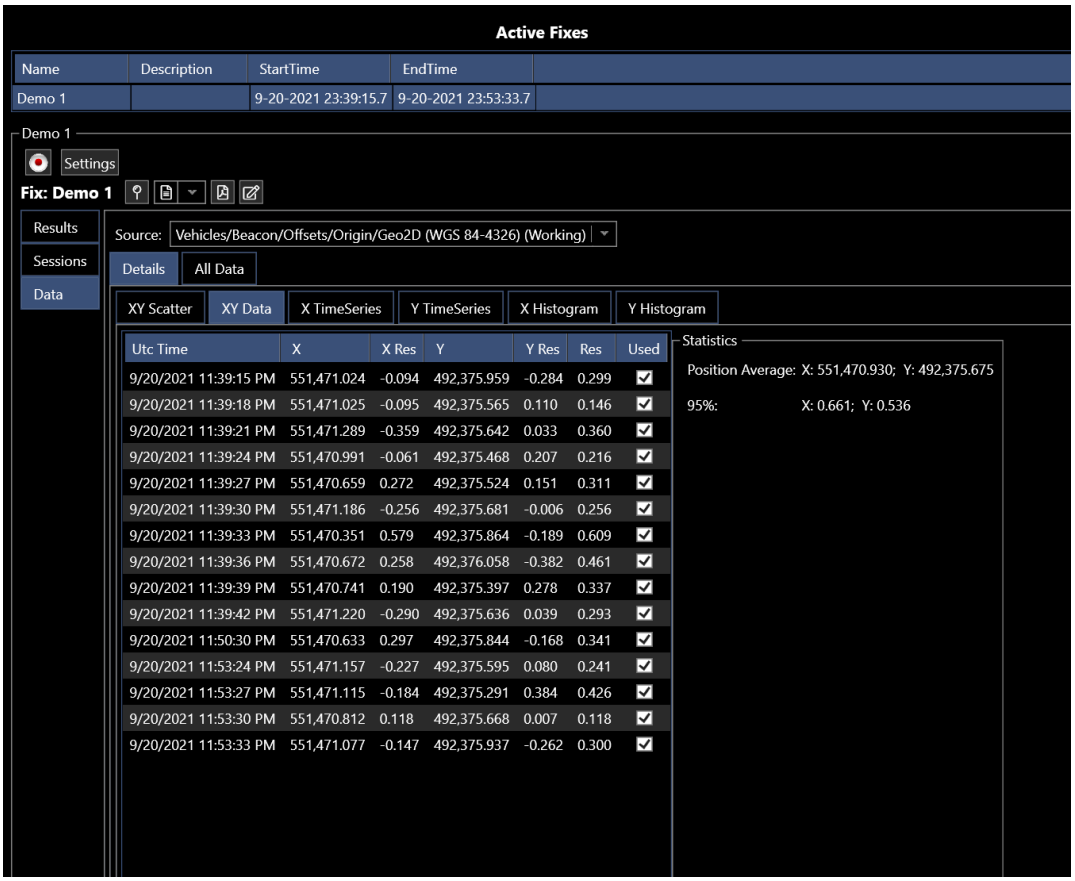


FIGURE 14-125 POSITION FIX XY DATA TAB

14.8.4.2.4 DETAILS - TIME SERIES TAB

Selecting the Timeseries tab displays the selected Source data as a timeseries. The data points can be graphically edited to reject/accept by left mouse click on the data point, rejected data point will appear as ✕.

FIGURE 14-126 shows the TimeSeries tab, labelled as X TimeSeries here and displaying Eastings, where the selected Source is a 2DGeo observation..

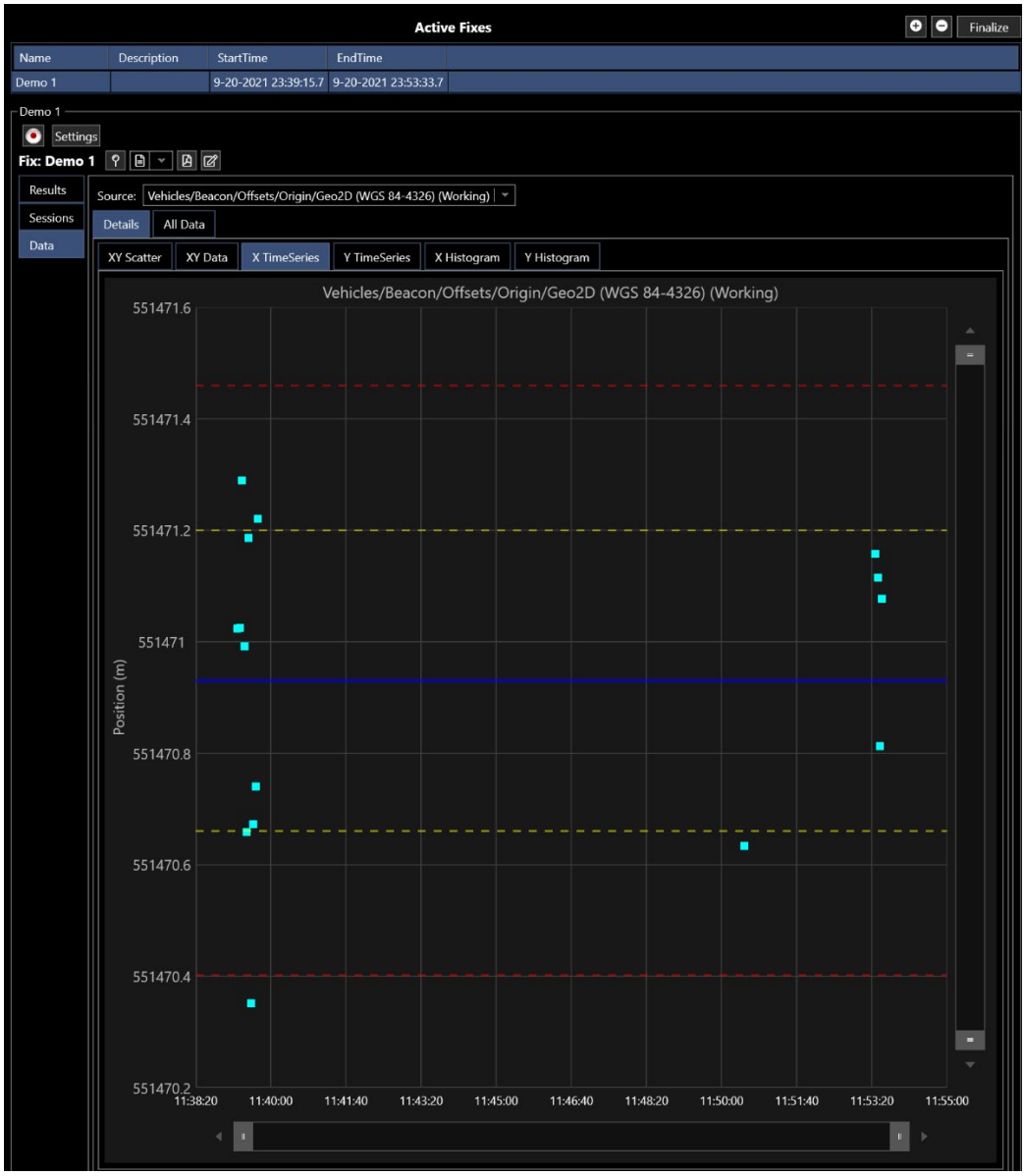


FIGURE 14-126 POSITION FIX X TIME SERIES TAB

14.8.4.2.5 DETAILS - Y TIME SERIES

When a selected Source is a 2DGeo observation, a second Timeseries tab is available for selection. Figure 14-127 shows the Y TimeSeries tab display the Northing data in a time series.

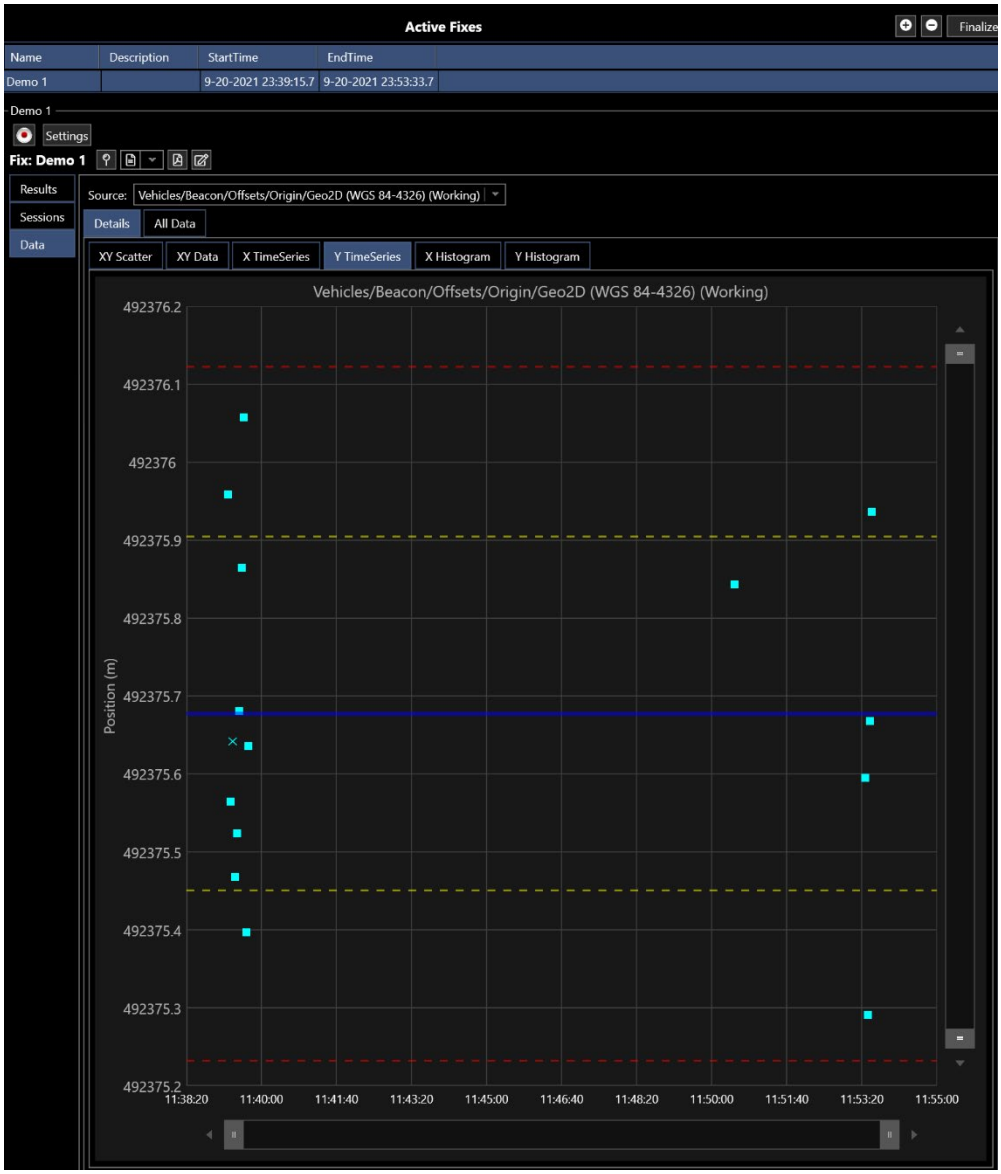


FIGURE 14-127 POSITION FIX Y TIME SERIES TAB

14.8.4.2.6 DETAILS - HISTOGRAM TAB

Selecting the Histogram tab presents the selected Source data in a histogram with the Normal Distribution Curve superimposed to assist evaluation of the data. The 1 sigma standard deviation range is displayed as a shaded area bounded with red vertical lines. The average value and the 1 sigma standard deviation is displayed at the top of the view.

Figure 14-128 shows the X Histogram tab for a 2DGeo Source.

FIGURE 14-128 POSITION FIX VIEW - EASTING HISTOGRAM TAB

14.8.4.2.7 DETAILS - Y HISTOGRAM TAB

When the Source is a 2DGeo observation, a second Histogram tab is available, Y Histogram tab displaying Northings.

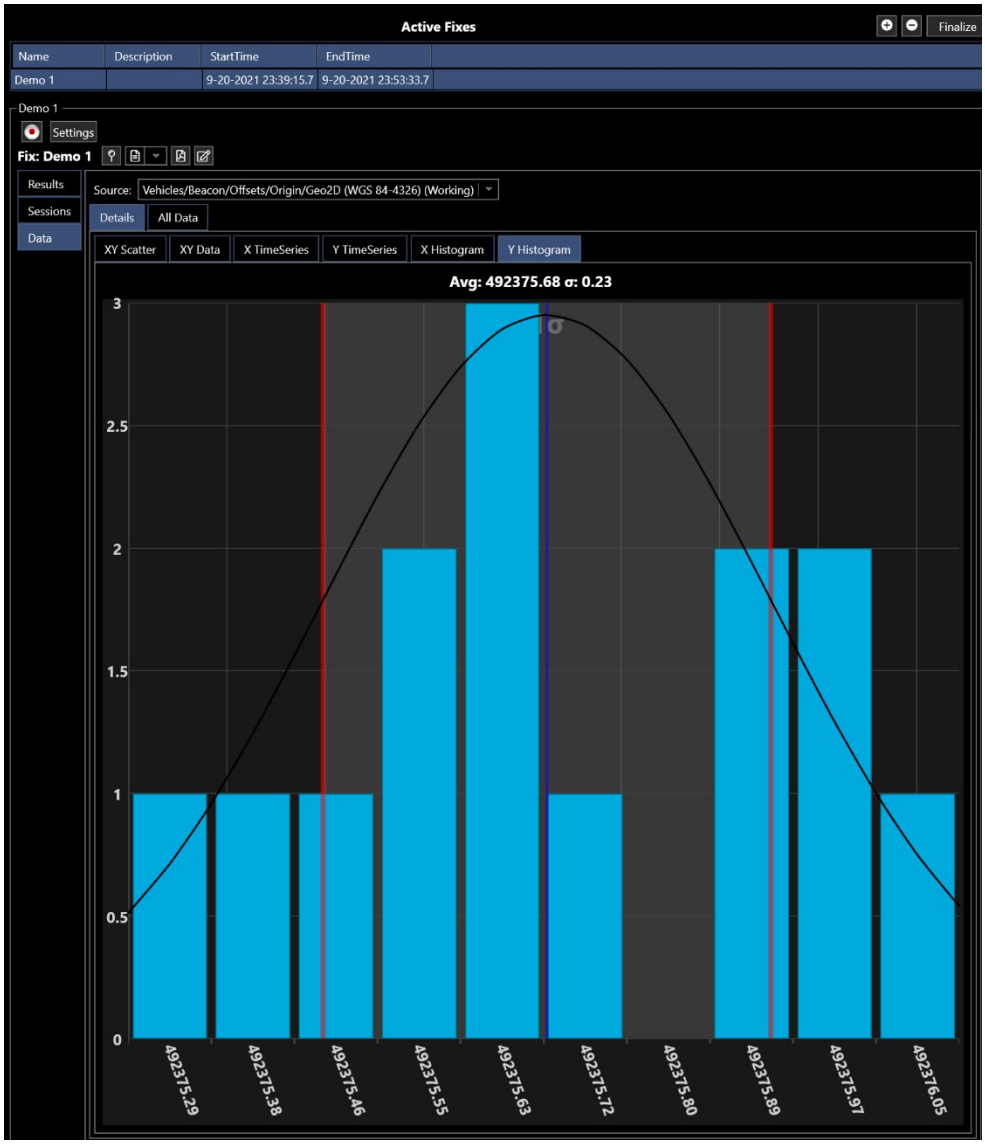


FIGURE 14-129 POSITION FIX VIEW - NORTHING HISTOGRAM TAB

14.8.5 QUERY POSITION FIX VIEW

Finalized Position Fixes can be viewed using the Query feature in the Position Fixes section of the Data ribbon (see Figure 14-130) or in the Explorer view (see Figure 14-131).

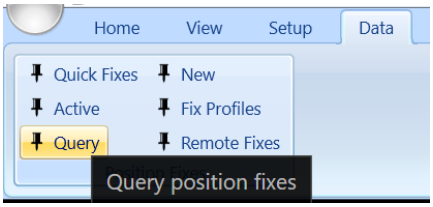


FIGURE 14-130 POSITION FIX QUERY - DATA RIBBON

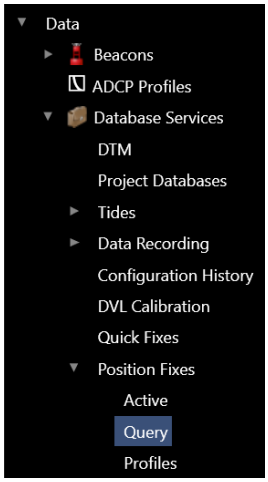


FIGURE 14-131 POSITION FIX QUERY – EXPLORER

1. Select Query from the Data ribbon or Explorer, this opens the Position Fix Query dialog, see Figure 14-132

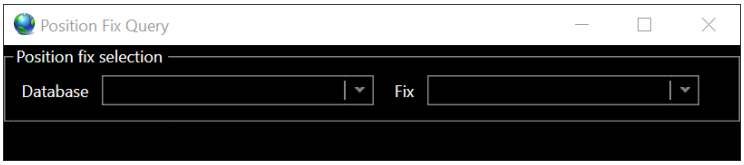


FIGURE 14-132 POSITION FIX QUERY DIALOG

   - **Database:** From the drop-down select the database the desired position fix is stored in, this will populate the drop-down list with those fixes present in the selected database
   - **Fix:** From the drop-down select the position fix to view
2. The selected position data will then be used to populate Selected Fix panel as shown in Figure 14-133. For details regarding working with the data from this view, refer to and Position Fix Data View

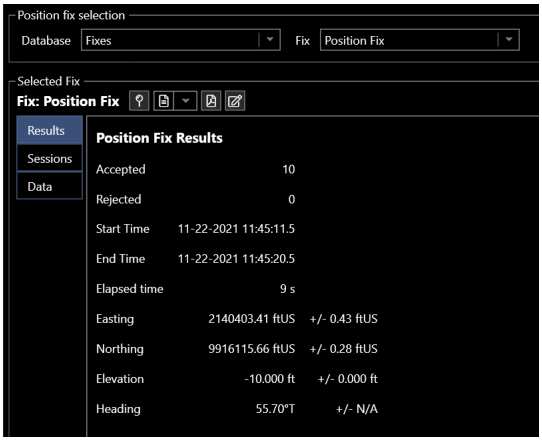


FIGURE 14-133 POSITION FIX QUERY RESULTS EXAMPLE

14.9 CONFIGURATION HISTORY

The **Configuration History** tool in NavView displays the configuration history via a query tool that can be exported as a text file. To access the configuration history window, open the explorer window, expand data, database services and click on Configuration History.

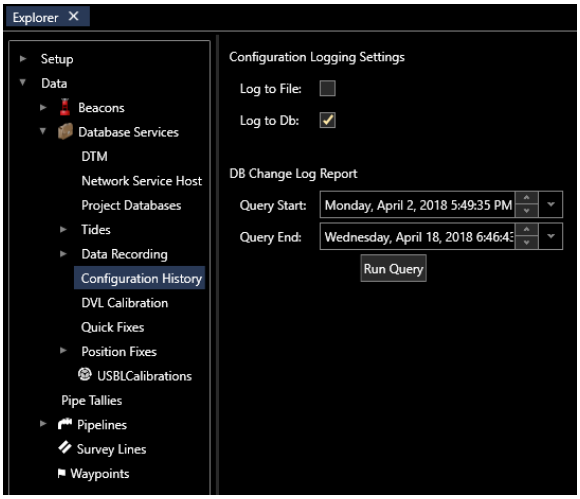


FIGURE 14-134 CONFIGURATION HISTORY

- **Configuration Logging Settings**
  - **Log to File:** If checked changes to the Project are logged to a file
  - **Log to DB:** If checked changes to the Project are logged to a database
- **DB Change Log Report**
  - **Query Start:** Enter date and time to start query
  - **Query End:** Enter date and time to start query

14.10 DVL CALIBRATION

The DVL calibration tool in NavView uses a custom query from the standard data recording. The ROV must be navigated down a straight line while recording positions, heading and DVL Data. NavView will then process the data and provide misalignments and scale factors which can be applied in the DVL settings.

There are three data streams required to calibrate a DVL sensor:

- Vehicle CRP Position (Geographic2D Observations)
- Vehicle Heading (Heading Observations)
- DVL Data (Horizontal Velocity Observations)

The Vehicle CRP input should be positioned without the DVL sensor. For the case of an ROV tracked using USBL this would be the corrected CRP position of the ROV based on beacon location. The vehicle heading used should be the corrected heading with C-O applied.

It is recommended to log a test data set and run through the query process prior to starting the actual calibration, to verify that data is coming in from all sensors and logged in the correct locations.

14.10.1 RECORDING DVL CALIBRATION DATA

Navigate to **Data Recording** in **Database Services**. Set up a new recording session. It is recommended but not necessary to only record the items of interest for the calibration. Enter a Logging Name describing the DVL Cal, so the data can be easily located. Uncheck “Downsample Data” so that all data gets recorded.

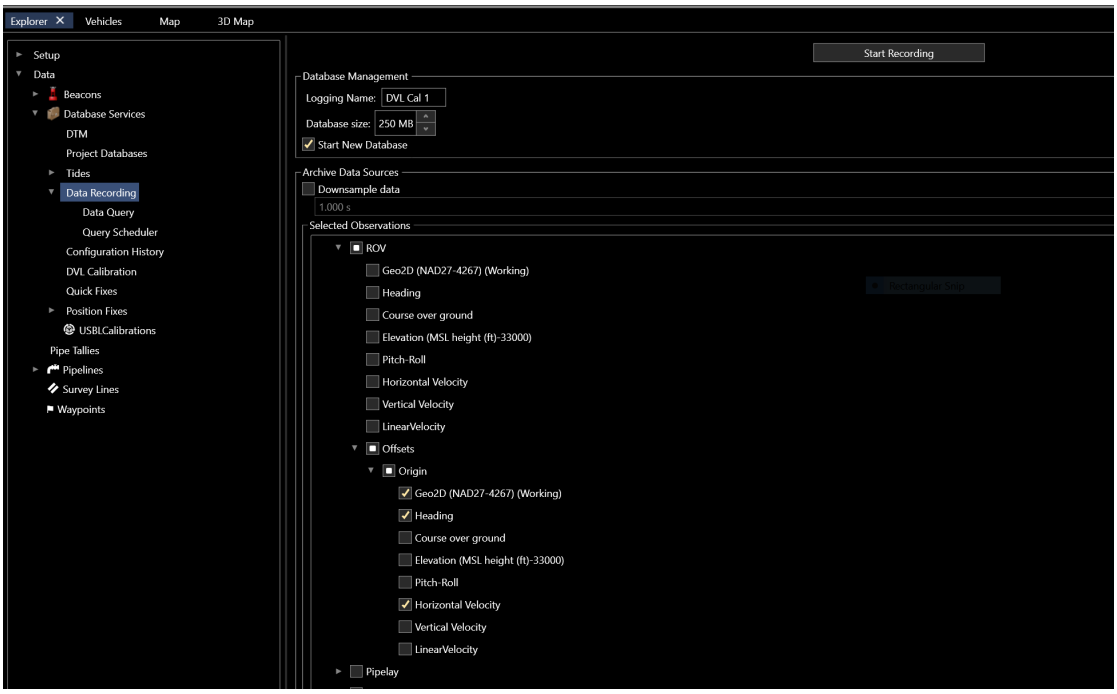


FIGURE 14-135 DVL CALIBRATION – DATA RECORDING

Start recording and navigate the vehicle down a straight line for approximately 100-200m meters. The length of navigation depends on the noise of the positioning system being used. If the system is positioned using LBL or USBL in shallow water where the accuracy is greater, then a shorter baseline could be used.

14.10.2 DATA QUERY

1. Navigate to the DVL Calibration section under database services, as seen below.

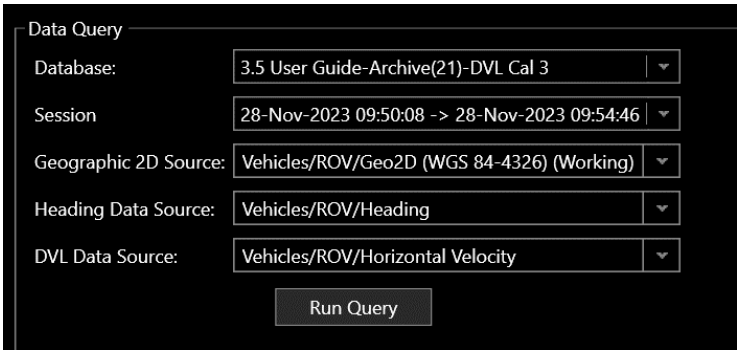


FIGURE 14-136 DVL CALIBRATION - DATA QUERY

a. **Database:** Select the database that was used to record the data for calibration
   b. **Session:** Each time data recording is started or stopped in NavView data logging, a new database session is created. These sessions are listed in a combo box for the selected database, by start and end time. Select the session that was used to record the DVL Calibration Data
   c. **Select Geographic 2D Source:** All position sources that were logged in the data recording session will be available. Select the source used to position the ROV without Kalman filter applied
   d. **Select Heading Data Source:** The heading source is the corrected vehicle heading. This is required to apply to velocity data from the DVL to calculate a position track. Select the heading source for the ROV used during the data recording session
   e. **Select DVL Data Source:** The velocity source is the DVL observations which are to be calibrated. Select the source logged during the data recording session

Once the database, session, and data sources are selected, click **Run Query** at the bottom of the screen. Data for the three sources will be presented in a graphical form as seen below.

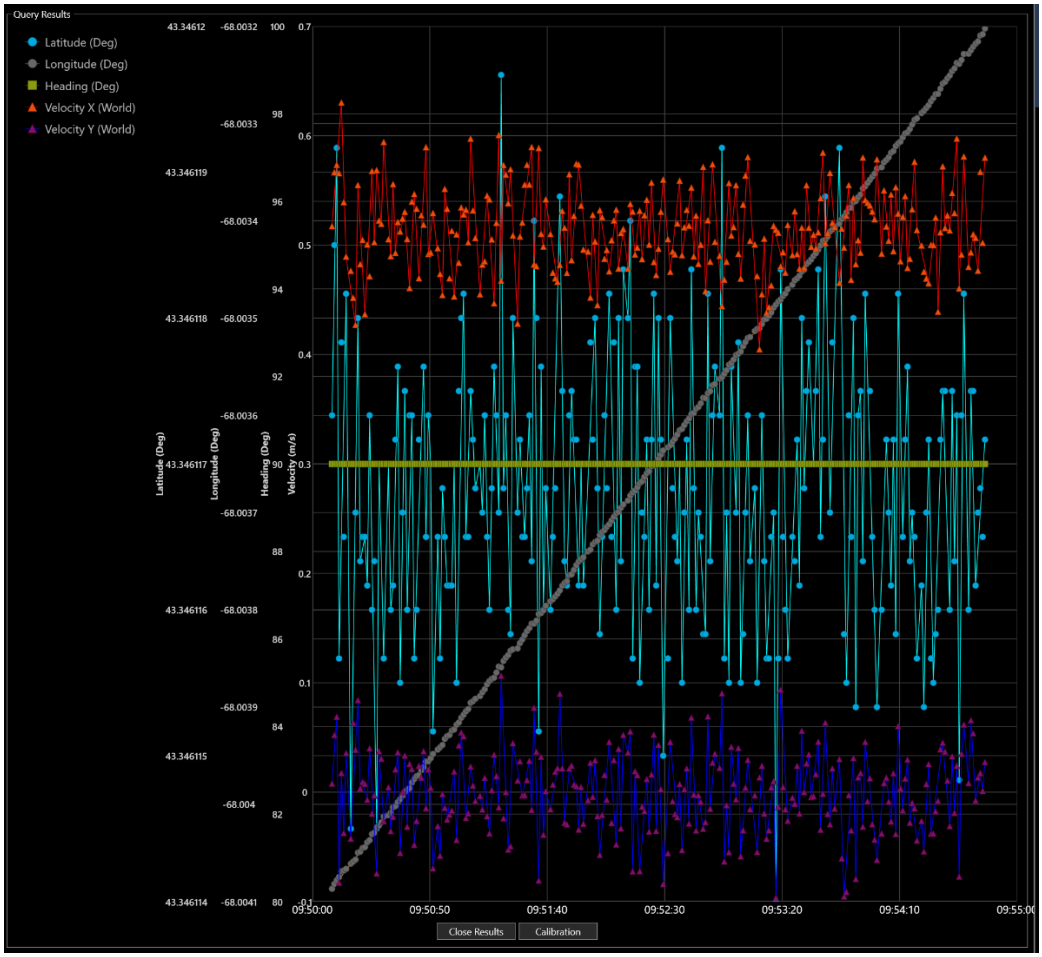


FIGURE 14-137 DVL CALIBRATION – RECORDED DATA – RUN QUERY RESULTS

2. Click **Calibration** to open the calibration tool.

14.10.3 CALIBRATION

The DVL Calibration tool window is shown below.

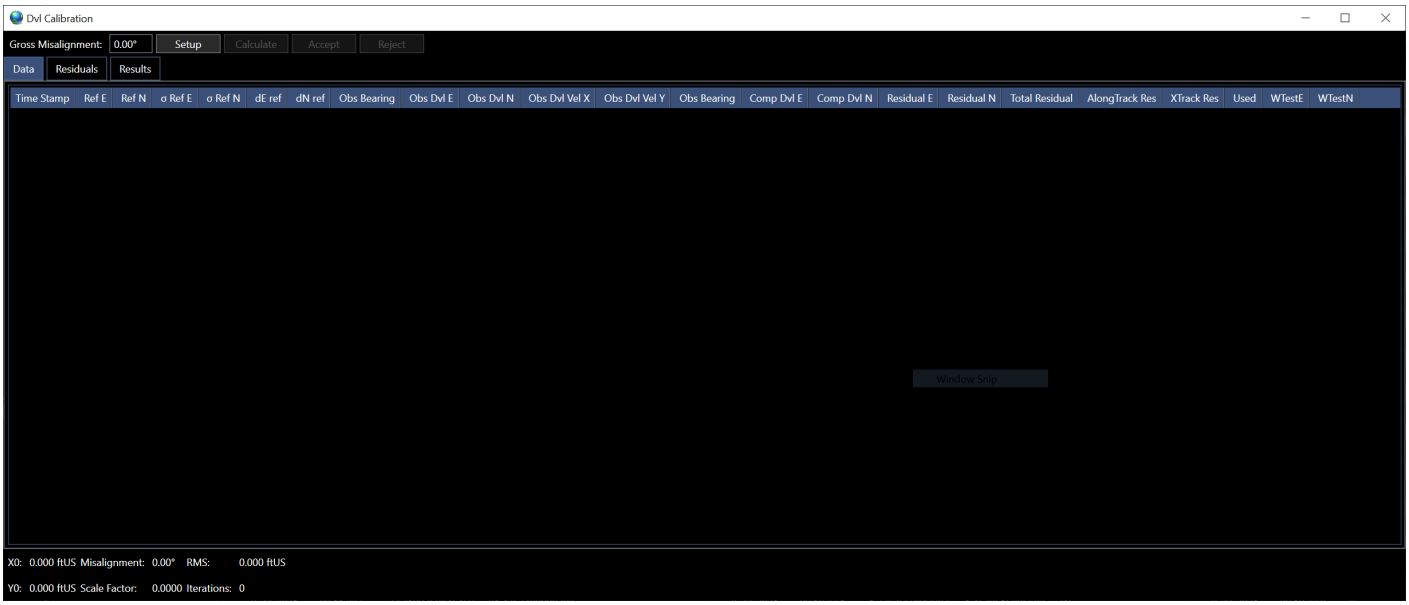


FIGURE 14-138 DVL CALIBRATION - TOOLS WINDOW

There are a few simple command buttons along the top of the window:

- **Gross Alignment:** if the DVL unit is rotated from forward when mounted on the vehicle, this rotation is entered here, e.g. rotated 90° or 180°
- **Setup:** this will populate the data from the data query and reset any parameters

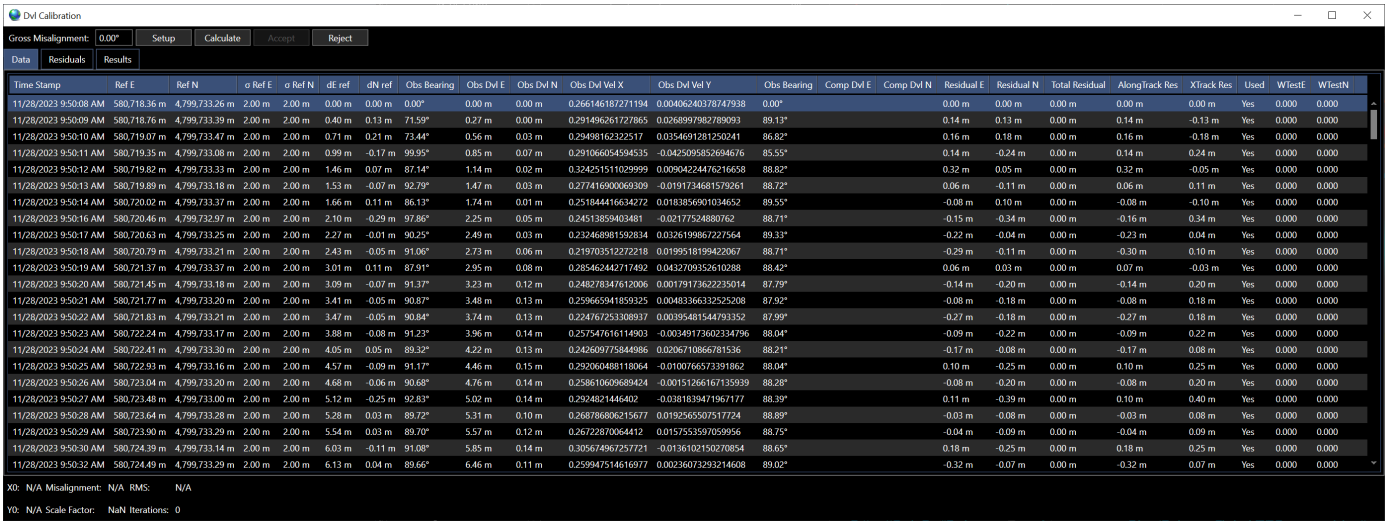


FIGURE 14-139 DVL CALIBRATION – DATA LOADED

- **Accept/Reject:** multiple data points can be selected simultaneously and accepted or rejected using these buttons
- **Calculate:** will run the calibration routine on the data and provide results

The tabs in the window are as follows:

- **Data Tab:** The observations are presented here in a tabular format. Here, once the result is calculated, data can be selected for rejection, and residuals can be examined numerically (see Figure 14-140)

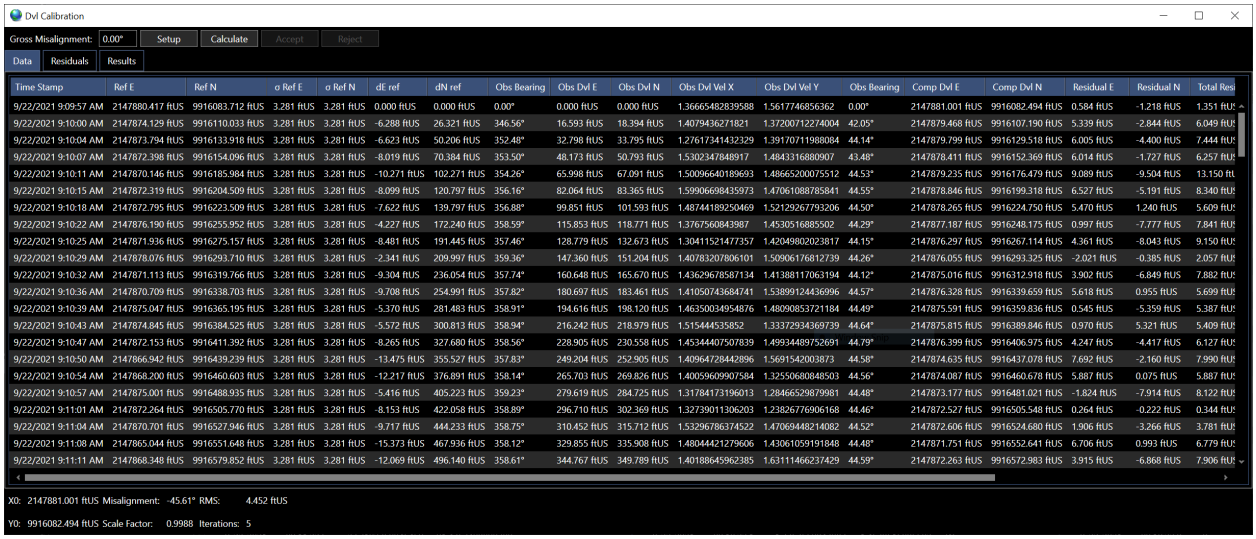


FIGURE 14-140 DVL CALIBRATION - DATA TAB

- **Residuals Tab:** On the residuals tab, residual data can be viewed as either **Track Relative**, **Eastings/Northings** or **Total**.
  - **Track Relative** residuals refer to data points relative to the trajectory of the vehicle, along track and cross track (see Figure 14-141)
  - **Easting/Northing** residuals are relative to north up.
  - **Total** shows the combined residual.

If a high residual is identified on these charts, it is possible to Navigate to the Data tab and sort by the type of residual and reject that item. Once this is done, the calculation should be run again.

FIGURE 14-141 DVL CALIBRATION - TRACK RELATIVE RESIDUALS TAB

- **Results Tab:** The results tab shows the results of each iteration in the least squares adjustment used to calculate the misalignments and scale factor. The shifts in value from each iteration of the calculation can be seen. If the result quickly converges in 2-4 iterations and has very small changes, it is likely an acceptable calculation. If the data changes dramatically and oscillates around a value, then the data should be re-examined to determine if there are any issues.

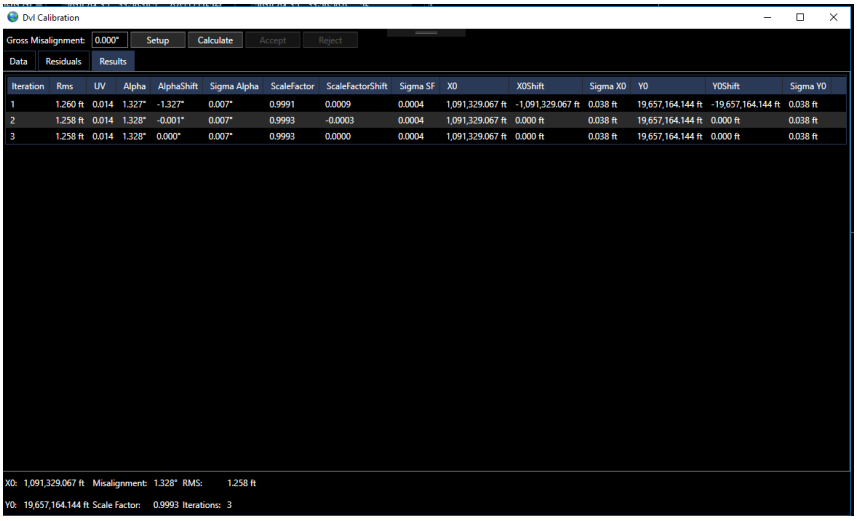


FIGURE 14-142 DVL CALIBRATION - RESULTS TAB

14.10.4 METHODOLOGY

The calibration routine calculates a location based only on dead reckoning of DVL Data and heading data then compares this to the position source location at each time epoch. The parameters of heading misalignment, scale factor, and starting position are adjusted using a least squares routine. Each iteration of least squares provides a shift for each of the

parameters, as seen above. These are applied to the parameters, and the calculation is run again. Convergence is determined once the parameters are no longer changing.

14.10.5 WORKFLOW

To calibrate the DVL, use the following steps, starting from loading into the calibration window.

1. Click the Setup button to load data into the calculation.
2. Click Calculate to get an initial result.
3. Look at the residuals tabs to get an idea of the size of the outliers. Also look at the RMS value shown at the bottom of the screen, and the parameter results to see if they make sense.
4. If outliers are found, return to the Data tab, Data can be sorted by: Residual E, Residual N, Total Residual, Along Track Residual, and Cross Track Residual by clicking on the table headers for those values. Sort the data by Total residual so that the greatest residuals in any direction will appear at the top of the list. Select these data items and click **Reject**
5. If data has been rejected, click **Calculate** again, and then re-examine the residuals and results. Repeat this process until satisfied.

14.10.6 EXAMPLE

The example residuals below show very large along track residuals for the first few seconds of data collection (see FIGURE 14-143).

FIGURE 14-143 DVL CALIBRATION - HIGH RESIDUALS EXAMPLE

When examining the results of the calibration, there are 6 iterations and the final RMS is 2155 ft, and the shift in Alpha (heading misalignment) is 180 degrees on the last iteration. It appears that the calculation has not converged.

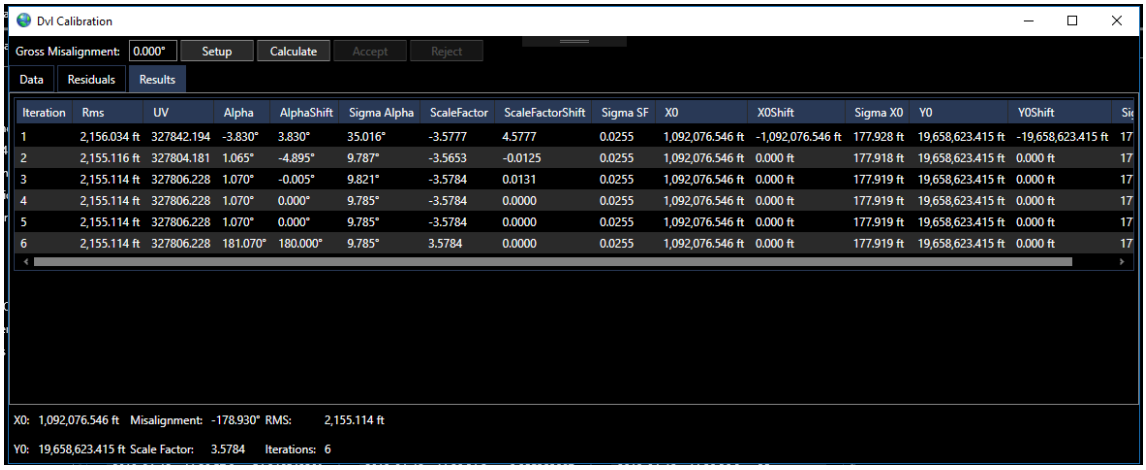


FIGURE 14-144 DVL CALIBRATION - RESULTS NOT CONVERGED

The user would then return to the data tab and sort by Total Residual. The total residual for several observations is very large. Click the Reject button to not use this data (see FIGURE 14-145).

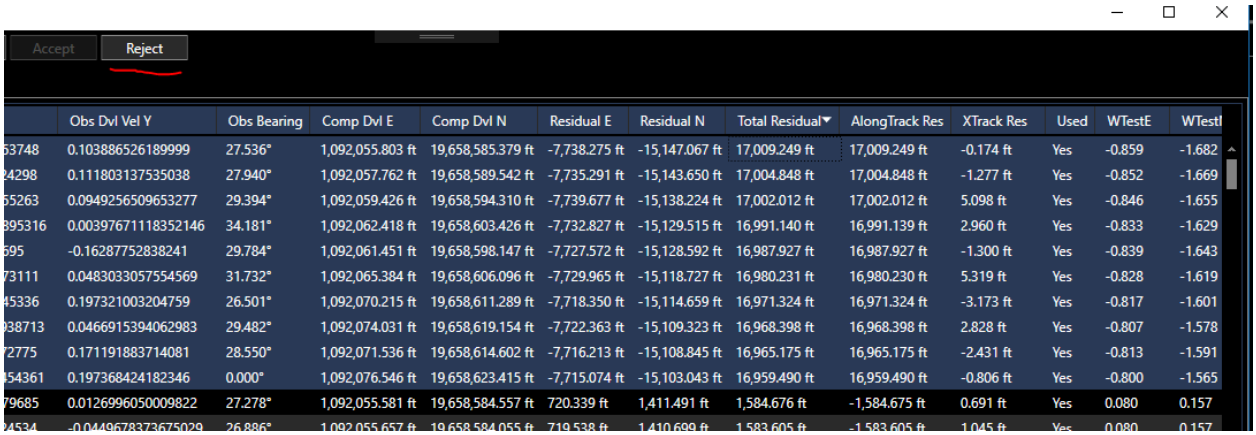


FIGURE 14-145 DVL CALIBRATION - RESIDUALS SORTED

Once this data was rejected, the Calculate button was clicked again. The resulting residuals tab is seen below:

FIGURE 14-146 DVL CALIBRATION - RECALCULTED RESIDUALS

Here, it appears there are one or two observations that fall outside the 95% confidence (orange line) and as such could still be rejected and the calibration rerun.

At this point, the Results tab is examined which shows that convergence has been achieved. There are only 3 iterations, and on the last one the shift in all parameters is seen to be zero (see FIGURE 14-147).

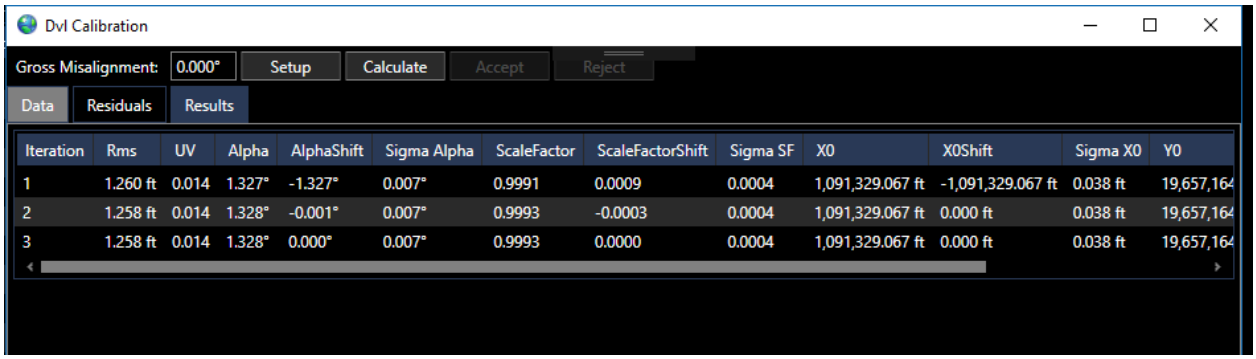


FIGURE 14-147 DVL CALIBRATION - RESULTS CONVERGED

14.11 USBL CALIBRATION

USBL calibrations determine the error in the mounting of the USBL transducer relative to the vessel's local coordinate reference frame. The results are correction values for pitch, roll and heading with an option for scaling that are applied to USBL observations before they are used.

This is covered in a sperate section, **USBL Box-In and Calibration**