

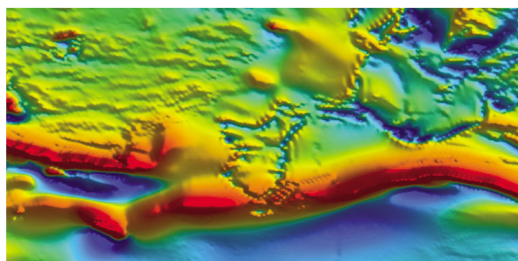


Government of **Western Australia**
Department of **Mines and Petroleum**

RECORD 2010/16

PROCEDURE FOR LEGACY POINT AND DATA CAPTURE (2nd edition)

by
S Sheppard, L Kelly, TR Farrell, and RE Green



Geological Survey of Western Australia



**GEOLOGICAL SURVEY OF
WESTERN AUSTRALIA**

Record 2010/16

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Procedure for legacy point and data capture

by

S Sheppard, L Kelly, TR Farrell, and RE Green

Abstract

This document explains the rationale and procedure for the capture of old Geological Survey of Western Australia (GSWA) field sites. The document consists of two main parts: 'Point capture from aerial photographs', which discusses transferring data from aerial photographs into real world coordinates in a digital environment using ArcMap; and 'Entry of field observations into WAROX', which concerns the entry of data from GSWA field notebooks, sample ticket books, and petrographic reports into GSWA's WAROX database.

Introduction

Legacy field observations, made during GSWA mapping prior to the routine use of the WAROX database, are an important information source that can be used to: design mapping programs and research questions of interest; more efficiently target remapping; and provide customers with all existing information at the start of the remapping program. However, these observations are currently scattered amongst aerial photographs, field notebooks, sample ticket books, petrographic reports, and the printed maps, providing a major impediment to their efficient use. In addition, sample site locations recorded before the availability of GPS units in 1991 and migrated from the old ROCKMIN database into WAROX, are at best accurate to no more than several hundred metres (and a kilometre or more at worst), while GPS observations recorded before 1 May 2000 typically have an uncertainty of ± 100 –200 m. This uncertainty commonly means that the rock samples and thin sections in GSWA collections cannot reliably be linked back to a rock type in the field. As such, it is important to capture these older field sites and enter the associated data into WAROX.

There are two basic steps involved in entering old GSWA field sites and data into the WAROX database:

1. capture of field site locations from hardcopy aerial photographs into a standalone copy of WAROX using ArcMap, followed by
2. entry of field notes, lithologies, structures, samples, scanned photographs, and petrographic reports into the captured field sites within WAROX.

Although the first step does not require a person with geological training, experience has shown that, at minimum, a third year university student is necessary for the correct entry of geological information from the field notebooks into WAROX. The most important attributes for someone capturing the field sites are the ability to match patterns from the aerial photographs with the imagery on screen, and an attention to detail.

The legacy capture process is based on the premise that the geologist's original field site was accurately located on the hardcopy aerial photograph. Experience has shown that this assumption is correct for the vast majority of sites. The importance of giving accurate, real world coordinates to these field sites cannot be overstated, because all of the observations (field notes, structural readings, and photographs) and derived data (e.g. petrography, microprobe analyses, whole-rock chemical and isotopic analyses, and geochronology) relate back to the field site and its location. Nevertheless, it may not be possible to accurately relocate every point. Reasons for this may include poor quality or deteriorated aerial photographs, faded or crowded markings on the aerial photographs, an inability to identify the originator, or featureless terrain.

The present Record is an update of GSWA Record 2009/17. This update was considered necessary in order to repair hyperlinks made invalid by a change of Department name, and an upgrade from ArcMap 9.2.1 to ArcMap 9.3; improve discussions on validating captured field sites, and setting the location description and location method, for

which minor process changes have been recently made; and to replace screenshots and instructions made obsolete by the introduction of Microsoft Office 2007.

Point capture from aerial photographs

Preparation

Project folder

Each 1:250 000 map sheet to be captured requires a folder labelled *MapSheetName_250k* in the directory [V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy Arc project data](#). Within this *MapSheetName_250k* folder, a separate folder must also be created for each set of aerial photographs attributable to that map — for example, Ninghan 1962, 1968, and 1980. If points from a 1:100 000 sheet are to be captured, then a new folder *MapSheetName_100k* is needed; this should be placed within the appropriate 1:250 000 sheet folder. These folders will also store the ArcMap project used for data capture, and the Warox_2k.mdb file into which the captured points will be uploaded.

Documentation of aerial photographs and Site IDs

Before point capture can begin in ArcMap, the hardcopy aerial photographs must be checked for completeness. To do this, compare the numbers on the supplied aerial photographs with the flight-line diagram for that map sheet. If the flight-line diagrams cannot be obtained from the library, they may be held at Geoscience Australia in Canberra, and accessible via the following link: <http://www.ga.gov.au/apps/aerial-flight-diagrams/index.php>. The numbers of any missing photographs should be entered into the file Template_Marked & Missing_photos.xls in [V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy Documentation](#). Open this template and use the “Save As” command to create a file named *MapSheetYr_Marked & Missing_photos.xls* in the appropriate folder. If all photos for a given run are present, then enter ‘NIL’ against that run number.

Next, make a list of the field sites recorded on each set of aerial photographs. This is very useful for picking up duplicate Site IDs, and, if points need to be checked later, then it is easy to go back to the required photograph. Enter the Site IDs into the “Marked photos” tab in *MapSheetYr_Marked & Missing_photos.xls*; if none of the photos in a run are marked, ‘NIL’ should be entered under the “Photo” column. Once this list is complete, consult the Project Manager or Terrane Custodian as to whether Site IDs for any particular geologists will not be captured. Points may not be captured for many reasons, including inadequately marked sites, illegible field notes, lost field notebooks, an unknown geologist, or, in the opinion of the Project Manager or Terrane Custodian, a geologist with insufficient experience in the rock types mapped.

If a geologist has points numbered from 1 to ‘X’ on each photograph, then *each* of the repeated point numbers will need to be assigned a new Site ID in the “Duplicate Site IDs” tab of the *MapSheetYr_Marked & Missing_photos.xls* spreadsheet. The purpose of this is to prevent duplicate Site IDs, which are not permitted by ArcMap’s Warox Tool. For each aerial photograph then, the original points starting from Run 1 should be listed in the “Duplicate Site IDs” worksheet, along with a new corresponding Site ID.

This step is extremely important, as it is the only way to link the points listed in the geologist’s field notebook with the new Site IDs in WAROX during the data entry process.

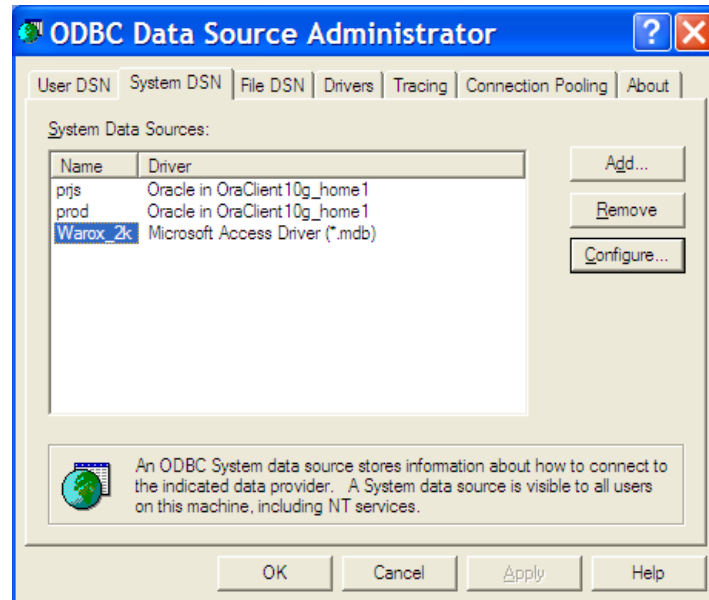
A project in ArcMap can now be created to capture the points listed in the *MapSheetName_Marked & Missing_photos.xls* spreadsheet. A separate project file will be required for each set of aerial photographs.

Set up of MS Access database for data capture

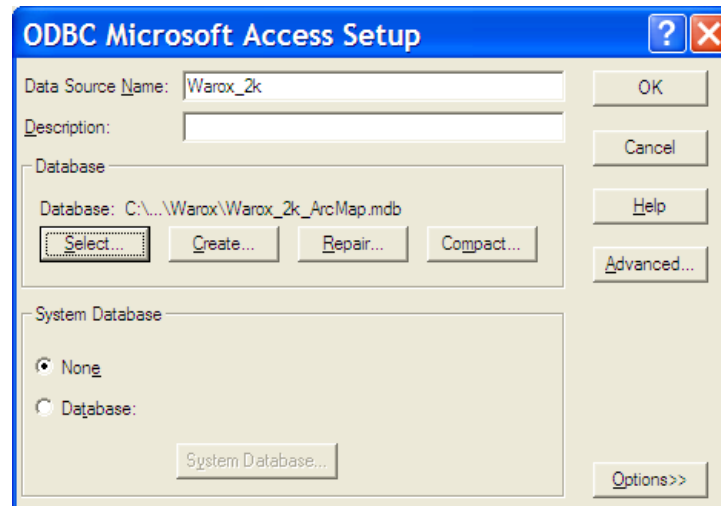
Copy the Legacy_Warox_2k.mdb file from [V:\GS53_Tetrapak\Projects\Legacy_Data_Capture](#) into the map sheet folder (i.e. [V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy Arc project data\MapSheetName](#)). Points captured in ArcMap will be saved into this file.

By default, the DMP ArcGIS Warox Tool will write data into C:\Program Files\Warox\Warox_2k.mdb. The following procedure, which directs this tool toward a file in another location, is reproduced from page 18 of DMPArcGISWaroxToolsUserManual.pdf (located in [C:\Program Files\Department of Mines and Petroleum\DMP ArcGIS Warox Tools](#)).

Go to “Start” > “Settings” > “Control Panel” > “Administrative Tools” > “Data Sources (ODBC)” (Note: If you cannot see “Administrative Tools” in the Control Panel, then click on “Switch to Classic View”). In the “ODBC Data Source Administrator” window, select the “System DSN” tab. Click on “Warox_2k” and then “Configure...”:



Then click on “Select...”:

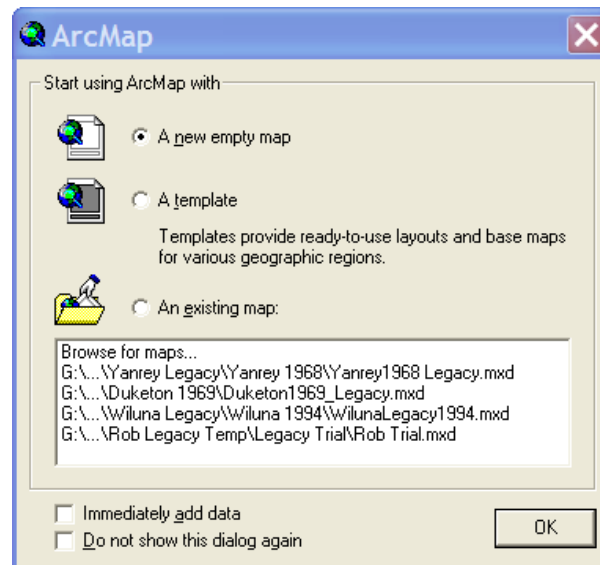


Navigate to the Warox_2k.mdb file in V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy Arc project data\MapSheetName, and then click “OK”. This procedure will need to be repeated each time a new project is started.

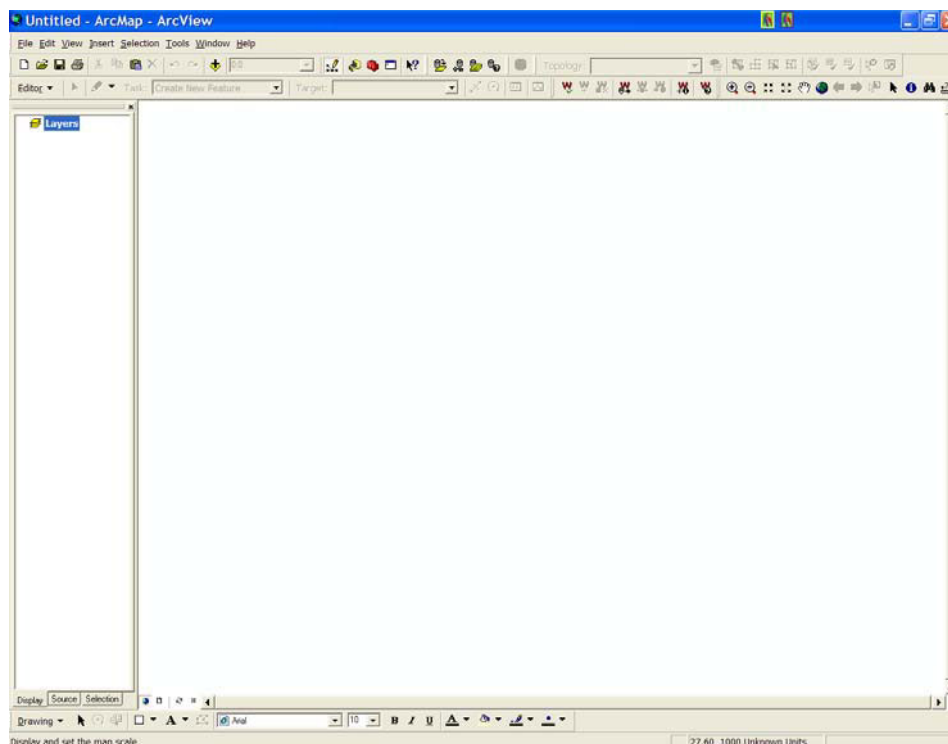
Copy the file WAROX_gdb.mdb from [V:\Resources\Databases\WAROX\WAROX_ARCGIS9_TOOLS](#) into the folder [C:\Program Files\Department of Mines and Petroleum\DMP ArcGIS Warox Tools](#). The Warox_gdb.mdb file is a holding place for all points captured in ArcMap, and is useful for locating and correcting duplicate Site IDs. At the conclusion of a project, this database file should be copied into V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy Arc project data\MapSheetName.

Project set up in ArcMap

The next step is to set up a new project in ArcMap to capture points from the aerial photographs. To do this, either double click on the shortcut to ArcMap on your desktop, or go to “Start” > “Programs” > “ArcGIS” > “ArcMap”. When the following screen appears, select the option “A new empty map”, and click “OK”.



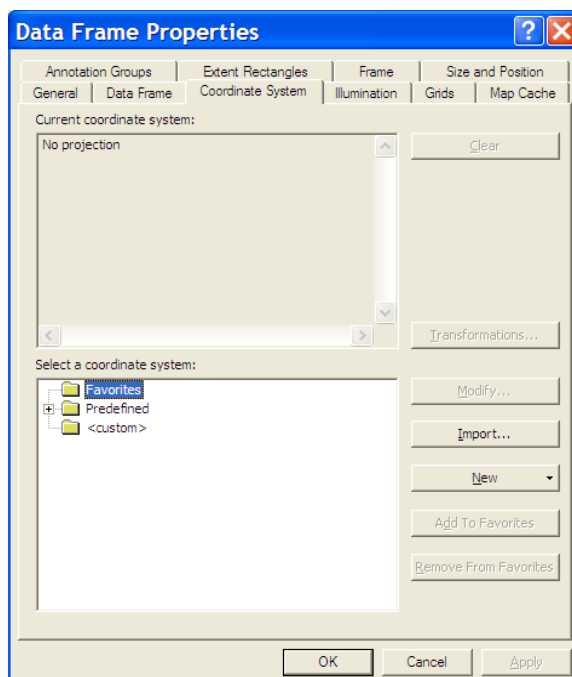
Selecting this option will open the following window:



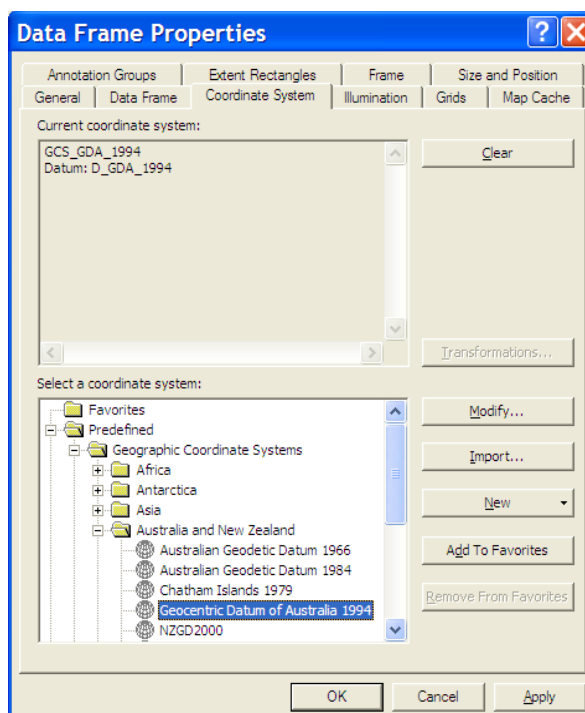
We now need to set the coordinates and select the datum for the project. There are two basic sets of coordinate systems that may be used: projected or geographic. If projected coordinates are to be used, then the correct zone must be selected. The problem with this approach is that if the map sheet is adjacent to a zone boundary, any points that plot

just off the sheet may fall into the adjacent zone, and will not display correctly in the ArcMap project. To avoid this, it is best to select geographic coordinates.

To select the coordinates and datum, right click on “Layers”, then select “Properties” from the resultant drop-down list. This brings up the following screen:



In the part of the window titled “Select a coordinate system”, select “Predefined”, then “Geographic Coordinate Systems”, then “Australia and NZ”, and “Geocentric Datum of Australia 1994”.



Then click “OK”. This will return you to the blank view in ArcMap.

Selecting the correct datum is crucial: point capture in the wrong datum may require the deletion and recapture of all points. Regardless of whether or not geographic or projected coordinates are used, only the GDA 1994 datum must be used.

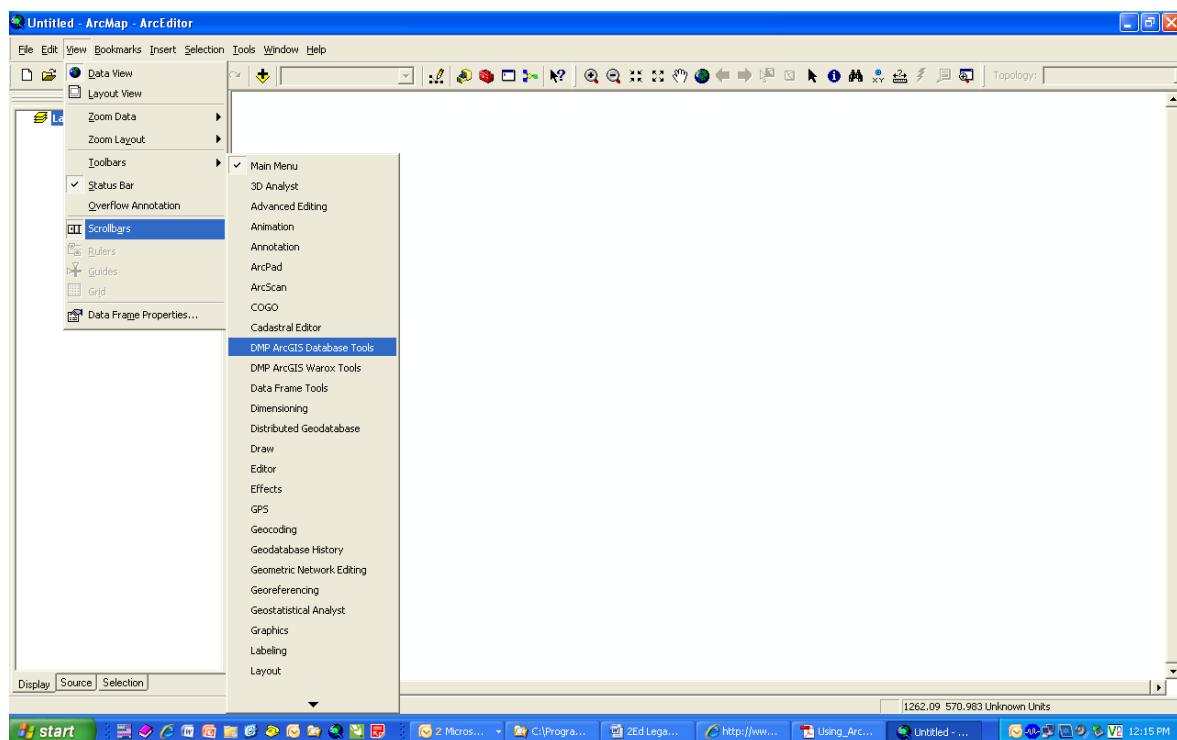
We now need to add some imagery to the project, which will be used to match the field sites on the aerial photographs with the same position on screen. Many areas in Western Australia will have orthophotography coverage, but those areas without will require the use of SPOT or LANDSAT imagery instead. We also need to add reference layers so that the spatial accuracy of this imagery can be checked. All GSWA digital images are stored on the [Spatialimages on 'Internal/Corp' \(I:\) drive](#).

Reference data

To add reference data to a project file, select the “DMP ArcGIS Database Tools” button from the menu along the top of the screen:

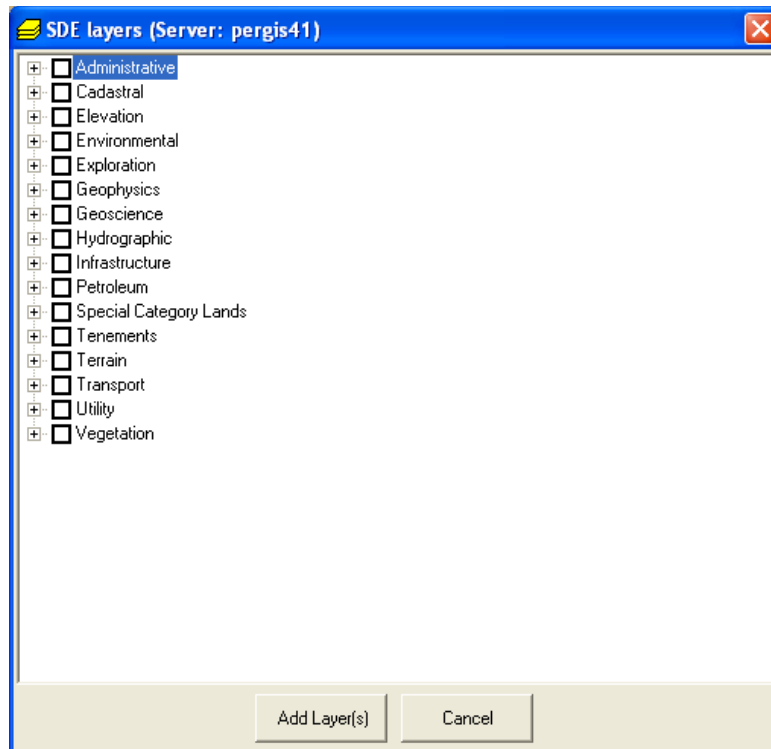


If this button is not visible, click on “View”, also on the menu along the top of the screen, followed by “Toolbars”, and then select the “DMP ArcGIS Database Tools” option from the drop-down list.

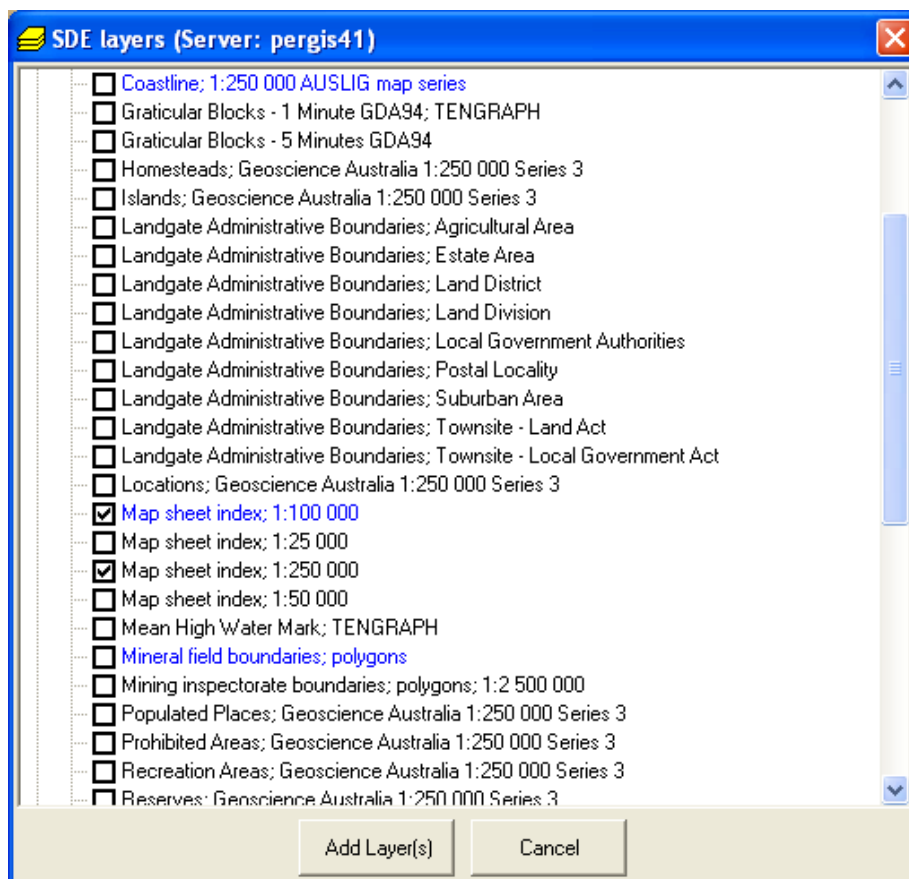


If “DMP ArcGIS Database Tools” does not appear in the drop-down list, it will need to be installed. To do this, click on the following hyperlink: [V:\Resources\Applications\ARCGIS_TOOLS\9.3.1\DMPArcGISDatabaseTools\DMPArcGISDatabaseTools_QuickInstall.bat](#). Right clicking anywhere on the menu at the top of the screen in ArcMap should then show the “DMP ArcGIS Database Tools” as an option. As described above, select this option to activate the toolbar.

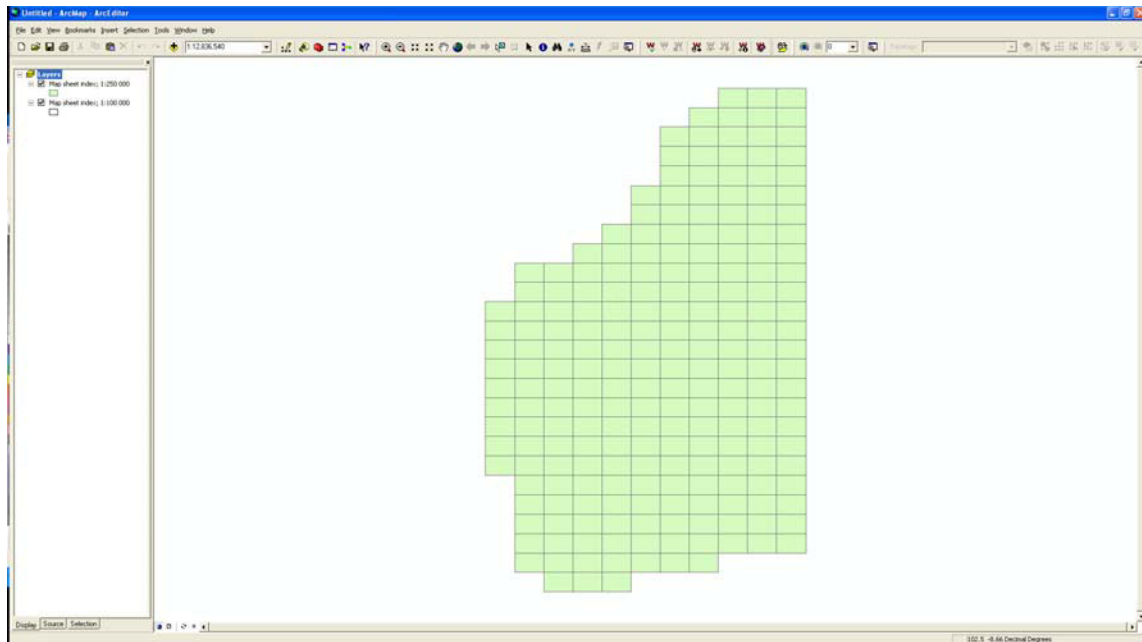
To add the 100K map sheet index and 250K map sheet index, expand the “Administrative” folder:



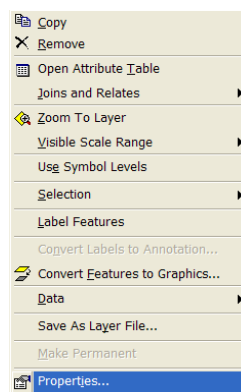
Select “Map sheet index; 1:100 000” and “Map sheet index; 1:250 000”, and click the “Add Layer(s)” button:



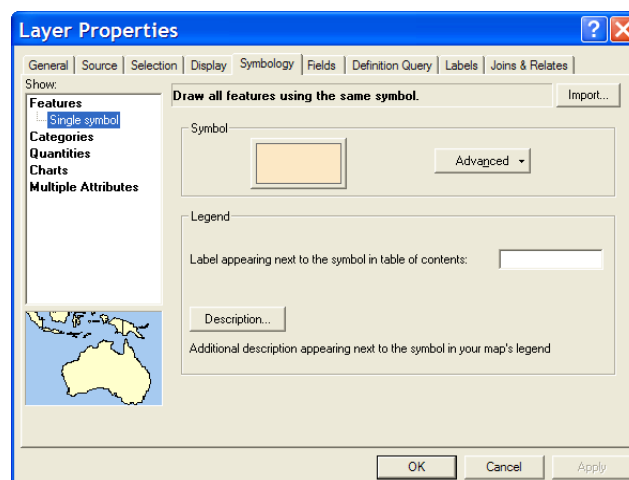
After adding the map sheet indexes, the window will resemble the following:



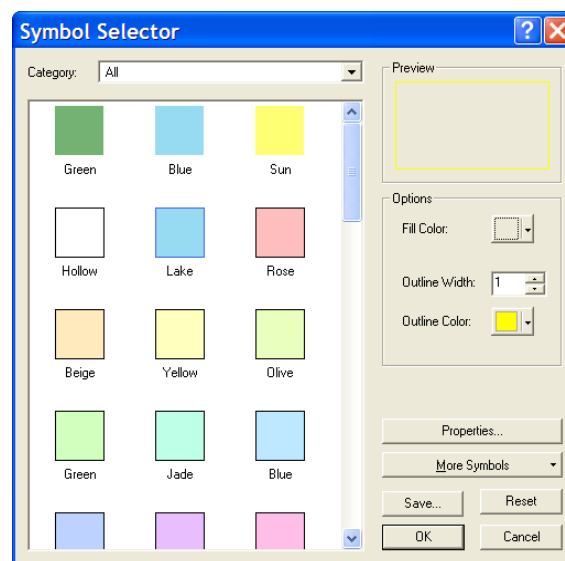
For each layer added, some properties need to be changed so that underlying layers, such as the orthophotography or LANDSAT images, will still be visible. To do this, right click on each layer in turn, and select “Properties”:



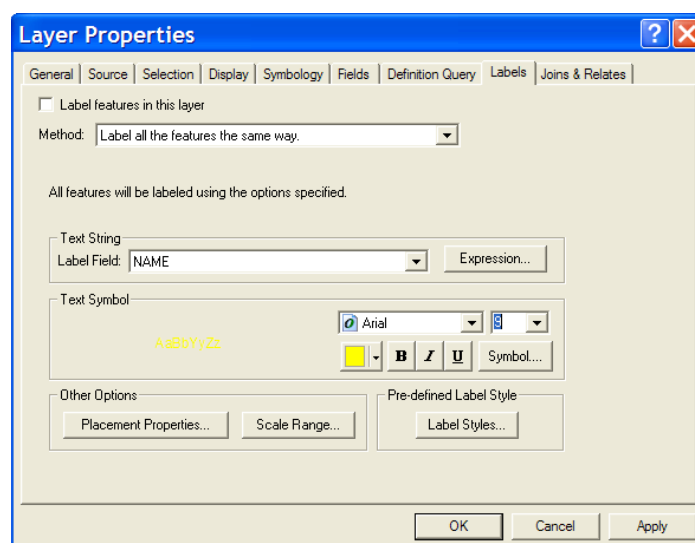
In the “Layer Properties” window that appears, click on the “Symbology” tab, followed by the “Symbol” button.



In the “Options” box, set “Fill Color” to “No Color”, “Outline Width” to 1, and “Outline Color” to whatever you like, then select “OK”.



Now select the “Labels” tab, and change the “Text Symbol” colour to match the outline; adjust the font size according to your preference. Select “Apply” and then “OK”.



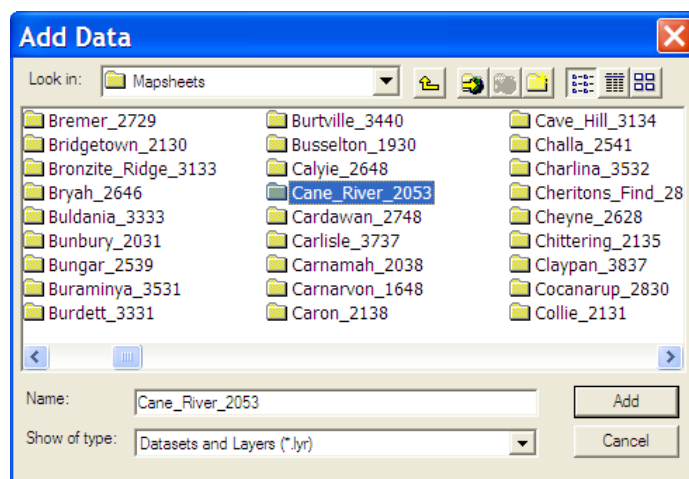
Imagery for data capture

Now we need to add orthophotography, LANDSAT, or SPOT imagery to the project file, so that points on the hardcopy aerial photographs can be matched on screen.

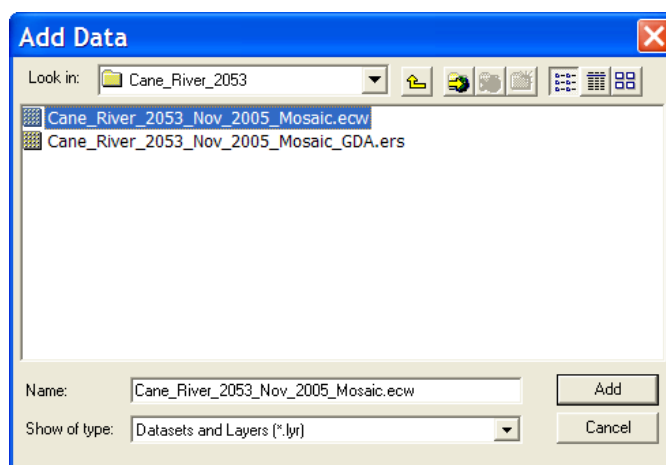
In ArcMap, press the “Add Data” button:



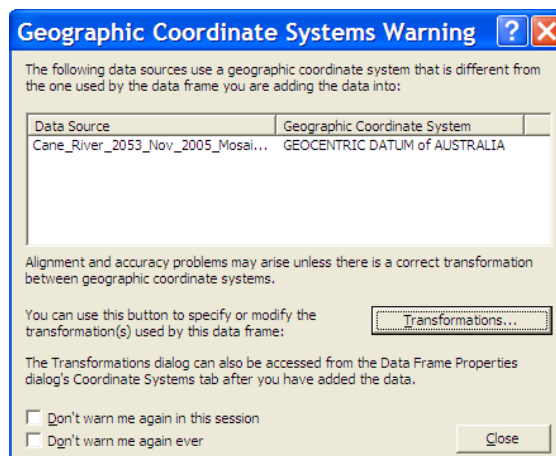
and navigate to the appropriate imagery in the [I:\External\Orthophotos\Mapsheets](#) folder. In this example, we are searching for the Cane River 1:100 000 sheet orthophoto.



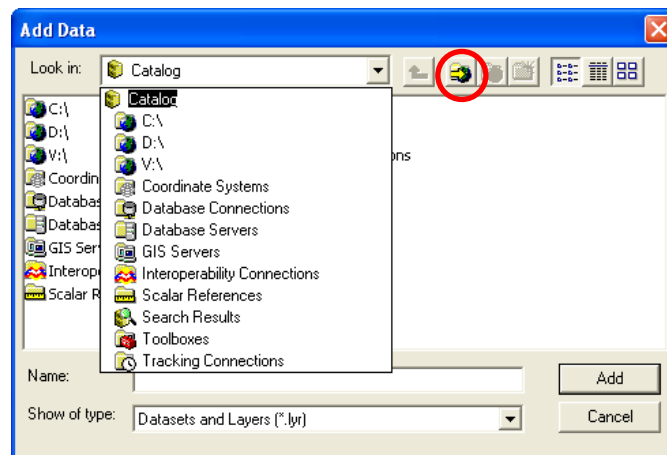
In the relevant map sheet folder, select the required .ecw or .jp2 file and click “Add”:



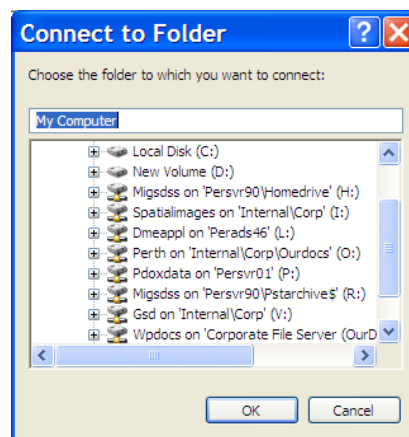
If the following screen appears, click on “Close”:



If the I:\ drive is not visible in the window, then it will need to be connected first. To connect to the I:\ drive (or any other drive), click on the “Connect to folder” button, circled below:

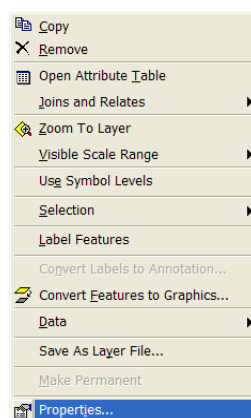


Select the required drive, and click “OK”.

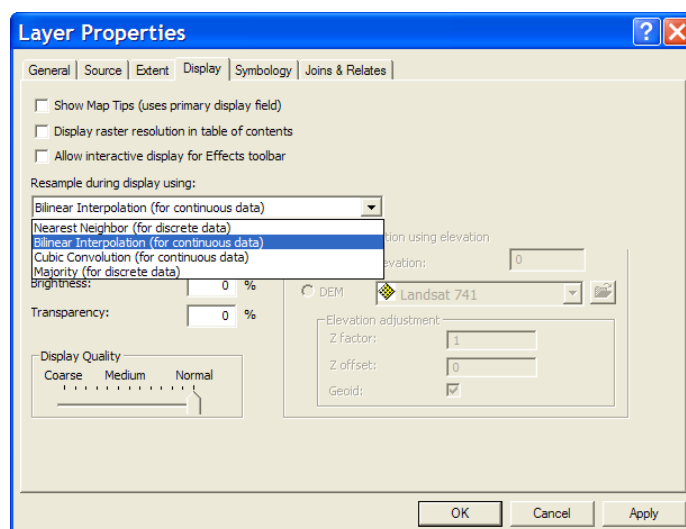


Double clicking on any of the drives will display the list of folders within each drive. However, it is best to select an entire drive rather than an individual folder, so that all folders within the drive will be accessible.

When zooming in on a small area, each newly imported orthophoto, LANDSAT, or SPOT image will appear pixelated. To smooth these images, right click on each layer in turn, and select “Properties”.



In the “Layer Properties” window that appears, select the “Display” tab. In the drop-down list under “Resample during display using:” set as “Bilinear Interpolation (for continuous data)”. Then select “Apply” and “OK”.



Accuracy of imagery

An important part of the data capture process is to have some independent means of checking that the orthophotos and other imagery is spatially correct *before* capture of the field sites begins. This is best done using shape files derived from GSWA field mappers’ GPS track logs, or differential GPS track logs from the Department of Main Roads.

To import track log files, use the “Add Data” command to go to [I:\ReferenceData](#). Track log files may be held in one of the following folders: GPS_Track or MainRoadsDGPS\Shapefiles.

The imagery can then be checked against any track logs that cross the sheet. This is best done by zooming in to an area — or areas — where the track logs run roughly east–west and north–south so that both the X and Y coordinates can be verified.

Once image accuracy has been verified, the ArcMap project can be saved into: V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy Arc project data\MapSheetName.

Data capture

Now that we have set up and saved the project, we are ready to start capturing points from the aerial photographs. This process requires the “DMP ArcGIS Warox Tools” toolbar (shown below):

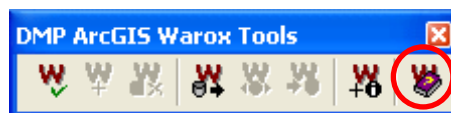


If this toolbar is not visible in ArcMap, right click anywhere on the menu bar at the top of the screen, turn on the toolbar by selecting its name in the drop-down list, and then drag it onto the menu bar.

If “DMP ArcGIS Warox Tools” does not appear in this drop-down list, it will need to be installed. To do this, click on the following hyperlink: V:\Resources\Applications\ARCGIS_TOOLS\9.3.1\DMPArcGISWaroxTools\DMPArcGISWaroxTools_QuickInstall.bat. Right clicking anywhere on the menu at the top of the screen in ArcMap should then show the “DMP ArcGIS Warox Tools” as an option. As described above, select this option to activate the toolbar.

Open WAROX editing session

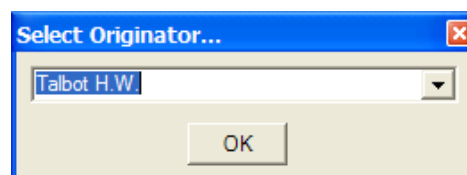
The following section is, in part, a summary taken from the DMP ArcGIS Warox Tools User Manual by BP Falletti, which can be accessed through the “Help” button on the “DMP ArcGIS Warox Tools” bar in ArcMap, as shown below:



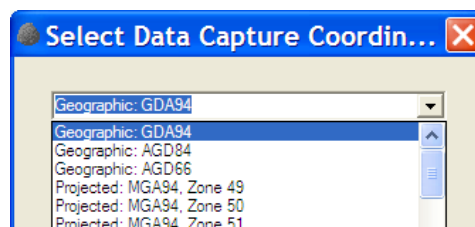
To begin entering points in ArcMap, select “Open Warox Editing Session”.



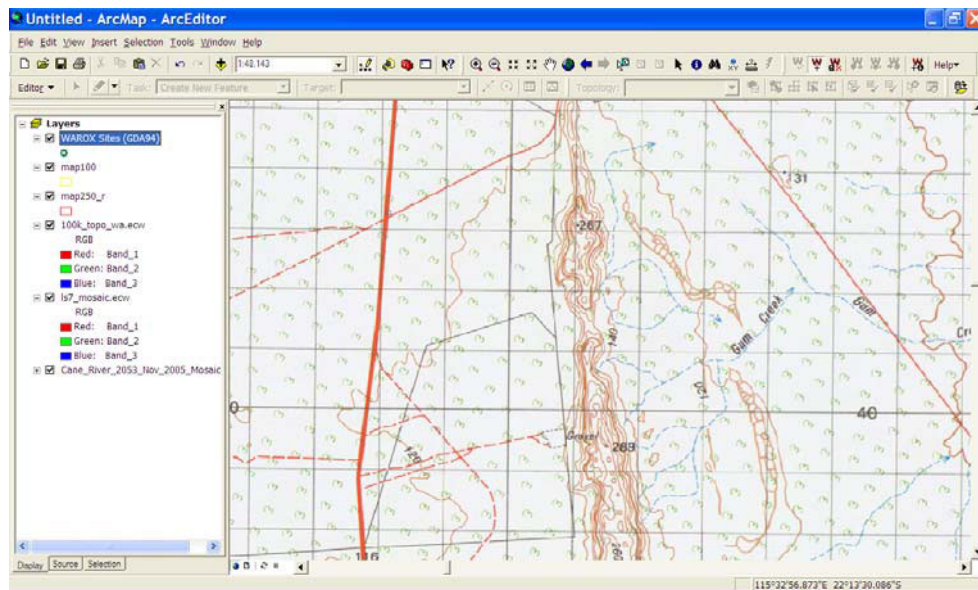
Select an Originator, using the three letter codes recorded in [V:\GS53 Tetrapak\Projects\Legacy_Data_Capture\Legacy_Documentation\GSD_ORIGINATORS_PROD.xls](V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy_Documentation\GSD_ORIGINATORS_PROD.xls), and click “OK”.



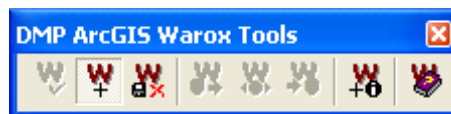
To set the coordinate system, choose “Geographic GDA94” in the next window, and click “OK”:



A new layer called “WAROX Sites (GDA94)” is created as a result.



The “Capture Warox Points” tool is then enabled, and set as active. The button “Close Warox Editing Session (Load Edits To Warox)” is also enabled, and the mouse arrow is changed to cross hairs.



Points can now be entered by left clicking the location on screen that corresponds with the same point on the aerial photograph marked by a field site. A small window then pops up, into which the user is asked to enter a Site ID for the new point. The Site ID must be 12 characters long, of which the first three characters are the originator’s three letter code, the second set of three characters are for the project code or map sheet initials, and the last six characters are for the point number on the aerial photograph.

The three characters for the project code could relate to a particular generation of mapping (e.g. 1960s vs 1970s) or to a particular tectonic unit (e.g. Gascoyne Province, Carnarvon Basin). Consult the Project Manager or Terrane Custodian for the correct project code. This approach to site numbering makes the search and retrieval of data related to a particular project more straightforward. Additionally, using this method, all the points for a given originator in a given project will be grouped together when Site IDs are listed in ascending or descending order in WAROX, and missing Site IDs can then be easily identified.

Alternatively, a three letter code for each 1:100 000 map sheet can be used instead of a project number. The standard three letter code for each sheet is listed in: V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy_Documentation\MAP_SHEET_CODES.xls.

If the format of the Site ID entered is correct, a new point is added to the database, and the user can capture another field site.

Close WAROX editing session

The steps listed above need to be followed for each new originator listed on a project. When changing originators, and before closing an editing session, it is important to save your work. To close and save an editing session, click on the “Close Warox Editing Session (Load Edits to Warox)” button:



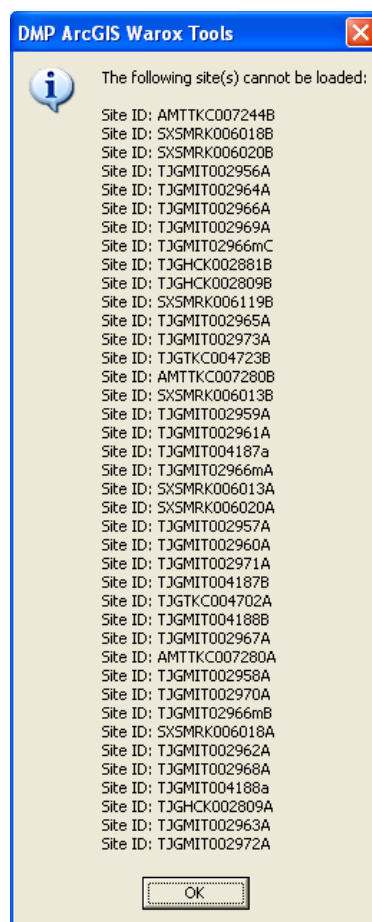
The newly captured sites are uploaded into the Warox_2k.mdb database located in V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy Arc project data\MapSheetName.

Load existing WAROX sites

To view all records existing in a Warox_2k.mdb file, click the “Load Existing Warox Sites” button:

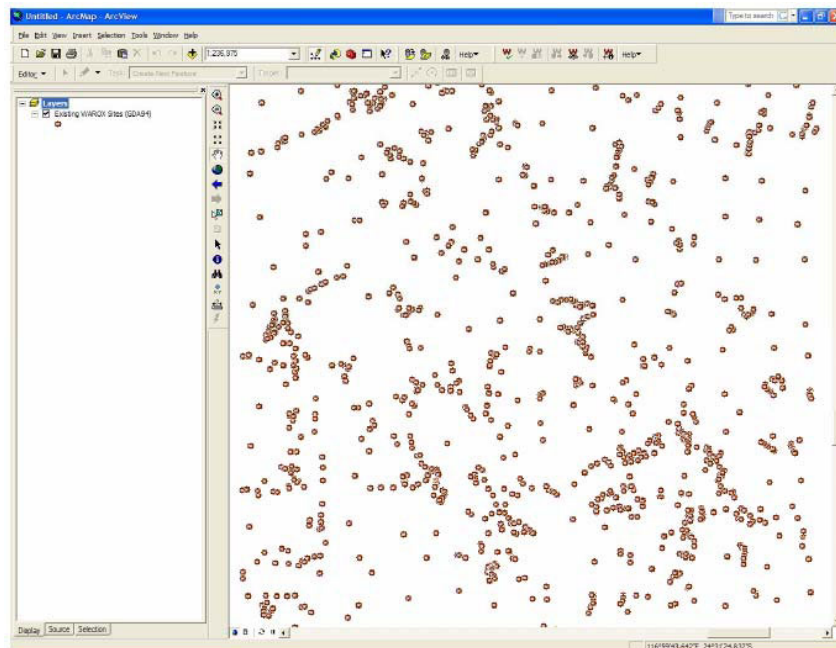


If the format of a Site ID is incorrect, or if a Site ID is duplicated, the sites cannot be displayed, and the following error message appears:



Regardless of the type of error, these points will need to be edited in the WAROX_gdb.mdb file in <C:\Program Files\Department of Mines and Petroleum\DMP ArcGIS Warox Tools>, before they can be loaded into the Warox_2k.mdb file.

Upon loading the existing sites, a new layer “Existing WAROX Sites (GDA94)” is added to ArcMap:



Moving WAROX sites

Once the existing WAROX sites have been loaded into ArcMap, any points which have been incorrectly located can be moved using the “Move Existing Warox Points” button:



In order to do this, left click on the point to be moved, then left click on the new desired location. Once a point is moved, the “Save Changes to Warox” button becomes enabled; be sure to click this button after every change.

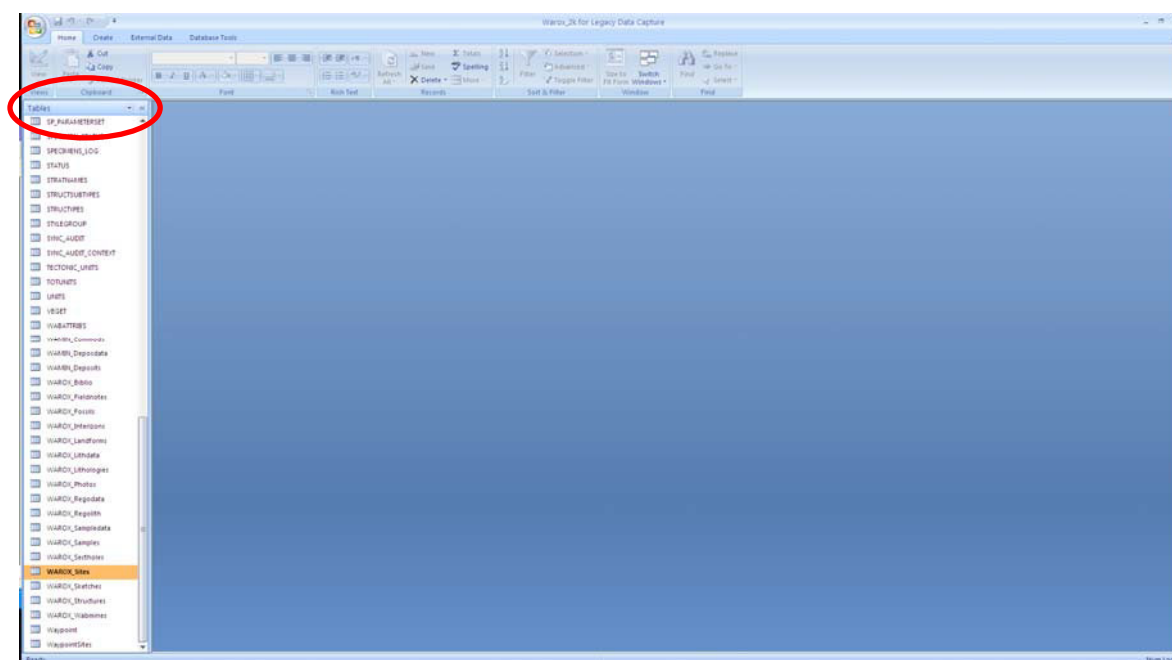
Assigning observation dates to captured points

Once all the points for a project have been captured, the observation date needs to be entered into the Warox_2k.mdb file for each point. In order to do this, the field notebook is usually required. If the exact date for the observation is not recorded, but the year can be obtained from the notebook, aerial photograph, or published map, then a nominal date (preferably 01/07/yyyy) may be entered.

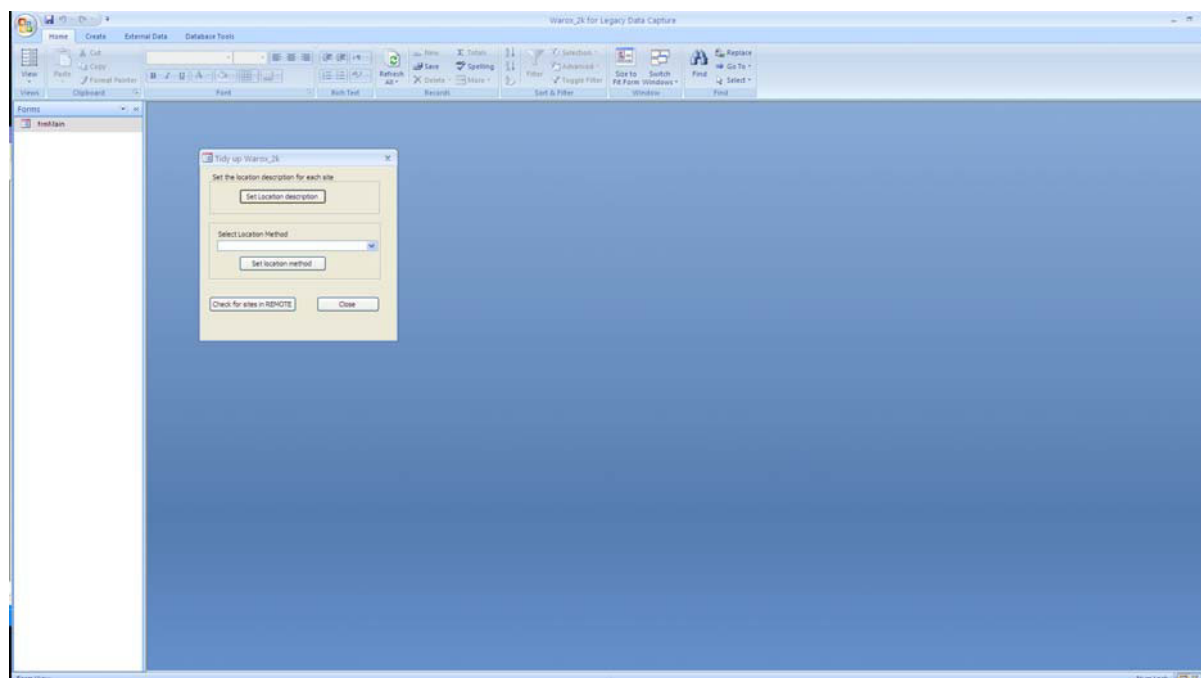
To enter these observation dates, open the relevant Warox_2k.mdb file, and then double click on the “WAROX_Sites” table to open it. In the “OBSDATE” column, enter the date for each observation in the format ‘dd/mm/yyyy’.

Setting the location description and location method

To enter the location description and location method, double click on the Warox_2k.mdb file in the project folder. The following screen will appear:

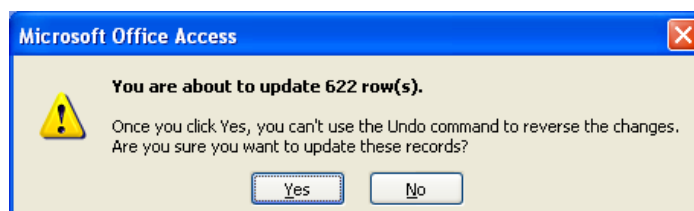


From the drop-down menu at top left, change “Tables” to “Forms” (circled above). Double click on “frmMain”. The following screen will appear:



In this dialog box, select “Set Location description” and enter the relevant information (which is listed on the aerial photographs) into each field, clicking “OK” after each.

Next, using the drop-down menu under “Select Location Method”, choose the type of imagery used to capture the points in ArcMap; then click on “Set location method” button. When the following screen appears, select “Yes”:



Finally, select the “check for sites in REMOTE” button; this checks whether any of the new sites already exist in WAROX. If some of these sites already exist, see the section, ‘Possible point capture complications’, below.

Re-assigning samples from old sites to newly captured sites

All rock specimens allocated a GSWA number (equivalent to the “SAMPLEID” in WAROX) before routine entry of data into the WAROX database, are linked to a field site location with an accuracy of no better than ± 100 –200 m. The site locations for older GSWA sample numbers, migrated into WAROX from the defunct ROCKMIN database, were mainly estimated from small-scale topographic maps, many of uncertain accuracy. When the real site locations for these samples have been captured in ArcMap, the sample numbers need to be linked to these new sites. This is done by the Specialist, Database Geologist using a script that takes a list of GSWA sample numbers and their matching new Site IDs, transfers all the existing data to the new Site IDs, and deletes the old Site IDs. The resulting data can then be edited during the data entry process.

Sample IDs for any given project are located by doing a sample query using the SmartQuery application. See the relevant Project Manager to obtain a copy of this application; the Project Manager will also explain how the query tool works. The sample query should be saved into: V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy Arc project data\MapSheetName.

To help the Specialist, Database Geologist re-assign Sample IDs to new Site IDs, use the sample ticket books (and field notebooks, if necessary) to construct an Excel spreadsheet with “Sample IDs” in one column and the corresponding new “Site IDs” in a second column. If a sample cannot be attached to a new Site ID, then enter ‘?’ into the relevant cell.

Upload of data points into the Oracle version of WAROX

Once the capture of points, including observation dates, is complete for a project, and Sample IDs have been reassigned to new Site IDs in an Excel spreadsheet, these data need to be uploaded into the Oracle version of WAROX by the Specialist, Database Geologist. To do this, send the Specialist, Database Geologist a link to the *ProjectName.mdb* file on the network. Include in this email a link to the spreadsheet containing the Sample IDs and new Site IDs.

It is also *necessary to save* the WAROX_gdb.mdb file from C:\Program Files\Department of Mines and Petroleum\DMP ArcGIS Warox Tools into V:\GS53_Tetrapak\Projects\Legacy_Data_Capture\Legacy Arc project data\MapSheetName as a back-up in case an editing session is accidentally closed without points being uploaded. These points can then be retrieved from the file and uploaded into WAROX, without having to be recaptured.

Updating the data capture progress

Once the Warox_2k.mdb file has been finalized and all possible samples reassigned to new Site IDs in the Excel spreadsheet, the Specialist, Database Geologist will update the Excel spreadsheet [V:\GS53_Tetrapak\Admin\Legacy_stuff\Legacy point capture progress.xls](#) and the ArcMap project [V:\GS53_Tetrapak\Admin\Legacy_stuff\Legacy points & Notes progress WA.mxd](#). Both the spreadsheet and project will then show the current status of legacy data

capture, with entries classified as to whether sites have been uploaded into WAROX or are awaiting checks prior to upload.

Sending a summary of marked photos to the library

The library catalogue for Mineral House (OLIB) contains records relating to aerial photographs, including details on which runs and photos are held by the library, which photos are missing, what year the photographs were flown, and if the photos are available to borrow. What the catalogue does *not* contain are details of whether a set of photos were used during regional mapping or not, and if they were, who generated the field sites. Thus, it is commonly unclear which set of photographs are of greatest interest for any given map sheet. In order to reduce the number of unnecessary photo requests, a template has been devised that lists a summary of the originators and marked photos, and which can be sent to the library when an ArcMap project has been completed. This will then be entered by Library staff into the “notes” field in OLIB.

The template in question can be located using the following link: [V:\GS53 Tetrapak\Projects\Legacy Data Capture\Legacy Documentation\template AirPhotos Fieldsites.doc](#). Open this document, select “Save As”, and save a copy with a name like ‘*AirphotosNameyyyy_forOLIB*’ into the ArcMap project folder just completed. In the template, the “Sheet name etc.” should include the name, year, and type of photography (for example, ‘CAF’ or ‘WA’). Then enter the surnames of the geologists who created field sites on the photo set, and numbers of the marked photos arranged by run. There is no need to list missing or unmarked photos (except where a whole run is unmarked), nor mention all marked photos individually. For example, rather than recording ‘Run 1: 5024, 5026, 5028, 5030, 5032, 5034, 5040’, the more concise ‘Run 1: 5024–5034, 5040’ can be used.

When the template is complete, attach the file to an email, and send it to the Reference Librarian, who will upload the new details into OLIB.

Possible point capture complications

This section attempts to offer solutions to some of the most common problems encountered during field site capture. As it cannot cover all eventualities, the best solution is to approach the responsible Project Manager or Terrane Custodian if in doubt — this may save you considerable time and effort in the long run!

Duplicate field site numbers

There are two main sources of duplicate field site numbers: accidental duplication, typically on different photographs; and the practice of systematically repeating point labelling (1, 2, 3, etc.) on each marked photograph. For the latter case, see the section ‘Documentation of aerial photographs and Site IDs’ on page 2, or the Specialist, Database Geologist for help.

Different locations for the same field site number

Many traverses in the field cover more than one photograph, and it was common practice when moving from one photograph to the next to mark a point near the edge on both photographs. However, on occasion, the points were inadvertently marked in somewhat different locations. No general guide can be given as to which point is correctly located; the best approach is to speak with the responsible Project Manager, who may be able to identify the correctly located point from information in the field notebooks, or by some other means.

More rarely, field site numbers from the same originator may have been marked in different locations on different sets of photographs. If this occurs systematically, then the value of the subsequent observations and data are compromised, and the sites probably should not be captured. Again, speak with the responsible Project Manager for a solution.

Field site numbers with no originator

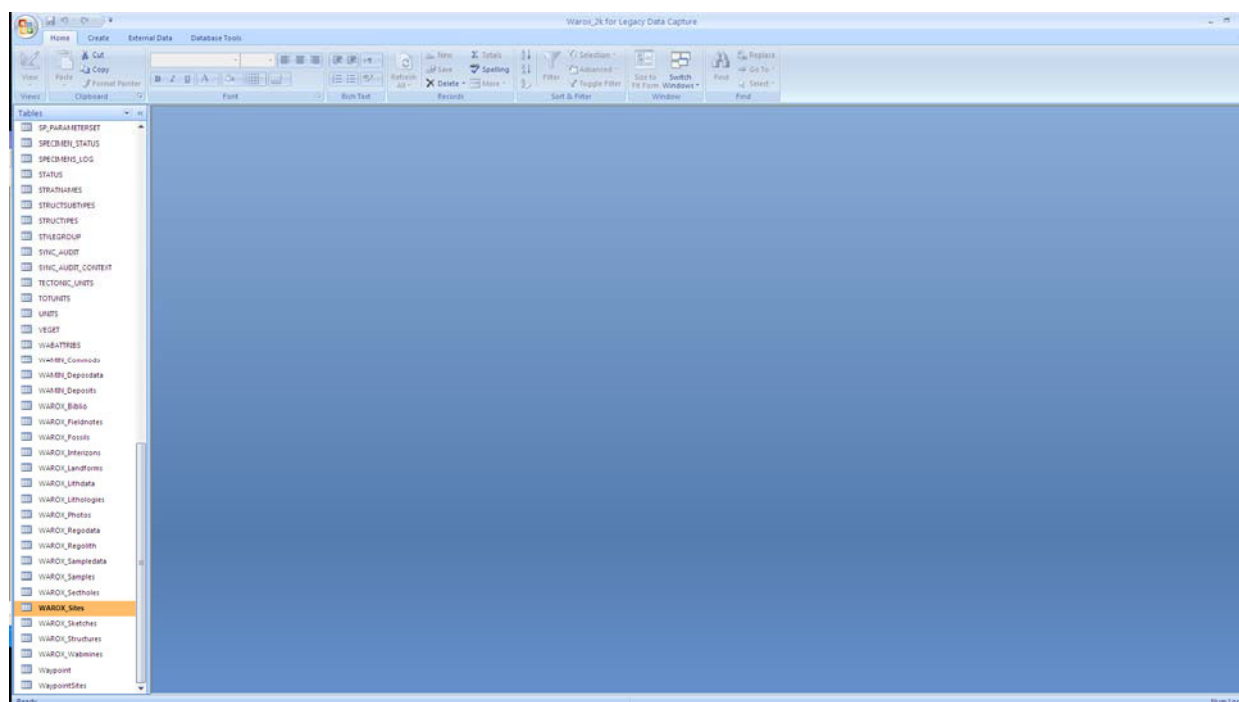
If the originator cannot be identified, there is no way of relating any observations or data to the location, and the points should not be entered. However, the points should still be noted in the Marked_Photos.xls spreadsheet for future reference.

Field sites marked with a number and letter(s)

In some instances, geologists have marked points with combinations of numbers and letter(s): for example, 4133A, 4133B. As the Warox Tool in ArcMap conforms to the data entry constraints of the WAROX database, letters cannot be part of the numeric component of the Site ID or the points will not load into the Warox_2k.mdb file.

As an example, Site IDs marked on an aerial photograph as “500”, “500A”, and “500B” for originator “ABC” on the “XYZ” 1:100 000 sheet could be entered into ArcMap as “ABCXYZ000500”, “ABCXYZ100500”, and “ABCXYZ200500”, respectively. The Warox_2k.mdb file (in V:\GS53_Tetrapak\Projects\Legacy_Data_Capture*MapSheetName*) must be then opened, and the Site IDs “ABCXYZ100500” and “ABCXYZ200500” changed to “ABCXYZ00500A” and “ABCXYZ00500B”. It is important to keep a list of the original and new Site IDs of any sites to be changed on a notepad or spreadsheet.

To edit a Site ID, double click on the relevant Warox 2k.mdb file:



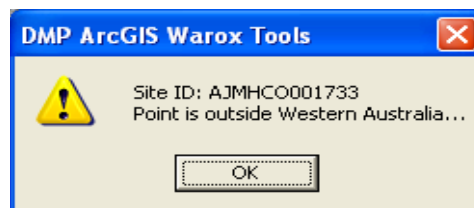
And then double click on the “WAROX_Sites” table to bring up the table of Site IDs.

SITEID	SITEID	ORIGIN	OBSOLETE	OBSERVE	STATEID	COUNTRYID	EASTING	NORTHING	LOC METH	ACCURACY	HMAPNO	QMAPID	LOCDESC
1842	AGSKIM000001	308	01/07/1962	WA	AUS	431227	810806	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1843	AGSKIM000002	308	01/07/1962	WA	AUS	431228	810804	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1844	AGSKIM000003	308	01/07/1962	WA	AUS	431869	810813	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1845	AGSKIM000004	308	01/07/1962	WA	AUS	428976	810841	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1846	AGSKIM000005	308	01/07/1962	WA	AUS	420969	810613	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1847	AGSKIM000006	308	01/07/1962	WA	AUS	493844	809879	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1848	AGSKIM000007	308	01/07/1962	WA	AUS	496416	809178	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1849	AGSKIM000008	308	01/07/1962	WA	AUS	455880	809268	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1850	AGSKIM000009	308	01/07/1962	WA	AUS	455870	809269	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1851	AGSKIM000010	308	01/07/1962	WA	AUS	497236	809178	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1852	AGSKIM000011	308	01/07/1962	WA	AUS	456437	809168	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1853	AGSKIM000012	308	01/07/1962	WA	AUS	496518	809178	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1854	AGSKIM000013	308	01/07/1962	WA	AUS	496204	809169	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1855	AGSKIM000014	308	01/07/1962	WA	AUS	496113	8092100	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1856	AGSKIM000015	308	01/07/1962	WA	AUS	497459	8091128	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1857	AGSKIM000016	308	01/07/1962	WA	AUS	497761	8090742	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1858	AGSKIM000017	308	01/07/1962	WA	AUS	497752	8090205	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1859	AGSKIM000018	308	01/07/1962	WA	AUS	497914	8090289	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1860	AGSKIM000019	308	01/07/1962	WA	AUS	496184	8091783	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1861	AGSKIM000020	308	01/07/1962	WA	AUS	495421	8091551	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1862	AGSKIM000021	308	01/07/1962	WA	AUS	493557	8089909	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1863	AGSKIM000022	308	01/07/1962	WA	AUS	491832	8094710	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1864	AGSKIM000023	308	01/07/1962	WA	AUS	492136	8094826	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1865	AGSKIM000024	308	01/07/1962	WA	AUS	492409	8095679	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1866	AGSKIM000025	308	01/07/1962	WA	AUS	491618	8094542	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1867	AGSKIM000026	308	01/07/1962	WA	AUS	445574	8092439	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1868	AGSKIM000027	308	01/07/1962	WA	AUS	446099	8092935	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1869	AGSKIM000028	308	01/07/1962	WA	AUS	442192	8087482	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1870	AGSKIM000029	308	01/07/1962	WA	AUS	415092	8088846	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1871	AGSKIM000030	308	01/07/1962	WA	AUS	413765	8089376	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1872	AGSKIM000031	308	01/07/1962	WA	AUS	414421	8087186	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1873	AGSKIM000032	308	01/07/1962	WA	AUS	399722	8088139	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1874	AGSKIM000033	308	01/07/1962	WA	AUS	399436	8087724	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1875	AGSKIM000034	308	01/07/1962	WA	AUS	403482	8094211	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1876	AGSKIM000035	308	01/07/1962	WA	AUS	399508	8088406	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1877	AGSKIM000036	308	01/07/1962	WA	AUS	398652	8088760	28	25	4563 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1878	AGSKIM000037	308	01/07/1962	WA	AUS	316931	8091812	28	25	4363 SE52-05			Legacy data captured from 1948 1:50,000 B&W airphotos
1879	AGSKIM000038	308	01/07/1962	WA	AUS	316660	8092416	28	25	4363 SE52-05			Legacy data captured from 1948 1:50,000 B&W airphotos
1880	AGSKIM000039	308	01/07/1962	WA	AUS	470594	8077294	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos
1881	AGSKIM000040	308	01/07/1962	WA	AUS	470594	8077294	28	25	4663 SE52-06			Legacy data captured from 1948 1:50,000 B&W airphotos

The Site IDs of interest can now be located and edited. When the editing is complete, click on “Save”, and then close the file.

Field sites outside of Western Australia

The WAROX ArcMap tool will only accept field sites with coordinates within Western Australia. If a field site plots outside of Western Australia, the following message will appear when the editing session is closed:



In this case, the field site in question will still appear in ArcMap, but will not load into the database file. The coordinates for these field sites will need to be loaded manually into the project’s Warox_2k.mdb file; to do this, see the relevant Project Manager.

Deleting field sites

If a field site needs to be deleted for any reason, make a note of the site number. After the editing session has been closed, and the points uploaded to Warox_2k.mdb, this database can be accessed as described in the section above (‘Field sites marked with a number and letter(s)’), and the point deleted from the “WAROX_Sites” table.

Entry of field observations into WAROX

Introduction

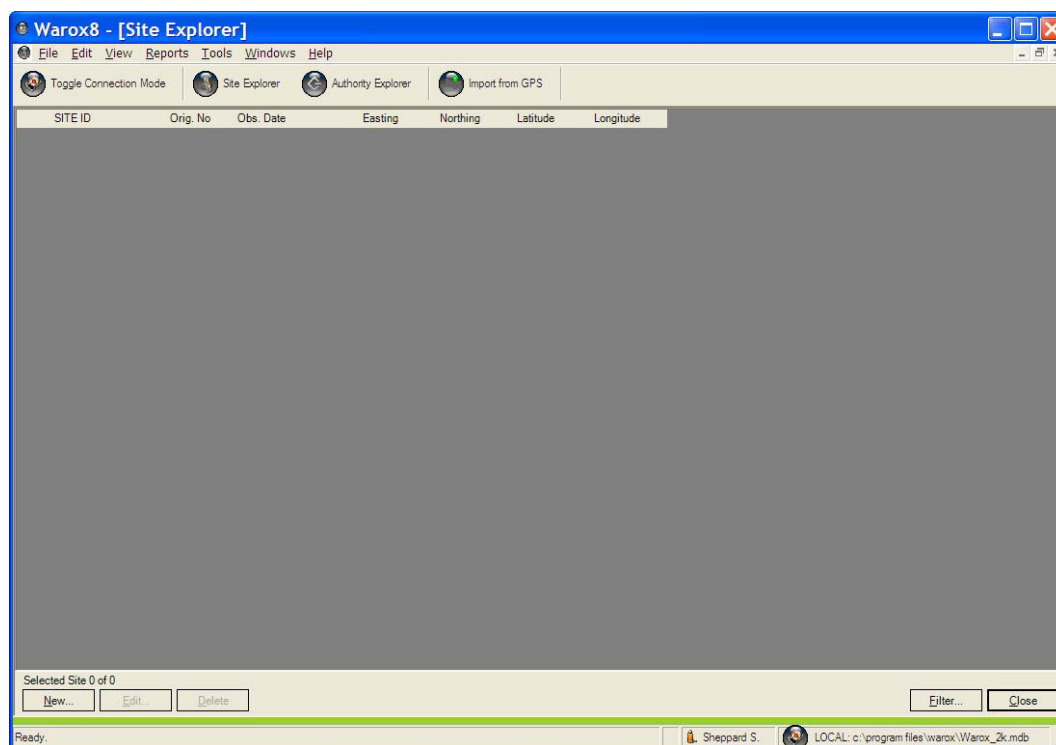
The data entry component of the legacy data capture process involves extracting field notes, lithologies, and structures from the field notebooks; obtaining details of the sample type and purpose from the sample ticket books (if entered); and the addition of any associated petrographic descriptions.

The following is intended as a general guide only, as it is not possible to cover all possible problems or ambiguities in converting field observations, which may contain invalid or antiquated terminology, incomplete descriptions, ambiguous structural measurements, or obscure abbreviations, into the standardized terms or names controlled by drop-down lists in WAROX. If in doubt, approach the relevant Project Manager or Terrane Custodian for guidance.

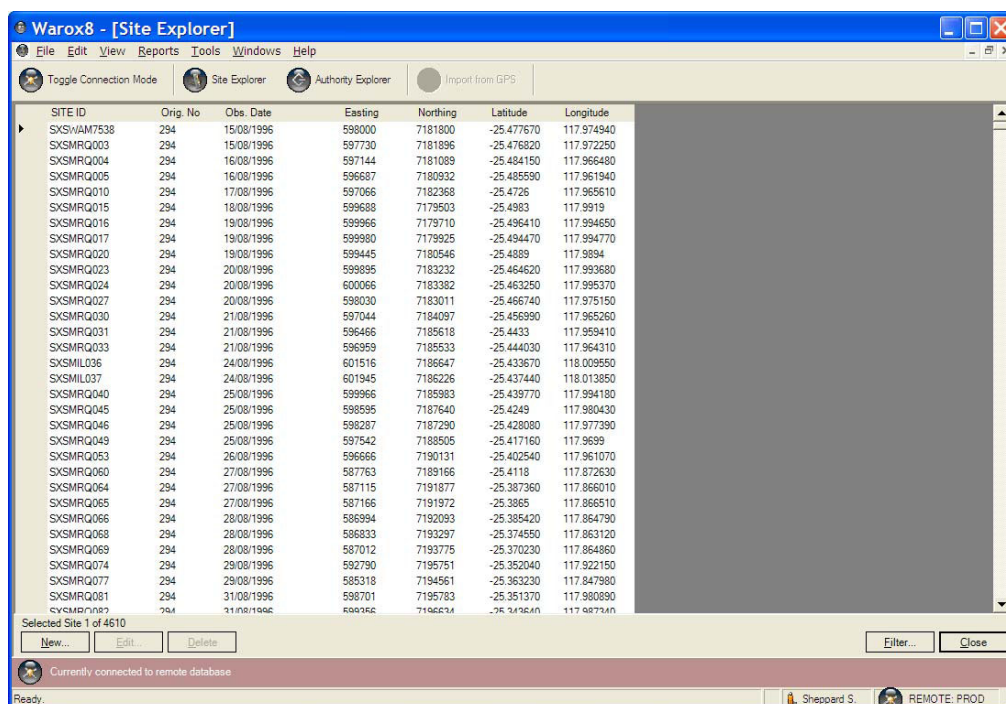
Site ID duplication is one possible source of complication when entering field notes for a geologist who has numbered their points from 1 to 'X' on each photograph. To avoid duplication in WAROX, each of the repeated point numbers will have been assigned a new Site ID in the "Duplicate Site IDs" tab of the *MapSheetYr_Marked & Missing_photos.xls* spreadsheet. This spreadsheet will need to be consulted in order to 'translate' the original Site ID in the field notebook to the corresponding new Site ID in WAROX; see 'Documentation of aerial photographs and Site IDs' in the first part of this document.

Field notes, lithologies, and structures

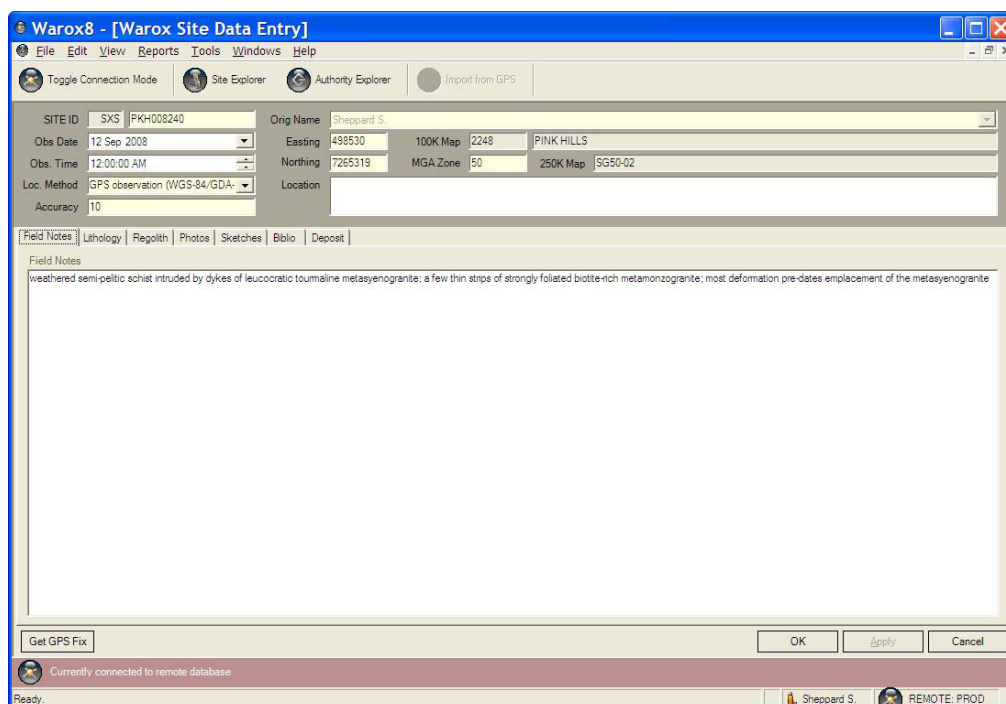
There are two modes of WAROX operation: one that writes data to a Warox_2k.mdb file on the C:\ drive, and a second that writes data to the Oracle version on the network. In order to be able to enter data into the Oracle version, the local Warox_2k.mdb file must be empty. If it is empty, then the following screen will appear after the "Warox8" icon on the desktop is double clicked:



The green bar along the bottom of the window indicates that the database is in local mode. To connect to the Oracle version, click on the “Toggle Connection Mode” button at the top of your screen, and enter your Username and Password. If successful, a similar screen with a list of Site IDs from the default originator will appear, but with a red bar along the bottom of the screen and the text “Currently connected to remote database”:



The rows of data can be arranged in ascending or descending order for any of the fields on screen by clicking on the relevant field header. In addition, the list of sites can be filtered according to different search criteria by clicking on the “Filter” button (bottom of screen). Once the Site ID of interest has been located in WAROX, double click on the record to start entering data from the field notebook. The following screen will appear:

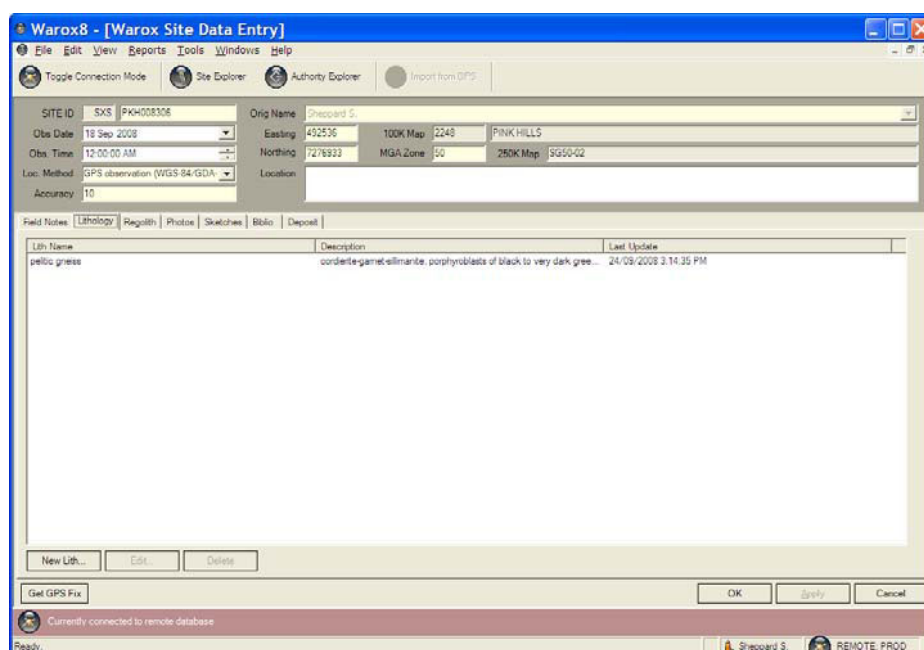


Currently, WAROX does not automatically record the operator who entered the field observations, only the originator who made the observations. As such, the person doing the data entry should put a statement, such as ‘Entered by...’, into the “Location” field.

The main tabs of interest on the main screen are “Field Notes” and “Lithology”. Most legacy sites will not contain associated photographs; for those that do, consult the relevant Project Manager or Terrane Custodian. The “Field Notes” tab should contain overall impressions of the area, range and distribution of rock types, and relationships between rock types. It should not contain detailed descriptions of the individual rock types — this information should be placed in the “Lithology” tab. All words and phrases should be typed out in full; avoid retyping acronyms or abbreviations used in the field notebooks.

Although the “Field Notes” field contains free text, and invalid or superseded terms (such as adamellite) can be inadvertently entered, the “Lithology” field is controlled by drop-down lists restricted to IUGS terms (such as monzogranite).

Lithologies are mandatory if structural measurements and sample information are to be entered, as these ‘hang off’ a lithology in WAROX. To enter a new lithology, click on the “Lithology” tab, and then the “New Lith...” button near the bottom left of screen:



Permissible lithologies are controlled by two drop-down lists, “Rock Type” and “Lith. Name”. A lithology can either be selected directly from the list in “Lith. Name”, in which case the “Rock Type” is automatically completed; or a “Rock Type” can be selected first, which then filters the list of related lithologies in the “Lith. Name” menu. It is possible to enter the same broad rock type in a number of ways, depending on how much information can be gleaned from the entry in the notebook. For example, a schist containing mainly quartz and mica could be entered with a “Lith. Name” of “schist”, “micaceous schist” or “quartz–mica schist” (“Rock Type” = “metamorphic protolith unknown”), “felsic schist derived from volcanic rock” (“Rock Type” = “meta-igneous felsic volcanic”), “granitic schist” (“Rock Type” = “meta-igneous felsic intrusive”), or “pelitic schist”, “semi-pelitic schist” or “siliciclastic schist” (“Rock Type” = “metasedimentary siliciclastic”) depending on the context and completeness of the observation in the field notebook. A “Rock Type” of “metamorphic protolith unknown” conveys much less information than the alternatives, and is probably best not used if there is an observation or inference that points to a more specific “Rock Type”.

Observations relating to features such as texture and grain size, can be entered into the free-text “Description” field, as shown in the example below.

However, observations relating to the lithology can also be placed into searchable drop-down lists using the “New Data” button near the bottom left of screen. The advantage to this approach is that attributes such as metamorphic assemblages or key minerals can be searched and extracted from WAROX, and then placed into ArcMap for the construction of, for example, metamorphic index maps. This is particularly useful when petrographic descriptions have been made, and the identification of fine-grained or metamorphic minerals is more certain.

The “New Data” button remains greyed out until the “Apply” button, located near the bottom right of screen, is selected. The “Apply” button must also be clicked before the “Samples”, “Petrography”, and “Structures” tabs become active.

To enter a new structure, select the “Structures” tab, and then select the “New Struct...” button near the bottom left corner of the screen:

The following window is displayed:

The structure can then be entered, either by selecting an option first from the “Type” drop-down list and then from the “Description” list, or by using the complete drop-down list in “Description”, in which case “Type” will be completed automatically. Depending on the type of structure, the “Planar features” or “Linear features” areas will be greyed out to prevent the accidental population of the “Linear features” field for planar structures, or information on lineations being entered in the “Planar features” field. Note that when features such as “Bedding; vertical” or “Cleavage; vertical” are entered, a value of ‘90’ *must* be entered into the “Dip” field.

The “LocalDef” and “RegDef” fields on the right-hand side of the window are controlled by drop-down lists. The “LocalDef” field, which records the type and generation of local deformations and structures (e.g. F1, L1, S1), can be completed from the notebooks, but the “RegDef” field, which assigns a deformation to an orogenic event, should be left blank as a rule. It is best to uncheck the “Plot100K” box, although the “Plot250K” box can be left in its default setting.

Sample numbers

To enter or edit sample details for a particular site, select the “Lithology” tab, click on a “Lith. Name”, and click on the “Edit” button from near the bottom left corner of the screen.

On the next screen, click on the “Samples” tab, highlight the “GSWA No.”, and again click the “Edit” button near the bottom left corner of the screen:

This will bring up the following window:

The GSWA sample number is displayed at the top of the box and should be checked for correctness. If the reasons for sampling are known, then one or more options can be selected from the drop-down list next to “Sampled for”; the “Sample Type”, “Sampling Method”, and “Sample Condition” can also be entered in this screen.

Petrographic descriptions

Most of the older GSWA sample numbers for which there are thin sections also have petrographic descriptions. Report numbers can be linked to a GSWA sample number using SmartQuery (again, see the relevant Project Manager for help with this application); the relevant reports, which have been scanned as PDFs, can then be selected from <V:\ProductArchive\PUBLICATIONS\Petrology Reports>. Text from the reports can be copied and pasted into WAROX as follows.

Under the “Lithology” tab, highlight the lithology for which you wish to enter the petrographic description, and click the “Edit” button:

Warox8 - [Warox Site Data Entry]

File Edit View Reports Tools Windows Help

Toggle Connection Mode Site Explorer Authority Explorer Import from GPS

SITE ID: SXS PKH008306 Orig Name: Sheppard S.

Obs Date: 18 Sep 2008 Easting: 492536 100K Map: 2248 PINK HILLS

Obs. Time: 12:00:00 AM Northing: 7276933 MGA Zone: 50 250K Map: SG50-02

Loc. Method: GPS observation (WGS-84/GDA) Location:

Accuracy: 10

Field Notes | Lithology | Regolith | Photos | Sketches | Biblio | Deposit

Lith Name	Description	Last Update
pelitic gneiss	cordierite-garnet-sillimanite; porphyroblasts of black to very dark green	24/03/2008 3:14:35 PM

New Lith... Edit... Delete

Get GPS Fix OK Apply Cancel

Currently connected to remote database

Ready. Sheppard S. REMOTE: PROD

Select the “Petrography” tab, and click on the “New Report” button:

Warox8 - [Lithology Data Entry]

File Edit View Reports Tools Windows Help

Toggle Connection Mode Site Explorer Authority Explorer Import from GPS

Site No: 510068 Site ID: SXSPKH008306 Easting: 492536

Orig Name: Sheppard S. Obs Date: 18/09/2008 Northing: 7276933

Rock Type: Metasedimentary siliclastic Strat. Name:

Lith. Name: pelitic gneiss or Age:

Description: cordierite-garnet-sillimanite; porphyroblasts of black to very dark green hercynitic spinel

Lithology Data | Samples | Petrography | Structures

Sample ID	Suffix	Report No.	Material Type
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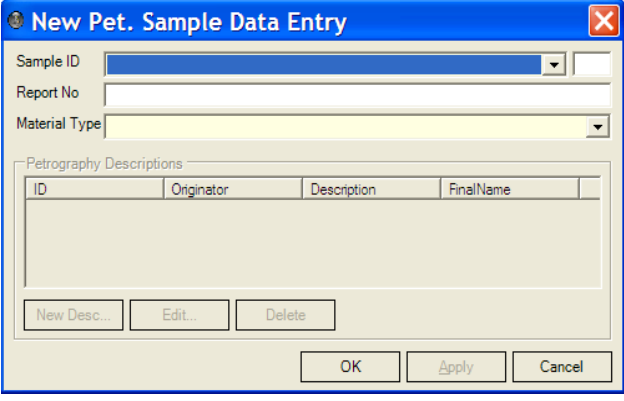
New Report... Edit... Delete

OK Apply Cancel

Currently connected to remote database

Ready. Sheppard S. REMOTE: PROD

Select the correct “Sample ID” from the drop-down list, enter the “Report No.”, and select the “Material Type” from the drop-down list.



New Pet. Sample Data Entry

Sample ID

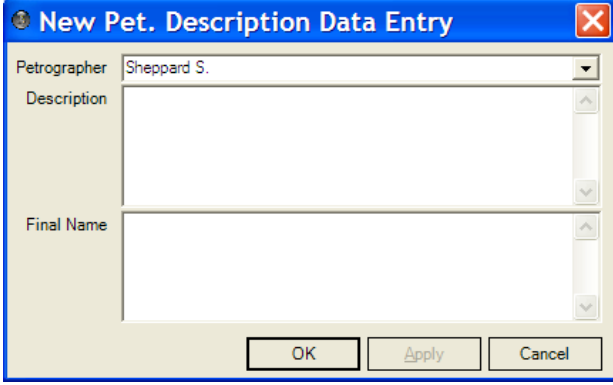
Report No

Material Type

Petrography Descriptions

ID	Originator	Description	FinalName

Click on “Apply” to enable the selection of the “New Desc...” button. In the window that subsequently appears, select the “Petrographer” from the drop-down list, paste the thin section description into the “Description” field, and enter the final rock name into the “Final Name” field.



New Pet. Description Data Entry

Petrographer

Description

Final Name

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